Smart relays
**Zelio Logic**
Your *advanced* solution!

*a brand of*
**Schneider**
Electric

**Telemecanique**

# Contents

# Zelio Logic smart relays

# 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** | 14102/12 | 14102/12 | 14102/12 | 14102/12 | 14102/12 |

*(1) FBD: Function Block Diagram*
▲ Available: 1st quarter 2004.

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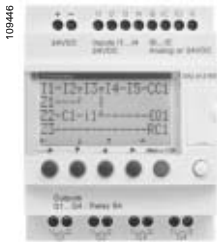| 10 | 26 |
|---|---|
| 6 (4) | 16 (6) |
| 4 | 10 |
| ⎓ 24 V, ∿ 24 V, ∿ 100...240 V | |
| Yes (6, 10 or 14 I/O) | |
| Yes | |
| Yes | |
| Yes | |
| LADDER / FBD *(1)* | |
| **SR3 B10●●●** | **SR3 B26●●●** |
| 14102/13 | 14102/13 |

*(1) FBD: Function Block Diagram*

# Zelio Logic smart relays
Compact and modular smart relays



*SR2 B121BD*

## 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*



**1** Modular smart relay
(10 or 26 I/O)
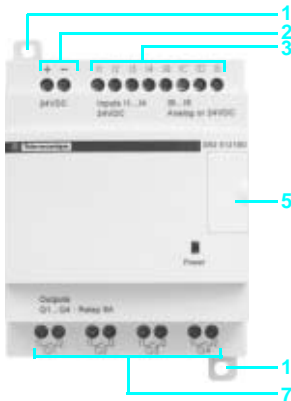**2** I/O extension module
(6,10 or 14 I/O)

▲ Available 1st quarter 2004.
▲▲ Available 2nd quarter 2004.

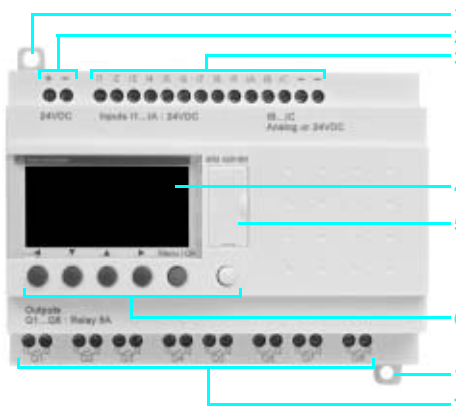Telemecanique

# 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
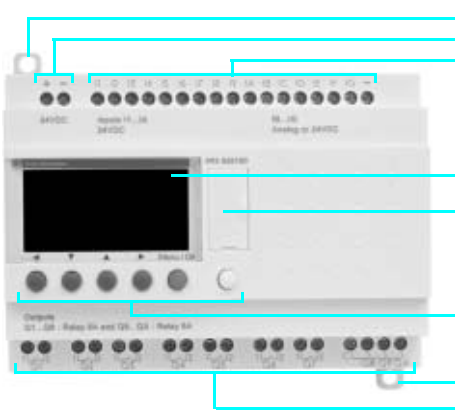


Modular smart relays have the following on the front panel:

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
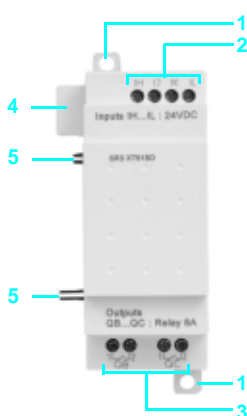


### 10 and 14 I/O
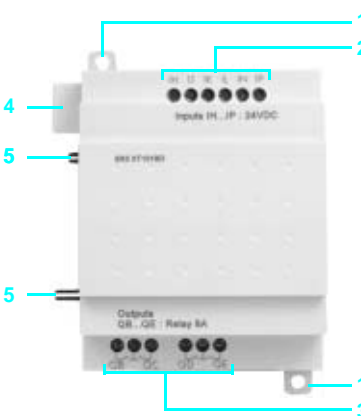


I/O extension modules have the following on the front panel:

1 Two retractable fixing lugs
2 Terminals for connection of the inputs
3 Terminals for connection of the outputs
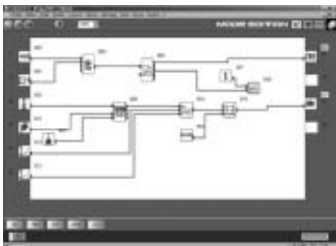4 A connector for connection to the smart relay (powered by the smart relay)
5 Locating pegs

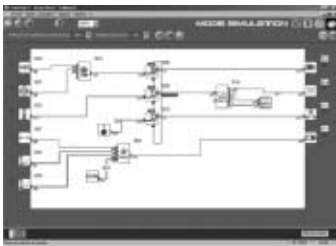# Zelio Logic smart relays
Compact and modular smart relays
"Zelio Soft for PC" programming software


*Programming in LADDER language*


*Programming in FBD language*


*"Simulation" mode*


*"Monitoring" window*

## "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).

*Presentation*

# 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 (1/10th 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. 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. 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 A•C — Timer. Function A/C — ON-delay and OFF delay | **TIMER BH** — TIMER B/H — Timer. Function BH. (Adjustable pulsed signal) | **TIMER BW** — TIMER BW — Timer - Function BW (pulse on rising/falling edge) |
| **TIMER Li** — TIMER Li — Pulse generator — ON-delay, OFF delay | **BISTABLE** — BISTABLE — Impulse relay function | **SET- RESET** — Bistable latching - Priority assigned either to SET or RESET function |
| **BOOLEAN** — BOOLEAN — Allows logic equations to be created between connected inputs | **CAM** — CAM — Cam programmer | **PRESET COUNT** — PRESET COUNT — Up/down counter |
| **UP DOWN COUNT** — UP DOWN COUNT — Up/down counter with external preset | **PRESET H-METER** — PRESET H•METER — Hour counter (hour, minute preset) | **TIME PROG** — TIME PROG — Time programmer, weekly and annual |
| **GAIN** — GAIN — Allows conversion of an analogue value by change of scale and offset. | **TRIGGER** — TRIGGER — Defines an activation zone with hysteresis. | **MUX** — MUX — Multiplexing functions on 2 analogue values |
| **COMP IN ZONE** — MAX VAL MIN — Zone comparison (Min. ⩽ Value ⩽ Max.) | **ADD/SUB** — Add and/or subtract function | **MUL/DIV** — Multiply and/or divide function |
| **DISPLAY** — DISPLAY — Display of digital and analogue data, date, time, messages for Human-Machine interface. | **COMPARE** — COMPARE — Comparison of 2 analogue values using the operands =, >, <, ⩽, ⩾. | **STATUS** — STATUS — Access to smart relay status |
| **ARCHIVE** — ARCHIVE — Storage of 2 values simultaneously | **SPEED COUNT** — SPEED COUNT — Fast counting up to 1 kHz | |

### SFC functions (2) (GRAFCET)

| | | |
|---|---|---|
| **RESET-INIT** — RESET-INIT — Reinitialisable step | **INIT STEP** — INIT STEP — Initial step | **STEP** — STEP — SFC step |
| **DIV-OR 2** — DIV-OR 2 — Divergence to OR | **CONV-OR 2** — CONV-OR 2 — Convergence to OR | **DIV-AND 2** — DIV-AND 2 — Divergence to AND |
| **CONV-AND 2** — CONV-AND2 — Convergence to AND | | |

### Logic functions

| | | |
|---|---|---|
| **AND** — AND — AND function | **OR** — OR — OR function | **NAND** — NAND — NOT AND function |
| **NOR** — NOR — NOT OR function | **XOR** — XOR — Exclusive OR function | **NOT** — NOT — NOT function |

*(1) Functional Block Diagram.*
*(2) Sequential Function Chart.*

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# 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 (open equipment) |
| Conformity with the EMC directive | Conforming to 89/336/EEC | | EN 61131-2 (Zone B) 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 ($\sim$) | | 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 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 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 |
| Nominal input current with extensions | | mA | 144 | 250 |
| Power dissipated | | W | 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 |
| Nominal input current with extensions | | mA | – | – | – | – | 100 | 160 | 300 | 180 |
| Power dissipated | | W | 3 | 3 | 6 | 3 | 3 | 4 | 6 | 5 |
| Power dissipated with extensions | | W | – | – | – | – | 8 | 8 | 10 | 10 |
| Micro-breaks | Permissible duration | ms | ⩽ 1 (repeated 20 times) | | | | | | | |
| Protection | | | Against polarity inversion | | | | | | | |

## $\sim$ 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 | | 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 | 160 | 280 |
| Nominal input current with extensions | | mA | – | – | 280 | 415 |
| Power dissipated | | VA | 4 | 6 | 4 | 7.5 |
| Power dissipated with extensions | | VA | – | – | 7,5 | 10 |
| Micro-breaks | Permissible duration | ms | ⩽ 10 (repeated 20 times) | | | |
| rms insulation voltage | | V | 1780 (50-60 Hz) | | | |

# Zelio Logic smart relays
Compact and modular smart relays

## ∿ 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 | | 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 |
| Nominal input current with extensions | | mA | – | – | – | 80/40 | 80/60 |
| Power dissipated | | VA | 7 | 7 | 11 | 7 | 12 |
| 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...50 |
| 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) 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 |

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# Zelio Logic smart relays
Compact and modular smart relays

## 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. ∿ 24...250 | ⎓ 5...150. ∿ 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.*

# Zelio Logic smart relays
## Compact and modular smart relays

### Electrical durability of relay outputs
(in millions of operating cycles, conforming to IEC 60947-5-1)

**d.c. loads**

**DC-12** *(1)*
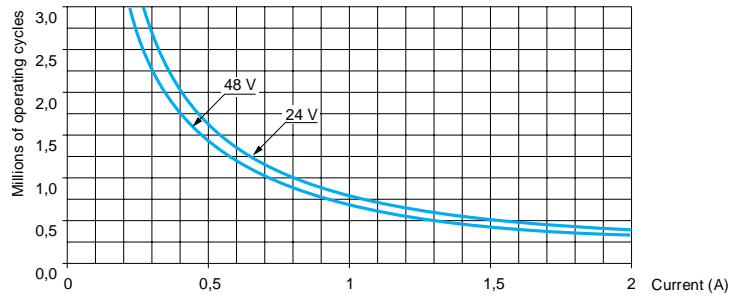


**DC-13** *(2)*
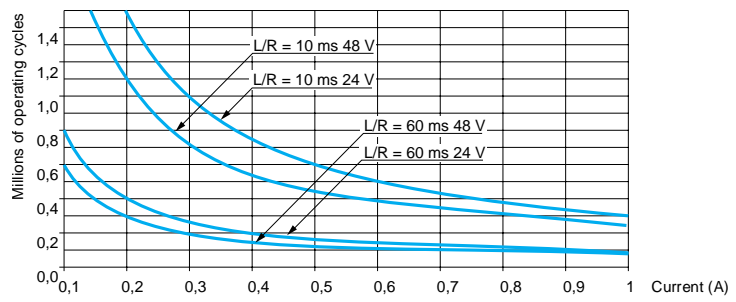


*(1) DC-12: switching resistive loads and photo-coupler isolated solid state loads, L/R ≤ 1ms.*
*(2) DC-13: switching electromagnets, L/R ≤ 2 x (Ue x Ie) in ms, Ue: Rated operational voltage, Ie: rated operational current (with protection diode on load, use the DC-12 curves and apply a coefficient of 0.9 to the millions of operating cycles value).*

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# Zelio Logic smart relays
Compact and modular smart relays

**Electrical durability of relay outputs** (continued)
(in millions of operating cycles, conforming to IEC 60947-5-1)

**a.c. loads**

**AC-12** *(1)*
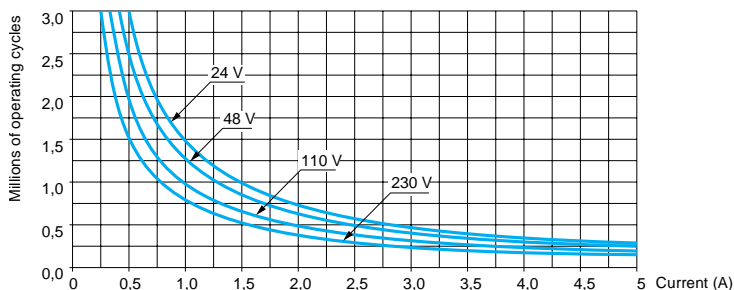


**AC-14** *(2)*
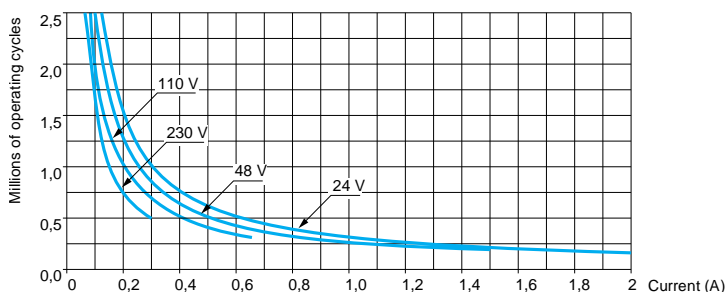


**AC-15** *(3)*
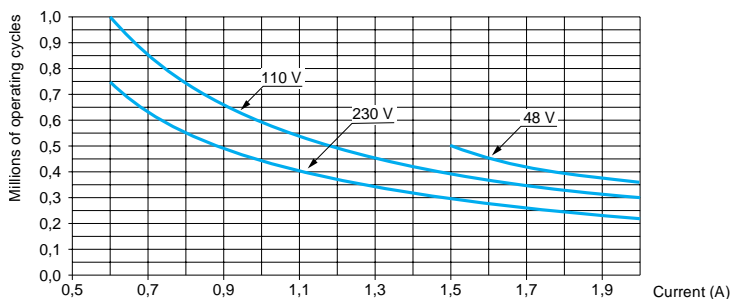


*(1) AC-12: switching resistive loads and photo-coupler isolated solid state loads, cos ≥ 0.9.*
*(2) AC-14: switching small electromagnetic loads whose power drawn with the electromagnet closed is ≤ 72 VA, making: cos = 0.3, breaking: cos = 0.3.*
*(3) AC-15: switching electromagnetic loads whose power drawn with the electromagnet closed is > 72 VA, making: cos = 0.7, breaking: cos = 0.4.*

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*SR2 A201BD*



*SR2 E121BD*



*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.*

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# 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
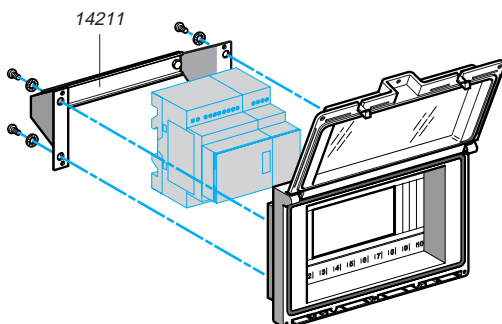Separate components



*SR2 SFT01*



*SR2 MEM01*          *SR2 COM01*



*ABL 7RM1202*

## "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 the PC (SUB-D, 9-way connector) and the smart relay, length: 3 m | SR2 CBL01 | 0.150 |
| **Interface** for USB port (for use with cable **SR2 CBL01**), length: 1.8 m | SR2 CBL06 | 0.350 |

## 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 | | Output signal | Reference | Weight kg |
|---|---|---|---|---|---|
| | °C | °F | | | |
| **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 |

## Mounting accessories *(4)*

| Description | Reference | Weight kg |
|---|---|---|
| **Dust and damp-proof enclosure for mounting through a door** with split blanking cover arrangement, fitted with an IP 55 dust and damp-proof window with hinged flap. Mounting capacity: - 1 or 2 SR2 modules with 10 or 12 I/O, or - 1 SR2 module with 20 I/O, or - 1  SR3 module with 10 I/O + 1 I/O extension module (6 or 10 or 14 I/O, or - 1 SR3 module with 26 I/O + 1 I/O extension module 6 I/O. | 14210 | 0.350 |
| **Fixing bracket and symmetrical mounting rail** for mounting enclosure **14210** through a door panel. | 14211 | 0.210 |

## 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.*
*(4) Products marketed under the Merlin Gerin brand.*



*14211*

*14210*

▲ Available: 2<sup>nd</sup> quarter of 2004.

# Zelio Logic smart relays
Compact and modular smart relays

## 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) |
|---|---|
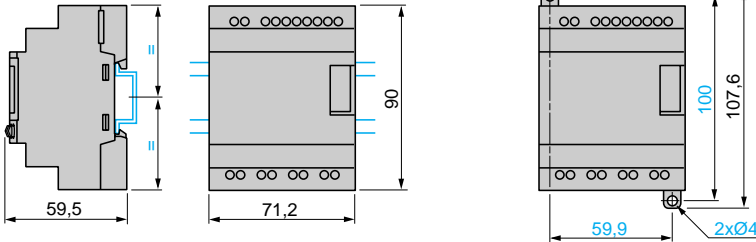
**SR2 B201JD, SR2 A201BD, SR2 B20●BD, SR2 B201B, SR2 A201FU, SR2 B201FU, SR2 D201BD, SR2 E201BD, SR2 E201B,**
**SR2 D201FU and SR2 E201FU (20 I/O)**
**SR3 B26●BD and SR3 B261FU (26 I/O)**

| Mounting on 35 mm ⌐⌐ rail | Screw fixing (retractable lugs) |
|---|---|
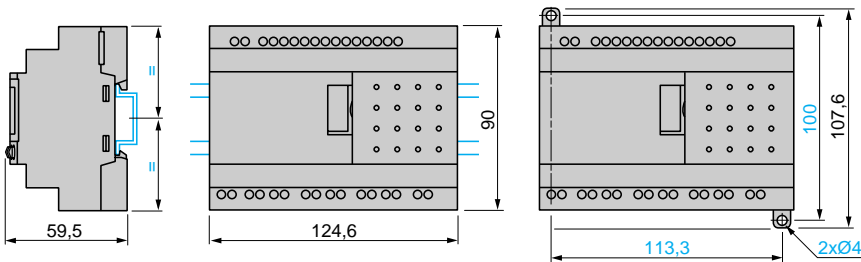
## I/O extension modules

**SR3 XT61●● (6 I/O), SR3 XT101●● and SR3 XT141●● (10 and 14 I/O)**
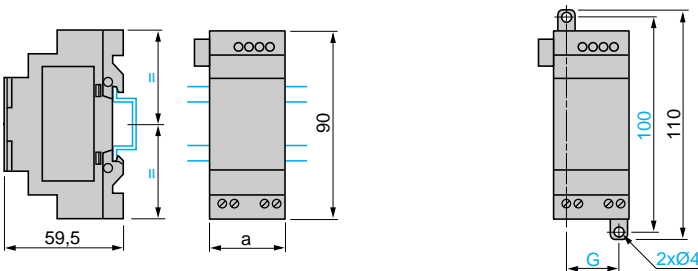
| Mounting on 35 mm ⌐⌐ rail | Screw fixing (retractable lugs) |
|---|---|

| SR3 | a | G |
|---|---|---|
| XT61●● | 35,5 | 25 |
| XT101●● | 72 | 60 |
| XT141●● | 72 | 60 |

## Enclosure + fixing bracket
**14210 and 14211**

Cut-out

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# Zelio Logic smart relays
## Compact and modular smart relays

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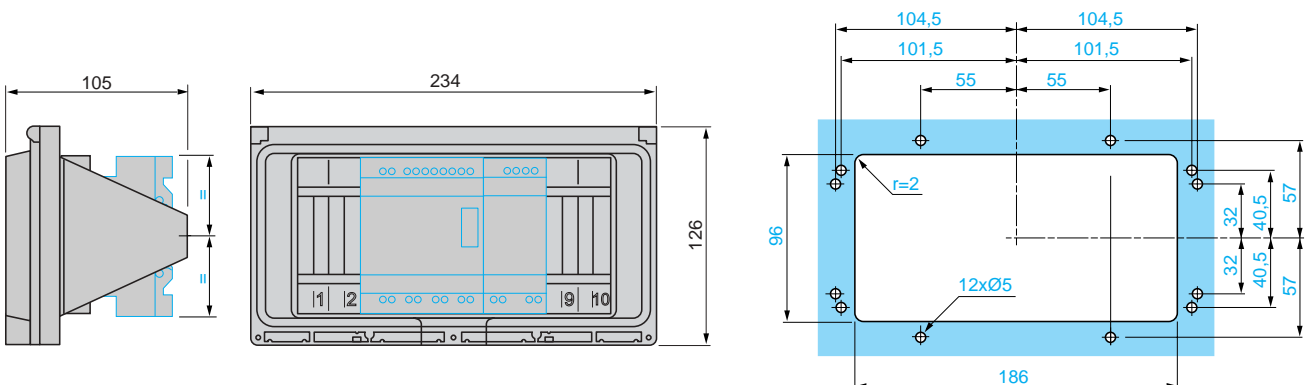
## Input connections

### 3-wire sensors

**SR2 ●●●●BD,  SR2 B121JD and SR3 ●●●●BD**

+ *(1)*

SR2 ●●●●BD
⎓ 24 V
SR2 B121JD
⎓ 12 V
SR3 ●●●●BD
⎓ 24 V
−

BL ◇ BN BL ◇ BN

BK      BK

+ − I1 I2 I3 I4 IB IC ID IE

Q1   Q2   Q3   Q4
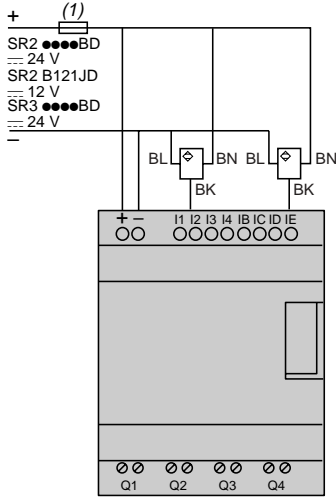
*(1) 1 A quick-blow fuse or circuit-breaker.*

### Analogue inputs

| **SR2 B12●BD, SR2 B121JD and SR3 B10●BD** | **SR2 B201BD, SR3 B26●BD and SR2 B201JD** |
|---|---|
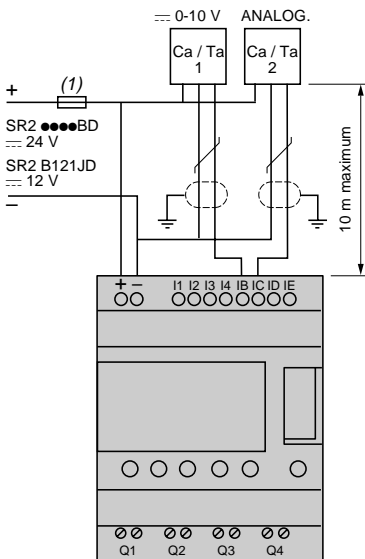
⎓ 0-10 V     ANALOG.

Ca / Ta 1     Ca / Ta 2

+ *(1)*

SR2 ●●●●BD
⎓ 24 V

SR2 B121JD
⎓ 12 V

−

10 m maximum

+ − I1 I2 I3 I4 IB IC ID IE

Q1   Q2   Q3   Q4

*(1) 1 A quick-blow fuse or circuit-breaker.*

⎓ 0-10 V     ANALOG.

Ca / Ta 1     Ca / Ta 2

+ *(1)*

SR2 B201BD
SR3 B26●BD
⎓ 24 V
SR2 B201JD
⎓ 12 V

−

10 m maximum

+ − I1 I2 I3 I4 I5 I6 IB IC ID IE IF IG − −

*(1) 1 A quick-blow fuse or circuit-breaker.*

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# Zelio Logic smart relays
Compact and modular smart relays

## Connection of smart relays on ⎓ supply

| SR2 ●●●●BD, SR2 B121JD, SR2 ●201BD and SR3 B10●●● | SR2 B122BD and SR2 B202BD, SR3 B102BD and SR3 B262BD |
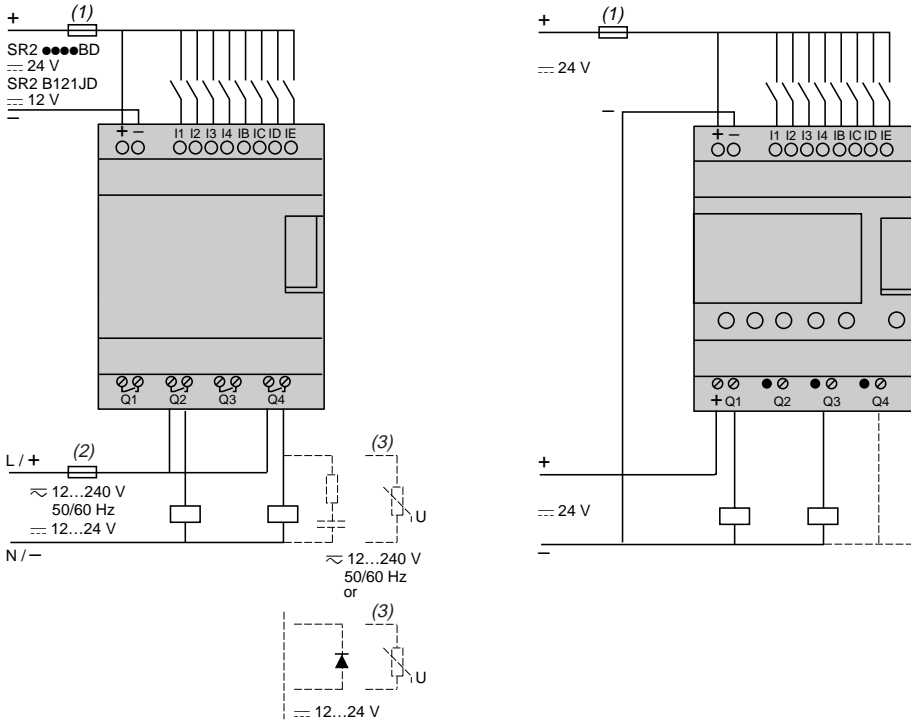


(1) 1 A quick-blow fuse or circuit-breaker.
(2) Fuse or circuit-breaker.
(3) Inductive load.

(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 |
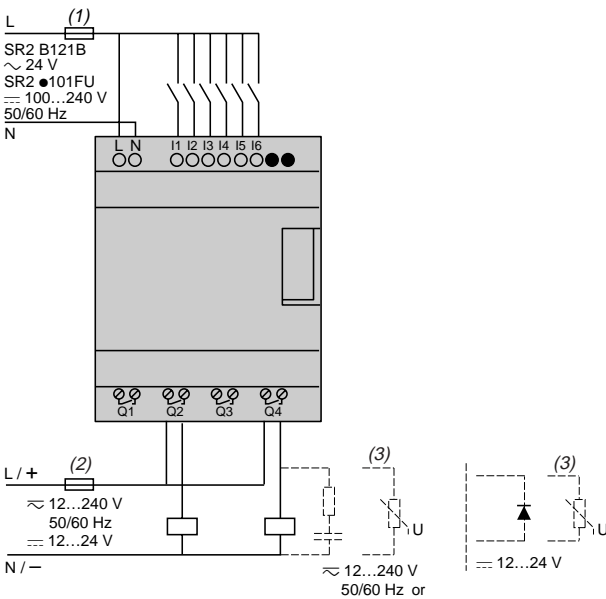


(1) 1 A quick-blow fuse or circuit-breaker.
(2) Fuse or circuit-breaker.
(3) Inductive load.

# 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 $\mu$V/°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 $\mu$V (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**.

### 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.



*RMT J40BD*



*RMT K90BD*

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# Analogue interfaces
## Zelio Analog
Converters for thermocouples and Pt100 probes
Voltage/current converters



*RMP T70BD*



*RMC A61BD*



*RMC L55BD*

### 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 allow Pt100 probes to be wired in 2, 3 and 4-wire mode.

### 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 ($\sim$ 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 ($\sim$ or $=$)
□ for outputs, a voltage/current range:
  - 0...10 V, 0...20 mA, 4...20 mA.

### Description
Zelio Analog converters have the following on their front panel, depending on the model:
**1** Two terminals for $=$ 24 V supply connection
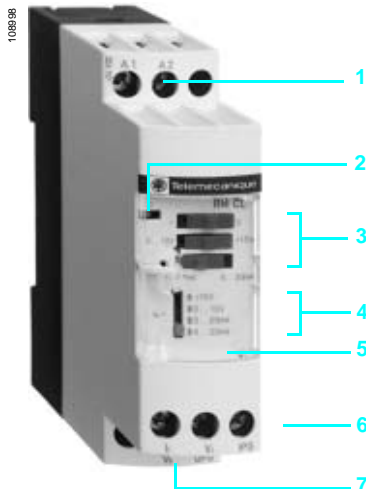**2** A 'Power ON' LED
**3** Three input selector switches (depending on model)
**4** An output selector switch (depending on model)
**5** A sealable protective cover
**6** A screw terminal block for inputs
**7** A screw terminal block for outputs.

# 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: voltage = - 13 V 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) | | | | |

# Analogue interfaces
Zelio Analog
Converters for thermocouples and Pt100 probes
Voltage/current converters

## Specific characteristics

| 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: voltage = - 13 V 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) ± 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 | | | | |

## Specific characteristics

| 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 ⎓ or ∿ 50/60 Hz | – |
| | Current | mA | 4...20 | 0...20; 4...20 | – | – |
| | | A | – | – | – | 0...1.5; 0...5; 0...15 ⎓ 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: | | | |
| | | | voltage: - 2.5 V current: 6 mA | voltage: - 10…+ 10 V = -10 V 0…+ 10 V = 0 V current: 0…20 mA = 0 mA 4…20 mA  = 4 mA | voltage: 0 V current: 0…20 mA = 0 mA 4…20 mA  = 4 mA | |
| **Supply** | | | | | | |
| Voltage | Rated | V | ⎓ 24 ± 20 % 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 %) 0...5 A: 1000 (0.1 %) 0..0.15 A: 2000 (0.2 %) |

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# Analogue interfaces

Zelio Analog
Converters for thermocouples and Pt100 probes
Voltage/current converters

RMT J40BD

RMT K90BD

RMP T70BD

RMP T13BD

RMC N22BD

RMC L55BD

RMC A61BD

## Converters for J and K type thermocouples

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range | | Switchable output signal | Reference | Weight kg |
|------|------|------|------|------|------|
| | °C | °F | | | |
| **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 |

## Converters for Universal Pt100 probes

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range | | Switchable output signal | Reference | Weight kg |
|------|------|------|------|------|------|
| | °C | °F | | | |
| **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 |

## Converters for Optimum Pt100 probes (1)

**Supply voltage ⎓ 24 V ± 20 %, non isolated**

| Type | Temperature range | | Output signal | Reference | Weight kg |
|------|------|------|------|------|------|
| | °C | °F | | | |
| **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 |

## 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 |

## 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.*

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# Analogue interfaces
Zelio Analog
Converters for thermocouples and Pt100 probes
Voltage/current converters

## Dimensions, mounting

### RMT ●●●●●/RMP ●●●●●/RMC ●●●●●

RMT ●●●●●●    RMC A61BD
RMP ●●●●●●
RMC ●●●●●●
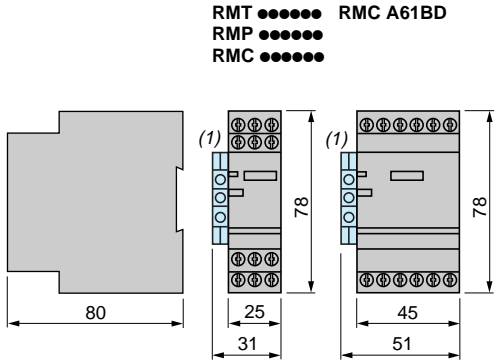
Mounting on rails AM1 ●●●●●

Panel mounting

2x∅4

90

78

78

80

25

31

45

51

90,5    90,5    83
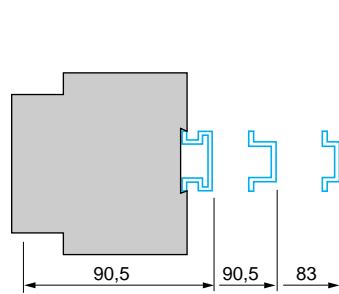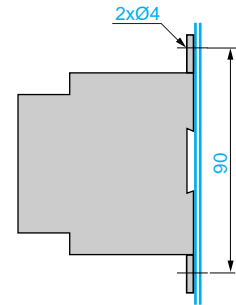
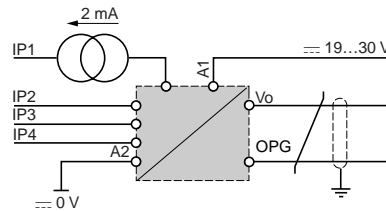*(1) Terminal block AB1 RRTP435U or AB1 RRTP435U2.*

## Schemes

### RMT J●●●●, RMT K●●●●

19…30 V

Type
J or K
(+) IP2
(−) IP1

A1

A2

Vo

OPG

0 V

### RMP T●0BD

2 mA

IP1

IP2
IP3
IP4

A1

A2

19…30 V

Vo

OPG

0 V

### RMP T●3BD

2 mA

IP1

IP2
IP3
IP4

A1

A2

19…30 V

Vo

Io

OPG

*(1)*
*(1)*
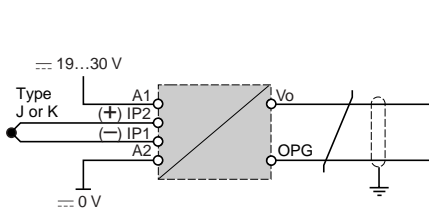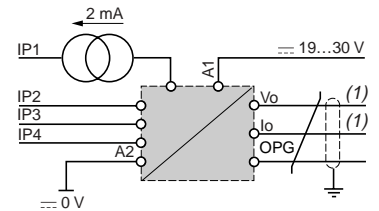
*(1) Use one output only.*

### Input connections on RMP T●●●●●

2-wire type
RL1 + RL2 ≤ 200 mΩ

RL1   IP1

IP2

IP3

RL2   IP4
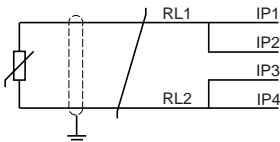
3-wire type
RL1 = RL2 = RL3
RL1 + RL2 ≤ 200 Ω
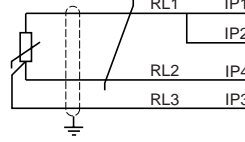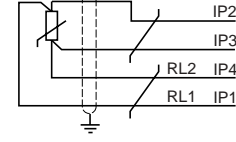
RL1   IP1

IP2

RL2   IP4

RL3   IP3

4-wire type
RL1 + RL2 ≤ 200 Ω

IP2

IP3

RL2   IP4

RL1   IP1

### RMC ●●●●●

#### RMC N22BD

19…30 V

4…20 mA

A1
Ii
IPG

A2

Vo

OPG

0 V

19…30 V

0…10 V

A1
Vi
IPG

A2

Io

OPG

0 V

#### RMC L55BD

A1

A2

19…30 V

0 V

*(1)*

I

V

*(1)*

Vi

Ii

IPG

Vo

OPG

*(1) Use one input only.*

#### RMC V60BD

A1

A2

19…30 V

0 V

*(1)*
*(1)*
*(1)*

V1

V2

V3

IPG

Vo

OPG

*(1) Use one input only.*

#### RMC A61BD

A1

A2

19…30 V

0 V

*(1)*
*(1)*
*(1)*

I1

I2

I3

Icom

Vo

Io1

Io2

OPG

*(2)*
*(2)*
*(2)*
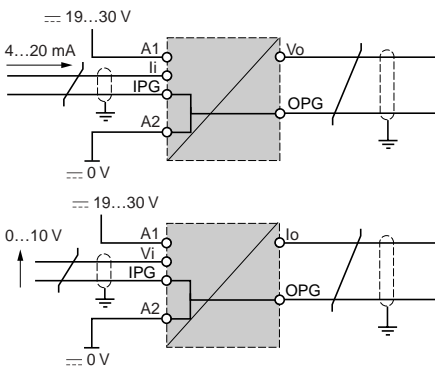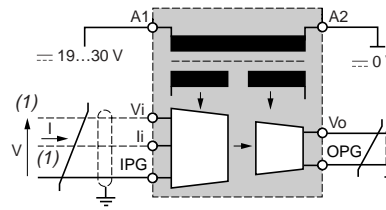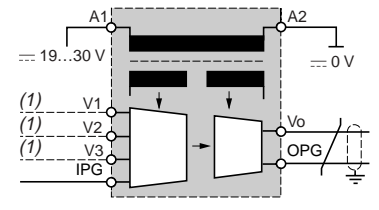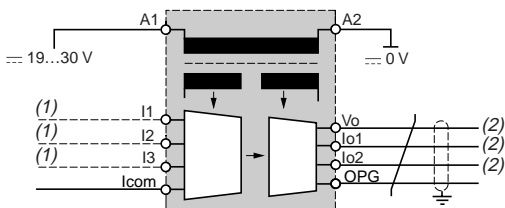
*(1) Use one input only.*
*(2) Use one output only.*

Telemecanique

# Power supplies and transformers
Phaseo modular regulated power supplies

## ABL 7RM modular switch mode power supplies

The ABL 7RM range of power supplies is designed to provide the d.c. voltage necessary for the control circuits of control system equipment. Comprising 2 products, this range meets the needs encountered in industrial, commercial and residential applications. These single-phase, modular, electronic switch mode power supplies provide a quality of output current which is suitable for the loads supplied and compatible with the Zelio logic range, making them ideal partners. Clear guidelines are given on selecting the upstream protection devices which are often used with them, and thus a comprehensive solution is provided which can be used in total safety.

These switch mode power supplies are totally electronic and regulated. The use of electronics makes it possible to significantly improve the performance of these power supplies, which offer:
- very compact size,
- integrated overload, short-circuit, overvoltage and undervoltage protection,
- a very wide range of permissible input voltages, without any adjustment,
- a high degree of output voltage stability,
- good performance,
- considerably reduced weight,
- a modular format allowing integration into panels.

Phaseo power supplies are single-phase. They deliver a voltage which is precise to 3 %, whatever the load and whatever the type of mains supply, within a range of 85 to 264 V for single-phase. Conforming to IEC standards and UL and CSA certified, they are suitable for universal use. The inclusion of overload and short-circuit protection makes downstream protection unnecessary if discrimination is not required.

All the products are fitted with an output voltage adjustment potentiometer in order to be able to compensate for any line voltage drops in installations with long cable runs. These power supplies are designed for direct mounting on 35 and 75 mm ⌐ rails, or on a mounting plate by means of retractable fixing lugs.

These power supplies are single-phase and two references are available :

■ ABL 7RM2401 (24 V⎓/1.3 A).
■ ABL 7RM1202 (12 V⎓/1.9 A).

## Description
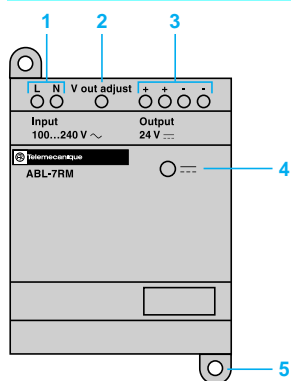


**1** 2.5 mm$^2$ screw terminal for connection of the incoming a.c. supply voltage.
**2** Output voltage adjustment potentiometer.
**3** 2.5 mm$^2$ screw terminal for connection of the output voltage.
**4** LED indicating presence of the d.c. output voltage.
**5** Retractable fixing lugs.

⊕ **Telemecanique**

# Characteristics

# Power supplies and transformers
## Phaseo modular regulated power supplies

## Technical characteristics

| Type of power supply | | | ABL 7RM1202 | ABL 7RM2401 |
|---|---|---|---|---|
| Approvals | | | UL - CSA - TÜV | |
| Conforming to standards | Safety | | IEC/EN 60950 - IEC/EN 61131-2/A11 | |
| | EMC | | EN 50081-1, IEC 61000-6-2 (EN 50082-2) | |

## Input circuit

| LED indication | | | no | no |
|---|---|---|---|---|
| Input voltage | Rated values | V | ∼ 100…240 | ∼ 100…240 |
| | Permissible values | V | ∼ 85…264 | ∼ 85…264 |
| | Permissible frequencies | Hz | 47…63 | 47…63 |
| | Efficiency at nominal load | | > 80% | > 80% |
| | Current consumption | A | 0.5 (100 V)/0.3 (240 V) | 0.6 (100 V)/0.4 (240 V) |
| | Current at switch-on | A | < 20 | < 20 |
| | Power factor | | 0.6 | 0.6 |

## Output circuit

| LED indication | | | Green LED | Green LED |
|---|---|---|---|---|
| Nominal output voltage | | V | ⎓ 12 | ⎓ 24 |
| Nominal output current | | A | 1.9 | 1.3 |
| Precision | Output voltage | | Adjustable 100 to 120 % | |
| | Line and load regulation | | ± 4 % | ± 3 % |
| | Residual ripple - interference | mV | 200 | 250 |
| Micro-breaks | Holding time for I max and Ve min | ms | > 10 | > 10 |
| Protection | Short-circuit | | Permanent/Thermal protection | |
| | Overcurrent, cold state | | < 1.7 In | < 1.6 In |
| | Undervoltage | V | < 10.5 | < 19 |

## Operating characteristics

| Connections | Input | mm² | 1 x 2.5 or 2 x 1.5 screw terminals | |
|---|---|---|---|---|
| | Output | mm² | 1 x 2.5 or 2 x 1.5 screw terminals | |
| Environment | Storage temperature | °C | -25 to +70 | |
| | Operating temperature | °C | -25 to +55 | |
| | Maximum relative humidity | | 95 % | |
| | Degree of protection | | IP2x | |
| | Vibrations | | EN 61131-2, IEC 68-2-6 test Fc | |
| Operating position | | | Vertical | |
| MTBF | | | Not available | |
| Connections | Series | | No | No |
| | Parallel | | Yes (same references) | Yes (same references) |
| Dielectric strength | Input/output | | 3000 VAC/50 Hz/1 min | |
| Protection class conforming to VDE 0106 1 | | | Class II without PE | |
| Input fuse incorporated | | | Yes (not interchangeable) | |
| Emissions | Conducted/radiated | | EN 50081-1 (generic standard), EN 55011, EN 55022 CI:B | |
| Immunity | Electrostatic discharge | | EN 61000-6-2 (generic standard), EN 61000-4-2 (4 kV contact/8 kV air) | |
| | Electromagnetic | | EN 61000-4-3 level 3 (10 V/m) | |
| | Conducted interference | | EN 61000-4-4 level 3 (2 kV), EN 61000-4-6 (10 V) | |
| | Mains interference | | EN 61000-4-11 | |

# Power supplies and transformers
Phaseo modular regulated power supplies

## Output characteristics

### Derating

The ambient temperature is a determining factor which limits the power that an electronic power supply can deliver continuously. If the temperature around the electronic components is too high, their life will be significantly reduced. Conversely, a power supply can deliver more than its rated power if the ambient temperature remains well below the nominal operating temperature.

The maximum ambient temperature for Phaseo power supplies is 55°C. Below this temperature, uprating is possible up to 110% of the nominal power.
The graph below shows the power (in relation to the nominal power) which the power supply can deliver continuously, according to the ambient temperature.
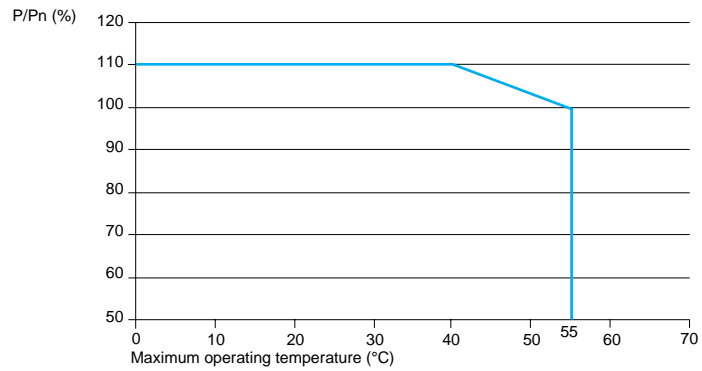


## Selection

### Upstream protection of power supplies

| Mains supply | ∼ 115 V single-phase | | | ∼ 230 V single-phase | | |
|---|---|---|---|---|---|---|
| Type of protection | Thermal-magnetic circuit-breaker | | Gg fuse | Thermal-magnetic circuit-breaker | | Gg fuse |
| Single-pole | GB2 CB●● | - | - | - | - | - |
| 2-pole | GB2 DB●● | C60N | - | GB2 DB●● | C60N | - |
| ABL 7RM2401 | GB2 CB/DB06 | MG24516 *(1)* 24184 | 1 A | GB2 CB/DB07 | MG24517 *(1)* 24185 | 1 A |
| ABL 7RM1202 | GB2 CB/DB06 | MG24516 *(1)* 24184 | 1 A | GB2 CB/DB07 | MG17453 *(1)* 24185 | 1 A |

*(1) UL certified circuit-breaker*

Telemecanique

# Power supplies and transformers
Phaseo modular regulated power supplies
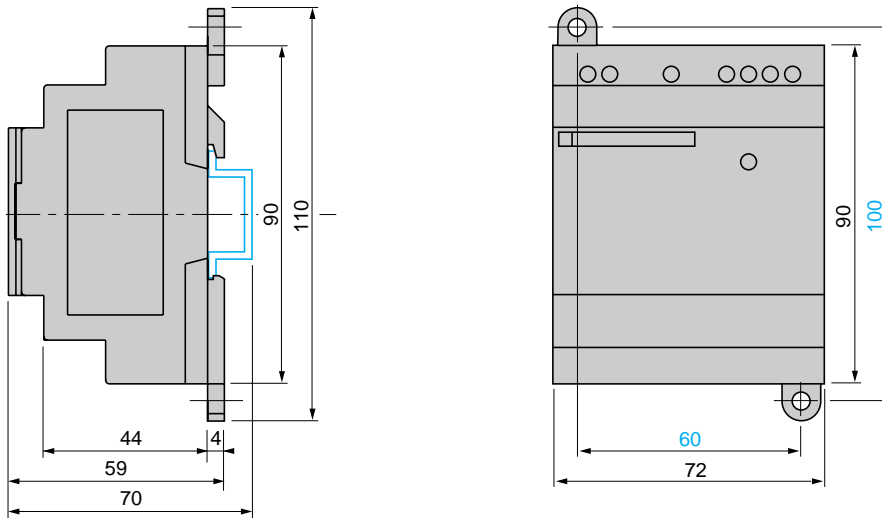
## ABL 7RM modular regulated switch mode power supplies

| Mains input voltage 47…63 Hz | Output voltage | Nominal power | Nominal current | Auto-protect reset | Reference | Weight |
|---|---|---|---|---|---|---|
| V | $=$ V | W | A | | | kg |
| **100…240** single-phase wide range | 12 | 22 | 1.9 | auto | **ABL 7RM1202** | 0.180 |
| | 24 | 30 | 1.3 | auto | **ABL 7RM2401** | 0.182 |

## Dimensions

**ABL 7RM●●●●  power supply**



## Scheme

**ABL 7RM●●●●**