

# Guardmaster® Safety Relays – DI, DIS, SI, CI, GLP, EM, And EMD

Safety Ratings	
Standards	IEC 60204-1, EN ISO 13849-1, EN ISO 12100, IEC 61508
Safety Classification	<b>DI/DIS/CI/SI/EM/EMD:</b> Suitable up to PLe and CAT4 per EN ISO 13849-1:2006, SIL CL3 per IEC 61508:2010/IEC62061:2006 depending on architecture and application characteristics <b>GLP:</b> Suitable up to PLd and CAT3 per EN ISO 13849-1:2006, SIL CL2 per IEC 61508:2010 /IEC62061:2006 depending on architecture and application characteristics
Certifications	CE Marked for all applicable directives, cULus Listed and TÜV
Power Supply	
Input Power Entry	24V DC (-15...+10%)
Power Consumption	<b>DI/SI:</b> 2.5 W <b>DIS:</b> 2 W <b>CI/EM/EMD:</b> 3.5 W <b>GLP:</b> 2.5 W
Inputs	
Safety Inputs	<b>DI/DIS:</b> 2 dual N.C., 2 dual OSSD, or safety mats and 1 single-wire safety input <b>SI/CI:</b> 1 dual N.C., 1 dual OSSD, or safety mats <b>GLP:</b> 1 dual N.C. or 1 dual OSSD and 1 single/wire safety <b>EM/EMD:</b> 1 single-wire safety input
Input Simultaneity	Infinite
Input Resistance, Max.	900 Ω
Reset	Configured automatic/manual or monitored manual
Reset Pulse Duration	250 ms...3 s
Power ON Delay Time	<b>DI/DIS/SI/CI/EM/EMD:</b> 5.5 s <b>GLP:</b> 11 s
Recovery Time	<b>DI/DIS/SI/CI:</b> 100 ms <b>EM/EMD:</b> 150 ms
Response Time (Safety Outputs)	<b>DI:</b> 35 ms (40 ms with mat input) <b>DIS:</b> 25 ms (30 ms with mat input) <b>SI/CI:</b> 35 ms (45 ms with mat input) <b>GLP:</b> overspeed detection time = 3/(speed limit [Hz]) <b>EM/EMD:</b> 35 ms
Response Time (Single-Wire Safety Outputs)	<b>DI/DIS:</b> 25 ms (30 ms with mat input) <b>SI/CI:</b> 25 ms (35 ms with mat input) <b>GLP/EM/EMD:</b> 25 ms
Outputs	
Safety Outputs	<b>DI/SI:</b> 2 N.O. <b>CI:</b> 3 N.O. <b>DIS:</b> 2 PNP (14, 24); 2 Decoupled (34, 44) <b>EM:</b> 4 N.O. <b>EMD:</b> 4 N.O. delayed <b>DIS/GLP:</b> 2 PNP safety, 2 PNP Lock
Solid State Output Rating	<b>DIS:</b> 2 x 1.5 A; 2 x 0.5 A; Total: max. 4 A <b>GLP:</b> 2 x 0.5 A; 2 x 0.3 A; Total: max 1.5 A
Contact Material	<b>DI:</b> AgNi + 0.2μ Au <b>SI/CI/EM/EMD:</b> AgNi
Auxiliary Contacts	<b>DI/DIS/SI/GLP/EM/EMD:</b> 1 PNP; 50 mA max <b>CI:</b> 1 N.C.
Thermal Current $I_{Tth}$	1 x 6 A
Rated Impulse withstand Voltage	2500V
Switching Current @ Voltage, Min.	<b>DI/SI/CI/EM/EMD:</b> 10 mA/10V
Fuses, Output	<b>Relay Outputs:</b> 6 A low blow or 10 A quick blow <b>Power Supply GLP:</b> 4A gG, tripping characteristic B or C
Mechanical Life	<b>DI/SI/CI/EM/EMD:</b> 10,000,000 operations

Utilization Category	
Inductive: AC-15	<b>DI:</b> 3 A/250V AC <b>SI/CI:</b> 1.5 A/250V AC <b>EM/EMD:</b> 1.5 A/250V AC
Inductive: DC-13	<b>DI:</b> 4 A/24V DC (0.1 Hz) <b>SI/CI:</b> 2 A/24V DC (0.1 Hz) <b>EM/EMD:</b> 2 A/24V DC
Output Rating	<b>DIS:</b> 14, 24: 1.5 A each 34, 44: 0.5 A each <b>GLP:</b> X14, X24: 0.5 A each 51, L61: 0.3 A each
Environmental and Physical Characteristics	
Enclosure Type Rating/ Terminal Protection	IP40 (NEMA 1)/IP20
Operating Temperature [C (F)]	-5...+55 ° (23...131 °)
Vibration	10...55 Hz, 0.35 mm
Shock	10 g, 16 ms 100 shocks
Mounting	35 mm DIN Rail
Weight [g (lb)]	<b>DI:</b> 180 (0.40) <b>DIS:</b> 150 (0.33) <b>SI:</b> 150 (0.33) <b>CI:</b> 225 (0.5) <b>GLP:</b> 150 (0.33) <b>EM:</b> 225 (0.50) <b>EMD:</b> 220 (0.49)
Terminals	Removable (Screw)
Conductor Size, Max.	0.2...4 mm <sup>2</sup> (24...12 AWG)

## Functional Safety Data ★

**Note:** Subject to change. For up-to-date information, visit <http://www.ab.com/safety/>

MTTF <sub>d</sub>		PFH <sub>D</sub>
DI	355 yr	4.35 x 10 <sup>-9</sup>
DIS	484 yr	4.39 x 10 <sup>-9</sup>
SI	262 yr	3.98 x 10 <sup>-9</sup>
CI	164 yr	4.26 x 10 <sup>-9</sup>
GLP	395 yr	7.18 x 10 <sup>-9</sup>
EM	190 yr	1.81 x 10 <sup>-9</sup>
EMD	165 yr	4.4 x 10 <sup>-9</sup>

★ Usable for ISO 13849-1: 2006 and IEC 62061. Data is based on the following assumptions:

- Mission time/proof test interval of 20 yr

- Functional test at least once within six-month period

- The PFH<sub>D</sub> given is the sum of the PFH<sub>D</sub> of the electronic aspects and the PFH<sub>D</sub> resulting from the B10d values of the two output relays based on 1 operation/hour, 365 days a year, 24 hours a day (8760 operations/year) at AC15 1 A 230V AC or at DC13 1.5 A 24V DC.

## Safety Relays

Relay Type	No. of Inputs	Inputs	Immediate Safety Outputs	Delayed Safety Outputs	Time Delay	Immediate Auxiliary Outputs	Power Supply	Cat. No.
Dual Input (DI)	2 dual-channel	1 N.C., 2 N.C., OSSD, Safety Mat	2 N.O.	—	—	1 S.S.	24V DC	440R-D22R2
Dual Input Solid-State Output (DIS)			2 S.S.	—				440R-D22S2
Single Input (SI)	1 dual-channel	1 N.C., 2 N.C., OSSD, Safety Mat	2 N.O.	—	—	1 S.S.	24V	440R-S12R2
Compatible Input (CI)			3 N.O.	—				440R-S13R2
Guardlocking Proximity (GLP)	1 dual-channel 2 PNP	2 N.C., OSSD	2 S.S.	—	—	1 S.S.	24V	440R-GL2S2P
Expansion Module (EM)	1 single-wire safety	—	4 N.O.	—	—	1 S.S.	24V	440R-EM4R2
Expansion Module Time Delayed (EMD)			<b>DI/SI:</b> 2 N.O. <b>CI:</b> 3 N.O. <b>DIS:</b> 2 PNP (14, 24); 2 Decoupled (34, 44) <b>EM:</b> 4 N.O. <b>EMD:</b> 4 N.O. delayed <b>DIS/GLP:</b> 2 PNP safety, 2 PNP Lock	4 N.O.	100 ms ... 300 s on or off delay 100 ms ... 20 s jog			440R-EM4R2D

## Expansion Module Relays

Relay Type	No. of Inputs	Safety Outputs	Delayed Safety Outputs	Time Delay	Auxiliary Outputs	Power Supply	Cat. No.
Expansion Module (EM)	1 single-wire safety	4 N.O.	–	–	1 S.S.	24V	440R-EM4R2
Expansion Module Time Delayed (EMD)		<b>DI/SI:</b> 2 N.O. <b>CI:</b> 3 N.O. <b>DIS:</b> 2 PNP (14, 24); 2 Decoupled (34, 44) <b>EM:</b> 4 N.O. <b>EMD:</b> 4 N.O. delayed <b>DIS/GLP:</b> 2 PNP safety, 2 PNP Lock	4 N.O.	100 ms ... 300 s on or off delay 100 ms ... 20 s jog			440R-EM4R2D

## LED Indicators

Indicator on Housing	Function	LED Color(s)
PWR/FAULT	Status and diagnostics	Green/Red
IN1	Status of safety output IN1	Green
IN2	Status of safety output IN2	Green
LOGIC IN	Status of single wire safety input	Green
OUT	Status of safety output	Green
LOCK‡	Status of the lock command	Green
B1*	Status and diagnostics	Green

‡ GLP only

\* B1 on EMD only