

Rockwell Automation Functional Safety Data Sheet



LISTEN.
THINK.
SOLVE.

Type	Family	Part no.	See Notes	SIL CL	PL	Category per ISO 13849-1	PFHd (Probability of dangerous failure per hour according to EN / IEC 62061 and EN / IEC 61508 (Continuous and High demand mode)	B10d (Electro-Mechanical products)	B10d test criteria	T1 Proof Test Interval- Mission Time - Lifetime Years	Third party review/report Reference
Interlock Switches	Elf	440K-E33	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 475.00/07
	Cadet 3	440K-C21	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 475.00/07
	Trojan 5, 6, & T15	440K-T11	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.00/07
	MT-GD2	440K-MT	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 475.00/07
	SensaGuard	440N-Z	-	3	e	4	1.12E-09			20	TUV Rheinland 968/EZ 269.04/09
	Ferrogard	440N-G	*1, *7, *12			1 (Up to 4 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.02/07
	Sipha Sensors S1, S2, S3, S4	440N-S	*1, *7, *12			N/A (Must only be used with designated monitoring unit- Up to Cat. 4)		2.00E+06	Control unit load		TUV Rheinland 968/EL 451.00/07
Guard Locking Switches	440G-MT	440G-MT	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 475.00/07
	TLS-GD2	440G-T	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.00/07
	Atlas 5	440G-L	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.01/07
	Spartan	440G-S	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.01/07
Hinge Interlocking Switches	Sprite	440H-S	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.02/07
	Ensign 3	440H-E	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.02/07
	Rotacam	440H-R	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.02/07
Presence Sensing	GuardShield	440L	-	3	e	Type 4 (IEC 61496)	3.17E-9 (IEC 61508, single) 9.51E-9 (IEC 61508, 3 cascaded)			20	TUV Nord Report 09 205 369681 000
	GuardShield Safe 2	445L	-	2	d	Type 2 (IEC 61496)	7.93E-9 (worst case figure; 32 modules x 30mm, L=3840 mm)			20	TUV Rheinland 968/M 114.03/09
	GuardShield Safe 4	445L	-	3	e	Type 4 (IEC 61496)	7.93E-9 (worst case figure; 32 modules x 30mm, L=3840 mm)			20	TUV Rheinland 968/M 113.04/09
	GuardShield Mirco 400	445L	-	3	e	Type 4 (IEC 61496)	4E-9 (Micro 400 alone, 255 beams cascaded) 6E-9 (worst case: Micro 400, MSR42, & MSR45E with 255 beams cascaded)			20	TUV Rheinland 968/M 155.09/09
	SafeZone	442L-S	-	2	d	3	4.46E-07			-	-
E-Stop and Operator Interface	LifeLine 3, 4	44E-L/D	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.00/07

Color Key	Not required
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Limit Switches	440P-C, 440P-M	440P-C, 440P-MD/MM/ MR/MS	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.01/07
	802T	802T	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.01/07
	Imp 1, 2	440P-M1	*1, *7, *8, *12, *16			1 (Up to 3 with monitoring unit)		2.00E+06	Mechanical only or minimal load		TUV Rheinland 968/EL 451.02/07
Safety Logic	MSR117	440R	-	3	e	4	2.53E-09			20	BGIA NA.520.25/04-155-403 Cert. 5032
	MSR121	440R	-	3	e	4	1.45E-09			20	BGIA Cert. 01160
	MSR122	440R	-	3	e	4	2.40E-10			20	BGIA Cert. 05267
	MSR124	440R	-	3	e	4	1.56E-09			20	BGIA Cert. 05265
	MSR125	440R	-	3	e	4	1.44E-09			20	BGIA NA.520.39/03-35-403
	MSR126	440R	-	3	e	4	1.45E-09			20	BGIA NA.520.25/05-85-402 Cert. 6169
	MSR127	440R	*7	3	e	4	1.45E-09			20	TUV Rheinland 968/EZ 284.00/08
	MSR131	440R	-	3	e	4	1.67E-09			20	BGIA Cert. 04202
	MSR132	440R	-	3	e	4	4.60E-10			20	BGIA Cert. 05152-05151
	MSR138	440R	*10	3/4	d/e	4	2.38E-09			20	BGIA Cert. 06172-06173
	MSR142	440R	-	3	e	4	1.92E-09			20	TUV Rheinland 968/EZ 197.00/05
	MSR144	440R	-	3	e	4	1.67E-09			20	TUV Rheinland 968/EZ 197.00/05
	MSR178	440R	*7	3	e	4	2.74E-09			20	TUV Rheinland 968/M 188.00/06
	MSR210	440R	-	3	e	4	3.44E-09			20	TUV Rheinland 968/EL 233.00/03
	MSR211	440R	-	3	e	4	3.49E-09			20	TUV Rheinland 968/EL 233.00/03
	MSR220	440R	-	3	e	4	3.70E-10			20	TUV Rheinland 968/EL 233.00/03
	MSR221	440R	-	3	e	4	3.70E-10			20	TUV Rheinland 968/EL 233.00/03
	MSR230	440R	-	3	e	4	2.30E-10			20	TUV Rheinland 968/EL 233.00/03
	MSR238	440R	-	2	d	3	7.70E-10			20	TUV Rheinland 968/EL 233.00/03
	MSR30	440R	-	3	e	4	9.20E-10			20	TUV Rheinland 968/EL 233.00/03
	MSR310	440R	*7	3	e	4	3.15E-09			20	TUV Rheinland 968/M 181.01/06
	MSR312	440R	*7	3	e	4	3.15E-09			20	TUV Rheinland 968/M 181.01/06
	MSR320	440R	*7	3	e	4	3.10E-10			20	TUV Rheinland 968/M 181.01/06
	MSR329	440R	*7	3	e	4	3.80E-10			20	TUV Rheinland 968/M 181.01/06
	MSR33	440R	-	3	e	4	9.20E-10			20	TUV Rheinland 968/EL 234.00/03
	MSR330	440R	*7	3	e	4	2.30E-10			20	TUV Rheinland 968/M 181.01/06
	MSR338	440R	*7	2	d	3	7.70E-10			20	TUV Rheinland 968/EZ 283.00/08
	MSR335	440R	-	3	e	4	9.20E-10			20	TUV Rheinland 968/EL 234.00/03
	MSR38	440R	-	3	e	4	9.20E-10			20	TUV Rheinland 968/EL 234.00/03
	MSR42	440R-P	-	3	e	4	9.00E-10 (Config. B002, worst-case)			10	TUV Rheinland 968/M 186.00/06
	MSR45E	440R-P	-	3	e	4	3.00E-10			10	TUV Rheinland 968/M 186.00/07
	MSR57	440R-S	-	3	e	4	7.04E-9 (single encoder) 3.38E-9 (dual encoder) 14.8E-9 (pulse test off)			20	TUV Rheinland 968/EZ 335.01/09
CU2	440R	-	1	b	1	1.58E-07			20	-	
CU4	440R	-	2	d	3	2.16E-09			20	BGIA Cert. 06170	
MatManager	440F-C	*7	2	d	3	2.59E-09			20	TUV Rheinland 968/M 198.00/08	
Safe Edge Controller	440F-C	-	2	d	3	3.91E-08			20	-	
Sipha Unit 2	440N	*15	2	d	3	7.27E-09			20	-	
GuardPLC 1200	1753-L28	-	3	e	4	3.09E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)	
GuardPLC 1600	1753-L28	-	3	e	4	3.93E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)	
GuardPLC 1800	1753-L32	-	3	e	4	5.67E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)	
GuardPLC 2000	1753-L1	-	3	e	4	4.37E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)	

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Safety Logic	GuardPLC I/O	1753-IB16	-	3	e	4	2.77E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-OB16	-	3	e	4	3.90E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-IB2XOB8	-	3	e	4	4.25E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-IB8XOB8	-	3	e	4	6.58E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-IB16X068	-	3	e	4	6.19E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-IF8XOF4	-	3	e	4	5.16E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	GuardPLC I/O	1753-OW8	-	3	e	4	1.73E-09			10	TUV Rheinland (TÜV No. 968 / EZ 164.03/05)
	SmartGuard 600 DeviceNet	1752-L24BBB	-	3	e	4	3.89E-10			10	TUV Rheinland (TÜV EZ 238.00/06)
	SmartGuard 600 EtherNet/IP	1752-L24BBBE	-	3	e	4	3.89E-10			10	TUV Rheinland (TÜV No. 968 / EZ 339.00/09)
	GuardLogix	1752-L6xS	-	3	e	4	1.90E-10			15	TUV Rheinland (TÜV EZ 191.06/08)
	CompactBlock Guard I/O (DeviceNet Safety)	1791DS-IB12	-	3	e	4	1.99E-10			2	TUV Rheinland (TÜV No. 968/EZ 190.01/05)
	CompactBlock Guard I/O (DeviceNet Safety)	1791DS-IB8XOB8	-	3	e	4	1.99E-10			2	TUV Rheinland (TÜV No. 968/EZ 190.01/05)
	CompactBlock Guard I/O (DeviceNet Safety)	1791DS-IB4XOW	-	3	e	4	4.20E-09			2	TUV Rheinland (TÜV No. 968/EZ 190.01/05)
	CompactBlock Guard I/O (DeviceNet Safety)	1791DS-IB8XOBV4	-	3	e	4	2.00E-10			10	TUV Rheinland (TÜV No. 968/EZ 243.03/07)
	CompactBlock Guard I/O (DeviceNet Safety)	1791DS-IB16	-	3	e	4	1.94E-10			20	TUV Rheinland (TÜV No. 968/EZ 243.03/07)
ArmorBlock Guard I/O (DeviceNet Safety)	1732DS-IB8XOBV4	-	3	e	4	2.00E-10			10	TUV Rheinland (TÜV No. 968/EZ 243.03/07)	
CompactBlock Guard I/O (EtherNet/IP Safety)	1791ES-IB8XOBV4	-	3	e	4	1.94E-10			10	TUV Rheinland (TÜV No. 968/EZ 265.00/07)	
CompactBlock Guard I/O (EtherNet/IP Safety)	1791ES-IB16	-	3	e	4	1.89E-10			10	TUV Rheinland (TÜV No. 968/EZ 265.00/07)	
POINT Guard I/O	1734-IB8S	-	3	e	4	1.34E-10			20	TUV Rheinland (TÜV No. 968/EZ 342.00/09)	
POINT Guard I/O	1734-OB8S	-	3	e	4	1.38E-10			20	TUV Rheinland (TÜV No. 968/EZ 342.00/09)	
Actuators	Contactors 100S-C	100S-C09...85	*3, *13			1		1.33E+06	AC-3	20	-
	Contactors 100S-D	100S-D95...420	*13			1		2.00E+07	Mechanical only (current carrying not breaking)		-
	Contactor Relays	700S-CFB	*3, *13			1		2.00E+06	AC-3	20	-
			*4			1		2.00E+07	Low energy or mechanical only		-
	Control Relays	700S-CF	*3, *13			1		2.00E+06	AC-15	20	KEMA (based on Supervised Manufacturer Testing)
	Reverser 104S-C	104S-C09...85	*3, *13			1		1.33E+06	AC-3	20	-
	PowerFlex 40P (Safe-Off)	-	-	-	-	3	-	-	-	-	TUV Rheinland No. 968/EZ 326.00/06
	PowerFlex 70 (Safe-Off)	-	-	-	-	3	-	-	-	-	TUV Rheinland No. 968/EZ 166.00/04
	PowerFlex 700S (Safe-Off)	-	-	-	-	3	-	-	-	-	TUV Rheinland No. 968/EZ 189.00/05
	PowerFlex 700L (Safe-Off)	-	-	-	-	3	-	-	-	-	TUV Rheinland No. 968/EZ 230.00/06
	PowerFlex 753	20G	-	3	e	4	2.68E-9 (P/T On) 31.3E-9 (P/T Off)			20	TUV Rheinland 968/EZ 334.00/08 (Safe Torque Off) TUV Rheinland 968/EZ 341.01/09 (Enhanced Safety)
	PowerFlex 755	20G	-	3	e	4	2.68E-9 (P/T On) 31.3E-9 (P/T Off)			20	TUV Rheinland 968/EZ 334.00/08 (Safe Torque Off) TUV Rheinland 968/EZ 341.01/09 (Enhanced Safety)
Kinetix 6000 (Safe-Off)	-	-	3	-	3	4.31E-10			15	TUV Rheinland (TÜV No. 968 / EZ 205.02/06)	
Kinetix 7000 (Safe-Off)	-	-	3	-	3	4.31E-10			15	TUV Rheinland (TÜV No. 968 / EZ 219.01/08)	

IMPORTANT - Data provided cannot be regarded as valid unless proper account is taken of relevant notes outlined below.

Notes
*1 - Other data may apply when used in combination with other products. The PFHD is applicable when combined into subsystems with other products and can be determined using the formulae given at Clause 6.7.8.2 of IEC 62061. The PL is applicable when combined into subsystems with other products and can be determined using the methodology given at Clause 4.5.4 of EN ISO 13849-1.
*2- The maximum rating shown here assumes the monitoring all dangerous single fault modes and a maximum diagnostic test interval of 6 months
*3 - B10d value assuming a failure to open is considered a dangerous failure. If in the application a failure to close is considered a dangerous failure, in this case 100S-C: B10d=4.00E+06, 700S-CFB: B10d=8.6E+05
*4 - For low energy switching, the contact reliability is expressed as "Assessed constant failure rate." The assessment method is given in IEC60947-5-4
*5 - Maximum Required Diagnostic Test Interval - actual testing should not exceed this value see IEC61508-4 3.8.7 Diagnostic Test interval and EN13849-1 3.1.29 test rate
*6 - depending on diagnostic test interval. Diagnostic tests are partly carried out at demand (fault detection by the process)
*7 - Where the product has two electrical safety switching function channels, the B10d data given is based on a failure of either channel. It can be used to determine the MTTFd of each single channel and will this produce conservative data.
*8 - The data given, including fault tolerance, is based on the use of fault exclusion at some single fault mechanical failure points, for example: actuator, cam, contact plunger, lock mechanism. Because of the inherent strength and simplicity of those parts they have an extremely low likelihood of failure and those faults are excluded in accordance with EN ISO 13849-2: 2008 Clause A.5.2 Table A4.
*9 - Data is provided for the Key code barrel assembly. The key code barrel is directly mechanically connected to a variety of parts that form the Prosafe system. Because of the inherent strength and simplicity of those parts they have an extremely low likelihood of failure and for the purposes of calculation those faults are excluded in accordance with EN ISO 13849-2: 2008 Clause A.5.2 Table A4.
*10 - the delayed acting contacts are only CAT 3 SIL cl 2
*11 - Safety mats are only applied for CAT3 SIL 2
*12 - The data for DC and SFF with connection to specified external monitoring equipment states the maximum achievable value. It is based on individual monitoring of the devices in redundant or dual channel configuration. In some cases this will require the use of two devices. It assumes a maximum diagnostic test interval of 6 months. It assumes the monitoring all dangerous single fault modes. The maximum value given will not be achievable if it can be foreseen that some single faults will not be detected in, for example, multiple normally closed switches are connected in a series arrangement to the monitoring equipment.
*13 - "Category 1 applies where the combination of the usage rate and the B10D value results in an MTTFd equal to or greater than 30 years."
*14 - This product must not be used in a safety related system unless it is connected to a suitable monitoring device
*15 - Sipsa control units are applied for EN 60947-5-3 as control devices of a PDF system together with sensors and OSSDs. The safety classifications referred in EN 60947-5-3 take into account the general principles of ISO 13849-1, but they are not directly equivalent to the categories defined in clause 6 of that standard.
*16 - The data given is based on the use of fault exclusion at some single fault mechanical failure points. Therefore subsystems intended to achieve Category 4, PLc or SIL 3 require the use of two separate devices. This is in accordance with the latest IEC and ISO Joint Technical Reports to EN ISO 13849-1 and IEC EN 62061.

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