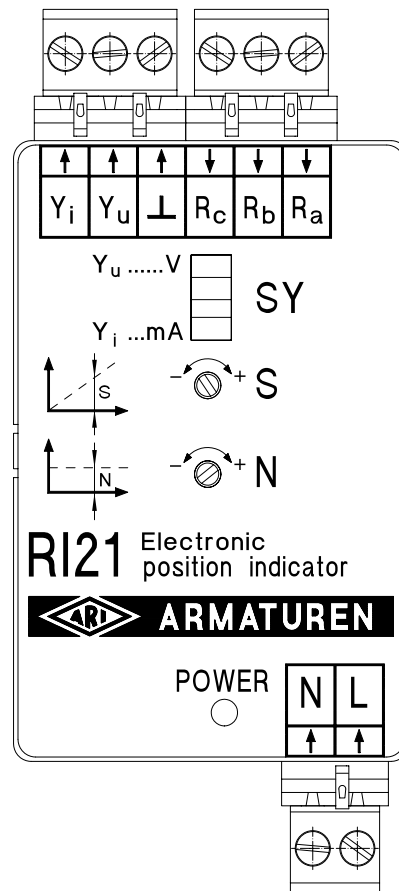


# Operating and installation instructions

## Electronic position indicator RI21



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## 1.0 General information on operating instructions

These operating instructions provide information on mounting and maintaining the fittings. Please contact the supplier or the manufacturer in case of problems which cannot be solved by reference to the operating instructions.

They are binding on the transport, storage, installation, start-up, operation, maintenance and repair.

The notes and warnings must be observed and adhered to.

- Handling and all work must be carried out by expert personnel or all activities must be supervised and checked.

It is the owner's responsibility to define areas of responsibility and competence and to monitor the personnel.

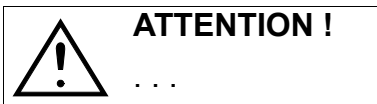
- In addition, current regional safety requirements must be applied and observed when taking the fittings out of service as well as when maintaining and repairing them.

The manufacturer reserves the right to introduce technical modifications at any time.

These Operating Instructions comply with the requirements of EU Directives.

## 2.0 Notes on possible dangers

### 2.1 Significance of Symbols



Warning of general danger.



Warning of dangerous voltage.

### 2.2 Explanatory notes on safety information

In these Operating and Installation Instructions dangers, risks and items of safety information are highlighted to attract special attention.

Information marked with the above symbol and "**ATTENTION!**" describe practices, a failure to comply with which can result in serious injury or danger of death for users or third parties or in material damage to the system or the environment. It is vital to comply with these practices and to monitor compliance.

All other information not specifically emphasised such as transport, installation, operating and maintenance instructions as well as technical data (in the operating instructions, product documentation and on the device itself) must also be complied with to the fullest extent in order to avoid faults which in turn can cause serious injury to persons or damage to property.

## 3.0 Storage and transport

- At -20° to +70°C dry, free from dirt.
- Do not unpack electronics prior to installation.
- Protect against external force (impact, vibration etc.).
- Do not soil or damage type identification plate and wiring diagram on the controller.

## 4.0 Description

### 4.1 Scope of application

The electronic position indicator RI21 is used for converting electrical resistances of up to 1000  $\Omega$  to electrical signals.

The electronic position indicator RI21 is suitable for installation in switch cabinets as well as in the actuator ARI-Premio or in actuators ARI CS25 through CS27.

Electronic position indicators installed in an actuator serve to indicate exact positioning.

The ambient conditions have to conform to the actual electromagnetic compatibility directives. Additionally the compatibility to these directives has to be maintained in case of expansion or other changes of the ambient conditions.

### 4.2 Operating principle

The Ready Status on the electronic position indicator is indicated by a yellow **LED**.

The positioning signal is selected by means of the slide switch **SY**.

Matching of the resistance input and positioning signal output is effected via trimming potentiometers.

The positioning signal outputs  $Y_u$  and  $Y_i$  are dependent on the set resistance value of the connected potentiometer.

The control section is (electrically) DC-decoupled from the mains input.



#### **ATTENTION !**

*For use on a three-wire system, the ground input  $\perp$  may only be connected up to the N contact of the mains input on the 24V AC version.*

*The new contact is referred to as **zero potential (0V)***

### 4.3 Technical data

Operating Voltage	$U_B$	24V 50-60Hz -20% +10%	115V 50-60Hz -20% +10%	230V 50-60Hz -20% +10%
Operating current	$I_B$	150 mA	40 mA	20 mA
Output positioning signal	$Y_u$	0(2) ... 10V DC (working resistance > 1000 $\Omega$ )		
Output positioning signal	$Y_i$	0(4) ... 20mA DC (working resistance < 800 $\Omega$ )		
Potentiometer input	$R_p$	0...1000 $\Omega$ (Tol. +30/-50%)		
Type of enclosure		IP40 (clamps IP20)		
Ambient temperature		-20....+70 °C		

### 4.4 Dimensions

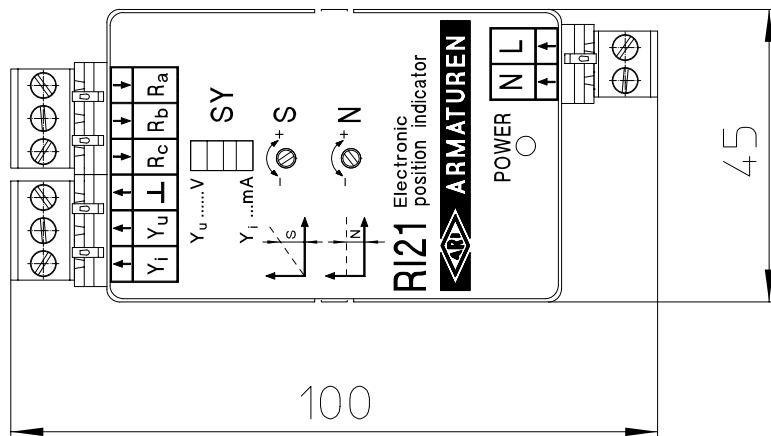
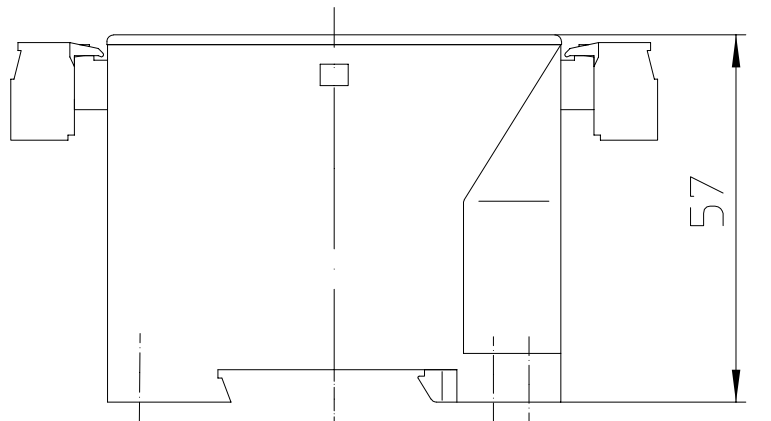


fig. 1

## 5.0 Installation



### **ATTENTION !**

*Work on electrical systems or equipment must only be carried out by qualified electricians or by trained individuals under the guidance and supervision of a qualified electrician in compliance with regional electrical requirements and regulations.*

*When connecting electronics the supply line must be disconnected from the mains (not live) during connection work. Non-compliance may result in death, serious injury or substantial damage to property.*

- *The power supply and data provided on the type identification plate must agree.*
- *Do not touch live parts when carrying out adjustments.*
- *Take particular caution at voltages above 24 V!*
- *Do not disconnect or connect series isolating terminals with the power on!*
- *Ground connection between N and  $\perp$  is only permitted in the 24 V version.*
- *Only one actuator is to be connected at any one time.*
- *Do not overshoot the range of the actuator when carrying out adjustments, danger of damage.*
- *Ensure that the motor connected in the actuator switches off in the end positions based on distance or torque.*

### 5.1 General notes on installation

The electronic position indicator RI21 can be installed in a switch cabinet or in the actuator ARI-PREMIO as well as in actuators CS25 through CS27.

Retrofitting of the electronic position indicator RI21 is possible on the ARI-PREMIO actuator.

On actuators CS25 through CS27 retrofitting of the electronic position indicator RI21 is conditional.

Please address all technical queries direct to ARI-ARMATUREN.

- Regional electrical requirements and regulations must be observed when laying electricity lines and making electrical connections.
- The cable cross-section must always correspond to the relevant input current and the cable length.
- The rated mains voltage and mains frequency must agree with the data on the type identification plate.

**Mains power fuse protection, installation side: 6 A max.**

### 5.2 Installation in control cabinet

- The controller is mounted on a profile rail in the control cabinet in accordance with DIN 46277.
- The mounting grid for control panel installation is L 58 mm x W 35 mm.

#### **Installation parts:**

- 1 electronic position indicator RI21

### 5.3 Installation in ARI-PREMIO actuator

Refer to figures below for installation in ARI-PREMIO actuator.

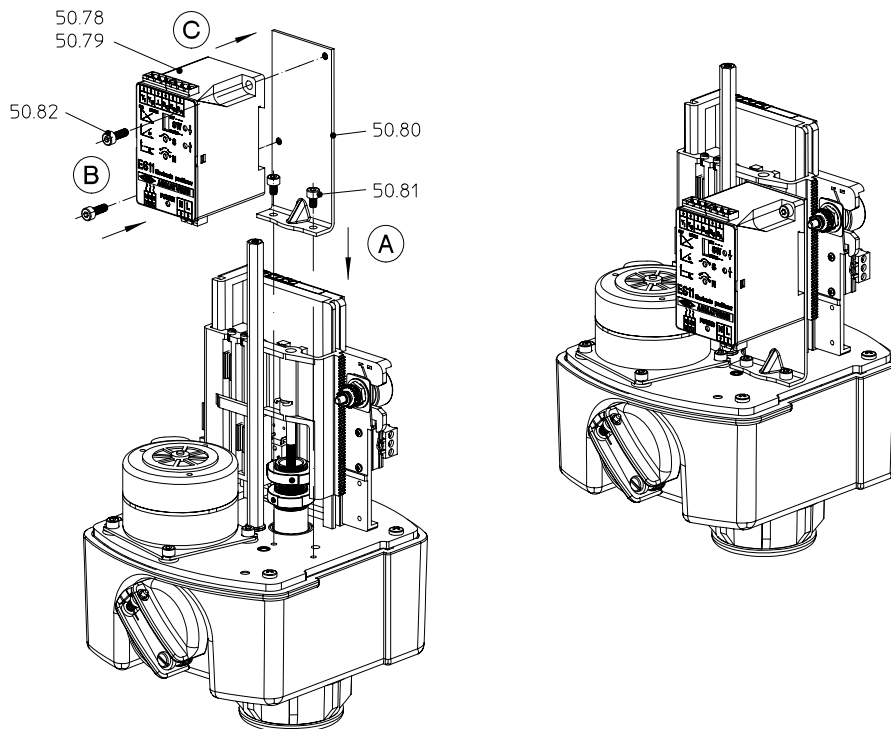


fig. 2: Installation RI21 / ES11 ARI-PREMIO 2,2 - 15 kN

#### Installation procedure:

Carefully remove cover.

- A** Fit mounting bracket (50.80) at point on gear cover provided for this purpose. Secure with two socket head cap screws (50.81) DIN EN ISO 4762 - M4x8.
- B/C** Secure the electronic position indicator RI21 (50.78/79) with two socket head cap screws (50.82) DIN EN ISO 4762 - M4x12 on mounting bracket (50.80).



#### **ATTENTION !**

*For potentiometer installation, refer to ARI-PREMIO operating instructions*

#### Installation parts:

- 1 electronic position indicator ES11
- 1 Mounting bracket ES11/RI21
- 2 Socket head cap screws DIN EN ISO 4762 - M4x8
- 2 Socket head cap screws DIN EN ISO 4762 - M4x12
- 1 1000 Ohm potentiometer
- 1 Potentiometer cable
- 2 PT screws KB 22x8 WN1412-Zi
- 1 Sliding block
- 1 Torsion spring
- 1 Washer
- 1 Spur gear  
19 teeth for 20 mm stroke, or  
28 teeth for 30 mm stroke, or  
45 teeth for 50 mm stroke, or

### 5.4 Installation in CS25 to CS27 actuator

Refer to figure below for installation in CS25 to CS27 actuator.

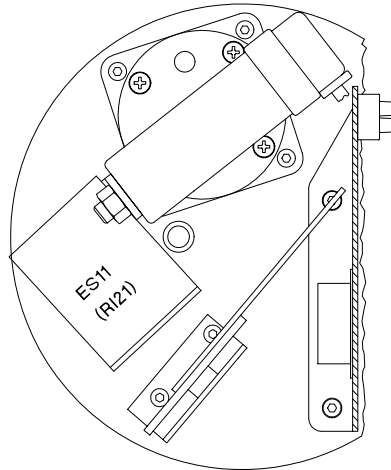


fig. 3

#### Installation procedure:

- Carefully remove cover.
- Loosen capacitor, for this purpose, release corresponding cable ties.
- Secure capacitor plate with screw DIN EN ISO 4762 - M8x10 on to gearbox cover.
- Install capacitor on capacitor plate
- Secure mounting bracket on gearbox cover with two self-tapping screws DIN7500 - M4x8.
- Secure RI21 to mounting bracket with two socket head cap screws DIN EN ISO 4762 - M4x12.
- Tie together newly installed cables with cable ties.
- Remove old circuit diagrams from cover and affix new circuit diagram in cover.



#### **ATTENTION !**

*For potentiometer installation, refer to operating instructions for CS actuators.*

#### Mounting parts:

- 1 electronic position indicator RI21
- 1 Mounting bracket ES11/RI21
- 2 Socket head cap screws DIN EN ISO 4762 - M4x12
- 1 Socket head cap screws DIN EN ISO 4762 - M8x10
- 1 Capacitor plate
- 2 Self-tapping screws DIN 7500 - M4x8
- 1 1000 Ohm potentiometer, soldered
- 2 Lock rings for potentiometer
- 1 Pinion for potentiometer
- 1 CS electronic position indicator cable
- 1 Circuit diagram RI21 + CS25
- 2 Cable ties

## 5.5 Electrical connection

### 5.5.1 Circuit diagram

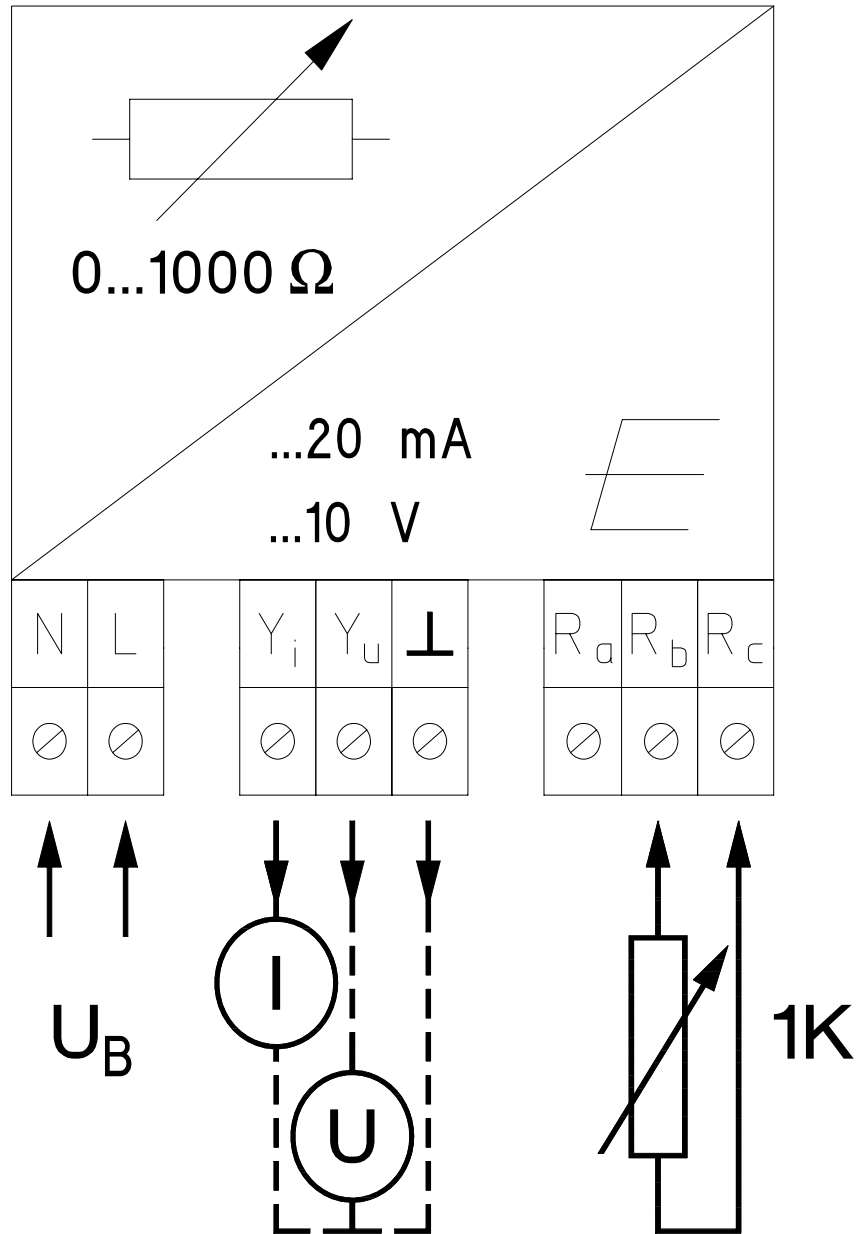


fig. 4

### 5.5.2 Terminal assignments

#### Power input

**N** ..... Terminal - power input ..... Neutral conductor  
**L** ..... Terminal - power input ..... Phase

#### Actuating signal output

**Y<sub>i</sub>** ..... Terminal - output signal ..... +...20 mA DC  
**Y<sub>u</sub>** ..... Terminal - output signal ..... +...10 V DC  
**⊥** ..... Terminal - ground, **GND** ..... 0 V

#### Potentiometer input

**R<sub>p</sub>** ..... Potentiometer ..... 0...1000 Ω  
**R<sub>a</sub>** ..... Terminal - potentiometer input  
 .....dashed line (yellow wire)  
**must'nt be connected because R<sub>a</sub> is internally wired with**  
**R<sub>b</sub>**  
**R<sub>b</sub>** ..... Terminal - potentiometer input ..... (grey wire)  
**R<sub>c</sub>** ..... Terminal - potentiometer input ..... (red wire)

### 5.5.3 Connection Conditions

All electrical terminals are connected to the electronic position indicator RI21 by means of series isolating terminals. The suitable conductor cross-sections for connecting the terminals are 0.2 to 2.5 mm<sup>2</sup>. To achieve optimal electromagnetic compatibility it is recommended to use shielded cables for connecting potentiometers or standardized active current or voltage signals.

Please contact ARI fittings direct for technical information.

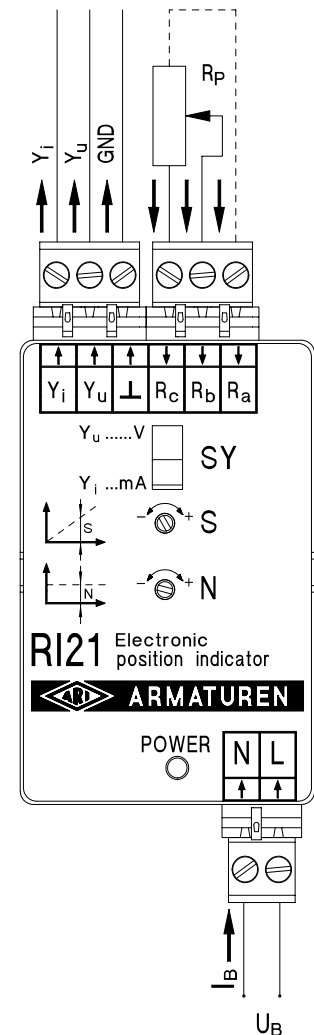



Fig. 5



**ATTENTION !**  
 To facilitate use in 3-conductor technology, the ground output ⊥ may be connected to the **N** contact of the power input only in the **24 V AC** version.  
 The new contact is then referred to as **zero potential (0V)**

Fuse protection of mains power supply on system side: 6 A max.

### 5.6 Connection in Control Cabinet

Power input for connection in control cabinet

The voltage supply is connected to terminals **N** and **L** in accordance with the type identification plate.

Actuating signal output for connection in control cabinet

The actuating signal output ...20 mA is connected to terminals **Y<sub>i</sub>** and **⊥**.

The actuating signal output ...10 V is connected to terminals **Y<sub>u</sub>** and **⊥**.



**ATTENTION !**  
**Only one actuating signal output may be connected at any one time.**

Potentiometer input for connection in control cabinet

A 1000 Ohm potentiometer is connected to terminals **R<sub>a</sub>**, **R<sub>b</sub>**, **R<sub>c</sub>**.

The wiper is connected to **R<sub>b</sub>**.

With the valve closed, there are 0 Ohms between **R<sub>b</sub>** and **R<sub>c</sub>**.

## 5.7 Connection in ARI-PREMIO (circuit diagram)

### 5.7.1 ARI-PREMIO 2,2 - 5 kN

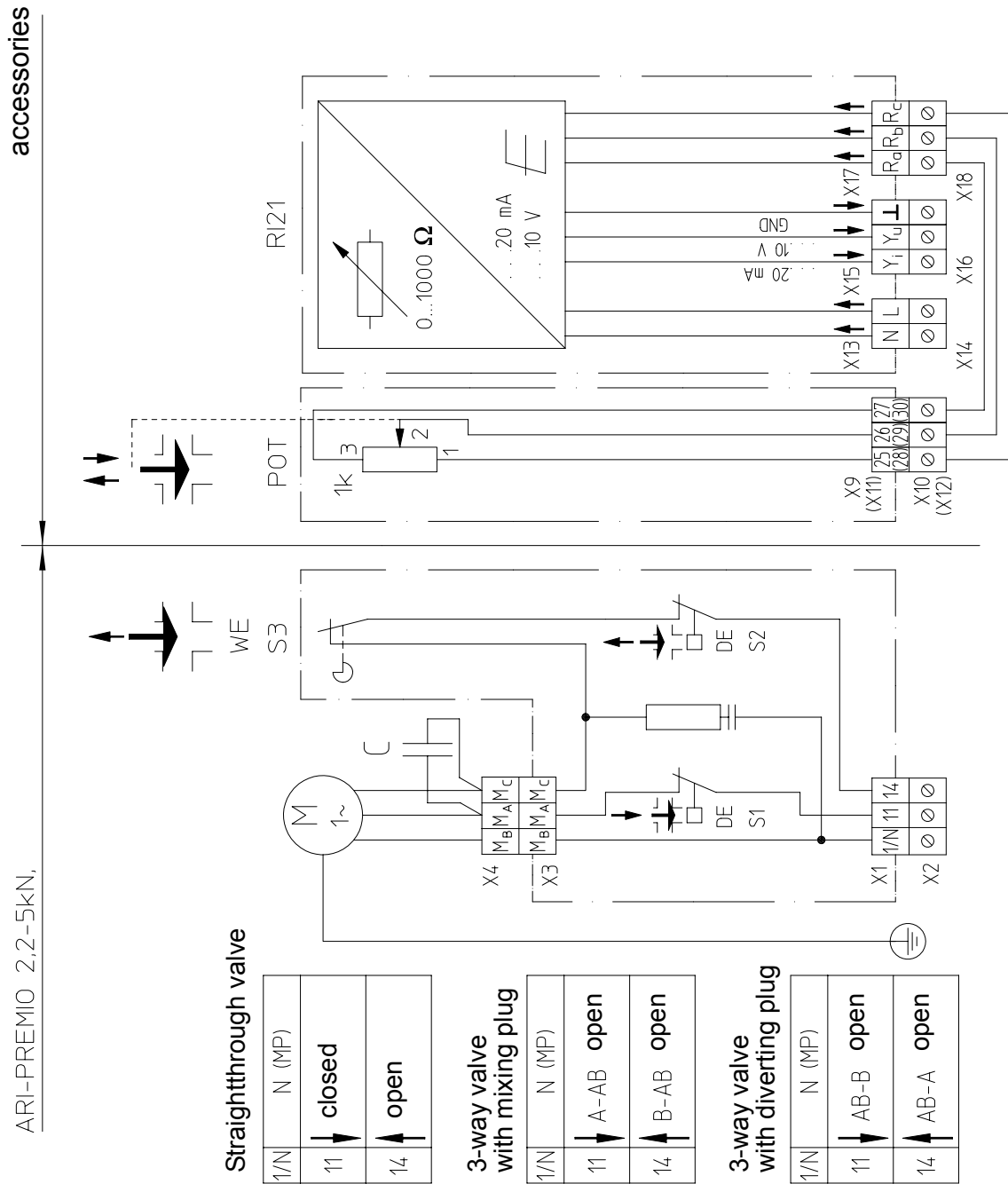


fig. 6

### 5.7.2 ARI-PREMIO 12 - 15 kN without integrated reversing contactor

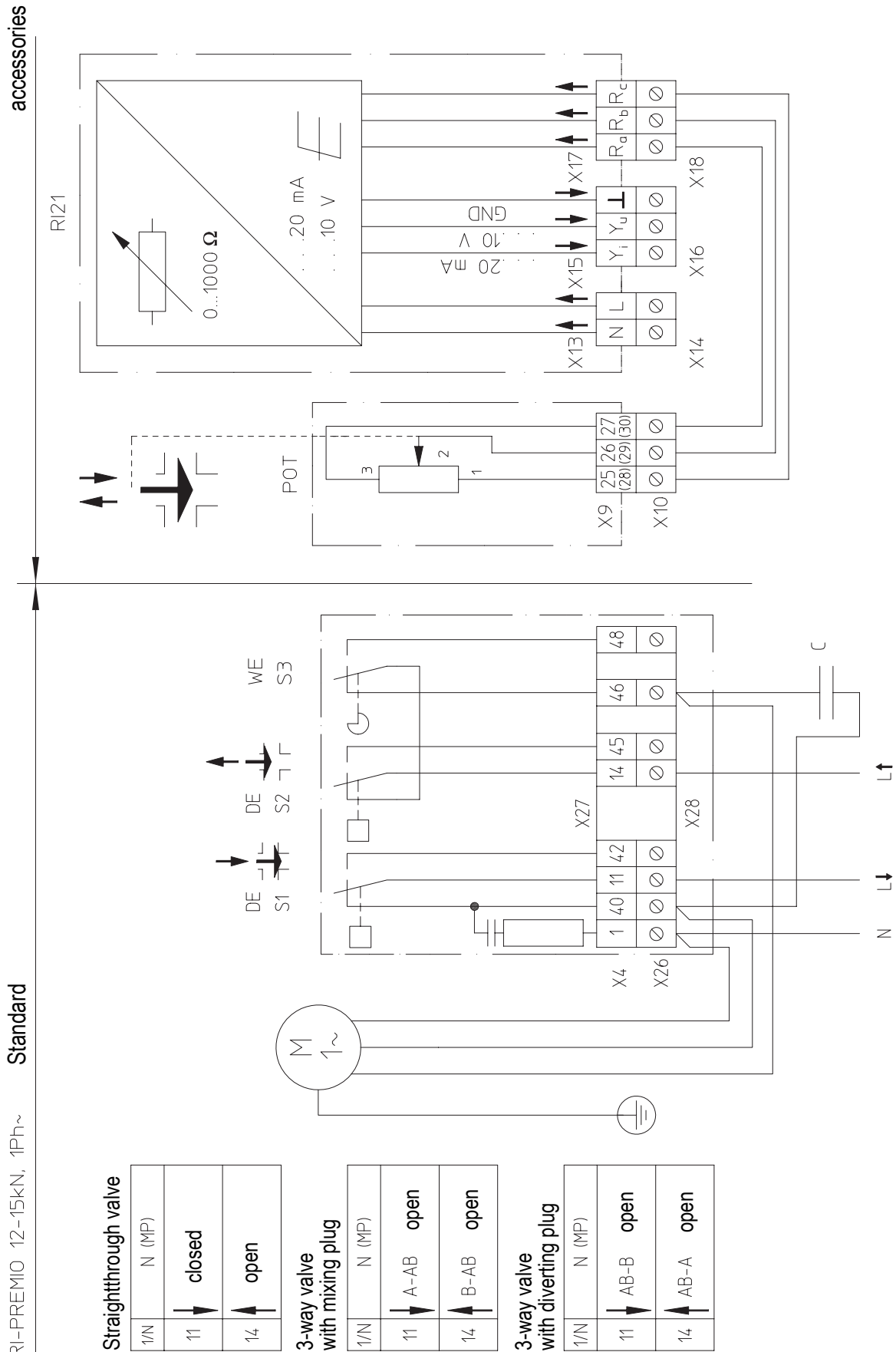
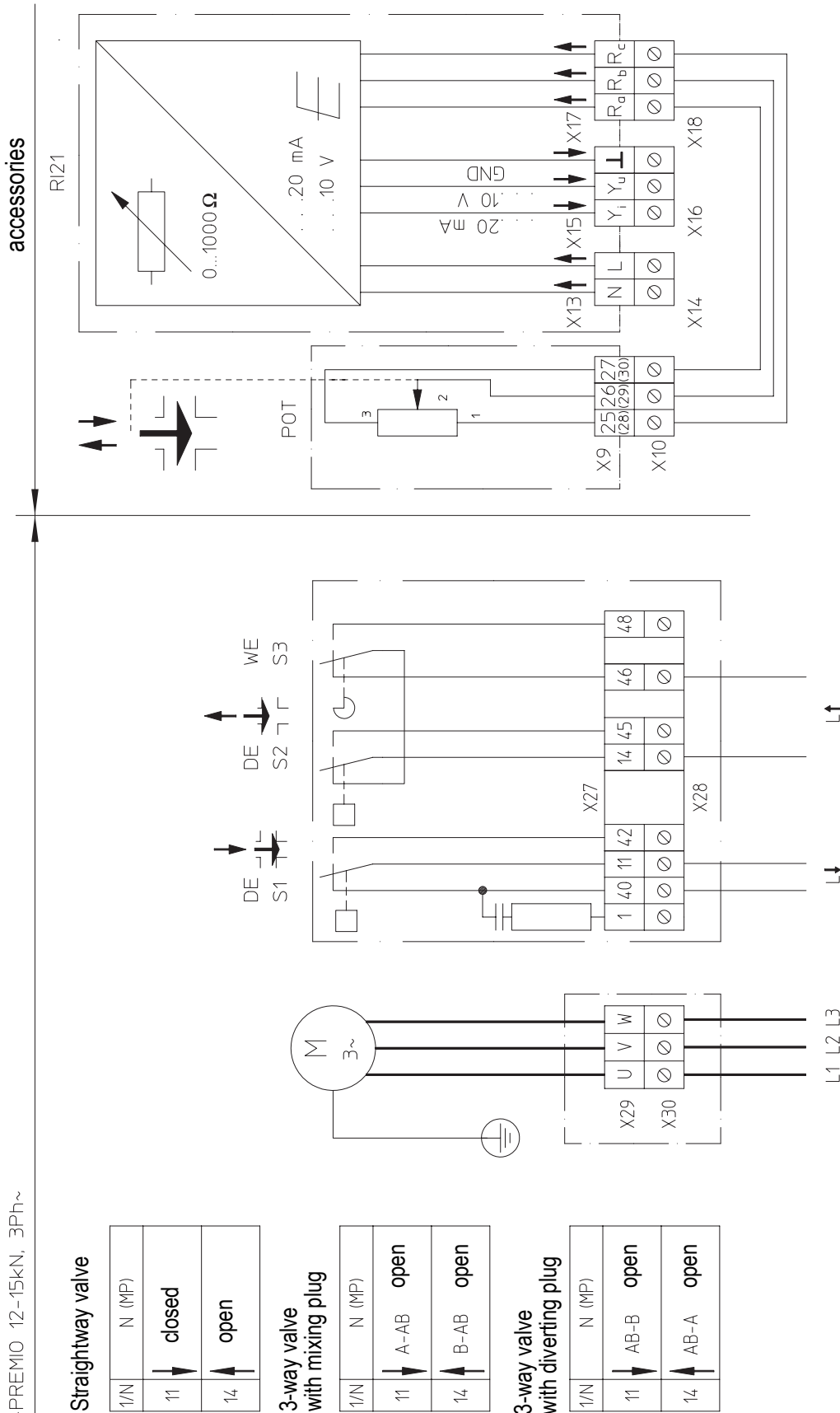


fig. 7

### 5.7.3 ARI-PREMIO 12 - 15 kN with integrated reversing contactor



**Straightway valve**

1/N	N (MP)
11	closed
14	open

**3-way valve with mixing plug**

1/N	N (MP)
11	open
14	open

**3-way valve with diverting plug**

1/N	N (MP)
11	open
14	open

External reversing contactor:  
 L1, L2, L3 - actuator spindle drives in  
 L3, L2, L1 - actuator spindle drives out  
 In all external reversing circuits the torque switches S1 and S2 have to be used to switch off the actuator motor.

ARI-PREMIO 12-15kN, 3Ph~  
 fig. 8

## 5.8 Connection in ARI-PREMIO (description)

Also refer to ARI-PREMIO operating instructions

### Power input for connection in ARI-PREMIO

The voltage supply is connected to terminals **N** and **L** in accordance with type identification plate.

### Actuating signal output for connection in ARI-PREMIO

The actuating signal output ...20 mA is connected to terminals **Y<sub>i</sub>** and  $\perp$ .

The actuating signal output ...10 V is connected to terminals **Y<sub>u</sub>** and  $\perp$ .



**ATTENTION !**

*Only one actuating signal output may be connected at any one time.*

### Potentiometer input for connection in ARI-PREMIO



**ATTENTION !**

*When installing the potentiometer, observe the operating instructions for the electrical linear actuator ARI-PREMIO.*

Plug connector **R<sub>a</sub>**, **R<sub>b</sub>**, **R<sub>c</sub>** from potentiometer cable into electronic position indicator RI21 and connector **25**, **26**, **27** into ARI-PREMIO pin block.

5.9 Connection in CS25 to CS27 actuator (circuit diagram)

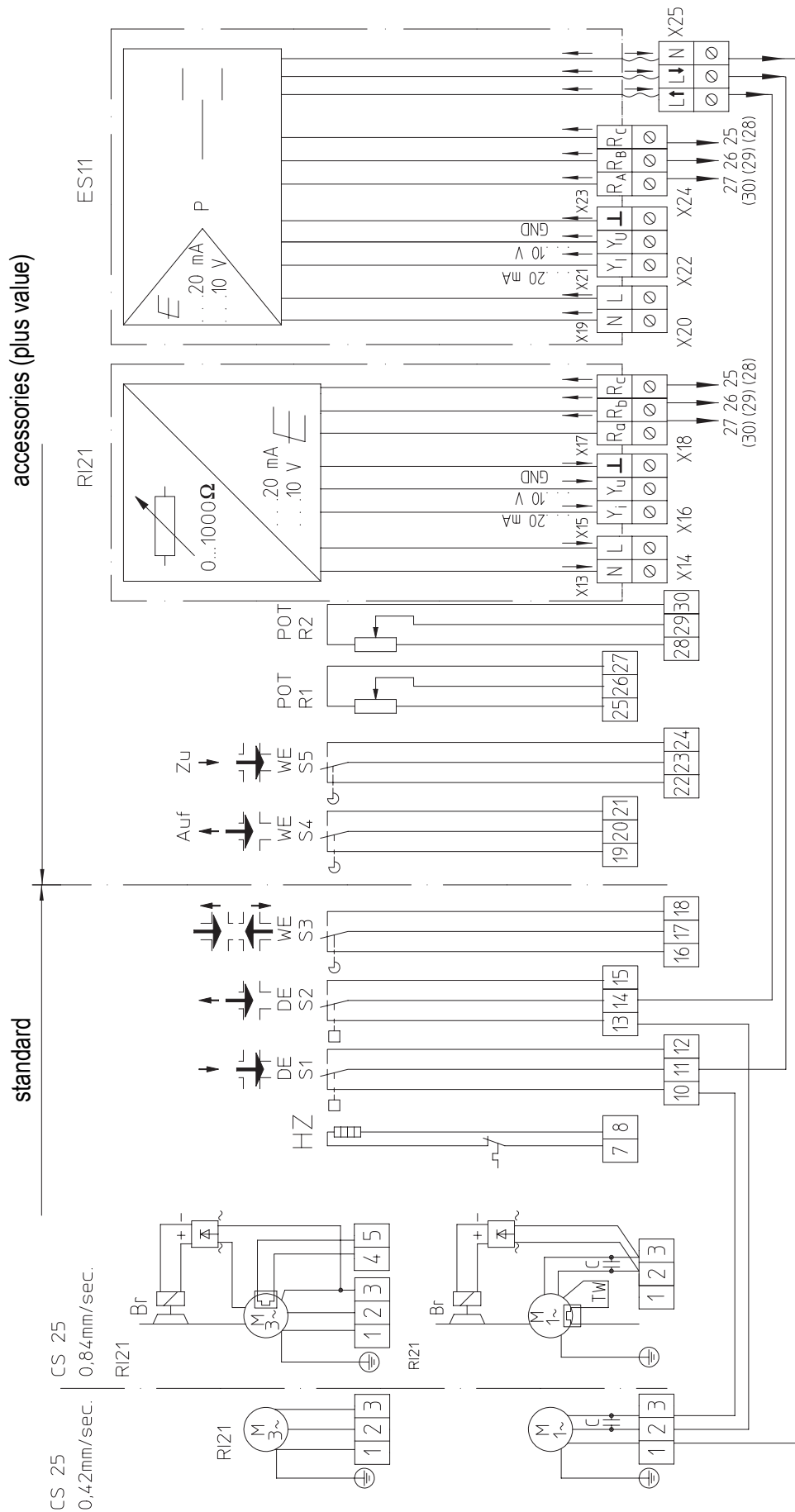


fig. 9

## 5.10 Connection in CS25 to CS27 actuator (description)

Also refer to CS25-27 operating instructions

### Power input for connection in CS actuator

The voltage supply is connected to terminals **N** and **L** in accordance with the type identification plate.

### Actuating signal output for connection in CS actuator

The actuating signal output ...20 mA is connected to terminals **Y<sub>i</sub>** and **⊥**.

The actuating signal output ...10 V is connected to terminals **Y<sub>u</sub>** and **⊥**.



**ATTENTION !**

*Only one actuating signal output may be connected at any one time.*

Potentiometer in CS actuator



**ATTENTION !**

*When installing the potentiometer, refer to operating instructions for electrical linear actuator CS25.*

Plug connector **R<sub>a</sub>**, **R<sub>b</sub>**, **R<sub>c</sub>** from potentiometer cable into the electronic position indicator RI21.

Unscrew connector **25**, **26**, **27** and connect cable in actuator.

R<sub>A</sub> ..... Terminal - potentiometer input (yellow cable) .....to terminal 27 (30)

R<sub>B</sub> ..... Terminal - potentiometer input (grey cable).....to terminal 26 (29)

R<sub>C</sub> ..... Terminal - potentiometer input (red cable) .....to terminal 25 (28)

## 6.0 Starting up



### **ATTENTION !**

- *The thrust actuator should only be operated for short periods without a hood when carrying out essential adjustments to potentiometers, directional switches and electrical options. During such activities the thrust actuator has hazardous live, bare parts as well as moving and rotating parts.*
- *Careless or unprofessional adjustments can lead to death, serious physical injury or substantial damage to property.*
- *Operating the thrust actuator without a hood is prohibited for any purpose other than that described above.*
- *Electronics must be moisture-free.*

Before starting up a new system or restarting a system following repair or modification check:

- that regional safety instructions have been complied with as a matter of principle
- that the data on power supply, actuating signal and ambient temperature are consistent with the technical data on the electronics.
- that all work has been properly completed!

The hood must be installed after completing the adjustments!

### 6.1 Basic settings of potentiometer

**The basic settings are very important for all other settings.**

#### **Independent Use (e. g. switch cabinet installation):**

The resistance at potentiometer input  $R_b$  and  $R_c$  should be between minimum 0.....500  $\Omega$  or maximum 0.....1300  $\Omega$  .

#### **If used in conjunction with ARI-Premio of ARI CS25 through CS27:**

Only carry out adjustments on the electronic position indicator RI21 when the actuator is installed on a valve and the 1 k $\Omega$  potentiometer in the actuator has been adapted to the relevant valve stroke. Refer to the operating instructions of the relevant actuator as an aid in adjusting the potentiometers in the actuator.

To facilitate basic setting, move the actuator into the required positions only with the hand wheel.

Before measuring the resistance, disconnect the potentiometer from the RI21 electronic position indicator and reconnect on completion of measurement.

**The resistance of the 1000  $\Omega$  potentiometer in the actuator is measured in order to adapt the potentiometer to the valve stroke.**

First measurement contact .....  $R_b$  - grey cable ..... - PREMIO terminal 26 (29)

Second measurement contact .....  $R_c$  - red cable ..... - PREMIO terminal 25 (28)

When the valve assembly is **closed**, there must be a resistance of **approx. 0  $\Omega$**  across the first and second measurement contacts.

When the valve assembly is **open**, there must be resistance of **500...1300  $\Omega$**  across the first and second measurement contacts.

## 6.2 Presetting actuating signal



### ATTENTION !

- The actuating signal is preset to 4...20 mA!
- The adjusting screws S (slope) and N (zero point) feature a slip clutch after a range of 25 turns. This clutch ensures the screws cannot be turned out of range.

If subsequent settings are made, the actuating signal data must be entered on the type identification plate with a water-proof pen.

## 6.3 Actuating signal selection

Setting of the required positioning signal is effected on switch SY.

Positioning the switch to  $Y_u$  will provide an output signal of up to 10 V DC voltage between terminal  $Y_u$  and GND.

Positioning the switch to  $Y_i$  provides an output signal of up to 20mA DC current between terminal  $Y_i$  and GND.

Only one positioning-switch output can be connected and used in each case.

## 6.4 Effective direction selection

- Zero-point setting always takes place from the transconductance setting.
- Prior to carrying out any setting operations, the voltage power supply must be switched off.
- The potentiometer must be positioned to approximately  $0 \Omega$ .
- Prior to resistance measurement, disconnect the potentiometer from the electronic position indicator RI21 and connect back up again following measurement.
- Resistance measurement on potentiometer cable between  $R_b$  and  $R_c$ .
- Connect voltage on **L** and **N** from the 2-pole line-up disconnect terminal; when this is done, the **yellow** LED should light up.
- Zero-point setting is carried out on the zero-point setscrew marked N.
- Switch the positioning signal switch **SY** to the desired positioning signal.
- Switch Current Output ..... to .....  $Y_i$ ...(**mA**)
- Switch Voltage Output ..... to .....  $Y_u$ ...(**V**)
- Positioning signal output up to **20 mA** ammeter on terminal  $Y_i$  and connect.
- Positioning signal output up to **10 V** voltmeter on terminal  $Y_u$  and connect.
- Adjust zero-point setscrew **N** in such a way that the minimum desired positioning signal value is present on the measuring set.
- To increase the output signal, turn zero-point setscrew **N** in **clockwise direction**; to **reduce** the output signal turn screw **in counterclockwise direction** (25 turns maximum).

### Example:

- Current Output.....minimum value .....  $Y_i = 0 \text{ mA}$  or **4 mA**.
- Voltage Output.....minimum value .....  $Y_u = 0 \text{ V}$  or **2V**

## 6.5 Zero point setting for standard effective direction

Zero-point setting is followed by transconductance setting.

- The potentiometer must be between **750 and 1100  $\Omega$** .
- Prior to resistance measurement, disconnect the potentiometer from the electronic position indicator RI21 and connect back up again following measurement.
- Resistance measurement on potentiometer cable between  **$R_b$  and  $R_c$** .
- Adaptation of the resistance range to the positioning signal range is set using the transconductance setscrew marked **S**.
- The measuring set from the set zero-point setting remains in the same measuring range for the transconductance setting.
- Adjust transconductance setscrew **S** in such a way that the maximum desired positioning signal value is present on the measuring set.
- To **increase** the output signal, turn transconductance setscrew **S** in **clockwise direction**; to **reduce** the output signal turn screw **in counterclockwise direction** (25 turns maximum)

### Example:

- Current Output.....minimum value .....  **$Y_i = 20 \text{ mA}$**
- Voltage Output.....maximum value .....  **$Y_u = 10 \text{ V}$**

## 7.0 Care and maintenance

The electronic position indicator RI21 requires little maintenance so that specific maintenance tasks are not specified at set intervals.

Dirt which may build up on the outside should be cleaned from the electronic position indicator RI21 corresponding to operating conditions.



### **ATTENTION !**

*Before cleaning electronics the supply line must be disconnected from the mains (not live). It must be impossible to switch the power on unintentionally while the mains are disconnected in this way.*

*Failure to comply may result in death, serious injury or substantial damage to property.*

The electronic position indicator RI21 must not be cleaned with watery liquids or with solvents or detergents which are aggressive, harmful or highly flammable.

Before cleaning, the detergent should preferably be applied to a cleaning cloth. Liquids must not penetrate into the inside of the electronic position indicator.

## 8.0 Troubleshooting

In the event of malfunction or faulty operating performance check that the installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.



### **ATTENTION !**

It is essential that the safety regulations are observed when identifying faults.

If malfunctions cannot be eliminated with the help of the following table "**9.0 troubleshooting table**", the supplier or manufacturer should be consulted.

## 9.0 Troubleshooting table

**ATTENTION !**

- read point 10.0 and 11.0 prior to dismantling and repair work!
- read point 6.0 before restarting the plant !

Faults	Possible causes	Corrective measures
Yellow LED is not lit	- Mains failure	- Check power supply
	- Incorrect operating voltage	- Connect operating voltage in accordance with type identification plate
	- electronic position indicator burnt out	- Check whether mains voltage agrees with the voltage specified on type identification plate. Replace electronic position indicator.
	- Connection terminal not connected correctly or cable has no contact in connection terminal	- Firmly plug in connection terminal and check connection cable
electronic position indicator cannot be adjusted	- Potentiometer not connected correctly	- Check connections
	- Potentiometer has incorrect value rating	- Replace potentiometer by 1000 Ω potentiometer
	- Potentiometer connected to incorrect terminal	- Correct connection in accordance with circuit diagram
	- No signal present at output	- Perform settings as under 6.0 through 6.5
	- Actuating signal connected to incorrect terminal	- Correct connection in accordance with circuit diagram
	- Adjusting screws <b>N</b> (zero point) and <b>S</b> (slope) are out of range	- Carry out settings as described under 6.0 to 6.5
Output positioning signal incapable of being set over the entire setting distance	- Spur gear transmission ratio at potentiometer incorrect	- Adapt spur gear transmission ratio to control range
	- Wrong potentiometer	- Use 1000 ohm potentiometer
	- Adjusting screws <b>N</b> (zero point) and <b>S</b> (slope) are out of range	- Carry out settings as described under 6.0 to 6.5

## 10.0 Dismantling of the position indicator



### **ATTENTION !**

- Before dismantling the electronics the supply line must be disconnected from the mains (not live). It must be impossible to switch the power on unintentionally while the mains are disconnected in this way.
- The actuating signal must be switched off.

## 11.0 Warranty / Guarantee

The extent and period of warranty cover are specified in the "Standard Terms and Conditions of Albert Richter GmbH & Co. KG" valid at the time of delivery or, by way of departure, in the contract of sale itself.

We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.

No warranty claims can be made for any damage caused as the result of incorrect handling or disregard of operating and installation instructions, datasheets and relevant regulations.

This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.

Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.

No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.

The warranty shall not cover maintenance work, installation of external parts, design modifications or natural wear.

Any damage incurred during transport should not be reported to us but *rather* to the competent cargo-handling depot, the railway company or carrier company immediately or else claims for replacements from these companies will be invalidated.



### **Technology for the Future.**

#### **GERMAN QUALITY VALVES**

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## 12.0 EC declaration of conformity / Manufacturers declaration

**ARI-Armaturen Albert Richter GmbH & Co. KG,  
Mergelheide 56-60, 33756 Schloß Holte-Stukenbrock**

### **EC declaration of conformity**

as defined by  
Directive about electromagnetic compatibility 89/336/EEC and  
EG-Low voltage directive 73/23/EEC

Herewith we declare, that the supplied model of

**Electronic Positioner ES 11 (24V, 115V, 230V) and  
Electronic Position Indicator RI 21 (24V, 115V, 230V)**

in the delivered version complies with the following regulations:

- Directive about electromagnetic compatibility 89/336/EEC  
(amended by 92/31/EEC and 93/68/EEC)

Applied harmonized standards:  
EN 55011; EN 55014; EN 50082-2

- EG-Low voltage directive 73/23/EEC  
(amended by 93/68/EEC)


Applied harmonized standards:  
EN 60730-1

### **Declaration of the manufacturer**

as defined by  
the Machinery Directive 98/37/EC

The supplied model is intended to be incorporated into machinery or assembled with other machinery to constitute machinery covered by this directive and must be put into service until the machinery into which it is be incorporated has been declared in conformity with the provisions of the directive as amended by 98/37/EC.

Schloß Holte-Stukenbrock, 07.07.2003

  
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(Brechtmann, managing director)

