TEU 211, TEU 211-Ex

Two-wire transmitter for temperature, field mounting

Operating Manual 42/11-37 EN Rev. 03

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Important Instructions for Your Safety!
Please read and observe!

Correct and safe operation of TEU 211 (-Ex) calls for appropriate transportation and storage, expert installation and commissioning as well as correct operation and meticulous maintenance.

Only those persons conversant with the installation, commissioning, operation and maintenance of similar apparatuses and who posses the necessary qualifications are allowed to work on the apparatus.

Please make a note of
- the contents of this Operating Manual,
- the safety regulations affixed to the apparatus,
- the safety regulations pertaining to the installation and operation of electrical systems as well as
- the directives and guidelines on explosion protection.

The user must ensure that units connected to the transmitter TEU 211 and TEU 211-Ex fulfil the appropriate requirements of the accident prevention regulations VBG4.

The directives, norms and guidelines mentioned in this Operating Manual are applicable in the Federal Republic of Germany. When using the apparatus in other countries, please observe the national regulations prevailing in the respective country.

This apparatus has been designed and tested in accordance with DIN VDE 0411 Part 1, "Safety requirements for electronic measuring apparatuses", and has been supplied in a safe condition. In order to retain this condition and to ensure safe operation, the safety instructions in this Operating Manual bearing the headline "Caution" must be observed. Otherwise, persons can be endangered and the apparatus itself as well as other equipment and facilities can be damaged.

If the information in this Operating Manual should prove to be insufficient in any point, the Hartmann & Braun Service Department will be delighted to give you more information.

Application and short description

The Transmitter TEU 211 (-Ex) is used to measure temperature and other process variables. It converts the input variable into a load-independent direct current 4...20 mA.

The transmitter is supplied with:
- standard parameters or
- customized parameters

Installation and Commissioning

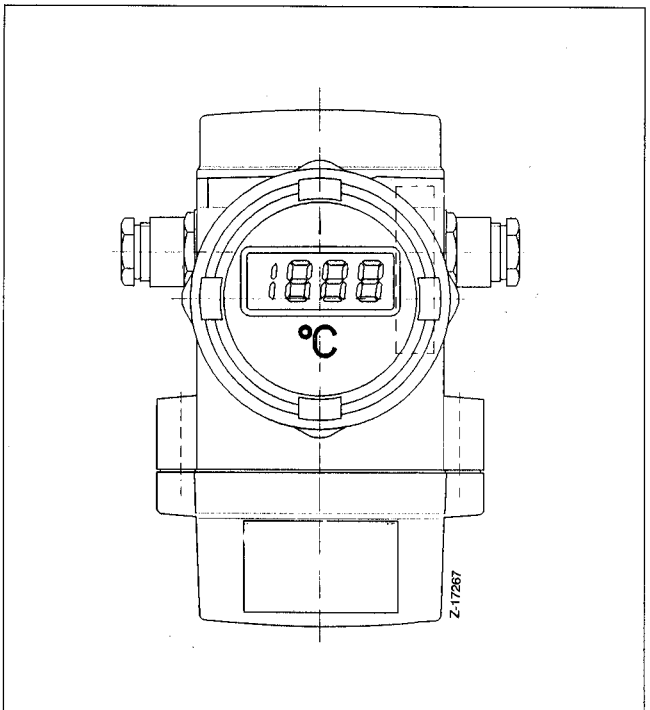

Fig. 1 Front view TEU 211 (-Ex)

Scope of delivery

The version with display is delivered with a set of labelling plates.

Rating plate inscription

Explanation of symbols:

⧈	Protective insulation (DIN 30 600)
⊖	Input (DIN 30 600)
⊕	Output (DIN 30 600)
⏚	Internal reference junction (DIN 30 600)
⏦	Electrical power (DIN 30 600)
⚠	Observe Operating Manual! (DIN 30 600)
Ex	Type-tested electrical apparatus (DIN 40 012)
⊢	Measured value constant (DIN 30 600) hold last valid value
◸	Measured value rising (DIN 30 600) overranging
◺	Measured value falling (DIN 30 600) underranging
50 °C	Default value
LKS	LKS-interface
FSK	FSK-interface
2 L/w/f	Two-wire circuit/wire/fils
3 L/w/f	Three-wire circuit/wire/fils
4 L/w/f	Four-wire circuit/wire/fils

1. Mounting location

Operating position as required

Ambient temperature	TEU 211	
	with display:	–20...+80 °C
	without display:	–25...+85 °C
	TEU 211-Ex.A and -Ex.B T4, T5	
	with display:	–20...+70 °C
	without display:	–25...+70 °C
	TEU 211-Ex.A and -Ex.B T6	
	with display:	–20...+50 °C
	without display:	–25...+50 °C
	TEU 211-Ex.D T4, T5, T6:	–20...+70 °C
Condensation	permissible	
Degree of protection	IP 65	

Transmitter **TEU 211-Ex** is to be mounted inside or outside the hazardous area.

2. Mounting the unit

(see Fig. 2 and 3)

⚠ Caution

When mounting the transmitter TEU 211-Ex bear in mind the directives governing electrical systems in hazardous areas (ElexV), the regulations pertaining to the installation of electrical systems in hazardous areas (DIN VDE 0165/2.91) and the following certificates of conformity:

- **for TEU 211-Ex.A and -Ex.B, type of protection "intrinsically safe": PTB no.Ex-93.C.2050 X**
- **for TEU 211-Ex.D, type of protection "pressure-proof enclosure": BVS 93.C.2031**

■ In unprotected areas the unit is to be mounted with packing glands showing horizontally to the right and to the left.

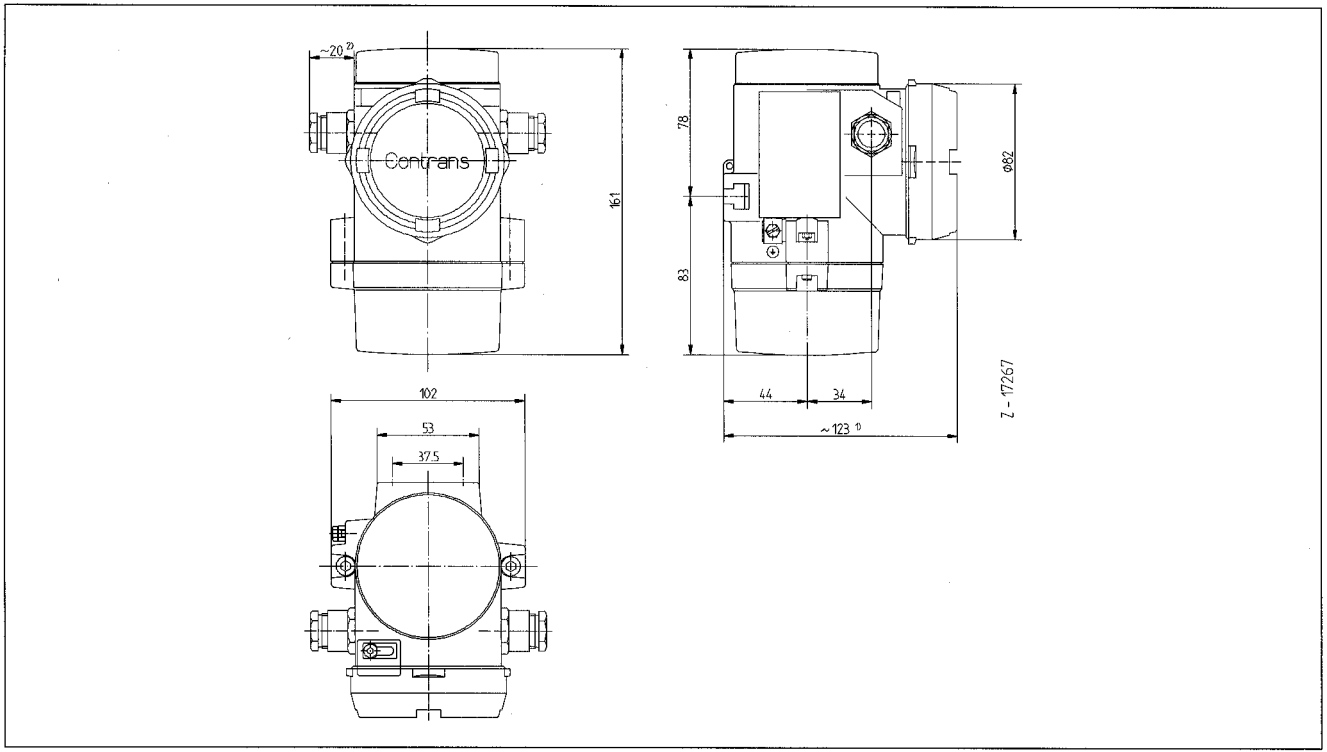

Fig. 2 Dimensional drawing
Connection Pg 13.5

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1 For version with display + 20 mm. For version EEx d and display + 29 mm
2 For version EEx d +37 mm

Mounting with fixing brackets (optional)

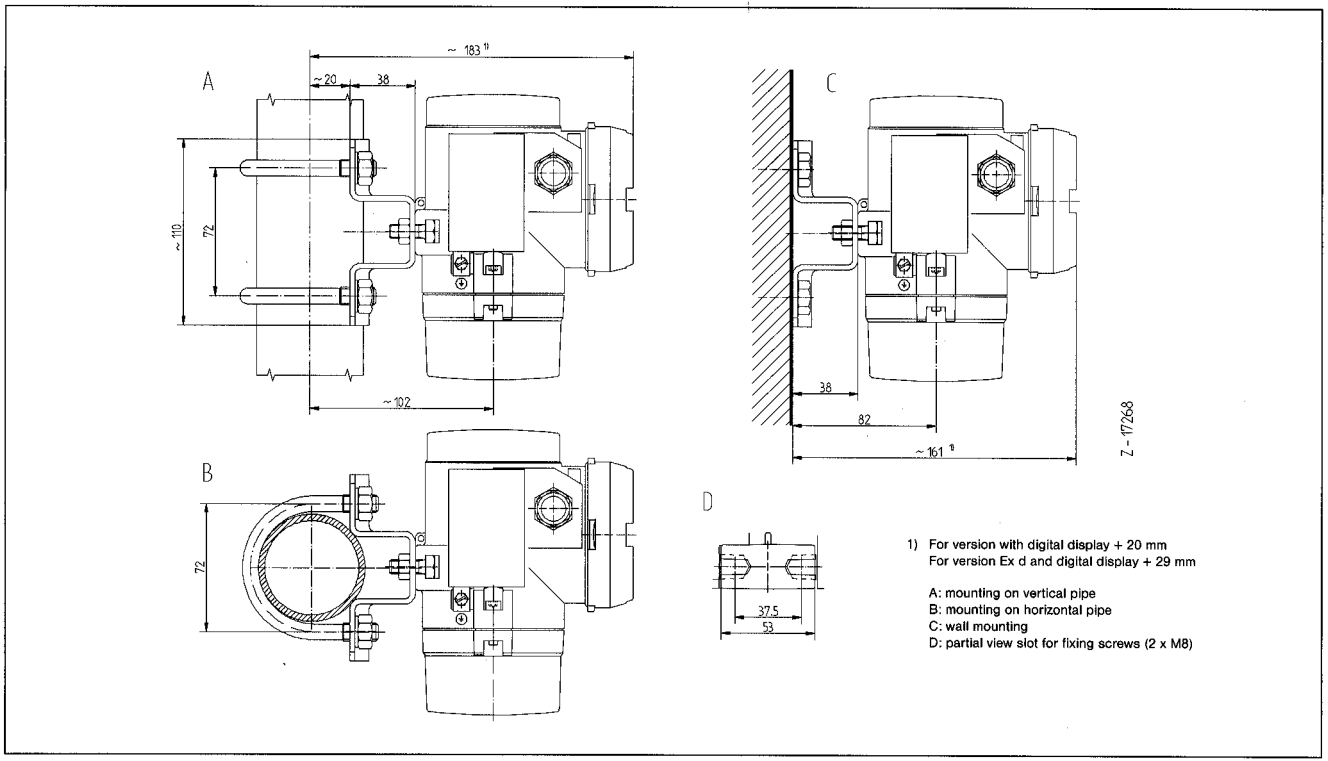

Fig. 3 Possible mounting positions with fixing brackets
A bracket with pipe mounting (internal dia. ⌀ 2")
C fixing brackets (hole diam. ⌀ 11 mm)

Note

Change brackets for horizontal pipe mounting B.

3. Connecting the unit

(see Fig. 4)

⚠ Caution

Safe isolation from circuits hazardous to touch is only guaranteed if the units connected meet the requirements to VDE 0106 T. 101 (basic requirements for safe isolation).

For safe isolation, lay instrument lines separately from circuits hazardous to touch or provide additional insulation.

If, for functional reasons, the intrinsically safe current circuit has to be earthed through connection to the potential equalization, it may only be earthed at one point.

When a unit with a certified intrinsically safe output circuit is connected to the TEU 211-Ex, evidence of the intrinsic safety of the interconnection must be provided to DIN VDE 0165/2.91.

When switching on the operating voltage the case must be closed and the panel secured through the block.

1. Unscrew the front panel with or without display.
2. Remove with or without display.
3. Lead lines through packed gland.
4. Fasten packing glands tightly.
5. Connect lines to terminal strip.
6. Replace front panel with or without display.
7. Switch on power supply. Units with display immediately indicate the measured value.

Connecting the transmitter TEU 211-Ex.D

⚠ Caution!

Do not open the case while the unit is in operation (with operating voltage "on").

Wait for 4 minutes after switching off the operating voltage before opening the case.

When switching on the operating voltage the case must be closed and the panel secured through the block.

Panel, case and electronics can only be replaced with certified components.

Please observe installation according to test certificate:

Replace sealing plugs of transport packing by cable and line gland or sealing plug (see Item 1 and 2). Only then is degree of protection IP 65 and flameproof enclosure guaranteed. Other connections must be tested and certified by an expert.

1. Connect transmitter via certified cable and line glands (Messrs. Hugro, INIEXNIEB 88.B.103.748, ISSEP 92.C.103.997, Ref. No. 0839938). See requirements to EN 50 018, Section 12.1 or 12.2.
2. Close non-occupied openings only with a dummy plug to EN 50 018, Section 12.5, Ref. No. 0283341).

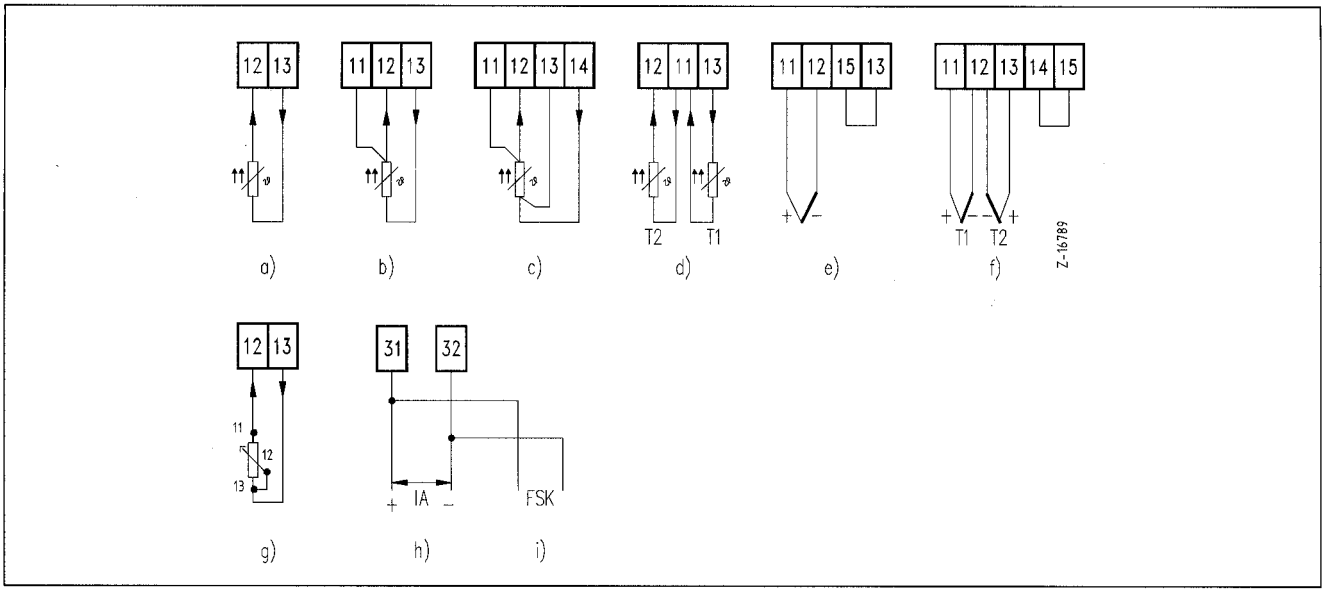

Fig. 4 Connection diagram

a) Resistance thermometer or resistance measurement in 2-wire circuit[1]
b) Resistance thermometer or resistance measurement in 3-wire circuit[1]
c) Resistance thermometer or resistance measurement in 4-wire circuit[1]
d) Resistance thermometer or resistance measurement in 2-wire circuit with difference (T1-T2) or mean value
e) Thermocouple or voltage measurement
f) Thermocouple or voltage measurement with difference (T1-T2) or mean value
g) Resistance teletransmitter measurement in 2-wire circuit[1]
h) Output signal current or supply voltage
i) FSK-interface

1 For resistance measurement with R > 391 Ω plug jumper ST 5 to 42. Determine the measuring range with PC software IBIS.

4. Line balancing

Line balancing is necessary for:
- Resistance thermometer or resistance measurement in 2-wire circuit,
- Resistance teletransmitter measurement.

Line balancing is not required for:
- Resistance thermometer or resistance measurement in 3-wire circuit

  Note

  If the line resistances are not the same for each conductor, the line can be balanced via PC software IBIS.

- Resistance thermometer or resistance measurement in 4-wire circuit.

Line balancing:
- **with PC software IBIS**
  Select menu branch: Device data / Expert / Unit / Adjustment / Line balancing.
- **On the unit without PC**
  1. Short-circuit sensor on site.
  2. Close jumper terminals 11 and 15.
  3. Wait for 30 seconds.
  4. Open jumper terminals 11 and 15.
  5. Connect sensor.

5. Adjustment

Transmitter TEU 211 (-Ex) is delivered fully adjusted. Adjustments must be only made if highest accurary is required (vernier adjustment for the lower-range and upper-range value).

Adjustment instructions are given in PC software IBIS.

Additional aids:
- Precision transmitter (for input)
- Measuring instrument (for output).

Operation

The transmitter is operated via the PC software IBIS. The following interfaces are available, depending on the communication between the PC and the transmitter:

LKS interface

(LKS = local communication interface)
(see Fig. 5)

⚠ Caution

Potential separation is necessary with the LKS interface if the output is electrically connected to earth.

Equipment:
- PC with PC software IBIS - application TEU 211
- LKS adapter

Both off-line and on-line communication are possible with transmitters with the LKS interface.

off-line communication
- Transmitter not operational (disconnect intrinsically safe circuits outside the hazardous area)

  Note
  The transmitter can be parameterized without power supply.

on-line communication
- Transmitter operational (not with TEU 211-Ex)

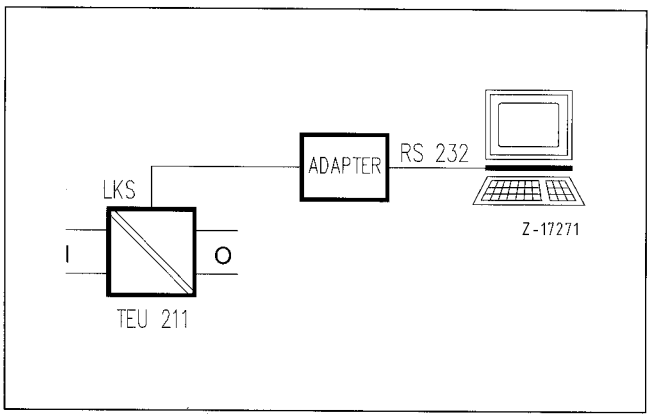

Fig. 5 PC communication with LKS interface and LKS adapter

FSK interface

(FSK = Frequency Shift Keying)
(see Fig. 6)

Equipment:
- PC with PC software IBIS application TEU 211
- FSK modem with terminal leads

Only on-line communication is possible with transmitters with the FSK interface (min. load 250 Ω). The FSK interface may be connected to a bus.

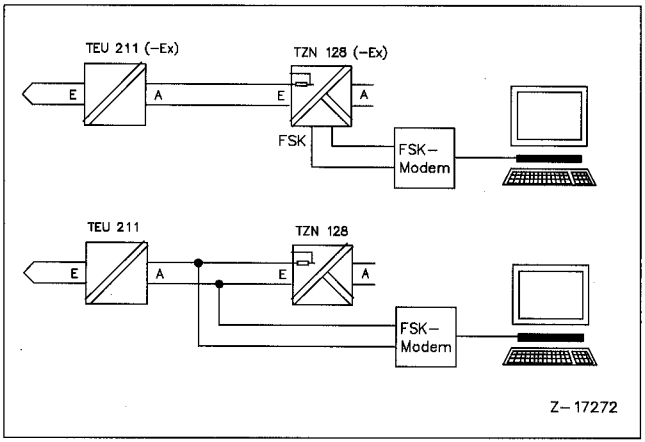

Fig. 6 PC-communication with FSK interface and FSK modem

FSK bus

(see Fig. 7)

The units are factory-set to the bus address 00000:00. This address does not permit bus operation. Bus operation is only possible if set to ≠ 00000:00. Setting of the bus address is described in PC software IBIS.

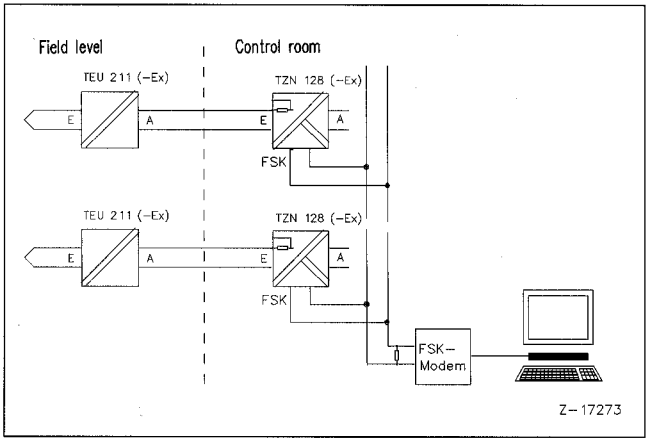

Fig. 7 PC-communication with FSK bus (example)

PC requirements

(Minimum requirements)

- PC: IBM compatible PC, XT or AT.
- Working memory: 640 KB RAM
- Disk drive: 3½" (1.44 MB)
- Monitor: Monochrome or colour
- Graphics card: CGA, EGA, VGA
- Interfaces: 1x serial: RS 232C
  1x parallel: for printer connection (optional)
- Operating system: MS DOS 3.2 or higher

Device data

The transmitter is supplied with:
- standard parameters (see table 1) or
- customized parameters.

Measuring circuit combination	MC 41	MC 42
Tag	-/-	-/-
Tag description	-/-	-/-
Bus address	0000:00	0000:00
Type of measurement	simple	simple
Sensor	Pt 100/ 3-wire circuitry	remote resistance transmitter/ 2-wire circuitry
Measuring range	0...100 °C	0...1000 Ω
Output	4...20 mA	4...20 mA
Underrange/ overrange	3.6...22 mA	3.6...22 mA
Output behaviour in case of sensor fault	overranging	overranging
Attenuation/ time constant	0.9 s	0.9 s
Display	0...100 °C	0...1000 Ω

Table 1 Standard parameters

Conversion

The transmitter can be modified to perform another measuring task i.e: the measuring circuit combinations can be changed.

Changing the measuring circuit combinations

(see Fig. 8)

⚠ Caution

The catalogue number (P...) on the rating plate gives the hardware configuration. This number is also stored in the transmitter. When changing the hardware, which also necessitates a change of the Catalogue Number, this must be stored in the transmitter using the IBIS PC software. No validity check is carried out for this modification.

Jumpers are located in the lower part of the enclosure (see Fig. 8 and 9).
Jumper ST 5 (left)
MC 41, resistance thermometer, thermocouple or resistance measurement

Jumper ST 5 (right)
MC 42, resistance measurement, upper-range value > 391 Ω

Write protection

Jumper ST 101 (left): with write protection
Jumper ST 101 (right): without write protection

Retrofitting the display

The display can be retrofitted together with a cover with glass insert. Therefore, use a special model for degree of protection Ex-d.

1. Screw off the cover.
2. Insert cable and display.
3. Change display format with PC software IBIS.
4. Screw on new cover.

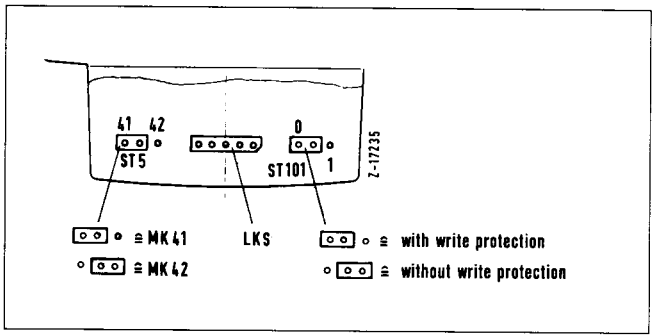

Fig. 8 Jumper position when changing the measuring circuit

Maintenance

⚠ Special safety instructions for working on transmitter TEU 211-Ex

Before beginning work on the instrument, the safety measures pertaining to the explosion protection must be observed.

Components upon which explosion protection is depending may only be replaced by equivalent and/or certified components.

If the unit has been repaired at a part upon which explosion protection is depending, it only may be re-commissioned after an expert has tested and certified that it meets the explosion protection requirements. This is not necessary, if the work has been carried out by authorized personnel of Hartmann & Braun.

Please observe, however, "Supplement to explosion-protected instruments" (Service Information 43/00-10 and/or "Rules of conduct for Hartmann & Braun personnel during operation on explosion-protected instruments and installations" (Technical Information 30 PD 210).

⚠ Additional safety instruction for working on transmitter TEU 211-Ex.D

Wait for 4 minutes after switching off the operating voltage before opening the case.

⚠ General safety instruction for working on transmitter TEU 211 and TEU 211-Ex

Whenever it is likely that protection has been impaired, the unit shall be made inoperative and be secured against any unintended operation.

It must be assumed that the protection has been impaired when the unit

- **shows visible signs of damage**
- **no longer functions**
- **has been stored for long periods under unfavourable conditions**
- **has been subjected to adverse transport conditions.**

The transmitter TEU 211 (-Ex) does not require any maintenance. In the event of errors, first check the power supply or the transmitter and its connection lines. PC software IBIS offers further possibilities of diagnostics (e.g. status information for different modules) and adjustment.

In the case of a defect, electronics can also be exchanged on site without removing fixing elements or connections.

Replacing the electronics

■ **Instruments without explosion protection and instruments with explosion-proof enclosure**

⚠ Caution

Do not open the case while the unit is in operation (with operating voltage "on").

Wait for 4 minutes after switching off the operating voltage before opening the case.

When switching on the operating voltage the case must be closed and the panel secured through the block.

Panel, case and electronics can only be replaced with certified components.

1. Loosen lateral screws (wrench 5 mm).
2. Remove lower part of the enclosure.
3. Disconnect plug connector.
4. Take off potted electronic assembly from the spacers while slightly pressing the plastics case.
5. Extract electronic assembly.
6. Insert the new electronic assembly and snap into place.
7. Connect plug connector.
8. Replace lower part of the enclosure.
9. Tighten fast lateral screws.

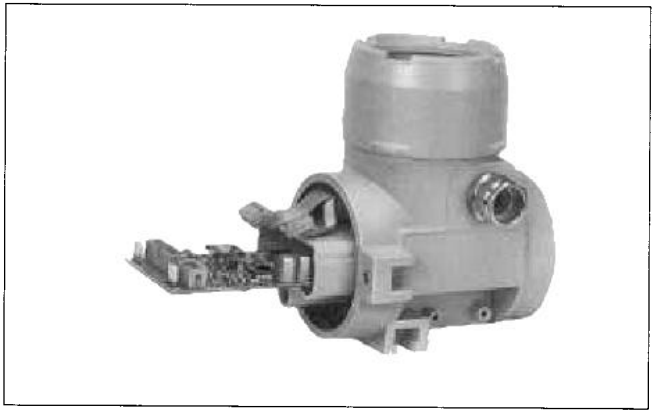

Fig. 9 Replacing the electronic assembly

■ **Instruments with explosion protection intrinsic safety**

1. Loosen lateral screws (wrench 5 mm)
2. Remove lower part of the enclosure.
3. Disconnect plug connector.
4. Loosen fastening recessed head screw (wrench L > 90 mm)
5. Extract potted electronic assembly.
6. Insert the new electronic assembly and screw tight.
7. Connect plug connector.
8. Replace lower part of the enclosure.
9. Tighten fast lateral screws.

Appendix

Description

(see Fig. 10)

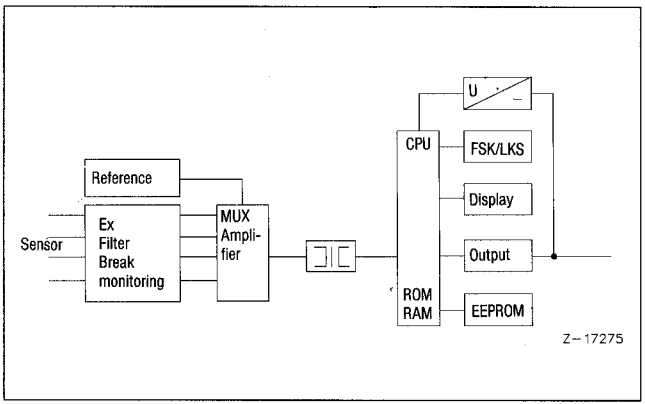

Fig. 10 Functional diagram

The input signals are routed via the **input protection circuit to the measuring point selector switch MUX.** The input variables (mV, Ω) are adapted to the input voltage range of the amplifier by means of a filter network. The input signal is routed via the MUX, amplifier, A/D converter and electrical isolation to the CPU.

The (sensor-) **break monitoring** checks the sensor impedance for maximum value. **Power supply** and signal transmission is carried out via the output current with an electrically isolated DC/DC converter. The CPU processes successively self-monitoring, analogue values and communication. The **RAM** and **ROM** contain operating data, firmware and fixed linearization tables. The **EEPROM** contains user-specific parameter setting data.

Communication with PC or other systems is possible via **LKS** interface or **FSK** interface. A display is integrated into the unit upon request.

Functional modules

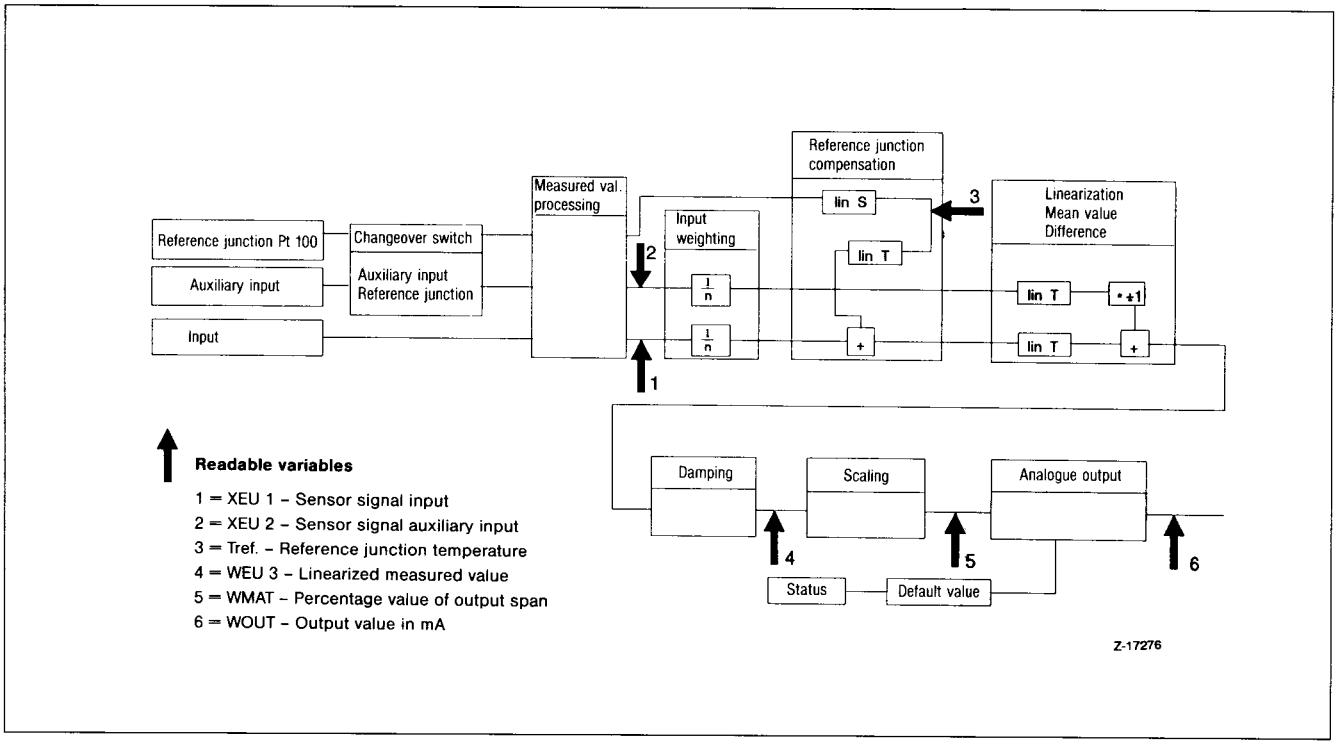

Fig. 11 Functional modules

Measured value processing

Measuring range setting (input circuit and sensor selection)
Sensor monitoring (break, short circuit)
Reference junction measurement for the internal reference junction

Input weighting

Mean value in the event of switching together several sensors at one input. Simulation of sensor characteristics with the same basic data (e.g. Pt 1000 from ther Pt 100 characteristic – 10x Pt 100).

Reference junction compensation

By means of internal or external reference junction when measuring with thermocouples.

Linearization / mean value / difference

Based on standardized curves or customized (max. 32 tiepoints)
Mean value, difference between input and auxiliary inputs.

Damping

Filter with 1st order delay ($\tau = 0$ s; 0.9...100 s)

Scaling

Lower range value to upper range value

Analogue output

Underranging / Overranging
Output behaviour during sensor and device faults.
Default value

Accessories

Designation	Catalog no.
Display complete	11491-4-0339131
Cable for display	11491-4-0339389
Cover for display	11491-4-0339090
Cover for display EEx d	11491-4-0339091
Cover closed	11491-4-0339387
Cover closed EEx d	11491-4-0339388
Cable gland EEx d	11491-4-0339129
Parts for tube mounting[1]	11491-4-0339293
Parts for tube mounting[2]	11491-4-0339294
Parts for wall mounting[1]	11491-4-0339295
Parts for wall mounting[2]	11491-4-0339296

1 Carbon steel
2 Stainless steel

Technical data

Input

Resistance thermometer in
2-, 3- and 4-wire circuit

Thermocouples
Without/with internal or external reference junction

Resistance teletransmitter

Ω-, kΩ, mV sources

Measurement

Simple:	1 sensor at input
Mean value:	1 sensor at input and 1 sensor at auxiliary input or 2...10 sensors in series at input
Difference:	1 sensor at input and 1 sensor at auxiliary input

Mean value and difference only for mV source and Ω source (MC 41) in 2-wire circuitry.

Measuring range Pt 100: $(T1 + T2)_{max.} < 300$ °C
Ni 100: $(T1 + T2)_{max.} < 250$ °C
Ω: $R_{m1} + 2R_{L1} + R_{m2} + 2R_{L2} < 415$ V

Measuring circuit combinations MC

Measuring circuit combination	Full modulation span	Minimum span
MC 41	0. . .391 Ω – 8. . .+120 mV	6.7 Ω 2 mV
MC 42	0. . .3250 Ω – 8. . .+120 mV	58 Ω 2 mV

Measuring range
can be parameterized

Input current
Thermocouple/mV approx. 70 nA

Measuring current
MC 41: approx. 0.29 mA
MC 42: approx. 35 µA

Overload limit [1]
Thermocouple/mV measurement (MC 41/MC 42)
– 0.5...+3.5 V
Resistance thermometer and resistance measurement (MC 41/MC 42)
Open or short-circuit input permitted.

(Sensor)break monitoring
mV measurement
Break: response threshold > 1.5 MΩ
or gradient > +3 mV/s
or gradient < –3 mV/s
or > 120 mV

Ω measurement

Response threshold for sensor break:	MC 41 > 391 Ω MC 42 > 3250 Ω
Response threshold for short-circuits:	< 5 Ω

Line resistance
(R_m - measuring resistance; R_L- Line resistance of a conductor)

2-wire circuit ($2R_L \leqq 10\ \Omega$):
with MC 41 (mean value/difference):
$R_{m1} + 2R_{L1} + R_{m2} + 2R_{L2} < 415\ \Omega$

3-wire circuit
0...10 Ω per conductor

4-wire circuit
0...50 Ω per conductor
with MC 41: $R_m + R_L < 415\ \Omega$

Internal reference junction
Built-in Pt 100 in 2-wire circuit

Linearization
As per DIN IEC standardized characteristics
Resistance thermometers: Pt 100, Ni 100
Thermocouples types B, E, J, K, L, N, R, S, T, U or customer specific (max. 32 tie points)

Input weighting
n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
(for resistance measurement additionally n = 0.5, e.g. for Pt 50)

Output

Output signal (rising/falling)
4...20 mA

Supply via DC voltage source
(I_K < 130 mA)

Supply voltage
11.5...42 V for TEU 211,TEU 211-Ex "pressure-proof" enclosure
11.5...29.4 V for TEU 211-Ex "intrinsically safe"

Power consumption
4... 20 mA

1 For **TEU 211-Ex** see Certificate of Conformity

Max. load

$$R = \frac{U_S - 11.5\ V}{I_{a\,max.}}$$

$I_{a\,max}$ = max. current parameterized
U_S = supply voltage

Admissible residual ripple of the supply voltage
FSK : 0.5 V (peak-peak) < 120 Hz
LKS: 1 V (peak-peak) < 120 Hz, additional residual ripple of the output signal 0.2 % (peak-peak)

Residual ripple of the output signal
< 0.5 % (peak-peak)

Control range (parameterizable)
Underranging
< 3 mA with LKS (< 3.3 mA increased residual ripple)
≦ 3.6 mA with FSK (< 3.8 mA increased residual ripple)

Overranging
20...23.6 mA, can be parameterized

Output behaviour in case of error
Case of error: Sensor or Sensor/Instruments fault
Underranging (set value)
Overranging (set value)
Default value can be parameterized 3...23.6 mA for LKS
3.6...23.6 mA for FSK
Hold last valid value

Damping
Filter with first order delay (τ = 0; 0.9...100 s)

Time constant τ set to	Responsetime T
0 s	typically 0.8 s max. 1 s
0.9 s	approx. 2.7 s
1 s	approx. 3.3 s
1.5 s	approx. 5.8 s
2 s	approx. 8.2 s
> 5 s	1 s + 4.6 · τ

Interfaces

Local communication interface LKS
for workshop parameterization (power supplied from PC)

Frequency Shift Keying FSK
for remote parameterization and bus operation

Data format
HART protocol

Digital display

Display
Single-line, 3½ digits, 7 segments, 12.7 mm high
e.g. - 199.9...00.0...199.9

Measuring range
Decimal point can be parameterized

Flashing
approx. 0.5 Hz with unit error, sensor error, overranging or underranging

Characteristics under nominal conditions

(to IEC 770)

Measuring deviation[1] (MV = Measured value)
0.1 % · MV + 0.1 % + K1
Additional error for internal reference junction: 0.25 K

Nonlinearity (contained within the measuring deviation)
0.1 % + K2

Calculation examples
see Data Sheet 11–1.02 project planning acid

	K1	K2	K3
Ω (MC 41)	80 mΩ	20 mΩ	10 mΩ
Ω (MC 42)	0.75 Ω	0.2 Ω	0.09 Ω
mV (MC 41/MC 42)	10 µV	5 µV	2 µV
Resistance thermometer (MC 41)	0.25 K	0.05 K	0.063 K
Resistance thermometer (MC 42)	0.25 K	0.05 K	0.1 K
Thermocouple > – 150 °C except type B (MC 41/ MC 42)	10 μV^2+0.2 K	10 μV^2 or 0.2 K (greater value holds)	2 μV^2
Thermocouple type E, K, N, T – 250. . .– 150 °C Type B > 300 °C (MC 41/MC 42)	10 μV^2+0.6 K	10 μV^2 or 0.6 K (greater value holds)	2 μV^2

1 Referred to the span set.
2 Insert temperature value which corresponds to the slope of 10 µV or 2 µV at the measurement point.

Variations

Ambient temperature[1]
(0.05 % · MV + 0.05 % + K3) / 10 K
with an internal reference junction additionally 0.1 K / 10 K

Power supply[1]
< 0.05 % / 10 V voltage variation

Parasitic voltage in input[1]
50 Hz symmetrical
< 0.5 % with U_{para} (peak-peak) = 0.3 · span ($\tau = 0$ s)
(elevated residual ripple)
< 0.5 % with U_{para} (peak-peak) = 4 · span ($\tau \geqq 0.9$ s)

50 Hz asymmetrical (to $U_{eff} = 50$ V)
< 0.006 % · full modulation / span ($\tau \geqq 0.9$ s)
< 0.05 % · full modulation / span ($\tau = 0$ s)

DC component of fault voltage (to UDC = 50 V)
< 0.006 % · full modulation / span ($\tau \geqq 0.9$ s)
< 0.05 % · full modulation / span ($\tau = 0$ s)

Transient response

Response time (damping not active)
typical 0.8 s (max. 1 s)

Electromagnetic compatibility

General interference immunity based on NAMUR recommendation for:
- Inrush current limitation
- Transient overvoltage
- Discharge of static electricity
- Electromagnetic fields

General and safety data

Climatic capabilities

Climatic category
HPD to DIN 40 040

Ambient temperature
TEU 211
with display: – 20...+80 °C
without display: – 25...+85 °C

TEU 211-Ex.A und -Ex.B T4, T5
with display: – 20...+70 °C
without display: – 25...+70 °C

TEU 211-Ex.A und -Ex.B T6
with display: – 20...+50 °C
without display: – 25...+50 °C

TEU 211-Ex.D bei T4, T5, T6:
– 20...+70 °C

Transportation and storage temperature
TEU 211
with display: – 20...+80 °C
without display: – 40...+90 °C

TEU 211-Ex.D
with display: – 20...+80 °C
without display: – 20...+90 °C

Relative humidity
≦ 80 %

Condensation
permissible

Mechanical stress

Tested
to DIN IEC 68 Part 2-27 and
to DIN IEC 68 Part 2-6

During transportation
Shock 30g / 18 ms / 18 Shocks
During operation
Vibration 2g / 0.15 mm / 5...150 Hz / 3 x 5 Cycles
Vibration 2g / 10 mm / 1...35 Hz / 3 x 1 Cycle

Seismic stress
Strong to very strong earthquakes
to draft DIN IEC 50A(CO) 179

Connection, case, mounting

Electrical connections
Screw terminals for 2.5 mm^2 incl. thimbles

Degree of protection (DIN 40 050)
IP 65

Class of protection VDE 0411, IEC 348
II

Degree of contamination
2

Overvoltage category
III

Test voltage to VDE 110 Part 1-2
U_{eff} = 500 V Circuits against case
U_{eff} = 750 V Circuits against one another

Material
Die-cast aluminium

Colour
RAL 7032

Operating position
as required

Weight
approx. 2 kg

Explosion protection

TEU 211-Ex.A and -Ex.B

Manufacturer's code
49/11-46 Ex

Certificate of conformity
PTB No. Ex-93.C.2050

Intrinsic safety type of protection
EEx [ia]ib IIC T4...T6
EEx [ia]ib IIB T4...T6

Ambient temperature
up to +70 °C for temperature class T4,T5
up to +50 °C for temperature class T6

Mounting
inside or outside the hazardous area

Input circuit, type of protection "intrinsically safe"
EEx [ia]ib IIC; EEx [ia]ib IIB
Max. values:
U = 9.5 V; I = 37.6 mA;
R = 991 Ω; P = 140 mW
Characteristic curve trapezoidal
For more detailed data see certificate of conformity

Supply and signal circuit, type of protection EEx ib IIC
for connection to a certified intrinsically safe circuit with the following max. values:
U = 29.4 V, I = 130 mA, P = 800 mW

Effective internal inductance Li
220 µH

Effective internal capacitance Ci
1.5 nF

TEU 211-Ex.D

Manufacturer's code
49/11-47 Ex

Certificate of conformity
BVS 93.C.2031

Flame-proof type of protection
EEx d IIC T6

Ambient temperature
+70 °C, Cable gland: -20...+95 °C

Mounting
inside the hazardous area

Packing instructions

If the original packing is no longer available, the transmitter TEU 211 (-Ex) must be wrapped in an insulating air foil or corrugated board and packed in a sufficiently large crate lined with shock absorbing material (foamed material or similar). The amount of cushioning must be adapted to the weight of the unit and to the mode of transport. The crate must be labelled "Fragile".

For overseas shipment the unit must additionally be sealed airtight in 0.2 mm thick polyethylene together with a desiccant (e.g. silica gel). The quantity of the desiccant must correspond to the packing volume and the probable duration of transportation (at least 3 months). Furthermore, for this type of shipment the crate should be lined with a double layer of kraft paper.

Subject to technical changes.

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