RE 15366/04.2020
Replaces: 04.2018

rexroth
A Bosch Company

# Multi disc parking brake Hägglunds BICA

- BICA 13 - BICA 37 valid for CA motors
- BICA 48 - BICA 160 valid for CB  motors
- BICA 90 - BICA 160 valid for CBm motors

## Features

- Robust design, industrial design
- Possibility for inductive position sensor
- Braking torque range between 13 – 160 kNm
- Manual emergency release
- Version for explosive environment (ATEX) available as option

## Contents

# 1 Ordering code

In order to identify Hägglunds equipment exactly, the following ordering code is used. These ordering codes should be stated in full in all correspondence e.g. when ordering spare parts.
Example Hägglunds BICA:

| BIC | A | | 013 | | N | | A | | 0 | | 0 | | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | 02 | | 03 | | 04 | | 05 | | 06 | | 07* | | 08* |

| 01 | **Brake Industrial Compact** | |
|---|---|---|
| | | **BIC** |

| 02 | **Version** | |
|---|---|---|
| | | **A** |

| 03 | **Maximum braking torque (kNm)** | |
|---|---|---|
| | 13 | **013** |
| | 24 | **024** |
| | 37 | **037** |
| | 48 | **048** |
| | 64 | **064** |
| | 90 | **090** |
| | 134 | **134** |
| | 160 | **160** |

| 04 | **Type of seal** | |
|---|---|---|
| | NBR (Nitrile) | **N** |
| | FPM (Viton) Standard for explosive environment (ATEX) | **V** |

| 05 | **Mounting kit (screws and/or adapter)** | |
|---|---|---|
| | None | **A** |
| | 13-37/CA | **B** |
| | 048/CB 280 | **C** |
| | 048/CB 400 | **D** |
| | 064/CB280 | **E** |
| | 064/CB 400 | **F** |
| | 090/CB 560-CB 1120 | **G** |
| | 090/CBM 2000-CBM 6000 | **H** |
| | 134/CB 560-CB 1120 | **J** |
| | 134/CBM 2000-CBM 6000 | **K** |
| | 160/CB 560-CB 1120 | **L** |
| | 160/CBM 2000-CBM 6000 | **M** |

| 06 | **Explosive environment** | |
|---|---|---|
| | Non explosive environment | **0** |
| | Explosive environment (ATEX) | **1** |

| 07 | **Modification *)** | |
|---|---|---|
| | | **0-9** |

| 08 | **Design** | |
|---|---|---|
| | Standard | **00** |
| | Special index *) | **01-99** |

*) To be filled in by Bosch Rexroth DC-HD/ENG

# 2 Functional description

### 2.1 Function

Hägglunds BICA brake is of multi disc type with a rotating disc-centre (brake discs) and a stationary housing (steel discs). It is a dry brake which means discs are running in dry condition (whithout oil). The brake is actuated by spring force and released by hydraulic pressure. Brake torque builds up in disc set between rotating disc-centre and stationary housing by a spring force acting on disc set through a piston. The brake is normally activated giving brake torque. When pressurizing brake the piston will move against cover and stop, giving zero brake torque.

**Manual emergency release**

If the pressure medium supply fails, the brake can be released mechanically.

### 2.2 Design

The brakes are designed for industrial applications together with Hägglunds Compact motors. The brake is not designed for suspended load applications and is not approved according to Classification societies safety rules.

**Note!**

**The BICA brakes is designed to be used as parking brake only.**

### 2.3 Design ATEX version

- ATEX Inducive position sensor is standard for brakes in explosive environment version see *8.2*
- Viton seals
- Wet (oiled) brake discs

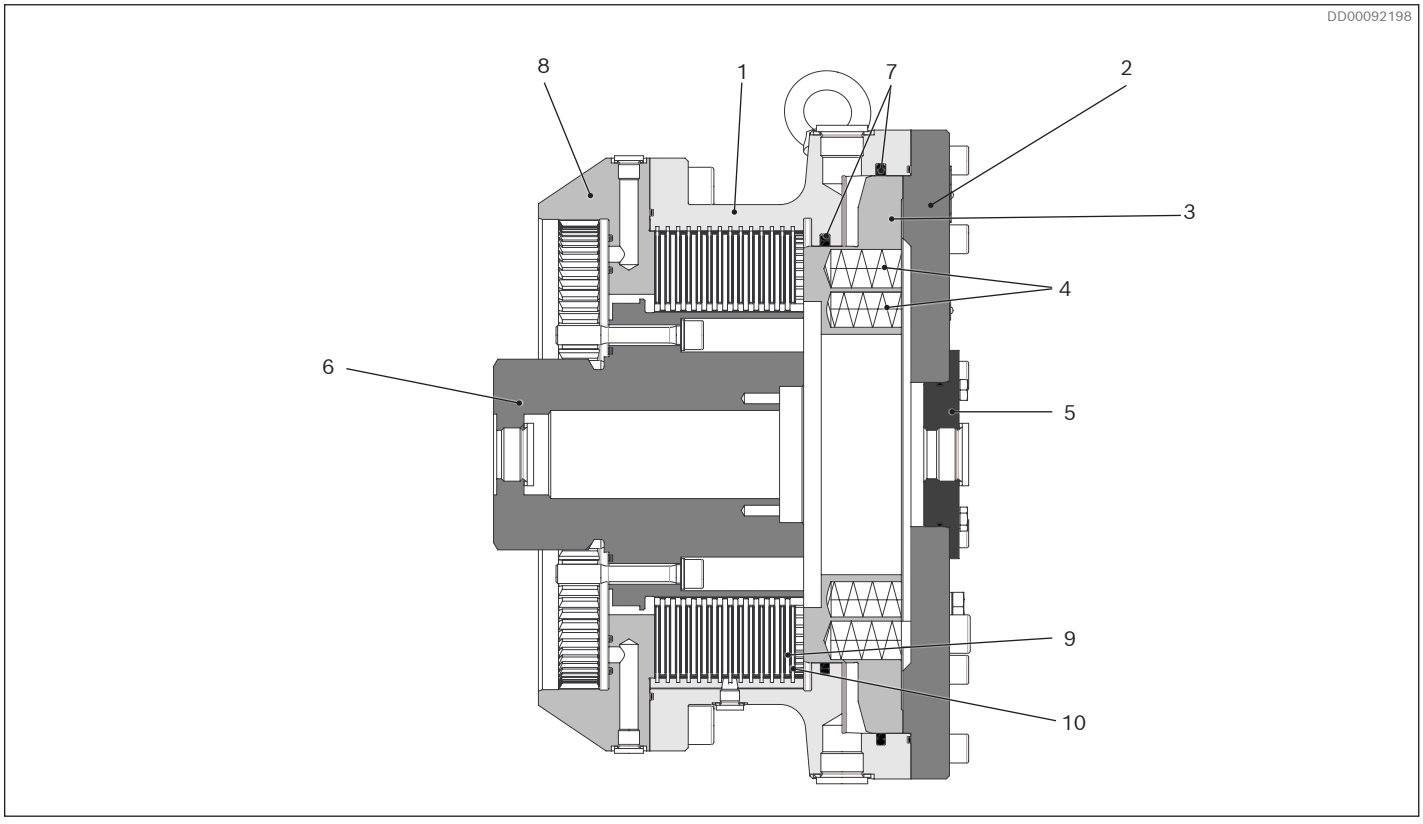


**Fig. 1: Section view of Hägglunds BICA 13 to BICA 37 for Hägglunds CA motors**

| | |
|---|---|
| **1.** Brake housing | **6.** Splined coupling |
| **2.** Brake cover | **7.** Piston seal |
| **3.** Brake piston | **8.** Attachment unit |
| **4.** Pressure spring | **9.** Brake disc, outer disc |
| **5.** Cover | **10.** Steel disc, inner disc |

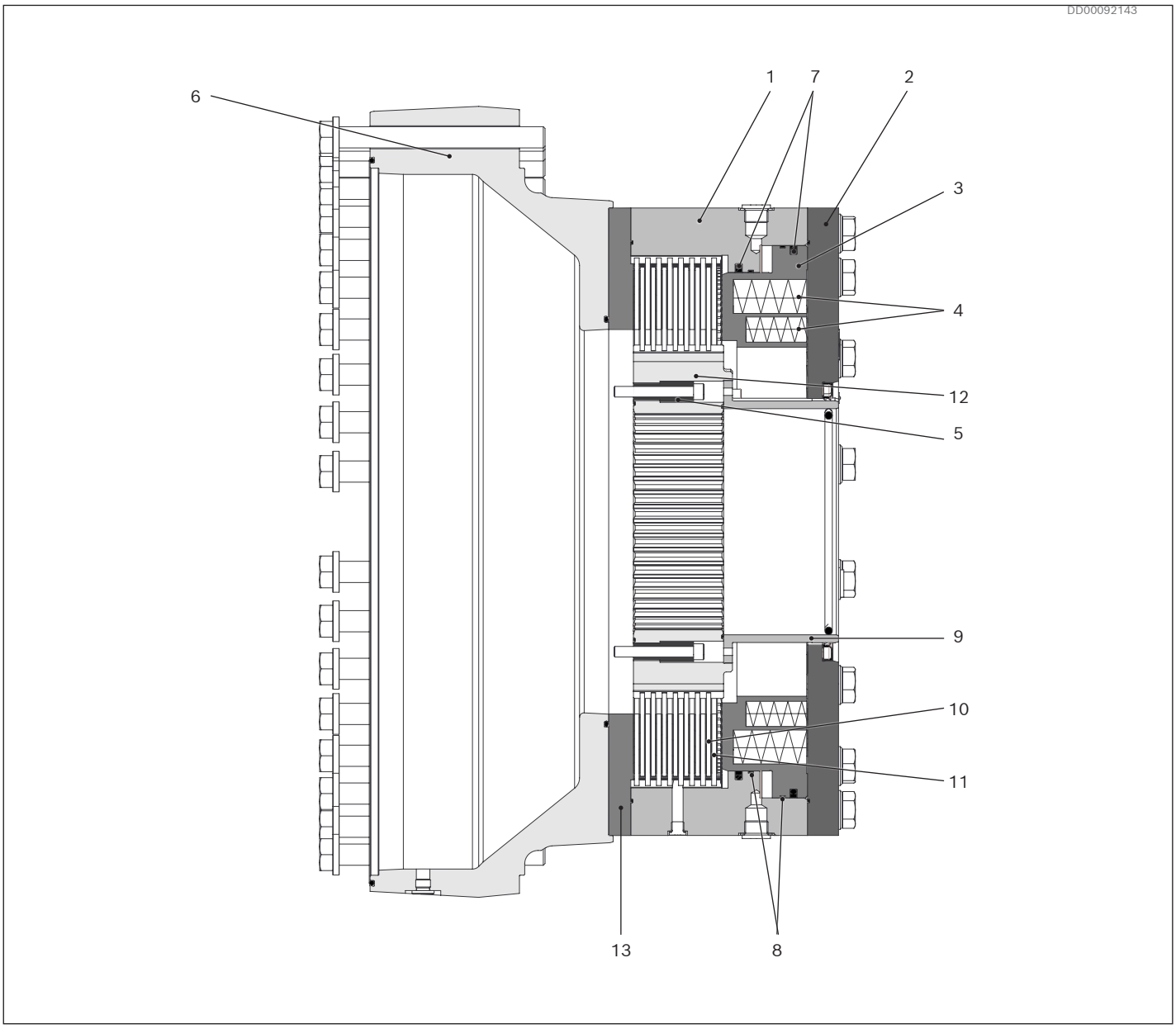


**Fig. 2: Section view of Hägglunds BICA 48 to BICA 160 for CB motors**

| | |
|---|---|
| **1.** Brake housing | **8.** Guide string |
| **2.** Brake cover | **9.** Distance sleeve |
| **3.** Brake piston | **10.** Brake disc, outer disc |
| **4.** Pressure spring | **11.** Steel disc, inner disc |
| **5.** Sleeve | **12.** Disc centre |
| **6.** Adapter | **13.** End cover |
| **7.** Piston seal | |

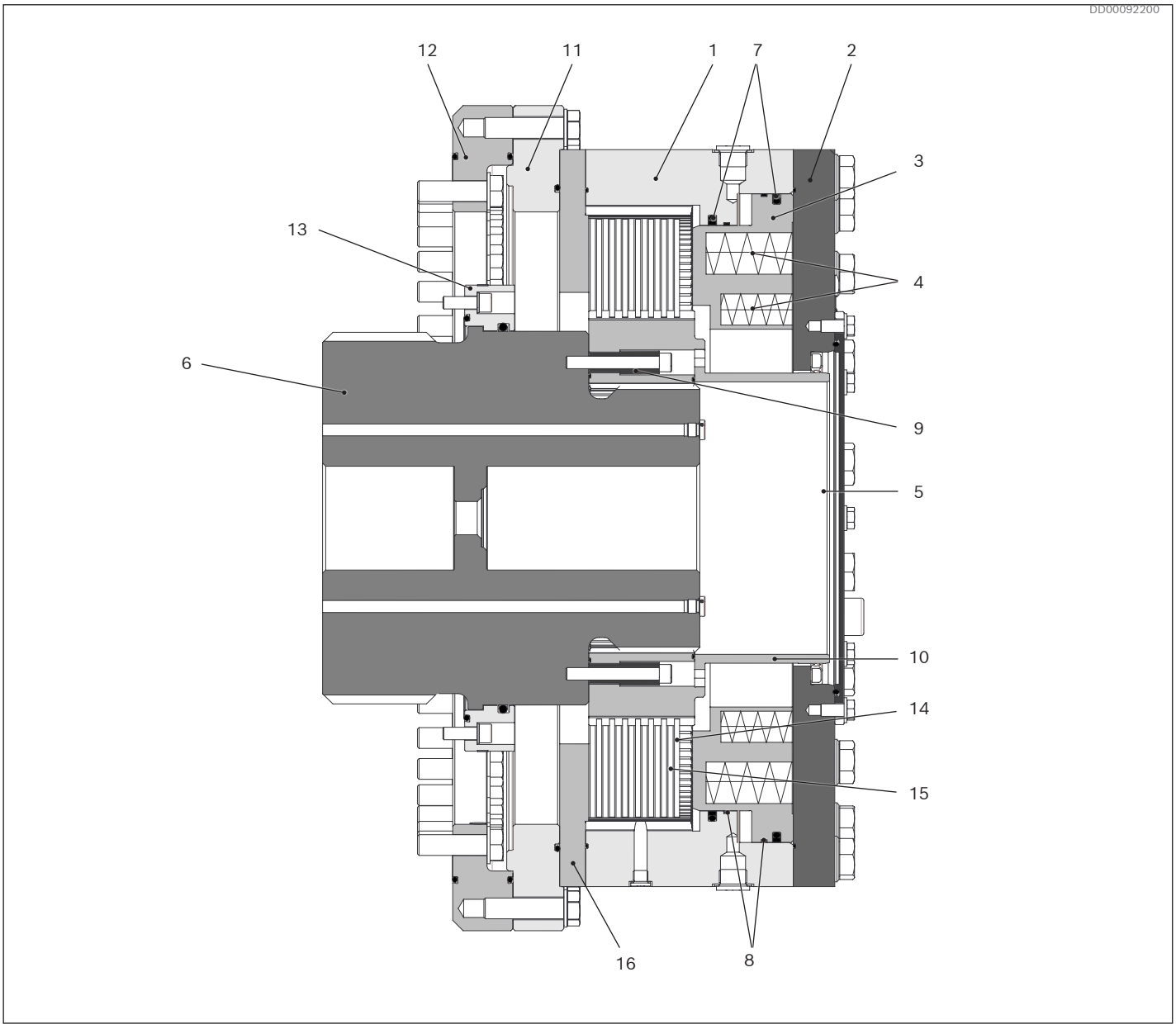


**Fig. 3: Section view of Hägglunds BICA 160 for Hägglunds CBm motors**

| | |
|---|---|
| **1.** Brake housing | **9.** Sleeve |
| **2.** Brake cover | **10.** Distance sleeve |
| **3.** Brake piston | **11.** Spacer ring |
| **4.** Pressure spring | **12.** Spacer ring |
| **5.** Cover | **13.** Bearing holder |
| **6.** Intermediate shaft | **14.** Brake disc, outer disc |
| **7.** Piston seal | **15.** Steel disc, inner disc |
| **8.** Guide string | **16.** End cover |

# 3 Fluid connections

## 3.1 Hydraulic symbol

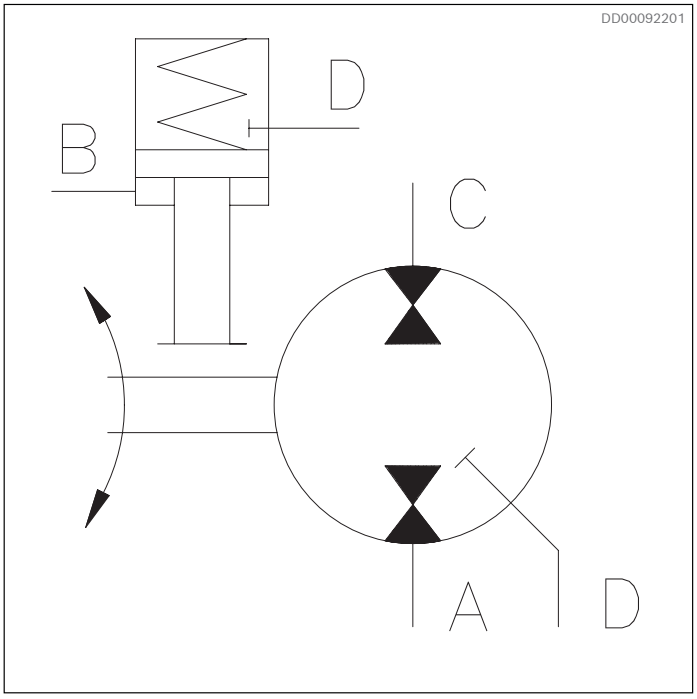


**Fig. 4: Hydraulic symbol**

Port locations and dimensions, *see Table 1: Port dimensions*

### 3.2 Port connections

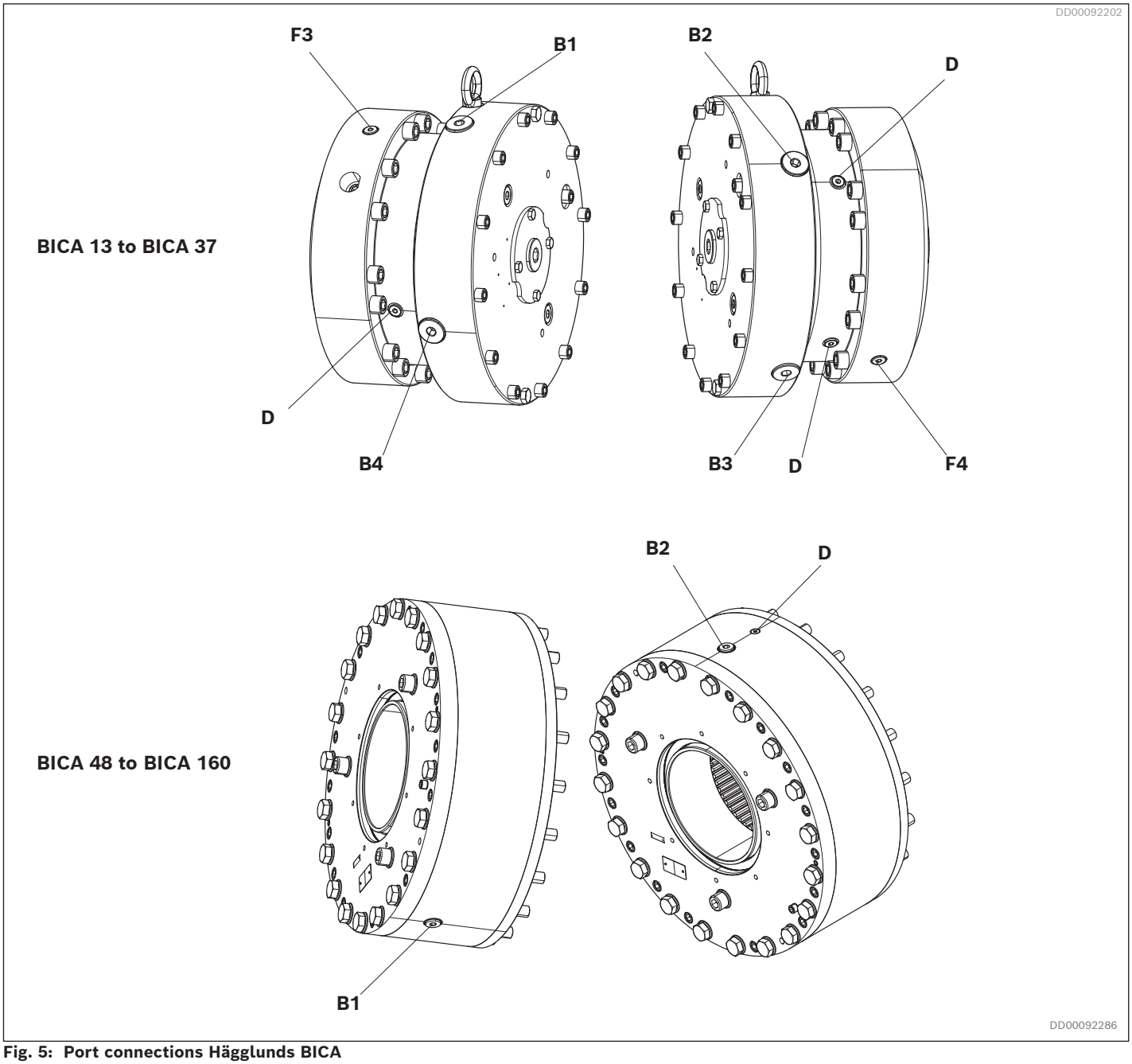


**Fig. 5: Port connections Hägglunds BICA**

**Table 1: Port dimensions**

| Connection | Description | Dimensions | | Remarks |
|---|---|---|---|---|
| | | BICA 13- 37 | BICA 48-160 | |
| B1 | Main connection | G 3/4″ | G 3/4″ | Normally plugged at delivery |
| B2, B3, B4 | Alternative main connection | G 3/4″ | G 3/4″ | Normally plugged at delivery. |
| D | Inspection plug | M12 x 1.5 | M14 x 1.5 | Normally plugged at delivery. For inspection of oil leakage. Can be connected to tank (optional). Inspection plug shall always be positioned vertically and facing downwards. |
| F3, F4 | Flushing connections | G 1/4″ | | Normally plugged at delivery. For flushing of axial bearing and motor case. |

# 4 Technical data

## 4.1 Brake data

**Table 2: Brake data (metric)**

| | | | Brake size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | **BICA 13** | **BICA 24** | **BICA 37** | **BICA 48** | **BICA 64** | **BICA 90** | **BICA 134** | **BICA 160** |
| Type of mounting | | | See section *7: Mounting alternatives* | | | | | | | |
| Port connections | | | See section *3.2: Port connections* | | | | | | | |
| Hydraulic fluids | | | See section *4.3: Hydraulic fluids* | | | | | | | |
| Pressure | Minimum pilot pressure | bar | 15 | 15 | 15 | 60 | 42 | 60 | 45 | 58 |
| | Maximum pilot pressure | bar | 60 | 60 | 60 | 320 | 250 | 320 | 320 | 320 |
| Temperature limits | | | | | | | | | | |
| Seal type: NBR (Nitrile) | Minimum | °C | -35 | -35 | -35 | -35 | -35 | -35 | -35 | -35 |
| | Maximum | °C | +70 | +70 | +70 | +70 | +70 | +70 | +70 | +70 |
| Seal type: FPM (Viton) | Minimum | °C | -20 | -20 | -20 | -20 | -20 | -20 | -20 | -20 |
| | Maximum | °C | +100 | +100 | +100 | +100 | +100 | +100 | +100 | +100 |
| Moment of inertia for rotary group | | $kg \cdot m^2$ | 0.06 | 0.24 | 0.24 | 0.68 | 1.64 | 1.35 | 3.58 | 4.02 |
| Weight | | kg | 87 | 175 | 210 | 210 | 310 | 310 | 570 | 593 |
| Displacement | New condition | litres | 0.115 | 0.210 | 0.335 | 0.086 | 0.140 | 0.140 | 0.285 | 0.285 |
| | Maximum worn condition | litres | 0.245 | 0,420 | 0.670 | 0.150 | 0.250 | 0.250 | 0.685 | 0.685 |
| Braking torque, static*) | | Nm | 13000 | 24000 | 37000 | 48000 | 64000 | 90000 | 134000 | 160000 |
| Max speed | Horizontal | | | | | | | | | |
| | Std | rpm | 1800 | 1200 | 1200 | 150 | 150 | 150 | 150 | 150 |
| | ATEX | rpm | On request | | | | | | | |
| | Vertical | rpm | Contact your Bosch Rexroth representative | | | | | | | |

*) The specified brake torque is achieved only with the pressure line in depressurized condition.

**Table 3: Brake data (US)**

| | | | Brake size | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | **BICA 13** | **BICA 24** | **BICA 37** | **BICA 48** | **BICA 64** | **BICA 90** | **BICA 134** | **BICA 160** |
| Type of mounting | | | See section *7: Mounting alternatives* | | | | | | | |
| Port connections | | | See section *3.2: Port connections* | | | | | | | |
| Hydraulic fluids | | | See section *4.3: Hydraulic fluids* | | | | | | | |
| Pressure | Minimum pilot pressure | psi | 218 | 218 | 218 | 870 | 610 | 870 | 650 | 840 |
| | Maximum pilot pressure | psi | 870 | 870 | 870 | 4640 | 3620 | 4640 | 4640 | 4640 |
| Temperature limits | | | | | | | | | | |
| Seal type: NBR (Nitrile) | Minimum | °F | -31 | -31 | -31 | -31 | -31 | -31 | -31 | -31 |
| | Maximum | °F | +158 | +158 | +158 | +158 | +158 | +158 | +158 | +158 |
| Seal type: FPM (Viton) | Minimum | °F | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 |
| | Maximum | °F | +212 | +212 | +212 | +212 | +212 | +212 | +212 | +212 |
| Moment of inertia for rotary group | | $lb{\cdot}ft^2$ | 1.4 | 5.7 | 5.7 | 16.1 | 38.9 | 32.0 | 85.0 | 95.4 |
| Weight | | lb | 192 | 385 | 462 | 462 | 682 | 682 | 1254 | 1307 |
| Displacement | New condition | US gal | 0.0304 | 0.0555 | 0.0885 | 0.0227 | 0.0370 | 0.0370 | 0.0753 | 0.0753 |
| | Maximum worn condition | US gal | 0.0647 | 0.1110 | 0.1770 | 0.0396 | 0.0660 | 0.0660 | 0.1810 | 0.1810 |
| Braking torque, static *) | | lbf ft | 9600 | 17700 | 27300 | 35400 | 47200 | 66400 | 98800 | 118000 |
| Max speed | Horizontal | | | | | | | | | |
| | Std | rpm | 1800 | 1200 | 1200 | 150 | 150 | 150 | 150 | 150 |
| | ATEX | rpm | On request | | | | | | | |
| | Vertical | rpm | Contact your Bosch Rexroth representative | | | | | | | |

*) The specified brake torque is achieved only with the pressure line in depressurized condition.

## 4.2 Explosion protection information, Hägglunds BICA

**Table 4: Explosion protection information Hägglunds BICA**

| | |
|---|---|
| Area of application according to ATEX directive 2014/34/EU | II2G, II3G |
| Protection of the brake by constructional safety according to | h ISO 80079-37:2016 |
| Temperature class | T4 |
| ATEX Classification of valve | II 2 G E x h IIc T4 Gb |
| Ambient temperature range | -20.....+40 °C (-4....+104 °F) |

### 4.3 Hydraulic fluids

Hägglunds BICA brakes are primarily designed to operate on conventional petroleum based hydraulic fluids.

Before the start of project planning, see data sheet **RE 15414**, Hydraulic fluid quick reference, for detailed information on hydraulic fluids and specific additional demands.

**Table 5: Applicable fluids**

| ISO 11158 | ISO 15380 | ISO 12922 |
|---|---|---|
| Mineral oil based and mineral oil related hydraulic fluids | Environmentally acceptable hydraulic fluids | Fire resistant hydraulic fluids |

**Filtration of the hydraulic fluid**

A contamination level better than 18/16/13 according to ISO 4406 is required.

The less contamined the fluid, the longer the service life of the brake.

### 4.4 Painting system

**Corrosion protection**

The painting system of Hägglunds motors and accessories are avalible in two different corrosivity categories regarding corrosion protection in accordance with SS-EN ISO 12944:

- C3 - Corrosivity category Medium - which is recommended for normal urban and industrial atmosphere.
- C5M - Corrosivity category Very High - which is recommended for marine environment with high salt load or other aggressive atmosphere.

**Colour**

Standard colour for Hägglunds motors and accessories is orange (RAL 2002)

## 5 Type of seal

**Option N:**

**NBR (Nitrile)** Prefered alternative at low ambient temperatures and moderate oil temperatures.
See section *4.1: Brake data*

**Option V:**

**FPM (Viton)** Prefered alternative at higher oil temperatures.

**Fluid type**
For some fluids, specific sealing materials are recommended.

**Table 6: Recommended type of seal**

| Fluid group | Recommended seal |
|---|---|
| HM | NBR/FPM |
| HV | NBR/FPM |
| HFB | NBR |
| HFC | NBR |
| HFDR | FPM |
| HFDU | FPM |
| HEES | NBR/FPM |
| HETG | NBR/FPM |
| HEPR | NBR/FPM |

## 6 Dimensions / Interface

For dimensional drawings, see *10 Related documents*.

# 7 Mounting alternatives

## 7.1 Hägglunds BICA mounting alternatives

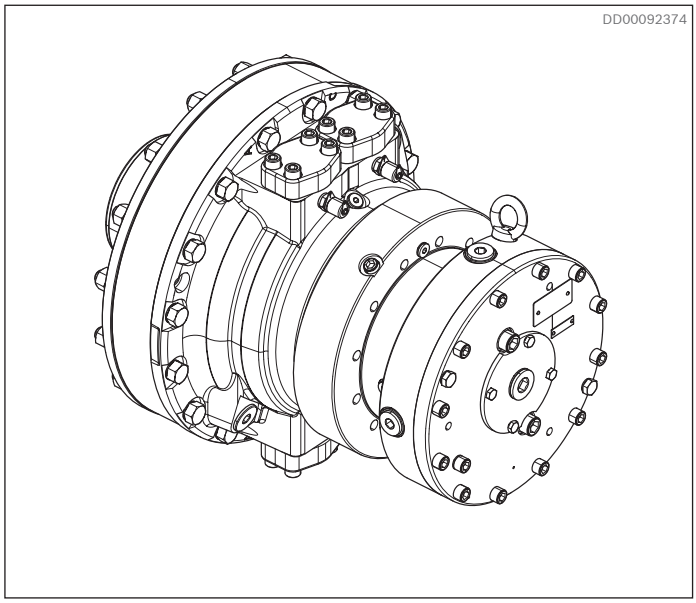


**Fig. 6: Hägglunds BICA 13 mounted on CA 50**

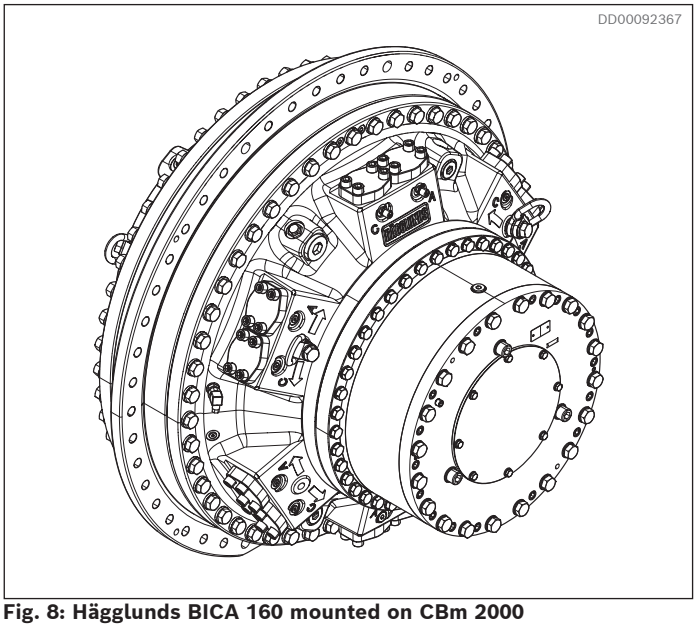


**Fig. 8: Hägglunds BICA 160 mounted on CBm 2000**

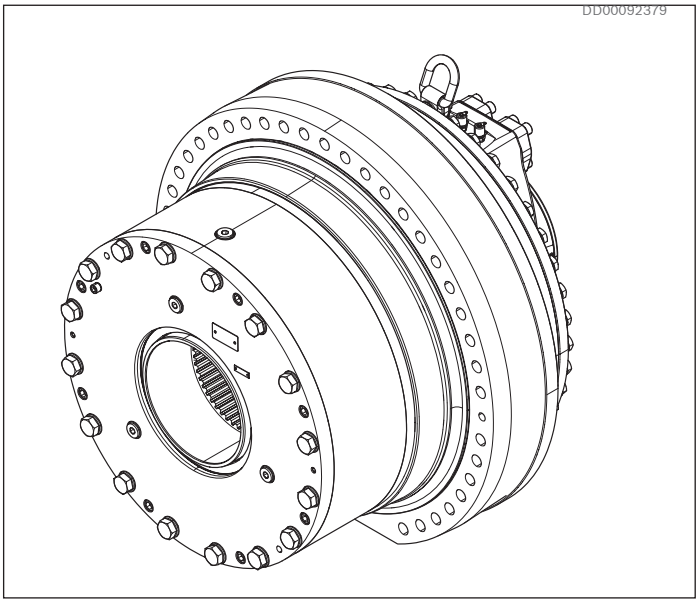


**Fig. 7: Hägglunds BICA 134 mounted on CB 560**

**Table 7: Possible mounting alternatives**

| | CA 50-210 | CB 280-400 | CB 560-1120 | CBM 2000-6000 |
|---|---|---|---|---|
| **BICA 13** | X | | | |
| **BICA 24** | X | | | |
| **BICA 37** | X | | | |
| **BICA 48** | | X | | |
| **BICA 64** | | X | | |
| **BICA 90** | | | X | X |
| **BICA 134** | | | X | X |
| **BICA 160** | | | X | X |

**Note!**

**BICA brakes on CB motors can only be used in combination with spline version of motors**

### 7.1.1 General information

**Customer shafts**

Mounting of CB motors with BICA requires special designed customer shaft, see *7.1.3* .

Mounting of CA and CBm motors with BICA are done according to standard shaft recommendations for motors.

**Mounting kits**

Use the same standard mounting kits as for motors.

**Assembly tools**

Use the same standard assembly tools as for motors.

### 7.1.2 Installation of Hägglunds CA with BICA on customer shaft

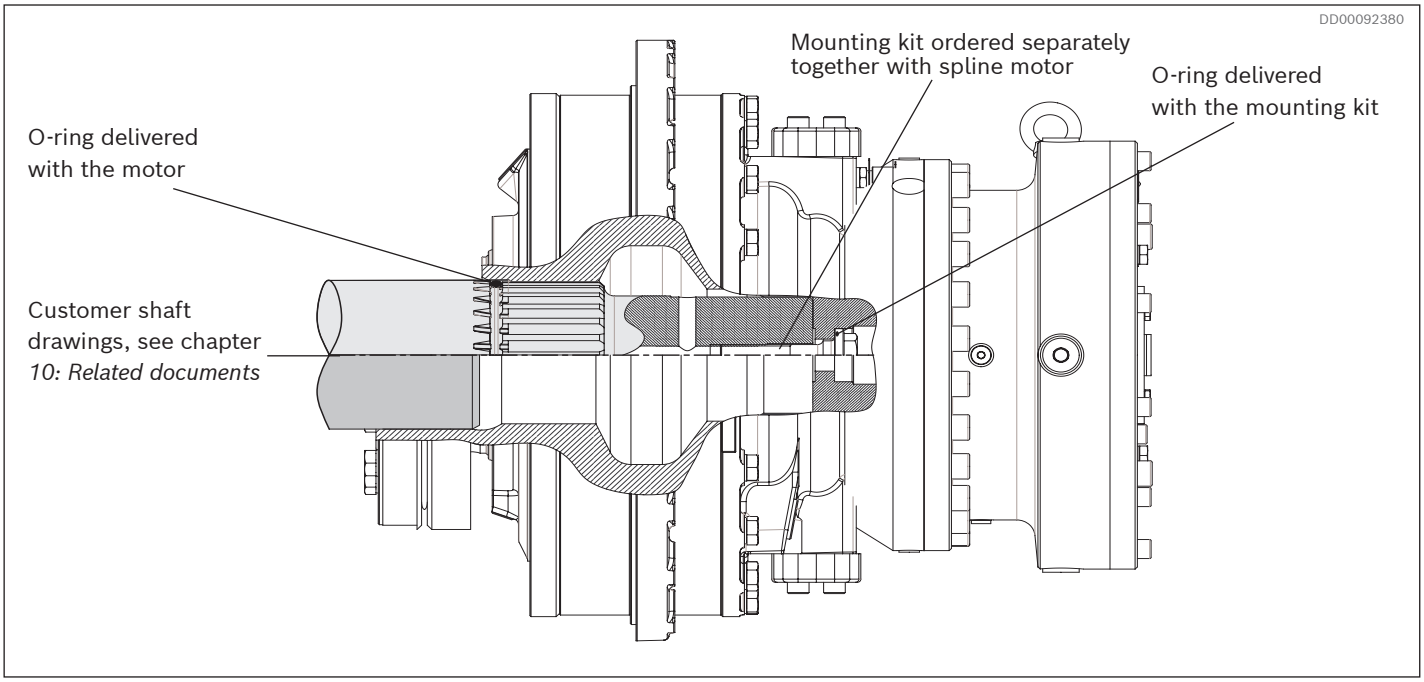


**Fig. 9: Example torque arm mounted CA motor with spline or shrink disc coupling and BICA brake on customer shaft**

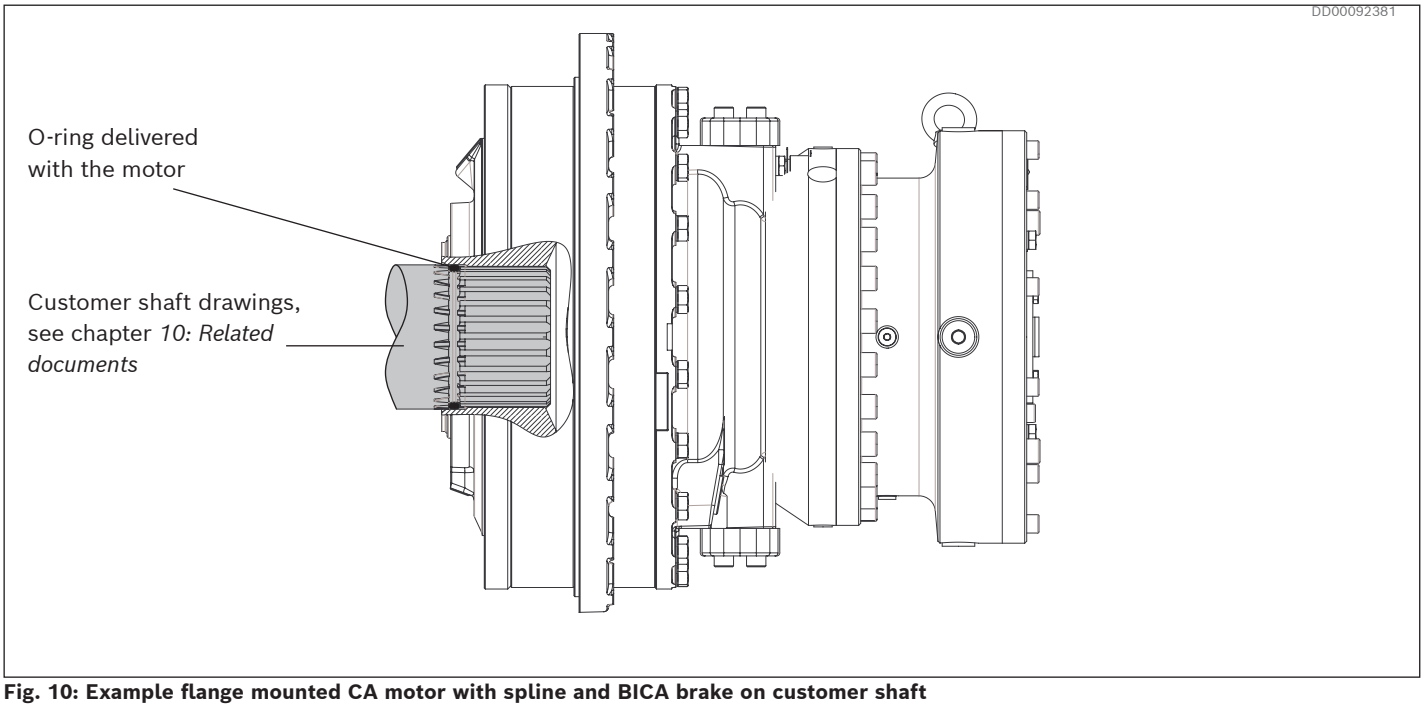


**Fig. 10: Example flange mounted CA motor with spline and BICA brake on customer shaft**

### 7.1.3 Installation of Hägglunds CB with BICA brake on customer shaft

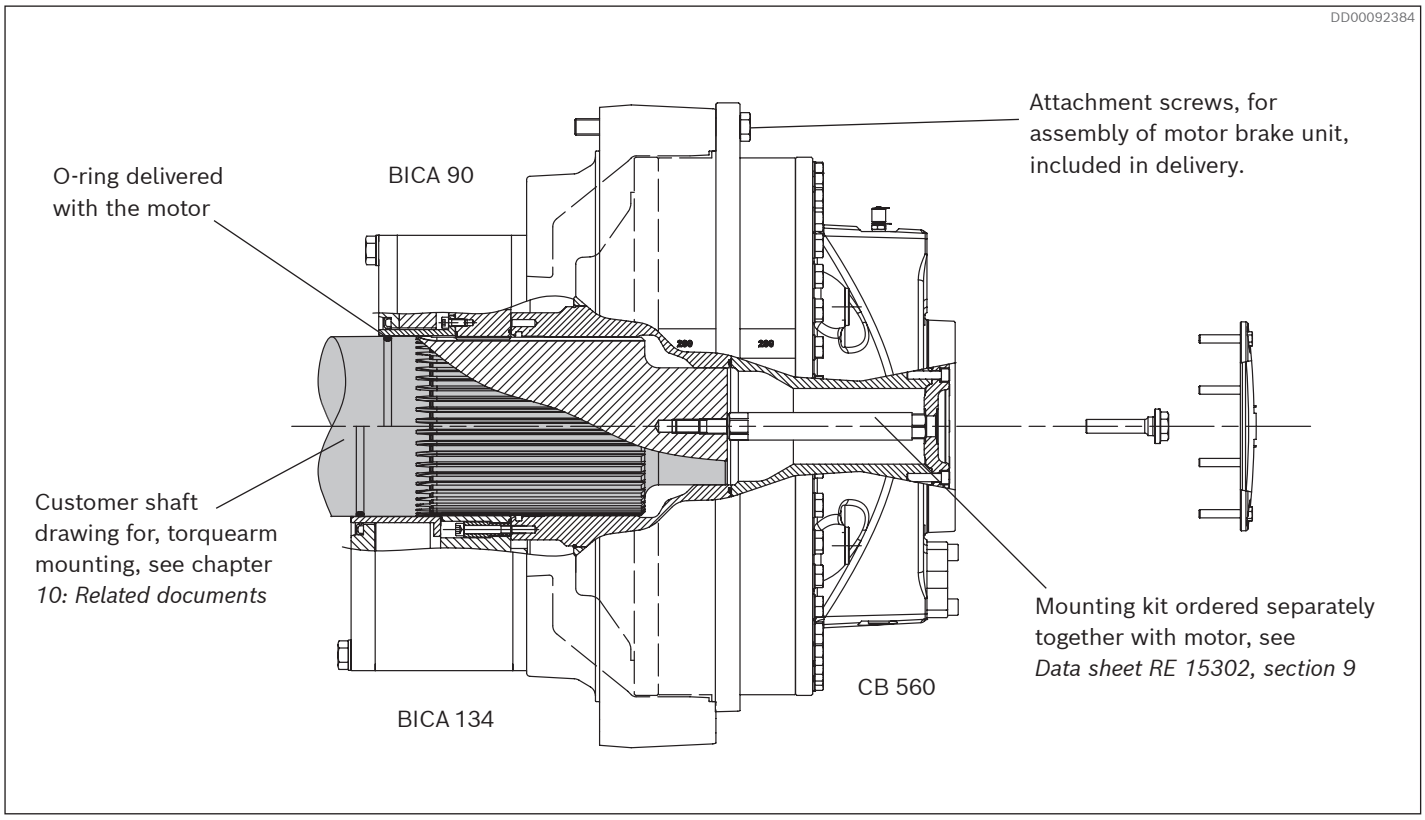


**Fig. 11: Example torque arm mounted CB motor with spline and BICA brake on customer shaft**

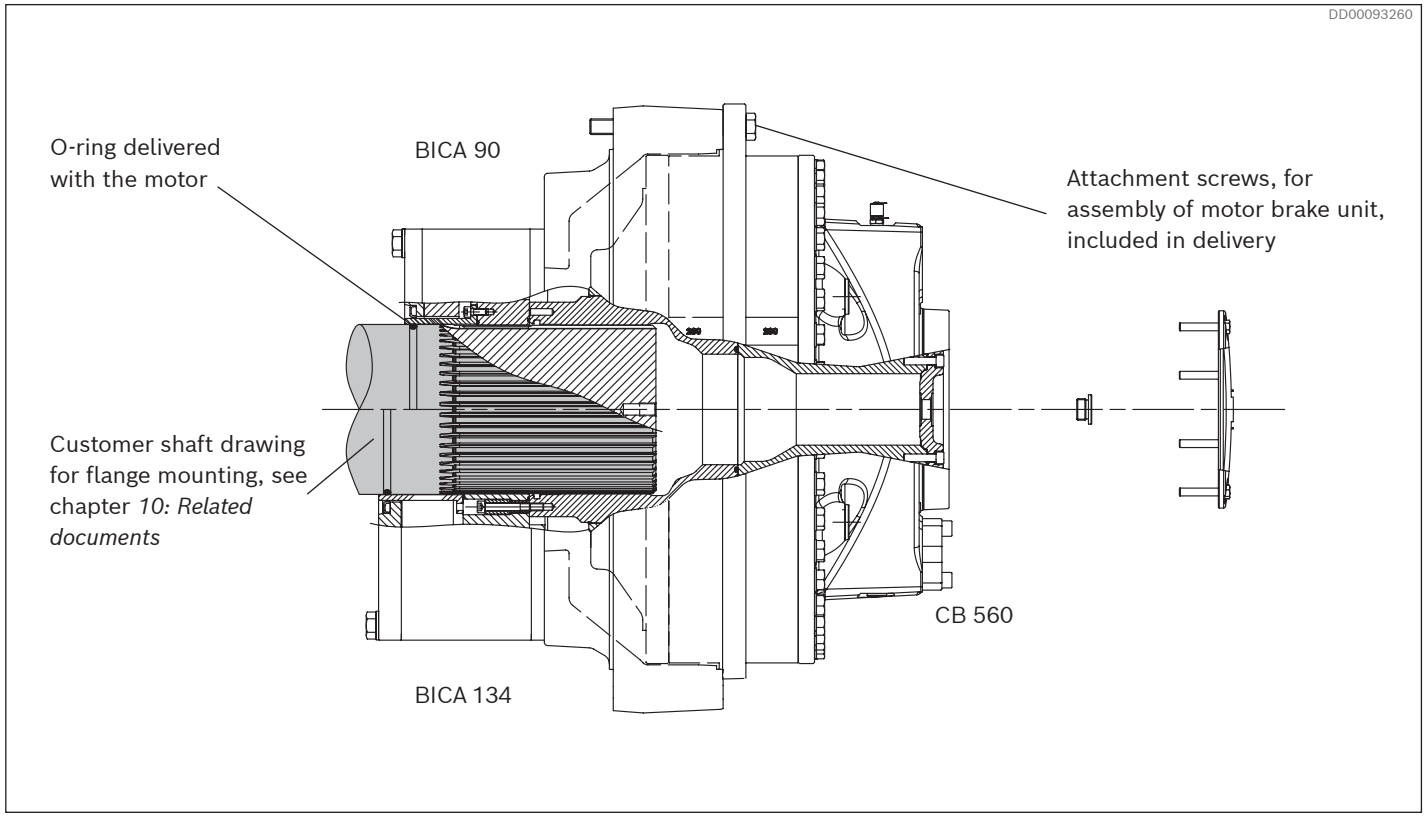


**Fig. 12: Example flange mounted CB motor with spline and BICA brake on customer shaft**

### 7.1.4 Installation of Hägglunds CBm with BICA brake on customer shaft

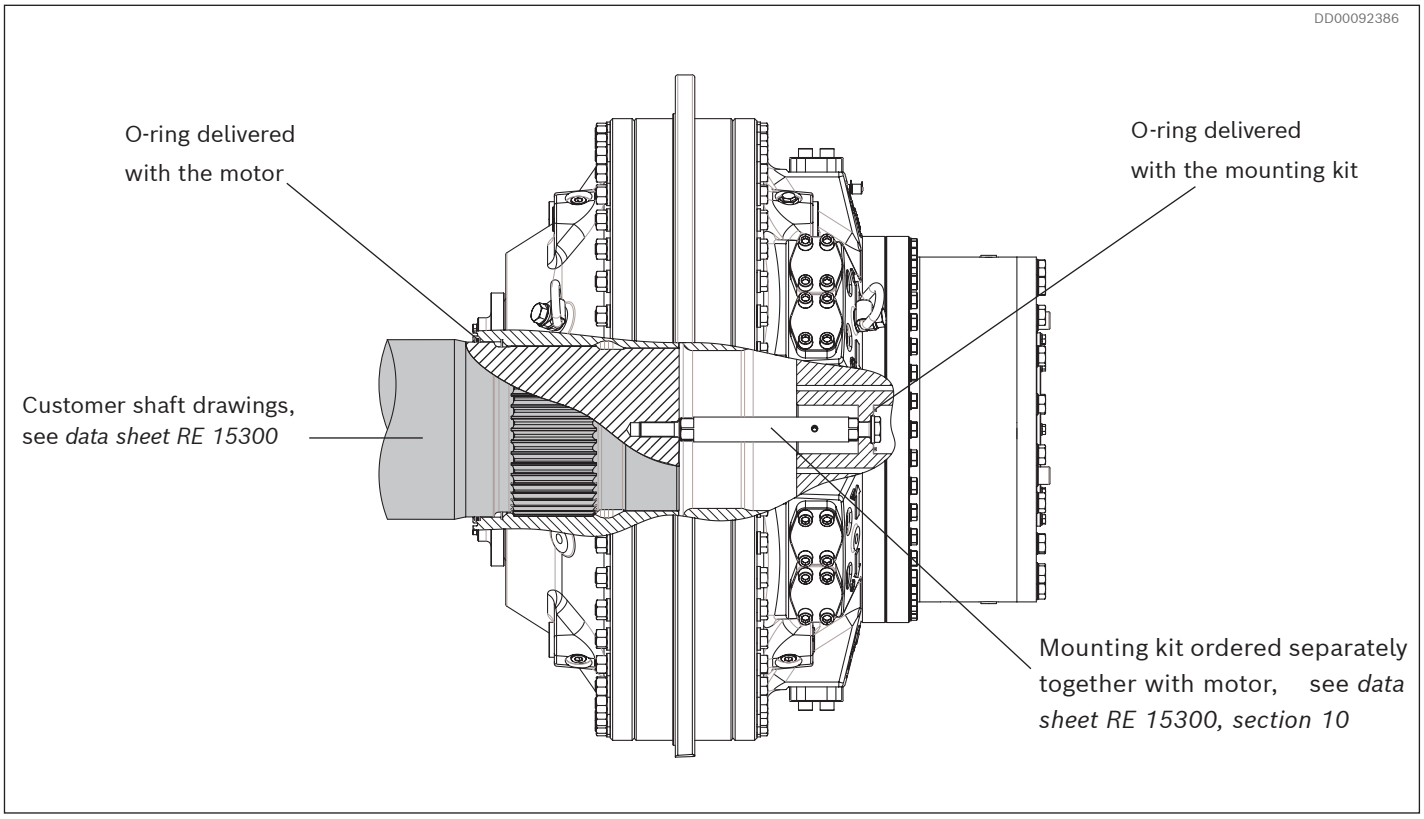


**Fig. 13: Example torque arm mounted Hägglunds CBm with spline and BICA brake on customer shaft**

## 7.2 Vertical mounting

For vertical mounting, contact your Bosch Rexroth representativ.

## 7.3 Submerged application

For submerged application, contact your Bosch Rexroth representativ.

# 8 Accessories

## 8.1 Inductive position sensor

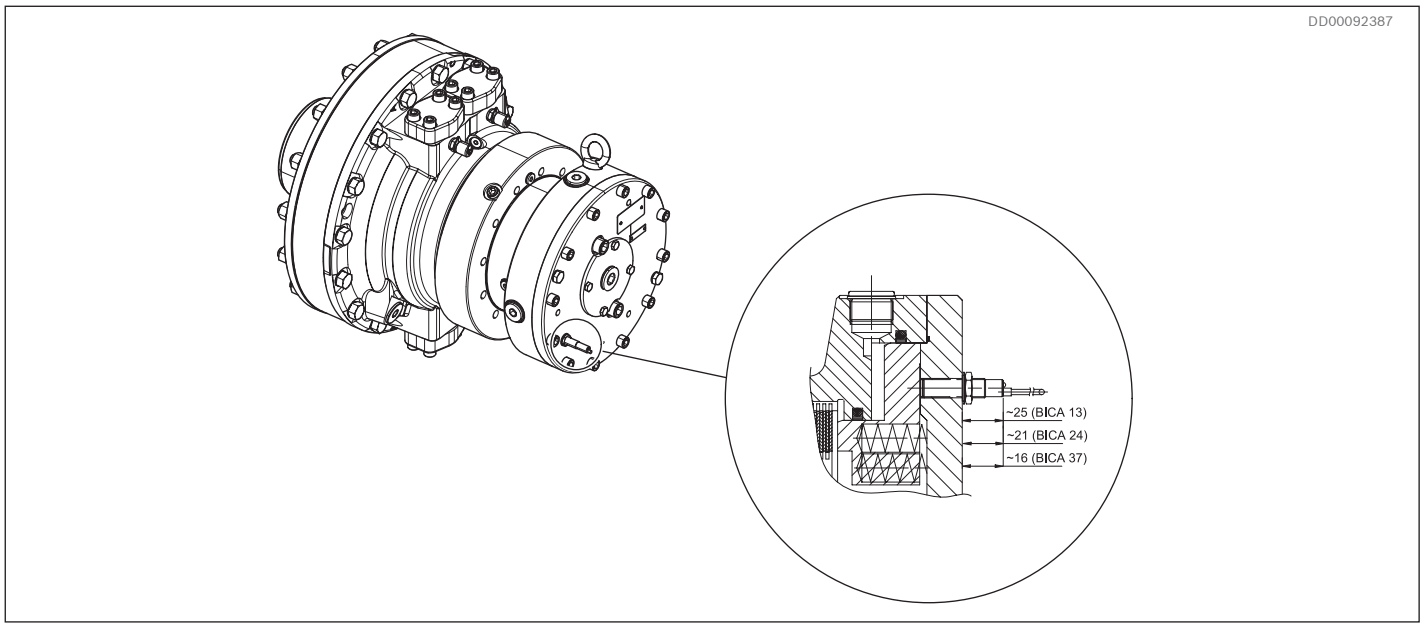


**Fig. 14: Hägglunds CA motor with BICA brake and inductive position sensor**

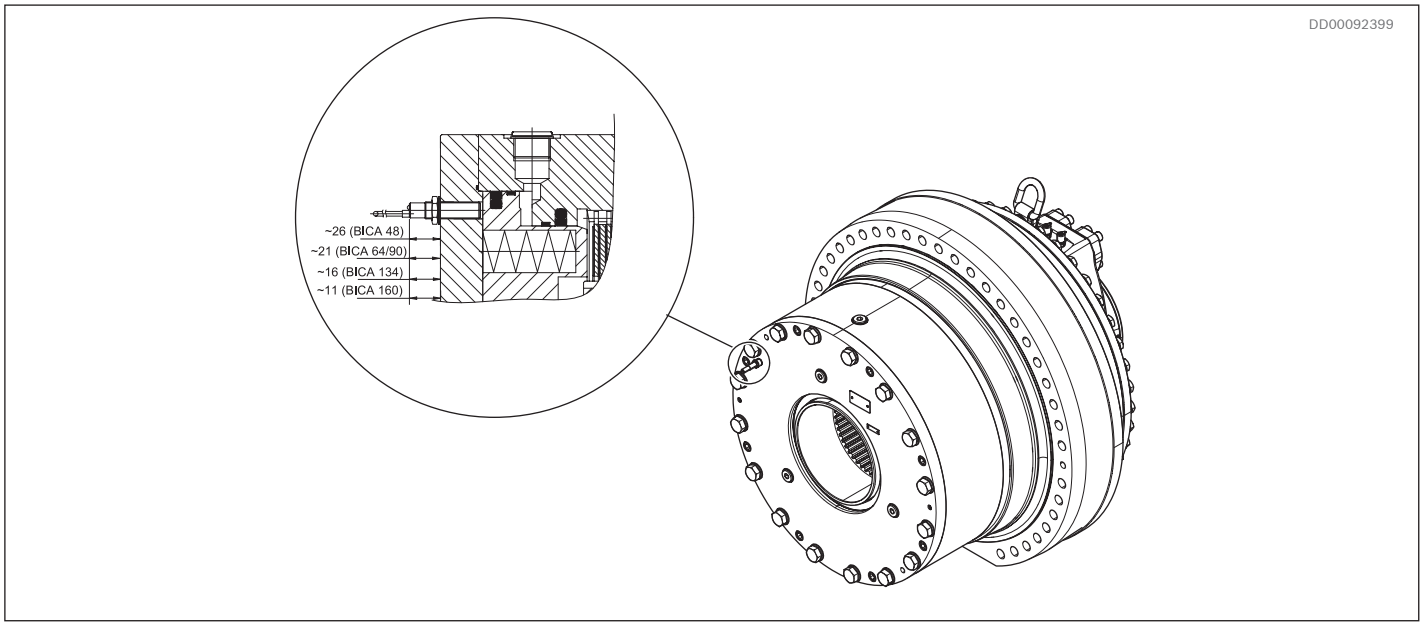


**Fig. 15: Hägglunds CB motor with BICA brake and inductive position sensor**

### Features

- Indication of open brake
- ATEX Inducive position sensor is standard for brakes in explosive environment version, see *8.2*

### Description

Inductive position sensor used as brake open indicator, protects the drive from running motor against actuated brake.

Inductive position sensor is available for all Hägglunds BICA brakes

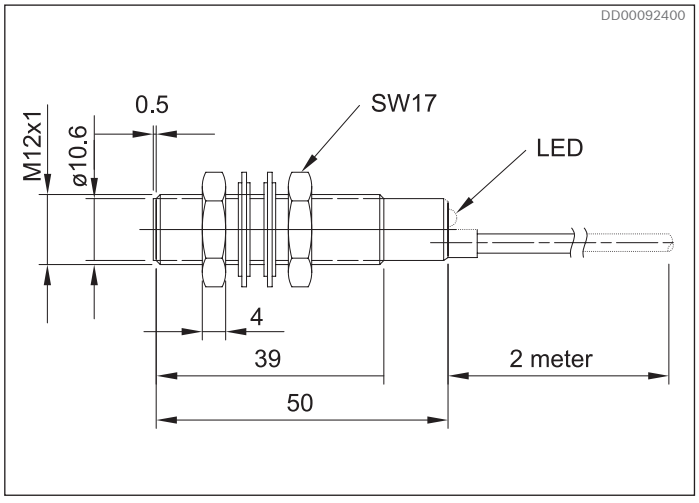


**Fig. 16: Dimensions inductive position sensor for BICA 13 to BICA 134**

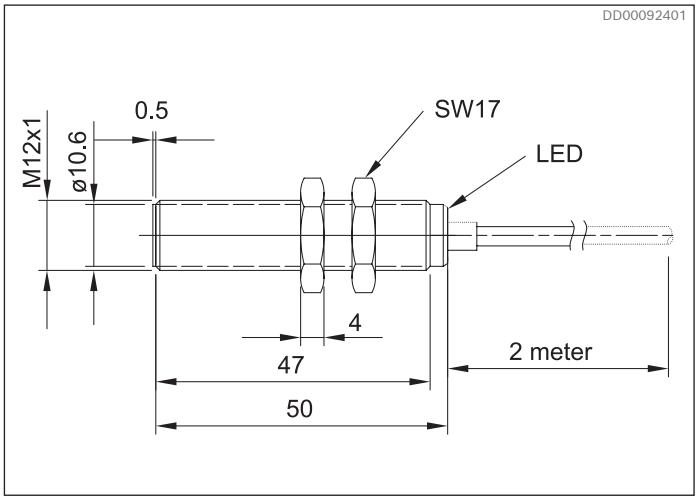


**Fig. 17: Dimensions inductive position sensor for BICA 160**

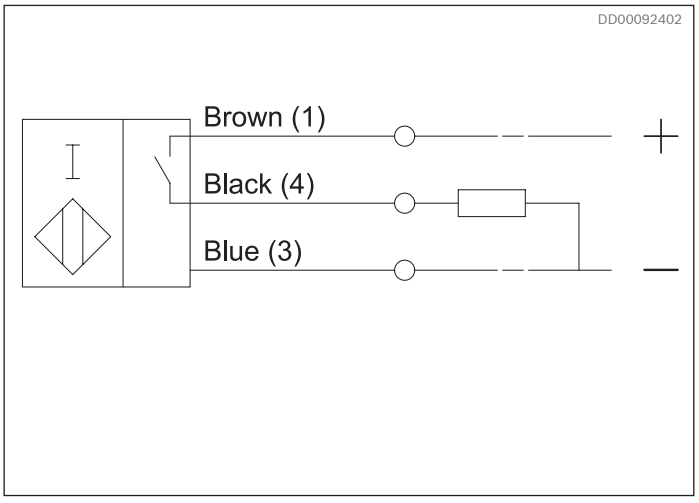


**Fig. 18: Wiring diagram inductive position sensor**

**Table 9: Material ID Inductive position sensor**

| Brake type | Material id |
|---|---|
| BICA 13 to BICA134 | R939011890 |
| BICA 160 | R901444090 |

**Table 8: Technical data, inductive position sensor**

| | | BICA 13 to BICA 134 | BICA 160 |
|---|---|---|---|
| Operational voltage range | Ub | 10...30 V DC | 10...30 V DC |
| Rated operational current | Ie | max 200 mA | max 200 mA |
| Short circuit protection | | Yes | Yes |
| Operating distance | Sa | 0...1.6 mm (Sn=2 mm) | 0...1.62 mm (Sn=2 mm) |
| Switching function | | PNP NO (Normally-Open) | PNP NO (Normally-Open) |
| Reverse polarity protection | | Yes | Yes |
| Operating temperature | Ta | -25...+70°C | -25...+70°C |
| Degree of protection | | IP67 | IP67 |
| Housing size | | M12×1 | M12×1 |
| Housin material | | Brass, nickel plated | Brass, nickel plated |
| Front cap | | PA6.6, black | PBT |
| Indication | | LED, yellow | LED, yellow |
| Cable | | LiYY 3×0.14 $mm^2$ × 2 m, PVC-outer jacket, black | LiYY 3×0.14 $mm^2$ × 2 m, PVC-outer jacket, black |
| For attachment | | 2 × hexagon nut and 2 × toothed washer | 2 × self locking nut |

### 8.2 Inductive position sensor ATEX classified version

For BICA brakes in explosive environment (ATEX version) a classified inductive position sensor is standard.

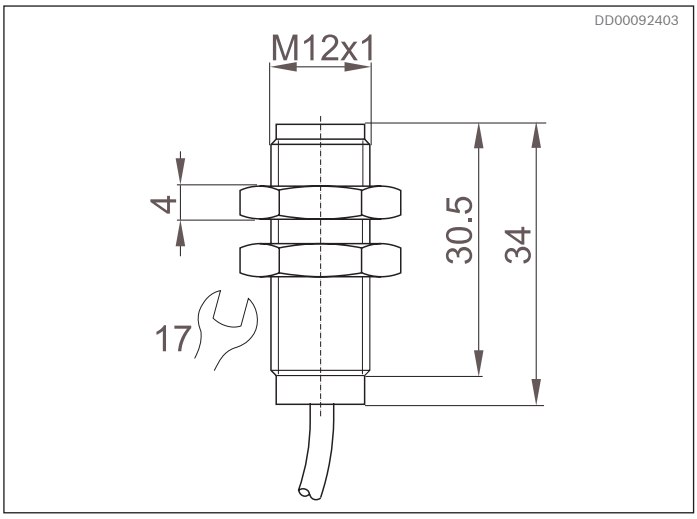


**Fig. 19: Dimensions ATEX inductive position sensor for BICA 13 to BICA 134**

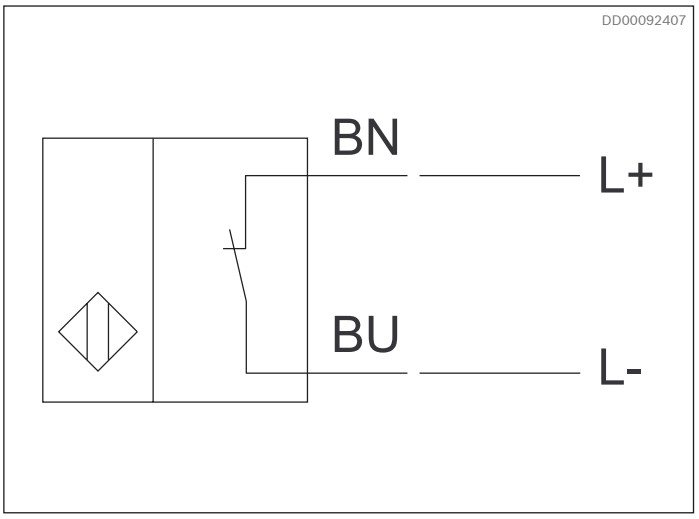


**Fig. 20: Wiring diagram ATEX inductive position sensor**

**Table 10: Technical data, ATEX inductive position sensor**

| | | ATEX BICA 13 to BICA 134 |
|---|---|---|
| Type | | NAMUR |
| Switching function | | Normally closed, NC |
| Operating distance | $s_n$ | Max 2 mm |
| Nominal voltage | $U_0$ | 8.2 V ($R_i$ approx. 1 kΩ) |
| Cable | | PVC 2 m, 0.34 mm² |
| Connection | Brown | L+ |
| | Blue | L- |
| Housing material | | PBT |
| Degree of protection | | IP66 |
| Certification | ATEX | II 2G Ex ia IIC T6 Gb |
| | | II 1D Ex iaD 20 T180° |
| Effective internal inductivity | Ci ≤45 nF; | a cable length of 10 m is considered |
| Effective internal inductance | Li ≤50 µH; | a cable length of 10 m is considered |

**Material ID: R901494288** Inductive position sensor

## 8.3 Speed sensor

### 8.3.1 Hägglunds SPDC

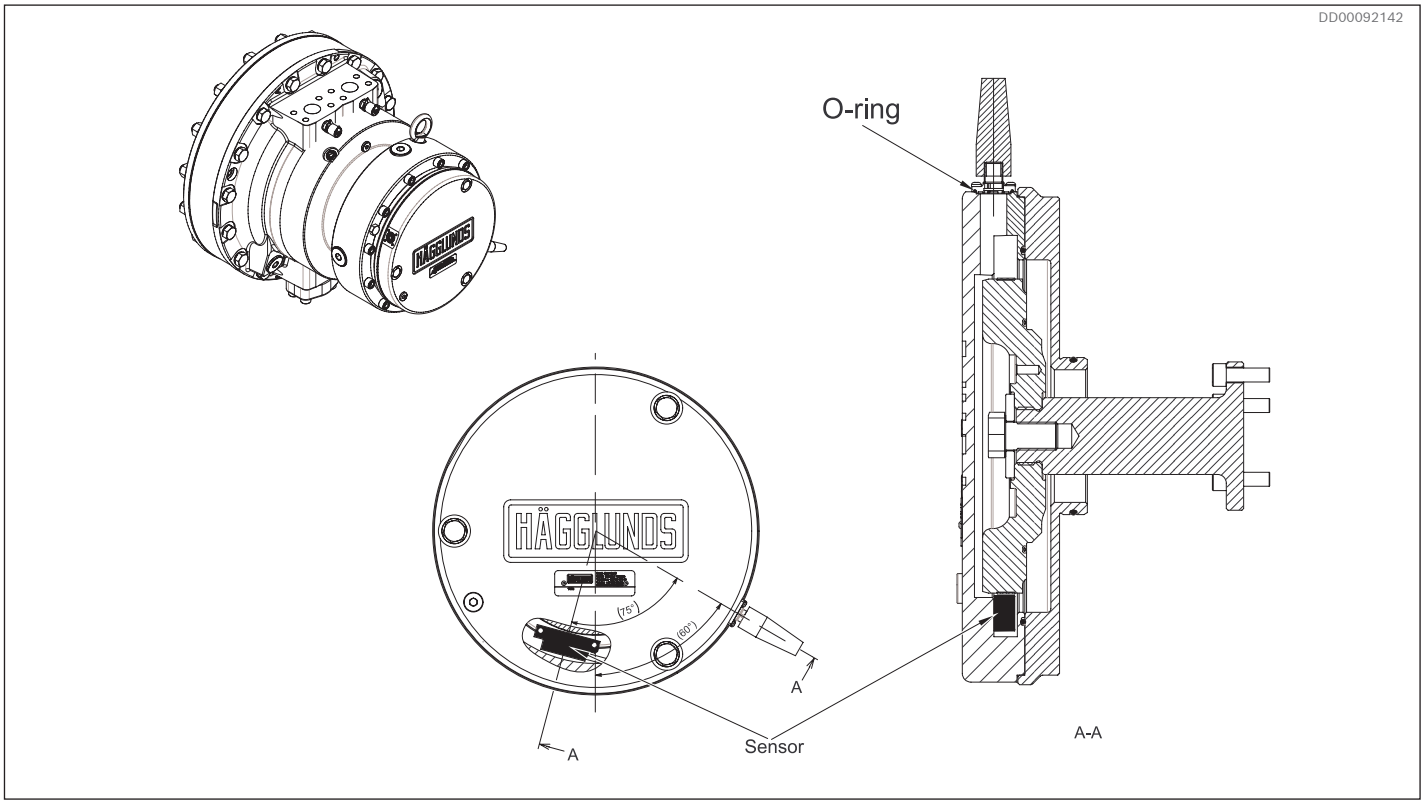


**Fig. 21: Example Hägglunds CA motor with BICA brake and SPDC BICA speed sensor**

For technical data, see document nr: **RE 15350**

**Features**

- Slim design fully integrated in brake
- Non-contact, wear free sensing system
- Possibility to read directions of rotation from sensor
- 1856 pulses per revolution for good speed control possibility
- Protection class IP67

**Description**

Speed sensing unit, Hägglunds SPDC, is a digital incremental encoder using magnetic sensing technology.

The sensor generates two square wave signals with 90° phase shift for detection of speed and direction of rotation.

Hägglunds SPDC BICA is only possible for usage with Hägglunds BICA 13 to BICA 37.

Hägglunds SPDC CB--, SPDC CBP- and SPDC CBM- is possible for usage with Hägglunds BICA 48 to BICA 160

## 9 Circuit design

**Things to consider when designing hydraulic circuit in applications with BICA brakes.**

- Be aware of residual back pressure in brake drain line
- Depending on the level of back pressure it will decrease the given brake torque by decreasing the brake force on the disc set accordingly
- Avoid running motor against closed brake
  - Be sure to have open the brake completely (min opening pressure level must be obtained) before starting motor
  - Inductive position sensor is available as option to avoid running motor against closed brake
- To avoid pressure peaks, when opening the brake a pressure limiting, valve must be fitted
- Air in the brake results in slow function. Be sure to ventilate the brake properly before start up of system
- Limiting the activation time of brake
  - Flushing of brake before start up of system. Specially important in cold environment
  - Make sure the drain line is correctly designed conserning diameter and length
  - Avoid back pressure

## 10 Related documents

| | Title | Document no | Document type |
|---|---|---|---|
| 🕮 | Hydraulic fluid quick reference | RE 15414 | Data sheet |
| 🕮 | Hägglunds CA | RE 15305 | Data sheet |
| 🕮 | Hägglunds CB | RE 15302 | Data sheet |
| 🕮 | Hägglunds CBm | RE 15300 | Data sheet |
| 🕮 | Rotation speed sensing unit, Hägglunds SPDC | RE 15350 | Data Sheet |
| 🕮 | Dimensions Hägglunds CA 50/CA 70 and BICA 13 to 37 | 141 0330 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CA 100/CA 140 and BICA 13 to 37 | 141 0331 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CA 210 and BICA 13 to 37 | 141 0354 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CB 280/CB 400 and BICA 48 | 041 0210 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CB 280/CB 400 and BICA 64 | 041 0211 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CB 560/CB 840 and BICA 90 | 041 0212 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CB 560/CB 840/CB 1120 and BICA 134 | 041 0213 | Dimension drawing |
| 🕮 | Dimensions Hägglunds CB 840 and BICA 160 | 041 0686 | Dimension drawing |
| 🕮 | CA 50 and CA 70 splines, Motor with brake and torque arm | 278 2232 | Dimension drawing |
| 🕮 | CA 50 and CA 70 splines, Flange mounted with brake | 278 2233 | Dimension drawing |
| 🕮 | CA 100 and CA 140 splines, Flange mounted | 278 2234 | Dimension drawing |
| 🕮 | CA 100 and CA 140 splines, With brake MDA 10 and torque arm | 278 2236 | Dimension drawing |
| 🕮 | CA 210 splines, Flange mounted | 278 2237 | Dimension drawing |
| 🕮 | CA 210 splines, Motors with brake and torque arm | 278 2239 | Dimension drawing |
| 🕮 | Customer shaft drawing CB 280 to CB 400 (torque arm mounting) | 041 0194 | Dimension drawing |
| 🕮 | Customer shaft drawing CB 280 to CB 400 (flange mounting) | 041 0195 | Dimension drawing |
| 🕮 | Customer shaft drawing CB 560 to CB 1120 (torque arm mounting) | 041 0196 | Dimension drawing |
| 🕮 | Customer shaft drawing CB 560 to CB 1120 (flange mounting) | 041 0197 | Dimension drawing |

**NOTES**

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**Bosch Rexroth AB**
895 80 Mellansel, Sweden
Tel: +46 (0) 660 870 00
Fax: +46 (0) 660 871 60
hagglunds@boschrexroth.com
www.boschrexroth.com



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