E-T-A Solid State Remote Power Controller E-1048-60.

Description

The E-T-A Solid State Remote Power Controller (SSRPC) E-1048-60. is an opto decoupled transistorised switching device providing both protection and signalisation.
It may be used wherever safe switching and protection of resistive, inductive or lamp loads in DC voltage systems is required.

Typical applications

Automation
- interface module providing inexpensive power amplification at PLC outputs
- optimum protection of individual loads by monitoring the load circuit

Protection and control of
- motors
- solenoids
- lamps

Features

- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -600) and in the OFF and ON condition (version -602)
- Physically isolated fault indication.
- Compact plug-in type

Ordering information

Type No.					
E-1048	Solid State Remote Power Controller				
	Version				
	600	wire break indication in OFF condition (standard)			
	602	with permanent wire break monitoring			
		Voltage rating			
		DC 24 V	DC 24 V (standard)		
			Current ratings		
			0.5 A		
			1.0 A		
			2.0 A		
			4.0 A		
E-1048 -	600	DC24 V	1.0 A	ordering example	

Where remote control, wire break and LED indication is not required, please contact us for a thermal-magnetic circuit breaker (e.g. types 2210, 3600, 3900).

E-1048-600

Technical data ($T_{ambient}$ = 25 °C; at U_N)

Load circuit	
Voltage rating U_S	DC 24 V (18...36 V)
Current rating I_N	0.5 A; 1 A; 2 A; 4 A (other ratings to special order)
Closed-circuit current I_{Contr}	typically 0.3 mA
Min. load current	
Standard version:	I_{load} > 1 mA
wire break indication in OFF condition	
Option: wire break indication in OFF and ON condition	
wire break ind. in OFF cond.	R_{load} > typ. 500 kΩ
wire break ind. in ON cond.	I_{load} < typ. 130 mA (0.5/1 A unit) I_{load} < typ. 500 mA (2/4 A unit)
Voltage drop U_{DSmax}	0.15 V; 0.3 V; 0.1 V; 0.2 V
Switch-on/switch-off time t_{on}/t_{off}	typ. 300 µs/700 µs with resistive load
Overload disconnection	approx. 1.5 (±0.3) x I_N after approx.
100 ms Short-circuit current (self-limiting)	max. 25 A (with 0.5 A and 1 A current ratings) max. 75 A (with 2 A and 4 A current ratings)
Short-circuit disconnection	< 250 µs
Control circuit	
Voltage rating	DC 24 V
Voltage controlled input U_E	DC 0 V < low level < 5 V DC 8.5 V < high level < 36 V
Input current I_E	1...10 mA (8.5...36 V)
Max. switching frequency f_{max}	500 Hz
Reset time after short-circuit/overload disconnection	1 ms
Fault indication output F (opto coupler)	
Voltage rating range	DC 5...36 V
Voltage rating range	DC 5...36 V
Max. load current	100 mA (ΔU < 2 V), with reverse polarity protection
Error indication	output F+ / F- conductive - wire break in load circuit - after short-circuit/overload disconnection
Parallel connection possible, as leakage current < 10 µA	
General data	
Temperature range	0 °C...+60 °C
Insulation voltage (IEC 60664/VDE 0110)	2.5 kV_{rms}
Mass	28 g

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Technical description

At the appropriate input level (>8.5 V), the opto decoupled input in the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply (U_S).
The transistor will switch off when
- the control voltage (U_E) is removed
- there is a short-circuit/overload in the load circuit.

Status indication is provided by two LEDs (red and green).
Thermal-magnetic style overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.
The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets (see Accessories).

Control circuit
ON condition:
If a voltage higher than 8.5 V is applied to the input terminals (-IN, +IN), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, the green LED will be lighted.
OFF condition:
A control voltage lower than 5 V will switch the output transistor off.

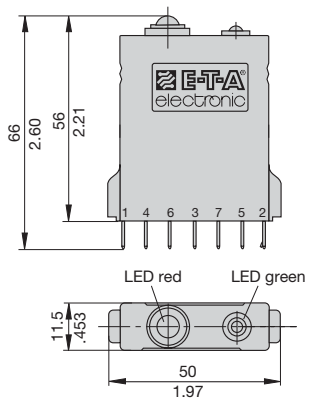
Load circuit
The load circuit switches depending on the control signal (“0” or “1”). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250 µs whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

Fault indication output
The fault indication circuit (F+, F-) is opto decoupled from the load and control circuit.
In the OFF condition, this circuit will provide wire break indication, with the transistor output being open.
In the ON condition, the circuit will provide short-circuit and overload monitoring and indication.
Visual fault indication by red LED.

Status indication

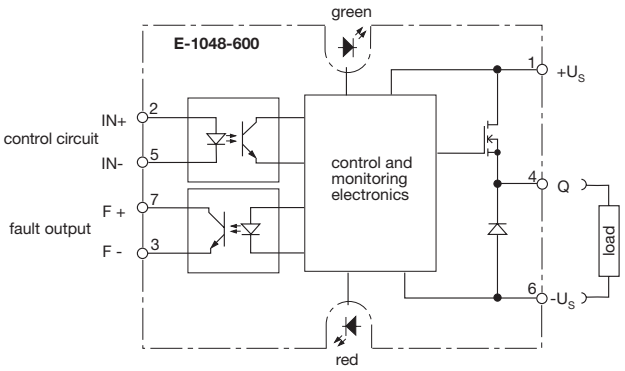
Status indication	Fault indication output (opto coupler)	LED green	LED red
non-conductive, no duty		○	○
conductive, normal duty		⊗	○
overload or short circuit at the output (and with option wire break indication in ON condition)		⊗	⊗
wire break, in the OFF position		○	⊗

Dimensions



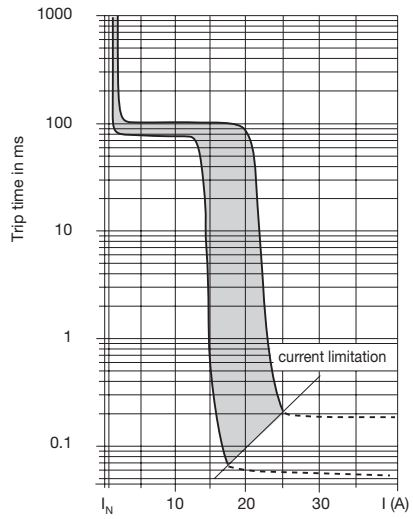
This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram

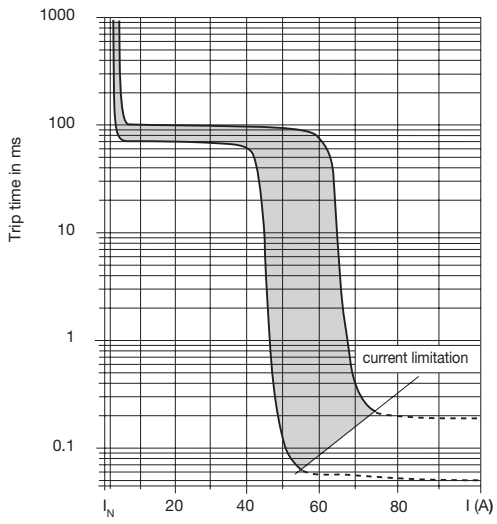


Typical time/current characteristics (T_A = 25 °C)

0.5 A and 1 A

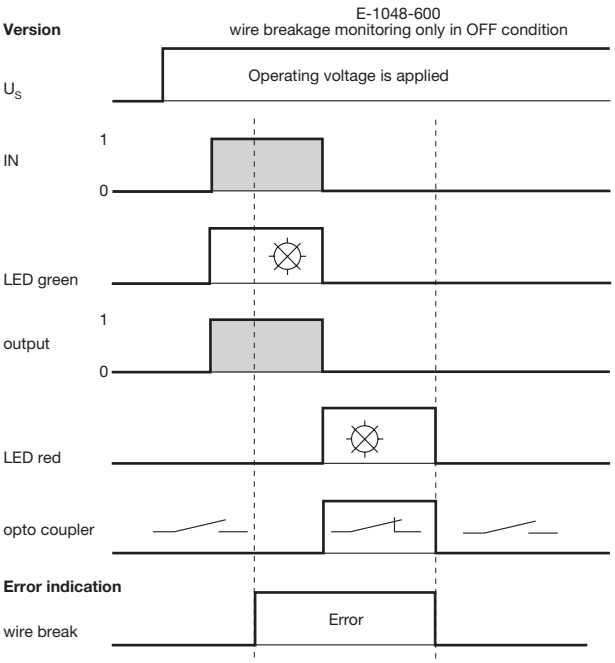


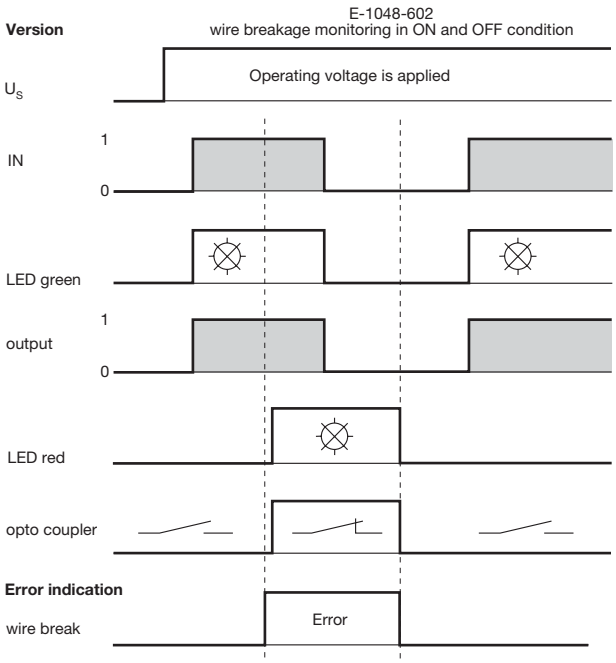
2 A and 4 A



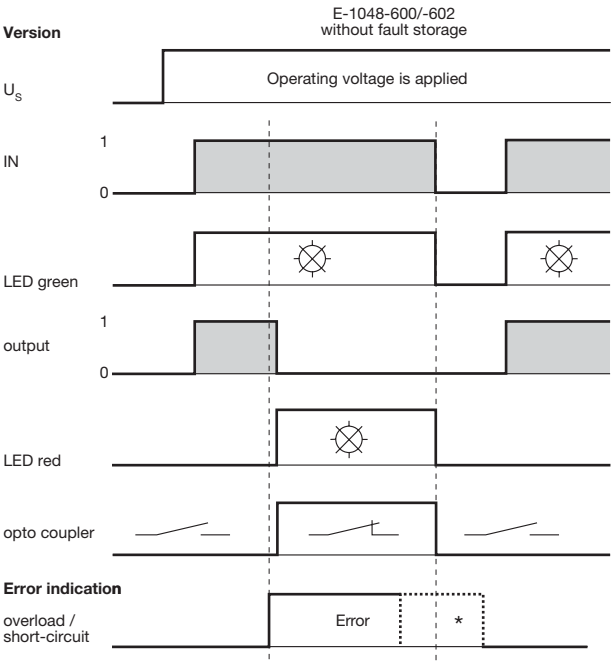
Functional diagrams E-1048-60.

Functional diagram E-1048-60.
wire break indication

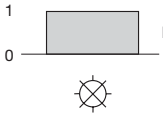




Functional diagram E-1048-60.
overload /short-circuit indication



* Fault indication is reset when control coltage is switched off, whether the failure is still active or not.



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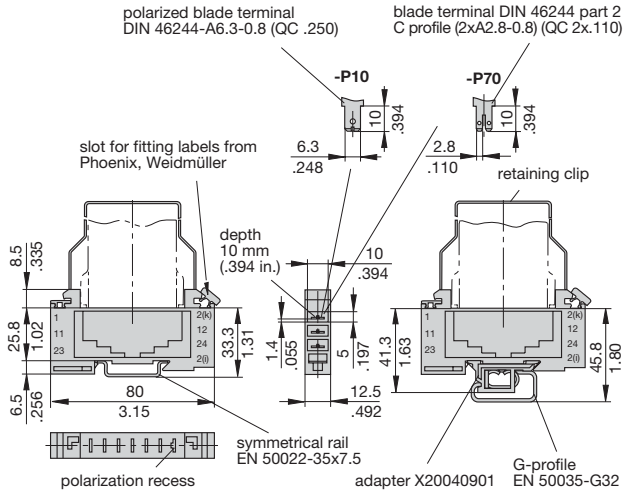
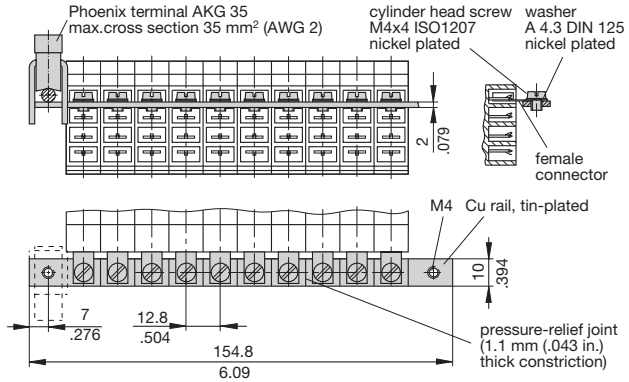
Accessories for E 1048-60.

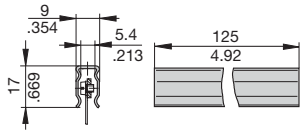
Single mounting sockets (with adapter)
(up to 16 A max. load)
17-P10-Si **17-P10-Si-20025**
17-P70-Si **17-P70-Si-20025**
(retaining clip Y 300 581 11 available on request)



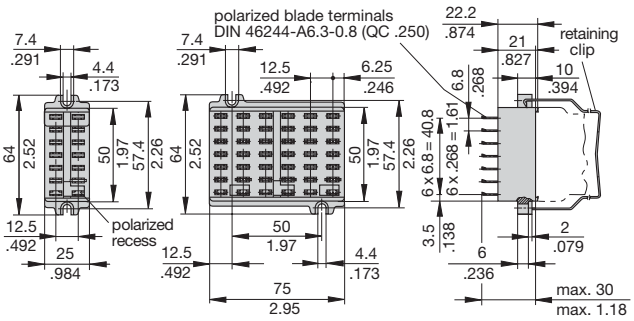
Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load),
more positions available on request
X 211 157 01 with terminal
X 211 157 02 without terminal



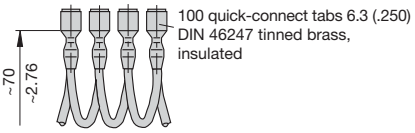
Insulating sleeving for busbar (10-way)
Y 303 824 01



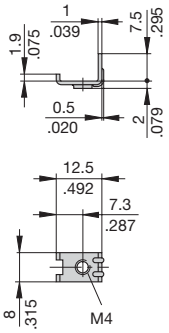
2-way mounting socket **6-way mounting socket**
23-P10-Si **63-P10-Si**
(retaining clip Y 300 581 03 available on request)



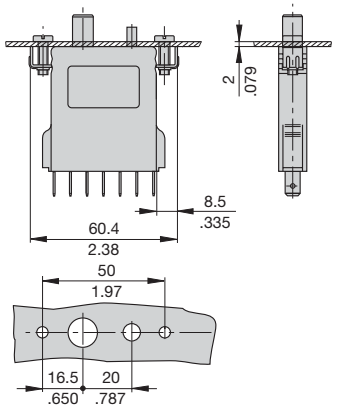
Connector bus links -P10
X 210 588 01/ 1.5 mm², (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm², (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm², (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm², (AWG 14), blau (up to 20 A max. load)



2 mounting clips
Y 300 504 02
(2 pcs needed per unit)

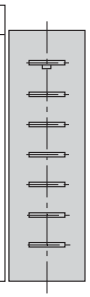


Installation drawing with
mounting clips Y 300 504 02



Pin selection 17-P10-Si fitted with E-1048-60.

E-1048-60.		17-P10-Si	
IN +	(2)	(2)	[2(k)]
IN -	(5)	(5)	[12]
F +	(7)	(7)	[24]
F -	(3)	(3)	[2(i)]
$-U_B$	(6)	(6)	[23]
Q	(4)	(4)	[11]
$+U_B$	(1)	(1)	[1]



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

E-T-A Solid State Remote Power Controller E-1048-7..

Description

The E-T-A Solid State Remote Power Controller E-1048-7.. is a transistorised switching device providing both protection and signalisation. It is suitable for all applications where the capabilities of the existing PLC outputs are not sufficient or where no protection against overload and short circuit or wire breakage monitoring of connected loads is provided. The use of a costly, high-capacity output card becomes superfluous when only one or two powerful outputs are necessary.

Using the SSRPC E-1048-7.. in combination with the module 17plus creates a new, very flexible system capable of being subsequently changed or extended. Busbars, pre-wired signal contacts and spring-loaded terminals reduce installation times considerably (see accessories).

E-1048-7..

Typical applications

Automation
- interface module providing inexpensive power amplification at PLC outputs
- optimum protection of individual loads by monitoring the load circuit

Protection and control of
- motors
- solenoids
- lamps

Features

- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A; 5 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -700 and -710) and in the OFF and ON condition (version -702 and -712)
- Fault storage: version -710; -712 and -713
- Physically isolated fault indication
- Compact plug-in type
- Plug-in design for use with power distribution system module 17plus
- Integral pre-wiring of common supply and signal contacts

Ordering information

Type No.				
E-1048	SSRPC for PLC outputs			
	Version			
	700	wire break indication in OFF condition (standard)		
	710	wire break indication in OFF condition and fault storage		
	702	permanent wire break indication		
	712	permanent wire break indication and fault storage		
	703	without wire break indication		
	713	without wire break indication with fault storage		
		Voltage rating		
		DC24 V	DC 24 V (standard)	
			Current ratings	
			0.5 A	
			1.0 A	
			2.0 A	
			4.0 A	
			5.0 A	
E-1048 -	700	DC24 V	1.0 A	ordering example

Technical data ($T_{ambient}$ = 25 °C; at U_N)

Load circuit	
Voltage rating U_S	DC 24 V (18...36 V)
Current rating I_N	0.5 A; 1 A; 2 A; 4 A; 5 A (other ratings to special order)
Closed-circuit current I_{Contr}	typically 0.3 mA
Min. load current	
Version -700/-710:	
wire break indication in OFF condition	
Optional: wire break indication in OFF and ON condition	
wire break ind. in OFF cond.	R_{load} typically 500 kΩ
wire break ind. in ON cond.	I_{load} < typ. 130 mA (0.5/1 A unit) I_{load} < typ. 500 mA (2/4/5 A unit)
Voltage drop U_{DSmax}	0.15 V; 0.3 V; 0.1 V; 0.2 V; 0.3 V
Switch-on/switch-off time t_{on}/t_{off}	typ. 300 µs/700 µs with resistive load
Overload disconnection	approx. 1.5 (± 0.3) x I_N after approx. 100 ms
Short-circuit current (self-limiting)	max. 25 A (with 0.5 A and 1 A current ratings) max. 75 A (with 2 A/4 A/5 A current ratings)
Short-circuit disconnection	< 250 µs
Control input	
Control level	between IN+ and GND
Voltage rating	DC 24 V
Voltage controlled input U_E	DC 0 V < low level < 5 V DC 8.5 V < high level < 36 V
Input current I_E	1...10 mA (8.5...36 V)
Max. switching frequency f_{max}	1 kHz
Reset time after short-circuit/ overload disconnection	1 ms
Fault indication output F relay contact	
max. switching voltage	DC 150 V AC 125 V
max. interrupting capacity	DC 30 W AC 60 W
limiting continuous current	1 A
General data	
Temperature range	0 °C...+60 °C
Insulation voltage (IEC 60664/VDE 0110)	DC 500 V > 10 MΩ
Mass	28 g

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Technical description

At the correct input voltage (> 8.5 V), the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply (U_S).
The transistor will switch off when
- the control voltage (U_E) is removed
- there is a short-circuit/overload in the load circuit.

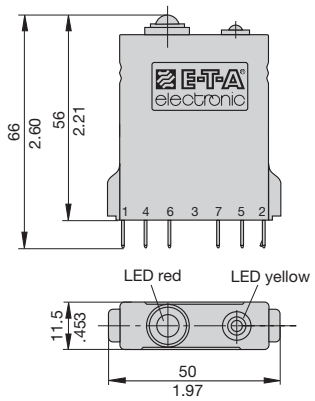
Status indication is provided by two LEDs (red and yellow).
Simulated thermal-magnetic overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.
The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets or **module 17plus** (see Accessories).

Control circuit
ON condition:
If a voltage higher than 8.5 V is applied to the input terminals (+I_N against GND), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, status indication by yellow LED.
OFF condition:
A control voltage lower than 5 V will switch the output transistor off.

Load circuit
The load circuit switches depending on the control signal (“0” or “1”). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250 µs whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

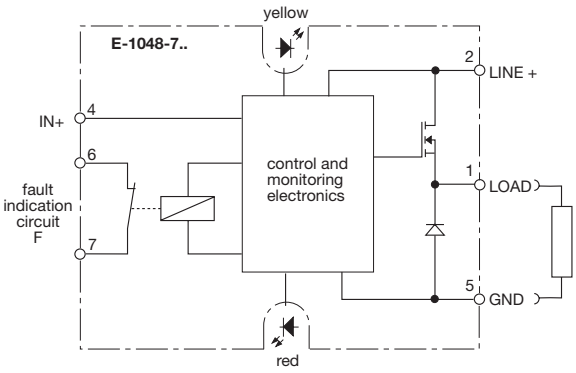
Fault indication output F
The fault indication circuit is physically isolated from the load and control circuits via a relay.
In the OFF condition, this circuit (with closed contact) will provide wire break indication, with the transistor output being open.
The versions with fault storage (-702/-712 and -713) store the fault signal until the control voltage is re-applied.
Visual fault indication by red LED.

Dimensions



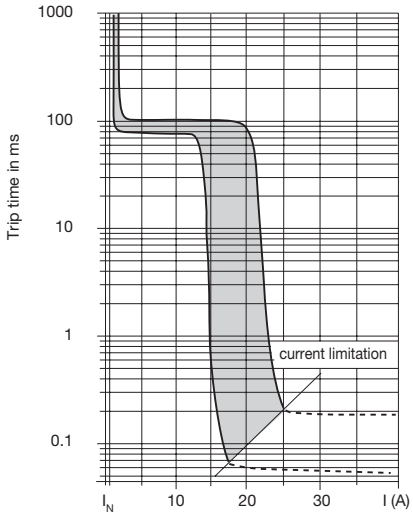
This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram

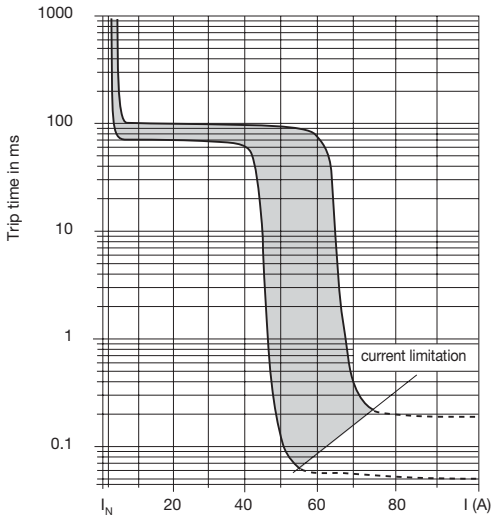


Typical time/current characteristics (T_A = 25 °C)

0.5 A and 1 A

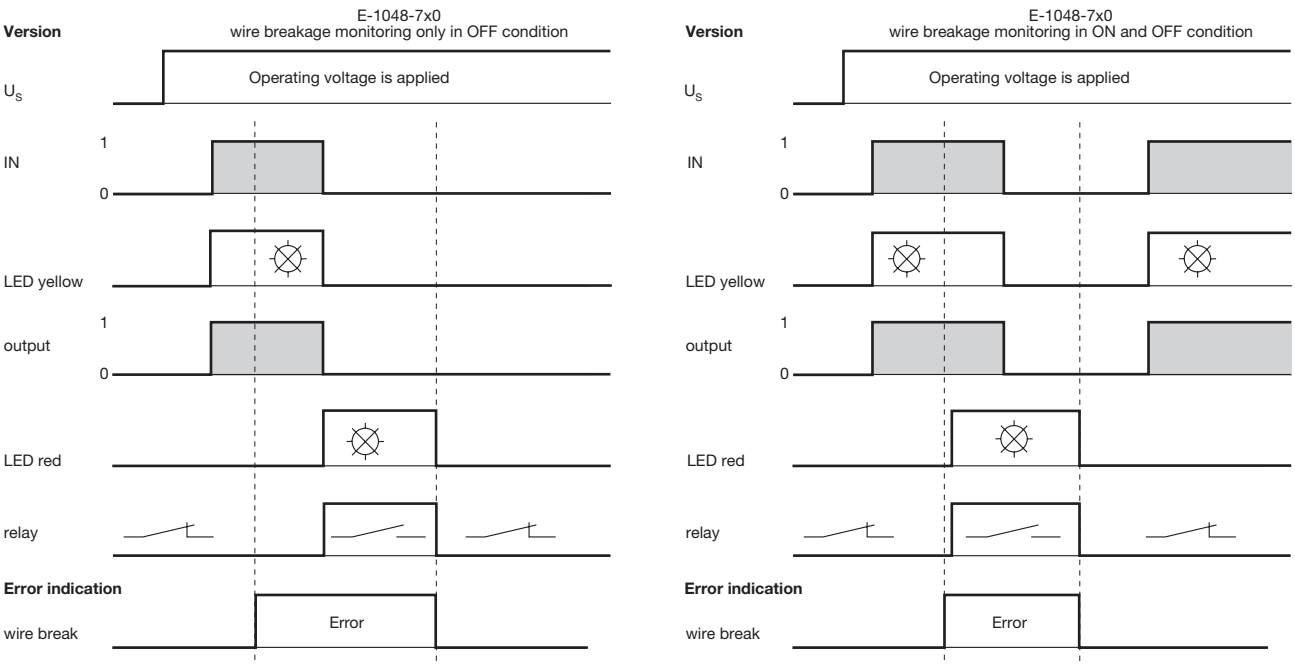


2 A and 4 A

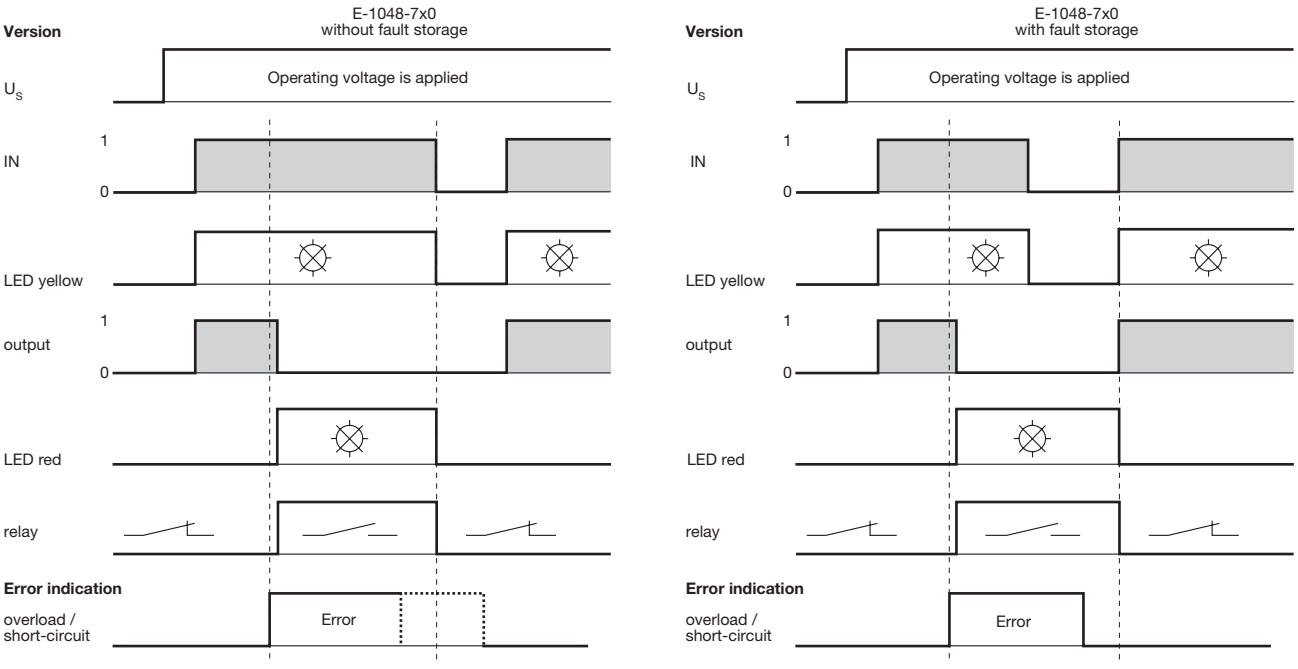


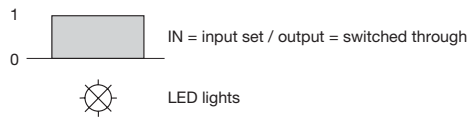
Functional diagrams E-1048-7..

Functional diagram E-1048-7..
wire break indication



Functional diagram E-1048-7..
overload /short-circuit indication





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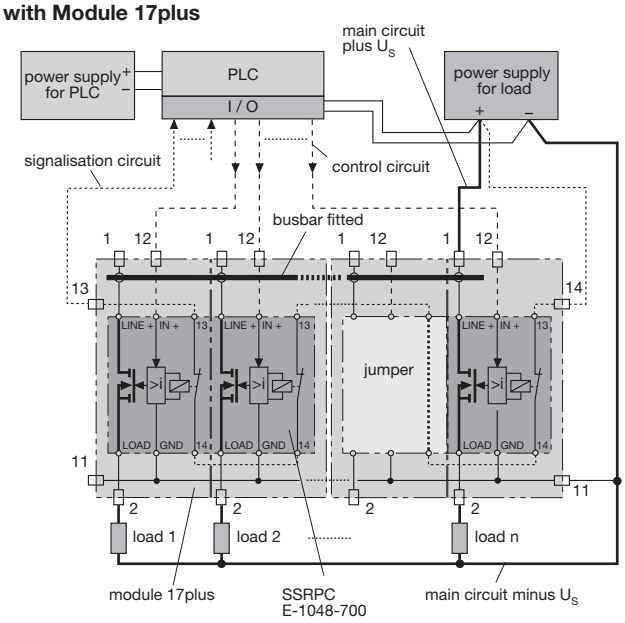
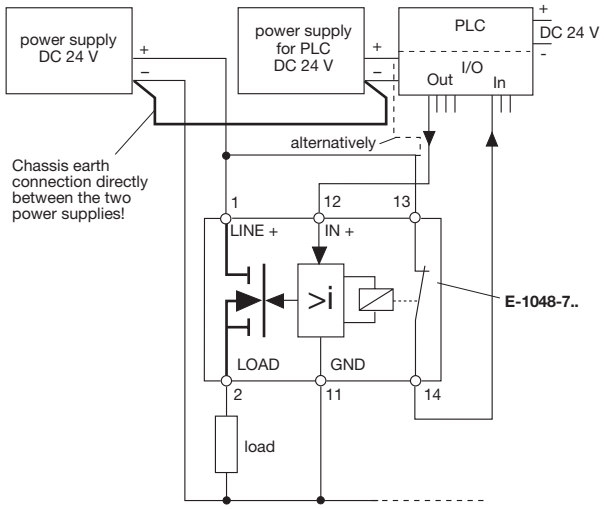
Connection diagram

Solid State Remote Power Controller E-1048-700 with Module 17plus



Wiring diagram

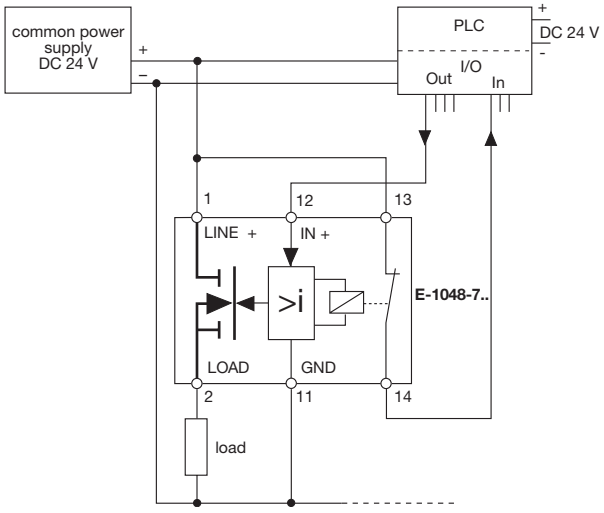
Separate power supply for load, PLC I/O and signal loop



Caution: If there is no firm chassis earth connection when using several separate power supplies, the connected fault indication loop may lead to intermittent operation of the SSRPC and resultant operational hazards.

Wiring diagram

Common power supply for load, PLC I/O and signal loop



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Accessories for E-1048-7..

Description

Module 17plus is a power distribution system for use with SSRPC E-1048-7.. for PLC outputs.
Each module accommodates two SSRPCs with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of spring-loaded terminals. The reference potential for the electronic amplifiers (GND pin 11) is also looped through and to the terminals connected at the sides. Control of the amplifiers (IN+), referenced to GND, is per channel via the separate terminal 12 beside the LOAD terminal. The SSRPC has an integral signal contact (break contact) used for group signalisation. Therefore the terminals of all break contacts are connected in series in the module 17plus and are connected to the terminal blocks via two terminals (13, 14). The module is designed to accommodate a probe for series connection continuity tests. When multipole circuit breakers are fitted auxiliary contacts are required for each pole. Individual circuit breaker signalisation is achieved through use of the break contacts (which close in the event of failure) connected in parallel by means of terminals on each module. The signalling circuitry between modules and the internal prewiring for the potential is automatically connected when the modules are linked together.
Meets the requirements of UL60950.

Ordering information

17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

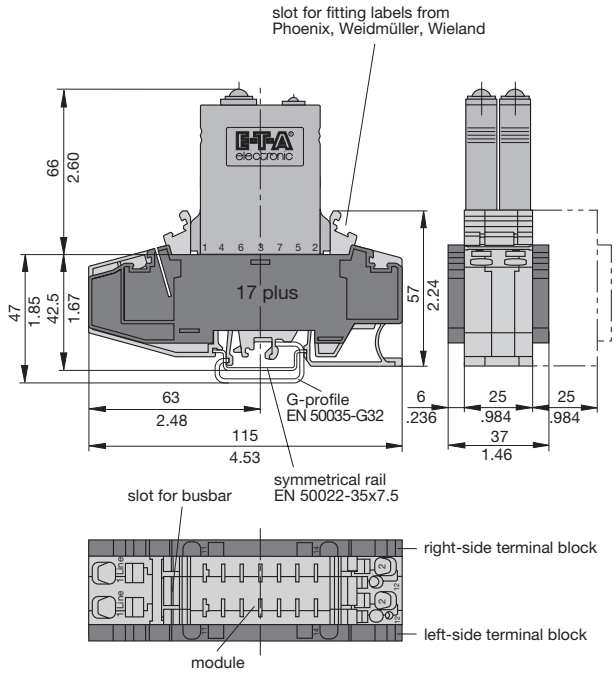
17plus

Technical data

Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
LINE feed (1):	spring-loaded terminals for 1.5-10 mm², (AWG 20 - AWG 10) SD 2 (0.8x4.0)
LOAD output (2):	spring-loaded terminals for 0.25-4 mm², (AWG 24 - AWG 12) SD 1 (0.6x3.5)
Reference potential GND and signalisation terminals (11, 13, 14):	spring-loaded terminals for 0.25-2.5 mm², (AWG 24 - AWG 14) SD 1 (0.6x3.5)
control IN+ terminal (12)	spring-loaded terminal for 0.25-1.5 mm², (AWG 24 - AWG 16) SD 0 (0.4x2.5)
Test probe for testing the group signal for line interruption: ≤ 2 mm ø	
Voltage rating (without SSRPC):	AC 433 V; DC 65 V
Current rating (without SSRPC)	
LINE feed (1)	50 A
LOAD output (2)	25 A
Reference potential GND (11)	10 A
Control IN+ (12)	1 A
Group signal /(13-14)	1 A
Internal resistance values (without SSRPC)	
LINE-LOAD (1-2)	≤ 5 mΩ
Group signal (13-14)	≤ 8 mΩ/per pole + 5 mΩ for each additional module
Busbar for power distribution	
insulated busbar (blue or red):	I_{max} 32 A
non-insulated busbar:	I_{max} 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	
Dielectric strength	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V
Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

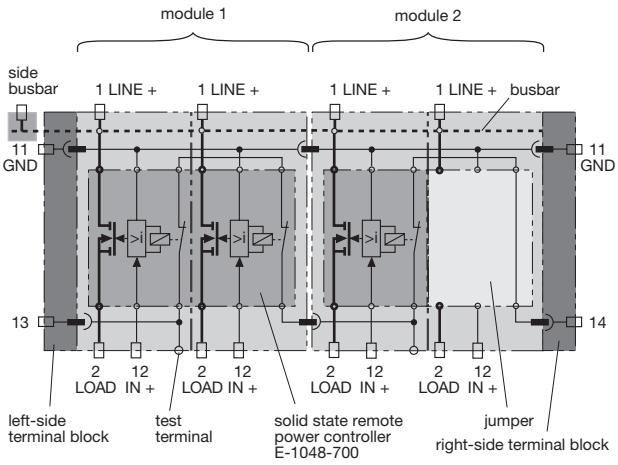
6

Dimensions



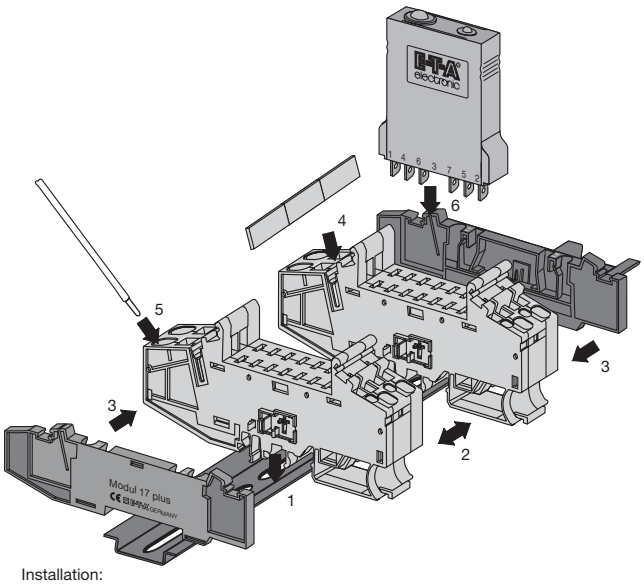
This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram

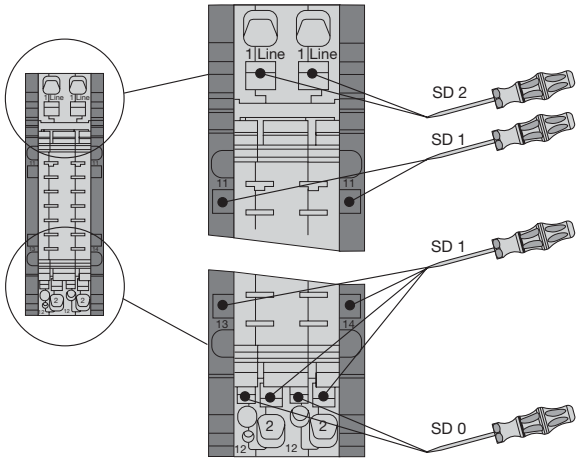


13, 14 terminals for group signalisation
11 reference potential GND
12 control IN+

Installation example



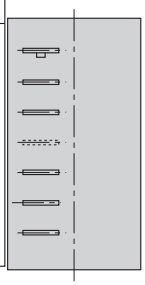
Installation:
1 Clip modules onto DIN rails.
2 Push modules together (side-by-side).
3 Snap on right-side and left-side terminal blocks.
4 Cut busbar to required length and fit on supply side of the modules.
5 Connect line feed with spring-loaded terminals.
6 Plug in SSRPC E-1048-7...



Connection and disconnection of cables with screw driver

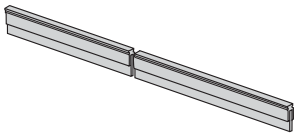
Pin selection, fitted with E-1048-7..

E-1048-7..		Module 17plus
LINE +	(2)	(1)
GND	(5)	(11)
F 7	(7)	(13)
F 6	(6)	(14)
IN+	(4)	(12)
LOAD	(1)	(2)

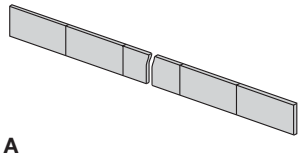


Accessories

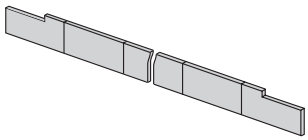
Busbar 32 A
X 222 005 01 blue insulation, 500 mm/19.68 in.
X 222 005 02 red insulation, 500 mm/19.68 in.
X 222 005 03 grey insulation, 500 mm/19.68 in.



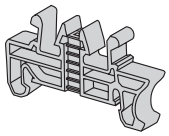
Busbar 50 A
Y 307 016 01 non-insulated, 500 mm/19.68 in.



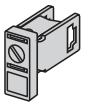
Busbar 50 A
Y 307 016 11 non-insulated, 500 mm/19.68 in.



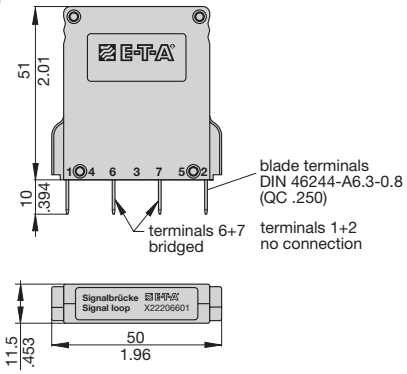
End bracket
X 222 004 01



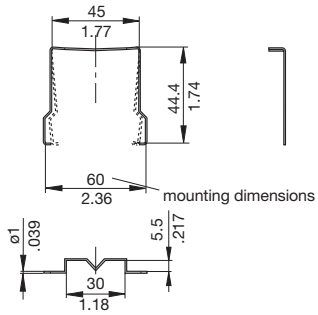
Screw terminal for busbar
X 211 156 01 non insulated



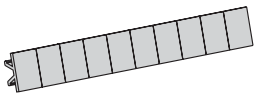
Jumper
X 222 066 01



Retaining clip for SSRPC E-1048-7..
recommended for fitting the devices
Y 300 581 11



Labels
marking area 6 x 10 mm
(packing unit 10 pcs = 1 strip)
part. no. Y 307 942 61



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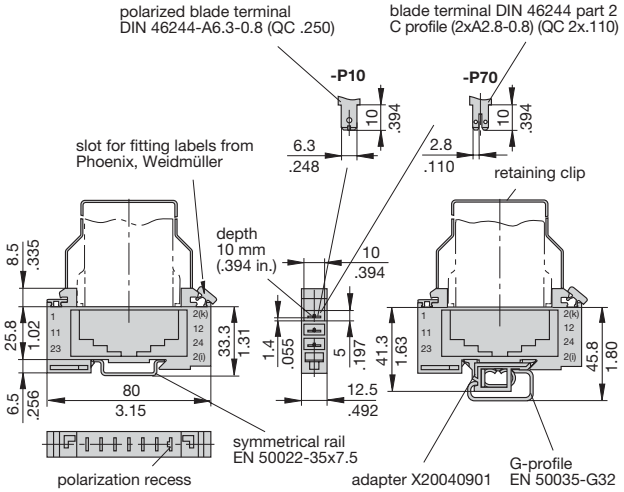
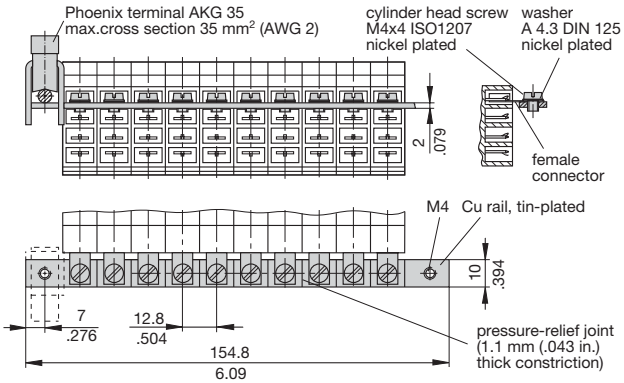
This is a metric design and millimeter dimensions take precedence (mm / inch)

Accessories for E-1048-7..

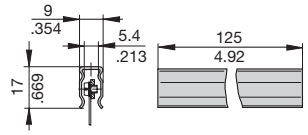
Single mounting sockets (with adapter)
(up to 16 A max. load)
17-P10-Si **17-P10-Si-20025**
17-P70-Si **17-P70-Si-20025**
(retaining clip Y 300 581 11 available on request)



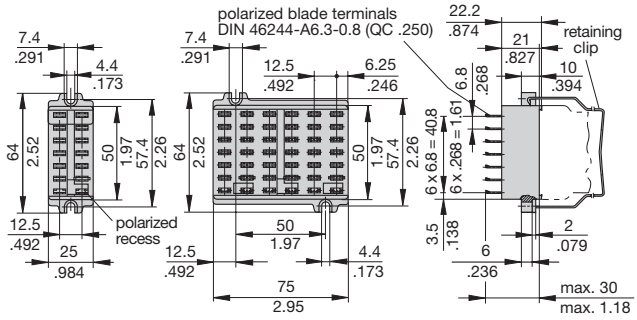
Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load),
more positions available on request
X 211 157 01 with terminal
X 211 157 02 without terminal



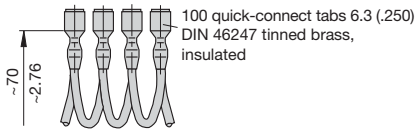
Insulating sleeving for busbar (10-way)
Y 303 824 01



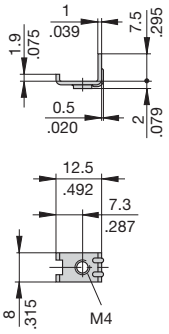
2-way mounting socket **6-way mounting socket**
23-P10-Si **63-P10-Si**
(retaining clip Y 300 581 03 available on request)



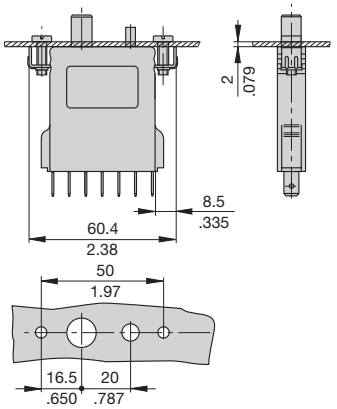
Connector bus links -P10
X 210 588 01/ 1.5 mm², (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm², (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm², (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm², (AWG 14), blau (up to 20 A max. load)



2 mounting clips
Y 300 504 02
(2 pcs needed per unit)

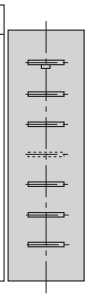


Installation drawing with
mounting clips Y 300 504 02



Pin selection 17-P10-Si, fitted with E-1048-7..

E-1048-7..		17-P10-Si	
LINE +	(2)	(2)	[2(k)]
GND	(5)	(5)	[12]
F 7	(7)	(7)	[24]
		(3)	[2(i)]
F 6	(6)	(6)	[23]
IN+	(4)	(4)	[11]
LOAD	(1)	(1)	[1]



This is a metric design and millimeter dimensions take precedence (mm / inch)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

E-T-A Smart Power Relay E-1048-8C. (CUBIC)

Description

The Smart Power Relay E-1048-8C.- is a remotely controllable electronic load disconnecting relay with three functions in a single unit:

- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin CUBIC version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

Now type E-1048-8C combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8C. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of an overload or short circuit, the trip curve is also suitable for smaller motor loads.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.

with e1 approval

E-1048-8C. CUBIC

Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Power supply LINE +	
Type	DC power supply with small R_i battery and generator etc.
Voltage ratings U_N	DC 12 V / DC 24 V
Operating voltage U_S:	DC 9...32 V
Load circuit LOAD	
Load output	Power MOSFET, high side switching
Max. current rating I_N	25 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range I_N	1 A...20 A (fixed ratings) up to 85 °C ambient without load reduction, 25 A up to 60 °C. Two basic versions with factory pre-set ratings: version 1: 1 A / 2 A / 3 A / 5 A / 7.5 A / 10 A version 2: 15 A / 20 A / 25 A
Induced current consumption I_0 of the unit (OFF condition)	< 1 mA
Typical voltage drop U_{ON} at rated current I_N (at 25 °C)	I_N / U_{ON} / I_N / U_{ON} 1 A / 50 mV / 10 A / 110 mV 2 A / 55 mV / 15 A / 70 mV 3 A / 60 mV / 20 A / 90 mV 5 A / 80 mV / 25 A / 120 mV 7.5 A / 90 mV
Switching point	typically 1.3 x I_N (-40 °C...+85 °C: 1.1...1.5 x I_N)
Trip time (standard curve)	typically 200 ms with switch-on onto overload and/or load increase on duty
Current limitation	version 1: typically 75 A version 2: typically 350 A
Temperature disconnection	power transistor > 150 °C
After trip	- resettable via external control signal (low-high) at control input IN+ - reset of supply voltage
Parallel connection of channels	for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).
Leakage current in OFF condition	version 1: max. 100 µA version 2: max. 500 µA
Free-wheeling diode for connected load	integral version 1: max. 40 A version 2: max. 100 A
Delay time t_{on} / t_{off} (resistive load)	typ. 5 ms / typ. 1.5 ms (EMC filter in control input)

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Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Wire breakage monitoring in ON and OFF condition of load	wire breakage thresholds: in OFF-condition (version 1): R_{load} > typically 100 kΩ in OFF-condition (version 2): R_{load} > typically 10 kΩ in ON-condition: I_{load} < typically 0.2 x I_N indication via group fault signalisation FM (switching output) Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear (possible options: - wire breakage indication only in ON condition - wire breakage indication only in OFF condition - no wire breakage indication)
Short circuit, overload in load circuit	- disconnection of load, indication via group signal SF - no automatic re-start - after remedy of the fault unit has to be reset via control input IN+
Control input IN+	
Control voltage IN+	0...5 V = "OFF", 8.5...32 V = "ON"
Control current I_E	1...10 mA (8.5...DC 32 V)
Reset in the event of a failure	- reset via external control signal (low - high) at control input IN+ - via reset of supply voltage
Dimmer operation (e.g. PWM signal)	possible, see max. switching frequency
Switching frequency at resistive or inductive load	max. 100 Hz
Status and diagnostic functions	
Control signal AS	transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A 0 V-level: when unit is set (at IN+ = 8.4...32 V)
Group signal SF	transistor output minus switching (LSS), open collector, short circuit and overload proof, load max. DC 32 V/2 A 0 V-level with overload and short circuit disconnection, wire breakage indication
Analogue output U(I)	voltage output 0-5 V proportional to load current: 1 V = 0.2 x I_N 5 V = 1.0 x I_N 5 V... typically 6.5 V = overload range tolerance: (for I_{load} > 0.2 x I_N) ± 8 % of I_N max. output current 5 mA load resistance > 1 kΩ against GND
Trip times definition of t_{90} reached 90% of final value	response time when switching on a load: t_{90} = typically 20 ms response time of load change on duty: t_{90} = typically 1 ms
Visual status indication	
control signal AS	LED yellow
group fault signal SF	LED red
General data	
Reverse polarity protection	
Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Status outputs	interference voltage resistance max. DC 32 V

Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Temperature range	
ambient temperature	- standard: -40...+85 °C without load reduction (60 °C at 25 A) - for other temperature ranges please see ordering key
Tests	
Humid heat	combined test, 9 cycles with functional test test to DIN EN 60068-2-30, Z/AD
Temperature change	min. temperature -40 °C, max. temperature +90 °C test to DIN IEC 60068-2-14, Nb
Vibration (random)	in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz) test to DIN EN 60068-2-64
Shock	25 g/11 ms, 10 shocks test to DIN EN 60068-2-27
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	housing -8C4 IP30 to DIN 40050 housing -8C5 IP54 to DIN 40050, higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EWG und 2006/28/EG
Terminals of CUBIC version (7 pin, standard)	5 blade terminals 6.3 mm x 0.8 mm and 2 blade terminals 2.8 mm x 0.6 mm to DIN 46244 Contact material CuZn37F44
Mounting:	- on automotive relay socket 7 pole or 9 pole
Housing CUBIC	
max. dimensions	30 x 30 x 40 mm when plugged in 30 x 30 x 51.6 mm including terminals
Materials	CUBIC: housing PA66-GF30 base plate PA6-GF30
Mass	approx. 23 g...43 g, depending on version
Approvals	
CE, e1 logo	according to EU, EMC and automotive directives, approvals no. **e1** 033880

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Ordering Information

Type

E-1048-8C Smart Power Relay DC 12 V/24 V - 1 A...20 A (25 A) in CUBIC housing

Housing / temperature range

- **4** with housing -40 °C...85 °C (60 °C at I_N = 25 A)
- **5** with housing -40 °C...85 °C (60 °C at I_N = 25 A) increased environmental requirements (IP protection class etc.)

Control input

- **C** with control input (+ control 8.5...32 V)

LEDs

- **0** without
- **3** 2 LEDs: AS yellow, SF red

Status output minus-switching

- **A** without
- **D** with AS and SF

Contents of group fault signal SF/ LED indication SF

- **0** without
- **1** short circuit / overload
- **2** short circuit / overload + wire breakage off
- **3** short circuit / overload + wire breakage on
- **4** short circuit / overload + wire breakage off + wire breakage on

Analogue output

- **V0** without
- **V1** 0...5 V

Characteristic curve

- **4** 200 ms standard switch-off delay with overload)

Voltage rating

- **U3** DC 12/24 V

Current ratings / colour of label

- **1 A** / black
- **2 A** / grey
- **3 A** / purple
- **5 A** / light-brown
- **7.5 A** / brown
- **10 A** / red
- **15 A** / blue
- **20 A** / yellows
- **25 A** / white

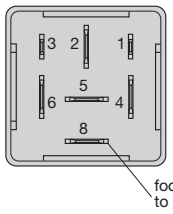
E-1048-8C 5 - C 3 D 4 V1 - 4 U3 - 20 A
ordering example 1: “DELUXE”-version 7 pin

E-1048-8C 4 - C 0 A 0 V0 - 4 U3 - 5 A
ordering example 2: “BASIC”-version 4 pin

This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

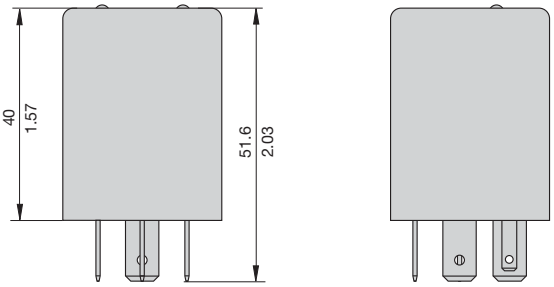
Dimensions CUBIC (7 pin version)

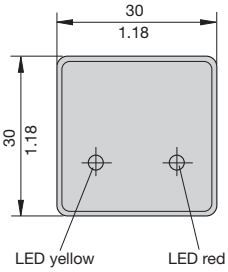
with all options: - LED indications AS/SF
- signal outputs AS/SF
- analogue output U (I)



2, 4, 5, 6 and 8 - blade terminals 6.3 x 0.8
1 and 3 - blade terminals 2.8 x 0.6

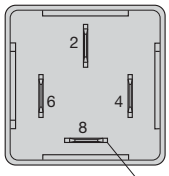
footprint to ISO 7588





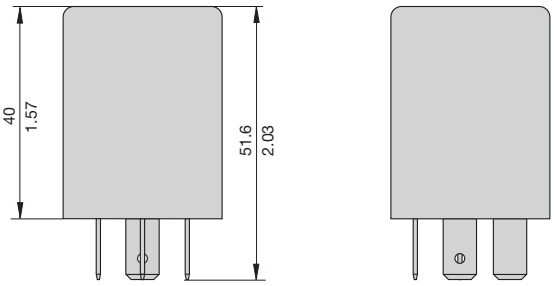
Dimensions BASIC (4 pin version)

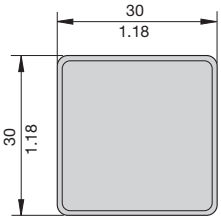
without options: - LED indication AS/SF
- signal outputs AS/SF
- analogue output U (I)



2, 4, 6 and 8 - blade terminals 6.3 x 0.8

footprint to ISO 7588





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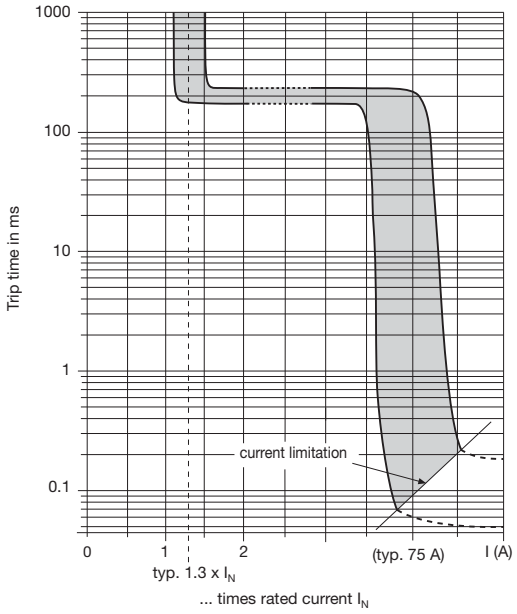
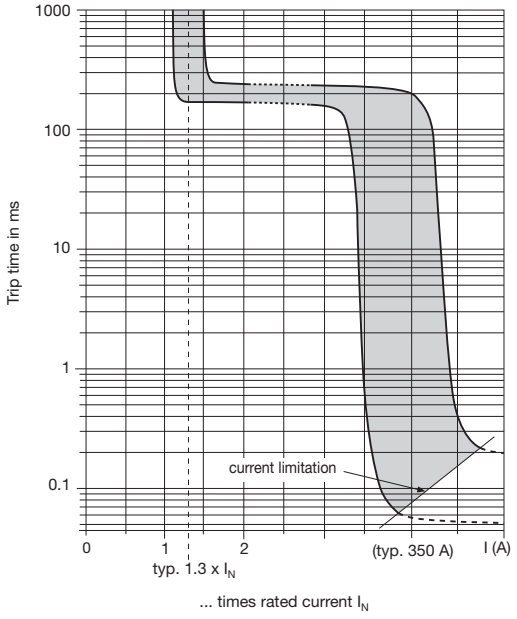
Typical time/current characteristics (T_A = 25 °C)

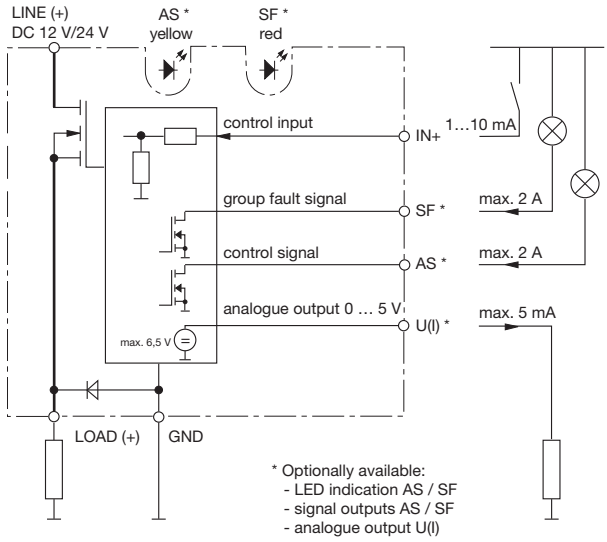
Version 1: 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)



Version 2: 15 A, 20 A and 25 A (standard 200 ms)

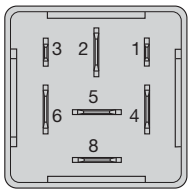


Connection diagram



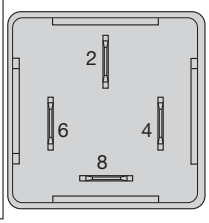
Pin selection (7 pin = “DELUXE”)

E-1048-8C. Cubic		
AS	(1)	control signal (≙ LED yellow)
LINE +	(2)	plus U_S (DC 12 V/24 V)
SF	(3)	group fault signal (≙ LED red)
IN+	(4)	control input
U(I)	(5)	0 ... 5 V analogue output
GND	(6)	minus U_S
LOAD	(8)	load output



Pin selection (4 pin = “BASIC”)

E-1048-8C. Cubic		
	(1)	
LINE +	(2)	plus U_S (DC 12 V/24 V)
	(3)	
IN+ (4)		control input
	(5)	
GND	(6)	minus U_S
LOAD	(8)	load output



All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

E-T-A Smart Power Relay E-1048-8I. (INLINE)

Description

The Smart Power Relay E-1048-8I.- is a remotely controllable electronic load disconnecting relay with three functions in a single unit:

- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin INLINE version is designed for use with various E-T-A terminal blocks, e. g. 17-P10-Si. A choice of current ratings is available from 1 A through 20 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

Now type E-1048-8I. combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8I. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of an overload or short circuit, the trip curve is also suitable for smaller motor loads.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 20 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.

E-1048-8I. INLINE

Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Power supply LINE +	
Type	DC power supply with small R_i battery and generator etc.
Voltage ratings U_N	DC 12 V / DC 24 V
Operating voltage U_S:	DC 9...32 V
Load circuit LOAD	
Load output	Power MOSFET, high side switching
Max. current rating I_N	20 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range I_N	1 A...15 A (fixed ratings) up to 85 °C ambient without load reduction, 20 A up to 70 °C. Two basic versions with factory pre-set ratings: version 1: 1 A / 2 A / 3 A / 5 A / 7.5 A / 10 A version 2: 15 A / 20 A
Induced current consumption I_0 of the unit (OFF condition)	< 1 mA
Typical voltage drop U_{ON} at rated current I_N (at 25 °C)	I_N / U_{ON} / I_N / U_{ON} 1 A / 50 mV / 7.5 A / 90 mV 2 A / 55 mV / 10 A / 110 mV 3 A / 60 mV / 15 A / 60 mV 5 A / 80 mV / 20 A / 60 mV
Switching point	typically 1.3 x I_N (-40 °C...+85 °C: 1.1...1.5 x I_N)
Trip time (standard curve)	typically 200 ms with switch-on onto overload and/or load increase on duty
Current limitation	version 1: typically 75 A version 2: typically 350 A
Temperature disconnection	power transistor > 150 °C
After trip	- resettable via external control signal (low-high) at control input IN+ - reset of supply voltage
Parallel connection of channels	for loads of 20 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).
Leakage current in OFF condition	version 1: max. 100 µA version 2: max. 500 µA
Free-wheeling diode for connected load	integral version 1: max. 40 A version 2: max. 100 A

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Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Delay time t_{on} / t_{off} (resistive load)	typically 5 ms / typically 1.5 ms (EMC filter in control input)
Wire breakage monitoring in ON and OFF condition of load	wire breakage thresholds: in OFF-condition (version 1): R_{load} > typically 100 kΩ in OFF-condition (version 2): R_{load} > typically 10 kΩ in ON-condition: I_{load} < typically 0.2 x I_N indication via group fault signalisation FM (switching output) Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear (possible options: - wire breakage indication only in ON condition - wire breakage indication only in OFF condition - no wire breakage indication)
Short circuit, overload in load circuit	- disconnection of load, indication via group signal SF - no automatic re-start - after remedy of the fault unit has to be reset via control input IN+
Control input IN+	
Control voltage IN+	0...5 V = “OFF”, 8.5...32 V = “ON”
Control current I_E	1...10 mA (8.5...DC 32 V)
Reset in the event of a failure	- reset via external control signal (low - high) at control input IN+ - via reset of supply voltage
Dimmer operation (e.g. PWM signal)	possible, see max. switching frequency
Switching frequency at resistive or inductive load	max. 100 Hz
Status and diagnostic function	
Control signal AS	transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A 0 V-level: when unit is set (at IN+ = 8.4...32 V)
Group signal SF	transistor output minus switching (LSS), open collector, short circuit and overload proof, load max. DC 32 V/2 A 0 V-level with overload and short circuit disconnection, wire breakage indication
Analogue output U(I)	voltage output 0-5 V proportional to load current: 1 V = 0.2 x I_N 5 V = 1.0 x I_N 5 V... typically 6.5 V = overload range tolerance: (for I_{load} > 0.2 x I_N) ± 8 % of I_N max. output current 5 mA load resistance > 1 kΩ against GND
Trip times definition of t_{90} reached 90% of final value	response time when switching on a load: t_{90} = typically 20 ms response time of load change on duty: t_{90} = typically 1 ms
Visual status indication	
Control signal AS	LED yellow
Group fault signal SF	LED red

Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperatureat U_N)

General data	
Reverse polarity protection	
Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Status outputs	interference voltage resistance max. DC 32 V
Temperature range	
ambient temperature	- standard: -40...+85 °C without load reduction (70 °C at 20 A) - for other temperature ranges please see ordering key
Tests	
Humid heat	combined test, 9 cycles with functional test test to DIN EN 60068-2-30, Z/AD
Temperature change	min. temperature -40 °C, max. temperature +90 °C test to DIN IEC 60068-2-14, Nb
Vibration (random)	in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz) test to DIN EN 60068-2-64
Shock	25 g/11 ms, 10 shocks test to DIN EN 60068-2-27
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	housing IP30 to DIN 40050 higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EW6 und 95/54/E6
Terminals of INLINE version (7 pin, standard)	7 blade terminals 6.3 mm x 0.8 mm to DIN 46244-A6.3-0.8 contact material CuZn37F37 copper-plated and tin-plated
Mounting:	- E-T-A socket type 17-P10-Si **(max. load 16 A)** - on a pc board with 6.3 mm receptacles
Housing	
max. dimensions	INLINE: 11.5 x 50 x 56 mm when plugged in 11.5 x 50 x 66 mm including terminals
Materials	INLINE: Ultramid
Mass	approx. 23 g...33 g, depending on version
Approvals	
CE, e1 logo	according to EU, EMC and automotive directives

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Ordering Information

Type

E-1048-8I Smart Power Relay DC 12 V/24 V - 1 A...20 A in INLINE housing

Housing / temperature range
- **3** with housing / 70 °C (without moisture condensation)
- **4** with housing / -40 °C...+85 °C (70 °C at I_N = 20 A)

C with control input (+ control 8.5...32 V)

LEDs
- **0** without LEDs
- **3** 2 LEDs: AS yellow, SF red

Status output minus-switching
- **A** without
- **D** with AS and SF

Contents of group fault signal SF/ LED indication SF
- **0** without
- **1** short circuit / overload
- **3** short circuit / overload + wire breakage on
- **4** short circuit / overload + wire breakage off + wire breakage on

Analogue output
- **V0** without
- **V1** 0...5 V

Characteristic curve
- **4** 200 ms (switch-off delay with overload)

Voltage rating
- **U3** DC 12/24 V

Current ratings / colour of label
- **1 A** / black
- **2 A** / grey
- **3 A** / purple
- **5 A** / light-brown
- **7.5 A** / brown
- **10 A** / red
- **15 A** / blue
- **20 A** / yellow

Available configurations:

part number (without options = “BASIC”)

E-1048-8I	**3**	**-**	**C**	**0**	**A**	**0**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**

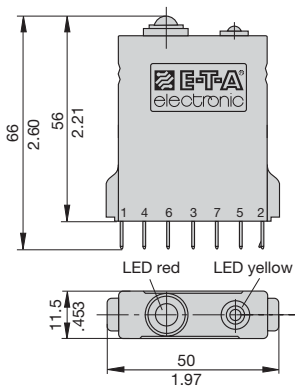
part number (various options)

E-1048-8I	**4**	**-**	**C**	**0**	**A**	**0**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**
E-1048-8I	**4**	**-**	**C**	**3**	**A**	**1**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**
E-1048-8I	**4**	**-**	**C**	**3**	**D**	**1**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**
E-1048-8I	**4**	**-**	**C**	**3**	**D**	**1**	**V1**	**-**	**4**	**U3**	**-**	**...**	**A**
E-1048-8I	**4**	**-**	**C**	**3**	**D**	**3**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**
E-1048-8I	**4**	**-**	**C**	**3**	**D**	**4**	**V0**	**-**	**4**	**U3**	**-**	**...**	**A**

part number (all options = “DELUXE”)

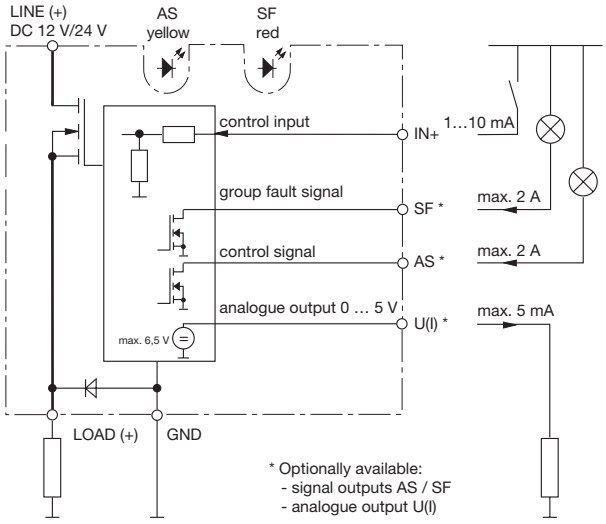
E-1048-8I	**4**	**-**	**C**	**3**	**D**	**4**	**V1**	**-**	**4**	**U3**	**-**	**...**	**A**

Dimensions (all options = “DELUXE”)



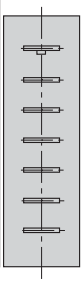
This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram (all options = “DELUXE”)



Pin selection

E-1048-8I.		17-P10-Si	
LINE +	(2)	(2)	[2(k)]
GND	(5)	(5)	[12]
SF	(7)	(7)	[24]
U(I)	(3)	(3)	[2(i)]
AS	(6)	(6)	[23]
IN+	(4)	(4)	[11]
LOAD	(1)	(1)	[1]



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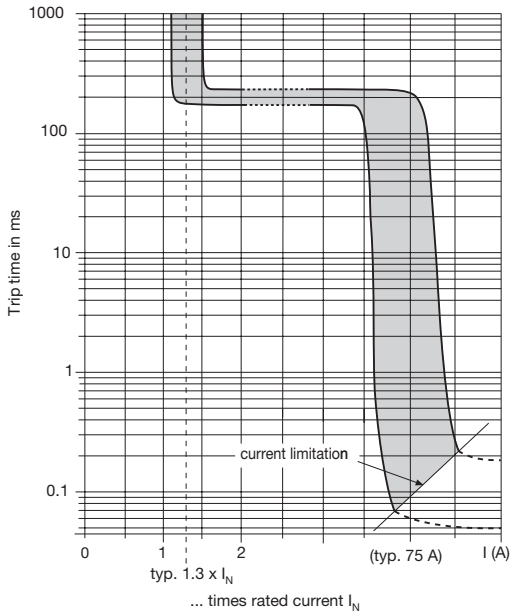
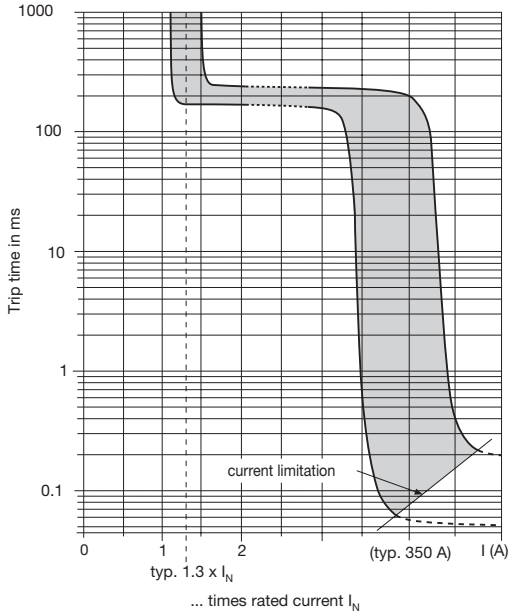
Typical time/current characteristics (T_A = 25 °C)

Version 1: 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)



Version 2: 15 A and 20 A (standard 200 ms)



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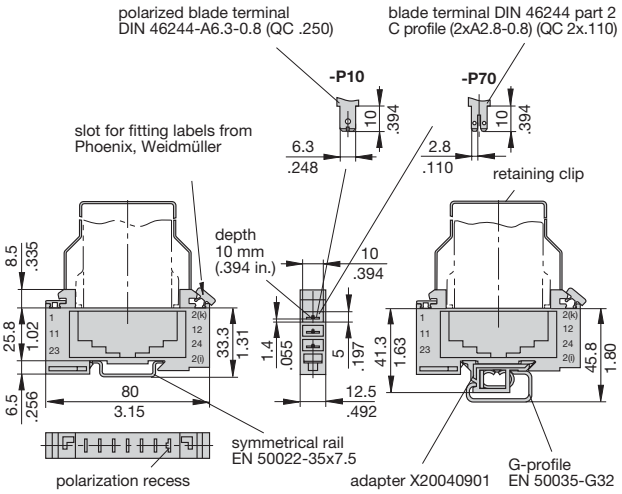
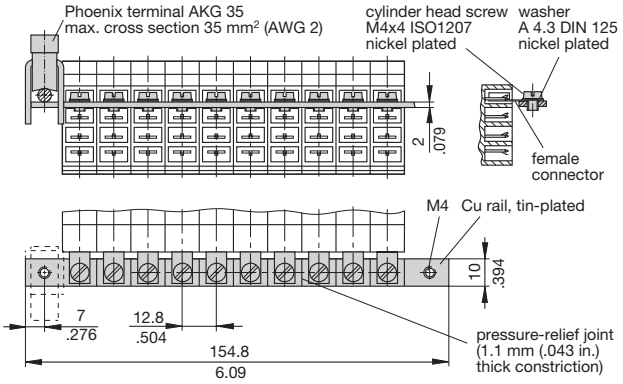
Accessories for E-1048-8I.

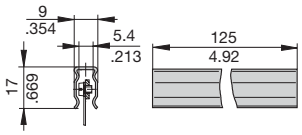
Single mounting sockets (with adapter)
(up to **16 A** max. load)
17-P10-Si **17-P10-Si-20025**
17-P70-Si **17-P70-Si-20025**
(retaining clip Y 300 581 11 available on request)



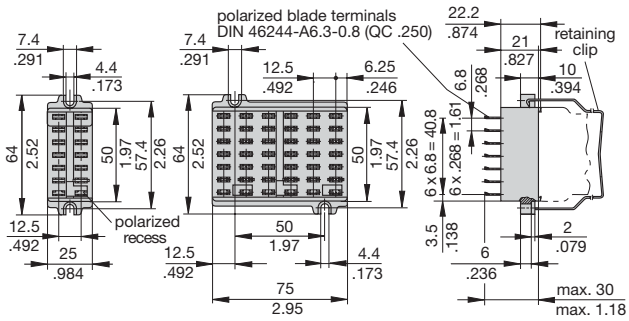
Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load),
more positions available on request
X 211 157 01 with terminal
X 211 157 02 without terminal



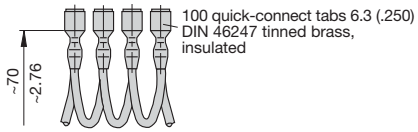
Insulating sleeving for busbar (10-way)
Y 303 824 01



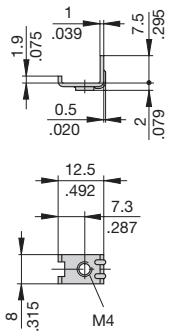
2-way mounting socket **6-way mounting socket**
23-P10-Si **63-P10-Si**
(retaining clip Y 300 581 03 available on request)



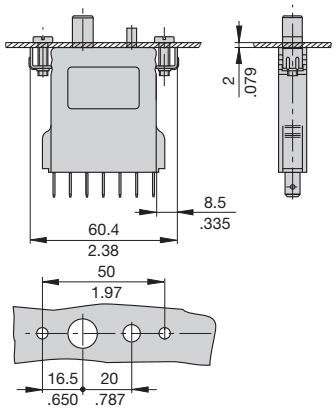
Connector bus links -P10
X 210 588 01/ 1.5 mm², (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm², (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm², (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm², (AWG 14), blue (up to 20 A max. load)



2 mounting clips
Y 300 504 02
(2 pcs needed per unit)



Installation drawing with
mounting clips Y 300 504 02



This is a metric design and millimeter dimensions take precedence (mm / inch)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Description

The Smart Power Relay E-1048-8D. is a remotely controllable electronic load disconnecting relay with two functions in a single unit:

- electronic relay
- electronic overcurrent protection

The 4 pin DICE version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection

Now type E-1048-8D. combines these two functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8D. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of a short circuit (ENTRY version) or overload/short circuit (ENTRYprotect version).
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.

E-1048-8D. DICE

Technical Data ($T_{amb.}$ = 25 °C, U_N = DC 24 V)

Power supply LINE +	
Type	DC power supply with small R_i battery and generator etc.
Voltage ratings U_N	DC 12 V / DC 24 V
Operating voltage U_S	DC 9...32 V
Load circuit LOAD	
Load output	Power MOSFET, high side switching
Max. current rating I_N	25 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range I_N	1 A...20 A (fixed ratings) up to 85 °C ambient without load reduction, 25 A up to 60 °C
ENTRY version	Load output with short circuit protection
ENTRYprotect version	Load output with short circuit and overload protection (typically 200 ms at I_{Load} > typically 1.3 x I_N) I_N = 1 A...10 A: see trip curve 1 I_N = 15 A...25 A: see trip curve 2
Induced current consumption I_0 of the unit (OFF condition)	< 1 mA
Typical voltage drop U_{ON} at rated current I_N (at 25 °C)	I_N / U_{ON}: 1 A 50 mV; 2 A 55 mV; 3 A 60 mV; 5 A 80 mV; 7.5 A 90 mV; 10 A 110 mV; 15 A 70 mV; 20 A 90 mV; 25 A 120 mV
Switching point (only ENTRYprotect)	typically 1.3 x I_N (-40 °C...+85 °C: 1.1...1.5 x I_N)
Trip time (standard curve) (only ENTRYprotect)	typically 200 ms with switch-on onto overload and/or load increase on duty
Current limitation	I_N = 1 A...10 A: typically 75 A I_N = 15 A...25 A: typically 350 A
Temperature disconnection	power transistor > 150 °C
After trip	- resettable via external control signal (low-high) at control input IN+ - reset of supply voltage
Parallel connection of channels	for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).
Leakage current in OFF condition	I_N = 1 A...10 A: max. 100 µA I_N = 15 A...25 A: max. 500 µA

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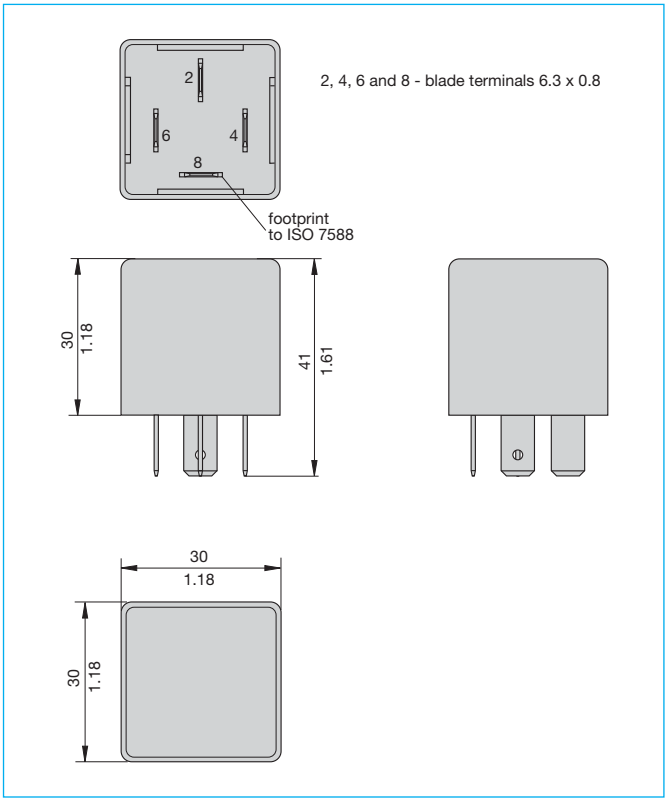
Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Free-wheeling diode for connected load	integral I_N = 1 A...10 A: max. 40 A I_N = 15 A...25 A: max. 100 A
Delay time t_{on} / t_{off} (resistive load)	typically 0.5 ms / typically 1.5 ms (EMC filter in control input)
Short circuit, overload in load circuit	- disconnection of load - no automatic re-start - after remedy of the fault unit has to be reset via control input IN+
Control input IN+	
Control voltage IN+	0...5 V = "OFF", 8.5...32 V = "ON"
Control current I_E	typically 1 mA at 12 V / typically 5 mA at 24 V
Reset in the event of a failure	- reset via external control signal (low - high) at control input IN+ - via reset of supply voltage
Dimmer operation (e.g. PWM signal)	possible, see max. switching frequency
Switching frequency at resistive or inductive load	max. 100 Hz
Rising edge of IN+	< 5 ms
General data	
Reverse polarity protection	
Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Temperature range	
ambient temperature	- standard: -40...+85 °C without load reduction (60 °C at 25 A)
Tests	
Humid heat	combined test, 9 cycles with functional test test to DIN EN 60068-2-30, Z/AD
Temperature change	min. temperature -40 °C, max. temperature +90 °C test to DIN IEC 60068-2-14, Nb
Vibration (random)	in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz) test to DIN EN 60068-2-64
Shock	25 g/11 ms, 10 shocks test to DIN EN 60068-2-27
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	housing -8D4 IP30 to DIN 40050 housing -8D5 IP54 to DIN 40050, higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EWG und 95/54/EG
Terminals (4 pin)	4 blade terminals 6.3 mm x 0.8 mm contact material CuZn37F44
Mounting:	- on automotive relay socket 4-pole
Housing	
max. dimensions	30 x 30 x 30 mm when plugged in 30 x 30 x 41.6 mm including terminals
Materials	housing PA66-GF30 base plate PA6-GF30
Mass	approx. 20 g
Approvals	
CE	according to EMC directive

Ordering Information

Type		
E-1048-8D	Smart Power Relay DC 12 V/24 V, 1 A...25 A in DICE housing	
	Housing / temperature range	
	4	with housing -40 °C...85 °C (60 °C at I_N = 25 A)
	5	with housing -40 °C...85 °C (60 °C at I_N = 25 A) increased environmental requirements (IP protection class etc.)
	Control input	
	C0	with control input (+ control 8.5...32 V)
	Options	
	A0	without options
	Characteristic curve	
	0	ENTRY, short circuit protected
	4	ENTRYprotect, 200 ms standard switch-off delay with overload, short circuit protected
	Voltage rating	
	U3	DC 12/24 V
	Current ratings / colour of label	
	1 A / black	
	2 A / grey	
	3 A / purple	
	5 A / light-brown	
	7.5 A / brown	
	10 A / red	
	15 A / blue	
	20 A / yellow	
	25 A / white	
E-1048-8D	4 - C0 A0 - 0 U3 - 10 A	ordering example: ENTRY version 4 pin

Dimensions DICE (4 pin version)



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

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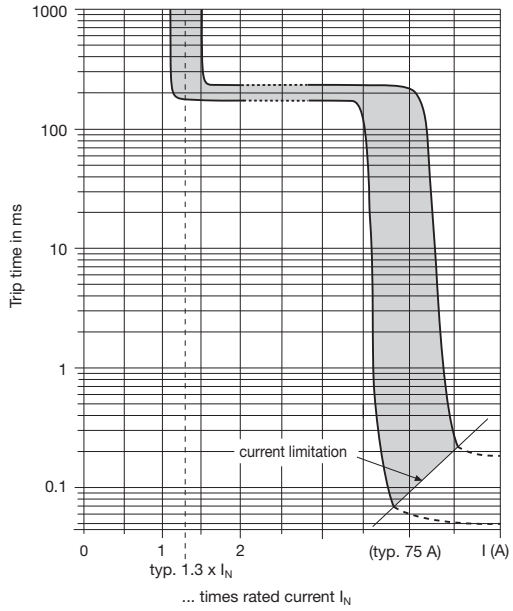
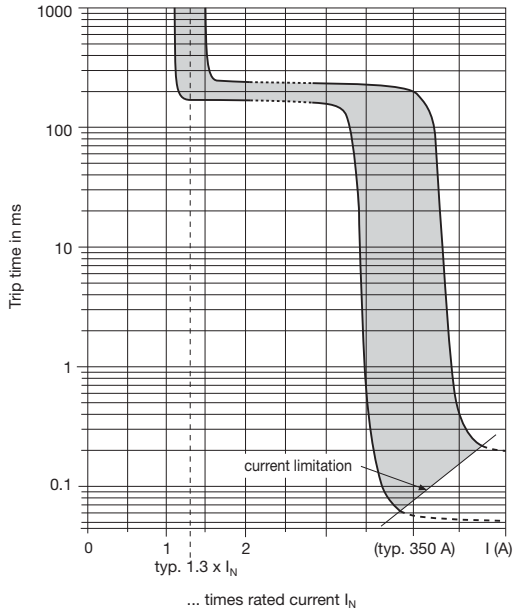
Typical time/current characteristics (T_A = 25 °C)

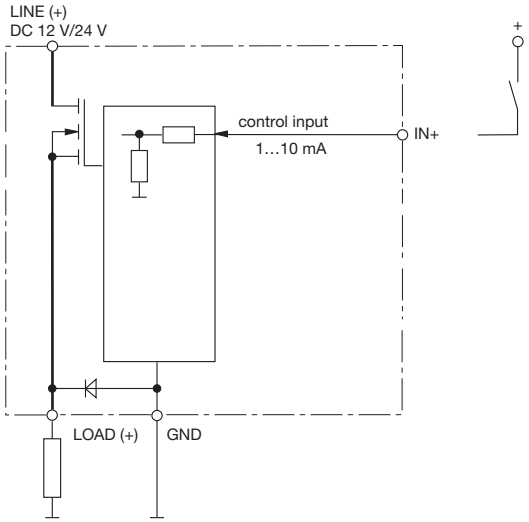
Trip curve 1 “ENTRYprotect”
1 A, 2 A, 3 A, 5 A, 7,5 A and 10 A (standard 200 ms)



Trip curve 2 “ENTRYprotect”
15 A, 20 A and 25 A (standard 200 ms)

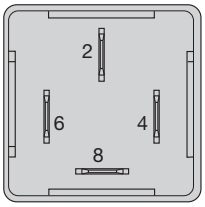


Connection diagram



Pin selection DICE (4 pin)

E-1048-8D. DICE		
	(1)	
LINE +	(2)	plus U_S (DC 12 V/24 V)
	(3)	
IN+ (4)		control input
	(5)	
GND	(6)	minus U_S
LOAD	(8)	load output



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All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Solid State Remote Power Controller E-1071-073

Description

The E-T-A Remote Power Controller E-1071-073 is an electronic ON/OFF control module with protective functions and is suitable for resistive and inductive loads such as solenoids in rolling mills and other large plant applications. It is specifically used in plant modernization where the load circuit supply should be maintained at DC 24 V.

Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants.

Features

- Solid-state relay with protective functions
- Solid-state switching avoids contact arcing and welding
- Inrush current limitation
- Overload and short-circuit proof output
- Low control power
- Control current indication by LED
- Auxiliary contact

Ordering information

Type No.				
E-1071	SSRPC			
	073	with signal output		
		Voltage rating of load		
		DC 24 V		
			Current rating	
			3.0 A	
E-1071 -	073 -	DC 24 V -	3.0 A	**ordering example**

E-1071-073

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 24 V)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 20...48 V
Current rating I_N	3 A
Current consumption (U_S = DC 24 V, U_{Contr} = “0”)	typically 17 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U_S (terminals 1 and 2)
Physical isolation	2-pole - by circuit breaker hand release - approx. 5 s after overload disconnection
Load circuit	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A
Voltage drop at I_N	max. 1.75 V
Overload disconnection	approx. 1.1 x I_N
Storage time t_S (at 2xI_N)	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I_N
Short-circuit response delay	approx. 4 µs
Load current monitoring	GREEN LED (lights at I_{load} > 0.2 A)
Current measuring terminals	2 x 2 mm dia. (0.1 Ω shunt ± 1 %)
Leakage current (U_{Contr} = “0”)	max. 3 mA
Free-wheeling diode	integral
Control circuit	
Control	opto coupler in control input
Control voltage U_{Contr}	“0” = 0...5 V “1” = 8.5...35 V
Control current I_{Contr}	typically 5 mA
Switching frequency f_{max}	100 Hz
Control signal (U_{Contr} = “1”)	YELLOW LED lights (IS flowing)
Protection	reverse polarity protection (diode)
Signal output	
Fault indication	auxiliary contact (N/O) - max. DC 30 V/3 A - physically isolated - closed with the circuit breaker tripped
General data	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 240 g

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Solid State Remote Power Controller E-1071-073

In principle, the E-T-A SSRPC E-1071-073 operates like conventional electro-mechanical relays, with additional protective and signal functions. The control input replaces the magnetic coil and the power transistor replaces the main contact.

Control circuit
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal “1”) is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

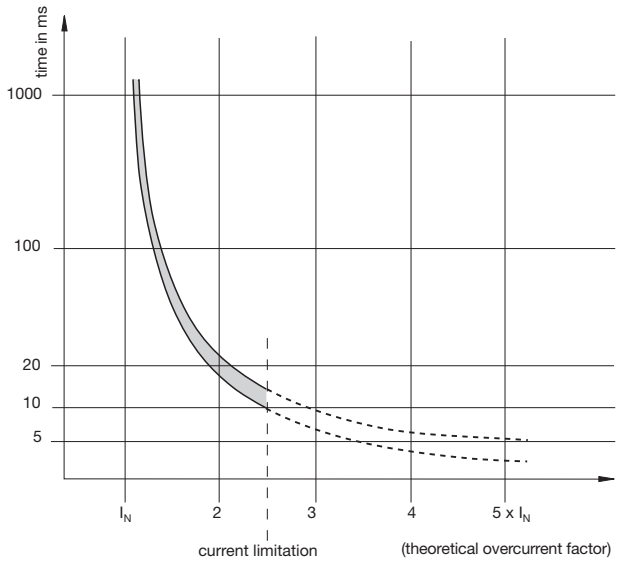
Load circuit
The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

Status indication
Status indication is provided by 2 LEDs (yellow and green) on the front of the housing.

YELLOW LED = correct control voltage
The LED indicates when the control voltage is higher than 8.5 V, with control current flowing.
GREEN LED = correct load current
The green LED indicates when the load current is higher than 0.2 A.

Faults such as too high a load resistance, wire break, poor contact, or overload/short-circuit, are available when only the yellow LED indicates. SSRPC E-1071-073 includes two current measuring terminals (2 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit.

Storage time characteristic curve t_s (T_A = 25 °C)



Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
Control input U_{Contr}	“0”	“1”	“1”	“0”	“1”
YELLOW LED - control current	0	1	1	0	1
GREEN LED - load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	circuit breaker tripped		

1 - LED indicates
0 - LED does not indicate

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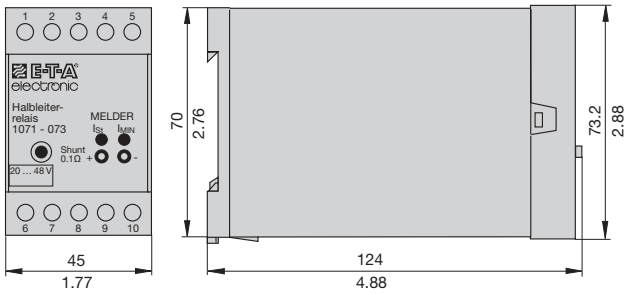
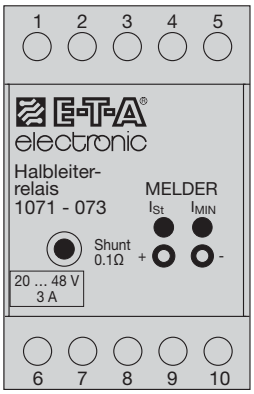
Dimensions



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

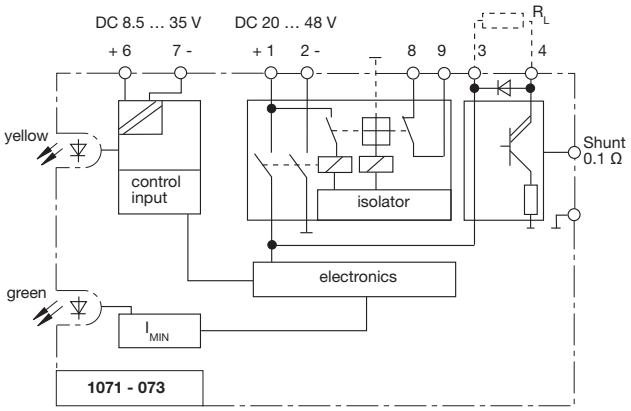
Terminal selection



Terminal

1	operating voltage $+U_S$: DC 20...48 V
2	operating voltage $-U_S$
3	load (+)
4	load (-)
5	not used
6	control voltage $+U_{Contr}$: max. DC 35 V
7	control voltage $-U_{Contr}$
8	auxiliary contact
9	auxiliary contact
10	not used

Basic circuit diagram



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Solid State Remote Power Controller E-1071-128

Description

The E-T-A Solid State Remote Power Controller E-1071-128 is an electronic ON/OFF control module with protective and signalling functions. It is suitable for inductive loads (solenoids, magnetic brakes) when the load circuit supply cannot be increased to the voltage level required (e. g. DC 36 V). The operating status of the controller/load connected is continuously indicated and signalled via opto coupler.

Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants where check-back signals for process control systems are needed.

Features

- Overcurrent and short-circuit proof switching output with electronic current limitation
- Switch-off current largely independent of operating voltage
- Inrush current limitation
- Physical isolation between control and load circuit via opto coupler
- Low control power; control current indication by LED
- Solid state switching avoids contact arcing and welding
- 2-pole physical isolation upon overload or when tripped manually
- Opto decoupled ON and fault indication by LED
- Setting of minimum current on front of housing, with minimum current indication (set at approx. 50 % of the load current rating)
- Current measuring terminals on front of housing
- Reverse polarity protection in control and load circuit

Ordering information

Type No.					
E-1071	SSRPC				
	128				
		Voltage rating of load			
		DC 24 V			
			Current rating		
			3.0 A		
E-1071 -	128	- DC 24 V	- 3.0 A	ordering example	

E-1071-128

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 24 V)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 20...48 V
Current rating I_N	3 A
Current consumption (U_S = DC 24 V, U_{Contr} = “0”)	typically 15 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U_S (terminals 1 and 2)
Physical isolation	2-pole - by manual release (circuit breaker) - approx. 5 s after overload disconnection
Load circuit	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A
Voltage drop at I_N	max. 2 V
Overload disconnection	approx. 1.1 x I_N
Storage time ts (at 2xI_N)	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I_N
Short-circuit response delay	approx. 4 µs
Load current monitoring I_{min} (MIN monitoring, to be set by potentiometer at 50 % of the load current rating)	GREEN LED lights at I_{load} > 0.2 I_{min} switch position I: 0.1...1.1 A switch position II: 1.1...2.1 A
Current measuring terminals	2 x 2 mm dia. (shunt 0.1 Ω ± 1 %)
Leakage current (U_{Contr} = “0”)	max. 3 mA
Free-wheeling diode	integral
Control circuit	
Control	opto coupler in control input
Control voltage U_{Contr}	“0” = 0...5 V “1” = 8.5...35 V
Control current I_{Contr}	typically 5 mA
Switching frequency f_{max}	10 Hz
Control signal (U_{Contr} = “1”)	YELLOW LED lights (I_{Contr} flowing)
Protection	reverse polarity protection (diode)
Status outputs	
2 signal outputs	ON indication/fault indication - physically isolated by opto coupler - transistor outputs plus switching - max. DC 33 V/100 mA per output - integral free-wheeling diode - 20 ms time delay (eliminating false signals before the minimum current is reached)
ON indication (terminal 8)	U_{Contr} = “0”: output non-conductive U_{Contr} = “1”: output connecting plus potential (terminal 10) to terminal 8
Fault indication (terminal 9)	fault: output non-conductive no fault: output connecting plus potential (terminal 10) to terminal 9

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Technical data ($T_{ambient}$ = 25 °C, U_S = 24 V DC)

General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Burning behaviour (housing)	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection	IP20 housing, terminals (IEC 529/DIN 40050)
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

Technical description

In principle, the E-T-A SSRPC E-1071-128 operates like conventional electro-mechanical relays, with additional protective and signalling functions. The control input replaces the magnetic coil and the power transistor replaces the main contact.
ON and fault indication outputs have more complex functions and may not be compared with auxiliary contacts.

Control circuit
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal “1”)is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuit
The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

Signal circuit
The signal circuit includes two opto couplers signalizing either correct ON duty or a fault. These signals may be computer processed.
- The ON signal output indicates correct operating in the ON condition. This output is conductive

  when control voltage is available

AND the load current is higher than the set minimum current
AND the circuit breaker has not tripped
AND there is no wire break.

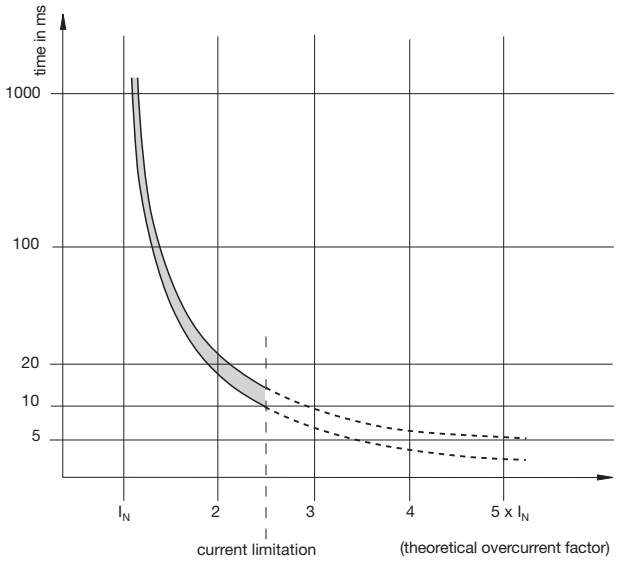
- The fault signal output signalizes the fault source which must be eliminated. This output is non-conductive when

  the circuit breaker has tripped on overload or short-circuit

OR there is a wire break
OR control voltage is available AND the minimum current has not been reached
OR no control voltage is applied although the load current is available.

The fault signal output operates on the closed-circuit principle, i.e. it carries plus potential during fault-free operation.

Storage time characteristic curve t_s (T_A = 25 °C)



Operating modes

Operating status	Fault-free operation		Short-circuit on the load		Wire break		Load current < minimum current	
Control input U_S	“0”	“1”	“0”	“1”	“0”	“1”	“0”	“1”
YELLOW LED - control current	0	1	0	1	0	1	0	1
GREEN LED - min. current indication	0	1	0	0	0	0	0	0
GREEN LED - ON indication	0	1	0	0	0	0	0	0
RED LED - fault indication	1	1	1	0	0	0	1	0
Remarks	load OFF	load ON	phys. isolation after approx. 5 s		no load connected, wire break			

1 - LED indicates
0 - LED does not indicate

Status outputs

ON Terminal 8	Fault Terminal 9	Remark
0	0	wire break or load current < minimum current (switched on) or short-circuit (switched on)
0	1	fault-free operation (switched off)
1	1	fault-free operation (switched on)

1 - status output carries plus potential
0 - status output carries minus potential

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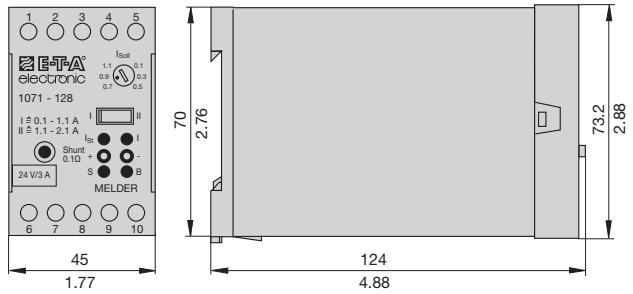
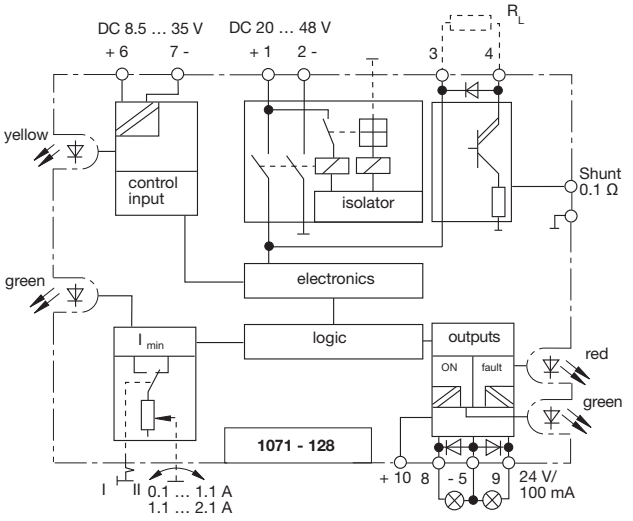
Dimensions

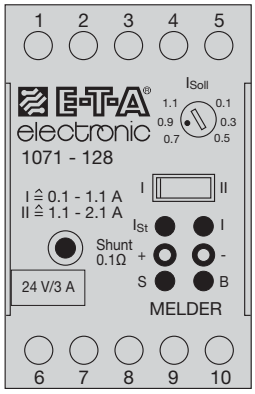


This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Basic circuit diagram



Terminal selection



Terminal

1	operating voltage $+U_S$: DC 20...48 V
2	operating voltage $-U_S$
3	load (+)
4	load (-)
5	auxiliary voltage $-U_A$ for status outputs
6	control voltage $+U_{Contr}$: max. DC 35 V
7	control voltage $-U_{Contr}$
8	ON status output (max. 100 mA)
9	fault status output (max. 100 mA)
10	auxiliary voltage $+U_A$ for status outputs: max. DC 33 V

Solid State Remote Power Controller E-1071-343

Description

The E-T-A Solid State Remote Power Controller E-1071-343 is a double relay with protective function both for resistive and inductive **DC 48 V** loads. It is particularly suitable to control upward/downward and forward/backward movements. **Failure of one channel will also cause the other channel to disconnect.**

Typical applications

- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected after failure of one of the circuits.

Features

- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
  - approx. 5 s after electronic fault disconnection
  - by manual release
- Both part units are disconnected upon isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

Ordering information

Type No.				
E-1071	SSRPC			
	343	double unit		
		Voltage rating of load		
		DC 48 V		
			Current rating	
			3 A / 3 A	
E-1071 -	343 -	DC 48 V -	3 A / 3 A	ordering example

E-1071-343

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 48 V)

Voltage rating U_N	DC 48 V
Operating voltage U_S	DC 36...60 V
Current rating I_N	3 A/3 A (2 A + 2 A)
Current consumption (U_S = DC 48 V, U_{Contr} = “0”)	typically 21 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U_S (terminals 1 and 2)
Physical isolation	2-pole - by manual circuit breaker release - approx. 5 s after overload disconnection - upon thermal response (approx. +130 °C)
Load circuits (I/II)	
Load output	NPN transistor, minus switching
Load rating	DC 48 V/0.2...3 A per channel with parallel duty of both channels: max. 4 A (e. g. 2 A + 2 A)
Voltage drop at I_N	max. 1.8 V
Overload disconnection	approx. 1.1 x I_N
Storage time t_S (at 2xI_N)	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I_N
Short-circuit response delay	approx. 4 µs
Load current monitoring	GREEN LED lights at I_{load} > 0.1 A
Current measuring terminals	3 x 4 mm dia. (shunt 0.1 Ω ± 1 %)
Leakage current (U_{Contr} = “0”)	max. 3 mA
Free-wheeling diode	integral
Control circuits (I/II)	
Control	opto coupler in control input
Control voltage U_{Contr}	“0” = 0...5 V “1” = 8.5...35 V
Control current	typically 5 mA
Switching frequency f_{max}	100 Hz
Control signal (U_{Contr} = “1”)	RED LED lights (I_S flowing)
Protection	reverse polarity protection (diode)
Signal output	
Fault indication	auxiliary contact (N/O) - max. DC 30 V/3 A - physically isolated - closed when the circuit breaker has tripped
General data	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

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Technical description

Under normal operating conditions, the E-T-A SSRPC E-1071-343 allows the connection and disconnection of the load outputs of two channels independent of each other.

Control circuits (I/II)
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (≙ control signal "1") is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuits (I/II)
The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

Status outputs
Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

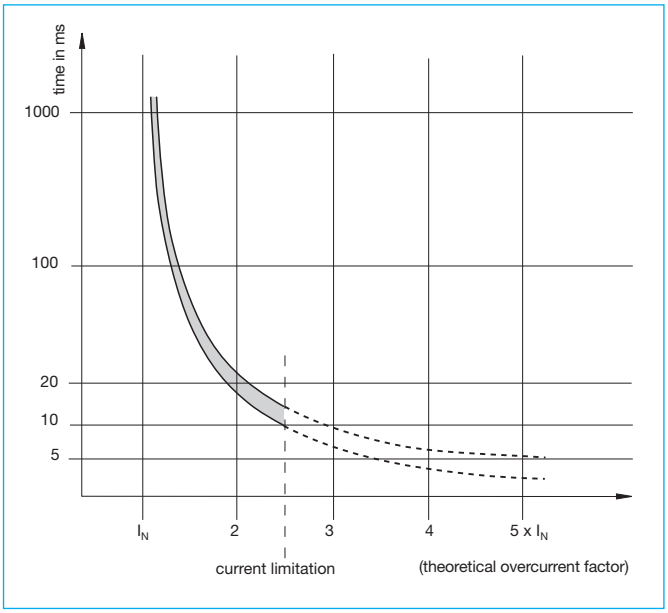
RED LED
ON indication (I/II)
The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED
Current flow indication (I/II)
The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-343 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

Storage time characteristic curve t_s (T_A = 25 °C)



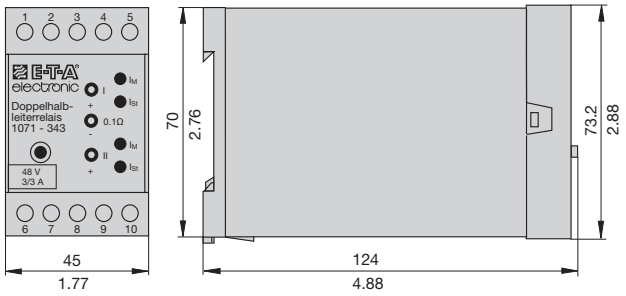
Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
Control input	"0"	"1"	"1"	"0"	"1"
RED LED - Control current	0	1	1	0	1
GREEN LED - Load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	both load circuits disconnected		

1 - LED indicates
0 - LED does not indicate

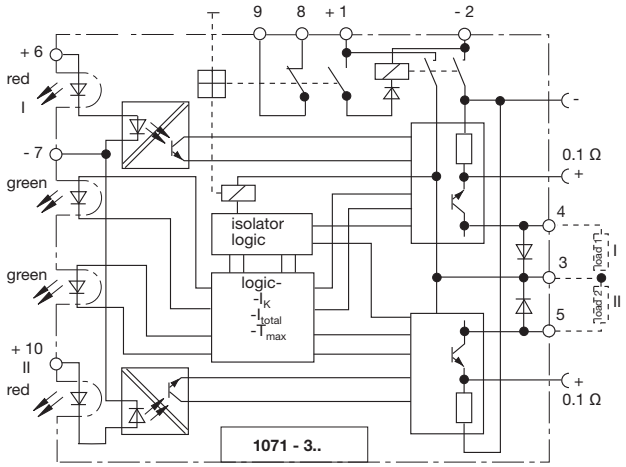
6

Dimensions

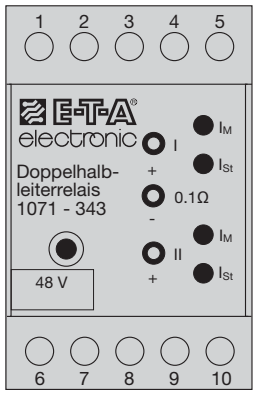


This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Basic circuit diagram



Terminal selection



Terminal

1	operating voltage $+U_S$: DC 36...60 V
2	operating voltage $-U_S$
3	load (+) (carrying plus potential) **CAUTION:** Do not connect to GND/$-U_S$
4	load I (-)
5	load II (-)
6	control voltage I $+U_{Contr}$: max. DC 35 V
7	control voltage I, II $-U_{Contr}$
8	auxiliary contact
9	auxiliary contact
10	auxiliary voltage II $+U_{Contr}$: max. DC 35 V

6

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Solid State Remote Power Controller E-1071-353

Description

The E-T-A Solid State Remote Power Controller E-1071-353 is a double relay with protective function both for resistive and inductive **DC 24 V** loads. It is particularly suitable to control upward/downward and forward/backward movements. **Failure of one channel will also cause the other channel to disconnect.**

Typical applications

- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected upon failure of one of the circuits.

Features

- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
  - approx. 5 s after electronic disconnection of a fault
  - by manual release
- Both part units are disconnected upon the isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

Ordering information

Type No.					
E-1071	SSRPC				
	353	double unit			
		Voltage rating of load			
		DC 24 V			
			Current rating		
			3 A / 3 A		
E-1071 -	353	-	DC 24 V	- 3 A / 3 A	ordering example

E-1071-353

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 24 V)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 20...48 V
Current rating I_N	3 A/3 A (2 A + 2 A)
Current consumption (U_S = DC 24 V, U_{Contr} = “0”)	typically 30 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U_S (terminals 1 and 2)
Physical isolation	2-pole - by manual circuit breaker release - approx. 5 s after overload disconnection - upon thermal response (approx. +130 °C)
Load circuits (I/II)	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A per channel with parallel duty of both channels: max. 4 A (e. g. 2 A + 2 A)
Voltage drop at I_N	max. 1.8 V
Overload disconnection	approx. 1.1 x I_N
Storage time t_S (at 2xI_N)	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I_N
Short-circuit response delay	approx. 4 µs
Load current monitoring	GREEN LED lights at I_{load} > 0.1 A
Current measuring terminals	3 x 4 mm dia. (shunt 0.1 Ω ± 1 %)
Leakage current (U_{Contr} = “0”)	max. 3 mA
Free-wheeling diode	integral
Control circuits (I/II)	
Control	opto coupler in control input
Control voltage U_{Contr}	“0” = 0...5 V “1” = 8.5...35 V
Control current I_{Contr}	typically 5 mA
Switching frequency f_{max}	100 Hz
Control signal (U_{Contr} = “1“)	RED LED lights (I_{Contr} flowing)
Protection	reverse polarity protection (diode)
Signal output	
Fault indication	auxiliary contact (N/O) - max. DC 30 V/3 A - physically isolated - closed when the circuit breaker has tripped
General data	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

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Technical description

Under normal operating conditions, the E-T-A SSRPC E-1071-353 allows the connection or disconnection of the load outputs of two channels independent of each other.

Control circuits (I/II)
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (≙ control signal "1") is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuits (I/II)
The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

Status outputs
Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

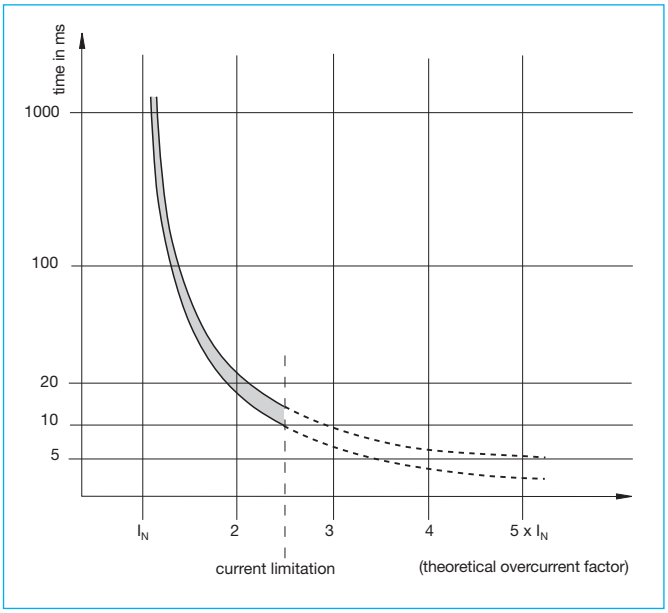
RED LED
ON indication (I/II)
The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED
Current flow indication (I/II)
The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-353 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

Storage time characteristic curve t_s (T_A = 25 °C)



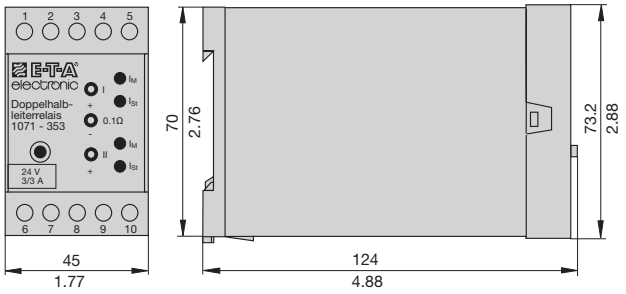
Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
Control input	"0"	"1"	"1"	"0"	"1"
RED LED - control current	0	1	1	0	1
GREEN LED - Load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	both load circuits disconnected		

1 - LED indicates
0 - LED does not indicate

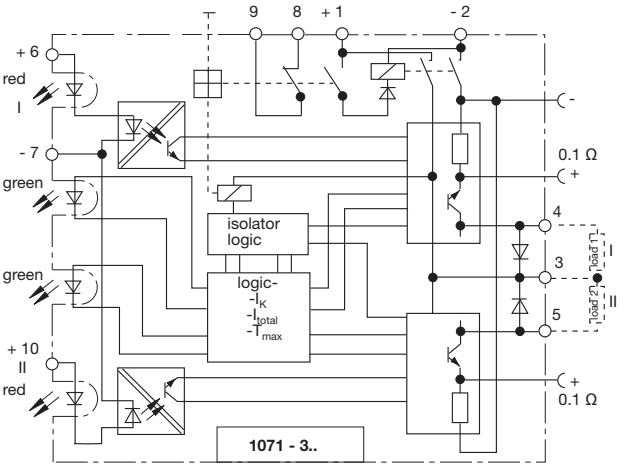
6

Dimensions

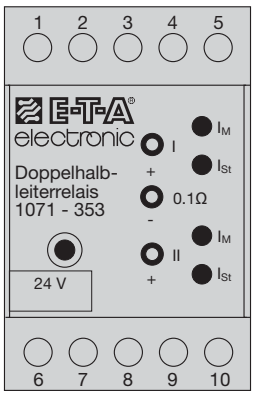


This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Basic circuit diagram



Terminal selection



Terminal

1	operating voltage + U_S: DC 20...48 V
2	operating voltage -U_S
3	load (+) (carrying plus potential) **CAUTION:** Do not connect to GND/-U_S
4	load I (-)
5	load II (-)
6	control voltage I +U_{Contr}: max. DC 35 V
7	control voltage I, II -U_{Contr}
8	auxiliary contact
9	auxiliary contact
10	auxiliary voltage II +U_{Contr}: max. DC 35 V

Solid State Remote Power Controller E-1072-100

Description

The E-T-A Solid State Remote Power Controller E-1072-100 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply ('IT systems') (see Machinery Directive EN 60204 part 1, para. 9.4.3.1).

Typical applications

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionability of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contacts).
- Two pole physical isolation upon overload or when tripped manually.

Features

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e.g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon
  - an overload in the load circuit,
  - short-circuit in the load (load+/load-, load+/-U_S, and load-/+U_S), followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input "In/Ctrl" with control current indication (YELLOW LED).
- "O.K." and availability indication (GREEN LED).
- Short-circuit and overload indication (fault indication F and RED LED).
- "Err1" group fault signalisation – all faults will be signalled:
  - wire breakage in the load circuit
  - earth fault at switching output
  - internal faults
  - overload or short circuit in the load circuit
- "Err2" fault signalisation:
  - only overload or short circuit in the load circuit
  - reset required
- Integral protection against reverse polarity and overvoltage for the control and load circuit.

Ordering information

Type No.				
E-1072	Solid State Remote Power Controller SSRPC			
	100	(trips only with overload or short circuit)		
		Voltage rating of load		
		DC 24 V		
			Current rating	
			3 A	
E-1072	- 100	- DC 24 V	- 3 A	

E-1072-100

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 24 V)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 19.2...36 V
Current rating I_N	max. 3 A
Current consumption I_0 (U_{Contr} = "0")	typically 24 mA
Power loss P_{max} (I_N=3 A)	typically 3.5 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_S	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication "Err1" and "Err2")
Load Circuit	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V/3 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at I_N	typically 0.9 V (R_i typically 300 mΩ)
Switch times (t_{on} / t_{off})	typically 2 ms (resistive load)
Overload disconnection	approx 1.15 x I_N (typically 3.45 A)
Trip time (I_{load}= 2 x I_N)	typically 400 ms
Short-circuit current I_K	typically 12 A current limitation
Trip time (upon I_K)	typically 50 ms, 2-pole isolation of load circuit after approx. 200 ms –> RED LED indicates, fault indication F "Err1" and "Err2"
Wire break monitoring	with the load switched on or off; RED LED "Error" lighted, group fault signalisation "Err1" (U_{Contr}= "0") wire break threshold R_{load} > 10 kΩ (U_{Contr}= "1") minimum current I_{load} < 30 mA
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I_{load} > 30 mA
Leakage current (U_{Contr} = "0")	typically 1 mA
Free-wheeling circuitry	integral
Load current measurement (term. 33: +shunt/ term. 34: -shunt)	no isolation of load circuit required as a 0.1 Ω/± 1 % measuring shunt is integral with the device. Measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)
Isolation of load circuit	2-pole by relay contacts - by manual release of RED button - approx. 200 ms after electronic tripping due to overload or short circuit ("OFF")

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Technical data (cont'd)

Control circuit

Control "In/Ctrl"	internal low-level signal relay in control input (with integral free-wheeling diode)
Control voltage U_{Contr}	"0" : 0...2.4 V "1" : 18...32 V
Control voltage I_{Contr}	typically 5...10 mA
Switching frequency f_{max}	10 Hz
Control signal (U_{Contr}"1")	"In/Ctrl" YELLOW LED lights with I_{Contr} flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)

Fault indication

"Err1"	group fault signalisation potential-free relay contact N/O, DC 30 V/0.5 mA....1 A
Fault indication "Err1"	- wire breakage in the load circuit - load current < 30 mA - other faults (ground fault in load circuit or internal fault) - overload/short circuit (= "Err2") - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed
Signal delay	typically 600 ms
"Err2"	fault indication potenial-free auxiliary contact, make contact N/O, DC 30 V/0.5 mA....1 A
Fault indication »Err2«	- overload or short circuit in the load circuit - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed - auxiliary contact "Err2" closed - RED button "OFF" - reset required - load circuit isolated 2-pole - manual release "OFF" - reverse polarity of U_S (LEDs not indicating)
Signal delay	typically 200 ms

General data

Ambient Temperature	0...+50 °C (without condensation)
Storage temperature	-20 ...+70 °C
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC	circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals)
Housing material	PA 66-FR
Mounting	symmetric rail to EN 50022-35
Vibration	3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050)	IP20 housing IP20 terminals
EMC	emitted interference EN 50081-1 interference suppression EN 61000-6-2
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 130 g

Status matrix

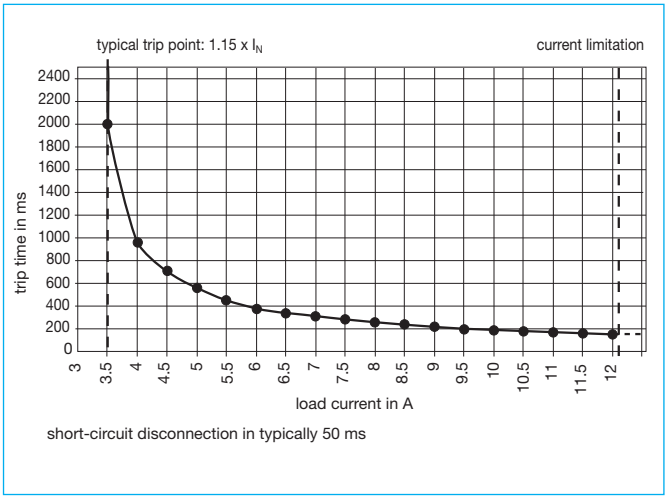
Operating status	Fault-free operation		Short circuit/ overload in load circuit	Wire break in load circuit		Other faults
Control input	**"0"**	**"1"**	**"1"**	**"0"**	**"1"**	**"0"**
Load output	OFF 2-pole *non-conductive*	ON 2-pole *conductive*	OFF 2-pole *non-conductive*	OFF 2-pole *non-conductive*	ON 2-pole *non-contuctive*	OFF 2-pole *non-conductive*
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	no	no	no

Indication						
YELLOW LED "In/Ctrl"	0	**1**	**1**	0	**1**	0
GREEN LED "O.K."	**1**	**1**	0	0	0	0
RED LED "Error"	0	0	**1**	**1**	**1**	**1**
relay contacts "Err1"	open	open	closed	closed	closed	closed
auxiliary contacts "Err2"	open	open	**closed**	open	open	open
RED operating/ reset button	ON	ON	OFF ("OFF")	ON	ON	ON
Remark	availability	load: > 30 mA < 3 A	RED button to be reset			ground fault in load circuit or internal fault

1 = LED lights
0 = LED does not light

Operating modes at:
- reverse polarity: indication of fault "Err2"; LEDs not illuminated!
- manual release "OFF" (RED button out): indication of fault "Err1" and "Err2", additionally lighted LED RED "Error".
- with U_S = 0 V: not fault indication "Err1".

Typical time/current characteristics (T_A = 25 °C)



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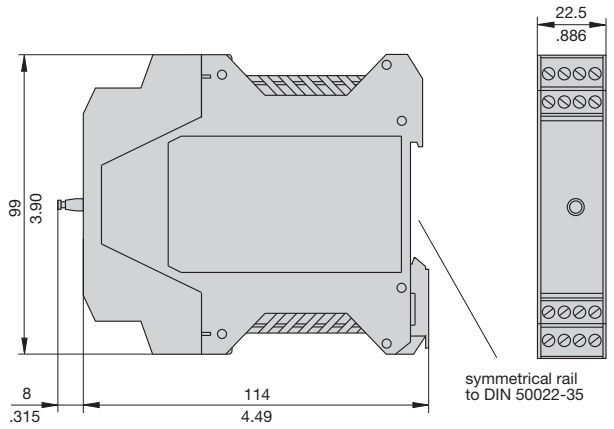
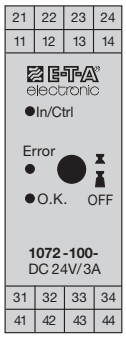
Dimensions

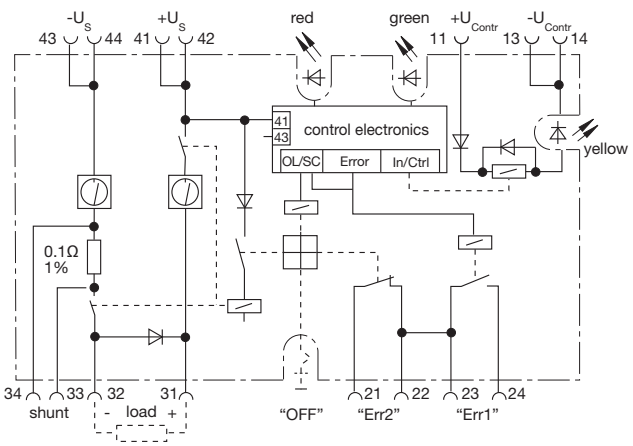


This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram



Basic circuit diagram



"In/Ctrl"	- LED yellow
"O.K."	- LED green
"Error"	- LED red
"OFF"	- red button
"Err1"	- relay contact
"Err2"	- auxiliary contact

Shown in OFF condition with no load (U_S= 0 V) and **red** button tripped ("OFF").

Terminal selection

Level	Terminal	Remark	
1	11	$+U_{Contr}$ (control voltage plus)	**DC 18...32 V**
1	13 / 14	$-U_{Contr}$ (control voltage minus)	
1	12	not use	
2	21	"Err2" fault indication OL/SC (signal contact	**NO**)
2	22 / 23	joint terminal "Err1", "Err2"	**C**
2	24	"Err1" group fault indication (relay contact	**NO**)
3	31	load (+)	**DC 24 V / max. 3 A**
3	32	load (-)	
3	33 / 34	load current measurement by voltmeter (shunt 0.1 Ω/± 1 % integral with device, 100 mV ≙ 1 A) term. 33: shunt+ / term. 34: shunt-	
4	41 / 42	$+U_S$ (operating voltage plus)	**DC 19.2...36 V**
4	43 / 44	$-U_S$ (operating voltage minus)	

Top side

21	22	23	24	LEVEL 2 (fault indication)
11	12	13	14	LEVEL 1 (control input)
31	32	33	34	LEVEL 3 (load circuit)
41	42	43	44	LEVEL 4 (voltage supply)

Cable side (bottom)

Description

The E-T-A Solid State Remote Power Controller E-1072-2.. complies with the EC Machinery Directive 98/37/EG and meets the requirements of EN60204 part 1 “Electrical equipment of machinery, safety of machinery” in ungrounded DC 24 V supply systems (“IT systems”).

The E-1072-2.. is a double pole electronic switching amplifier for magnetic valves (hydraulic and pneumatic mechanisms), magnetic brakes and magnetic couplings with rated voltage DC 24 V and a max. current rating of 1 A or 2 A. It combines true circuit breaker characteristics with additional diagnostic functions.

Why use the E-1072-2..

- for double pole switching of actuators (magnetic valves, magnetic brakes) in machinery and equipment
- for monitoring the electronic function of the loads and signal to the PLC
- for preventing a voltage dip of the DC 24 V output voltage in a switch-mode power supply, in the event of a short circuit, as a true 2 pole, remotely controllable electronic circuit breaker
- for protecting the cables of the load circuit
- for status signalling and for visually indicating load circuit faults (LEDs or RED trip button) via potential-free signal contacts
- for double-pole physical isolation of the load circuit – manually or electrically in the event of a failure (short circuit/overload)

Features

- Voltage rating DC 24 V (19.2...36 V)
- Current rating I_N max. 1 A or 2 A (min. load current 30 mA)
- Activates and monitors DC 24 V magnetic valves
- PLC controllable 2 pole remote power controller with physical isolation of control input
  - Switching output with integral current limitation to 2 x I_N
  - Disconnection of load in the event of short circuit or overload, followed by double pole physical isolation of load
  - Permanent wire break monitoring of load circuit
  - Group fault signalisation via relay contact “Err1”
  - Additional signal contact “Err2” when integral circuit breaker has tripped due to short circuit or overload in the load circuit
  - LED displays: LED green: OK
LED red: Error
LED yellow In/Ctrl (control current indication)
  - Integral reverse polarity protection and overload protection for control and load circuit
  - No back-up fuse required due to integral fail-safe element
  - Track-mountable, width 22.5 mm

Additional feature E-1072-**210**
- additional “status indication” relay output to facilitate confirmation to a PLC, for example, of activation and a load current > 30 mA.

Additional feature E-1072-**220** (see fig. “inrush current curve magnetic valves”)
- Analogue output 4-20 mA proportional to load current enables permanent monitoring of magnetic valve circuits as well as recording of the load current via ET200 sub-assemblies or field bus modules (with analogue input). In addition it is possible to check the inrush current characteristic curve of a magnetic valve to determine whether the armature of the valve has moved or is stuck.

E-1072-220

Technical Data (T_U = 25 °C, U_S = DC 24 V) (T_U = ambient temperature at U_N)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 19.2...36 V
Current rating I_N	max. 1 A or 2 A
Current consumption I_0 (U_{Contr} = “0”)	typically 25 mA
Power loss P_{max} (I_N= 1 A)	typically 1.6 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_S	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication “Err1” and “Err2”) indication “BM”
Load Circuit	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V/1 A or 2 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at I_N (with I_N=1 A)	typically 0.8 V
Switching times (t_{on} / t_{off})	typically 1 ms (resistive load)
Overload disconnection	approx 1.15 x I_N
Trip time (I_{load} = 1.5 x I_N)	typically 1 s
Short-circuit current I_K	typically 2 x I_N current limitation
Trip time (upon I_K)	typically 300 ms at I_N = 1 A, 100 ms at I_N = 2 A, 2-pole isolation of load circuit after approx. 20 ms –> RED LED indicates, fault indication F “Err1” and “Err2”
Wire break monitoring	with the load switched on or off; RED LED “Error” lighted, group fault signalisation “Err1” (U_{Contr}= “0”) wire break threshold R_{load} > 30 kΩ (U_{Contr}= “1”) minimum current I_{load} < 30 mA
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I_{load} > 30 mA
Leakage current (U_{Contr} = “0”)	typically 1 mA
Free-wheeling circuitry	integral
Load current measurement (term. 33: +shunt/ term. 34: -shunt)	no isolation of load circuit required as a I_N = 1 A: 0.2 Ω/1 %, I_N = 2 A: 0.1 Ω/1 % measuring shunt is integral with the device. Measurement by voltmeter terminal 33 - terminal 34 (200 mV = I_N)
Isolation of load circuit	2-pole by relay contacts - by manual release of RED button - approx. 20 ms after electronic tripping due to overload or short circuit (“OFF”)

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Technical Data (T_U = 25 °C, U_B = DC 24 V) (T_U = ambient temperature at U_N)

Control circuit	
Control "In/Ctrl"	internal low-level signal relay in control input (with integral free-wheeling diode)
Control voltage U_{Contr}	"0" : 0...2.4 V "1" : 18...32 V
Control voltage I_{Contr}	typically 5...10 mA
Switching frequency f_{max}	10 Hz
Control signal (U_{Contr} "1")	"In/Ctrl" YELLOW LED lights with I_{Contr} flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)
Fault indication	
"Err1"	group fault signalisation potential-free relay contact N/O, (closed circuit principle) DC 30 V/5 mA...1 A
Fault indication "Err1"	relay contact "Err1" open - wire breakage in the load circuit - load current < 30 mA - other faults (ground fault in load circuit or internal fault) - overload/short circuit (= "Err2") - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed
Signal delay	typically 600 ms
"Err2"	fault indication potenial-free auxiliary contact, make contact N/O, DC 30 V/5 mA....1 A
Fault indication "Err2"	signal contact "Err2" closed - overload or short circuit in the load circuit - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" open - auxiliary contact "Err2" closed - RED button "OFF" - reset required - 2-pole physical isolation in load circuit - manual release "OFF" - reverse polarity of U_S (LEDs not indicating)
Option –210	with status indication "BM" potential-free relay contact DC 30 V / 5 mA...1 A
Function "BM"	relay contact closed, if I_{load} > 30 mA relay contact open, with wire breakage and after trip of circuit breaker
Option –220	analogue output proportional to load current "ANA" 4-20 mA, max. load 500 Ω on -U_S (term. 44) U_{Contr} = "0" –> 4 mA U_{Contr} = "0" –> 4 mA with 0 A (load current) 20 mA with I_N Accuracy: ± 5 % of measured value
General data	
Ambient Temperature	0...+50 °C (without condensation)
Storage temperature	-20...+70 °C
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC	not required because of integral fail-safe element with VDE approval
Housing material	PA 66-FR
Mounting	symmetric rail to EN 50022-35
Vibration	3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050)	IP20 housing IP20 terminals
EMC	emitted interference EN 50081-1 interference suppression EN 61000-6-2
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 130 g

Ordering information

Type		
E-1072	Solid State Remote Power Controller	
	Version	
	210	with additional option: status indication
	220	with additional option: analogue output 4-20 mA
	Voltage rating of load	
	DC 24 V	
	Current rating	
	1 A or 2 A	

E-1072 - 210 - DC 24 V - 1 A ordering example

Status matrix

Operating status	Fault-free operation		Short circuit/ overload in load circuit	Wire break in load circuit		Other faults
Control input	**"0"**	**"1"**	**"1"**	**"0"**	**"1"**	**"0"**
Load output	OFF 2-pole *non-conductive*	ON 2-pole conductive	OFF 2-pole *non-conductive*	OFF 2-pole *non-conductive*	ON 2-pole *non-contuctive*	OFF 2-pole *non-conductive*
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	no	no	no

Indication						
YELLOW LED "In/Ctrl"	0	**1**	**1**	0	**1**	0
GREEN LED "O.K."	**1**	**1**	0	0	0	0
RED LED "Error"	0	0	**1**	**1**	**1**	**1**
relay contacts "Err1" (group fault)	closed	closed	open	open	open	open
auxiliary contacts "Err2" (circuit breaker)	open	open	**closed**	open	open	open
RED operating/ reset button	ON	ON	OFF "OFF"	ON	ON	ON
relays contact "BM" indication option-210	open	closed	open	open	open	open
analgo output option-220	4 mA	4 mA... 20 mA	> 20 mA 4 mA	4 mA	4 mA	4 mA
Remark	available	I_{load}: > 30 mA < 1 A or 2 A I_N	RED button to be reset		I_{load}: < 30 mA	ground fault in load circuit or internal fault

1 = LED lights
0 = LED does not light

Operating modes at:
- reverse polarity: indication of fault "Err2"; LEDs not illuminated!
- manual release "OFF" (RED button out): indication of fault "Err1" and "Err2", additionally lighted LED RED "Error".
- with U_S = 0 V: group fault signalisation »Err1« (closed circuit principle)

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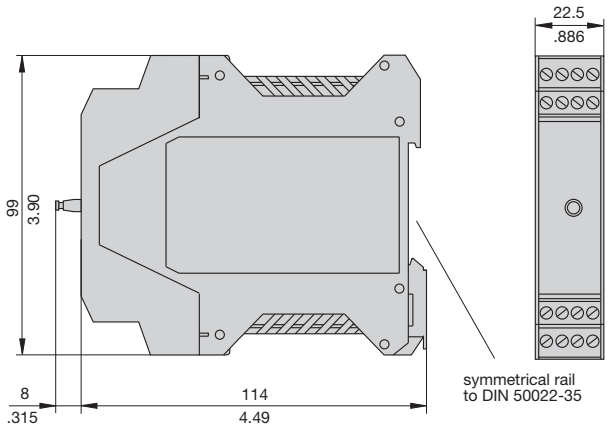
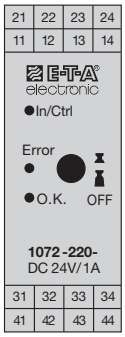
Dimensions

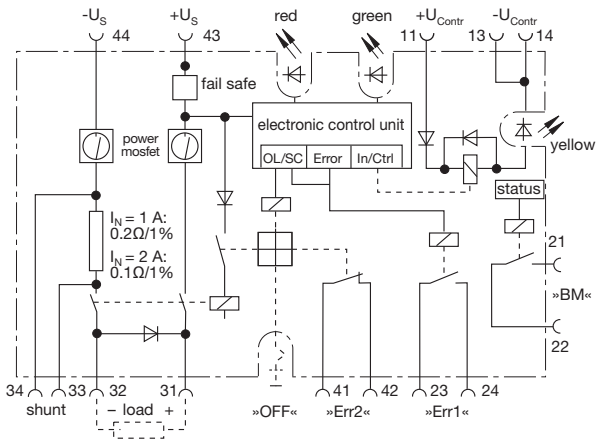


This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Connection diagram



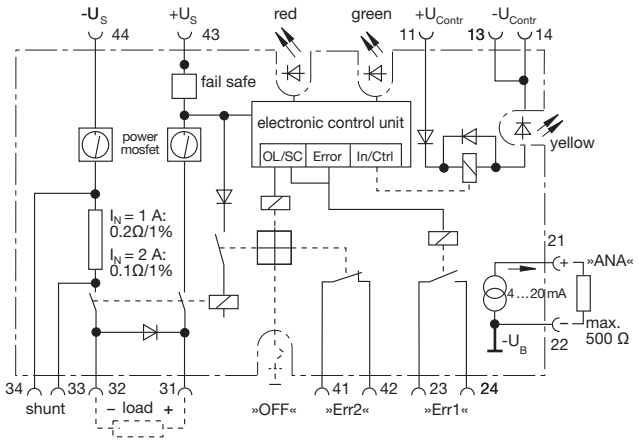
Basic circuit diagram -210



»In/Ctrl«	- LED yellow
»O.K.«	- LED green
»Error«	- LED red
»OFF«	- red button
»Err1«	- relay contact
»Err2«	- signal contact
»BM«	- relay contact

Shown in »OFF« condition with no load (U_S= 0 V) and **red button** tripped.

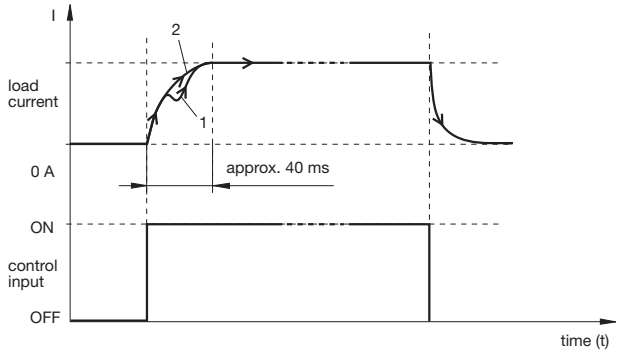
Basic circuit diagram -220



»In/Ctrl«	- LED yellow
»O.K.«	- LED green
»Error«	- LED red
»OFF«	- red button
»Err1«	- relay contact
»Err2«	- signal contact
»ANA«	- analogue output 4 … 20 mA

Shown in »OFF« condition with no load (U_S= 0 V) and **red button** tripped.

Inrush current curve magnetic valve



1 Inrush current curve if armature of valve has moved and reached its final position.
2 Inrush current curve if armature of valve has not moved.

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Terminal selection

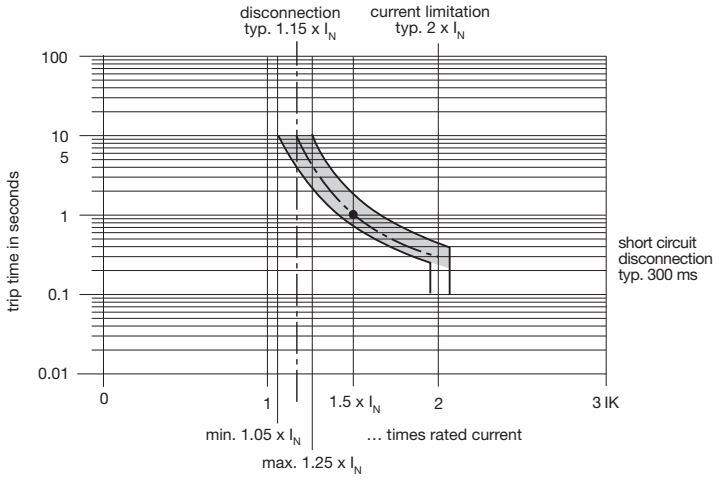
Level	Terminal	Remark		
1	11	$+U_{Contr}$ (Control voltage plus)		**DC 18...32 V**
	12	not used		
	13 / 14	$-U_{Contr}$ (Vontrol voltage minus)		
2	21 22	option-210: status indication “BM” (relay contact)	option-220: analog output 4-20 mA	Kl. 21 **(+)** Kl. 22 **(-)**
	23 / 24	“Err1” group fault signalisation		(relay contact)
3	31	load (+)		**DC 24 V / 1 A (or 2 A)**
	32	load (-)		
	33 / 34	load current measurement by voltmeter I_N = 1 A: shunt 0.2 Ω/1 % I_N = 2 A: shunt 0.1 Ω/1 % shunt integral with device Kl. 33: shunt+ / Kl. 34: shunt-		
4	41 / 42	“Err2” indication of fault circuit breaker (auxiliary contact)		
	43	$+U_S$ (operating voltage plus)		**DC 19.2...36 V**
	44	$-U_S$ (operating voltage minus)		

Top side

21	22	23	24	LEVEL 2
11	12	13	14	LEVEL 1
31	32	33	34	LEVEL 3
41	42	43	44	LEVEL 4

Cable side (bottom)

Typical time/current characteristics (T_A = 25 °C)



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Solid State Remote Power Controller E-1072-CF2

Description

The E-T-A Solid State Remote Power Controller E-1072 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply ("IT systems") (see Machinery Directive EN 60204 part 1).

Typical applications

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionability of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contact).
- Two pole physical isolation upon overload or when tripped manually.

Features

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e. g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon
  - an overload in the load circuit,
  - short-circuit in the load (load+/load-, load+/-U_S, and load-/+U_S), followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input with control current indication (YELLOW LED).
- OK and availability indication (GREEN LED).
- Short-circuit and overload indication (fault indication F and RED LED).
- Continuous wire break monitoring of the load circuit (fault indication F and ORANGE LED).
- Additional supervision of the power transistors and load output potential (e.g. ground fault) when not energized. Deviation from required state is indicated as an internal fault (fault indication F, RED + ORANGE LEDs).
- Integral reverse polarity and overvoltage protection of control and load circuits.
- Integral fault indication F (wire break, short-circuit, overload, ground fault, internal fault)
  - switch contact (N/O) with external status indication (RED actuator button tripped).
  - internal fault storage (push RED button to reset).

Ordering information

Type No.				
E-1072	Solid State Remote Power Controller SSRPC			
	CF2			
		Voltage rating of load		
		DC 24 V		
			Current rating	
			3 A	
E-1072 -	CF2	-	DC 24 V -	3 A

E-1072-CF2-..

Technical data ($T_{ambient}$ = 25 °C, U_S = DC 24 V)

Voltage rating U_N	DC 24 V
Operating voltage U_S	DC 19.2...36 V
Current rating I_N	max. 3 A
Current consumption I_0 (U_{Contr} = "0")	typically 24 mA
Power loss P_{max} (I_N=3 A)	typically 3.5 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_S	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication)
Load circuit	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V / 3 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at I_N	typically 0.9 V (R_i typically 300 mΩ)
Switch times (t_{on} / t_{off})	typically 2 ms (resistive load)
Overload disconnection	approx 1.15 x I_N (typically 3.45 A)
Trip time (I_{load} = 2 x I_N)	typically 400 ms
Short-circuit current I_K	typically 12 A current limitation
Trip time (upon I_K)	typically 50 ms, 2-pole isolation of load circuit after approx. 1 s
Wire break monitoring	–> RED LED indicates, fault indication F with the load switched on or off; RED button trips after approx. 1 s –> ORANGE LED indicates, fault indication F (U_{Contr} ="0") wire break threshold R_{load} > 120 kΩ (U_{Contr} ="1") minimum current I_{load} < 30 mA
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I_{load} > 30 mA
Leakage current (U_{Contr} = "0")	typically 1 mA
Free-wheeling circuitry	integral Option (on request): additional quick release (max. 30 W load)
Load current measurement (term. 33: +shunt/) (term. 34: -shunt)	no isolation of load circuit required as a 0.1 Ω/±1 % measuring shunt is integral with he device. Measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)
Isolation of load circuit	2 pole by relay contacts - by manual release of RED button - approx. 1 s after electronic fault sensing (wire break, overload, short-circuit, internal fault)

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Technical data (cont'd)

Control circuit

Control	via low-level signal relay in control input (with integral free-wheeling diode)
Control voltage U_{Contr}	"0" : 0...2.4 V "1" : 18...32 V
Control voltage I_{Contr}	typically 5...10 mA
Switching frequency f_{max}	10 Hz
Control signal (U_{Contr}"1")	YELLOW LED lights with I_{Contr} flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)

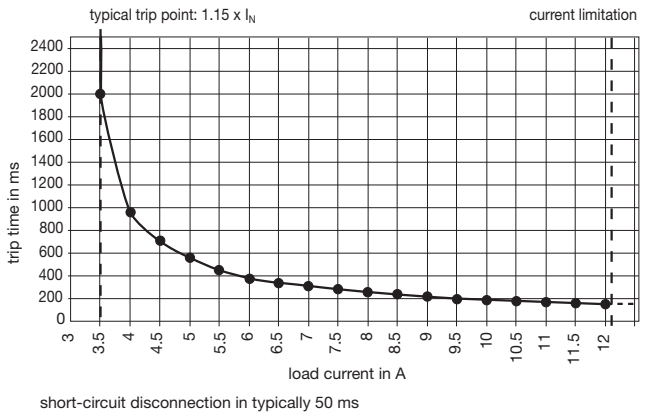
Fault indication

Fault indication F	Potential-free auxiliary contact (hard gold plated N/O contact), DC 30 V/0.5 mA...1 A
Faults	Contact F1-F2 closed after RED button has tripped upon
LED	- wire break in load circuit (ORANGE LED indicates) - overload/short-circuit in load circuit (RED indicates) - internal fault (RED + ORANGE LEDs indicate) (e. g. ground fault in load circuit, power transistor failure) Faults indicated by the LEDs remain stored until the RED button is reset! - manual release (GREEN LED indicates) - reverse polarity of U_S (LEDs not indicating)
Signal delay	typically 1 s

General data

Ambient Temperature	0...+50 °C (without condensation)
Storage temperature	-20...+70 °C
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC	circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals)
Housing material	PA 66-FR
Mounting	symmetric rail to EN 50022-35
Vibration	3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050)	IP20 housing IP20 terminals
EMC	to EN 61326-1 (01-1998)
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 135 g

Typical time/current characteristics (T_A= 25 °C)



short-circuit disconnection in typically 50 ms

Operating modes

Operating status	Fault-free operation		Load short circuited	Wire break in load circuit		Internal fault
Control input	**"0"**	**"1"**	**"1"**	**"0"**	**"1"**	**"0"**
Load output	OFF 2-pole *non-conductive*	ON 2-pole *conductive*	OFF 2-pole *non-conductive*	OFF 2-pole *non-conductive*	OFF 2-pole *non-conductive*	OFF 2-pole *non-conductive*
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	yes	yes	yes

Indication						
YELLOW LED control current	0	**1**	**1**	0	**1**	0
GREEN LED OK signal	**1**	**1**	0	0	0	0
ORANGE LED wire break	0	0	0	**1**	**1**	**1**
RED LED fault (short-circuit, overload)	0	0	**1**	0	0	**1**
Fault auxiliary contacts	open	open	closed	closed	closed	closed
RED operating/ reset button	ON	ON	OFF	OFF	OFF	OFF
Remark	availability	load: > 30 mA < 3 A	RED button to be reset	RED button to be reset	RED button to be reset	RED button to be reset

1 = LED lights
0 = LED does not light

Faults indicated by the LEDs remain stored until the RED button is reset!

Operating modes at:
- reverse polarity: indication of fault F; LEDs not illuminated!
- manual release (RED button out): indication of fault F, GREEN LED lights!

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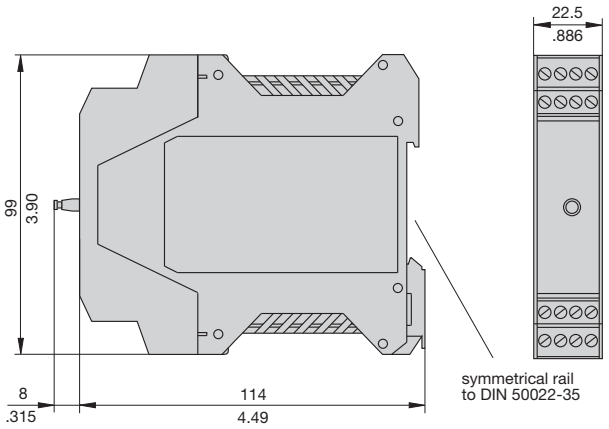
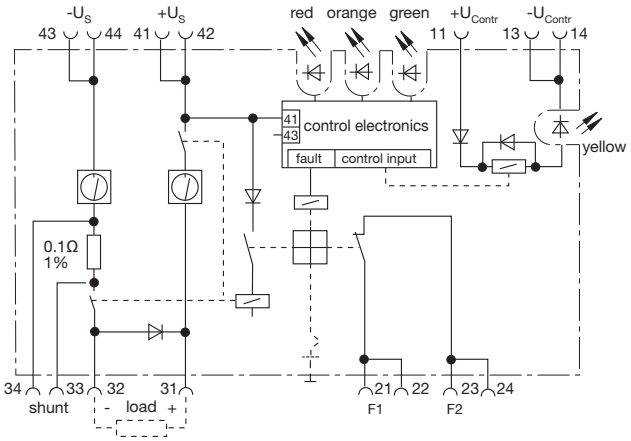
Dimensions



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

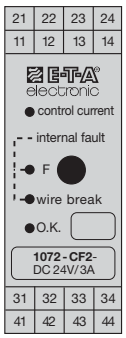
Basic circuit diagram



LED	
yellow	- control current
red	- overload/short circuit
orange	- wire break
red+orange	- internal fault/ground fault
green	- O.K.

Shown in OFF condition with no load and red actuator button tripped.

Connection diagram



Terminal selection

Level	Terminal	Remark	
1	11	$+U_{Contr}$ (control voltage plus)	**DC 18...32 V**
1	13 / 14	$-U_{Contr}$ (control voltage minus)	
1	12	not use	
2	21 / 22	F1 fault indication (circuit breaker contact)	**NO**
2	23 / 24	F2 fault indication (circuit breaker contact)	
3	31	load (+)	**DC 24 V / max. 3 A**
3	32	load (-)	
3	33 / 34	load current measurement by voltmeter (shunt 0.1 Ω/1 % integral with device, 100 mV ≙ 1 A) Kl. 33: shunt+ / Kl. 34: shunt-	
4	41 / 42	$+U_S$ (operating voltage plus)	**DC 19.2...36 V**
4	43 / 44	$-U_S$ (operating voltage minus)	

Top side

21	22	23	24	LEVEL 2 (fault indication)
11	12	13	14	LEVEL 1 (control input)
31	32	33	34	LEVEL 3 (load circuit)
41	42	43	44	LEVEL 4 (voltage supply)

Cable side (bottom)

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