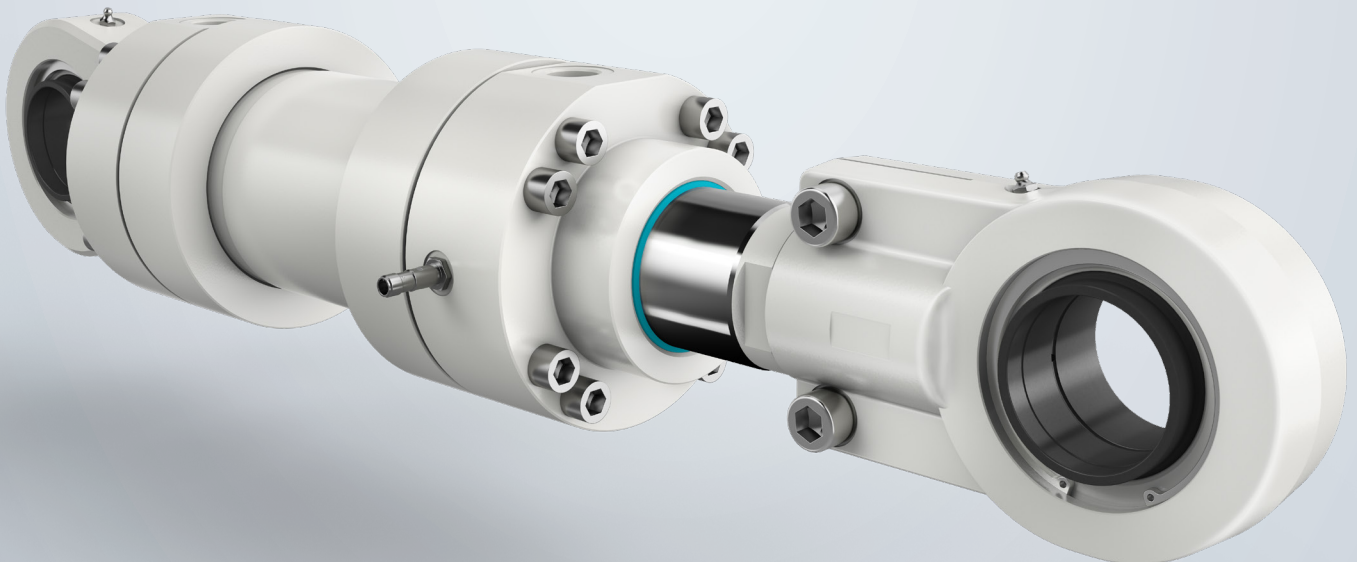


Intelligent

**Series-production
range according
to ISO 6022**

LIEBHERR

Components
Hydraulic cylinders





Smart head

With the series-production range according to ISO 6022 Liebherr has a range of hydraulic cylinders in the product portfolio that are aimed at the diverse needs and requirements of its industry customers.

Installation dimensions and mounting options comply with the standard specifications, but give the customer maximum flexibility and individuality for every application with selected details.

For instance, the series contains 24 basic variants for the rated diameter combination of piston and piston rod, thereby also extending the dimensions defined in the standard. A total of six mounting types and four alternative oil connections are available for each of these basic variants.

Area of application

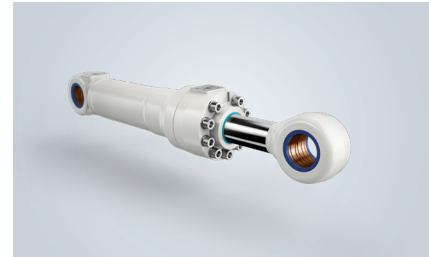
The products are used in various stationary applications such as the paper and steel industry as well as in machine tools or automation and manufacturing technology.

The hydraulic cylinders may also be exposed to static and dynamic loads.

There is something for everyone

Robust - Series-production range 380 bar

The hydraulic cylinders of the series-production range 380 bar are mainly used in mobile applications. This also means that they can be used wherever durable and robust products are required in highly dynamic situations. The “eye-to-eye” mounting has been specially designed for connection to construction machinery to ensure optimum operation. The hybrid cylinder option is an added bonus. The use of carbon-fibre reinforced plastic saves on weight and increases machine efficiency.



Convertible - Series-production range 260 bar

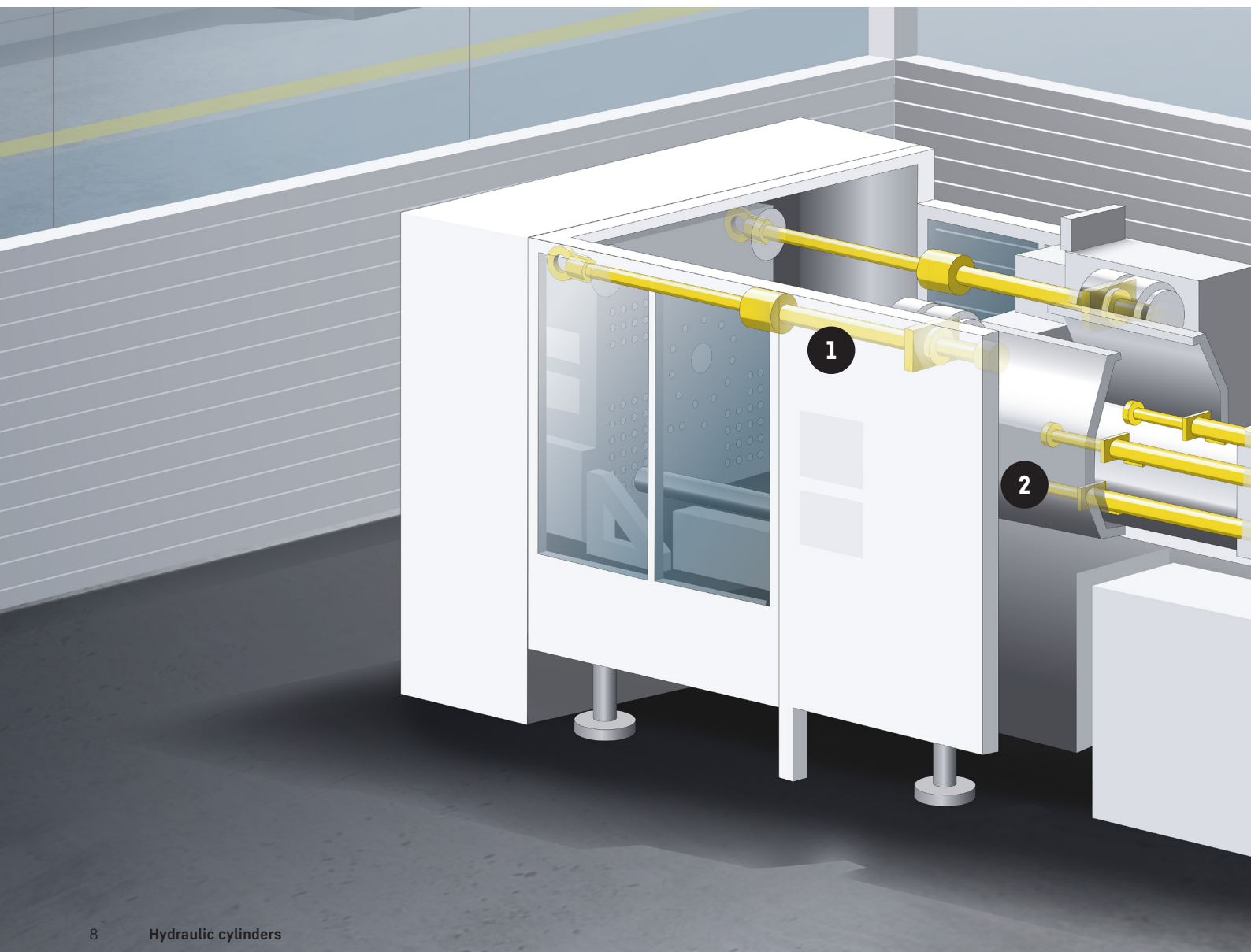
With the series-production range 260 bar, Liebherr offers customers hydraulic cylinders that can be adapted to their specific application. The production range has been stripped down to the essentials and can still be used in demanding conditions - in both mobile and stationary applications. A wide range of mounting options are available, including alternative oil connections and piston rod designs. The hydraulic cylinder adapts to your application.



Series-production range according to ISO 6022 at a glance

Type	Series production range acc. to ISO 6022
Mounting type	Round flange at head, Round flange at base, Fixed bushing eye at base, Spherical bearing eye at base, Swivel bearing mounting, Foot mounting
Piston diameter	63-320 mm
Piston rod diameter	40-220 mm
Installation length	36-4385 mm (depending on mounting type)
Stroke length	110-457 mm (depending on mounting type)
Piston rod connection	Threaded rod, Pre-assembled swivel head
Piston rod coating	Single chrome coating NSS with 120 h Rating 9, Double chrome coating AASS with 96 h Rating 10 (hardened)
Hydraulic port	Inch threaded connection acc. to 1179-1, Metric threaded connection acc. to ISO 9974-1, SAE port acc. ISO 6162-2 6000 PSI, UNF port acc. ISO 11926-1
Hydraulic port location at head	Top (0°), Right (90°), Bottom (180°), Left (270°) - piston rod side view
Control block assembly	Without, Both sides
End of stroke cushioning	Without, Rod side, Piston side, Both sides
Position measuring system	Without, Magnetostrictive position measuring system
Proximity switch	Without, Rod side, Piston side, Both sides
Vent port	VST1 screw plug on both sides, Measuring coupling rod side/piston side/on both sides
Paint	Primed white, Painted Liebherr grey (based on RAL7043)
Applications	Paper and steel industry, machine tools, automation and manufacturing technology

In use always & everywhere



1

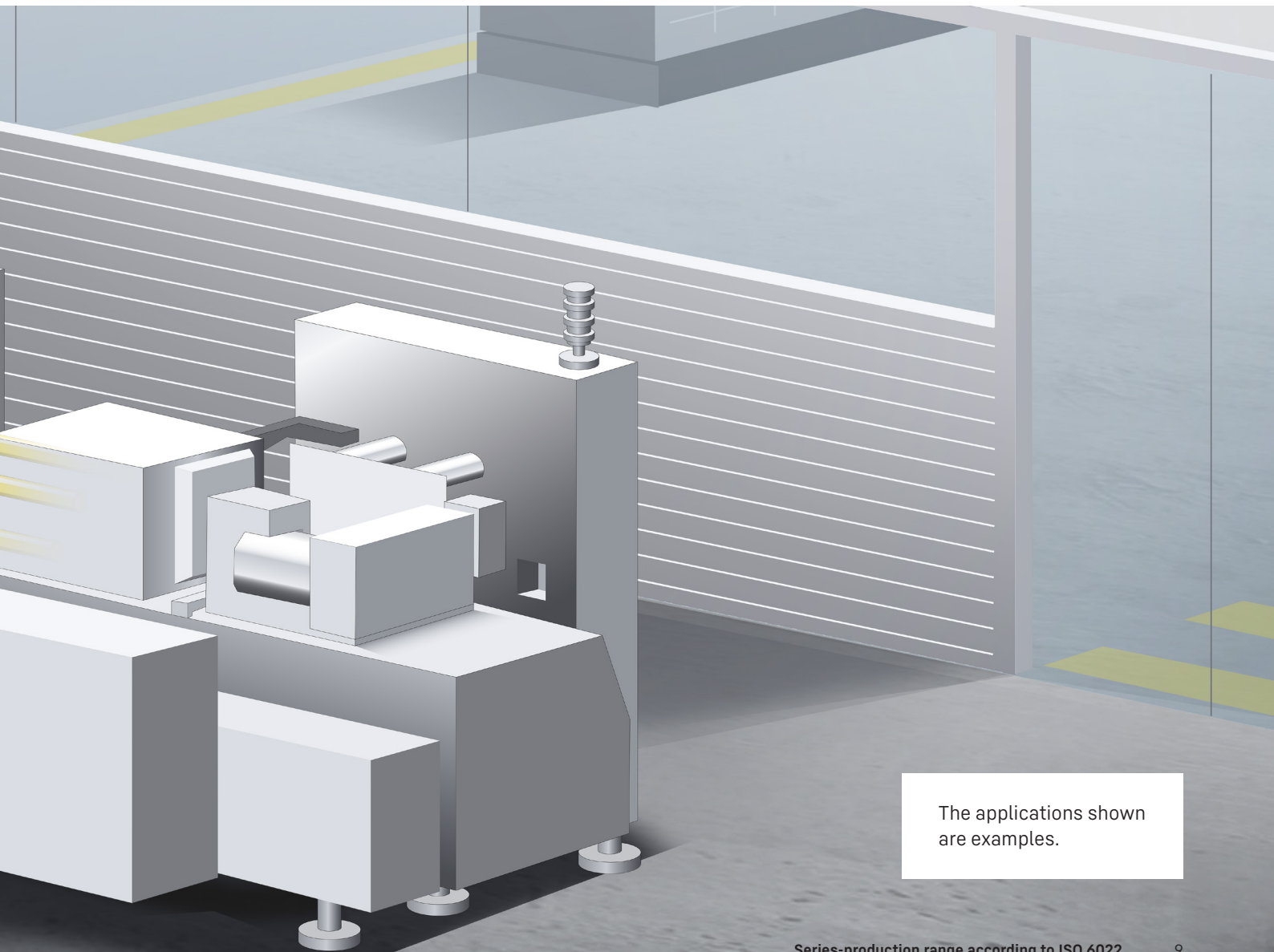
Lock cylinder

The hydraulic cylinders of the series-production range according to ISO 6022 can be used in injection moulding machines. They can be used as locking cylinders in the locking unit.

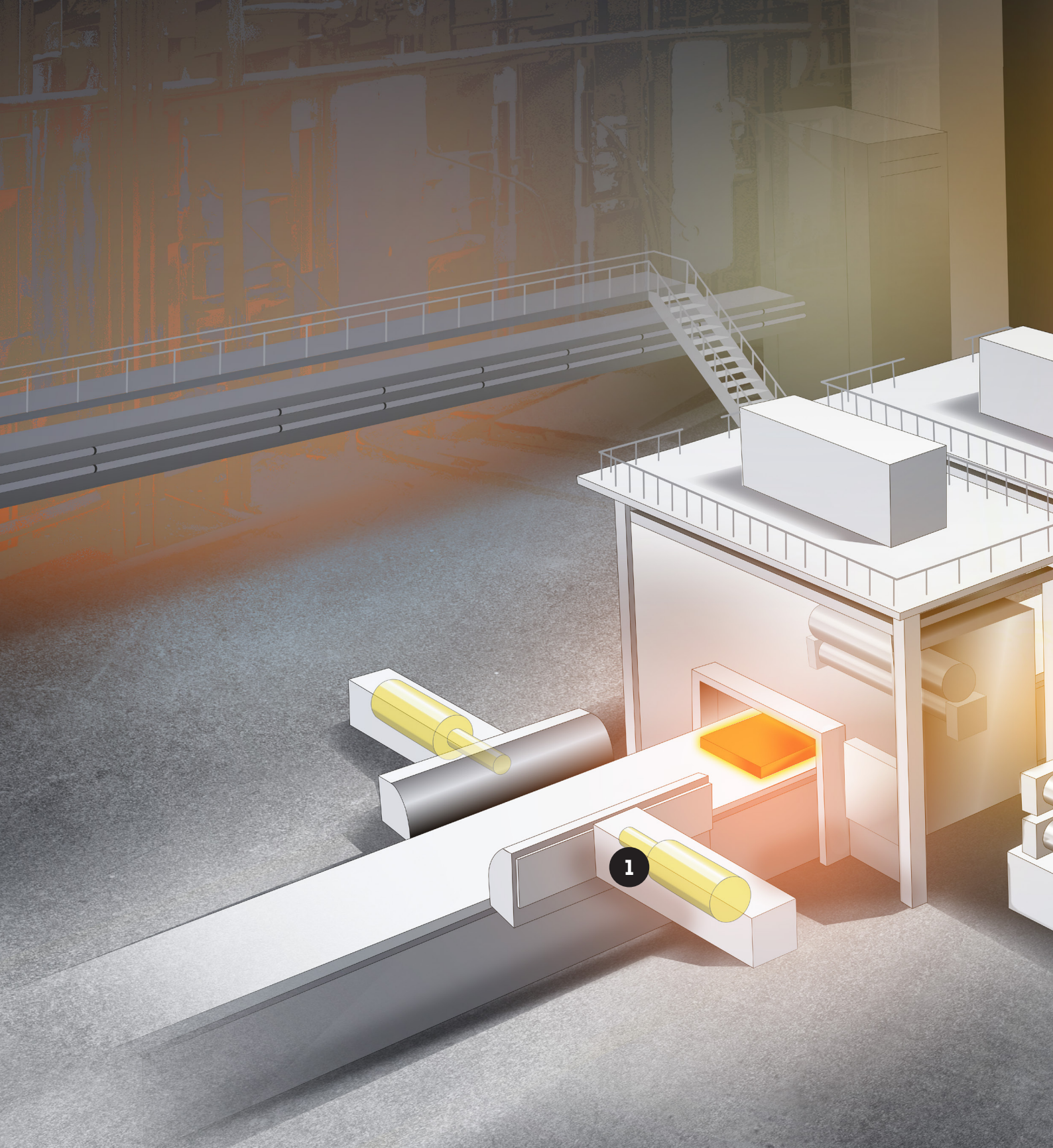
2

Drive cylinder

The purpose of the drive cylinder is to move tools. Standard cylinders are suitable for high speed applications such as injection moulding machines.



The applications shown are examples.



1

Adjusting cylinder

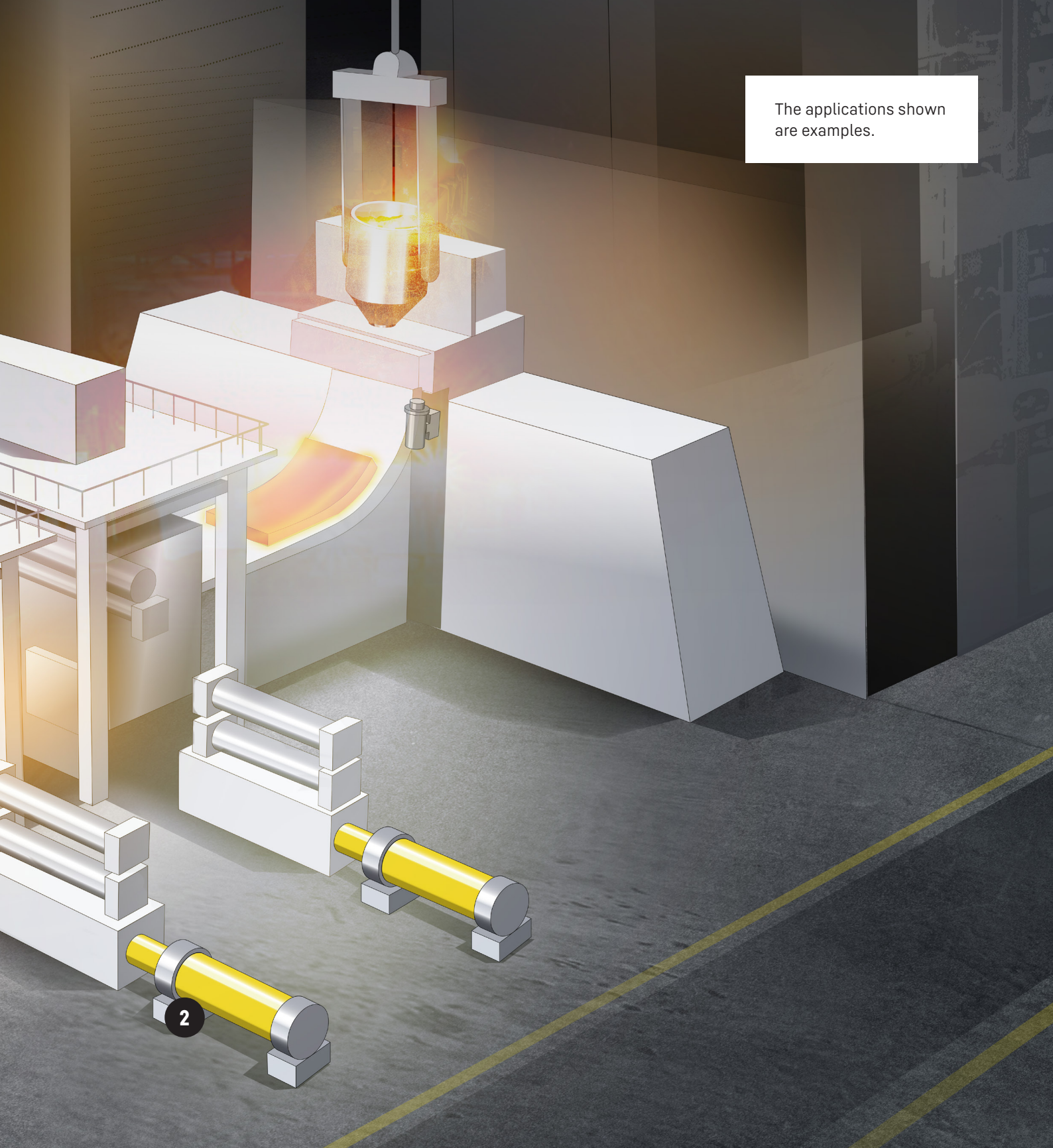
As an adjusting cylinder, the hydraulic cylinder ensures that strip thicknesses are accurately maintained in the steel mill.

2

Interchangeable tool cylinder

The standard cylinders of the series-production range of hydraulic cylinders according to ISO 6022 can be used as interchangeable tool cylinders. They reliably contribute to short changeover times.

The applications shown are examples.



Technical design

Hydraulic cylinder configuration

The hydraulic cylinders are calculated and designed using the latest technology. For example, the finite element method is used to help configure the designs. Accompanying impulse and endurance tests are also carried out to verify the calculation results.

The industrial series-production range is designed for dynamic and static applications. With this series, Liebherr sets a reliable standard in terms of durability and resistance.

Sensor technology

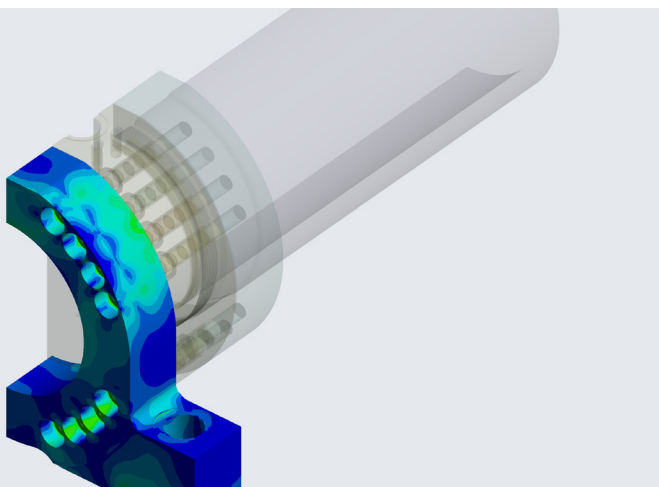
To achieve the many different control tasks, the linear movement and response of the hydraulic cylinders must be accurately recorded, monitored and controlled. For this reason, the ISO 6022-based series is designed so that pressure sensors, proximity switches and position transducers can be selected as options. Liebherr uses products from well-known manufacturers or to customer specification.

Seals

Seals are extremely important for the reliability of hydraulic cylinders. Liebherr uses a compact arrangement of seals and an innovative sealing system in the series-production range to meet the highest standards. This means that high-quality, low-friction seals are used as standard. A proven tandem sealing system consisting of a primary and a secondary seal is used for the rod seal.

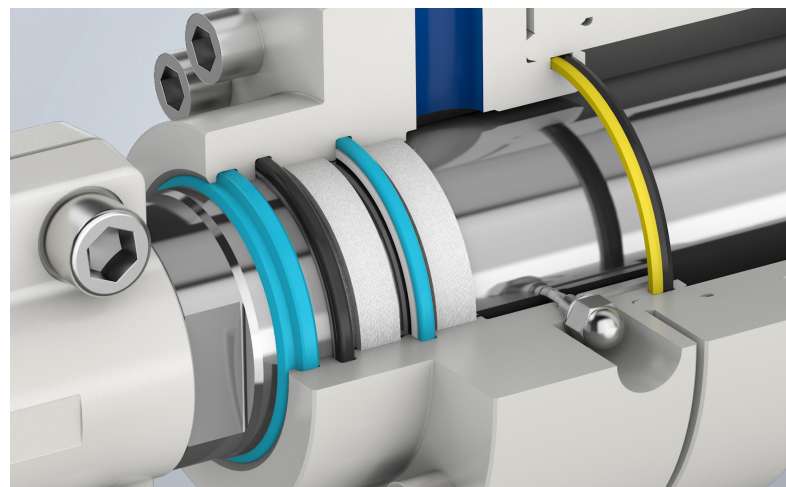
Piston rod coating

A high quality single chrome plating with a thickness of $25\ \mu\text{m}$ ($\pm 5\ \mu\text{m}$) is used as standard. For higher corrosion or impact protection requirements, a hardened piston rod with double chrome plating is available. This coating guarantees a minimum of 96 hours in the Acetic Acid Salt Spray (AASS) test to DIN EN ISO 9227 Rating 10.



Hydraulic cylinder configuration

The hydraulic cylinders are designed according to the current state of the art. This is supported by the use of the FEM method as well as pulse and endurance tests.



Seals

The seals are compactly arranged. A tandem sealing system is used.

Mounting types

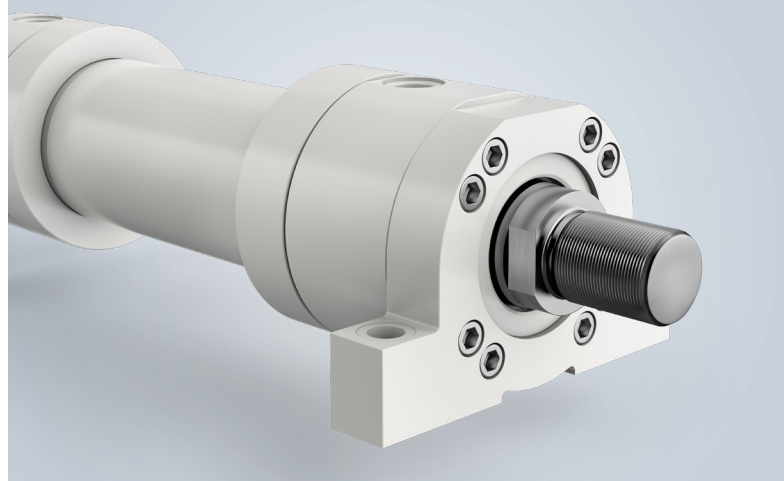
In order to satisfy the different installation situations for hydraulic cylinders, the series has six possible mounting options according to ISO 6022:

- Round flange at head (MF3)
- Round flange at base (MF4)
- Fixed bushing eye at base (MP3)
- Spherical bearing eye at base (MP5)
- Swivel bearing mounting (MT4)
- Foot mounting (MS2)

The end of the piston rod is threaded for connection. An optional swivel head can also be pre-assembled.

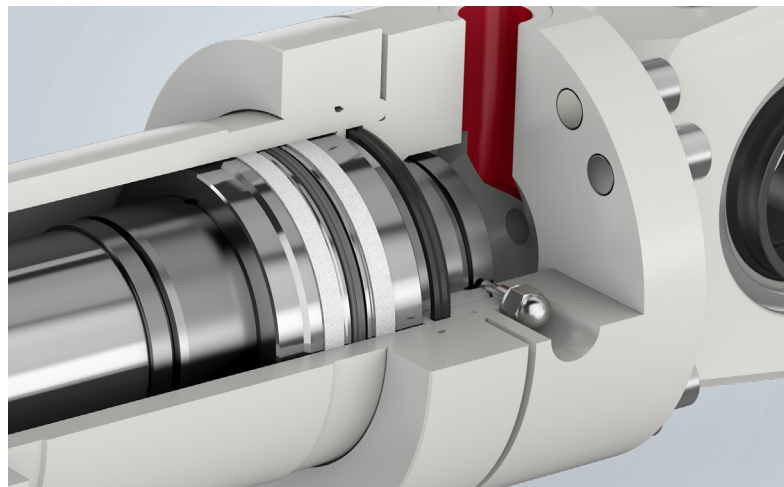
End of stroke cushioning

Controlled and gentle return to the end positions is particularly important in highly dynamic applications. For this purpose, Liebherr offers an adjustable cushioning system as an option. The customer can choose between piston-side and/or rod-side cushioning. The system ensures that the hydraulic cylinder operates smooth and without stuttering.



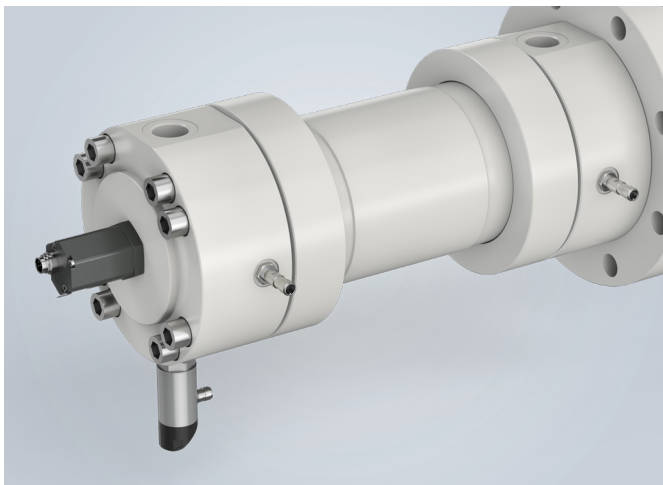
Mounting types

Six mounting types are available to suit a wide range of installation situations.



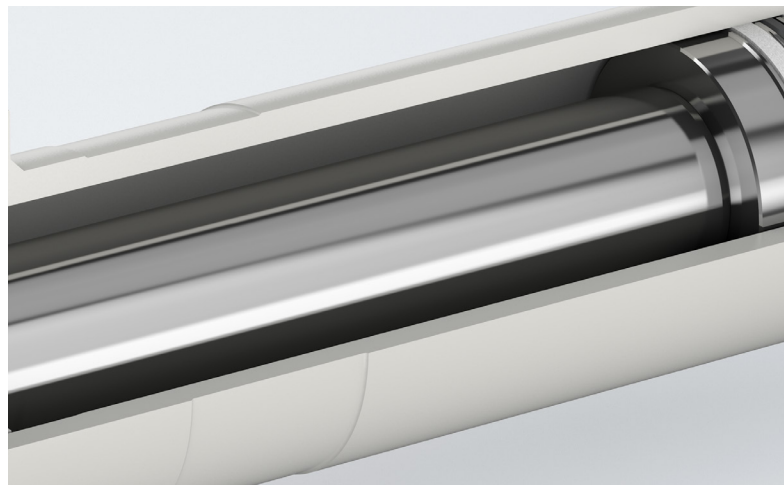
End of stroke cushioning

Cushioning can be configured on the rod, base or both sides.



Sensor technology

The intelligent hydraulic cylinders of the series-production range according to ISO 6022 can be configured with high quality sensors.



Piston rod coating

The high quality coatings are adapted for use in hydraulic cylinders.

Sizes and dimensions

The following table illustrates all relevant dimensions of the basic design. The tolerances for stroke and installation length comply with ISO 6022. Any additional tolerance specifications will be supplied individually with the relevant approval drawing. Each combination of piston and piston rod diameter defines a basic variant.

On the following pages this variant is extended according to the type of mounting. Depending on the type of mounting, additional dimensions are available. These can be taken from the relevant tables. Corresponding 3D models can be supplied for each variant.

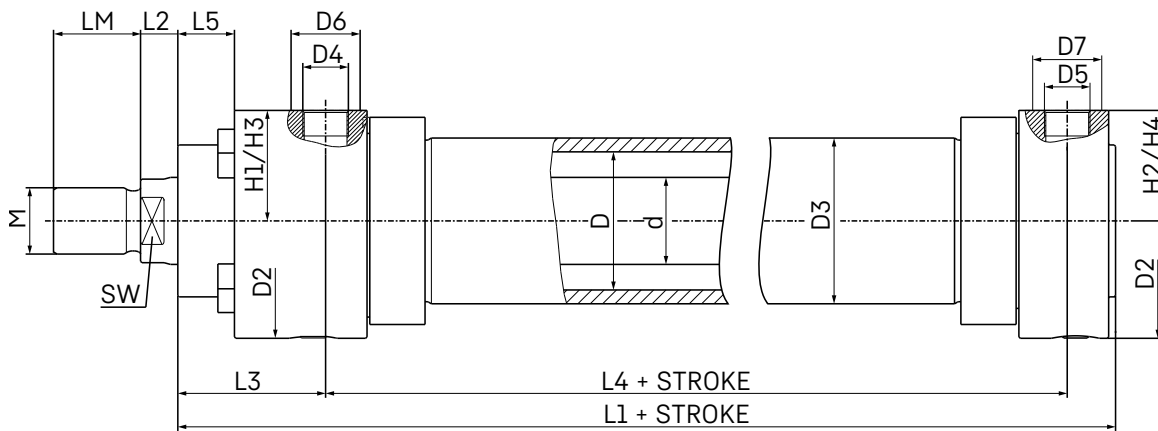
Basic dimensions

D	d	D2	D21/D24	L5	M	LM	SW	L2	L4
63	40	120	75	32	M33x2	45	32	21	32
63	45	120	75	32	M33x2	45	36	21	32
80	50	145	90	36	M42x2	56	41	24	36
80	56	145	90	36	M42x2	56	46	24	36
100	63	170	110	41	M48x2	63	50	27	41
100	70	170	110	41	M48x2	63	60	27	41
125	80	206	132	45	M64x3	85	65	31	45
125	90	206	132	45	M64x3	85	75	31	45
140	90	226	145	45	M72x3	90	75	31	45
140	100	226	145	45	M72x3	90	85	31	45
160	100	265	160	50	M80x3	95	85	35	50
160	110	265	160	50	M80x3	95	95	35	50
180	110	292	185	55	M90x3	106	95	40	55
180	125	292	185	55	M90x3	106	110	40	55
200	125	306	200	61	M100x3	112	110	40	61
200	140	306	200	61	M100x3	112	120	40	61
220	140	355	235	71	M125x4	125	120	42	71
220	160	355	235	71	M125x4	125	140	42	71
250	160	395	250	71	M125x4	125	140	42	71
250	180	395	250	71	M125x4	125	160	42	71
280	180	445	295	88	M160x4	160	160	48	88
280	200	445	295	88	M160x4	160	180	48	88
320	200	490	320	88	M160x4	160	180	48	88
320	220	490	320	88	M160x4	160	200	48	88

* As standard according to ISO 1179-1, Option 1 acc. to ISO 9974-1, Option 2 acc. to ISO 11926-1/SAE J1926, Option 3 acc. to ISO 6162-2 (SAE 6000 PSI)

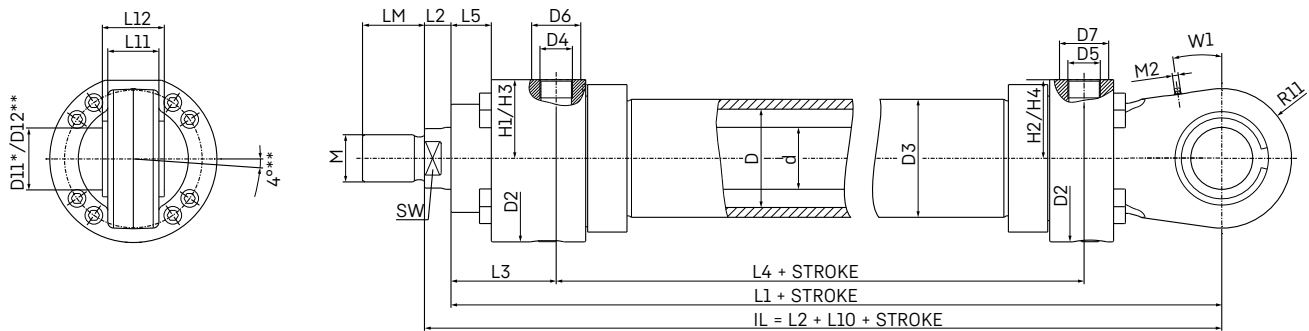
** Height with SAE-connection

Note: If not otherwise indicated, all information are provided in millimetres.



Hydraulic port at piston rod end and at base (D4=H1/D5=H2)					Piston rod end	
D4*/D5* standard/option 1-2-3	H1/H2	D6/D7 option 1-2	D4/D5 option 4	H3**/H4**	L23	L3
G 3/4"/M27x2/1 1/16-12 UN-2B	55	120	SAE 1/2"	54	4	91
G 3/4"/M27x2/1 1/16-12 UN-2B	55	120	SAE 1/2"	54	4	91
G 3/4"/M27x2/1 1/16-12 UN-2B	68	143	SAE 1/2"	67	5	96
G 3/4"/M27x2/1 1/16-12 UN-2B	68	143	SAE 1/2"	67	5	96
G 1"/M33x2/1 5/16-12 UN-2B	80	170	SAE 1/2"	79	5	107
G 1"/M33x2/1 5/16-12 UN-2B	80	170	SAE 1/2"	79	5	107
G 1"/M33x2/1 5/16-12 UN-2B	99	204	SAE 3/4"	97	5	122
G 1"/M33x2/1 5/16-12 UN-2B	99	204	SAE 3/4"	97	5	122
G 1 1/4"/M42x2/1 5/8-12 UN-2B	108	223	SAE 1"	106	5	135
G 1 1/4"/M42x2/1 5/8-12 UN-2B	108	223	SAE 1"	106	5	135
G 1 1/4"/M42x2/1 5/8-12 UN-2B	128	262	SAE 1"	127	7	150
G 1 1/4"/M42x2/1 5/8-12 UN-2B	128	262	SAE 1"	127	7	150
G 1 1/4"/M42x2/1 5/8-12 UN-2B	142	292	SAE 1 1/4"	139	5	154
G 1 1/4"/M42x2/1 5/8-12 UN-2B	142	292	SAE 1 1/4"	139	5	154
G 1 1/4"/M42x2/1 5/8-12 UN-2B	149	306	SAE 1 1/4"	146	10	180
G 1 1/4"/M42x2/1 5/8-12 UN-2B	149	306	SAE 1 1/4"	146	10	180
G 1 1/2"/M48x2/1 7/8-12 UN-2B	174	355	SAE 1 1/2"	170	10	202
G 1 1/2"/M48x2/1 7/8-12 UN-2B	174	355	SAE 1 1/2"	170	10	202
G 1 1/2"/M48x2/1 7/8-12 UN-2B	194	395	SAE 1 1/2"	190	10	215
G 1 1/2"/M48x2/1 7/8-12 UN-2B	194	395	SAE 1 1/2"	190	10	215
G 1 1/2"/M48x2/1 7/8-12 UN-2B	219	445	SAE 1 1/2"	216	10	242
G 1 1/2"/M48x2/1 7/8-12 UN-2B	219	445	SAE 1 1/2"	216	10	242
G 1 1/2"/M48x2/1 7/8-12 UN-2B	242	490	SAE 2"	237	10	234
G 1 1/2"/M48x2/1 7/8-12 UN-2B	242	490	SAE 2"	237	10	234

Fixed bushing eye and spherical bearing eye at base (MP3/MP5)



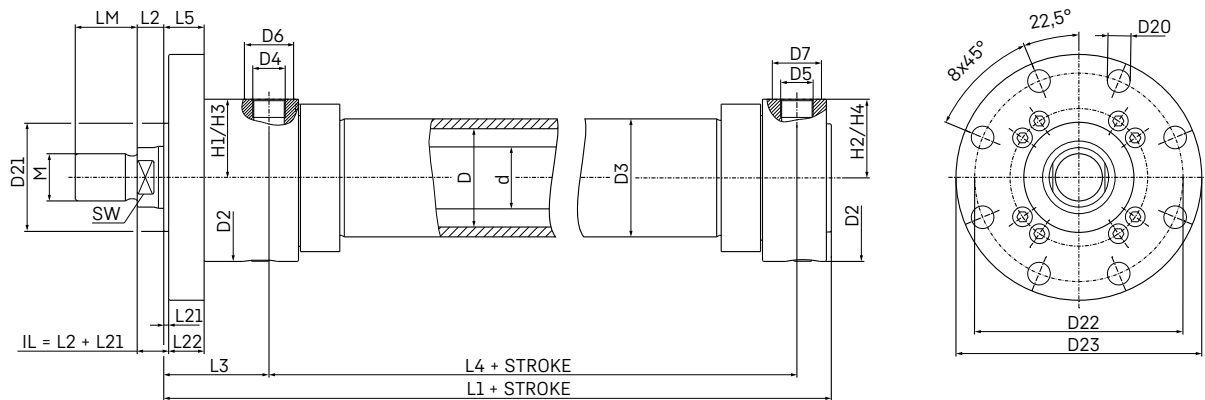
Basic dimensions				Specific dimensions regarding mounting type						
D	d	L10 + Hub	D11* (H9)/D12** (H7)	L12	L11	4**	R11	L13	W1	M2
63	40	327	40	40	32	4	50	81	8	M6
63	45	327	40	40	32	4	50	81	8	M6
80	50	371	50	50	40	4	63	97	9	M6
80	56	371	50	50	40	4	63	97	9	M6
100	63	415	63	63	52	4	71	110	8	M6
100	70	415	63	63	52	4	71	110	8	M6
125	80	489	80	80	66	4	90	133	9	M10x1
125	90	489	80	80	66	4	90	133	9	M10x1
140	90	549	90	90	72	4	100	161	10	M10x1
140	100	549	90	90	72	4	100	161	10	M10x1
160	100	582	100	100	84	4	112	162	8	M10x1
160	110	582	100	100	84	4	112	162	8	M10x1
180	110	650	110	110	88	4	129	194	8	M10x1
180	125	650	110	110	88	4	129	194	8	M10x1
200	125	716	125	125	102	4	140	221	8	M10x1
200	140	716	125	125	102	4	140	221	8	M10x1
220	140	861	160	160	130	4	180	287	10	M10x1
220	160	861	160	160	130	4	180	287	10	M10x1
250	160	861	160	160	130	4	190	279	9	M10x1
250	180	861	160	160	130	4	190	279	9	M10x1
280	180	1032	200	200	138	4	220	358	9	M10x1
280	200	1032	200	200	138	4	220	358	9	M10x1
320	200	1032	200	200	162	4	228	355	9	M10x1
320	220	1032	200	200	162	4	228	355	9	M10x1

* With bushing

** With spherical bearing

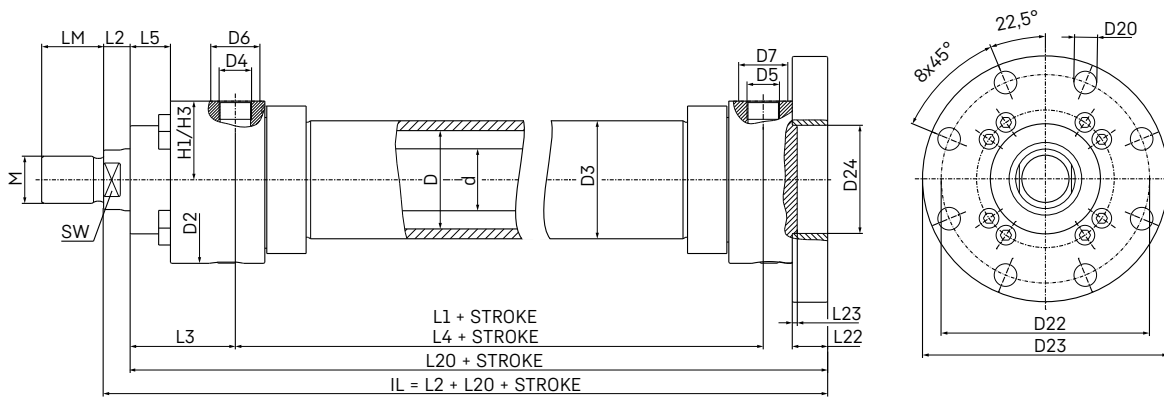
Note: Both bushing and spherical bearing eye are equipped with a screw thread M10x1 as well as a conical grease nipple according to DIN 71412 form A.

Round flange at head (MF3)



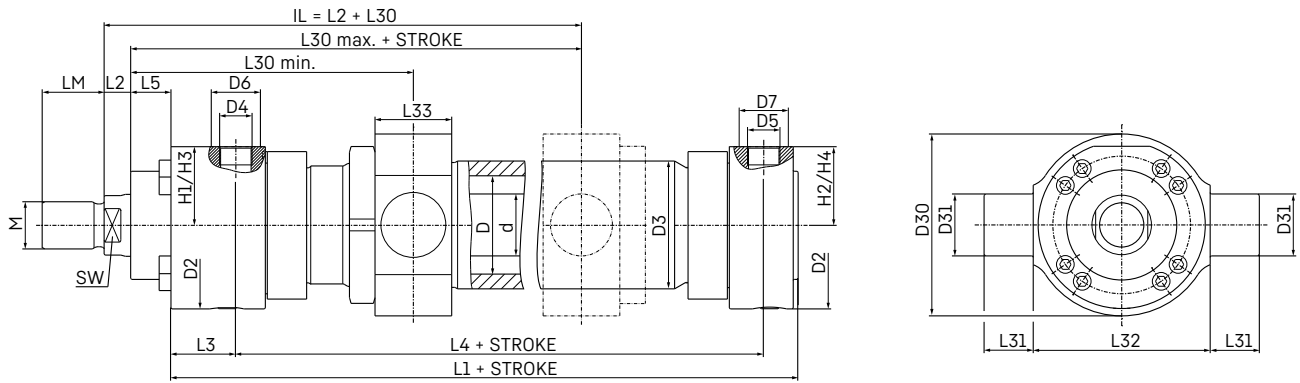
Basic dimensions		Specific dimensions regarding mounting type					
D	d	L22	D23	L21	D22	D20	L20
63	40	28	175	4	150	13,5	277
63	45	28	175	4	150	13,5	277
80	50	32	210	4	180	17,5	308
80	56	32	210	4	180	17,5	308
100	63	36	250	5	212	22	344
100	70	36	250	5	212	22	344
125	80	40	285	5	250	22	399
125	90	40	285	5	250	22	399
140	90	40	330	5	285	26	434
140	100	40	330	5	285	26	434
160	100	45	360	5	315	26	470
160	110	45	360	5	315	26	470
180	110	50	410	5	355	33	510
180	125	50	410	5	355	33	510
200	125	56	440	5	385	33	556
200	140	56	440	5	385	33	556
220	140	63	500	8	435	39	648
220	160	63	500	8	435	39	648
250	160	63	540	8	475	39	661
250	180	63	540	8	475	39	661
280	180	80	630	8	555	45	774
280	200	80	630	8	555	45	774
320	200	80	675	8	600	45	782
320	220	80	675	8	600	45	782

Round flange at base (MF4)



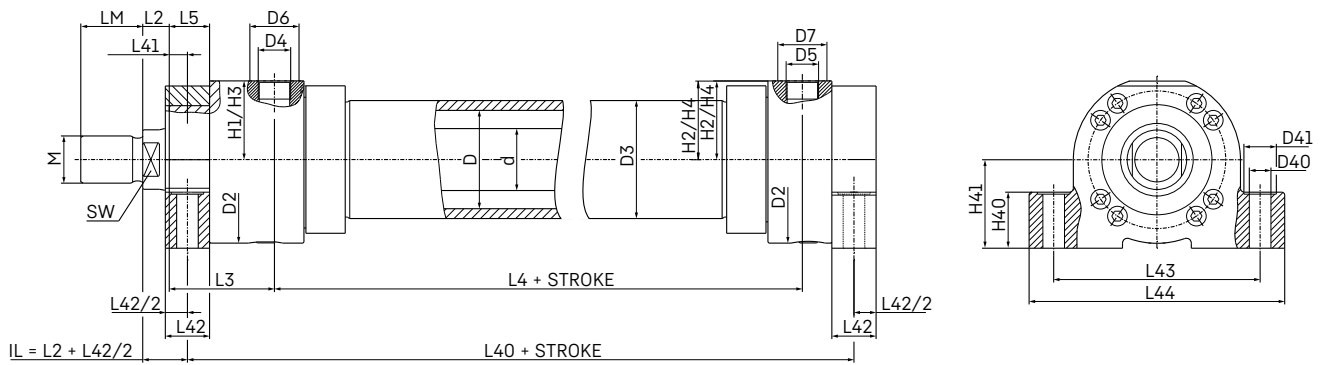
Basic dimensions		Specific dimensions regarding mounting type					
D	d	L22	D23	L21	D22	D20	L20
63	40	28	175	4	150	13,5	277
63	45	28	175	4	150	13,5	277
80	50	32	210	4	180	17,5	308
80	56	32	210	4	180	17,5	308
100	63	36	250	5	212	22	344
100	70	36	250	5	212	22	344
125	80	40	285	5	250	22	399
125	90	40	285	5	250	22	399
140	90	40	330	5	285	26	434
140	100	40	330	5	285	26	434
160	100	45	360	5	315	26	470
160	110	45	360	5	315	26	470
180	110	50	410	5	355	33	510
180	125	50	410	5	355	33	510
200	125	56	440	5	385	33	556
200	140	56	440	5	385	33	556
220	140	63	500	8	435	39	648
220	160	63	500	8	435	39	648
250	160	63	540	8	475	39	661
250	180	63	540	8	475	39	661
280	180	80	630	8	555	45	774
280	200	80	630	8	555	45	774
320	200	80	675	8	600	45	782
320	220	80	675	8	600	45	782

Swivel bearing mounting (MT4)



Basic dimensions		Specific dimensions regarding mounting type							
D	d	L30 min.	L30 max. + Hub	D3 max.	L33	D31	L31	L32	D30
63	40	200	110	83	48	40	32	125	125
63	45	200	110	83	48	40	32	125	125
80	50	217	117	105	58	50	40	150	155
80	56	217	117	105	58	50	40	150	155
100	63	254	126	130	78	63	50	180	185
100	70	254	126	130	78	63	50	180	185
125	80	295	139	160	98	80	63	224	230
125	90	295	139	160	98	80	63	224	230
140	90	334	144	175	118	90	70	265	255
140	100	334	144	175	118	90	70	265	255
160	100	368	146	200	128	100	80	280	285
160	110	368	146	200	128	100	80	280	285
180	110	393	155	220	138	110	90	320	325
180	125	393	155	220	138	110	90	320	325
200	125	437	183	254	155	125	100	335	340
200	140	437	183	254	155	125	100	335	340
220	140	492	209	299	180	160	125	385	390
220	160	492	209	299	180	160	125	385	390
250	160	513	230	324	180	160	125	425	430
250	180	513	230	324	180	160	125	425	430
280	180	586	243	356	220	200	160	480	485
280	200	586	243	356	220	200	160	480	485
320	200	605	247	406	220	200	160	530	535
320	220	605	247	406	220	200	160	530	535

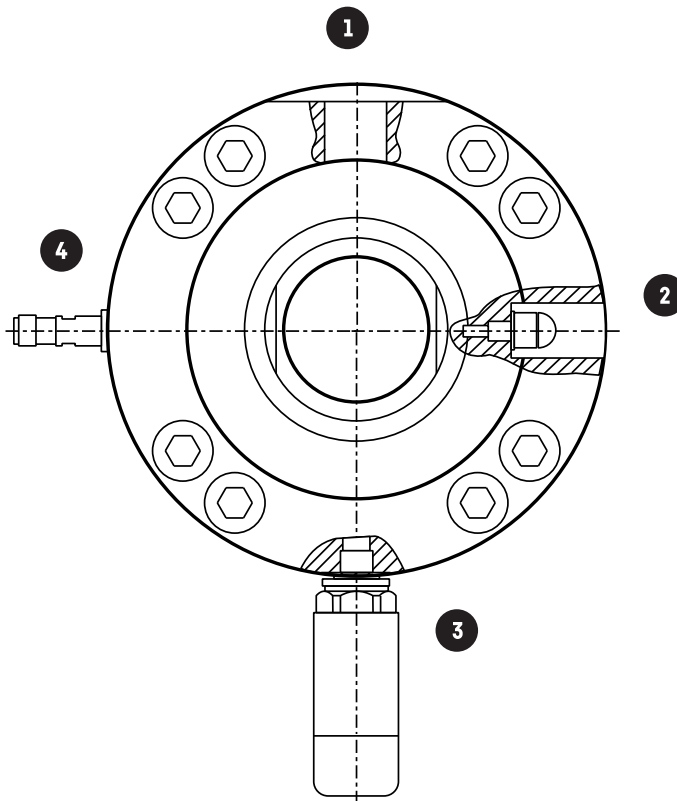
Foot mounting (MS2)



Basic dimension		Specific dimensions regarding mounting type								
D	d	L40 + Stroke	L43	L44	L42	L41	D40	D41	H40	H41
63	40	252	150	180	35	14,5	13,5	20	42	65
63	45	252	150	180	35	14,5	13,5	20	42	65
80	50	280	180	220	40	16	17,5	26	47	75
80	56	280	180	220	40	16	17,5	26	47	75
100	63	312	210	260	45	18,5	22	33	57	90
100	70	312	210	260	45	18,5	22	33	57	90
125	80	364	255	310	50	20	26	40	67	105
125	90	364	255	310	50	20	26	40	67	105
140	90	399	290	355	50	20	30	46	72	115
140	100	399	290	355	50	20	30	46	72	115
160	100	435	330	400	60	20	33	50	77	135
160	110	435	330	400	60	20	33	50	77	135
180	110	475	360	440	70	20	40	58	92	150
180	125	475	360	440	70	20	40	58	92	150
200	125	509	385	470	70	26	40	58	97	160
200	140	509	385	470	70	26	40	58	97	160
220	140	594	445	540	80	31	45	69	102	185
220	160	594	445	540	80	31	45	69	102	185
250	160	617	500	605	90	26	52	78	112	205
250	180	617	500	605	90	26	52	78	112	205
280	180	701	550	660	95	40,5	52	78	142	235
280	200	701	550	660	95	40,5	52	78	142	235
320	200	714	610	730	100	38	62	93	142	255
320	220	714	610	730	100	38	62	93	142	255

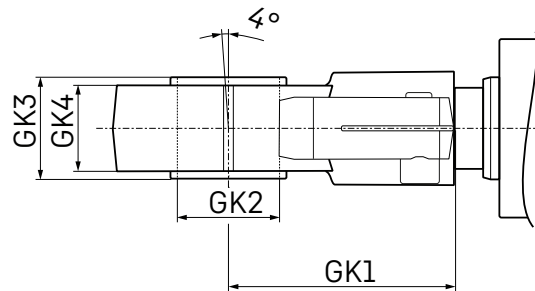
Equipment options

All cylinders in the series-production range can be customised with different standard equipment configurations. The position of each option is shown as standard. The top view, looking at the piston rod end, shows the possible options and their respective 90° position. They are available on both the piston and rod ends.



- 1** Apart from a threaded connection in inches, a metric thread, a UNF-thread or a 6000 PSI-SAE connection can also be selected. A threaded connection in inches is provided as standard.
- 2** The adjustment option for the integrated cushioning system is located at an offset of 90° in clockwise direction to the hydraulic port.
- 3** On the opposite side to the hydraulic port is a standard vent hole which is closed with a screw. A measuring coupling can be fitted here as an option.
- 4** A proximity switch can be fitted at a 90° offset clockwise of the vent hole.

Swivel head and tolerances



Tolerance for swivel head acc. to ISO 8132

D	GK1	GK2	GK3	GK4
63	97	40	40	34
80	120	50	50	42
100	140	63	63	53,5
125	180	80	80	68
140	195	90	90	72
160	210	100	100	85,5
180	235	110	110	88
200	260	125	125	105
220	310	160	160	133
250	310	160	160	133
280	390	200	200	165
320	390	200	200	165

Tolerances for series-production range acc. to ISO 6022

	Basic variant	Round flange at head	Round flange at base	Fixed bushing eye/ spherical bearing eye at base	Swivel bearing mounting	Foot mounting**		
Dimensions	E1 (ZJ)*	E2 (WC)	E3 (ZP)*	E4 (XC)*	E5 (XV)*	E6 (XS)*	E7 (SS)	
Design	Basic	MF3	MF4	MP3	MT4	MS2	MS2	Stroke tolerance***
Stroke length								
≤ 1250	± 1,5	± 2	± 1,5	± 1,5	± 2	± 2	± 2	
> 1250 = 3150	± 3	± 4	± 3	± 3	± 4	± 4	± 4	+5

* Incl. stroke length

** Not standardized

*** Stroke tolerances must not be added to the tolerances listed in this table.

General information

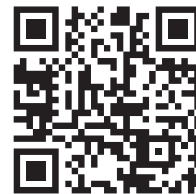
The maximum operating pressures must be less than or equal to the rated pressure of 250 bar. In the case of increased loads, such as pressure peaks or high operating frequency, the design of the hydraulic cylinder must be checked.

For the installation, commissioning, safe use and maintenance of the hydraulic cylinders in the series-production range according to ISO 6022, the relevant operating and maintenance instructions in the latest version must be observed.

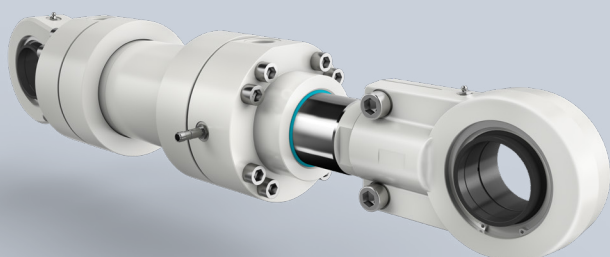
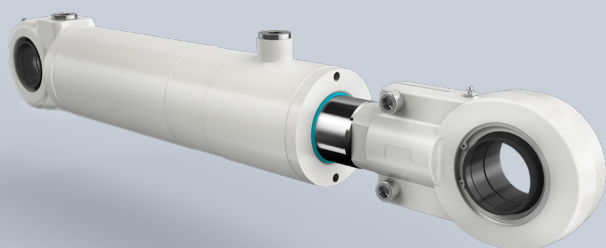
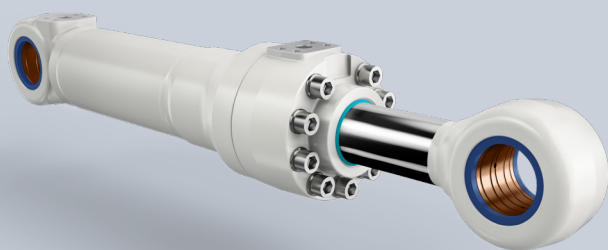
Service and repair work on Liebherr products must only be carried out by specially trained personnel. The selected seals of the hydraulic cylinders are suitable for the operation with mineral oils. The suitability of the requested oil must be verified by Liebherr.

All graphic representations serve as an example and do not necessarily correspond to the configured product.

Configure series- production ranges



Configure
your hydraulic
cylinder now



380 bar

Highly dynamic and mobile applications of earth movement

The hydraulic cylinders of the series-production range 380 bar come in handy mainly in mobile applications. This also means that they can be used wherever durable and robust products are required in highly dynamic situations. The “eye-eye mounting” was specially designed for connection to construction machinery and thus ensures optimal operation. The hybrid cylinder option is an added bonus. The use of carbon-fibre reinforced plastic saves on weight and increases machine efficiency.

260 bar

Mobile and stationary applications

The hydraulic cylinders of the 260 bar series-production range can be used under demanding conditions of static and dynamic loads. A wide range of mounting types are available, including alternative oil connections and piston rod designs. The hydraulic cylinder adapts to fit your application.

ISO 6022

Mechanical and plant engineering

The hydraulic cylinders according to ISO 6022 come in handy in stationary applications, in which they can withstand equally with static and dynamic loads. The hydraulic cylinders can be equipped with a large portfolio of additional intelligent options (e.g. position transducer, end position cushioning or proximity switch) as required.

Ready, set, configure

For the first time, Liebherr has made it possible to individually and easily configure all hydraulic cylinder series-production ranges via an online-based configurator on the company's website. Depending on the application and requirements, the configurator offers all kinds of variations: from the 380 bar series for mobile applications, the ISO 6022 series for industrial use all the way to the 260 bar series as a link between mobile and stationary applications.

"When it comes to selecting and assembling the right product, the configurator offers assistance through stored logic and targeted user guidance." explains Jan Winter, product manager at Liebherr-Components Kirchdorf GmbH.



Available at any time
on all devices,
location-independent



CRP-hybrid cylinders
configurable for
380 bar



Offer received
within one
business day



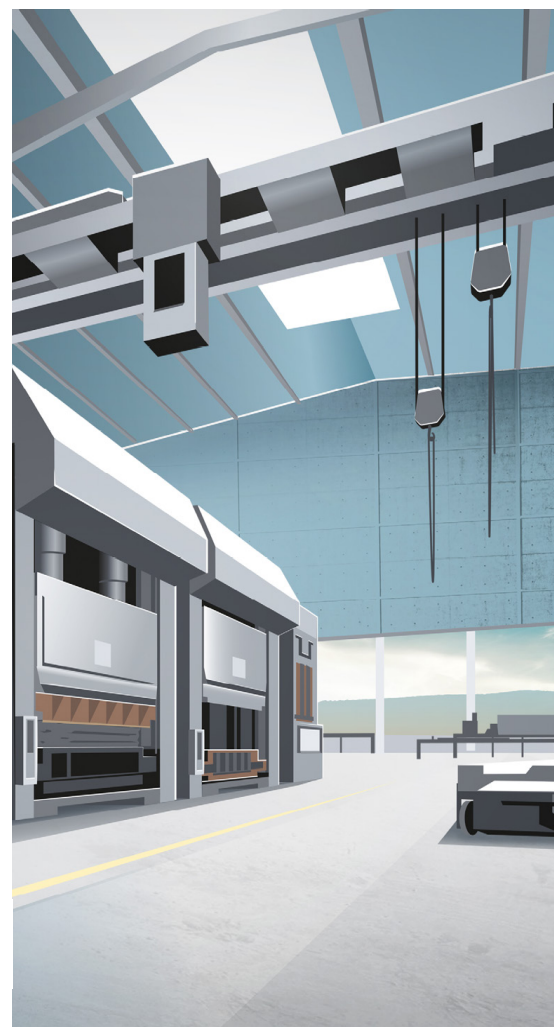
Wide range
wavailable for
many applications



Product key:
Recall and saving is
possible at any time



3D models and
technical data
for download



Request your individually suitable offer now.

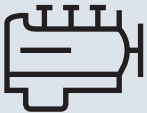
Components

From A to Z – the components division of the Liebherr Group offers a broad range of solutions in the area of mechanical, hydraulic, electric and electronic drive system and control technology. The efficient components and systems are produced at a total of ten production sites around the world to the highest standards of quality. Central contact persons for all product lines are available to our customers at

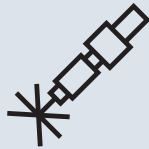
Liebherr-Components AG and the regional sales and distribution branches.

Liebherr is your partner for joint success: from the product idea to development, manufacture and commissioning right through to customer service solutions like remanufacturing.

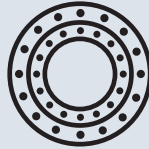
components.liebherr.com



Engines



Fuel injection systems



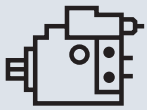
Slewing bearings



Gearboxes



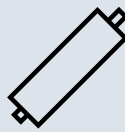
Winches



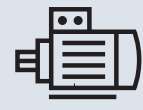
Hydraulic pumps and motors



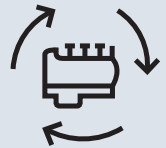
Hydraulic cylinders



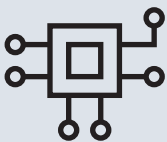
Piston accumulators



Electric machines



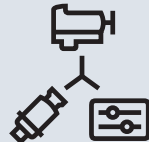
Remanufacturing



Industrial electronics



Electrical drive and control technology



Drive systems



Aerospace electronics



Fibre composite

LIEBHERR

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