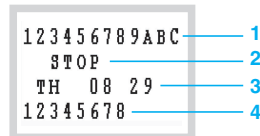# "Zelio Logic" programmable relays

Presentation

- The "Zelio Logic" Programmable relay is designed for use in small automated systems.
- It is suitable for use in both industrial sectors and commercial premises.
- Its compactness and ease of setting-up provide a competitive alternative to basic cable logic or specific card solutions.
- The ease of programming, ensured by the universality of the contact language, meets all automation requirements and also the needs of the electrician.
- The versions without display or buttons provide not only a competitively priced solution, but also the confidentiality of applications.
- Programming can be performed either locally, using keypad + LCD display, or by using "Zelio Soft" software.

Description

SR1-A, SR1-B
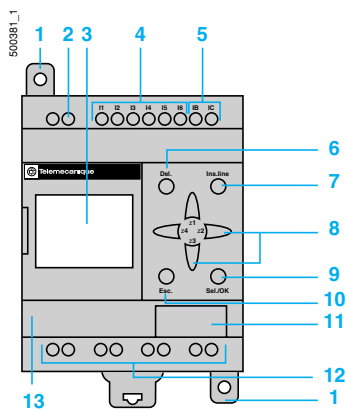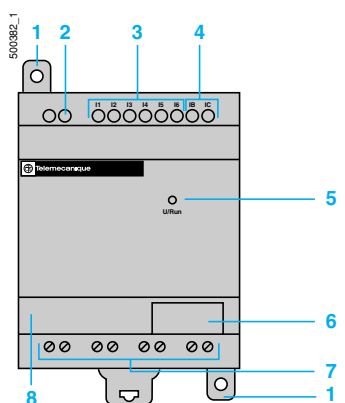

1 Retractable fixing lugs
2 Screw terminal supply connections
3 4 line, 12 character, LCD display
4 Screw terminal input connections
5 Screw terminal 0 – 10 V analogue input connections, suitable for discrete === (only applicable to SR1-B)
6 Cancellation button
7 Line insertion button
8 Navigation buttons or Z button after configuration
9 Selection and validation button
10 Escape button (Esc.)
11 Slot for memory back-up and for transfer from one product to another (optional) or for programmable relay/PC connecting cable.
12 Screw terminal relay output connections
13 Location for re-usable label

"Zelio Logic" main screen

1 Input status indication
2 Programmable relay RUN or STOP mode indication
3 Indication of a parameter (date and time by default for programmable relays with clock)
4 Output status indication

SR1-D, SR1-E

1 Retractable fixing lugs
2 Screw terminal supply connections
3 Screw terminal input connections
4 Screw terminal 0 – 10 V analogue input connections, suitable for discrete === (only applicable to SR1-E)
5 U/RUN: operating LED
   Steady: power on, Stop mode
   Flashing: Run mode
   Fast flashing: relay fault
6 Slot for memory back-up and for transfer from one product to another (optional) or for programmable relay/PC connecting cable
7 Screw terminal relay output connections
8 Location for re-usable label

Back-up memory

- Allows a programme to be copied into another programmable relay (examples: for building identical equipment, remote transmission of updates).
- The memory also allows a back-up copy of the programme to be saved prior to exchanging the product.
- When used with a programmable relay without display or buttons, the copy of the programme contained in the cartridge is automatically transferred into the programmable relay at power-up.

Telemecanique

Schneider Electric

Contact language

| Function	Electrical scheme	Ladder language	Zelio programmable relay symbol	Notes
Contact	N/O 14 13	⊣ ⊢	Ix Ix	I corresponds to the real state of the contact connected to the input of the programmable relay.
	or	or	ix or ix	i (or I) corresponds to the inverse state of the contact connected to the input of the programmable relay.
	N/C 22 21	⊣/⊢	Ix Ix	
			ix or ix	
Standard coil	A1 A2	⊣( )⊢	Qx	The coil is energised when the contacts to which it is connected are closed.
Latch coil (Set)	A1 A2	⊣(S)⊢	SQ	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)⊢	RQ	The coil is de-energised when the contacts to which it is connected are closed. It remains inactive when the contacts re-open.

Example

Cabled logic

2 alternatives with Zelio programmable relay

(1) KM1 = Q1

or
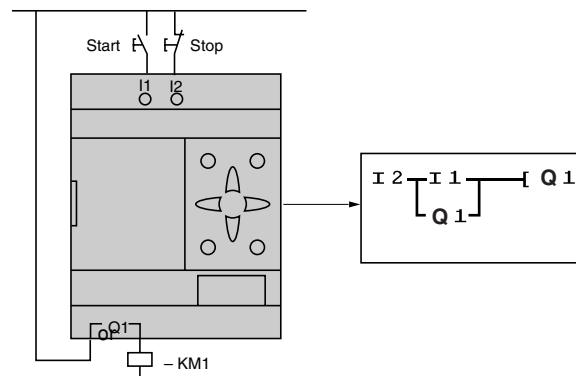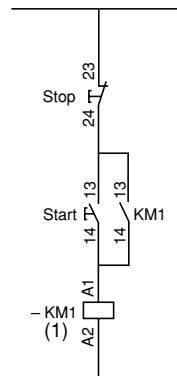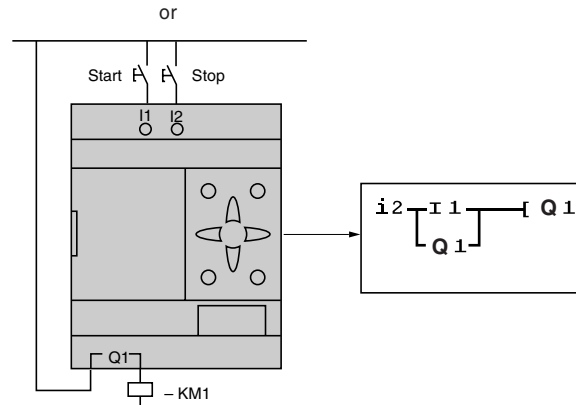
"Zelio Logic" programmable relays

Functions

The Zelio Logic programmable relay comprises:
- 8 **Time delay function** blocks, each with 8 choices of parametering,
- 8 **Counter function** blocks,
- 8 **Analogue function** blocks, each with 7 choices of comparator parametering,
- 4 **Clock function** blocks, each comprising 4 channels.

Time delay function block

```
T T 1    ┌─┐      a
R T .  ─┘  └─
   T .  ┌─t─┐
🔒  t = 0 0 . 0 0 s
```
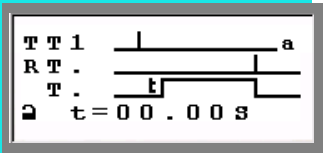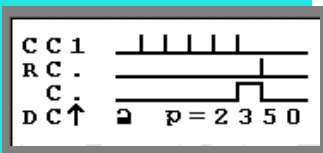
TT●: time delay control input
RT●: time delay reset to zero
T●: time delay output
a: Zelio symbol/type of time delay
s: time base
t 00.00: time delay value
🔒: locking of time delay value

```
I 3 ───────── T T 1
T 1 ──────────[ Q 3
■
```
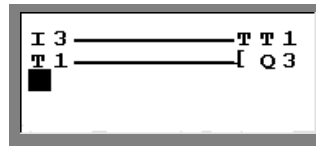
When inputting data to the **time delay function** block TT1, a window automatically opens for the inputting of the various parameters.

Counter function block

```
C C 1    ┌┐┌┐┌┐┌┐┌┐
R C .  ──┘└┘└┘└┘└┘└
   C .         ┌─┐
D C↑  🔒  p = 2 3 5 0
```

CC●: counting input
RC●: counter reset to zero
C●: counter output
DC●: count up/down selection
p: preset value
🔒: locking of preset counter value

```
I 1 ───────── C C 1
I 2 ───────── D C 1
```
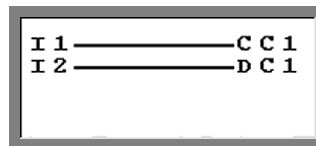
In the first programming line, each pulse at input I1 increments or decrements the counter C1.
Input I2 determines the counting direction, either up or down.

Clock function block

```
🕐1    M O    1 4 : 3 2
A B C D        M O→T H
▲        O N    0 7 : 3 5
🔒       O F F   2 0 : 1 8
```
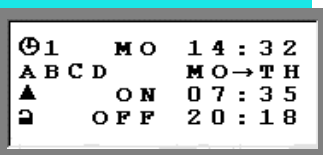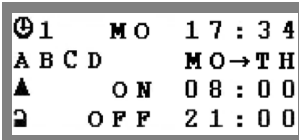
 : clock block output
ABCD: time zones
MO 14: 32: current date and time
MO –>TH: first day/last day
ON: start time
OFF: off time
🔒: locking of time zones

```
I 1 ─🕐1 ─────┬─[ Q 1
              │ C C 1
I 2 ─🕐1 ─────┤ C C 1
■             └─D C 1
```
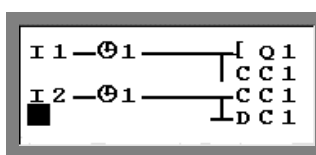
The insertion of the clock block will enable output Q1 to change state in accordance with the preset time zones.

Programming example with 2 time zones
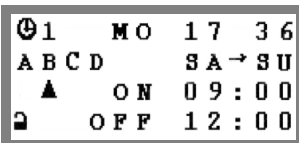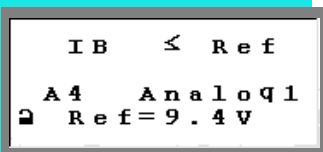Channel A time zone

```
🕐1    M O    1 7 : 3 4
A B C D        M O→T H
▲        O N    0 8 : 0 0
🔒       O F F   2 1 : 0 0
```

From Monday to Friday, the active time zone will be from 8: 00 (ON) until 21: 00 (OFF).

Channel B time zone

```
🕐1    M O    1 7   3 6
A B C D        S A→S U
   ▲     O N    0 9 : 0 0
🔒       O F F   1 2 : 0 0
```

For Saturday and Sunday, the active time zone will be from 9: 00 (ON) until 12: 00 (OFF)

Analogue function block

```
   I B    ≤  R e f

A 4    A n a l o q 1
🔒  R e f = 9 . 4 V
```

A4: analogue block output
Ref: reference voltage
IB ≤ Ref: type of operation available

🔒: locking of analogue block reference value

```
A 1 ──────────[ Q 4
                .
```
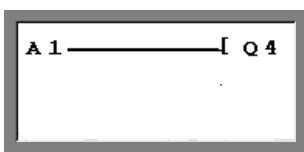
The analogue function block controls output Q 4 according to the result of the comparison.

```
   I C    ≥  R e f

A 1    A n a l o q 4
🔒  R e f = 6 . 4 V
```
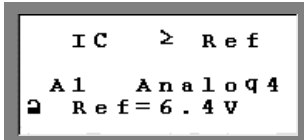
In this example, output Q 4 changes state when the value of the analogue input IC is greater than the 6.4 V reference voltage.

Telemecanique

Schneider Electric

Modes

Parametering mode

```
  T1=05:00M
> C1=0051
  A1=6.4V
  🕘1
```

This mode centralises all the parameters relating to unlocked function blocks that are used in the programme. Any of these parameters can be modified.

In this example, the user can modify:
- the preset time delay value T1,
- the preset counter value C1,
- the reference voltage of analogue block A1,
- the parameters of clock block n°1 (date, time zones).

Display mode

```
  PROGRAM.    ▲
  PARAMET.
> VISU.
  RUN/STOP    ▼
```

This mode enables display of the current values of the various function blocks used in the programme. It is also possible to select one of these values for display on the screen instead of the date and time.

In this example, the user has the option of displaying the current values of:
- the time delay T1,
- the analogue input IC,
- the counter C1.

```
  TH 10:44  ◆
  T1=00:00M
  C1=0000
> Ic=0.0V
```

```
123456789ABc
    STOP
    Ic=0.0V
12345678
```

The value IC has been selected for being permanently displayed on the main screen instead of the date and time.

Diagnostic mode

```
123456789ABc
|  RUN
   TH   11:01
12345678
```

This mode is accessible after the Zelio programmable relay is set to RUN.

Main screen

```
I3───────TT1
T1───────[ Q3
I1─🕘1────[ Q1
         CC1
```
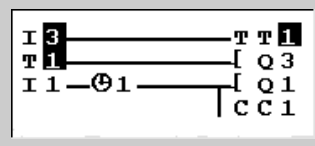
Programming screen

Changing to programming mode allows all the active and inactive elements of the programme to be displayed.
All active elements appear in reversed video.

"Zelio Logic" programmable relays

Environmental characteristics

Approvals			UL, CSA, C-TICK
Degree of protection			IP 20
Temperature	Operation	˚**C**	- 20...+ 55 conforming to IEC/EN 60068-2-1 and 60068-2-2
	Readability of display	˚**C**	0...+ 55 conforming to IEC/EN 60068-2-1 and 60068-2-2
	Storage	˚**C**	- 25...+ 70 (conforming to IEC/EN 61131-2)
Maximum relative humidity		**%**	95 without condensation or dripping water
Altitude		**m**	0…2000
Mechanical resistance	Immunity to vibrations		Conforming to standard IEC/EN 60068-2-6, test Fc
	Immunity to mechanical shock		Conforming to standard IEC/EN 60068-2-27, test Ea
Resistance to electrostatic discharge	Immunity to electrostatic discharge		Conforming to standard IEC/EN 61000-4-2, level 3 (1)
Resistance to HF interference	Immunity to electromagnetic radiated fields		Conforming to standard IEC/EN 61000-4-3, level 3 (1)
	Immunity to rapid, pulsed transients		Conforming to standard IEC/EN 61000-4-4, level 3 (1)
	Immunity to surges		Conforming to standard IEC/EN 61000-4-5
	Immunity to damped oscillatory waves		Conforming to standard IEC/EN 61000-4-12
Connection to screw terminals (Tightened using Ø 3.5 screwdriver)	Flexible cable with cable end	**mm²**	1 conductor: 0.14…1.5, cable: AWG26…AWG16 2 conductors: 0.14…0.75, cable: AWG26…AWG18
	Semi-rigid cable	**mm²**	1 conductor: 0.14…2.5, cable: AWG26…AWG14
	Rigid cable	**mm²**	1 conductor: 0.14…2.5, cable: AWG26…AWG14 2 conductors: 0.14…1.5, cable: AWG26…AWG16
	Tightening torque	**N.m**	0.6

Supply characteristics

Programmable relay type	**SR1-**		**B121JD**	**●1●1BD**	**●201BD**	**B122BD**	**●101FU**	**●201FU**
Primary	Nominal voltage	**V**	⎓ 12	⎓ 24			∼ 100...240	
Voltage limits	Including ripple	**V**	10.2...14.4	19.2…30			∼ 85…264	
Nominal frequency		**Hz**	–	–			50-60 (47...63)	
Nominal input current		**mA**	105	83	130	45	∼ 100 V ≤ 50 ∼ 240 V ≤ 27	∼ 100 V ≤ 80 ∼ 240 V ≤ 40
Heat dissipation		**W**	1.3	1.6	2.9	1.1	3	5.3
Micro-breaks	Acceptable duration		≤ 1 ms, repeated 20 times				≤ 10 ms, repeated 20 times	
Isolation voltage	Primary/earth	**Vrms**	–				2000 (50-60 Hz)	
Protection			Against polarity inversion				–	

Processing characteristics

Programmable relay type	**SR1-**		**B121JD, ●1●●BD, SR1-●101FU**	**●201BD, SR1-●201FU**
Number of control scheme lines			60	80
Maximum cycle time		**ms**	6	8
Response time (2)		**ms**	12 to 24 (**SR1**-**B121JD and ●1●●BD**) 20 to 40 (**SR1-●101FU**)	14 to 26 (**SR1-●201BD**) 22 to 42 (**SR1-●201FU**)
Back-up time in case of power failure	Day/time	**H**	≥ 72 to 40 ˚C only applicable to **SR1-B** and **SR1-E**	
	Programme and adjustments		For life, internal EEPROM	
Programme memory checking			At each power-up	

(1) Minimum level under test conditions defined by the standards
(2) Time between change of state of an input and change of state of an output directly linked by the programme in the same cycle.

"Zelio Logic" programmable relays

Discrete ⎓ 24 V input characteristics

Programmable relay type				SR1-●●●●BD	SR1-●●●●JD	SR1-●●●BD	SR1-●●●JD
	Input			I1 to IA		IB and IC	
Connection				Screw terminals		Screw terminals	
Nominal value of inputs	Voltage		**V**	24	12	24	12
	Current		**mA**	3	3	0.62	0.21
Input switching limit values	State 1	Voltage	**V**	≥ 15	≥ 6.5	≥ 9.9	≥ 9.9
		Current	**mA**	> 1.8	> 1.6	0.16	0.16
	State 0	Voltage	**V**	< 5	< 6.2	< 5	< 5
		Current	**mA**	< 0.5	< 1.5	0.08	0.08
Input impedance at state 1			**kΩ**	8	4	38	57
Configurable response time	State 0 to 1		**ms**	0.3 (fast)…3 (slow)		3 (not configurable)	
	State 1 to 0		**ms**	0.5 (fast)…5 (slow)		5 (not configurable)	
Conformity to IEC/EN 61131-2				Yes, type 1		No	
Sensor compatibility	3-wire			Yes PNP		Yes	
	2-wire			No		No	
Type of input				Resistive			
Isolation	Between supply and inputs			None			
	Between inputs			None			

AC (∿ 100…240 V) input characteristics

Programmable relay type				SR1-●●01FU
Connection				Screw terminals
Nominal value of inputs	Voltage		**V**	∿ 100…240
	Current	115 V	**mA**	0.65
		240 V	**mA**	1.3
	Frequency		**Hz**	47…63
Input switching limit values	At state 1	Voltage	**V**	≥ 79
		Current	**mA**	≥ 0.4 (U = 240 V)
	At state 0	Voltage	**V**	< 40
		Current	**mA**	< 0.3
Response time	State 0 to 1	50/60 Hz	**ms**	45…50 (U = 110 V), 85…90 (U = 240 V)
	State 1 to 0	50/60 Hz	**ms**	45…50 (U = 110 V), 18…22 (U = 240 V)
Isolation	Between supply and inputs			None
	Between inputs			None

Integral analogue input characteristics

Programmable relay type				SR1-B●●●●BD	SR1-B121JD
Analogue inputs	Number of channels			2	
	Voltage range of input		**V**	0…10	
	Input impedance		**kΩ**	62.5 to 10 V	
	Maximum non destructive voltage		**V**	± 30	± 15
Conversion	Resolution			8 bits	
	Conversion time			Relay cycle time	
	Precision	at 25 ˚C		± 1.6 % of the full range	
		at 60 ˚C		± 2.9 % of the full range	
	Repeat accuracy	at 55 ˚C		< 0.1 % of the full range	
Isolation	Between analogue channel & supply		**V**	None	
Cabling distance			**m**	10 max with screened cable (sensor not isolated)	

Relay output characteristics (screw terminal connections) (1)

Programmable relay type				SR1-B121JD, SR1-●1●1BD, SR1-●101FU	SR1-●201BD, SR1-●201FU
Number of outputs	Without common potential			4	8
Operating limit values			V	⎓ 5…150, ∿ 24…250	
Contact type				N/O	
Thermal current			A	8	
Electrical durability for 500,000 operating cycles	Utilisation category	DC-12	V	24	
			A	1.5	
		DC-13	V	24 V L/R = 10 ms	
			A	0.6	
		AC-12	V	230	
			A	1.5	
		AC-15	V	230	
			A	0.9	
Minimum switching capacity	At 5 V minimum voltage		mA	10	
Lower power switching reliability of contact				17 V - 5 mA Failure rate for 100 million operating cycles: 1	
Maximum operating rate	No-load		Hz	10	
	At Ie		Hz	0.5	
Mechanical life	In millions of operating cycles			10	
Rated impulse withstand voltage	Conforming to IEC/EN 60947-1		kV	2.5	
Response time	Trip		ms	10	
	Reset		ms	5	
Built-in protection	Against short-circuit			None. The use of a protection device (fuse or circuit-breaker) is recommended for each channel or group of channels	
	Against overvoltage and overload			None. Connect in parallel to the terminals of each preactuator an RC circuit, MOV (ZNO) suppressor or an appropriately sized diode for the voltage	

Transistor output characteristics (screw terminal connections)

| Programmable relay type			SR1-B122BD
Number of outputs	With positive polarity common potential		4 (PNP)
Operating limit values		V	19.2…30
Loads	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 Against overvoltage (2) Against inversions of power supply

(1) Characteristics at 55 ˚C for 60 % loading of inputs/outputs or at 45 ˚C for 100 % loading of inputs/outputs.
(2) If there is no volt-free contact between the relay output and the load.
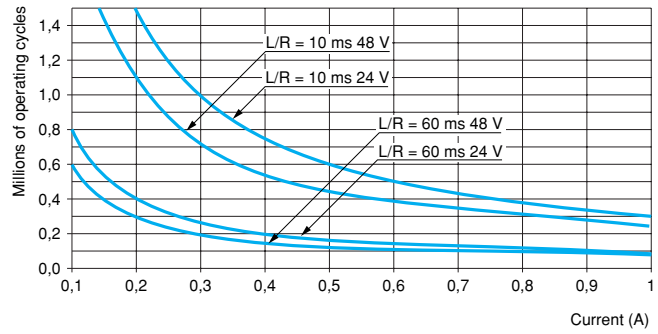
Electrical durability of relay outputs (in millions of operating cycles) (conforming to IEC/EN 60947-5-1)

d.c. loads

DC-12 (1)
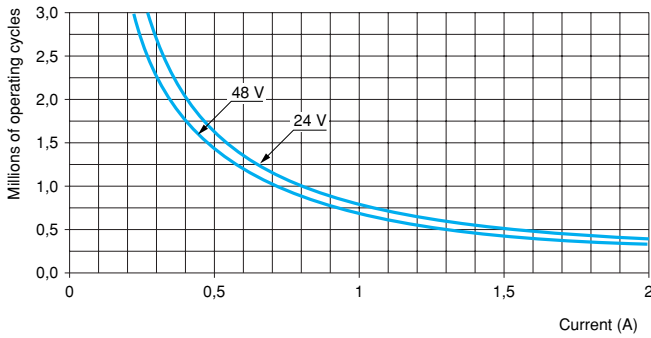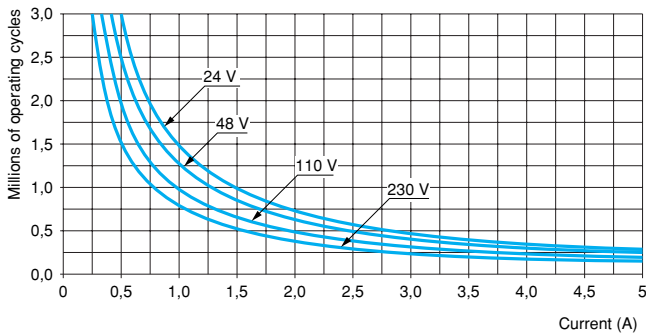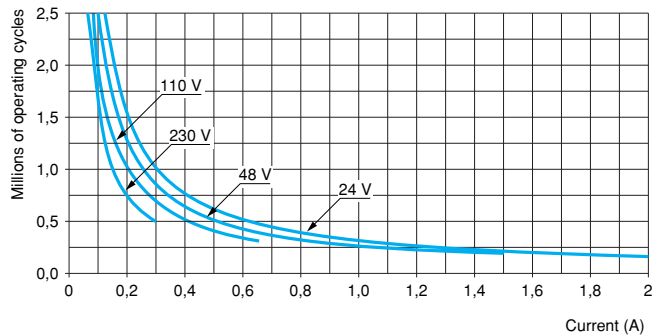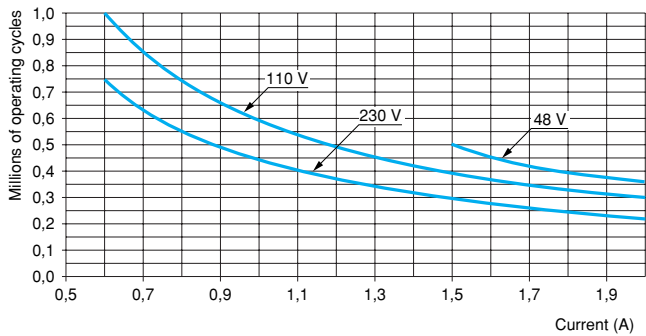

DC-13 (2)

a.c. loads

AC-12 (3)

AC-14 (4)

AC-15 (5)

(1) DC-12: switching resistive loads and photo-coupler isolated solid state loads, L/R ≤ 1 ms.
(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).
(3) AC-12: switching resistive loads and photo-coupler isolated solid state loads, cos ≥ 0.9.
(4) AC-14: switching electromagnetic loads whose power drawn with the electromagnet closed is ≤ 72 VA, making: cos = 0.3, breaking: cos = 0.3.
(5) AC-15: switching electromagnetic loads whose power drawn with the electromagnet closed is > 72 VA, making: cos = 0.7, breaking: cos = 0.4.
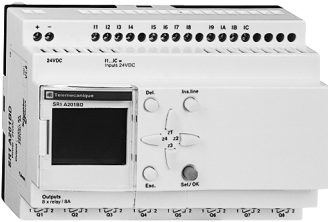
"Zelio Logic" programmable relays

816716

SR1-B121BD

20245

SR1-A201BD

20247

SR1-E121BD

SR1PACK●●

Programmable relays

Number of I/O	Discrete inputs	Outputs	Clock	Reference	Weight kg
Supply ⎓ 12 V					
12	8 I ⎓ 12 V (1)	4 O relay	Yes	**SR1-B121JD**	0.290
Supply ⎓ 24 V					
10	6 I ⎓ 24 V	4 O relay	No	**SR1-A101BD**	0.290
12	8 I ⎓ 24 V (1)	4 O relay	Yes	**SR1-B121BD**	0.290
		4 O transistor	Yes	**SR1-B122BD**	0.290
20	12 I ⎓ 24 V	8 O relay	No	**SR1-A201BD**	0.350
	12 I ⎓ 24 V (1)	8 O relay	Yes	**SR1-B201BD**	0.350
Supply ∿ 100/240 V					
10	6 I ∿ 100/240 V	4 O relay	No	**SR1-A101FU**	0.290
			Yes	**SR1-B101FU**	0.290
20	12 I ∿ 100/240 V	8 O relay	No	**SR1-A201FU**	0.350
			Yes	**SR1-B201FU**	0.350

Programmable relays without display and without buttons

Number of I/O	Discrete inputs	Outputs	Clock	Reference	Weight kg
Supply ⎓ 24 V					
10	6 I ⎓ 24 V	4 O relay	No	**SR1-D101BD**	0.270
12	8 I ⎓ 24 V (1)	4 O relay	Yes	**SR1-E121BD**	0.270
Supply ∿ 100/240 V					
10	6 I ∿ 100/240 V	4 O relay	No	**SR1-D101FU**	0.270
			Yes	**SR1-E101FU**	0.270

Kits

Description	Reference	Weight kg
d.c. Zelio SR1B121BD + cable and software	**SR1PACKBD**	0.548
a.c. Zelio SR1B101FU + cable and software	**SR1PACKFU**	0.548

Separate accessory

Description	Reference	Weight kg
EEPROM memory	**SR1-MEM01**	0.001

Documentation

Description	Language	Reference	Weight kg
User's guide for direct programming on the relay	English	**SR1-MAN01EN**	0.100
	French	**SR1-MAN01FR**	0.100
	German	**SR1-MAN01DE**	0.100
	Italian	**SR1-MAN01IT**	0.100
	Spanish	**SR1-MAN01ES**	0.100

(1) Including 2 configurable analogue inputs.

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"Zelio Soft" software

"Zelio Soft" software enables:
- inputting of control schemes,
- monitoring of applications, using its coherence test feature,
- inputting of messages for display on the "Zelio Logic" Programmable relay,
- programme testing.
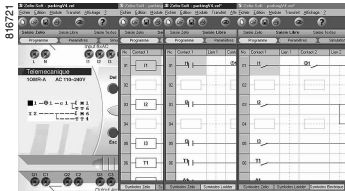
Input modes for control schemes

"Zelio input" mode enables users who have directly programmed the Zelio programable 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.
Using Zelio Soft in "free mode" enables users to select their preferred symbol language from the following 3 alternatives :
- Zelio symbols,
- Ladder symbols,
- electrical symbols.
"Free input" mode also enables the creation of mnemonics and notes associated with each line of the programme.
Instant switching from one input mode to the other is simply achieved, at any time, by clicking the mouse.
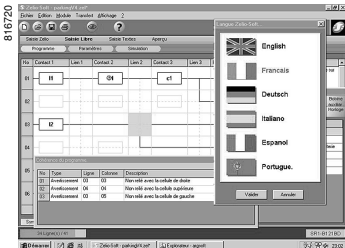
Coherence test and application languages

Zelio Soft monitors applications via its coherence test function and turns red at the slightest input error. The problem can be located by simply clicking the mouse.
Zelio Soft allows switching between the 6 application languages (English, French, German, Italian, Portuguese and Spanish) at any time, and editing of the application file in the selected language. It allows selection of the representation mode (Zelio, Ladder or electrical) for editing the file.
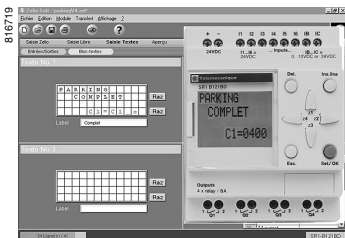
Inputting messages for display on Zelio Logic

Zelio Soft allows 4 Text function blocks to be configured, corresponding to 4 screens of 4 lines x 12 characters, which can be displayed on all the programmable relays with LCD display. These screens are activated in the same simple way as a coil in the control scheme. It is then possible to display messages as text only or to associate them with 1 or 2 variables, the latter being current values and/or setting values of function blocks used in the programme.
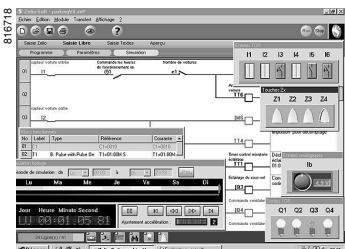
Programme testing

The Zelio Soft simulator makes it possible to test all the programmes, i.e.:
- activate discrete inputs and their contact modes (N/O or N/C, fleeting or continuous),
- display the output states,
- vary the voltage of the analogue inputs IB and IC,
- activate the buttons,
- simulate the application programme in real time or accelerated time,
- dynamically display, in red, the various active elements of the programme.

References

Description	Reference	Weight kg
Programmable relay-PC connecting cable length 1.8 m	**SR1-CBL01**	0.350
Kit comprising: - "Zelio soft" autonomous programming software - cable.	**SR1-KIT01**	0.500
"Zelio Soft" multilingual programming software (1)	**SR1-SFT01**	0.150

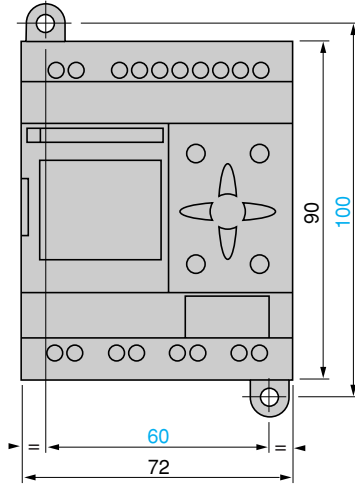(1) EN/FR/DE/ES/IT/PO - contains the on-line user's guide for the PC.

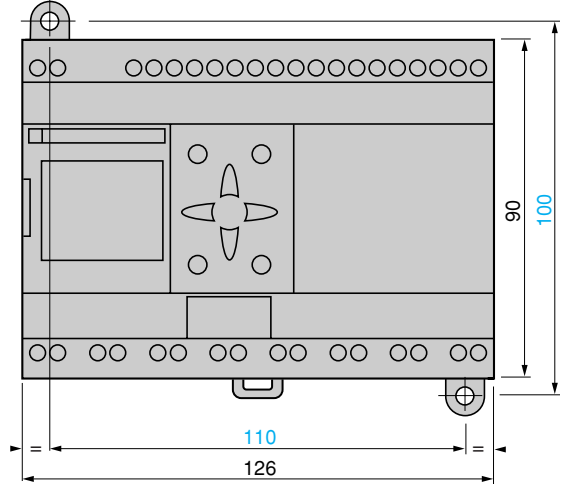|	SR1-	A	B	B122BD	B121JD	D	E
Zelio Soft	Version 1.2	Yes	Yes	No	No	No	No
	Version 1.3	Yes	Yes	Yes	No	No	No
	Version 1.4	Yes	Yes	Yes	No	Yes	Yes
	≥ Version 1.5	Yes	Yes	Yes	Yes	Yes	Yes

"Zelio Logic"
programmable relays

Dimensions
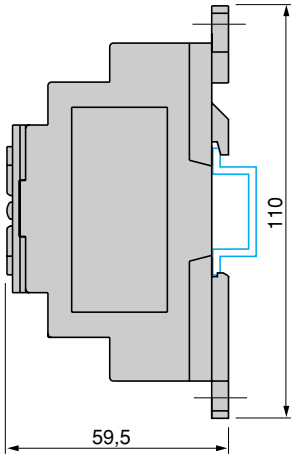
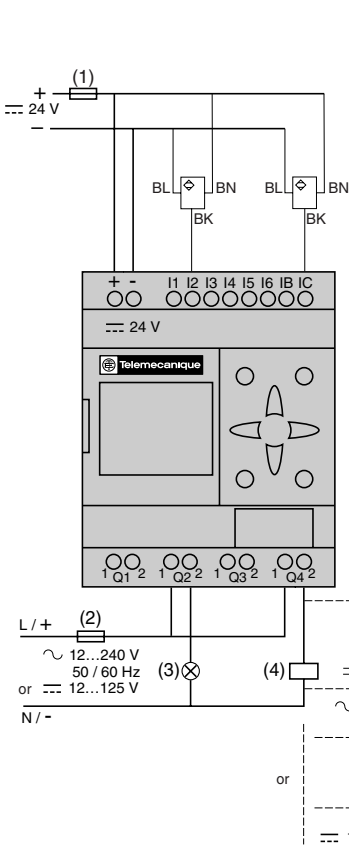**Programmable relays SR1-●●●●●●**   **SR1-●1●●●●**   **SR1-●2●●●●**
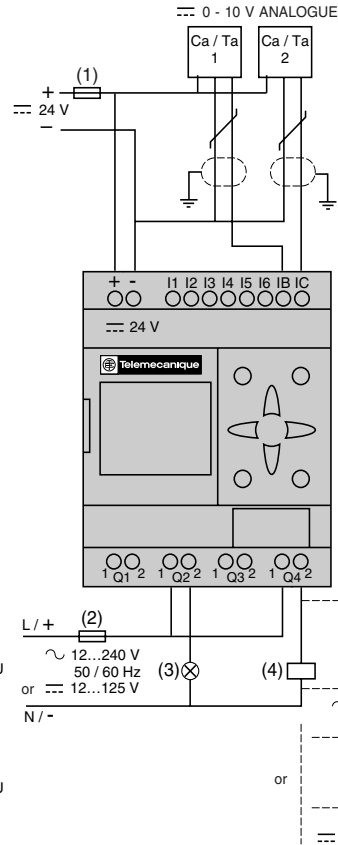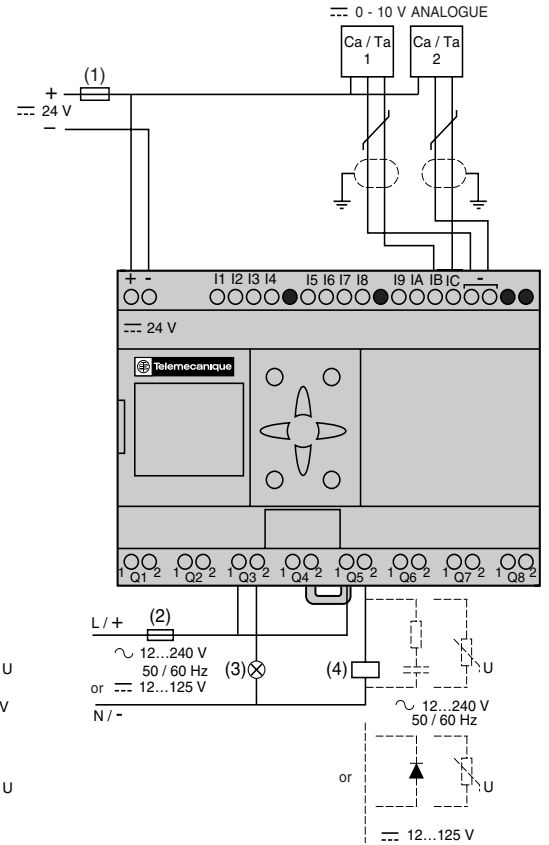

Schemes

**3-wire sensors
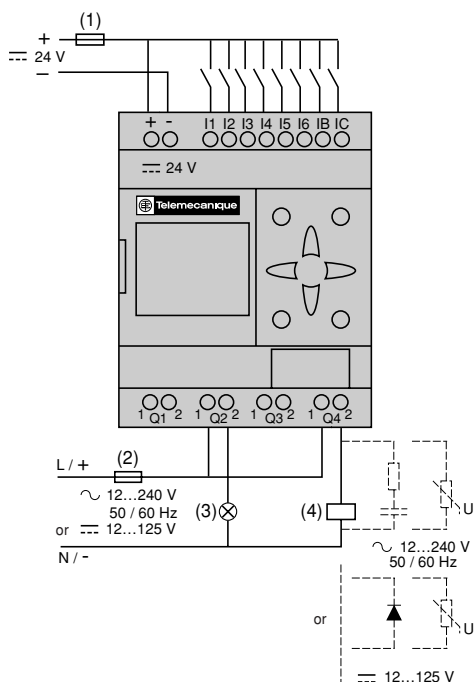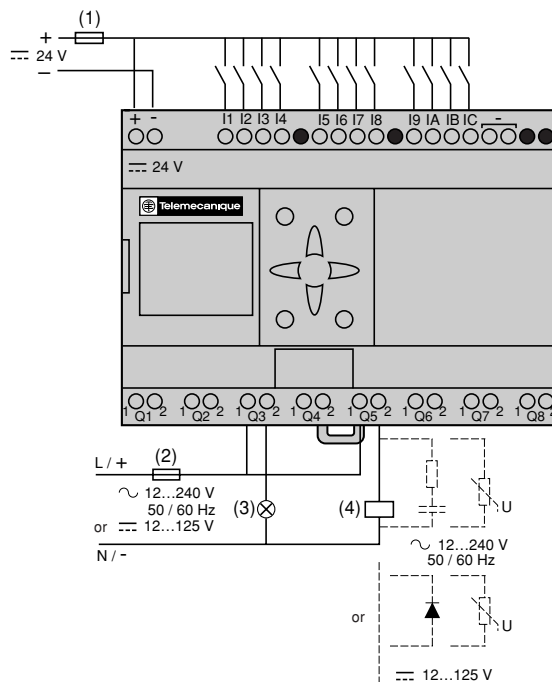on SR1-●●1BD, SR1-B121JD**   **Analogue inputs
on SR1-B121BD, SR1-B121JD**   **on SR1-B201BD**

(1) 1 A quick-blow fuse or circuit-breaker.
(2) 16 A fuse or circuit-breaker (B16).
(3) Resistive load.
(4) Inductive load.

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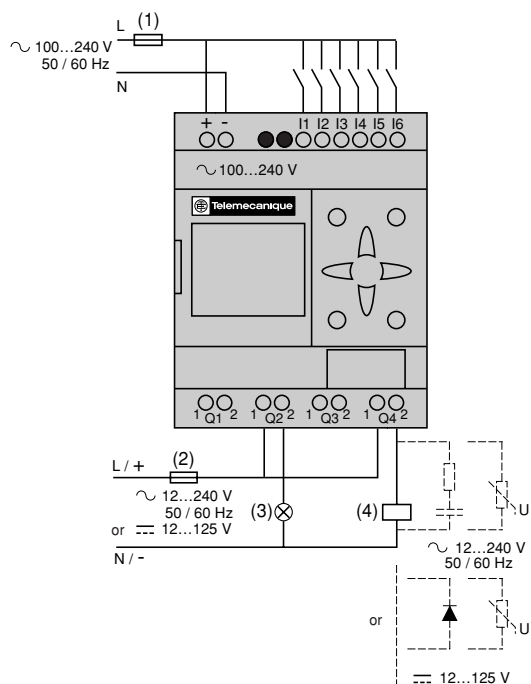# "Zelio Logic" programmable relays

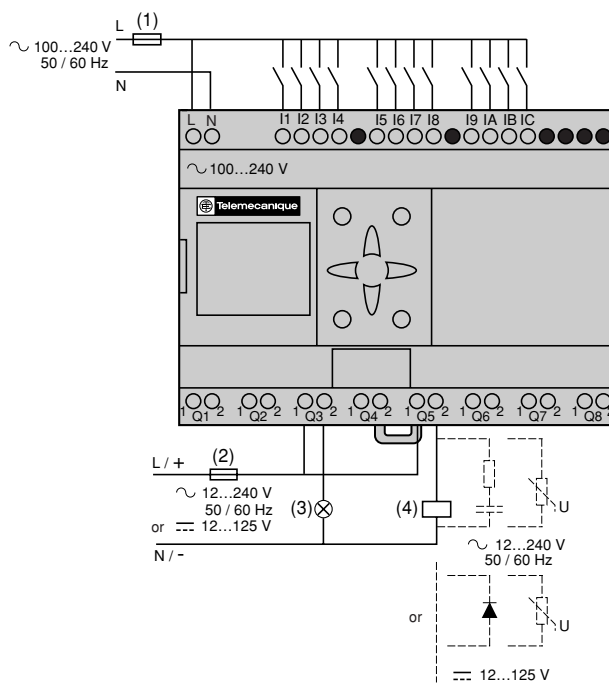**SR1-●1●1BD, B121JD, B122BD**

SR1-●201BD

SR1-●101FU

SR1-●201FU

(1) 1 A quick-blow fuse or circuit-breaker
(2) 16 A fuse or circuit-breaker (B16).
(3) Resistive load.
(4) Inductive load.

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