PROFILE

The UNIFLEX CI/CB transmitters provide solutions for measurement and monitoring in process control and other industrial applications. Temperature, voltage, current, and resistive signals can be connected without the need for any hardware changes. In addition, the transmitters feature an integrator function, e.g. for analogue/pulse conversion, sample-and-hold tasks, and also differentiation of the input signal are possible.

The transmitters meet the market requirements regarding reliable EMC protection, flexibility and reduced stock keeping. The version with built-in display allows configuration and parameter setting via the front panel keys. With a PC and connecting adapter, both the indicating version (CI) as the “blind” version (CB) can be configured and adjusted remotely. This allows documentation of the adjusted parameters, as also reading of the input signal and parameters during operation.

DESCRIPTION

The transmitter has independent signal inputs for thermocouples, resistive temperature sensors, resistance transducers, DC-voltage and DC-current. For thermocouple measurement, the cold-junction compensation is provided with a built-in sensor. Resistance thermometers can be connected in 3- or 4- wire configuration. Signals (thermocouples included) can be linearized with up to 8 segments.

The version with extended computing facilities provides additional functions:

– Integration
– Sample-and hold and
– Differentiation.

The functions are triggered via a control input which replaces the resistive input.

INPUT CIRCUIT MONITOR

Resistance thermometer, thermocouples, resistance transducers are always monitored for break.

Signalling options

– Red LED in front (lights up on alarm)
– Via switching output (selection of energized or de-energized or not operational)
– Via the output signal (selectable for upscale or downside).

SENSOR SIGNAL CORRECTION

Sensor signal correction is used to match sensor and transmitter for tolerance-compensated readings.

Fig. 1 Sensor signal correction

Two different corrective methods are available

– Correction with lower and upper input signal within the selected span or
– Setting of values from the calibration table (scaling).

Subsequent corrections during operation are possible with both versions, by means of the front panel key[s]. The curve can be adjusted for offset and for gain.
LIMIT SIGNALLING
- Min. and max. alarm (adjusted in engineering units, together with computing function in %). Adjustable between -10 and 110 % referred to the output signal span.

Hysterisis
- programmable in engineering units or in % in the range from 0,0... 99,9 referred to the output signal span.

Signal suppression (response delay)
- programmable from 0... 999 s. All alarms shorter than the selected delay are ignored.

Signalling
- red LED in front panel (lights up on alarm)
- switching output (selection of energized or de-energized or no operation)

FILTER
Via built-in mathematical filter. It is adjustable for time constant and bandwidth.

Fig. 2 Filter function

The bandwidth is the tolerance above and below the process value, in which the filter is active. Changes of the process value larger than the adjusted bandwidth are not filtered and will be transferred directly to the output.

INTEGRATOR
Thermocouple as DC signals can be integrated with variable time constants.

DIFFERENTIATOR
Supplies the differential quotient of the input signal during a timed period. Application include the provision of a tendency or trend signal for feed-forward control, signaling of sudden changes in the process, etc.

SAMPLE-AND-HOLD AMPLIFIER
The sample-and-hold amplifier stores input signals which are only present for a short time. Typical applications are: storage of discontinuous set-values, and storage of signals in the case of a fault in the signal source.

Fig. 3 Dimensions (in mm)

TECHNICAL DATA

INPUT (configurable)
Resolution: approx. 20 000 steps referred to full span.
Measuring cycle: 200 ms

THERMOCOUPLES
Measurement limits (TC group 1)

<table>
<thead>
<tr>
<th>Type</th>
<th>Start [°C]</th>
<th>End [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>-100</td>
<td>1000</td>
</tr>
<tr>
<td>J</td>
<td>-100</td>
<td>1200</td>
</tr>
<tr>
<td>L</td>
<td>-100</td>
<td>900</td>
</tr>
<tr>
<td>K</td>
<td>-100</td>
<td>1370</td>
</tr>
<tr>
<td>N</td>
<td>-100</td>
<td>1300</td>
</tr>
<tr>
<td>T</td>
<td>-100</td>
<td>400</td>
</tr>
<tr>
<td>W(C)</td>
<td>0</td>
<td>2315</td>
</tr>
</tbody>
</table>

Smallest span 4(2) mV

Measurement limits (TC group 2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Start [°C]</th>
<th>End [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>0</td>
<td>1780</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>1780</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>1920</td>
</tr>
</tbody>
</table>

Smallest span 2 mV

Input resistance: 1MΩ

Linearization
built-in (temperature linear) with optimized positioning of supporting points for reduced error.

Conformity error
for TC-group 1: ≤ 0,2 K
for TC-Group 2: ≤ 0,5 K

Input circuit monitor
for break and reversed polarity

Cold-junction-compensation
internal or external (0...60 °C) selectable

Display error: ≤ 3 K ± 1 d

RESISTANCE THERMOMETER
PT100 DIN IEC

Type | Start [°C] | End [°C] | Min | Sensor current |
-----|------------|----------|-----|---------------|
E    | -200       | +650     | 50 (25) K | < 0.4 mA |
J    | -200       | +650     | 50 (25) K | < 0.4 mA |
L    | -200       | +650     | 50 (25) K | < 0.4 mA |
K    | -200       | +650     | 50 (25) K | < 0.4 mA |
N    | -200       | +650     | 50 (25) K | < 0.4 mA |
T    | -200       | +650     | 50 (25) K | < 0.4 mA |
W(C) | 0          | 2315     |      |              |

Smallest span 2 mV

Input resistance: 1MΩ

Linearization
built-in with optimized positioning of supporting points for smallest error

Conformity error: ≤ 0,1 K

Input circuit monitor: for break

Display error: ≤ 1 K ± 1 d

RESISTANCE & POTENTIOMETRIC TRANSDUCER

Range | Start [°C] | End [°C] | Min | Measuring current |
------|------------|----------|-----|-------------------|
1     | 0          | 400      | 20 (10) | ca. 0.4 mA |
2     | 0          | 1500     | 50    | ca. 0.1 mA   |

Values given in Ω

Connection
Transducer: 3-wire connection, current through resistor
Resistance: 3 or 4-wire connection
Lead resistance: ≤ 30Ω per lead
Input resistance: 1MΩ
Input circuit monitor: for break

1) Figure in brackets with approx. twice the effect
**DIRECT VOLTAGE mV signals**

<table>
<thead>
<tr>
<th>Range</th>
<th>Start</th>
<th>End</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-3</td>
<td>23</td>
<td>2.5</td>
</tr>
<tr>
<td>2</td>
<td>-11</td>
<td>69</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>160</td>
<td>15</td>
</tr>
</tbody>
</table>

**Input resistance:** 1 MΩ

**V signals via internal voltage**

<table>
<thead>
<tr>
<th>Range</th>
<th>Start</th>
<th>End</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.6</td>
<td>4.4</td>
<td>400 mV</td>
</tr>
<tr>
<td>2</td>
<td>-2</td>
<td>13</td>
<td>1000 mV</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>30</td>
<td>2000 mV</td>
</tr>
</tbody>
</table>

**Input resistance:** approx. 100 kΩ

**DIRECT CURRENT mA**

**Input resistance:** approx. 18 Ω

**ADDITIONAL LINEARIZATION**

Possible for all input signals -except potentiometric transducers- with 8 segments respect. 9 supporting points.

**CONTROL INPUT**

designed for external potential-free contact and small currents. Min. duration of control signal: ≥100 ms

**PERMISSIBLE INTERFERENCE at input**

(to DIN IEC 770 6.2.4)

Common mode suppression: negligible

Series mode: no effect up to 450 mVrms for TC (type S)

1 Vrms for mV (0...50 mV)

750 mVrms for Pt100 (0...100 °C)

10Vrms for DC 0...4V / 0...5 mA

**OUTPUT**

The required adjusted output signal is activated via software. The current and voltage output signals are always available in parallel.

**Synchronism error:** ≤ 0.5 %

**STANDARD CURRENT SIGNAL**

0...20 mA or 4...20 mA

Output sense: direct or inverse

**Controlled range:** -0.3...23 mA

**Load:** 0...700 Ω

**Load effect:** ≤ 0.1 % / 100 Ω

**STANDARD VOLTAGE SIGNAL**

0...10 V parallel to current signal

Output sense: direct or inverse

**Controlled range:** -0.15...11.5 V

**Load:** ≥ 2 kΩ (not continuous short-circuit proof)

**Load effect:** negligible with ≥ 2 kΩ

**Resolution:** 13 bit (9000 steps)

**CHARACTERISTIC**

**linear**

**Conformity error**

Incl. factory calibration error ≤ 0.06 % of fsd

**Factory calibration**

at 23 °C; RT ± 1 K, TC ± 2 K

**Hysteresis:** ≤ 0.02 % fsd

**Reproducibility:** ≤ 0.01 %

**Input circuit monitor**

Output action selectable upscale or downscale.

**DYNAMIC RESPONSE**

For a step change from 10 to 90 % of input signal

Output follows input: approx. 630 ms

**Setting time** after external “Hold” signal: 100 ms + max. 600 ms

**SWITCHING OUTPUT**

One relay with potential-free change-over contact.

**Contact rating:** max. 250 VAC, 1 A min.

10 V, 0.1 A; Energized or de-energized operation configurable.

**Operating mode:** selectable for input circuit monitor and/or limit signalling.

**DISPLAY**

- **Version with indicator** (UNIFLEX CI) 4-digit LCD, 7 mm high, range of display -200...99.9...0...9999.

- Green LED: ready for operation

- Red LED: input circuit monitor or limit signaler activated.

- **Version without indicator** (UNIFLEX CB)

- Green LED: ready for operation

- Red LED: input circuit monitor or limit signaler activated.

- Blinking mode LED’s for sensor signal correction mode.

**Fig. 4 Electrical connections**

1) Nicht mit allen Versionen möglich

1) Not possible with all versions

1) Figure in brackets with approx. twice the effect
**OPERATION**

**Version with indicator**
Configuration, Parameter setting and input signal correction are menu-guided via three front-panel keys.

**Version without indicator**
Input signal correction is done by means of a single front key and a digital voltmeter for the output signal.

**PC-based operation**
For both versions, additional software is available (Engineering tool based on Windows) for configuration, parameter setting, and input signal correction.

**SERIAL INTERFACE**
RS 232C with active adapter

**COMPUTING FUNCTIONS**

**FUNCTIONS without CONTROL**

- Input signal correction
- 1st-order filter with adjustable operating range (bandwidth)
- Linearization with 8 segments
- \(\sqrt{x}\), where \(\sqrt{x} = 0\)
- \(x^2\)

**FUNCTIONS with CONTROL**

- Input signal correction
- 1st-order filter with adjustable operating range (bandwidth)
- Linearization with 8 segments
- \(\sqrt{x}\), where \(\sqrt{x} = 0\)
- \(x^2\)

- **Integrator** with adjustable time constant (t=0, 1...999, 9 min.) and adjustable input offset (P1).
  The control input resets integrator to zero.

  Formula: \(y(t) = y(t) + \frac{1}{t} \cdot \left( x(t) + P1 \right) \)

  - **Differentiator** with adjustable time constant (t=0, 1...999, 9 min.) and adjustable gain (P1).
  The control input resets differentiator to zero.

  Formula: \(y(t) = \frac{1}{t} \cdot \left( x(t) + P1 \right) \)

  - **Sample-and-hold**
  Activated control input holds output signal according to process value.

**POWER SUPPLY**

**AC(DC) SUPPLY**
85...264 VAC\(^1\), 50 or 60 Hz

**Power consumption:** approx. 5.3 VA

**UNIVERSAL SUPPLY**
18...50 VDC / 18...40 VAC

**Consumption:** approx. 1.9 W/2.9 VA

**POWER SUPPLY EFFECT**
negligible within specified limits.

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\(^1\) also suitable for DC
\(^2\) In field housing max. + 54 °C
ENVIRONMENTAL CONDITIONS

TEMPERATURE LIMITS

For specified accuracy: 0...55 °C
For operation: -10 ... + 60 °C
Storage: -20 ... + 70 °C

TEMPERATURE EFFECT (within -10...+ 60 °C)

On span start
R - input: ≤ 0,03 % / 10K
TC/U/I - input: ≤ 0,04 % / 10K

On span
R - input: ≤ 0,05 % / 10K
TC/U/I - input: ≤ 0,05 % / 10K

EFFECT of internal cold junction compensation
≤ 0,13 K / 10 K

RELATIVE HUMIDITY
90 % rH, no condensation

SHOCK AND VIBRATIONS
DIN IEC 68-2-6/Fc and DIN 68.2.29/Eb

ELECTROMAGNETIC COMPATIBILITY
Complies with EN 50081-1 and EN 50082-2 for unlimited use within rural and industrial areas.

EXPLOSION PROTECTION
No explosion protection.

SAFETY CHARACTERISTICS
According to EN 61010-1
Excess-voltage category III
Pollution degree 2
Operating voltage range 300 V
Protective class I
CE-marking
According to European directives for "Electromagnetic compatibility" and "Electrical equipment use within specified voltage limits (safety characteristics)."

ORDERING INFORMATION

If not specified otherwise, the transmitter will be delivered with the following standard settings.

UNIFLEX CI/CB Standard version
CON1 0200; CON2 0001.
Range 0...150 °C, Pt100, 3-wire configuration. Input circuit monitoring upscale action. Switching output de-energized, set to span start and end. Hysteresis 5%, suppression 2s, filter time 0,1 s, bandwidth 5 °C.

Version with extended computing function
CON1 0540; CON2 0000
Range 0...10 V, limit alarm not active, set to span start and end. Hysteresis 5%, suppression 2 s, filter time 0,1 s, bandwidth 0,5 V.
Time constant 0,1 min.
Input offset/gain P1 1,0

GENERAL

HOUSING
Polycarbonate, glasfibre reinforced, self-extinguishing

DIMENSIONS
93 x 111 x 40 mm

MODE OF PROTECTION
Housing and terminals IP30

ELECTRICAL CONNECTION
screw terminals for max. 2,5 mm²

WEIGHT
0,225 kg net

MOUNTING
Wall or 35 mm rail to DIN 46277

MOUNTING POSITION
Vertical, dense mounting and temperatures ≥ 50 °C forced ventilation is recommended.

ACCESSORIES
Operating notes: D / E / F
9499-040-43801

OPTIONAL ACCESSORIES

Description | Order-no.: |
---|---|
Active adapter for connection of UNIFLEX CI/CB to a RS232 interface of a laptop or PC | 9407-998-00001 |
Engineering tool for setting of configuration and parameters, read-out and documentation, base Windows (3.11). Licence (1) | 9407-999-00881 |
Field housing for UNIFLEX transmitter. Protection IP 67, with transparent lid. Cable gland PG 13,5 | 9407-290-01001 |

Fig. 7 Field housing IP 67
**Display and function**

- without display (CB)
  - Standard transmitter: 0
  - Transmitter with integrator, differentiator, sample-and-hold: 2

- With display (CI)
  - Standard transmitter: 1
  - Transmitter with integrator, differentiator, sample-and-hold: 2

1) Not possible with resistive input

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**Configuration and supply voltage**

**Standard-configuration**
- AC supply 85...265 VAC (UC): 1
- Universal supply 18...40 VAC / 18...50 VDC: 2

**Customer specific configuration**
- AC supply 85...265 VAC (UC): 3
- Universal supply 18...40 VAC / 18...50 VDC: 4