

**Multi-function timer range**

**83.01 - Multi-function & multi-voltage, 1 Pole**

**83.02 - Multi-function & multi-voltage, 2 Pole (timed + instantaneous options), external time setting potentiometer option**

**83.52 - Multi-function & multi-voltage, 2 Pole (timed + instantaneous options), external time setting potentiometer option, pause function option**

- 22.5 mm wide
- Eight time scales from 0.05 s to 10 days
- High input/output isolation
- Wide supply range (24...240)V AC/DC
- 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
- Multi-voltage versions with "PWM clever" technology
- Complies with EN 45545-2:2013 (protection against fire of materials), EN 61373 (resistance against random vibrations and shock, Category 1, Class B), EN 50155 (resistance to temperature and humidity, T1 class)

For outline drawing see page 5

**Contact specification**

Contact configuration		1 CO (SPDT)	2 CO (DPDT)	2 CO (DPDT)
Rated current/Maximum peak current	A	16/30	12/30	12/30
Rated voltage/Maximum switching voltage	V AC	250/400	250/400	250/400
Rated load AC1	VA	4000	3000	3000
Rated load AC15 (230 V AC)	VA	750	750	750
Single phase motor rating (230 V AC)	kW	0.5	0.5	0.5
Breaking capacity DC1: 30/110/220 V	A	16/0.3/0.12	12/0.3/0.12	12/0.3/0.12
Minimum switching load	mW (V/mA)	300 (5/5)	300 (5/5)	300 (5/5)
Standard contact material		AgNi	AgNi	AgNi

**Supply specification**

Nominal voltage (U <sub>N</sub> )	V AC (50/60 Hz)	24...240	24...240	24...240
	V DC	24...240	24...240	24...240
Rated power AC/DC	VA (50 Hz)/W	< 1.5/< 2	< 2/< 2	< 2/< 2
Operating range	V AC	16.8...265	16.8...265	16.8...265
	V DC	16.8...265	16.8...265	16.8...265

**Technical data**

Specified time range		(0.05...1)s, (0.5...10)s, (0.05...1)min, (0.5...10)min, (0.05...1)h, (0.5...10)h, (0.05...1)d, (0.5...10)d		
Repeatability	%	± 1	± 1	± 1
Recovery time	ms	200	200	200
Minimum control impulse	ms	50	50	50
Setting accuracy-full range	%	± 5	± 5	± 5
Electrical life at rated load in AC1	cycles	50 · 10 <sup>3</sup>	60 · 10 <sup>3</sup>	60 · 10 <sup>3</sup>
Ambient temperature range	°C	-20...+60	-20...+60	-20...+60
Protection category		IP 20	IP 20	IP 20

**Approvals** (according to type)



83.01	83.02	83.52
<ul style="list-style-type: none"> <li>• Multi-voltage</li> <li>• Multi-function</li> </ul>	<ul style="list-style-type: none"> <li>• Multi-voltage</li> <li>• Multi-function</li> <li>• Timing can be regulated using ext. Potentiometer</li> <li>• 2 timed contacts or 1 timed + 1 instantaneous contact</li> </ul>	<ul style="list-style-type: none"> <li>• Multi-voltage</li> <li>• Multi-function</li> <li>• Timing can be regulated using ext. Potentiometer</li> <li>• 2 timed contacts or 1 timed + 1 instantaneous contact</li> <li>• 3 functions with pause option</li> </ul>
<p><b>AI:</b> On-delay  <b>DI:</b> Interval  <b>GI:</b> Pulse delayed  <b>SW:</b> Symmetrical flasher (starting pulse on)  <b>BE:</b> Off-delay with control signal  <b>CE:</b> On- and off-delay with control signal  <b>DE:</b> Interval with control signal on  <b>WD:</b> Watchdog (Retriggerable interval with control signal on)</p> <p>Wiring diagram (without control signal)</p> <p>Wiring diagram (with control signal)</p>	<p><b>AI:</b> On-delay  <b>DI:</b> Interval  <b>GI:</b> Pulse delayed  <b>SW:</b> Symmetrical flasher (starting pulse on)  <b>BE:</b> Off-delay with control signal  <b>CE:</b> On- and off-delay with control signal  <b>DE:</b> Interval with control signal on  <b>WD:</b> Watchdog (Retriggerable interval with control signal on)</p> <p>Wiring diagram (without control signal)</p> <p>Wiring diagram (with control signal)</p>	<p><b>AE:</b> On-delay with control signal  <b>GE:</b> Pulse delayed with control signal on  <b>IT:</b> Timing step  <b>FE:</b> Interval with control signal on and off  <b>EEa:</b> Interval with control signal off (retriggerable)  <b>DEp:</b> Interval with control signal on and pause signal  <b>BEp:</b> Off-delay with control signal and pause signal  <b>SHp:</b> "Shower" function</p> <p>Wiring diagram (with control signal and external potentiometer connection)</p> <p>Wiring diagram (with control signal and pause signal)</p>

**Mono-function timer range**

**83.11 - ON-delay, multi-voltage**

**83.21 - Interval, multi-voltage**

**83.41 - Off-delay with control signal, multi-voltage**

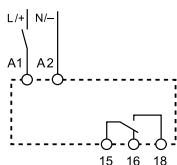
- 1 Pole
- 22.5 mm wide
- Eight time scales from 0.05 s to 10 days
- High input/output isolation
- Wide supply range (24...240)V AC/DC
- 35 mm rail (EN 60715) mount
- "Blade + cross" - both flat blade and cross head screw drivers can be used to adjust the range and function selectors, the timing trimmer, and to disengage the rail mounting clip
- Multi-voltage versions with "PWM clever" technology
- Complies with EN 45545-2:2013 (protection against fire of materials), EN 61373 (resistance against random vibrations and shock, Category 1, Class B), EN 50155 (resistance to temperature and humidity, T1 class)

**83.11**



- Multi-voltage
- Mono-function

**AI:** On-delay



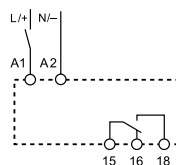
Wiring diagram  
(without control signal)

**83.21**



- Multi-voltage
- Mono-function

**DI:** Interval



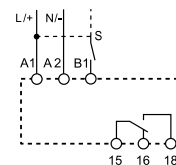
Wiring diagram  
(without control signal)

**83.41**



- Multi-voltage
- Mono-function

**BE:** Off-delay with control signal



Wiring diagram  
(with control signal)

H

For outline drawing see page 5

**Contact specification**

Contact configuration		1 CO (SPDT)	1 CO (SPDT)	1 CO (SPDT)
Rated current/Maximum peak current	A	16/30	16/30	16/30
Rated voltage/Maximum switching voltage	V AC	250/400	250/400	250/400
Rated load AC1	VA	4000	4000	4000
Rated load AC15 (230 V AC)	VA	750	750	750
Single phase motor rating (230 V AC)	kW	0.5	0.5	0.5
Breaking capacity DC1: 30/110/220 V	A	16/0.3/0.12	16/0.3/0.12	16/0.3/0.12
Minimum switching load	mW (V/mA)	300 (5/5)	300 (5/5)	300 (5/5)
Standard contact material		AgNi	AgNi	AgNi

**Supply specification**

Nominal voltage (U <sub>N</sub> )	V AC (50/60 Hz)	24...240	24...240	24...240
	V DC	24...240	24...240	24...240
Rated power AC/DC	VA (50 Hz)/W	< 1.5/< 2	< 1.5/< 2	< 1.5/< 2
Operating range	V AC	16.8...265	16.8...265	16.8...265
	V DC	16.8...265	16.8...265	16.8...265

**Technical data**

Specified time range		(0.05...1)s, (0.5...10)s, (0.05...1)min, (0.5...10)min, (0.05...1)h, (0.5...10)h, (0.05...1)d, (0.5...10)d		
Repeatability	%	± 1	± 1	± 1
Recovery time	ms	200	200	200
Minimum control impulse	ms	—	—	50
Setting accuracy-full range	%	± 5	± 5	± 5
Electrical life at rated load in AC1	cycles	50 · 10 <sup>3</sup>	50 · 10 <sup>3</sup>	50 · 10 <sup>3</sup>
Ambient temperature range	°C	-20...+60	-20...+60	-20...+60
Protection category		IP 20	IP 20	IP 20

**Approvals** (according to type)



**Mono-function and multi-function timer range**

**83.62 - Power off-delay, multi-voltage, 2 Pole**

**83.82 - Star-Delta, multi-voltage, star and delta output contacts**

**83.91 - Asymmetrical flasher, multi-voltage, 1 Pole**

- 22.5 mm wide
- Time scales:
- Type 83.62 - 0.05 s to 3 minutes
- Type 83.82/83.91 - 0.05 s to 10 days
- Wide supply range (24...240)V AC / DC
- 35 mm rail (EN 60715) mount
- Complies with EN 45545-2:2013 (protection against fire of materials), EN 61373 (resistance against random vibrations and shock, Category 1, Class B), EN 50155 (resistance to temperature and humidity, T1 class)

- \* (0.05...2)s, (1...16)s, (8...70)s, (50...180)s
- \*\* (0.05...1)s, (0.5...10)s, (0.05...1)min, (0.5...10)min, (0.05...1)h, (0.5...10)h, (0.05...1)d, (0.5...10)d
- \*\*\* 0.05 s, 0.2 s, 0.3 s, 0.45 s, 0.6 s, 0.75 s, 0.85 s, 1 s

For outline drawing see page 5

**Contact specification**

Contact configuration	83.62	83.82	83.91
Contact configuration	2 CO (DPDT)	2 NO (DPST-NO)	1 CO (SPDT)
Rated current/Maximum peak current	A 8/15	16/30	16/30
Rated voltage/Maximum switching voltage	V AC 250/400	250/400	250/400
Rated load AC1	VA 2000	4000	4000
Rated load AC15 (230 V AC)	VA 400	750	750
Single phase motor rating (230 V AC)	kW 0.3	0.5	0.5
Breaking capacity DC1: 30/110/220 V	A 8/0.3/0.12	16/0.3/0.12	16/0.3/0.12
Minimum switching load	mW (V/mA) 300 (5/5)	300 (5/5)	300 (5/5)
Standard contact material	AgNi	AgNi	AgNi

**Supply specification**

Parameter	83.62	83.82	83.91
Nominal voltage (U <sub>N</sub> )	V AC (50/60 Hz) 24...240	24...240	24...240
	V DC 24...220	24...240	24...240
Rated power AC/DC	VA (50 Hz)/W < 1.5/< 2	< 1.5/< 2	< 1.5/< 2
Operating range	V AC 16.8...265	16.8...265	16.8...265
	V DC 16.8...242	16.8...265	16.8...265

**Technical data**

Parameter	83.62	83.82	83.91
Specified time range	*	**	
Repeatability	% ± 1	± 1	± 1
Recovery time	ms —	200	200
Minimum control impulse	ms 500 ms (A1 - A2)	—	50
Setting accuracy-full range	% ± 5	± 5	± 5
Electrical life at rated load in AC1	cycles 100·10 <sup>3</sup>	50·10 <sup>3</sup>	50·10 <sup>3</sup>
Ambient temperature range	°C -20...+60	-20...+60	-20...+60
Protection category	IP 20	IP 20	IP 20

**Approvals** (according to type)

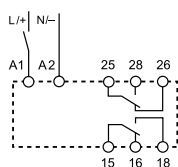


**83.62**



- Multi-voltage
- Mono-function
- 2 pole

**BI:** Power off-delay (True off-delay)



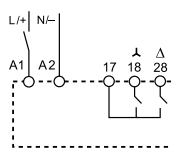
Wiring diagram (without control signal)

**83.82**



- Multi-voltage
- Mono-function
- 2 pole
- Transfer time can be regulated (0.05...1)s\*\*\*

**SD:** Star-delta



Wiring diagram (without control signal)

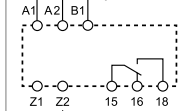
**83.91**



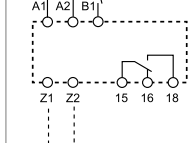
- Multi-voltage
- Multi-function

- LI:** Asymmetrical flasher (starting pulse on)
- LE:** Asymmetrical flasher (starting pulse on) with control signal
- PI:** Asymmetrical flasher (starting pulse off)
- PE:** Asymmetrical flasher (starting pulse off) with control signal

Wiring diagram (without control signal)

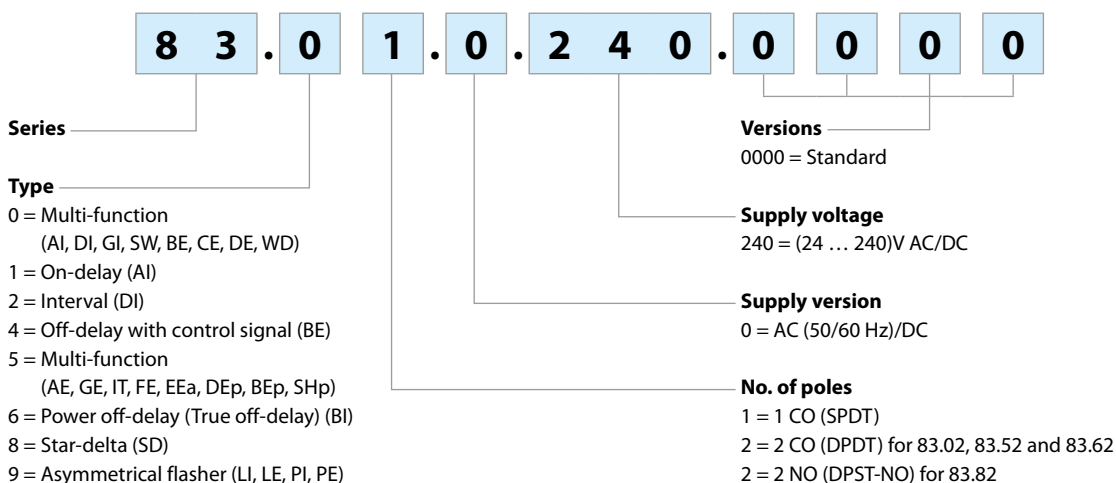


Wiring diagram (with control signal)



## Ordering information

Example: 83 series, modular timers, 1 CO (SPDT) - 16 A, supply rated at (24...240)V AC/DC.



## Technical data

### Insulation

Dielectric strength	between input and output circuit	V AC	4000
	between open contacts	V AC	1000
Insulation (1.2/50 µs) between input and output		kV	6

### EMC specifications

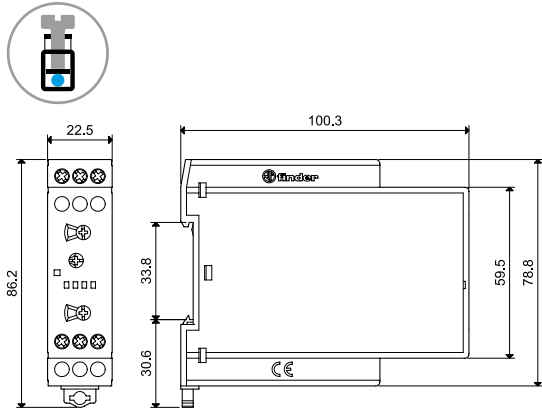
Type of test	Reference standard	83.01/02/52/11/21/41/82/91	83.62	
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV	
	air discharge	EN 61000-4-2	8 kV	
Radio-frequency electromagnetic field	(80 ÷ 1000 MHz)	EN 61000-4-3	10 V/m	
	(1000 ÷ 2700 MHz)	EN 61000-4-3	3 V/m	
Fast transients (burst) (5-50 ns, 5 and 100 kHz)	on Supply terminals	EN 61000-4-4	7 kV	
	on control signal terminal (B1)	EN 61000-4-4	6 kV	
Surges (1.2/50 µs) on Supply terminals	common mode	EN 61000-4-5	6 kV	
	differential mode	EN 61000-4-5	4 kV	
	on control signal terminal (B1)	common mode	EN 61000-4-5	6 kV
	differential mode	EN 61000-4-5	4 kV	
Radio-frequency common mode on Supply terminals	(0.15 ÷ 80 MHz)	EN 61000-4-6	10 V	
	(80 ÷ 230 MHz)	EN 61000-4-6	10 V	
Radiated and conducted emission		EN 55022	class A	

### Other data

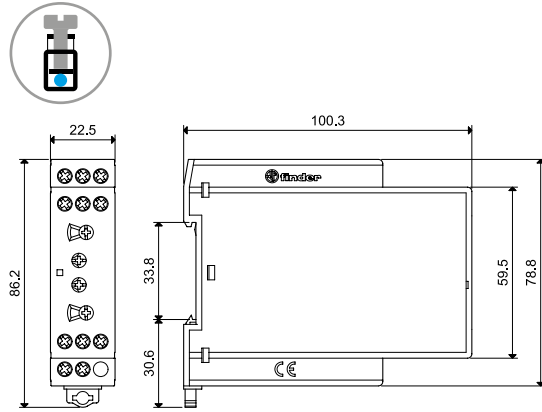
Current absorption on control signal (B1)	< 1 mA			
- max cable length (capacity of ≤ 10 nF/100 m)	150 m			
- when applying a control signal to B1, which is different from the supply voltage at A1/A2	B1 is isolated from A1 and A2 by an opto-coupler, and can therefore be operated at a voltage other than the supply voltage. If using a control signal of between (24... 48)V DC and a supply voltage of (24...240)V AC, ensure that the signal - is connected to A2 and the + is applied to B1, and that L is applied to B1 and N to A2.			
External potentiometer for 83.02/52	Use a 10 kΩ / ≥ 0.25 W linear potentiometer. Maximum cable length 10 m. When using an external potentiometer, the timer automatically use its setting in place of the internal setting. Consider the voltage potential at the potentiometer to be the same as the timer supply voltage.			
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	mm <sup>2</sup>	1 x 6 / 2 x 4
		stranded cable	mm <sup>2</sup>	1 x 4 / 2 x 2.5
	AWG		1 x 10 / 2 x 12	

**Outline drawings**

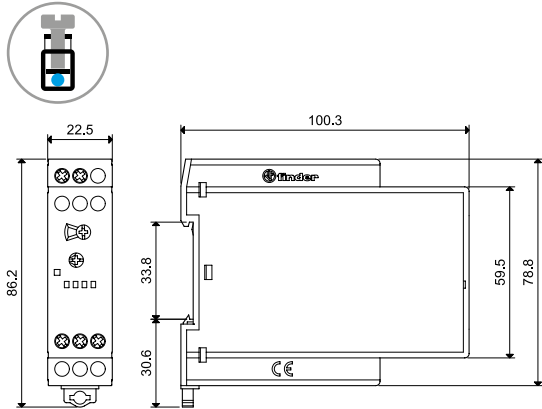
83.01  
Screw terminal



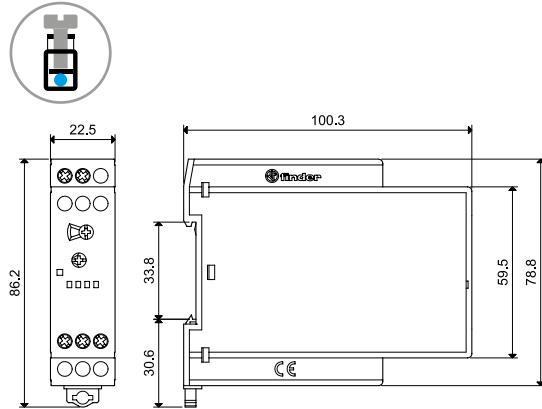
83.02/52  
Screw terminal



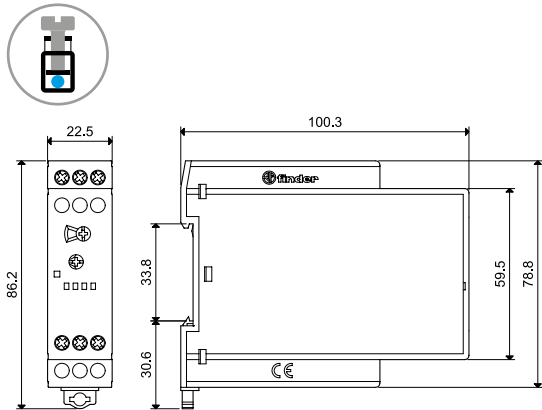
83.11  
Screw terminal



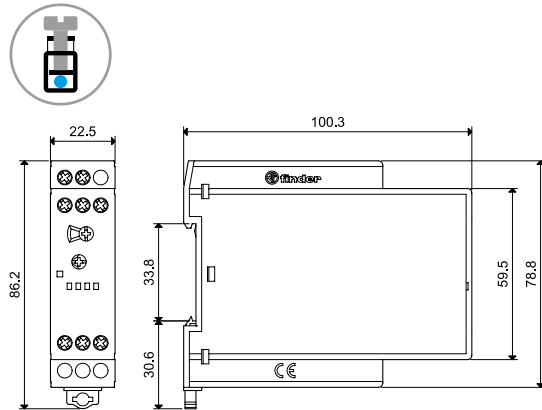
83.21  
Screw terminal



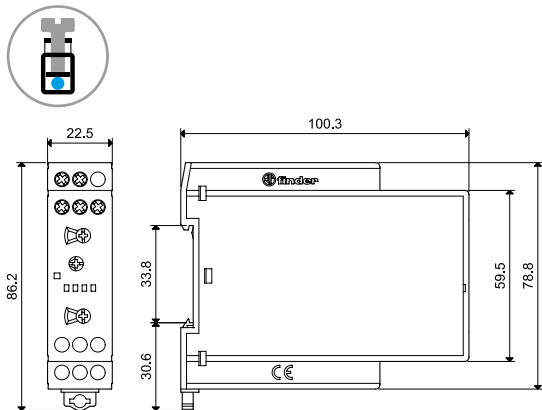
83.41  
Screw terminal



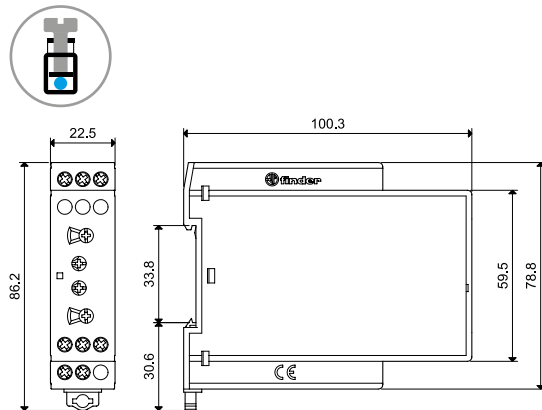
83.62  
Screw terminal



83.82  
Screw terminal



83.91  
Screw terminal



### Accessories



060.72

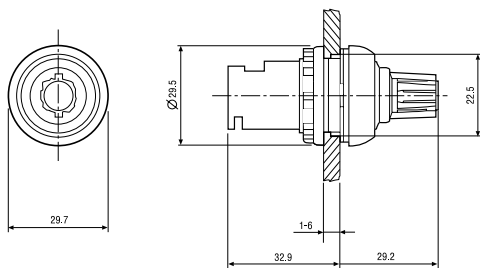
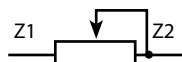
Sheet of marker tags, for types 83.01/11/21/41/62/82, plastic, 72 tags, 6 x 12 mm 060.72



087.02.2

Potentiometer usable as external potentiometer for type 83.02/52  
10 kΩ / 0.25 W linear, IP 66

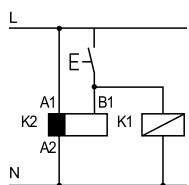
087.02.2



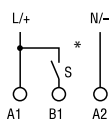
### Functions

LED*	Supply voltage	NO output contact	Contacts	
			Open	Closed
	OFF	Open	15 - 18 25 - 28	15 - 16 25 - 26
	ON	Open	15 - 18 25 - 28	15 - 16 25 - 26
	ON	Open (Timing in Progress)	15 - 18 25 - 28	15 - 16 25 - 26
	ON	Closed	15 - 16 25 - 26	15 - 18 25 - 28

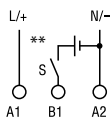
\* The LED on type 83.62 is illuminated when supply voltage is supplied to timer.



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



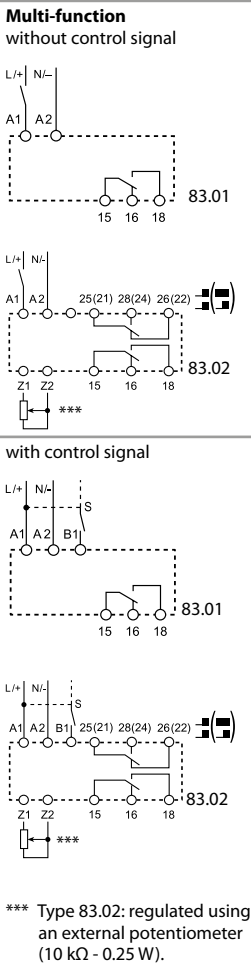
\* With DC supply, positive polarity has to be connected to B1 terminal (according to EN 60204-1).



\*\* 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

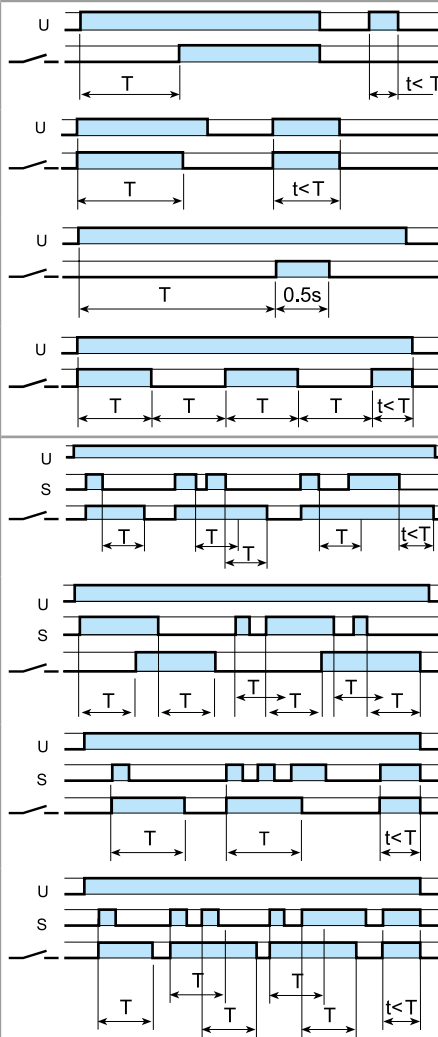
### Wiring diagram



U = Supply voltage

S = Signal switch

= Output contact



- (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.
- (GI) Pulse delayed.**  
Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs after a fixed time of 0.5s.
- (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).
- (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.
- (WD) Watchdog (Retriggerable 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; subsequent closures of control signal during the delay will extend the time. If the closure of the control signal (S) is longer than the preset time (T) then the output contacts reset.

NOTE: The timing function must be set when the timer is de-energised. Or for the 83.02/52, when the contact mode selector is in the OFF position.

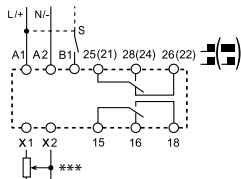
### 83.02 type

Contact mode selector	Functions without control signal (example: AI)	Functions with control signal (example: BE)
2 timed contacts 	<p>Both output contacts (15-18 and 25-28) follow the timing function</p>	<p>Both output contacts (15-18 and 25-28) follow the timing function</p>
OFF 	<p>Both output contacts [15-18 and 25(21)-28(24)] stay permanently open</p>	<p>Both output contacts [15-18 and 25(21)-28(24)] stay permanently open</p>
1 timed + 1 instantaneous contact 	<p>The output contact 15-18 follows the timing function The output contact 21-24 follows the power supply (U)</p>	<p>The output contact 15-18 follows the timing function The output contact 21-24 follows the control signal (S)</p>

## Functions

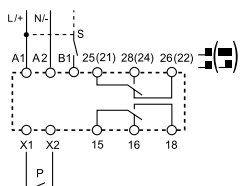
### Wiring diagram

#### Multi-function with control signal



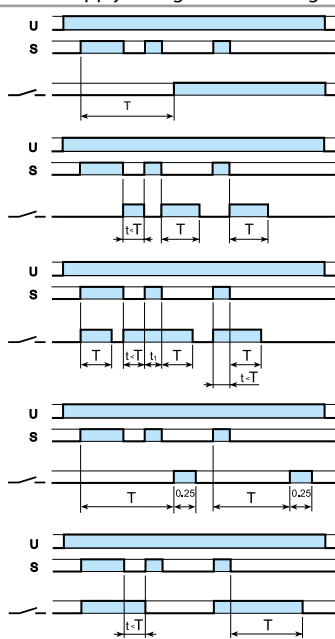
\*\*\* Regulated using an external potentiometer (10 kΩ - 0.25 W).

#### with control signal and pause signal



Type  
83.52

U = Supply voltage    S = Signal switch    P = Pause switch    = Output contact



#### (AE) On-delay with control signal.

Power is permanently applied to the timer. Closing the Signal Switch (S) initiates the preset delay, after which times the output contacts transfer and remain so until the power is removed.

#### (EEa) Interval with control signal off (retriggerable).

Power is permanently applied to the timer. On opening of the Signal Switch (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.

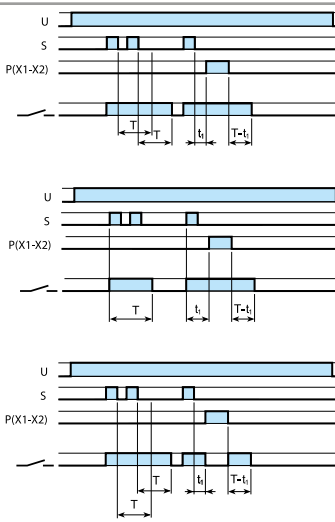
Power is permanently applied to the timer. Both the opening and the closing of the Signal Switch (S) initiates the transfer of the output contacts. In both instances the contacts reset after the preset delay has elapsed.

#### (GE) Pulse delayed with control signal on.

Power is permanently applied to the timer. Closing the Signal Switch (S) initiates the preset delay, after which the output contacts transfer. Reset occurs after a fixed time of 0.25 s.

#### (IT) Timing step.

Closing the Signal Switch (S) the output contacts transfer and remain so, after S opening, for the duration of the preset delay, after which they reset. During the timing period it is possible to immediately open the contact with a further impulse on S.



#### (BEp) Off-delay with control signal and pause signal.

Power is permanently applied to the timer. The output contacts transfer immediately on closure of the Signal Switch (S). Opening the signal switch initiates the preset delay, after which the output contacts reset. Closure of the pause switch (X1-X2) will immediately halt the timing process, but the elapsed time will be retained. The current state of the output contacts will be maintained. On opening of the pause switch, timing resumes from the retained value.

#### (DEp) Interval with control signal on and pause signal.

Power is permanently applied to the timer. On momentary or maintained closure of Signal Switch (S), the output contacts transfer, and remain so for the duration of the preset delay, after which they reset. Closure of the pause switch (X1-X2) will immediately halt the timing process, but the elapsed time will be retained. The current state of the output contacts will be maintained. On opening of the pause switch, timing resumes from the retained value.

#### (SHp) "Shower" function (Off-delay with control signal and pause signal).

Power is permanently applied to the timer. The output contacts transfer immediately on closure of the Signal Switch (S). Opening the signal switch initiates the preset delay, after which the output contacts reset. Closure of the pause switch (X1-X2) will immediately halt the timing process, but the elapsed time will be retained. During the pause, the output contacts 15-18 and 25-28 will be open. On opening of the pause switch, timing resumes from the retained value and the output contacts will take the previous condition.

### 83.52 type

Contact mode selector	Functions with control signal and pause signal (example: BEp)	Function SHp
2 timed contacts 	<p>Both output contacts (15-18 and 25-28) follow the timing function</p>	<p>Both output contacts (15-18 and 25-28) follow the timing function</p>
OFF 	<p>Both output contacts [15-18 and 25(21)-28(24)] stay permanently open</p>	<p>Both output contacts [15-18 and 25(21)-28(24)] stay permanently open</p>
1 timed + 1 instantaneous contact 	<p>The output contact 15-18 follows the timing function The output contact 21-24 follows the control signal (S)</p>	<p>The output contact 15-18 follows the timing function. The output contact 21-24 is always open, unless during the pause, when is closed</p>

## Functions

### Wiring diagram

U = Supply voltage

S = Signal switch

= Output contact

Function	Wiring Diagram	Timing Diagram	Description
Mono-function without control signal		<b>83.11</b> 	<b>(AI) On-delay.</b> Apply power to timer. Output contacts transfer after preset time has elapsed. Reset occurs when power is removed.
		<b>83.21</b> 	<b>(DI) Interval.</b> Apply power to timer. Output contacts transfer immediately. After the preset time has elapsed, contacts reset.
		<b>83.62</b> 	<b>(BI) Power off-delay (True off-delay).</b> Apply power to timer (minimum 500 ms). Output contacts transfer immediately. Removal of power initiates the preset delay, after which time the output contacts reset.
		<b>83.82</b> 	<b>(SD) Star-3delta.</b> Apply power to timer. The star contact ( $\lambda$ ) closes immediately. After preset delay has elapsed the star contact ( $\lambda$ ) resets. After a further time (settable from 0.05 s to 1 s) the delta contact ( $\Delta$ ) closes and remains in that position, until reset on power off.
with control signal (S)		<b>83.41</b> 	<b>(BE) Off-delay with control signal.</b> 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.
Asymmetrical recycler without control signal		<b>83.91</b> 	<b>(LI) Asymmetrical flasher (starting pulse on) - (Z1-Z2 open).</b> Apply power to timer. Output contacts transfer immediately and cycle between ON and OFF for as long as power is applied. The ON and OFF times are independently adjustable.
			<b>(PI) Asymmetrical flasher (starting pulse off) - (Z1-Z2 linked).</b> Apply power to timer. Output contacts transfer after time T1 has elapsed and cycle between OFF and ON for as long as power is applied. The ON and OFF times are independently adjustable.
			<b>(LE) Asymmetrical flasher (starting pulse on) with control signal - (Z1-Z2 open).</b> Power is permanently applied to the timer. Closing control signal (S) causes the output contacts to transfer immediately and cycle between ON and OFF, until opened.
			<b>(PE) Asymmetrical flasher (starting pulse off) with control signal - (Z1-Z2 linked).</b> Power is permanently applied to the timer. Closing the control signal (S) initiates delay T1 after which the output contacts transfer and continue to cycle between OFF and ON, until the control signal is opened.
Z1-Z2 open: (LI) function Z1-Z2 linked: (PI) function			
with control signal			
Z1-Z2 open: (LE) function Z1-Z2 linked: (PE) function			

