

HYDAIRA

Hydraulic Cylinders



www.specken-drumag.com
www.ribapneumatic.de
www.hydaira.ch
www.cges.be

SPECKEN  **DRUMAG**

Information and General Notes

Introduction

Effective round basic design. Compact construction with space-saving outside diameter and length for an excellent ratio between power and space requirements.

The screw connections on all components ensure simple installation and replacement.

Maximum pressure

The pressures stated in the catalog refer to the dynamic continuous pressure for all mounting types. A higher pressure is also permissible in some cases, depending on the application and installation situation. A written description of your application is mandatory for approval of this higher pressure. If outlet throttling is employed, the resulting pressure ratio must be taken into account. The dynamic pressure in the cylinder should only exceed the maximum operating pressure by 30% for a short time.

Minimum pressure

The minimum permissible pressure depends on the employed sealing type. Please contact us to discuss the selection of the required seals for pressures of below 10 bar.

Cylinder mounting

If a different mounting method than the standard method is required, we would be pleased to investigate solutions to suit your needs.

Function types

Various functional cylinder types are available. Customized solutions are available upon request.

Connections

With Whitworth pipe thread; the length of the connections can be modified upon request. Larger and other (metric) connections are available upon request.

Piston rod

The standard material for piston rods is CK 45, ground and hard-chrome plated. Hardened and stainless steel piston rods are also available. Piston rods with special coatings can be supplied upon request. Thicker or thinner piston rods are generally possible. The piston rods should, however, always be tested for bend resistance.

Piston rod end

The end of the piston rod is manufactured as a standard version described in the catalogue if not otherwise specified by the customer. Variations from the catalogue versions are possible when the required dimensions are specified.

Cylinder tube

The cylinder tube is made of steel and the liner is very finely honed.

Seals

We supply up to 8 different seal types, depending on the speed, temperature and pressure. Should other sealing types or materials be required, we would be pleased to select the right seals for your application.

End position damping

The purpose of end position damping is to lower the kinetic energy to a level at which neither the cylinder nor the machine in which the cylinder is installed is damaged without having to install a corresponding extra device. We recommend a damping feature for speeds exceeding 20 mm/s. Various damping systems are used depending on the cylinder type. These include plastic impact damping, self-adjusting progressive damping or adjustable damping with needle valves. Depending on the application we can also offer optimized damping (shorter damping times).

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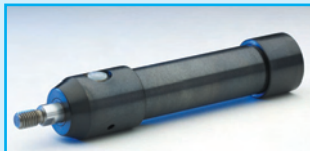
Page



ZAR series

Piston diameters 10-25 mm, operating pressures up to 63 bar,
6 seal versions, 6 types of fastening, stainless

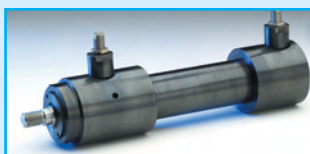
4-9



ZU series

Piston diameters 10-100 mm, operating pressures up to 100 bar,
8 seal versions, 12 types of fastening

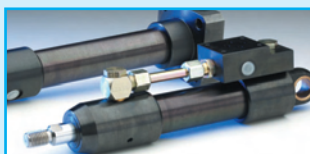
10-16



ZISO/T series acc. to ISO 6020/1

Piston diameters 25-100 mm, operating pressures up to 160 bar,
4 seal versions, 11 types of fastening

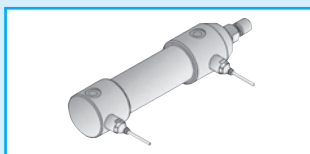
17-23



ZU 250 series

Piston diameters 20-100 mm, operating pressures up to 250 bar,
4 seal versions, 11 types of fastening

24-30

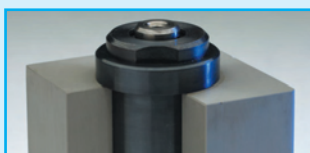


Special versions

Hydraulic cylinders with piston \varnothing 100-250 mm
Hydraulic cylinders in servo quality

Hydraulic cylinders with end position sensing
Hydraulic cylinders with path-measuring system

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ZHSS Series

Piston diameters 16-50 mm, operating pressures up to 400 bar,
round, compact design, 3 types of fastening

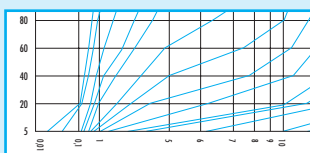
32-33



Accessories — Piston rod knuckles

Joint head GS — Fork joint GG — Swivel head GE

34

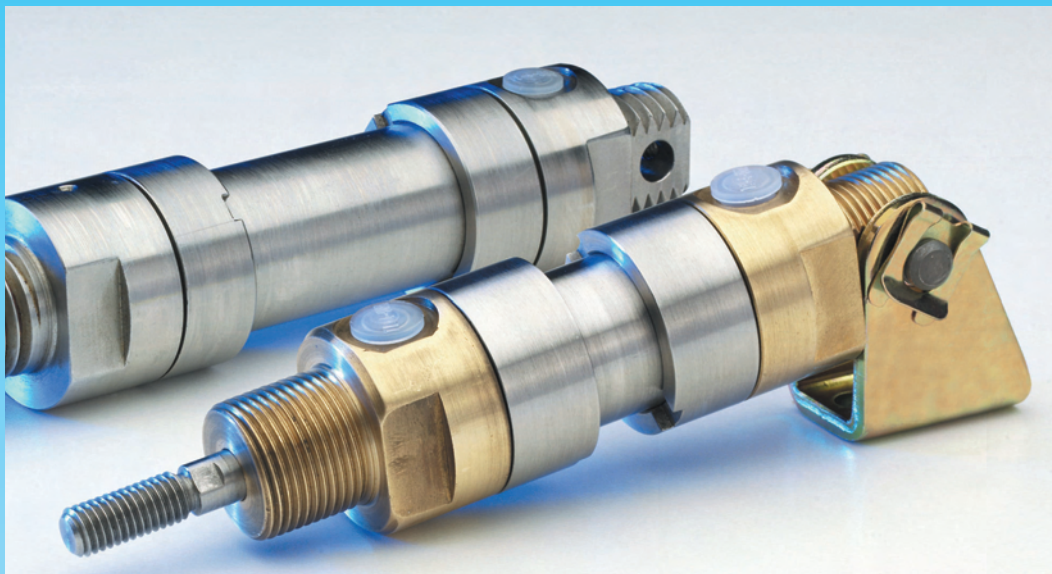


Piston force and Bend resistance

Determination of cylinder and piston rod diameters

35

ZAR series



63 bar standard cylinder

Dimensions acc. to ISO 6432

Piston Ø 10-25 mm

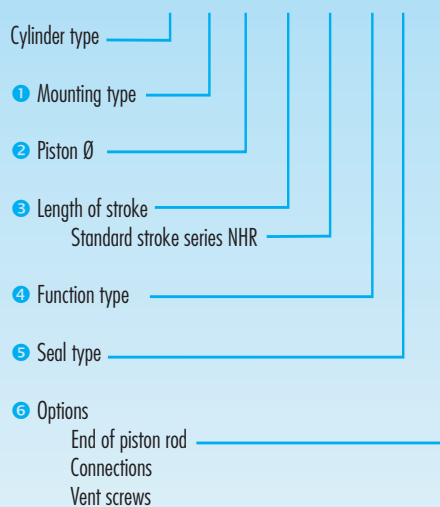
Lengths of stroke at your option (take account of the bend resistance, see page 35)

Standard lengths of stroke

- Robust - stainless - antimagnetic
- Nylon impact absorption
- Turnable connections

Determine your 63 bar standard cylinder

Ordering example: **ZAR-FBv 25/125 NHR15 D-U01 E31**



Special versions on request

General information

Design:

Guide head and cover: brass

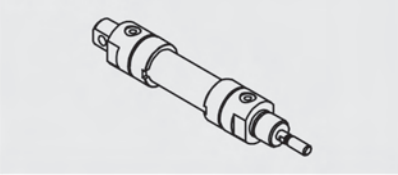
Piston rod: stainless steel (1.4305), polished

Piston: light alloy

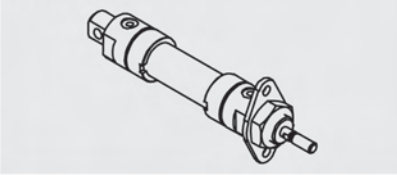
Cylinder tube: stainless steel tube (1.4301), bore very finely honed

1 Mounting types

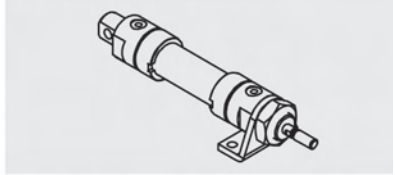
A Basic version



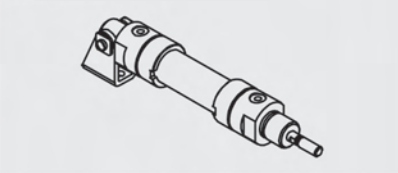
FBv Front flange



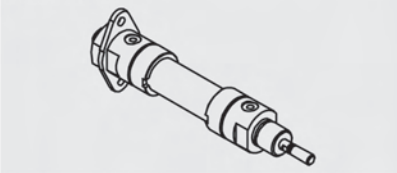
HB Front angle foot (for short strokes)



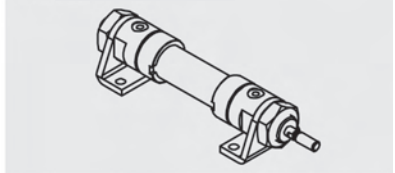
LB Bearing block



FBh Rear flange



HB2 Two angle feet



2 Piston Ø

Piston Ø (mm)	10	12	16	20	25
Piston surface pushing (cm ²)	0.78	1.13	2.00	3.14	4.90
Piston surface pulling (cm ²)	0.66	0.85	1.72	2.64	4.12

3 Length of stroke

Lengths of stroke at your option: We manufacture any length of stroke you desire.

Standard stroke versions NHR: A choice of 8 standard lengths of stroke for every piston Ø is available for short-time delivery.

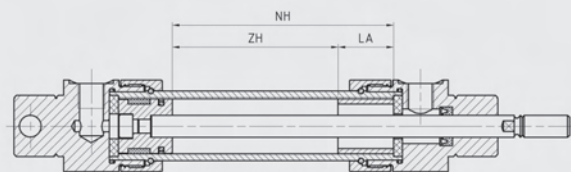
● **Ordering example:** ZAR-FBv 20/100 NHR14 D-U00

Piston Ø		10	12	16	20	25								
Function	Stroke	NHR	NHR measures of length											
			L1	L1c	L1	L1c	L1	L1c	L1	L1c	L1	L1c		
			25	11	67	89	69	100	76	107	84	120	89	129
			50	12	92	114	94	125	101	132	109	145	114	154
			80	13	122	144	124	155	131	162	139	175	144	184
			100	14	142	164	144	175	151	182	159	195	164	204
			125	15	167	189	169	200	176	207	184	220	189	229
			160	16	202	224	204	235	211	242	219	255	224	264
			200	17	242	264	244	275	251	282	259	295	264	304
			250	18	292	314	294	325	301	332	309	345	314	354

Intermediate strokes aNHR:

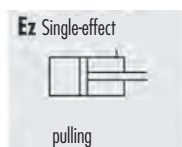
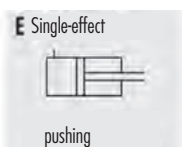
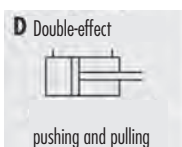
By inserting a stroke-limiting bushing (LA) any intermediate stroke (ZH) can be realized. The measures of length L1 and L1c always correspond with the normal stroke.

● **Ordering example:** ZAR-FBv 20/90 aNHR14 D-U00

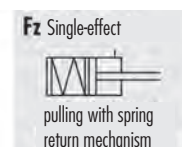
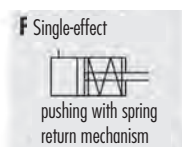
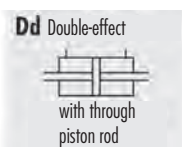


4 Function types

Standard function types:



Special function types (on request):



5 Seal types

Standard version: U00 for hydraulic fluid (mineral oil). Seal types for other pressure media on request.

Seal types	U00	U01*	U06	U07	U11	U12
Piston seal, PTFE gliding ring (min. piston Ø 20 mm with driving band)	●	●	●	●	●	●
Rod seal, grooved ring	●	●				
Rod seal, PTFE gliding ring (min. piston Ø 20 mm)			●	●	●	●
Dust seal		●		●		●
O-rings Nitril	●	●	●	●		
O-rings Viton					●	●
	Piston speed					
max. 0.5 m/s	●	●				
max. 10 m/s			●	●	●	●
	Temperature range					
-20/+100 °C	●	●	●	●		
-20/+200 °C					●	●

* Seal type U01 is available for piston diameters of at least 12 mm.

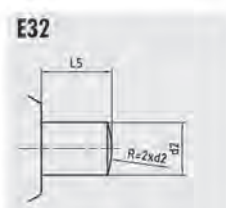
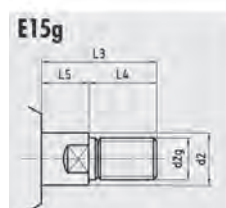
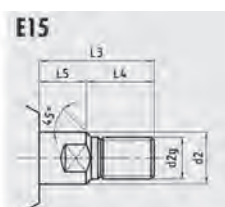
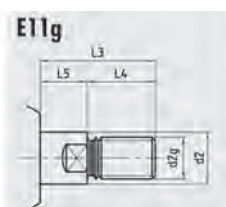
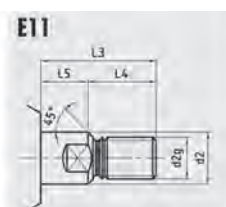
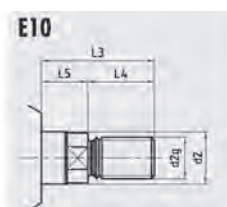
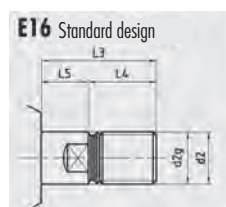
6 Options

End of piston rod:

Standard version: E16

Additional versions as shown in the illustrations are manufactured based on the catalog if not otherwise specified by the customer.

Tailor-made versions available on request.



Connections:

are manufactured based on the catalog if not otherwise specified by the customer.

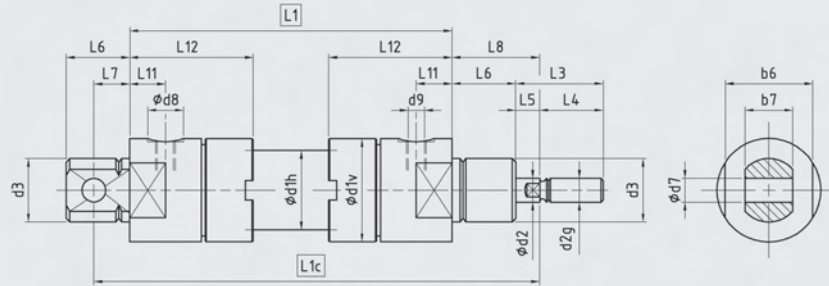
Larger and other (metric) connections are available on request.

Vent screws (ES):

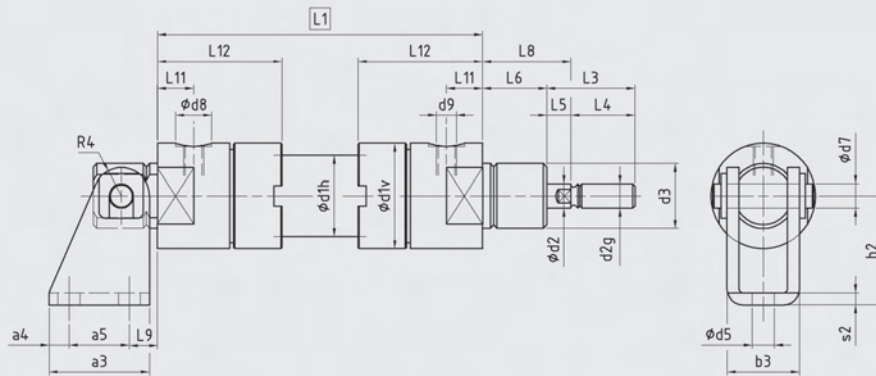
are attached to order and in accordance with the position specified by the customer.

Dimension drawings/Dimensions

A Basic design



LB Bearing block



Piston Ø	10	12	16	20	25
d1v	20	22	26	33	38
d1h	14	16	20	25	30
d2-f7	4	6	6	8	10
d2g	M4	M6	M6	M8	M10x1.25
d3	M12x1.25	M16x1.5	M16x1.5	M22x1.5	M22x1.5
d5	4.5	5.5	5.5	6.6	6.6
d7	4	6	6	8	8
d8	9	9	9	16	16
d9	M5	M5	M5	G 1/8"	G 1/8"
a3	20	25	25	32	32
a4	4	5	5	6	6
a5	12.5	15	15	20	20
b3	13	18	18	24	24
b6	17	19	22	27	32

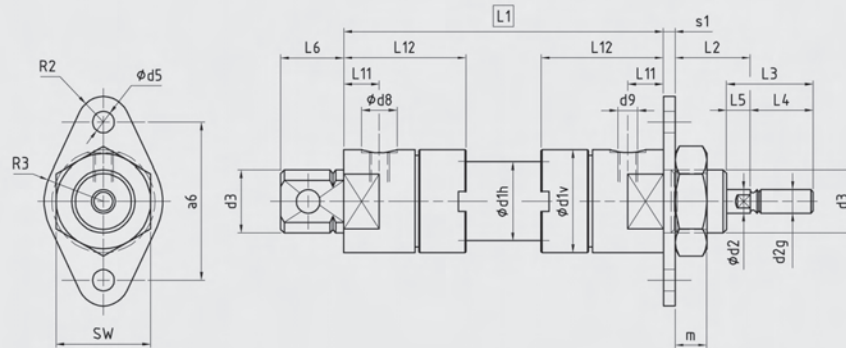
Piston Ø	10	12	16	20	25
b7	8	12	12	16	16
h2	24	27	27	30	30
R4	5	7	7	10	10
s2	2.5	3	3	4	4
L3	16	22	22	26	30
L4	12	16	16	20	22
L5	4	6	6	6	8
L6	12	16	16	18	20
L7	6	9	9	12	12
L8	16	22	22	24	28
L9	7	7	7	8	8
L11	7	8	9	10	11
L12	26	29	31	36	38

Function type	Measures of length L1 and measures of length L1c					
D/E/Ez	L1 = Stroke +	42	44	51	59	64
	L1c = Stroke +	64	75	82	95	104

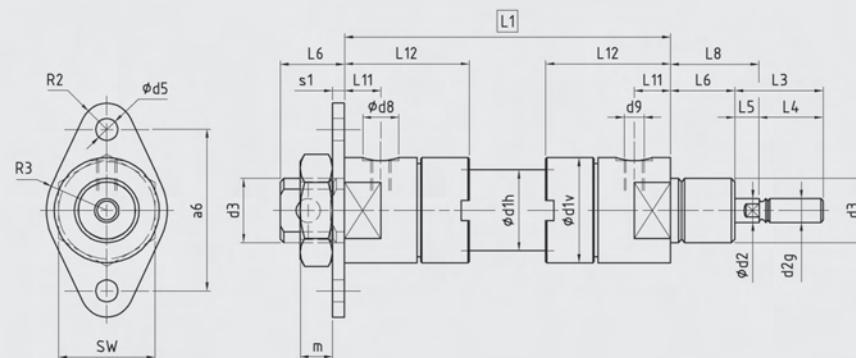
	Minimum measures of length L1 and L1c				
L1 =	62	66	73	84	89
L1c =	84	97	104	120	129

Dimension drawings/Dimensions

FBv Front flange



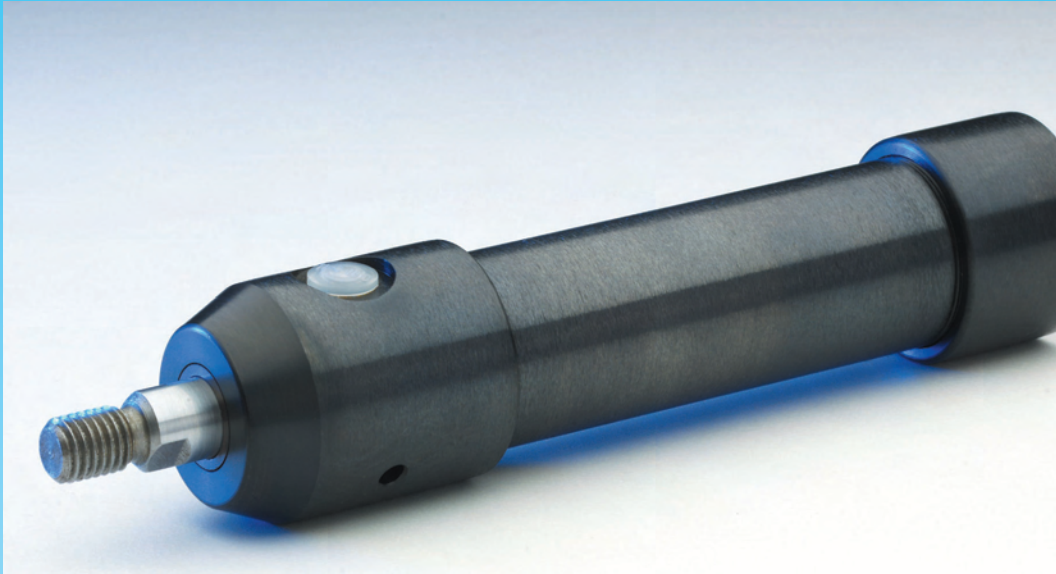
FBh Rear flange



Piston Ø	10	12	16	20	25
d1v	20	22	26	33	38
d1h	14	16	20	25	30
d2-f7	4	6	6	8	10
d2g	M4	M6	M6	M8	M10x1.25
d3	M12x1.25	M16x1.5	M16x1.5	M22x1.5	M22x1.5
d5	4.5	5.5	5.5	6.6	6.6
d8	9	9	9	16	16
d9	M5	M5	M5	G 1/8"	G 1/8"
a6	30	40	40	50	50
R2	5	6.5	6.5	8	8
R3	12.5	15	15	20	20
Function type	Measures of length L1				
D/E/Ez L1 = Stroke +	42	44	51	59	64

Piston Ø	10	12	16	20	25
s1	3	4	4	5	5
SW	19	24	24	32	32
m	6	8	8	11	11
L2	13	18	18	19	23
L3	16	22	22	26	30
L4	12	16	16	20	22
L5	4	6	6	6	8
L6	12	16	16	18	20
L8	16	22	22	24	28
L11	7	8	9	10	11
L12	26	29	31	36	38
Function type	Minimum measures of length L1				
L1 =	62	66	73	84	89

ZU series



100 bar universal cylinder

Piston Ø 10-100 mm

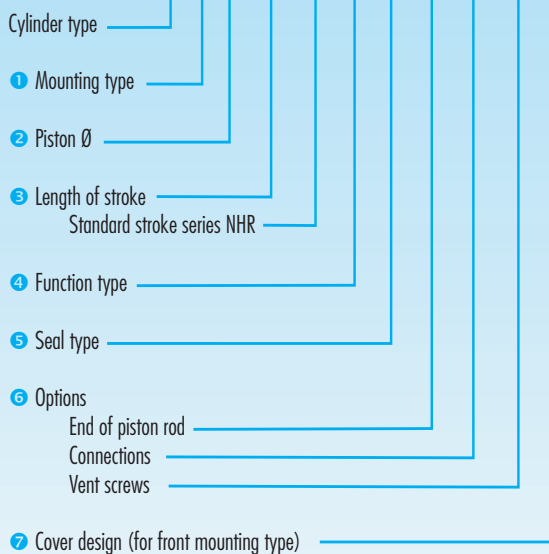
Lengths of stroke at your option (take account of the bend resistance, see page 35)

Standard lengths of stroke

- Round, compact design; black blued
- Piston rod hard chromium plated
- Particularly suited for installation into machines and appliances

Determine your 100 bar universal cylinder:

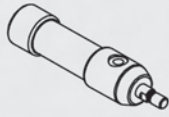
Ordering example: **ZU-Fv 32/140 NHR16 D-H03 E11g G1/4" ES As4**



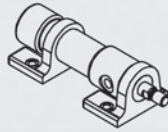
Special versions on request

1 Mounting types

A Basic design



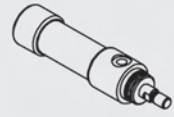
Hw Foot mounting (piston Ø 10-56 mm)



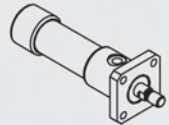
G Thread mounting



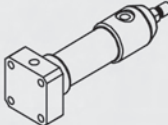
Gz Thread with centering



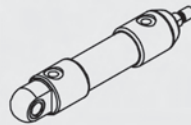
Fv Front flange



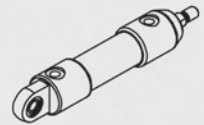
Fh Rear flange



Si Swivelling support

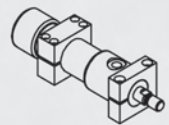


Sk Hinged support (piston Ø 20-100 mm)

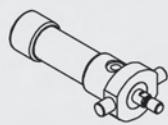


Special mounting types: (on request)

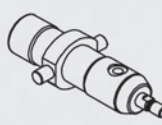
KH Clamping holder



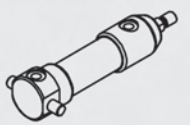
Sv Front support bolt



Sm Centered support bolt



S Rear support bolt



2 Piston Ø

Piston Ø (mm)	10	12.5	16	20	25	32	40	50	56	63	70	80	90	100
Piston surface pushing (cm ²)	0.78	1.23	2.00	3.14	4.90	8.05	12.5	19.6	23.7	31.1	38.5	50.2	63.6	78.5
Piston surface pulling (cm ²)	0.56	0.95	1.50	2.36	3.73	6.04	9.42	14.7	18.8	23.1	30.1	37.7	51.0	58.9

3 Length of stroke

Lengths of stroke at your option: We manufacture any length of stroke you desire.

Standard stroke versions NHR: With piston Ø 10-50 mm, a choice of 8 standard lengths of stroke for every piston Ø is available for short-time delivery.

● **Ordering example:** ZU-Fv 25/90 NHR15 D-H03 As1

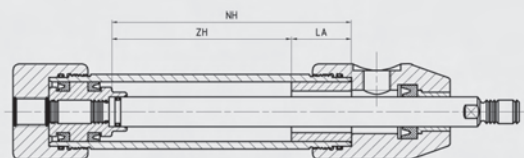
Piston Ø	10	12.5	16	20	25	32	40	50	
Function	NHR								
	Length of stroke								
D	11	10	11	12	14	16	18	20	22
	12	20	22	25	28	32	36	40	45
	13	28	32	36	40	45	50	56	63
	14	40	44	50	56	64	72	80	90
	15	56	63	70	80	90	100	110	125
	16	80	90	100	110	125	140	160	180
	17	110	125	140	160	180	200	220	250
	18	160	180	200	220	250	280	320	360

Intermediate strokes aNHR:

By inserting a stroke-limiting bushing (LA) any intermediate stroke (ZH) can be realized from a longer standard stroke (NH).

The measures of length L1v and L1h always correspond with the normal stroke.

● **Ordering example:** ZU-Fv 25/80 aNHR15 D-H03 As1



4 Function types

D Double effect



pushing and pulling

E Single-effect



pushing

Ez Single-effect



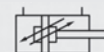
pulling

Dbb Double-effect



with end position damping on both sides (piston Ø 20-56 mm)

Dbb Double-effect



with end position damping on both sides (piston Ø 63-100 mm)

Special function types: (on request)

Dd Double effect



with through piston rod

Dbv Double-effect



with end position damping at the front

Dbh Double-effect



with end position damping at the back

F Single-effect



pushing with spring return mechanism

Fz Single-effect



pulling with spring return mechanism

5 Seal types

Standard version: H00 for hydraulic fluid (mineral oil). Seal types for other pressure media on request.

Seal types	H00	H01	H03	H04	H06	H07	H11	H12
Piston seal, PTFE gliding ring (piston Ø 10-16 mm)	●	●						
Piston seal, grooved ring (piston Ø 20-100 mm)								
Piston seal, PTFE gliding ring (min. piston Ø 20 mm with driving band)			●	●	●	●	●	●
Rod seal, grooved ring	●	●	●	●				
Rod seal, PTFE gliding ring					●	●	●	●
Dust seal		●		●		●		●
O-rings Nitril	●	●	●	●	●	●		
O-rings Viton							●	●
Piston speed								
max. 0.5 m/s	●	●	●	●				
max. 10 m/s					●	●	●	●
Temperature range								
-20/+100 °C	●	●	●	●	●	●		
-20/+200 °C							●	●

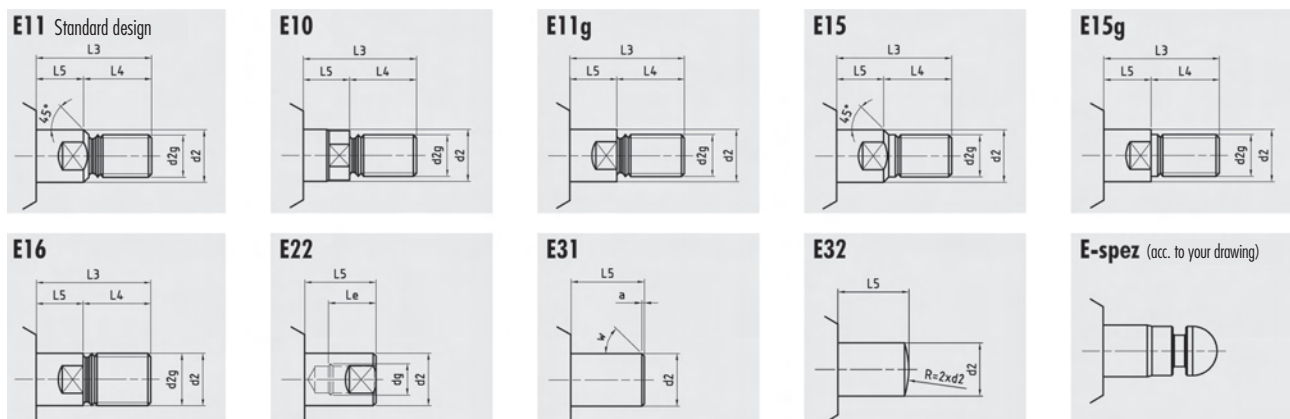
6 Options

End of piston rod:

Standard version: E11

Additional versions as shown in the illustrations are manufactured based on the catalog if not otherwise specified by the customer.

Tailor-made versions available on request.



Connections:

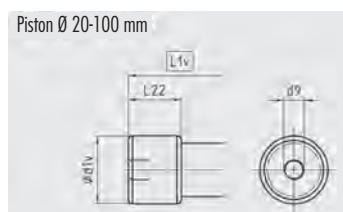
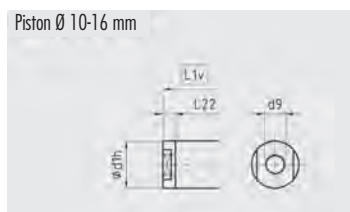
are manufactured based on the catalog if not otherwise specified by the customer. The position of the connections can be customized. Larger and other (metric) connections are available on request.

Vent screws (ES):

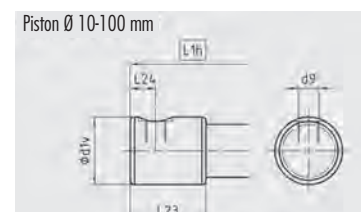
are attached to order and in accordance with the position specified by the customer.

7 Cover design (for mounting / fastening on the cylinder head)

As1 Cover with axial connection (standard version)



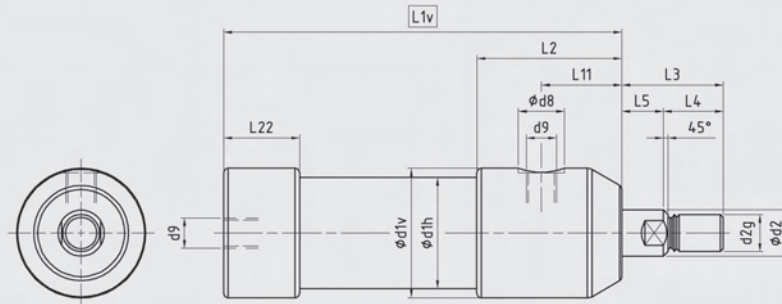
As4 Cover with lateral connection (to order)



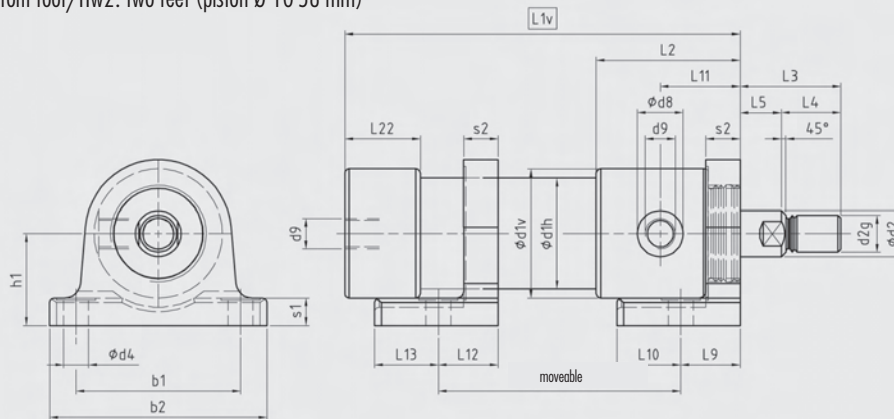
Piston Ø	10	12.5	16	20	25	32	40	50	56	63	70	80	90	100
L22	6	6	6	25	26	31	33	38	39	43	46	52	55	60
L23	16	16	16	36	37	40	48	51	52	54	57	67	70	71
L24	8	8	8	12	12	12	15	15	16	16	16	19	19	19

Dimension drawings/Dimensions

A Basic design



Hw/Hw2 Hw: front foot/Hw2: two feet (piston Ø 10-56 mm)

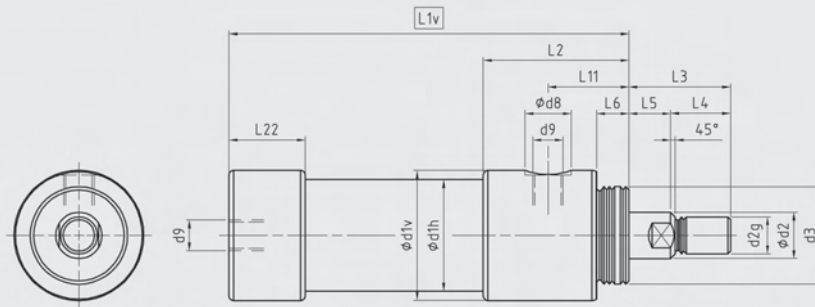


Piston Ø	10	12.5	16	20	25	32	40	50	56	63	70	80	90	100
d1v	24	24	28	32	36	45	56	68	78	85	90	105	116	130
d1h	16	18	22	25	30	38	48	60	68	75	80	90	105	115
d2-f7	6	6	8	10	12	16	20	25	25	32	32	40	40	50
d2g	M5	M5	M6	M8	M10	M14	M16	M20	M20	M24	M24	M33	M33	M42
d4	4.5	4.5	4.5	5.5	7	9	11	13	13	-	-	-	-	-
d8	15	15	15	16	16	16	20	20	20	20	20	26	26	26
d9	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"
b1	30	30	34	40	45	56	72	100	100	-	-	-	-	-
b2	42	42	46	50	60	72	95	125	125	-	-	-	-	-
h1±0.1	18	18	20	22	25	32	40	50	50	-	-	-	-	-
s1	6	6	6	8	8	10	12	15	15	-	-	-	-	-
s2	8	8	8	9	9	11	14	16	16	20	20	25	25	35
L2	35	35	40	46	48	52	63	70	75	82	91	96	114	125
L3	15	15	17	23	27	37	44	52	52	55	55	70	70	80
L4	10	10	12	14	16	22	26	32	32	35	35	45	45	55
L5	5	5	5	9	11	15	18	20	20	20	20	25	25	25
L9	16	16	16	18	20	22	26	30	30	-	-	-	-	-
L10	19	19	20	20	22	24	28	35	35	-	-	-	-	-
L11	18	18	22.5	24.5	25.5	28.5	35	40	44.5	48	55	55	69	78
L12	16	16	16	18	20	22	26	30	30	-	-	-	-	-
L13	19	19	20	20	22	24	28	35	35	-	-	-	-	-
L22	6	6	6	25	26	31	33	38	39	43	46	52	55	60

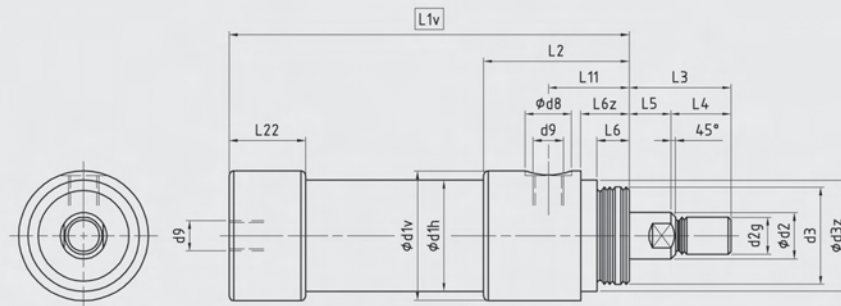
Function type	Measures of length L1v and measures of length L1h (with cover design As4)														
D	L1v = Stroke +	52.5	55.5	62	66	73	82	93	104	112	119	125	133	148	166
	L1h = Stroke +	62.5	65.5	72	77	84	91	108	117	125	130	136	148	163	177
E/Ez	L1v = Stroke +	52.5	55.5	54	58	63	70	80	90	97	104	110	118	133	154
	L1h = Stroke +	62.5	65.5	64	69	74	79	95	103	110	115	121	133	148	165
Dbb	L1v = Stroke +	-	-	-	100	113	130	147	165	169	-	-	-	-	-
	L1h = Stroke +	-	-	-	111	124	139	162	178	182	182	188	211	226	248
Minimum measures of length L1v and L1h															
L1v =	-	-	-	72	75	84	97	109	115	126	138	149	170	186	
L1h =	-	-	-	83	86	93	112	122	128	137	149	164	185	197	

Dimension drawings/Dimensions

G Thread fastening



Gz Thread fastening with centering

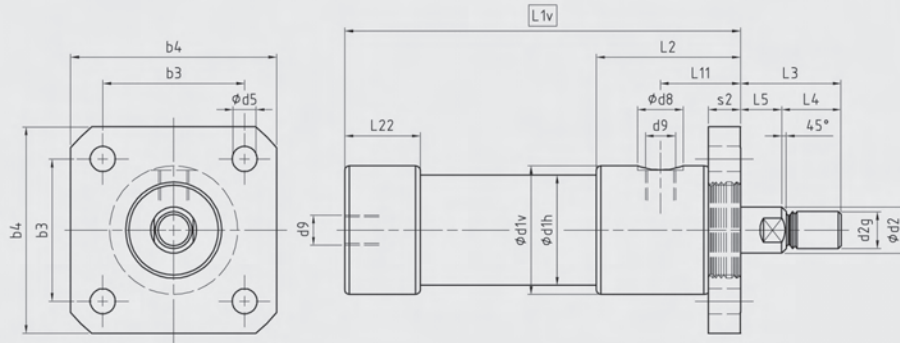


Piston Ø	10	12.5	16	20	25	32	40	50	56	63	70	80	90	100
d1v	24	24	28	32	36	45	56	68	78	85	90	105	116	130
d1h	16	18	22	25	30	38	48	60	68	75	80	90	105	115
d2-f7	6	6	8	10	12	16	20	25	25	32	32	40	40	50
d2g	M5	M5	M6	M8	M10	M14	M16	M20	M20	M24	M24	M33	M33	M42
d3	M16x1	M16x1	M20x1	G 1/2"	G 3/4"	G 1"	G 1 1/4"	G 1 1/2"	G 1 1/2"	G 2"	G 2"	G 2 1/2"	G 2 1/2"	G 3"
d3z-h7	20	20	24	25	28	40	48	60	60	75	75	90	90	115
d8	15	15	15	16	16	16	20	20	20	20	20	26	26	26
d9	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"
L2	35	35	40	46	48	52	63	70	75	82	91	96	114	125
L3	15	15	17	23	27	37	44	52	52	55	55	70	70	80
L4	10	10	12	14	16	22	26	32	32	35	35	45	45	55
L5	5	5	5	9	11	15	18	20	20	20	20	25	25	25
L6	8	8	8	9	9	11	14	16	16	20	20	25	25	35
L6z	11	11	12	13	13.5	16	21	23	23	30	30	35	35	49
L11	18	18	22.5	24.5	25.5	28.5	35	40	44.5	48	55	55	69	78
L22	6	6	6	25	26	31	33	38	39	43	46	52	55	60

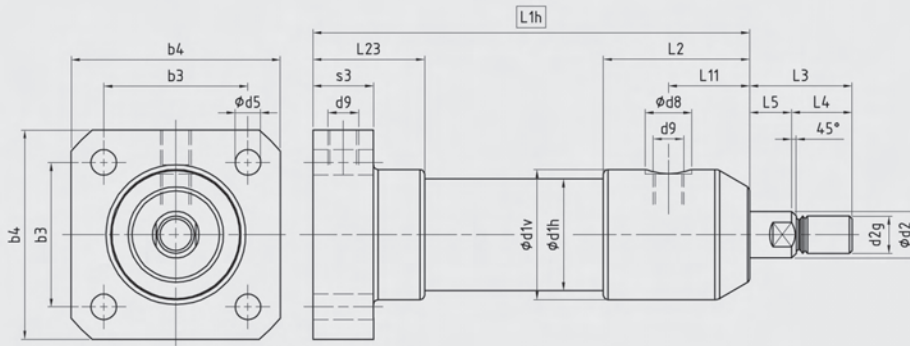
Function type		Measures of length L1v and measures of length L1h (with cover design As4)													
D	L1v = Stroke +	52.5	55.5	62	66	73	82	93	104	112	119	125	133	148	166
	L1h = Stroke +	62.5	65.5	72	77	84	91	108	117	125	130	136	148	163	177
E/Ez	L1v = Stroke +	52.5	55.5	54	58	63	70	80	90	97	104	110	118	133	154
	L1h = Stroke +	62.5	65.5	64	69	74	79	95	103	110	115	121	133	148	165
Dbb	L1v = Stroke +	-	-	-	100	113	130	147	165	169	182	188	211	226	248
	L1h = Stroke +	-	-	-	111	124	139	162	178	182	182	188	211	226	248
		Minimum measures of length L1v and L1h													
	L1v =	-	-	-	72	75	84	97	109	115	126	138	149	170	186
	L1h =	-	-	-	83	86	93	112	122	128	137	149	164	185	197

Dimension drawings/Dimensions

Fv Front flange



Fh Rear flange



Piston Ø	10	12.5	16	20	25	32	40	50	56	63	70	80	90	100
d1v	24	24	28	32	36	45	56	68	78	85	90	105	116	130
d1h	16	18	22	25	30	38	48	60	68	75	80	90	105	115
d2-f7	6	6	8	10	12	16	20	25	25	32	32	40	40	50
d2g	M5	M5	M6	M8	M10	M14	M16	M20	M20	M24	M24	M33	M33	M42
d5	5.5	5.5	6	7	7	9	11	13	13	13	13	17	17	17
d8	15	15	15	16	16	16	20	20	20	20	20	26	26	26
d9	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"
b3	25	25	28	36	36	48	62	70	70	80	80	100	100	115
b4	35	35	40	50	50	65	90	100	100	110	110	130	130	150
s2	8	8	8	9	9	11	14	16	16	20	20	25	25	35
s3	16	16	16	20	20	20	26	26	26	26	26	32	32	32
L2	35	35	40	46	48	52	63	70	75	82	91	96	114	125
L3	15	15	17	23	27	37	44	52	52	55	55	70	70	80
L4	10	10	12	14	16	22	26	32	32	35	35	45	45	55
L5	5	5	5	9	11	15	18	20	20	20	20	25	25	25
L11	18	18	22.5	24.5	25.5	28.5	35	40	44.5	48	55	55	69	78
L22	6	6	6	25	26	31	33	38	39	43	46	52	55	60
L23	16	16	16	36	37	40	48	51	52	54	57	67	70	71

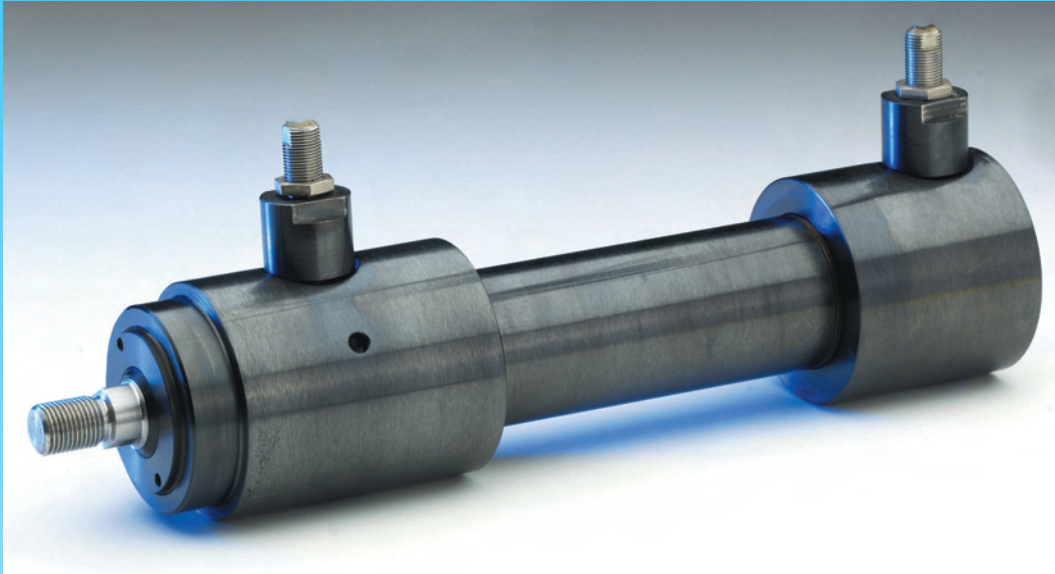
Function type

Measures of length L1v and measures of length L1h (with cover design As4)

D	L1v = Stroke +	52.5	55.5	62	66	73	82	93	104	112	119	125	133	148	166
	L1h = Stroke +	62.5	65.5	72	77	84	91	108	117	125	130	136	148	163	177
E/Ez	L1v = Stroke +	52.5	55.5	54	58	63	70	80	90	97	104	110	118	133	154
	L1h = Stroke +	62.5	65.5	64	69	74	79	95	103	110	115	121	133	148	165
Dbb	L1v = Stroke +	-	-	-	100	113	130	147	165	169	182	188	211	226	248
	L1h = Stroke +	-	-	-	111	124	139	162	178	182	182	188	211	226	248

Minimum measures of length L1v and L1h

L1v =	-	-	-	72	75	84	97	109	115	126	138	149	170	186
L1h =	-	-	-	83	86	93	112	122	128	137	149	164	185	197



160 bar standard cylinder

Dimensions acc. to ISO 6020-1

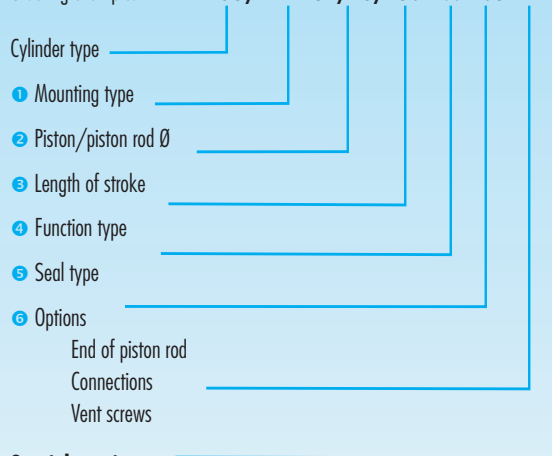
Piston Ø 25-100 mm

Lengths of stroke at your option (take account of the bend resistance, see page 35)

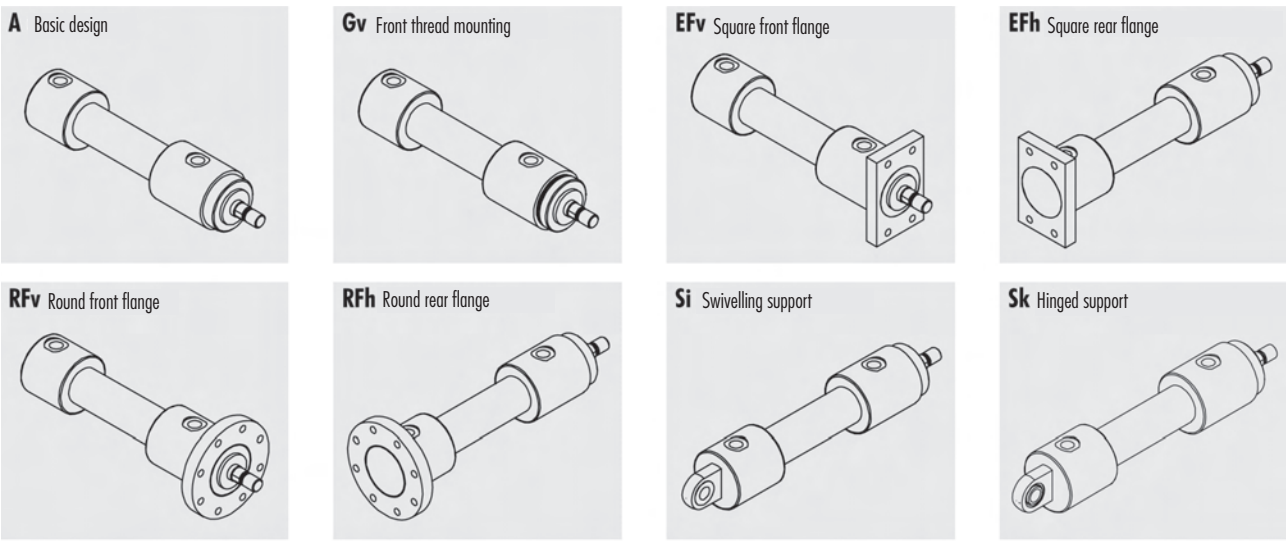
- Round design; black blued
- Piston rod hard chromium plated; with dust seal
- Particularly suited for installation into machines and appliances

Determine your 160 bar standard cylinder:

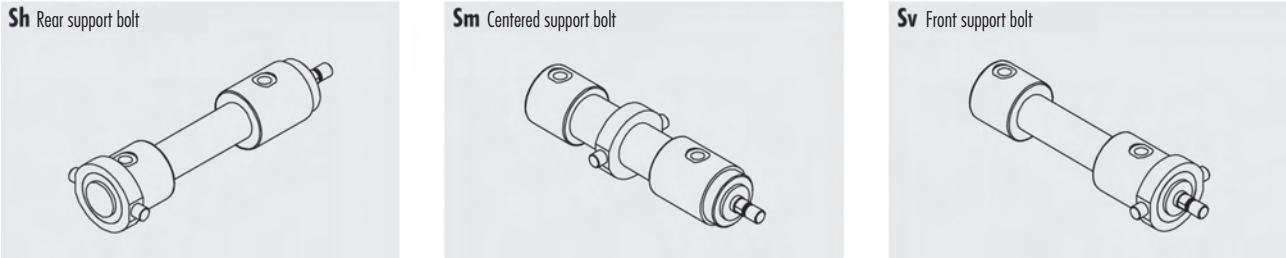
Ordering example: **ZISO/T-RFv 32/18/250 Dbb-H03 E22 ES**



1 Mounting types



Special mounting types: (on request)



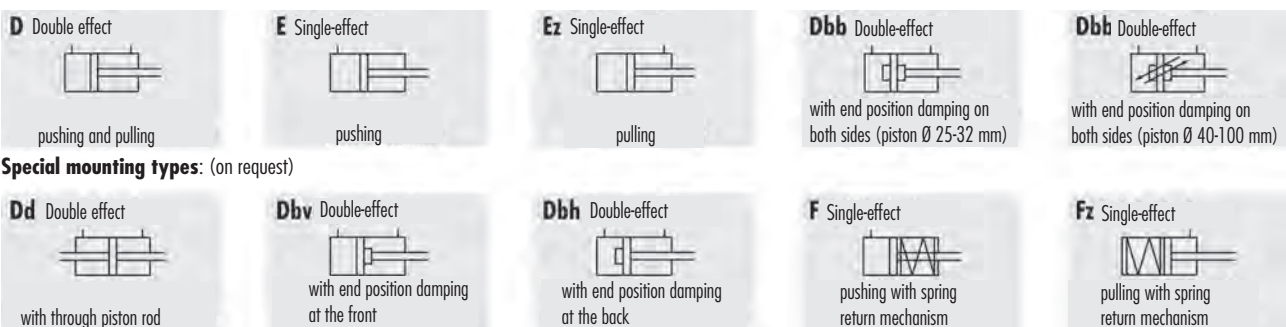
2 Piston Ø

Piston Ø (mm)	25		32		40		50		63		80		100	
Piston rod Ø	14	18	18	22	22	28	28	36	36	45	45	56	56	70
Piston surface pushing (cm ²)	4.9		8.0		12.6		19.6		31.2		50.3		78.5	
Piston surface pulling (cm ²)	3.4	2.4	5.5	4.2	8.8	6.4	13.5	9.5	21.8	15.3	34.4	25.8	53.9	40.1

3 Length of stroke

Lengths of stroke at your option: we manufacture any length of stroke you desire.

4 Function types



Special mounting types: (on request)

5 Seal types

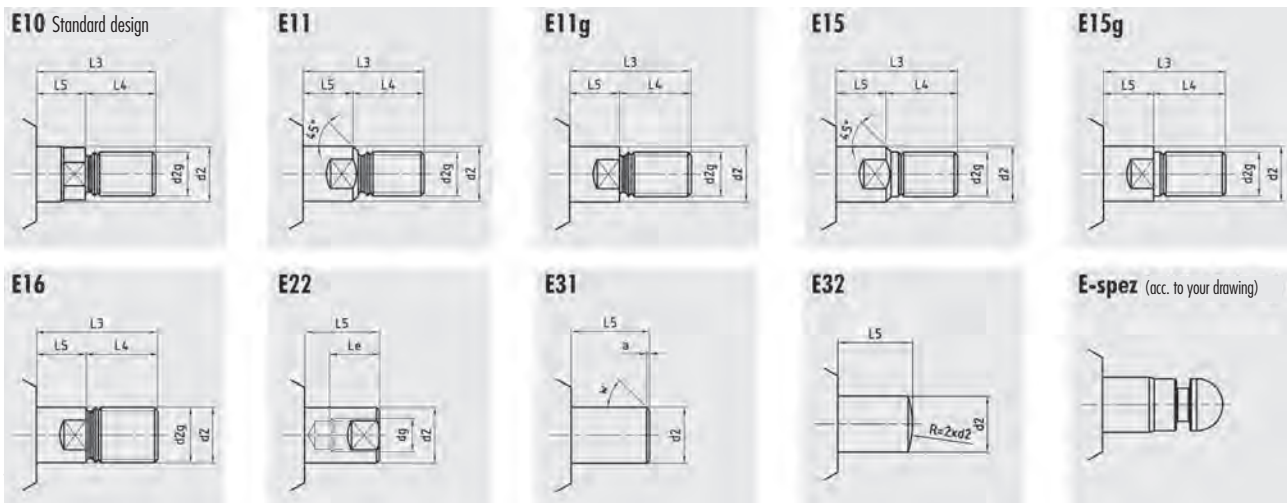
Seal types	H00	H03	H06	H11
Piston seal, grooved ring	●			
Piston seal, PTFE gliding ring		●	●	●
Rod seal, grooved ring	●	●		
Rod seal, PTFE gliding ring			●	●
Dust seal	●	●	●	●
O-rings Nitril	●	●	●	
O-rings Viton				●
Piston speed				
max. 0.5 m/s	●	●		
max. 10 m/s			●	●
Temperature range				
-20/+100 °C	●	●	●	
-20/+200 °C				●

6 Options

Standard version: E10

Additional versions as shown in the illustrations are manufactured based on the catalog if not otherwise specified by the customer.

Tailor-made versions available on request.



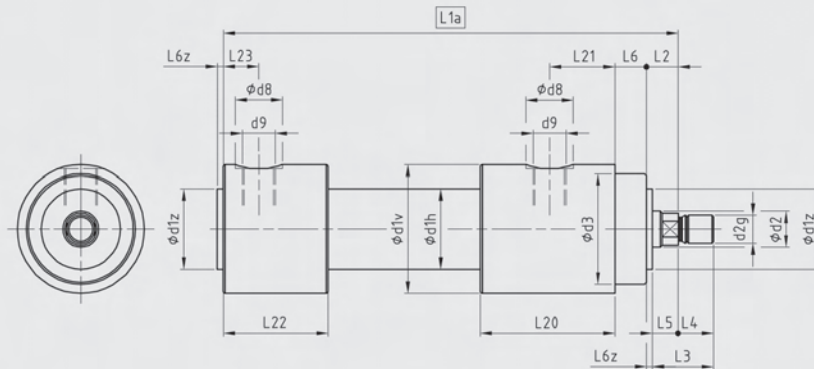
Larger and other (metric) connections are available on request.

Vent screws (ES):

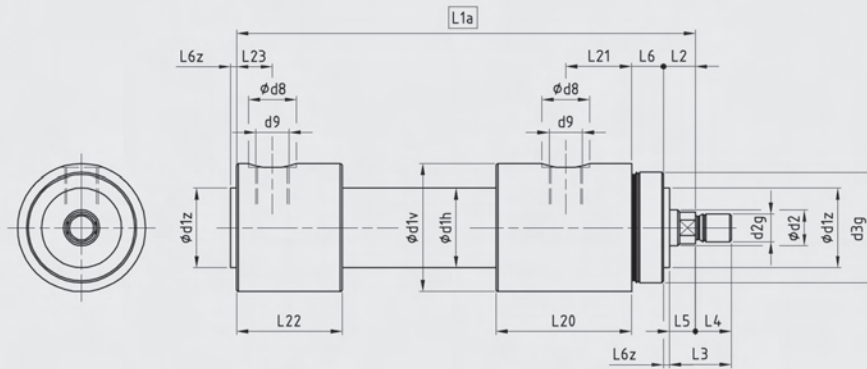
are attached to order and in accordance with the position specified by the customer.

Dimension drawings/Dimensions

A Basic design



Gv Front thread fastening

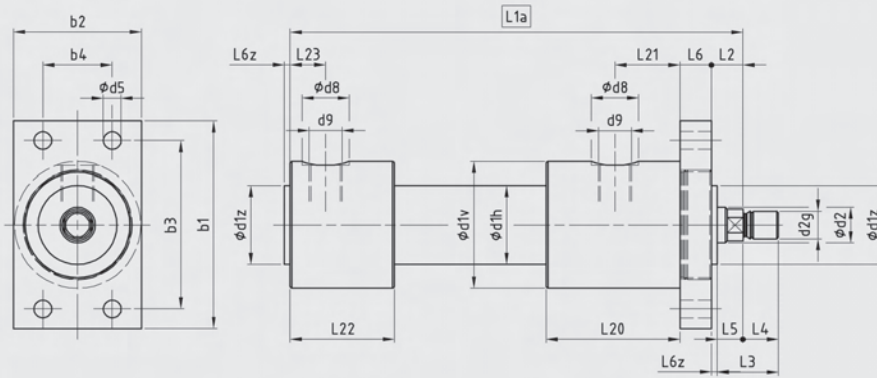


Piston Ø	25		32		40		50		63		80		100	
Piston rod Ø d2-f7	14	18	18	22	22	28	28	36	36	45	45	56	56	70
d2g	M12x1.25	M14x1.5	M14x1.5	M16x1.5	M16x1.5	M20x1.5	M20x1.5	M27x2	M27x2	M33x2	M33x2	M42x2	M42x2	M48x2
L3	29	31	31	35	35	41	42	50	52	61	63	74	76	83
L4	16	18	18	22	22	28	28	36	36	45	45	56	56	63
L5		13		13		13		14		16		18		20
d1v		54		64		74		93		103		128		148
d1h		33		40		50		65		80		100		124
d1z-f8		32		40		50		60		70		85		106
d3		48		55		65		80		90		110		125
d3g		M48x1.5		M55x1.5		M65x1.5		M80x1.5		M90x2		M110x2		M125x2
d8		20		24		28		28		34		34		42
d9		G 1/4"		G 3/8"		G 1/2"		G 1/2"		G 3/4"		G 3/4"		G 1"
L2		16		16		16		18		20		22		25
L6		12		16		16		20		25		32		32
L6z		3		3		3		4		4		4		5
L20		61		68		88		95		102		112		145
L21		30		33		41		45		50		55		76
L22		46		53		69		72		77		82		98
L23		15		18		22		22		25		25		29

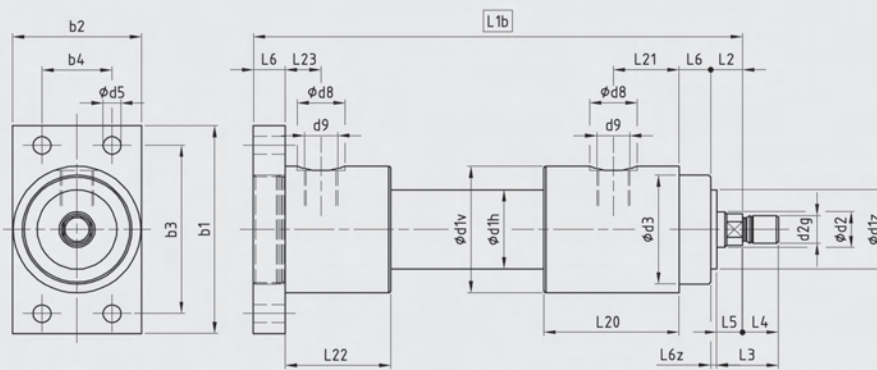
Function type	Measures of length L1a							
D/E/Ez/Dbb	L1a=Stroke+	150	170	190	205	224	250	300

Dimension drawings/Dimensions

EFv Square front flange



EFh Square rear flange

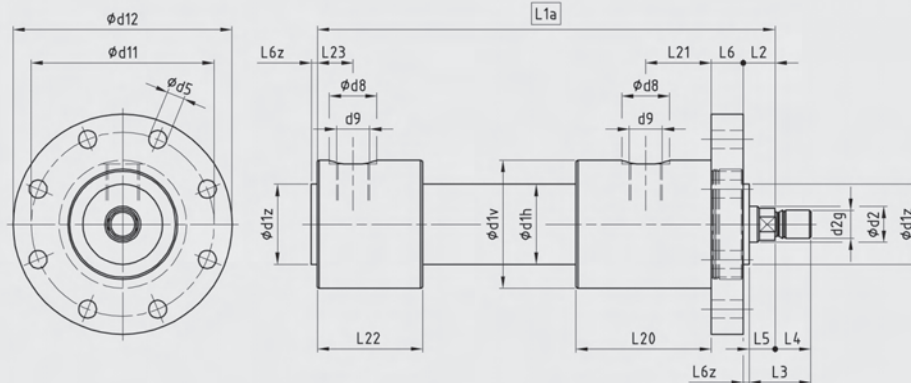


Piston Ø	25		32		40		50		63		80		100	
Piston rod Ø d2-f7	14	18	18	22	22	28	28	36	36	45	45	56	56	70
d2g	M12x1.25	M14x1.5	M14x1.5	M16x1.5	M16x1.5	M20x1.5	M20x1.5	M27x2	M27x2	M33x2	M33x2	M42x2	M42x2	M48x2
L3	29	31	31	35	35	41	42	50	52	61	63	74	76	83
L4	16	18	18	22	22	28	28	36	36	45	45	56	56	63
L5		13		13		13		14		16		18		20
d1v		54		64		74		93		103		128		148
d1h		33		40		50		65		80		100		124
d1z-f8		32		40		50		60		70		85		106
d3		48		55		65		80		90		110		125
d5		6.6		9		9		11		13.5		17.5		22
d8		20		24		28		28		34		34		42
d9		G 1/4"		G 3/8"		G 1/2"		G 1/2"		G 3/4"		G 3/4"		G 1"
b1		85		105		120		140		160		185		225
b2		55		65		80		100		110		130		150
b3		69.2		85		98		116.4		134		152.5		184.8
b4		28.7		35.2		40.6		48.2		55.5		63.1		76.5
L2		16		16		16		18		20		22		25
L6		12		16		16		20		25		32		32
L6z		3		3		3		4		4		4		5
L20		61		68		88		95		102		112		145
L21		30		33		41		45		50		55		76
L22		46		53		69		72		77		82		98
L23		15		18		22		22		25		25		29

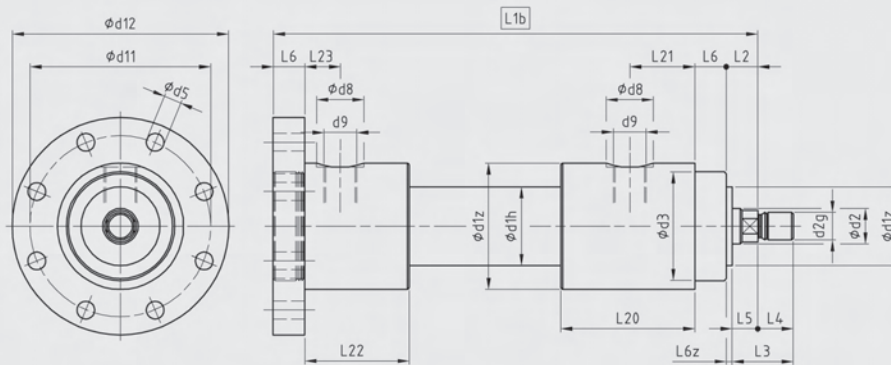
Function type	Measures of length L1a and measures of length L1b						
D/E/Ez/Dbb	L1a = Stroke + L1b = Stroke +	150	170	190	205	224	300
		162	186	206	225	249	332

Dimension drawings/Dimensions

RFv Round front flange



RFh Round rear flange

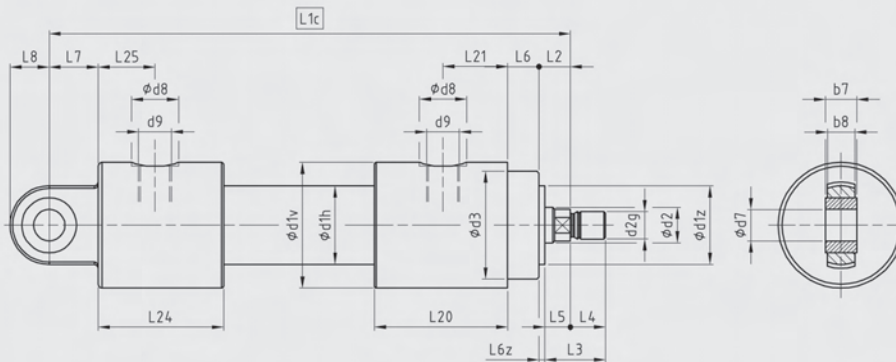


Piston Ø	25		32		40		50		63		80		100	
Piston rod Ø d2-f7	14	18	18	22	22	28	28	36	36	45	45	56	56	70
d2g	M12x1.25	M14x1.5	M14x1.5	M16x1.5	M16x1.5	M20x1.5	M20x1.5	M27x2	M27x2	M33x2	M33x2	M42x2	M42x2	M48x2
L3	29	31	31	35	35	41	42	50	52	61	63	74	76	83
L4	16	18	18	22	22	28	28	36	36	45	45	56	56	63
L5		13		13		13		14		16		18		20
d1v		54		64		74		93		103		128		148
d1h		33		40		50		65		80		100		124
d1z-f8		32		40		50		60		70		85		106
d3		48		55		65		80		90		110		125
d5		6.6		9		9		11		13.5		17.5		22
d8		20		24		28		28		34		34		42
d9		G 1/4"		G 3/8"		G 1/2"		G 1/2"		G 3/4"		G 3/4"		G 1"
d11		75		92		106		126		145		165		200
d12		90		110		130		150		170		200		240
L2		16		16		16		18		20		22		25
L6		12		16		16		20		25		32		32
L6z		3		3		3		4		4		4		5
L20		61		68		88		95		102		112		145
L21		30		33		41		45		50		55		76
L22		46		53		69		72		77		82		98
L23		15		18		22		22		25		25		29

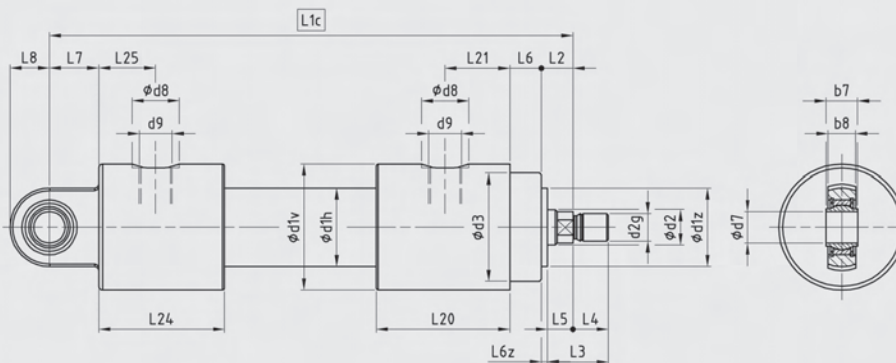
Function type	Measures of length L1a and measures of length L1b							
D/E/Ez/Dbb	L1a = Stroke +	150	170	190	205	224	250	300
	L1b = Stroke +	162	186	206	225	249	282	332

Dimension drawings/Dimensions

Si Swivelling support with gunmetal bush

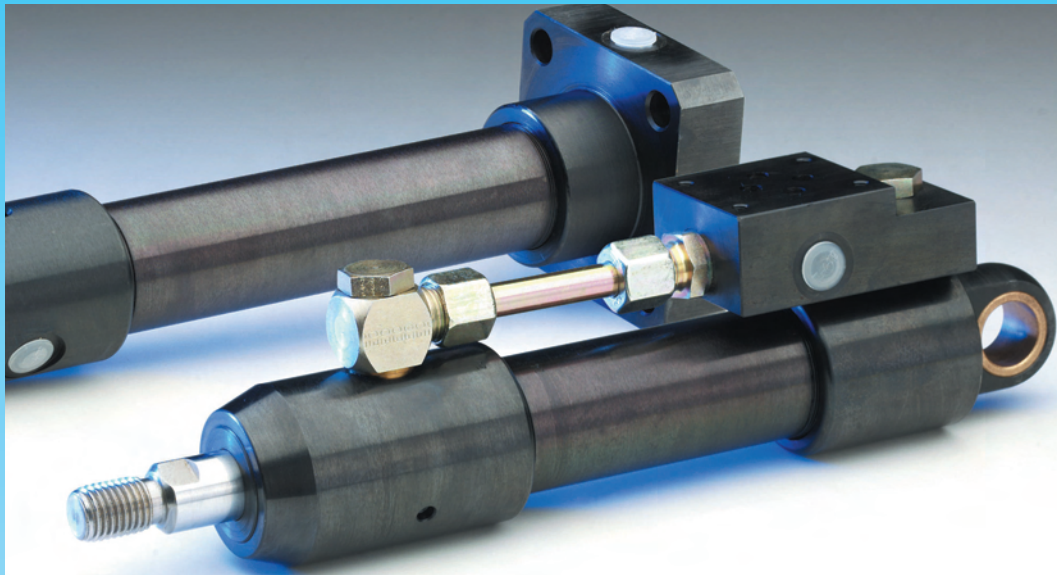


Sk Hinged support with steel/steel swing support



Piston Ø	25		32		40		50		63		80		100	
Piston rod Ø d2-f7	14	18	18	22	22	28	28	36	36	45	45	56	56	70
d2g	M12x1.25	M14x1.5	M14x1.5	M16x1.5	M16x1.5	M20x1.5	M20x1.5	M27x2	M27x2	M33x2	M33x2	M42x2	M42x2	M48x2
L3	29	31	31	35	35	41	42	50	52	61	63	74	76	83
L4	16	18	18	22	22	28	28	36	36	45	45	56	56	63
L5		13		13		13		14		16		18		20
d1v		54		64		74		93		103		128		148
d1h		33		40		50		65		80		100		124
d1z-f8		32		40		50		60		70		85		106
d3		48		55		65		80		90		110		125
d7-H7		12		16		20		25		32		40		50
d8		20		24		28		28		34		34		42
d9		6 1/4"		6 3/8"		6 1/2"		6 1/2"		6 3/4"		6 3/4"		6 1"
b7		12		16		20		25		32		40		50
b8		11		14		18		22		28		32		40
L2		16		16		16		18		20		22		25
L6		12		16		16		20		25		32		32
L6z		3		3		3		4		4		4		5
L7		20		25		30		40		50		60		75
L8		16		20		25		32		40		50		63
L20		61		68		88		95		102		112		145
L21		30		33		41		45		50		55		76
L24		54		64		80		84		92		104		118
L25		23		29		33		34		40		47		49
Function type	Measures of length L1c													
D/E/Ez/Dbb	L1c = Stroke +	178		206		231		257		289		332		395

ZU 250 series



250 bar hydraulic cylinder

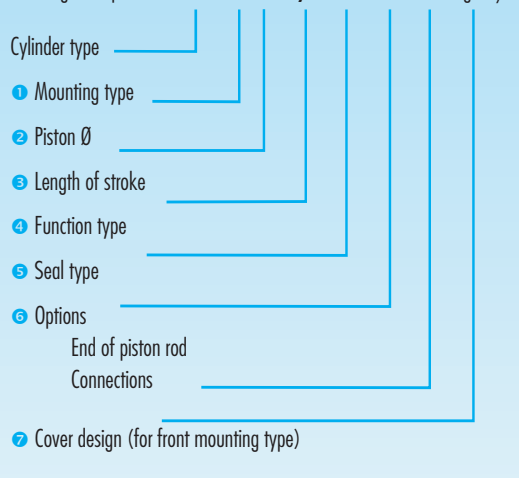
Piston Ø 20-100 mm

Lengths of stroke at your option (take account of the bend resistance, see page 35)

- Round, compact design; black blued
- Piston rod hard chromium plated; with dust seal
- Particularly suited for installation into machines and appliances

Determine your 250 bar hydraulic cylinder:

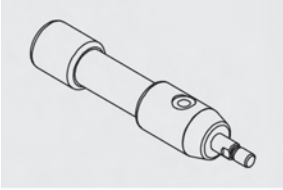
Ordering example: **ZU250-G 25/140 Dbb-H03 E11g G1/4" As4**



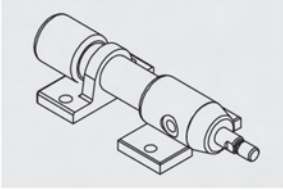
Special versions on request

1 Mounting types

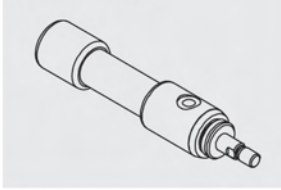
A Basic design



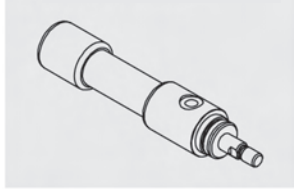
H Foot mounting



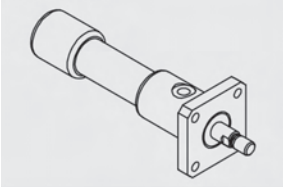
G Fixation filetage



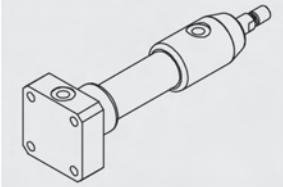
Gz Thread mounting



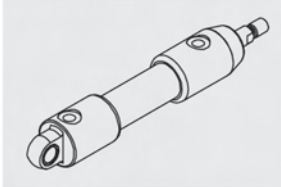
Fv Front flange



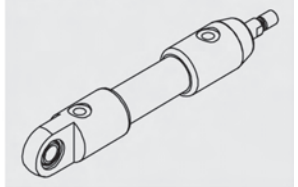
Fh Rear flange



Si Swivelling support

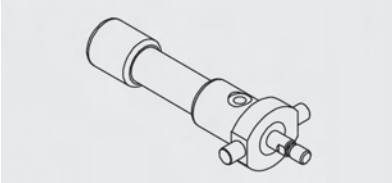


Sk Hinged support

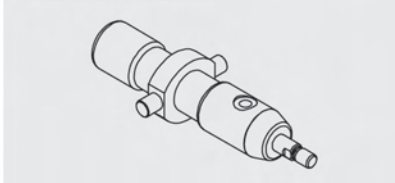


Special mounting types: (on request)

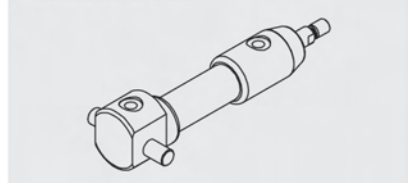
Sv Front support bolt



Sm Centered support bolt



S Rear support bolt



2 Piston Ø

Piston Ø (mm)	20	25	32	40	50	55	63	70	80	90	100
Piston surface pushing (cm ²)	3.14	4.90	8.05	12.5	19.6	23.7	31.1	38.5	50.2	63.6	78.5
Piston surface pulling (cm ²)	2.0	2.9	4.9	7.6	11.6	15.6	18.6	25.9	30.6	44.0	50.2

3 Length of stroke

Lengths of stroke at your option: We manufacture any length of stroke you desire.

4 Function types

D Double effect



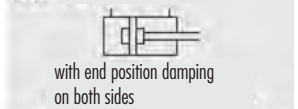
E Single effect



Ez Single effect

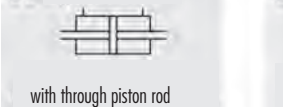


Dbb Double effect



Special mounting types: (on request)

Dd Double effect



Dbv Double effect



Dbh Double effect



F Single effect



Fz Single effect



5 Seal types

Standard version: H00 for hydraulic fluid (mineral oil). Seal types for other pressure media on request.

Seal types	H00	H03	H06	H11
Piston seal, grooved ring	●			
Piston seal, PTFE gliding ring		●	●	●
Rod seal, grooved ring	●	●		
Rod seal, PTFE gliding ring			●	●
Dust seal	●	●	●	●
O-rings Nitril	●	●	●	
O-rings Viton				●
Piston speed				
max. 0.5 m/s	●	●		
max. 10 m/s			●	●
Temperature range				
-20/+100 °C	●	●	●	
-20/+200 °C				●

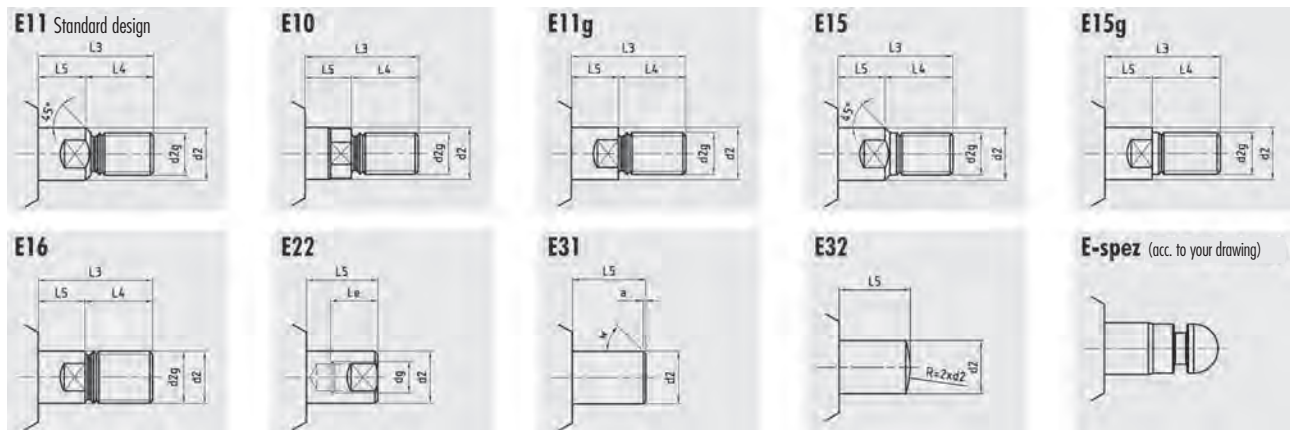
6 Options

End of piston rod:

Standard version: E11

Additional versions as shown in the illustrations are manufactured based on the catalog if not otherwise specified by the customer.

Tailor-made versions available on request.



Connections:

are manufactured based on the catalog if not otherwise specified by the customer.

The position of the connections can be customized.

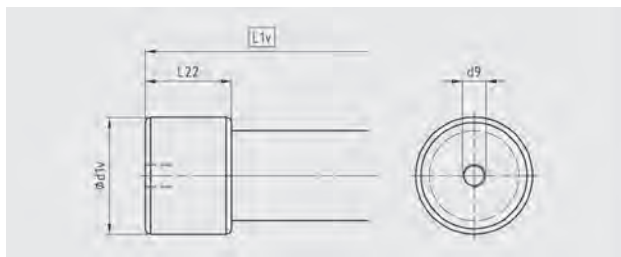
Larger and other (metric) connections are available on request.

Vent screws (ES):

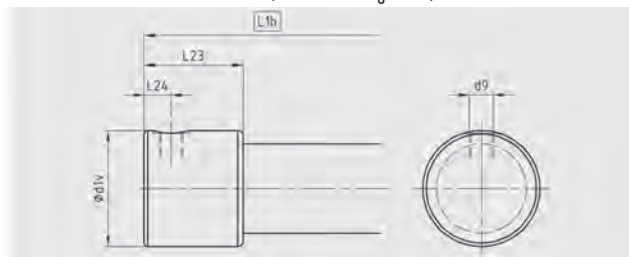
are attached to order and in accordance with the position specified by the customer.

7 Cover design (for mounting / fastening on the cylinder head)

As1 Cover with axial connection (measure of length L1v) standard version



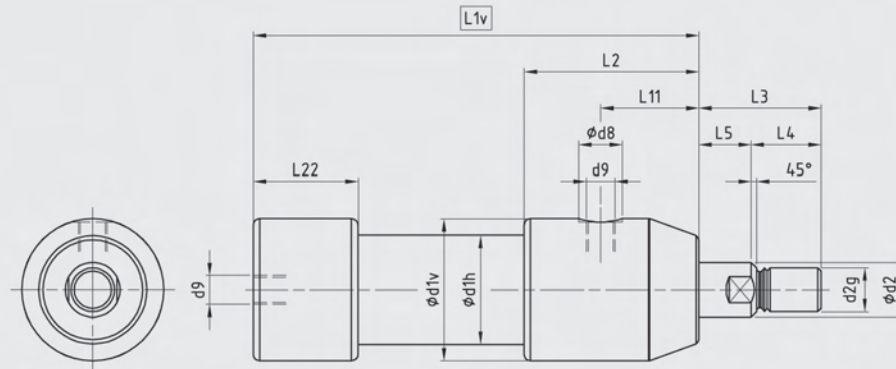
As4 Cover with lateral connection (measure of length L1h)



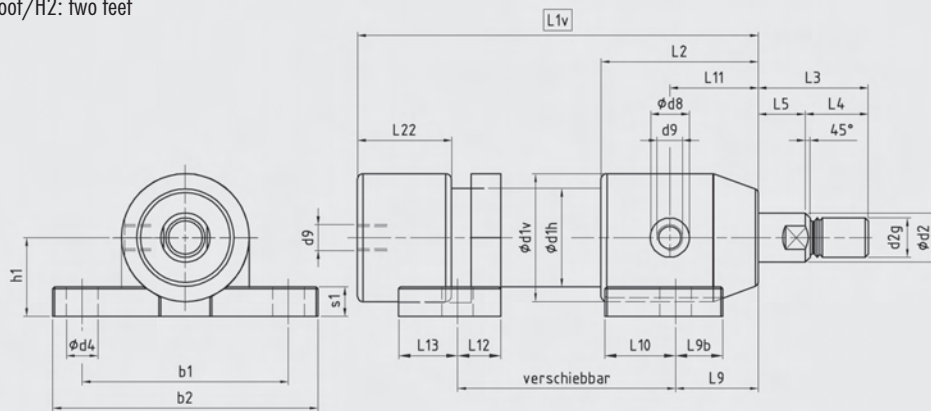
Piston Ø	20	25	32	40	50	55	63	70	80	90	100
L22	39	41	44	48	56	57	59	61	64	62	78
L23	45	45	53	55	67	67	68	68	72	70	82
L24	12	12	15	15	19	19	19	19	20	20	22

Dimension drawings/Dimensions

A Basic design



H/H2 H: Front foot/H2: two feet



Piston Ø	20	25	32	40	50	55	63	70	80	90	100
d1v	35	42	52	65	80	90	100	110	125	135	150
d1h	26	33	40	50	65	70	80	90	100	112	124
d2-f7	12	16	20	25	32	32	40	40	50	50	60
d2g	M10	M12	M16	M20	M24	M24	M33	M33	M42	M42	M48
d4	9	11	13	16	17	17	22	22	26	26	29
d8	16	16	20	20	26	26	26	26	33	33	33
d9	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 1/2"
b1	60	70	85	105	130	140	155	170	190	210	230
b2	76	90	110	135	162	176	195	210	240	260	280
h1±0.1	22	25	32	40	50	56	63	70	80	90	100
s1	8.5	10	14	15	17	18	20	22	23	24	26
L2	61	61	72	80	95	100	107	115	125	132	145
L3	32	40	47	56	63	63	77	77	91	91	100
L4	16	22	26	32	35	35	45	45	55	55	60
L5	16	18	21	24	28	28	32	32	36	36	40
L9	36	33	39	42	50	54	59	63	69	72	80
L9b	17	20	20	24	25	28	30	32	34	37	40
L10	23	26	30	36	40	42	44	48	51	55	60
L11	31	31	39	45	53	58	65	72	79	85	90
L12	15	18	20	22	26	28	30	32	34	37	40
L13	20	24	27	30	35	38	40	43	45	50	54
L22	39	41	44	48	56	57	59	61	64	62	78
L23	45	45	53	55	67	67	68	68	72	70	82
L24	12	12	15	15	19	19	19	19	20	20	22

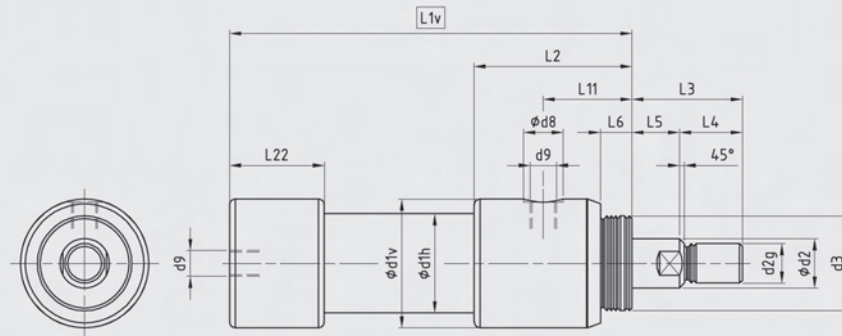
Function type

Measures of length L1v (with standard cover design As1) and measures of length L1h (with cover design As4)

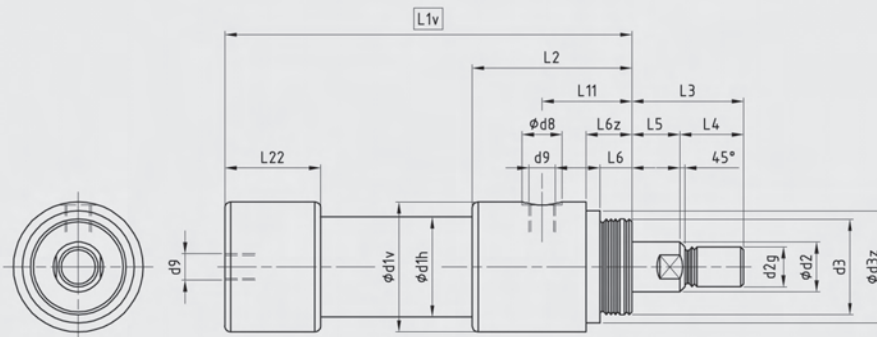
D/E/Ez	L1v = Stroke +	91	96	112	124	141	150	161	174	185	197	209
	L1h = Stroke +	97	100	121	131	152	160	170	181	193	205	213
Dbb	L1v = Stroke +	103	110	128	142	161	170	183	196	209	221	237
	L1h = Stroke +	109	114	137	149	172	180	192	203	217	229	241
Minimum measures of length L1v und L1h												
	L1v =	101	103	117	129	152	158	167	177	190	195	224
	L1h =	107	107	126	136	163	168	176	184	198	203	228

Dimension drawings/Dimensions

G Thread fastening



Gz Thread fastening with centering

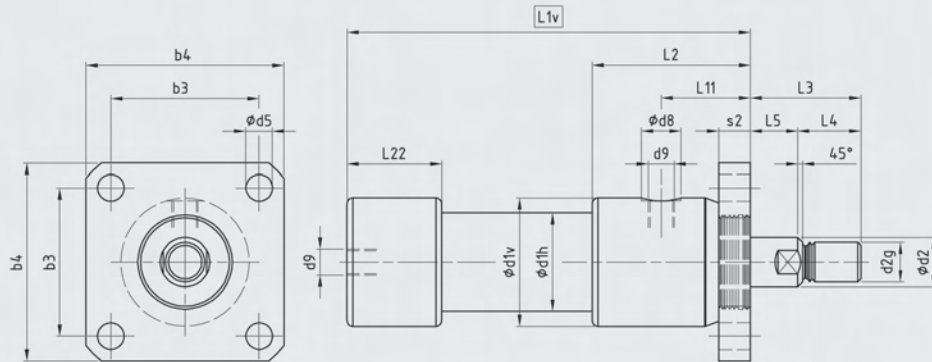


Piston Ø	20	25	32	40	50	55	63	70	80	90	100
d1v	35	42	52	65	80	90	100	110	125	135	150
d1h	26	33	40	50	65	70	80	90	100	112	124
d2-f7	12	16	20	25	32	32	40	40	50	50	60
d2g	M10	M12	M16	M20	M24	M24	M33	M33	M42	M42	M48
d3	G 3/4"	G 1"	G 1 1/4"	G 1 1/2"	G 2"	G 2"	G 2 1/2"	G 2 1/2"	G 3"	G 3"	G 4"
d3z-h7	28	38	46	56	70	75	90	90	110	110	125
d8	16	16	20	20	26	26	26	26	33	33	33
d9	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 1/2"
L2	61	61	72	80	95	100	107	115	125	132	145
L3	32	40	47	56	63	63	77	77	91	91	100
L4	16	22	26	32	35	35	45	45	55	55	60
L5	16	18	21	24	28	28	32	32	36	36	40
L6	9	11	14	16	20	20	25	25	35	35	40
L6z	13.5	16	21	23	30	30	35	35	49	49	54
L11	31	31	39	45	53	58	65	72	79	85	90
L22	39	41	44	48	56	57	59	61	64	62	78
L23	45	45	53	55	67	67	68	68	72	70	82
L24	12	12	15	15	19	19	19	19	20	20	22

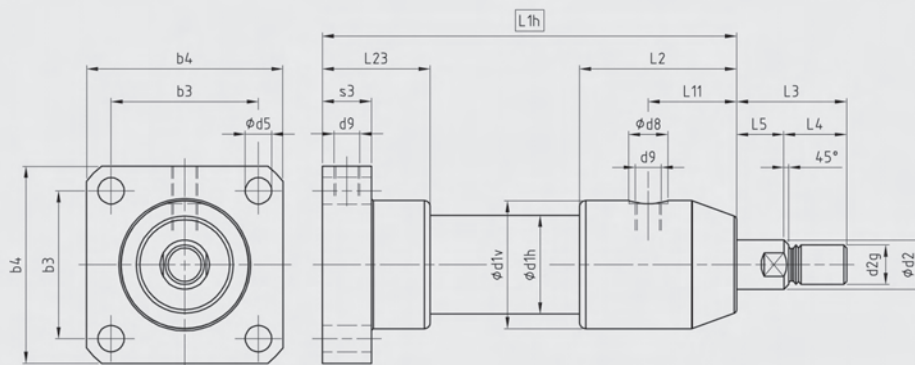
Function type	Measures of length L1v (with standard cover design As1) and measures of length L1h (with cover design As4)											
D/E/Ez	L1v = Stroke +	91	96	112	124	141	150	161	174	185	197	209
	L1h = Stroke +	97	100	121	131	152	160	170	181	193	205	213
Dbb	L1v = Stroke +	103	110	128	142	161	170	183	196	209	221	237
	L1h = Stroke +	109	114	137	149	172	180	192	203	217	229	241
Minimum measures of length L1v und L1h												
L1v =	101	103	117	129	152	158	167	177	190	195	224	
L1h =	107	107	126	136	163	168	176	184	198	203	228	

Dimension drawings/Dimensions

Fv Front flange



Fh Rear flange

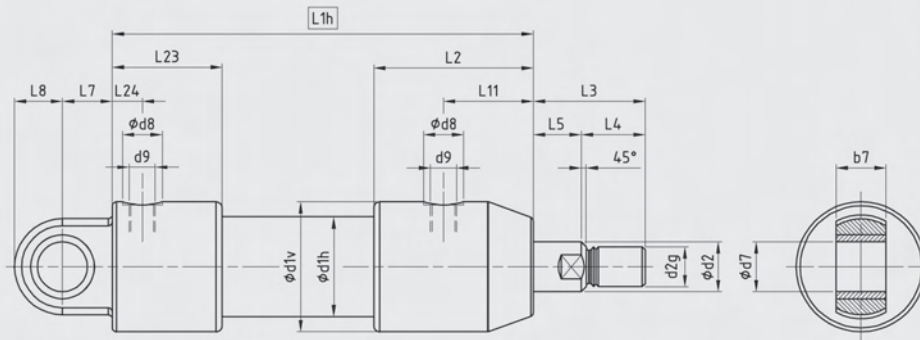


Piston Ø	20	25	32	40	50	55	63	70	80	90	100
d1v	35	42	52	65	80	90	100	110	125	135	150
d1h	26	33	40	50	65	70	80	90	100	112	124
d2-f7	12	16	20	25	32	32	40	40	50	50	60
d2g	M10	M12	M16	M20	M24	M24	M33	M33	M42	M42	M48
d5	7	9	11	13.5	13.5	13.5	17.5	17.5	17.5	17.5	20
d8	16	16	20	20	26	26	26	26	33	33	33
d9	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 1/2"
b3	40	48	62	75	85	95	105	110	125	130	150
b4	55	70	85	100	115	125	140	145	160	165	190
s2	9	11	14	16	20	20	25	25	35	35	40
s3	20	20	25	25	30	30	30	30	30	30	30
L2	61	61	72	80	95	100	107	115	125	132	145
L3	32	40	47	56	63	63	77	77	91	91	100
L4	16	22	26	32	35	35	45	45	55	55	60
L5	16	18	21	24	28	28	32	32	36	36	40
L11	31	31	39	45	53	58	65	72	79	85	90
L22	39	41	44	48	56	57	59	61	64	62	78
L23	45	45	53	55	67	67	68	68	72	70	82
L24	12	12	15	15	19	19	19	19	20	20	22

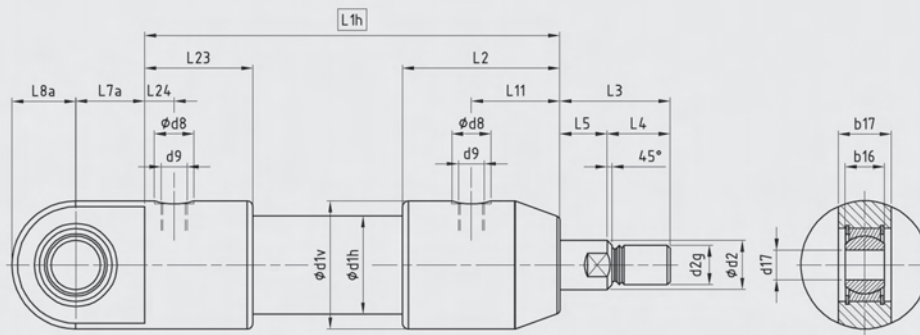
Function type	Measures of length L1v and measures of length L1h (with cover design As4)											
D/E/Ez	L1v = Stroke +	91	96	112	124	141	150	161	174	185	197	209
	L1h = Stroke +	97	100	121	131	152	160	170	181	193	205	213
Dbb	L1v = Stroke +	103	110	128	142	161	170	183	196	209	221	237
	L1h = Stroke +	109	114	137	149	172	180	192	203	217	229	241
Minimum measures of length L1v und L1h												
L1v =	101	103	117	129	152	158	167	177	190	195	224	
L1h =	107	107	126	136	163	168	176	184	198	203	228	

Dimension drawings/Dimensions

Si Swivelling support with gunmetal bush



Sk Hinged support with steel/steel swing support



Piston Ø	20	25	32	40	50	55	63	70	80	90	100	
d1v	35	42	52	65	80	90	100	110	125	135	150	
d1h	26	33	40	50	65	70	80	90	100	112	124	
d2-f7	12	16	20	25	32	32	40	40	50	50	60	
d2g	M10	M12	M16	M20	M24	M24	M33	M33	M42	M42	M48	
d7-H7	12	16	20	25	32	32	40	40	50	50	60	
d8	16	16	20	20	26	26	26	26	33	33	33	
d9	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 1/2"	
d17-H7	12	15	20	25	30	30	40	40	50	50	60	
b7	12	16	20	25	32	32	40	40	50	50	60	
b16	10	12	16	20	22	22	28	28	35	35	44	
b17	13	15	21	27	29	29	34	34	41	41	52	
L2	61	61	72	80	95	100	107	115	125	132	145	
L3	32	40	47	56	63	63	77	77	91	91	100	
L4	16	22	26	32	35	35	45	45	55	55	60	
L5	16	18	21	24	28	28	32	32	36	36	40	
L7	12	16	20	25	32	32	40	40	50	50	60	
L7a	20	25	28	35	42	42	52	52	65	65	78	
L8	11.5	15	19	24	31	31	38	38	48	48	58	
L8a	17.5	21	26	32.5	40	40	50	50	62.5	62.5	75	
L11	31	31	39	45	53	58	65	72	79	85	90	
L23	45	45	53	55	67	67	68	68	72	70	82	
L24	12	12	15	15	19	19	19	19	20	20	22	
Function type	Measures of length L1h											
D/E/Ez	L1h = Stroke +	97	100	121	131	152	160	170	181	193	205	213
Dbb	L1h = Stroke +	109	114	137	149	172	180	192	203	217	229	241
Minimum measures of length L1h												
L1h =	107	107	126	136	163	168	176	184	198	203	228	

Special versions (on request)

Hydraulic cylinders with piston Ø100-250 mm

ZH100 = hydraulic cylinder for operational pressures up to 100 bar
ZH250 = hydraulic cylinder for operational pressures up to 250 bar

Dimensions: on request

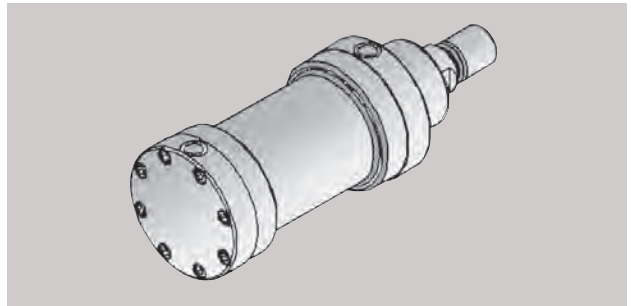
Available versions:

Piston Ø: 100–250 mm

Lengths of stroke at your option: We manufacture any length of stroke you desire

Function types: D, Dbb

Seal version: standard version: H00



Hydraulic cylinders with end position sensing

Hydraulic cylinders with pressure-resistant inductive proximity switches for end position sensing.

Design: PNP/normally open contact (short circuit-resistant). **Dimensions:** on request
The proximity switches are attached 180° (opposite) to the connections if not otherwise specified by the customer.

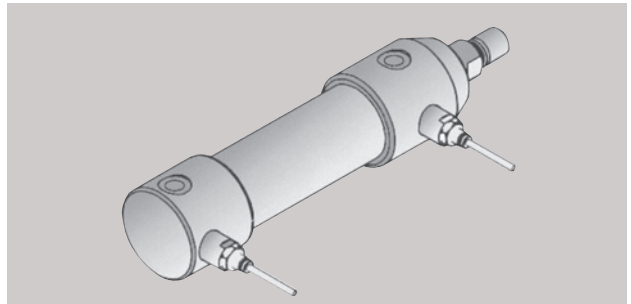
Available versions:

Piston Ø: minimum piston Ø 10 mm

Lengths of stroke at your option: We manufacture any length of stroke you desire

Function types: D, Dbb

Seal version: Standard version: H03



Hydraulic cylinders in servo quality

Dimensions: on request
with connecting plate for directional control valve on request (NG6/NG10)

Available versions:

Piston Ø: minimum piston Ø 20 mm

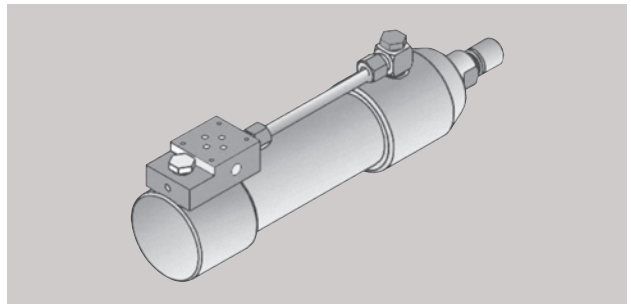
Lengths of stroke at your option: We manufacture any length of stroke you desire

Function types: D, Dbb

seal versions: Standard version: H40

Piston with sliding ring PTFE and driving band

Piston rod with tandem sealing (sliding-ring seal/grooved ring and dust seal)



Hydraulic cylinders with path-measuring system

For high-precision positioning, adjusting and controlling movements, our hydraulic cylinders can be equipped with contactlessly operating path measurement systems.

Dimensions: on request

Available versions:

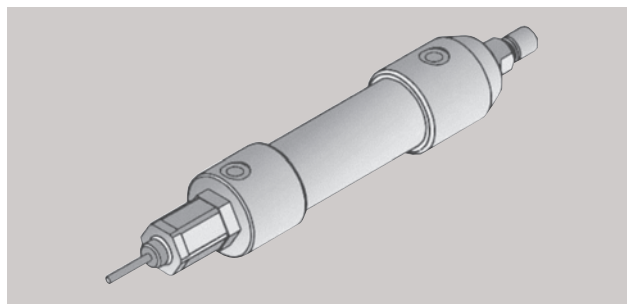
Piston Ø: minimum piston Ø 40 mm

Lengths of stroke at your option: We manufacture any length of stroke you desire

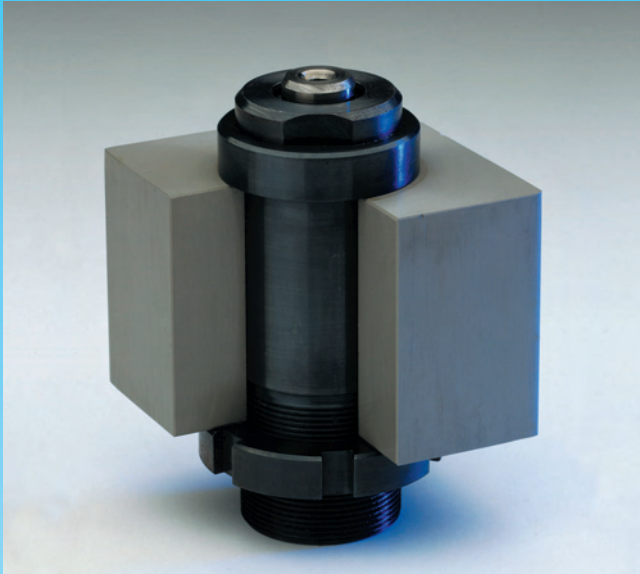
Function type: D

Path sensors for: (dimensions on request)

- analog interface
- digital pulse interface
- SSD interface
- CANopen interface



ZHSS Series



400 bar clamping cylinder

Piston Ø 16-50 mm

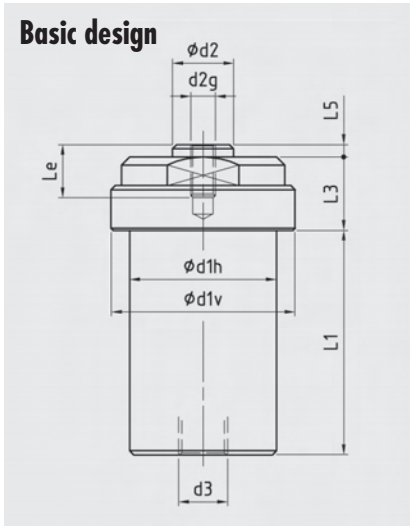
Standard lengths of stroke

- Single-effect pushing operation;
with or without spring return mechanism
- Round, compact design;
black blued
- piston rod hardened;
with dust seal

General information

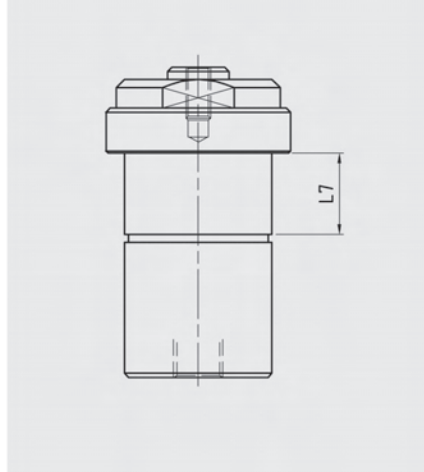
Piston Ø (mm)	16	20	25	32	40	50	
Piston surface pushing (cm ²)	2.01	3.14	4.91	8.04	12.56	19.63	
Piston force (daN)	pushing at 100 bar	201	314	491	804	1256	1963
	160 bar	321	502	785	1286	2010	3140
	250 bar	502	785	1227	2010	3140	4907
	400 bar	804	1256	1964	2316	5024	7852
Spring force (daN)	stressed	12	14	24	30	50	72
	pre-stressed	6	7	12	15	25	36

Mounting types



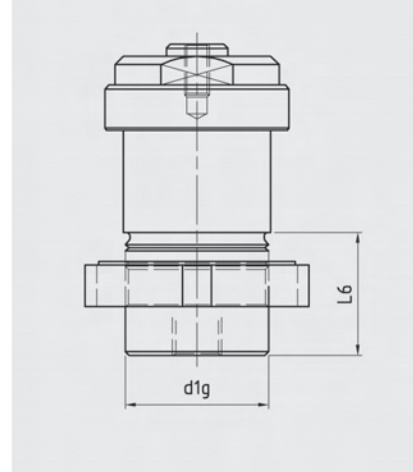
Ordering example: ZHSS 25-3

With retaining ring (DIN 471)



ZHSS 25-3 L7 = 10 mm

With thread and slotted nut



ZHSS 25-3 d1g = M35x1.5 L6 = 30 mm

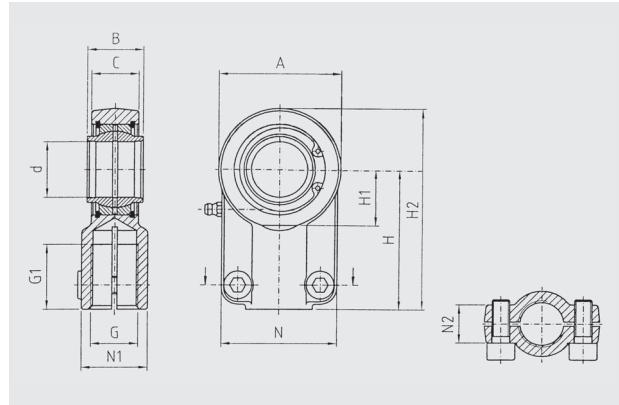
General dimensions

Function type	Type	Stroke	L1	L3	Le	L5	L6/L7	d1v	d1h-h8	d1g	d2-h7	d2g	d3
	ZHSS 16-1	4	45	13.5	10	2.5	Lengths L6 and L7 can be chosen	30	25	M25x1.5	10	M5	G 1/8"
	ZHSS 16-2	8	58					36	30	M30x1.5	12	M5	G 1/8"
	ZHSS 20-1	5	50	15	10	3		45	36	M35x1.5	15	M6	G 1/4"
	ZHSS 20-2	10	68					55	45	M45x1.5	20	M8	G 1/4"
	ZHSS 25-1	6	55	18	12	3		65	55	M55x1.5	25	M10	G 1/4"
	ZHSS 25-2	12	76					82	70	M70x2	32	M12	G 1/4"
	ZHSS 32-1	8	63	20	16	4		30	25	M25x1.5	10	M5	G 1/8"
	ZHSS 32-2	16	91					36	30	M30x1.5	12	M5	G 1/8"
	ZHSS 40-1	10	70	21	20	6		45	36	M35x1.5	15	M6	G 1/4"
	ZHSS 40-2	20	105					55	45	M45x1.5	20	M8	G 1/4"
	ZHSS 50-1	12	78	24	24	6		65	55	M55x1.5	25	M10	G 1/4"
	ZHSS 50-2	24	120					82	70	M70x2	32	M12	G 1/4"
	ZHSS 16-3	18	45	13.5	10	2.5		30	25	M25x1.5	10	M5	G 1/8"
	ZHSS 16-4	31	58					36	30	M30x1.5	12	M5	G 1/8"
	ZHSS 20-3	20	50	15	10	3		45	36	M35x1.5	15	M6	G 1/4"
	ZHSS 20-4	38	68					55	45	M45x1.5	20	M8	G 1/4"
	ZHSS 25-3	27	55	18	12	3		65	55	M55x1.5	25	M10	G 1/4"
	ZHSS 25-4	48	76					82	70	M70x2	32	M12	G 1/4"
	ZHSS 32-3	28	63	20	16	4		30	25	M25x1.5	10	M5	G 1/8"
	ZHSS 32-4	56	91					36	30	M30x1.5	12	M5	G 1/8"
	ZHSS 40-3	38	70	21	20	6		45	36	M35x1.5	15	M6	G 1/4"
	ZHSS 40-4	73	105					55	45	M45x1.5	20	M8	G 1/4"
	ZHSS 50-3	40	78	24	24	6		65	55	M55x1.5	25	M10	G 1/4"
	ZHSS 50-4	82	120					82	70	M70x2	32	M12	G 1/4"

Accessories – Piston rod knuckles

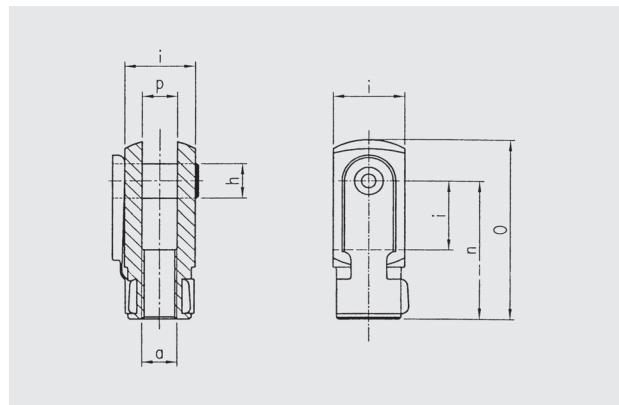
Joint head GS (DIN 24338, ISO 6982, sliding contact surface combin.: steel/steel)

Typ	Ø d-H7	A	B	C-h12	G	G1	H	H1	H2	N	N1	N2
GS 12	12	32	12	10.5	M 12 x 1.25	17	38	14	54	32	16	12
GS 16	16	40	16	13	M 14 x 1.5	19	44	18	64	40	21	11.5
GS 20	20	47	20	17	M 16 x 1.5	23	52	22	77	47	25	14
GS 25	25	58	25	21	M 20 x 1.5	29	65	27	96	54	30	17
GS 32	32	70	32	27	M 27 x 2	37	80	32	118	66	38	22
GS 40	40	89	40	32	M 33 x 2	46	97	41	145.5	80	47	26
GS 50	50	108	50	40	M 42 x 2	57	120	50	179	96	58	32
GS 63	63	132	63	52	M 48 x 2	64	140	62	211	114	70	38



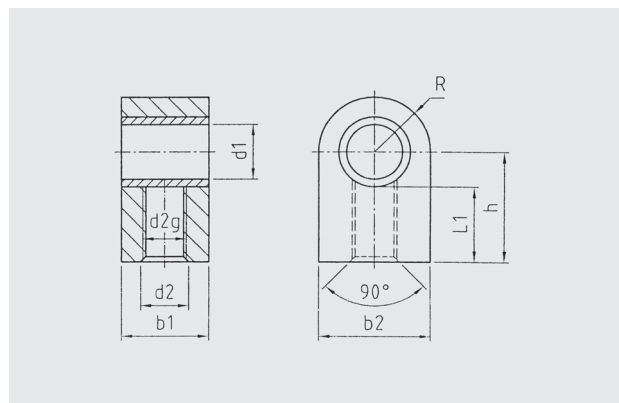
Fork joint GG (acc. to ISO 8140, with stainless steel bolt)

Typ	a	Ø h-h8	i	n	o	p
GG - M 4	M 4	4	8	16	21	4
GG - M 6	M 6	6	12	24	31	6
GG - M 8	M 8	8	16	32	42	8
GG - M 10 x 1.25	M 10 x 1.25	10	20	40	52	10
GG - M 12 x 1.25	M 12 x 1.25	12	24	48	62	12
GG - M 16 x 1.5	M 16 x 1.5	16	32	64	83	16
GG - M 20 x 1.5	M 20 x 1.5	20	40	80	105	20
GG - M 27 x 2	M 27 x 2	30	55	110	148	30
GG - M 36 x 2	M 36 x 2	35	70	144	188	35



Swivel head GE with gunmetal bush

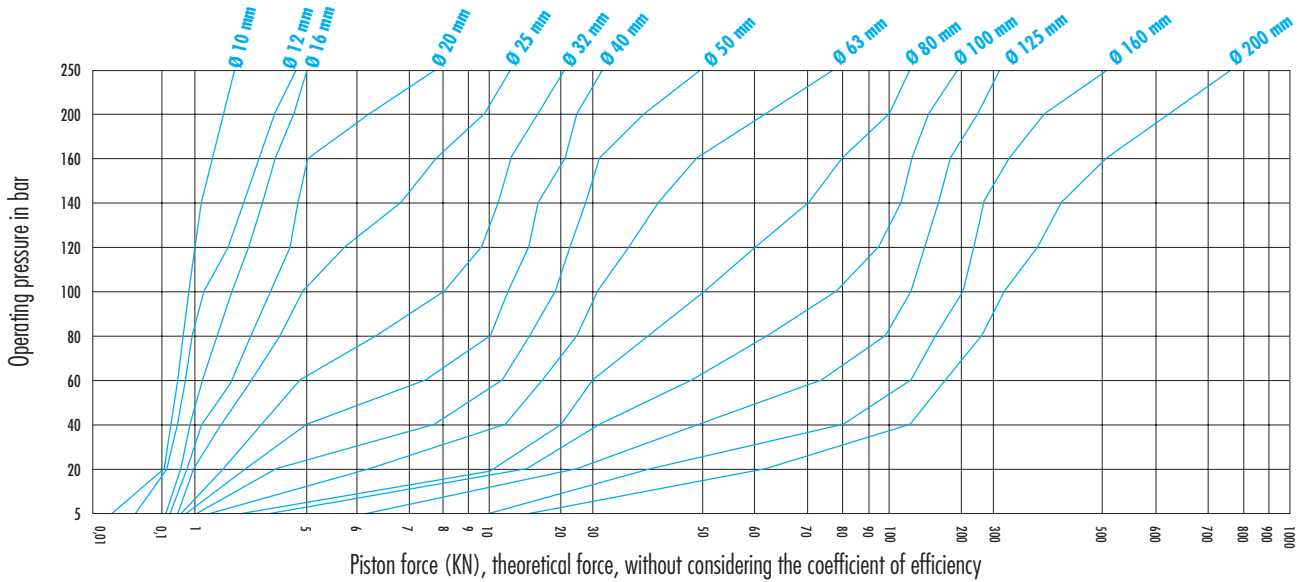
Typ	d2g	Ø d1-H7	Ø d2	b1	b2	h	L1	R
GE 5	M 5	6	6	10	18	18	13	9
GE 6	M 6	8	8	12	20	20	14	10
GE 8	M 8	10	10	15	25	24	17	12.5
GE 10	M 10	12	12	20	25	28	19	12.5
GE 12	M 12	14	14	20	30	32	22	15
GE 14	M 14	16	16	25	30	36	25	15
GE 16	M 16	20	20	30	40	42	29	20
GE 20	M 20	25	25	40	50	50	34	25
GE 24	M 24	25	32	40	50	60	44	25
GE 27	M 27	32	32	50	60	70	50	30
GE 33	M 33	40	40	60	80	80	55	40
GE 42	M 42	50	50	80	100	100	70	50
GE 48	M 48	60	60	100	120	125	76	—
GE 52	M 52	80	80	100	120	125	76	—



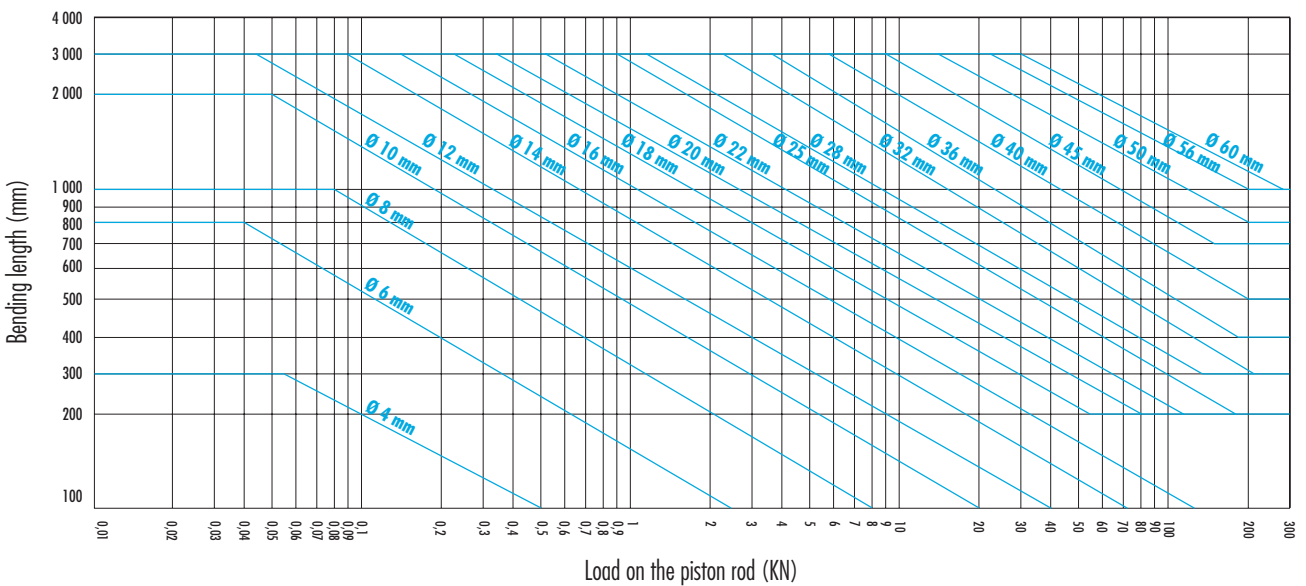
Larger threads for the swivel head GE available on request.

Piston force and bending length

Determination of the cylinder diameter required



Determination of the piston rod diameter required



Piston rods with adequate diameters should be provided for if cylinders with a long stroke are used. The length of stroke is limited depending on pressure, type of fastening, type of connection of the rod end and guide quality of the moved mass.

The above diagram applies only for rigidly guided mass and front or back flange fastening.

Attention: The max. permitted bending length must be calculated in case of a deviating type of fastening. We calculate for you the piston rod diameter required based on your description of the planned use. The diagram "Determination of the piston rod diameter required" applies only to the mounting described.