

AE214 Field Indicator



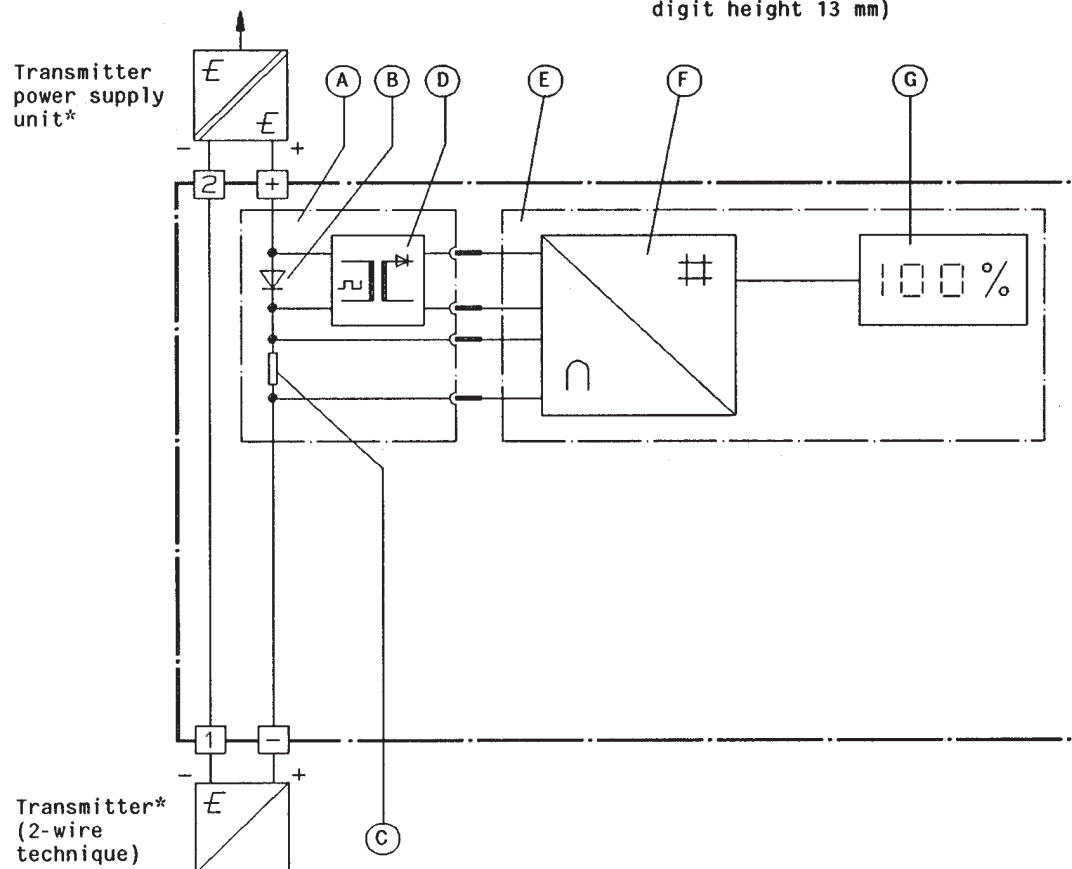
The field indicator AE214 provides a numerical indication of measured values in physical units or percent. The device can be incorporated in any transmitter circuit independent of the location of the measuring point. The indicator scale is freely selectable, which means that measured values can be displayed either in percent or as physical quantity, such as temperature, pressure, differential pressure, liquid level, flow, etc.

FEATURES

- Explosion protection:
 - ATEX II 2 G EEx ia IIC T6
 - ATEX II 2 G EEx d IIC T6 / T4
 - FM approved
- Loop powered 2-wire device
- No additional supply required
- Input signal 4 to 20 mA
- Voltage drop < 1V
- Large 3½-digit LCD display unit
- Display proportional to input signal
- Display switchable to square-root extraction of input signal
- Universal range adjustment
- Zero elevation or suppression
- Adjustment of display range without simulator
- Decimal point selectable
- Display characteristic invertible
- Replaceable unit-of-measurement labels
- Robust design / vibration-resistant
- Protection class IP 66
- EMC in accordance with the latest NAMUR-recommendations and international standards and laws
- Can be mounted in any position

2.3 Block diagram of Type AE214-A

(display range 0 to 100%, linear;
digit height 13 mm)



* Circuit example

Functional description

The signal current (4 to 20 mA) flows in the

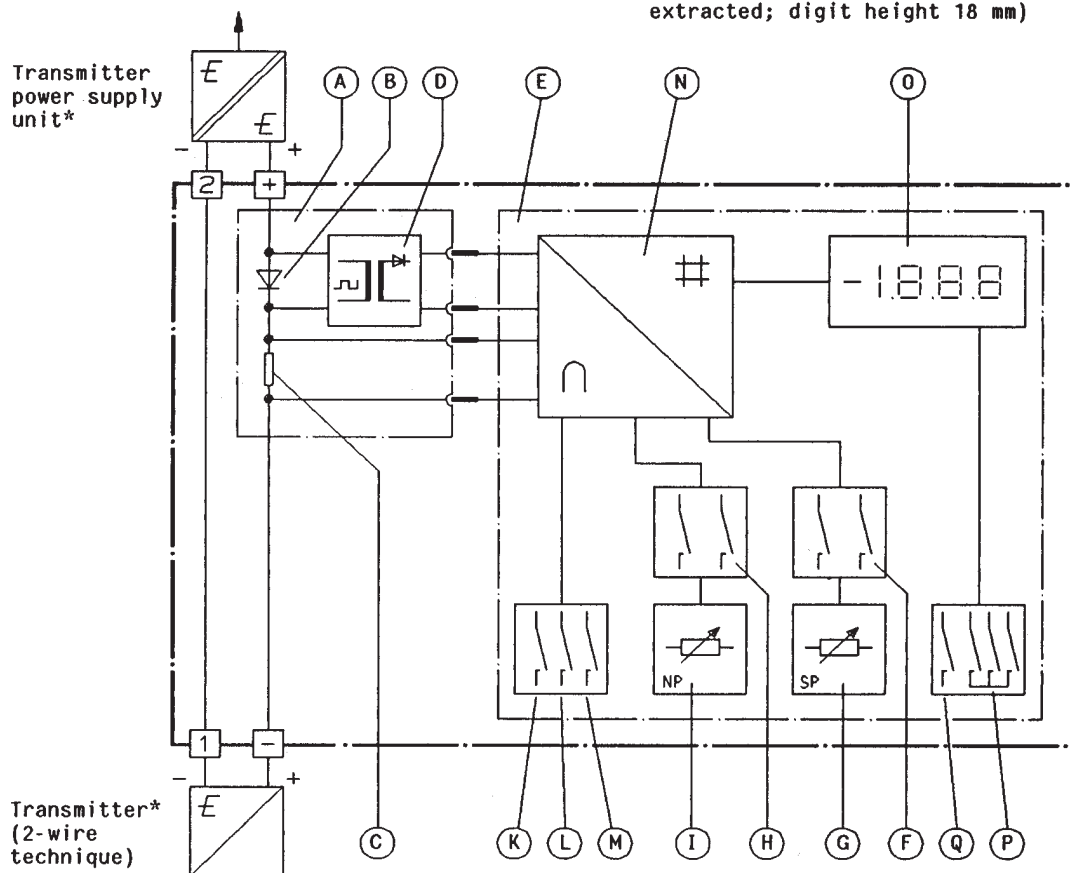
① power supply module via a
② diode and a
③ measuring resistor. The voltage (0.7 V) present at the diode is multiplied in a
④ chopper circuit, and is then available to the
⑤ indicator module in the form of a supply voltage.

The voltage drop caused at the measuring resistor by the signal current (60 to 300 mV) is supplied to the indicator module as the measuring voltage. The display range is fixed (0 to 100).

The
⑥ analog/digital converter digitizes the conditioned input signal and displays it in the
⑦ 2½-digit LCD display unit.

2.4 Block diagram of Type AE214-B

(display range settable, linear/square-root extracted; digit height 18 mm)



* Circuit example

Functional description

The signal current (4 to 20 mA) flows in the

- (A) power supply module via a
 - (B) diode and a
 - (C) measuring resistor. The voltage (0.7 V) present at the diode is multiplied in a
 - (D) chopper circuit, and is then available to the
 - (E) indicator module in the form of a supply voltage.
- The voltage drop caused at the measuring resistor by the signal current (60 to 300 mV) is supplied to the indicator module as the measuring voltage. The display range is set by means of switches and potentiometers.
- (F) Switches for coarse setting of the span
 - (G) Potentiometer for fine setting of the span
 - (H) Switches for coarse setting of the lower range value
 - (I) Potentiometer for fine setting of the lower range value

The display can be switched from the actual value to the set value with the

- (K) switch.
- (L) Changeover switch for set value: lower range value and upper range value.

The display can be changed from linear to square-root extraction of the input signal with the

- (M) switch.
- The
- (N) analog/digital converter digitizes the conditioned input signal and displays it in the
- (O) 3 1/2-digit LCD display unit. A decimal point can be set after any digit by means of the
- (P) changeover switches.
- (Q) Switch for inverting the display characteristic (see also Page 11).

3 MOUNTING

3.1 Dimensions

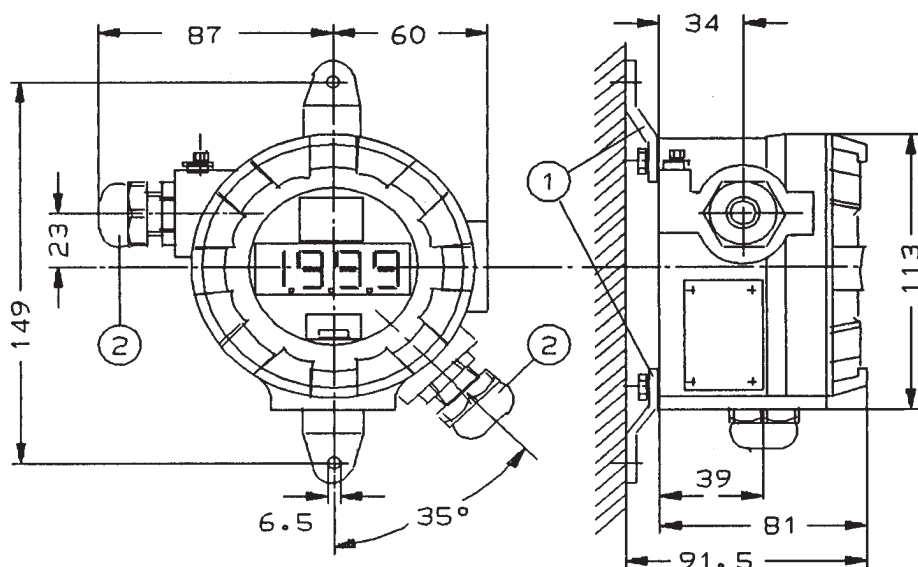


Fig. 1 Dimensions with mounting plates for wall mounting

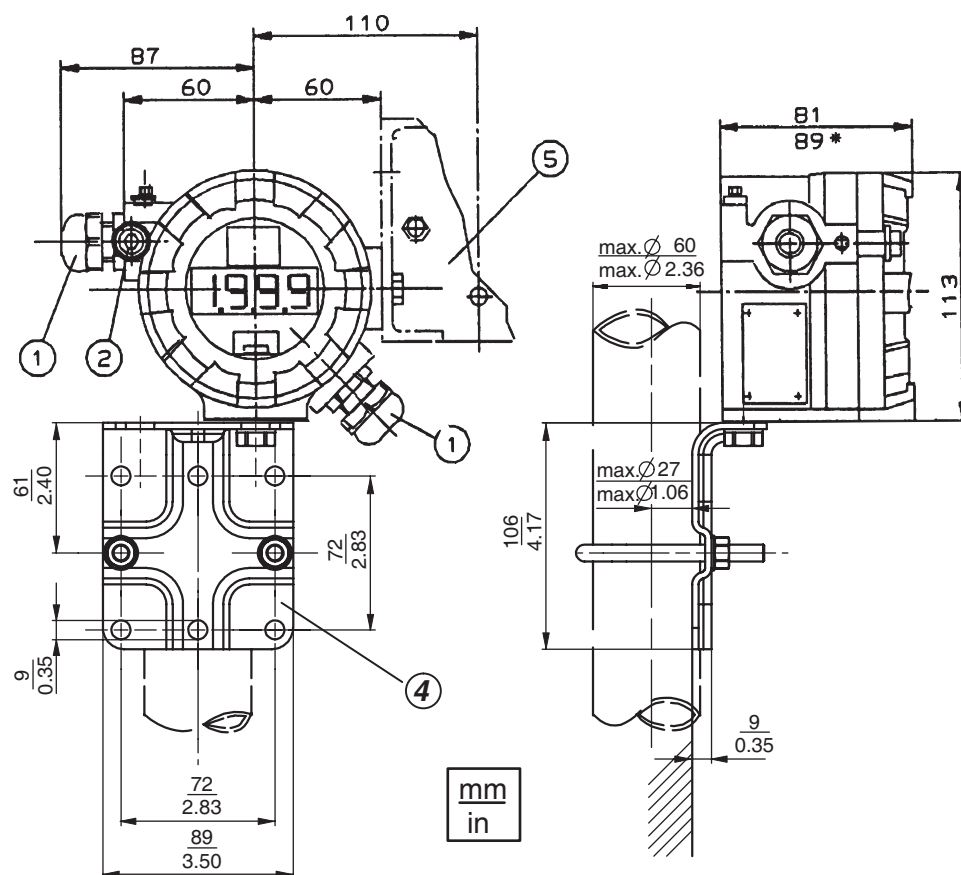


Fig. 2 Dimensions with mounting bracket for pipe and wall mounting

- | | |
|--|---|
| ① Mounting plates (included in delivery) | ④ Clip for upright or horizontal mounting (accessory) |
| ② Screwed gland | ⑤ Mounting alternative |
| ③ Mounting bracket (accessory) | |

3.2 Mounting the field indicator

The field indicators are designed to conform to protection class IP 66, and are suitable for wall and pipe mounting. They can be installed in any position.

The indicator is supplied with 2 mounting plates for wall mounting.

The indicator can be secured to an upright or horizontal pipe with a diameter of up to 60 mm using the kit with mounting bracket and clip available under Type No. ZGPG 415 974 059 (accessory; see also Para. 3.1).

3.3 Electrical connection

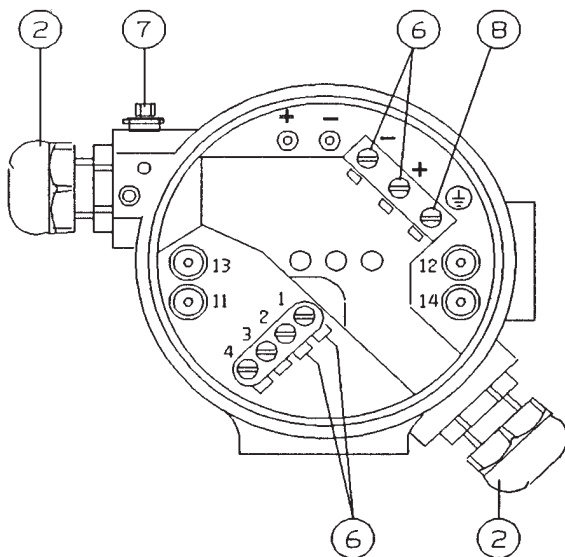


Fig. 3 Terminal compartment

The terminal compartment is accessible when the cap is unscrewed (see Para. 8).

The leads are fed in through the screwed glands Pg 13.5 (2). These are suitable for diameters between 6 and 12 mm.

They should be properly sealed!

The connection is made at the ⑥ screw terminals for core cross-sections of up to 2.5 mm², as shown in the circuit example.

Grounding, ground conductor

If a ground connection or terminal is necessary on the system side (e.g. for shock protection, potential equalization, protection against electromagnetic interference), appropriate connections must be made to the

⑦ external safety ground terminal or the

⑧ internal safety ground terminal.

Power supply

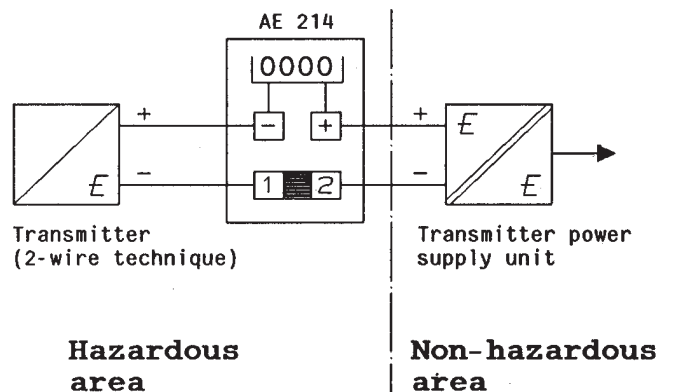
The power supply is drawn from the signal circuit.

Voltage drop: < 1 V

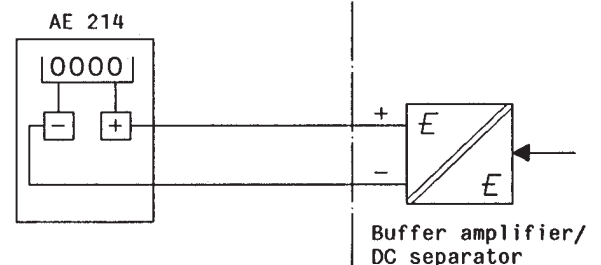
Circuit examples

Ground conductor not shown!

a)



b)



4 SAFETY REQUIREMENTS

4.1 General requirements

This device fulfils the requirements of IEC Publ. 348* for protection class I.

Work may only be carried out on electrical components by qualified personnel, if any voltage sources are connected to the device.

The device contains no built-in fuses. Protection against electric shock must be provided on the system side.

7.2 Connection requirements

The device is to be used and to be connected in accordance with the relevant connection diagram (see 3.3) and the application intended. Local regulations valid for such installations, in Germany DIN VDE 0100 resp. DIN VDE 0800, are to be observed.

The device may be connected to low-voltage circuits, providing the insulation of these circuits against hazardous voltages (e.g. 220 V mains) meets at least the requirements for basic insulation.

The ground conductor must be connected to the corresponding terminal prior to connection of other leads and during operation of the device.

If the connected circuits meet the requirements laid down in IEC 348 for protective low voltages, the device can be operated without a ground conductor (protection class III).

4.3 Explosion protection

see Document EX EIO1221 A

Type of protection Intrinsic Safety:

Type AI 575: II 2 G EEx ib/ia IIC T6

Certificate of Conf.: PTB 03 ATEX 2230

for connection to a certified intrinsically safe circuit with maximum values

$U_i = 40 \text{ V}$

$I_i = 120 \text{ mA}$ (70°C) or 150 mA (65°C)

$P_i = 2 \text{ W}$

The effective internal inductance L_i is negligibly low.

The effective internal capacitance C_i is 4.8 nF.

The control circuit is electrically isolated from ground.

Type of protection Flameproof Enclosure:

Type AD 575: II 2 G EEx d IIC T6/T4

Certificate of Conf.: PTB 01 ATEX 1079

Technical data

Input current: 4-20 mA

Internal impedance drop: 1 V

Rated conductor size: up to 2.5 mm²

Admissible ambient temperature

max. +75°C for temperature classe T6

max. +80°C for temperature classe T4

Connection:

1. Connection of Indicator Type AD 575 shall be by means of suitable cable entries or conduit systems, which meet the requirements of EN 50 018, sections 13.1 and 13.2, and for which a separate examination certificate has been issued.

2. Cable entries (conduit threads) and sealing plugs of simple design must not be used. Should the AD 575 be connected by means of a conduit entry which has been approved for this purpose, the required sealing device has to be provided immediately at the housing.

3. Openings not used shall be closed as specified in EN 50 018 sections 11.9 .

4. The connecting lead of Indicator Type AD 575 shall be installed to provide for permanent wiring and adequate protection against damage.

Attention!

When repairing explosion-proof equipment, observe the national regulations. Use only original spare parts when making repairs. The following applies to the Federal Republic of Germany: Repairs involving parts required for explosion-proofing must either be carried out by the manufacturer or by authorized personnel and confirmed by certificate.

* See DIN IEC 348/VDE 0411, Part 1/...81
(Draft March 1981)
Safety requirements for electronic measuring equipment.

5 COMMISSIONING AND REMOVAL FROM OPERATION

The field indicator AE 214 is set on delivery to the display range ordered.

It is ready for operation when the electrical leads are connected.

The measurement circuit is not affected when the indicator inset is removed or inserted!

6 MAINTENANCE

The field indicator AE 214 requires no regular maintenance.

7 SETTING THE DEVICE

7.1 Field indicators AE214-A

Display range: 0 to 100 % fixed

Display : linear

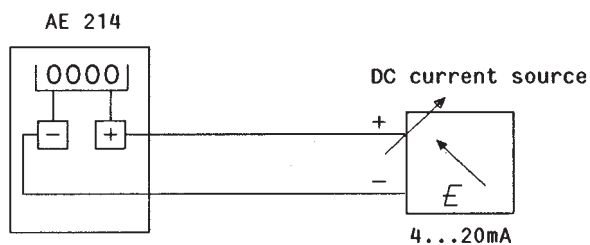


Fig. 5 Test circuit

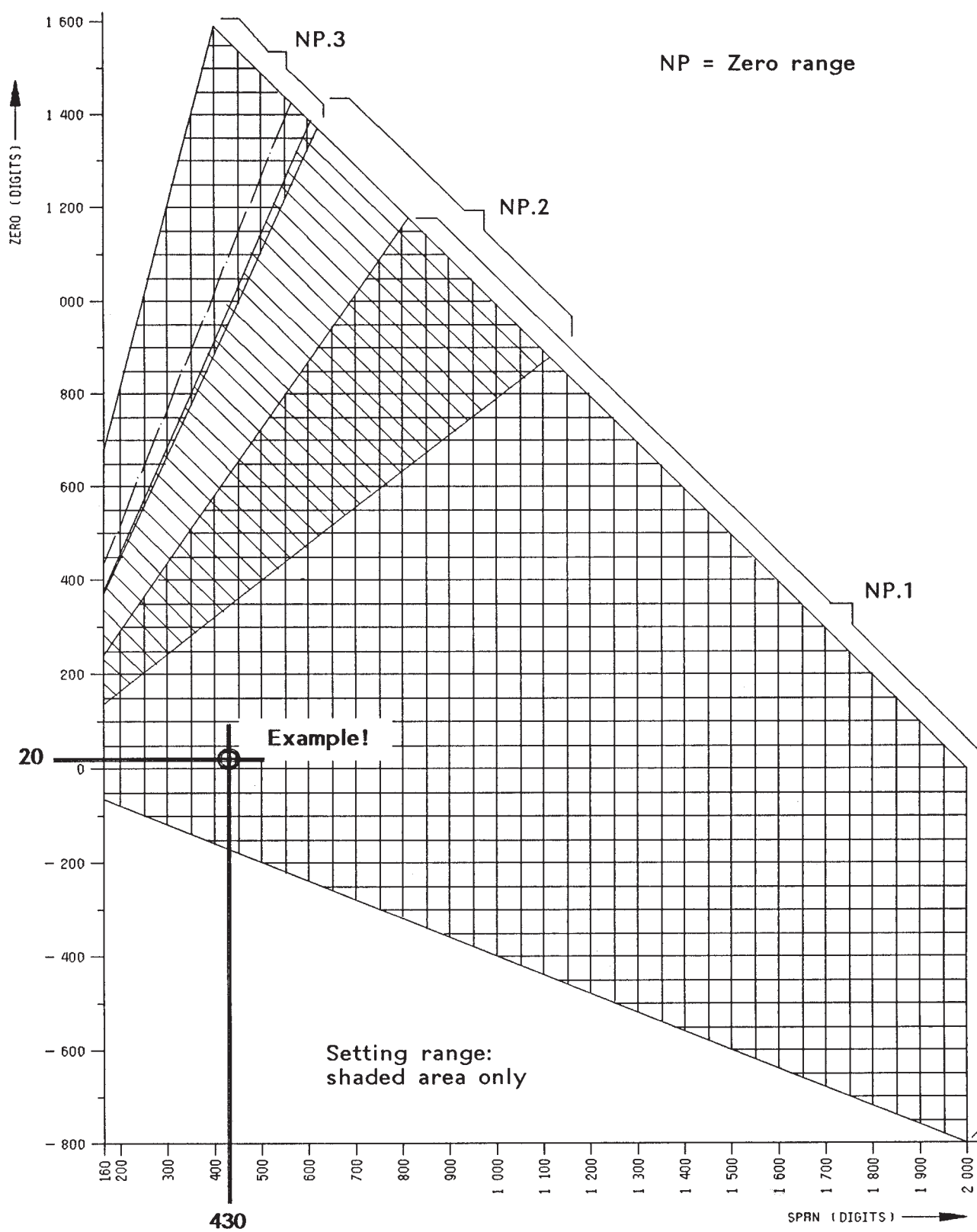


Fig. 8 Determining the zero range

7.3 Field indicators AE214-B

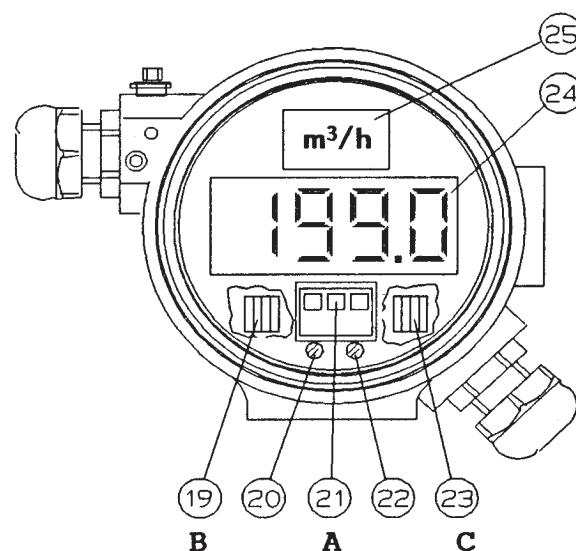
Display range: settable

Display : linear/square-root-extracted,
switchable

The display range and the display characteristic are freely selectable (see tables on Page 11). It is moreover possible to set the decimal point after any digit. Either a linear or square-root-extracted measured value can be displayed.

The unit of measurement can be specified on an adhesive label fixed above the display unit.

Switches, which are accessible when the indicator inset is opened, are used for the coarse setting of the display range and for setting the decimal point. Potentiometers are used for the fine settings of the display range and the zero.



- ①9 Switch group B for setting the decimal point and for inverting the display characteristic*
- ②0 Potentiometer for the zero fine setting
- ②1 Switch group A for setting the lower value and the upper value of the display range and for selecting linear or square-root-extracted display of the measured value
- ②2 Potentiometer for the display range fine setting
- ②3 Switch group C for the zero and display range coarse settings*
- ②4 3½-digit LCD display unit
- ②5 Unit of measurement

* The switches are located behind the front plate of the indicator inset.

Fig. 9 Setting elements of the field indicator
(shown without cap)

7.3.1 Setting the display range

Preliminary operations:

Unscrew the cap and remove the indicator inset (see Para. 8).
Set up the test circuit (Fig. 5).

Press out the front plate (17) of the indicator inset by applying a screwdriver to the lug (18) (see Fig. 6).
Reinsert the field indicator inset in its housing in the correct position.

The signal current for supplying the indicator must be ≥ 4 mA.

Setting the lower range value:

- Set the sliding switches in switch group A (21) to positions 1 and 4 (see Table 4).
- Set switch S1 in switch group B (19) to either "normal" or "inverted" in accordance with the desired display characteristic (see Table 5).
- Set sliding switches S1 and S2 in switch group C (23) for the coarse zero setting to the position shown in Table 6 for a normal or inverted characteristic.
- Set the zero with the zero potentiometer (20).

Setting the upper range value:

- Set the sliding switch in switch group A (21) to positions 1 and 3 (see Table 4).
- Set sliding switches S3 and S4 in switch group C (23) for the coarse display range setting to the position shown in Table 7.
- Set the upper range value with the span potentiometer (22).

A decimal point can be set if necessary with switches S2, S3 and S4 in switch group B (19), as shown in Table 8.

It is possible to switch over to a display of the measured value with switch group A. The value in the set display range which corresponds to the current signal value (4...20 mA) is then indicated.

The display of the measured value can be set with the sliding switches to either linear (sliding switches set to positions 2 and 6) or square-root-extracted (sliding switches set to positions 2 and 5) (see Table 4).

When these settings have been made, press on the front plate of the indicator inset firmly again.

Example:

Coarse setting for a desired display range:

e.g. 4 mA = -100.0
20 mA = + 50.0
(normal characteristic)

Setting:

Zero range according to Table 6 (normal characteristic):
-1900 to -300, i.e.
switch S1 ▲, switch S2 ▼

Span: $500 - (-1000) = 1500$
Table 7: switch S3 ▲, switch 4 ▼

Caution!

If the display range is altered, the sticker on the rear of the indicator inset must be corrected accordingly.

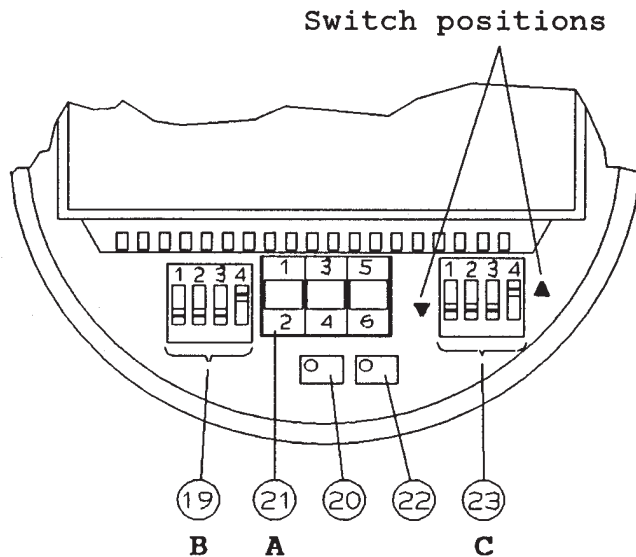


Fig. 10 Locations of switches

Functions of switches**Table 4: Switch group A**

Switch position	Device setting	LCD display
set to 1 and 3/ 4	Display range: Upper range value Zero	Set value
or		
set to 2 and 5/ 6	Measured value display Square-root- extracted Linear	Actual value

Table 5: Switch group B

Switch position	Display characteristic*	LCD display
S1 ▼	Normal	**
▲	Inverted	

Table 5: Switch group C***

Switch position		Zero Coarse setting for: Normal characteristic	
S1	S2	Range	
▲	▼	-1900	-300
▼	▼	-900	340
▼	▲	270	1900
		Inverted characteristic	
S1	S2	Range	
▲	▼	1900	300
▼	▼	900	-340
▼	▲	-270	-1900

Table 7: Switch group C***

Switch position S3 S4		Span Coarse setting Range	
▲	▼	000	1530
▼	▼	1520	2440
▼	▲	2430	3900

Table 8: Switch group B

Switch position S2 S3 S4			Decimal point position
▲	▼	▼	X.XXX
▼	▲	▼	XX.XX
▼	▼	▲	XXX.X
▼	▼	▼	XXXX

▲ / ▼ = Switch direction

* Normal $\hat{=}$ Indication rises as input rises

Inverted $\hat{=}$ Indication falls as input rises

** Positive measured values are represented on the LCD display unit without a + sign.

*** No other combinations of switch positions in switch group C are permitted, since the value indicated may then be incorrect.

8 OPENING THE HOUSING AND REMOVING THE INDICATOR INSET

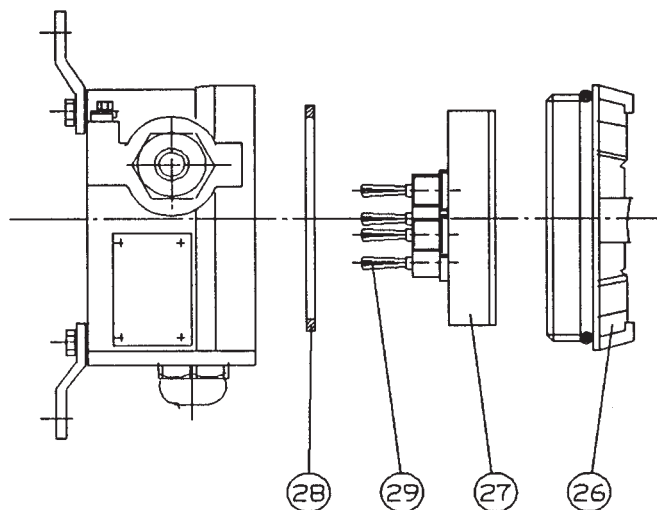


Fig. 11 Removing the indicator inset

Unscrew the

②⑥ cap anticlockwise. If this is not possible manually, use a flat steel bar up to 20 mm wide. Lift off the cap.

The

②⑦ indicator inset is secured in the cap by means of a ②⑧ snap ring. Remove the snap ring from the groove using a sharp object and remove the indicator inset.

Reassemble the device in reverse order.

Make sure that the

②⑨ 4 plug-in contacts 11 to 14 of the indicator inset are inserted in the correct sockets 11 to 14. Screw on the cap tight again by hand. Make sure that the O-ring is properly sealed!

Note:

Condensation is not permitted when the housing is open.

9 INDICATOR INSETS

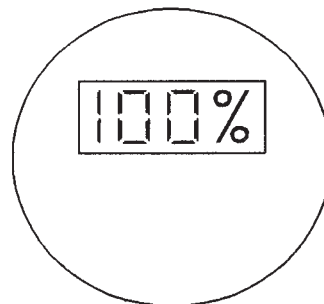
9.1 Inset for field indicator AE214-A

Type No. AZDG 418 128 014

Display range : 0 to 100%, fixed

Display : linear

Digit height : 13 mm



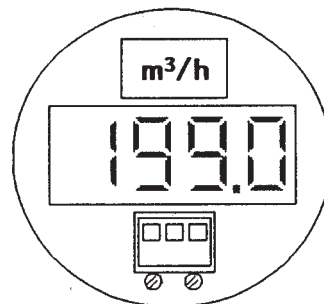
9.3 Inset for field indicators AE214-B

Type No. AZDG 420 036 015

Display range : settable

Display : linear/square-root
extracted,
switchable

Digit height : 18 mm



10 FAULT FINDING

Fault	Possible cause	Test and remedy
No display	No input signal	Check signal circuit
	Terminals connected incorrectly	Reconnect correctly, see Para. 3.3
Incorrect display	Signal range incorrect	Check input signal
	Display range set incorrectly	Reset device correctly to desired display range, see Paras. 7.2.1 and 7.3.1