PSR-PC50

SIL 3 coupling relay for safety-related switch on

Data sheet 105818_en_01

© PHOENIX CONTACT 2014-08-18

1 Description

The PSR-PC50 SIL coupling relay can be used for power adaptation and electrical isolation in Safe-State-ON applications up to SIL 3 according to IEC 61508 as well as IEC 61511.

By filtering the controller test pulses, premature failure of the safety relays is prevented.

The contact side is fully monitored for open circuit and short circuit as well as load and diagnostics supply voltage.

If an error occurs, the internal device input impedance is affected. As such, the test pulses sent from the controller are disrupted and the error is reported to the corresponding digital output without additional wiring effort.

Features

- SIL 3 coupling relays for safety-related switch on
- Applications: Energized-to-Safe
- Complete monitoring of the load side for:
 - Open circuit
 - Short circuit
 - Presence of supply voltage for diagnostics and loads
- Error message output through interrupting test pulses of the higher-level controller
- Easy proof test
- Integrated DCS test pulse filter
- Low inrush current
- One undelayed enabling channel
- Optional plug-in screw or spring-cage terminal blocks
- Special design for avoiding spurious trips
- Housing width 17.5 mm
- Compatible with EMERSON DeltaV SIS SLS1508 and CSLS (further controller cards on request)

Δ	WARNING: Risk of electric shock	
<u>_!</u> \	Observe the safety instructions in the corresponding section!	
1	Make sure you always use the latest documentation. It can be downloaded from the product at <u>phoenixcontact.net/products</u> .	
1	This data sheet is valid for all products listed on the following pages.	





2 1	Table of contents Description	1
2	Table of contents	2
3	Ordering data	3
4	Technical data	4
5	Safety notes	6
6	Basic circuit diagram	7
7	Derating 7.1 Vertical mounting position 7.2 Horizontal mounting position	7
8	Load curve	7
9	Operating and indication elements 9.1 Connection versions 9.2 Connection assignment	8
10	Startup	9
11	Proof test 11.1 Testing of relay channels 11.2 Testing diagnostics	9
12	Application examples	
	12.1 Application example 1 - SIL 3	

3 Ordering data

Description	Туре	Order No.	Pcs. / Pkt.
Coupling relay for SIL 3 low demand applications, couples digital output signals to the periphery, 1 enabling current path, module for F&G applications, test pulse filter, plug-in screw connection, 17.5 mm width	PSR-PC50-1NO-1DO-24DC-SC	2904664	1
Coupling relay for SIL 3 low demand applications, couples digital output signals to the periphery, 1 enabling current path, module for F&G applications, test pulse filter, plug-in spring-cage connection, 17.5 mm width	PSR-PC50-1NO-1DO-24DC-SP	2904665	1

4 Technical data

Nomial pipt voltage μ _h 24 VDC-15 %; +10 %; (A1A2 and 24VA2)Input voltage range (factor)06 S 1.1Typical input a corrent68 m. (A1A2) 15 m. (A2VA2; topolagin on load M1 +100 mA)Typical input hourent25 A (24VA2; topolagin on load M1 +100 mA)Typical input hourent25 A (24VA2; topolagin on load M1 +100 mA)Current consumption30 m. A (1A22) 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9	Input data	
Typical input current 65 mA (41/A2) 5 mA (24/K2) (sep) 280 mA (41/A2) 280 mA (41/A2)	Nominal input voltage U _N	24 V DC -15 %; +10 % (A1/A2 and 24V/A2)
Typical inrush current 15 mA (241/A/2) 2.5 A (24/A/2); for 10 µs) 2.5 A (24/A/2; for 10 µs) 2.5 m (1 foput TPs) Vp. 13 m (1 foput TPs) Input filter time 2 m (5 for 5 puble duration) * 100 ms (Test puble rate) Max permissible overall conductor resistance (1 foput and reset circuit at U ₁) 30 ms Recovery time 1 s Operating voltage display Yelow LED Status display Gareen LED Protective circuit Overlaad protection Suppressor diode Otyput data 1 enabling current path Contact type 1 enabling current path Contact type 15 V AC/D2 (with diagnostics) 20 V AC/D2	Input voltage range (factor)	0.85 1.1
2.5 A (24/λ2, (c) 10µs) 200 nA ((nput TP)) Current consumption ½ 2.0 mA (nput TP)) Input filer time 2 mo. (feapt TP)) Max permissible overall conductor resistance 2 mo. (feapt used auration) * 100 m (Input TP) 2 mo. (feapt used auration) * 100 m (Test pulse inte) 30 ms Recovery time 30 ms Operating voltage display Yelow LED Status display Green LED Protective circuit Querical protection Suppressor diode Operating voltage display Yelow LED Status display Green LED Protective circuit Querical protection Suppressor diode Operating voltage ApNL gold-fashed Mainmum switching voltage 1 a nabing current path Contact materia ApNL gold-fashed Mainmum switching voltage 25 v A/C/C (with uid agnostics) Diagnostic threshold 20 v A/C/C (with diagnostics) Maximum switching voltage 25 v A/C/C (with diagnostics) Diagnostic threshold 20 v A/C/C (with diagnostics) Maximum inskitching voltage 25 v A/C/C (with diagnostics) Diagnostic	Typical input current	
Input filter time2 ms (Input TP2) by 5 sm (Input TP2) by 5 sm (Input tP3)Input filter time2 ms (Test pulse duration) > 100 (LO/LO and NINT and load resistance in the event of a short circuit) (Input and reset circuit at Un)Max, permissible overall conductor resistance (Input and reset circuit at Un)30 msRecovery time30 msRecovery time1 sOperating voltage displayGreen LEDIndicationRed LEDIndicationIndicationProtective circuitOverload protection Suppressor diodeOttact type1 enabling current pathContact tasiailApN, gold-filashadMinimum switching voltage250 VACC (with diagnostics)Outs turing continuous current5 A (NO contact)Diagnostic threshold20 maBayneshold Eleg20 maMaximum insub current5 A (NO contact)Insub current path5 A (NO contact)Diagnostic threshold20 maMaximum insub current5 A (NO contact)Bayneshold Eleg20 VACD (with diagnostics)Switching capacity min.5 A (NO contact)Musch and savice life20 MaDiagnostic threshold20 MaSwitching capacity min.16 (digila)Musch and savice life20 VACDMusch and savice life20 VACDDiagnostic threshold20 VACDNominal voltage Un20 VACDDiagnostic threshold20 VACDDiagnostic threshold20 VACDDiagnostic threshold20 VACDDiagnostic	Typical inrush current	2.5 A (24V/A2; for 10 μs)
> 100 mis (Test pulse rate) Max permissible overall conductor resistance (input and reset circuit at U _µ) Max permissible overall conductor resistance Typical pick-up time Becovery time Operating voltage display Status display Operating voltage display Status display Indication Protective circuit Contact type Contact type Contact type Contact material Minimum switching voltage 250 V AC 150 V CDC (with diagnostics) 200 / 18 AC (wervupper) Maximum switching voltage Maximum switching voltage 100 maA 101 mush current 54 (NO contact) Diagnostic threshold Maximum switching voltage Maximum insurf current, minimum 100 mA	Current consumption	typ. 18 mA (Input TP2)
(Input and reset circuit at U _N)Typical pick-up time0 msRecovery time1 sOperating voltage displayYellow LEDStatus displayGreen LEDIndicationRed LEDProtective circuitOverload protection Suppressor diodeOutput dataContact typeContact type1 enabling current pathContact tratarialAqNi, gold/fashedMinimum switching voltage20 V AC/DC (with uit diagnostics)20 V AC/DC (with uit diagnostics)20 V AC/DC (with uit diagnostics)Maximum switching voltage20 Q / 18 kQ (lower/upper)Limitig continuous current5 A (IVO contect)Diagnostic threshold20 Q / 18 kQ (lower/upper)Maximum insub current1.5 VMaximum insub current1.5 VMusher ol outputs1 (diglal)Number ol outputs1 (20 mAPercer data100 mAPercer data1 (low manument outputs)Contact type1 (diglal)Number ol outputs1 (diglal)Number ol outputs1 (diglal)Number ol outputs1 (low manument outputs)Diagonstict treshoutputs1 (low manument outputs)Diagonstict treshoutputs1 (low manument outputs)Diagonstict treshoutputs1 (low manument outputs)Diago	Input filter time	
Recovery time 1 s Operating voltage display Yellow LED Status display Green LED Indication Red LED Protective circuit Overload protection Suppressor diode Output data Contact material Contact material AgNi, gold-flashed Minimum switching voltage 1 s V AC/DC (without diagnostics) 20 V ACC (Without diagnostics) 20 V AC/DC (without diagnostics) 20 V AC Limiting continuous current 5 A (I/VO contact) Diagnostic threshold 20 Ω / 18 kΩ (lower/upper) Maximum invus current 5 A (I/VO contact) Invus current, minimum 100 mA Switching capacity min. 1.5 W Mechanical service life 28 V DC Number of outputs 1 (digital) Nominal voltage U _N 28 V DC Limiting continuous current 100 mA Electromagnetic du		$<$ 10 Ω (LO/LO' and NI/NI' and load resistance in the event of a short circuit)
Operating voltage displayYellow LEDStatus displayGreen LEDIndicationRed LEDProtective circuitOverload protection Suppressor diodeOutput dataI enabling current pathContact type1 enabling current pathContact traterialAgNi, gold-flashedMinimum switching voltage250 VAC/DC (without diagnostics) 20 VAC/DC (without diagnostics)Maximum switching voltage250 VACLimiting continuous current5.4 (N/O contact)Diagnostic threshold20 0.7 18 kQ (lower/upper)Maximum invush current5.4Nusch capacity min.1.5 WMechanical service life39 VDCMumber of outputs1 (digital)Number of outputs1 (digital)Number of outputs1 (digital)Contact type23 VDCLimiting continuous current29 VDCDescent data100 mANumber of outputs1 (digital)Number of outputs1 (digital)Number of outputs100 mACenter data100 mA <td>Typical pick-up time</td> <td>30 ms</td>	Typical pick-up time	30 ms
Staus disply Green LED Indication Red LED Protective circuit Overload protection Suppressor diode Output data Enabling current path Contact type 1 enabling current path Contact material AgNi, gold-flashed Minimum switching voltage 250 V AC/C (with diagnostics) 20 V AC/CC (with diagnostics) Maximum switching voltage 250 V AC Limiting continuous current 5 A (IVO contact) Diagnostic threshold 20 Q / 18 KQ (lower/upper) Maximum inrush current 5 A (IVO contact) Diagnostic threshold 20 Q / 18 KQ (lower/upper) Maximum inrush current 100 mA Switching capacity min. 1.5 W Mechanical service life Approx.5 x 10 ⁷ cycles Numier of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Concert data Electromagnetic dust-proof relay Nominal operating mode 100 ^w Goperating factor Degree of protection of inst. location IPs4 Mounting type Vin all mounting	Recovery time	1 s
Indication Red LED Protective circuit Overload protection Suppressor diode Output data Enabling current path Contact material AgNi, gold-flashed Minimum switching voltage 1 sV AC/DC (with diagnostics) 20 V AC/DC (with diagnostics) Maximum switching voltage 250 V AC Maximum switching voltage 250 V AC/DC (with diagnostics) Maximum switching voltage 250 V AC Limiting continuous current 5 A (NC contact) Diagnostic threshold 20 Q / 18 kΩ (lower/upper) Maximum inrush current 5 A Inrush current, minimum 100 mA Switching capacity min. 1.5 W Mechanical service life 230 V C Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Solidauge U _N 23 V DC Limiting continuous current 100 mA Sominal voltage U _N 23 V DC Limiting continuous current 100 mA Sominal voltage U _N 23 V DC Limiting contrinuous current	Operating voltage display	Yellow LED
Protective circuit Overload protection Suppressor diode Contact type 1 enabling current path Contact material AgNi, gold-flashed Minimum switching voltage 15 V AC/DC (without diagnostics) Maximum switching voltage 250 V AC Maximum switching voltage 250 V AC/DC (with diagnostics) Maximum switching voltage 250 V AC Diagnostic threshold 20 Q / 18 kQ (lower/upper) Maximum inrush current 5 A (N/O contact) Diagnostic threshold 20 Q / 18 kQ (lower/upper) Maximum inrush current 5 A Inrush current, minimum 100 mA Switching capacity min. 1.5 W Mechanical service life Approx. 5 x 10 ⁷ cycles Aumber of outputs 1 (dig1a) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Secondate U 20 V AC/DC (with diagnostics) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Secondate U 20 V DC Nominal operating mode 100 voperating factor Peigr	Status display	Green LED
Output data I enabling current path Contact type 1 enabling current path Contact material AgNi, gold-flashed Minimum switching voltage 20 V AC/DC (without diagnostics) 20 V AC/DC (with diagnostics) Maximum switching voltage 250 V AC 125 V DC Limiting continuous current 5 A (N/O contact) Diagnostic threshold 20 Ω / 18 kΩ (lower/upper) Maximum inrush current 5 A Switching capacity min. 100 mA Switching capacity min. 1.5 W Mechanical service life Approx.5 x 10 ⁷ cycles Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Softer performance 20 m Iumiting continuous current 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Softer performance 20 m General data 100 mA Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Nominal operating mode 100% operating	Indication	Red LED
Contact type1 enabling current pathContact materialAgNi, gold-flashedMinimum switching voltage15 V AC/DC (with diagnostics) 20 V AC/DC (with diagnostics)Maximum switching voltage250 V AC 125 V DCLimiting continuous current5 A (N/O contact)Diagnostic threshold20 Q / 18 KQ (lower/upper)Maximum inrush current5 AInrush current, minimum100 mASwitching capacity min.1.5 WSwitching capacity min.1.5 WNumber of outputs1 (digital)Number of outputs1 (digital)Number of outputs1 (digital)Number of outputs1 (digital)Number of outputs1 (digital)Refer20 W PCLimiting continuous current100 mASetter100 mANumber of outputs1 (digital)Number of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mASetter100 mASetter100 mASetter100 mALimiting continuous current1 (digital)Number of outputs1 (digital)Nominal voltage UN20 V DCLimiting continuous current100 mASetter100 mASetter100 mASetter100 mALimiting continuous current100 mASetter100 mASetter100 mASetter100 mASetter100 mA <trr>Setter100 mA</trr>	Protective circuit	Overload protection Suppressor diode
Contact materialAgNi, gold-flashedMinimum switching voltage15 V AC/DC (without diagnostics) 20 V AC/DC (with diagnostics)Maximum switching voltage250 V AC 125 V DCLimiting continuous current5 A (N/O contact)Diagnostic threshold20 Ω / 18 kΩ (lower/upper)Maximum inrush current5 ASwitching capacity min.100 mASwitching capacity min.1.5 WMechanical service life20 X / DCNumber of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mAStart23 V DCLimiting continuous current100 mANominal voltage UN23 V DCLimiting continuous current100 mAStart100 mAStart100 mAStart100 mANominal voltage UN23 V DCLimiting continuous current100 mAStart100 mAStart <td>Output data</td> <td></td>	Output data	
Minimum switching voltage15 V AC/DC (without diagnostics) 20 V AC/DC (with diagnostics)Maximum switching voltage250 V AC 125 V DCLimiting continuous current5 A (N/O contact)Diagnostic threshold20 Ω / 18 kΩ (lower/upper)Maximum inrush current5 ANarinum inrush current100 mASwitching capacity min.1.5 WMechanical service lifeAppros. 5 x 10 ⁷ cyclesAlterm outputsNumber of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mASetter23 V DCLimiting continuous current100 mAStreet23 V DCLimiting continuous current100 mAStreet100 mAStreet100 mAStreet100 mAStreet100 mANumber of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mAStreet100 mA<	Contact type	1 enabling current path
20 V AC/DC (with diagnostics) Maximum switching voltage 250 V AC Limiting continuous current 5 A (N/O contact) Diagnostic threshold 20 Ω / 18 kΩ (lower/upper) Maximum inrush current 5 A Inrush current, minimum 100 mA Switching capacity min. 1.5 W Mechanical service life Approx.5 x 10 ⁷ cycles Atarm outputs 1 (digital) Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Starm outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Starm outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA Diagnostic dust-proof relay 100 mA Start dust 100% operating factor Pelay type Io0% operating factor Nominal operating mode 100% operating factor Diagnostion IP20 Min. degree of protection of inst. location IP4 Mounting type IN rait mounting Airand oreepage distances between the power circuits DIN rait mounting	Contact material	AgNi, gold-flashed
Line bood125 V DCLimiting continuous current5 A (N/O contact)Diagnostic threshold20 Ω / 18 kΩ (lower/upper)Maximum inrush current5 AInrush current, minimum100 mASwitching capacity min.1.5 WMechanical service lifeApprox. 5 x 10 ⁷ cyclesAtarm outputsNumber of outputs1 (digital)Nominal voltage U _N 23 V DCLimiting continuous current100 mACenteral dataVector fielayNominal operating mode100% operating factorDegree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN FaiT	Minimum switching voltage	
Diagnostic threshold20 Ω / 18 kΩ (lower/upper)Maximum inrush current5 AInrush current, minimum100 mASwitching capacity min.1.5 WMechanical service lifeApprox. 5 x 10 ⁷ cyclesAlarm outputsNumber of outputs1 (digital)Nominal voltage U _N 23 V DCLimiting continuous current100 mABelectromagnetic dust-proof relayRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN Fail mounting	Maximum switching voltage	
Maximum inrush current5 AInrush current, minimum100 mASwitching capacity min.1.5 WMechanical service lifeApprox. 5 x 10 ⁷ cyclesAlarm outputsNumber of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mABelay typeRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN EN 50178	Limiting continuous current	5 A (N/O contact)
Inrush current, minimum 100 mA Switching capacity min. 1.5 W Mechanical service life Approx. 5 x 10 ⁷ cycles Alarm outputs 1 (digital) Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA General data Relay type Electromagnetic dust-proof relay Nominal operating mode 100% operating factor Degree of protection of inst. location IP20 Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Diagnostic threshold	$20 \Omega / 18 k\Omega$ (lower/upper)
Switching capacity min.1.5 WMechanical service lifeApprox. 5 x 10 ⁷ cyclesAlarm outputsI (digital)Number of outputs1 (digital)Nominal voltage UN23 V DCLimitig continuous current100 mAGeneral dataRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN EN 50178	Maximum inrush current	5 A
Mechanical service life Approx. 5 x 10 ⁷ cycles Alarm outputs I (digital) Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA General data Relay type Electromagnetic dust-proof relay Nominal operating mode 100% operating factor Degree of protection IP20 Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Inrush current, minimum	100 mA
Alarm outputs Number of outputs 1 (digital) Nominal voltage U _N 23 V DC Limiting continuous current 100 mA General data Relay type Electromagnetic dust-proof relay Nominal operating mode 100% operating factor Degree of protection of inst. location IP20 Munting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Switching capacity min.	1.5 W
Number of outputs1 (digital)Nominal voltage UN23 V DCLimiting continuous current100 mAGeneral dataFelay typeRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN EN 50178	Mechanical service life	Approx. 5 x 10 ⁷ cycles
Nominal voltage UN23 V DCLimiting continuous current100 mAGeneral dataRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN EN 50178	Alarm outputs	
Limiting continuous current100 mAGeneral data100 mAGeneral dataElectromagnetic dust-proof relayRelay typeElectromagnetic dust-proof relayNominal operating mode100% operating factorDegree of protectionIP20Min. degree of protection of inst. locationIP54Mounting positionvertical or horizontalMounting typeDIN rail mountingAir and creepage distances between the power circuitsDIN EN 50178	Number of outputs	1 (digital)
General data Relay type Electromagnetic dust-proof relay Nominal operating mode 100% operating factor Degree of protection IP20 Min. degree of protection of inst. location IP54 Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Nominal voltage U _N	23 V DC
Relay type Electromagnetic dust-proof relay Nominal operating mode 100% operating factor Degree of protection IP20 Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Limiting continuous current	100 mA
Nominal operating mode 100% operating factor Degree of protection IP20 Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	General data	
Degree of protection IP20 Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Relay type	Electromagnetic dust-proof relay
Min. degree of protection of inst. location IP54 Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Nominal operating mode	100% operating factor
Mounting position vertical or horizontal Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Degree of protection	IP20
Mounting type DIN rail mounting Air and creepage distances between the power circuits DIN EN 50178	Min. degree of protection of inst. location	IP54
Air and creepage distances between the power circuits DIN EN 50178	Mounting position	vertical or horizontal
	Mounting type	DIN rail mounting
Rated insulation voltage 250 V AC	Air and creepage distances between the power circuits	DIN EN 50178
	Rated insulation voltage	250 V AC

General data			
Rated surge voltage / insulation	6 kV/safe isolation (through prote	ctive impedance)	
Pollution degree	2		
Surge voltage category	III		
Dimensions	Screw connection	Spring-cage connection	
WxHxD	17.5 x 112.2 x 114.5 mm	17.5 x 117.4 x 114.5 mm	
Connection data	Screw connection	Spring-cage connection	
Conductor cross section, solid	0.2 mm ² 2.5 mm ²	0.2 mm ² 1.5 mm ²	
Conductor cross section, stranded	0.2 mm ² 2.5 mm ²	0.2 mm ² 1.5 mm ²	
Conductor cross section AWG/kcmil	24 12	24 16	
Stripping length	7 mm	8 mm	
Ambient conditions			
Ambient temperature (operation)	-20 °C 55 °C		
Ambient temperature (storage/transport)	-40 °C 65 °C		
Max. permissible relative humidity (operation)	75 % (on average, 85% infrequer	ntly, non-condensing)	
Max. permissible humidity (storage/transport)	75 % (on average, 85% infrequer	ntly, non-condensing)	
Maximum altitude	max. 2000 m (Above sea level)		
Shock	15g		
Vibration (operation)	2g		
Certification / Approvals			
Approvals	applied for		
Safety parameters for IEC 61508 - Low dem	and		
SIL	3 (15 % of total SIL)		
PFD _{avg}	1,49 x 10 ⁻⁴		
Proof test interval	120 Months		
Duration of use	240 Months		
Alternative illustration of the device as 100 ⁻	I structure for process customers		
Calculation basis	Application example 1 - SIL 3		
Equipment type	Туре А		
HFT	0		
SIL	3 (15 % of total SIL)		
Safe Failure Fraction (SFF)	99.6 %		
λSD	4.27 FIT		
λSU	849 FIT		
λDD	4.21 FIT		
λDU	3.40 FIT		
λTotal	860.88 FIT		
MTBF	110.5 Years		
PFD _{avg}	1,49 x 10 ⁻⁵ (For T1 = 1 year)		

5 Safety notes



WARNING: Risk of electric shock

During operation, parts of electrical switching devices carry hazardous voltages.

Before working on the switching device, disconnect the power.

Please observe the safety regulations of electrical engineering and industrial safety and liability associations!

Disregarding these safety regulations may result in death, serious personal injury or damage to equipment.

Startup, mounting, modifications, and upgrades should only be carried out by a skilled electrical engineer!



WARNING: Danger due to faulty devices!

The devices may be damaged following an error and correct operation can no longer be ensured.

In the event of an error, replace the device immediately.

Repairs to the device, especially if the housing must be opened, may only be carried out by the manufacturer or authorized persons. Otherwise the warranty is invalidated.



WARNING: risk of electric shock!

The safety relay may only be connected to devices which meet the requirements of EN 60950.

Suitable devices are available online at phoenixcontact.net/products.



WARNING: Loss of safety function

When an error is detected by the higher-level controller, it is assumed that the safety function can no longer be performed. The error must be removed within 72 hours or

within the process safety time if required by the application.



NOTE: Risk of damage to equipment due to incorrect installation

For reliable operation, the safety relay must be installed in housing protected from dust and humidity (IP54).

Carry out wiring according to the application. Refer to the "Application examples" section for this.

NOTE: Risk of damage to equipment due to noise emissions

When operating relay modules the operator must meet the requirements for noise emission for electrical and electronic equipment (EN 61000-6-4) on the contact side and, if required, take appropriate measures.

6 Basic circuit diagram

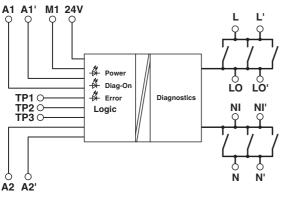


Figure 1 Block diagram

Key:

Designation	Explanation
A1/A2	Safety relay input voltage
A1'/A2'	Safety relay input voltage for optionally re- dundant wiring
M1	Semiconductor alarm output
24 V	Supply voltage for connectable load mon- itoring
TP1/TP2/TP3	Test point for proof test
L/L'	On-load voltage input
N/N'	0 V
LO/LO'	Load input
NI/NI'	Load output



Contacts A1', A2', L', N', LO', NI' are **not** suitable for further wiring. These contacts may only be used for optional redundant wiring.

7 Derating

7.1 Vertical mounting position

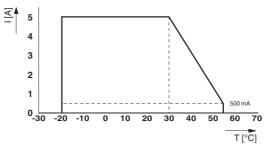
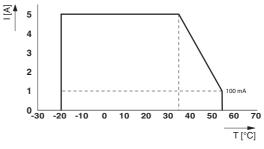


Figure 2 Vertical installation derating curve

7.2 Horizontal mounting position





8 Load curve

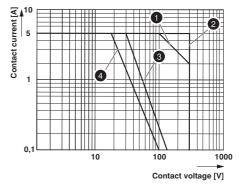


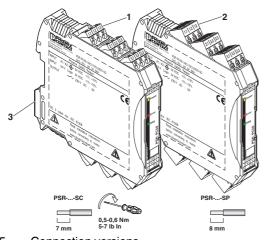
Figure 4 Relay load curve

Key:

No.	Explanation
1	AC inductive load $\cos \varphi = 0.4$
2	AC resistive load
3	DC resistive load
4	DC inductive load L/R = 7 ms

9 Operating and indication elements

9.1 Connection versions



- 1 COMBICON plug-in screw terminal block
- 2 COMBICON plug-in spring-cage terminal block
- 3 Metal lock for fixing to DIN rail

Figure 5 **Connection versions** 9.2 **Connection assignment** Figure Designation Explanation TP1/TP2/TP3 Test point for proof test A1/A2 Safety relay input voltage A1'/A2' Safety relay input voltage for optionally redundant wiring TP1 TP2 TP3 A1´ 24V A2 A1 M1 A2 24 V Supply voltage for connectable load monitoring M1 Semiconductor alarm output Erro Power LED status indicator, yellow - contacts on the load side are closed Error LED status indicator, red - error Diag LED status indicator, green - diagnostics are active Diag PSR-PC50 L/L'On-load voltage input N/N' 0 V LO/LO' Load input NI/NI' Load output

1

Contacts A1', A2', L', N', LO', NI' are **not** suitable for further wiring. These contacts may only be used for optional redundant wiring.

10 Startup

Once the nominal input voltage of 24 V DC has been enabled at terminals A1 and A2 (as well as A1' and A2' for optionally redundant wiring), the Power LED lights up.

The contacts L, L', LO, LO' as well as NI, NI' and N, N' close.

The **24 V** connection should only be activated if the diagnostic function is to be used, and should be set to **A2**.

The minimum diagnostic threshold value is **20** Ω , the maximum value is **18** k Ω .

Diagnostics is performed for open circuit and short circuit of the load as well as for a loss of on-load voltage, load supply voltage and supply voltage for diagnostics.

The activation of diagnostic functions is indicated by the **Diag** LED.

If the diagnostics respond, the minimum current consumption is pushed and a **bad channel** is generated **via A1** (depending on the controller).

Additionally the **Error** LED illuminates and the semiconductor alarm output **M1** is active.

The load is not monitored when the contacts are closed on the output side.

The diagnostic function is not suitable for semiconductor loads.

 Perform a full function and diagnostic test during startup.

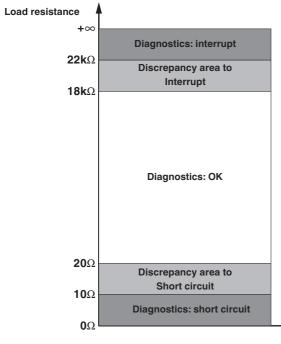


Figure 6 Diagnostic thresholds

11 Proof test

The Proof test checks the individual relay channels and device diagnostics to ensure proper functioning.



CAUTION: The enabling contacts are closed during the Proof test!

11.1 Testing of relay channels

- 1. Disconnection of A1/A1'
- Apply 24 V DC to TP1 (set to A2/A2'. Check whether the load is activated/whether the contacts L to LO to N to NI have continuity. Then disconnect TP1 again.
- 3. Repeat step 2 for TP2 and TP3
- 4. Restore the original configuration so that the reference configuration and the physical configuration are the same again.
- 5. Check switchability by the controller!



CAUTION: If during step 2 or 3 the load is not activated or no continuity can be measured, the device is faulty. Replace the device!

11.2 Testing diagnostics

- 1. Interrupt the load path then close it again.
- 2. Interrupt the load path briefly then restore this to the operating state.
- Interrupt the supply voltage of the load before connection L or after connection N. Then restore the supply voltage.



CAUTION: If during this diagnostics test no error (ERROR) is displayed. the device is faulty. Replace the device!

12 Application examples

Key:

- SIS = Safety Instrumented System (safe control)
- DC = Diagnostic Coverage according to IEC 61508 (line/load diagnostics at DO)
- DI = Digital input
- DO = Digital output

Connection options:

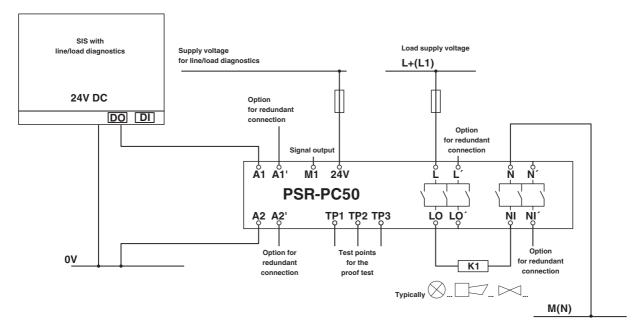


Figure 7 Connection options

12.1 Application example 1 - SIL 3

Assumptions, information, and marginal conditions

- The DC of the digital output is 90%.
- Diagnostics of PSR-PC50 are active.
- The test pulses of the controller are activated and evaluated.

A fault e.g., open circuit or short circuit of the

- A potential error is indicated accordingly.

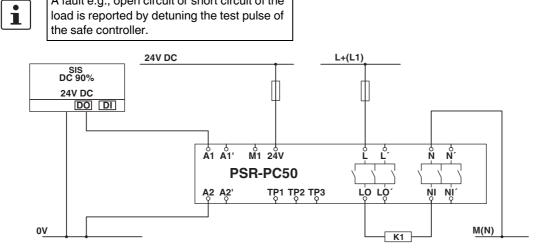


Figure 8 Application example 1 - SIL 3