



finder®

The power in relays and timers since 1954

RAILWAY APPLICATIONS



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FINDER's 10,000 different products, represent one of the most extensive product lines available on the market. They are the result of specialization across a variety of relay types: step relays, light dependent relays, miniature and sub-miniature p.c.b relays, plug-in general purpose and power relays, relay interface modules, timers, relay and powertimers, relay sockets and accessories.

1949 Turin: Piero Giordanino patented step relay (Italy)

1954 Founded by Piero Giordanino

1965 Open factory in Almese, Turin (Italy)

1966 Launch 60 Series industrial relay

1974 Open factory in Sanfront, Cuneo (Italy)

1981 Produce own tools and machines

1991 Open factory in S. Jean de Maurienne (France)

1993 Launch timer range

1996 Introduce first fully-automated production line for new generation P.C.B. relay

2001 Acquire of Eichhoff Reles SL, Valencia (Spain)

2002 Produce own pcb's for use in relays and timers

2003 Open logistics centre for Central Europe in Trebur Astheim (Germany)

2006 Open logistics centre in Almese, Turin (Italy)

2009 Finder's 55 year anniversary

FINDER has the widest range of quality approvals of any relay manufacturer.

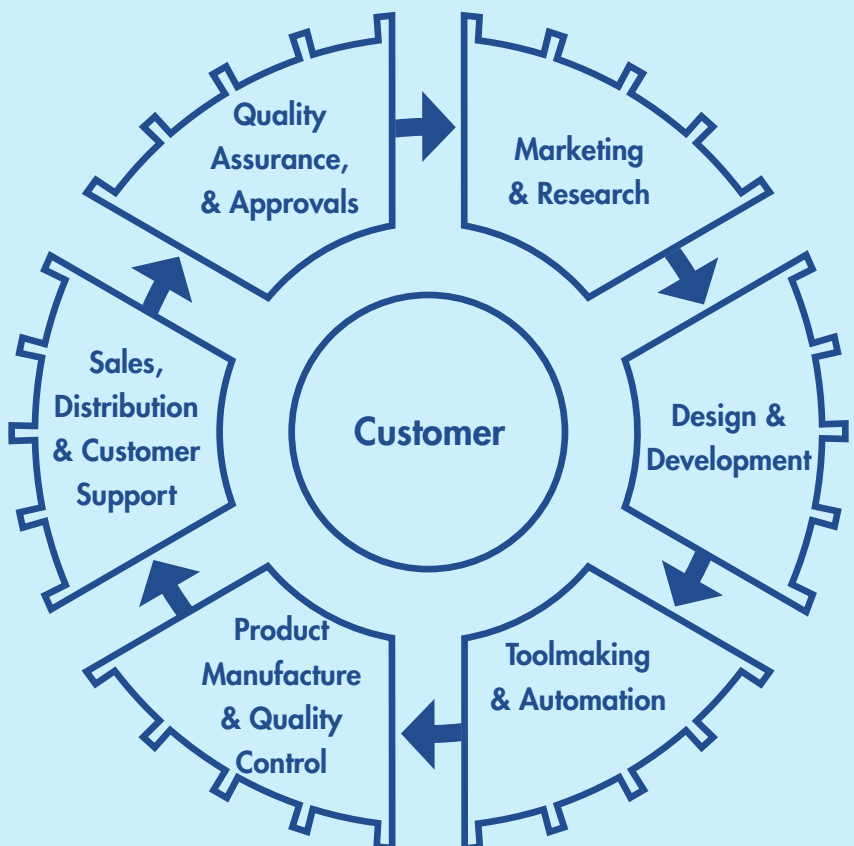
Our four factories use machines which have been designed and built in-house by our own team of technicians, who are experts in their own right in production techniques and industrial automation.



RINA



TOTAL IN-HOUSE CAPABILITY





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Relays used for railway rolling stock are subject to increasingly higher technical demands – such as the need for wider operating ranges; higher resistance to shock and vibration; operation over a wider range of temperature and humidity ; and above all, the fire resistance properties of the relay's constituent parts.

Fire and smoke characteristics of the materials

The relays and their sockets and accessories are manufactured using specific insulating materials, which satisfy the requirements of fire protection prescribed by the standard **UNI CEI 11170-3** for Risk levels LR1 to LR4:

- conformity to reaction to fire test (Single flame source test according to **ISO 11925-2**)
- smoke class F2 (or better) according to **NF F 16-101** (calculated from Opacity according to **NF X 10-702-2 + NF X 10-702-1** and from Toxicity according to **NF X 70-100-1 + NF X 70-100-2**).

Mechanical and climatic characteristics

The resistance against random vibrations and shock of the relays and their sockets and accessories is in compliance with the prescription of **EN 61373** standard for Category 1, **Class B** products.

Their resistance to temperature and humidity is in compliance with the prescription of **EN 50155** standard, **TX class**.





Finder: reliable component of travel.

RoHS
compliance

46 and 56 series Relays for railway applications

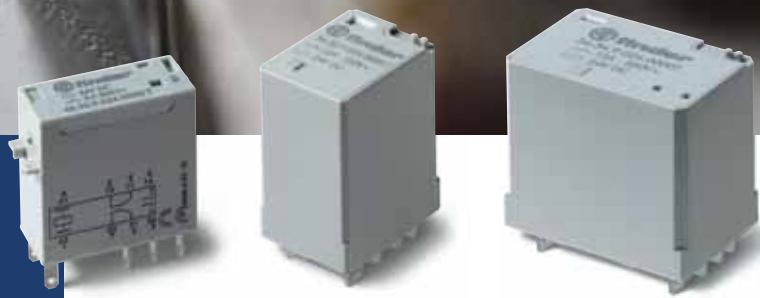
Plug-in power relays:

Type 46.52T - 8 A with 2 pole

Type 56.34T - 12 A with 4 pole

Type 56.32T - 12 A with 2 pole

- Complies with **UNI CEI 11170-3** (protection against fire of materials), **EN 61373** (resistance against random vibrations and shock, Category 1, Class B), **EN 50155** (resistance to temperature and humidity, TX class)
- DC coils with extended range
- 97 and 96 series sockets
- Coil EMC suppression modules



Type 46.52T











Type 56.32T

Type 56.34T



finder[®]

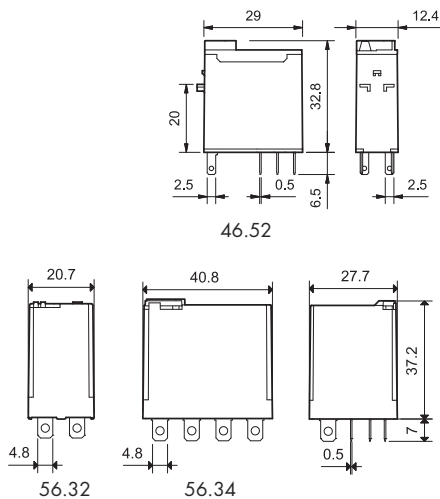
The power in relays and timers since 1954

	Rated current	Function & Features		Sockets
 <p>46 Series Page 1</p>	8 A	2 CO	Relays for railway - Plug-in mounting - DC coils with extended range - Complies with UNI CEI 11170-3 (protection against fire of materials), EN 61373 (resistance against random vibrations and shock, Category 1, Class B), EN 50155 (resistance to temperature and humidity, TX class) - 97 and 96 series sockets - Coil EMC suppression modules	 <p>Type 97.02 Type 97.52 Page 4,5</p>
 <p>56 Series Page 1</p>	12 A	2 CO 4 CO		 <p>Type 96.02 Type 96.04 Page 6</p>
 <p>86 Series Page 7</p>	—	Multi-functions Bi-functions	Timer modules - Multi-voltage - Time scale from 0.05s to 100h - Wide supply range in AC or DC coils - Timer for 96, 97 series sockets	 <p>Type 96.02 Type 96.04 Type 97.02 Type 97.52 Page 10...12</p>
 <p>72 Series Page 13</p>	6 A	Phase rotation Phase loss	Monitoring relay - 17.5mm wide - Universal voltage monitoring (208...480VAC)	
 <p>80 Series Page 15</p>	16 A	Multi-functions Mono-functions	Modular timers - 17.5mm wide - Six time scale from 0.1s to 24h - Multi-voltage - High input /output isolation - 1 pole - Relay output, 16A	
 <p>81 Series Page 20</p>	16 A	Multi-function and multi-voltage timer	Modular timers - 17.5 mm wide - Seven functions (4 with supply start and 3 with signal start with Reset function) - Six time ranges from 0.1s to 10h - 1 pole - Relay output, 16A	
 <p>13 Series Page 23</p>	16 A	Electronic step relay	Electronic step relay - 1 contact - Longer mechanical and electrical life - Suitable for SELV applications according to IEC 364	

Features

Plug-in power relays:
8 A, 2 pole
12 A, 2 and 4 pole

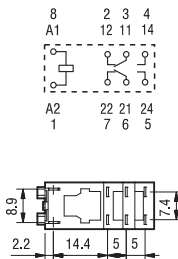
- DC coils with extended range
- Complies with **UNI CEI 11170-3** (protection against fire of materials), **EN 61373** (resistance against random vibrations and shock, Category 1, Class B), **EN 50155** (resistance to temperature and humidity, TX class)
- Cadmium Free contacts (standard version)
- Contact material options
- 97 and 96 series sockets
- Coil EMC suppression modules
- Accessories



46.52T



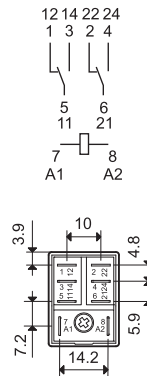
• 2 Pole CO, 8A
 • Plug-in



56.32T



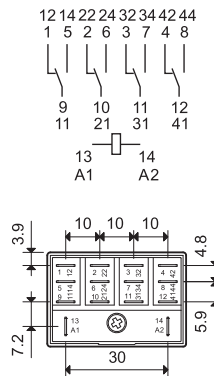
• 2 Pole CO, 12 A
 • Plug-in/Faston 187



56.34T



• 4 Pole CO, 12 A
 • Plug-in/Faston 187



Contact specification

Contact configuration	2 CO (DPDT)	2 CO (DPDT)	4 CO (4PDT)
Rated current/Maximum peak current A	8/15	12/20	12/20
Rated voltage/Maximum switching voltage V AC	250/400	250/400	250/400
Rated load AC1 VA	2,000	3,000	3,000
Rated load AC15 (230 V AC) VA	350	700	700
Single phase motor rating (230 V AC) kW	0.37	0.55	0.55
Breaking capacity DC1: 30/110/220 V A	6/0.5/0.15	12/0.5/0.25	12/0.5/0.25
Minimum switching load mW (V/mA)	300 (5/5)	500 (10/5)	500 (10/5)
Standard contact material	AgNi	AgNi	AgNi

Coil specification

Nominal voltage (U _N)	V AC (50/60 Hz)	—	—	—
	V DC	24 - 72 - 110	24 - 72 - 110	24 - 72 - 110
Rated power W		0.5	1	1.3
Operating range @ 23 °C	AC	—	—	—
	DC	(0.70...1.6) U _N	(0.70...1.6) U _N	(0.70...1.6) U _N
Holding voltage		0.4 U _N	0.6 U _N	0.6 U _N
Must drop-out voltage		0.1 U _N	0.1 U _N	0.1 U _N

Technical data

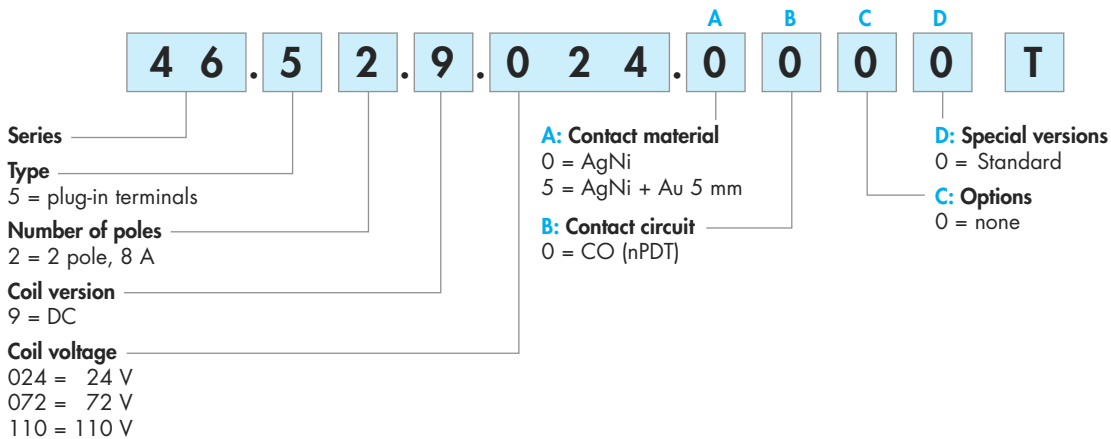
Mechanical life DC	cycles	10 · 10 ⁶	10 · 10 ⁶	10 · 10 ⁶
Electrical life at rated load AC1	cycles	100 · 10 ³	100 · 10 ³	100 · 10 ³
Operate/release time	ms	10/3	8/8	8/8
Insulation between coil and contacts (1.2/50 μs)	kV	6 (8 mm)	4	4
Dielectric strength between open contacts	V AC	1,000	1,000	1,000
Ambient temperature range	°C	-40...+70	-40...+70	-40...+70
Environmental protection		RT II	RT I	RT I

Approvals (according to type)

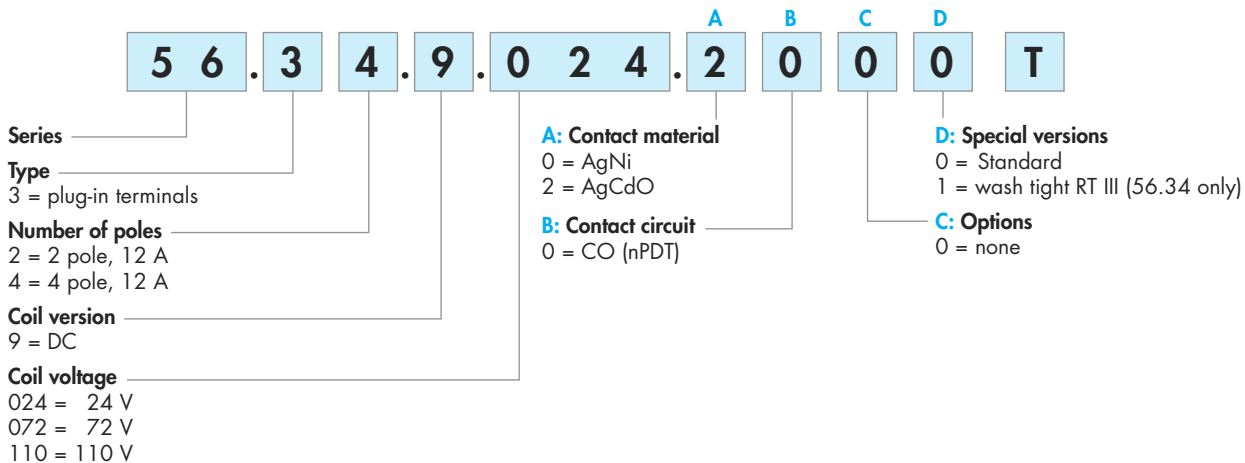


Ordering information

Example: 46 series plug-in relay, 2 poles, 24 V DC coil, AgNi contacts.



Example: 56 series plug-in relay, 4 poles, 24 V DC coil, AgCdO contacts.

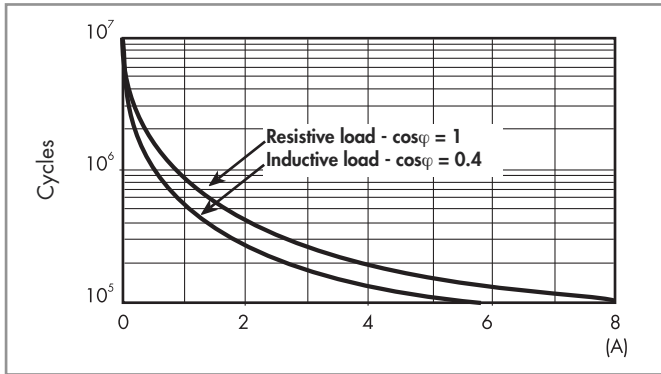


Technical data

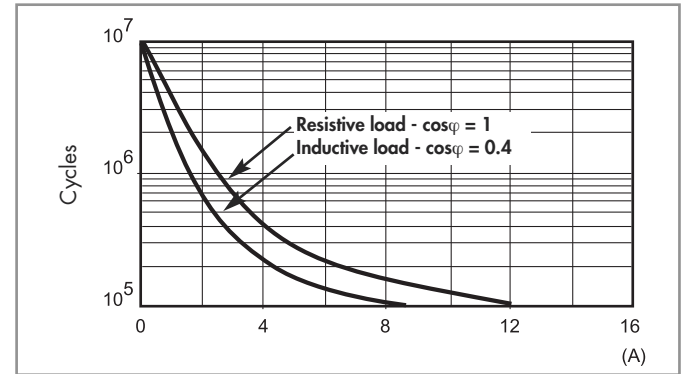
Insulation according to EN 61810-1		46.52		56.32/34	
Nominal voltage of supply system	V AC	230/400		230/400	
Rated insulation voltage	V AC	250	400	250	400
Pollution degree		3	2	3	2
Insulation between coil and contact set					
Type of insulation		Reinforced (8 mm)		Basic	
Overvoltage category		III		III	
Rated impulse voltage	kV (1.2/50 µs)	6		4	
Dielectric strength	V AC	4,000		2,500	
Insulation between adjacent contacts					
Type of insulation		Basic		Basic	
Overvoltage category		III		III	
Rated impulse voltage	kV (1.2/50 µs)	4		4	
Dielectric strength	V AC	2,000		2,500	
Insulation between open contacts					
Type of disconnection		Micro-disconnection		Micro-disconnection	
Dielectric strength	V AC/(1.2/50 µs)	1,000/1.5		1,000/1.5	
Conducted disturbance immunity					
Burst (5...50)ns, 5 kHz, on A1 - A2	EN 61000-4-4	level 4 (4 kV)		level 4 (4 kV)	
Surge (1.2/50 µs) on A1 - A2 (differential mode)	EN 61000-4-5	level 3 (2 kV)		level 4 (4 kV)	
Other data					
Bounce time: NO/NC	ms	1/4		1/3	
Power lost to the environment	without contact current	W	0.6		1 (56.32) / 1.3 (56.34)
	with rated current	W	2		3.8 (56.32) / 6.9 (56.34)

Contact specification

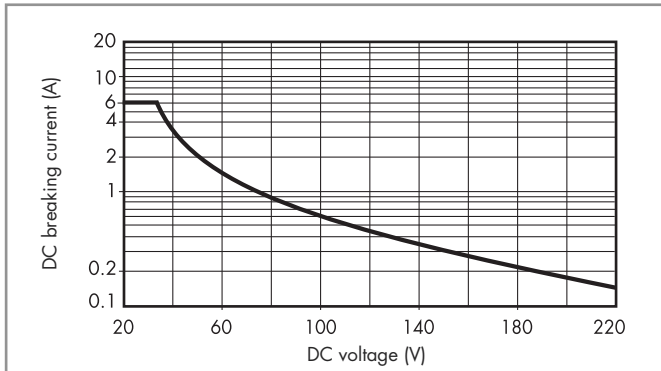
F 46 - Electrical life (AC) v contact current - Type 46.52



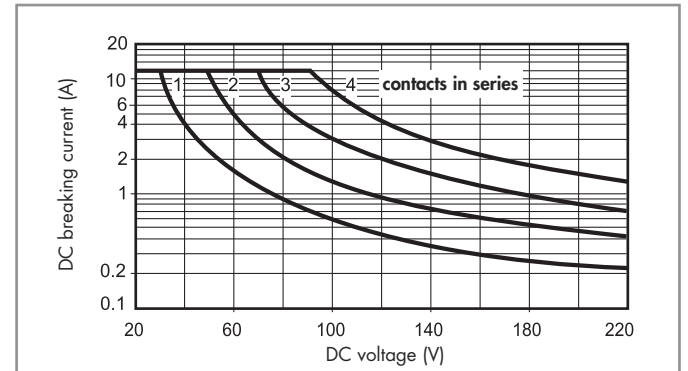
F 56 - Electrical life (AC) v contact current - Type 56.32 and 56.34



H 46 - Maximum DC1 breaking capacity - Type 46.52



H 56 - Maximum DC1 breaking capacity - Type 56.32 and 56.34



- When switching a resistive load (DC1) having voltage and current values under the curve, an electrical life of $\geq 100 \cdot 10^3$ can be expected.
- In the case of DC13 loads, the connection of a diode in parallel with the load will permit a similar electrical life as for a DC1 load.
Note: the release time for the load will be increased.

Coil specifications

DC coil data, 2 CO - Type 46.52 @ 23 °C

Nominal voltage U_N	Coil code	Operating range		Resistance R	Rated coil consumption I at U_N
		U_{min}	U_{max}		
V		V	V	Ω	mA
24	9.024	16.8	38	1,200	20
72	9.072	50.4	115	3,400	7
110	9.110	77	176	23,500	4.7

DC coil data, 2 CO - Type 56.32 @ 23 °C

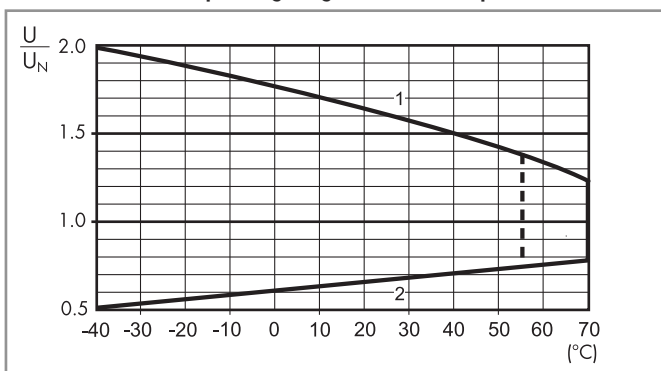
Nominal voltage U_N	Coil code	Operating range		Resistance R	Rated coil consumption I at U_N
		U_{min}	U_{max}		
V		V	V	Ω	mA
24	9.024	16.8	38	600	40
72	9.072	50.4	115	5,100	14
110	9.110	77	176	12,500	8.8

Other types of coil version are available on request.

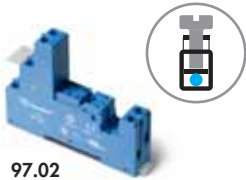
DC coil data, 4 CO - Type 56.34 @ 23 °C

Nominal voltage U_N	Coil code	Operating range		Resistance R	Rated coil consumption I at U_N
		U_{min}	U_{max}		
V		V	V	Ω	mA
24	9.024	16.8	38	490	49
72	9.072	50.4	115	4,000	18
110	9.110	77	176	10,400	10.5

RT 46 / 56 - DC coil operating range v ambient temperature



- 1 - Max. permitted coil voltage.
- 2 - Min. pick-up voltage with coil at ambient temperature.

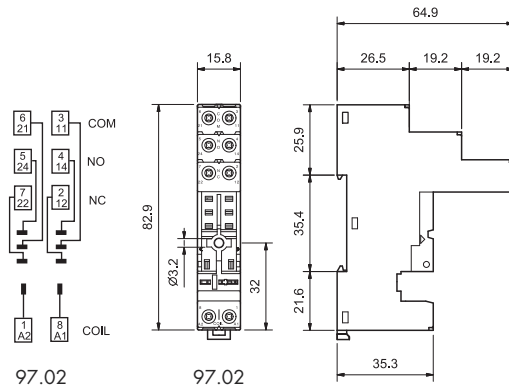


97.02

Approvals
(according to type):

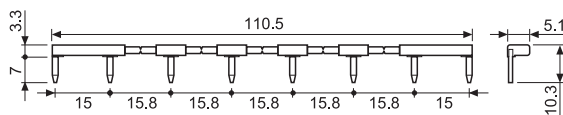


Screw terminal socket panel or 35 mm rail (EN 60715) mount		97.02 SMA
For relay type		46.52
Accessories		
Metal retaining clip (supplied with socket - packaging code SMA)		097.71
8-way jumper link		095.18
Modules (see table below)		99.02
Timer modules (see table below)		86.30
Technical data		
Rated current		8 A - 250 V AC
Dielectric strength		6 kV (1.2/50 μs) between coil and contacts
Protection category		IP 20
Ambient temperature	°C	-40...+70
Screw torque	Nm	0.8
Wire strip length	mm	8
Max. wire size for 97.02 socket		solid wire
	mm ²	1x6 / 2x2.5
	AWG	1x10 / 2x14
		stranded wire
		1x4 / 2x2.5
		1x12 / 2x14



095.18

8-way jumper link for 97.02 socket	095.18
Rated values	10 A - 250 V



86.30

86 series timer module	
(12...24)V AC/DC; Bi-function: AI, DI; (0.05s... 100h)	86.30.0.024.0000

Approvals (according to type):



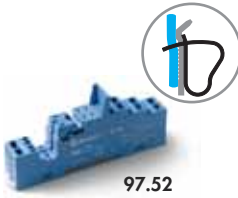
99.02

99.02 coil indication and EMC suppression modules for 97.02 socket		
Diode (+A1, standard polarity)	(6...220)V DC	99.02.3.000.00
LED	(6...24)V DC/AC	99.02.0.024.59
LED + Diode (+A1, standard polarity)	(6...24)V DC	99.02.9.024.99
LED + Varistor	(6...24)V DC/AC	99.02.0.024.98
RC circuit	(6...24)V DC/AC	99.02.0.024.09

Approvals
(according to type):



DC Modules with
non-standard polarity
(+A2) on request.

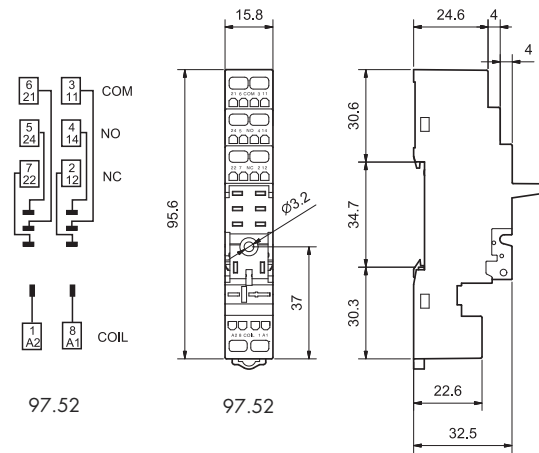
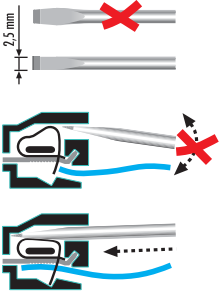


97.52

Approvals
(according to type):



Screwless terminal socket panel or 35 mm rail (EN 60715) mount	97.52 SMA	
For relay type	46.52	
Accessories		
Metal retaining clip (supplied with socket - packaging code SMA)	097.71	
Modules (see table below)	99.02	
Timer modules (see table below)	86.30	
Technical data		
Rated current	8 A - 250 V AC	
Dielectric strength	6 kV (1.2/50 μs) between coil and contacts	
Protection category	IP 20	
Ambient temperature	°C -25...+70	
Wire strip length	mm 8	
Max. wire size for 97.52 socket	solid wire	stranded wire
	mm ²	2x(0.2...1.5)
	AWG	2x(24...18)



86 series timer module	(12...24)V AC/DC; Bi-function: AI, DI; (0.05s...100h)	86.30.0.024.0000
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86.30

Approvals (according to type):

99.02 coil indication and EMC suppression modules for 97.52 socket		
Diode (+A1, standard polarity)	(6...220)V DC	99.02.3.000.00
LED	(6...24)V DC/AC	99.02.0.024.59
LED + Diode (+A1, standard polarity)	(6...24)V DC	99.02.9.024.99
LED + Varistor	(6...24)V DC/AC	99.02.0.024.98
RC circuit	(6...24)V DC/AC	99.02.0.024.09

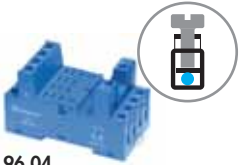


99.02

Approvals
(according to type):



DC Modules with
non-standard polarity
(+A2) on request.

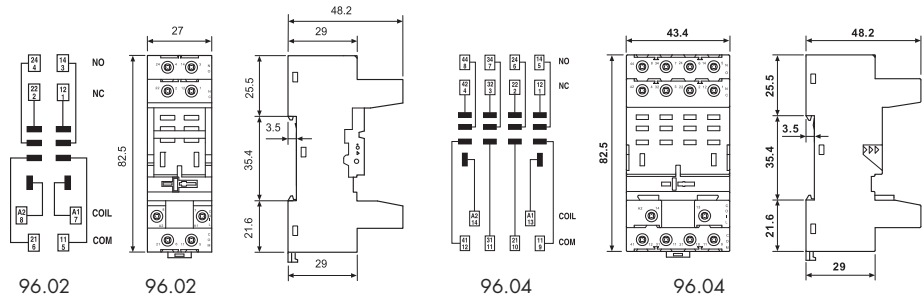
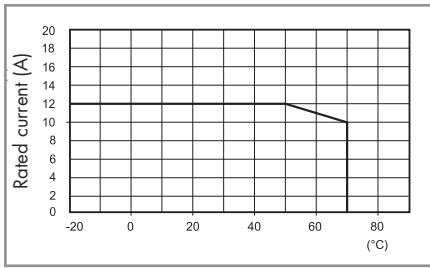


96.04
Approvals
(according to type):



Screw terminal (Box clamp) socket panel or 35 mm (EN 60715) rail mount	96.02 SMA	96.04 SMA
For relay type	56.32	56.34
Accessories		
Metal retaining clip (supplied with socket - packaging code SMA)	094.71	096.71
Modules (see table below)	99.02	
Timer modules (see table below)	86.00, 86.30	
Technical data		
Rated values	12 A - 250 V	
Dielectric strength	2 kV AC	
Grado di protezione	IP 20	
Protection category	°C -40...+70 (see diagram L96)	
⊕ Screw torque	Nm 0.8	
Wire strip length	mm 8	
Max. wire size for 96.02 and 96.04 socket	solid wire	stranded wire
	mm ² 1x6 / 2x2.5	1x4 / 2x2.5
	AWG 1x10 / 2x14	1x12 / 2x14

L 96 - Rated current vs ambient temperature



86.00



86.30

86 series timer modules		
Multi-voltage: (12...240)V AC/DC;		
Multi-functions: AI, DI, SW, BE, CE, DE, EE, FE; (0.05 s...100 h)		86.00.0.240.0000
(12...24)V AC/DC; Bi-function: AI, DI; (0.05 s...100 h)		86.30.0.024.0000

Approvals (according to type):



99.02

Approvals
(according to type):



99.02 coil indication and EMC suppression modules for 96.02 and 96.04 socket		
Diode (+A1, standard polarity)	(6...220)V DC	99.02.3.000.00
LED	(6...24)V DC/AC	99.02.0.024.59
LED + Diode (+A1, standard polarity)	(6...24)V DC	99.02.9.024.99
LED + Varistor	(6...24)V DC/AC	99.02.0.024.98
RC circuit	(6...24)V DC/AC	99.02.0.024.09

DC Modules with non-standard polarity (+A2) on request.

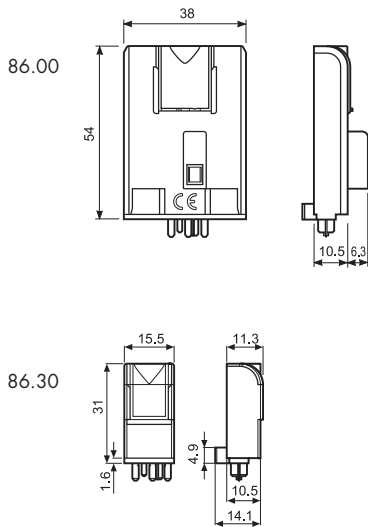
Features

Timer modules for use in conjunction with relay & socket.

86.00 - Multi-function & multi-voltage timer module

86.30 - Bi-function & multi-voltage timer module

- Timer module type 86.00 for 96 series sockets and type 86.30 for 96, 97 series sockets
- Wide supply voltage range:
12...240 V AC/DC (86.00)
12...24 V AC/DC (86.30)
- LED indicator



86.00



- Time scale: from 0.05s to 100h
- Multi-function
- Plug-in for use with 96.04 sockets

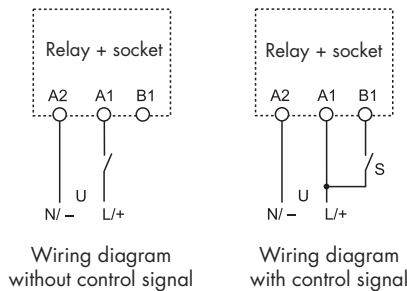
86.30



- Time scale: from 0.05s to 100h
- Bi-function
- Plug-in for use with 96.02, 96.04, 97.02 and 97.52 sockets

- AI:** On-delay
DI: Interval
SW: Symmetrical flasher (starting pulse on)
BE: Off-delay with control signal
CE: On- and off-delay with control signal
DE: Interval with control signal on
EE: Interval with control signal off
FE: Interval with control signal on and off

- AI:** On-delay
DI: Interval



Contact specification

Contact configuration

Rated current/Maximum peak current A

Rated voltage/Maximum switching voltage V AC

Rated load AC1 VA

Rated load AC15 (230 V AC) VA

Single phase motor rating (230 V AC) kW

Breaking capacity DC1: 30/110/220 V A

Minimum switching load mW (V/mA)

Standard contact material

Supply specification

Nominal voltage (U_N) V AC (50/60 Hz)

V DC

Rated power AC/DC W

Operating range V AC (50/60 Hz)

DC

Technical data

Specified time range

Repeatability %

Recovery time ms

Minimum control impulse ms

Setting accuracy full range %

Electrical life at rated load in AC1 cycles

Ambient temperature range °C

Protection category

Approvals (according to type)

See 56 series relays

See 46, 56 series relays

(0.05...1)s, (0.5...10)s, (5...100)s, (0.5...10)min, (5...100)min, (0.5...10)h, (5...100)h

± 1 ± 1

≤ 50 ≤ 50

50 —

± 5 ± 5

See 56 series relays See 46, 56 series relays

−20...+50 −20...+50

IP 20 IP 20

Ordering information

Example: 86 series multi-function timer module, (12...240)V AC/DC supply voltage.



Series _____
Type _____
 0 = Multi-function timer (AI, DI, SW, BE, CE, DE, EE, FE)
 3 = Bi-function timer (AI, DI)
No. of poles _____
 See 46, 56 series relays
 Poles for chosen relay/socket combination -
 according to chart below

Supply voltage
 024 = (12...24)V AC/DC (86.30 only)
 240 = (12...240)V AC/DC (86.00 only)
Supply version
 0 = AC (50/60 Hz)/DC

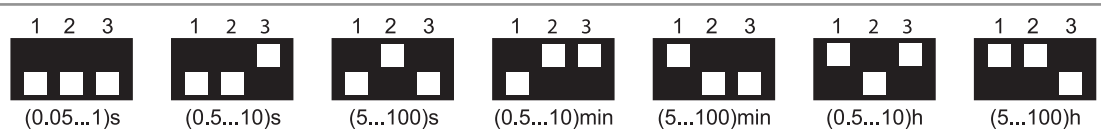
Combinations

Number of poles	Relay type	Socket type	Timer module
2	46.52	97.02/97.52	86.30
2	56.32	96.02	86.30
4	56.34	96.04	86.00/86.30

Technical data

EMC specifications				
Type of test		Reference standard	86.00	86.30
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV	n.a.
	air discharge	EN 61000-4-2	8 kV	8 kV
Radio-frequency electromagnetic field (80 ÷ 1000 MHz)		EN 61000-4-3	10 V/m	10 V/m
Fast transients (burst) (5-50 ns, 5 kHz) on Supply terminals		EN 61000-4-4	4 kV	2 kV
Surges (1.2/50 µs) on Supply terminals	common mode	EN 61000-4-5	4 kV	2 kV
	differential mode	EN 61000-4-5	4 kV	1 kV
Radio-frequency common mode (0.15 ÷ 80 MHz) on Supply terminals		EN 61000-4-6	10 V	10 V
Radiated and conducted emission		EN 55022	class B	class B
Other data		86.00	86.30	
Current absorption on control signal (B1)	mA	1	—	
Power lost to the environment	without contact current	W	0.1 (12 V) - 1 (230 V)	
	with rated current		See 56 series relays	
			See 46, 56 series relays	

Time scales



NOTE: Time scales and functions must be set before energising the timer.
 To achieve the minimum time setting of 0.05 seconds it is necessary to use one of the functions with control signal.
 When setting very short times it may be necessary to take into account the operate time of the relay used.

Functions

- U** = Supply voltage
- S** = Control signal
- = Output contact

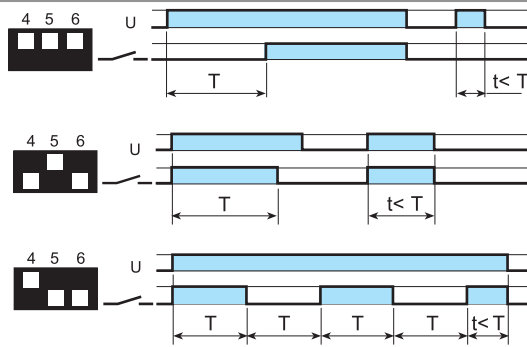
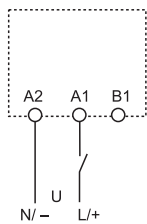
LED Type 86.00	LED Type 86.30	Supply voltage	NO output contact
		OFF	Open
		ON	Open
		ON	Open (timing in progress)
		ON	Closed

Without control signal = Start via contact in supply line (A1).
 With control signal = Start via contact into control terminal (B1).

Wiring diagram

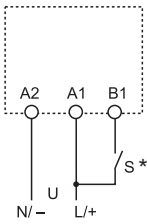
Type 86.00

Without control signal

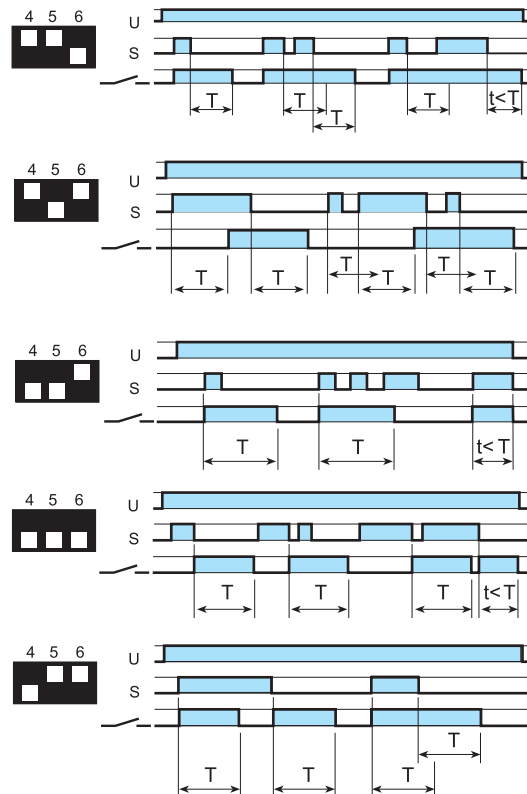


- (AI) On-delay.**
Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.
- (DI) Interval.**
Apply power to timer. Output contacts transfer immediately. After the preset time has elapsed, contacts reset.
- (SW) Symmetrical flasher (starting pulse on).**
Apply power to timer. Output contacts transfer immediately and cycle between ON and OFF for as long as power is applied. The ratio is 1:1 (time on = time off).

With control signal



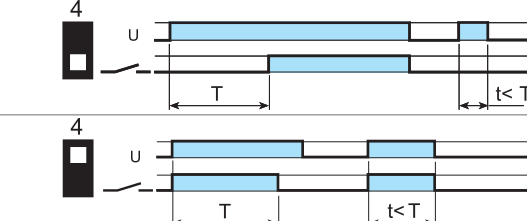
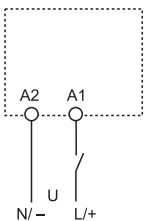
* With DC supply, positive polarity has to be connected to B1 terminal (according to EN 60204-1). Switch S should be exclusively used to provide the control signal to terminal B1. (Do not connect any other load at this point).



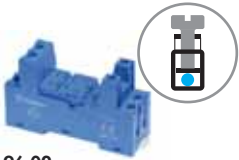
- (BE) Off-delay with control signal.**
Power is permanently applied to the timer. The output contacts transfer immediately on closure of the control signal (S). Opening the control signal initiates the preset delay, after which time the output contacts reset.
- (CE) On- and off-delay with control signal.**
Power is permanently applied to the timer. Closing the control signal (S) initiates the preset delay, after which time the output contacts transfer. Opening the control signal initiates the same preset delay, after which time the output contacts reset.
- (DE) Interval with control signal on.**
Power is permanently applied to the timer. On momentary or maintained closure of control signal (S), the output contacts transfer, and remain so for the duration of the preset delay, after which they reset.
- (EE) Interval with control signal off.**
Power is permanently applied to the timer. On opening of the control signal (S) the output contacts transfer, and remain so for the duration of the preset delay, after which they reset.
- (FE) Interval with control signal on and off.**
Power is permanently applied to the timer. Both the opening and closing of the control signal (S) initiates the transfer of the output contacts. In both instances the contacts reset after the delay period has elapsed.

Wiring diagram

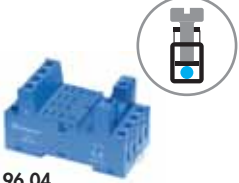
Type 86.30



- (AI) On-delay.**
Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.
- (DI) Interval.**
Apply power to timer. Output contacts transfer immediately. After the preset time has elapsed, contacts reset.



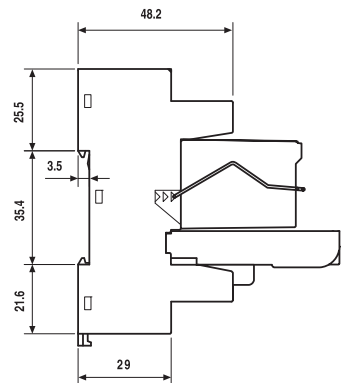
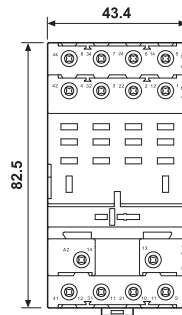
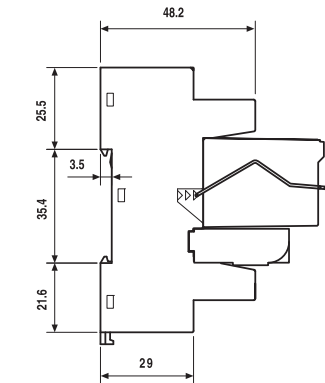
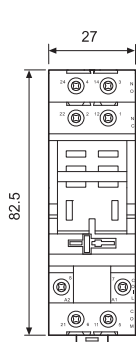
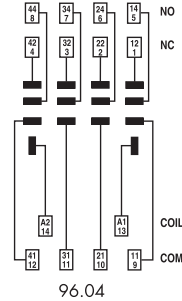
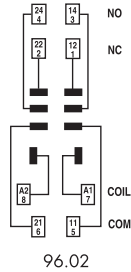
96.02
Approvals
(according to type):



96.04
Approvals
(according to type):

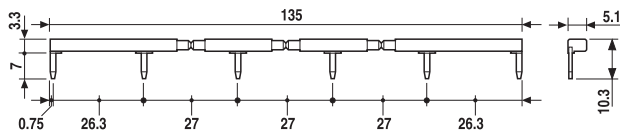


Screw terminal (Box clamp) socket	96.02 SMA	96.04 SMA
panel or 35 mm rail (EN 60715) mount		
For relay type	56.32	56.34
Accessories		
Metal retaining clip (supplied with socket - packaging code SMA)	094.71	096.71
6-way jumper link	094.06	—
Identification tag	095.00.4	090.00.2
Timer modules	86.30	86.00, 86.30
Technical data		
Rated values	12 A - 250 V	
Dielectric strength	2 kV AC	
Protection category	IP 20	
Ambient temperature	°C -40...+70	
⊕ Screw torque	Nm 0.8	
Wire strip length	mm 8	
Max. wire size for 96.02/04 sockets	solid wire	stranded wire
	mm ²	1x6 / 2x2.5
	AWG	1x10 / 2x14



094.06

6-way jumper link for 96.02 socket	094.06
Rated values	10 A - 250 V



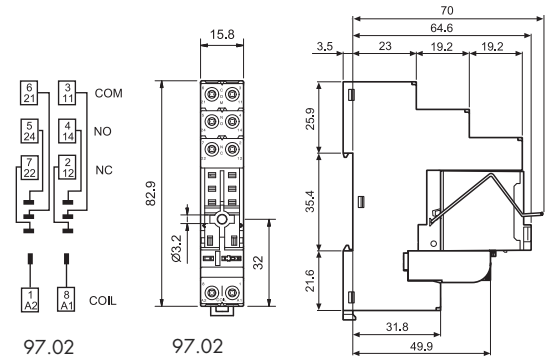


97.02

Approvals
(according to type):



Screw terminal socket	97.02 SMA		
panel or 35 mm rail (EN 60715) mount			
For relay type	46.52		
Accessories			
Metal retaining clip (supplied with socket - packaging code SMA)	097.71		
8-way jumper link	095.18		
Identification tag	095.00.4		
Timer modules	86.30		
Technical data			
Rated current	8 A - 250 V AC		
Dielectric strength	6 kV (1.2/50 μs) between coil and contacts		
Protection category	IP 20		
Ambient temperature	°C	-40...+70	
Screw torque	Nm	0.8	
Wire strip length	mm	8	
Max. wire size for 97.02 sockets	solid wire	stranded wire	
	mm ²	1x6 / 2x2.5	1x4 / 2x2.5
	AWG	1x10 / 2x14	1x12 / 2x14

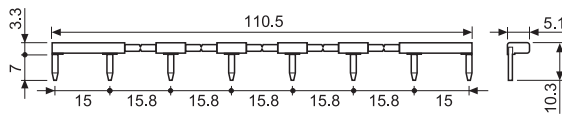


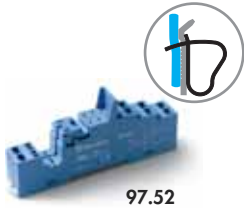
97.02 + 46.52 + 097.71 + 86.30



095.18

8-way jumper link for 97.02 sockets	095.18
Rated values	10 A - 250 V



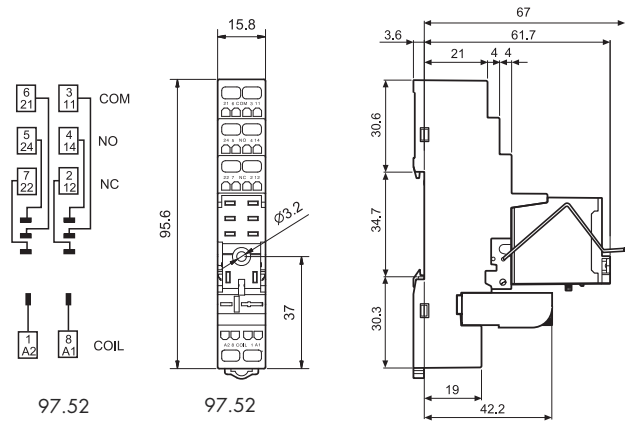
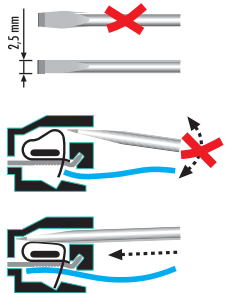


97.52

Approvals
(according to type):



Screwless terminal socket		97.52 SMA	
panel or 35 mm rail (EN 60715) mount			
For relay type		46.52	
Accessories			
Metal retaining clip (supplied with socket - packaging code SMA)		097.71	
Timer modules		86.30	
Technical data			
Rated current		8 A - 250 V AC	
Dielectric strength		6 kV (1.2/50 μ s) between coil and contacts	
Protection category		IP 20	
Ambient temperature	°C	-25...+70	
Wire strip length	mm	8	
Max. wire size for 97.52 sockets	solid wire	stranded wire	
	mm ²	2x(0.2...1.5)	2x(0.2...1.5)
	AWG	2x(24...18)	2x(24...18)

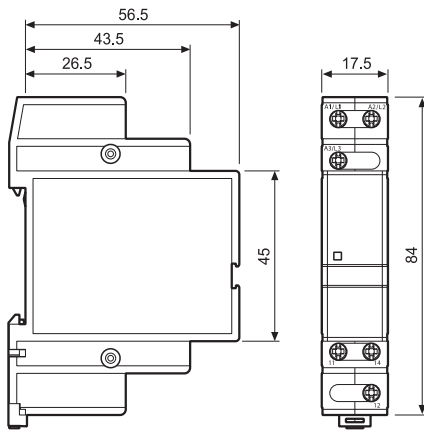


97.52 + 46.52 + 097.71 + 86.30

Features

3 Phase - Rotation and phase loss monitoring relay

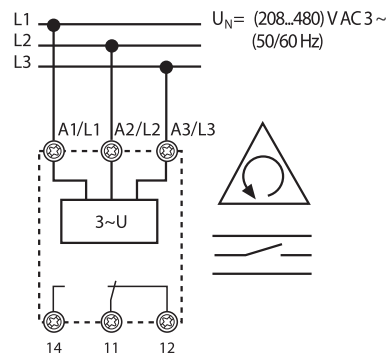
- Universal voltage monitoring (U_N from 208 V to 480 V, 50/60 Hz)
- Phase loss monitoring, under phase regeneration
- Positive safety logic - make contact opens if the relay detects an error
- Small size (17.5 mm wide)
- 35 mm rail (EN 60715) mount
- European patent pending for the fully innovative principle at the root of the 3 phase monitoring and error survey system



72.31



- Phase rotation monitoring
- Phase loss monitoring



Contact specification

Contact configuration	1 CO (SPDT)
Rated current/Maximum peak current A	6/15
Rated voltage/Maximum switching voltage V AC	250/400
Rated load AC1 VA	1,500
Rated load AC15 (230 V AC) VA	250
Single phase motor rating (230 V AC) kW	0.185
Breaking capacity DC1: 30/110/220 V A	3/0.35/0.2
Minimum switching load mW(V/mA)	500 (10/5)
Standard contact material	AgCdO

Supply specification

Nominal system voltage (U_N) V AC 3 ~	208...480
Frequency Hz	50/60
Rated power VA 50 Hz/ W	8/1
Operating range V AC 3 ~	170...500

Technical data

Electrical life at rated load AC1 cycles	$100 \cdot 10^3$
Switch-off/reaction time s	<0.5/<0.5
Ambient temperature °C	-20...+50
Protection category	IP20

Approvals (according to type)



Ordering information

Monitoring relays

Example: 3 phase line monitoring relay, phase rotation and loss monitoring

7 2 . 3 1 . 8 . 4 0 0 . 0 0 0 0 T

Series
Type
 3 = 3 phase AC line monitoring
No. of poles
 1 = 1 CO

Supply voltage
 400 = (208...480)V AC 3~
Supply version
 8 = AC (50/60 Hz)

Technical data

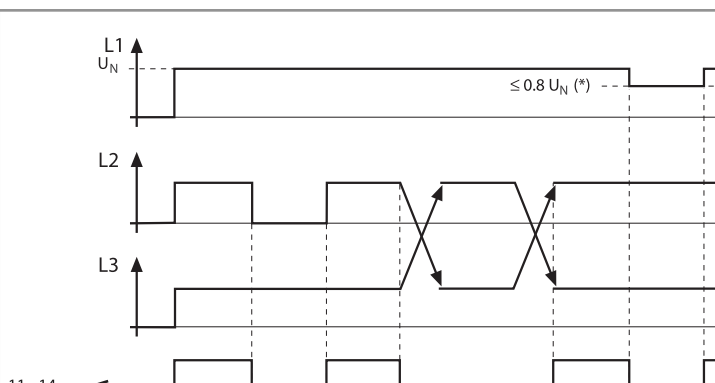
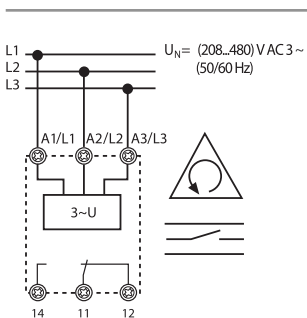
Insulation			
Insulation		Dielectric strength	Impulse (1.2/50 μs)
	between supply and contacts	3,000 V	5 kV
	between open contacts	1,000 V	1.5 kV
EMC specifications			
Type of test		Reference standard	
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV
	air discharge	EN 61000-4-2	8 kV
Fast transients (burst) (5-50ns, 5kHz) on A1, A2, A3		EN 61000-4-4	2 kV
Surge (1.2/50 μs)	differential mode	EN 61000-4-5	4 kV
Other data			
Start up time (NO contact closure after energising)		s	< 2
Regeneration level (Maximum)		≤ 80% of average of other 2 phase	
Power lost to the environment	without contact current	W	1
	with rated current	W	1.4
Screw torque		Nm	0.8
Max. wire size		solid cable	stranded cable
	mm ²	1x6 / 2x4	1x4 / 2x2.5
	AWG	1x10 / 2x12	1x12 / 2x14

Functions

L1, L2, L3 = Supply voltage

= Contact 11- 14

LED status	Supply voltage	NO output contact	Contacts	
			Open	Closed
	Supply voltage OFF	OFF		
	- Incorrect phase rotation - Phase loss	ON	Open	11 - 14
	Normal operation	ON	Closed	11 - 12



Switch off
 - Incorrect phase rotation
 - Phase loss

Output contact (11 - 14)
 - Closed, if monitored system healthy

(*) Phase loss monitoring possible under regeneration up to 80% of the average of the other 2 phases

Features

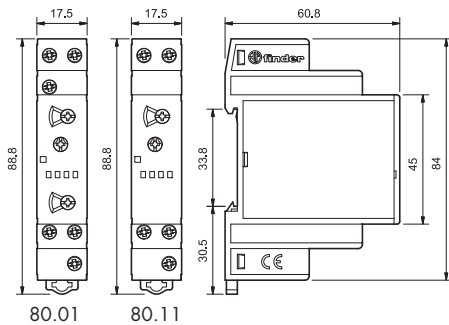
Multi-function and mono-function timer range

80.01 - Multi-function & multi-voltage

80.11 - ON delay, multi-voltage

- 17.5 mm wide
- Six time scales from 0.1 s to 24h
- High input/output isolation
- 35 mm rail (EN 60715) mount
- "Blade + cross" - both flat blade and cross head screw drivers can be used to adjust the range and function selectors, the timing trimmer, and to disengage the rail mounting clip
- New multi-voltage versions with "PWM clever" technology

80.01 / 80.11
Screw terminal



80.01



- Multi-voltage
- Multi-function

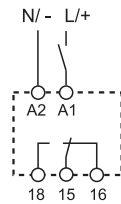
80.11



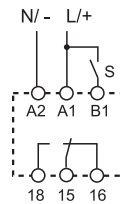
- Multi-voltage
- Mono-function

- AI:** On-delay
DI: Interval
SW: Symmetrical flasher (starting pulse on)
BE: Off-delay with control signal
CE: On- and off-delay with control signal
DE: Interval with control signal on

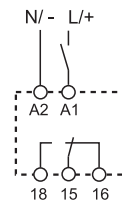
- AI:** On-delay



Wiring diagram
(without control signal)



Wiring diagram
(with control signal)



Wiring diagram
(without control signal)

Contact specification

Contact configuration		1 CO (SPDT)	1 CO (SPDT)
Rated current/Maximum peak current	A	16/30	16/30
Rated voltage/Maximum switching voltage V AC		250/400	250/400
Rated load AC1	VA	4,000	4,000
Rated load AC15 (230 V AC)	VA	750	750
Single phase motor rating (230 V AC)	kW	0.55	0.55
Breaking capacity DC1: 30/110/220 V	A	16/0.3/0.12	16/0.3/0.12
Minimum switching load	mW (V/mA)	500 (10/5)	500 (10/5)
Standard contact material		AgCdO	AgCdO

Supply specification

Nominal voltage (U _N)	V AC (50/60 Hz)	12...240	24...240
	V DC	12...240	24...240
Rated power AC/DC	VA (50 Hz)/W	< 1.8 / < 1	< 1.8 / < 1
Operating range	AC	(10.8...265) V	(16.8...265) V
	DC	(10.8...265) V	(16.8...265) V

Technical data

Specified time range		(0.1...2)s, (1...20)s, (0.1...2)min, (1...20)min, (0.1...2)h, (1...24)h	
Repeatability	%	± 1	± 1
Recovery time	ms	≤ 50	≤ 50
Minimum control impulse	ms	50	—
Setting accuracy-full range	%	± 5	± 5
Electrical life at rated load in AC1	cycles	100·10 ³	100·10 ³
Ambient temperature range	°C	-10...+50	-10...+50
Protection category		IP 20	IP 20

Approvals (according to type)



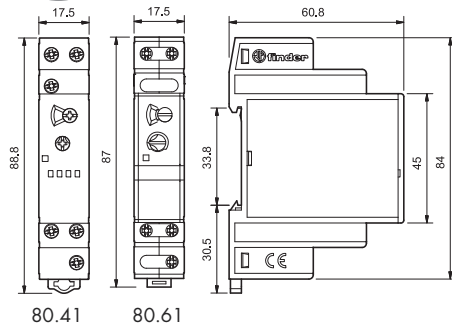
Features

Mono-function timer range

80.41 - Off-delay with control signal, multi-voltage
80.61 - True OFF delay, multi-voltage

- 17.5 mm wide
- Six time scales from 0.1s to 24h (type 80.41)
- Four time scales from 0.1s to 20s (type 80.61)
- High input/output isolation
- 35 mm rail (EN 60715) mount
- "Blade + cross" - both flat blade and cross head screw drivers can be used to adjust the range and function selectors, the timing trimmer, and to disengage the rail mounting clip (type 80.41)
- New multi-voltage versions with "PWM clever" technology
- Rotary range selector, and timing trimmer (type 80.61)

80.41 / 80.61
Screw terminal



Contact specification

Contact configuration		1 CO (SPDT)	1 CO (SPDT)
Rated current/Maximum peak current	A	16/30	8/15
Rated voltage/Maximum switching voltage	V AC	250/400	250/400
Rated load AC1	VA	4,000	2,000
Rated load AC15 (230 V AC)	VA	750	400
Single phase motor rating (230 V AC)	kW	0.55	0.3
Breaking capacity DC1: 30/110/220 V	A	16/0.3/0.12	8/0.3/0.12
Minimum switching load	mW (V/mA)	500 (10/5)	300 (5/5)
Standard contact material		AgCdO	AgNi

Supply specification

Nominal voltage (U_N)	V AC (50/60 Hz)	24...240	24...240
	V DC	24...240	24...240
Rated power AC/DC	VA (50 Hz)/W	< 1.8 / < 1	< 0.6 / < 0.6
Operating range	AC	(16.8...265) V	(16.8...265) V
	DC	(16.8...265) V	(16.8...265) V

Technical data

Specified time range		(0.1...2)s, (1...20)s, (0.1...2)min, (1...20)min, (0.1...2)h, (1...24)h	(0.1...1)s, (0.5...5)s, (1...10)s, (2...20)s
Repeatability	%	± 1	± 1
Recovery time	ms	≤ 50	≤ 50
Minimum control impulse	ms	50	300 (A1-A2)
Setting accuracy-full range	%	± 5	± 5
Electrical life at rated load in AC1	cycles	100·10 ³	100·10 ³
Ambient temperature range	°C	-10...+50	-10...+50
Protection category		IP 20	IP 20

Approvals (according to type)

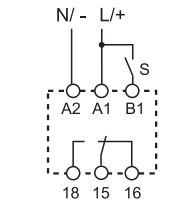


80.41



- Multi-voltage
- Mono-function

BE: Off-delay with control signal



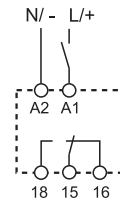
Wiring diagram
(with control signal)

80.61



- Multi-voltage
- Mono-function

BI: True off-delay



Wiring diagram
(without control signal)

Ordering information

Example: 80 series, modular timers, 1 CO (SPDT) - 16 A, supply rated at (12...240)V AC/DC.

8 0 . 0 1 . 0 . 2 4 0 . 0 0 0 0 T

Series

Type

- 0 = Multi-function timer (AI, DI, SW, BE, CE, DE);
1 CO 16 A - 250 V AC
- 1 = Monofunction timer: On-delay (AI);
1 CO 16 A - 250 V AC
- 4 = Monofunction timer:
Off-delay with control signal (BE);
1 CO 16 A - 250 V AC
- 6 = Monofunction timer: True off-delay (BI);
1 CO 8 A - 250 V AC

Versions

- 0 = Standard
- 2 = Standard (for type 80.61 only)

Supply voltage

- 240 = (12 ... 240)V AC/DC (80.01)
- 240 = (24 ... 240)V AC/DC (80.11, 80.41, 80.61)

Supply version

- 0 = AC (50/60 Hz)/DC

No. of poles

- 1 = 1 CO (SPDT)

Technical data

Insulation				
Dielectric strength			80.01/11/41	
	between input and output circuit	V AC	4,000	
	between open contacts	V AC	1,000	
Insulation (1.2/50 µs) between input and output		kV	6	
EMC specifications				
Type of test		Reference standard		
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV	
	air discharge	EN 61000-4-2	8 kV	
Radio-frequency electromagnetic field (80 ÷ 1000 MHz)		EN 61000-4-3	10 V/m	
Fast transients (burst) (5-50 ns, 5 kHz) on Supply terminals		EN 61000-4-4	4 kV	
Surges (1.2/50 µs) on Supply terminals	common mode	EN 61000-4-5	4 kV	
	differential mode	EN 61000-4-5	4 kV	
	on control signal (B1)	common mode	EN 61000-4-5	4 kV
		differential mode	EN 61000-4-5	4 kV
Radio-frequency common mode (0.15 ÷ 80 MHz) on Supply terminals		EN 61000-4-6	10 V	
Radiated and conducted emission		EN 55022	class B	
Other data				
Current absorption on control signal (B1)			< 1 mA	
Power lost to the environment	without contact current	W	1.4	
	with rated current	W	3.2	
Screw torque		Nm	0.8	
Max. wire size		solid cable	stranded cable	
		mm ²	1x4 / 2x2.5	
		AWG	1x12 / 2x14	

Functions

U = Supply voltage

S = Control signal

= Output contact

LED*	Supply voltage	NO output contact	Contacts	
			Open	Closed
	OFF	Open	15 - 18	15 - 16
	ON	Open	15 - 18	15 - 16
	ON	Open (Timing in Progress)	15 - 18	15 - 16
	ON	Closed	15 - 16	15 - 18

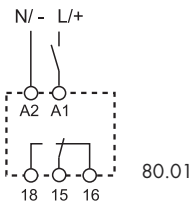
* The LED on type 80.61 is illuminated only when the supply voltage is applied to the timer; during the timing period the LED is not illuminated.

Wiring diagram

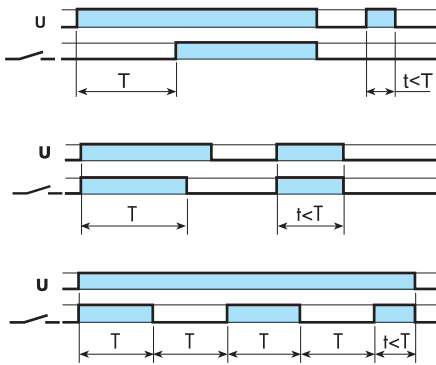
Without control signal = Start via contact in supply line (A1).

With control signal = Start via contact into control terminal (B1).

Without control signal



Type 80.01



(AI) On-delay.

Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.

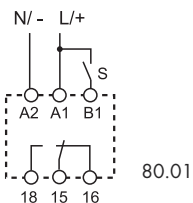
(DI) Interval.

Apply power to timer. Output contacts transfer immediately. After the preset time has elapsed, contacts reset.

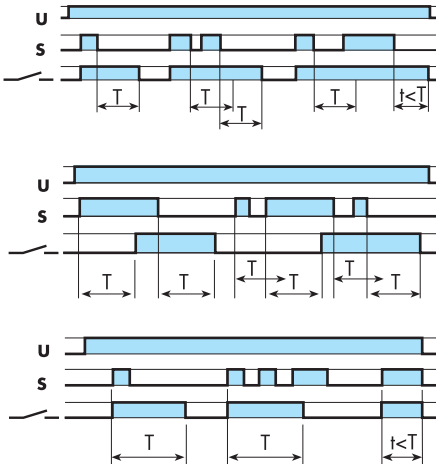
(SW) Symmetrical flasher (starting pulse on).

Apply power to timer. Output contacts transfer immediately and cycle between ON and OFF for as long as power is applied. The ratio is 1:1 (time on = time off).

With control signal



80.01



(BE) Off-delay with control signal.

Power is permanently applied to the timer. The output contacts transfer immediately on closure of the control signal (S). Opening the control signal initiates the preset delay, after which time the output contacts reset.

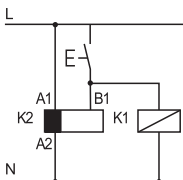
(CE) On- and off-delay with control signal.

Power is permanently applied to the timer. Closing the control signal (S) initiates the preset delay, after which time the output contacts transfer. Opening the control signal initiates the same preset delay, after which time the output contacts reset.

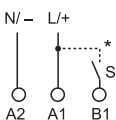
(DE) Interval with control signal on.

Power is permanently applied to the timer. On momentary or maintained closure of control signal (S), the output contacts transfer, and remain so for the duration of the preset delay, after which they reset.

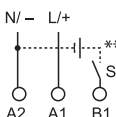
NOTE: The function must be set before energising the timer.



- Possible to control an external load, such as another relay coil or timer, connected to the control signal terminal B1.



* With DC supply, positive polarity has to be connected to B1 terminal (according to EN 60204-1).



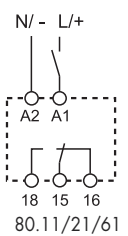
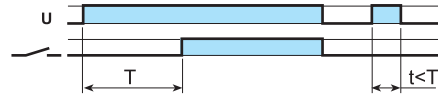
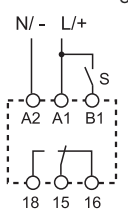
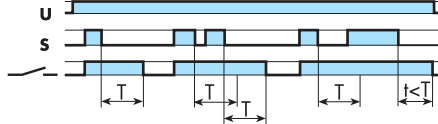
** A voltage other than the supply voltage can be applied to the control signal (B1), example:

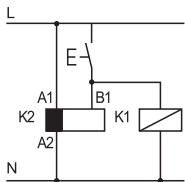
A1 - A2 = 230 V AC

B1 - A2 = 12 V DC

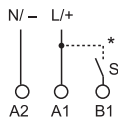
Functions

Wiring diagram

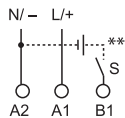
<p>Without control signal</p> 	<p>Type 80.11</p>		<p>(A) On-delay. Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.</p>
<p>With control signal</p> 	<p>80.41</p>		<p>(BE) Off-delay with control signal. Power is permanently applied to the timer. The output contacts transfer immediately on closure of the control signal (S). Opening the control signal initiates the preset delay, after which time the output contacts reset.</p>



• Possible to control an external load, such as another relay coil or timer, connected to the control signal terminal B1.



* With DC supply, positive polarity has to be connected to B1 terminal (according to EN 60204-1).



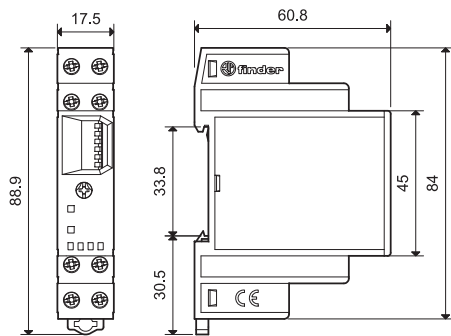
** A voltage other than the supply voltage can be applied to the control signal (B1), example:
A1 - A2 = 230 V AC
B1 - A2 = 12 V DC

Features

Multi-function and multi-voltage timer

- One module 17.5 mm wide housing
- Seven functions (4 with supply start and 3 with control signal)
- Additional Reset function
- Six time ranges from 0.1s to 10h
- 35 mm rail (EN 60715) mounting

81.01
Screw terminal

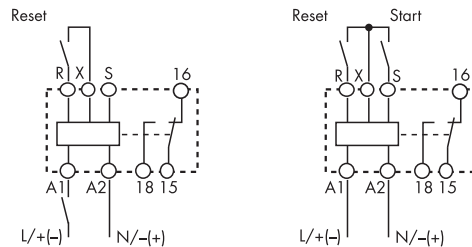


81.01



- Multi-voltage (DC non polarized)
- Multi-function
- 35 mm rail (EN 60715) mounting

- AI:** On-delay
- DI:** Interval
- SW:** Symmetrical flasher (starting pulse on)
- SP:** Symmetrical flasher (starting pulse off)
- BE:** Off-delay with control signal
- DE:** Interval with control signal on
- EE:** Interval with control signal off



Wiring diagram
without control signal

Wiring diagram
with control signal

Contact specification		
Contact configuration		1 CO (SPDT)
Rated current/Maximum peak current	A	16/30
Rated voltage/Maximum switching voltage	V AC	250/400
Rated load AC1	VA	4000
Rated load AC15 (230 V AC)	VA	750
Single phase motor rating (230 V AC)	kW	0.55
Breaking capacity DC1: 30/110/220 V	A	16/0.3/0.12
Minimum switching load	mW (V/mA)	500 (10/5)
Standard contact material		AgCdO
Supply specification		
Nominal voltage (U _N)	V AC (50/60 Hz)	12...230
	V DC	12...230 (non polarized)
Rated power AC/DC	VA (50 Hz)/W	< 2 / < 2
Operating range	V AC	10.8...250
	V DC	10.8...250
Technical data		
Specified time range		(0.1...1)s, (1...10)s, (10...60)s, (1...10)min, (10...60)min, (1...10)h
Repeatability	%	± 1
Recovery time	ms	≤ 50
Minimum control impulse	ms	50
Setting accuracy-full range	%	± 5
Electrical life at rated load in AC1	cycles	100·10 ³
Ambient temperature range	°C	-10...+50
Protection category		IP 20
Approvals (according to type)		

Ordering information

Example: 81 series, multi function timer; 1 CO 16 A - 250 V AC, supply rated at (12...230)V AC/DC.

8 1 . 0 1 . 0 . 2 3 0 . 0 0 0 0 T

Series

Type

0 = Multi-function (AI, DI, SW, SP, BE, DE, EE)

No. of poles

1 = 1 CO (SPDT)

Supply voltage

230 = (12 ... 230)V AC/DC

Supply version

0 = AC (50/60 Hz)/DC

Technical data


EMC specifications			
Type of test		Reference standard	
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV
	air discharge	EN 61000-4-2	8 kV
Radio-frequency electromagnetic field (80 ÷ 1000 MHz)		EN 61000-4-3	10 V/m
Fast transients (burst) (5-50 ns, 5 kHz) on Supply terminals		EN 61000-4-4	4 kV
Surges (1.2/50 µs) on Supply terminals	common mode	EN 61000-4-5	4 kV
	differential mode	EN 61000-4-5	4 kV
Radio-frequency common mode (0.15 ÷ 80 MHz) on Supply terminals		EN 61000-4-6	10 V
Radiated and conducted emission		EN 55022	class A
Other data			
Current absorption on control signal (B1)		< 1 mA (S-X)	< 1 mA (R-X)
Voltage potential on the input terminal R - X and S - X		Not galvanic separation from the supply voltage on A1 - A2	
Power lost to the environment	without contact current	W	1.3
	with rated current	W	3.2
Screw torque		Nm	0.8
Max. wire size		solid cable	stranded cable
		mm ²	1x6 / 2x4
		AWG	1x10 / 2x12







Time range setting

	(0.1...1)s	(1...10)s	(10...60)s	(1...10)min	(10...60)min	(1...10)h
1						
2						
3						
4						
5						
6						

NOTE: time range and function must be set before energising the timer.

Functions

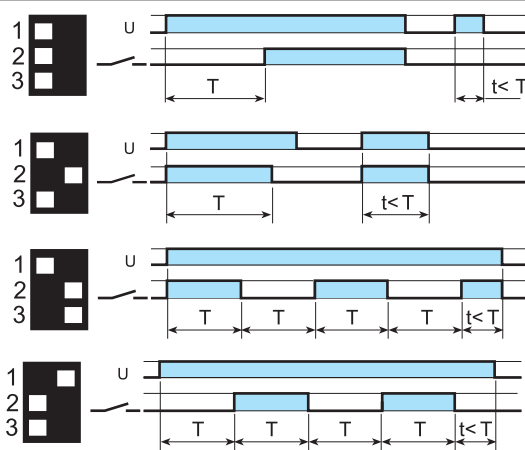
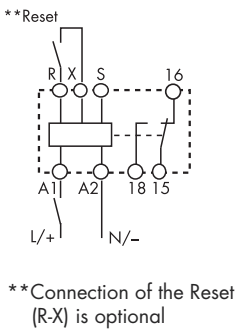
- U** = Supply voltage
- S** = Control signal
- R** = Reset
-  = Output contact

LED (green)	LED (red)	Supply voltage	NO output contact	Contacts	
				Open	Closed
		OFF	Open	15 - 18	15 - 16
		ON	Open	15 - 18	15 - 16
		ON	Closed	15 - 16	15 - 18

Without control signal = Start via contact in supply line (A1).
 With control signal = Start via contact into control terminal (B1).

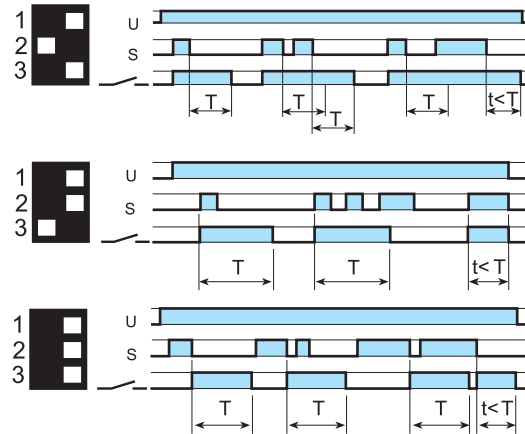
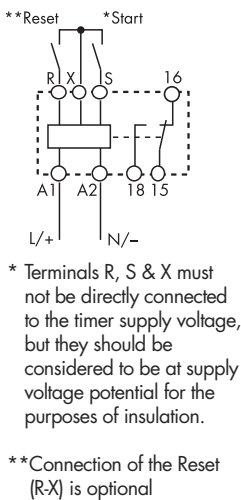
Wiring diagram

Without control signal



- (AI) On-delay.**
Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.
- (DI) Interval.**
Apply power to timer. Output contacts transfer immediately. After the preset time has elapsed, contacts reset.
- (SW) Symmetrical flasher (starting pulse on).**
Apply power to timer. Output contacts transfer immediately and cycle between ON and OFF for as long as power is applied. The ratio is 1:1 (time on = time off).
- (SP) Symmetrical flasher (starting pulse off).**
Apply power to timer. First transfer of contact occurs after preset time has elapsed. The timer now cycles between OFF and ON as long as power is applied. The ratio is 1:1 (time on = time off).

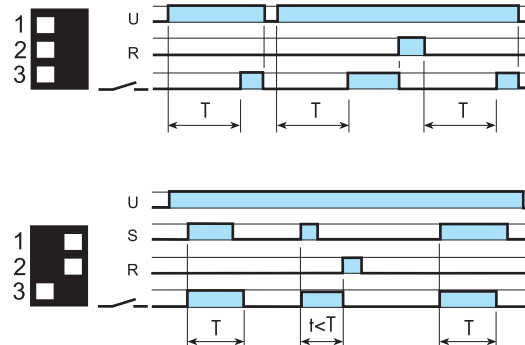
With control signal



- (BE) Off-delay with control signal.**
Power is permanently applied to the timer. The output contacts transfer immediately on closure of the control signal (S). Opening the control signal initiates the preset delay, after which time the output contacts reset.
- (DE) Interval with control signal on.**
Power is permanently applied to the timer. On momentary or maintained closure of control signal (S), the output contacts transfer, and remain so for the duration of the preset delay, after which they reset.
- (EE) Interval with control signal off.**
Power is permanently applied to the timer. On opening of the control signal (S) the output contacts transfer, and remain so for the duration of the preset delay, after which they reset.

RESET function (R)

For each and every function and time range, the timer is immediately reset when the reset switch is closed.



- Example:
On-delay function (without control signal).
Closing the external reset switch immediately resets the timer. Opening the reset switch re-initiates the timing function.
- Example:
Interval with control signal on function.
Closing the external reset switch terminates the interval time and resets the timer. To re-start, it is necessary to open the reset switch, before closing the control signal contact.

Features

Quiet operating electronic step/monostable relay

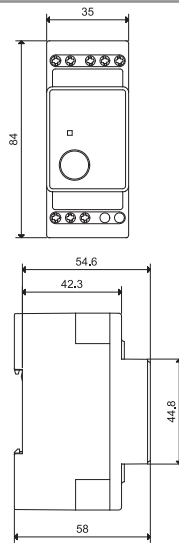
1 Pole output contact

- Selectable Step or Monostable operation
- Control input can be continuously applied
- Longer mechanical and electrical life, and much quieter than electromechanical step relays
- Suitable for SELV applications according to IEC 364
- Supply 24 V AC/DC
- 35 mm rail (EN 60715) mount
- Cadmium free contact material

13.01



- Step or monostable relay
- 35 mm rail (EN 60715) mount



Contact specification		
Contact configuration		1 CO (SPDT)
Rated current/Maximum peak current	A	16/30 (120 A - 5 ms)
Rated voltage/Maximum switching voltage V AC		250/400
Rated load AC1	VA	4,000
Rated load AC15 (230 V AC)	VA	750
Nominal lamp rating: incandescent (230 V)	W	2,000
compensated fluorescent (230 V)	W	750
uncompensated fluorescent (230 V)	W	1,000
halogen (230 V)	W	2,000
Minimum switching load	mW (V/mA)	1,000 (10/10)
Standard contact material		AgSnO ₂
Supply specification		
Nominal voltage (U _N)	V AC (50/60 Hz)	24
	V DC	24
Rated power AC/DC	V AC (50 Hz)/W	2.5/2.5
Operating range	AC (50 Hz)	(19.2...26.2) V
	DC	(16.8...33.6) V
Technical data		
Electrical life at rated load in AC1	cycles	100 · 10 ³
Maximum impulse duration		continuous
Dielectric strength between: open contacts	V AC	1,000
supply - contacts	V AC	4,000
Ambient temperature range	°C	-10...+60
Protection category		IP 20
Approvals (according to type)		

Ordering information

Example: 13 series, electronic step/monostable relay, 35 mm rail (EN 60715) mount, 1 CO (SPDT) 16 A contact, 24 V AC/DC supply.

1 3 . 0 1 . 0 . 0 2 4 . 0 0 0 0 T

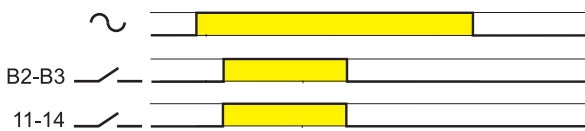
Series _____
Type _____
 0 = Step/Monostable, 35 mm rail (EN 60715) mount, 35 mm wide
No. of poles _____
 1 = 1 pole

Supply voltage
 024 = 24 V AC/DC
Supply version
 0 = AC (50/60 Hz)/DC

Technical data

Insulation		
Dielectric strength	between control circuit and contacts	V AC 4,000
	between supply and contacts	V AC 4,000
	between open contacts	V AC 1,000
Other data		
Power lost to the environment	without contact current	W 2.2
	without rated current	W 3.5
Max cable length for push-button connection	m	100
Terminals		
Max. wire size		solid cable
	mm ²	1x6 / 2x4
	AWG	1x10 / 2x12
		stranded cable
		1x6 / 2x2.5
		1x10 / 2x14
Screw torque	Nm	0.8

Functions



Monostable
 On closure of a switch between terminals (B2-B3) the output contact will close, and remain so, until the switch opens.



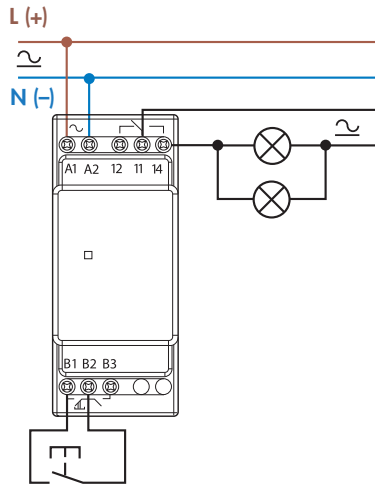
Bistable
 After every impulse (B1-B2), the output contact changes state - alternately switching from open to closed and vice versa.

Wiring diagrams

Type 13.01

Step wiring diagram

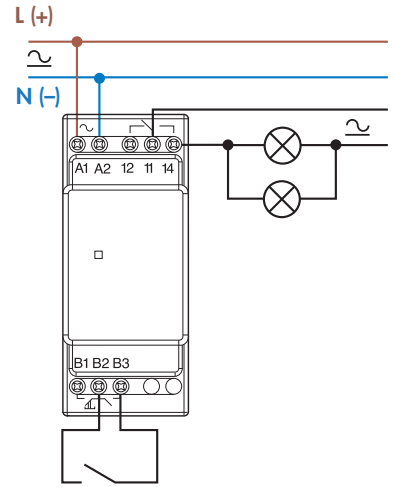
Red LED indication:
Continuous = relay ON



Type 13.01

Monostable wiring diagram

Red LED indication:
Continuous = relay ON







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