Datasheet Type 55 · Single rod cylinder in tie rod design with attached adjustable proximity switches

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Description

- Hydraulic single rod cylinder in tie rod design
- Attached adjustable proximity swiches for variable querying of the piston position
- Piston diameter: 25 - 200 mm
- Stroke up to 2000 mm (eventually should be paid attention to buckling)
- With / without end position cushioning with identical dimensions
- Up to three area ratios phi = 1.25, phi = 1.4 and phi = 2.0
- 16 mounting types and the assembly with different seals enable an optimal adaption of the cylinder to each case of application
- Various piston rod designs may be combined with each mounting type
- Special designs, e.g. with the attachment of additional elements are available
- Mounting dimensions are in accordance with DIN 24554
- Cushioning is precisely adjustable
- An essential advantage in maintenance is the quick and simple replacement of the piston rod seal
- Attachment parts in compliance with the standards ISO 8132, DIN 24 337 and DIN 24 338 are available as accessories

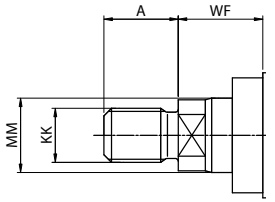
Technical data

- Operating pressure: 100 bar (10 MPa)
- Test pressure: 150 bar (15 MPa)
- Temperature range of hydraulic fluid: - 20 ... + 80 °C
- Viscosity range: (20 ... 80) 10^{-6} m^2/s
- Piston speed: ≤ 0.5 m/s
  (higher speeds on request)

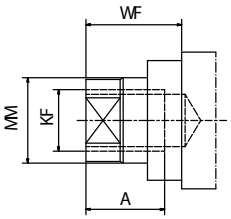
Hydraulic fluids:

- Mineral oils, HFC, HFD liquids in combination with seals made of PTFE and fluoric elastomeres
- HFA and HFB liquids on request

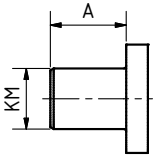
Piston rod end



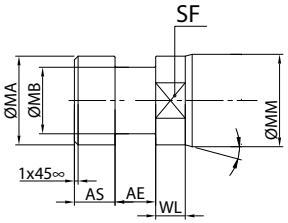
External thread, ref. no. 0
External thread, ref. no. 4



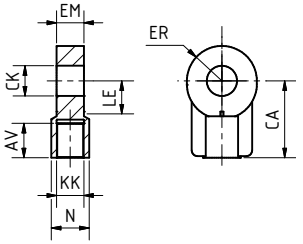
Inside thread, ref. no. 1



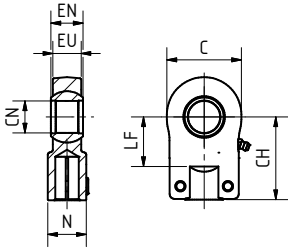
Cylindrical, ref. no. 2



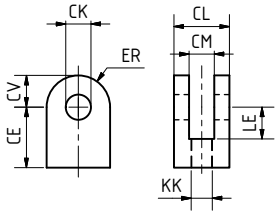
Clutch element, ref. no. 3



Plain rod eye, ref. no. 5



Swivel head, ref. no. 8



Clevis, ref. no. 9

Special design on request!

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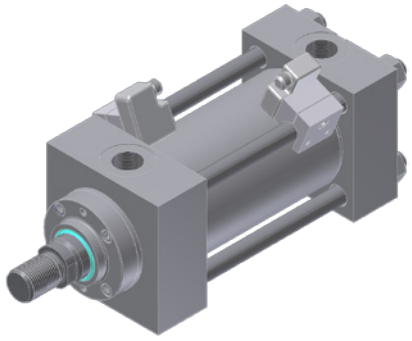
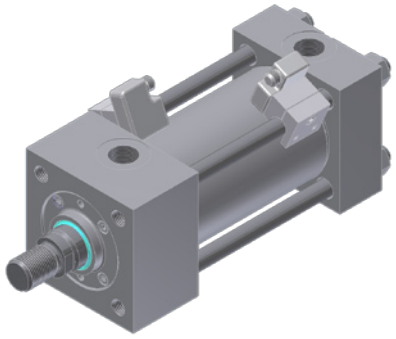
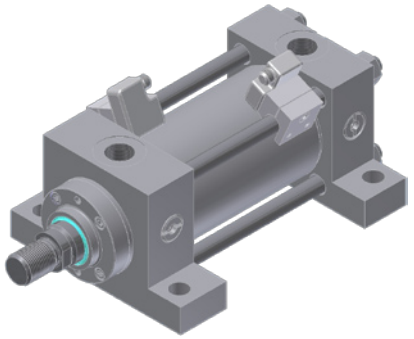
Mounting types



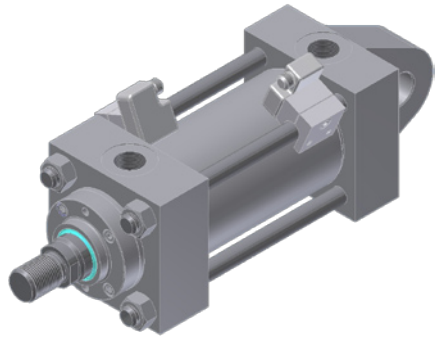
Mounting type: 00
Description: Basic form
ISO-des.: --



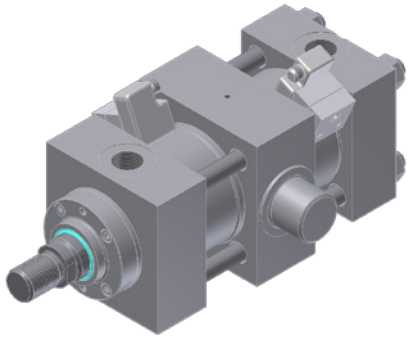
Mounting type: 01
Description: Threaded holes head end
ISO-des.: MX 5



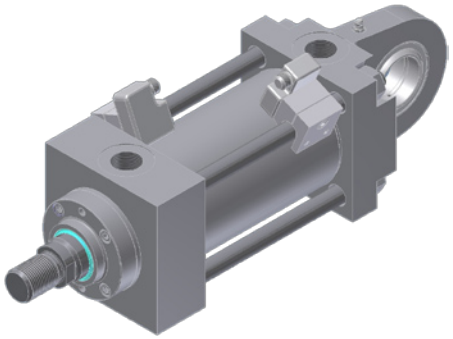
Mounting type: 02
Description: Foot mounting
ISO-des.: MS 2



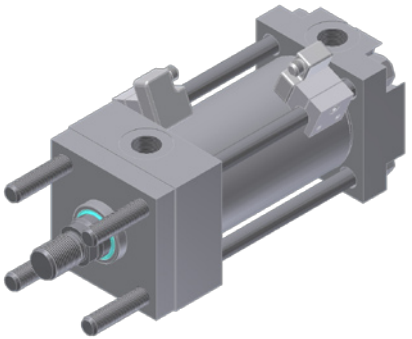
Mounting type: 05
Description: Rod eye
ISO-des.: MP 3



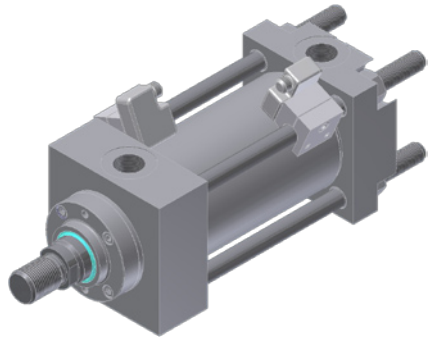
Mounting type: 06
Description: Trunnion
ISO-des.: MT 4



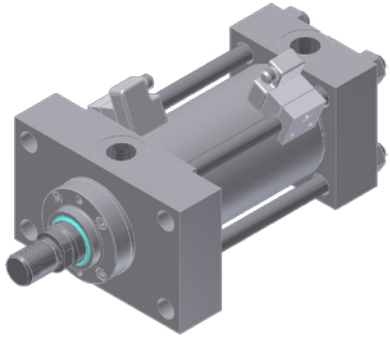
Mounting type: 08
Description: Rod end bearing
ISO-des.: MP 5



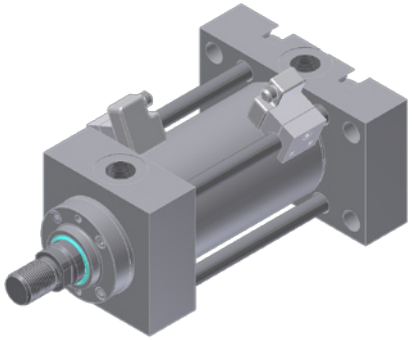
Mounting type: 11
Description: Tie rods elongated head end
ISO-des.: MX 3



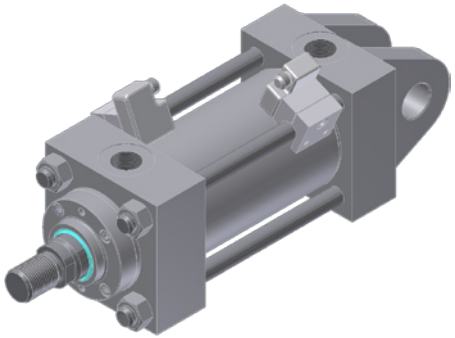
Mounting type: 12
Description: Tie rods elongated cap end
ISO-des.: MX 2



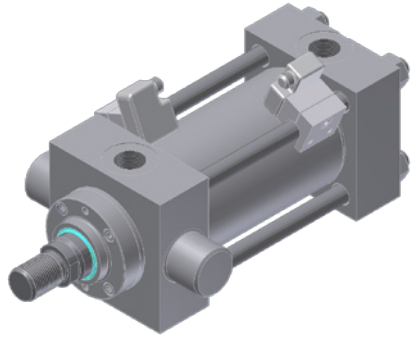
Mounting type: 13
Description: Rectangular flange head end
ISO-des.: ME 5



Mounting type: 14
Description: Rectangular flange cap end
ISO-des.: ME 6



Mounting type: 15
Description: Clevis mounting
ISO-des.: MP 1



Mounting type: 16
Description: Trunnion on the head
ISO-des.: MT 1

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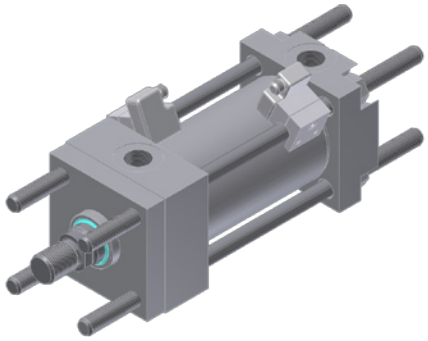
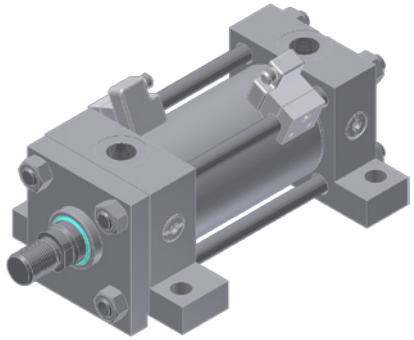
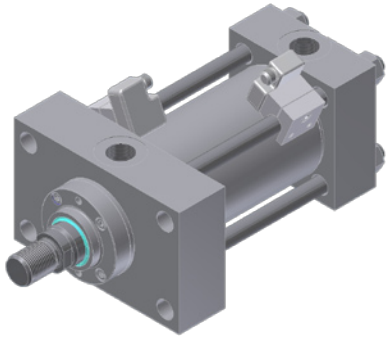
Mounting types



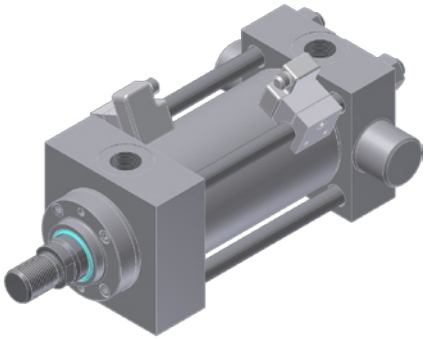
Mounting type: 19
Description: Tie rods elongated both ends
ISO-des.: MX 1



Mounting type: 22
Description: Foot mounting with fit-in key
ISO-des.: MS 2

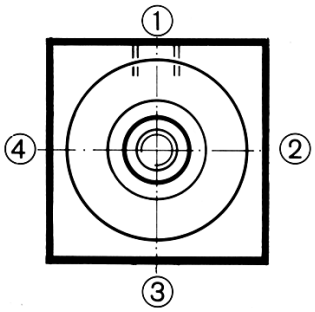


Mounting type: 23
Description: Rectangular flange head end
ISO-des.: --



Mounting type: 26
Description: Trunnion on the bottom
ISO-des.: MF 4

Position of connections



Piston rod view

Connections: Standard position of connections is side 1 for all mounting types.
Connections in different positions are available on request.

Cushioning: Standard position of the adjustment screw for cushioning is side 3, except for:

Mounting type 02, ISO MS 2: side 2
Mounting type 22, ISO MS 2: side 2

Different positions are available on request.

Air bleed: Standard position of the air bleed screw is side 4 for all mounting types.
Air bleed screws in different positions are available on request.

If the connections are ordered on a position deviating from side 1, then the position of the adjustment screw for cushioning and the position of the air bleed screw change accordingly.
If you wish differing positions, please specify when ordering.

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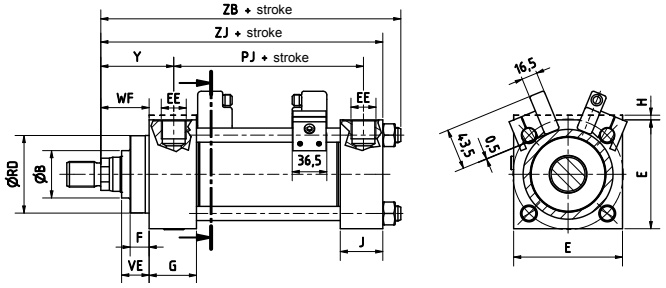
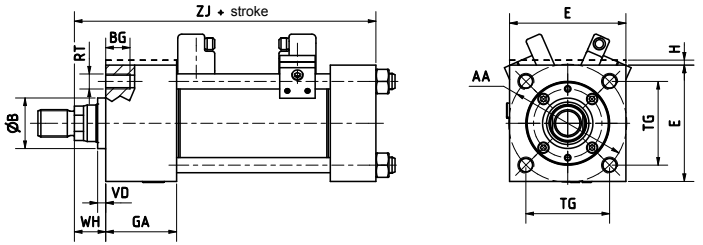
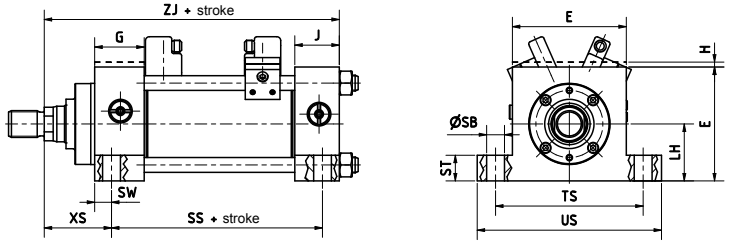
Mounting types



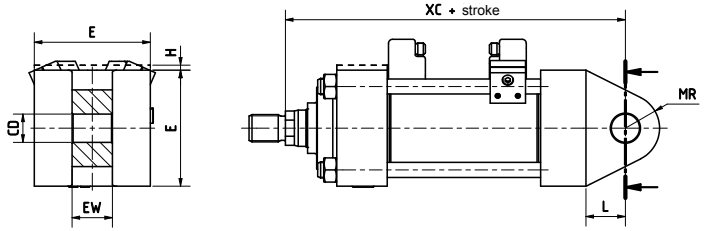
Mounting type 00: Basic form; ISO-des.: --



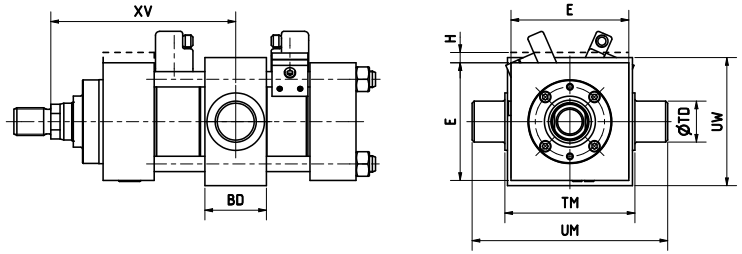
Mounting type 01: Threaded holes head end; ISO-des.: MX 5



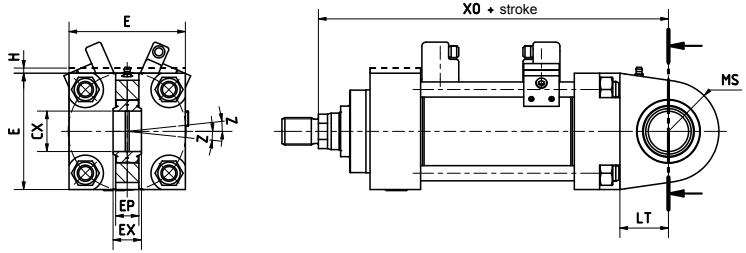
Mounting type 02: Foot mounting; ISO-des.: MS 2



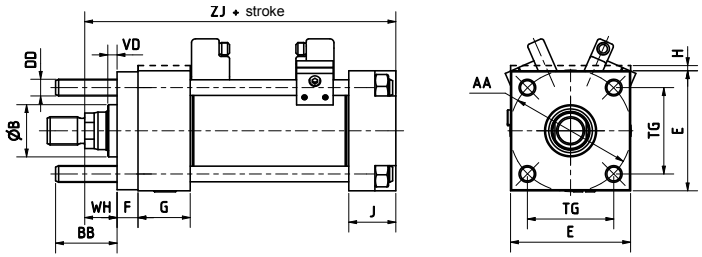
Mounting type 05: Rod eye; ISO-des.: MP 3



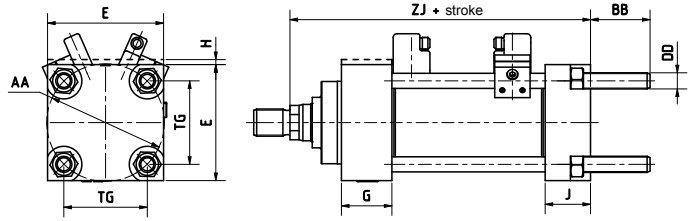
Mounting type 06: Trunnion; ISO-des.: MT 4



Mounting type 08: Rod end bearing; ISO-des.: MP 5

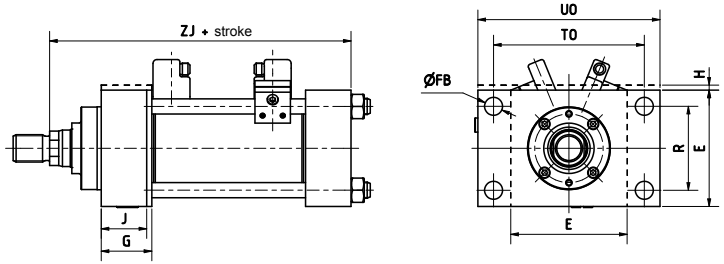


Mounting type 11: Tie rods elongated head end; ISO-des.: MX 3

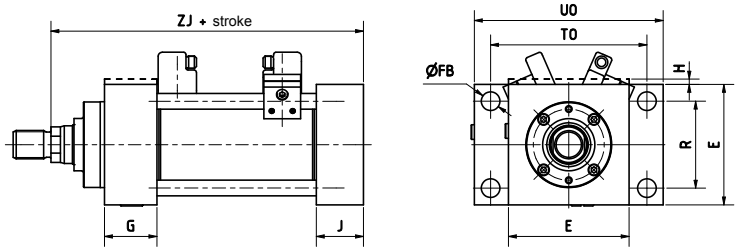


Mounting type 12: Tie rods elongated cap end; ISO-des.: MX 2

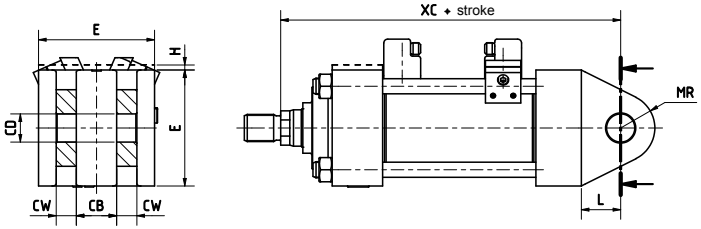
Mounting types



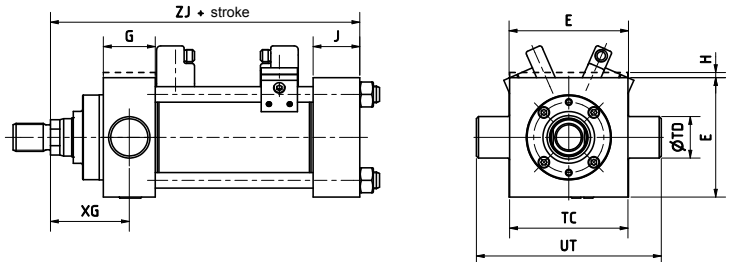
Mounting type 13: Rectangular flange head end; ISO-des.: ME 5



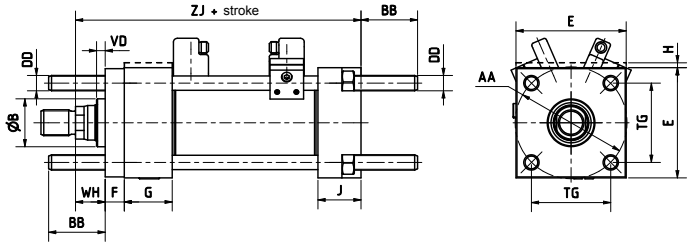
Mounting type 14: Rectangular flange cap end; ISO-des.: ME 6



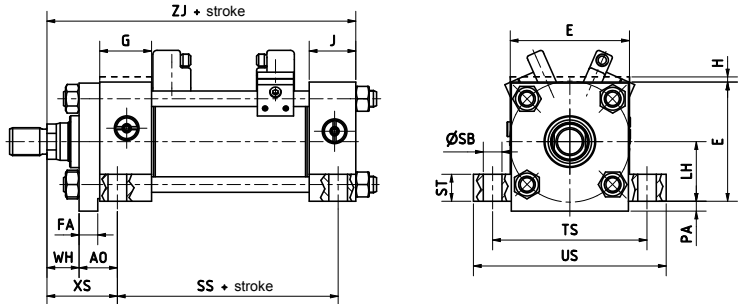
Mounting type 15: Clevis mounting; ISO-des.: MP 1



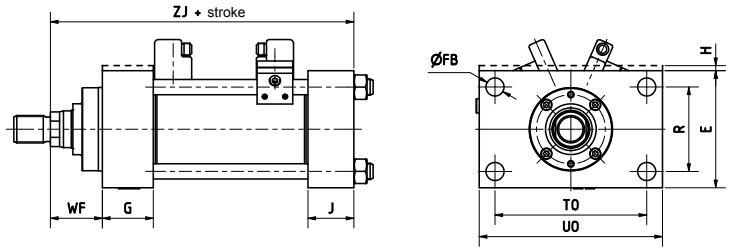
Mounting type 16: Trunnion on the head; ISO-des.: MT 1



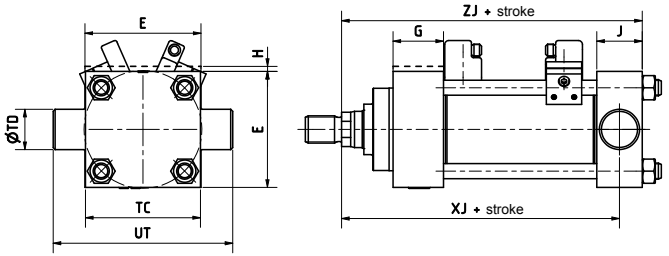
Mounting type 19: Tie rods elongated both ends; ISO-des.: MX 1



Mounting type 22: Foot mounting with fit-in key; ISO-des.: MS 2



Mounting type 23: Rectangular flange head end, wide; ISO-des.: --



Mounting type 26: Trunnion on the bottom; ISO-des.: MF 4

Datasheet Type 55 · Single rod cylinder in tie rod design with attached adjustable proximity switches

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Piston rod dimensions

Piston Ø	Rod end	Tol.	25		32		40		50			63			80			100			125			140			160			180			200		
Piston rod Ø MM			**12**	**18**	**14**	**22**	**18**	**28**	**22**	**28**	**36**	**28**	**36**	**45**	**36**	**45**	**56**	**45**	**56**	**70**	**56**	**70**	**90**	**63**	**80**	**100**	**70**	**90**	**110**	**80**	**100**	**125**	**90**	**110**	**140**
A	0	h15	14		16		18		22			28			36			45			56			63			63			85			85		
A	4			18		22		28		28	36		36	45		45	56		56	63		63	85		85	95		85	95		95	112		95	112
A	1		14	18	16	22	18	28	22	28	36	28	36	45	36	45	56	45	56	63	56	63	85	63	85	95	63	85	95	85	95	112	85	95	112
AE	3	+0.1	7.5		9		11		17.5			20			25			27.5			40			40			40			50			50		
AS	3	-0.1	7.5		9		11		17.5			20			25			27.5			40			40			40			50			50		
C	8		40		45		55		65			80			100			125			160			205			205			240			240		
CH	8	js13	42		48		58		68			85			105			130			150			185			185			240			240		
CK	5, 9		12 -0.008		16 -0.008		20 -0.012		25 -0.012			30 -0.012			40 -0.012			50 -0.012			60 -0.015			80 -0.015			80 -0.015			100 -0.020			100 -0.020		
CN	8		12 -0.008		16 -0.008		20 -0.012		25 -0.012			30 -0.012			40 -0.012			50 -0.012			60 -0.015			80 -0.015			80 -0.015			100 -0.020			100 -0.020		
SF	0		10	15	12	17	15	24	19	24	30	24	30	36	30	36	46	36	46	60	46	60	75	50	70	85	60	75	95	70	85	100	75	95	120
EN	8		10 -0.12		14 -0.12		16 -0.12		20 -0.12			22 -0.12			28 -0.12			35 -0.12			44 -0.15			55 -0.15			55 -0.15			70 -0.20			70 -0.20		
EU	8	h13	8		11		13		17			19			23			30			38			47			47			57			57		
KF	1		M8x1	M12x1.25	M10x1.25	M16x1.5	M12x1.25	M20x1.5	M16x1.5	M20x1.5	M27x2	M20x1.5	M27x2	M33x2	M27x2	M33x2	M42x2	M33x2	M42x2	M48x2	M42x2	M48x2	M64x3	M48x2	M64x3	M80x3	M48x2	M64x3	M80x3	M64x3	M80x3	M100x3	M64x3	M80x3	M100x3
KK	0		M10x1.25		M12x1.25		M14x1.5		M16x1.5			M20x1.5			M27x2			M33x2			M42x2			M48x2			M48x2			M64x3			M64x3		
KK	4		M14x1.5		M16x1.5			M20x1.5		M20x1.5	M27x2		M27x2	M33x2		M33x2	M42x2		M42x2	M48x2		M48x2	M64x3		M64x3	M80x3		M64x3	M80x3		M80x3	M100x3		M80x3	M100x3
LF	8	min	16		20		25		30			35			45			58			68			92			92			116			116		
MA	3		11.2	17	13	20	17	26	21	26	34	26	34	42	34	42	53	42	53	67	53	67	87	60	77	97	67	87	107	77	97	122	87	107	137
MB	3	-0.1	7.8	11.8	8.8	15.8	11.8	19.8	15.8	19.8	23.8	19.8	23.8	31.8	23.8	31.8	40.8	31.8	40.8	45.8	40.8	45.8	59.8	44.8	55.8	69.8	45.8	59.8	79.8	55.8	69.8	89.8	59.8	79.8	99.8
N	8	max	17		21		25		30			36			45			55			68			90			90			110			110		
RK	3		0.4		0.6		0.6		1			1.6			1.6			2			2.5			3			3			3.5			3.5		
W	3		15		15		15		15			15	30	30	30			30			30			30			30			30			30		
WL	3		5	6	6	8	6	9	8	9	9	9	9	12	9	12	16	12	16	17	16	17	17	17	17	18	17	17	18	17	18	18	17	18	18

Rod end = piston rod ends which correspond to dimensions

Cylinder dimensions

Piston Ø	Mt.	Tol.	25		32		40		50			63			80			100			125			140			160			180			200		
Piston rod Ø MM			**12**	**18**	**14**	**22**	**18**	**28**	**22**	**28**	**36**	**28**	**36**	**45**	**36**	**45**	**56**	**45**	**56**	**70**	**56**	**70**	**90**	**63**	**80**	**100**	**70**	**90**	**110**	**80**	**100**	**125**	**90**	**110**	**140**
Piston area A_1 (cm^2)			4.9		8		12.6		19.6			31.2			50.3			78.5			122.7			153.9			201.1			254.5			314.2		
Annulus area A_2 (cm^2)			3.8	2.4	6.5	4.2	10	6.4	15.8	13.5	9.4	25	21	15.3	40.1	34.4	25.6	62.6	53.9	40.1	98.1	84.2	59.1	122.7	103.7	75.4	162.6	137.4	106	204.2	175.9	131.8	250.5	219.1	160
AA	11,12,19		40		47		59		74			91			117			137			178			200			219			246			269		
AO	22		18		20		20		29			33			37			44			44			54			54			60			60		
Ø B	00		24	30	26	34	30	42	34	42	50	42	50	60	50	60	72	60	72	88	72	88	108	80	108	122	88	108	133	98	133	154	108	133	163
BB	11,12,19		19		24		35		46			46			59			59			81			92			92			115			115		
BD	06		20		25		30		40			50			60			70			90			100			110			120			130		
BG	01		8		9		12		18			18			24			24			27			32			32			40			40		
CB	15	A16	12		16		20		30			30			40			50			60			70			70			80			80		
CD	05,15	H9	10		12		14		20			20			28			36			45			56			56			70			70		
CW	15		6		8		10		15			15			20			25			30			35			35			40			40		
CX	08		12 -0.008		16 -0.008		20 -0.012		25 -0.012			30 -0.012			40 -0.012			50 -0.012			60 -0.015			80 -0.015			80 -0.015			100 -0.020			100 -0.020		
DD	11,12,19		M5x0.8		M6x1		M8x1		M12x1.25			M12x1.25			M16x1.5			M16x1.5			M22x1.5			M27x2			M27x2			M30x2			M30x2		
E	00	±1.5	40		45		63		75			90			115			130			165			190			205			230			245		
EE (Whitworth pipe thread)	00		G 1/4"		G 1/4"		G 3/8"		G 1/2"			G 1/2"			G 3/4"			G 3/4"			G 1"			G 1"			G 1"			G 1 1/4"			G 1 1/4"		
EP	08	h15	8		11		13		17			19			23			30			38			47			47			57			57		
EW	05	h14	12		16		20		30			30			40			50			60			70			70			80			80		
EX	08		10 -0.12		14 -0.12		16 -0.12		20 -0.12			22 -0.12			28 -0.12			35 -0.12			44 -0.15			55 -0.15			55 -0.15			70 -0.2			70 -0.2		
F	00		10		10		10		16			16			20			22			22			25			25			25			25		
FA	22	-0.075	8		8		8		14			14			18			22			22			25			25			25			25		

Mt. = mounting types which correspond to dimensions

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Cylinder dimensions

Piston Ø	Mt.	Tol.	25		32		40		50			63			80			100			125			140			160			180			200		
Piston rod Ø MM			**12**	**18**	**14**	**22**	**18**	**28**	**22**	**28**	**36**	**28**	**36**	**45**	**36**	**45**	**56**	**45**	**56**	**70**	**56**	**70**	**90**	**63**	**80**	**100**	**70**	**90**	**110**	**80**	**100**	**125**	**90**	**110**	**140**
Annulus area A_1 (cm^2)			4.9		8		12.6		19.6			31.2			50.3			78.5			122.7			153.9			201.1			254.5			314.2		
Annulus area A_2 (cm^2)			3.8	2.4	6.5	4.2	10	6.4	15.8	13.5	9.4	25	21	15.3	40.1	34.4	25.6	62.6	53.9	40.1	98.1	84.2	59.1	122.7	103.7	75.4	162.6	137.4	106	204.2	175.9	131.8	250.5	219.1	160
G	00		48		48		53		45			45			50			50			58			58			58			76			76		
GA	01		58		58		63		61			61			70			72			80			83			83			101			101		
H	00		5		5																														
J	00		25		25		38		38			38			45			45			58			58			58			76			76		
L	05,15		13		19		19		32			32			39			54			57			63			63			82			82		
LH	02,22	h10	19		22		31		37			44			57			63			82			94			101			114			122		
LT	08	min	16		20		25		31			38			48			58			72			92			92			116			116		
MR	05,15		12		15		16		25			29			34			44			53			59			59			76			76		
MS	08	max	20		22.5		29		33			40			50			62			80			100			100			120			120		
PA	22	-0.2	5		5		5		8			8			10			10			10			12			12			12			12		
PJ + stroke	00	±1.25	73		76		93		82			88			101			109			127			136			140			165			175		
R	13,14	js13	27		33		41		52			65			83			97			126			140			155			180			190		
Ø RD	00	f8	38		42		62		74			75	88	88	82	105	105	92	125	125	105	150	150	125	160	160	125	170	170	135	200	200	150	210	210
RT	01		M5x0.8		M6x1		M8x1.25		M12x1.75			M12x1.75			M16x2			M16x2			M22x2.5			M27x3			M27x3			M30x3.5			M30x3.5		
Ø SB	02,22	H13	6.6		9		11		14			18			18			26			26			33			33			39			39		
SS + stroke	02,22	±1.25	93		93		118		100			94			113			110			141			136			140			172			182		
ST	02,22		8.5		12.5		12.5		19			26			26			32			32			38			38			44			44		
SW	02,22		8		10		10		13			17			17			22			22			29			29			35			35		
TC	16,26	h14	38		44		63		76			89			114			127			165			190			203			230			241		
Ø TD	06,16,26	f8	12		16		20		25			32			40			50			63			70			80			90			100		
TG	11,12,19		28.03		33.2		41.7		52.3			64.3			82.7			96.9			125.9			141.3			154.9			174			190.2		
TM	06	h14	48		55		76		89			100			127			140			178			200			215			248			279		
TO	13,14	js13	51		58		87		105			117			149			162			208			238			253			290			300		
TS	02,22	js13	54		63		83		102			124			149			172			210			245			260			301			311		
UM	06		68		79		108		129			150			191			220			278			312			341			388			439		
UO	13,14		65		70		110		130			145			180			200			250			285			300			340			360		
US	02,22		72		84		103		127			161			186			216			254			303			318			371			381		
UT	16,26		58		68		95		116			139			178			207			265			316			329			390			401		
UW	06		45		50		70		85			100			125			150			190			205			230			260			280		
VD	11,19		6		12		12		9			13			9			10			9			7			7			7			7		
VE	00		16		22		22		25			29			29			32			32			32			32			32			32		
WF	00	±2	25		35		35		41			48			51			57			57			57			57			57			57		
WH	11,19,22		15		25		25		25			32			31			35			35			32			32			32			32		
XC + stroke	05,15	±1.25	147		167		192		199			208			237			265			299			313			318			382			391		
XG	16	±2	44		54		57		64			70			76			71			75			75			75			85			85		
XO + stroke	08	±1.25	150		168		198		198			214			246			269			314			342			347			416			425		
XS	02,22	±2	33		45		45		54			65			68			79			79			86			86			92			92		
XV min	06		125		140		150		160			175			190			200			225			245			245			270			270		
XV max + stroke	06		52		62		68		58			59			67			75			79			69			74			91			100		
XJ + stroke	26	±1.5	121		135		154		148			157			176			195			219			235			240			277			286		
Y	00	±2	50		60		62		67			71			77			82			86			86			86			98			98		
Z	08		3°		3°		3°		3°			3°			3°			3°			3°			3°			3°			3°			3°		
ZB max + stroke	00		141		157		186		184			193			220			233			270			284			289			337			346		
ZJ + stroke	00	±1	134		148		173		167			176			198			211			242			250			255			300			309		
Cushioning path	00		12		14		16		18			20			22			26			28			30			30			38			38		
min. stroke all Mt. 2xPS	00		40		35		26		38			36			30			25			15			5											
min. stroke Mt. 06 ISO MT4	06		90		94		99		107			121			128			131			151			174			174			176			176		

Mt. = mounting types which correspond to dimensions

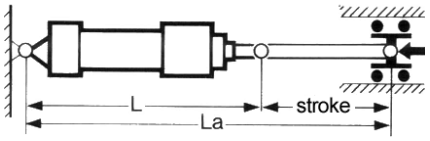
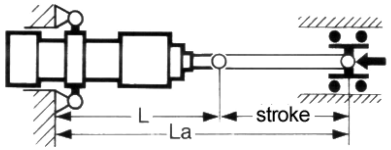
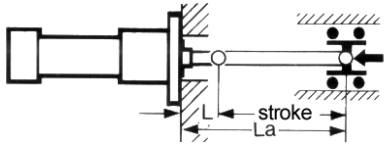
Calculation of buckling strength

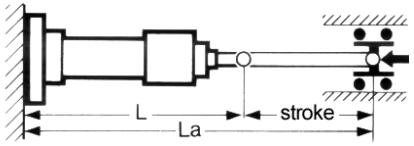
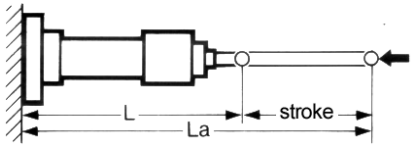
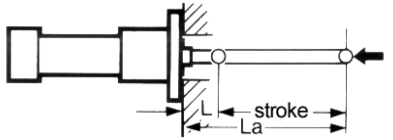
Proceeding:

1. Determine the necessary length La of the piston rod (including stroke).
2. Define the effective buckling length S_{kv} with the help of the table.
3. Identify the allowable buckling length $S_{K,zul.}$ using the diagram.
4. The effective buckling length must be less than or equal to the allowable buckling length.

$$S_{kv} \leq S_{k,zul.}$$

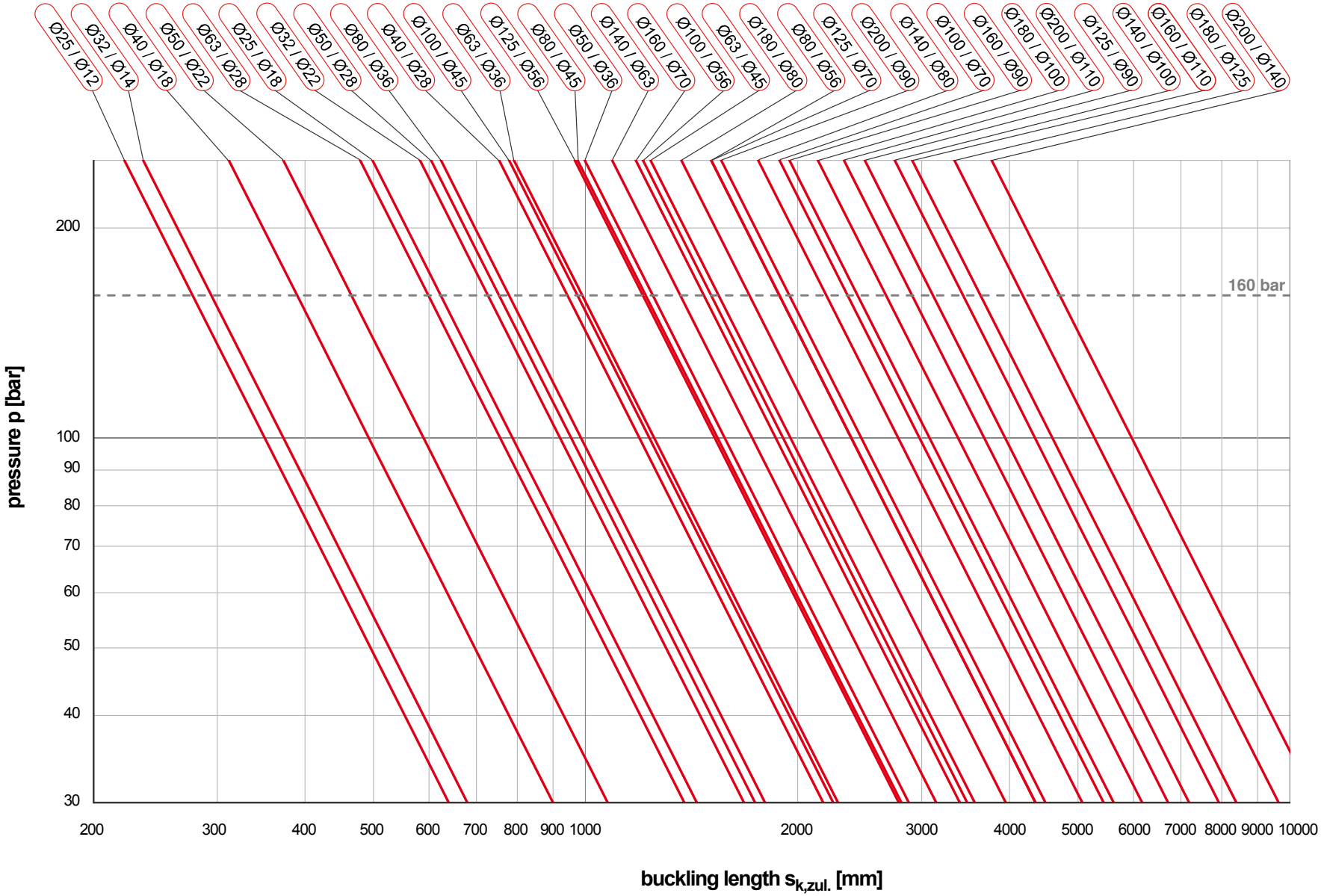
Effective buckling length S_{kv}

Type of fixing			
Mounting type	05, 08, 15	06, 16, 26	01, 02, 11, 13, 19*, 22, 23
Effective buckling length	$S_{kv}=L_a$	$S_{kv}=L_a$	$S_{kv}=0.7\ L_a$

Type of fixing			
Mounting type	12, 14, 19*	12, 14, 19*	01, 02, 11, 13, 19*, 22, 23
Effective buckling length	$S_{kv}=0.7\ L_a$	$S_{kv}=2\ L_a$	$S_{kv}=2\ L_a$

*depends on the mounting of the cylinder

Allowable buckling length $S_{k,zul.}$



(safety factor S = 3.5)

Datasheet Type 55 · Single rod cylinder in tie rod design with attached adjustable proximity switches

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Ordering Code Standard Cylinders / Standard Cylinders DIN/ISO

in case of deviation from standard only: EEV EEH - DAEV DAEH - ELV ELH

for cylinders with proximity switch only: S SZA - SVO SHI

Classification / order number	TYP	.	KST	KSTH	KSTV	.	BEA	.	BAA	.	DAE	-	DKO	-	MM	-	HUB	-	KDI	.	KSDI	.	EE	-	EEV	EEH	-	DAEV	DAEH	-	ELV	ELH	-	S	SZA	-	SVO	SHI
Example	51	.	0	0	8	.	02	.	2	.	1	-	050	-	022	-	0350	-	5	.	0	.	0	-	1	1	-	2	0	-	0	0	-	N	0	-	3	3

Abbr.	Characteristics	41	44	46	47	48	51	53	55	57
		Types of cylinders								
TYP	**Type of cylinder**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**

KST	**Piston rod**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	single	X	X	X	X	X	X	X	X	X
1	on both sides (double rod cylinder)	X					X		X	
2	on both sides, small rear rod						X		X	
3	on both sides, large rear rod						X		X	
4	on both sides, medium rear rod						X		X	

KSTH	**Piston rod end, rear**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	external thread	X	X	X	X	X	X		X	
1	internal thread	X					X		X	
2	cylindrical	X								
4	external thread ISO 4395						X		X	
5	plain rod eye	X								
8	swivel head (Type 51, 55: DIN 24555)	X					X		X	

KSTV	**Piston rod end, front**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	external thread	X	X	X	X	X	X	X	X	X
1	internal thread	X	X	X	X	X	X	X	X	X
2	cylindrical	X	X	X	X	X	X	X	X	X
3	coupling	X	X	X	X	X	X	X	X	X
4	external thread ISO 4395	X	X	X	X	X	X	X	X	X
5	plain rod eye	X	X	X	X	X	X	X	X	X
8	swivel head (Type 51, 55: DIN 24555)	X	X	X	X	X	X	X	X	X
9	clevis	X	X	X	X	X	X	X	X	X

BEA	**Mounting type**	ISO-des.	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
00	basic form		X		X	X	X	X	X	X	
01	threaded flange head end		X								
	threaded holes head end	MX5						X	X	X	
02	foot mounting	MS2	X	X	X	X	X	X	X	X	X
03	flange head end	MF3	X	X	X	X	X				
04	flange cap end	MF4	X	X	X	X	X				
05	rod eye	MP3	X	X	X	X	X	X	X	X	
06	trunnion	MT4	X		X	X	X	X	X	X	
08	rod end bearing	MP5	X		X	X	X	X	X	X	
11	threaded holes head end	MX5			X	X	X				X
	tie rods elongated head end	MX3						X	X	X	
12	threaded holes cap end										X
	tie rods elongated cap end	MX2						X	X	X	
13	rectangular flange head end 1), 3)	MF1/ME5			X	X	X	X	X	X	X
14	rectangular flange cap end 2), 3)	MF2/ME6			X	X	X	X	X	X	X
15	clevis mounting	MP1						X	X	X	
16	trunnion on the head	MT1						X	X	X	
19	tie rods elongated both ends	MX1						X	X	X	
22	foot mounting with fit-in key	MS2						X	X	X	X
23	rectangular flange head end (wide)							X	X	X	
26	trunnion on the bottom	MT2						X	X	X	
33	flange on cylinder		X		X	X	X				
43	longitudional bores, sinks on both sides										X

BAA	**Type of construction**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
2	double-acting	X	X	X	X	X	X	X	X	X
3+4	single-acting (3=pushing; 4=pulling)	X	X	X	X	X	X	X	X	X
5+6	single-acting with spring (5=pushing; 6=pulling)	X		X	X	X	X			X

DAE	**Cushioning**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without cushioning	X	X	X	X	X	X	X	X	X
1	cushioning in the front	X	X	X	X	X	X	X	X	
2	cushioning in the head	X	X	X	X	X	X	X	X	
3	cushioning on both sides	X	X	X	X	X	X	X	X	

DKO	**Piston diameter**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
	see measuring index									

MM	**Piston rod diameter**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
	see measuring index									

HUB	**Stroke**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
	consider buckling									

KDI	**Piston seal**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	NBR lip seals / PUR lip seals	X s	X	X	X	X	X	X	X	
2	PUR lip seal / Viton®	X	X							
3	piston ring / casting		X s							
5*	sleeve ring/o-ring; tefl./NBR	X (S)	X	X s	X s	X s	X s	X	X s	X s
6	sleeve ring/o-ring;tefl./Viton®	X	X	X	X	X	X	X	X	X
7	compact seal / NBR	X		X	X	X	X	X s	X	

KSDI	**Piston rod seal**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	NBR lip seals / PUR lip seals	X s		X	X s	X s	X s	X s	X s	
1	PUR lip seal, u-seal				X	X	X	X	X	X s
2	lip seal / Viton®	X			X	X	X	X	X	X
3	chevron ring NBR		X s	X s						
4	chevron ring Viton®		X	X						
5	stepseal/o-ring; tefl./NBR			X	X	X	X	X	X	
6	stepseal/o-ring;tefl./Viton®			X	X	X	X	X	X	
9	PUR lip seal, u-seal+scraper Viton®				X		X	X		X

EE	**Hydraulic connections**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	pipe thread (DIN/ISO 228)	X s	X s	X s	X s	X s	X s	X s	X s	X s
1	metrical ISO thread	X		X	X	X	X	X	X	
2	UNF thread	X		X	X	X	X	X	X	
3	flange connection			X	X	X	X	X	X	

EEV	**Hydr. connection, front position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
1	0 degrees (at top)	X s	X s	X s	X s	X s	X s	X s	X s	X
2	45 / 60 degrees (clockwise)			X	X	X				
2 / 3	90 degrees (clockwise)			3	3	3	2	2	2	X
4	135 degrees (clockwise)			X	X	X				
3 / 5	180 degrees (clockwise)			5	5	5	3	3	3	
6	225 degrees (clockwise)			X	X	X				
4 / 7	270 degrees (clockwise)			7	7	7	4	4	4	
8	315 degrees (clockwise)			X	X	X				

1) MF 1 for 44, 46, 47, 48; ME 5 for 51, 53, 55

2) MF 2 for 44, 46, 47, 48; ME 6 for 51, 53, 55

3) mounting type 13 (14) for type 57: longitudinal bores, sinks on rear (front)

* type 41: standard for piston diameter = 12, 15, 20

s = standard design

(S) = standard design, not for all forms of construction

RC = rear center

EEH	**Hydr. Connection, rear position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
1	0 degrees (at top)	RC		X s	X s	X s	X s	X s	X s	X
2	45 / 60 degrees (clockwise)			X	X	X				
2 / 3	90 degrees (clockwise)			3	3	3	2	2	2	X
4	135 degrees (clockwise)			X	X	X				
3 / 5	180 degrees (clockwise)			5	5	5	3	3	3	
6	225 degrees (clockwise)			X	X	X				
4 / 7	270 degrees (clockwise)			7	7	7	4	4	4	
8	315 degrees (clockwise)			X	X	X				

DAEV	**Cushioning, front position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without cushioning	X		X	X	X	X	X	X	
1	0 degrees (at top)			X	X	X	X	X	X	
2	45 / 60 degrees (clockwise)	X		X	X	X				
2 / 3	90 degrees (clockwise)	X s		3 s	3 s	3 s	2 s	2 (S)	2 s	
4	135 degrees (clockwise)			X	X	X				
3 / 5	180 degrees (clockwise)	X		5	5	5	3	3 s	3	
6	225 degrees (clockwise)			X	X	X				
4 / 7	270 degrees (clockwise)	X		7	7	7	4	4	4	
8	315 degrees (clockwise)			X	X	X				

DAEH	**Cushioning, rear position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without cushioning	X		X	X	X	X	X	X	
1	0 degrees (at top)			X	X	X	X	X	X	
2	45 / 60 degrees (clockwise)	X		X	X	X				
2 / 3	90 degrees (CW; 51/55: Bf. 02->S)	X s		3 s	3 s	3 s	2 (S)	2 (S)	2 (S)	
4	135 degrees (clockwise)			X	X	X				
3 / 5	180 degrees (clockwise)	X		5	5	5	3 s	3 s	3 s	
6	225 degrees (clockwise)			X	X	X				
4 / 7	270 degrees (clockwise)	X		7	7	7	4	4	4	
8	315 degrees (clockwise)			X	X	X				

ELV	**Air bleed, front position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without air bleed	X	X							X
1 - 8	see cushioning position	X	X	X	X	X	X	X	X	X

ELH	**Air bleed, rear position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without air bleed	X	X							X
1 - 8	see cushioning position	X	X	X	X	X	X	X	X	X

S	**Position detection**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
Z	attached proximity switches								X	
N	built-in proximity switches	X	X	X	X	X	X	X		X

SZA	**Number of switches**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
1 - 9	for S = Z								X	
1 - 2	for S = N	X	X	X	X	X	X	X		X

SVO	**Switch, front position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without switch	X	X	X	X	X	X	X	X	X
1 - 8	see cushioning position	X	X	X	X	X	X	X	X	X

SHI	**Switch, rear position**	**41**	**44**	**46**	**47**	**48**	**51**	**53**	**55**	**57**
0	without switch	X	X	X	X	X	X	X	X	X
1 - 8	see cushioning position	X	X	X	X	X	X	X	X	X