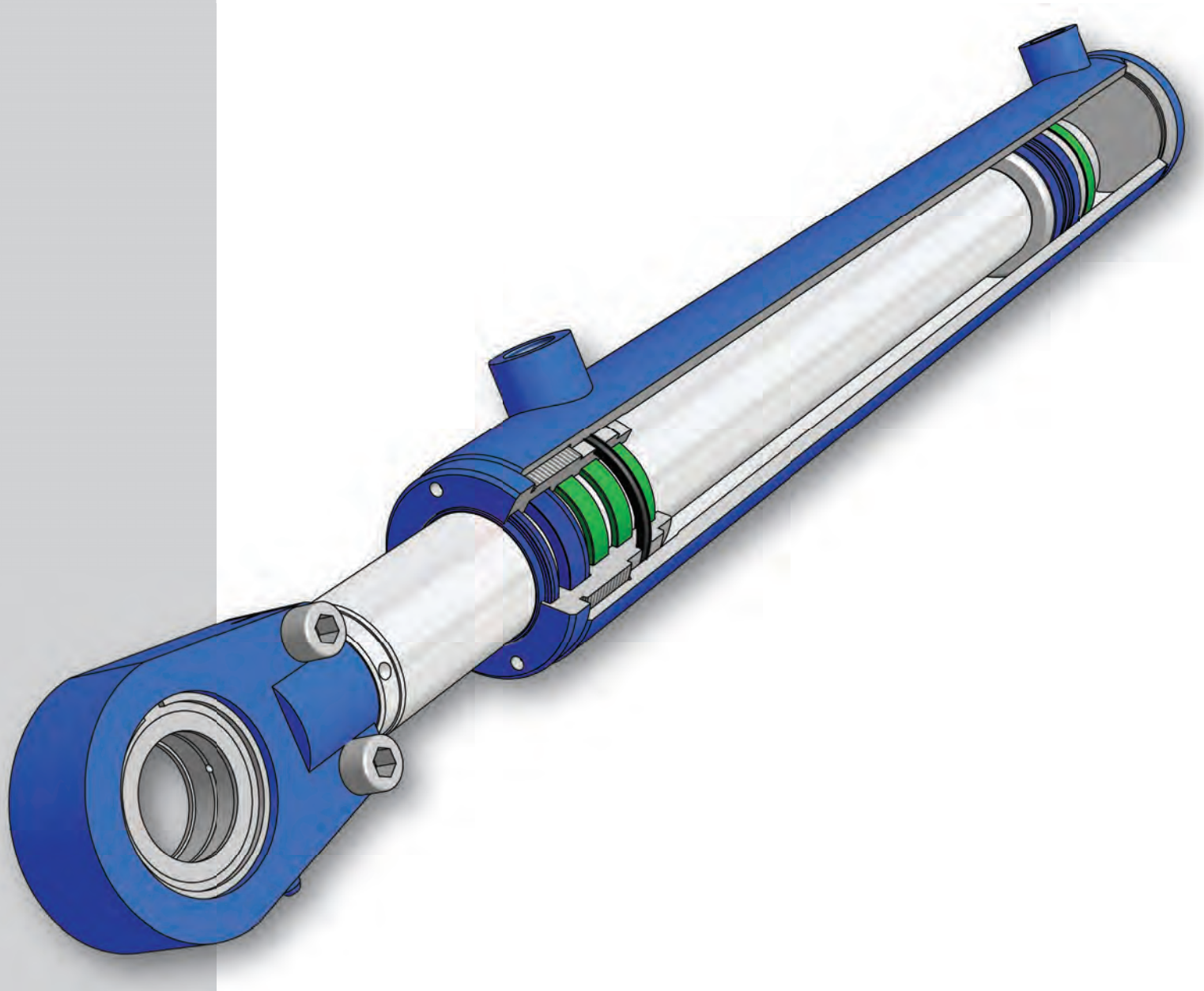
www.hydropa.de

hydropa®
HYDRAULISCHE ERZEUGNISSE GMBH & CIE. KG



HYDRAULIC CYLINDER
HYKS

INTRODUCTION

The hydraulic cylinder, as a link between hydraulic control and the machine, is suitable for use in many areas of industry, such as pressing and joining applications, the chemical industry or tool making. Hydraulic cylinders can also be used without a problem in areas having extremely high or low ambient temperatures.

The Hydropa HYKS series of hydraulic cylinders exhibit a sturdy welded/bolted construction with honed and seamless cylinder barrels and ground, precision hard chrome-plated piston rods that are delivered with a prime coating as a standard feature. We are also happy to manufacture customized hydraulic cylinders. In order for us to submit an offer to meet your needs, please provide any special dimensions and requirements for the hydraulic cylinder along with your inquiry.

When designing hydraulic cylinders, the permissible collapse load for the particular stroke must be taken into consideration! If you cannot glean this information from the documents at your disposal, we would be happy to take care of this for you.

TABLE OF CONTENTS

GENERAL

GENERAL CHARACTERISTICS

Piston diameter:	32 to 200 mm
Perm. max. operating pressure:	250 bar
Test pressure:	350 bar
Piston speed:	0.5 m/s to 4 m/s
Temperature range:	-30° C to +80° C
Mounting position:	any
Distance measurement:	transducer or inductive proximity switch

MATERIALS

Piston rod:	20MnV6
Cylinder:	St52
Seals:	• NBR • PTFE • POM • PU

The seals are designed for use with hydraulic oils in accordance with DIN 51524 and DIN 51525 and a temperature range of -30 ° C to +80 ° C. Seals for other temperature ranges and operating media as well as for other cylinder and rod materials are available upon request.

OPERATING PRESSURE

Our hydraulic cylinders are subjected to a static pressure test before delivery. The operating pressure can be selected freely on the basis of the operating conditions and the required level of safety – with reference to the test pressure.

PORTS

The oil ports are manufactured with standard metric fine thread or Whitworth pipe thread.

VENTILATION

Ventilation takes place at idling pressure through the base or rod-end oil port. Additional ventilation connections on the hydraulic cylinder can be provided upon customer request.

FILTERING

When the system is filled during operation, the hydraulic fluid must be filtered so that contamination with solids does not exceed the thresholds according to NAS 1638 Class 8 (Class 9 for 15µm and smaller) or ISO17/14. Finer filtration increases the lifetime of the equipment. Whatever the application, it must be ensured that the above limits are not exceeded.

DIFFERENTIAL CYLINDER

It must be ensured that differential cylinders have a free flow of hydraulic fluid from the piston rod end so that the pressure never exceeds the maximum operating pressure as a result of the pressure ratio.

OPERATING INSTRUCTIONS

STORAGE

In order to ensure a long shelf life of the bearing surfaces and seals of hydraulic cylinders, and to protect them against corrosion, the piston rods should be retracted and the cylinders filled completely with oil. It is important to ensure that no air is trapped in the cylinder and that the connections are sealed airtight. The piston rod thread, the free rod end, and ball and socket joints should be coated lightly with anti-corrosion grease. If the cylinders are stored at fluctuating ambient temperatures, they must be protected with a pressure relief valve on each port end. After long periods of storage, pressure marks may occur at the seals, but these will disappear after the piston has been extended and retracted several times.

INSTALLATION

During the installation of hydraulic cylinders the following points should be noted:

- Before installing the hydraulic cylinder in the system, the type designation must be compared with the ordering data
- Make sure to keep the hydraulic cylinder and the area around it clean
- The operating fluid must be compatible with the sealing material
- Pipes should be cleaned of dirt, scale, chips, and the like before installation
- Never use lint-producing cloth or special paper for cleaning purposes
- The hydraulic cylinders must be installed and operated without any radial forces or stress. These transverse forces put a strain on the piston and piston rod guide of the hydraulic cylinder and lead to a shorter lifetime and leakages or even destruction.

COMMISSIONING

Before commissioning, the hydraulic cylinder must be vented. At idle pressure, open the bleeder screw / base- and rod-end screw and let the air escape. When no more bubbles come forth from the oil, re-tighten the bleed screw / screw.

MAINTENANCE

Hydraulic cylinders are generally maintenance free. For heavy-duty use, make sure to lubricate the bearings, such as the articulated and swivel eyes as well as the trunnion.

Seals and bearings are consumables. Once the internal or external leakage reaches an unacceptable level, we recommend that you replace the seals and bearings and check the cylinder for further wear. Of course we are always at your service to do this work for you.

ASSEMBLY AND DISASSEMBLY

When seals are changed, all seals and guide elements in general should be replaced. The contact surfaces of metallic parts should be checked for any cracks or score marks. If they do not exhibit any signs of damage or abnormal wear, then they can be re-used.

In order to disassemble the hydraulic cylinder, unscrew the rod guide (12) from the cylinder housing (7) using a hook wrench. Pull the rod (1) out of the cylinder housing (7). After removing the piston (3) by means of a hook wrench, all of the sealing elements (5, 6, 8, 9, 11, 13) and guide elements (4, 10) can now be replaced.

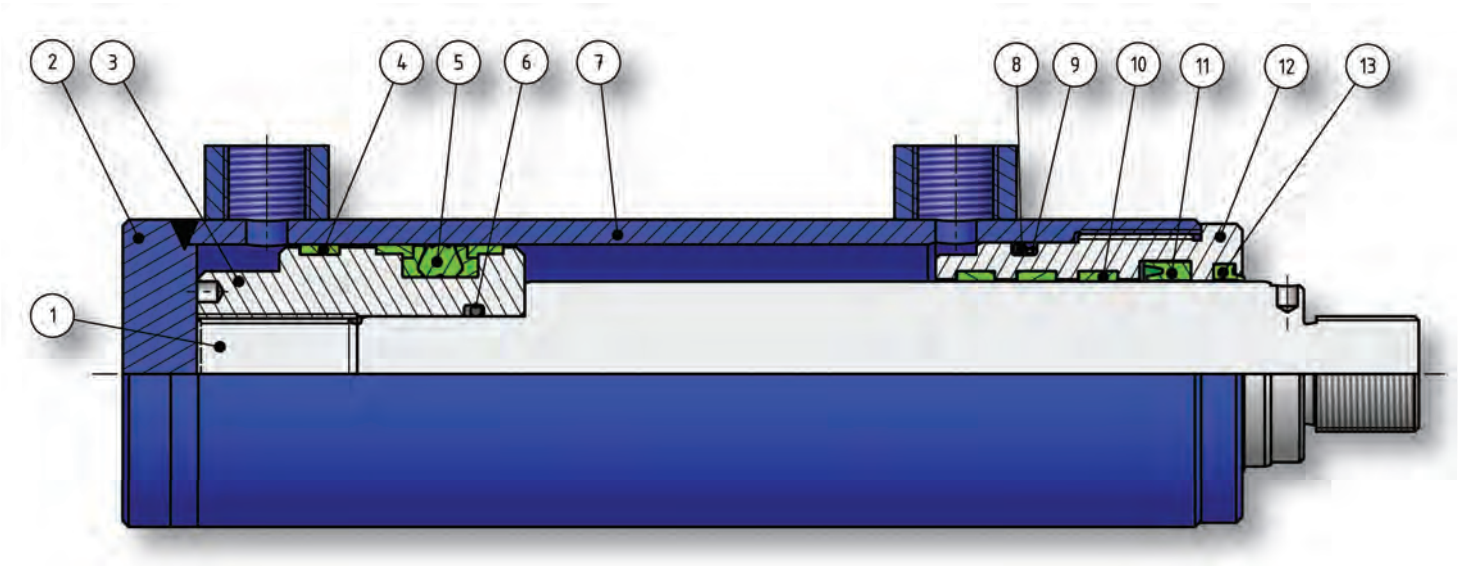
Oil the seals lightly and slip on with the help of a round-pointed tool. Be sure to install the rod seal (11) and the scraper ring (13) in the right direction. Once all of the seal and guide elements have been replaced, insert the piston into the lubricated cylinder housing (7). Lubricate the thread of the rod guide (12) and screw in firmly into the cylinder housing (7). Mount the assembled cylinder on a test bench to check for proper functioning and leaks.

REPLACMENT PARTS

When ordering spare parts, always include the imprinted order number, which is located to the right of the base-end connection (in reference to the piston rod).

PLEASE NOTE :

Installation, repair and commissioning of cylinders may be carried out only by trained specialist personnel with the necessary expertise. Hydropa assumes no liability for any damage resulting from installation, repairs and commissioning, which were not carried out or commissioned by Hydropa.



1 - Piston rod
2 - Cylinder base
3 - Piston
4 - Piston ring
5 - Piston seal
6 - O-ring
7 - Cylinder tube
8 - O-ring
9 - Support ring
10 - Piston rings
11 - Rod seal
12 - Rod guide
13 - Scraper

BASIS OF CALCULATIONS FOR HYDRAULIC CYLINDERS

Piston and ring surfaces / lifting and tractive forces					
Piston Ø (mm)	Rod Ø A (mm)	Piston area (cm^2)	Ring area (cm^2)	Theoretical compressive force at 210 bar (kN)	Theoretical tractive force at 210 bar (kN)
32	18	8,042	5,498	16,89	11,55
	22		4,241		8,91
40	22	12,566	8,765	26,39	18,41
	28		6,409		13,46
50	28	19,635	13,477	41,23	28,30
	36		9,456		19,86
63	36	31,172	20,994	65,46	44,09
	45		15,268		32,06
80	45	50,265	34,361	105,56	72,16
	56		25,635		53,83
100	56	78,540	53,910	164,93	113,21
	70		40,055		84,12
125	70	122,718	84,234	257,71	176,89
	90		59,101		124,11
140	90	153,938	90,321	323,27	189,67
	100		75,398		158,34
160	100	201,062	122,522	422,23	257,30
	110		106,029		222,66
180	110	254,469	159,436	534,38	334,82
	125		131,751		276,68
200	125	314,159	191,441	659,73	402,03
	140		160,221		336,46

EFFICIENCY FACTOR

The values given in the table do not take into account the efficiency factor. Every hydraulic cylinder loses power due to the friction resistance of the sealing and guiding elements. Since the effect of these losses is different at different pressures, the following average values are anticipated as the efficiency factors:

Efficiency factor				
Pressure (bar)	20	120	160	250
Efficiency factor µ	0,85	0,9	0,92	0,97

PISTON FORCES

p = pressure
A = effective piston surface
F = effective piston force
d1 = piston diameter
d2 = piston rod diameter
μ = efficiency factor of the cylinder

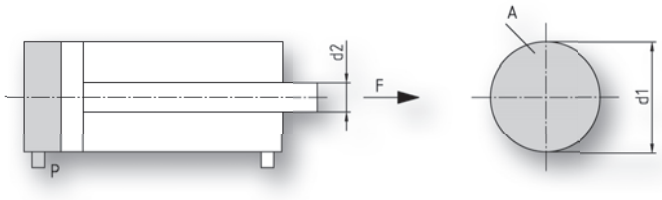
Effective piston force:
F = p * A * μ

example

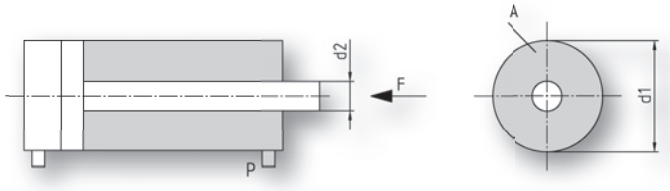
given:
Hydraulic cylinder with d1 = 100 mm, d2 = 70 mm,
μ = 0.85, p = 60 bar [1 bar = 10 N/cm2]

needed:
Effective piston force (F)

extension:
F = p * A * μ
= 600 N/cm2 * (π * (10 cm)2 / 4) * 0.85
= 40.055 N



retraction:
F = p * A * μ
= 600 N/cm2 * (π * ((10 cm)2 - (7 cm)2) / 4) * 0.85
= 20.428 N



PISTON SPEED

Q = volumetric flow rate
A = effective piston surface
v = piston speed

Piston speed:
v = Q / A

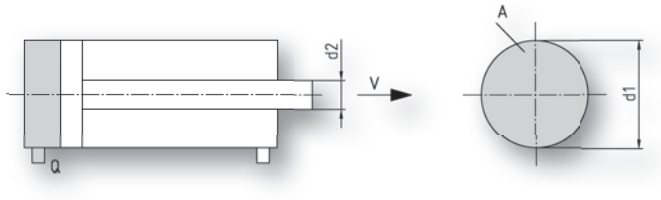
example

given:
Hydraulic cylinder with d1 = 50 mm, d2 = 36 mm,
Q = 12 l/min

needed:
Piston speed (v)

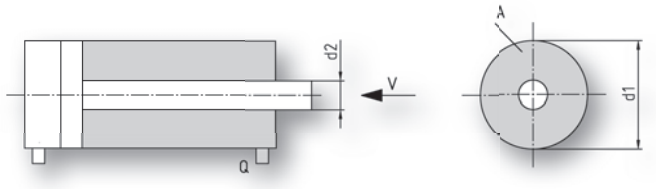
extension:

$$v = \frac{Q}{A} = \frac{12.000 cm^3 / min}{\frac{((\pi * (5cm)^2)}{4}} = 611 \frac{cm}{min} = 6{,}11 \frac{m}{min}$$



retraction:

$$v = \frac{Q}{A} = \frac{12.000 cm^3 / min}{\frac{((\pi * (5cm)^2)}{4} - \frac{((\pi * (3{,}6cm)^2)}{4}} = 1.269 \frac{cm}{min} = 12{,}69 \frac{m}{min}$$



TECHNICAL DATA

Buckling calculation

The calculation of buckling S_K is carried out according to Euler, whereby in simplified terms the piston rod and tube can be regarded as a slender rod.

Euler case 2 using articulated / swivel eye as an example

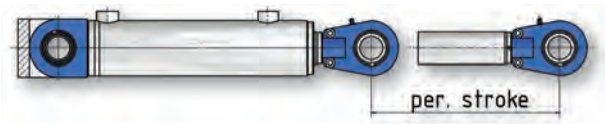
$$S_K = \frac{\sqrt{\frac{\pi^2 * E * J}{F * S}} - (A + \text{add. meas.})}{2}$$

Euler case 3 using head flange as an example

$$S_K = \frac{\sqrt{\frac{\pi^2 * E * J}{F * S}}}{0{,}707} - (A + \text{add. meas.})$$

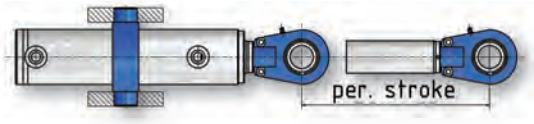
The tables show the permissible stroke in mm at buckling stress (compressive stress) according to Euler with 3.5 times the safety factor and flexibly guided load.

S_K = per. stroke length in mm
E = modulus of elasticity $2{,}1 * 10^5$ for steel in N/mm²
J = moment of area im mm⁴
for circular cross-section = $\frac{d^4 * \pi}{64}$
F = compressive force in N/cm²
A = measurement A of the piston rod eye, see pg. 17
S = 3.5 (safety factor)



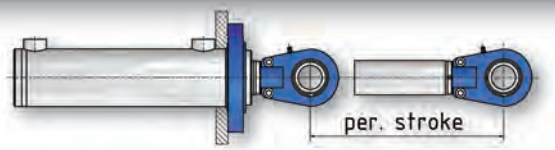
Mounting type articulated / swivel eye HYKS-...-G/S-... (with measurement "J" and piston rod eye)

Piston Ø (mm)	32		40		50		63		80		100		125		140		160		180		200	
Piston rod Ø (mm)	18	22	22	28	28	36	36	45	45	56	56	70	70	90	90	100	100	110	110	125	125	140
Working pressure (bar)	permissible stroke (mm)																					
50	330	545	405	725	540	985	730	1230	915	1510	1145	1905	1450	2550	2215	2800	2385	2950	2535	3375	2970	3820
100	205	355	250	480	345	655	470	825	595	1015	750	1285	955	1735	1485	1900	1595	1995	1685	2285	1985	2590
150	145	270	185	370	255	510	355	645	455	800	575	1010	735	1370	1165	1500	1245	1575	1310	1800	1550	2040
200	115	220	145	305	205	425	285	535	370	670	470	850	605	1155	970	1265	1040	1320	1090	1510	1290	1715
250	90	185	115	260	170	365	240	465	310	580	400	740	515	1010	840	1100	895	1150	935	1310	1110	1495



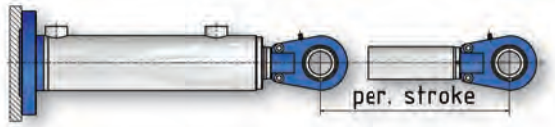
Mounting type trunnion HYKS-...-M-... (with measurement "F" and piston rod eye)

Piston Ø (mm)	32		40		50		63		80		100		125		140		160		180		200	
Piston rod Ø (mm)	18	22	22	28	28	36	36	45	45	56	56	70	70	90	90	100	100	110	110	125	125	140
Working pressure (bar)	permissible stroke (mm)																					
50	485	770	590	610	785	1375	1050	1715	1305	2100	1620	2630	2040	3510	3080	3860	3320	4075	3540	4665	4140	5280
100	315	520	390	690	525	940	705	1175	875	1440	1095	1810	1380	2420	2105	2660	2270	2805	2410	3205	2825	3630
150	240	405	300	545	405	745	550	935	690	1150	860	1445	1090	1935	1675	2125	1805	2240	1910	2560	2245	2905
200	195	340	245	460	335	630	460	795	575	975	720	1225	915	1650	1420	1810	1530	1905	1610	2175	1900	2470
250	165	290	210	400	290	550	400	695	500	855	625	1080	795	1455	1245	1595	1340	1675	1410	1910	1660	2170



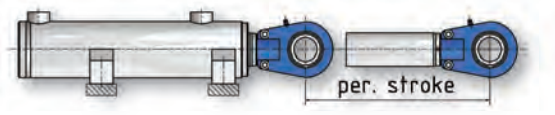
Mounting type head flange HYKS-...-K-... (with measurement "D" and piston rod eye)

Piston Ø (mm)	32		40		50		63		80		100		125		140		160		180		200	
Piston rod Ø (mm)	18	22	22	28	28	36	36	45	45	56	56	70	70	90	90	100	100	110	110	125	125	140
Working pressure (bar)	permissible stroke (mm)																					
50	1160	1765	1395	2305	1815	3065	2400	3810	2960	4650	3670	5815	4595	7710	6840	8495	7385	8980	7915	10295	9210	11625
100	795	1225	960	1605	1260	2140	1670	2665	2060	3250	2550	4070	3200	5400	4780	5945	5160	6285	5520	7200	6425	8135
150	635	990	770	1295	1010	1730	1345	2155	1660	2635	2060	3300	2580	4380	3865	4820	4170	5090	4455	5830	5190	6590
200	540	845	655	1115	865	1485	1150	1855	1420	2265	1760	2840	2210	3770	3320	4145	3580	4380	3825	5015	4455	5665
250	475	750	580	985	765	1320	1015	1645	1260	2015	1560	2520	1960	3350	2950	3685	3180	3895	3390	4460	3955	5035



Mounting type base flange HYKS-...-B-... (with measurement "J" and piston rod eye)

Piston Ø (mm)	32		40		50		63		80		100		125		140		160		180		200	
Piston rod Ø (mm)	18	22	22	28	28	36	36	45	45	56	56	70	70	90	90	100	100	110	110	125	125	140
Working pressure (bar)	permissible stroke (mm)																					
50	515	820	625	1080	830	1455	1110	1810	1385	2230	1715	2790	2160	3715	3260	4090	3515	4315	3750	4940	4385	5595
100	335	550	410	730	550	995	740	1240	930	1530	1155	1915	1460	2560	2230	2815	2400	2965	2550	3395	2995	3850
150	255	430	315	575	430	790	580	985	730	1220	910	1530	1150	2050	1775	2250	1910	2370	2020	2710	2375	3075
200	205	360	255	485	355	665	480	835	615	1035	760	1300	965	1745	1500	1915	1615	2015	1705	2300	2010	2615
250	175	310	215	420	305	585	415	730	530	910	660	1140	840	1535	1315	1685	1415	1770	1490	2020	1760	2300

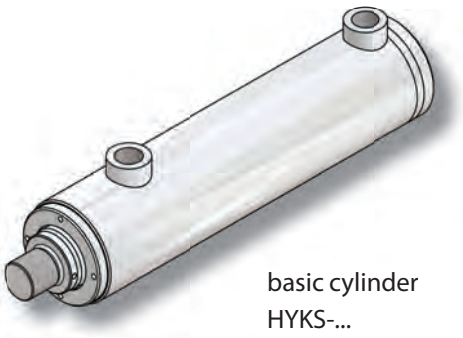


Mounting type tangential feet HYKS-...-T-... (with measurement "P" and piston rod eye)

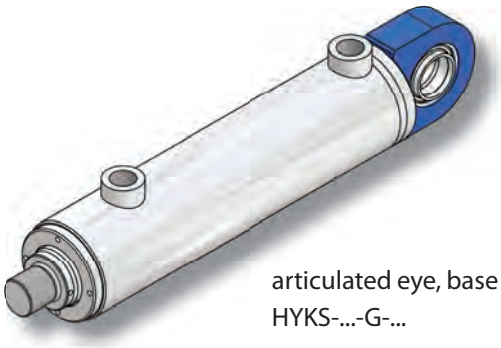
Piston Ø (mm)	32		40		50		63		80		100		125		140		160		180		200	
Piston rod Ø (mm)	18	22	22	28	28	36	36	45	45	56	56	70	70	90	90	100	100	110	110	125	125	140
Working pressure (bar)	permissible stroke (mm)																					
50	1130	1740	1370	2280	1795	3040	2375	3780	2930	4620	3635	5780	4560	7670	6975	8445	7330	8925	7855	10235	9145	11565
100	770	1200	940	1585	1240	2120	1645	2635	2030	3225	2520	4035	3160	5360	4735	5900	5105	6235	5460	7145	6365	8075
150	610	960	750	1275	990	1710	1320	2130	1630	2605	2025	3260	2540	4340	3820	4775	4120	5040	4400	5775	5130	6525
200	515	820	635	1090	845	1465	1125	1830	1390	2235	1730	2800	2175	3730	3275	4100	3530	4330	3765	4960	4395	5605
250	450	725	560	965	745	1300	995	1625	1230	1985	1525	2485	1920	3315	2905	3645	3130	3840	3335	4400	3895	4975

MOUNTING METHODS

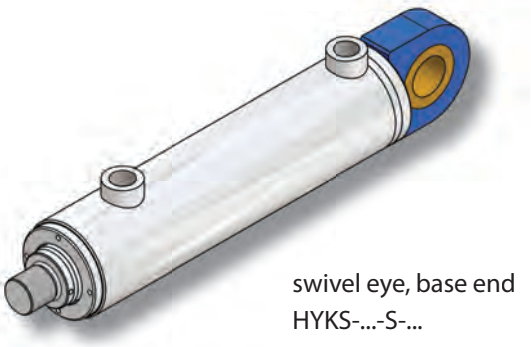
Optional: Piston rod eye, fork head
We also build other models according to customer specifications.



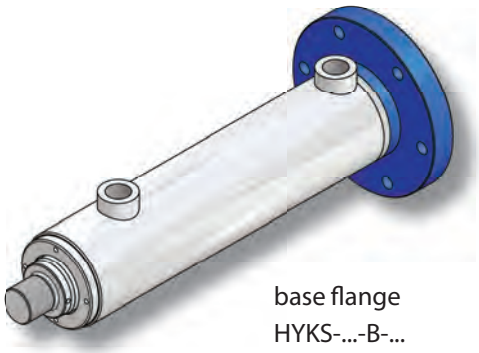
basic cylinder
HYKS-...



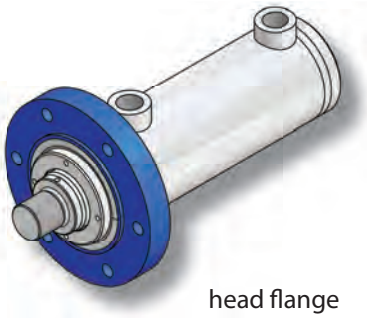
articulated eye, base end
HYKS-...-G-...



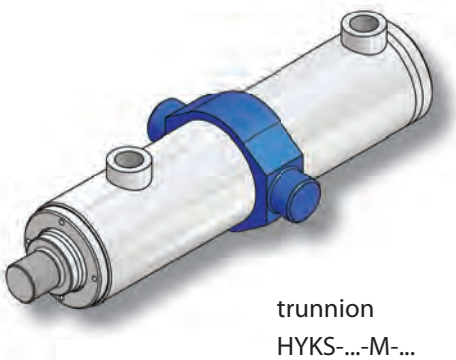
swivel eye, base end
HYKS-...-S-...



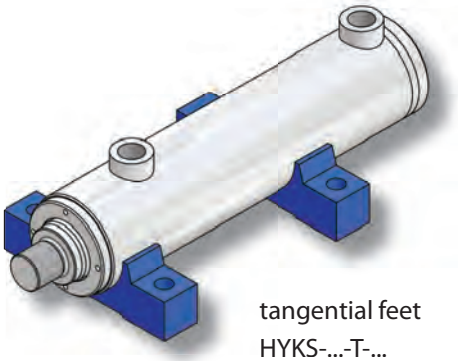
base flange
HYKS-...-B-...



head flange
HYKS-...-K-...



trunnion
HYKS-...-M-...



tangential feet
HYKS-...-T-...

PRODUCT KEY HYDRAULIC CYLINDER SERIES: HYKS

HYKS - [ ] - [ ] - [ ] / [ ] / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]
1 2 3 4 5 6 7 8 9 10 11 12

1 TYPE
D = double-acting
E = single-acting

2 MOUNTING TYPE
G = articulated eye
S = swivel eye
K = head flange
B = base flange
M = trunnion
T = tangential feet

3 PISTON DIAMETER (mm)

4 ROD DIAMETER (mm)
... = piston rod material 20MnV6 (standard)
... N = piston rod material 1.4057 (stainless steel)
... X = piston rod material see SO-text

5 ROD DIAMETER
(for synchronous cylinder only) (mm)
... = piston rod material 20MnV6 (standard)
... N = piston rod material 1.4057 (stainless steel)
... X = piston rod material see SO-text

6 STROKE (mm)

7 OIL PORT THREAD
R = pipe thread
M = metric thread

8 TYPE OF MOUNTING ON PISTON ROD
G = piston rod eye, clampable
S = swivel eye, clampable
GK = fork head, clampable
X = custom mounts

9 POSITION OF THE OIL PORTS
(with reference to the rod)
0 = oil port position standard
1 = oil port position 90° to the left
2 = oil port position 90° to the right
3 = oil port position 180°
4 = custom position see SO-text

10 SEALS
SD = standard seals, leak-free
A = stick-slip-free seals with retaining function (AQ-Seal 5)
AV = like A, but made of Viton® flouroelastomers*
AX = seals see SO-text

11 SPECIFICATIONS OF POSITION MEASURING SYSTEMS
W = position measuring system
VW = prepared for position measuring system
N = inductive proximity switch
VN = prepared for inductive proximity switch

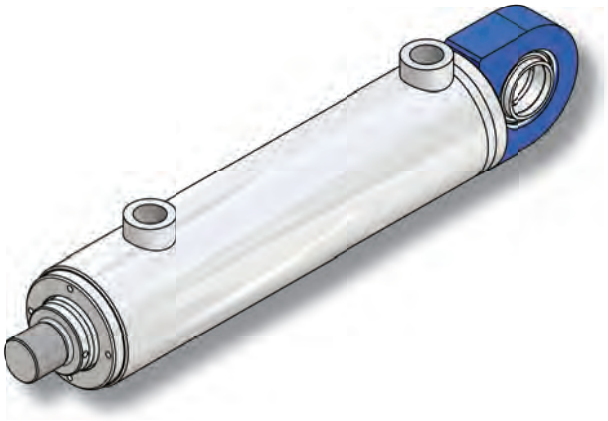
12 ADDITIONAL SPECIFICATIONS
S = standard
SO = custom

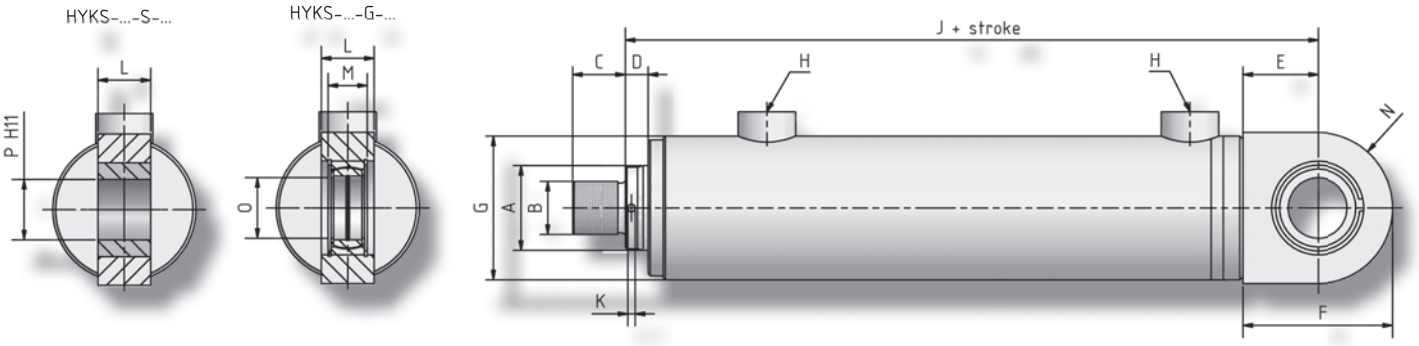
EXAMPLE

HYKS - D - G - 050 / 028N / ... - 0100 - R - G - 0 - A - W - SO
1 2 3 4 5 6 7 8 9 10 11 12

*Viton® is a registered trademark of DuPont Performance Elastomers

DIFFERENTIAL CYLINDER WITH ARTICULATED / SWIVEL EYE

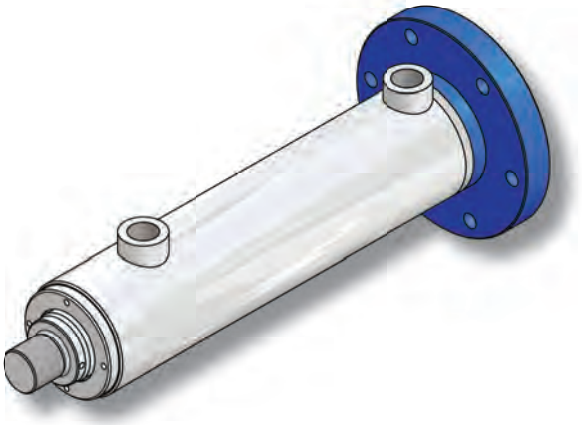


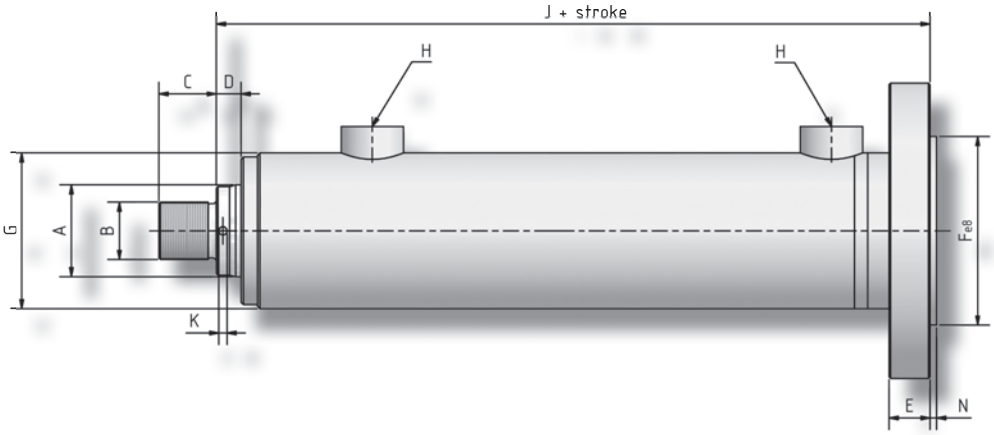


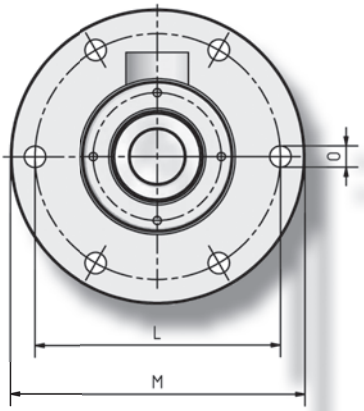
Differential cylinder with articulated / swivel eye

Type	Piston Ø (mm)	Piston rod Ø A (mm)	B	C	D	E	F	G Ø	H		J	K Ø	L	M	N	O Ø	PH11 Ø	Tilt angle α	GIHR-K, SA-K, GK (equipm.)	Weight (kg)	
									W-Tube (Standard)	Metr.										for stroke 0mm	each-100mm of stroke
HYKS-...-G/S-32/18-...	32	18	M16 x 1,5	16	15	25	53	42	G 3/8	M18 x 1,5	155±2	3	19	16	25	20 -0,01	20	9°	20	1,5	0,7
HYKS-...-G/S-32/22-...		22																			0,8
HYKS-...-G/S-40/22-...	40	22	M16 x 1,5	16	15	30	57,5	50	G 3/8	M18 x 1,5	180±2	3	23	20	27,5	25 -0,01	25	7°	25	2,5	0,9
HYKS-...-G/S-40/28-...		28																			1
HYKS-...-G/S-50/28-...	50	28	M22 x 1,5	22	15	35	69	62	G 1/2	M22 x 1,5	200±2	4	28	22	32	30 -0,01	30	6°	30	4	1,3
HYKS-...-G/S-50/36-...		36																			1,6
HYKS-...-G/S-63/36-...	63	36	M28 x 1,5	28	15	45	87	75	G 1/2	M22 x 1,5	235±3	4	30	25	42	35 -0,012	35	6°	35	6,5	1,8
HYKS-...-G/S-63/45-...		45																			2,2
HYKS-...-G/S-80/45-...	80	45	M35 x 1,5	35	15	50	100	95	G 3/4	M27 x 2	260±3	5	35	28	50	40 -0,012	40	7°	40	11	2,9
HYKS-...-G/S-80/56-...		56																			3,5
HYKS-...-G/S-100/56-...	100	56	M45 x 1,5	45	20	60	123	120	G 3/4	M27 x 2	300±3	5	40	35	58	50 -0,012	50	6°	50	19,5	4,7
HYKS-...-G/S-100/70-...		70																			5,8
HYKS-...-G/S-125/70-...	125	70	M58 x 1,5	58	20	70	140	145	G 1	M33 x 2	340±3	6	50	44	70	60 -0,015	60	6°	60	32,5	6,4
HYKS-...-G/S-125/90-...		90																			7,7
HYKS-...-G/S-140/90-...	140	90	M65 x 1,5	65	25	75	157	165	G 1	M33 x 2	390±4	6	55	49	77	70 -0,015	70	6°	70	49	9,7
HYKS-...-G/S-140/100-...		100																			11
HYKS-...-G/S-160/100-...	160	100	M80 x 2	80	25	85	175	190	G 1 1/4	M42 x 2	435±4	8	60	55	90	80 -0,015	80	6°	80	72,5	12,7
HYKS-...-G/S-160/110-...		110																		73	14
HYKS-...-G/S-180/110-...	180	110	M100 x 2	100	30	95	208	220	G 1 1/4	M42 x 2	500±4	8	65	60	113	90 -0,015	90	7°	90	113	17,4
HYKS-...-G/S-180/125-...		125																		113,5	19,5
HYKS-...-G/S-200/125-...	200	125	M110 x 2	110	35	115	240	245	G 1 1/4	M42 x 2	545±4	8	70	70	125	100 -0,015	100	7°	100	149,5	22
HYKS-...-G/S-200/140-...		140																		150	24,4

DIFFERENTIAL CYLINDER WITH BASE FLANGE



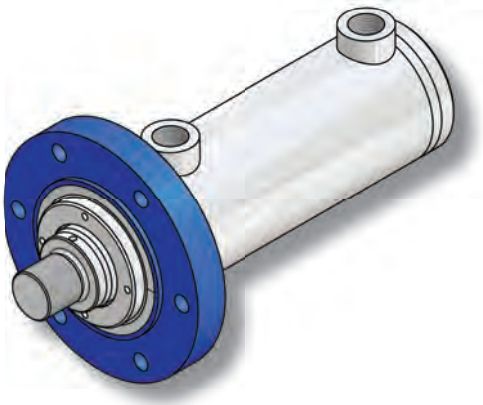


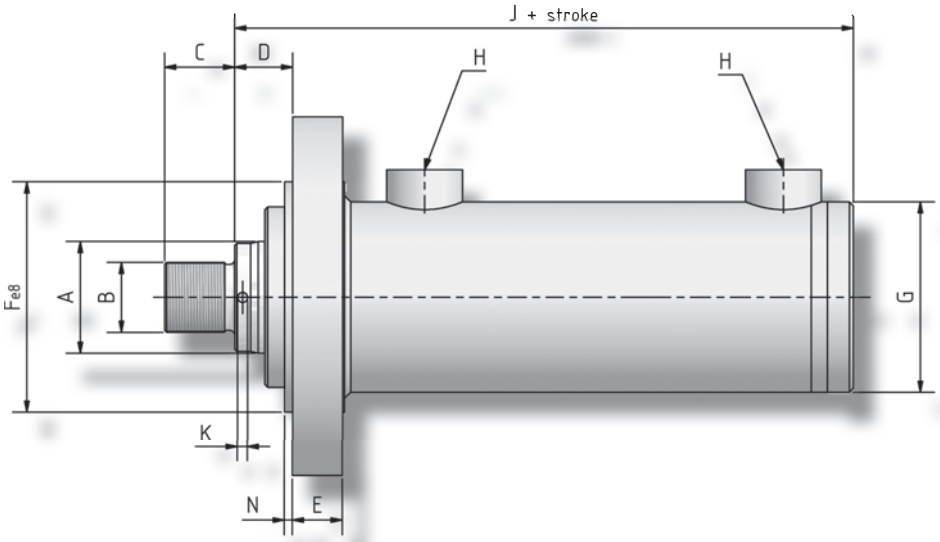


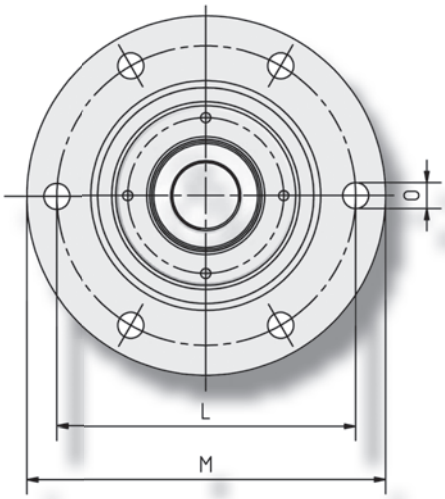
Differential cylinder with base flange

Type	Piston Ø (mm)	Piston rod Ø A (mm)	B	C	D	E	Fe8 Ø	G Ø	H		J	K Ø	L Ø	M Ø	N	O Ø	GIHR-K, SA-K, GK (equipm.)	Weight (kg)	
									W-Tube (Standard)	Metr.								for stroke 0mm	each 100mm of stroke
HYKS-...-B-32/18-...	32	18	M16 x 1,5	16	15	12	56	42	G 3/8	M18 x 1,5	150±2	3	78	98	3	9	20	2,5	0,7
HYKS-...-B-32/22-...		22																	0,8
HYKS-...-B-40/22-...	40	22	M16 x 1,5	16	15	15	65	50	G 3/8	M18 x 1,5	170±2	3	90	110	3	9	25	3,5	0,9
HYKS-...-B-40/28-...		28																	1
HYKS-...-B-50/28-...	50	28	M22 x 1,5	22	15	18	75	62	G 1/2	M22 x 1,5	180±2	4	100	125	3	10,5	30	5,5	1,3
HYKS-...-B-50/36-...		36																	1,6
HYKS-...-B-63/36-...	63	36	M28 x 1,5	28	15	22	90	75	G 1/2	M22 x 1,5	215±3	4	115	140	3	13	35	9	1,8
HYKS-...-B-63/45-...		45																	2,2
HYKS-...-B-80/45-...	80	45	M35 x 1,5	35	15	25	115	95	G 3/4	M27 x 2	225±3	5	150	180	4	13	40	16	2,9
HYKS-...-B-80/56-...		56																	3,5
HYKS-...-B-100/56-...	100	56	M45 x 1,5	45	20	35	140	120	G 3/4	M27 x 2	275±3	5	175	210	4	17	50	29	4,7
HYKS-...-B-100/70-...		70																	5,8
HYKS-...-B-125/70-...	125	70	M58 x 1,5	58	20	40	170	145	G 1	M33 x 2	320±3	6	210	250	5	22	60	48	6,4
HYKS-...-B-125/90-...		90																	7,7
HYKS-...-B-140/90-...	140	90	M65 x 1,5	65	25	45	190	165	G 1	M33 x 2	360±4	6	235	280	5	22	70	71	9,7
HYKS-...-B-140/100-...		100																	11
HYKS-...-B-160/100-...	160	100	M80 x 2	80	25	50	220	190	G 1 1/4	M42 x 2	400±4	8	270	320	5	30	80	104	12,4
HYKS-...-B-160/110-...		110																	14
HYKS-...-B-180/110-...	180	110	M100 x 2	100	30	60	250	220	G 1 1/4	M42 x 2	465±4	8	305	360	5	33	90	161	17,4
HYKS-...-B-180/125-...		125																	19,5
HYKS-...-B-200/125-...	200	125	M110 x 2	110	35	65	280	245	G 1 1/4	M42 x 2	495±4	8	340	400	5	33	100	213	22
HYKS-...-B-200/140-...		140																214	24,4

DIFFERENTIAL CYLINDER WITH HEAD FLANGE



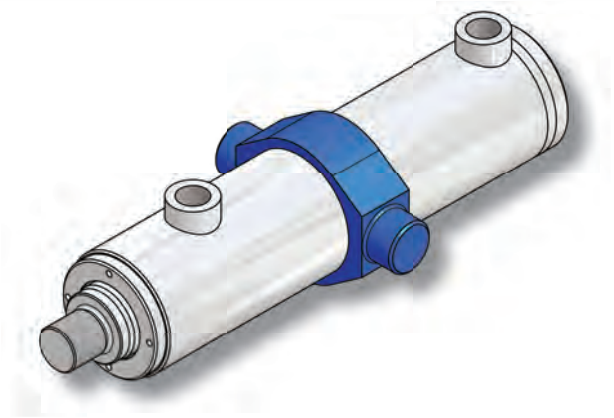


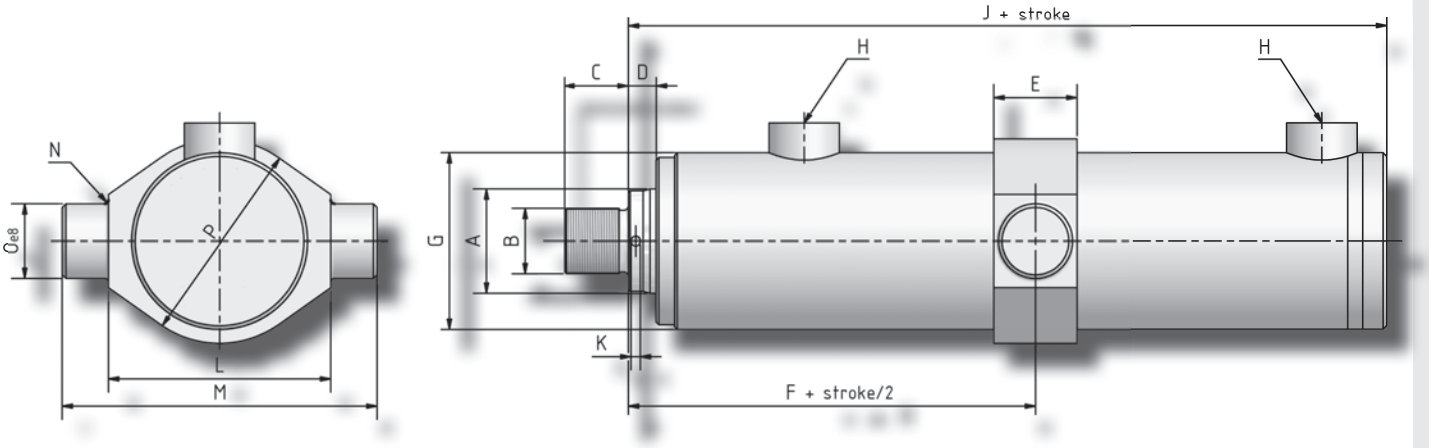


Differential cylinder with head flange

Type	Piston Ø (mm)	Piston rod Ø A (mm)	B	C	D	E	Fe8 Ø	G Ø	H		J	K Ø	L Ø	M Ø	N	O Ø	GIHR-K, SA-K, GK (equipm.)	Weight (kg)	
									W-Tube (Standard)	Metr.								for stroke 0mm	each 100mm of stroke
HYKS-...-K-32/18-...	32	18	M16 x 1,5	16	21	12	56	42	G 3/8	M18 x 1,5	130±2	3	78	98	3	9	20	2	0,7
HYKS-...-K-32/22-...		22																	0,8
HYKS-...-K-40/22-...	40	22	M16 x 1,5	16	26	15	65	50	G 3/8	M18 x 1,5	153±2	3	90	110	3	9	25	3	0,9
HYKS-...-K-40/28-...		28																	1
HYKS-...-K-50/28-...	50	28	M22 x 1,5	22	26,5	18	75	62	G 1/2	M22 x 1,5	165±2	4	100	125	3	11	30	5	1,3
HYKS-...-K-50/36-...		36																	1,6
HYKS-...-K-63/36-...	63	36	M28 x 1,5	28	28	22	90	75	G 1/2	M22 x 1,5	188±3	4	115	140	3	13	35	8	1,8
HYKS-...-K-63/45-...		45																	2,2
HYKS-...-K-80/45-...	80	45	M35 x 1,5	35	29	25	115	95	G 3/4	M27 x 2	210±3	5	150	180	4	13	40	14,5	2,9
HYKS-...-K-80/56-...		56																	3,5
HYKS-...-K-100/56-...	100	56	M45 x 1,5	45	34	35	140	120	G 3/4	M27 x 2	240±3	5	175	210	4	17	50	25,5	4,7
HYKS-...-K-100/70-...		70																	5,8
HYKS-...-K-125/70-...	125	70	M58 x 1,5	58	40	40	170	145	G 1	M33 x 2	270±3	6	210	250	5	22	60	41,5	6,4
HYKS-...-K-125/90-...		90																	7,7
HYKS-...-K-140/90-...	140	90	M65 x 1,5	65	45	45	190	165	G 1	M33 x 2	315±4	6	235	280	5	22	70	62	9,7
HYKS-...-K-140/100-...		100																	11
HYKS-...-K-160/100-...	160	100	M80 x 2	80	45	50	220	190	G 1 1/4	M42 x 2	350±4	8	270	320	5	30	80	91	12,6
HYKS-...-K-160/110-...		110																	14
HYKS-...-K-180/110-...	180	110	M100 x 2	100	50	60	250	220	G 1 1/4	M42 x 2	405±4	8	305	360	5	33	90	140	17,4
HYKS-...-K-180/125-...		125																141	19,5
HYKS-...-K-200/125-...	200	125	M110 x 2	110	55	65	280	245	G 1 1/4	M42 x 2	430±4	8	340	400	5	33	100	187	22
HYKS-...-K-200/140-...		140																188	24,4

DIFFERENTIAL CYLINDER WITH TRUNNION

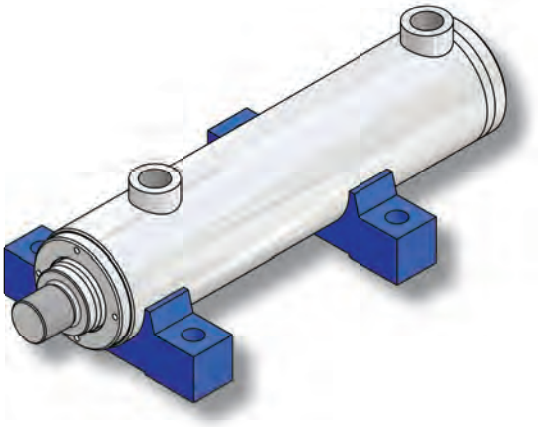


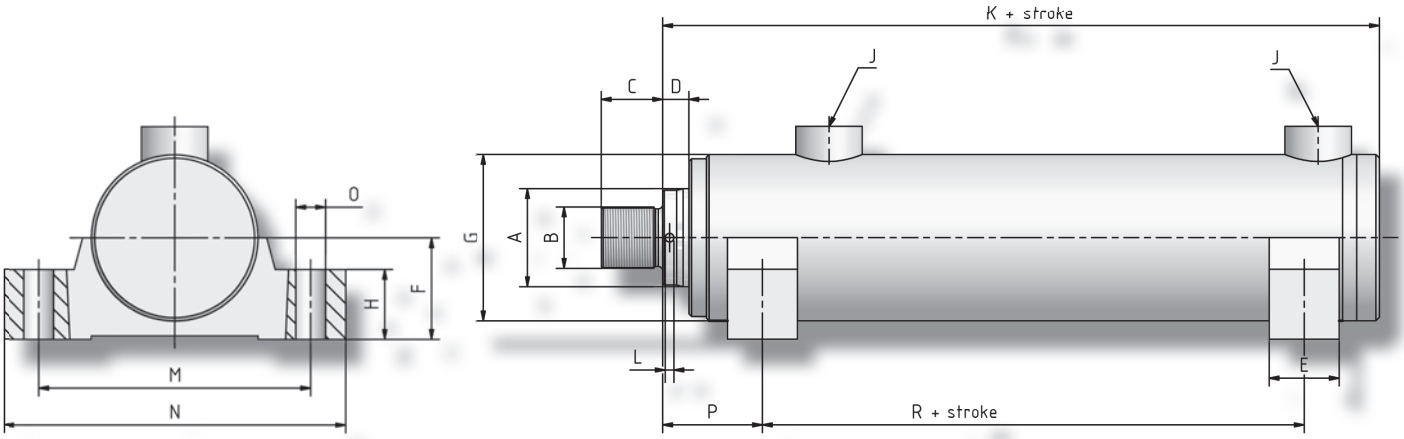


Differential cylinder with trunnion

Type	Piston Ø (mm)	Piston rod Ø A (mm)	B	C	D	E	F	G Ø	H		J	K Ø	L	M	N	Oe8 Ø	P Ø	GIHR-K, SA-K, GK (equipm.)	Weight (kg)	
									W-Tube (Standard)	Metr.									for stroke 0mm	each 100mm of stroke
HYKS-...-M-32/18-...	32	18	M16 x 1,5	16	15	25	90	42	G 3/8	M18 x 1,5	130±2	3	60	90	R1,6	20	60	20	1,5	0,7
HYKS-...-M-32/22-...		22																		0,8
HYKS-...-M-40/22-...	40	22	M16 x 1,5	16	15	30	100	50	G 3/8	M18 x 1,5	153±2	3	65	100	R1,6	25	65	25	2,5	0,9
HYKS-...-M-40/28-...		28																		1
HYKS-...-M-50/28-...	50	28	M22 x 1,5	22	15	35	105	62	G 1/2	M22 x 1,5	165±2	4	85	125	R1,6	30	80	30	4	1,3
HYKS-...-M-50/36-...		36																		1,6
HYKS-...-M-63/36-...	63	36	M28 x 1,5	28	15	40	120	75	G 1/2	M22 x 1,5	188±3	4	100	140	R2	35	90	35	6	1,8
HYKS-...-M-63/45-...		45																		2,2
HYKS-...-M-80/45-...	80	45	M35 x 1,5	35	15	45	135	95	G 3/4	M27 x 2	210±3	5	120	170	R2	40	110	40	10,5	2,9
HYKS-...-M-80/56-...		56																		3,5
HYKS-...-M-100/56-...	100	56	M45 x 1,5	45	20	55	160	120	G 3/4	M27 x 2	240±3	5	155	215	R2	50	140	50	19	4,7
HYKS-...-M-100/70-...		70																		5,8
HYKS-...-M-125/70-...	125	70	M58 x 1,5	58	20	65	180	145	G 1	M33 x 2	270±3	6	185	255	R2,5	60	165	60	32	6,4
HYKS-...-M-125/90-...		90																		7,7
HYKS-...-M-140/90-...	140	90	M65 x 1,5	65	25	70	205	165	G 1	M33 x 2	315±4	6	210	290	R2,5	65	190	70	49	9,7
HYKS-...-M-140/100-...		100																		11
HYKS-...-M-160/100-...	160	100	M80 x 2	80	25	80	230	190	G 1 1/4	M42 x 2	350±4	8	230	335	R2,5	75	215	80	72,5	12,6
HYKS-...-M-160/110-...		110																		14
HYKS-...-M-180/110-...	180	110	M100 x 2	100	30	90	260	220	G 1 1/4	M42 x 2	405±4	8	280	340	R3	85	245	90	113	17,4
HYKS-...-M-180/125-...		125																		19,5
HYKS-...-M-200/125-...	200	125	M110 x 2	110	35	100	275	245	G 1 1/4	M42 x 2	430±4	8	290	400	R3	90	270	100	149,5	22
HYKS-...-M-200/140-...		140																	150	24,4

DIFFERENTIAL CYLINDER WITH TANGENTIAL FEET



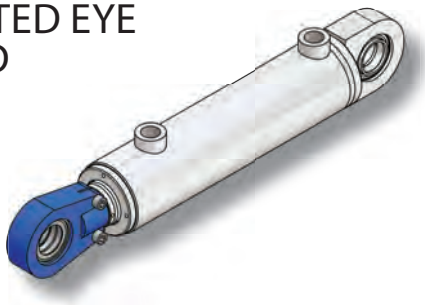


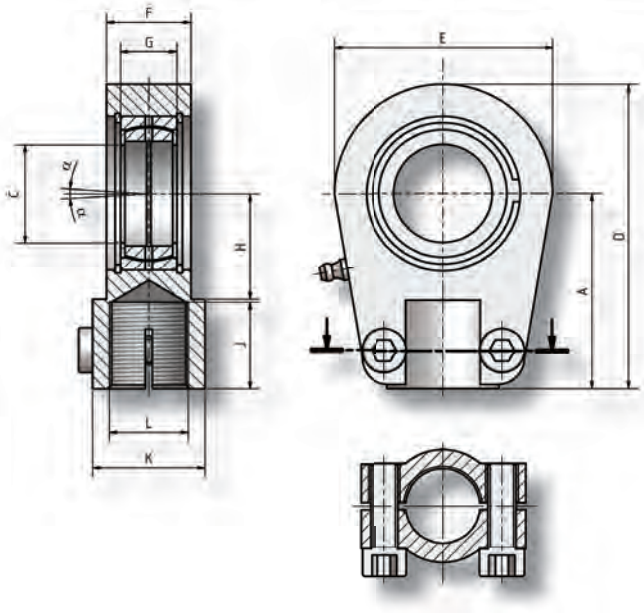
Differential cylinder with tangential feet

Type	Piston Ø (mm)	Piston rod Ø A (mm)	B	C	D	E	F	G Ø	H	J		K	L Ø	M	N	O Ø	P	R	GIHR-K, SA-K, GK (equipm.)	Weight (kg)	
										W-Tube (Standard)	Metr.									for stroke 0mm	each 100mm of stroke
HYKS-...-T-32/18-...	32	18	M16 x 1,5	16	15	20	30	42	20	G 3/8	M18 x 1,5	130±2	3	75	95	11	45	60	20	2	0,7
HYKS-...-T-32/22-...		22																			0,8
HYKS-...-T-40/22-...	40	22	M16 x 1,5	16	15	25	35	50	25	G 3/8	M18 x 1,5	150±2	3	90	115	11	45	75	25	3	0,9
HYKS-...-T-40/28-...		28																			1
HYKS-...-T-50/28-...	50	28	M22 x 1,5	22	15	25	40	62	30	G 1/2	M22 x 1,5	165±2	4	105	130	11	45	85	30	5	1,3
HYKS-...-T-50/36-...		36																			1,6
HYKS-...-T-63/36-...	63	36	M28 x 1,5	28	15	30	48	75	35	G 1/2	M22 x 1,5	190±3	4	120	150	13	50	90	35	8	1,8
HYKS-...-T-63/45-...		45																			2,2
HYKS-...-T-80/45-...	80	45	M35 x 1,5	35	15	40	58	95	40	G 3/4	M27 x 2	210±3	5	155	195	17	57	110	40	14,5	2,9
HYKS-...-T-80/56-...		56																			3,5
HYKS-...-T-100/56-...	100	56	M45 x 1,5	45	20	50	70	120	50	G 3/4	M27 x 2	240±3	5	185	230	21	68	120	50	25,5	4,7
HYKS-...-T-100/70-...		70																			5,8
HYKS-...-T-125/70-...	125	70	M58 x 1,5	58	20	55	85	145	55	G 1	M33 x 2	270±3	6	220	270	25	75	140	60	41	6,4
HYKS-...-T-125/90-...		90																			7,7
HYKS-...-T-140/90-...	140	90	M65 x 1,5	65	25	60	95	165	60	G 1	M33 x 2	315±4	6	260	320	28	85	150	70	61,5	9,7
HYKS-...-T-140/100-...		100																			11
HYKS-...-T-160/100-...	160	100	M80 x 2	80	25	70	108	190	70	G 1 1/4	M42 x 2	350±4	8	290	360	31	95	165	80	91	12,6
HYKS-...-T-160/110-...		110																		91,5	14
HYKS-...-T-180/110-...	180	110	M100 x 2	100	30	80	120	220	80	G 1 1/4	M42 x 2	405±4	8	330	405	37	105	180	90	138,5	17,4
HYKS-...-T-180/125-...		125																		139,5	19,5
HYKS-...-T-200/125-...	200	125	M110 x 2	110	35	85	137	245	85	G 1 1/4	M42 x 2	430±4	8	370	450	37	115	200	100	184	22
HYKS-...-T-200/140-...		140																		185	24,4

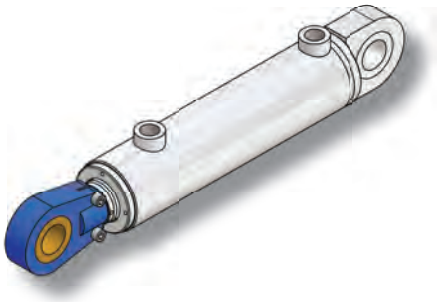
PISTON ROD EYES

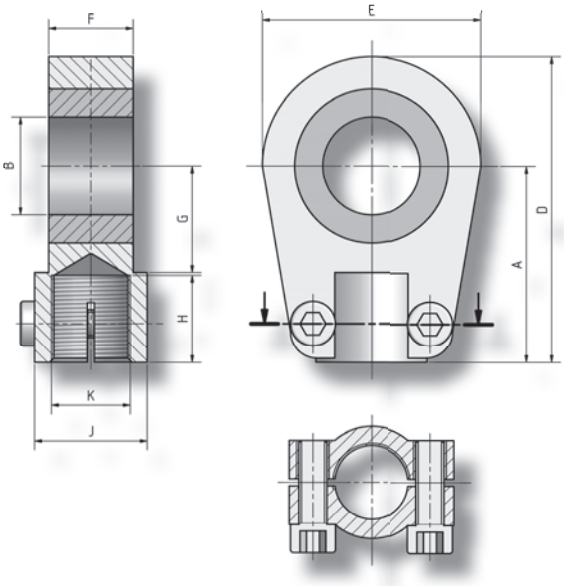
ARTIUCLATED EYE ROD SIDED





SWIVEL EYE ROD SIDED





Articulated eye

Type	A	C Ø	D	E	F	G	H	J	K	L	α	Weight (kg)
GIHR-K20	50	20 -0,010	80	56	19	16	25	17	25	M16 x 1,5	9°	0,5
GIHR-K25	50	25 -0,010	80	56	23	20	28	17	25	M16 x 1,5	7°	0,5
GIHR-K30	60	30 -0,010	94	64	28	22	30	23	32	M22 x 1,5	6°	0,8
GIHR-K35	70	35 -0,010	112	78	30	25	38	29	40	M28 x 1,5	6°	1,2
GIHR-K40	85	40 -0,012	135	94	35	28	45	36	49	M35 x 1,5	7°	2
GIHR-K50	105	50 -0,012	168	116	40	35	55	46	61	M45 x 1,5	6°	3,8
GIHR-K60	130	60 -0,012	200	130	50	44	65	59	75	M58 x 1,5	6°	5,4
GIHR-K70	150	70 -0,015	232	154	55	49	75	66	86	M65 x 1,5	6°	8,5
GIHR-K80	170	80 -0,015	265	176	60	55	80	81	105	M80 x 2	6°	12
GIHR-K90	210	90 -0,020	323	206	65	60	90	101	124	M100 x 2	5°	21,5
GIHR-K100	235	100 -0,020	360	230	70	70	105	125	138	M110 x 2	7°	27,5

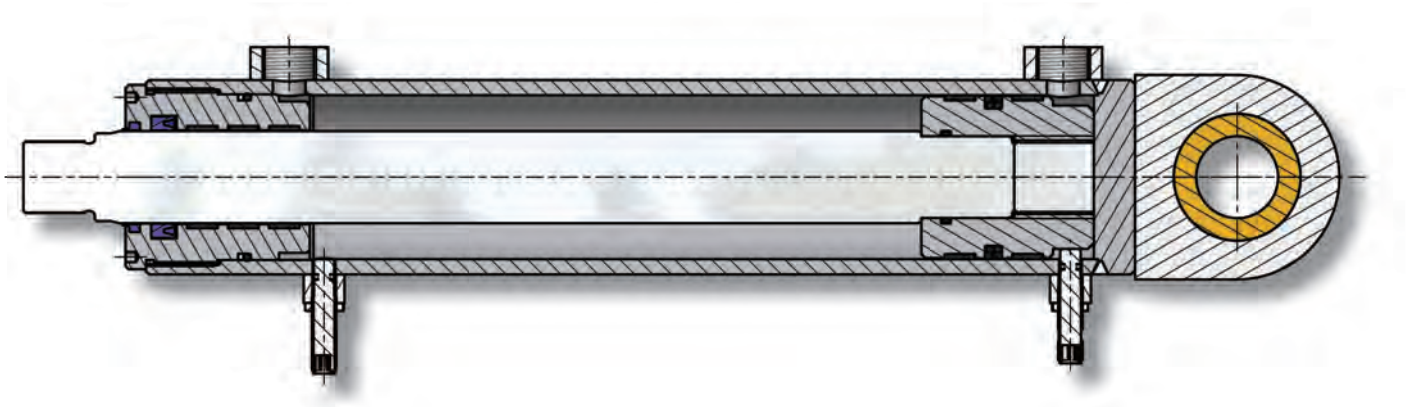
Swivel eye

Type	A	B H11 Ø	D	E	F	G	H	J	K	Weight (kg)
SA-K20	50	20	80	56	19	25	17	25	M16 x 1,5	0,5
SA-K25	50	25	80	56	23	28	17	25	M16 x 1,5	0,5
SA-K30	60	30	94	64	28	30	23	32	M22 x 1,5	0,8
SA-K35	70	35	112	78	30	38	29	40	M28 x 1,5	1,2
SA-K40	85	40	135	94	35	45	36	49	M35 x 1,5	2
SA-K50	105	50	168	116	40	55	46	61	M45 x 1,5	3,8
SA-K60	130	60	200	130	50	65	59	75	M58 x 1,5	5,4
SA-K70	150	70	232	154	55	75	66	86	M65 x 1,5	8,5
SA-K80	170	80	265	176	60	80	81	105	M80 x 2	12
SA-K90	210	90	323	206	65	90	101	124	M100 x 2	21,5
SA-K100	235	100	360	230	70	105	125	138	M110 x 2	27,5

END POSITION SENSING AND LINEAR POSITION MEASUREMENT SYSTEM

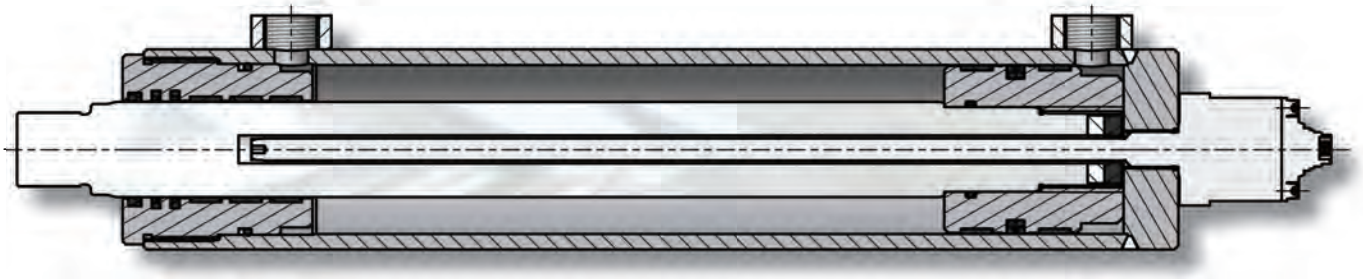
END POSITION SENSOR

+ available either with plug-in connector or moulded PU cable
+ high operational safety due to the detection of end position directly at the piston
+ lower installation costs, no external mechanism necessary
+ can be integrated into all series



LINEAR POSITION MEASUREMENT SYSTEM

+ impervious to shock, vibration, temperature, contamination and moisture
+ wear and maintenance-free due to non-contact detection of the measuring position
+ absolute output signal, even after a power interruption, no homing run required
+ high resolution, reproducibility and linearity
+ easy installation, no power supply to the position encoder is needed
+ pressure resistant to 600 bar, for integration into hydraulic cylinders
+ reliable operation, even under extreme environmental conditions
+ individual setting of the zero point possible



PLEASE NOTE !
The total length of the cylinder can vary slightly upwards depending on the size due to the installation of the end position sensor or the linear displacement measurement system. Our technicians would be glad to assist you with any questions about your particular needs. Please contact us.

CYLINDER REQUEST FORM

name of company _____
street _____
postal code/city _____
contact _____
telephone _____
fax _____
e-Mail _____
customer number _____

acc. to offer _____
dated _____
acc. to drawing _____
modification _____
previous order _____
delivered on _____
remarks _____

quantity: _____ series: HYKS

piston Ø _____ mm rod Ø _____ mm stroke _____ mm installation length _____ mm

ò differential cylinder ò synchronous cylinder ò plunger cylinder
ò pressure cylinder ò venting both ends ò pull cylinder

Mounting type:

ò base-end bearing ò head flange ò Piston rod eye
ò swivel eye ò trunnion ò articulated eye, clampable
ò articulated eye ò tangential feet ò swivel eye, clampable
ò base flange ò custom mount ò fork head, clampable

Piston rod:

ò standard, chrome-plated ò hardened, chrome-plated
ò stainless steel, chrome-plated ò custom coating

_____
_____

Seals:

ò seal with retaining function ò stick-slip-free seal
ò seal for fire resistant fluids ò custom seal

_____
_____

Technical data:

pressure force _____ kN test pressure _____ bar
tractive force _____ kN working pressure _____ bar

Stroke speed:

extension _____ m/s strokes _____ min, h, day
retraction _____ m/s oper. hrs. _____ hrs/day

Type of use:

purpose of the cylinder: _____ installation location: ò indoors
mounting position of the cylinder: _____ ò outdoors

Additional information:

ambient temperature: _____°C operating temperature _____ °C remarks: _____

Medium:

ò HLP _____ ò other _____

Coating:

ò primed ò RAL _____ ò other _____

Additional remarks:

_____
_____

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