

Technical manual BA 1109



Signal converter

WTAU – 100 / 120 / 200 / 220

Isolation amplifier Pt100 – active

for galvanic isolation, conversion and adjustment of a Pt100 temperature signal

Input signals Pt100 in 2- or 3-wire-technology

- Zero value $-100^{\circ}\text{C} \dots +35^{\circ}\text{C}$
- Measuring range 25K...660K

Output signals

- Direct voltage 0...10V / 2...10V – simultaneous outputs
- Direct current 0...20mA / 4...20mA - simultaneous outputs

Signal adjustment of zero value and amplification – optional

Single or double channel version – optional

Space saving safe isolation with 4kV~

Wide range power supply from 20 to 253V AC and DC

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know how mit system



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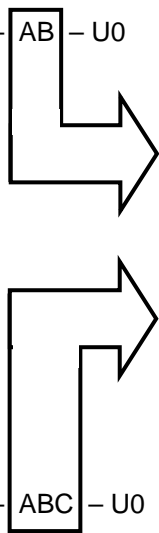
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	WTAU – 100 – U0	WTAU – 120 – U0	WTAU – 200 – U0	WTAU – 220 – U0
Fix adjusted version		X		X
Adjustable version	X		X	
Single channel version	X	X		
Double channel version			X	X

Order code

WTAU – 100 – U0 Version single channel device, adjustable

WTAU – 120 – **AB** – U0 Version single channel device, fix adjusted



temperature range	code no. A
0°C...+50°C	A
0°C...+100°C	B
0°C...+150°C	C
0°C...+200°C	E
0°C...+250°C	F
0°C...+300°C	G
0°C...+400°C	H
0°C...+500°C	J
0°C...+600°C	L
-40°C...+60°C	Q
-50°C...+100°C	O
-100°C...+50°C	M
special range	Y

output 1	code no. B
0...10V	1
0...20mA	2
4...20mA	3
special range	Y

output 2	code no. C
0...10V	1
0...20mA	2
4...20mA	3
special range	Y

WTAU – 220 – **ABC** – U0 Version double channel device, fix adjusted

WTAU – 200 – U0 Version double channel device, adjustable

Application

The active isolation amplifier of the series **WTAU** is used to linearize Pt100 temperature signals, to convert it into one resp. two galvanic isolated electrical standard signals or to adjust the signals in the zero value and/or end value resp. amplification.

A galvanic isolation is sometimes the only possibility at error generating ground loops, unwished signal overlapping and potential problems.

Thus, a current flow between more signal current circuits that distort the signal is avoided.

The free configurable resp. fix signal conversion, dependent on version, allows the flexible adaption of the Pt100 temperature signal to different systems, e.g. to the standard signal input of a SPS control.

The adjustable version is suitable, if sections, e.g. +10°C...+40°C of a standard temperature signal 0°C...+50°C should be amplified to a complete standard signal e.g. 4...20mA or for zero value adjustment e.g. because of temperature losses caused by heat transfer.

At the versions WTAU – 200 – U0 / WTAU – 220 – U0 the Pt100 temperature signal is converted in parallel into two electrical standard signal. Thus the Pt100 temperature signal can be doubled, to use it in two separated evaluation circuits.

Function

Measuring principle

Version WTAU – 100 – U0 / WTAU – 200 – U0 – adjustable version

The connected resistance proportional electrical Pt100 voltage signal is measured by the evaluation circuit, linearized, adjusted according to the front-sided trimmer and transmitted galvanically isolated to the simultaneous output signals 0...10V and 0...20mA or 2...10V and 4...20mA according to the settings of the internal configuration switches.

The respective current resp. voltage signals at the output can be used simultaneous. Therefore there are simultaneous 2 output signals at the single channel versions WTAU – 100 – U0 and simultaneous 4 output signals at the double channel version WTAU – 200 – U0 are available.

Examples:

- | | | | |
|-------------------|--|-----------------|--------------------|
| ▪ WTAU – 100 – U0 | Input signal 0°C..+100°C is converted to | output signal | 0...10V / 0...20mA |
| ▪ WTAU – 100 – U0 | Input signal 0°C..+50°C is converted to | output signal | 2...10V / 4...20mA |
| ▪ WTAU – 200 – U0 | Input signal 0°C..+50°C is converted to | output signal 1 | 0...10V / 0...20mA |
| | | output signal 2 | 2...10V / 4...20mA |

Version WTAU – 120 – U0 / WTAU – 220 – U0 – fix adjusted version

The connected resistance proportional electrical Pt100 voltage signal is measured by the evaluation circuit, linearized and transmitted galvanically isolated to the to the output signal 0...10V or 0...20mA or 4...20mA. At the version WTAU – 220 – U0 the Pt100 input signal is transmitted simultaneously to the both output channels.

Examples:

- | | | | |
|-------------------|--|-----------------|----------|
| ▪ WTAU – 120 – U0 | Input signal 0°C..+100°C is converted to | output signal | 0...10V |
| ▪ WTAU – 220 – U0 | Input signal 0°C..+50°C is converted to | output signal 1 | 0...10V |
| | | output signal 2 | 0...20mA |

Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.

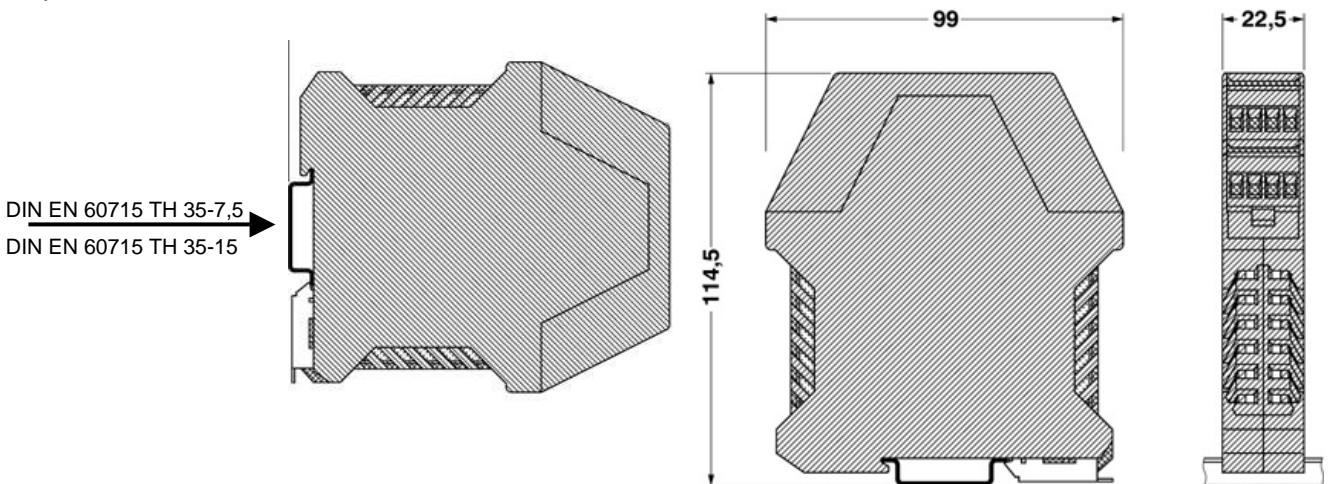
The device may only be used within the permitted operation limits that are listed in this technical manual. Every use besides these limits as agreed can lead to serious dangers.

The device meets the legal requirements of all relevant EC directives. **CE**



Installation notes

The device is conceived for vertical installation on a standard fastening rail acc. to DIN EN 60715 TH 35-7,5 resp. TH 35-15.



The device must be installed protected against dust and humidity, e.g. in control stations or in a suitable protection housing with a minimum protection classification IP55 acc. to DIN EN 60529.

The devices must be installed weather and stroke protected, ideally at places without direct solar radiation. This is especially important in warm climatic regions.

Maintenance

The device is free of maintenance.

Repair

A repair may only be carried out by the manufacturer. When sending back the device, add a note with the description of the error and the application.

Electrical connection

The electrical connection of the device must be carried out according to the respective country specific standards. Incorrect installation or adjustment could cause applicationally conditioned risks.

Power supply input, measuring input and signal output channels are safe galvanically isolated from each other. This is also valid for both signal output channels among each other.

Connection of the Pt100 – measuring input

For the two or three-wire connection cable between the isolation amplifier and the Pt100 a standard installation cable or multi-wire cable for measuring intends with a maximum of 25 Ω per wire can be used.

Pt100 in 2- or 3-wire-measurement can be connected.

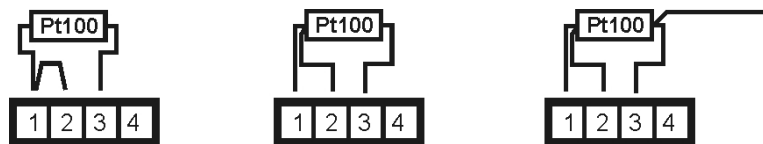
At a 2-wire-measurement the terminals 1 and 2 must be connected by a wire link.

A 4-wire-measurement of the Pt100 is not possible. When connecting a 4-wire Pt100 this must be proceeded in 3-wire-measurement, whereas the not used fourth wire may not be connected..

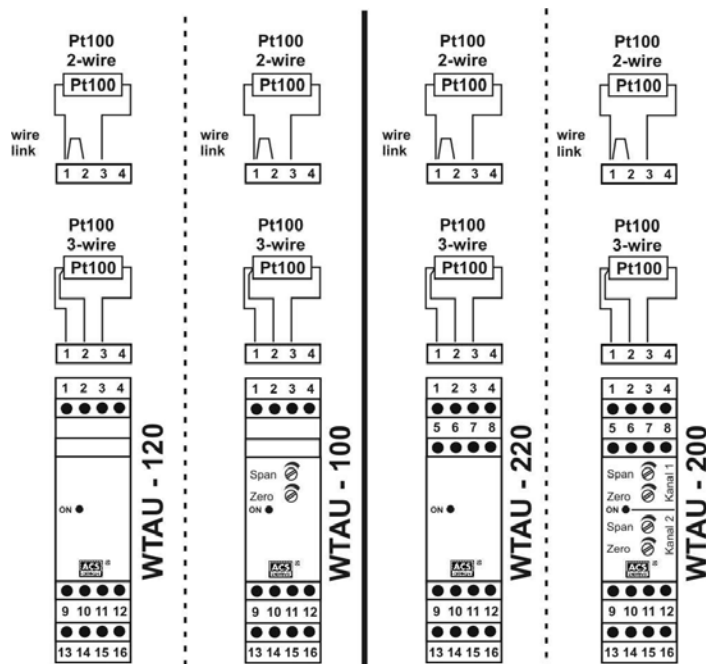
The use of a shielded signal cable is recommended, if strong electromagnetic influences could happens, e.g. due to machines or radio equipment. In that case the shielding of the cable should be connected to earth only at the side of the Pt100.

The signal cable should be installed separated from power leading wires.

Terminal occupation



Connection scheme



Electrical connection

Connection of the output

For the two-wire connection cable between the isolation amplifier and the connected devices a standard installation cable or multi-wire cable for measuring intends with a maximum of 25 Ω per wire can be used.

The use of a shielded signal cable is recommended, if strong electromagnetic influences could happens, e.g. due to machines or radio equipment. In that case the shielding of the cable should be connected to earth only at the side of the connected device. When connecting a SPS input stage there must be paid attention that mostly the signal circuit must be connected to earth by connection the minus terminal with measuring earth. The signal cable should be installed separated from power leading wires.

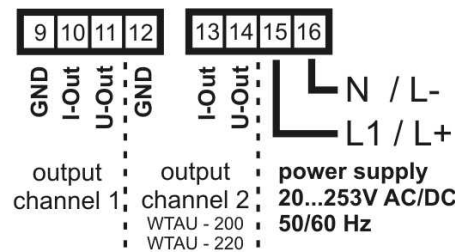
For inauguration it is suggested, to deactivate all connected control devices, to avoid unwanted control reactions.

Connection of the power supply voltage

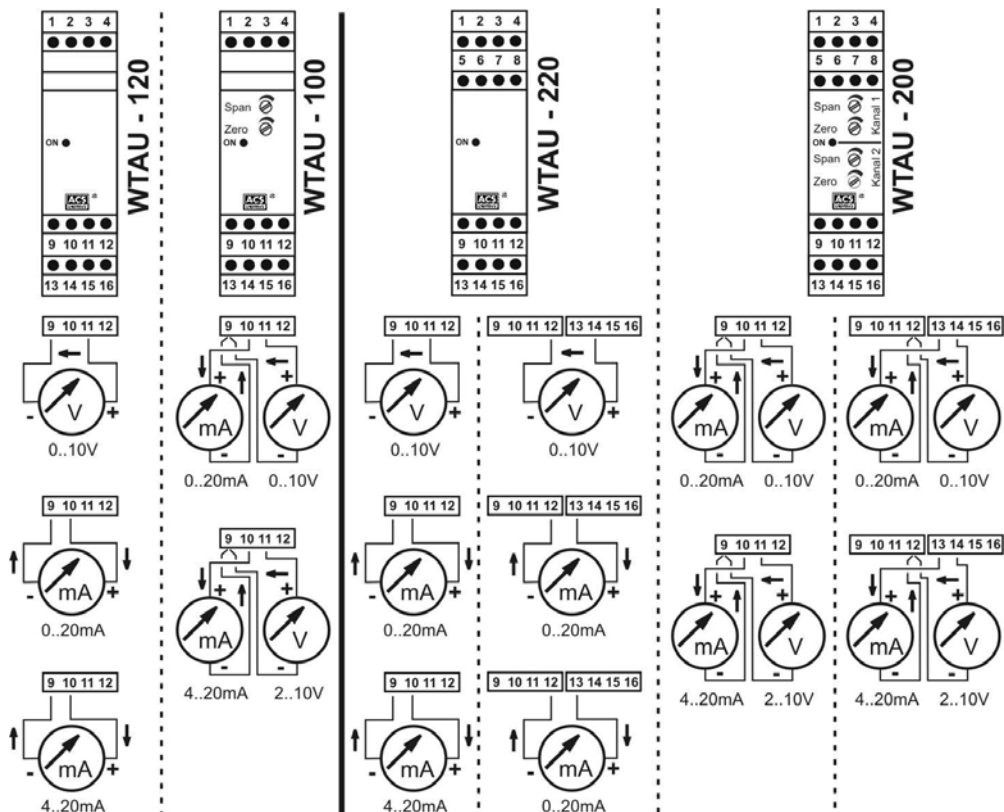
Due to the integrated wide range power supply, for connection to supply voltages from 20...253V AC / DC, the isolation amplifier is suitable for using in all common energy supply networks. The connection is reverse polarity protected.

A fuse is integrated internally at the power supply circuit. Due to this the installation of a fine protection is not necessary.

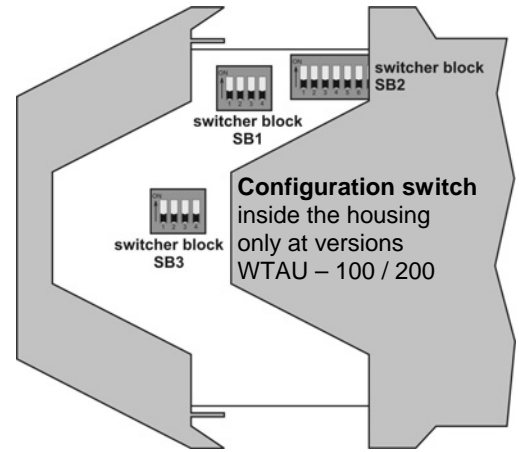
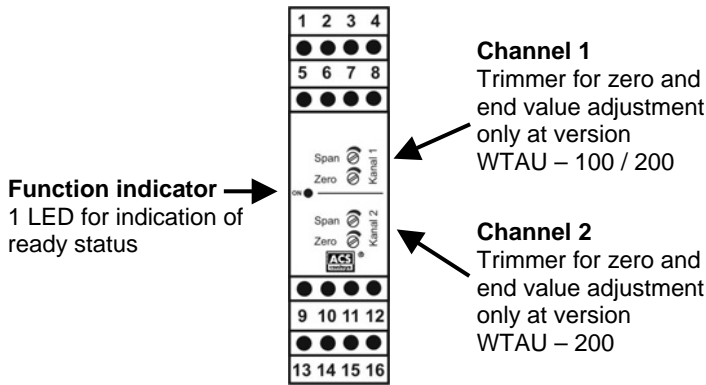
Terminal occupation



Connection scheme



Operation and display elements



Function indicator

- ON → green LED → ready status, power supply voltage on

Trimmer

For adjustment of zero and end value per channel. Only available at versions WTAU – 100 / 200.

At the Pt100 – isolation amplifier WTAU – 200 – U0 both output signals (output 1 and output 2) are changed uniform by the configuration switches and by the trimmer channel 1.

The output 2 can be additionally separately changed in the zero value by $\pm 3\%$ and in the end value by $\pm 6\%$ by the further trimmer at the front side (channel 2).

For an accurate results the adjustment zero value – end value must be proceeded repeatedly with connected signal, because zero and end value adjustment effects each other.

Configuration switches

The configuration of the input and output signal ranges is made per dip switches inside the housing.



Dangerous voltage

Ensure a safe switching off the supply voltage when opening the housing

For configuration release the upper housing part at top and bottom side behind the terminals by using a screwdriver and pull it out of the housing. Drop-in pin's avoid a complete pulling out. Following the respective dip switches can be set according to the desired functions to ON or OFF.

The switch S3 of switcher block S3 must be set to position ON. The position of all other not described switches are without importance.

Input signal range zero value switcher block SB1

Switch 2 (SB1) → zero value

switch	switching state ON	switching state OFF
2	zero value 0°C	zero value –50°C

Input signal range measuring range switcher block SB2

Switch 1, 2, 3, 4, 5, 6 (SB2) → measuring range

S1	S2	S3	S4	S5	S6	measuring range
OFF	OFF	OFF	OFF	OFF	ON	50 Kelvin
OFF	OFF	OFF	OFF	ON	OFF	100 Kelvin
OFF	OFF	OFF	ON	OFF	OFF	150 Kelvin
OFF	OFF	ON	OFF	OFF	OFF	200 Kelvin
OFF	ON	OFF	OFF	OFF	OFF	300 Kelvin
ON	OFF	OFF	OFF	OFF	OFF	500 Kelvin

Output signal range channel 1 switcher block SB1

Switch 4 (SB1) → signal range

switch	switching state ON	switching state OFF
4	0...10V / 0...20mA	2...10V / 4...20mA

Output signal range channel 2 switcher block SB3

Switch 4 (SB3) → signal range

switch	switching state ON	switching state OFF
4	0...10V / 0...20mA	2...10V / 4...20mA

Technical data

Auxiliary power supply

Permitted supply voltage:	20 V to 253 V AC / DC 48...62 Hz, reverse polarity protected
Power consumption:	≤ 3 VA / 2 W (WTAU –100 / 120) resp. ≤ 6 VA / 3 W (WTAU – 200 / 220)
Overvoltage category:	II acc. to DIN EN 61010-1
Protection classification:	II double or reinforced insulation
Isolation voltage:	4kV~ auxiliary power to signal inputs to signal outputs
Galvanic isolation:	All supply, input and output channels among each other as well as both output channels from each other are safe galvanically isolated.

Signal input

Temperature resistor Pt100:	3-wire- / 2-wire-measurement, temperature linear, current 2 x 0,680mA ± 20µA
Measuring signal range:	-100°C...+660°C, dependent on settings resp. configuration
Wire resistance:	≤ 40 Ω per wire

Signal output (1x resp. 2x available, depends on version)

Direct voltage:	0...10 V / 2...10 V, max. 17V, overload and short circuit protected
Permitted load direct voltage:	
▪ WTAU –100 / 120	$R_L \geq 1250\Omega$ at 10V / $R_L \geq 2000\Omega$ at 10V (at simultaneous output I_{out} with 20mA)
▪ WTAU – 200 / 220	$R_L \geq 3333\Omega$ at 10V / $R_L \geq 6666\Omega$ at 10V (at simultaneous output I_{out} with 20mA)
Direct current:	0...20mA / 4...20mA, max. 28mA
Permitted load direct current:	
▪ WTAU –100 / 120	$R_L \geq 880\Omega$ at 20mA / $R_L \geq 680\Omega$ at 20mA (at simultaneous output U_{out} with 5mA)
▪ WTAU – 200 / 220	$R_L \geq 570\Omega$ at 20mA / $R_L \geq 530\Omega$ at 20mA (at simultaneous output U_{out} with 1,5mA)
Adjustment range zero value:	-100...+35°C depends on setting configuration switch zero value
Adjustment range measuring range	25...660K depends on setting configuration switch measuring range
Adjustment range zero output 2:	± 3% of respective nominal measuring range
Adjustment range - range output 2:	± 6% of respective nominal measuring range
Limit value deviation:	≤ 0,1% of factory calibrated measuring range (delivery setting)
Range changing deviation:	≤ 4% of respective nominal measuring range
Characteristic deviation:	≤ 0,1% of respective nominal measuring range ≤ 0,2% at range 50K of respective nominal measuring range
Temperature deviation:	≤ 0,05% / 10 K of respective nominal measuring range
Long term deviation:	≤ ±0,1% of respective nominal measuring range / year
Influence output load:	≤ 0,05% of respective nominal measuring range
Influence auxiliary power:	≤ 0,005%/10V at range 500K of respective nominal measuring range ≤ 0,06%/10V at range 50K of respective nominal measuring range
Error supervision:	Output signal ≥ 20mA/10V at wire break Output signal 0mA/0V at short circuit of terminals 1/3 resp. 2/3 Measurement in 2-wire-technology at short circuit of terminals 1/2

Materials

Connection housing:	PA – polyamide
Terminal housing:	PA – polyamide
Sticker:	PE – polyester

Connection terminals

Number:	3 terminal blocks with each 4 terminals, everlasting screws
Connection cross-section:	maximum 1 x 2,5 mm or 2 x 1,5 mm

Housing style

Housing:	Series installation housing, 22,5mm wide
Weight:	100 g

Environmental conditions

Environmental temperature:	Single installation – 40°C...+70°C Series installation – 40°C...+60°C
Climatic classification:	3K3 resp. 3M2 DIN EN 60721-3-3
Protection classification:	IP20 DIN EN 60529
EM – compatibility:	emission DIN EN 61326-1 operation device class B immunity DIN EN 61326-1 industrial range