PLC INTERFACE With Leakage Current and Interference Voltage Suppression PLC-…SO46

1. Description

PLC INTERFACE, the super thin, plug-in, and flexible modular interface system with a user-friendly jumper system, now offers an extended range of relay interfaces for applications in which high levels of interference voltage occur on the control side (coil).

Application Problem: Long Cables

This problem is familiar to almost every practical expert: relays do not drop again on a "0" signal or even pick up in extreme cases due to interference voltages on the control cables. This is often caused by long and/or poorly-laid cables. AC voltages are thus coupled from neighboring cables, which frequently exceed 10 V. Conventional coupling relays become overloaded with these undefined signals and do not demonstrate clear switching behavior.

Application Problem: Leakage Currents From AC Outputs

The same effect occurs if electronic AC outputs produce leakage currents. This is often the case for many AC voltage initiators and PLC AC output cards. Leakage currents of several mA can also adversely affect the operation of conventional relays, which remain "suspended".

Solution: PLC-…SO46 With Integrated Filter

6.2 mm (0.244 in.) and 14 mm (0.551 in.) PLC...SO46 versions with integrated filter are now available for applications in 120 V AC or 230 V AC networks with high levels of interference voltage. This multi-level filter circuit considerably reduces interference in the control circuit and thus contributes to safe signal transmission.

The PLC-…SO46 is only supplied as a basic terminal block with filter; a relay or optocoupler is not fitted. For possible components, please refer to the Technical Data.

All Other PLC Advantages

The PLC-…SO46 series also features the other advantages of the PLC range:

- Super thin 6.2 mm (0.244 in.) and 14 mm (0.551 in.) design
- Either universal SPDT or sensor version for input signals
- User-friendly, vibration-resistant, and time-saving jumper system
- Integrated input and protection circuit
- Relay or optocoupler can be quickly replaced using an engagement lever
- Either screw or spring-cage connection technology
- …

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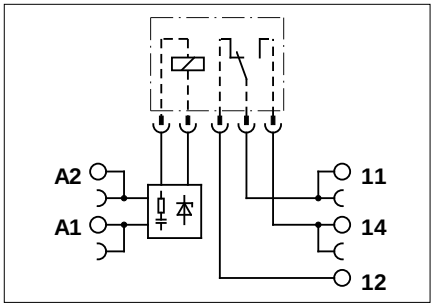
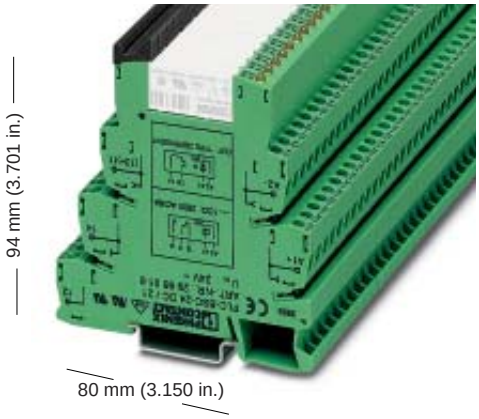
2. Technical Data: Universal Range



Circuit diagram



Note: Please refer to the INTERFACE catalog for assembly instructions and accessories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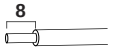


	solid [mm²]	flexible [mm²]	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the relay.

PLC-B…/21/SO46

Basic terminal block with integrated filter
that can be fitted with a relay or optocoupler

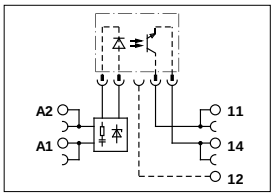
Housing width 6.2 mm (0.244 in.) (GL cULus provided)

[1)] The technical data only applies to basic terminal blocks fitted with a REL-MR-60DC/21 or REL-MR-60DC/21AU

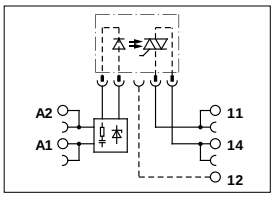
Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…/21/SO46 basic terminal block for plug-in REL-MR-60DC… miniature relay, for mounting on ⊔	120 V AC	**PLC-BSC-120UC/21/SO46**	**29 80 31 9**	10
	230 V AC	**PLC-BSC-230UC/21/SO46**	**29 80 33 5**	10
PLC interface with spring-cage connection				
PLC-BSP…/21/SO46 basic terminal block for plug-in REL-MR-60DC… miniature relay, for mounting on ⊔	120 V AC	**PLC-BSP-120UC/21/SO46**	**29 80 35 1**	10
	230 V AC	**PLC-BSP-230UC/21/SO46**	**29 80 37 7**	10
Suitable plug-in miniature relay	Gold contact	**REL-MR-60DC/21AU**	**29 61 13 4**	18
	Power contact	**REL-MR-60DC/21**	**29 61 11 8**	18

Technical Data[1)]

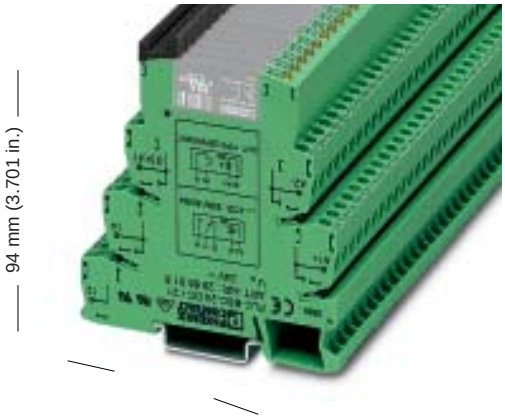
Input Data			
Nominal input voltage U_N		120 V AC	230 V AC
Permissible range (with reference to U_N and T_u = 20°C [68°F])		0.8…1.4	0.78…1.14
Typical release voltage		50 V AC	80 V AC
Typical input current at U_N (50 Hz/60 Hz)		7/8 mA	8.8/10 mA
Typical response time/release time at U_N		7 ms/20 ms	7 ms/20 ms
Input wiring:		Operating indicators, bridge rectifier, filter	
Output Data (when fitted with...)		**REL-MR-60DC/21**	**REL-MR-60DC/21AU**
Contact version		Single contact, 1 Form C contact	Single contact, 1 Form C contact
Contact material		AgSnO	Ag alloy, hard gold-plated
Maximum switching voltage		250 V AC/DC	30 V AC/36 V DC
Minimum switching voltage		12 V AC/DC	100 mV
Limiting continuous current		6 A	50 mA
Maximum inrush current		On request	50 mA
Minimum switching current		10 mA	1 mA
Maximum shutdown power, ohmic load:	24 V DC	140 W	1.2 W
	48 V DC	20 W	-
	60 V DC	18 W	-
	110 V DC	23 W	-
	220 V DC	40 W	-
	250 V AC	1500 VA	-
Minimum switching power		120 mW	100 µW
General Data			
Test voltage I/O		4 kV, 50 Hz, 1 minute	
Ambient operating temperature range		-20°C to +55°C (-4°F to +131°F)	
Nominal operating mode		100% ED	
Flammability class		V0 according to UL 94	
Mechanical life		2 x 10^7 cycles	
Standards/specifications		IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 3, Surge Voltage Category III, DIN EN 50 178/VDE 0160 (in relev. parts), IEC 60 255/DIN VDE 0435 (in relev. parts), DIN VDE 0106-101: 1986-11, reinforced insulation for I/O	
Mounting position/mounting		Any/can be mounted without spacing	



Circuit diagram for DC output



Circuit diagram for AC output



Note: Please refer to the INTERFACE catalog for assembly instructions and accessories

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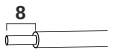


	solid	flexible [mm²]	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the optocoupler.

PLC-B…/21/SO46

Basic terminal block with integrated filter
that can be fitted with a relay or optocoupler

Housing width 6.2 mm (0.244 in.) (GL cULus provided)

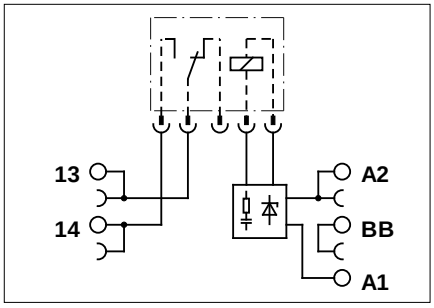
[1] The technical data only applies to basic terminal blocks fitted with a OPT-60DC/24DC/2, OPT-60DC/48DC/100 or OPT-60DC/230AC/1

Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…/21/SO46 basic terminal block for plug-in OPT-60DC… miniature optocoupler, for mounting on ⊓	120 V AC	**PLC-BSC-120UC/21/SO46**	**29 80 31 9**	10
	230 V AC	**PLC-BSC-230UC/21/SO46**	**29 80 33 5**	10
PLC interface with spring-cage connection				
PLC-BSP…/21/SO46 basic terminal block for plug-in OPT-60DC… miniature optocoupler, for mounting on ⊓	120 V AC	**PLC-BSP-120UC/21/SO46**	**29 80 35 1**	10
	230 V AC	**PLC-BSP-230UC/21/SO46**	**29 80 37 7**	10
Suitable plug-in miniature optocoupler		**OPT-60DC/48DC/100**	**29 66 62 1**	18
		OPT-60DC/24DC/2	**29 66 60 5**	18
		OPT-60DC/230AC/1	**29 67 96 3**	18

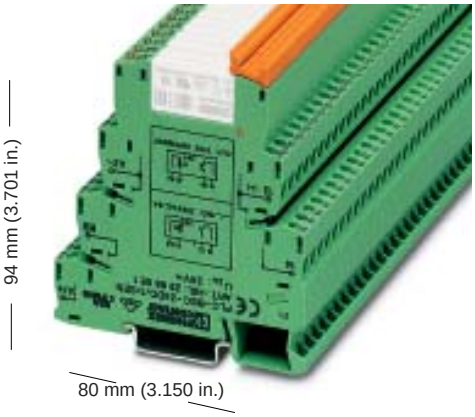
Technical Data[1]

Input Data			
Nominal input voltage U_N	120 V AC	230 V AC	
Permissible range (with reference to U_N)	0.85…1.1	0.8…1.1	
Switching level	≤ 0.4 x U_N	≤ 0.4 x U_N	0 signal ("L")
Typical input current at U_N (50 Hz/60 Hz)	7/8 mA	8.8/10 mA	
Typical switch-on time at U_N	6 ms	6 ms	
Typical switch-off time at U_N	10 ms	10 ms	
Input wiring:	Operating indicators, bridge rectifier, filter		
Output Data (when fitted with...)	**OPT-60DC/48DC/100**	**OPT-60DC/24DC/2**	**OPT-60DC/230AC/1**
Maximum switching voltage	48 V DC	30 V DC	253 V AC
Minimum switching voltage	3 V DC	3 V DC	24 V AC
Limiting continuous current (refer to catalog for derating curve)	100 mA	3 A	0.75 A
Maximum inrush current	–	15 A (10 ms)	30 A (10 ms)
Output switching	2-wire floating ground	2-wire floating ground	2-wire floating ground
Output wiring	Protection against polarity reversal, Surge voltage protection	Protection against polarity reversal, Surge voltage protection	RCV circuit
Voltage drop on limiting continuous current	< 1 V DC	< 200 mV DC	< 1 V DC
Leakage current in the off state	–	–	< 1 mA
Maximum phase displacement (inductive load)	–	–	cosφ = 0.5
Maximum load value I^2 x t (t = 10 ms)	–	–	4.5 A^2s
General Data			
Test voltage I/O	2.5 kV, 50 Hz, 1 minute		
Ambient operating temperature range	-20°C to +55°C (-4°F to +131°F)		
Nominal operating mode	100% ED		
Flammability class	V0 according to UL 94		
Standards/specifications	IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 2, Surge Voltage Category III		
Mounting position/mounting	Any/can be mounted without spacing		

3. Technical Data: Sensor Version for Input Signals



Circuit diagram



Note: Please refer to the INTERFACE catalog for assembly instructions and accessories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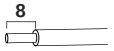


	solid	flexible [mm²]	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the relay.

PLC-B…/1/SEN/SO46

Basic terminal block with integrated filter
that can be fitted with a relay or optocoupler

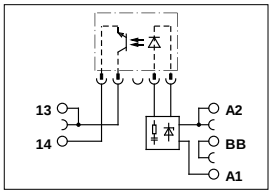
Housing width 6.2 mm (0.244 in.) (GL cULus provided)

[1)] The technical data only applies to basic terminal blocks fitted with a REL-MR-60DC/21 or REL-MR-60DC/21AU

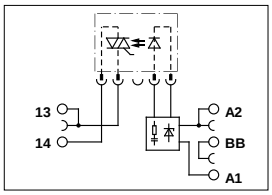
Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…/1/SEN/SO46 basic terminal block	120 V AC	**PLC-BSC-120UC/1/SEN/SO46**	**29 80 32 2**	10
for plug-in REL-MR-60DC… miniature relay,	230 V AC	**PLC-BSC-230UC/1/SEN/SO46**	**29 80 34 8**	10
for mounting on ⊔				
PLC interface with spring-cage connection				
PLC-BSP…/1/SEN/SO46 basic terminal block	120 V AC	**PLC-BSP-120UC/1/SEN/SO46**	**29 80 36 4**	10
for plug-in REL-MR-60DC… miniature relay,	230 V AC	**PLC-BSP-230UC/1/SEN/SO46**	**29 80 38 0**	10
for mounting on ⊔				
Suitable plug-in miniature relay	Gold contact	**REL-MR-60DC/21AU**	**29 61 13 4**	18
	Power contact	**REL-MR-60DC/21**	**29 61 11 8**	18

Technical Data[1)]

Input Data		
Nominal input voltage U_N	120 V AC	230 V AC
Permissible range (with reference to U_N and T_u = 20°C [68°F])	0.8…1.4	0.78…1.14
Typical release voltage	50 V AC	80 V AC
Typical input current at U_N (50 Hz/60 Hz)	7/8 mA	8.8/10 mA
Typical response time/release time at U_N	7 ms/20 ms	7 ms/20 ms
Input wiring:	Operating indicators, bridge rectifier, filter	
Output Data (when fitted with...)	**REL-MR-60DC/21**	**REL-MR-60DC/21AU**
Contact version	Single contact, 1 Form A contact	Single contact, 1 Form A contact
Contact material	AgSnO	Ag alloy, hard gold-plated
Maximum switching voltage	250 V AC/DC	30 V AC/36 V DC
Minimum switching voltage	12 V AC/DC	100 mV
Limiting continuous current	6 A	50 mA
Maximum inrush current	On request	50 mA
Minimum switching current	10 mA	1 mA
Maximum shutdown power, ohmic load: 24 V DC	140 W	1.2 W
48 V DC	20 W	-
60 V DC	18 W	-
110 V DC	23 W	-
220 V DC	40 W	-
250 V AC	1500 VA	-
Minimum switching power	120 mW	100 µW
General Data		
Test voltage I/O	4 kV, 50 Hz, 1 minute	
Ambient operating temperature range	-20°C to +55°C (-4°F to +131°F)	
Nominal operating mode	100% ED	
Flammability class	V0 according to UL 94	
Mechanical life	2 x 10^7 cycles	
Standards/specifications	IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 3, Surge Voltage Category III, DIN EN 50 178/VDE 0160 (in relev. parts), IEC 60 255/DIN VDE 0435 (in relev. parts), DIN VDE 0106-101: 1986-11, reinforced insulation for I/O	
Mounting position/mounting	Any/can be mounted without spacing	



Circuit diagram for DC output



Circuit diagram for AC output

Note: Please refer to the INTERFACE catalog for assembly instructions and accessories

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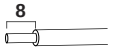


	solid [mm²]	flexible [mm²]	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the optocoupler.

PLC-B…/1/SEN/SO46

Basic terminal block with integrated filter that can be fitted with a relay or optocoupler

Housing width 6.2 mm (0.244 in.) (GL cULus provided)

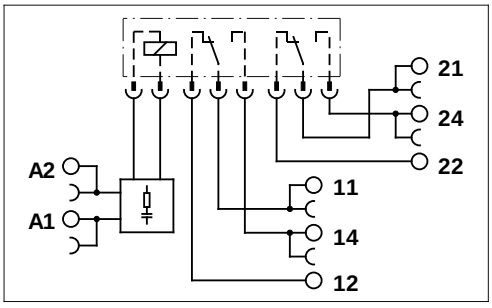
[1] The technical data only applies to basic terminal blocks fitted with a OPT-60DC/24DC/2, OPT-60DC/48DC/100 or OPT-60DC/230AC/1

Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…/1/SEN/SO46 basic terminal block for plug-in OPT-60DC… miniature optocoupler, for mounting on ⊓	120 V AC 230 V AC	**PLC-BSC-120UC/1/SEN/SO46** **PLC-BSC-230UC/1/SEN/SO46**	**29 80 32 2** **29 80 34 8**	10 10
PLC interface with spring-cage connection				
PLC-BSP…/1/SEN/SO46 basic terminal block for plug-in OPT-60DC… miniature optocoupler, for mounting on ⊓	120 V AC 230 V AC	**PLC-BSP-120UC/1/SEN/SO46** **PLC-BSP-230UC/1/SEN/SO46**	**29 80 36 4** **29 80 38 0**	10 10
Suitable plug-in miniature optocoupler		**OPT-60DC/48DC/100** **OPT-60DC/24DC/2** **OPT-60DC/230AC/1**	**29 66 62 1** **29 66 60 5** **29 67 96 3**	18 18 18

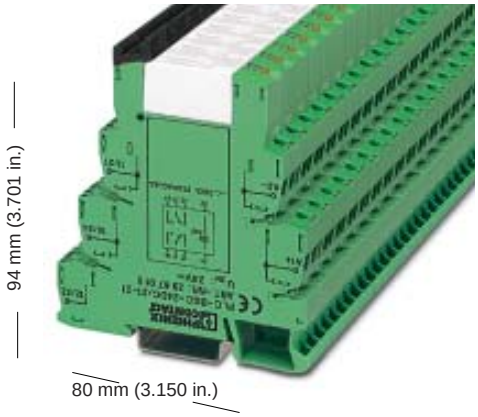
Technical Data[1]

Input Data			
Nominal input voltage U_N	120 V AC	230 V AC	
Permissible range (with reference to U_N)	0.85…1.1	0.8…1.1	
Switching level	≤ 0.4 x U_N	≤ 0.4 x U_N	
Typical input current at U_N (50 Hz/60 Hz)	7/8 mA	8.8/10 mA	
Typical switch-on time at U_N	6 ms	6 ms	
Typical switch-off time at U_N	10 ms	10 ms	
Input wiring:	Operating indicators, bridge rectifier, filter		
Output Data (when fitted with...)	**OPT-60DC/48DC/100**	**OPT-60DC/24DC/2**	**OPT-60DC/230AC/1**
Maximum switching voltage	48 V DC	30 V DC	253 V AC
Minimum switching voltage	3 V DC	3 V DC	24 V AC
Limiting continuous current (refer to catalog for derating curve)	100 mA	3 A	0.75 A
Maximum inrush current	–	5 A (10 ms)	30 A (10 ms)
Output switching	2-wire floating ground	2-wire floating ground	2-wire floating ground
Output wiring	Protection against polarity reversal, Surge voltage protection	Protection against polarity reversal, Surge voltage protection	RCV circuit
Voltage drop on limiting continuous current	≤ 1 V DC	≤ 200 mV DC	< 1 V AC
Leakage current in the off state	–	–	< 1 mA
Maximum phase displacement (inductive load)	–	–	cosφ = 0.5
Maximum load value I^2 x t (t = 10 ms)	–	–	4.5 A^2s
General Data			
Test voltage I/O	2.5 kV, 50 Hz, 1 minute		
Ambient operating temperature range	-20°C to +55°C (-4°F to +131°F)		
Nominal operating mode	100% ED		
Flammability class	V0 according to UL 94		
Standards/specifications	IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 2, Surge Voltage Category III		
Mounting position/mounting	Any/can be mounted without spacing		

4. Technical Data: Universal SPDT Version



Circuit diagram



Note: Please refer to the INTERFACE catalog for assembly instructions and accessories

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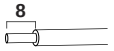


	solid	flexible [mm²]	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the relay.

PLC-BSC…21-21/SO46

Basic terminal block with integrated filter that can be fitted with a relay

Housing width 14 mm (0.244 in.) (GL cULus provided)

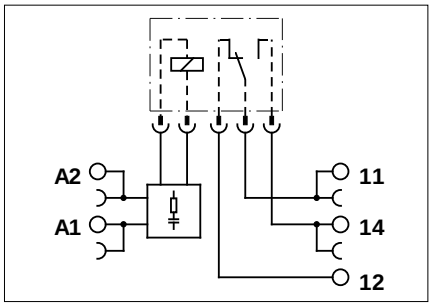
[1] The technical data only applies to basic terminal blocks fitted with a REL-MR-110DC/21-21 or REL-MR-110DC/21-21AU

Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…/21-21/SO46 basic terminal block for plug-in REL-MR-110DC… miniature relay, for mounting on ⊓	120 V AC	**PLC-BSC-120UC/21-21/SO46**	**29 80 41 6**	10
	230 V AC	**PLC-BSC-230UC/21-21/SO46**	**29 80 42 9**	10
Suitable plug-in miniature relay				
	Gold contact	**REL-MR-110DC/21-21AU**	**29 61 22 8**	18
	Power contact	**REL-MR-110DC/21-21**	**29 61 20 2**	18

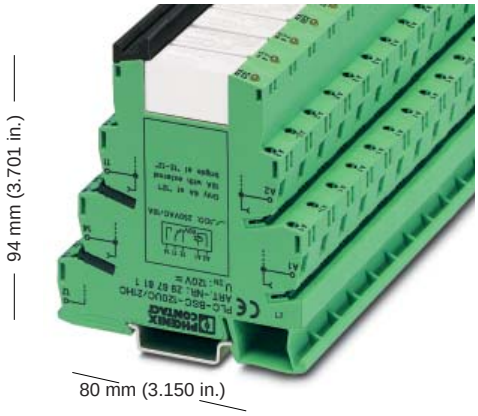
Technical Data[1]

Input Data			
Nominal input voltage U_N		120 V AC	230 V AC
Permissible range (with reference to U_N and T_u = 20°C [68°F])		0.78…1.4	0.78…1.14
Typical release voltage		16 V AC	60 V AC
Typical input current at U_N (50 Hz/60 Hz)		6/7 mA	8.5/10 mA
Typical response time/release time at U_N		7 ms/10 ms	7 ms/10 ms
Input wiring:		Operating indicators, bridge rectifier, filter	
Output Data (when fitted with...)		**REL-MR-110DC/21-21**	**REL-MR-110DC/21-21AU**
Contact version		Single contact, 2 Form C contacts	Single contact, 2 Form C contacts
Contact material		AgNi	AgNi + 5 µ Au
Maximum switching voltage		250 V AC/DC	30 V AC/36 V DC
Minimum switching voltage		5 V AC/DC	100 mV
Limiting continuous current		6 A	50 mA
Maximum inrush current		On request	50 mA
Minimum switching current		10 mA	1 mA
Maximum shutdown power, ohmic load:	24 V DC	140 W	1.2 W
	48 V DC	100 W	-
	60 V DC	60 W	-
	110 V DC	44 W	-
	220 V DC	60 W	-
	250 V AC	1500 VA	-
Minimum switching power		50 mW	100 µW
General Data			
Test voltage I/O		4 kV, 50 Hz, 1 minute	
Ambient operating temperature range		-20°C to +55°C (-4°F to +131°F)	
Nominal operating mode		100% ED	
Flammability class		V0 according to UL 94	
Mechanical life		3 x 10^7 cycles	
Standards/specifications		IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 3, Surge Voltage Category III, DIN EN 50 178/VDE 0160 (in relev. parts), IEC 60 255/DIN VDE 0435 (in relev. parts), DIN VDE 0106-101: 1986-11, reinforced insulation for I/O	
Mounting position/mounting		Any/can be mounted without spacing	

5. Technical Data: Universal Version for High Continuous Load Currents

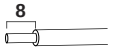


Circuit diagram



Note: Please refer to the INTERFACE catalog for assembly instructions and accessories

M 3



	solid [mm²]	flexible	AWG	I [A]	U [V]
Connection data	0.14 - 2.5	0.14 - 2.5	26 - 14	*	*

* The electrical data is determined by the relay.

PLC-BSC…21HC/SO46

Basic terminal block with integrated filter that can be fitted with a relay

Housing width 14 mm (0.244 in.) (GL cULus provided)

[1] The technical data only applies to basic terminal blocks fitted with a REL-MR-110DC/21HC

Description	Input voltage U_N	Type	Order No.	Pcs. Pkt.
PLC interface with screw connection				
PLC-BSC…21HC/SO46 basic terminal block for plug-in REL-MR-110DC… miniature relay, for mounting on ⊓	120 V AC 230 V AC	**PLC-BSC-120UC/21HC/SO46** **PLC-BSC-230UC/21HC/SO46**	**29 80 43 2** **29 80 44 5**	10 10
Suitable plug-in miniature relay	Power contact			
		REL-MR-110DC/21HC	**29 61 33 8**	18

Technical Data[1]

Input Data			
Nominal input voltage U_N		120 V AC	230 V AC
Permissible range (with reference to U_N and T_u = 20°C [68°F])		0.85…1.4	0.78…1.14
Typical release voltage		16 V AC	60 V AC
Typical input current at U_N (50 Hz/60 Hz)		6/7 mA	8.5/10 mA
Typical response time/release time at U_N		7 ms/10 ms	7 ms/20 ms
Input wiring:		Operating indicators, bridge rectifier, filter	
Output Data (when fitted with...)		**REL-MR-110DC/21HC**	
Contact version		Single contact, 1 Form C contact	
Contact material		AgNi	
Maximum switching voltage		250 V AC/DC	
Minimum switching voltage		12 V AC/DC	
Limiting continuous current		10 (6) A[2]	
Maximum inrush current		16 A	
Minimum switching current		100 mA	
Maximum shutdown power, ohmic load:	24 V DC	240 (144) W[2]	
	48 V DC	58 W	
	60 V DC	48 W	
	110 V DC	50 W	
	220 V DC	80 W	
	250 V AC	2500 (1500) VA[2]	
Minimum switching power		1.2 W	
General Data			
Test voltage I/O		4 kV, 50 Hz, 1 minute	
Ambient operating temperature range		-20°C to +55°C (-4°F to +131°F)	
Nominal operating mode		100% ED	
Flammability class		V0 according to UL 94	
Mechanical life		3 x 10^7 cycles	
Standards/specifications		IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 3, Surge Voltage Category III, DIN EN 50 178/VDE 0160 (in relev. parts), IEC 60 255/DIN VDE 0435 (in relev. parts), DIN VDE 0106-101: 1986-11, reinforced insulation for I/O	
Mounting position/mounting		Any/can be mounted without spacing	

[1] Input wiring depends on the type

[2] The values in brackets are for connections 12. If connections 12 are jumpered, the values in brackets are valid.