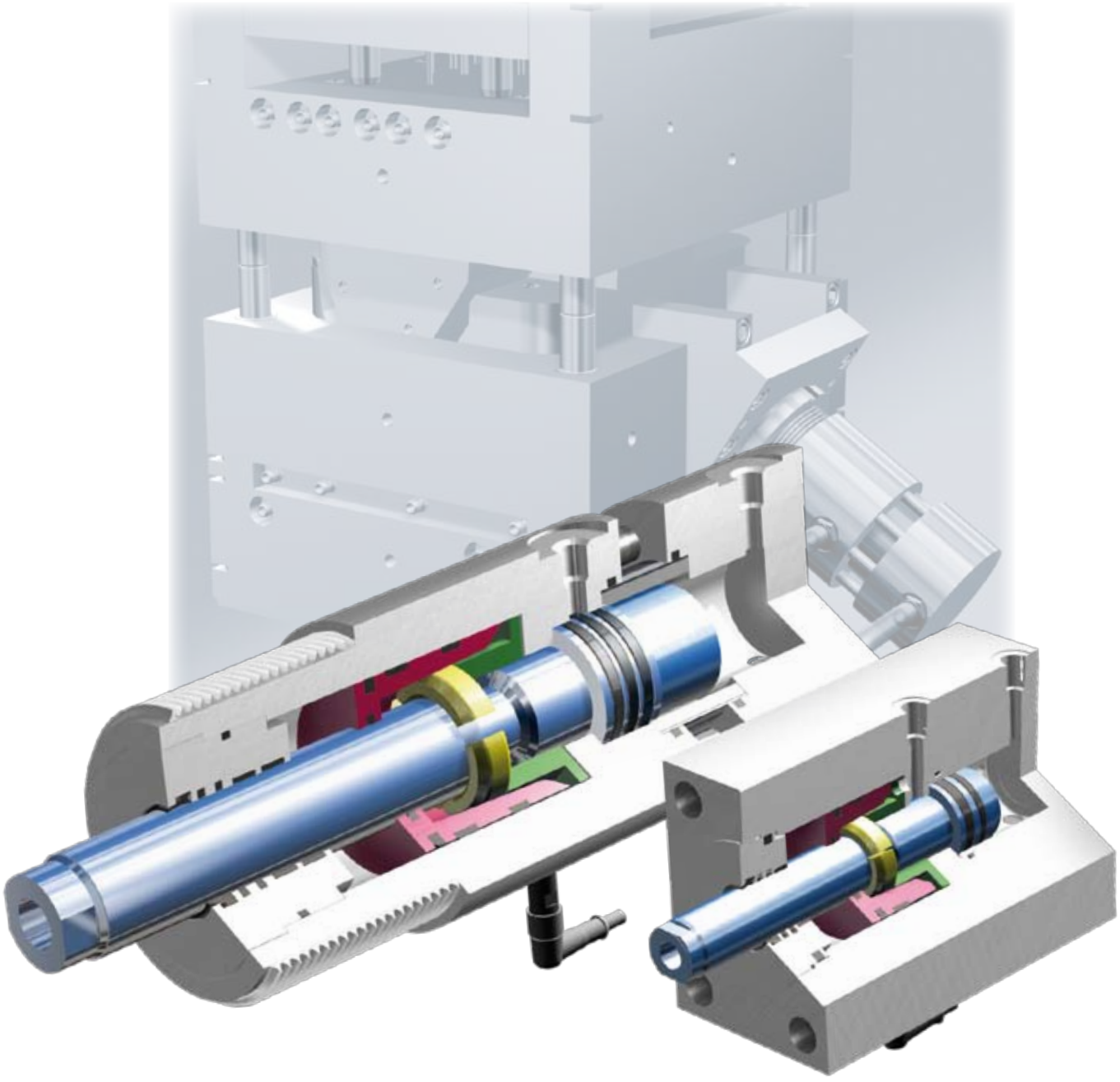
CyPull • CyBlock

Locking Core Pull Cylinders • Short Stroke Block Cylinder



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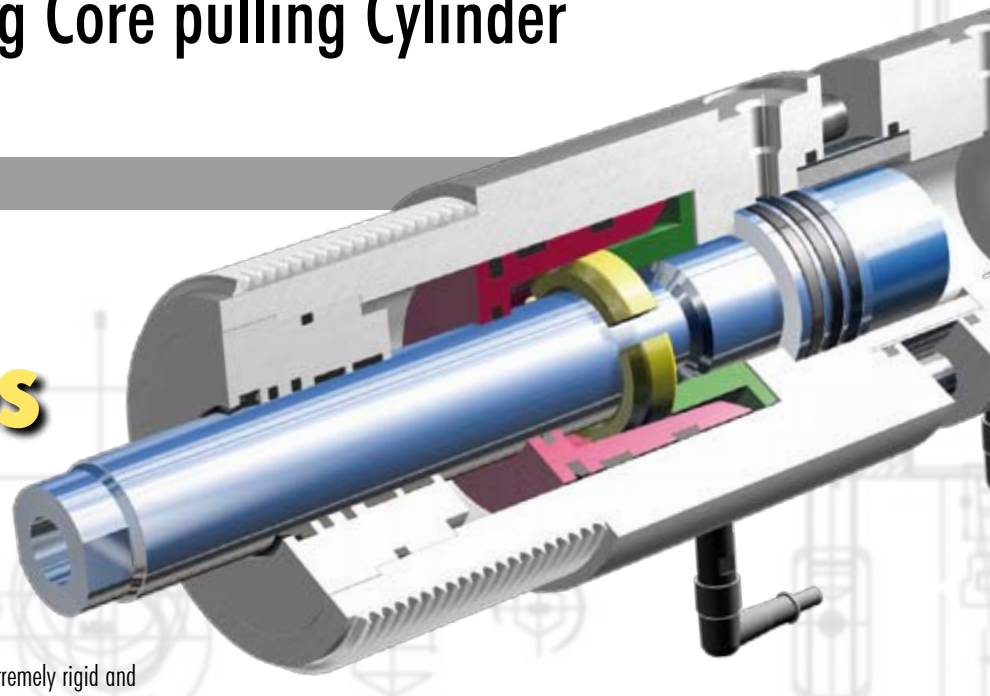
CyPull Locking Core pulling Cylinder



...simplifies mould and die construction

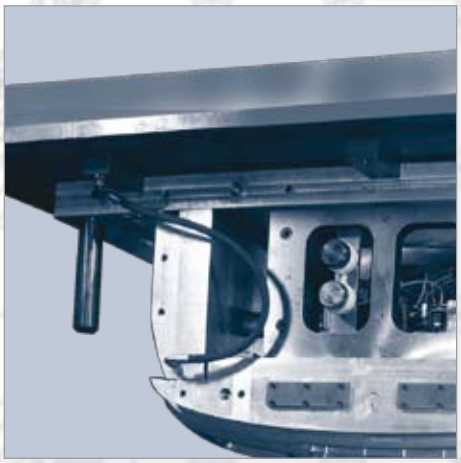
Hydraulic cylinders are essential as a device for moving and positioning of cores in mould and die construction. Successful designers have been using the CyPull locking core pull cylinders for over 20 years, producing complex technical parts precisely and economically.

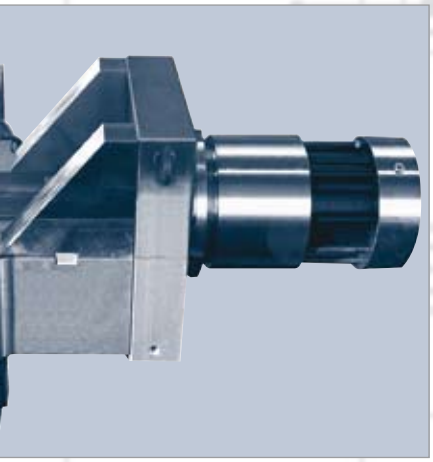
Common hydraulic cylinders often cannot bear up against the high internal mould pressure. Therefore they need additional locking mechanisms. The **CyPull** has an integrated positive locking device which enables most complex moving processes even in confined area. The holding forces of **CyPull** are significantly higher than the required stroke forces so that smaller installation sizes can be used.

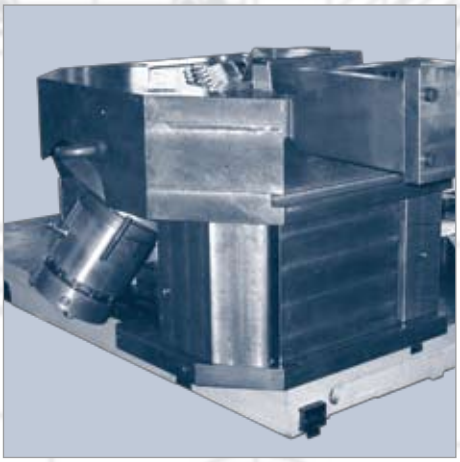
The design is extremely rigid and normally does not need any further maintenance. Once adjusted the cylinder achieves an ever consistent high workpiece quality, increasing the productivity.

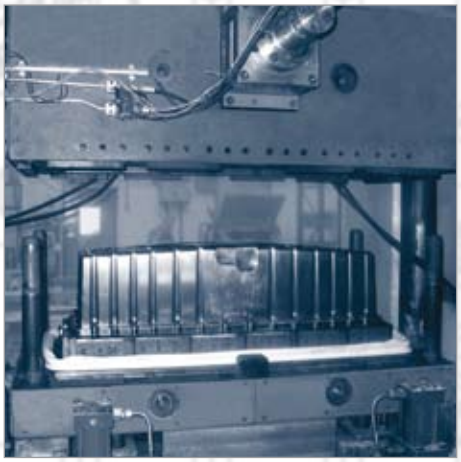
As an option proximity switches are available for an optimal adaption of cylinder to the injection mould machine.

To meet the different applications that occur in the automotive, medical and electronic industry a wide range of different **CyPull** cylinder types have been developed to meet every application.

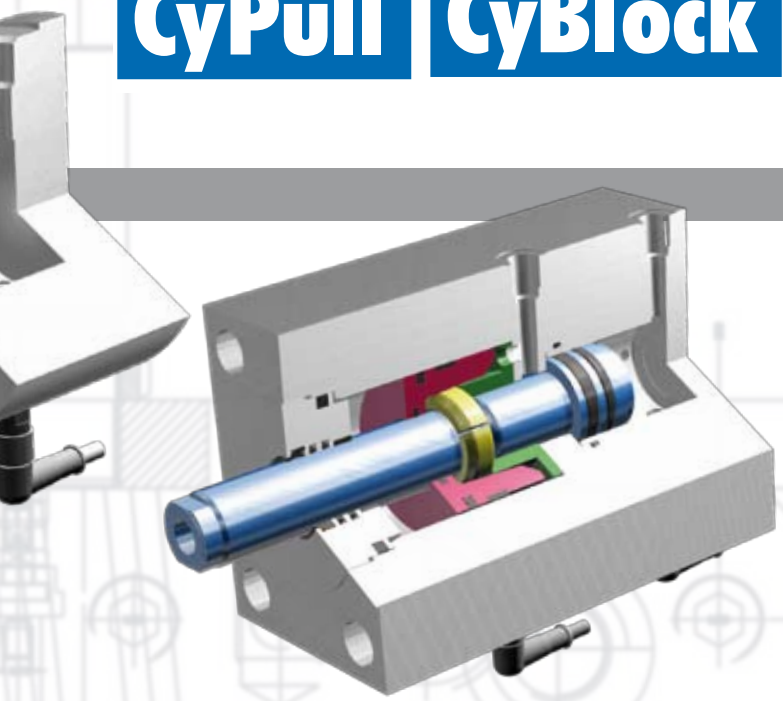






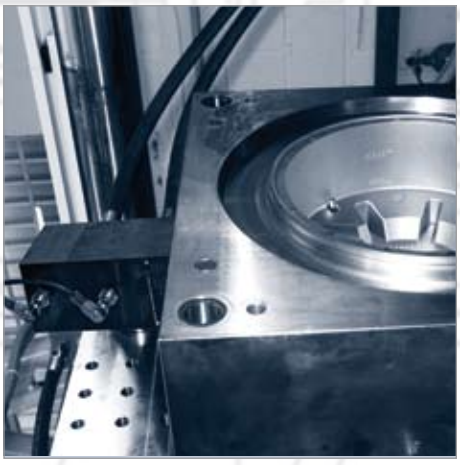


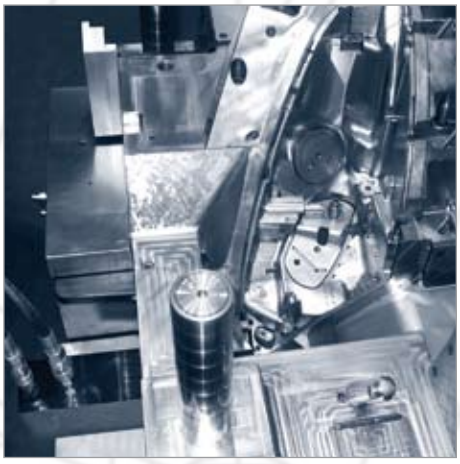
CyPull CyBlock



The compact alternative:
Short stroke block cylinder series HSZ/HDZ

The CyBlock block cylinder was especially developed for injection moulding cores in tool and mould manufacturing which require a safe holding with only a short mould release stroke. It is a compact alternative to the CyPull locking core pull cylinders and is functionally derived from the hydromechanical clamping element CyDim which is equipped with an integrated locking system like the CyPull cylinders.

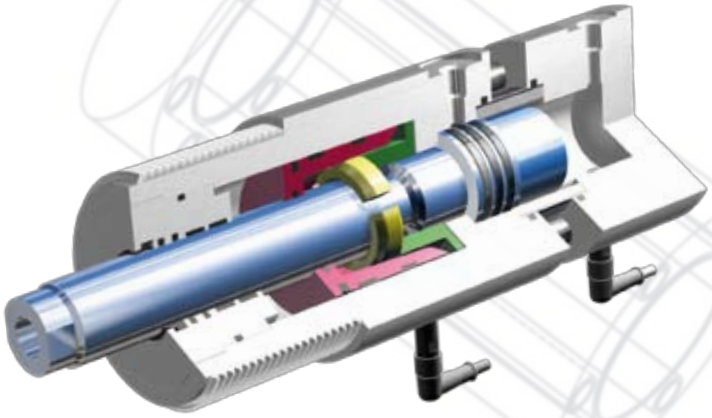




Content

CyPull Overview Locking Core Pull Cylinders

Overview



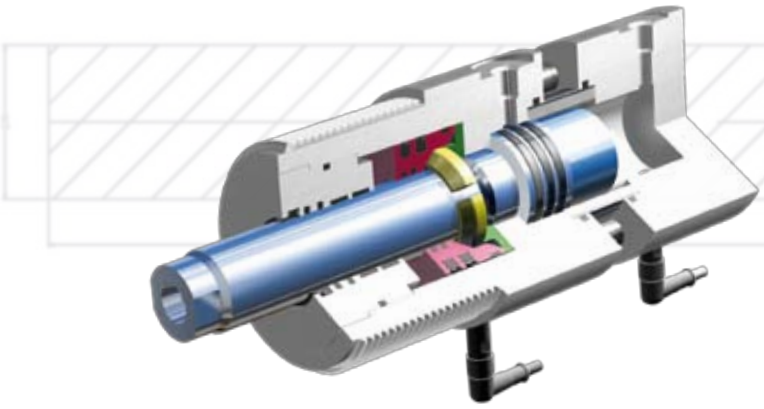
Series	HS/HSD	HD/HDD
Design	Tie rod version with round cross section	
Nom size ∅	25-200 mm	32-200 mm
Stroke length	free choice	
Holding forces	high holding forces in locked position	
max. Pressure	200 bar	
Locking	hydraulic with by-pass	
Locking indicator	electronic	
Seals	HS: PTFE/NBR; HSD: PTFE/Viton	HD: PTFE/NBR; HDD: PTFE/Viton

Series **HS/HSD*** (→Page 18-19)

Series with hydraulic locking and preload which can compensate in critical cases elasticities and tolerances of the tool

- hydraulic locking with by-pass
- Piston diameter 25-200 mm

*Series HSD is suited especially for applications in high temperature ranges up to 180°C (Special Viton seals, hardened tie rods)

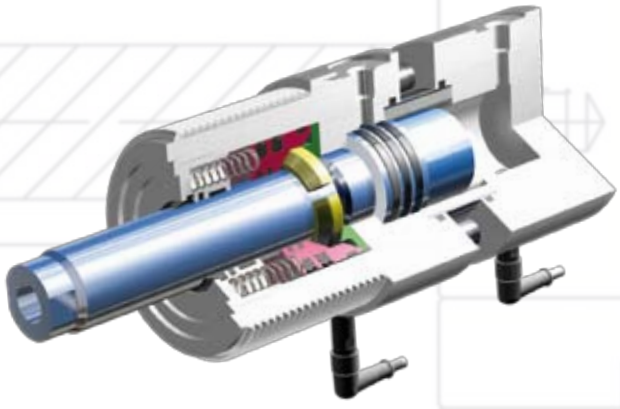


Series **HD/HDD*** (→Page 20-21)

Series with hydraulic locking without pre-load

- hydraulic locking with by-pass
- Piston diameter 32-200 mm

*Series HDD is suited especially for applications in high temperature ranges up to 180°C (Special Viton seals, hardened tie rods)



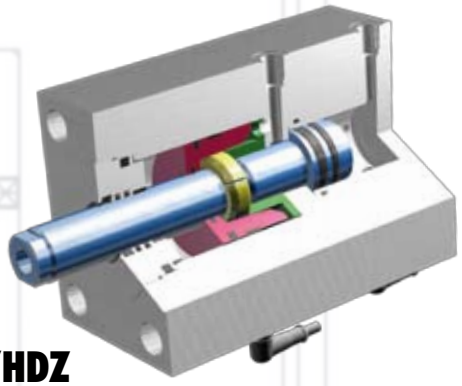
Series **HX** (→Page 22-23)

Standard series for standard applications, without pre-load

- spring operated locking
- Piston diameter 25-125 mm

CyBlock Block Cylinder

HX	Special designs of HSD/HDD	Block Cylinder HSZ/HDZ
Tie rod version with round cross section		block housing
25-125 mm	25-200 mm	20, 25, 32, 40 mm
free choice		20, 25, 35, 40 mm
high holding forces in locked position		
200 bar		160 bar
spring operated	hydraulic with by-pass	hydraulic
mechanical/electronic	electronic	electronic
PTFE/NBR	PTFE/Viton	PTFE/Viton



Series **HSZ/HDZ**

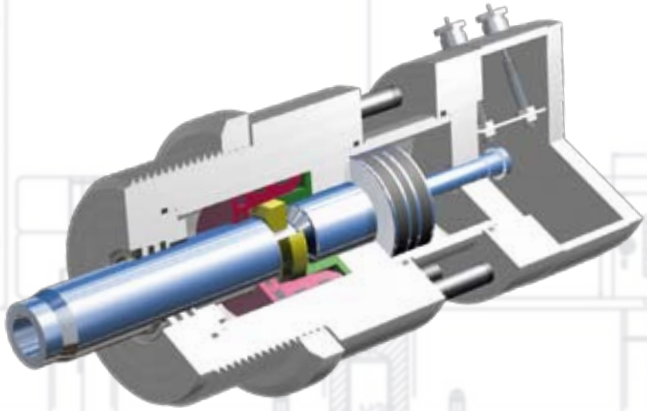
Special series for short stroke applications (→Page 34-35)

- Nom. size 20 - 40 mm (HSZ)
- Nom. size 25 - 50 mm (HDZ)

Accessories

The complete mounting system for easy adaption to existing tools and moulds (→Page 14, 24-25):

- Pressure screw with cone for alignment compensation
- Counterpiece to the pressure screw
- Lock nuts
- Mounting flange



Special designs of HSD/HDD

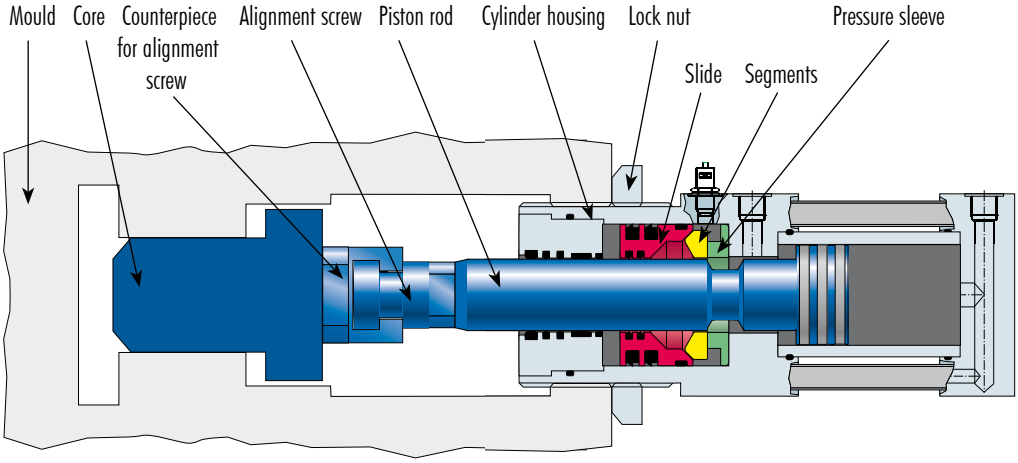
Examples for special designs on customer demand for die casting applications, with enlarged retraction forces (→Page 16-17)

Optional accessories

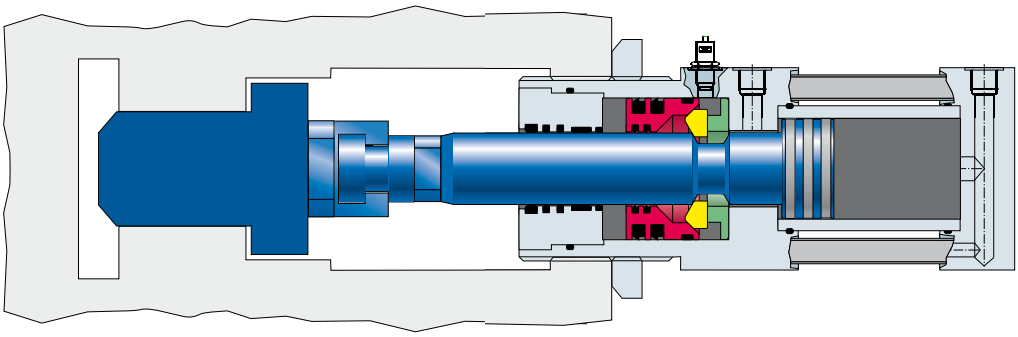
- Integrated proximity switches for the sensing of the locking position (→Page 28 et sqq.)

CyPull

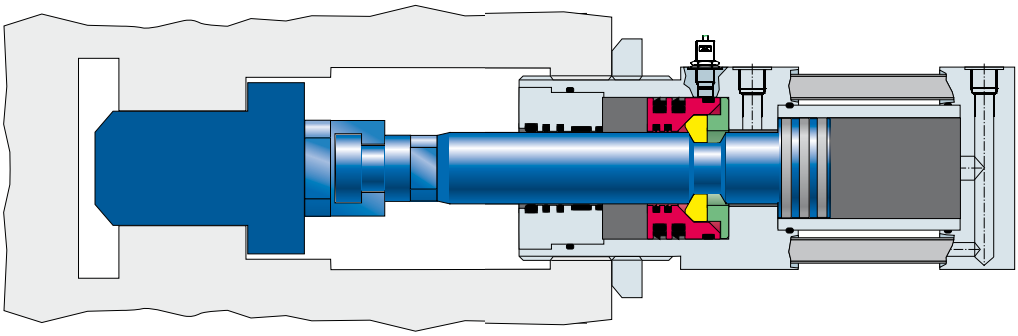
Functional process without pre-load, Series **HD** and **HX**



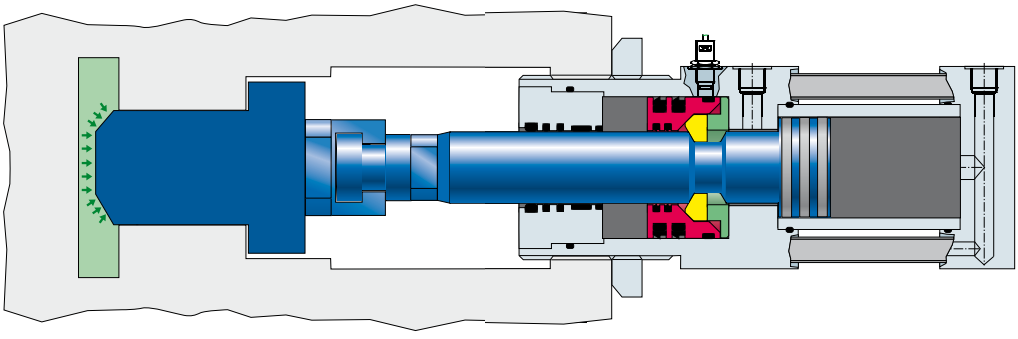
Released position



Start of locking



Completely locked position



Locked position with applied injection pressure

Functional process

All CyPull locking core pull cylinders work basically according to double acting cylinders whose piston rod is extended by applying hydraulic pressure.
When the final position of the piston rod is reached the locking slide moves in converse direction and presses the locking segments into the annular groove of the piston rod. So the segments are fixed in radial and axial position, that means: the piston rod ist positively locked. The hydraulic pressure can be switched off.
The retraction of the piston rod is operated by pressurising the rod sided piston surface. This counter pressure pushes the slide off its locking position and the segments move out of the annular groove while the piston rod retracts.

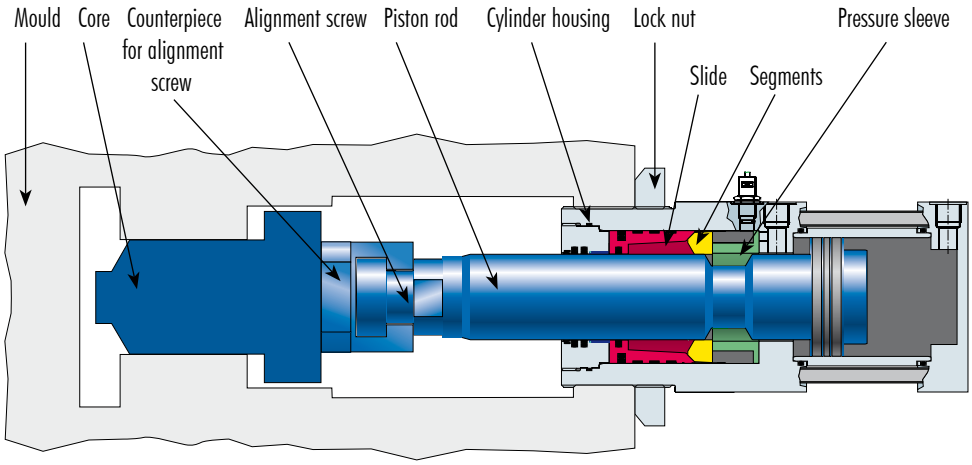
Series HD: the locking slide is operated by hydraulic pressure which is branched off with a by-pass drilling from the main hydraulic ports for extending and retracting the piston rod. This enables very fast stroke cycles.

Series HX: the slide is locked with spring operation and released hydraulically.

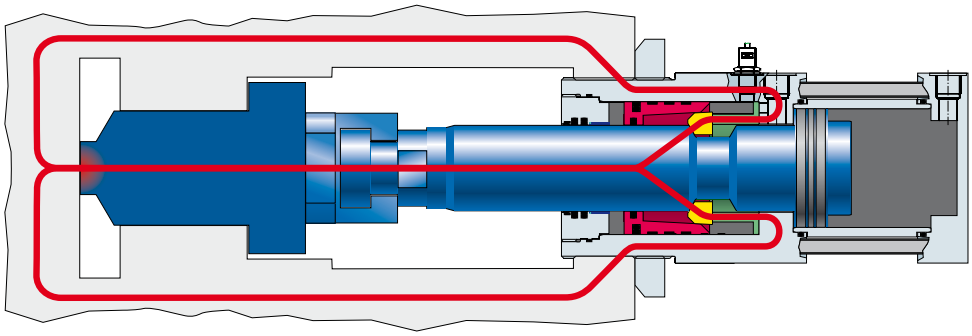
With the series HD and HX the piston rod always reaches one defined final position without the possibility to compensate tolerances or elasticities. The lock proceeds **with positive lock without pre-load.**

CyPull

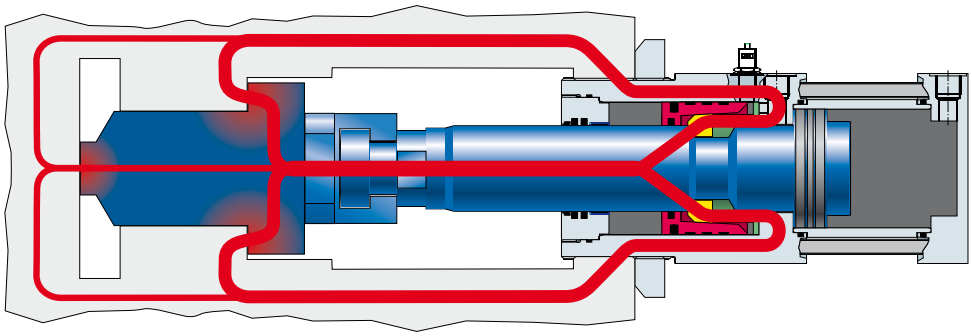
Functional process with pre-load, Series **HS**



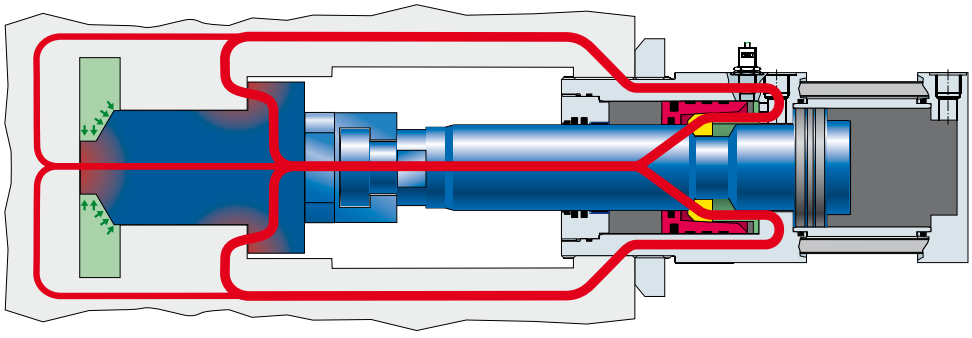
Released position



Start of locking (red curve: force displacement)



Completely locked position



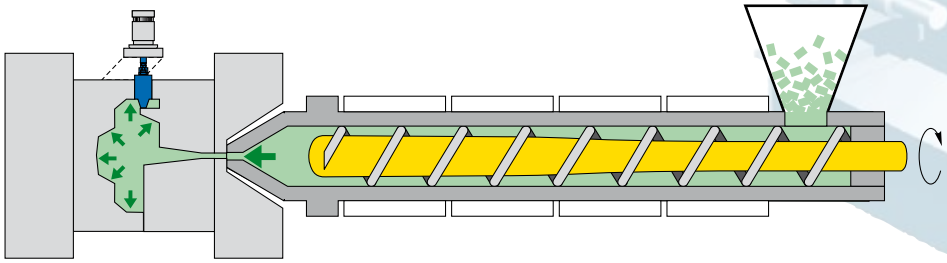
Locked position with applied injection pressure

Characteristic functional process series **HS**

The locking system of series **HS** is operated hydraulically. In addition the locking segments can create a pre-load. The locking slide and the segments have a characteristic cone shaped contour which enables the piston rod to lock within a defined tolerance range. This tolerance range can reach up to **1 mm stroke**. That means that the final extended position can vary within this range but is always locked reliably. In this range a pre-load is generated.
This behaviour of the piston rod has advantages in the case of critical tool or mould situations with the danger of elasticity. These are dependant of the processed material and pressure which can lead to flash.
The significant advantage of the design of series HS is the possibility to compensate elasticity within a defined range.

For the choice of the adequate CyPull cylinder the following factors must be regarded:

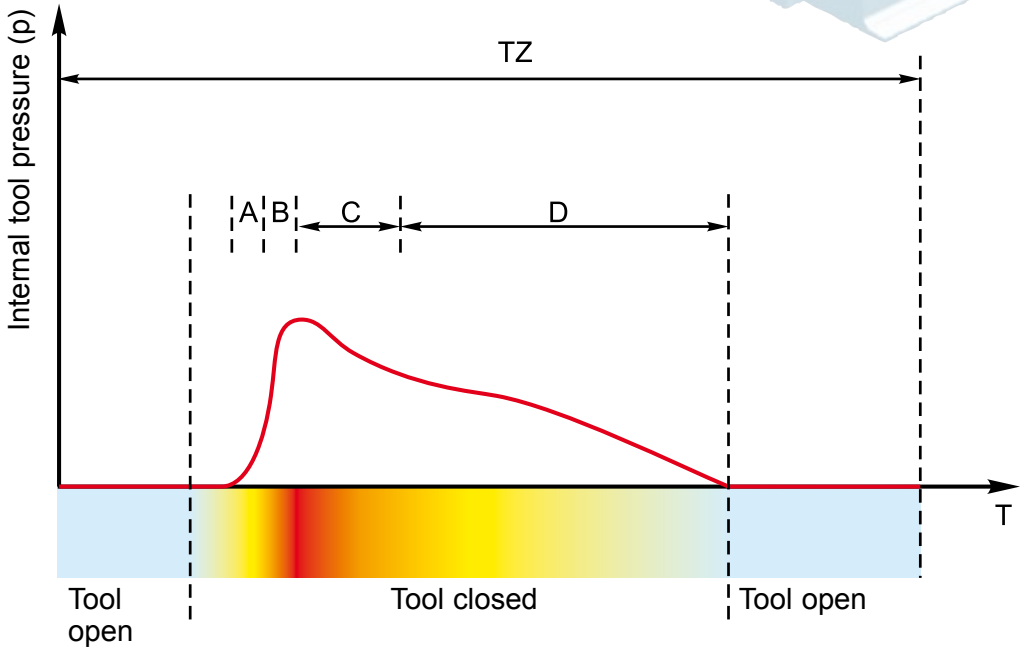
- Internal tool pressure
- Pressurised core surface, recommended cylinder size
- Type of core - is pre-load required or not?



Internal mould pressure

After the tool is locked and filled completely the material is highly compressed, i. e. the internal pressure increases very much. In this phase cores and slides are exposed to the maximum pressure load. This pressure decreases when the material cools down and contracts. The red curve in the diagram on the right shows the **Cyclical pressure distribution** during an injection cycle.

A: filling
B: compression
C: shaping of parts
D: cooling of shaped parts
TZ: cycle



CyPull

Depending on the processed material different injection pressures are demanded as shown in the table on the right. This pressure can reach values far above 1000 bar which means an extreme load for tools and cores. The higher the pressure peaks are the more the danger of elasticities increases, particularly with filigree and complex shapes.

Material	average injection pressure*
PP, PS, PE	600-800 bar
ABS, PPS	800-1000 bar
Glass fibre reinforced	1000-1400 bar

*These are only guide values which can be exceeded significantly in some cases.

Recommended cylinder sizes for different injection mould materials, Series **HS****

depending on the pressurised core surface

pressurised area (mm^2) / Material	300	500	1000	1500	2000	3000	4000	5000	6000	7000	8000
PP, PS, PE	HS 25	HS 25	HS 32	HS 40	HS 50	HS 50	HS 63	HS 80	HS 80	HS 80	HS100
ABS, PPS	HS 25	HS 25	HS 40	HS 40	HS 50	HS 63	HS 80	HS 80	HS100	HS100	HS100
Glass fibre reinforced	HS 25	HS 32	HS 40	HS 50	HS 63	HS 80	HS 80	HS100	HS100	HS125	HS125

Recommended cylinder sizes for different injection mould materials, Series **HD****

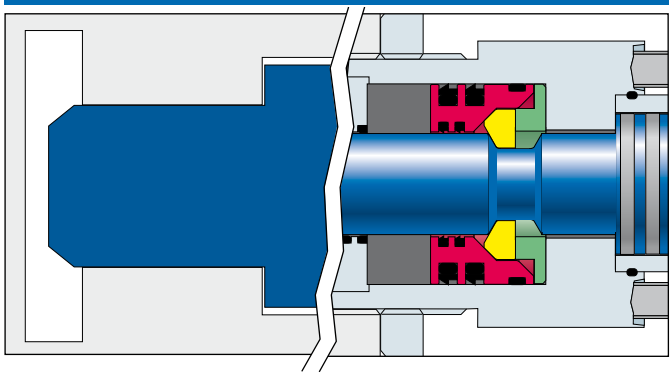
depending on the pressurised core surface

pressurised area (mm^2) / Material	300	500	1000	1500	2000	3000	4000	5000	6000	7000	8000
PP, PS, PE	HD 32	HD 32	HD 40	HD 50	HD 63	HD 80	HD 80	HD100	HD100	HD100	HD125
ABS, PPS	HD 32	HD 32	HD 50	HD 63	HD 63	HD 80	HD100	HD100	HD125	HD125	HD125
Glass fibre reinforced	HD 32	HD 40	HD 50	HD 63	HD 80	HD100	HD100	HD125	HD125	HD160	HD160

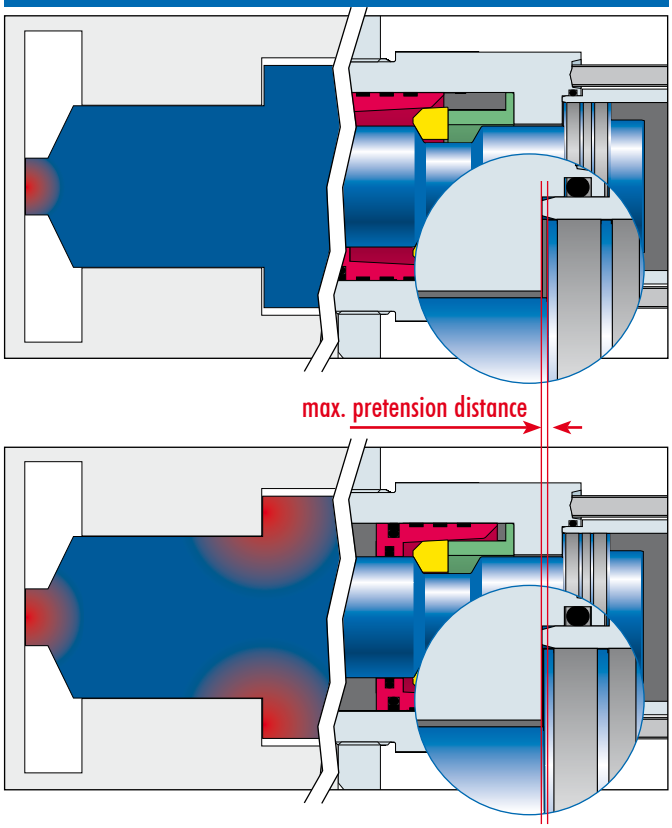
**Note: This table should only be used as a guide to correct cylinder selection and assumes that the cylinders are mounted and adjusted to the tool correctly.

Type of core - is pre-load requested or not?

Without pre-load: Series HX and HD

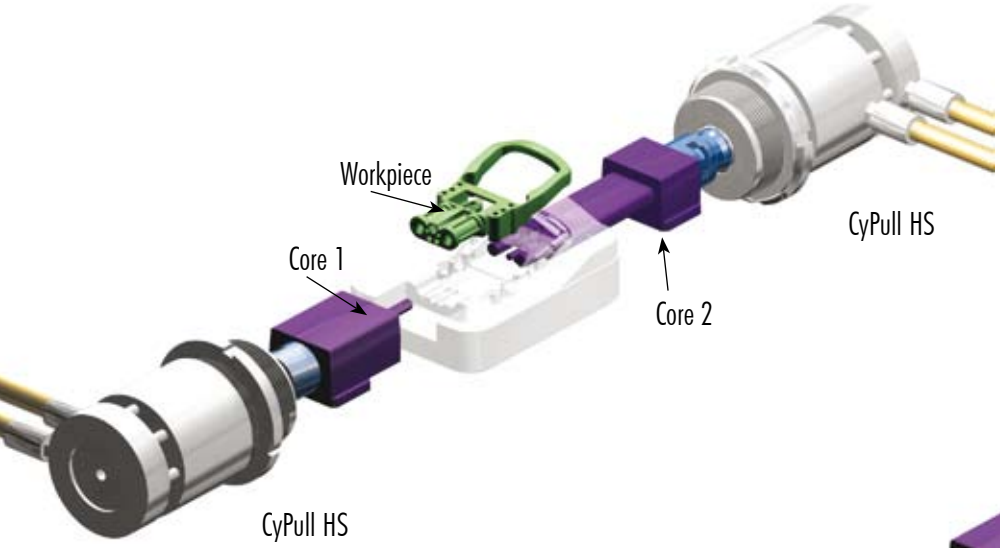


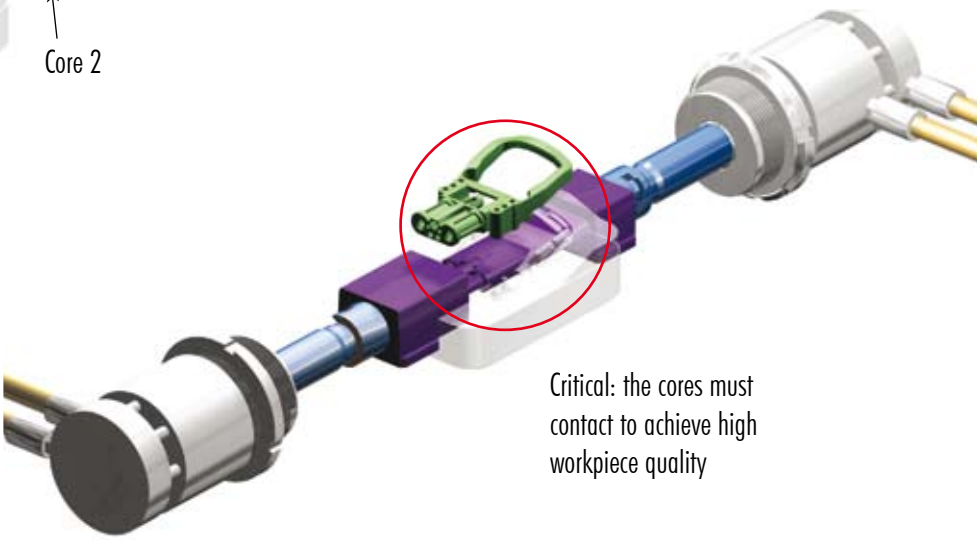
With pre-load: Series HS



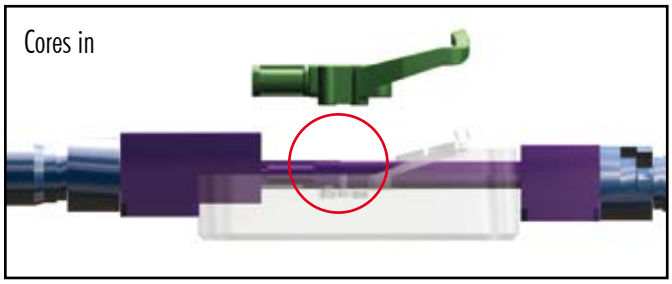
Core situation	Stroke	Examples	recommended series
Fully exposed cores with no shut off	10-80 mm	core pins	**HX, HD**
Touching, laterally injected cores	10-80 mm	simple breakups; tool-protection against flash	**HX, HD**
A pair of partially touching cores	10-200 mm	underfloor slides; main- and multiple cores; two component applications; multiple insert parts	**HS**
Deflection cores	10-200 mm	underfloor slides; touching cores	**HS**
Cores with insert parts	10-200 mm	rough pressing of insert parts	**HS**
Generally for strokes of more than 80 mm			**HS**

Example 1: a pair of touching cores





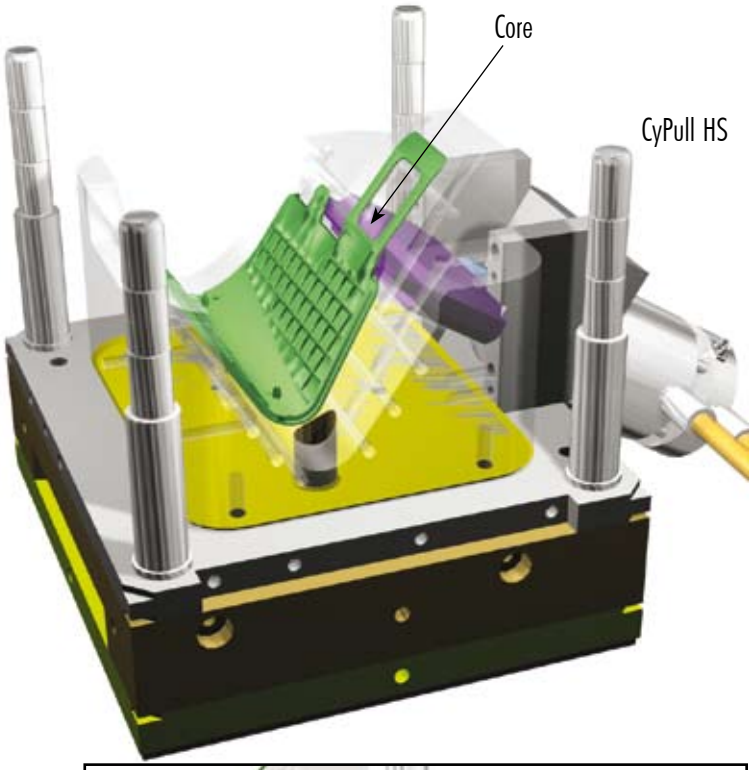
Critical: the cores must contact to achieve high workpiece quality

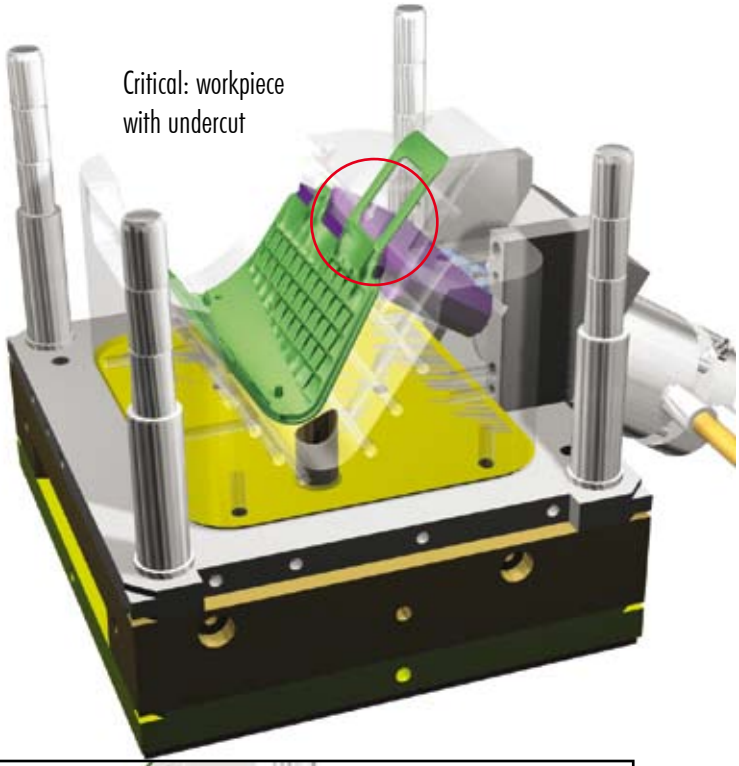


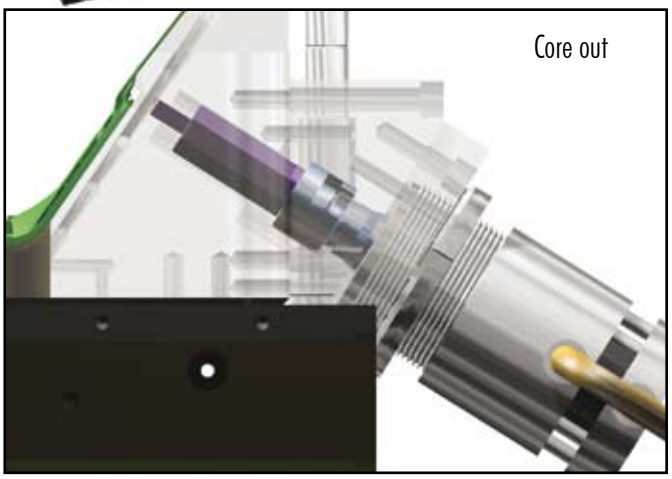
If two counteracting cores must build a "free of flash" aperture, it is necessary that the cores reach the absolutely defined final position.

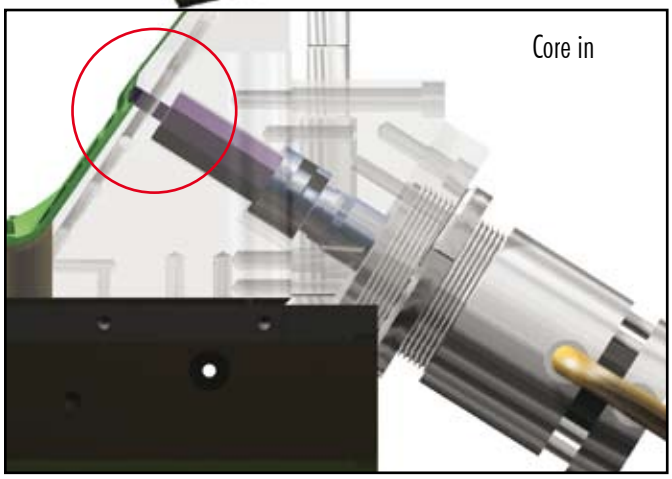
The cores with their very complex contour travel into each other and are extremely exposed to the high internal pressure on their large surface area. Therefore we highly recommend the use of series **HS** in those cases.

Example 2: Underfloor slides



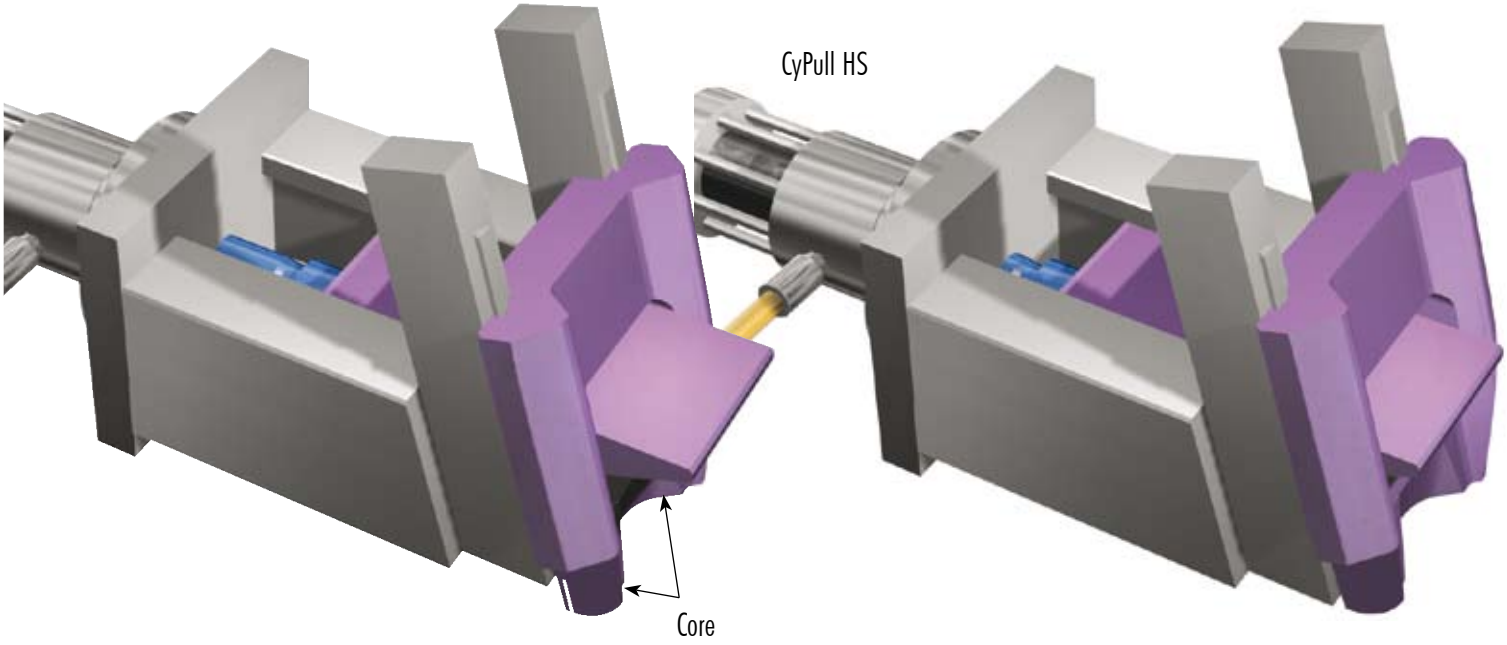


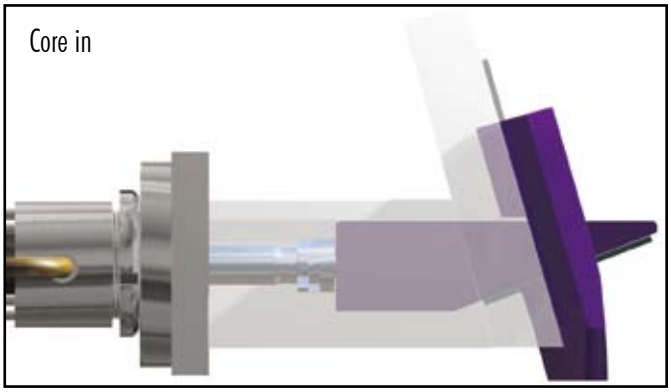


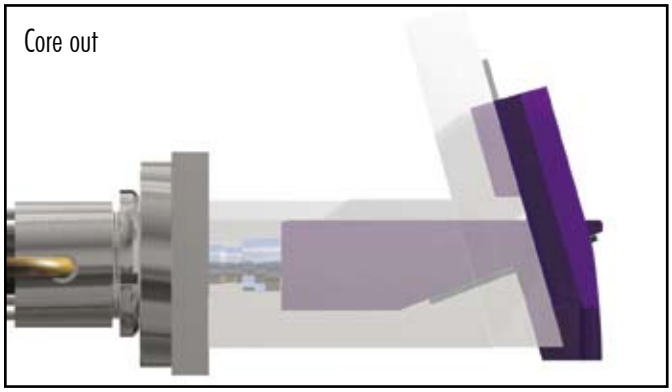


For a correct workpiece shape (with undercut) the core must reach the defined end position and compensate possible tolerances from cycle to cycle. Additionally critical: the angled flanged cylinder mounting position. Here like in all other cases care must be taken for a fixture of the cylinder which is as rigid as possible to reduce any tolerance to a minimum.

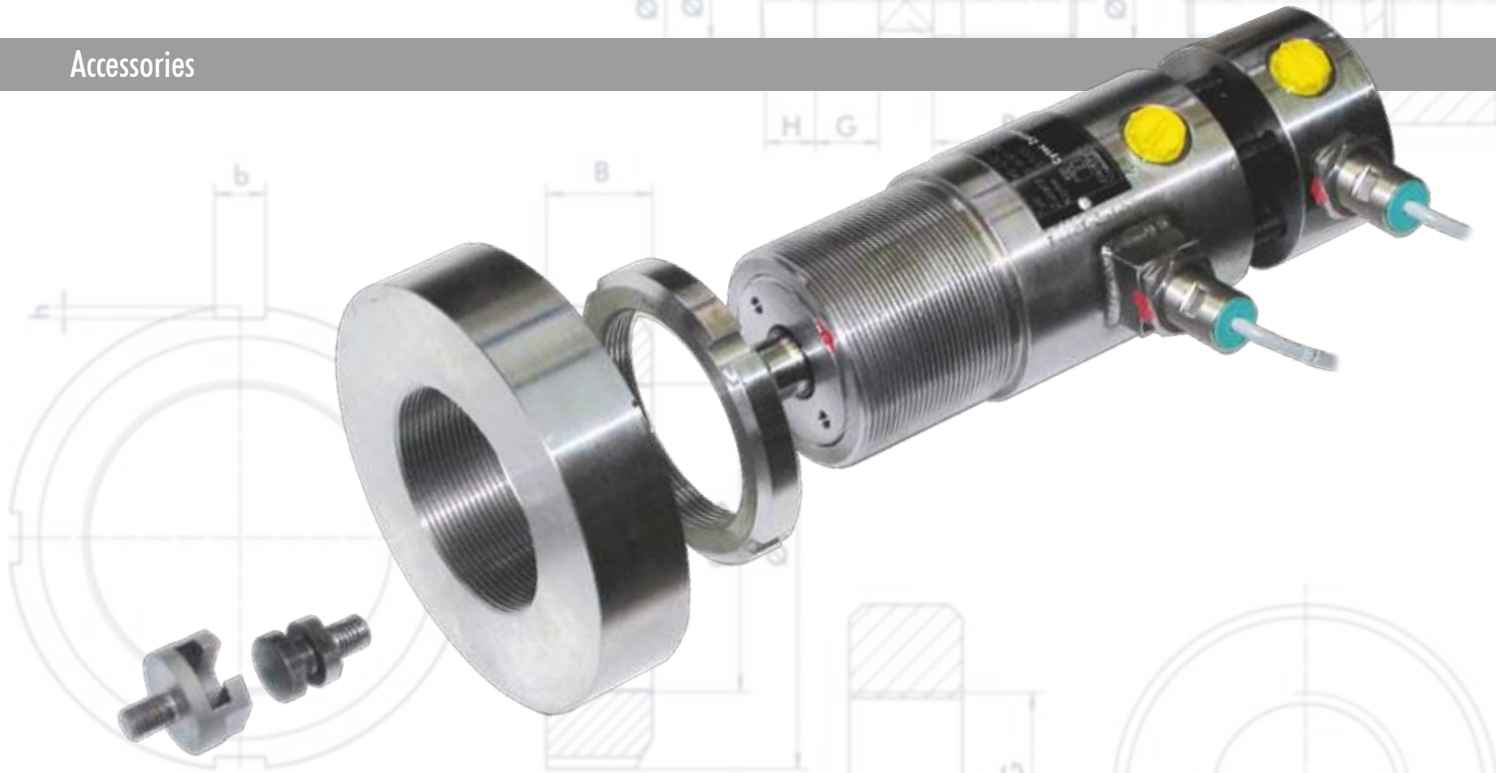
Example 3: deflected cores

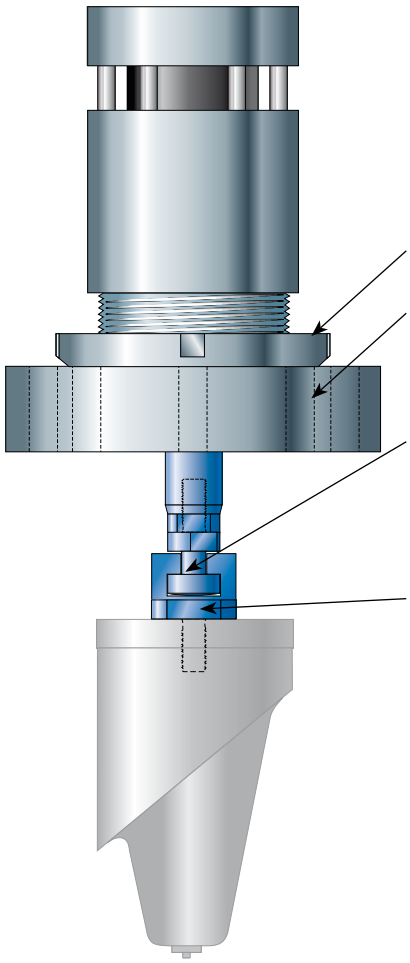






Special mould designs require a deflection of the core movement, to avoid inauspicious long cores and an attenuation of the mould. In this example the core is deflected by a bevel. In such cases the cylinder series can only be defined by the injection pressure and the deflection angle. This should be discussed with the manufacturer.





Accessories

A complete mounting system is available that makes it simple to adapt to existing moulds. Because the complete holding force of the piston rod is transferred through the mounting elements also, any possible elasticity must be reduced to a minimum. Therefore we categorically recommend the use of original CyTec coupling elements. They are characterised by high rigidity and mechanical strength. (technical data →from page 24):

- **Pressure screw with cone for alignment compensation**
  (Please ensure that the pressure srew is properly secured to the piston rod. This applies also for all other coupling elements.)
- **Counterpiece to pressure screw**
- **Lock nut**
- **Mounting flange**

CyPull

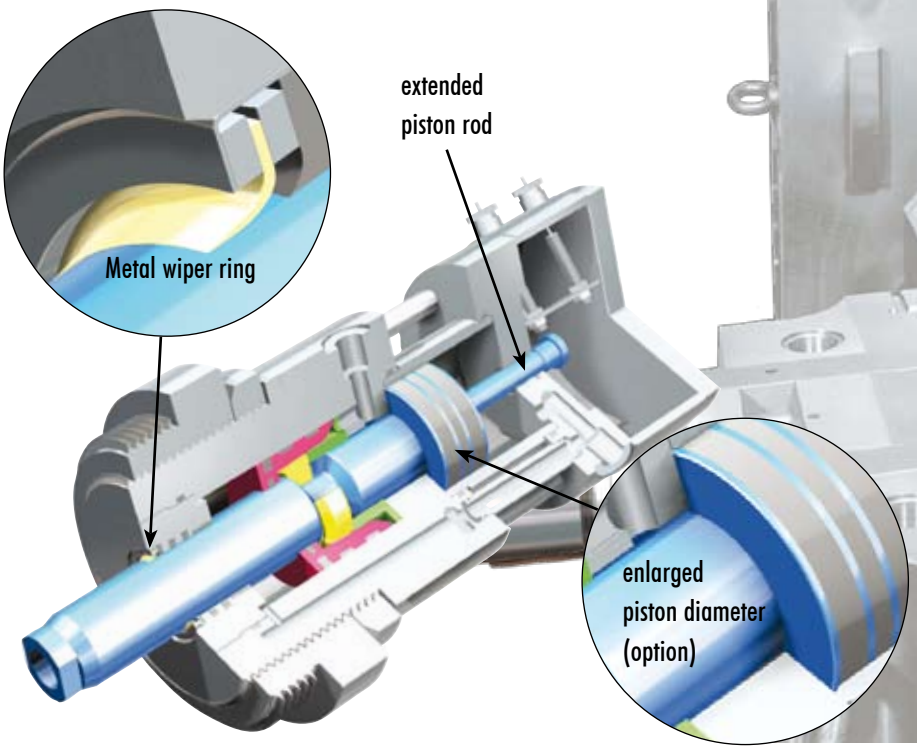
How to order

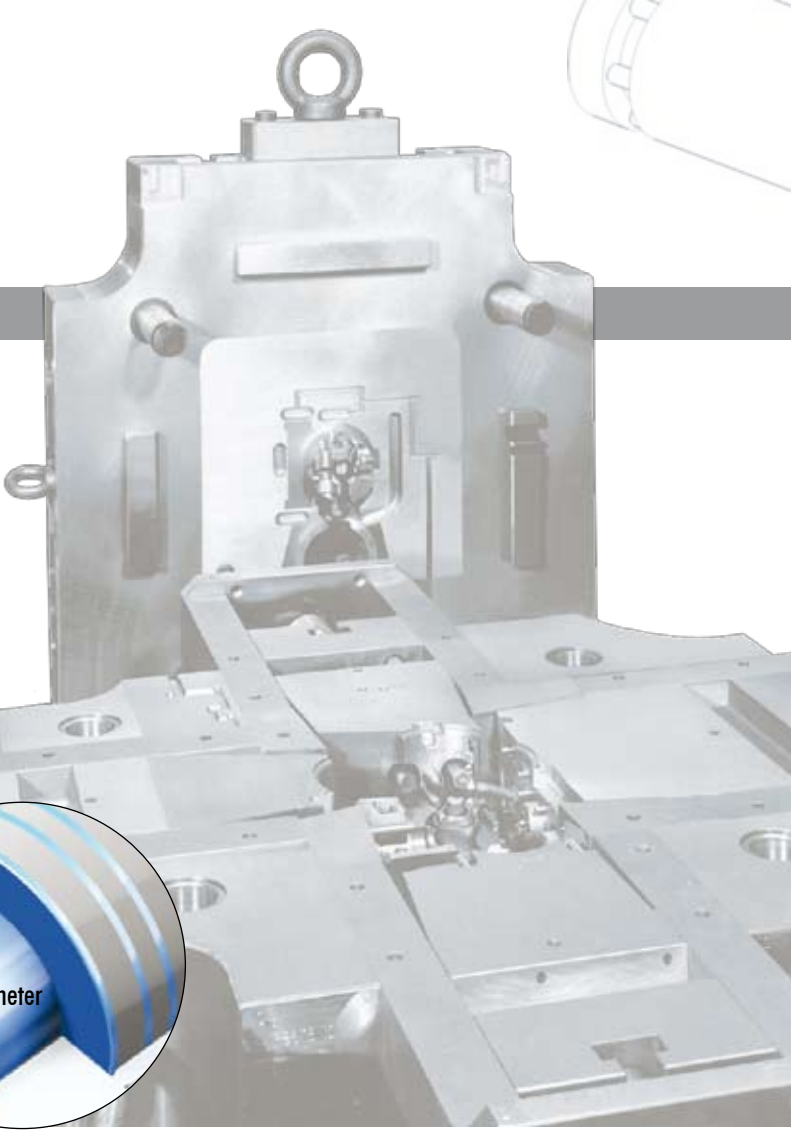
	Description	Order code
Series	Locking core pull cylinder	**HS, HSD** **HD, HDD** **HX**
Piston ∅	from 25 up to 200 mm (HS,HSD) from 32 up to 200 mm (HD,HDD) from 25 up to 125 mm (HX)	
Rod ∅	According to the tables	
Stroke length	Required stroke in mm	
Lock point	Standard: lock on extend	**01**
Rod thread	Standard: internal thread	**I**
Accessories	Lock nut Pressure screw Counterpiece to pressure screw Square mounting flange Round mounting flange	**N** **F** **G** **KS** **KO**
Seals	Viton seals	**VI**
Options	3-wire proximity sensors PNP pos. switching	**B6, B7, B8, B9** (cable) **B27, B28, B29** (angled plug)
	2-wire prox. sensors NAMUR pos. switching incl. amplifier 230 V	**B1, B2, B3, B4** (cable) **B22, B23, B24** (angled plug)
	optional amplifiers (for use with NAMUR sensors)	**WA** (115 V AC) **WD** (24 V DC)
	Protrusion of the retracted piston rod different to standard	**E=... (mm)**
Further accessory	Tester for function control of proximity switches	**ST 020-122**

Example:
HS 050 / 036 - 0050 - 01 - I - N - F - KS - VI - B.. - E=43

CyPull

Special series for die casting: HDD and HSD





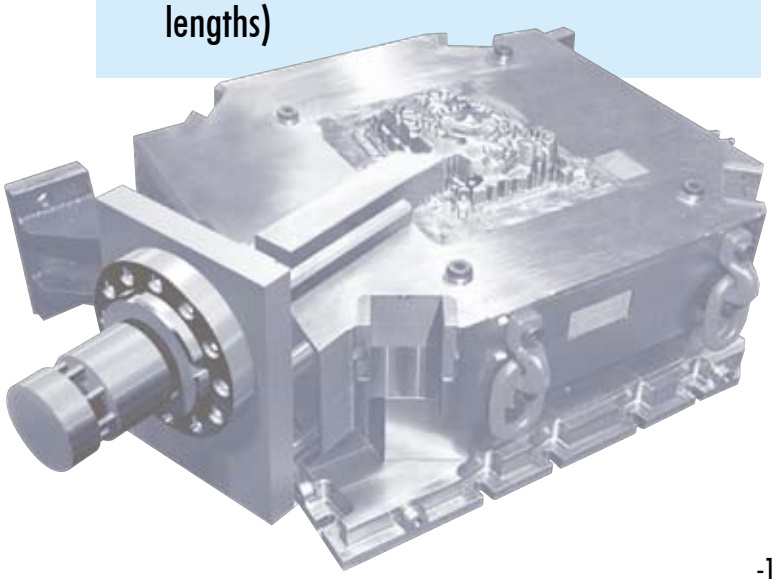
Special features

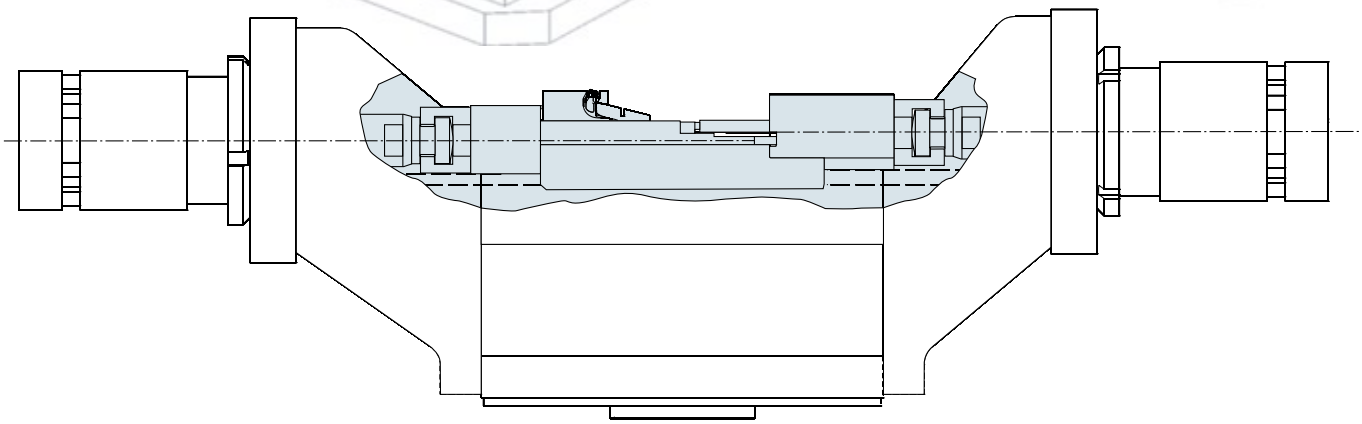
- High retraction force by means of enlarged piston diameter (option)
- Safe function with high ambient temperature and dirty conditions
- Design to customer demands (adaptation to mould structure, special mountings and lengths)

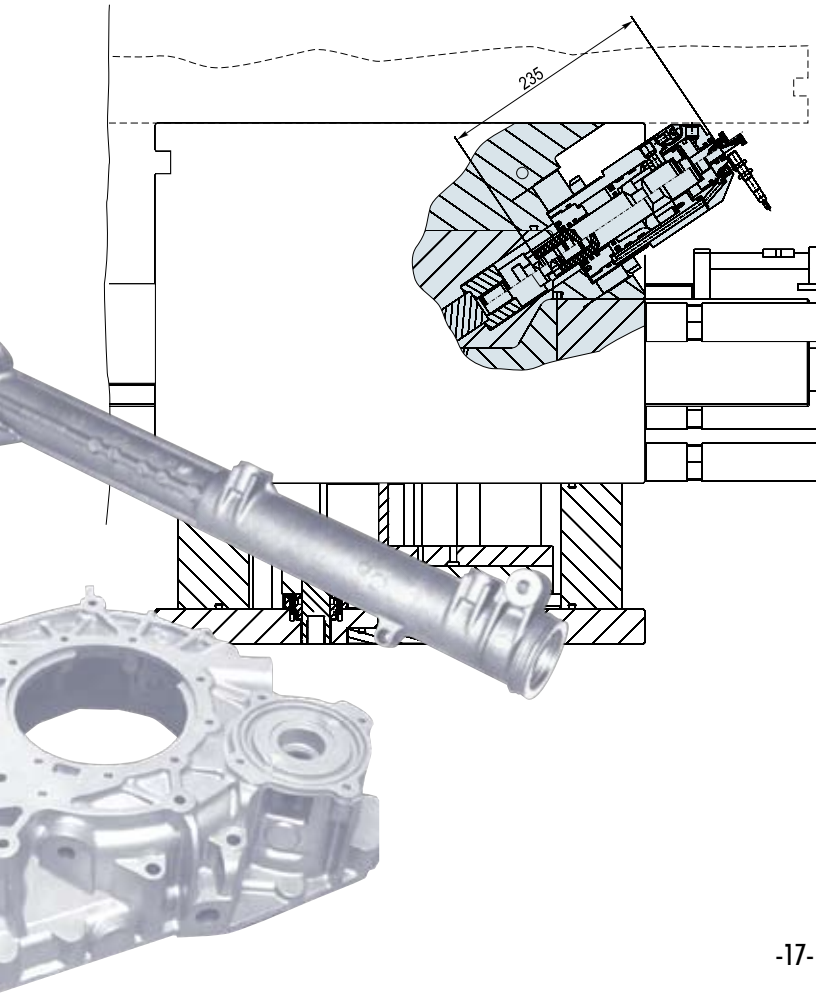
The die casting series are designed for rough conditions (ambient temperatures up to 180°C). The mechanical parts are coated and equipped with Viton seals. Productivity can be increased significantly. As an option, integrated or externally mounted proximity switches are available.

Equipment for die casting applications

- **Hardened piston rod**
  for safe operation with high ambient temperature and dirty conditions
- **Metal wiper ring**
  for the safe cleaning of the piston rod avoiding dirt contamination
- **Special seals**
  made of Viton with high durability against ambient temperatures up to 180°C.
- **Proximity switches** (up to 180°C) as an option







Application example underfloor slide:

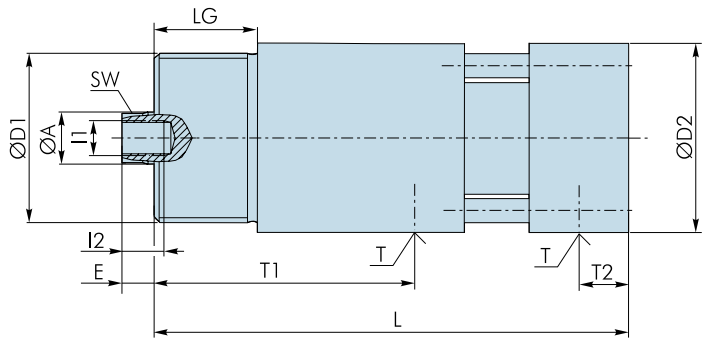
Underfloor slides often are in critical position to the mounting plate of the machine. In such cases it is difficult to use cylinders of the standard series.

To avoid an unnecessary weakening of the mounting plate or mould half special cylinder designs are available. These individually adapted solutions are geared to the mould structure and are not restricted in their technical properties in comparison to the standard series. This application example shows a locking core pull cylinder with enlarged piston diameter,
a CyPull **HSD 70:**

- **Stroke: 18 mm**
- **Holding force with pre-load: 360 kN**

Technical data

Series HS/HSD



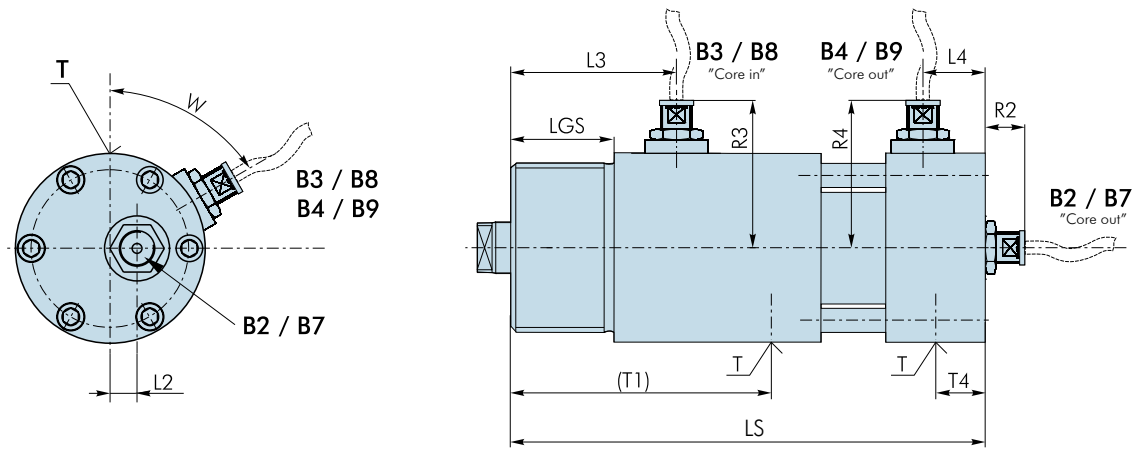
Dimensions without integrated sensors

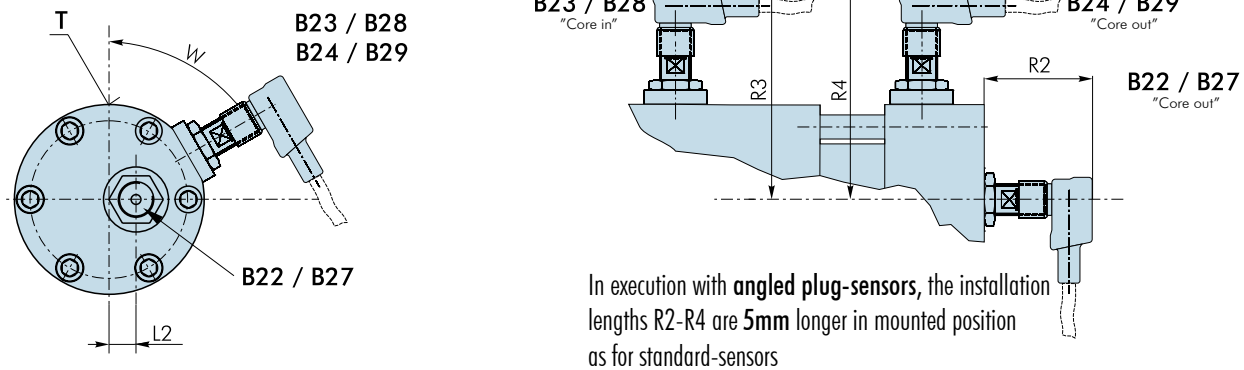
Piston Ø	max. pretension distance	A	SW	l1	l2	E	D1	D2	LG	L= Stroke+	T	T1	T2	Weight (kg) (up to100 mm stroke)
25	0,5	16	13	M8	20	10	M55x1,5	60	50	159	G1/4	101	18	4
32	0,5	20	17	M10	25	12	M70x2	75	60	181	G1/4	128	14	5
40	0,5	28	23	M16	30	15	M85x2	95	70	199	G1/4	135	14	8
50	1,0	36	27	M20	35	21	M90x2	100	80	242	G3/8	176	15	10
63	1,0	45	36	M27	41	25	M110x2	120	90	225	G3/8	159	15	17
80	1,0	56	46	M30	45	28	M140x2	150	100	283	G1/2	206	17	32
100	1,0	70	60	M42	45	33	M160x3	170	110	290	G1/2	211	18	48
125	1,0	90	70	M56	50	33	M190x3	200	120	318	G3/4	226,5	21	61
160	1,0	110	95	M64	95	40	M235x3	250	150	389	G1	272	37	77
200	1,0	140	115	M80	112	50	M290x3	310	185	472	G1	326	46	106

Further sizes upon request

Piston Ø	Holding force (kN) with preload	Stroke force (kN)			Retraction force (kN)		
		100 bar	150 bar	200 bar	100 bar	150 bar	200 bar
25	50	4,9	7,3	10	2,9	4,3	5,8
32	80	8,0	12	16	4,9	7,4	10
40	150	13	19	25	6,4	10	13
50	240	20	29	39	9,5	14,	19
63	360	31	47	62	15	23	31
80	560	50	75	101	26	38	51
100	880	79	118	157	40	60	80
125	1.280	123	184	245	59	89	118
160	2.100	201	302	402	106	159	212
200	3.300	314	471	628	160	240	320

Series HS/HSD with integrated sensors (Standard **B2-B9**, with angled plug **B22-B29**)





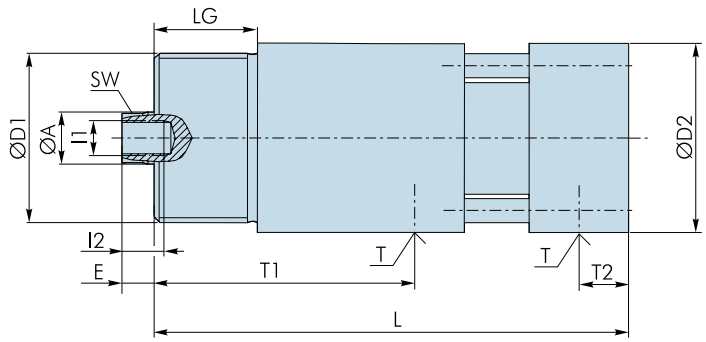
In execution with **angled plug-sensors,** the installation lengths R2-R4 are **5mm** longer in mounted position as for standard-sensors

Alternative and additional dimensions respectively series HS/HSD with int. sensors (Standard **B2-B9**, with angled plug **B22-B29**)

Piston Ø	L2	L3	L4	LGS	R2	R3	R4	T4	W	LS= Stroke+
25	9	80	18	50	44	91	79	18	60°	159
32	11	104,5	19,5	60	46	88,5	78,5	14	60°	187
40	14	112,5	13,5	70	41	97	83	14	60°	199
50	18	154	13,5	80	41	101	81,5	15	90°	242
63	23	133,5	17	90	41	106	86,5	15	60°	225
80	30	157	17	100	39	121	93	17	60°	283
100	35	187,5	18	110	37	128	100	18	60°	290
125	40	195,5	21	120	29	136	110	21	60°	318
160	72,5	237,5	37	150	14	156	120	37	75°	389
200	90	268,5	46	185	14	175	135	46	60°	472

Technical data

Series HD/HDD



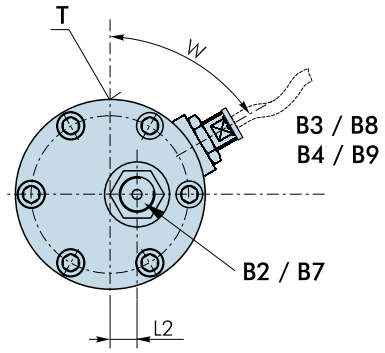
Dimensions without integrated sensors

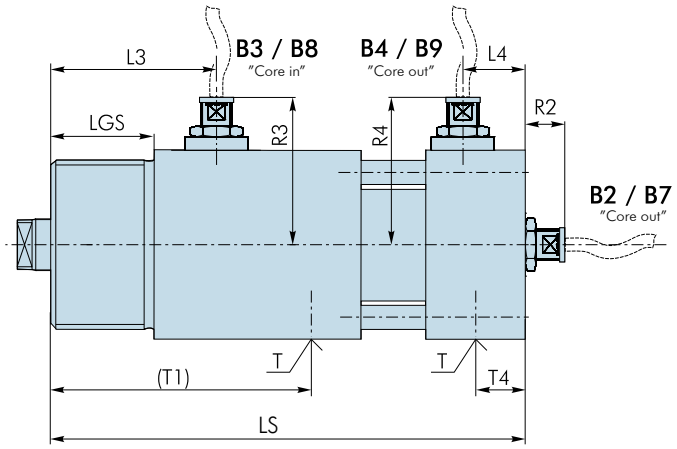
Piston Ø	A	SW	l1	l2	E	D1	D2	LG	L= Stroke+	T	T1	T2	Weight (kg) (up to100 mm stroke)
32	20	17	M10	25	12	M65x2	75	54	144,5	G1/4	91,5	14	5
40	28	23	M16	25	15	M85x2	95	70	150	G1/4	86	14	8
50	36	30	M20	35	21	M90x2	100	80	179	G3/8	113	15	10
63	45	36	M27	40	25	M110x2	120	90	180	G3/8	114	15	17
80	56	46	M30	45	28	M140x2	150	100	222	G1/2	145	17	32
100	70	60	M42	45	33	M160x3	170	110	225	G1/2	146	18	48
125	90	70	M56	55	33	M190x3	200	120	260	G3/4	168,5	21	61
160	110	95	M64	95	40	M235x3	250	150	322	G1	205	37	55
200	140	120	M80	112	50	M290x3	310	185	402	G1	256	46	106

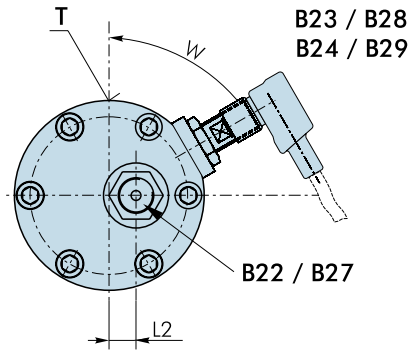
Further sizes upon request

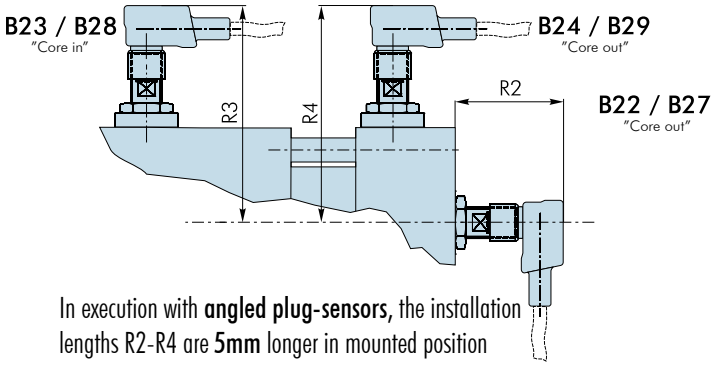
Piston Ø	Holding force (kN)	Stroke force (kN)			Retraction force (kN)		
		100 bar	150 bar	200 bar	100 bar	150 bar	200 bar
32	60	8,0	12	16	4,9	7,4	10
40	88	13	19	25	6,4	10	13
50	140	20	29	39	9,5	14,	19
63	224	31	47	62	15	23	31
80	360	50	75	101	26	38	51
100	564	79	118	157	40	60	80
125	880	123	184	245	59	89	118
160	1.440	201	302	402	106	159	212
200	2.250	314	471	628	160	240	320

Series HD/HDD with integrated sensors (Standard **B2-B9**, with angled plug **B22-B29**)









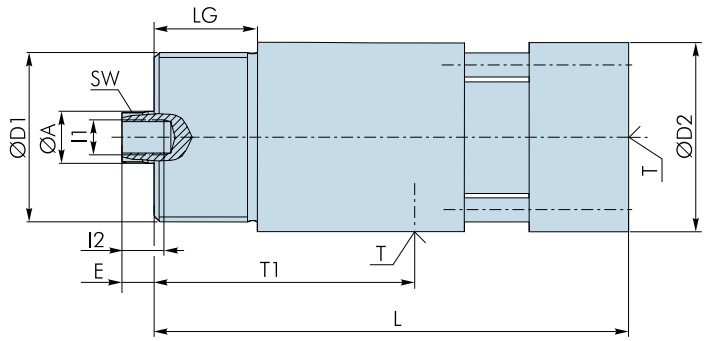
In execution with **angled plug-sensors,** the installation lengths R2-R4 are **5mm** longer in mounted position as for standard-sensors

Alternative and additional dimensions respectively series HD/HDD with int. sensors (Standard **B2-B9**, with angled plug **B22-B29**)

Piston Ø	L2	L3	L4	LGS	R2	R3	R4	T4	W	LS= Stroke+
32	11	71	19,5	54	46	88,5	78,5	14	60°	150,5
40	14	63,5	13,5	46	41	97	83	14	60°	150
50	18	90,5	13,5	80	41	101	81,5	15	90°	179
63	23	89,5	17	72	41	106	86,5	15	60°	180
80	30	120	17	100	39	121	93	17	60°	222
100	35	122	18	110	37	128	100	18	60°	225
125	52,5	137,5	27,5	120	29	136	110	21	60°	260
160	72,5	171	37	150	14	156	120	37	75°	322
200	90	217	46	185	14	175	135	46	60°	402

Technical data

Series HX



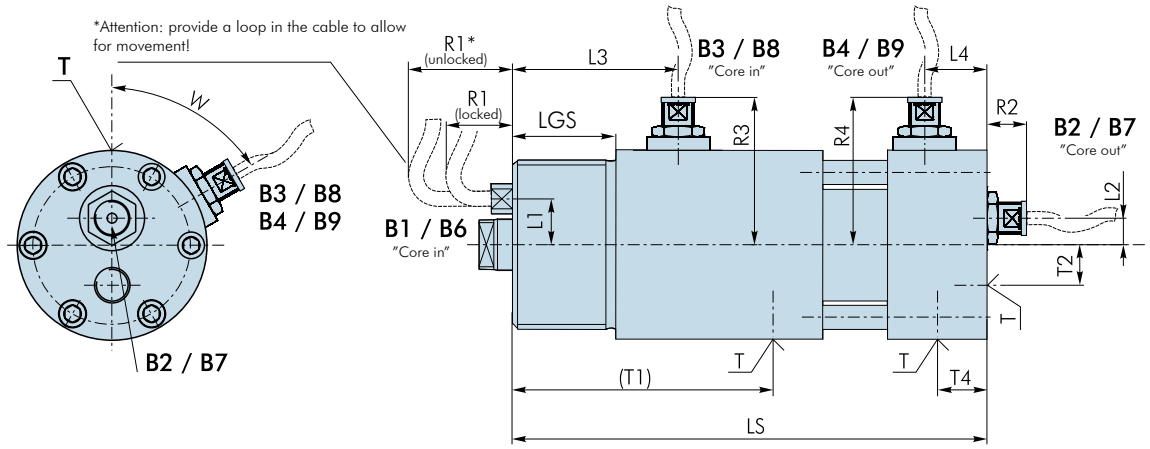
Dimensions without integrated sensors

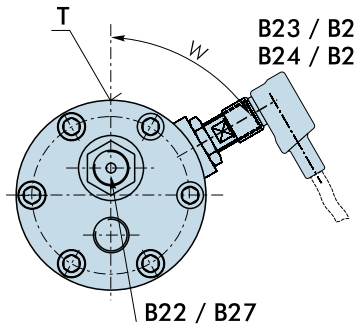
Piston Ø	A	SW	I1	I2	E	D1	D2	LG	L= Stroke+	T	T1	Weight (kg) (up to100 mm stroke)
25	16	13	M8	20	10	M55x2	60	50	140	G1/4	86	3
32	20	17	M10	25	12	M65x2	70	60	150	G1/4	97	5
40	28	23	M16	25	15	M85x2	95	70	150	G1/4	86	7
50	36	30	M20	35	21	M90x2	100	80	160	G3/8	94	9
63	45	36	M27	40	25	M110x2	120	90	187	G3/8	121	16
80	56	46	M30	45	28	M140x2	150	100	227	G1/2	145	30
100	70	60	M42	45	33	M160x3	170	110	252	G1/2	169	45
125	90	70	M56	55	33	M170x3	190	120	260	G3/4	168,5	57

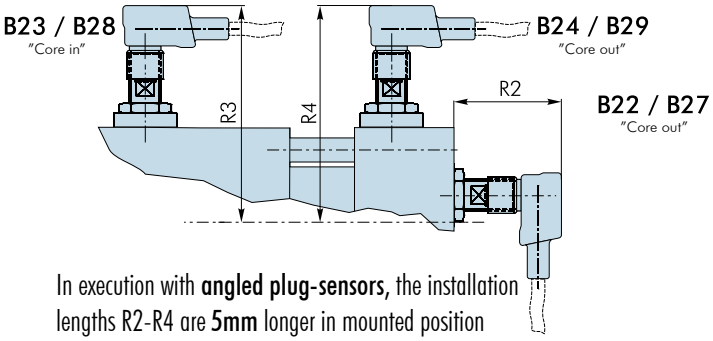
Further sizes upon request

Piston Ø	Holding force (kN)	Stroke force (kN)			Retraction force (kN)		
		100 bar	150 bar	200 bar	100 bar	150 bar	200 bar
25	20	4,9	7,4	9,8	2,9	4,4	5,8
32	60	8,0	12	16	4,9	7,4	9,8
40	88	13	19	25	6,4	9,6	13
50	140	20	29	39	9,5	14	19
63	224	31	47	62	15	23	31
80	360	50	76	101	26	38	51
100	564	79	118	157	40	60	80
125	880	123	184	245	59	89	118

Series HX with integrated sensors (Standard **B2-B9**, with angled plug **B22-B29**)



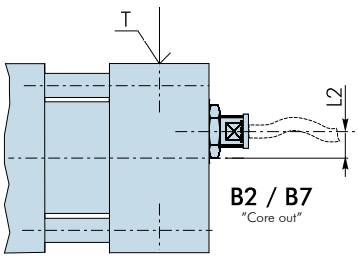




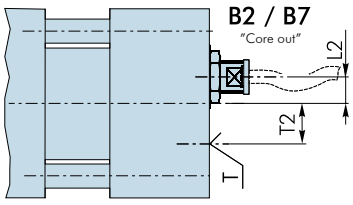
In execution with **angled plug-sensors**, the installation lengths R2-R4 are **5mm** longer in mounted position as for standard-sensors

Alternative and additional dimensions respectively Series HX with int. sensors (Standard **B2-B9**, with angled plug **B22-B29**)

Piston Ø	L1	L2	L3	L4	LGS	R1 (unlocked)	R1 (locked)	R2	R3	R4	T2	T4 (for B4)	T4 (for B2)	W	LS = Stroke+
25	15	6	66,5	17	50	10	5	46	85	74,5	-	21	15	180°	146
32	17	10	77,5	20	60	13	5	46	88,5	78,5	-	20	13	60°	158
40	22,5	14	65	17	48	15	6	41	97,5	83	-	14	14	90°	150
50	29,5	18	71,5	13,5	58	20	9	41	101	81,5	14	15	-	90°	160
63	34	14	97	17	78	21	5	41	106	91	14	15	-	60°	187
80	40	18	120,5	17	100	27	5	33	121	93	18	17	-	60°	222
100	50	23	146,5	26	110	29	5	32	128	100	23	26	-	60°	255
125	59	29	137,5	31	120	28	5	29	136	110	29	31	-	60°	265



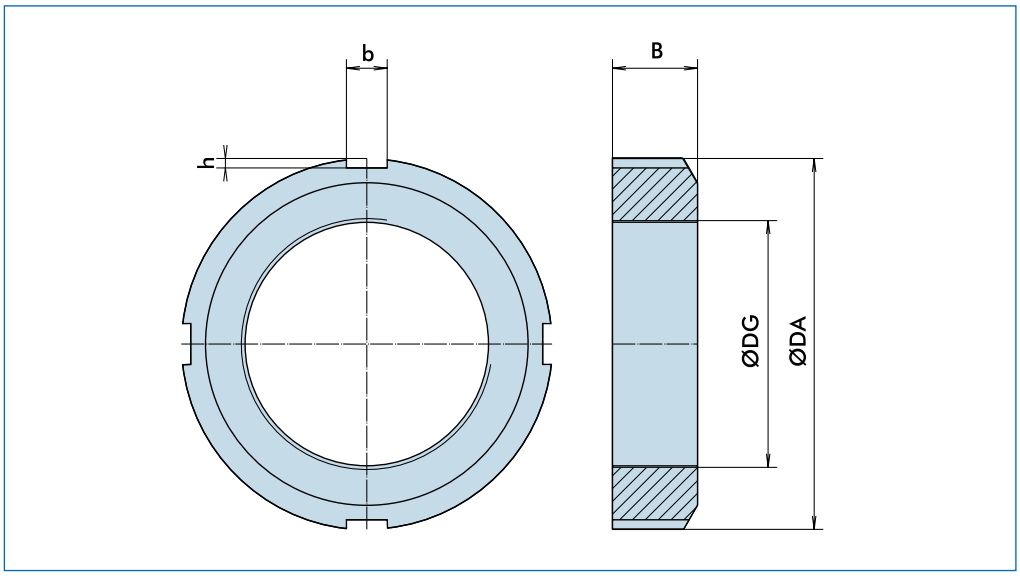
Position of pressure port "T" for function "extending" with sensor equipped versions up to **cyl.-size 40** inclusive



Position of pressure port "T" for function "extending" with sensor equipped versions from **cyl.-size 50**

Lock nuts **N**

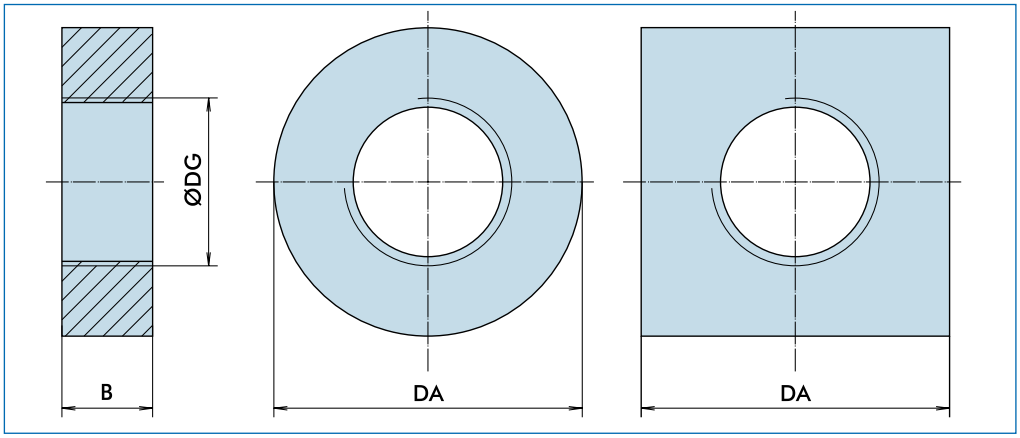
to secure the cylinders
against turning



Cylinder-Nom.- Ø	HS/HX 25	HD/HX 32	HS 32	40	50	63	80	100	HX 125	HS/HD 125	HS/HD 160	HS/HD 200
DA	75	85	92	110	120	145	180	210	220	240	285	340
B	11	12	12	16	16	19	22	25	26	28	30	30
b	7	7	8	8	10	12	14	16	16	18	20	24
DG	M55x2	M65x2	M70x2	M85x2	M90x2	M110x2	M140x2	M160x3	M170x3	M190x3	M235x3	M290x3
h	3	3	3,5	3,5	4	5	6	7	7	8	10	12

Flange round **KO**
Flange square **KS**

to mount the cylinder
at the mould

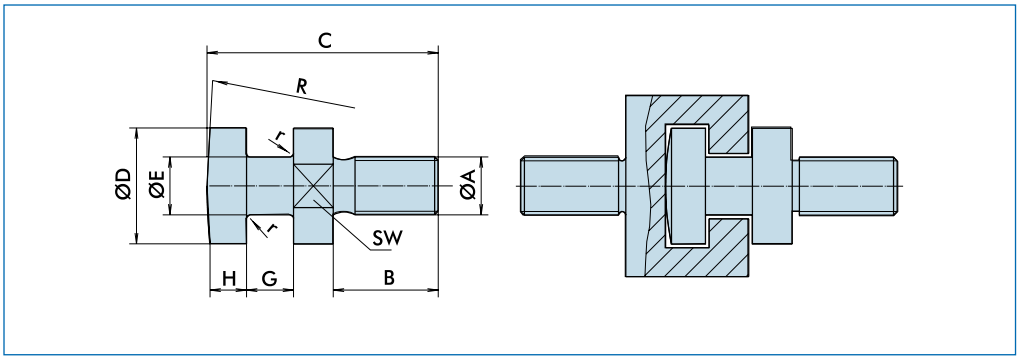


Cylinder-Nom.- Ø	HS/HX 25	HS 32	HX/HD 32	40	50	63	80	100	HX 125	HS/HD 125	HS/HD 160	HS/HD 200
DA	120	130	130	150	180	210	240	290	360	380	on request	on request
B	25	30	30	30	40	45	60	70	85	90		
DG	M55x2	M70x2	M65x2	M85x2	M90x2	M110x2	M140x2	M160x3	M170x3	M190x3		
recommended screw mountings*	6 x M10	6 x M12	6 x M12	6 x M12	6 x M16	8 x M16	8 x M20	8 x M24	6 x M30	8 x M30		
recomm. pitch circle-Ø for flange KO	95	107	107	127	150	180	205	245	310	325		

*of property class 10.9 according to ISO 898-1 for flange KO (not included in delivery)

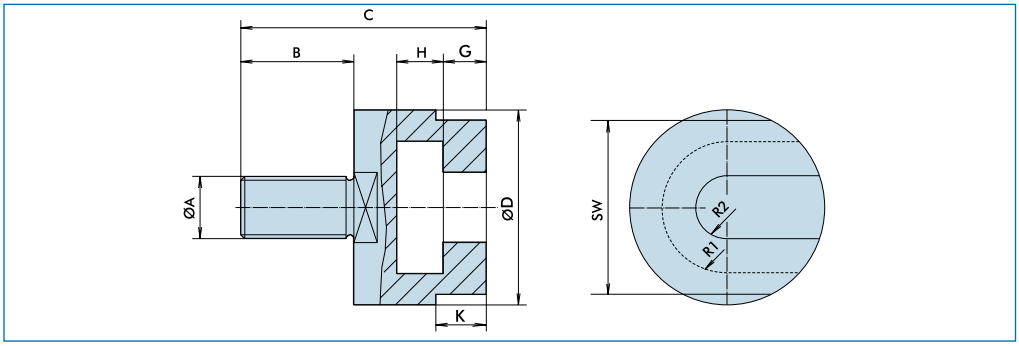
Pressure screw **F**

with cone for alignment compensation



Cyl.-Nom.- Ø	25	32	40	50	63	80	100	125	160	200
A	M8	M10	M16	M20	M27	M30	M42	M56	M64	M80
B	14,5	14,5	20	28	39	35	40	45	85	105
C	32	32	40	56	75	89	115	135	200	250
D	16	20	25	32	40	52	65	80	102	130
E	8	10	16	18	24	30	40	55	70	90
G	6,5	6,5	7	10	13	19	25	30	38	48
H	5,5	5,5	6	10	12	19	25	30	38	48
r	1	1	1	1	1,5	2	2	2	2,5	3
R	320	320	400	500	630	800	1.000	1.200	1.500	1.850
SW	14	17	22	27	36	46	55	70	90	110

Counterpiece for pressure screw **G**



Cyl.-Nom.- Ø	25	32	40	50	63	80	100	125	160	200
A	M8	M10	M16	M20	M27	M30	M42	M56	M64	M80
B	14,5	14,5	20	28	39	35	40	45	85	105
C	31,5	31,5	41	58	79	92	120	135	200	250
R1	8,5	10,5	13	16,5	20,5	27	33,5	41,5	52,5	66,5
R2	4,5	5,5	8,5	9,5	12,5	15,5	28	28	35,5	45,5
G	5,5	5,5	6	9	12	18	24	29	37	46
H	6	6	6,5	10,5	12,5	19,5	25,5	30,5	38,5	49
D	25	31	37	47	57	76	92	108	137	173
SW	22	26	32	41	50	65	80	90	110	140
K	6,5	8,5	10	12	14	20	30	36	30	20

For proper function and to achieve best workpiece quality, the following preconditions for mould design and installation of the cylinder must be accomplished:

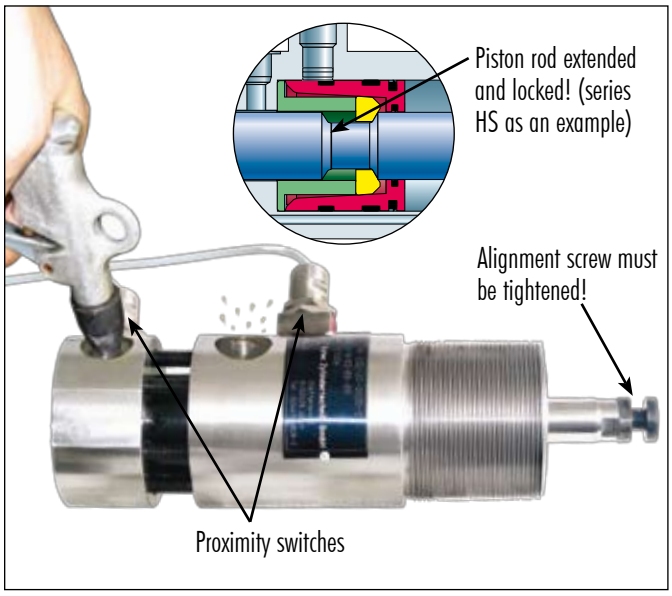
Design preconditions (mould):

- Consideration of highest possible rigidity of coupling elements between cylinder and mould, like traverses, angular and adaptor flanges, screwed joints
- Avoidance of bending forces: any transmission of cross or bending moments into the piston rod is forbidden!
- Shortest distribution of forces as possible
- Regard screw recommendations for mounting the flange implicitly! (see table page 24)

Preconditions with installation (cylinder):

- The front pressure port (retract) must be depressurised and open during the locking process!
- The piston rod must have reached its extended end position and be locked!
- When using alignment screws and other coupling elements, a secure connection of the elements must be provided (Screw joints must be tightened carefully!)
- Especially for series HX: the piston rod must not be twisted!

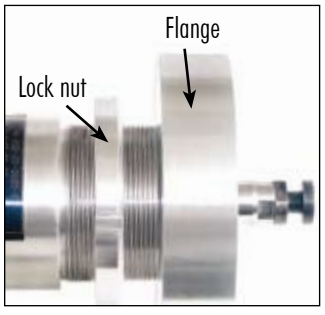
Installation instructions



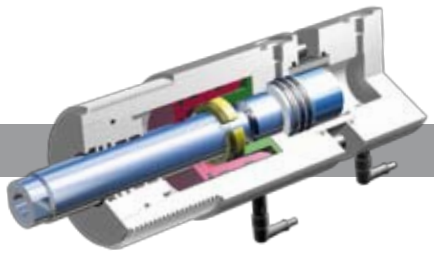
1. With pressurising the back port with air the piston rod is put into locked position. Only for series **HX** and **HD**: a click will be heard when the rod locks up. **Caution:** when the rod moves and when it reaches the locked position, small amounts of oil may be sprayed from the front port!

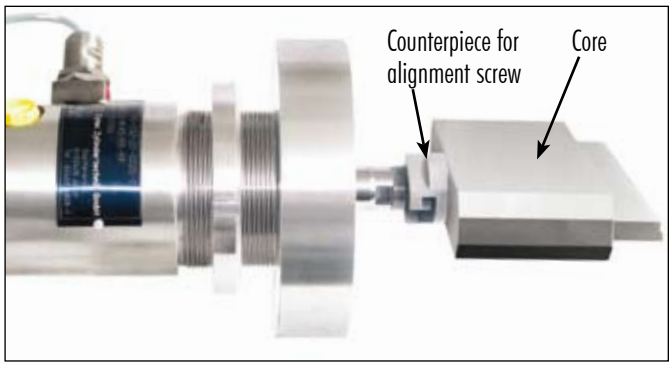
Only for series **HX**: when no proximity switches are used the locking position is indicated by a pin retracted into the front end of the cylinder.

Pin protrudes: rod unlocked
Pin retracted: rod locked



2. Screw lock nut to the end of the thread. The bevel must face the front end of the cylinder. Then screw the cylinder into the flange until only the half of its thread is visible.

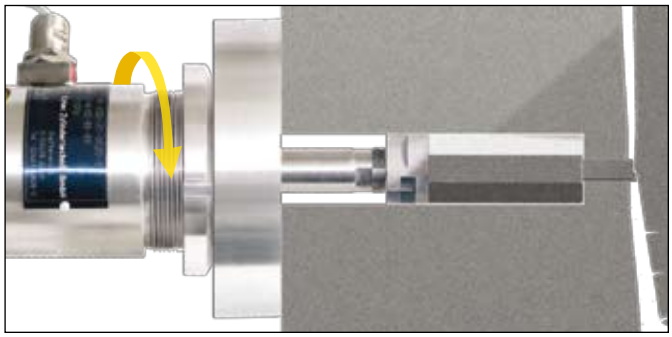




3. Provided with an alignment screw, the rod can be connected to the core using a counterpiece. **Ensure that all threads and screwed joints between piston rod, coupling elements and core are tightened and secured.**

4. Now the flange is mounted to the mould carefully using the **recommended** socket screws.

Adjustment of the locking up point



With screwing in the cylinder into the mounting flange, the "core in" position and the locking up of the piston rod is put into alignment. In case of using contacting cores it is recommended that the cylinder is screwed in securely, e. g. using adequate tools.

A full resistance must be found!

When the cylinder is in its correct adjusted axial position the lock nut is tightened. The bevel of the lock nut must face the flange.

Series **HS**: Adjustment of maximum pre-load

Piston ∅	Thread size	max. pretension distance	Degree	Rotation adjustment range
25	M55x2	0,5mm	90°	0,1mm≅18°
32	M70x2	0,5mm	90°	
40	M85x2	0,5mm	90°	
50	M90x2	1,0mm	180°	
63	M110x2	1,0mm	180°	
80	M140x2	1,0mm	180°	
100	M160x3	1,0mm	120°	0,1mm≅12°
125	M190x3	1,0mm	120°	
160	M235x3	1,0mm	120°	
200	M290x3	1,0mm	120°	

Additional advice for series **HS**

To achieve an optimal pre-load proceed as follows:

1. Installation and adjustment according to the table above
2. Remeasure the flash, if necessary.
3. Release the lock nut.
4. The cylinder must be re-adjusted regarding the measured flash **(refer to table above)**.
5. Tighten lock nut.

Further adjustments can be made step by step until the proper position is reached.

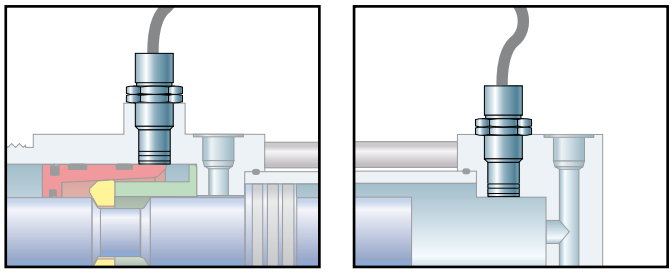
Advice for the programming of the machine control for series **HS**

If the core pull control of the injection moulding machine offers the possibility to hold the control valve in "Core in"-position during the injection process, this position should be used. By means of this it is avoided that proximity switches eventually switch too early and inhibit a complete locking or that the pre-load cannot come into effect. A creeping back of the core in case of mould deformation is also enabled.

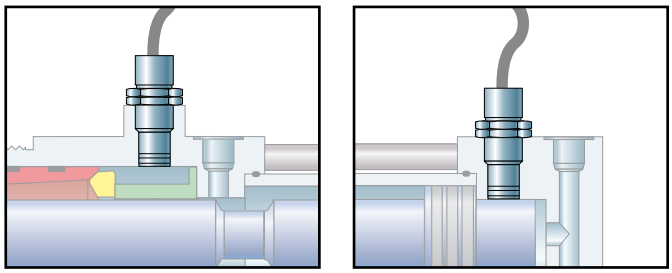
Sensing of end position with proximity switches (option)

Inductive proximity switches

Inductive proximity switches enable the electronic sensing of the locked condition and core position respectively. The cylinders can be equipped with two sensors each to detect the following positions:



Core in - Piston rod extended and locked



Core out - Piston rod retracted and unlocked

Two types of inductive sensors are available:

- **3-wire DC PNP**, positive switching
  (on request: 3-wire DC NPN negative switching)
- **2-wire DC NAMUR**

in two designs each:

- with cable or
- with angled plug

PNP Sensor

Three wires are connected directly with the machine. A direct voltage of 10 - 30 V is necessary (see connection diagram page 30). Depending on their mounting position at the cylinder housing they have different designations:

with cable: B6, B7, B8, B9
with angled plug: B27, B28, B29

Technical data	
Admissible ambient temperature range:	up to +70°C
Function of switching element:	PNP-norm. open (all series except B6) PNP-normally shut (only B6)
Operational voltage range:	10 ... 30 VDC
Protection class according to DIN 40050:	IP 67
Connection cable:	2m PVC-cable 3 x ∅ 0,5mm²
Smallest allowed bending radius of cable:	50 mm

NAMUR Sensor

The NAMUR sensor is designed to be used in hazardous areas and is "intrinsically safe". These sensors are wired to an amplifier (included in delivery together with the sensors) which is connected to the control panel of the moulding machine (see wiring diagram on page 30).
Normally the sensors are driven with **230 V AC**, optional amplifiers of **110 V AC** and **24 V DC** are also available. **In case of order, please indicate which voltage should be used for the amplifiers!**

Depending on their mounting position at the cylinder housing they have different designations:

with cable: B1, B2, B3, B4
with angled plug: B22, B23, B24

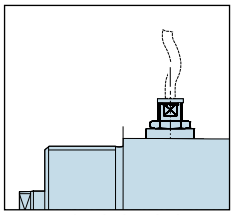
Technical data	
Admissible ambient temperature range:	up to +70°C
Function of switching element:	signal change (with connection to amplifier)
Operational voltage range:	10 ... 30 VDC
Protection class according to DIN 40050:	IP 67
Connection cable:	2m PVC-cable 2 x ∅ 0,5mm²
Smallest allowed bending radius of cable:	50 mm

Caution: For HX cylinders the sensors for inquiry "Core in - Piston rod is extended and locked" can additionally be mounted **in axial position** (**B6** and **B1**), see advice on the following page.

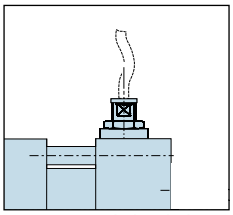
Designation of switches and their indication function

	PNP		NAMUR			
Switching function	cable	ang. plug	cable	ang. plug	Indication function	used for:
normally shut	B6	-	B1	-	Locking axial	only for HX
normally open	B7	B27	B2	B22	End of stroke axial	all series
normally open	B8	B28	B3	B23	Locking radial	all series
normally open	B9	B29	B4	B24	End of stroke radial	all series

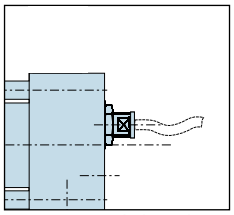
Possible combinations for all series:



rod sided radial



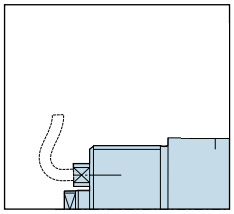
piston sided radial



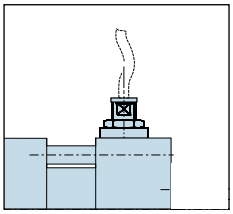
piston sided axial

PNP	B8 / B28	with	B9 / B29	or	B7 / B27
NAMUR	B3 / B23	with	B4 / B24	or	B2 / B22

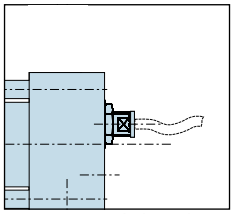
Possible combinations additionally only for series HX:



rod sided axial



piston sided radial



piston sided axial

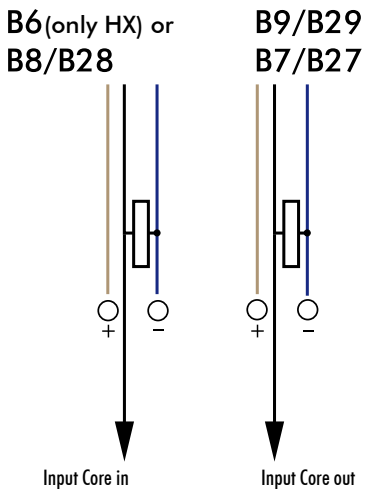
PNP	B6	with	B9 / B29	or	B7 / B27
NAMUR	B1	with	B4 / B24	or	B2 / B22

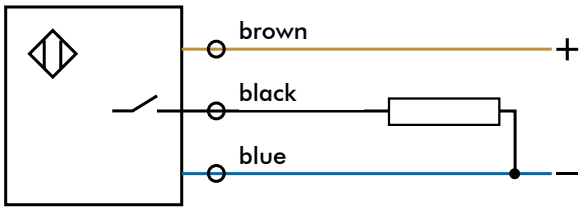
Advice for ordering:

- **Regard before ordering whether your application needs sensors for detecting the locking condition!** (A retrofit is only possible with exchange of the cylinder's housing parts)
- **Decide which position must be inquired (locked, unlocked or both positions)**
- **Decide on type of sensor (PNP or NAMUR)**

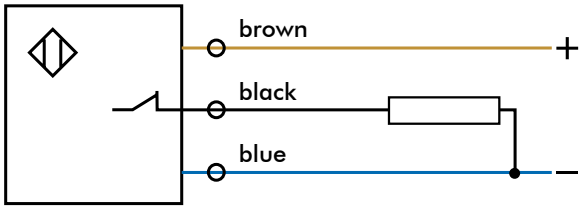
For further information, please contact our sales engineers.

Wiring diagram 3-wire-PNP -Sensors



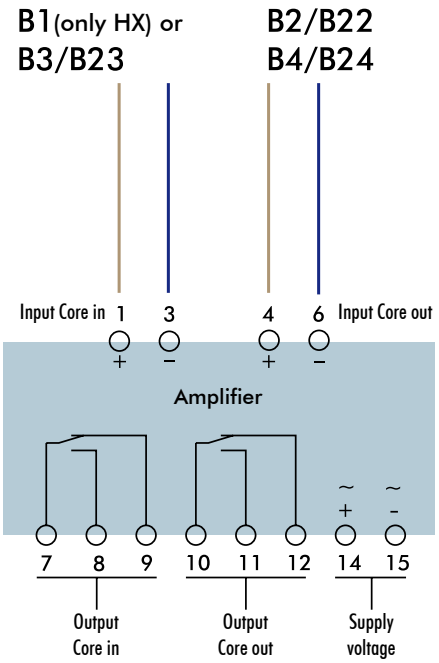


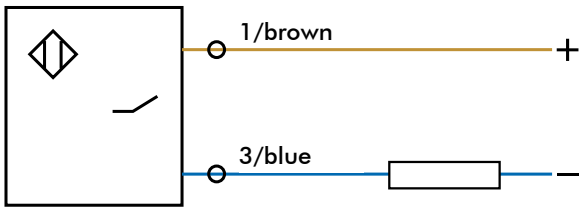
PNP Normally open (+) switching (all except B6)



PNP Normally shut (+) switching (only B6)

Wiring diagram 2-wire-NAMUR-Sensors inclusive amplifier





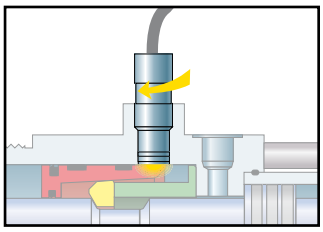
NAMUR signal change (connected to amplifier)

Mounting instructions for proximity switches

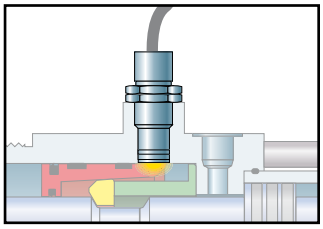
The integrated switches are adjusted by the manufacturer and do not require any further adjustment.
In exceptional cases it can be necessary that the sensors are exchanged. Please proceed as follows:

Inquiry "piston rod locked - core in":
This condition is detected by the front sensor (rod side). Before fitting the switch, the piston rod of the cylinder must be in the completely extended position. The locking slide is in locked position.

Now screw the switch in until you just get a signal on the switch and then, wind in another half a turn.



Then tighten the sensor in its position using the lock nuts.

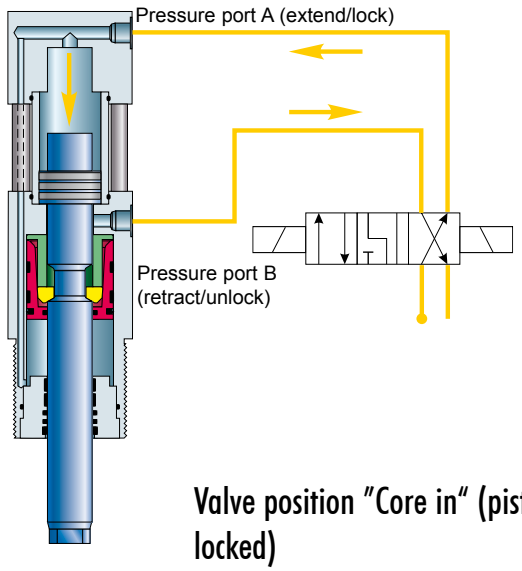


Inquiry "piston rod unlocked - core out": This condition is detected by the rear sensor (piston side). Before fitting the switch, the piston rod of the cylinder must be in the completely retracted position. Then follow the above procedure. Then tighten the sensor in its position using the lock nuts.

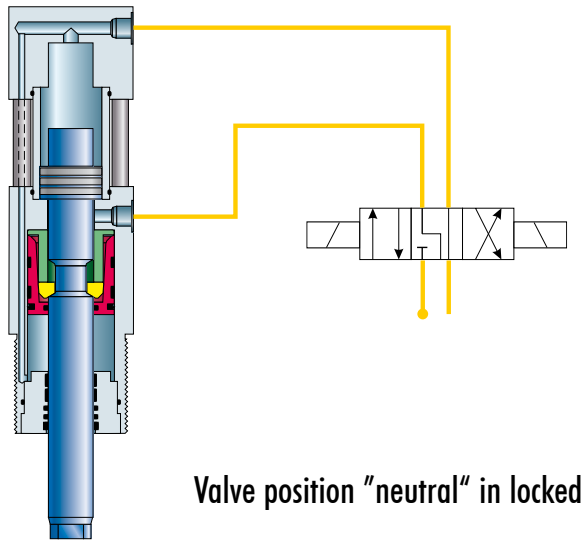
Caution: It is possible to screw the switches in too far, then, when the slide moves across, or the piston moves back, it will collide with the switch and break the ceramic front face.

Provide for highest cleaniness! With screwing the sensor into the cylinder body the O-ring seal must not be damaged!

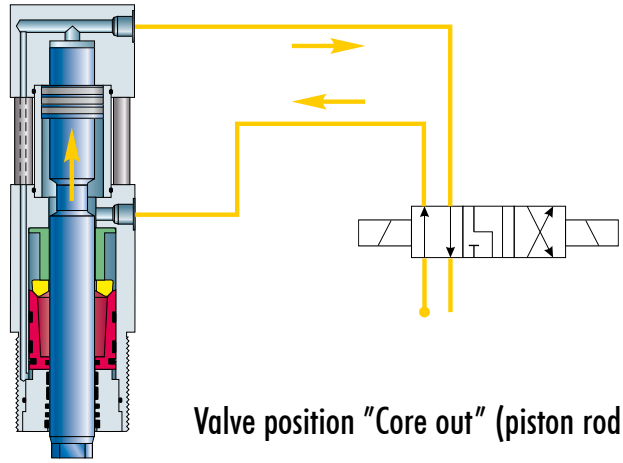
As an option, a hand held proximity switch tester is available for testing the PNP switches.



Valve position "Core in" (piston rod extended and locked)



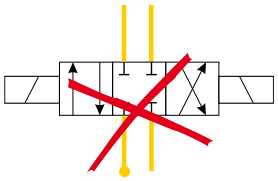
Valve position "neutral" in locked position



Valve position "Core out" (piston rod retracted)

Control

Compared to a conventional cylinder, the CyPull cylinder needs no additional control devices. When the piston rod reaches its end position, the lock comes into effect automatically. It generally applies that in locked position **no hydraulic pressure** must be "blocked up" and that the control valve is either in **"Core in"** or **neutral** position. With standard switching mode of the core pull control system, this is not always the case.



This type of control valve is not recommended because it can cause a blocking up of the hydraulic pressure with high pressure peaks and damage of the cylinder!

Trouble shooting

Symptom	possible Reason	Repairing
The piston rod does not lock.	• The cylinder is incorrectly set on the mould	• Reset cylinder
	Too high pressure on the locking side (tank port):	
	• inadmissably high back pressure in the tank pipe because of faulty valve control	• Check valve position • Repeat initial adjustment
	• Filter dirty	• Exchange filter
	• Defective valve	• Exchange valve
	The piston rod cannot extend completely:	
	• Mechanical obstruction or faulty mechanical limit stop	• Rework mould
	Proximity switch gives faulty signal:	
	• Defective sensor	• Exchange sensor
	• Faulty signal processing	• Check machine control
	• Faulty adjustment of switch	• Re-adjustment of switch or exchange
The cylinder leaks	**Leakiness on piston rod:**	
	• Excentric position of piston rod	• Re-adjustment or repair by manufacturer
	• Damaged piston rod	• Repair by manufacturer
The piston rod does not retract after injection cycle	**The core is obstructed:**	
	• Mould is clamping the core	• Rework the mould
	• Mis-alignment between cylinder and core	• Check alignment, only use original CyTec coupling elements
	• Die casting applications: too high material contraction at the core	• Increase retraction pressure
Flash on injection moulding	**Elasticities of the coupling elements between piston rod and core:**	
	• Wrong choice of coupling elements	• Use only original CyTec coupling elements • Repeat initial adjustment, check pretension distance (series HS)
	• Faulty or damaged coupling elements (no original parts)	
	• Use of washers or the like (forbidden!)	
	• Wrong type or wrong size of cylinder	• in case of doubt choose the next bigger size • in case of doubt choose series HS
	• Insufficient mounting of the cylinder to the mould	• Regard installation advice, especially screw recommendation
	• Deformation on the mould	• Rework the mould

CyBlock

CyBlock Cylinder

The compact series CyBlock was especially developed for injection moulding cores in tool and mould manufacturing which require a safe holding with only a short mould release stroke. They are easy to mount and to adjust and complete the range of the locking cylinders series CyPull. Standardised stroke lengths and a new mounting system are characteristic for this new series. For axial adjustment purposes, each cylinder is supplied with 2 mounting shims (one of which is a spare). By measuring the core home position and the cylinder rod distance, the shim can be adapted to give the correct mounting position. The shims have a material thickness of 2 mm which can be reduced down to 1 mm by peeling in steps of 0,05 mm.

The final stroke positions are indicated by means of inductive proximity switches (3 wire pnp normally open).

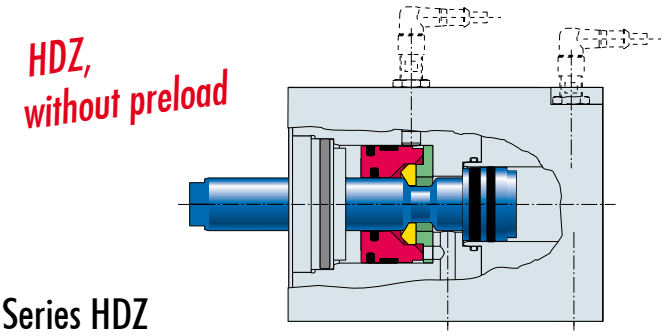
The CyBlock cylinders can be buried into the mould tools. Due to possible heat in the tool high quality Viton seals are fitted as standard.

How to order

Order code	Example: HSZ 025/016 - 0025 - 01 - F - G - VI - B28-B29
Series short stroke block cylinder	HSZ, HDZ
Piston-/Rod- ∅ according table	
Stroke length accodring table	
Locking rod sided with extended piston rod	01
Accessories (option): Alignment screw	F
Accessories (option): Counterpiece to alignment screw	G
Seals Viton	VI
Monitoring of final position (option) with proximity switches	B28 B29

Order code for spare shims for:	HSZ 020	HSZ/HDZ 025	HSZ/HDZ 032	HSZ/HDZ 040	HSZ/HDZ 050
091-	088	080	081	082	085

Similar to series CyPull, the CyBlock cylinders are equipped with integrated positive lock for the extended stroke position of the piston rod. Two versions are available:

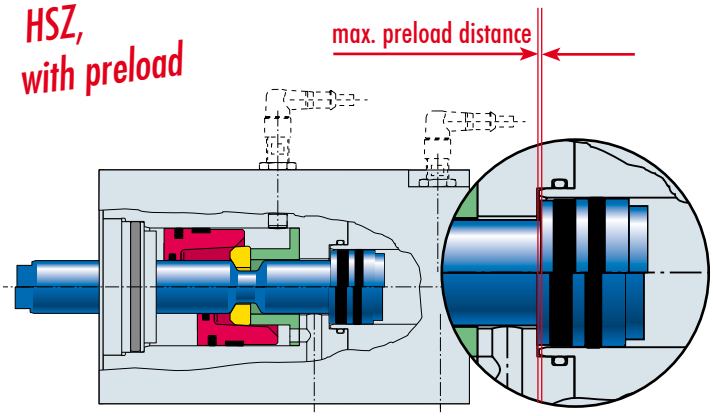


Series HDZ

This cylinder locks in the end position without preload.

Applications:

- Simple core pins
- Support cylinders for inserts
- cores where the use of preload is undesirable.



Series HSZ

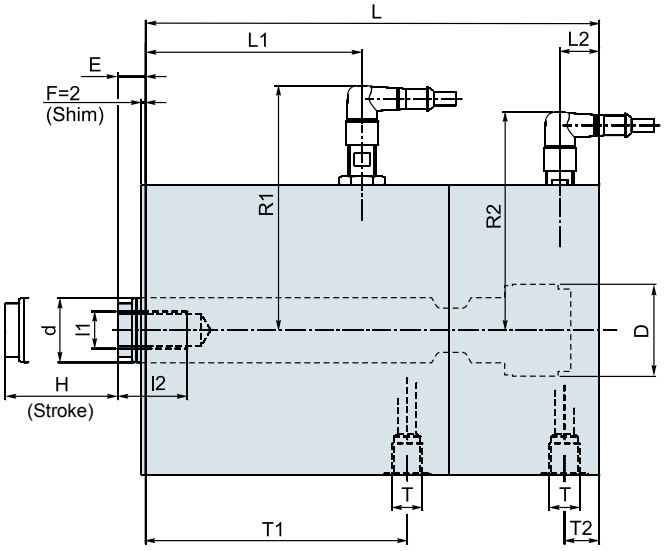
This cylinder locks in the end position as the HDZ version but its special design allows a locking tolerance range and can be adjusted to generate a preload on the core.

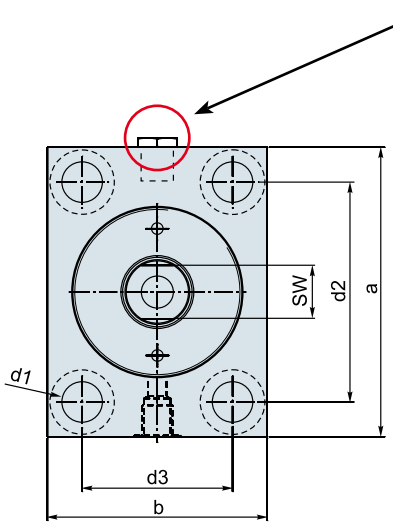
Applications:

- Complex core forms
- Partially touching cores
- Paired touching cores

CyBlock

Technical data





In case of unneeded proximity switches, the according tap holes are covered with plugs by the manufacturer. Proximity switches can be retrofitted at any time.

Dimensions

Series	D (Piston Ø)	d	H (Stroke)	max. preload distance	a	b	L	d1	d2	d3	E	SW	l1	l2	T	T1	T2	L1	L2	R1	R2
HSZ	20	14	20	0,4	77	55	132	11	55	35	9	10	M6	12	G1/8	79	9	65	11	91	85
	25	16	25	0,5	85	63	157	11	63	40	10	13	M8	17	G1/4	94	11	80	12	95	87
	32	20	25	0,5	100	75	170	13,5	76	45	12	17	M10	17	G1/4	104	14	86	14,5	97	91
	40	28	35	0,5	125	95	196	17,5	95	65	12	23	M16	23	G1/4	113	15,5	93,5	17	106	95
HDZ	25	16	25	-	85	63	133	11	63	40	10	13	M8	17	G1/4	70	11	56	12	95	87
	32	20	25	-	100	75	139	13,5	76	45	12	17	M10	17	G1/4	73	14	58	14,5	97	91
	40	28	35	-	125	95	166	17,5	95	65	12	23	M16	23	G1/4	83	15,5	63,5	17	106	95

Forces

	HSZ 020	HSZ 025	HSZ 032	HSZ 040	HDZ 025	HDZ 032	HDZ 040
Holding Force under preload (kN):	32	50	80	150	-	-	-
Holding Force without preload (kN):	-	-	-	-	32	60	88
Stroke Force with 100 bar (kN):	3,1	4,9	8,0	13	4,9	8,0	13
Stroke Force with 150 bar (kN):	4,7	7,4	12	19	7,4	12	19
Retraction Force with 100 bar (kN):	1,6	2,9	4,9	6,4	2,9	4,9	6,4
Retraction Force with 150 bar (kN):	2,4	4,3	7,4	10	4,3	7,4	10
max. admissible operating Pressure (bar):	160	160	160	160	160	160	160

Proximity switches

Execution:	Angular plug with 3m PVC-cable 3 x ∅ 0,34mm²
Admissible ambient temperature range:	up to +80°C
Function of switching element:	3-wire-PNP-norm. open

Operational voltage range:	10 ... 30 VDC
Protection class according to DIN 40050:	IP 68
Connection cable:	3m PVC-cable, 3 x ∅ 0,34mm²
Smallest allowed bending radius of cable:	50 mm

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CyLock	Cylinder with integrated locking device	**CyTwist**	Spindle-clamping system
CyPull	Locking core-pull cylinder	**CySpeed**	Motor spindle
CyDock	Docking system with self-locking	**CyTool**	Manual tool clamping system
CyDim	Hydromechanical clamping system	**CyFit**	Quick coupler
CyTrac	Collet clamp lock	**CyCon**	Tool/spindle controlling system
CyStop	Pneumatic cylinder with internal braking device	**CyCool**	Tool cooling/lubricating system
CyLift	Multifunctional lifting column	**CyMill**	2-Axis-NC-Milling heads
CyTab	Pallet clamping system	**CyTorque**	Torque motors

CYTEC SYSTEMS

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