RFID Magnetic Locking Safety Switches

D40ML Series

Magnetic latching combines with RFID technology to deliver high holding force and tamper resistance

- RFID provides a high degree of tamper resistance.
- Clean/Sanitize in Place – stainless steel versions are rated IP69K
- LEDs support easy fault diagnosis
- Install up to 20 switches in series
- Residual magnetism acts as light door latch after unlocking
- Two actuator types
  - Basic – all actuators in the system are identically coded.
  - Unique – every actuator is individually coded. 32,000,000 codes
  - Both offer tolerance for misalignment
- Two switch sizes provide multiple holding force options
  Medium Duty
  - Stainless Steel: $F1_{max}$ (typical) 600N, F_{zh} 450N
  - Plastic and Diecast: $F1_{max}$ (typical) 900N, F_{zh} 675N

  Heavy Duty
  - Stainless Steel: $F1_{max}$ (typical) 950N, F_{zh} 700N
  - Plastic and Diecast: $F1_{max}$ (typical) 1500N, F_{zh} 1150N
- Three case materials
  - Plastic, diecast metal, 316 stainless steel
- For use on machines with no rundown time if power is lost

Diagnostic Indicator Function

Yellow LED indicates OPEN

Shown in Guard Open Position

Green LED indicates CLOSED

Shown in Guard Closed Position

Switch Status	Guard	Green LED	Yellow LED	Safety Output
Locked	Closed	Steady	Off	Closed
Solenoid Power OFF (unlocked)	Closed	Flashing	Off	Open
Guard Open	Open	Off	Steady	Open
Door Forced Open	Open	Off	Flashing	Open

Ordering Information

Case Material	Holding Force $F1_{max}$ (typical)	Actuator Type	Cable Configuration	Model Number
316 Stainless Steel (IP69K)	600N	Unique	5m Cable	D40ML-SS2-U-5M
			10m Cable	D40ML-SS2-U-10M
			Pigtail w/ M12 Connector	D40ML-SS2-U-M12
		Basic	5m Cable	D40ML-SS2-B-5M
			10m Cable	D40ML-SS2-B-10M
			Pigtail w/ M12 Connector	D40ML-SS2-B-M12
	950N	Unique	5m Cable	D40ML-SS1-U-5M
			10m Cable	D40ML-SS1-U-10M
			Pigtail w/ M12 Connector	D40ML-SS1-U-M12
		Basic	5m Cable	D40ML-SS1-B-5M
			10m Cable	D40ML-SS1-B-10M
			Pigtail w/ M12 Connector	D40ML-SS1-B-M12
Plastic (IP67)	900N	Unique	5m Cable	D40ML-P2-U-5M
			10m Cable	D40ML-P2-U-10M
			Pigtail w/ M12 Connector	D40ML-P2-U-M12
		Basic	5m Cable	D40ML-P2-B-5M
			10m Cable	D40ML-P2-B-10M
			Pigtail w/ M12 Connector	D40ML-P2-B-M12
	1500N	Unique	5m Cable	D40ML-P1-U-5M
			10m Cable	D40ML-P1-U-10M
			Pigtail w/ M12 Connector	D40ML-P1-U-M12
		Basic	5m Cable	D40ML-P1-B-5M
			10m Cable	D40ML-P1-B-10M
			Pigtail w/ M12 Connector	D40ML-P1-B-M12
Diecast Metal (IP67)	900N	Unique	5m Cable	D40ML-M2-U-5M
			10m Cable	D40ML-M2-U-10M
			Pigtail w/ M12 Connector	D40ML-M2-U-M12
		Basic	5m Cable	D40ML-M2-B-5M
			10m Cable	D40ML-M2-B-10M
			Pigtail w/ M12 Connector	D40ML-M2-B-M12
	1500N	Unique	5m Cable	D40ML-M1-U-5M
			10m Cable	D40ML-M1-U-10M
			Pigtail w/ M12 Connector	D40ML-M1-U-M12
		Basic	5m Cable	D40ML-M1-B-5M
			10m Cable	D40ML-M1-B-10M
			Pigtail w/ M12 Connector	D40ML-M1-B-M12

Spare Actuators

Product Description	Model Number
Stainless Steel; IP69K; 950N; Basic Code; Actuator	D40ML-SS1-B-ACT
Stainless Steel; IP69K 600N; Basic Code; Actuator	D40ML-SS2-B-ACT
Diecast Metal; IP67; 1500N; Basic Code; Actuator	D40ML-M1-B-ACT
Diecast Metal; IP67; 900N; Basic Code; Actuator	D40ML-M2-B-ACT
Plastic; IP67; 1500N; Basic Code; Actuator	D40ML-P1-B-ACT
Plastic; IP67; 900N; Basic Code; Actuator	D40ML-P2-B-ACT

Note: Spare actuators are not available for uniquely coded switches.

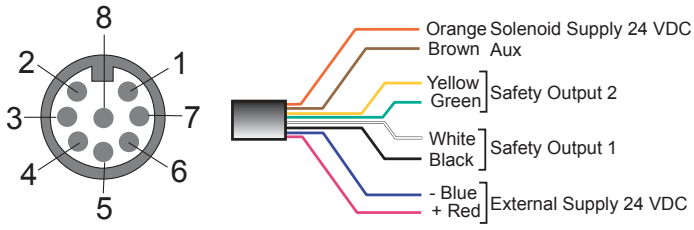
Accessories

Product Description	Model Number
Quick Disconnect Cable, 8-pin M12 to Flying Leads, PVC Jacket, 5 Meter Length	D40ML-CBL-M12-5M
Quick Disconnect Cable, 8-pin M12 to Flying Leads, PVC Jacket, 10 Meter Length	D40ML-CBL-M12-10M

Specifications

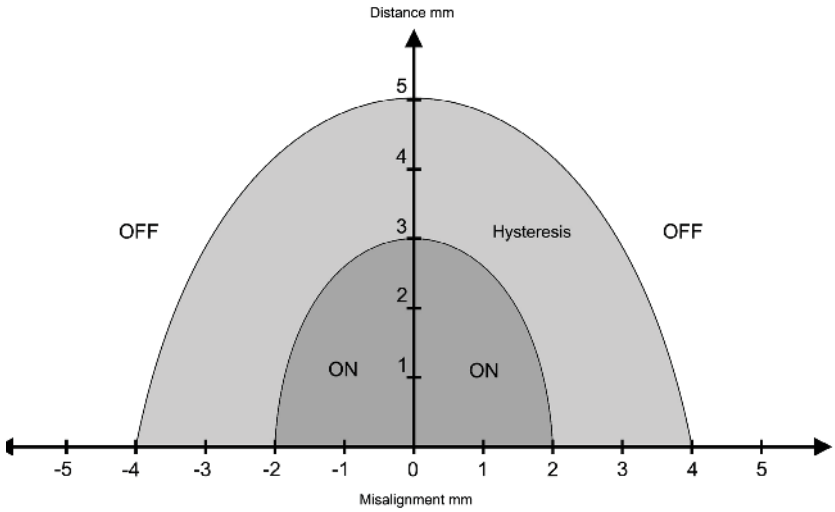
Codes and Standards:	IEC 60947-5-3:2013, EN 60947-5-1:2004 + AC:2005 + A1:2009, EN 60947-1:2007 + A1:2011, EN ISO 13849-1:2008 + AC:2009, EN 62061:2005 + AC:2010 + A1:2013, ISO 14119:2013, UL508
Safety Classification and Reliability Data:	
Minimum Switched Current:	10V DC 1mA
Dielectric Withstand:	250VAC
Insulation Resistance:	100 MΩ
Shock Resistance:	11ms 30G
Vibration Resistance:	10 Hz to 55 Hz, 1 mm amplitude
Switching Distance:	S_{ao} 1 mm Close; S_{ar} 10 mm Open
Misalignment	Between switch and actuator, 2 mm in any direction
Switching Frequency:	1.0 Hz maximum
Response Time (On-->Off):	10 ms max.
Operating Time (Off -->On):	150 ms
Approach Speed:	200mm/m to 1000mm/s
Body Material:	D40ML-P_: Plastic D40ML-M_: Diecast Metal D40ML-SS_: 316 Stainless Steel Actuator Seal: Silicone Encapsulation: High Temperature Epoxy
Operating Temperature Range:	-25C to + 40C
Ambient Operating Humidity:	up to 90% at 25C ~ 40C
Enclosure Protection:	IP67 (Plastic or Diecast Metal) IP69K (Stainless steel versions with flying leads)
Cable Type:	PVC 8 core, 6mm outer diameter
Mounting Bolts:	2 x M5 Tightening torque 1.0 Nm
Mounting Position:	Any
Power Supply:	24VDC ± 10% (selv / pelv)
Power Consumption:	Unlocked: 50 mA max. Locked: 500 mA max.
Holding Force:	Medium Duty - Stainless Steel: $F1_{max}$ (typical) 600N, F_{zh} 450N - Plastic and Diecast: $F1_{max}$ (typical) 900N, F_{zh} 675N Heavy Duty - Stainless Steel: $F1_{max}$ (typical) 950N, F_{zh} 700N - Plastic and Diecast: $F1_{max}$ (typical) 1500N, F_{zh}1150N
Max. Switched Current (Outputs):	200mA (min. internal resistance 8.5 Ohms)
Auxiliary Signal	Door open (24 VDC), Door closed (0 VDC) 200 mA max.
Characteristic Data according to EN ISO13849-1:	PLe : If both channels are used in combination with a SIL3/PLe control device Category : Cat. 4 MTTFd : 1100a Diagnostic Coverage DC : 99% (high) Number of operating days per year: : d_{op} = 365d Number of operating hours per day: h_{op} = 24h B10d: Not mechanical parts implemented
Characteristic Data according to IEC62061 (used as a sub system):	Safety Integrity Level: SIL3 PFH (1/h): 4.77E-10 Corresponds to 4.8% of SIL3 PFD: 4.18E-05 Corresponds to 4.2% of SIL3 Proof Test Interval T_1: 20a
Information with regard to UL508	Use LVLC or Class 2 supply. Type 1 enclosure.
When the product use deviates from these assumptions (different load, operating frequency, etc.) the values must be adjusted accordingly.	

Cable Wiring



Non-Contact RFID Locking Switch Wiring Diagram			
Quick Connect (CC) M12 8-way male plug	**Conductor Colors**	**Function**	**Power Rating**
8	Orange	Lock Applied (24 VDC +/- 10%)	500mA Max
5	Brown	Auxiliary Signal (Door Open/Closed)	+24 VDC (200mA)
4	Yellow	Safety Output 2	200mA Max
6	Green	Safety Output 2	
1	White	Safety Output 1	200mA Max
7	Black	Safety Output 1	
3	Blue	0 VDC	50mA Max
2	Red	+24 VDC +/- 10%	

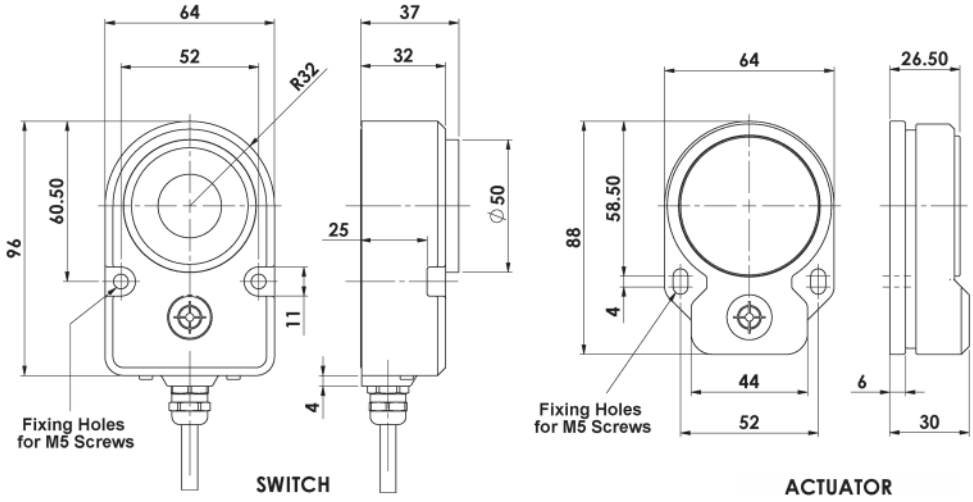
Typical Operating Distance



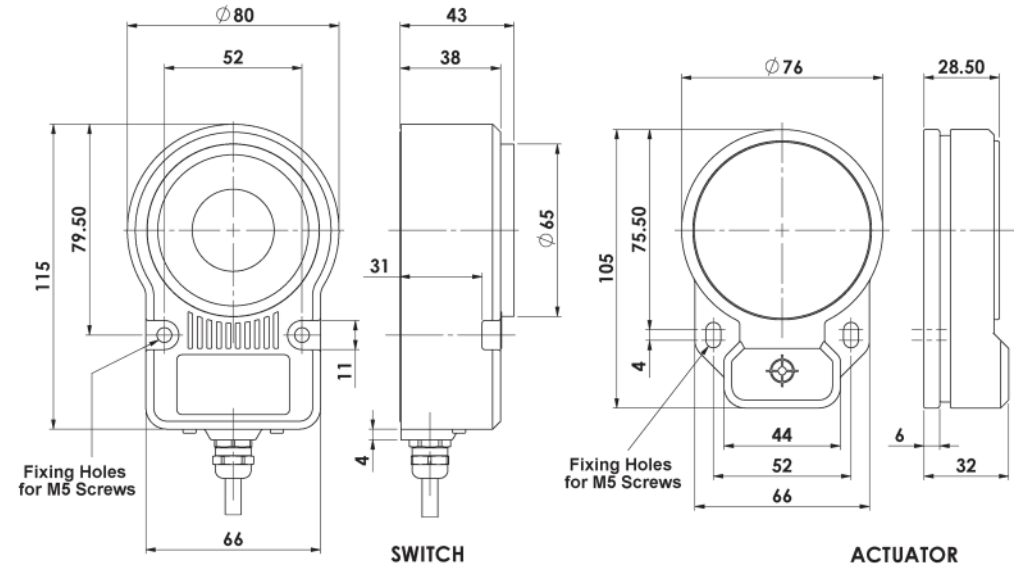
Note: DO NOT use switch and actuator as a guard door stop.

Dimensions

D40ML Medium Duty Switch Dimensions (mm)



D40ML Heavy Duty Switch Dimensions (mm)



Installation:

- Installation of all D40ML series safety switches must be in accordance with a risk assessment for the individual application.
- The use of a safety relay is required for monitoring RFID coded switches. These relays monitor two redundant circuits as per ISO13849-1 for up to PLe/Category 4 protection.
- D40ML series switches are designed to operate with most dual channel safety relays to satisfy EN60947-5-3.
- M5 mounting bolts must be used to mount the switches. Tightening torque for mounting bolts to ensure reliable fixing is 1.0 Nm. Always mount on non-ferrous materials.
- Do not mount adjacent switches or actuators closer than 30mm.
- To achieve nominal holding force ensure face-to-face alignment of magnetic parts.
- After installation always check each switch function by opening and closing each guard individually in turn and ensuring that the Green LED on the switch and the LEDs on the safety relay are illuminated when the switch is closed and are extinguished when the switch is open. Check that the machine stops and cannot be re-started when each switch is open.

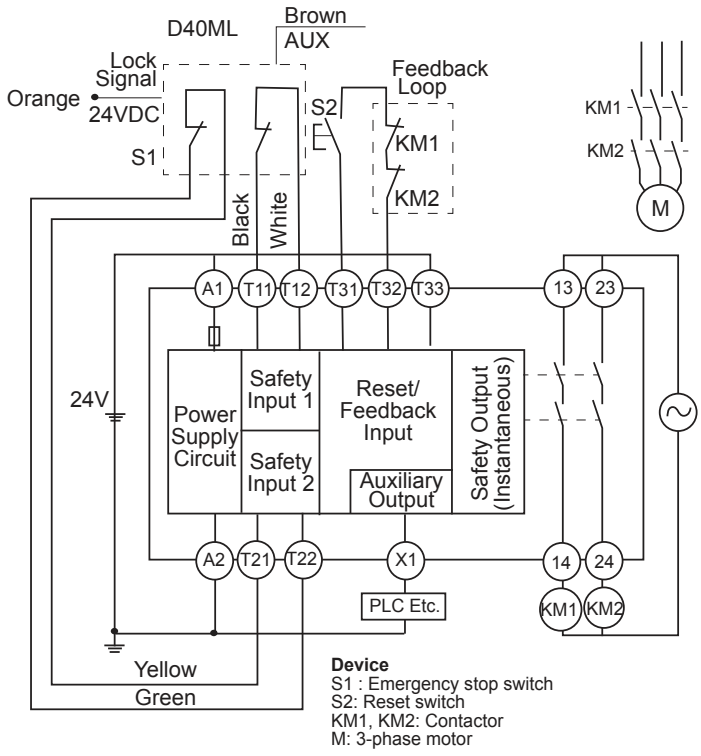
Maintenance/Safety Checks: Monthly: Check alignment of actuator and look for signs of mechanical damage to the switch casing or cables.
The safety functions and mechanics must be tested regularly. For applications where infrequent guard access is foreseeable, the system must have a manual function test to detect a possible accumulation of faults. At least once per month for PLe Cat3/4 or once per year for PLd Cat3 (ISO13849-1). Where possible it is recommended that the control system of the machine demands and monitors these tests, and stops or prevents the machine from starting if the test is not done. (ISO14119). Check that the machine stops and cannot be re-started when each switch is open.

NOTE: The safety outputs will only close when the actuator is in place and the lock magnet is energized. Forcing open of the lock will cause the safety outputs to open.

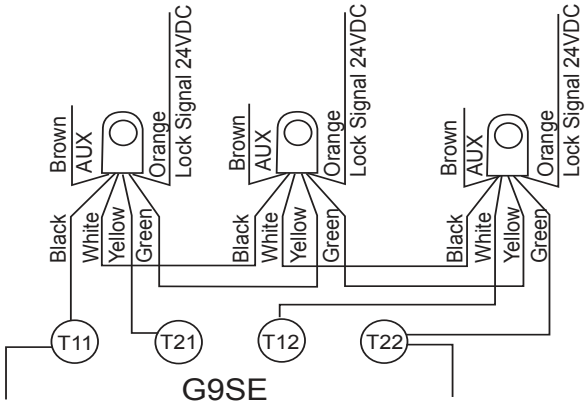
IMPORTANT: The guard holding has no interlock function. The Risk Assessment for the particular application should include the risk of spare actuators. Spare actuators should not be readily available and must be securely controlled. Record any RFID codes as required by factory rules or with reference to any risk assessment for the particular application and user location.

Wiring Options

D40ML to G9SE-201 (up to Safety PLe acc. EN ISO 13849-1)



D40ML to G9SE-201 - Series Connections (up to Safety PLd acc. EN ISO 13849-1, maximum 20 switches)



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