Contrans T
TEU 315, TEU 315-Ex, TEU 325, TEU 325-Ex

Transmitter for temperature and direct current variables in four-wire circuit

11-3.03 EN



- **Transmitters TEU 315 and TEU 325 are designed for direct and alternating voltage measurement as well as for resistance and direct current measurement**
- **IP 20 surface mounting case**
- **19“ plug-in card module**
- **IP 54 field enclosure**

Description

Functional diagram
1 = Switched-mode regulator
2 = Power supply
3 = Amplifier
4 = Range unit
5 = Ex limitation for input
6 = Electrical isolation
7 = Output stage
8 = Sensor break monitor
9 = Sensor break signal contact
10 = Reference junction compensation
11 = Alarm monitor
12 = Ex limitation for power supply

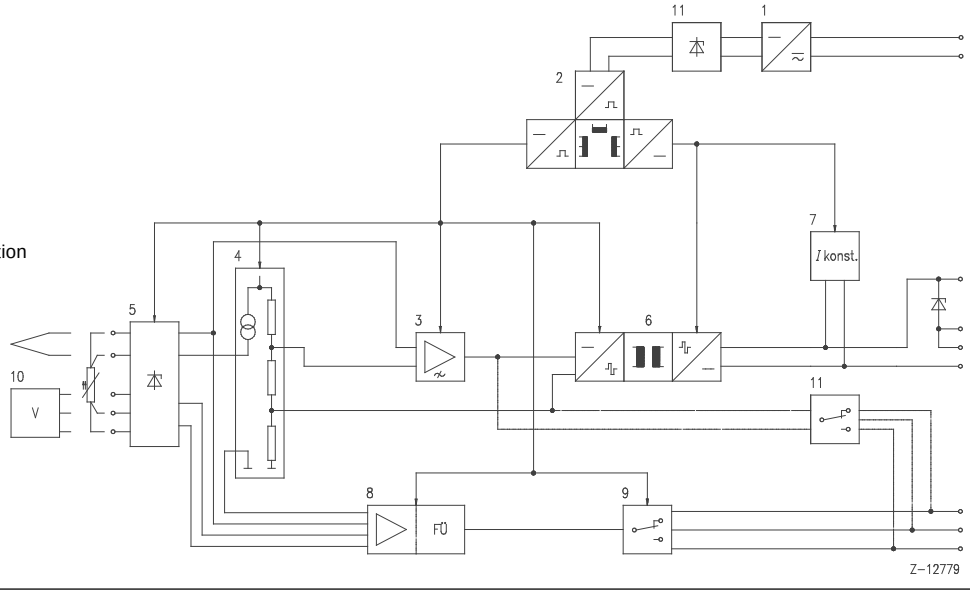


Figure 1 Functional diagram

The input variables are converted to a load-independent direct current or voltage signal. Matching to the measured variable and the measuring range is accomplished with interchangeable measuring circuit accessories and range units with adjustable span. The basic version consists of the following subassemblies:

Circuit board with switched-mode regulator and rectifier (1), power supply (2), amplifier (3), range module (4). In addition, the following modules can be incorporated:

Electrical isolation (6), output stage (7), measuring circuit accessory for sensor break monitoring or strain gauge bridge supply (8), sensor break signal contact (9) or alarm monitor (11) (relay or transistor output). Explosion-proof transmitters (TEU 3.5-Ex.A and 3.5-Ex.B) are fitted with a limiter (5) for the intrinsic safety of the input circuit, power supply limiter (12) and electrical isolation (6). Explosion protected version TEU 3.5-Ex.C is intrinsically safe in the input and output and it has an extra electronic current and voltage limiter in its output circuit. No electrical isolation is fitted between the input and output circuits of this version.

The input signal is passed via the range unit (4) to the amplifier (3) which delivers a load-independent direct current signal. If electrical isolation (6) is built in, the direct current signal is chopped, decoupled by an isolating transformer and changed back into a load-independent direct current by a rectifier circuit with impedance matching network. This signal is unipolar.

An output stage (7) is required to transform it into a bipolar current signal or into a load-independent voltage. If the measuring circuit is broken the amplifier is driven to upper or lower range value by the measuring circuit accessory (8). In resistance measurement in four-wire circuit, the measuring circuit accessory also houses the impedance converter whose high-impedance input permits this circuit.

The sensor break signal contact (9) is controlled by the measuring circuit accessory (8) and causes the relay contact to switch when the measuring circuit is broken. The internal reference junction compensation (10) for thermocouples supplies a compensation voltage to the transmitter if the ambient temperature deviates from 20 °C. The power supply (2) supplies the modules with the necessary voltages.

The alarm monitor (11) (relay or transistor outputs) has an adjustable switching point in NO or NC contact circuit. In the 19" version, the alarm value is adjustable at the front panel. An LED indicates the switching status. Transmitters with an output linear with temperature have range units with built-in correction elements. The transmitters can optionally be supplied with test jacks for input and/or output as well as with measure/test selector switches for the input.

Technical data

Application for	Measuring circuit	Connection diagram
mV sensors and thermocouples with or without offset of the lower range value		
output signal linear with voltage	351	a
linear with temperature	352	a
mV difference or temperature difference with 2 thermocouples		
output signal linear with voltage	353	b
Voltage measurement with voltage divider from 150 mV, with or without offset of lower range value	355	d
Rotational speed or alternating voltage measurement	365	d
Resistance thermometer in two-wire circuit		
output signal linear with resistance	371	e or f
linear with temperature Pt 100 IEC	372	e or f
Resistance thermometer in three-wire circuit		
output signal linear with resistance	373	h
linear with temperature Pt 100 IEC	374	h
Resistance thermometer in four-wire circuit (accessory 4-wire impedance converter required)		
output signal linear with resistance	371	g
linear with temperature Pt 100 DIN	372	g
Temperature difference with 2 resistance thermometers, output signal linearized in operating range	378	j
Current measurement with or without offset of lower range value	381	c
Current measurement in sum or differentiation circuit, with or without offset of lower range value (2 current inputs)	382	c
Resistance teletransmitter	391	k or l
Strain gauge measurement in full bridge circuit	395	m

Input

Separate technical data for versions	**TEU 315 TEU 315-Ex.A-C**	**TEU 325 TEU 325-Ex.A-C**
Span from		
mV	1 mV	20 mV
Ω (Pt 100)	3.2 Ω	10 Ω
	Linear with resistance or temperature Pt 100 IEC	
Ω (Teletransmitter)	10 Ω	30 Ω
mA	5 µA	100 µA
Spans	See setting limits	See setting limits

Measuring circuit 351, 352, 353

Permitted source and lead resistance

	Up to 1 kΩ/mV	Up to 5 Ω/mV
	Without balancing	Without balancing
	With thermocouple break monitor	
	max. 700 Ω	max. 700 Ω

Separate technical data for versions	TEU 315 TEU 315-Ex.A-C	TEU 325 TEU 325-Ex.A-C
Input resistance	1 MΩ/mV	2 kΩ/mV
Measuring circuit 395	Supply voltage 4 V ± 0.12%, max. 11 mA, Strain gauge rated resistance 350 Ω or greater	
other	See common technical data	

Common technical data

Permitted source and lead resistance

Measuring circuit	
371, 372:	Lead balancing required for two-wire circuit. Four-wire circuit not balanced. (Lead resistance max. 100 Ω per wire)
373, 374:	Up to 10 Ω per wire without balancing (resistance of each lead must be equal)
378:	Lead resistance must be balanced
381:	> 1000 x input resistance
391:	Lead balancing required
355:	Up to 5 Ω/V without balancing
365:	Up to 500 Ω without balancing
395:	Up to 30 Ω per wire without balancing (lead resistances must be equal)

Input resistance

In current measurement
Measuring circuit 381: Up to 0.34 mA = 1087 Ω
0.34...4.0 mA = 87.6 Ω
4.0...100 mA = 5.6 Ω

In current measurement in sum or differential circuit
Measuring circuit 382: Input resistance = $\frac{700\ mV}{I_{1.2}}$

In voltage measurement with voltage divider
Measuring circuit 355: > 4 kΩ/V
Measuring circuit 365: 100 kΩ

Overload limit

See certificate of conformity for intrinsically safe measuring circuit

Voltage
–3.5...+7 V for measuring circuits 351, 352, 353.
140 % for measuring circuit 355.
250 V (rms) for measuring circuit 365.

Resistance, voltage
Open or short-circuited input permitted

Current
1 : 10 for < 5 mA,
1 : 4 for ≤ 50 mA,
1 : 2 for ≥ 50 mA

Technical data

Range units

Interchangeable range units with adjustable span (with optional built-in linearization). Rebalancing is required after replacement. This does not apply in TEU 315, TEU 315-Ex if the range unit is labelled “with basic balancing”. In transmitters with test jacks for input and with test/measure selector switches (Suppl. No. 450) exchange is only possible between the following circuits:

351	355	371 - 2-wire	371 - 4-wire	381
352	365	372 - 2-wire	372 - 4-wire	
353		373		
		374		
		391		

The half measurement deviation (Suppl. No. 430) is cancelled by replacement.

Setting limits

(Note smallest span in TEU 325)

	Output signal 0...5/10/20 mA, ± 10 mA 20...0 mA, 0...10 V	Output signal 4...20 mA
Measuring circuit 351, 353		
Span	1...165 mV	1...135 mV
Lower range value	– 75...150 mV	– 45...150 m V
Measuring circuit 355		
Span	0.15...+ 150 V	0.15...150 V
With test jacks	0.15...+ 60 V	0.15...60 V
		Span / Zero ≥ 2
for TEU 3.5Ex	max. 7.5 V	max. 7.5 V
Lower range value	– 100...+ 100 V	– 80...+ 100 V
Measuring circuit 365		
Span	5...125 V (rms)	5...125 V (rms)
With test jacks	0.15...+ 60 V	0.15...60 V
for TEU 3.5Ex	max. 5.5 V_{rms}	max. 5.5 V_{rms}
Lower range value	≤ 0.8 x upper range value	≤ 0.8 x upper range value
Measuring circuits 371, 372 [1])		
Span	3...250 Ω	3....250 Ω
Lower range value	30...320 Ω	80...320 Ω
Measuring circuit 373, 374 [1])		
Span	10...250 Ω	10...260 Ω
Lower range value	20...315 Ω	78...315 Ω
Measuring circuit 378		
Span	3...250 Ω	3...250 Ω
Lower range value	$R_{T1} = R_{T2}$	$R_{T1} = R_{T2}$
Measuring circuit 381		
Span 1	≥ 5 µA...< 0.34 mA	≥ 5 µA...< 0.34 mA
Lower range value 1	– 0.18...+ 0.18 mA	– 0.05...+ 0.18 mA
Span 2	≥ 0.34 mA...< 4 mA	≥ 0.34 m A...< 4 mA
Lower range value 2	– 2.2 mA...+ 2.2 mA	– 0.6 mA...+ 2.2 mA
Span 3	≥ 4 mA...≤ 100 mA	≥ 4 mA...≤ 100 mA
Lower range value 3	– 35 mA...+ 35 mA	– 10 mA...+ 35 mA
Measuring circuit 391		
Span	10...2000 Ω	10...2000 Ω
Lower range value	0...1000 Ω	0...1000 Ω
Meas. circuit 382	ΔI ≥ 200 µA	ΔI ≥ 200 µA
Measuring circuit 395		
Span	1...229 m V	0.82...184 mV
Lower range value	– 75...+ 150 mV	– 75...+ 150 mV

Measuring circuit accessories

	Thermocouple break monitor	Thermometer and wire break monitor
Permitted measuring circuit capacitance	0...200 nF	0...200 nF
Permitted measuring circuit resistance	0...700 Ω	0...600 Ω
Output signal	rising or falling	rising or falling

Signal break contact or alarm monitor

	Relay with changeover contact	NO contact	Transistor [1]) (optocoupler)
Max. switching capacity	3 W	10 W, L/R ≤ 50 ms 10 VA, cos φ ≥ 0.7	
Max. switching current	150 mA DC	0.5 A AC/DC	100 mA
Max. switching voltage	≤ 28 V DC	≤ 220 V AC/DC	18. . . 30 V DC

Min. or max. switching action is selectable (repluggable).
NO contact operation (repluggable to NC contact operation).
Switching point adjustable separately with potentiometer.
Adjustment range 0...100 % (potentiometer limit stop at 110 % max.).
Switching hysteresis 0.5 %.

Relay output or transistor output	Measured signal Lower alarm value	Upper alarm value	Signal circuit as
Normally closed circuit	1	0	Closed circuit current max. = open circuit current min.
Normally open circuit	0	0	Closed circuit current min. = open circuit current max.

1 = Contact closed (relay energized) or transistor conducting
0 = Contact open (relay deenergized) or transistor blocking

1) Use measuring circuit linear with resistance for spans < 10 Ω because non-linearity is <0.15 %

Technical data

Output

With electrical isolation

Signal range 0...20 mA, 4...20 mA
- Without test jack 0...750 Ω or 0...600 Ω and 0...50 Ω
- With test jack 0...700 Ω or 0...550 Ω and 0...50 Ω

Signal range 10...0...+ 10 mA
- Without test jack 0...750 Ω or 0...450 Ω and 0...50 Ω
- With test jack 0...650 Ω or 0...350 Ω and 0...50 Ω

Signal range 0...5 mA
- Without test jack 0...3 kΩ or 0...2.4 kΩ and 0...50 Ω
- With test jack 0...2.8 kΩ or 0...2.2 kΩ and 0...50 Ω

Signal range 0...10 mA
- Without test jack 0...1.5 kΩ or 0...1.2 kΩ and 0...50 Ω
- With test jack 0...1.4 kΩ or 0...1.1 kΩ and 0...50 Ω

Signal range 0...10 V
- Without test jack > 2 kΩ
- With test jack > 2 kΩ

Without electrical isolation

Signal range 0...20 mA, 4...20 mA
- Without test jack 0...300 Ω or 0...350 Ω and 0...50 Ω
- With test jack 0...450 Ω or 0...300 Ω and 0...50 Ω
- Output EEx ib
  - Without test jack 0...300 Ω or 0...150 Ω and 0...50 Ω

Open output permitted

Ripple content of output variable
< 0.5 % (peak-to-peak) without input interference voltage with spans > 5 mV, > 3.2 Ω, > 5 µA
< 1 % with spans < 5 mV

Ripple content of measuring circuit 365

With filter 1	With filter 2
f = 5 Hz: 0.5 %	f = 20 Hz: 0.5%
10 Hz: 0.2 %	30 Hz: 0.2%
≥ 35 Hz: 0.1%	≥ 50 Hz: 0.1%

Limitation of output current
approx. 27 mA (approx. 32 mA for TEU 3.5-Ex.C)
min. 2 mA with output 4...20 mA (Suppl. No. 480)

Power supply

(See ordering information for rated voltages)

Alternating voltage: –15%...+ 10%

Frequency: 48...62 Hz

Direct voltage: ± 25 %
With 24 V DC 18...33 V
With 24 V AC/DC 19.2...33 V

Power consumption	Alarm monitor	
Power supply	With	Without
24 V DC/ 24 V AC/DC	3.1 W	2.8 W
48/60 V DC	3.2 W	2.9 W
110/220 V DC	3.4 W	3.1 W
110/127/220 V AC	3.4 W	3.1 W
230 V AC	3.7 W	3.4 W

The power consumption of transmitters with measuring circuit 395 (strain gauge measurement) is 0.3 W higher.

Residual ripple: ≤ 20 % within the tolerance range

Required connective capacity of power supply sources
P_{rms} = 1.5 x power consumption.
Current drain non-sinusoidal.

Fuses: Provided in the power supply unit.

Construction		
19" plug-in card	**Surface mounting case**	**Field enclosure**

Environmental capabilities

H&B climate group as per H&B standard 120-005
2 Z with extended upper and lower limit temperature

Application class to DIN 40 040		
JSF	JVF	HVD
Ambient temperature		
– 10...+ 70 °C [1])	–10...+ 55 °C	– 25...+ 55 °C
Transportation and storage temperature		
–30...+ 80 °C	–30...+ 80 °C	–30...+ 80 °C
Annual average relative humidity		
< 75%	< 75%	≤ 80 %
Condensation		
None	None	Tolerated
Degree of protection to DIN 40 050		
IP 00		IP 54
Connection	Screw terminals IP 20 Tab connectors IP 00 (IP 20 with insulating sleeves)	

Mechanical capabilities

Conforming to DIN 40046, Sheets 7 and 8,

Mechanical test class to H&B standard 120-201		
2/2F	2/2F	2/2F

Case and mounting

Electrical connections		
32-pole blade connector to DIN 41 612 type D or F	Tab connectors 6.3 mm or screw terminals for 2.5 mm²	Screw terminals for 2.5 mm²
Color		
RAL 7032	RAL 7032	RAL 7032
Mounting position		
Handle at top or bottom. Front panel vertical.	Handle at top or bottom. Front panel vertical.	Cable glands downwards.

Protection class to VDE 0411 IEC 348, Non Ex version

I When built into 19" sub-rack	II Connection of a functional group is required for RF suppression. The measuring circuits are then also insulated in accordance with protection class II.	II

Protection class to VDE 0411 IEC 348, Ex version

I With grounding conductor	I With grounding conductor	–
Insulation class to VDE 0110		
C	C	C
Weight		
Approx. 0.6 kg	Approx. 1.0 kg	Approx. 2.0 kg

Test voltage in accordance with VDE 0411
Mains against input/output 3 kV. In versions with electrical signal isolation, input against output 3 kV, with test jacks 0.75 kV, with Ex.A and Ex.B 3 kV.

1) Max. + 60 °C (application class JUF) for TEU 3.5-Ex with power supply 110/127/220 V AC. See page 9 for permitted ambient temperature of equipped 19" sup-rack.

Technical data

Characteristics in equilibrium under nominal conditions

Basic form of the characteristic: Linear

Characteristic coincidence at limit point setting

Measurement deviation
< ± 0.5% [1]) referred to output span, half measurement deviation as "special feature".
< ± 1% for spans < 5 mV, < 7 Ω or < 25 µA

Non-linearity
Included in the measurement deviation.
Deviation at limit point setting:

Measuring circuit	
352.1...3:	< 0.3 %, not available with "half deviation". With start of range < 300 °C < 0.5% for type S < 1 % for type R
352.4:	Deviation depends on characteristic form
365:	< 0.2 %
378,395:	< 0.3 %
372,374:	< 0.2 % for temp. > 0 °C

All other measuring circuits: < 0.1%

Static error: < 0.1% referred to output span

Nominal conditions

Ambient temperature: 18...28 °C

Permitted temperature variation during measurement: 2 K

Power supply
Voltage: ± 2 %
Harmonic content: ≤ 5 %
Rated frequency: ± 0.5%
Free of harmonic content with DC supply.

Load
at I_A: $R_{A\ max.}$
at U_A: $R_{A\ min.}$

Warm-up time: ≥ 30 minutes

Characteristics in equilibrium under divergence from nominal conditions

Effect of ambient temperature
≤ 0.2 % / 10 K on zero (Referred to output span)
≤ 0.1%/10 K on span (Referred to output span)
Incremental error with built-in reference junction compensation: approx. 0.5 °C / 10 K
With Pt 100 IEC for spans < 50 K: 0.05 °C / 10 K

Effect of power supply
< 0.1 % / 10% voltage fluctuation
< 0.1 % at 48...62 Hz frequency fluctuation

Effect on the input

Effect of a balanced
50 Hz parasitic alternating voltage
< 0.1 % at 3 x span, increased residual ripple

unbalanced 50 Hz parasitic alternating voltage
< 0.1 % up to 250 V_{rms} max.

unbalanced parasitic direct voltage
< 0.1% up to 250 V max.

Effect of radio frequency interference (interfering radiation)
< 0.3 % [2]) at 27...460 MHz, 1 W transmitter power, 0.5 m antenna distance

Effects on the output

Effect of load
with current output: < 0.05 % in the load range
with voltage output: < 0.5 % from 2 kΩ...∞

Effect of external voltage with current output
< 0.1% at $U_{ext.} \leq 15$ V
(7.5 V with output ± 10 mA,
10 V without electrical isolation)

Effect of parasitic voltage
< 0.1 % per 250 V (with electrical isolation)

Time response (dynamic response)

Abrupt change from 10 to 90%, residual error ± 1 %, aperiodic setting

	Electrical isolation With Measuring ranges 1...5 mV	Electrical isolation With Measuring ranges > 5 mV	Electrical isolation Without Measuring ranges 1...5 mV	Electrical isolation Without Measuring ranges > 5 mV
Response time Ta:	300 ms	300 ms	300 ms	200 ms
Recovery time after break in measuring circuit:	10 s	6 s	70 s	12 s

Response time for measuring circuit 365
With filter 1: < 8 s,
with filter 2: < 0.7 s

Long-term drift: < 0.2%/year

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[1]) Incremental error with internal reference junction compensation
19" plug-in card: 0.5 K,
surface mounting case: 0.5 K,
field enclosure: 1.0 K.

[2]) In 4-wire circuit Pt 100 with span > 40 Ω
In strain gauge measurement with span > 20 mV

Technical data

Explosion protection

Manufacturer's identification no.: 49/11-38Ex

Certificate of conformity: PTB-No. Ex-84/2123X

	Type key With chopper amplifier from 1 mV	Type key With differential amplifier from 20 mV
Without explosion protection:	TEU 315	TEU 325
Input EEx ia IIC:	TEU 315-Ex.A	TEU 325-Ex.A
Input EEx ib IIC:	TEU 315-Ex.B	TEU 325-Ex.B
Input and output EEx ib IIC:	TEU 315-Ex.C	TEU 325-Ex.C

Mounting outside the hazardous area.

Ambient temperature up to + 70 °C

Control loop up to 220 V and 1 A

Input circuit with type of protection intrinsic safety
EEx ia II C or EEx ib II C

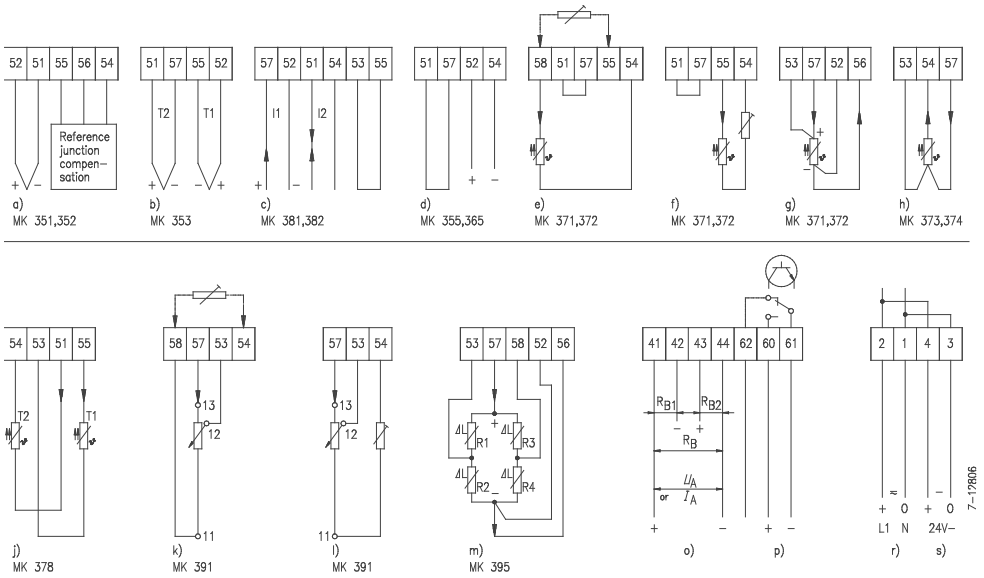
Transmitter maximum values	Measuring circuit 371, 372 373, 374 378, 391	 395	 351, 352 353, 365	 355, 381 382
U	19.5 V	19.5 V	19.5 V	19.5 V
I	72 mA	100 mA	40 mA	30 mA
P	0.4 W	0.6 W	0.2 W	0.15 W
L_i	0	0	0	0
C_i	5 nF	4 nF	5 nF	4 nF
EEx ib				
Permitted L_a	5.5 mH	2.9 mH	See certificate of	
Permitted C_a	190 nF	191 nF	conformity	
EEx ia				
Permitted L_a	1 mH	1 mH	See certificate of	
Permitted C_a	82 nF	66 nF	conformity	

Output circuit with type of protection intrinsic safety EEx ib II C
for connecting passive intrinsically safe circuits.
This current circuit has electronic limitation.

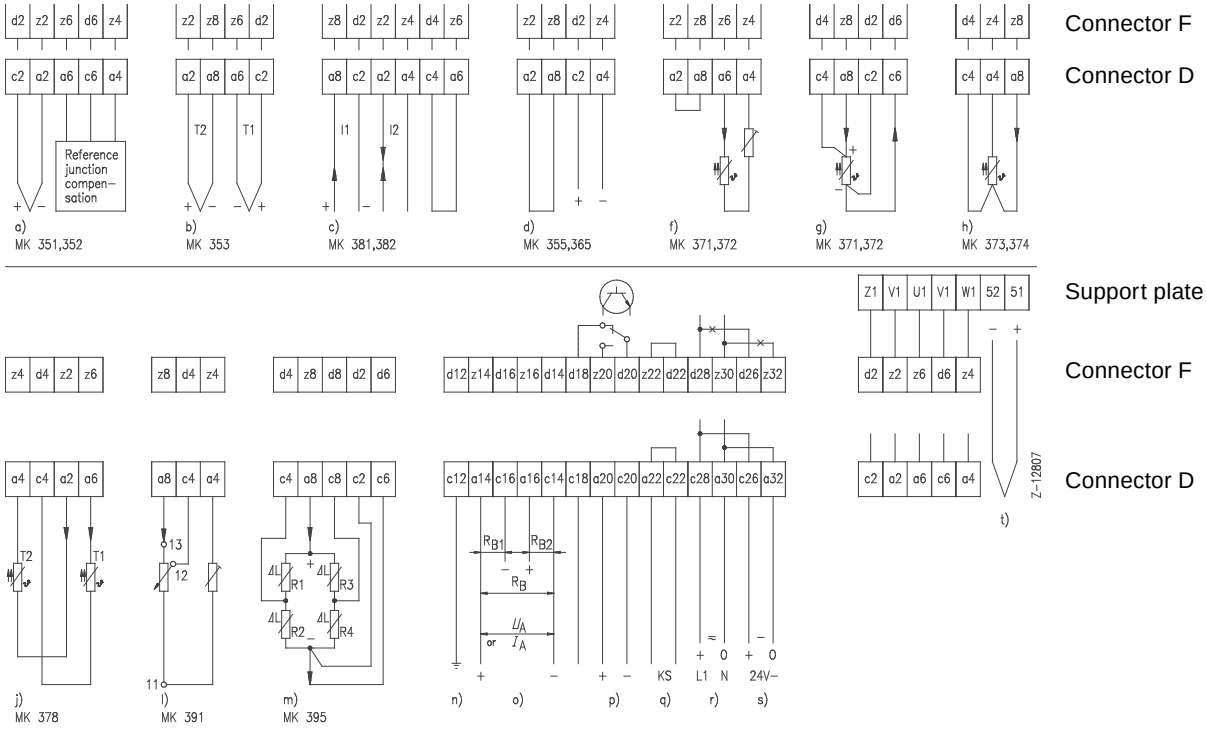
Maximum transmitter values	
U	10 V
I	50 mA
P	0.5 W
L_i	0
C_i	0
Permitted L_a	2 mH
Permitted C_a	350 nF

Connection diagram for TEU 315, TEU 325, TEU 315-Ex, TEU 325-Ex

IP 54 enclosure



19" plug-in card module and IP 20 surface-mounting case



MK = Measuring circuit

a) Thermoelectric voltage and mV measurement with and without reference junction compensation

b) Temperature differential measurement with 2 thermocouples

c) µA, mA measurement with I_1, sum or difference current measurement with $I_1 \pm I_2$

d) Voltage measurement with built-in voltage divider (U ≥ 150 mV), rotational speed or alternating voltage measurement

e) Temperature measurement with resistance thermometer Pt 100, two-wire circuit, internal lead resistance balancing

f) Temperature measurement with resistance thermometer Pt 100, two-wire circuit, lead resistance balancing external or with zero potentiometer

g) Temperature measurement with resistance thermometer Pt 100, four-wire circuit

h) Temperature measurement with resistance thermometer Pt 100, three-wire circuit

j) Resistance differential measurement, lead resistance balancing with zero potentiometer (T1 < T2)

k) Resistance teletransmitter measurement, internal lead resistance balancing (11 = teletransmitter start, 12 = pick-up, 13 = teletransmitter end)

l) Resistance teletransmitter measurement, lead resistance balancing external or with zero potentiometer (11= teletransmitter start, 12 = pick-up, 13 = tele trans-mitter end)

m) Strain gauge measurement

n) Only required for Ex version

o) Output signal current or voltage $R_{B1} > R_{B2}$ (R_{B2} = output at the interlock diode) Reverse polarity for action characteristic

p) Measuring circuit break signal contact or alarm monitor

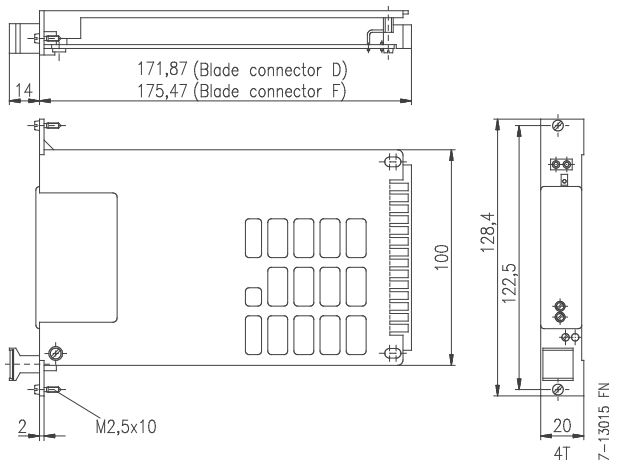
q) Control loop (only for 19" plug-in card)

r) Power supply AC/DC, all voltages except 24 V DC (x = interruption in case of power supply > 24 V)

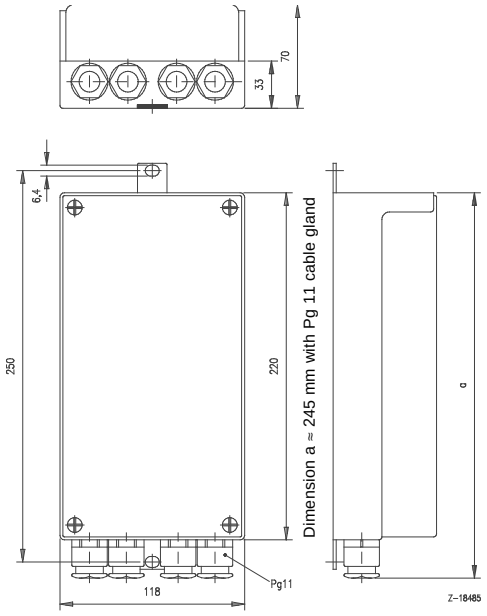
s) 24 V DC power supply

t) Internal reference junction compensation connected to terminal board on 19"sub-rack (see Suppl. No. 441)
With spring contact strip cover and built-in reference junction compensation, note the connection diagram on the reference junction module

Dimensional drawings for TEU 315, TEU 325, TEU 315-Ex, TEU 325-Ex (dimensions imm)



19" plug-in card module



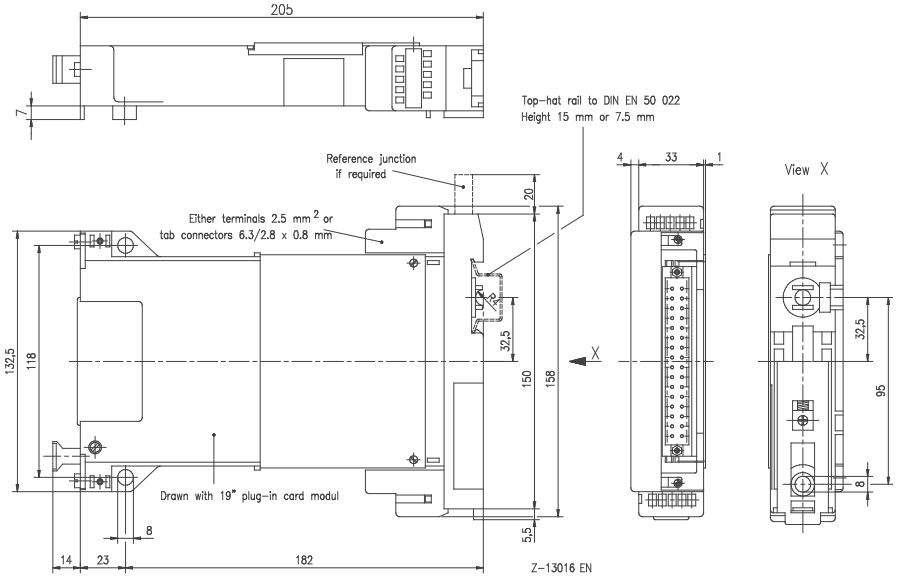
IP 54 field enclosure

Mounting information

Ambient temperature of equipped 19" sub-rack
(for installation in cabinets, see Data Sheet 92-9.39 EN for permitted number of transmitters or sub-racks per cabinet)

Explosion protection	Power supply	19" sub-rack equipped with TEU 3.5 4 E spacing	5 E spacing
Yes	110 V AC, 127 V AC, 220 V AC	≤ 40 °C	≤ 50 °C
Yes	24 V AC/DC, 24 V DC	≤ 50 °C	≤ 60 °C
No	110 V AC, 127 V AC, 220 V AC, 240 V AC, 110 V DC, 220 V DC	≤ 50 °C	≤ 60 °C
No	24 V AC/DC, 24 V DC, 48 V DC, 60 V DC	≤ 55 °C	≤ 65 °C

Insert a cover plate 1E wide between the units if 5 E spacing is used



IP 20 surface mounting case

Position of terminals in IP 20 surface mounting case

Version	Connector assembly Top	Bottom	Spring contact strip Type
TEU 3.5	a 2, 4, 6, 8	a 14, 16, 20, 30, 32	D
	c 2, 4, 6, 8	c 14, 16, 18, 20, 26, 28	D
TEU 3.5-Ex.A	z 2, 4, 6, 8	z 14, 16, 20, 30, 32	F
TEU 3.5-Ex.B	d 2, 4, 6, 8	d 12, 14, 16, 18, 20, 26, 28	F
TEU 3.5-Ex.C	z 2, 4, 6, 8, 14	z 30, 32	F
	d 2, 4, 6, 8, 14	d 12, 26, 28	F

Ordering information

Transmitter TEU 315	**Catalog-No.**	**1**	**1**	**3**	**3**	**5**	
Transmitter TEU 325	**Catalog-No.**	**1**	**1**	**3**	**4**	**5**	
Transmitter TEU 315-Ex	**Catalog-No.**	**1**	**1**	**3**	**3**	**6**	
Transmitter TEU 325-Ex	**Catalog-No.**	**1**	**1**	**3**	**4**	**6**	

Construction

19" plug-in card with blade connector type D [1]			**1**
19" plug-in card with blade connector type F [1]			**3**
IP 20 surface mounting case with 19" plug-in card	Tab connectors		**5**
	Screw terminals		**6**
IP 54 field enclosure with circuit board		**5**	**7**

Explosion protection

Without explosion protection	Without electrical isolation	**5**	**1**
Without explosion protection	With electrical isolation	**5**	**2**
Input and output EEx ib	Without electrical isolation (Ex.C)	**6**	**1**
Input EEx ib	with electrical isolation (Ex.B)	**6**	**2**
Input EEx ia	with electrical isolation (Ex.A)	**6**	**4**

Output signal

0...20 mA		**1**
4...20 mA		**2**
–10...0...+10 mA	only with electrical isolation	**5**
0...10 V	only with electrical isolation	**6**
Other output signals (see Suppl. No. 420...425)		**0**

Power supply

220 V AC			**1**
127 V AC			**2**
110 V AC			**3**
24 V AC/DC	(19,2...33 V DC)		**4**
24 V DC	(18...33 V DC)		**5**
Other power supply (see Suppl.No.415...419)		**5**	**0**

Measuring circuit accessory

Without			**0**
Thermocouple break monitor	rising		**1**
	falling		**2**
Two/three-wire thermometer and wire break monitor	rising		**3**
	falling		**4**
Four-wire impedance converter			**7**
Four-wire impedance converter with thermometer and wire break monitor	rising		**8**
	falling		**9**

Measuring circuit

351	linear with voltages [5]		**1**	**0**
352.1	for type J, L[5]) linear with temperature		**0**	**4**
352.2	for type K, U, type E.T lower range value > –50 °C [5]) linear with temperature.		**0**	**5**
352.3	for type R, S, type B lower range value > 800 °C [5]) linear with temperature		**0**	**6**
352.4	Sensor on requests [5]) linear with temperature		**0**	**7**
353	mV difference		**3**	**0**
355	voltage measurement from 150 mV	**0**	**4**	**0**
371.1[2])	linear with resistance (Two-/four-wire)		**5**	**0**
372.1[2])	linear with temperature Pt 100 IEC(Two-/four-wire)		**6**	**0**
373.1	linear with resistance (Three-wire)		**7**	**0**
374.1	linear with temperature Pt 100 IEC (Three-wire)		**8**	**0**
378 [3])	temperature difference (Suppl.No. 442)		**9**	**0**
381	current measurement	**0**	**0**	**1**
382	sum or difference current	**0**	**0**	**2**
391	resistance teletransmitter (Suppl. No. 442-444)	**0**	**0**	**3**
365	alternating voltage (see Suppl. No. 445, 446)	**0**	**0**	**8**
395[4])	strain gauge measurement (electrical isolation required)	**3**	**0**	**9**
Without range unit			**0**	**0**

Catalog No. **1 1 3** ☐☐ **- 0 -** ☐☐☐☐☐☐☐

[1]) See Data Sheet 92-9.35 EN for 19" sub-rack.

[2]) In four-wire circuit the four-wire impedance converter accessory is required (7, 8 or 9).
In case of two-wire circuit, a lead balancing is required (Suppl. No. 442-444) or accessories/retrofit parts

[3]) Two/three wire break monitor acts for both thermometers.

[4]) Only output signal 0. . . 20 m A or 4. . . 20 m A.

[5]) For internal reference junction, see Suppl. No. 440-441 or accessories/retrofit parts.

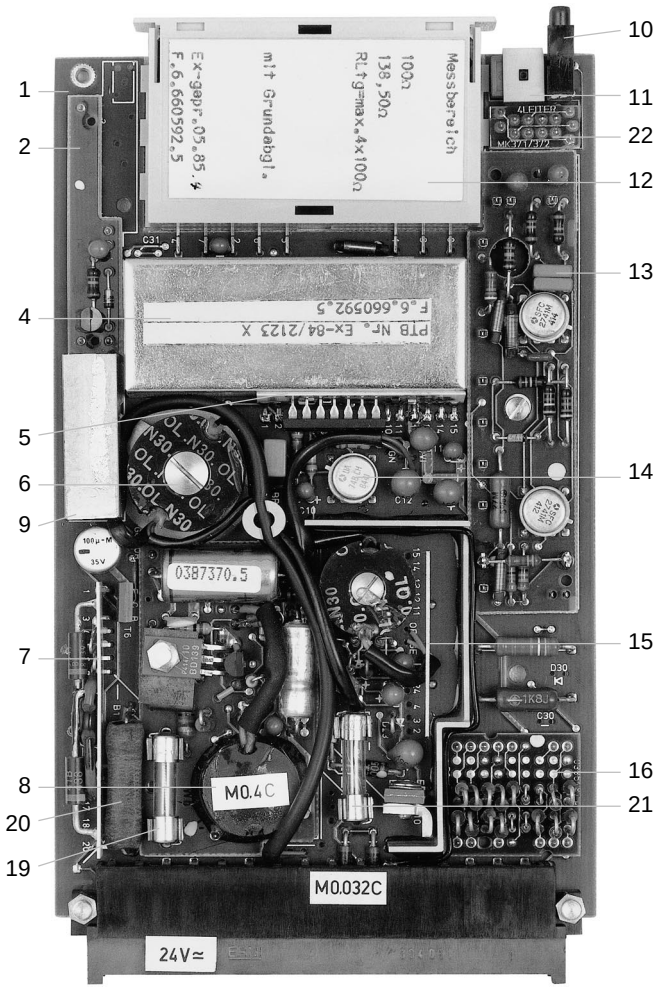
Ordering information

Transmitter TEU 315, TEU, 315-Ex, TEU 325, TEU 325-Ex	Suppl. No.
Additional required ordering information, Measuring ranges	
Measuring ranges (as per Data Sheet 11-1.01 EN)	300 (...)
Special measuring range For temperature measurement state the material of the sensor and if applicable the reference junction temperature. For differential temperature measurement quote the validity range and balance point. In the case of measuring circuit 382, state whether sum or difference measurement and rank.	302...305 ☐
For measuring circuits 371.1,372.1,373.1,374.1	
Measuring range can be modified subsequently	311
Measuring range cannot be modified subsequently	312
External reference junction ...°C (to Data Sheet 1.01EN)	309
Additional optional ordering information	
Binary output (not for TEU 3.5-Ex.C)	
Measuring circuit break signal contact with NO contact (Break monitor accessory required)	401
Measuring circuit break signal contact with changeover contact [1] (Break monitor accessory required)	402
or Alarm monitor (A = normally open circuit, R = normally closed circuit)	
1 Relay output With changeover contact [1] $A_{min.} = R_{max.}$	403
With changeover contact [1] $A_{max.} = R_{min.}$	404
With NO contact $A_{min} = R_{max.}$	405
With NO contact $A_{max.} = R_{min.}$	406
1 Transistor output $A_{min.} = R_{max.}$	407
$A_{max.} = R_{min.}$	408
Power supply 230 V AC (only for units without explosion protection)	415
48 V DC (only for units without explosion protection)	416
60 V DC (only for units without explosion protection)	417
110 V DC (only for units without explosion protection)	418
220 V DC (only for units without explosion protection)	419
Output signal 20...0 mA (falling charcteristic) only with electrical isolation	420
20...4 mA (falling characteristic) only with electrical isolation	421
0...5 mA (only with electrical isolation)	424
0...10 mA (only with electrical isolation)	425
Adjusted to half measurement deviation [2]	430
Response time approx. 30 ms (measuring range > 5 mV)	435
Input with surge protection (not for measuring circuit MK 355, 365; not for TEU 3.5-Ex) [3]	436
Internal reference junction compensation to 20 °C	
for type IP 20 and IP 54	440
for 19" plug-in card with IP 00 connector plate	441
IP 20 spring terminal strip cover with bult-in reference junction compensation, see Data Sheet 11-9.51EN	
Lead balancing with zero potentiometer (lead resistance adjusted to 0 Ω, range unit without basic balancing)	442
10 Ω built-in lead balancing resistance (only for IP 54)	443
External lead balancing (lead resistance adjusted to 10 Ω)	447
Only for measuring circuit 365:	
Filter 1, response time 8.0s (f = 5...1000 Hz)	445
Filter 2, response time 0.7s (f = 20...1000 Hz)	446
Test jacks for input (see range unit section, page 4, not for TEU 3.5-Ex.A)	450
Test jacks for output (not with Suppl.No.403-408, not for TEU 3.5-Ex.C)	451
Output current limitation ≥ 2 mA with output 4...20 mA (only with electrical isolation, not for measuring circuit 395)	480
Additional inscriptions	481...483 ☐
Rating plate and inscription in English	485
Approval No. Ex-85/122X by TÜV Vienna	490
TÜV approval as per DIN 3440, register no.TR 919915	493
Operating Manual (state total quantity required) [4]	
German (no specification required for 1 off)	Z 2 D (...pcs)
English (always quote Suppl. No)	Z 2 E (...pcs)
French (always quote Suppl. No)	Z 2 F (...pcs)
Spanish (always quote Suppl. No.)	Z 2 S (...pcs)

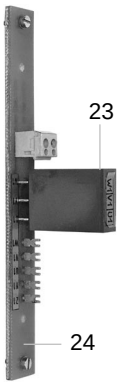
[1]) Not for TEU 3.5 Ex.A
[2]) Except measuring circuit 352, Suppl. No. 442, internal reference junction
[3]) Relay contacts are not surge protected
[4]) 1 off at no extra charge

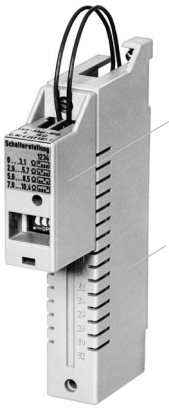
Accessories, Retrofitting Parts

19" plug-in card design

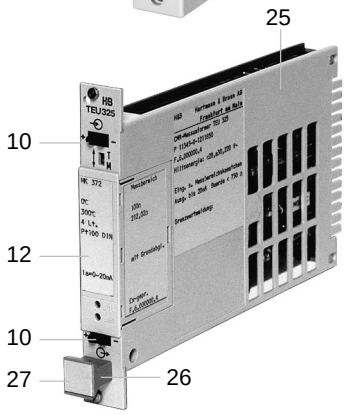


Reference junction 20 °C for 19" subrack

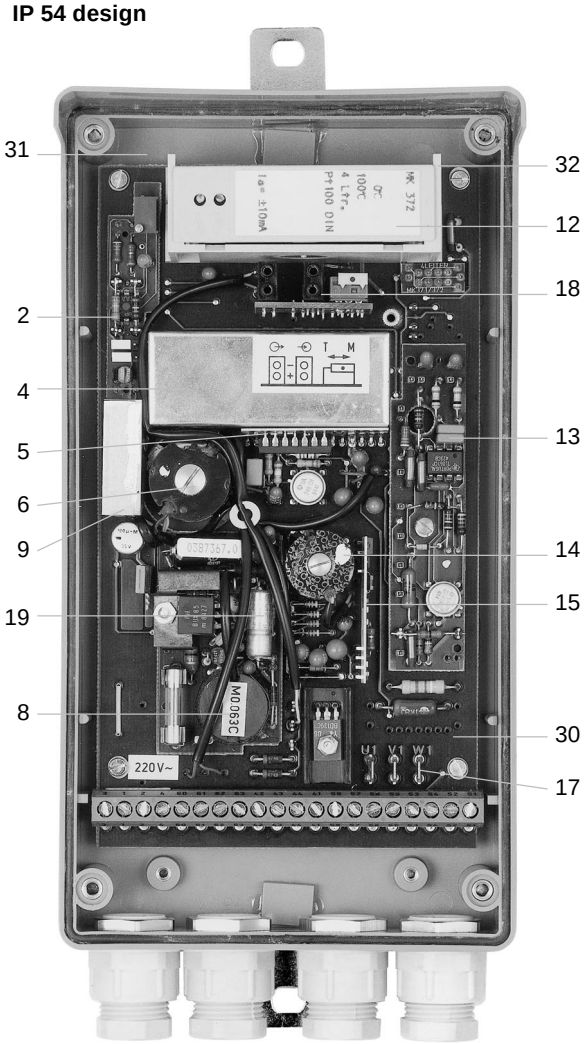




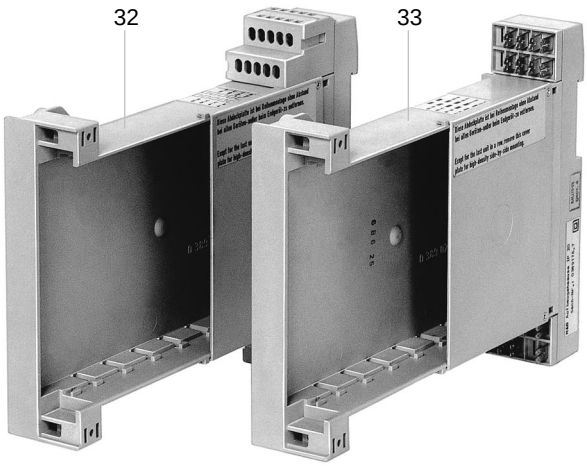
Covering flaps for spring-contact strip
Degree of protection IP 20 with line balancing or reference junction 20 °C



IP 54 design



Surface-mounting case design IP 20



Ordering information

Accessories, Retrofitting Parts			Fig. No.	Weight g	Catalog No.
Plug-in components and accessories (common components)					
Measuring range unit with measuring range adjustment					
Measuring circuit	351	(linear with voltage)	12	25	11390-4-0340529
	352.1	for type J, L) Linear with Temperature	12	30	11390-4-0340540
	352.2	(or type K, U) Linear with Temperature	12	30	11390-4-0340541
	352.3	(for type S, R, Linear with Temperature for type B, lower range value > 800 °C)	12	30	11390-4-0340542
	352.4	(Sensors on request)	12	30	11390-4-0340543
	353	(mV difference)	12	25	11390-4-0340544
	355	(voltage measurement from 150 mV)	12	25	11390-4-0340545
	365	(alternating voltage) [3]	12	25	11390-4-0340546
	371	(linear with resistance)	12	30	11390-4-0340547
	372	(linear with temperature Pt 100 IEC)	12	35	11390-4-0340548
	373	(linear with resistance)	12	25	11390-4-0340549
	374	(linear with temperature Pt 100 IEC)	12	35	11390-4-0340550
	378	(temperature difference)	12	25	11390-4-0340551
	381	(current measurement)	12	25	11390-4-0340552
	382	(current as sum or difference)	12	30	11390-4-0340553
	391	(teletransmitter)	12	25	11390-4-0340554
	395	(strain gauge measurement only for TEU 315)	12	30	11390-4-0340555
					Suppl. No.
Measuring range acc. to Data Sheet 11-1.00 EN					300 (...)
Special measuring range (Specify the material of the sensor and the reference junction temperature if necessary, specify the validity range and alignment point for temperature differential measurements)					302/303 ☐
Reference junction, external					305
Reference junction, internal					306
Output signal 0...20 m A [1]					315
Output signal 0...20 mA					316
Output signal 0...16 mA [2]					319
Pt 100 IEC, two-wire circuit, line resistance with zero potentiometer (0 Ω adjusted)					323
Pt 100 IEC, two-wire circuits line resistance 10 Ω					320
Pt 100 IEC, four-wire circuit					321
For measuring circuit 365:		Filter 1			445
		Filter 2			446
Measuring range unit without measuring range adjustment (without Ex testing)					
Measuring circuit	351		12	25	11390-4-0340556
	353		12	25	11390-4-0340559
	355		12	25	11390-4-0340560
	365		12	25	11390-4-0340561
	371		12	30	11390-4-0340562
	372		12	35	11390-4-0340563
	373		12	25	11390-4-0340564
	374		12	35	11390-4-0340565
	378		12	25	11390-4-0340566
	381		12	25	11390-4-0340567
	382		12	30	11390-4-0340568
	391		12	25	11390-4-0340569
Measuring circuit option: thermocouple break monitoring and two/three-wire thermometer and wire break monitoring			13	10	11304-4-0387495
Measuring circuit option: strain gauge power supply			13	15	11304-4-0387464
Measuring circuit option: four-wire impedance transformer			13	15	11304-4-0387366
Measuring circuit option: four-wire impedance transformer with thermometer and wire break monitoring			13	20	11304-4-0387365
Test reference junction for alignment			23	12	11304-4-0377650
Reference junction 20 °C (only IP 20 and IP 54)			23	12	11304-4-0370723

[1]) Can also be used for transmitters with output signal 0... 5 mA, 0.. .10 mA, ± 10 mA, 20...0 mA, 0...10 V
[2]) Can be used for transmitters with output signal 20...4 mA (decreasing characteristic)
[3]) Specify filter (Suppl. No. 445, 446) required
[4]) See Data Sheet 92-4.40 EN for other connection techniques

Ordering information

Accessories, Upgrading Components	Fig. No.	Weight approx. g	Catalog No.	
Common Components			Series 1 and 2	
Chopper amplifier	4	40	11304-4-0387630	
Differential amplifier	4	40	11304-4-0387376	
Shielding	4	30	11304-4-0387437	
Constant voltage source 15 V	5	20	11304-4-0384221	
Transformer A 18 for electrical isolation	14	80	11304-4-0388636	
Transformer A 22 for power supply				Series 2 [1])
24 V AC/DC	6	90		11304-4-0367962
48 V / 60 V DC	6	90		11304-4-0367963
110 V / 127 V AC	6	90		11304-4-0367964
220 V AC/DC / 220 V AC	6	90		11304-4-0367965
			Series 1	
Transformer A 22 for power supply	6	90	11304-4-0387460	
Switching controller 220 V AC	8	150	11304-4-0387367	11304-4-0367061
Switching controller 110 V/127 V AC	8	150	11304-4-0387368	11304-4-0367430
Switching controller 48 V /60V DC	8	150	11304-4-0387369	11304-4-0365319 (not Ex)
Switching controller 230 V AC				11304-4-0367431
Switching controller 24 V AC/DC	8	150	11304-4-0387370	11304-4-0365202 (not Ex)
Switching controller 220 V AC	8	150	11304-4-0387400	11304-4-0367061
Switching controller 110 V DC	8	150	11304-4-0388470	11304-4-0367430
Switching controller 24 V DC	8	150	11304-4-0388720	11304-4-0365202 (not Ex)
Switching controller 24 V AC/DC-Ex	8	150		11304-4-0365203 (Ex)
			Series 1 and 2	
Output stage 10 mA	15	30	11304-4-0384218	
Output stage 5 mA	15	30	11304-4-0384217	
Output stage 20 mA	15	30	11304-4-0384216	
Output stage ± 10 mA	15	30	11304-4-0384212	
Output stage, decreasing characteristic	15	30	11304-4-0384214	
Output stage 0...10 V	15	30	11304-4-0384215	
Break-signal contact with NO contact	2	30	11304-4-0387403	
Break-signal contact with changeover contact	2	30	11304-4-0387404	
Relay with NO contact	9	10	94682-4-0805951	
Relay with changeover contact	9	10	94682-4-0805950	
Test jack module meas.circuit 351, 352, 353	22	5	11304-4-0387402	
Test jack module meas.circuit 355, 365	22	5	11304-4-0387406	
Test jack module meas.circuit 371, 372 (2-wire)	22	5	11304-4-0387407	
meas.circuit 373, 374, 391	22	5	11304-4-0387407	
Test jack module meas.circuit 371, 372 (4-wire)	22	5	11304-4-0387408	
Test jack module meas.circuit 381	22	5	11304-4-0387409	
2-pole test jack	10	5	94682-4-0862420	
Measure/test selector switch	11	5	94682-4-0804634	
Fuse				
1M 0.4C for power supply 24 V DC, 24 V AC/DC	19	1	94382-4-0882500	
1M 0.16C for power supply 48/60/24 V DC	19	1	94382-4-0881475	
1M 0.125C for power supply 110 V DC, 110/127 V AC	19	1	94682-4-0864873	
1M 0.063C for power supply 220 V DC / 220/230 V DC	19	1	94382-4-0882497	
Cap for measuring range unit	12	10	11304-4-0387428	
Connector for test jack		5	70904-4-0340517	
Connector covering, red		1	70905-4-0458828	
Connector covering, black		1	70905-4-0458829	
Design IP 54			Series 1	Series 2 [1])
Motherboard with electrical isolation	30	120	11304-4-0387493	11304-4-0367896
Motherboard without electrical isolation	30	110	11304-4-0387494	11304-4-0367897
			Series 1 and 2	
Surge voltage protection		10	11304-4-0387481	
Line balancing resistor, plug-in	18	15	11304-4-0340734	
Test jacks for output and input with measure/test selector switch	18	15	11304-4-0387497	
Case IP 54	31	520	11304-4-0835507	
Guide for measuring range unit	32	20	11304-4-0387501	
Alarm signalling unit with transistor output	2	20	11304-4-0367233	
Alarm signalling unit with NO contact	2	30	11304-4-0367231	
Alarm signalling unit with changeover contact	2	30	11304-4-0367232	

[1]) On the 19" plug-in card, series 2 is marked on the wiring track side: In IP 54 version on the component side

Ordering information

Accessories, Upgrading Components		Fig.	Weight approx. g	Catalog No.	
19" design					
Motherboard without electrical isolation				Series 1	Series 2 [1])
with connector D		1	110	11304-4-0387389	11304-4-0367894
with connector F		1	110	11304-4-0387390	11304-4-0367895
Motherboard with electrical isolation					
with connector D		1	110	11304-4-0387386	11304-4-0367892
with connector F		1	110	11304-4-0387387	11304-4-0367893
				Series 1 and 2	
Surge voltage protection		16	10	11304-4-0387526	
Voltage limitation input EEx ia		16	10	11304-4-0387466	
Voltage limitation input EEx ib		16	10	11304-4-0387620	
Voltage limitation power supply EEx ia		7	10	11304-4-0387621	
Voltage limitation power supply EEx ib		7	10	11304-4-0387622	
Current limitation output EEx ib			10	11304-4-0387419	
Cover with front panel					
no test jack cutouts		25	40	11304-4-0387448	
for input test jack and selector switch		25	40	11304-4-0387449	
for output test jack (Ex)		25	40	11304-4-0387450	
for output test jack		25	40	11304-4-0387451	
for input and output test jack (Ex)		25	40	11304-4-0387453	
for input and output test jack		25	40	11304-4-0387454	
for input test jack and alarm signal		25	40	11304-4-0387452	
for alarm signal		25	40	11304-4-0387837	
Handle for front panel		26	5	94671-4-0482176	
Cover plate for handle		27	1	94671-4-0455682	
Test jack for Ex		10	5	94682-4-0864499	
Fuse 2 M 0.16 with rubber covering for Ex version		20	1	11304-4-0387652	
Fuse 3 M 0.032 C with Ex input		21	1	94382-4-0881525	
Ex coding comb for connector D			10	11304-4-0388120	
Ex coding pin for connector F			2	94172-4-0458650	
Alarm signalling unit with transistor output		2	20	11304-4-0387399	
Alarm signalling unit with NO contact		2	30	11304-4-0387397	
Alarm signalling unit with changeover contact		2	30	11304-4-0387398	
Reference junction 20 °C					
and terminal board for 19" subrack		24	25	11304-4-0388477	
Cover caps for spring-contact strips					
Degree of protection IP 20	Set of 1	28	40	11391-4-0365276	
	Set of 5	28	200	11391-4-0365277	
Line balancing resistor					
Connection	Solder	29	20	11391-4-0365487	
	Wire-wrap	29	20	11391-4-0365589	
	Maxi-Termi-Point	29	20	11391-4-0365588	
Reference junction					
Connection	Solder	29	20	11391-4-0365521	
	Wire-wrap	29	20	11391-4-0365543	
	Maxi-Termi-Point	29	20	11391-4-0365542	

[1]) On the 19" plug-in card, series 2 is marked on the wiring track side

Ordering information

Accessories, Upgrading Components

Surface-mounting case IP 20 (for TEU 315/325, Weight approx. 350 g)

Version	Connection	Connector	Fig. No.	Power supply	Catalog No.
TEU 315/325	Tab connectors	D	33	24 V DC, 24 V AC/DC	
				110 VAC, 127 V AC, 220 V AC	11304-4-0389176
	Terminals	D	32	24 V DC, 24 V AC/DC	
				110V AC, 127 V AC, 220 V AC	11304-4-0389175
TEU 315/325-Ex-A	Tab connectors	F	33	24 V DC	11304-4-0340158
				24 V AC/DC	11304-4-0340157
				110 V AC	11304-4-0340156
				127 V AC	11304-4-0340155
				220 V AC	11304-4-0340154
	Terminals	F	32	24 V DC	11304-4-0340170
				24 V AC/DC	11304-4-0340169
				110 V AC	11304-4-0340168
				127 V AC	11304-4-0340167
				220 V AC	11304-4-0340166
TEU 315/325-Ex-B	Tab connectors	F	33	24 V DC	11304-4-0340152
				24 V AC/DC	11304-4-0340151
				110 V AC	11304-4-0340150
				127 V AC	11304-4-0340149
				220 V AC	11304-4-0340148
	Terminals	F	32	24 V DC	11304-4-0340164
				24 V AC/DC	11304-4-0340163
				110 V AC	11304-4-0340162
				127 V AC	11304-4-0340161
				220 V AC	11304-4-0340160
TEU 315/325-Ex-C	Tac connectors	F	33	24 V DC	11304-4-0340196
				24 V AC/DC	11304-4-0340197
				110 V AC	11304-4-0340198
				127 V AC	11304-4-0340199
				220 V AC	11304-4-0340200
	Terminals	F	32	24 V DC	11304-4-0340190
				24 V AC/DC	11304-4-0340291
				110 V AC	11304-4-0340192
				127 V AC	11304-4-0340193
				220 V AC	11304-4-0340194

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