DRIVE
SOLUTIONS

SIT-LOCK® 30 MONOLOCK

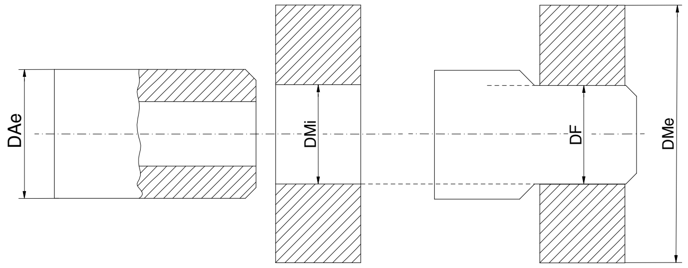
for shaft-hub connections

EASY. QUICK. MONOLOCK.

SIT-LOCK

SIT-LOCK® keyless locking device advantages compared to conventional systems

Interference fit



Interference fit shaft-hub connections can be achieved by cooling the shaft or heating the hub. This type of connection is not widely used for the following reasons:

- requires tight tolerances;
- difficult to remove;
- locking area temperature changes;
- the effect of the centrifugal force created by the hub can decrease transmissible torque;
- increased stress concentrated on the edges.

Shaft strength depends on the type of coupling used

As an example, we look at the following data. For a shaft with a diameter d equal to 50 mm, its shaft strength would match the diameter of:

- 39 mm feather key coupling
- 35 mm splined shaft coupling
- 46 mm interference fit
- 49 mm SIT-LOCK® coupling

Note

Incorrect calculations that do not account for all the stresses in a shaft-hub coupling can cause irreparable shaft breakage. Below is an example of fatigue failure caused by shaft-hub locking using a feather key.

SIT-LOCK® locking device coupling

Simply by tightening the screws, SIT-LOCK® keyless locking devices create an axial force on the shaft and the hub that is spread over the entire contact surface. Unlike traditional systems, they offer numerous advantages. The main ones are listed below.

Calculation ease

All the information, transmissible torque, axial force limits, etc., can be found in the catalogue. No additional calculations are required.

Installation and removal

Quick and easy. When installing, the screws simply need to be tightened to the M_s value indicated in the table. For removal, however, the screws need to be loosened evenly.

Shaft and hub tolerances and surface finish

Tight tolerances are not necessary. h8/H8 tolerances are typically used.

Operating temperatures

The values shown in the tables are valid for temperatures from -20 °C to +200 °C. For uses lower or higher than these values, please contact our Technical Department.

Simultaneous loads possible

Using SIT-LOCK® locking devices allows simultaneous torque, axial force, bending moment and radial force. For further information or calculations, please contact our Technical Department.

Increased shaft strength

The shaft has no slots and the pressure generated by tightening the screws does not cause any reduction of the shaft's strength. This enables the diameter of the shaft to be reduced with the same stresses applied, leading to considerable savings on costs.

Easy axial and angular adjustment

Unlike conventional couplings, SIT-LOCK® locking devices simply require placing the hub in the desired position relative to the shaft and tightening the screws.

No backlash

Connection in transmissions using SIT-LOCK® locking devices are perfectly rigid and there is no backlash that could impair motion transmission or machine precision over time.

Formulas for proper SIT-LOCK® locking device use

All the values in the table have been calculated and verified by our Technical Department. All the information for proper use is shown in the table. By tightening the screws to the torque M_s indicated in the table, an axial force P_v occurs which generates a radial force N on the shaft and hub contact surfaces. The pressure generated on the shaft and hub determines the transmissible torque M_t indicated in the table.

Therefore:

$$M_t = N \cdot \mu \cdot \frac{d}{2}$$

Avoid using molybdenum disulphide based lubricants or greases on the shaft and hub contact surfaces as this would considerably decrease the friction coefficient μ.

Screw tightening torque M_s

Where necessary, the screw tightening torque M_s can be reduced. As a result, the transmissible torque M_t indicated in the tables decreases proportionally. The same applies to the axial force limits F_{ax} and the pressure generated on the shaft P_w and hub P_n. The tightening torque M_s can be decreased by 30% or 40% of the value indicated in the tables.

Temperature influence

The values in the table are typically valid for applications from -20 °C to +200 °C. In extreme cases, it is possible to use them from -40 °C to +300 °C. For applications subject to high temperatures, we recommend using shafts and hubs with the same coefficient of thermal expansion.
For more details, please contact our Technical Department.

Applications with simultaneous torque and axial force

SIT-LOCK® locking devices can simultaneously transmit torque M_t and tolerate an axial force F_{ax}. The table shows the maximum permissible values. Where both values are present simultaneously, the transmissible torque M_t value decreases. Below is the formula for calculating transmissible torque:

$$M_{tam} = \sqrt{M_t^2 + \left(F_{AXR} \cdot \frac{d}{2000}\right)^2}$$

M_{tam} = total torque (Nm)
M_t = required torque (Nm)
F_{AXR} = required axial force (N)
d = shaft diameter (mm)

Radial force influence

The radial force F_R affects the contact pressure on the shaft and hub generated by the locking device. Radial force generates an increase in pressure P_n generated on the hub. It is highly important to calculate this value as it must be used to verify the minimum hub diameter D_{min}.

$$\Delta_{Pn} = \frac{F_R}{D \cdot H}$$

Δ_{Pn} = additional pressure on hub (N/mm²)
F_R = radial force applied (N)
D = external diameter of the locking device (mm)
H = locking device outer ring width (mm)

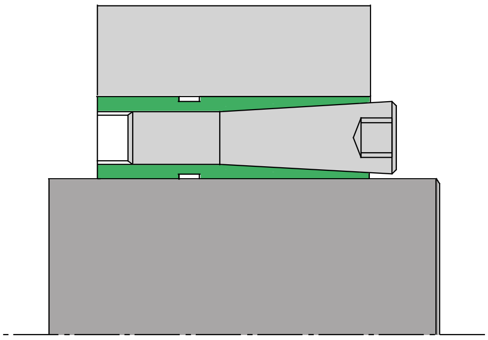
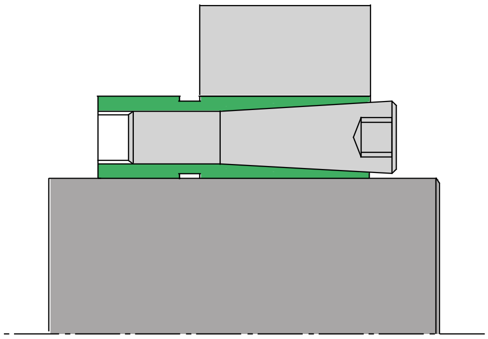
Safety factors

The transmissible torque M_t and tolerable axial force F_{ax} values stated in the catalogue must not be exceeded. The design phase should take any service factors into account.

Applications on shafts with bores

For hollow shaft applications, please contact our Technical Department.
The maximum bore d_B will depend on the elastic load $\sigma_{0,2}$ of the shaft material

SIT-LOCK® 30 MONOLOCK

Features

Composed of a single cylindrical ring in which a tapered hole is cut. A special screw with a tapered surface is inserted into the tapered hole. The screw is of quality 12.9 in order to allow the tightening torques indicated in the tables.

By tightening the screw to the tightening torque M_s indicated in the table, a pressure is generated on the shaft and hub. This pressure allows to transmit the torque Mt indicated in the table. The indicated M_t and F_{ax} values are valid for dry surfaces.

Applications with simultaneous M_t torque and F_{ax} axial force

In applications where M_t and F_{ax} are simultaneously present, the value of transmissible torque decreases. Below is the formula for calculating the total torque:

$$M_{tam} = \sqrt{M_t^2 + (F_{AXR} \cdot \frac{d}{2000})^2}$$

M_{tam} = total torque (Nm)
M_t = required torque (Nm)
F_{AXR} = required axial force (N)
d = shaft diameter (mm)

Axial displacement

When tightening the screws there is no hub to shaft axial displacement.

Surface finish

Normal surface finish is sufficient. The following values are recommended:

$R_a \leq 3{,}2\ \mu m$ - $R_t \leq 16\ \mu m$

Tolerances

The following tolerances are recommended:

shaft d h8 - hub seat D H8

Installation

Clean the inner and outer contact surfaces of the locking device, shaft and hub contact surfaces thoroughly. Remove any traces of oil from the contact surfaces of the components. Mount the shaft, hub and locking device in the desired position and then tighten the screw to the M_s torque shown in the table.

Removal

Loosen the clamping screw. No additional operations are necessary.

Reusing the locking device

When reusing the locking device, check all the surfaces are clean and show no obvious signs of deformation or seizing. Clean the surfaces of the locking device. Check the screw for deformation. Assemble the locking device in their original places.

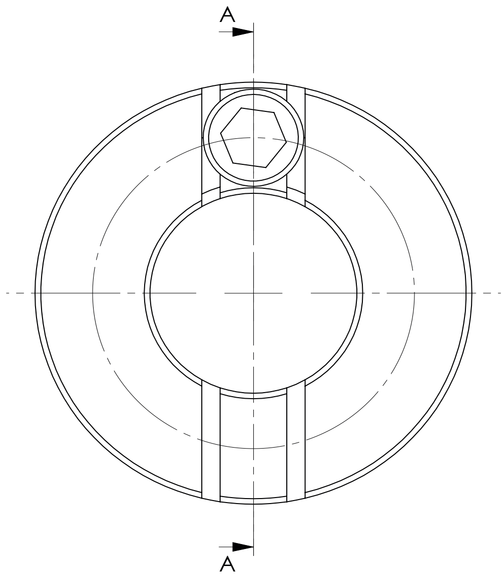
Benefits

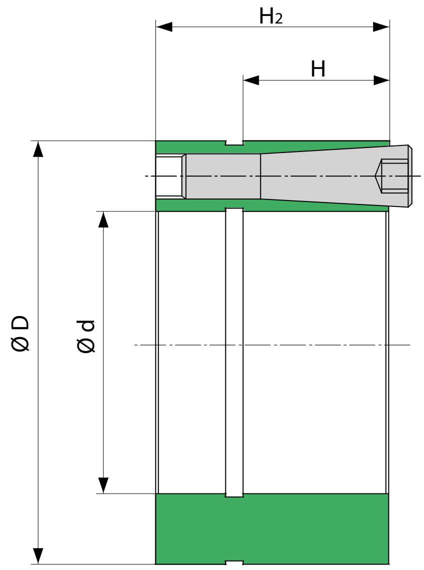
- Quick and easy assembly and disassembly
- Quick installation and removal
- Economical
- Compact dimensions

Recommended for the connection of:

- Timing pulleys
- Sprockets
- Levers
- Cams
- Gears

SIT-LOCK® 30 MONOLOCK standard series

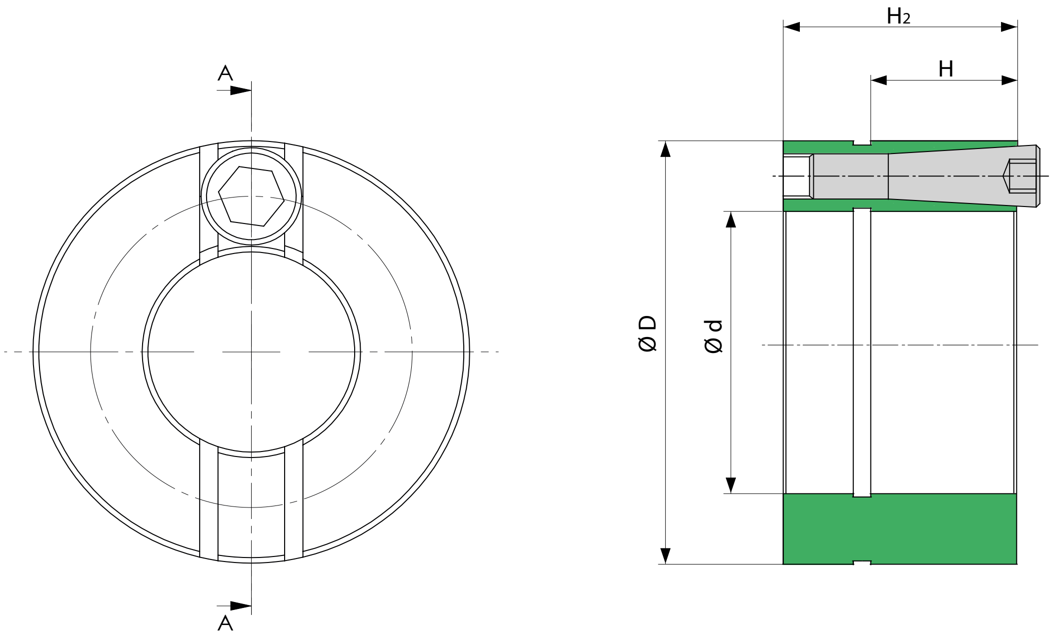




Dimensions [mm]			Clamping screws 12.9		Values with tolerances for shaft h8/hub H8	
d x D	H	H2	Type	M_s [Nm]	M_t [Nm]	F_{ax} [kN]
18 x 38	20	30	M6	18	60	6,65
19 x 39	20	30	M6	18	63	6,65
20 x 40	20	30	M6	18	66	6,65
22 x 42	20	30	M6	18	73	6,65
24 x 44	20	30	M6	18	80	6,65
25 x 45	20	30	M6	18	83	6,65
28 x 48	20	30	M6	18	93	6,65
30 x 50	20	30	M6	18	100	6,65
32 x 52	20	30	M6	18	106	6,65
35 x 55	20	30	M6	18	116	6,65
38 x 58	20	30	M6	18	125	6,65
40 x 60	20	30	M6	18	133	6,65
42 x 67	25	40	M8	42	260	12,30
45 x 70	25	40	M8	42	280	12,30
48 x 73	25	40	M8	42	295	12,30
50 x 75	25	40	M8	42	310	12,30
55 x 80	25	40	M8	42	340	12,30
60 x 85	25	40	M8	42	370	12,30
65 x 90	25	40	M8	42	400	12,30

M_s Screw tightening torque Nm
M_t Transmissible torque Nm
F_{ax} Transmissible axial force kN

SIT-LOCK® 40 MONOLOCK special series for high torques (on request)



Dimensions [mm]			Clamping screws 12.9		Values with tolerances for shaft h8/hub H8	
d x D	**H**	**H2**	**Type**	**M_s [Nm]**	**M_t [Nm]**	**F_{ax} [kN]**
18 x 43	25	40	M8	42	110	12,3
19 x 44	25	40	M8	42	115	12,3
20 x 45	25	40	M8	42	120	12,3
22 x 47	25	40	M8	42	130	12,3
24 x 49	25	40	M8	42	145	12,3
25 x 50	25	40	M8	42	150	12,3
28 x 53	25	40	M8	42	170	12,3
30 x 55	25	40	M8	42	180	12,3
32 x 57	25	40	M8	42	195	12,3
35 x 60	25	40	M8	42	210	12,3
38 x 63	25	40	M8	42	230	123
40 x 65	25	40	M8	42	240	12,3

M_s	Screw tightening torque	Nm
M_t	Transmissible torque	Nm
F_{ax}	Transmissible axial force	kN

Application diagram for internal locking devices

For any applications using SIT-LOCK® shaft-hub locking devices, our Technical Department is available for application research, Customer support and to provide the best technical and most affordable solutions.

Below is a diagram with data required for applications.

Application sketch

Shaft diameter in mm	
Shaft material and elasticity limit in N/mm²	
External hub diameter	
Hub material and elasticity limit in N/mm²	
Maximum torque in Nm	
Eventual axial forces in kN	
Eventual bending moment in Nm	
Eventual radial forces in kN	
Maximum number of revolutions per minute	
Operating temperature in °C	
Eventual shaft bore in mm	
Continuous or reciprocating motion	
Shaft tolerances	
Hub tolerance	
Shaft surface roughness in R_a	
Hub surface roughness in R_a	

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528.00 - 02/23 (1000 - 02/23)