Automation and control

# Automation and relay functions

Catalogue
December
03

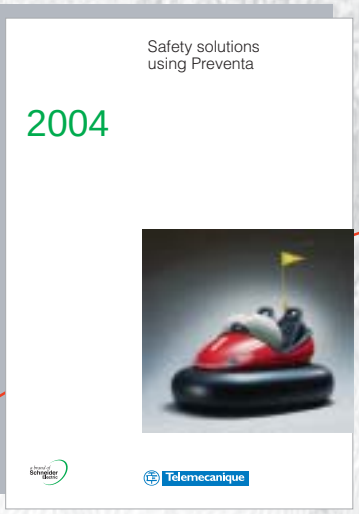
a brand of Schneider Electric

Telemecanique

Art. 61231 - DIA6ED2030901EN


**Data-processing,**
**Communication**

Art. 67341 - MKTED203111EN




**Control and Protection,**
**Detection,**
**Data-processing,**
**Man-Machine dialogue**

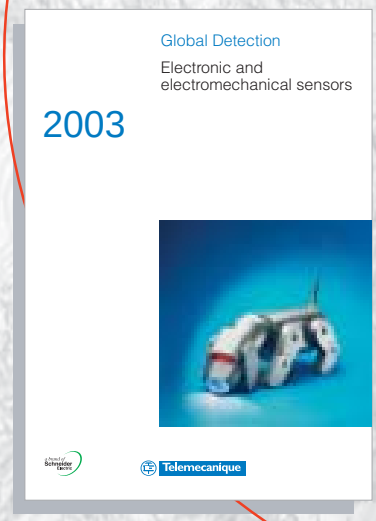
Art. 55053 - MKTED203041EN


**Control and Protection,**
**Detection,**
**Data-processing,**
**Man-Machine dialogue,**
**Communication**

*The*
*Essential guide*

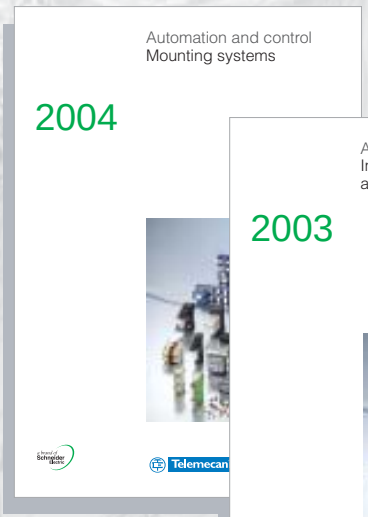
To be issued: 1st quarter 2004

Art. 54752 - MKTED203031EN

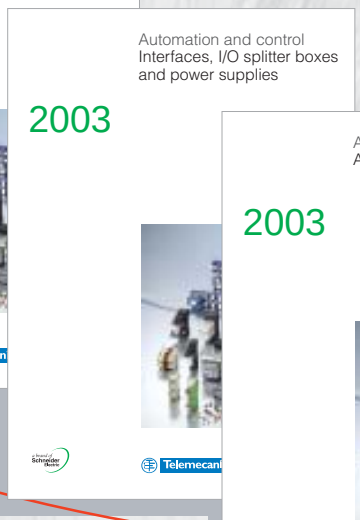



**Detection**

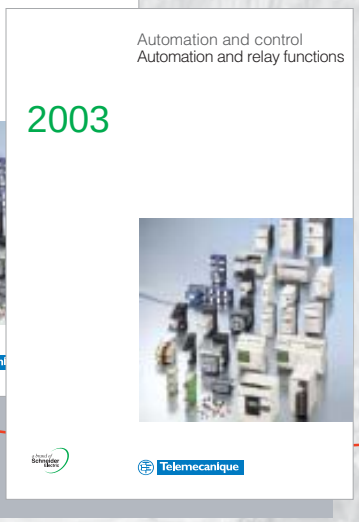
To be issued




Art. 70263 - MKTED203113EN




Art. 70455 - MKTED204011EN




**Panel-building and cabling accessories**

AUTC201108140EN

Transparent factory
The future of automation

2003

Schneider Electric

AUTC201104124EN

Momentum
automation platform

2002

Schneider Electric

AUTC201384126EN

Quantum
automation platform

2003

Schneider Electric

AUTC201496125EN

Premium
automation platform

2003

Schneider Electric

AUTC101272123EN

Nano
programmable controllers
and
Micro
automation platform

2001

Schneider Electric

**Data-processing,**
**Man-Machine dialogue,**
**Communication,**
**Supervision**

## An overview of the product range

- **Safety solutions using Preventa,**
- **Global Detection,**
- **AS-Interface,**
- **Control and connection components,**
- **Motor starter solutions (Control and protection components),**
- **Soft starters and variable speed drives**

AUTC20176206EN

Twin Line
Motion control

2003

AUTCD21124207EN

Lexium
Motion control

2002

Art. 46753 - MKTED203011EN

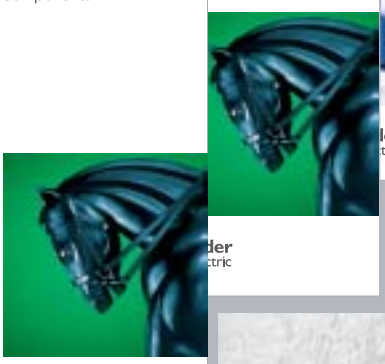
Soft starters and
variable speed drives

2003

Art. 27501 - MKTED201001EN

Motor starter solutions
Control and protection
components

2001



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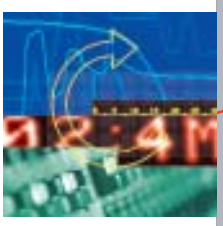
**Control and protection**

Art. 28697 - MKTED299014EN

Telemecanique

Components for
Human-Machine interfaces

2001



Merlin Gerin
Modicon
Square D
Telemecanique

Schneider Electric

**Man-Machine dialogue**

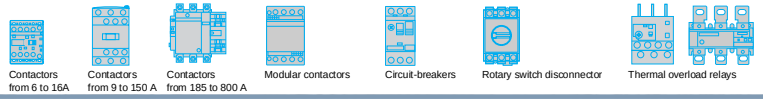
# Automation solutions

## An overview of the product range

**Products listed in this catalogue**

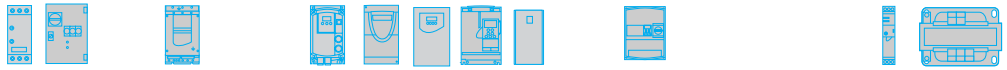
Product listed in other catalogues (see previous pages)

### Control and protection



Contactors from 6 to 16A
Contactors from 9 to 150 A
Contactors from 185 to 800 A
Modular contactors
Circuit-breakers
Rotary switch disconnector
Thermal overload relays
**Measurement and control relays**
Motor starters open version
Contactor and reversing contactor breakers
Direct on-line starters, enclosed version
Star-delta starters, enclosed version

### Control and protection



Soft starters open and enclosed version
Soft start-soft stop units for asynchronous motors
Variable speed drives for asynchronous motors
Ready-assembled variable speed drives
Power supplies and transformers

### Detection

Photo-electric detectors
Inductive, capacitive, magnet and ultrasonic proximity sensors
Limit switches
Limit switches for safety applications
Electromechanical pressure and vacuum switches
Electronic pressure and vacuum switches
Connectors
Encoders
Inductive identification system

### Data processing

**Twido programmable controllers**
Nano programmable controllers
Micro automation platform
Premium automation platform
Quantum automation platform
Momentum automation platform
TBX distributed I/O
Advantys STB distributed I/O
IP 67 splitter boxes
Telefast® 2 pre-wired system
Interfaces
**Control relays**
**Electronic timing relays**
**Zelio Logic smart relays**
Preventa safety modules

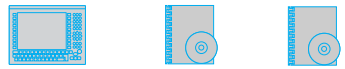
### Human-Machine dialogue

Control and signalling units
Cam switches
Control stations
Pendant control stations
Operator dialogue terminals
Industrial control stations
Integrated Human-Machine interfaces
Illuminated beacons and indicator banks
**Totalising timers and counters**
Foot switches
Emergency stop stations
Emergency stop trip wire switches

### Communication

Communication architecture: Ethernet network, Modbus Plus network, Fipway network, AS-i bus, Fipio bus, CANopen bus, Uni-Telway bus, Modbus bus, INTERBUS, Profibus DP, asynchronous serial links

### Supervision



Magelis IPC industrial PC
Vijeo Look software
Monitor Pro software

### Panel building and cabling accessories

Wall-mounted enclosures
Floor-standing enclosures
Uprights, mounting plates, mounting rail, cable ducting and cable clips
Prefabricated busbar systems and power distribution systems
Tego Dial
Tego Power
Profil front panel
Terminal blocks
Cable ends
Marking accessories
Tools

### Power distribution

Prefadis service poles and posts, lighting poles
Canalis busbar trunking for lighting distribution
Canalis busbar trunking for low and medium power distribution
Canalis busbar trunking for high power distribution
Mobile distribution: Canalis track section and cable carriers

### Services

**Product reference index**
**Technical information**
**Schneider Electric worldwide**

# Automation and control
# **Automation and relay functions**

Contents

# 1 - Twido programmable controller

# Twido programmable controller
## Compact and modular base controllers

1

| | | | | |
|---|---|---|---|---|
| **Applications** | | Compact base controllers | | |
| | |  |  |  |
| **Discrete I/O** | Basic | 10 | 16 | 24 |
| | Number of inputs | 6 sink/source ⎓ 24 V inputs *(1)* | 9 sink/source ⎓ 24 V inputs *(1)* | 14 sink/source ⎓ 24 V inputs *(1)* |
| | Number of outputs | 4 relay outputs | 7 relay outputs | 10 relay outputs |
| | Type of connection | Non-removable screw terminal block | | |
| **I/O expansion** | Number of expansion modules | | | 4 discrete, analogue and |
| | Discrete I/O modules | | | 8, 16 or 32 ⎓ 24 V inputs; |
| | Analogue I/O modules | | | 2 x 12 bit inputs; 1 x 12 bit output |
| | AS-Interface *(3)* | | | Management of slave modules: |
| **Maximum number of I/O per configuration** (base controller with I/O expansion module) | | 10 | 16 | 88 with screw terminal I/O expansion modules *(4)*<br>152 with HE 10 connector I/O expansion module |
| **Integrated counting and positioning** | 5 kHz counting | 3 x 16 bit counting channels (0...65535 points):<br>- dedicated ⎓ 24 V discrete inputs of the base controller<br>- up/down counting with preset | | |
| | 20 kHz counting | 1 x 16 bit counting channel (0...65535 points):<br>- dedicated ⎓ 24 V discrete inputs for incremental encoder or proximity sensors<br>- up/down counting, up counter, down counter and frequency meter | | |
| | 7 kHz positioning | | | |
| **Functions** | PID | | | For all controller versions ≥ 2.0 |
| | Event processing | | | For all controller versions ≥ 2.0 |
| **Communication** | | 1 RS 485 serial port (mini-DIN connector) | 1 RS 485 serial port (mini-DIN connector)<br>1 optional serial port: RS 232C (mini-DIN connector) or RS 485 (mini-DIN connector or screw terminals) | |
| **Supply voltage** | | ∿ 100...240 V supply (⎓ 24 V discrete sensors powered by the base controller) | | |
| **Programming** | Application memory | 700 instructions | 2000 instructions | 3000 instructions |
| | Internal bits | 128 bits | 128 bits | 256 bits |
| | Internal words *(5)* | 3000 | | |
| | Standard function blocks *(5)* | 64 timers, 128 counters | | 128 timers, |
| | Double words | | Yes | |
| | Floating, Trigonometrical | | | |
| | Real-time clock | Optional TWD XCP RTC real time clock cartridge, using 16 real-time clock blocks | | |
| | Languages | Reversible languages: Ladder language and Instruction List language (with Grafcet instructions) | | |
| | Software | TwidoSoft running under Windows 98 SE, Windows 2000 and Windows XP | | |
| **Twido base controller models** | | **TWD LCAA 10DRF** | **TWD LCAA 16DRF** | **TWD LCAA 24DRF** |
| **Page** | | 1/8 | | |

*(1) Sink input: positive logic. Source input: negative logic.*
*(2) Within the consumption limit controlled by TwidoSoft software.*
*(3) The AS-Interface M3 profile supports analogue profile 7.3 (7 slaves), but not analogue profile S-7.4.*

## Modular base controllers

| | | |
|---|---|---|
| 20 | | 40 |
| 12 sink/source ⎓ 24 V inputs *(1)* | | 24 sink/source ⎓ 24 V inputs *(1)* |
| 8 sink or source transistor outputs (depending on model) | 6 relay outputs and 2 transistor source outputs | 16 sink or source transistor outputs (depending on model) |
| HE 10 connector | Removable screw terminal block | HE 10 connector |
| AS-Interface I/O modules *(2)* | 7 discrete, analogue and AS-Interface I/O modules *(2)* | |
| 8, 16 or 32 ⎓ 24 V or relay outputs; 4 ⎓ 24 V inputs/4 relay outputs or 16 ⎓ 24 V inputs/8 relay outputs, connection by screw or spring terminals and by HE 10 connector | | |
| or 2 inputs/1 x 12 bit output, connection by screw terminals | | |
| discrete (max. 62 modules), analogue (max. 7 modules). For all controller versions ≥ 2.0 | | |
| 84 with screw terminal I/O expansion module<br>148 with HE 10 connector I/O expansion module | 132 with screw terminal I/O expansion module<br>244 with HE 10 connector I/O expansion module | 152 with screw terminal I/O expansion module<br>264 with HE 10 connector I/O expansion module |
| 2 x 16 bit channels (0...65535 points):<br>- dedicated discrete inputs of the base controller<br>- up/down counting with preset | | |
| 2 x 16 bit channels (0...65535 points):<br>- dedicated ⎓ 24 V discrete inputs for incremental encoders or proximity sensors<br>- up/down counting, up counter, down counter, frequency meter | | |
| 2 channels: PWM function (pulse width modulation output) and PLS function (pulse generator output) | | |
| For all controller versions ≥ 2.0 | | |
| For all controller versions ≥ 2.0 | | |
| | | |
| ⎓ 24 V power supply | | |
| | 3000 instructions, 6000 with memory extension cartridge TWD XCP MFK64 | |
| | | |
| | | |
| 128 counters | | |
| | | |
| | Yes | |
| | | |
| | | |
| | | |
| **TWD LMDA 20D●K** *(6)* | **TWD LMDA 20DRT** | **TWD LMDA 40D●K** *(6)* |

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*(4) With maximum of 42 relay outputs (on base controller and I/O expansions).*
*(5) The maximum values of the internal words and function blocks cannot be cumulated.*
*(6) Replace the ● in the reference with* **T**: *source transistor outputs,* **U:** *sink transistor outputs*

# Twido programmable controller
## Compact base controllers

1

*TWD LCAA 10DRF*

*TWD LCAA 16DRF*

*TWD LCAA 24DRF*

## Presentation

The Twido range of compact programmable controllers offers an "all-in-one" solution in a compact overall size (80/95 x 90 x 70 mm).Three base controllers are available, differing in their processing capacity and their number of ⎓ 24 V inputs and relay outputs (10, 16 and 24 I/O). All these compact base controllers use an a.c. power supply between 100 and 240 V and provide a ⎓ 24 V supply to the sensors.

This type of compact base controller offers the following advantages:

■ A significant number of I/O (up to 24 I/O) in a small overall size, so reducing the size of consoles or panels for applications where space is an important factor.

■ A variety of expansion options and product options offer the user a degree of flexibility which is generally only available with larger automation platforms. The TWD LCAA 24DRF 24 I/O compact base controller can take up to 4 discrete I/O expansion modules (corresponding to a 64 I/O configuration), optional modules such as a digital display**,** memory cartridge and real-time clock cartridge, as well as an additional RS 485 or RS 232C communication port.

■ The compact controller solution also allows great wiring flexibility. For expansion modules (with base controller TWD LCAA 24DRF) several types of connection are offered, such as removable screw terminal blocks, and spring type connections which allow simple, fast and safe wiring. The TwidoFast system provides a pre-wired cabling solution, allowing connection of modules with HE 10 connectors to:
□ pre-formed cables with free wires at one end for direct connection to sensors/ preactuators,
□ TwidoFast kits (connection cables plus Telefast sub-base).

■ The display and plug-in memory options allow easy adjustment, transfer and backup of applications:
□ the digital display can be used as a local display and adjustment tool,
□ the EEPROM technology in the memory modules allows backup and transfer of programs to any Twido compact or modular controller.

■ TwidoSoft software allows easy programming using instruction list language instructions or ladder language graphic objects. It uses the same objects and sets of instructions as those used by PL7-07 software for Nano programmable controllers. TwidoSoft software allows existing Nano PLC applications to be reused with Twido controllers by importing an ASCII file.

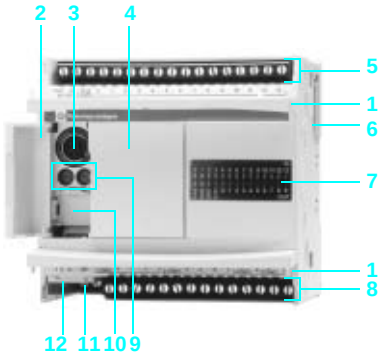
■ Compact controllers have 2 analogue adjustment points (only one for 10 I/O controllers) accessible on the front panel. These adjustable values are stored in system words and are updated at every scan.

| Compact base controller | ⎓ 24V inputs | Relay outputs | Analogue adjustment | Serial ports | I/O expansion | Display module | Optional cartridge |
|---|---|---|---|---|---|---|---|
| **TWD LCAA 10DRF** | 6 | 4 | 1 point<br>0…1023 | 1 x RS 485 | No | Yes | 1 slot:<br>real-time clock<br>or memory |
| **TWD LCAA 16DRF** | 9 | 7 | 1 point<br>0…1023 | 1 x RS 485,<br>+ option of<br>1 x RS 232C/485 | No | Yes | 1 slot:<br>real-time clock<br>or memory |
| **TWD LCAA 24DRF** | 14 | 10 | 1 point<br>0…1023<br>1 point<br>0…511 | 1 x RS 485,<br>+ option of<br>1 x RS 232C/485 | Yes, 4 max<br>*(1)* | Yes | 1 slot:<br>real-time clock<br>or memory |

*(1) I.e.: a maximum of 88 I/O with screw terminal expansion modules, with a maximum of 32 relay outputs in I/O expansion modules.*
*Maximum of 152 I/O with HE 10 connector expansion modules.*

# Twido programmable controller
## Compact base controllers






## Description

Twido TWD LCAA ●● DRF compact programmable base controllers comprise:

1 Two hinged connection terminal block covers for access to the terminals.

2 A hinged access door.

3 A mini-DIN type RS 485 serial port connector (allowing connection of the programming terminal).

4 A slot (protected by a removable cover) for digital diagnostic/maintenance display module TWD XCP ODC.

5 A screw terminal block for ⎓ 24 V supply to the sensors and for connection of the input sensors.

6 A connector for I/O expansion modules TWD D●●, TWD A●● and TWD NOI 10M3 (maximum of 4 on 24 I/O models).

7 A display block showing:
- the status of the controller (PWR, RUN, ERR and STAT),
- the inputs and outputs (IN● and OUT●).

8 A screw terminal block for connection of the output preactuators.

9 Two analogue adjustment points (one point for 10 and 16 I/O models).

10 An extension connector for the addition of a 2nd RS 232C/RS 485 serial port using adapter TWD NAC ●●● (for 16 and 24 I/O models).

11 A screw terminal block for connection of the ∿ 100...240 V mains power supply

12 A connector for the TWD XCP MFK32 memory cartridge or TWD XCP RTC real-time clock cartridge (access through the bottom of the controller).

Compact base controllers can be mounted on a symmetrical DIN rail, mounting plate or panel (2 x 4.3 Ø holes).

# Twido programmable controller
Compact base controllers

1

## Characteristics of compact base controllers

| | | | | | |
|---|---|---|---|---|---|
| **Temperature** | Operation | **°C** | 0…+ 55 | | |
| | Storage | **°C** | - 25…+ 70 | | |
| **Relative humidity** | | | 30 to 95 %, without condensation | | |
| **Degree of protection** | | | IP 20 | | |
| **Altitude** | Operation | **m** | 0…2000 | | |
| | Storage | **m** | 0…3000 | | |
| **Vibration resistance** | Mounted on ⊓ rail | **Hz** | 10…57, amplitude 0.075 mm, acceleration 57…150 Hz | | |
| | | **m/s²** | 9.8 (1 gn) | | |
| | Plate or panel mounted (using fixing kit TWD XMT5) | **Hz** | 2…25, amplitude 1.6 mm, acceleration 25…100 Hz | | |
| | | **m/s²** | 39.2 (4 gn) | | |
| **Shock resistance** | | **m/s²** | 147 (15 gn) for 11 ms | | |
| **Backup battery** | Data backed up | | Internal RAM: internal variables, internal bits and words, timers, counters, shift registers... | | |
| | Autonomy | **days** | Approximately 30 at 25 °C with fully charged battery | | |
| | Battery type | | Lithium battery, not interchangeable | | |
| | Charging time | **h** | Approximately 15 to charge from 0…90% of the full charge | | |
| | Life | **years** | 10 | | |
| **Base controller type** | | | **TWD LCAA 10DRF** | **TWD LCAA 16DRF** | **TWD LCAA 24DRF** |
| **Number of ⎓ 24 V inputs** | | | 6 | 9 | 14 |
| **Number and type of outputs** | | | 4 relay | 7 relay | 10 relay |
| **Connection of I/O** | | | Non-removable screw terminal block | | |
| **I/O expansion modules** | Max. no. of modules | | – | | 4 |
| | Max. no. of I/O | | – | | 88/152 *(1)* |
| | AS-Interface | | – | Management of slave modules: 62 (discrete), 7 (analogue) | |
| **Application memory capacity** | | | 700 instructions | 2000 instructions | 3000 instructions |
| **Cycle time** | Processing time | **ms** | 1 for 1000 logic instructions | | |
| | System overhead | **ms** | 0.5 | | |
| **Data memory** | Internal bits | | 128 | | 256 |
| | Internal words *(2)* | | 3000 | | |
| | Timers *(2)* | | 64 | | 128 |
| | Counters *(2)* | | 128 | | |
| | Double words | | – | Yes | |
| **Power supply** | Rated voltage | **V** | ∿ 100…240 | | |
| | Voltage range | **V** | ∿ 85…264 | | |
| | Maximum inrush current | **A** | 35 | | 40 |
| | ⎓ 24 V sensor supply | **mA** | 250 | | |
| **Maximum power required** | ∿ 100 V | **VA** | 20 | 22 | 33 (base with 4 I/O expansion modules) |
| | ∿ 264 V | **VA** | 30 | 31 | 40 (base with 4 I/O expansion modules) |

### Communication

| | | | | |
|---|---|---|---|---|
| **Function** | | | **Built-in serial link** | **Optional serial interface adapter** *(3)* |
| **Port type** | | | RS 485 | RS 232C, with adapter TWD NAC 232D<br>RS 485, with adapter TWD NAC 485● |
| **Maximum data rate** | | **K bits/s** | 38.4 | |
| **Isolation between internal circuit and serial port** | | | Not isolated | |
| **Programming terminal connection** | | | Half-duplex terminal port | No |
| **Communication protocols** | | | Modbus Master/Slave RTU<br>ASCII character mode | |
| **Remote Link I/O** | | | Yes, see page 1/37 | |

### Integrated functions

| | | | |
|---|---|---|---|
| **Counter** | Number of points | | 4 |
| | Frequency | | 3 channels at 5 kHz (function FCi), 1 channel at 20 kHz (function VFCi) |
| | Capacity | | 16 bits (0...65535 points) |
| **PID** | 24 I/O base controllers | | For controller versions ≥ 2.0 |
| **Event processing** | | | For controller versions ≥ 2.0 |
| **Analogue adjustment points** | 10/16/24 I/O base controllers | | 1 point adjustable from 0…1023 points |
| | 24 I/O base controllers | | 1 point adjustable from 0…511 points |

*(1) The first value corresponds to the maximum number of I/O (base controller and expansion module) with screw or spring terminal expansion modules, the second value is for HE 10 connector expansion modules.*
*(2) The maximum values cannot be cumulated.*
*(3) With 16 I/O base controller TWD LCAA 16DRF and 24 I/O base controller TWD LCAA 24DRF.*

## ⎓ input characteristics

| Base controller type | | | | TWD LCAA 10DRF | TWD LCAA 16DRF | TWD LCAA 24DRF |
|---|---|---|---|---|---|---|
| **Number of input channels** | | | | 6 | 9 | 14 |
| **Rated input voltage** | | | V | ⎓ 24 sink/source (positive or negative logic) | | |
| **Commons** | | | | 1 | | |
| **Input voltage range** | | | V | ⎓ 20.4...28.8 | | |
| **Rated input current** | | | **mA** | 11 mA for I0.0 and I0.1,<br>7 mA for other inputs I0.i | | |
| **Input impedance** | | | **kΩ** | 2.1 kΩ for I0.0 and I0.1,<br>3.4 kΩ for other inputs I0.i | | |
| **Filter time** | At state 1 | | **µs** | 35 µs programmed filter time for I0.0…I0.5,<br>40 µs or programmed filter time for other inputs I0.i | | |
| | At state 0 | | **µs** | 45 µs programmed filter time for I0.0…I0.5,<br>150 µs or programmed filter time for other inputs I0.i | | |
| **Isolation** | | | | No isolation between points, isolation with internal logic by photocouplers | | |

## Relay output characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| **Number of output channels** | | | | 4 | 7 | 10 |
| **Output currents** | | | **A** | 2 per channel,<br>8 per common | | |
| **Commons** | Common 0 | | | 3 N/O contacts | 4 N/O contacts | 4 N/O contacts |
| | Common 1 | | | 1 N/O contact | 2 N/O contacts | 4 N/O contacts |
| | Common 2 | | | – | 1 N/O contact | 1 N/O contact |
| | Common 3 | | | – | | 1 N/O contact |
| **Minimum switching load** | | | **mA** | 0.1/0.1 ⎓ V (reference value) | | |
| **Contact resistance** (when new) | | | **mΩ** | 30 max | | |
| **Loads** (resistive, inductive) | | | **A** | 2A/∿ 240 V or 2A/⎓ 30 V (with 1800 operations/hour max):<br>- electrical life: minimum 100 000 operations,<br>- mechanical life: minimum 20 x $10^6$ operations. | | |
| **rms insulation voltage** | | | **V** | ∿1 500 for 1 minute | | |
| **Consumption for all the outputs** | At state 1 | ⎓ 5 V | **mA** | 24 | 30 | 36 |
| | | ⎓ 24 V | **mA** | 26 | 40 | 55 |
| | At state 0 | ⎓ 5 V | **mA** | 5 | 5 | 5 |

## Real-time clock cartridge (optional) *(1)*

| | | |
|---|---|---|
| **Precision** | **s/month** | ± 30 at 25 °C |
| **Autonomy** | **days** | Approximately 30 at 25 °C with fully charged battery |
| **Battery type** | | Lithium battery, not interchangeable |
| **Charging time** | **h** | Approximately 10 to charge from 0...90 % of the full charge |
| **Life** | **years** | 10 |

## Memory cartridge (optional) *(1)*

| | | |
|---|---|---|
| **Memory type** | | EEPROM |
| **Memory capacity** | **Kb** | 32 |
| **Save/transfer program and internal words** | | Yes |
| **Program size increase** | | No |

*(1) Compact base controllers have only one cartridge slot, therefore only one type of cartridge can be used.*

# Twido programmable controller
## Compact base controllers

1

*TWD LCAA 10DRF/16DRF/24DRF*

## References

### Compact base controllers

| Number of I/O | Inputs sink/source | Outputs | Program memory | Reference | Weight kg |
|---|---|---|---|---|---|
| **10 I/O** | 6 ⎓ 24 V inputs | 4 relay outputs | 700 instructions | **TWD LCAA 10DRF** | 0.230 |
| **16 I/O** | 9 ⎓ 24 V inputs | 7 relay outputs | 2000 instructions | **TWD LCAA 16DRF** | 0.250 |
| **24 I/O** | 14 ⎓ 24 V inputs | 10 relay outputs | 3000 instructions | **TWD LCAA 24DRF** | 0.305 |

*TWD XCP MFK32/RTC*

*TWD NAC ●●●●*

*TWD XCP ODC*

### Separate components *(1)*

| Description | Application | Type | Reference | Weight kg |
|---|---|---|---|---|
| **32 Kb memory cartridge** | Application backup<br>Program transfer | EEPROM | **TWD XCP MFK32** | 0.005 |
| **Real-time clock cartridge** | Date-stamping RTC based programming | – | **TWD XCP RTC** | 0.005 |
| **Serial interface adapter** | See page 1/35 | – | **TWD NAC ●●●●** | – |
| **Digital display** | Data display and modification | – | **TWD XCP ODC** | 0.020 |
| **Input simulators** | 6 inputs | – | **TWD XSM 6** | – |
| | 9 inputs | – | **TWD XSM 9** | – |
| | 14 inputs | – | **TWD XSM 14** | – |

| Description | Application | Reference | Weight kg |
|---|---|---|---|
| **Fixing kit**<br>(Sold in packs of 5) | For fitting compact base controllers or extensions on a mounting plate | **TWD XMT5** | – |

### Magelis compact displays

| Description | Protocol | Compatible with PLC types | Supply voltage | Reference | Weight kg |
|---|---|---|---|---|---|
| **Compact display, 2 lines of 20 characters**<br>(alphanumeric display) | Uni-Telway, Modbus | Twido, Nano, Micro, Premium | ⎓ 5 V by terminal port on PLC | **XBT N200** | 0.360 |
| **Compact displays, 4 lines of 20 characters**<br>(matrix display) | Uni-Telway, Modbus | Twido, Nano, Micro, Premium | ⎓ 5 V by terminal port on PLC | **XBT N400** | 0.360 |
| | | Twido *(2)* Nano, Micro, Premium, TSX series 7, Momentum, Quantum Other Modbus slave modules | ⎓ 24 V external source | **XBT N401** | 0.360 |

*XBT N401*

### Phaseo regulated power supply

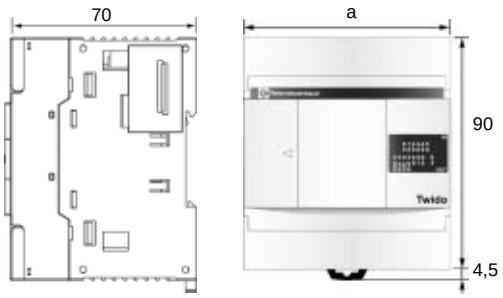
| Description | Mains input voltage 47…63 Hz | Output voltage | Rated power | Rated current | Auto-protect reset | Reference | Weight |
|---|---|---|---|---|---|---|---|
| | V | ⎓ V | W | A | | | kg |
| **Regulated switch mode power supply for AS-Interface bus** *(3)* | ∿ 100…240 single-phase wide range | 30 + 24 | 2 x 72 | 2.4 + 3 | Auto | **ASI ABLM3024** | 1.300 |

*ASI ABLM3024*

*(1) Other separate components, see page pages 1/35 and 1/39.*
*(2) Connection via built-in port or optional serial port on Twido programmable controllers.*
*(3) With earth fault detection.*

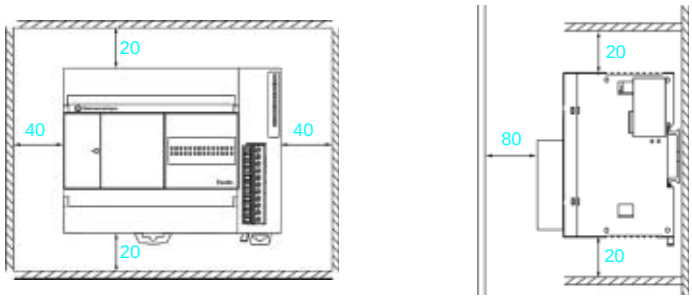
## Dimensions

### TWD LCAA 10DRF/16DRF/24DRF




| | a |
|---|---|
| **TWD LCAA 10 DRF** | 80 |
| **TWD LCAA 16 DRF** | 80 |
| **TWD LCAA 24 DRF** | 95 |

### Installation rules

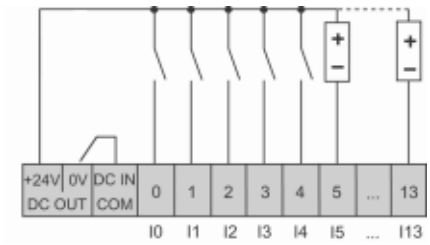



Important:
- Vertical mounting: not permissible for temperatures ⩾ 40° C, “upside down” flat mounting not permissible.
- Avoid placing devices which generate heat (transformers, power supplies, power contactors...) beneath the controller.

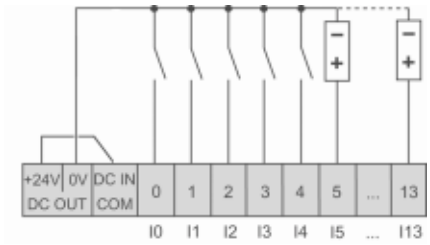
## Connections

### Connection of ⎓ 24 V inputs

#### TWD LCAA 10DRF/16DRF/24DRF



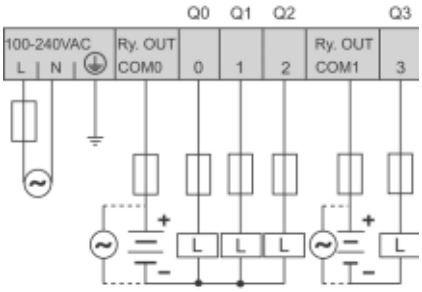

Connection to sink inputs (positive logic) with sensors powered by the base controller.



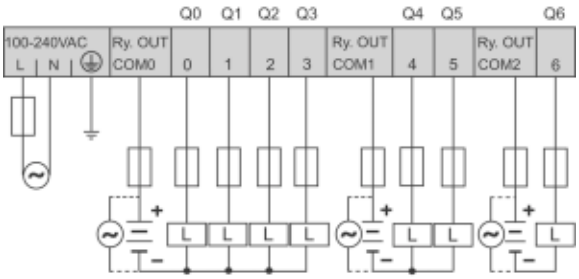

Connection to source inputs (negative logic) with sensors powered by the base controller.

### Connection of ∿ 100…240 V power supplies and relay outputs

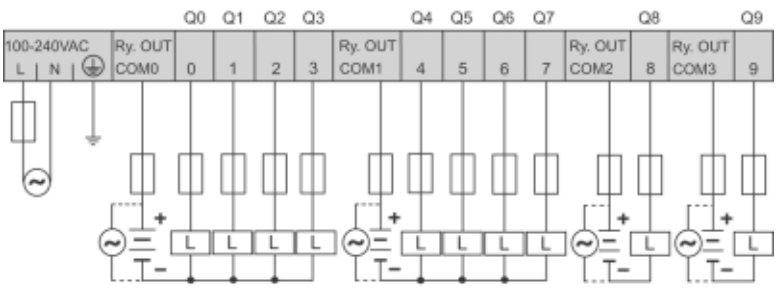
#### TWD LCAA 10DRF




#### TWD LCAA 16DRF




#### TWD LCAA 24DRF



# Twido programmable controller
## Modular base controllers

1

*TWD LMDA 20DTK/20DUK*

*TWD LMDA 20DRT*

*TWD LMDA 40DTK/40DUK*

## Presentation

The modular programmable controller range includes five base controllers, which differ in their processing capacity and their number and type of I/O (20 or 40 I/O with connection by screw terminal block or HE 10 connector, with relay or sink/source transistor outputs). They can be fitted with any of the I/O expansion modules in the range (18 discrete and analogue modules). All these modular base controllers use a ⎓ 24 V power supply.

These modular base controllers offer:

■ Modular design to adapt to the needs of the application by using a base controller which can be fitted with up to 4 or 7 discrete or analogue I/O expansion modules (depending on the model).

■ A variety of options which offer the user a degree of flexibility which is generally only available with larger automation platforms. TWD LMDA modular base controllers can be fitted simultaneously with an optional memory cartridge module, a real-time clock cartridge module and a digital display module or serial interface module; both of the latter two modules allow the addition of a second RS 485 or RS 232C communication port.

■ The modular controller solution also allows great wiring flexibility. Several types of connection are offered, such as removable screw terminal blocks, spring type connections or HE 10 connectors which allow simple, fast and safe wiring. The TwidoFast system provides a pre-wired cabling solution, allowing connection of modules with HE 10 connectors to:
□ pre-formed cables with free wires at one end for direct connection to sensors/ preactuators,
□ TwidoFast kits (connection cables plus Telefast sub-base).

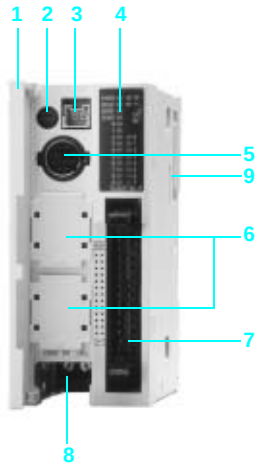
■ TwidoSoft software allows easy programming using instruction list language instructions or ladder language graphic objects. It uses the same objects and sets of instructions as those used by PL7-07 software for Nano programmable controllers. TwidoSoft software allows existing Nano PLC applications to be reused with Twido controllers by importing an ASCII file.

■ Modular base controllers include:
□ 1 analogue voltage input, 0...10 V 9 bits (512 points),
□ 1 analogue adjustment point accessible on the front panel. This point can be set to a value between 0 and 1024. This adjustable value from 0...1023 points is stored in system words and is updated at every scan.

| Modular base controller | ⎓ 24V inputs | Outputs | Type of connection | Serial ports | I/O expansion | Interface module extension | Optional cartridge |
|---|---|---|---|---|---|---|---|
| **TWD LMDA 20DTK** | 12 sink/source | 8 source transistor | HE 10 connector | 1 x RS 485, + option of 1 x RS 232C/485 | 4 modules | 1 module: display or serial link | 2 slots: real-time clock and memory |
| **TWD LMDA 20DUK** | 12 sink/source | 8 sink transistor | HE 10 connector | 1 x RS 485, + option of 1 x RS 232C/485 | 4 modules | 1 module: display or serial link | 2 slots: real-time clock and memory |
| **TWD LMDA 20DRT** | 12 sink/source | 6 relay, 2 source transistor | Removable screw terminal block | 1 x RS 485, + option of 1 x RS 232C/485 | 7 modules | 1 module: display or serial link | 2 slots: real-time clock and memory |
| **TWD LMDA 40DTK** | 24 sink/source | 16 source transistor | HE 10 connectors | 1 x RS 485, + option of 1 x RS 232C/485 | 7 modules | 1 module: display or serial link | 2 slots: real-time clock and memory |
| **TWD LMDA 40DUK** | 24 sink/source | 16 sink transistor | HE 10 connectors | 1 x RS 485, + option of 1 x RS 232C/485 | 7 modules | 1 module: display or serial link | 2 slots: real-time clock and memory |

# Twido programmable controller
## Modular base controllers






## Description

Twido TWD LMDA ●0 D●● base controllers comprise:

On the front panel:

1 A hinged door.

2 An analogue adjustment point.

3 A connector for connection of the built-in analogue input.

4 A display block showing:
- the status of the controller (PWR, RUN, ERR and STAT),
- the status of the inputs and outputs (INi and OUTi).

5 A mini-DIN type RS 485 serial port connector (allowing connection of the programming terminal).

6 Two slots (protected by a removable cover) for memory cartridge TWD XCP MFK●● and real-time clock cartridge TWD XCP RTC.

7 One (or more) HE 10 type connector(s) or screw terminal block for connection of the input sensors/output preactuators.

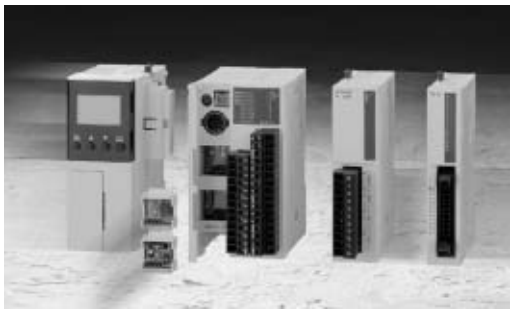
8 Screw terminals for connection of the ⎓ 24 V mains power supply.

On the right-hand side panel:

9 A connector for I/O expansion modules TWD D●●, TWD A●● and TWD NOI 10M3 (4 or 7 depending on model).

On the left-hand side panel:
A connector for display module TWD XCP ODM or serial interface module TWD NOZ ●●●● (not visible).

Modular base controllers are mounted on a symmetrical DIN rail. Fixing kit TWD XMT5 (supplied in lots of 5) allows plate or panel mounting.



### Example of configuration with expansion modules and extension

Shown opposite, an example configuration consisting of a TWD LMDA 20DRT modular base controller with:

■ built-in display module TWD XCP ODM on the left,

■ two I/O expansion modules TWD DDI 8DT and TWD DDO 16K on the right.

The modular base controller is fitted with real-time clock cartridge TWD XCP RTC and memory extension cartridge TWD XCP MFK64.

# Twido programmable controller
Modular base controllers

1

## General characteristics of modular base controllers

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Temperature** | | **°C** | Operation: 0…+ 55; Storage: - 25…+ 70 | | | | |
| **Relative humidity** | | | 30 to 95 %, without condensation | | | | |
| **Degree of protection** | | | IP 20 | | | | |
| **Altitude** | | **m** | Operation: 0…2000; Storage: 0…3000 | | | | |
| **Vibration resistance** | Mounted on ⊓ rail | **Hz** | 10…57, amplitude 0.075 mm, acceleration 57…150 Hz | | | | |
| | | **m/s²** | 9.8 (1 gn) | | | | |
| | Plate or panel mounted (using fixing kit TWD XMT5) | **Hz** | 2…25, amplitude 1.6 mm, acceleration 25…100 Hz | | | | |
| | | **m/s²** | 39.2 (4 gn) | | | | |
| **Shock resistance** | | **m/s²** | 147 (15 gn) for 11 ms | | | | |
| **Backup battery** | Data backed up | | Internal RAM: internal variables, internal bits and words, timers, counters, shift registers... | | | | |
| | Autonomy | **days** | Approximately 30 at 25 °C with fully charged battery | | | | |
| | Battery type | | Lithium battery, not interchangeable | | | | |
| | Charging time | **h** | Approximately 15 to charge from 0…90% of the full charge | | | | |
| | Life | **years** | 10 | | | | |
| **Base controller type** | | **TWD** | **LMDA 20DTK** | **LMDA 20DUK** | **LMDA 20DRT** | **LMDA 40DTK** | **LMDA 40DUK** |
| **Number of ⎓ 24 V inputs** | | | 12 | | | 24 | |
| **Number and type of outputs** *(1)* | | | 8 source transistor | 8 sink transistor | 6 relay, 2 source transistor | 16 source transistor | 16 sink transistor |
| **Connection of I/O** | | | HE 10 connector | | Removable screw terminal block | HE 10 connector | |
| **I/O expansion modules** | Max. no. of modules | | 4 | | 7 | | |
| | Max. no. of I/O | | 84/148 *(2)* | | 132/244 *(2)* | 152/264 *(2)* | |
| | AS-Interface | | Management of slave modules: 62 (discrete), 7 (analogue) | | | | |
| **Application memory capacity** | | | 3000 instructions | | 3000 instructions, 6000 with memory cartridge TWD XCP MFK64 | | |
| **Cycle time** | Processing time | **ms** | 1 for 1000 logic instructions | | | | |
| | System overhead | **µs** | 0.5 | | | | |
| **Data memory** | Internal bits | | 256 | | | | |
| | Internal words *(3)* | | 3000 | | | | |
| | Timers *(3)* | | 128 | | | | |
| | Counters *(3)* | | 128 | | | | |
| | Double words | | Yes | | | | |
| | Floating, Trigonometrical | | – | | Yes | | |
| **Power supply** | Rated voltage | **V** | ⎓ 24 | | | | |
| | Voltage range | **V** | ⎓ 20.4…26.4 including ripple | | | | |
| | Maximum input current | **mA** | 560 at 26.4 V | | 700 at 26.4 V | | |
| | Maximum inrush current | **A** | 50 | | | | |
| | Consumption | **W** | 15 (base with 4 I/O expansion modules) | | 19 (base with 7 I/O expansion modules) | | |

### Communication

| **Function** | **Built-in serial link** | **Optional serial interface module** *(4)* |
|---|---|---|
| **Port type** | RS 485 | RS 232C, with module TWD NOZ 232D<br>RS 485, with module TWD NOZ 485● |
| **Maximum data rate** | **K bits/s** | 38.4 |
| **Isolation between internal circuit and serial port** | | Not isolated |
| **Programming terminal connection** | Half-duplex terminal port | No |
| **Communication protocols** | | Modbus Master/Slave RTU. ASCII character mode |
| **Remote Link I/O** | | Yes, see page 1/35 |

### Integrated functions

| | | | |
|---|---|---|---|
| **Counter** | Number of points | | 4 |
| | Frequency | | 2 channels at 5 kHz (function FCi), 2 channels at 20 kHz (function VFCi) |
| | Capacity | | 16 bits (0...65535 points) |
| **Positioning** | Number of points | | 2 |
| | Frequency | **kHz** | 7 |
| | Functions | | PWM, pulse width modulation output; PLS, pulse generator output |
| **Analogue input** | Number of channels | | 1 channel |
| | Range | | 0...10 V |
| | Resolution | | 9 bits (0...511 points) |
| | Input impedance | **kΩ** | 100 |
| **PID** | | | For controller versions ≥ 2.0 |
| **Event processing** | | | For controller versions ≥ 2.0 |
| **Analogue adjustment points** | | | 1 point adjustable from 0…1023 points |

*(1) Source output: positive logic, sink output: negative logic.*
*(2) The first value corresponds to the maximum number of I/O (base controller and expansion module) with screw or spring terminal expansion modules, the second value is for HE 10 connector expansion modules.*
*(3) The maximum values cannot be cumulated.*
*(4) Or with serial interface adapter TWD NAC ●●●● fitted in built-in display module TWD XCP ODM.*

## ⎓ input characteristics

| Base controller type | | TWD | LMDA 20DTK | LMDA 20DUK | LMDA 20DRT | LMDA 40DTK | LMDA 40DUK |
|---|---|---|---|---|---|---|---|
| **Number of input channels** | | | 12 | | | 24 | |
| **Rated input voltage** | | **V** | ⎓ 24 sink/source (positive or negative logic) | | | | |
| **Commons** | | | 1 | | | 2 | |
| **Input voltage range** | | **V** | ⎓ 20.4...26.4 | | | | |
| **Rated input current** | | **mA** | 5 mA for I0.0 and 10.1, 10.6 and I0.7, 7 mA for other inputs I0.i | | | | |
| **Input impedance** | | **kΩ** | 5.7 kΩ for I0.0 and I0.1, 10.6 and 10.7, 4.7 kΩ for other inputs I0.i | | | | |
| **Filter time** | At state 1 | **µs** | 35 µs for I0.0 and I0.1, I0.6 and I0.7, 40 µs for other inputs I0.i | | | | |
| | At state 0 | **µs** | 45 µs for I0.0 and I0.1, I0.6 and I0.7, 150 µs other inputs I0.i | | | | |
| **Isolation** | | | No isolation between channels, isolation with internal logic by photocouplers | | | | |

## Transistor output characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Number of output channels** | | | 8 | | 2 | 16 | |
| **Output logic** *(1)* | | | Source | Sink | Source | | Sink |
| **Commons** | | | 1 | | | 2 | |
| **Nominal output values** | Voltage | **V** | 24 | | | | |
| | Current | **A** | 0.3 | | | | |
| **Output voltage range** | Voltage | **V** | 20.4…28.8 | | | | |
| | Current per channel | **A** | 0.36 | | | | |
| | Current per common | **A** | 1 | | | | |
| **Response time** | At state 1 | **µs** | 5 µs for Q 0.0 and Q 0.1, 300 µs for other outputs Q 0.i | | | | |
| | At state 0 | **µs** | 5 µs for Q 0.0 and Q 0.1, 300 µs for other outputs Q 0.i | | | | |
| **Residual voltage (voltage at state 1)** | | **V** | 1 max | | | | |
| **Maximum inrush current** | | **A** | 1 | | | | |
| **Leakage current** | | **mA** | 0.1 | | | | |
| **Overvoltage protection** | | **V** | 39 | | | | |
| **Maximum power of filament lamp** | | **W** | 8 | | | | |
| **Isolation** | | | No isolation between channels, isolation with internal logic by photocouplers | | | | |

## Relay output characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| **Number of output channels** | | | – | | 6 | – |
| **Output currents** | | **A** | – | | 2 per channel, 8 per common | – |
| **Commons** | Common 1 | | – | | 3 N/O contacts | – |
| | Common 2 | | – | | 2 N/O contacts | – |
| | Common 3 | | – | | 1 N/O contact | – |
| **Minimum switching load** | | **mA** | – | | 0.1/0.1 ⎓ V (reference value) | – |
| **Contact resistance** (when new) | | **mΩ** | – | | 30 max | – |
| **Loads** (resistive, inductive) | | **A** | – | | 2/∿ 240 V, 2/⎓ 30 V *(2)* | – |
| **rms insulation voltage** | | **V** | – | | ∿1 500 for 1 minute | – |
| **Consumption for all the outputs** | At state 1 ⎓ 5 V | **mA** | – | | 30 | – |
| | ⎓ 24 V | **mA** | – | | 40 | – |
| | At state 0 ⎓ 5 V | **mA** | – | | 5 | – |

## Real-time clock cartridge (optional)

| | | |
|---|---|---|
| **Precision** | **s/month** | ± 30 at 25 °C |
| **Autonomy** | **days** | Approximately 30 at 25 °C with fully charged battery |
| **Battery type** | | Lithium battery, not interchangeable |
| **Charging time** | **h** | Approximately 10 to charge from 0...90 % of the full charge |
| **Life** | **years** | 10 |

## Memory cartridge (optional)

| Cartridge type | | TWD XCP MFK32 | TWD XCP MFK64 |
|---|---|---|---|
| **Memory type** | | EEPROM | |
| **Save/transfer program and internal words** | | Base controllers TWD LMDA 20D●K/20DRT/20D●K | Base controllers TWD LMDA 20DRT/40D●K |
| **Program size increase** | | – | 6000 instructions with base controllers TWD LMDA 20DRT/40D●K |

*(1) Source output: positive logic, sink output: negative logic.*
*(2) 2A/∿ 240 V or 2A/⎓ 30 V (with 1800 operations/hour max):*
*- electrical life: minimum 100 000 operations,*
*- mechanical life: minimum 20 x $10^6$ operations.*

# Twido programmable controller
## Modular base controllers



*TWD LMDA 20DTK/20DUK* *TWD LMDA 40DTK/40DUK*

*TWD LMDA 20DRT*

*TWD XCP MFK ●●*

*XBT N401*

*ABL 7CEM●●●●*

*ASI ABLM3024*

## References

### Modular base controllers, 20 I/O

| Sink/source inputs | Outputs | No. of I/O expansion modules | Program memory | Reference | Weight kg |
|---|---|---|---|---|---|
| **12 ⎓ 24 V** I | 8 O, source transistor | 4 | 3000 instructions | **TWD LMDA 20DTK** *(2)* | 0.140 |
| | 8 O, sink transistor | 4 | 3000 instructions | **TWD LMDA 20DUK** *(2)* | 0.140 |
| | 6 O, relay<br>2 O, source transistor | 7 | 3000 instructions *(1)* | **TWD LMDA 20DRT** | 0.185 |

### Modular base controllers, 40 I/O

| Sink/source inputs | Outputs | No. of I/O expansion modules | Program memory *(1)* | Reference | Weight kg |
|---|---|---|---|---|---|
| **24 ⎓ 24 V** I | 16 O, source transistor | 7 | 3000 instructions *(1)* | **TWD LMDA 40DTK** *(2)* | 0.180 |
| | 16 O, sink transistor | 7 | 3000 instructions *(1)* | **TWD LMDA 40DUK** *(2)* | 0.180 |

### Separate components

| Description | Application | Type | Reference | Weight kg |
|---|---|---|---|---|
| **32 Kb memory cartridge** | Application backup<br>Program transfer | EEPROM | **TWD XCP MFK32** | 0.005 |
| **64 Kb memory cartridge** *(3)* | Memory extension<br>Application backup<br>Program transfer | EEPROM | **TWD XCP MFK64** | 0.005 |
| **Real-time clock cartridge** | Date-stamping, RTC based programming | – | **TWD XCP RTC** | 0.005 |
| **Serial interface module** | See page 1/35 | – | **TWD NOZ ●●●●** | – |
| **Digital display module** | See page 1/35 | – | **TWD XCP ODM** | – |
| **Fixing kit**<br>(Sold in packs of 5) | For fitting modular base controllers or extensions on a mounting plate | – | **TWD XMT5** | – |

### Replacement parts

| | | | | |
|---|---|---|---|---|
| **Screw terminal blocks**<br>(Sold in packs of 2) | Controller TWD LMDA 20DRT, 13 contacts | – | **TWD FTB 2T13** | – |
| | Controller TWD LMDA 20DRT, 16 contacts | – | **TWD FTB 2T16** | – |
| **Analogue input cable** | Length 1 m | – | **TWD XCA 2A10M** | – |

### Magelis compact displays

| Description | Protocol | Compatible with PLC types | Supply voltage | Reference | Weight kg |
|---|---|---|---|---|---|
| **Compact display, 2 lines of 20 characters**<br>(alphanumeric display) | Uni-Telway, Modbus | Twido, Nano, Micro, Premium | ⎓ 5 V by terminal port on PLC | **XBT N200** | 0.360 |
| **Compact displays, 4 lines of 20 characters**<br>(matrix display) | Uni-Telway, Modbus | Twido, Nano, Micro, Premium | ⎓ 5 V by terminal port on PLC | **XBT N400** | 0.360 |
| | | Twido *(4)*, Nano, Micro, Premium, TSX series 7, Momentum, Quantum<br>Other Modbus slave modules | ⎓ 24 V external source | **XBT N401** | 0.360 |

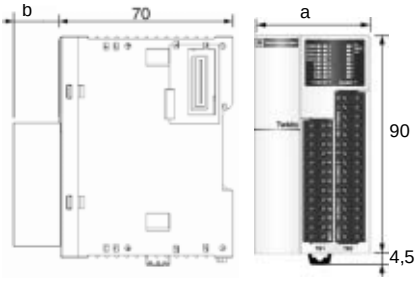
### Phaseo regulated power supplies

| Description | Mains input voltage 47…63 Hz | Output voltage | Rated power | Rated current | Auto-protect reset | Reference | Weight |
|---|---|---|---|---|---|---|---|
| | V | ⎓ V | W | A | | | kg |
| **Single-phase regulated switch mode power supplies** *(5)* | ∿ 100…240 single-phase wide range<br>⎓ 110…220 *(6)* | 24 | 15 | 0.6 | Auto | **ABL 7CEM24006** | 0.180 |
| | | | 30 | 1.2 | Auto | **ABL 7CEM24012** | 0.220 |
| | ∿ 100…240 single-phase wide range | 24 | 48 | 2 | Auto | **ABL 7RE2402** | 0.520 |
| | | | 72 | 3 | Auto | **ABL 7RE2403** | 0.520 |
| | | | 120 | 5 | Auto | **ABL 7RE2405** | 1.000 |
| **Regulated switch mode power supplies for AS-Interface bus***(7)* | ∿ 100…240 single-phase wide range | 30 + 24 | 2 x 72 | 2.4 + 3 | Auto | **ASI ABLM3024** | 1.300 |

*(1) 6000 instructions with memory extension cartridge TWD XCP MFK64*
*(2) Connection by HE 10 connector, see TwidoFast pre-formed cable and Telefast 2 pre-wired system, page 1/39.*
*(3) Memory extension with base controllers TWD LMDA 20DRT/40D●K.*
*(4) Connection via built-in port or via optional serial port on Twido programmable controllers.*
*(5) These products do not conform to standard EN 61000-3-2.*
*(6) Compatible input voltage, not indicated on the product.*
*(7) With earth fault detection.*

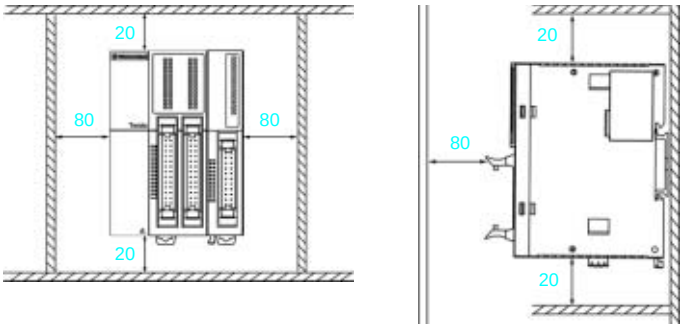
## Dimensions

### TWD LMDA 20D●K/20DRT/40D●K




| | a | b |
|---|---|---|
| **TWD LMDA 20DTK/DUK** | 35.4 | 0 (excluding connector) |
| **TWD LMDA 20DRT** | 47.5 | 14.6 |
| **TWD LMDA 40DTK/DUK** | 47.5 | 0 (excluding connector) |

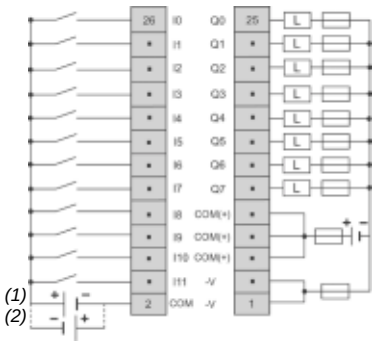
### Installation rules




Important:
- Horizontal or flat mounting not permissible.
- Avoid placing devices which generate heat (transformers, power supplies, power contactors...) beneath the controller.

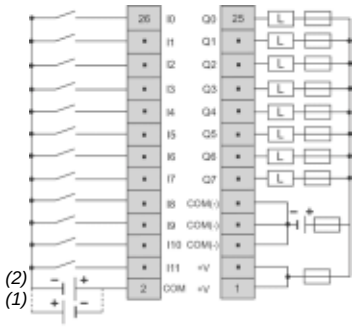
## Connections

### TWD LMDA 20DTK

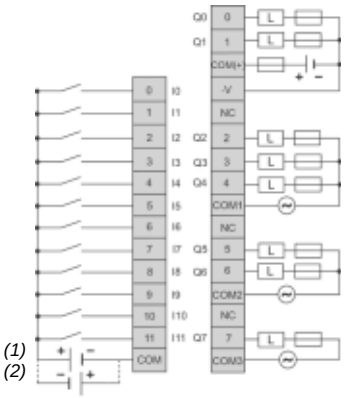



- The COM (+) and COM (-) terminals are interconnected internally.
- The COM and COM (+), COM and COM (-) terminals are independent.
- The -V and +V terminals are interconnected internally.

### TWD LMDA 20DUK

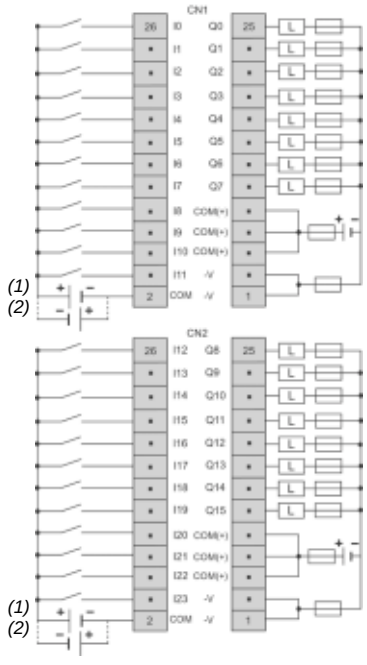



### TWD LMDA 20DRT



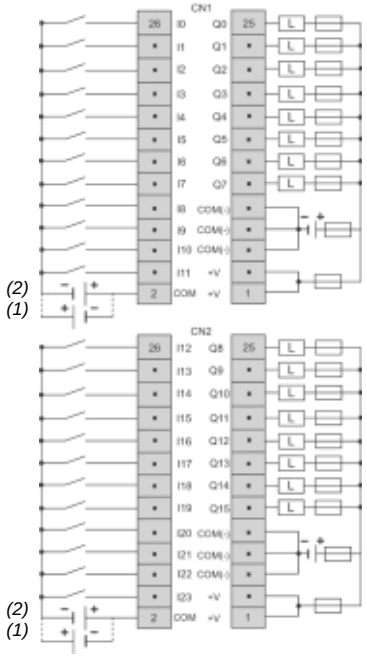

- Output channels 0 and 1 are of the source transistor type.
  Output channels 2 to 7 are of the relay type.
- The COM terminals are independent.

### TWD LMDA 40DTK




- Connectors CN1 and CN2 are independent.
- The COM (+) and COM (-) terminals are interconnected internally.
- The COM and COM (+), COM and COM (-) terminals are independent.
- The -V and +V terminals are interconnected internally.

### TWD LMDA 40DUK




*(1) Supply connection for sink inputs (positive logic).*
*(2) Supply connection for source inputs (negative logic).*

# Twido programmable controller
## Discrete I/O modules

1

| | | | | |
|---|---|---|---|---|
| **Applications** | | Discrete I/O modules | | |
| | |  |  |   |
| **Type** | | 8 ⎓ 24 V inputs | 16 ⎓ 24 V inputs | 32 ⎓ 24 V inputs |
| **Connection** | | Removable screw terminal block | HE 10 connector | |
| **Inputs** | Voltage ranges | ⎓ 20.4...28.8 V | | |
| | Input current | 7 mA per point | 5 mA per point | |
| | Input logic | Sink/source *(1)* | | |
| | Commons | 1 common point | | 2 common points |
| | Response time<br>□ Energisation | 4 ms | | |
| | □ De-energisation | 4 ms | | |
| **Outputs** | Output types | | | |
| | Voltage range | | | |
| | Commons | | | |
| | Output current<br>□ Per output | | | |
| | □ Per group of channels | | | |
| **Isolation** | | Between channels : common point,<br>Between bus and channels : by photocoupler | | |
| **I/O module type** | | **TWD DDI 8DT** | **TWD DDI 16DT** | **TWD DDI 16DK** **TWD DDI 32DK** |
| **Page** | | 1/22 | | |

*(1) Sink input : positive logic, source input : negative logic.*

| Discrete mixed I/O modules | | Master module for AS-Interface bus |
|---|---|---|
|  |  |  |
| 4 ⎓ 24 V inputs/4 relay outputs | 16 ⎓ 24 V inputs/8 relay outputs | ■ For controller versions ≥ 2.0<br>■ Management of slave modules:<br>□ Discrete: maximum of 62 slaves arranged in 2 banks, A/B, of 31 addresses each<br>□ Analogue: maximum of 7 slaves in bank A<br>■ The AS-Interface M3 profile supports analogue profile 7.3 (7 slaves), but does not support analogue profile S-7.4 |
| Removable screw terminal block | Non-removable spring terminal block | |
| ⎓ 20.4...28.8 V | | |
| 7 mA per point | | |
| Sink/source | | |
| 1 common point | | |
| 4 ms | | |
| 4 ms | | |
| 1 N/O contact | | |
| ∿ 240 V, ⎓ 30 V | | |
| 1 common point | 2 common points | |
| 2 A (Ith) | | |
| 7 A (Ith) | | |
| Between input channels : common point, between output channels : common point<br>Between bus and channels : by photocoupler | | |
| **TWD DMM 8DRT** | **TWD DMM 24DRF** | **TWD NOI 10M3** |
| 1/22 | | 1/33 |

# Twido programmable controller
## Discrete I/O modules

1

| | | | | | |
|---|---|---|---|---|---|
| **Applications** | | 8/16 output modules with removable screw terminal block | | | |
| | |  |  |  |  |
| **Type** | | 8 ⎓ 24 V transistor outputs | | 8 relay outputs | 16 relay outputs |
| **Connection** | | Removable screw terminal block | | | |
| **Inputs** | Voltage range | | | | |
| | Input current | | | | |
| | Input logic | | | | |
| | Commons | | | | |
| | Response time<br>□ Energisation | | | | |
| | □ De-energisation | | | | |
| **Outputs** | Output types | Transistor | | Relay with 1 N/O contact | |
| | Voltage range | ⎓ 20.4...28.8 V | | ∿ 240 V, ⎓ 30V | |
| | Logic *(1)* | Sink | Source | – | |
| | Commons | 1 common point | | 2 common points | |
| | Output current<br>□ Per output | 0.3 A nominal | | 2 A max. | |
| | □ Per group of channels | 3 A at 28.8 V | | 7 A max. | 8 A max. |
| **Isolation** | | Between channels: common point<br>Between bus and channels: by photocoupler. | | Between channels: common point.<br>Between bus and channels: ∿ 1500 V for 1 minute. | |
| **Output module type** | | **TWD DDO 8UT** | **TWD DDO 8TT** | **TWD DRA 8RT** | **TWD DRA 16RT** |
| **Page** | | 1/22 | | | |

*(1) Source output : positive logic, sink output : negative logic.*

## 16/32 output modules with HE 10 connectors

| | | | |
|---|---|---|---|
| 16 ⎓ 24 V transistor outputs | 16 ⎓ 24 V transistor outputs | 32 ⎓ 24 V transistor outputs | 32 ⎓ 24 V transistor outputs |
| HE 10 connector | | | |
| Transistor | | | |
| ⎓ 20.4...28.8 V | | | |
| Sink | Source | Sink | Source |
| 1 common point | | 2 common points | |
| 0.1 A nominal | | | |
| 1 A at 28.8 V | | | |
| Between channels: common point.<br>Between bus and channel: by photocoupler. | | | |
| **TWD DDO 16UK** | **TWD DDO 16TK** | **TWD DDO 32UK** | **TWD DDO 32TK** |

1/22

# Twido programmable controller
## Discrete I/O modules



## Presentation

The range of Twido I/O modules includes input modules, output modules and mixed input/output modules. With the 14 I/O modules offered, in addition to the I/O integrated in 24 I/O compact base controllers and modular base controllers, configurations can be adapted to best suit application requirements, so optimising costs. The following discrete I/O modules are available :

■ 4 ⎓ 24 V discrete input modules comprising an 8-channel module, two 16-channel modules and a 32-channel module, equipped with either removable screw terminal blocks or HE 10 type connector, depending on the model. These modules can be either “sink or source”.

■ 8 discrete output modules comprising two output modules with 8 and 16 relay outputs, three output modules with 8, 16 or 32-channel "sink" transistor outputs and three output modules with 8, 16 or 32-channel "source" transistor outputs, equipped with either removable screw terminal blocks or HE 10 type connector, depending on the model.

■ 2 discrete mixed input and output modules, comprising one 4-channel input/ 4-channel relay output module with removable screw terminal block and one 16-channel input/8-channel relay output module with non-removable spring terminal block.

The narrow width of these I/O modules (17.5 mm, 23.5 mm, 29.7 mm or 39.1 mm) makes it possible to build Twido configurations of up to 264 I/O with a minimal overall size of L 255.4 mm x H 90 mm x D 81.3 mm.

All these discrete I/O modules and the analogue I/O modules are connected to the base controller by stacking them on a DIN rail, starting from the right-hand side panel of the base controller, according to the following rules :
□ For the 24 I/O compact base controller TWD LCAA 24DRF: 4 modules max. (see characteristics page 1/6).
□ For 20 I/O modular base controllers TWD LMDA 20D●K: 4 modules max. (see characteristics page 1/13).
□ For 20 and 40 I/O base controllers TWD LMDA 20DRT/40D●K: 7 modules max. (see characteristics page 1/13).

All the discrete I/O modules are electrically isolated with the use of a photocoupler between the internal electronic circuit and the input/output channels.

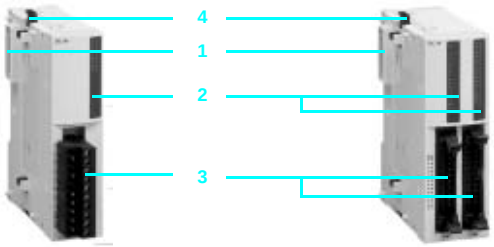
## Description

Twido discrete I/O modules comprise :

1 An extension connector for electrical connection to the previous module *(1)*.
2 One or two blocks for displaying the channels and module diagnostics.
3 One or two connection components of varying type, depending on the model :
□ removable screw terminal block (1 or 2) for modules whose reference ends in **T,**
□ HE 10 connector (1 or 2) for modules whose reference ends in **K**,
□ non-removable spring terminal block for module TWD DMM 24DRF.
4 Latching mechanism for attachment to the previous module.

These modules are mounted on a symmetrical DIN rail. Fixing kit TWD XMT 5 (supplied in lots of 5) allows plate or panel mounting. For modules with removable screw terminal block, the terminal blocks are supplied with the module.

*(1) A connector on the right-hand side panel ensures continuity of the electrical link with the next I/O module.*




*Module with removable screw terminal block*

*Module with HE 10 connector*

# Twido programmable controller
Discrete I/O modules



## General characteristics

| | | | |
|---|---|---|---|
| **Temperature** | | **°C** | Operation : 0…+ 55. Storage : - 25…+ 70. |
| **Relative humidity** | | | 30 to 95 %, without condensation |
| **Degree of protection** | | | IP 20 |
| **Altitude** | | **m** | Operation : 0…2000. Storage : 0…3000. |
| **Vibration resistance** | Mounted on ⊓ rail | **Hz** | 10…57, amplitude 0.075 mm, acceleration 57…150 Hz |
| | | **m/s²** | 9.8 (1 gn) |
| | Plate or panel mounted (using fixing kit TWD XMT5) | **Hz** | 2…25, amplitude 1.6 mm, acceleration 25…100 Hz |
| | | **m/s²** | 39.2 (4 gn) |
| **Shock resistance** | | **m/s²** | 147 (15 gn) for 11 ms |

## Characteristics of ⎓ input channels

| **Module type** | | | **TWD** | **DDI 8DT** | **DDI 16DT** | **DDI 16DK** | **DDI 32DK** | **DMM 8DRT** | **DMM 24DRF** |
|---|---|---|---|---|---|---|---|---|---|
| **Number of input channels** | | | | 8 | 16 | 16 | 32 | 4 | 16 |
| **Rated input voltage** | | | **V** | ⎓ 24 sink/source | | | | | |
| **Connection** | | | | Removable screw terminal block | | HE 10 connector | | Removable screw terminal block | Spring terminal block |
| **Commons** | | | | 1 | | | 2 | 1 | |
| **Input voltage range** | | | **V** | ⎓ 20.4...28.8 | | | | | |
| **Rated input current** | | | **mA** | 7 | | 5 | | 7 | |
| **Input impedance** | | | **kΩ** | 3.4 | | 4.4 | | 3.4 | |
| **Filter time** | At state 1 | | **ms** | 4 | | | | | |
| | At state 0 | | **ms** | 4 | | | | | |
| **Isolation** | | | | No isolation between channels, isolation with internal logic by photocouplers | | | | | |
| **Internal consumption for all inputs** | At state 1 | ⎓ 5 V | **mA** | **25** | 40 | 35 | 65 | 25 *(1)* | 65 *(1)* |
| | | ⎓ 24 V | **mA** | 0 | | | | 20 *(1)* | 45 *(1)* |
| | At state 0 | ⎓ 5 V | **mA** | 5 | | | 10 | 5 *(1)* | 10 *(1)* |

## Characteristics of transistor output modules

| **Module type** | | | **TWD** | **DDO 8UT** | **DDO 8TT** | **DDO 16UK** | **DDO 16TK** | **DDO 32UK** | **DDO 32TK** |
|---|---|---|---|---|---|---|---|---|---|
| **Number of output channels** | | | | 8 | | 16 | | 32 | |
| **Output logic** *(2)* | | | | Sink | Source | Sink | Source | Sink | Source |
| **Connection** | | | | Removable screw terminal block | | HE 10 connector | | | |
| **Commons** | | | | 1 | | | | 2 | |
| **Nominal output values** | Voltage | | **V** | 24 | | | | | |
| | Current | | **A** | 0.3 | | 0.1 | | | |
| **Output voltage range** | Voltage | | **V** | 20.4…28.8 | | | | | |
| | Current per channel | | **A** | 0.36 | | 0.12 | | | |
| | Current per common | | **A** | 3 | | 1 | | | |
| **Response time** | At state 1 | | **µs** | 300 | | | | | |
| | At state 0 | | **µs** | 300 | | | | | |
| **Residual voltage** (voltage at state 1) | | | **V** | 1 max | | | | | |
| **Maximum inrush current** | | | **A** | 1 | | | | | |
| **Leakage current** | | | **mA** | 0.1 | | | | | |
| **Overvoltage protection** | | | **V** | 39 | | | | | |
| **Maximum power of filament lamp** | | | **W** | 8 | | | | | |
| **Isolation** | | | | No isolation between channels, isolation with internal logic by photocouplers | | | | | |
| **Consumption for all the outputs** | At state 1 | ⎓ 5 V | **mA** | 10 | | 10 | | 20 | |
| | | ⎓ 24 V | **mA** | 20 | | 40 | | 70 | |
| | At state 0 | ⎓ 5 V | **mA** | 5 | | 5 | | 10 | |

## Characteristics of relay output channels

| **Module type** | | | **TWD** | **DRA 8RT** | **DRA 16RT** | **DMM 8DRT** | **DMM 24DRF** |
|---|---|---|---|---|---|---|---|
| **Number of output channels** | | | | 8 N/O contacts | 16 N/O contacts | 4 N/O contacts | 8 N/O contacts |
| **Output currents** | Current per channel | | **A** | 2 | | | |
| | Current per common | | **A** | 7 | 8 | 7 | |
| **Minimum switching load** | | | **mA** | 0.1/0.1 ⎓ V (reference value) | | | |
| **Contact resistance** (when new) | | | **mΩ** | 30 max | | | |
| **Loads** (resistive, inductive) | | | **A** | 2A/∿ 240 V or 2A/⎓ 30 V (with 1800 operations/hour max) :<br>- electrical life : minimum 100 000 operations<br>- mechanical life : minimum 20 x $10^6$ operations | | | |
| **rms insulation voltage** | | | **V** | ∿1 500 for 1 minute | | | |
| **Consumption for all the outputs** | At state 1 | ⎓ 5 V | **mA** | 30 | 45 | See values above (input channels) | |
| | | ⎓ 24 V | **mA** | 40 | 75 | See values above (input channels) | |
| | At state 0 | ⎓ 5 V | **mA** | 5 | 5 | See values above (input channels) | |

*(1) Consumption values are indicated for all inputs/outputs at state 0 or at state 1.*
*(2) Source output : positive logic, sink output : negative logic.*

# Twido programmable controller
## Discrete I/O modules




TWD DDI 8DT


TWD DDI 32DK


TWD DDO 8●T/DRA 8RT


TWD DDO 16●K


TWD DDO 32●K


TWD DRA 16RT


TWD DDM 8DRT


TWD DDM 24DRF

## References

These discrete I/O modules are mounted on symmetrical DIN rails to the right of the Twido base controller. The maximum number of discrete and/or analogue I/O modules which may be mounted depends on the type of base controller:

| Type of TWD base | LCAA 10DRF | LCAA 16DRF | LCAA 24DRF | LMDA 20D●K | LMDA 20DRT | LMDA 40D●K |
|---|---|---|---|---|---|---|
| Number of modules | 0 | 0 | 4 | 4 | 7 | 7 |

### Discrete input modules

| Input voltage | No. of channels | No. of common point | Connection | Reference | Weight kg |
|---|---|---|---|---|---|
| ⎓ **24 V sink/source** | 8 | 1 | Removable screw terminal block (supplied) | **TWD DDI 8DT** | 0.085 |
| | 16 | 1 | Removable screw terminal block (supplied) | **TWD DDI 16DT** | 0.100 |
| | | | HE 10 connector | **TWD DDI 16DK** | 0.065 |
| | 32 | 2 | HE 10 connector | **TWD DDI 32DK** | 0.100 |

### Discrete output modules

| Type of output | No. of channels | No. of common point | Connection | Reference | Weight kg |
|---|---|---|---|---|---|
| **Transistor ⎓ 24 V/0.3 A** | 8, sink | 1 | Removable screw terminal block (supplied) | **TWD DDO 8UT** | 0.085 |
| | 8, source | 1 | Removable screw terminal block (supplied) | **TWD DDO 8TT** | 0.085 |
| **Transistor ⎓ 24 V/0.1 A** | 16, sink | 1 | HE 10 connector | **TWD DDO 16UK** | 0.070 |
| | 16, source | 1 | HE 10 connector | **TWD DDO 16TK** | 0.070 |
| | 32, sink | 2 | HE 10 connector | **TWD DDO 32UK** | 0.105 |
| | 32, source | 2 | HE 10 connector | **TWD DDO 32TK** | 0.105 |
| **Relay 2 A** (Ith) **~ 230 V/⎓ 30 V** | 8 (N/O contact) | 2 | Removable screw terminal block (supplied) | **TWD DRA 8RT** | 0.110 |
| | 16 (N/O contact) | 2 | Removable screw terminal block (supplied) | **TWD DRA 16RT** | 0.145 |

### Discrete mixed input/output modules

| No. of I/O | No. and type of inputs | No. and type of outputs | No. of common point | Connection | Reference | Weight kg |
|---|---|---|---|---|---|---|
| **8** | 4 I, ⎓ 24 V sink/source | 4 O, relay (N/O contact) 2 A (Ith) | Inputs : 1 common Outputs : 1 common | Removable screw terminal block (supplied) | **TWD DMM 8DRT** | 0.095 |
| **24** | 16 I, ⎓ 24 V sink/source | 8 O, relay (N/O contact) 2 A (Ith) | Inputs : 1 common Outputs : 2 commons | Non-removable spring terminal block | **TWD DMM 24DRF** | 0.140 |

### Separate component

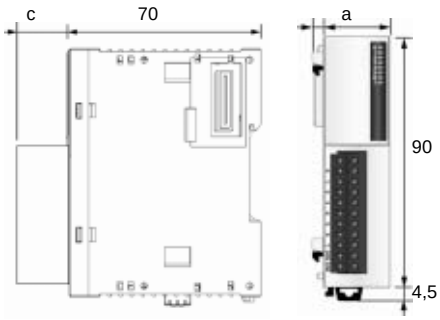
| Description | Type | TWD module compatibility | Reference | Weight kg |
|---|---|---|---|---|
| **Wiring system** | TwidoFast, Telefast | DDI 16/32DK DDO 16●K/32●K | See page 1/38 | – |

### Replacement parts

| Description | Type | TWD module compatibility | Reference | Weight kg |
|---|---|---|---|---|
| **Screw terminal blocks** (sold in lots of 2) | 10 contacts | DDI ●DT DRT ●RT DDO 8●T | **TWD FTB 2T10** | – |
| | 11 contacts | DMM 8DRT | **TWD FTB 2T11** | – |

## Dimensions

### Discrete I/O modules

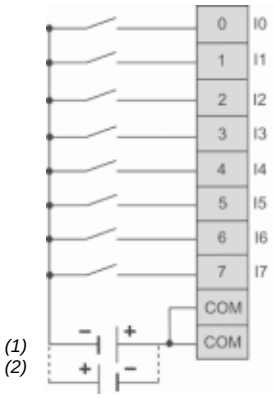



| TWD | a | c |
|---|---|---|
| DDI 8DT/16DT | 23.5 | 14.6 |
| DDI 16DK | 17.6 | 11.3 |
| DDI 32DK | 29.7 | 11.3 |
| DDO 8UT/8TT | 23.5 | 16.6 |
| DDO 16UK/16TK | 17.6 | 11.3 |
| DDO 32UK/32TK | 29.7 | 11.3 |
| DRA 8RT/16RT | 23.5 | 14.6 |
| DMM 8DRT | 23.5 | 14.6 |
| DMM 24DRF | 39.1 | 1.0 |

## Connections

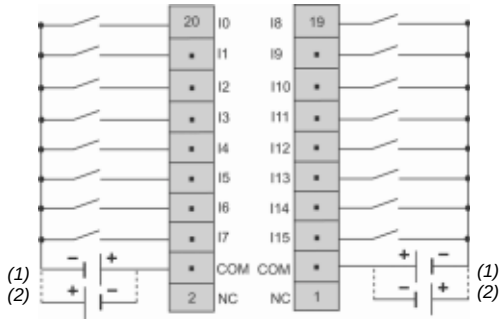
### ⎓ 24 V input modules

**TWD DDI 8DT**



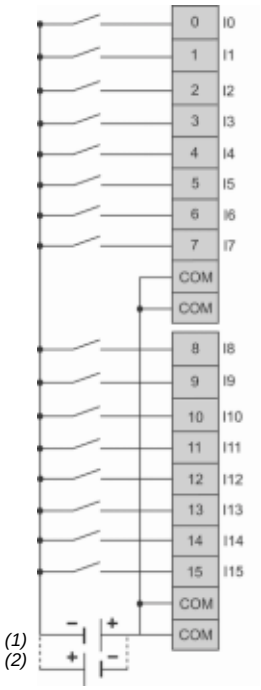

□ The COM terminals are linked internally.

**TWD DDI 16DK**



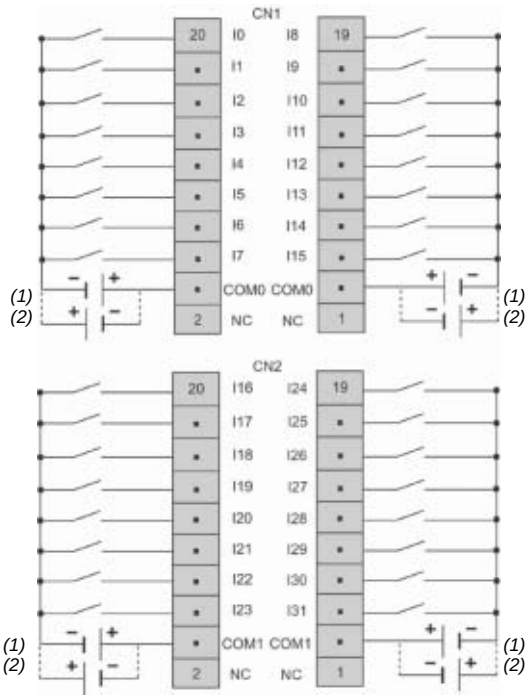

□ The COM terminals are linked internally.

**TWD DDI 16DT**




□ The COM terminals are linked internally.

**TWD DDI 32DK**



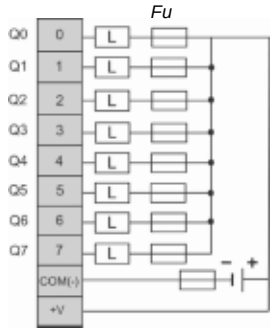

□ The COM0 terminals are linked internally.
□ The COM1 terminals are linked internally.

*(1) Source input (negative logic)*
*(2) Sink input (positive logic)*

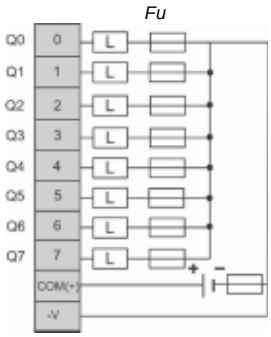
1

## Transistor output modules

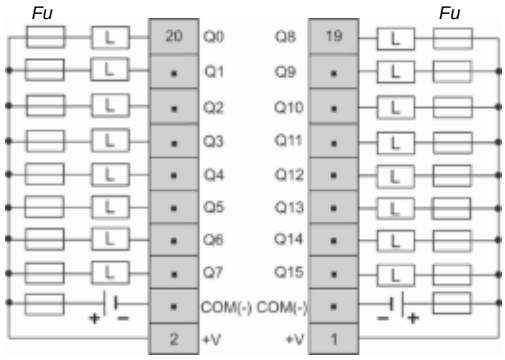
### TWD DDO 8UT



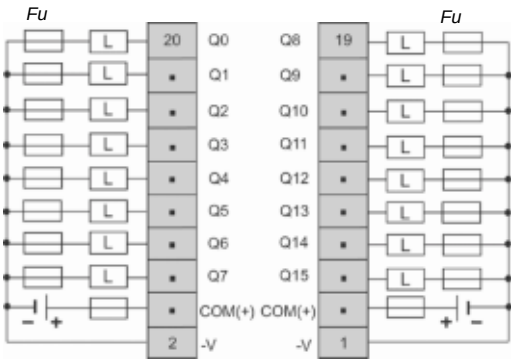

### TWD DDO 8TT



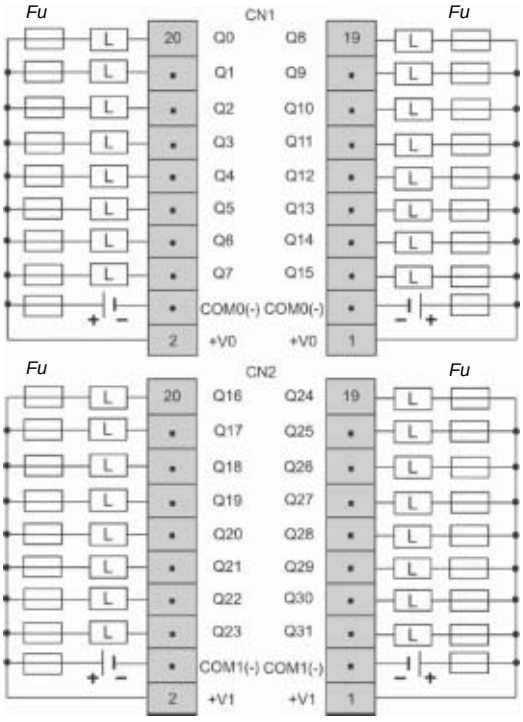

### TWD DDO 16UK



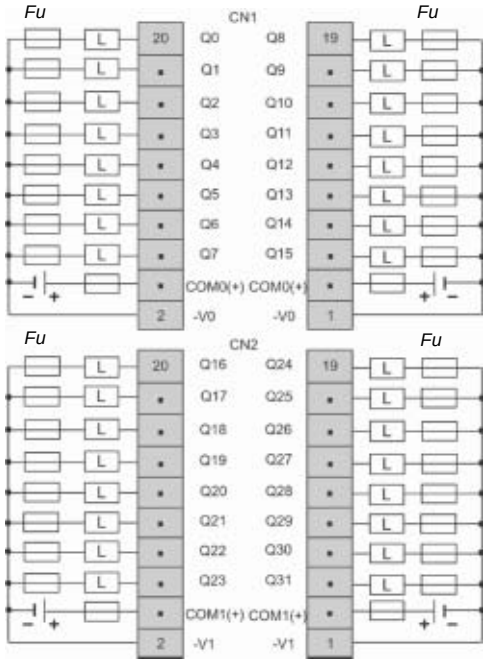

### TWD DDO 16TK




### TWD DDO 32UK




### TWD DDO 32TK

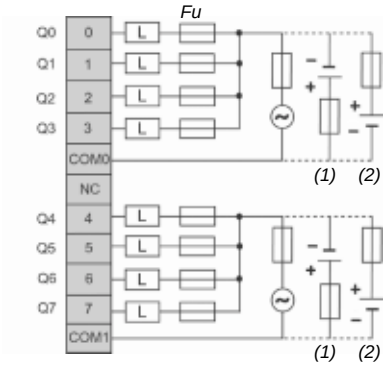



Terminals :
- COM (-) are linked internally.
- COM0 (-) are linked internally.
- COM1 (-) are linked internally.
- + V are linked internally.
- + V0 are linked internally.
- + V1 are linked internally.

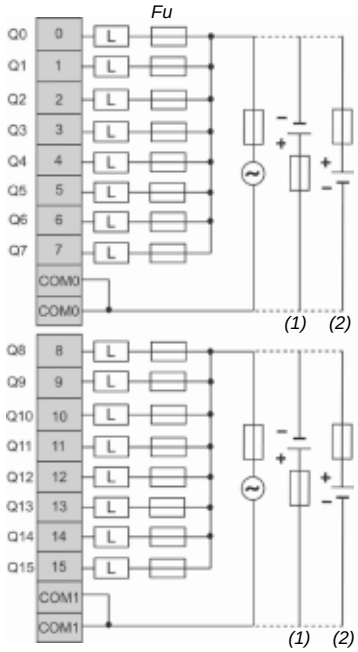
Terminals :
- COM (+) are linked internally.
- COM0 (+) are linked internally.
- COM1 (+) are linked internally.
- - V are linked internally.
- - V0 are linked internally.
- - V1 are linked internally.

## Relay output modules

### TWD DRA 8RT




### TWD DRA 16RT

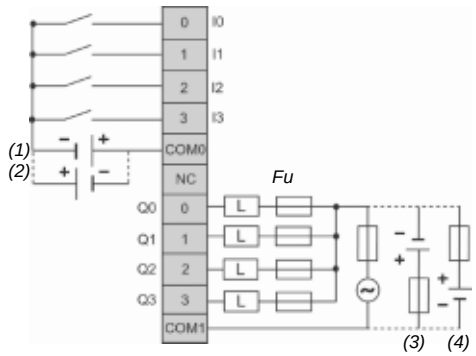



Terminals :
- COM0 are linked internally.
- COM1 are linked internally.
- COM0 and COM1 are independent

*(1) Sink output (negative logic)*
*(2) Source output (positive logic)*

## Mixed input/output modules

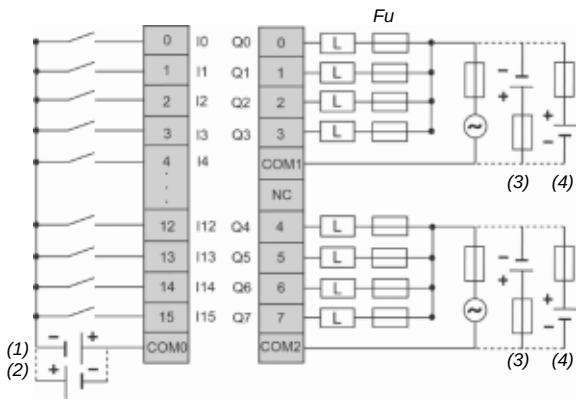
### TWD DMM 8DRT




- The COM (+) terminals are linked internally

*(1) Source input (negative logic)*
*(2) Sink input (positive logic)*
*(3) Sink output (negative logic)*
*(4) Source output (positive logic)*

### TWD DMM 24DRT




- Terminals COM0, COM1 and COM2 are independent
- Terminals - V are linked internally.

*(1) Source input (negative logic)*
*(2) Sink input (positive logic)*
*(3) Sink output (negative logic)*
*(4) Source output (positive logic)*

# Twido programmable controller
## Analogue I/O modules



| | | | |
|---|---|---|---|
| **Applications** | | Analogue input modules | Analogue output modules |
| | |  |  |
| **Number of I/O** | | 2 inputs | 1 output |
| **Type** | | Voltage/current | |
| **Connection** | | Removable screw terminal block | |
| **Inputs** | Range | 0...10 V (non differential)<br>4...20 mA (differential) | |
| | Resolution | 12 bits (4096 points) | |
| | Acquisition period | 32 ms + 1 controller cycle time | |
| **Outputs** | Range | | 0...10 V<br>4...20 mA |
| | Resolution | | 12 bits (4096 points) |
| | Transfer time | | 20 ms + 1 controller cycle time |
| **External supply** | | ⎓ 24 V external power supply to sensors/preactuators (voltage range 20.4...28.8 V) | |
| **Isolation** | | Isolation between channels and earth : by photocoupler | |
| **Analogue I/O module type** | | **TWD AMI 2HT** | **TWD AMO 1HT** |
| **Pages** | | 1/30 | |

| Analogue mixed I/O modules | | Master module for AS-Interface bus |
|---|---|---|
|  |  |  |
| 2 inputs/1 output | | ■ For controller versions ≥ 2.0<br>■ Management of slave modules:<br>□ Discrete: maximum of 62 slaves arranged in 2 banks, A/B, of 31 addresses each<br>□ Analogue: maximum of 7 slaves in bank A<br>■ The AS-Interface M3 profile supports analogue profile 7.3 (7 slaves), but does not support analogue profile S-7.4 |
| Voltage/current | Thermocouple/temperature probe inputs<br>Voltage/current output | |
| 0...10 V (non differential)<br>4...20 mA (differential) | Thermocouple type K, J and T<br>Pt 100 3-wire temperature probe | |
| 12 bits (4096 points) | | |
| 32 ms + 1 controller cycle time | 100 ms + 1 controller cycle time | |
| **TWD AMM 3HT** | **TWD ALM 3LT** | **TWD NOI 10M3** |
| 1/30 | | 1/33 |

# Twido programmable controller
## Analogue I/O modules



## Presentation

Twido analogue I/O expansion modules enable the acquisition of various analogue values encountered in industrial applications, such as :

- High-level inputs (voltage 0…10 V or current 4…20 mA).
- High-level outputs (voltage 0…10 V or current 4…20 mA).
- Low level inputs from thermocouples type K, J and T.
- Low level inputs from 3-wire Pt 100 temperature probes, range -100...500 °C.

Analogue output modules are used to control the preactuators in devices such as variable speed drives, valves and applications that require process control. The output current or the voltage is proportional to the numerical value defined by the user program. When the Twido controller stops, the outputs can be configured with fallback (reset to the lowest scale value or hold the last value received). This function, when set to “hold”, is useful when debugging the application or when a fault occurs, in order not to disturb the process being controlled.

The 4 following analogue I/O modules are available :

- One module with 2 high-level inputs.
- One module with 1 high-level input.
- One mixed module with 2 inputs and 1 high-level output.
- One mixed module with 2 thermocouple or temperature probe inputs and 1 high-level output.

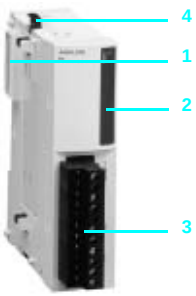
All Twido analogue extension modules offer 12-bit resolution (4096 points) with connection by removable screw terminal block. An external ⎓ 24 V power supply is required for each analogue module.

Like discrete I/O modules, analogue I/O modules are connected to the base controller by stacking them on a DIN rail, starting from the right-hand side panel of the base controller, according to the following rules :
- For 24 I/O compact base controller TWD LCAA 24DRF : 4 modules max. (see characteristics page 1/6).
- For 20 I/O modular base controllers TWD LMDA 20D●K : 4 modules max. (see characteristics page 1/13).
- For 40 I/O modular base controllers TWD LMDA 20DRT/40D●K : 7 modules max. (see characteristics page 1/13).

All analogue I/O modules are electrically isolated with the use of a photocoupler between the internal electronic circuit and the input/output channels.

## Description

Twido analogue I/O modules comprise :




1 An extension connector for electrical connection to the previous module *(1)*.
2 A block for displaying the channels and module diagnostics.
3 A removable screw terminal block for connection of the ⎓ 24 V external power supply, the sensors and the preactuators.
4 A latching mechanism for attachment to the previous module.

These modules are mounted on a symmetrical DIN rail. Fixing kit TWD XMT 5 (supplied in lots of 5) allows plate or panel mounting.

*(1) A connector on the right-hand side panel ensures continuity of the electrical link with the next I/O module.*

# Twido programmable controller
Analogue I/O modules



## General characteristics

| | | | |
|---|---|---|---|
| **Temperature** | | **°C** | Operation : 0…+ 55. Storage : - 25…+ 70. |
| **Relative humidity** | | | 30 to 95 %, without condensation |
| **Degree of protection** | | | IP 20 |
| **Altitude** | | **m** | Operation : 0…2000. Storage : 0…3000. |
| **Vibration resistance** | Mounted on ⊓ rail | **Hz** | 10…57, amplitude 0.075 mm, acceleration 57…150 Hz |
| | | **m/s²** | 9.8 (1 gn) |
| | Plate or panel mounted (using fixing kit TWD XMT5) | **Hz** | 2…25, amplitude 1.6 mm, acceleration 25…100 Hz |
| | | **m/s²** | 39.2 (4 gn) |
| **Shock resistance** | | **m/s²** | 147 (15 gn) for 11 ms |

## Analogue input characteristics

| **Module type** | | | **TWD AMI 2HT/AMM 3HT** | | **TWD ALM 3LT** | |
|---|---|---|---|---|---|---|
| **Number of channels** | | | 2 high-level inputs | | 2 low-level inputs | |
| **Range** | | | Voltage<br>0…10 V | Current<br>4…20 mA | Thermocouple<br>Type K (0…1300° C)<br>Type J (0…1200° C)<br>Type T (0…400° C) | Temperature probe<br>Pt probe,<br>3-wire type<br>(- 100…500° C) |
| **Type** | | | Non differential | Differential | | |
| **Resolution** | | | 4096 points (12 bits) | | | |
| **LSB value** | | | 2.5 mV | 4 µA | 0.325° C (type K)<br>0.3° C (type J)<br>0.1° C (type T) | 0.15° C |
| **Connection** | | | Removable screw terminal block | | | |
| **Permissible continuous overload** | | | ⎓ 13 V | 40 mA | – | |
| **External supply** | | **V** | Rated voltage : ⎓ 24. Voltage range : ⎓ 20.4…28.8 | | | |
| **Input impedance** | | | 1 MΩ min | 10 Ω | 250 Ω max | 5 Ω max |
| **Max. sampling duration** | | **ms** | 16 | | 50 | |
| **Sampling repetition time** | | **ms** | 16 | | 50 | |
| **Acquisition period** | | **ms** | 32 + 1 controller cycle time | | 100 + 1 controller cycle time | |
| **Measuring precision** | Max. error at 25° C | **% PE** | ± 0.2 | | 0.2 + precision of cold junction compensation (± 4° C max) | ± 0.2 |
| | Temperature coefficient | **% PE/°C** | ± 0.006 | | | |
| | Repeat accuracy after stabilisation time | **% PE** | ± 0.5 | | | |
| | Non linearity | **% PE** | ± 0.2 | | | |
| | Total error | **% PE** | ± 1 | | | |
| **Common mode rejection** | | | - 50 dB | | | |
| **Cross talk** | | | 2 low significance bits max. | | | |
| **Cabling** | | | Twisted shielded pair recommended | | – | |
| **Dielectric strength** | | **V rms** | ∿ 500 between the input and the supply circuit | | | |
| **Type of protection** | | | Photocoupler between the input and the internal circuit | | | |
| **Consumption** | | **mA** | ⎓ 5 V internal supply : 50. ⎓ 24 V external supply : 40 | | | |

## Analogue output characteristics

| **Module type** | | | **TWD AMO 1HT/AMM 3HT/ALM 3LT** | |
|---|---|---|---|---|
| **Number of channels** | | | 1 output | |
| **Range** | | | Voltage<br>0…10 V | Current<br>4…20 mA |
| **Resolution** | | | 4096 increments (12 bits) | |
| **LSB value** | | | 2.5 mV | 4 µA |
| **Load impedance** | | Ω | 2000 min | 300 max |
| **Applicable load** | | | Resistive | |
| **Stabilisation time** | | **ms** | 20 | |
| **Total output system transfer time** | | **ms** | 20 + 1 controller scan time | |
| **External supply** | | **V** | Rated voltage : ⎓ 24. Voltage range : ⎓ 20.4…28.8 | |
| **Measuring precision** | Max. error at 25 °C | **% PE** | ± 0.2 | |
| | Temperature coefficient | **% PE/°C** | ± 0.015 | |
| | Repeat accuracy after stabilisation time | **% PE** | ± 0.5 | |
| | Output error | **% PE** | ± 1 | |
| | Non linearity | **% PE** | ± 0.2 | |
| | Output ripple | | 1 low significance bit max. | |
| | Total error | **% PE** | ± 1 | |
| **Cabling** | | | Twisted shielded pair recommended | |
| **Dielectric strength** | | **V rms** | ∿ 500 between the input and the supply circuit | |
| **Consumption** (for TWD AMO 1HT) | ⎓ 5 V internal supply | **mA** | 50 | |
| | ⎓ 24 V external supply | **mA** | 40 | |

# Twido programmable controller
## Analogue I/O modules

1

*TWD AMI 2HT*

*TWD ALM 3LT*

## References

These analogue I/O expansion modules are mounted on symmetrical DIN rails to the right of the Twido base controller. The sensors/preactuators are connected to a removable screw terminal block (supplied with each module). The maximum number of analogue I/O modules which may be mounted depends on the type of base controller :

| Type of TWD controller | LCAA 10DRF | LCAA 16DRF | LCAA 24DRF | LMDA 20D●K | LMDA 20DRT | LMDA 40D●K |
|---|---|---|---|---|---|---|
| Number of modules | 0 | 0 | 4 | 4 | 7 | 7 |

### Analogue I/O modules

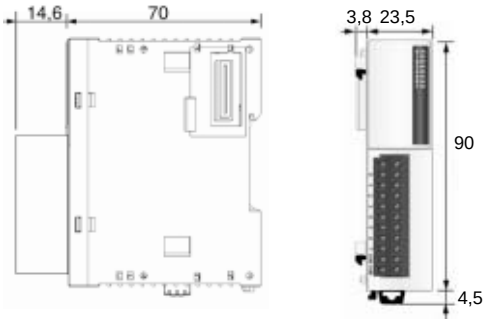
| Channel type | Input range | Output range | Resolution | Reference | Weight kg |
|---|---|---|---|---|---|
| **2 inputs** | 0…10 V<br>4…20 mA | – | 12 bits | **TWD AMI 2HT** | 0.085 |
| **1 output** | – | 0…10 V<br>4…20 mA | 12 bits | **TWD AMO 1HT** | 0.085 |
| **2 inputs and 1 output** | 0…10 V<br>4…20 mA | 0…10 V<br>4…20 mA | 12 bits | **TWD AMM 3HT** | 0.085 |
| | Thermocouple K, J, T<br>Temperature probe Pt 100 | 0…10 V<br>4…20 mA | 12 bits | **TWD ALM 3LT** | 0.085 |

### Replacement part

| Description | Application | Reference | Weight kg |
|---|---|---|---|
| **Screw terminal block**<br>(Sold in packs of 2) | 11 contacts | **TWD FTB 2T11** | – |

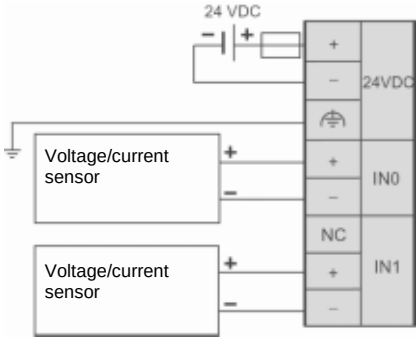
## Dimensions

### Analogue I/O modules



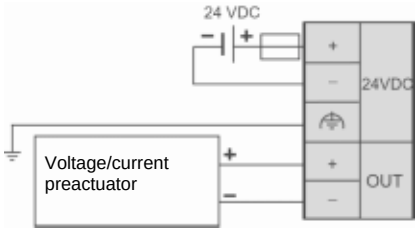

## Connections

### Input module TWD AMI 2HT



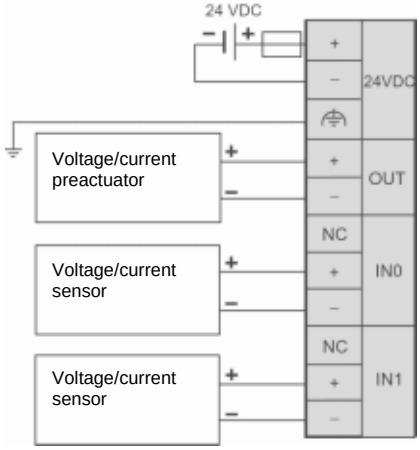

- Fit a fuse of appropriate size for the sensor type.
- Do not connect any wires to the unused channel.

### Output module TWD AMO 1HT



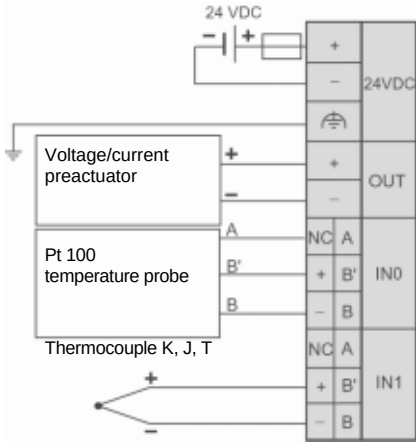

- Fit a fuse of appropriate size for the preactuator type.
- Do not connect any wires if the channel is unused.

### Mixed input/output module TWD AMM 3HT




- Fit a fuse of appropriate size for the sensor and preactuator types.
- Do not connect any wires to unused channels.

### Mixed input/output module TWD ALM 3LT



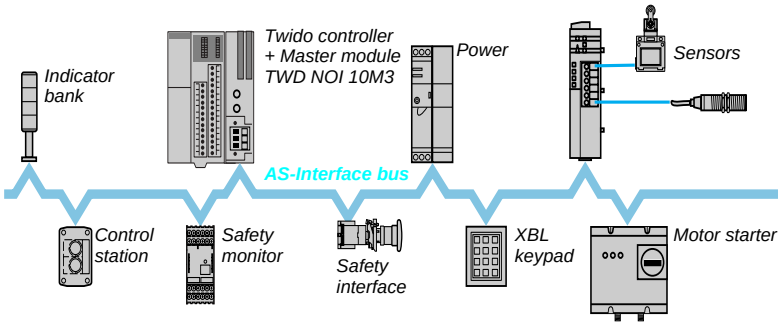

- Fit a fuse of appropriate size for the sensor and preactuator types.
- For a Pt 100 3-wire temperature probe (RTD), connect the three wires to terminals A , B' and B (channels IN0 and IN1).
- For a Pt 100 2-wire temperature probe (RTD), connect the two wires to terminals A and B' and make a bridge between B' and B (channels IN0 and IN1).
- For a thermocouple, connect the two wires to the + and - terminals (channels IN0 and/or IN1).
- Do not connect any wires to unused channels.

# Twido programmable controller
## Master module for AS-Interface bus



## Presentation

Master module TWD NOI 10M3 for AS-Interface bus allows the Twido controller (versions ⩾ 2.0) to perform the function of AS-Interface master.



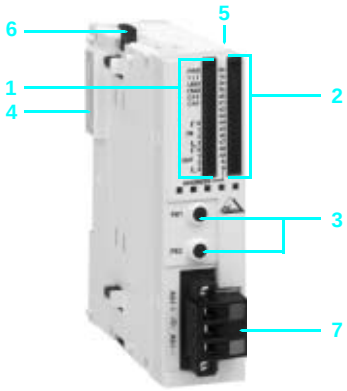

The bus consists of a Master station (Twido controller) and Slave stations. The Master, which supports the AS-Interface profile, polls each of the devices connected to the AS-Interface bus, in turn, and stores information gathered (sensor/actuator status, operating status of the devices) in the controller memory. Communication on the AS-Interface bus is managed in a way that is totally transparent to the Twido application program.

The TWD NOI 10M3 master module manages the following with the AS-Interface M3 profile:
- discrete slave modules (maximum of 62 slaves arranged in 2 banks, A and B, of 31 addresses each),
- analogue slaves (maximum of 7 slaves in bank A).

The AS-Interface M3 profile supports analogue profile 7.3 (7 slaves), but not analogue profile S-7.4.
The maximum number of TWD NOI 10M3 modules per Twido controller is 2.
7 discrete, analogue and AS-Interface I/O modules are controlled by TwidoSfot software, see page 1/40.
An AS-Interface power supply is essential to supply the various modules on the bus. It should preferably be located close to the stations with high power consumption. For more information on power supplies, see pages 1/8 and 1/14.

## Description

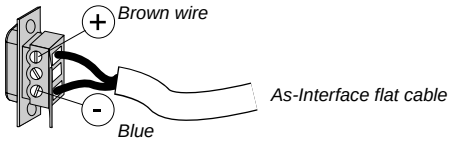
Module TWD NOI 10M3 takes the form of a standard-size module. It is connected to a Twido base controller (compact or modular) in the same way as any I/O module.




It comprises:
1 A display block comprising:
- 6 pilot lights indicating the module operating modes:
  - green PWR pilot light: module powered up,
  - red FLT pilot light: error in the configuration loaded,
  - green LMO pilot light: module in local mode,
  - green CMO pilot light: module in connected mode,
  - red CNF pilot light: not used,
  - red OFF pilot light: module in protected, unconnected mode.
- 6 green pilot lights, 3 for inputs, 3 for outputs.

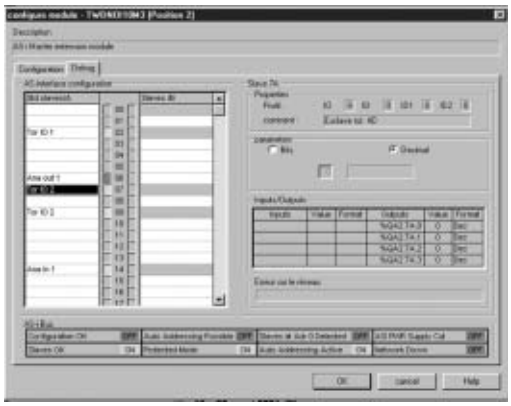
2 A block for displaying the status of the addresses.
3 Two pushbuttons PB1 and PB2 for controlling the status of the slaves by selecting their address and changing the mode.
4 An extension connector for electrical connection to the previous module.
5 A connector (on the RH side) for I/O expansion modules TWD D●● and TWD A●● (4 or 7 depending on version).
6 A latching mechanism for attachment to the previous module.
7 A power supply removable screw terminal block.

### TWD NOI 10M3 master module connections



# Twido programmable controller
## Master module for AS-Interface bus





## Diagnostics

The 30 pilot lights on the front panel of the module are used in conjunction with the two pushbuttons for diagnostics by the Twido controller.
The display block on the front panel of master module TWD NOI 10M3 allows simplified local diagnostics to be performed by displaying the slaves present on the AS-Interface bus.

## Software set-up

The AS-Interface bus is configured using TwidoSoft software, see pages 1/40 to 1/47.
The services offered are based on the principle of simplicity:
□ Management of profile tables, parameters and data by the master (management transparent to the user).
□ Topological addressing of I/O: any AS-Interface slave defined on the bus has a topological address assigned to it on the bus, in a way that is transparent to the user.
□ Each AS-Interface module sensor/actuator is seen by the Twido programmable controller in the same way as any “In-rack" I/O.

## General characteristics

| Module type | | | TWD NOI 10M3 |
|---|---|---|---|
| **AS-Interface profile** | | | AS-Interface M3 , V 2.11 (profile S-7.4 not supported) |
| **Type of addressing** | | | Standard and extended |
| **Product certifications** | | | AS-Interface n° 47801 |
| **Degree of protection** | | | IP 20 |
| **Altitude** | | **m** | Operation: 0…2000; Transport: 0…3000 |
| **Temperature** | | **°C** | Operation: 0…+ 55; Storage: - 25…+ 70 |
| **Relative humidity** | | | 30 to 95 % (without condensation) |
| **Degree of pollution** | | | 2 conforming to IEC 60664 |
| **Immunity to corrosion** | | | Free of corrosive gases |
| **Vibration resistance** | Mounted on ⊓ rail | **Hz** | 10…57, amplitude 0.075 mm,<br>57…150 (acceleration: 9.8 m/s²); for 2 hours on all 3 axes |
| | Plate or panel mounted<br>(using fixing kit TWD XMT5) | **Hz** | 2…25, amplitude 1.6 mm,<br>25…100 (acceleration: 39.2 m/s²); for 90 minutes on all 3 axes |
| **Shock resistance** | | **m/s²** | 147 (15 gn) duration 11 ms, on all 3 axes |
| **As-Interface external power supply** | | **⎓ V** | 29.5…31.6 |
| **Internal current** | At ⎓ 5 V | **mA** | 80 |
| | At ⎓ 24 V | **mA** | 0 |
| **AS-Interface consumption at ⎓ 24 V** | | **mW** | 540 |

## Communication characteristics

| | | | |
|---|---|---|---|
| **As-Interface bus cycle time** | With 1 to 19 slaves | **ms** | 3 |
| | With 20 to 62 slaves | **ms** | 0.156 x (1 + N) where N = number of active slaves |
| | With 31 standard slaves or slaves in banks A & B | **ms** | 5 |
| | With 62 slaves in banks A and B | **ms** | 10 |
| **Max. no. of modules** | Analogue modules *(1)* | | 7 |
| | Discrete modules *(1)* | | 62 |
| **Max. no. of I/O** | Standard slaves | | 248 = 124 inputs + 124 outputs |
| | Slaves in banks A and B | | 434 = 248 inputs + 186 outputs |
| **Max. length of AS-Interface cable** | Without splitter block or extension | **m** | 100 |
| | With a total of 2 splitter blocks or extensions | **m** | 300 |
| **AS-Interface bus voltage** | | **⎓ V** | 30 |

## References

*TWD NOI 10M3*

| Description | Number per controller | Protocol/profile | Number of I/O *(1)* | Reference | Weight kg |
|---|---|---|---|---|---|
| **AS-Interface master module for Twido programmable controllers V ⩾ 2.0** | 2 | AS-Interface/M3 | 63 discrete modules max.<br>7 analogue modules max. | **TWD NOI 10M3** | 0.085 |

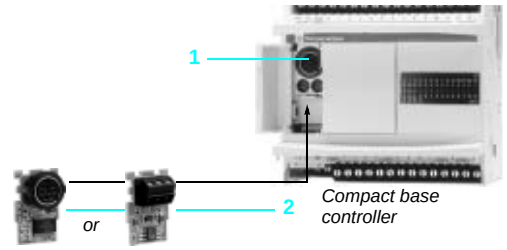
### Connection accessories

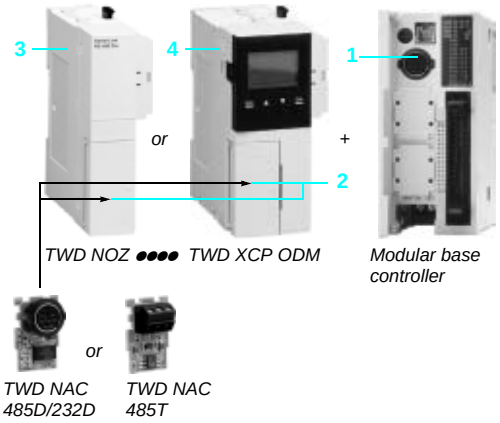
| Description | Length | Reference | Weight kg |
|---|---|---|---|
| **Flat cable for AS-Interface bus (yellow)** | 20 m | **XZ CB 10201** | 1.400 |
| | 50 m | **XZ CB 10501** | 3.500 |
| | 100 m | **XZ CB 11001** | 7.000 |

*(1) When analogue and discrete modules are connected simultaneously to the network, the analogue modules use addresses 1 to 31 in bank A. When an analogue module uses a certain address, the module addresses having the same number in bank B cannot be occupied for slaves in banks A/B.*

# Twido programmable controller
## Communication






## Presentation

In order to communicate with an intelligent environment, Twido compact and modular programmable controllers offer an RS 485 serial communication port on the module as well as an optional type RS 485 or RS 232 link.
These two ports allow Twido compact and modular controllers to use four communication protocols: Programming, Modbus, ASCII, and Remote link.

## Description

**Compact base controllers have the following on the front panel:**

1 An RS 485 serial port, with mini-DIN type connector for connection to the programming terminal.

2 A slot for fitting a 2nd optional port (RS 485/RS 232) using TWD NAC ●●● adapters.

**Modular base controllers have the following on the front panel:**

1 An RS 485 serial port, with mini-DIN type connector for connection to the programming terminal.

The slot for fitting a 2nd optional port (RS 485/RS 232) using adapters TWD NAC ●●● is located behind the removable cover 2 of a TWD NOZ ●●●● interface module 3 or a TWD XCP ODM display module 4.
The interface and display modules connect to the left-hand side of modular base controllers.

**Twido controller communication ports**

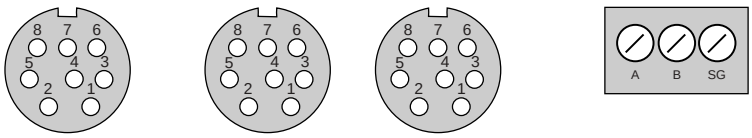
| | Serial port | Optional port (2nd port) | | |
|---|---|---|---|---|
| | RS 485 mini-DIN | RS 485 mini-DIN | RS 232 mini-DIN | RS 485 screw terminal block |
| **Compact base controllers** | All compact base controllers TWD LCAA ●●●● | TWD NAC 485 D *(1)* | TWD NAC 232 D *(2)* | TWD NAC 485 T *(1)* |
| **Modular base controllers** | All modular base controllers TWD LMDA ●●●● | TWD NOZ 485 D *(1)* or TWD XCP ODM + TWD NAC 485D | TWD NOZ 232 D *(2)* or TWD XCP ODM + TWD NAC 232D | TWD NOZ 485 T *(1)* or TWD XCP ODM + TWD NAC 485T |

*(1) With max. cable length: 200 m.*
*(2) With max. cable length: 10 m.*

If the RS 232 physical layer is used for a length greater than 10 metres, use the RS 485 physical layer and an RS 485/RS 232 conversion module reference **XGS Z24**.

## Connection

**Serial link RS 485** / **Optional link RS 485D** / **RS 232 D** / **RS 485T**




| | TWD LCAA ●●●● TWD LMDA ●●●● | TWD NAC 485D TWD NOZ 485D | TWD NAC 232D TWD NOZ 232D |
|---|---|---|---|
| 1 | A + | A + | RTS |
| 2 | B - | B - | DTR |
| 3 | NPC | NC | TXD |
| 4 | /DE | NC | RXD |
| 5 | /DPT | NC | DSR |
| 6 | NPC | NC | 0 V |
| 7 | 0 V | 0 V | 0 V |
| 8 | 5 V (180 mA) | 5 V (180 mA) | 5 V (180 mA) |

| | TWD NAC 485T TWD NOZ 485T |
|---|---|
| A | A + |
| B | B - |
| SG | 0 V |

NC: not connected
NPC: do not connect
/DPT: 1 = master; If not connected, the PUNIT protocol is used for communication with PCs (at state 1, 19200 bauds, with no parity); If connected to 0 V, the communication parameters are those configured by the TwidoSoft software.

*TWD NAC 232D/485D*

*TWD NAC 485T*

*TWD NOZ ●●●*

*TWD XCP ODM*

## References

### Serial link modules and adapters

| Description | Compatibility | Physical layer | Connection | Reference | Weight kg |
|---|---|---|---|---|---|
| **Serial interface adapters** | Compact base controllers TWD LCAA 16/24DRF Built-in display module TWD XCP ODM | RS 232C | Mini-DIN connector | **TWD NAC 232D** | 0.010 |
| | | RS 485 | Mini-DIN connector | **TWD NAC 485D** | 0.010 |
| | | | Screw terminals | **TWD NAC 485T** | 0.010 |
| **Serial interface modules** | Modular base controllers TWD LMDA 20/40D●● | RS 232C | Mini-DIN connector | **TWD NOZ 232D** | 0.085 |
| | | RS 485 | Mini-DIN connector | **TWD NOZ 485D** | 0.085 |
| | | | Screw terminals | **TWD NOZ 485T** | 0.085 |

### Digital display and built-in display module

| Description | Compatibility | Characteristics | Reference | Weight kg |
|---|---|---|---|---|
| **Built-in display module** | Modular base controllers TWD LMDA 20/40D●● | Mounted on left-hand side of base controller. Enables adjustment and diagnostics of the programmable controller. Can take a serial adapter TWD NAC ●●●● | **TWD XCP ODM** | 0.105 |

### Connection accessory

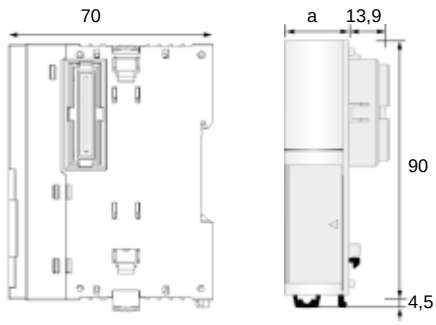
| Description | Link | | Length | Reference | Weight kg |
|---|---|---|---|---|---|
| | from | to | | | |
| **Serial link connection cable** | Serial interface adapter or RS 485 serial interface module (mini-DIN connector) | Modbus module (RJ 45 connector) | 3 m | **TWD XCA RJ030** | 0.160 |

### Modems

| Description | Supply voltage | Reference | Weight kg |
|---|---|---|---|
| **PSTN modem**: type WESTERMO TD-33 / V.90, supplied with a telephone cable (length 3 m) | ⎓ 12/36 V | **SR1 MOD01** | 0.231 |
| **GSM modem**: type WAVECOM WMOD2B dual band 900/1800 Mhz, supplied with a power cable (length 1.5 m) and clips for plate mounting | ⎓ 24 V | **SR1 MOD02** | 0.127 |
| **Accessory kit for GSM modem** comprising: a modem cable (length 0.5 m), an antenna with cable (length 3 m), and accessories for mounting on ⊓ rail | – | **SR1 KIT02** | 0.180 |

## Dimensions

### Modules TWD NOZ ●●●/XCP ODM

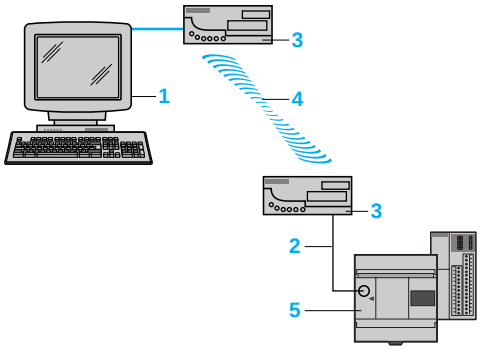



| | a |
|---|---|
| **TWD NOZ ●●●●** | 22.50 |
| **TWD XCP ODM** | 38 |

# Twido programmable controller
Communication protocols

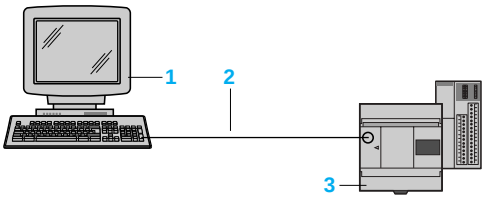


## Programming protocol




**Link by modem**

1 Remote programming PC.
2 Cable TSX PCX 1031 on serial port.
3 Modem for transmitting/receiving data.
4 Telephone or radio link.
5 Twido compact or modular controller.



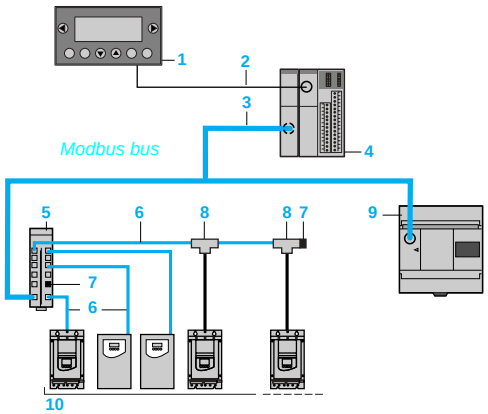

**Link by cable**

1 Programming PC.
2 Cable TSX PCX 1031 RS 485 on serial port or USB cable TSX PCX 3030 for Windows 2000 or XP.
3 Twido compact or modular controller.

## Characteristics

| Protocol type | | Programming |
|---|---|---|
| Data rate | Kbit/s | 19.2 |
| Physical layer | | RS 485 |
| Connection | | Serial port |
| Compatibility | | With compact base controllers TWD LCAA ●●●● and modular base controllers TWD LMDA ●●●● |

## Modbus protocol




**Twido controller connected directly on the Modbus bus**

1 Magelis compact display XBT N40●.
2 Cable XBTZ 978 on serial port.
3 Cable for optional RS 485 port.
4 Twido modular controller.
5 Modbus hub LU9 GC3.
6 Modbus tap link cable VW3 A8 306 R●●.
7 Line end adapters VW3 A8 306 RC.
8 Modbus T-junctions VW3 A8 306 TF●● (with cables).
9 Twido compact controller.
10 Modules: ATS 48 and ATV 28.

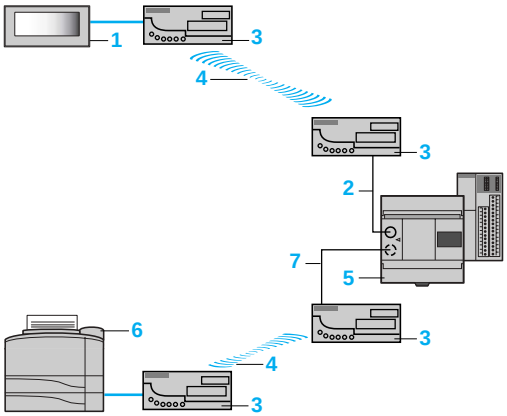
## Characteristics

| Protocol type | | Modbus |
|---|---|---|
| Data rate | Kbit/s | 1.2…38.4<br>Initial value: 19.2 |
| Data bits | | 7 or 8<br>Initial value: 8 |
| Stop bits | | 1 or 2 |
| Parity | | Without, even or odd<br>Initial value: without |
| Physical layer | | RS 485/RS 232 (point-to-point) |
| Connection | | Serial port (RS 485) or optional port (RS 485/RS 232) |
| Compatibility | | Compact base controllers TWD LCAA ●●●● and modular base controllers TWD LMDA ●●●● |

# Twido programmable controller
Communication protocols

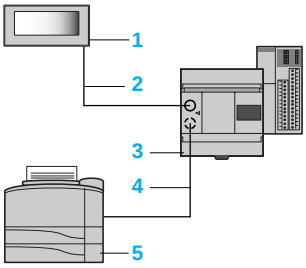


## ASCII protocol




**Link by modem**

1 Simple ASCII display.
2 Standard RS 485 cable or cable TSX PCX 1031 for RS 232 conversion, on serial port.
3 Modem for transmitting/receiving data.
4 Telephone or radio link.
5 Twido compact or modular controller.
6 ASCII printer.
7 Standard RS 485/RS 232 cable on optional port.



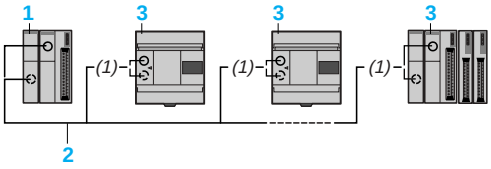

**Link by cable**

1 Simple ASCII display.
2 Standard RS 485 cable or cable TSX PCX 1031 for RS 232 conversion, on serial port.
3 Twido compact or modular controller.
4 Standard RS 485/RS 232 cable on optional port.
5 ASCII printer.

### Characteristics

| Protocol type | | ASCII |
|---|---|---|
| Data rate | Kbit/s | 1.2…38.4<br>Initial value: 19.2 |
| Data bits | | 7 or 8<br>Initial value: 8 |
| Stop bits | | 1 or 2<br>Initial value: 1 |
| Parity | | Without, even or odd<br>Initial value: without |
| Physical layer | | RS 485/RS 232 |
| Connection | | Serial port (RS 485) or optional port (RS 485/RS 232) |
| Compatibility | | With compact base controllers TWD LCAA ●●●● and<br>modular base controllers TWD LMDA ●●●● |

## “Remote link” protocol




*(1) Connection is made either to the serial port, or to the optional port.*

**“Remote Link” decentralised I/O**

Each compact or modular base controller can be extended by means of Twido base controllers used either as an I/O extension, or as a local “reflex” controller.

□ When used as an I/O extension, these base controllers cannot take any I/O extensions.

□ When used as a local “reflex” controller, these base controllers have their own application program. Internal words are reserved for automatic exchange of information between the base controllers.

1 Base controller.
2 RS 485 3-wire cable on serial port or on optional port.
3 Twido base controllers used as I/O extension or as local “reflex” controller.

### Characteristics

| Protocol type | | Remote link |
|---|---|---|
| Data rate | Kbit/s | 38.4 |
| Physical layer | | RS 485 |
| Connection | | Serial port or optional port only. |
| Number of Twido modules that can be connected | | from 1 to 7 |
| Compatibility | | With compact base controllers TWD LCAA ●●●● and<br>modular base controllers TWD LMDA ●●●● |

# Twido programmable controller
Pre-wired solutions

1

## Presentation

With its HE 10 connector products, the Twido range offers several solutions for economical, fast and reliable wiring.

■ TwidoFast pre-formed cables, in 3 or 5 m lengths, have one end fitted with an HE 10 type connector and the other with referenced, free wires, to facilitate the connection of inputs/outputs.

■ Telefast 2 pre-wired kits which, under a single reference, include a TeleFast 2 sub-base together with its cable (1 or 2 m length) for connection to the HE 10 connectors on Twido modules. These sub-bases allow easy wiring with their screw terminal blocks, as well as signal adaptation (Twido transistor outputs to relay outputs, 1 common per 4 channels).

■ Three types of cable, available in 3 lengths, which ensure compatibility with the entire Telefast 2 range, so allowing Twido controllers to be used in conjunction with Telefast 2 sub-bases (see table below).

## Combinations of modular base controllers and I/O modules with HE 10 type connector

Combination possible

Not applicable

| | Twido modules | Base controller | | Extension modules | | |
|---|---|---|---|---|---|---|
| | | 12 inputs | 8 outputs | 16 inputs | 16 outputs | |
| | **TWD** | **LMDA 20DTK/40DTK** *(6)* | | **DDI 16DK/32DK** *(6)* | **DDO 16TK/32TK** *(6)* | **DDO 32UK/32DK** |
| | Type of connection block | 26-way HE10 | | 20-way HE10 | | |
| **With TwidoFast pre-formed cables** | | | | | | |
| 12 inputs and 8 outputs | **TWD FCW 30M/50M** | | | | | |
| 16 inputs or 16 outputs | **TWD FCW 30K/50K** | | | | | |
| **With TwidoFast kits (sub-bases + cables)** | | | | | | |
| Telefast 2 mixed connection kits | | | | | | |
| 12 inputs/8 outputs | **TWD FST 20DR10/20DR20** | | | | | |
| Telefast 2 connection kits with passive sub-bases | | | | | | |
| 16 inputs | **TWD FST 16D10/16D20** | | | | | |
| Telefast 2 connection kits with relay sub-bases | | | | | | |
| 16 outputs | **TWD FST 16R10/16R20** | | | | | |
| **With Telefast 2 and all necessary cables** | | **ABF TP26MP●00** | | **ABF TE20EP●00** | **ABF TE20SP●00** | |
| Connection sub-bases | | | | | | |
| 8 channels | **ABE 7H08R●●/7H08S21** | | | *(1)* | *(1)* | |
| 12 channels | **ABE 7H12R●●/7H12S21** | | *(4)* | | | |
| 16 channels | **ABE 7H16R●●/H16C●●/7H16S21** | | | | | |
| | **ABE 7H16R23** | *(3)* | | | | |
| | **ABE 7H16F43** | | *(4)* | | | |
| | **ABE 7H16S43** | *(3)* | | | | |
| Input adapter sub-bases | | | | | | |
| 16 channels | **ABE 7S16E2●●/7P16F3●●** | *(3)* | | | | |
| Output adapter sub-bases | | | | | | |
| 8 channels | **ABE 7S08S2●●●** | | | | | |
| | **ABE 7R08S●●●/7P08T330** | | *(5)* | | *(1) (2)* | |
| 16 channels | **ABE 7R16S●●●/7R16T●●●/7P16T●●●** | | *(4)* | | | |
| | **ABE 7S16S1●●●** | | *(4)* | | | |
| | **ABE 7S16S2●●●** | | | | | |
| Sub-bases for analogue/counting I/O | | | | | | |
| | **ABE 7CPA01/7CPA02/7CPA03** | | | | | |
| | **ABE 7CPA21/7CPA31** | | | | | |

*(1) Using splitter sub-base ABE 7ACC02 which allows splitting of 16 channels into 2 x 8 channels (Twido/sub-base cable).*
*(2) For sub-base ABE 7R08S216 with 8 bistable relays, all 16 output channels are used.*
*(3) 12 input channels used out of 16 available.*
*(4) 8 output channels used out of 12/16 available.*
*(5) Except for sub-base ABE 7R08S216 with bistable relays which requires 16 output channels.*
*(6) Module with two connectors, requiring use of two identical cables.*

## Connections

**ABF TP26MP●00**

| *26-way HE10* ***A*** | | *20-way HE10* ***B*** | | *26-way HE10* ***C*** | |
|---|---|---|---|---|---|
| *Twido side* | 1 | *Input side* | – | *Output side* | 18 |
| | 2 | | 20 | | – |
| | 3 | | – | | 20 |
| | 4 | | 12 | | – |
| | 5 | | – | | 17 |
| | 6 | | 11 | | – |
| | 7 | | – | | 19 |
| | 8 | | 10 | | – |
| | 9 | | – | | – |
| | 10 | | 9 | | – |
| | 11 | | – | | 8 |
| | 12 | | 8 | | – |
| | 13 | | – | | 7 |
| | 14 | | 7 | | – |
| | 15 | | – | | 6 |
| | 16 | | 6 | | – |
| | 17 | | – | | 5 |
| | 18 | | 5 | | – |
| | 19 | | – | | 4 |
| | 20 | | 4 | | – |
| | 21 | | – | | 3 |
| | 22 | | 3 | | – |
| | 23 | | – | | 2 |
| | 24 | | 2 | | – |
| | 25 | | – | | 1 |
| | 26 | | 1 | | – |

**ABF TE20EP●00**

| *26-way HE10* ***A*** | | *20-way HE10* ***B*** | |
|---|---|---|---|
| *Twido side* | 1 | *Input side* | – |
| | 2 | | – |
| | 3 | | 18 |
| | 4 | | 20 |
| | 5 | | 16 |
| | 6 | | 8 |
| | 7 | | 15 |
| | 8 | | 7 |
| | 9 | | 14 |
| | 10 | | 6 |
| | 11 | | 13 |
| | 12 | | 5 |
| | 13 | | 12 |
| | 14 | | 4 |
| | 15 | | 11 |
| | 16 | | 3 |
| | 17 | | 10 |
| | 18 | | 2 |
| | 19 | | 9 |
| | 20 | | 1 |

**ABF TE20SP●00**

| *26-way HE10* ***A*** | | *20-way HE10* ***B*** | |
|---|---|---|---|
| *Twido side* | 1 | *Output side* | 18 |
| | 2 | | 20 |
| | 3 | | 19 |
| | 4 | | 17 |
| | 5 | | 16 |
| | 6 | | 8 |
| | 7 | | 15 |
| | 8 | | 7 |
| | 9 | | 14 |
| | 10 | | 6 |
| | 11 | | 13 |
| | 12 | | 5 |
| | 13 | | 12 |
| | 14 | | 4 |
| | 15 | | 11 |
| | 16 | | 3 |
| | 17 | | 10 |
| | 18 | | 2 |
| | 19 | | 9 |
| | 20 | | 1 |

# Twido programmable controller
Pre-wired solutions



## References

*TWD FST 16●0*

*TWD FST 16R●0*

### TwidoFast pre-formed cables

| Description | Description | For use with Twido | Gauge C.s.a. | Cable length | Reference | Weight kg |
|---|---|---|---|---|---|---|
| **Pre-formed cables** | 1 pre-formed cable: one end fitted with HE 10 connector, one end with free wires | Modular base controllers TWD LMDA 20DTK/40DTK | 22 0.035 mm² | 3 m | **TWD FCW 30M** | 0.405 |
| | | | 22 0.035 mm² | 5 m | **TWD FCW 50M** | 0.670 |
| | | I/O extensions TWD DDI 16DK/32DK TWD DDO 16●K/32●K | 22 0.035 mm² | 3 m | **TWD FCW 30K** | 0.405 |
| | | | 22 0.035 mm² | 5 m | **TWD FCW 50K** | 0.670 |
| **HE10 female connector** (Sold in packs of 5) | 26-way | – | – | – | **TWD FCN 5K26** | – |
| | 20-way | – | – | – | **TWD FCN 5K20** | – |

### TwidoFast kits (sub-bases + cables)

| Description | Description | For use with Twido | Gauge C.s.a. | Cable length | Reference | Weight kg |
|---|---|---|---|---|---|---|
| **16 inputs** | 1 passive sub-base 1 pre-formed cable | Inputs TWD DDI 16DK/32DK | 22 0.035 mm² | 1 m | **TWD FST 16D10** | 0.330 |
| | | | 22 0.035 mm² | 2 m | **TWD FST 16D20** | 0.410 |
| **16 outputs** | 1 relay sub-base 1 pre-formed cable | Outputs TWD DDO 16TK/32TK | 22 0.035 mm² | 1 m | **TWD FST 16R10** | 0.440 |
| | | | 22 0.035 mm² | 2 m | **TWD FST 16R20** | 0.520 |
| **12 inputs/8 outputs** | 1 passive sub-base 1 relay sub-base 1 pre-formed cable | Modular base controllers TWD LMDA 20DTK/40DTK | 22 0.035 mm² | 1 m | **TWD FST 20DR10** | 0.570 |
| | | | 22 0.035 mm² | 2 m | **TWD FST 20DR20** | 0.650 |

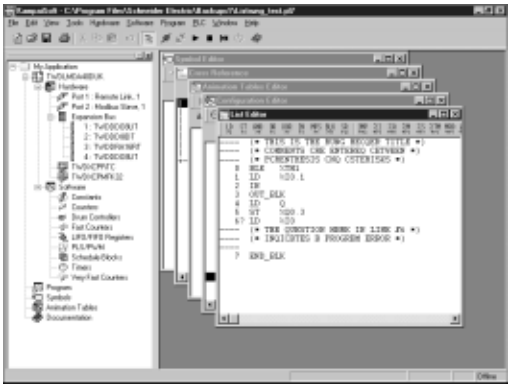
### Telefast 2 connection cables *(2)*

| Description | Description | For use with Twido | Gauge C.s.a. | Cable length | Reference | Weight kg |
|---|---|---|---|---|---|---|
| **Discrete I/O** | 1 pre-formed cable: one end fitted with 26-way HE 10 connector on Twido side, one end fitted with two 20-way HE 10 connectors on Telefast 2 side | Modular base controllers TWD LMDA 20DTK/40DTK | 28 0.080 mm² | 1 m | **ABF TP26MP100** | 0.200 |
| | | | 28 0.080 mm² | 2 m | **ABF TP26MP200** | 0.500 |
| | | | 28 0.080 mm² | 3 m | **ABF TP26MP300** | 0.800 |
| **Discrete inputs** | 1 pre-formed cable: one end fitted with 20-way HE 10 connector on Twido side, one end fitted with 20-way HE 10 connector on Telefast 2 side | Inputs TWD DDI 16DK/32DK | 28 0.080 mm² | 1 m | **ABF TE20EP100** | 0.080 |
| | | | 28 0.080 mm² | 2 m | **ABF TE20EP200** | 0.140 |
| | | | 28 0.080 mm² | 3 m | **ABF TE20EP300** | 0.210 |
| **Discrete outputs** | 1 pre-formed cable: one end fitted with 20-way HE 10 connector on Twido side, one end fitted with 20-way HE 10 connector on Telefast 2 side | Outputs TWD DDO 16TK/32TK | 28 0.080 mm² | 1 m | **ABF TE20SP100** | 0.080 |
| | | | 28 0.080 mm² | 2 m | **ABF TE20SP200** | 0.140 |
| | | | 28 0.080 mm² | 3 m | **ABF TE20SP300** | 0.210 |

*(1) Each station may be used as a decentralised I/O extension or as a local "reflex" programmable controller (with exchanges of input/output words between the different stations).*
*(2) For further details of the Telefast 2 range, please refer to the specialist catalogue "Telefast 2 pre-wired system".*

# Twido programmable controller
## TwidoSoft programming software





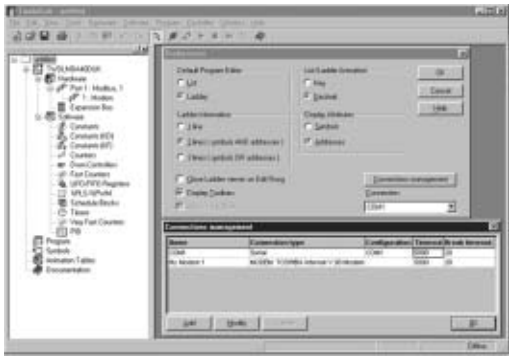
## Presentation

TwidoSoft is a graphical development environment for creating, configuring and managing applications for Twido programmable controllers. TwidoSoft is a 32-bit Windows-based program which runs on a PC with Windows 98 (second edition), 2000 or XP operating system. TwidoSoft software is based on a standard interface which offers the user-friendly features of the Windows environment with which users are already familiar: windows, toolbars, pull-down menus, balloon tips, context-sensitive help, etc.

For development work, TwidoSoft provides a comprehensive set of features to simplify programming and configuration:
- Programming in instruction list or ladder language. These two languages are reversible.
- Application browser with multiple window views, aiding easy software configuration.
- Editors for main programming and configuration functions.
- Cut, copy and paste functions.
- Symbolic programming.
- Cross-referencing.
- Duplication of application programs.

On site (on-line mode), TwidoSoft provides the following main functions:
- Real-time animation of program and/or data elements.
- Diagnostics on programmable controller operation.
- Monitoring of the application's use of memory.
- Downloading and uploading of controller programs.
- Backup of controller programs to the optional EEPROM memory modules.

### Connecting a PC to a Twido controller

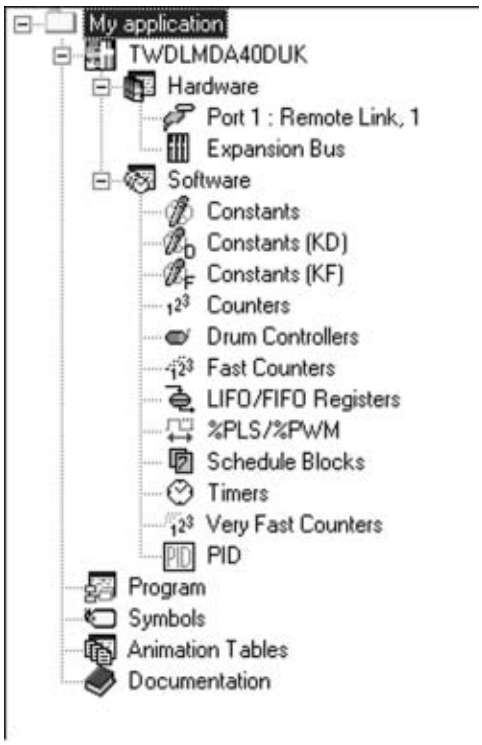


■ The PC is connected to the built-in serial port of the Twido controller by means of a TSX PCX 1031 multifunction cable or to a USB port using cable TSX PCX 3030 (Windows 2000 or XP only). It converts RS 232 output signals from the PC to RS 485 signals for the controller.
Connection of a PC, via cable, to the built-in port of Twido base controllers automatically sets the communication protocol of this port to a protocol which is compatible with TwidoSoft.

■ It is also possible to connect the PC to the serial port of Twido base controllers via modems.
The modems used must be defined, for TwidoSoft via the "Preferences" screen, and for the Twido controller, via the hardware configuration ("Connection management" screen).
When the connection is established, TwidoSoft and the Twido controller will each initialise the modem assigned to them by sending a initialisation string of the Hayes protocol type.

# Twido programmable controller
## TwidoSoft programming software
## User interface






### User interface

TwidoSoft provides an intuitive, Windows-based user interface, including balloon tips and on-line help. The Twido user interface offers the following features:

■ Application browser: this browser is a window providing the directory structure of the application. The windows and toolbars can be moved and attached to the borders of the main window. The elements of an application appear in a logical hierarchy based on their structure within the application. They are arranged as an indented tree structure which can be expanded or collapsed. The application browser can be used to view, program and manage a Twido application and to configure hardware using a graphical representation of the base controllers, I/O extensions and options.

■ Status bar: this is a panel at the bottom of the main window which displays information about the application, the controller status and the TwidoSoft software mode. This bar includes a "a memory usage indicator", indicating the percentage of total memory used by the program. A warning message is displayed when available memory is getting low.

■ Operating modes: TwidoSoft software can operate in on-line mode (PC connected to the Twido base controller) and off-line mode (PC disconnected from the Twido base controller). Off-line mode is used to develop an application in the design office. This application must then be transferred from the PC memory to the controller memory (downloaded) in order to be able to run on the controller. On-line mode is used to debug and adjust this application. In this mode, the application program in the PC memory is identical to the application in the controller memory. Program changes can therefore be made directly to the application in the Twido controller.

### Editors and viewers

TwidoSoft provides special windows, called editors, for performing the main tasks necessary to develop an application. A TwidoSoft application consists of a program, configuration data, symbols allocated to the variables and documentation. These components can be used in any order when creating an application.

Developing each part of an application using separate editors makes it possible to rationalise the development process. TwidoSoft software provides:
■ Instruction List language and Ladder language editors.
■ A configuration editor.
■ Variables editors (with symbols) and animation table editors.
■ Ladder language, cross reference and program error viewers.

TwidoSoft software also provides security features to protect the integrity of programs. "Application protection" right of access prevents access to the controller application. This option prohibits unauthorised transfers of an application. Password protection is selected when an application is transferred to the controller to make access to the application secure.

### Configuration of hardware and software

Configuring Twido programmable controllers consists of selecting options for the controller's hardware and software resources. These resources can be adapted at any time while creating a program:

■ Hardware resources allow the user to define the type and number of Twido components in a configuration: base controller, remote controllers, I/O expansion modules and optional modules.
■ Software resources consist of configurable and non configurable functions. Function blocks (also called variables) are blocks created in memory to execute automation functions which will be used by the program. For example, when configuring a counter function block, memory addresses in the controller are assigned to represent the values associated with the parameters of this counter (current values, preset values). Other software resources are called internal memory blocks, such as bits, words, constant words, system words, network exchange words.

These resources are configured using TwidoSoft software.

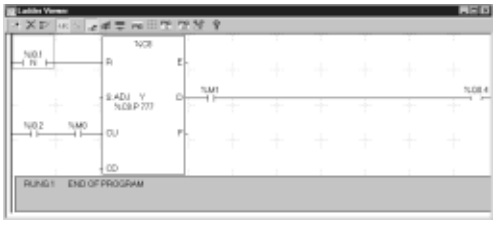
1

## Programming

TwidoSoft allows the user to write a controller program in either Ladder language or instruction List language. The language selected depends on user preference and does not affect the application:
- Ladder language consists of a series of ladder rungs, represented graphically, together with text comments.
- Instruction List language consists of a series of text-based instructions.

In either language, the program is "written" in the logical order required to control the machine or process. It is recommended that the programs be "documented" by adding comments (explanatory text inserted at program instruction level).

These two languages are reversible, provided that a few basic rules are followed:



### Ladder programming

A program written in Ladder language consists of networks of linked graphical elements (similar to electromagnetic contact diagrams), organised into rungs which are executed sequentially by the controller when it is in RUN mode.

Each rung comprises graphical elements (contacts, coils) linked by horizontal and vertical "lines", organised into a programming grid starting with a potential bar on the left and ending with a second potential bar on the right. The graphical elements are associated with:
- Controller inputs and outputs, such as sensors, pushbuttons and relays.
- Arithmetic, logic and numeric value comparison operations.
- Automation function blocks, such as timers, counters, drum controllers, registers, etc.
- Controller internal variables, such as internal bits and words.

### Instruction List programming

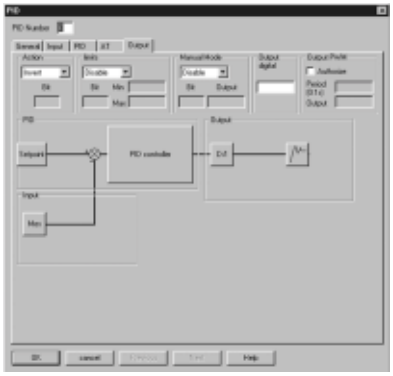
A program written in instruction List language consists of a series of instructions executed sequentially by the controller. Each instruction is represented by a single program line and consists of three components:
- Line number - line numbers are generated automatically when the instructions are entered.
- Instruction code - the instruction code is a symbol linked to an operand identifying the operation to be performed on this operand. These operations are generally of the Boolean and numerical type.
- Operand - an operand is a reference, a symbol or a number representing a piece of physical data. For example, in the program opposite, the operand %I0.4 is the reference corresponding to a controller discrete input.

### Programmable controller variables

An instruction can include from zero to three operands, depending on the type of instruction code. The operands may be:
- Sensor image inputs (detectors, control buttons, etc.)
- Preactuator output images (contactors, solenoid valves, pilot lights, etc.)
- Internal bits (equivalent to the internal relays in electromagnetic control equipment)
- Control equipment function blocks (timers, counters, drum controllers, registers).
- ...

# Twido programmable controller
## TwidoSoft programming software
## Integrated functions, software set-up





## Integrated functions

### PID

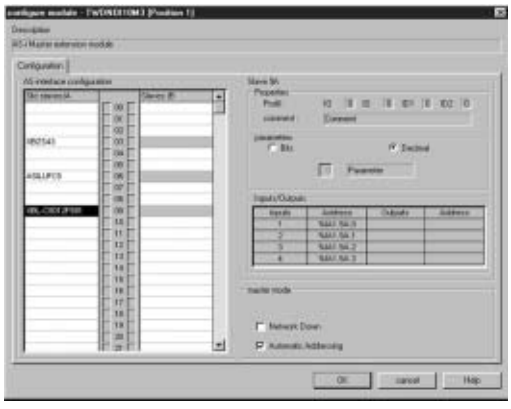
**For all controller versions ⩾ 2.0:**
- 14 PID programming loops.
- "Autotuning" algorithm ▲.
- Analogue / PWM output.
- Linear conversion of measuring input.
- 2 alarm levels (high and low) on the "measurement".
- Command output limits,
- Direct and inverse action.
- 2 animated modes for TwidoSoft PID:
  - configuration mode,
  - debugging mode.

### Event processing

**For all controller versions ⩾ 2.0:**
- Event management by the application.
- 2 priority levels.
- 3 types of source:
  - 4 event sources based on the basic inputs,
  - 4 event sources based on the very fast threshold counter (VFcounter),
  - 1 event source based on the periodic event (Timer).
- Command masked and enabled by the system bits.
- Each event executes a single user logic subroutine.
- Updating of "reflex" outputs.

## Software set-up

**For all controller versions ⩾ 2.0:**
Configuration of the AS-Interface bus is carried out via TwidoSoft software, version 2.0 or greater. The services offered are based on the principle of simplicity:
- Management of profile tables, parameters and data by the master (management transparent to the user).
- Topological addressing of I/O: any AS-Interface slave defined on the bus has a topological address assigned to it on the bus, in a way that is transparent to the user.
- Each AS-Interface module sensor/actuator is seen by Twido in the same way as any I/O.



### Configuration of the AS-Interface bus

Configuration of all the modules present on the AS-Interface bus is carried out by following the on-screen instructions:

**Definition of the AS-Interface bus master module**
Module TWD NOI 10M3 is defined like any I/O module.

**Configuration of AS-Interface slave modules**
From the definition screen, it is possible to configure all the slave modules corresponding to all the I/O of the interfaces present on the AS-Interface bus.
The user selects the reference of the AS-Interface module shown in the Schneider Electric catalogue, among the various discrete, analogue or safety modules. This selection automatically determines the AS-Interface profile and parameters associated with each interface module.

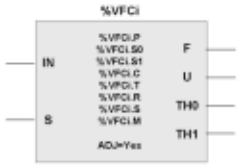
### Programming

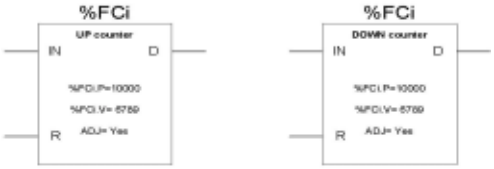
After configuration, the I/O connected to the AS-Interface bus are processed by the application program in the same way as any of the PLCs "In-rack" I/O, either by their address (e.g. %I\4.0\16.2, input 2 of slave 16 on the AS-Interface bus), or by their associated symbol (e.g. Start_conveyor).

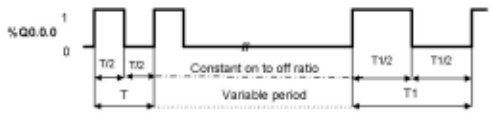
▲ Available 1st half of 2004.

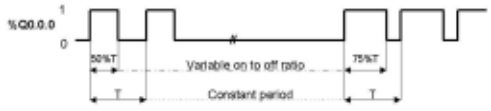
# Twido programmable controller
## TwidoSoft programming software
## Integrated counter, positioning






## Integrated counter function

The counter function allows the controller to count a large number of pulses, within one program scan cycle. Using its integrated 16-bit fast counters, Twido can count up to 65 535 pulses generated by ⎓ 24 V sensors. It can compare the current counter value with a preset value and trigger an output when the preset value is reached. This type of counter function can be used for counting parts or events, or for measuring length or position .

The number of integrated fast-counters depends on the type of base controller:

| Base controller type<br>TWD | Compact<br>LCAA 10/12/24 DRF | Modular<br>LMDA 20D●K |
|---|---|---|
| Counter VFC (20 kHz) | 1 | 2 |
| Counter FC (5 kHz) | 3 | 2 |

### Very fast counter - VFC (20 kHz)

The 20 kHz VFC (Very Fast Counter) is an up/down counter with possibility of auxiliary inputs. The counter is accessed by means of a function block (%VFCi) programmed using TwidoSoft. The %VFCi function block can be used to execute one of the following 5 functions, all with a maximum frequency of 20 kHz:

- Up/Down counter
- Up/Down counter with detection of running direction.
- Single Up counter.
- Single Down counter.
- Frequency meter.

The pulses to be counted may come from an incremental encoder or from 2 proximity sensors (up/down counting) connected to inputs I0 and I1 of Twido base controllers.

### Fast counter - FC (5 kHz)

The fast counter is available for up or down counting of pulses (rising edges) on the discrete inputs of Twido base controllers, at a maximum frequency of 5 kHz. The Up and Down counters are accessed by means of a function block (%VFCi) programmed using TwidoSoft. Using the configuration editor, the user must select either Up or Down counting mode for each function block, define the initial value of the preset %FCi.P (1...65 535) and select the attribute "adjustable" in order to be able to dynamically change the preset value %FCi.P and the current value %FCi.V.

Within function block %FCi, the current value %FCi.V varies by:

- Incrementing the value 0 to the preset value %FCi.P in counter mode.
- Decrementing the preset value %FCi.P to 0 in down counter mode.

## Positioning

Twido modular controllers include two positioning functions (frequency 7 kHz) which can be used, for example, for controlling step motors:

- Function PLS (pulse) - pulse generator output
- Function PWM - pulse width modulation output. This function can also be used for applications with light or sound intensity control (controller function).

### PLS function (pulse, 7kHz)

The PLS function block generates pulses of fixed ratio. In some cases, the frequency can be fixed and in others it is variable (as in control of slopes when driving step motors). The %PLS function block can be programmed to generate a specific number of pulses.

%PLS function blocks are assigned to outputs %Q0.0.0 or %Q0.0.1 on modular base controllers.

The pulse generator signal has a variable period, but with a constant duty cycle which establishes an ON to OFF ratio of 50 % of the period (see illustration opposite).

### PWM function (7 kHz)

The PWM function block generates pulses of fixed frequency, with a variable ratio between the high state and low state of the output signal. The ON to OFF duration ratio is a dynamic variable called %PWM.R, with a range from 0 % to 100 %.

PWM function blocks are assigned to outputs %Q0.0.0 or %Q0.0.1 on a base controller. The PWM function can be used to control analogue module outputs.

The user-defined %PWM function block generates a signal on output %Q0.0.0 or %Q0.0.1 of modular base controllers (see illustration opposite).

# Twido programmable controller
TwidoSoft programming software



## Characteristics

### Instructions

| | |
|---|---|
| **Combinational List instructions** | ■ **LD**, **LDN**, **LDR**, **LDF** : read the state of a bit, (direct, inverse, rising and falling edges)<br>■ **ST**, **STN**, **S**, **R** : write an output (direct, inverse, set, reset)<br>■ **AND**, **ANDN**, **ANDR**, **ANDF** : logic AND with a bit (direct, inverse, rising and falling edges)<br>■ **OR**, **ORN**, **ORR**, **ORF** : logic OR with a bit (direct, inverse, rising and falling edges)<br>■ **LD (, AND (, OR(,)** : open and close brackets (8 possible levels)<br>■ **XOR**, **XORN**, **XORR**, **XORF** : exclusive OR with a bit<br>■ **MPS**, **MRD**, **MPP** : buffer memory management for divergence towards output bits<br>■ **N** : negation |
| **Grafcet List instructions** | ■ **-*-i** : step (1 ≤ i ≤ 62)<br>■ **=*=i** : initial step (1 ≤ i ≤ 62)<br>■ **#i** : activate step i, after deactivation of current step<br>■ **#** : deactivate current step<br>■ **#Di** : deactivate step i after another step<br>■ **=*=POST** : start post-processing<br>■ **%Xi** : bit associated with step i |
| **Instructions on program** | ■ **MCS**, **MCR** : master relay<br>■ **END**, **ENDC**, **ENDCN** : end of program (conditional or unconditional)<br>■ **JMP**, **JMPC**, **JMPCN** : jump to a label % L (conditional or unconditional)<br>■ **SRn** : call subroutine n (0 ≤ n ≤ 15)<br>■ **RET** : end of subroutine<br>■ **NOP** : non-operative instruction |
| **List title and comments** | ■ **Title** : 122 characters before each **LD**, **LDN**, **LDR**, **LDF** instruction<br>■ **Comments** : 4 lines of 122 characters before each **LD**, **LDN**, **LDR**, **LDF** instruction<br>■ Possibility of associating a comment of 122 characters with each instruction |
| **Ladder rungs** | ■ 10 contacts of 7 lines with 1 output per line<br>■ Title : 122 characters per rung<br>■ Comments : 4 lines of 122 characters |
| **Ladder language graphical symbols** | ■ Normally open, normally closed and on edge contacts<br>■ Direct, inverse, SET and RESET coils<br>■ Program jump, subroutine call |
| **Standard function blocks** *(1)* | ■ Timers : **%TMi** (0 ≤ i ≤ 31) 0 to 9999 (word)<br>■ Up/Down counters : **%Ci** (0 ≤ i ≤ 15) 0 to 9999 (word)<br>■ 4 16-bit LIFO or FIFO registers : **%Ri** (0 ≤ i ≤ 3)<br>■ 4 Drum controllers : **%DRi** (0 ≤ i ≤ 3) 8 steps<br>■ Real-time clock : **%RTCi** (0 ≤ i ≤ 15) month, day, hour, minute. |
| **Specific function blocks** *(1)* | ■ Transmission/reception of message of 64 words maximum (internal or constant) : **EXCH**<br>■ Exchange control : **%MSG** available output, fault output<br>■ 8 shift bit registers : **%SBRi** (0 ≤ i ≤ 7), shift one step to the left or right (max. 16 steps)<br>■ 8 step counter blocks : **%SCi** (0 ≤ i ≤ 7), move forward or back one step (max. 256 steps)<br>■ Fast counter (5 kHz ), Up/Down counter : **%FC**<br>■ Very fast counter 20 kHz, Up/Down counter, frequency meter **%VFC**<br>■ Pulse width modulated output : **%PWM with modular base controller**<br>■ Pulse generator output : **%PLS with modular base controller** |
| **Numerical instructions** | ■ Assignment in word, indexed word, word table bit strings : **:=**<br>■ Arithmetic : **+**, **-**, **x**, **/**, **REM**, **SQRT**<br>■ Logic : **AND**, **OR**, **XOR**, **NOT**, **INC**, **DEC**<br>■ Shift operation : **SHL**, **SHR**, **ROL**, **ROR** (logic and rotate)<br>■ Conversion : **BTI**, **ITB** (BCD <-> Binary)<br>■ Comparison: **>**, **<**, **<=**, **>=**, **=**, **<>** |
| **Specific functions** | ■ 1 input for controller RUN/STOP command<br>■ 1 Security output : controller "block" error<br>■ Real time display of Grafcet steps used<br>■ Symbol table management |
| **Arithmetic functions with variables** | ■ +, -, *, /<br>■ SQRT<br>■ ABS<br>■ TRUNC<br>■ LOG<br>■ LN<br>■ EXP<br>■ EXPT |

*(1) When the numbers of objects are not indicated, see characteristics pages 1/6 and 1/12*

1

## Characteristics *(continued)*

### Instructions *(continued)*

| | |
|---|---|
| **Trigonometrical functions with variable** | ■ COS<br>■ SIN<br>■ TAN<br>■ ACOS<br>■ ASIN<br>■ ATAN<br>■ DEG_TO_RAD<br>■ RAD_TO_DEG |
| **Double word functions** | ■ +, -, *, /<br>■ SQRT<br>■ ABS<br>■ REM<br>■ INC<br>■ DEC<br>■ SHL<br>■ SHR<br>■ ROL<br>■ ROR |
| **Other functions** | ■ SUM_ARR<br>■ EQUAL_ARR<br>■ FIND_EQR_FIND_GTR, FIND_LTR<br>■ MAX_ARR, MIN_ARR<br>■ OCCUR_ARR<br>■ SORT_ARR<br>■ ROR_ARR, ROL_ARR<br>■ LENGTH_ARR<br>■ L_KUP<br>■ MEAN<br>■ ITB, BTI<br>■ DINT_TO_REAL, REAL_TO_DINT |

### Addressable objects

| | |
|---|---|
| **Bit objects** (1) | ■ **% I/Qx.y** : I/O bits<br>■ **% Mi** : internal bits<br>■ **% Si** : 128 system bits<br>■ **%Xi** : 62 Grafcet steps<br>■ **% ●●i.j** : function block bits<br>■ **% ●●i:Xk** : bits extracted from internal words, system words, constant words, input and output words |
| **Word objects** (1) | ■ **% MWi** : internal words<br>■ **% KWi**: 64 constant words<br>■ **% SWi** : 128 system words<br>■ **% INWi.j** : 4 input words per controller (exchange words for inter-controller communication)<br>■ **% QNWi.j** : 4 output words per controller (exchange words for inter-controller communication) |
| **Bit string and word table objects** | ■ **%●i:L** : bit strings (I/O, internal, system and Grafcet bits)<br>■ **%●Wi:L** : word tables (internal, constant and system words) |

*(1) When the numbers of objects are not indicated, see characteristics pages 1/6 and 1/12*

# Twido programmable controller
## TwidoSoft programming software



## References

The multi-language software packages (English, French, German, Italian and Spanish) are for use on PCs *(1)* with Windows 98 SE , Windows 2000 and Windows XP operating system.
These software packages include:
■ A CD-ROM containing TwidoSoft multi-language software and multi-language documentation for hardware and software set-up.
■ Depending on the model, a PC/Twido controller connection cable, reference TSX PCX 1031 which is compatible with Twido, Micro and Premium programmable controllers (length 2.5 m).

### TwidoSoft software packages

| Description | Reversible languages | PC connection cable | Reference *(1)* | Weight kg |
|---|---|---|---|---|
| **TwidoSoft multi-language packs** | Ladder Instruction List | TSX PCX 1031 | **TWD SPU 1001 V10M** | – |
| | | Without | **TWD SPU 1002 V10M** | – |

### Separate components

| Description | Application | | Reference | Weight kg |
|---|---|---|---|---|
| | From | To | | |
| **Connecting cables** | All Twido controllers | USB port on the PC *(2)* with TwidoSoft software installed | **TSX PCX 3030** | – |
| | | Serial port on the PC with TwidoSoft software installed | **TSX PCX 1031** | – |

### TwidoPack kits

Schneider Electric offers two TwidoPack kits to help you discover and become familiar with the new range of Twido programmable controllers. TwidoPack, which is inexpensive and easy to use, is available in two versions, each comprising:
■ A Twido base controller.
■ A set of options.
■ A TwidoSoft software package (with cable) TWD SPU 1001 V10M.
■ A teach-yourself E-Learning CD-Rom.

| Description | Twido base controller | Options | Reference *(3)* | Weight kg |
|---|---|---|---|---|
| **TwidoPack Compact** | Compact 10 I/O<br>TWD LCAA 10DRF<br>∿ 100…240 V, relay outputs | Real-time clock cartridge<br>TWD XCP RTC<br>6-input simulator<br>TWD XSM 6 | **TWD XDP PAK1●** | – |
| **TwidoPack Modular** | Modular 20 I/O<br>TWD LMDA 20DTK<br>⎓ 24V supply, transistor outputs | Real-time clock cartridge<br>TWD XCP RTC<br>Built-in display module<br>TWD XCP ODM<br>Serial interface adapter<br>TWD NAC 485T<br>Pre-formed cable (3 m)<br>TWD FCW 30M | **TWD XDP PAK2●** | – |

### User documentation

| Description | Format | Language | Reference | Weight kg |
|---|---|---|---|---|
| **Twido installation and set-up manuals**<br>Hardware and software | Hard copy (216 x 181 mm) | English | **TWD USE 10AE** | – |
| | | French | **TWD USE 10AF** | – |
| | | German | **TWD USE 10AD** | – |
| | | Spanish | **TWD USE 10AS** | – |
| | | Italian | **TWD USE 10AI** | – |

*(1) Typical recommended configuration: 300 MHz processor, 128 Mb of RAM with 40 Mb of available hard disk space.*
*(2) PC running under Windows 2000 or XP operating system only.*
*(3) Replace the ● at the end of the reference with* **E***: English,* **F***: French.*

Contents

# 2 - Zelio Relay - plug-in relays

# Zelio Relay - plug-in relays



| | | | | |
|---|---|---|---|---|
| **Applications** | | **Equipment based on control relays** | | |
| | | **Control relays** | **Mini-control relays** | |
| | |  |  |  |
| **Control voltages** | ~ | 12…690 V | 12…690 V | 24…400 V |
| | ⎓ | 12…440 V | 12…250 V | 12…72 V |
| **Functions** | | | | |
| | Instantaneous relays | ● | ● | ● |
| | On-delay or Off-delay relays | ● | ● | – |
| | Latching relays | ● | – | – |
| | Pulse on energisation relays | – | – | – |
| | Flashing relays | – | – | – |
| | ● *Function performed* | | | |
| **Features** | | Low consumption version for ⎓ | | Version with alternating contacts |
| | | Linked contacts (in accordance with INRS and BIA specifications) | | |
| | | – | | |
| | | – | | |
| **Number of contacts** | On basic device | 5 N/O or 3 N/O + 2 N/C combined double break | 4 N/C or N/O combined double break | 2 N/C or N/O combined double break |
| | On auxiliary contact blocks | Up to 4 N/C or N/O contacts combined double break | 4 N/C or N/O combined double break | 2 N/C or N/O combined double break |
| **Conventional thermal current** | | 10 A | | |
| **Operational voltage** | | Up to 690 V | Up to 660 V | Up to 690 V |
| **Durability** (operating cycles) | | | | |
| | 1 A/230 V, AC-15 | 30 million | 2 million | 10 million |
| | 1 A/24 V, DC-13 | 30 million | 6 million | 10 million |
| **Device type** | | **CAD** | **CA●-K** | **CA●-SK** |
| **Pages** | | Please consult our catalogue “Motor starter solutions” | | |

## Equipment based on plug-in control relays

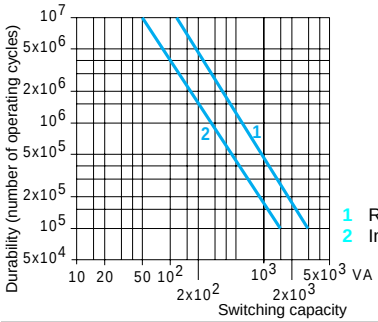
| Plug-in control relays | Universal type plug-in control relays | Miniature plug-in control relays | | Interface relays |
|---|---|---|---|---|
|  |  |  | |  |
| 12…240 V | 24…230 V<br>(other voltages available on request) | 24…230 V<br>(other voltages available on request) | | 24…240 V |
| 5…240 V | 24 or 48 V<br>(other voltages available on request) | 12, 24, 48 or 110 V<br>(other voltages available on request) | | 6, 12, 24, 48, 60 or 110 V |
| ● | ● | ● | | ● |
| ● | ● | – | | – |
| ● | – | – | | – |
| ● | ● | – | | – |
| ● | ● | – | | – |
| Low consumption as standard for ⎓ | Manual override of contact operation possible, by means of actuator | | | – |
| – | Version with LED to indicate relay status | | | – |
| Version with low level contacts (gold flashed contacts) | – | – | Version with gold-flashed contacts | – |
| – | Other functions and connections available on request | | | |
| 4 C/O (Off-delay, On-delay) | 2 or 3 C/O (Off-delay, On-delay) | 2 or 4 C/O (Off-delay, On-delay) | 2, 3 or 4 C/O (Off-delay, On-delay) | 1 or 2 C/O (Off-delay, On-delay) |
| – | – | – | – | – |
| 5 A | 10 A (RUN-21 and RUN-31)<br>4 A (RUN-33) | 5 A (RXN-21) | 6 A (RXL-4)<br>10 A (RXL-3)<br>12 A (RXL-2) | 8 A (RSB-2A080●●)<br>12 A (RSB-1A120●●)<br>16 A (RSB-1A160●●) |
| Up to 250 V | | | | Up to ∿ 400 V/⎓ 300 V |
| 400 000 | 500 000 | 100 000 | 100 000 | 100 000 |
| – | – | – | – | – |
| **RH** | **RU** | **RXN** | **RXL** | **RSB** |
| *(1)* | 2/5 | 2/8 | | 2/11 |

*(1) Please consult your Regional Sales Office.*

# Zelio Relay - plug-in relays
## Universal relays

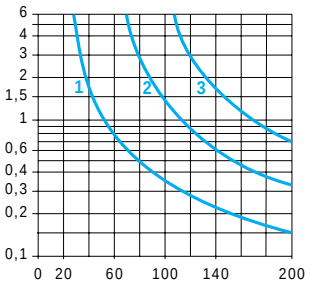
| Relay type | | | | RUN 21C | RUN 31C | RUN 21D | RUN 31A | RUN 33A |
|---|---|---|---|---|---|---|---|---|
| **Contact characteristics** | | | | | | | | |
| **Number and type of contacts** | | | | 2 C/O | 3 C/O | 2 C/O | 3 C/O | 3 C/O linked |
| **Contact materials** | | | | AgNi | | | | Hard silver 10 µ gold-flashed |
| **Rated thermal current** (Ith) | For temperature ⩽ 40 °C | | A | 10 | | 10 | | 4 |
| **Maximum operating rate** In operating cycles/h | No-load | | | 36 000 | | 36 000 | | 36 000 |
| | Under load | | | 3600 | | 3600 | | 3600 |
| **Switching voltage** | Minimum | | V | 20 | | 20 | | 10 |
| | Maximum | | V | ∿/⎓ 250 | | ∿/⎓ 250 | | ∿ 250, ⎓ 125 |
| **Breaking capacity** | Minimum | | mA | 50 | | 50 | | 1 |
| | Maximum | | VA | 3000 | | 3000 | | 1000 |
| **Coil characteristics** | | | | | | | | |
| **Rated voltage** (Un) | | ∿ | V | 24, 48, 110, 230, 50/60 Hz (other voltages available on request) | | | | |
| | | ⎓ | V | 12, 24, 48, 110 (other voltages available on request) | | | | |
| **Average consumption** | Inrush | ∿ | VA | 3.5 | | | | |
| | Sealed | | | ∿ 2.3 VA, ⎓ 1.5 W | | | | |
| **Permissible voltage variation** | | | | 0.8…1.1 Un (50 Hz or ⎓), 0.85…1.1 Un (60 Hz) | | | | |
| **Drop-out voltage threshold** | | | | ≥ ∿ 0.15 Un, ≥ ⎓ 0.05 Un | | | | |
| **Environment** | | | | | | | | |
| **Conforming to standards** | Standard version | | | EN 61810-1 | | | | |
| **Product certifications** (pending) | Standard version | | | UL, CSA | | | | |
| **Ambient air temperature** around the device | Storage | | °C | - 40…+ 70 | | | | |
| | Operation | | °C | ∿ - 20…+ 40, ⎓ - 20…+ 60 | | | | |
| **Vibration resistance** | Conforming to IEC EN 68-2-6 | | | 4 gn (30…100 Hz) | | | | |
| **Degree of protection** | | | | IP 40 | | | | |
| **Shock resistance** | | | | 10 gn | | | | |
| **Mechanical durability** | In millions of operating cycles | | | 20 | | | | |
| **Operating time** (response time) | Between coil energisation and making of the On-delay contact | ∿ | ms | About 15 | | | | |
| | | ⎓ | ms | About 15 | | | | |
| | Between coil de-energisation and making of the Off-delay contact | ∿ | ms | About 15 | | | | |
| | | ⎓ | ms | About 15 | | | | |
| **Electrical durability** In millions of operating cycles/h | Resistive load | | | ≥ 0.1 to 10 A | | | | |
| | Inductive load | | | See curves below | | | | |
| **Insulation characteristics** | | | | | | | | |
| **Rated insulation voltage (Ui)** | Conforming to IEC 947 | | V | 250 | | | | |
| **Insulation class** | Conforming to VDE 0110 | | | C 250, B 380 | | | | |
| **Dielectric strength** (rms voltage) | Between coil and contact | ∿ | V | 2500 | | | | |
| | Between poles | | V | 2500 | | | | |
| | Between contacts | ∿ | V | 1000 | | | | |

**Durability in N (230 V, 50 Hz)**




1 Resistive load
2 Inductive load

Switching capacity on a ⎓ supply for minimum durability of : $10^6$ operating cycles (resistive or inductive load with diode RVW 040BD)




1 Contact
2 Contacts in series
3 Contacts in series

| Socket type | | | RUZ 1A | RUZ 1D | RUZ 1C | RUZ 7A | RUZ 7D |
|---|---|---|---|---|---|---|---|
| **Socket characteristics** | | | | | | | |
| **Conventional rated thermal current (Ith)** | | A | 10 | | | | |
| **Insulation class** | | | C 250 | | | | |
| **Degree of protection** | | | IP 20 | | | | |
| **Product certifications** | | | CSA, UR | | | | |
| **Connection** | Solid cable without cable end | | 2 x 2.5 mm² | | | | |
| | Flexible cable with or w/o cable end | | 2 x 1.5 mm² | | | | |
| **Arrangement of coil/contact terminals** | | | Mixed | | | | |
| **Type of protection module** | | | – | | | **RUW** type E2 | |
| **Relay types used** | | | **RUN 31A RUN 33A** | **RUN 21D** | **RUN 21C RUN 31C** | **RUN 31A RUN 33A** | **RUN 21D** |

References : page 2/5
Dimensions : page 2/15
Schemes : page 2/13

# Zelio Relay - plug-in relays
## Universal relays

560592

*RUN 31C22●● + RUZ 1C*

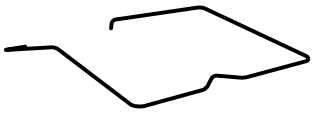
560593

*RUN 31A21●● + RUZ 1A*

560594

*RUN 33A22●● + RUW 101MW + RUZ 7A*

560590



*RUZ 200*

### Relays for standard applications

| Number of C/O contacts | Conventional rated thermal current | LED | Pins | Sold in lots of | Unit reference, to be completed by adding the control voltage code (1) | Weight |
|---|---|---|---|---|---|---|
| | A | | | | | kg |
| **2** | 10 | Without | Octal | 10 | **RUN 21D21●●** | 0.105 |
| | | | 8 flat pins | 10 | **RUN 21C21●●** | 0.110 |
| | | Green | Octal | 10 | **RUN 21D22●●** | 0.105 |
| | | | 8 flat pins | 10 | **RUN 21C22●●** | 0.110 |
| **3** | 10 | Without | Undecal | 10 | **RUN 31A21●●** | 0.105 |
| | | | 11 flat pins | 10 | **RUN 31C21●●** | 0.110 |
| | | Green | Undecal | 10 | **RUN 31A22●●** | 0.105 |
| | | | 11 flat pins | 10 | **RUN 31C22●●** | 0.110 |

### Relays with gold-flashed contacts

| | | | | | | |
|---|---|---|---|---|---|---|
| **3** | 4 | Green | Undecal | 10 | **RUN 33A22●●** | 0.105 |

### LED indicator modules *(2)*

| Description | Type | Voltage | Sold in lots of | Unit reference | Weight |
|---|---|---|---|---|---|
| | | V | | | kg |
| **"Power on" indication** | – | ∼ 110…230 | 20 | **RUW 010P7** | 0.006 |
| | | ⎓ 6/24 With protection diode | 20 | **RUW 030BD** | 0.006 |

### Protection modules *(2)*

| | | | | | |
|---|---|---|---|---|---|
| **Diode** | **E2** | ⎓ 6…230 | 20 | **RUW 040BD** | 0.006 |
| **Varistor** | **E2** | ∼ 24 | 20 | **RUW 042B7** | 0.006 |
| | **E2** | ∼ 230 | 20 | **RUW 042P7** | 0.006 |
| **RC circuit** | **E2** | ∼ 110…240 | 20 | **RUW 041P7** | 0.006 |

### Timer module *(2)*

| | | | | | |
|---|---|---|---|---|---|
| **Multifunction** | – | ⎓ 24…240 | 1 | **RUW 101MW** | 0.020 |

### Sockets

| Protection module | Relay type | I/O | Sold in lots of | Unit reference | Weight |
|---|---|---|---|---|---|
| | | | | | kg |
| **Without module (indicator, protection or timer)** | RUN 21 octal | Mixed | 10 | **RUZ 1D** | 0.067 |
| | RUN 31 and RUN 33 undecal | Mixed | 10 | **RUZ 1A** | 0.067 |
| | RUN 21C and RUN 31C | Mixed | 10 | **RUZ 1C** | 0.067 |
| **With module (indicator, protection or timer)** | RUN 31A and RUN 33 | Mixed | 10 | **RUZ 7A** | 0.069 |
| | RUN 21 octal | Mixed | 10 | **RUZ 7D** | 0.069 |

### Accessories

| Description | Sold in lots of | Unit reference | Weight |
|---|---|---|---|
| | | | kg |
| **Maintaining clamp for octal/undecal** | 25 | **RUZ 200** | 0.001 |
| **Maintaining clamp for flat pin** | 25 | **RUZ 210** | 0.001 |

*(1) Standard control circuit voltage. For other voltages, please consult your Regional Sales Office.*

| Volts | | 12 | 24 | 48 | 110 | 230 |
|---|---|---|---|---|---|---|
| ⎓ | RUN 21 and RUN 31 | JD | BD | ED | FD | – |
| | RUN 33 | – | BD | ED | – | – |
| ∼ **50/60 Hz** | RUN 21, RUN 31 and RUN 33 | – | B7 | E7 | F7 | P7 |

*(2) Modules for use with sockets **RUZ 7A** or **RUZ 7D**.*

### Coil characteristics

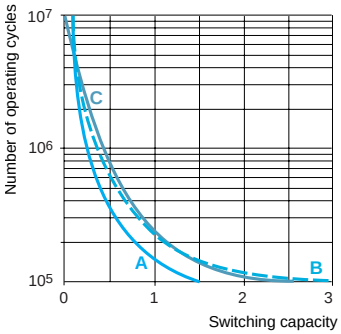
| Control circuit voltage Uc | d.c. supply | | | | a.c. supply 50/60 Hz | | | |
|---|---|---|---|---|---|---|---|---|
| | Average resistance at 20 °C ± 10% | Cod. | Operating voltage limits | | Average resistance at 20 °C ± 15 % | Cod. | Operating voltage limits | |
| | | | Min. | Max. | | | Min. | Max. |
| V | Ω | | V | V | Ω | | V | V |
| **12** | 96 | **JD** | 9.6 | 19.2 | – | | – | – |
| **24** | 384 | **BD** | 19.2 | 26.4 | 73.7 | **B7** | 204 | 26.4 |
| **48** | 1336 | **ED** | 38.4 | 52.8 | 305 | **E7** | 408 | 54.8 |
| **110** | 7660 | **FD** | 88 | 121 | 1710 | **F7** | 93.5 | 121 |
| **230** | – | – | – | – | 7500 | **P7** | 196 | 253 |

Characteristics : page 2/4
Dimensions : page 2/15
Schemes : page 2/13

# Zelio Relay - plug-in relays
## Miniature relays

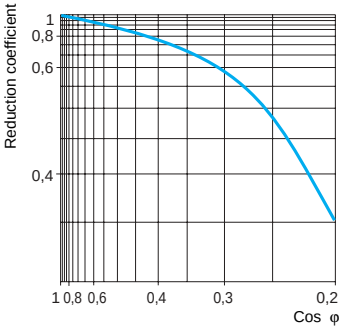
| Relay type | | | | RXL 2A12B●●● | RXL 3A10B●●● | RXL 4A06B●●● | RXL 4G06B●●● |
|---|---|---|---|---|---|---|---|
| **Contact characteristics** | | | | | | | |
| **Number and type of contacts** | | | | 2 C/O | 3 C/O | 4 C/O | |
| **Contact materials** | | | | AgNi | | | AgNi/AU 5 µ |
| **Conventional rated thermal current** (Ith) | For temperature ⩽ 40 °C | | **A** | 12 | 10 | 6 | |
| **Maximum operating rate** In operating cycles/h | No-load | | | 18 000 | | | |
| | Under load | | | 1200 | | | |
| **Switching voltage** | Minimum | | **V** | 5 | | | |
| | Maximum | | **V** | ∿ 250, ⎓ 250 | | | |
| **Breaking capacity** | Minimum | | **mA** | 5 | 5 | 5 | 2 |
| | Maximum | | **VA** | 3000 | 2500 | 1500 | 1500 |
| **Coil characteristics** | | | | | | | |
| **Rated voltage** (Un) | | ∿ | **V** | 24…230, 50/60 Hz | | | |
| | | ⎓ | **V** | 12…110 | | | |
| **Average consumption** | | ∿ | **VA** | 1.6 | | | |
| | | ⎓ | **W** | 0.9 | | | |
| **Permissible voltage variation** | | | | 0.8…1.1 Un (50/60 Hz or ⎓) | | | |
| **Drop-out voltage threshold** | | ∿ | | ≥ 0.15 Un | | | |
| | | ⎓ | | ≥ 0.1 Un | | | |
| **Environment** | | | | | | | |
| **Conforming to standards** | Standard version | | | IEC 61810-1 | | | |
| **Product certifications** (pending) | Standard version | | | UL, CSA | | | |
| **Ambient air temperature** around the device | Storage | | **°C** | - 40…+ 85 | | | |
| | Operation | | **°C** | ⎓ - 40…+ 70, ∿ - 40...+ 55 | | | |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | | > 5 gn (10…150 Hz) | | | |
| **Degree of protection** | | | | IP 40 | | | |
| **Shock resistance** | | | | 10 gn (closing), 5 gn (opening) | | | |
| **Mechanical durability** | In millions of operating cycles | | | ≥ 20 | | ≥ 20 | |
| **Operating time** (response time) | Between coil energisation and making of the On-delay contact | ∿ | **ms** | About 12 | | | |
| | | ⎓ | **ms** | About 12 | | | |
| | Between coil de-energisation and making of the Off-delay contact | ∿ | **ms** | About 12 | | | |
| | | ⎓ | **ms** | About 4 | | | |
| **Electrical durability** In millions of operating cycles/h | Resistive load | | | 12 A - 250 V : ≥ 0.1 | 10 A - 250 V : ≥ 0.1 | 6 A - 250 V : ≥ 0.1 | |
| | Inductive load | | | See curves below | | | |
| **Insulation characteristics** | | | | | | | |
| **Rated insulation voltage (Ui)** | Conforming to IEC 947 | | **V** | 250 | | | |
| **Insulation class** | Conforming to VDE 0110 | | | C 250 | | B 250 | |
| **Dielectric strength** (rms voltage) | Between coil and contact | ∿ | **V** | 2500 | | | |
| | Between poles | | **V** | 2500 | | 2000 | |
| | Between contacts | ∿ | **V** | 1500 | | | |

**Electrical durability of contacts**
Resistive load ∿



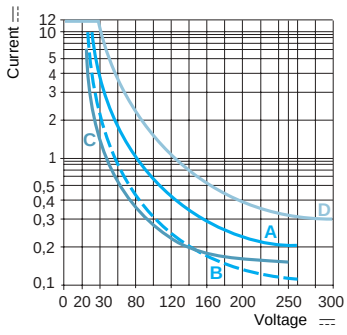

A ***RXL 4***
B ***RXL 2***
C ***RXL 3***

Reduction coefficient for inductive load (depending on power factor cos φ)




***RXL 2***, ***RXL 3*** *et* ***RXL 4***

Breaking capacity on a resistive load ⎓




A ***RXL 3*** *(T = 0 ms)*
B ***RXL 3*** *(T = 40 ms)*
C ***RXL 4***
D ***RXL 2***

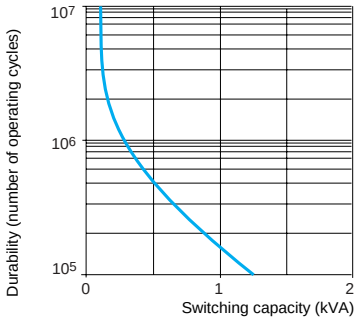
Durability (inductive load) = durability (resistive load) x reduction coefficient

References : pages 2/8 and 2/9
Dimensions : page 2/14
Schemes : page 2/12

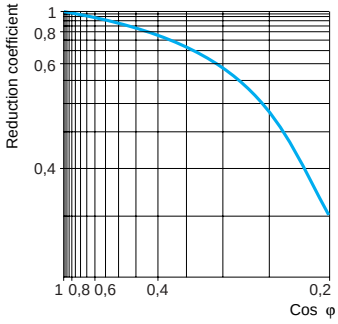
# Zelio Relay - plug-in relays
## Miniature relays

| Relay type | | | RXN 21E1●●● | RXN 41G1●●● |
|---|---|---|---|---|
| **Contact characteristics** | | | | |
| **Number and type of contacts** | | | 2 C/O | 4 C/O |
| **Contact materials** | | | AgNi | |
| **Rated thermal current** (Ith) | For temperature ⩽ 40 °C | **A** | 5 | |
| **Maximum operating rate** In operating cycles/h | No-load | | 18 000 | |
| | Under load | | 1200 | |
| **Switching voltage** | Minimum | **V** | Minimum: 5, maximum: 250 ∿ , 250 ⎓ | |
| **Breaking capacity** | Minimum | **mA** | 10 | |
| | Maximum | **VA** | 1250 | |
| **Coil characteristics** | | | | |
| **Rated voltage** (Un) | | **V** | ⎓ 12…110, ∿ 24…230, 50/60 Hz | |
| **Average consumption** | | | ⎓ 0.9 W, ∿ 1.6 VA | |
| **Permissible voltage variation** | | | 0.8…1.1 Un (50/60 Hz or ⎓) | |
| **Drop-out voltage threshold** | | | ⎓ ≥ 0.1 Un, ∿ ≥ 0.15 Un | |
| **Environment** | | | | |
| **Conforming to standards** | Standard version | | IEC 61810-1 | |
| **Approvals** (pending) | Standard version | | CSA, UL | |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 70 | |
| | Operation | **°C** | - 20…+ 50 | |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | > 5 gn (30…150 Hz) | |
| **Degree of protection** | | | IP 40 | |
| **Shock resistance** | | | 20 gn | |
| **Mechanical durability** | In millions of operating cycles | | 20 | |
| **Operating time** (response time) | Between coil energisation and making of the On-delay contact ∿ | **ms** | About 12 | |
| | ⎓ | **ms** | About 12 | |
| | Between coil de-energisation and making of the Off-delay contact ∿ | **ms** | About 12 | |
| | ⎓ | **ms** | About 4 | |
| **Electrical durability** In millions of operating cycles/h | Resistive load | | 5 A / 250 V : ≥ 0.1 | |
| | Inductive load | | See curves below | |
| **Insulation characteristics** | | | | |
| **Rated insulation voltage (Ui)** | Conforming to IEC 947 | **V** | 250 | |
| **Insulation class** | Conforming to VDE 0110 | | A 250 | |
| **Dielectric strength** (rms voltage) | Between coil and contact ∿ | **V** | 2000 | |
| | Between poles | **V** | 2000 | |
| | Between contacts ∿ | **V** | 1500 | |

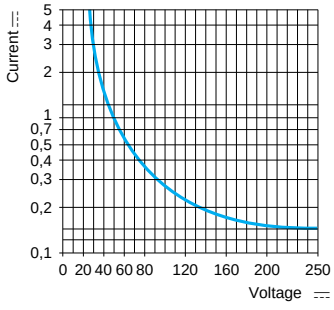
**Electrical durability of contacts**
Resistive load ∿




Reduction coefficient for inductive load (depending on power factor cos φ)




Breaking capacity on a resistive load ⎓




Durability (inductive load) = durability (resistive load) x reduction coefficient

| Socket type | | RXZ | E1S108M | E1S111M | E1S114M | E1M114M | E1M114 | 7G |
|---|---|---|---|---|---|---|---|---|
| **Socket characteristics** | | | | | | | | |
| **Conventional rated thermal current (Ith)** | | **A** | 12 | | | 12 | 7 | 6 |
| **Insulation class** | | | C 250 | | | | | |
| **Degree of protection** | | | IP 20 | | | | | |
| **Product certifications** | | | CSA, UR | | | | | |
| **Connection** | Solid cable without cable end | | 2 x 2.5 mm² | | | | 2 x 1.5 mm² | 2 x 2.5 mm² |
| | Flexible cable with or w/o cable end | | 2 x 1.5 mm² | | | | | |
| **Arrangement of coil/contact terminals** | | | Separate | | | Mixed | | |
| **Type of protection module** | | | **RZM** type E | | | | – | **RXW** type L |
| **Relay types used** | | | **RXL 2 RXN 21** | **RXL 3** | **RXL 4 RXN 4** | **RXL 4 RXN 4** | **RXL 2** *(1)*, **RXN 21 RXL 4, RXN 41** | **RXN 21 RXN 41** |

*(1) Limited to 7 A in operation.*

References : pages 2/8 and 2/9
Dimensions : page 2/14
Schemes : page 2/12

# Zelio Relay - plug-in relays
## Miniature relays

560586

*RXN 21E12BD + RXZ E1M114*

108780-26-s

*RXL 4A06B1BD + RXZ E1S114M*

560588

*RXL 2A12B2BD + RXZ P20 + RXZ E1S108M*

560589

*RXL 3A10B2BD + RZM 031RB + RXZ P10 + RXZ E1S111M*

## References

### Relays for standard applications *(1)*

| Number of C/O contacts | Conventional rated thermal current | LED | Sold in lots of | Unit reference, to be completed by adding the control voltage code (2) | Weight |
|---|---|---|---|---|---|
| | A | | | | kg |
| **2** | 5 | Red | 10 | **RXN 21E12●●** | 0.035 |
| | | Without | 10 | **RXN 21E11●●** | 0.034 |
| | 12 | Green | 10 | **RXL 2A12B2●●** | 0.036 |
| | | Without | 10 | **RXL 2A12B1●●** | 0.035 |
| **3** | 10 | Green | 10 | **RXL 3A10B2●●** | 0.036 |
| | | Without | 10 | **RXL 3A10B1●●** | 0.035 |
| **4** | 5 | Red | 10 | **RXN 41G12●●** | 0.035 |
| | | Without | 10 | **RXN 41G11●●** | 0.034 |
| | 6 | Green | 10 | **RXL 4A06B2●●** | 0.036 |
| | | Without | 10 | **RXL 4A06B1●●** | 0.035 |

### Relays with gold-flashed contacts *(1)*

| | | | | | |
|---|---|---|---|---|---|
| **4** | 6 | With | 10 | **RXL 4G06B2●●** | 0.036 |
| | | Without | 10 | **RXL 4G06B1●●** | 0.035 |

### Protection modules for sockets RXZ 7G

| Description | Type | Voltage | Sold in lots of | Unit reference | Weight |
|---|---|---|---|---|---|
| | | V | | | kg |
| **Diode** | **L** | ⎓ 12…250 | 10 | **RXW 040MD** | 0.010 |

### Protection modules for relay/sockets RXZ E●●●●M

| | | | | | |
|---|---|---|---|---|---|
| **Diode** | | ⎓ 6…230 | 10 | **RZM 040W** | 0.003 |
| **Diode + green LED** | **E** | ⎓ 6…24 | 10 | **RZM 031RB** | 0.004 |
| | | ⎓ 24…60 | 10 | **RZM 031BN** | 0.004 |
| | | ⎓ 110…230 | 10 | **RZM 031FPD** | 0.004 |
| **Varistor + green LED** | **E** | ⎓ or ∿ 6…24 | 10 | **RZM 021RB** | 0.005 |
| | | ⎓ or ∿ 24…60 | 10 | **RZM 021BN** | 0.005 |
| | | ⎓ or ∿ 110…230 | 10 | **RZM 021FP** | 0.005 |
| **RC circuit** | **E** | ∿ 24…60 | 10 | **RZM 041BN7** | 0.010 |
| | | ∿ 110…240 | 10 | **RZM 041FU7** | 0.010 |

*(2) Standard control circuit voltages*

| Volts | | 12 | 24 | 48 | 110 | 120 | 230 |
|---|---|---|---|---|---|---|---|
| ⎓ | | JD | BD | ED | FD | – | – |
| ∿ **(50/60 Hz)** | RXN | – | B7 | E7 | F7 | – | P7 |
| | RXL | – | B7 | E7 | – | F7 | P7 |

*For other voltages, please consult your Regional Sales Office.*

### Coil characteristics

| Control circuit voltage Uc | d.c. supply | | | | a.c. supply 50/60 Hz | | | |
|---|---|---|---|---|---|---|---|---|
| | Average resistance at 20 °C ± 10% | Cod. | Operating voltage limits | | Average resistance at 20 °C ± 15 % | Cod. | Operating voltage limits | |
| | | | Min. | Max. | | | Min. | Max. |
| V | Ω | | V | V | Ω | | V | V |
| **RXN relays** | | | | | | | | |
| **12** | 160 | **JD** | 9.6 | 13.2 | – | – | – | – |
| **24** | 640 | **BD** | 19.2 | 26.4 | 150 | **B7** | 19.2 | 26.4 |
| **48** | 2600 | **ED** | 38.4 | 52.8 | 635 | **E7** | 38.4 | 52.8 |
| **110** | 13 600 | **FD** | 88 | 121 | – | **F7** | – | – |
| **230** | – | – | – | – | 15 400 | **P7** | 184 | 253 |
| **RXL relays** | | | | | | | | |
| **12** | 160 | **JD** | 9.6 | 13.2 | – | – | – | – |
| **24** | 640 | **BD** | 19.2 | 26.4 | 158 | **B7** | 19.2 | 26.4 |
| **48** | 2600 | **ED** | 38.4 | 52.8 | 640 | **E7** | 38.4 | 52.8 |
| **110** | 13 600 | **FD** | 88 | 121 | – | – | – | – |
| **120** | – | – | – | – | 3770 | **F7** | 96 | 132 |
| **230** | – | – | – | – | 16 100 | **P7** | 184 | 253 |

*(1) These relays have a lockable Test button on their front face, which can be converted to non-lockable or can be eliminated; see accessories on page opposite.*

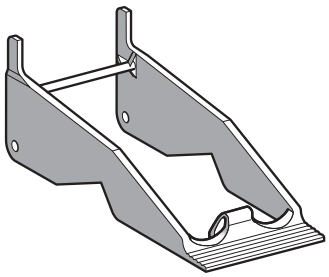
Characteristics : pages 2/6 and 2/7
Dimensions : page 2/14
Schemes : page 2/12

# Zelio Relay - plug-in relays
## Miniature relays

560590

*RXZ 200*

560591



*RXZ R235*

### Sockets *(1)*

| Protection module | Application | Type | I/O | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|---|---|---|
| **Without** | RXN 21, RXN 41, RXL 2A12 and RXL 4 | – | Mixed | 10 | **RXZ E1M114** | 0.048 |
| **With** | RXN 21, RXN 41 | L | Mixed | 10 | **RXZ 7G** | 0.055 |
| | RXN 21, RXL 2 | E | Separate | 10 | **RXZ E1S108M** | 0.058 |
| | RXL 3A10 | E | Separate | 10 | **RXZ E1S111M** | 0.065 |
| | RXN 4, RXL 4 | E | Separate | 10 | **RXZ E1S114M** | 0.070 |
| | | E *(2)* | Mixed | 10 | **RXZ E1M114M** | 0.070 |

### Accessories

| Description | Application | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|---|
| **Button** | For non-lockable Test function | 20 *(3)* | **RXZ P20** | 0.001 |
| **Blanking cover** | For elimination of Test function | 20 *(3)* | **RXZ P10** | 0.001 |
| **Metal maintaining clamps** | For use on all sockets | 10 | **RXZ 200** | 0.001 |
| **Plastic maintaining clamps** | RXZ E | 10 | **RXZ R235** | 0.005 |
| **Legends** | Clip-in fixing on socket RXZ-7G | 10 | **RXZ 300** | 0.010 |
| | Clip-in fixing on socket RXZ-7 in place of module RXW 040MD | 10 | **RXZ 310** | 0.011 |
| | Clip-in fixing on socket RXZ-E | 10 | **RXZ L320** | 0.001 |

*(1) A bag containing ten **RXZ 300** legends is supplied with sockets **RXZ 7G**.*
*  **RXZ E1M114** : 7 A, ∿ 300 V.*
*  **RXZ 7G** : 6 A, ∿ 300 V.*
*  **RXZ E1S●●●M** : 12 A, ∿ 300 V.*
*(2) Each socket **RXZ E1M114M** is delivered with a legend **RXZ L320**.*
*(3) 10 red and 10 green.*

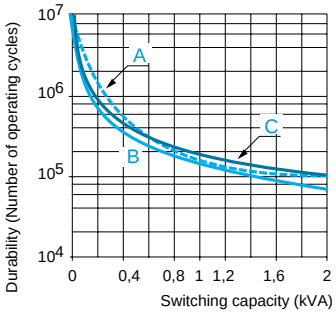
Characteristics : pages 2/6 and 2/7
Dimensions : page 2/14
Schemes : page 2/12

# Zelio Relay - plug-in relays
## Interface relays

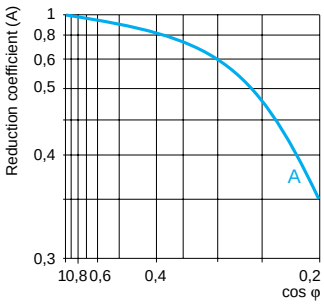
2

| Relay type | | | RSB 2A080●● | RSB 1A120●● | RSB 1A160●● |
|---|---|---|---|---|---|
| **Contact characteristics** | | | | | |
| **Number and type of contacts** | | | 2 C/O | 1 C/O | 1 C/O |
| **Contact materials** | | | AgNi | | |
| **Rated thermal current** (Ith) | For temperature ⩽ 40 °C | **A** | 8 | 12 | 16 |
| **Maximum operating rate** In operating cycles/h | No-load | | 72 000 | | |
| | Under load | | 600 | | |
| **Switching voltage** | Minimum | **V** | 5 | | |
| | Maximum | **V** | ∼ 400, ⎓ 300 | | |
| **Breaking capacity** | Minimum | **mA** | 5 | | |
| | Maximum | **VA** | 2000 | 3000 | 4000 |
| **Coil characteristics** | | | | | |
| **Rated voltage** (Un) | | **V** | ⎓ 6…110, ∼ 24…240, 50/60 Hz | | |
| **Average consumption** | | | ⎓ 0.45 W, ∼ 0.75 VA | | |
| **Permissible voltage variation** | | | 0.8…1.1 Un (50/60 Hz or ⎓) at 20 °C | | |
| **Drop-out voltage threshold** | | | ≥ ⎓ 0.1 Un, ≥ ∼ 0.15 Un | | |
| **Environment** | | | | | |
| **Conforming to standards** | Standard version | | IEC 61810-1 | | |
| **Product certifications** (pending) | Standard version | | UL, CSA | | |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 85 | | |
| | Operation | **°C** | ⎓ - 40…+ 85, ∼ - 40...+ 70 | | |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | > 10 gn (10…150 Hz) | | |
| **Degree of protection** | | | IP 40 | | |
| **Shock resistance** | | | 10 gn (closing), 5 gn (opening) | | |
| **Mechanical durability** | In millions of operating cycles | | ≥ 30 | | |
| **Operating time** (response time) | Between coil energisation and making of the On-delay contact ∼ | **ms** | About 12 | | |
| | Between coil energisation and making of the On-delay contact ⎓ | **ms** | About 9 | | |
| | Between coil de-energisation and making of the Off-delay contact ∼ | **ms** | About 10 | | |
| | Between coil de-energisation and making of the Off-delay contact ⎓ | **ms** | About 4 | | |
| **Electrical durability** In millions of operating cycles/h | Resistive load | | 8 A - 250 V : ≥ 0.1 | 12 A - 250 V : ≥ 0.1 | 16 A - 250 V : ≥ 0.07 |
| | Inductive load | | See curves below | | |
| **Insulation characteristics** | | | | | |
| **Rated insulation voltage (Ui)** | Conforming to IEC 947 | **V** | 400 | | |
| **Insulation class** | Conforming to VDE 0110 | | C 250 | | |
| **Dielectric strength** (rms voltage) | Between coil and contact ∼ | **V** | 5000 | | |
| | Between poles | **V** | 2500 | | |
| | Between contacts ∼ | **V** | 1000 | | |

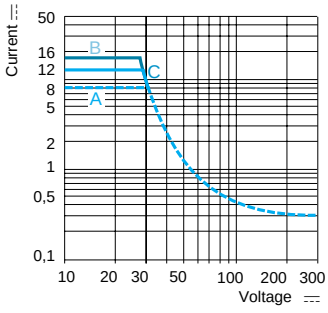
**Electrical durability of contacts**
Resistive load ∼




Reduction coefficient for inductive load ∼ (depending on power factor cos φ)




Maximum switching capacity on a resistive load ⎓




A ***RSB 2A080●●*** B ***RSB 1A160●●*** C ***RSB 1A120●●***

Durability (inductive load) = durability (resistive load) x reduction coefficient.

| Socket type | | | RSZ E1S48M | RSB E1S35M |
|---|---|---|---|---|
| **Socket characteristics** | | | | |
| **Conventional rated thermal current (Ith)** | | **A** | 12 | |
| **Insulation class** | | | C 250 | |
| **Degree of protection** | | | IP 20 | |
| **Product certifications** | | | CSA, UR | |
| **Connection** | Solid cable without cable end | | 2 x 2.5 $mm^2$ | |
| | Flexible cable with or w/o cable end | | 2 x 1.5 $mm^2$ | |
| **Arrangement of coil/contact terminals** | | | Separate | |
| **Type of protection module** | | | **RZM** type E | |
| **Relay types used** | | | **RSB 2A080** and **RSB 1A160** (contacts to be wired in parallel) | **RSB 1A120** |

References : page 2/11
Dimensions : page 2/14
Schemes : page 2/12

# Zelio Relay - plug-in relays
## Interface relays



560582

*RSB 2A080BD + RSZ E1S48M*

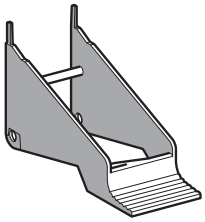
560583

*RSB 1A120JD + RZM 031FPD + RSZ E1S35M*

560584

*RSB 1A160BD + RSZ E1S48M*

560585



*RSZ R215*

### Relays for standard applications

| Number of C/O contacts | Conventional rated thermal current | Sold in lots of (2) | Unit reference, to be completed by adding the control voltage code (1) (2) | Weight |
|---|---|---|---|---|
| | A | | | kg |
| 2 | 8 | 10 | RSB 2A080●● | 0.014 |
| 1 | 12 | 10 | RSB 1A120●● | 0.014 |
| | 16 | 10 | RSB 1A160●● | 0.014 |

### Protection modules

| Description | Type | Voltage | Sold in lots of | Unit reference | Weight |
|---|---|---|---|---|---|
| | | V | | | kg |
| Diode | E | ⎓ 6…230 | 10 | RZM 040W | 0.003 |
| Diode + LED | E | ⎓ 6…24 | 10 | RZM 031RB | 0.004 |
| | | ⎓ 24…60 | 10 | RZM 031BN | 0.004 |
| | | ⎓ 110…230 | 10 | RZM 031FPD | 0.004 |
| Varistor + LED | E | ⎓ or ∿ 6…24 | 10 | RZM 021RB | 0.005 |
| | | ⎓ or ∿ 24…60 | 10 | RZM 021BN | 0.005 |
| | | ⎓ or ∿ 110…230 | 10 | RZM 021FP | 0.005 |
| RC circuit | E | ∿ 24…60 | 10 | RZM 041BN7 | 0.010 |
| | | ∿ 110…240 | 10 | RZM 041FU7 | 0.010 |

### Sockets - 12 A, ∿ 300 V

| Application | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|
| RSB 2A080 and RSB 1A160 | 10 | RSZ E1S48M | 0.050 |
| RSB 1A120 | 10 | RSZ E1S35M | 0.060 |

### Accessories

| Application | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|
| Maintaining clamp | 10 | RSZ R215 | 0.002 |
| Legend | 10 | RSZ L300 | 0.001 |

*(1) Standard control circuit voltages*

| Volts | 6 | 12 | 24 | 48 | 60 | 110 | 120 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|---|---|---|
| ⎓ | RD | JD | BD | ED | ND | FD | – | – | – | – |
| ∿ 50/60 Hz | – | – | B7 | E7 | – | – | F7 | M7 | P7 | U7 |

*For other voltages, please consult your Regional Sales Office.*

*(2) To order a relay complete with socket (**sold in lots of 20**): add suffix **S** to the references selected above. Example: **RSB 2A080●● becomes RSB 2A080●●S***

### Coil characteristics

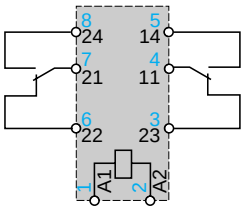
| Control circuit voltage Uc | d.c. supply: Average resistance at 20 ° ± 10% | Cod. | d.c. supply: Operating voltage limits Min. | Max. | a.c. supply 50/60 Hz: Average resistance at 20 °C ± 15 % | Cod. | Operating voltage limits Min. | Max. |
|---|---|---|---|---|---|---|---|---|
| V | Ω | | V | V | Ω | | V | V |
| 6 | 90 | RD | 4.2 | 15.3 | – | – | – | – |
| 12 | 360 | JD | 8.4 | 30.6 | – | – | – | – |
| 24 | 1440 | BD | 16.8 | 61.2 | 400 | B7 | 19.2 | 26.4 |
| 48 | 5700 | ED | 33.6 | 122.4 | 1550 | E7 | 38.4 | 57.6 |
| 60 | 7500 | ND | 42 | 153 | – | – | – | – |
| 110 | 25 200 | FD | 77 | 280 | – | – | – | – |
| 120 | – | – | – | – | 10 200 | F7 | 96 | 144 |
| 220 | – | – | – | – | 35 500 | M7 | 176 | 264 |
| 230 | – | – | – | – | 38 500 | P7 | 184 | 276 |
| 240 | – | – | – | – | 42 500 | U7 | 192 | 288 |

Characteristics : page 2/10
Dimensions : page 2/14
Schemes : page 2/12

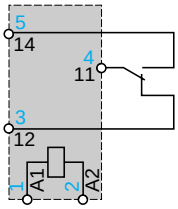
# Zelio Relay - plug-in relays

## Interface relays *(1)*

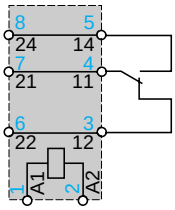
**RSB 2A080●●**




**RSB 1A120●●**



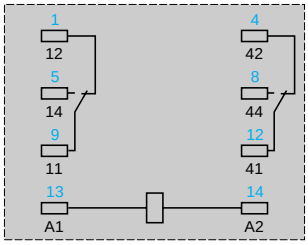

**RSB 1A160●●**



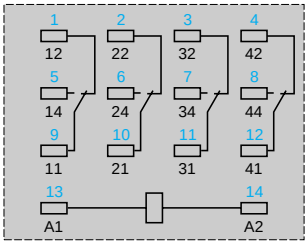

When using relay RSB 1A160●● with socket RSZ E1S48M : terminals 11 and 21, 14 and 24, 12 and 22 must be linked.

## Miniature relays *(1)*

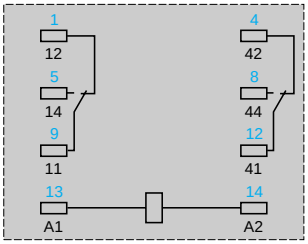
**RXN 21E1●●●**



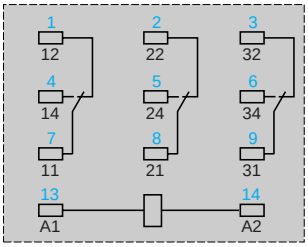

**RXN 41G**



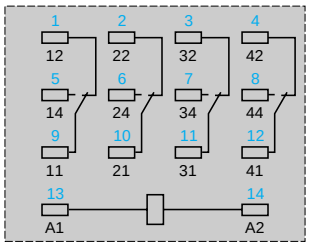

**RXL 2●●**




**RXL 3●●**

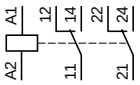



**RXL 4●●**

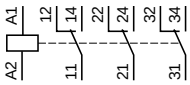



## Universal relays *(1)*

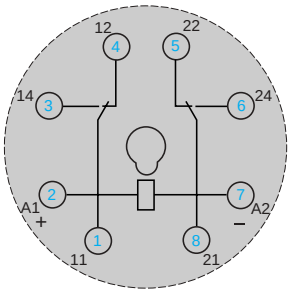
**RUN 21D2●●●, RUN 21C2●●●**



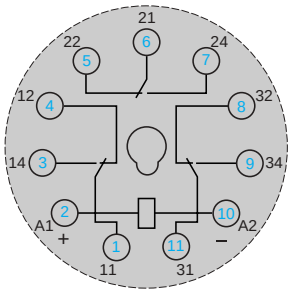

**RUN 31A2●●●, RUN 33A2●●●**
**RUN 31C2●●●**



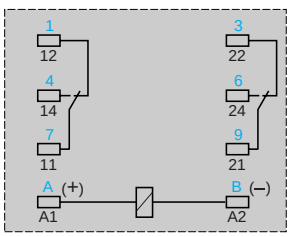

**RUN 21D2●●●**



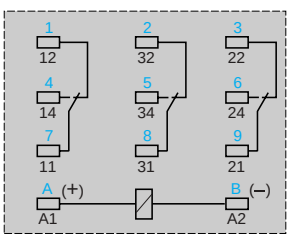

**RUN 33A2●●●, RUN 31A2●●●**




**RUN 21C2●●●**




**RUN 31C2●●●**




*(1) Blue references are those marked on the relay .*

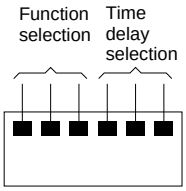
References :
pages 2/5, 2/8 and 2/11

Dimensions:
page 2/14

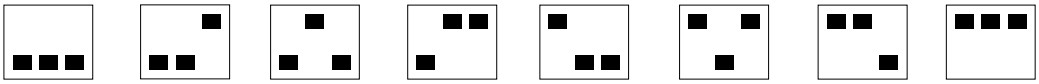
# Zelio Relay - plug-in relays
## Universal relays

**Multifunction timer module**
**RUW 101MW**

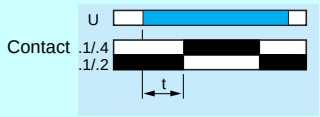
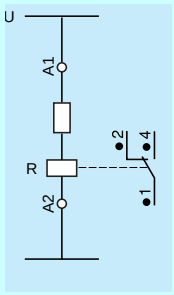
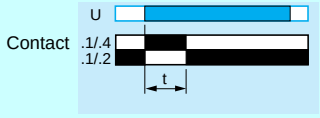
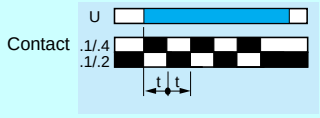
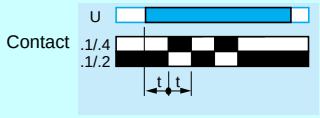
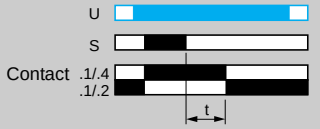
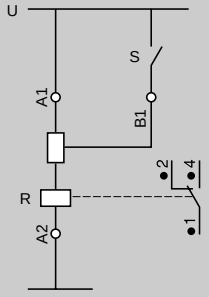
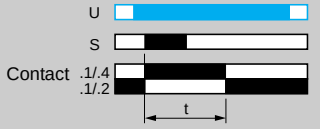
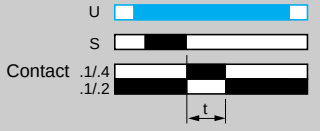
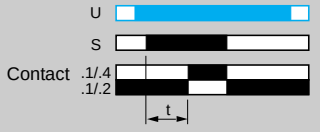
Programming




Timing range selection




Function selection

| Selection | Function | Control | Function diagram | Control scheme |
|---|---|---|---|---|
| | **On-delay timer E** | Series control |  |  |
| | **Monostable with maintained control Wu** | Series control |  | |
| | **Flashing relay, starting On-delay phase Bi** | Series control |  | |
| | **Flashing relay, starting Off-delay phase Bp** | Series control |  | |
| | **Off-delay timer R** | Control by external contact (S) |  |  |
| | **Monostable with pulse control Ws** | Control by external contact (S) |  | |
| | **Monostable starting on de-energisation Wa** | Control by external contact (S) |  | |
| | **On-delay timer Es** | Control by external contact (S) |  | |

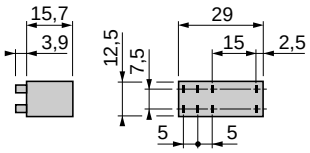
Power off / Power on — Contact open / Contact closed — U : voltage — R : relay RUN●●● — S : external control — t : adjustable time delay

References :
page 2/5

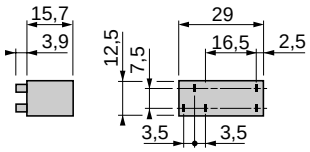
# Zelio Relay - plug-in relays

## Interface relays (references: page 2/11)

### RSB 2A080●●, RSB 1A160●●

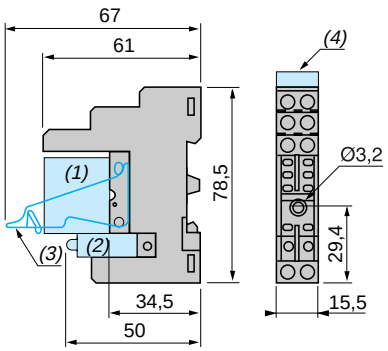



### RSB 1A120●●

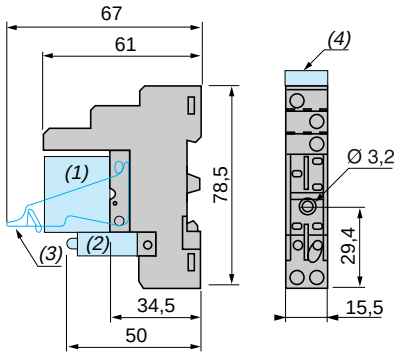



## Sockets (references: page 2/11)

### RSZ E1S48M

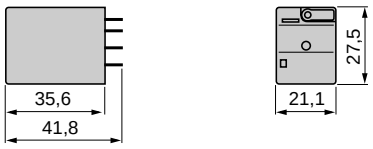



### RSZ E1S35M



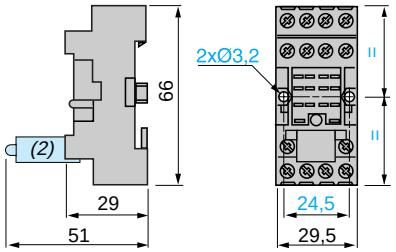

## Miniature relays (references: pages 2/8)

### RXN 21E1●●●, RXN 41G1●●●, RXL●●●

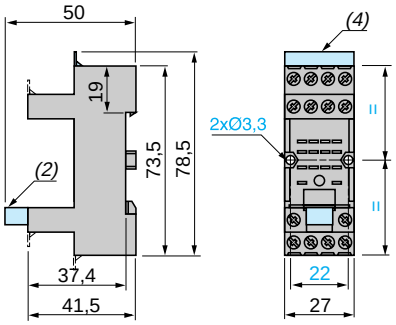



## Sockets (references: page 2/9)

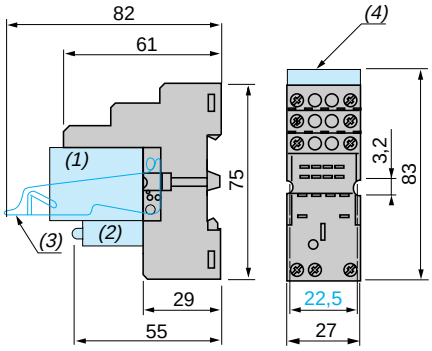
### RXZ E1M114



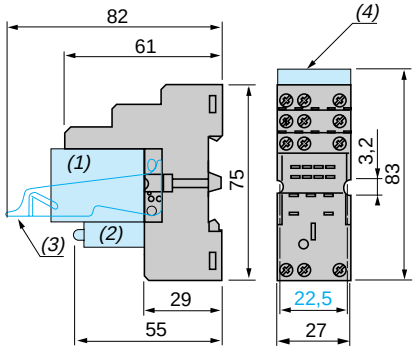

### RXZ 7G



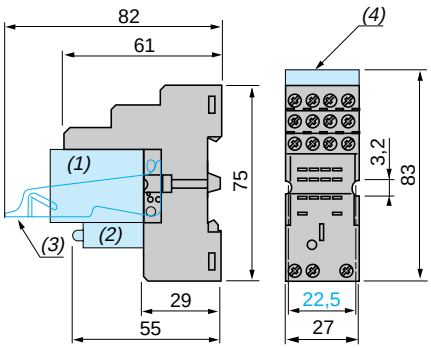

### RXZ E1S108M



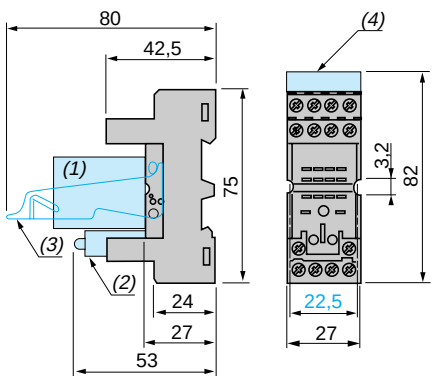

### RXZ E1S111M




### RXZ E1S114M




### RXZ E1M114M



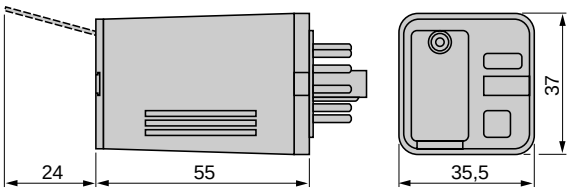

*(1) Relays, (2) Add-on protection module,*
*(3) Maintaining clamp, (4) Legend.*

References:
pages 28042/4, 28042/5 and 2/

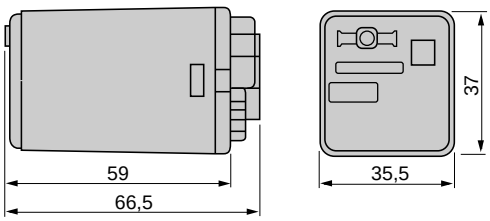
Schemes:
page 2/12

## Universal relays (references: page 2/5)

**RUN 21D2●●●, RUN 31A2●●●, RUN 33A2●●●**

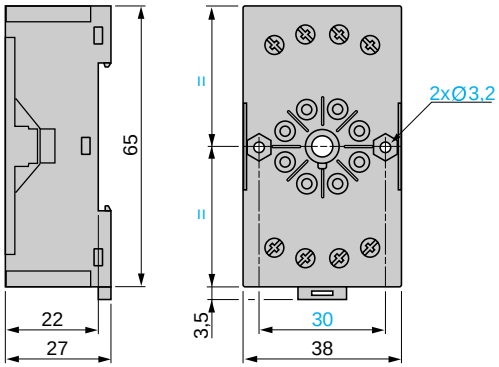



**RUN 21C2●●● , RUN 31C2●●●**

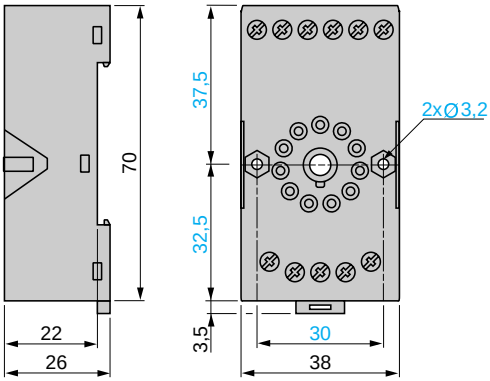



## Sockets (references: page 2/5)

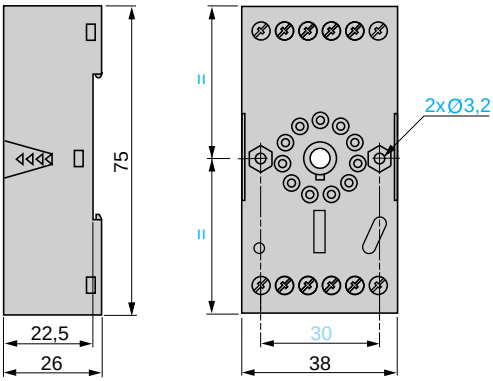
**RUZ 1D**



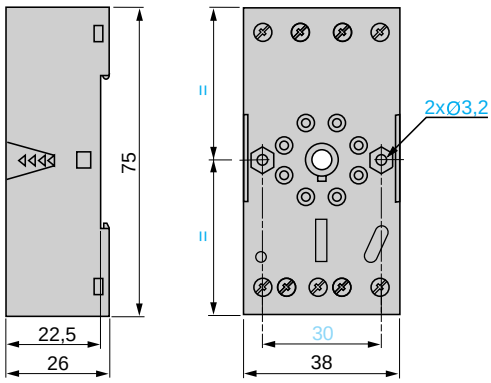

**RUZ 1A**



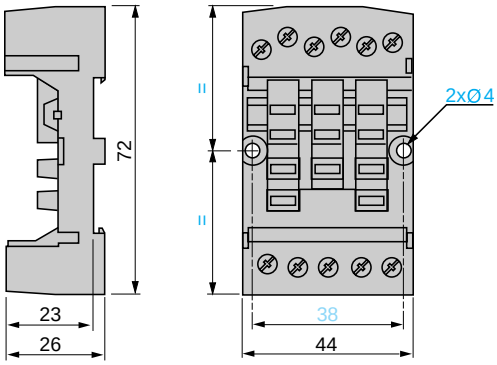

**RUZ 7A**




**RUZ 7D**




**RUZ 1C**




References:
page 2/5

Schemes:
page 2/13

Contents

# 3 - Zelio Time - timing relays

# Zelio Time - timing relays



| | | | | |
|---|---|---|---|---|
| **Applications** | **These timing relays enable simple automation cycles to be set up using wired logic. They can also be used to complement the functions of PLCs.** | | | |
| **Output** | **Solid state**<br>**Timing relays with solid state output reduce the amount of wiring required (wired in series). The durability of these timing relays is independent of the number of operating cycles.** | | **Relay**<br>**Relay outputs provide complete isolation between the supply and outut circuits.**<br>**It is possible to have several output circuits.** | |
| |  |  |  |  |
| **Type** | Modular | Industrial | Modular | Industrial |
| **Timing ranges** | *7 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h, 100 h | *1 or 2 ranges,*<br>depending on model :<br>10 s, 30 s, 300 s, 60 min | *7 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h, 100 h | Depending on model :<br>*4 ranges :*<br>0.6 s, 2.5 s, 20 s, 160 s<br>*7 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h, 100 h<br>*7 ranges :*<br>1 s, 3 s, 10 s, 30 s, 100 s, 300 s, 10 min<br>*10 ranges :*<br>1 s, 3 s, 10 s, 30 s, 100 s, 300 s, 30 min, 300 min, 30 h, 300 h |
| **Relay type** | **RE 88 826 0●●** | **RE9** | **RE 88 826 1●●**<br>**RE 88 826 503** | **RE 88 865 ●●●**<br>**RE7** |
| **Pages** | 3/6 and 3/7 | 3/10 | 3/14 and 3/15 | 3/18 to 3/23<br>and 3/26 to 3/29 |

**These timing relays enable simple automation cycles to be set up using wired logic.**
**They can also be used to complement the functions of PLCs.**

**Relay**
**Relay outputs provide complete isolation between the supply and output circuits.**
**It is possible to have several output circuits.**








| Optimum | Plug-in | | Panel-mounted | | |
|---|---|---|---|---|---|
| | Universal | Miniature | Analogue | Digital | Electromechanical |
| *1 range,*<br>depending on model :<br>0.5 s, 3 s, 10 s, 30 s, 300 s, 30 min | *7 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h, 100 h | *7 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h, 100 h | Depending on model :<br>*6 ranges :*<br>1 s, 10 s, 1 min, 10 min, 1 h, 10 h<br>*8 ranges :*<br>1 s, 10 s, 1 min, 4 min, 10 min, 1 h, 10 h, 60 h | Depending on model :<br>*7 ranges :*<br>99.99 s, 999.99 s, 99 min 59 s, 99.99 min, 999.9 min, 99 h 59 min, 999.9 h<br>*11 ranges :*<br>99.99 s, 999.99 s, 9999 s, 99 min 59 s, 99.99 min, 999.9 min, 9999 min, 99 h 59 min, 99,99 h, 999.9 h, 9999 h | Depending on model :<br>*3 ranges :*<br>6 s, 60 s, 12 min<br>*3 ranges :*<br>6 min, 60 min, 12 h |
| **RE8** | **RE 88 867 ●●●** | **RE 88 896 20●** | **RE 88 875 ●●●**<br>**RE 88 896 ●●●** | **RE 88 857 ●●●** | **RE 88 226 ●●●** |
| 3/34 to 3/37 | 3/40 to 3/45 | 3/47 | *(1)* | 3/51, 3/55 and 3/57 | *(1)* |

*(1) Please consult your Regional Sales office.*

# Zelio Time - timing relays
Modular relays, solid state output, width 17.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Setting accuracy at full scale** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 50 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 350 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Multivoltage supply** | | | | Depending on version, see pages 3/6 and 3/7 |
| **Frequency** | | | **Hz** | 50/60 |
| **Operating range** | | | | 85…110 % Un |
| **On-load factor** | | | | 100 % |
| **Maximum power consumption** | Depending on model | ⎓ 24 V | **W** | 0.6 |
| | | ⎓ 240 V | **W** | 1.5 |
| | | ∿ 240 V | **VA** | 32 |

## Output characteristics

| | | |
|---|---|---|
| **Output type** | | Solid state |
| **Breaking capacity** | **A** | ∿/⎓ 0.7 at 20° C (0.5 A UL) |
| **Derating** | **mA** | 5 / °C |
| **Maximum permissible current** | **A** | 20 ≤ 10 ms |
| **Minimum breaking current** | **mA** | 10 |
| **Leakage current** | **mA** | < 5 |
| **Maximum switching voltage** | **V** | ∿/⎓ 250 |
| **Typical voltage drop at terminals** | | 3-wire 4V - 2-wire 8V |
| **Electrical life** | | $10^8$ operations |
| **Mechanical life** | | $10^8$ operations |
| **Dielectric strength conforming to IEC 664, IEC 255-5** | **kV** | 2.5 at 1 mA / 1 min |

## Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 1 LED** | Green | | Operating status indication:<br>Pulsing : relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing : timing in progress<br>On steady : relay energised, no timing in progress |

## Input characteristics

| | | |
|---|---|---|
| **Input type** | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage : 0.4 V whatever the supply voltage of the timer |

References : pages 3/6 and 3/7
Dimensions : page 3/6
Schemes : page 3/7

# Zelio Time - timing relays
Modular relays, solid state output, width 17.5 mm

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UL us, CSA |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Panel-mounted | | IP 50 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts, conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms > |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Mounting method** | Symmetrical mounting rail (EN 50022) | **mm** | 35 |
| **Clamping capacity** | Without cable end | **mm²** | 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |
| **Spring terminals, 2 terminals per connection point** | Flexible cable | **mm²** | 1.5 |
| | Solid cable | **mm²** | 2.5 |
| **Enclosure material** | | | Self-extinguishing |



References : pages 3/6 and 3/7
Dimensions : page 3/6
Schemes : page 3/7

# Zelio Time - timing relays
## Modular relays, solid state output, width 17.5 mm

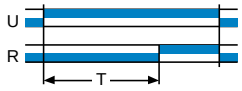


*Solid state output*

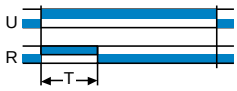
- *Multifunction or single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *Solid state output: 0.7 A - 250 V (0.5 A UL)*
- *Screw terminals*
- *State indication by 1 LED*

## Function diagrams

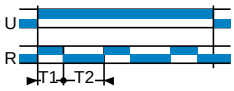
**Function A**
Delay on energisation



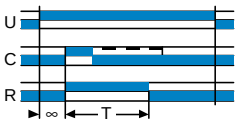

**Function H**
Timing on energisation
Pulse-on energisation



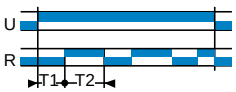

**Function Li**
Asymmetrical recycler
Pulse start



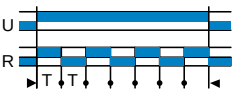

**Function B**
Timing on impulse, one shot




**Function L**
Asymmetrical recycler
Start after pause




**Function Di**
Symmetrical flasher, start with output in operating position



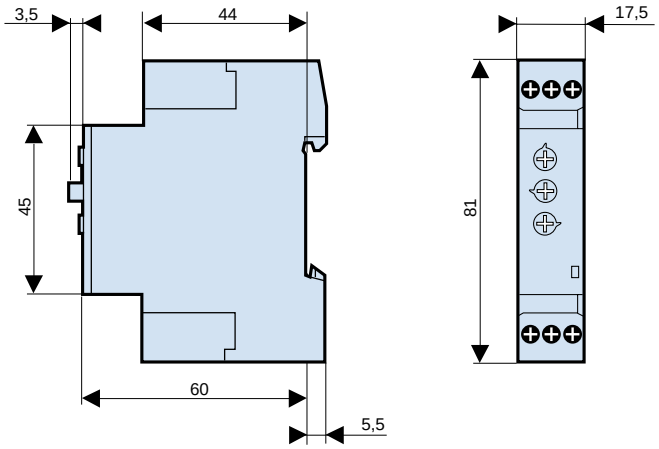

## References



| | | | |
|---|---|---|---|
| **Connection** | Screw terminals | ● | ● |
| **Functions** | | **Multifunction** | **Single function** |
| | | A - At - B - C - H - Ht - Di - D - Ac - Bw | A |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | |
| **Rated current** | | 0.7 A | 0.7 A |
| **Voltages** | 24…240 V ∿ 50/60 Hz | **RE 88 826 004** | – |
| | 24…240 V ∿/⎓ 50/60 Hz | – | **RE 88 826 014** |
| **Weight** (kg) | | 0.060 | 0.060 |

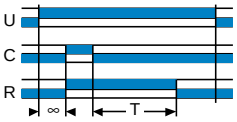
## Dimensions and connection schemes

### Dimensions

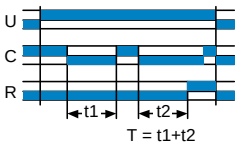



Characteristics : pages 3/4 and 3/5
Schemes : page 3/7

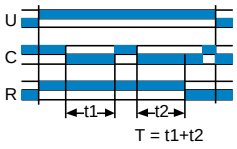
### Function C
Off-delay, with control contact



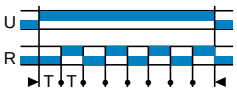

### Function At
Timing on energisation with memory



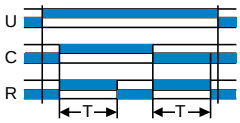

### Function Ht
Delay on energisation with memory



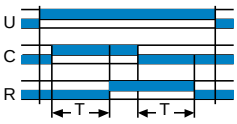

### Function D
Symmetrical flasher, start with output in rest position




### Function Bw
Pulse output (adjustable)




### Function Ac
Timing after closing/opening of control contact



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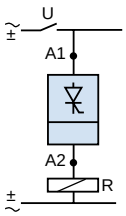
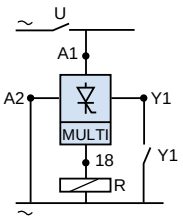
| ● | ● |
|---|---|
| **Single function** | **Dual function** |
| H | Li - L |
| 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | |
| 0.7 A | 0.7 A |
| **RE 88 826 044** | **RE 88 826 054** |
| – | – |
| 0.060 | 0.060 |

## Connection schemes

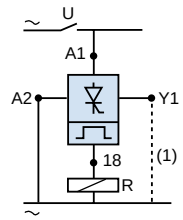
**Functions A, H**




**Function U**




**Functions L, Li**




*(1) Link A2-Y1 for function L only.*

Characteristics : pages 3/4 and 3/5

Dimensions : page 3/6

# Zelio Time - timing relays
## Industrial relays, solid state output, width 22.5 mm

## Presentation


The RE9 range of relays is designed for simple, repetitive applications with short and intensive cycles because their solid state output provides very high electrical durability.
Each relay has a single timing range.
Each relay has a wide voltage range from 24 to 240 V.
The range comprises 9 references with 3 model types:
- RE9-TA: function A,
- RE9-RA: function C,
- RE9-MS: multifunction A, H, L, Li.

These products have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

3

## Environment

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 61812-1, EN 61812-1 |
| **Product certifications** | | | CSA, GL pending. UL |
| **CE marking** | | | Zelio Time timing relays conform to European regulations relating to CE marking |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 85 |
| | Operation | **°C** | - 20…+ 60 |
| **Permissible relative humidity range** | Conforming to IEC 60721-3-3 | | 15…85 % Environmental class 3K3 |
| **Vibration resistance** | Conforming to IEC 6068-2-6, 10 to 55 Hz | | a = 0.35 ms |
| **Shock resistance** | Conforming to IEC 6068-2-27 | | 15 gn - 11 ms |
| **Degree of protection** | Casing | | IP 50 |
| | Terminals | | IP 20 |
| **Degree of pollution** | Conforming to IEC 60664-1 | | 3 |
| **Overvoltage category** | Conforming to IEC 60664-1 | | III |
| **Rated insulation voltage** | Conforming to IEC | **V** | 250 |
| | Conforming to CSA | **V** | 300 |
| **Test voltage for insulation tests** | Dielectric test | **kV** | 2.5 |
| | Shock wave | **kV** | 4.8 |
| **Voltage limits** | Power supply circuit | | 0.85…1.1 Uc |
| **Frequency limits** | Power supply circuit | **Hz** | 50/60 ± 5 % |
| **Disconnection value** | Power supply circuit | | > 0.1 Uc |
| **Mounting position** without derating | In relation to normal vertical mounting plane | | Any position |
| **Cabling** Maximum c.s.a. | Flexible cable without cable end | **$mm^2$** | 2 x 2.5 |
| | Flexible cable with cable end | **$mm^2$** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 0.6…1.1 |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC 61000-4-5 | | Level 3 (2 kV) |
| **Radiated and conducted emissions** | CISPR11 | | Group 1 class A |
| | CISPR22 | | Class A |

References : page 3/10
Dimensions : page 3/10
Schemes : page 3/11

# Zelio Time - timing relays
Industrial relays, solid state output, width 22.5 mm

| Timing relay type | | | RE9-TA On-delay | RE9-RA Off-delay | RE9-MS Multifunction |
|---|---|---|---|---|---|
| **Supply characteristics** | | | | | |
| **Supply voltage** | | **V** | ≂ 24…240 | ∿ 24…240 | ≂ 24…240. See page 3/10 |
| **Voltage limits** | Of the control circuit | | 0.85…1.1 Un | | |
| **Frequency** | | **Hz** | 50…60 ± 5 % | | |
| **Control contact** | Mechanical only | | In series | Between Y2 and A2 | In series |
| **Maximum length of connecting cable** | From contact to RE9 | **m** | – | 20 | – |
| **Control input consumption** | Input Y2 | **mA** | – | 5 | – |
| **Timing characteristics** | | | | | |
| **Setting accuracy** | | | < ± 20 % | | |
| **Repeat accuracy** | | | < 1 % | | |
| **Minimum reset time** | After the time delay period | **ms** | 100 | | |
| **Minimum switching time** | | **ms** | – | 40 | – |
| **Maximum immunity to microbreaks** | During the time delay period | **ms** | 100 | 2 | 70 |
| | After the time delay period | **ms** | 2 | – | 2 |
| **Temperature drift** | | | ≤ 0.1 % per degree centigrade | | |
| **Switching characteristics (solid state type)** | | | | | |
| **Maximum continuous current** | At ambient temperature: 20 °C | **A** | 0.7 (minimum 10 mA) | | |
| **Maximum overload current** | VDE 0435 part. 303, 4.8.3/Class II | **A** | 15 for 10 ms | | |
| **Maximum voltage drop** | Closed state | **V** | At 0.7 A: 3 | | |
| **Leakage current** | Open state | **mA** | ≤ 6 | ≤ 1 | ≤ 6 |
| **Maximum dissipated power** | | **W** | 2.5 | 4 | 2.5 |
| **Derating** | For temperature > 20 °C | **mA** | Without | | |
| **Electrical durability** | In millions of operating cycles | | > 100 | | |

References : page 3/10
Dimensions : page 3/10
Schemes : page 3/11

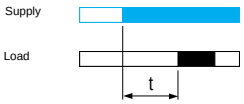
# Zelio Time - timing relays
## Industrial relays, solid state output, width 22.5 mm

*Solid state output, 1 C/O contact*

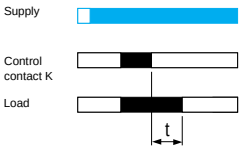


## Function diagrams

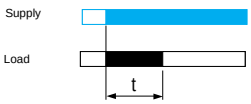
### Function A
Delay on energisation



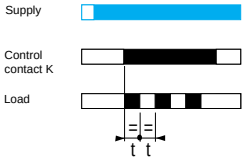

### Function C
Off-delay



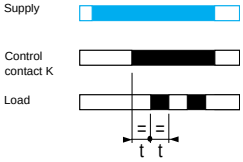

### Function H
Timing on energisation
Pulse-on energisation




### Function Di
Symmetrical flasher, start with output in operating position




### Function D
Symmetrical flasher, start with output in rest position



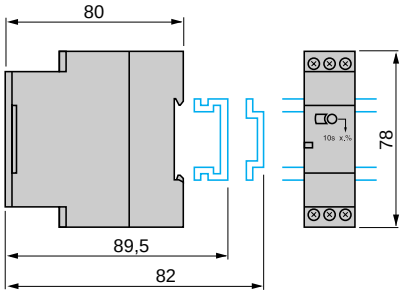

## References



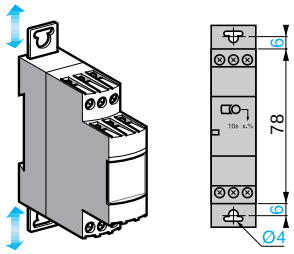

| **Functions** | | **A** | **C** | **A, H, D, Di** |
|---|---|---|---|---|
| **Voltages** | ⎓ or ∿ 24…240 V | ● | – | ● **(A)** |
| | ∿ 24…240 V | – | ● | ● **(H, D, Di)** |
| **Timing ranges** | 0.1 s…10 s | **RE9 TA11MW** | **RE9 RA11MW7** | **RE9 MS21MW** |
| | 0.3 s…30 s | **RE9 TA31MW** | **RE9 RA31MW7** | – |
| | 3 s…300 s | **RE9 TA21MW** | **RE9 RA21MW7** | **RE9 MS21MW** |
| | 40 s…60 min | **RE9 TA51MW** | **RE9 RA51MW7** | – |
| **Weight** (kg) | | 0.110 | 0.110 | 0.110 |

## Dimensions

Rail mounting




Screw fixing



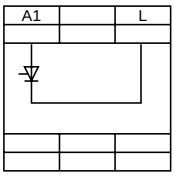

Characteristics : pages 3/8 and 3/9

Schemes : page 3/11

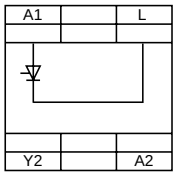
# Zelio Time - timing relays
Industrial relays, solid state output, width 22.5 mm

## Terminal blocks

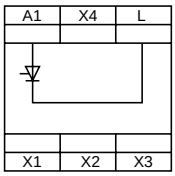
### RE9 TA




### RE9 RA

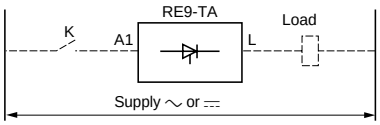



### RE9 MS



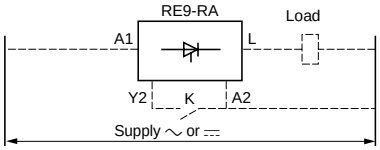

## Recommended application schemes

### RE9 TA




The timing relay is placed in series, with the load whose de-energisation is to be delayed on one side and switch K on the other side. The mains supply may be a.c. or d.c. and the voltage may be between 24 V and 240 V. See function diagram on page opposite.

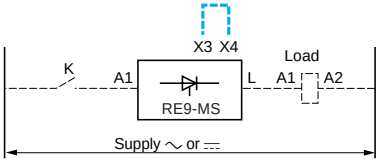
### RE9 RA



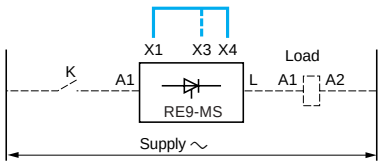

The timing relay is placed in series with the load whose de-energisation is to be delayed. Switch K is connected to terminals Y2 and A2 of the timing relay, and terminal A2 is connected to the mains supply, as indicated in the diagram opposite. The device is operated from an a.c. mains supply whose voltage is between 24 V and 240 V. See function diagram on page opposite.

### RE9 MS

**Delay on energisation**
**Function A**




**Pulse-on energisation**
**Function H**



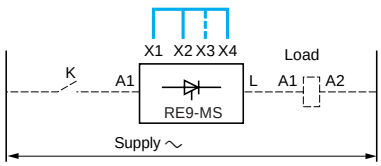

Link to be made between terminals X1 and X4

**Selection of the timing range**

**X3-X4 not linked :** range 3 s…300 s (factory configuration)

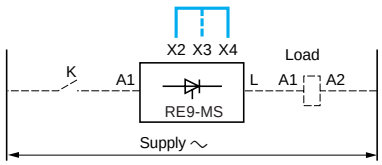
**X3-X4 linked :** range 0.1 s…10 s

**Symmetrical flasher**
**Start with output in the rest position**
**Function D**




Link to be made between terminals X2 and X4 on one side and between X1 and X2 on the other side

**Symmetrical flasher**
**Start with output in the operating position**
**Function Di**




Link to be made between terminals X1 and X4

***Note :*** *For supply voltages greater than 30 V, the rated voltage of the load is equal to the supply voltage. For a supply voltage of 24 V, the voltage drop within the RE9 relay must be taken into account (about 3 V); a coil with a nominal voltage of 21 V must therefore be selected for the load.*

Characteristics : pages 3/8 and 3/9
Dimensions : page 3/10

# Zelio Time - timing relays
Modular relays, relay output,
width 17.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Setting accuracy at full scale** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 30 |
| | Typical under load | **ms** | 100 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 100 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Multivoltage supply** | | | | Depending on version, see pages 3/10 |
| **Frequency** | | | **Hz** | 50/60 |
| **Operating range** | | | | 85…110 % of Un |
| **On-load factor** | | | | 100 % |
| **Maximum power consumption** | Depending on model | ⎓ 24 V | **W** | 0.6 |
| | | ⎓ 240 V | **W** | 1.5 |
| | | ∿ 240 V | **VA** | 32 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Relay, 1 C/O contact, AgNi (cadmium-free) |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | 10 /⎓ 5 V |
| **Maximum switching voltage** | | **V** | ∿/⎓ 250 |
| **Electrical life** | | | $10^5$ operations 8 A 250 V resistive |
| **Mechanical life** | | | 5 x $10^6$ operations |
| **Dielectric strength** | Conforming to IEC 1812-1 | **kV** | 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 664-1, IEC 1812-1 | **kV** | 5, wave 1.2/50 µs |

## Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 1 LED** | Green | | Operating status indication<br>Pulsing : relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing : timing in progress<br>On steady : relay energised, no timing in progress |

## Input characteristics

| | | |
|---|---|---|
| **Input type** | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage : 0.4 V whatever the supply voltage of the relay |

References : pages 3/13 and 3/14
Dimensions : page 3/14
Schemes : page 3/15

# Zelio Time - timing relays
Modular relays, relay output,
width 17.5 mm

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UL us, CSA, GL except RE 88 826 503 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Panel-mounted | | IP 50 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts, conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply, conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms > |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Mounting method** | Symmetrical mounting rail (EN 50022) | **mm** | 35 |
| **Clamping capacity** | Without cable end | **mm²** | 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |
| **Spring terminals, 2 terminals per connection point** | Flexible cable | **mm²** | 1.5 |
| | Solid cable | **mm²** | 2.5 |
| **Enclosure material** | | | Self-extinguishing |

3

References :
pages 3/13 and 3/14

Dimensions :
page 3/14

Schemes :
page 3/15

# Zelio Time - timing relays
## Modular relays, relay output, width 17.5 mm

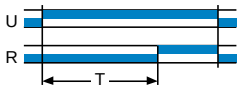


*Relay output, 1 C/O contact*

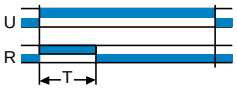
- *Multifunction or single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *1 relay output: 8 A - 250 V (10 A UL)*
- *Screw or spring terminals*
- *State indication by 1 LED*
- *Option of supplying a load in parallel*
- *3-wire sensor control option*

## Function diagrams

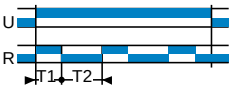
**Function A**
Delay on energisation



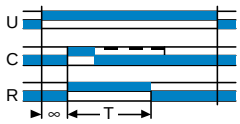

**Function H**
Timing on energisation
Pulse-on energisation



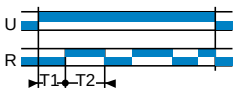

**Function Li**
Asymmetrical recycler
Pulse start



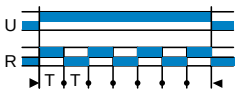

**Function B**
Timing on impulse, one shot




**Function L**
Asymmetrical recycler
Start after pause




**Function Di**
Symmetrical flasher, start with output in operating position



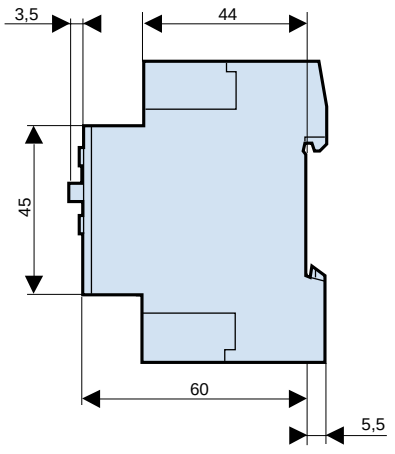

## References

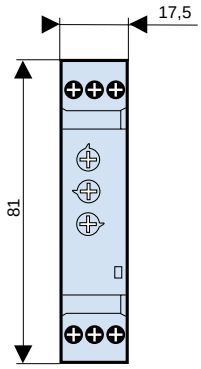



| | | | | |
|---|---|---|---|---|
| **Connection** | Screw terminals | ● | ● | ● |
| | Spring terminals | – | – | – |
| **Functions** | | **Multifunction** | **Dual function** | **Single function** |
| | | A - At - B - C - H - Ht - Di - D Ac - Bw | A - At | B |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| **Rated current** | | 8 A | 8 A | 8 A |
| **Voltages** | ⎓ 24 V / ∿ 24…240 V | **RE 88 826 105** | **RE 88 826 115** | **RE 88 826 125** |
| | ∿/⎓ 12…240 V | – | – | – |
| **Weight** (kg) | | 0.060 | 0.060 | 0.060 |

## Dimensions and connection schemes

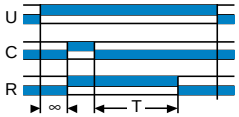
### Dimensions



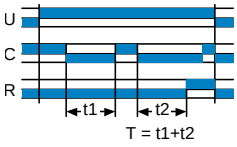




Characteristics : pages 3/12 and 3/13
Schemes : page 3/15

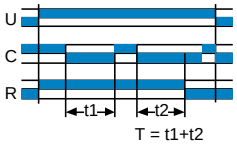
### Function C
Off-delay, with control contact



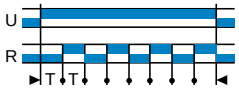

### Function At
Timing on energisation with memory



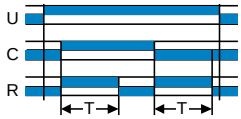

### Function Ht
Delay on energisation with memory



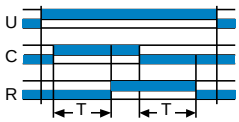

### Function D
Symmetrical flasher, start with output in rest position




### Function Bw
Pulse output (adjustable)




### Function Ac
Timing after closing/opening of control contact





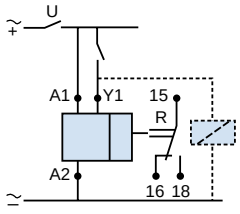




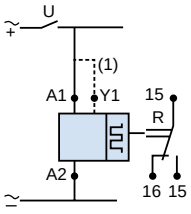
| | | | | |
|---|---|---|---|---|
| ● | ● | ● | ● | – |
| – | – | – | – | ● |
| **Single function** | **Dual function** | **Dual function** | **Multifunction** | **Multifunction** |
| C | H - Ht | Li - L | A - At - B - C - H - Ht - Di - D - Ac - Bw | A - At - B - C - H - Ht - Di - D - Ac - Bw |
| 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | | | |
| 8 A | 8 A | 8 A | 8 A | 8 A |
| **RE 88 826 135** | **RE 88 826 145** | **RE 88 826 155** | – | – |
| – | – | – | **RE 88 826 103** | **RE 88 826 503** |
| 0.060 | 0.060 | 0.060 | 0.060 | 0.060 |

## Connection scheme

**All functions except L and Li**




**Functions L and Li**




*(1) Link A1-Y1 for function L only.*

Characteristics : pages 3/12 and 3/13
Dimensions : page 3/14

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Full scale setting accuracy** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 30 |
| | Typical under load | **ms** | 100 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 100 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Mutivoltage supply** | | | | Depending on version, see pages 3/18 and 3/19 |
| **Frequency** | | | **Hz** | 50/60 |
| **Operating range** | | | | 85…110 % Un (85…120 Un for ∿/⎓ 12 V ) |
| **On-load factor** | | | | 100 % |
| **Maximum power consumption** | Depending on model | ⎓ 24 V | **W** | 0.6 |
| | | ⎓ 240 V | **W** | 1.5 |
| | | ∿ 240 V | **VA** | 32 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Relay, C/O contact AgNi (cadmium free) |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | 10 / ⎓ 5 V |
| **Maximum switching voltage** | | **V** | ∿/⎓ 250 |
| **Electrical life** | | | $10^5$ operations 8 A 250 V resistive |
| **Mechanical life** | | | 5 x $10^6$ operations |
| **Dielectric strength** | Conforming to IEC 1812-1 | **kV** | 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 664-1, IEC 1812-1 | **kV** | 5, wave 1.2/50 µs |

## Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 2 LEDs** | Green | | Operating state indication green LED<br>Pulsing: relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing: timing in progress<br>On steady: relay energised, no timing in progress |
| | Yellow | | On-delay relay |

## Input characteristics

| | | | |
|---|---|---|---|
| **Input type** | | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage: 0.4 V whatever the supply voltage of the timer |

References : pages 3/18 and 3/19
Dimensions : page 3/18
Schemes : page 3/19

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UL us, CSA,<br>GL except RE 88 865 503 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Front panel | | IP 50 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply, conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Fixing** | Symmetrical mounting rail (EN 50022) | **mm** | 35 |
| **Clamping capacity** | Without cable end | **mm²** | 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |
| **Spring terminals, 2 terminals per connection point** | Flexible cable | **mm²** | 1.5 |
| | Solid cable | **mm²** | 2.5 |
| **Enclosure material** | | | Self-extinguishing |



References : pages 3/18 and 3/19
Dimensions : page 3/18
Schemes : page 3/19

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm

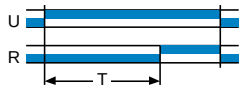


*Relay output, 1 C/O contact*

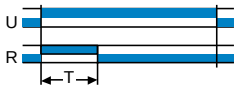
- *Multifunction or single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *1 relay output: 8 A - 250 V (10 A UL)*
- *Screw or spring terminals*
- *State indication by 1 LED*
- *Option of supplying a load in parallel*
- *3-wire sensor control option*

## Function diagrams

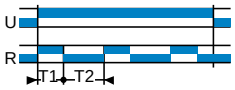
**Function A**
Delay on energisation



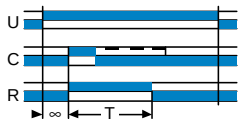

**Function H**
Timing on energisation



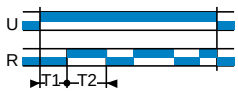

**Function Li**
Asymmetrical recycler
Pulse start



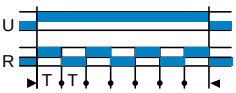

**Function B**
Timing on impulse, one shot




**Function L**
Asymmetrical recycler
Start after pause




**Function Di**
Flashing relay
Pulse start



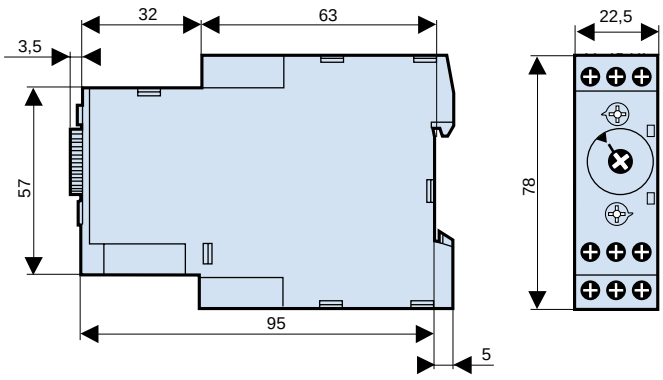

## References




| | | | | |
|---|---|---|---|---|
| **Connection** | Screw terminals | ● | ● | ● |
| | Spring terminals | – | – | – |
| **Functions** | | **Multifunction** | **Dual function** | **Single function** |
| | | A - At - B - C - H - Ht - Di - D Ac - Bw | A - At | B |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| **Selectable interswitching time** | | – | – | – |
| **Rated current** | | 8 A | 8 A | 8 A |
| **Voltages** | ⎓ 24 V / ∿ 24…240 V | **RE 88 865 105** | **RE 88 865 115** | **RE 88 865 125** |
| | ∿/⎓ 12 V | – | – | – |
| | ∿/⎓ 12…240 V | – | – | – |
| | ∿ 230 / 380 V | – | – | – |
| **Weight** (kg) | | 0.090 | 0.090 | 0.090 |

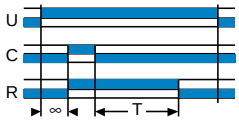
## Dimensions and connection schemes

### Dimensions

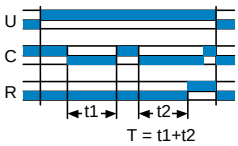



Characteristics : pages 3/16 and 3/17
Schemes : page 3/19

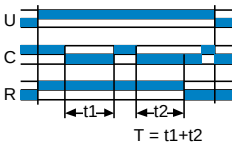
**Function C**
Off-delay



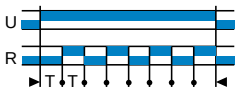

**Function At**
Timing on energisation with memory



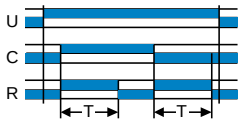

**Function Ht**
Delay on energisation with memory



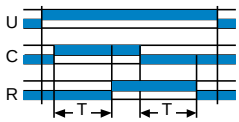

**Function D**
Flashing relay
Start after pause



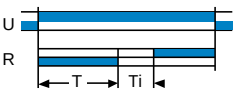

**Function Bw**
Pulse output (adjustable)




**Function Ac**
Timing after closing/opening of control contact




**Function Q**
Star-delta starting

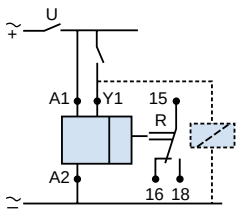




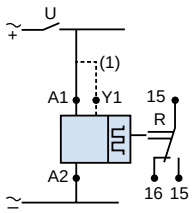
| | | | | | | |
|---|---|---|---|---|---|---|
| ● | ● | ● | ● | ● | ● | – |
| – | – | – | – | – | – | ● |
| **Single function** | **Dual function** | **Dual function** | **Single function** | **Single function** | **Multifunction** | **Multifunction** |
| C | H - Ht | Li - L | Q | Q | A - At - B - C - H - Ht - Di - D - Ac - Bw | A - At - B - C - H - Ht - Di - D - Ac - Bw |
| 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | | | | | |
| – | – | – | 20 - 40 - 60 - 80 - 100 - 120 - 140 ms | 20 - 40 - 60 - 80 - 100 - 120 - 140 ms | – | – |
| 8 A | 8 A | 8 A | 8 A | 8 A | 8 A | 8 A |
| **RE 88 865 135** | **RE 88 865 145** | **RE 88 865 155** | **RE 88 865 175** | – | – | – |
| – | – | – | – | – | – | – |
| – | – | – | – | – | **RE 88 865 103** | **RE 88 865 503** |
| – | – | – | – | **RE 88 865 176** | – | – |
| 0.090 | 0.090 | 0.090 | 0.090 | 0.090 | 0.090 | 0.090 |

## Connection schemes

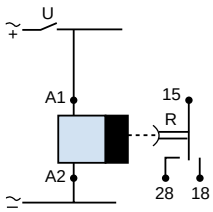
**All functions except L and Li**




**Functions L and Li**




**Function Q**




*(1) Link A1-Y1 for function L only.*

Characteristics :
pages 3/16 and 3/17

Dimensions :
page 3/18

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Full scale setting accuracy** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 30 |
| | Typical under load | **ms** | 100 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 100 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Multivoltage supply** | | | | Depending on version, see pages 3/22 and 3/23 |
| **Frequency** | | | **Hz** | 50/60 |
| **Operating range** | | | | 85…110 % Un (85…120 Un for ∿/⎓ 12 V ) |
| **On-load factor** | | | | 100 % |
| **Maximum power consumption** | Depending on model | ⎓ 24 V | **W** | 0.6 |
| | | ⎓ 240 V | **W** | 1.5 |
| | | ∿ 240 V | **VA** | 32 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Relay, C/O contacts, AgNi (cadmium-free) |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | 10 / ⎓ 5 V |
| **Maximum switching voltage** | | **V** | ∿/⎓ 250 |
| **Electrical life** | | | $10^5$ operations 8 A 250 V resistive |
| **Mechanical life** | | | 5 x $10^6$ operations |
| **Dielectric strength** | Conforming to IEC 1812-1 | **kV** | 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 664-1, IEC 1812-1 | **kV** | 5, wave 1.2/50 µs |

## Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 2 LEDs** | Green | | Operating state indication green LED<br>Pulsing: relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing: timing in progress<br>On steady: relay energised, no timing in progress |
| | Yellow | | On-delay relay |

## Input characteristics

| | | | |
|---|---|---|---|
| **Input type** | | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage: 0.4 V whatever the supply voltage of the timer |

References : pages 3/22 and 3/23
Dimensions : page 3/22
Schemes : page 3/23

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UL us, CSA<br>GL except RE 88 865 265 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Front panel | | IP 50 except RE 88 865 265 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply, conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks, conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms > |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Fixing** | Symmetrical mounting rail (EN 50022) | **mm** | 35 |
| **Clamping capacity** | Without cable end | **mm²** | 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |
| **Enclosure material** | | | Self-extinguishing |
| **Weight : 22.5 mm enclosure** | | **g** | 90 |



References : pages 3/22 and 3/23
Dimensions : page 3/22
Schemes : page 3/23

# Zelio Time - timing relays

## Industrial single or multifunction relays, relay outputs, width 22.5 mm

3

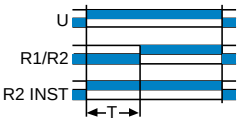
*Relay output, 2 C/O contacts*

- *Multifunction or single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *2 relay outputs: 8 A - 250 V (10 A UL) of which 1 instantaneous*
- *Screw terminals*
- *State indication by 1 LED*
- *Option of supplying a load in parallel*
- *3-wire sensor control option*

## Function diagrams

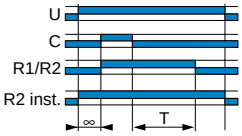
### Function A

Delay on energisation,
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



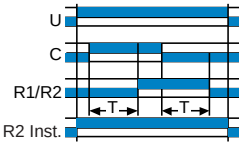

### Function C

Off-delay
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



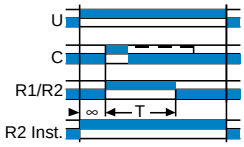

### Function Ac

Timing after closing/opening of control contact
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



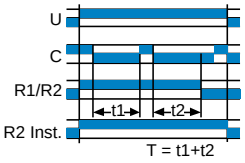

### Function B

Timing on impulse, one shot
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



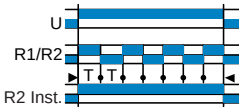

### Function Ht

Delay on energisation with memory
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous




### Function Di

Flashing relay
Pulse start
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



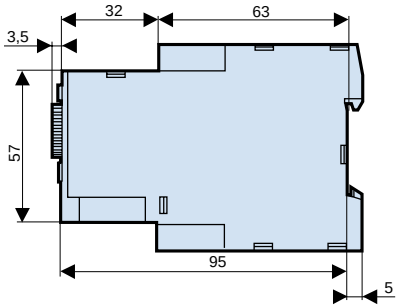

## References

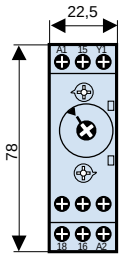


| | | | |
|---|---|---|---|
| **Connection** | Screw terminals | ● | ● |
| **Functions** | | **Multifunction** | **Dual function** |
| | | A - At - B - C - H - Ht - Di - D - Ac - Bw | A - At |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | – |
| | 4 ranges | – | – |
| **Relay output** | | 2 timed contacts, 1 convertible to instantaneous | 2 timed contacts |
| **Rated current** | | 8 A | 8 A |
| **Voltages** | ⎓ 24 V / ∿ 24…240 V | **RE 88 865 305** | **RE 88 865 215** |
| | ∿/⎓ 12 V | – | – |
| **Weight** (kg) | | 0.090 | 0.090 |

## Dimensions and connection schemes

### Dimensions



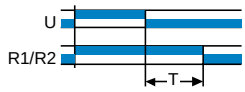




Characteristics :
pages 3/20 and 3/21

Schemes :
page 3/23

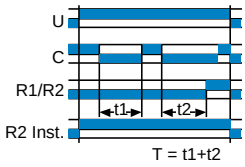
### Function K

Delay on de-energisation
True off-delay
(without auxiliary supply)
2 timed contacts



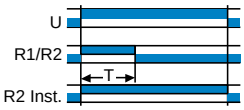

### Function At

Timing on energisation
with memory
2 timed contacts or
2 timed contacts, 1 of which
convertible to instantaneous



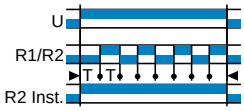

### Function H

Timing on energisation
2 timed contacts or
2 timed contacts, 1 of which
convertible to instantaneous



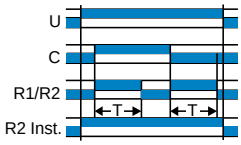

### Function D

Flashing relay
Start after pause
2 timed contacts or
2 timed contacts, 1 of which
convertible to instantaneous




### Function Bw

Pulse output (adjustable)
2 timed contacts or
2 timed contacts, 1 of which
convertible to instantaneous




3

561176

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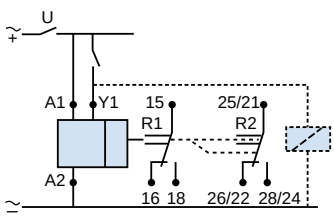
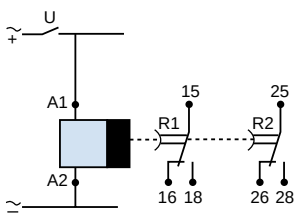
| ● | ● |
|---|---|
| **Single function** | **Multifunction** |
| K | A - At - B - C - H - Ht - Di - D - Ac - Bw |
| – | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h |
| 0.6 s - 2.5 s - 20 s - 160 s | – |
| 2 timed contacts | 2 timed contacts, 1 convertible to instantaneous |
| 8 A | 8 A |
| **RE 88 865 265** | **–** |
| – | **RE 88 865 303** |
| 0.090 | 0.090 |

## Connection schemes

**All functions except K**




**Function K**




Characteristics :
pages 3/20 and 3/21

Dimensions :
page 3/22

# Zelio Time - timing relays

## Industrial single or multifunction relays, relay output, width 22.5 mm



## Presentation

560872

The RE7 range of relays, with only 23 references, covers all timing applications.

These relays offer multi-range timing from 50 ms to 300 h.

They are multivoltage.

Three models combine several different functions: multifunction relays.

These products have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

## Environment

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 61812-1, EN 61812-1 |
| **Product certifications** | | | CSA, GL pending, UL |
| **CE marking** | | | Zelio Time timing relays conform to European regulations relating to CE marking |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 85 |
| | Operation | **°C** | - 20…+ 60 |
| **Permissible relative humidity range** | Conforming to IEC 60721-3-3 | | 15…85 % Environmental class 3K3 |
| **Vibration resistance** | Conforming to IEC 6068-2-6, 10 to 55 Hz | | a = 0.35 ms |
| **Shock resistance** | Conforming to IEC 6068-2-27 | | 15 gn - 11 ms |
| **Degree of protection** | Casing | | IP 50 |
| | Terminals | | IP 20 |
| **Degree of pollution** | Conforming to IEC 60664-1 | | 3 |
| **Overvoltage category** | Conforming to IEC 60664-1 | | III |
| **Rated insulation voltage** Between contact circuit and power supply or between contact circuit and control inputs | Conforming to IEC | **V** | 250 |
| | Conforming to CSA | **V** | 300 |
| **Test voltage for insulation tests** | Dielectric test | **kV** | 2.5 |
| | Shock wave | **kV** | 4.8 |
| **Voltage limits** | Power supply circuit | | 0.85…1.1 Uc |
| **Frequency limits** | Power supply circuit | **Hz** | 50/60 ± 5 % |
| **Disconnection value** | Power supply circuit | | > 0.1 Uc |
| **Mounting position** without derating | In relation to normal vertical mounting plane | | Any position |
| **Cabling** Maximum c.s.a. | Flexible cable without cable end | **mm²** | 2 x 2.5 |
| | Flexible cable with cable end | **mm²** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 0.6…1.1 |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

| | | |
|---|---|---|
| **Electrostatic discharge** | Conforming to IEC 61000-4-2 | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC 61000-4-3 | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC 61000-4-4 | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC 61000-4-5 | Level 3 (2 kV) |
| **Radiated and conducted emissions** | CISPR11 | Group 1 class A |
| | CISPR22 | Class A |

## Consumption

| **Average consumption** | | | ∿ 50/60 Hz | | | | | ⎓ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 24 V | 48 V | 110 V | 240 V | | 24 V | 48 V | 110 V | 240 V |
| | RE7-●●11BU | **VA** | 0.7 | 1.6 | 1.8 | 8.5 | **W** | 0.5 | 1.2 | – | – |
| | RE7-●●12BU and RE7-●●13BU | **VA** | 1.2 | 2 | 2.8 | 12.5 | **W** | 0.8 | 1.6 | – | – |
| | RE7-●●●●MW *(1)* | **VA** | 2 | 2.5 | 3.2 | 6 | **W** | 2 | 1 | 3.2 | 2 |

*(1) RE7-RB●●MW: current peak on energisation = 1 A / 30 ms.*

References :
pages 3/26 to 3/29

# Zelio Time - timing relays
Industrial single or multifunction relays, relay output, width 22.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Setting accuracy** | As % of the full-scale value | | ± 10 % |
| **Repeat accuracy** | | | ± 0.2 % |
| **Influence of voltage** | In the voltage range, 0.85…1.1 Un | | < 0.2 % |
| **Influence of temperature** | | | < 0.07 %/°C |
| **Immunity to microbreaks** | | **ms** | 3 |
| **Minimum control pulse** | | **ms** | 20 (except **RE7-RB1●MW**: 1 s) |
| **Reset time** | | **ms** | 50 |

## Output circuit characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Maximum switching voltage** | | **V** | ≂ 250 | | |
| **Mechanical durability** | In millions of operating cycles | | 20 | | |
| **Current limit Ith** | | **A** | 8 (except **RE7-RB●●MW**: 5 A) | | |
| **Rated operational limits at 70 °C** Conforming to IEC 60947-5-1/1991 and VDE 0660 | | | 24 V | 115 V | 250 V |
| | AC-15 | **A** | 3 | 3 | 3 |
| | DC-13 | **A** | 2 | 0.2 | 0.1 |
| **Minimum switching capacity** | | | 12 V/10 mA | | |
| **Contact material** | | | 90/10 nickel silver (except **RE7-RB●●MU**: gold flashed silver alloy) | | |

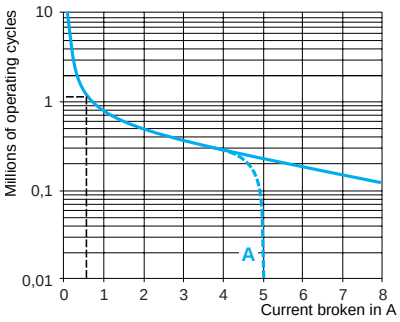
## Remote control input characteristics

| | | | |
|---|---|---|---|
| **Maximum voltage** | Applicable to inputs Y1Z2, X1Z2, X2Z2 | **V** | 60 |
| **Signal delivered by control inputs Y1Z2, X1Z2, X2Z2** ⚠ No galvanic insulation between these inputs and the supply | Switching current | **mA** | < 1 |
| | Maximum distance | **m** | 50 |
| | Compatibility | | 3/4-wire PNP and NPN Telemecanique sensors or other sensors without an internal load |
| **Potentiometer for connection between terminals Z1Z2, Z3Z2** | Type | | Linear at ± 20 % |
| | Resistance | **kΩ** | 47 ± 20 % |
| | Power | **W** | 0.2 |
| | Maximum distance | **m** | 25 by shielded cable: shielding linked to terminal Z2 |

**a.c. load**

**Curve 1**

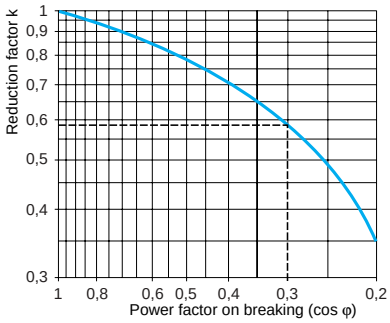
Electrical durability of contacts on resistive load in millions of operating cycles




A **RE7-RB●●MW**

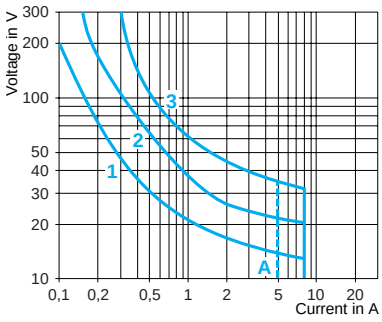
**Curve 2**

Reduction factor k for inductive loads (applies to values taken from durability curve 1)




**d.c. load**

**Load limit curve**

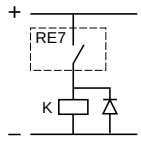



A **RE7-RB●●MW**
1 L/R = 20 ms
2 L/R with load protection diode
3 Resistive load

Example:

An LC1-F185 contactor supplied with 115 V/50 Hz for a consumption of 55 VA or a current consumption equal to 0.1 A and cos φ = 0.3.
For 0.1 A, curve 1 indicates a durability of approximately 1.5 million operating cycles.
As the load is inductive, it is necessary to apply a reduction coefficient k to this number of cycles as indicated by curve 2.

For cos φ = 0.3: k = 0.6
The electrical durability therefore becomes:
1.5 $10^6$ operating cycles x 0.6 = 900 000 operating cycles.




References :
pages 3/26 to 3/29

# Zelio Time - timing relays

## Industrial single-function relays, relay output, width 22.5 mm

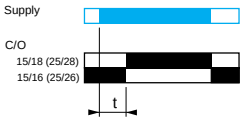
*Relay output, 1 C/O contact*
*Multiple timing ranges*



## Function diagrams

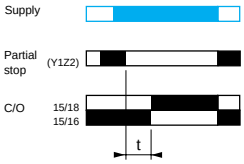
### Function A

Delay on energisation



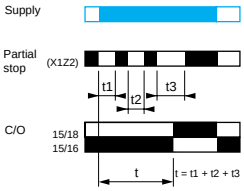

### Function Wt

External control for start of time delay



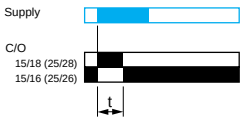

### Function At

External control for partial stop of time delay (with memory)



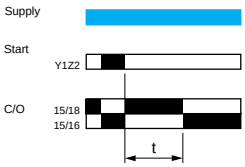

### Function H

Pulse-on energisation
Start on energisation



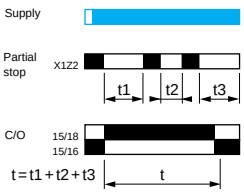

### Function Hi

Start on opening of external control contact




### Function Ht

External control for partial stop of time delay (with memory)




## References



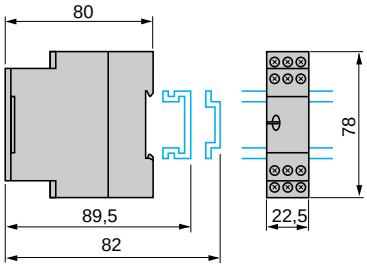


| **Functions** | | **A** | **A, Wt, At** | **Ac** | **Ae, Af** |
|---|---|---|---|---|---|
| **Timing ranges** | | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges |
| **Voltages** | ⎓ or ∿ 24 V | ● | ● | ● | ● |
| | ∿ 110...240 V | ● | ● | ● | ● |
| | ∿ or ⎓ 42...48 V | – | ● | ● | ● |
| | ⎓ or ∿ 24...240 V | – | – | – | – |
| **References** | | **RE7 TL11BU** | **RE7 TM11BU** | **RE7 MA11BU** | **RE7 MV11BU** |
| **Weight** (kg) | | 0.150 | 0.150 | 0.150 | 0.150 |

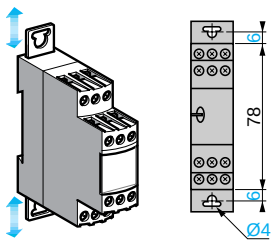
## Dimensions and connection schemes

### Dimensions

Rail mounting



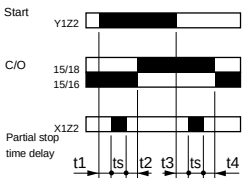

Screw fixing



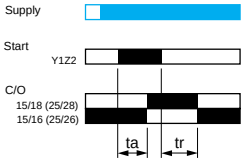

Characteristics :
pages 3/24 and 3/25

Schemes :
pages 3/30 and 3/31

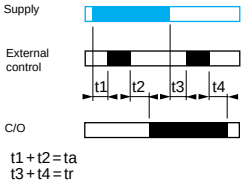
### Function Ac
Remote control for partial stop of time delay




### Function Ae
External control for start of time delay

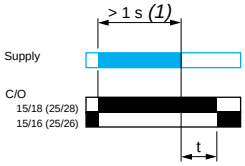



### Function Af
Asymmetrical On-delay and Off-delay with external control

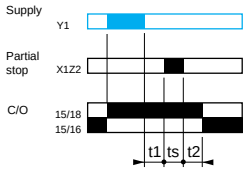



t1 + t2 = ta
t3 + t4 = tr

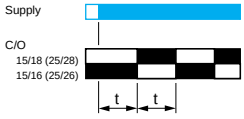
### Function K
Off-delay



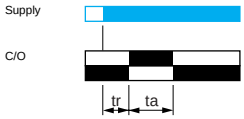

### Function Hf
Remote control for stop of time delay



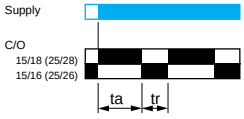

### Function D
Symmetrical flasher, start with output in rest position



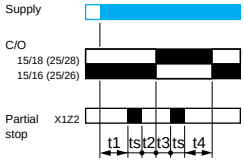

### Function L
Start with output in rest position (X2Z2 not linked)




### Function Li
Asymmetrical flasher. Start with output in operating position (X2Z2 linked)




### Function Lt
External control for partial stop of time delay




*(1) If the device has been stored, de-energised, for more than a month, it must be energised for about 15 seconds in order to activate it. Subsequently, it only takes 1 second to start the time delay. ⚠ If this time is not complied with, the relay remains energised indefinitely.*



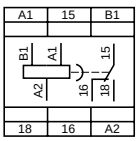




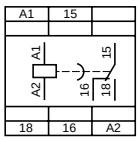
| K | Hf | H | Hi, Ht | D | L, Li, Lt |
|---|---|---|---|---|---|
| 0.05 s…10 min<br>7 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges |
| – | ● | ● | ● | ● | ● |
| – | ● | ● | ● | ● | ● |
| – | ● | – | ● | – | ● |
| ● | – | – | – | – | – |
| **RE7 RB11MW** | **RE7 RA11BU**<br>**RE7 RM11BU**<br>low level contact | **RE7 PE11BU** | **RE7 PM11BU** | **RE7 CL11BU** | **RE7 CV11BU** |
| 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 |

## Connection schemes

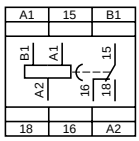
**RE7 TL11BU**



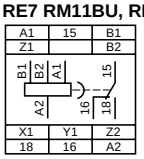

**RE7 RB11MW**



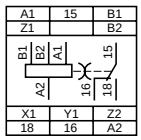

**RE7 PE11BU**



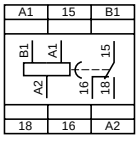

**RE7 TM11BU, RE7 RA11BU**
**RE7 RM11BU, RE7 PM11BU**



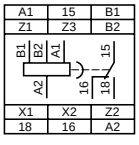

**RE7 MA11BU**
**RE7 MV11BU**




**RE7 CL11BU**




**RE7 CV11BU**




Characteristics :
pages 3/24 and 3/25

Dimensions :
page 3/26

Schemes :
pages 3/30 and 3/31

# Zelio Time - timing relays

Industrial single or multifunction relays, relay output, width 22.5 mm

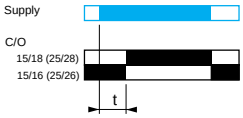
*Relay output, 2 C/O contacts*
*Multiple timing ranges*



## Function diagrams

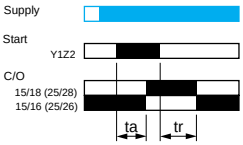
### Function A

Start on energisation



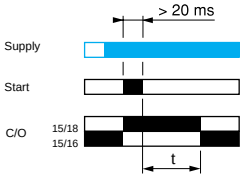

### Function Ac

External control for start of time delay



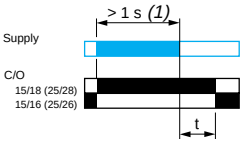

### Function C

Off-delay with external control for start of time delay




### Function K

Off-delay




*(1) If the device has been stored, de-energised, for more than a month, it must be energised for about 15 seconds in order to activate it. Subsequently, it only takes 1 second to start the time delay. ⚠ If this time is not complied with, the relay remains energised indefinitely.*

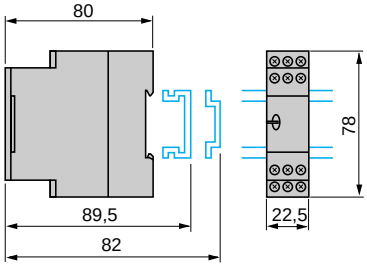
## References


| Functions | | A | Ac | C | K |
|---|---|---|---|---|---|
| **Timing ranges** | | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s...300 h<br>10 ranges | 0.05 s…10 min<br>7 ranges |
| **Voltages** | ⎓ or ∿ 24 V | ● | ● | ● | – |
| | ∿ 110…240 V | ● | ● | ● | – |
| | ∿ or ⎓ 42…48 V | ● | ● | ● | – |
| | ⎓ or ∿ 24…240 V | – | – | – | ● |
| **References** | | **RE7 TP13BU** | **RE7 MA13BU**<br>symmetrical | **RE7 RL13BU**<br>low level contact | **RE7 RB13MW** |
| **Weight** (kg) | | 0.150 | 0.150 | 0.150 | 0.150 |

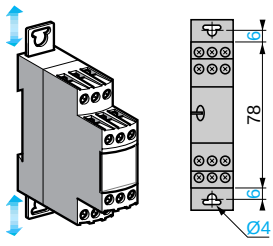
## Dimensions and connection schemes

### Dimensions

Rail mounting



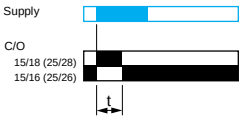

Screw fixing




Characteristics : pages 3/24 and 3/25
Schemes : pages 3/30 and 3/31

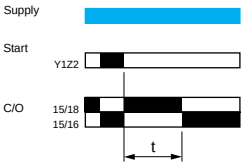
### Function H

Pulse-on energisation
Start on energisation



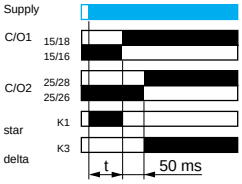

### Function Hi

Start on opening of external control contact



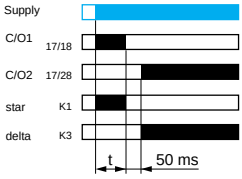

### Function Qt

Timing relays for star-delta starters



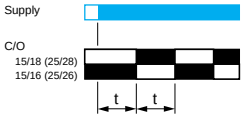

### Function Qg

Timing relays for star-delta starters



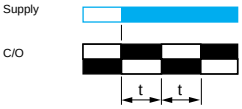

### Function D

Symmetrical flasher, start with output in rest position




### Function Di

Symmetrical flasher start with output in operating position

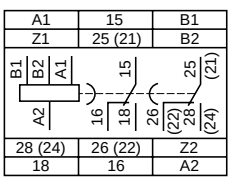



3

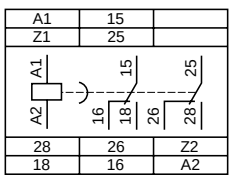

| H | Hi | D | Qt | Qg | A, C, H, Hi, D, Di | A, C, H, Hi, D, Di, Qg, Qt | |
|---|---|---|---|---|---|---|---|
| 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | 0.05 s...300 h 10 ranges | |
| ● | ● | ● | ● | ● | ● | ● | – |
| ● | ● | ● | ● | ● | ● | ● | – |
| ● | ● | ● | ● | ● | ● | ● | – |
| – | – | – | – | – | – | – | ● |
| **RE7 PP13BU** | **RE7 PD13BU** | **RE7 CP13BU** | **RE7 YA12BU** | **RE7 YR12BU** | **RE7 ML11BU** | **RE7 MY13BU** | **RE7 MY13MW** |
| 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 |

## Connection schemes

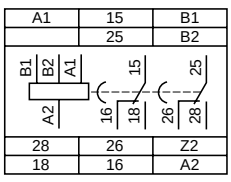
**RE7 TP13BU**



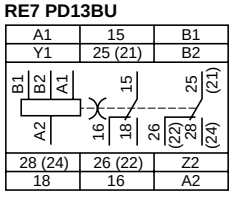

**RE7 RB13MW**



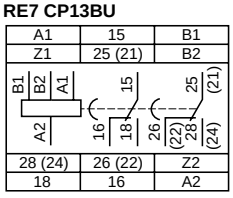

**RE7 YA**



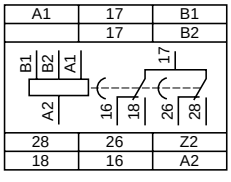

**RE7 RL13BU, RE7 MA13BU**
**RE7 PD13BU**



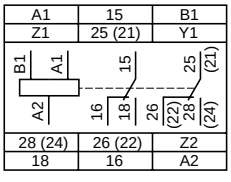

**RE7 PP13BU**
**RE7 CP13BU**



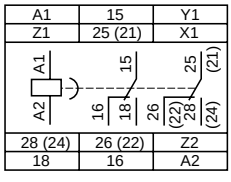

**RE7 YR**




**RE7 MY13BU**




**RE7 MY13MW**

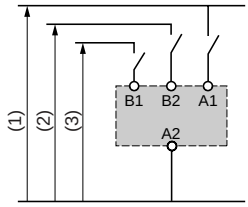



Characteristics : pages 3/24 and 3/25
Dimensions : page 3/29
Schemes : pages 3/30 and 3/31

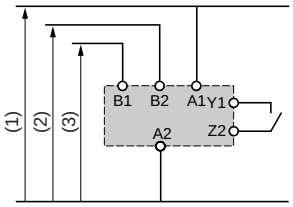
# Zelio Time - timing relays
Industrial single or multifunction relays,
relay output, width 22.5 mm

## Recommended application schemes

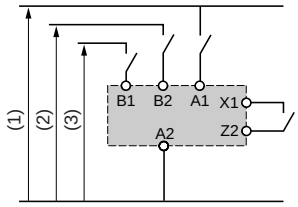
**RE7 TL, TM, TP, CL, CP, ML, MY**
Start on energisation



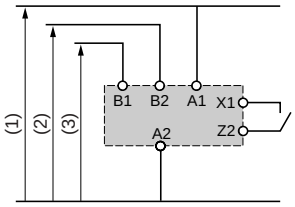

**RE7 TM, MA, MV, RM, RL, PM, PD, ML, MY**
Start by external control



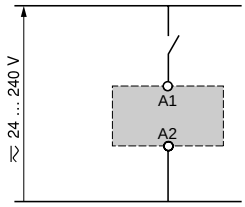

**RE7 TM, PM, ML, MY**
External control of partial stop



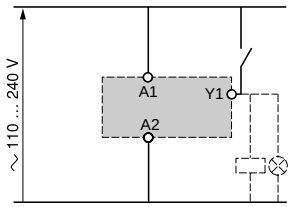

**RE7 MA, MV, RA, RM**
Start by external control

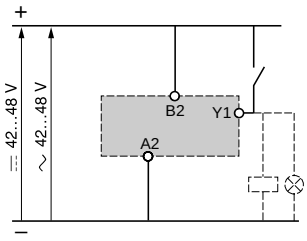


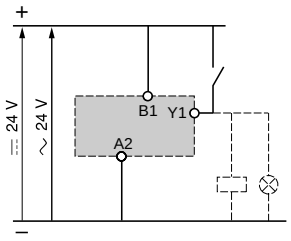

**RE7 RB**
Start on de-energisation



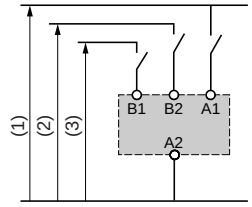

**RE7 RA**
Start by external control



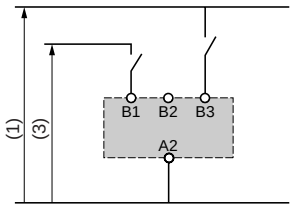



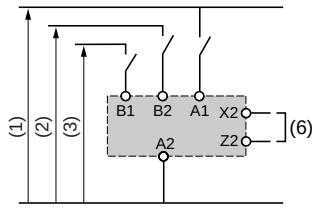

**RE7 PP**
Start on energisation



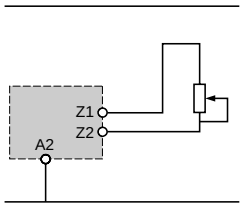

**RE7 PE**
Start on energisation



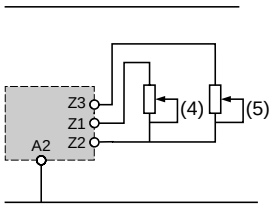

**RE7 CV**
Selection of starting phase



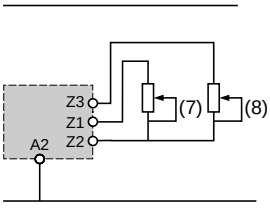

**RE7 TM, TP, MA, RA, RM, PP, PM, ML, MY**
Connection of potentiometer



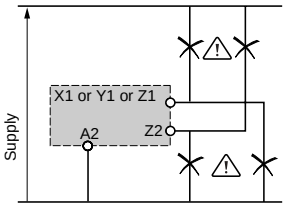

**RE7 MV**
Connection of potentiometers to asymmetrical timing relays




**RE7 CV**
Connection of potentiometers




Connection precautions




⚠ No galvanic isolation between supply terminals A1, A2, B1, B2 and control inputs X1, Y1, Z1, Z2.

*(1) ∿ 110…240 V except RE7 MY13MW : ⎓ 24…240 V*
*(2) ⎓ 12…48 V*
*(3) ⎓ 24 V*
*(4) Adjustment of the On-delay period*
*(5) Adjustment of the Off-delay period*
*(6) Start during the On-delay period : X2, Z2 linked. Start during the Off-delay period : X2, Z2 not linked*
*(7) Off-delay adjustment (tr) (contact 15/16 closed)*
*(8) On-delay adjustment (ta) (contact 15/18 closed)*

Characteristics :
pages 3/24 and 3/25

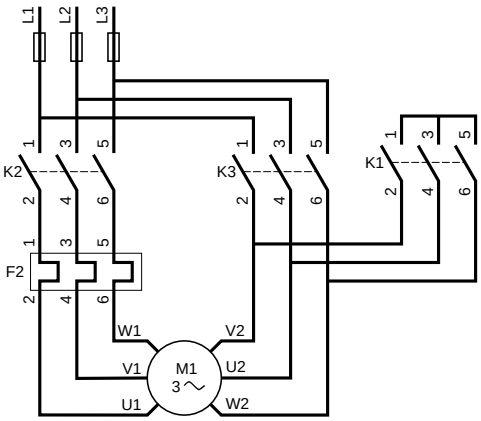
References :
pages 3/26 to 3/29

# Zelio Time - timing relays
Industrial single or multifunction relays, relay output, width 22.5 mm

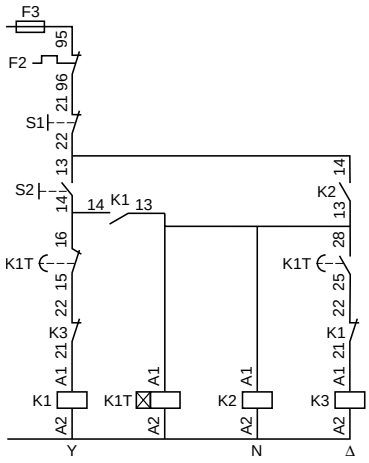


## Recommended application schemes (continued)

**Power scheme**
**RE7 YA12BU**




**Control schemes**
Star-delta function with double On-delay timing Qt

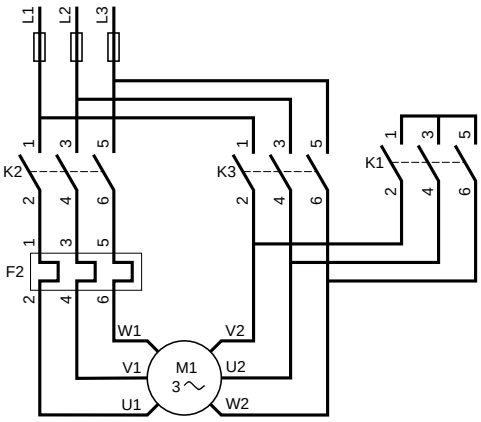



Terminal block

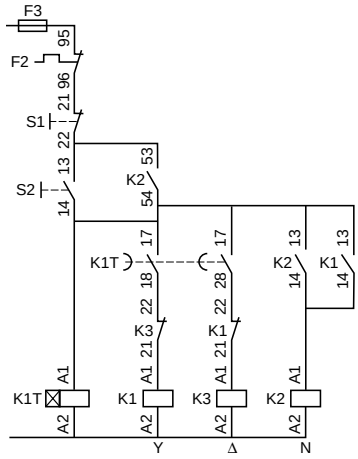
| | | |
|---|---|---|
| A1 | 15 | B1 |
| | 25 | B2 |
| 28 | 26 | Z2 |
| 18 | 16 | A2 |

K1T = relay RE7 YA

**Power scheme**
**RE7 YR12BU**




**Control schemes**
Star-delta function with contact for switching to star connection Q



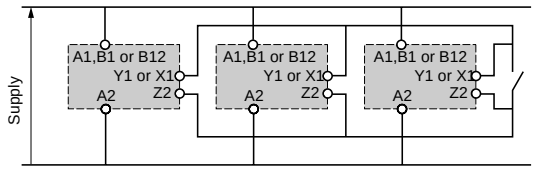

Terminal block

| | | |
|---|---|---|
| A1 | 17 | B1 |
| | 17 | B2 |
| 28 | 26 | Z2 |
| 18 | 16 | A2 |

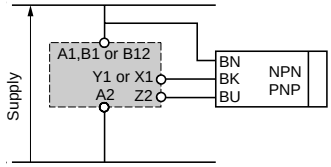
K1T = relay RE7 YR

⚠ No galvanic isolation between supply terminals A1, A2, B1, B2 and supply terminal Z2.
This terminal must therefore never be used (factory setting).

**Control of several relays with a single external control contact**



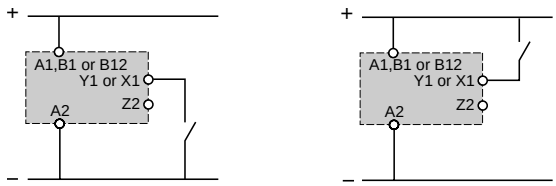

**Connection of a Telemecanique 3-wire NPN or PNP sensor**




It is advisable to follow the recommended wiring schemes detailed above and on previous pages. However, the connections below are possible if the restrictions given are taken into account.

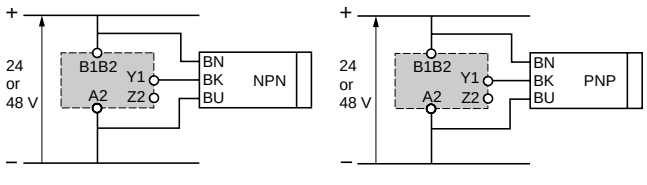
**Connection of an external control contact without using terminal Z2:**

- possible on all RE7 relays with external control option except RE7 RA11BU,
- d.c. supply only.




**Connection of a Telemecanique 3-wire NPN or PNP sensor without using terminal Z2:**

- only possible on relay RE7●●●●BU,
- d.c. supply only.




Characteristics :
pages 3/24 and 3/25

References :
pages 3/26 to 3/29

# Zelio Time - timing relays

## Industrial single-function relays, optimum, relay output, width 22.5 mm

## Presentation


The RE8 range of relays is designed for simple and repetitive applications, providing basic functions.

Each relay comprises:
- a single timing range,
- a C/O output relay.

These products have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

3

## Environment

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 61812-1. EN 61812-1 |
| **Product certifications** | | | CSA, GL pending. UL |
| **CE marking** | | | Zelio Time timing relays conform to European regulations relating to CE marking |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 85 |
| | Operation | **°C** | - 20…+ 60 |
| **Permissible relative humidity range** | Conforming to IEC 60721-3-3 | | 15…85 % Environmental class 3K3 |
| **Vibration resistance** | Conforming to IEC 6068-2-6, 10 to 55 Hz | | a = 0.35 ms |
| **Shock resistance** | Conforming to IEC 6068-2-27 | | 15 gn - 11 ms |
| **Degree of protection** | Casing | | IP 50 |
| | Terminals | | IP 20 |
| **Degree of pollution** | Conforming to IEC 60664-1 | | 3 |
| **Overvoltage category** | Conforming to IEC 60664-1 | | III |
| **Rated insulation voltage** | Conforming to IEC | **V** | 250 |
| | Conforming to CSA | **V** | 300 |
| **Test voltage for insulation tests** | Dielectric test | **kV** | 2.5 |
| | Shock wave | **kV** | 4.8 |
| **Voltage limits** | Power supply circuit | | 0.9…1.1 Uc |
| **Frequency limits** | Power supply circuit | **Hz** | 50/60 ± 5 % |
| **Disconnection value** | Power supply circuit | | > 0.1 Uc |
| **Mounting position** without derating | In relation to normal vertical mounting plane | | Any position |
| **Connection** maximum c.s.a. | Flexible cable without cable end | **$mm^2$** | 2 x 2.5 |
| | Flexible cable with cable end | **$mm^2$** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 0.6…1.1 |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC 61000-4-5 | | Level 3 (2 kV) |
| **Radiated and conducted emissions** | CISPR11 | | Group 1 class A |
| | CISPR22 | | Class A |

## Consumption

| **Consumption** | | | ~ | | | | | | ⎓ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 24 V | 110 V | 240 V | 380 V | 415 V | | 24 V |
| | RE8-TA, RA, CL, PE, PU, PT | **VA** | 0.7 | 1.8 | 8.5 | – | – | **W** | 0.5 |
| | RE8-YG, RB | **VA** | 0.9 | 2.5 | 13 | – | – | **W** | 0.5 |
| | RE8-YA | **VA** | 0.9 | 2.5 | 13 | 8 | 9 | **W** | 0.7 |

References : pages 3/34 to 3/37
Dimensions : pages 3/34 and 3/36
Schemes : page 3/35

# Zelio Time - timing relays

Industrial single-function relays, optimum, relay output, width 22.5 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Setting accuracy** | As % of the full-scale value | | ± 20 % |
| **Repeat accuracy** | | | < 1 % |
| **Influence of voltage** | In the voltage range, 0.9…1.1 Un | | < 2.5 % |
| **Influence of temperature** | | | < 0.2 %/°C |
| **Immunity to microbreaks** | | **ms** | 3 |
| **Minimum control pulse** | | **ms** | 26 (except **RE8-YG**: 60) |
| **Reset time** | | **ms** | 50 |

## Output circuit characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Maximum switching voltage** | | **V** | ≂ 250 | | |
| **Mechanical durability** | In millions of operating cycles | | 20 | | |
| **Current limit Ith** | | **A** | 8 | | |
| **Rated operational limits at 70 °C** Conforming to IEC 60947-5-1/1991 and VDE 0660 | | | 24 V | 115 V | 250 V |
| | AC-15 | **A** | 3 | 3 | 3 |
| | DC-13 | **A** | 2 | 0.2 | 0.1 |
| **Minimum switching capacity** | | | 12 V/10 mA | | |
| **Contact material** | | | 90/10 nickel silver | | |

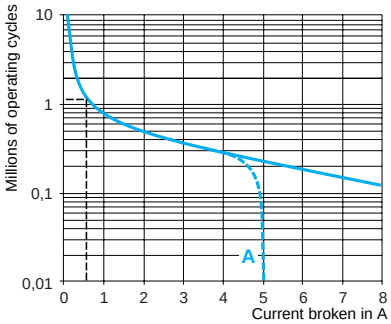
## Remote control input characteristics

| | | | |
|---|---|---|---|
| **Signal delivered by control input Y1** ⚠ No galvanic insulation between this input and the supply | No-load voltage | | Supply voltage |
| | Switching current | **mA** | < 10 |
| | Maximum distance | **m** | 50 |
| | Compatibility | | 2-wire sensors ⎓ with leakage current < 1 mA |

**a.c. load**

**Curve 1**

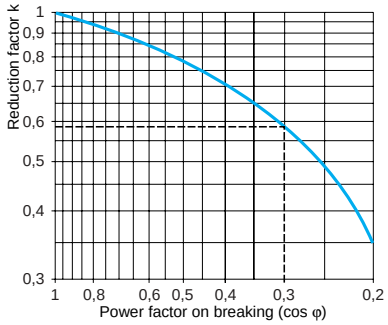
Electrical durability of contacts on resistive load in millions of operating cycles




A **RE8-RB●●BUTQ**

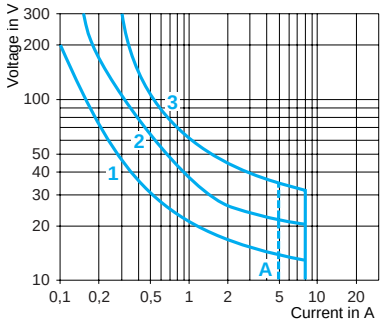
**Curve 2**

Reduction factor k for inductive loads (applies to values taken from durability curve 1)




**d.c. load**

**Load limit curve**

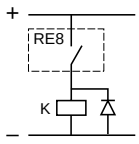



A **RE8-RB●●BUTQ**
1 L/R = 20 ms
2 L/R with load protection diode
3 Resistive load

Example:

An LC1-F185 contactor supplied with 115 V/50 Hz for a consumption of 55 VA or a current consumption equal to 0.1 A and cos φ = 0.3.
For 0.1 A, curve 1 indicates a durability of approximately 1.5 million operating cycles.
As the load is inductive, it is necessary to apply a reduction coefficient k to this number of cycles as indicated by curve 2.

For cos φ = 0.3: k = 0.6
The electrical durability therefore becomes:
1.5 $10^6$ operating cycles x 0.6 = 900 000 operating cycles.



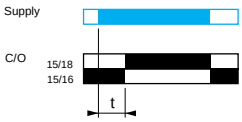

References : pages 3/34 to 3/37
Dimensions : pages 3/34 and 3/36
Schemes : page 3/35

# Zelio Time - timing relays
## Industrial single-function relays, optimum, relay output, width 22.5 mm

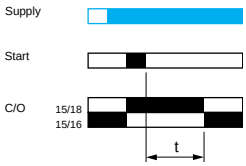
*Relay output, 1 C/O contact*
*Single timing range*

## Function diagrams

### Function A
Start on energisation




### Function C
With control contact




## References (sold in packs of 10)

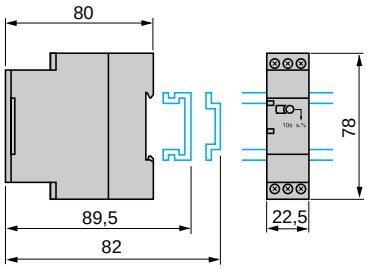


| Functions | | A | C | |
|---|---|---|---|---|
| **Voltages** | ⎓ or ∿ 24 V | ● | ● | – |
| | ∿ 110…240 V | ● | – | ● |
| | ∿ 380…415 V | – | – | – |
| **Timing ranges** | 0.05 s…0.5 s | – | – | – |
| | 0.1 s…3 s | **RE8 TA61BUTQ** | – | – |
| | 0.1 s…10 s | **RE8 TA11BUTQ** | **RE8 RA11BTQ** | **RE8 RA11FUTQ** |
| | 0.3 s…30 s | **RE8 TA31BUTQ** | **RE8 RA31BTQ** | **RE8 RA31FUTQ** |
| | 3 s…300 s | **RE8 TA21BUTQ** | **RE8 RA21BTQ** | **RE8 RA21FUTQ** |
| | 20 s…30 min | **RE8 TA41BUTQ** | – | **RE8 RA41FUTQ** |
| **Weight** (kg) | | 0.110 | 0.110 | 0.110 |

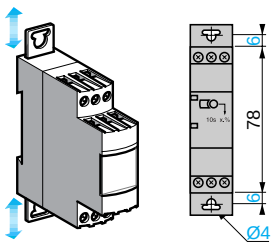
## Dimensions

### Dimensions

Rail mounting



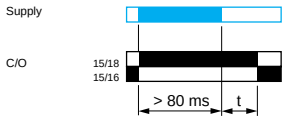

Screw fixing




Characteristics : pages 3/32 and 3/33
Schemes : page 3/35

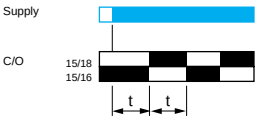
## Function K

Off-delay




## Function D

Symmetrical




3

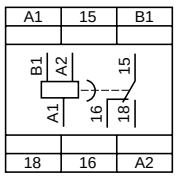


| K | D |
|---|---|
| ● | ● |
| ● | ● |
| – | – |
| **RE8 RB51BUTQ** | – |
| – | – |
| **RE8 RB11BUTQ** | **RE8 CL11BUTQ** |
| **RE8 RB31BUTQ** | – |
| – | – |
| – | – |
| 0.110 | 0.110 |

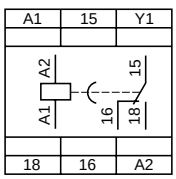
# Schemes

## Connection schemes

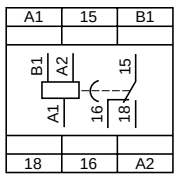
**RE8 TA, CL**




**RE8 RA**

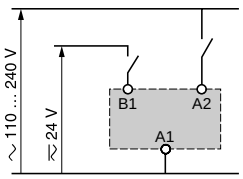



**RE8 RB**

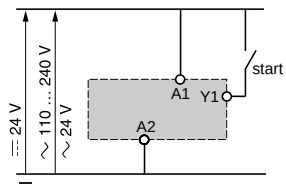



## Recommended application schemes

**RE8 TA, CL**

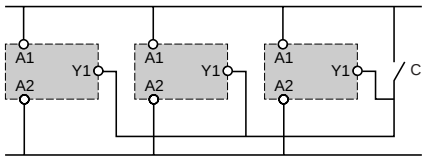



**RE8 RA**



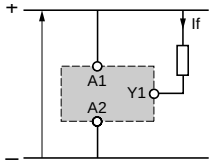

## Control of several relays with a single external control contact

**RE8 RA, RE8 PD**




The external control contact C may be an electronic control device, for example a 2-wire sensor. In this case A1-A2 = ⎓ 24 V and the control device can only control up to a maximum of 4 relays.

## Connection of a ⎓ 2-wire sensor




Leakage current (open state) If < 1 mA.

Characteristics :
pages 3/32 and 3/33

Dimensions :
page 3/34

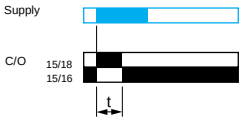
# Zelio Time - timing relays
## Industrial single-function relays, optimum, relay output, width 22.5 mm

*Relay output, 1 C/O contact*
*Single timing range*

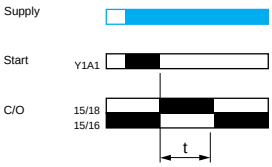


## Function diagrams

### Function H
Pulse-on energisation




### Function W
Start on opening of external control contact




## References (sold in packs of 10)

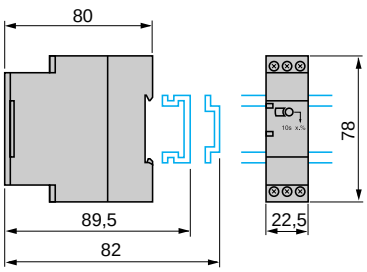


| Functions | | H | W | |
|---|---|---|---|---|
| **Voltages** | ⎓ or ∿ 24 V | ● | ● | – |
| | ∿ 110…240 V | ● | – | ● |
| | ∿ 380…415 V | – | – | – |
| **Timing ranges** | 0.05 s…0.5 s | – | – | – |
| | 0.1 s…3 s | – | – | – |
| | 0.1 s…10 s | **RE8 PE11BUTQ** | **RE8 PD11BTQ** | **RE8 PD11FUTQ** |
| | 0.3 s…30 s | **RE8 PE31BUTQ** | **RE8 PD31BTQ** | **RE8 PD31FUTQ** |
| | 3 s…300 s | **RE8 PE21BUTQ** | **RE8 PD21BTQ** | **RE8 PD21FUTQ** |
| | 20 s…30 min | – | – | – |
| **Weight** (kg) | | 0.110 | 0.110 | 0.110 |

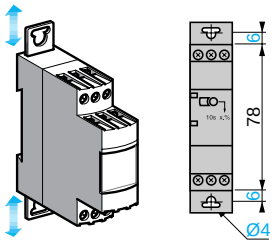
## Dimensions, schemes

### Dimensions

Rail mounting

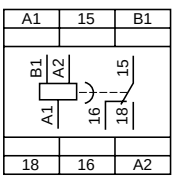



Screw fixing

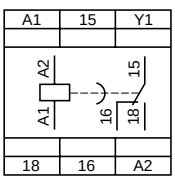



### Connection schemes (terminal blocks)

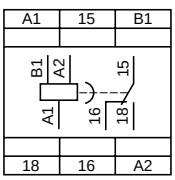
**RE8 PE**



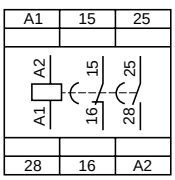

**RE8 PD**



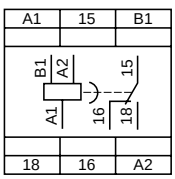

**RE8 PT**




**RE8 YA**




**RE8 YG**

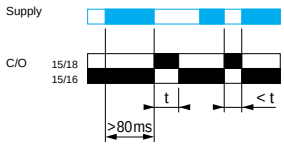



Characteristics :
pages 3/32 and 3/33

Schemes :
page 3/37

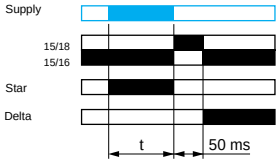
### Function He

Pulse-on energisation, start on de-energisation



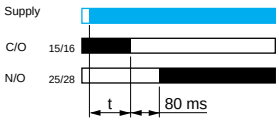

### Function Qc

Timing relay for star-delta starters




### Function Qe

Timing relay for star-delta starters





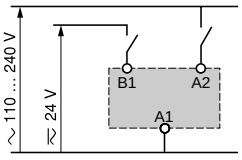


| He | Qc | Qe | | |
|---|---|---|---|---|
| ● | ● | ● | – | – |
| ● | ● | – | ● | – |
| – | – | – | – | ● |
| **RE8 PT01BUTQ** | – | – | – | – |
| – | – | – | – | – |
| – | **RE8 YG11BUTQ** | – | – | – |
| – | **RE8 YG31BUTQ** | **RE8 YA32BTQ** | **RE8 YA32FUTQ** | **RE8 YA32QTQ** |
| – | **RE8 YG21BUTQ** | – | – | – |
| – | – | – | – | – |
| 0.110 | 0.110 | 0.110 | 0.110 | 0.110 |

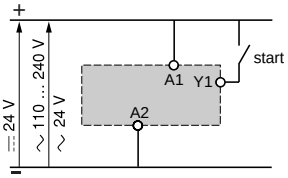
## Recommended application schemes

**Pulse-on energisation relays**

**RE8 PE, RE8 PT**

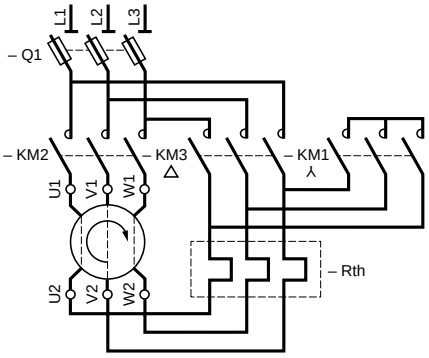



**RE8 PD**

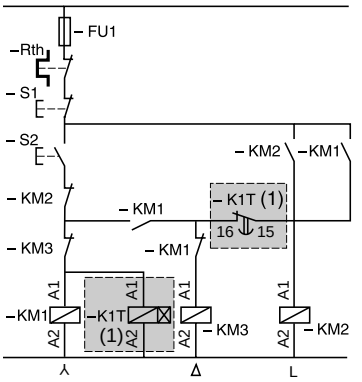



**Timing relays for star-delta starters**

**RE8 YG, RE8 YA**

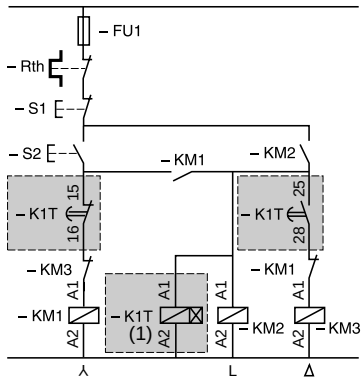



**RE8 YG**




*(1) K1T : RE8-YG●1●●TQ*

**RE8 YA**




*(1) K1T : RE8-YA32●●TQ*

***Note :*** *Correct operation of the star-delta starter associated with the RE8 YG is only possible if the wiring scheme is strictly complied with.*

Characteristics :
pages 3/32 and 3/33

Dimensions :
page 3/36

# Zelio Time - timing relays

## Universal plug-in relays, 8-pin, relay output, width 35 mm



### Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Full scale setting accuracy** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 30 |
| | Typical under load | **ms** | 100 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 100 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

### Supply characteristics

| | | | |
|---|---|---|---|
| **Multivoltage supply** | | | Depending on version, see pages 3/40 and 3/41 |
| **Frequency** | | **Hz** | 50/60 |
| **Operating range** | | | 85…110 Un % (85…120 Un for ∿/⎓ 12 V ) |
| **On-load factor** | | | 100 % |
| **Maximum power consumption** | Depending on model ⎓ 24 V | **W** | 0.6 |
| | ⎓ 240 V | **W** | 1.5 |
| | ∿ 240 V | **VA** | 32 |

### Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Relay, 1 or 2 C/O contacts, AgNi (cadmium -free) |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | 10/⎓ 5 V |
| **Maximum switching voltage** | | **V** | ∿/⎓ 250 |
| **Electrical life** | | | $10^5$ operations 8 A 250 V resistive |
| **Mechanical life** | | | 5 x $10^6$ operations |
| **Dielectric strength** | Conforming to IEC 1812-1 | **kV** | 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 664-1, IEC 1812-1 | **kV** | 5, wave 1.2/50 µs |

### Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 1 LED** | Green | | Operating status indication<br>Pulsing: relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing: timing in progress<br>On steady: relay energised, no timing in progress |

### Input characteristics

| | | | |
|---|---|---|---|
| **Input type** | | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage: 0.4 V whatever the supply voltage of the timer |

References : pages 3/40 and 3/41
Dimensions : page 3/40
Schemes : page 3/41

# Zelio Time - timing relays

## Universal plug-in relays, 8-pin, relay output, width 35 mm

### General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UR us, CSA, GL |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Front panel | | IP 50 |
| **Vibration resistance** | | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply, conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms > |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Fixing** | Plug-in socket | | 8-pin |
| **Enclosure material** | | | Self-extinguishing |

3

References : pages 3/40 and 3/41
Dimensions : page 3/40
Schemes : page 3/41

# Zelio Time - timing relays

## Universal plug-in relays, 8-pin, relay output, width 35 mm

*Relay output, 1 or 2 C/O contacts*

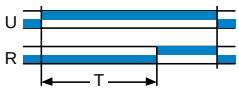
- *Multifunction of single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *1 or 2 relay outputs: 8 A - 250 V (10 A UL)*
- *Plug-in*
- *State indication by 1 LED*
- *Option of supplying a load in parallel*
- *3-wire sensor control option*



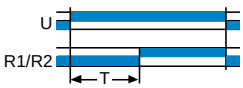
## Function diagrams

### Function A

Delay on energisation
1 contact

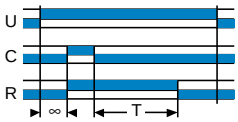



2 timed contacts



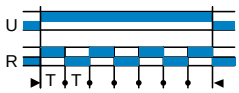

### Function C

Off-delay
1 timed contact



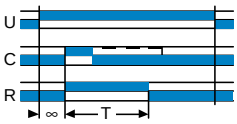

### Function Di

Flashing relay
Pulse start



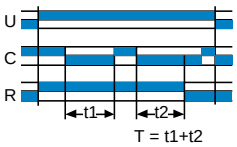

### Function B

Timing on impulse, one shot




### Function Ht

Delay on energisation with memory




## References

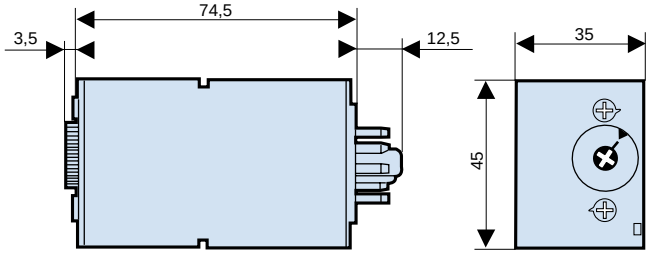



| | | | | |
|---|---|---|---|---|
| **Connection** | Plug-in sub-base | ● | ● | ● |
| **Functions** | | **Multifunction** | **Single function** | **Single function** |
| | | A - At - B - C - H - Ht - Di - D Ac - Bw | A | C |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| **Relay output** | | 1 timed contact | 2 timed contacts | 1 timed contact |
| **Rated current** | | 8 A | 8 A | 8 A |
| **Voltages** | ⎓ 24 V / ∿ 24…240 V | **RE 88 867 105** | **RE 88 867 215** | **RE 88 867 135** |
| | ∿/⎓ 12 V | – | – | – |
| | ∿/⎓ 12…240 V | – | – | – |
| **Weight** (kg) | | 0.080 | 0.080 | 0.080 |
| **Socket** *(1)* | 8-pin | **RUZ 1D** | **RUZ 1D** | **RUZ 1D** |
| | Weight (kg) | 0.067 | 0.067 | 0.067 |

*(1) These products are sold in packs of 10*

## Dimensions and connection schemes

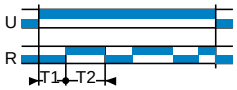
### Dimensions



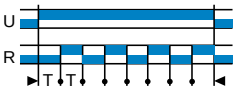

Characteristics :
pages 3/38 and 3/39

Schemes :
page 3/41

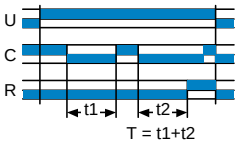
### Function L
Asymmetrical recycler
Start after pause




### Function D
Flashing relay
Start after pause



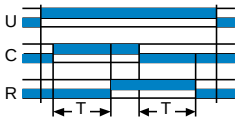

### Function At
Timing on energisation
with memory



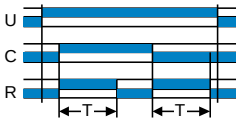

### Function H
Timing on energisation


### Function Li
Asymmetrical recycler
Pulse start


### Function Ac
Timing after closing/opening
of control contact




### Function Bw
Pulse output (adjustable)




3

561179

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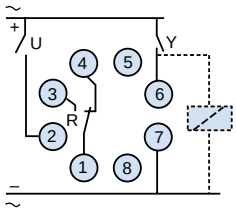
561178

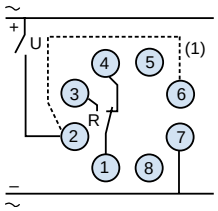
| ● | ● | ● |
|---|---|---|
| **Dual function** | **Multifunction** | **Multifunction** |
| Li - L | A - At - B - C - H - Ht - Di - D - Ac - Bw | A - At - B - C - H - Ht - Di - D - Ac - Bw |
| 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| 1 timed contact | 1 timed contact | 1 timed contact |
| 8 A | 8 A | 8 A |
| **RE 88 867 155** | – | – |
| **–** | **RE 88 867 100** | **–** |
| – | – | **RE 88 867 103** |
| 0.080 | 0.080 | 0.080 |
| **RUZ 1D** | **RUZ 1D** | **RUZ 1D** |
| 0.067 | 0.067 | 0.067 |

## Connection schemes

**Timing relays with 1 relay output**
**All functions except L and Li**

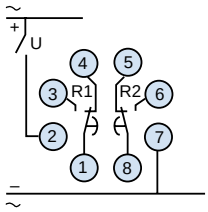



**Functions L and Li**




*(1) Link between pins 2 and 6 for function L only.*

**Timing relays with 2 relay outputs**
**Function A**




Characteristics :
pages 3/38 and 3/39

Dimensions :
page 3/40

# Zelio Time - timing relays

Universal plug-in relays, 11-pin,
relay output, width 35 mm



## Timing characteristics

| | | | |
|---|---|---|---|
| **Repeat accuracy** (with constant parameters) | Conforming to IEC 1812-1 | | ± 0.5 % |
| **Drift** | Temperature | | ± 0.05 % / °C |
| | Voltage | | ± 0.2 % / V |
| **Full scale setting accuracy** | Conforming to IEC 1812-1 | | ± 10 % at 25 °C |
| **Minimum duration of control impulse** | Typical | **ms** | 30 |
| | Typical under load | **ms** | 100 |
| **Maximum reset time by de-energisation** | Typical | **ms** | 100 |
| **Immunity time to microbreaks** | Typical | **ms** | > 10 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Multivoltage supply** | | | | Depending on version, see pages 3/44 and 3/45 |
| **Frequency** | | | **Hz** | 50/60 |
| **Operating range** | | | | 85…110 % Un (85…120 Un for ⎓ 12 V ) |
| **On-load factor** | | | | 100 % |
| **Maximum power consumption** | Depending on model | ⎓ 24 V | **W** | 0.6 |
| | | ⎓ 240 V | **W** | 1.5 |
| | | ~ 240 V | **VA** | 32 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Relay, C/O contacts, AgNi (cadmium free) |
| **Breaking capacity** | | | ~ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ~ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | 10 /⎓ 5 V |
| **Maximum switching voltage** | | **V** | ~/⎓ 250 |
| **Electrical life** | | | $10^5$ operations 8 A 250 V resistive |
| **Mechanical life** | | | 5 x $10^6$ operations |
| **Dielectric strength** | Conforming to IEC 1812-1 | **kV** | 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 664-1, IEC 1812-1 | **kV** | 5, wave 1.2/50 µs |

## Display characteristics

| | | | |
|---|---|---|---|
| **State indication by 1 LED** | Green | | Operating status indication<br>Pulsing: relay energised, no timing in progress (except Di-D and Li-L)<br>Flashing: timing in progress<br>On steady: relay energised, no timing in progress |

## Input characteristics

| | | |
|---|---|---|
| **Input type** | **V** | Volt-free contact (no potential)<br>Control possible by 3-wire sensor with PNP output, maximum residual voltage: 0.4 V whatever the supply voltage of the timer |

References :
pages 3/44 and 3/45

Dimensions :
page 3/44

Schemes :
page 3/45

# Zelio Time - timing relays

Universal plug-in relays, 11-pin,
relay output, width 35 mm

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 1812-1, EN 50081-1/2, EN 50082-1/2, LV directives (73/23/EEC + 93/68/EEC (CE marking) + EMC (89/336/EEC + IEC 669-2-3) |
| **Product certifications** | | | c UR us, CSA, GL |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 60 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Degree of protection conforming to IEC 529** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| | Front panel | | IP 50 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | f = 10…55 Hz<br>A = 0.35 mm |
| **Relative humidity without condensation** | Conforming to IEC 68-2-3 | | 93 % |
| **Electromagnetic compatibility** | Immunity to electrostatic discharge, conforming to IEC 1000-42 | | Level III (Air 8 kV/Contact 6 kV) |
| | Immunity to electromagnetic fields, conforming to ENV 50140/204 (IEC 1000-4-3) | | Level III 10 V/m : (80 MHz…1 GHz) |
| | Immunity to fast transients in bursts, conforming to IEC 1000-4-4 | | Level III (direct 2 kV / capacitive connecting clip 1 kV) |
| | Immunity to surges on the power supply, conforming to IEC 1000-4-5 | | Level III (common mode 2 kV / differential mode 1 kV) |
| | Immunity to radio frequency interference in common mode conforming to ENV 50141 (IEC 1000-4-6) | | Level III (10 V rms : 0.15…80 MHz) |
| | Immunity to voltage dips and breaks, conforming to IEC 1000-4-11 | | 30 % / 10 ms |
| | | | 60 % / 100 ms > |
| | | | 95 % / 5 s |
| | Radiated and mains conducted disturbance, conforming to EN 55022 (EN 55011 Group 1) | | Class B |
| **Fixing** | Plug-in socket | | 11-pin |
| **Enclosure material** | | | Self-extinguishing |



References :
pages 3/44 and 3/45

Dimensions :
page 3/44

Schemes :
page 3/45

# Zelio Time - timing relays

## Universal plug-in relays, 11-pin, relay output, width 35 mm



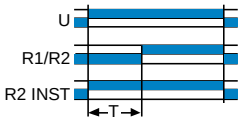
*Relay output, 2 C/O contacts*

- *Multifunction or single function*
- *Multi-range (7 switchable ranges)*
- *Multivoltage*
- *2 relay outputs: 8 A - 250 V (10 A UL)*
- *Plug-in*
- *State indication by 1 LED*
- *Option of supplying a load in parallel*
- *3-wire sensor control possible*

## Function diagrams

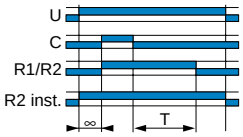
### Function A

Delay on energisation
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



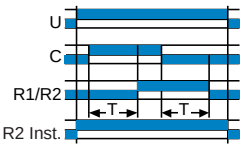

### Function C

Off-delay
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



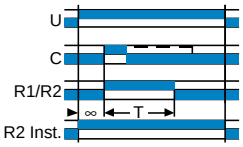

### Function Ac

Timing after closing/opening of control contact
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



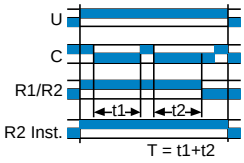

### Function B

Timing on impulse, one shot
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



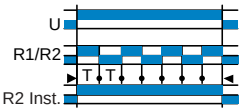

### Function Ht

Delay on energisation wih memory
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous




### Function Di

Flashing relay
Pulse start
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous




## References

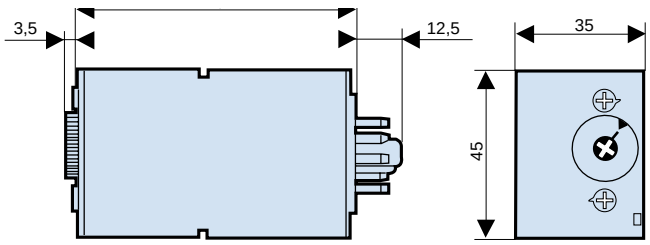



| | | | | |
|---|---|---|---|---|
| **Connection** | Plug-in sub-base | ● | ● | ● |
| **Functions** | | **Multifunction** | **Dual function** | **Single function** |
| | | A - At - B - C - H - Ht - Di - D Ac - Bw | A - At | C |
| **Timing ranges** | 7 ranges | 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| **Relay output** | | 2 timed contacts, 1 convertible to instantaneous | 2 timed contacts | 2 timed contacts |
| **Rated current** | | 8 A | 8 A | 8 A |
| **Voltages** | ⎓ 24 V / ∿ 24…240 V | **RE 88 867 305** | **RE 88 867 415** | **RE 88 867 435** |
| | ∿/⎓ 12 V | – | – | – |
| | ∿/⎓ 12…240 V | – | – | – |
| **Weight** (kg) | | 0.080 | 0.080 | 0.080 |
| **Socket** *(1)* | 11-pin, | **RUZ 1A** | **RUZ 1A** | **RUZ 1A** |
| | Weight (kg) | 0.067 | 0.067 | 0.067 |

*(1) These products are sold in packs of 10*

## Dimensions and connection schemes

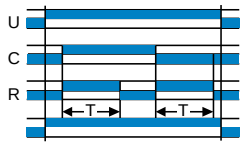
### Dimensions




Characteristics : pages 3/42 and 3/43
Dimensions : page 3/45

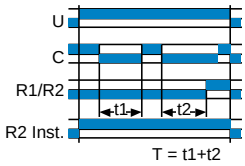
### Function Bw

Pulse output (adjustable)
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



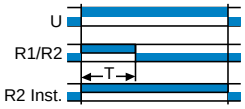

### Function At

Timing on energisation with memory
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



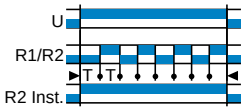

### Function H

Timing on energisation
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



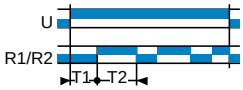

### Function D

Flashing relay
Start after pause
2 timed contacts or
2 timed contacts, 1 of which convertible to instantaneous



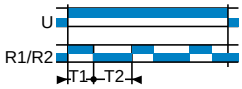

### Function L

Asymmetrical recycler
Start after pause
2 timed contacts




### Function Li

Asymmetrical recycler
Pulse start
2 timed contacts





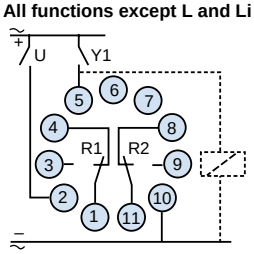




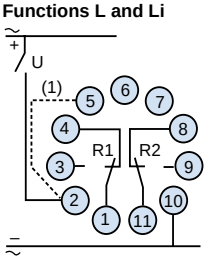
| ● | ● | ● |
|---|---|---|
| **Dual function** | **Multifunction** | **Multifunction** |
| Li - L | A - At - B - C - H - Ht - Di - D - Ac - Bw | A - At - B - C - H - Ht - Di - D - Ac - Bw |
| 1 s - 10 s - 1 min - 10 min - 1 h - 10 h - 100 h | | |
| 2 timed contacts | 2 timed contacts,<br>1 convertible to instantaneous | 2 timed contacts,<br>1 convertible to instantaneous |
| 8 A | 8 A | 8 A |
| **RE 88 867 455** | – | – |
| **–** | **RE 88 867 300** | **–** |
| – | – | **RE 88 867 303** |
| 0.080 | 0.080 | 0.080 |
| **RUZ 1A** | **RUZ 1A** | **RUZ 1A** |
| 0.067 | 0.067 | 0.067 |

## Connection schemes

**All functions except L and Li**




**Functions L and Li**




*(1) Link between pins 2 and 5 for function L only.*

Characteristics :
pages 3/42 and 3/43

Dimensions :
page 3/44

Contents

# 4 - Zelio Count - counters

# Zelio Count - counters
## Electromechanical hour counters, 7 digits

| | | | |
|---|---|---|---|
| **Counter type** | | | **XBK H hour counters** |
| **Display type** | | | **Mechanical** |
| **Characteristics** | | | |
| **Function** | | | Hour counters |
| **Supply voltage** | | **V** | ∿ 24 ± 10 % 50 Hz<br>∿ 115 ± 10 % 50 Hz<br>∿ 230 ± 10 % 50 Hz |
| **Consumption** | | **VA** | XBK H70000001M : 0.56<br>XBK H70000002M : 1<br>XBK H70000004M : 0.08 |
| **Backup capacity** | | | Permanent |
| **Number of digits** | | | 7 |
| **Display precision** | | | 99999.99 h |
| **Digit height** | | **mm** | 5 |
| **Counting mode** | | | Adding 1/100 of an hour |
| **Reset** | | | Without |
| **Inputs** | Function | | Validation |
| | Type | | Contact |
| **Environment** | | | |
| **Conforming to standards** | | | EN 50081-2,<br>EN 50082-2, VDE 0435 |
| **Product certifications** | | | UL, CSA (pending) |
| **Temperature** | Operation | **°C** | - 10…+ 50 |
| | Storage | **°C** | - 25…+ 70 |
| **Degree of protection** | Conforming to IEC 529 | | IP 65 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | 3 gn (10 to 150 Hz) |
| **Shock resistance** | Conforming to IEC 68-2-27 | | 30 gn (11 ms) |
| **Protection against electric shocks** | Conforming to IEC 536 | | Class II |
| **Mounting and fixing** | | | Flush-mounting unit fixed by a self-locking collar |
| **Connection** | | | Screw terminal block |



References :
page 4/3

Dimensions :
page 4/3

# Zelio Count - counters
## Electromechanical hour counters, 7 digits

## References

560844

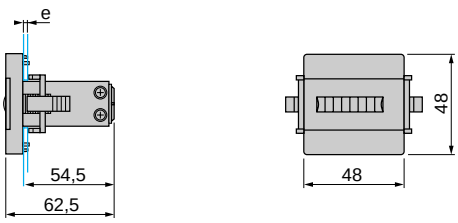
*XBK H7000000●M*

| Supply voltage | Number of display digits | Mains supply frequency | Reset type | Reference | Weight |
|---|---|---|---|---|---|
| V | | Hz | | | kg |
| **Hour counters with mechanical display (max. display capacity : 99999.99 h** | | | | | |
| ∿ **24** | 7 | 50 | Without | **XBK H70000004M** | 0.060 |
| ∿ **115** | 7 | 50 | Without | **XBK H70000001M** | 0.060 |
| ∿ **230** | 7 | 50 | Without | **XBK H70000002M** | 0.060 |

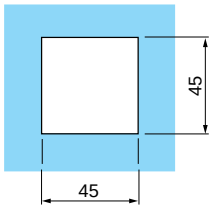
## Dimensions

**XBK H7000000●M**

Flush-mounting




e : panel thickness, 1 mm < e < 2.5 mm




4

Characteristics :
page 4/2

# Zelio Count - counters
## Electromechanical totalising counters, 5 to 8 digits

| | | | |
|---|---|---|---|
| **Counter type** | | | **XBK T totalising counters** |
| **Display type** | | | **Mechanical** |
| **Characteristics** | | | |
| **Functions** | | | Totalising counters with mechanical display |
| **Supply voltage** | | **V** | ⎓ 24 ± 10 %<br>⎓ 48 ± 10 %<br>∿ 115 ± 10 % |
| **Consumption** | | **W/VA** | XBK T50000U10M and XBK T50000U08M and XBK T70000U00M : 1.5<br>XBK T50000U11M and XBK T60000U10M and XBK T80000U00M : 2.5<br>XBK T60000U11M : 2.75<br>XBK T60000U00M : 0.155 |
| **Counting frequency** | | **Hz** | 10, 20, 25 |
| **Backup capacity** | | | Permanent |
| **Number of digits** | | | 5, 6, 7 or 8 |
| **Setting accuracy** | | | 99999…99999999 |
| **Digit height** | | **mm** | 4 |
| **Counting mode** | | | Adding |
| **Reset to zero** | | | With or without |
| **Reset type** | | | Manual |
| **Inputs** | Function | | Counting |
| | Type | | Contact |
| **Mechanical life in millions of pulses** | | | 10 except XBK T60000U10M and XBK T80000U00M : 200 |
| **Environment** | | | |
| **Conforming to standards** | | | EN 50081-2, EN 50082-2 |
| **Product certifications** | | | UL, CSA (pending)<br>(except XBK T60000U00M) |
| **Temperature** | Operation | **°C** | - 10…+ 50 except XBK T60000U00M : - 10...+ 70 |
| | Storage | **°C** | -20…+ 60 except XBK T60000U00M : - 40…+ 85 |
| **Degree of protection** | Conforming to IEC 529 | | IP 40 except XBK T60000U00M : IP 65 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | 5 gn (10 to 150 Hz) |
| **Shock resistance** | Conforming to IEC 68-2-27 | | 30 gn (6 ms) |
| **Protection against electric shocks** | Conforming to IEC 536 | | Class II |
| **Mounting and fixing** | | | Flush-mounting |
| **Connection** | | | By AMP lugs on a cable connector |



References : page 4/5
Dimensions : page 4/5
Schemes : page 4/5

# Zelio Count - counters

Electromechanical totalising counters, 5 to 8 digits

## References

560824

*XBK T50000U●●M*

560825

*XBK T60000U00M*

560826

*XBK T60000U1●M*

560827

*XBK T70000U00M*

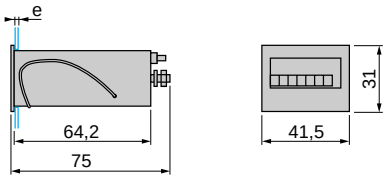
560828

*XBK T80000U00M*

| Supply voltage | Number of display digits | Counting frequency | Reset type | Reference | Weight |
|---|---|---|---|---|---|
| V | | kHz | | | kg |
| **Totalising counters with mechanical display** | | | | | |
| ⎓ **24** | 5 | 20 | Manual | **XBK T50000U10M** | 0.100 |
| | 6 | 25 | Without | **XBK T60000U00M** | 0.030 |
| | | 25 | Manual | **XBK T60000U10M** | 0.150 |
| | 7 | 20 | Without | **XBK T70000U00M** | 0.100 |
| | 8 | 25 | Without | **XBK T80000U00M** | 0.150 |
| ⎓ **48** | 5 | 20 | Without | **XBK T50000U08M** | 0.100 |
| ∿ **115** | 5 | 10 | Manual | **XBK T50000U11M** | 0.100 |
| | 6 | 10 | Manual | **XBK T60000U11M** | 0.030 |

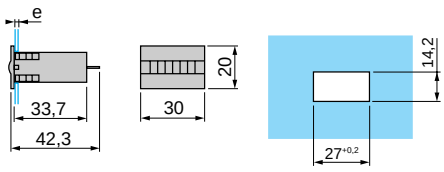
## Dimensions

**XBK T50000U●●M, XBK T70000U00M** — Flush-mounting

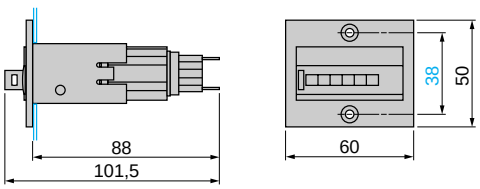



e : panel thickness, 1 mm < e < 2.5 mm

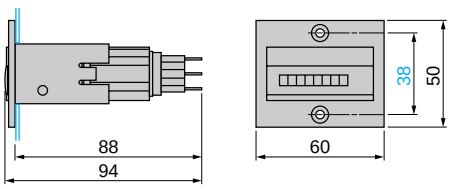
**XBK T60000U00M** — Flush-mounting



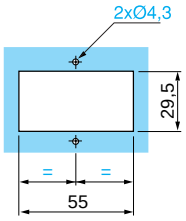

**XBK T60000U1●M**




**XBK T80000U00M**

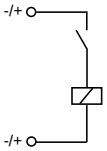



Common flush-mounting

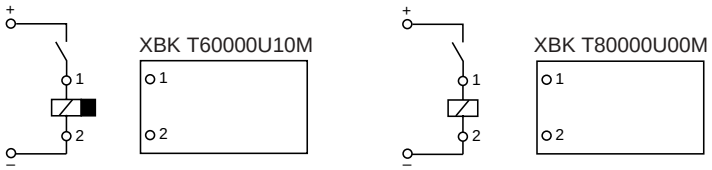



## Schemes

**XBK T50000U●●M, XBK T70000U00M**




**XBK T80000U00M, XBK T60000U1●M**




Characteristics : page 4/4

# Zelio Count - counters
## Electromechanical preselection counters, 5 digits

| | | | |
|---|---|---|---|
| **Counter type** | | | **XBK P5 preselection counters** |
| **Display type** | | | **Mechanical** |
| **Characteristics** | | | |
| **Function** | | | Preselection counters |
| **Supply voltage** | | **V** | ⎓ 24 ± 10 % |
| **Consumption** | | **W** | 2.5 |
| **Counting frequency** | | **Hz** | 25 |
| **Number of digits** | | | 5 |
| **Display capacity** | | | 99999 |
| **Digit height** | | **mm** | 4 |
| **Number of presets** | | | 1 |
| **Preset display** | | | Adding (continuous) or subtracting (non continuous) |
| **Counting mode** | | | Adding or subtracting |
| **Reset** | | | Adding from zero or subtracting from the preset value |
| **Reset type** | | | Manual or manual and electrical |
| **Type of input signals** | | | Contact (20 VA/220 V/1 A max) |
| **Output type** | | | Contact (volt-free) |
| **Connection** | | | By AMP lugs on a cable connector |
| **Environment** | | | |
| **Conforming to standards** | | | EN 50081-2 and EN 50082-2, EN 61010 |
| **Product certifications** | | | XBK P5●●●D●●M : CSA (pending)<br>XBK P5●●●U●●M : UL/CSA (pending) |
| **Temperature** | Operation | **°C** | - 10…+ 50 |
| | Storage | **°C** | - 40…+ 85 |
| **Degree of protection** | Conforming to IEC 529 | | IP 40 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | 5 gn (10 to 150 Hz) |
| **Shock resistance** | Conforming to IEC 68-2-27 | | 30 gn (6 ms) |
| **Protection against electric shocks** | Conforming to IEC 536 | | Class II |
| **Mounting and fixing** | | | Removable and flush-mounting<br>Fixing by screws on front panel |



References : page 4/7
Dimensions : page 4/7
Schemes : page 4/7

# Zelio Count - counters
## Electromechanical preselection counters, 5 digits

## References

560838

*XBK P50100D●0M*

560839

*XBK P50100U●0M*

| Supply voltage | Number of display digits | Counting frequency | Number of presets | Reset type | Reference | Weight |
|---|---|---|---|---|---|---|
| V | | kHz | | | | kg |
| **Subtracting preselection counters with mechanical display** | | | | | | |
| ⎓ **24** | 5 | 25 | 1 | Manual | **XBK P50100D10M** | 0.200 |
| | | | | Manual and electrical | **XBK P50100D20M** | 0.240 |
| **Adding preselection counters with mechanical display** | | | | | | |
| ⎓ **24** | 5 | 25 | 1 | Manual | **XBK P50100U10M** | 0.200 |
| | | | | Manual and electrical | **XBK P50100U20M** | 0.240 |

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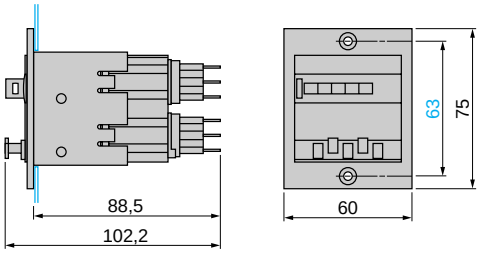
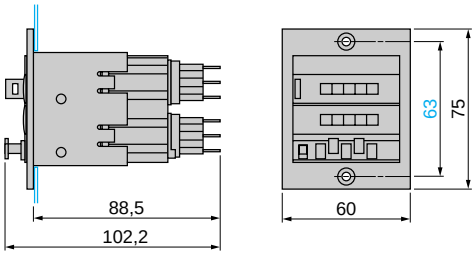
## Dimensions

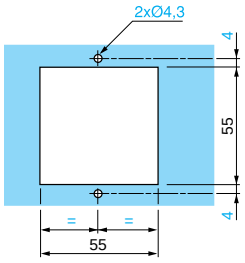
**XBK P50100D●0M**




**XBK P50100U●0M**

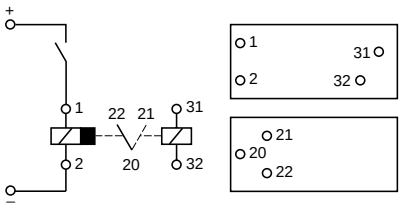



Common flush-mounting




## Schemes

**XBK P50100D●0M, XBK P50100U●0M**




Characteristics :
page 4/6

# Zelio Count - counters

## Electronic preselection and multifunction counters, 48 x 48, 6 digits, LCD or LED

| | | | |
|---|---|---|---|
| **Counter type** | | | **Preselection XBK P6** |
| **Display type** | | | **LCD or LED** |
| **Characteristics** | | | |
| **Functions** | Mulltifunction | | Counter, 'Batch' counter, totalising counter, tachometer and chronometer |
| **Supply voltage** | | **V** | ⎓ 24 or ∿ 230 ± 10 % or ∿ 115 ± 10 % |
| **Sensor supply voltage** | | | ⎓ 12 to 24 (50 mA max) for XBK P6●●30G32E or XBK P6●●30G31E |
| **Consumption** | | | 150 mA ⎓ 24 V, 50mA ∿ 230 V or ∿ 115 V |
| **Counting frequency** | | **Hz** | 5000 (2500 for bi-directional counting) |
| **Number of digits** | | | 6 |
| **Display capacity** | | | 999999 |
| **Digit height** | | **mm** | 7.6 (LED) or 9 (LCD) |
| **Number of presets** | | | 1 or 2 |
| **Preset display** | | | Non continuous |
| **Counting mode** | | | 5 programmable modes :<br>- single counter input,<br>- single counter with phase discriminator,<br>- differential inputs,<br>- summing inputs,<br>- counting direction inputs.<br>(Counter input resistance 5 kΩ) |
| **Reset** | | | 2 modes : reset to zero and reset to preset value |
| **Reset type** | | | Manual, electrical and automatic |
| **Output type** | | | Relay,changeover (response time 5 ms) :<br>⎓ 5 V < Uc < ⎓ 30 V<br>∿ 5 V < Uc < ∿ 250 V<br>10 mA < I < 1 A<br>Transistor PNP : ⎓ 12…24 V, 10 mA max |
| **Connection** | | | Screw terminal block |
| **Minimum duration of counting pulse** | | **ms** | 17 at 30 Hz<br>0.1 at 5 KHz |
| **Environment** | | | |
| **Conforming to standards** | | | EN 50081-2 and EN 50082-2, EN 61010 |
| **Product certifications** | | | UL, C-UL (pending) |
| **Temperature** | Operation | **°C** | - 0…+ 50 |
| | Storage | **°C** | - 20…+ 70 |
| **Degree of protection** | Conforming to IEC 529 | | IP 65 |
| **Vibration resistance** | Conforming to IEC 68-2-6 | | 1 gn (10 to 150 Hz) |
| **Shock resistance** | Conforming to IEC 68-2-27 | | 10 gn (18 ms) |
| **Protection against electric shocks** | Conforming to IEC 536 | | Class II |
| **Mounting and fixing** | | | Flush-mounting unit and fixing by a self-locking clamp with setscrews |

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References : page 4/9
Dimensions : page 4/9
Schemes : page 4/9

# Zelio Count - counters

Electronic preselection and multifunction counters, 48 x 48, 6 digits, LCD or LED

## References

560820

*XBK P61●30G3●E*

560821

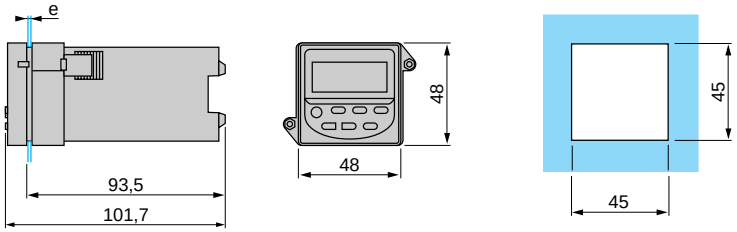
*XBK P62●30G3●E*

| Supply voltage | Number of display digits | Counting frequency | Number of presets | Reference | Weight |
|---|---|---|---|---|---|
| V | | kHz | | | kg |
| **Manual, electrical and automatic reset** | | | | | |
| **Preselection counters with LCD display** | | | | | |
| ⎓ **24** | 6 | 5 | 1 | **XBK P61130G30E** | 0.150 |
| | | | 2 | **XBK P61230G30E** | 0.150 |
| ∿ **115** | 6 | 5 | 1 | **XBK P61130G31E** | 0.250 |
| | | | 2 | **XBK P61230G31E** | 0.250 |
| ∿ **230** | 6 | 5 | 1 | **XBK P61130G32E** | 0.250 |
| | | | 2 | **XBK P61230G32E** | 0.250 |
| **Preselection counters with LED display** | | | | | |
| ⎓ **24** | 6 | 5 | 1 | **XBK P62130G30E** | 0.150 |
| | | | 2 | **XBK P62230G30E** | 0.150 |
| ∿ **230** | 6 | 5 | 1 | **XBK P62130G32E** | 0.250 |
| | | | 2 | **XBK P62230G32E** | 0.250 |

## Dimensions

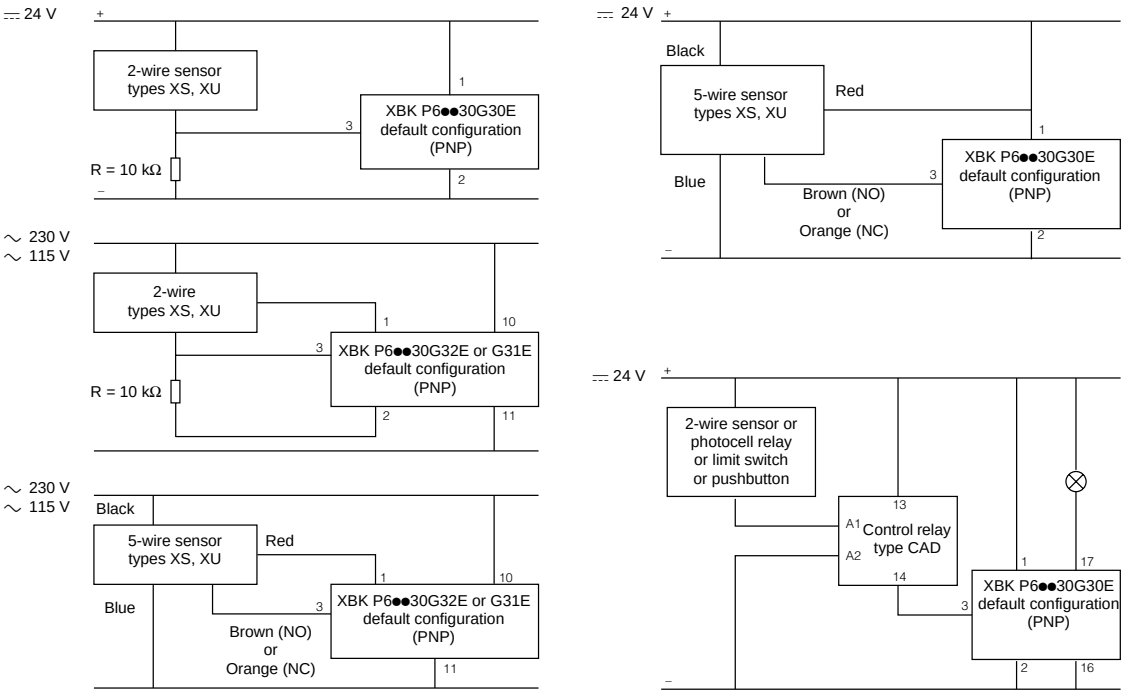
### XBK P6●●30G3●E

Flush-mounting




## Schemes

### XBK P6●●30G3●E




Characteristics : page 4/8

# Zelio Count - counters

Electronic totalising counters, 24 x 48, 8 digits, LCD

## Technical characteristics

| | | | | |
|---|---|---|---|---|
| **Function** | | | Impulse counter | |
| **Display** | | | 8 digit LCD | |
| **Digit height** | | **mm** | 7 | |
| **Counting capacity** | | | 0…99 999 999 | |

## Input characteristics

| | | | | |
|---|---|---|---|---|
| **Counter type** | | | **RC 87 610 040** | **RC 87 610 050** |
| **Input type** | | | 1 slow counting input by volt-free contact or NPN open-collector transistor (terminals 3 - 4)<br>1 fast counting input by voltage level (terminals 3 - 5) | 1 slow counting input |
| **Voltage** | Terminals 3 - 5 | **V** | ⎓ 4…30 | – |
| | Terminals 4 - 5 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 5 - 6 | **V** | – | ∿ 48…240 |

## Reset characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Front panel** | Dipswitch n° 2 to OFF | | Inhibited | Inhibited |
| | Dipswitch n° 2 to ON | | Enabled | Enabled |
| **Voltage** | Terminals 2 - 3 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 1 - 2 | **V** | – | ∿ 48…240 |

## Counting speed characteristics

| | | | | |
|---|---|---|---|---|
| **Counting speed** (slow counting) | | **Hz** | 40 | 40 |
| **Slow counting** (minimum impulse duration) | Low level | **ms** | 12 | 12 |
| | High level | **ms** | 12 | 12 |
| **Fast counting** | Low level | **µs** | 70 | – |
| | High level | **µs** | 70 | – |
| **Input levels** | | **V** | ⎓ 4…30 | ⎓ 4…30 |
| **Input impedance** | | **kΩ** | 3.5 min | 3.5 min |

## Supply characteristics

| | | | |
|---|---|---|---|
| **2 alkaline batteries** | Life | | 4 years |
| **1 lithium battery** | Life | | 8 years |
| | | | Supply can be switched off via Dipswitch n° 1 located on the underside of the device |

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | VDE 0110, IEC 664, 348, 255.4, 255.5, 801.2, 801.4 |
| **Product certifications** | | | c UL us, CSA |
| **Material** | | | Self-extinguishing |
| **Connection** | | | By 6 screw terminals on back of the device |
| **Clamping capacity** | | **mm²** | 2 x 1.5 |
| **Mounting method** | | | By yoke |
| **Front panel degree of protection** | | | IP 66 |
| **Temperature limits** | Operation | **°C** | -10…+ 55 |
| | Storage | **°C** | -20…+ 70 |
| **Insulation resistance** | Conforming to IEC 255.5 | **MΩ** | 100 (⎓ 500 V) |
| **Dielectric strength** | Conforming to IEC 255.5 | | 2000 V/50 Hz/1 min |

*(1) The reset is galvanically isolated from the counting input.*

References : page 4/11
Dimensions : page 4/11
Schemes : pages 4/11 and 4/19

# Zelio Count - counters

## Electronic totalising counters, 24 x 48, 8 digits, LCD

- LCD display, 8 digits, digit height 7 mm
- Powered by alkaline batteries or lithium battery
- Counting inputs : solid state (⎓ 4…30 V) or voltage (up to ⎓/∿ 240 V)
- Dimensions DIN - 24 x 48 mm
- Reset on front panel or external with inhibit facility

## References


*RC 87 610 050*

### Totalising counters, LCD 24 x 48

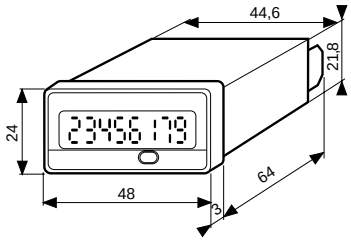
| Description | Reference | Weight kg |
|---|---|---|
| **Solid state input, lithium battery** | **RC 87 610 040** | 0.060 |
| **Voltage input, lithium battery** | **RC 87 610 050** | 0.065 |

### Accessories

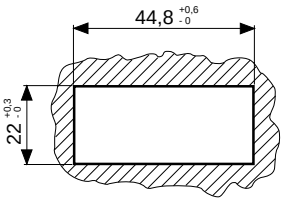
| Description | Dimensions | Reference | Weight kg |
|---|---|---|---|
| **Adaptors for panel cut-out** | 25 x 50 mm (dimensions 29 x 54 mm) | **RC 26 546 829** | 0.002 |
| | 45 x 45 mm (dimensions 52 x 52 mm) | **RC 26 546 830** | 0.008 |
| | Ø 50 mm (dimensions Ø 73 mm) | **RC 26 546 831** | 0.011 |

## Dimensions

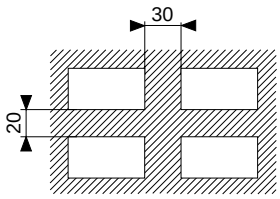
### RC 87 610 0●0



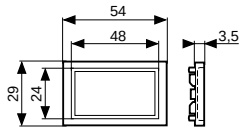

**Panel cut-out**
(Max. thickness 10mm) 1 unit



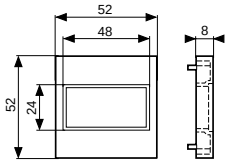

4 units



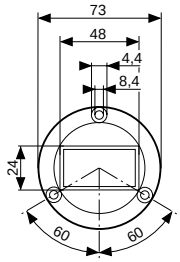

### RC 26 546 829




### RC 26 546 830

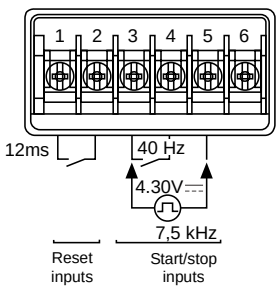



### RC 26 546 831



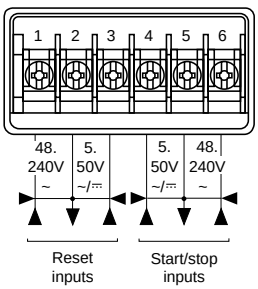

## Schemes (other schemes on page 4/19)

### RC 87 610 040




**Terminals**
1 - Reset input
2 - 0 V reset
3 - 0 V counting
4 - Slow counting
5 - Fast counting

### RC 87 610 050




**Terminals**
1 - Reset ∿ 48…240 V
2 - 0 V reset
3 - Reset ∿/⎓ 5…50 V
4 - ∿/⎓ 5…50 V
5 - 0 V
6 - ∿ 48…240 V

Characteristics : page 4/10

# Zelio Count - counters

Electronic total/partial impulse counters, 24 x 48, 8 digits, LCD

## Technical characteristics

| | | | | |
|---|---|---|---|---|
| **Function** | | | Impulse counter | |
| **Display** | | | 8 digit LCD | |
| **Digit height** | | **mm** | 7 | |
| **Counting capacity** | | | 0…99 999 999 | |

## Input characteristics

| **Counter type** | | | **RC 87 610 240** | **RC 87 610 250** |
|---|---|---|---|---|
| **Input type** | | | 1 counting input by volt-free contact or NPN or PNP open-collector transistor (terminals 3 - 4) | 1 galvanically isolated counting input |
| **Minimum time closed** | | **ms** | 40 | – |
| **Voltage** | Terminals 4 - 5 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 5 - 6 | **V** | – | ∿ 48…240 |

## Reset to zero characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Front panel** | | | Partial counter always enabled | |
| **External** (total counter) | | | Volt-free contact or NPN or PNP open-collector transistor (terminals 1 - 2) | |
| **Minimum time closed** | | **ms** | 40 | 40 |
| **Voltage** | Terminals 2 - 3 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 1 - 2 | **V** | – | ∿ 48…240 |

## Counting input characteristics

| | | | | |
|---|---|---|---|---|
| **Counting speed** (selectable with dispwitch n° 4) | | **Hz** | 14 or 100 | 14 |
| **Slow counting** (minimum impulse duration) | Low level | **ms** | 35 | |
| | High level | **ms** | 35 | |
| **Fast counting** (minimum impulse duration) | Low level | **ms** | 5 | |
| | High level | **ms** | 5 | |

## Supply characteristics

| | | | |
|---|---|---|---|
| **1 lithium battery** | Life | | 5 years |
| | | | Supply can be switched off via Dipswitch n° 3 located on the underside of the device |

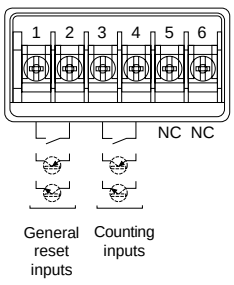
## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | VDE 0110, IEC 664, IEC 48, IEC 255.4, IEC 255.5, IEC 801.2, IEC 801.4 |
| **Product certifications** | | | c UL us, CSA |
| **Material** | | | Self-extinguishing |
| **Connection** | | | By 6 screw terminals on back of the device |
| **Clamping capacity** | | **mm²** | 2 x 1.5 |
| **Fixing** | | | By yoke |
| **Front panel degree of protection** | | | IP 66 |
| **Temperatures** | Operation | **°C** | - 10…+ 55 |
| | Storage | **°C** | - 20…+ 70 |

*(1) The reset is galvanically isolated from the counting input.*

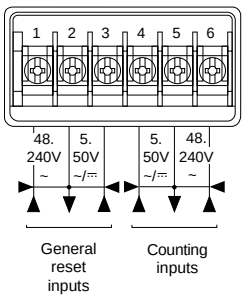
## Schemes (other schemes on pages 4/18 and 4/19)

**RC 87 610 240**




**Terminals**
1 - General reset input
2 - General reset common
3 - Count common
4 - Counting
5 - Not connected
6 - Not connected

**RC 87 610 250**




**Terminals**
1 - Reset ∿ 48…240 V
2 - General reset common
3 - Reset ∿/⎓ 5…50 V
4 - ∿/⎓ 5…50 V
5 - Count common
6 - ∿ 48…240 V

References : page 4/13
Dimensions : page 4/13

# Zelio Count - counters

## Electronic total/partial impulse counters, 24 x 48, 8 digits, LCD

- Partial or total count display
- Counting capacity :
  - partial : 0…999 999
  - total : 0…99 999 999
- Counting inputs and reset inputs :
  - RC 87 610 240 : solid state
  - RC 87 610 250 : voltage
- Decimal point
- Integral module for voltage inputs (~ / ⎓ 5…50 V, ~ 48…240 V)
- Powered by lithium battery. Life : 5 years
- Front panel reset for "partial" count
- Front panel or electrical reset for total count
- Accessories for panel cut-out 25 x 50, 45 x 45, Ø 50

## References


*RC 87 610 240*

### Total/partial impulse counters, LCD 24 x 48

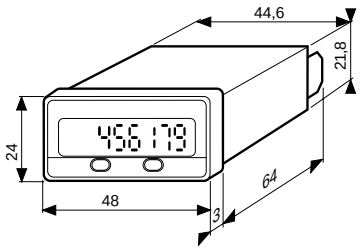
| Description | Reference | Weight kg |
|---|---|---|
| **Solid state input** | **RC 87 610 240** | 0.060 |
| **Voltage input** | **RC 87 610 250** | 0.065 |

### Accessories

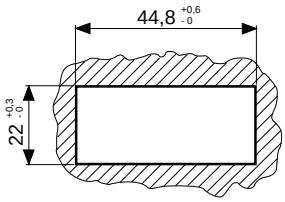
| Description | Dimensions | Reference | Weight kg |
|---|---|---|---|
| **Adaptors for panel cut-out** | 25x50 mm (dimensions 29x54 mm) | **RC 26 546 829** | 0.002 |
| | 45x45 mm (dimensions 52x52 mm) | **RC 26 546 830** | 0.008 |
| | Ø 50 mm (dimensions Ø 73 mm) | **RC 26 546 831** | 0.011 |

## Dimensions

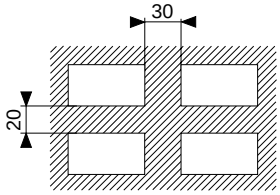
### RC 87 610 2●0



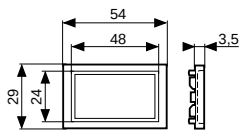

**Panel cut-out**
(Max. thickness 10mm) 1 unit



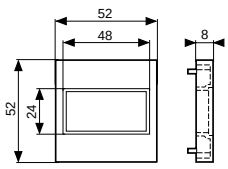

4 units



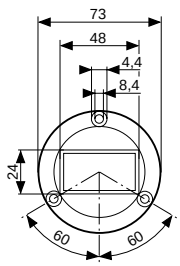

### RC 26 546 829




### RC 26 546 830




### RC 26 546 831




Characteristics : page 4/12
Schemes : page 4/12

# Zelio Count - counters

Electronic totalising counters,
hour counters, chronometers,
24 x 48, 6 or 8 digits, LCD

| Counter type | | | RC 87 610 340 | RC 87 610 440 |
|---|---|---|---|---|
| **Technical characteristics** | | | | |
| **Functions** | | | Impulse counter | Hour counter/chronometer |
| **Solid state input** | | | Solid state | Solid state |
| **Display** | | | 8 digit LCD | 6 digit LCD |
| **Digit height** | | **mm** | 7 | 7 |
| **Counting capacity** | | | 0…99 999 999 | – |
| **Time ranges** | | | – | 0…99 999.9 h<br>0…99 999.9 min<br>0…99 999.9 s<br>0…99 h 59 min 59 s |
| **Time base** | | | – | Quartz (precision ± 50 ppm) |
| **Possibility of reloading current value** | | | – | Yes |
| **Supply**<br>1 lithium battery | Life | | 8 years | 5 years |
| **Input characteristics** | | | | |
| **Volt-free contact** | | | – | 1 Start/Stop input<br>40 ms minimum (terminals 3-5)<br>1 Reset input<br>100 ms minimum (terminals 1-3)<br>1 Prog. input (terminals 3-4)<br>1 enable Reset input (terminals 1-2) |
| **Slow input** | | **Hz** | 40 max | – |
| **In.L**<br>Volt-free contact or transistor | T OFF | **ms** | 12 min | – |
| | T ON | **ms** | 12 min | – |
| | Current output | **µA** | 52 max | – |
| | Leakage current in OFF state | **µA** | 0.2 max | – |
| | Residual voltage | **V** | 0.4 max | – |
| | NPN collector | | – | – |
| **Fast input** | | **kHz** | 7 max | – |
| **In.H** | T OFF | **µs** | 70 min | – |
| | T ON | **µs** | 70 min | – |
| | Level 0 | **V** | ⎓ 0…1 | – |
| | Level 1 | **V** | ⎓ 4…30 | – |
| | Current consumption | **mA** | 6 max at ⎓ 24 V | – |
| **Reset to zero : Reset** | | | Volt-free contact or transistor | Volt-free contact or transistor |
| | NPN open collector | **ms** | 12 minimum | 100 minimum |
| **Enable reset** | | | Front panel | Front panel |
| **Electromagnetic environment characteristics** | | | | |
| **Radiated field** | Conforming to IEC 1000-4-3 | | Level 3, 10 V/M, 26 MHz to 1 GHz | |
| **Fast transients** | Conforming to IEC 1000-4-4 | | Level 3, 1 kV | |
| **Damped oscillatory wave** | Conforming to IEC 255-4 | | Level 3, 1 kV | |
| **Electrostatic discharge** | Conforming to IEC 1000-2-6 | | Level 3, 8 kV | |
| **Operating characteristics** | | | | |
| **Conforming to standards** | | | VDE 0110, IEC 664, 348, 255.4, 255.5, 801.2, 801.4 | |
| **Product certifications** | | | c UL us, CSA | |
| **Material** | | | Self-extinguishing | |
| **Connection by screw terminals on back of the device** | | | 5 terminals | |
| **Clamping capacity** | | **mm²** | 2 x 1.5 | |
| **Fixing** | | | By yoke | |
| **Degree of protection** | | | IP 64 | |
| **Temperature limits** | Operation | **°C** | 0…+ 55 | |
| | Storage | **°C** | - 25…+ 70 | |

References :
page 4/15

Dimensions :
page 4/15

Schemes :
page 4/15

# Zelio Count - counters

## Electronic totalising counters, hour counters, chronometers , 24 x 48, 6 or 8 digits, LCD

- *8 or 6 digits LCD display, digit height 7 mm*
- *Totalising counter:*
  - *7 kHz and 40 Hz inputs*
  - *maximum counting capacity : 99 999 999 impulses*
- *Hour counter/chronometer:*
  - *start/stop inputs*
  - *4 time ranges:*
    - *99 999.9 hours - 99 999.9 min*
    - *99 999.9 s - 99 h 59 min 59 s*
- *Powered by lithium battery:*
  - *reset from front panel or remote reset*

## References


*RC 87 610 340*

### Totalising counters, LCD 24 x 48

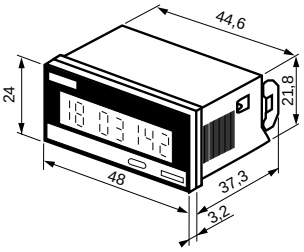
| Description | Reference | Weight kg |
|---|---|---|
| **Impulse counter** | **RC 87 610 340** | 0.060 |
| **Hour counter/chronometer** | **RC 87 610 440** | 0.060 |

### Accessories

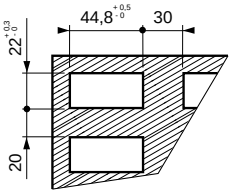
| Description | Dimensions | Reference | Weight kg |
|---|---|---|---|
| **Adaptors for panel cut-out** | 25x50 mm (dimensions 29x54 mm) | **RC 26 546 829** | 0.006 |
| | 45x45 mm (dimensions 52x52 mm) | **RC 26 546 830** | 0.008 |
| | Ø 50 mm (dimensions Ø 73 mm) | **RC 26 546 831** | 0.011 |

## Dimensions

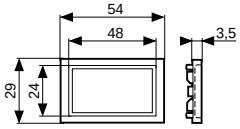
### RC 87 610 ●40



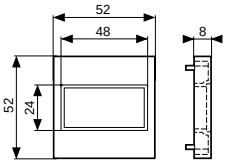

**Panel cut-out**



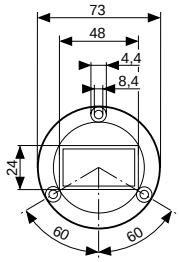

### RC 26 546 829




### RC 26 546 830

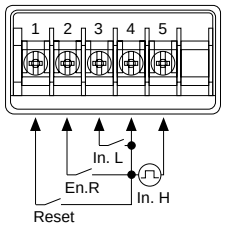


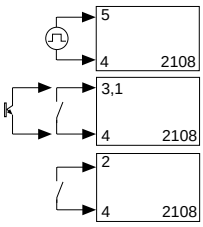

### RC 26 546 831




## Schemes

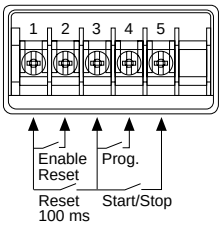
### RC 87 610 340

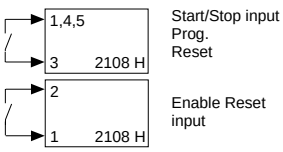



**Terminals**
1 - Reset input
2 - Enable Reset
3 - Slow counting
4 - OV
5 - Fast counting

### RC 87 610 440




**Terminals**
1 - Reset input
2 - Enable Reset
3 - Common
4 - Prog.
5 - Start/Stop

Characteristics : page 4/14

# Zelio Count - counters

Electronic hour counters, 24 x 48, 6 digits, LCD

## Technical characteristics

| | | | |
|---|---|---|---|
| **Function** | | | Hour counter |
| **Display** | | | 6 digit LCD |
| **Digit height** | | **mm** | 7 |
| **Time ranges** | | | 0…99 999.9 h<br>0…99 999.9 min<br>0…99 999.9 s<br>0…99 h 59 min 59 s |
| **Time base** | | | Quartz (precision ± 50 ppm) |
| **Possibility of reloading current value** | | | Yes |

## Input characteristics

| | | | | |
|---|---|---|---|---|
| **Counter type** | | | **RC 87 610 140** | **RC 87 610 150** |
| **Input type** | | | 1 start/stop input by volt-free contact or open-collector transistor (terminals 3-4) | 1 start/stop input |
| **Voltage** | Terminals 4 - 5 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 5 - 6 | **V** | – | ∿ 48…240 - 50/60 Hz |
| **Minimum time closed** | | **ms** | 40 | – |
| **Minimum impulse time** | ∿ | **ms** | – | 50 |
| | ⎓ | **ms** | – | 35 |

## Reset characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Front panel** | Dipswitch n° 2 to OFF | | Inhibited | Inhibited |
| | Dipswitch n° 2 to ON | | Enabled | Enabled |
| **External** | | | Volt-free contact or open-collector transistor (terminals 1 - 2) | – |
| **Minimum time closed** | | **ms** | 100 | – |
| **Minimum impulse time** | | **ms** | – | 100 |
| **Voltage** | Terminals 2 - 3 | **V** | – | ∿ / ⎓ 5…50 |
| | Terminals 1 - 2 | **V** | – | ∿ 48…240 - 50/60 Hz |

## Supply characteristics

| | | | |
|---|---|---|---|
| **1 lithium battery** | Life | | 5 years |
| | | | Supply can be switched off via Dipswitch n° 1 located on the underside of the device |

## General characteristics

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | VDE 0110, IEC 664, 348, 55.4, 255.5, 801.2, 801.4 |
| **Product certifications** | | | c UL us, CSA |
| **Material** | | | Self-extinguishing |
| **Connection** | | | By 6 screw terminals on back of the device |
| **Clamping capacity** | | **mm²** | 2 x 1.5 |
| **Mounting method** | | | By yoke |
| **Front panel degree of protection** | | | IP 66 |
| **Temperature limits** | Operation | **°C** | -10…+ 55 |
| | Storage | **°C** | -20…+ 70 |

*(1) The reset is galvanically isolated from the counting input.*

References : page 4/17
Dimensions : page 4/17
Schemes : page 4/17

# Zelio Count - counters
## Electronic hour counters, 24 x 48, 6 digits, LCD

- *Counting inputs and reset inputs : solid state or voltage*
- *Integral module for voltage inputs(~ or ⎓ 5…50 V, ~ 48…240 V)*
- *4 time ranges :*
  - *99 999.9 h - 99 999.9 min*
  - *99 999.9 s - 99 h 59 min 59 s*
- *Possibility of reloading current value*
- *Powered by lithium battery. Life 5 years*
- *Reset on front panel or external with inhibit facility*

## References


*RC 87 610 150*

### Hour counters, LCD 24 x 48

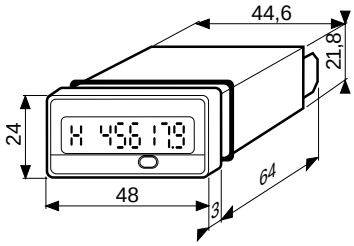
| Description | Reference | Weight kg |
|---|---|---|
| **Solid state input** | **RC 87 610 140** | 0.060 |
| **Voltage input** | **RC 87 610 150** | 0.065 |

### Accessories

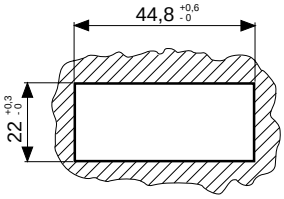
| Description | Dimensions | Reference | Weight kg |
|---|---|---|---|
| **Adaptors for panel cut-out** | 25x50 mm (dimensions 29x54 mm) | **RC 26 546 829** | 0.002 |
| | 45x45 mm (dimensions 52x52 mm) | **RC 26 546 830** | 0.008 |
| | Ø 50 mm (dimensions Ø 73 mm) | **RC 26 546 831** | 0.011 |

## Dimensions

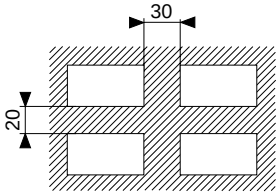
### RC 87 610 1●0



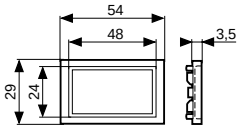

**Panel cut-out**
(Max. thickness 10 mm) 1 unit



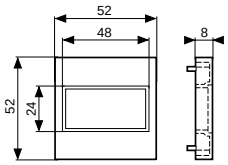

4 units



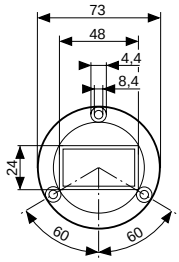

### RC 26 546 829




### RC 26 546 830

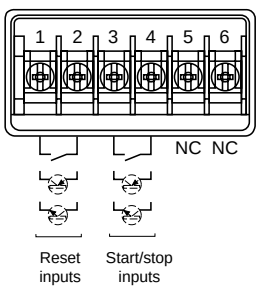



### RC 26 546 831



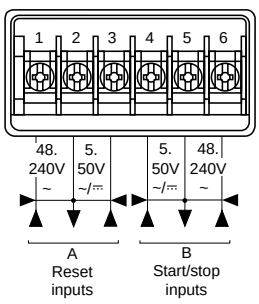

## Schemes (other schemes on page 4/19)

### RC 87 610 140




**Terminals**
1 - Reset input
2 - Reset common
3 - Start/stop common
4 - Start/stop input
5 - N/C
6 - N/C

### RC 87 610 150




**Terminals**
1 - Reset ~ 48…240 V
2 - Reset common
3 - Reset ~/⎓ 5…50 V
4 - ~/⎓ 5…50 V
5 - Start/stop common
6 - ~ 48…240 V

Characteristics : page 4/16

# Zelio Count - counters
## Counters 24 x 48

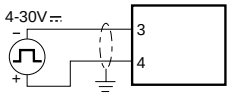
## Connection schemes

**RC 87 610 240**

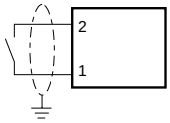
**Fast counting input**

**Counting and general reset input**

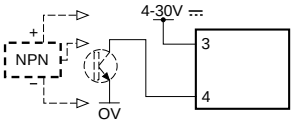
**Voltage**

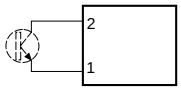



**Volt-free contact**

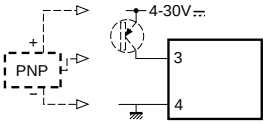


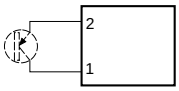

**NPN transistor or 3-wire NPN proximity sensor** *(1)*
**(RC 87 610 240)**



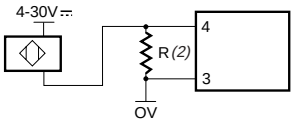




**PNP transistor or 3-wire PNP proximity sensor** *(1)*
**(RC 87 610 240)**

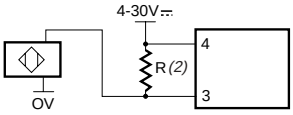



**2-wire proximity sensor**




**2-wire proximity sensor**




*(1) For sensor with leakage current ≤ 0.1 mA.*
*(2) R = 470 Ω / 2 Ω for a 2-wire sensor with leakage current ≤ 1.5 mA.*

References :
page 4/13

# Zelio Count - counters
Counters 24 x 48

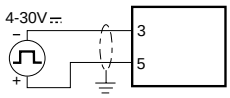
## Connection schemes

### RC 87 610 040, RC 87 610 140

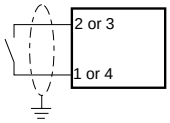
**Fast counting input RC 87 610 040**

**Slow counting or reset input RC 87 610 040**
**Start/Stop or reset input RC 87 610 140**

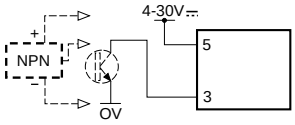
**Voltage**

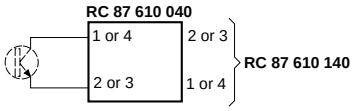



**Volt-free contact**

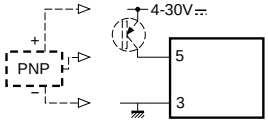


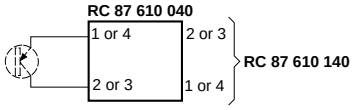

**NPN transistor (RC 87 610 140)**
**NPN transistor or 3-wire NPN proximity sensor** *(1)*
**(RC 87 610 040)**



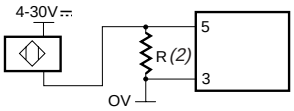




**PNP transistor (RC 87 610 140)**
**PNP transistor or 3-wire PNP proximity sensor** *(1)*
**(RC 87 610 040)**

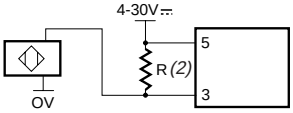



**2-wire proximity sensor**




**2-wire proximity sensor**

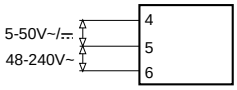


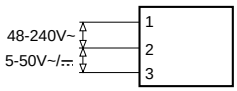

### RC 87 610 050, RC 87 610 150, RC 87 610 250

**Counting input RC 87 610 050, RC 87 610 250**
**Start/Stop input RC 87 610 150**

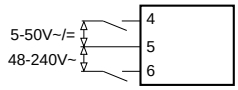
**Reset RC 87 610 050, RC 87 610 150, RC 87 610 250**

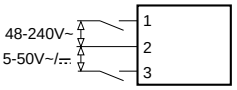
**Voltage**



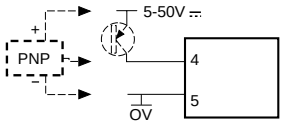



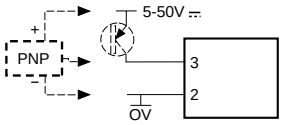

**Live contact**



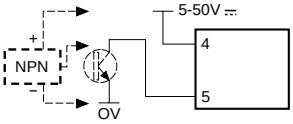



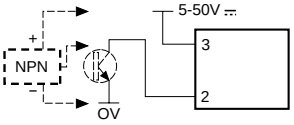

**PNP transistor or 3-wire PNP proximity sensor** *(1)*



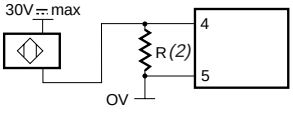



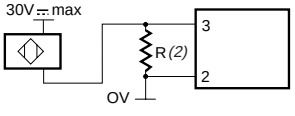

**NPN transistor or 3-wire NPN proximity sensor** *(1)*



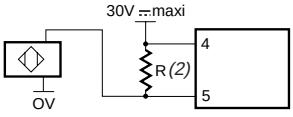



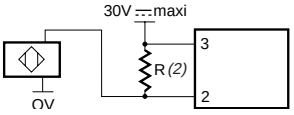

**2-wire proximity sensor**




**2-wire proximity sensor**




*(1) For sensor with leakage current ≤ 0.1 mA.*
*(2) R = 470 Ω / 2 Ω for a 2-wire sensor with leakage current ≤ 1.5 mA.*

References :
pages 4/11 to 4/17

# Zelio Count - counters

## Electronic preselection and multifunction counters

## Models RC 87 618 and RC 87 619

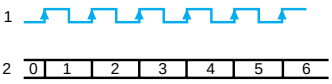


## Input modes

### Input mode

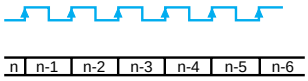
PNP : count on rising edge
NPN : count on falling edge

### UP



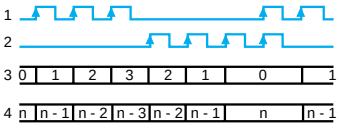

***1*** *Input IN1*
***2*** *Display*

### DN



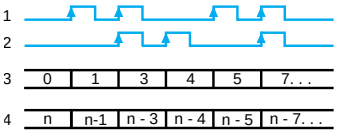

***1*** *Input IN1*
***2*** *Display*

### IND



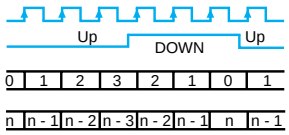

***1*** *Input IN1 count in the direction of the cycle*
***2*** *Input IN2 count in the opposite direction from the cycle*
***3*** *Display (O...P) 2 channel up/down counters*
***4*** *Display (P...O) 2 channel up/down counters*

### CUMUL



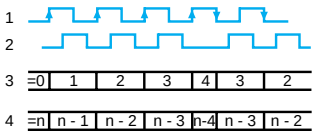

***1*** *Input IN1 count in the direction of the cycle*
***2*** *Input IN2 count in the opposite direction from the cycle*
***3*** *Display (O...P) 2 channel up/down counters*
***4*** *Display (P...O) 2 channel up/down counters*

### DIR



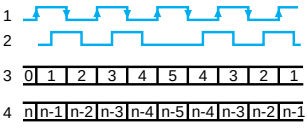

***1*** *Input IN1 input pulses*
***2*** *Input IN2 reversal of counting direction*
***3*** *Display (O...P) 1 channel up/down counters*
***4*** *Display (P...O) 1 channel up/down counters*

### PH



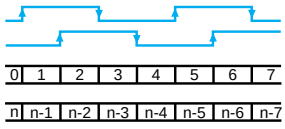

***1*** *Input IN1 (signals 90° out of phase)*
***2*** *Input IN2 (signals 90° out of phase)*
***3*** *Display (O...P)*
***4*** *Display (P...O)*

### PH2




***1*** *Input IN1 counts on rising and falling edges*
***2*** *Input IN2 direction of count reversed if IN2 in advance of IN1*
***3*** *Display (O...P)*
***4*** *Display (P...O)*

### PH4

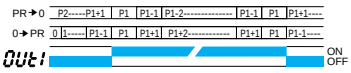



***1*** *Input IN1 counts on rising and falling edges*
***2*** *Input IN2 counts on rising and falling edges, direction of count reversed if IN2 in advance of IN1*
***3*** *Display (O...P)*
***4*** *Display (P...O)*

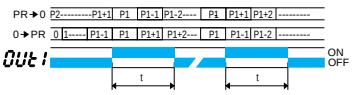
## Output modes

### Single cycle nAnU

### 2 presets

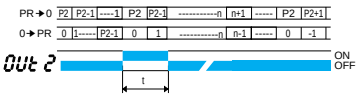



Maintained




Pulsed (transient pulse)
(t = 0.1…9.9 s)

### Repetitive cycle AUtO



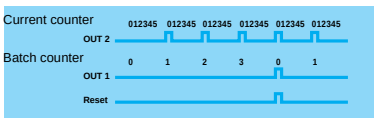

Pulsed with auto Reset to value of P2 (or P for 1 preset)
(t = 500 ms)
t = 0.1 s to 9.9 s for multifunction

## Batch counter function

### Principle

P1 is the “batch” preset.
When P2 is displayed, the value displayed on the upper digits represents the current counter value (reset to P2). In this configuration the “RST” key on the front panel of the device reinitialises the current value. When P1 (batch preset) is displayed, the value displayed on the upper digits represents the value of the Batch counter. In this configuration the “RST” on the front panel of the device resets the batch counter.
An "electrical" reset (RST terminal) still resets the current counter value and that of the batch counter.

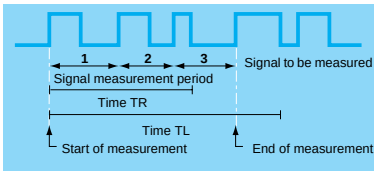
### Example




On a packing line, bottles need to be counted into packs of 6 bottles and then despatched in a box containing a batch of 4 packs.
P2 : current counter preset value : 00006
P1 : batch counter preset value : 00004

Characteristics : pages 4/22 and 4/23
References : pages 4/24 and 4/25
Dimensions : pages 4/24 and 4/25
Schemes : pages 4/24 and 4/25

# Zelio Count - counters
## Electronic preselection and multifunction counters
## Models RC 87 618 and RC 87 619




## Totalising counter function

On multifunction version:
- totalising counter reset via front panel only,
- current value reset via front panel and electrical.

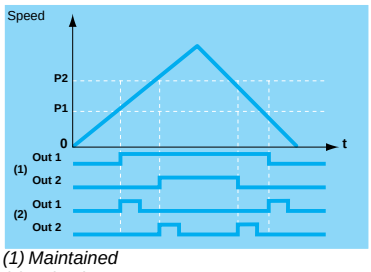
## Tachometer function

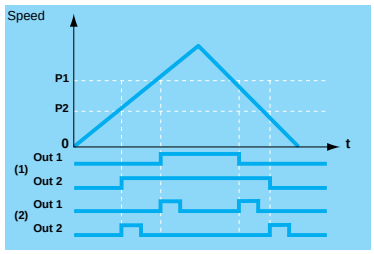
### Measurement principle

Measurement begins on a rising edge of the signal to be measured.
The measurement time is greater than TR, but less than TL.
Measurement stops at the end of the current period (3) after TR.

If the period (3) does not end before TL, the measurement result will be zero (0).
The outputs are updated at the end of each measurement according to the selected output mode.
- Maintained output : output active if the measured speed is greater than the preset speed.
- Pulsed output : output activated during time T, when the preset threshold is crossed.

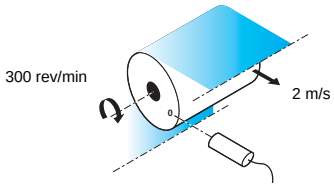
Measurement accuracy : 100 + (200/TR) PPM
Example : for TR = 1 s : 300 PPM (0.03 %).




*(1) Maintained*
*(2) Pulsed output*

### Application example




You wish to display a linear speed of 2.00 m/s for a drive pulley rotating at 300 rev/min. A sensor on this pulley delivers one pulse, per revolution, i.e. :

$$V = \frac{Ns \cdot Coef \cdot RPX}{n}$$

Required display : V = 2.00 (result in m/s → RPX = 1). Given that : n = 1

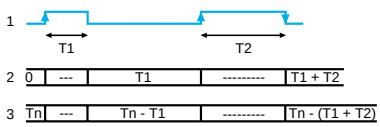
$$Ns = \frac{300}{60} = 5$$

$$\text{Dwhere } Coef = \frac{V \cdot n}{Ns \cdot RPX} \rightarrow Coef = \frac{200 \cdot 1}{5 \cdot 1} = 40$$

In addition, the decimal point is positioned in the hundreds (xxxx.xx). Selection of TR : you wish the measurement to be updated every 2 seconds → TR = 2 s.
Select TL > TR, for example TL = 3 s.
The tachometer function can also be used to calculate a flow rate.

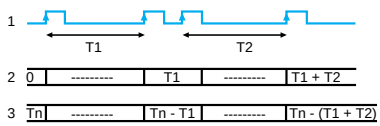
## Chronometer function (precision : 150 ppm)

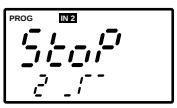

***1*** *Input IN1*
***2*** *Display (0...PR), 1 channel pulse measurement*
***3*** *Display (PR...0), 1 channel pulse measurement*



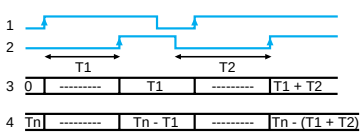


***1*** *Input IN1*
***2*** *Display (0...PR), 1 channel period measurement*
***3*** *Display (PR...0), 1 channel period measurement*




***1*** *Input IN1 (start counting)*
***2*** *Input IN2 (stop counting)*
***3*** *Display (0...PR), measurement on 2 separate channels*
***4*** *Display (PR...0), measurement on 2 separate channels*




Characteristics : pages 4/22 and 4/23
References : pages 4/24 and 4/25
Dimensions : pages 4/24 and 4/25
Schemes : pages 4/24 and 4/25

# Zelio Count - counters

## Electronic preselection and multifunction counters

## Models RC 87 618 and RC 87 619

| Counter type | | | RC 87 618 ●●● | | RC 87 619 ●●● | | |
|---|---|---|---|---|---|---|---|
| **Technical characteristics** | | | | | | | |
| **Functions** | | | Preselection up/down counters | | | | |
| | Mulltifunction | | Counters, “Batch” counters, tachometers and chronometers | | Counters, “Batch” counters, totalising counters, tachometers and chronometers | | |
| **Number of presets** | | | 1 or 2 | | | | |
| **Back-lit or red illuminated display** | Current value | | 5 digits | | 6 digits | | |
| | Preset | | 5 digits | | 6 digits | | |
| **Digit height** | Current value | **mm** | 8 | | 10 | | |
| | Preset | **mm** | 4 | | 6 | | |
| **Display capacity** | | | - 9999…+ 99999 | | | | |
| **Simultaneous readout of count value and one preset** | | | Yes | | Yes | | |
| **Input characteristics** | | | | | | | |
| **Inputs** | | | 2 counting inputs IN1, IN2 | | 2 counting inputs IN1, IN2, 1 inhibit input | | |
| **Input modes** (see page 4/20) | | | UP, DN, DIR, IND, CUMUL PH, PH2, PH4 | | | | |
| **Input by contact** | | | Voltage or solid state for 3-wire and 2-wire detection using external resistor (NPN or PNP depending on wiring) | | Voltage or solid state (NPN/PNP depending on wiring) | | |
| **Counting speed** | Counters | | 5 kHz or 30 Hz 2.5 kHz PH4 | | 5 kHz (2.5 kHz in phase x 4) 30 Hz in debounce mode | | |
| | Mulltifunction | | Counter | Tachometer | Counter | Tachometer | Totalising counter |
| | UP, DOWN, DIR | **kHz** | 7.5 | 9 | 7.5 | 9 | 6 |
| | IND, CUMUL (IN1, IN2 non simultaneous) | **kHz** | 7.5 | 9 | 7.5 | 9 | 6 |
| | IND, CUMUL (IN1, IN2 simultaneous) | **kHz** | 4 | 5 | 4 | 5 | 3 |
| | PH, PH2 | **kHz** | 5 (except in Batch mode) : 4 kHz) | | 5 (except in Batch mode) : 4 kHz) | | 3.5 |
| | PH4 | **kHz** | 2.5 | 4 | 2.5 | 4 | 1.5 |
| **Low level** | | **V** | ⎓ 0…1 | | | | |
| **High level** | | **V** | ⎓ 4…30 | | | | |
| **Impedance** | | **kΩ** | 10 | | | | |
| **Reset characteristics** | | | | | | | |
| **Reset to zero or to preset value** | Front panel | | If not protected in programming phase | | | | |
| | Electrical | | By contact, voltage or solid state (NPN or PNP depending on wiring) | | By contact, voltage or solid state (NPN or PNP) | | |
| **Minimum pulse time** | | **ms** | 5 | | | | |
| **Low level** | | **V** | ⎓ 0…1 | | | | |
| **High level** | | **V** | ⎓ 4…30 | | | | |
| **Impedance** | | **kΩ** | 10 | | | | |
| **Option to protect against reset from front panel** | | | Yes | | | | |
| **Scale factor (each input pulse is multiplied by this figure)** | | | 00.001…99.999 | | | | |
| **Decimal point selectable for ease of reading** | | | xxxxx, xxxx.x, xxx.xx, xx.xxx | | xxxxxx, xxxxx, x, xxxx, xx, xxx.xx, xx.xxxx | | |
| **Sensor supply** | ∿ version | | ⎓ 12 or 100 V | | | | |
| | ⎓ version | | Un- 2 V/100 mA | | | | |
| **Configuration and current value saved** | | | In EEPROM memory | | | | |

4

Functions : pages 4/20 and 4/21
References : pages 4/24 and 4/25
Dimensions : pages 4/24 and 4/25
Schemes : pages 4/24 and 4/25

# Zelio Count - counters

## Electronic preselection and multifunction counters

### Models RC 87 618 and RC 87 619

| Counter type | | | RC 87 618 ●●● | RC 87 619 ●●● |
|---|---|---|---|---|
| **Output characteristics** | | | | |
| **Solid state outputs** | | | | |
| - Type | | | NPN open collector | |
| - Maximum current | | **mA** | 100 | |
| - Maximum voltage | | **V** | ⎓ 40 | |
| - Voltage drop | | **V** | < 1.5 | |
| - Response time | | **µs** | < 250 | |
| **Relay outputs** | | | | |
| - Type | | | 2 N/O contacts or 2 solid state depending on model | 2 C/O contacts + 2 solid state |
| - Rated current | | **A** | 2 | |
| - Maximum voltage | | **V** | ∿ 250 | |
| - Maximum breaking capacity (resistive) AC-1 | | **VA** | 500 | |
| - Minimum current | | **mA** | 10 | 100 |
| - Response time | | **ms** | < 10 | |
| - Mechanical life | | | 3 x $10^6$ operating cycles | 3 x $10^7$ operating cycles |
| - Electrical life at I max. AC-1 | | | 1 x $10^5$ | 1 x $10^5$ |
| - Output modes : maintained or pulsed (fixed or adjustable pulse duration)) | | | t = 0.1…9.9 s | t = 0.1…9.9 s |
| - Single cycle or repetitive (immediate auto reset) | | | Yes | |
| **Supply** (min/max values) | | **V** | ⎓ 10…30, ∿ 20…55, ∿ 80…260 | |
| - Maximum consumption | ⎓ version | **W** | 4 | < 5 |
| | ∿ 50/60 Hz version | **VA** | 10 | < 13 |
| **General characteristics** | | | | |
| **Immunity to microbreaks** | ⎓ 10…30 V version | **ms** | 10 | |
| | ∿ 20…55 V version | **ms** | 10 | |
| | ∿ 80…260 V version | **ms** | 10 | |
| **Relative humidity** (without condensation) | | | 95 % | |
| **Altitude** | | **m** | 0…2000 | |
| **Insulation (IEC 664-1)** | | **kV** | 2.5 | |
| **Standards** | Conforming to IEC 1000.4.2 | | Level 3 | |
| | Conforming to IEC 1000.4.3 | | Level 3 | |
| | Conforming to IEC 1000.4.4 | | Level 3 | |
| | Conforming to IEC 1000.4.6 | | Level 3 | |
| | Conforming to IEC 55022/11 group 1 | | Class A | |
| **Vibration withstand on 3 axes** conforming to IEC 68-2-6 | | | 10…55 Hz / 0.35 mm | |
| **Material** | | | Self-extinguishing | |
| **Connection** | | | Screw terminals | |
| **Clamping capacity** | | **mm²** | 2 x 1.5 | |
| **Front panel fixing** | | | With bracket | |
| **Front panel protection** | | | IP 54 | |
| **Front panel seal** | | | Yes | |
| **Temperature limits** | Operation | **°C** | 0…+ 55 | |
| | Storage | **°C** | - 25…+ 70 | |
| **Product certifications** | | | c UL us, CSA | |



Functions : pages 4/20 and 4/21
References : pages 4/24 and 4/25
Dimensions : pages 4/24 and 4/25
Schemes : pages 4/24 and 4/25

# Zelio Count - counters

Electronic preselection and multifunction counters, 48 x 48, 5 digits, LCD or LED
Model RC 87 618

## References

### Preselection and multifunction up/down counters 48 x 48

Functions : counter, batch counter, tachometer, chronometer
Counting input modes UP, DN, IND, CUMUL, DIR, PH, PH2, PH4
Time base : 99 h 59 min, 99 min 59 s, 99.99 s, 24 h
2 presets

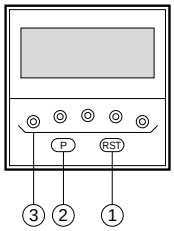

*RC 87 618 222*


*RC 87 618 322*

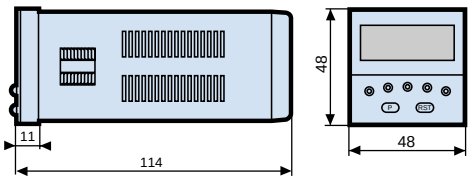
| Description | Supply voltage | Outputs | Reference | Weight kg |
|---|---|---|---|---|
| **Back-lit LCD display** | ∿ 80…260 V | 2 N/O | **RC 87 618 228** | 0.200 |
| | | 2 solid state | **RC 87 618 268** | 0.200 |
| | ∿ 20…55 V | 2 N/O | **RC 87 618 224** | 0.200 |
| | | 2 solid state | **RC 87 618 264** | 0.200 |
| | ⎓ 10…30 V | 2 N/O | **RC 87 618 222** | 0.200 |
| | | 2 solid state | **RC 87 618 262** | 0.200 |
| **Red LED display** | ∿ 80…260 V | 2 N/O | **RC 87 618 328** | 0.200 |
| | | 2 solid state | **RC 87 618 368** | 0.200 |
| | ∿ 20…55 V | 2 N/O | **RC 87 618 324** | 0.200 |
| | | 2 solid state | **RC 87 618 364** | 0.200 |
| | ⎓ 10…30 V | 2 N/O | **RC 87 618 322** | 0.200 |
| | | 2 solid state | **RC 87 618 362** | 0.200 |

## Dimensions

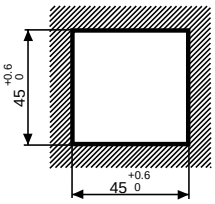
**Display**




***1*** *Reset*
***2*** *Access to all parameters in Prog. mode*
***3*** *Incrementation of figures and multipliers selection of a parameter value*

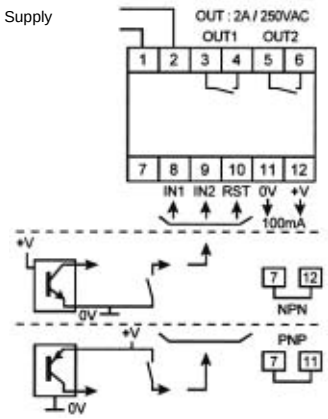



**Panel cut-out**

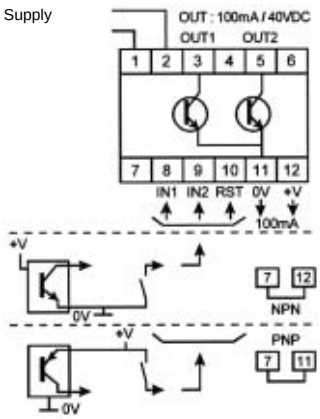



## Connection schemes

**RC 87 618 22●, RC 87 618 32●**




**RC 87 618 26●, RC 87 618 36●**




Functions : pages 4/20 and 4/21
Characteristics : pages 4/22 and 4/23

# Zelio Count - counters

Electronic preselection and multifunction counters, 72 x 72, 6 digits, LCD or LED
Model RC 87 619

## References

### Preselection and multifunction up/down counters 72 x 72

Functions : counter, batch counter, tachometer, chronometer, totalising counter
Counting input modes UP, DN, IND, CUMUL, DIR, PH, PH2, PH4
Time base : 99 h 59 min, 99 min 59 s, 99.99 s, 24 h, 999.99 h, 999.99 min.
2 presets

| Description | Supply voltage | Outputs | Reference | Weight kg |
|---|---|---|---|---|
| **Back-lit LCD display** | ∿ 80…260 V | 2 C/O + 2 solid state | **RC 87 619 228** | 0.290 |
| | ∿ 20…55 V | 2 C/O + 2 solid state | **RC 87 619 224** | 0.290 |
| | ⎓ 10…30 V | 2 C/O + 2 solid state | **RC 87 619 222** | 0.290 |
| **Red LED display** | ∿ 80…260 V | 2 C/O + 2 solid state | **RC 87 619 328** | 0.290 |
| | ∿ 20…55 V | 2 C/O + 2 solid state | **RC 87 619 324** | 0.290 |
| | ⎓ 10…30 V | 2 C/O + 2 solid state | **RC 87 619 322** | 0.290 |

560818

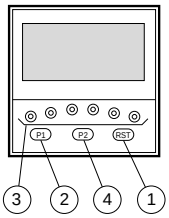
*RC 87 619 222*

560819

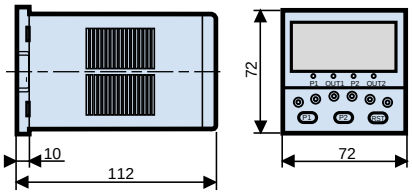
*RC 87 619 322*

## Dimensions

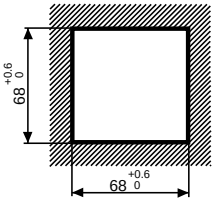
**Display**




***1*** *Reset*
***2/4*** *Access to all parameters in Prog. mode*
***3*** *Incrementation of figures and multipliers selection of a parameter value*

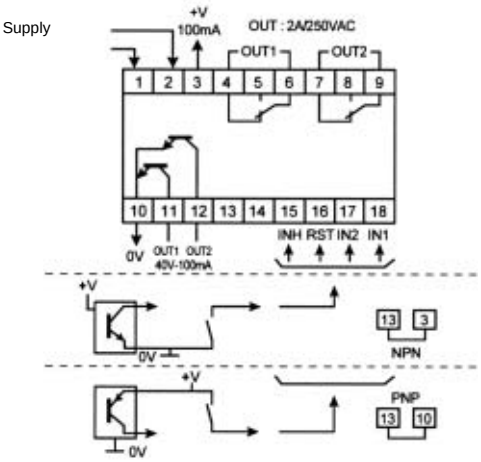



**Panel cut-out**




## Connection schemes

**RC 87 619 22●, RC 87 619 32●**




Functions : pages 4/20 and 4/21
Characteristics : pages 4/22 and 4/23

Contents

# 5 - Zelio Control - measurement and control relays

# Zelio Control - measurement and control relays

| Applications | Supply control relays | | |
|---|---|---|---|
| | 3-phase | | 3-phase + neutral |
| |  |  |  |
| Functions | Control :<br>- rotational direction,<br>- presence of phases,<br>- undervoltage,<br>- overvoltage and undervoltage<br>- asymmetry of phases | | Control :<br>- overvoltage and undervoltage<br>- presence of neutral, |
| Relay output | 1 or 2 C/O contacts | | 2 C/O contacts |
| Width | 22.5 mm | 45 mm | 45 mm |
| Relay type | RM4 T●●●<br>RM 84 873 004<br>RM 84 873 299<br>RM 84 873 5●● | RM 84 873 01●<br>RM 84 873 201<br>RM 84 873 3●● | RM 84 873 211 |
| Pages | 5/19 | 5/25 | 5/25 |

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| Voltage measurement relays | Current measurement relays |
|---|---|

| Control :<br>- overvoltage<br>~ 50 mV...5 V<br>~ 1..0.100 V<br>~ 30..0.500 V | Control :<br>- overvoltage **or** undervoltage | | Control :<br>- overvoltage **and** undervoltage | Control :<br>- overcurrent | | Control :<br>overcurrent and undercurrent | |
|---|---|---|---|---|---|---|---|
| | ~ 50 mV...5 V<br>~ 1...100 V<br>~ 30...500 V<br>~ 0.2...60 V<br>~ 15...600 V<br>~ or ⎓ 20...80 V<br>~ or ⎓ 65...260 V | ~ 0.2...60 V<br>~ 15...600 V | | 1...20 A<br>with built-in TI | 3 mA...1 A | 3 mA...1 A<br>2...500 mA<br>0.1...10 A<br>10...100 A<br>with built-in TI | 0.3...15 A<br>2...500 mA<br>0.1...10 A |
| 1 C/O contact | 1 or 2 C/O contacts | 1 C/O contact | 2 C/O contacts | 1 C/O contact | | 1 or 2 C/O contacts | |
| 22.5 mm | | 45 mm | 22.5 mm | 17.5 mm | 22.5 mm | | 45 mm |
| **RM4 UA0●●** | **RM4 UA3●**<br>**RM 84 872 0●●** | **RM 84 872 3●●** | **RM4 UB3●** | **RM 84 871 102** | **RM4 JA01●** | **RM4 JA31●●**<br>**RM 84 871 0●●** | **RM4 JA32●●**<br>**RM 84 871 3●●** |
| 5/28 | 5/35 | 5/37 | 5/41 | 5/45 | 5/48 | 5/53 | 5/37 |

# Zelio Control - measurement and control relays

| **Applications** | **Liquid level control relays** | | |
|---|---|---|---|
| |  |  |  |
| **Functions** | Control :<br>- empty | | Control :<br>- empty or fill |
| **Relay output** | 1 C/O contact | | 1 or 2 C/O contacts |
| **Width** | 22.5 mm | Plug-in<br>8 or 11-pin | 22.5 mm |
| **Relay type** | **RM 84 870 1●1** | **RM 84 870 30●**<br>**RM 84 870 807** | **RM4 L●●●●**<br>**RM 84 870 00●** |
| **Pages** | 5/55 | 5/57 | 5/65 |

| Liquid level control relays | | | Motor control relays | |
|---|---|---|---|---|
|  |  |  |  |  |
| Control :<br>- empty or fill with alarm | Control :<br>- empty and fill | | Control :<br>- underspeed | Control :<br>- overload and underload (cos φ) |
| 2 C/O contacts | 1 C/O contact | 1 C/O contact | 1 C/O contact | 2 C/O contacts |
| 45 mm | | Plug-in<br>8 or 11-pin | 45 mm | |
| **RM 84 870 50●** | **RM 84 870 604** | **RM 84 870 40●**<br>**RM 84 870 808** | **RM 84 874 30●** | **RM 84 873 40●** |
| 5/67 | 5/69 | 5/71 | 5/75 | 5/77 |

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# Zelio Control - measurement and control relays
Relays model RM4

## Environment

| | | | |
|---|---|---|---|
| **Conforming to standards** | | | IEC 60255-6, EN 60255-6 |
| **Product certifications** | | | CSA, GL, UL, pending |
| **CE marking** | | | Zelio Control measurement relays conform to European regulations relating to CE marking |
| **Ambient air temperature** around the device | Storage | **°C** | - 40…+ 85 |
| | Operation | **°C** | - 20…+ 65 |
| **Permissible relative humidity range** | Conforming to IEC 60721-3-3 | | 15…85 % Environmental class 3K3 |
| **Vibration resistance** | Conforming to IEC 6068-2-6, 10 to 55 Hz | | a = 0.35 ms |
| **Shock resistance** | Conforming to IEC 6068-2-27 | | 15 gn - 11 ms |
| **Degree of protection** | Casing | | IP 50 |
| | Terminals | | IP 20 |
| **Degree of pollution** | Conforming to IEC 60664-1 | | 3 |
| **Overvoltage category** | Conforming to IEC 60664-1 | | III |
| **Rated insulation voltage** | Conforming to IEC | **V** | 500 |
| | Conforming to CSA | **V** | *(1)* |
| **Test voltage for insulation tests** | Dielectric test | **kV** | 2,5 |
| | Shock wave | **kV** | 4,8 |
| **Voltage limits** | Power supply circuit | | 0.85…1.1 Uc *(2)* |
| **Frequency limits** | Power supply circuit | | 50/60 ± 5 % |
| **Disconnection value** | Power supply circuit | | > 0.1 Uc *(2)* |
| **Mounting position** without derating | In relation to normal vertical mounting plane | | Any position |
| **Cabling** Maximum c.s.a. | Flexible cable without cable end | **mm²** | 2 x 2.5 |
| | Flexible cable with cable end | **mm²** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 0.6…1.1 |

## Immunity to electromagnetic interference (EMC) (Application class 2 conforming to EN 61812-1)

| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC 61000-4-5 | | Level 3 (2 kV) |
| **Radiated and conducted emissions** | CISPR11 | | Group 1 class A |
| | CISPR22 | | Class A |

*(1) Value not communicated*
*(2) Except RM4-T, see page 5/11.*

# Zelio Control - measurement and control relays
Relays model RM4

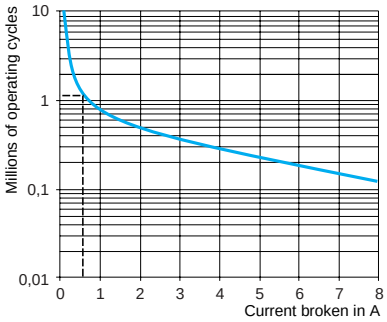
## Output circuit characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Mechanical durability** | In millions of operating cycles | | 30 | | |
| **Current limit Ith** | | **A** | 8 | | |
| **Rated operational limits at 70 °C** Conforming to IEC 60947-5-1/1991 and VDE 0660 | | | 24 V | 115 V | 250 V |
| | AC-15 | **A** | 3 | 3 | 3 |
| | DC-13 | **A** | 2 | 0.3 | 0.1 |
| **Minimum switching capacity** | | | 12 V/10 mA | | |
| **Switching voltage** | Rated | **V** | ∿ 250 | | |
| | Max. | **V** | ∿ 440 | | |
| **Contact material** | | | 90/10 nickel silver | | |

**a.c. load**

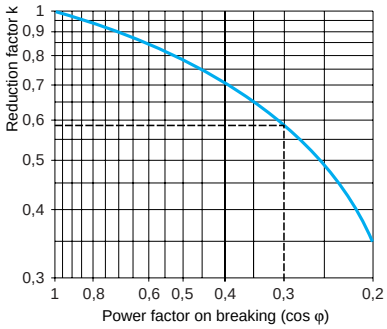
**Curve 1**

Electrical durability of contacts on resistive load in millions of operating cycles



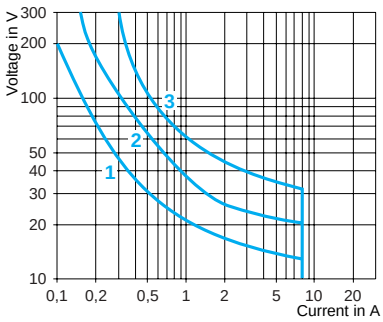

**Curve 2**

Reduction factor k for inductive loads (applies to values taken from durability Curve 1)




**d.c. load**

**Load limit curve**

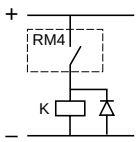



Example:

An LC1-F185 contactor supplied with 115 V/50 Hz for a consumption of 55 VA or a current consumption equal to 0.5 A and cos φ = 0.3.
For 0.5 A, curve 1 indicates a durability of approximately 1.5 million operating cycles.
As the load is inductive, it is necessary to apply a reduction coefficient k to this number of cycles as indicated by curve 2.

For cos φ = 0.3: k = 0.6
The electrical durability therefore becomes:
1.5 $10^6$ operating cycles x 0.6 = 900 000 operating cycles.

1 L/R = 20 ms
2 L/R with load protection diode
3 Resistive load




5

# Zelio Control - measurement and control relays

## 3-phase supply control relays model RM4 T


*RM4 T*

## Functions

These devices are designed to monitor 3-phase supplies and to protect motors and other loads against the faults listed in the table below.
They have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

| | RM4 TG | RM4 TU | RM4 TR | RM4 TA |
|---|---|---|---|---|
| Monitoring of rotational direction of phases | ■ | ■ | ■ | ■ |
| Detection of complete failure of one or more of the phases | ■ | ■ | ■ | ■ |
| Undervoltage detection | | ■ | | |
| Overvoltage and undervoltage detection (2 thresholds) | | | ■ | |
| Detection of phase asymmetry (imbalance) | | | | ■ |

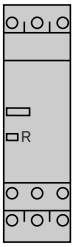
■ Function performed
Function not performed

## Applications

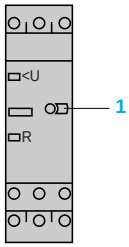
- Control for connection of moving equipment (site equipment, agricultural equipment, refrigerated trucks).
- Control for protection of persons and equipment against the consequences of reverse running (lifting, handling, elevators, escalators, etc.).
- Control of sensitive 3-phase supplies.
- Protection against the risk of a driving load (phase failure).
- Normal/emergency power supply switching.

## Presentation

**RM4 TG**

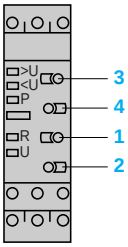



**RM4 TU**

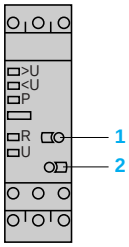



**R** Yellow LED: indicates relay output state.
**<U** Red LED: undervoltage fault.
1 Undervoltage setting potentiometer.

**RM4 TR31, RM4 TR32**

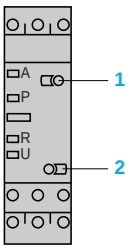



**RM4 TR33, RM4 TR34**

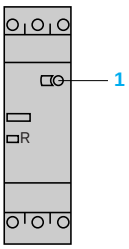



1 Time delay function selector:
⊠ Fault detection delayed
■ Fault detection extended
2 Potentiometer for setting time delay in seconds.
3 Potentiometer for setting overvoltage as a direct value.
4 Potentiometer for setting undervoltage as a direct value.
**R** Yellow LED: indicates relay output state.
**U** Green LED: indicates that supply to the RM4 is on.
**>U** Red LED: overvoltage fault.
**<U** Red LED: undervoltage fault.
**P** Red LED: phase failure or incorrect rotational direction of phases.

**RM4 TA3**




**RM4 TA0**




1 Asymmetry threshold setting potentiometer, from 5 to 15 %.
2 Potentiometer for setting time delay, 0.1 to 10 s.
**R** Yellow LED: indicates relay output state.
**U** Green LED: indicates that supply to the RM4 is on.
**A** Red LED: phase asymmetry.
**P** Red LED: phase failure or incorrect rotational direction of phases.

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References : page 5/11
Characteristics : page 5/12
Dimensions, schemes : page 5/13

# Zelio Control - measurement and control relays

## 3-phase supply control relays model RM4 T

### Operating principle

The supply voltage to be monitored is connected to terminals L1, L2, L3 of the product.

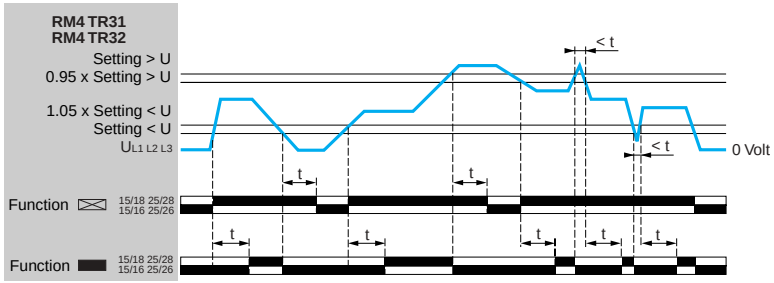
There is no need to provide a separate power supply for RM4 T relays, they are self-powered by terminals L1, L2, L3.

■ **Monitoring rotational direction of phases and detection of complete failure of one or more phases** (RM4 T all models):
□ When terminals L1, L2, L3 are energised, the relay is energised and the yellow LED comes on if the rotational direction of phases is correct and if all 3 phases are present.
□ If one or more of the phases have failed or if the rotational direction is incorrect, the relay is not energised at switch-on.
□ In normal operation (no fault) the relay is energised; it de-energises instantaneously in the event of failure of one or more of the phases (any time delay set is not active on these faults).
□ In the event of failure or absence of a single phase, a voltage greater than the detection threshold (≈ 130 V on RM4 TG, undervoltage threshold setting on RM4 TU and RM4 TR) can be generated back through the control circuit, thus preventing detection of the phase failure. In this case, we recommend the use of RM4 TA relays.
□ The absence of a phase is signalled, on RM4 TR and RM4 TA, by illumination of LED “P”.

■ **Overvoltage and undervoltage detection (RM4 TR):**
□ In normal operation, the relay is energised and LEDs "U" and "R" are illuminated.
□ If the average of the 3 voltages between phases goes outside the range to be monitored, the output relay is de-energised:
- **overvoltage**: the red LED “> U” illuminates,
- **undervoltage**: the red LED “< U” illuminates.

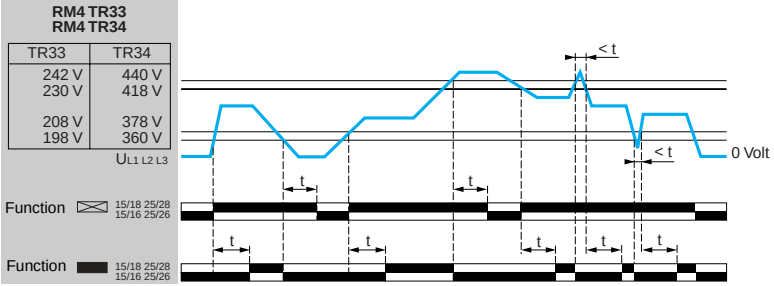
□ When the supply returns towards its rated value, the relay is re-energised according to the hysteresis value (5 %) and the corresponding red LED goes out.
□ A selector switch allows selection of an adjustable time delay from 0.1 s to 10 s. With function ⋈ transient "over" or "under" voltages are not taken into account. With function ■ all variations above or below are taken into account and re-energisation of the relay is delayed.
□ In all cases, in order to be detected, the duration of the overvoltage or undervoltage must be greater than the measuring cycle time (80 ms).

**Function diagram (RM4 TR31, RM4 TR32)**




t : time delay

**Function diagram (RM4 TR33, RM4 TR34)**




t : time delay

References : page 5/11
Characteristics : page 5/12
Dimensions, schemes : page 5/13

# Zelio Control - measurement and control relays

## 3-phase supply control relays model RM4 T

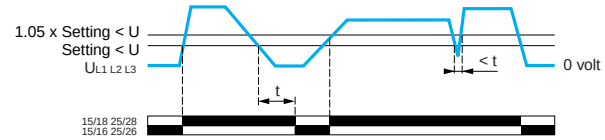
### Operating principle (continued)

■ **Undervoltage detection only (RM4 TU)**

□ In normal operation, the output relay is energised and the yellow LED is illuminated.

□ If the average of the 3 voltages between phases is less than the undervoltage threshold setting, the relay is de-energised after 550 ms and the red LED “< U” illuminates.

**Function diagram**




t : fixed time delay = 550 ms

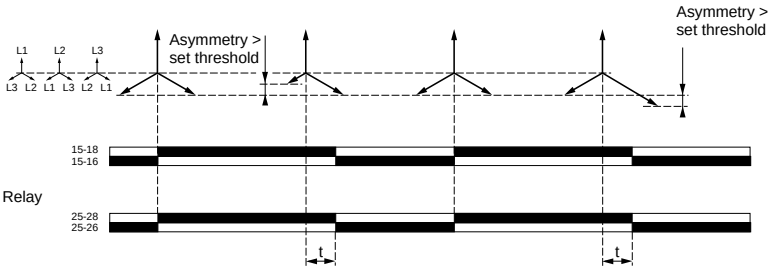
■ **Detection of phase asymmetry (RM4 TA)**

□ In normal operation, the output relay is energised and the yellow and green LEDs are illuminated.

□ In the event of an asymmetry fault, after a time delay set between 0.1 s and 10 s (on RM4 TA3 only), the output relay is de-energised, the yellow LED goes out and red LED “A” illuminates (RM4 TA3● only).

□ The relay re-energises when the asymmetry value measured is less than half of the asymmetry value setting (hysteresis).

**Function diagram**




t : time delay

**Example** : asymmetry set at 10 %, mains supply voltage 400 V

- relay de-energisation threshold: 400 V – 10 % = 360 V, 10 %,
- relay re-energisation threshold: 400 V $- \frac{10\%}{2}$ = 380 V.

References : page 5/11
Characteristics : page 5/12
Dimensions, schemes : page 5/13

# Zelio Control - measurement and control relays

## 3-phase supply control relays model RM4 T

561024

*RM4 TG20*

### Rotational direction and presence of phases

| Time delay | Rated mains supply voltage *(1)* | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|
| s | V | mm | | | kg |
| Without | 200...500 50/60 Hz | 22.5 | 2 C/O | **RM4 TG20** | 0.110 |

### Rotational direction and presence of phases + undervoltage

| Time delay | Rated mains supply voltage *(1)* | Control threshold | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|---|
| s | V | V | mm | | | kg |
| Without | 200…240 50/60 Hz | Undervoltage 160…220 | 22.5 | 2 C/O | **RM4 TU01** | 0.110 |
| | 380…500 50/60 Hz | Undervoltage 300…430 | 22.5 | 2 C/O | **RM4 TU02** | 0.110 |

### Rotational direction and presence of phases + overvoltage and undervoltage

#### Relays with fixed voltage thresholds

561025

*RM4 TR33*

| Adjustable time delay | Rated mains supply voltage *(1)* | Control threshold | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|---|
| s | V | V | mm | | | kg |
| 0.1...10 | 220 50/60 Hz | Undervoltage 198 Overvoltage 242 | 22.5 | 2 C/O | **RM4 TR33** | 0.110 |
| | 400 50/60 Hz | Undervoltage 360 Overvoltage 440 | 22.5 | 2 C/O | **RM4 TR34** | 0.110 |

#### Relays with fixed voltage thresholds

| Adjustable time delay | Rated mains supply voltage *(1)* | Control threshold | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|---|
| s | V | V | mm | | | kg |
| 0.1…10 | 200…240 50/60 Hz | Undervoltage 160…220 Overvoltage 220…300 | 22.5 | 2 C/O | **RM4 TR31** | 0.110 |
| | 380…500 50/60 Hz | Undervoltage 300…430 Overvoltage 420…580 | 22.5 | 2 C/O | **RM4 TR32** | 0.110 |

561026

*RM4 TA01*

### Rotational direction and presence of phases + asymmetry

| Time delay on de-energisation | Rated mains supply voltage *(1)* | Control threshold | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|---|
| s | V | % | mm | | | kg |
| **Fixed** 0.5 | 200...240 50/60 Hz | Asymmetry 5…15 | 22.5 | 1 C/O | **RM4 TA01** | 0.110 |
| | 380…500 50/60 Hz | Asymmetry 5…15 | 22.5 | 1 C/O | **RM4 TA02** | 0.110 |
| **Adjustable** 0.1…10 | 200...240 50/60 Hz | Asymmetry 5…15 | 22.5 | 2 C/O | **RM4 TA31** | 0.110 |
| | 380...500 50/60 Hz | Asymmetry 5…15 | 22.5 | 2 C/O | **RM4 TA32** | 0.110 |

*(1) Can be used on other supply voltages provided that the minimum operational voltages, maximum voltage between phases and compatibility with the control threshold ranges are complied with, see page 5/11.*

5

Presentation : pages 5/8 to 5/10
Characteristics : page 5/12
Dimensions, schemes : page 5/13

# Zelio Control - measurement and control relays

## 3-phase supply control relays model RM4 T

| Relay type | | | RM4 TG | RM4 TU | RM4 TR | RM4 TA |
|---|---|---|---|---|---|---|
| **Output relay and operating characteristics** | | | | | | |
| **Number of C/O contacts** | | | 2 | 2 | 2 | **RM4 TA3●** : 2<br>**RM4 TA0●** : 1 |
| **Output relay state** | | | Energised during fault free operation. De-energised or unable to energise on detection of rotational direction fault or failure of one or more phases. | Energised during fault free operation. De-energised on detection of undervoltage or rotational direction fault or failure of one or more phases. | Energised during fault free operation. De-energised on detection of overvoltage, undervoltage or rotational direction fault or phase failure. | Energised during fault free operation. De-energised on detection of asymmetry fault, phase failure or rotational direction fault. |
| **Accuracy of the switching threshold setting** | As % of the set value | | – | ± 3 % | ± 3 % | ± 3 % |
| **Switching threshold drift** | Depending on the permissible ambient temperature | | – | ≤ 0.06 % per degree centigrade | ≤ 0.06 % per degree centigrade | ≤ 0.06 % per degree centigrade |
| | Within the measuring range | | – | ≤ 0.5 % | ≤ 0.5 % | ≤ 0.5 % |
| **Accuracy of the time delay setting** | As % of the full-scale value | | – | ± 10 % | ± 10 % | ± 10 % |
| **Time delay drift** | Within the measuring range | | – | ≤ 0.5 % | ≤ 0.5 % | ≤ 0.5 % |
| | Depending on the rated operational temperature | | – | ≤ 0.07 % per degree centigrade | ≤ 0.07 % per degree centigrade | ≤ 0.07 % per degree centigrade |
| **Hysteresis** | Fixed | | – | About 5 % of the de-energisation threshold | About 5 % of the de-energisation threshold | About 50 % of the asymmetry percentage |
| **Measuring cycle** | | **ms** | ≤ 80 | ≤ 80 | ≤ 80 | ≤ 80 |
| **Measuring input characteristics** | | | | | | |
| **Minimum operational voltage** *(1)* | L1 L2<br>or<br>L2 L3<br>or<br>L1 L3 | **V** | 140 | **RM4 TU01:** 160 | **RM4 TR31**,<br>**RM4 TR33:** 160 | **RM4 TA01**,<br>**RM4 TA31:** 160 |
| | | | | **RM4 TU02:** 290 | **RM4 TR32**,<br>**RM4 TR34:** 290 | **RM4 TA02**,<br>**RM4 TA32:** 290 |
| **Maximum permissible voltage between phases** | L1 L2 L3 | **V** | 580 | **RM4 TU01:** 300 | **RM4 TR31**,<br>**RM4 TR33:** 300 | **RM4 TA01**,<br>**RM4 TA31:** 300 |
| | | | | **RM4 TU02:** 580 | **RM4 TR32**,<br>**RM4 TR34:** 580 | **RM4 TA02**,<br>**RM4 TA32:** 580 |

*(1) Minimum voltage required for operation of indicators and of the time delay.*

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Presentation : pages 5/8 to 5/10
References : page 5/11
Dimensions, schemes : page 5/13

# Zelio Control - measurement and control relays

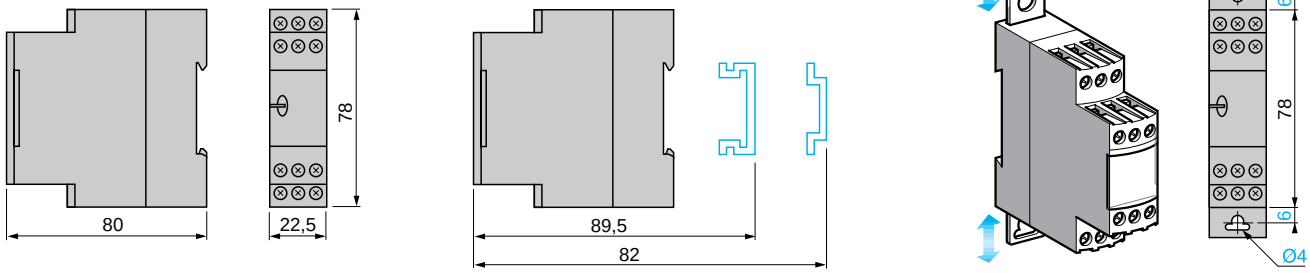
3-phase supply control relays model RM4 T

## Dimensions

**RM4 T**

**Rail mounting**

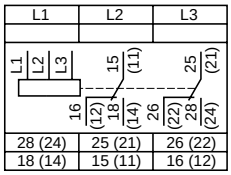
**Screw fixing**




## Schemes

**Terminal blocks**

**RM4 TG20, TU0●**

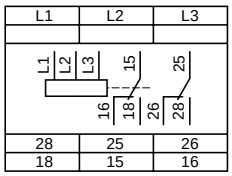



**L1, L2, L3** Supply to be monitored

**15(11)-18(14)** 1st C/O contact
**15(11)-16(12)** of the output relay

**25(21)-28(24)** 2nd C/O contact
**25(21)-26(22)** of the output relay

**RM4 TR3●, TA3●**

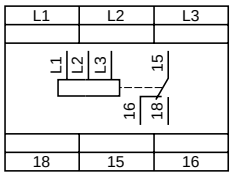



**L1, L2, L3** Supply to be monitored

**15-18** 1st C/O contact
**15-16** of the output relay

**25-28** 2nd C/O contact
**25-26** of the output relay

**RM4 TA0●**

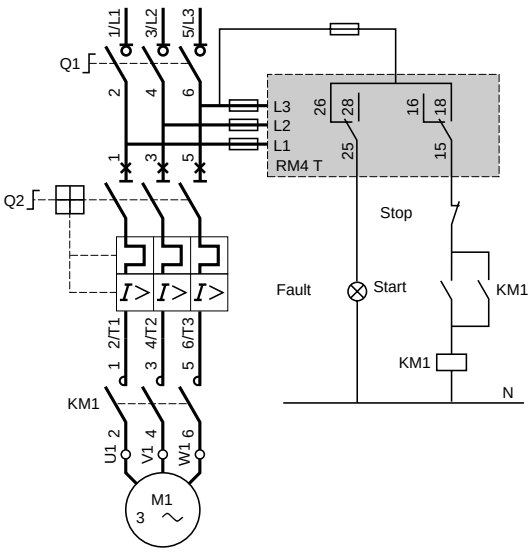



**L1, L2, L3** Supply to be monitored

**15-18** 1st C/O contact
**15-16** of the output relay

## Application scheme

Example




Presentation : pages 5/8 to 5/10
References : page 5/11
Characteristics : page 5/12

# Zelio Control - measurement and control relays

## Phase control relays, self-powered, model RM 84 873

- *Optimised installation and space savings (22.5 mm).*
- *Control: the phase control relay can simply be installed and used to monitor phase failure or phase reversal, without any adjustment.*
- *Safety: the level of safety of the installation can be selected by using versions with 1 or 2 C/O output contacts.*
- *Self-powered : simple to install; uses the controlled mains supply for its own power supply.*

### Operating principle

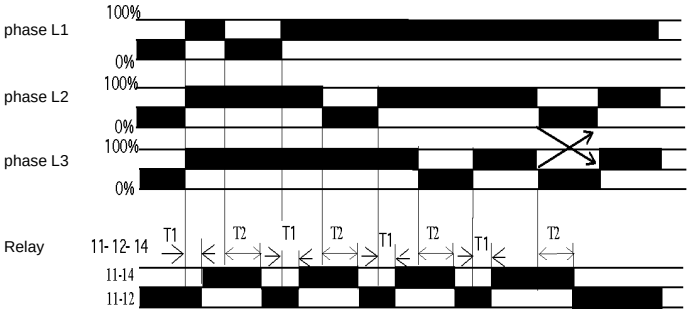
These relays monitor the correct sequencing of phases L1, L2 and L3, as well as the total loss of one of these phases.

When the phase sequence is correct, the output relay is energised; this is indicated by a yellow LED.

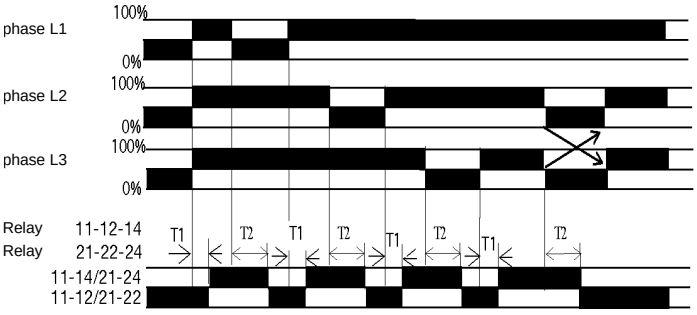
The relay de-energises (LED off) if one of the following faults occurs:
- incorrect sequence of phases at terminals L1, L2 and L3,
- total loss of one phase or of all three phases (phase failure detection threshold < ∿ 50 V).

### Timing diagrams

**RM 84 873 299**




**RM 84 873 004**




5

References : page 5/15
Characteristics : page 5/15
Dimensions : page 5/15
Schemes : page 5/79

# Zelio Control - measurement and control relays

## Phase control relays, self-powered, model RM 84 873

## References


*RM 84 873 004*

**Phase control relays**

| Outputs | Reference | Weight kg |
|---|---|---|
| 1 C/O | **RM 84 873 299** | 0.100 |
| 2 C/O | **RM 84 873 004** | 0.100 |

## Input characteristics

| | | | |
|---|---|---|---|
| **Supply voltage** | | **V** | 3 x ∿ 230…400 self-powered |
| **Operating range** | | **V** | 200…500 |
| **Frequency** | | | 50/60 Hz +/- 1 Hz |
| **Maximum consumption** | | **VA** | 25 |

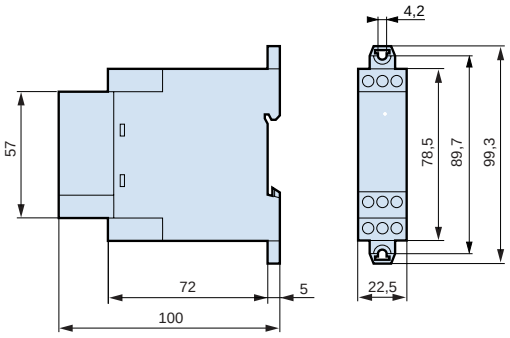
## Output characteristics

| | | | |
|---|---|---|---|
| **Output relay** | | | Cadmium-free |
| **Rated current** | | **A** | 8 |
| **Maximum switching voltage** | | **V** | ∿ 250 / ∿ 440 |
| **Rated breaking capacity** | | **VA** | 2000 |
| **Minimum breaking current** | | **mA** | 10/ 5 V |
| **Electrical life** | | | AC-12 : $10^5$ operating cycles at 8 A/ ∿ 250 V |
| **Mechanical life** | | | 2 x $10^7$ operating cycles |
| **Pick-up delay** | t1 | **ms** | < 200 |
| **Drop-out delay** | t2 | **ms** | < 300 in the event of loss of one phase |

## Other characteristics

| | | | |
|---|---|---|---|
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |
| **Clamping capacity** | Without cable end | **mm²** | 2 x 2.5 |
| | With cable end | **mm²** | 1 x 4 or 2 x 1.5 |
| **Tightening torque** | | **Nm** | 1 (M3 screw/IEC 947-1) |
| **Temperature limits** | Operation | **°C** | - 20…+ 50 |
| | Storage | **°C** | - 30…+ 70 |
| **Enclosure material** | | | Self-extinguishing PC |
| **Protection class** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| **Dielectric strength** | Conforming to IEC 255-5 | | 2.5 kV/1 min/1 mA/50 Hz |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/15
Schemes : page 5/79

# Zelio Control - measurement and control relays

## Phase control relays, self-powered, model RM 84 873

- *Control:*
  - *phase sequence,*
  - *phase failure,*
  - *voltage drop on one or more phases.*
- *Regeneration rate 90 % of Un.*
- *Power supply: 3 x ∿ 230 V and 3 x ∿ 400 V.*
- *Dual frequency: 50 and 60 Hz.*
- *Indication of phase presence and relay state by yellow LED.*
- *Relay output : 2 C/O contacts, 8A.*

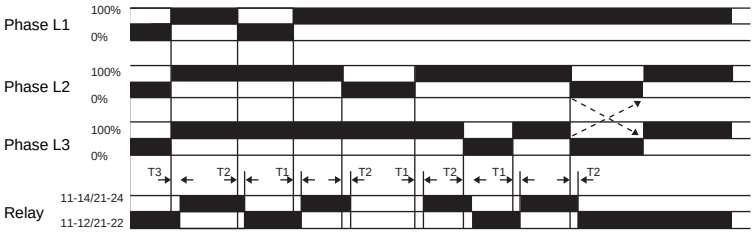
### Operating principle

This relay monitors the correct sequencing of phases L1, L2 and L3, as well as a regeneration rate equal to 90% (-10 % of Un).

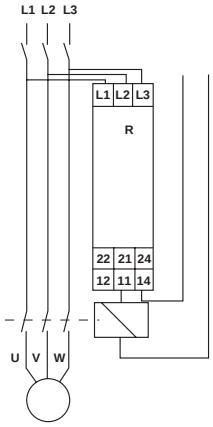
When the phase sequence is correct, the output relay is energised; this is indicated by a yellow LED.

The relay de-energises (LED off) if one of the following faults occurs:
- incorrect sequence of phases at terminals L1, L2 and L3,
- voltage drop on one or more phases.

### Timing diagrams




### Connection scheme

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References : page 5/17
Characteristics : page 5/17
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# Zelio Control - measurement and control relays

## Phase control relays, self-powered, model RM 84 873

## References


*RM 84 873 511*

**Phase control relays**

| Voltage | Reference | Weight kg |
|---|---|---|
| ∼ 230 V | **RM 84 873 511** | 0.120 |
| ∼ 400 V | **RM 84 873 512** | 0.120 |

## Input characteristics

| | | | |
|---|---|---|---|
| **Supply voltage** | | **V** | 3 x ∼ 230 and 3 x ∼ 400 self-powered |
| **Operating range** | | | - 20…+ 15 % Un |
| **Frequency** | | | 50-60 Hz +/- 1 Hz |
| **Maximum consumption** | | **VA** | 17 at Un/50 Hz (20 at 60 Hz) |
| | | **VA** | 23 at Un + 15 %/50 Hz (27 at 60 Hz) |

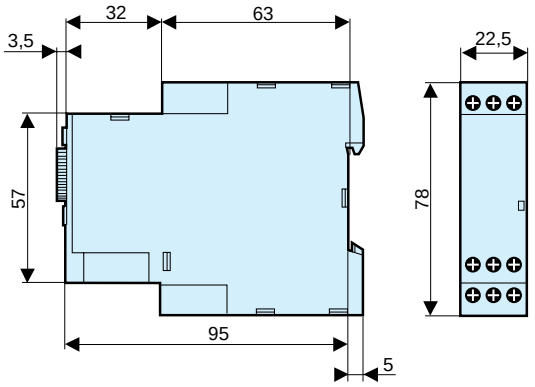
## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | 2 cadmium-free C/O contacts |
| **Rated current** | | **A** | 8 |
| **Maximum switching voltage** | | | ∼ 250 V/ ∼ 440 V |
| **Rated breaking capacity** | | **VA** | 2000 |
| **Minimum breaking current** | | **mA** | 100/12 V |
| **Electrical life** | | | AC-12 : $10^5$ operating cycles at 8 A/ ∼ 250 V |
| **Mechanical life** | | | 2 x $10^7$ operating cycles |
| **Time to onset of fault t2** | | **ms** | < 200 |
| **Time to disappearance of fault t1** | | **ms** | < 200 |
| **Clamping capacity** | Without cable end | **mm²** | 1 x 4 or 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Tightening torque** | | **Nm** | 1 (M3 screw/IEC 947-1) |
| **Temperature limits** | Operation | **°C** | - 20…+ 50 |
| | Storage | **°C** | - 40…+ 70 |
| **Relative humidity** | | | 95 % max without condensation |
| **Enclosure material** | | | Self-extinguishing PC |
| **Protection class** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| **Dielectric strength** | Conforming to IEC 60255-5 | **kV** | 2.5/1 min/1 mA/50 Hz |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |
| **Insulation coordination** | Conforming to IEC 60664-1 | | Overvoltage category III; degree of pollution 3; 4 kV/3 |
| **Vibration** Conforming to IEC 60068-2-6 | Amplitude | **mm** | 0.35 peak |
| | Frequency | **Hz** | 10…55 |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/16
Schemes : page 5/16

# Zelio Control - measurement and control relays

## Phase asymmetry control relays, self-powered, model RM 84 873

- *Control:*
  - *phase imbalance (asymmetry),*
  - *phase sequence,*
  - *phase failure,*
  - *voltage drop on one or more phases.*
- *Asymmetry rate can be adjusted on the front panel, from - 5 % to - 15 % of Un.*
- *Power supply: 3 x ∿ 230 V and 3 x ∿ 400 V.*
- *Dual frequency: 50 and 60 Hz.*
- *Indication of phase presence and relay state by yellow LED.*
- *Relay output: 2 C/O contacts, 8A.*

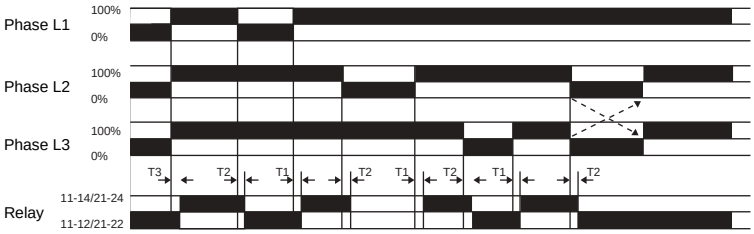
### Operating principle

These relays monitor the correct sequencing of phases L1, L2 and L3, as well as a regeneration rate of - 5 % to - 15 % of Un.

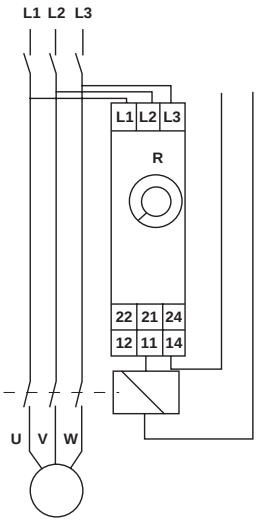
When the phase sequence is correct, the output relay is energised; this is indicated by a yellow LED.

The relay de-energises (LED off) if one of the following faults occurs:
- incorrect sequence of phases at terminals L1, L2 and L3,
- voltage drop on one or more phases.

### Timing diagrams




### Connection scheme

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References : page 5/19
Characteristics : page 5/19
Dimensions : page 5/19

# Zelio Control - measurement and control relays

## Phase asymmetry control relays, self-powered, model RM 84 873

## References


*RM 84 873 501*

**Phase asymmetry control relays**

| Voltage | Reference | Weight kg |
|---|---|---|
| ∼ 230 V | **RM 84 873 501** | 0.120 |
| ∼ 400 V | **RM 84 873 502** | 0.120 |

## Input characteristics

| | | |
|---|---|---|
| **Supply voltage** | **V** | 3 x ∼ 230 and 3 x ∼ 400 self-powered |
| **Operating range** | | - 20…+ 15 % Un |
| **Frequency** | | 50-60 Hz +/- 1 Hz |
| **Maximum consumption** | **VA** | 17 at Un/ 50 Hz (20 at 60 Hz) |
| | **VA** | 23 at Un + 15 %/50 Hz (27 at 60 Hz) |

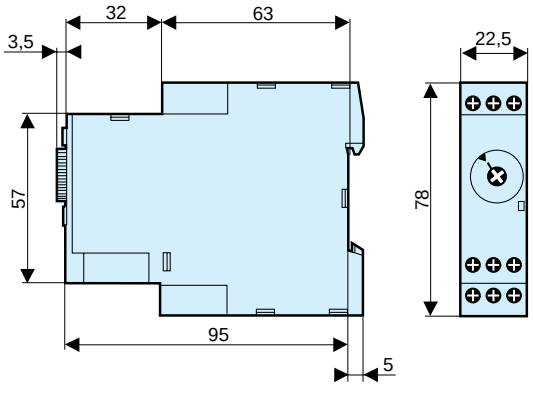
## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | 2 cadmium-free C/O contacts |
| **Rated current** | | **A** | 8 |
| **Maximum switching voltage** | | | ∼ 250 V/∼ 440 V |
| **Rated breaking capacity** | | **VA** | 2000 |
| **Minimum breaking current** | | **mA** | 100/12 V |
| **Electrical life** | | | AC-12 : $10^5$ operating cycles at 8 A/∼ 250 V |
| **Mechanical life** | | | 2 x $10^7$ operating cycles |
| **Time to onset of fault t2** | | **ms** | < 200 |
| **Time to disappearance of fault t1** | | **ms** | < 200 |
| **Clamping capacity** | Without cable end | **mm²** | 1 x 4 or 2 x 2.5 |
| | With cable end | **mm²** | 2 x 1.5 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Tightening torque** | | **Nm** | 1 (M3 screw/IEC 947-1) |
| **Temperature limits** | Operation | **°C** | - 20…+ 50 |
| | Storage | **°C** | - 40…+ 70 |
| **Relative humidity** | | | 95 % max without condensation |
| **Enclosure material** | | | Self-extinguishing PC |
| **Protection class** | Terminal block | | IP 20 |
| | Enclosure | | IP 40 |
| **Dielectric strength** | Conforming to IEC 60255-5 | **kV** | 2.5/1 min/1 mA/50 Hz |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |
| **Vibration** Conforming to IEC 60068-2-6 | Amplitude | **mm** | 0.35 peak |
| | Frequency | **Hz** | 10…55 |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/18
Scheme : page 5/18

# Zelio Control - measurement and control relays

## Phase sequence and loss of phase control relays, model RM 84 873

- *Control:*
  - *phase sequence,*
  - *loss of one or more phases,*
  - *undervoltage.*
- *Senses its own supply voltage.*
- *Potentiometer for adjustment of mains power.*
- *Time delay in the event of a fault adjustable : 0.2 to 10 s.*
- *Relay output: 2 C/O contacts, 8 A.*
- *Power-on and relay state indication by 2 LEDs.*

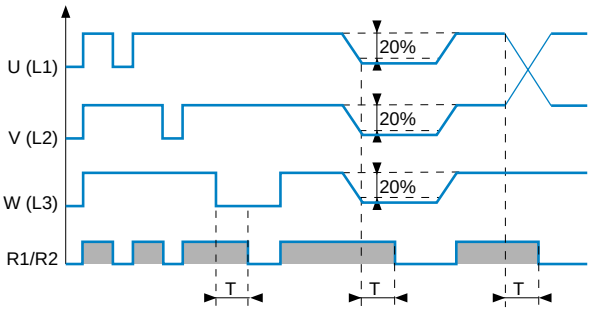


### Operating principle

On a 3-phase supply, this relay simultaneously monitors phase sequence, loss of a phase with a maximum regeneration rate of 70 % of the voltage indicated by a potentiometer on the front panel and symmetrical voltage drop on the 3 phases of less than 20 % of the preset value.

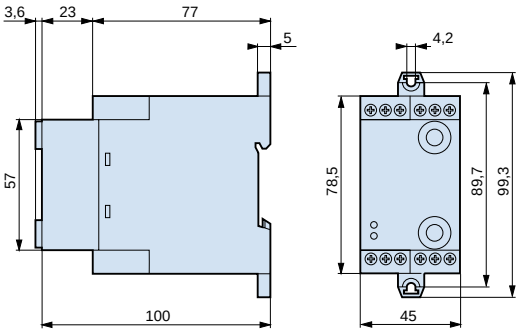
When the 3 phases are in sequence, the output relay is energised and this is indicated by a yellow LED.

The output relay de-energises (LED off) after a time delay T, adjustable between 0.2 and 10 s on the front panel, if one of the following faults occurs:
- reversed direction of phase rotation,
- absence of one or more phases,
- voltage drop.




**Note :**
Time delay T is not operational during loss of L1 and L2. It operates during loss of L3, phase inversion or voltage drop. Its purpose is to avoid spurious triggering of the output relays during transient states, notably during motor starting.

### Dimensions

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Characteristics : page 5/21
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# Zelio Control - measurement and control relays

## Phase sequence and loss of phase control relays, model RM 84 873

## References


*RM 84 873 010*

**Phase sequence and loss of phase control relays**

| Voltage | Setting range V | Reference | Weight kg |
|---|---|---|---|
| 3 x ∿ 230 V | ∿ 180…260 | **RM 84 873 010** | 0.350 |
| 3 x ∿ 400 V | ∿ 320…460 | **RM 84 873 012** | 0.350 |
| 3 x ∿ 480 V | ∿ 380…550 | **RM 84 873 015** | 0.350 |
| 3 x ∿ 575 V | ∿ 460…660 | **RM 84 873 016** | 0.350 |

## Technical characteristics

| | | | |
|---|---|---|---|
| **Supply** | | | Self-powered, terminals L1-L2 |
| **Operating range** | | | 0.7…1.2 x Un |
| **Frequency** | | **Hz** | 50/60 |
| **Maximum consumption** | | **VA** | 6 |
| **Immunity to microbreaks** | | **ms** | 10 |
| **Delay on pick-up** | | **ms** | 500 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |

## Input characteristics

| | | | |
|---|---|---|---|
| **Measurement input resistance** | | **kΩ** | 1 at Un |
| **Regeneration rate** | | | max. 70 % of the threshold setting |
| **Undervoltage detection** (symmetrical drop) | | | ∿ 20 % of the threshold setting |
| **Threshold setting accuracy** | | | ± 10 % |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | 2 C/O contacts, AgCdO |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿/⎓ 8 |
| **Minimum breaking current** | | **mA** | ∿/⎓ 100 |
| **Maximum switching voltage** | | **V** | ∿/⎓ 250 |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |
| **Time delay in the event of a fault** | | **s** | 0.2…10 Max : 10…15 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Indication** | Power on | | Green LED |
| | Relay | | Yellow LED |
| **Enclosure** | | | Self-extinguishing PC |
| **Terminals** | Without cable end | **$mm^2$** | 2 x 2.5 |
| | With cable end | **$mm^2$** | 2 x 1.5 |
| | Tightening torque | **Nm** | 0.6 max |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 70 |
| **Relative humidity** | | | 93 % without condensation |
| **Vibration** | Amplitude | **mm** | 0.35 |
| | Frequency | **Hz** | 10…55 |
| **Insulation resistance** | Conforming to IEC 60664-1 | **MΩ** | > 100 at 500 V |
| **Dielectric strength** | | **kV** | 3 at 1 mA for 1 minute/50 Hz |
| **Product certifications** | | | c UL us, CSA |



Functions : page 5/20
Dimensions : page 5/20
Schemes : page 5/79

# Zelio Control - measurement and control relays

## Phase asymmetry control relays, self-powered, model RM 84 873

- *Control:*
  - *phase imbalance (asymmetry),*
  - *phase sequence,*
  - *disconnection of one or more phases with regenerated voltage equivalent to 95 % of Un.*
- *Asymmetry rate adjustable on front panel (5 % to 20 %).*
- *3-phase power supply:*
  *3 x ∿ 230 V and 3 x 400 V ∿.*
- *Dual frequency : 50 and 60 Hz.*
- *Indication of phase presence and relay state by 2 LEDs.*
- *Time delay in the event of a fault adjustable from 0.5 to 10 seconds.*
- *Relay output:*
  - *1 C/O contact, 8 A,*
  - *2 C/O contacts, 8 A,*



T1: Delay after a fault
T2: Delay on power-down
T3: Delay on power-up.

## Operating principle

The device is self-powered by two phases.

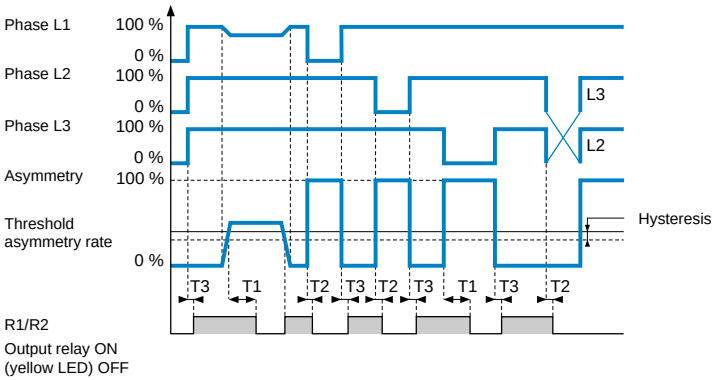
A green LED indicates that the power supply is ON.

When the phase sequence is correct and the asymmetry rate is lower than the threshold indicated on the front panel, the output relay is energised; this is indicated by a yellow LED (lit).

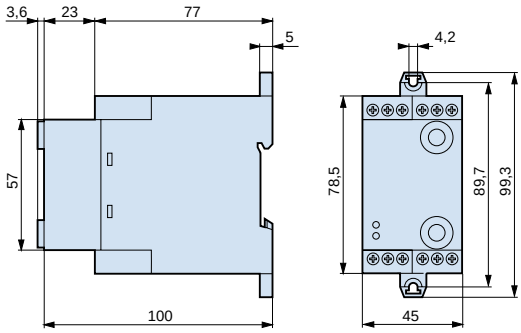
The output relay de-energises after a delay T1, adjustable on the front panel, if one of the following faults is present:
- incorrect phase sequence,
- absence of L3,
- asymmetry rate higher than the threshold setting. This imbalance represents the increase or decrease in the voltage of two phases compared to the voltage of a different phase.

The output relay de-energises instantaneously in the event of a break on L1 or L2. A hysteresis fixed at about 10 % ensures bounce-free relay switching around the threshold.

As differential measurement is used, the relay does not react to symmetrical increases or decreases in the mains supply.




## Dimensions

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# Zelio Control - measurement and control relays

## Phase asymmetry control relays, self-powered, model RM 84 873

## References

561001

*RM 84 873 300*

**Phase asymmetry control relays, self-powered**

| Number of relays | Supply voltages measured | Reference | Weight kg |
|---|---|---|---|
| **1** | 3 x ∼ 230 V | **RM 84 873 300** | 0.360 |
| | 3 x ∼ 400 V | **RM 84 873 301** | 0.360 |
| **2** | 3 x ∼ 230 V | **RM 84 873 310** | 0.360 |
| | 3 x ∼ 400 V | **RM 84 873 311** | 0.360 |

## Auxiliary power supply characteristics

| | | | |
|---|---|---|---|
| **Auxiliary voltage** (self-powered from terminals L1-L2) | | **V** | ∼ 230, ∼ 400 |
| **Operating range** | | | 0.8…1.2 x Un |
| **Frequency** | | **Hz** | 50-60 |
| **Maximum consumption** | | **VA** | 4 at Un, 8 at Un + 20 % |
| **Immunity to microbreaks** | | **ms** | 10 |
| **Delay on power-up** | t3 | **s** | 1 max |
| **Delay on power-down** | t2 | | 300 max |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |

## Input characteristics

| | | | |
|---|---|---|---|
| **3-phase supply** | Rated voltage | **V** | 3 x ∼ 230, 3 x ∼ 400 |
| | Operating range | **V** | ∼ 185…275, ∼ 320…480 |
| **Frequency** (can be altered via switch beneath the device) | | **Hz** | 50-60 |
| **Regeneration rate** | | | max 95 % of Un |
| **Asymmetry rate adjustment** | | | 5…20 % of Un |
| **Threshold setting accuracy** | Conforming to VDE 0435 | | ± 20 % at full scale |
| **Temperature drift** | | | 0.1 %/ °C |
| **Repeat accuracy** | | | ± 1 % at full scale |
| **Fixed hysteresis** | | | 10 % of the threshold setting |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | Volt-free C/O contact, AgCdO |
| **Breaking capacity** | | | ∼ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **V** | ∼/⎓ 8 |
| **Minimum breaking current** | | **mA** | ∼/⎓ 100 |
| **Maximum switching voltage** | | **V** | ∼/⎓ 250 |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |
| **Mechanical life** | | | 5 x $10^6$ operating cycles |

## Other characteristics

| | | | |
|---|---|---|---|
| **Time delay in the event of fault t1 :** | | **s** | 0.5…10, Max : 10…16 |
| **Indication** | Supply | | Green LED |
| | Relay | | Yellow LED |
| **Protection class** | Terminal block | | IP 20 |
| | Enclosure | | IP 30 |
| **Enclosure** | | | Self-extinguishing PC, panel or DIN rail mounted |
| **Terminal block clamping capacity** | Without cable end | **$mm^2$** | 2 x 2.5 |
| | With cable end | **$mm^2$** | 2 x 1.5 |
| | Tightening torque | **Nm** | 0.6 max (M3 screw/IEC 947-1) |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 (conforming to IEC 68-2-14) |
| | Storage | **°C** | - 30…+ 70 (conforming to IEC 68-2-1/2) |
| **Relative humidity** | Conforming to IEC 68-2-30 | | 93 % without condensation |
| **Vibrations** | Amplitude | **mm** | 0.35 |
| (conforming to IEC 68-2-6) | Frequency | **Hz** | 10…55 |
| **Insulation resistance** | Conforming to IEC 255-5 | **mΩ** | > 100 at ⎓ 500 V |
| **Dielectric strength** | Conforming to IEC 255-5 | **kV** | 2.5/1 min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 255-5/664-1 | **kV** | 5/wave 1.2 - 50 µs |
| **Product certifications** | | | c UL us, CSA, RM 84 873 30● : GL |

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Dimensions: page 5/22
Schemes : page 5/79

# Zelio Control - measurement and control relays

## Voltage control relays for 3-phase supply, model RM 84 873

- *Controls overvoltage and undervoltage on its own power supply (window type).*
- *RM 84 873 201: phase to phase / RM 84 873 211: between phase and neutral.*
- *Minimum and maximum thresholds can be adjusted separately.*
- *Absence of neutral detected on relay RM 84 873 211.*
- *Delay on crossing the upper or lower threshold, adjustable between 0.1 and 10 seconds on the front panel of the device.*
- *Overvoltage and undervoltage indicated by 2 yellow LEDs.*
- *Power on indicated by 1 green LED.*
- *2 output relays: upper and lower threshold.*
- *2 separate time delays.*



### Operating principle

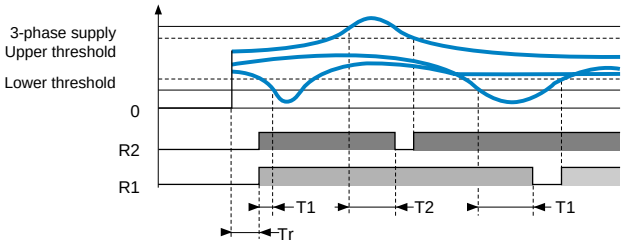
The two relays are energised when the measured voltages are between the minimum and maximum thresholds, which can be adjusted separately via two potentiometers on the front panel of the device.

If one or more voltages go outside the “window” between the two thresholds, the relay corresponding to the fault de-energises following a delay which can be adjusted on the front panel. Each relay can have its own individual time delay (0.1 to 10 s).

A hysteresis fixed at 3 % ensures bounce-free relay switching when the voltage levels return to a value between the upper and lower thresholds.

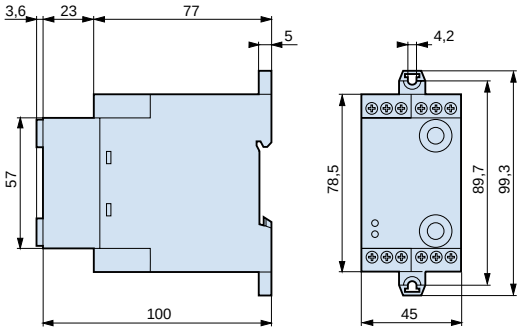
The device is not affected by the phase sequence, or by harmonic distortion.

A green LED indicates that the power supply is ON. Two yellow LEDs indicate when the upper and lower thresholds have been exceeded. They are lit when the voltages are within the set “window”.




| | Lower threshold | Upper threshold |
|---|---|---|
| **RM 84 873 201** | **340…392** | **408…460** |
| **RM 84 873 211** | **195…225** | **235…264** |

### Dimensions




References :
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Characteristics :
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Schemes :
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# Zelio Control - measurement and control relays

## Voltage control relays for 3-phase supply, model RM 84 873

## References

561002

*RM 84 873 211*

**Voltage control relays for 3-phase supply**

| Power supplies measured | Reference | Weight kg |
|---|---|---|
| ∿ 3 x 400 V | **RM 84 873 201** | 0.310 |
| ∿ 3 x 400 V + neutral | **RM 84 873 211** | 0.310 |

## Supply characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un on terminals L1-L2** | | **V** | ∿ 400, ± 30 % (50/60 Hz) |
| **Maximum power** | | **VA** | 4 at Un<br>8 at Un + 20 % |
| **Immunity to microbreaks** | | **ms** | 10 |
| **Delay on pick-up** | | **s** | About 3 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |

## Control circuit characteristics

| | | | |
|---|---|---|---|
| **Adjustment of upper threshold** | | | 102…115 % of Un |
| **Adjustment of lower threshold** | | | 85…98 % of Un |
| **Fault delay** | | **s** | 0.1…10 (0…+ 50 %) |
| **Hysteresis** | | | About 3 % |
| **Setting accuracy** | | | ± 10 % |
| **Repeat accuracy** | Upper threshold | | 0.06 % |
| | Lower threshold | | 0.09 % |
| **Temperature drift** | | | ± 0.05 %/°C |

## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output** | | | 2 C/O contacts, AgCdO |
| **Breaking capacity** | | | ∿ 2000 VA, ⎓ 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | ∿ 100, ⎓ 100 |
| **Maximum switching voltage** | | **V** | ∿ 250, ⎓ 250 |
| **Mechanical life** | | | 30 x $10^6$ operating cycles |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |

## Other characteristics

| | | | |
|---|---|---|---|
| **Delay on crossing the threshold** | | **s** | 0.1…10 Max : 10…15) |
| **Indication** | Supply | | Green LED |
| | Overvoltage relay | | Yellow LED |
| | Undervoltage relay | | Yellow LED |
| **Protection class** Conforming to IEC 529-5 | Terminal block | | IP 20 |
| | Enclosure | | IP 50 |
| **Enclosure** | | | Self-extinguishing Pc, panel or DIN rail mounted |
| **Terminal capacity** | With cable end | **mm²** | 2 x 1.5 |
| | Without cable end | **mm²** | 2 x 2.5 |
| **Tightening torque** | Conforming to IEC 947-1 | **Nm** | 0.6 max (M3 screw) |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 (conforming to IEC 68-1-14) |
| | Storage | **°C** | - 30…+ 70 (conforming to IEC 68-1-1/2) |
| **Relative humidity** | Conforming to IEC 68-2-30 | | 93 % without condensation |
| **Vibrations** Conforming to IEC 682-6 | Amplitude | **mm** | 0.35 |
| | Frequency | **Hz** | 10…55 |
| **Insulation resistance** | Conforming to IEC 255-5 | **MΩ** | > 10 at ∿ 500 V |
| **Dielectric strength** | Conforming to IEC 255-5 | **kV** | > 2.5/1min/1 mA/50 Hz |
| **Impulse voltage** | Conforming to IEC 255-5/664-1 | **kV** | 5, wave 1.2-50 µs |
| **Product certifications** | | | C UL us, CSA |

Functions : page 5/24
Dimensions : page 5/24
Schemes : page 5/80

# Zelio Control - measurement and control relays

## Voltage measurement relays model RM4 U


*RM4 UA01*

## Functions

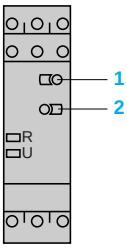
These devices are designed to detect when voltage rises above or drops below a preset threshold, on an a.c. or a d.c. supply.
They have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

| Relay type | Voltage control | Overvoltage or undervoltage detection *(1)* | Measuring range |
|---|---|---|---|
| **RM4 UA0●** | Yes | No | 50 mV…500 V |
| **RM4 UA3●** | Yes | Yes | 50 mV…500 V |

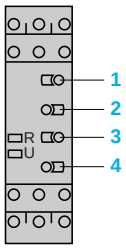
**Applications** :
- d.c. motor overspeed control,
- battery monitoring,
- monitoring of a.c. or d.c. supplies,
- speed monitoring (with tacho-generator).

## Presentation

**RM4 UA0●**
Width 22.5 mm




**RM4 UA3●**
Width 22.5 mm




1 Adjustment of voltage threshold as % of setting range max. value.
2 Hysteresis adjustment from 5 to 30 % *(2)*.
3 Fine adjustment of time delay as % of setting range max. value.
4 Switch combining:
- selection of the timing range: 1s, 3s, 10s, 30s, no time delay,
- selection of overvoltage (>) or undervoltage (<) detection.

See table below.
**R** Yellow LED: indicates relay state.
**U** Green LED: indicates that supply to the RM4 is on.

**Table showing details for switch 4**

| Switch position | Function | Time delay (t) |
|---|---|---|
| < 0 | Undervoltage control | No time delay |
| < 1 | Undervoltage control | 0.05 to 1 s |
| < 3 | Undervoltage control | 0.15 to 3 s |
| < 10 | Undervoltage control | 0.5 to 10 s |
| < 30 | Undervoltage control | 1.5 to 30 s |
| > 0 | Overvoltage control | No time delay |
| > 1 | Overvoltage control | 0.05 to 1 s |
| > 3 | Overvoltage control | 0.15 to 3 s |
| > 10 | Overvoltage control | 0.5 to 10 s |
| > 30 | Overvoltage control | 1.5 to 30 s |

*(1) Selection by switch on front face.*
*(2) Value of voltage difference between energisation and de-energisation of the output relay (% of the voltage threshold to be measured).*

5

References : page 5/28
Characteristics : page 5/29
Dimensions, schemes : page 5/30
Setting-up : page 5/31

# Zelio Control - measurement and control relays

## Voltage measurement relays model RM4 U

### Operating principle

The supply voltage is connected to terminals A1-A2.
The voltage to be monitored is connected to terminals B1, B2 or B3 and C.

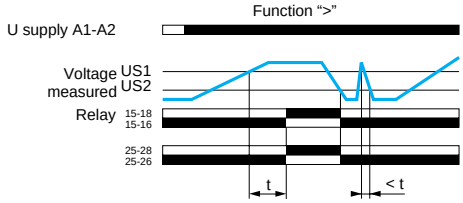
Hysteresis is adjustable between 5 and 30%: **for overvoltage** h = (US1 - US2) / US1, **for undervoltage** h = (US2 - US1) / US1.
A measuring cycle lasts only 80 ms, which allows rapid detection of changes in voltage.

**Relay set for overvoltage detection** (RM4 UA0● or selector on “>” for model RM4 UA3●) :
If the voltage is > the setting threshold US1, the output relay is energised with or without a time delay. When the voltage returns to a value US2 below the threshold, depending on the hysteresis setting, the relay is instantaneously de-energised.

**Relay set for undervoltage detection** (selector on “<”, model RM4 UA3● only):
If the voltage is < the setting threshold US1, the output relay is energised with or without a time delay. When the voltage returns to a value US2 above the threshold, depending on the hysteresis setting, the relay is de-energised.

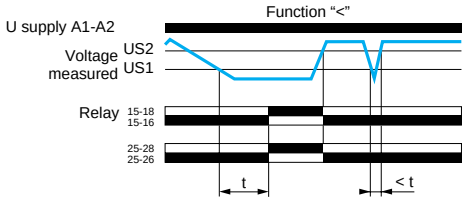
**Function diagrams**

Overvoltage control




t : time delay

Undervoltage control




t : time delay

**Note:** the measurement ranges can be extended above 500 V by adding a resistor, see page 5/31.
The measurement range on ∿ supply can be extended by means of a voltage transformer, the secondary of which is connected to the measuring terminals of the corresponding RM4.

# Zelio Control - measurement and control relays

## Voltage measurement relays model RM4 U


*RM4 UA01*

### Voltage measurement relays: overvoltage detection

| Time delay | Voltage to be measured depending on connection ∿ or ⎓ | Width | Output relay | Basic reference, to be completed by adding the voltage code *(1)* | Weight |
|---|---|---|---|---|---|
| | V | mm | | | kg |
| **Without** | 0.05...0.5<br>0.3…3<br>0.5…5 | 22.5 | 1 C/O | **RM4 UA01●** | 0.168 |
| | 1...10<br>5…50<br>10…100 | 22.5 | 1 C/O | **RM4 UA02●** | 0.168 |
| | 30...300<br>50…500 | 22.5 | 1 C/O | **RM4 UA03●** | 0.168 |

### Voltage measurement relays: overvoltage or undervoltage detection

| Adjustable time delay | Voltage to be measured depending on connection ∿ or ⎓ | Width | Output relay | Basic reference, to be completed by adding the voltage code *(1)* | Weight |
|---|---|---|---|---|---|
| s | V | mm | | | kg |
| **0.05...30** | 0.05...0.5<br>0.3…3<br>0.5…5 | 22.5 | 2 C/O | **RM4 UA31●●** | 0.168 |
| | 1...10<br>5…50<br>10…100 | 22.5 | 2 C/O | **RM4 UA32●●** | 0.168 |
| | 30...300<br>50…500 | 22.5 | 2 C/O | **RM4 UA33●●** | 0.168 |

*(1) Standard supply voltages*

| | | | | | |
|---|---|---|---|---|---|
| **RM4 UA0●** | Volts | **24** | **110...130** | **220...240** | |
| | ∿ 50/60 Hz | B | F | M | |
| **RM4 UA3●** | Volts | **24...240** | **110...130** | **220...240** | **380...415** |
| | ∿ 50/60 Hz | MW | F | M | Q |
| | ⎓ | MW | – | – | – |

5

Presentation : pages 5/26 and 5/27
Characteristics : page 5/29
Dimensions, schemes : page 5/30
Setting-up : page 5/31

# Zelio Control - measurement and control relays

## Voltage measurement relays model RM4 U

### Power supply circuit characteristics

| Relay type | | | RM4 UA0● | | | RM4 UA3● | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Rated supply voltage** (Un) | ∿ 50/60 Hz | **V** | 24 | 110...130 | 220...240 | 24...240 | 110…130 | 220...240 | 380...415 |
| | ⎓ | **V** | – | – | – | 24...240 | – | – | – |
| **Average consumption** at Un | ∿ | **VA** | 2 | 1.9…3.3 | 2.7…3.5 | 1.5…3.3 | 1.9…3.3 | 2.7…3.4 | 2.7…3 |
| | ⎓ | **W** | – | – | – | 1.2 | – | – | – |

### Output relay and operating characteristics

| Relay type | | RM4UA0● | RM4 UA3● |
|---|---|---|---|
| **Number of C/O contacts** | | 1 | 2 |
| **Output relay state** | | Energised when:<br>voltage measured > threshold setting | Energised when:<br>voltage measured > threshold setting (“>” function)<br>voltage measured < threshold setting (“<” function) |
| **Setting accuracy of the switching threshold** | | As % of the full-scale value: ± 5 % | |
| **Switching threshold drift** | **%** | ≤ 0.06 per degree centigrade, depending on the permissible ambient temperature | |
| | **%** | ≤ 0.5, within the supply voltage range (0.85…1.1 Un) | |
| **Hysteresis** (adjustable) | **%** | 5…30 of the voltage threshold setting | |
| **Setting accuracy of the time delay** | | As % of the full-scale value: ± 10 % | |
| **Time delay drift** | **%** | – | ≤ 0.5, within the supply voltage range (0.85…1.1 Un) |
| | | | ≤ 0.07 per degree centigrade, depending on rated operating temperature |
| **Measuring cycle** | **ms** | ≤ 80 | |

### Measuring input characteristics

**Internal input resistance and permissible overload depending on the voltage measurement ranges**

| Relay type | | RM4 UA●1 | | | RM4 UA●2 | | | RM4 UA●3 | |
|---|---|---|---|---|---|---|---|---|---|
| **Measurement range**<br>∿ 50-60 Hz and ⎓ | **V** | 0.05…0.5 | 0.3…3 | 0.5…5 | 1…10 | 5…50 | 10…100 | 30…300 | 50…500 |
| **Internal input resistance Ri** | **kΩ** | 6.6 | 43 | 71 | 23 | 112 | 225 | 668 | 1111 |
| **Permissible continuous overload** | **V** | 20 | 60 | 80 | 90 | 150 | 300 | 400 | 550 |
| **Permissible non repetitive overload**<br>for t ≤ 1 s | **V** | 25 | 80 | 100 | 100 | 200 | 400 | 500 | 550 |

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Presentation : pages 5/26 and 5/27
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# Zelio Control - measurement and control relays

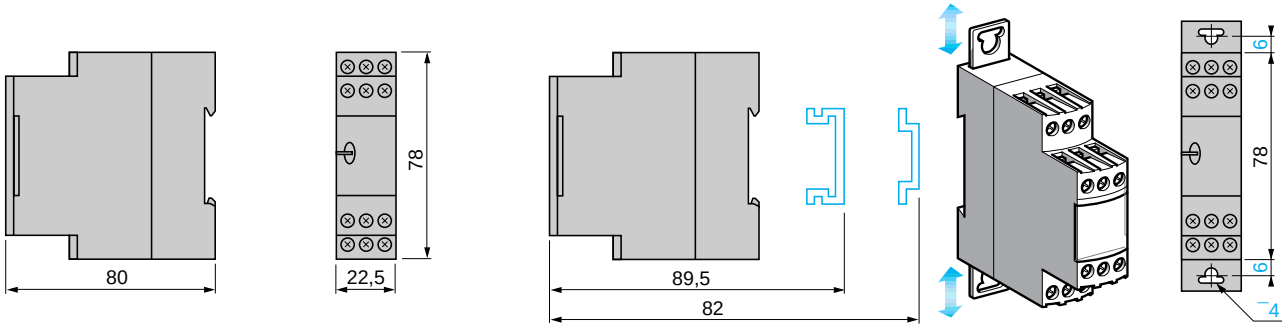
## Voltage measurement relays model RM4 U

## Dimensions

**Dimensions**
**RM4 UA**

**Rail mounting**

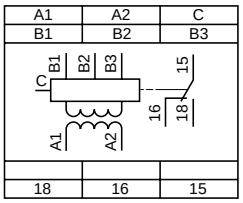
**Screw fixing**



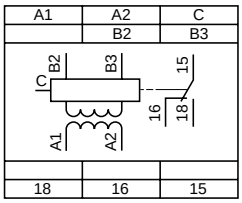

## Schemes

**Terminal blocks**

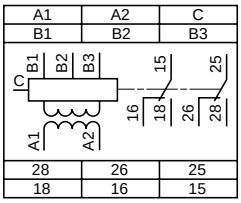
**RM4 UA01, UA02**



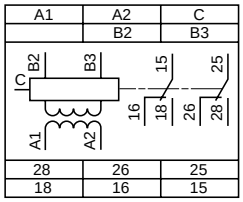

**RM4 UA03**




**RM4 UA31, UA32**



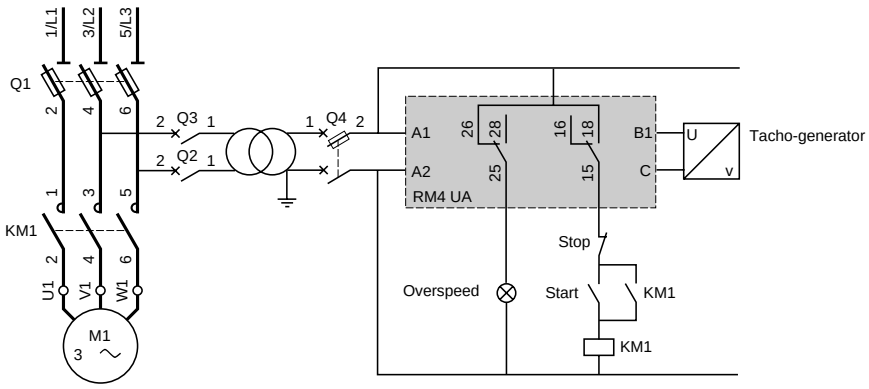

**RM4 UA33**




| | | Connection and current values to be measured, depending on type of **RM4 UA** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **A1-A2** | Supply voltage | **RM4 UA●1** | B1-C | 0.05…0.5 V | **RM4 UA●2** | B1-C | 1…10 V | **RM4 UA●3** | B2-C | 30…300 V |
| **B1, B2, B3, C** | Voltages to be measured (see table opposite) | | B2-C | 0.3…3 V | | B2-C | 5…50 V | | B3-C | 50…500 V |
| | | | B3-C | 0.5…5 V | | B3-C | 10…100 V | | | |

### Application scheme

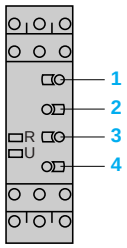
Example: overspeed monitoring (undervoltage function)




Presentation : pages 5/26 and 5/27
References : page 5/28
Characteristics : page 5/29
Setting-up : page 5/31

# Zelio Control - measurement and control relays
## Voltage measurement relays model RM4 U

**Example of undervoltage to be measured**
Undervoltage threshold to be measured: 12 V ⎓.
Output relay time delay: 20 s.
Reset voltage threshold: 13.2 V
Supply voltage: 230 V ∿ 60 Hz.




Product selected **RM4 UA32M**
Connection of voltage to be measured B2-C (5 to 50 V)

■ **Adjustments:**
□ Adjustment of function and timing range, switch 4:
- determine the timing range, immediately greater than the time required; in the above example 30 s,
- determine whether overvoltage or undervoltage detection is required; in this example, undervoltage,
- position switch 4 according to the above 2 criteria; in this example, switch 4 on **< 30**.

□ Fine adjustment of time delay:
Depending on the max. range setting displayed at 4 (in the above example: 30 s) use potentiometer 3 to set the required time delay as a % of value 4.
In the above example, the required time = 20 s therefore :

$\frac{t \times 100}{4} = \frac{20 \times 100}{30} =$ **66 %**

Set the time delay potentiometer 3 to **66**.

□ Set the voltage threshold setting potentiometer 1 as a percentage of the maximum value of the measuring range selected when wiring.
In the above example: wiring B2-C, max. value of measuring range = 50 V, therefore:

Setting 1 = $\frac{12 \times 100}{50}$ **= 24 %**

Set the voltage threshold setting potentiometer 1 to **24**.

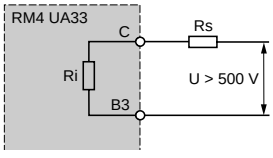
□ Set the hysteresis 2 as a % of the threshold value; in this example:

Setting 2 = $\frac{13.2 - 12}{12}$ **= 10 %**

Set the hysteresis 2 to **10**.

**Extension of the measuring range**

**⎓ or ∿ supply**

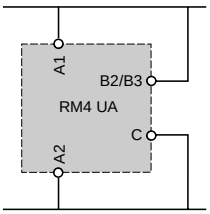



Simply connect an additional resistor (Rs) in series with the measuring input B3 or C.
If the value of Rs is in the region of:
Rs = Ri $\frac{U}{Um}$ -1 where:

**Ri** Internal resistance of input B3-C.
**Um** Maximum value of threshold setting range.
**U** Voltage threshold to be measured.

The tripping threshold of the relay will be towards the maximum graduation on the threshold setting potentiometer.
In general, the power consumed by the resistor does not exceed 0.5 W.
For a.c. voltages, it is also possible to use a voltage transformer.

**Supply by the measured voltage**




For monitoring mains and power supplies, the RM4 UA can be supplied by the voltage to be controlled, provided that:
- the measurement threshold is within the operating range of the product's power supply (0.85…1.1 Uc),
- variations of the voltage to be measured are compatible with the supply and measurement voltage ranges.

Presentation : pages 5/26 and 5/27
References : page 5/28
Characteristics : page 5/29
Dimensions, schemes : page 5/30

# Zelio Control - measurement and control relays

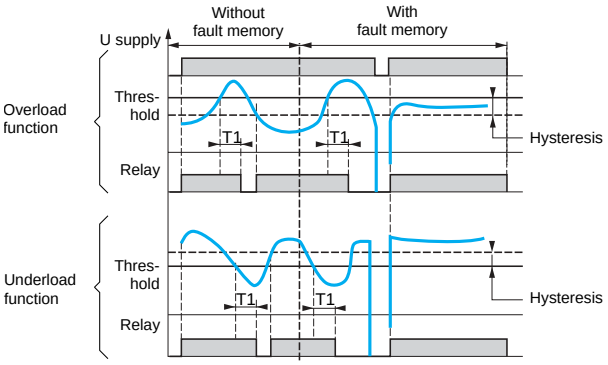
## Voltage control relays with memory, self-powered, model RM 84 872

*■ Simple to install, these threshold relays check their own supply voltage level.*
*■ RM4 84 872 04● : Select "Overvoltage" or "Undervoltage" mode and the memory function by means of dip switches, then set the delay on crossing threshold T1.*
*■ RM4 84 872 05● : set the required high and low voltage thresholds and the delay on crossing threshold T1.*

## Operating principle

### Overvoltage-undervoltage control with memory

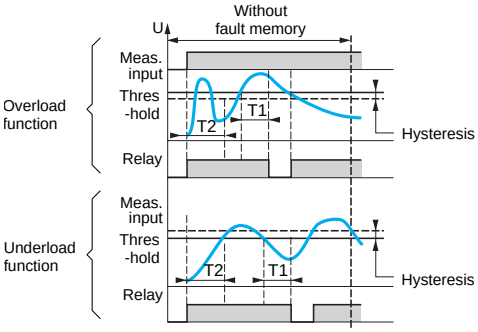
Two operating modes are available :
■ a.c. / d.c. voltage control without memory,
■ a.c. / d.c. voltage control with memory (see previous page).



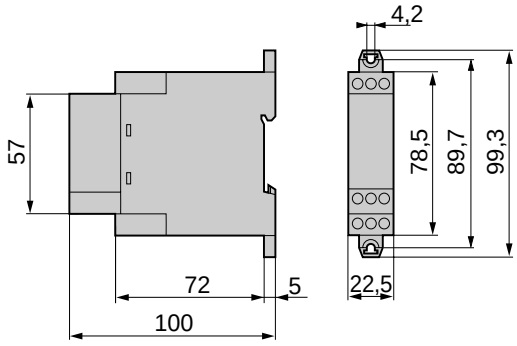

### Threshold without memory

The window threshold relay controls an electrical voltage which acts as its own power supply (simplified wiring). When the value of the controlled voltage, a.c. or d.c., goes outside the window, the output relay de-energises at the end of a time delay T1 which can be set on the front panel between 0.1 and 3 s.
It re-energises when the voltage returns within the window and stays between the upper and lower thresholds displayed by two potentiometers on the front panel. A fixed hysteresis ensures bounce-free relay switching around the thresholds.

***Note :*** *time delay T1 on crossing the upper and lower thresholds provides immunity to transients, so preventing spurious triggering of the output relay.*




## Dimensions




References : page 5/33
Characteristics : page 5/33
Schemes : pages 5/80 and 5/81

# Zelio Control - measurement and control relays

## Voltage control relays with memory, self-powered, model RM 84 872

## References


*RM 84 872 0●●*

| Type | Voltage to be measured | Reference | Weight kg |
|---|---|---|---|
| **With memory** | ∿ or ⎓ 20…80 V | **RM 84 872 046** | 0.100 |
| | ∿ or ⎓ 65…260 V | **RM 84 872 047** | 0.100 |
| **Without memory** | ∿ or ⎓ 20…80 V | **RM 84 872 056** | 0.100 |
| | ∿ or ⎓ 65…260 V | **RM 84 872 057** | 0.100 |

## Supply characteristics

| Relay type | | | RM 84 872 04● | RM 84 872 05● |
|---|---|---|---|---|
| **Supply voltage Un** | | **V** | ∿ or ⎓ 20…80, ∿ or ⎓ 65…260 | |
| **Operating range** | | **V** | 15…150, 50…275 | |
| **Maximum consumption** | ∿ 260 V | **VA** | 6,7 | 6 |
| | ∿ 80 V | **VA** | 2 | 2 |
| | ⎓ 260 V | **W** | 2 | 2 |
| | ⎓ 80 V | **W** | 0.8 | 0.8 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output relay** | | | 1 cadmium-free C/O contact |
| **Rated current** | | **A** | 8 |
| **Switching current** | | **V** | ∿ 250 |
| **Maximum voltage** | | **V** | ∿ 440 |
| **Rated breaking capacity** | | **VA** | 2000 |
| **Minimum breaking current** | | **mA** | 100 at ⎓ 12 V |
| **Electrical life** | AC-12 | | $10^5$ operating cycles at 8 A at ∿ 250 V |
| **Mechanical life** | | | 2 x $10^7$ operating cycles |
| **Time delay** | On crossing the threshold T1 | **s** | 0.1…3 ± 10 % |
| **Delay on pick-up** | | **ms** | 500 |

## Input characteristics

| | | | | |
|---|---|---|---|---|
| **Relay type** | | | Measures its own supply voltage | |
| **Measurement range** | | **V** | 20…80 or 65…260 depending on model | |
| **Frequency of the signal measured** | | **Hz** | 50…60 ± 1 | |
| **Hysteresis** | | | Adjustable 5…20 % | Fixed 5 % |
| **Threshold setting accuracy** | | | ± 10 % | |
| **Repeat accuracy** | With constant parameters | | ± 0.3 % | |
| **Temperature drift** | | | ± 0.5 % per °C | |

## Other characteristics

| | | | |
|---|---|---|---|
| **Temperature** | Operation | **°C** | - 20…+ 50 |
| | Storage | **°C** | - 40…+ 70 |
| **Relative humidity** | Without condensation | | 95 % |
| **Enclosure material** | | | Self-extinguishing |
| **Degree of protection** | Conforming to IEC 60529 | | Enclosure : IP 40D, terminal block : IP 20 |
| **Connection** | Flexible cable w/o cable end | **mm²** | 1 x 4 or 2 x 2.5 |
| | Flexible cable with cable end | **mm²** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 1 |
| **Dielectric strength** | Conforming to IEC 60255-5 | **kV** | 2.5 kV for 1 min at 1 mA 50 Hz |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | a = 0.35 mm |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC/EN 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC/EN 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC/EN 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC/EN 61000-4-5 | | Level 3 (2 kV) |
| **Radio frequencies** | Conforming to IEC/EN 61000-4-6 | | Level 3 (10 V rms) |
| **Voltage dips and breaks** | Conforming to IEC/EN 61000-4-11 | | 30 % for 10 ms, 60 % for 100 ms and 1 s, > 95 % for 5 s and 10 ms |
| **Damped oscillatory wave at 1 MHz** | Conforming to IEC 61255-22-1 | | Class III |
| **Radiated and conducted emissions** | | | Class B |

Functions : page 5/32
Dimensions: page 5/32
Schemes : pages 5/80 and 5/81

# Zelio Control - measurement and control relays

## Voltage control relays model RM 84 872

*■ Space savings, accurate measurement and optimised functions to improve the safety of your electrical installation.*
*■ These relays allow you to ensure that your equipment is working under correct conditions, by checking their supply voltage.*
*■ Control: select "Overvoltage" or "Undervoltage" mode by means of a dip switch.*
*■ Safety: in the same way, choose whether or not to activate the fault memory function and the delay on threshold crossing.*
*■ Accuracy: 2 products for greater measuring accuracy, provided by a microprocessor.*

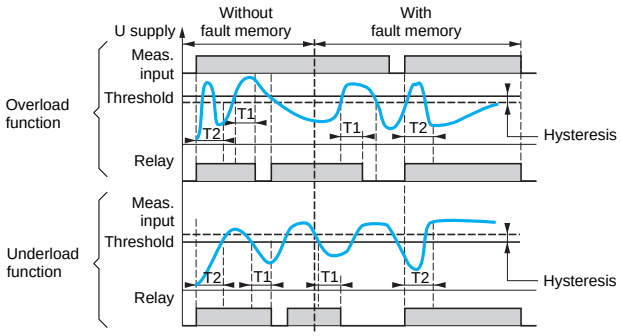
## Operating principle

### Control of a.c. / d.c. voltage without memory

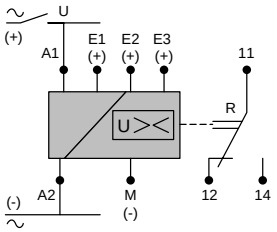
When the value of the controlled voltage, a.c. or d.c., reaches the threshold Ue displayed on the front panel, the output relay changes state at the end of a time delay T1, which can be set on the front panel to between 0.1 and 3 s.
As soon as the voltage drops below 5 to 50% of the threshold (hysteresis), the output relay instantly changes state again. Changing the hysteresis on the front panel does not therefore modify the value of the preset threshold.

### Control of a.c. / d.c. voltage with memory

When the value of the controlled voltage, a.c. or d.c., reaches the Ue threshold displayed on the front panel, the output relay changes state at the end of a time delay T1, which can be set on the front panel to between 0.1 and 3 s, and remains latched in this position.

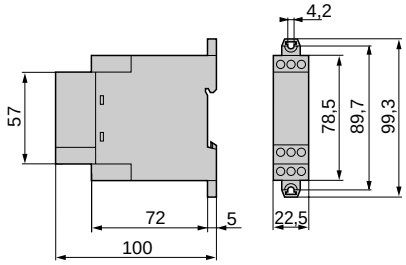



## Connection schemes




A1 - A2 : Supply

## Dimensions




References : page 5/35
Characteristics : page 5/35

# Zelio Control - measurement and control relays

## Voltage control relays model RM 84 872

## References


*RM 84 872 03●*

| Measurement range | Supply voltage | Reference | Weight kg |
|---|---|---|---|
| **0.2…60 V** | ∿ 24 V | **RM 84 872 021** | 0.120 |
| | ∿ 120 V | **RM 84 872 023** | 0.120 |
| | ∿ 230 V | **RM 84 872 024** | 0.120 |
| **15…600 V** | ∿ 24 V | **RM 84 872 031** | 0.120 |
| | ∿ 120 V | **RM 84 872 033** | 0.120 |
| | ∿ 230 V | **RM 84 872 034** | 0.120 |

## Auxiliary supply characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Relay type** | | | **RM 84 872 02●** | | | **RM 84 872 03●** | | |
| **Supply voltage Un** | | **V** | 24, 120, 230 50/60 Hz (galvanic isolation by transformer) | | | | | |
| **Operating range** | | | 0.8…1.15 Un | | | | | |
| **Average consumption** | | **VA** | 3 | | | | | |

## Output characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Output relay** | | | 1 cadmium-free C/O contact | | | | | |
| **Rated current** | | **A** | 8 | | | | | |
| **Switching voltage** | | **V** | ∿ 250 | | | | | |
| **Maximum voltage** | | **V** | ∿ 440 | | | | | |
| **Rated breaking capacity** | | **VA** | 2000 | | | | | |
| **Minimum breaking current** | | **mA** | 100 at ⎓ 12 V | | | | | |
| **Electrical life** | AC-12 | | $10^5$ operating cycles at 8 A at ∿ 250 V | | | | | |
| **Mechanical life** | | | 2 x $10^7$ operating cycles | | | | | |
| **Time delay** | On crossing threshold T1 | **s** | 0.1…3 ± 10 % | | | | | |
| | On crossing threshold T2 | **s** | 1…20 ± 10 % | | | | | |
| **Delay on pick-up** | | **ms** | 500 | | | | | |

## Input characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Measurement range** | | **V** | 0.2…60 | | | 15…600 | | |
| **Frequency of the measured signal** | | **Hz** | 40…500 | | | | | |
| **Adjustable hysteresis** | | | 5…50 % of the threshold setting | | | | | |
| **Threshold value** | | | 10…100 % of the range | | | | | |
| **Threshold setting accuracy** | | | ± 10 % | | | | | |
| **Measurement ranges** | Inputs | | **E1-M** | **E2-M** | **E3-M** | **E1-M** | **E2-M** | **E3-M** |
| | Sensitivity | **V** | 0.2…2 | 1…10 | 6…60 | 15…150 | 30…300 | 60…600 |
| | Input resistance | **kΩ** | 2 | 10 | 60 | 100 | 300 | 600 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Temperature** | Operation | **°C** | - 20…+ 50 |
| | Storage | **°C** | - 40…+ 70 |
| **Relative humidity** | Without condensation | | 95 % |
| **Enclosure material** | | | Self-extinguishing |
| **Degree of protection** | Conforming to IEC 60529 | | Enclosure: IP 40D, terminal block: IP 20 |
| **Connection** | Flexible cable w/o cable end | **mm²** | 1 x 4 or 2 x 2.5 |
| | Flexible cable with cable end | **mm²** | 2 x 1.5 |
| **Tightening torque** | | **N.m** | 1 |
| **Dielectric strength** | Conforming to IEC 60255-5 | **kV** | 2.5 kV for 1 min at 1 mA 50 Hz |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | a = 0.035 mm |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

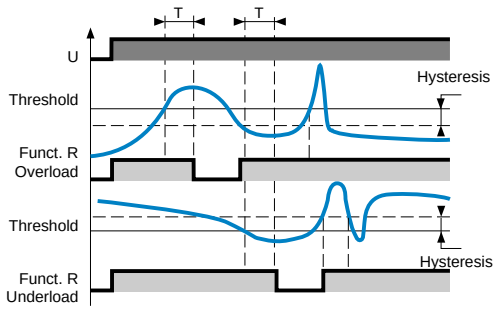
| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC/EN 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC/EN 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC/EN 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC/EN 61000-4-5 | | Level 3 (2 kV) |
| **Radio frequencies** | Conforming to IEC/EN 61000-4-6 | | Level 3 (10 V rms) |
| **Voltage dips and breaks** | Conforming to IEC/EN 61000-4-11 | | 30 % for 10 ms, 60 % for 100 ms and 1 s, > 95 % for 5 s and 10 ms |
| **Damped oscillatory wave at 1 MHz** | Conforming to IEC 61255-22-1 | | Class III |
| **Radiated and conducted emissions** | | | Class B |

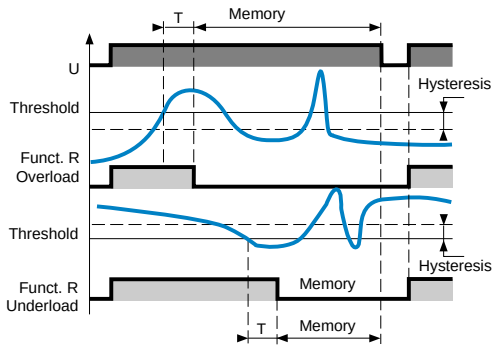
Functions : page 5/34
Schemes : page 5/34
Dimensions: page 5/34

# Zelio Control - measurement and control relays

## Voltage-current control relays with display, models RM 84 872 and RM 84 871

- *Displays the actual value and the preset value on the LCD display.*
- *Controls a.c. and d.c. signals (automatic detection).*
- *Overload or underload modes can be selected.*
- *Threshold and hysteresis can be adjusted separately.*
- *Memory function in the event of a fault.*
- *Delay on crossing the threshold.*

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## Operating principle

These devices are designed to control an a.c. or d.c. electric signal.
The threshold and hysteresis can be adjusted separately via two potentiometers on the front panel of the device. Before powering up the device, the operating mode must be selected by means of two dip-switches on the underside of the device (with/without memory, over/under value).
The mode is validated when power is applied to terminals A1 - A2.
The signal to be monitored is connected between terminals E1, E2 or E3 (depending on the range) and terminal M.

## Voltage or current control, without memory

When the value of the controlled signal, a.c. or d.c., reaches the threshold set on the front panel, the output relay opens (failsafe) at the end of time delay T. It closes immediately when the signal goes below (or above in under value mode) the threshold minus hysteresis (plus hysteresis in under value mode).

## Voltage or current control, with memory

When the threshold is reached, the output relay opens at the end of time delay T and remains in that position.
To reset the relay, the power supply must be switched off.
This operating mode enables the detection of over or under values of short duration.

**Notes**

The threshold crossing time delay T, which can be adjusted on the front panel from 0.1 to 3 seconds, ensures immunity to transients and other interference, thus preventing spurious triggering of the output relay.

In “under value” mode, the absolute value of the hysteresis cannot be more than the maximum of the measurement range.

## Programming - display

**Normal mode**

In this mode, the device displays the value of the measured signal, its form (~ or ⎓), the mode selected (OVER or UNDER), the memory function (ON or OFF), and the state of the output relay.
In the event of measurement overflow, the display indicates OVERFLOW (by three dashes on the screen and the flashing symbol OVER).

**Parameter entry mode**

If the user wishes to modify one of the three parameters (Threshold, Hysteresis or Threshold delay), he simply needs to set the corresponding potentiometer and the value of the modified parameter automatically appears.
After 2 seconds, the current value of the measured signal reappears in the display : return to NORMAL mode.

**Exception**

In UNDER mode (underload), since the hysteresis is always greater than the threshold, it is possible that it will exceed the maximum measurement range according to the settings (Threshold + Hysteresis > Max. Threshold). To remedy this problem, when the user sets the hysteresis or threshold in proportions which exceed the management capacity, the value of the hysteresis is automatically corrected so that it does not exceed the range maximum. In addition, the user is warned by flashing of the symbol UNDER.

**Parameter display mode**

To review the parameters, press the pushbutton (VISU) several times in succession, to cycle through the settings. Keep the pushbutton depressed to scroll through the values.

References : page 5/37
Characteristics : page 5/37
Dimensions : page 5/38
Schemes : page 5/39

# Zelio Control - measurement and control relays

## Voltage-current control relays with display, models RM 84 872 and RM 84 871

## References


*RM 84 872 305*

**Control relay with LCD display - Voltage-Current**

| Measurement range | Supply voltage | Reference | Weight kg |
|---|---|---|---|
| 0.2 …60 V | ⎓ 24 V | **RM 84 872 301** | 0,160 |
| | ∿ 230 V | **RM 84 872 305** | 0.160 |
| 15 …600 V | ∿ 230 V | **RM 84 872 310** | 0.160 |
| 2…500 mA | ∿ 230 V | **RM 84 871 305** | 0.160 |
| 0.1…10 A | ∿ 230 V | **RM 84 871 310** | 0.160 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Relay type** | | | **RM 84 872 301** | **RM 84 87● 305/RM 84 87● 310** |
| **Supply voltage** | | **V** | ⎓ 24 | ∿ 230 (50/60 Hz) |
| **Operating range** | | | 0.85…1.10 x Un | 0.85…1.10 x Un |
| **Maximum power consumption** | | | 1 W | 3 VA |
| **Immunity to microbreaks** | | **ms** | 10 | 10 |
| **Delay on pick-up** | | **ms** | 500 | 500 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 | 4 kV/3 |

## Output characteristics

| | | | |
|---|---|---|---|
| **Relay type** | | | 1 C/O contact, AgCdO, 5 A, 250 V |
| **Minimum current** | | **mA** | 100 |
| **Mechanical life** | | | 5…$10^6$ operating cycles |
| **Electrical life** | AC-12 | **VA** | 1250, $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3, 6000 operating cycles |
| | DC-13 | | L/R = 300 ms, 6000 operating cycles |
| **Delay on crossing the threshold** | | | 0.1…3 seconds ± 10 % |
| **LCD display** | | | Relay state. OVER or UNDER Mode. Memory function. Type of signal (∿ or ⎓) Measurement overflow |

## Other characteristics

| | | | |
|---|---|---|---|
| **Protection class** | Conforming to IEC 529 | | Terminal block: IP 20, front panel: IP 40, enclosure: IP 50 |
| **Enclosure** | | | Self-extinguishing Pc |
| **Terminal capacity** | With cable end | **$mm^2$** | 2 x 1.5 |
| | Without cable end | **$mm^2$** | 2 x 2.5 |
| **Tightening torque** | | **Nm** | 0.6 max |
| **Temperature limits** | | **°C** | Operation: - 20…+ 60, storage: - 30…+ 70 |
| **Relative humidity** | | | 93 % without condensation |
| **Dielectric strength** | Conforming to IEC 255-5 | **kV** | 2.5/1 min/1 mA/50 Hz |
| **Product certifications** | | | c UL us, CSA |

## Voltage control relay input characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Relay type** | | | **RM 84 872 301/RM 84 872 305** | | | **RM 84 872 310** | | |
| **Input circuits** | | | E1-M | E2-M | E3-M | E1-M | E2-M | E3-M |
| **Measurement ranges** | | **V** | 0.2…2 | 1…10 | 6…60 | 15…150 | 30…300 | 60…600 |
| **Input resistance** | | **kΩ** | 2 | 10 | 60 | 100 | 300 | 650 |
| **Maximum continuous voltage at 20 °C** | | **V** | 4 | 20 | 120 | 200 | 350 | 650 |
| **Peak overload** | < 1 ms at 20 °C | **V** | 50 | 100 | 300 | – | – | – |
| | < 50 ms at 20 °C | **kV** | – | – | – | 2 | 2 | 2 |

## Current control relay input characteristics

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Relay type** | | **RM 84 871 305** | | | **RM 84 871 310** | | |
| **Input circuits** | | E1-M | E2-M | E3-M | E1-M | E2-M | E3-M |
| **Measurement ranges** | | 2…20 mA | 10…100 mA | 50…500 mA | 0.1…1 A | 0.5…5 A | 1…10 A |
| **Input resistance** | Ω | 5 | 1 | 0.2 | 0.1 | 0.02 | 0.01 |
| **Maximum continuous voltage at 20 °C** | | 40 mA | 200 mA | 1 A | 2 A | 10 A | 14 A |
| **Peak overload** | < 1 ms at 20 °C | **A** | 1 | 5 | 8 | 17 | 20 | 50 |

## General input characteristics

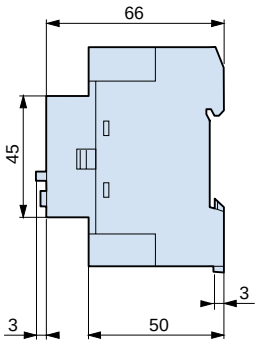
| | | |
|---|---|---|
| **Maximum line voltage** | | Mains 277/ ∿ 480 V |
| **Hysteresis** | | Adjustable from 5 to 50 % of threshold |
| **Frequency of a.c. signal measured** | **Hz** | 40…500 |
| **Threshold setting accuracy** | | ± 10 % |
| **Repeat accuracy** | | ± 0.1 % with constant parameters |
| **Temperature drift** | | ± 0.05 %/°C |
| **Voltage drift** | | ≤ 0.5 % |

Functions : page 5/36
Dimensions : page 5/38
Schemes : page 5/39

# Zelio Control - measurement and control relays

## Voltage-current control relays with display, models RM 84 872 and RM 84 871

**RM 84 871 305, RM 84 871 310, RM 84 872 301, RM 84 872 305, RM 84 872 310**

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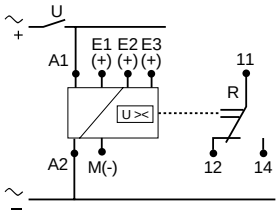
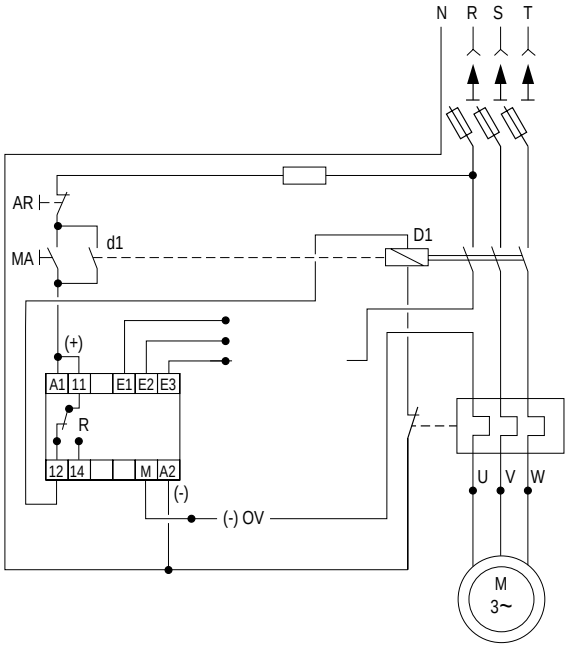
# Zelio Control - measurement and control relays

## Voltage-current control relays with display, models RM 84 872 and RM 84 871

### Connection and application schemes

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# Zelio Control - measurement and control relays

## Voltage control relays model RM4 U

561037

*RM4 UB*

## Functions

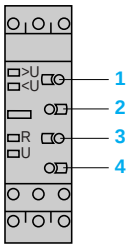
These devices are designed for monitoring single-phase voltages.
They have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

## Applications

- Protection of electronic or electromechanical devices against overvoltage and undervoltage.
- Normal/emergency power supply switching.

## Presentation

**RM4 UB**




1 Overvoltage setting potentiometer.
2 Undervoltage setting potentiometer.
3 Time delay function selector:
⊠ Fault detection delayed.
■ Fault detection extended.
4 Potentiometer for setting time delay in seconds.
**R** Yellow LED: indicates relay state.
**U** Green LED: indicates that supply to the RM4 is on.
**> U** Red LED: overvoltage fault.
**< U** Red LED: undervoltage fault.

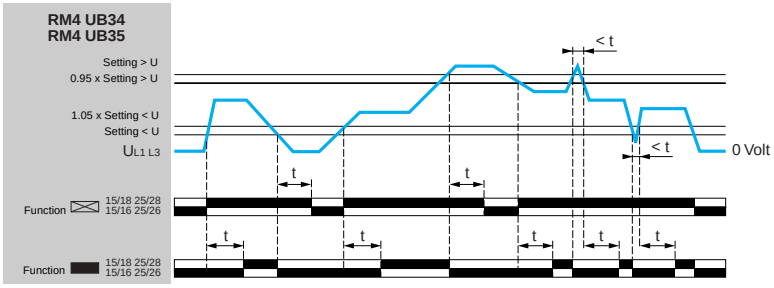
## Operating principle

The voltage to be monitored is connected to terminals L1, L3 of the product.

There is no need to provide a separate power supply for RM4 UB relays, they are self-powered by terminals L1, L3.

If the voltage goes outside the range to be monitored, the output relay is de-energised:
- **overvoltage**: the red LED "> U" illuminates,
- **undervoltage**: the red LED "< U" illuminates.
When the voltage returns towards its rated value, the relay is re-energised according to the hysteresis value (5 %) and the corresponding red LED goes out.
A selector switch allows selection of an adjustable time delay from 0.1 s to 10 s. With function ⊠ transient "over" or "under" voltages are not taken into account. With function ■ all variations above or below are taken into account and re-energisation of the relay is delayed.
In all cases, in order to be detected, the duration of the overvoltage or undervoltage must be greater than the measuring cycle time (80 ms).

**Function diagram**




t : time delay

References : page 5/41
Characteristics : page 5/42
Dimensions, schemes : page 5/43

# Zelio Control - measurement and control relays

## Voltage control relays model RM4 U


*RM4 UB*

### Relays with fixed voltage thresholds

| Adjustable time delay | Control threshold | Width | Output relay | Reference | Weight |
|---|---|---|---|---|---|
| s | V | mm | | | kg |
| 0.1…10 | Undervoltage 80…120 50/60 Hz Overvoltage 160…220 | 22.5 | 2 C/O | **RM4 UB34** | 0.110 |
| | Undervoltage 160…220 50/60 Hz Overvoltage 220…300 | 22.5 | 2 C/O | **RM4 UB35** | 0.110 |

5

Presentation : page 5/40
Characteristics : page 5/42
Dimensions, schemes : page 5/43

# Zelio Control - measurement and control relays

## Voltage control relays model RM4 U

### Output relay and operating characteristics

| | | | |
|---|---|---|---|
| **Number of C/O contacts** | | | 2 |
| **Output relay state** | | | Energised during fault free operation.<br>De-energised on detection of an overvoltage or undervoltage fault |
| **Accuracy of the switching threshold setting** | As % of the set value | | ± 3 % |
| **Switching threshold drift** | Depending on the permissible ambient temperature | | ≤ 0.06 % per degree centigrade |
| | Within the measuring range | | ≤ 0.5 % |
| **Accuracy of the time delay setting** | As % of the full scale value | | ± 10 % |
| **Time delay drift** | Within the measuring range | | ≤ 0.5 % |
| | Depending on the rated operational temperature | | ≤ 0.07 % per degree centigrade |
| **Hysteresis** | Fixed | | About 5 % of the de-energisation threshold |
| **Measuring cycle** | | **ms** | ≤ 80 |

### Measuring input characteristics

| | | | |
|---|---|---|---|
| **Minimum operational voltage** | | **V** | **RM4**: 60<br>**RM4 UB35**: 160 |
| **Maximum permissible voltage between L1 and L3** | | **V** | **RM4 UB34**: 300<br>**RM4 UB35**: 300 |

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Presentation : page 5/40
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Dimensions, schemes : page 5/43

# Zelio Control - measurement and control relays

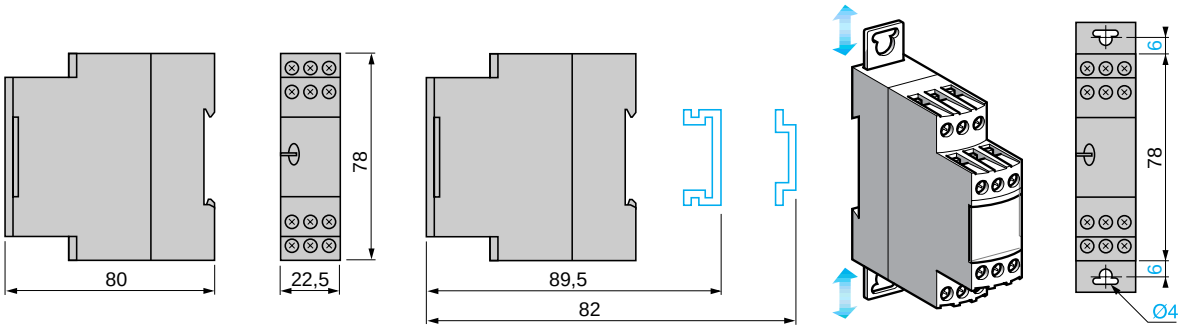
## Voltage control relays model RM4 U

## Dimensions

**RM4 UB**

**Rail mounting**

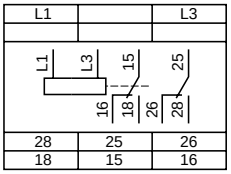
**Screw fixing**




## Connection schemes

**Terminal blocks**

**RM4 UB**



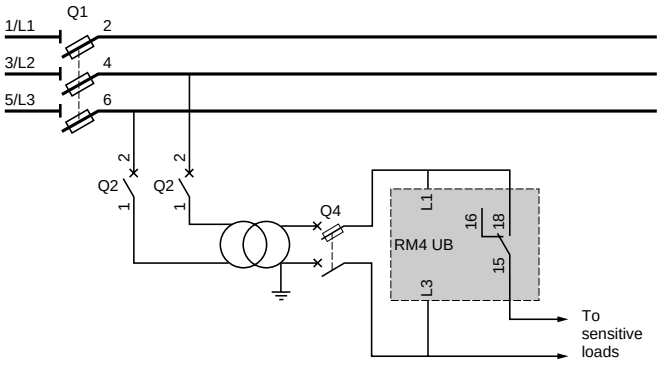

**L1, L3** Voltage to be monitored

**15-18** 1st C/O contact
**15-16** of the output relay

**25-28** 2nd C/O contact
**25-26** of the output relay

## Application schemes

Example

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# Zelio Control - measurement and control relays

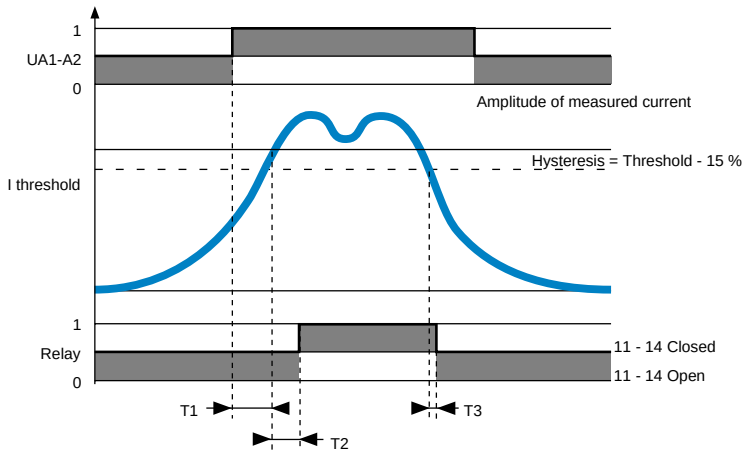
## a.c. current control relays, model RM 84 871

- *Current transformer incorporated by passing a cable through the front panel.*
- *a.c. current threshold adjustable from ∿ 1 to 20 A (30 Hz to 400 Hz) via button on front panel.*
- *Relay output ∿ 5 A - 250 V - 1 N/O contact.*
- *Multivoltage supply:*
  - *∿ 110 to 240 V 50/60 Hz,*
  - *∿ or ⎓ 24 V.*
- *17.5 mm enclosure, clips onto symmetrical DIN rail.*

### Operating principle

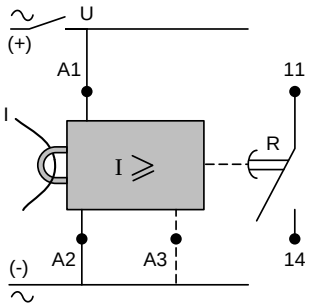
The relay contact (11 and 14) closes if the current is greater than the threshold.

The relay contact (11 and 14) opens if the current is less than 15 % (hysteresis) of the threshold.




T1: Delay on pick-up 500 ms maximum
T2: Response time to sensing 400 ms ± 50 %
T3: Response time on de-energisation 120 ms ± 50 %

### Connection scheme




A1 - A2 ∿ 110…240 V supply
A1 - A2 ∿ or ⎓ 24 V supply

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Dimensions :
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# Zelio Control - measurement and control relays

## a.c. current control relays, model RM 84 871

## References


*RM 84 871 102*

**a.c. current control relays**

| Voltage | Reference | Weight kg |
|---|---|---|
| ⏦/⎓ 24 V/ ⏦ 110…240 V | **RM 84 871 102** | 0.080 |

**Note**: The graduated set-point scale on the front panel relates to sinusoidal or delta current measurement. The relay can measure non-sinusoidal currents, for example currents subject to phase control. In this case an error coefficient may be assigned to the display, this coefficient being a function of the tripping angle of the phase controller (form factor).

## Supply characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ⏦/⎓ 24/⏦ 110…240 |
| **Frequency** | | **Hz** | 50/60 |
| **Operating range** | | | ± 15 % for 24 V ⎓/⏦ , - 15…+ 10 % from 110…240 V ⏦ |
| **Maximum consumption** | ⏦ 24 V | **VA** | 1 |
| | ⏦ 240 V | **VA** | 9 |
| | ⎓ 24 V | **W** | 0.6 |
| **Temperature drift** | | | 0.06 %/ °C |
| **Repeat accuracy** | | | 0.45 % |
| **Relative humidity** | | | 95 % |

## Input characteristics

| | | | |
|---|---|---|---|
| **Measured current range** | | **A** | 1…20 sinusoidal |
| **Frequency range of measured current** | | **Hz** | 30…400 |
| **Setting accuracy** | | **V** | ± 10 % of the maximum scale value |
| **Switching hysteresis** | | | 15 % of the set value |
| **Maximum continuous current** | | **A** | 40 |
| **Accidental overload current** | | **A** | 100 A for 3 s |
| **Response time to sensing** | t2 | **ms** | 400 ± 50 % |
| | t3 | | 120 ± 50 % |
| **Delay on pick-up** | t1 | **ms** | 500 max |

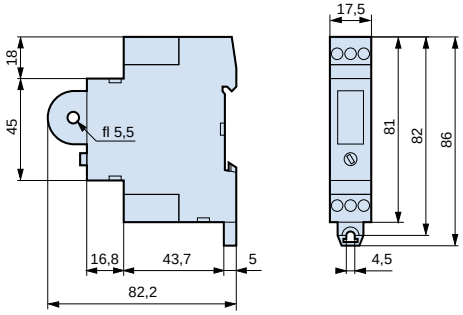
## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output** | | | 1 N/O contact (AgCdO) |
| **Breaking capacity** | | **VA** | 1250 |
| **Maximum breaking current** | | **A** | ⏦ 5, ⎓ 5 |
| **Minimum breaking current** | | **mA** | ⏦ 10, ⎓ 10 |
| **Maximum switching voltage** | | **V** | ⏦ 250, ⎓ 250 |
| **Mechanical life** | | | 30 x $10^6$ operating cycles |
| **Electrical life** | | | $10^5$ operating cycles at 1250 VA resistive |
| **Terminal capacity** | With cable end | **mm²** | 2 x 1.5 |
| | Without cable end | **mm²** | 2 x 2.5 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 70 |
| **Dielectric strength** | Conforming to IEC 255-5 | **kV** | 2.5/1 min/1 mA/50 Hz |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/44
Scheme : page 5/44

# Zelio Control - measurement and control relays

## Current measurement relays model RM4 J


*RM4 JA01*


*RM4 JA32*

5

## Functions

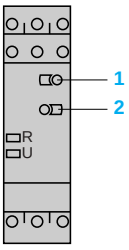
These devices are designed to detect when when current rises above or drops below a preset threshold, on an a.c. or a d.c. supply.
They have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

| Relay type | Overcurrent detection | Overcurrent or undercurrent detection *(1)* | Measuring range |
|---|---|---|---|
| **RM4 JA01** | Yes | No | 3 mA…1 A |
| **RM4 JA31** | Yes | Yes | 3 mA…1 A |
| **RM4 JA32** | Yes | Yes | 0.3 A…15 A |

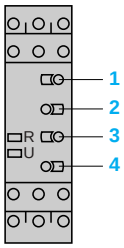
**Applications** :
- excitation control of d.c. machines,
- control of load state of motors and generators,
- control of current drawn by a 3-phase motor,
- monitoring of heating or lighting circuits,
- control of pump draining (undercurrent),
- control of overtorque (crushers),
- monitoring of electromagnetic brakes or clutches.

## Description

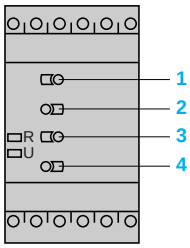
**RM4 JA01**
Width 22.5 mm




**RM4 JA31**
Width 22.5 mm




**RM4 JA32**
Width 45 mm




1 Adjustment of current threshold as % of setting range max. value.
2 Hysteresis adjustment from 5 to 30 % *(2)*.
3 Fine adjustment of time delay as % of setting range max. value.
4 10-position switch combining:
- selection of the timing range: 1 s, 3 s, 10 s, 30 s, no time delay,
- selection of overcurrent (>) or undercurrent (<) detection.

See table below.
**R** Yellow LED: indicates relay state.
**U** Green LED: indicates that supply to the RM4 is on.

**Table showing details for switch 4**

| Switch position | Function | Time delay (t) |
|---|---|---|
| < 0 | Undercurrent detection | No time delay |
| < 1 | Undercurrent detection | 0.05 to 1 s |
| < 3 | Undercurrent detection | 0.15 to 3 s |
| < 10 | Undercurrent detection | 0.5 to 10 s |
| < 30 | Undercurrent detection | 1.5 to 30 s |
| > 0 | Overcurrent detection | No time delay |
| > 1 | Overcurrent detection | 0.05 to 1 s |
| > 3 | Overcurrent detection | 0.15 to 3 s |
| > 10 | Overcurrent detection | 0.5 to 10 s |
| > 30 | Overcurrent detection | 1.5 to 30 s |

*(1) Selection by switch on front face.*
*(2) Value of current difference between energisation and de-energisation of the output relay (% of the current threshold to be measured).*

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Characteristics : page 5/49
Dimensions, schemes : page 5/50
Setting-up : page 5/51

# Zelio Control - measurement and control relays

## Current measurement relays model RM4 J

### Operating principle

The supply voltage is connected to terminals A1-A2.
The current to be monitored is connected to terminals B1, B2, B3 and C. See diagram below.

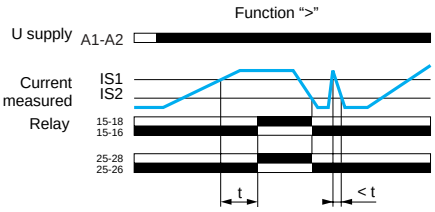
Hysteresis is adjustable between 5 and 30 %: for **overcurrent** h = (IS1 - IS2) / IS1, for **undercurrent** h = (IS2 - IS1) / IS1.
A measuring cycle lasts only 80 ms, which allows rapid detection of changes in current.

**Relay set for overcurrent detection** (RM4 JA01 or selector on “>” for model RM4 JA3●).
If the current is > the setting threshold IS1, the output relay is energised with or without a time delay, depending on the model. When the current returns to a value IS2 below the threshold, depending on the hysteresis setting, the relay is instantaneously de-energised.

**Relay set for undercurrent detection** (selector on “<”, model RM4 JA3● only).
If the current is <, the setting threshold IS1, the output relay is energised with or without a time delay, depending on the model. When the current returns to a value IS2 above the threshold, depending on the hysteresis setting, the relay is instantaneously de-energised.

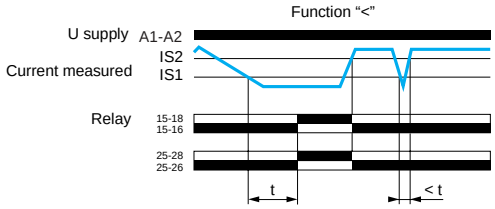
**Function diagrams:**

Overcurrent detection

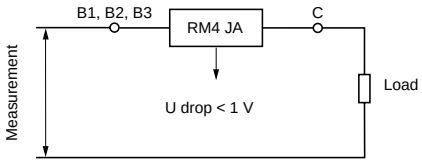



t : time delay

Undercurrent detection




t : time delay




**Note**: The measurement ranges can be extended by means of a current transformer, the secondary of which is connected to the measuring terminals of the RM4 relay, or by means of a resistor connected in parallel with the measuring input (see example page 5/51 “Setting-up”).

# Zelio Control - measurement and control relays

## Current measurement relays model RM4 J

561068

*RM4 JA01*

561069

*RM4 JA32*

### Overcurrent detection

| Time delay | Current to be measured depending on connection ∿ or ⎓ | Width | Output relay | Basic reference, to be completed by adding the voltage code *(1)* | Weight |
|---|---|---|---|---|---|
| **s** | | **mm** | | | **kg** |
| **Without** | 3...30 mA<br>10...100 mA<br>0.1...1 A | 22.5 | 1 C/O | **RM4 JA01●** | 0.172 |

### Overcurrent or undercurrent detection

| Adjustable time delay | Current to be measured depending on connection ∿ or ⎓ | Width | Output relay | Basic reference, to be completed by adding the voltage code *(1)* | Weight |
|---|---|---|---|---|---|
| **s** | | **mm** | | | **kg** |
| **0.05...30** | 3...30 mA<br>10...100 mA<br>0.1...1 A | 22.5 | 2 C/O | **RM4 JA31●●** | 0.172 |
| | 0.3...1.5 A<br>1...5 A<br>3...15 A | 45 | 2 C/O | **RM4 JA32●●** | 0.204 |

*(1) Standard supply voltages*

| | | | | | |
|---|---|---|---|---|---|
| **RM4 JA01** | Volts | **24** | **110...130** | **220...240** | |
| | ∿ 50/60 Hz | B | F | M | |
| **RM4 JA31** | Volts | **24...240** | **110...130** | **220...240** | **380...415** |
| and **RM4 JA32** | ∿ 50/60 Hz | MW | F | M | Q |
| | ⎓ | MW | – | – | – |

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Presentation : pages 5/46 and 5/47
Characteristics : page 5/49
Dimensions, schemes : page 5/50
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# Zelio Control - measurement and control relays

## Current measurement relays model RM4 J

### Power supply circuit characteristics

| Relay type | | | RM4 JA01 | | | RM4 JA31 and RM4 JA32 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Rated supply voltage** (Un) | ∿ 50/60 Hz | **V** | 24 | 110...130 | 220...240 | 24...240 | 110…130 | 220...240 | 380...415 |
| | ⎓ | **V** | – | – | – | 24...240 | – | – | – |
| **Average consumption** at Un | ∿ | **VA** | 2 | 1.9…3.3 | 2.7…3.5 | 1.5…3.3 | 1.9…3.3 | 2.7…3.4 | 2.7…3 |
| | ⎓ | **W** | – | – | – | 1.2 | – | – | – |

### Output relay and operating characteristics

| Relay type | | RM4 JA01 | RM4 JA31 and RM4 A32 |
|---|---|---|---|
| **Number of C/O contacts** | | 1 | 2 |
| **Output relay state** | | Energised when:<br>current measured > threshold setting | Energised when:<br>current measured > threshold setting (“>” function)<br>current measured < threshold setting (“<” function) |
| **Setting accuracy of the switching threshold** | | As % of the full-scale value: ± 5 % | |
| **Switching threshold drift** | **%** | ≤ 0.06 per degree centigrade, depending on the permissible ambient temperature | |
| | **%** | ≤ 0.5, within the supply voltage range (0.85…1.1 Un) | |
| **Hysteresis** (adjustable) | **%** | 5…30 of the current threshold setting | |
| **Setting accuracy of the time delay** | | As % of the full-scale value: ± 10 % | |
| **Time delay drift** | **%** | – | ≤ 0.07 per degree centigrade, depending on temperature |
| | | | ≤ 0.5, within the supply voltage range (0.85… 1.1 Un) |
| **Measuring cycle** | **ms** | ≤ 80 | |

### Measuring input characteristics

**Internal input resistance and permissible overload depending on the current measurement ranges**

| Relay type | | RM4 JA01 and RM4 JA31 | | | RM4 JA32 | | |
|---|---|---|---|---|---|---|---|
| **Measurement range**<br>∿ 50-60 Hz and ⎓ | | 3…30 mA | 10…100 mA | 0.1…1 A | 0.3…1.5 A | 1… 5 A | 3… 15 A |
| **Internal input resistance Ri** | Ω | 33 | 10 | 1 | 0.06 | 0.02 | 0.006 |
| **Permissible continuous overload** | **A** | 0.05 | 0.15 | 1.5 | 2 | 7 | 20 |
| **Permissible non repetitive overload**<br>for t ≤ 3 s | **A** | 0.2 | 0.5 | 5 | 10 | 15 | 100 |

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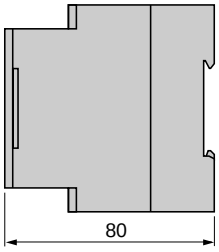
# Zelio Control - measurement and control relays

## Current measurement relays model RM4 J

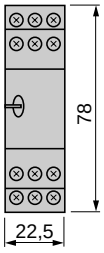
## Dimensions

**Dimensions**

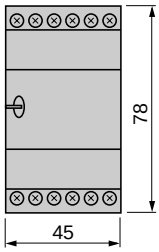
**RM4 JA** (common side view)



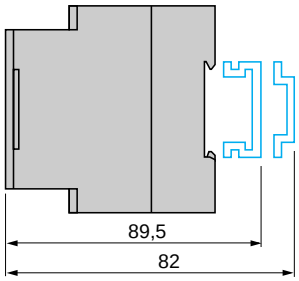

**RM4 JA●**



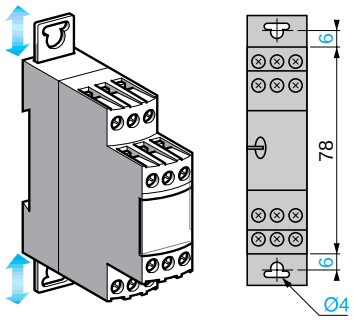

**RM4 JA32**




**Rail mounting**



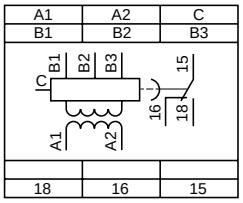

**Screw fixing**



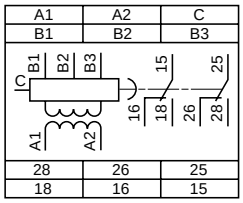

## Connection schemes

**Terminal blocks**

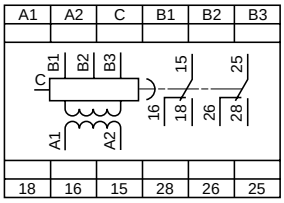
**RM4 JA01**




**RM4 JA31**




**RM4 JA32**

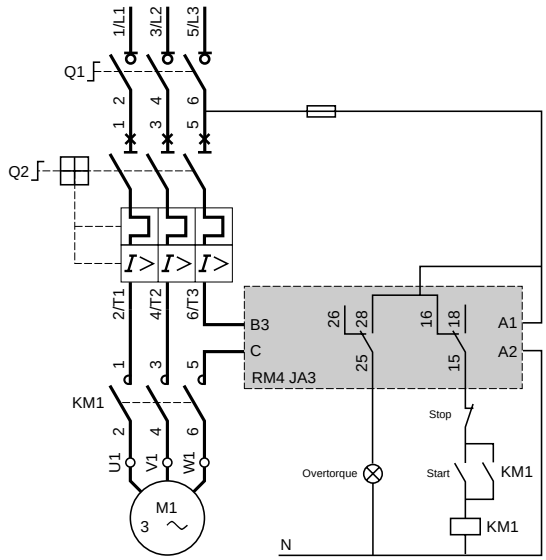



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **A1-A2** | Supply voltage | Connection and current values to be measured, depending on type of RM4 JA | | | | | |
| **B1, B2,** | Currents to be measured | **RM4 JA01** | B1-C | 3…30 mA | **RM4 JA32** | B1-C | 0.3…1.5 A |
| **B3, C** | (see table opposite) | **& RM4 JA31** | B2-C | 10…100 mA | | B2-C | 1…5 A |
| | | | B3-C | 0.1…1 A | | B3-C | 3…15 A |

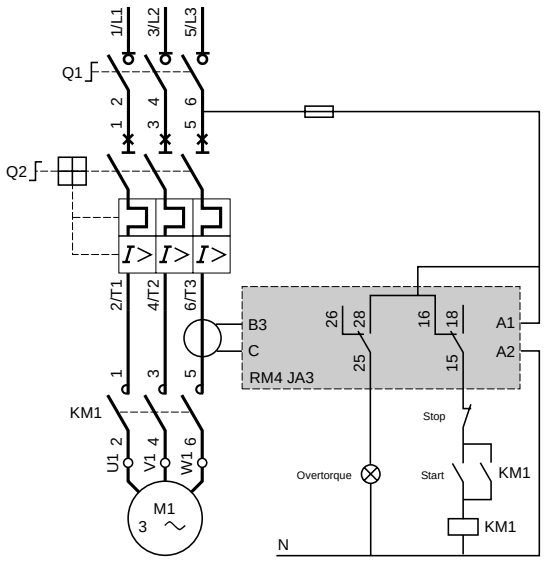
## Application schemes

Example: detection of blockage on a crusher (overcurrent function)

Current measured ≤ 15 A




Current measured > 15 A

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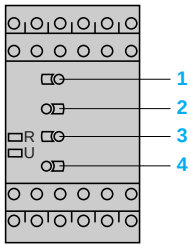
# Zelio Control - measurement and control relays
## Current measurement relays model RM4 J

**Example of overcurrent to be measured**
Overcurrent threshold at: 13 A.
Output relay time delay: 5 s.
Reset current threshold: 11 A
Supply voltage: 127 V ⎓




Product selected **RM4 JA32MW**
Connection of current to be measured B3-C (3 to 15 A)

■ **Adjustments:**
□ Adjustment of function and timing range, switch 4:
- determine whether overcurrent or undercurrent detection is required; in this example, overcurrent,
- determine the timing range, immediately greater than the time required; in this example 10 s,
- position switch 4 according to the above 2 criteria; in this example, switch 4 on **> 10**.

□ Fine adjustment of time delay:
Depending on the max. range setting displayed at 4 (in the above example: 10 s) use potentiometer 3 to set the required time delay as a % of value 4.
In the above example, the required time = 5 s therefore:

$\frac{t \times 100}{4} = \frac{5 \times 100}{10} =$ **50 %**

Set the time delay potentiometer 3 to **50**.

□ Set the current threshold setting potentiometer 1 as a percentage of the maximum value of the measuring range selected when wiring.
In the above example: wiring B3-C, max. value of measuring range = 15 A, therefore:

Setting 1 = $\frac{13 \times 100}{15}$ **= 87 %**

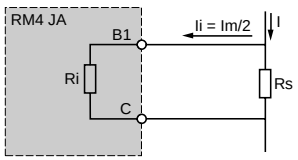
Set the current threshold setting potentiometer 1 to **87**.

□ Set the hysteresis 2 as a % of the threshold value; in this example:

Setting 2 = $\frac{13 - 11}{13}$ **= 15.4 %**

Set the hysteresis 2 to **15**
(13 - 11 = 2 i.e. 15.4 % of the current to be measured).

**Extension of the measuring range**
■ **d.c. or a.c. supply**
Simply connect a resistor “Rs” to terminals B1-C (or B2, B3-C) on the measuring input.
The relay energisation threshold will be towards the middle of the setting potentiometer range if the value of Rs is in the region of:




$Rs = \frac{Ri}{(2I/Im) - 1}$ where:

**Ri** Internal resistance of input B1-C,
**Im** Maximum value of threshold setting range,
**I** Current threshold to be measured.

Power dissipated by Rs: $P = Rs\ (I - Im/2)^2$

■ **Application:**
Use of relay **RM4 JA31●●** (10 to 100 mA).
Connection B2-C to measure a threshold of 1 A, knowing that Ri = 10 Ω for this rating and that Im = 100 mA.
The value of Rs will be: $\frac{10}{(2 \times 1/0.1) - 1} = 0.526\ \Omega$

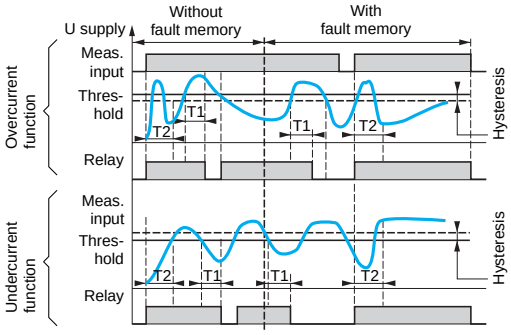
$P = (1 - \frac{0.1}{2})^2 \times 0.526$ i.e. 0.47 W

Select a resistor Rs capable of dissipating at least twice the calculated value, i.e. 1 W for this example, in order to limit temperature rise.
On an a.c. supply, it is also possible to use a current transformer.

# Zelio Control - measurement and control relays

## Current control relay, model RM 84 871

*■ Space savings, accurate measurement and optimised functions to improve the safety of your electrical installation.*
*■ Control: select "Overcurrent" or "Undercurrent" mode by means of a dip switch on the underside of the unit.*
*■ Safety: in the same way, choose whether or not to activate the fault memory function and set the threshold crossing delay T1 and the inhibit time delay T2. a.c./d.c. mode is detected automatically.*
*■ Accuracy: 3 products enable you to choose the best product for greater measuring accuracy, provided by a microprocessor.*




During the time delays, the yellow LED flashes at a frequency of 1 Hz.

## Operating principle

### Control of a.c. / d.c. current without memory

When the value of the controlled current, either a.c. or d.c., reaches the threshold displayed on the front panel, the output relay changes state at the end of time delay T1.
It instantly returns to the initial state when the current drops below the hysteresis threshold, or when the power supply is disconnected.

### Control of a.c. / d.c. current with memory

The output relay changes state at the end of time delay T1 and remains latched in this position. To reset it, the memory function must be reactivated by disconnecting the auxiliary supply.

### Overcurrent function

The time delay on energisation T2 prevents current peaks due to motor starting.
The delay on upward crossing of threshold T1 provides immunity to transients and other interference, thereby preventing spurious triggering of the output relay.

### Undercurrent function

The time delay on energisation T2 prevents the occurrence of current troughs.
The delay on downward crossing of threshold T1 provides immunity to random dips, thereby preventing spurious triggering of the output relay.

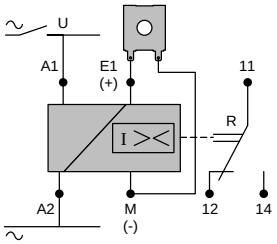
***Note :*** *In "undercurrent" mode, the absolute value of the hysteresis cannot be greater than the measurement range maximum.*

## Connection schemes

**RM 84 871 02●, RM 84 871 03●**

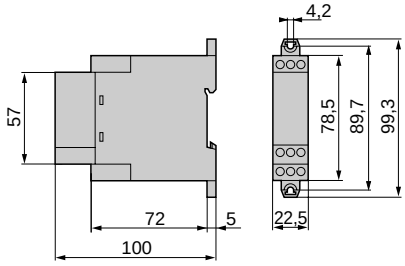
A1 - A2 : Supply

**RM 84 871 044**




A1 - A2 : Supply

## Dimensions

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# Zelio Control - measurement and control relays

## Current control relay, model RM 84 871

## References

561468

*RM 84 871 0●●*

### Current control relay

| Measurement range | Supply voltage | Reference | Weight kg |
|---|---|---|---|
| **2…500 mA** | ∿ 24 V | **RM 84 871 021** | 0.150 |
| | ∿ 120 V | **RM 84 871 023** | 0.150 |
| | ∿ 230 V | **RM 84 871 024** | 0.150 |
| **0.1…10 A** | ∿ 24 V | **RM 84 871 031** | 0.150 |
| | ∿ 120 V | **RM 84 871 033** | 0.150 |
| | ∿ 230 V | **RM 84 871 034** | 0.150 |
| **10…100 A** with current transformer | ∿ 230 V | **RM 84 871 044** | 0.150 |

### Accessories

| Description | Reference | Weight kg |
|---|---|---|
| **Current transformer** | **RM 26 852 304** | 0.065 |

## Auxiliary supply characteristics

| | | | | |
|---|---|---|---|---|
| **Relay type** | | **RM 84 871 021<br>RM 84 871 023<br>RM 84 871 024** | **RM 84 871 031<br>RM 84 871 033<br>RM 84 871 034** | **RM 84 871 044** |
| **Supply voltage Un** | **V** | 24, 120, 230 50/60 Hz (galvanic isolation by transformer) | | 230 50/60 Hz |
| **Operating range** | | 0.8…1.15 Un | | |
| **Average consumption** | **VA** | 3 | | |

## Output characteristics

| | | | |
|---|---|---|---|
| **Output relay** | | 1 cadmium-free C/O contact | |
| **Rated current** | **A** | 8 | |
| **Switching voltage** | **V** | ∿ 250 | |
| **Maximum voltage** | **V** | ∿ 440 | |
| **Rated breaking capacity** | **VA** | 2000 | |
| **Minimum breaking current** | **mA** | 100 at ⎓ 12 V | |
| **Electrical life** | AC-12 | | $10^5$ operating cycles at 8 A at ∿ 250 V |
| **Mechanical life** | | | 2 x $10^7$ operating cycles |
| **Time delay** | On crossing threshold T1 | **s** | 0,1…3 ± 10 % |
| | On energisation T2 | **s** | 1…20 ± 10 % |

## Input characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Measurement range** | | **mA** | 2…500 | | – | | | – |
| | | **A** | – | | 0.1…10 | | | 10…100, with current transformer |
| **Frequency of the measured signal** | | **Hz** | 40…500 | | | | | |
| **Adjustable hysteresis** | | | 5…50 % of the threshold setting | | | | | |
| **Threshold value** | | | 10…100 % of the range | | | | | |
| **Threshold setting accuracy** | | | ± 10 % | | | | | |
| **Measurement ranges** | Inputs | | **E1-M** | **E2-M** | **E3-M** | **E1-M** | **E2-M** | **E3-M** | **E1-M** |
| | Sensitivity | **mA** | 2…20 | 10…100 | 50…500 | – | – | – | – |
| | | **A** | – | – | – | 0.1…1 | 0.5…5 | 1…10 | 10…100 |
| | Input resistance | **kΩ** | 5 | 1 | 0.2 | 0.1 | 0.2 | 0.01 | 4 |

## Other characteristics

| | | | |
|---|---|---|---|
| **Temperature** | | **°C** | Operation: - 20…+50, storage: - 40…+ 70 |
| **Relative humidity** | Without condensation | | 95 % |
| **Enclosure material** | | | Self-extinguishing |
| **Degree of protection** | Conforming to IEC 60529 | | Enclosure: IP 40D, terminal block: IP 20 |
| **Connection** | | **$mm^2$** | Flexible cable without cable end: 1 x 4 or 2 x 2.5, flexible cable with cable end: 2 x 1.5 |
| **Tightening torque** | | **N.m** | 1 |
| **Dielectric strength** | Conforming to IEC 60255-5 | **kV** | 2.5 for 1 min at 1 mA 50 Hz |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |
| **Vibration resistance** | Conforming to IEC 60068-2-6 | | a = 0.035 mm |

## Immunity to electromagnetic interference (EMC) (application class 2 conforming to EN 61812-1)

| | | | |
|---|---|---|---|
| **Electrostatic discharge** | Conforming to IEC/EN 61000-4-2 | | Level 3 (6 kV contact, 8 kV air) |
| **Electromagnetic fields** | Conforming to IEC/EN 61000-4-3 | | Level 3 (10 V/m) |
| **Fast transients** | Conforming to IEC/EN 61000-4-4 | | Level 3 (2 kV) |
| **Shock waves** | Conforming to IEC/EN 61000-4-5 | | Level 3 (2 kV) |
| **Radio frequencies** | Conforming to IEC/EN 61000-4-6 | | Level 3 (10 V rms) |
| **Voltage dips and breaks** | Conforming to IEC/EN 61000-4-11 | | 30 % for 10 ms, 60 % for 100 ms and 1 s, > 95 % for 5 s and 10 ms |
| **Damped oscillatory wave at 1 MHz** | Conforming to IEC 61255-22-1 | | Class III |
| **Radiated and conducted emissions** | | | Class B |

Functions : page 5/52
Schemes : page 5/52
Dimensions: page 5/52

# Zelio Control - measurement and control relays

## Liquid level control relays (low and high sensitivity), model RM 84 870

- *Regulation of two thresholds:*
  - *minimum,*
  - *maximum.*
- *Emptying control*
- *Probes with a.c. current flowing through them.*
- *Sensitivity adjustment potentiometer on front panel of the device.*
- *Sensitivity adjustable from:*
  - *250 kΩ to 5 kΩ (low sensitivity),*
  - *50 kΩ to 1 MΩ (high sensitivity).*

### Operating principle

Control of maximum and/or minimum levels of conductive liquids (tap water, sea water, waste water, chemical solutions, coffee ...).

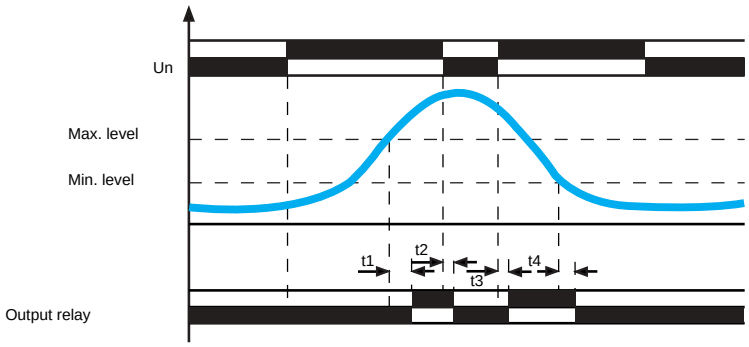
The operating principle is based on measurement of the apparent resistance of the liquid between two submerged probes. When this value is less than the threshold setting on the front panel of the device, the output relay changes state. To avoid electrolytic phenomena, an a.c. current runs across the probes.

Applications in the food-processing, chemical industries, etc.

### Regulation of two levels, minimum/maximum

The output relay changes state when the level of the liquid reaches the maximum level probe, with the minimum level probe submerged. It returns to its initial state when the minimum level probe is no longer in contact with the liquid.

#### Emptying control



# Zelio Control - measurement and control relays

## Liquid level control relays (low and high sensitivity), model RM 84 870

## References


*RM 84 870 131*

**Emptying control relays (low and high sensitivity)**

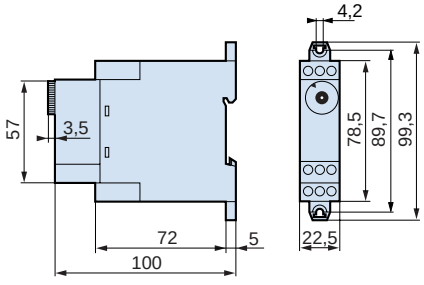
| Voltage | Sensitivity | Reference | Weight kg |
|---|---|---|---|
| ∿ 24 V | 250 Ω…5 kΩ | **RM 84 870 121** | 0.150 |
| | 50 kΩ…1 MΩ | **RM 84 870 131** | 0.150 |

**Note** : the probe cable (maximum length 100 metres) needs not be screened, but it is inadvisable to fit it in parallel with the power supply cables.
If a screened cable is used, do not exceed the capacities indicated.

## Characteristics

| | | | | |
|---|---|---|---|---|
| **Relay type** | | | **RE 84 870 121** | **RE 84 870 131** |
| **Supply voltage** | | **V** | ∿ 24 (50/60 Hz) | |
| **Supply range** | | | ± 15 % of Un<br>- 15…+ 10 % if other products are mounted on the same rail | |
| **Maximum power consumption** | | **VA** | 3 | |
| **Sensitivity adjustment** | | | 250 kΩ…5 kΩ | 50 kΩ…1 MΩ |
| **Measurement accuracy** (at maximum sensitivity) | | | ± 30 % | ± 30 % |
| **Maximum electrode voltage** | | **V** | ∿ 24 (50/60 Hz) | ∿ 24 (50/60 Hz) |
| **Maximum electrode current** | | | 3 mA (50/60 Hz) | 50 µA (50/60 Hz) |
| **Maximum cable capacity** | | **nF** | 100 | 1 |
| **Initialisation time** | (t3) | **ms** | 650 | 650 |
| **Response time** | High level (t1) | **ms** | 600 | 600 |
| | Low level (t4) | | 300 ms | 2 seconds |
| **Output relay** (to meet AC-1 requirements, resistive load) | | | 1 C/O contact, cadmium-free, 8 A/ ∿ 250 V | |
| **Galvanic isolation via transformer** (4 kV, 8 mm creepage distance) | | | Class II VDE 0551 | |
| **Isolation of contacts and electrodes from the supply** 1 min/1 mA/50 Hz (IEC 60 225-5) | | **kV** | ∿ 2.5 | |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/2 | |
| **Ambient air temperature** | Operation | **°C** | - 20…+ 60 | |
| | Storage | **°C** | - 30…+ 70 | |
| **Degree of protection** | Enclosure | | IP 50 | |
| | Terminal block | | IP 20 | |
| **Enclosure material** | | | Self-extinguishing Pc | |
| **Product certifications** | | | c UL us, CSA | |

## Dimensions




Functions : page 5/54
Schemes : page 5/78

# Zelio Control - measurement and control relays

## Plug-in liquid level control relays, model RM 84 870

- *Controlling the levels of conductive liquids*
- *Regulation of two thresholds:*
  - *minimum,*
  - *maximum.*
- *Emptying function.*
- *Plug-in, 8 or 11-pin.*
- *Sensitivity adjustable from 5 kΩ to 100 kΩ.*

## Operating principle

Control of maximum and/or minimum levels of conductive liquids (tap water, sea water, waste water, chemical solutions, coffee ...).

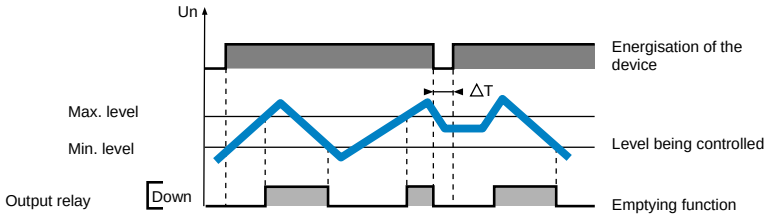
The operating principle is based on measurement of the apparent resistance of the liquid between two submerged probes. When this value is less than the threshold setting on the front panel of the device, the output relay changes state. To avoid electrolytic phenomena, an a.c. current runs across the probes.

Applications in the food-processing, chemical industries, etc.

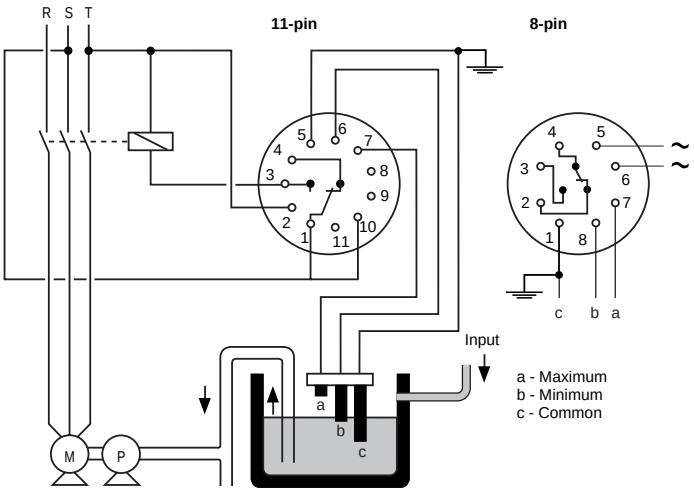
## Regulation of two levels, minimum/maximum

The output relay changes state when the level of the liquid reaches the maximum level probe, with the minimum level probe submerged. It returns to its initial state when the minimum level probe is no longer in contact with the liquid.

### Emptying control




## Connection scheme




For RM 84 870 807 (special 11-pin base fitting), pin 5 must be connected to “a” (maximum) and pin 7 must be connected to “c” (common).

# Zelio Control - measurement and control relays

## Plug-in liquid level control relays, model RM 84 870

## References

561008


*RM 84 870 303*

### Liquid level control relays

| Number of pins | Voltage | Reference | Weight kg |
|---|---|---|---|
| **8-pin** | ∿ 24 V | **RM 84 870 301** | 0.140 |
| | ∿ 120 V | **RM 84 870 303** | 0.140 |
| | ∿ 230 V | **RM 84 870 304** | 0.140 |
| **11-pin** | ∿ 24 V | **RM 84 870 306** | 0.140 |
| | ∿ 120 V | **RM 84 870 308** | 0.140 |
| | ∿ 230 V | **RM 84 870 309** | 0.140 |
| **Special 11-pin base fitting** | ∿ 230 V | **RM 84 870 807** | 0.190 |

**Note** : The probe cable (maximum length 100 metres) need not be screened, but it is inadvisable to fit it in parallel with the power supply cables.
Screened cable may be used, with the screening connected to the common.

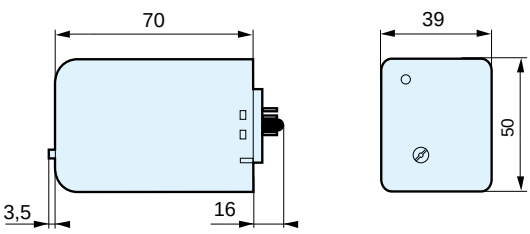
### Accessories

| Description | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|
| **11-pin socket** | 10 | **RUZ 1A** | 0,067 |

## Characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ∿ 24, 120, 230 (50/60 Hz) |
| **Operating range** | | | 0.85…1.15 x Un |
| **Maximum power consumption** | | **VA** | 3 |
| **Sensitivity adjustment** | | **kΩ** | 5…100 |
| **Measurement accuracy** (at maximum sensitivity) | | | 0…+ 30 % |
| **Maximum electrode voltage** | | **V** | ∿ 24 (50/60 Hz) |
| **Maximum electrode current** | | **mA** | 1 (50/60 Hz) |
| **Maximum cable capacity** | | **nF** | 10 |
| **Response time** | High level | **ms** | 300 |
| | Low level | **ms** | 500 |
| **Output relay** (to meet AC-1 requirements, resistive load) | | | 1 C/O contact, AgCdO ∿ 8 A max. |
| **Galvanic isolation via transformer** (4 kV, 8 mm creepage distance) | | | Class II VDE 0551 |
| **Isolation of contacts and electrodes from the supply** | | **kV** | ∿ 2.5 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 70 |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/56
Scheme : page 5/56

# Zelio Control - measurement and control relays

## Liquid level control relays model RM4


*RM4 LG01*

## Functions

These devices monitor the levels of conductive liquids.
They control the actuation of pumps or valves to regulate levels and are also suitable for protecting submersible pumps against running empty, or protecting tanks from "overflow". They can also be used to control dosing of liquids in mixing processes and to protect heating elements in the event of non immersion.
They have a transparent, hinged flap on their front face to avoid any accidental alteration of the settings. This flap can be directly sealed.

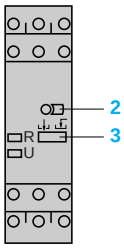
■ **Compatible liquids**:
- spring, town, industrial and sea water,
- metallic salt, acid or base solutions,
- liquid fertilizers,
- non concentrated alcohol (< 40 %),
- liquids in the food-processing industry: milk, beer, coffee, etc.

■ **Non-compatible liquids**:
- chemically pure water,
- fuels, liquid gasses (inflammable),
- oil, concentrated alcohol (> 40 %),
- ethylene, glycol, paraffin, varnish and paints.

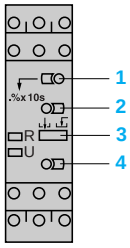

*RM4 LA32*

## Description

**RM4 LG01**
Width 22.5 mm




**RM4 LA32**
Width 22.5 mm




1 Fine adjustment of time delay (as % of setting range max. value).
2 Fine adjustment of response sensitivity (as % of setting range max. value).
3 Function selector switch:
- empty or fill .
4 Switch combining:
- selection of the response sensitivity range,
- selection of time delay on energisation or on de-energisation of the relay.

**R** Yellow LED: indicates relay state.
**U** Green LED: indicates that supply to the RM4 is on.

**Table showing details for switch 4**

| Switch position | Time delay | Sensitivity |
|---|---|---|
| 500 | On-delay | High = 500 kΩ range |
| 500 | Off-delay | High = 500 kΩ range |
| 50 | On-delay | Medium = 50 kΩ range |
| 50 | Off-delay | Medium = 50 kΩ range |
| 5 | On-delay | Low = 5 kΩ range |
| 5 | Off-delay | Low = 5 kΩ range |

References : page 5/60
Characteristics : page 5/61
Dimensions, schemes : page 5/62
Setting-up : page 5/63

# Zelio Control - measurement and control relays

## Liquid level control relays model RM4

### Operating principle

The operating principle is based on a change in the resistance measured between immersed or non-immersed electrodes. Low resistance between electrodes: liquid present. High resistance between electrodes: no liquid present. The electrodes may be replaced by other sensors or probes which transmit values representing variations in resistance.

The a.c. measuring voltage which is < 30 V and galvanically insulated from the supply and contact circuits, ensures safe use and the absence of any electrolysis phenomena.

RM4 relays may be used:

■ For detection of a liquid level, operating with 2 electrodes, one reference electrode and one high level electrode, or an LA9 RM201 probe. Example: prevention of tank overflow.

■ For regulating a liquid level between a minimum and a maximum level, operating with 3 electrodes, one reference electrode, one low level electrode and one high level electrode, or two LA9 RM201 probes.
Example: water tower.

The state of the output relay can be configured:

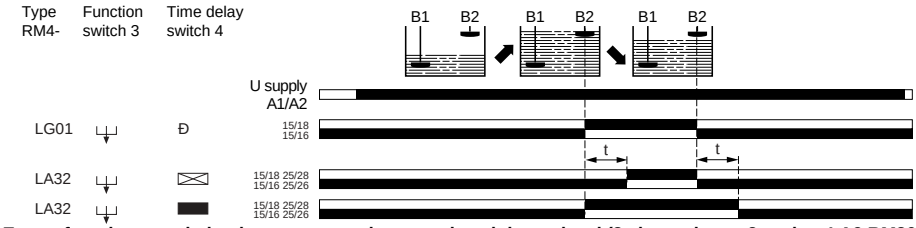
■ Empty function : the output relay is energised when high level electrode B2 is immersed and is de-energised when low level electrode B3 is "dry" *(1)*.

■ Fill function : the output relay is energised when the low level electrode is "dry" and is de-energised when high level electrode is immersed *(1)*.

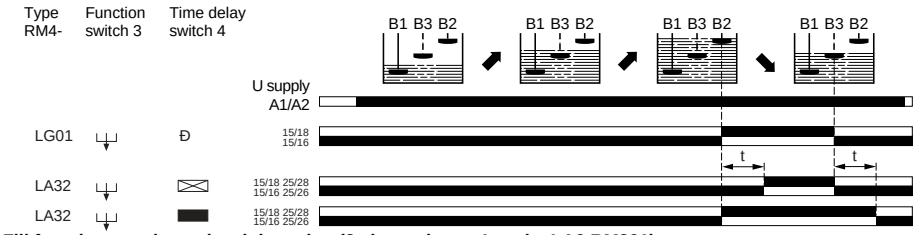
On model RM4 LA32 a time delay can be set on energisation or de-energisation of the output relay in order to raise the maximum level function or to lower the minimum level function .

This function also makes it possible to avoid pulsing of the output relay (wave effect) when operating with 2 electrodes.

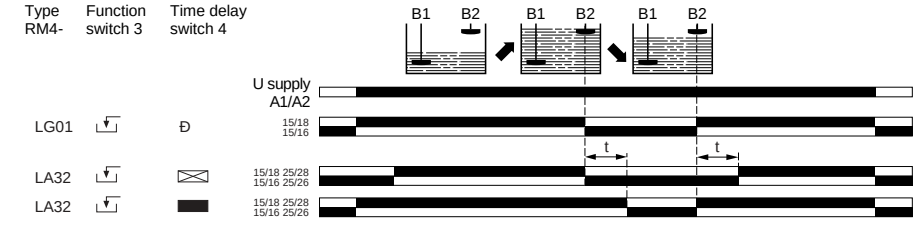
**Empty function, maximum level detection (2 electrodes or 1 probe LA9 RM201)**



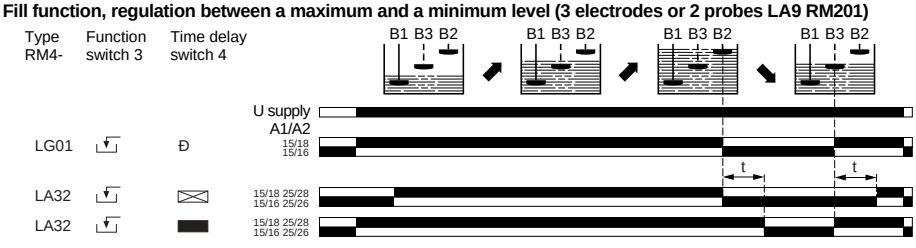

**Empty function, regulation between a maximum and a minimum level (3 electrodes or 2 probes LA9 RM201)**




**Fill function, maximum level detection (2 electrodes or 1 probe LA9 RM201)**




**Fill function, regulation between a maximum and a minimum level (3 electrodes or 2 probes LA9 RM201)**




B1 : reference electrode B2 : high level electrode B3 : low level electrode

*(1) When operating with 2 electrodes, the high level electrode performs both high and low level functions.*

References : page 5/60
Characteristics : page 5/61
Dimensions, schemes : page 5/62
Setting-up : page 5/63

# Zelio Control - measurement and control relays

## Liquid level control relays, model RM4

## References

### Liquid level control relays

| Time delay | Sensitivity scale | Width | Output relay | Basic reference, to be completed by adding the voltage code *(1)* | Weight |
|---|---|---|---|---|---|
| | kΩ | mm | | | kg |
| **Without** | 5…100 | 22.5 | 1 C/O | **RM4 LG01●** | 0.165 |
| **Adjustable 0.1...10 s** | 0.25 ...5<br>2.5 ...50<br>25 ...500 | 22.5 | 2 C/O | **RM4 LA32●●** | 0.165 |

561087

*RM4 LG01*

561088

*RM4 LA32*

### Liquid level control probe

| Type of installation | Maximum operating temperature | Reference | Weight |
|---|---|---|---|
| | °C | | kg |
| **Suspended by cable** | 100 | **LA9 RM201** | 0.100 |

561089

*LA9 RM201*

*(1) Standard supply voltages*

| | | | | | | |
|---|---|---|---|---|---|---|
| **RM4 LG01** | Volts | | **24** | **110...130** | **220...240** | **380...415** |
| | ∿ 50/60 Hz | | B | F | M | Q |
| **RM4 LA32** | Volts | **24...240** | **24** | **110...130** | **220...240** | **380...415** |
| | ∿ 50/60 Hz | MW | B | F | M | Q |
| | ⎓ | MW | – | – | – | – |

Presentation : pages 5/58 and 5/59
Characteristics : page 5/61
Dimensions, schemes : page 5/62
Setting-up : page 5/63

# Zelio Control - measurement and control relays

## Liquid level control relays model RM4

### Power supply circuit characteristics

| Relay type | | | RM4 LG01 | | | | RM4 LA32 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rated supply voltage** (Un) | ∿ 50/60 Hz | **V** | 24 | 110...130 | 220...240 | 380...415 | 24...240 | 24 | 110...130 | 220...240 | 380...415 |
| | ⎓ | **V** | – | – | – | – | 24...240 | – | – | – | – |
| **Average consumption** at Un | ∿ | **VA** | 1.9 | 2.6 | 2.4 | 2.9 | 2.7 | 3.1 | 2.7 | 2.6 | 3.4 |
| | ⎓ | **W** | – | – | – | – | 2.4 | – | – | – | – |

### Output relay and operating characteristics

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Number of C/O contacts** | | | 1 | | | | 2 | | | |
| **Output relay state** | | | Can be configured by switch: empty / fill | | | | | | | |

### Electrode circuit characteristics *(1)*

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sensitivity scale** | **kΩ** | 5…100 (adjustable) | | | | 0.25…5 | | 2.5…50 | | 25…500 |
| **Maximum a.c. electrode voltage** (peak to peak) | **V** | 24 | | | | 24 | | | | |
| **Maximum current in the electrodes** | **mA** | 1 | | | | | | | | |
| **Maximum cable capacity** | **nF** | 10 | | | | 200 | | 25 | | 4 |
| **Maximum cable length** | **m** | 100 | | | | 1000 | | 100 | | 20 |

*(1) The electrodes may also be incorporated in the probes. The probes are normally designed for fixing to a tank by means of a bracket with a seal (closed tanks) or suspended by their own electrical connecting cable (boreholes, etc.). See page 5/63 “Setting-up” Probe LA9-RM201.*

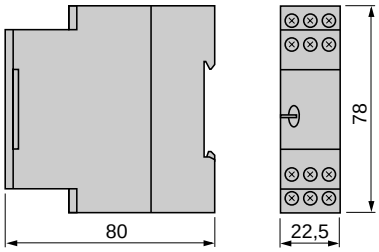
5

# Zelio Control - measurement and control relays

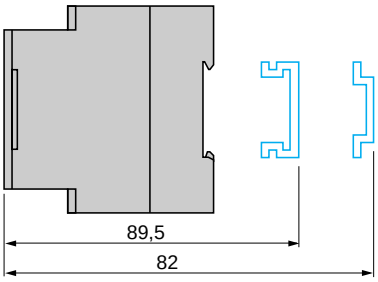
Liquide level control relays

## Dimensions

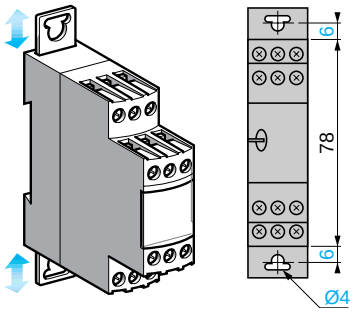
**RM4 LG01, LA32**



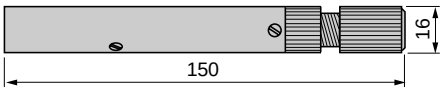

**Rail mounting**




**Screw fixing**



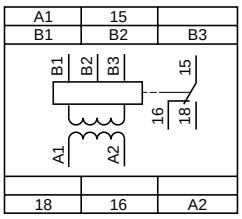

**Probe LA9 RM201**



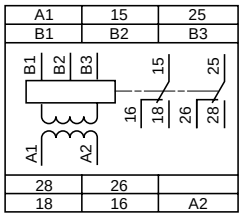

5

## Connection schemes

**RM4 LG01**




**RM4 LA32**




| | |
|---|---|
| **A1-A2** | Supply voltage |
| **B1, B2, B3** | Electrodes (see table opposite) |
| **15-18** | 1st C/O contact |
| **15-16** | of the output relay |
| **25-28** | 2nd C/O contact |
| **25-26** | of the output relay |

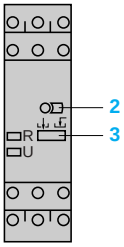
| **Electrodes and level controlled** | |
|---|---|
| **B1** | Reference or tank earth electrode |
| **B2** | High level |
| **B3** | Low level |

Presentation : pages 5/58 and 5/59
References : page 5/60
Characteristics : page 5/61
Setting-up : page 5/63

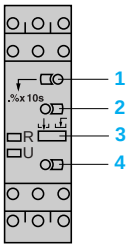
# Zelio Control - measurement and control relays
## Liquide level control relays

## Setting-up

■ Select the empty /fill function according to the sequence to be performed.
■ If necessary, set potentiometer **1** to minimum (time delay).
■ Set potentiometer **2** to minimum; on RM4-LA, select the lowest sensitivity range using potentiometer **4** (5 or 5 ).
■ With all the electrodes immersed, turn the sensitivity potentiometer towards maximum until the relay is energised ( function) or de-energised ( function), then exceed the threshold by about 10 % to compensate for variation in the supply voltage.
If the relay is not able to energise, a higher sensitivity scale must be used (selector **4** on RM4 LA32) or relay RM4 LG must be replaced by an RM4 LA32 relay and the adjustment procedure must be started again.
■ Then check that the relay de-energises ( function) or energises ( function) as soon as electrodes B3 and B2 are out of the liquid. If the relay does not de-energise, select a lower sensitivity scale.



RM4 LG01

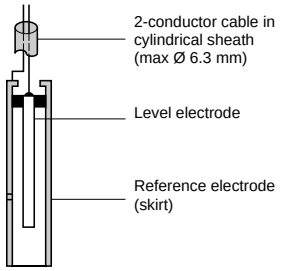


RM4 LA32

■ The electrode connection point must be protected against corrosion by sticking or sealing. In areas where thunderstorms are likely to occur, measures must also be taken to protect the electrode lines.
**Note:** the high level can be raised by means of the adjustable time delay from 0.1 to 10 seconds with function .
The low level can be lowered by means of this same time delay with function .

### Probe LA9 RM201

This probe is of the "suspension" type. It is coaxial, i.e. in addition to the normal (central) electrode, the stainless steel skirt can also act as earth (reference electrode), which means that there is no need to install a separate reference probe. In this way, for controlling one level, only one probe is required instead of 2; for controlling 2 levels, only 2 probes are required instead of 3.

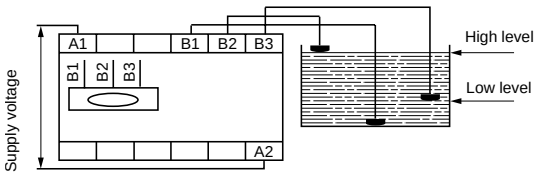


LA9 RM201

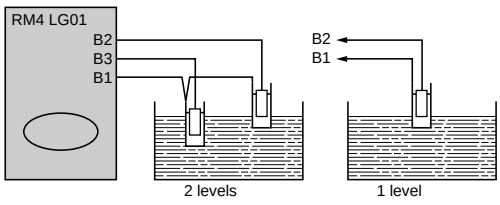
The connecting cable must be of the "2-conductor" type, with common cylindrical PVC sheath, having a maximum diameter of 6.3 mm. The skirt also acts as a "calming chamber", so avoiding inaccuracy due to an agitated surface of the liquid (waves).
Maximum operating temperature: 100 °C.
Probe LA9 RM201 can also be fixed on various containers (cisterns, tanks, ...) by means of a bracket or other suitable fixing device.

### Connection examples

**Control by electrodes**




**Control by probes**



# Zelio Control - measurement and control relays

## Liquid level control relays, model RM 84 870

- *Regulation of two levels:*
  - *minimum,*
  - *maximum.*
- *Monitoring of filling (UP) or emptying (DOWN) selectable by means of switch on the front panel of the device.*
- *Probes with a.c. current flowing through them.*
- *Sensitivity adjustment potentiometer on front panel of the device.*
- *Sensitivity adjustable from 5 kΩ to 100 kΩ.*

### Operating principle

Control of maximum and/or minimum levels of conductive liquids (tap water, sea water, waste water, chemical solutions, coffee ...).

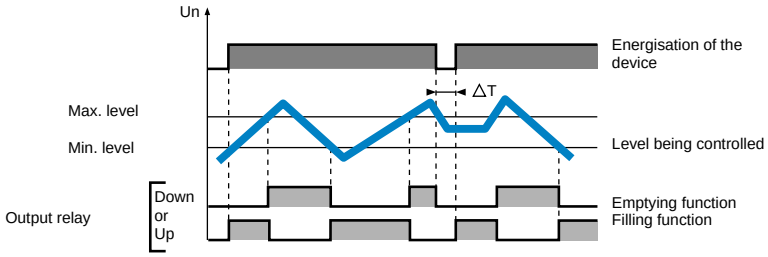
The operating principle is based on measurement of the apparent resistance of the liquid between two submerged probes. When this value is less than the threshold setting on the front panel of the device, the output relay changes state. To avoid electrolytic phenomena, an a.c. current runs across the probes.

Applications in the food-processing, chemical industries, etc.

### Regulation of two levels, minimum/maximum

The output relay changes state when the level of the liquid reaches the maximum level probe, with the minimum level probe submerged. It returns to its initial state when the minimum level probe is no longer in contact with the liquid.

#### Filling or emptying control




***Note :*** *If the voltage break ΔT lasts 1 second or more, the relay is instantly re-energised if in "UP" mode and is de-energised if in "DOWN" mode.*

5

References : page 5/65
Characteristics : page 5/65
Dimensions : page 5/65
Schemes : page 5/78

# Zelio Control - measurement and control relays

## Liquid level control relays, model RM 84 870

## References


*RM 84 870 001*

**Filling (UP) and emptying (DOWN) control relays**

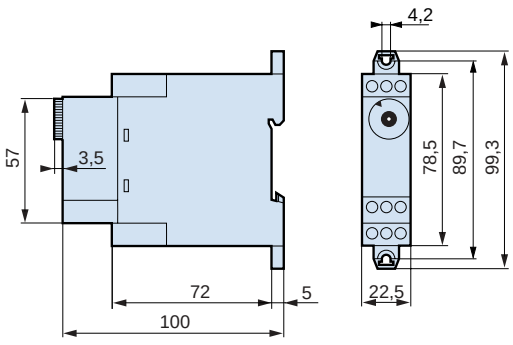
| Voltage | Reference | Weight kg |
|---|---|---|
| ∿ 24 V | **RM 84 870 001** | 0.140 |
| ∿ 120 V | **RM 84 870 003** | 0.140 |
| ∿ 230 V | **RM 84 870 004** | 0.140 |

**Note** : The probe cable (maximum length 100 metres) need not be screened, but it is inadvisable to install it in parallel with the power supply cables.
A screened cable may be used, with the screening connected to the common.

## Characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ∿ 24, 120, 230 (50/60 Hz) |
| **Operating range** | | | 0.85…1.15 x Un |
| **Maximum power consumption** | | **VA** | 3 |
| **Sensitivity adjustment** | | **kΩ** | 5…100 |
| **Measurement accuracy** (at maximum sensitivity) | | | 0…+ 30 % |
| **Electrode voltage** (maximum) | | **V** | ∿ 24 (50/60 Hz) |
| **Electrode current** (maximum) | | **mA** | 1 (50/60 Hz) |
| **Maximum cable capacity** | | **nF** | 10 |
| **Response time** | High level | **ms** | 300 |
| | Low level | **ms** | 500 |
| **Output relay** (to meet AC-1 requirements, resistive load) | | | 1 C/O contact, AgCdO ∿ 8 A max. |
| **Galvanic isolation via transformer** (4 kV, 8 mm creepage distance) | | | Class II VDE 0551 |
| **Isolation of contacts and electrodes from the supply** | | **kV** | ∿ 2.5 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 70 |
| **Product certifications** | | | c UL us, CSA |

## Dimensions



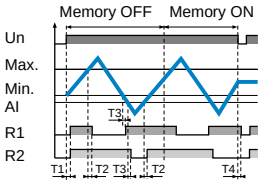

Functions : page 5/64
Schemes : page 5/78

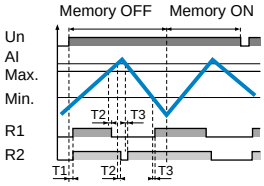
# Zelio Control - measurement and control relays

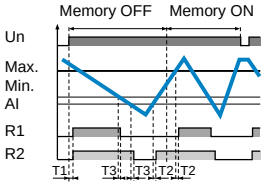
## Liquid level control relays with alarm, model RM 84 870

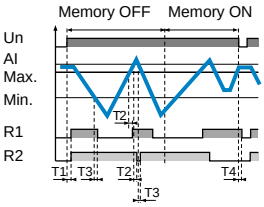
- *Control and automatic regulation of liquid levels.*
- *2 sensitivity ranges.*
- *Fill or empty function selectable via dip switch.*
- *High or low level alarm selectable via dip switch.*
- *Selectable memory.*
- *Power on, output relay state and alarm relay state indication LEDs.*






T1 : Delay on pick-up
T2 : Response time on immersion
T3 : Response time on emersion
T4 : Response time on energisation

## Operating principle

Control of the level of a conductive liquid at specific points (high and low levels) with alarm when the level is abnormally high or abnormally low.
The operating principle is based on measurement of the apparent resistance of the liquid between submerged probes. When this value is below the threshold setting on the front panel of the device, the output relay R1 and/or the alarm relay R2 change state.
To avoid electrolysis phenomena, an a.c. current runs across the probes.

### Sensitivity adjustment

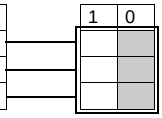
Set the sensitivity so that the relay changes state when the probes are in contact with the liquid. Then check that the relay returns to its initial position as soon as the probes emerge.
In certain applications, fine adjustment of sensitivity leads to the detection of undesirable factors, such as the presence of foam or bubbles on the surface of the liquid, or the appearance of leakage impedance between probes (extended line capacity, humidity ...).

***Note :*** *Latching of alarm relay R2 in the de-energised state, in the event of a fault, can be programmed via a switch on the underside of the device (the switch must be operated with the device switched off). To reset alarm relay R2, the power supply to the device must be switched off, provided that the levels have been re-established.*

### Programming

The level controller can be programmed by means of 3 switches on the underside of the device:

| | 1 | 0 |
|---|---|---|
| **Memory** | OFF | ON |
| **Alarm** | Low | High |
| **Function** | Empty | Fill |




***Note :*** *Memory, Alarm and Function selections must only be made with the device switched off.*

## Filling control with low level alarm

On energisation, probe AI is submerged, relays R1 and R2 change to the energised state and the pump is ON: filling starts, the LED for relay R1 is lit. When the liquid reaches the max. level probe, relay R1 changes to the de-energised state and the pump is OFF: filling stops, the LED for relay R1 goes out. Relay R1 re-energises when the min. level probe emerges. In the event of a fault (continual drop in level) probe AI is emerged, relay R2 changes to the de-energised state and the alarm is triggered: the LED for relay R2 comes on. This fault can be memorised.

## Filling control with high level alarm

On energisation, the level in the tank is low, relays R1 and R2 change to the energised state and the pump is ON: filling starts, the LED for relay R1 is lit. When the liquid reaches the max. level probe, relay R1 de-energises and the pump is OFF: filling stops and the relay LED goes out. In the event of a fault, if the level continues to rise and reaches probe AI, relay R2 de-energises and the alarm is triggered: the LED for relay R2 comes on. This fault can be memorised.

## Emptying control with low level alarm

On energisation, the min. level, max. level and AI probes are submerged, relays R1 and R2 change to the energised state and the pump is ON: emptying starts, the LED for relay R1 is lit. When the liquid reaches the max. level probe, relay R1 de-energises and the pump is OFF: emptying stops, the LED for relay R1 goes out. In the event of a fault, if the level continues to drop, probe AI emerges, relay R2 de-energises and the alarm is triggered: the LED for relay R2 comes on. This fault can be memorised.

## Emptying control with high level alarm

On energisation, the min. level and max. level probes are submerged and probe AI is above the level of the liquid. Relays R1 and R2 change to the energised state and the pump is ON: emptying starts, the LED for relay R1 is lit. When the min. level probe emerges, relay R1 de-energises and the pump is OFF: emptying stops, the LED for relay R1 goes out. The relay re-energises when the max. level probe is submerged. In the event of a fault, if the level continues to rise and reaches probe AI, relay R2 de-energises and the alarm is triggered: the LED for relay R2 comes on. This fault can be memorised.

References : page 5/67
Characteristics : page 5/67
Dimensions : page 5/67
Scheme : page 5/67

# Zelio Control - measurement and control relays

## Liquid level control relays with alarm, model RM 84 870

## References


*RM 84 870 504*

**Liquid level control relays with alarm**

| Voltage | Reference | Weight kg |
|---|---|---|
| ∿ 24 V | **RM 84 870 501** | 0.280 |
| ∿ 230 V | **RM 84 870 504** | 0.280 |

**Note**: The probe cable need not be screened, but it is inadvisable to install it close to the power supply cables.
In order to conform to the EMC directive (89/336/EEC) a screened cable must be used, with the screening connected to the common and to earth.

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Supply voltage Un** | | | **V** | ∿ 24 or 230 (50/60 Hz) galvanic isolation by transformer |
| **Operating range** | | | | 0.85…1.15 Un |
| **Maximum power** | Rated | | **VA** | 3 at Un |
| | Maximum | | **VA** | 4 at Un + 15 % |
| **Immunity to microbreaks** | | | **ms** | 10 |
| **Delay on pick-up** | t1 | | **s** | About 2 |
| **Response time on de-energisation** | t4 | | **ms** | 500 |
| **Insulation coordination** | | | | Category III, degree of pollution 2 conforming to IEC 664-1/VDE 0110 : 4 kV/2 |

## Control characteristics

| | | | | |
|---|---|---|---|---|
| **Sensitivity range** | | | | 5…100 kΩ |
| **Setting accuracy** | | | | ± 30 % at maximum sensitivity |
| **Electrode voltage** | | | **V** | ∿ 15 (50/60 Hz) |
| **Electrode current** | | | **mA** | 1 |
| **Response time** | On immersion | t2 | **ms** | 400 |
| | On emersion | t3 | **ms** | 700 |

## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | 2 C/O contacts, AgCdO |
| **Breaking capacity** | | | 2000 VA, 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | ∿ 100, ⎓ 100 |
| **Maximum switching voltage** | | **V** | ∿ 250, ⎓ 250 |
| **Mechanical life** | | | 2 x $10^6$ operating cycles |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |

## Other characteristics

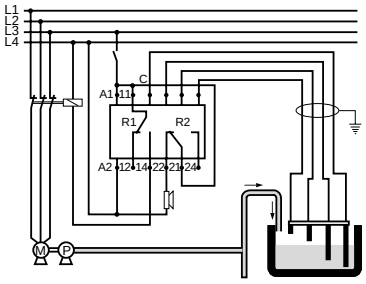
| | | | |
|---|---|---|---|
| **Enclosure material** | | | Self-extinguishing Pc |
| **Terminal capacity** | With cable end | **mm²** | 2 x 1.5 |
| | Without cable end | **mm²** | 2 x 2.5 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 (conforming to IEC 68-1-14) |
| | Storage | **°C** | - 30…+ 70 (conforming to IEC 68-1-1/2) |
| **Relative humidity** | | | 93 % without condensation |
| **Product certifications** | | | c UL us, CSA |

## Connection scheme and dimensions

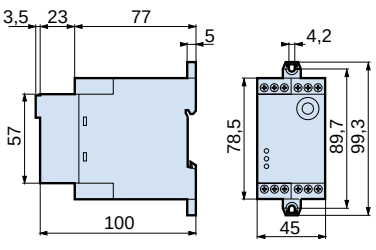
**Terminal connections**

**A1 - A2** : Supply voltage
**11 - 12 - 14** : Output relay (R1)
**21 - 22 - 24** : Alarm output relay (R2)
**C - Min - Max - AI** : Probe inputs
Green LED : power on.
Yellow LED : output relay state.
Red LED : alarm relay state.

**Connection**




**Dimensions**




***Note :*** *If the reservoir is conductive (metal), it can be used as the reference electrode (C).*

Functions :
page 5/66

# Zelio Control - measurement and control relays

## Liquid level control relays, combined fill/empty functions, model RM 84 870

- *Control and automatic regulation of liquid levels.*
- *Sensitivity adjustable from 5 to 100 kΩ.*
- *Combined regulation of emptying a well and filling a tank.*
- *Power on and output relay state indication LED.*

## Operating principle

Control of tank filling at 2 levels (min. 1, max. 1) with simultaneous control of well or supply tank emptying at 2 levels (min 2, max 2) in order to protect the pump against running empty.

The operating principle is based on measurement of the apparent resistance of the liquid between two submerged probes. To avoid electrolytic phenomena, an a.c. current runs across the probes.

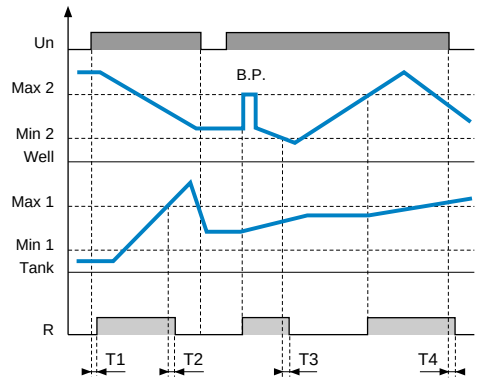
In certain applications, fine adjustment of sensitivity leads to the detection of undesirable factors, such as the presence of foam or bubbles on the surface of the liquid, or the appearance of leakage impedance between probes (extended line capacity, humidity ...).

## Combined fill/empty function

The output relay changes state (is de-energised) when the level of the liquid in the tank reaches the max. 1 level probe, with the min. 1 level probe submerged. It returns to its initial state (closes again) when the min. 1 level probe is no longer in contact with the liquid.

When the level of the liquid in the well reaches the min. 2 level probe, the pump stops (relay open. Protection : prevents the pump from running empty).
If, on energisation or after a power cut, the max. 2 level probe in the tank is above the liquid level, the device must be reset by pressing the pushbutton (B.P.).

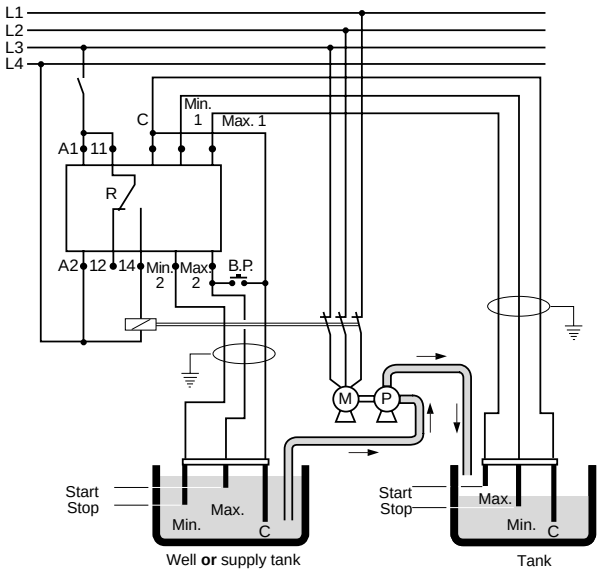
T1: Delay on pick-up
T2: Response time on immersion
T3: Response time on emersion
T4: Response time on de-energisation




## Wiring and application scheme

**Use of terminals**

| | | |
|---|---|---|
| A1 - A2 | : | Supply voltage |
| 11 - 12 - 14 | : | Output relay (R) |
| C - Min. 1 - Max. 1 | : | Tank probe inputs |
| C - Min. 2 - Max. 2 | : | Well or supply tank probe inputs |




References : page 5/69
Characteristics : page 5/69
Dimensions : page 5/69

# Zelio Control - measurement and control relays

## Liquid level control relays, combined fill/empty functions, model RM 84 870

## References

561032

*RM 84 870 604*

**Combined fill/empty function**

| Voltage | Reference | Weight kg |
|---|---|---|
| ∿ 230 V | **RM 84 870 604** | 0.250 |

**Note**: The probe cable (maximum length 100 metres) need not be screened, but it is inadvisable to install it close to the power supply cables.
In order to conform to the EMC directive (89/336/EEC) a screened cable must be used, with the screening connected to the common and to earth.

## Supply characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ∿ 230 (50/60 Hz) galvanic isolation via transformer |
| **Operating range** | | | 0.85…1.15 Un |
| **Power** | Rated | **VA** | 3 max at Un |
| | Maximum | | 4 at Un + 15 % |
| **Immunity to microbreaks** | | **ms** | 10 |
| **Delay on pick-up** | t1 | **ms** | 400 |
| **Response time on de-energisation** | t4 | **ms** | 500 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/2 |

## Control characteristics

| | | | | |
|---|---|---|---|---|
| **Sensitivity range** | | | | 5…100 kΩ |
| **Setting accuracy** | | | | ± 30 % at maximum sensitivity |
| **Electrode voltage** | | | **V** | ∿ 15 (50/60 Hz) |
| **Electrode current** | | | **mA** | 1 |
| **Accuracy** | | | | ± 30 % at maximum sensitivity |
| **Response time** | On immersion | t2 | **ms** | 400 |
| | On emersion | t3 | **ms** | 700 |

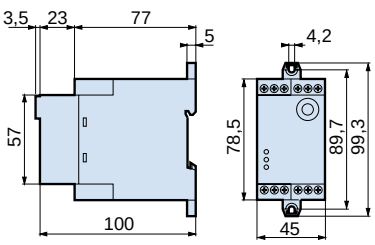
## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output type** | | | 1 C/O contact, AgCdO |
| **Breaking capacity** | | | 2000 VA, 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | ∿ 100, ⎓ 100 |
| **Maximum switching voltage** | | **V** | ∿ 250, ⎓ 250 |
| **Mechanical life** | | | 5 x $10^6$ operating cycles |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |

## Other characteristics

| | | | |
|---|---|---|---|
| **Enclosure material** | | | Self-extinguishing Pc |
| **Terminal capacity** | With cable end | **mm²** | 2 x 1.5 |
| | Without cable end | **mm²** | 2 x 2.5 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 (conforming to IEC 68-1-14) |
| | Storage | **°C** | - 30…+ 70 (conforming to IEC 68-1-1/2) |
| **Relative humidity** | | | 93 % without condensation |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/68
Scheme : page 5/68

# Zelio Control - measurement and control relays

## Plug-in liquid level control relays, combined fill/empty functions, model RM 84 870

- *Controlling the levels of conductive liquids.*
- *Combined fill/empty function.*
- *Combined regulation of emptying a well and filling a tank.*
- *Plug-in, 11-pin.*
- *Output relay state indication LED.*
- *Sensitivity adjustable from 5 kΩ to 100 kΩ.*



## Operating principle

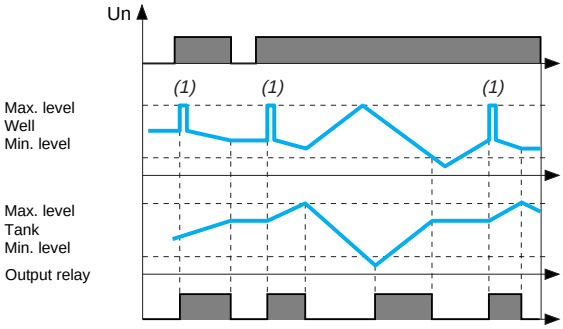
### Combined fill/empty function

The output relay changes state when the level of the liquid in the tank reaches the maximum level probe, with the minimum level probe submerged. It returns to its initial state when the minimum level probe is no longer in contact with the liquid.

When the level of the liquid in the well reaches the minimum level probe, the pump stops.

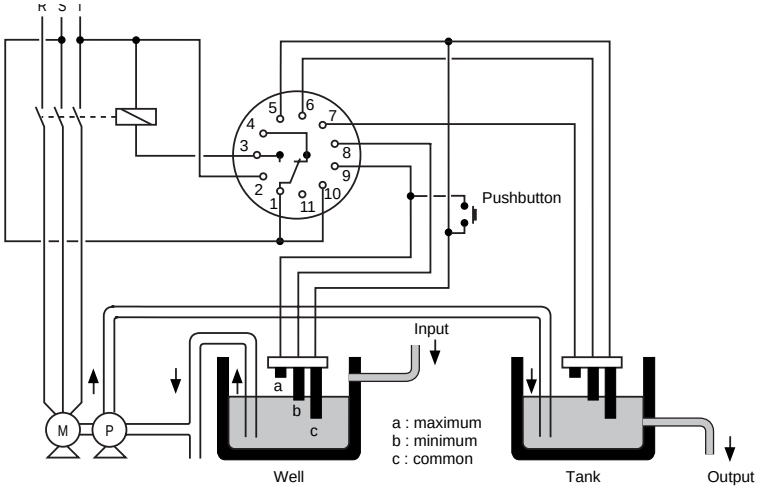
If, on energisation or after a power cut, the maximum level probe in the tank is above the liquid level, reset the device by pressing button BP.

### Emptying control




*(1) Pushbutton*

## Connection scheme




For RM 84 870 808 (special 11-pin base fitting), pin 5 must be connected to “a” (maximum) and pin 7 must be connected to “c” (common).

References : page 5/71
Characteristics : page 5/71
Dimensions : page 5/71

# Zelio Control - measurement and control relays

## Plug-in liquid level control relays, combined empty/fill functions, model RM 84 870

## References

561009


*RM 84 870 40●*

### Liquid level control relays

| Number of pins | Voltage | Reference | Weight kg |
|---|---|---|---|
| **11-pin** | ∿ 24 V | **RM 84 870 401** | 0.140 |
| | ∿ 120 V | **RM 84 870 403** | 0.40 |
| | ∿ 230 V | **RM 84 870 404** | 0.140 |
| **Special 11-pin base fitting** | ∿ 230 V | **RM 84 870 808** | 0.190 |

### Accessories

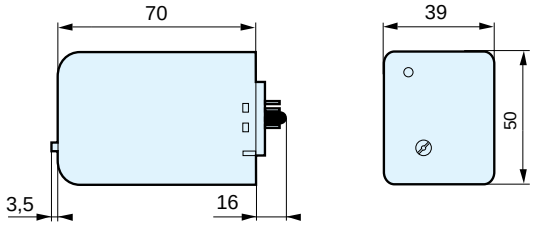
| Description | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|
| **11-pin socket** | 10 | **RUZ 1A** | 0.067 |

**Note**: The probe cable (maximum length 100 metres) need not be screened, but it is inadvisable to fit it in parallel with the power supply cables.
Screened cable may be used, with the screening connected to the common.

## Characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ∿ 24, 120, 230 (50/60 Hz) |
| **Operating range** | | | 0.85…1.15 x Un |
| **Maximum power consumption** | | **VA** | 3 |
| **Sensitivity adjustment** | | **kΩ** | 5…100 |
| **Measurement accuracy** (at maximum sensitivity) | | | 0…+ 30 % |
| **Maximum electrode voltage** | | **V** | ∿ 24 (50/60 Hz) |
| **Maximum electrode current** | | **mA** | 1 (50/60 Hz) |
| **Maximum cable capacity** | | **nF** | 10 |
| **Response time** | High level | **ms** | 300 |
| | Low level | **ms** | 500 |
| **Output relay** (to meet AC-1 requirements, resistive load) | | | 1 C/O contact, AgCdO ∿ 8 A max. |
| **Galvanic isolation via transformer** (4 kV, 8 mm creepage distance) | | | Class II VDE 0551 |
| **Isolation of contacts and electrodes from the supply** | | **kV** | ∿ 2.5 |
| **Ambient air temperature** | Operation | **°C** | - 20…+ 60 |
| | Storage | **°C** | - 30…+ 70 |
| **Product certifications** | | | c UL us, CSA |

## Dimensions




Functions : page 5/70
Scheme : page 5/70

# Zelio Control - measurement and control relays

## Electrode holders and probes


*RM 79 696 043*



*RM 79 696 006*

### Probes

| Application | No. of probes | Length | Operating temperature | Maximum pressure | Reference | Weight |
|---|---|---|---|---|---|---|
| | | mm | °C | kg/cm² | | kg |
| **Recommended for drinks vending machines and where installation space is limited** (Stainless steel) | 3 | 1000 | 80 | 2 | **RM 79 696 044** | 0.800 |
| **Suitable for boilers, pressure vessels and under high temperature conditions** *(1)* (304 stainless steel) | 1 | 1000 | 200 | 25 | **RM 79 696 014** | 0.360 |

| Description | Material | Reference | Weight kg |
|---|---|---|---|
| **Protected probe for mounting by suspension** | Protective shell PUC (S7) Electrode : stainless steel | **RM 79 696 043** | 0.150 |

### Electrode holders

| Description | Material | Reference | Weight kg |
|---|---|---|---|
| **Electrode for use up to 350 °C and 15 kg/cm2** *(2)* | Stainless steel isolated by ceramic | **RM 79 696 006** | 0.150 |

*(1) 3/8" BSP mounting thread with hexagonal head. Use a 24 mm spanner for tightening.*
*(2) 3/8" BSP mounting thread.*

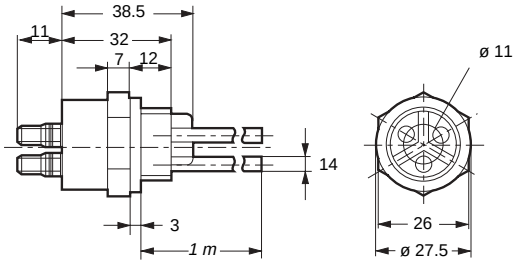
Dimensions : page 5/73

# Zelio Control - measurement and control relays

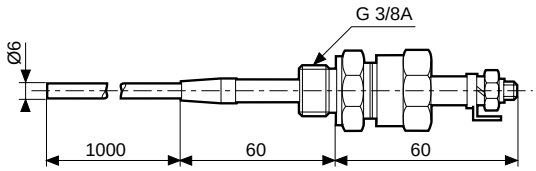
## Electrode holders and probes

### Probes

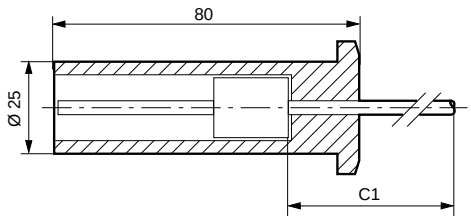
**RM 79 696 044**




**RM 79 696 014**



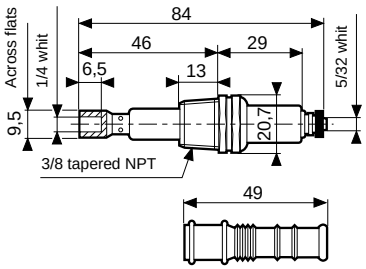

**RM 79 696 043**




C1 : cable supplied to required length **RM 79 696 001**

### Electrode holder

**RM 79 696 006**



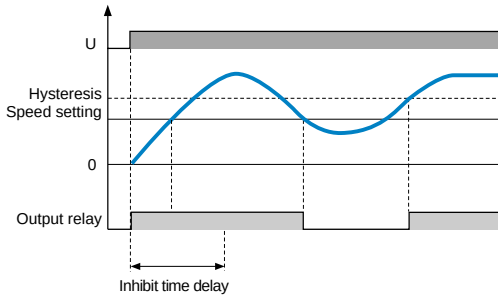

References :
page 5/72

# Zelio Control - measurement and control relays

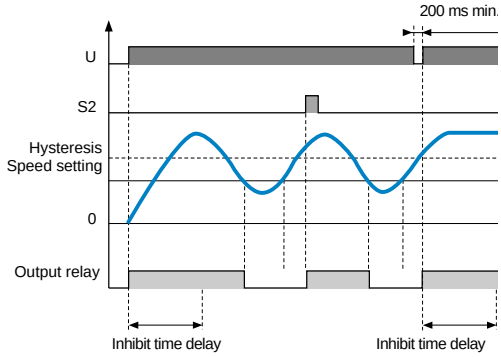
## Underspeed control relays, model RM 84 874

- *Detection of motor underspeed, stoppage, running speed or stalling.*
- *Information detected by 3-wire or NAMUR sensor, or by contact or voltage.*
- *Adjustable time from 100 ms to 10 min in 4 sub-ranges.*
- *Power-on inhibit time adjustable from 0.3 to 30 seconds.*
- *Default time delay adjustable from 0.3 to 3 seconds.*
- *Power on and output relay state indication LEDs.*

**Without latching**




**With latching**




## Operating principle

This control relay is used to resolve problems of underspeed on: conveyor belts, conveyors, etc., where crossing of a low speed threshold must trigger an alarm.

Speed information is detected by means of a sensor such as a 3-wire or NAMUR proximity sensor, or a volt-free contact, or the voltage.

On energisation, in order to allow the process being monitored to reach its operating speed, monitoring is inhibited for a time between 0.3 and 30 seconds, which can be adjusted on the front panel of the control relay.

If starting requires an inhibition time greater than 30 seconds, external contact S2 must be closed during starting to inhibit the relay (during this time, the yellow LED flashes), then opened once nominal speed has been reached.

On each cycle of the process being monitored, the sensor sends an impulse to the relay.

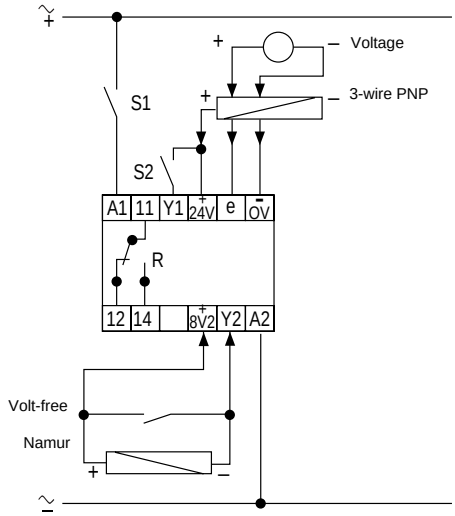
Each of these impulses resets the relay's internal time delay.
If the time between two impulses is less than the setting value on the relay, the time delay is reset at each impulse, and the output relay stays closed.

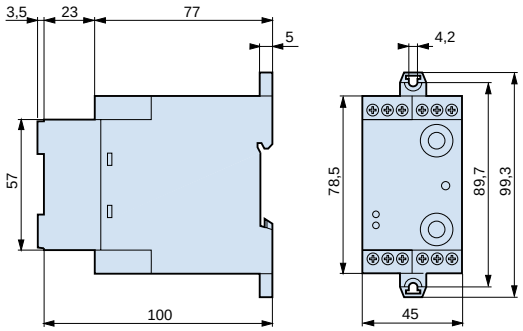
If the speed of the process being monitored drops, the time between two impulses increases.
When the time between two impulses is greater than the setting value on the relay the process being monitored is running at underspeed and the output relay changes state (opens).
The output relay closes again when the speed of the process being monitored exceeds the setting value, plus the hysteresis (5% of the setting value).

If "memory" mode is selected, the relay stays open when an underspeed fault is detected. In this case, the output relay can only close again after a manual reset has been performed by closing external contact S2.

A yellow LED indicates the state of the relay.
A green LED indicates that the power supply is ON.

## Connection scheme and dimensions




**Terminal identification**

| | |
|---|---|
| AI - A2 | : Supply voltage |
| 11 - 12 - 14 | : Output relay (R) |
| + 24 V - E - 0 V | : 3-wire PNP sensor |
| E - 0 V | : Voltage input |
| + 8 V 2 - Y2 | : Contact/NAMUR sensor input |

References : page 5/75
Characteristics : page 5/75

# Zelio Control - measurement and control relays

## Underspeed control relays, model RM 84 874

## References


*RM 84 874 304*

**Underspeed control**

| Voltage | Reference | Weight kg |
|---|---|---|
| ⎓ 24 V | **RM 84 874 300** | 0.255 |
| ∿ 24 V | **RM 84 874 301** | 0.255 |
| ∿ 110 V | **RM 84 874 303** | 0.255 |
| ∿ 230 V | **RM 84 874 304** | 0.255 |

## Supply characteristics

| | | | | |
|---|---|---|---|---|
| **Relay type** | | | **RM 84 874 300** | **RM 84 874 301/RM 84 874 303/ RM 84 874 304** |
| **Supply voltage Un** | | **V** | ⎓ 24 | ∿ 24, ∿ 110, ∿ 230 |
| **Operating range** | | | 0.85…1.15 Un | 0.85…1.15 Un |
| **Maximum power consumption** | | | 1 W max at Un and 1.5 W at Un + 15 % | 3.5 VA max at Un and 5 VA at Un + 15 % |
| **Immunity to microbreaks** | | **ms** | 10 | 10 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4 kV/3 | 4 kV/3 |

## Input/control circuit characteristics

| | | | |
|---|---|---|---|
| **Input circuit** | 3-wire sensor | | 24 V PNP (50 mA max) |
| | NAMUR sensor | | 8.2 V on 1 kΩ |
| | Contact | | Volt-free |
| | Voltage input | **V** | 30 max |
| **Input resistance** | | **kΩ** | 16 kΩ except for NAMUR 1 |
| **State** | High | **V** | Min 4.5; max 30 |
| | Low | **V** | Min 0; max 1 |
| **Cut-off frequency** | | **Hz** | 200 |
| **Minimum impulse time** | | **ms** | 5 |
| **Minimum time between impulses** | | **ms** | 5 |
| **Selection of time delay and memory function** | | | 8-position switch on front panel |
| | Without memory | | 0.1…1 s, 1…10 s, 0.1…1 min, 1…10 min |
| | With memory | | 0.1…1 s, 1…10 s, 0.1…1 min, 1…10 min |
| **Hysteresis** | | | 5 % of the threshold setting |
| **Setting accuracy** | | | 10 % of the full scale value (at 25 °C) |
| **Repeat accuracy** | | | ± 0.5 % with constant parameters |
| **Temperature drift** | | | ± 0.05 % / °C |
| **Voltage drift** | | | ± 1 % / V |
| **Reset time** | | **ms** | 200 minimum |
| **Reset time for S2** | | **ms** | 100 minimum |
| **Inhibit time delay** | | **s** | 0.3…30 ± 10 % |

## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output** | | | 1 C/O contact, AgCdO |
| **Breaking capacity** | | | 2000 VA, 80 W |
| **Maximum breaking current** | | **A** | ∿ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | ∿ 100, ⎓ 100 |
| **Maximum switching voltage** | | **V** | ∿ 100, ⎓ 100 |
| **Mechanical life** | | | 5 x $10^6$ operating cycles |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |

## Other characteristics

| | | | |
|---|---|---|---|
| **Enclosure material** | | | Self-extinguishing Pc |
| **Terminal capacity** | With cable end | **mm²** | 2 x 1.5 |
| | Without cable end | **mm²** | 2 x 2.5 |
| **Temperature limits** | Operation | **°C** | - 20…+ 60 (conforming to IEC 68-1-14) |
| | Storage | **°C** | - 30…+ 70 (conforming to IEC 68-1-1/2) |
| **Relative humidity** | | | 93 % without condensation |
| **Product certifications** | | | c UL us, CSA |

Functions : page 5/74
Dimensions: page 5/74
Scheme : page 5/74

# Zelio Control - measurement and control relays

## Motor load control relays (Cos φ), model RM 84 873

- *Self-powered*
- *Control of motor overload and underload*
- *Measurement of phase displacement between voltage and current (Cos φ).*
- *Independent adjustment of minimum and maximum thresholds, from 0.1 to 0.99.*
- *Power-on inhibit time adjustable from 0.5 to 20 seconds.*
- *Default time delay adjustable from 0.3 to 3 seconds.*
- *2 output relays (one per threshold).*
- *Power on and output relay state indication LEDs.*

### Operating principle

The control relay is used for motor protection. The variation in the power factor (voltage/current phase displacement or Cos φ) is related to the variation in the mechanical load of the motor. The control relay monitors the power factor, and therefore the mechanical load, and checks that it is between two defined and adjustable limits.

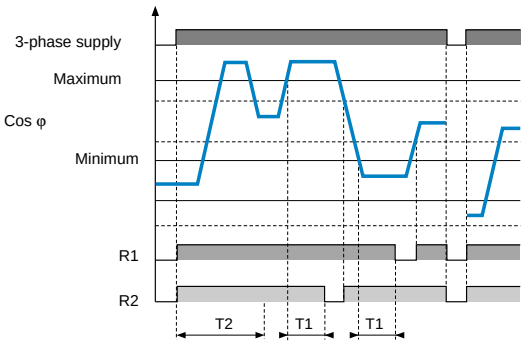
A green LED indicates that the power supply is ON.
Two yellow LEDs indicate the state of the output relays.

On power-up, the two output relays are closed for the duration of the inhibit time (T2 adjustable from 0.5 to 20 seconds). If the power factor value is between the two threshold settings, both relays are closed.

If the power factor exceeds the maximum value set by the user, the high threshold relay is de-energised after a time delay T1 (adjustable from 0.3 to 3 seconds). During this time delay, the green LED flashes (1 Hz). The relay closes again as soon as the value measured drops below the threshold, less the hysteresis.

If the power factor drops below the minimum value set by the user, the low threshold relay is de-energised after a time delay T1 (adjustable from 0.3 to 3 seconds). During this time delay, the green LED flashes. The relay closes again as soon as the value measured has risen above the threshold, plus the hysteresis.

If the value of the high threshold is set as less than or equal to the low threshold value, the green LED flashes rapidly (2 Hz).




5

References : page 5/77
Characteristics : page 5/77
Dimensions : page 5/77
Schemes : page 5/81

# Zelio Control - measurement and control relays

## Motor load control relays (Cos φ), model RM 84 873

## References

561004

*RM 84 873 400*

**Motor load control relays (Cos φ)**

| Power supply/control | Reference | Weight kg |
|---|---|---|
| ∼ 3 x 230 V | **RM 84 873 400** | 0.360 |
| ∼ 3 x 400 V | **RM 84 873 401** | 0.360 |

## Supply characteristics

| | | | |
|---|---|---|---|
| **Supply voltage Un** | | **V** | ∼ 230, 400, self-powered via L1 and L2 |
| **Operating range** | | | 0.85…1.15 Un |
| **Power** | Rated | **VA** | 2 at Un |
| | Maximum | **VA** | 3 at Un + 15 % |
| **Immunity to microbreaks** | | **ms** | 10 |
| **Creepage distance and clearance** | Conforming to IEC 60664-1 | **kV** | 4kV/3 |

## Control input circuit characteristics

| | | | |
|---|---|---|---|
| **Threshold display** | | | 0.1…0.99 |
| **Voltage circuit input resistance** | | **kΩ** | About 2 (Un) |
| **Current measurement** | | | By internal link via 2 terminals |
| **Current range** | | **A** | 0.5…10 |
| **Input resistance** | | **mΩ** | 20 |
| **Maximum continuous current** | | **A** | 14 (at 20 °C) |
| **Peak overload** | | **A** | 50 (< 1 second) (at 20 °C) |
| **Time delays** | On energisation (t2) | **s** | 0.5…20 ± 20 % of the full scale value |
| | On crossing the threshold (t1) | **s** | 0.3…3 ± 20 % of the full scale value |
| **Frequency** | | **Hz** | 50…60 |
| **Hysteresis** | Cos φ ≥ 0.4 | | 10 % fixed |
| | Cos φ < 0.4 | | 10 % <Hysteresis < 30 % |
| **Setting accuracy** | | | ± 10 % of the full scale value |
| **Repeat accuracy** | | | ± 0.08 % with constant parameters |
| **Temperature drift** | | | ± 0.05 % / °C |

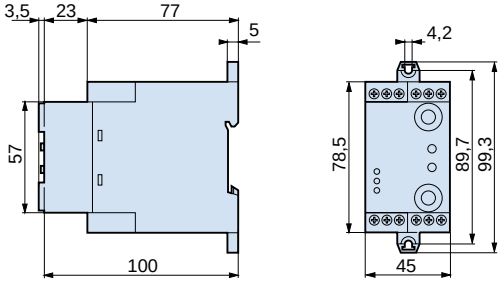
## Output circuit characteristics

| | | | |
|---|---|---|---|
| **Output** | | | 2 C/O contacts, AgCdO |
| **Breaking capacity** | | | 2000 VA, 80 W |
| **Maximum breaking current** | | **A** | ∼ 8, ⎓ 8 |
| **Minimum breaking current** | | **mA** | ∼ 100, ⎓ 100 |
| **Maximum switching voltage** | | **V** | ∼ 250, ⎓ 250 |
| **Mechanical life** | | | 30 x $10^6$ operating cycles |
| **Electrical life** | AC-12 | | 2000 VA - $10^5$ operating cycles |
| | AC-15 | | Cos φ = 0.3 - 6000 operating cycles |
| | DC-13 | | L/R = 300 ms - 6000 operating cycles |

## Other characteristics

| | | | |
|---|---|---|---|
| **Enclosure material** | | | Self-extinguishing Pc |
| **Terminal capacity** | | **mm²** | With cable end: 2 x 1.5, Without cable end: 2 x 2.5 |
| **Temperature limits** | | **°C** | Operation: - 20…+ 60 (to IEC 68-1-14), storage: - 30…+ 70 (to IEC 68-1-1/2) |
| **Relative humidity** | | | 93 % without condensation |
| **Product certifications** | | | c UL us, CSA |

## Dimensions

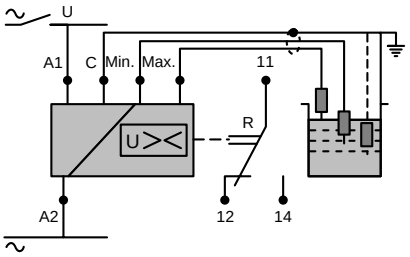



Functions : page 5/76

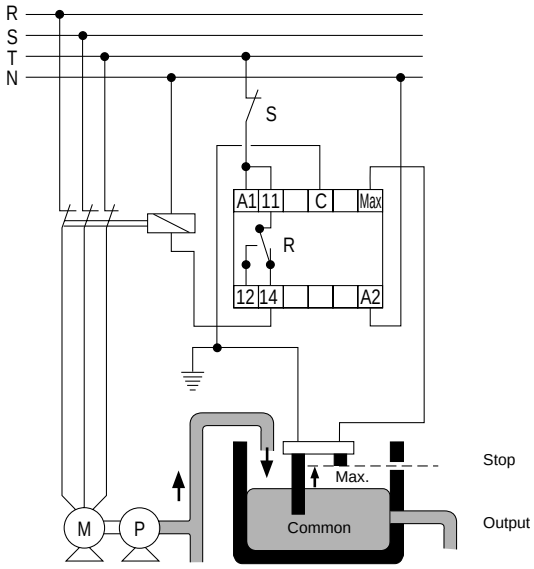
Schemes : page 5/81

# Zelio Control - measurement and control relays
## Relay model RM 84

**RM 84 870 00●, RM 84 870 1●1** (References : pages 5/65 and 5/55)



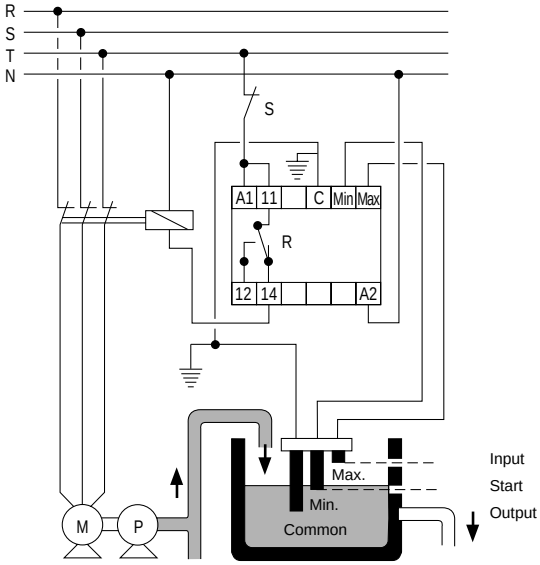

A1 - A2 : Supply



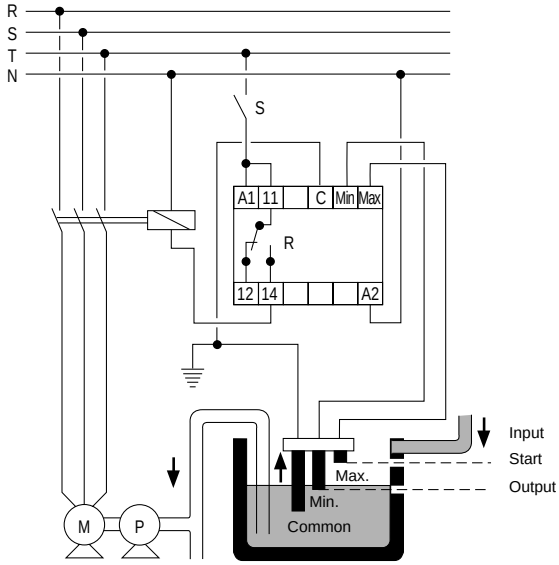

**RM 84 870 00●** (References : page 5/65)

**Regulation of two levels**

"Up" filling control




"Down" emptying control

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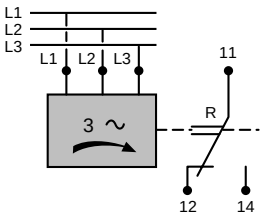
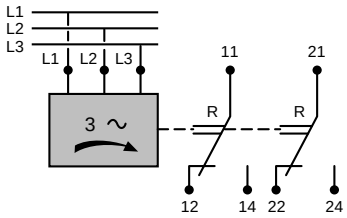
# Zelio Control - measurement and control relays
## Relay model RM 84

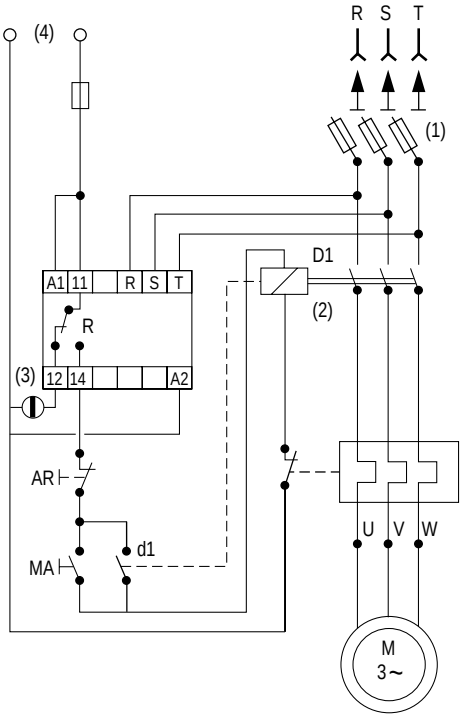
**RM 84 873 299** (References : page 5/15)



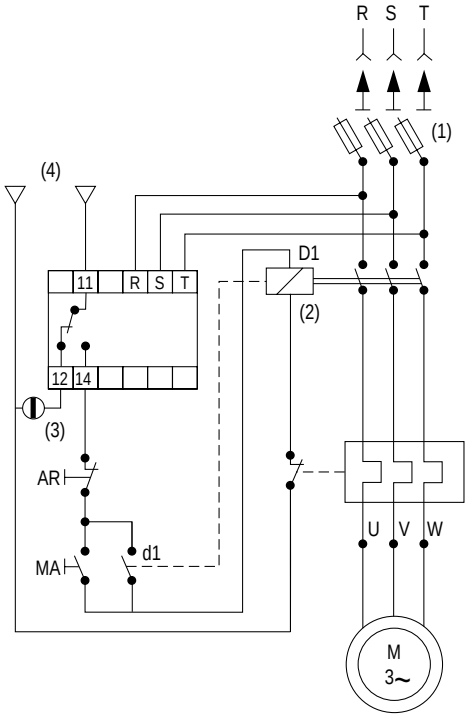

**RM 84 873 004** (References : page 5/15)




**RM 84 892 299, RM 84 873 01●, RM 84 873 3●●** (References : pages 5/21 and 5/23)

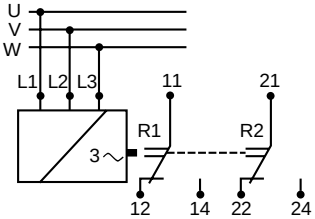



*(1) Isolating switch*
*(2) Contactor*
*(3) Alarm*
*(4) Supply*




*(1) Isolating switch*
*(2) D1 Contactor*
*(3) Alarm*
*(4) Auxiliary power supply for contactor coil and signalling*

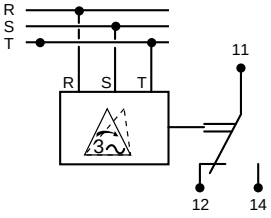
**RM 84 873 01●** (References : page 5/21)




**Terminal referencing**

L1 - L2 - L3 : 3-phase supply being monitored
12 - 13 - 14 : Output relay
21 - 22 - 24 : Output relay

**RM 84 873 3●●** (References : page 5/23)




**Terminal referencing**

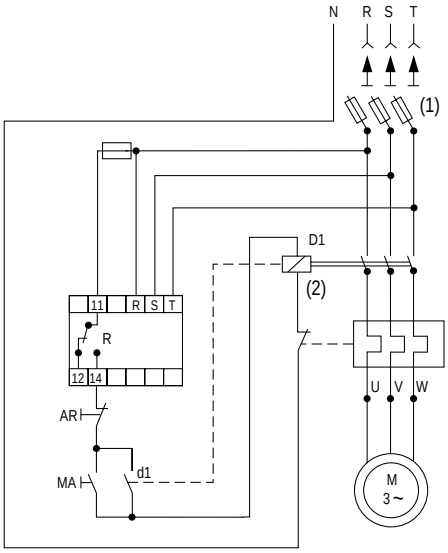
Terminals L1 - L2 - L3 : 3-phase supply being monitored
12 - 13 - 14 : Output relay

5

# Zelio Control - measurement and control relays
## Relay model RM 84

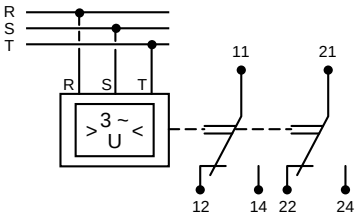


**RM 84 873 3●●** (References : page 5/23)




*(1) Isolating switch*
*(2) D1 Contactor*

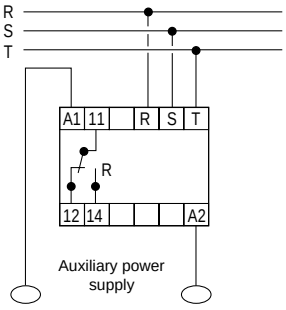
**RM 84 873 201** (References : page 5/25)



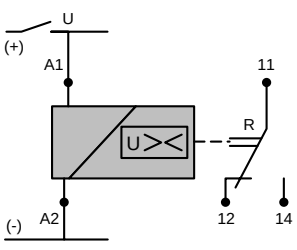

**Terminal referencing**

Terminals L1 - L2 - L3 : 3-phase supply being monitored
11 - 12 - 14 : Output relay (R1) lower threshold
21 - 22 - 24 : Output relay (R2) upper threshold

**RM 84 873 201** (References : page 5/25)

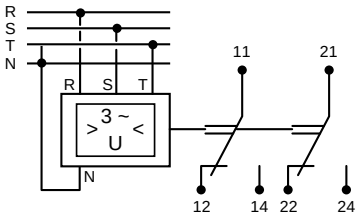



**RM 84 872 04●** (References : page 5/33)




A1 - A2 : Supply

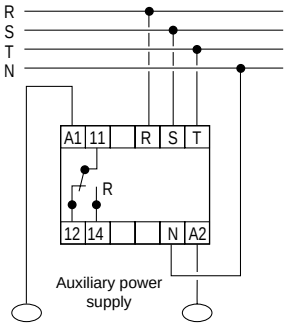
**RM 84 873 211** (References : page 5/25)



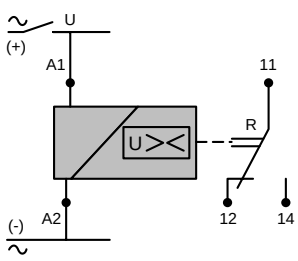

**Terminal referencing**

Terminals L1 - L2 - L3 - N : 3-phase supply being monitored
11 - 12 - 14 : Output relay (R1) lower threshold
21 - 22 - 24 : Output relay (R2) upper threshold

**RM 84 873 211** (References : page 5/25)




**RM 84 872 05●** (References : page 5/33)



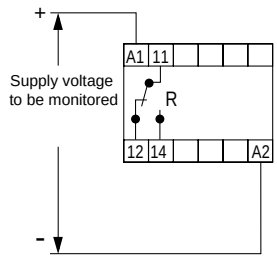

A1 - A2 : Supply

# Zelio Control - measurement and control relays

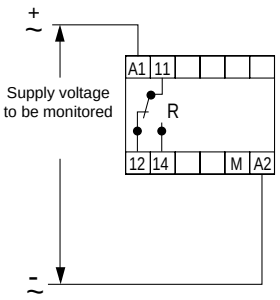
## Relay model RM 84

**RM 84 872 04●** (References : page 5/33)

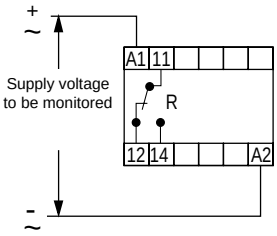
⎓ 12 V version

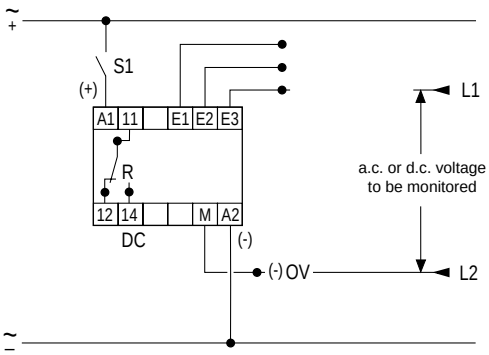



~/⎓ 20 - 80 V
and ~/⎓ 90 - 270 V version



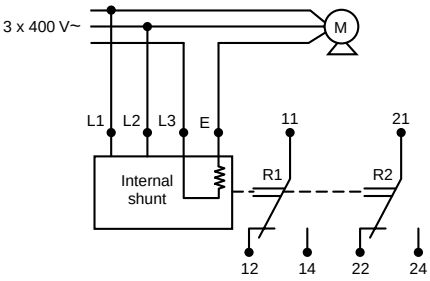

**RM 84 872 05●** (References : page 5/33)



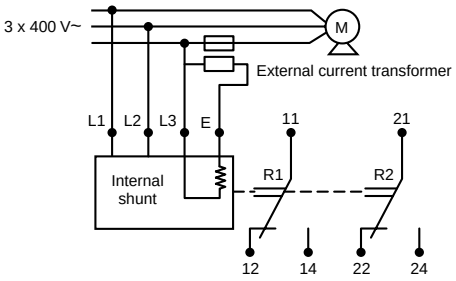




**RM 84 873 40●** (References : page 5/77)

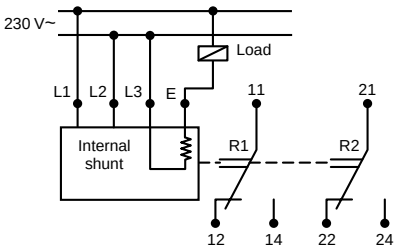
**Operation on a 3-phase supply I < 10 A ~**




**Operation on a 3-phase supply I > ~ 10 A**




**Operation on a single-phase supply ~ 230 V**




**Terminal referencing**

L1 - L2 - L3 : Supply to be monitored
E : Current read output
11 - 12 - 14 : Output relay (R1) lower threshold
21 - 22 - 24 : Output relay (R2) upper threshold

5

Contents

# 6 - Zelio Logic smart relays and Zelio Analog analogue interfaces

## Zelio Logic smart relays



## Zelio Analog - analogue interfaces



6

# Zelio Logic smart relays
## Compact and modular smart relays

| Smart relay type | Compact smart relays | | | |
|---|---|---|---|---|
| |  |  |  | |
| **Number of I/O** | 10 | 12 | 20 | |
| **Number of discrete inputs (of which analogue inputs)** | 6 (0) | 8 (4) | 12 (2) | 12 (6) |
| **Number of "relay" or "transistor" outputs** | 4 | 4 | 8 | |
| **Supply voltage** | ⎓ 24 V, ∿ 100...240 V | ⎓ 12 V, ⎓ 24 V, ∿ 24 V, ∿ 100...240 V | | |
| **I/O extensions** | No | | | |
| **Modbus communication module ▲** | No | | | |
| **Clock** | No | Yes | Depends on model | |
| **Display and programming buttons** | Depends on model | | | |
| **Programming language LADDER / FBD** | LADDER | LADDER / FBD *(1)* | LADDER | LADDER / FBD *(1)* |
| **References** | **SR2 ●101●●** | **SR2 ●121●●** | **SR2 B122BD** | **SR2 A201●●** | **SR2 B20●●● SR2 E201●●** |
| **Pages** | 6/14 | 6/14 | 6/14 | 6/14 | 6/14 |

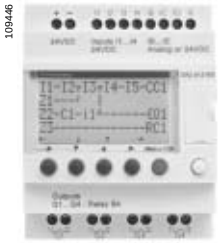
*(1) FBD: Function Block Diagram*
▲ Available: 1st quarter 2004.

6

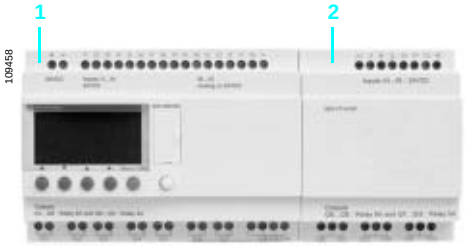
| | |
|---|---|
|  |  |
| 10 | 26 |
| 6 (4) | 16 (6) |
| 4 | 10 |
| ⎓ 24 V, ∿ 24 V, ∿ 100...240 V | |
| Yes (6, 10 or 14 I/O) | |
| Yes | |
| Yes | |
| Yes | |
| LADDER / FBD *(1)* | |
| **SR3 B10●●●** | **SR3 B26●●●** |
| 6/15 | 6/15 |

*(1) FBD: Function Block Diagram*

# Zelio Logic smart relays
## Compact and modular smart relays




*SR2 B121BD*




1 Modular smart relay (10 or 26 I/O)
2 I/O extension module (6,10 or 14 I/O)

▲ Available 1st quarter 2004.
▲▲ Available 1st half 2004.

## Presentation

Zelio Logic smart relays are designed for use in small automated systems. They are used in both industrial and commercial applications.

■ **For industry:**
□ automation of small finishing, production, assembly or packaging machines.
□ decentralised automation of ancillary equipment of large and medium-sized machines in the textile, plastics and materials processing sectors,
□ automated systems for agricultural machinery (irrigation, pumping, greenhouses, ...).

■ **For the commercial/building sectors:**
□ automation of barriers, roller shutters, access control,
□ automation of lighting installations,
□ automation of compressors and air conditioning systems.

Their compact size and ease of setting-up make them a competitive alternative to solutions based on cabled logic or specific cards.

Simple programming, ensured by the universal nature of LADDER and function block diagram FBD *(1)* languages, meets all automation requirements and also the needs of the electrician.

Compact smart relays are suitable for simple automated systems, up to 20 I/O.

If required, modular smart relays can be fitted with I/O extensions and a module for communication on the Modbus network, for greater performance and flexibility, from 10 to 40 I/O.

### Programming

Programming can be carried out:
■ independently, using the buttons on the smart relay (ladder language),
■ on a PC, using "Zelio Soft" software.

When using a PC, programming can be carried out either in LADDER language, or in function block diagram language (FBD).

### LCD display backlighting *(2)*

Backlighting of the display is programmable using “Zelio Soft” software and by direct action on the smart relay's 6 programming buttons.

### Memory

The Zelio Logic smart relay has a backup memory which allows programs to be copied into another smart relay (examples: for building identical equipment, remote transmission of updates).

The memory also allows a backup copy of the program to be saved prior to exchanging the product.

When used with a smart relay without display or buttons, the copy of the program contained in the cartridge is automatically transferred into the smart relay at power-up.

### Autonomy and backup

Autonomous operating time of the clock, ensured by a lithium battery, is 10 years.

Data backup (preset values and current values) is provided by an EEPROM Flash memory (10 years).

### I/O extensions

Zelio Logic smart relays can, if necessary, take the following I/O extensions:
■ 6, 10 or 14 I/O, supplied with ⎓ 24 V via the smart relay,
■ 6, 10 or 14 I/O, supplied with ∿ 24 V via the smart relay,
■ 6, 10 or 14 I/O, supplied with ∿ 100... 240 V via the smart relay.

### Communication module ▲

A module for communication on the Modbus network will be available for Zelio Logic modular smart relays. It is supplied with ⎓ 24 V via the smart relay.

### Communication interface ▲▲

The "communication" products in the Zelio Logic range include:
■ a communication interface connected between a smart relay and a modem,
■ analogue or GSM modems,
■ “Zelio Soft Com” software.

They are designed for monitoring or remote control of machines or installations which operate without personnel.

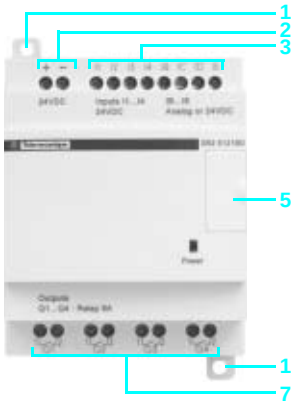
The communication interface, supplied with ⎓ 12/24 V, allows messages, telephone numbers and call conditions to be stored.

*(1) FBD: Functional Block Diagram.*
*(2) LCD: Liquid Crystal Display*

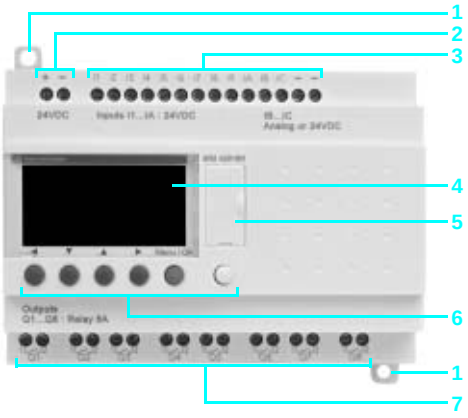
# Zelio Logic smart relays
## Compact and modular smart relays

## Compact smart relays

### Without display - 10, 12 and 20 I/O




### With display - 10, 12 and 20 I/O

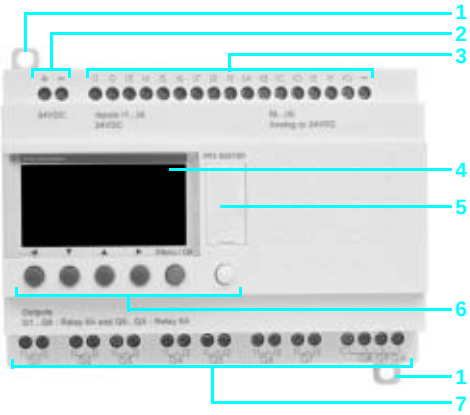



Compact smart relays have the following on the front panel:

1 Two retractable fixing lugs
2 Two power supply terminals
3 Terminals for connection of the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for a memory cartridge and connection to a PC
6 6 buttons for programming and parameter entry
7 Terminals for connection of the outputs

## Modular smart relays

### 10 and 26 I/O

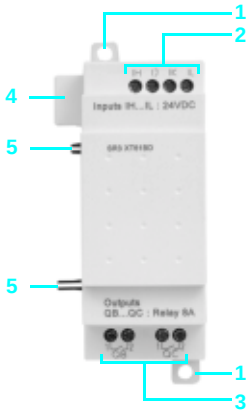



Modular smart relays have the following on the front panel:

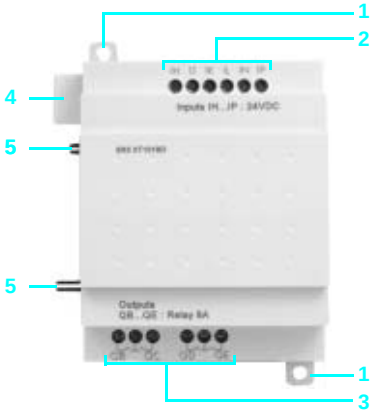
1 Two retractable fixing lugs
2 Two power supply terminals
3 Terminals for connection of the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for a memory cartridge and connection to a PC
6 6 buttons for programming and parameter entry
7 Terminals for connection of the outputs

## I/O extension modules

### 6 I/O




### 10 and 14 I/O



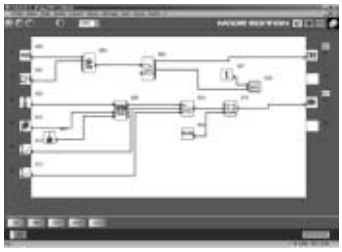

I/O extension modules have the following on the front panel:

1 Two retractable fixing lugs
2 Terminals for connection of the inputs
3 Terminals for connection of the outputs
4 A connector for connection to the smart relay (powered by the smart relay)
5 Locating pegs

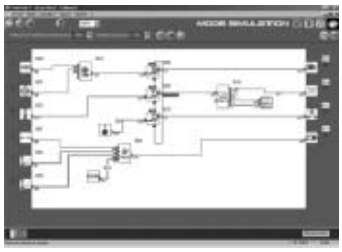
6

# Zelio Logic smart relays
## Compact and modular smart relays
## “Zelio Soft for PC” programming software

*Programming in LADDER language*



*Programming in FBD language*



*"Simulation" mode*

*"Monitoring" mode*

### “Zelio Soft for PC” (version 2.0)

“Zelio Soft” software allows:
- programming in LADDER language or in function block diagram language (FBD),
- simulation, monitoring and supervision,
- uploading and downloading of programs,
- output of personalised files,
- automatic compiling of programs,
- on-line help.

#### Coherence test and application languages

“Zelio Soft” software monitors applications by means of its coherence test function. An indicator turns red at the slightest input error. The problem can be located by simply clicking the mouse.
"Zelio Soft" software allows switching, at any time, to any of the 6 application languages (English, French, German, Spanish, Italian, Portuguese), and editing of the application file in the selected language.

#### Inputting messages for display on Zelio Logic

"Zelio Soft" software allows Text function blocks to be configured, which can then be displayed on all smart relays which have a display.

#### Program testing

2 test modes are provided: simulation and monitoring.

“Zelio Soft” **simulation** mode allows all the programs to be tested, without the smart relay, i.e.:
- enable discrete inputs,
- display the status of outputs,
- vary the voltage of the analogue inputs,
- enable the programming buttons,
- simulate the application in real time or in accelerated time,
- dynamically display (in red) the various active elements of the program.

“Zelio Soft” **monitoring** mode makes it possible to test the program executed by the smart relay, i.e.:
- display the program "on line",
- force inputs, outputs, control relays and current values of the function blocks,
- adjust the time,
- change from STOP mode to RUN mode and vice versa.

In simulation or monitoring mode, the monitoring window allows the status of the smart relay I/O to be displayed within your application environment (diagram or image).

# Zelio Logic smart relays
## Compact and modular smart relays
## “Zelio Soft” programming software

## LADDER language

### Definition


*Text function block*


*Timer*


*Up/down counter*


*Fast counter*


*Analogue comparator*


*Clock*


*Control relay*


*Counter comparator*


*LCD backlighting*


*Summer/Winter time switching*


*Output coil*

LADDER language allows a LADDER program to be written with elementary functions, elementary function blocks and derived function blocks, as well as with contacts, coils and variables.
The contacts, coils and variables can be annotated. Text can be placed freely within the graphic.

■ **Control scheme input modes**
“Zelio input” mode enables users who have directly programmed the Zelio smart relay to find the same user interface, even when using the software for the first time.
“Free input” mode, which is more intuitive, is very user-friendly and incorporates many additional features.
With LADDER programming language, two alternative types of symbol can be used :
□ LADDER symbols,
□ electrical symbols.
"Free input" mode also allows the creation of mnemonics and notes associated with with each line of the program.
Instant switching from one input mode to the other is possible at any time, by clicking the mouse.
Up to 120 control scheme lines can be programmed, with 5 contacts and 1 coil per program line.

■ **Functions:**
□ 16 time delay function blocks; parameters of 11 different types can be set for each of these (1/10$^{th}$ second to 9999 hours),
□ 16 up/down counter function blocks from 0 to 32767,
□ 1 fast counter (1 kHz),
□ 16 text function blocks,
□ 16 analogue comparator function blocks,
□ 8 clock function blocks, each with 4 channels,
□ 28 control relays,
□ 8 counter comparators,
□ automatic Summer/Winter time switching,
□ variety of coil functions, latching (Set/Reset), impulse relay, contactor
□ LCD screen with programmable backlighting.

### Functions

| Function | Electrical scheme | LADDER language | Notes |
|---|---|---|---|
| **Contact** | 13 14 or 21 22 | I or i | I corresponds to the real state of the contact connected to the input of the smart relay.<br>i corresponds to the inverse state of the contact connected to the input of the smart relay. |
| **Standard coil** | A1 A2 | ( ) | The coil is energised when the contacts to which it is connected are closed. |
| **Latch coil (Set)** | A1 A2 | (S) | The coil is energised when the contacts to which it is connected are closed. It remains tripped when the contacts re-open. |
| **Unlatch coil (Reset)** | A1 A2 | (R) | The coil is de-energised when the contacts to which it is connected are closed.<br>It remains inactive when the contacts re-open. |

# Zelio Logic smart relays
Compact and modular smart relays
"Zelio Soft" programming software

## Function block diagram language (FBD) (1)

### Definition

FBD language allows graphical programming based on the use of predefined function blocks.
This language provides the use of 23 pre-programmed functions for counting, time delay, timing, definition of switching threshold (temperature regulation for example), generation of impulses, time programming, multiplexing, display, etc.

### Pre-programmed functions

Zelio Logic smart relays provide a high processing capacity, up to 200 function blocks, including 23 pre-programmed functions:


**TIMER AC**
Timer. Function A/C
ON-delay and OFF delay


**TIMER BH**
Timer. Function BH.
(Adjustable pulsed signal)


**TIMER BW**
Timer - Function BW
(pulse on rising/falling edge)


**TIMER Li**
Pulse generator
ON-delay, OFF delay


**BISTABLE**
Impulse relay function


**SET- RESET**
Bistable latching - Priority assigned either to SET or RESET function


**BOOLEAN**
Allows logic equations to be created between connected inputs


**CAM**
Cam programmer


**PRESET COUNT**
Up/down counter


**UP DOWN COUNT**
Up/down counter with external preset


**PRESET H-METER**
Hour counter
(hour, minute preset)


**TIME PROG**
Time programmer,
weekly and annual


**GAIN**
Allows conversion of an analogue value by change of scale and offset.


**TRIGGER**
Defines an activation zone with hysteresis.


**MUX**
Multiplexing functions on 2 analogue values


**COMP IN ZONE**
Zone comparison
(Min. ⩽ Value ⩽ Max.)

**ADD/SUB**
Add and/or subtract function

**MUL/DIV**
Multiply and/or divide function


**DISPLAY**
Display of digital and analogue data, date, time, messages for Human-Machine interface.


**COMPARE**
Comparison of 2 analogue values using the operands =, >, <, ⩽, ⩾.


**STATUS**
Access to smart relay status


**ARCHIVE**
Storage of 2 values simultaneously


**SPEED COUNT**
Fast counting up to 1 kHz

### SFC functions (2) (GRAFCET)


**RESET-INIT**
Reinitialisable step


**INIT STEP**
Initial step


**STEP**
SFC step


**DIV-OR 2**
Divergence to OR


**CONV-OR 2**
Convergence to OR


**DIV-AND 2**
Divergence to AND


**CONV-AND 2**
Convergence to AND

### Logic functions


**AND**
AND function


**OR**
OR function


**NAND**
NOT AND function


**NOR**
NOT OR function


**XOR**
Exclusive OR function


**NOT**
NOT function

*(1) Functional Block Diagram.*
*(2) Sequential Function Chart.*

# Zelio Logic smart relays
Compact and modular smart relays

## Environment characteristics

| | | | |
|---|---|---|---|
| **Product certifications** | | | UL, CSA, GL, C-TICK |
| **Conformity with the low voltage directive** | Conforming to 73/23/EEC | | EN 61131-2 |
| **Conformity with the EMC directive** | Conforming to 89/336/EEC | | EN 61131-2 (Zone B)<br>EN 61000-6-2, EN 61000-6-3 and EN 61000-6-4 |
| **Degree of protection** | Conforming to IEC 60529 | | IP 20 |
| **Overvoltage category** | Conforming to IEC 60664-1 | | 3 |
| **Degree of pollution** | Conforming to IEC/EN 61131-2 | | 2 |
| **Ambient air temperature around the device** | Operation | **°C** | -20... +55 (+40 in enclosure), conforming to IEC 60068-2-1 and IEC 60068-2-2 |
| | Storage | **°C** | -40... +70 |
| **Maximum relative humidity** | | | 95 % without condensation or dripping water |
| **Maximum operating altitude** | Operation | **m** | 2000 |
| | Transport | **m** | 3048 |
| **Mechanical resistance** | Immunity to vibrations | | IEC 60068-2-6, test Fc |
| | Immunity to mechanical shock | | IEC 60068-2-27, test Ea |
| **Resistance to electrostatic discharge** | Immunity to electrostatic discharge | | IEC 61000-4-2, level 3 |
| **Resistance to HF interference (**Immunity) | Immunity to electromagnetic radiated fields | | IEC 61000-4-3, level 3 |
| | Immunity to fast transients in bursts | | IEC 61000-4-4, level 3 |
| | Immunity to shock waves | | IEC 61000-4-5 |
| | Radio frequency in common mode | | IEC 61000-4-6, level 3 |
| | Voltage dips and breaks (~) | | IEC 61000-4-11 |
| | Immunity to damped oscillation wave | | IEC 61000-4-12 |
| **Conducted and radiated emissions** | Conforming to EN 55022/11 (Group 1) | | Class B |
| **Connection to screw terminals** (Tightened using Ø 3.5 screwdriver) | Flexible cable with cable end | **mm²** | 1 conductor: 0.25...2.5, cable: AWG 24... AWG14<br>2 conductors: 0.25...0.75, cable: AWG 24... AWG18 |
| | Semi-solid cable | **mm²** | 1 conductor: 0.2...2.5, cable: AWG 25... AWG14 |
| | Solid cable | **mm²** | 1 conductor: 0.2...2.5, cable: AWG 25... AWG14<br>2 conductors: 0.2...1.5, cable: AWG 24... AWG16 |
| | Tightening torque | **N.m** | 0.5 |

## ⎓ 12 V supply characteristics

| **Smart relay type** | | | **SR2 B121JD** | **SR2 B201JD** |
|---|---|---|---|---|
| **Primary** | Nominal voltage | **V** | 12 | 12 |
| **Voltage limits** | Including ripple | **V** | 10.4…14.4 | 10.4…14.4 |
| **Nominal input current** | | **mA** | 120 | 200 |
| **Maximum nominal input current with extensions** | | **mA** | 144 | 250 |
| **Power dissipated** | | **WA** | 1.5 | 2.5 |
| **Micro-breaks** | Permissible duration | **ms** | ⩽ 1 (repeated 20 times) | |
| **Protection** | | | Against polarity inversion | |

## ⎓ 24 V supply characteristics

| **Smart relay type** | | | **SR2 ●1●1BD** | **SR2 ●1●2BD** | **SR2 ●2●1BD** | **SR2 ●2●2BD** | **SR3 B101BD** | **SR3 B102BD** | **SR3 B261BD** | **SR3 B262BD** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Primary** | Nominal voltage | **V** | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| **Voltage limits** | Including ripple | **V** | 19.2…30 | 19.2…30 | 19.2…30 | 19.2…30 | 19.2…30 | 19.2…30 | 19.2…30 | 19.2…30 |
| **Nominal input current** | | **mA** | 100 | 100 | 100 | 100 | 100 | 50 | 190 | 70 |
| **Maximum nominal input current with extensions** | | **mA** | – | – | – | – | 100 | 160 | 300 | 180 |
| **Power dissipated** | | **WA** | 3 | 3 | 6 | 3 | 3 | 4 | 6 | 5 |
| **Maximum power dissipated with extensions** | | **W** | – | – | – | – | 8 | 8 | 10 | 10 |
| **Micro-breaks** | Permissible duration | **ms** | ⩽ 1 (repeated 20 times) | | | | | | | |
| **Protection** | | | Against polarity inversion | | | | | | | |

## ~ 24 V supply characteristics

| **Smart relay type** | | | **SR2●1●1B** | **SR2●2●1B** | **SR3 B101B** | **SR3 B261B** |
|---|---|---|---|---|---|---|
| **Primary** | Nominal voltage | **V** | 24 | 24 | 24 | 24 |
| **Voltage limits** | Including ripple | **V** | 20.4…28.8 | 20.4…28.8 | 20.4…28.8 | 20.4…28.8 |
| **Nominal frequency** | | **Hz** | 50-60 | 50-60 | 50-60 | 50-60 |
| **Nominal input current** | | **mA** | 145 | 233 | 140 | 280 |
| **Power dissipated** | | **VA** | 4 | 6 | 4 | 7.5 |
| **Micro-breaks** | Permissible duration | **ms** | ⩽ 10 (repeated 20 times) | | | |
| **rms insulation voltage** | | **V** | 1780 (50-60 Hz) | | | |

6

## ~ 100...240 V supply characteristics

| Smart relay type | | | SR2 ●101FU | SR2 ●121FU | SR2 ●201FU | SR3 B101FU | SR3 B261FU |
|---|---|---|---|---|---|---|---|
| **Primary** | Nominal voltage | **V** | 100…240 | 100…240 | 100…240 | 100…240 | 100…240 |
| **Voltage limits** | Including ripple | **V** | 85…264 | 85…264 | 85…264 | 85…264 | 85…264 |
| **Nominal input current** | | **mA** | 80/30 | 80/30 | 100/50 | 80/30 | 100/50 |
| **Maximum nominal input current with extensions** | | **mA** | – | – | – | 80/40 | 80/60 |
| **Power dissipated** | | **VA** | 7 | 7 | 11 | 7 | 12 |
| **Maximum power dissipated with extensions** | | **VA** | – | – | – | 12 | 17 |
| **Micro-breaks** | Permissible duration | **ms** | 10 | 10 | 10 | 10 | 10 |
| **rms insulation voltage** | | **V** | 1780 | 1780 | 1780 | 1780 | 1780 |

## Processing characteristics

| Smart relay type | | | SR2/SR3 |
|---|---|---|---|
| **Number of control scheme lines** | With LADDER programming | | 120 |
| **Number of function blocks** | With FBD programming | | Up to 200 |
| **Cycle time** | | **ms** | 10 |
| **Response time** | | **ms** | 20 |
| **Back-up time** (in the event of power failure) | Day/time | | 10 years (lithium battery) at 25 °C |
| | Program and settings | | 10 years (EEPROM memory) |
| **Program memory checking** | | | At each power-up |
| **Clock drift** | | | 12 min/year (0 to 55 °C)<br>6 sec/month (at 25 °C and calibration) |
| **Timer block accuracy** | | | 1 % ± 2 of the cycle time |

## Discrete ⎓ 24 V input characteristics

| Smart relay type | | | | SR2/SR3 |
|---|---|---|---|---|
| **Connection** | | | | Screw terminal block |
| **Nominal value of inputs** | Voltage | | **V** | 24 |
| | Current | | **mA** | 4 |
| **Input switching limit values** | At state 1 | Voltage | **V** | ≥ 15 |
| | | Current | **mA** | ≥ 2.20 |
| | At state 0 | Voltage | **V** | ≤ 5 |
| | | Current | **mA** | < 0.75 |
| **Input impedance at state 1** | | | **KΩ** | 7.4 |
| **Configurable response time** | State 0 to 1 | | **ms** | 0.2 |
| | State 1 to 0 | | **ms** | 0.3 |
| **Conformity to IEC 61131-2** | | | | Type 1 |
| **Sensor compatibility** | 3-wire | | | Yes PNP |
| | 2-wire | | | No |
| **Input type** | | | | Resistive |
| **Isolation** | Between supply and inputs | | | None |
| | Between inputs | | | None |
| **Maximum counting frequency** | | | **kHz** | 1 |
| **Protection** | Against inversion of terminals | | | Control instructions not executed |

## Discrete ~ 100...240 V input characteristics

| Smart relay type | | | | SR2/SR3 |
|---|---|---|---|---|
| **Connection** | | | | Screw terminal block |
| **Nominal value of inputs** | Voltage | | **V** | 100... 240 |
| | Current | | **mA** | 0.6 |
| | Frequency | | **Hz** | 47... 63 |
| **Input switching limit values** | At state 1 | Voltage | **V** | ≥ 79 |
| | | Current | **mA** | > 0.1750 |
| | At state 0 | Voltage | **V** | ≤ 40 |
| | | Current | **mA** | < 0.05 |
| **Input impedance at state 1** | | | **KΩ** | 350 |
| **Configurable response time** | State 0 to 1 (50/60 Hz) | | **ms** | 50 |
| | State 1 to 0 (50/60 Hz) | | **ms** | 50 |
| **Isolation** | Between supply and inputs | | | None |
| | Between inputs | | | None |
| **Protection** | Against inversion of terminals | | | Control instructions not executed |

## Integral analogue input characteristics

| Smart relay type | | | | SR2/SR3 |
|---|---|---|---|---|
| **Analogue inputs** | Input range | | **V** | 0...10 or 0...24 |
| | Input impedance | | **KΩ** | 12 |
| | Maximum non destructive voltage | | **V** | 30 |
| | Value of LSB | | | 39 mV, 4 mA |
| | Input type | | | Common mode |
| **Conversion** | Resolution | | | 8 bit |
| | Conversion time | | | Smart relay cycle time |
| | Precision | at 25 °C | | ± 5 % |
| | | at 55 °C | | ± 6.2 % |
| | Repeat accuracy | at 55 °C | | ± 2 % |
| **Isolation** | Between analogue channel and supply | | | None |
| **Cabling distance** | | | **m** | 10 maximum, with screened cable (sensor not isolated) |
| **Protection** | Against inversion of terminals | | | Control instructions not executed |

## Relay output characteristics

| Smart relay type | | | | SR2●●●/ SR3 B101●● | SR3 B261●●, SR3 XT141●● |
|---|---|---|---|---|---|
| **Operating limit values** | | | **V** | ⎓ 5...150.<br>∿ 24...250 | ⎓ 5...150.<br>∿ 24...250 |
| **Contact type** | | | | N/O | N/O |
| **Thermal current** | | | **A** | 8 | 8 outputs: 8 A<br>2 outputs: 5 A |
| **Electrical durability for 500 000 operating cycles** | Utilisation category | DC-12 | **V** | 24 | 24 |
| | | | **A** | 1.5 | 1.5 |
| | | DC-13 | **V** | 24 (L/R = 10 ms) | 24 (L/R = 10 ms) |
| | | | **A** | 0.6 | 0.6 |
| | | AC-12 | **V** | 230 | 230 |
| | | | **A** | 1.5 | 1.5 |
| | | AC-15 | **V** | 230 | 230 |
| | | | **A** | 0.9 | 0.9 |
| **Minimum switching capacity** | At minimum voltage of 12 V | | **mA** | 10 | 10 |
| **Low power switching reliability of contact** | | | | 12 V - 10 mA | 12 V - 10 mA |
| **Maximum operating rate** | No-load | | **Hz** | 10 | 10 |
| | At Ie (operational current) | | **Hz** | 0.1 | 0.1 |
| **Mechanical life** | In millions of operating cycles | | | 10 | 10 |
| **Rated impulse withstand voltage** | Conforming to IEC 60947-1 and 60664-1 | | **kV** | 4 | 4 |
| **Response time** | Trip | | **ms** | 10 | 10 |
| | Reset | | **ms** | 5 | 5 |
| **Built-in protection** | Short-circuit | | | None | |
| | Against overvoltage and overload | | | None | |

## Transistor output characteristics

| Smart relay type | | | SR2/SR3 |
|---|---|---|---|
| **Operating limit values** | | **V** | 19.2...30 |
| **Load** | Nominal voltage | **V** | ⎓ 24 |
| | Nominal current | **A** | 0.5 |
| | Maximum current | **A** | 0.625 at 30 V |
| **Drop out voltage** | At state 1 | **V** | ⩽ 2 for I = 0.5 A |
| **Response time** | Trip | **ms** | ⩽ 1 |
| | Reset | **ms** | ⩽ 1 |
| **Built-in protection** | Against overload and short-circuits | | Yes |
| | Against overvoltage *(1)* | | Yes |
| | Against inversions of power supply | | Yes |

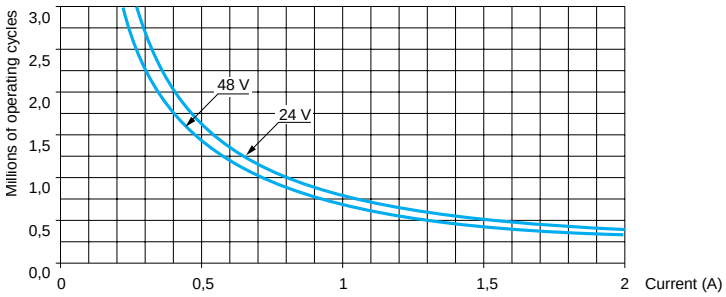
*(1) If there is no volt-free contact between the relay output and the load.*

## Electrical durability of relay outputs

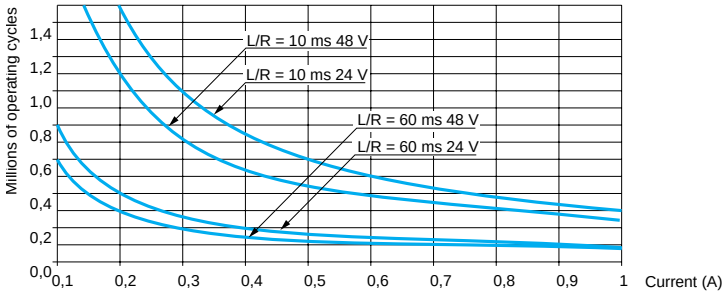
(in millions of operating cycles, conforming to IEC 60947-5-1)

### d.c. loads

**DC-12** *(1)*




**DC-13** *(2)*



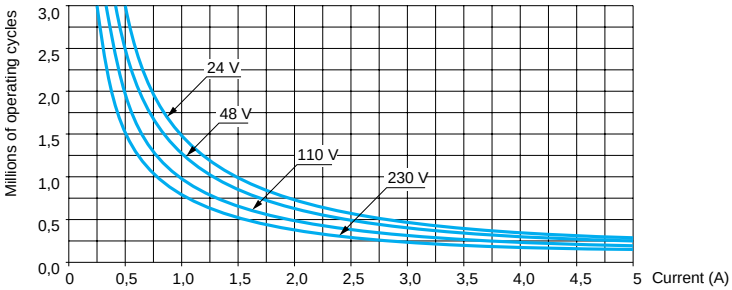

*(1) DC-12: switching resistive loads and photo-coupler isolated solid state loads, L/R ≤ 1ms.*
*(2) DC-13: switching electromagnets, L/R ≤ 2 x (Ue x Ie) in ms, Ue: Rated operational voltage, Ie: rated operational current (with protection diode on load, use the DC-12 curves and apply a coefficient of 0.9 to the millions of operating cycles value)*

## Electrical durability of relay outputs (continued)

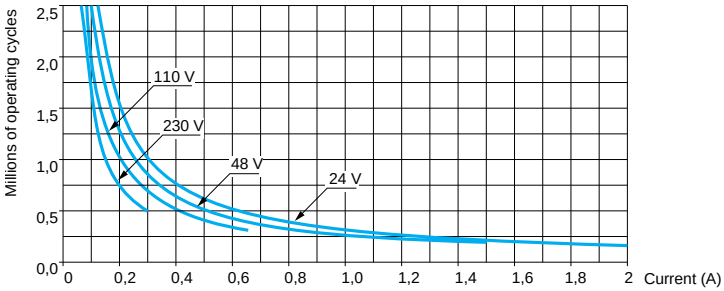
(in millions of operating cycles, conforming to IEC 60947-5-1)

**a.c. loads**

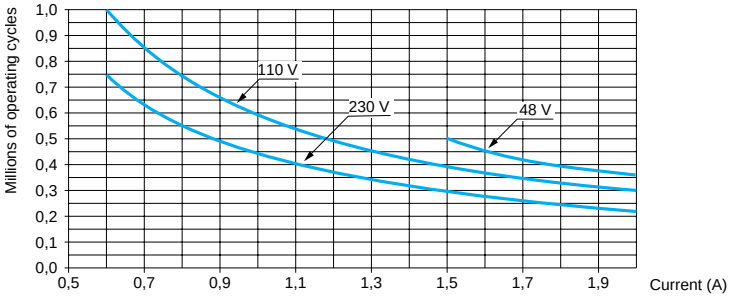
**AC-12** *(1)*




**AC-14** *(2)*




**AC-15** *(3)*




*(1) AC-12: switching resistive loads and photo-coupler isolated solid state loads, cos ≥ 0.9.*
*(2) AC-14: switching small electromagnetic loads whose power drawn with the electromagnet closed is ≤ 72 VA, making: cos = 0.3, breaking: cos = 0.3.*
*(3) AC-15: switching electromagnetic loads whose power drawn with the electromagnet closed is > 72 VA, making: cos = 0.7, breaking: cos = 0.4.*

# Zelio Logic smart relays
## Compact smart relays


109440

*SR2 A201BD*


109442

*SR2 E121BD*

510345

*SR2 PACK●●●*

### Compact smart relays with display

| Number of I/O | Discrete inputs | Of which 0-10 V analogue inputs | Relay outputs | Transistor outputs | Clock | Reference | Weight kg |
|---|---|---|---|---|---|---|---|
| **Supply ⎓ 12 V** | | | | | | | |
| **12** | 8 | 4 | 4 | 0 | Yes | **SR2 B121JD** | 0.250 |
| **20** | 12 | 6 | 8 | 0 | Yes | **SR2 B201JD** | 0.250 |
| **Supply ⎓ 24 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | No | **SR2 A101BD** *(1)* | 0.250 |
| **12** | 8 | 4 | 4 | 0 | Yes | **SR2 B121BD** | 0.250 |
| | 8 | 4 | 0 | 4 | Yes | **SR2 B122BD** | 0.220 |
| **20** | 12 | 2 | 8 | 0 | No | **SR2 A201BD** *(1)* | 0.380 |
| | 12 | 6 | 8 | 0 | Yes | **SR2 B201BD** | 0.380 |
| | 12 | 6 | 0 | 8 | Yes | **SR2 B202BD** | 0.280 |
| **Supply ∿ 24 V** | | | | | | | |
| **12** | 8 | 0 | 4 | 0 | Yes | **SR2 B121B** | 0.250 |
| **20** | 12 | 0 | 8 | 0 | Yes | **SR2 B201B** | 0.380 |
| **Supply ∿ 100...240 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | No | **SR2 A101FU** *(1)* | 0.250 |
| **12** | 8 | 0 | 4 | 0 | Yes | **SR2 B121FU** | 0.250 |
| **20** | 12 | 0 | 8 | 0 | No | **SR2 A201FU** *(1)* | 0.380 |
| | 12 | 0 | 8 | 0 | Yes | **SR2 B201FU** | 0.380 |

### Compact smart relays without display

| Number of I/O | Discrete inputs | Of which 0-10 V analogue inputs | Relay outputs | Transistor outputs | Clock | Reference | Weight kg |
|---|---|---|---|---|---|---|---|
| **Supply ⎓ 24 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | No | **SR2 D101BD** *(1)* | 0.220 |
| **12** | 8 | 4 | 4 | 0 | Yes | **SR2 E121BD** | 0.220 |
| **20** | 12 | 2 | 8 | 0 | No | **SR2 D201BD** *(1)* | 0.350 |
| | 12 | 6 | 8 | 0 | Yes | **SR2 E201BD** | 0.350 |
| **Supply ∿ 24 V** | | | | | | | |
| **12** | 8 | 0 | 4 | 0 | Yes | **SR2 E121B** | 0.220 |
| **20** | 12 | 0 | 8 | 0 | Yes | **SR2 E201B** | 0.350 |
| **Supply ∿ 100...240 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | No | **SR2 D101FU** *(1)* | 0.220 |
| **12** | 8 | 0 | 4 | 0 | Yes | **SR2 E121FU** | 0.220 |
| **20** | 12 | 0 | 8 | 0 | No | **SR2 D201FU** *(1)* | 0.350 |
| | 12 | 0 | 8 | 0 | Yes | **SR2 E201FU** | 0.350 |

### Compact "discovery" packs

| Number of I/O | Pack contents | Reference | Weight kg |
|---|---|---|---|
| **Supply ⎓ 24 V** | | | |
| **12** | An **SR2 B121BD** compact smart relay with display, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR2 PACKBD** | 0.700 |
| **20** | An **SR2 B201BD** compact smart relay with display, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR2 PACK2BD** | 0.850 |
| **Supply ∿ 100...240 V** | | | |
| **12** | An **SR2 B121FU** compact smart relay with display, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR2 PACKFU** | 0.700 |
| **20** | An **SR2 B201FU** compact smart relay with display, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR2 PACK2FU** | 0.850 |

*(1) Programming on smart relay in LADDER language only.*

# Zelio Logic smart relays
## Modular smart relays


*SR3 B101BD*


*SR3 XT61BD*


*SR3 XT141BD*

### Modular smart relays with display

| Number of I/O | Discrete inputs | Of which 0-10 V analogue inputs | Relay outputs | Transistor outputs | Clock | Reference | Weight kg |
|---|---|---|---|---|---|---|---|
| **Supply ⎓ 24 V** | | | | | | | |
| **10** | 6 | 4 | 4 | 0 | Yes | **SR3 B101BD** | 0.250 |
| | 6 | 4 | 0 | 4 | Yes | **SR3 B102BD** | 0.220 |
| **26** | 16 | 6 | 10 *(1)* | 0 | Yes | **SR3 B261BD** | 0.400 |
| | 16 | 6 | 0 | 10 | Yes | **SR3 B262BD** | 0.300 |
| **Supply ∿ 24 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | Yes | **SR3 B101B** | 0.250 |
| **26** | 16 | 0 | 10 *(1)* | 0 | Yes | **SR3 B261B** | 0.400 |
| **Supply ∿ 100-240 V** | | | | | | | |
| **10** | 6 | 0 | 4 | 0 | Yes | **SR3 B101FU** | 0.250 |
| **26** | 16 | 0 | 10 *(1)* | 0 | Yes | **SR3 B261FU** | 0.400 |

### I/O extension modules *(2)*

| Number of I/O | Discrete inputs | Relay outputs | Reference | Weight kg |
|---|---|---|---|---|
| **Supply ⎓ 24 V (for smart relays SR3 B●●●BD)** | | | | |
| **6** | 4 | 2 | **SR3 XT61BD** | 0.125 |
| **10** | 6 | 4 | **SR3 XT101BD** | 0.200 |
| **14** | 8 | 6 | **SR3 XT141BD** | 0.220 |
| **Supply ∿ 24 V (for smart relays SR3 B●●●B)** | | | | |
| **6** | 4 | 2 | **SR3 XT61B** | 0.125 |
| **10** | 6 | 4 | **SR3 XT101B** | 0.200 |
| **14** | 8 | 6 | **SR3 XT141B** | 0.220 |
| **Supply ∿ 100-240 V (for smart relays SR3 B●●●FU)** | | | | |
| **6** | 4 | 2 | **SR3 XT61FU** | 0.125 |
| **10** | 6 | 4 | **SR3 XT101FU** | 0.200 |
| **14** | 8 | 6 | **SR3 XT141FU** | 0.220 |

### Communication module *(2)*

| For use on | Supply voltage | Reference | Weight kg |
|---|---|---|---|
| **Modbus network** | ⎓ 24 V | **SR3 MBU01BD** ▲ | 0.300 |

### Modular "discovery" packs

| Number of I/O | Pack contents | Reference | Weight kg |
|---|---|---|---|
| **Supply ⎓ 24 V** | | | |
| **10** | An **SR3 B101BD** modular smart relay, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR3 PACKBD** | 0.700 |
| **26** | An **SR3 B261BD** modular smart relay, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR3 PACK2BD** | 0.850 |
| **Supply ∿ 100...240 V** | | | |
| **10** | An **SR3 B101FU** modular smart relay, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR3 PACKFU** | 0.700 |
| **26** | An **SR3 B261FU** modular smart relay with display, a connecting cable and “Zelio Soft” programming software supplied on CD-Rom. | **SR3 PACK2FU** | 0.850 |

*(1) Including 8 outputs at maximum current of 8 A and 2 outputs at maximum current of 5 A.*
*(2) Power supply to the I/O extension and communication modules is via the modular smart relays*

***Note:*** *The smart relay and its associated extensions must have an identical voltage.*

▲ Available: 1st quarter of 2004.

# Zelio Logic smart relays
## Compact and modular smart relays
## Separate components

510352

*SR2 SFT01*

109369


*SR2 MEM01*

510353

*SR2 COM01*

510354

*ABL7 RM1202*

### "Zelio Soft" software for PC

| Description | Reference | Weight kg |
|---|---|---|
| **"Zelio Soft" for PC multi-language programming software** supplied on CD-Rom *(1)*, compatible with Windows 95, 98, NT, 2000, XP and ME. | **SR2 SFT01** | 0.200 |
| **Connecting cable** between smart relay and PC (length: 3 m) | **SR2 CBL01** | 0.150 |

### Back-up memory

| Description | Reference | Weight kg |
|---|---|---|
| **EEPROM back-up memory** | **SR2 MEM01** | 0.010 |

### Communication interface *(2)*

| Description | Supply | Reference | Weight kg |
|---|---|---|---|
| **Communication interface** | ⎓ 12/24 V | **SR2 COM01** ▲ | 0.140 |

### Converters for Optimum Pt100 probes *(3)*

**Supply voltage ⎓ 24 V (20 %, not isolated)**

| Type | Temperature range °C | Temperature range °F | Output signal | Reference | Weight kg |
|---|---|---|---|---|---|
| **Pt100 2-wire, 3-wire and 4-wire** | - 40...40 | - 40...104 | 0...10 V or 4...20 mA | **RMP T13BD** | 0.116 |
| | - 100...100 | - 148...212 | 0...10 V or 4...20 mA | **RMP T23BD** | 0.116 |
| | 0... 100 | 32... 212 | 0...10 V or 4...20 mA | **RMP T33BD** | 0.116 |
| | 0... 250 | 32... 482 | 0...10 V or 4...20 mA | **RMP T53BD** | 0.116 |
| | 0... 500 | 32...932 | 0...10 V or 4...20 mA | **RMP T73BD** | 0.116 |

### Power supplies *(3)*

| Input voltage | Nominal output voltage | Nominal output current | Reference | Weight kg |
|---|---|---|---|---|
| ∿ 100...240 V (47...63 Hz) | ⎓ 12 V | 1.9 A | **ABL 7RM1202** | 0.180 |
| | ⎓ 24 V | 1.4 A | **ABL 7RM2401** | 0.182 |

### Documentation

| Description | Language | Reference | Weight kg |
|---|---|---|---|
| **User's manual** for direct programming on the smart relay | English | **SR2 MAN01EN** | 0.100 |
| | French | **SR2 MAN01FR** | 0.100 |
| | German | **SR2 MAN01DE** | 0.100 |
| | Spanish | **SR2 MAN01ES** | 0.100 |
| | Italian | **SR2 MAN01IT** | 0.100 |
| | Portuguese | **SR2 MAN01P0** | 0.100 |

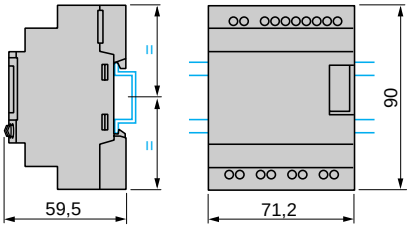
*(1) CD-Rom containing "Zelio Soft" software, an application library, a self-training manual, installation instructions and a user's manual.*
*(2) See pages 6/20 to 6/25*
*(3) See our catalogue "Interfaces, I/O splitter boxes and power supplies".*

▲ Available: 1st half of 2004.

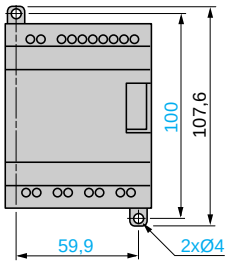
## Compact and modular smart relays

**SR2 A101BD, SR2 D101FU, SR3 B101BD and SR3 B101FU (10 I/O)**
**SR2 B121JD, SR2 B12●BD, SR2 B121B, SR2 A101FU, SR2 B121FU, SR2 D101BD, SR2 E121BD, SR2 E121B, SR2 E121FU (12 I/O)**

**Mounting on 35 mm ⊓ rail**

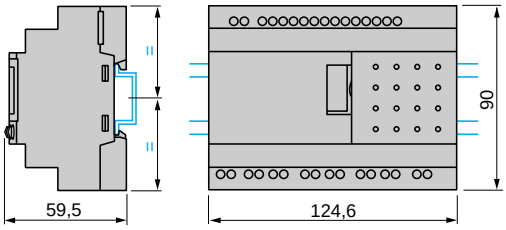



**Screw fixing** (retractable lugs)

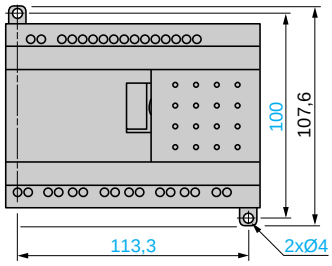



**SR2 B201JD, SR2 A201BD, SR2 B20●BD, SR2 B201B, SR2 A201FU, SR2 B201FU, SR2 D201BD, SR2 E201BD, SR2 E201B, SR2 D201FU and SR2 E201FU (20 I/O)**
**SR3 B26●BD and SR3 B261FU (26 I/O)**

**Mounting on 35 mm ⊓ rail**



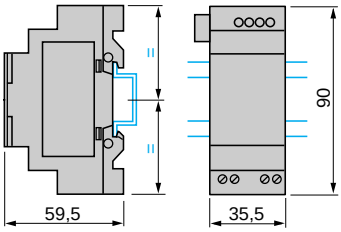

**Screw fixing** (retractable lugs)



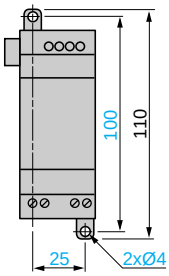

## I/O extension modules

**SR3 XT61●● (6 I/O)**

**Mounting on 35 mm ⊓ rail**

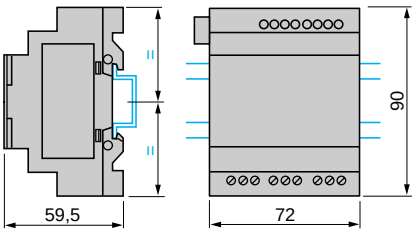



**Screw fixing** (retractable lugs)

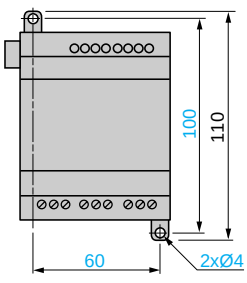



**SR3 XT101●● and SR3 XT141●● (10 and 14 I/O)**

**Mounting on 35 mm ⊓ rail**




**Screw fixing** (retractable lugs)



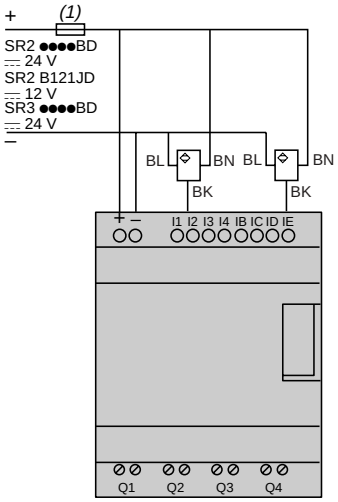

6

# Zelio Logic smart relays
Compact and modular smart relays

## Input connections

### 3-wire sensors

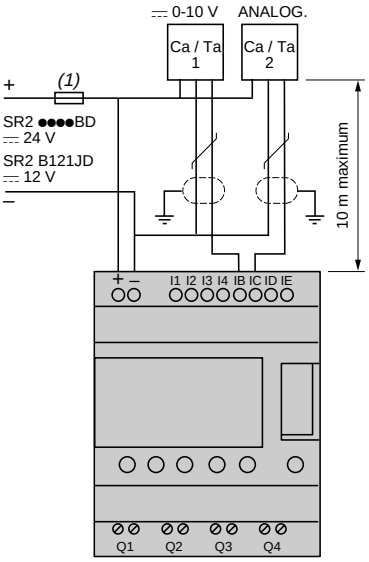
**SR2 ●●●●BD, SR2 B121JD and SR3 ●●●●BD**




*(1) 1 A quick-blow fuse or circuit-breaker.*

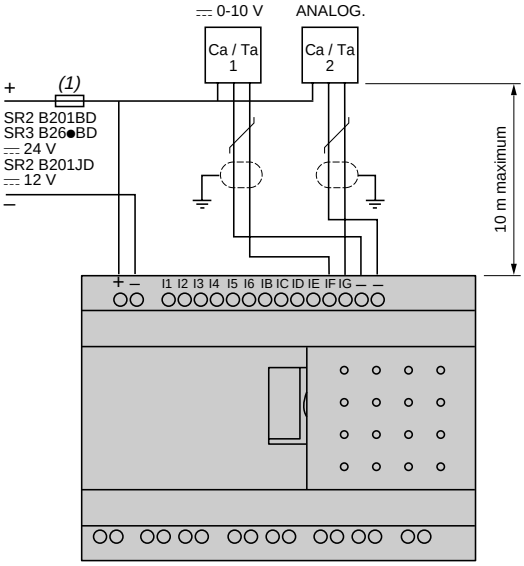
### Analogue inputs

**SR2 B12●BD, SR2 B121JD and SR3 B10●BD**




*(1) 1 A quick-blow fuse or circuit-breaker.*

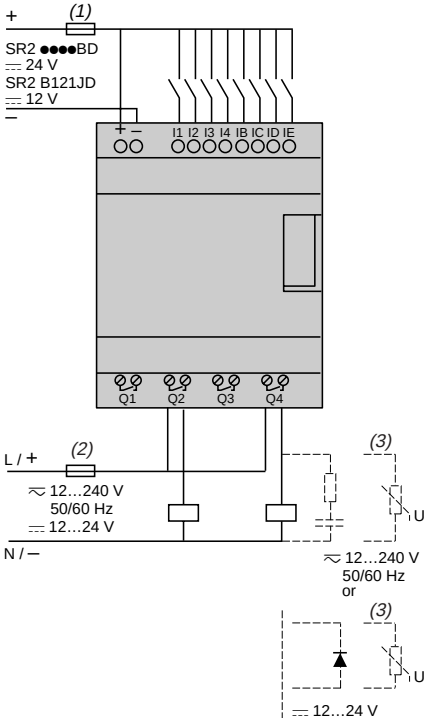
**SR2 B201BD, SR3 B26●BD and SR2 B201JD**




*(1) 1 A quick-blow fuse or circuit-breaker.*

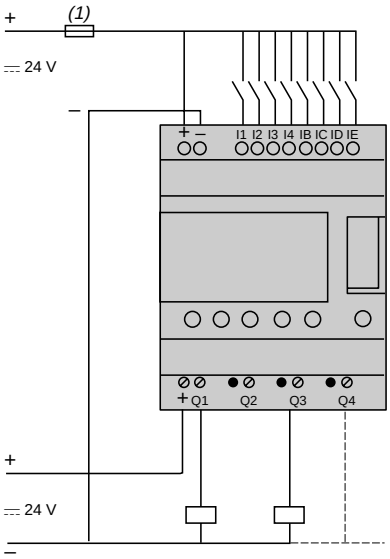
## Connection of smart relays on ⎓ supply

**SR2 ●●●●BD, SR2 B121JD, SR2 ●201BD and SR3 B10●●●**




*(1) 1 A quick-blow fuse or circuit-breaker.*
*(2) Fuse or circuit-breaker.*
*(3) Inductive load.*

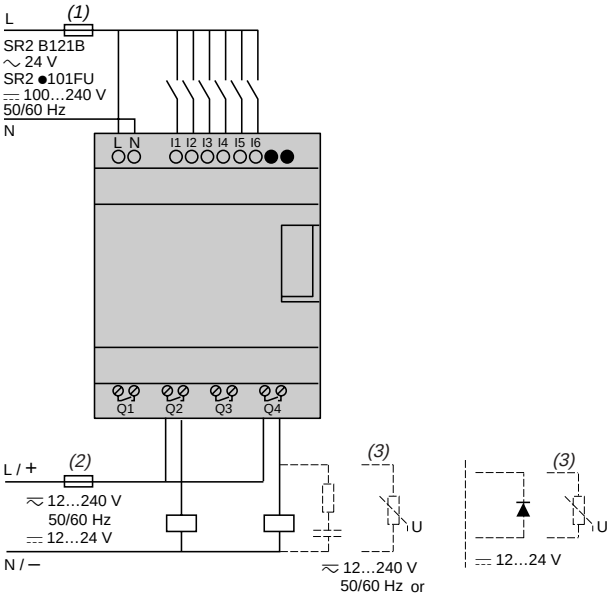
**SR2 B122BD and SR2 B202BD, SR3 B102BD and SR3 B262BD**




*(1) 1 A quick-blow fuse or circuit-breaker.*

## Connection of smart relays on ∿ supply

**SR2 B●●●B, SR2 A1●1FU, SR2 ●201FU, SR3 B●●B and SR3 B●●●FU**




*(1) 1 A quick-blow fuse or circuit-breaker.*
*(2) Fuse or circuit-breaker.*
*(3) Inductive load.*

6

# Analogue interfaces
## Zelio Analog
## Converters for thermocouples and Pt100 probes
## Voltage/current converters

The Zelio Analog range of converters is designed to convert signals emitted by sensors or electrical measurements into standard electrical signals which are compatible with automation platforms, controllers (thermal processes, speed, …). They also allow the connection distance between a sensor and the measurement acquisition device to be increased: for example between a thermocouple and a programmable controller.
Conforming to IEC standards, UL and CSA certified, these converters are suitable for universal use.

**Measurement signals for thermocouples and Pt100 probes**
The voltages induced by thermocouples vary between 10 and 80 µV/°C, Pt100 probes (100 ohms at 0 °C) produce about 0.5 mV/°C, with measurement currents of 1 mA. Depending on the sensor, the signal to be measured ranges from a few µV (thermocouple) to 250 and 700 mV for a Pt100 probe.
It is therefore difficult to transmit these low level signals over long electric lines without encountering problems of interference, signal reduction or errors.
Connecting Zelio Analog converters close to the sensors resolves these problems :
- 4-20 mA current loops transmitted over a long distance are less sensitive to interference than low level voltage signals from sensors,
- signal reductions during transmission (resistance) of voltages do not occur,
- the cables used to connect the converters to process equipment (programmable controllers) are standard cables, which are more cost effective than extension cables or compensation cables suitable for low level signals for Pt100 probes or thermocouples.

## Presentation

### The Zelio Analog range

The Zelio Analog range has been developed both to take account of the most common applications and to ensure great simplicity of installation:
- pre-set input and output scales, requiring no adjustment
- outputs protected against reverse polarity, overvoltage and short-circuits
- ⎓ 24 V power supply
- sealable protective cover
- rail mounting and screw fixing onto mounting plate
- LED indicator on the front panel
- input and output selector switches on the front panel
- output with fallback value if no input signal is present (due to failure of a sensor, for example).

The Zelio Analog converter range is divided into four families:
- Converters for J and K type thermocouples: **RMT J/K**
- Converters for Universal Pt100 probes: **RMP T●0**
- Converters for Optimum Pt100 probes: **RMP T●3**
- Universal voltage/current converters: **RMC**.


108999

*RMT J40BD*


108997

*RMT K90BD*

### Converters for J and K type thermocouples

Thermocouples, which consist of two metals with different thermo-electric characteristics, produce a voltage that varies according to temperature. This voltage is transmitted to the Zelio Analog converter which converts it to a standard signal. Converters for thermocouples have cold junction compensation to allow detection of measurement errors induced by the connection to the device itself.

Converters for J and K type thermocouples have :
- for inputs, a pre-set temperature range, depending on the model:
  - Type J: 0...150 °C, 0...300 °C, 0...600 °C
  - Type K: 0...600 °C, 0...1200 °C.
- for outputs, a switchable signal:
  - 0...10 V, 0... 20 mA, 4... 20 mA.

6

Characteristics : pages 6/22 and 6/23
References : page 6/24
Dimensions : page 6/25
Schemes : page 6/25

# Analogue interfaces
## Zelio Analog
## Converters for thermocouples and Pt100 probes
## Voltage/current converters

109000

*RMP T70BD*

### Converters for Universal Pt100 probes

Pt100 probes with platinum resistor are electrical conductors whose resistance varies according to the temperature.
This ohmic resistance is transmitted to the Zelio Analog converter which converts it to a standard signal.
Converters for Universal Pt100 probes have:
■ for inputs, a pre-set temperature range, depending on the model:
□ - 100...100 °C,
□ - 40...40 °C,
□ 0...100 °C,
□ 0...250 °C,
□ 0...500 °C.
■ for outputs, a switchable signal:
□ 0... 10 V, 0... 20 mA, 4... 20 mA.
The products in the Universal Pt100 family allow wiring of Pt100 probes in 2, 3 and 4-wire mode.

### Converters for Optimum Pt100 probes

Derived from the above family, these converters have:
■ for inputs, a pre-set temperature range identical to that of converters for Universal Pt100 probes.
■ for outputs:
□ a 0... 10V signal dedicated to Zelio Logic analogue inputs.
They allow Pt100 probes to be wired in 2, 3 and 4-wire mode.

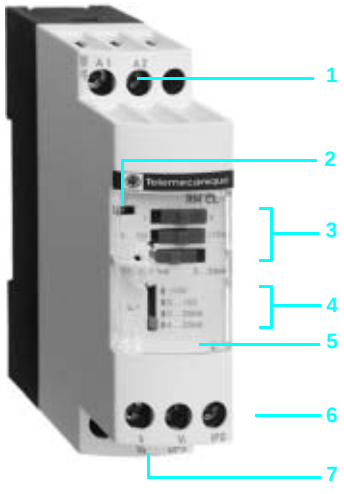
109002

*RMC A61BD*

### Universal voltage/current converters

This family of converters allows the adaptation of electrical values (voltage/current).
Four products are available:
■ a cost effective converter which will convert a 0...10 V signal to a 4...20mA signal or vice versa.
■ a Universal voltage/current converter allowing the most common signals. They have:
□ for inputs, a voltage/current range:
- 0...10 V, ± 10 V, 0...20 mA, 4...20 mA.
□ for outputs, a switchable voltage/current range:
- 0...10 V, ± 10 V, 0...20 mA, 4...20 mA.
■ two Universal voltage/current converters which allow conversion of electrical power signals, both a.c. and d.c.
They have the following, depending on the model:
□ **for voltage inputs**, a range of 0 to 500 V (~ or ⎓)
□ for outputs, a switchable voltage/current range:
- 0...10 V, 0...20 mA, 4...20 mA.
□ **for current inputs**, a range of 0 to 15 A (~ or ⎓)
□ for outputs, a voltage/current range:
- 0...10 V, 0...20 mA, 4...20 mA.

108998




*RMC L55BD*

### Description

Zelio Analog converters have the following on their front panel, depending on the model:
1 Two terminals for ⎓ 24 V supply connection
2 A 'Power ON' LED
3 Three input selector switches (depending on model)
4 An output selector switch (depending on model)
5 A sealable protective cover
6 A screw terminal block for inputs
7 A screw terminal block for outputs.

Characteristics : pages 6/22 and 6/23
References : page 6/24
Dimensions : page 6/25
Schemes : page 6/25

# Analogue interfaces
## Zelio Analog
## Converters for thermocouples and Pt100 probes
## Voltage/current converters

### Environment characteristics

| Converter types | | | RMT J/K●●●●●, RMP ●●●●●, RMC●●●●● |
|---|---|---|---|
| **Conforming to standards** | | | IEC 947-1, IEC 584-1 (IEC 751, DIN 43760 for RMP●●●●) |
| **Approvals** | | | UL, CSA, GL, CE |
| **Degree of protection** | | | |
| | Housing | | IP 50 |
| | Terminal block | | IP 20 |
| **Flame resistance** | | **°C** | 850 conforming to UL, IEC 695-2-1 |
| **Shock resistance** | | | 50 gn/11ms conforming to IEC 68-2-27 |
| **Vibration resistance** | | | 5 gn (10...100 Hz) conforming to IEC 68-2-6 |
| **Immunity to EMC** | | | |
| | Resistance to electrostatic discharge | **kV** | Level 3: 8 (air), 6 (contact) conforming to IEC 1000-4-2 |
| | Immunity to fast transient currents | **kV** | On the power supply: 2; on the input-output: 1 conforming to IEC 1004-4 |
| | Surge withstand | **kV** | 0.5 - waves 1.2/50µs; 0.5 J conforming to IEC 1000-4-5 |
| **Disturbance** | | | |
| | Radiated/conducted | | CISPR11 and CISPR22 Group1- Class B |
| **Insulation voltage** | | **kV** | 2 |
| **Ambient air temperature around the device** | | | |
| | Storage | **°C** | - 40...85 (- 40...185 °F) |
| | Operation | **°C** | Mounted side-by-side: 0...50 (32...122 °F); 2 cm spacing: 0...60 (32...140 °F) |
| **Degree of pollution** | | | 2 conforming to IEC 60 664-1 |
| **Mounting** | | | 35 mm DIN rail, clip-on or fixed on mounting plate |
| **Connection** | | **mm²** | 2 x1.5 or 1 x 2.5 cable |
| **Tightening torque** | | **Nm** | 0.6...1.1 |

### Specific characteristics

| Types of converter for thermocouples | | | RMT J40BD | RMT J60BD | RMT J80BD | RMT K80BD | RMT K90BD |
|---|---|---|---|---|---|---|---|
| **Input types** | Thermocouple type, to IEC 584 | | J (Fe-CuNi) | | | K (Ni-CrNi) | |
| | Temperature range | **°C** | 0...150 | 0...300 | 0...600 | 0...600 | 0...1200 |
| | | **°F** | 32...302 | 32...572 | 32...1112 | 12...1112 | 32...2192 |
| **Analogue output switchable to voltage or current** | | | | | | | |
| **Voltage** | Range | **V** | 0...10 | | | | |
| | Minimum impedance of load | **kΩ** | 100 | | | | |
| **Current** | Range | **mA** | 0...20; 4...20 | | | | |
| | Maximum impedance of load | Ω | 500 | | | | |
| **Built-in protection** | | | Reverse polarity, overvoltage (± 30 V) and short-circuit | | | | |
| **Safety feature** | Output state when no inputs are wired or when input wire broken | | Output predetermined according to type of output selected:<br>voltage = - 13 V<br>current = 0 mA | | | | |
| **Supply** | | | | | | | |
| **Voltage** | Rated | ⎓ **V** | 24 ± 20 %, non isolated | | | | |
| **Maximum current consumption** | For voltage output | **mA** | 40 | | | | |
| | For current output | **mA** | 60 | | | | |
| **Built-in protection** | | | Reverse polarity | | | | |
| **Signalling** | | | Green LED (power on) | | | | |
| **Measurements** | | | | | | | |
| **Accuracy** | At 20 °C | **%** | ± 1 of the full scale value | | | | |
| **Repeatability error** | At 20 °C | **%** | ± 0.25 of the full scale value | | | | |
| | At 60 °C | **%** | ± 0.8 of the full scale value | | | | |
| **Temperature coefficient** | | **ppm/°C** | 200 (0.02 %) | | | | |
| **Cold junction compensation** | | | Built-in, cold junction measurement: 0 to 60 °C (0...140 °F) | | | | |



Presentation : pages 6/20 and 6/21
References : page 6/24
Dimensions : page 6/25
Schemes : page 6/25

# Analogue interfaces
## Zelio Analog
## Converters for thermocouples and Pt100 probes
## Voltage/current converters

### Specific characteristics (continued)

| Types of converter for Pt100 probes | | | RMP T10/13BD | RMP T20/23BD | RMP T30/33BD | RMP T50/53BD | RMP T70/73BD |
|---|---|---|---|---|---|---|---|
| **Input types** | Probe type | | Pt100 - IEC 751; DIN 43760 (2, 3, 4-wire) | | | | |
| | Temperature range | **°C** | - 40...40 | - 100...100 | 0...100 | 0...250 | 0...500 |
| | | **°F** | - 40...104 | - 148...212 | 32...212 | 32...482 | 32...932 |
| **Analogue output** | | | | | | | |
| **Output selection** | | | 0...10 V/0...20 mA, 4...20 mA switchable for RMP T●0BD | | | | |
| | | | 0...10 V or 4...20 mA for RMP T●3BD | | | | |
| **Voltage** | Minimum impedance of load | **kΩ** | 100 | | | | |
| **Current** | Maximum impedance of load | **Ω** | 500 | | | | |
| **Built-in protection** | | | Reverse polarity, overvoltage (± 30 V) and short-circuit | | | | |
| **Safety feature** | Output state when no inputs are wired or when input wire broken | | Output predetermined according to type of output selected:<br>voltage = - 13 V<br>current = 0 mA | | | | |
| **Supply** | | | | | | | |
| **Voltage** | Rated | **⎓ V** | 24 ± 20 %, non isolated | | | | |
| **Maximum current consumption** | For voltage output | **mA** | 40 | | | | |
| | For current output | **mA** | 60 | | | | |
| **Built-in protection** | | | Reverse polarity | | | | |
| **Signalling** | | | Green LED (power on) | | | | |
| **Measurements** | | | | | | | |
| **Accuracy** | At 20 °C | **%** | ± 0.5 of the full scale value (3, 4-wire connection)<br>± 1 of the full scale value (2-wire connection) | | | | |
| **Repeatability error** | At 20 °C | **%** | ± 0.2 of the full scale value | | | | |
| | At 60 °C | **%** | ± 0.6 of the full scale value | | | | |
| **Temperature coefficient** | | **ppm/°C** | 150 (0.015 %) | | | | |
| **Connection in 2-wire mode** | | | | | | | |
| | Maximum resistance of cable | **mΩ** | 200 | | | | |

| Types of voltage/current converters | | | RMC N22BD | RMC L55BD | RMC V60BD | RMC A61BD |
|---|---|---|---|---|---|---|
| **Input types** | Voltage | **V** | ⎓ 0...10 | ⎓ 0...10, ±10 | 0...50; 0...300; 0...500<br>⎓ or ∿ 50/60 Hz | – |
| | Current | **mA** | 4...20 | 0...20; 4...20 | – | – |
| | | **A** | – | – | – | 0...1.5; 0...5; 0...15<br>⎓ or ∿ 50/60 Hz |
| **Analogue output** | | | | | | |
| **Output selection** | | | By cabling | Switchable | Switchable | By cabling |
| **Voltage** | Range | **V** | 0...10 | 0...10; ± 10 | 0...10 | 0...10 |
| | Minimum impedance of load | **kΩ** | 100 | | | |
| **Current** | Range | **mA** | 4...20 | 0...20; 4...20 | 0...20; 4...20 | 0...20; 4...20 |
| | Maximum impedance of load | **Ω** | 500 | | | |
| **Built-in protection** | | | Reverse polarity, overvoltage (± 30 V) and short-circuit | | | |
| **Safety** | Output state when no inputs are wired or when input wire broken | | Output predetermined according to type of output selected:<br>voltage:<br>- 2.5 V<br>current:<br>6 mA | voltage:<br>- 10…+ 10 V = -10 V<br>0…+ 10 V = 0 V<br>current:<br>0…20 mA = 0 mA<br>4…20 mA = 4 mA | voltage: 0 V<br>current:<br>0…20 mA = 0 mA<br>4…20 mA = 4 mA | |
| **Supply** | | | | | | |
| **Voltage** | Rated | **V** | ⎓ 24 ± 20 %<br>non isolated | ⎓ 24 ± 20 % isolated (1.5 kV) | | |
| **Maximum current consumption** | For voltage output | **mA** | 40 | 70 | | |
| | For current output | **mA** | 60 | 90 | | |
| **Built-in protection** | | | Reverse polarity | | | |
| **Signalling** | | | Green LED (power on) | | | |
| **Measurements** | | | | | | |
| **Accuracy** | At 20 °C | **%** | ± 1 of the full scale value | | ± 5 of the full scale value | |
| **Repeatability error** | At 20 °C | **%** | ± 0.2 of the full scale value | | | |
| | At 60 °C | **%** | ± 0.6 of the full scale value | | | |
| **Temperature coefficient** | | **ppm/°C** | 200 (0.02 %) | | | 0...1.5 A: 500 (0.05 %)<br>0...5 A: 1000 (0.1 %)<br>0..0.15 A: 2000 (0.2 %) |

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Presentation : pages 6/20 and 6/21
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Dimensions : page 6/25
Schemes : page 6/25

# Analogue interfaces

## Zelio Analog

Converters for thermocouples and Pt100 probes
Voltage/current converters


*RMT J40BD*


*RMT K90BD*

### Converters for J and K type thermocouples

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range °C | Temperature range °F | Switchable output signal | Reference | Weight kg |
|---|---|---|---|---|---|
| **Type J** | 0…150 | 32…302 | 0…10 V, 0…20 mA, 4…20 mA | **RMT J40BD** | 0.120 |
| | 0…300 | 32…572 | 0…10 V, 0…20 mA, 4…20 mA | **RMT J60BD** | 0.120 |
| | 0…600 | 32…1112 | 0…10 V, 0…20 mA, 4…20 mA | **RMT J80BD** | 0.120 |
| **Type K** | 0…600 | 32…1112 | 0…10 V, 0…20 mA, 4…20 mA | **RMT K80BD** | 0.120 |
| | 0…1200 | 32…2192 | 0…10 V, 0…20 mA, 4…20 mA | **RMT K90BD** | 0.120 |


*RMP T70BD*

### Converters for Universal Pt100 probes

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range °C | Temperature range °F | Switchable output signal | Reference | Weight kg |
|---|---|---|---|---|---|
| **Pt100 2-wire, 3-wire and 4-wire** | - 40…40 | - 40…104 | 0…10 V, 0…20 mA, 4…20 mA | **RMP T10BD** | 0.120 |
| | - 100…100 | - 148…212 | 0…10 V, 0…20 mA, 4…20 mA | **RMP T20BD** | 0.120 |
| | 0…100 | 32…212 | 0…10 V, 0…20 mA, 4…20 mA | **RMP T30BD** | 0.120 |
| | 0…250 | 32…482 | 0…10 V, 0…20 mA, 4…20 mA | **RMP T50BD** | 0.120 |
| | 0…500 | 32…932 | 0…10 V, 0…20 mA, 4…20 mA | **RMP T70BD** | 0.120 |


*RMP T13BD*

### Converters for Optimum Pt100 probes *(1)*

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range °C | Temperature range °F | Output signal | Reference | Weight kg |
|---|---|---|---|---|---|
| **Pt100 2-wire, 3-wire and 4-wire** | - 40…40 | - 40…104 | 0…10 V or 4…20 mA | **RMP T13BD** | 0.120 |
| | - 100…100 | - 148…212 | 0…10 V or 4…20 mA | **RMP T23BD** | 0.120 |
| | 0…100 | 32…212 | 0…10 V or 4…20 mA | **RMP T33BD** | 0.120 |
| | 0…250 | 32…482 | 0…10 V or 4…20 mA | **RMP T53BD** | 0.120 |
| | 0…500 | 32…932 | 0…10 V or 4…20 mA | **RMP T73BD** | 0.120 |


*RMC N22BD*

### Universal voltage/current converters

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Input signal | Output signal | Reference | Weight kg |
|---|---|---|---|
| 0…10 V or 4…20 mA | 0…10 V or 4…20 mA | **RMC N22BD** | 0.120 |

**Supply voltage ⎓ 24 V ± 20 %, isolated**

| Input signal | Output signal | Reference | Weight kg |
|---|---|---|---|
| 0…10 V, ± 10 V, 0…20 mA, 4…20 mA | Switchable: 0…10 V, ± 10 V, 0…20 mA, 4…20 mA | **RMC L55BD** | 0.120 |
| 0…50 V, 0…300 V, 0…500 V ⎓ or ∿ 50/60 Hz | Switchable: 0…10 V, 0...20 mA, 4…20 mA | **RMC V60BD** | 0.150 |
| 0…1.5 A, 0…5 A, 0…15 A ⎓ or ∿ 50/60 Hz | 0…10 V or 0...20 mA or 4…20 mA | **RMC A61BD** | 0.150 |


*RMC L55BD*


*RMC A61BD*

### Connection accessories

| Description | Type | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|---|
| **Terminal blocks for connection of protective earth conductor** | Screw | 100 | **AB1 RRTP435U** | 0.025 |
| | Spring | 100 | **AB1 RRTP435U2** | 0.015 |

*(1) Converters dedicated to Zelio Logic smart relays.*

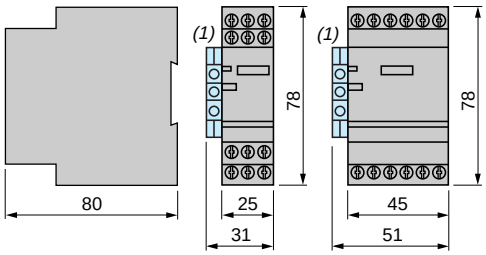
Presentation : pages 6/20 and 6/21
Characteristics : pages 6/22 and 6/23
Dimensions : page 6/25
Schemes : page 6/25

# Analogue interfaces
## Zelio Analog
Converters for thermocouples and Pt100 probes
Voltage/current converters

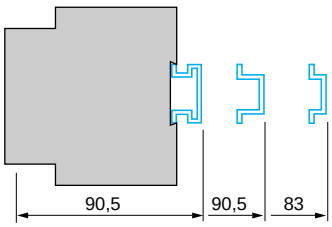
## Dimensions, mounting

**RMT ●●●●●/RMP ●●●●●/RMC ●●●●●**

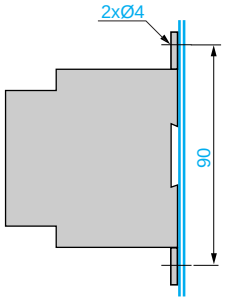
**RMT ●●●●●●RMC A61BD**
**RMP ●●●●●●**
**RMC ●●●●●●**




Mounting on rails **AM1 ●●●●●**



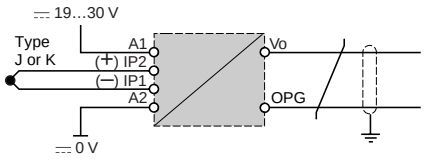

Panel mounting



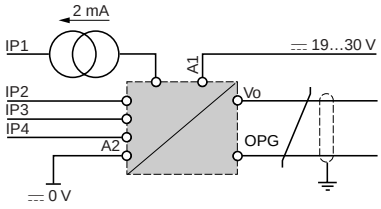

*(1) Terminal block **AB1 RRTP435U** or **AB1 RRTP435U2**.*

## Schemes

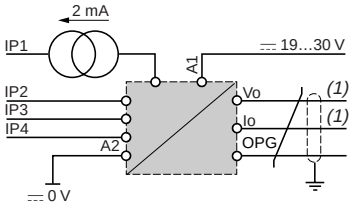
**RMT J●●●●, RMT K●●●●**




**RMP T●0BD**



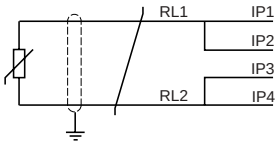

**RMP T●3BD**



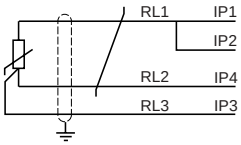

*(1) Use one output only.*

**Input connections on RMP T●●●●●**

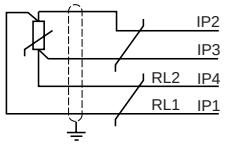
2-wire type
RL1 + RL2 ≤ 200 mΩ




3-wire type
RL1 = RL2 = RL3
RL1 + RL2 ≤ 200 Ω

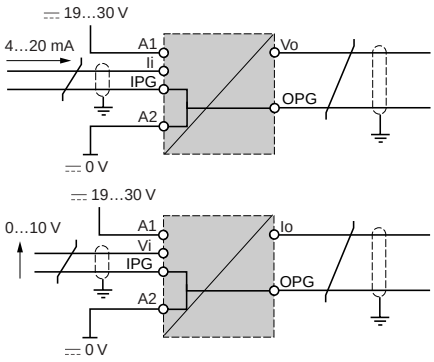



4-wire type
RL1 + RL2 ≤ 200 Ω

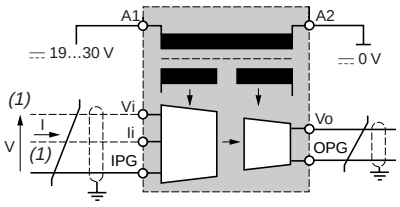



**RMC ●●●●●**

**RMC N22BD**

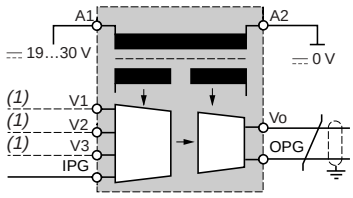



**RMC L55BD**



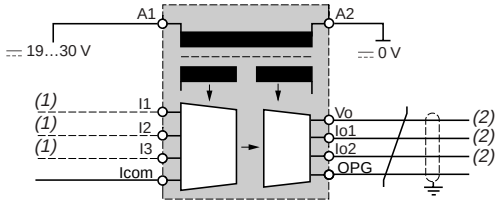

*(1) Use one input only.*

**RMC V60BD**




*(1) Use one input only.*

**RMC A61BD**




*(1) Use one input only.*
*(2) Use one output only.*

Presentation : pages 6/20 and 6/21
Characteristics : pages 6/22 and 6/23
References : page 6/24

Contents

# 7 - Services

# Product reference index

# Product reference index

Depending on the climatic and environmental conditions in which the equipment is placed, Schneider Electric can offer specially adapted products to meet your requirements.

In order to make the correct choice of protective finish, two points should be remembered :

- The prevailing climate of the country is never the only criterion.
- Only the atmosphere in the immediate vicinity of the equipment need be considered.

## All climates treatment “TC”

This is the standard treatment for the Telemecanique brand equipment and is suitable for the vast majority of applications.
It is the equivalent of treatments described as “Klimafest”, “Climateproof”, “Total tropicalisation” or “Super tropicalisation” and meets the same requirements, in particular :

- Publication UTE C 63-100 (method l), successive cycles of humid heat at :
  + 40 °C and 95 % relative humidity.

- DIN 50016 - Variations of ambient conditions within a climatic chamber :
  + 23 °C and 83 % relative humidity,
  + 40 °C and 92 % relative humidity.

It also meets the requirements of the following marine classification authorities : BV-LROS-GL-DNV-RINA.

### Characteristics

- Steel components are usually treated with zinc chromate and, when they have a mechanical function, they may also be painted.

- Insulating materials are selected for their high electrical, dielectric and mechanical characteristics.

- Metal enclosures have a stoved paint finish, applied over a primary phosphate protective coat, or are galvanised (e.g. some prefabricated busbar trunking components).

### Limits for use of “TC” (All climates) treatment

- “TC” treatment is suitable for the following temperatures and humidity :

| | | | | |
|---|---|---|---|---|
| Temperature | (°C) | 20 | 40 | 50 |
| Relative humidity | (%) | 95 | 80 | 50 |

- It may also be used where the above limits are only exceeded accidentally or for very short periods, or where temperature variations are not sufficient or fast enough to cause heavy condensation or dripping water on the equipment.
  “TC” treatment is therefore suitable for all latitudes, including tropical and equatorial regions, where the equipment is mounted in normal, ventilated industrial locations. Being sheltered from external climatic conditions, temperature variations are small, the risk of condensation is minimised and the risk of dripping water is virtually non-existent.

### Extension of use of “TC” (All climates) treatment

In cases where the humidity around the equipment exceeds the conditions described above, where the equipment, in tropical regions, is mounted outdoors, or where it is placed in a very humid location (laundries, sugar refineries, steam rooms, etc.), “TC” treatment can still be used if the following precautions are taken :

- The enclosure in which the equipment is mounted must be protected with a “TH” finish (see next page) and must be well ventilated to avoid condensation and dripping water (e.g. enclosure base plate mounted on spacers).

- Components mounted inside the enclosure must have a “TC” finish.

- If the equipment is to be switched off for long periods, a heater must be provided (0.2 to 0.5 kW per square decimetre of enclosure), switched on automatically when the equipment is turned off. This heater keeps the inside of the enclosure at a temperature slightly higher than the outside surrounding temperature, thereby avoiding any risk of condensation and dripping water (the heat produced by the equipment itself in normal running is sufficient to provide this temperature difference).

- For pilot devices, the use of “TC” treatment can be extended to outdoor use provided the enclosure is made of light alloys, zinc alloys or plastic material. In this case, it is essential to ensure that the degree of protection against penetration of liquids and solid objects is suitable for the applications involved.

## “TH” treatment for hot and humid environments

This treatment is for hot and humid atmospheres where installations are subject to condensation, dripping water and the risk of fungi.

Plastic insulating components are also resistant to attacks from insects such as termites and cockroaches. These properties have led to this treatment being described as “Tropical Finish”, but this does not mean that all equipment installed in tropical and equatorial regions must systematically have undergone “TH” treatment. On the other hand, certain operating conditions in temperate climates may well require the use of “TH” treated equipment (see limitations for use of “TC” treatment).

**Special characteristics of “TH” treatment**

- All insulating components are made of materials which are either resistant to fungi or treated with a fungicide, and which have increased resistance to creepage (Standards IEC 112, NF C 26-220, DIN 5348).
- Metal enclosures receive a top-coat of stoved, fungicidal paint, applied over a rust inhibiting undercoat. Components with “TH” treatment may be subject to a surcharge (1). Please consult your Regional Sales Office.

(1) A large number of the Telemecanique brand products are “TH” treated as standard and are, therefore, not subject to a surcharge.

## Protective treatment selection guide

| Location | Environmental conditions | Duty cycle | Internal heating of enclosure when not in use | Type of climate | Protective treatment of components | Protective treatment of enclosure |
|---|---|---|---|---|---|---|
| Indoors | No dripping water or condensation | Unimportant | Unnecessary | Unimportant | “TC” | “TC” |
| | Presence of dripping water or condensation | Frequent switching off for periods of more than 1 day | No | Temperate | “TC” | “TH” |
| | | | | Equatorial | “TH” | “TH” |
| | | | Yes | Unimportant | “TC” | “TH” |
| | | Continuous | Unnecessary | Unimportant | “TC” | “TH” |
| Outdoors (sheltered) | No dripping water or dew | Unimportant | Unnecessary | Temperate | “TC” | “TC” |
| | | | | Equatorial | “TH” | “TH” |
| Exposed outdoors or near the sea | Frequent and regular presence of dripping water or dew | Frequent switching off for periods of more than 1 day | No | Temperate | “TC” | “TH” |
| | | | | Equatorial | “TH” | “TH” |
| | | | Yes | Unimportant | “TC” | “TH” |
| | | Continuous | Unnecessary | Unimportant | “TC” | “TH” |

These treatments cover, in particular, the applications defined by methods I and II of guide UTE C 63-100.

## Special precautions for electronic equipment

Electronic products always meet the requirements of “TC” treatment. A number of them are “TH” treated as standard.

Some electronic products (for example : programmable controllers, flush mountable controllers CCX and flush mountable operator terminals XBT) necessitate the use of an enclosure providing a degree of protection to at least IP 54, as defined by the standards IEC 664 and NF C 20 040, for use in industrial applications or in environmental conditions requiring a “TH” treatment.

These electronic products, including flush mountable products, must have a degree of protection to at least IP 20 (either provided by the enclosure itself or following installation) for restricted access locations where the degree of pollution does not exceed 2 (a test booth not containing machinery or other dust producing activities, for example).

## Special treatments

For highly corrosive industrial environments, Schneider Electric is able to offer special protective treatments. Please consult your Regional Sales Office.

## Standardisation

### Conformity to standards

The Telemecanique brand products satisfy, in the majority of cases, national (for example: BS in Great Britain, NF in France, DIN in Germany), European (for example: CENELEC) or international (IEC) standards. These product standards precisely define the performance of the designated products (such as IEC 60947 for low voltage equipment).
When used correctly, as designated by the manufacturer and in accordance with regulations and correct practices, these products will allow assembled equipment, machine systems or installations to conform to their appropriate standards (for example: IEC 60204, relating to electrical equipment used on industrial machines).
Schneider Electric is able to provide proof of conformity of its production to the standards it has chosen to comply with, through its quality assurance system.
On request, and depending on the situation, Schneider Electric can provide the following:
- a declaration of conformity,
- a certificate of conformity (ASEFA/LOVAG),
- an approval certificate or agreement, in the countries where this procedure is required or for particular specifications, such as those existing in the merchant navy.

| Code | Standards body | | Country |
|---|---|---|---|
| | Name | Abbreviation | |
| **ANSI** | American National Standards Institute | ANSI | USA |
| **BS** | British Standards Institution | BSI | Great Britain |
| **CEI** | Comitato Elettrotecnico Italiano | CEI | Italy |
| **DIN/VDE** | Verband Deutscher Electrotechniker | VDE | Germany |
| **EN** | Comité Européen de Normalisation Electrotechnique | CENELEC | Europe |
| **GOST** | Gosudarstvenne Komitet Standartov | GOST | Russia |
| **IEC** | International Electrotechnical Commission | IEC | Worldwide |
| **JIS** | Japanese Industrial Standard | JISC | Japan |
| **NBN** | Institut Belge de Normalisation | IBN | Belgium |
| **NEN** | Nederlands Normalisatie Institut | NNI | Netherlands |
| **NF** | Union Technique de l'Electricité | UTE | France |
| **SAA** | Standards Association of Australia | SAA | Australia |
| **UNE** | Asociacion Española de Normalizacion y Certificacion | AENOR | Spain |

### European EN standards

These are technical specifications established in conjunction with, and with approval of, the relative bodies within the various CENELEC member countries (European Union, European Free Trade Association and many central and eastern European countries having «member» or «affiliated» status). Arrived at through the principle of consensus, the European standards are the result of a weighted majority vote. Such adopted standards are then integrated into the national collection of standards, and contradictory national standards are withdrawn.
The European standards are now incorporated within the French standards and carry the prefix NF EN. Under the “Technical Union of Electricity” (UTE), the French version of the corresponding European standard carries a double notation: European reference (NF EN …) and classification (C …).
Therefore, the standard NF EN 60947-4-1 relating to motor contactors and starters, effectively constitutes the French version of the European standard EN 60947-4-1 and carries the UTE classification C 63-110.
This standard is identical to the British standard BS EN 60947-4-1 or the German standard DIN EN 60947-4-1.
Whenever reasonably practical, European standards reflect the international standards (IEC).
With regard to automation system components and distribution equipment, in addition to complying with the requirements of French NF standards, Telemecanique brand components conform to the standards of all other major industrial countries.

## Regulations

### European Directives

Opening up of European markets assumes harmonisation of the regulations pertaining to each member country of the European Union.
The purpose of the European Directive is to eliminate obstacles hindering the free circulation of goods within the European Union, and it applies to each member country. Member countries are obliged to transcribe each Directive into their national legislation and to simultaneously withdraw any contradictory regulations. The Directives, in particular those of a technical nature which concern us, only establish the objectives to be achieved and are referred to as “essential requirements”.
The manufacturer must take all the necessary measures to ensure that his products conform to the requirements of each Directive applicable to his production.
As a general rule, the manufacturer certifies conformity to the essential requirements of the Directive(s) for his product by affixing a CE mark.
The CE mark is affixed to Telemecanique brand products, as defined by French and European regulations.

**Significance of the CE mark**
- The CE mark affixed to a product signifies that the manufacturer certifies that the product conforms to the relevant European Directive(s) which concern him ; this condition must be met to allow free distrubition and circulation within the countries of the European Union of any product subject to one or move of the E.U. Directives.
- The CE mark is intended solely for national market control authorities.
- The CE mark must not be confused with a conformity marking.

**European Directives** (continued)

For electrical equipment, only conformity to standards signifies that the product is suitable for its designated function, and only the guarantee of an established manufacturer can provide a high level of quality assurance.
For Telemecanique brand products, one or several Directives are likely to be applicable, depending on the product, in particular:
- the Low Voltage Directive 73/23/EEC amended by Directive 93/68/EEC: the CE mark relating to this Directive has been compulsory since 1st January 1997.
- the Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC: the CE mark on products covered by this Directive has been compulsory since 1st January 1996.

**ASEFA-LOVAG certification**

The function of ASEFA (Association des Stations d'Essais Française d'Appareils électriques - *Association of French Testing Stations for Low Voltage Industrial Electrical Equipment*) is to carry out tests of conformity to standards and to issue certificates of conformity and test reports. ASEFA laboratories are authorised by the French authorisation committee (COFRAC).
ASEFA is now a member of the European accord group LOVAG (Low Voltage Agreement Group). This means that any certificates issued by LOVAG/ASEFA are recognised by all the authorities forming the membership of the group and carry the same validity as those issued by any of the member authorities.

## Quality labels

When components can be used in domestic and similar applications, it is sometimes recommended that a “Quality label” be obtained, which is a form of certification of conformity.

| Code | Quality label | Country |
|---|---|---|
| **CEBEC** | Comité Electrotechnique Belge | Belgium |
| **KEMA-KEUR** | Keuring van Electrotechnische Materialen | Netherlands |
| **NF** | Union Technique de l'Electricité | France |
| **ÖVE** | Österreichischer Verband für Electrotechnik | Austria |
| **SEMKO** | Svenska Electriska Materiel Kontrollanatalten | Sweden |

## Approvals

In some countries, the approval of certain electrical equipment is required by law or by the market. In this case, an approval certificate is issued by the official test authority.
Each approved component must bear the relevant quality label when this is mandatory:

| Code | Approval authority | Country |
|---|---|---|
| **CSA** | Canadian Standards Association | Canada |
| **UL** | Underwriters Laboratories | USA |

Note on approvals issued by the Underwriters Laboratories (UL). There are two levels of approval:

**“Recognized” (FL)** The component is fully approved for inclusion in equipment built in a workshop, where the operating limits are known by the equipment manufacturer and where its use within such limits is acceptable by the Underwriters Laboratories.
The component is not approved as a “Product for general use” because its manufacturing characteristics are incomplete or its application possibilities are limited.
A “Recognized” component does not necessarily carry the approval symbol.

**“Listed” (UL)** The component conforms to all the requirements of the classification applicable to it and may therefore be used both as a “Product for general use” and as a component in assembled equipment.
A “Listed” component must carry the approval symbol.

## Marine classification authorities

Prior approval by certain marine classification authorities is generally required for electrical equipment which is intended for use on board merchant vessels.

| Code | Classification authority | Country |
|---|---|---|
| **BV** | Bureau Veritas | France |
| **DNV** | Det Norske Veritas | Norway |
| **GL** | Germanischer Lloyd | Germany |
| **LROS** | Lloyd's Register of Shipping | Great Britain |
| **NKK** | Nippon Kaiji Kyokaï | Japan |
| **RINA** | Registro Italiano Navale | Italy |
| **RRS** | Register of Shipping | Russia |

## Note

For further details on a specific product, please refer to the “Characteristics” pages in this catalogue or consult your Regional Sales Office.

## Degrees of protection against the penetration of solid bodies, water and personnel access to live parts

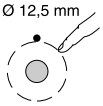
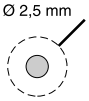
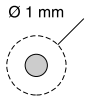
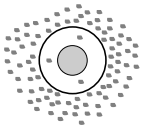
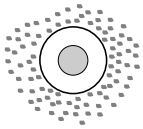
The European standard EN 60529 dated October 1991, IEC publication 529 (2nd edition - November 1989), defines a coding system (IP code) for indicating the degree of protection provided by electrical equipment enclosures against accidental direct contact with live parts and against the ingress of solid foreign objects or water.
This standard does not apply to protection against the risk of explosion or conditions such as humidity, corrosive gasses, fungi or vermin.
Certain equipment is designed to be mounted on an enclosure which will contribute towards achieving the required degree of protection (example : control devices mounted on an enclosure).
Different parts of an equipment can have different degrees of protection (example : enclosure with an opening in the base).
Standard NF C 15-100 (May 1991 edition), section 512, table 51 A, provides a cross-reference between the various degrees of protection and the environmental conditions classification, relating to the selection of equipment according to external factors.
Practical guide UTE C 15-103 shows, in the form of tables, the characteristics required for electrical equipment (including minimum degrees of protection), according to the locations in which they are installed.

### IP ●●● code

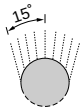
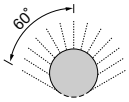
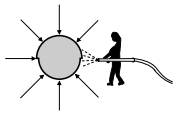
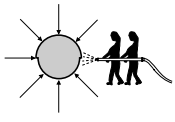
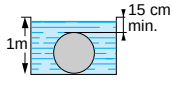
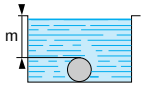
The IP code comprises **2 characteristic numerals** (e.g. **IP 55**) and may include **an additional letter** when the actual protection of personnel against direct contact with live parts is better than that indicated by the first numeral (e.g. IP 20C).

Any characteristic numeral which is unspecified is replaced by an X (e.g. IP XXB).

**1st characteristic numeral :** corresponds to **protection of the equipment against penetration of solid objects** and **protection of personnel against direct contact with live parts.**

| | Protection of the equipment | | Protection of personnel |
|---|---|---|---|
| 0 | Non-protected | | Non-protected |
| 1 |  | Protected against the penetration of solid objects having a diameter greater than or equal to 50 mm. | Protected against direct contact with the back of the hand (accidental contacts). |
| 2 |  | Protected against the penetration of solid objects having a diameter greater than or equal to 12.5 mm. | Protected against direct finger contact. |
| 3 |  | Protected against the penetration of solid objects having a diameter greater than or equal to 2.5 mm. | Protected against direct contact with a Ø 2.5 mm tool. |
| 4 |  | Protected against the penetration of solid objects having a diameter > 1 mm. | Protected against direct contact with a Ø 1 mm wire. |
| 5 |  | Dust protected (no harmful deposits). | Protected against direct contact with a Ø 1 mm wire. |
| 6 |  | Dust tight. | Protected against direct contact with a Ø 1 mm wire. |

**2nd characteristic numeral :** corresponds to **protection of the equipment against penetration of water with harmful effects.**

| | | |
|---|---|---|
| 0 | Non-protected | |
| 1 |  | Protected against vertical dripping water, (condensation). |
| 2 |  | Protected against dripping water at an angle of up to 15°. |
| 3 |  | Protected against rain at an angle of up to 60°. |
| 4 |  | Protected against splashing water in all directions. |
| 5 |  | Protected against water jets in all directions. |
| 6 |  | Protected against powerful jets of water and waves. |
| 7 |  | Protected against the effects of temporary immersion. |
| 8 |  | Protected against the effects of prolonged immersion under specified conditions. |

# Degrees of protection against mechanical impact

The European standard EN 50102 dated March 1995 defines a coding system (IK code) for indicating the degree of protection provided by electrical equipment enclosures against external mechanical impact.
Standard NF C 15-100 (May 1991 edition), section 512, table 51 A, provides a cross-reference between the various degrees of protection and the environmental conditions classification, relating to the selection of equipment according to external factors.
Practical guide UTE C 15-103 shows, in the form of tables, the characteristics required for electrical equipment (including minimum degrees of protection), according to the locations in which they are installed.

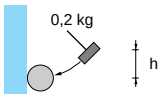
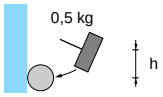
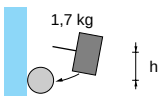
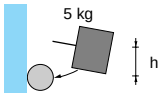
**Additional letter :** corresponds to **protection of personnel against direct contact with live parts**.

| | |
|---|---|
| A | With the back of the hand. |
| B | With the finger. |
| C | With a Ø 2.5 mm tool. |
| D | With a Ø 1 mm wire. |

## IK ●● code

The IK code comprises **2 characteristic numerals** (e.g. **IK 05**).

**2 characteristic numerals :** corresponding to a **value of impact energy**.

| | | h (cm) | Energy (J) |
|---|---|---|---|
| 00 | Non-protected | | |
| 01 |   | 7.5 | 0.15 |
| 02 | | 10 | 0.2 |
| 03 | | 17.5 | 0.35 |
| 04 | | 25 | 0.5 |
| 05 | | 35 | 0.7 |
| 06 |   | 20 | 1 |
| 07 | | 40 | 2 |
| 08 |   | 30 | 5 |
| 09 |   | 20 | 10 |
| 10 | | 40 | 20 |