

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to clutch failure, resulting in damage to other parts.

Safety and Guideline Signs

DANGER



Immediate and impending danger which can lead to severe physical injuries or to death.

DANGER



Danger of injury to people, in particular due to hot surfaces.

CAUTION



Danger of injury to people and damage to machines.

DANGER



Danger for people with heart pacemakers.



Please Observe!
Guidelines on important points.



According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

Safety Regulations

These Installation and Operational Instructions (I + O) are part of the clutch delivery. Please keep them handy and near to the ROBA[®]-contitorque at all times.



It is forbidden to start use of the product until you have ensured that all applicable EU directives and directives for the machine or system into which the product has been installed have been fulfilled. At the time these Installation and Operational Instructions go to print, the ROBA[®]-contitorque clutches accord with the known technical specifications and are operationally safe at the time of delivery. Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the ATEX directive.

DANGER



- if the ROBA[®]-contitorque clutches are modified.
- if the relevant standards for safety and / or installation conditions are ignored.

User-implemented Protective Measures



- Cover all moving parts to protect against seizure, dust or foreign body impact.
- The ROBA[®]-contitorque heats up during slipping operation. Do not touch the ROBA[®]-contitorque housing! => Danger of burns.
- The ROBA[®]-contitorque works using strong magnetic fields which can disturb or destroy electronic or mechanical devices. This is particularly the case for heart pacemakers. Data saved on credit cards, hard drives or disks can be deleted by the magnetic fields.



- In order to prevent such occurrences, please keep to the safety distance of more than 0,2 metres away from the ROBA[®]-contitorque.
- The ROBA[®]-contitorque must not be subjected to impact stresses, as the magnets break into slivers and can injure people.
- The ROBA[®]-contitorque must not come into contact with metal chips.
- If work with metal parts is carried out in the ROBA[®]-contitorque area, please be extremely careful, as the highly magnetic surface on the outer diameter of the magnetic part (2) attracts metal parts. This can lead to injuries to personnel and damage to the ROBA[®]-contitorque through crushing.
- The ROBA[®]-contitorque must not be dismantled. Due to the strong magnetic fields, clutch parts or other elements may be pulled towards the magnet, causing crush injuries.
- The ROBA[®]-contitorque cylindrical fitting surface on the hub (Item 1 / Fig. 3) may not be damaged or made dirty, as this will reduce the running smoothness or cause the torque adjustment to fail.

To prevent injury or damage, only professionals and specialists should work on the devices, following the relevant standards and directives. Please read the Installation and Operational Instructions carefully before installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!

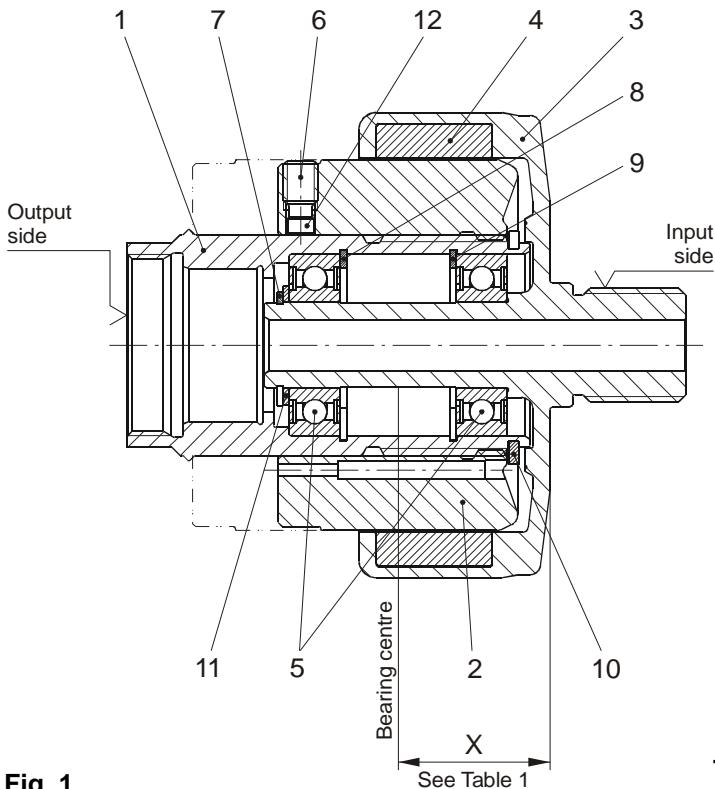


Fig. 1

Parts List (Only use mayr[®] original parts)

Item	Name
1	Hub
2	Magnetic part with permanent magnets
3	Flange
4	Hysteresis material
5	Roller bearing
6	Socket set screw
7	Locking ring 1
8	Locking ring 2
9	Locking ring 3 (only for Size 3)
10	Locking ring 4
11	Shim rings
12	Stainless steel plug

Table 1

Size/Type	Dimension X
3/151.400	26,25 mm
3/151.300	35,65 mm
4/151.300	43 mm

Construction and Function

The ROBA[®]-contitorque can be used as a load-holding overload clutch or brake in machine drives.

The ROBA[®]-contitorque input side consists of a flange (3) with hysteresis material (4). The drive elements are screwed together with the flange (3) threaded pin.

The clutch output side consists of a magnetic part with permanent magnets (2) and a hub (1).

The magnetic part (2) is screwed onto the hub (1) and secured using the clamping screw (6) and the stainless steel plugs (12).

The output elements are screwed into the hub (1) fine thread. The input and output sides are connected rotatably using the roller bearings (5). The roller bearings (5) are held axially with the locking ring 1 (7), the locking rings 2, 3 (Items 8, 9) and the shim rings (11).

The locking ring 4 (10) serves as an axial limit stop for the magnetic part (2).

In normal operation, the torque is transmitted contactlessly and synchronously via magnetic forces from the input side to the output side.

On overload, the clutch slips, meaning that the input and output sides move together at a relative speed, the so-called slipping speed. On overload, the clutch torque is equal to the set torque.

Torque Characteristics

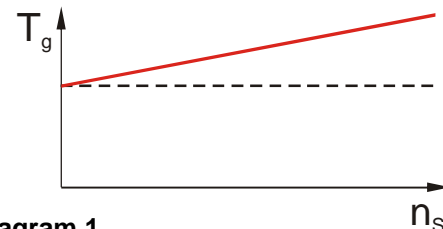


Diagram 1

The hysteresis material (4) is constantly re-magnetised and back again by the permanent magnets (2).

This causes performance loss, which must be released into the surrounding area in the form of heat.

Please contact the manufacturers for precise details.



If the relative speed n_s increases, the set clutch limit torque T_g also increases. However, at relative speeds $n_s < 100$ rpm, this effect can be neglected (see Diagram 1).



If the permitted performance loss is exceeded, the ROBA[®]-contitorque overloads:
=> Destruction of the permanent magnets
=> The clutch must be thermally dimensioned (see section Thermal Dimensioning, page 3).

State of Delivery

The ROBA[®]-contitorque Type 151. $\frac{3}{4}$ 00 is delivered manufacturer-assembled.
The clutch is set manufacturer-side to the maximum torque.
The flange (3) is equipped with a threaded pin M20 x 1,5.
The hub (1) has a fine thread (inside thread) M32 x 1,5.
All clutch components (inc. the roller bearing (5)), except the locking rings (7 - 9), the shim rings (11) and the magnetic material (2/4) are made of rustproof stainless steel.
The locking rings (7 - 9), the shim rings (11), the permanent magnets on the magnetic part (2) and the hysteresis material (4) are corrosion-protected.

Technical Data

Table 2

Size/Type	Limit torque T_g ¹⁾ for overload [Nm]	Permitted power loss $P_{v,perm}$ [W] ²⁾ at operating temperature ³⁾ [°C]		
		0-25 °C	26-35 °C	36-45 °C
3/151.400	1 - 2	24	20	16,5
3/151.300	0,5 - 3	26	22	18
4/151.300	0,5 - 6	34	29	23,5

Table 3

Size/Type	Maximum permitted mechanical speed n_{max} ⁴⁾ [rpm]	Max. permitted bearing load ⁵⁾	
		Radial F_{rad} [N]	Axial F_{ax} [N]
3/151.400	2000	223	149
3/151.300	2000	325	217
4/151.300	2000	390	260

Table 4

Size/Type	Mass moment of inertia [10 ⁻³ kgm ²]		Weight [kg]
	Input side (flange) J_{an}	Output side (hub) J_{ab}	
3/151.400	0,653	0,447	1,43
3/151.300	0,779	0,541	1,7
4/151.300	2,375	1,724	3,34

- 1) Please contact the manufacturer for the tolerance values for the maximum deviation of the set limit torque T_g from the scale values. At high relative speeds, the limit torque T_g increases due to eddy current effects. Please contact the manufacturer for the exact T_g values.
- 2) This results in a maximum surface temperature of c. 100°C on rotating flanges ($n=200$ rpm).
- 3) Operating temperature within a range of 0 – 45 °C
- 4) The maximum permitted speed in slipping operation must be calculated via thermal dimensioning (see below).
- 5) With reference to a nominal bearing service lifetime $L_{10h} = 20000$ h, the radial force F_{rad} level arm must be max. 70 mm away from the bearing centre (Fig. 1) and a bearing speed $n = 350$ rpm.

Clutch Thermal Dimensioning

$$P_V = \frac{T \cdot n_s \cdot V}{9,55} \leq P_{V,perm}$$

with $V = \frac{t_s}{t_{cycle}}$ and t_s ⁶⁾ $\left\{ \begin{array}{l} \leq 23 \text{ s for Size 3} \\ \leq 16 \text{ s for Size 4} \end{array} \right.$

For continuous slipping operation: $V = 1$

P_V = Clutch/brake power loss [W]
 $P_{V,perm}$ = permitted clutch/brake power loss Clutch/brake[W]
 T = Clutch/brake torque [Nm]
 n_s = Slipping speed [rpm]
 V = Reduction factor [-]
 t_s = Slipping period [s]
 t_{cycle} = Cycle period [s]

⁶⁾ Valid for maximum torque adjustment and a slipping speed of $n_s = 2000$ rpm. Please contact the manufacturer for other torques and slipping speed values for t_s .

The following Diagram shows the ROBA[®]-contitorque clutch and brake operating characteristic curve.

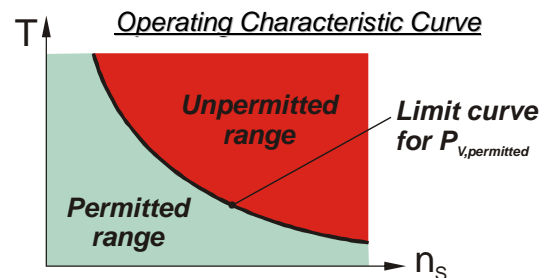


Diagram 2

The green area below the limit curve $P_{V,perm}$ shows the permitted range. If the operating point lies in the red area (above the limit curve), the clutch will be destroyed by overload.

Calculation Example:

Screwing on screw caps
(Application as clutch in an assembly cycle)

- Given:

$T = 2$ Nm (Screw-on torque screw cap)
 $n_s = 300$ rpm (Screw-on speed)
 $t_s = 3$ s (Slipping period)
 $t_{cycle} = 10$ s (Cycle period)

Operating temperature 30°C

- Required:

$P_V = ???$ (Clutch power loss)

$$V = \frac{t_s}{t_{zykl}} = \frac{3s}{10s} = 0,3$$

$$P_V = \frac{T \cdot n_s \cdot V}{9,55} = \frac{2Nm \cdot 300 \text{ min}^{-1} \cdot 0,3}{9,55} = 18,85 \text{ W}$$

- Selected:

ROBA[®]-contitorque 3/151.400 with $T_g = 1 - 2$ Nm and $P_{V,perm} = 20 \text{ W} > P_V = 18,85 \text{ W}$ (see above)



Fig. 2

Torque Adjustment

If no particular torque was specified in the order, the ROBA®-contitorque is set manufacturer-side to the maximum torque.



The torque set on the ROBA®-contitorque can be read using the graduation scale located on the magnetic part (2) (see Fig. 3).



The torque on the ROBA®-contitorque must only be adjusted step-wise (for the max. step width, see Table 5). After each step-wise adjustment, the clutch must slip, so that no pulsating torque occurs.

Should intermittent torque occur, the clutch must be set to maximum torque and the hub (1) must be turned by 2 turns relative to the flange (3).



Damage to or dirt on the cylindrical fitting surface (Fig. 3) will lead to reductions in running smoothness or torque adjustment failure.



The clamping screws (6) must not be dismantled, as otherwise the stainless steel plugs (12) could fall out of the threaded holes of the magnetic part (2) and may be lost.



Observe the max. tightening torque of 3 Nm for the clamping screws (6). Use a torque wrench.

Procedure for Torque Adjustment (see Figs. 3 and 4):

- 1) Turn the three clamping screws (6) back until the magnetic part (2) can be turned. This equals approximately half a thread turn.
- 2) The torque must only be adjusted step-wise. The maximum step width is defined in Table 5.
- 3) Secure the hub (1) against turning (using an open-ended wrench SW 36 for Size 3 or SW 41 for Size 4). Turn the magnetic part (2) using an open-ended wrench SW 10 or by hand slowly until either the maximum step width acc. Table 5 or the required torque value is reached. The open-ended wrenches are not included in delivery. **If the step width for torque adjustment is smaller than the maximum step width (see Table 5), then step 6) can be left out.**
- 4) Tighten the clamping screw (6) by hand.
- 5) Turn the hub (1) relative to the flange (3) by approximately two turns (= 720° rotation angle) ("slipping"), so that the magnetisation of the hysteresis material (4) reverses. In order to do this, secure the flange (3) by hand and turn either the hub (1) or the magnetic part (2) using an open-ended wrench (see step 3). If the ROBA-contitorque has already been installed into a system, then the hub (1) can also be turned mechanically.
- 6) Repeat the previous steps 1) to 5) until the required clutch torque is reached.
- 7) Tighten the clamping screw (6) (hexagon socket SW 3) using a torque wrench (not included in delivery) to a tightening torque $M_a = 3$ Nm.

Table 5

Size	Type	Torque adjustment range	Maximum step width
3	151.400	1 to 2 Nm	0,3 Nm
	151.300	0,5 to 2 Nm 2 to 3 Nm	0,3 Nm 0,5 Nm
4	151.300	0,5 to 2 Nm	0,4 Nm
		2 to 6 Nm	1 Nm

Example for ROBA®-contitorque 4/151.300

Torque adjustment from 3 Nm to 1,4 Nm:

(Brief description)

- a) Adjust the magnetic part (2) from the scale value 3 Nm to the scale value 2 Nm (max. step width 1 Nm) and let the clutch slip for approximately two turns.
- b) Adjust the magnetic part (2) from the scale value 2 Nm to the scale value 1,6 Nm (max. step width 0,4 Nm) and let the clutch slip for approximately two turns.
- c) Adjust the magnetic part (2) from the scale value 1,6 Nm to the scale value 1,4 Nm (max. step width 0,2 Nm) and let the clutch slip for approximately two turns.

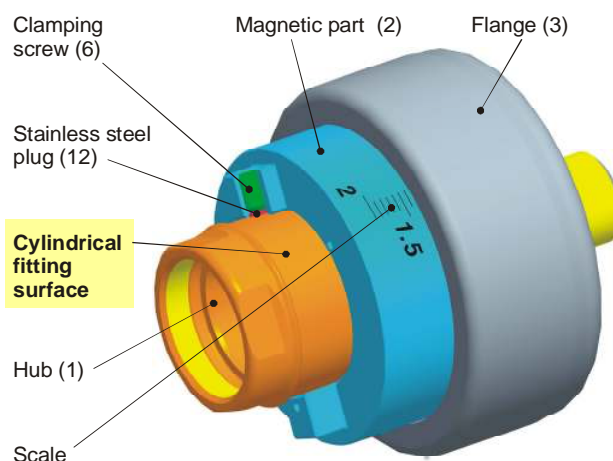


Fig. 3

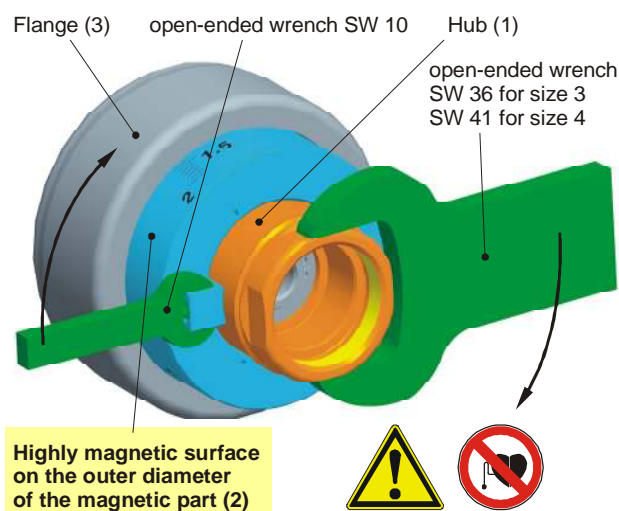


Fig. 4

Important Installation Guidelines

- The bores, threads and all mounting parts must be free of grease and oil.
- The inner and outer threads of the mounting parts must be burr and chip-free.



When installing the ROBA[®]-contitorque, please make sure that any heat produced can dissipate into the surrounding area.



The ROBA[®]-contitorque has a highly magnetic surface on the outer diameter of the magnetic part (2) (see Fig. 4 on page 4). In order to prevent injury to personnel and damage to the clutch, metal objects must not be brought near this surface.



The ROBA[®]-contitorque must not be removed!



The ROBA[®]-contitorque cylindrical fitting surface on the hub (Item 1 / Fig 3) must not be damaged or made dirty.

Installation

a) Attaching input elements (flange-side)

The drive elements are screwed together with the flange (3) threaded pin (remove the transport protection cap). To hold it up, we recommend using an oil filter strap wrench (not included in delivery) to be applied to the flange (3) outer diameter.

b) Attaching output elements (hub-side)

The output elements are screwed into the hub (1) fine thread (inside thread). To hold it up, we recommend using an open-ended wrench SW36 for Size 3 or SW41 for Size 4, which engages into the radial bores of the hub (1), as shown in Fig. 4 on page 4. The open-ended wrench is not included in delivery.

Cleaning

When cleaning the clutch, please make sure that no liquid enters the cylindrical gap between the magnetic part (2) and the flange (3) and the gap between the hub (1) and the roller bearing (5.) The clutch is installed vertically as a standard procedure (flange (3) faces upwards). When cleaning, e.g. using a high pressure cleaner, we recommend always holding the cleaning jet diagonally downwards onto the ROBA[®]-contitorque.

Maintenance

The torque transmission is contactless, meaning that no maintenance is necessary for the ROBA[®]-contitorque. The roller bearings (5) are covered and greased with a grease filling to last for the duration of their lifetime. Special maintenance work may be necessary, however, if the device is subject to large amounts of dirt or dust or is operating in extreme ambient conditions. In this case, please contact the manufacturers.

Disposal

All steel components:
Steel scrap

(Code No. 160117)