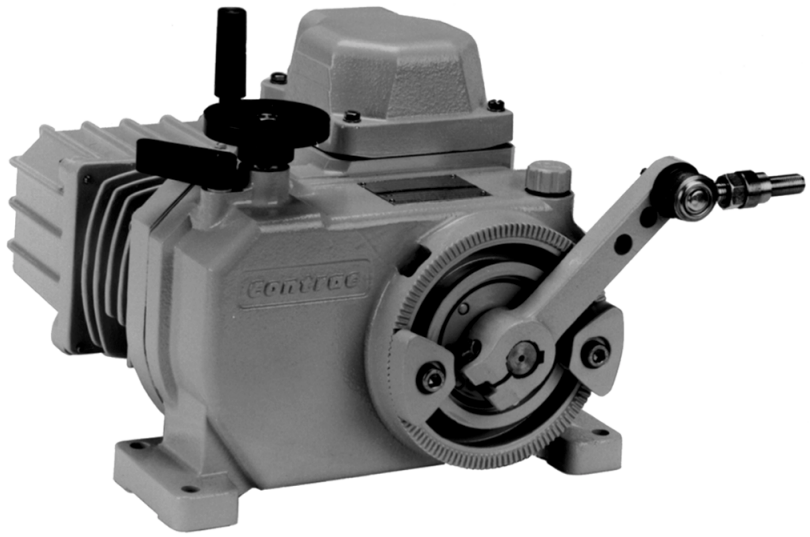
Contrac

Part Turn Actuators
PME 120 AI / PME 120 AN

Rated Torque 100 Nm
With Integrated Electronics or
For Separate Field Housing

Operating Instructions

42-68-151EN



(d036rxa)

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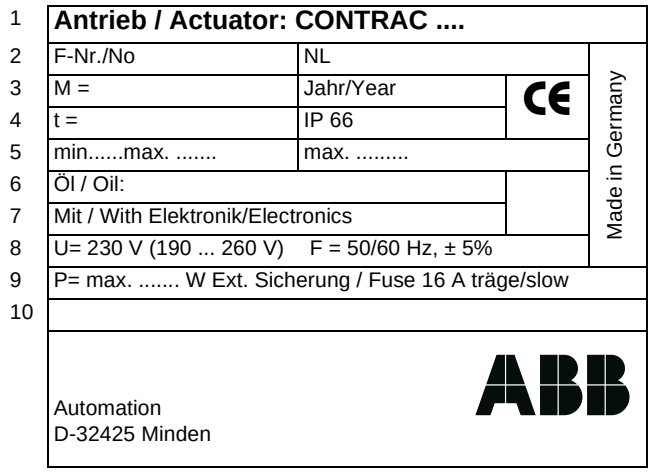
1. Device Identification

1.1 Actuator ID Label

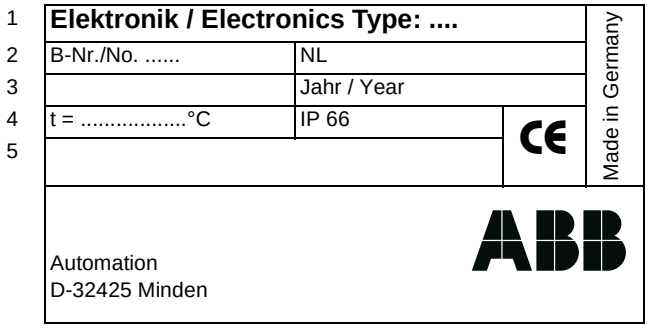


1. Actuator type
2. Device number / No. of non-standard version
3. Rated torque / Year of manufacture
4. Permissible ambient temperature
5. Min./max. positioning travel / Min./max. speed
6. Filled-in oil type
7. Associated electronics
8. Permissible voltage range / Mains frequency
9. Power consumption / Fus
10. Available for customer-specific information

1.2 ID Label of Electronics

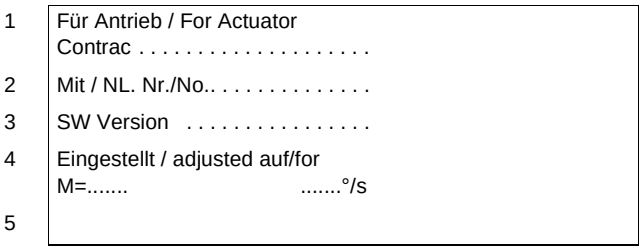
The ID labels of the power electronics are located on the electronics cover.

1.2.1 ID Label for Hardware Description



1. Electronics type
2. Device no. / No. of non-standard version
3. / year of manufacture
4. Premissible ambient temperature / protection
5. No used

1.2.2 ID Label for Software Description



1 Associated actuator
2 No. (if required)
3 Downloaded software version
4 Configured force (torque)/configured speed
5 Available for customer-specific information

2. General

2.1 Proper Use

Control actuators are intended to be used exclusively for actuating final control elements (valves, vanes, etc.). Do not use these actuators for any other purpose. Otherwise, a hazard of personal injury or of damage to or impairment of the operational reliability of the device may arise.

2.2 Safety and Precautions

When mounting the actuator in areas which may be accessed by unauthorized persons, take the required protective measures.

! Warning !

- Control actuators perform movements for positioning vanes and valves. Handle properly and with care. Otherwise, a hazard of bruise injuries may arise.
- When changing the oil of the actuator, thoroughly remove any oil that may have run down on the floor during the procedure to avoid accidents.
- Dispose of the waste oil in compliance with the respective local regulations. Make sure that no waste oil reaches the water cycle
- Only qualified specialists who have been trained for these tasks are authorized to mount and adjust the control actuator, and to make the electrical connection.
- When working on the actuator itself or its electronics always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.

3. Storage

Contrac actuators may be stored under moist and aggressive condition for a short time. The equipment is protected against external corrosive influences. However, direct exposure to rain, snow, etc. must be avoided
Interior areas of the actuator with risk of condensation are protected by desiccant placed in the connector (and in the terminal box of the separate electronics, if present). The desiccant guarantees sufficient protection for approximately 150 days. It can be regenerated at a temperature of 90° C within 4 h.
The desiccant must be removed prior to commissioning the actuator or the electronics.

3.1 Long-time Storage

If you intend to store or transport the device for a longer time, we recommend to wrap it in plastic foil and add desiccant. Regularly check if the desiccant is still active.

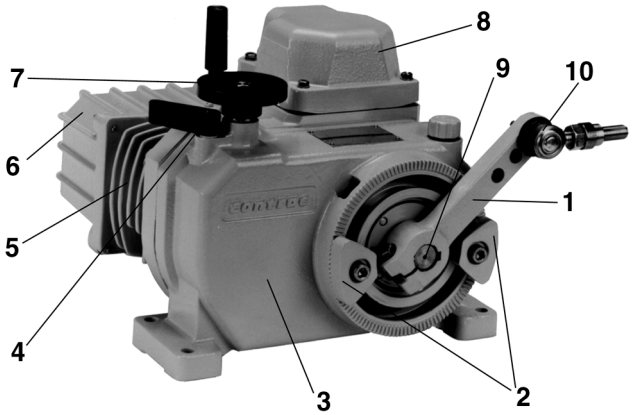
4. Delivery State

If not otherwise specified by the customer, ***Contrac*** actuators are delivered with the following standard configuration:

Behavior in 0/100% position:	Shut-off with rated torque
Setpoint function:	Linear; setpoint = positioning value
Input (setpoint):	4 ... 20 mA
Function:	Positioner, parameter: setpoint
Output (actual value):	4 ... 20 mA
Digital inputs:	DI 1 switch-over manual/automatic and v.v. DI 2 / DI 3 manual control +/-
Digital outputs:	DO 1 ready to operate, DO 2/3 end position signalling
Range:	Not adjusted

The configuration of your actuator may differ from the standard configuration specified above. It can be called up for display using the configuration program.

5. Assemblies



(d0001rxa)

1: Lever
2: Mechanical stops
3: Gearbox
4: Lock lever
5. Motor
6. Cover (incl. electronics for PME 120 AI)
7. Handwheel
8. Connector
9. Ouput shaft
10. Ball-and-socket joint

Figure 1: PME 120

5.1 Normal mode

! Warning !

The friction clutch is designed such that a handwheel force of around 11 N suffices to create the rated torque on the actuator. If you should feel a considerable counterforce when moving the actuator by hand, do not increase the force you apply to the handwheel. Otherwise, you might damage the actuator or valve

The motor triggered by the power electronics drives the output shaft (9) via oil-lubricated spur gears. The drive lever mounted on the shaft transmits rotary motion to the valve. The brake built in the motor (5) acts as a retainer when the power is off.

5.2 Handwheel mode

- Allows you to move the actuator manually when the electrical power is off.
- Turn the lock lever (4) clockwise
- Turn the handwheel (7) to move the lever to the wanted position.
- Release the lock lever.

6. Technical Data

	PME 120 AI	PME 120 AN
Rated torque [Nm]	40 ... 100	
Starting torque [Nm]	appr. 1.2 x rated torque (break-away torque in end positions 2 x rated torque for short time)	
Rated speed [°/s]	1.5 ... 4.5	
Weight	approx. 45 kg	approx. 32 kg
Associated electronics	integrated in actuator	for field mounting: EAN 820 for rack mounting: EAS 822
Power supply (on electronics)	115 V AC (94 V ... 130 V) or 230 V AC (190 V ... 260 V); 47.5 ... 63 Hz	
Max. power consumption with 115 / 230 V AC [A]	1.0 / 0.5	
Current consumption in positioning mode:	approx. 40 ... 50% of I_{max}., each	

Table 1:

7. Lubrication

Prior to delivery the actuator is filled with 2.5 l oil in factory.

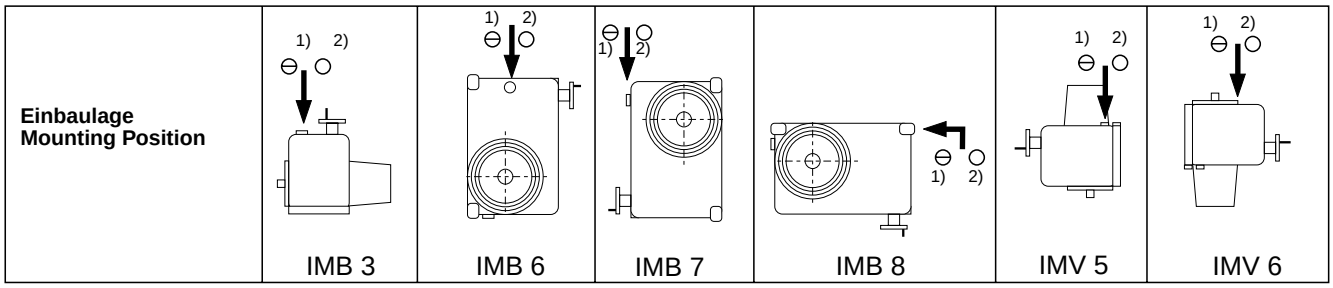


Figure 2:

Min. oil quantity; approx. [l]	2.2	2.5	2.2	2.2	2.5	2.5
Min. oil level [mm] under inspection screw	45	2	42	20	23	17

Table 2: The arrow indicates the position of the inspection screw [1)] and the vent screw [2)]. After having mounted the actuator, replace the highest inspection screw with the separately delivered vent screw.

7.1 Lubricants

! Warning !

Do not pollute the synthetic Mobil SHC 629 oil, nor mix it with mineral oils. Prior to changing over to synthetic lubricant oil always throroughly clean the set of gears!

	Oil types	
Ambient temperature	Oil type used by manufacturer for first filling	Possible other oil types
- 10°C ... + 65°C	ESSO Spartan EP 220 (L-CKC to ISO TR 3498)	Aral Degol BMB 220 BP Energol GR-XP 220 Shell Omala 220 Mobilgear 630
- 25°C ... + 55°C	Mobil SHC 629	**-----**

Table 3:

8. Mounting

8.1 Actuator Check

- Is the actuator filled with the appropriate oil type?
- Is enough oil in the actuator?
- Did you fasten the separately delivered vent screw in the highest bore (depending on the mounting orientation)?
- Has the actuator integrated or separate electronics ?

8.2 Mounting orientation

All mounting orientations seen in Figure 2 are permissible. To facilitate mounting and maintenance, however, it is recommended to use orientation IMB 3.

8.3 Mounting Instructions

- Make sure that the actuator is accessible from all sides to ensure convenient handwheel operation, electrical connection, and replacement of assemblies.
- Avoid direct exposure to rain, snow and other environmental influences. Select the mounting site accordingly.
- Exclusively mount the actuator on a rigid, non-vibrating support to avoid relative motion between the actuator and the valve.
- When mounting the actuator close to heat sources use an insulating layer or shielding.

8.4 Mounting the Actuator to the Valve

8.4.1 Preparing the Equipment

- Make sure that the shaft and lever bore surface are clean and free of grease.
- Determine the length of the stay tube (not included in the scope of delivery).
- Move the valve to the “CLOSED“ position.
- Move the actuator to the corresponding end position using the handwheel. Observe the permissible angle.
- Spacing “L“ minus 140 mm yields the required length of the link tube.
- Drill a cone bore into the valve lever for mounting the second ball-and-socket joint, as seen in Figure 4.
- Insert the ball-and-socket joint, secure with crown nut and split-pin.
- Remove the welding bushings and weld them to the stay tube (C 15 to DIN 17210)
- Insert the link rod between the two ball-and-socket joints and screw it in.
- If required adjust “L” by turning the link rod.
- When all adjustment steps are finished, fasten the counter nuts.

8.4.2 Adjusting the Stops in Dependence of the Travel

- Move the output lever / valve to the position requiring fine adjustment.
- Put the stop onto the toothing as close to the output lever as possible and fasten with screws.
- Move the output lever towards the stop using the handwheel; turn the coupling rod for fine adjustment.
- Fasten the counter nuts.
- Fasten the stop in the other mounting position close to the end position, depending on the toothing.

8.4.3 Adjusting the Stops in Dependence of the Torque

- First proceed as described above for travel-dependent adjustment.
- Prior to re-fastening the counter-nut lock the handwheel and then turn the coupling rod in such a way that an initial tension occurs in the valve’s closing position.
- Fasten the counter-nuts.

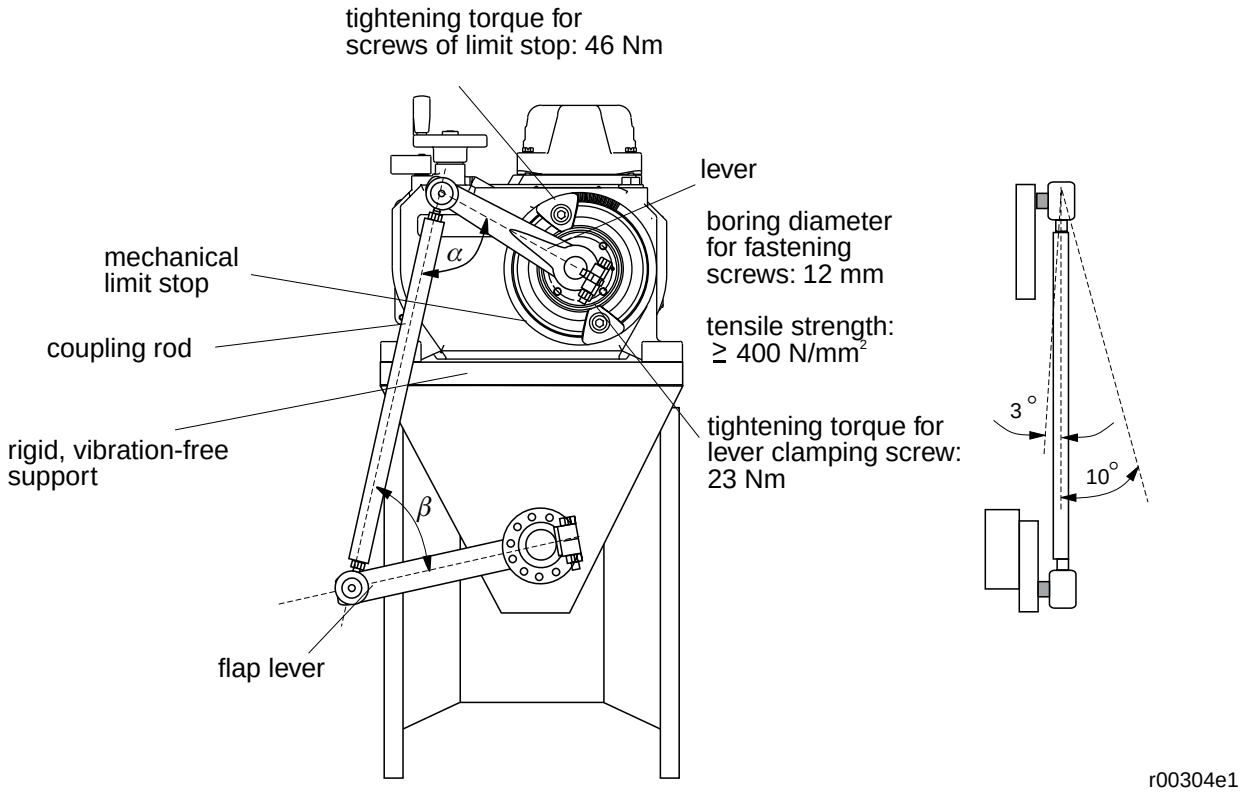


Figure 3: Mounting PME 120, example

$\alpha \geq 15$ °
β according to dimensions specified by the valve manufacturer

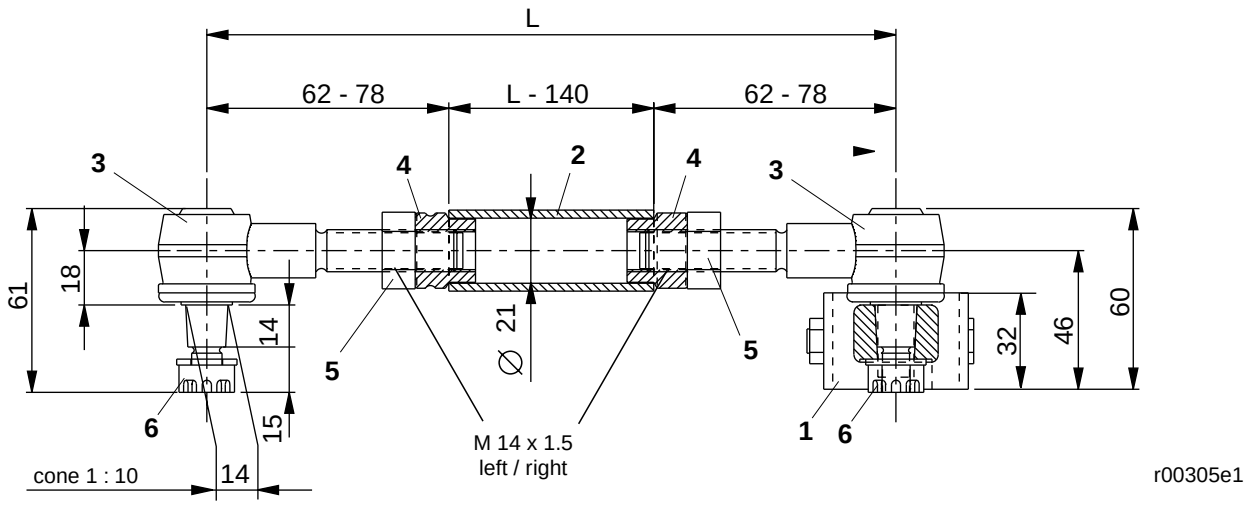


Figure 4: Dimensional drawing

1. Output lever
2. Link tube
3. Ball-and-socket joint
4. Welding bushings (C15 to DIN 17210)
5. Counter nuts
6. Crown nuts

9. Electrical Connection

9.1 Wiring Diagram for PME 120 AI

The electrical connection is done with a combined plug on the actuator and with screw terminals on the electronics.

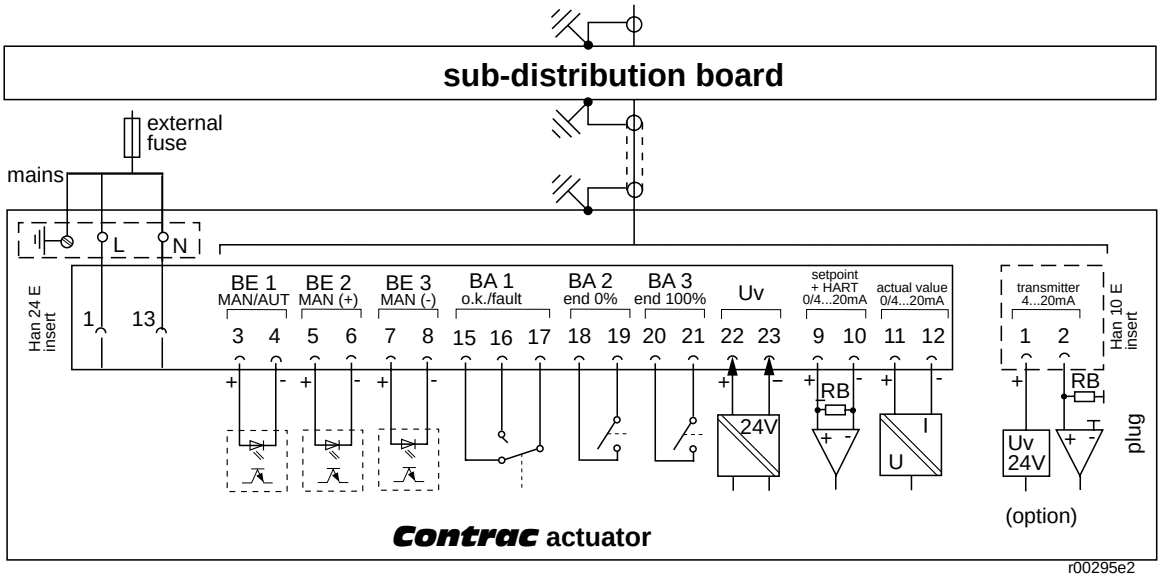


Figure 5: Electrical connection, standard

The following steps must be performed to switch the actuator to automatic mode (AUT):

- Activate digital inputs DI 1, DI 2 and DI 3 via the configuration program.
- Make sure that the supply voltage is present on digital input 1 (DI 1).
- Activate AUT mode via the configuration program.

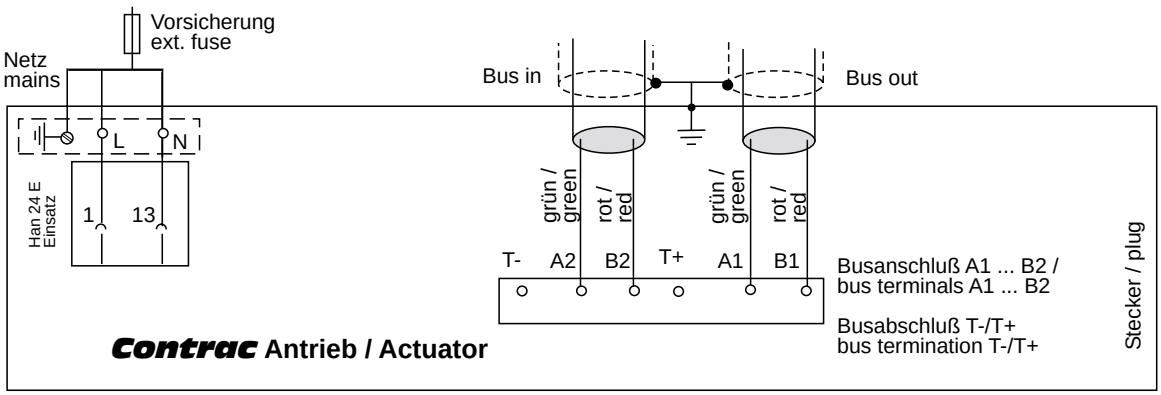


Figure 6: Electrical connection, Profibus DP

9.2 Wiring Diagram for PME 120 AN

The electrical connection is done with a combined plug on the actuator and with screw terminals on the electronics.

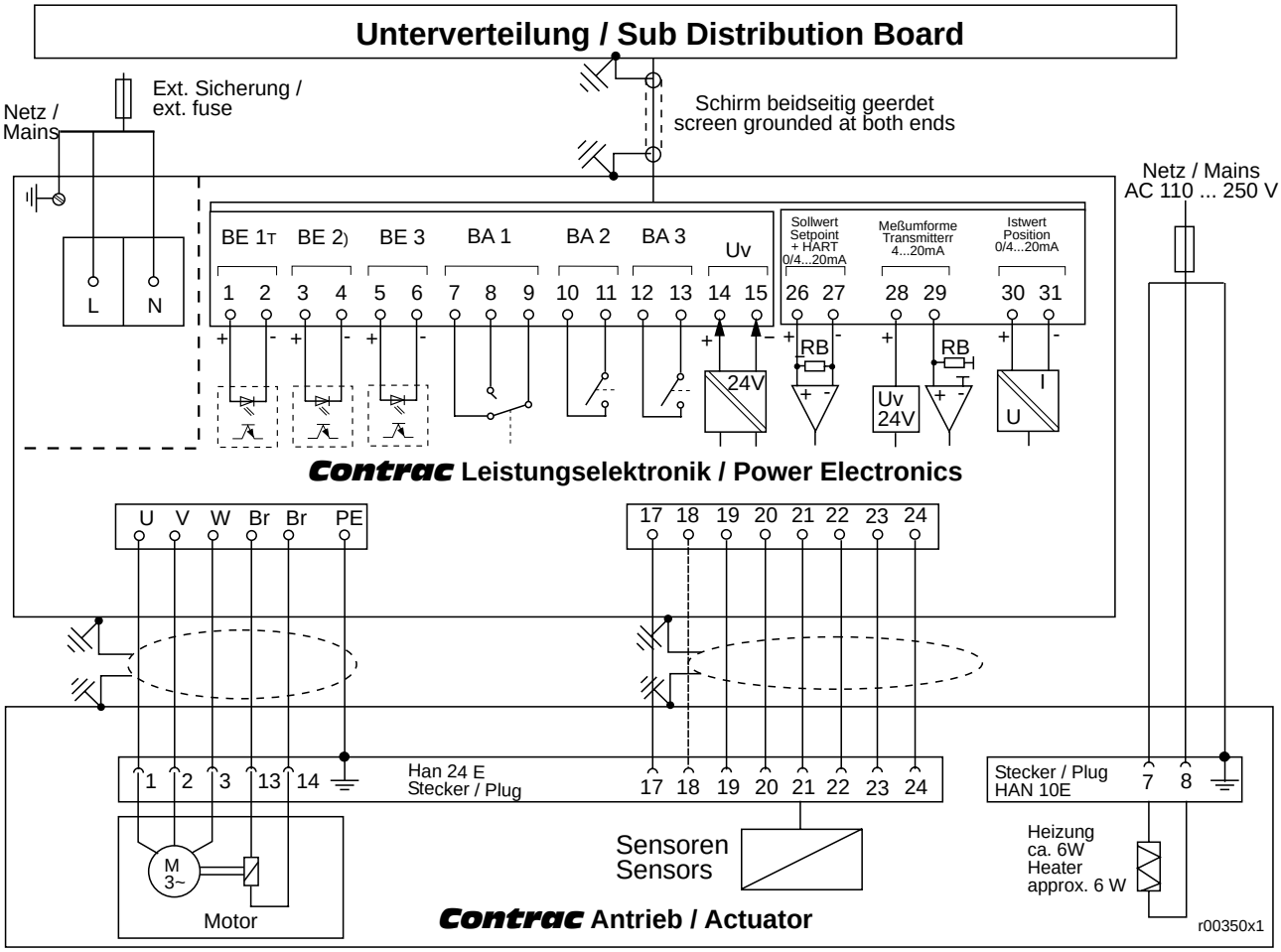


Figure 7: Electrical connection, standard

The following steps must be performed to switch the actuator to automatic mode (AUT):

- Activate digital inputs DI 1, DI 2 and DI 3 via the configuration program.
- Make sure that the supply voltage is present on digital input 1 (DI 1).
- Activate AUT mode via the configuration program.

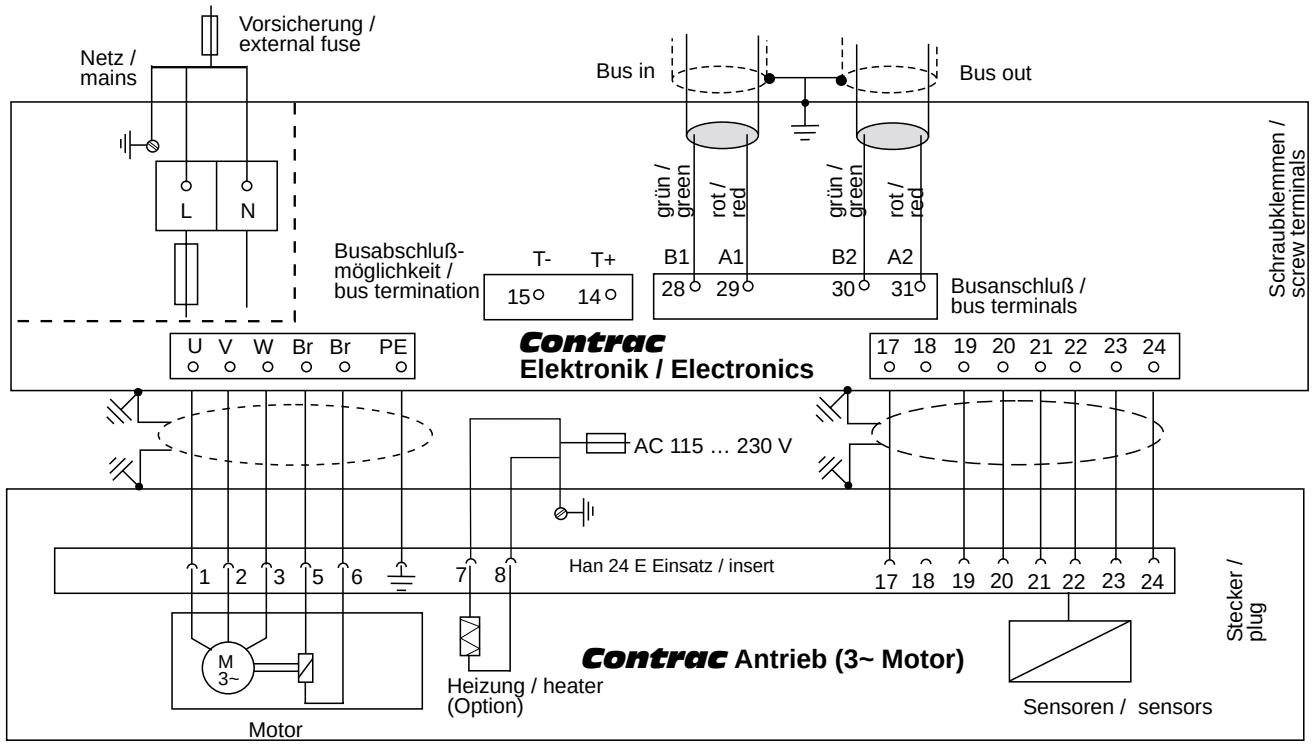


Figure 8: Electrical connection, Profibus DP (not with EAS 822)

9.2.1 Signal Inputs and Outputs (Conventional Triggering)

(Standard)

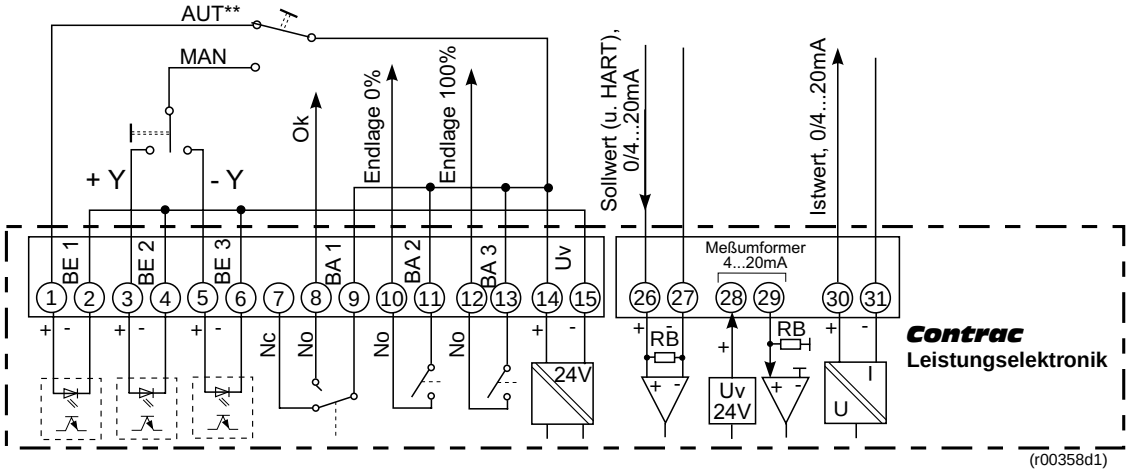


Figure 9:

** Write-protected when applying +24 V DC to DI 1.

9.2.2 Signal Inputs and Outputs (Conventional Triggering)

(after a step controller)

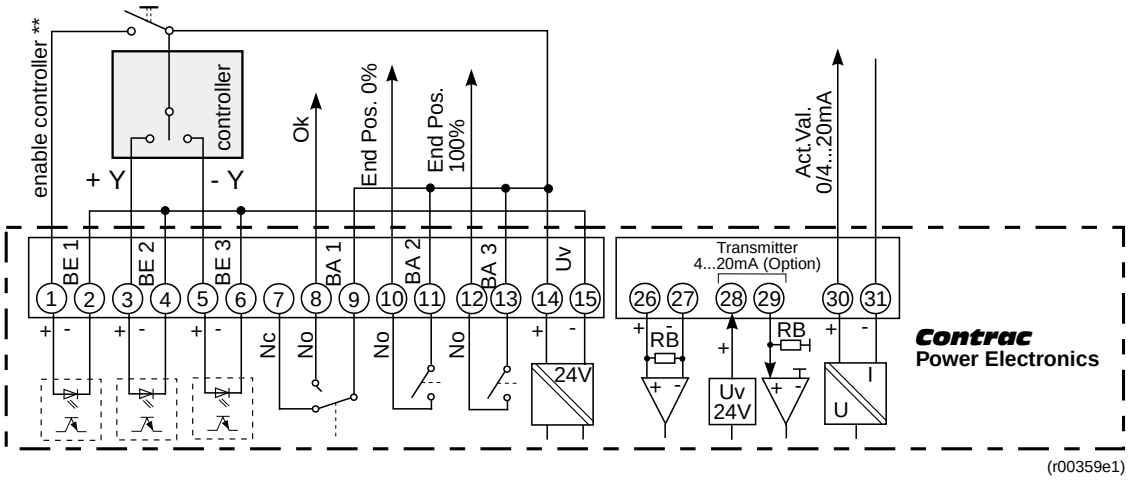


Figure 10:

** Write-protected when applying +24 V DC to DI 1.

Refer to Operating Instructions 42/68-820 (Power Electronics for Field Mounting) and 42/68-821 (Rack-Mounting Electronics) for installation details.

10. Setup

! Note !

The commissioning and service field is located on the electronics!

The basic settings (definition of end positions) can be made via the commissioning and service field (CSF). It is used for adapting the actuator to the operating range and the effective direction without a PC. The actuator can be set up and configured completely using the appropriate configuration program.

10.1 Setup via CSF

10.1.1 Operating Elements

1.	Write-protect switch	(Default setting: OFF)
2.	LED for 100% position	Indication if adjustment procedure, saved position, or fault by different flash frequencies.
3.	Drive button	Press to cause drive motion
4.	Reset button	Press to restart processor and clear any 0% and 100% values.
5.	Drive button	Press to cause drive motion
6.	RS 232 socket	Connector for PC
7.	Potential toggle switch	Connection of reference potential to the system or protective earth (by default set to system)
8.	HART sockets	Connectors for HART communication
9.	LED for 0% position	Indication if adjustment procedure, saved position, or fault by different flash frequencies.
10.	Accept button (0%)	Press to define current position as 0%; simultaneously press push button 11 to complete the adjustment procedure.
11.	Accept button (100%)	Press to define current position as 100%; simultaneously press push button 10 to complete the adjustment procedure

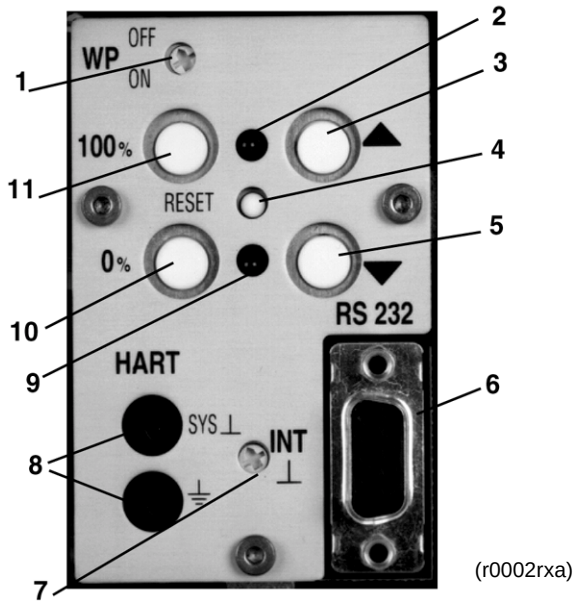


Figure 11: Commissioning and Service Field (CSF)

! Warning !

The actuator range is not preset in factory!

10.1.2 Initial Situation

- Electronics connected to power supply and actuator
- Write-protect switch (1) set to “OFF” position
- Electronics in operating mode “MAN” (no signal on DI 1)
- No fault (if a fault occurs, both LEDs flash alternately at 4 Hz)

10.1.3 Setup Procedure

- Undo the screws of the CSF
- Swing the cover to the side

10.1.3.1 "Adjustment" Mode

- Set electronics to "Adjustment" mode by pressing push buttons (3) and (5) simultaneously for approx. 5 seconds, until both LEDs (2 + 9) are flashing synchronously at approx. 4 Hz.

10.1.3.2 Defining First Position (0% or 100%)

(Higher precision in 2nd position)

- Move to desired position by pressing push button (3) or (5).
- To accept the position, press push button (10) or (11); the associated LED flashes at approx. 1 Hz when value is correctly accepted, the other continues to flash at approx. 4 Hz

10.1.3.3 Defining Second Position (0% or 100%)

- Move to second position by pressing push button (3) or (5).
- To accept the position, press push button (10) or (11); both LEDs (2) and (9) are flashing at approx. 1 Hz when value is accepted correctly.

10.1.3.4 Saving the Settings

- The settings are accepted by simultaneously pressing the push buttons (10 + 11); the LEDs (2 + 9) extinguish after a short time, and the adjustment procedure is completed.
- If the selected range is too small for the actuator, both LEDs will flash again at 4 Hz, and the adjustment procedure has to be repeated with a larger value (min. positioning travel).
  (See positioning travel specification on actuator ID label)

10.1.3.5 Correction after Setup

- If the setting is to be corrected after accepting the first value, first press the Reset button (4) and then repeat the setting.
- If the correction is to be done after saving the settings, the entire adjustment procedure must be repeated.

10.2 Adjustment Using the Configuration Program

Context-sensitive help information is available in the configuration program at all times. For basic handling and installation instructions refer to the associated manual, number 41/68-001.

! Warning !

A conductive ground connection is established between the PC and the CONTRAC electronics with the RS 232 communication cable. If the PC is grounded, this may cause a ground loop in the installation.

10.3 Indication at CSF

Function	Indication
Adjustment	
Change-over to adjustment mode: Press and hold both drive switches for approx. 5 seconds	Both LEDs flash synchronously at approx 4 Hz after time has expired.
Moving to an end position Use respective drive button on CSF	Both LEDs continue to flash at 4 Hz while driving.
Saving the first end position Press button 0% or 100%	The associated LED flashes at approx. 1 Hz, the other continues at 4 Hz.
Saving the second end position Press button 0% or 100%	The associated LED flashes at approx. 1 Hz synchronously to the first one.
Terminate adjustment Press 0% and 100% buttons simultaneously	Both LEDs are briefly lit together and then extinguish.
Operation	
Normal operation: MAN / AUT	LED off
Driving with button on CSF Priority over control system	LED off
Fault (both LEDs flash alternately at 4 Hz)	
Reset: Resets fault indications	If no other fault conditions exist, both LEDs extinguish.
Reset if operating range is exceeded; press and hold both drive button for 5 seconds, then press Reset button	After approx. 5 seconds the flash rhythm is briefly interrupted. After "Reset" the electronics switch to adjustment mode.

Table 4:

11. Maintenance

Contrac actuators have a robust construction. As a result, they are highly reliable and require only little 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, temperatures, etc.) and derives the remaining operating time until the next routine maintenance is required. Use the configuration program for viewing this information.

11.1 Motor and Gears

All maintenance work must be carried out by qualified specialists who have been trained for this task. As a rule, perform the following routine maintenance works:

- Check the shafts and gears.
- Check the motor pinion gear and the respective mating gear.
- Replace the motor's rotary shaft seal and ball bearings.
- Check the position sensor.
- Change the oil; then make a visual check and check for proper operation.

11.2 Adjusting the Brake

In automatic mode the brake is permanently released. Therefore, it is not exposed to wear and does not require any re-adjustment.

! Warning !

The actuator setting may be changed accidentally by the repelling power of the valve when the brake is released!

11.3 Replacing the Position Sensor

11.3.1 Dismounting

- Disconnect the ribbon cable from the PCB
- Undo the two fastening screws (1) of the position sensor and pull the sensor out of the gears.

11.3.2 Mounting

The toothed gear pair of the position sensor is held in place by a tension spring (3), to ensure sufficient free motion when the direction of rotation is reversed.

- Set the stop pin to the center position, as seen in Figure 15.
- Align the sensor and its gears with the actuator; set the first toothed gear in 11:00 o'clock position (see Figure 16) onto the drive shaft gear (4).
- Slightly move the sensor back and forth to pre-tension the toothed gears with the difference "z" until the second toothed gear snaps in.
- Fasten the screws (1) tightly.
- Connect the plug (5) of the ribbon cable to the PCB.

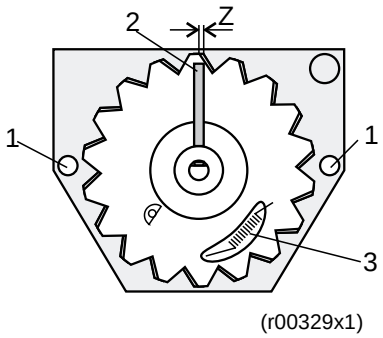


Figure 12: Position sensor SP 1

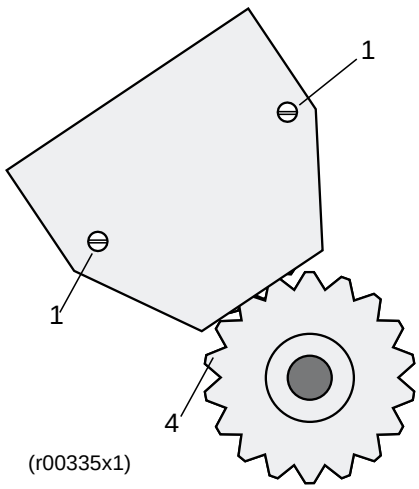


Figure 13: Mounting position of SP 1

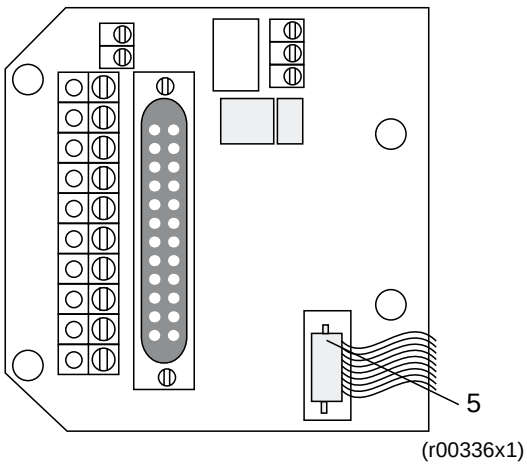


Figure 14: Connecting the ribbon cable plug to the PCB

After mounting is completed readjust the actuator range as described in section 10 of this manual.

12. Troubleshooting

This section only describes how to handle hardware errors. Refer to the configuration program's online help for errors related to the software.

Error	Possible reason	Measures to be taken
Valve cannot be moved by actuator	Malfunction of actuator or valve (e.g. cable gland fastened too tightly)	Disconnect the actuator from the valve. If the actuator is working properly then, the valve is likely to be defective. Otherwise, the actuator seems to be the error source.
Actuator does not react	No communication	Set up communication using the configuration program
	Motor / brake is defective	Check the winding resistances of the motor and brake.
	Digital inputs of electronics are not connected	Connect
	Brake does not release (no audible "click" noise)	Check the air gap (should be around 0.25 mm) and the electrical connection of the brake. Check the winding resistance of the brake coil.
Actuator does not work in automatic mode, although "AUT" has been selected in the configuration program	Digital input 1 (DI 1) has not been connected.	Connect DI 1.
LEDs on the commissioning and service field are flashing simultaneously	Actuator has not been adjusted properly	Adjust the actuator.

Table 5:

12.1Electrical Test Values

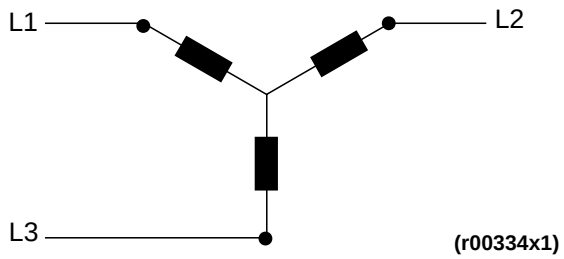


Figure 15: Motor block diagram

Winding resistance ± 5% at 20° C (motor)	L1 (blue) - L2 (black):3,4 Ω L1 (blue) - L3 (violet):3,4 Ω
Winding resistance ± 5% at 20° C (brake)	50 Ω

Table 6:

13. Your notes

ABB Automation Products
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Phone: +49 (571) 830 - 0
Fax.: +49 (571) 830 - 1860
http://www.abb.de/automation

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