

6.3 Switches

6.3.1 Switch versions

For position detection, depending on the requirement, mechanical switches in different protection classes as well as inductive proximity switches Figure 6.41 with the usual output circuits are available.

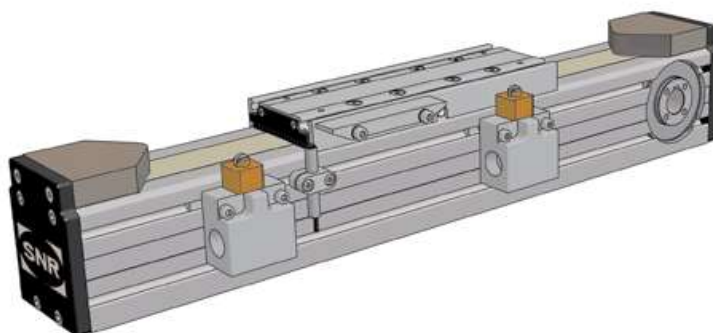


Figure 6.41 — Linear Axis with a set of mechanical limit switches and inductive proximity switch

For the emergency shutdown of the drives before the mechanical end position damper be achieved, mechanically actuated switches are usually used. A combination with outside placed inductive proximity switches to set additional switching points for example for reference movements is possible. A mechanical limit switch set consists of two switches with fasteners and cam switch.

An extremely compact version for Linear Axis of the AXC series are the inductive proximity switches for installation in the profile grooves (Figure 6.42). They are flush with the surface of the aluminum profile of the axis and have almost no interference contour. In this case a groove insert (Chapter 6.6) will be mounted in addition to assured positioning of the cable in the groove.

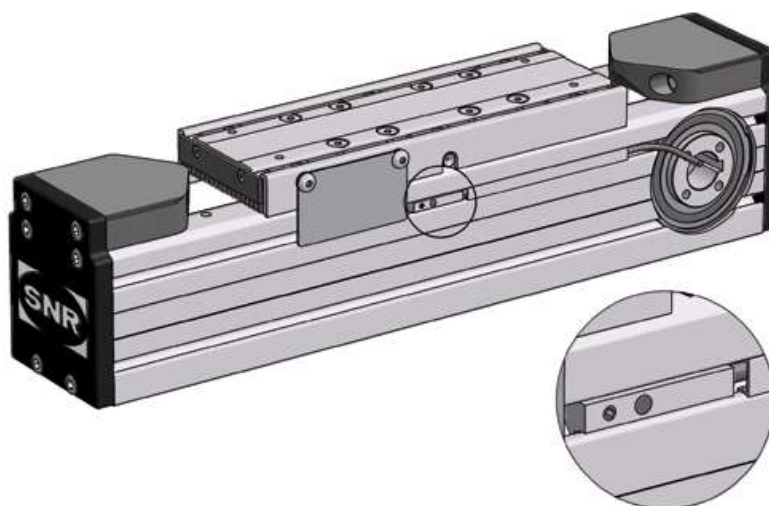


Figure 6.42 — Inductive proximity switches installation in the profile groove

The inductive proximity switches are available in the versions PNP-NC (opener), PNP-NO (closer) and NPN-NC (opener). An inductive proximity switches set consists of two switches with fasteners and cam switch.

All switches are installed factory-provided.

6.3.2 Cable guiding

The cable of the inductive proximity switches for the AXC series are laid in a groove to the drive. The cable guiding is chosen such that at least 0.5 m free cable length remains. If this is not possible with the available cable length, the cable is led out on the opposite side. Only two inductive proximity switches per side can be used for the type AXC60.

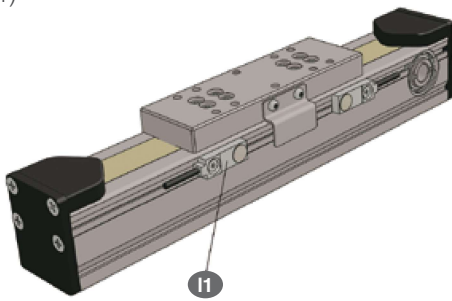
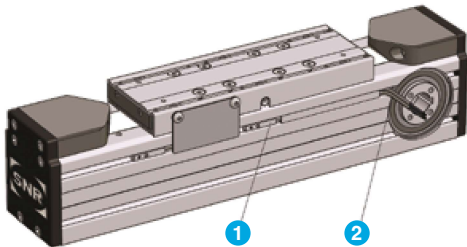
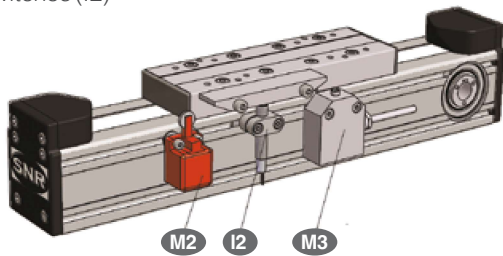
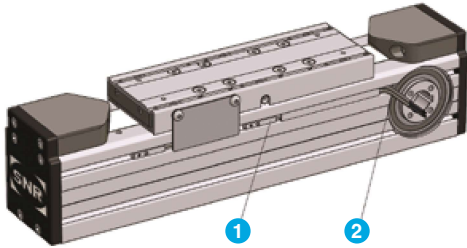
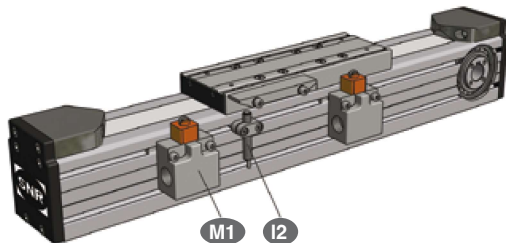
The cable of the inductive proximity switches I2 are laid in a groove to the drive except for AXC40. The cable length is chosen such that at least 0.5 m free cable length remains. If this is not possible with the maximum available cable length, the cable is led out on the opposite side. For the type AXDL 110 Z the cables are always laid out to the deflection pulley side. For the types AXDL160Z and AXDL240Z the cables are always laid out to the pulley side.

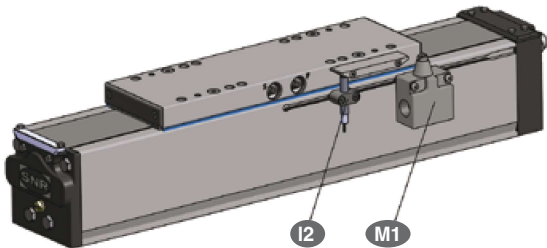
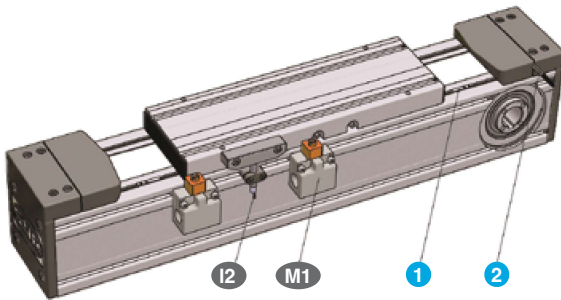
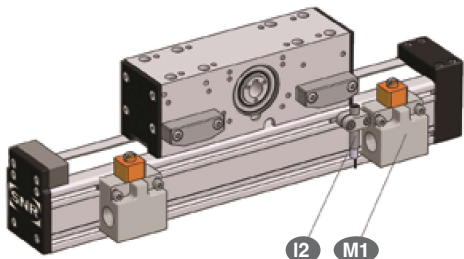
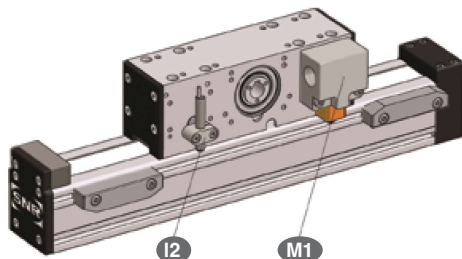
6.3.3 Mounting options

Depending on series and size a variety combination and assembly options of limit switches are possible, which are summarized in Table 6.31. The most common combinations can be encoded on the type code.

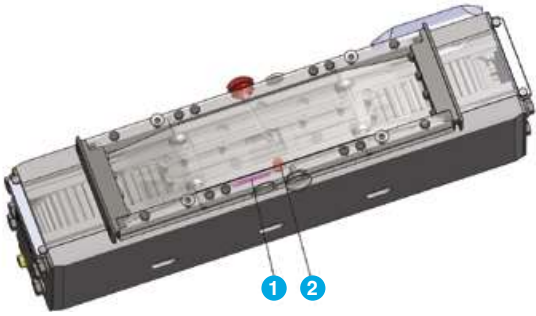
An overview of these options contains Table 6.37 in Chapters 6.3.7.

Table 6.31 — Switch mounting on SNR Linear Axis

AXC			
		Inductive proximity switches (I1)	
AXC40Z AXC40S AXC40T			
		Inductive proximity switches (AXC Initiator)	Mechanical (M2,M3) and inductive proximity switches (I2)
AXC60Z AXC60S AXC60T		 1 AXC – Initiator 2 Cable guide	
		Inductive proximity switches (AXC Initiator)	Mechanical (M1) and inductive proximity switches (I2)
AXC80Z AXC80S AXC80T AXC100Z_B AXC100Z_C AXC100Z_L		 1 AXC – Initiator 2 Cable guide	

AXC100Z_D AXC100S_D	Mechanical (M1) and inductive proximity switches (I2) 
AXC120Z AXC120S AXC120T	Mechanical (M1), AXC initiator and inductive proximity switches (I2)  1 AXC – Initiator 2 Cable guide
AXC_A	<div><div>Slider moved Mechanical (M1)* and inductive proximity switches (I2)  I2 M1 <small>* M2 for AXC40A</small></div><div>Profile moved Mechanical (M1)* and inductive proximity switches (I2)  I2 M1 <small>* M2 for AXC40A</small></div></div>

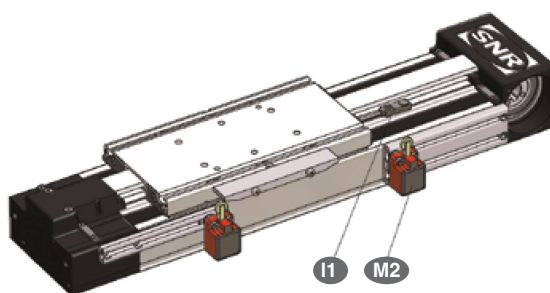
AXF

<p>AXF100Z AXF100S AXF100T AXF100G</p>	<p>Magnetic field switch</p>  <p> 1 Magnetic field switch 2 Switching magnet </p>
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AXDL

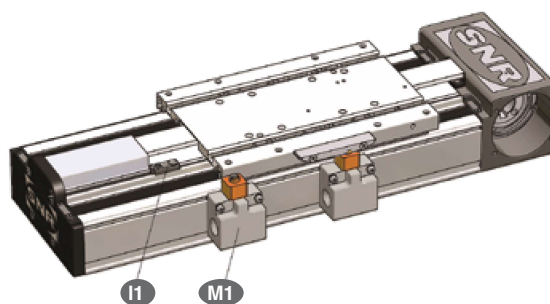
Mechanical (M2) and inductive proximity switches (I1)

AXDL110Z
AXDL100S
AXDL110T



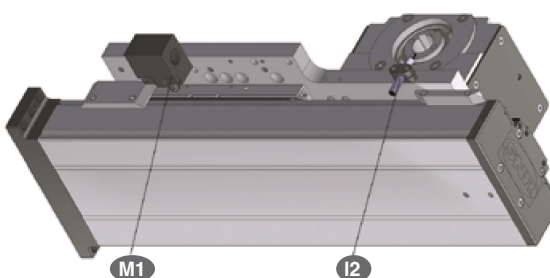
Mechanical (M1) and inductive proximity switches (I1)

AXDL160Z
AXDL160S
AXDL160T
AXDL240Z
AXDL240S
AXDL240T



Mechanical (M1) and inductive proximity switches (I2)

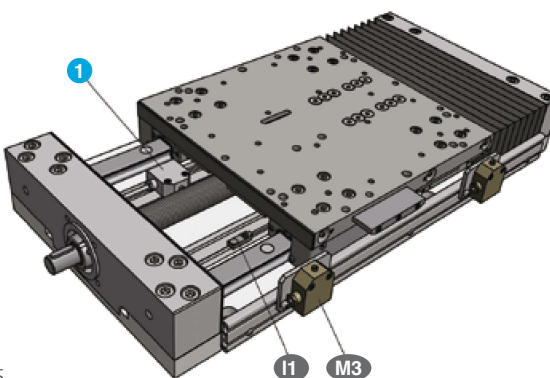
AXDL160A
AXDL240A



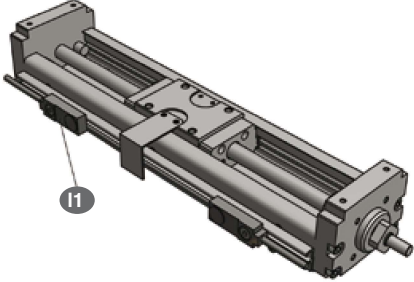
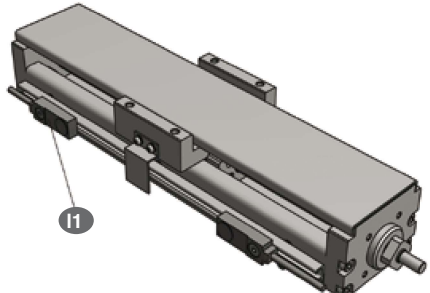
AXLT

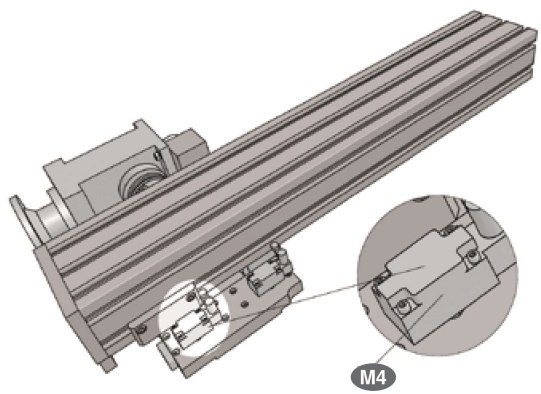
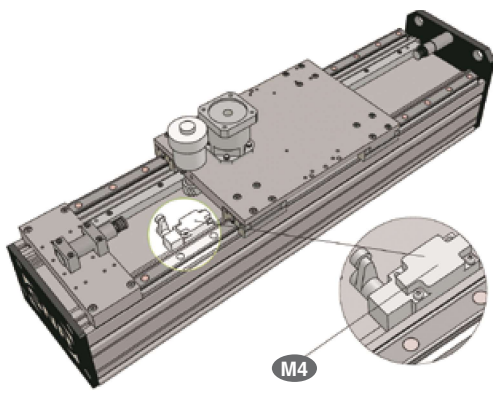
Mechanical (M3) and inductive proximity switches (I1, I3)

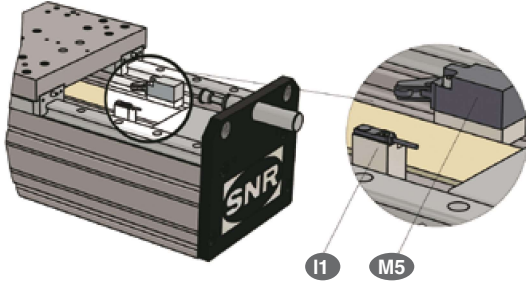
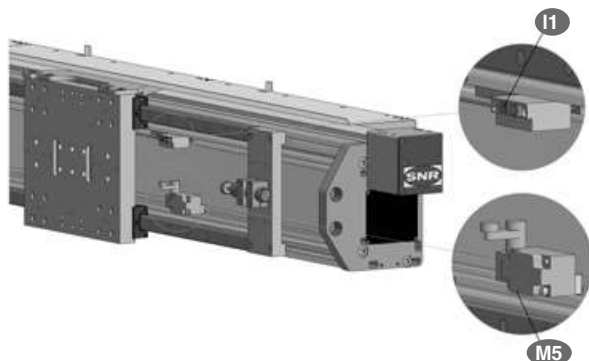
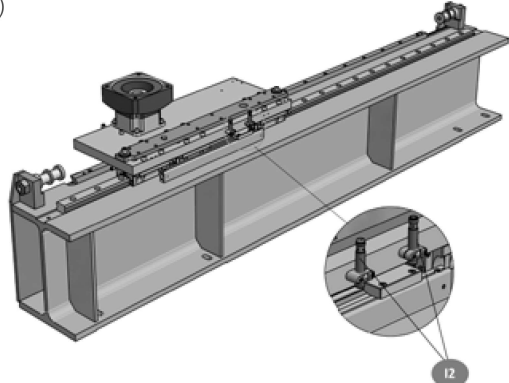
AXLT_S
AXLT_T



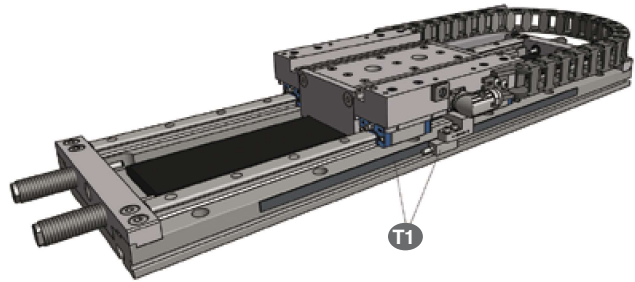
1 M1 only for AXLT455

AXBG		
AXBG_S	Inductive proximity switches (I1)	Inductive proximity switches (I1)
		

AXS		
AXS200M_ AXS230MB AXS280MB AXS110TA AXS120TH AXS120TV AXS240TH AXS280TH AXS280TV	Mechanical switches (M4)	
AXS280MP AXS460MP AXS500MP	Mechanical switches (M4)	

<p>AXS200Y AXS280Z</p>	<p>Mechanical (M5) and inductive proximity switches (I1)</p>  <p>The diagram shows a 3D perspective view of a mechanical assembly. A circular inset highlights a specific component, which is then shown in a larger circular detail. This detail shows a mechanical switch (M5) and an inductive proximity switch (I1) mounted on a metal plate. The SNR logo is visible on the side of the assembly.</p>
<p>AXS_Y</p>	<p>Mechanical (M5) and inductive proximity switches (I1)</p>  <p>The diagram shows a 3D perspective view of a mechanical assembly. Two circular insets highlight specific components, which are then shown in larger circular details. These details show a mechanical switch (M5) and an inductive proximity switch (I1) mounted on a metal plate. The SNR logo is visible on the side of the assembly.</p>
<p>AXS300MP</p>	<p>Inductive proximity switches (I2)</p>  <p>The diagram shows a 3D perspective view of a mechanical assembly. A circular inset highlights a specific component, which is then shown in a larger circular detail. This detail shows an inductive proximity switch (I2) mounted on a metal plate. The SNR logo is visible on the side of the assembly.</p>

AXLM

<p>AXLM</p>	<p>Magnetic encoded position measuring system (T1...T4)</p>  <p>The diagram shows a 3D perspective view of a mechanical assembly. A circular inset highlights a specific component, which is then shown in a larger circular detail. This detail shows a magnetic encoded position measuring system (T1) mounted on a metal plate. The SNR logo is visible on the side of the assembly.</p>
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6.3.4 Dimensions

For the assembly of limit switches consist of Linear Axis of the series AXC, AXDL, AXLT, AXBG and AXLM depending on size, different mounting versions (Figure 6.43) and from this resulting interference contours.

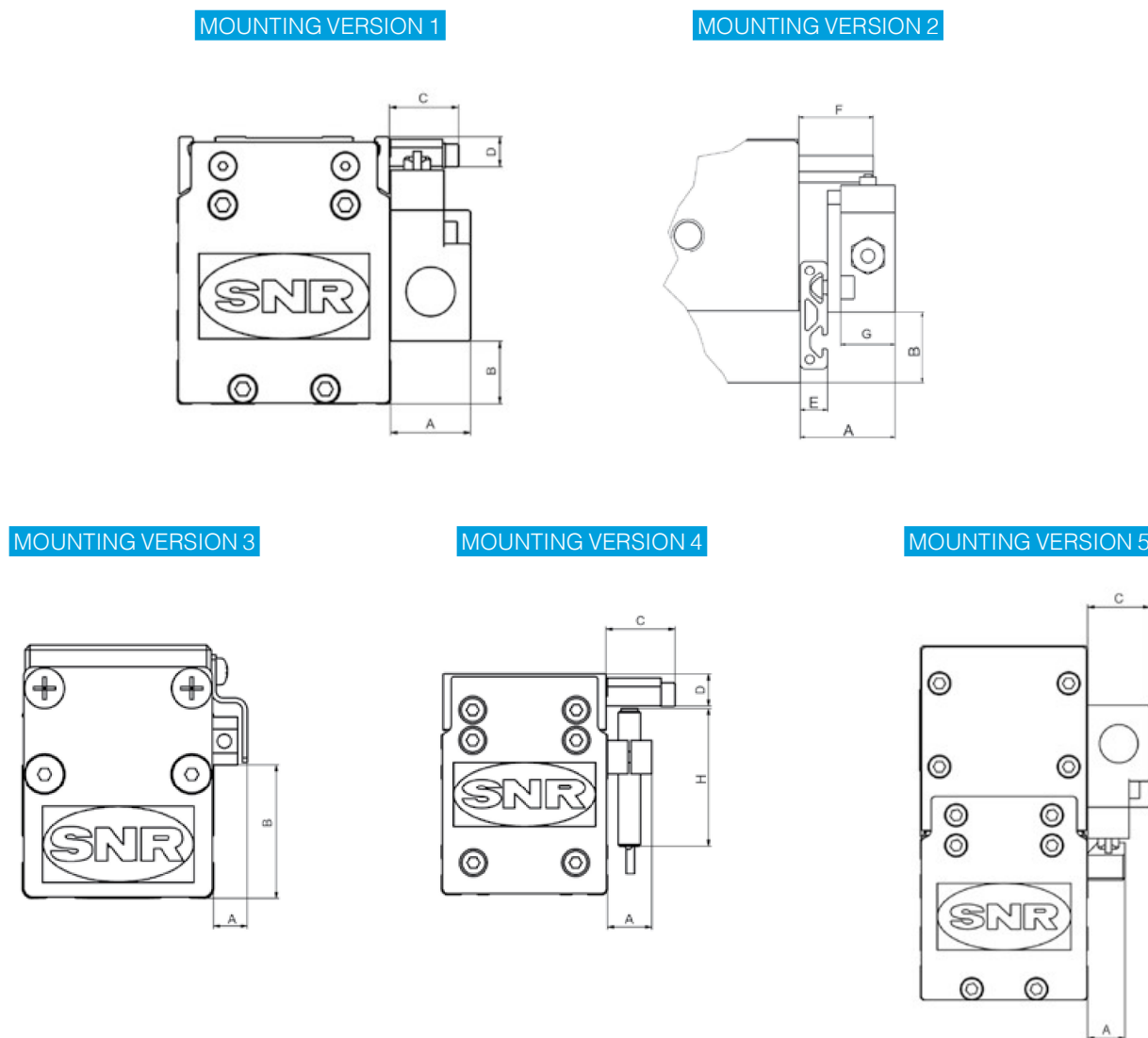


Figure 6.43 — Mounting versions of limit switches

The dimensions are shown in Table 6.32.

Table 6.32 — Dimensions for the limit switch mounting

Type		Switch	Mounting version	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	L ¹ [mm]
AXC40Z AXC40S AXC40T		I1	3	7,0	28,0							30
AXC40A	Slider moved	I1	3	7,0	28,0							58
	Profile moved	M2	5	18,0		21,00						58
		I2	5	18,0		16,00						58
AXC60Z AXC60S AXC60T		M2	1	22,0	19,5	25	11,5					95
		M3	1	20,0	12,5	18	19,0					80
		I2	4	16,0		as with M2 / M3					50	95
AXC60A	Slider moved	M1	1	30,0	9,5	18	55,0					80
		I2	4	16,0		15,0	50,0					55
	Profile moved	M1	5	18,0		30,0						80
		I2	5	18,0		16,00						80
AXC80Z AXC80S AXC80T		M1	1	30,0	25,5	26	11,0					95
		I2	4	16,0		26	11,0				50	95
AXC80A	Slider moved	M1	1	30,0	9,5	18	55,0					55
		I2	4	16,0		16,0	80,5					55
	Profile moved	M1	5	18,0		30,0						80
		I2	5	18,0		16,00						80
AXC100Z_ AXC100Z_C AXC100Z_L		M1	1	30,0	22,5	15	23,5					80
		I2	4	16,0		15	23,5				50	80
AXC100S_D AXC100Z_D		M1	1	30,0	22,5	15	11,0					85
		I2	4	16,0		15	11,0				50	85
AXC120Z AXC120S AXC120T		M1	1	30,0	64,5	26	20,0					80
		I2	4	16,0		26	11,0				50	80
AXC120A	Slider moved	M1	1	30,0	9,5	18	55,0					80
		I2	4	16,0		12,8	150,0				50	80
	Profile moved	M1	5	18,0		30,0						80
		I2	5	18,0		16,00						80
AXDL110Z AXDL110S AXDL110T		M2	2	31,0	7,0	24	9,3	10	27,5	20		120
AXDL160Z AXDL160S AXDL160T		M1	1	30,0	9,5	15	8,5					85
AXDL160A		M1	5	8,0		33,00						80
		I2	5	15,5		16,00						85
AXDL240Z AXDL240S AXDL240T		M1	1	30,0	22,0	15	33,0					80
AXDL240A		M1	5	8,0		29,00						80
AXLT155S AXLT155T		M3	2	25,0	1,0				27,5	20		54
AXLT225S AXLT225T		M3	2	25,0	11,0				27,5	20		54
AXLT325S AXLT325T		M3	2	35,0	26,0				27,5	20		90
AXLT455S AXLT455T		M3	2	34,0	39,5				27,5	20		90
AXBG15S		I1	3	12,7	4,8							10
AXBG20S		I1	3	13,0	6,0							10
AXBG26S		I1	3	13,0	7,0							15
AXBG33S		I1	3	13,0	9,0							15
AXBG46S		I1	3	13,0	10,5							15
AXBG55S		I1	3	13,5	13,0							20
AXLM155		T_	5	1,7		17,50						
AXLM225		T_	5	1,7		18,50						
AXLM325		T_	2									

¹ Length of the cam switch² Switch internally placed, no interference contour

6.3.5 Line splitter

For the field installation of the inductive switches, Linear Axis of the AXC, AXDL and AXLT series can be equipped with line splitters. Depending on the number of required switches, Y line splitter for two or sensor boxes for four switches are available.

Line splitters have to be specified as special options of the Linear Axis and will be delivered with fully wired limit switches. For the connection to the signal processing controller, fixed cables, connectors as well as fieldbus and IO-Link are available.

6.3.6 Technical data

The technical data of the available switches and position measuring systems are contained in the Tables 6.33 to 6.36.

Table 6.33 — Mechanical safety limit switches

Switch	Life time	Housing material	Cable gland	Conductor cross-section	Protection class
M1	30 x 10 ⁶ switching operations	Plastic	M20 x 1,5	0,5...2,5 mm ²	IP67
M2	30 x 10 ⁶ switching operations	Plastic	Screwed connection 4 x M3,5	0,5...1,5 mm ²	IP30
M3	10 x 10 ⁶ switching operations	Metal	Screwed connection	max. 1,5 mm ²	IP67
M4	30 x 10 ⁶ switching operations	Plastic	M20 x 1,5	0,5...2,5 mm ²	IP67
M5	30 x 10 ⁶ switching operations	Plastic	M20 x 1,5	0,5...2,5 mm ²	IP67

Switching segment: Snap-action switch (force disconnection) each case 1 x opener and 1 x closer

Table 6.34 — Inductive proximity switches

Switch	Connection voltage	Max. load current	Switching accuracy	Cable length	Protection class
AXC-Initiator	10...30 V DC	100 mA	≤ 2% of the reacting distance	10 m	IP67
I1	10...30 V DC	100 mA	≤ 10% of the reacting distance	5 m	IP67
I2	12...30 V DC	100 mA	≤ 5% of the reacting distance	2 m	IP67








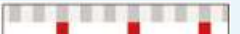
The magnetic field switch detects the magnetic field of the in the slider integrated magnet. Due to the contactless position detection is the function of the magnetic field switches reliable and without wear.

Table 6.35 — AXF – Magnetic field switch

Switch	Connection voltage	Rated operational current	Rated switching field intensity	Cable length	Protection class
AXF Magnetic field switch	10...30 V DC	200 mA	1,2 kA/m	5 m	IP67

The magnet encoded position measuring system is a contactless incremental measuring system, consisting of sensor head and magnetic tape, which is available in several versions. All functions are realized via magnetic sensing.

Table 6.36 — Magnetic encoded position measuring system

Switch	Output signal	Reference point signal	Operating voltage	Total system accuracy	Output voltage (A/B/Z)	Maximum velocity	Protection class	Sensor head	Magnetic tape
T1	Sinusoidal analog signals Sin/Cos	without	5 V ± 5%	± 10µm	1 Vss	5 m/s	IP67		with alternating north and south poles 
T2	Sinusoidal analog signals Sin/Cos	1 Reference point signal	5 V ± 5%	± 10µm	1 Vss	5 m/s	IP67		with one reference point signal 
T3	Sinusoidal analog signals Sin/Cos	Distance-coded reference point signals	5 V ± 5%	± 10µm	1 Vss	5 m/s	IP67		with reference point signals according mathematical algorithm 
T4	Sinusoidal analog signals Sin/Cos	fix periodic reference point signals	5 V ± 5%	± 10µm	1 Vss	5 m/s	IP67		with several reference point signals at the same distance 

6.3.7 Possible switch combinations

Table 6.37 — Possible switch combination

Code number	Mechanical switches					Inductive proximity switches											AXC															
	M1	M2	M3	M4	M5	AXC-Initiator PNP-NC	AXC-Initiator PNP-NO	AXC-Initiator NPN-NC	AXF - Magentic field switch PNP-NC	AXF - Magentic field switch PNP-NO	AXF - Magentic field switch NPN-NC	I1 PNP-NC	I1 PNP-NO	I1 NPN-NO	I2 PNP-NC	I2 PNP-NO	I2 NPN-NO	AXC40...Z/S/T...	AXC40A Slider moved	AXC40A Profile moved	AXC60...Z/S/T...	AXC60A Slider moved	AXC60A Profile moved	AXC80...Z/S/T...	AXC80A Slider moved	AXC80A Profile moved	AXC100Z...B / C / L...	AXC100Z...D... **	AXC100...S / T...	AXC120...Z / S / T...	AXC120A Slider moved	AXC120A Profile moved
00																		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
01	1																				x			x	x		x	x	x	x	x	
	2																							x	x			x	x	x	x	
02	2																				x			x	x		x	x	x	x	x	
	2																				x						x	x	x	x	x	
03	2															1						x		x	x		x	x	x	x	x	
	2															1					x						x	x	x	x	x	
04	2																1					x		x	x		x	x	x	x	x	
	2															1					x											
05			1																		x											
06			2																		x											
07			2													1					x											
08			2														1				x											
09	1																						x			x						x
10	2																						x1			x						x
11	1															1							x									
12						1																x	x		x	x		x			x	
13						2															x	x		x	x		x			x		x
14																2					x											x
15						3																x	x		x	x		x			x	
16		1																			x											
18								1													x	x		x	x		x			x		
19								2													x	x		x	x		x			x		
20																2					x											x
21								3													x	x		x	x		x			x		
22									1												x	x		x	x		x			x		
23									2												x	x		x	x		x			x		
25						2	1																	x	x		x			x		
26												1						x	x													
27													2					x	x													
28															2						x			x			x			x		
29															3						x							x		x		
30																		x	x													
31																					x			x			x			x		
32																		x	x													
33																					x			x			x			x		
34																																
35																																

* RP = Reference point signal

**only on the drive side possible

¹not in combination with A – Standard connections possible. Choose in this case code number 01 on both sides (combinations 01 + 26 / 29 / 32 also possible)

x Option possible

	Mechanical switches															Magnetic encoded position measuring system				AXF	AXDL				AXLT		AXBG	AXS				AXLM
Code number	M1	M2	M3	M4	M5	AXF - Magnetic field switch PNP-NC	AXF - Magnetic field switch PNP-NO	AXF - Magnetic field switch NPN-NC	I1 PNP-NC	I1 PNP-NO	I1 NPN-NO	I2 PNP-NC	I2 PNP-NO	I2 NPN-NO	T1 (without RP*)	T2 (1 RP*)	T3 (distance-coded RP*)	T4 (fix periodic RP*)	AXF100...Z / SN / T / G...	AXDL110Z / S / T...	AXDL160Z / S	AXDL240Z / S	AXDL...A	AXLT...155/225...	AXLT...325/455...	all	AXS...M	AXS280Y	AXS200Y - AXS280Z	AXS...T	all	
00																			x	x	x	x	x	x	x	x	x	x	x	x		
01	1																															
				1																	x	x	x					x	x		x	
02					1																											
	2			2																x		x	x					x	x		x	
03					2						1																		x			
	2				2					1				1							x									x		
04				2								1								x										x		
	2				2						1				1							x	x	x						x		
05			1																						x	x						
06			2																						x	x						
07			2							1															x							
08			2								1														x							
			2											1											x							
12						1													x													
13						2													x													
18							1												x													
19							2												x													
21								1											x													
22								2											x													
26									1											x ²	x ²	x ²			x ³	x ³	x		x	x		
27										2			1							x ²	x ²	x ²		x	x ³	x ³	x		x	x		
28												2								x ²	x ²	x ²		x	x ³	x ³	x		x	x		
29										1										x ²	x ²	x ²		x	x ³	x ³	x		x	x		
30											2									x ²	x ²	x ²		x	x ³	x ³	x		x	x		
31												3								x ²	x ²	x ²		x	x ³	x ³	x		x	x		
32											1									x ²	x ²	x ²		x	x ³	x ³	x		x	x		
33												2								x ²	x ²	x ²		x	x ³	x ³	x		x	x		
34												3								x ²	x ²	x ²		x	x ³	x ³	x		x	x		
35									2	1										x ²	x ²	x ²			x ³	x ³	x		x	x		
50															1																	x
51																1																x
52																	1															x
53																		1														x

* RP = Reference point signal **only on the drive side possible

¹ - not in combination with A – Standard connections possible

Choose in this case code number 01 on both sides (combinations 01 + 26 / 29 / 32 also possible)

² - Initiator mounted on the right side on the top; define in the type code on position 11

³ - Initiator on the left side inside placed; define in the type code on position 11

x: Option possible

Other switch combinations are marked in type code with "XX" and described in plain text.