# Safety networks and units



## Safety – total solutions for industrial safety

### Meeting safety requirements

The EU machinery directive 98 / 37 / EC is the foundation for the safety of machinery within The European Union. Since 1995 these documents have had a major impact on safety for workers and work equipment. The directive is in relation with more than 400 harmonised EN standards. To meet these requirements, familiarity and know-how is required to ensure that safety is combined with good ergonomic and economic principles. Therefore efficient and innovative safety sensors and components are invaluable. Omron works closely with many leading machinery manufacturers and end users to develop practical solutions for industrial safety. These solutions include products for emergency-stop applications, safety guard door monitoring and interlocking as well as safety sensors for finger, hand, limb and body protection.

Our aim is to make the workplace a safer environment using cost-effective and ergonomically designed products.



# DeviceNet safety offers more than a safe network

DeviceNet is an innovative industrial network system that enables a wide range of devices to be easily networked and managed remotely.

Everything can be seamlessly integrated into DeviceNet, making it one of the best industrial field busses around.

As a founding member of DeviceNet and specialist for machine safety, Omron is one of the few companies with expertise to combine innovative bus technology and safety to a seamless solution up to safety category 4 (EN 954-1) and SIL 3 (IEC 61508).





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# Selection table

# Safety network and units

		Safety bu	is system	Flexi	ble safety unit	Safety re	elay units
	Model	NEA1-SCPU01	DST1-ID12SL-1		G9SX	G9SA	G9SB
	Safety category	up to Category 4					
eria	Safety integrity level (IEC 61508)	SIL 3				•	•
crite	Reaction time	dependent on safety ap	plication program	15 ms		max. 10 ms	
ction o	DeviceNet safety Bus interface			-		-	-
ele	EDM function						
S	Interlock function						
	Logical 'AND' connection	-	-			-	-
	Relay expansion units	-	-	-			-
	clamp terminals	-	•	-		-	-
atures	Detachable screw terminals	-	-			-	-
Fe	Safe timing functions	-	•	-			-
	USB-Interface		-	-		-	-
	E-Stop application	-				-	
	Door switch monitoring	•	-	•		-	•
	Safety light curtain monitoring	•	•	•		-	-
tion	EDM monitoring						
licat	Interlock function						
App	Logic function blocks		-	-		-	-
`	Safe ON delay timer	-	-	-		-	-
	Safe OFF delay timer	-	-	-		-	-
	I WO-Hand Control	-	-	-			-
	automatic reset	-	-	-		-	-
pply tage	24 VDC	-	-	-		_	-
Su vol	100 VAC - 240 VAC	-	-	-		-	-
Its	Safety inputs		-				
utpu	Test signal output		-	-		-	-
nd or	Solid state safety outputs					-	-
n-a	Safety relay outputs	-		-		3PST-NO, 5PST-NO	DPST-NO, 3PST-NO
-	Auxiliary outputs	<b>■</b>	<b>■</b>	<b>.</b>		SPST-NC	SPST-NC
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No / not available

# NE1A-SCPU01



### Safety network controller NE1A

The NE1A hosts the safety application program. All local and DeviceNet safety-based in- and outputs are monitored and controlled by the NE1A. It manages up to 16 DeviceNet safety slaves and can be seamlessly integrated in a standard DeviceNet system.

- · Removable cage-clamp terminals for easy installation
- Predefined and certified function blocks for easy programming
- LED display and status LEDs for advanced diagnostics
- System status on DeviceNet for easy troubleshooting and predictive maintenance
- · Easy scalability through the addition of DeviceNet safety devices



#### **Ordering information**

#### Stand-alone programmable controller Programmable safety circuits

Using DeviceNet safety offers benefits far before the need for a safety network is obvious. The safety network controller uses predefined logical function blocks to set up the programmable safety system. Modifications of the safety system in the life cycle of a machine are done without tedious wiring.



Appearance	Appearance description	Part number
Safety network controler	16 PNP inputs 8 PNP outputs 4 test outputs 128 function block programming removable cage clamp terminals	NE1A-SCPU01
Software		
Appearance	Appearance description	Part number
Safety network configurator	Installation disk (CD-ROM) IBM PC/AT compatible Windows 2000 or XP	WS02-CFSC1-E (English version)

Note: For further information please refer to chapter software.

General spec	cifications		Safety input specification	ons	
DeviceNet cor	nmunications	11 to 25 VDC	Input type	Sinking inputs (PNP)	
power supply	voltage	(supplied from communications	ON voltage	11 VDC min. between each input terminal and	
			OFF voltage	5 VDC max. between each input terminal and 0	
Unit power su	ppiy voitage	20.4 to 26.4 VDC (24 VDC -15% +10%)	OFF current	1 mA max.	
I/O power sup	ply voltage		Input current	4.5 mA	
Consumption Communications current power supply		24 VDC, 15 mA			
	Internal circuit	24 VDC, 230 mA	Salety output specificat	ions	
	power supply		Output type	Sourcing outputs (PNP)	
Mounting met	hod	35-mm DIN track	Rated output current	0.5 A max. per output	
Ambient opera	ating	-10 °C +55 °C	Residual voltage	1.2 V max. between each output terminal and V	
temperature					
Ambient stora	ige	-40 °C +70 °C	Test output specifications		
temperature			Output type	Sourcing outputs (PNP)	
Degree of prot	tection	IP20 (IEC 60529)	Rated output current	0.7 A max. per output (see note.)	
			Residual voltage	1.2 V max. between each output terminal and	

# DST1-ID/DST1-MRD



## DeviceNet safety I/O terminal block family

- · Removable cage clamp terminals for easy installation
- up to 12 Inputs for safety signals
- 4 test pulse outputs to ensure crosstalk and short circuit detection
- up to 8 safety outputs (solid state or relay)
- · Status LEDs for advanced diagnostics
- · Mixed mode operation (safety and standard) for all in- and outputs



#### Ordering information

#### Safety network

#### Expand safety I/O through networks

Safety components distributed over many different installation locations required long and complicated wiring. Replacing the wiring with a network between safety components greatly improves productivity.



# DST1-ID/DST1-MRD

1 mA max.

6 mA

# Safety network and units

100,000 operations min. (at rated load and

switching frequency of 1,800 operations/h)

Electrical life expectancy

#### Specifications

General specifications		Safety output specificat	ions		
DeviceNet communications	11 to 25 VDC	Output type	Sourcing outputs (PNP)		
power supply voltage	(supplied from communications	Rated output current	0.5 A max. per output		
		Residual voltage	1.2 V max. between each output terminal and V1		
Unit power supply voltage	20.4 to 26.4 VDC (24 VDC -15% +10%)	Test output specification	ns		
I/O power supply voltage					
Consumption Communication	s DST1-ID12SL-1/MD16SL-1: 100 mA	Output type	Sourcing outputs (PNP)		
current power supply	DST1-MRD08SL-1: 110 mA	Rated output current	0.7 A max. per point		
Mounting method	35-mm DIN track	Residual voltage	1.2 V max. between each output terminal and V0		
Ambient operating temperature	e -10 °C +55 °C	Safety output specifications for relay outputs			
Ambient storage temperature	-40 °C +70 °C				
Degree of protection	IP20 (IEC 60529)	Relays	G7SA-2A2B, EN 50205 class A		
Weight		Minimum applicable load	1 mA at 5 VDC		
weight	DST1-MRD08SL-1: 600 g	Rated load for a resistive	240 VAC: 2 A, 30 VDC: 2 A		
Safety input specifications					
Safety input specifications		Rated load for an inductive	2 A at 240 VAC ( $\cos \phi = 0.3$ ),		
Input type Sin	king inputs (PNP)	load	1 A at 24 VDC		
ON voltage 11	VDC min. between each input terminal and G1	Mechanical life expectancy	5,000,000 operations min.		
OFF voltage 5 V	DC max. between each input terminal and G1		(switching frequency of 7,200 operations/h)		

#### Safety I/O terminals DST1-ID12SL-1

**OFF** current

Input current



#### DST1-MD16SL-1



#### DST1-MRD08SL-1







### Flexible safety unit

G9SX-family modules can be connected by a logical "AND" function to implement partial/global stopping of a machine. Solid-state outputs, detailed LED diagnosis and clever feedback signals help to keep maintenance easy. The line-up is completed by expansion units with safe timing functions.

- Clear and transparent segmentation of safety functions by use of unique "AND" connection
- Solid-state outputs for long life and relay outputs in extension box available
- Detailed LED indications enable easy diagnosis
- Clever feedback signals for easy maintenance

#### **Ordering information**

Advanced unit								
Safety outputs		Auxiliary outputs	No. of input	Max. OFF-	Rated	Terminal block type	Model	
Instantaneous	OFF-delayed		channels	delay time	voltage			
P channel MOS-FET	P channel MOS FET	channel MOS FET PNP transistor 1 or 2 channels 0 to 15 in 24 VD	24 VDC	Screw terminals	G9SX-AD322-T15-RT			
transistor output	transistor outputs	outputs		16 steps		Cage clamp terminals	G9SX-AD322-T15-RC	

<sup>\*1</sup> The OFF-delay time can be set in 16 steps as follows: T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s

Basic unit						
Safety outputs		Auxiliary outputs	No. of input	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed		channels			
P channel MOS FET		PNP transistor output	1 or 2 channels	24 VDC	Screw terminals	G9SX-BC202-RT
transistor output					Cage clamp terminals	G9SX-BC202-RC
Expansion unit						
Safety outputs		Auxiliary outputs OFF-delay	OFF-delay time	FF-delay time Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
4 PST-NO (contact)		1 (solid state)		24 VDC	Screw terminals	G9SX-EX401-RT
		PNP transistor output			Cage clamp terminals	G9SX-EX401-RC
/	4 PST-NO (contact)	Synchroniz	Synchronized		Screw terminals	G9SX-EX041-T-RT
			with G9S-X-AD - unit		Cage clamp terminals	G9SX-EX041-T-RC

Power input			Inputs					
Item	G9SX-AD322-	G9SX-BC202- G9SX-EX- Item			G9SX-AD322-	G9SX-BC202-		
Rated supply voltage	20.4 to 26.4 VD	C (24 VDC -15% +10%)	Safety input		Operating voltage:	20.4 VDC to 26.4 VDC,		
			Feedback/reset in	put	internal impedance	: approx. 2.8 kΩ		
Outputs								
Item		G9SX-AD322-		G9SX-B	3C202-□			
Instantaneous safety out OFF-delayed safety outp	put ut	P channel MOS FET transistor output P char Load current: Using 2 outputs or less: 1 A DC max. Using 3 outputs or more: 0.8 A DC max.		P chann Load cu	nnel MOS FET transistor output current: Using 1 output: 1 A DC max. Using 2 outputs: 0.8 A DC max.			
Auxiliary output		PNP transistor output Load current: 100 mA max.	VP transistor output bad current: 100 mA max.					
Expansion unit								
Item		G9SX-EX-						
Rated load		250 VAC, 3A / 30 VDC, 3A (resistive load)						
Rated carry current		3 A						
Maximum switching volta	age	250 VAC, 125 VDC						
Characteristics								
Item		G9SX-AD322-🗆	G9SX-BC202-		G9SX-E	EX-🗆		
Operating time (OFF to C	ON state)	50 ms max. (Safety input: ON) 100 ms max. (Logical AND connection input: ON)	50 ms max. (Safety	input: O	N) 30 ms r	nax.		
Response time (ON to O	FF state)	15 ms max.			10 ms r	nax.		
Durability Electrical					100,000	) cycles min.		
Mechanical					5,000,0	00 cycles min.		
Ambient temperature		-10 °C +55 °C (with no icing or condens	sation)					



## Expandable safety relay unit

G9SA-family offers a complete line-up of compact and expandable safety relay units. Modules with safe OFF-delay timing are available as well as a two-hand controller. Simple multiplication of safety contacts is possible by using the connection on the front.

- 45 m-wide housing, expansion units are 17.5 m wide
- · Safe OFF-delay timer
- Simple expansion connection
- Certification up to category 4 according to EN954-1 depending on the application

30 s

G9SA-EX031-T30

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#### **Ordering information**

Emergency-stop units									
Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model	Category				
3PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC / VDC	G9SA-301	4				
			100 to 240 VAC						
5PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC / VDC	G9SA-501					
			100 to 240 VAC						

#### Emergency-stop OFF-delay units

Main contacts	OFF-delay contacts	Auxiliary contact	Number of input channels	OFF-delay time	Rated voltage	Model	Category
3PST-NO	3PST-NO DPST-NO SPST-NC		1 channel or	7.5 s	24 VAC / VDC	G9SA-321-T075	Main contacts: 4 OFF-delay contacts: 3
			2 channels	channels 1	100 to 240 VAC		
			possible	15 s	24 VAC / VDC	G9SA-321-T15	
					100 to 240 VAC		
				30 s	24 VAC / VDC	G9SA-321-T30	
					100 to 240 VAC		

#### Two-hand controller

Main contacts	Auxiliary contact	Number of input channels		Rated voltage Model		lodel	Category		
3PST-NO	3PST-NO SPST-NC 2 channels		24 VAC / VDC	G	i9SA-TH301	4 (IIIc, EN574)	4 (IIIc, EN574)		
				100 to 240 VAC					
<b>Expansion unit</b> The expansion unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.				<b>Expansion un</b> The expansion G9SA-301, G9	nits with Ol 1 unit conne 9SA-501, G	<b>FF-delay outpι</b> ects to a a9SA-321, or G9	u <b>ts</b> 9SA-TH301.		
Main contacts	Auxiliary contact	Model	Category	Main contact	Auxiliary	OFF-delay	Model	Category	
3PST-NO	SPST-NC	G9SA-EX301	4	form	contact	time			
		3PST-NO	SPST-NC	7.5 s	G9SA-EX031-T075	3			
				15 c	COSA EV021 T15				

#### Specifications

Power input				Inputs				
Item	G9SA-301/	G9SA-501	G9SA-321-T	Item	G9SA-301/321-T□/TH301	G9SA-501		
	TH301			Input current	40 mA max.	60 mA max.		
Power supply voltage	24 VAC/VDC:24 100 to 240 VAC	VAC, 50/60 Hz, 100 to 240 VAC	or 24 VDC 5, 50/60 Hz	Contacts	Contacts			
Operating voltage range	85% to 110% of	rated power sup	ply voltage	Item	G9SA-301/501/321-T□/TH3	G9SA-301/501/321-T□/TH301/EX301/EX031-T□		
					Resistive load (cos ∉ 1)			
				Rated load	250 VAC, 5 A			

#### Characteristics

Item		G9SA-301/TH301	G9SA-501/321-T	G9SA-EX301/EX031-T			
Operating time		30 ms max. (not including bounce time)					
Response time *1		10 ms max. (not including bounce time)					
Durability	Mechanical	5,000,000 operations min. (at approx. 7,200	,000,000 operations min. (at approx. 7,200 operations/hr)				
	Electrical	00,000 operations min. (at approx. 1,800 operations/hr)					
Minimum permissible load (reference value)							
Ambient temperature		Operating: -25°C to 55°C (with no icing or Storage: -25°C to 85°C (with no icing or	condensation)				

<sup>\*1</sup> The response time is the time it takes for the main contact to open after the input is turned OFF.

Rated carry current 5 A



## Slim-size safety unit

G9SB is a family of slender safety relay units, providing two safety contacts in a 17.5 m- and three safety contacts in a 22.5 m-wide housing.

- 17.5 m- and 22.5 m-wide housing
- 1- and 2-input channel units
- · Manual and automatic reset units
- Certification up to category 4 according to EN954-1 depending on the application

### ) ® *u* ≙

#### **Ordering information**

Main contacts	Auxiliary contact	Number of input channels	Reset mode	Input type	Rated voltage	Model	Category (EN954-1)	Size
DPST-NO 2 safety contacts	None	2 channels	Auto-reset	Inverse	24 VAC / VDC	G9SB-2002-A	4	17.5 mm
		1 channel or 2 channels		+ common		G9SB-200-B		
		2 channels	Manual-reset	Inverse		G9SB-2002-C		
		1 channel or 2 channels		+ common		G9SB-200-D		
3PST-NO 3 safety	SPST-NC	None (direct breaking)	Auto-reset		24 VDC	G9SB-3010	3	17.5 mm
contacts		2 channels		Inverse	24 VAC / VDC	G9SB-3012-A	4	22.5 mm
		1 channel or 2 channels		+ common		G9SB-301-B		
		2 channels	Manual-reset	Inverse		G9SB-3012-C		
		1 channel or 2 channels		+ common		G9SB-301-D		

#### Specifications

Power input	ower input						
Item		G9SB-200□-□	G9SB-3010	G9SB-301			
Power supply voltage		24 VAC / VDC: 24 VAC, 50/60 Hz, or 24VDC 24 VDC: 24 VDC					
Operating voltage range	je	85% to 110% of rated power supply voltage					
Power consumption		1.4 VA / 1.4 W max.	1.7 W max.	1.7 VA / 1.7 W max.			
Inputs							
Item		G9SB-200□-□	G9SB-3010	G9SB-301□-□			
Input current		25 mA max.	60 mA max. (See note.)	30 mA max.			
Note: Indicates the curr	ent between terminals A	1 and A2.					
Contacts							
Item		G9SB-200□-□	G9SB-3010	G9SB-301			
		Resistive load (cos∉ 1)					
Rated load		250 VAC, 5 A					
Rated carry current		5 A					
Characteristics							
Item		G9SB-200□-□	G9SB-3010	G9SB-301□-□			
Response time *1		10 ms max.					
Durability	Mechanical	5,000,000 operations min. (at approx.	7,200 operations/hr)				
Electrical		100,000 operations min. (at approx. 1,800 operations/hr)					
Minimum permissable	load (reference value)	5 VDC, 1 mA					
Ambient operating ten	perature	-25 °C +55 °C (with no icing or condensation)					

<sup>\*1</sup> The response time is the time it takes for the main contact to open after the input is turned OFF.

# Safety sensors

# F3SN/SH - total solutions for industrial safety

## Safety sensor solution for safe applications

Omron, a leading manufacturer of sensors for industrial safety, extends its product range with two safety light curtains, the F3SN and the F3SH.

The F3SN is a type 4 sensor that provides finger and hand protection in areas where access to dangerous machine parts is required while systems are still operating.

The F3SH is a multi-beam safety sensor for body protection. If a person enters a dangerous zone the F3SH ensures that the hazardous equipment within that zone is shut off. Both of these type 4 safety sensors are invaluable in areas where operation, maintenance and repair work is a necessity in an industrial environment.

Their slim profile makes these sensors highly attractive prospects when installation space is a premium. The field of operation is extensive; protection heights vary from 189 mm to 1822 mm, with a detection distance of up to 10 meters. In addition, the modular construction of these sensors means that you have a wide variety of detection heights and resolutions to choose from.









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Muting controller	F3SP-U4P	129

# Selection table

		Category 4	Category 2	Categ	itegory 4	
		+	Į		+	
	Model	F3SN-A	F3S-B	F3SL	F3SH-A	
Ð	Safety category	Category 4	Category 2	Category 4		
eria	Operating distance	0.2 - 7 m / 0.2 - 10 m	0.3 - 5 m	0.3 - 20 m	0.2 - 10 m	
ection crit	Protective height	189 - 1,822 mm	300 - 1,650 mm	351 - 2,095 mm	900 mm	
	Resolution	14, 25, 40, 70 mm	30, 55, 80 mm	30 mm	-	
	Beam pitch	9, 15, 30, 60 mm	25, 50, 70 mm	22 mm	300 mm	
Sele	Reaction time	10 - 19.5 ms	20 - 45 ms	20 - 35 ms	10 ms	
0,	Temperature range	-10 °C - 55 °C				
	Size of housing	30x30 mm	30x40 mm	35x50 mm	30x30 mm	
es	Blanking function	internal	option	internal	-	
	Muting function	-	-	-	-	
	EDM function	internal				
	Interlock function	internal				
atui	Series connection	option	option	-	option	
Е	Mounting kits	option				
"	Parameter setting	option (Console)	option (PC)	internal DIP switch	Option (Console)	
	External control unit	-	-	-	-	
	Optical heating	-	-	-	-	
	Finger protection	-	-	-	-	
_	Hand protection				-	
tior	Arm protection				-	
lica	Body protection					
Idd	Presence detection	-	-		-	
4	Muting application	-				
	Blanking application				-	
Supply voltage	24 VDC					
s	Safety outputs	2 PNP OSSD transistor outputs				
put	Auxiliary output	2 PNP (non safety)	1 PNP (non safety)	1 PNP (non safety)	2 PNP (non safety)	
Out	Test input			-		
pu	EDM input					
- al	Reset input					
<u> </u>	Muting sensor input	-	-	-	-	
	Page	123	125	126	123	

# Safety sensors

		Category 2 and 4	Category 4	Category 2	
		R REPORT			REPORT
	Model	F3S-TGR	F3SS	E3FS + F3SP-U3P/U5P	F3SP-U4P
	Safety category	Category 4	Category 2	Category 2	Category 2
eria	Operating distance	0.5 - 6 m (active / passive) 0.5 - 5 m (active / passive)	0.3 - 60 m	0 - 10 m	-
rite	Protective height	500 - 900 m	-	-	-
с ц	Resolution	-	-	-	-
tio	Beam pitch	300 mm, 400 mm, 500 mm	-	-	-
elec	Reaction time	16 ms	35 ms	32 ms	30 ms
Ň	Temperature range	-10 °C - 55 °C	0 °C - 55 °C	-10 °C - 55 °C	-10 °C - 55 °C
	Size of housing	30x30 mm	50x115x90 mm	Sensor: M18 housing Control unit: 22,5/45 mm wide	45 mm wide
	Blanking function	-	-	-	-
	Muting function	internal	-		
	EDM function	-	-	-	-
es	Interlock function	internal			
tur	Series connection	-	-	-	-
Fea	Mounting kits		-		-
ш	Parameter setting	-	-	-	-
	External control unit	-	-		-
	Optical heating	-	-	-	-
	Finger protection	-	-	-	-
	Hand protection	-	-	-	-
ion	Arm protection	-	-	-	-
cat	Body protection				-
bp	Presence detection	-	-	-	-
₹	Muting application				
	Blanking application	-	-	-	-
Supply voltage	24 VDC	•		•	
s	Safety outputs	2 PNP OSSD transistor outputs		2 NO relay outputs	2 NO relay outputs
put	Auxiliary output	-	-	-	-
Out	Test input				
pu	EDM input	-	-	-	-
- al	Reset input				
<u> </u>	Muting sensor input		-		
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Standard

No / not available





# F3SN-A / F3SH-A



# Category-4 safety light curtain / multi-beam safety sensor

The F3SN family is a category-4 safety light curtain with resolutions of 14, 25, 30 and 60 mm. An operating range of up to 10 m and protective heights from 189 to 1,822 mm are provided with no dead zone.

- Detection height = Sensor length
- Sensing distance up to 7 m (14 mm resolution) and 10 m for all other types
- · LED bar for easy alignment and diagnosis
- Blanking function by using setup console
- · Category-4 sensor complying with EN 61496-1



#### **Ordering information**

Safety light curtain						
Minimum detection object	Sensing distance	Series connection, connector	Model <sup>*1</sup>			
14 mm dia. (finger protection)	0.2 to 7 m	No	F3SN-AP14 F3SN-AP14H			
		Yes	F3SN-AP14H-01			
25 mm dia.	0.2 to 10 m	No	F3SN-A			
(hand protection)		Yes	F3SN-AP25-01			
40 mm dia.	0.2 to 10 m	No	F3SN-A			
(for presence protection)		Yes	F3SN-AP40-01			
70 mm dia.	0.2 to 10 m	No	F3SN-A			
(for presence detection)		Yes	F3SN-A			

<sup>\*1</sup> \_\_\_\_ in the model name indicates the detection width (mm).

#### Multi-beam safety sensor

Optical axis pitch	Sensing distance	Number of optical axes	Distance between optical axes at each end	Series connection, connector	Model
Body protection	0.2 to 10 m	4	900 mm	No	F3SH-A09P03
				Yes	F3SH-A09P03-01

#### Accessories (order separately)

#### Setting console

Model	Accessories
F39-MC11	One branching connector, one connector cap, 2 m cable, instruction manual

#### List of safety light curtains

F3SN-A P14, F3SN-A P14-01, F3SN-A P14H-01

Model	Detection height	Number of optical axes
F3SN-A0207P14 (-01)	207	23
F3SN-A0297P14 (-01)	297	33
F3SN-A0405P14 (-01)	405	45
F3SN-A0495P14 (-01)	495	55
F3SN-A0603P14 (-01)	603	67
F3SN-A0711P14 (-01)	711	79
F3SN-A0801P14 (-01)	801	89
F3SN-A0909P14 (-01)	909	101
F3SN-A0999P14 (-01)	999	111
F3SN-A1107P14 (-01)	1,107	123
F3SN-A1197P14H(-01)	1,197	133
F3SN-A1359P14H(-01)	1,359	151
F3SN-A1503P14H(-01)	1,503	167
F3SN-A1611P14H(-01)	1,611	179

#### F3SN-A P25, F3SN-A P25-01

Model	Detection height	Number of optical axes
F3SN-A0307P25 (-01)	307	19
F3SN-A0457P25 (-01)	457	29
F3SN-A0607P25 (-01)	607	39
F3SN-A0907P25 (-01)	907	59
F3SN-A1057P25 (-01)	1,057	69
F3SN-A1207P25 (-01)	1,207	79
F3SN-A1357P25 (-01)	1,357	89
F3SN-A1507P25 (-01)	1,507	99
F3SN-A1657P25 (-01)	1,657	109
F3SN-A1807P25 (-01)	1,807	119

**Note:** Highlighted products are preferred stock types, other detection heights are available.

# **F3SN-A / F3SH-A**

#### Specifications

Model	Stand-alone	F3SN-A	F3SN-A	F3SN-A	F3SN-A	F3SH-A09P03		
Item	Series connection	F3SN-A	<sup>3</sup> F3SN-A	F3SN-A	F3SN-A	F3SH-A09P03-01		
Senso	r type	Type 4 Safety Light Curtain						
Operat	ing range	0.2 to 7 m 0.2 to 10 m						
Beam	pitch (P)	9 mm	15 mm	30 mm	60 mm	300 mm		
Protec	tive height (PH)	189 to 1611 mm PH = n × P	217 to 1822 mm PH = $(n - 1) \times P + 37$	217 to 1807 mm PH = $(n - 1) \times P + 37$	277 to 1777 mm PH = $(n - 1) \times P + 37$	-		
Outern	nost beam gap	-				900 mm		
Detect	ion capability	Non-transparent: 14 mm in diameter	Non-transparent: 25 mm in diameter	Non-transparent: 40 mm in diameter	Non-transparent: 70 mm in diameter	-		
Effecti (EAA)	ve aperture angle	Within ±2.5° for the emitter	and receiver at a detection	distance of at least 3 m ac	cording to IEC 61496-2			
Light s	ource	Infrared LED (870 nm)						
Supply	voltage (Vs)	24 VDC ±10% (ripple p-p 10	0% max.)					
OSSD		Two PNP transistor outputs	, load current 300 mA max					
Auxilia (non-sa	ry output afety output)	One PNP transistor output,	load current 50 mA max.					
Extern (non-sa	al indicator output afety output) <sup>*4</sup>	One PNP transistor output, load current 40 mA max.						
Output	operation mode	OSSD output: Light-ON Auxiliary output: Dark-ON (can be changed by the F39-MC11) External indicator output: Light-ON (can be changed by the F39-MC11) <sup>*4</sup>						
Input v	oltage	For test input, interlock sele (with a sink current of 3 mA	ction input, reset input, and max.), OFF voltage: 0 to 1	d external relay monitor inpu .5 V or open	ut voltages; ON voltage: 9 t	o 24 V		
Test fu	nctions	Self-test (after power ON, a External test (light emission	nd during operation, one construction by test input	ycle during response time)				
Safety	related functions	Auto reset/manual reset (interlock) *5       Auto reset mode/man         EDM (external device monitoring)       reset mode (interlock         Fixed blanking *6       EDM (external device monitoring)         Floating blanking *6       monitoring)						
Respo	nse time	ON to OFF: 10 to 15.5 ms n	nax., 19,5 ms max. for 179	beams		ON to OFF: 10 ms max.		
Ambie	nt light intensity	Incandescent lamp: 3000 Ix max. (light intensity on the receiver surface) Sunlight: 10000 Ix max. (light intensity on the receiver surface)						
Ambie	nt temperature	Operating: -10 °C +55 °C, storage: -30 °C +70 °C (with no icing or condensation)						
Degree	of protection	IP65 (IEC60529)						
Conne	ction method	M12 connector (8 pins)						
Materia	als	Case: Aluminum, cap: Zinc	die-cast, optical cover: PM	MA (acrylic resin)				
Size (c	ross section)	30x30 mm						

\*1 The 4 digits in \_\_\_\_ in the model number represent the protective height. Use the formula given in the information on protective height specifications to calculate the height.

For example, if the beam gap is 9 mm, and the No. of beams is 21, the protective height will be 9x21 = 189 mm. The model with this protective height is F3SN-A0189P14.

\*2 F3SN-A C P14-01 is a customized model. Consult with your OMRON representative when ordering this model. \*3 For sizes above 1,125 mm add "H" after P14, e.g. F3SN-A1143P14H. Ask for supplemental manual.

\*4

Models ending in -01 only. \*5

For the factory setting, the manual reset mode is set to the "start / restart" interlock. Using the F39-MC11 can select either the start interlock or the restart interlock

\*6 For the factory setting, the function is not set. It can be enabled with the F39-MC11.

#### Connection

Using a manual reset function and an external device monitoring function





do not intend to use the external relay monitor, ct the auxiliary output that is set for dark: ON =

F39-MC11 to disable the external relay monitor function.





## Category-2 safety light curtain

The F3S-B is a category-2 safety light curtain with resolutions of 30, 55 and 80 mm. An operating range of up to 5 m and protective heights from 300 mm to 1,650 mm are provided with a very small dead zone.

- Sensing distance up to 5 m
- LEDs for easy alignment and diagnosis
- Series connection of two sensors is possible
- · Category-2 sensor complying with EN 61496-1

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#### **Ordering information**

Stand-alone	Optical resolution	No. of optical axes	Protective height		Stand-alone	Stand-alone Optical resolution	Stand-alone Optical No. of resolution optical axes
F3S-B122P	30 mm	12	300 mm		F3S-B215P	F3S-B215P 55 mm	F3S-B215P 55 mm 21
F3S-B182P		18	450 mm		F3S-B245P	F3S-B245P	F3S-B245P 24
F3S-B242P		24	600 mm		F3S-B275P	F3S-B275P	F3S-B275P 27
F3S-B302P		30	750 mm		F3S-B305P	F3S-B305P	F3S-B305P 30
F3S-B362P		36	900 mm		F3S-B335P	F3S-B335P	F3S-B335P 33
F3S-B422P		42	1,050 mm		F3S-B047P	F3S-B047P 80 mm	F3S-B047P 80 mm 4
F3S-B482P		48	1,200 mm		F3S-B067P	F3S-B067P	F3S-B067P 6
F3S-B542P		54	1,350 mm		F3S-B087P	F3S-B087P	F3S-B087P 8
F3S-B602P		60	1,500 mm		F3S-B107P	F3S-B107P	F3S-B107P 10
F3S-B662P		66	1,650 mm		F3S-B127P	F3S-B127P	F3S-B127P 12
F3S-B065P	55 mm	6	300 mm		F3S-B147P	F3S-B147P	F3S-B147P 14
F3S-B095P		9	450 mm		F3S-B167P	F3S-B167P 80 mm	F3S-B167P 80 mm 16
F3S-B125P		12	600 mm		F3S-B187P	F3S-B187P	F3S-B187P 18
F3S-B155P		15	750 mm		F3S-B207P	F3S-B207P	F3S-B207P 20
F3S-B185P		18	900 mm	ļ	F3S-B227P	F3S-B227P	F3S-B227P 22

#### **Specifications**

Туре	F3S-B P Stand-alone	*1		F3S-BM	P□□ <sup>*1</sup> for series con	inection	F3S-BS			
Sensor type	Type 2 Safety	/ Light Curtair	ו							
Optical-axis pitch	25 mm	50 mm	75 mm	25 mm	50 mm	75 mm	25 mm	50 mm	75 mm	
Optical resolution	Non-transparent: in diameter									
(Detection capability)	30 mm	55 mm	80 mm	30 mm	55 mm	80 mm	30 mm	55 mm	80 mm	
Protective height	300 / 450 / 60	00 / 750 / 900	/ 1,050 / 1,200	) / 1,350 / 1,50	00 / 1,650 mm		300 / 450 / 60	00 / 750 mm		
Detection distance	0.3 to 5.0 m									
Response time	ON to OFF 2 ON to OFF 2	I to OFF 20 ms to 45ms (stand-alone) I to OFF 20 ms to 65ms (series connection)								
Supply voltage (Vs)	24 VDC ±20%	6 (including 5	Vp-p ripple)							
Current consumption	400 mA max.	(under no-loa	ad conditions)							
Light source	Infrared LED	(880 nm wave	elength).							
Effective aperture angle	Within ±5° for	the emitter a	nd receiver at	a detection di	stance of at lea	ast 3 m accord	ding to IEC 614	496-2		
Control output	Two PNP trai	nsistor outputs	s, load current	200 mA max.						
Instability output	PNP transisto	or output (non	safety output)							
Protection circuit	Output short-	circuit protecti	ion, power sup	ply reverse co	onnection prote	ection				
External test function	Mode selection Active: 17 VI Inactive: No	lode selection by connecting "External test input" line to: active: 17 VDC to Vs, 10 mA max. duration time at least 15 ms nactive: No connection or 0 to 2.5 VDC, 2 mA max.								
Relay monitoring function (optional)	Default inacti	ve, selectable	with F39-U1E							
Start interlock function (optional)	Default inacti	ve, selectable	with F39-U1E							
Blanking function (optional)	Default inacti	ve, selectable	with F39-U1E							
Connection method	For extensior For series co	or extension cable: 8 pins, M12 connector or series connection cable: 6 pins, M12 connector								
Ambient temperature	Operating: -	0 °C +55 °C	(with no icing o	or condensatio	on)					
Degree of protection	IP65 (IEC605	29)								
Size (cross section)	30x40 mm									

<sup>\*1</sup> For detailed type names and optical specifications, see "Type Naming Rule"



# Category-4 safety light curtain for long-distance detection

The F3SL category-4 safety light curtain is ideal for applications where long operating ranges of up to 20 m are needed. A resolution of 30 mm ensures hand detection even in large machines and conveyor lines.

- Sensing distance up to 20 m
- LEDs for easy alignment and diagnosis
- Blanking function included
- EDM function included
- Category-4 sensor complying with EN 61496-1

#### **Ordering information**

Sensor type	Sensing distance	Detection width (mm)	Model
Through-beam	0.3 to 20 m	351	F3SL-A0351P30
		523	F3SL-A0523P30
		700	F3SL-A0700P30
		871	F3SL-A0871P30
		1,046	F3SL-A1046P30
		1,219	F3SL-A1219P30
		1,394	F3SL-A1394P30
		1,570	F3SL-A1570P30
		1,746	F3SL-A1746P30
		1,920	F3SL-A1920P30
		2,095	F3SL-A2095P30

Item	Model	F3SL- A0351 P30	F3SL- A0523 P30	F3SL- A0700 P30	F3SL- A0871 P30	F3SL- A1046 P30	F3SL- A1219 P30	F3SL- A1394 P30	F3SL- A1570 P30	F3SL- A1746 P30	F3SL- A1920 P30	F3SL- A2095P 30
Sensing	distance	0.3 to 20 m										
<b>Optical</b> a	xis pitch	22 mm										
Number axes	of optical	16	24	32	40	48	56	64	72	80	88	96
Protectiv	e height	351 mm	523 mm	700 mm	871 mm	1,046 mm	1,219 mm	1,394 mm	1,570 mm	1,746 mm	1,920 mm	2,095 mm
Min. sens	sing object	Opaque obje	ect, 30-mm d	ia. or greater	(52-mm or 7	4-mm dia. wł	hen using floa	ating blanking	g)			
Effective angle	aperture	Emitter / rec	eiver: ±2.5° (	or less each (	based on IE0	C61496-2 at (	detection dist	ance of 3 m	or greater)			
Light sou	irce	Infrared LED	) (850 nm)									
Supply v	oltage (Vs)	24 VDC ±20	% including	5% ripple (p-j	p)							
Current of	consumption	Emitter: 285	mA or less,	receiver: 1.4	A or less (inc	luding load c	output current	t)				
Control o	output	PNP transist	tor outputs x	2, load curre	nt 500 mA or	less, Light C	N					
Auxiliary	output	Same signal	l as control o	utput: PNP tr	ansistor outp	uts x 1 outpu	it (non-safety	output), load	l current 100	mA or less		
Protectiv	e circuits	Output load	short circuit	protection, re	verse power	connection p	rotection					
Safety fu	nctions	Start/restart	interlock fun	ction (select	enable/disabl	e with DIP sv	witch)					
		<ul> <li>Blanking functions ① Channel select (fixed blanking) ② Floating blanking ③ No blanking (initial setting)</li> <li>Select ①, ②, or ③ with DIP switch.</li> <li>The optical axes for ① fixed blanking are set by a teach button.</li> </ul>										
Diagnosi	s functions	<ul> <li>Self diagnet</li> </ul>	osis functions	s when the pe	ower is turned	d on						
		<ul> <li>External re</li> </ul>	elay (MPCE)	monitor funct	tion (connect	external rela	y monitor inp	ut wire to con	ntact b of exte	ernal relay, 5	0 mA 24 VD0	C)
Respons	e time	ON to OFF 2	20 ms max.			ON to OFF 2	25 ms max.		ON to OFF	30 ms max.	ON to OFF	35 ms max.
Ambient	temperature	Operating / S	Storage: 0 °C	to 55 °C (wi	th no icing or	condensatio	n)					
Degree o	f protection	IP65 (IEC 60	0529)									
Connecti	on method	M12 Connec	ctor									
Accesso	ries	Test rod, mo (1 kΩ, 2 resi	ounting brack stors), surge	ets (upper/lo protector (2)	wer), operatio	on manual, s	pecial hex wr	ench for prog	gram button a	access, test lo	oad resistors	
Size (cro	ss section)	35x50 mm										



# Safety sensor for perimetrical guarding

The F3S-TGR perimetrical guards are available in category 2 and category 4 with integrated muting function. They are available as 2-, 3- and 4-beam guards with an operation range of up to 50 m.

- Sensing distance up to 50 m
- Muting function included (no additional controller needed)
- Two muting actuator shapes for easy muting applications
- Automatic and manual restart function included

F3S-TGR-SB4-K C mirror reflection type (type 4)

Sensing

distance

0.5 to 6 m

0.5 to 5 m

Beam

pitch

500

400

300

MTL behind the model name. Ex. F3S-TGR-SB4-K2C-500MTL.

For muting applications with transport in only one direction, please add the

Model

· Category-2 and -4 sensor complying with EN 61496-1

F3S-TGR-SB4-K2C-500(MTL)\*1

F3S-TGR-SB4-K3C-800(MTL)\*1

F3S-TGR-SB4-K4C-900(MTL)\*1

#### **Ordering information**

#### Safety multi beam sensors

#### F3S-TGR-SB2-K C mirror reflection type (type 2)

Number of optical axes	Sensing distance	Beam pitch	Model
2	0.5 to 6 m	500	F3S-TGR-SB2-K2C-500(MTL) <sup>*1</sup>
3	0.5 to 5 m	400	F3S-TGR-SB2-K3C-800(MTL) <sup>*1</sup>
4		300	F3S-TGR-SB2-K4C-900(MTL) <sup>*1</sup>

For muting applications with transport in only one direction, please add the MTL behind the model name. Ex. F3S-TGR-SB4-K2C-500MTL.

#### Flexible muting connector box

Flexible muting connector box		
SLC connection type	Other connection	Model
M12 8pin connector without cable	4 x muting sensor connection (4pin)	F39-TGR-SB-CMB1
M12 8pin connector with 100 mm cable	1 x muting lamp M12 (4pin) 1 x override / Test input M12 (4pin) 1 x cabinet connection M12 (8pin)	F39-TGR-SB-CMB2

Number of

2

3

4

\*1

optical axes

Safety sensors				
	F3S-TGR-SB4-K□C-□□□(MTL)	F3S-TGR-SB2-K C- C- (MTL)		
Sensor type	Туре 4	Type 2		
Operating range	F3S-TGR-SB□-K2C 0.5 - 6 m F3S-TGR-SB□-K3C/K4C 0.5 - 5 m			
Beam pitch and number of beam	F3S-TGR-SB□-K2C 500 mm 2 beam with mirror F3S-TGR-SB□-K3C 400 mm 3 beam with mirror F3S-TGR-SB□-K4C 300 mm 4 beam with mirror			
Effective aperture angle (EAA)	Within ±2.5°	Within ±5°		
Light source	Infrared LED (880 nm)			
Supply voltage (Vs)	24 VDC ±20%			
OSSD	Two PNP transistor outputs, load current 500 mA max			
Output operation mode	Light - ON			
Test functions	Self-test (after power ON and during operation, one cycle during response time)			
Protection	Output short-circuit protection			
Response time	ON to OFF 16 ms max			
Ambient temperature	Operating: -10 °C +55 °C (with no icing or condensation	on)		
Degree of protection	IP65 (IEC 60529)			
Size (cross section)	38x48 mm			
Muting connection box				
Supply voltage (Vs)	24 VDC ±20%			
Ambient temperature	Operating: -10 to +55 °C (with no icing or condensation	n)		
Safety light curtain connector	M12 8 pins female			
Cabinet connector	M12 8 pins male			
Sensor connector	4 x M12 4 pins female			
Muting sensor connector	M12 4 pins female			
Test / override connectors	M12 4 pins female			
Degree of protection	IP65 (IEC60529)			



# Single-beam safety sensor in compact housing

The slender M18-sized E3FS is a category-2 safety single beam with an operating range of up to 10m. Plastic and metal housing, cable and M12-connector offer flexibility in application together with a control unit such as F3SP-U3P, F3SP-U4P or F3SP-U5P.

Output contacts

2 NO 2.5 A

Width

22.5 mm

45 mm

- Sensing distance up to 10m
- LEDs for easy alignment and diagnosis
- Cable and M12 plug categories
- Plastic and metal housing

Safety single beam sensors

Safety single beam sensors

Sensors

1 to 2

1 to 4

• Category-2 sensor complying with EN 61496-1

Controller for safety single beam sensors

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F3SP-U3P-TGR

F3SP-U5P-TGR

Model

#### **Ordering information**

Safety single beam sensors (Type 2)						
Case material	Operation distance	Model				
Plastic	0 to 10 m	Cable type	E3FS-10B4			
		Plug type	E3FS-10B4-P1			
Nickel Brass	el Brass		E3FS-10B4-M			
		Plug type	E3FS-10B4-M1-M			

Sensors						
Sensing method	Through-beam					
Controller	F3SP-U3P-TGR, F3SP-U5P-TGR					
Supply voltage (Vs)	4 VDC ± 10% (ripple p-p 10% max.)					
Effective aperture angle (EAA)	5° (at 3 m)					
Current consumption	Emitter: 50 mA max. Receiver: 25 mA max.					
Sensing distance	10 m					
Standard sensing object	Opaque object: 11 mm min. in diameter					
Response time	2.0 ms (E3FS only)					
Control output	PNP transistor output, load current: 100 mA max.					
Test input (emitter)	21.5 to 24 VDC: emitter OFF (source current: 3 mA max.) Open or 0 to 2.5 V: emitter ON (leakage current: 0.1 mA max.)					
Ambient light intensity	Incandescent lamp: 3.000 lx max. (light intensity on the receiver surface) Sunlight: 10,000 lx max. (light intensity on the receiver surface)					
Ambient temperature	Operating: -10 °C +55 °C, storage: -30 °C +70 °C (with no icing or condensation)					
Degree of protection	IP67 (IEC 60529)					
Light source	Infrared LED					
Protection	Output short-circuit protection, reverse polarity protection					
Controllers						
	F3SP-U3P	F3SP-U5P				
Number of sensors	1 to 2 safety single beam sensor	1 to 4 safety single beam sensor				
Width	22.5 mm	45 mm				
Muting input	2 Inputs	4 Inputs				
Safety related function	Override function Muting lamp Connection Interlock system (automatic and manual reset)					
Power supply voltage	24 VDC ±10%					
Power consumption	420 mA max.					
Output contacts	2 NO 2.5 A (protected by fuse), 115 VAC max.	2 NO 2.5 A (protected by fuse), 250 VAC max.				
Indicators	6 LED for status and diagnostics					
Degree of protection	IP20 (IEC 60529)					
Terminal	16 screw terminals, detachable blocks with '4pin'	32 screw terminals, detachable blocks with '4pin'				
Response time	≤30 ms					
Ambient temperature	Operation: -10 °C +55 °C					
Housing material	Plastic; DIN rail mounting					

# F3SP-U4P



# Safety light curtain controller with integrated muting function

The F3SP-U4P muting controller can handle up to two safety light curtains. It has a 45 mm-wide housing, two safety relay outputs with up to 2.5 A and additional functions such as muting-lamp monitoring and override function.

- Two independent muting functions with override
- Slim housing: 45 mm
- · LEDs for status and diagnosis
- · Detachable terminals
- · Fully certified according to EN 61496-1

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#### Ordering information

Description	lodel
Muting controller for safety light curtain F3S-B, F3SN and F3SH F3	3SP-U4P-TGR

#### Specifications

	F3SP-U4P-TGR
Power supply voltage	24 VDC ±10%
Power consumption	420 mA max. (excl. SLC power consumption)
Output contacts	2 NO 2.5 A (protected by fuse)
Indicators	6 LEDs for status and diagnostics.
Degree of protection	IP20 (IEC 60529)
Terminal	32 screw terminals (1.5 mm <sup>2</sup> ), detachable blocks with 4 screws each
Response time	≤ 30 ms
Ambient temperature	Operating: -10 °C + 55 °C
Housing material	Plastic, DIN rail mounting

#### Wiring example

Control unit F3SP-U4P-TGR in a mixed configuration that allows the use of several OMRON safety light curtains and perimetrical guards.



# Safety components

## D4N series – Next-generation safety switches

The D4N series is a new range of industrial safety switches that combines practical, cost-effective solutions with innovative features for the safe guarding and interlocking of machinery doors. There are six sub-families in the range, each providing its own capabilities for door-safety applications. These universal switches provide customers with a choice of over 1500 configurations, so there is literally a model for every requirement!

Many of the new features in these switches are unique. Make-before-break contacts, for example, provide enough time for vital process information to be saved before the system is shut down. More contacts have been added to the switches so that one is available to provide feedback data to the control system. Gold-clad contacts have been included for switching micro-loads and higher current more reliably. And all switches are tested to guarantee at least 1 million operations. No matter how safety-critical the requirement, Omron's D4N series has an excellent product solution for your application!







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### Selection table

		Safety door switches			Non-contact safety door switches	Safe	ety door-lock swi	tches
				6				
	Model	D4NS	D4BS	D4NH	D40B	D4NL	D4GL	D4BL
<u>a</u> .	Housing	Plastic	Metal	Plastic	Plastic	Plastic	Plastic	Metal
iter	Connector type M12		-		-	-	-	-
r L	Head mounting	4 directions	4 directions	-	-	4 directions	4 directions	4 directions
ion	Actuation	Straight	Straight	Hinge	-	Straight	Straight	Straight
ect	Key holding force	-	-	-	-	1,300 N	1,000 N	700 N
Sel	Protection class	IP67	1					
	Conformity	EN50047. EN108	8		EN1088			
	Conduit size PG13.5				-			
	Conduit size M20				-	-		
	Conduit size G1/2	-	-		-			-
	Conduit size 1/2-14NPT	-	-		-	-	-	-
	Cable length 3 5 10 m	-	-	-		-	-	-
	Gold clad contacts		-	-		-	-	-
	Operation key adjustable	-	-		-	-		-
	Mechanical lock /	-	-	-	-		-	-
	24 VDC solenoid release							
tures	Mechanical lock / 110 VAC solenoid release	-	-	-	-		-	-
Fea	Mechanical lock / 230 VAC solenoid release	-	-	-	-		-	-
	24 VDC solenoid lock / mechanical release	-	-	-	-	-	-	-
	mechanical release	-	-	-	-	-	-	-
	240 VAC solenoid lock, mechanical release	-	-	-	-	-	-	-
	Shaft actuator	-	-	-	-	-	-	-
	Arm lever actuator	-	-	-	-	-	-	-
	High temperature sensor	-	-		-	-	-	-
cation	Door monitoring	-	-	-	-	-	•	•
Appl	Door locking	-	-	-	-	-	•	-
	1NC / 1NO SL				-	-	-	-
	2NC SL				-	-	-	-
	2NC / 1NO	-	-	-	-	-	-	-
	2NC / 1NO SL		-		-	-	-	-
	3NC SL		-		-	-	-	-
	1NC / 1NO (MBB contact)		-		-	-	-	-
c	2NC / 1NO (MBB contact)		-		-	-	-	-
atio	1NO / 1NC	-	-	-		-	-	-
Jura	2NO / 1NC	-	-	-		-	-	-
sonfig	1NC / 1NO SL + 1NC / 1NO SL	-	-	-	-			-
cto	1NC / 1NO SL + 2NC SL	-	-	-	-			-
nta	1NC / 1NO SL + 1NC SL	-	-	-	-	-	-	
ပိ	2NC SL + 1NC / 1NO SL	-	-	-	-			-
	2NC / 1NO SL + 1NC / 1NO SL	-	-	-	-	-	-	-
	2NC/1NO SL + 2NC SL	-	-	-	-			-
	2NC SL + 2NC SL	-	-	-	-			-
	2NC SL + 1NC SL	-	-	-	-	-	-	
	3NC SL + 1NC / 1NO SL	-	-	-	-			-
	3NC SL + 2NC SL	-	-	-	-			-
	Page	135	136	137	138	139	140	141

# Safety components

		S	afety limit switch	es	E-stop switches		Safety relay and enabling
						•17	SWICCIES
	Model	D4N	D4B-N	D4N-R	A22E	A165E	G7SA
	Housing	Plastic	Metal	Plastic		i	
teria	Protection class	■ IP67	-	-	- IP65	-	-
ion crit	Operating temperature range	-30 °C - 70 °C	-40 °C - 80 °C	-30 °C - 70 °C	-20 °C - 70 °C	-10 °C - 55 °C	-40 °C - 85 °C
lect	Head size	-	-	-	30 mm, 40 mm, 60 mm	30 mm, 40 mm	-
Se	Number of poles	-	-	-	-	-	4pole and 6pole
	Flux tight	-	-	-	-	-	
	Conformity	EN50047, EN108	18 	_	EN 60947-5-1		EN50205
	Conduit size PG13.5	-	-	-	-	-	-
	Conduit size M20		-	-	-	-	-
	Conduit size 01/2	-	-	-	-	-	-
	Gold clad contacts	-	-	-	-		-
	Actuators	-	-	-			_
	Resin roller, resin lever		-	-	-	-	-
	Resin roller, metal lever				-	-	-
	Metal roller, metal lever		-	-	-	-	-
	Bearing lever, metal lever		-	-	-	-	-
	Adj. resin roller,	•	-	-	-	-	-
Features	Adj. rubber roller, metal lever	-	-	•	-	-	-
	Adj. rod lever	-			-	-	-
	Top plunger		•	-	-	-	-
	Top roller plunger				-	-	-
	Roller arm lever		-	-	-	-	-
	Cat whisker		-	-	-	-	-
	Plastic rod				-	-	-
	Fork lever lock		-	-	-	-	-
	Lighted head	-	-	-			-
	Push lock - pull reset	-	-	-	-	-	-
	Push lock, lurn reset	-	-	-	-	-	-
	Relay socket						-
_	Position monitoring			-	-	-	-
atio	E-stop application	-	-	-	-		-
Applica	General safety application	-	-	-	-	-	•
	1NC/1NO snap action				-	-	-
E	2NC snap action		-	-	-	-	-
atic	1NC/1NO slow action				-	-	-
igur	2NC slow action				-	-	-
onf	2NC/1NO slow action		-	-	-	-	-
cto	3NC slow action		-	-	-	-	-
Conta	1NC / 1NO (MBB slow action)		-	-	-	-	-
	2NC / 1NO (MBB slow action)	•	-	-	-	-	-
F	SPST (NC)	-	-	-	-		-
atio		-	-	-	-		-
Jura	TPST (NC) + 3PST (NC)	-	-	-	-		-
nfiç	4PST-NO + DPST-NC	-	-	-	-	-	
t co	3PST-NO + 3PST-NC	-	-	-	-	-	
tac	3PST-NO + SPST-NC	-	-	-	-	-	
Con	DPST-NO + DPST-NC	-	-	-	-	-	
	5PST-NO + SPST-NC	-	-	-	-	-	
	Page	142	144	145	Please contact your OMRON	146	147
					representative		
					Standard	N	o / not available

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# D4NS



# Safety door switch with plastic housing

The D4NS line-up includes three-contact models with 2NC / 1NC and 3NC contact forms in addition to the previous contact forms, 1NC / 1NO and 2NC. Models with M12 connectors and conduit opening, such as M20, are also available.

- Line-up with three contacts: 2NC / 1NC and 3NC contact forms
- · Line-up with two contacts 1NC / 1NO and 2NC
- M12 connector types available
- · Standardised gold-clad contacts for high contact reliability
- Applicable for standard loads and micro loads



: Models with approved direct opening contacts.

#### **Ordering information**

Switches				
Туре	Contact configuration		Conduit opening/connector	Model
1-conduit	Slow-action	1NC / 1NO	M20	D4NS-4AF
		2NC	M20	D4NS-4BF
		2NC / 1NO	M20	D4NS-4CF
		3NC	M20	D4NS-4DF
	Slow-action MBB contact	1NC / 1NO	M20	D4NS-4EF
		2NC / 1NO	M20	D4NS-4FF
2-conduit	Slow-action	1NC / 1NO	M20	D4NS-8AF
		2NC	M20	D4NS-8BF
		2NC / 1NO	M20	D4NS-8CF
	Slow-action MBB contact	1NC / 1NO	M20	D4NS-8EF
	Slow-action MBB contact	2NC / 1NO	M20	D4NS-8FF
1-conduit,	Slow-action	1NC / 1NO	M12 connector	D4NS-9AF
with connector		2NC	M12 connector	D4NS-9BF
	Slow-action MBB contact	1NC / 1NO	M12 connector	D4NS-9EF

Note: Additionally conduit sizes G1/2, 1/2-14NPT and Pg13,5 are available.

#### Operation keys (order separately)

Туре		Model
Horizontal mounting	Ĩ	D4DS-K1
Vertical mounting	- Alexandre - Alex	D4DS-K2

Туре	Model
Adjustable mounting (horizontal)	D4DS-K3
Adjustable mounting (horizontal/vertical)	D4DS-K5

#### Specifications

Degree of protection		IP67 (EN60947-5-1) (This applies for the switch only. The degree of protection for the key hole is IP00.)			
Durability <sup>*1</sup>	Mechanical	1,000,000 operations min.			
	Electrical	500,000 operations min. for a resistive load of 3 A at 250 VAC 300,000 operations min. for a resistive load of 10 A at 250 VAC			
Operating speed		0.05 to 0.5 m/s			
Operating frequency		30 operations/minute max.			
Direct opening force *2		) N min.			
Direct opening travel *2		0 mm min.			
Minimum applicable loa	ad	Resistive load of 1 mA at 5 VDC (N-level reference value)			
Protection against elect	tric shock	Class II (double insulation)			
Pollution degree (operation	ting environment)	3 (EN60947-5-1)			
Contact gap		2 x 2 mm min			
Conditional short-circuit current		100 A (EN60947-5-1)			
Rated open thermal cur	rent (I <sub>th</sub> )	10 A (EN60947-5-1)			
Ambient temperature		Operating: -30° C to 70° C with no icing			

<sup>\*1</sup> The durability is for an ambient temperature of 5° C to 35° C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative. <sup>\*2</sup> These figures are minimum requirements for safe operation.

Note: - The above values are initial values.

# D4BS



### Safety door switch with metal housing

The D4BS line-up includes two-contact models with 1NC/1NO and 2NC in a robust metal housing. Models with M12 connectors and conduit opening, such as M20, are also available.

- · Robust metal housing
- · Line-up with two contacts: 1NC / 1NO and 2NC
- · M12 connector types available
- Standardised gold-clad contacts for high contact reliability
- · Applicable for standard loads and micro loads

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#### **Ordering information**

Туре	Mounting direction	Conduit size	1NC/1NO (slow-action)	2NC (slow-action)
1-conduit	Front-side	Pg13.5	D4BS-15FS	D4BS-1AFS
	mounting	M20	D4BS-45FS	D4BS-4AFS
3-conduit		Pg13.5	D4BS-55FS	D4BS-5AFS
		M20	D4BS-85FS	D4BS-8AFS

#### **Operation keys (order separately)**

Туре		Model
Horizontal mounting	<b>S</b>	D4BS-K1
Vertical mounting		D4BS-K2
Adjustable mounting (horizontal)	Ĩ	D4BS-K3

#### Specifications

Degree of protection <sup>*1</sup>	IP67 (EN60947-5-1)
Durability <sup>*2</sup>	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations min. (10 A at 250 VAC, resistive load)
Operating speed	0.1 m/s to 0.5 m/s
Operating frequency	30 operations/min max.
Rated frequency	50/60 Hz
Contact gap	2 x 2 mm min.
Direct opening force <sup>*3</sup>	19.61 N min. (EN60947-5-1)
Direct opening travel*3	20 mm min. (EN60947-5-1)
Full stroke	23 mm min.
Conventional enclosed thermal current (I <sub>th</sub> )	20 A (EN60947-5-1)
Conditional short-circuit current	100 A (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Protection against electric shock	Class I (with ground terminal)
Ambient temperature	Operating: -40°C to 80°C (with no icing)

\*1 Although the switch box is protected from dust, oil, or water penetration, do not use the D4BS in places where dust, oil, water, or chemicals may penetrate through \*2

the key hole on the head, otherwise switch damage or malfunctioning may occur. The durability is for an ambient temperature of 5° C to 35° C and an ambient humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

\*3 These figures are minimum requirements for safe operation.

Note: The above values are initial values.

# D4NH



## Safety door hinge switch

D4NH safety-door hinge switches are available with one or two built-in contacts, shaft or arm lever actuator and various conduit types, e.g. M20.

- Direct opening mechanism
- Shaft or arm lever actuator
- Wide temperature range
- Metric conduit types available

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#### **Ordering information**

	Conduit size					
Actuator			Built-In switch mechanism			
			1NC / 1NO (slow-action)	2NC (slow-action)	2NC / 1NO (slow-action)	
Shaft	1-conduit	M20	D4NH-4AAS	D4NH-4BAS	D4NH-4CAS	
		M12 connector	D4NH-9AAS	D4NH-9BAS		
	2-conduit	M20	D4NH-8AAS	D4NH-8BAS	D4NH-8CAS	
Arm lever	1-conduit	M20	D4NH-4ABC	D4NH-4BBC	D4NH-4CBC	
		M12 connector	D4NH-9ABC	D4NH-9BBC		
	2-conduit	M20	D4NH-8ABC	D4NH-8BBC	D4NH-8CBC	
Actuator	Conduit size		Built-in switch mechanism			
			3NC (slow-action)	1NC / 1NO MBB (slow-action)	2NC / 1NO MBB (slow-action)	
Shaft	1-conduit	M20	D4NH-4DAS	D4NH-4EAS	D4NH-4FAS	
		M12 connector		D4NH-9EAS		
Arm lever	1-conduit	M20	D4NH-4DBC	D4NH-4EBC	D4NH-4FBC	
		M12 connector		D4NH-9EBC		

Note: Conduit types with G1/2, 1/2-14NPT and Pg13,5 are also available.

**bold** = Preferred stock item

Degree of protection		IP67 (EN60947-5-1)		
Durability	Mechanical	1,000,000 operations min.		
	Electrical	500,000 operations min. for a resistive load of 3 A at 250 VAC 300,000 operations min. for a resistive load of 10 A at 250 VAC		
Operating speed		2 to 360°/s		
Operating frequency		30 operations/minute max.		
Protection against electric shock		Class II (double insulation)		
Pollution degree (operating environn	nent)	3 (EN60947-5-1)		
Contact gap		Snap-action: 2x9.5 mm min Slow-action: 2x2 mm min		
Conditional short-circuit current		100 A (EN60947-5-1)		
Rated open thermal current (Ith)		10 A (EN60947-5-1)		
Ambient temperature		Operating: -30° C to 70° C with no icing		



## Compact non-contact door switch

Three types of sensors and two control units present the D40B family. Standard sensors are available with 3 m and 10 m cabling. The high temperature sensor (up to +125 °C) is equipped with a 5 m cable. If requested, all sensor types are available with an auxiliary output.

- · Contact-free detection of the closing/opening of a door
- Non contact=no abrasion=no particles •
- Washable actuator •
- Easy cleaning there is no key hole •
- Good coverage of mechanical tolerances ٠

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Sensors (switches/actuators)						
Classification	Shape	Auxiliary output	Cable length	Model		
Standard sensor		None	3 m / 10 m	D40B-1B3 / D40B-1B10		
		1 NC	3 m / 10 m	D40B-1D3 / D40B-1D10		
Elongated sensor		None	3 m / 10 m	D40B-2B3 / D40B-2B10		
		1 NC	3 m / 10 m	D40B-2D3 / D40B-2D10		
ligh-temperature type sensor		1 NC	5 m	D40B-3D5C		
		1 NO		D40B-3E5C		

Note: A sensor used in combination with a controller is classified category 3.

Safety contacts	Auxiliary contacts/ output <sup>*1</sup>	Rated voltage	Model
1 NO	1 NC	24 VAC/VDC	D40B-J1
2 NO	1 NC	24 VAC/VDC 110/230 VAC	D40B-J2

#### Specifications

Sensor (switc	h/actuator)				
Item Type		Standard sensor	High-temperature type sensor		
Switching dista	ance (nominal value)	OFF -> ON: 5 mm ON -> OFF: 15 mm	OFF -> ON: 9 mm ON -> OFF: 17 mm		
Operating temp	perature	-10 °C +55 °C	-25 °C +125 °C		
Degree of prote	ection	IP67 (IEC 60947-5-1)			
Material		ABS	Stainless steel		
Controller					
Item	Туре	D40B-J1	D40B-J2		
Power supply v	voltage	24 VAC / VDC	24 VAC / VDC or 110/230 VAC (selectable)		
Allowable volta	ige range	Power supply voltage ±15%			
Rated load	Safety contacts	250 VAC, 4 A, cos <i>φ</i> = 1, 30 VDC, 2 A, cos <i>φ</i> = 1			
	Auxiliary contacts / output <sup>*1</sup>	230 VAC, 100 mA, $\cos\phi$ = 1, 24 VDC, 100 mA, $\cos\phi$ = 1	250 VAC, 4 A, cos <i>φ</i> = 1, 30 VDC, 2 A, cos <i>φ</i> = 1		
Response time		25 ms max.			
Operating temp	perature	-10 °C +55 °C			

\*1 D40B-J1: MOS output; D40B-J2: contact output.

Controllers

Safety contacts	Auxiliary contacts/ output *1	Rated voltage	Model
1 NO	1 NC	24 VAC/VDC	D40B-J1
2 NO	1 NC	24 VAC/VDC 110/230 VAC	D40B-J2

\*1 Non-safety output.

**Ordering information** 



### **Guard-lock safety door switch**

The D4NL guard-lock safety-door switches are available with four or five built-in contacts. When locked, they have a key holding force of up to 1300 N. Mechanical lock/solenoid release types and vice versa set up the complete range in combination with various conduit types, e.g. M20.

- · Safety-door switch with electromagnetic lock or unlock mechanism
- · Models with four or five built-in contacts
- Strong key holding force: 1300 N
- · For standard loads and micro loads

Lock and release Contact configuration

1NC / 1NO + 1NC / 1NO

2NC / 1NO + 1NC / 1NO

1NC / 1NO + 2NC

2NC + 1NC / 1NO

2NC / 1NO + 2NC

3NC + 1NC / 1NO

2NC + 2NC

3NC + 2NC

types

Solenoid lock

mechanical

release

· Keys are compatible with D4GL and D4NS

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: Models with approved direct opening contacts.

Model

D4NL-4AFG-B

D4NL-4BFG-B

D4NL-4CFG-B

D4NL-4DFG-B D4NL-4EFG-B

D4NL-4FFG-B

D4NL-4GFG-B

D4NL-4HFG-B

Conduit

opening

M20

M20

M20

M20

M20

M20

M20

M20

#### Ordering information

For 110V and 230V version ask your local OMRON representative					
Lock and release types	Contact configuration	Conduit opening	Model		
Mechanical lock	1NC / 1NO + 1NC / 1NO	M20	D4NL-4AFA-B		
solenoid release	1NC / 1NO + 2NC	M20	D4NL-4BFA-B		
	2NC + 1NC / 1NO	M20	D4NL-4CFA-B		
	2NC + 2NC	M20	D4NL-4DFA-B		
	2NC / 1NO + 1NC / 1NO	M20	D4NL-4EFA-B		
	2NC / 1NO + 2NC	M20	D4NL-4FFA-B		
	3NC + 1NC / 1NO	M20	D4NL-4GFA-B		
	3NC + 2NC	M20	D4NL-4HFA-B		

Note: - Conduit sizes of G1/2 and Pg 13,5 are also available. - Solenoid: 24 VDC, Orange LED: 10 to 115 VAC/VDC

#### **Operation keys**

	······································							
Туре		Model	Туре		Model			
Horizontal mounting	I.	D4DS-K1	Adjustable mounting (horizontal)		D4DS-K3			
Vertical mounting	Ś	D4DS-K2	Adjustable mounting (horizontal / vertical)		D4DS-K5			

#### **Specifications**

Degree of p	rotection	IP67 (EN60947-5-1) (This applies for the switch only. The degree of protection for the key hole is IP00.)
Durability <sup>*1</sup>	Mechanical	1,000,000 operations min.
	Electrical	500,000 operations min. for a resistive load of 3 A at 250 VAC
Operating s	peed	0.05 to 0.5 m/s
Operating fi	requency	30 operations/minute max.
Rated frequ	ency	50/60 Hz
Contact gap	)	2x2 mm min
Direct open	ing force <sup>*2</sup>	60 N min. (EN60947-5-1)
Direct open	ing travel <sup>*2</sup>	10 mm min. (EN60947-5-1)
Holding for	ce	1,300 N min.
Minimum ap	oplicable load	Resistive load of 1 mA at 5 VDC (N-level reference value)
Thermal cur	rrent (I <sub>th</sub> )	10 A (EN60947-5-1)
Conditional current	short-circuit	100 A (EN60947-5-1)
Pollution de (operating e	egree environment)	3 (EN60947-5-1)
Protection a shock	against electric	Class II (double insulation)
Ambient ten	nperature	Operating: -10° C to 55° C (with no icing or condensation)

<sup>1</sup> The durability is for an ambient temperature of 5° C to 35° C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative.

<sup>\*2</sup> These figures are minimum requirements for safe operation.

Note: The above values are initial values.



### Guard-lock safety door switch

The D4GL guard-lock safety-door switches are available with four or five built-in contacts. When locked, they have a key holding force of up to 1000 N. Mechanical lock/solenoid release types and vice versa set up the complete range in combination with various conduit types, e.g. M20.

Slim safety-door switch with electromagnetic lock or unlock mechanism

1NC / 1NO + 1NC / 1NO

2NC / 1NO + 1NC / 1NO

1NC / 1NO + 2NC

2NC + 1NC / 1NO

2NC / 1NO + 2NC

2NC + 2NC

- Models with four or five built-in contacts
- Strong key holding force: 1000 N
- · For standard loads and micro loads

Lock and release Contact configuration

types

Solenoid lock

mechanical

release

• Keys are compatible with D4NL and D4NS

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#### : Models with approved direct opening contacts.

Model

D4GL-4AFG-A

D4GL-4BFG-A

D4GL-4CFG-A

D4GL-4DFG-A

D4GL-4EFG-A

D4GL-4FFG-A

D4DS-K5

Conduit

size

M20

M20

M20

M20

M20

M20

#### **Ordering information**

Lock and release types	Contact configuration	Conduit size	Model
Mechanical lock	1NC / 1NO + 1NC / 1NO	M20	D4GL-4AFA-A
solenoid release	1NC / 1NO + 2NC	M20	D4GL-4BFA-A
	2NC + 1NC / 1NO	M20	D4GL-4CFA-A
	2NC + 2NC	M20	D4GL-4DFA-A
	2NC / 1NO + 1NC / 1NO	M20	D4GL-4EFA-A
	2NC / 1NO + 2NC	M20	D4GL-4FFA-A
	3NC + 1NC / 1NO	M20	D4GL-4GFA-A
	3NC + 2NC	M20	D4GL-4HFA-A

Note: - conduit sizes of G1/2 and Pg13,5 are also available. - solenoid: 24 VDC, orange/green LED: 24 VDC

#### Operation keys (order separately)

operation keys (order separatery)						
Туре		Model	Туре			
Horizontal mounting		D4DS-K1	Adjustable mounting (horizontal)			
Vertical mounting	S.	D4DS-K2	Adjustable mounting (horizontal / vertical)			
				N 19		

	3NC + 1NC / 1	NO	M20		D4GL-4GFG-A
	3NC + 2NC		M20		D4GL-4HFG-A
Туре				Mode	A Contraction of the second
Adjustable mountin	ng			D4DS	-K3

#### Specifications

Degree of p	rotection	IP67 (EN60947-5-1) (This applies for the switch only. The degree of protection for the key hole is IP00.)
Durability *1 Mechanical		1,000,000 operations min.
	Electrical	500,000 operations min. for a resistive load of 4 mA at 24 VDC; 150,000 operations min. for a resistive load of 1 A at 125 VAC in 2 circuits and 4 mA at 24 VDC in 2 circuits
Operating s	peed	0.05 to 0.5 m/s
Operating fr	requency	30 operations/minute max.
Rated frequ	ency	50/60 Hz
Contact gap	)	2x2 mm min.
Direct open	ing force <sup>*2</sup>	60 N min. (EN60947-5-1)
Direct open	ing travel <sup>*3</sup>	10 mm min. (EN60947-5-1)
Holding for	e	1,000 N min.
Minimum ap	plicable load	Resistive load of 4 mA at 24 VDC (N-level reference value)
Thermal cur	rrent (I <sub>th</sub> )	2.5 A (EN60947-5-1)
Conditional current	short-circuit	100 A (EN60947-5-1)
Pollution de (operating e	egree environment)	3 (EN60947-5-1)
Protection a shock	igainst electric	Class II (double insulation)
Ambient ten	nperature	Operating: -10°C to 55°C with no icing

1 The durability is for an ambient temperature of 5° C to 35° C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative.

<sup>\*2</sup> These figures are minimum requirements for safe operation.

<sup>\*3</sup> These figures are minimum requirements for safe operation.

Note: The above values are initial values.



### Guard-lock safety door switch with metal housing

The D4BL guard-lock safety-door switches are available with three built-in contacts. They are mechanically locked when the key is inserted and have a solenoid release. An auxiliary release key ensures easy maintenance and unlocks the door in case of power failure.

- · Automatically mechanical lock
- Auxiliary release key for easy maintenance •
- Tough aluminium die-cast body •
- Horizontal and vertical conduit opening •
- · Head direction can easily be changed

#### Ordering information

Lock method	Conduit size	Voltage for solenoid	Without indicator 1NC/1NO+ 1NC (slow-action)	With LED indicator 1NC/1NO+ 1NC (slow-action)	Without indicator 2NC+ 1NC (slow-action)	With LED indicator 2NC+ 1NC (slow-action)
Mechanical	PG13.5	24 VDC	D4BL-1CRA	D4BL-1CRA-A	D4BL-1DRA	D4BL-1DRA-A
lock		110 VAC	D4BL-1CRB	D4BL-1CRB-A	D4BL-1DRB	D4BL-1DRB-A
	M20	24 VDC	D4BL-4CRA	D4BL-4CRA-A	D4BL-4DRA	D4BL-4DRA-A
		110 VAC	D4BL-4CRB	D4BL-4CRB-A		
Solenoid lock	Pg 13.5	24 VDC	D4BL-1CRG	D4BL-1CRG-A	D4BL-1DRG	D4BL-1DRG-A
	M20	24 VDC		D4BL-4CRG-A		

#### Operation keys (order separately)

Туре		Model	Туре		Model	
Horizontal mounting	<b>S</b>	D4BL-K1		Adjustable mounting (horizontal)	Ĩ	D4BL-K3
Vertical mounting	. <b>L</b>	D4BL-K2				

#### **Specifications**

Degree of protection	IP67 (EN60947-5-1)					
Durability <sup>*1</sup>	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations min. (10 A resistive load at 250 VAC)					
Operating speed	0.05 to 0.5 m/s					
Operating frequency	30 operations/min max.					
Rated frequency	50/60 Hz					
Operating characteristics	Direct opening force:     19.61 N min. (EN60947-5-1)       Direct opening travel:     20 mm min. (EN60947-5-1)       All stroke: 23 mm min.					
Holding force	700 N min. (GS-ET-19)					
Thermal current (I <sub>th</sub> )	10 A (EN60947-5-1)					
Pollution degree (operating environment)	3 (EN60947-5-1)					
Protection against electric shock	k Class I (with ground terminal)					
Ambient temperature	Operating: -10°C to 55°C (with no icing)					
<sup>*1</sup> The durability is for an ambient t	temperature of 5°C to 35°C and an ambient humidity of 40% to 70%					

The durability is for an ambient temperature of 5°C to 35°C and an ambient humidity of 40% to 70%.

Note: The above values are initial values.

Solenoid coil characteristics

Item	24 VDC mechanical lock models	110 VAC mechanical lock models	24 VAC solenoid lock models
Rated operating voltage	24 VDC <sup>+10%</sup> / <sub>-15%</sub> (100% ED)	110 VAC ±10% (50/60 Hz)	24 VDC <sup>+10%</sup> / <sub>-15%</sub> (100% ED)
Current consumption	Approx. 300 mA	Approx. 98 mA	Approx. 300 mA
Indicator characteristics			
Item	LED		
Rated voltage	10 to 115 VAC/VDC		
Current leakage	Approx. 1 mA		
Color (LED)	Orange, green		



# Safety-limit switch with plastic housing

The D4N-family is a complete line-up of safety-limit switches. They are available with one, two or three built-in contacts and a wide range of head and actuator types. To set up easy installation and maintenance, various conduit types, e.g. M20 and M12 connector types, are provided.

- Direct opening mechanism
- · Various actuators
- Double insulation
- · Gold-plated contacts for handling micro loads
- Metric conduit types available

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#### **Ordering information**

D4N

Actuator	Conduit size	Conduit size		Built-in switch mechanism						
			1NC / 1N0	1NC / 1NO (snap-action) 1NC / 1NO (slow-action)			2NC (slow-action)			
			Direct opening	Model	Direct opening	Model	Direct opening	Model		
Roller lever	1-conduit	M20	$\rightarrow$	D4N-4120	$\bigcirc$	D4N-4A20	$\bigcirc$	D4N-4B20		
•   (resin lever, resin roller)		M12 connector	$\bigcirc$	D4N-9120	$\bigcirc$	D4N-9A20	$\bigcirc$	D4N-9B20		
A Plunger	1-conduit M20	$\bigcirc$	D4N-4131	$\bigcirc$	D4N-4A31	$\bigcirc$	D4N-4B31			
-		M12 connector	$\bigcirc$	D4N-9131	$\bigcirc$	D4N-9A31	$\bigcirc$	D4N-9B31		
	2-conduit	M20	$\bigcirc$	D4N-8131	$\bigcirc$	D4N-8A31	$\bigcirc$	D4N-8B31		
Roller plunger	1-conduit	M20	$\ominus$	D4N-4132	$\bigcirc$	D4N-4A32	$\ominus$	D4N-4B32		
		M12 connector		D4N-9132	$\bigcirc$	D4N-9A32		D4N-9B32		
	2-conduit	M20	$\bigcirc$	D4N-8132	$\bigcirc$	D4N-8A32	$\bigcirc$	D4N-8B32		
One-way roller arm lever (horizontal)	1-conduit	M20	$\ominus$	D4N-4162	$\bigcirc$	D4N-4A62	$\bigcirc$	D4N-4B62		
lía		M12 connector		D4N-9162	$\bigcirc$	D4N-9A62	$\bigcirc$	D4N-9B62		
	2-conduit	M20	$\bigcirc$	D4N-8162	$\bigcirc$	D4N-8A62	$\bigcirc$	D4N-8B62		
One-way roller arm lever (vertical)	1-conduit	M20	$\bigcirc$	D4N-4172	$\bigcirc$	D4N-4A72	$\bigcirc$	D4N-4B72		
Adjustable roller lever, form lock	1-conduit	M20	$\bigcirc$	D4N-412G	$\bigcirc$	D4N-4A2G	$\bigcirc$	D4N-4B2G		
(metal lever, resin roller)		M12 connector	$\bigcirc$	D4N-912G	$\bigcirc$	D4N-9A2G	$\bigcirc$	D4N-9B2G		
Adjustable roller lever, form lock (metal lever, rubber roller)	1-conduit	M20	$\bigcirc$	D4N-412H	$\bigcirc$	D4N-4A2H	$\bigcirc$	D4N-4B2H		
11		M12 connector		D4N-912H		D4N-9A2H		D4N-9B2H		

Note: Conduit sizes 1/2-14NPT, G1/2 and Pg13,5 are also available.

#### Switches with two contacts and MBB contacts

Bold = preferred stock item

Actuator	Conduit size		Built-in switch mechanism					
			1NC / 1NC	) (snap-action)	1NC / 1NO (slow-action)		2NC (slow-action)	
	Dire		Direct opening	Model	Direct opening	Model	Direct opening	Model
Roller lever (resin lever, resin roller)	1-conduit	M20	$\bigcirc$	D4N-4C20	$\bigcirc$	D4N-4E20	$\bigcirc$	D4N-4F20
		M12 connector				D4N-9E20		
	2-conduit	M20	$\bigcirc$	D4N-8C20	$\bigcirc$	D4N-8E20	$\bigcirc$	D4N-8F20
Roller plunger	1-conduit	M20	$\ominus$	D4N-4C32	$\bigcirc$	D4N-4E32	$\ominus$	D4N-4F32
		M12 connector				D4N-9E32		
	2-conduit	M20	$\bigcirc$	D4N-8C32	$\bigcirc$	D4N-8E32	$\bigcirc$	D4N-8F32
One-way roller arm lever (horizontal)	1-conduit	M20	$\bigcirc$	D4N-4C62	$\bigcirc$	D4N-4E62	$\bigcirc$	D4N-4F62
1111		M12 connector				D4N-9E62		
	2-conduit	M20	$\bigcirc$	D4N-8C62	$\bigcirc$	D4N-8E62	$\bigcirc$	D4N-8F62

Note: Conduit sizes 1/2-14NPT, G1/2 and Pg13,5 are also available.

Bold = preferred stock item

# Safety components

General-purpose switches with two contacts

Actuator	Conduit size		Built-in switch mechanism							
				1NC / 1NO (snap-action)		2NC (snap-action)		(slow-action)	2NC (slow-action)	
			Direct opening	Model	Direct opening	Model	Direct opening	Model	Direct opening	Model
Cat whisker	1-conduit	M20		D4N-4180		D4N-4280				D4N-4B80
Plastic rod	1-conduit	M20		D4N-4187		D4N-4287				D4N-4B87

Note: Conduit sizes 1/2-14NPT, G1/2 and Pg13,5 are also available.

Bold = preferred stock item

#### Specifications

Degree of protection		IP67 (EN60947-5-1)			
Durability <sup>*1</sup>	Mechanical	15,000,000 operations min. / Fork lever 10,000,000 operations min.			
	Electrical	500,000 operations min. for a resistive load of 3 A at 250 VAC 300,000 operations min. for a resistive load of 10 A at 250 VAC			
Operating speed		1 mm/s to 0.5 m/s (D4-1120)			
Operating frequency		30 operations/minute max.			
Minimum applicable load		Resistive load of 1 mA at 5 VDC (N-level reference value)			
Protection against electri	c shock	Class II (double insulation)			
Pollution degree (operation	ng environment)	3 (EN60947-5-1)			
Contact gap		Snap-action: 2x0.5 mm min Slow-action: 2x2 mm min			
Conditional short-circuit current		100 A (EN60947-5-1)			
Rated open thermal current (I <sub>th</sub> )		10 A (EN60947-5-1)			
Ambient temperature		Operating: -30° C to 70° C with no icing			

<sup>\*1</sup> The durability is for an ambient temperature of 5° C to 35° C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative.

Note: - The above values are initial values.



### Safety-limit switch with metal housing

The D4BN family is a complete line-up of safety-limit switches in metal housing. They are available with one or two built-in contacts and a wide range of head and actuator types. To set up easy installation and maintenance, various conduit types, e.g. M20, are provided.

- · Direct opening mechanism
- · Various actuators
- · Robust metal housing
- Gold-plated contacts for handling micro loads •
- · Metric conduit types available

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#### **Ordering information**

Switches	(EN50041)			
		1NC / 1NO (snap-action)	1NC / 1NO (slow-action)	2NC (slow-action)
Side rotary	Roller lever (form A)	D4B-4111N	D4B-4511N	D4B-4A11N
	Adjustable roller lever	D4B-4116N	D4B-4516N	D4B-4A16N
	Adjustable rod lever (form D)	D4B-4117N	D4B-4517N	D4B-4A17N
Top plunger	Plain (form B)	D4B-4170N	D4B-4570N	D4B-4A70N
	Roller (form C)	D4B-4171N	D4B-4571N	D4B-4A71N
Wobble	Coil spring	D4B-4181N		
lever	Plastic rod	D4B-4187N		

#### Spec

Degree of protection

siddow	Conspring	D4D-41011N			VVODDIe	Coll sp	Jing				
lever	Plastic rod	D4B-4187N			lever	Plastic	c rod				
Note: Co	onduit sizes G1/2	and Pg 13,5 are	also available					italic =	safety limit swit	ich, mec	hanical form lo
Specif	ications										
Item			Snap-action				Slow-ac	tion			
Durabilit	y <sup>*1</sup>	Mechanical	30,000,000 operatio	ons min.			10,000,0	00 operatio	ns min.		
		Electrical	500,000 operations	min. (at a 250 VA	C, 10 A resistiv	e load)					
Operatin	g speed		1 mm/s to 0.5 m/s								
Operatin	g frequency		Mechanical: 120 o Electrical: 30 op	operations/min perations/min							
Rated fre	equency		50/60 Hz								
Contact	resistance		25 m $\Omega$ max. (initial	value)							
Pollution (operation	i degree ig environment	)	3 (EN60947-5-1)								
Conditional short-circuit current 100 A (EN60947-5-1)											
Conventi (I <sub>th</sub> )	ional enclosed	thermal current	20 A (EN60947-5-1	)							
Protection against electric shock Class I (with ground terminal)											
Ambient temperature Operating: -40 °C to 80 °C (with no icing) <sup>*2</sup>											

\*1 The durability is for an ambient temperature of 5 °C to 35 °C and ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.

IP67 (EN60947-5-1)

\*2 -25 °C to 80 °C for the flexible-rod type.

	3-conduit	Switch			
n)			1NC / 1NO (snap-action)	1NC / 1NO (slow-action)	2NC (slow-action)
1	Side rotary	Roller lever (form A)	D4B-8111N		
I		Adjustable roller lever	D4B-8116N		
I		Adjustable rod lever (form D)	D4B-8117N		
1	Top plunger	Plain (form B)			
1		Roller (form C)	D4B-8171N		D4B-8A71N
	Wobble	Coil spring			
	lever	Plastic rod			

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## Safety-limit switch with manual reset

The D4NR family is a complete line-up of safety-limit switches with manual reset. They are available with one, two or three built-in contacts and a wide range of actuator types. To set up easy installation and maintenance, various conduit types, e.g. M20 and M12 connector types, are provided.

- Direct opening mechanism
- · Various actuators
- Pull-reset switches ٠
- Gold-plated contacts for handling micro loads ٠
- Metric conduit types available •

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#### **Ordering information**

Actuator	Conduit size		Built-in switch mech	nanism			
			1NC / 1NO (slow-action)	2NC / 1NO (slow-action)			
Roller lever	1-conduit	M20	D4N-4A20R	D4N-4C20R			
(resin lever, resin roller)		M12 connector	D4N-9A20R				
	2-conduit	M20	D4N-8A20R	D4N-8C20R			
Adjustable roller lever, form lock (metal lever, rubber roller)	1-conduit	M20	D4N-4A2HR	D4N-4C2HR			
		M12 connector	D4N-9A2HR				
J.	2-conduit	M20	D4N-8A2HR	D4N-8C2HR			
A Plunger	1-conduit	M20	D4N-4A31R	D4N-4C31R			
		M12 connector	D4N-9A31R				
	2-conduit	M20	D4N-8A31R	D4N-8C31R			
Roller plunger	1-conduit	M20	D4N-4A32R	D4N-4C32R			
A		M12 connector	D4N-9A32R				
	2-conduit	M20	D4N-8A32R	D4N-8C32R			
Note: Conduit types with G1/2, 1/2-14NPT and I	ote: Conduit types with G1/2. 1/2-14NPT and Po13.5 are also available.						

Note: Conduit types with G1/2, 1/2-14NPT and Pg13,5 are also available.

Degree of protection		IP67 (EN60947-5-1)			
Durability	Mechanical	1,000,000 operations min.			
	Electrical	500,000 operations min. for a resistive load of 3 A at 250 VAC 300,000 operations min. for a resistive load of 10 A at 250 VAC			
Operating speed		1 mm/s to 0.5 m/s (D4N-1A20R)			
Operating frequency		30 operations/minute max.			
Protection against electri	c shock	Class II (double insulation)			
Pollution degree (operation	ng environment)	3 (EN60947-5-1)			
Contact gap		Snap-action: 2 x 0.5 mm min Slow-action: 2 x 2 mm min			
Rated open thermal current (Ith)		10 A (EN60947-5-1)			
Ambient temperature		Operating: -30° C to 70° C with no icing			





### **Emergency stop switch**

The A165E line-up offers E-stop switches with various head types. For flexible application, a wide range of accessories is provided. To set up easy installation and maintenance, various contact combinations are available.

- Direct opening mechanism with minimum contact separation of 3 mm
- · Safety lock mechanism prevents misuse
- Short mounting depth
- · Modular construction; easy installation using snap-in switch

**3) 1***R*<sup>1</sup> **1***R* 

#### **Ordering information**

Illumination	Rated voltage	Pushbutton color	Pushbutton size	Terminal	Contact	Standard load (125 VAC at 5 A, 250 VAC at 3 A, 30 VDC at 3 A)
LED	24 VDC	Red	30 dia.	Solder terminal	SPST-NC	A165E-LS-24D-01
					DPST-NC	A165E-LS-24D-02
None					SPST-NC	A165E-S-01
					DPST-NC	A165E-S-02
					TPST-NC	A165E-S-03U
LED	24 VDC		40 dia.		SPST-NC	A165E-LM-24D-01
					DPST-NC	A165E-LM-24D-02
None					SPST-NC	A165E-M-01
					DPST-NC	A165E-M-02
					TPST-NC	A165E-M-03U

Note: The above models have a surface indication of "RESET." Models with "STOP" indication are also available. For further information, contact your OMRON representative.

#### Accessories (order separately)

$\cdots \cdots \cdots \cdots \cdots $					
Item	Туре	Model	Precautions		
Yellow plate	Yellow, 45 dia.	A16Z-5070	Use this as an emergency stop nameplate.		
Panel plug	Rectangular	A16ZJ-3003	Used for covering the panel cutouts for future panel expansion.		
	Square	A16ZA-3003			
	Round	A16ZT-3003			
Tightening tool		A16Z-3004	Useful for repetitive mounting. Be careful not to tighten excessively.		
Extractor		A16Z-5080	Convenient for extracting the switch and lamp.		

#### Specifications

Rated voltage	Resistive load			Features
	A165E series	A165ED-U series		Operating force (OF) max.
125 VAC	5 A	1 A		Releasing force (RF) min.
250 VAC	3 A	0.5 A		Pretravel (PT)
30 VDC	3 A	1 A		
Minimum applicable load	150 mA at 5 VDC	1 mA at 5 VDC	ĺ	

Item		Emergency stop switch
Allowable operating	Mechanical	20 operations/minute max.
frequency	Electrical	10 operations/minute max.
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 2,000 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground 1,000 VAC, 50/60 Hz for 1 min between lamp terminals <sup>*1</sup>
Durability	Mechanical	100,000 operations min.
	Electrical	100,000 operations min.
Ambient temperature		Operating: -10°C to 55°C (with no icing or condensation) Storage: -25°C to 65°C (with no icing or condensation)
Protection against electric shock		Class II

<sup>\*1</sup> LED not mounted. Test them with the LED removed.



### **Relays with forcibly guided contacts**

The slim G7SA relay family with forcibly guided contacts is available as a four- or six-pole type in various contact combinations and offers reinforced insulation. Terminals are arranged for easy PCB layout. It can be soldered directly to a PCB or used together with the P7SA sockets.

- Forcibly guided contacts
- Conforms to EN 50205 •
- 6 A at 240 VAC and 6 A at 24 VDC for resistive loads .
- Reinforced insulation between inputs and outputs and poles
- 4- and 6-pole relays available

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#### Ordering information

Relays with forcibly guided contacts					
Туре	Sealing	Poles	Contacts	Rated voltage	Model
Standard Flux-tight	Flux-tight	4 poles	3PST-NO, SPST-NC	24 VDC*1	G7SA-3A1B
			DPST-NO, DPST-NC		G7SA-2A2B
		6 poles	5PST-NO, SPST-NC		G7SA-5A1B
			4PST-NO, DPST-NC		G7SA-4A2B
		3PST-NO, 3PST-NC		G7SA-3A3B	

Sockets					
Туре		LED indicator	Poles	Rated voltage	Model
Track- mounting	Track mounting and screw mounting possible	Yes	4 poles 6 poles	24 VDC	P7SA-10F-ND P7SA-14F-ND
Back- mounting	PCB terminals	No	4 poles 6 poles		P7SA-10P P7SA-14P

\*1 12 VDC, 21 VDC, 48 VDC are available on request.

#### Specifications

Coil						
Rated voltage	Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Max. voltage	Power consumption
24 VDC	4 poles: 15 mA 6 poles: 20.8 mA	4 poles: 1,600 Ω 6 poles: 1,152 Ω	75% max. (V)	10% min. (V)	110% (V)	4 poles: approx. 360 mW 6 poles: approx. 500 mW

Note: Refer to datasheet for details

#### Contacts

Load	Resistive load ( $\cos\phi$ = 1)	Load	Resistive load (cos <i>ϕ</i> = 1)
Rated load	6 A at 250 VAC, 6 A at 30 VDC	Max. switching current	6 A
Rated carry current	6 A	Max. switching capacity	1,500 VA, 180 W
Max. switching voltage	250 VAC, 125 VDC	(reference value)	

Relays with forcibly guided contacts

	-			
Contact resistance		100 m $\Omega$ max. (The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.)		
Operating time *1		20 ms max.		
Response time *1		10 ms max. (The response time is the time it takes for the normally open contacts to open after the coil voltage is turned OFF.)		
Release time *1		20 ms max.		
Insulation resistance		100 M $\Omega$ min. (at 500 VDC) (The insulation resistance was measured with a 500 VDC megger at the same places that the dielectric strength was measured.)		
Dielectric strength <sup>*2 *3</sup>		Between coil contacts/different poles: 4,000 VAC, 50/60 Hz for 1 min (2,500 VAC between poles 3-4 in 4-pole Relays or poles 3-5, 4-6, and 5-6 in 6-pole Relays.) Between contacts of same polarity: 1,500 VAC, 50/60 Hz for 1 min		
Durability	Mechanical	10,000,000 operations min. (at approx. 36,000 operations/hr)		
	Electrical	100,000 operations min. (at the rated load and approx. 1,800 operations/hr)		
Min. permissible load <sup>*4</sup>		5 VDC, 1 mA (reference value)		
Ambient temperature *5		Operating: -40°C to 85°C (with no icing or condensation)		
Ambient humidity		Operating: 35% to 85%		
Approved standards		EN61810-1 (IEC61810-1), EN50205, UL508, CSA22.2 No. 14		

These times were measured at the rated voltage and an ambient temperature of 23°C. Contact bounce time is not included.

\*2 Pole 3 refers to terminals 31-32 or 33-34, pole 4 refers to terminals 43-44, pole 5 refers to terminals 53-54, and pole 6 refers to terminals 63-64. When using a P7SA socket, the dielectric strength between coil contacts/different poles is 2,500 VAC, 50/60 Hz for 1 min.

- \*3
- \*4 Min. permissible load is for a switching frequency of 300 operations/min.

\*5 When operating at a temperature between 70°C and 85°C, reduce the rated carry current (6 A at 70°C or less) by 0.1 A for each degree above 70°C.

Note: The values listed above are initial values