
# Operating manual
# Signal box with inductive limit value transmitters for linear and rotary actuators
# Series 827S.E/X

09.2019 / 1.0

Original instructions

Cover picture background: Freepik.com

# Table of contents

# 1 General data

This operating manual contains instructions that enable the product to be safely and properly installed, put into operation and maintained.

The target group for this operating manual is exclusively specially trained and authorised technical personnel.

Please contact the manufacturer if you encounter problems that cannot be solved with the aid of this operating manual.

The product is subject to technical changes at any time.

## 1.1 Validity of the manual

This operating manual applies to the product in the version described in the device pass.

## 1.2 Contact details

Further information about the product can be obtained from:

**Manufacturer's address**

ARCA Regler GmbH
Kempener Str. 18
D-47918 Tönisvorst
Tel.: +49 (0) 2156-7709-0
Fax: +49 (0) 2156-7709-55
E-mail: sale@arca-valve.com
www.arca-valve.com

## 1.3 Other applicable documents

The product can be delivered as part of an actuator and equipped with additional components that are described in their own operating manuals. The instructions as well as the warning and safety information contained therein must also be observed.

Furthermore, the following documents apply in addition to this operating manual.

- Device pass
- Installation drawing

## 1.4 Place of storage of the manual

The operating manual and all other applicable documents are part of the product. They must be kept in the immediate vicinity of the product and must be accessible to the personnel at all times.

## 1.5 ARCA ONSITE

If the product was supplied as part of a complete control valve, the operating documentation can be downloaded from our ARCA ONSITE portal with the help of the control valve's serial number.

Two options are available here:

1. Scan the **QR code**[1], which can be found on the control valve. Further entries are not required.

2. Visit the website **https://onsite.arca-valve.com/search** and enter the ARCA order no. and ARCA serial no. of the control valve. The order no. and serial no. of the control valve can be found on the device pass and on our order confirmation.

**Entry example**

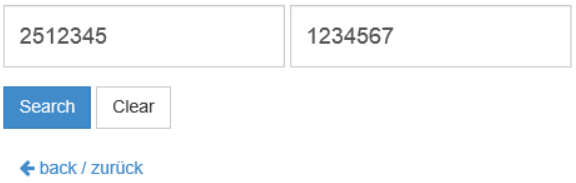



*Illustration 1:* ARCA ONSITE

[1] **QR Code** is a registered trademark of DENSO WAVE INCORPORATED

# 2 Safety

## 2.1 Introduction

This manual contains all the information you need for the connection and commissioning of the device.

It is addressed to people who mechanically mount, electrically connect, parameterise and commission the device, as well as service and maintenance technicians.

This manual applies to devices in both non-intrinsically and intrinsically safe versions.

We expressly state that the contents of this operating manual do not form part of or modify a former or existing agreement, assurance or legal relationship. All obligations are specified in the particular purchase contract which also contains all the applicable warranty regulations. These contractual warranty conditions are neither extended nor restricted by any statements in this document.

The contents reflect the technical state at the time of printing.

We reserve the right to make technical changes in the course of further development.

**⚠ WARNING**

**Use of a damaged or incomplete device**

Risk of explosion!

► Do not use damaged or incomplete devices.

## 2.2 General safety information

### Requirement for safe use

This equipment has been supplied from the factory in a totally safe condition. To maintain this condition and to ensure safe operation of the device, follow these instructions and observe all safety-relevant information.

Pay attention to the notices and symbols on the device. Do not remove any notices or symbols from the device. Keep the notices and symbols in a fully legible condition at all times.

## 2.3 Explanation of symbols and notices

This documentation contains notes that you must observe for your own personal safety and for the avoidance of damage to property. Notes concerning personal safety are highlighted by a warning triangle; notes concerning only damage to property are not marked by a warning triangle. Depending on the danger level, the warning notes are shown in decreasing order of severity as follows:

**⚠ DANGER**

**means that death or serious injuries will occur if the corresponding preventive measures are not taken.**

**⚠ WARNING**

**means that death or serious injuries can occur if the corresponding preventive measures are not taken.**

**⚠ CAUTION**

**with a warning triangle means that slight injury and/or damage to property can occur if the corresponding preventive measures are not taken.**

**NOTICE**

**indicates an important item of information about the product itself or how the product should be handled, to which special attention should be paid.**

| CAUTION |
| --- |
| without a warning triangle means that damage to property can occur if the corresponding preventive measures are not taken. |

| ATTENTION |
| --- |
| indicates that an undesirable event or condition can occur if the corresponding instructions are not observed. |

If several danger levels occur, the warning note for the respectively highest level will always be used. If a warning note with a warning triangle warns against personal injury, a warning against damage to property may be included in the same warning note.

## 2.4 Warning symbols on the device

| Symbol | Explanation of the warning symbols on the device |
| --- | --- |
|  | Observe the operating manual |
|  | Protect the device against shocks (otherwise the protection class is not guaranteed) |

## 2.5 Intended use

Observe the following:

**⚠ WARNING**

**ARCA signal boxes may be used only for the applications foreseen in the associated technical documentation. Proper transport, storage, erection, assembly, installation, commissioning, operation and maintenance are required for trouble-free and safe operation. The permissible environmental conditions must be maintained. Notices in the associated documentation must be observed.**

## 2.6 Improper modifications to the device

**⚠ WARNING**

**Modification to the device**

Modifications and repairs to the device, in particular in potentially explosive areas, can be dangerous for personnel, the plant and the environment!

► Modify or repair the device only as described in the instructions for the device. The manufacturer's warranty and the product approvals are rendered null and void if this is ignored.

## 2.7 Qualified Personnel

The device may be set up and operated only in conjunction with this documentation. Startup and operation may be performed only by **qualified personnel**. Qualified personnel within the meaning of the safety instructions in this documentation are persons who are authorised to commission, earth and mark devices, systems and circuits according to the safety standards.

Qualified persons are those who are familiar with the erection, assembly, startup and operation of the product. These persons possess the following qualifications:

- They are authorised and have been trained or instructed to operate and maintain devices and systems in accordance with the safety standards for electrical circuits, high pressures and aggressive and/or hazardous media.
- In the case of devices with explosion protection: they are authorised and have been trained or instructed to carry out work on electrical circuits for plants that are at risk from explosions.
- They have been trained or instructed in the care and use of appropriate safety equipment in accordance with safety standards.

## 2.8 Liability disclaimer

We have checked the contents of this manual for correspondence to the hardware and software described. Nevertheless, deviations cannot be ruled out; therefore we cannot give any guarantee for full correspondence. The details are checked regularly and any necessary corrections will be included in subsequent editions.

## 2.9 Laws and regulations

The test certificates, regulations and laws applicable to your country must be observed for the connection, assembly and operation.

These are, for example:

- IEC 60079-14 (international)
- EN 60079-14 (EC)
- Operational safety ordinance

## 2.10 Conformity to European directives

The CE mark on the device indicates its conformity to the following European directives:

| | |
|---|---|
| 2014/30/EU<br>EMC | Directive of the European Parliament and of the Council on the harmonisation of the Laws of the Member States relating to electromagnetic compatibility. |
| 2014/34/EU<br>ATEX | Directive of the European Parliament and of the Council on the harmonisation of the Laws of the Member States relating to equipment and protection systems intended for use in potentially explosive atmospheres. |
| 2014/35/EU<br>LVD | Directive of the European Parliament and of the Council on the harmonisation of the Laws of the Member States relating to the making available of electrical equipment designed for the use within certain voltage limits. |

The applied standards can be found in the EU Declaration of Conformity for the device.

## 2.11 Use in potentially explosive areas

**⚠ WARNING**

**Unsuitable device for potentially explosive areas**

Risk of explosion!

- ► Use only devices that are approved for use in Ex-zones and are marked accordingly.
- ► Make sure that the device is suitable for the area of use.

**⚠ WARNING**

**Loss of safety of the device in the ignition protection class Intrinsic Safety "Ex i"**

If the device has already been operated on non-intrinsically safe circuits or with a higher operating voltage, the safety of the device for use in potentially explosive areas is no longer guaranteed. There is a danger of explosion!

- ► Connect the device in the ignition protection class Intrinsic Safety exclusively to an intrinsically safe electrical circuit.
- ► Observe the electrical data in the certificate.

**⚠ WARNING**

**Impermissible accessories and impermissible spare parts**

Danger of explosion in potentially explosive areas or damage to the device!

► Use exclusively original accessories and original spare parts.

► Observe all relevant installation and safety instructions described in the manuals for the device, accessories and spare parts.

**⚠ WARNING**

**Open cable entry or incorrect cable gland**

Danger of explosion in potentially explosive areas or damage to the device!

► Seal the cable entries for the electrical connections. Use exclusively cable glands or blanking plugs for this that are approved for the respective ignition protection class.

**⚠ WARNING**

**Exceeding the maximum ambient or media temperature**

Risk of explosion in potentially explosive areas

The temperature class of the device is no longer valid if the maximum permissible ambient or media temperature is exceeded!

► Make sure that the maximum permissible ambient or media temperature of the device is not exceeded.

**⚠ WARNING**

**Electrostatic charging of nameplates**

The nameplates used on the device can reach a charging capacity of 5 pF.

► Keep the device and the cables at a distance from strong electromagnetic fields.

**⚠ CAUTION**

**Electrostatically endangered assemblies**

The device contains electrostatically endangered assemblies. Electrostatically endangered assemblies can be destroyed by voltages far below the threshold of human perception. These voltages already occur if you touch a component or electrical connection without having electrostatically discharged yourself first. The damage caused to an assembly due to overvoltage is not usually immediately apparent and only becomes noticeable after a lengthy period of operation.

► Therefore, prevent electrostatic charging.

# 3 Transport, storage and packaging

## 3.1 Transport

Transport at a temperature lower than -40 °C or higher than +80 °C is not permissible.

## 3.2 Storage

**NOTICE**

**Improper storage!**

There is a danger of the product no longer functioning if it is stored improperly.

- ► Storage at a temperature lower than -40 °C or higher than +80 °C is not permissible.
- ► It must be stored in roofed-over storage places and that are weatherproof.

Openings are sealed with suitable means to prevent the ingress of dirt. These should be removed by technical personnel at the place of installation.

**⚠ CAUTION**

**Inadequate protection during storage**

The packaging offers only limited protection against moisture and infiltration!

- ► Provide additional packaging if necessary.

## 3.3 Packaging

The product is packed in a PE film inside the outer packaging (cardboard box, wooden crate, pallet, lattice box).

If the packaging, in particular the PE film, has been opened, the product must be stored immediately in a heated room.

The product must be packed in weatherproof or seaworthy packaging for transport by ship, rail or truck.

# 4 Type plate

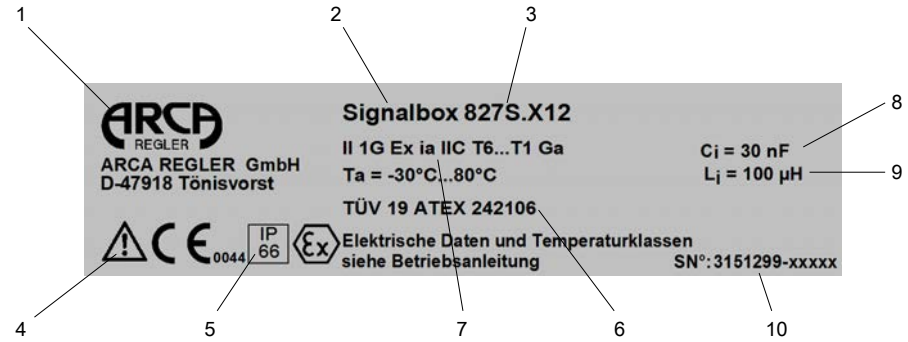



*Illustration 2:* 827S nameplate

| | |
|---|---|
| 1 | Manufacturer |
| 2 | Device name |
| 3 | Type |
| 4 | Observe the operating manual |
| 5 | Protection class |
| 6 | Approval |
| 7 | ATEX marking for potentially explosive areas |
| 8 | Internal capacitance |
| 9 | Internal inductance |
| 10 | Fabrication number |

# 5 Type key

| 827S. | X | 2 | 1 |
|---|---|---|---|
| [1] | [2] | [3] | [4] |

| 1. Series | |
|---|---|
| 827S. | |

| 2. Explosion protection [1] | |
|---|---|
| E | not explosion proof |
| X | explosion protected "ia" [1] |

| 3. Number of slot-type initiators | |
|---|---|
| 1 | 1 slot-type initiator |
| 2 | 2 slot-type initiators |
| 3 | 3 slot-type initiators [2] |

| 4. Types of slot-type initiators | |
|---|---|
| 1 | SC 3.5…NO…-BU |
| 2 | SJ 3.5-SN |
| 3 | SB 3.5-E2 [2] |

[1]) ATEX approval, other approvals on enquiry

[2]) only in explosion protection class "E": not explosion proof

**Example of type designation**

827S.X21

Signal box 827S – explosion-proof "ia" – 2 slot-type initiators – initiators type SC 3.5…NO…-BU

# 6 Description

## 6.1 Function

- The signal box 827S is used for the feedback of up to 3 freely adjustable valve positions (positions of the actuator) to the control system. The stroke or rotary movement of the actuator is transmitted to a shaft by the stroke or rotary angle sensor. This rotary movement is transmitted directly to an immersion disc. The movement of the immersion disc into or out of the respective slot-type initiator generates the corresponding electrical signal.
- The slot-type initiators can be arranged in arbitrary positions around this immersion disc and adjusted so that almost any desired switching position is representable for the slot-type initiator.

## 6.2 Construction

This section describes the mechanical and electrical construction, the device components and the principles of the operation of the signal box.

The signal box is used to signal the positions (usually the end positions) of:

- linear actuators or
- rotary actuators VDI/VDE 3845

Linear actuators may be mounted in a number of ways.

- NAMUR or IEC 60534
- integrated mounting (ARCA, SAMSON)

The signal box can be mounted and operated on all normal actuators.

The device is available for single-acting and double-acting actuators as well as for potentially explosive and non-potentially explosive applications.

## 6.3 Device Components

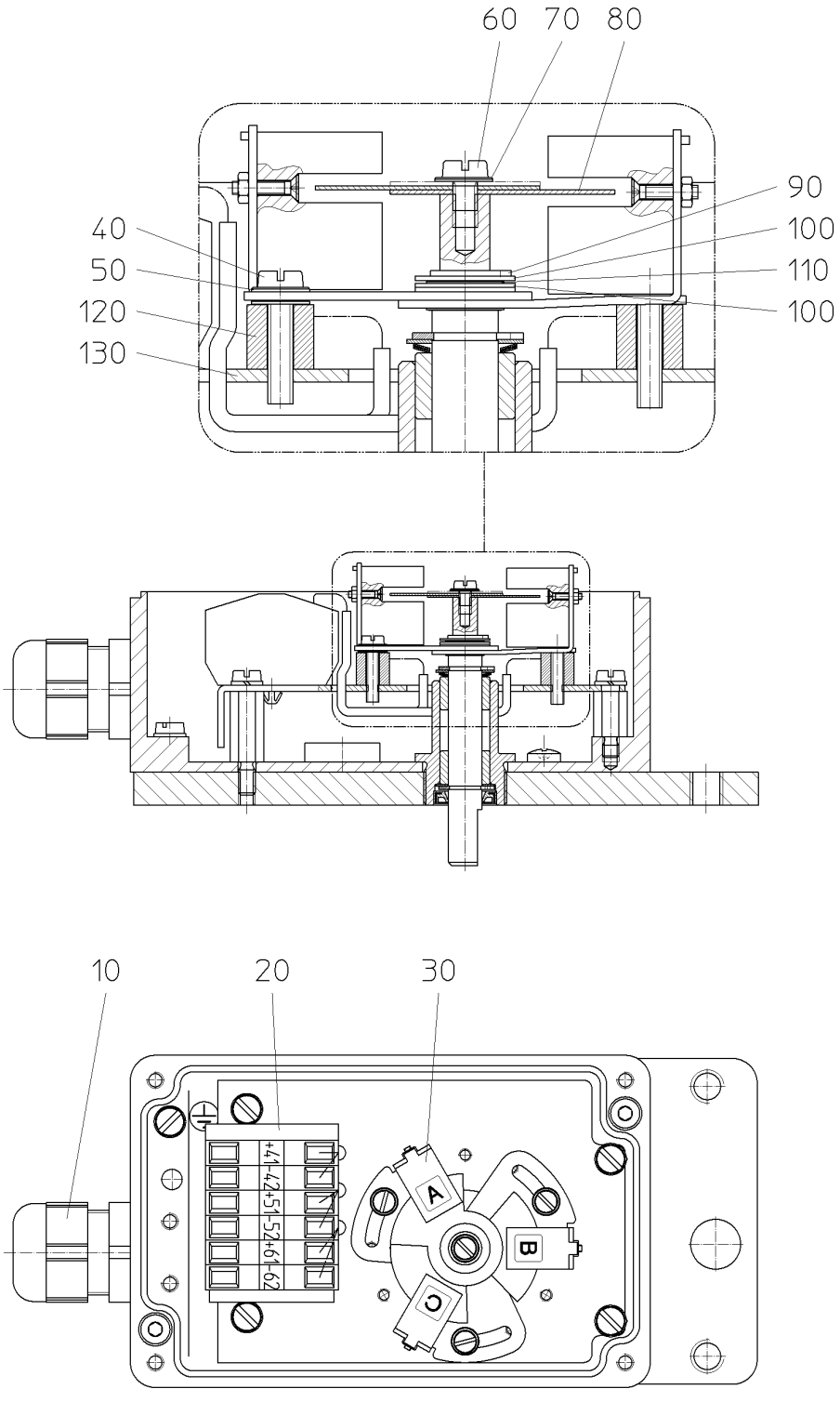



*Illustration 3:* Construction

| | |
|---|---|
| 10 | Cable gland |
| 20 | Terminal set |
| 30 | Proximity switch |
| 40 | Screw |
| 50 | Washer |
| 60 | Screw |
| 70 | Washer |
| 80 | Switching disc |

| | |
|---|---|
| 90 | Circlip |
| 100 | Washer |
| 110 | Spring washer |
| 120 | Spacer sleeve |
| 130 | Base plate |

### 6.3.1 Electrical Connections

The signal box's connecting terminals are located on the left-hand side.

# 7 Assembly

## 7.1 Safety instructions for assembly

**CAUTION**

**Improper installation**

Improper installation can result in damage to the device, its destruction or the impairment of its function.

Ascertain that the device shows no visible signs of damage each time before installing it.
Ascertain that the process connections are clean and that suitable seals and cable glands are used.

Install the device using suitable tools.

**ATTENTION**

**The device protection class becoming null and void**

Damage to the device due to open or improperly closed housing. The protection class specified on the nameplate is no longer guaranteed.

**⚠ CAUTION**

**Humid environment**

If the environment is humid, mount the signal box in such a way that there is no chance of the shaft freezing at low ambient temperatures. Make sure that water does not enter an open housing or screw connection. If the signal box cannot be immediately and permanently mounted and connected on site, it is possible for water to enter.

## 7.2 Mounting a linear actuator

### 7.2.1 Mounting with mounting kit for "Integrated Fitting Linear Actuator"

Included with the "integrated fitting linear actuator" are (see figures below for serial numbers):

| Serial no. | No. of items | Name | Note |
|---|---|---|---|
| 1 | 1 | Driver pin cpl. with roller | mounted on lever (2) |
| 2 | 1 | Lever | |
| 3 | 1 | Washer | B6.4 - DIN 125 - A2 |
| 4 | 1 | Spring lock washer | A6 – DIN 127- A2 |
| 5 | 1 | Cylinder screw | M6 x 25 - DIN 7984 - A2 |
| 6 | 1 | Hex nut | M6 - DIN 6923 – A2 |
| 7 | 1 | Square nut | M6 - DIN 557 - A4 |
| 8 | 2 | Cylinder screw | M8 x 65 - DIN 912 - A2 |
| 9 | 2 | Spring lock washer | A8 - DIN 127 - A2 |

**Mounting procedure (see figures below)**

1. Fig. 5: Adjust the pin (1) on the previously assembled lever (2) to the value of the stroke range given on the actuator or, if this is not available as a scale value, to the next larger scale value. In case of un-

certainty with regard to the actual working stroke (pneumatic actuators often have a setting distance reserve), the next larger scale value should be selected. The centre of the pin should rest on the scale line on the lever (2).

2. Fig. 6: Push the lever (2) to the stop on the signal box shaft and fix it with cylinder screw (5).
3. Hold the signal box against the actuator in such a way that the roller passes between the pins (16).
4. Align the signal box horizontally on the yoke and assemble it with the screws (8) and spring lock washers (9).

**Assembly procedure plan - integrated fitting**

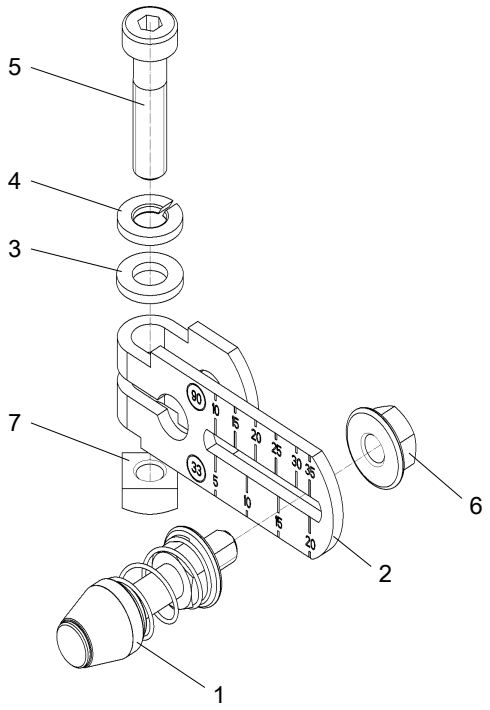



*Illustration 4:* Lever mounted

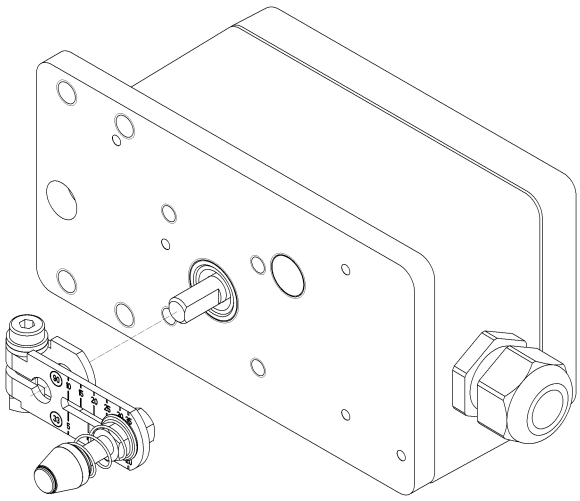


*Illustration 5:* Mounting the lever on the signal box

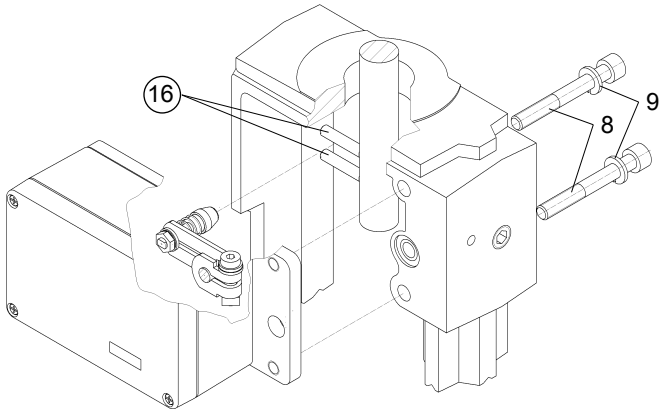



*Illustration 6:* Mounting the signal box on the actuator

### 7.2.2 Mounting with mounting kit "Linear actuator IEC 60534"

Included with the mounting kit "Linear actuator IEC 60534", stroke 3 to 35 mm, are (see figures below for serial numbers):

| Serial no. | No. of items | Name | Note |
|---|---|---|---|
| 1 | 1 | Driver pin cpl. with roller | mounted on lever (2) |
| 2 | 1 | NAMUR lever | For stroke range 3 mm to 35 mm, or (order separately for stroke range > 35 mm to 130 mm, see Fig. 10) |
| 3 | 2 | Washer | B 6.4 - DIN 125 - A2 |
| 4 | 3 | Spring lock washer | A6 - DIN 127 - A2 |
| 5 | 3 | Cylinder screw | M6 x 25 - DIN 7984 - A2 |
| 6 | 1 | Hex nut | M6 - DIN 6923 - A2 |
| 7 | 1 | Square nut | M6 - DIN 557 - A4 |
| 9 | 6 | Spring lock washer | A8 - DIN 127 - A2 |
| 17 | 1 | NAMUR mounting bracket IEC 534 | Standardised connecting location for mounting bracket with rib, column or flat surface |
| 18 | 1 | Sensing hoop | Guides the roller with the driver pin and turns the lever arm |
| 19 | 2 | Clamping piece | Assembly of the sensing hoop to the actuator's stem |
| 20 | 2 | U-bolts | Only for actuators with columns |
| 21 | 2 | Hex screw | M8 x 16 - DIN 933–A2 |
| 22 | 6 | Washer | B 8.4 - DIN 125 - A2 |
| 23 | 4 | Hex screw | M8 x 20 - DIN 933–A2 |
| 24 | 4 | Hex nut | M8 - DIN 934 - A4 |

**Mounting procedure (see figures below)**

1. Fig. 9: Assemble the clamping pieces (19) using the cylinder screws (5) and spring lock washers (4) to the actuator stem.

2. Push the sensing hoop (18) into the cut-outs in the clamping pieces (19). Adjust to the required length, and tightened the screws (5) so that it is still just possible to push the sensing hoop.
3. Fig. 10: Adjust the pin (1) on the previously assembled lever (2) to the value of the stroke range given on the actuator or, if this is not available as a scale value, to the next larger scale value. In case of uncertainty with regard to the actual working stroke (pneumatic actuators often have a setting distance reserve), the next larger scale value should be selected. The centre of the pin should rest on the scale line on the lever (2).
4. Push the lever (2) to the stop on the signal box shaft and fix it with the cylinder screw (5).
5. Fig. 11: Mount the mounting bracket (17) to the rear of the positioner with two hex screws (21), spring lock washer (9) and washers (22). The choice of the row of holes depends on the width of the actuator's lantern width. The roller should engage in the sensing hoop (18) as close to the stem as possible, but must not touch the clamping pieces (19).
6. Fig. 12: Hold the signal box with the fixing angle to the actuator in such a way that the pin (1) passes inside the sensing hoop (18).
7. Tighten the sensing hoop (18).
8. Prepare the assembly parts in accordance with the actuator type:
   – Actuator with a rib: hex screw (23), washer (22) and spring lock washer (9).
   – Actuator with a flat surface: four hex screws (23) with washer (22) and spring lock washer (9).
   – Actuator with columns: two U-bolts (20), four hex nuts (24) with washer (22) and spring lock washer (9).
9. Attach the signal box with the previously prepared assembly parts to the yoke. Adjust the height of the signal box so that the horizontal position of the lever is achieved as close as possible to the centre of the stroke. The actuator's lever scale provides orientation here. It is essential that the horizontal lever position is passed through within the stroke range.

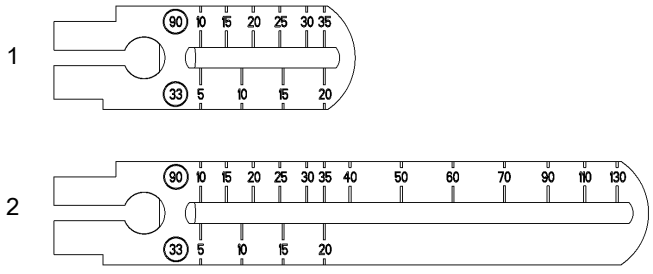



*Illustration 7:* NAMUR lever 3 mm to 35 mm (1), NAMUR lever > 35 mm to 130 mm (2)

**Assembly procedure - linear actuator IEC**

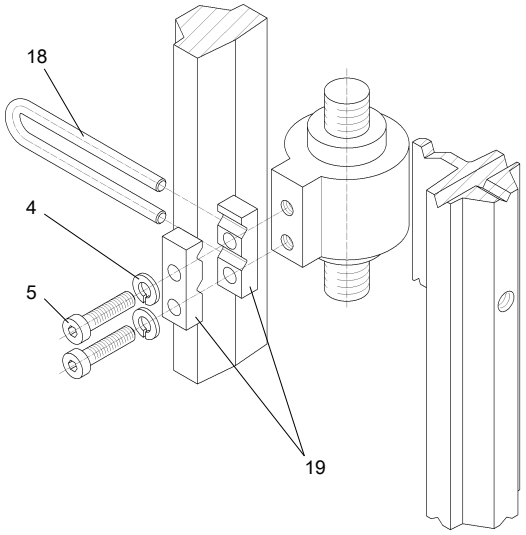



*Illustration 8:* Mounting the feedback lever on the actuator stem

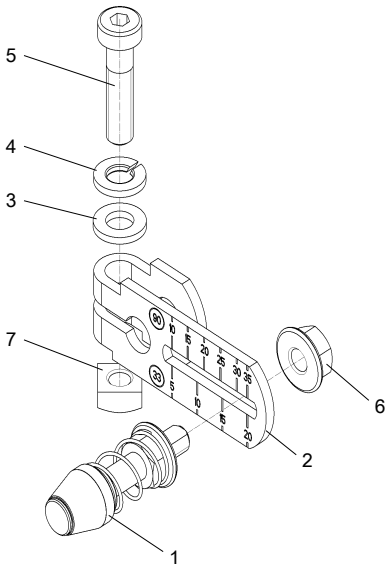



*Illustration 9:* Lever mounted

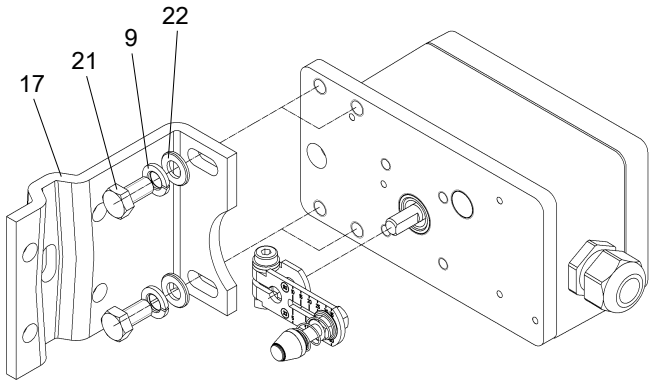



*Illustration 10:* Assembly with mounting bracket

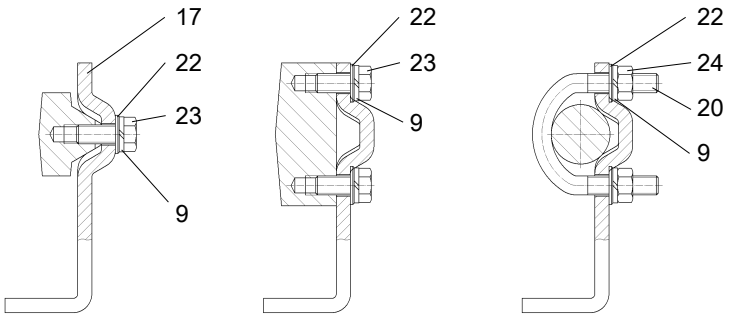



*Illustration 11:* Fastening to different types of yoke

## 7.3 Mounting with mounting kit "Rotary actuator VDI/VDE 3845"

Included with the mounting kit "Rotary actuator VDI/VDE 3845", are (see figures below for serial numbers):

| Serial no. | No. of items | Name | Note |
|---|---|---|---|
| 3 | 1 | Washer | B6.4 - DIN125 - A2 |
| 25 | 1 | Coupling wheel | Mounting on the axle of the positioner |
| 26 | 1 | Driver | Fitted to the actuator's shaft stub |
| 27 | 1 | Labels | Display of the actuator position, consisting of scale and pointer |
| | 8 | Scale | Various divisions |
| | 1 | Pointer | Reference point for scale |
| 28 | 4 | Hex screw | M6 x 12 - DIN933 - A2 |
| 29 | 4 | Lock washer | S6 |
| 30 | 1 | Cylinder screw | M6 x 12 - DIN84 - A2 |
| 31 | 1 | Mounting bracket VDI/ VDE3845 | |
| 32 | 1 | Square nut | M4 - DIN562 -A2 |
| 33 | 1 | Hexagon socket screw | M4 x 10 - DIN916 - A2 |
| 34 | 1 | Allen key | for item 33 |

**Mounting procedure (see figures below)**

1. Fig. 13: Attach the VDI/VDE 3845 mounting bracket (31), actuator-specific, supplied by actuator manufacturer, on the rear of the signal box, and fix it in place with the hex screws (28) and lock washers (29).
2. Insert square nut (32) into the coupling wheel (25), screw the hexagon socket screw (33) into the square nut (32).
3. Fig. 14: Push the coupling wheel (25) as far as it will go on the signal box shaft, pull it back about 1 mm and tighten the hexagon socket screw (33) with the supplied Allen key (34).
4. Fig. 15: Place the driver (26) on the actuator's shaft stub and tighten it with cylinder screw (30) and washer (3).

5. Fig. 16: Carefully place the signal box with the mounting bracket on the actuator. One of the two pins (35) of the coupling wheel (25) must engage in the driver (26).
6. Fig. 17: Align the signal box / mounting bracket centrally on the actuator and screw tight (screws are not included with the supply, but are part of the actuator's mounting bracket).

**Assembly procedure for VDI/ VDE 3845 rotary actuator**

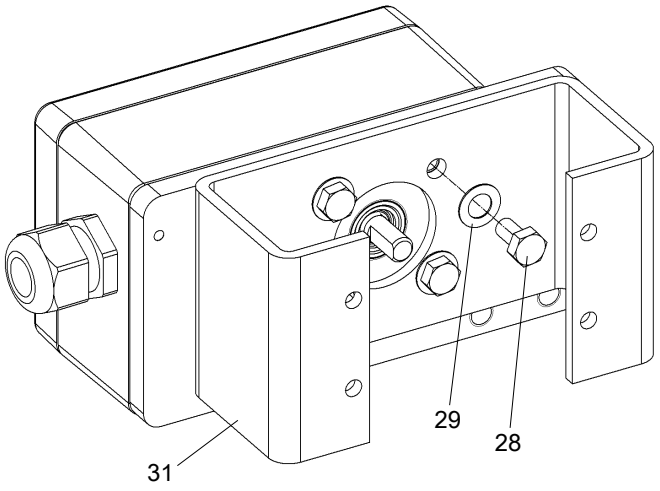



*Illustration 12:* Mounting bracket

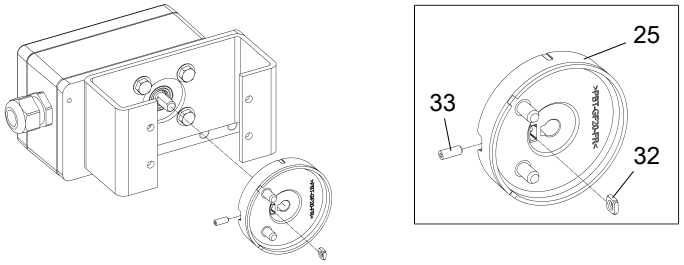



*Illustration 13:* Coupling wheel

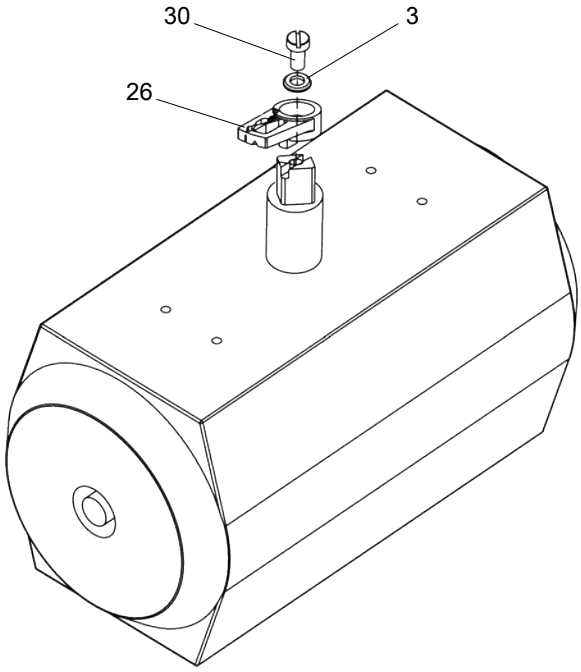



*Illustration 14:* Mounting the driver on the actuator

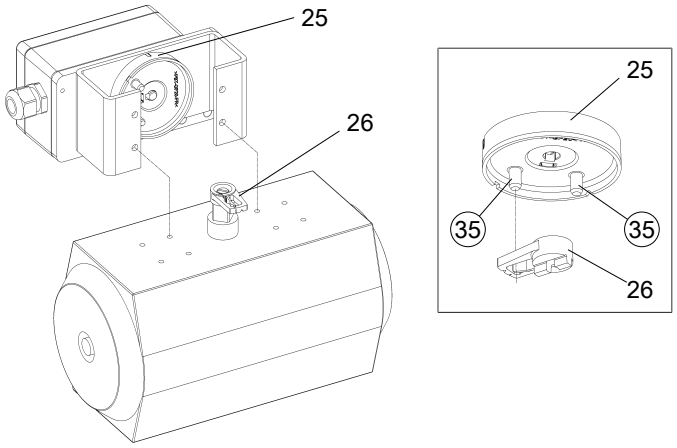



*Illustration 15:* Alignment of mounting bracket

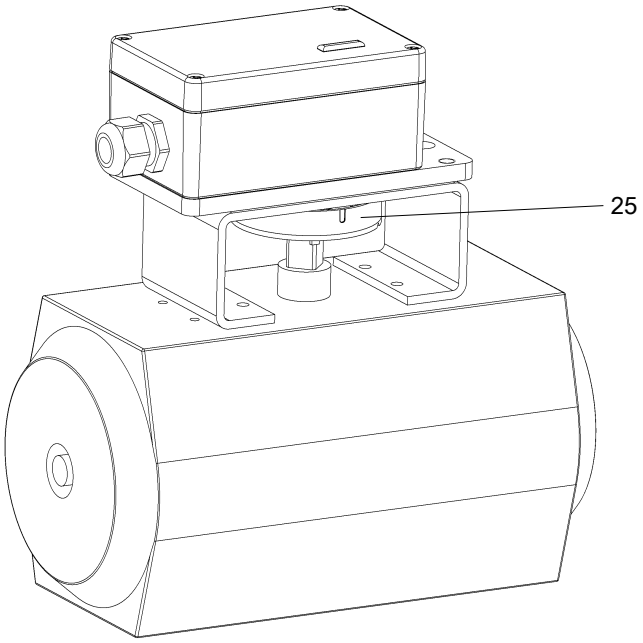
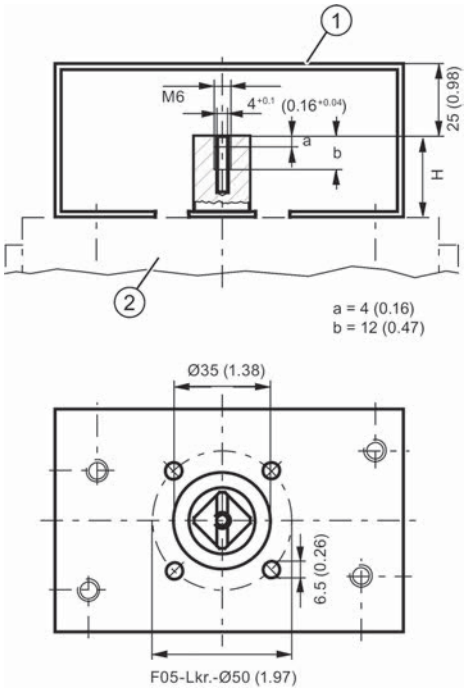



*Illustration 16:* Positioner with mounting bracket fitted on rotary actuator




| | |
|---|---|
| 1 | Positioner fixing plane |
| 2 | Rotary actuator |

*Illustration 17:* Mounting bracket (supplied by the actuator manufacturer) and dimensions

## 7.4 Use of the signal box in a humid environment

**CAUTION**

Never clean the signal box with a high pressure cleaner. Protection class IP66 is inadequate for this.

This information provides you with important notes on mounting and operating the signal box in wet environments (frequent heavy rain and/or persistent tropical condensation) in which protection class IP66 is no longer sufficient, in particular when there is a risk that the water might freeze.

**Avoid unfavourable mounting positions:**

- in order to prevent the penetration of fluids into the device, e.g. through the cable gland, during normal operation.

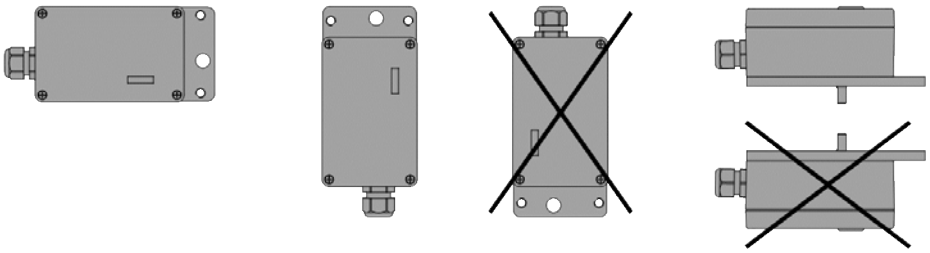


*Illustration 18:* Favourable and unfavourable mounting positions

# 8 Electrical connection

## Basic safety instructions

**⚠ WARNING**

**Inappropriate power supply**

Risk of explosion in potentially explosive areas in case of inappropriate power supply, e.g. if alternating current is used instead of direct current.

► Connect the device in accordance with the prescribed supply and signal circuits. The applicable regulations can be found in the certificates or on the nameplate.

**⚠ WARNING**

**Unsafe low-voltage power supply**

Risk of explosion in potentially explosive areas due to voltage flashover.

► Connect the device to a low-voltage power supply with safe isolation.

**⚠ WARNING**

**Connection of the device when live**

Risk of explosion in potentially explosive areas

► Connect the device in potentially explosive areas only when switched off.

⇨ **Exceptions:** energy-restricted circuits may be connected in potentially explosive areas even when live.

**⚠ WARNING**

**Missing potential equalisation**

If there is no potential equalisation, there is a risk of explosion in potentially explosive areas due to equalising current or ignition sparks.

► Make sure that potential equalisation is available for the device.

⇨ **Exceptions:** in the case of devices with the ignition protection class Intrinsic Safety "Ex i" it may be possible to dispense with potential equalisation.

**⚠ WARNING**

**Unprotected wire ends**

Risk of explosion in potentially explosive areas due to unprotected wire ends.

► Protect unused wire ends according to IEC/EN 60079-14.

**⚠ WARNING**

**Improper routing of shielded cables**

Risk of explosion due to equalisation currents between the potentially explosive area and areas that are not potentially explosive.

- ► Earth shielded cables leading into the potentially explosive area at one end only.
- ► In case of earthing at both ends, lay a potential equalisation conductor.

**⚠ WARNING**

**Unsuitable cables and/or cable glands**

Risk of explosion in potentially explosive areas and if cables and/or cable glands are connected that do not match each other or do not meet the technical requirements.

- ► Use only cables and cable glands that meet the specified requirements.
- ► Tighten the cable glands according to the specified torques.
- ► When replacing cable glands, use only cable glands of the same type.
- ► Check for firm seat tightness of the cables after installation.

**CAUTION**

**Formation of condensation in the device**

Damage to the device due to the formation of condensation when the temperature difference between transport or storage and the place of installation is more than 20 °C.

- ▪ Leave the device to stand for a few hours in the new environment before putting it into operation.

**CAUTION**

**Excessively high ambient temperature**

Damage to the cable insulation.

- ▪ If the ambient temperature is ≥ 60 °C, use heat-resistant cables designed for an ambient temperature at least 20 °C higher.

## 8.1 Electrical connection standard

### Type 827S.E11 and 827S.E12

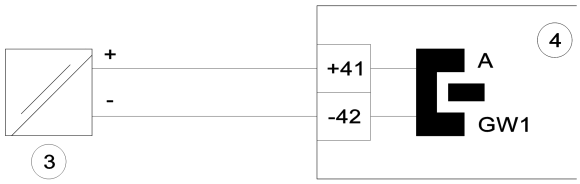



*Illustration 19:* 827S_Terminal diagram_2-wire_1NO

### Type 827S.E21 and 827S.E22

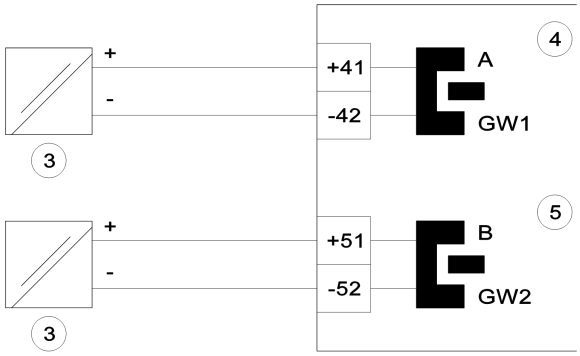



*Illustration 20:* 827S_Terminal diagram_2-wire_2NO

### Type 827S.E31 and 827S.E32

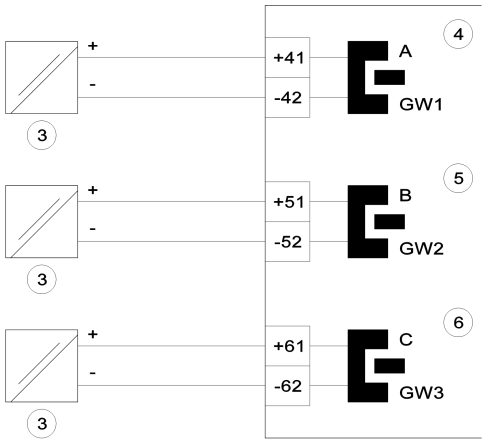



*Illustration 21:* 827S_Terminal diagram_2-wire_3NO

| | | | |
|---|---|---|---|
| 3 | Switching amplifier Ex ia EN 60947-5-6 | 5 | limit value transmitter 2 |
| 4 | limit value transmitter 1 | 6 | limit value transmitter 3 |

## 8.2 Electrical connection ignition protection class Ex ia IIC

### Type 827S.X11 and 827S.X12

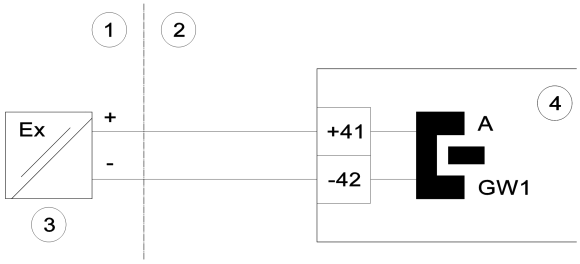



*Illustration 22:* 827S_Terminal diagram_2-wire_1NO_EX

### Type 827S.X21 and 827S.X22

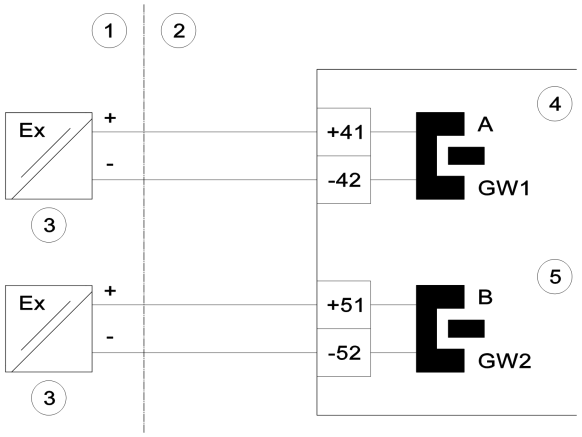



*Illustration 23:* 827S_Terminal diagram_2-wire_2NO_EX

| | | | |
|---|---|---|---|
| 1 | Area of no explosive hazard | 4 | limit value transmitter 1 |
| 2 | Potentially explosive area | 5 | limit value transmitter 2 |
| 3 | Switching amplifier Ex ia EN 60947-5-6 | | |

## 8.3 Electrical connection, 3-wire, direct switching

### Type 827S.E13

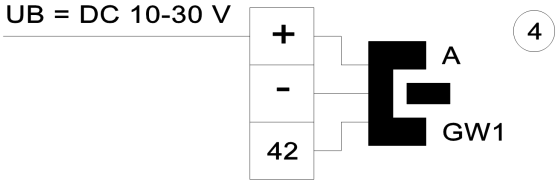



*Illustration 24:* 827S_Terminal diagram_3-wire_1NO

## Type 827S.E23

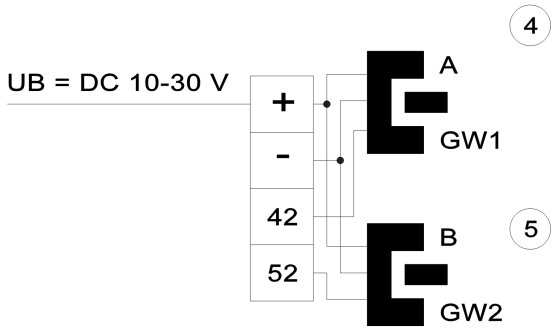



*Illustration 25:* 827S_Terminal diagram_3-wire_2NO

## Type 827S.E33

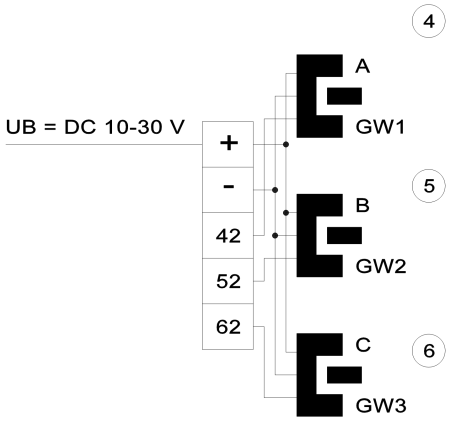



*Illustration 26:* 827S_Terminal diagram_3-wire_3NO

| | |
|---|---|
| 4 | limit value transmitter 1 |
| 5 | limit value transmitter 2 |
| 6 | limit value transmitter 3 |

# 9 Commissioning

**⚠ WARNING**

**Improper commissioning in potentially explosive areas**

Failure of device or risk of explosion in potentially explosive areas

► Do not put the device into operation until it is completely assembled and connected.

► Consider the effects on other devices in the plant before commissioning.

**⚠ WARNING**

**Loss of the explosion protection**

Risk of explosion in potentially explosive areas due to open or improperly closed device.

**⚠ WARNING**

**Opening the device when live**

Risk of explosion in potentially explosive areas

► Open the device only when it is switched off.

► Before commissioning, check that the cover, the cover fastenings and the cable glands have been fitted properly.

⇨ **Exceptions:** devices of the ignition protection class Intrinsic Safety "Ex i" may also be opened in a potentially explosive area when switched on.

**ATTENTION**

**The device protection class becoming null and void**

Damage to the device due to open or improperly closed housing. The protection class specified on the nameplate is no longer guaranteed.

- Make sure that the device is securely closed.

## 9.1 Commissioning

- Mount the signal box with the appropriate mounting kit.
- The limit contacts are normally adjusted so that a signal is present in each of the end positions (open/closed). Both vanes can be infinitely rotated so that intermediate positions can also be signalled.
  In addition, the third limit value transmitter (with 827S.E3* version) can be used for signalling an intermediate position.
- To ensure reliable switching, the switching point should be set approx. 2% before the mechanical stop (open/closed). We recommend the valve position "closed" for the limit value transmitter "A" and the valve position "open" for the limit value transmitter "B", whose setting is described below for a normally closed valve.

1. Loosen the screw (40) on the limit value transmitter "A"
2. Position the limit value transmitter "A" (30) in the centre of the slot
3. Tighten the screw (40) on the limit value transmitter "A"

4. Loosen the screw of the vane (60)
5. Coarse adjustment of the vane (80) with input signal 0% (valve position "closed")
6. Tighten the screw (60)
7. Apply a 100% input signal
8. Loosen the screw (40) on the limit value transmitter "B"
9. Coarse adjustment of the limit value transmitter "B" with input signal 100% (valve position "open"). It may be necessary to position the screw (40) and the spacer sleeve (120) in a different threaded hole in the base plate (130).
10. Tighten the screw (40) on the limit value transmitter "B"
11. Apply a 2% input signal
12. Loosen the screw (40) on the limit value transmitter "A"
13. Adjust vane "A" so that a signal is present at the limit value transmitter "A".
14. Tighten the screw (40) on the limit value transmitter "A"
15. Apply a 98% input signal
16. Loosen the screw (40) on the limit value transmitter "B"
17. Adjust the vane so that a signal is present at the limit value transmitter "B".
18. Tighten the screw (40) on the limit value transmitter "B"
19. If a third limit value transmitter (with version 827S.E3*) is present, steps 8 – 10 and 15 – 18 are to be carried out analogously for the desired switching position.
20. By opening and closing the actuator, ensure that each limit value transmitter switches reliably in the desired position in both directions.

# 10 Service and maintenance

## Basic safety instructions

**⚠ WARNING**

**Impermissible repair of the device**

Repairs may be carried out only by authorised personnel.

**⚠ WARNING**

**Impermissible accessories and impermissible spare parts**

Risk of explosion in potentially explosive areas or damage to the device.

► Use exclusively original accessories and original spare parts.

► Observe all relevant installation and safety instructions described in the manuals for the device, accessories and spare parts.

**⚠ WARNING**

**Improper connection following maintenance**

Risk of explosion in potentially explosive areas or damage to the device

► Connect the device correctly following maintenance.

► Close the device after maintenance.

**CAUTION**

**Penetration of moisture into the device**

Damage to the device

- Make sure that no moisture gets into the device during cleaning and maintenance work.

**⚠ WARNING**

**Electrostatic charging**

Risk of explosion in potentially explosive areas due to electrostatic charging, which can occur, for example, when cleaning housings with a dry cloth.

► Prevent electrostatic charging in potentially explosive areas.

**⚠ WARNING**

**Open housing**

Risk of explosion in potentially explosive areas due to hot components and/or charged capacitors in the interior of the device.

► Switch the device off before opening it in a potentially explosive area.

⇨ **Exceptions:** devices of the ignition protection class Intrinsic Safety "Ex i" may also be opened in a potentially explosive area when switched on.

**⚠ WARNING**

**Dust deposits thicker than 5 mm**

Risk of explosion in potentially explosive areas. The device can heat up as a result of dust deposits.

► Remove dust deposits that are thicker than 5 mm.

# 11 Technical Data

## Basic device

| | | | | | |
|---|---|---|---|---|---|
| **Signal box** | **827S.** | **.** | **.** | **.** | |
| **Angular range** | 60° for linear valves (10 - 120 mm) and 90° for rotary valves | | | | |
| **Ambient temperature** | -40 to +80 °C | | | | |
| **Connections** | | | | | |
| Cable entry | 1-off M20 x 1.5 | | | | |
| Terminals | Cage clamp max. 2.5 mm² | | | | |
| **Protection class** | IP 66 | | | | |
| Climate class | ZQF according to DIN 40040 | | | | |
| Weight | 0.8 kg | | | | |

## Inductive limit value transmitter

| | | | | | |
|---|---|---|---|---|---|
| **Version** | **827S.** | ***** | **.** | **1** | |
| **Normal version** | 2-wire technology according to DIN 19234 (NAMUR), for switching amplifiers to be connected downstream | | | | |
| Slot-type initiators | Type SC 3.5 N0-BU (replacement for SJ 3.5 N) | | | | |
| Function | NC, normally closed | | | | |
| Switching difference | ≤1 % | | | | |
| Control circuit | see downstream switching amplifier | | | | |
| EMC according to | EN 60947-5-2 and DIN 19234 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Version** | **827S.** | ***** | **.** | **2** | |
| **Safe design** | 2-wire technology according to DIN 19234 (NAMUR) for customer-provided switching amplifier in safe design | | | | |
| Slot-type initiators | Type SJ 3.5 SN | | | | |
| Function | NC, normally closed | | | | |
| Switching difference | ≤1 % | | | | |
| Control circuit | see downstream switching amplifier | | | | |
| EMC according to | EN 60947-5-2 and DIN 19234 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Version** | **827S.** | **E** | **.** | **3** | |
| **Direct-switching** | 3-wire technology, direct-switching<br>Type SB 3.5 E2 | | | | |
| Function | NO, normally open | | | | |
| Switching difference | ≤1 % | | | | |
| Operating voltage | 10 - 30 V DC | | | | |
| permissible load current | 100 mA | | | | |

## Electrical data, explosion-proof version

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ignition protection class<br>Intrinsic safety | II 1 G Ex ia IICT6…T1 Ga | | | | | | | | | | |
| for connection to electrical circuits with the following maximum values | **Type 1** | | | **Type 2** | | | **Type 3** | | | **Type 4** | | |
| | $U_i$ = 16 V | | | $U_i$ = 16 V | | | $U_i$ = 16 V | | | $U_i$ = 16 V | | |
| | $I_i$ = 25 mA | | | $I_i$ = 25 mA | | | $I_i$ = 52 mA | | | $I_i$ = 76 mA | | |
| | $P_i$ = 34 mW | | | $P_i$ = 64 mW | | | $P_i$ = 169 mW | | | $P_i$ = 242 mW | | |
| Internal capacitance $C_i$ | **827S.X*1** | | | | | | **827S.X*2** | | | | | |
| | 150 nF | | | | | | 30 nF | | | | | |
| | Cable length of 10 m is taken into account | | | | | | | | | | | |
| Internal inductance $L_i$ | **827S.X*1** | | | | | | **827S.X*2** | | | | | |
| | 150 µH | | | | | | 100 µH | | | | | |
| | Cable length of 10 m is taken into account | | | | | | | | | | | |
| Ambient temperature | **Type 1** | | | **Type 2** | | | **Type 3** | | | **Type 4** | | |
| | Maximum permissible ambient temperature in °C for use in temperature classes | | | | | | | | | | | |
| | T6 | T5 | T4-T1 | T6 | T5 | T4-T1 | T6 | T5 | T4-T1 | T6 | T5 | T4-T1 |
| 827.X11 | +73 | +80 | +80 | +65 | +80 | +80 | +45 | +60 | +80 | +30 | +45 | +54 |
| 827.X12 | +73 | +80 | +80 | +66 | +80 | +80 | +45 | +60 | +80 | +30 | +45 | +74 |
| 827.X21 | +73 | +80 | +80 | +65 | +80 | +80 | +45 | +60 | +80 | +30 | +45 | +54 |
| 827.X22 | +73 | +80 | +80 | +66 | +80 | +80 | +45 | +60 | +80 | +30 | +45 | +74 |

# 12 Disposal and recycling

**⚠ WARNING**

**Operating media and auxiliary materials that are hazardous to health**

Danger to people and the environment!

► Wear suitable protective equipment

► If applicable, collect and dispose of rinsing medium or residual medium. Particular attention is to be paid to dead spaces (pressure compensation, bellows, etc.)

► Observe the legal regulations for the disposal of media that are hazardous to health

ARCA products are modularly constructed and can be sorted by material into the following components.

- Electronic components
- Metals
- Plastics
- Greases and oils
- Packaging material

The general rules are:

- greases and oils are usually water pollutants and must not be allowed to escape into the environment
- Dispose of dismantled materials properly or recycle the separate materials
- Observe national disposal regulations

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