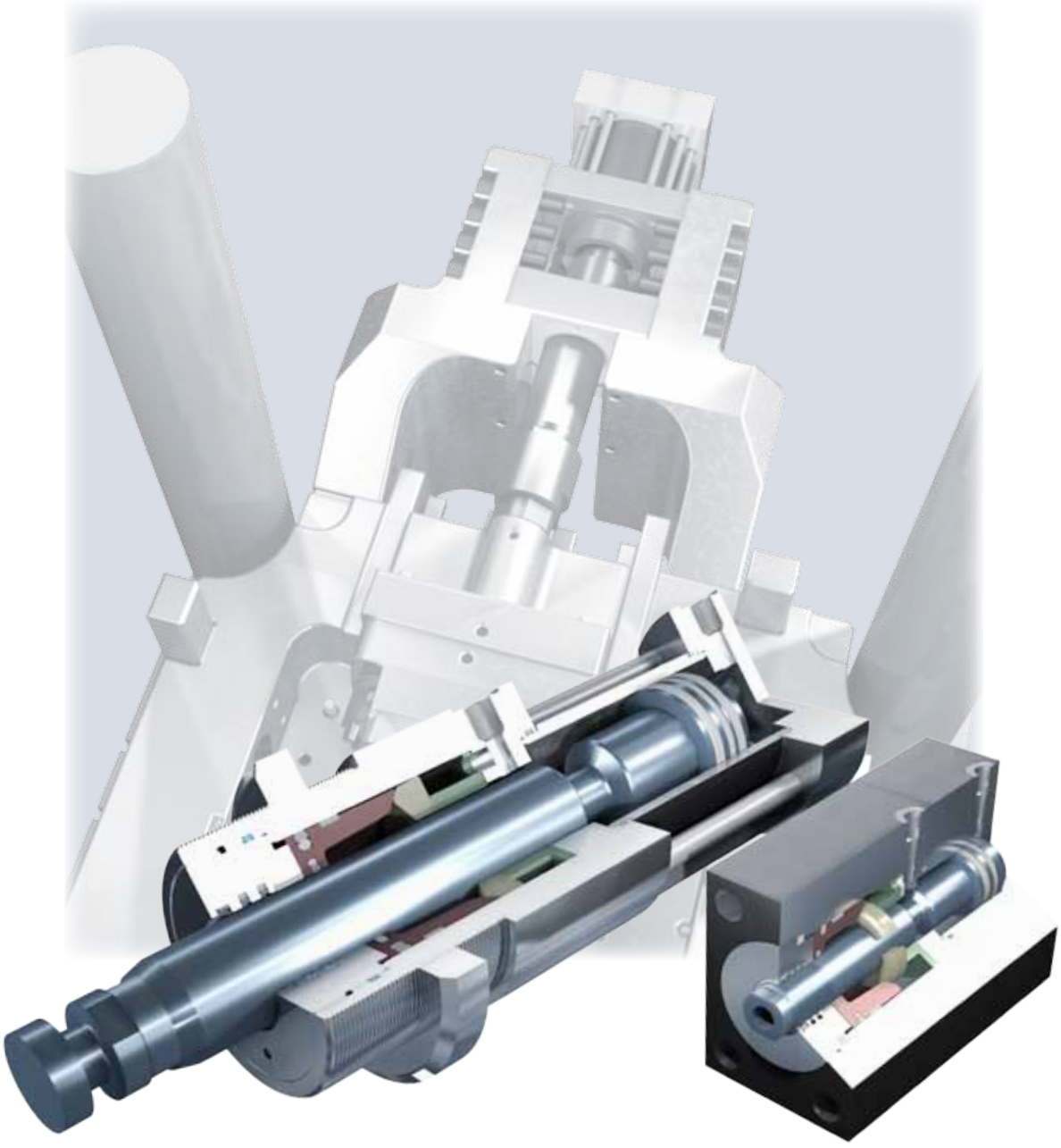
CyPull • CyBlock

Locking Core Pull Cylinders • Short Stroke Block Cylinder



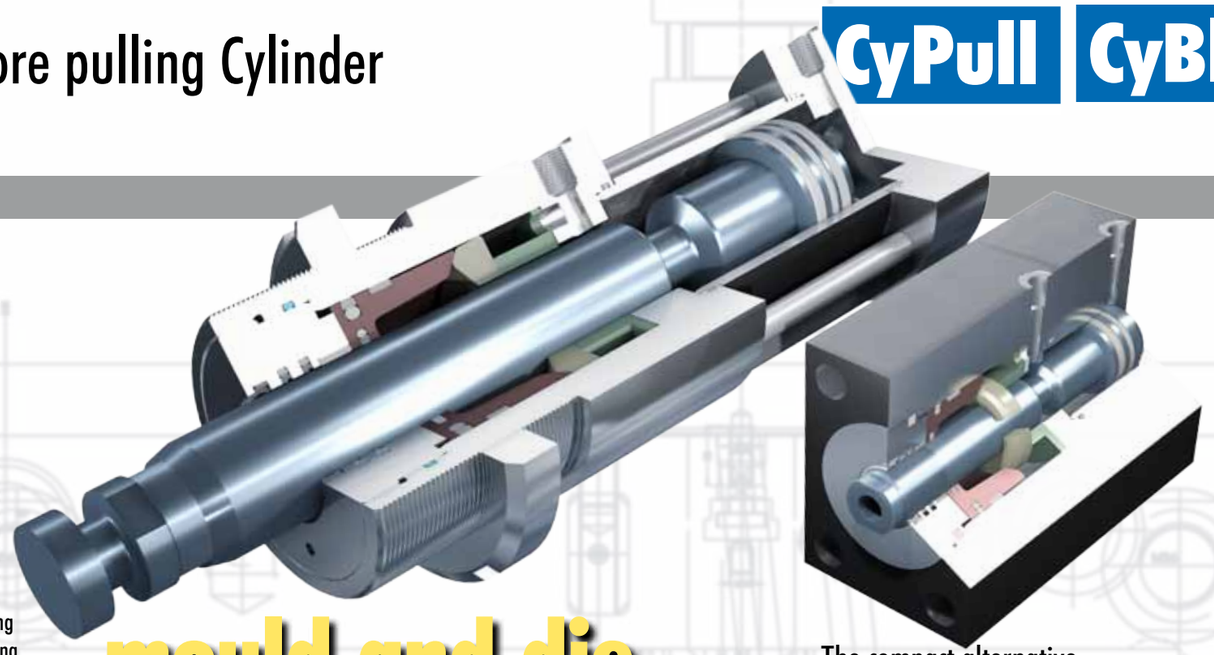
CYTEC SYSTEMS

Germany: CyTec Cylindertechnik GmbH
Steffensrott 1 • D-52428 Jülich • Tel.: (+49) 2461/68 08-0 • Fax: (+49) 2461/68 08-758
E-mail: info@cytec.de • http://www.cytec.de • Edition 02/2015

Great Britain: CyTec Systems UK Ltd. • Unit H • 100 Shaw Road (Off Daltry Street) • GB Oldham, OL1 4AB
Phone: (+44) 0161/678 70 90 • Fax: (+44) 0161/620 53 92 • Edition 02/2015
E-mail: sales@cytec-uk.com • http://www.cytecsystems-uk.com

CyPull Locking Core pulling Cylinder

CyPull CyBlock



...simplifies mould and die construction

Hydraulic cylinders are essential as a device for moving and positioning of cores in mould and die construction. CyPull locking core pull cylinders are used for many years successfully, 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.

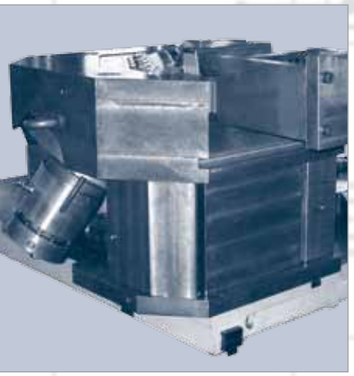
The design is extremely rigid and normally does not need any further maintenance. Once adjusted the cylinder achieves an ever consistent high workpiece quality, increasing the productivity.

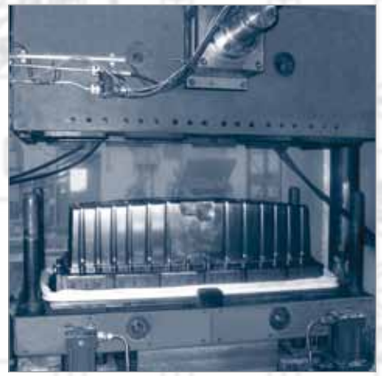
As standard, the cylinders are equipped with proximity switches which allow an optimised adjustment with the machine control.

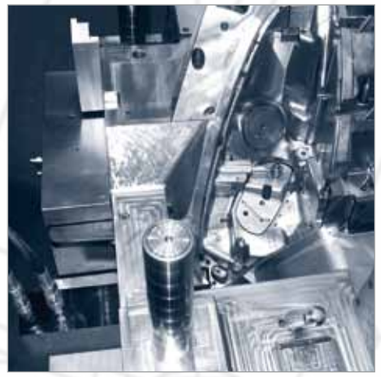
For almost every application an appropriate **CyPull** locking cylinder is available.

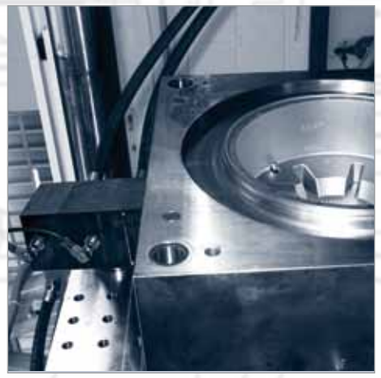
The compact alternative: Short stroke block cylinder series HSZ/HDZ

The CyBlock block cylinder was especially developed for injection moulding cores in tool and mould manufacturing and is a compact alternative to the CyPull locking core pull cylinders equipped with an integrated locking system like the CyPull cylinders.





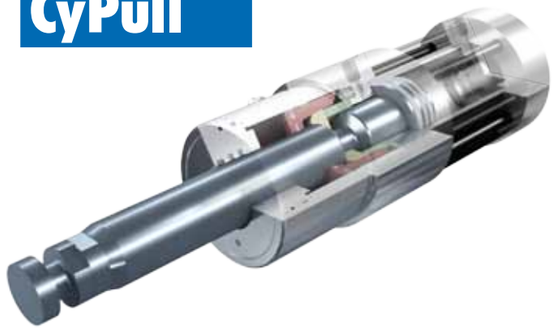




Content

Overview Locking Core Pull Cylinders / Block Cylinders

CyPull



Locking core pull cylinder Series HS

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

with metal wiper ring for die cast applications

Locking core pull cylinder Series HD

Series with hydraulic locking and without preload

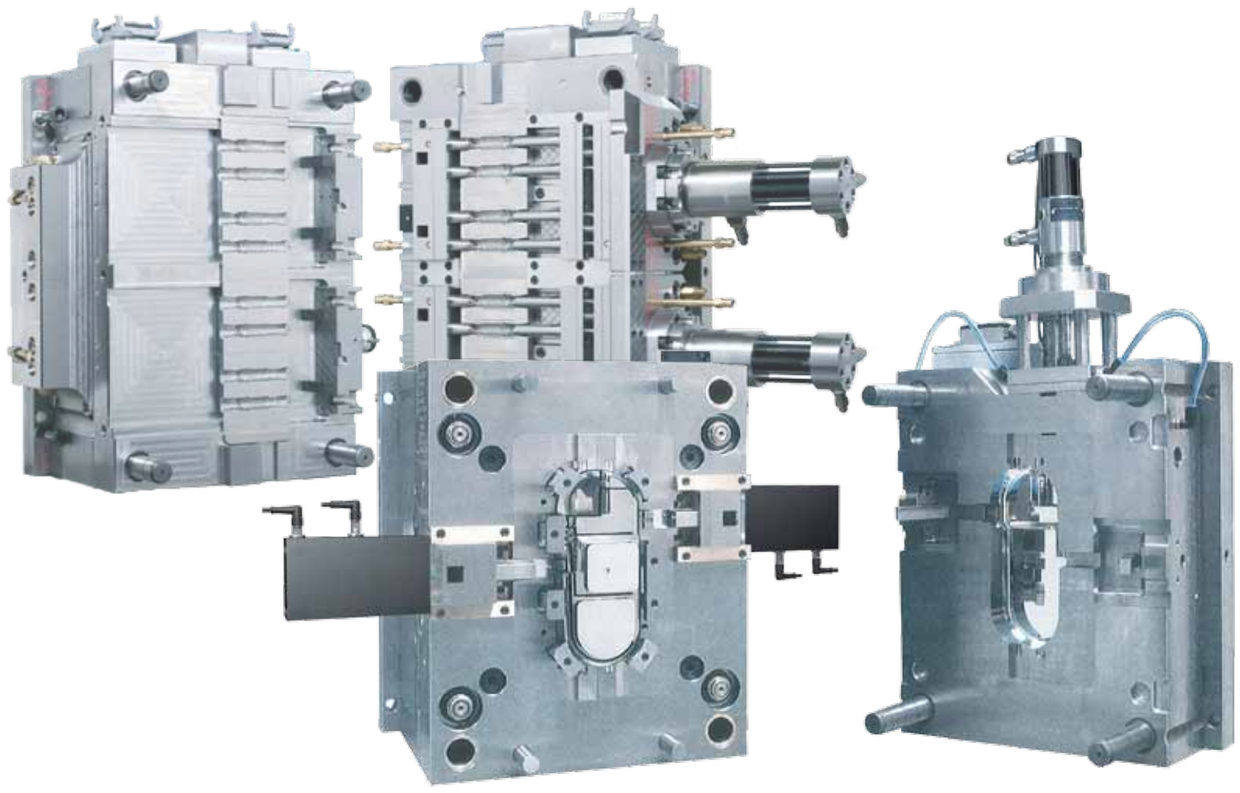
- hydraulic locking with by-pass
- Piston diameter 32-200 mm

Series HDD

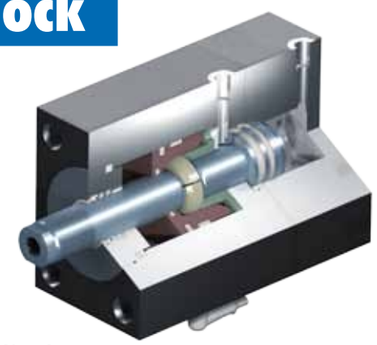
with metal wiper ring for die cast applications

Technical data overview

Series	HS/HSD	HD/ HDD	HSZ	HDZ
Design	Tie rod version with round cross section		block housing	
Nom. size Ø	25-200 mm	32- 200 mm	20 - 63 mm	25 - 63 mm
Standard stroke length	standardised stroke lengths up to size Ø 80		10 - 50 mm	
Optional stroke lengths	optional, deviant stroke lengths for all sizes on request			
Holding forces	high holding forces in locked position			
Max. allowed pressure	200 bar		160 bar	
Locking	hydraulic with by-pass ander pre-load	hydraulic without with by-pass pre-load	hydraulic ander pre-load	hydraulic without pre-load
Locking indicator	electronic with pnp-sensors			
Plug connection	with angular plugs			
Seals	Viton			



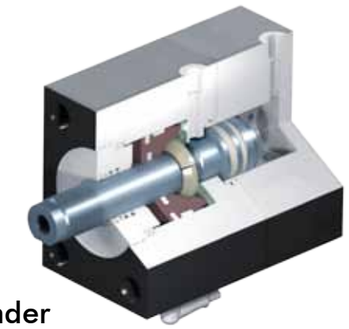
CyBlock



Block cylinder Series HSZ

Special series for short stroke applications with hydraulic locking and preload which can compensate in critical cases elasticities and tolerances of the tool

- hydraulic locking
- Piston diameter 20 - 63 mm



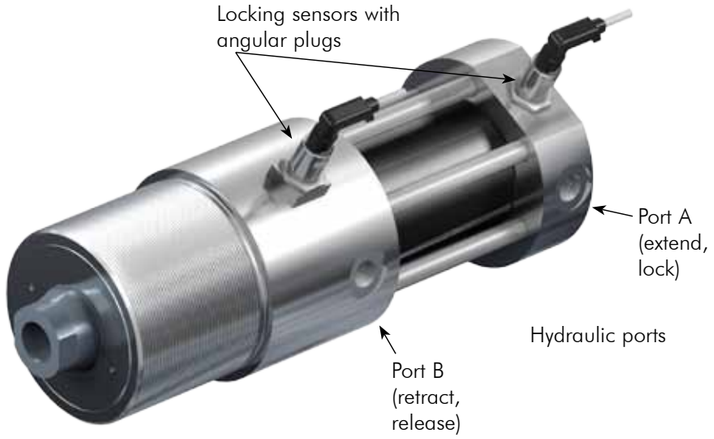
Block cylinder Series HDZ

Special series for short stroke applications with hydraulic locking and without pre-load

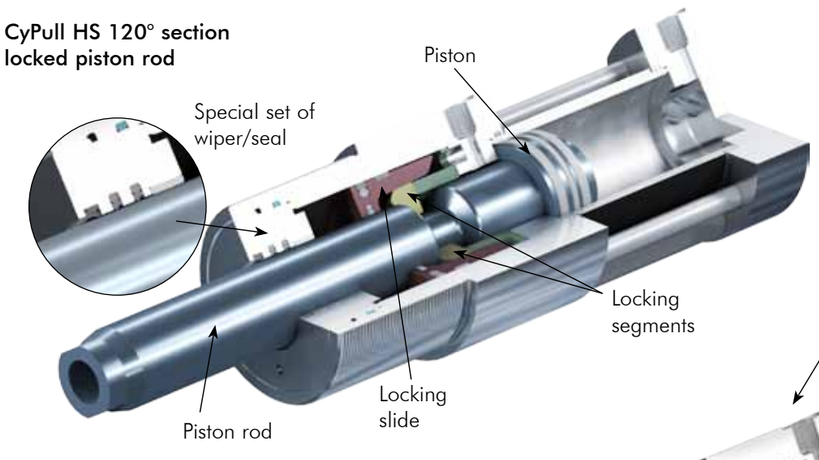
- hydraulic locking
- Piston diameter 20 - 63 mm

Technical details and accessories for standard locking core pull cylinders

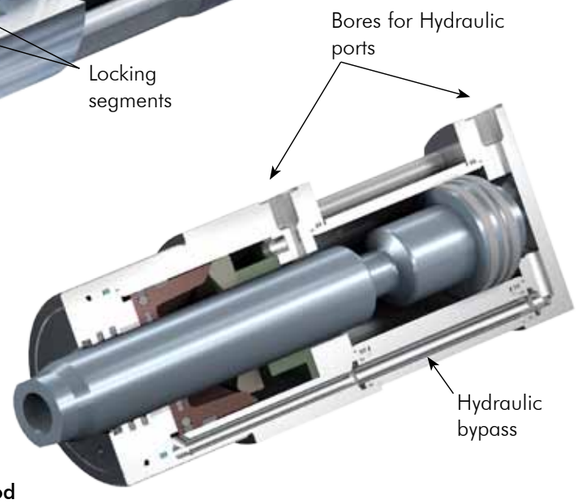
Technical details series HS(D) / HD(D)



CyPull HS



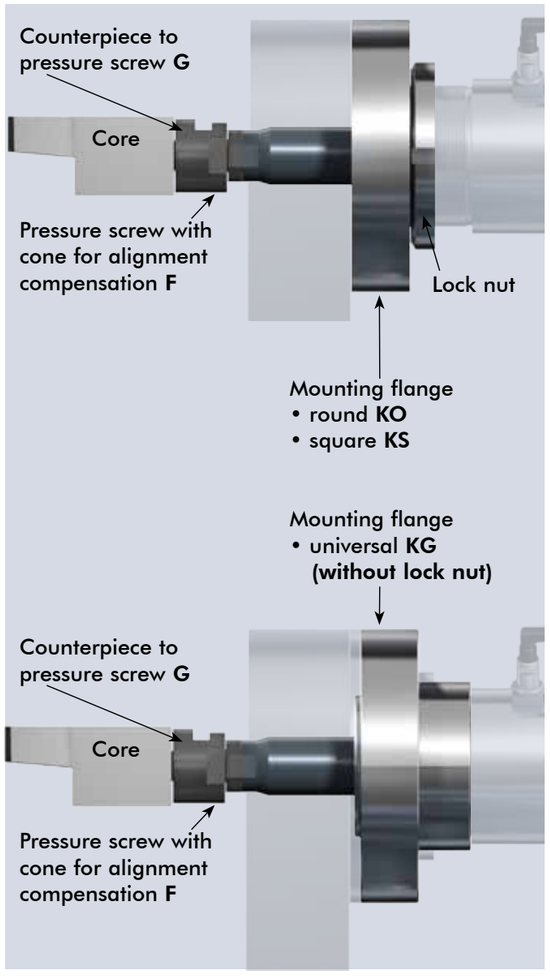
CyPull HS 120° section
locked piston rod



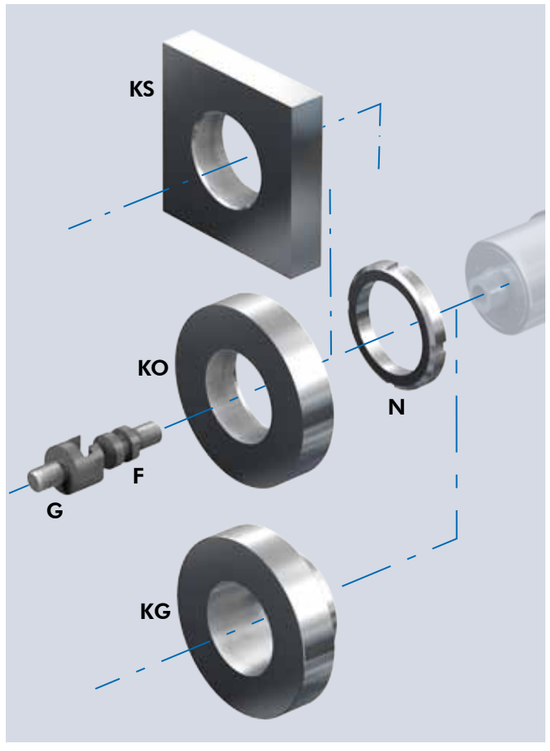
CyPull HS
180° section
released piston rod

Accessories for standard cylinders

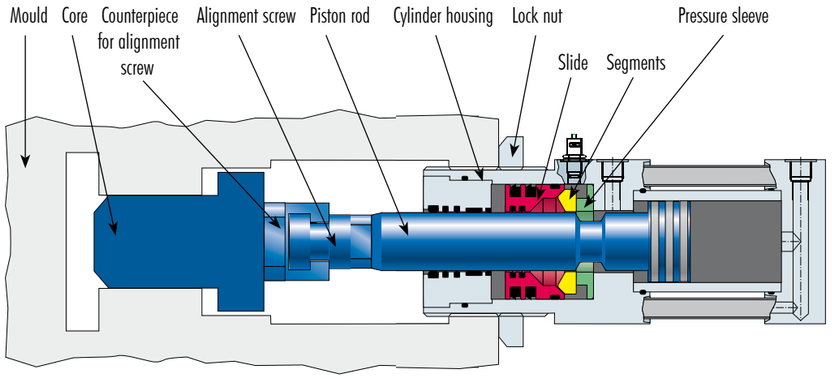
Series	HS/HSD	HD/HDD
Pressure screw **F**	x	x
Counterpiece to pressure screw **G**	x	x
Lock nut **N**	x	x
Mounting flange round **KO**	x	x
Mounting flange square **KS**	x	x
Mounting flange universal **KG**	x	x
Sensor tester for sensors	x	x



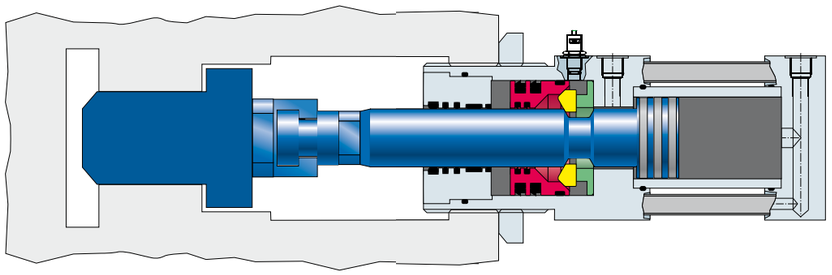
A complete mounting system is available that makes it simple to adapt to existing moulds. Because the complete holding force of the piston rod is transferred through the mounting elements also, any possible elasticity must be reduced to a minimum. Therefore we categorically recommend the use of original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



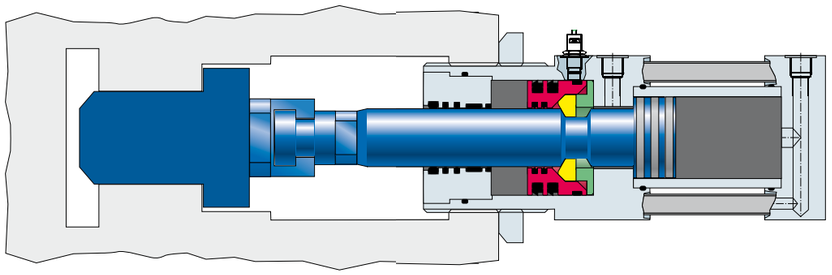
Functional process without pre-load, Series HD



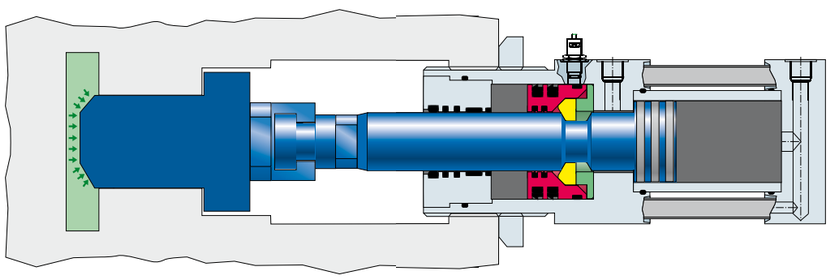
Released position



Start of locking



Completely locked position



Locked position with applied injection pressure

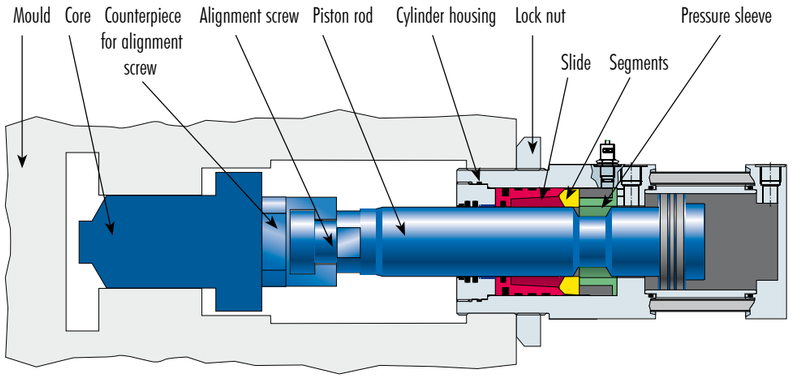
Functional process series **HD**

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.

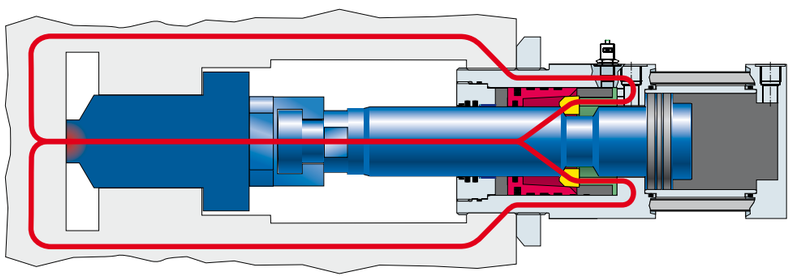
The locking slide is operated by hydraulic pressure which is branched off with a by-pass drilling from the main hydraulic ports for extending and retracting the piston rod. This enables very fast stroke cycles.

With the series **HD** 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.**

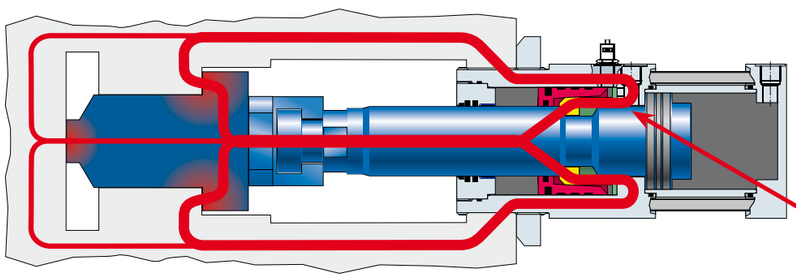
Functional process with pre-load, Series HS



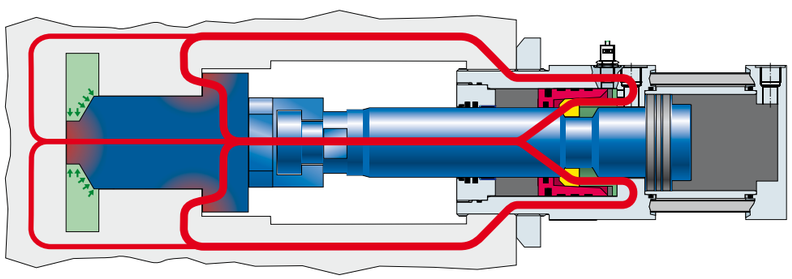
Released position



Start of locking (red curve: force displacement)



Completely locked position

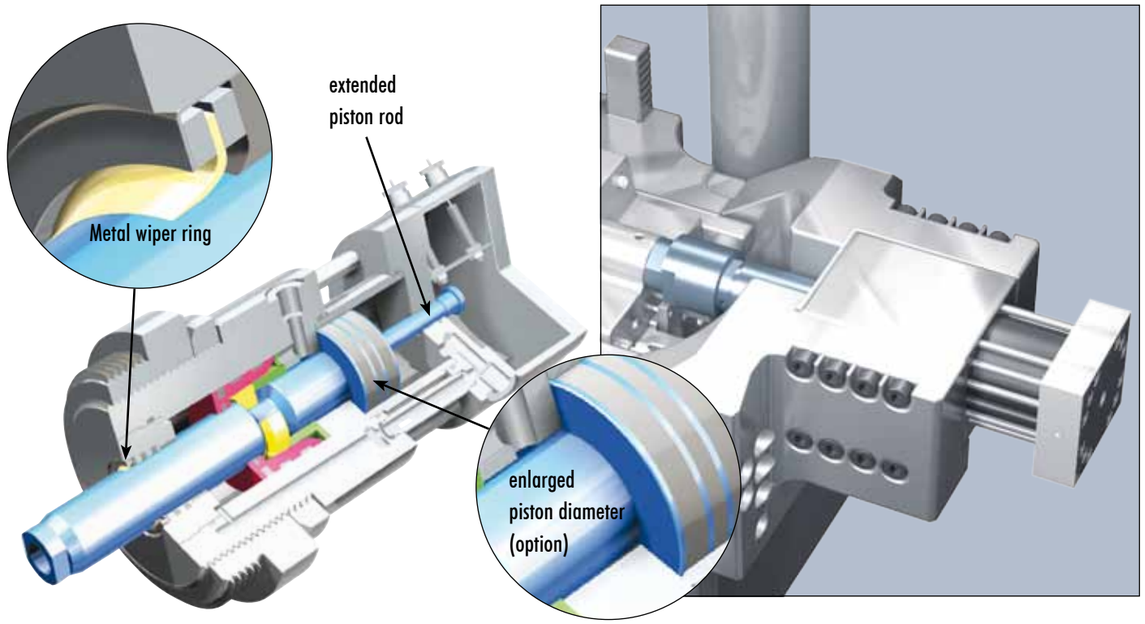


Locked position with applied injection pressure

Functional process series **HS**

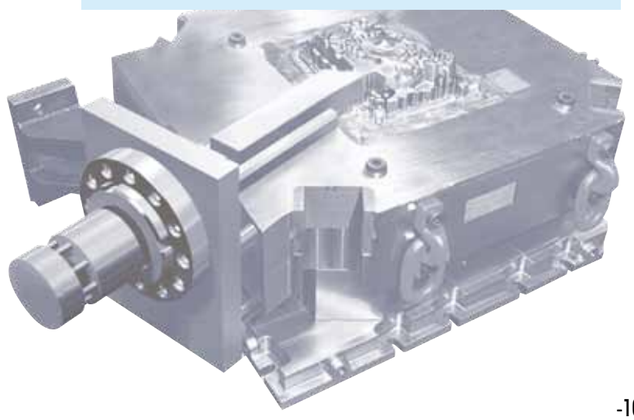
The locking system of series **HS** is operated hydraulically. In addition the locking segments can create a pre-load. The locking slide and the segments have a characteristic cone shaped contour which enables the piston rod to lock within a defined tolerance range. This tolerance range can reach up 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.

Red curve: displays the force displacement



Special features

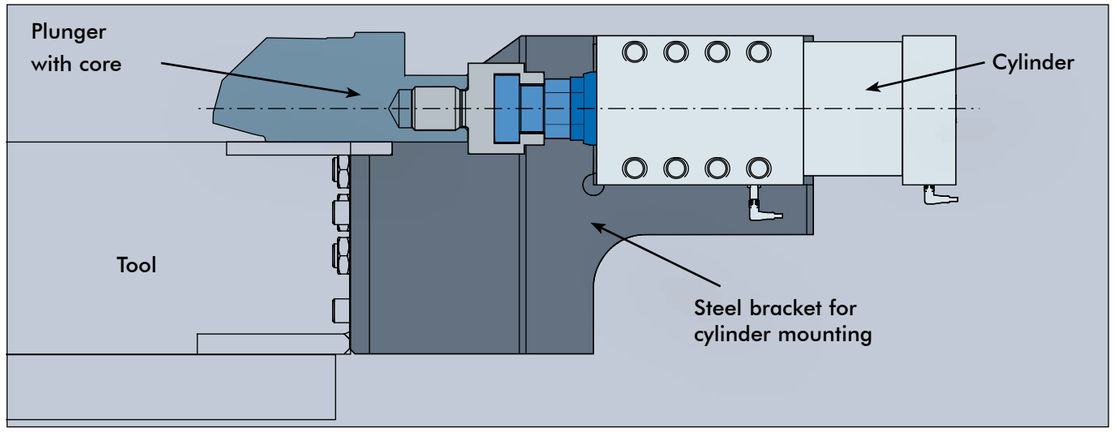
- High retraction force by means of enlarged piston diameter (option)
- Safe function with high ambient temperature and dirty conditions
- Design to customer demands (adaptation to mould structure, special mountings and lengths)



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.

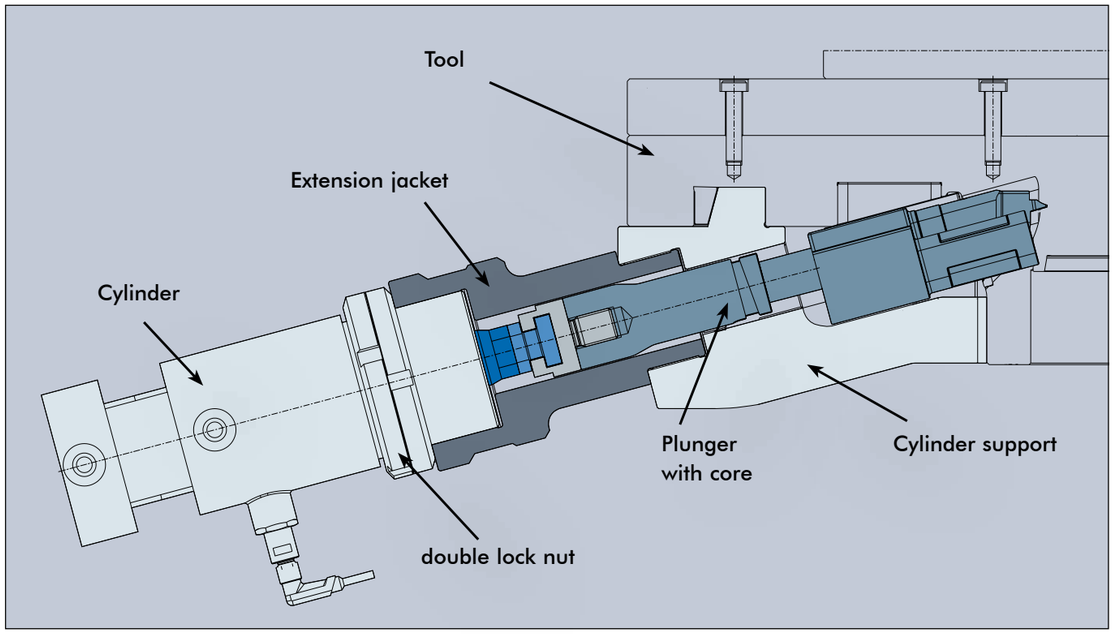
Equipment for die casting applications

- **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 120°C) as an option



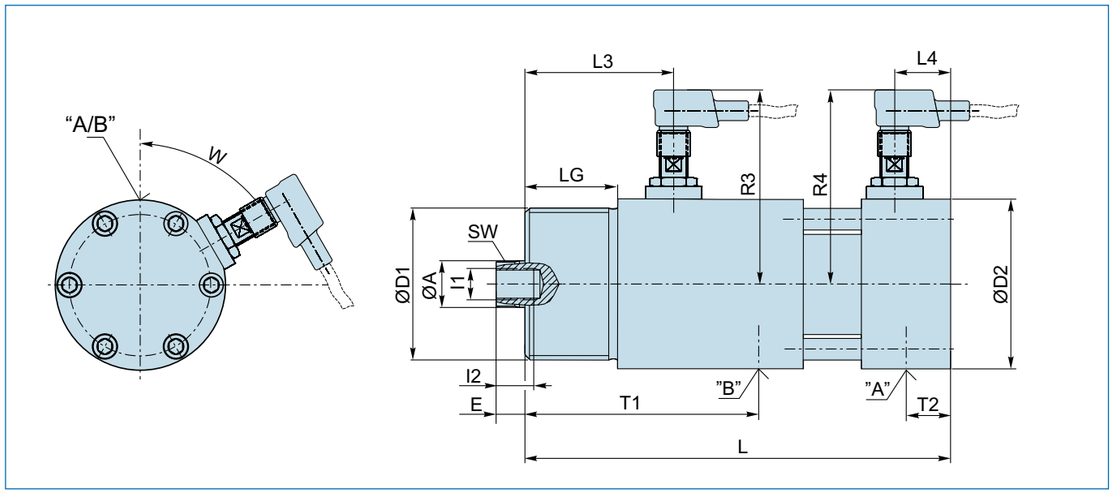
Application example main slide on a die casting machine for fabrication of automotive oil pans:

- Cylinder model CyPull HS 160 with pre-load
- Transmission of high forces via massive steel brackets
- optimised force flow directly into the tool



Application example under floor slide:

Under floor slides are often in critical position to the carrier plate and need special reinforced fixtures.



Sizes series HS/HSD (in mm)

	Piston Ø	max. preload distance	Ø A	SW	I1	I2	E	Ø D1	Ø D2	LG	L	Pressure ports A/B
Standard	25	0,5	16	13	M8	20	10	M55x2	60	50	159	G1/4
	32	0,5	20	17	M10	25	12	M70x2	75	60	187	G1/4
	40	0,5	28	23	M16	30	15	M85x2	95	70	199	G1/4
	50	1,0	36	27	M20	35	21	M90x2	100	80	242	G3/8
	63	1,0	45	36	M27	41	25	M110x2	120	90	225	G3/8
	80	1,0	56	46	M30	45	28	M140x2	150	100	283	G1/2
Option	100	1,0	70	60	M42	45	33	M160x3	170	110	290	G1/2
	125	1,0	90	80	M56	50	33	M190x3	200	120	318	G3/4
	160	1,0	110	95	M64	95	40	M235x3	250	150	389	G1
	200	1,0	140	115	M80	112	50	M290x3	325	185	472	G1

	Piston Ø	T1	T2	L3	L4	R3	R4	W	Weight appr.(kg) (up to 100 mm stroke)	Stroke
Standard	25	101	18	80	18	83	72	60°	4	35 | 50 | 75
	32	128	14	104,5	19,5	92,5	83	60°	6	40 | 60 | 80 | 100
	40	135	14	112,5	13,5	100	84	60°	10	50 | 60 | 80 | 100
	50	176	15	144	13,5	117	71,5	90°	13	60 | 80 | 100 | 120
	63	159	15	133,5	17	122	105	60°	19	75 | 100 | 125 | 150
	80	206	17	157	17	132	110,5	60°	35	50 | 80 | 120 | 160
Option	100	211	18	187,5	18	124	102	60°	48	on request
	125	226,5	21	195,5	21	152	132	60°	75	
	160	272	37	237,5	37	172	147	75°	137	
	200	326	46	268,5	46	191	169	60°	286	

Other sizes and different stroke lengths on request

Sizes series HD/HDD (in mm)

	Piston Ø	Ø A	SW	I1	I2	E	Ø D1	Ø D2	LG	L	Pressure ports A/B
Standard	32	20	17	M10	25	12	M65x2	75	54	150,5	G1/4
	40	28	23	M16	25	15	M85x2	95	46	150	G1/4
	50	36	27	M20	35	21	M90x2	100	80	189	G3/8
	63	45	36	M27	40	24,5	M110x2	120	72	180	G3/8
	80	56	46	M30	45	28	M140x2	150	100	222	G1/2
Option	100	70	60	M42	45	33	M160x3	170	105	225	G1/2
	125	90	70	M56	55	33	M190x3	200	120	260	G3/4
	160	110	95	M64	95	40	M235x3	250	150	322	G1
	200	140	115	M80	112	50	M290x3	325	185	402	G1

	Piston Ø	T1	T2	L3	L4	R3	R4	W	Weight appr.(kg) (up to 100 mm stroke)	Stroke
Standard	32	91,5	14	71	19,5	92,5	83	60°	5	40 | 60 | 80 | 100
	40	86	14	63,5	13,5	100	84	60°	8	50 | 60 | 80 | 100
	50	123	15	100,5	13,5	117	71,5	90°	11	60 | 80 | 100 | 120
	63	114	15	89,5	17	122	105	60°	17	75 | 100 | 125 | 150
	80	145	17	120	17	132	110,5	60°	32	50 | 80 | 120 | 160
Option	100	146	18	122	18	124	102	60°	40	on request
	125	168,5	21	137,5	27,5	152	132	60°	65	
	160	205	37	171	37	172	147	75°	90	
	200	256	46	217	46	191	169	60°	247	

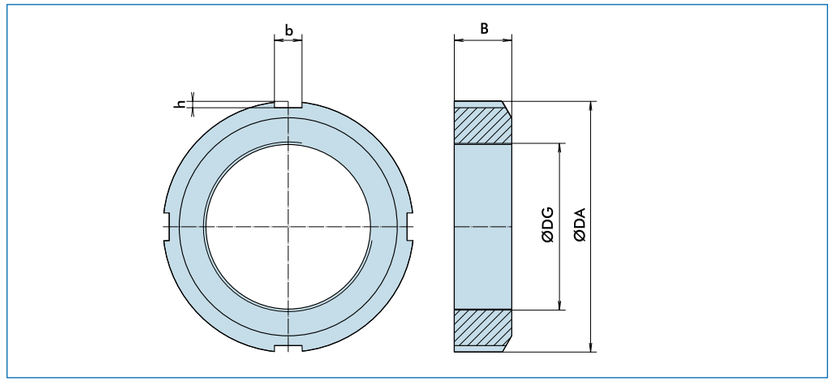
Other sizes and different stroke lengths on request

Forces series HS/HSD and HD/HDD (in kN)

Piston Ø	Holding force under preload, only series HS	Holding force without preload, only series HD	Stroke force, all series			Retraction force, all series		
			100 bar	150 bar	200 bar	100 bar	150 bar	200 bar
25 (only HS)	50	-	4,9	7,4	10	2,9	4,4	5,8
32	80	60	8,0	12	16	4,9	7,4	10
40	150	88	13	19	25	6,4	9,6	13
50	240	140	20	29	39	9,5	14,2	19
63	360	224	31	47	62	15	23	31
80	560	360	50	75	101	26	38	51
100	880	564	79	118	157	40	60	80
125	1.280	880	123	184	245	59	88,7	118
160	2.100	1.440	201	302	402	106	159	212
200	3.300	2.250	314	471	628	160	240	320

Lock nut **N**

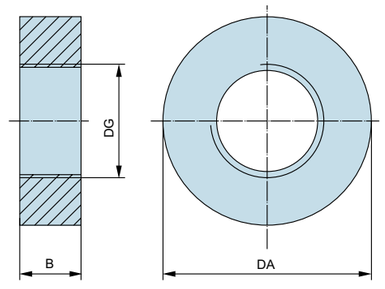
to secure the cylinders
against turning



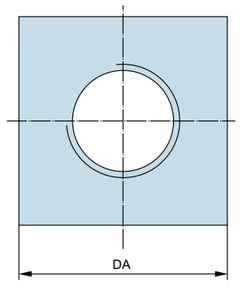
Cylinder-Nenn-Ø	HS 25	HD 32	HS 32	40	50	63	80	100	HS/HD 125	HS/HD 160	HS/HD 200
Ø DA	75	85	92	110	120	145	180	210	240	285	340
B	11	12	12	16	16	19	22	25	28	30	30
b	7	7	8	8	10	12	14	16	18	20	24
Ø DG	M55x2	M65x2	M70x2	M85x2	M90x2	M110x2	M140x2	M160x3	M190x3	M235x3	M290x3
h	3	3	3,5	3,5	4	5	6	7	8	10	12

Mounting flanges

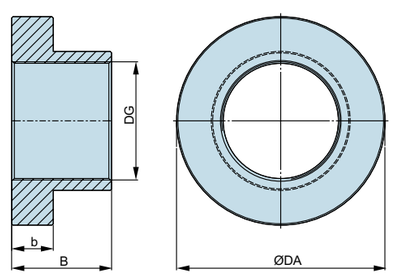
Standard flange round **KO**



Standard flange square **KS**



Universal flange round **KG**

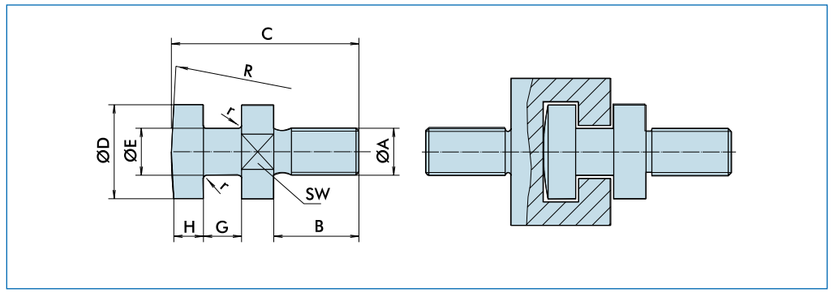


Cylinder nom. Ø	HS 25	HS 32	HD 32	40	50	63	80	100	HS/HD 125	HS/HD 160	HS/HD 200
DA	120	130	130	150	180	210	240	290	380	on request	on request
B	25	30	30	30	40	45	60	70	90		
b											
Ø DG	M55x2	M70x2	M65x2	M85x2	M90x2	M110x2	M140x2	M160x3	M190x3		
recommended screw mountings*	6 x M10	6 x M12	6 x M12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

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

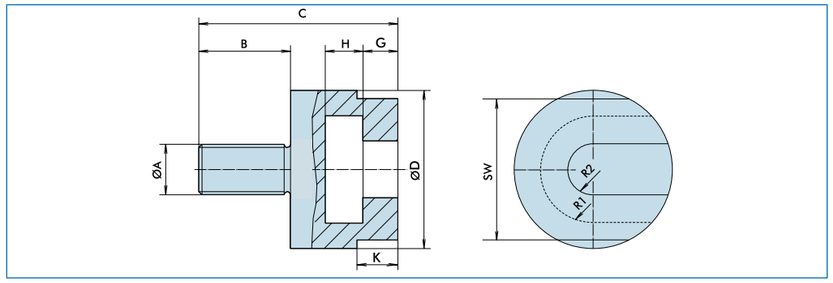
Pressure screw **F**

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	29,5	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	1,5	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 to 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	249,5
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	29	37,5	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

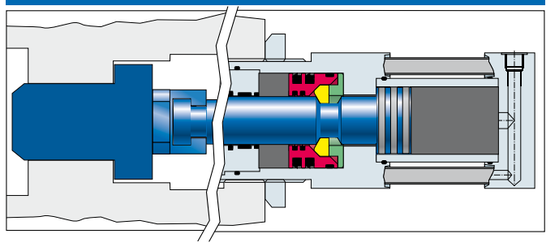
The following advice is used to preselect the cylinder size. For the choice of the adequate CyPull cylinder the following factors must be considered:

- Type of core
- Holding force (cross section area, cavity pressure)

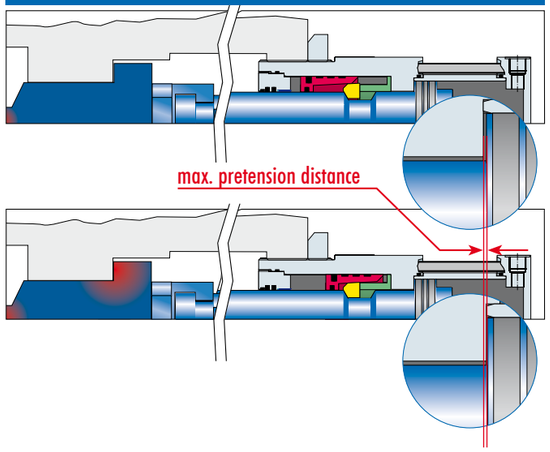
Type of core

The type of core determine the cylinder model to be chosen, i. e. whether a preload is necessary or not. The following table gives an overview.

Without preload: Series HD



With preload: Series HS



Core situation	Stroke	Examples	recommended Series
Fully exposed cores with no shut off	10-80 mm	core pins	**HD**
Touching, laterally injected cores	10-80 mm	simple breakups; tool-protection against flash	**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**

Holding force

For the choice of a certain cylinder size the required holding force is essential, which the cylinder must generate to counteract the pressure that arises through the injection process.

Conversion from SI unit to SI conformable unit

$$\mathbf{1\ Pa} = 1\,\frac{N}{m^2} = 1\,\frac{kg}{m \cdot s^2}$$

$$\mathbf{1\ MPa} = 1\,\frac{N}{mm^2} = 10\ bar$$

$$\mathbf{1\ PSI} = 6{,}8948\,\frac{N}{mm^2} = 6{,}8948 \cdot 10^{-2}\ bar$$

$$\mathbf{1\ N} = 1\,\frac{kg \cdot m}{s^2}$$

Calculation of the requested holding force

The required holding force can be calculated with the formula

$$\mathbf{F = p \cdot A}$$

Parameters:

F Force [N]
A pressurised core surface [mm²]
p injection pressure [bar]

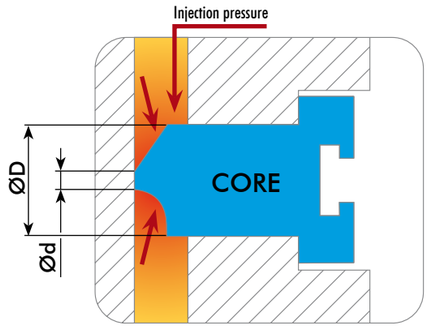
If the actual injection pressure is unknown, the following standard values for the average injection pressure can be determined:

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.

Example

A round, partially touching core according to adjacent figure is internally pressurised with 1 000 bar.



Size of core: d = 12 mm
D = 30 mm

Calculation: $F = p \cdot A$

$$A_{annulus} = \frac{\pi \cdot (D^2 - d^2)}{4}$$

$$F = 1.000\ bar \cdot \frac{\pi \cdot [(30mm)^2 - (12\ mm)^2]}{4} = 59.376{,}1\ N = 59{,}4\ kN$$

Conclusion: The holding force of the cylinder should be **at least (!) 60 kN**.

So for this application a cylinder series HS, HSD (CyPull) or HSZ (CyBlock) with a Piston diameter of 32 mm is recommended (HS032; HSD032 or HSZ032).

Moreover also the requested retraction force should be regarded. This is indicated in the catalog tables.

Note: the holding force is not dependant from the operational pressure of the cylinder!

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

depending on the pressurised core surface

pressurised area (mm²) / 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

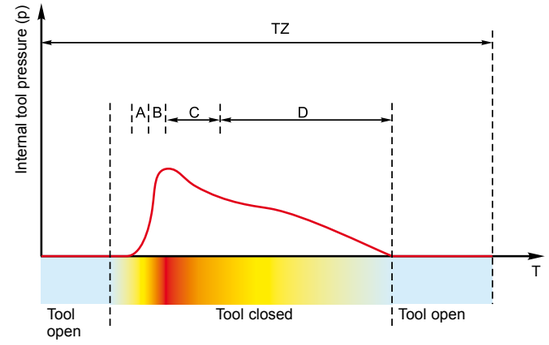
pressurised area (mm²) / Material	300	500	1000	1500	2000	3000	4000	5000	6000	7000	8000
PP, PS, PE	HD 32	HD 32	HD 40	HD 50	HD 63	HD 80	HD 80	HD100	HD100	HD100	HD125
ABS, PPS	HD 32	HD 32	HD 50	HD 63	HD 63	HD 80	HD100	HD100	HD125	HD125	HD125
Glass fibre reinforced	HD 32	HD 40	HD 50	HD 63	HD 80	HD100	HD100	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.

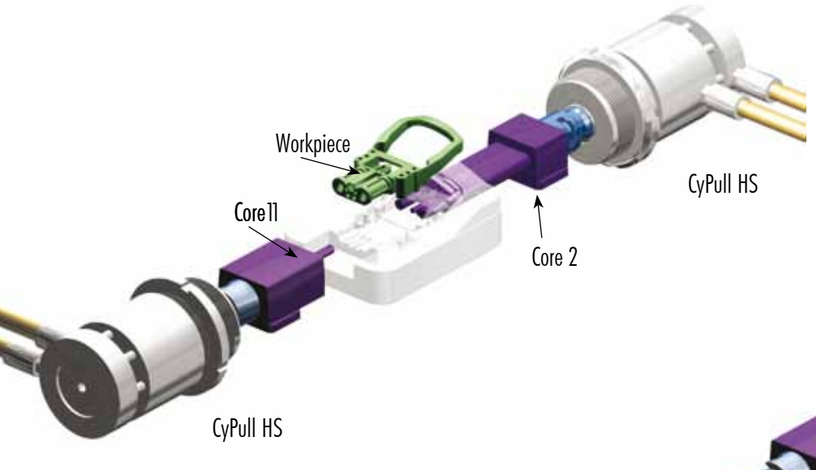
Internal tool pressure

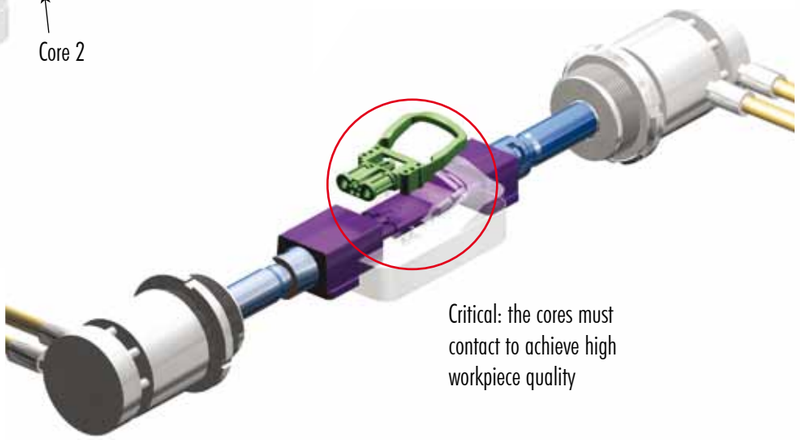
After the tool is locked and filled completely the material is highly compressed, i. e. the internal pressure increases very much. In this phase cores and slides are exposed to the maximum pressure load. This pressure decreases when the material cools down and contracts. The red curve in the diagram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

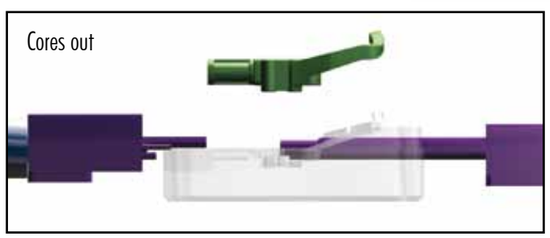


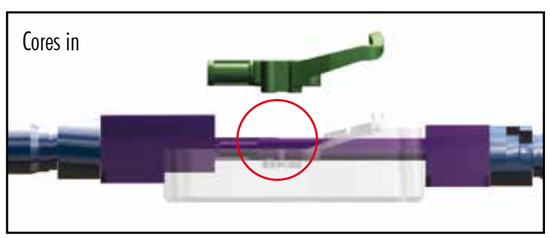
Example 1: a pair of touching cores





Critical: the cores must contact to achieve high workpiece quality





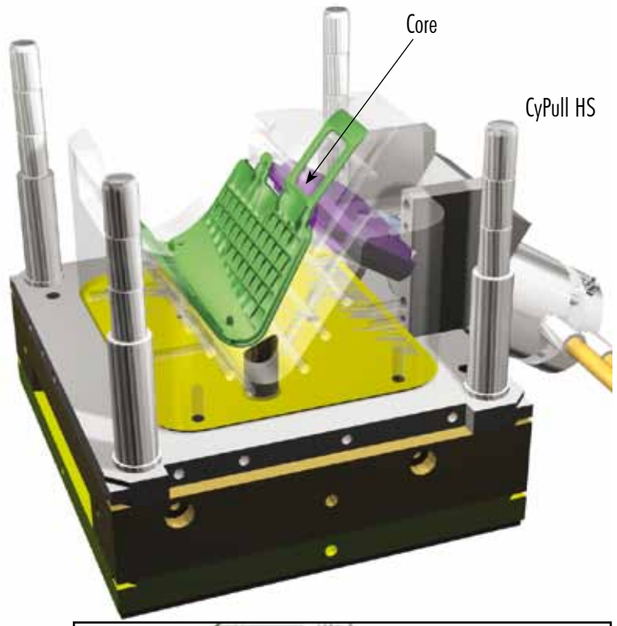
If two counteracting cores must build a "free of flash" aperture, it is necessary that the cores reach the absolutely defined final position.

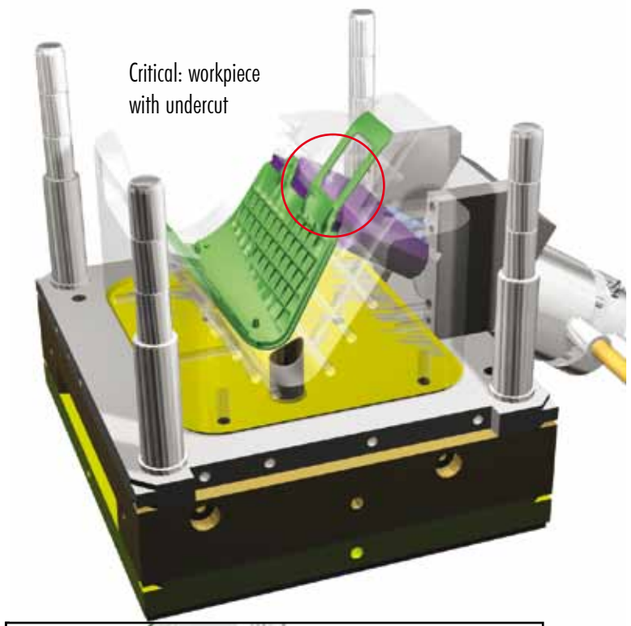
The cores with their very complex contour travel into each other and are extremely exposed to the high internal pressure on their large surface area. Therefore we highly recommend the use of series **HS** in those cases.

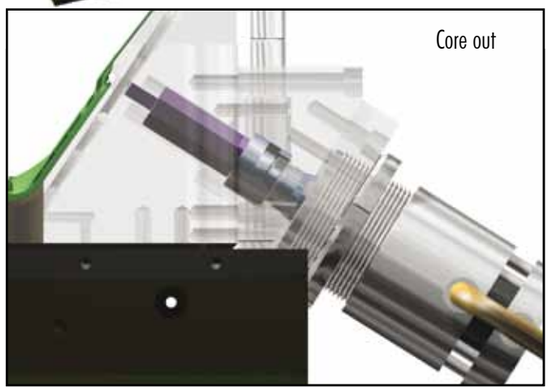
CyPull

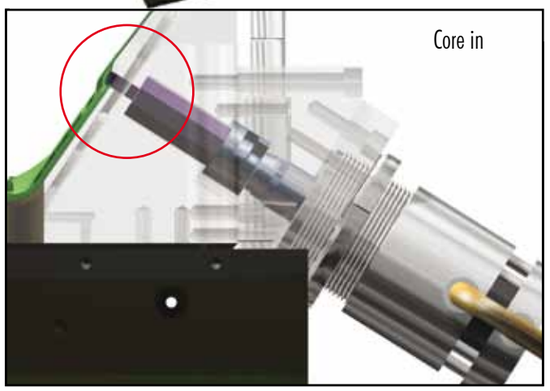
Core situation (examples)

Example 2: Underfloor slides



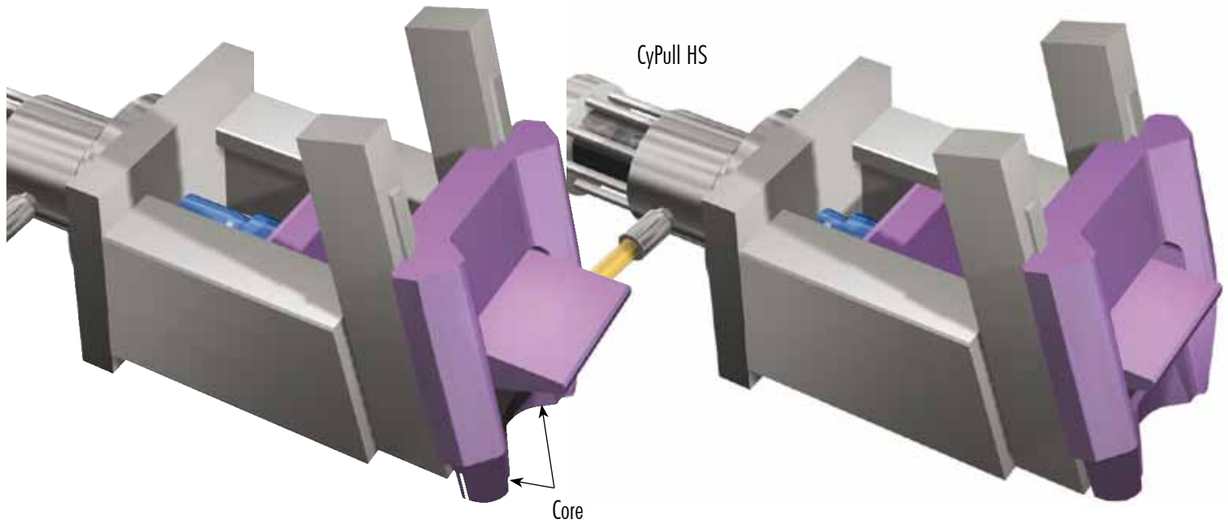


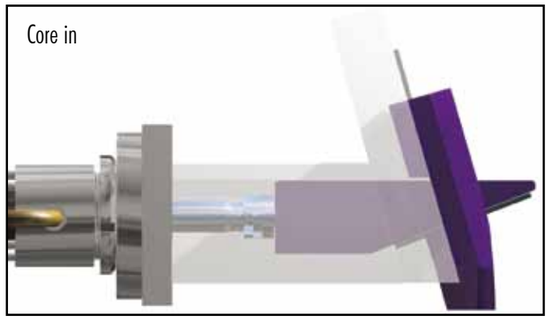


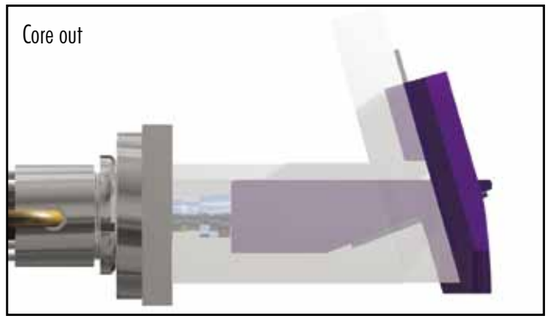


For a correct workpiece shape (with undercut) the core must reach the defined end position and compensate possible tolerances from cycle to cycle. Additionally critical: the angled flanged cylinder mounting position. Here like in all other cases care must be taken for a fixture of the cylinder which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

	Description	Order code	Example standard order: HS 063 - 036 - 0075 - N - F - G - KO - VS	additional options: B.. - E=43
Series	Locking core pull cylinder	HS, HSD HD, HDD		
Piston Ø	from 25 up to 200 mm (HS, HSD) from 32 up to 200 mm (HD,HDD)			
Rod Ø	according to tables			
Stroke length	stroke length in mm according to tables			
Acces-sories	Lock nut.....	N		
	Pressure screw.....	F		
	Counterpiece to pressure screw.....	G		
	Mounting flange square.....	KS		
	Mounting flange round.....	KO		
	Mounting flange universal.....	KG		
	Sealing caps (in case of orders without sensors).....	VS		
Options	3-wire-proximity switches PNP pos. switching as cable execution deviant from the standard- Plug execution	B8, B9 (Kabel)		
	2-wire prox. sensors NAMUR pos. switching incl. amplifier 230 V	B23, B24 (Winkelstecker) B3, B4 (Kabel)		
	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)		

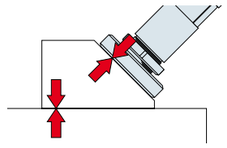
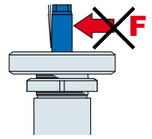
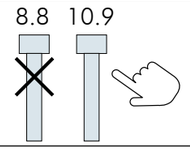
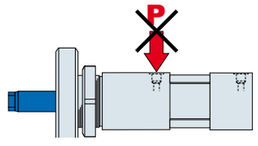
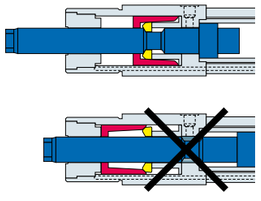
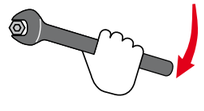
Ext. accessory	Tester for function control of proximity switches	ST 20-122

--- Type number
--- Specification
--- Commission number / admissible operating pressure

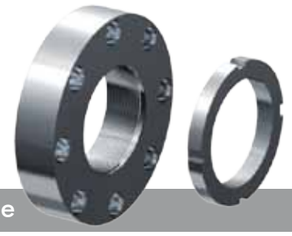
in case of any further please provide the commission number!

Installation, constructive directions

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

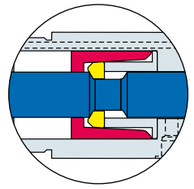
• Consideration of highest possible rigidity of coupling elements between cylinder and mould, like traverses, angular and adaptor flanges, screwed joints	
• Avoidance of bending forces: any transmission of cross or bending moments into the piston rod is forbidden!	
• Shortest distribution of forces as possible	
• Regard screw recommendations (number and property class) for mounting the flange implicitly! (see table page 18)	
• The front pressure port B (retract) must be depressurised and open during the locking process!	
• The piston rod must have reached its extended end position and be locked! Only in this condition the cylinder may be mounted.	
• When using alignment screws and other coupling elements, a secure connection of the elements must be provided (Screw joints must be tightened carefully!)	

CyPull



Installation advice with standard flange

Step 1: With pressurising the back port (A) with air the piston rod is put into locked position. 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 (B)!



Step 2, 3: 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.

Step 4, 5: 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.** The same applies also for direct mounting to other fixture elements.

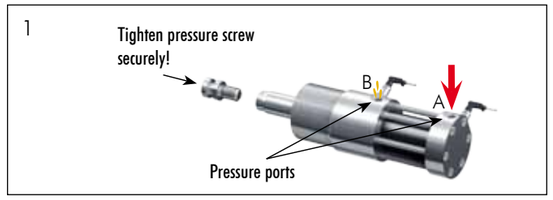
Step 6: Now the flange is mounted to the mould carefully using the **recommended** Allen screws.

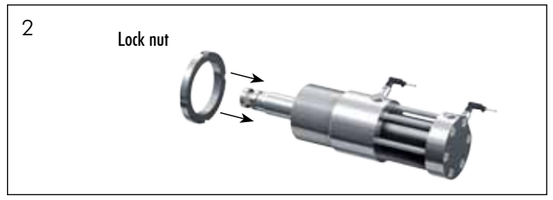
Adjustment of the locking up point

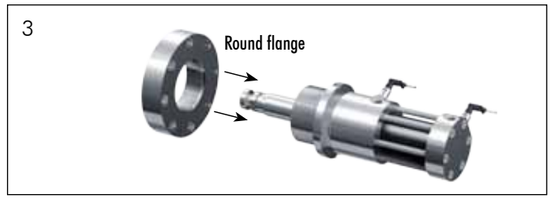
Step 7: With screwing in the cylinder into the mounting flange, the "core in" position and the locking up of the piston rod is put into alignment. In case of using contacting cores it is recommended that the cylinder is screwed in securely, e. g. using adequate tools.

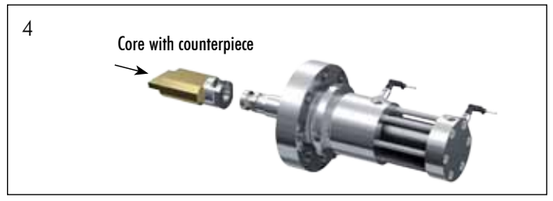
For cylinders series HS, a full resistance must be found!

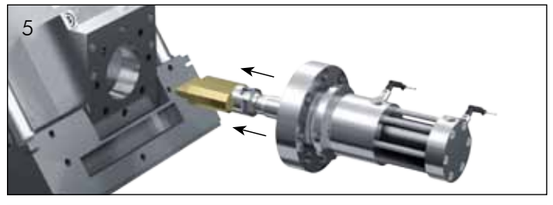
When the cylinder is in its correct adjusted axial position the lock nut is tightened. The bevel of the lock nut must face the flange.

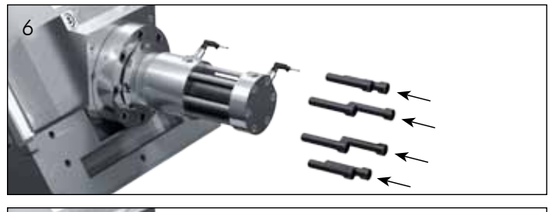


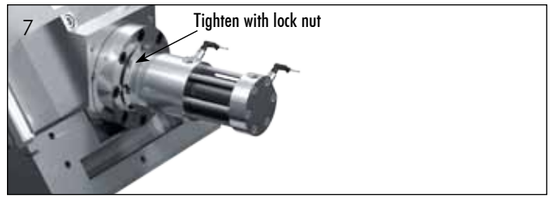






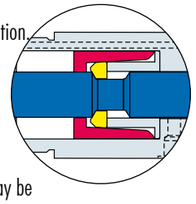






Installation advice with universal flange

Step 1: With pressurising the back port (A) with air the piston rod is put into locked position. 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 (B)!

Step 2: Screw the cylinder on to the universal flange completely.

Step 3, 4: 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.** The same applies also for direct mounting to other fixture elements.

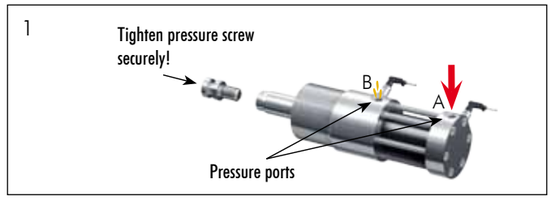
Step 5, 6: Now the flange is mounted to the mould carefully using the **recommended** Allen screws.

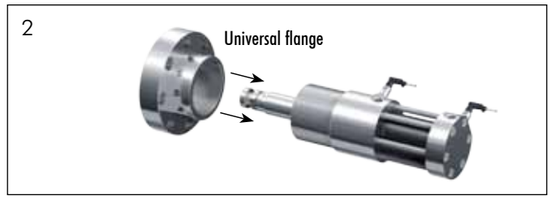
Regard the screw recommendations!

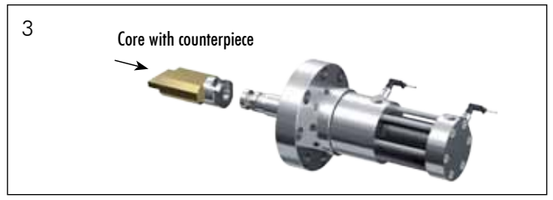
Adjustment of the locking up point

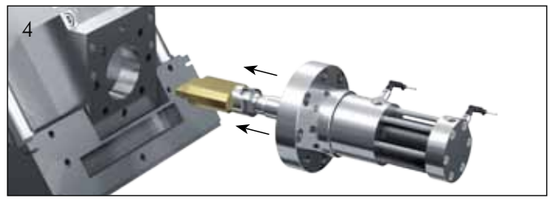
Step 7: With adjusting the mounting flange, the "core in" position and the locking up of the piston rod is put into alignment. In case of contacting cores it is recommended that the cylinder is screwed in securely, e. g. using adequate tools. In case of flashing, the flange must be adapted by grinding or turning until a good injection result is achieved.

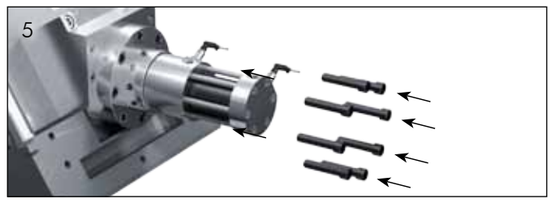
For cylinders series HS,HSD a full resistance must be found!

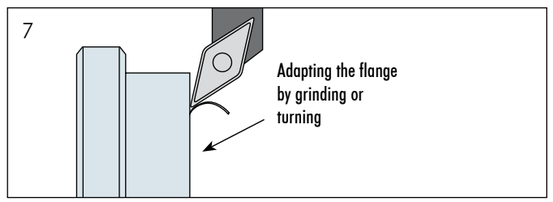




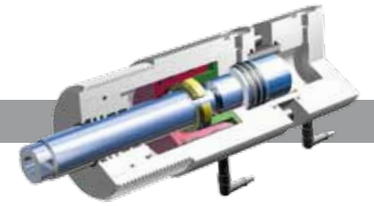








CyPull



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

Piston Ø	Standard and universal flange		only standard flange/lock nut	
	Thread size	max. preload distance	Degree	Adjustment range
25	M55x2	0,5 mm	90°	0,1mm ≈ 18°
32	M70x2	0,5 mm	90°	
40	M85x2	0,5 mm	90°	
50	M90x2	1,0 mm	180°	
63	M110x2	1,0 mm	180°	
80	M140x2	1,0 mm	180°	
100	M160x3	1,0 mm	120°	
125	M190x3	1,0 mm	120°	0,1mm ≈ 12°
160	M235x3	1,0 mm	120°	
200	M290x3	1,0 mm	120°	

Additional advice for series **HS/HSD**

To achieve an optimal pre-load proceed as follows:

1. Installation and adjustment according to the table above.
2. Remeasure the flash, if necessary

- **with standard flange and lock nut:**

3. Release the lock nut.
4. The cylinder must be re-adjusted regarding the measured flash, when the rod is retracted **(refer to table above)**.
5. Tighten lock nut again.

- **with universal flange:**

3. Release the flange with cylinder.
4. The flange must be adapted according to the flash thickness (grinding, turning).
5. Remount flange and cylinder.

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

Advice for the programming of the machine control

When moving "cores in" the control valve must be kept in an open neutral position once the "core in" position is reached.

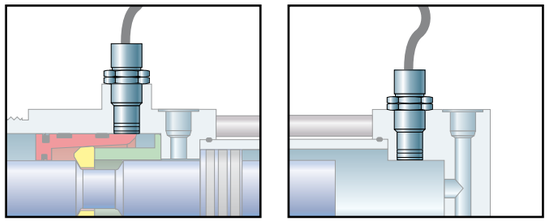
To avoid problems with the "core in" proximity switch signalling too early which may inhibit the complete locking of the cylinder or when using series **HS/HSD** the pre load cannot fully come into effect (the pre load compensates for the creeping back of the core due to mould deformation). We recommend holding the hydraulic pressure whilst the lock fully engages.

It is important that the "core in" position (hydraulic supply) must not be switched off too early, in order that the locking process can be completed correctly.

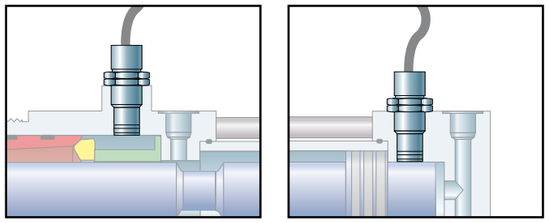
Recommendation: 1 sec. dwell time after "core in"-signal.

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:

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

PNP Sensor (Standard)

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 angled plug (standard):** **B27, B28, B29**
- **with cable (option):** **B7, B8, B9**

Technical data	
Admissible ambient temperature range:	up to +70°C
Function of switching element:	PNP-norm. open PNP-normally shut
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 (Option)

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:

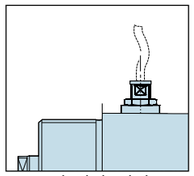
- **with angled plug:** **B22, B23, B24**
- **with cable:** **B2, B3, B4**

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

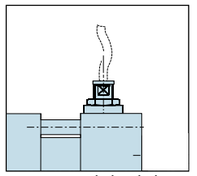
Designation of switches and their indication function

	PNP		NAMUR			
Switching function	cable	ang. plug	cable	ang. plug	Indication function	used for:
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

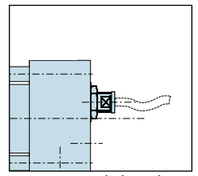
Possible combinations for all series:



rod sided radial



piston sided radial



piston sided axial

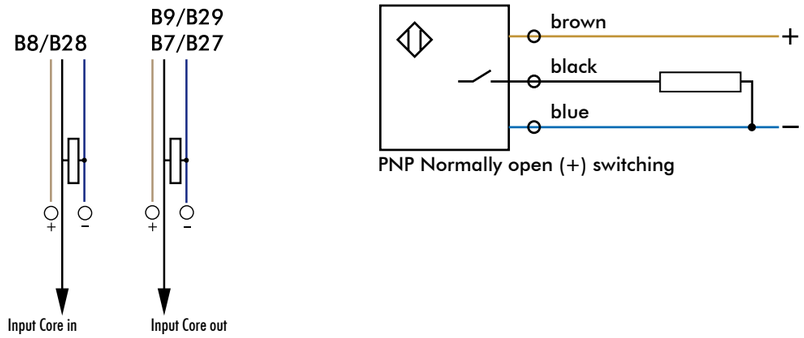
PNP	B8 / B28	with	B9 / B29	or	B7 / B27
NAMUR	B3 / B23	with	B4 / B24	or	B2 / B22

Advice for ordering:

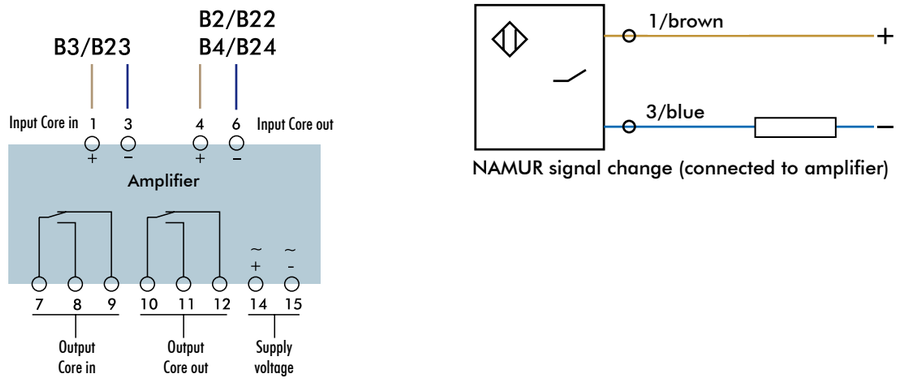
- Regard before ordering whether your application needs sensors for detecting the locking condition!
  (A retrofit is only possible with exchange of the cylinder's housing parts)
- Decide which position must be inquired (locked, unlocked or both positions)
- Decide on type of sensor (PNP or NAMUR)

For further information, please contact our sales engineers.

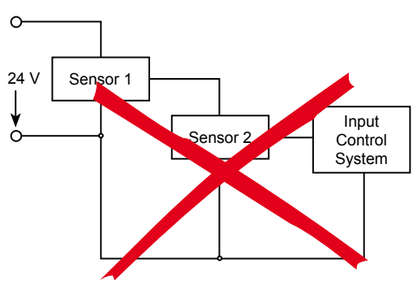
Wiring diagram 3-wire-PNP-Sensors (Standard)



Wiring diagram 2-wire-NAMUR-sensors incl. amplifier (Option)



Switching advice



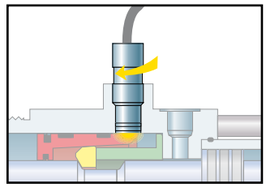
A <u>serial connection</u> of the sensors of parallel working cylinders is forbidden because of <u>security reasons</u>. Possibly there can occur undefined signals for short periods, though the second (third o. s.) cylinder isn't retracted or locked. A generated peak voltage causes a misinterpretation of the signals in the control system. That leads to faulty switching and can cause a machine crash.

Mounting instructions for proximity switches

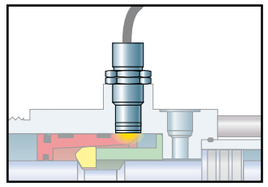
The integrated switches are adjusted by the manufacturer and do not require any further adjustment.
In exceptional cases it can be necessary that the sensors are exchanged. Please proceed as follows:

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.

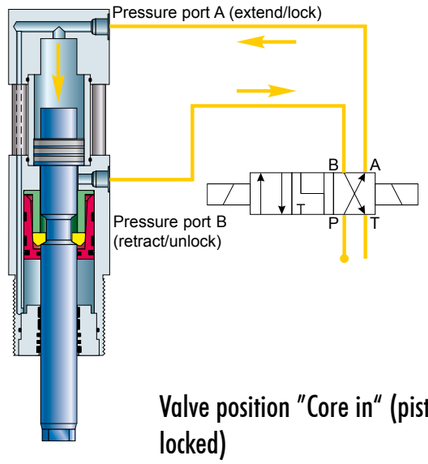


Inquiry "piston rod unlocked - core out": This condition is detected by the rear sensor (piston side). Before fitting the switch, the piston rod of the cylinder must be in the completely retracted position. Then follow the above procedure. Then tighten the sensor in its position using the lock nuts.

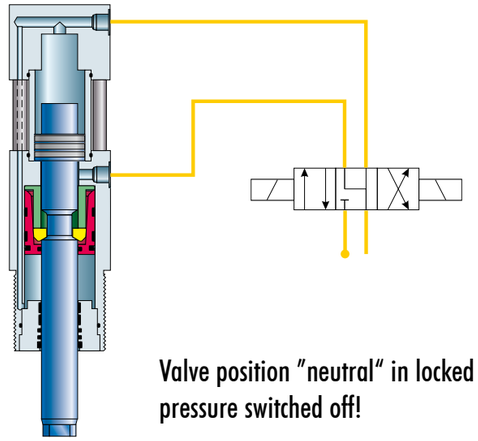
Caution: It is possible to screw the switches in too far, then, when the slide moves across, or the piston moves back, it will collide with the switch and break the ceramic front face.

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

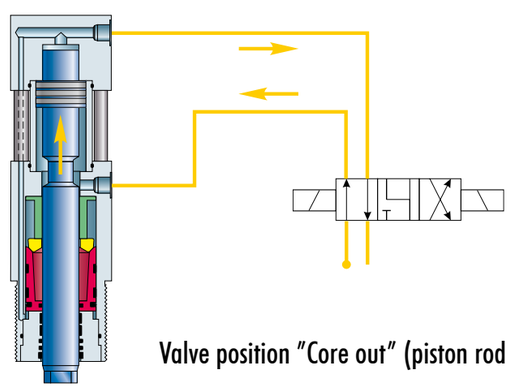
As an option, a hand held proximity switch tester is available for testing the PNP switches.



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



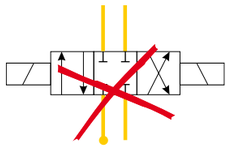
Valve position "neutral" in locked position, pressure switched off!



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!

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):	
	• inadmissibly 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
	• Cylinder is incorrectly adjusted	• Re-adjustment of cylinder
	• Coupling has come loose	• Insure couplings are tight
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
	• Faulty or damaged coupling elements (no original parts)	• Repeat initial adjustment, check pretension distance (series HS)
	• 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

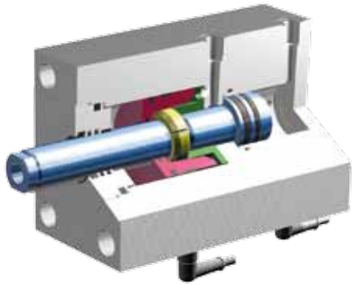
Service contact: Phone: (+44) 0161/678 70 90 • Fax: (+44) 0161/620 53 92 • E-mail: sales@cytec-uk.com

CyBlock

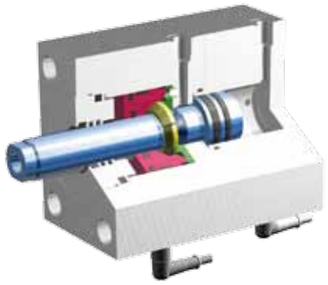
Short stroke block cylinder

CyBlock short stroke 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. 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:



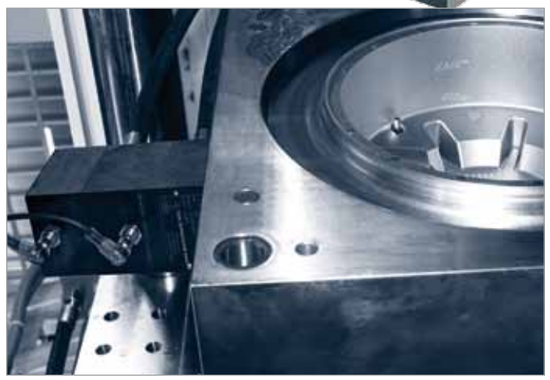
- Series HSZ
  with positive lock and a locking tolerance range and can be adjusted to generate a preload on the core to compensate tolerances and elasticity of the tool. This type is suited for i. e. complex core forms, partially touching cores, paired touching cores, underfloor slides etc.

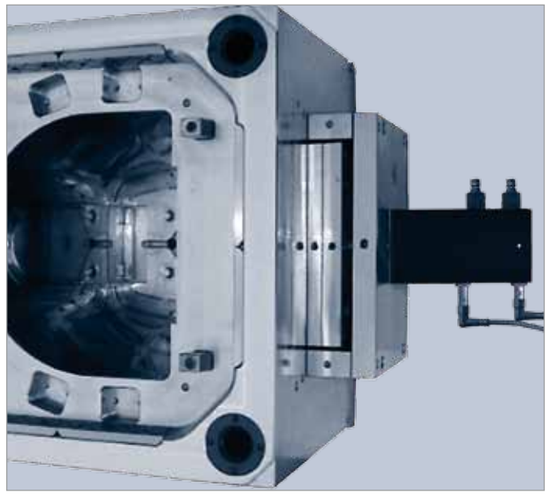


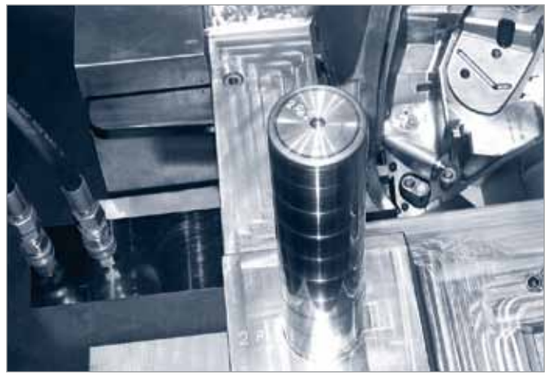
- Series HDZ
  with positive lock without preload in the end position.
  This type is suited for i. e. simple core pins, support cylinder for inserts, cores where the use of preload is undesirable.

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.



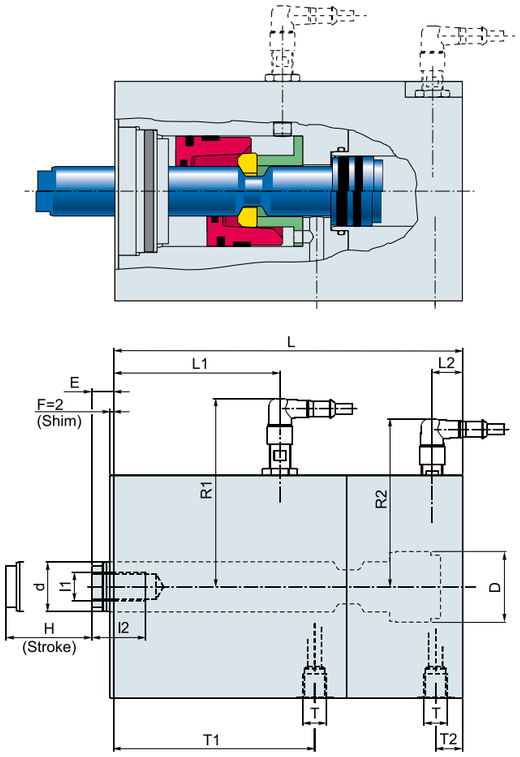


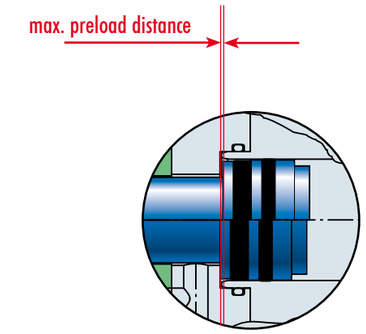


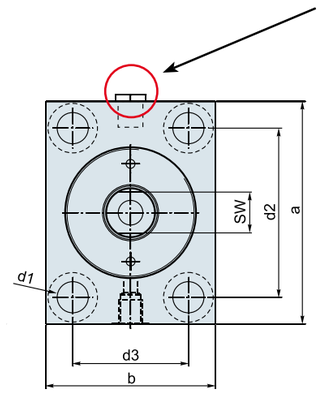
CyBlock

Series **HSZ** with hydraulic locking and preload

Technical data







Where proximity switches are not required, the according tapped holes are covered with plugs by the manufacturer. Proximity switches can be retrofitted at any time.

Dimensions I

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
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
50	36	**40**	1,0	160	120	267	22	120	80	15	27	M20	35	G3/8	174	18	144	19,5	132	122
63	45	**50**	1,0	150	200	265	26	158	108	20	36	M27	41	G3/8	159	18	133,5	19,5	137	127

Dimensions II

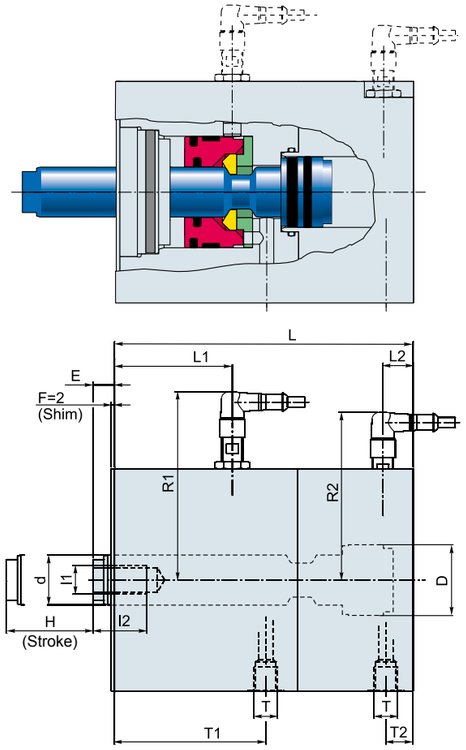
D (Piston Ø)	Recomm. screw mountings according ISO 4762*
20	M10x140
25	M10x160
32	M12x180
40	M16x200
50	M20x280
63	M24x280

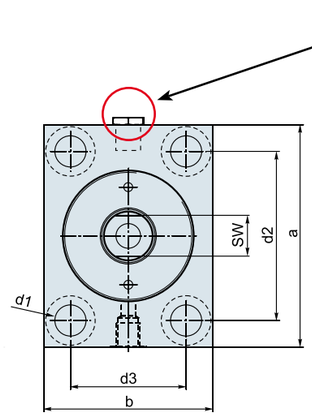
Forces

D (Piston Ø)	Holding force under preload (kN)	Stroke force (kN)		Retraction force (kN)		max. admissible operating pressure (bar)
		100 bar	150 bar	100 bar	150 bar	
20	**32**	3,1	4,7	1,6	2,4	160
25	**50**	4,9	7,4	2,9	4,3	160
32	**80**	8,0	12	4,9	7,4	160
40	**150**	13	19	6,4	10	160
50	**240**	20	29	9,5	14	160
63	**360**	31	47	15	23	160

*property class 10.9 according ISO 898-1(not included in delivery!)

Technical data





Where proximity switches are not required, the according tapped holes are covered with plugs by the manufacturer. Proximity switches can be retrofitted at any time.

Dimensions I

D (Piston Ø)	d	H (Stroke)	a	b	L	d1	d2	d3	E	SW	l1	l2	T	T1	T2	L1	L2	R1	R2
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
50	36	**40**	160	120	204	22	120	80	15	27	M20	35	G3/8	111	18	91	19,5	132	122
63	45	**50**	150	200	220	26	158	108	20	36	M27	41	G3/8	114	18	88,5	19,5	137	127

Dimensions II

D (Piston Ø)	Recomm. screw mountings according ISO 4762*
25	M10x135
32	M12x150
40	M16x170
50	M20x220
63	M24x240

Forces

D (Piston Ø)	Holding force without preload (kN)	Stroke force (kN)		Retraction force (kN)		max. admissible operating pressure (bar)
		100 bar	150 bar	100 bar	150 bar	
25	**32**	4,9	7,4	2,9	4,3	160
32	**60**	8,0	12	4,9	7,4	160
40	**88**	13	19	6,4	10	160
50	**140**	20	29	9,5	14	160
63	**224**	31	47	15	23	160

*property class 10.9 according ISO 898-1(not included in delivery!)

How to order

	Description	Order code
Series	Block cylinder	HSZ HDZ
Piston Ø	20 25 32 40 50 63 mm (HSZ) --- 25 32 40 50 63 mm (HDZ)	
Rod Ø	14 16 20 28 36 45 mm (HSZ) --- 16 20 28 36 45 mm (HDZ)	
Stroke length	20 25 25 35 40 50 mm (HSZ) --- 25 25 35 40 50 mm (HDZ)	
Locking	rod-sided, piston rod extended	01
Thread	on piston rod	I
Accessories	Pressure screw Counterpiece to pressure screw	F G
Sealings	Viton seals	VI
Options	3-wire sensors PNP pos. switching for inquiry of locking and final position	B28, B29 (up to +70°) B48, B49 (up to +120°)

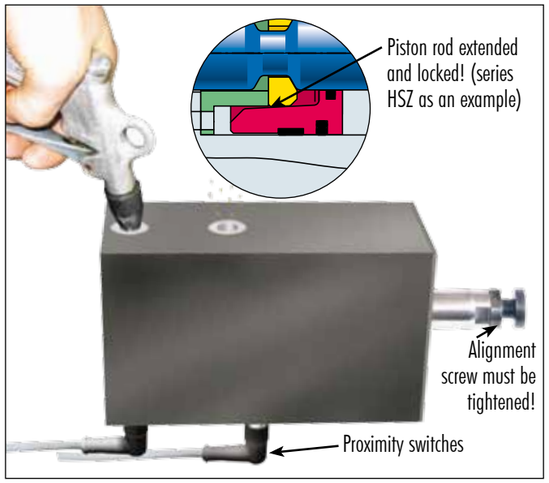
Example: HSZ 025-016-0025-01-I-F-G-VI-B28-B29

Ext. accessory	Tester for function control of proximity switches	ST 20-122

Order code for spare shims for	HSZ 020	HSZ/HDZ 025	HSZ/HDZ 032	HSZ/HDZ 040	HSZ/HDZ 050
091-	0088	0080	0081	0082	0085

For proper function and to achieve best workpiece quality, the same preconditions for mould design and installation must be regarded as apply for CyPull series. The details on →page 24 are essential!

Installation instructions

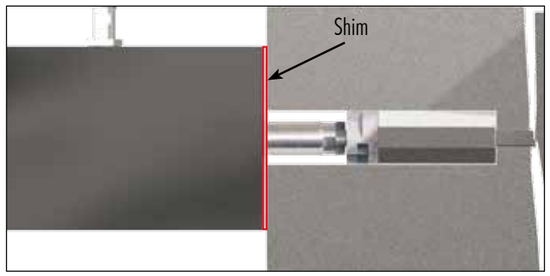


1. With pressurising the back port with air the piston rod is put into locked position. Only for series **HDZ**: a click will be heard when the rod locks up. **Caution:** when the rod moves and when it reaches the locked position, small amounts of oil may be sprayed from the front port!

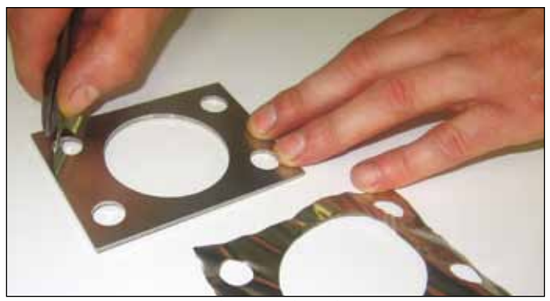
2. Provided with an alignment screw, the rod can be connected to the core using a counterpiece. **Ensure that all threads and screwed joints between piston rod, coupling elements and core are tightened and secured. The same applies of course for direct mountings to other coupling elements.**

3. Now the flange is mounted to the mould carefully using 4 socket screws according **property class 10.9 according ISO 989-1**.

Adjustment of the locking up point



Using the shipped shim, the core position and the rod lock are brought into correlation.



For this purpose the thickness of the shim (2 mm) can be reduced down to 1 mm by peeling off the foils in steps of 0,05 mm.

CyBlock

Installation instructions

Additional installation advice for series **HSZ**

Series	Piston Ø	max. preload distance
HSZ	20	0,4 mm
	25	0,5 mm
	32	0,5 mm
	40	0,5 mm
	50	1,0 mm

To achieve an optimal pre-load proceed as follows:

1. Installation and adjustment regarding the screw recommendations and the preload distances according to the table above
2. Remeasure the flash, if necessary.
3. Release the mounting screws.
4. The cylinder must be re-adjusted regarding the measured flash, when the piston rod is retracted. For this reduce the foil layers of the shim as described under chapter „Adjustment of the locking up point".
5. Install the cylinder again.

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

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

When moving "cores in" the control valve must be kept in an open neutral position once the "core in" position is reached.

To avoid problems with the "core in" proximity switch signalling too early which may inhibit the complete locking of the cylinder or when using series **HSZ** the pre load cannot fully come into effect (the pre load compensates for the creeping back of the core due to mould deformation). We recommend holding the hydraulic pressure whilst the lock fully engages.

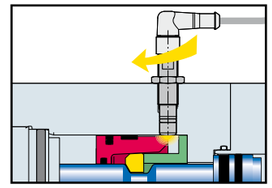
It is important that the "core in" position (hydraulic supply) must not be switched off too early, in order that the locking process can be completed correctly.

Recommendation: 1 sec. dwell time after "core in"-signal.

Adjustment of the optional proximity switches

The integrated switches are adjusted by the manufacturer and do not require any further adjustment.

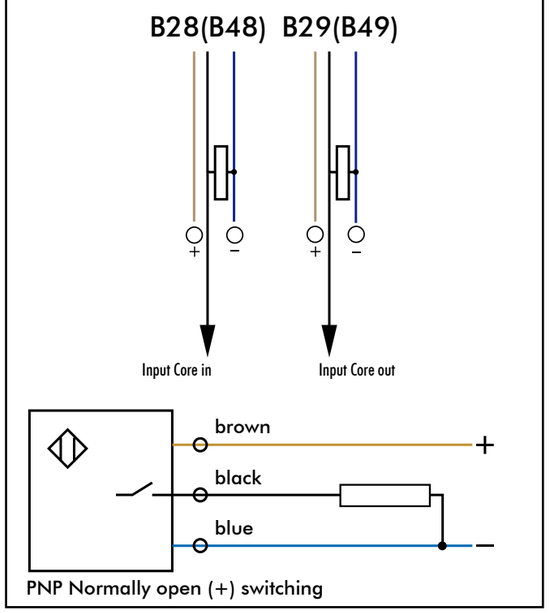
Should an exchange of the sensors be necessary anyhow, please approach the same way as described for series CyPull on →page 31.



Technical data inductive PNP-sensor

Admissible ambient temperature range:	up to +70°C (execution **B28/B29**)
	optional up to +120°C (execution **B48/B49**)
Function of switching element:	3-wire-PNP-norm. open, pos. switching
Operational voltage range:	10 ... 30 VDC
Protection class sensor (DIN 40050):	IP 68
Protection class plug (DIN 40050):	IP 67
Cable with angular plug:	3m PU-cable 3 x ∅ 0,35mm²
Smallest allowed bending radius of cable:	50 mm

Wiring diagram 3-wire-PNP -Sensors



Your competent partners for innovative technical solutions

CyTec Cylindertechnik GmbH • Steffensrott 1 • D - 52428 Jülich • Tel.: (+49) 2461/6808-0 • Fax.: (+49) 2461/6808758 • E-mail: info@cytec.de

Germany South
CyTec Zylindertechnik
Carl-Zeiss-Str. 7
D- 72124 Pliezhausen
Tel.: (+49) 7127/811880
Fax.: (+49) 7127/811885

France
CyTec Systems SARL
Parc des Erables
66 route de Sartrouville
F- 78230 Le Pecq
Tel.: (+33) 01 30 87 13 50
Fax.: (+33) 01 30 87 13 51

Great Britain
CyTec Systems UK Ltd.
Unit H • 100 Shaw Road (Off Daltry Str.)
GB- Oldham, OL1 4AB
Tel.: (+44) 0161/678 70 90
Fax.: (+44) 0161/620 53 92
Web: www.cytecsystems-uk.com

Portugal
Nelson S. Bernardo Lda
No 3, Loja 17
Rua Fonte Cabeço D'el Rey
2400-719 Leiria
Tel.: (+351) 244 691 446
Fax.: (+351) 244 695 166
Web: www.nsb.pt

Italy
Emanuele Mascherpa S.p.A.
Via Natale Battaglia, 39
I- 20127 Milano
Tel.: (+39) 02/280031
Fax.: (+39) 02/2829945
Web: www.mascherpa.it

Hungary
Working KFT
Budai Nagy Antal út
HU- 2400 Dunaújváros
Tel./Fax: (+36) 25/431740

South Korea
High Klasse Technic
310-1 Ho, 6-Dong, 2211,
Jeongwang-dong, Siheung-si,
Gyeonggi-do, Korea
Tel.: (+82) 31 430 1520
Fax.: (+82) 31 624 6059
Web: www.highklasse.co.kr

China
CyTec Zylindertechnik China Ltd.
301-2-10, Yilong International community
3, Changyuan, 453400 Xinxiang, Henan
Tel.: (+86) 373/8821619
Fax.: (+86) 373/8821619
Web: www.cytec.cn

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CYTEC SYSTEMS

Germany: CyTec Zylindertechnik GmbH
Steffensrott 1 • D-52428 Jülich • Tel.: (+49) 2461/68 08-0 • Fax: (+49) 2461/68 08-758
E-mail: info@cytec.de • http://www.cytec.de • Edition 02/2015

Great Britain: CyTec Systems UK Ltd. • Unit H • 100 Shaw Road (Off Daltry Street) • GB Oldham, OL1 4AB
Phone: (+44) 0161/678 70 90 • Fax: (+44) 0161/620 53 92 • Edition 02/2015
E-mail: sales@cytec-uk.com • http://www.cytecsystems-uk.com