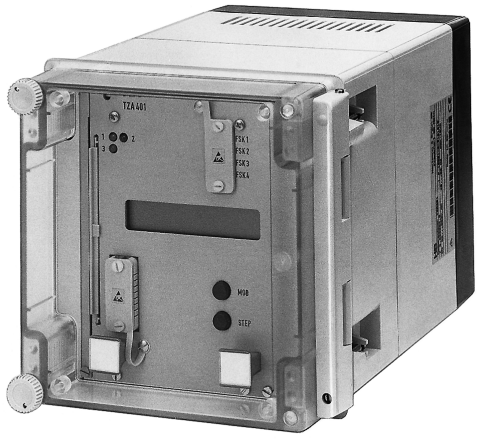
TZA 401

Measuring computer

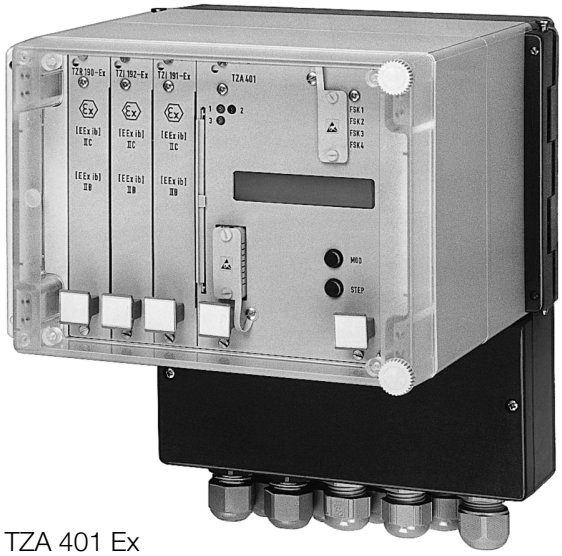
Manual

42/18-50 EN

Rev. 03



TZA 401
Surface mounting case



TZA 401 Ex
Field housing

Operating Instructions

Measuring Computer TZA 401

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12 Important Instructions for Your Safety!

Please read and observe!

Correct and safe operation of the Measuring Computer TZA 401 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 possess the necessary qualifications are allowed to work on the apparatus.

Please take note of the contents of this Operating Manual and the safety instructions affixed to the apparatus.

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 EN 61010-1 „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 ABB Service Department will be delighted to give you more information.

13 Application and brief Description

The Measuring Computer TZA 401 has been designed primarily for use as a flow rate and heat counter for gas, water or steam. Analog and binary input signals are interconnected acc. to a programmed algorithm and the result is output as an analog or binary signal.

Complex calculations can be executed with Measuring Computer TZA 401. Furthermore, intrinsically safe inputs and the PTB calibration approval grant access to a vast range of deployment possibilities.

Examples of application:

- Flow rate calculation with state correction
- Thermal, refrigerating and heat capacity calculation
- Logic operations

The device will be supplied as „19'' plug-in card“, „Control panel case“ and „field housing IP 65“.

The device can be either configured and parameterized at the factory or can be supplied with options for customized configuration. The user must have submitted a complete questionnaire for the required computation program in order to have customized configuration and parameter definition performed by the manufacturer.

Note

These Operating Instructions are valid for devices configured and parameterized at the factory. Customized configuration and parameter definition with program TZAKON2 are described in Configuration Instructions 42/18-51EN.

Explosion protection

The measuring computer TZA 401 must be installed **outside the hazardous area**. Signals coming from the hazardous area are transmitted via intrinsically safe analog inputs. The intrinsic safety of the inputs is realized for both resistance thermometer Pt 100 and mA signals via safety barriers. For the type of construction „field housing“ the safety barriers are integrated; for the type of construction „19'' plug-in card“ the safety barriers must be mounted together with the TZA 401 in the subrack.

Safety barriers without electrical isolation,

19'' plug-in card, blade connector type F

TZR 190-Ex	for intrinsically safe connection of resistance thermometers in 4-wire circuit, one-channel
TZI 191-Ex	for connection of intrinsically safe measuring signals 0/4...20 mA, one-channel
TZI 192-Ex	for connection of intrinsically safe measuring signals 0/4...20 mA, two-channel

Certificate of conformity	PTB Nr. Ex-80/2022 X
Ambient temperature	-40...+50 ^{o}C
Mounting location	outside the hazardous area in subrack or field housing
Designation	[EEx ib] IIC/IIB

Maximum values U_0, I_k, L_a and C_a for each of the intrinsically safe input circuits in type of protection EEX ib IIC/IIB depend on the protective circuit of the safety barriers; see „Expert Commentary“ No. 95-04-205-Ex.

Electrical safety

tested to DIN EN 61010-1/VDE 0411 part 1

Class of protection I

Test voltages

- 3.7 kV ACpower supply against input/output circuits
- 500 V AClimit-value transmitter against system zero

Safety isolation

- Power supply against signal circuits
- Signal circuits:
- Functional extra-low voltage with safety isolation to DIN VDE 0100 part 410 and VDE 0106 part 101/11.86 with transformer to DIN VDE 0551 part 1/09.89

Overvoltage category / degree of pollution

- III/2 for power supply and signal circuits
- II/2 for signal circuits
- to DIN EN 61010-1

Electromagnetic compatibility

Interference immunity

- tested to IEC 801 and VDE 0843
- The standard requirements of the NAMUR recommendation are fulfilled.

Interference suppression

- to DIN EN 55011, limit-value class B

Power supply

Nominal voltage

- 230 V AC (95...253 V AC)
- Alternating voltage -15...+10 %; 48...62 Hz

24 V UC

- Alternating voltage -15...+10 %; 48...62 Hz
- Direct voltage ± 25 %
- Residual ripple ≤ 20 % of tolerance band

Power consumption

- approx. 10 VA

Fuses

- Mains card
- 230 V AC:T 0,16 A
- 24 V UC:T 1 A
- I/O extension card
- 24 V DC:M 2 A
- Fuses are soldered onto the cards.

Mounting Site

The mounting site and mounting orientation must conform to the following specifications with respect to climatic and mechanical stress capabilities:

	19" Plug-in card	Field case	Control panel case
Ambiente temperature	0....+50°C	0....+50°C	0....+50°C
Relative atmospheric humidity	≤ 75%	≤ 85%	≤ 85%
Condensation	None	only	Front panel only
Degree of protection	IP 00	IP 65	IP 20, Front panel IP 65
Vibration	2g / 0,15 mm / 5...150 Hz	2g / 0,15 mm / 5...150 Hz	2g / 0,15 mm / 5...150 Hz

Tabelle 4-1 Ambiente temperature

Rating Plate Inscription

Power supply

Observe Operating Manual!

19" Plug-In Card

Caution

The device may only be operated when fully assembled and installed.

The „19" plug-in card“ version of the device (width 18T) has been designed for installation in a 19" subrack. One subrack can accommodate a total of four devices.

Before installation: Mount spring-contact strips (design F) in the subrack acc. to the spacing of the blade connector arrangement (Fig. 16-2).

Basic version: 2 spring-contact strips,
Version with I/O extension card: 3 spring-contact strips.

Insert the device firmly into spring-contact strips of the slot provided and secure it using the five screws located on the front panel.

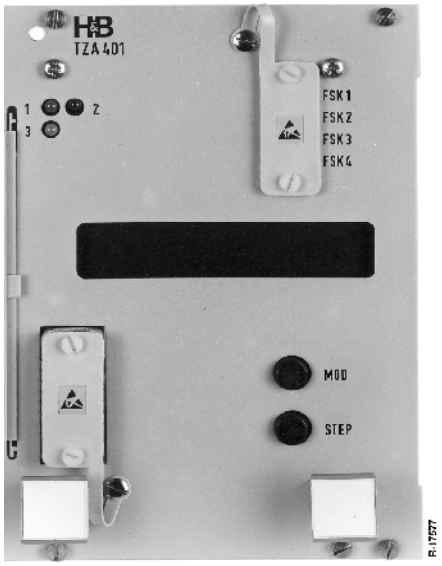

Fig. 16-1 19" plug-in card, front view

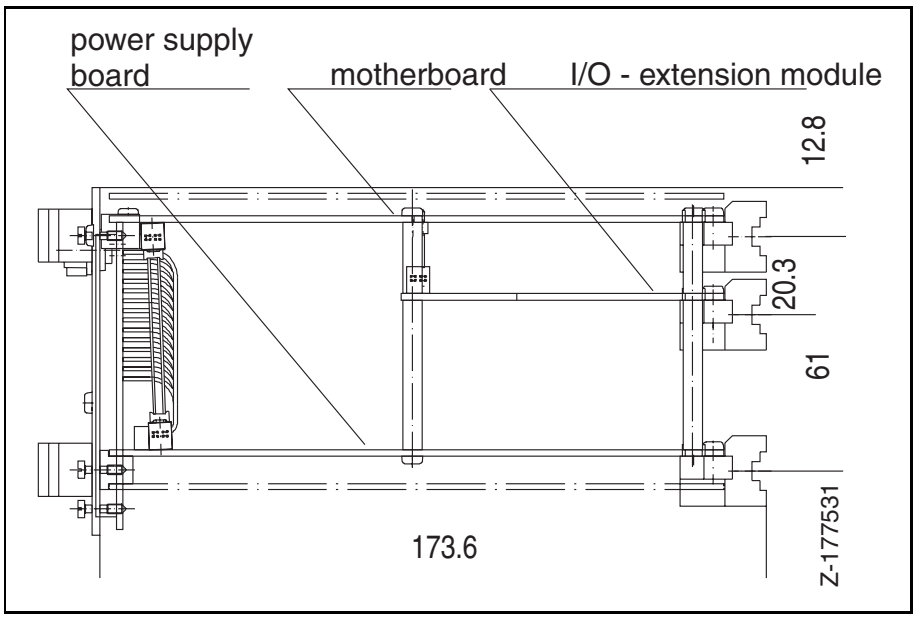

Fig. 16-2 Dimensional drawing of 19" plug-in card (dimensions in mm)

Field Case

Mount the field case directly on a wall using the four mounting screws (Ø ≤ 4,2 mm) (Fig. 16-3) . The cable glands must be facing downwards. . .

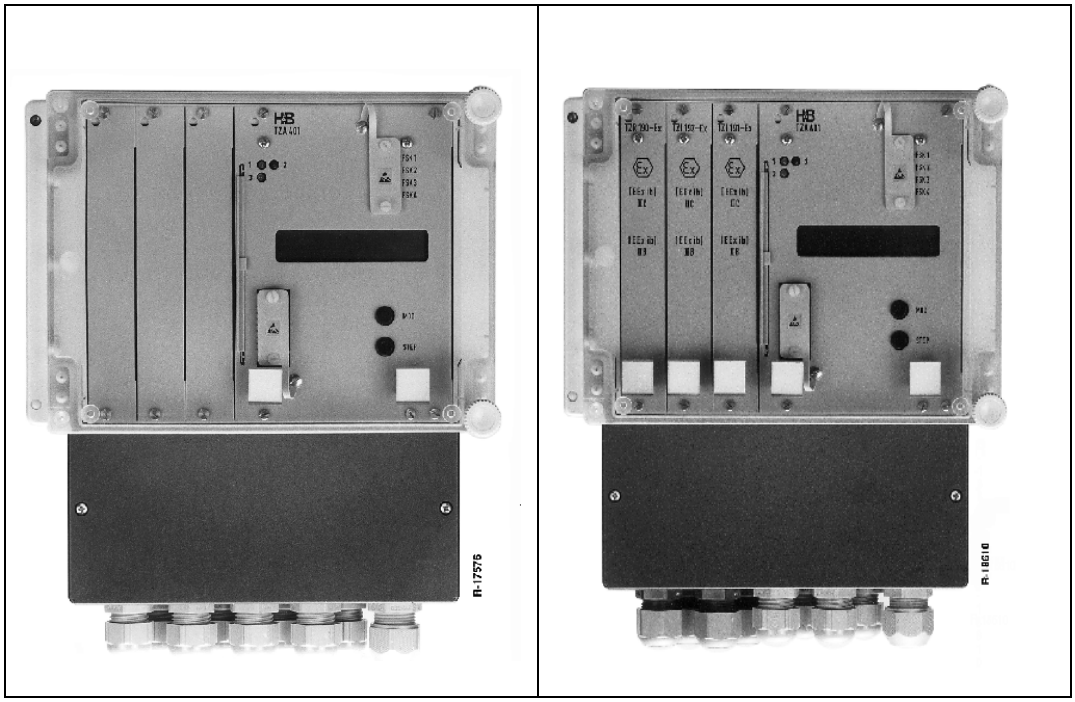

Fig. 16-3 Field case, front view

Fig. 16-4 Field case, explosion-protected design, front view

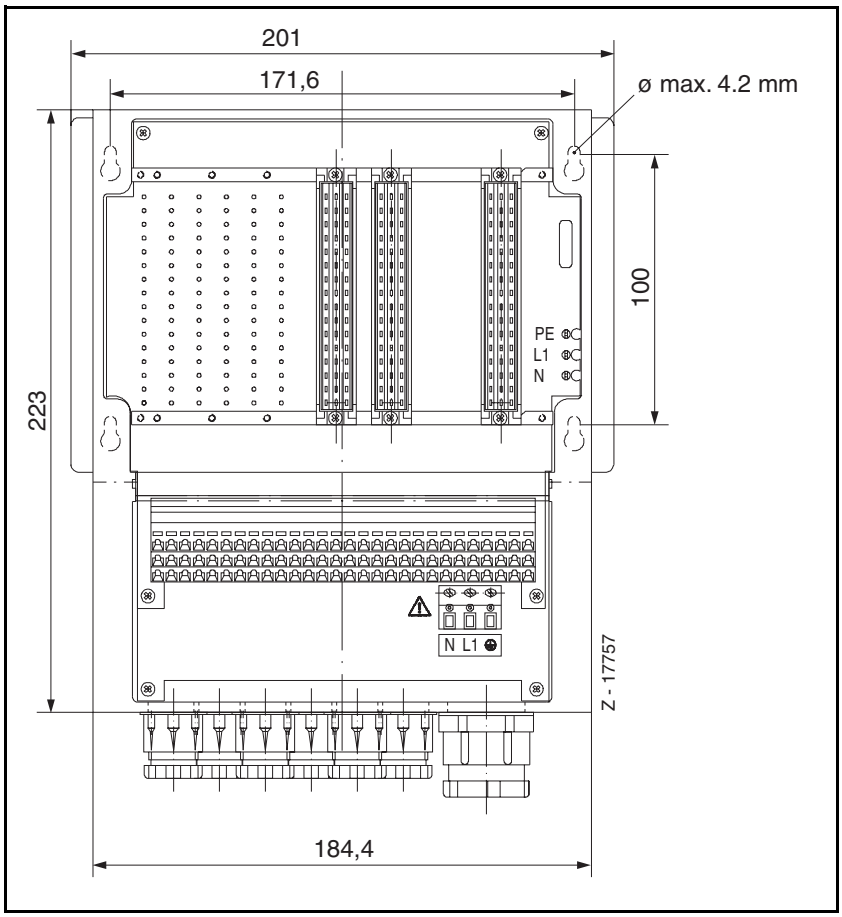

Fig. 16-5 Dimensional drawing of field case (dim. in mm

Control panel case

Mount the control panel case in the control panel (preferably in a vertical position) using the four integrated mounting elements..

Fig. 16-6 Control panel case, front view

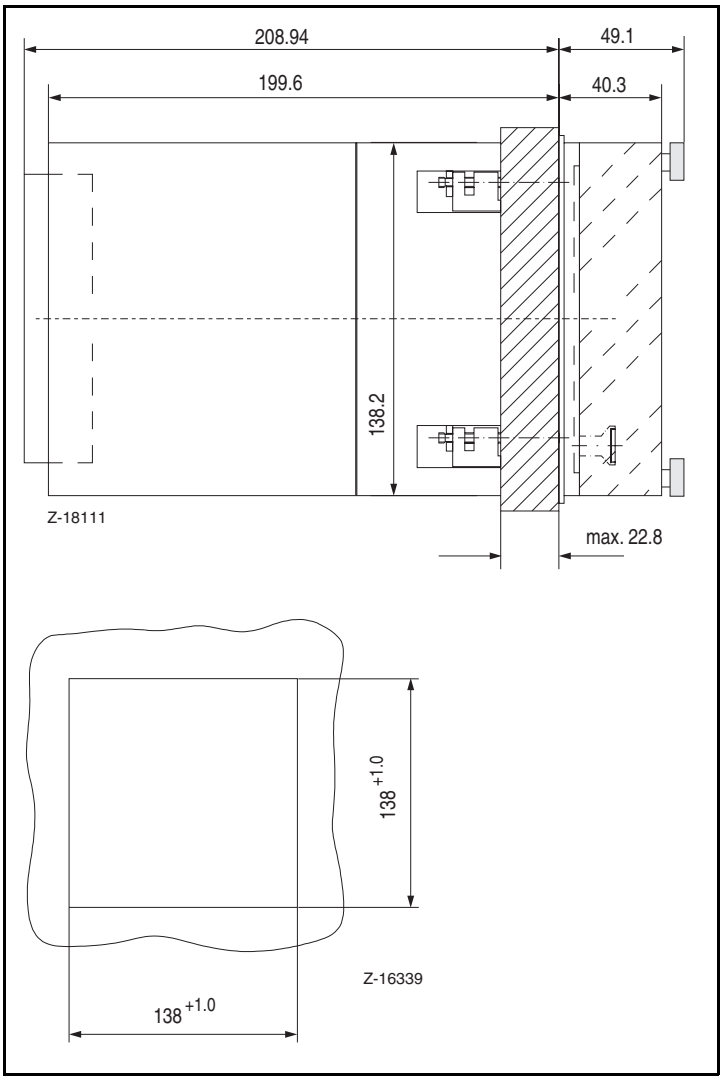

Fig. 16-7 Dimensional drawing of control panel case (dim. in mm)

Caution

Before any other connection is made, the protective ground terminal shall be connected to a protective conductor. Any interruption of the protective conductor inside or outside the apparatus or disconnection of the protective ground terminal is likely to make the apparatus dangerous.

Provision must be made within the mains supply line for switching off the apparatus at all poles. The switch-off facility can also be used for a group of instruments, if the facility used can accommodate the required current and voltage carrying capacity.

No particular polarity need be observed when connecting a 24 V UC power supply.

When selecting the lead material as well as when installing measurement and output signal lines the stipulations enshrined in DIN VDE 0100 must be observed. We recommend the use of single-wire copper conductors or flexible copper conductors with gas-tight crimped, tin-plated connector sleeves. Fixed cabling is necessary for all connecting cables.

For explosion-protected designs please observe in addition DIN VDE 0165/2.91.

Note

Before connecting the signal lines, check, while referring to the following sections þComputation Programsþ which input and output variables are to be connected to which terminals. See Connection Diagrams in chapter 8.

19" Plug-In Card

Route the signal and power supply lines to the appropriate spring-contact strip and connect (Fig. 19-1 and Fig. 19-2). The terminals have been designed either as a solder connection,

in wire-wrap technology (1 mm x 1 mm) or as maxi-termipoint connection (2.4 mm x 0.8 mm).

For 19" plug-in card in explosion-protected design, additionally provide connectors for linking safety barriers and plug-in card (Fig. 19-3 and Fig. 19-4).

Field Case

1. Having undone the two cross-head screws, remove the terminal cover.

2. Route the signal and power supply lines through the cable glands (8 x PG 11, 1 x PG 13.5) and connect to the terminals (up to max. 2.5 mm^2 for wires) (Fig. 19-5 and Fig. 19-6).

For field housing in explosion-protected design, route the cables to the intrinsically safe inputs via the blue cable glands (Fig. 19-7).

Control panel case

The signal and power supply lines are to be connected with the terminals on the back of the case (solid conductors 2,5 mm^2; connector sleeves 1,5 mm^2 max.) (Fig. 19-5).

All device versions

The FSK sockets „FSK1...4“ as well as the socket for the RS-232C interface are situated on the front panel, each featuring a screwable cover (Fig. 16-1).

Note

Communication with intelligent transmitters is only possible with non explosion-protected versions.

Computation Program No. 731: flow rate, dry/wet gas

Calculation of the output variable

$$A = f[p, T, \varsigma_n, \varphi, \Delta p1, \Delta p2, Q_v, f(Q_v), Z, \alpha, \varepsilon]$$

$$A = Q_n = Q_{nr} \cdot \sqrt{\frac{\Delta p}{\Delta p_r} \cdot \frac{p}{p_r} \cdot \frac{Tr}{T} \cdot \frac{\varsigma_{nr}}{\varsigma_n} \cdot \frac{Z_r}{Z}} \cdot f(\varphi)$$

$$A = Q_n = Q_v \cdot \frac{p}{p_n} \cdot \frac{T_n}{T} \cdot \frac{Z_n}{Z} \cdot f(\varphi)$$

Legend

A	Output
E	Input
p	Absolute pressure
Δ p	Differential pressure, linear or with root extraction
Q_n	Volume flow rate in normal state
Q_v	Volume flow rate in operating state
T	Temperature
Z	Real gas factor
α	Flow rate coefficient
ε	Expansion factor
ς_n	Standard density
φ	Relative humidity

Indices

n	Normal state (1013 mbar, 0°C)
r	Calculation value

Variables	p	T	ς_n	φ	Δ p1, Q_v	f(Q_v)	Δ p2	T	-	Q	Q,P, T, φ	Q	Q,P, T, φ
19" Plug-In Card	z2,d2	z4,d4	z6,d6	z8,d8	z10, d10	z10, d18	z12, d12	z4,d4	z8,d8	z18, d18	z20, d20	z22, d22	z24, d24
Field case / Control panel case	63,64	35,36	7,8	67,68	39,40	39,41	11,12	75,76	47,48	42,43	14,15	19,20	21,22
Field case Ex-version	29,30	1,2 57-60	-	-	31,32	-	3,4	57-60	-	42,43	14,15	19,20	21,22
Inputs / outputs	E1	E2	E3	E4	E5	EB1	E6	Ex1	EX2	A1 (mA)	A2(V)	AX1 (mA)	AX2 (mA)

Table 7-1 Terminal assignment

Computation Program No. 735: thermal power, dry/wet gas

Calculation of the output variable

$$A = f[p, T, H_u, \varphi, \Delta p1, \Delta p2, Q_V, f(Q_V), Z, \alpha, \varepsilon]$$

$$A = Q_n = Q_{nr} \cdot \sqrt{\frac{\Delta p}{\Delta p_r} \cdot \frac{p}{p_r} \cdot \frac{Tr}{T} \cdot \frac{Z_r}{Z}} \cdot f(\varphi)$$

$$A = Q_n = Q_V \cdot \frac{p}{p_n} \cdot \frac{T_n}{T} \cdot \frac{Z_n}{Z} \cdot f(\varphi)$$

$$A = P = Q_n \cdot H_u$$

Legend

A	Output
E	Input
H_u	Lower heating value in normal state
p	Absolute pressure
Δ p	Differential pressure, linear or with root extraction
Q_n	Volume flow rate in normal state
Q_v	Volume flow rate in operating state
T	Temperature
P	Thermal or refrigerating capacity
Z	Real gas factor
α	Flow rate coefficient
ε	Expansion factor
φ	Relative humidity

Indices

n	Normal state (1013 mbar, 0°C)
r	Calculation value

Variables	p	T	H_u	φ	Δ p1, Q_v	f(Q_v)	Δ p2	T	-	P	Q, P, T, φ	P, Q	Q, P, T, φ
19" Plug-In Card	z2,d2	z4,d4	z6,d6	z8,d8	z10, d10	z10, d18	z12, d12	z4,d4	z8,d8	z18, d18	z20, d20	z22, d22	z24, d24
Field case / Control panel case	63,64	35,36	7,8	67,68	39,40	39,41	11,12	75,76	47,48	42,43	14,15	19,20	21,22
Field case Ex-version	29,30	1,2 57-60	-	-	31,32	-	3,4	57-60	-	42,43	14,15	19,20	21,22
Inputs / outputs	E1	E2	E3	E4	E5	EB1	E6	Ex1	EX2	A1 (mA)	A2(V)	AX1 (mA)	AX2 (mA)

Table 7-2 Terminal assignment

Computation Program No. 751: flow rate/thermal power, water

Calculation of the output variable

$$A = f[p, T, T_w, T_k, T_Q, \Delta p1, \Delta p2, Q_v, f(Q_v)]$$

$$A = Q_m = Q_{mr} \cdot \sqrt{\frac{\Delta p}{\Delta p_r} \cdot \frac{v_r}{v}}$$

$$A = Q_m = Q_v \cdot \varsigma$$

$$A = P = Q_m \cdot (h_w - h_k)$$

Legend

A	Output
E	Input
h	Enthalpy
p	Absolute pressure
Δ p	Differential pressure, linear or with root extraction
Q_m	Mass flow
Q_v	Volume flow rate in operating state
T	Temperature
Δ T	Temperature difference
v	Specific volume
P	Thermal or refrigerating capacity
T_Q	Temperature for density correction

Indices

k	Cold
r	Calculation value
w	Warm

Variables	p	T, T_w	T_k	T_Q	Δ p1, Q_v	f(Q_v)	Δ p2	T, T_w	T_k	P,Q_m, Q_v	P,Q_m, Q_v, Δ T,T_w, T_k,T	P,Q_m, Q_v, Δ T,T_w, T_k,T	P,Q_m, Q_v, Δ T,T_w, T_k,T
19" Plug-In Card	z2, d2	z4, d4	z6, d6	z8, d8	z10, d10	z10, d18	z12, d12	z4,d4	z8,d8	z18, d18	z20, d20	z22, d22	z24, d24
Field case / Control panel case	63, 64	35, 36	7,8	67, 68	39,40	39,41	11,12	75,76	47,48	42,43	14,15	19,20	21,22
Inputs / outputs	E1	E2	E3	E4	E5	EB1	E6	Ex1	EX2	A1 (mA)	A2(V)	AX1 (mA)	AX2 (mA)

Table 7-3 Terminal assignment

Computation Program No. 761: flow rate/thermal power, steam

Calculation of the output variable

$$= f[p, T, \Delta p1, \Delta p2, Q_V, f(Q_v), \alpha, \varepsilon]$$

$$A = Q_m = Q_{mr} \cdot \sqrt{\frac{\Delta p}{\Delta p_r} \cdot \frac{v_r}{v}}$$

$$A = Q_m = Q_V \cdot \varsigma$$

$$A = P = Q_m \cdot h$$

Legend

A	Output
E	Input
h	Enthalpy
p	Absolute pressure
Δ p	Differential pressure, linear or with root extraction
Q_m	Mass flow
Q_v	Volume flow rate in operating state
T	Temperature
v	Specific volume
P	Thermal or refrigerating capacity
α	Flow rate coeffizient
ε	Expansion factor
ς	Operating density

Indices

r	Calculation value

Variables	p	T	-	-	Δ p1, Q_v	f(Q_v)	Δ p2	T	-	P,Q_m, Q_v	P,Q_m, Q_v, p,T	P,Q_m, Q_v, p,T	P,Q_m, Q_v, p,T
19" Plug-In Card	z2,d2	z4, d4	z6, d6	z8, d8	z10, d10	z10, d18	z12, d12	z4,d4	z8,d8	z18, d18	z20, d20	z22, d22	z24, d24
Field case / Control panel case	63,64	35, 36	7,8	67, 68	39,40	39,41	11,12	75,76	47,48	42,43	14,15	19,20	21,22
Inputs / outputs	E1	E2	E3	E4	E5	EB1	E6	Ex1	EX2	A1 (mA)	A2(V)	AX1 (mA)	AX2 (mA)

Table 7-4 Terminal assignment

Computation Program No. 765: flow rate/thermal power, steam minus water

Calculation of the output variable

$$f[p, T, T_w, \Delta p_w, \Delta p1, \Delta p2, Q_{vw}, Q_{vD}, f(Q_v), \alpha, \varepsilon]$$

$$A = Q_m = Q_{mr} \cdot \sqrt{\frac{\Delta p}{\Delta p_r} \cdot \frac{v_r}{v}}$$

$$A = Q_m = Q_v \cdot \varsigma$$

$$A = \Delta P = P_D - P_w$$

$$P_w = Q_{mW} - h_w$$

Legend

A	Output
E	Input
h	Enthalpy
p	Absolute pressure
Δ p	Differential pressure, linear or with root extraction
Q_m	Mass flow
Q_v	Volume flow rate in operating state
T	Temperature
v	Specific volume
P	Thermal or refrigerating capacity
ΔP	Thermal difference
α	Flow rate coefficient
ε	Expansion factor
ς	Operating density

Indices

D	Steam
r	Calculation value
w	Water

Variables	p	T	T_W	Δp_w, Q_{vW}	Δ p1, Q_{vD}	f(Q_v)	Δ p2	T	T_W	P_D,P_W, Q_{mD}, Q_{mW}, Δ p	P_D,P_W, Q_{mD}, Q_{mW}, p,T,T_w, Δ p	P_D,P_W, Q_{mD}, Q_{mW}, p,T,T_w, Δ p	P_D,P_W, Q_{mD}, Q_{mW}, p,T,T_w, Δ p
19" Plug-In Card	z2, d2	z4, d4	z6, d6	z8, d8	z10, d10	z10, d18	z12, d12	z4,d4	z8,d8	z18, d18	z20, d20	z22, d22	z24, d24
Field case / Control panel case	63, 64	35, 36	7,8	67, 68	39,40	39,41	11,12	75,76	47,48	42,43	14,15	19,20	21,22
Inputs / outputs	E1	E2	E3	E4	E5	EB1	E6	Ex1	EX2	A1 (mA)	A2(V)	AX1 (mA)	AX2 (mA)

Table 7-5 Terminal assignment

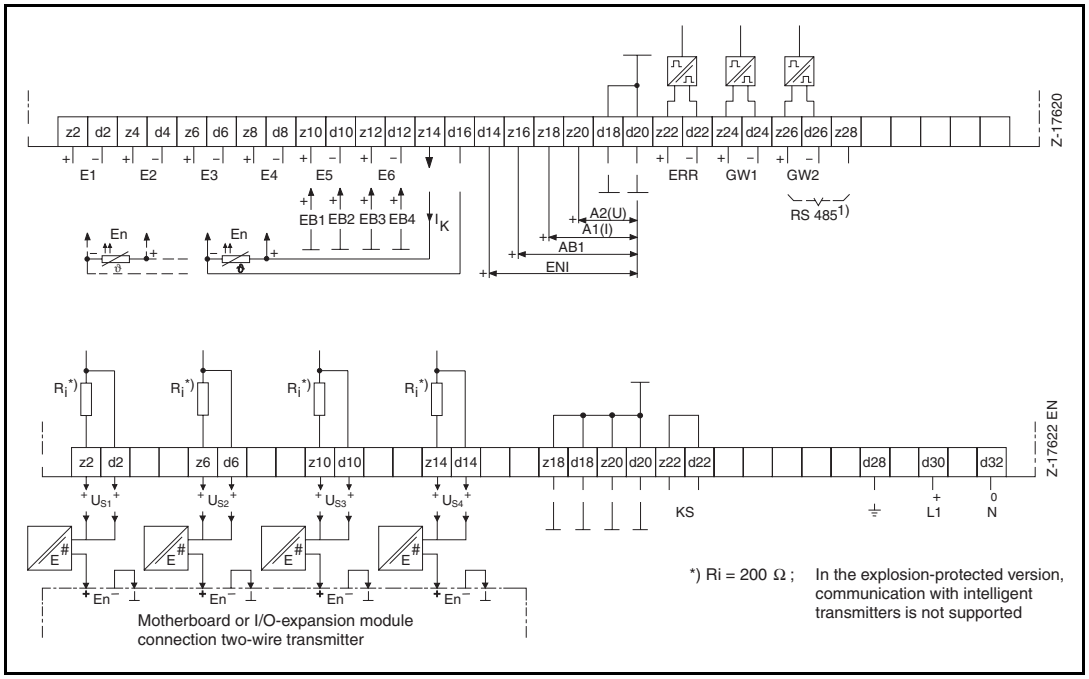

Fig. 19-1 Connection diagram of 19" plug-in card - motherboard (above) and mains card (below)

1) RS 485 alternative to GW2: z26 = TxD/RxD-P, d26 = TxD/RxD-N, z28 = reference potential

*) Ri = 200 Ω ; communication with intelligent transmitters is only possible with non explosion-protected devices

E_n Analog inputs E1...E6, E1, EX2

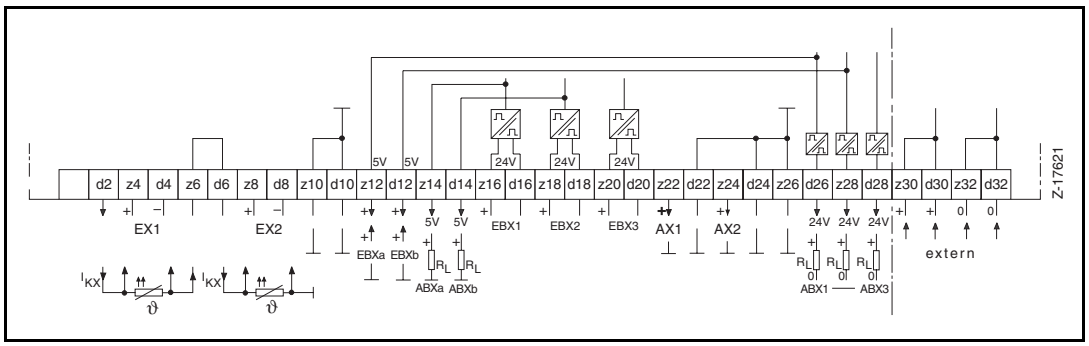

Fig. 19-2 Connection diagram of 19" plug-in card - I/O extension card

Note Link negative pole and system zero ⊥ together when connecting electrically isolated 4-wire transmitters to the analog inputs EX1 and EX2

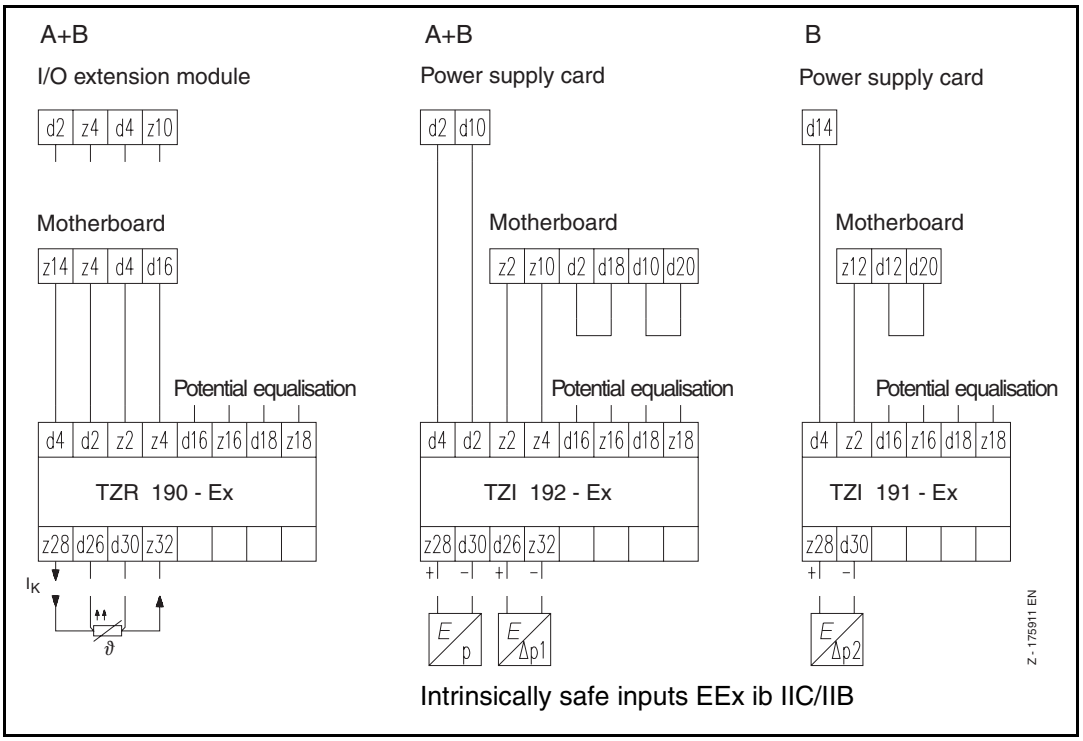

Fig. 19-3 Connection diagram of 19" plug-in card with intrinsically safe inputs via safety barriers for A 1 x Pt 100 direct, 2 x mA B 1 x Pt 100 direct, 3 x mA (see „Expert Commentary“ No. 95-04-205-Ex)

Notes The safety barrier TZR 190-Ex is connected to either the motherboard or the I/O extension card.
The user has to provide connectors for linking the safety barriers and plug-in card.

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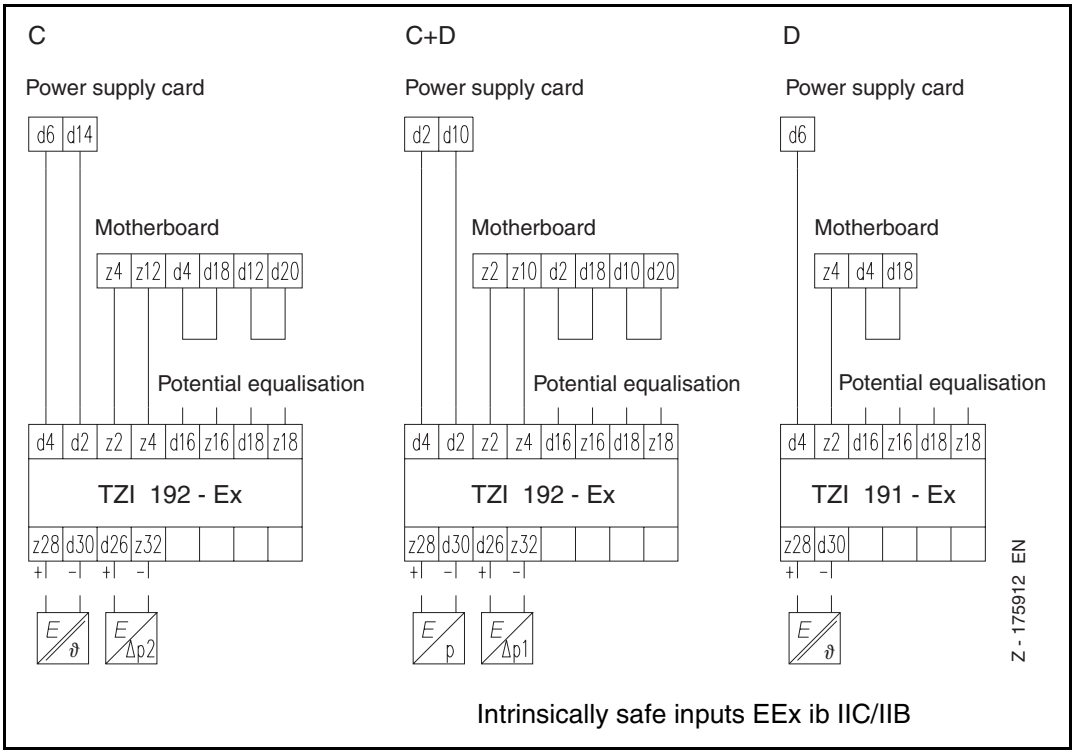

Fig. 19-4 Connection diagram of 19" plug-in card with intrinsically safe inputs via safety barriers for C 4 x mA D 3 x mA (see „Expert Commentary“ No. 95-04-205-Ex)

Note The user has to provide connectors for linking the safety barriers and plug-in card.

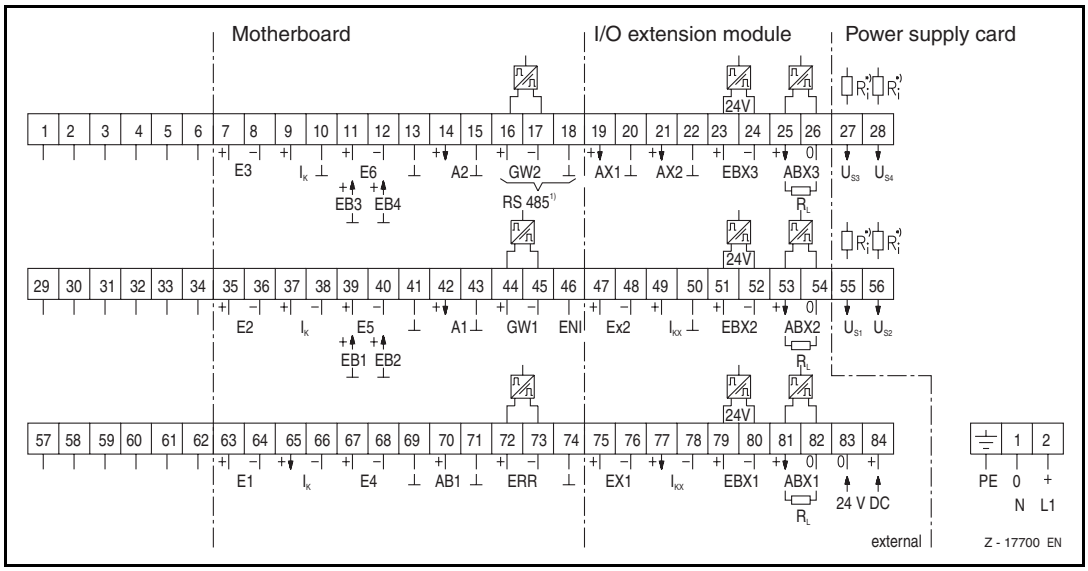

Fig. 19-5 Connection diagram of field case / Control panel case

1) RS 485 as alternative to GW2: 16 = TxD/RxD-P, 17 = TxD/RxD-N, 18 = reference potential

*) Ri = 200 Ω ; communication with intelligent transmitters is only possible with non explosion-protected devices

Note For units without I/O extension card, terminals 19-26, 47-54 and 75-84 are not occupied.

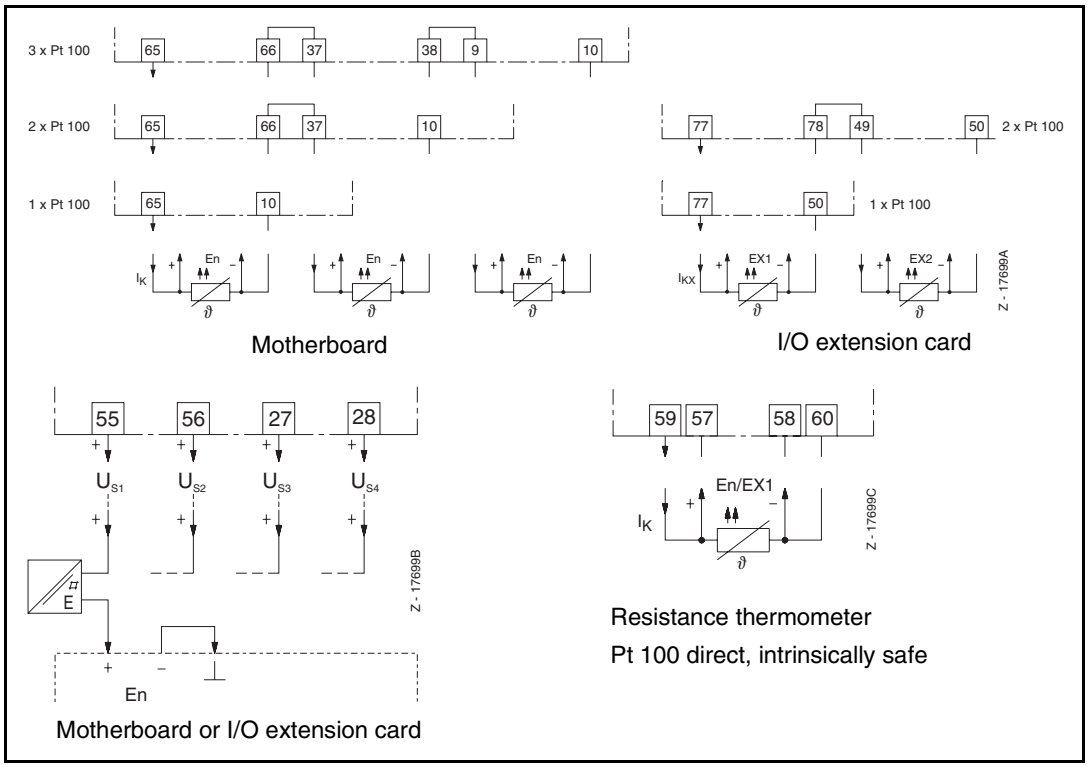

Fig. 19-6 Terminal assignment (field case/control panel case) for resistance thermometer Pt 100 direct and for two-wire transmitter

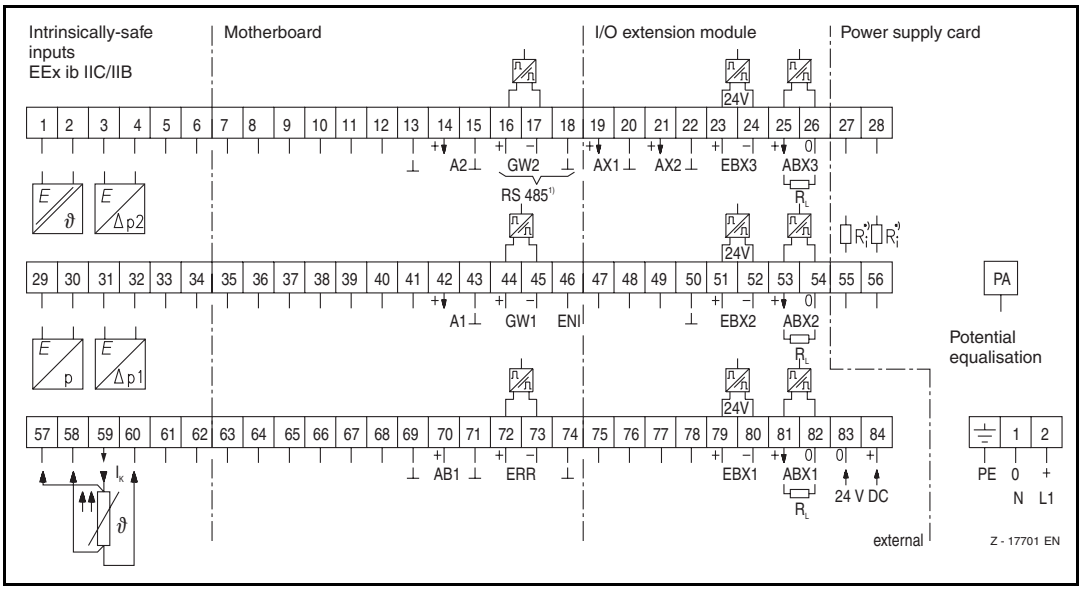

Fig. 19-7 Connection diagram of field case with intrinsically safe inputs (see „Expert Commentary“ No. 95-04-205-Ex)

1) RS 485 as alternative to GW2: 16 = TxD/RxD-P, 17 = TxD/RxD-N, 18 = reference potential

Note For units without I/O extension card, terminals 19-26, 47-54 and 75-84 are not occupied.

Legends for Figs. 8-1 to 8-7

Motherboard

A1, A2	Analog outputs (mA, V)
AB1	Binary outputs (5 V)
E1...E6 (En)	Analog inputs (mA, V, ê, Pt 100)
EB1...EB4	Binary inputs (5 V, 24 V)
ENI	Binary inputs (approx. 10 V), e.g. NAMUR transmitter
ERR	Fault signal output (24 V, open collector)
GW1, GW2	Alarm signalling unit outputs (24 V, open collector)
I_K	Constant current source for Pt 100
⊥	System zero

I/O extensions card

ABXa, ABXb	Binary outputs (5 V, active)
ABX1...ABX3	Binary outputs (24 V, active)
AX1, AX2	Analog outputs (mA)
EBXa, EBXb	Binary inputs (5 V)
EBX1...EBX3	Binary inputs (24 V)
EX1, EX2 (En)	Analog inputs (mA, V, Pt 100)
I_{KX}	Constant current source for Pt 100
⊥	System zero

Mains card

KS	Control loop
L1/+, N/0	Power supply
PE	Protective conductor
US1...US4	Supply voltage for two-wire transmitter
⊥	System zero

Caution

Before switching on the device, make sure it is set to the voltage of the power supply.

The device is ready for operation on switching it on, if it has been configured and parameterized at the factory. The green LED „1“ lights up.

The program TZAKON2 and a connection cable for the RS-232C interface are required for configuration and parameter definition by the user (see Configuration Instructions 42/18-51 EN).

Display and control elements (Fig. 16-1)
LED „1“ (green) Pilot lamp (power supply)
LED „2“ (red) Fault indicator (hardware and software)
LED „32 (yellow) Status indicator (program inactive)

The 16-digit LC Display is used for alphanumeric display of the design data as well as for the current measured and calculation values.

The „MOD“ and „STEP“ keys are used for changing the display as well as for selecting the measured variables, device data and parameter data (Fig. 20-1).

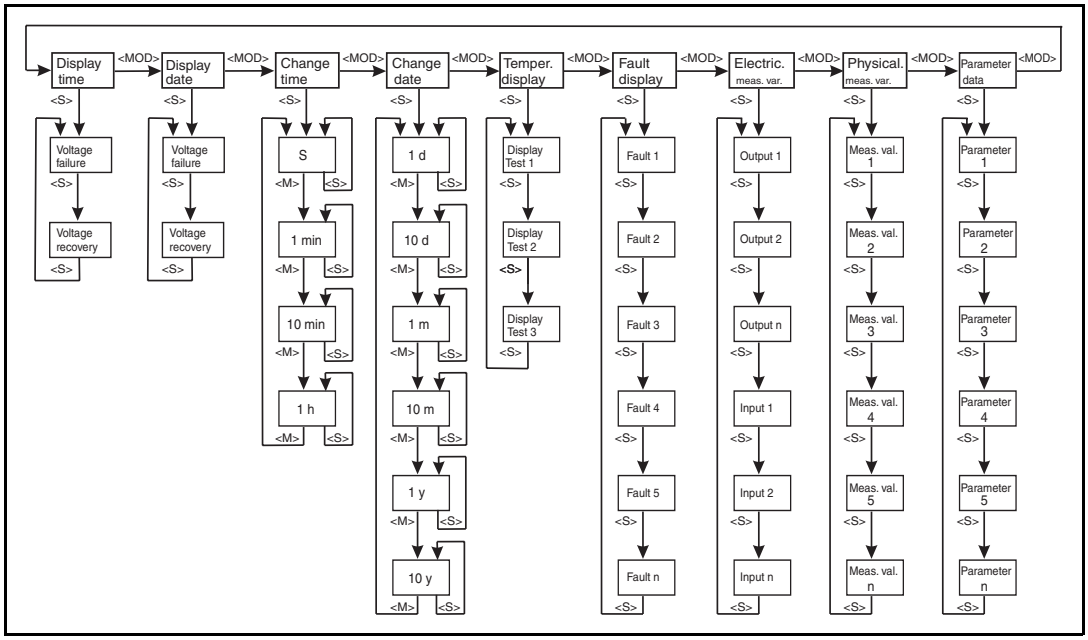

Fig. 20-1 Display and operation with the keys „MOD“ and „STEP“

<MOD> Hold „MOD“ key (approx. 2 s)
<M> Tip „MOD“ key (approx. « ½ s)
<S> Tip „STEP“ key (approx. « ½ s)
With <MOD>, jump from any submenu to the next main menu item.

For „Change time/date“ the digit modifiable with <S> flashes;
With <M>, jump to the left to the next higher position.

Note:

The submenu items featured in the main menus „Fault display“, „Electrical measured variables“, „Physical measured variables“ and „Parameter data“ are a function of the computation program selected.

Caution

When the apparatus is connected to its supply, terminals may be live, and the opening of the covers or removal of parts (except those to which access can be gained without a tool) is likely to expose live parts.

Live terminals may be exposed when pulling out the 19" plug-in card.

The electrical input and output circuits of the field case and the control panel case are interrupted after pulling out the plug-in card; in such a situation, an external protection circuit with interlock diodes, for example, must be provided.

Any operations on the opened apparatus under voltage shall only be carried out by a person who is aware of the hazard involved.

Packing Instructions

- If the original packing is no longer available, the apparatus 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) for the transportation. The amount of cushioning must be adapted to the weight of the apparatus and to the mode of transport. Thecrate must be labelled „Fragile“.
- For overseas shipment the apparatus must additionally be sealed airtight in 0.2 mm thick polyethylene together with a desiccant (e.g. silica gel). The quantity of the desiccant mus 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.

Replacement parts

Field case IP 65	18081-4-0346740
Control panel case	18081-4-0346741

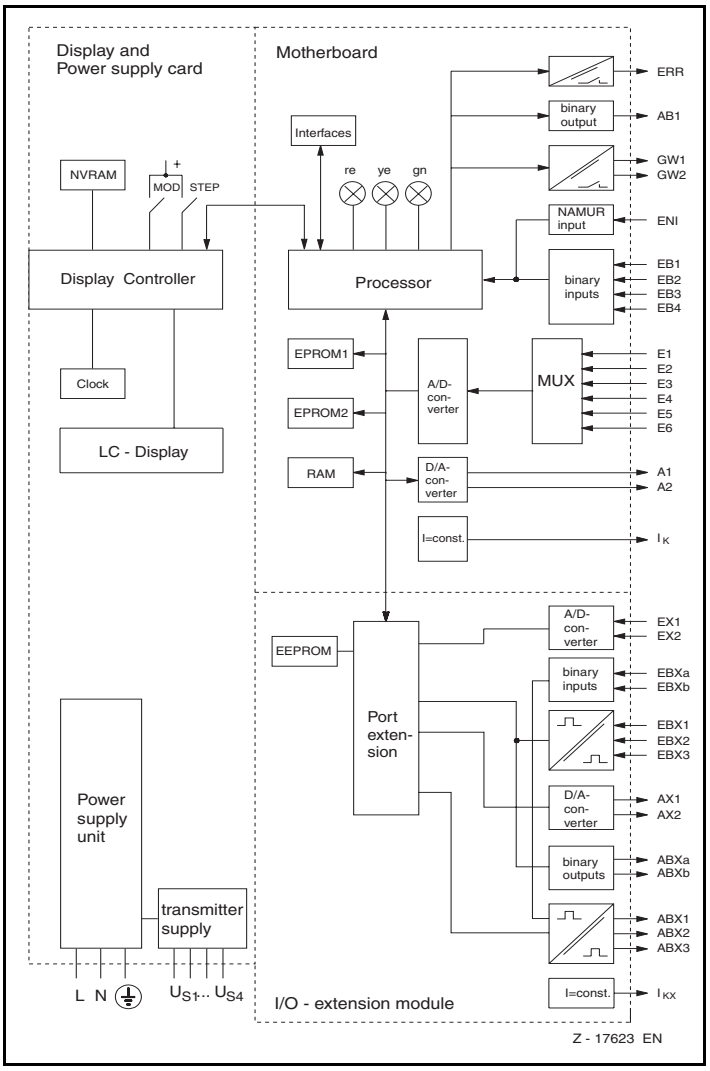

Fig. 22-1 Functional diagram

The Measuring Computer TZA 401 is composed of the mother-board and mains card. The I/O extension card featuring addition-al inputs and outputs can be installed as an option.

Analog signals, e.g. current, voltage, resistance, can be connected to inputs E1...E6. Instead of analog inputs E5 and E6, four binary inputs EB1...EB4 can be selected, for example for pulses and binary states.

Two supplementary analog inputs, EX1 and EX2, are situated on the I/O extension card; only the same type of input signals may be connected to these two inputs, e.g. two current, voltage or resistance signals. This card also features two additional analog current outputs AX1 and AX2 as well as diverse binary inputs and outputs.

All motherboard input signals are processed digitally acc. to the computation algorithm programmed. The resolution of the A/D converter on the motherboard is ±3600 digits. The resolution of the A/D converter on the I/O extension card is ≥±16 bits. The floating point arithmetic operates with eight digits.

The processor controls the display and the real-time clock via the display controller. The NV-RAM is used for data storage in the event of power failure. The „MOD“ and „STEP“ keys are used for changing the display and for selecting the measured variables, device data and parameter data.

Up to four two-wire transmitters can be powered with the transmitter power supply US1...US4 (Imax. = 25 mA).

The inputs on the motherboard are isolated from each other and from the system zero by means of an electronic potential separation up to ±10 V. The potential separation is ±4 V on the I/O extension card.

The operating data and calibration data are stored in EPROM1, while EPROM2 contains one or more computation programs with the relevant parameter files. Each of the two EPROMs can accommodate a capacity of 32 KB.

The computation program loaded in the EPROM is started on switching on the power supply. The program interrupts the processing operation in the event of power failure; an automatic restart is effected on voltage recovery.

Device-specific calibration of the inputs and outputs is performed at the factory.

Please consult Configuration Instructions 42/18-51 EN for more information on the hardware and software.

Subject to technical changes.

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