SAFETY-COUPLINGS

SERIES SE

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MALMEDIE

CONTENTS

The operational experience with couplings that we have accumulated over more than 50 years in all sectors of drive technology attests the high performance and quality of our products. MALMEDIE Safety-Couplings have been used for more than 30 years as torque limiters in various executions (e.g. gear couplings, elastic couplings, cardan shafts etc.). They have thoroughly proven themselves even under very difficult application conditions, such as in the metallurgical industry and rolling mills, mining and the chemical industry. Their function is characterised by high precision of disengagement and rapid reset. Thus the drive components of equipment can, on the one hand, be effectively protected from damage due to overload, and on the other hand lost production time can be significantly reduced. The possible variation in the number and size of the safety elements and of the effective diameter means that the maximum release (shut-off) torque can be selected almost without limit. The individual safety element cannot be overloaded if correctly chosen. The MALMEDIE Safety-Couplings range offers a large number of variants, so that an optimal solution can be found even for difficult applications.

Quality and production

All Safety-Coupling parts are produced to stringent internal quality standards. With the aid of modern CNC manufacturing technology the ability to replace individual parts is guaranteed. All load-bearing coupling parts are produced from high-quality heat-treated steel. Wear is reduced by the purposeful selection of materials and by appropriate hardening treatments.

Design and characteristics

Unlike shear pins or break rings, the safety elements are not destroyed when disengagement is triggered, and can quickly be reactivated with the simplest tools, such as a hammer. If needed, two or more safety elements can be used for form-fitted and tensionally locked connection of two coupling flanges. Despite their compact design, the safety elements generate axial forces during transmission of the torque. These must be contained by special, precise and stable bearings of the two coupling flanges, and not transmitted to the connected drive units such as motors, gears etc. (see Fig.1). The MALMEDIE Safety-Couplings are suitable for use in reversing operation. On account of the diversity of the applications, MALMEDIE Safety-Couplings are adapted almost exclusively to the customer's request. Only the safety elements are standardised series items.

MALMEDIE Safety-Coupling

- *high load capacity*
- *robust*
- *high shut-off accuracy*
- *fast re-engagement*
- *maintenance free*
- *suitable for use in potentially explosive atmospheres according to directive 94/9/EU* ⟨Ex⟩

Advantages of the MALMEDIE - Safety-Coupling:

- *low costs due to short downtimes*
- *suitable for reversing operation*
- *full unlocking*
- *readjustable*
- *low risk of damage*
- *long service life*

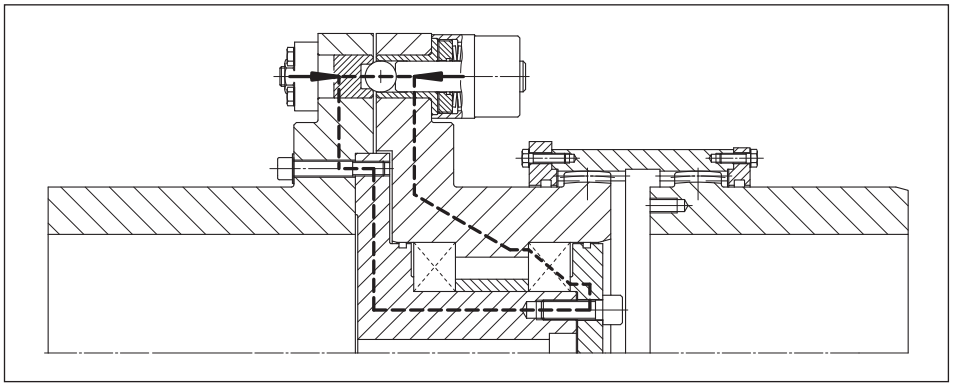


Fig. 1
Course of axial force

The size of coupling required depends on the following factors:

1. *Max. drive torque* T_{nom}
2. *Max. plant shock torque* T_{max}
3. *Shut-off torque* T_{so}
4. *Shut-off range* $T_{so\,min} - T_{so\,max}$
5. *Operating speed* n_{op}
6. *Dimensions of the input and output shafts*

$$T_{nom} = \frac{N \cdot 9550}{n} \cdot K_1 \cdot K_2 \leq T_{KN}$$

1. max. drive torque T_{nom} [Nm]

N = plant power output [kW]
n = coupling rotational speed [rpm]
K_1 = operating factor, taken from the "Type of drive" table
K_2 = operating factor, taken from the "Type of loading" table
T_{KN} = coupling torque, taken from dimension sheet [Nm]

Type of drive	K_1 operating factor	
	Daily operation, duration up to 12 hours	Daily operation, duration above 12 hours
Electric motor, turbine	1,00	1,05
Hydraulic motor	1,05	1,10
Combustion engine	1,10	1,20

Type of loading	Operation	K_2 operating factor	Working machine
SMOOTH	Continuous operation without overload	1,0 – 1,25	Light ventilation fans Radial pumps Electrical generators Centrifugal pumps Stirrers (low viscosity liquids)
LIGHT DUTY	Continuous operation with light overloads and brief, infrequent shock loads	1,25 – 1,5	Large ventilation fans Piston pumps Stirrers (high viscosity liquids) Textile machinery Machine tools Belt conveyors Elevator
MEDIUM DUTY	Operation with frequent light shock loads and brief, medium level overloads	1,5 – 1,8	Piston compressors Conveyor machinery Calenders Briquetting presses Non-reversing rolling mills Smoothing machinery Winches
HEAVY DUTY	Operation with heavy and frequent shock loads. Frequent load reversals. High level of safety.	1,8 – 2,2	Cranes, elevators (heavy load operations) Mixers Rolling lines Reversing rolling mills Kneading machinery Punching machinery Shears
VERY HEAVY DUTY	Operation with very heavy and frequent shock loads. Frequent and sudden load reversals. Very high level of safety.	> 2,2	Reversing rolling mills Heavy load operations in the steel industry Shearing and cutting units Forging presses Billet shears Hammers Stone breakers / milling machinery

The K_2 operating factors specified are average values.

2. Max. plant shock torque T_{max} [Nm]

$$T_{max} \leq T_{Kmax}$$

TK_{max} = max. coupling torque, taken from dimension sheet [Nm]

The max. plant shock torque T_{max} must be smaller than the max. coupling torque TK_{max} of the connected components (gear coupling, cardan shaft, elastic coupling etc.), otherwise a larger coupling must be selected.

3. Shut-off torque T_{so} [Nm]

$$T_{so} = T_{max} \cdot c_a$$

T_{max} = plant shock torque [Nm]
c_a = shock factor

Load	Shock factor
even	1,25 – 1,75
uneven	1,75 – 2,25
impulsive	2,25 – 3,00

4. Shut-off range $T_{so\ min}$ – $T_{so\ max}$ [Nm]

$$n_{SE} = \frac{T_{so} \cdot 2000}{d_w \cdot F_{u\ max}}$$

Round up the number of SE elements to a whole number.

n_{SE} = necessary number of SE elements
T_{so} = shut-off torque [Nm]
d_{eff} = effective diameter [mm]
$F_{u\ min}$ = min. shut-off force per SE element [N]
$F_{u\ max}$ = max. shut-off force per SE element [N]
$T_{so\ min}$ = min. shut-off torque [Nm]
$T_{so\ max}$ = max. shut-off torque [Nm]

$$T_{so\ min} = \frac{n_{SE} \cdot F_{u\ min} \cdot d_{eff}}{2000}$$

$$T_{so\ max} = \frac{n_{SE} \cdot F_{u\ max} \cdot d_{eff}}{2000}$$

Size	Shut-off force / safety element [N]	
	Fu min	Fu max
10	5435	13180
20	15700	36724
30	81853	185264
40	264838	511542

The shut-off range of the coupling is adjustable from $T_{so\ min}$ to $T_{so\ max}$.

5. Operating rotational speed $n_{Operation}$ [rpm]

$$n_{Operation} \leq n_{perm}$$

n_{perm} = permissible coupling rotational speed [rpm]

The max. permissible coupling speed n_{perm} depends on the connected components (gear coupling, cardan shaft, elastic coupling etc.) and also, depending on the application, on the alignment, or in the case of elastic couplings on the ambient temperature.

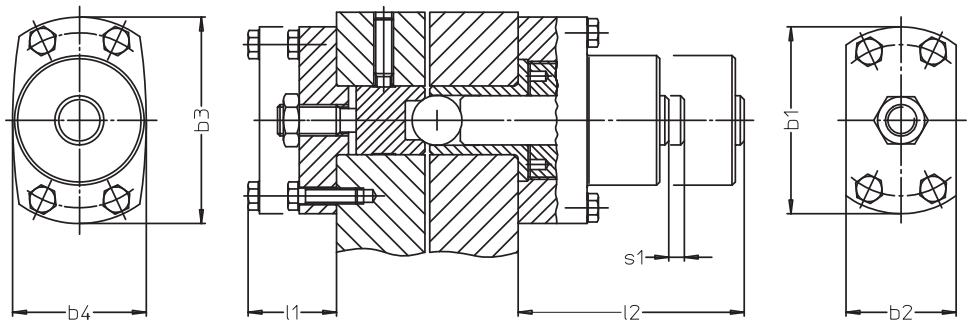
6. Dimensions of the input and output shafts

Furthermore a check must be made as to whether the input or output shaft diameters are smaller than the max. permissible bore diameter of the coupling according to the dimension sheet. The maximum bore diameters specified in the dimension sheets apply for keyways according to DIN6885 Sheet 1, without taper. In addition, all connections are to be checked for the torque transferred across the hub/shaft connection.

Please contact our Technical Department is you have any queries.

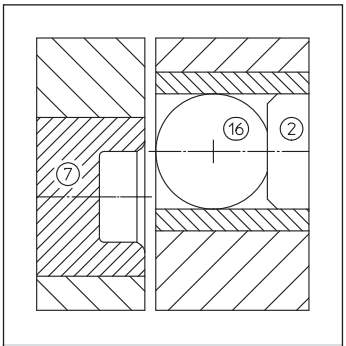
Key connections see Page 14

Dimension sheet 712-01 / Type SE

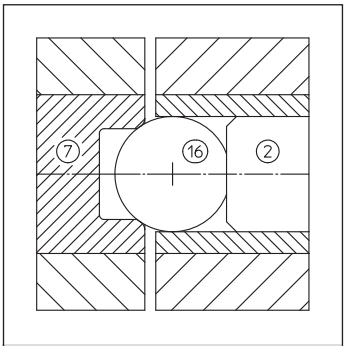


(1) Disassembly dimensions
(2) Engagement travel

Size	Tangential force		Dimensions							Weight
	Fu min. [N]	Fu max. [N]	b1 [mm]	b2 [mm]	b3 [mm]	b4 [mm]	l1 (1) [mm]	l2 (1) [mm]	s1 (2) [mm]	[kg]
10	5435	13180	66	35	66	46	36	71	6,5	1,1
20	15700	36724	95	56	105	68	45	115	8	3,6
30	81853	185264	170	100	170	122	53	174	13,5	15,5
40	264838	511542	230	170	278	195	110	300	27	95



disengaged



engaged

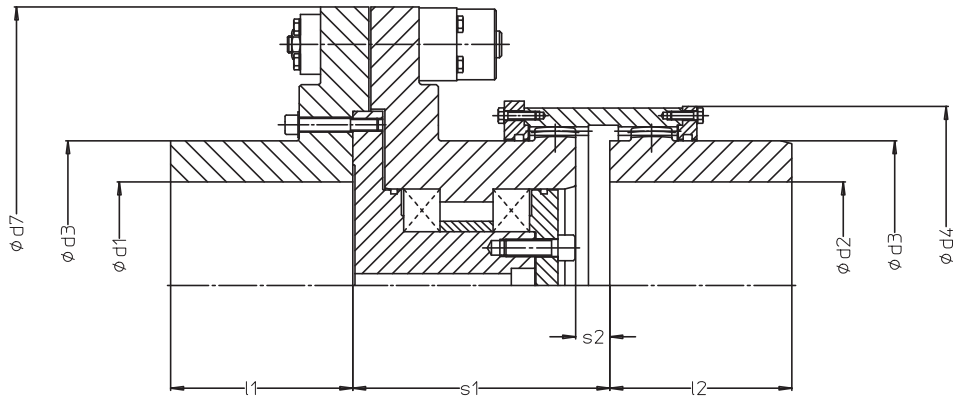
Functional Description

Disengagement
In case of overload, the ball (item 16) and the pin (item 2) of the Safety-Element are moved rearwards by the centring bush (item 7); at the same time the two flanges are free to rotate independently. The tensionally locked connection is disengaged. The pin and the ball are held securely in the rear position and the gap between the coupling flanges ensures, that there is no wearing of the ball, centring bush or the coupling flanges themselves.

Re-engagement
The centre of the centring bush (item 7) and the centre of the ball (item 16) are coarsely aligned. By means of a blow with a plastic hammer against the end of the pin (item 2), the element audibly engages and the tensionally locked connection between the two coupling flanges is restored.

Adjustment
The Safety-Element is delivered having been pre-adjusted to the shut-off torque or shut-off force (in the case of linear applications) specified by the customer. If a change should be necessary at site, this is easily done by removing the element and adjusting the spring force in accordance with the table of the maintenance manual.

Dimension sheet 712-02 / Type LX-SE



Examples:

Size	Shut-off torque (1)		Dimensions [mm]						
	Tso min. [Nm]	Tso max. [Nm]	d1, d2 máx. (2)	d3 [mm]	d4 [mm]	d7 [mm]	l1, l2 [mm]	s1 [mm]	s2 [mm]
0,56-10	1550	7500	109	152	193	340	120	160	23,5
0,56-20	4800	22400	109	152	193	380	120	160	23,5
0,88-10	1750	8300	128	178	221	370	140	180	26
0,88-20	5300	24600	128	178	221	410	140	180	26
1,4-10	1950	9350	147	205	256	410	160	200	27,5
1,4-20	5900	41300	147	205	256	450	160	200	27,5
2,2 -10	2100	10100	168	235	288	440	175	220	32
2,2 -20	6400	44600	168	235	288	480	175	220	32
2,2 -30	37700	85000	168	235	288	590	175	220	32
3,5 -10	2350	11200	193	269	331	480	200	250	32
3,5 -20	7000	49000	193	269	331	520	200	250	32
3,5 -30	41000	138000	193	269	331	630	200	250	32
5,6 -10	2650	12700	230	322	385	540	225	280	46
5,6 -20	7950	55000	230	322	385	580	225	280	46
5,6 -30	45900	207000	230	322	385	690	225	280	46
7 -10	2800	13500	250	350	415	570	250	310	52
7 -20	8400	58000	250	350	415	610	250	310	52
7 -30	48300	218000	250	350	415	720	250	310	52
8,8 -10	2950	14100	255	357	435	590	280	340	57
8,8 -20	8750	61000	255	357	435	630	280	340	57
8,8 -30	50000	226000	255	357	435	740	280	340	57

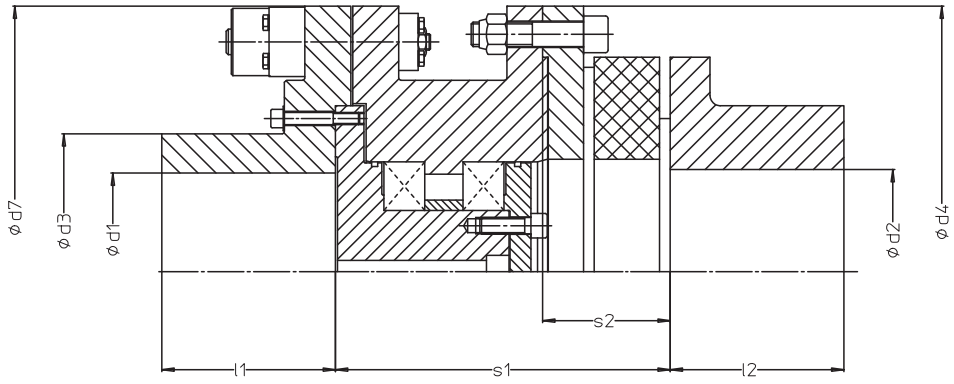
Larger/smaller couplings, higher shut-off torques and intermediate sizes on request.

(1) Depending on the number and size of the safety elements.

The torques stated do not refer to the connection of shaft and hub. If necessary, these must be checked.

(2) The values specified for the bores are valid according to DIN6885-1 (see Page 14).

Dimension sheet 712-03 / Type SE-E



Examples:

Larger/smaller couplings, higher shut-off torques and intermediate sizes on request.

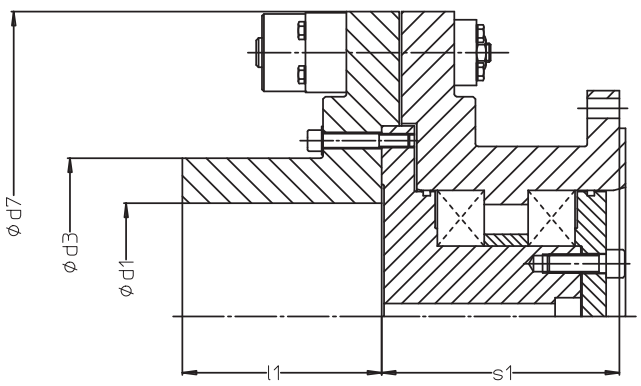
(1) Depending on the number and size of the safety elements.

The torques stated do not refer to the connection of shaft and hub. If necessary, these must be checked.

(2) The values specified for the bores are valid according to DIN6885-1 (see Page 14).

Size	Shut-off torque (1)		Dimensions [mm]								
	Tso min. [Nm]	Tso max. [Nm]	d1 max. (2)	d2 max. (2)	d3 [mm]	d4 [mm]	d7 [mm]	l1 [mm]	l2 [mm]	s1 [mm]	s2 [mm]
133/10	1250	5900	95	115	133	285	280	100	110	192	75
152/10	1550	7500	109	125	152	330	340	120	120	215	81
152/20	4800	12000	109	125	152	330	380	120	120	215	81
178/10	1750	8300	127	145	178	370	370	140	140	240	90
178/20	5300	15000	127	145	178	370	410	140	140	240	90
205/10	1950	9350	146	160	205	410	410	160	155	268	99
205/20	5900	22000	146	160	205	410	450	160	155	268	99
235/10	2100	10100	168	185	235	460	440	175	175	297	113
235/20	6400	30000	168	185	235	460	480	175	175	297	113
269/20	7000	35000	192	200	269	520	520	200	195	339	125

Dimension sheet 712-04 / Type SE-F



For flange mounting of e.g. sprocket wheels, crown gears, belt pulleys etc.

Examples:

Size	Shut-off torque (1)		Dimensions [mm]				
	Tso min. [Nm]	Tso max. [Nm]	d1 max.(2)	d3 [mm]	d7 [mm]	l1 [mm]	s1 [mm]
152/10	1550	7500	109	152	340	120	134
152/20	4800	22400	109	152	380	120	134
178/10	1750	8300	127	178	370	140	150
178/20	5300	24600	127	178	410	140	150
205/10	1950	9350	146	205	410	160	169
205/20	5900	41300	146	205	450	160	169
235/10	2100	10100	168	235	440	175	184
235/20	6400	44600	168	235	480	175	184
235/30	37700	85000	168	235	590	175	184
269/10	2350	11200	192	269	480	200	214
269/20	7000	49000	192	269	520	200	214
269/30	41000	138000	192	269	630	200	214
318/10	2650	12700	227	318	540	225	229
318/20	7950	55000	227	318	580	225	229
318/30	45900	207000	227	318	690	225	229
342/10	2800	13500	244	342	570	250	253
342/20	8400	58000	244	342	610	250	253
342/30	48300	218000	244	342	720	250	253
358/10	2950	14100	255	358	590	280	278
358/20	8750	61000	255	358	630	280	278
358/30	50000	226000	255	358	740	280	278

Larger/smaller couplings, higher shut-off torques and intermediate sizes on request.

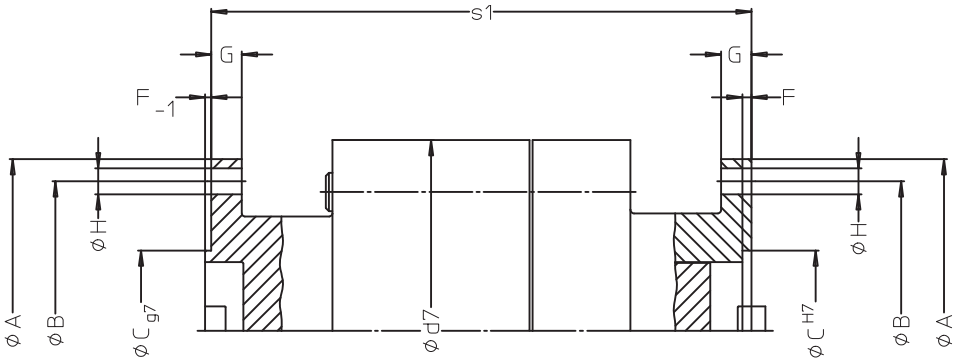
(1) Depending on the number and size of the safety elements.

The torques stated do not refer to the connection of shaft and hub. If necessary, these must be checked.

(2) The values specified for the bores are valid according to DIN6885-1 (see Page 14).

Dimension sheet 712-05 / Type SE-G

For flange mounting of cardan shafts.



Larger/smaller couplings, higher shut-off torques and intermediate sizes on request.

All connecting flanges also possible with face key.

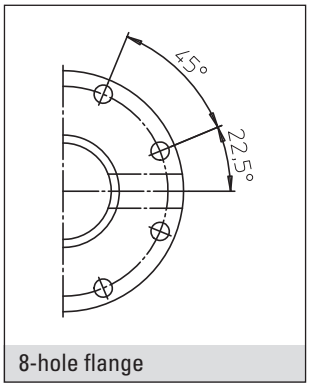
Connecting flange also with Hirth-type serration.

Optionally external adjustable.

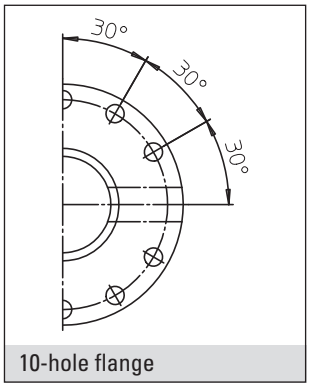
(1) Depending on the number and size of the safety elements.

(2) Number of flange holes

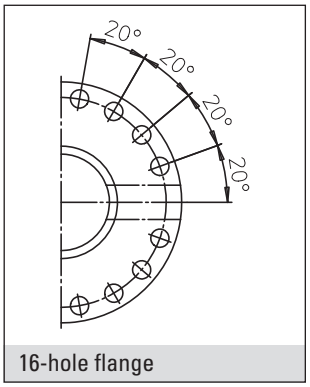
Size	Shut-off torque (1)		Dimensions [mm]								
	Tso min. [Nm]	Tso max. [Nm]	A [mm]	B [mm]	C [mm]	F [mm]	G [mm]	H [mm]	I (2)	d7 (1) [mm]	s1 (1) [mm]
225	2900	26700	225	196	105	5	20	17	8	250	350
250	3300	30400	250	218	105	5	25	19	8	275	350
285	3800	44400	285	245	125	6	27	21	8	310	350
315	4300	60000	315	280	130	7	32	23	10	340	350
350	4800	67600	350	310	155	7	35	23	10	375	350
390	5500	89200	390	345	170	8	40	25	10	415	350
435	6200	115000	435	385	190	10	42	28	16	460	350



8-hole flange

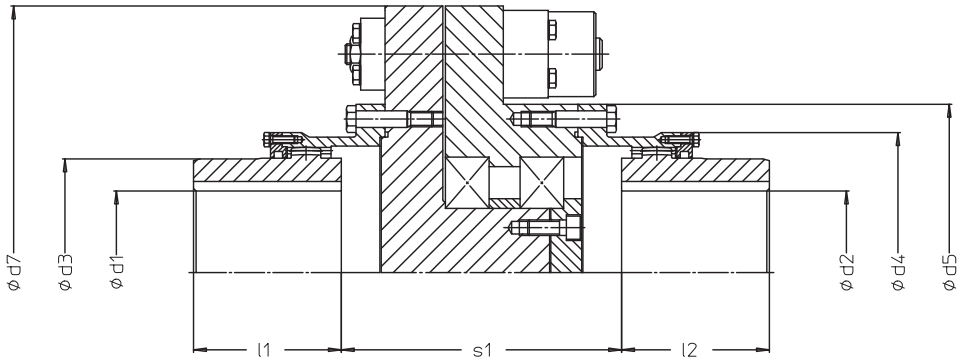


10-hole flange



16-hole flange

Dimension sheet 712-06 / Type SE-GLX



For flange mounting between MALMEDIE gear coupling halves according to dimensional sheet 710-51 / 710-52 / 710-53

Examples:

Size	Shut-off torque (1)		Dimensions [mm]						
	Tso min. [Nm]	Tso max. [Nm]	d1, d2 max. (2)	d3 [mm]	d4 [mm]	d5 [mm]	d7 [mm]	l1, l2 [mm]	s1 [mm]
0,056	1050	5000	48	68	105	132	240	60	146
0,088	1100	5400	58	81	117	144	255	70	152
0,14	1200	8700	69	97	133	160	270	80	150
0,22	4100	14300	80	112	148	177	335	90	198
0,35	4600	21300	95	133	171	208	355	100	201
0,56	4900	34150	109	152	193	230	385	120	210
0,88	5350	37450	127	178	218	262	415	140	218
1,4	6150	43000	146	205	253	306	465	160	238
2,2	7000	64600	168	235	283	338	515	175	242
3,5	7700	72000	192	269	332	383	565	200	260

Larger/smaller couplings, higher shut-off torques and intermediate sizes on request.

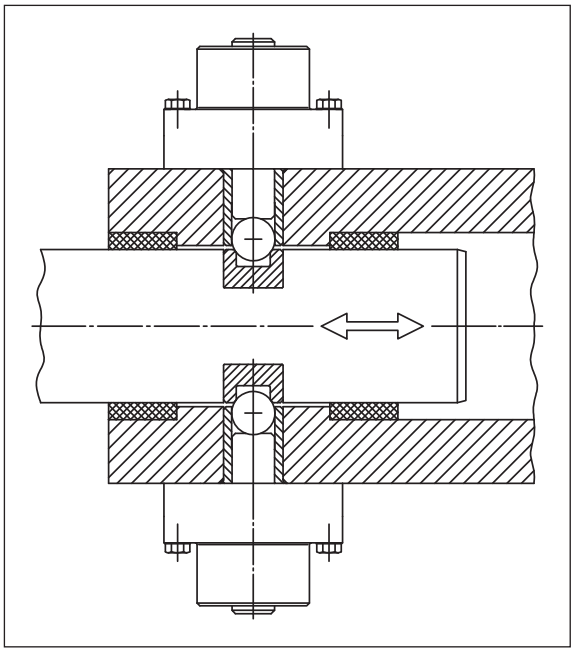
(1) Depending on the number and size of the safety elements.

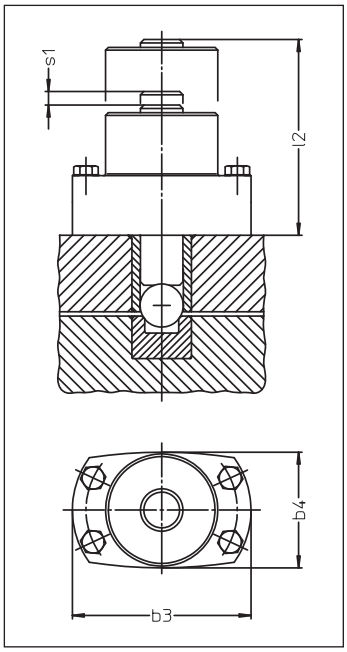
The torques stated do not refer to the connection of shaft and hub. If necessary, these must be checked.

(2) The values specified for the bores are valid according to DIN6885-1 (see Page 14).

Dimension sheet 712-07 / Type SE-L

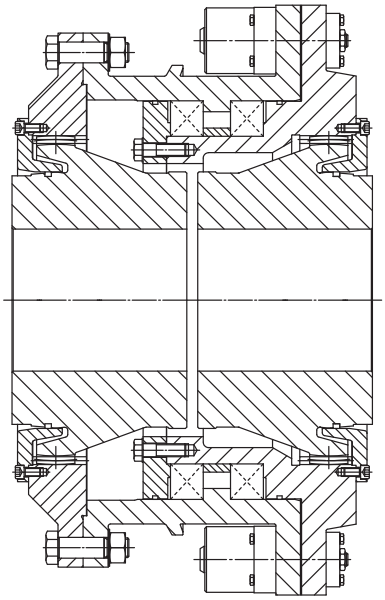
For linear movements, e.g. for installation in connection rods or tension rods



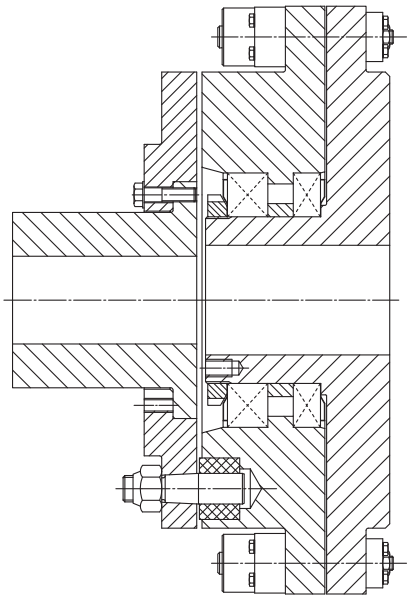


(1) Disassembly dimensions
(2) Engagement travel

Size	Release force / element		Dimensions				Weight
	Fu min [N]	Fu max. [N]	b3 [mm]	b4 [mm]	l2 (1) [mm]	s1 (2) [mm]	[kg]
10	5435	13180	66	46	71	6,5	1,1
20	15700	36724	105	68	115	8	3,6
30	81853	185264	170	122	174	13,5	15,5
40	264838	511542	278	195	300	27	95

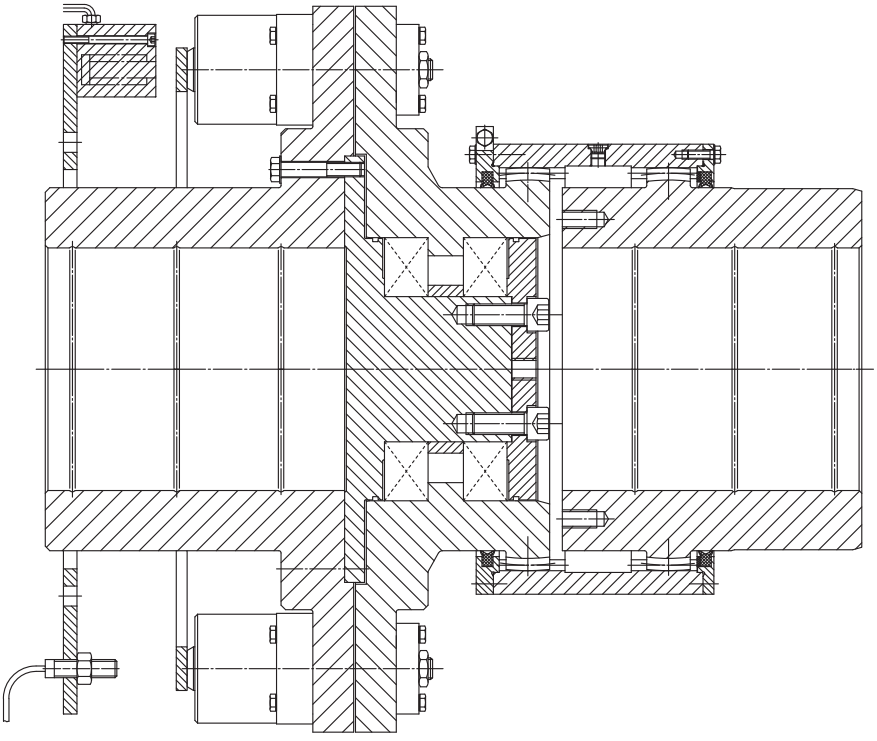


Gear-Coupling with Safety-Elements
for operation in rolling mills.

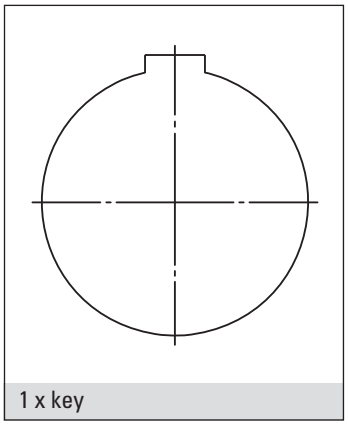


Elastic bolt coupling with
Safety-Elements.

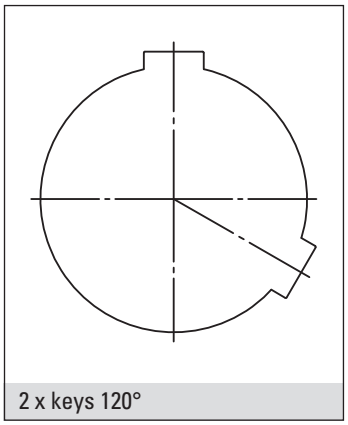
Automatic re-engagement device



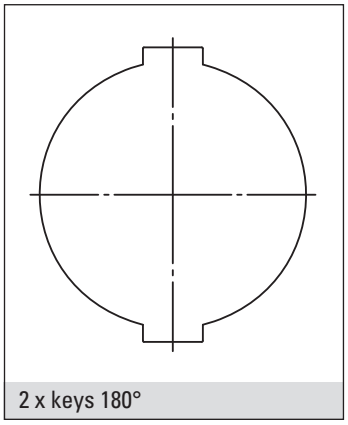
Gear-Coupling with Safety-Elements, type LX-SE, with automatic re-engagement device.
Re-engagement can take place either hydraulically or pneumatically.



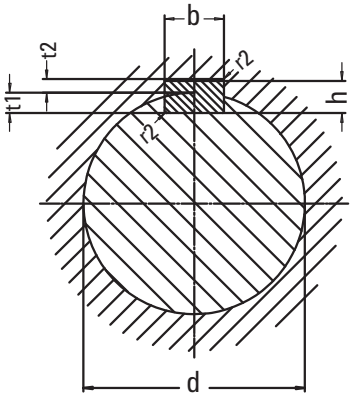
1 x key



2 x keys 120°



2 x keys 180°



The given values for the bores are valid according to DIN6885-1. As a matter of principle, every key connection must be checked with regard to surface pressure. Keyways according to BS 46, ANSI B17.1 or other standards are also possible. For other types of connections, such as e.g. shrink-fit connections or spline connections in accordance with DIN5480, multiple splined shaft connections, or shrink-fit sleeve connections, please get in contact with our Technical Department.

DIN6885-1

all dimensions in mm

Bore d1	from	38	44	50	58	65	75	85	95	110
	to	44	50	58	65	75	85	95	110	130
Key	Width w	12	14	16	18	20	22	25	28	32
	Height h	8	9	10	11	12	14	14	16	18
Shaft keyway	*Width w	12	14	16	18	20	22	25	28	32
	Depth t1	5	5,5	6	7	7,5	9	9	10	11
	Tolerance	+ 0,2								
	r2 min.	0,4				0,6				
	r2 max.	0,6				0,8				
Hub keyway	**Width w	12	14	16	18	20	22	25	28	32
	Depth t2	3,3	3,8	4,3	4,4	4,9	5,4	5,4	6,4	7,4
	Tolerance	+ 0,2								
	r2 min.	0,4				0,6				
	r2 max.	0,6				0,8				

Bore d1	from	130	150	170	200	230	260	290	330	380	440
	to	150	170	200	230	260	290	330	380	440	500
Key	Width w	36	40	45	50	56	63	70	80	90	100
	Height h	20	22	25	28	32	32	36	40	45	50
Shaft keyway	*Width w	36	40	45	50	56	63	70	80	90	100
	Depth t1	12	13	15	17	20	20	22	25	28	31
	Tolerance	+ 0,3									
	r2 min.	1				1,6			2,5		
	r2 max.	1,2				2			3		
Hub keyway	**Width w	36	40	45	50	56	63	70	80	90	100
	Depth t2	8,4	9,4	10,4	11,4	12,4	12,4	14,4	15,4	17,4	19,5
	Tolerance	+ 0,3									
	r2 min.	1				1,6			2,5		
	r2 max.	1,2				2			3		

* **Tolerance width w of the shaft keyway**

tight fit	P9
loose fit	N9

** **Tolerance width w of the shaft keyway**

tight fit	P9
loose fit	JS9

Inquiry form
for Safety-Couplings

Place of use

Project _____

Working machine _____

Operation

Type of operation _____

Operating factor _____

☐	SMOOTH	1,00 – 1,25	Continuous operation without overload or shock loads.
☐	LIGHT DUTY	1,25 – 1,50	Continuous operation with light overloads and brief infrequent shock loads.
☐	MEDIUM DUTY	1,50 – 1,80	Operation with frequent light shock loads and brief, medium level overloads.
☐	HEAVY DUTY	1,80 – 2,20	Operation with heavy and frequent shock loads. Frequent load reversals: High level of safety.
☐	VERY HEAVY DUTY	>2,20	Operation with very heavy and frequent shock loads. Frequent and sudden load reversals. Very high level of safety.

Direction of force

☐ constant

☐ alternating

Operations per hour _____ / h

Operational duration per day _____ h/d

Ambient temperature _____ °C

Technical data

Type of drive ☐ Electric motor, turbine ☐ Hydraulic motor ☐ Combustion engine

Motor power output _____ kW

Motor rotational speed _____ rpm

Gear transmission ratio _____

Gear efficiency _____

Coupling rotational speed _____ rpm

Nominal torque _____ kNm ☐ without operating factor ☐ with operating factor

max. torque _____ kNm ☐ without operating factor ☐ with operating factor

Shut-off torque T_{so} _____ Nm

Design

Coupling type _____ Coupling size _____ (pre-selection) Overall length _____

Hub-shaft connection

1.) Coupling hub

Bore diameter _____

Shaft diameter _____

☐ Keyway

Quantity _____

Angle _____

☐ DIN5480-gearing

☐ Shrink-fit connection

☐ Other

2.) Coupling hub

Bore diameter _____

Shaft diameter _____

☐ Keyway

Quantity _____

Angle _____

☐ DIN5480-gearing

☐ Shrink-fit connection

☐ Other

Remark

_____

_____

_____

Company

_____

_____

Mr / Mrs

_____

_____

Street

_____

_____

Postcode/Town

_____

_____

Country

_____

_____

Phone

_____

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Fax

_____

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eMail

_____

_____

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