1 Important Notes

Safety and warning instructions

Always follow the safety and warning instructions in this publication!

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the drive and the environment.

Tips and useful information.

A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that you adhere to the information in the operating instructions. Consequently, read the operating instructions before operating the drive!

The operating instructions contain important information about servicing and should be kept close to the unit.

Waste disposal
Please follow the current instructions:

- Housing parts, gear wheels, shafts and anti-friction bearings of the gear units must be disposed of as steel scrap. The same applies to gray cast iron castings unless there are separate collection arrangements.
- Some worm gears are made of non-ferrous metals and must be disposed of accordingly.
- Collect waste oil and dispose of it correctly.

Live and moving parts of electrical motors can cause severe or fatal injuries.

Mounting, connection, startup, maintenance and repair only by trained personnel observing

- these operating instructions,
- all other operating instructions/wiring diagrams appertaining to the drive,
- currently valid national/regional regulations.
2 Description of Components

2.1 Drive with AR torque limiting coupling

Drives with torque limiting coupling consist of a standard gear unit and motor/variable speed gearmotor with an adapter installed between them. The torque limiting coupling is installed in this adapter. In gearmotors with a multi-stage gear unit, the torque limiting coupling may be located between the first and second gear unit.

The friction hub [7] at the motor end has cup springs [5] and a slotted round nut [6]. It drives the coupling plate and connecting pin at the output end by means of the friction ring pads [4] of the driving disc [3]. The slip torque is individually set in the factory according to the specific drive selection.

The speed of the coupling plate at the output end is picked up by an encoder [2] and passed on to a monitoring unit [8]. Speed monitors and slip monitors are used as monitoring units. These can be mounted in conjunction with contactors, fuse units, etc. on a standard 35 mm rail (to DIN EN 50022) in the switch cabinet or they can be attached using two holes.

**Speed monitor W**

The speed monitor [8] is used with constant-speed gearmotors and is connected to the encoder [2] in the adapter.
**Description of Components**

**Drive with AR torque limiting coupling**

**Slip monitor WS**

The slip monitor [8] is used with

- VARIBLOC® variable speed drives
- and speed-controlled motor with NV1 tachometer.

![Figure 2: Adapter with torque limiting coupling and WS slip monitor (VARIBLOC®)](51779axx)


Input 1 of the slip monitor is connected to the encoder of the adapter. Depending on the application, either the encoder of the VARIBLOC® variable speed gear unit or the speed-controlled motor is connected to input 2 of the slip monitor.

![Figure 3: Speed-controlled motor with NV1 tachometer.](51659AXX)

[1] Encoder NV

With speed-controlled motors with encoder, the slip monitor (input 2) is connected to the NV1 encoder [1].

The input and output speeds are compared to establish the slip in the torque limiting coupling. To achieve this, the slip monitor counts and compares the pulses coming from inputs 1 and 2. Slip is signaled when the difference between the pulses within a certain cycle time exceeds the specified sensitivity value.

**For information on the slip monitor, please refer to the separate operating instructions of the manufacturer.**
2.2 Drive with hydraulic centrifugal coupling

Hydraulic centrifugal couplings are fluid flow couplings which operate according to the Föttinger principle. They consist of two half ring shells on rotating bearings. The shells are equipped with blades and are mounted opposite one another with a narrow gap in between.

The torque applied is transmitted by the mass forces of the fluid flow. This fluid circulates within a closed circuit, between the pump impeller (primary side, 5) on the driving shaft (motor shaft) and the turbine wheel (secondary side, 2) on the driven shaft (gear unit input shaft).

A speed differential (slip) is required to maintain the integrity of the oil circuit and thus to transmit the torque. The hydraulic centrifugal coupling is unable to transmit torque if the slip is zero.

Consequently, ensure that the amount of heat generated by the power losses is less than or equal to the amount of heat which can be dissipated for the corresponding speed. The temperature mainly depends on the local operating conditions (frequency of starts, ambient temperature) and should not exceed 90 °C in continuous operation.
Description of Components

Drive with hydraulic centrifugal coupling AT

**Figure 5:** Design of a drive with hydraulic centrifugal coupling

1. Gear unit
2. Basic flange, complete
3. Backstop
4. Adapter flange
5. Hydraulic centrifugal coupling
6. Extended housing, complete
7. Motor

**Figure 6:** Design of a drive with hydraulic centrifugal coupling and brake BM(G)

1. Gear unit
2. Basic flange, complete
3. Brake bearing flange with installed brake, complete
4. Bearing flange
5. Hydraulic centrifugal coupling
6. Extended housing, complete
7. Motor
8. Terminal box
2.3 Drive on MK swing base for motors

Drive units on a swing base [2] are available especially for systems which are heavy starting. They consist of a helical-bevel gear unit, a hydraulic centrifugal coupling [5] and an electric motor [7]. All these components are mounted on a torsionally rigid swing base [2]. A protective cowl [4] and collecting pan [3] provide protection against contact with rotating parts and protect the environment and people against oil from the centrifugal coupling.

**Figure 7: Drive with hydraulic centrifugal coupling on MK swing base**

- [1] Gear unit
- [2] Swing base
- [3] Collecting pan
- [4] Protective cowl
- [5] Hydraulic centrifugal coupling
- [6] Thermal monitoring device (option)
- [7] Electric motor
- [8] Torque arm (optional)
- [9] Speed monitor (only in conjunction with thermal monitoring device BTS)

**Thermal monitoring device**

The hydraulic centrifugal coupling is equipped with fusible safety plugs that allow hydraulic oil to be evacuated in the event of excessive temperature (severe overload, blockage). Oil evacuation can be prevented by using a thermal monitoring device (mechanical or proximity-type).

Despite the monitoring device, the centrifugal coupling is still equipped with fusible safety plugs. However, these react significantly later than the monitoring device.
**Description of Components**

**Drive on MK swing base for motors**

### Mechanical thermal monitoring device MTS

A switch bolt [2] screwed into the centrifugal coupling [1] releases a spring-loaded switch pin if the temperature reaches an excessive level. This switch pin operates a switch [3] by means of which a warning signal can be output or the machine can be switched off.

![Figure 8: Mechanical thermal monitoring device MTS](image)

**Figure 8: Mechanical thermal monitoring device MTS**

- [G] Gear side
- [M] Motor side
- [1] Hydraulic centrifugal coupling
- [2] Switch bolt
- [3] Switch

### Proximity-type thermal monitoring device BTS

This monitoring device consists of three components:

- A switch bolt [2] that is screwed into the centrifugal coupling [1] and that changes its inductance value if the temperature reaches an excessive level.
- A switch [3] that detects the change in the inductance of the switch bolt [2] and
- a speed monitor [4] that evaluates the signals from the switch [5].

In turn, a warning signal can be output via the speed monitor [4] or the machine can be switched off.

![Figure 9: Proximity-type thermal monitoring device BTS](image)

**Figure 9: Proximity-type thermal monitoring device BTS**

- [G] Gear side
- [M] Motor side
- [1] Hydraulic centrifugal coupling
- [2] Switch bolt
- [3] Switch
- [4] Speed monitor
3 Installation

3.1 Installation of drive with AR torque limiting coupling

Installing the encoder

1. Remove the fan guard from the driving motor
2. Slowly turn the motor or adapter shaft extension until a trigger cam (= head of the machine screw) becomes visible in the threaded hole
3. Install in the encoder until contact is made with the trigger cam
4. Turn the encoder [1] back by two turns (corresponds to a clearance of 2 mm)

5. Use a lock nut to secure the encoder on the outside of the adapter
6. Check: slowly turn the motor or adapter shaft extension
   - Correct mounting: trigger cams do not touch the encoder
7. Install the fan guard

Figure 10: Encoder
Connecting monitoring devices

Do not route the feeder lines in multicore cables to avoid interference from parasitic voltages. Maximum line lengths 500 m with core cross section 1.5 mm². Use shielded cables if there is a risk of interference from power current or control cables and if the lines are longer than 10 m.

1. For version with speed monitor W
   Connect the encoder of the adapter to the speed monitor
   • using a 3-core cable
   • Encoder creates one (1) pulse/revolution

For version with slip monitor WS
   Make connections to the slip monitor as follows:
   • Encoder of the adapter to terminals 4, 5, 6 (input 1) using a three core cable
   • With VARIBLOC® / IG encoder to terminals 5, 6, 11 (input 2) using a three core cable
   • With speed-controlled motor / NV1 encoder to terminals 5, 6, 11 (input 2) using a three core cable
   • Encoder creates two (2) pulses/revolution

2. Connect the speed monitor or slip monitor according to the circuit diagram supplied with the relevant unit.
3.2 Installation of drive with hydraulic centrifugal coupling

**Lubricant supply to the bearings**

With adapter types AT311 - AT542, the drive unit must be stopped once a week to ensure that lubricant is supplied to the bearings of the hydraulic centrifugal coupling.

With swing bases MK../51 MK../61, the drive unit must be stopped once a month to ensure that lubricant is supplied to the bearings of the hydraulic centrifugal coupling.

**Connecting the brake**

The brake is released electrically. The brake is applied mechanically when the voltage is switched off.

Comply with the applicable regulations issued by the relevant employer’s liability insurance association regarding phase failure protection and the associated circuit/circuit modification!

1. Connect the brake according to the circuit diagram supplied with the brake.

2. If necessary, for version with manual brake release, screw in
   - hand lever (for manually disengaging brake)
   - or manual brake release screw (for fixing brake in the disengaged position)

**Connecting the brake control system**

The DC disc brake is powered from a brake rectifier/control unit with protective circuitry. This is either accommodated in the terminal box or must be installed in the switch cabinet (comply with the EMC instructions in the "AC Motors/AC Brake Motors" operating instructions).

1. Connect the brake control system according to the circuit diagram supplied with the brake

Check the line cross sections – see the "AC Motors/AC Brake Motors" operating instructions for the brake currents (10567908)
3.3 Installation of drive on MK swing base

**Foot mounting**
- The drive on a swing base may only be mounted or installed on a torsionally rigid support structure.
- Only clutch operation without transverse forces is permitted if the swing base is attached to the foot surfaces.

**Attachment of shaft-mounted version via torque arm**
Gear units can be used either with a solid shaft or as shaft-mounted versions. A torque arm is available as an option for shaft-mounted gear units.
1. Use the supplied retaining screws to mount the torque arm onto the foot mounting rails of the swing base
2. Secure the retaining screws to prevent them shaking loose
3. Do not exert strain on the swing base through the torque arm

**MTS/BTS operating distances**
If the drive unit is equipped with a thermal monitoring unit, then the operating distances between the switch bolt [1] and the switch [2] must be maintained when the parts are installed (see the following figure). The operating distance can be adjusted by moving the switch and the retaining bracket [3].

![Figure 11: MTS/BTS operating distances](image)

- [1] Switch bolt
- [2] Switch
- [3] Retaining bracket
Connecting the MTS switch

The switch can be used either as NO or NC contact.

1. Connect the switch as shown in the wiring diagram
2. Check the operating distance (see "Setting the MTS/BTS operating distances" on page 14)
Connecting BTS speed monitor

1. Install the speed monitor in a suitable switch cabinet and connect as shown in the wiring diagram.

2. The total resistance of an extension cable between the switch and the speed monitor must be $< 5 \, \Omega$. Use a shielded cable if the distances are greater.

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**Figure 13: Wiring diagram for BTS/MTS speed monitor**

- [1] GND for trigger input
- [2] Trigger input for startup bypass
- [3] Supply voltage for trigger input, for triggering by switching on the supply voltage. Jumper between terminals 3 and 2
- [4] Supply voltage DC +24 V
- [5] GND supply voltage
- [6] Do not connect!
- [7] Do not connect!
- [8] Namur input L-
- [9] Namur input L+
- [10] Output relay Normally open contact NO
- [11] Output relay Normally closed contact NC
- [12] Output relay Root COM
- [13] Do not connect!
- [14] Do not connect!
- [15] Do not connect!
- [16] Supply voltage, AC 230 V, L1
- [17] Supply voltage, AC 115 V, L1
- [18] Supply voltage, N

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4 Startup

Before startup, make sure that
- all connections have been made properly,
- the drive is not blocked,
- there are no other sources of danger present.
- If the drive is operated with star-delta connection, the switching time setting from star to delta is as short as possible (2 to 5 s)

With hydraulic centrifugal coupling
- the fill volume is correct after lengthy storage (the necessary oil volume is indicated on the coupling)

With swing base
- the protective cowl is installed correctly

4.1 Startup of a drive with AR torque limiting coupling

Setting the speed monitor W

<table>
<thead>
<tr>
<th>Settings</th>
<th>Description</th>
<th>Setting measures / values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching speed (1)</td>
<td>Allows the desired value to be set accurately</td>
<td>Rough setting with step switch (1, 10, 100)</td>
</tr>
<tr>
<td></td>
<td>Note: If the drive stalls, you can achieve the shortest possible slip times by setting the switching speed slightly below the rated speed.</td>
<td>Fine tuning with potentiometer (scale 5...50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Example: Step switch “100”, potentiometer setting “13”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switching speed = 100 x 13 = 1300 pulses/min</td>
</tr>
<tr>
<td>Switching function II (2)</td>
<td>Defines the properties of monitoring function II = speed below set speed (LED lights up when relay has picked up)</td>
<td>Set function II according to circuit diagram 08 115 _2</td>
</tr>
<tr>
<td>Starting lag (3)</td>
<td>Fault messages can be prevented when the motor is starting by means of an adjustable delay time.</td>
<td></td>
</tr>
<tr>
<td>Hysteresis (4)</td>
<td>Difference between the switch-on and switch-off point of the relay. Monitoring for exceeding the lower speed limit: Potentiometer setting “5 %”</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 14: Speed monitor](image)
1. Set the speed monitor according to the table on page 17

2. Functional check
   Set the switching speed on the potentiometer in monitoring electronics:
   • Value > rated speed
   • Correct: relay in speed monitor picks up

3. Indications:
   • LED1 lights up when the relay has picked up
   • LED2 signals input pulses
   • LED3 displays that the operating voltage is correct

### Relay position

<table>
<thead>
<tr>
<th>Function</th>
<th>Relay position at speed</th>
<th>In normal mode with startup bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>upper limit violation</td>
<td>lower limit violation</td>
</tr>
<tr>
<td>I</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>II</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>III</td>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
<tr>
<td>IV</td>
<td><img src="image7" alt="Diagram" /></td>
<td><img src="image8" alt="Diagram" /></td>
</tr>
</tbody>
</table>
### 4.2 Setting slip monitor parameters

- The following information only applies to the slip monitor type ifm DS2005, Monitor/FS-2
- If the supplied slip monitor differs from this type, then only the operating instructions of the supplied unit is relevant.
- The specified parameters are recommendations for safe operation. It might be necessary to adjust the parameters depending on the type and control of the machine.
- The operating instructions of the slip monitor must always be observed!

Below mentioned parameters allow for rapidly switching off the unit with minimum slip. If slip is intended temporarily during normal operation of the machine, for instance with short torque impulses caused by load fluctuations, then the parameters must be modified accordingly.

The x in some parameter designations stands as placeholder for sensor input 1 or 2.
- The proximity switch of the torque limiting coupling adapter is connected to input 1.
- The proximity switch/AC tachogenerator of the variable speed gear unit or frequency-controlled motor is connected to input 2.

The following information only applies to the slip monitor type ifm DS2005, Monitor/FS-2. If the supplied slip monitor differs from this type, then only the operating instructions of the supplied unit is relevant.

The specified parameters are recommendations for safe operation. It might be necessary to adjust the parameters depending on the type and control of the machine.

The x in some parameter designations stands as placeholder for sensor input 1 or 2.

The proximity switch/AC tachogenerator of the variable speed gear unit or frequency-controlled motor is connected to input 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning</th>
<th>Value</th>
<th>Factory setting</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOx</td>
<td>Switching function of outputs 1 and 2</td>
<td>F4</td>
<td>Yes</td>
<td>Relay has picked up in normal operation and during startup bypass.</td>
</tr>
<tr>
<td>CTx</td>
<td>Cycle time</td>
<td>0.0 (s)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>NCx</td>
<td>Number of trigger cams</td>
<td>NC1: 2, NC2: 2</td>
<td>No</td>
<td>Setting for operating the torque limiting coupling adapter with VARIBLOC® variable speed gear unit.</td>
</tr>
<tr>
<td>STP</td>
<td>Startup bypass time</td>
<td>3.0 (s)</td>
<td>No</td>
<td>The output relay remains picked up during this time to allow slip during the startup phase of a machine without switching off. Under favorable conditions, i.e. with low external mass moments of inertia and low drive utilization in normal operation, this time can be reduced or even set to 0.0 s. The adequate time can be found out through trials under rated load.</td>
</tr>
<tr>
<td>SOP</td>
<td>Memory function of the outputs</td>
<td>1</td>
<td>No</td>
<td>With this setting, the outputs are only reset by a reset on the front side of the speed monitor after successful switching off. It might be necessary to adjust this function to the machine control or processes.</td>
</tr>
<tr>
<td>OPP</td>
<td>Simultaneous switching of outputs 1 and 2</td>
<td>1</td>
<td>No</td>
<td>Both outputs drop if slip occurs</td>
</tr>
<tr>
<td>DIM</td>
<td>Display format</td>
<td>0</td>
<td>Yes</td>
<td>Display in revolutions/minute</td>
</tr>
<tr>
<td>VER</td>
<td>Software version</td>
<td>-</td>
<td>-</td>
<td>The installed software version can be viewed</td>
</tr>
<tr>
<td>SPx</td>
<td>Max. number of differential pulses</td>
<td>1</td>
<td>Yes</td>
<td>Slip is signaled after a differential pulse</td>
</tr>
<tr>
<td>DTx</td>
<td>Delay time of the outputs</td>
<td>0.0 (s)</td>
<td>Yes</td>
<td>No switch-off delay</td>
</tr>
<tr>
<td>FTx</td>
<td>Fleeting time</td>
<td>0.0 (s)</td>
<td>Yes</td>
<td>Fleeting time not active</td>
</tr>
</tbody>
</table>
4.3 Startup of drive on MK swing base

Setting the BTS speed monitor

Display on evaluation unit

- Operating mode
  - Temperature ok
  - Normal operating condition

- Overheating
  - Speed of switch element < 60 min⁻¹

- Start bypass active
  - No temperature monitoring!

- Setting mode
  - Setting of startup bypass interval

- Software version number

Setting the BTS speed monitor

1. Check the cabling according to the wiring diagram (see Sec. Installation "Connecting the BTS speed monitor"). Take particular care to check that the supply voltage is connected correctly.

2. Apply the supply voltage to the evaluation unit, initially without starting up the hydraulic centrifugal coupling. The unit displays the following during the time interval when the startup bypass is active: [Temperature ok]. The output relay has picked up and the LED on the front panel lights up.

3. After the startup bypass time has elapsed, the unit displays [Overheating]. The output relay drops and the LED on the front panel goes out.

4. Set the startup bypass time if necessary (see “Setting the startup bypass time”)

Overheating of the hydraulic centrifugal coupling is not picked up during the startup bypass time!
5. A jumper is installed between terminals 2 and 3 of the evaluation unit (default factory setting). Remove this jumper for external triggering.

6. Start BTS with a hydraulic centrifugal coupling in the normal way. The speed of the hydraulic centrifugal coupling with the switch element must be significantly greater than 60 min⁻¹ after the startup bypass time has elapsed.

   The evaluation unit displays [LED] if there is no overheating. The output relay remains picked up and the LED on the front panel is lit.

7. Switch off the drive with the hydraulic centrifugal coupling, leaving the BTS ready to operate. If the speed of the hydraulic centrifugal coupling with the switch element is slower than 60 min⁻¹, then the evaluation unit displays [LED]. The output relay drops and the LED on the front panel goes out.

8. Regular operation can be started.

**Setting the startup bypass time**

Make the setting using the buttons on the front panel (see the following figure).

- The factory setting of the startup bypass time is 10 s.
- The startup bypass time starts when the startup bypass is triggered.
- Overheating of the hydraulic centrifugal coupling is not picked up during the startup bypass time!
- The speed of the hydraulic centrifugal coupling with the switch element should be significantly greater than 60 min⁻¹ after the startup bypass time has elapsed!

![Figure 15: Setting the startup bypass time](image)
5 Inspection and Maintenance

5.1 Inspection and maintenance intervals

<table>
<thead>
<tr>
<th>Unit / unit part</th>
<th>Interval</th>
<th>What to do?</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic centrifu-gal coupling</td>
<td>Every 500 hours of operation, at the latest after 3 months</td>
<td>Inspect the drive for irregularities. Replace any worn flexible elements on the connection coupling.</td>
<td>See &quot;Replacing the flexible elements and the motor&quot; on page 30</td>
</tr>
<tr>
<td></td>
<td>Every 15,000 hours of operation</td>
<td>Inspect the oil, change if necessary</td>
<td>See &quot;Inspecting/changing the oil&quot; on page 27</td>
</tr>
<tr>
<td>Adapter with centrifugal couplings and brake BM(G)</td>
<td>The periods of wear are affected by many factors and may be short. Calculate the required inspection/maintenance intervals in accordance with the project planning documents.</td>
<td>Inspect the brake • Working air gap • Brake disc Extract the abraded matter Inspect the switch elements in the switch cabinet and change if necessary (e.g. in case of burn-out)</td>
<td>See &quot;Removing the hydraulic centrifugal coupling&quot; on page 28 and the &quot;AC Motors/AC Brake Motors&quot; operating instructions</td>
</tr>
<tr>
<td>Adapter with torque limiting coupling</td>
<td>At least every 3000 hours of operation</td>
<td>Inspect the friction ring pads and cup springs, change if necessary, adjust the slip torque</td>
<td>See &quot;Inspection/maintenance of the drive with AR torque limiting coupling&quot; on page 23</td>
</tr>
</tbody>
</table>

**Required tools**

- Standard tool
- Hook spanner
- Hydraulic press
- Puller/extractor (threaded spindle with same diameter as gear unit input shaft)
- Torque wrench
5.2 Inspection/maintenance of drive with AR torque limiting coupling

Inspecting / changing the friction ring pads, adjusting the slip torque

It is only possible to check and adjust the slip torque accurately by using a torque wrench with an appropriate connection piece. For the setting of values, see the table on page 25.

1. Disconnect the drive from voltage supply safeguarding it against unintentional power-up

2. Disconnect the motor/variable speed gearmotor from the adapter

3. Unscrew the safety screw [1], pull the friction hub off the shaft extension (see Figure 16)

4. Clamp the friction hub [8] in a vise

5. **With AR 71–115:** Unscrew the multi-tang washer [2] (see Figure 17)
   **With AR 132–195:** Unscrew the clamping screw on the slotted round nut [7] (see Figure 16)
6. Unscrew the slotted round nut slightly until you can easily adjust the torque limiting coupling by hand

7. **With AR 71–115:** Mark the position of the slotted round nut [3] (see Figure 17)
   **With AR 132–195:** Mark the driving disc [4] (see Figure 17)

8. Unscrew and remove the slotted round nut, remove the cup springs [6] (see Figure 16)

   **Note:** Note the sequence of the cup springs!

9. Inspect the friction ring pads [5]: replace them if they are worn

   **Note:** Do not allow any lubricants to get onto the friction surface – this will irreparably damage the surface!

10. Inspect the cup springs [6]: replace them if they are burned out

11. Reinstall the cup springs [6] (in the same sequence as before)

12. Screw on the slotted round nut up to the mark

13. Measuring/setting

   **with a torque wrench**
   - Connect the torque wrench to the hole in the hub
   - Measure the torque (in both directions), if necessary readjust using the slotted round nut

   **Rough setting without torque wrench**
   - Use the hook spanner to set the torque limiting coupling (see Figure 17)
   - Slip torque according to value “Z” (see the following table), calculated from the mark

   **With AR 71–115:** = Number of tangs on the multi-tang washer
   **With AR 132–195:** = Number of slots in the slotted round nut

14. Secure the slotted round nut using the multi-tang washer or clamping screw

15. Assemble the drive in reverse order
Inspection/maintenance of drive with AR torque limiting coupling

**Inspection and Maintenance**

**Slip torques AR**

<table>
<thead>
<tr>
<th>Adapter type</th>
<th>Cup springs Thickness ( \mu \text{m} )</th>
<th>Sequences Fig.</th>
<th>Setting range ( \text{Nm} )</th>
<th>No. of tangs or slots “Z”</th>
<th>Slip torque ( M_{R} ) in ( \text{Nm} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR71</td>
<td>4 0.6</td>
<td>1</td>
<td>1.0-2.0</td>
<td>1.0 1.4 1.6 1.8 2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.1-4.0</td>
<td>2.1</td>
<td>2.4 2.6 3.2 3.4 3.8 4.0</td>
<td></td>
</tr>
<tr>
<td>AR80</td>
<td>4 0.6</td>
<td>1</td>
<td>1.0-2.0</td>
<td>1.0 1.4 1.6 2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.1-4.0</td>
<td>2.1</td>
<td>2.4 2.6 3.2 3.4 3.8 4.0</td>
<td></td>
</tr>
<tr>
<td>AR85</td>
<td>3 0.9</td>
<td>2</td>
<td>6.1-16</td>
<td>6.0</td>
<td>8.0 9.0 10 11 12 13 14 15 16</td>
</tr>
<tr>
<td>AR90</td>
<td>4 0.6</td>
<td>2</td>
<td>2.0-4.0</td>
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<td>200 280 300</td>
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</table>

1. For sequence of cup springs, refer to the legend below

Legend

- Fig.1 Double alternating sequence ()
- Fig.2 Alternating sequence ()
- Fig.3 Aligned sequence ))

Changing the encoder on the adapter

The switching output of the encoder does not have any contacts, so its service life is not limited by the starting frequency. Proceed as follows if it has to be changed nevertheless:

1. Disconnect the drive from voltage supply safeguarding it against unintentional power-up
2. Remove the fan guard from the driving motor
3. Remove the encoder connection
4. Unscrew the lock nut on the encoder and remove the old encoder
5. Install the encoder (see Sec. Installation “Installing the encoder”)
6. Connect the encoder to the speed/slip monitor
7. Install the fan guard
5.3 **Inspection/maintenance of drive with hydraulic centrifugal coupling**

**Tightening torques**

*Figure 18: Position of plugs on the hydraulic centrifugal coupling*

1. Filler plug
2. Fusible safety plug
3. Nozzle plug
4. Retaining screw

The hydraulic centrifugal coupling is equipped with fusible safety plugs, filler plugs, nozzle plugs and retaining screws. These prevent overheating and make sure the coupling is filled correctly. During maintenance, it is important to adhere to the tightening torques specified in the table below precisely to ensure the coupling does not leak.

<table>
<thead>
<tr>
<th>Adapter type</th>
<th>Fusible safety plug</th>
<th>Filler plug</th>
<th>Nozzle plug</th>
<th>Retaining screw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thread size</td>
<td>Response temp. [°C]/color</td>
<td>Tightening torque [Nm]</td>
<td>Screw size</td>
</tr>
<tr>
<td>AT311 - 312</td>
<td>M10</td>
<td>(110 / yellow)</td>
<td>22</td>
<td>M10</td>
</tr>
<tr>
<td>AT321 - 522</td>
<td>M12x1.5</td>
<td>(140 / red)</td>
<td>31</td>
<td>M12x1.5</td>
</tr>
<tr>
<td>AT541 - 542</td>
<td>M14x1.5</td>
<td>(160 / green)</td>
<td>39</td>
<td>M14x1.5</td>
</tr>
<tr>
<td>MK.../51</td>
<td>M18x1.5</td>
<td></td>
<td>144</td>
<td>M24x1.5</td>
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<tr>
<td>MK.../61</td>
<td>M24x1.5</td>
<td></td>
<td>144</td>
<td>M24x1.5</td>
</tr>
</tbody>
</table>

1. Fusible safety plugs for the temperatures in brackets are available on request

2. Standard in conjunction with thermal switching device MTS/BTS
Inspection and Maintenance
Inspection/maintenance of drive with hydraulic centrifugal coupling

**Inspecting / changing the oil**
Only use hydraulic oils in accordance with table 6. Do not mix lubricants! The required oil volume is indicated on the coupling.

<table>
<thead>
<tr>
<th>Requirements for hydraulic oil</th>
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</thead>
<tbody>
<tr>
<td>Viscosity</td>
</tr>
<tr>
<td>Pour point</td>
</tr>
<tr>
<td>Starting viscosity</td>
</tr>
<tr>
<td>Flash point</td>
</tr>
<tr>
<td>Raffinate</td>
</tr>
<tr>
<td>Compatibility</td>
</tr>
</tbody>
</table>

1. **Disconnect the drive from voltage supply safeguarding it against unintentional power-up. Wait until the coupling has cooled off – risk of burns!**

2. Remove the cover, place a collecting vessel underneath
3. Remove the filler plug and fusible safety plug (air pressure equalization)
4. Drain some used oil and check it
   • If it is OK, reinstall the filler plug and fusible safety plug, put the cover back on
   • If it is contaminated, drain all the oil
   **In addition, for drives on a swing base:**
   • The hydraulic centrifugal coupling used here has an additional deceleration chamber with an oil space which must be drained separately:
   • Remove the nozzle plug and drain the oil from the deceleration chamber
   • Tighten the nozzle plug to the appropriate tightening torque (see table on previous page)
   • Drain the coupling once again through the filler and fusible safety plugs
5. If the coupling is installed horizontally
   • Turn the coupling until the opening for the filler plug is in vertical position
   • Fill with new oil
   • Screw in the filler plug
6. If the coupling is installed vertically
   • Screw in the filler plug
   • Fill with new oil through the opening for the fusible safety plug
7. Screw in the fusible safety plug and put the cover back on

**Changing defective fuses**
The fuse trips after a corresponding time interval if a malfunction occurs on the machine leading to inadmissible heating of the centrifugal coupling. This causes the coupling housing to be drained. The drive is thus protected against damage. Only use genuine fuses in accordance with the table on the previous page.

1. Sec. "Inspecting/changing the oil" on previous pages, points 1 and 2
2. Remove the filler plug and defective fusible safety plug
3. Drain all the remaining oil
4. Sec. "Inspecting/changing the oil"
5. Screw in a new fusible safety plug and put the cover back on, adhere to the tightening torques
Removing the hydraulic centrifugal coupling

Never use the housing to pull the coupling off or on—this will damage the material or lead to leakage!

1. Disconnect the drive from voltage supply safeguarding it against unintentional power-up
2. Disconnect the driving motor at the flange
3. Remove the holding screw and holding disk
4. Pull off the coupling
   • with the puller/extractor
   • using the coupling hub

AT311 - AT522

![Figure 19: Pulling off the centrifugal coupling](image)

AT541 - AT542, MK51 - MK61

![Figure 20: Pulling off the centrifugal coupling](image)

[1] Gear unit input shaft
[3] Pull-off disk (holding disk)
[4] Circlip
[5] Threaded spindle of puller
5. Inspect/maintain the brake if installed
   - See the "AC Motors/AC Brake Motors" operating instructions
6. Install:
   - Coupling, holding disk, holding screw, driving motor

![Figure 21: Pulling on the hydraulic centrifugal coupling](image)

[4] Holding disk
5.4 Inspection/maintenance of drive on MK swing base

Changing flexible elements and changing motor

1. Disconnect the drive from voltage supply safeguarding it against unintentional power-up. Wait until the coupling has cooled off - risk of burns!
2. Remove the cover and, if necessary, the collecting pan
3. Remove the driving motor
4. Inspect the oil and change if necessary (see "Inspecting/changing the oil")
5. Check the flexible elements of the hydraulic centrifugal coupling and replace them as a set if required
6. If changing the motor:
   • Pull the coupling half from the motor end off the motor shaft and pull it onto the new motor.
   • Mounting is easier if you first apply lubricant to the coupling half or heat it up briefly (to 80 - 100 °C).
7. Mounting the driving motor:
   • Bring the hydraulic centrifugal coupling and the flexible connection coupling into mesh and align them roughly.
   • The gap between the two coupling halves should be about 4 mm.
8. Use a dial indicator to line up the driving motor accurately:
   • The deflection on the dial indicator must not exceed 0.2 mm when measuring on the circumference at the indicated points.
   • Misalignment may lead to bearing damage on the hydraulic centrifugal coupling.
9. Tighten the retaining screws on the driving motor and check its alignment
10. Mount the collecting pan; check the operating distance (see Sec. "Setting the operating distances MTS/BTS") if there is an MTS/BTS thermal switching device.

Figure 22: Use a dial indicator to line up the driving motor accurately:

Revising the MTS switch bolt

Replace the switch bolt in the hydraulic centrifugal coupling if the thermal monitoring device MTS has tripped.

1. Disconnect the drive from voltage supply safeguarding it against unintentional power-up. Wait until the coupling has cooled off - risk of burns!
2. Remove the cover
3. Check the oil and change if necessary (see "Inspecting/changing the oil")
4. Turn the coupling until the switch bolt is vertical
5. Remove the tripped switch bolt
6. Install a new switch bolt and tighten to the tightening torque for the fusible safety plug (see "Tightening torques")
7. Reactivate the switch, line up the switch tab with the switch bolt until the switch tab clips in
8. Check the operating distance (see "Setting the MTS/BTS operating distances")
9. Install the cover
### 6.1 Malfunction of drive with AR torque limiting coupling

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No display</td>
<td>Encoder on adapter is defective</td>
<td>Measure input pulses, if necessary:</td>
</tr>
<tr>
<td></td>
<td>In VARIBLOC® with slip monitor:</td>
<td>• Change encoder of the adapter, see Sec. Inspection/Maintenance &quot;Changing the pulse encoder of the</td>
</tr>
<tr>
<td></td>
<td>• IG encoder defective</td>
<td>• adapter&quot;</td>
</tr>
<tr>
<td></td>
<td>• Operating distance of proximity switch too long</td>
<td>• Changing the IG encoder / NV1 encoder</td>
</tr>
<tr>
<td></td>
<td>• With speed-controlled motor:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NV1 encoder defective</td>
<td></td>
</tr>
<tr>
<td>Slip torque is not reached</td>
<td>Cup springs burned out or installed incorrectly after maintenance</td>
<td>Inspect cup springs, see Sec. Inspection/Maintenance &quot;Inspecting/replacing friction ring pads, adjusting the slip torque&quot;</td>
</tr>
</tbody>
</table>

### 6.2 Malfunction of drive with hydraulic centrifugal coupling

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive does not start up</td>
<td>Too little or too much oil</td>
<td>Check fill and correct see &quot;Inspecting/changing the oil&quot;</td>
</tr>
<tr>
<td>Coupling gets too hot</td>
<td>Excessive coupling slip due to overload</td>
<td>Check motor current, reduce load if necessary</td>
</tr>
<tr>
<td></td>
<td>Too little or too much oil</td>
<td>Check fill and correct see &quot;Inspecting/changing the oil&quot;</td>
</tr>
<tr>
<td>Oil leaking</td>
<td>Fuse defective due to overheating</td>
<td>Check fuses and replace if necessary see Sec. Inspection/Maintenance &quot;Replacing defective fuses&quot;, eliminate cause</td>
</tr>
<tr>
<td></td>
<td>Coupling leaking</td>
<td>Tighten bolts, note tightening torques see Sec. Inspection and Maintenance &quot;Tightening torques&quot;</td>
</tr>
<tr>
<td>Severe wear on flexible elements of hydraulic centrifugal coupling</td>
<td>Misalignment between motor and hydraulic centrifugal coupling when mounting, or due to distortion during installation.</td>
<td>Check alignment. Install the drive without distortion.</td>
</tr>
</tbody>
</table>
## 6.3 Malfunction of drive on MK swing base

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal monitoring device MTS trips</td>
<td>Overheating of coupling due to overload</td>
<td>Clarify what is leading to overload. Reduce load. Replace the switch bolt, see Sec. Inspection/Maintenance &quot;Replacing the MTS switch bolt&quot;</td>
</tr>
<tr>
<td>Thermal monitoring device BTS trips</td>
<td>Overheating of coupling due to overload</td>
<td>Clarify what is leading to overload, reduce load. Let coupling cool off.</td>
</tr>
<tr>
<td></td>
<td>Overheating of coupling due to overload</td>
<td>Increase startup bypass time if necessary (speed of coupling &gt; 60 min⁻¹ after startup bypass time has elapsed)</td>
</tr>
<tr>
<td></td>
<td>Switch element defective</td>
<td>Check switch element, replace if necessary</td>
</tr>
<tr>
<td></td>
<td>Operating distance between switch and switch element too large</td>
<td>Set the MTS/BTS operating distance, see &quot;Setting MTS/BTS operating distances&quot;</td>
</tr>
<tr>
<td>No display on BTS speed monitor</td>
<td>No supply voltage</td>
<td>Connect supply voltage according to wiring diagram</td>
</tr>
<tr>
<td></td>
<td>Speed monitor defective</td>
<td>Replace speed monitor</td>
</tr>
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</table>
The following amendments and changes were made to the previous edition of the AR/AT Centrifugal & Torque Limiting Couplings, MK Swing Base operating instructions (publication number 09186018, edition 07/2000):

**General**
- The slip monitor was changed.

**Description of components**
- The slip monitor description was revised. The speed-controlled motor with NV 1 tachometer was added.

**Installation**
- Installation of drive with AR torque limiting coupling was revised.

**Startup**
- Setting the slip monitor parameters was revised.

**Inspection and maintenance**
- The AR slip torques table was updated.
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# Address List

## Germany

**Headquarters**
- **Production**
- **Sales**
- **Service**

**Bruchsal**
- **Address:** SEW-EURODRIVE GmbH & Co KG
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- **Contact Information:**
  - Tel. +49 7251 75-0
  - Fax +49 7251 75-1970
  - http://www.sew-eurodrive.de
  - sew@sew-eurodrive.de
  - Service Electronics:
    - Tel. +49 171 7210791
  - Service Gear Units and Motors:
    - Tel. +49 172 7601377

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**Garbsen** (near Hannover)
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  - Fax +49 89 909552-50
  - scm-kirchheim@sew-eurodrive.de

**Langenfeld** (near Düsseldorf)
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  - scm-langenfeld@sew-eurodrive.de

**Meerane** (near Zwickau)
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Additional addresses for service in Germany provided on request!

## France

**Production**
- **Sales**
- **Service**

**Haguenau**
- **Address:** SEW-USOCOME
  - 48-54, route de Soufflenheim
  - B. P. 185
  - F-67506 Haguenau Cedex
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  - Tel. +33 3 88 73 67 00
  - Fax +33 3 88 73 66 00
  - http://www.usocome.com
  - sew@usocome.com

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- **Service**

**Bordeaux**
- **Address:** SEW-USOCOME
  - Parc d’activités de Magellan
  - 62, avenue de Magellan - B. P. 182
  - F-33607 Pessac Cedex
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  - Tel. +33 5 57 26 39 00
  - Fax +33 5 57 26 39 09

**Lyon**
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  - Parc d’Affaires Roosevelt
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  - F-69120 Vaulx en Velin
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  - Tel. +33 4 72 15 37 00
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**Paris**
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  - 2, rue Denis Papin
  - F-77390 Verneuil l’Etang
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  - Tel. +33 1 64 42 40 80
  - Fax +33 1 64 42 40 88

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## Algeria

**Sales**
- **Service**

**Alger**
- **Address:** Réducom
  - 16, rue des Frères Zaghnoun
  - Bellevue EI-Harrach
  - 16200 Alger
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  - Tel. +213 21 8222-84
  - Fax +213 21 8222-84

## Argentina

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- **Sales**
- **Service**

**Buenos Aires**
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  - Centro Industrial Garin, Lote 35
  - Ruta Panamericana Km 37.5
  - 1619 Garín
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  - Fax +54 3327 4572-21
  - sewar@sew-eurodrive.com.ar

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**Assembly**
- **Sales**
- **Service**

**Melbourne**
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  - 27 Beverage Drive
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  - Fax +61 3 9933-1003
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  - New South Wales, 2164
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  - Tel. +61 2 9725-9900
  - Fax +61 2 9725-9905
  - enquires@sew-eurodrive.com.au
## Address List

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<tr>
<th>Country</th>
<th>Assembly</th>
<th>Sales</th>
<th>Service</th>
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<tr>
<td><strong>Austria</strong></td>
<td>Wien</td>
<td>SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien</td>
<td>Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 <a href="http://sew-eurodrive.at">http://sew-eurodrive.at</a> <a href="mailto:sew@sew-eurodrive.at">sew@sew-eurodrive.at</a></td>
</tr>
<tr>
<td><strong>Belgium</strong></td>
<td>Brüssel</td>
<td>CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre</td>
<td>Tel. +32 10 231-311 Fax +32 10 231-336 <a href="http://www.caron-vector.be">http://www.caron-vector.be</a> <a href="mailto:info@caron-vector.be">info@caron-vector.be</a></td>
</tr>
<tr>
<td><strong>Brazil</strong></td>
<td>Sao Paulo</td>
<td>SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaioli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250</td>
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<tr>
<td><strong>Bulgaria</strong></td>
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<td>BEVER-DRIVE GMBH Bogdanovetz Str.1 BG-1606 Sofia</td>
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</tr>
<tr>
<td><strong>Cameroon</strong></td>
<td>Douala</td>
<td>Electro-Services Rue Drouot Akwa B.P. 2024 Douala</td>
<td>Tel. +237 4322-99 Fax +237 4277-03</td>
</tr>
<tr>
<td><strong>Canada</strong></td>
<td>Toronto</td>
<td>SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1</td>
<td>Tel. +1 905 791-1553 Fax +1 905 791-2999 <a href="http://www.sew-eurodrive.ca">http://www.sew-eurodrive.ca</a> <a href="mailto:l.reynolds@sew-eurodrive.ca">l.reynolds@sew-eurodrive.ca</a></td>
</tr>
<tr>
<td></td>
<td>Vancouver</td>
<td>SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta, B.C. V4G 1E2</td>
<td>Tel. +1 604 946-5535 Fax +1 604 946-2513 <a href="mailto:b.wake@sew-eurodrive.ca">b.wake@sew-eurodrive.ca</a></td>
</tr>
<tr>
<td></td>
<td>Montreal</td>
<td>SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9</td>
<td>Tel. +1 514 367-1124 Fax +1 514 367-3677 <a href="mailto:a.peluso@sew-eurodrive.ca">a.peluso@sew-eurodrive.ca</a></td>
</tr>
<tr>
<td><strong>Chile</strong></td>
<td>Santiago de Chile</td>
<td>SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile</td>
<td>Tel. +56 2 75770-00 Fax +56 2 75770-01 <a href="mailto:sewsales@entelchile.net">sewsales@entelchile.net</a></td>
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<td><strong>China</strong></td>
<td>Tianjin</td>
<td>SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457</td>
<td>Tel. +86 22 25322612 Fax +86 22 25322611 <a href="http://www.sew.com.cn">http://www.sew.com.cn</a></td>
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<td></td>
<td>Suzhou</td>
<td>SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China</td>
<td>Tel. +86 512 62581781 Fax +86 512 62581783 <a href="mailto:suzhou@sew.com.cn">suzhou@sew.com.cn</a></td>
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Additional addresses for service in Brazil provided on request!
Additional addresses for service in Canada provided on request!
Additional addresses for service in Chile provided on request!
<table>
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<tr>
<td>Colombia</td>
<td>Bogotá</td>
<td>SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá</td>
<td>Tel. +57 1 54750-50 Fax +57 1 54750-44 <a href="mailto:sewcol@andinet.com">sewcol@andinet.com</a></td>
<td></td>
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<tr>
<td>Croatia</td>
<td>Zagreb</td>
<td>KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb</td>
<td>Tel. +385 1 4613-158 Fax +385 1 4613-158 <a href="mailto:kompeks@net.hr">kompeks@net.hr</a></td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Praha</td>
<td>SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luná 591 CZ-16000 Praha 6 - Vokovice</td>
<td>Tel. +420 220121234 + 220121236 Fax +420 220121237 <a href="http://www.sew-eurodrive.cz">http://www.sew-eurodrive.cz</a> <a href="mailto:sew@sew-eurodrive.cz">sew@sew-eurodrive.cz</a></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>Kopenhagen</td>
<td>SEW-EURODRIVEA/S Geminijevej 28-30, P.O. Box 100 DK-2670 Greve</td>
<td>Tel. +45 43 9585-00 Fax +45 43 9585-09 <a href="http://www.sew-eurodrive.dk">http://www.sew-eurodrive.dk</a> <a href="mailto:sew@sew-eurodrive.dk">sew@sew-eurodrive.dk</a></td>
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<tr>
<td>Estonia</td>
<td>Tallin</td>
<td>ALAS-KUUL AS Paldiski mnt. 125 EE 0006 Tallin</td>
<td>Tel. +372 6593230 Fax +372 6593231</td>
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<tr>
<td>Finland</td>
<td>Lahti</td>
<td>SEW-EURODRIVE CY Vesimäentie 4 FIN-15860 Hollola 2</td>
<td>Tel. +358 3 589-300 Fax +358 3 7806-211 <a href="http://www.sew-eurodrive.fi">http://www.sew-eurodrive.fi</a> <a href="mailto:sew@sew-eurodrive.fi">sew@sew-eurodrive.fi</a></td>
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<tr>
<td>Gabon</td>
<td>Libreville</td>
<td>Electro-Services B.P. 1889 Libreville</td>
<td>Tel. +241 7340-11 Fax +241 7340-12</td>
<td></td>
</tr>
<tr>
<td>Great Britain</td>
<td>Normanton</td>
<td>SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR</td>
<td>Tel. +44 1924 893-855 Fax +44 1924 893-702 <a href="http://www.sew-eurodrive.co.uk">http://www.sew-eurodrive.co.uk</a> <a href="mailto:info@sew-eurodrive.co.uk">info@sew-eurodrive.co.uk</a></td>
<td></td>
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<tr>
<td>Greece</td>
<td>Athen</td>
<td>Christ. Boznos &amp; Son S.A. 12, Mavromichail Street P.O. Box 80136, GR-18545 Piraeus</td>
<td>Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 <a href="http://www.boznos.gr">http://www.boznos.gr</a> <a href="mailto:Boznos@otenet.gr">Boznos@otenet.gr</a></td>
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<tr>
<td>Hong Kong</td>
<td>Hong Kong</td>
<td>SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong</td>
<td>Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 <a href="mailto:sew@sewhk.com">sew@sewhk.com</a></td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Budapest</td>
<td>SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18</td>
<td>Tel. +36 1 437 06-58 Fax +36 1 437 06-50 <a href="mailto:sew-eurodrive.voros@matarnet.hu">sew-eurodrive.voros@matarnet.hu</a></td>
<td></td>
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<tr>
<td>India</td>
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<td>Baroda</td>
<td>SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi - Baroda - 391 243</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gujarat</td>
<td>Tel. +91 265 2831021 Fax +91 265 2831087 <a href="mailto:sew.baroda@gecsl.com">sew.baroda@gecsl.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bangalore</td>
<td>SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road</td>
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<td></td>
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<td></td>
<td>Bangalore</td>
<td>Tel. +91 80 22265565 Fax +91 80 22269659 <a href="mailto:sewbangalore@sify.com">sewbangalore@sify.com</a></td>
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<tr>
<td></td>
<td></td>
<td>Mumbai</td>
<td>SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza Andheri Kurla</td>
<td>Tel. +91 22 28348440 Fax +91 22 28217858 <a href="mailto:sewmumbai@vsnl.net">sewmumbai@vsnl.net</a></td>
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<tr>
<td>Ireland</td>
<td></td>
<td>Dublin</td>
<td>Alporton Engineering Ltd. 48 Moyle Road Dubnlin Industrial Estate Glasnevin</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Dublin 11</td>
<td>Tel. +353 1 830-6277 Fax +353 1 830-6498</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>Milano</td>
<td>SEW-EURODRIVE di R. Blickle &amp; Co.s.a.s. Via Bernini, 14 I-20020 Solaro (Milano)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Tel. +39 2 96 9801 Fax +39 2 96 799781 <a href="mailto:sewit@sew-eurodrive.it">sewit@sew-eurodrive.it</a></td>
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<tr>
<td>Ivory Coast</td>
<td></td>
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<td>SICA Ste industrielle et commerciale pour l'Afrique 165 Bld de Marseille</td>
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<tr>
<td></td>
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<td></td>
<td>B.P. 2323, Abidjan 08</td>
<td>Tel. +225 2579-44 Fax +225 2584-36</td>
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<tr>
<td>Japan</td>
<td></td>
<td>Toyoda-cho</td>
<td>SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Toyoda-cho, lwata gun Shizuoka</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>prefecture, 438-0818</td>
<td>Tel. +81 538 373811 Fax +81 538 373814 <a href="mailto:sewjapan@sew-eurodrive.co.jp">sewjapan@sew-eurodrive.co.jp</a></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td>Ansan-City</td>
<td>SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4,</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Shingil-Dong Ansan-425-120</td>
<td>Tel. +82 31 492-8051 Fax +82 31 492-8056 <a href="mailto:master@sew-korea.co.kr">master@sew-korea.co.kr</a></td>
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<tr>
<td>Lebanon</td>
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<td>Beirut</td>
<td>Gabriel Acar &amp; Fils sarl B. P. 80484 Bourj Hammoud, Beirut</td>
<td></td>
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<tr>
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<td>Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 <a href="mailto:gacar@beirut.com">gacar@beirut.com</a></td>
</tr>
<tr>
<td>Luxembourg</td>
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<td>Brüssel</td>
<td>CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre</td>
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<td>Tel. +32 10 231-336 <a href="http://www.caron-vector.be">http://www.caron-vector.be</a> <a href="mailto:info@caron-vector.be">info@caron-vector.be</a></td>
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<td>Skopje</td>
<td>SGS-Skopje / Macedonia &quot;Teodosij Sinactaski&quot; 66 91000 Skopje / Macedonia</td>
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<td>Tel. +389 2 385 466 Fax +389 2 384 390 <a href="mailto:sgs@mol.com.mk">sgs@mol.com.mk</a></td>
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<td>Malaysia</td>
<td></td>
<td>Johore</td>
<td>SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Bahru, Johor West Malaysia</td>
<td>Tel. +60 7 3549409 Fax +60 7 3541404 <a href="mailto:kohtan@pd.jaring.my">kohtan@pd.jaring.my</a></td>
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<td>Country</td>
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<td>S. R. M. Société de Réalisations Mécaniques</td>
<td>5, rue Emir Abdelkader 05 Casablanca</td>
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<td>Rotterdam</td>
<td>VECTOR Aandrijftechniek B.V.</td>
<td>Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam</td>
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<td>SEW-EURODRIVE NEW ZEALAND LTD.</td>
<td>P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland</td>
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<td>SEW-EURODRIVE PTE. LTD.</td>
<td>No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644</td>
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<td>Slovenia</td>
<td>Sales Service</td>
<td>Celje</td>
<td>Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO – 3000 Celje</td>
<td>Tel. +386 3 490 83-20 Fax +386 3 490 83-21 <a href="mailto:pakman@siol.net">pakman@siol.net</a></td>
</tr>
<tr>
<td>South Africa</td>
<td>Assembly Sales Service</td>
<td>Johannesburg</td>
<td>SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertiham 2013</td>
<td>Tel. +27 11 248-7000 Fax +27 11 494-2311 <a href="mailto:ljansen@sew.co.za">ljansen@sew.co.za</a></td>
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<tr>
<td></td>
<td></td>
<td>Capetown</td>
<td>SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse &amp; Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town</td>
<td>Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 <a href="mailto:dswanepoel@sew.co.za">dswanepoel@sew.co.za</a></td>
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<tr>
<td></td>
<td></td>
<td>Durban</td>
<td>SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monacoce Place Pinetown Durban P.O. Box 10433, Ashwood 3605</td>
<td>Tel. +27 31 700-3451 Fax +27 31 700-3847 <a href="mailto:dtait@sew.co.za">dtait@sew.co.za</a></td>
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<tr>
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<td>Assembly Sales Service</td>
<td>Bilbao</td>
<td>SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)</td>
<td>Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 <a href="mailto:sew.spain@sew-eurodrive.es">sew.spain@sew-eurodrive.es</a></td>
</tr>
<tr>
<td>Sweden</td>
<td>Assembly Sales Service</td>
<td>Jönköping</td>
<td>SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping</td>
<td>Tel. +46 36 3442-00 Fax +46 36 3442-80 <a href="http://www.sew-eurodrive.se">http://www.sew-eurodrive.se</a> <a href="mailto:info@sew-eurodrive.se">info@sew-eurodrive.se</a></td>
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<tr>
<td>Switzerland</td>
<td>Assembly Sales Service</td>
<td>Basel</td>
<td>Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel</td>
<td>Tel. +41 61 41717-17 Fax +41 61 41717-00 <a href="http://www.imhof-sew.ch">http://www.imhof-sew.ch</a> <a href="mailto:info@imhof-sew.ch">info@imhof-sew.ch</a></td>
</tr>
<tr>
<td>Thailand</td>
<td>Assembly Sales Service</td>
<td>Chon Buri</td>
<td>SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuiaroh Muang District Chon Buri 20000</td>
<td>Tel. +66 38 454281 Fax +66 38 454288 <a href="mailto:sewnthailand@sew-eurodrive.co.th">sewnthailand@sew-eurodrive.co.th</a></td>
</tr>
<tr>
<td>Tunisia</td>
<td>Sales</td>
<td>Tunis</td>
<td>T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Meurine Erriadh</td>
<td>Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76</td>
</tr>
<tr>
<td>Turkey</td>
<td>Assembly Sales Service</td>
<td>Istanbul</td>
<td>SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-81540 Maltepe ISTANBUL</td>
<td>Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 <a href="mailto:sew@sew-eurodrive.com.tr">sew@sew-eurodrive.com.tr</a></td>
</tr>
</tbody>
</table>
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Fax Manuf. +1 864 439-9948  
Fax Ass. +1 864 439-0566  
Telex 805 550  
http://www.seweurodrive.com  
csl yliman@seweurodrive.com |
|---------------------|------------|-------------------|---------------------|
| Assembly Sales Service | Greenville | 1295 Old Spartanburg Highway  
P.O. Box 518  
Lyman, S.C. 29365 | Tel. +1 864 439-7537  
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Fax Manuf. +1 864 439-9948  
Fax Ass. +1 864 439-0566  
Telex 805 550  
http://www.seweurodrive.com  
csl yliman@seweurodrive.com |
| Sales Service | Greenville | SEW-EURODRIVE INC. | Tel. +1 864 439-7537  
Fax Sales +1 864 439-7830  
Fax Manuf. +1 864 439-9948  
Fax Ass. +1 864 439-0566  
Telex 805 550  
http://www.seweurodrive.com  
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| Service | Greenville | 1295 Old Spartanburg Highway  
P.O. Box 518  
Lyman, S.C. 29365 | Tel. +1 864 439-7537  
Fax Sales +1 864 439-7830  
Fax Manuf. +1 864 439-9948  
Fax Ass. +1 864 439-0566  
Telex 805 550  
http://www.seweurodrive.com  
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cshayward@seweurodrive.com |
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cshayward@seweurodrive.com |
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csbridgeport@seweurodrive.com |
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cstroy@seweurodrive.com |
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