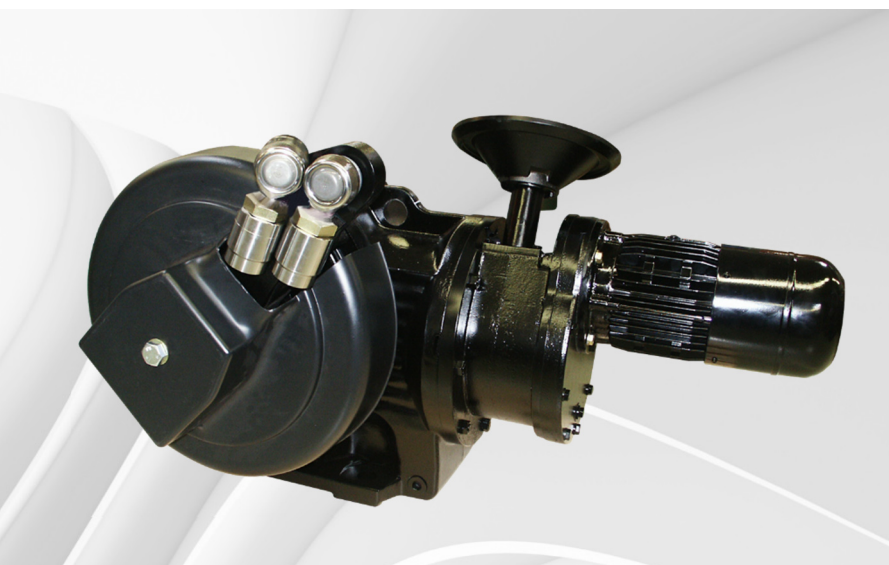


RHDE8000 / RHDE 16000 (Contrac)

Electrical rotary actuator



Electrical rotary actuator for the operation of final control elements

—
RHDE8000
RHDE16000

Introduction

Compact actuator for the operation of final control elements with preferably 90° rotary movement such as valve flaps, ball valves, etc.

The nominal torque is transferred through a lever actuator.

A special electronic unit controls the actuator. The special electronic unit serves as the interface between actuator and control system.

Additional Information

Additional documentation on RHDE8000 / RHDE16000 (Contrac) is available for download free of charge at www.abb.com/actuators.

Alternatively simply scan this code:



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1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.

For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Information and symbols on the product must be observed.

These may not be removed and must be fully legible at all times.

The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '**NOTICE**' indicates possible material damage.

Note

'**Note**' indicates useful or important information about the product.

... 1 Safety

Intended use

Control actuators are used exclusively for operating final control elements (valves, valve flaps, etc.).

They may only be operated using a suited Contrac electronic unit for field installation or mounting rack installation.

In addition to this operating instruction, the relevant documentation for the electronic unit and software tool must be observed.

Improper use

The following are considered to be instances of improper use of the device:

- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

Notes on data safety

This product is designed to be connected to and to communicate information and data via a network interface.

It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).

Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and / or theft of data or information.

ABB Automation Products GmbH and its affiliates are not liable for damages and / or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and / or theft of data or information.

Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

Manufacturer's address

ABB Automation Products GmbH Measurement & Analytics

Schillerstr. 72

32425 Minden

Germany

Tel: +49 571 830-0

Fax: +49 571 830-1806

Customer service center

Tel: +49 180 5 222 580

Email: automation.service@de.abb.com

2 Use in potentially explosive atmospheres

Explosion proof Contrac actuators are classified as type II devices for operation in potentially explosive atmospheres for days and device category 2.

They are designed for use in Ex zones 1 and 21.

Can of course also be used in zones 2 and 22 (for gas and dust atmosphere).

Ex marking

Actuator components

Full identification	II 2 GD ck Ex de [ib] ib II B T4 or IP6x T=130 °C ZELM 04 ATEX 0209 X
Motor with brake	II GD Ex de IIB T4
Gearing	II 2GD ck T4
Position sensor	II 2G Ex [ib] ib IIC T4
Anti-condensation heater	II 2G Ex d II C
Connection areas	II 2G/D Ex e II B T4

Standards

Applicable standards

• EN 50 014	• EN 50 0281-1-1
• EN 50 018	• EN 13 463-1
• EN 50 019	• EN 13 463-5
• EN 50 020	• EN 13 463-8

Thermal motor monitoring

In Contrac control actuators for use in potentially explosive atmospheres, additional independent monitoring of motor temperature is required.

Monitoring can be performed using the ABB SD241-B monitoring unit or a comparable certified tripping unit for thermistor temperature sensors.

The motor temperature monitoring unit interrupts the power supply as soon as the motor temperature up-scales the permissible limit value.

... 2 Use in potentially explosive atmospheres

Overview

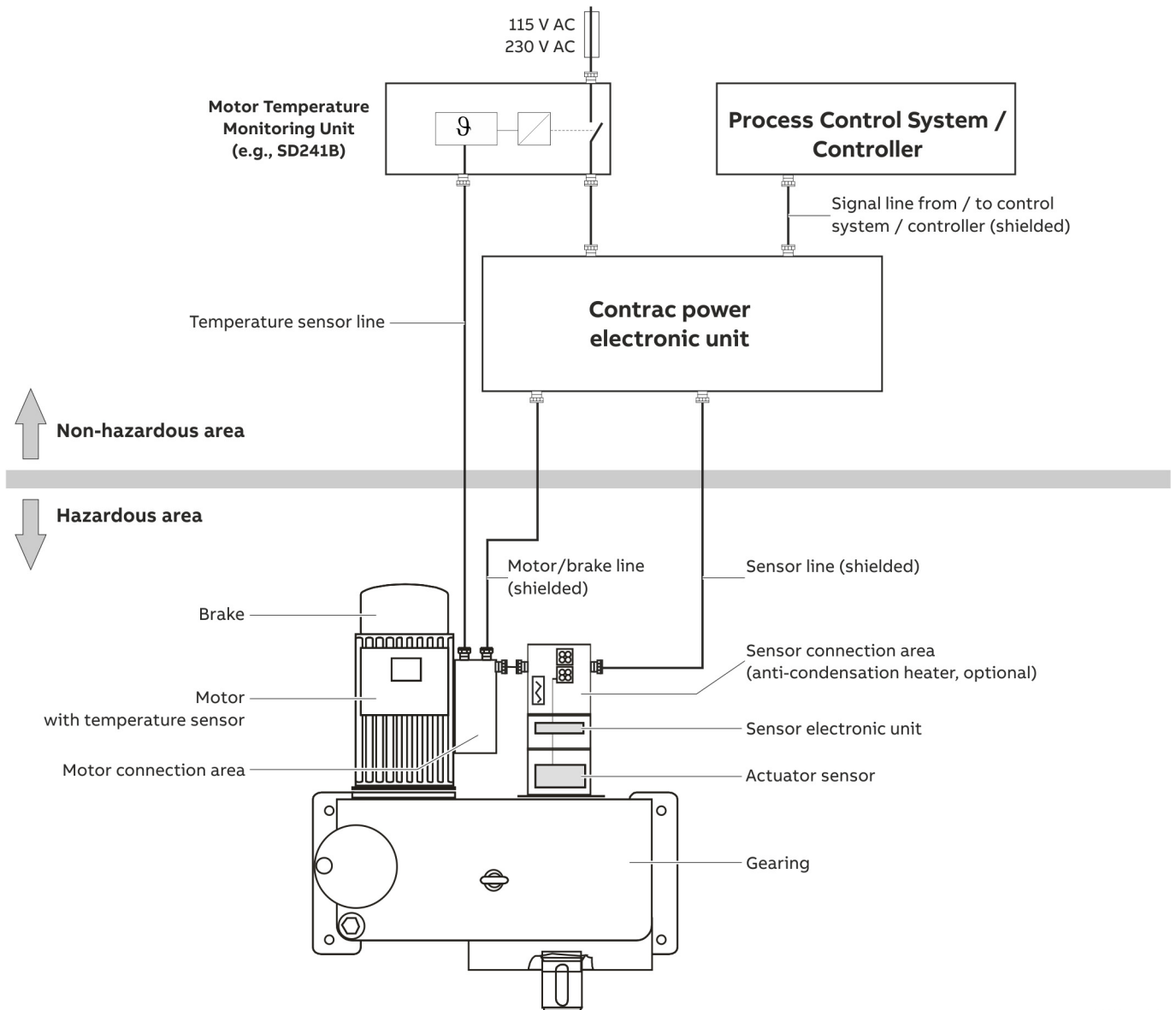



Figure 1: Allocation of the Contrac components when using in potentially explosive atmospheres (example)

Technical data for the cable set (for Ex-relevant range)



	Motor connection	Motor temperature monitoring	Signal terminal (option)
Wire conductor	8 × 1.5	2 × 1.5	8 × 0.5
Mat.-No.	9280271	9280272	9280183
Manufacturer	Huber + Suhner	Huber + Suhner	Bröckskes (Helu-Kabel)
Type	RX125 S2 B 8g1.5 mm ² BK	RX125 S2 2×1.5 mm ² BK	So-LTG-PUR-8 × 0.5 (HK-So-Li12YC11Y-OB-8 × 0.5)
Sheathing diameter	14.3 ±0.4 mm (0.56 ±0.02 in)	8.0 ±0.4 mm (0.31 ±0.02 in)	8.5 ±0.4 mm (0.33 ±0.02 in)
Nominal voltage U _o / U (U _o also applies to wire / shielding)	600 / 1000 V	600 / 1000 V	300 / 500 V
Wire / wire test voltage	3.5 kV	3.5 kV	1.2 kV

Temperature range	Motor connection	Motor temperature monitoring	Signal terminal (option)
Moving	-25 to 125 °C (-13 to 257 °F)	-25 to 125 °C (-13 to 257 °F)	-40 to 90 °C -40 to 194 °F)
Not moving	-40 to 125 °C (-40 to 257 °F)	-40 to 125 °C (-40 to 257 °F)	-50 to 90 °C (-58 to 194 °F)
Protective earth	GNYE		
Environment	UV-resistant and weather-proof	UV-resistant and weather-proof	UV-resistant and weather-proof

	Motor connection	Motor temperature monitoring	Signal terminal (option)
Cable gland	13.5 to 18 / M25 × 1.5 Exe	4 to 8.5 / M20 × 1.5 Exe	
Mat.-No.	9287589	9287588	
Manufacturer	Rabe-System-Technik	Rabe-System-Technik	
Type	CMDEL-T	ADE 1F	
Article no.	00222574	00816674	
Cable diameter	13.5 to 18 mm (0.53 to 0.71 in)	4 to 8.5 mm (0.16 to 0.33 in)	
Material	Brass, nickel-plated	Brass, nickel-plated	
Standard seal insert	Neoprene	Neoprene	
O-ring	Perbunan	Neoprene	
Temperature range	-40 to 100 °C (-40 to 212 °F)	-40 to 100 °C (-40 to 212 °F)	
IP rating	IP 68 - 10 bar (140.04 psi)	IP 68 - 5 bar (72.52 psi)	
Certificate	LCIE 97 ATEX 6005 X / 01	LCIE 97 ATEX 6008 X / 03	
Marking	 II 2 G D Ex e II / Ex tD	Ex II 2 G D, Exe II	

... 2 Use in potentially explosive atmospheres

... Technical data for the cable set (for Ex-relevant range)

Option			
	Motor connection	Motor temperature monitoring	Signal terminal (option)
Manufacturer	Pflitsch	Pflitsch	
Type	blue globe ATEX	blue globe ATEX	
Diameter	M25 × 1.5 KAD20-16/16-11	M20 × 1.5 KAD14-9/9-5	
Article no.	bg225 msex	bg220 msex	
Temperature range	−40 to 115 °C (−40 to 239 °F)	−40 to 115 °C (−40 to 239 °F)	
IP rating	IP 68	IP 68	
Certificate	PTB 06 ATEX 1036 X	PTB 06 ATEX 1036 X	
Marking	 II 2 G Ex e II	 II 2 D Ex tD A21 IP68	

Note
If the specified cable harness does not meet all safety-relevant requirements, the proper installation material must be used.

3 Design and function

Design

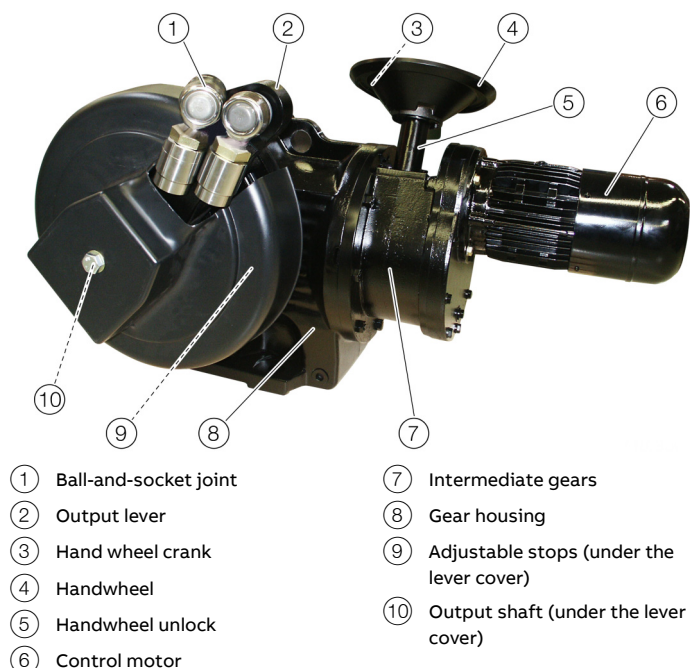


Figure 2: (illustrations may differ from actual installation)

Principle of operation

Compact actuator for the operation of final control elements with preferably 90° rotary movement such as valve flaps, ball valves, etc.

The nominal torque is transferred through a lever actuator.

A special electronic unit controls the actuator. The special electronic unit serves as the interface between actuator and control system.

During continuous positioning, the electronic unit varies the motor torque steplessly until the actuator force and the control valve force are balanced. High response sensitivity and high positioning accuracy with short positioning time ensure an excellent control quality and a long actuator life.

... 3 Design and function

Device designs




	RHDE8000 / RHDE16000 (Contrac)
Operating mode	S9; stallproof acc. to EN 60034-1
IP rating	IP 66
Explosion protection	ATEX
Humidity	≤ 95 % annual average; condensation not permitted
Ambient temperature	–25 to 60 °C (–13 to 140 °F) –30 to 40 °C (–22 to 104 °F) (reduced operating speed at rated load and below –10 °C (14 °F))
Transport and storage temperature	–30 to 60 °C (–22 to 140 °F)
Long-term storage temperature	–30 to 40 °C (–22 to 104 °F)
Mounting position	IMB 3, IMB 6, IMB 7, IMV 6; preferably IMB 3 in accordance with EN 60034-7
Coating	2-layer component epoxy (RAL 9005, black)
Anti-condensation heater	Motor winding: directly from electronic unit. Signal space: separate heating resistor; separate power supply or power feed from Contrac electronic unit
Electrical connection	Terminals in Ex e area; separately for motor and signals Connection cable for electronic unit – actuator available as an option (see ordering information for electronic unit)
Power supply for motor and sensors	Via Contrac electronic unit only

	RHDE8000-15	RHDE8000-80
Nominal torque	8000 Nm (5900 lbf-ft), adjustable to 0.5, 0.75 or 1 × nominal torque	
Starting torque	1.2 × nominal torque (break-away torque in end positions for short time 2 × nominal torque)	
Rated time for 90°; adjustable	15 to 900 s	80 to 900 s
Rated operating speed, adjustable	6.0 to 0.1°/s	1.12 to 0.1°/s
Operating angle	Typically 90° (min. 35°; max. 140°), see manual for reduced angle with lever and limit stop	
Weight	Approx. 710 kg (1565 lb)	Approx. 725 kg (1598 lb)
Associated electronic unit	For field mounting: EBN861 For rack installation: EBS862	For field mounting: EBN853 For rack installation: EBS852
Thermal motor monitoring	With motor temperature monitoring equipment SD241B or similarly certified tripping unit for thermistor temperature sensors	
Motor	BD 112 M-4 B	BD 90 L-4 B
Sensors	Position and temperature sensor always available	

RHDE16000-30	
Nominal torque	16000 Nm (11800 lbf-ft), adjustable to 0.5, 0.75 or 1 × nominal torque
Starting torque	1.2 × nominal torque (break-away torque in end positions for short time 1.5 × nominal torque)
Rated time for 90°; adjustable	30 to 900 s
Rated operating speed, adjustable	3.0 to 0.1°/s
Operating angle	Typically 90° (min. 35°; max. 140°), see manual for reduced angle with lever and limit stop
Weight	Approx. 1030 kg (2270 lb)
Associated electronic unit	For field mounting: EBN861
	For rack installation: EBS862
Thermal motor monitoring	With motor temperature monitoring equipment SD241B or similarly certified tripping unit.
Motor	BD 112 M-4 B
Sensors	Position and temperature sensor always available

4 Product identification

Name plate

1	Antrieb/ ActuatorCONTRAC ...		
2	F-Nr./No	NL -/-	CE 0044
3	F=	Jahr/Year	
4	Ta =	IP 66	
5	s = min. max.	v = mm/s	
6	Öl / Oil:		 II 2G II 2D
7	für/for Elektronik/Electronics EBN.../EBS...		
8	II2G ck Ex d e [ib] ib IIB T4 Gb, II 2D ck Ex tb IIIC T130°C		
9	PTZ 16 ATEX 0017X		
10			
<div>ABBAutomationProducts GmbH Schillerstraße 72 D-32425 Minden Made in Germany</div> <div></div>			

- | | |
|---|--|
| ① Full type designation | ⑥ Filled oil types |
| ② manufacturing number / NL-No.
(For no-list design) | ⑦ Associated Contrac electronic unit |
| ③ Output torque / Year of manufacture | ⑧ Explosion protection degree |
| ④ Permissible ambient temperature / IP rating / CE mark with information about the monitoring authority | ⑨ Approval body and inspection no. |
| ⑤ Min., max. operating angle / max. operating speed / Heating (optional) | ⑩ Free for customer-specific information |

Figure 3: Name plate (example)

5 Transport and storage

Inspection

Check the devices immediately after unpacking for possible damage that may have occurred from improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents.

All claims for damages must be submitted to the shipper without delay and before installation.

Transporting the device

Safety instructions

DANGER

Danger to life due to falling or toppling loads.

Risk of death or serious injury due to the device falling down or toppling over!

- Standing under suspended loads is prohibited.
- Do not detach the hoisting equipment until installation is complete.
- Only use the dedicated load pick-up devices (eyebolts) for suspending the components.

Consider the following items during transport:

- Pay attention to the device weight details.
- Do not expose the device to humidity during transport. Pack the device accordingly.
- Pay attention to the permissible transportation temperatures for the device.

Returning devices

For the return of devices, follow the instructions in **Repair** on page 35.

Storing the device

Note

The storage data provided below assumes that the devices are fully closed and thus comply with the IP rating stated in the specification.

When devices are supplied, their IP rating is guaranteed. If the devices have been tested or commissioned, the IP rating needs to be guaranteed before they are put into storage.

The devices may be stored under moist and corrosive conditions for a short time. The equipment is protected against external corrosive influences. However, direct exposure to rain, snow, etc., must be avoided.

The permissible storage and transport temperatures must be observed.

Devices equipped with a heater are also protected by desiccant, which is placed in the following locations where condensation may be a problem:

Position sensor:	In connection chamber
Electronic unit	In electrical connection chamber

The desiccant guarantees sufficient protection for approximately 150 days. It can be regenerated at a temperature of 90 °C (114 °F) within 4 h.

Remove the desiccant prior to commissioning the actuator or the electronics.

If you intend to store or transport the device for a prolonged period (> 6 months), we recommend that you wrap it in plastic film and add desiccant.

Protect uncovered metallic surfaces with an appropriate long-term corrosion inhibitor.

The relevant long-term storage temperatures must be observed.

6 Installation

Safety instructions

DANGER

Danger to life due to falling or toppling loads.

Risk of death or serious injury due to the device falling down or toppling over!

- Standing under suspended loads is prohibited.
- Do not detach the hoisting equipment until installation is complete.
- Only use the dedicated load pick-up devices (eyebolts) for suspending the components.

Please observe the following safety instructions

- Only qualified specialists may mount and adjust the control actuator, and make the electrical connection.
- When working on the actuator or the electronics always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.
- Switch off the supply voltage and take precautions to prevent unintentional switch-on.

Mounting

Actuator check

Before you start to install the actuator make sure that the delivery status corresponds to the ordered status and to the intended use.

- Check the oil level when installing the device in positions other than IMB 3.
- Once the actuator is installed, fasten the vent valve in the uppermost oil hole.
- Prior to commissioning the device, make sure that the motor and the connection chambers are free of dirt, humidity and corrosion.

... 6 Installation

... Mounting

Installation instructions

- Make sure that no process forces are exerted on the final control element.
- Do not lift the actuator by the motor or handwheel.
- The load pick-up device (eyebolt) attached to the actuator may only be loaded in the vertical direction. Only use the load pick-up device to lift / lower the actuator (without final control element mounted).
- Make sure that the actuator is accessible from all sides so that convenient handwheel operation, electrical connection, or exchange of assemblies is possible.
- Select the installation location such to avoid direct exposure to rain, snow and other environmental influences.
- The control actuators can withstand vibration loadings in accordance with EN 60068-2-6, Table C.2 to 150 Hz and max. 2 g.
- The substructure should be designed to be level and torsion-resistant.
- The drive elements (lever/coupling rod) must not cause additional vibration loadings (e.g., use spring couplings or vibration absorbers in the coupling rod.)
- When mounting the actuator close to heat sources use an insulating layer or shielding.
- Make sure that the max. ambient temperature of 60 °C (140 °F) or 40 °C (104 °F) for the lower temperature design is not up-scaled. If required, provide a sunshield to protect against direct sunlight.
- The maximum tilt angle of 140° must not be exceeded.

Fastening the actuator

1. Place the actuator on the fastening device in the correct position. Pay attention to the rotating direction in combination with the final control element.
2. Fasten the actuator using four screws. Use the biggest possible screw diameter and observe the tightening torque (see table **Locking and fastening elements** on page 16).

Mounting position

The spur gears of the actuator are oil lubricated. They contain the max. oil quantity when leaving the manufacturer. Once the actuator is installed replace the uppermost check plug by the separately supplied venting plug.

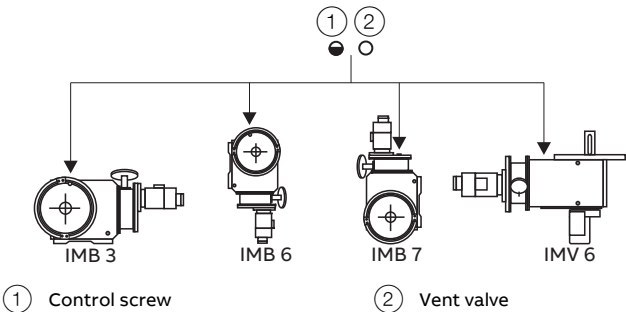


Figure 4: Permissible mounting positions

The mounting positions presented are permissible. To facilitate mounting and maintenance, however, it is recommended that you use position IMB 3 For each mounting position, check the oil level prior to commissioning **Filling volumes** on page 34.

Note

For the RHDE16000, only mounting position IMB 3 is permitted.

Note

It is important that sufficient cooling air is supplied and sufficient space is available should components need to be exchanged.

To achieve this, allow for the following minimum distances:

Actuator	Space
RHDE8000 / RHDE16000	40 mm (1.57 in)

Assembly with the final control element

WARNING

Risk of injuries due to crushing between the lever and the stops or between the lever and the coupling rod, respectively!

- Prior to starting any mechanical work on the device, switch off the voltage supply to the motor and take precautions to prevent unintentional switch-on.

WARNING

Risk of injury due to live parts!

- When working on the actuator or the related subassembly, switch off the power supply for the electronic unit and separate anti-condensation heater (option), and take precautions to prevent unintentional switch-on!

NOTICE

Vibrational loading may cause the lever cover to come off!

- Secure the lever cover with the appropriate screw locking devices!

Note

Before finally coupling the actuator to the valve, let it once overshoot the actual 'OPEN' and 'CLOSED' end positions by at least 10 %.

Preparation for mounting with lever

1. Make sure that the shaft and lever hole surface are clean and free of grease.
2. Determine the length of the coupling tube (not included in the scope of delivery) on-site.
3. Move the final control element to the 'CLOSED' end position.
4. Use the handwheel to move the actuator into the proper end position. Observe the permissible angle.
5. Refer to relevant data sheet for the required length of the connection pipe.
6. In order to fasten the second ball-and-socket joint, provide a cone in the lever of the final control element, in accordance with the dimensions.
7. Insert the ball-and-socket joint, and secure with crown nut and split-pin.
8. Remove the welding bushings and weld them to the coupling tube.
9. Insert the link rod between the two ball-and-socket joints and screw it in.
10. The 'L' dimension can be adjusted by turning the link rod.
11. When adjustment is finished, fasten the counter nuts.

Travel-dependent stop adjustment

1. Remove the lever cover.
2. Move the actuator lever / final control element to the end position requiring finer mechanical adjustment.
3. Put the limit stop onto the toothing as close to the actuator lever as possible and fasten it with screws.
4. Do not fix the mechanical limit stops within the adjusted operating range.
5. Move the driver lever towards the limit stop using the handwheel; turn the link rod for fine adjustment.
6. Tighten the counter nuts.
7. Fasten the limit stop in the other mounting position close to the end position, depending on the toothing.
8. Re-attach the lever cover. Observe the tightening torque!

Force-dependent stop adjustment

1. First make adjustment as described in **Travel-dependent stop adjustment** on page 15 (action steps 1 to 4).
2. Prior to re-fastening the counter nut, turn the link rod with the hand wheel locked in place to provide pretension in the closed position of the valve.
3. Lock the hand wheel.
4. Turn the link rod or slightly shift the mechanical limit stop to get a small gap between the lever and the limit stop. The procedure depends on the stiffness of the linkage arrangement.
5. Tighten the counter-nuts and limit stop screws.
6. Re-attach the lever cover. Observe the tightening torque!

... 6 Installation

... Mounting

Installation variants

Locking and fastening elements

Locking screws of mechanical limit stops		
Tightening torque Nm (lbf-ft)		
670 (494.17)		
lever clamping screw		
Tightening torque Nm (lbf-ft)		
1400 (1032.56)		
Lever cover		
Tightening torque Nm (lbf-ft)		
30 + 5 (22.13 + 3.69)		
Mounting screw (property class 8.8)		
Hole diameter	tensile strength	Yield strength
mm (in)	N/mm ² (lbf/in ²)	N/mm ² (lbf/in ²)
39 (1.54)	≥ 800 (≥ 116032)	≥ 640 (≥ 93550)
Specifications for linkage of ball-and-socket valve in driver lever cone		
Actuator	Ball-and-socket joint	ThreadTightening torque Nm (lbf ft)
RHD(E)8000 /	B50	M30 × 1.5 258 (190)
RHD(E)16000		

Mounting with lever

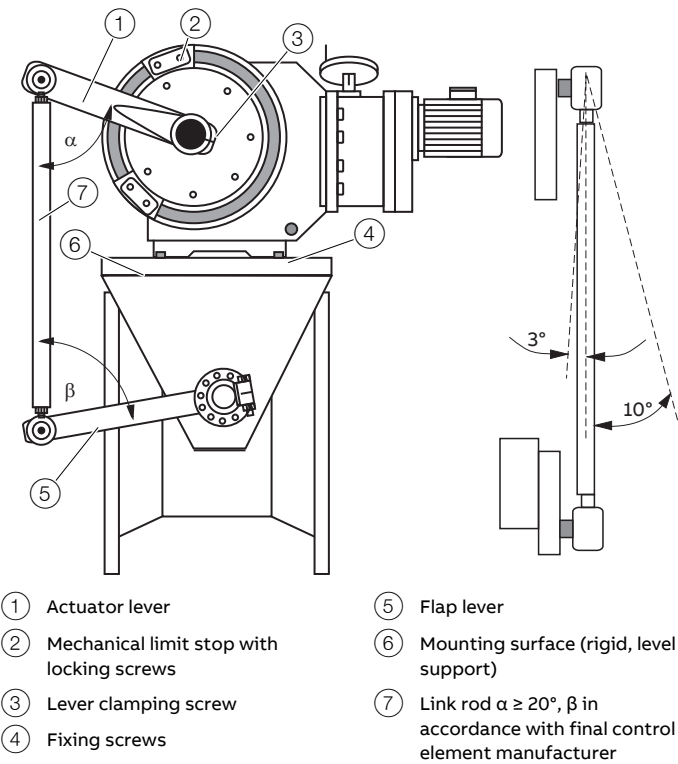


Figure 5: Component lever actuator

Installation with additional output elements

When mounting an additional drive element instead of the standard lever, the following installation conditions must be observed:

Maximum permissible shaft loads				
Type	radial force at distance x N (lbf)	Distance x from shaft edge mm (in)	axial force N (lbf)	Max. output torque
RHD(E)8000	28284 (6358)	103 (4.04)	4911 (1104)	Occasionally, 2 times nominal torque for a short time
RHD(E)16000	45255 (10173)	103 (4.04)	7858 (1767)	

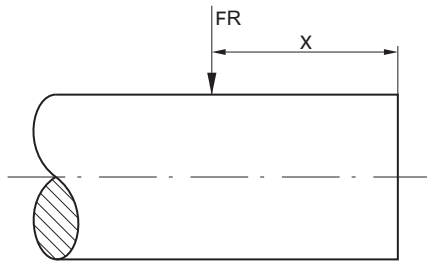


Figure 6: Shaft end

Configuring the drive element hub

The new output element is mechanically connected to the actuator shaft via a hole with feather key groove. This connection should be designed so that the nominal torque and any possible max. output torque is transmitted securely. The drive element must be mounted securely on the output drive shaft with suitable measures to prevent axial shift. For the new drive element, you can use the current mechanical stops.

The following parameters must be observed:

Type	bore diameter mm (in)	Feather key width mm (in)	Hub length mm (in)
RHD(E)8000	110 +0.09/+0,036 (4.33 +0.00354/+0.00142)	28 -0.022/-0,074 (1.1023 -0.00087/-0.00291)	205 (8.07)
RHD(E)16000	120 +0.09/+0,036 (4.73 +0.00354/+0.00142)	32 -0.026/-0,088 (1.2599 -0.001023/-0.003464)	205 (8.07)

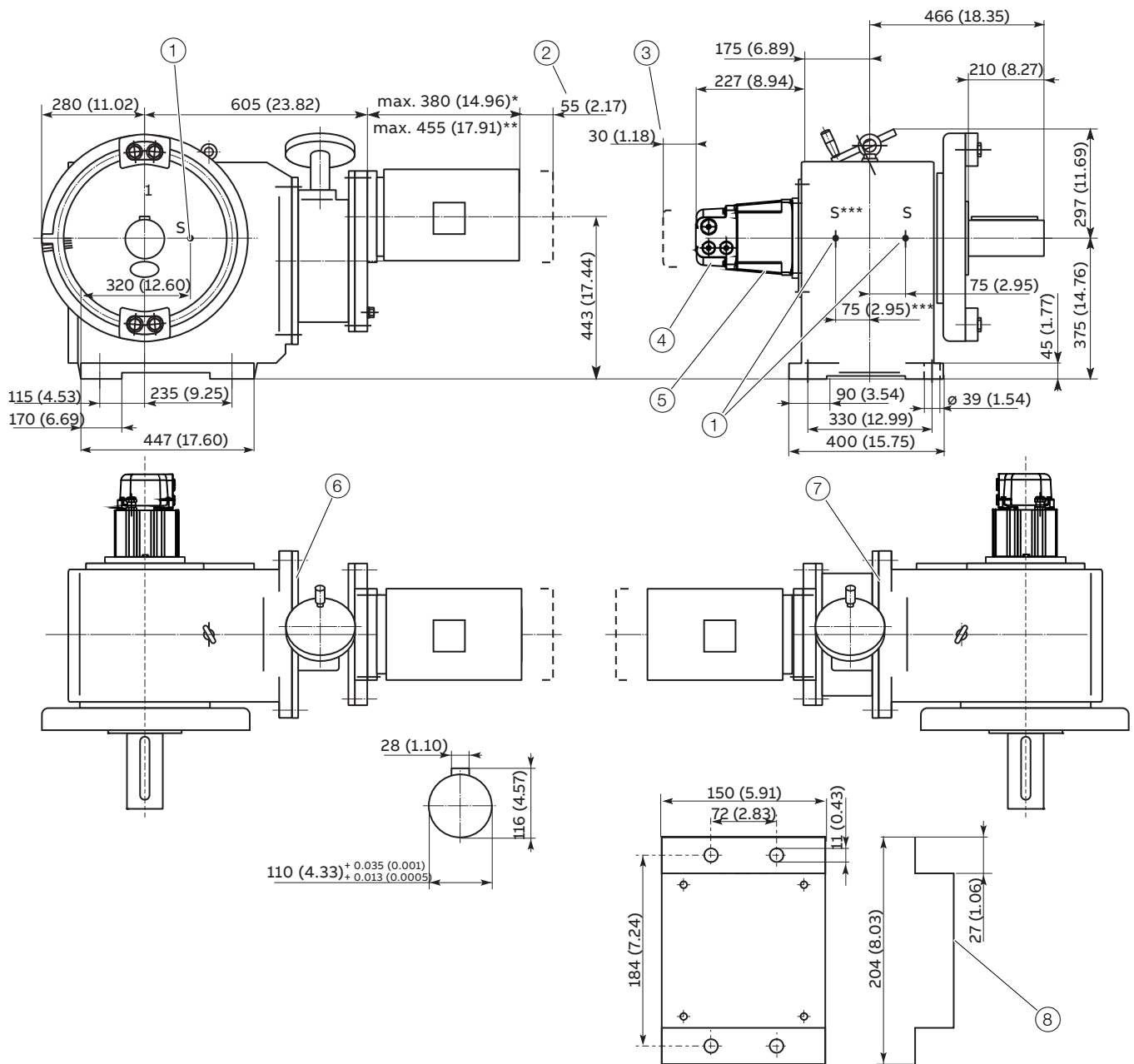
Minimum yield strength of the hub Rp 0.2 with actuator RHD(E)8000 320 N/mm² (46412.80 lbf/in²).

Minimum yield strength of the hub Rp 0.2 with actuator RHD(E)16000 250 N/mm² (36260.00 lbf/in²).

... 6 Installation

Dimensions

Control actuator RHDE8000



★ RHD8000-80

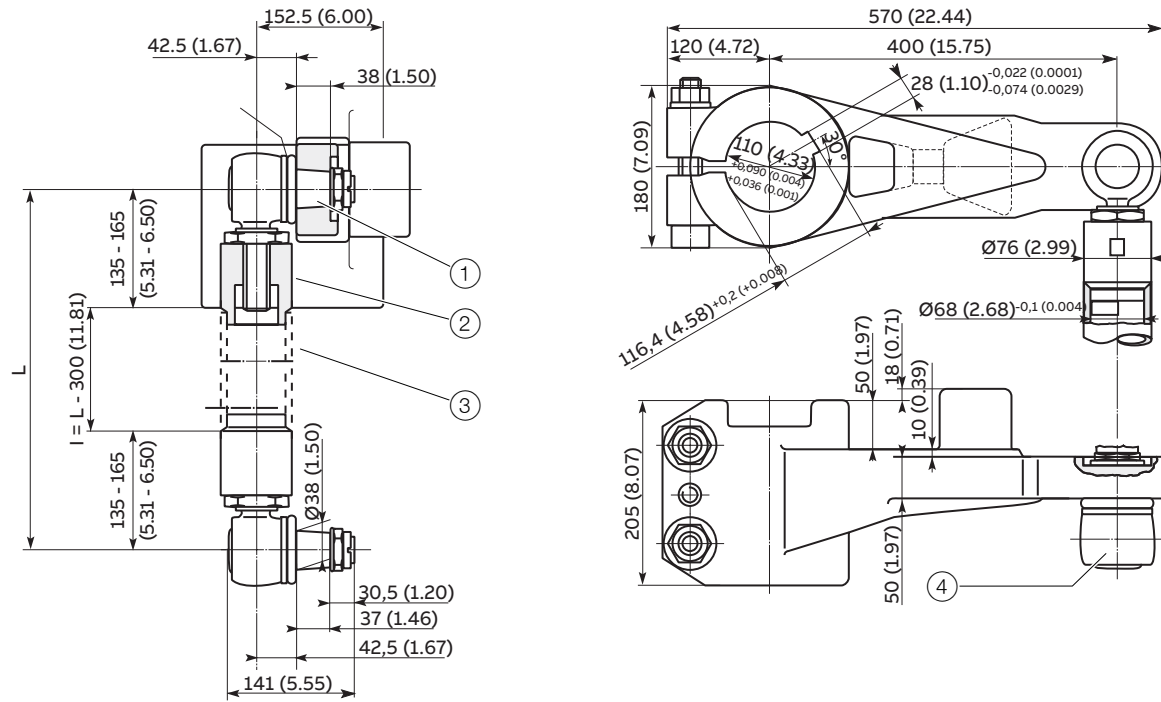
★★ RHD8000-15

*** Center of gravity for output drive shaft, right

- | | |
|---------------------------|------------------------------|
| ① S = Center of gravity | ⑤ Signal generator |
| ② Motor removal dimension | ⑥ Actuator shaft left |
| ③ Removal dimension | ⑦ Actuator shaft right |
| ④ Plug | ⑧ Plug holder (not to scale) |

Figure 7: Dimensions in mm (in)

Level actuator RHDE8000



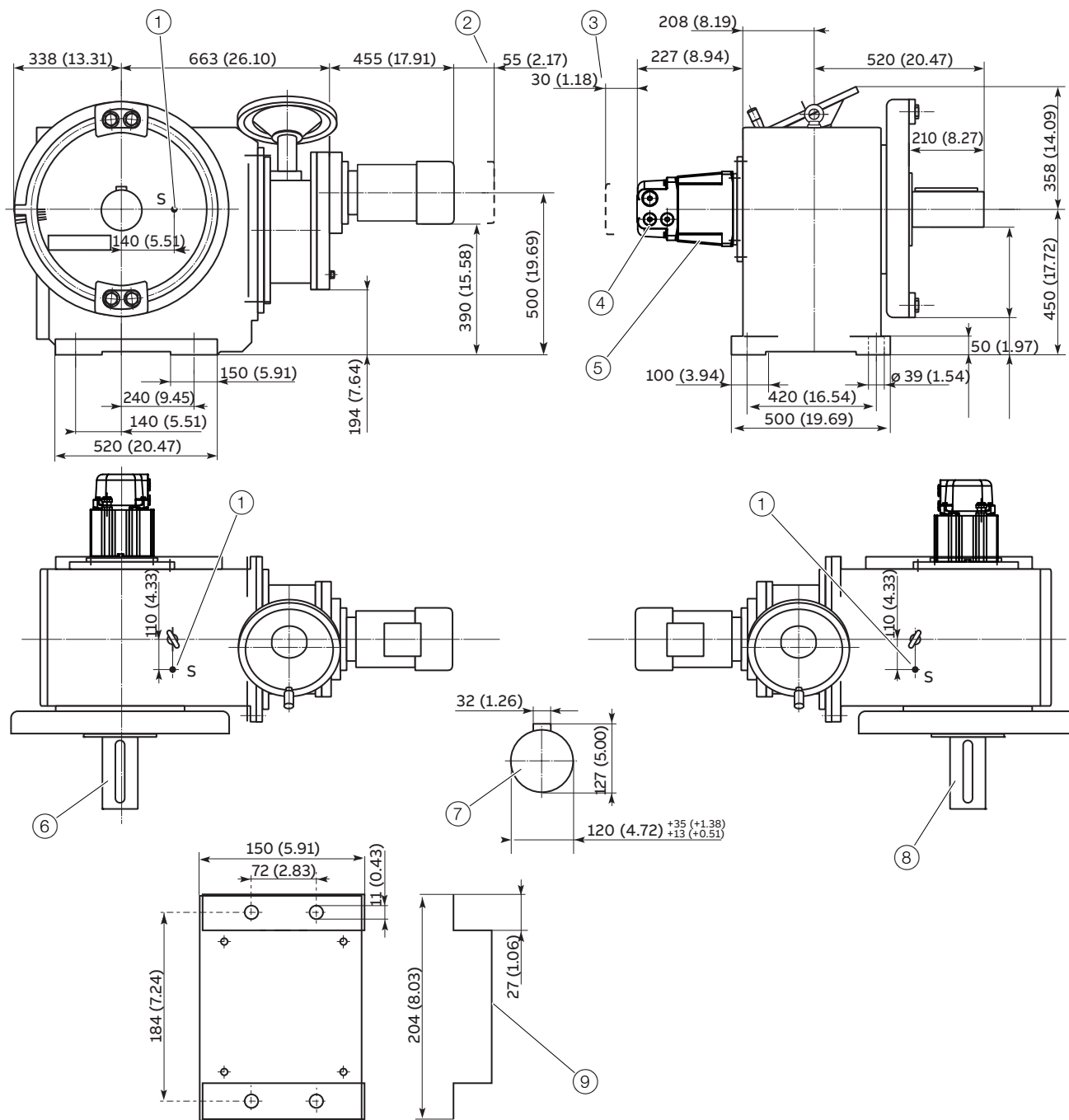
- ① Cone 1:10
- ② Welding bushings are included in delivery
- ③ Connection pipe 2 ½ in DIN EN 10255 / ISO 65 or 3 in schedule 80 pipe. Size 'L' acc. to requirements. The pipe is not included in delivery
- ④ Angular deflection of ball and socket joint: Pointing towards the actuator max. 3°; pointing away from the actuator max. 10°

Figure 8: Dimensions in mm (in)

... 6 Installation

... Dimensions

Control actuator RHDE16000



① S = Center of gravity

② Motor removal dimension

③ Removal dimension

④ Plug

⑤ Signal generator

⑥ Actuator shaft left

⑦ Actuator shaft

⑧ Actuator shaft right

⑨ Plug holder (not to scale)

Figure 9: Dimensions in mm (in)

7 Electrical connections

Safety instructions

WARNING

Risk of injury due to live parts!

Risk of death or serious injuries due to electricity and unexpected machine movements. In automatic mode the motor is always under power, even at standstill.

- When working on the actuator or the related subassembly, switch off the supply voltage for the electronic unit and separate anti-condensation heater (option), and take precautions to prevent unintentional switch-on.

The electrical connection may only be established by authorized specialist personnel.

Notices on electrical connection in this instruction must be observed; otherwise, electric safety and the IP-rating may be adversely affected.

Safe isolation of electric circuits which are dangerous if touched is only guaranteed when the connected devices fulfill the requirements of EN 61140 (basic requirements for secure separation).

To ensure safe isolation, install supply lines so that they are separate from electrical circuits which are dangerous if touched, or implement additional isolation measures for them.

Each actuator requires a suited Contrac electronic unit with installed actuator-specific software. Observe the information in the operating instruction. The specifications on the name plates of the electronic unit and actuator must match to guarantee correct hardware and software allocation.

Conductor cross-section on control actuator

Screw terminals

Motor/brake	max. 2.5 mm ² (14 AWG)
Signals	max. 2.5 mm ² (14 AWG)

Conductor cross-section on electronic unit

Note

Detailed information on separate electronic units can be found in the corresponding data sheets.

EBN853 – Screw terminals

Motor/brake	rigid: 0.2 to 6 mm ² (24 to 10 AWG)
	flexible: 0.2 to 4 mm ² (24 to 12 AWG)
Mains	rigid: 0.5 to 6 mm ² (20 to 10 AWG)
	flexible: 0.5 to 4 mm ² (20 to 12 AWG)
Signals	rigid: 0.5 to 4 mm ² (20 to 12 AWG)
	flexible: 0.5 to 2.5 mm ² (20 to 14 AWG)

EBN861 – Screw terminals

Motor / brake	rigid: 0.2 to 6 mm ² (24 to 10 AWG)
	flexible: 0.2 to 4 mm ² (24 to 12 AWG)
Mains	rigid: 0.5 to 6 mm ² (20 to 10 AWG)
	flexible: 0.5 to 4 mm ² (20 to 12 AWG)
Signals	rigid: 0.5 to 4 mm ² (20 to 12 AWG)
	flexible: 0.5 to 2.5 mm ² (20 to 14 AWG)

EBS852 – Clamping connection

	Suited for cable Ø	Terminals for conductor cross-section
Mains cable	13 mm (0.51 in)	max. 4 mm ² (12 AWG)
Signal cable (DCS)	8 mm (0.31 in)	max. 1.5 mm ² (16 AWG)
Transmitter (option)	8 mm (0.31 in)	max. 1.5 mm ² (16 AWG)
Motor cable	13 mm (0.51 in)	max. 4 mm ² (12 AWG)
Sensor cable	8 mm (0.31 in)	max. 1.5 mm ² (16 AWG)

EBS862 – Clamping connection

	Terminals for conductor cross-section
Mains cable	max. 6 mm ² (10 AWG)
Signal cable (DCS)	max. 4 mm ² (12 AWG)
Transmitter (option)	max. 4 mm ² (12 AWG)
Motor cable	max. 6 mm ² (10 AWG)
Sensor cable	max. 4 mm ² (12 AWG)

Cable glands

DANGER

Risk of explosion!

Risk of explosion due to the use of unsuitable cable glands.

- The cable glands used must be approved for type of protection 'Ex e – increased safety'.
- The cable glands used must guarantee correct contact of the cable shielding.

The actuators and electronic units are supplied without cable glands. Suited cable glands must be installed on site.

Tap holes for cable glands

	metric	optional adapters for*	
Signals	M20 × 1.5 (2×)	PG 16 (2×)	NPT ½ in (2×)
Motor	M25 × 1.5 (1×)	PG 21 (1×)	NPT ¾ in (1×)
Temperature sensor	M20 × 1.5 (1×)	PG 16 (2×)	NPT ½ in (2×)

* Adapter for PG or NPT thread must be ordered separately

Selection of suited connection cables

Please observe the following information when selecting cables:

- Use suited cables only for the electric connection between the Contrac control actuator in potentially explosive atmospheres and the components outside of the potentially explosive atmospheres.
- Use shielded cables for the motor / brake cable, the sensor cable, and the signal cable to the control system / controller.
- Connect the shielding of the motor / brake cable and the sensor cable on both sides (to the actuator and to the Contrac electronic unit).
- For the connection between the motor and motor temperature monitoring unit and for the power supply, shielded cables are not required.

Installation information on the cable harness for actuators in Ex design

The electrical connection between the Contrac electronic unit and the Contrac actuator can be established using the cable set (order code 695). The cable harness is not part of the Ex prototype test certificate and must therefore be tested for safety-relevant functionality within the complete installation by the installer or operator.

If the specified cable harness does not meet all safety-relevant requirements, the proper installation material must be used. For the specified motor connection cable, the shielding must be connected at both ends and connected with protective ground.

Please observe the following information when installing the cable set:

- The specific regulations governing the installation of electric systems in potentially explosive atmospheres must be observed during electric installation work. The provisions in accordance with EN 60079-14 must be observed, particularly in respect of installing the shield bonding and potential equalization between the actuator, electronic unit, and motor protection equipment, see **Connection of cable shielding** on page 24.
- The motor and position sensor may only be connected using IP 66 Ex cable glands in accordance with EN 60079 ff with EU type examination certificate in accordance with Directive 2014/34/EU.
- Use a cable lug or a solid wire, bended to a 'U', to connect the motor cable
- Make sure that sufficient strain relief measures are in place for all cable connections.
- Protect all cables in the connection chambers sufficiently against contact with metal components. Guarantee a gap of at least 6 mm (0.24 in) between all conductive components.
- Remove the desiccant in the connection chamber of the motor and position sensor.
- Do not change the factory-set installation position of the motor junction box.
- Close off any cable entries that are not required using ATEX-certified IP 66 sealing plugs.

... 7 Electrical connections

Connection of cable shielding

Sensor-connection chamber

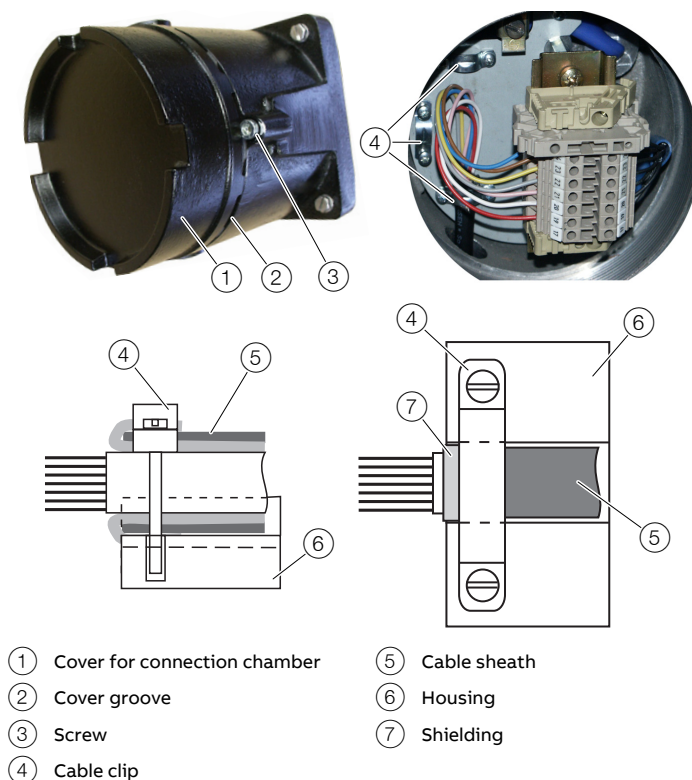


Figure 11: Connection of the cable shielding in the sensor connection chamber

1. Insert screw.
2. Unscrew the cover for the connection chamber
3. Cut the cable sheath to the required length.
4. Separate the cable shield and pull it back over the outer sheath
5. Push the cable through the cable gland and fasten it with the cable clip
6. Make sure that the cable shield is in contact with the clip and the housing.
7. Connect cable in accordance with **Electrical connections** on page 22.
8. Check the cable connections for tight fit and fasten the cable gland.
9. Screw the cover of the connection chamber back on tight.
10. Loosen the screw to the point where until it is pressing against the cover ①. Make sure that the screw is fully inserted in a groove in the cover ②.

Note

When installing the cover for the connection area, take care not to damage the sealing ring. If the sealing ring is damaged, contact the manufacturer.

Motor connection chamber

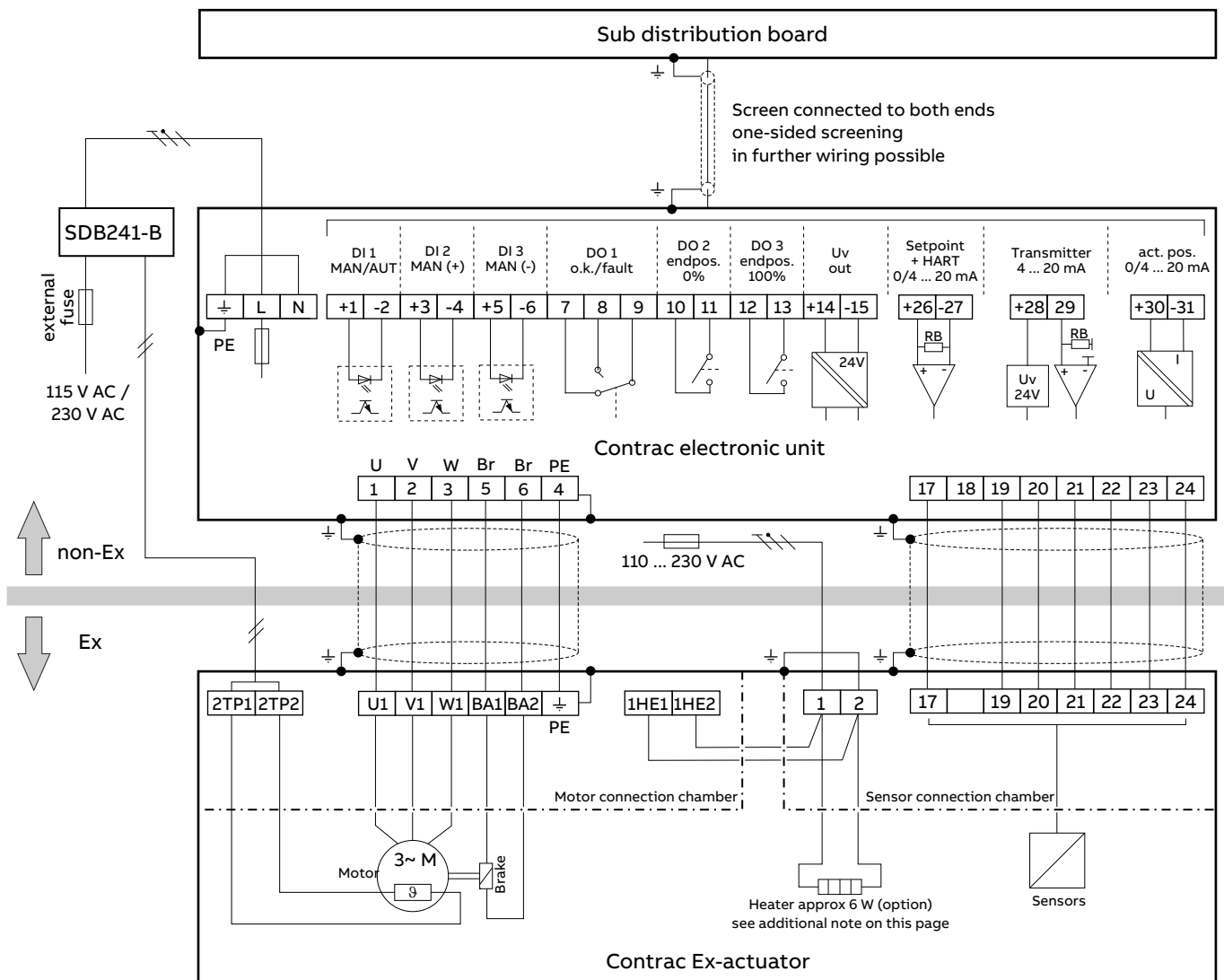
Apply the cable shield to the motor in a suited manner.

Electronic Unit EBN853 (Contrac)

Analog / Digital

Note

The electrical connection is established via screw terminals on the control actuator and on the electronic unit.



BE = digital input

BA = digital output

Figure 12: Control via analog input 0/4 to 20 mA, HART® communication or digital inputs

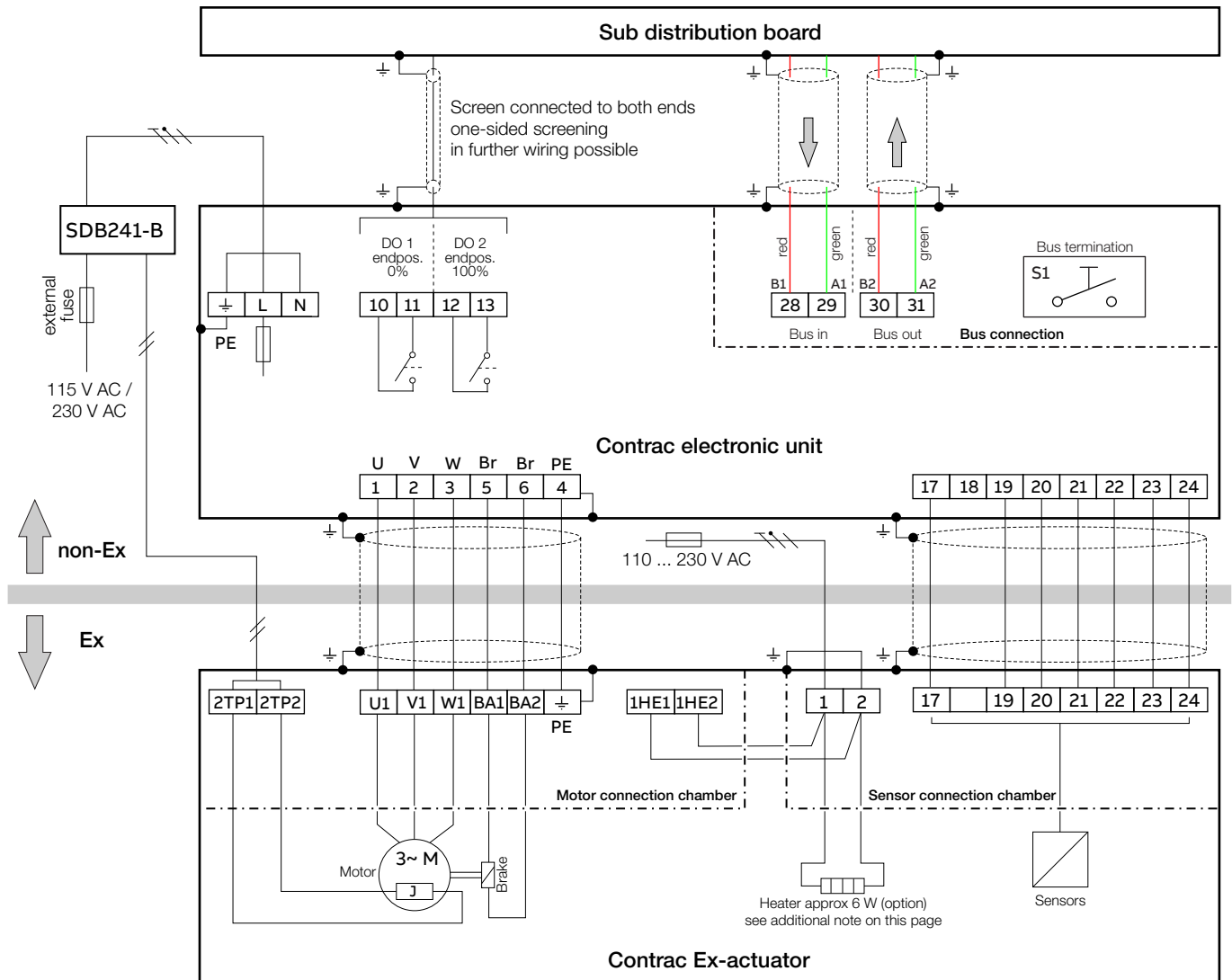
... 7 Electrical connections

... Electronic Unit EBN853 (Contrac)

PROFIBUS DP®

Note

The electrical connection is established via screw terminals on the control actuator and on the electronic unit.



BA = digital output

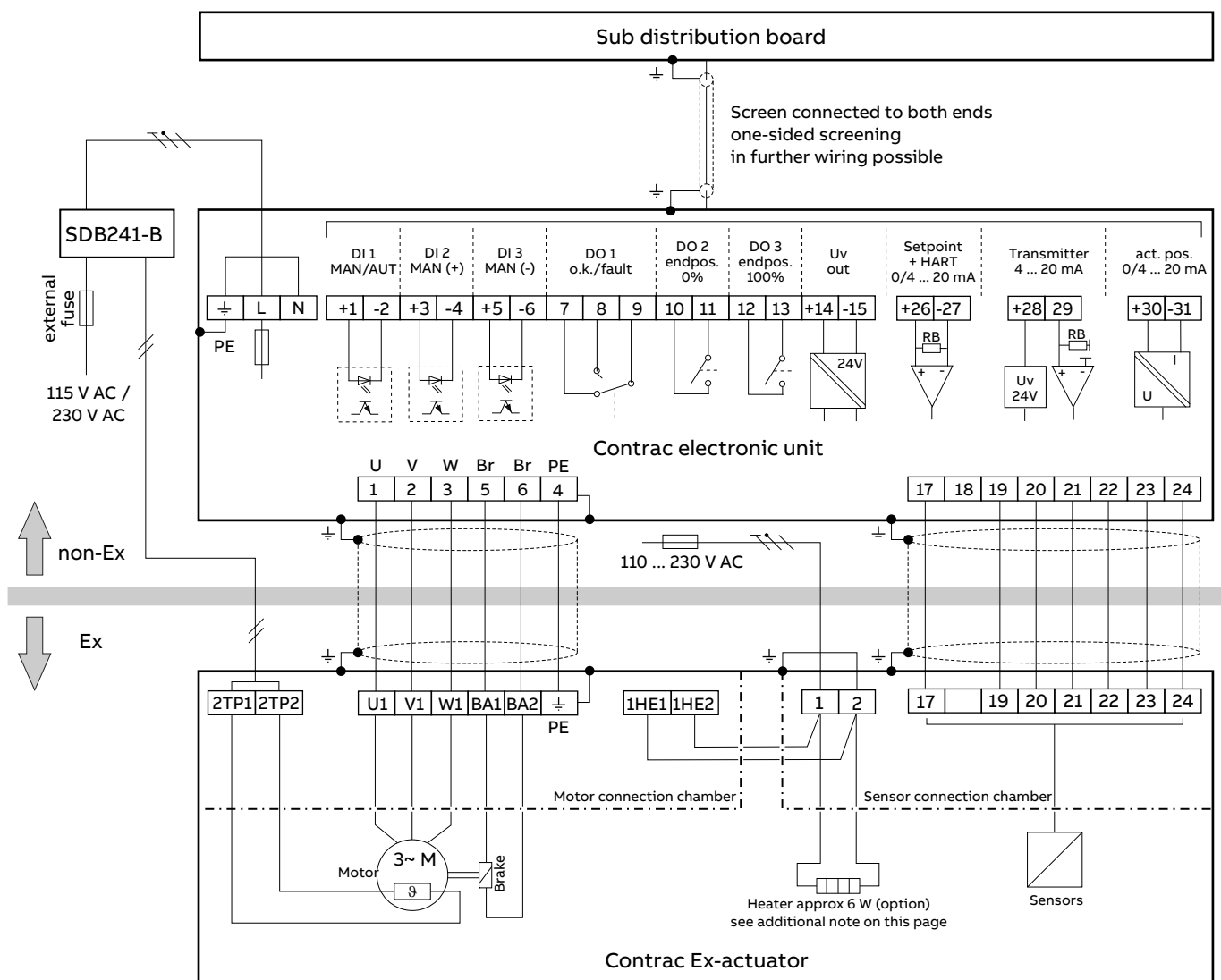
Figure 13: Control via fieldbus PROFIBUS DP®

Electronic Unit EBN861 (Contrac)

Analog / Digital

Note

- The electrical connection is established via screw terminals on the control actuator and on the electronic unit.
- If you are using a separate heat supply, the heater must be protected with a 2 to 6 A medium time-lag fuse (e.g. NEOZED D01 E14).



BE = digital input

BA = digital output

Figure 14: Control via analog input 0/4 to 20 mA, HART® communication or digital inputs

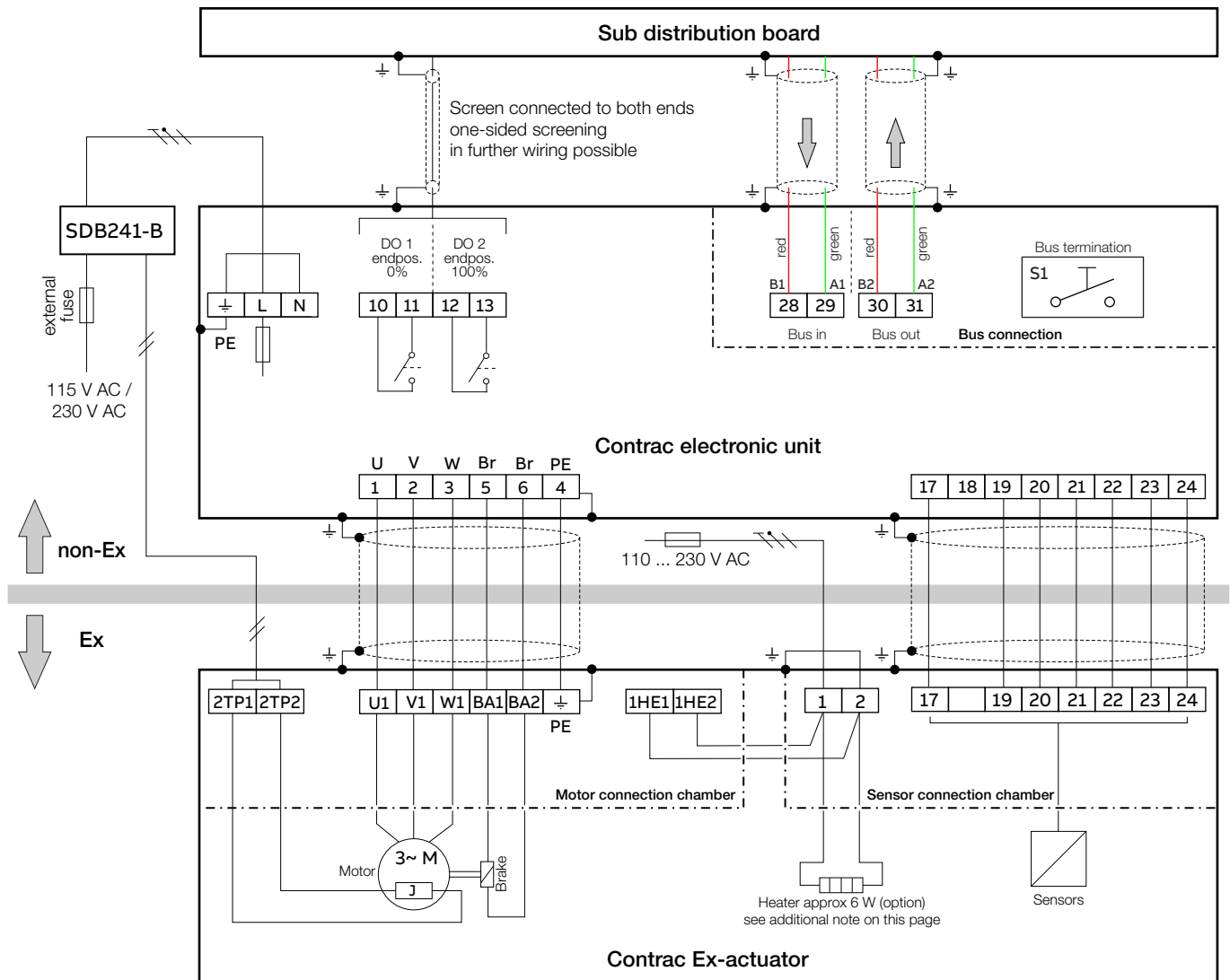
... 7 Electrical connections

... Electronic Unit EBN861 (Contrac)

PROFIBUS DP®

Note

- The electrical connection is established via screw terminals on the control actuator and on the electronic unit.
- If you are using a separate heat supply, the heater must be protected with a 2 to 6 A medium time-lag fuse (e.g. NEOZED D01 E14).



BA = digital output

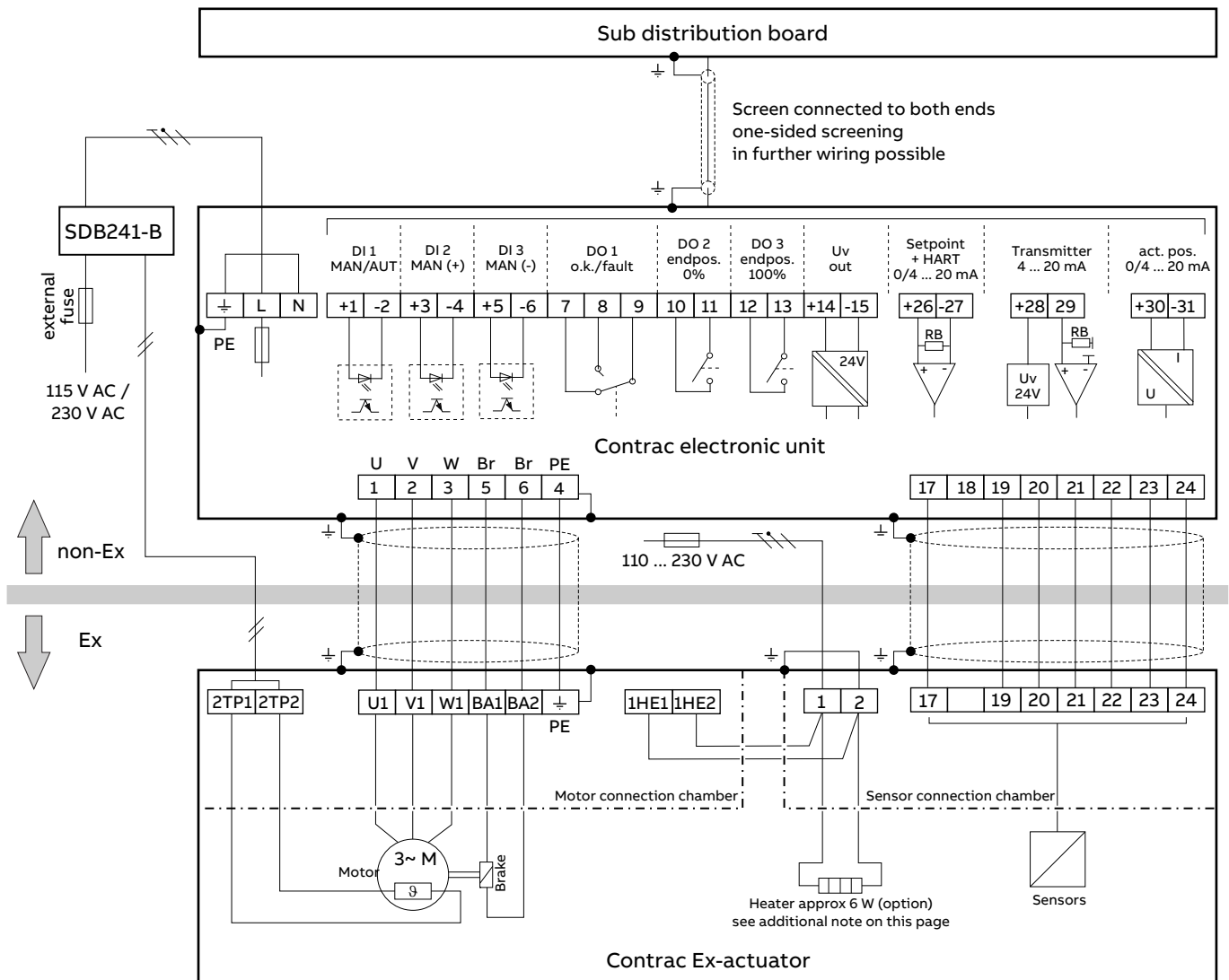
Figure 15: Control via fieldbus PROFIBUS DP®

Electronic unit EBS852 (Contrac) / EBS862 (Contrac)

Analog / Digital

Note

- The electrical connection is established via screw terminals on the control actuator and on the electronic unit.
- If you are using a separate heat supply, the heater must be protected with a 2 to 6 A medium time-lag fuse (e.g. NEOZED D01 E14).



BE = digital input

BA = digital output

Figure 16: Control via analog input 0/4 to 20 mA, HART® communication or digital inputs

8 Commissioning

Note

It is imperative that you observe the operating instruction of the corresponding electronic unit for the commissioning of the actuator.

9 Operation

Safety instructions

DANGER

Danger to life due to unexpected movement of the actuator!

Unexpected movement of the actuator may lead to very serious injuries or to death.

- Make sure that the actuator can move without posing a danger to people!

WARNING

Risk of crushing between the lever and the stops or between the lever and the link rod, respectively!

- Do not reach into the danger zone.
- Start up the actuator with installed lever cover only.

Note

Positioning loop monitoring in the electronic unit must always be active, it is set as default at the factory and cannot be deactivated nor changed afterwards.

- Before power-up, make sure that the ambient conditions specified in the data sheet are complied with and that the power supply corresponds with the information specified on the name plate of the electronic unit.
- If it can be assumed that safe operation is no longer possible, take the unit out of operation and secure against unintended startup.
- When the actuator is installed in work or traffic areas that may be accessed by unauthorized persons, the operator must put appropriate protective measures in place.
- Switch off the power supply to the motor before handwheel operation.

Automatic mode / Handwheel mode

WARNING

Risk of injury due to live parts!

Risk of death or serious injuries due to electricity and unexpected machine movements. In automatic mode the motor is always under power, even at standstill.

- When working on the actuator or the related subassembly, switch off the supply voltage for the electronic unit and separate anti-condensation heater (option), and take precautions to prevent unintentional switch-on.

The motor controlled by the electronic unit controls the output shaft via the oil-lubricated gearing. This transmits the rated torque to the valve via a lever with ball-and-socket joints and a coupling rod. The position sensor detects backlash-free the current position of the output drive shaft.

Adjustable limit stops prevent overloading of the valve in the event of an operating error. The brake integrated in the motor carries out the stop function if the supply voltage is switched off.

Manual operation

Handwheel mode allows you to move the actuator when the supply voltage is switched off.

CAUTION

Risk of injury!

Risk of injury due to unexpected movement of the handwheel. When pressing the handwheel unlock, the handwheel can unexpectedly move due to the reset force of the valve.

- Hold the handwheel in place with your free hand when pressing the handwheel unlock.

1. Remove cotter pin.
2. Press handwheel unlock.
3. Turn the hand wheel to move the actuator lever to the desired position.

Note

When the handwheel is turned to the right, this causes a left turn of the actuator lever (rotating direction with view to the handwheel shaft or output shaft).

4. Release the unlocking catch.
5. Insert the cotter pin.

Handwheel operation in combination with positioning loop monitoring

The positioning loop monitoring of the electronic unit monitors actuator behavior. The electronic unit monitors whether the travel commands trigger the corresponding processes.

When the supply voltage is switched off, the positioning time-out function is disabled and handwheel operation is no longer monitored.

If the actuator is moved via the handwheel while the supply voltage is switched on, the positioning loop monitoring recognizes this state as 'travel without travel command'. A corresponding signal is output.

There are several options for resetting this positioning loop error:

- Resetting via the commissioning and service field
- Resetting via the graphical user interface
- Changing the setpoint signal by at least 3 % for more than 1 s
- Wiring of digital inputs BE2 or BE3 (not with step controller)

Note

In the case of actuators with an explosion-proof design, the 'positioning loop monitoring' function must not be deactivated!

10 Diagnosis / error messages

This chapter only covers hardware-related errors. For additional troubleshooting information, refer to the online help for the operator interface.

Error	Possible cause	Troubleshooting the Instrument
Valve cannot be moved by actuator.	Failure either on the actuator or the final control element (e.g. packed gland too tight).	Disconnect actuator from valve. If the actuator moves, the valve is the possible cause. If the actuator does not move, the actuator is the possible cause.
The actuator does not respond.	Incorrect electronic unit or incorrect data set.	Compare information on name plates for actuator and electronic unit.
	Incorrectly configured electronic unit.	Check / change. Change the settings via the parameterization software.
	No communication with the control system.	Check wiring.
	Incorrect wiring between actuator and electronic unit.	Check wiring.
	Motor / brake defective.	Check the winding resistance of the motor and brake. Check the brake lock.
	Binary inputs on the electronic unit are not wired.	Make connection.
Actuator does not run in automatic mode, although automatic mode is selected in the user interface.	Brake does not release (no mechanical 'click')	Check the brake air gap (approx. 0.25 mm (0.010 in)) and electrical connection to the brake. Check winding resistance of the brake coil.
	Digital input 1 (BE 1) not wired.	Make connection. Check the software settings for the digital inputs.
Actuator does not respond to control (LED 5 flashing at 1 Hz) (software version 2.00 and higher).	Actuator in manual mode (MAN) through commissioning and service field.	Switch actuator to automatic mode (AUT).
LEDs in the commissioning and service panel (ISF) are flashing synchronously.	Actuator is not adjusted properly.	Adjust actuator.
LEDs flash alternately.	Electronic unit / drive malfunction.	Drive the actuator beyond the adjusted end position, either manually or using the buttons on the commissioning and service field; (if necessary disconnect from final control element first).
Malfunction when approaching the end position.	Actuator in limit range of positioning sensor.	Drive the actuator back into the operating range and connect it to the valve. Readjust the actuator for the operating range.

Electrical test values

The specified resistance values for the motor refer to measurements between the external conductors.

	BD 90 L-4 B	BD 112 M-4 B
Motor*	19 Ω	2.4 Ω
Brake*	1620 Ω	1059 Ω

* Specified winding resistance $\pm 5\%$ at 20 °C (68 °F)

11 Maintenance

Safety instructions

WARNING

Risk of injury due to live parts!

Risk of death or serious injuries due to electricity and unexpected machine movements. In automatic mode the motor is always under power, even at standstill.

- When working on the actuator or the related subassembly, switch off the supply voltage for the electronic unit and separate anti-condensation heater (option), and take precautions to prevent unintentional switch-on.

Notice on auxiliary and operating materials

- Observe the manufacturer's regulations and safety data sheets!
- Mineral oil and grease can contain additives that, under special conditions, may lead to adverse effects.
- Skin contact with oil or grease may cause skin damage (skin irritations, inflammations, allergies). Avoid long-term, excessive or repeated skin contact. If lubricants contact your skin, immediately wash with water and soap! Do not allow lubricants to get in contact with open wounds!
- If lubricant splashes into the eye, rinse with plenty of water for at least 15 minutes and then consult a doctor!
- When handling lubricants use suited skin protection and care products or wear oil-resistant gloves.
- Lubricants that dripped to the floor are a potential source of danger, due to the slip hazard created. Spread sawdust or use oil adsorbent to bind and remove the lubricants.

Repair and maintenance activities may only be performed by authorized customer service personnel.

When replacing or repairing individual components, use original spare parts.

General

Contrac actuators feature a robust construction. As a result, they are highly reliable and require minimal maintenance. The maintenance intervals depend upon the effective load and are therefore not specified here.

The built-in microprocessor evaluates the actual load factors (e.g. torques, forces, temperatures, etc.) and derives the remaining operating time until the next routine maintenance is required.

Use the configuration program to view this information.

Inspection and overhaul

- Only use genuine spare parts for maintenance of the actuators (e.g., ball bearings, gaskets, and oil).
- Maintenance work needs to be performed after the life cycle has expired.
- Inspection / maintenance is due once the intervals specified have passed, at the very latest.

Maintenance plan

Interval	Measures
1 × per year	Visual check of the gaskets for leaks. Remove and replace if leaks are present.
Every 2 years	Functional check: drive the actuator 2 × through the entire stroke range and check for correct speed reduction.
Every 4 years	Check oil level
max. every 10 years, preferably after the expiry of the calculated remaining service time	Replace oil, roller bearings, and gaskets on motor and gears. Check gear wheels for wear; replace if necessary.

Make sure that no chippings or other materials get into the gears during maintenance work.

Do not move the actuator during the oil level check.

... 11 Maintenance

Removing the motor and adjusting the brakes

WARNING

Risk of injury!

The actuator position may be changed accidentally by the repelling power of the valve when the motor is removed or the brake is released.

- Make sure that no process forces are exerted on the lever.

In automatic mode, the brake is nearly not exposed to any mechanical wear, since it is permanently released. Any readjustment is not necessary. Use the test function of the configuration software to check the brake.

Oil change

Note

Oils for different temperature ranges may not mixed.

During an oil change, thoroughly remove any oil that may have escaped to avoid accidents.

Dispose of old oil according to local regulations. Make sure that the oil does not enter the water cycle. Make sure that any oil leaking from the device cannot come into contact with hot components.

Proceed as follows to drain or change the oil:

1. Provide a collecting vessel capable of holding the expected oil quantity in accordance with **Filling volumes** on page 34 .
2. Open and release the vent valve, see **Fastening the actuator** on page 14.
3. Unscrew the lowermost drain plug to drain the oil.
4. Collect the oil in the collection vessel.
5. Make sure all of the oil has been removed from the actuator housing.
6. Screw the drain plug back in.
7. Refill with the proper volume of oil in accordance with **Filling volumes** on page 34 and securely tighten the vent valve.

Oil types

Ambient temperature	Oil types – DIN 51517	
	Default oil filled with delivery	Alternative oil
–25 to 60 °C (–13 to 140 °F)	Mobil SHC 629 – DIN 51517 / ISO 12925-1	–
–30 to 40 °C (–22 to 104 °F)	Mobil SHC 626	–

Filling volumes

RHDE8000

Mounting position	Minimum oil level I (gal)*	Min. oil level under inspection plug mm (in)
IMB 3	63 (16.64)	90 (3.54)
IMB 6	62 (16.34)	90 (3.54)
IMB 7	74 (19.53)	45 (1.77)
IMV 6	53 (14.00)	85 (3.35)

RHDE16000

Mounting position	Minimum oil level I (gal)*	Min. oil level under inspection plug mm (in)
IMB 3	90 (23.78)	100 (3.94)
IMB 6	For these installation positions, please contact the manufacturer.	
IMB 7		
IMV 6		

* US liquid gallon

12 Repair

Repair and maintenance activities may only be performed by authorized customer service personnel.
When replacing or repairing individual components, use original spare parts.

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.

Fill out the return form (see **Return form** on page 37) and include this with the device.

In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 4 for nearest service location.

13 Recycling and disposal

Note



Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).

They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

Notice on RoHS II-Directive 2011/65/EU

As of 7/22/2019, the products provided by ABB Automation Products GmbH fall within the scope of regulations on hazardous substances with restricted uses or the directive on waste electrical and electronic equipment in accordance with ElektroG.

Note

Detailed information on the RoHS Directive is available in the ABB download area.

www.abb.com/actuators

14 Approvals and certifications

CE mark



The version of the device as provided by us meets the requirements of the following EU directives:

- ATEX Directive 2014/34/EU
- EMC directive 2014/30/EU
- Machinery Directive 2006/42/EC / 2006/42/EG
- Low Voltage Directive 2014/35/EU
- RoHS II Directive 2011/65/EU (as of 7/22/2019)

15 Additional documents

Note

All documentation, declarations of conformity and certificates are available in ABB's download area.

www.abb.com/actuators

16 Appendix

Return form

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:

Address:

Contact person:

Telephone:

Fax:

Email:

Device details:

Type:

Serial no.:

Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes

☐ No

If yes, which type of contamination (please place an X next to the applicable items):

☐ biological

☐ corrosive / irritating

☐ combustible (highly / extremely combustible)

☐ toxic

☐ explosive

☐ other toxic substances

☐ radioactive

Which substances have come into contact with the device?

1.

2.

3.

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date

Signature and company stamp

... 16 Appendix

Installation declaration



EINBAUERKLÄRUNG für eine unvollständige Maschine

DECLARATION OF INCORPORATION FOR AN INCOMPLETE MACHINE

Hersteller / Manufacturer:	ABB Automation Products GmbH Minden
Anschrift / Address:	Schillerstraße 72 D-32425 Minden
Produktbezeichnung: <i>Product name:</i>	Elektrischer Regelantrieb CONTRAC und CONTRAC Ex <i>Electrical Actuator CONTRAC and CONTRAC Ex</i>

Typ / Type:

Fabriknummer / Serial number:

Herstelldatum / Date of manufacture:

Einbauerklärung im Sinne der EG-Maschinenrichtlinie (2006/42/EG) Anhang II B

Declaration of incorporation as defined by EG-Machinery Directive (2006/42/EG) annex II B

Die bezeichneten Produkte halten die grundlegenden Anforderungen der EG-Maschinenrichtlinie 2006/42/EG Anhang I, Ziffer 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.7, 1.7.1, 1.7.4 ein. Sie sind ausschließlich zum Einbau in eine Maschine bestimmt. Die Inbetriebnahme darf erst vorgenommen werden, nachdem die Konformität des Endproduktes mit den oben genannten Richtlinien festgestellt wurde. Die Sicherheits-hinweise der mitgelieferten Dokumentation sind zu beachten. Der Hersteller verpflichtet sich, die Unterlagen zur unvollständigen Maschine einzelstaatlichen Stellen auf begründetes Verlangen zu übermitteln.

The designated products follow the basic requirements of the EC Machinery Directive 2006/42/EC Annex I, paragraph 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.7, 1.7.1, 1.7.4. These products are determined exclusively for installation on a machine. The introduction may only be carried out after the conformity of the final product with the abovementioned guidelines was found. The safety remarks of the supplied documentation have to be observed. The manufacturer must undertake to forward the documents to the partly completed machinery on a reasoned request by national authorities.

Dokumentationsbevollmächtigter: Wolfgang Lasarzik

Authorised person for documentation:

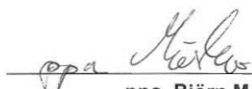
Anschrift / Address: Siehe Anschrift des Herstellers/ *Refer to address of manufacturer*

Die Sicherheitshinweise der mitgelieferten Dokumentation sind zu beachten.

The safety remarks of the supplied documentation have to be observed.

16.10.2013

Datum
Date



ppa. Björn Mösko
Standortleiter Minden
Head of Location Minden



i. V. Tilo Merlin
Leiter R&D
Head of R&D

Trademarks

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