

Digital Temperature Transmitter with HART® Protocol, Head Mounting

Electrical Temperature Measurement



Model T32.10
Model T32.11

- HART®-Protocol
- Configurable via
 - HART® Communicator
 - Asset Management System
e.g. AMS, SIMATIC PDM, SMART Vision
 - User friendly WIKA Configuration Software
- Model T32.11 has increased ambient temperature stability
- Universal transmitter for
 - RTDs/Thermocouples
 - Resistance-sensors/mV-sensors
- Output linear to temperature with RTD and thermocouple input signals
- Customer specific linearisation with max. 30 points for sensors with Ω - or mV-output
- Individually configurable signalling for possible errors of the sensor system
- EMC Conformity per DIN EN 61 326-1 NAMUR NE 21
- Isolation voltage AC 1500 V between sensor and current loop
- 100% Rh protection, moisture condensation permissible
- Extended ambient temperature range
- Terminal connections with captive screws



Description

The digital temperature transmitter T32 range is designed for universal use in the process industry.

Comprehensive individual configuration possibilities like, for example, type of sensor, measuring range and error signalling, high accuracy, galvanic isolation and excellent EMI protection characterize these transmitters. The compact head mounting case fits in any DIN connecting head form B with expanded mounting room, e.g. WIKA model BSS.

Due to its high ambient temperature stability model T32.11 is the best choice for extremely critical measurement points.

Configuration can be done by means of a HART® Communicator model 275 or a FSK modem (e.g. VIATOR) via the RS 232-C of a standard DOS PC, or with the HART functionality of a Asset Management System or DCS system.

During configuration any one of 15 types of sensors can be selected. Measured temperatures are from -270 °C up to 1820 °C.

The following sensors can be connected:

- RTDs per DIN EN 60 751, JIS C 1606, DIN 43 760 in 2, 3 and 4 wire connection, the connection-system used is configurable and ensures an optimal lead wire compensation
- thermocouples per DIN EN 60 584 resp. DIN 43 710 Cold junction compensation (CJC) is built-in, the use of an external CJC is selectable via configuration.
- resistance-sensors up to 5000 Ω in 2, 3 and 4 wire connection, configurable compensation of the connection cable
- mV-sensors up to 1200 mV

The transmitters are delivered with a basic configuration (see ordering information). Alternatively, upon request, transmitters can be delivered with a customized configuration within the given limits.

Also available as rail mounting version: model T32.30, see data sheet TE 32.02.

Specification
Model T32.10 / T32.11

Input	configurable: type of sensor and measuring range	max. measuring range	minimum measuring span
RTDs	Pt 100 DIN EN 60751	-200 ... + 850 °C ¹⁾	10 K or 3,8 Ω, whichever is greater
	Pt (x) x is configurable between 10 ... 1000 e.g. for Pt 10, Pt 50, Pt 500, Pt 1000 etc.		
	JPt 100 JIS C 1606		
	Ni 100 DIN 43760 : 1987-09		
thermocouples	type T, Cu-CuNi DIN EN 60584	-200 ... + 500 °C	50 K or 2 mV, whichever is greater
	type E, NiCr-CuNi DIN EN 60584	-270 ... +1000 °C	
	type J, Fe-CuNi DIN EN 60584	-210 ... +1200 °C	
	type L, Fe-CuNi DIN 43710 : 1985-12	-200 ... + 900 °C	
	type K, NiCr-Ni DIN EN 60584	-270 ... +1372 °C	
	type N, NiCrSi-NiSi DIN EN 60584	-270 ... +1300 °C	
	type U, Cu-CuNi DIN 43710 : 1985-12	-200 ... + 600 °C	
	type R, PtRh-Pt DIN EN 60584	-50 ... +1768 °C	
	type S, PtRh-Pt DIN EN 60584	-50 ... +1768 °C	
	type B, PtRh-PtRh DIN EN 60584	0 ... +1820 °C	
resistance-sensor		0 ... 700 Ω / 0 ... 5000 Ω	4 Ω up to 32 Ω
mV-sensor		-400 ... +1200 mV	2 mV up to 32 mV
RTDs / resistance-sensor			
measuring deviation per DIN EN 60770, 23 °C ± 5 K			
RTDs	MV ≤ 200 °C	± 0.08 K	
	MV > 200 °C	± (0.08 K + 0.01 % (MV - 200 K))	
resistance-sensor		± 0.03 Ω or 0.01 % MV , whichever is greater	
temperature coefficient T_C ²⁾	RTDs	± (0.05 K + 0.015 % MV) / 10 K _{Ta}	
	resistance-sensor	± (0.01 Ω + 0.01 % MV) / 10 K _{Ta}	
sensor current		approx. 0.2 mA	
lead wire connection		configurable: 2 wire , 3 wire , 4 wire	
connection leads	effect	± 0.02 Ω / 10 Ω	
	max. permissible resistance	30 Ω each wire, 3 wire symmetric	
signalling of sensor error		configurable	
thermocouples			
measuring deviation per DIN EN 60770, 23 °C ± 5 K			
type T, L, U	-150 °C < MV ≤ 0 °C	± (0.25 K + 0.15 % MV)	
	MV > 0 °C	± (0.25 K + 0.015 % MV)	
E, J, K, N	-150 °C < MV ≤ 0 °C	± (0.4 K + 0.2 % MV)	
	MV > 0 °C	± (0.4 K + 0.03 % MV)	
R, S	50 °C < MV ≤ 400 °C	± (1.2 K + 0.1 % (MV - 400 K))	
	400 °C < MV ≤ 1600 °C	± (1.2 K + 0.015 % (MV - 400 K))	
B	400 °C < MV ≤ 1000 °C	± (1.3 K + 0.25 % (MV - 1000 K))	
	MV > 1000 °C	± 1.3 K	
temperature coefficient T_C ²⁾	type T, L, U	MV > -150 °C	model T32.10: ± (0.1 K + 0.02 % MV) / 10 K _{Ta} T32.11: ± (0.07 K + 0.007 % MV) / 10 K _{Ta}
		E, J, K, N	MV > -150 °C
R, S	50 °C < MV ≤ 1600 °C		model T32.10: ± (0.3 K + 0.025 % (MV - 400 K)) / 10 K _{Ta} T32.11: ± (0.25 K + 0.005 % (MV - 400 K)) / 10 K _{Ta}
		B	400 °C < MV ≤ 1000 °C
	MV > 1000 °C		
additional error of cold junction compensation at 23 °C ± 5 K		± 0.8 K	
temperature coefficient T_C ²⁾ of cold junction compensation		± 0.1 K / 10 K _{Ta}	
connection leads	effect	± 0.1 μV / 10 Ω	
	max. permissible resistance	250 Ω	
signalling of sensor error		configurable	
mV-sensor			
measuring deviation per DIN EN 60770, 23 °C ± 5 K			
temperature coefficient T_C ²⁾		± (10 μV + 0.03 % MV)	
		model T32.10: ± (2 μV + 0.03 % MV) / 10 K _{Ta} T32.11: ± (2 μV + 0.01 % MV) / 10 K _{Ta}	
connection leads	effect	± 0.1 μV / 10 Ω	
	max. permissible resistance	250 Ω	
signalling of sensor error		configurable	









MV measuring value (temperature measuring values in °C)

 T_a ambient temperature


 T_C temperature coefficient

1) extended up to 1000 °C

 2) between the standard range of ambient temperature -40 °C ≤ T_a ≤ +85 °C, with option "extended range of ambient temperature" the double value is valid outside the standard range

Analogue output for measuring range	configurable: 4 ... 20 mA or 20 ... 4 mA, 2 wire design		
with type of sensor RTDs	linear to temperature per DIN EN 60751 / JIS C 1606 / DIN 43760 : 1987-09		
with type of sensor thermocouple	linear to temperature per DIN EN 60584 / DIN 43 710 : 1985-12		
by simulation mode	independent from input signal, simulation value configurable from 3.5 mA up to 22.5 mA		
output limits configurable			
application specification	lower limit: from 3.6 mA up to 4.0 mA upper limit: from 20.0 mA up to 21.5 mA		
NAMUR NE 43	lower limit: 3.8 mA upper limit: 20.5 mA		
not active	lower limit: 3.6 mA upper limit: 21.5 mA		
measuring deviation per DIN EN 60770, 23 °C ± 5 K	model T32.10: ± 0.04 % of measuring span T32.11: ± 0.03 % of measuring span		
temperature coefficient T_C	model T32.10: ± 0.1 % of measuring span / 10 K_{T_a} T32.11: ± 0.02 % of measuring span / 10 K_{T_a}		
rising time t_{90}	approx. 0.5 s		
measured value update	approx. 3 / s		
damping	configurable: off or 1 s up to 60 s		
load R_A	$R_A \leq (U_B - 12V) / 0.0225 A$ with R_A in Ω and U_B in V		
load effect	no measurable effect		
power supply effect	no measurable effect		
Total measuring deviation	sum of input + output per DIN EN 60770, 23 °C ± 5 K		
Signalling at analogue output	with sensor error and internal malfunction		
NAMUR NE 43	up scale	> 21.0 mA	
	down scale	< 3.6 mA	
configurable	up scale	12 mA up to 22.5 mA	
	down scale	3.5 mA up to 12 mA	
Power supply U_B			
model T32.1x.000 (without Ex-protection)	DC 12 ... 42 V		
model T32.1x.002 (with  , intrinsically safe ia)	DC 12 ... 30 V		
model T32.1x.004 (with  , intrinsically safe ib)	DC 12 ... 30 V		
model T32.1x.006 (with Ex-protection per )	DC 12 ... 30 V		
model T32.1x.008 (with Ex-protection per )	DC 12 ... 30 V		
model T32.1x.009 (with  , energy-limited)	DC 12 ... 40 V		
input power supply protection	reverse polarity		
-protection per Directive 94/9/EC (ATEX 100a) Intrinsically Safe per EN 50 020	EC Type Test DMT 98 ATEX E 007 X		
model T32.10.002 and model T32.11.002	II 1G EEx ia IIB / IIC T4 / T5 / T6		
model T32.10.004 and model T32.11.004	II 2G EEx ib IIB / IIC T4 / T5 / T6		
permissible ambient temperature	-50 °C ... +85 °C with T4 -50 °C ... +75 °C with T5 -50 °C ... +60 °C with T6		
maximum values for connection of the current loop circuit (connections + and -)	$U_i = DC 30 V$ $C_i = 7.8 nF$	$I_i = 130 mA$ $L_i = 100 \mu H$	$P_i = 800 mW$
maximum values for connection of the sensor circuit (connections 1 up to 4)	$U_o = DC 11.5 V$ Group IIB: Group IIC:	$I_o = 12.3 mA$ $C_o = 11 \mu F$ $C_o = 1.6 \mu F$	$P_o = 35.2 mW$ $L_o = 1 mH$ $L_o = 1 mH$
Explosion protection per 	CSA File No. 1248412 (old: LR 105000-6)		
model T32.10.006 and model T32.11.006	Intrinsically Safe: Class I, Division 1, Groups A, B, C and D Non-Incendive: Class I, Division 2, Groups A, B, C and D		
max. permissible ambient temperature	85 °C, 75 °C, 60 °C for T-Code T4, T5, T6 respectively		
Entity Parameters	Input Terminals (+, -)	$V_{max} = 30 Vdc$ $C_i = 7.8 nF$	$I_{max} = 130 mA$ $L_i = 0.1 mH$ $P_{max} = 800 mW$
	Output Terminals (1, 2, 3, 4)	$V_{oc} = 11.5 Vdc$ $C_a = 1.6 \mu F$	$I_{sc} = 12.3 mA$ $L_a = 1 mH$ $P_{max} = 35.2 mW$
Explosion protection per 	Installation Drawing No. 3181945		
model T32.10.008 and model T32.11.008	Intrinsically Safe: Class I, Division 1, Groups A, B, C and D Non-Incendive: Class I, Division 2, Groups A, B, C and D		
permissible ambient temperature	temperature code T4 -50 °C ... +85 °C temperature code T5 -50 °C ... +75 °C temperature code T6 -50 °C ... +60 °C		
Entity Parameters	Power Loop (Terminals + and -)	$V_{max} = 30 Vdc$ $C_i = 7.8 nF$	$I_{max} = 130 mA$ $L_i = 100 \mu H$ $P_{max} = 800 mW$
	Sensor Circuit (Terminals 1 to 4)	$V_{oc} = 11.5 Vdc$ $C_a = 1.6 \mu F$	$I_{sc} = 12.3 mA$ $L_a = 1 mH$ $P_{max} = 35.2 mW$

 R_A load U_B loop power supply voltage, see power supply T_a ambient temperature T_C temperature coefficient

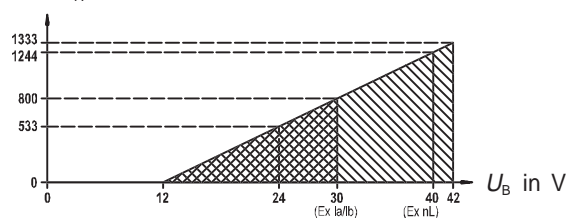
 -protection, energy-limited per EN 50 021	EC Type Test DMT 99 E 088 X
model T32.10.009 and model T32.11.009	II 3G EEx nL IIC T4 / T5 / T6
permissible ambient temperature	-50 °C ... +85 °C with T4 -50 °C ... +75 °C with T5 -50 °C ... +60 °C with T6
maximum values for connection of the current loop circuit (connections + and -)	$U_i = DC 40 V$ $C_i = 7.8 nF$ $L_i = 100 \mu H$
maximum values for connection of the sensor circuit (connections 1 up to 4)	$U_o = DC 5.5 V$ $I_o = 0.21 mA$ $C_o = 1000 \mu F$ $L_o = 1000 mH$
Electromagnetic compatibility (EMC)	per EMC Directive 89/336/EEC DIN EN 61326-1 and additional NAMUR NE 21 (May 93)
Ambient conditions	
ambient and storage temperature	
standard range	-40 ... +85 °C
option: extended range	-50 ... +85 °C or -40 ... +105 °C ¹⁾
climate class	Cx (-40 ... +85 °C, 5 % up to 95 % relative humidity) DIN EN 60654-1
maximum permissible humidity	100 % relative humidity (unlimited with isolated sensor connection wires), moisture condensation permissible DIN IEC 68-2-30 Var. 2
vibration	10 ... 2000 Hz 5 g DIN IEC 68-2-6
shock	DIN IEC 68-2-27 $g_N = 30$
salt fog	DIN IEC 68-2-11
Special features	
communication	HART Protocol Rev. 5 inclusive burst mode, Multidrop
<p>All T32 parameters are configurable with following possibilities:</p> <ul style="list-style-type: none"> - user friendly WIKA Configuration Software, free of charge Download possible via www.wika.de - HART Communicator HC 275: T32 Device Description is integrated resp. upgradable with old versions - Asset Management Systems <ul style="list-style-type: none"> AMS: completely integrated resp. upgradable with old versions Simatic PDM: completely integrated from version 5.1, upgradable with version 5.0.2 Smart Vision: upgradable by DTM per FDT standard from SV version 4 PACTware: upgradable by DTM per FDT standard <p>The Configuration-Set (see accessory) can be used for the direct communication via the serial interface of a PC.</p> <p>Note: Parameter, which are defined by a universally HART command (e.g. the measuring range) can be processed with all HART configuration tools in principle.</p>	
isolation voltage (input versus analogue output)	AC 1500 V, 60 s
warm-up time	approx. 5 Min.
power consumption with U_b 24 V	max. 540 mW
temperature units	configurable: K, °C, °F, °R
configuration and calibration data	permanently stored in EEPROM
testing current to monitor sensor	nom. 1 μA during testing cycle, otherwise 0 μA
self-monitoring	automatic execution of initial test after connection to power supply, thereafter monitoring due to internal malfunction
guarantee	5 years for performance with standard range of ambient temperature, legal warranty with extended range of ambient temperature
Case	head mounting design
material	plastic, PBT, glass fibre reinforced
degree of protection	case IP 66 / IP 67 IEC 529 / EN 60529
terminal connections	terminal connections IP 00 IEC 529 / EN 60529
cross section of terminal connections	max. 2.5 mm ² , screws captive
weight	approx. 70 g
dimensions	see drawings

1) -40 ... +105 °C only without explosion protection, HART communication up to +95 °C

Load diagram

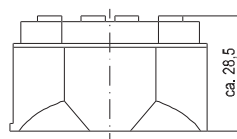
The permissible load is dependent upon the loop power supply voltage.

load R_A in Ω

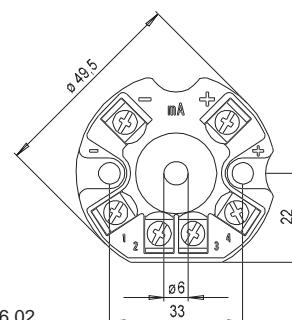


drawing no. 3191 311.02

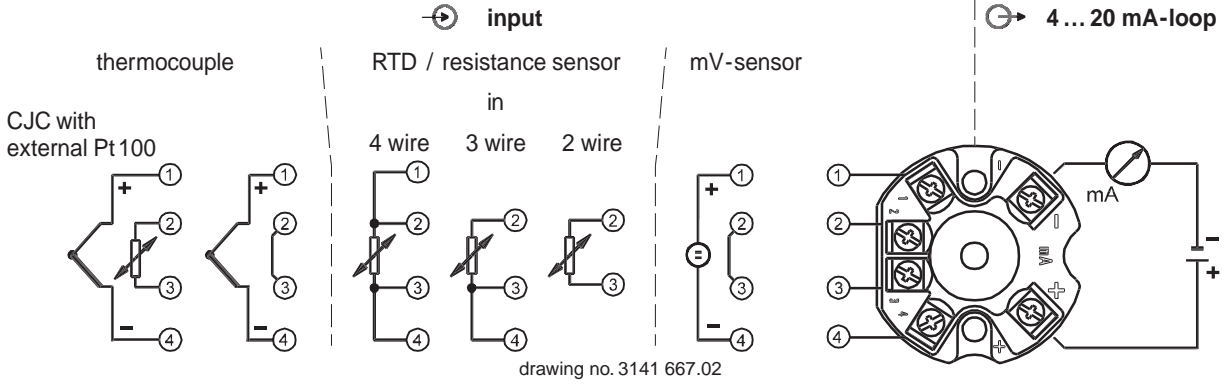
Dimensions in mm



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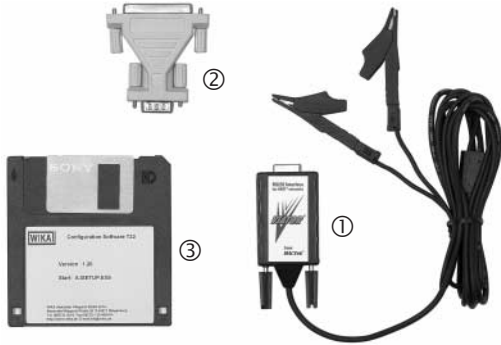
Designation of terminal connectors



Accessory (Order No. see last page)

The **Configuration-Set** contains

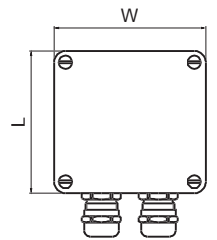
- ① FSK modem (HART® adapter)
- ② Plug adapter (9-pin / 25-pin plug)
- ③ Configuration Software (3.5" disk, multi-lingual, Online Help)
(free of charge download from the **WIKAI** Homepage www.wika.de)



HART Communicator HC 275



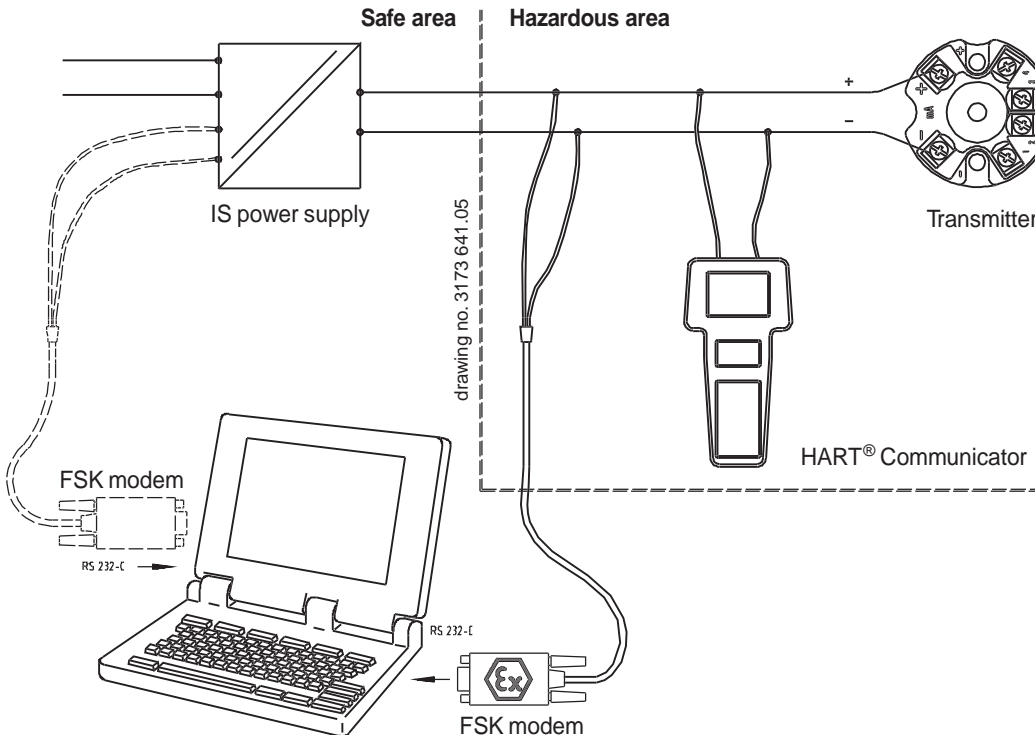
Field case



Wiring scheme

Following must be observed, particularly with applications in hazardous area:

- the wiring scheme
- The total of all output values of all simultaneously connected instruments (IS power supply, FSK modem, HART® Communicator) must not exceed the permissible maximum values of the T32.



Ordering information for temperature transmitter Model T32.10 / T32.11

Field No.	Code	Features
		Model
1	<input type="checkbox"/>	T32.10 T32.10, head mounting
	<input type="checkbox"/>	T32.11 T32.11, head mounting, with increased ambient temperature stability
		Explosion protection
	<input type="checkbox"/>	0 without
	<input type="checkbox"/>	2 II 1G EEx ia IIC T4/T5/T6
	<input type="checkbox"/>	4 II 2G EEx ib IIC T4/T5/T6
	<input type="checkbox"/>	6 CSA Class I, Division 1, Groups A, B, C and D
	<input type="checkbox"/>	8 FM Class I, Division 1, Groups A, B, C and D
2	<input type="checkbox"/>	9 II 3G EEx nL IIC T4/T5/T6
		Measuring range
	<input type="checkbox"/>	GK basic configuration 1)
3	<input type="checkbox"/>	KK customer's specification 2) <i>please state as additional text</i>
		Ambiente temperature
	<input type="checkbox"/>	S standard range -40 °C ... +85 °C
	<input type="checkbox"/>	N extended range -50 °C ... +85 °C <i>T32.11 on request</i>
4	<input type="checkbox"/>	H extended range -40 °C ... +105 °C <i>only without explosion protection as well as T32.11 on request</i>
		Additional order info
	<input type="checkbox"/>	YES <input type="checkbox"/>
	<input type="checkbox"/>	NO <input type="checkbox"/>
5	<input type="checkbox"/>	T <input type="checkbox"/> Z <input type="checkbox"/> additional text <i>Please state in clearly understandable text !</i>

Order code:

1	2	3	4	5
<input type="text"/>	- 00	<input type="text"/>	- <input type="text"/>	- <input type="text"/>

Additional text:

Accessory (please order separately)	Order No.
Configuration-Set for T32 without explosion protection	36 27404
Configuration-Set for T32 with explosion protection	36 33233
Configuration Software T32 on 3.5" disk 3)	36 33374
HART Communicator HC 275 english	22 97486
HART Communicator HC 275 german	22 97478
Power supply DC 24 V	14 49586
Field case, plastic (ABS), IP 65, for mounting of a head mounting transmitter, permissible ambient temperature: -40 °C ... +80 °C, 82x80x55 mm (WxLxH), with two cable glands M16x1.5	33 01732
Adapter for mounting on a DIN rail, plastic/stainless steel	35 93789
Adapter for mounting on a DIN rail, steel tin galvanized	36 19851
Adapter for mounting on a DIN rail, steel zinc galvanized	23 73633

- 1) Input signal: Pt 100 in 3 wire connection, Measuring range: 0 ... 150 °C, Output signal: 4 ... 20 mA, Output limits: NAMUR (lower limit: 3.8 mA upper limit: 20.5 mA), Signalling of sensor error: NAMUR down scale (< 3.6 mA), Damping: off, Mains: 50Hz, Write protection: not active
- 2) Please pay attention to the limits of measuring ranges on page 2.
- 3) Free of charge download from the [WIKAI](http://www.wika.de) Homepage www.wika.de



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