

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.



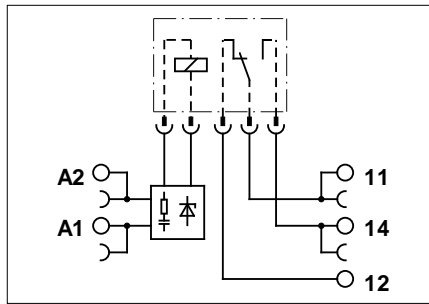
All Other PLC Advantages

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

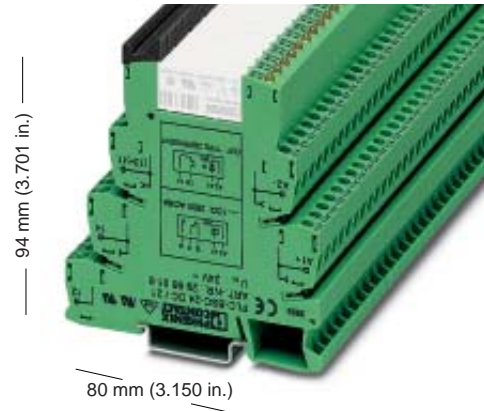
- Super thin 6.2 mm (0.244 in.) and 14 mm (0.551 in.) design
- Either universal SPDT or sensor version for input signals
- User-friendly, vibration-resistant, and time-saving jumper system
- Integrated input and protection circuit
- Relay or optocoupler can be quickly replaced using an engagement lever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

INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46

2. Technical Data: Universal Range



Circuit diagram



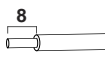
PLC-B.../21/SO46

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

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



M 3



	solid [mm ²]	flexible [mm ²]	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.

Description	Input voltage U _N
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 230 V AC
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 230 V AC
Suitable plug-in miniature relay	Gold contact Power contact

Technical Data¹⁾

Input Data	
Nominal input voltage U _N	
Permissible range (with reference to U _N and T _u = 20°C [68°F])	
Typical release voltage	
Typical input current at U _N (50 Hz/60 Hz)	
Typical response time/release time at U _N	
Input wiring:	
Output Data (when fitted with...)	
Contact version	
Contact material	
Maximum switching voltage	
Minimum switching voltage	
Limiting continuous current	
Maximum inrush current	
Minimum switching current	
Maximum shutdown power, ohmic load:	24 V DC 48 V DC 60 V DC 110 V DC 220 V DC 250 V AC
Minimum switching power	
General Data	
Test voltage I/O	
Ambient operating temperature range	
Nominal operating mode	
Flammability class	
Mechanical life	
Standards/specifications	
Mounting position/mounting	

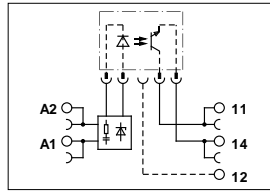
Housing width 6.2 mm (0.244 in.) (BL) (us provided)

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

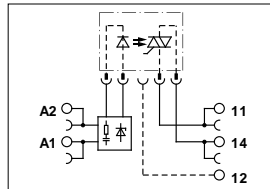
Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/21/SO46	29 80 31 9	10
PLC-BSC-230UC/21/SO46	29 80 33 5	10
PLC-BSP-120UC/21/SO46	29 80 35 1	10
PLC-BSP-230UC/21/SO46	29 80 37 7	10
REL-MR-60DC/21AU	29 61 13 4	18
REL-MR-60DC/21	29 61 11 8	18

120 V AC	230 V AC
0.8...1.4	0.78...1.14
50 V AC	80 V AC
7/8 mA	8.8/10 mA
7 ms/20 ms	7 ms/20 ms
Operating indicators, bridge rectifier, filter	
REL-MR-60DC/21	REL-MR-60DC/21AU
Single contact, 1 Form C contact	Single contact, 1 Form C contact
AgSnO	Ag alloy, hard gold-plated
250 V AC/DC	30 V AC/36 V DC
12 V AC/DC	100 mV
6 A	50 mA
On request	50 mA
10 mA	1 mA
140 W	1.2 W
20 W	-
18 W	-
23 W	-
40 W	-
1500 VA	-
120 mW	100 μW
4 kV, 50 Hz, 1 minute	
-20°C to +55°C (-4°F to +131°F)	
100% ED	
V0 according to UL 94	
2 x 10 ⁷ cycles	
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	
Any/can be mounted without spacing	

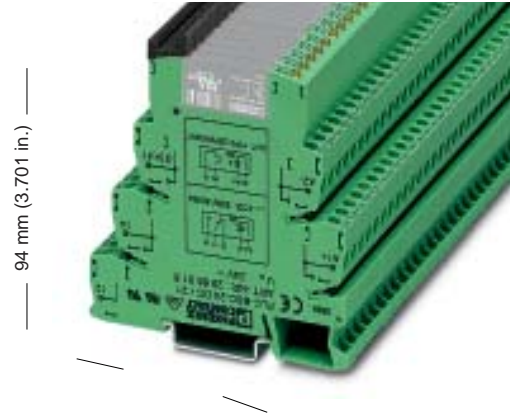
INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46



Circuit diagram for DC output



Circuit diagram for AC output



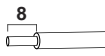
PLC-B.../21/SO46

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

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



M 3



	solid [mm ²]	flexible [mm ²]	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.

Description	Input voltage U _N
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 230 V AC
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 230 V AC
Suitable plug-in miniature optocoupler	

Technical Data¹⁾

Input Data	0 signal ("L")
Nominal input voltage U _N	
Permissible range (with reference to U _N)	
Switching level	
Typical input current at U _N (50 Hz/60 Hz)	
Typical switch-on time at U _N	
Typical switch-off time at U _N	
Input wiring:	

Output Data (when fitted with...)
Maximum switching voltage
Minimum switching voltage
Limiting continuous current (refer to catalog for derating curve)
Maximum inrush current
Output switching

Output wiring

Voltage drop on limiting continuous current
Leakage current in the off state
Maximum phase displacement (inductive load)
Maximum load value I ² x t (t = 10 ms)

General Data

Test voltage I/O
Ambient operating temperature range
Nominal operating mode
Flammability class
Standards/specifications

Mounting position/mounting

Housing width 6.2 mm (0.244 in.) (UL us 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

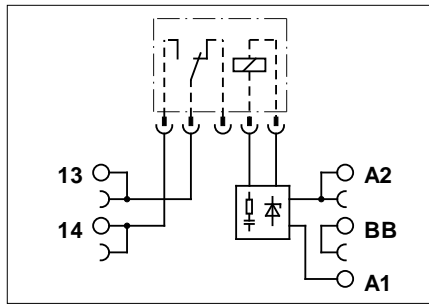
Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/21/SO46	29 80 31 9	10
PLC-BSC-230UC/21/SO46	29 80 33 5	10
PLC-BSP-120UC/21/SO46	29 80 35 1	10
PLC-BSP-230UC/21/SO46	29 80 37 7	10
OPT-60DC/48DC/100	29 66 62 1	18
OPT-60DC/24DC/2	29 66 60 5	18
OPT-60DC/230AC/1	29 67 96 3	18

120 V AC	230 V AC	
0.85...1.1	0.8...1.1	
≤ 0.4 x U _N	≤ 0.4 x U _N	
7/8 mA	8.8/10 mA	
6 ms	6 ms	
10 ms	10 ms	
Operating indicators, bridge rectifier, filter		
OPT-60DC/48DC/100	OPT-60DC/24DC/2	OPT-60DC/230AC/1
48 V DC	30 V DC	253 V AC
3 V DC	3 V DC	24 V AC
100 mA	3 A	0.75 A
-	15 A (10 ms)	30 A (10 ms)
2-wire floating ground	2-wire floating ground	2-wire floating ground
Protection against polarity reversal,	Protection against polarity reversal,	RCV circuit
Surge voltage protection	Surge voltage protection	
< 1 V DC	< 200 mV DC	< 1 V DC
-	-	< 1 mA
-	-	cosφ = 0.5
-	-	4.5 A ² s

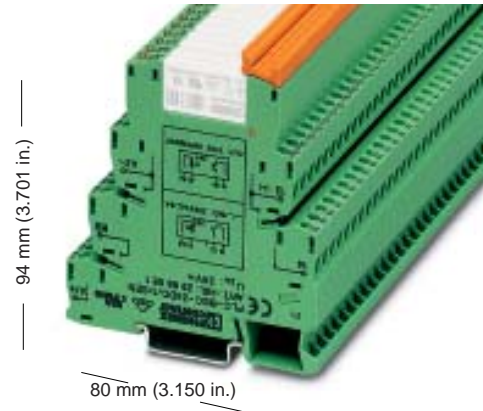
2.5 kV, 50 Hz, 1 minute
-20°C to +55°C (-4°F to +131°F)
100% ED
V0 according to UL 94
IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 2,
Surge Voltage Category III
Any/can be mounted without spacing

INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46

3. Technical Data: Sensor Version for Input Signals



Circuit diagram



PLC-B.../1/SEN/SO46

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

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



	solid	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.

Housing width 6.2 mm (0.244 in.) (UL 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
PLC interface with screw connection PLC-BSC.../1/SEN/SO46 basic terminal block for plug-in REL-MR-60DC... miniature relay, for mounting on	120 V AC 230 V AC
PLC interface with spring-cage connection PLC-BSP.../1/SEN/SO46 basic terminal block for plug-in REL-MR-60DC... miniature relay, for mounting on	120 V AC 230 V AC
Suitable plug-in miniature relay	Gold contact Power contact

Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/1/SEN/SO46	29 80 32 2	10
PLC-BSC-230UC/1/SEN/SO46	29 80 34 8	10
PLC-BSP-120UC/1/SEN/SO46	29 80 36 4	10
PLC-BSP-230UC/1/SEN/SO46	29 80 38 0	10
REL-MR-60DC/21AU	29 61 13 4	18
REL-MR-60DC/21	29 61 11 8	18

Technical Data¹⁾

Input Data
Nominal input voltage U_N
Permissible range (with reference to U_N and T_u = 20°C [68°F])
Typical release voltage
Typical input current at U_N (50 Hz/60 Hz)
Typical response time/release time at U_N
Input wiring:

120 V AC	230 V AC
0.8...1.4	0.78...1.14
50 V AC	80 V AC
7/8 mA	8.8/10 mA
7 ms/20 ms	7 ms/20 ms
Operating indicators, bridge rectifier, filter	

Output Data (when fitted with...)
Contact version
Contact material
Maximum switching voltage
Minimum switching voltage
Limiting continuous current
Maximum inrush current
Minimum switching current
Maximum shutdown power, ohmic load:

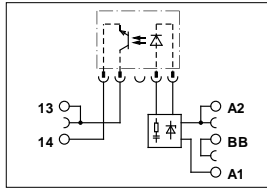
REL-MR-60DC/21	REL-MR-60DC/21AU
Single contact, 1 Form A contact	Single contact, 1 Form A contact
AgSnO	Ag alloy, hard gold-plated
250 V AC/DC	30 V AC/36 V DC
12 V AC/DC	100 mV
6 A	50 mA
On request	50 mA
10 mA	1 mA
140 W	1.2 W
20 W	-
18 W	-
23 W	-
40 W	-
1500 VA	-
120 mW	100 μW

Minimum switching power
General Data
Test voltage I/O
Ambient operating temperature range
Nominal operating mode
Flammability class
Mechanical life
Standards/specifications

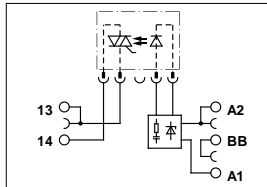
4 kV, 50 Hz, 1 minute
-20°C to +55°C (-4°F to +131°F)
100% ED
V0 according to UL 94
2 x 10⁷ cycles
IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 3, Surge Voltage Category III, DIN EN 50 178/VDE 0160 (in relev. parts), IEC 60 255/DIN VDE 0435 (in relev. parts), DIN VDE 0106-101: 1986-11, reinforced insulation for I/O
Any/can be mounted without spacing

Mounting position/mounting

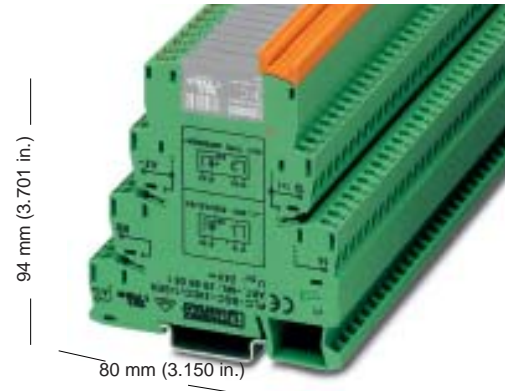
INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46



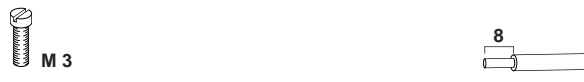
Circuit diagram for DC output



Circuit diagram for AC output



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



	solid [mm ²]	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 optocoupler.

Description	Input voltage U _N
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 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
Suitable plug-in miniature optocoupler	

Technical Data¹⁾

Input Data	0 signal ("L")
Nominal input voltage U _N	
Permissible range (with reference to U _N)	
Switching level	
Typical input current at U _N (50 Hz/60 Hz)	
Typical switch-on time at U _N	
Typical switch-off time at U _N	
Input wiring:	

Output Data (when fitted with...)
Maximum switching voltage
Minimum switching voltage
Limiting continuous current (refer to catalog for derating curve)
Maximum inrush current
Output switching

Output wiring
Voltage drop on limiting continuous current
Leakage current in the off state
Maximum phase displacement (inductive load)
Maximum load value I ² x t (t = 10 ms)

General Data
Test voltage I/O
Ambient operating temperature range
Nominal operating mode
Flammability class
Standards/specifications

Mounting position/mounting

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.) (UL us 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

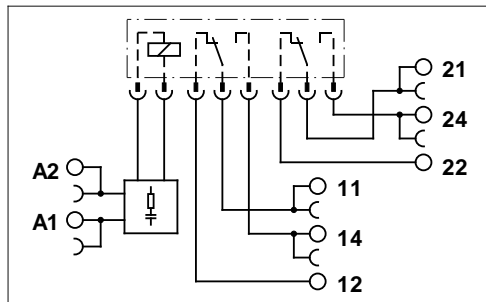
Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/1/SEN/SO46	29 80 32 2	10
PLC-BSC-230UC/1/SEN/SO46	29 80 34 8	10
PLC-BSP-120UC/1/SEN/SO46	29 80 36 4	10
PLC-BSP-230UC/1/SEN/SO46	29 80 38 0	10
OPT-60DC/48DC/100	29 66 62 1	18
OPT-60DC/24DC/2	29 66 60 5	18
OPT-60DC/230AC/1	29 67 96 3	18

120 V AC	230 V AC	
0.85...1.1	0.8...1.1	
≤ 0.4 x U _N	≤ 0.4 x U _N	
7/8 mA	8.8/10 mA	
6 ms	6 ms	
10 ms	10 ms	
Operating indicators, bridge rectifier, filter		
OPT-60DC/48DC/100	OPT-60DC/24DC/2	OPT-60DC/230AC/1
48 V DC	30 V DC	253 V AC
3 V DC	3 V DC	24 V AC
100 mA	3 A	0.75 A
-	5 A (10 ms)	30 A (10 ms)
2-wire floating ground	2-wire floating ground	2-wire floating ground
Protection against polarity reversal,	Protection against polarity reversal,	RCV circuit
Surge voltage protection	Surge voltage protection	
≤ 1 V DC	≤ 200 mV DC	< 1 V AC
-	-	< 1 mA
-	-	cosφ = 0.5
-	-	4.5 A ² s

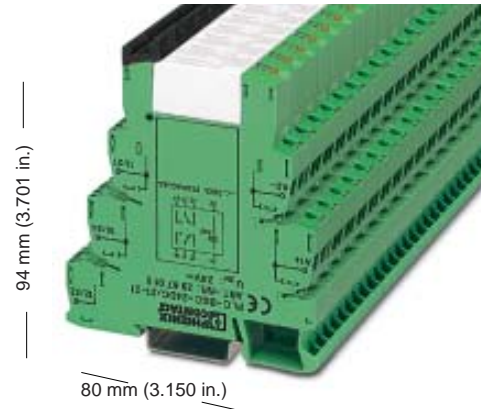
2.5 kV, 50 Hz, 1 minute
-20°C to +55°C (-4°F to +131°F)
100% ED
V0 according to UL 94
IEC 60 664/IEC 60 664 A/DIN VDE 0110, degree of pollution 2,
Surge Voltage Category III
Any/can be mounted without spacing

INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46

4. Technical Data: Universal SPDT Version



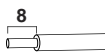
Circuit diagram



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



M 3



	solid [mm ²]	flexible [mm ²]	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.

Description	Input voltage U _N
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 230 V AC
Suitable plug-in miniature relay	Gold contact Power contact

Technical Data¹⁾

Input Data	
Nominal input voltage U _N	120 V AC
Permissible range (with reference to U _N and T _u = 20°C [68°F])	0.78...1.4
Typical release voltage	16 V AC
Typical input current at U _N (50 Hz/60 Hz)	6/7 mA
Typical response time/release time at U _N	7 ms/10 ms
Input wiring:	Operating indicators, bridge rectifier, filter
Output Data (when fitted with...)	
Contact version	REL-MR-110DC/21-21
Contact material	AgNi
Maximum switching voltage	250 V AC/DC
Minimum switching voltage	5 V AC/DC
Limiting continuous current	6 A
Maximum inrush current	On request
Minimum switching current	10 mA
Maximum shutdown power, ohmic load:	140 W
	100 W
	60 W
	44 W
	60 W
	1500 VA
	50 mW
Minimum switching power	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

PLC-BSC...21-21/SO46

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

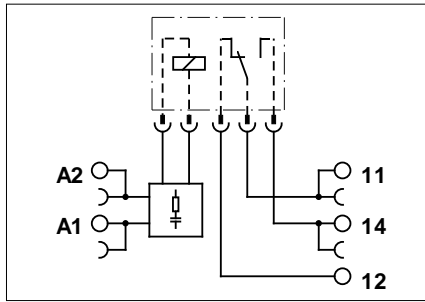
Housing width 14 mm (0.244 in.) (UL cULus provided)

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

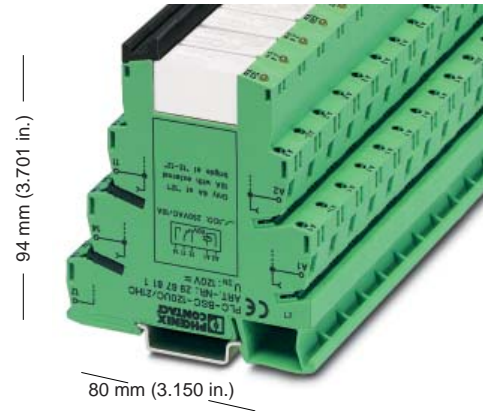
Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/21-21/SO46	29 80 41 6	10
PLC-BSC-230UC/21-21/SO46	29 80 42 9	10
REL-MR-110DC/21-21AU	29 61 22 8	18
REL-MR-110DC/21-21	29 61 20 2	18

INTERFACE Relay: Resistant Against Interference Voltages and Leakage Currents PLC-...SO46

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



Circuit diagram



PLC-BSC...21HC/SO46

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

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



	solid	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.

Description	Input voltage U _N
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
Suitable plug-in miniature relay	Power contact

Technical Data¹⁾

Input Data	
Nominal input voltage U _N	
Permissible range (with reference to U _N and T _U = 20°C [68°F])	
Typical release voltage	
Typical input current at U _N (50 Hz/60 Hz)	
Typical response time/release time at U _N	
Input wiring:	

Output Data (when fitted with...)	
Contact version	
Contact material	
Maximum switching voltage	
Minimum switching voltage	
Limiting continuous current	
Maximum inrush current	
Minimum switching current	
Maximum shutdown power, ohmic load:	24 V DC 48 V DC 60 V DC 110 V DC 220 V DC 250 V DC
Minimum switching power	

General Data	
Test voltage I/O	
Ambient operating temperature range	
Nominal operating mode	
Flammability class	
Mechanical life	
Standards/specifications	

Mounting position/mounting

¹⁾ Input wiring depends on the type

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

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

Type	Order No.	Pcs. Pkt.
PLC-BSC-120UC/21HC/SO46	29 80 43 2	10
PLC-BSC-230UC/21HC/SO46	29 80 44 5	10
REL-MR-110DC/21HC	29 61 33 8	18

120 V AC	230 V AC
0.85...1.4	0.78...1.14
16 V AC	60 V AC
6/7 mA	8.5/10 mA
7 ms/10 ms	7 ms/20 ms
Operating indicators, bridge rectifier, filter	

REL-MR-110DC/21HC	
Single contact, 1 Form C contact	
AgNi	
250 V AC/DC	
12 V AC/DC	
10 (6) A ²⁾	
16 A	
100 mA	
240 (144) W ²⁾	
58 W	
48 W	
50 W	
80 W	
2500 (1500) VA ²⁾	
1.2 W	

4 kV, 50 Hz, 1 minute
-20°C to +55°C (-4°F to +131°F)
100% ED
V0 according to UL 94
3 x 10 ⁷ cycles
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
Any/can be mounted without spacing

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