

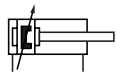
Technical details

Operating pressure	1 ... 10 bar
Temperature range	-20°C ... +80°C (XGH: -10°C...+150°C)
Max. stroke	2500 mm
Medium	Filtered, oil-free and dried compressed air according to ISO 8573-1:2010, Class 7:2:4, instrument air, free of aggressive additives. Alternatively the pressure dew point must be at least 10°C below lowest occurring ambient temperature.
Materials	Cylinder tube: Al, (painted) End caps: Al-die-cast (painted) Piston rod: steel hard chrome plated (optional 1.4301) Seals: PU, NBR (optional FKM)
	Cylinders in accordance with 2014/34/EU (ATEX) available. (Chapter 13)

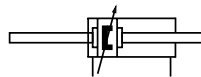


Double acting cylinder with adjustable cushions and magnetic piston for proximity sensors. Standard stroke lengths in table below, additional lengths on request.

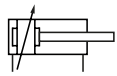
Versions



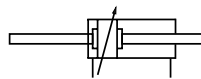
050, 054, 000, 004
double acting, adjustable cushioning, with magnetic piston



450, 454, 400, 404
double acting, double end piston rod, adjustable cushioning, with magnetic piston

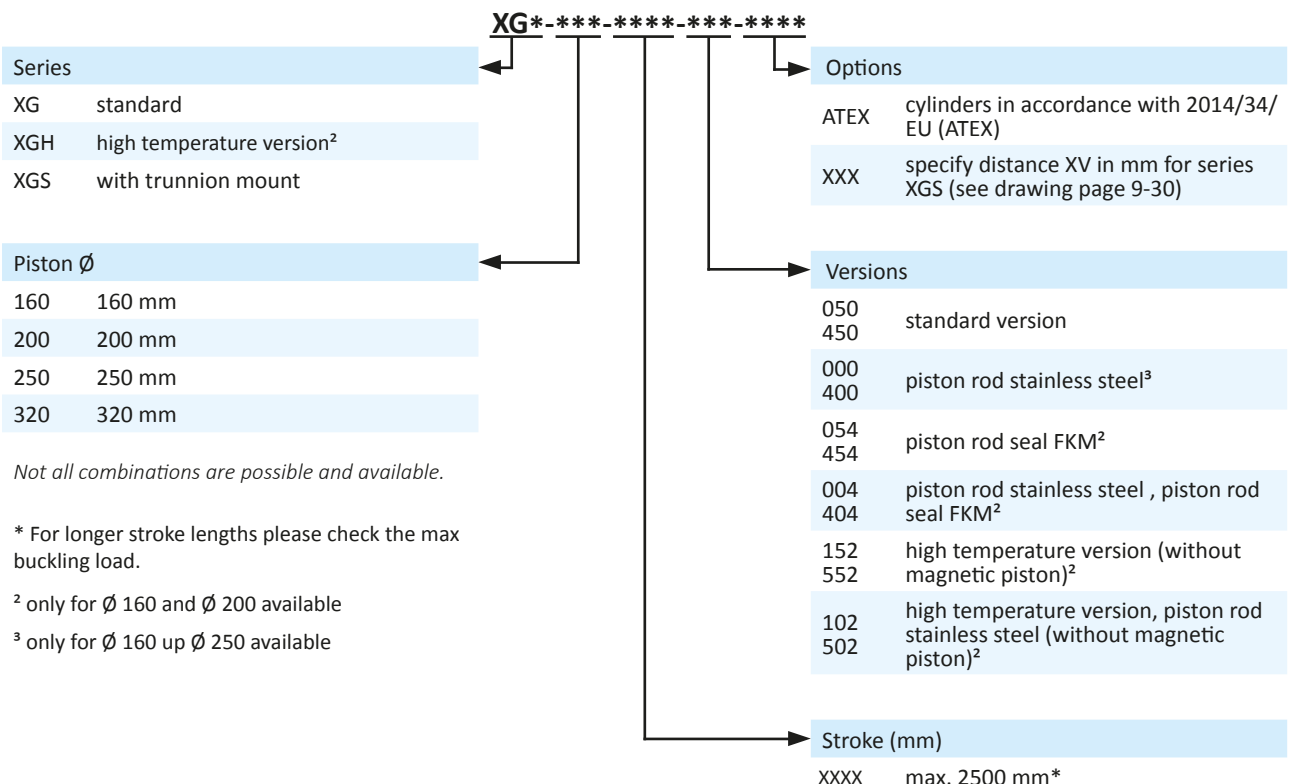


152, 102
double acting, adjustable cushioning



552, 502
double acting, double end piston rod, adjustable cushioning

Order code



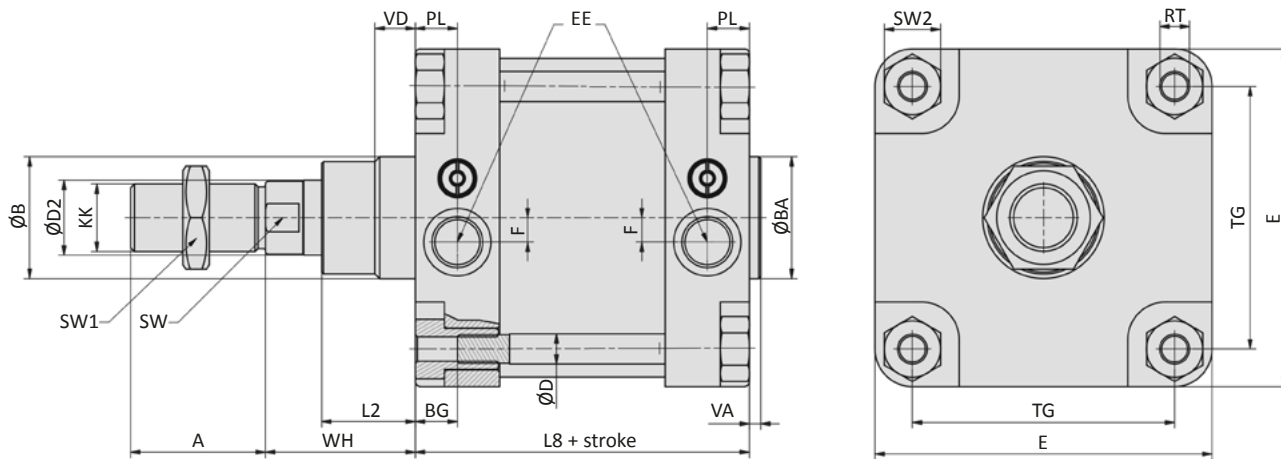
Series XG

ISO 15552, double acting

Technical data

Model-no.:	XG-160-...	XG-200-...	XG-250-...	XG-320-...
Piston \varnothing (mm)	160	200	250	320
Force at 6 bar (N)	Extension	10852	16956	26494
	Retraction	10174	16278	25434
Connection	G3/4	G3/4	G1	G1
Piston rod thread	M36 x 2	M36 x 2	M42 x 2	M48 x 2
Cushioning length (mm)	50	50	60	65

Dimensions series XG

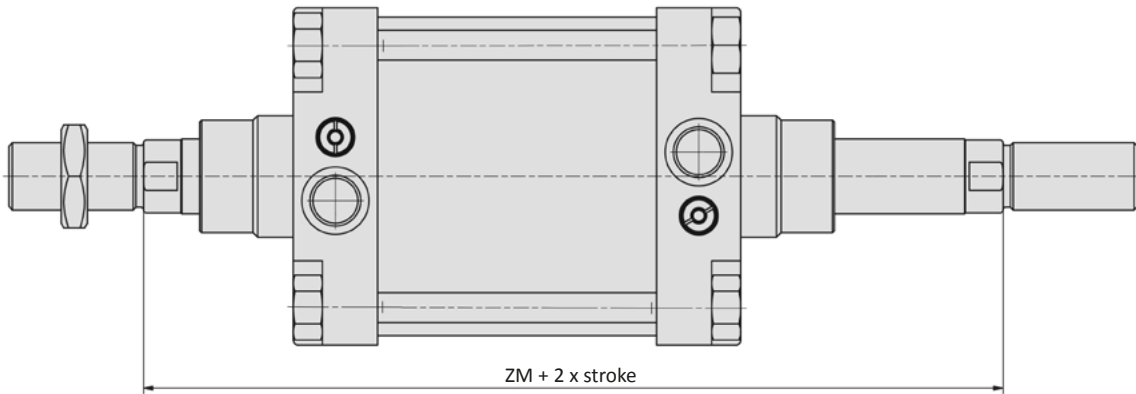


Piston \varnothing	A	$\varnothing B$	$\varnothing BA$	BG	$\varnothing D$	$\varnothing D2$	E	EE	F	KK	L2
160	72	65	65	22.5	16	40	180	G3/4	13	M36 x 2	50
200	72	75	75	22.5	16	40	220	G3/4	13	M36 x 2	55
250	84	90	90	25	20	50	268	G1	15	M42 x 2	67
320	96	110	110	28	25	63	340	G1	0	M48 x 2	82

Piston \varnothing	L8	PL	RT	SW	SW1	SW2	TG	VA	VD	WH
160	179.5	22.5	M16	36	55	30	140	6	21.5	80
200	180	22.5	M16	36	55	30	175	6	26.5	95
250	200	31	M20	46	65	36	220	10	20	105
320	220	31	M24	55	75	46	270	10	20	120

Piston \varnothing (mm)	160	200	250	320
Weight (kg)	15.0	20.0	28.5	48.4
each 100 mm stroke	2.0	2.5	3.8	6.2

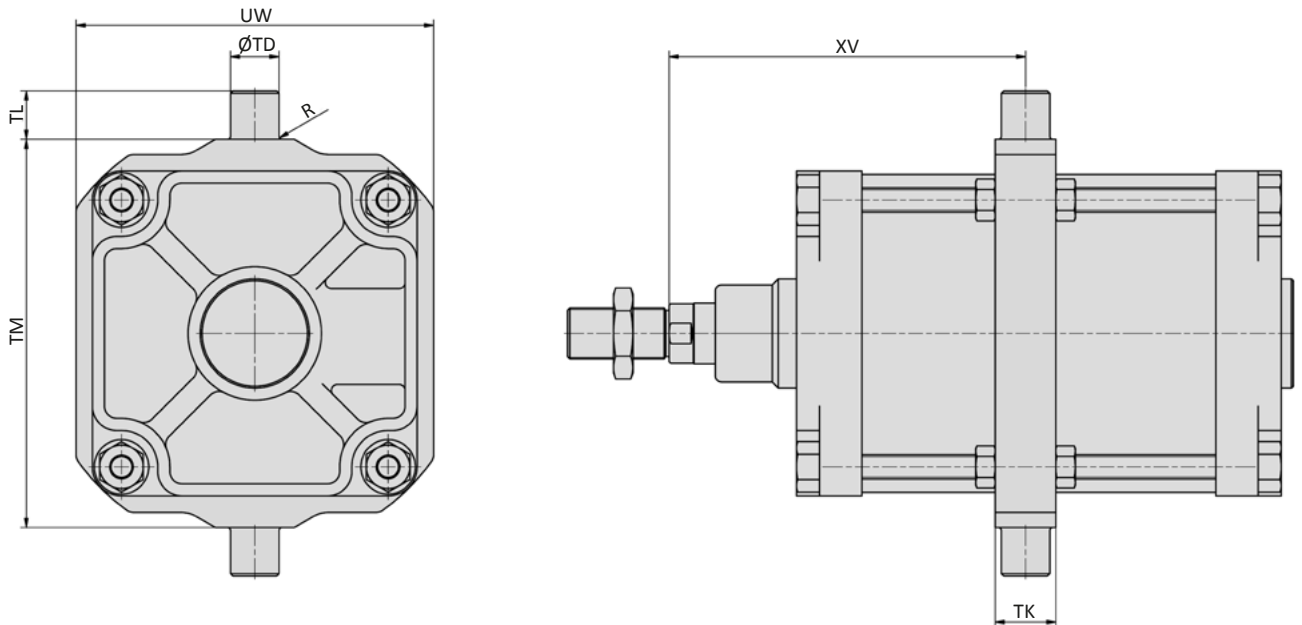
Dimensions series XG (addition at double end piston rod)



Piston Ø (mm)	160	200	250	320
ZM	340	370	410	460

Piston Ø (mm)	160	200	250	320	
Weight (kg)	0 mm stroke	16.9	22.5	32.3	54.8
	each 100 mm stroke	3.3	3.5	4.0	6.4

Dimensions series XGS (addition at mounted trunnion mount)



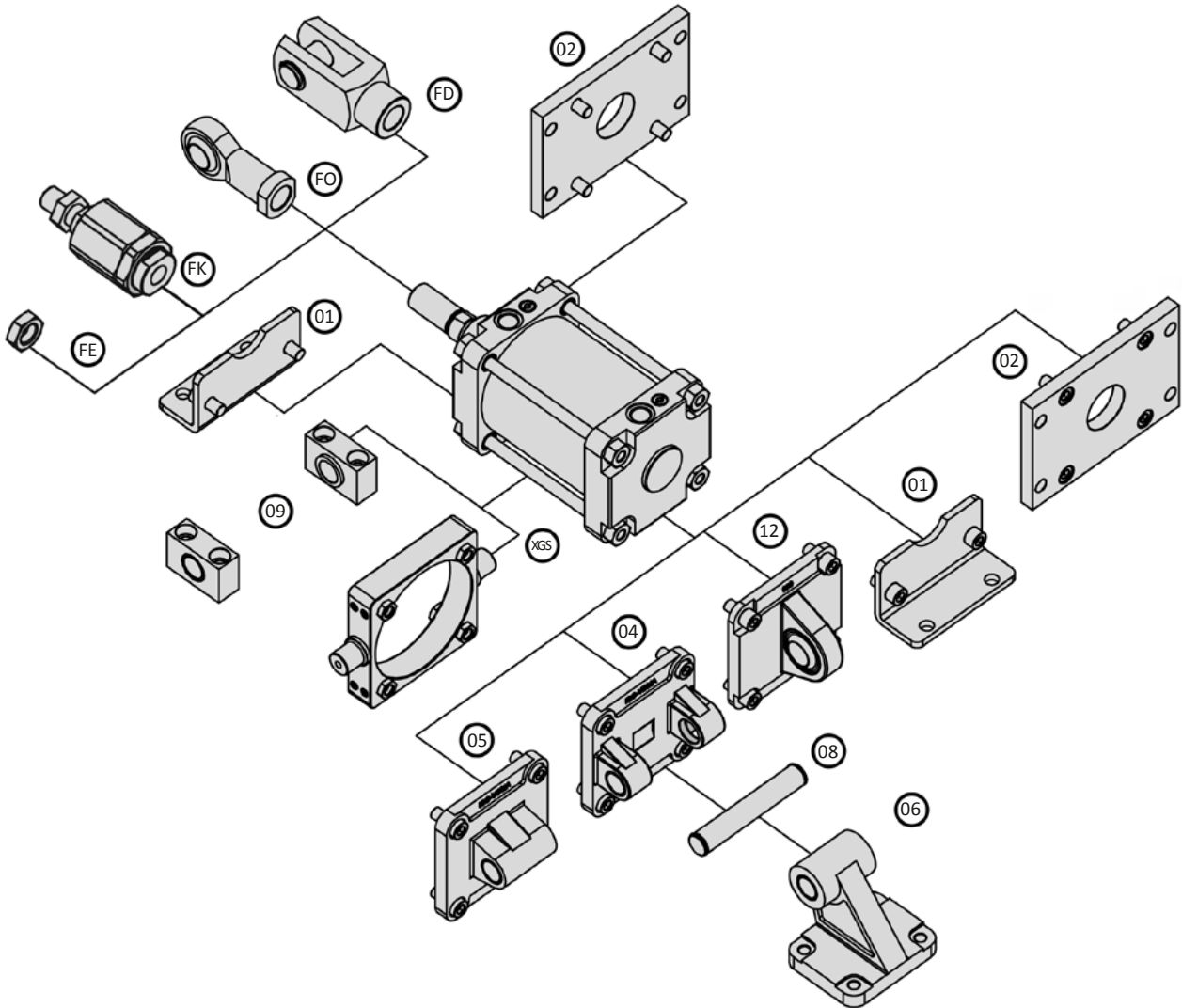
Piston Ø	R	Ø TD	TK	TL	TM	UW	XV_{min}
160	2.5	32	40	32	200	190	153
200	2.5	32	40	32	250	240	168
250	2.5	40	50	40	320	295	200
320	2.5	50	70	50	400	370	231

Piston Ø (mm)	160	200	250	320	
Weight (kg)	0 mm stroke	19.2	27.3	41.0	72.6
	each 100 mm stroke	2.0	2.5	3.8	6.2

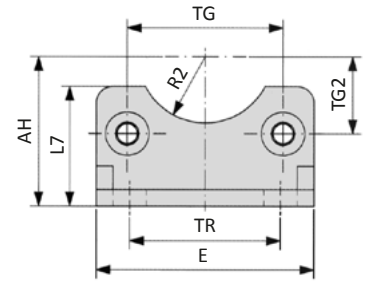
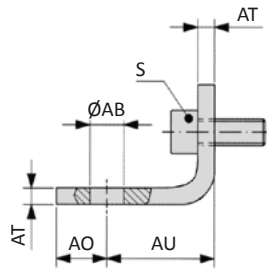
Series XG

Mounting accessories

Mounting accessories VLB-xxx-yy



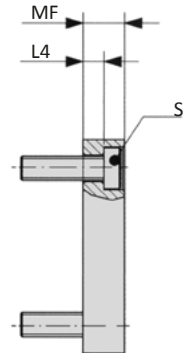
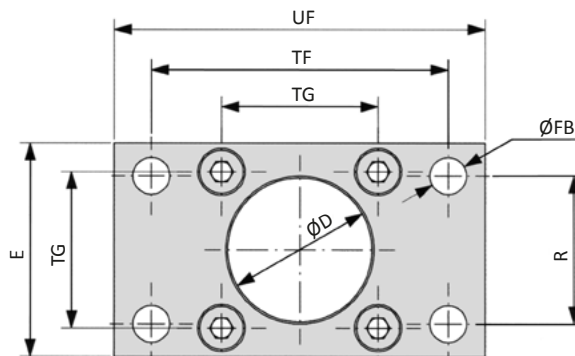
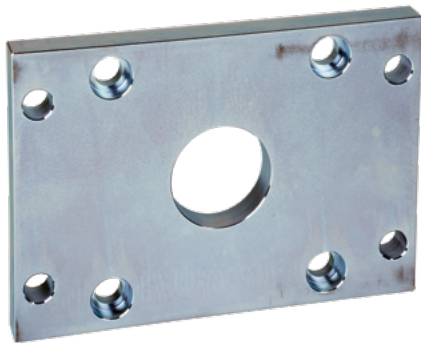
VLB-xxx-01 Foot mount



Model-no.:	Ø AB	AH	AO	AU	AT	E	L7	R2	S	TG	TG2	TR
VLB-160-01	18	115	15	60	9	180	100	32.5	M16 x 30	140	70	115
VLB-200-01	22	135	30	70	12	220	100	37.5	M16 x 30	175	87.7	135
VLB-250-01	26	165	25	75	14	270	150	45	M20 x 40	220	110	165
<i>tolerances and adjustments</i>	H14	JS16		± 0.2	± 1			H15		± 0.3		JS14

material: steel, zinc plated; 2 x 2 screws in accordance with EN ISO 4762 are included

VLB-xxx-02 Flange mount

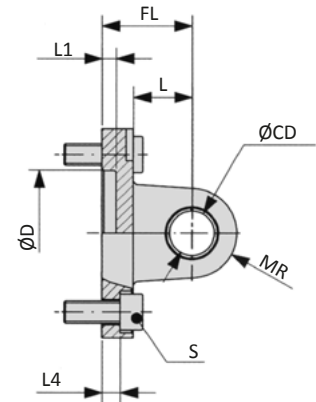
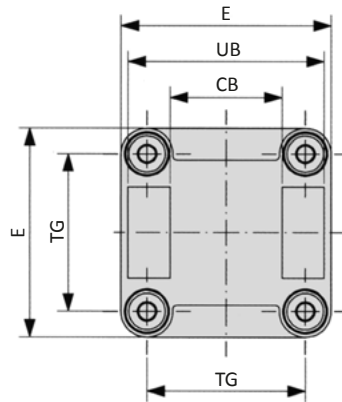


Model-no.:	Ø D	E	Ø FB	L4	MF	R	S	TF	TG	UF
VLB-160-02	65	180	18	9.5	20	115	M16 x 30	230	140	260
VLB-200-02	75	220	22	12.5	25	135	M16 x 30	270	175	300
VLB-250-02	90	285	26	10.5	25	165	M20 x 30	330	220	400
VLB-320-02	110	350	33	15	30	200	M24 x 40	400	270	470
<i>tolerances and adjustments</i>	H11		H13	0 - 0.5	JS14	JS14		JS14	± 0.3	

material: steel, zinc plated; 4 screws in accordance with DIN 7984 are included

Series XG Mounting accessories

VLB-xxx-04 Clevis mount with bushing

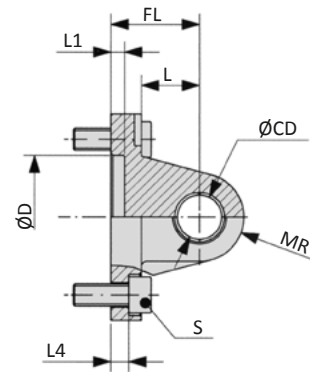
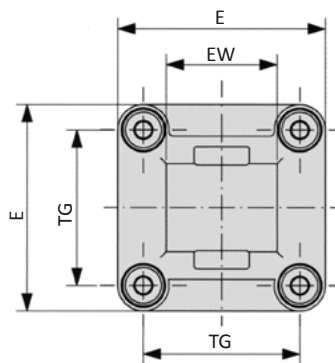
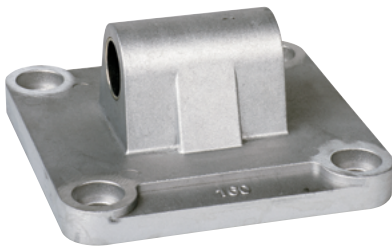


Inclusive clevis pin
order no: **VLB-xxx-48**

Model-no.:	CB	Ø CD	Ø D	E	FL	L	L1	L4	MR	S	TG	UB
VLB-160-04	90	30	65	180	55	35	7	10	25	M16 x 30	140	170
VLB-200-04	90	30	75	220	60	35	7	11	25	M16 x 30	175	170
VLB-250-04	110	40	90	270	70	45	-	11	40	M20 x 30	220	200
VLB-320-04	120	45	110	350	80	50	-	15	45	M24 x 40	270	220
<i>tolerances and adjustments</i>	H14	H9	H11		± 0.2			± 0.5			± 0.3	h13

materials: Al, bushing steel and PTFE (Ø 250 and 320 without bushing); 4 screws in accordance with EN ISO 4762 are included

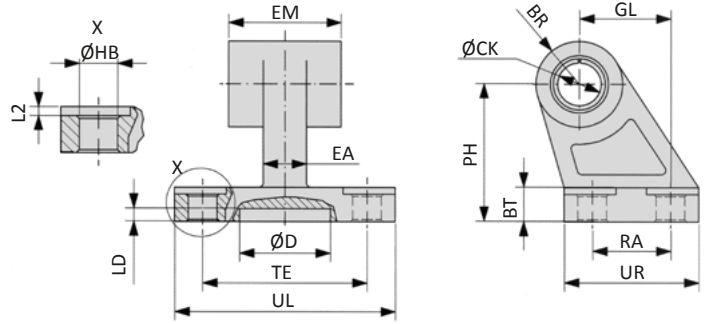
VLB-xxx-05 Swivel mount



Model-no.:	Ø CD	Ø D	E	EW	FL	L	L1	L4	MR	S	TG
VLB-160-05	30	65	180	90	55	35	7	10	25	M16 x 30	140
VLB-200-05	30	75	220	90	60	35	7	11	25	M16 x 30	175
VLB-250-05	40	90	270	110	70	45	11	11	40	M20 x 30	220
VLB-320-05	45	110	350	120	80	50	15	15	45	M24 x 40	270
<i>tolerances and adjustments</i>	H9	H11		-0.5 -1.2	± 0.2			± 0.5			± 0.3

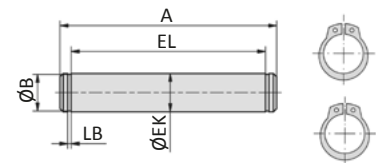
materials: Al, bushing steel and PTFE; 4 screws in accordance with EN ISO 4762 are included

VLB-xxx-06 Swivel mount 90°



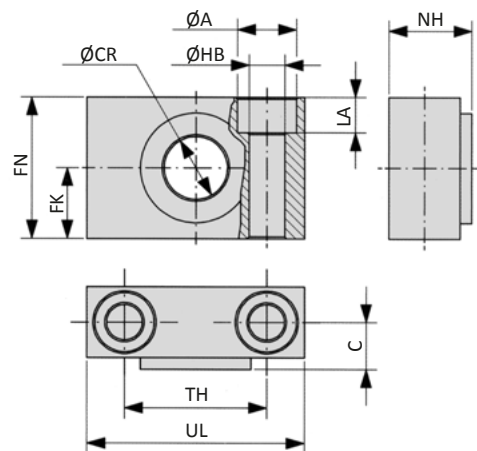
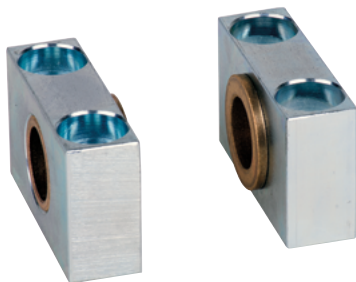
Model-no.:	BR	BT	Ø CK	Ø D	EA	EM	GL	Ø HB	L2	LD	PH	RA	TE	UL	UR
VLB-160-06	31.5	25	30	31	36	90	97	14	4	5	115	88	118	156	126
VLB-200-06	31.5	30	30	31	40	90	105	18	4	5	135	90	122	162	130
<i>tolerances and adjustments</i>			H9			-0.5 -1.5	JS14	H13			JS15	JS14	JS14		
	material: Al														

VLB-xxx-08 Clevis pin



Model-no.:	A	Ø B	Ø EK	EL	LB
VLB-200-08	178	28.6	30	171.5	1.60
VLB-250-08	211	37.5	40	202	1.85
VLB-320-08	234	42.5	45	222	1.85
<i>tolerances and adjustments</i>			e8	+3 0	
	material: steel, zinc plated; 2 snap rings are included				

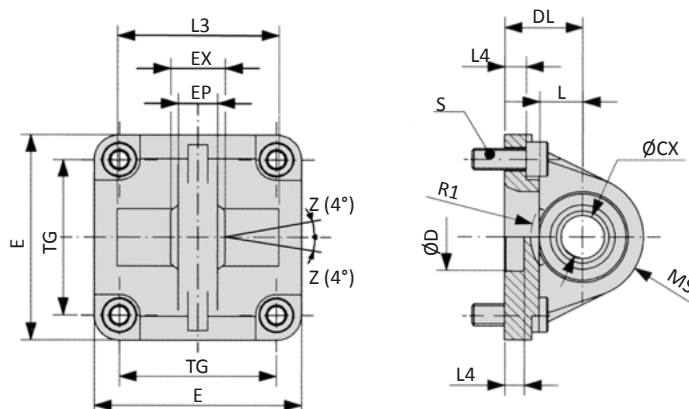
VLB-xxx-09 Bearing block



Model-no.:	Ø A	C	Ø CR	FK	FN	Ø HB	LA	NH	TH	UL
VLB-200-09	26	22.5	32	30	60	18	17	40	60	92
VLB-250-09	33	31	40	35	70	22	20	56	70	140
<i>tolerances and adjustments</i>			H9	± 0.2		H13			± 0.3	
	materials: Al, bronze bushing									

Series XG Mounting accessories

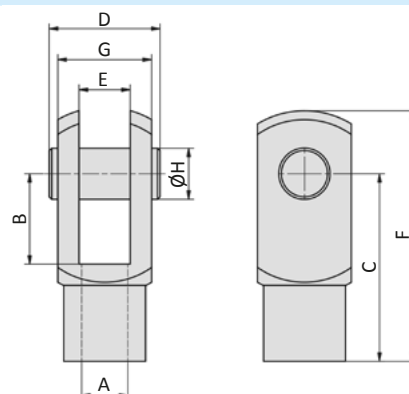
VLB-xxx-12 Swivel mount with spherical bearing



Model-no.:	Ø CX	Ø D	DL	E	EP	EX	L	L1	L3	L4	MS	R1	S	TG
VLB-160-12	35	65	55	180	28	43	35	7	-	10	45	-	M16 x 30	140
VLB-200-12	35	75	60	220	28	43	35	7	-	11	48	-	M16 x 30	175
<i>tolerances and adjustments</i>	H7	H11	± 0.2			± 0.1				± 0.5				± 0.3

materials: Al, bearing steel, bronze bushing; 4 screws in accordance with EN ISO 4762 are included

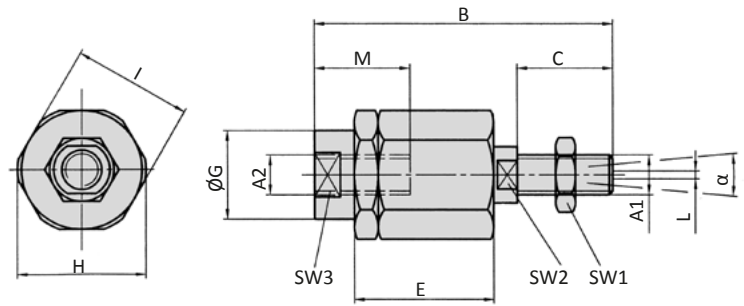
FD-xxx Rod clevis



Model-no.:	for cylinder	A	B	C	D	E	F	G	H
FD-200	XG-160, XG-200	M36 x 2	72	144	84	35	188	70	35
FD-250	XG-250	M42 x 2	84	168	104.5	40	232	85	40
FD-320	XG-320	M48 x 2	96	192	117.5	50	265	96	50

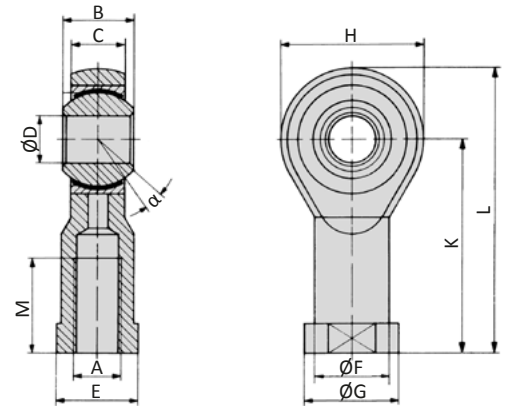
material: steel, zinc plated

FK-xxx Flexible coupling



Model-no.:	for cylinder	A1, A2	B	C	D	E	ØG	H	I	L	M	SW1	SW2	SW3	α
FK-200	XG-160, XG-200	M36 x 2	190	72	15.5	77	57	75	70	2	68	32	54	55	8°
material: steel, zinc plated															

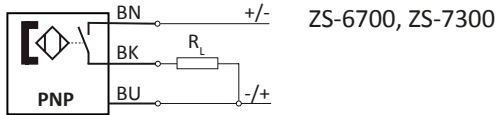
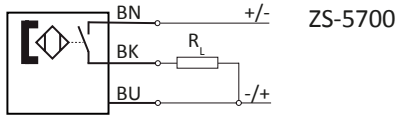
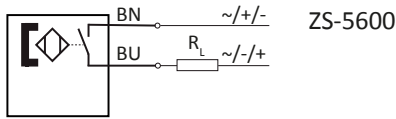
FO-xxx Rod eye



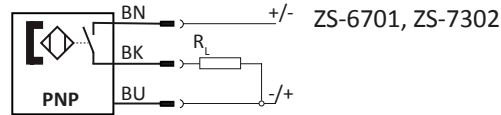
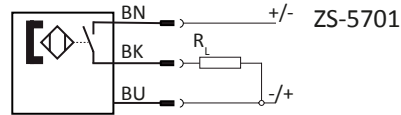
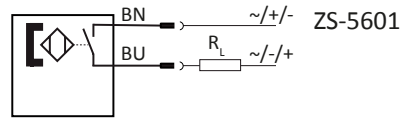
Model-no.:	for cylinder	A	B	C	ØD	E	ØF	ØG	H	K	L	M	α
FO-160/200	XG-160, XG-200	M36 x 2	43	28	35	50	46	58	80	125	165	56	16°
FO-250	XG-250	M42 x 2	49	33	40	55	53	65	91	142	187	60	16°
FO-320	XG-320	M48 x 2	60	45	50	60	65	75	117	162	218	65	14°
materials: steel, zinc plated, bearing steel, bronze bushing													

Series ZS Proximity sensors

Proximity sensors with cable



Proximity sensors with plug



Technical data

Model-no.:	ZS-5600	ZS-5601	ZS-5700	ZS-5701
Design	2-pole Reed sensor	2-pole Reed sensor	3-pole Reed sensor	3-pole Reed sensor
Contact function	NO	NO	NO	NO
Rated operational voltage	5 ... 240 V AC / DC	5 ... 60 V AC / DC	5 ... 30 V DC	5 ... 30 V DC
Rated operational current I_e	3 ... 100 mA	3 ... 100 mA	≤ 500 mA	≤ 500 mA
Max. voltage drop at I_e	≤ 2.5	≤ 2.5	≤ 0.1	≤ 0.1
Breaking capacity	10 W	10 W	10 W	10 W
Cable length	3 m	0.3 m with M8 connection	5 m	0.3 m with M8 connection
Temperature range	-10 ... +70°C	-10 ... +70°C	-10 ... +70°C	-10 ... +70°C
Protection	IP 67	IP 67	IP 67	IP 67
Switching status indication	LED red	LED red	LED yellow	LED yellow
Model-no.:	ZS-6700	ZS-6701	ZS-7300	ZS-7302
Design	3-pole inductive	3-pole inductive	3-pole inductive	3-pole inductive
Contact function	NO	NO	NO	NO
Output	PNP	PNP	PNP	PNP
Rated operational voltage	5 ... 30 V DC	5 ... 30 V DC	10 ... 30 V DC	10 ... 30 V DC
Rated operational current I_e	≤ 200 mA	≤ 200 mA	≤ 100 mA	≤ 100 mA
Max. voltage drop at I_e	≤ 1.0	≤ 1.0	≤ 2.5	≤ 2.5
Breaking capacity	6 W	6 W	3 W	3 W
Cable length	3 m	0.3 m with M8 connection	6 m	0.3 m with M12 connection
Temperature range	-10 ... +70°C	-10 ... +70°C	-20 ... +60°C	-20 ... +60°C
Protection	IP 67	IP 67	IP 67	IP 67
Switching status indication	LED green	LED green	LED yellow	LED yellow
	-	-	II 3G Ex nA T4 II 3D Ex tD A22 IP67 T 125°C	II 3D Ex tc IIIC T125°C Dc X


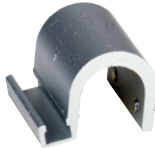
Cable with bushing for proximity sensors

Model-no.:	KA-30	KA-50	KA-51	KA-100	KA-101
Connection	M8, snap-in	M8, snap-in	M8, snap-in	M8, snap-in	M8, snap-in
Version	straight	straight	elbow 90°	straight	elbow 90°
Cable length	3 m	5 m	5 m	10 m	10 m

Mounting

For this cylinder series separate mounting brackets are necessary for the sensor mounting.

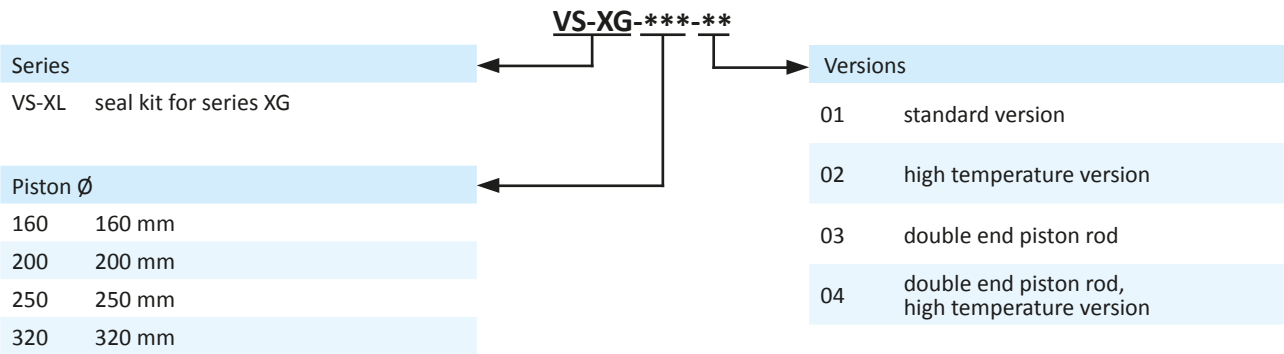
Mounting brackets for proximity sensors

Model-no.:	NT-250	HTM-080/100-1
		
Design	Sensor mounting	Mounting bracket for tie rod design
For series	HM, HE, CM, XG, XM	XG-160, XG-200

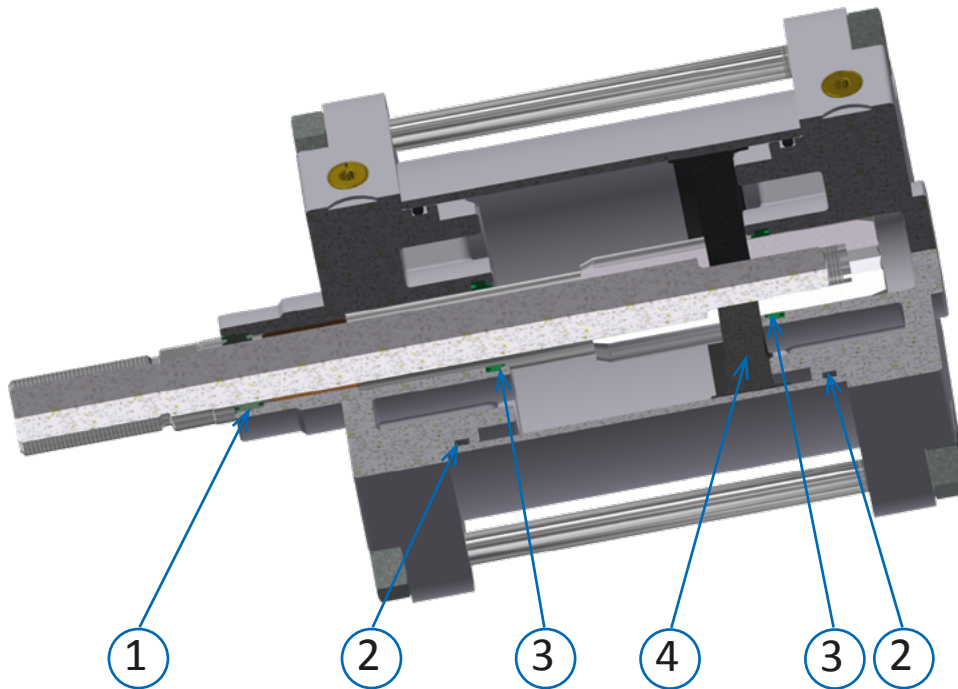
Series XL

Seal kits

Order code



Content



Standard version

Position	Part	Quantity
1	piston rod seal (PUR)	1*
2	O-ring (NBR)	2
3	cushion seal (PUR)	2
4	piston with magnet (NBR)	1
5	grease	2

*2 pieces for version 03

High temperature version

Position	Part	Quantity
1	piston rod seal (FKM) + circlip	1*
2	O-ring (FKM)	2
3	cushion seal (FKM)	2
4	piston (FKM)	1
5	grease	2

*2 pieces for version 04

Air consumption cylinder (NI for a single stroke of 100 mm, based upon extension)

Piston-Ø	Pressure in bar						
	2	3	4	5	6	7	8
160	6,09	8,12	10,16	12,16	14,16	16,23	18,25
200	9,52	12,68	15,88	19,00	22,12	25,36	28,52
250	14,88	19,81	24,81	29,69	34,56	39,63	44,56

Required flow rate (NI/min at p = 6 bar)

Piston-Ø	speed (m/s)				
	0,25	0,5	1	1,5	2
160	2110	4220	8440	12660	16881
200	3297	6594	13188	19782	26376

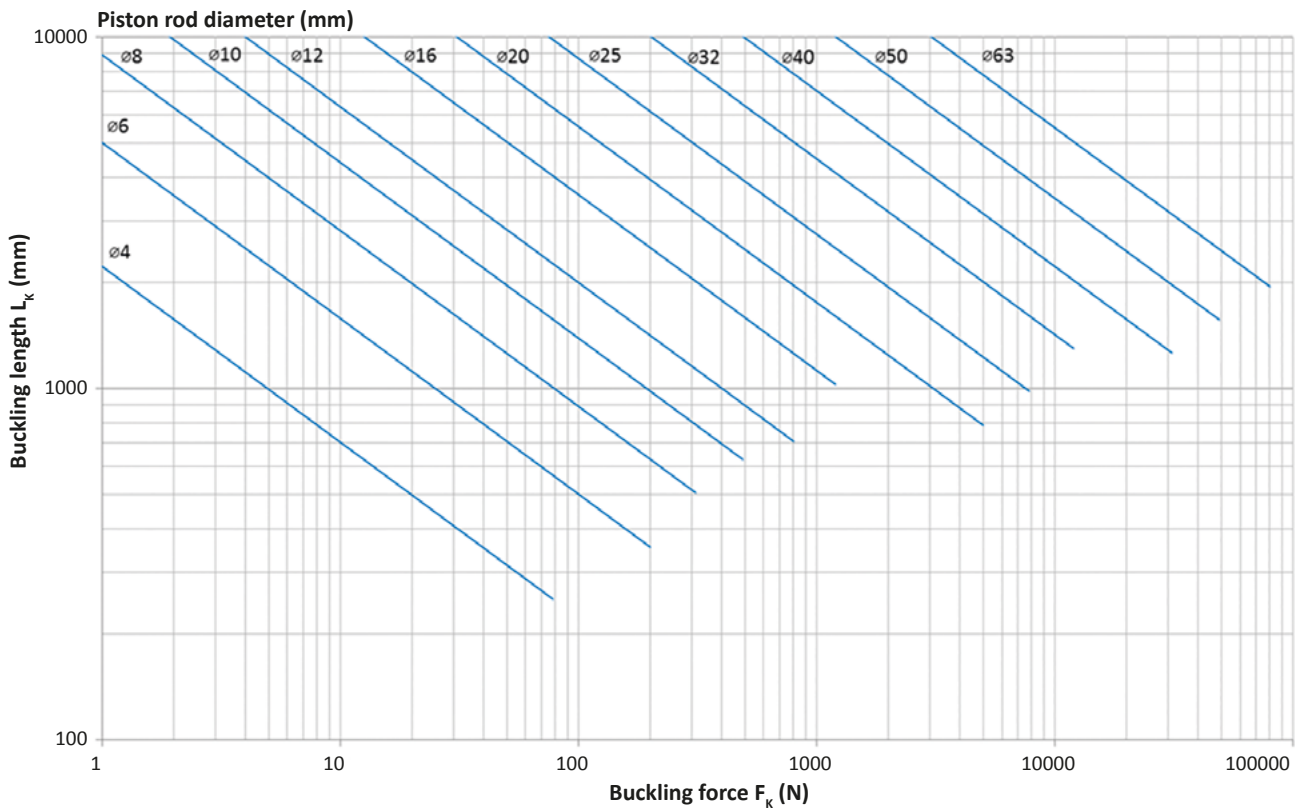
Force chart cylinders (N)

Piston-Ø	Piston rod Ø (mm)	Pressure in bar						
		2	3	4	5	6	7	8
160		3617	5426	7235	9043	10852	12660	14469
	40	3391	5087	6782	8478	10174	11869	13565
200		5652	8478	11304	14130	16956	19782	22608
	40	5426	8139	10852	13565	16278	18991	21704
250		8831	13247	17663	22078	26494	30909	35325
	50	8478	12717	16956	21195	25434	29673	33912
320		14469	21704	28938	36173	43407	50642	57876
	63	13908	20862	27817	34771	41725	48679	55633

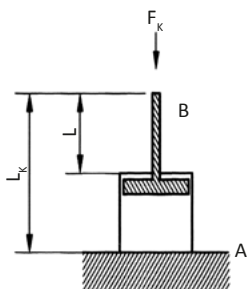
	Kraft beim Ausfahren*
	Kraft beim Einfahren*

* Die interne Reibung wurde mit einem Abzug von 10% berücksichtigt.

Critical load diagram for the piston rod

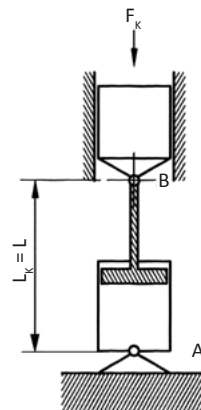


First elastic case of buckling



A: fixed restraint
 B: open end
 $L_k \approx 4 * \text{cylinder stroke length}$

Second elastic case of buckling



A: joint
 B: joint
 $L_k \approx 2 * \text{cylinder stroke length}$

Knowing the actual buckling case, either 1 or 2, and knowing the requested stroke length you can calculate the buckling length L_k . If you know the buckling force F_k (compressive force) you determine in the diagram above the intersection of both data. Choose the next graph line above to get the necessary rod diameter.