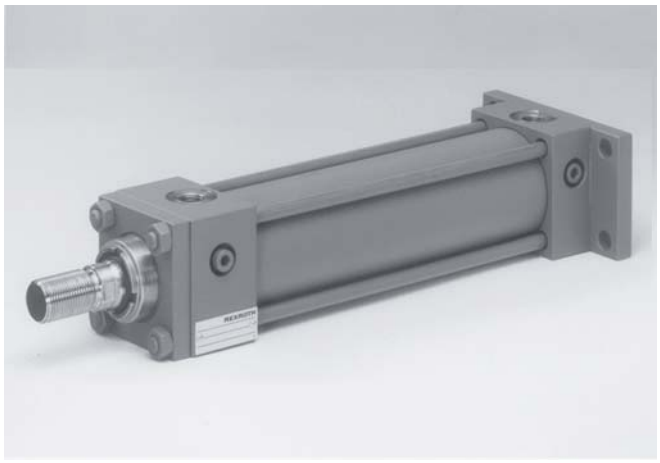
RE 17 017/05.03

Replaces: 08.99

Hydraulic cylinders
Types CD 210 / CG 210

Series 1X
Nominal pressure:
210 bar (21 MPa)



K 4639-5

Type CD 210 D../…

Overview of contents

Features

- Easily serviced modular system, head and base are fixed using the tie rod principle
- Operating pressure up to a max. of 210 bar
- 16 mounting styles
- Piston Ø: 40 to 200 mm
- Piston rod Ø: 16 to 140 mm

Note:
When selecting the cylinder type, please take note of the explanations on page 3!

Description

The basis for this range is an easily serviced modular system.

- The cylinder head and base are fixed to the cylinder tube by means of tie rods. Therefore simple assembly and dis-assembly for servicing.
- The pipe threads are available optionally in ISO 228/1 or metric ISO thread forms.
- Bleed points (standard)
- Adjustable end position cushioning
- Installation length identical for models with or without end position cushioning.
- The stroke is freely selectable within the maximum available range.

Technical data (for applications outside these parameters, please consult us!)

Operating pressure [1]		Up to 210 bar (dependent on piston Ø and mounting style)	
Static test pressure		Permissble operating pressure x 1.3 (dependent on piston Ø and mounting style)	
Installation		Optional	
Pressure fluid		Mineral oil to DIN 51 524 (HL, HLP) Phosphate ester (HFD-R)	
Pressure fluid temperature range	°C	– 20 to + 70	
Viscosity range	mm^2/s	2.8 to 380	
Cleanliness class to ISO		Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15	
Stroke velocity	m/s	0.5 (dependent on connection size)	
For permissible installation and positional tolerances, see page 66		Stroke lengths	Permissible deviation in mm
		0 to 1250	+ 1 – 1.5
		1251 to 2000	+ 1 – 2
		2001 to 3000	+ 1 – 3

[1] The specified operating pressures are only valid for applications with shock-free operation. If extreme loads occur, e.g. as happens in high sequence cycles, the fixings and piston rod thread connections need to be designed for durability (fatigue strength).

Cylinders that lie outside the above stated parameters are also available if required.
Please enquire, giving exact details of the application.

Explanations (item no. explanation for pages 6 to 59)

1 Selectable position of the connections (see below).

12 Check valve and bleed point. The bleed point is standard.

13 Adjustable throttle valve for end position cushioning.

14 Threads B and C. Threads E and F together with the associated trunnion head are always on the last side of each piston Ø stated.

15 Take note of the permissible loading for screwed on self-aligning clevis.

16 Associated pin Ø, tolerance m6. minimum pin material strength $\sigma_{0,2}$= 600 N/mm^2 (the pin is not included within the scope of supply).

17 Pins and split pins are included within the scope of supply.

20 Grease nipple, cone head form A to DIN 71 412. As a lubricant commercially available, corrosion preventative, lithium based greases can be used.

21 Re-lubrication possible via lubrication bore in housing.

22 The counter face Ø D1 at base is not suitable for enlarged connection threads, 13 and 14, for O-ring fittings.

23 In models with inlarged port threads 13 and 14, the distance between the ports is changed.

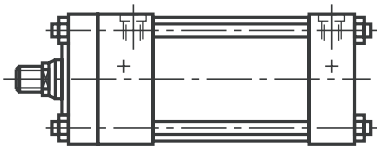
24 In double rod cylinder type CG, the max. loading on side "Y" is 13 kN.

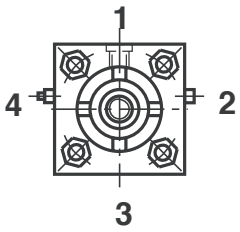
Position of connections

By rotating the cylinder base and/or the cylinder head, the position of the connections can be changed during assembly for most types of cylinder mounting styles. The options can be seen in the table below.

The throttle and check valves change their positions accordingly.

With mounting styles F, L, N and T as well as the cylinder base with mounting style G, the throttle and check valve are in position 1 when the port position is rotated.



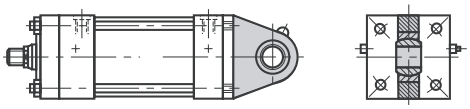
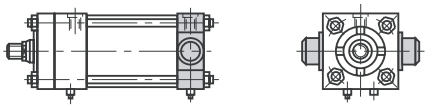
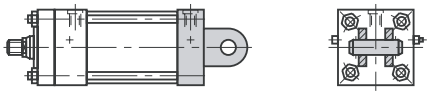
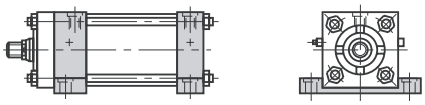
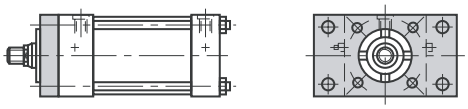
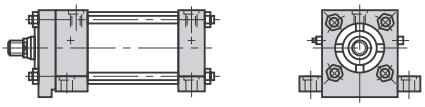
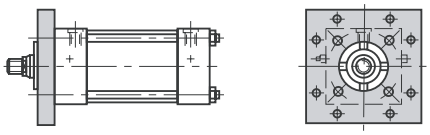
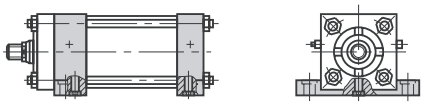
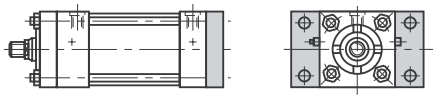
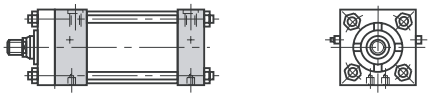
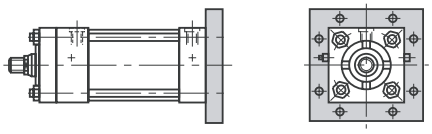
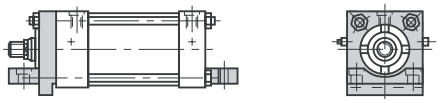
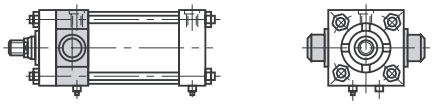
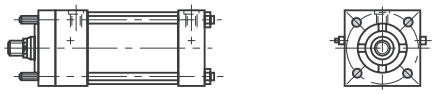
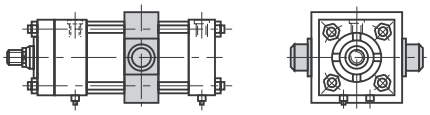
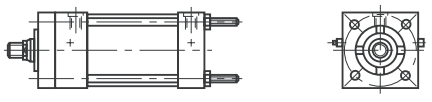


	Selectable position of connections															
Mounting styles	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	**T**
At cylinder head	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	2	2	□ 2	2	2	2	□ 2	–	■ 2	2	2	–	2	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	4	4	□ 4	4	4	4	□ 4	–	■ 4	4	4	–	4	4
At cylinder base	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	■ 2	2	□ 2	2	2	2	□ 2	–	■ 2	2	2	2	–	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	■ 4	4	□ 4	4	4	4	□ 4	–	■ 4	4	4	4	–	4

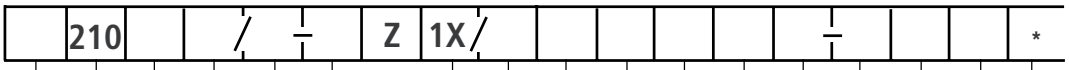
■ = Positions 2 and 4 are not possible with:
Piston Ø **40** with enlarged connection threads 13 and 14

□ = Positions 2 and 4 are not possible with piston Ø **40; 50** and **63**

Mounting styles

Swivel clevis at cylinder base **B**		Trunnion mounting at cylinder base **S**	
Clevis for at cylinder base **G**		Foot mounting **F**	
Rectangular flange at cylinder base **C**		Foot mounting with key **L**	
Square flange at cylinder base **H**		Foot mounting with O-ring seals for subplate mounting **M**	
Rectangular flange at cylinder base **D**		Threaded holes in cylinder head and base **N**	
Square flange at cylinder base **K**		Foot mounting front face with key **T**	
Trunnion mounting at cylinder head **R**		Extended tie rod at cylinder head **P**	
Centre trunnion mounting **E**		Extended tie rod at cylinder base **Q**	

Ordering details



Single rod cylinder = **CD**
Double rod cylinder = **CG**

Series = **210**

For mounting styles, see page 4

Piston Ø	Piston rod Ø	Area ratio φ	Ordering details
40	16	1.2:1	= 40/ 16
	18	1.25:1	= 40/ 18
	25	1.6:1	= 40/ 25
50	22	1.25:1	= 50/ 22
	25	1.35:1	= 50/ 25
	36	2:1	= 50/ 36
63	25	1.2:1	= 63/ 25
	28	1.25:1	= 63/ 28
	36	1.4:1	= 63/ 36
	45	2:1	= 63/ 45
80	36	1.25:1	= 80/ 36
	45	1.4:1	= 80/ 45
	56	2:1	= 80/ 56
100	45	1.25:1	=100/ 45
	50	1.35:1	=100/ 50
	70	2:1	=100/ 70
125	50	1.2:1	=125/ 50
	56	1.25:1	=125/ 56
	63	1.35:1	=125/ 63
	90	2:1	=125/ 90
150	63	1.2:1	=150/ 63
	70	1.25:1	=150/ 70
	80	1.4:1	=150/ 80
	100	1.8:1	=150/100
180	80	1.25:1	=180/ 80
	90	1.35:1	=180/ 90
	125	2:1	=180/125
200	90	1.25:1	=200/ 90
	100	1.35:1	=200/100
	140	2:1	=200/140

Stroke length
750 mm = **750**
(enter stroke length in mm)

Series = **1X**
(11 to 19: unchanged installation and connection dimensions)

Port connections

00 =	Flange connection with O-ring seals; only possible for mounting style "M"
01 =	Pipe threads to ISO 228/1
02 =	Metric ISO threads
13 = [3]	Enlarged port connections with pipe threads to ISO 228/1
14 = [3]	Enlarged port connections with metric ISO thread

The port connection sizes are associated with the piston Ø.

Piston rod version

H =	Hardened and hard chrome plated for piston rod Ø ≤ 100 mm
C =	Hard chome plated, for piston rod Ø ≥ 80 mm

Piston rod end

B =	External threads
C =	External threads
E =	Internal threads
F =	Threads for self-aligning clevis
T = [1]	With self-aligning clevis CGK mounted
L = [2]	With self-aligning clevis CGA mounted
M= [2]	With self-aligning clevis CGAK mounted

End position cushioning

U =		Without
K =	(viewed "Y")	Base end
S =	(viewed "X")	Head end
D =		Both ends

Seals

M =	Seals, suitable for mineral oil to DIN 51 524 (HL, HLP)
V =	(FKM) seals, suitable for phosphate ester (HFD-R)

Port connection at cylinder head
Enter position of ports
Table on pg. 3 to be taken into account

Port connection at cylinder base
Enter position of ports
Table on pg. 3 to be taken into account

Seals

A =	Standard version
T =	Low friction version

Stop tube extension
State

Further details [4] in clear text

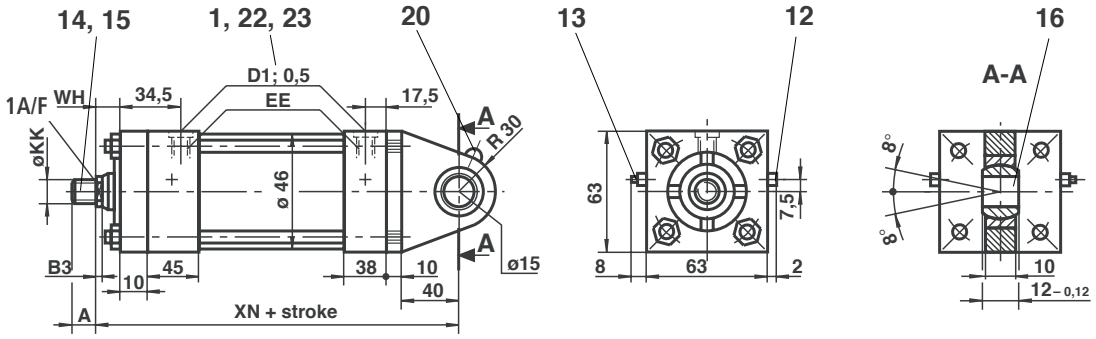
[1] Only possible with Ø40/16 to 180/80
[2] Only possible with Ø180/90 to 200/140
[3] Not possible for piston Ø 200
[4] When fitting inductive proximity switches, the details must always be stated in clear text on the order.

Ordering example: CD 210 B50/22 - 200Z1X/01HBDM1-1A

When ordering special versions, an "X" is entered at the relevant point in the ordering details and an SO added at the end of the code.

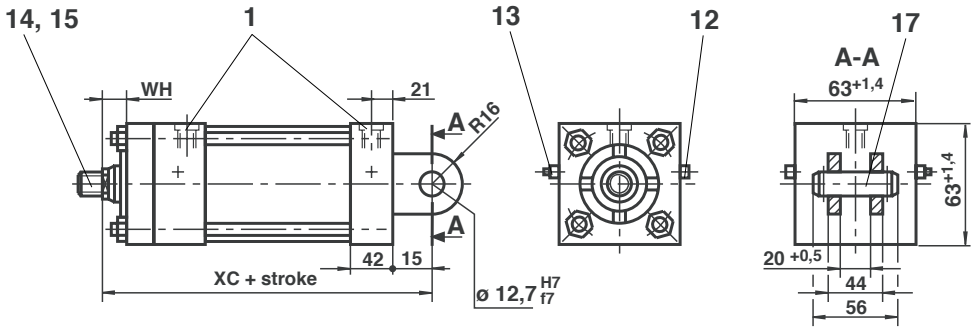
Mounting style B

Operating pressure 210 bar



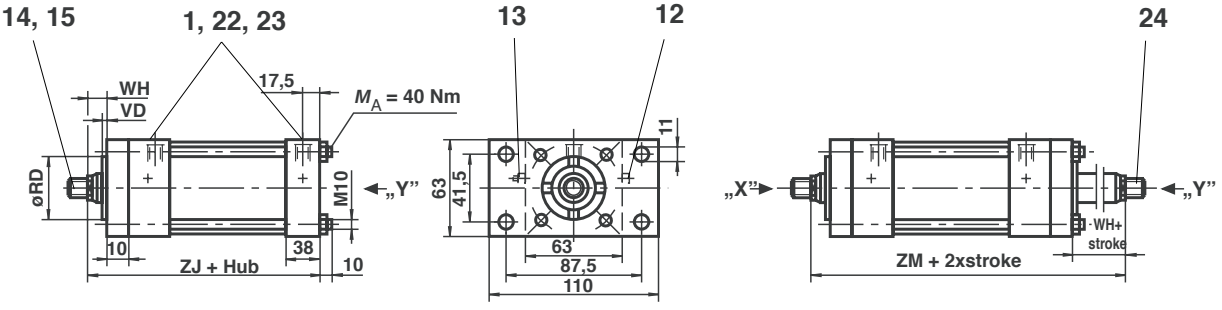
Mounting style G

Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 16 and Ø 18: 180 bar at base end, 210 bar rod end
Operating pressure for rod Ø 25: 110 bar at base end, 210 bar rod end



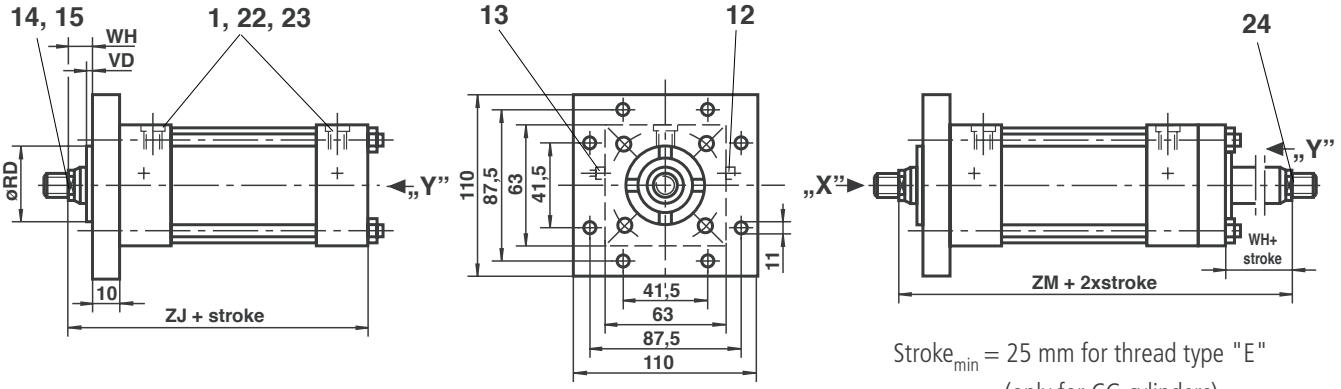
$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

◥ Max. load 13 kN

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

Mounting style H

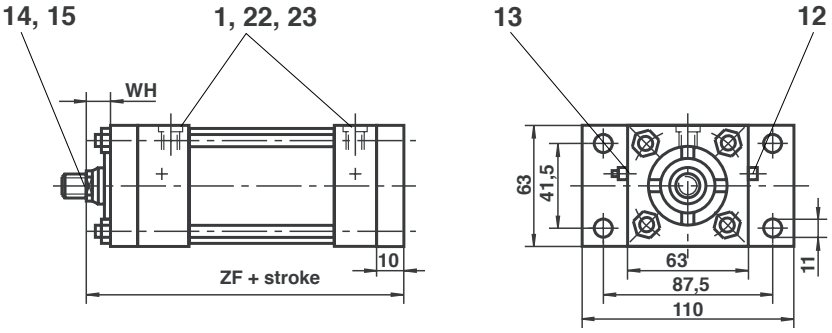
Operating pressure 210 bar



$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

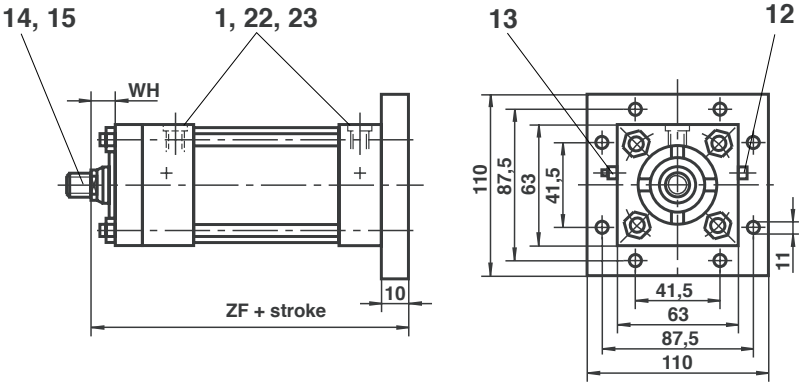
Mounting style D

Operating pressure 210 bar



Mounting style K

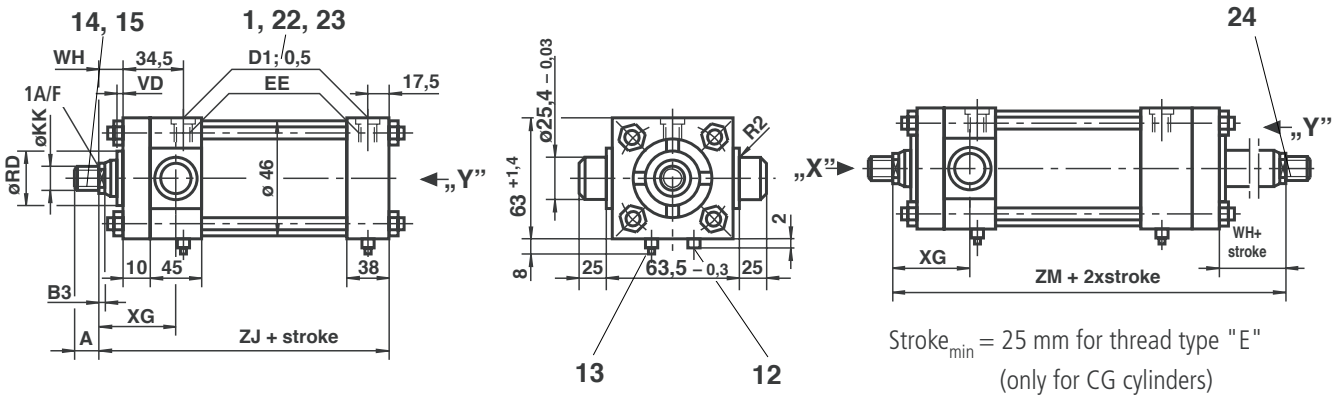
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
16	28,5	6	16	162	193	153	143	176	5	13	30	30
18	32	6	16	162	193	153	143	176	5	14		
25	38	13	25	171	202	162	152	194	7	22		

Mounting style R

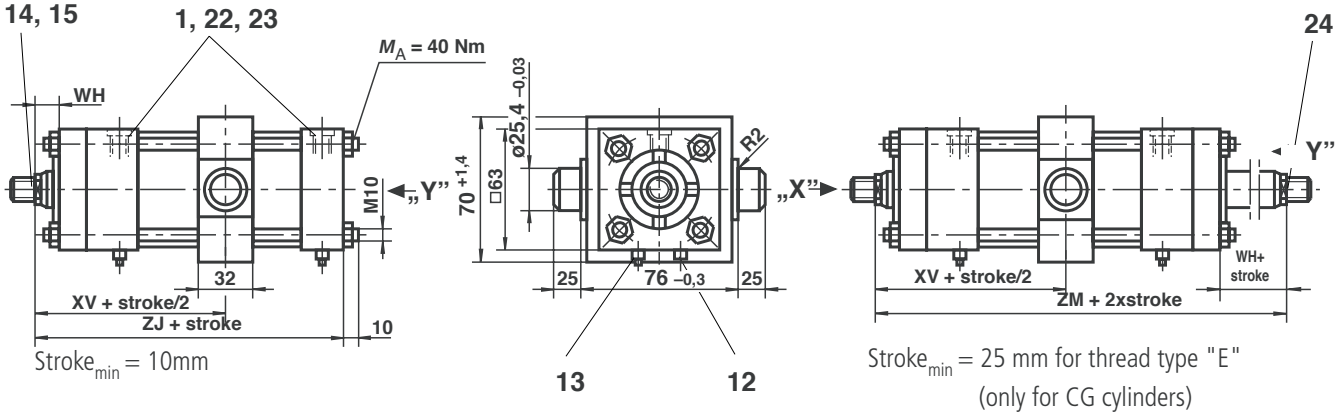
Operating pressure 210 bar



Stroke$_{min}$ = 25 mm for thread type "E" (only for CG cylinders)

Mounting style E

Operating pressure 210 bar

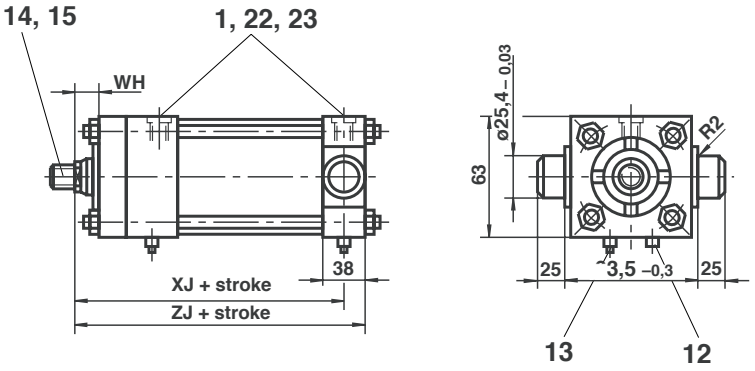


Stroke$_{min}$ = 10mm

Stroke$_{min}$ = 25 mm for thread type "E" (only for CG cylinders)

Mounting style S

Operating pressure 210 bar

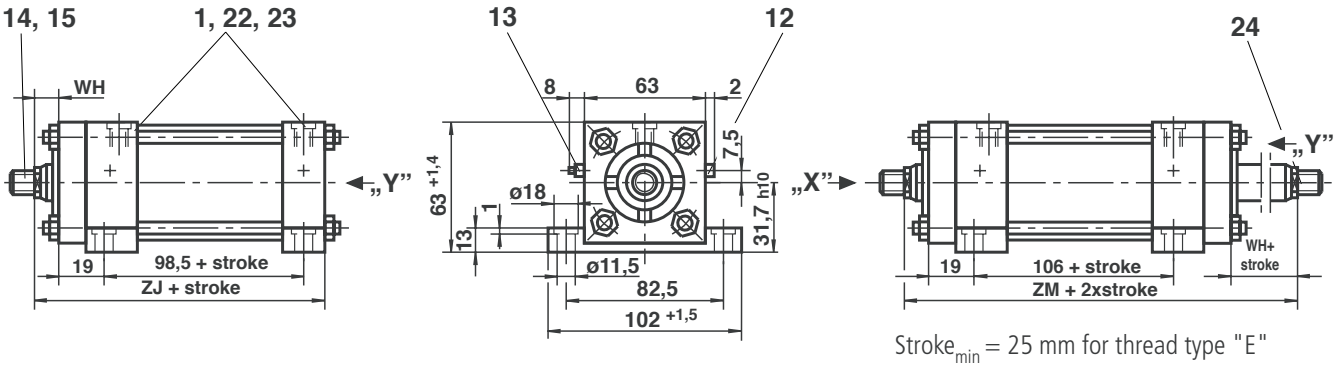


◥ Max. load 13 kN

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

Mounting style F

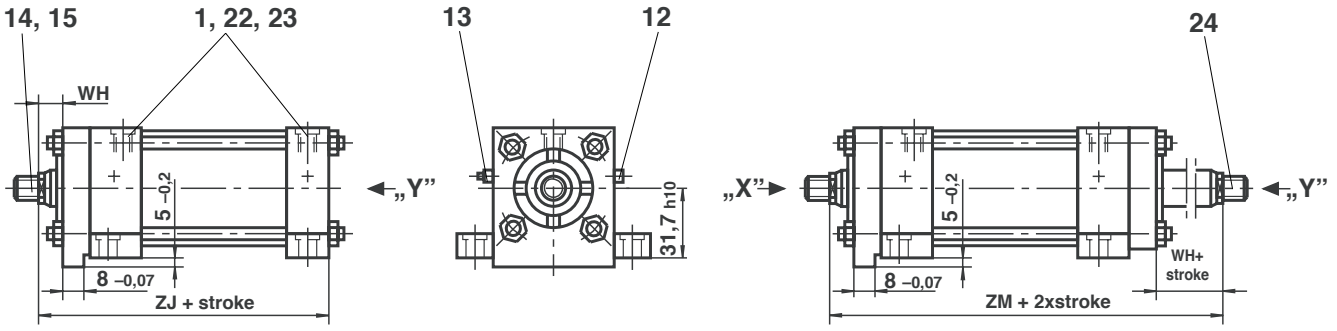
Operating pressure 210 bar



$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

Mounting style L

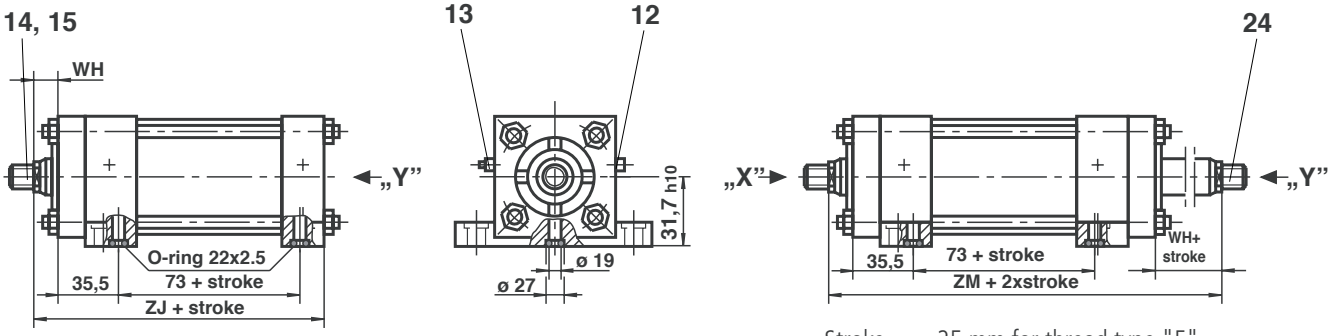
Operating pressure 210 bar



$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

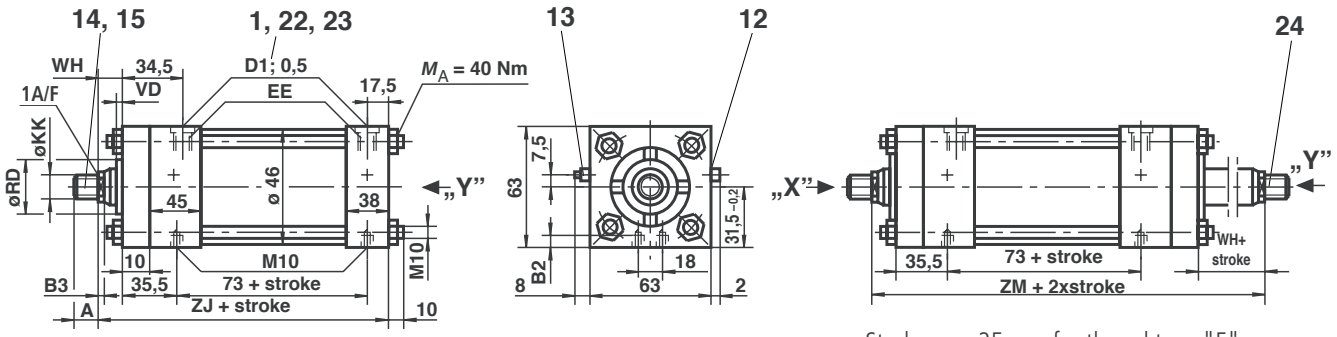


$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
16	28.5	6	16	48	124	88	143	176	5	13	30	30
18	32	6	16	48	124	88	143	176	5	14		
25	38	13	25	57	133	97	152	194	7	22		

Mounting style N

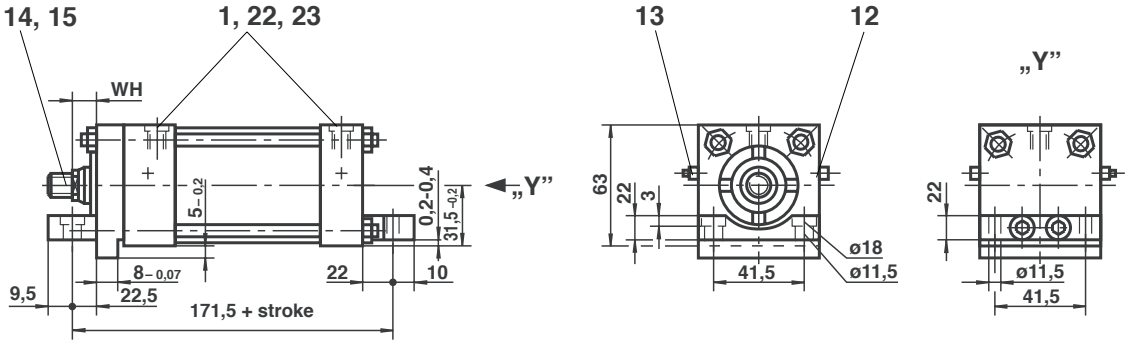
Operating pressure 210 bar



$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

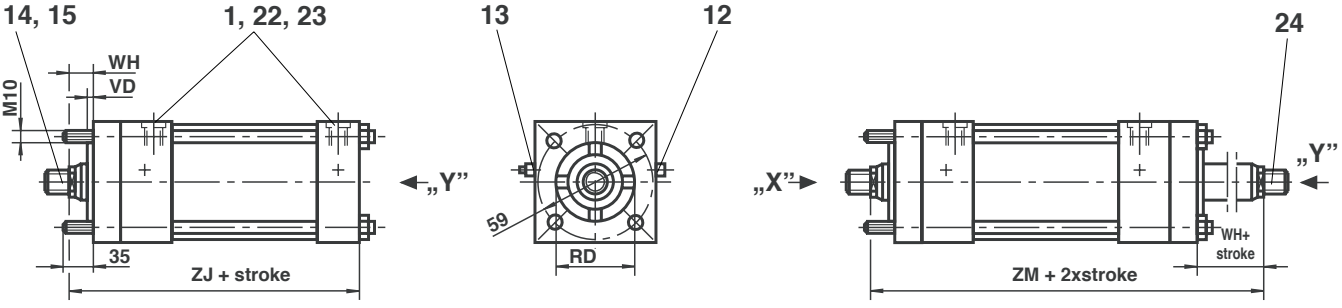
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar



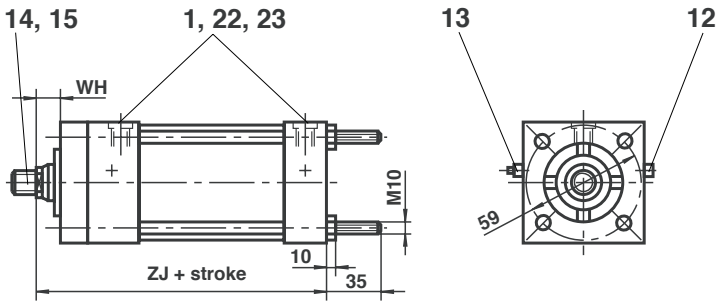
$Stroke_{min}$ = 25 mm for thread type "E"
(only for CG cylinders)

◥ Max. load 13 kN

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

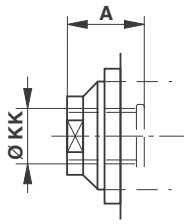
Mounting style Q

Operating pressure 210 bar

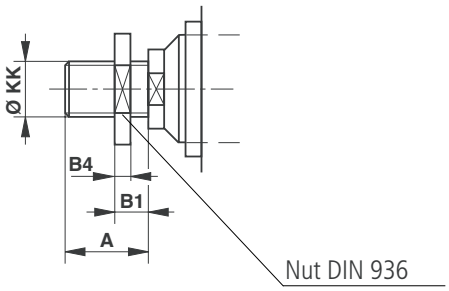


Additional thread types

Thread type „E"



Thread type „F"



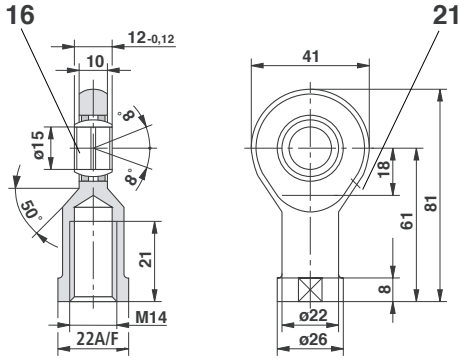
Self-aligning clevis CGK 15

to suit thread type „F"

Material No.: **R900001328**

Weight: 0.16 kg

Permissible load: 18 kN



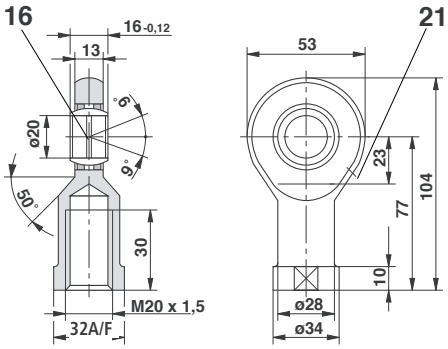
Self-aligning clevis CGK 20

to suit thread type „F"

Material No.: **R900001329**

Weight: 0.34 kg

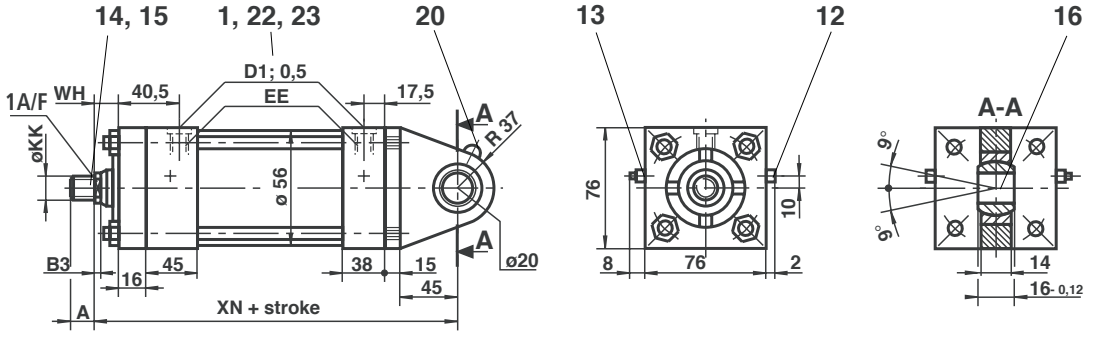
Permissible load: 30 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
16	28.5	8	6	16	143	176	14	12	5	13	30	30
18	32	8	6	16	143	176	14	12	5	14		
25	38	9	13	25	152	194	15	12	7	22		

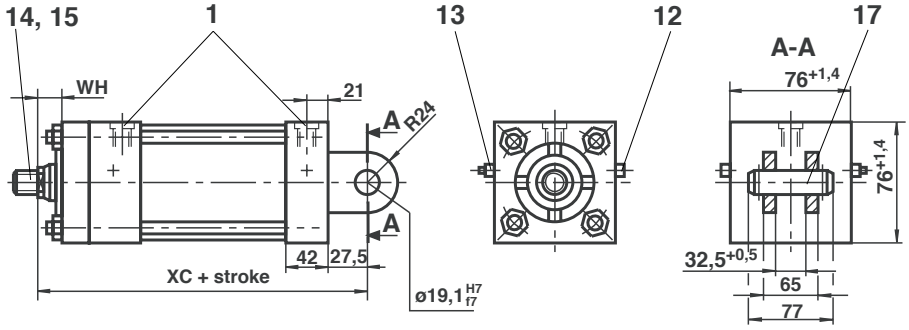
Mounting style B

Operating pressure 210 bar



Mounting style G

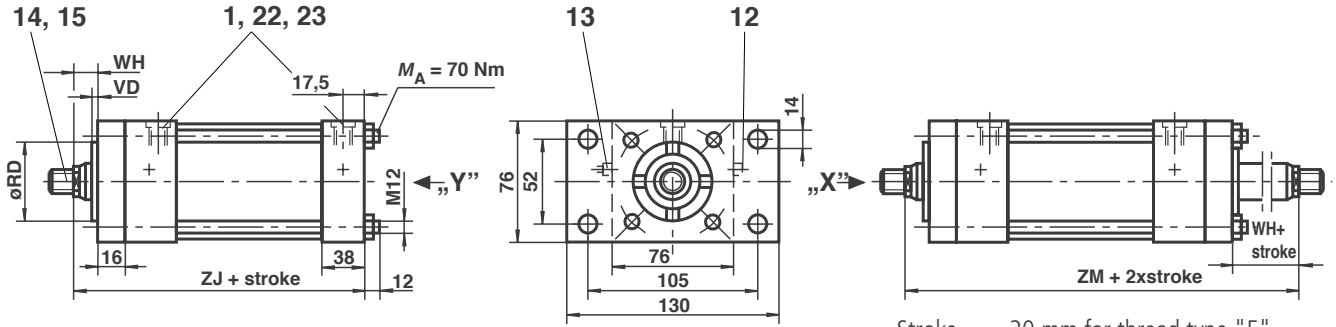
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 22 and Ø 25: 180 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 36: 110 bar at base end, 210 bar at rod end

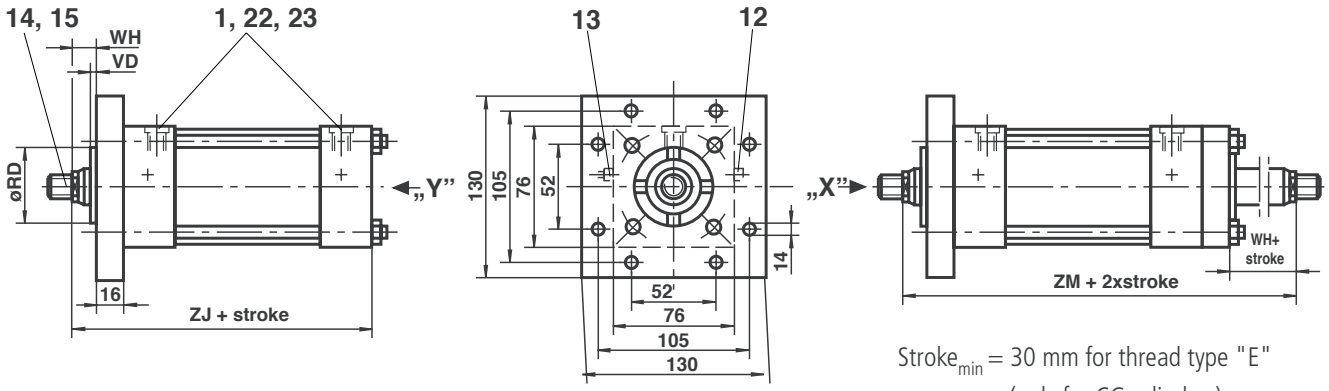


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

Mounting style H

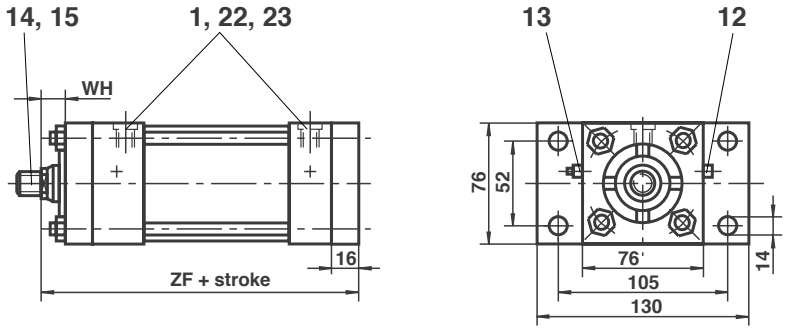
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

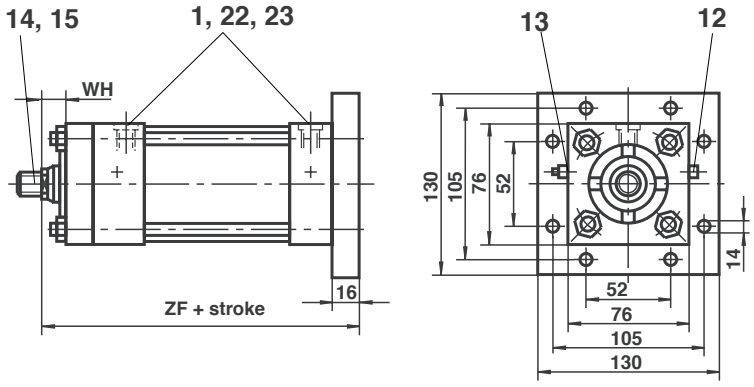
Mounting style D

Operating pressure 210 bar



Mounting style K

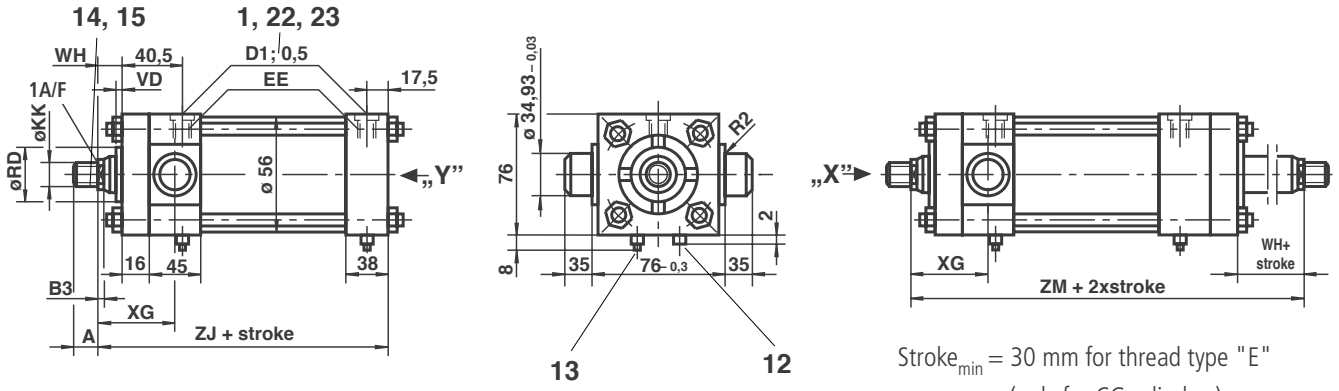
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
22	38	6	19	184	212.5	168.5	152.5	194.5	8	19	30	30
25	38	7	19	184	212.5	168.5	152.5	194.5	8	22		
36	50	10	25.5	190.5	219	175	159	207.5	8	30		

Mounting style R

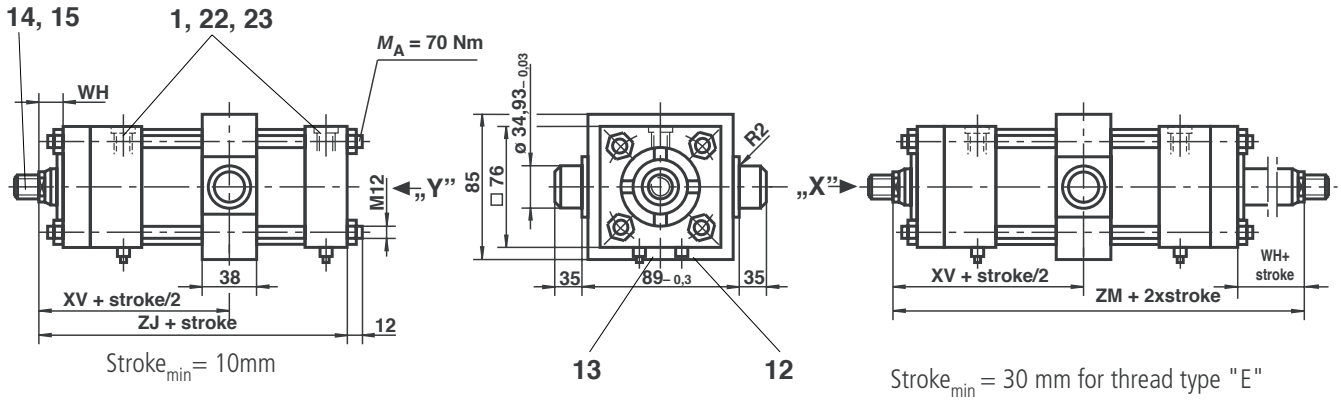
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Mounting style E

Operating pressure 210 bar

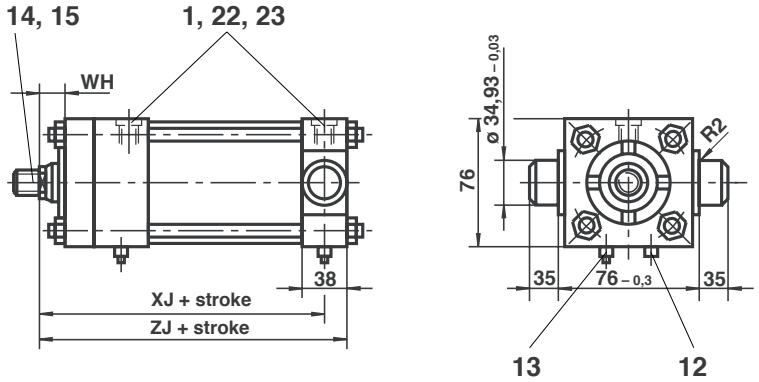


$Stroke_{min}$ = 10mm

$Stroke_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Mounting style S

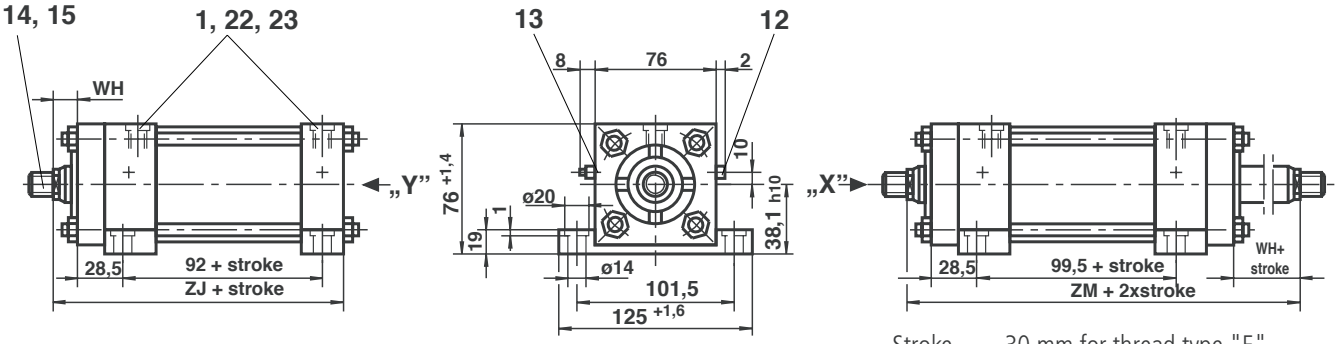
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

Mounting style F

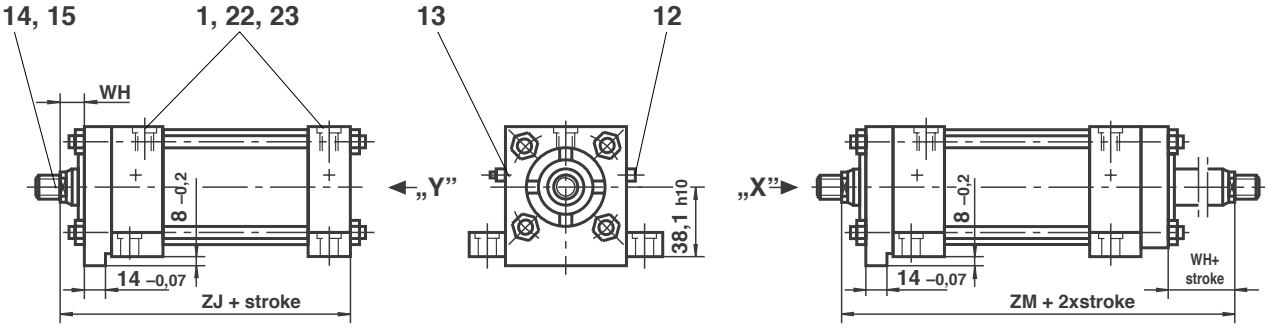
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style L

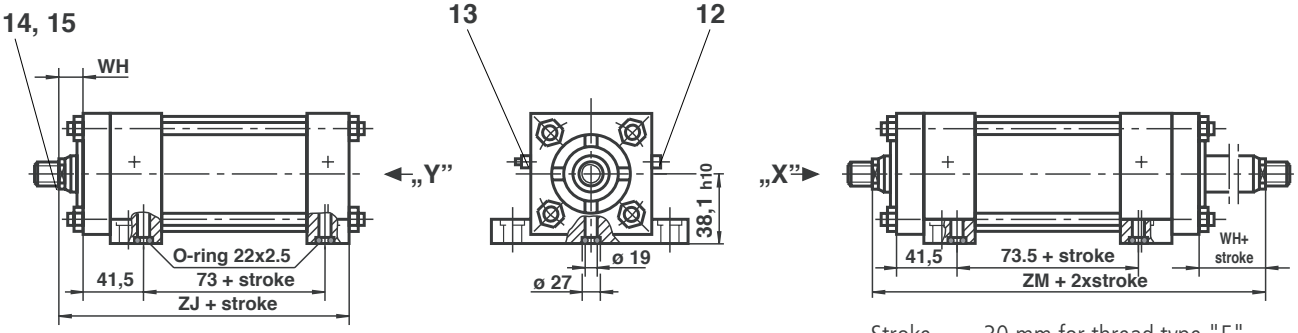
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting styles M

Operating pressure 210 bar

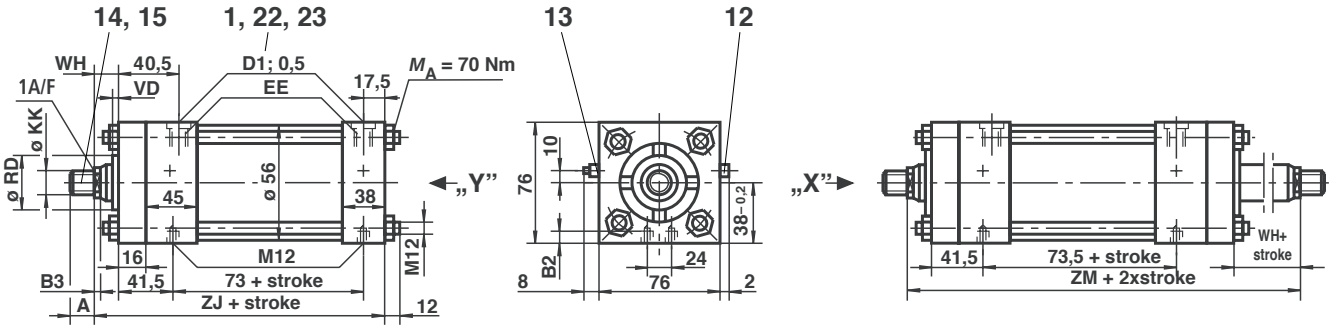


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
22	38	6	19	57	133.5	97	152.5	194.5	8	19	30	30
25	38	7	19	57	133.5	97	152.5	194.5	8	22		
36	50	10	25.5	63.5	140	104	159	207.5	8	30		

Mounting style N

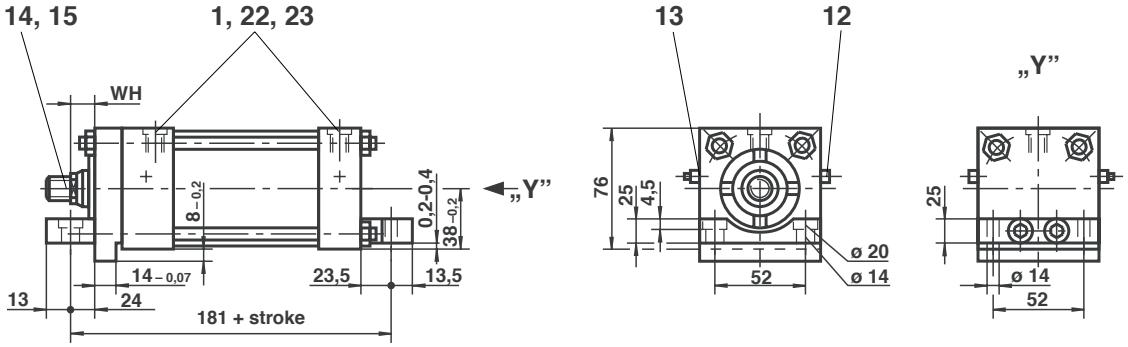
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

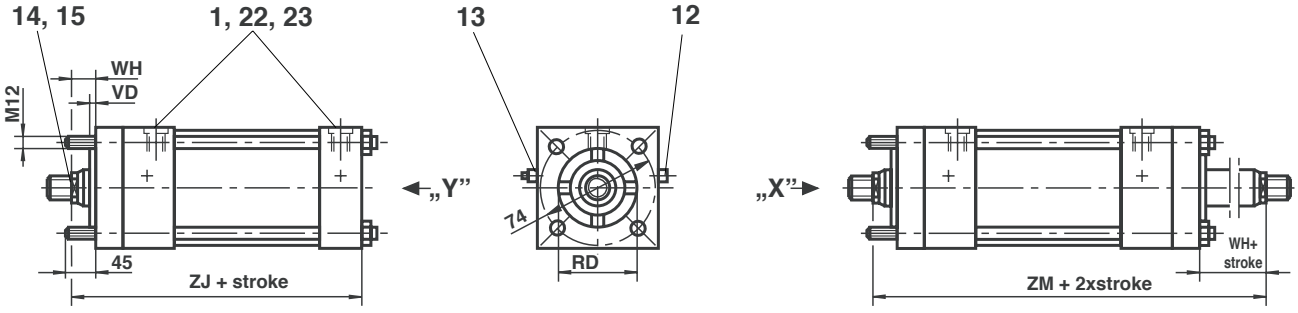
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

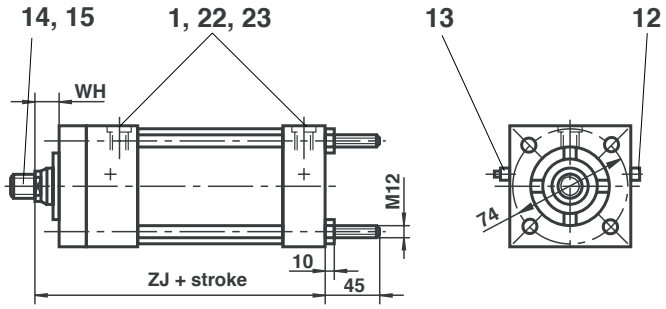


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
Ø	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

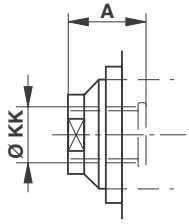
Mounting style Q

Operating pressure 210 bar

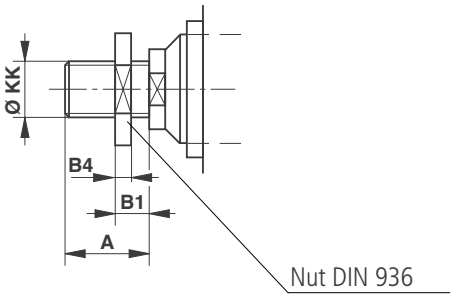


Additional thread types

Thread type „E"



Thread type „F"



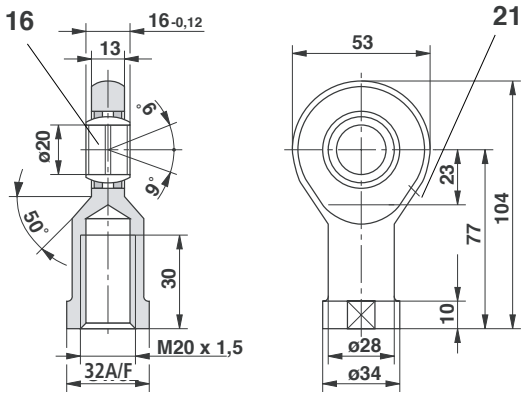
Self-aligning clevis CGK 20

to suit thread type „F"

Material No.: **R900001329**

Weight: 0.34 kg

Permissible load: 30 kN



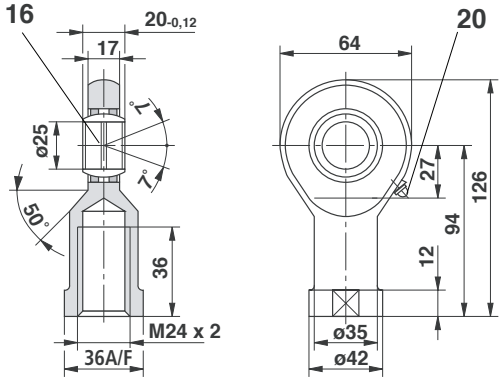
Self-aligning clevis CGK 25

to suit thread type „F"

Material No.: **R900001330**

Weight: 0.6 kg

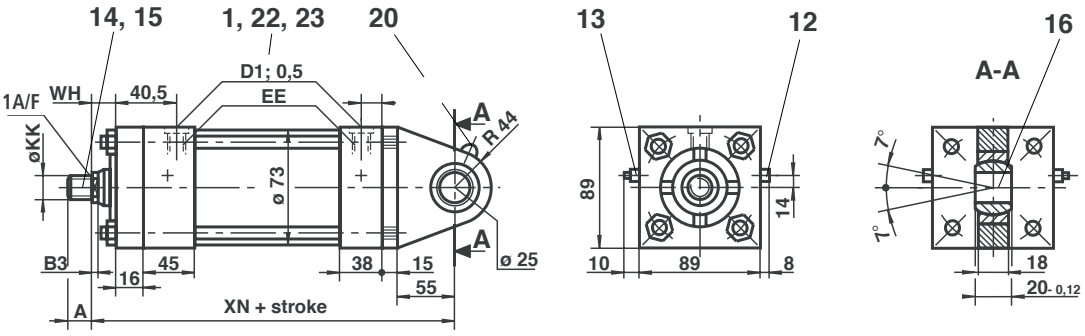
Permissible load: 42 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
22	38	9	6	19	152.5	194.5	15	16	8	19	30	30
25	38	9	7	19	152.5	194.5	15	16	8	22		
36	50	10	10	25.5	159	207.5	19	12	8	30		

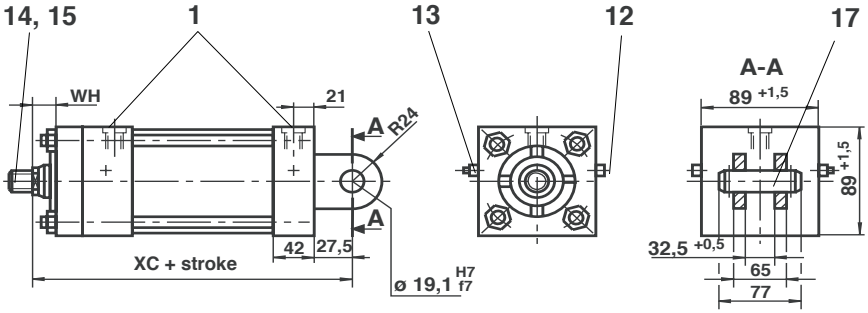
Mounting style B

Operating pressure 210 bar



Mounting style G

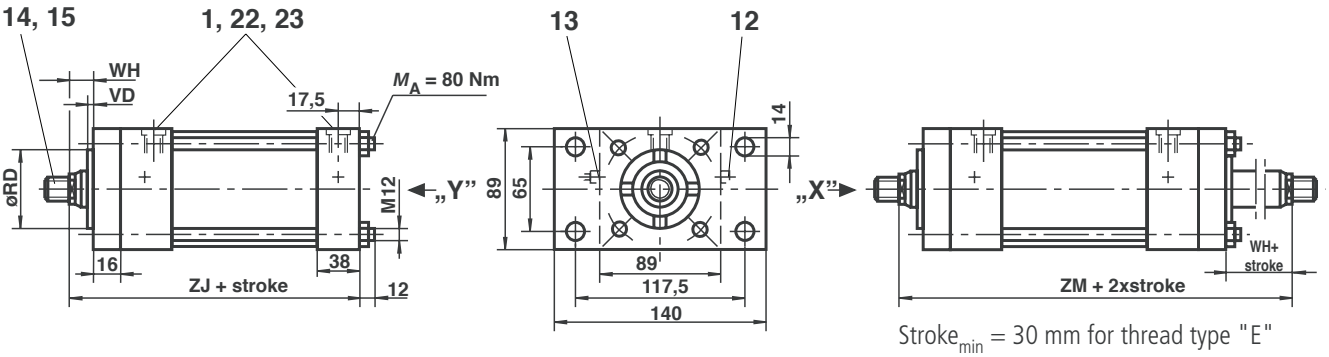
Operating pressure210 bar



Mounting style C

Operating pressure for rod Ø 25 and Ø 28: 180 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 36 and Ø 45: 110 bar at base end, 210 bar at rod end

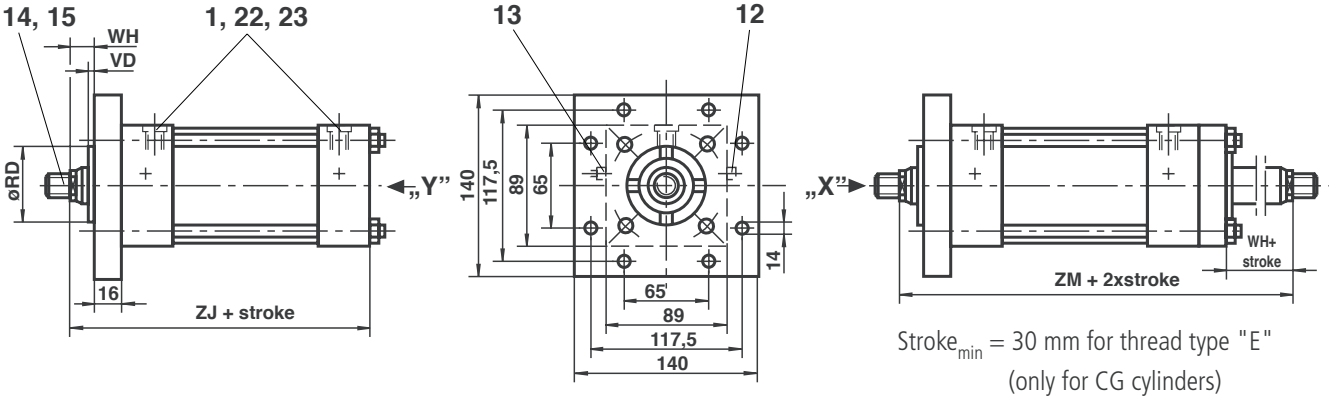


Stroke$_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

Mounting style H

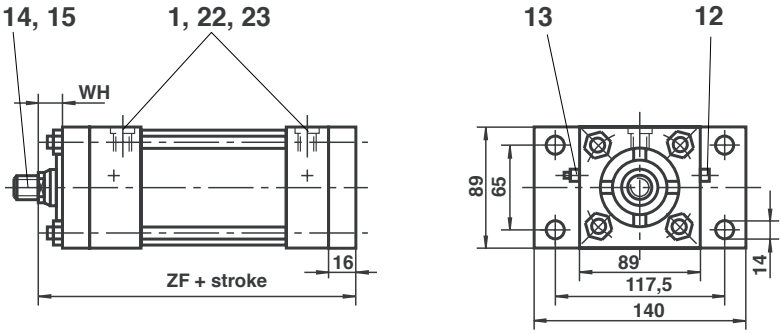
Operating pressure 210 bar



Stroke$_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

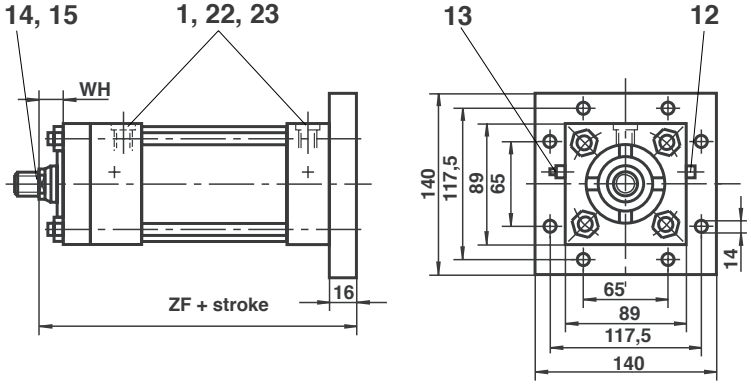
Mounting style D

Operating pressure 210 bar



Mounting style K

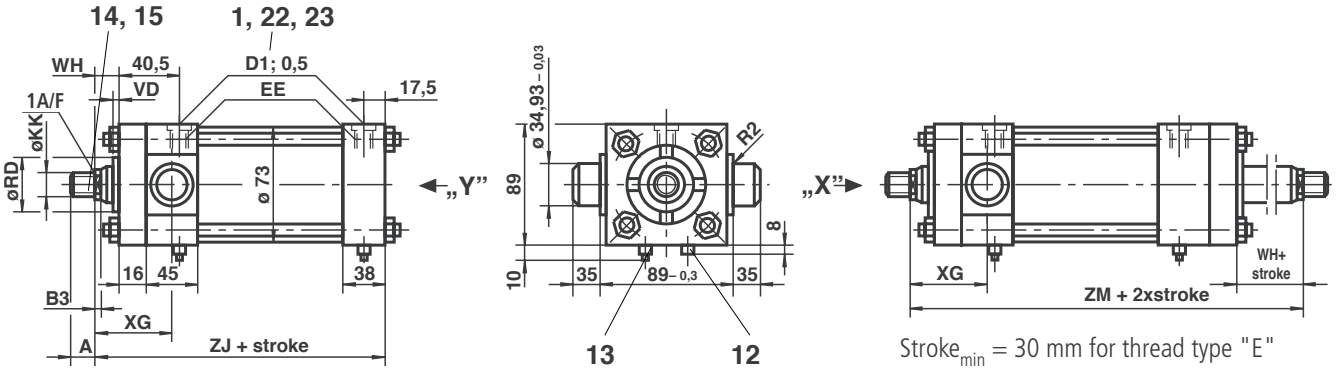
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
25	38	6	19	187	225.5	171.5	155.5	197.5	8	22	30	30
28	42	6	19	187	225.5	171.5	155.5	197.5	8	22		
36	50.7	10	25.5	193.5	232	178	162	210.5	10	30		
45	60	13	32	200	238,5	184.5	168.5	223.5	12	41		

Mounting style R

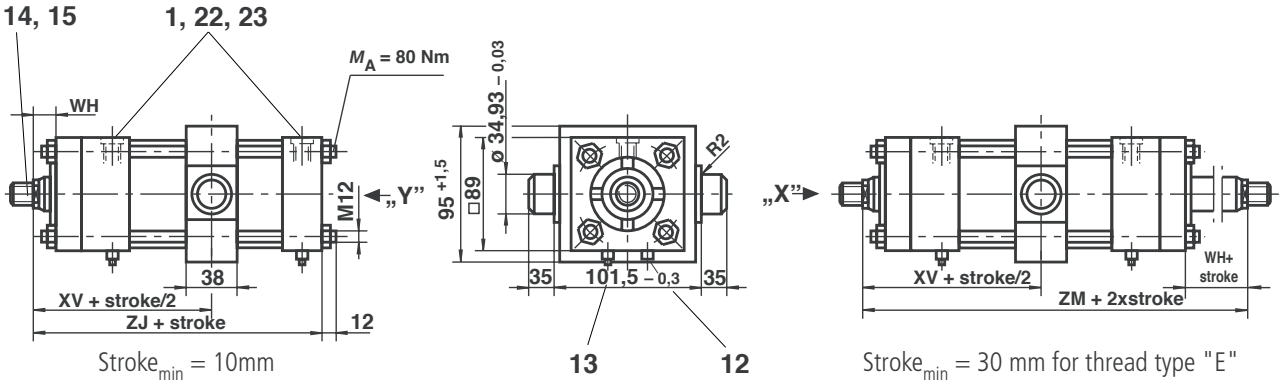
Operating pressure 210 bar



Stroke$_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Mounting style E

Operating pressure 210 bar

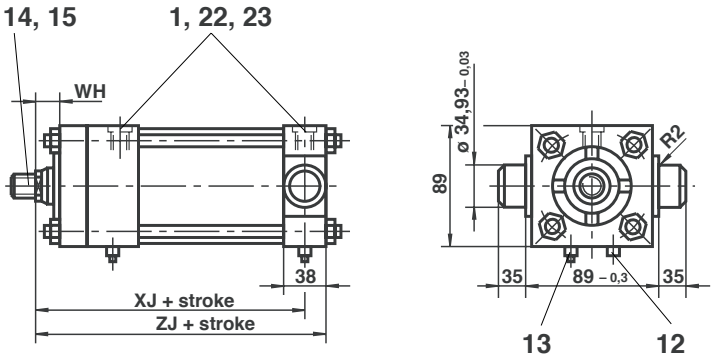


Stroke$_{min}$ = 10mm

Stroke$_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Mounting style S

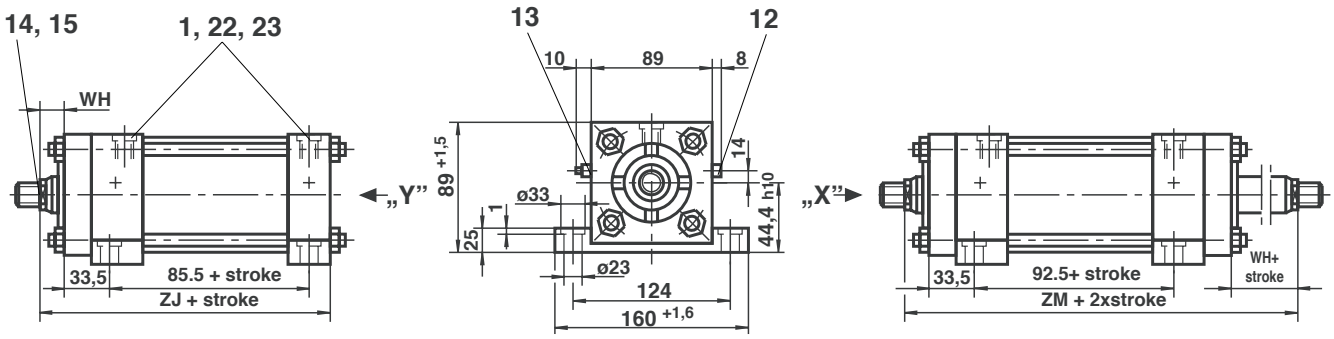
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

Mounting style F

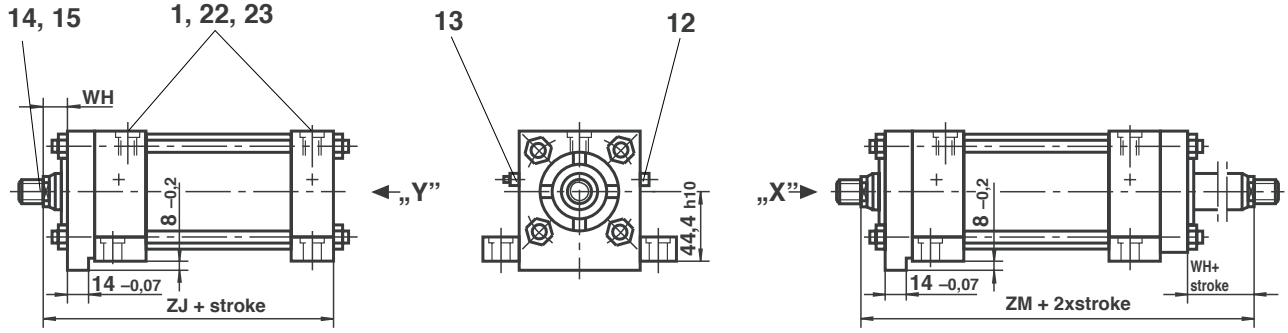
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style L

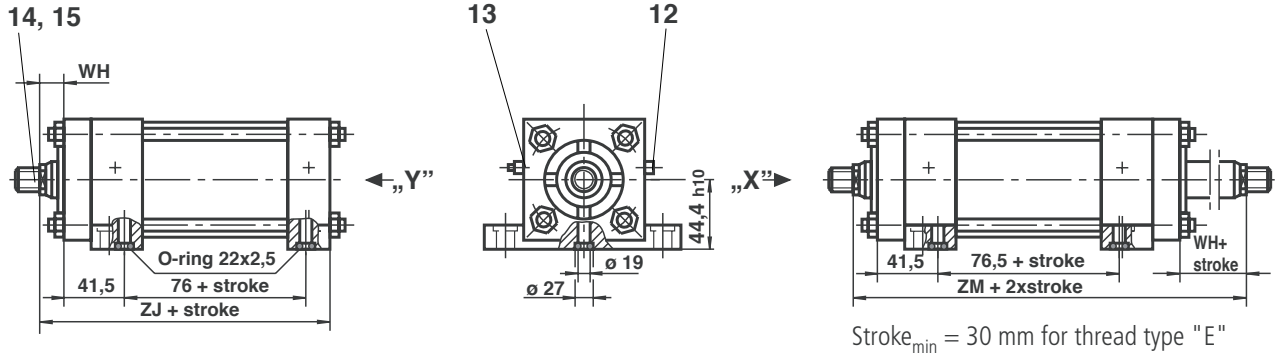
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

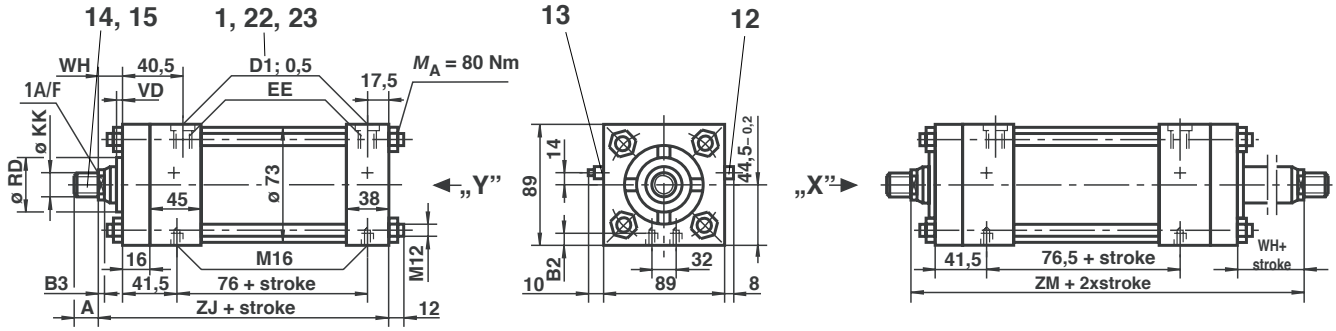


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
25	38	6	19	57	136.5	99	155.5	197.5	8	22	30	30
28	42	6	19	57	136.5	99	155.5	197.5	8	22		
36	50.7	10	25.5	3,5	143	105.5	162	210.5	10	30		
45	60	13	32	70	149.5	112	168.5	223.5	12	41		

Mounting style N

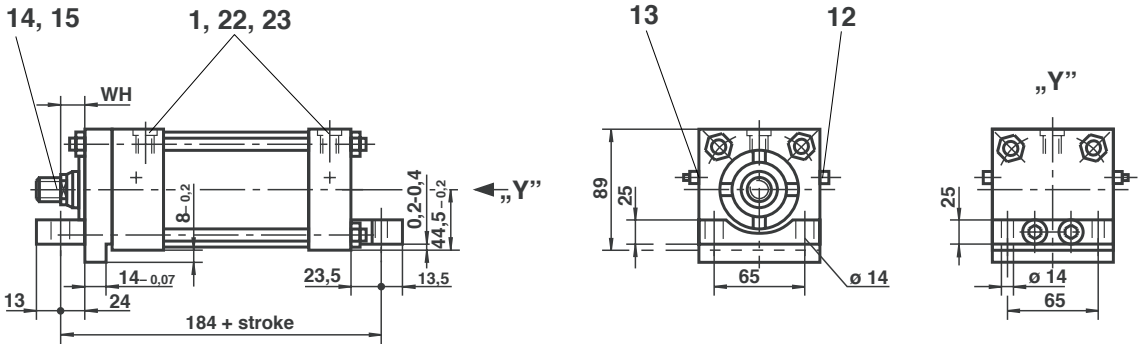
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

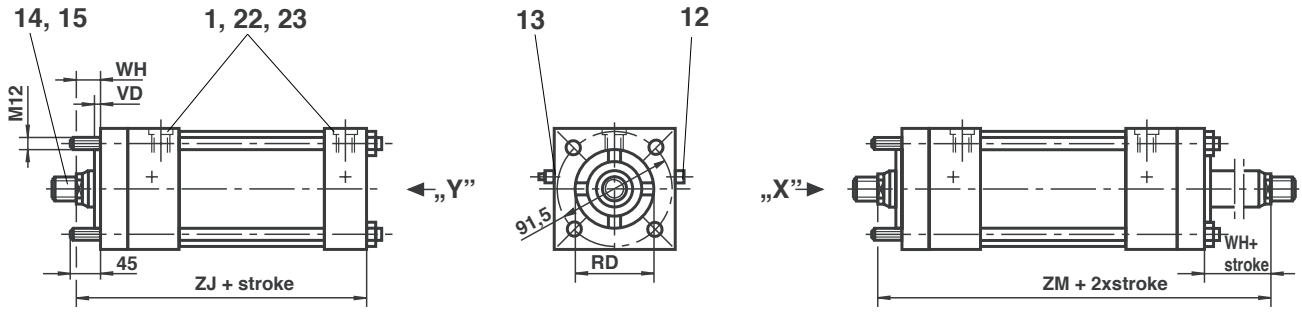
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

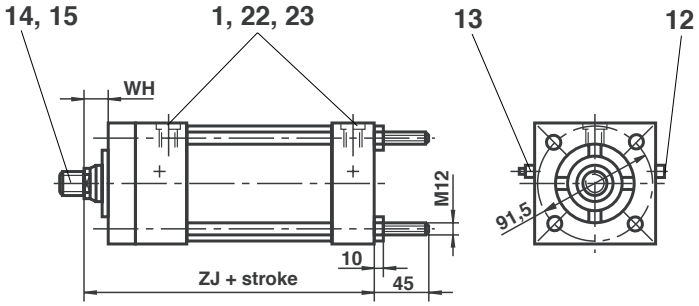


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
Ø	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

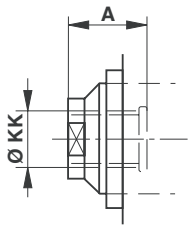
Mounting style Q

Operating pressure 210 bar

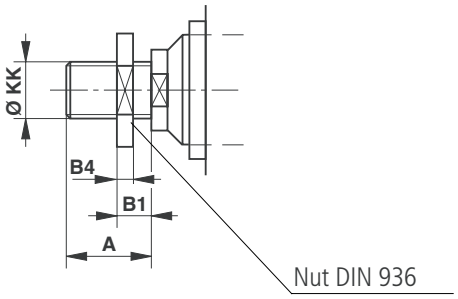


Additional thread types

Thread type „E"



Thread type „F"



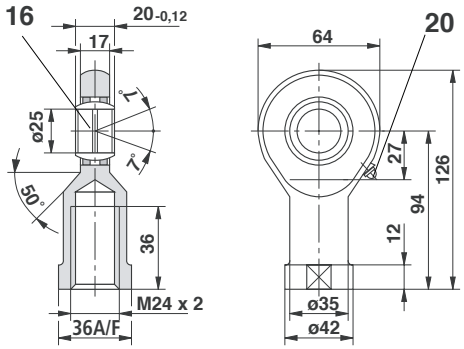
Self-aligning clevis CGK 25

to suit thread type „F"

Material No.: **R900001330**

Weight: 0.6 kg

Permissible load: 42 kN



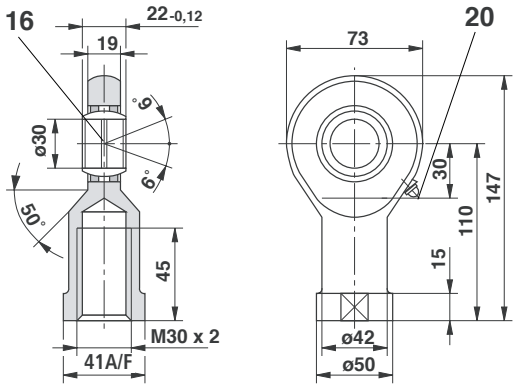
Self-aligning clevis CGK 30

to suit thread type „F"

Material No.: **R900001331**

Weight: 0.9 kg

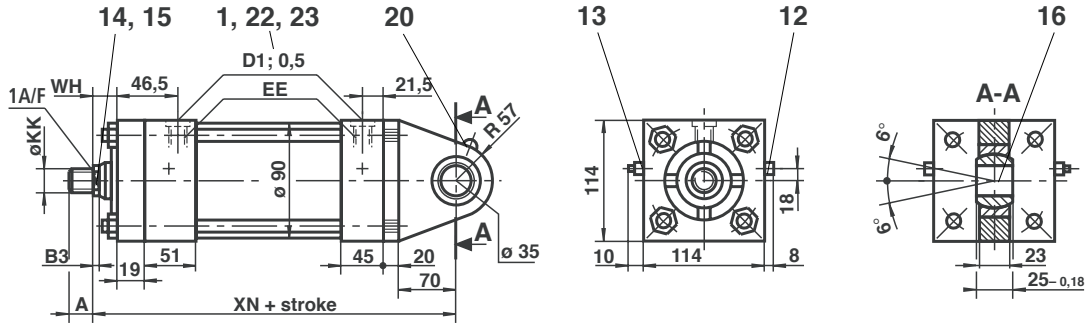
Permissible load: 55 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
25	38	10	6	19	155.5	197.5	19	20	8	22	30	30
28	42	10	6	19	155.5	197.5	19	20	8	22		
36	50.7	12	10	25.5	162	210.5	20	14	10	30		
45	60	12	13	32	168.5	223.5	20	14	12	41		

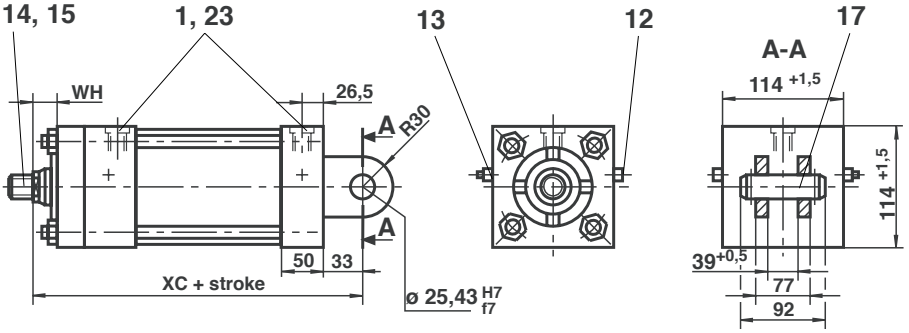
Mounting style B

Operating pressure 210 bar



Mounting style G

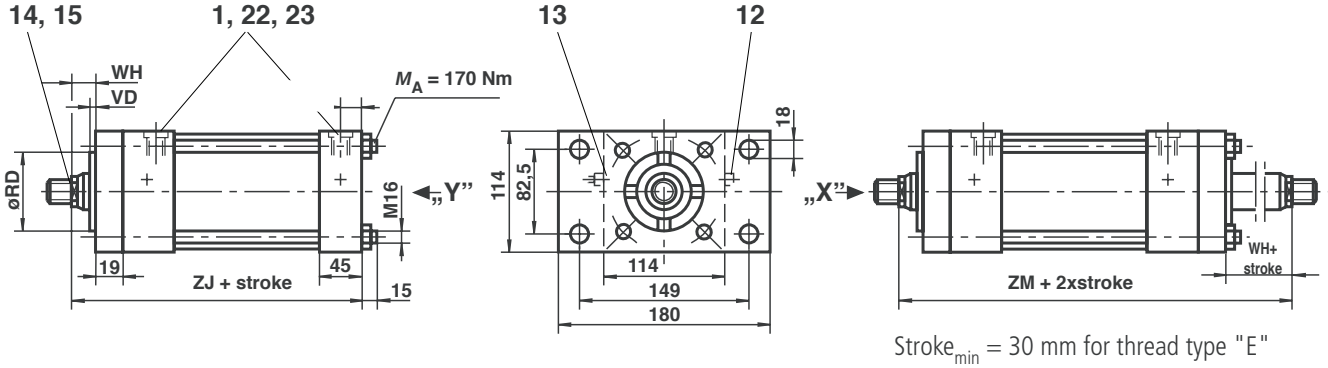
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 36: 180 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 45 and Ø 56: 110 bar at base end, 210 bar at rod end

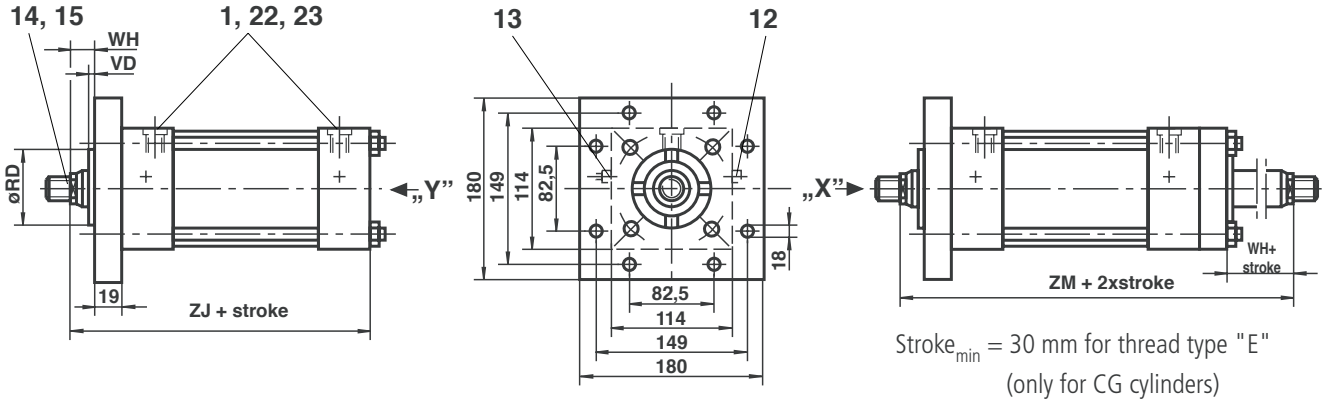


$Stroke_{min}$ = 30 mm for thread type "E" (only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

Mounting style H

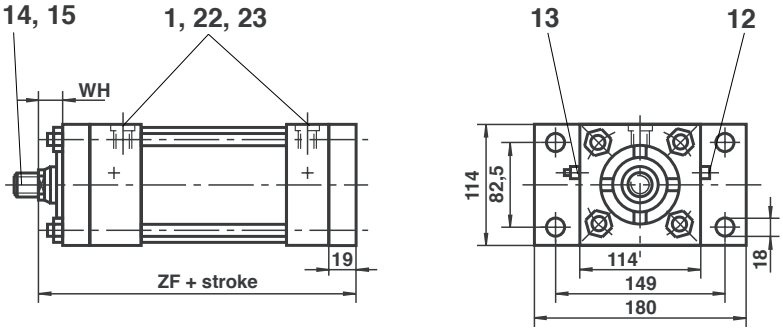
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

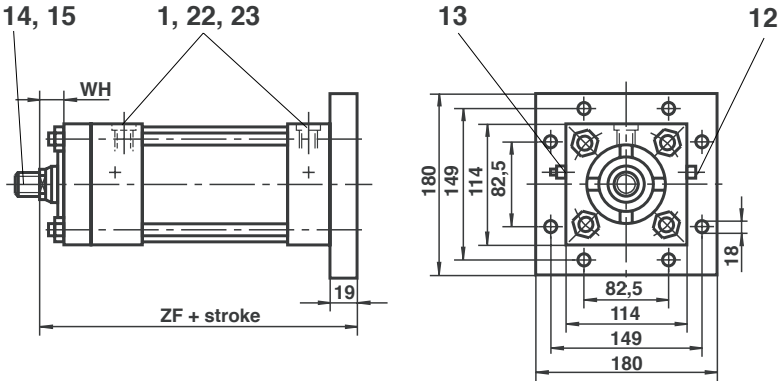
Mounting style D

Operating pressure 210 bar



Mounting style K

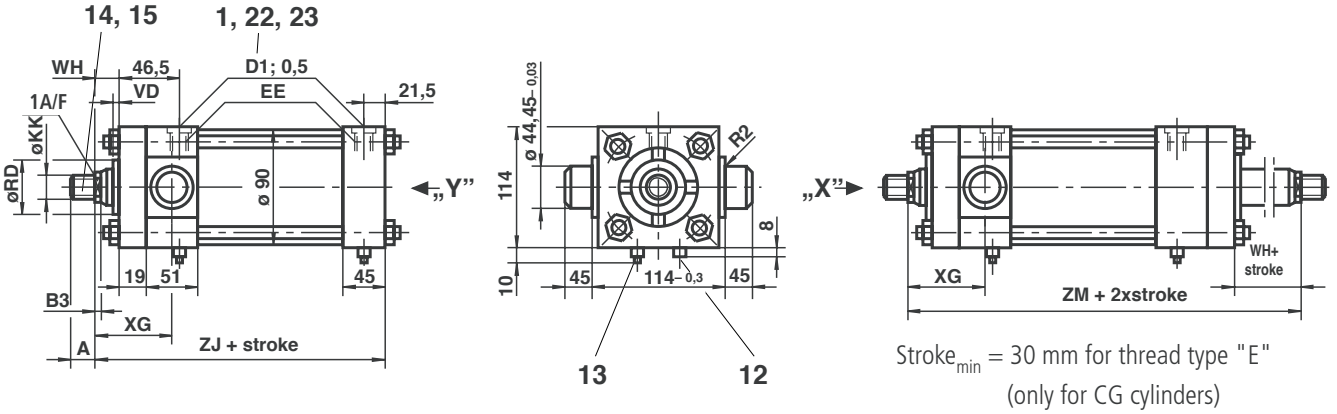
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cusioning length Piston side	Cusioning length Rod end
36	50	6	22	219	271	200	181	228	9	30	35	35
45	60	10	28.5	225.5	277.5	206.5	187.5	241	12	41		
56	70	10	32	229	281	210	191	248	15	46		

Mounting style R

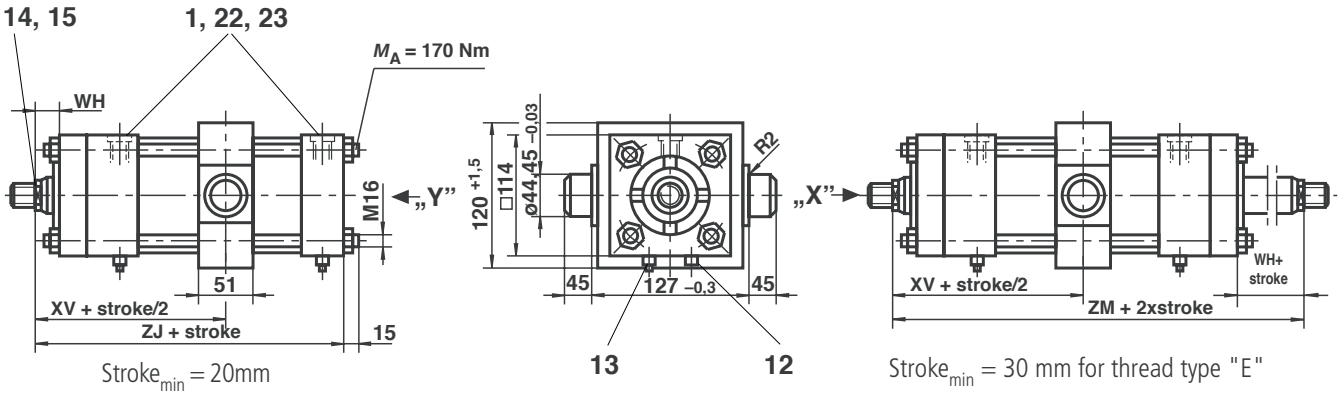
Operating pressure 210 bar



Stroke$_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style E

Operating pressure 210 bar

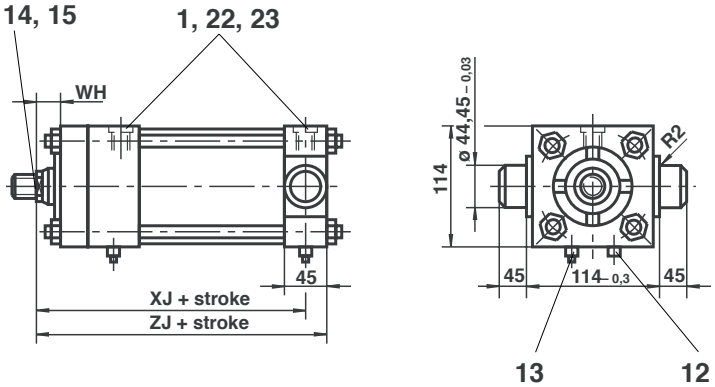


Stroke$_{min}$ = 20mm

Stroke$_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style S

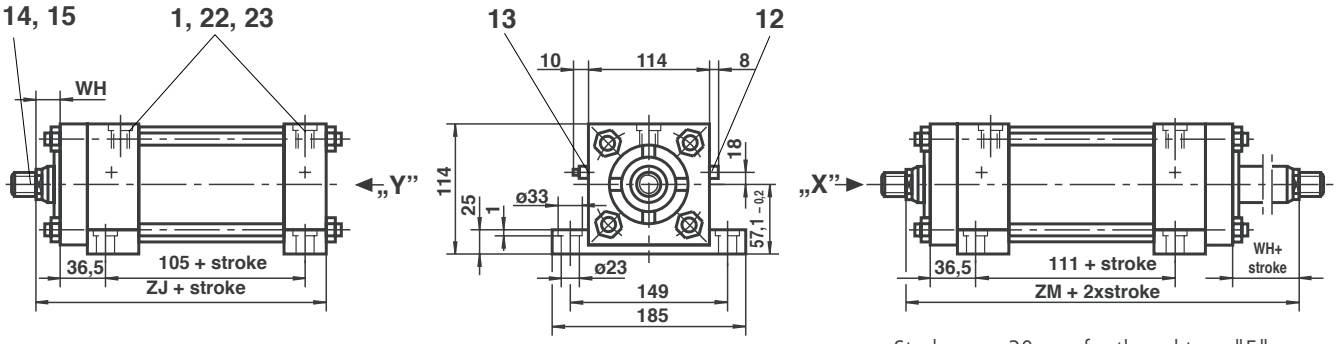
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

Mounting style F

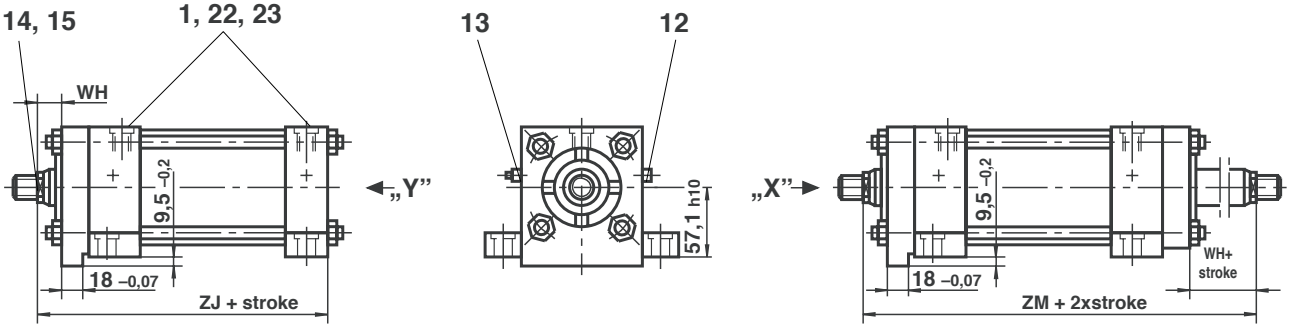
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style L

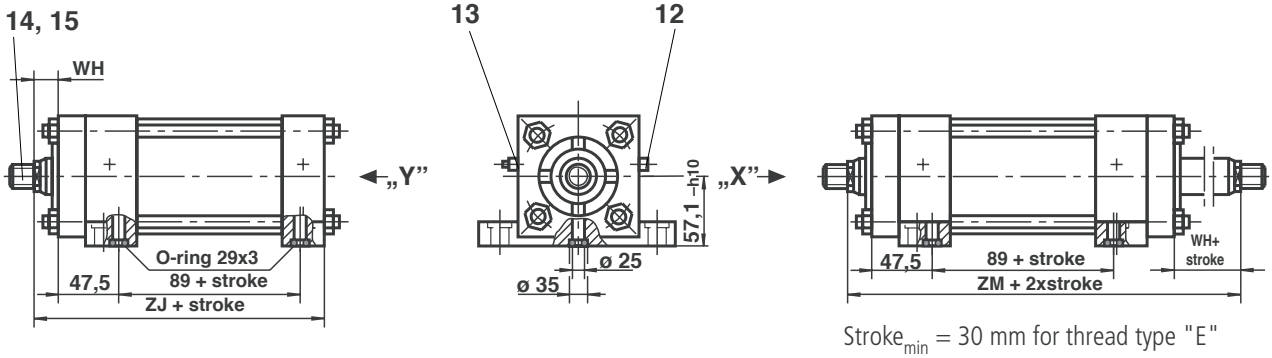
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

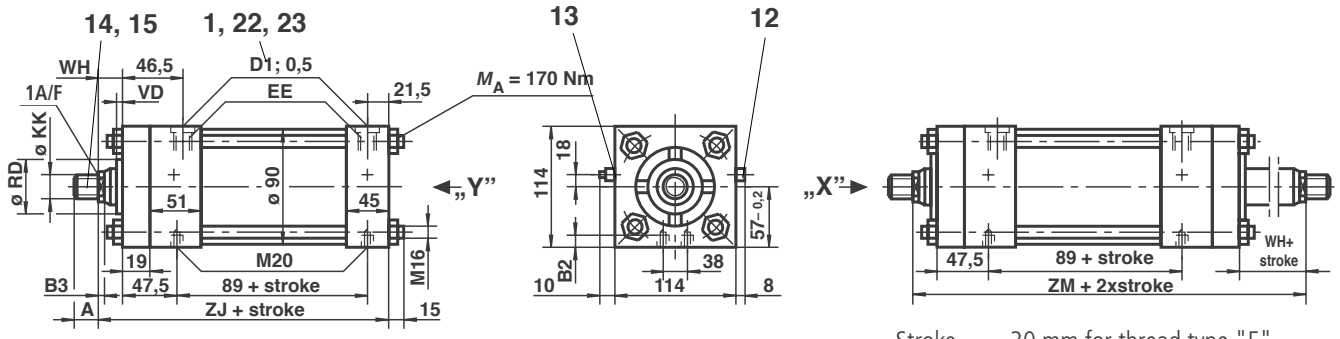


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
36	50	6	22	66.5	158.5	114	181	228	9	30	35	35
45	60	10	28.5	73	165	120.5	187.5	241	12	41		
56	70	10	32	76.5	168.5	124	191	248	15	46		

Mounting style N

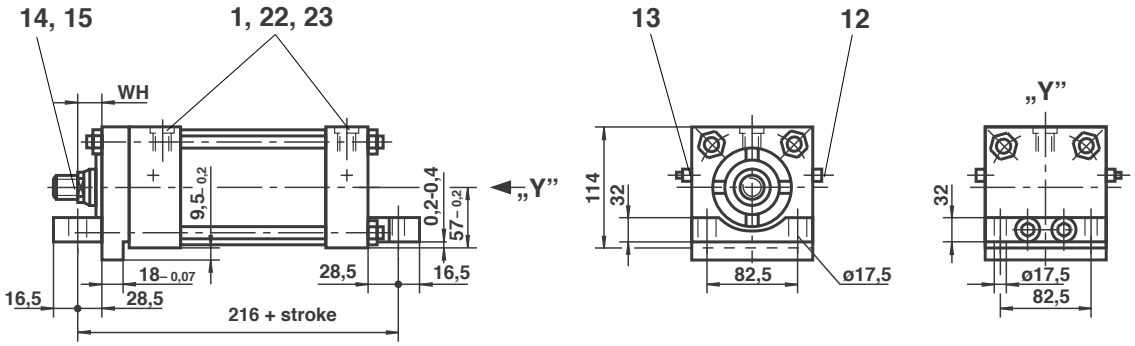
Operating pressure 210 bar



$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

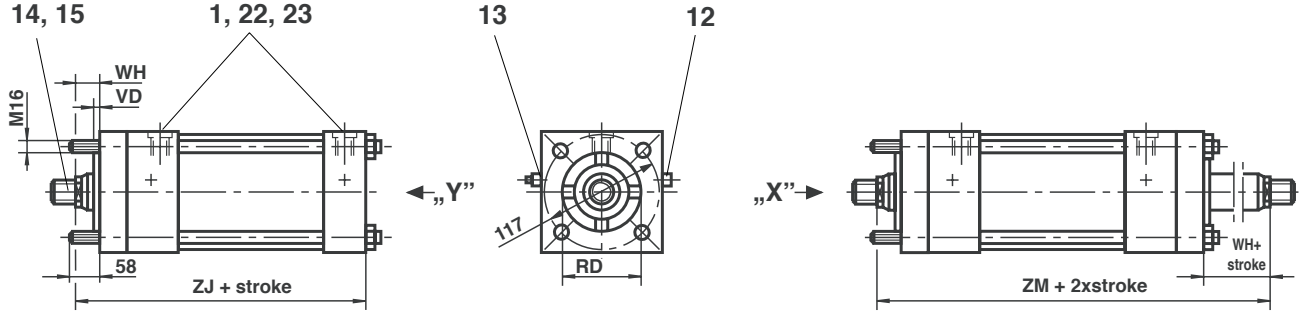
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

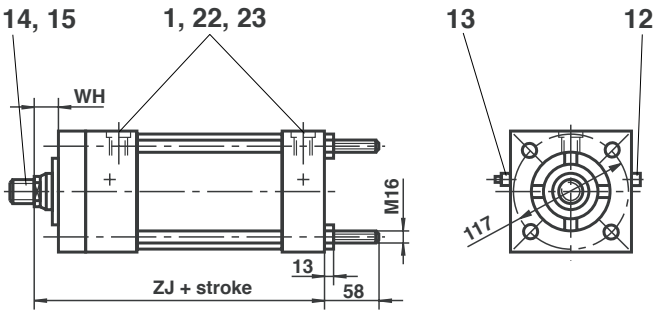


$Stroke_{min}$ = 30 mm for thread type "E"
(only for CG cylinders)

Piston rod	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
Ø	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

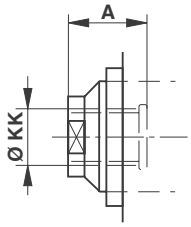
Mounting style Q

Operating pressure 210 bar

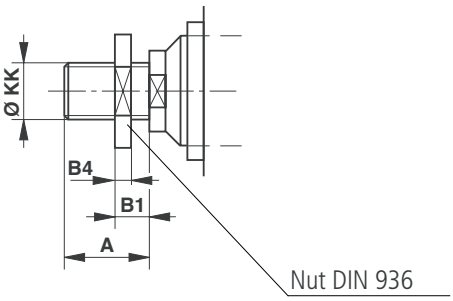


Additional thread types

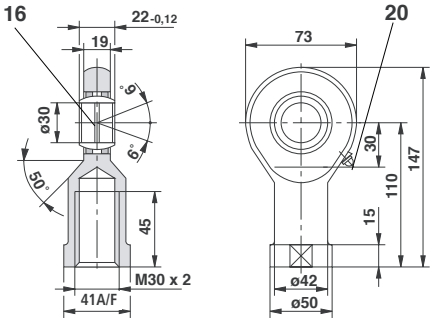
Thread type „E"



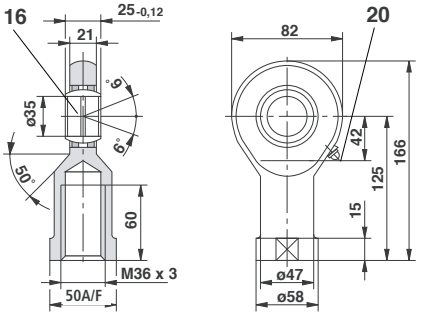
Thread type „F"



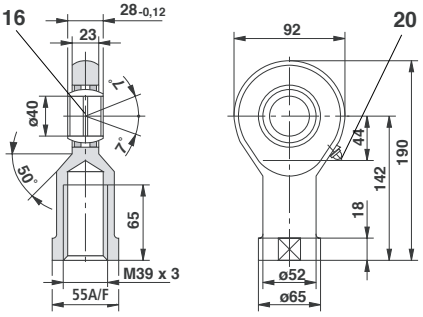
Self-aligning clevis CGK 30
to suit thread type „F"
Material No.: **R900001331**
Weight: 0.9 kg
Permissible load: 55 kN



Self-aligning clevis CGK 35
to suit thread type „F"
Material No.: **R900012486**
Weight: 1.4 kg
Permissble load: 73 kN



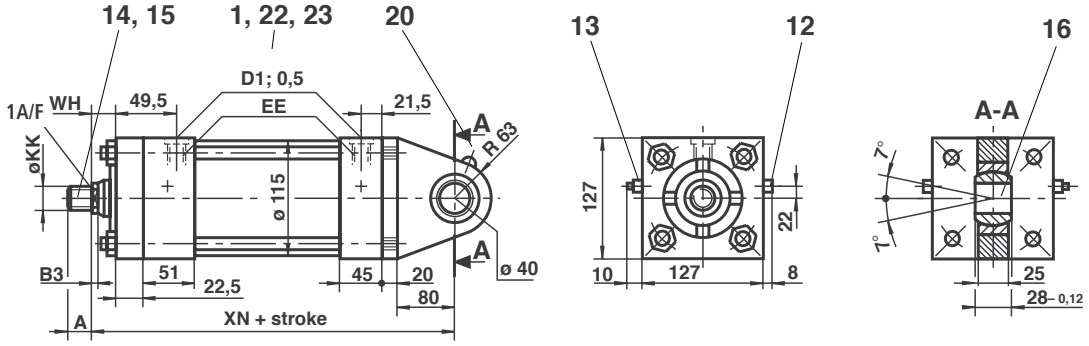
Self-aligning clevis CGK 40
to suit thread type „F"
Material No.: **R900001332**
Weight: 2 kg
Permissible load: 90 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
36	50	12	6	22	181	228	20	20	9	30	35	35
45	60	14	10	28.5	187.5	241	20	15	12	41		
56	70	16	10	32	191	248	25	15	15	46		

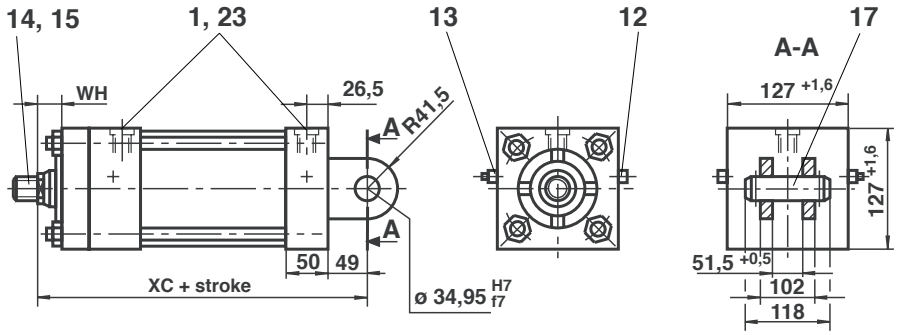
Mounting style B

Operating pressure 210 bar



Mounting style G

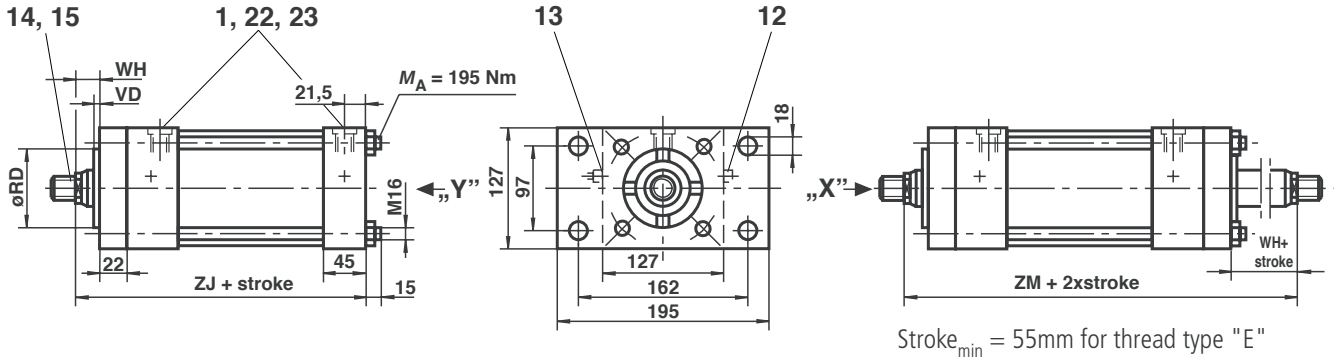
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 45 and Ø 50: 180 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 70: 110 bar at base end, 210 bar at rod end

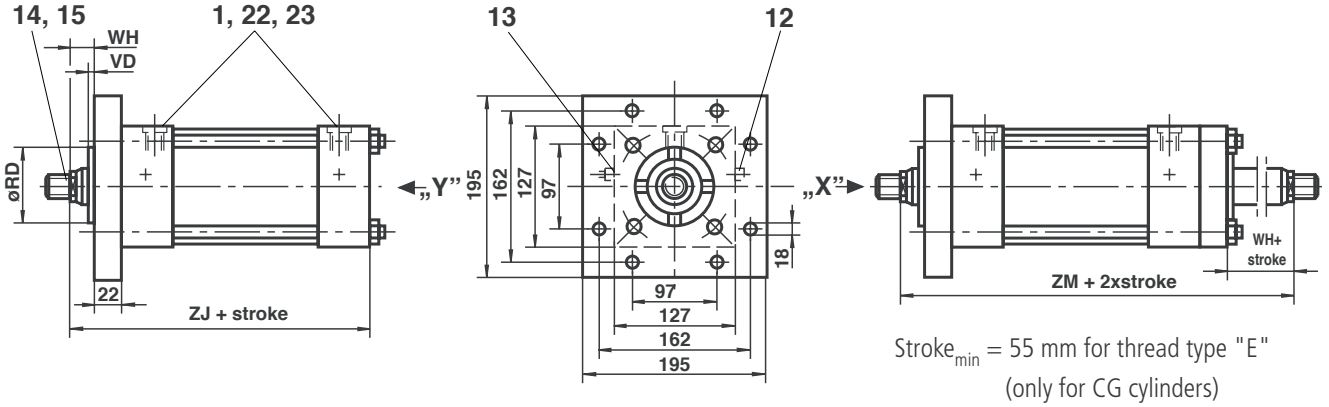


$Stroke_{min}$ = 55mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48x 2	M56 x 2	M45 x 3	76	100								

Mounting style H

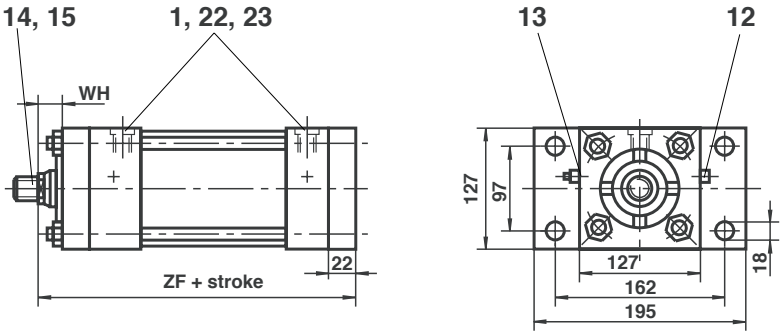
Operating pressure 210 bar



$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

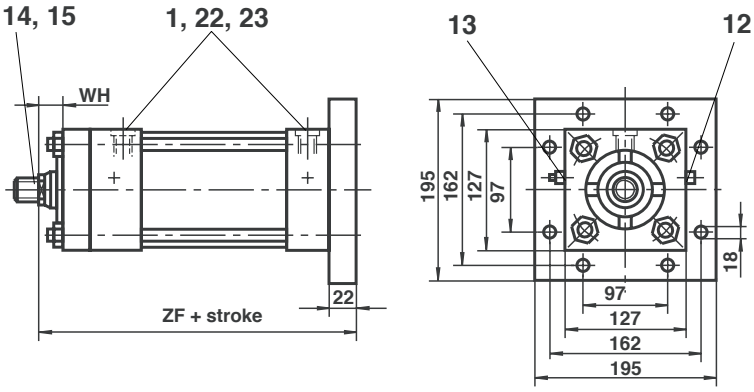
Mounting style D

Operating pressure 210 bar



Mounting style K

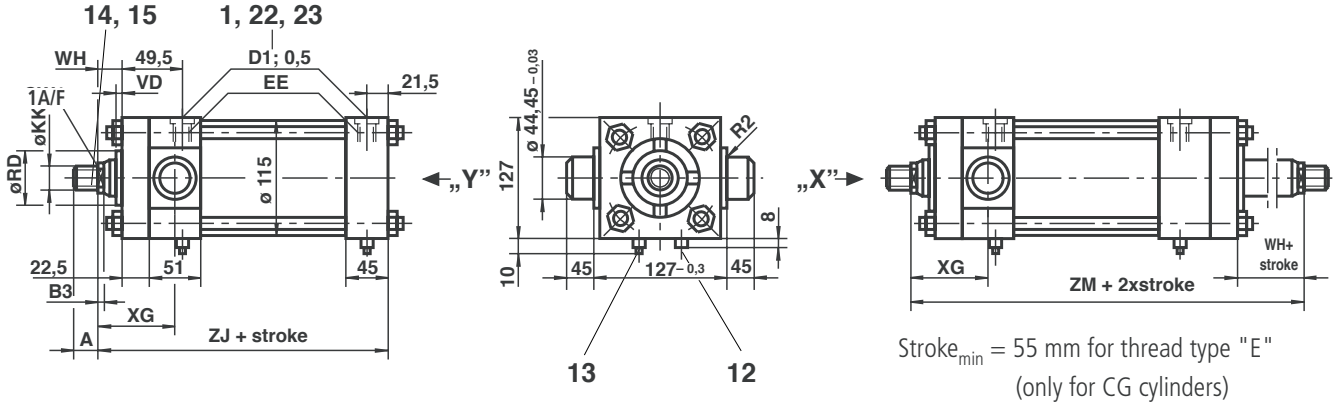
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
45	60	6	25.5	248	294	216	194	247.5	12	41	35	35
50	66.6	6	28.5	251	297	219	197	253.5	15	46		
70	90	10	35	257.5	303.5	225.5	203.5	266.5	15	60		

Mounting style R

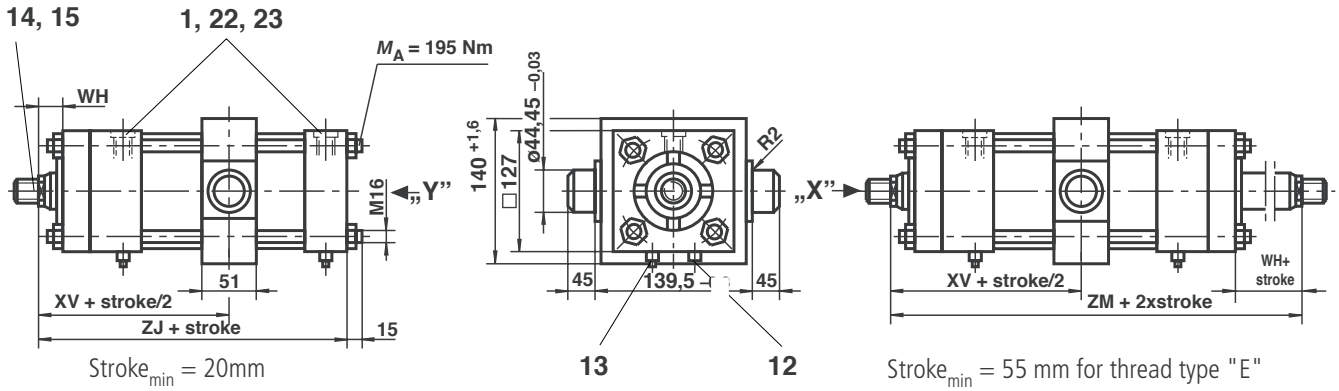
Operating pressure 210 bar



$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Mounting style E

Operating pressure 210 bar

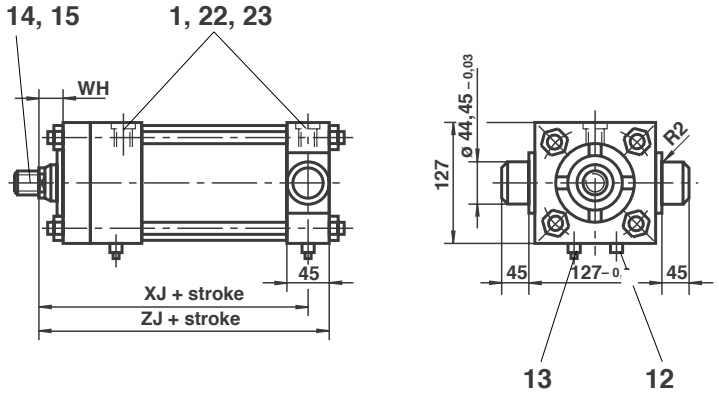


$Stroke_{min}$ = 20mm

$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Mounting style S

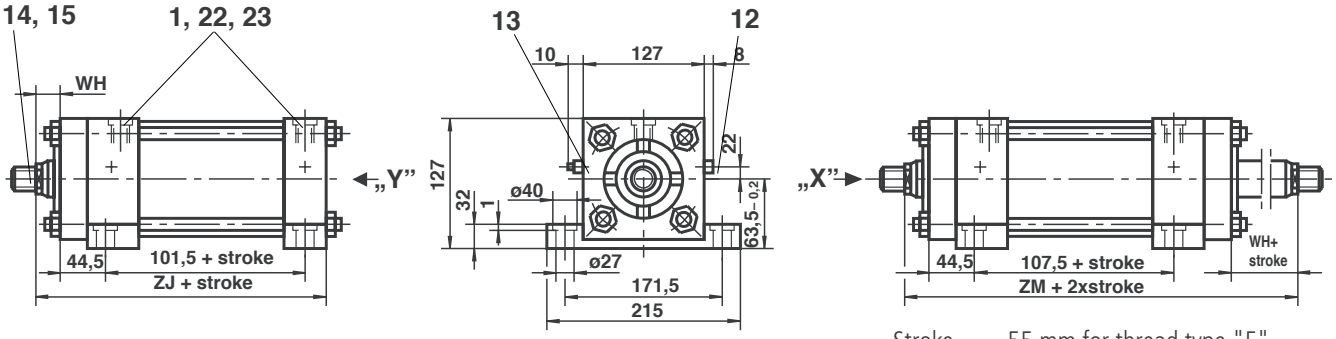
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48x 2	M56 x 2	M45 x 3	76	100								

Mounting style F

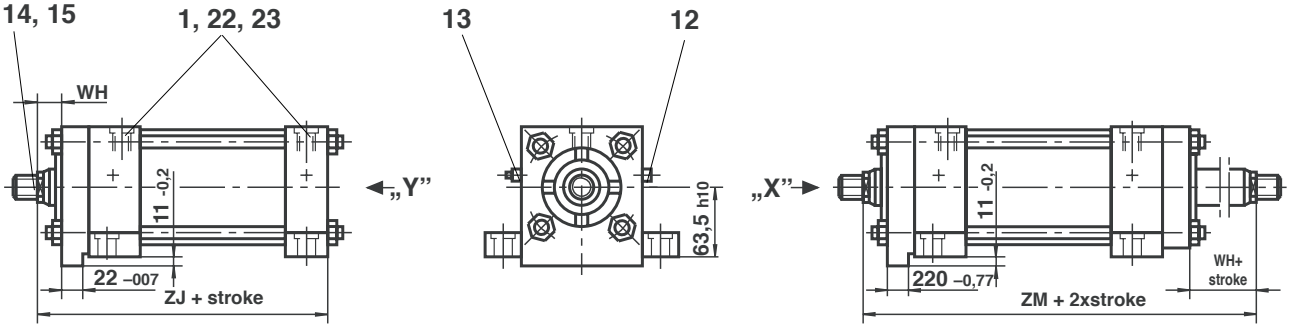
Operating pressure 210 bar



$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Mounting style L

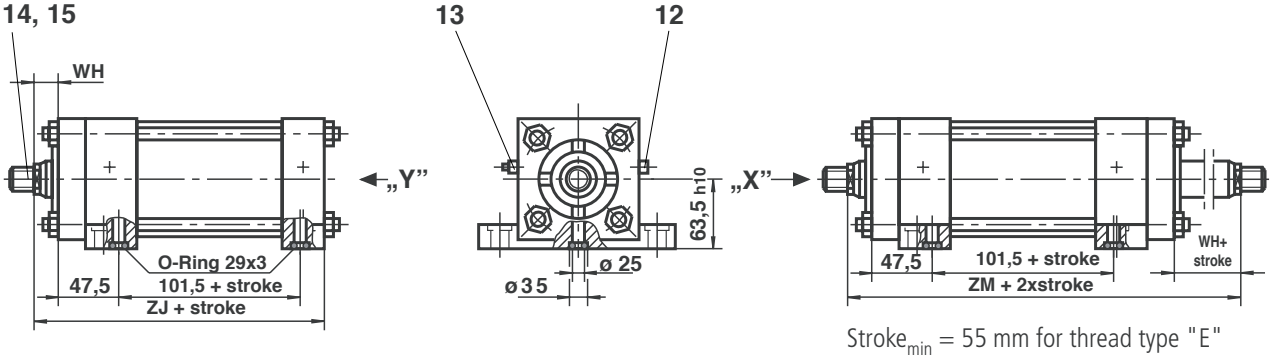
Operating pressure 210 bar



$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

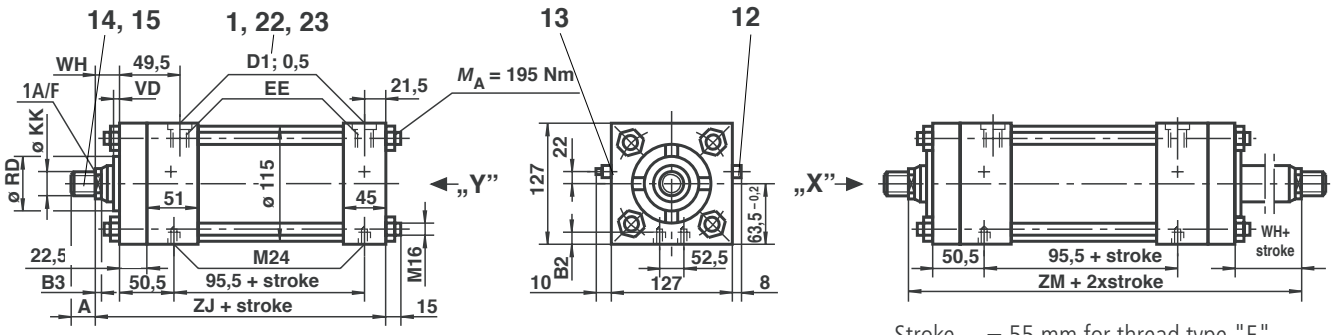


$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
45	60	6	25.5	73	171.5	124	194	247.5	12	41	35	35
50	66.6	6	28.5	76	174.5	127	197	253.5	15	46		
70	90	10	35	82,5	181	133	203.5	266.5	15	60		

Mounting style N

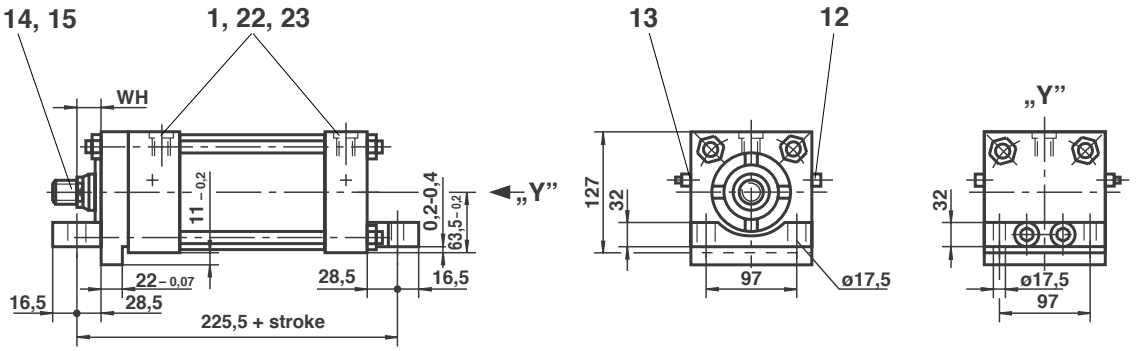
Operating pressure 210 bar



$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

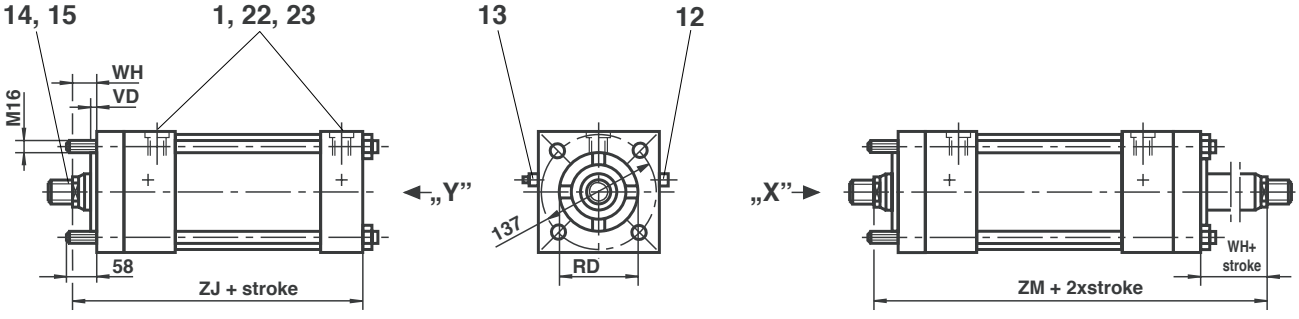
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

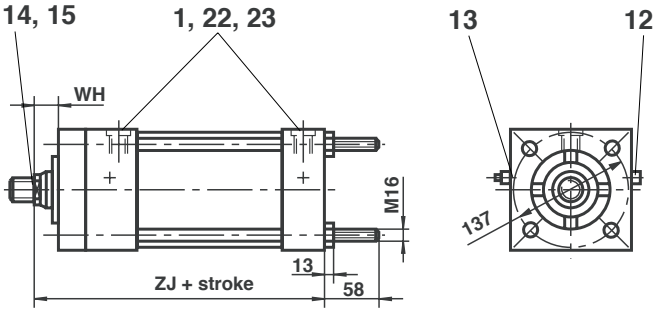


$Stroke_{min}$ = 55 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48x 2	M56 x 2	M45 x 3	76	100								

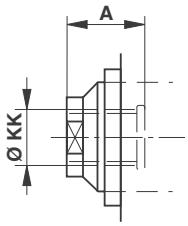
Mounting style Q

Operating pressure 210 bar

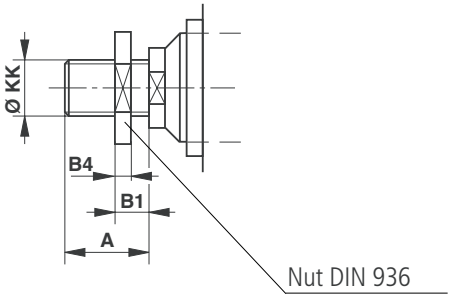


Additional thread types

Thread type „E"



Thread type „F"



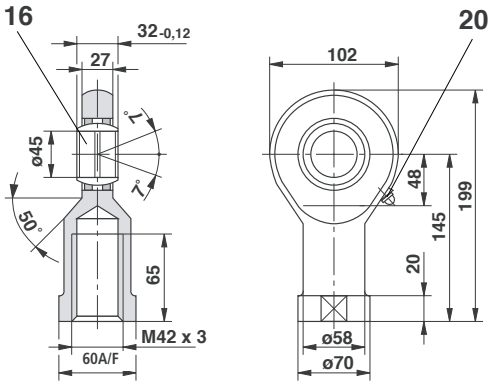
Self-aligning clevis CGK 45

to suit thread type „F"

Material No.: **R900001333**

Weight: 2.7 kg

Permissible load: 120 kN



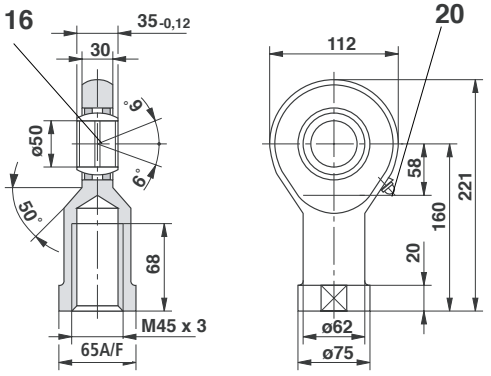
Self-aligning clevis CGK 50

to suit thread type „F"

Material No.: **R900001334**

Weight: 3.5 kg

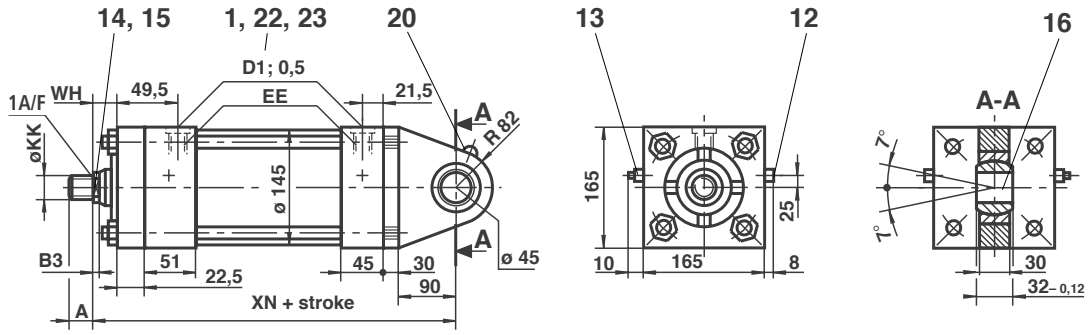
Permissible load: 145 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
45	60	16	6	25.5	194	247.5	25	25	12	41	35	35
50	66.6	18	6	28.5	197	253.5	32	25	15	46		
70	90	18	10	35	203.5	266.5	32	15	15	60		

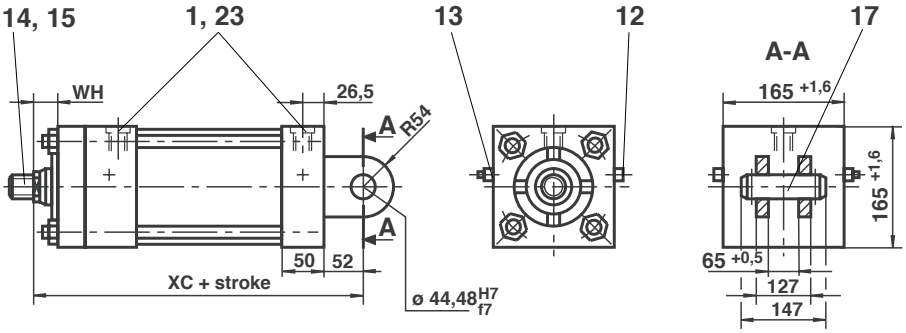
Mounting style B

Operating pressure 210 bar



Mounting style G

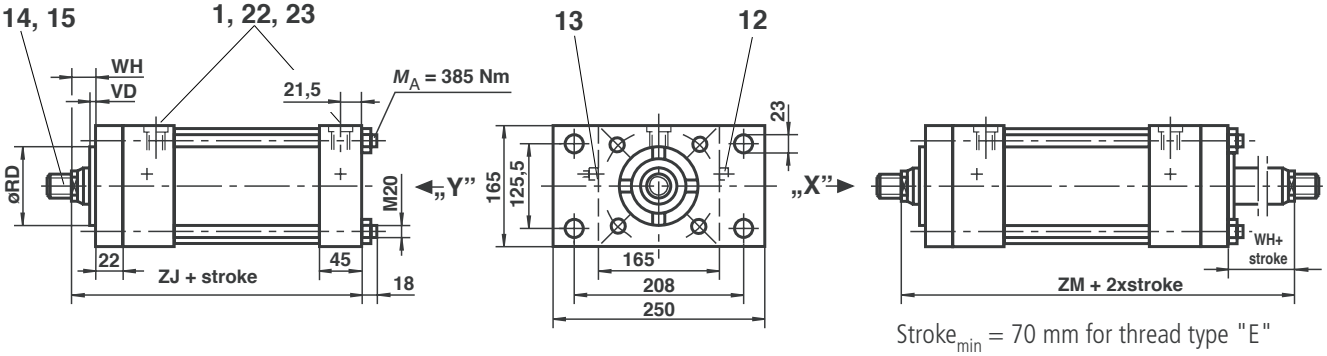
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 50 and Ø 56: 160 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 63 and Ø 90: 60 bar at base end, 210 bar at rod end

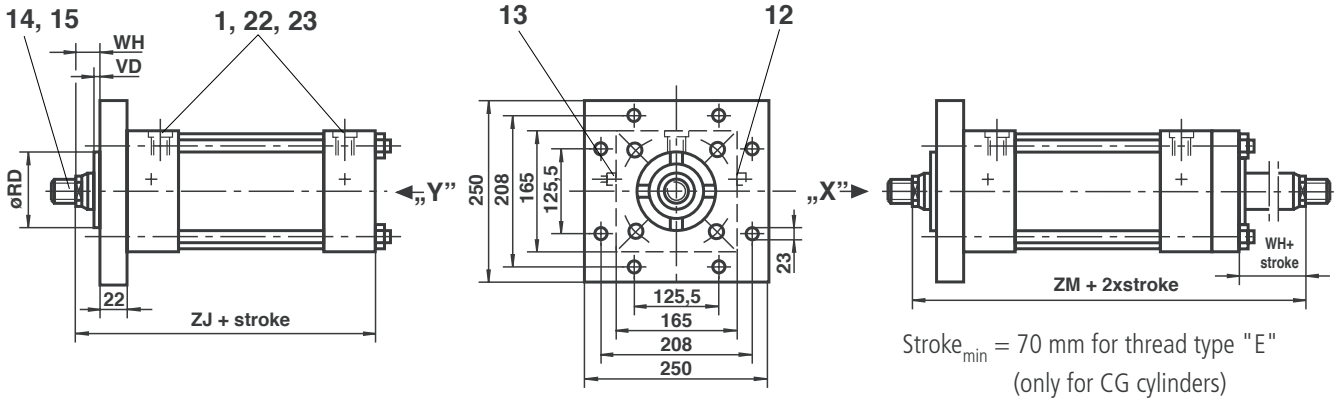


$Stroke_{min}$ = 70 mm for thread type "E" (only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

Mounting style H

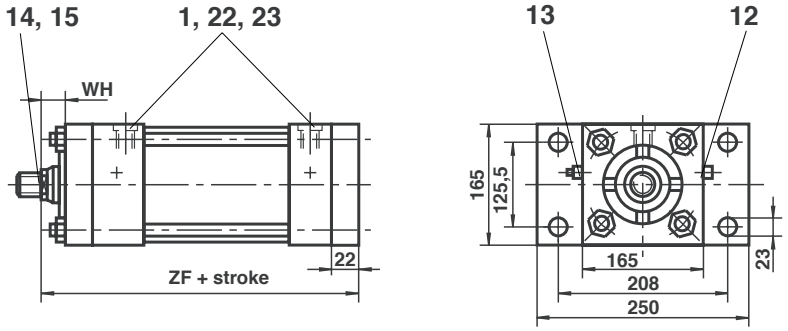
Operating pressure 210 bar



$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

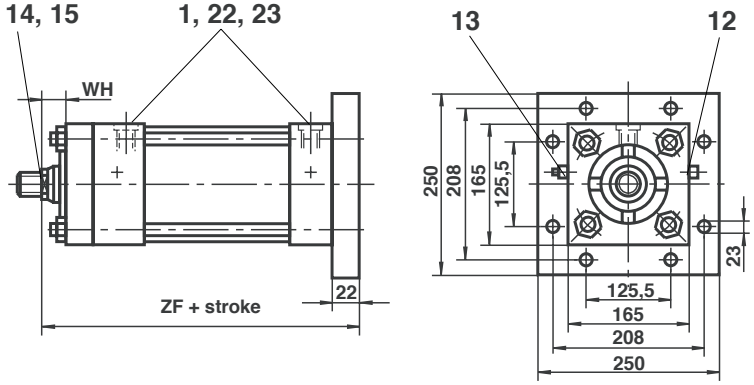
Mounting style D

Operating pressure for rod Ø 50, 56 and Ø 63: 210 bar at base end, 150 bar at rod end
Operating pressure for rod Ø 90: 210 bar at base end, 210 bar at rod end



Mounting style K

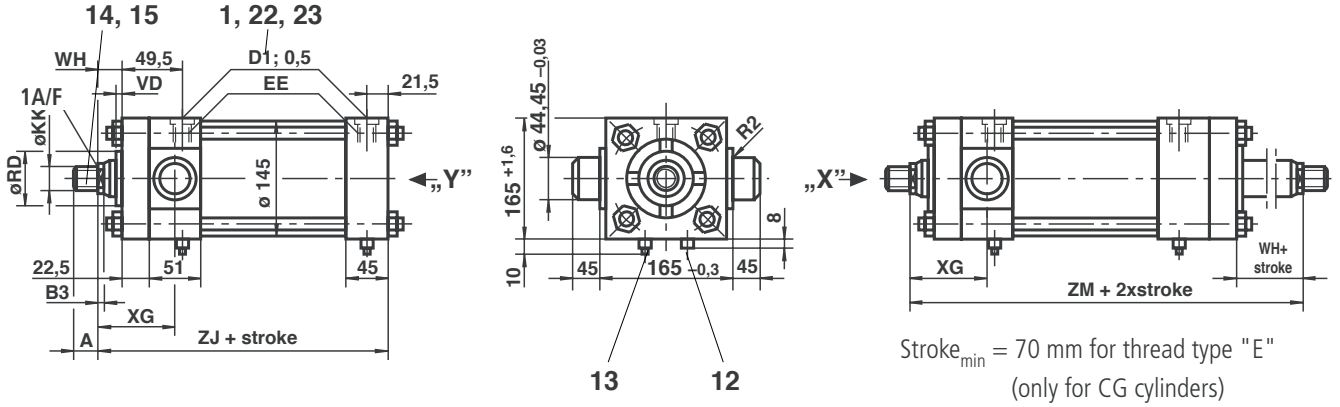
Operating pressure 210 bar



Piston rod Ø	RD_{f7}	VD	WH	XC	XN	ZF	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
50	66.6	6	28.5	266.5	329.5	231.5	209.5	266	14	46	33	35
56	70	7	28.5	266.5	329.5	231.5	209.5	266	14	46		
63	79.3	10	35	273	336	238	216	279	15	55		
90	108	10	35	273	336	238	216	279	15	75		

Mounting style R

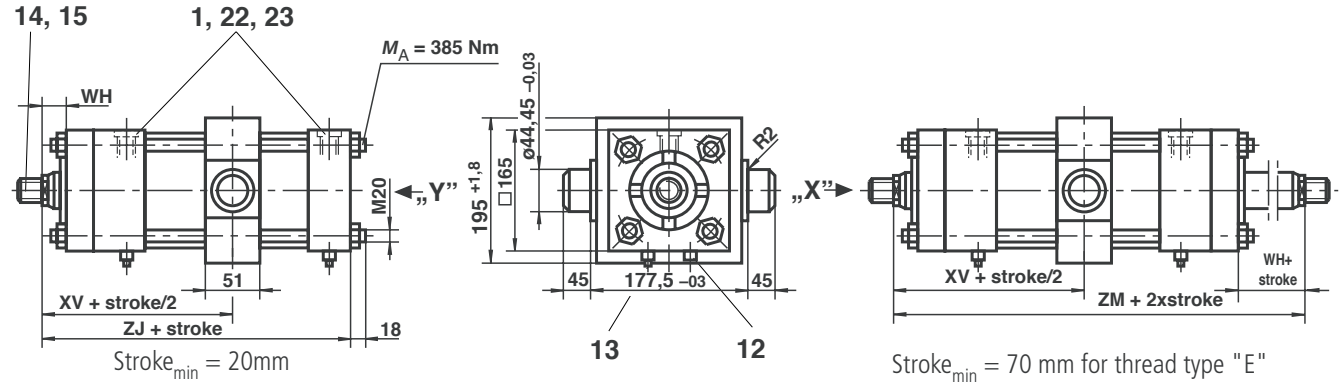
Operating pressure 210 bar



$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

Mounting style E

Operating pressure 210 bar

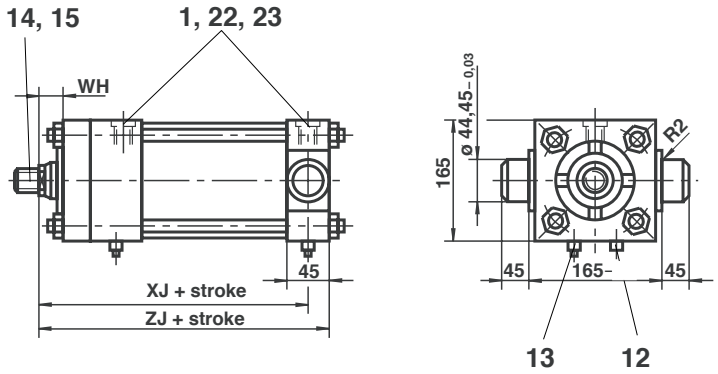


$Stroke_{min}$ = 20mm

$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

Mounting style S

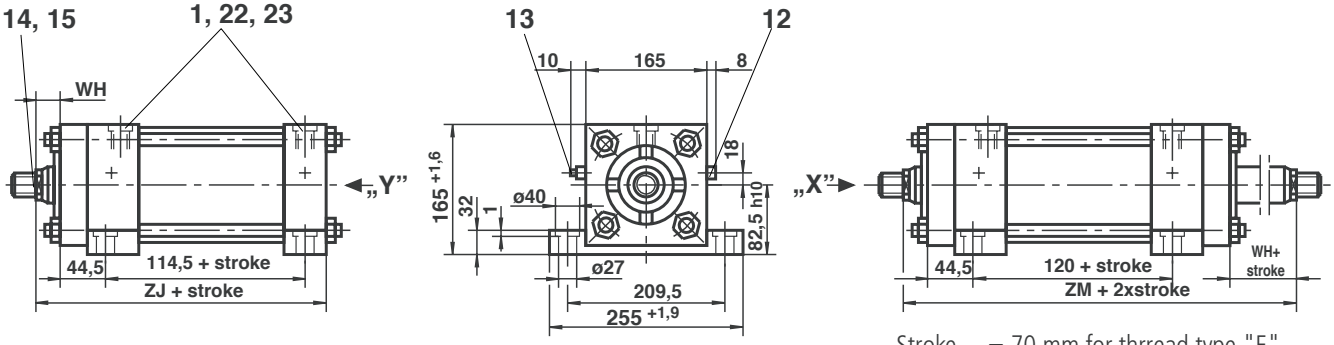
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

Mounting style F

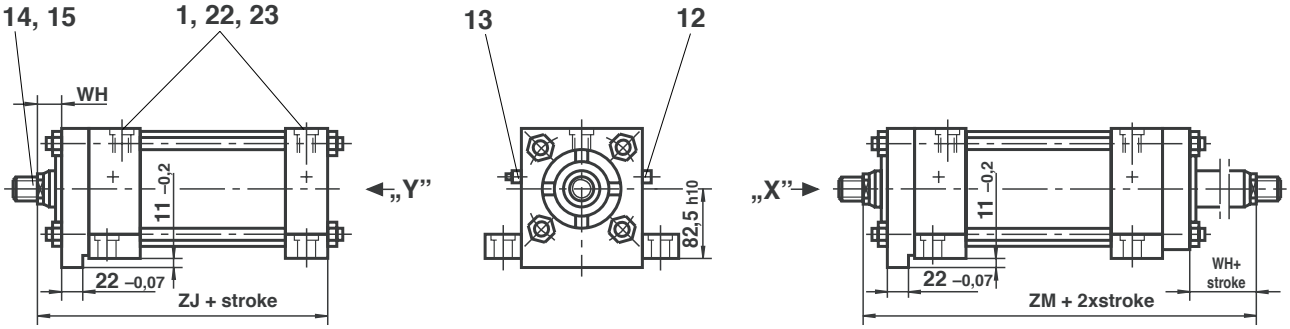
Operating pressure 210 bar



$Stroke_{min}$ = 70 mm for thrread type "E"
(only for CG cylinders)

Mounting style L

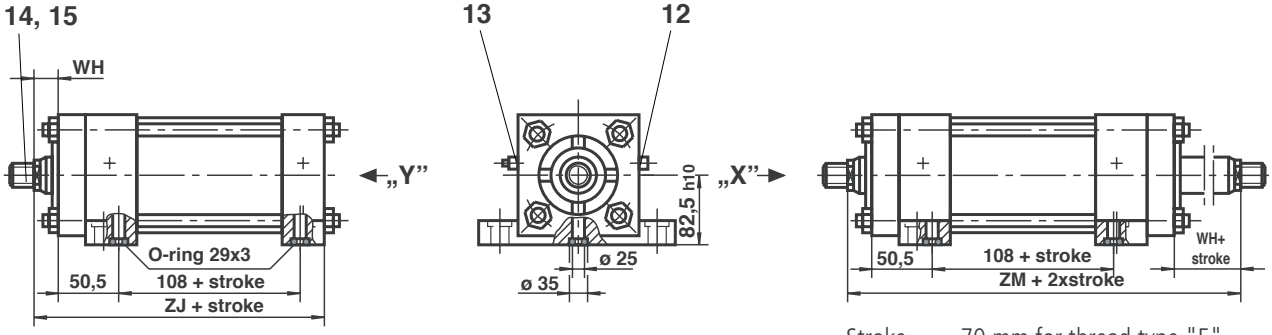
Operating pressure 210 bar



$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

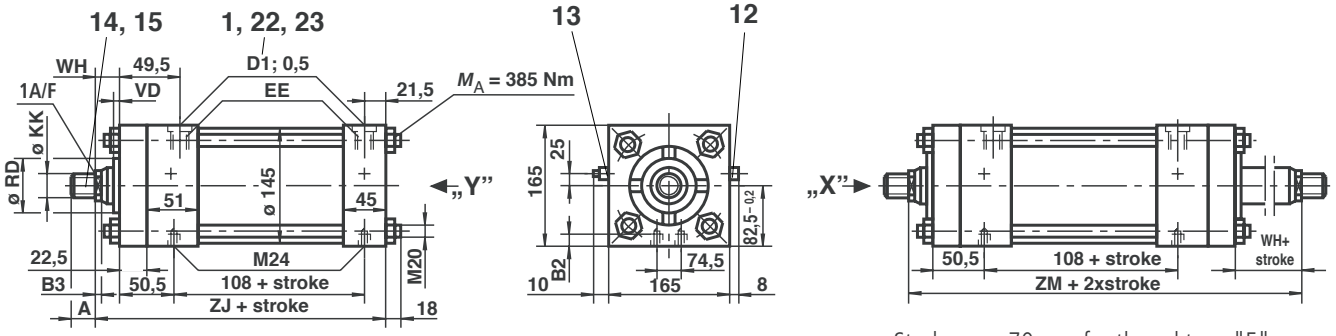


$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}	VD	WH	XG	XJ	XV	ZJ	ZM	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
50	66.6	6	28.5	76	187	133	209.5	266	14	46	33	35
56	70	7	28.5	76	187	133	209.5	266	14	46		
63	79.3	10	35	82.5	193.5	139.5	216	279	15	55		
90	108	10	35	82.5	193.5	139.5	216	279	15	75		

Mounting style N

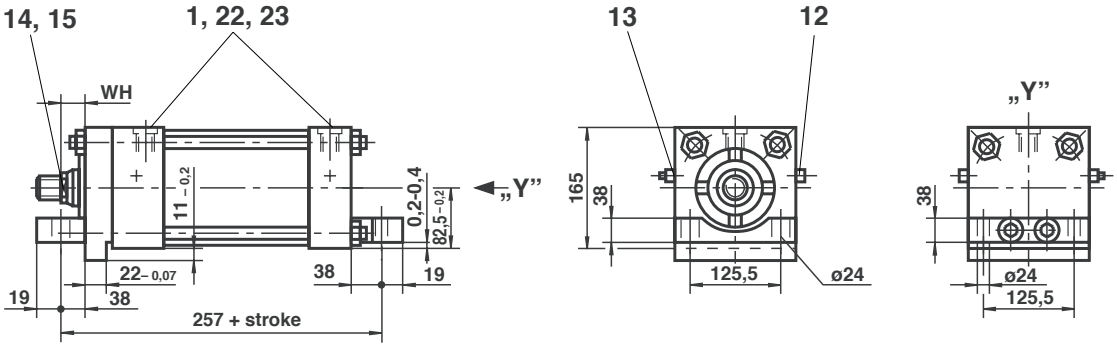
Operating pressure 210 bar



$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

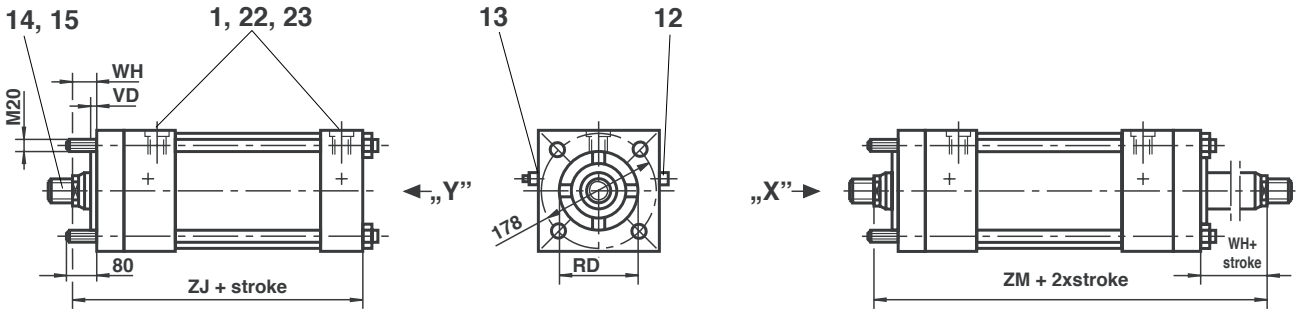
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure210 bar

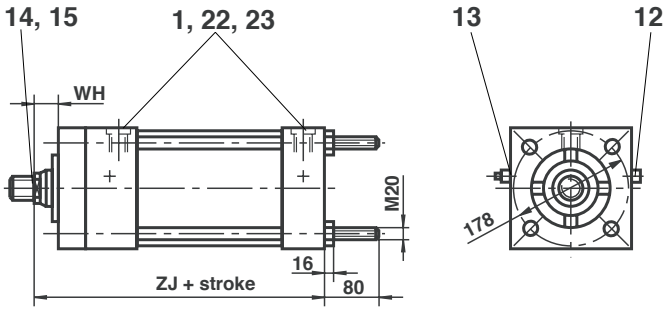


$Stroke_{min}$ = 70 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

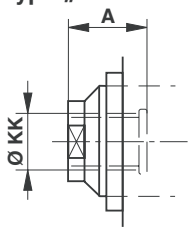
Mounting style Q

Operating pressure 210 bar

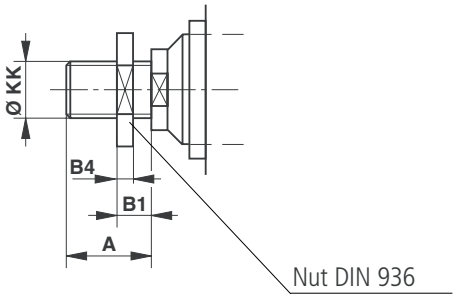


Addtional thread types

Thread type „E"



Thread type „F"



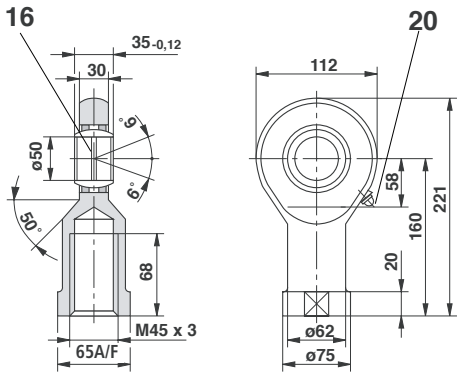
Self-aligning clevis CGK 50

to suit thread type „F"

Material No.: **R900001334**

Weight: 3.5 kg

Permissible load: 145 kN



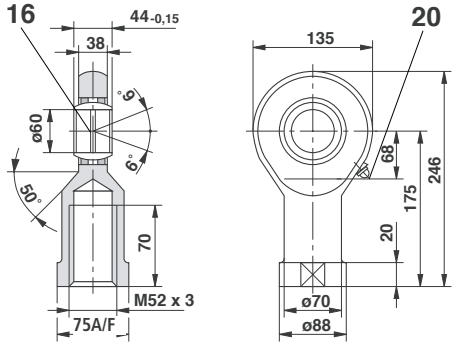
Self-aligning clevis CGK 60

to suit thread type „F"

Material No.: **R900001335**

Weight: 5.6 kg

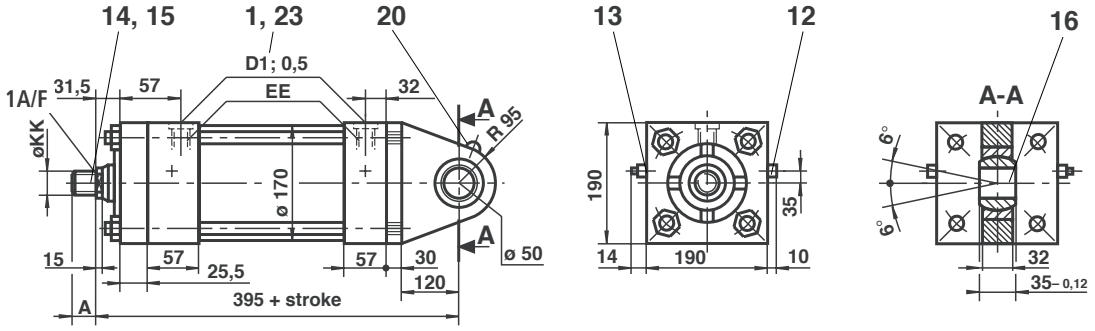
Permissible load: 225 kN



Piston rod Ø	RD_{f7}	B4	VD	WH	ZJ	ZM	B1	B2	B3	1A/F	Cushioning length Piston side	Cushioning length Rod end
50	66.6	18	6	28.5	209.5	266	32	40	14	46	33	35
50	70	18	7	28.5	209.5	266	32	40	14	46		
63	79.3	20	10	35	216	279	45	25	15	55		
90	108	20	10	35	216	279	45	25	15	75		

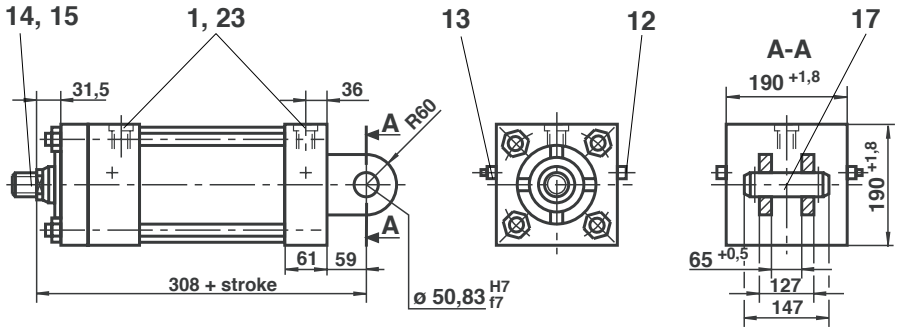
Mounting style B

Operating pressure210 bar



Mounting style G

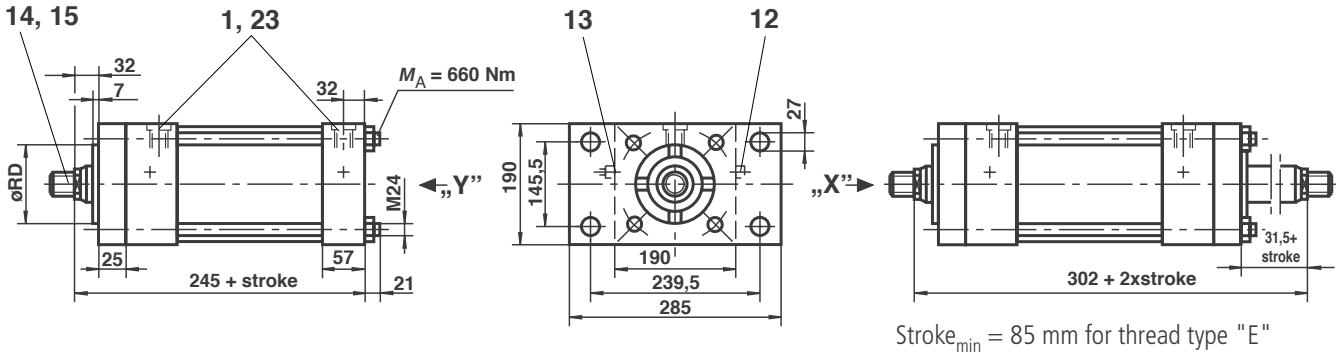
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 63 and Ø 70: 130 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 80 and Ø 100: 60 bar at base end, 210 bar at rod end

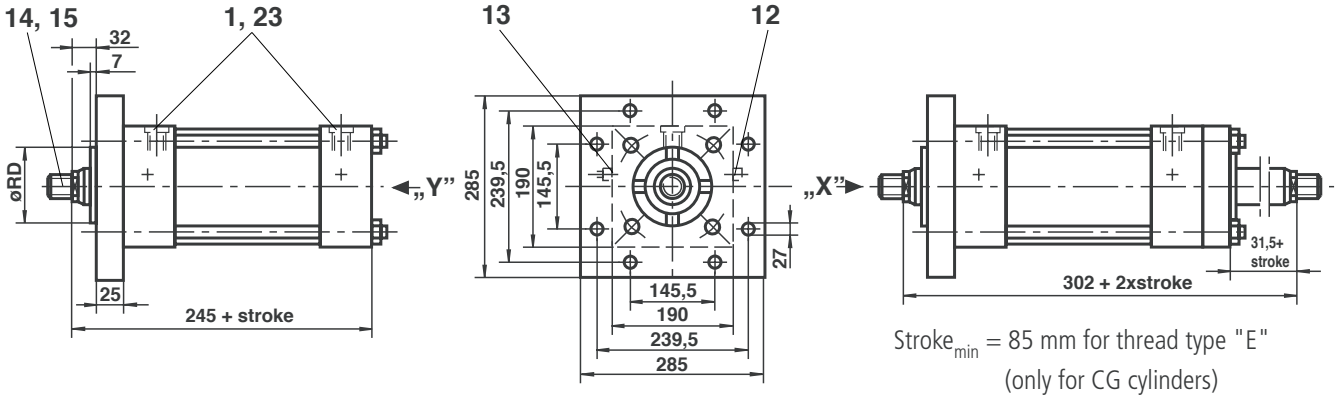


$Stroke_{min}$ = 85 mm for thread type "E" (only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

Mounting style H

Operating pressure 210 bar

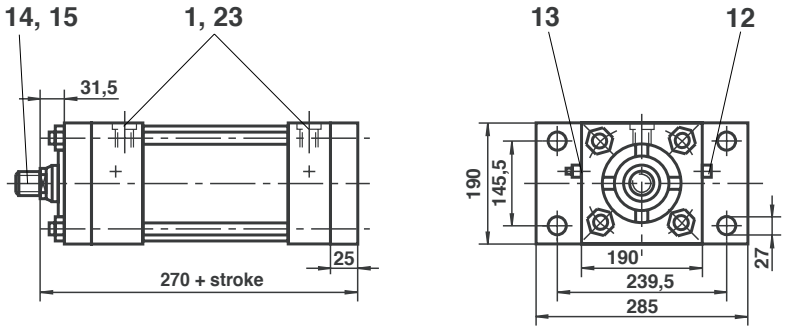


Stroke$_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Mounting style D

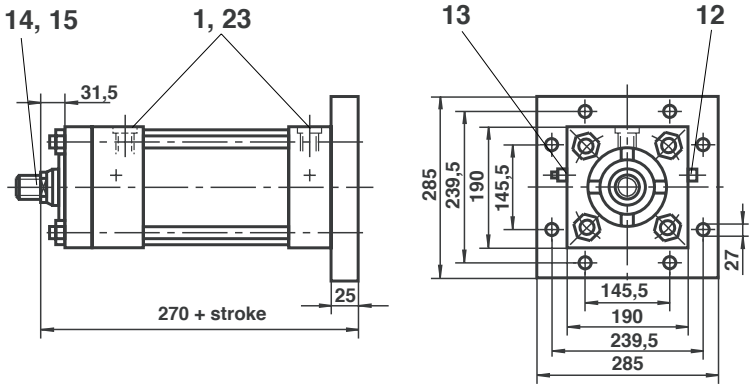
Operating pressure for rod Ø 63 and Ø 70: 210 bar at base end, 150 bar at rod end

Operating pressure for rod Ø 80 and Ø 100: 210 bar at base end, 210 bar at rod end



Mounting style K

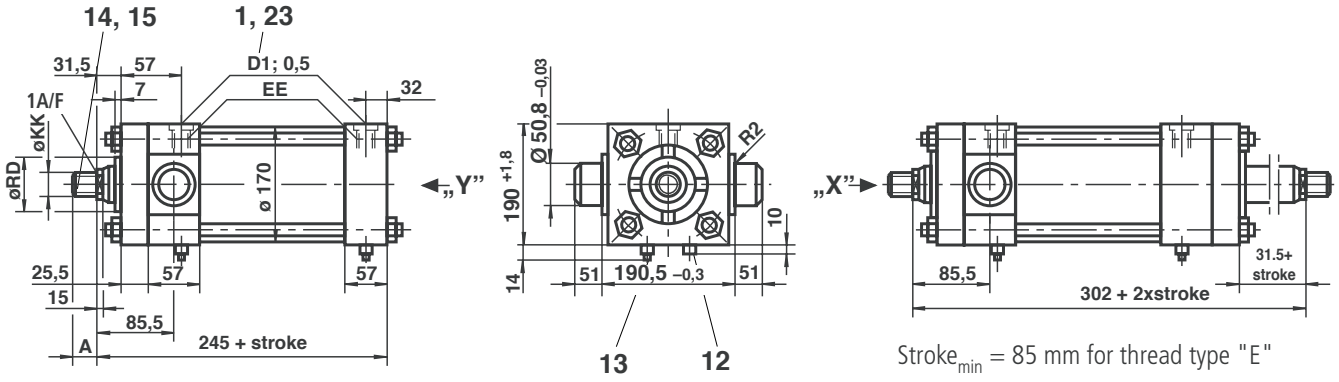
Operating pressure 210 bar



Piston rod Ø	RD_{f7}									1A/F	Cushioning length Piston side	Cushioning length Rod end
63	79.3									55	38	35
70	90									60		
80	95.2									75		
100	120									85		

Mounting style R

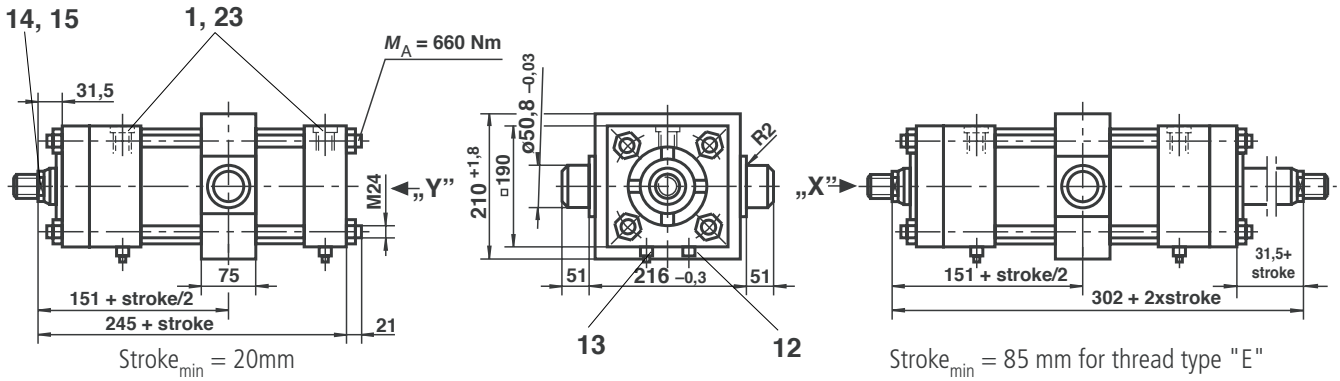
Operating pressure 210 bar



Stroke$_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Mounting style E

Operating pressure 210 bar

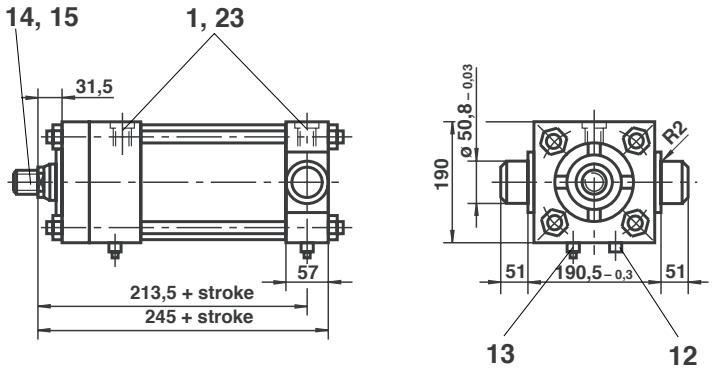


Stroke$_{min}$ = 20mm

Stroke$_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Mounting style S

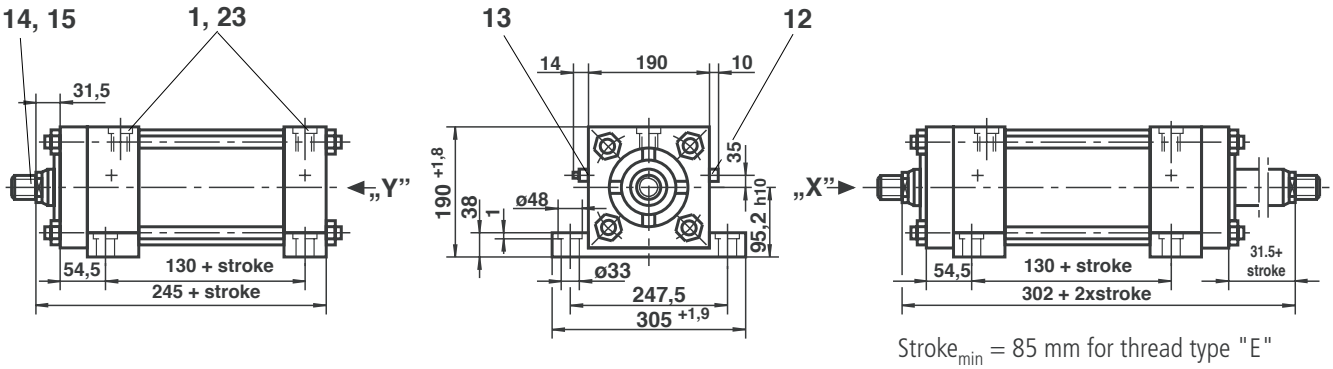
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

Mounting style F

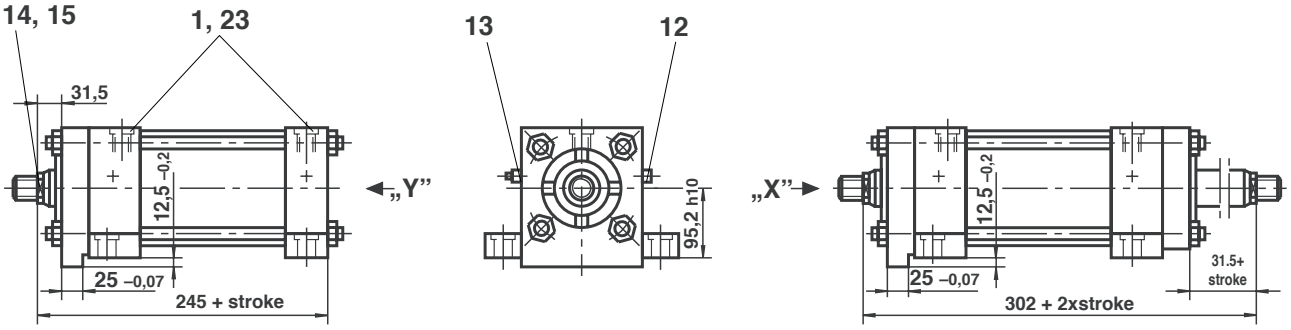
Operating pressure 210 bar



$Stroke_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Mounting style L

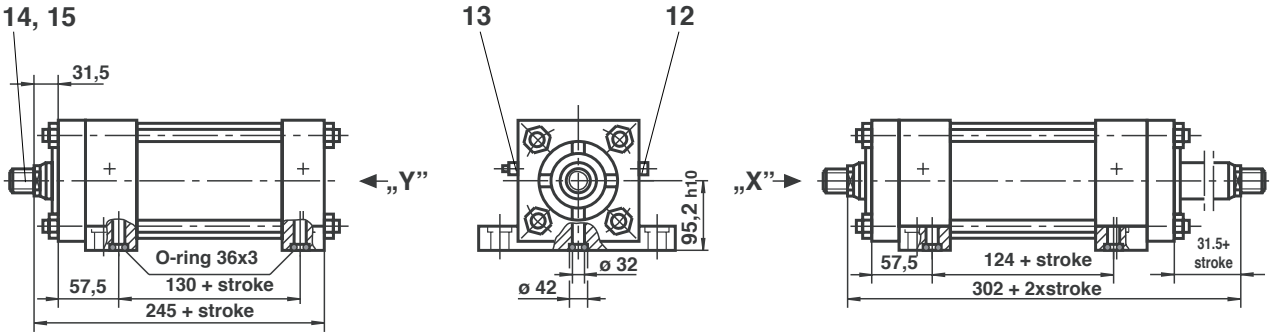
Operating pressure 210 bar



$Stroke_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

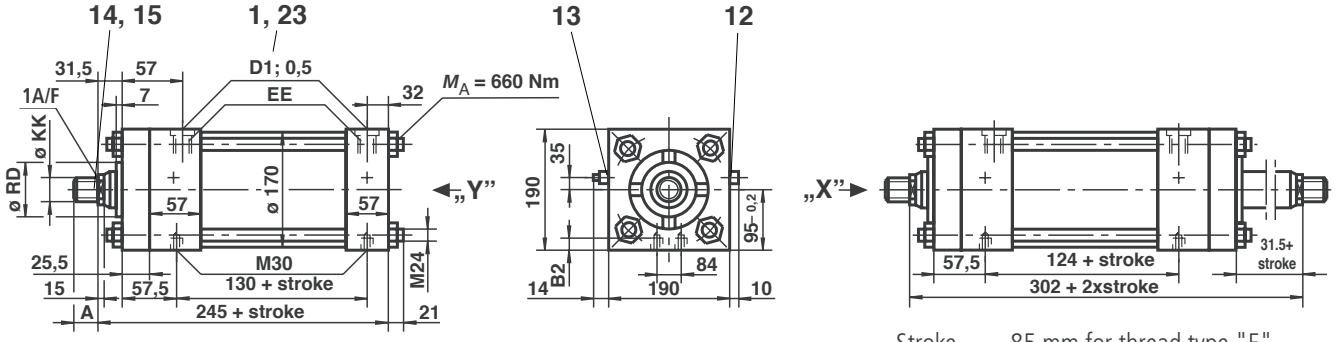


$Stroke_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}									1A/F	Cusioning length Piston side	Cusioning length Rod end
63	79.3									55	38	35
70	90									60		
80	95.2									75		
100	120									85		

Mounting style N

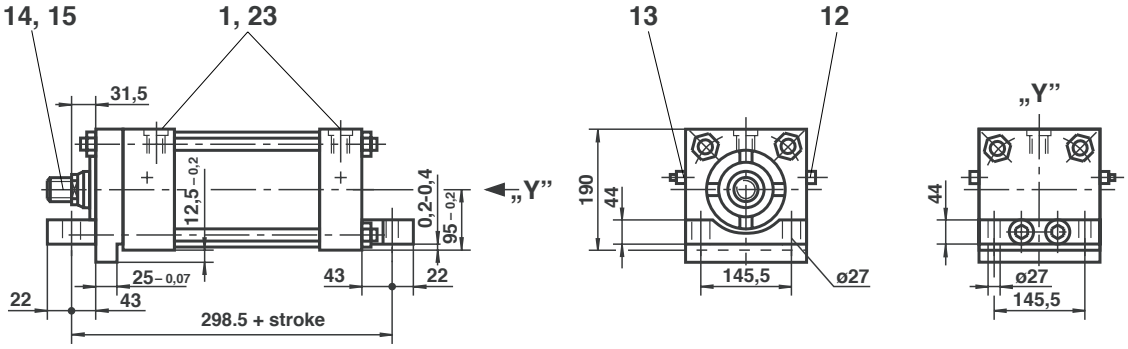
Operating pressure 210 bar



$Stroke_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

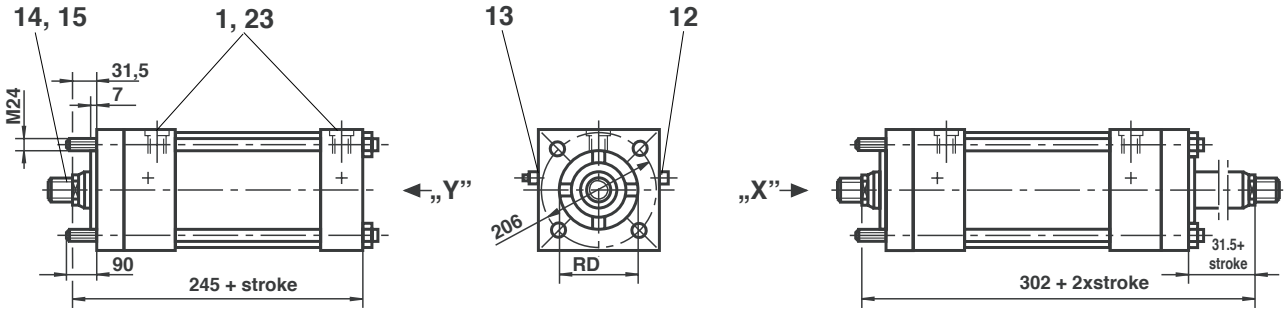
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

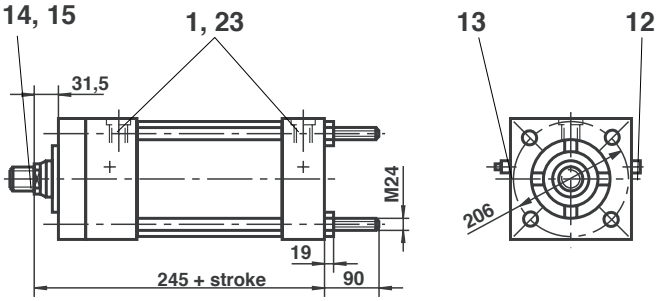


$Stroke_{min}$ = 85 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

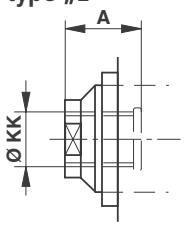
Mounting style Q

Operating pressure 210 bar

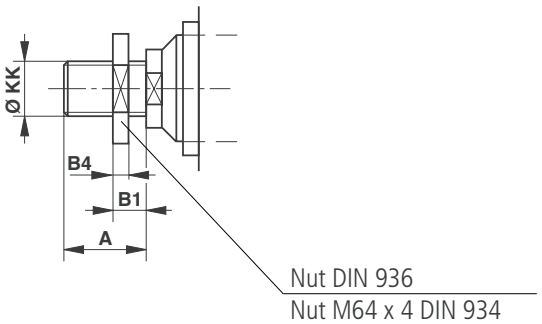


Addtional thread types

Thread type „E"



Thread type „F"



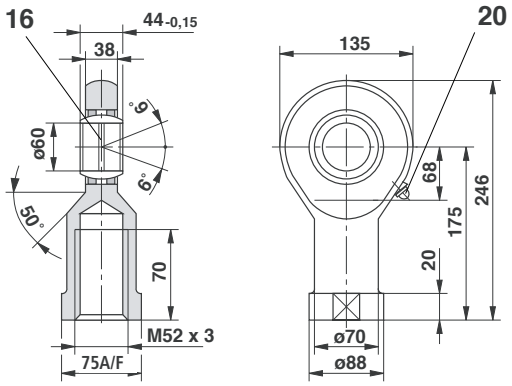
Self-aligning clevis CGK 60

to suit thread type „F"

Material No.: **R900001335**

Weight: 5.6 kg

Permissible load: 225 kN



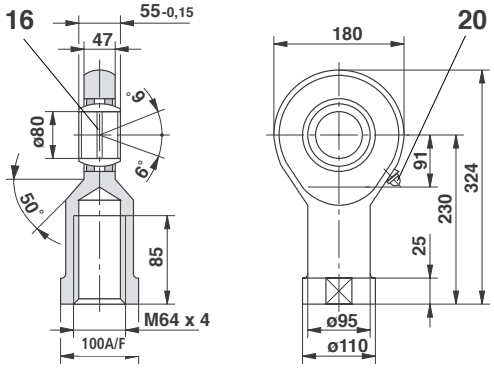
Self-aligning clevis CGK 80

to suit thread type „F"

Material No.: **R900001928**

Weight: 13.1 kg

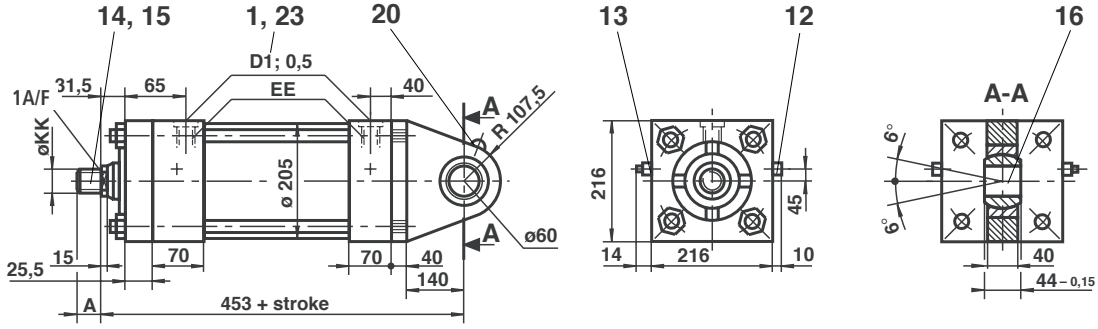
Permissible load: 371 kN



Piston rod Ø	RD_{f7}	B4					B1	B2		1A/F	Cushioning length Piston side	Cushioning length Rod end
63	79.3	20					45	45		55	38	35
70	90	20					45	45		60		
80	95.2	51					60	30		75		
100	120	51					60	30		85		

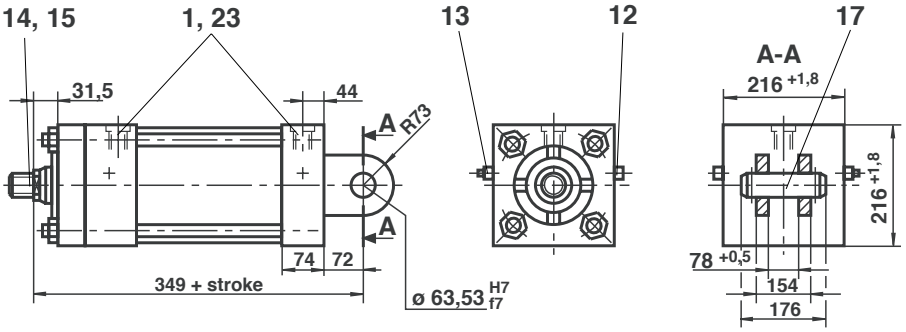
Mounting style B

Operating pressure 210 bar



Mounting style G

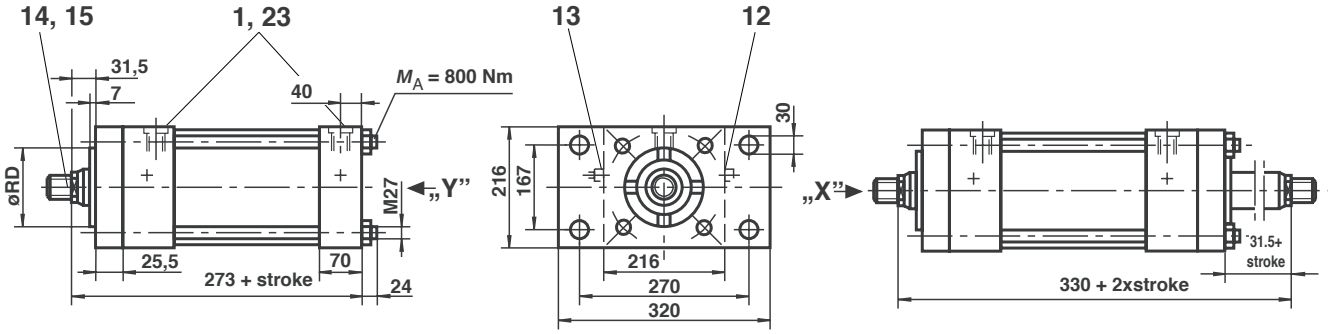
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 80 and Ø 90: 110 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 125: 60 bar at base end, 210 bar at rod end

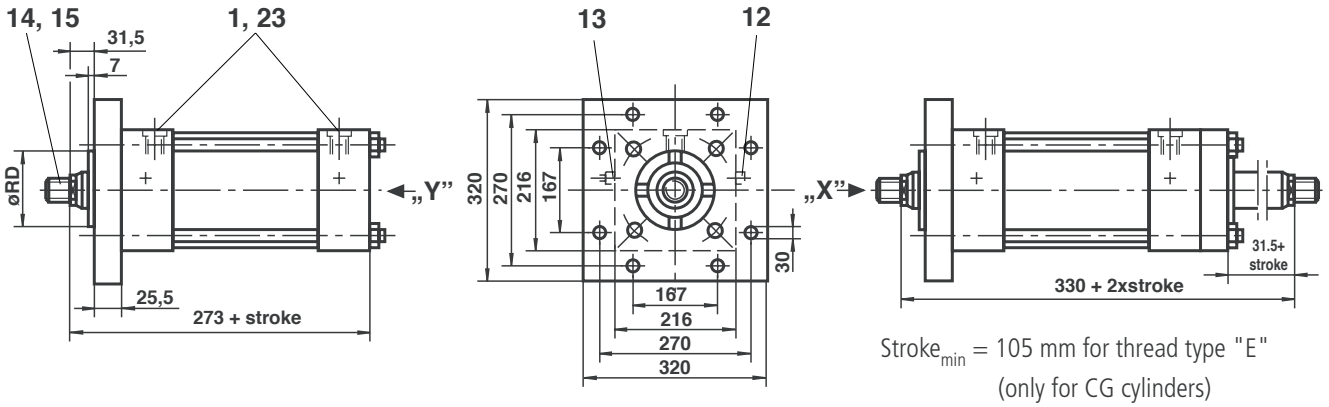


Stroke$_{min}$ = 105 mm for thread type "E" (only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

Mounting style H

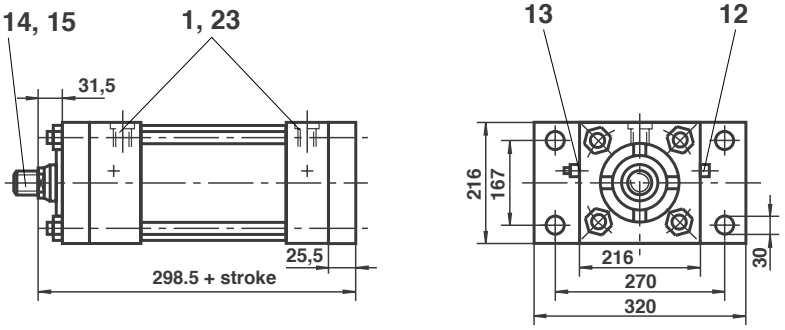
Operating pressure 210 bar



$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

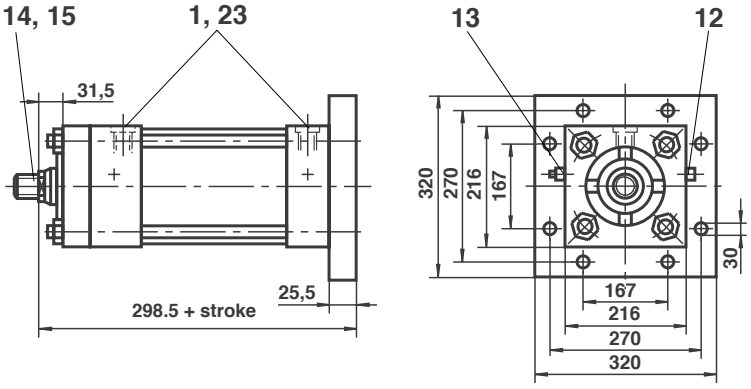
Mounting style D

Operating pressure for rod Ø 80 and Ø 90: 210 bar at base end, 110 bar at rod end
Operating pressure for rod Ø 125: 210 bar at base end, 150 bar at rod end



Mounting style K

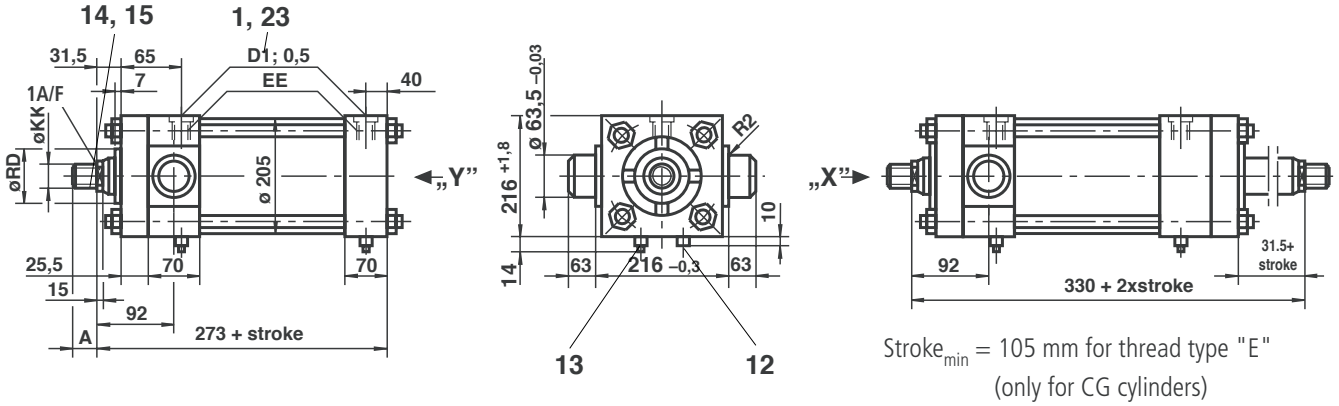
Operating pressure 210 bar



Piston rod Ø	RD_{f7}									1A/F	Cushioning length Piston side	Cushioning length Rod side
80	95.2									75	50	50
90	108									75		
125	146									115		

Mounting style R

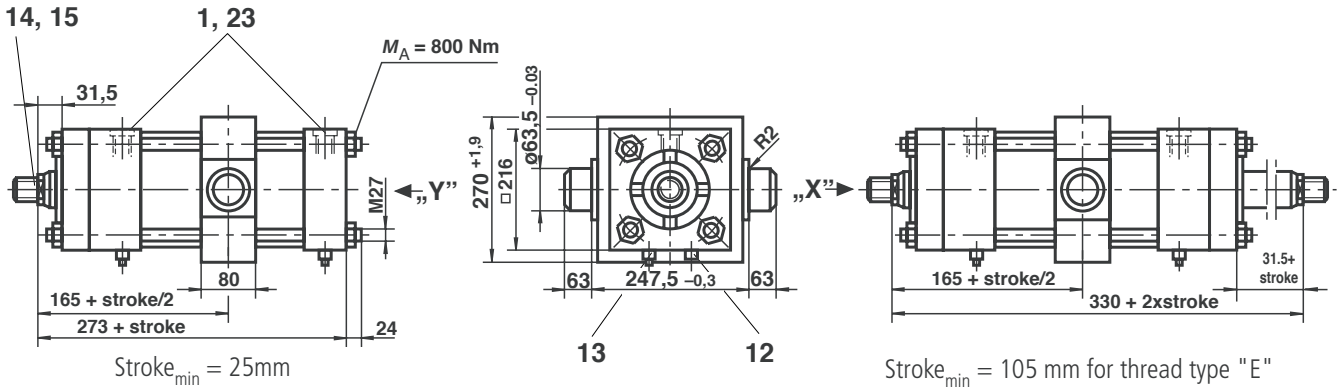
Operating pressure 210 bar



$Stroke_{min}$ = 105 mm for thread type "E" (only for CG cylinders)

Mounting style E

Operating pressure 210 bar

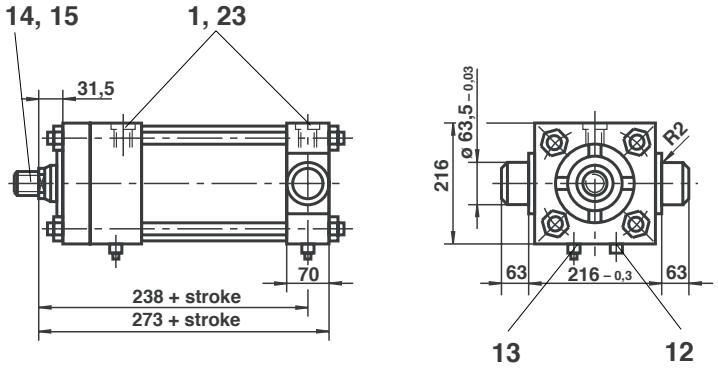


$Stroke_{min}$ = 25mm

$Stroke_{min}$ = 105 mm for thread type "E" (only for CG cylinders)

Mounting style S

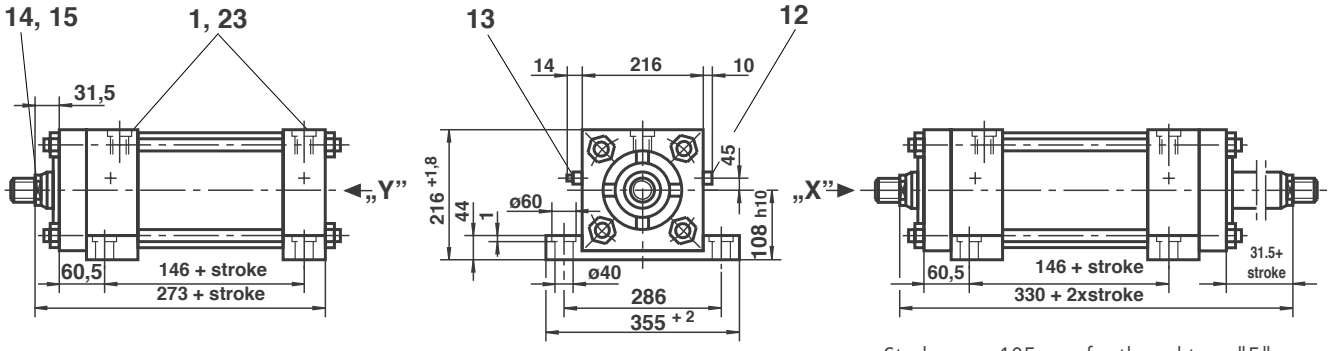
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

Mounting style F

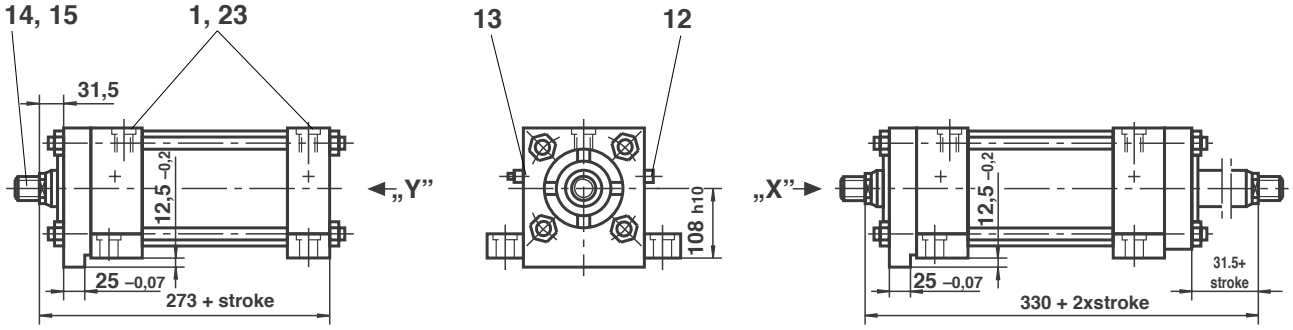
Operating pressure 210 bar



$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

Mounting style L

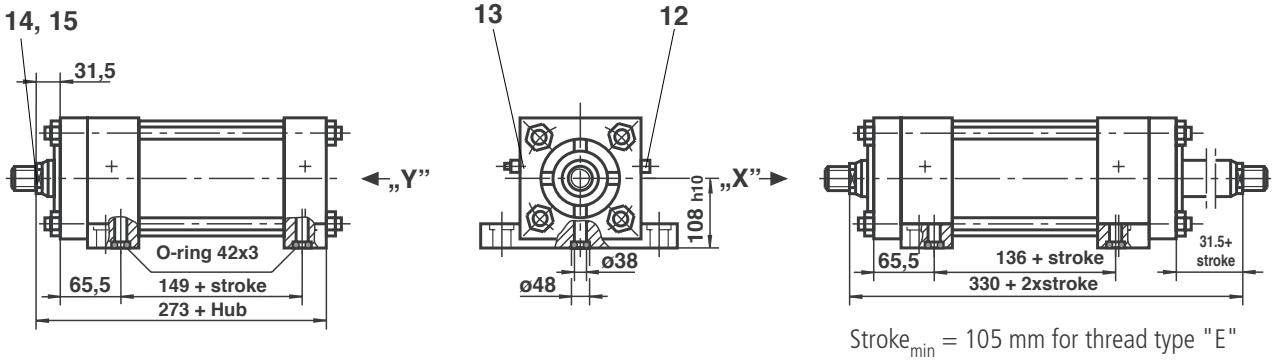
Operating pressure 210 bar



$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

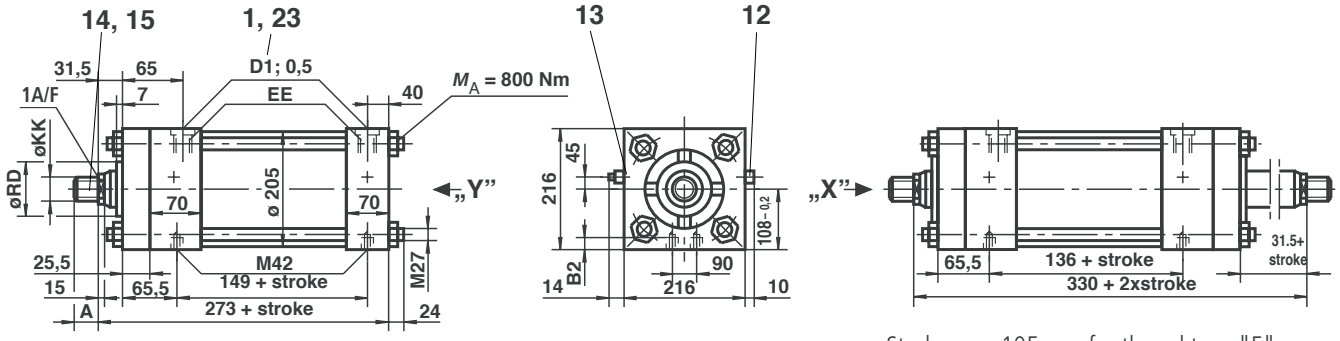


$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}									1A/F	Cushioning length Piston side	Cushioning length Rod side
80	95.2									75	50	50
90	108									75		
125	146									115		

Mounting style N

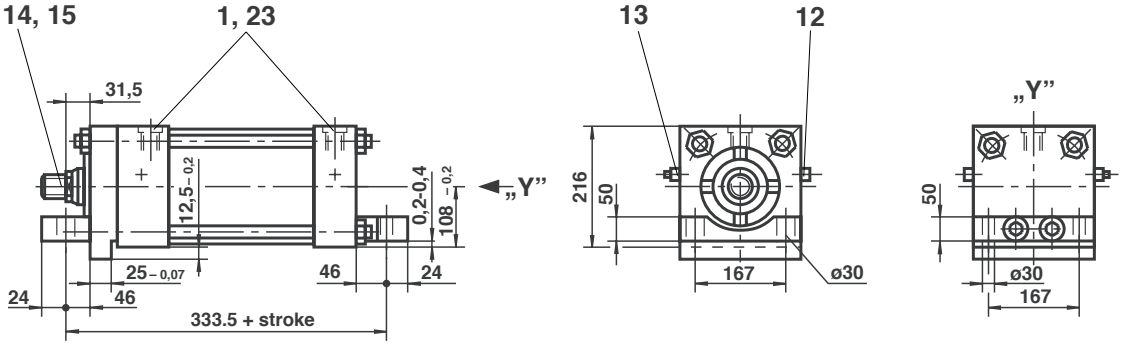
Operating pressure 210 bar



$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

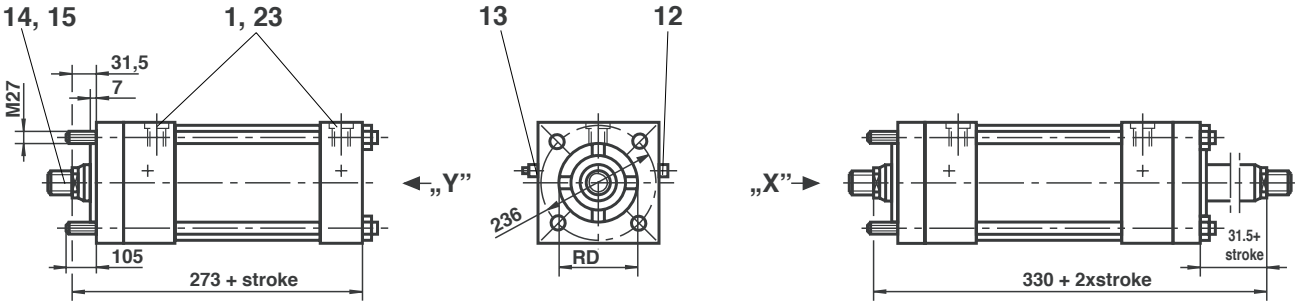
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

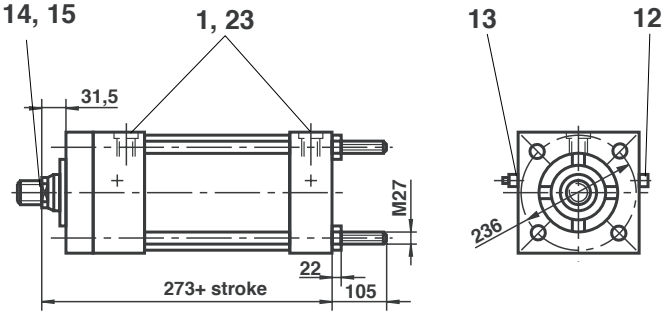


$Stroke_{min}$ = 105 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

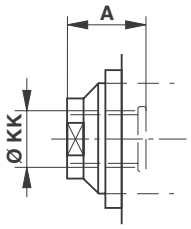
Mounting style Q

Operating pressure 210 bar

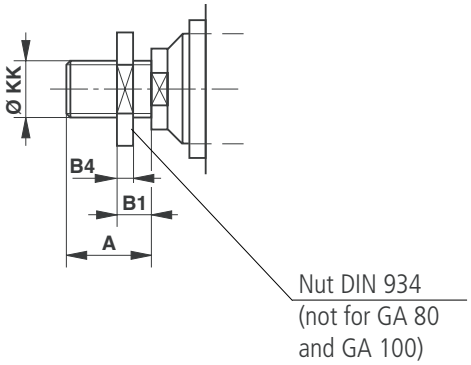


Additional thread types

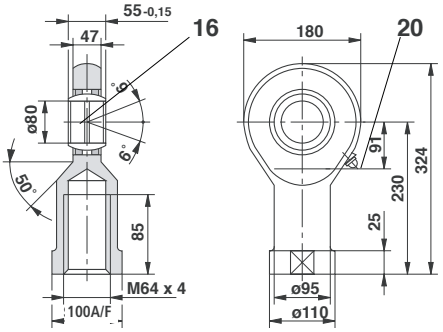
Thread type „E"



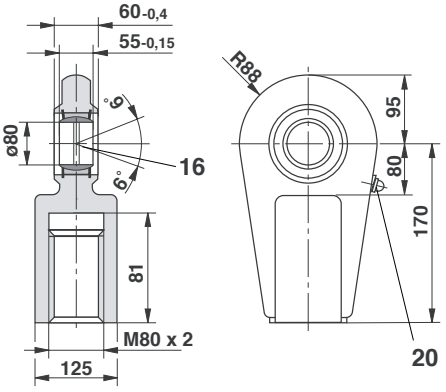
Thread type „F"



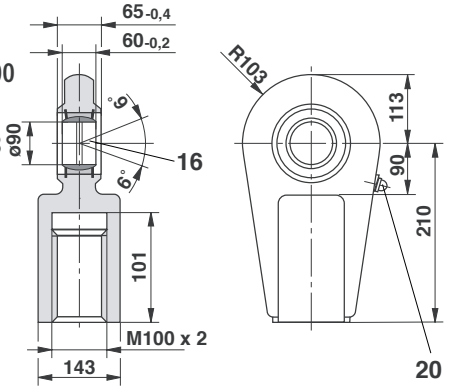
Self-aligning clevis CGK 80
to suit thread type „F"
Material No.: **R900001928**
Weight: 13.1 kg
Permissible load: 375 kN



Self-aligning clevis CGA 80
to suit thread type „F"
Material No.: **R900303132**
Weight: 12.2 kg
Permissible load: 385 kN



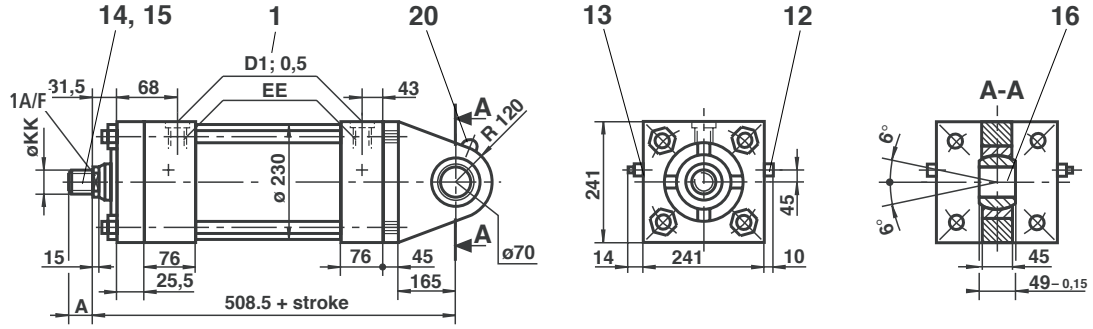
Self-aligning clevis CGA 100
to suit thread type „F"
Material No.: **R900303133**
Weight: 21.5 kg
Permissible load: 535 kN



Piston rod Ø	RD_{f7}	B4						B1	B2	1A/F	Cushioning length Piston side	Rod side
80	95.2	51						60	40	75	50	50
90	108	–						–	40	75		
125	146	–						–	28	115		

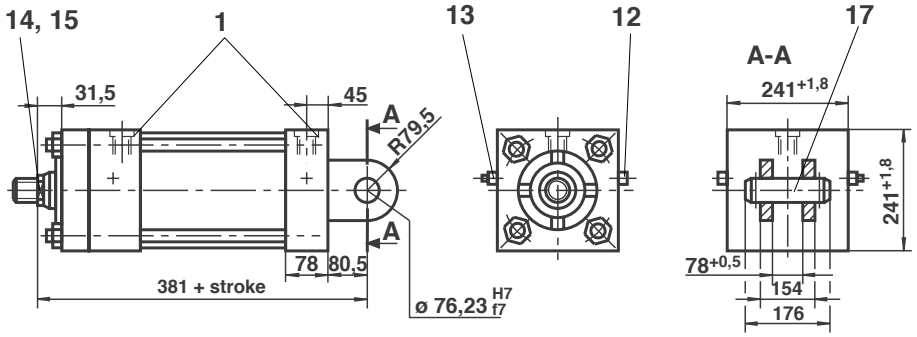
Mounting style B

Operating pressure 210 bar



Mounting style G

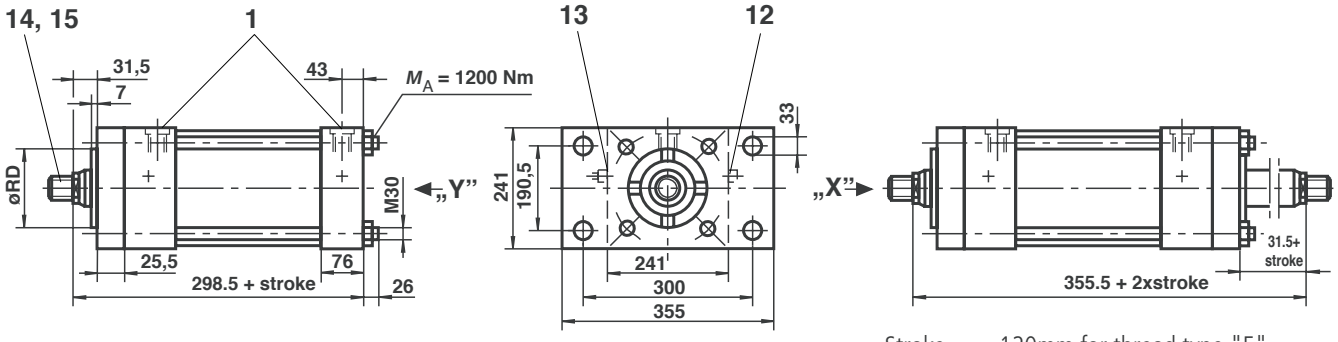
Operating pressure 210 bar



Mounting style C

Operating pressure for rod Ø 90 and Ø 100: 70 bar at base end, 210 bar at rod end

Operating pressure for rod Ø 140: 40 bar at base end, 210 bar at rod end

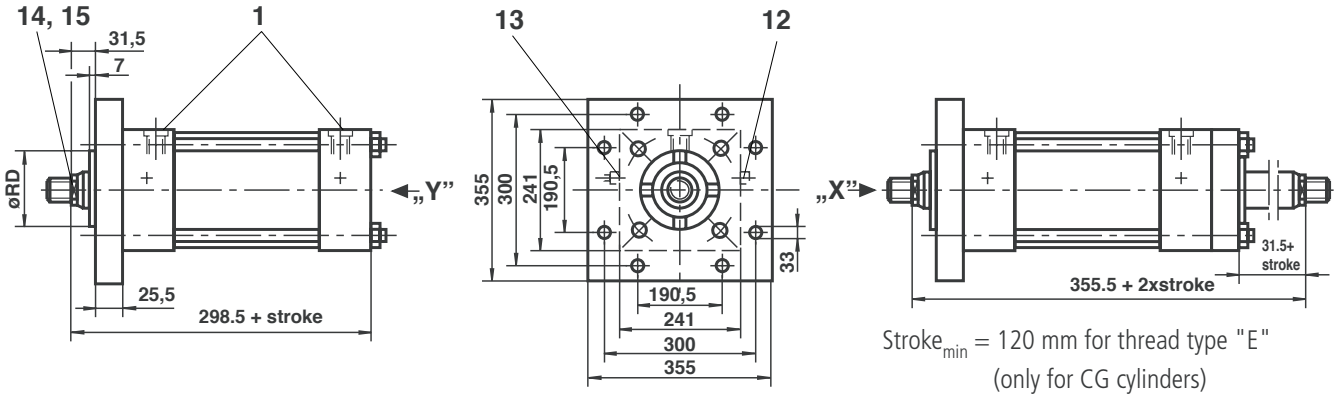


Stroke$_{min}$ = 120mm for thread type "E"
(only for CG cylinders)

Piston rod	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
Ø	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

Mounting style H

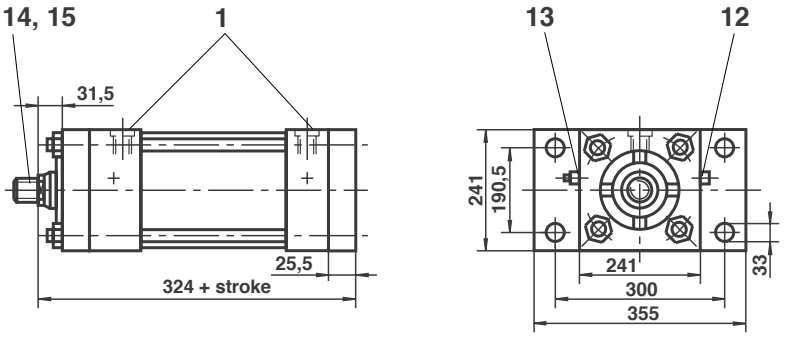
Operating pressure 210 bar



$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

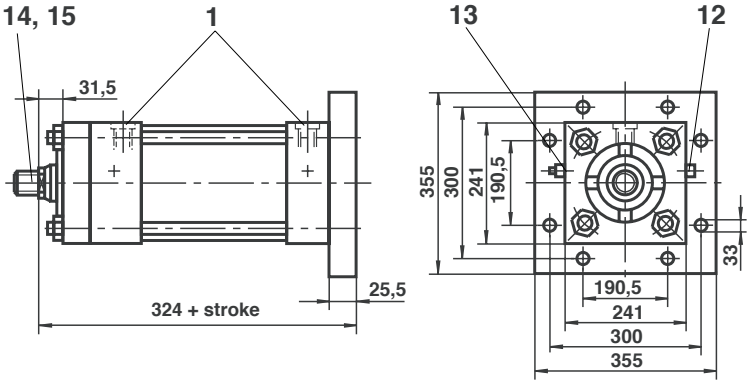
Mounting style D

Operating pressure for rod Ø 90 and Ø 100: 210 bar at base end, 110 bar at rod end
Operating pressure for rod Ø 140: 210 bar at base end, 150 bar at rod end



Mounting style K

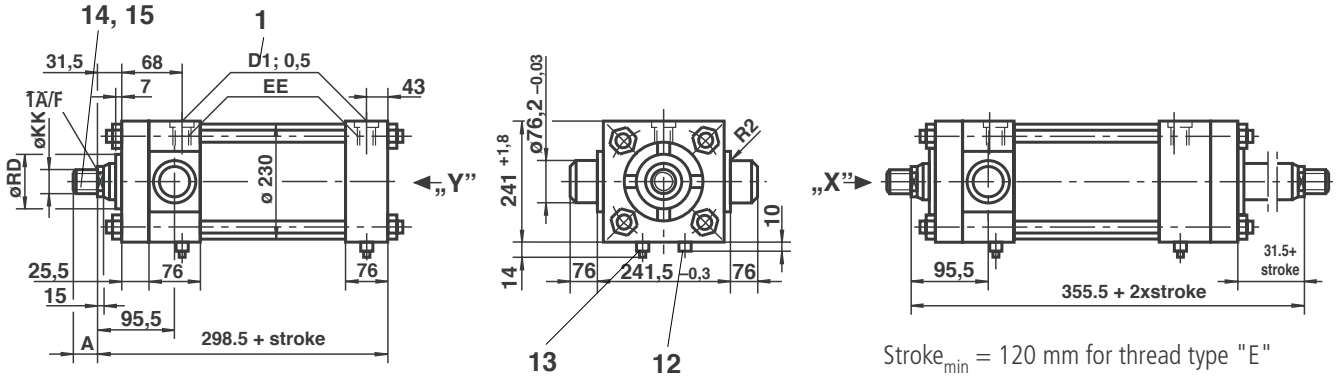
Operating pressure 210 bar



Piston rod Ø	RD_{f7}									1A/F	Cushioning length Piston side	Cushioning length Rod end
90	108									75	50	50
100	120									85		
140	158									120		

Mounting style R

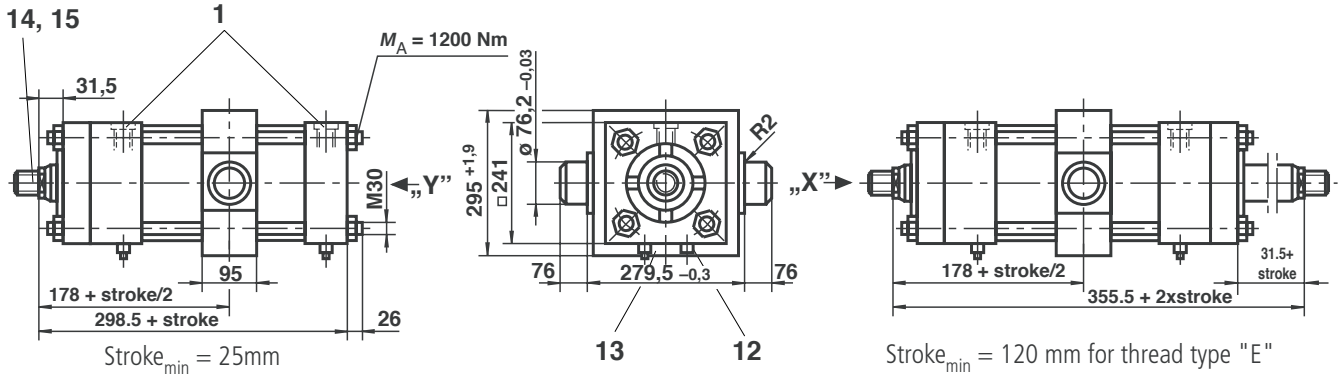
Operating pressure 210 bar



Stroke$_{min}$ = 120 mm for thread type "E" (only for CG cylinders)

Mounting style E

Operating pressure 210 bar

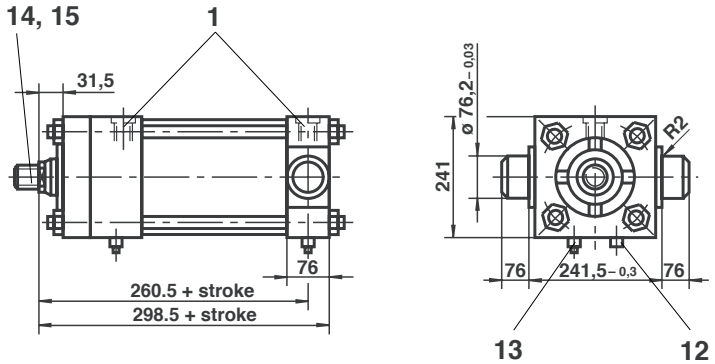


Stroke$_{min}$ = 25mm

Stroke$_{min}$ = 120 mm for thread type "E" (only for CG cylinders)

Mounting style S

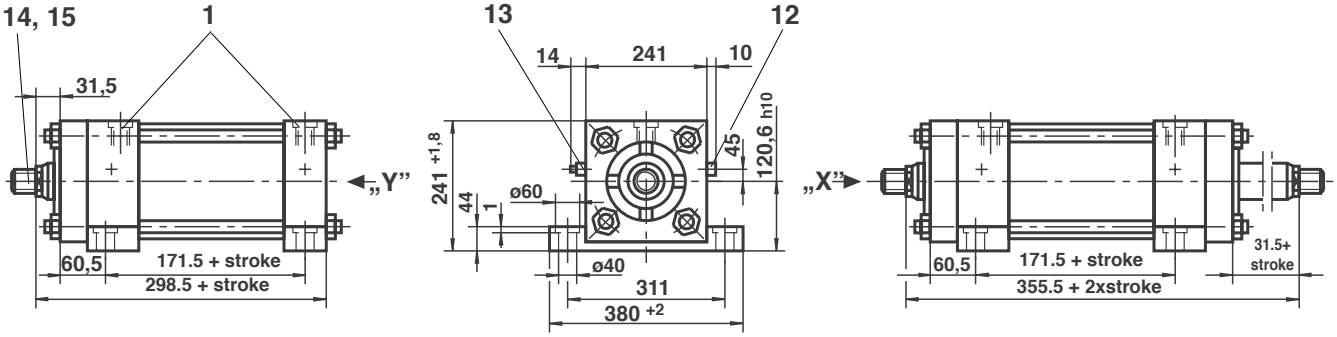
Operating pressure 210 bar



Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

Mounting style F

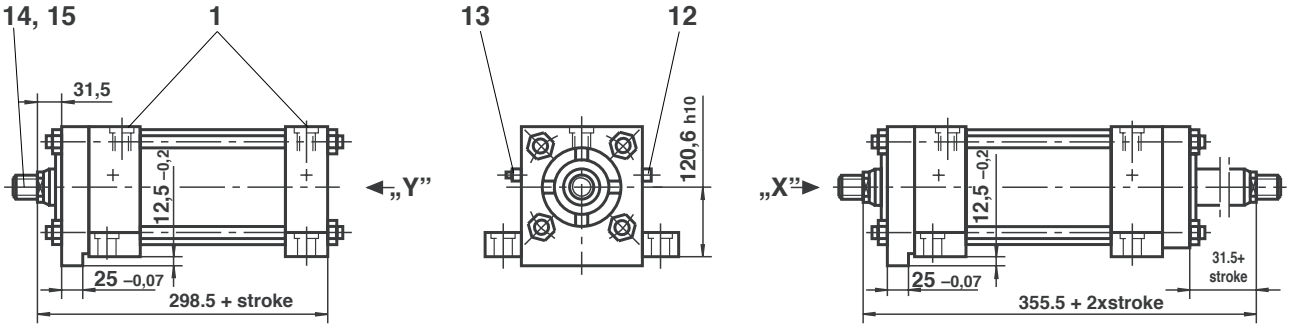
Operating pressure 210 bar



$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

Mounting style L

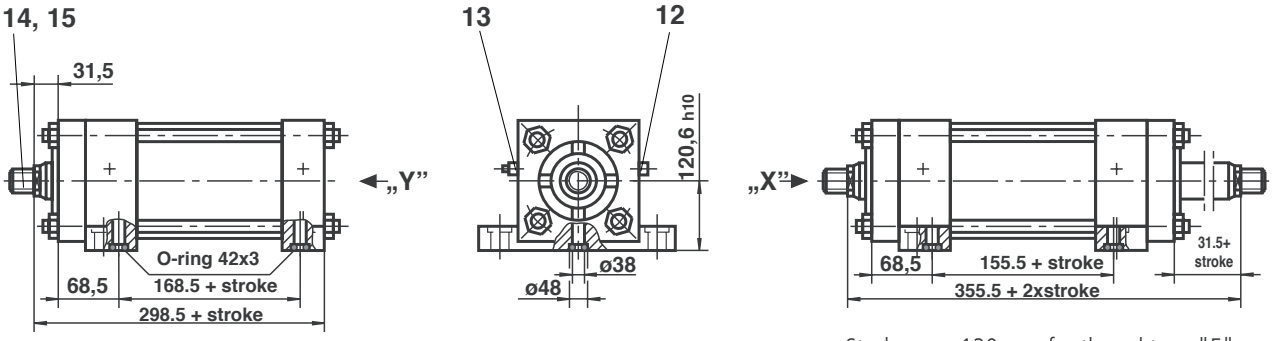
Operating pressure 210 bar



$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

Mounting style M

Operating pressure 210 bar

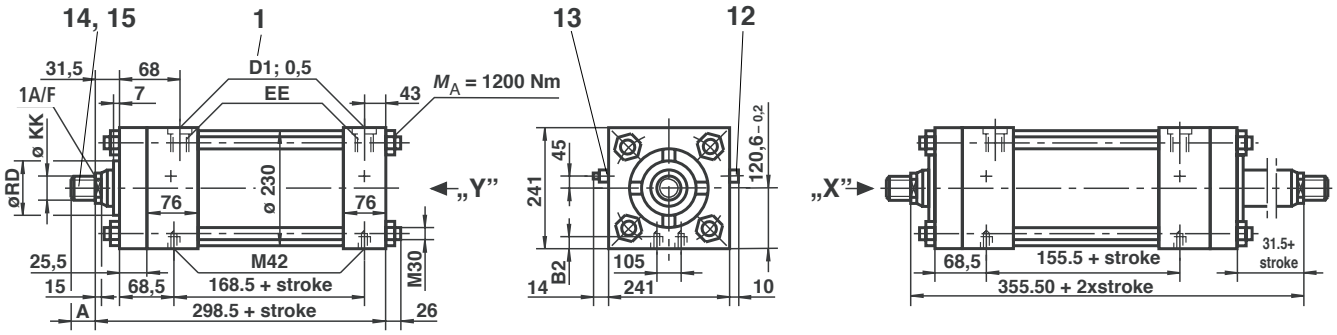


$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	RD_{f7}									1A/F	Cushioning length Piston side	Cushioning length Rod end
90	108									75	50	50
100	120									85		
140	158									120		

Mounting style N

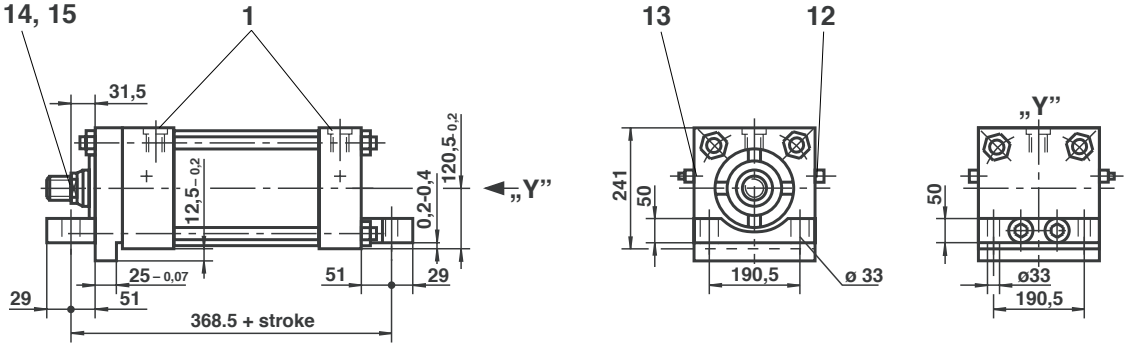
Operating pressure 210 bar



$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

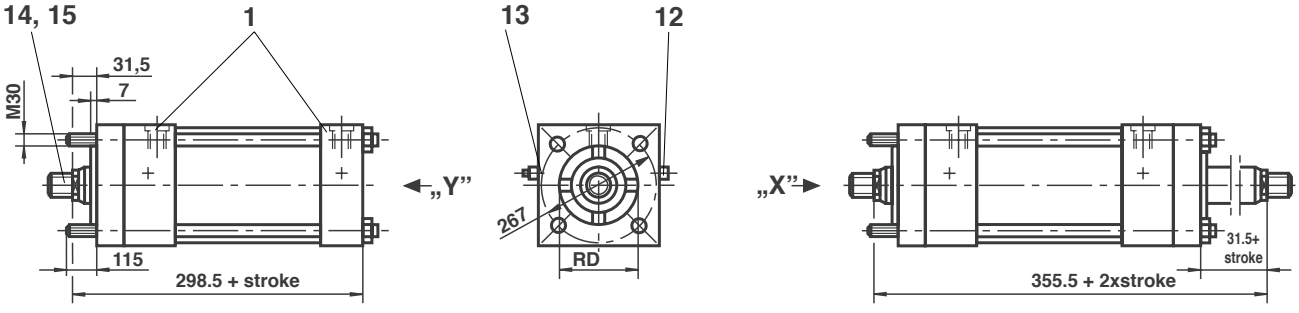
Mounting style T

Operating pressure 210 bar



Mounting style P

Operating pressure 210 bar

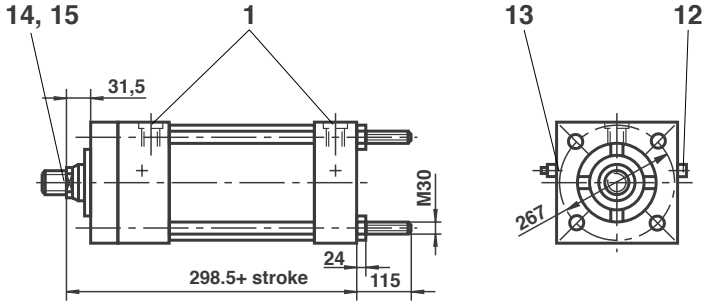


$Stroke_{min}$ = 120 mm for thread type "E"
(only for CG cylinders)

Piston rod Ø	KK			A		EE				D1			
	Thread type			Thread type		Connection				Connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

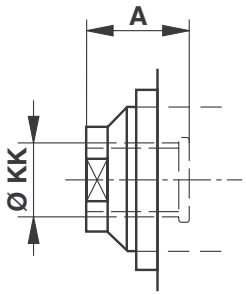
Mounting style Q

Operating pressure 210 bar

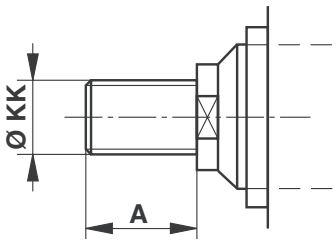


Addtional thread types

Thread type „E"



Thread type „F"



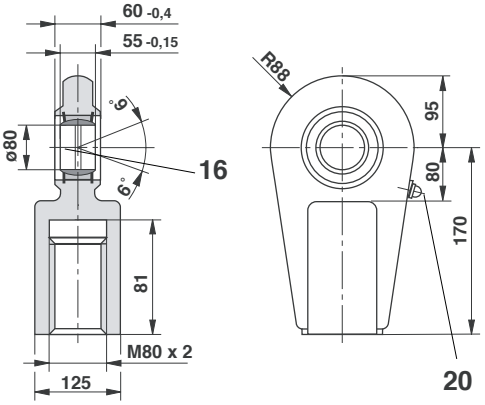
Self-aligning clevis CGA 80

to suit thread type „F"

Material No.: **R900303132**

Weight: 12.2 kg

Permissible load: 385 KN



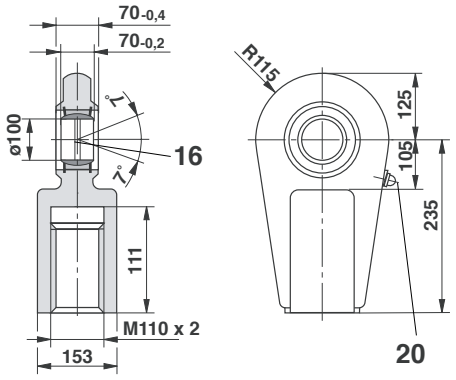
Self-aligning clevis CGA 110

to suit thread type „F"

Material No.: **R900303134**

Weight: 27.5 kg

Permissible load: 660 KN



Piston rod Ø	RD_{f7}							B2		1A/F	Cushioning length Piston side	Rod end
90	108							55		75	50	50
100	120							55		85		
140	158							32		120		

Forces, areas

Operating	Piston Ø	mm	40			50			63			
pressure in bar	Piston rod Ø	mm	16	18	25	22	25	36	25	28	36	45
75	Force; piston end	kN	9.43			14.73			23.38			
	Force; rod end	kN	7.91	7.51	5.37	11.88	11.04	7.10	19.69	18.76	15.74	11.44
100	Force; piston end	kN	12.56			19.64			31.18			
	Force; rod end	kN	10.56	10.03	7.66	15.84	14.71	9.47	26.26	25.03	20.99	15.26
150	Force; piston end	kN	18.85			29.45			46.76			
	Force; rod end	kN	15.84	15.04	11.48	23.76	22.08	14.20	39.40	37.53	31.49	22.90
210	Force; piston end	kN	26.39			41.24			65.46			
	Force; rod end	kN	22.17	21.05	16.05	33.27	30.91	19.88	55.15	52.55	44.08	32.06
Piston area		cm^2	12.56			19.63			31.16			
Annulus area		cm^2	10.55	10.02	7.65	15.83	14.71	9.46	26.25	25.01	20.98	15.26
Dampening	Piston end	cm^2	6.84			13.91			22.10			
area	Rod end	cm^2	8.76	8.76	6.41	14.33	13.47	8.29	23.10	23.10	19.80	13.10

Operating	Piston Ø	mm	80			100			125			
pressure in bar	Piston rod Ø	mm	36	45	56	45	50	70	50	56	63	90
75	Force; piston end	kN	37.70			58.91			92.04			
	Force; rod end	kN	30.07	25.77	19.22	46.97	44.18	30.05	77.31	73.57	68.66	44.33
100	Force; piston end	kN	50.27			78.54			122.72			
	Force; rod end	kN	40.10	34.36	25.63	62.63	58.91	40.06	103.08	98.10	91.55	59.11
150	Force; piston end	kN	75.40			117.81			184.08			
	Force; rod end	kN	60.14	51.54	38.45	93.95	88.37	60.10	154.63	147.13	137.32	88.66
210	Force; piston end	kN	105.56			164.94			257.71			
	Force; rod end	kN	84.20	72.15	53.83	131.53	123.71	84.13	216.48	206.00	192.25	124.13
Piston area		cm^2	50.24			78.50			122.66			
Annulus area		cm^2	40.07	34.34	25.62	62.60	58.88	40.04	103.03	98.04	91.50	59.08
Dampening	Piston end	cm^2	30.63			58.90			92.50			
area	Rod end	cm^2	36.40	30.60	20.10	57.30	54.70	31.97	92.50	92.50	47.20	47.20

Operating	Piston Ømm		150			180			200			
pressure in bar	Piston rod Ø	mm	63	70	80	100	80	90	125	90	100	140
75	Force; piston end	kN	132.54			190.85			235.62			
	Force; rod end	kN	109.16	103.68	94.84	73.63	153.16	143.14	98.81	187.92	176.72	120.17
100	Force; piston side	kN	176.72			254.47			314.16			
	Force; rod end	kN	145.55	138.24	126.45	98.18	204.21	190.85	131.75	250.56	235.63	160.23
150	Force; piston end	kN	265.08			381.70			471.24			
	Force; rod end	kN	218.33	207.38	189.68	147.28	306.32	286.28	197.63	375.85	353.45	240.34
210	Force; piston end	kN	371.10			534.39			659.74			
	Force; rod end	kN	305.65	290.32	265.55	206.20	428.85	400.80	276.70	526.18	494.83	336.50
Piston area		cm^2	176.63			254.34			314.00			
Annulus area		cm^2	145.47	138.17	126.38	98.13	204.10	190.75	131.68	250.42	235.50	160.14
Dampening	Piston end	cm^2	126.50			193.6			235.60			
area	Rod end	cm^2	130.10	130.10	81.70	81.70	179.00	179.00	109.20	238.70	219.00	137.50

Weight

Piston Ø		mm	40			50			63			
Piston rodØ		mm	16	18	25	22	25	36	25	28	36	45
Weight per	Single rod cylinder		0.55	0.6	0.8	0.9	1.0	1.3	1.6	1.7	2.0	2.4
100 mm stroke in kg	Double rod cylinder		0.75	0,8	1.2	1.2	1.3	2.1	2.0	2.2	2.6	3.6
	Mounting style		CD		CG	CD		CG	CD		CG	
Weight for zero stroke in kg	B		4.7		–	7.5		–	11.3		–	
	G		4.3		–	7.2		–	10.5		–	
	E		5.0		5.7	8.2		9.8	11.1		13.6	
	H		4.6		5.3	7.7		9.3	10.6		13.0	
	K, D		4.9		–	8.4		–	11.6		–	
	C, F, L, M, R, S, T		4.2		4.9	6.9		8.4	10.3		12.7	
	N, P, Q,		4.0		4.7	6.4		8.0	9.3		11.7	

Piston Ø		mm	80			100			125			
Piston rod Ø		mm	36	45	56	45	50	70	50	56	63	90
Weight per	Single rod cylinder		2.5	3.0	3.6	3.9	4.2	5.6	5.9	6.3	6.8	9.3
100 mm stroke in kg	Double rod cylinder		3.3	4.2	5.5	4.1	5.8	8.6	7.8	8.2	9.3	14.3
	Mounting style		CD		CG	CD		CG	CD		CG	
Weight for zero stroke in kg	B		21.0		–	29.5		–	54.7		–	
	G		19.5		–	28.6		–	48.2		–	
	E		21.3		25.5	28.3		35.1	49.5		60.5	
	H		20.0		24.0	27.3		34.0	48.8		61.0	
	K, D		21.8		–	27.7		–	52.5		–	
	C, F, L, M, R, S, T		18.7		23.0	25.6		33.0	45.0		57.3	
	N, P, Q,		17.3		21.3	23.8		30.5	42.5		54.7	

Piston Ø		mm	150			180			200			
Piston rod Ø		mm	63	70	80	100	80	90	125	90	100	140
Weight per	Single rod cylinder		7.9	8.4	9.4	11.5	11.6	12.7	17.3	15.2	16.4	22.2
100 mm stroke in kg	Double rod cylinder		10.4	14.0	13.4	17.7	15.6	17.7	26.9	20.2	22.6	34.3
	Mounting style		CD		CG	CD		CG	CD		CG	
Weight for zero stroke in kg	B		81.3		–	132.2		–	181.5			–
	G		72.0		–	119.0		–	160.0			–
	E		76.5		91.5	117.5		142.0	165.0		197.0	
	H		73.5		88.5	110.5		135.0	151.0		183.0	
	K, D		80.6		–	120.0		–	162.5		–	
	C, F, L, M, R, S, T		68.6		83.6	106.3		131.0	145.0		177.0	
	N, P, Q,		66.0		81.0	101.3		126.0	140.0		172.0	

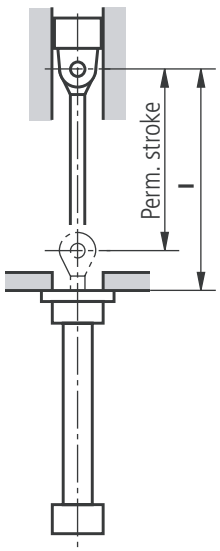
CD = Single rod cylinder

CG = Double rod cylinder

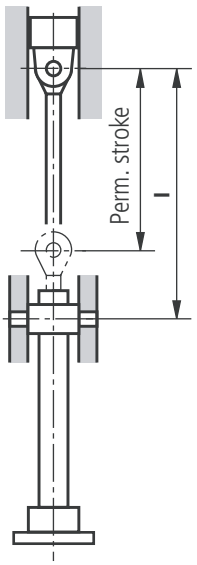
Permissible stroke lengths

Piston Ø in mm	Rod Ø in mm	Mounting styles: C, F, H, L, M, N, P, T — Operating pressure in bar — Max. permissible stroke in mm				Mounting style: R — Operating pressure in bar — Max. permissible stroke in mm				Maximum available stroke lengths in mm (standard)
		75	100	150	210	75	100	150	210	
40	16	560	470	370	295	330	270	200	150	1000
	18	745	635	505	415	455	365	270	210	
	25	1000	1000	1000	845	990	830	650	520	
50	22	880	750	595	490	545	450	325	250	1200
	25	1160	990	785	645	770	620	480	380	
	36	1200	1200	1200	1200	1200	1200	1170	960	
63	25	880	745	655	470	540	445	380	255	1400
	28	1145	975	775	640	735	610	455	350	
	36	1400	1400	1325	1100	1275	1080	845	685	
	45	1400	1400	1400	1400	1400	1400	1400	1210	
80	36	1505	1285	1025	845	985	815	625	490	1700
	45	1700	1700	1645	1365	1585	1340	1055	855	
	56	1700	1700	1700	1700	1700	1700	1700	1480	
100	45	1875	1600	1275	1050	1240	1030	790	625	2000
	50	2000	1990	1585	1300	1515	1280	995	800	
	70	2000	2000	2000	2000	2000	2000	2000	1890	
125	50	1820	1545	1220	1000	1160	970	740	585	2300
	56	2300	2005	1605	1325	1585	1330	1025	815	
	63	2300	2300	2035	1680	1965	1660	1300	1050	
	90	2300	2300	2300	2300	2300	2300	2300	2300	
150	63	2450	2085	1655	1360	1585	1330	1030	825	2600
	70	2600	2600	2115	1755	2100	1775	1385	1120	
	80	2600	2600	2600	2280	2600	2265	1780	1445	
	100	2600	2600	2600	2600	2600	2600	2600	2590	
180	80	2800	2800	2245	1845	2160	1820	1415	1135	2800
	90	2800	2800	2800	2515	2680	2270	1790	1455	
	125	2800	2800	2800	2800	2800	2800	2800	2800	
200	90	3000	3000	2690	2240	2680	2270	1790	1455	3000
	100	3000	3000	3000	2845	3000	2825	2260	1865	
	140	3000	3000	3000	3000	3000	3000	3000	3000	

$S_K = l \times \sqrt{\frac{1}{2}}$

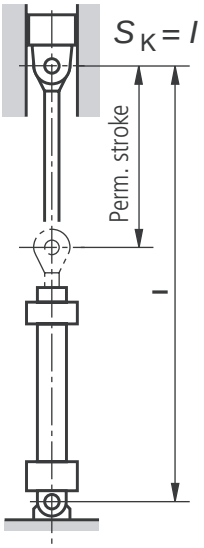


$S_K = l$

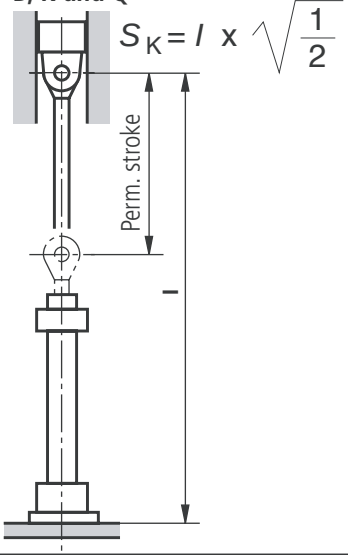


Permissible stroke lengths

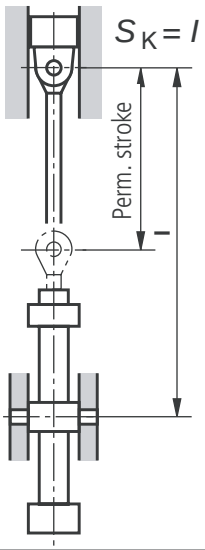
Piston Ø in mm	Rod Ø in mm	Mounting styles: B, G und S — Operating pressure in bar — Max. permissible stroke in mm				Mounting styles: D, K,Q und E — Operating pressure in bar — Max. permissible stroke in mm				Maximum available stroke lengths in mm (standard)
		75	100	150	210	75	100	150	210	
40	16	95	65	30	10	195	155	105	70	1000
	18	160	120	75	45	285	230	170	130	
	25	415	340	250	190	620	520	405	325	
50	22	195	150	95	60	340	280	205	155	1200
	25	295	235	160	115	465	385	290	225	
	36	760	635	490	390	1090	925	730	600	
63	25	185	140	105	45	330	265	225	140	1400
	28	280	220	150	105	460	380	285	220	
	36	555	455	340	260	820	690	535	430	
	45	960	810	630	505	1365	1165	920	755	
80	36	380	305	215	150	615	510	390	305	1700
	45	690	570	425	325	1025	860	670	540	
	56	1175	990	770	615	1670	1425	1130	925	
100	45	495	400	285	205	775	645	495	390	2000
	50	650	530	385	290	975	820	630	500	
	70	1495	1265	990	800	2000	1800	1430	1180	
125	50	455	360	245	165	735	610	455	350	2300
	56	640	525	380	285	990	830	640	510	
	63	855	700	525	400	1270	1070	830	665	
	90	2035	1730	1365	1115	2300	2300	1960	1625	
150	63	640	510	360	255	1010	845	645	505	2600
	70	865	710	530	405	1315	1110	865	700	
	80	1180	975	735	570	1740	1465	1140	920	
	100	2045	1725	1355	1095	2600	2465	1965	1620	
180	80	900	725	525	390	1390	1165	895	710	2800
	90	1280	1065	815	640	1900	1615	1275	1044	
	125	2740	2325	1840	1500	2800	2800	2645	2195	
200	90	1095	905	675	520	1675	1420	1120	910	3000
	100	1445	1205	920	725	2150	1830	1450	1190	
	140	3000	2630	2080	1700	3000	3000	2990	2485	



D, K und Q



E



Buckling calculation

The calculations for buckling are normally carried out according to Euler, as the piston rod is normally considered as a slender column.

$$\text{Buckling load } K = \frac{\pi^2 \bullet E \bullet J}{s_K^{\,2}} \text{ in N}$$

i.e. at this load, the rod will buckle!

$$\text{Max. operating load } F = \frac{K}{S} \text{ in N}$$

s_K = Free buckling length in mm

E = Module of elasticity in N/mm^2

= $2.1 \bullet 10^5$ for steel

J = Moment of inertia in mm^4

for circular cross-sectional area

$$= \frac{d^4 \bullet \pi}{64} = 0.0491 \bullet d^4$$

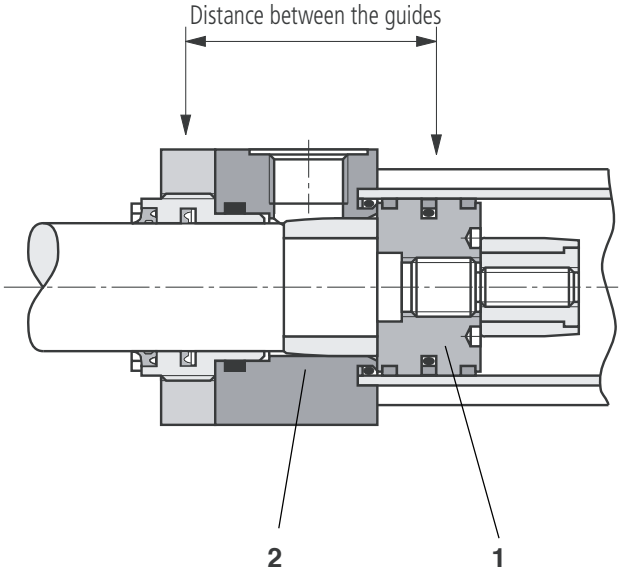
S = Safety (3.5)

Stop tube extension

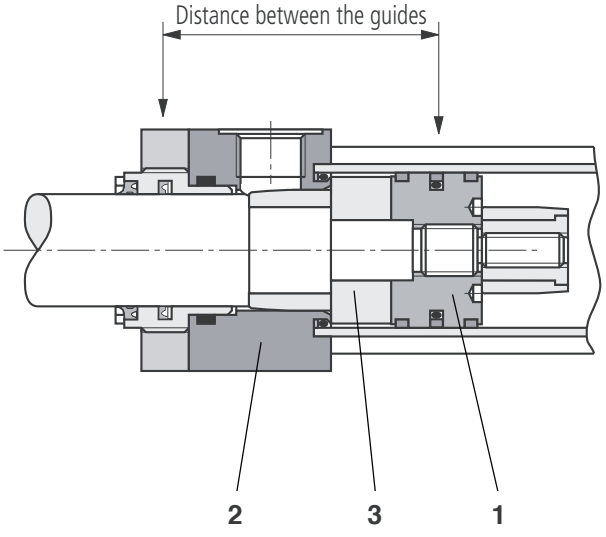
With long strokes and compressive loads, a stop tube is recommended in order to reduce the bearing loads when the rod is extended.

A spacer bush (3) is inserted between piston (1) and cylinder head (2). The spacer bush extends the lever arm and thus reduces the bearing loads.

Without stop tube extension



With stop tube extension



Ordering details	Stop tube extension in mm for all piston Ø							
	–	25	50	75	100	125	150	175
Mounting style	Stroke lengths in mm							
B, G, S	Up to 500	501 to 625	626 to 750	751 to 875	876 to 1000	1001 to 1125	1126 to 1250	1251 to 3000
C, F, H, L	Up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–
D, E, K, Q	Up to 665	666 to 835	836 to 1000	1001 to 1165	1166 to 1335	1336 to 1500	1501 to 1665	1666 to 3000
R	Up to 1000	1001 to 1250	1251 to 1500	1501 to 1750	1751 to 2000	2001 to 2250	2251 to 2500	2501 to 3000
M, N, P, T	Up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–

Installation length of cylinders with stop tube extensions:

Installation length of standard cylinder + stop tube extension
(The position of the trunnions for mounting styles E + R are not changed.)

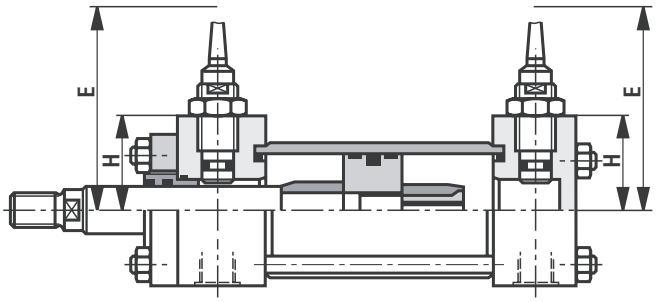
Inductive proximity switches (dimensions in mm)

Inductive proximity switches are used for reliable end position control in hydraulic cylinders. They are an important element in the safe and accurate monitoring of the end positions of safety devices, locking devices and/or other machine functions, by means of a signal output.

Depending on the clyinder version, the switching point is between 1 mm and 4 mm before the end of the stroke, with a repeatability of ≤ 0.5 mm.

On safety grounds the proximity switch is secured against being screwed in too far, and for this reason the switching point is not adjustable

- Reliable, accurate end position control
- Contact and wear-free switching
- Pressure resistant to a max. of 500 bar
- Integral mounting gives good protection against damage and environmental influences
- Integrated short circuit protection



E = Mounting space

State in clear text in a case of an order!

Piston Ø	Rod Ø	CD 210	
		H	E
40	16 18 25	42.5	105
50	22 25	42.5	105
	36	48	110
63	25 28	44.5	108
	36 45	53	115
80	36	57	116
	45 56	60	122
100	45 50	63.5	119
	70	67.5	130
125	50 56 63 90	82.5	140
150	63 70 80 100	85	146
180	80 90 125	108	159
200	90 100 140	120.5	166

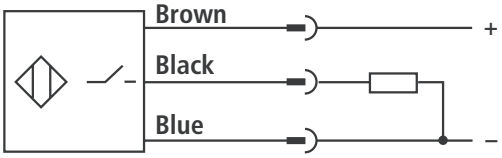
Technical data

Pressure resistant	bar	Max. 500
Operating voltage including residual ripple	V DC	10 to 30
Residual ripple of operating voltage	%	Max. 15
Output technology		PNP
Switching function		N.O.
Idle current	mA	≤ 10
Output loading	Ω	≥ 200
Output resistance Ra and diode	kΩ	4.7
Repeatability	mm	≤ 0.5
Max. switching frequency	kHz	1

Short circuit protected version

Protection to DIN 40 050	IP 67	
Ambient temperature range	°C	–25 to +70
Connection type		2 m cable is moulded in, 3 x 0.34 mm^2

Output circuit



Further notes

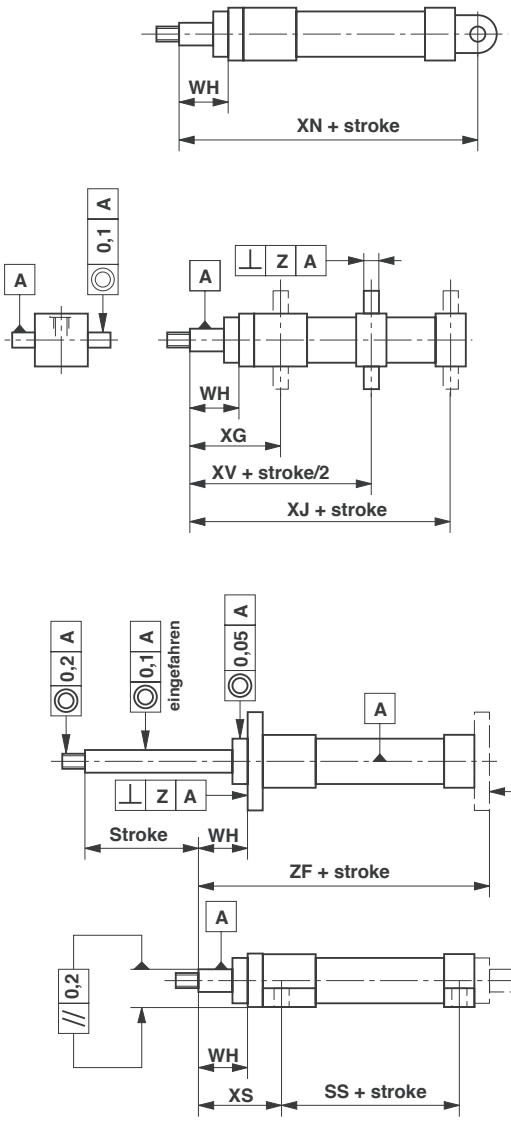
Installation: 180° offset from connections

Connection: Enlarged connections are subject to prior consulation with Dept. BRI-ZY

Mounting style: With mounting styles F, L, M, N and T it is **not** possible to mount 180° offset from connections!

For main dimensions and mounting styles, see pages 6 to 59

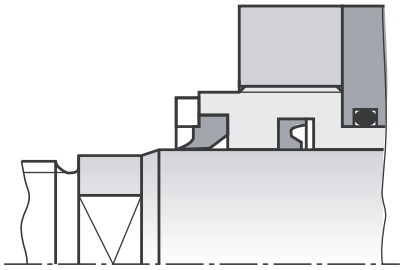
Installation lengths, positional tolerances

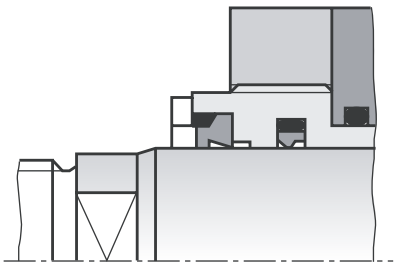


Stroke length in mm	Up to 1250	1251 to 2000	2001 to 3000
Stroke tolerance in mm	+1 –1,5	+1 –2	+1 –3
WH	± 2	± 2	+ 3 – 2
ZF	± 1	± 1.5	± 2
XS	± 2	± 2	+ 3 – 2
SS	± 1.25	+ 1.5 – 2	+ 1.5 – 3
XG	± 2	± 2	+ 3 – 2
XV	± 2	± 2	± 2
XJ	± 2	± 2	± 2
XN	± 1.25	± 2	± 2
Z	0.1/100		

Seals (standard version)

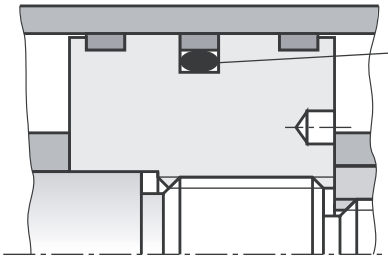
Piston rod seals





Version related to piston rod - Ø 50, 63 and 80 mm

Piston seals

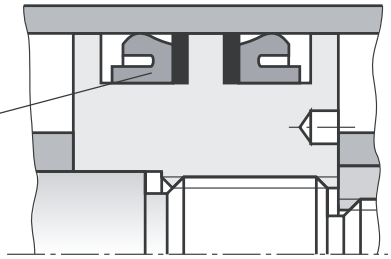


Version "T"

Glide ring for low friction operation

Version "A"

Lip ring for leak-free operation under static conditions



End position cushioning

End position cushioning for cylinder base

The piston (1) is threaded directly onto the cylinder rod, cushioning bush (2) is screwed onto the cylinder rod by means of a retaining ring (3).

As the conical damping bush enters the drilling in the cylinder base (4), the cross-section for the outgoing fluid from the piston chamber (5) reduces until it is zero. The fluid from the piston chamer (5) can then only flow via drilling (6) and the adjustable throttle valve (7). The degree of cushioning is controlled by the setting of throttle valve (7). The smaller the flow cross-section, the greater the degree of end position dampening.

Adjustable throttle valve for the end position cushioning

The design of the throttle valve prevents the needle valve (8) from being completely screwed out when setting the end position dampening.

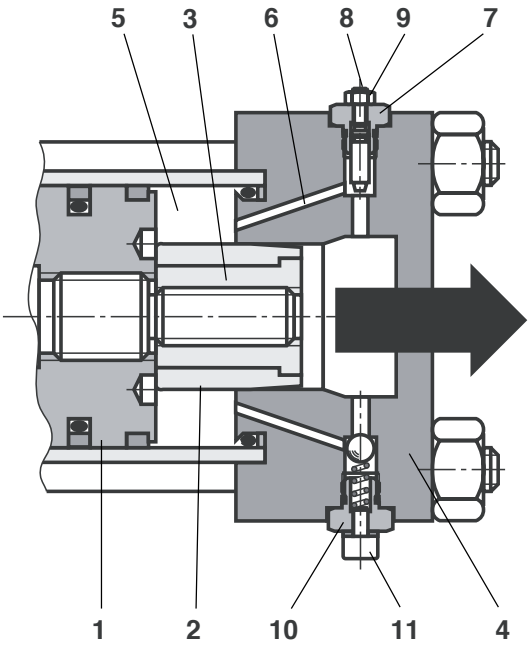
When the end position dampening is correctly set, the screw is locked by means of lock nut (9).

Check valve with bleed screw

This check valve (10) is used as a start-up aide from the end position and permits the throttle valve to be by-passed at the start of the outward stroke of the cylinder. The cylinder is bled of air by means of bleed screw (11).

The bleed screw is fitted as standard on cylinders without end position cushioning.

The throttle valve and check valve are in a kit form and are interchangable.



Calculation of the deceleration force

The end position cushioning must produce a controlled deceleration (braking) of the stroke velocity in both end positions.

In doing this, the total energy comprising of the product of the moving mass and its velocity must not exceed the working parameters of the dampening system.

The energy which is to be braked is converted within the cushioning into heat, the cushioning works to the principle of throttling a flow.

Calculation of the cushioning force

When the cylinder is installed horizontally, the deceleration force can be calculated as follows:

Cylinder extending

$$F_B = m \bullet a + A_K \bullet p$$

F_B = Deceleration force in N
m = Moving mass in kg
a = Deceleration in m/s^2

$$a = \frac{v^2}{2 \bullet s}$$

Cylinder retracting

$$F_B = m \bullet a + A_R \bullet p$$

v = Piston velocity in m/s
s = Dampening length in m
A_K = Piston area in cm^2
A_R = Annulus area in cm^2
p = System pressure in N/cm^2

1 bar ~ 10 N/cm^2

For vertical operation of the cylinder, the force generated by the weight F_B applied to the cylinder (consisting of the external load plus the cylinder rod and piston) must be added or subtracted dependent upon the direction of movement.

The cylinder friction is ignored in these calculations.

Calculation of the average dampening pressure

Normally the average dampening pressure must not exceed the nominal pressure of the cylinder.

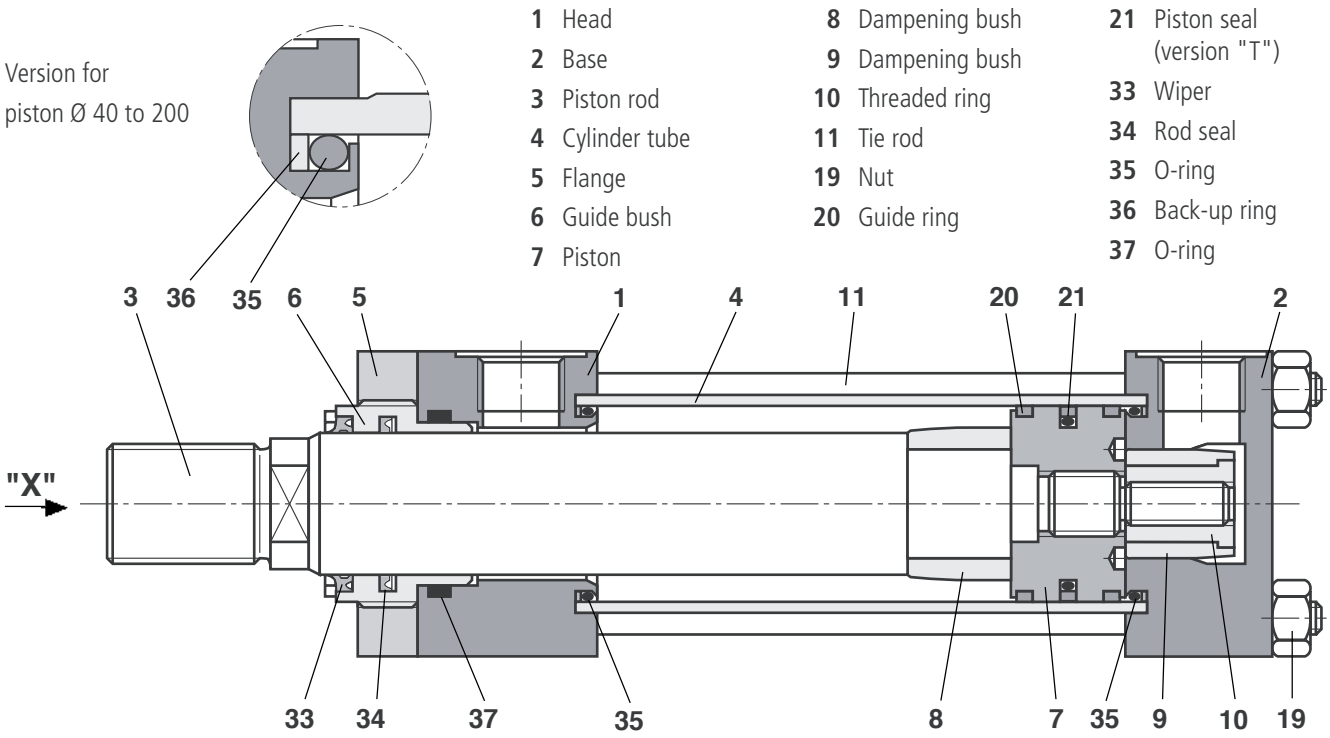
$$p_D = \frac{F_B}{A_D}$$

p_D = Average dampening pressure in N/cm^2
F_B = Deceleration force in N
A_D = Effective dampening area in cm^2

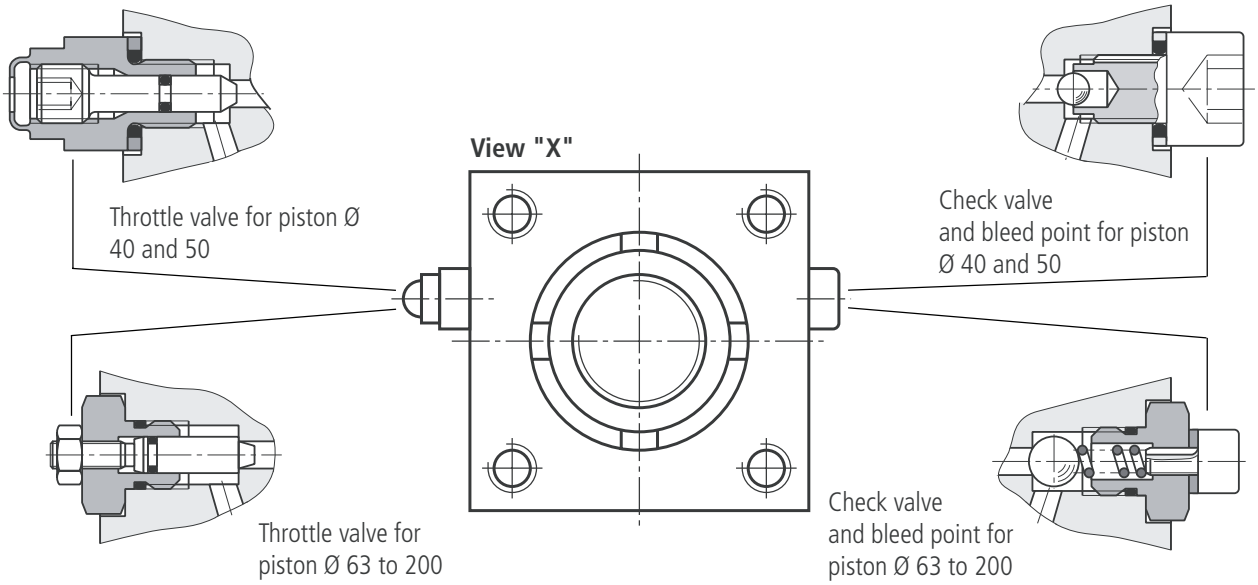
1 bar ~ 10 N/cm^2

If the above calculation results in a higher value, then the dampening length must be increased or the system pressure reduced.

Spare parts diagram



Throttle and check valve in cylinder base and cylinder head



Ordering of spare parts:

– When designating individual parts and item nos. from the spare parts diagram, please give complete ordering details of the cylinder.

– For seal sets, please give complete ordering details of the cylinder.

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