Series 36XW-CTD

Piezoresistive multi-parameter probe with excellent accuracy and digital interfaces

Features

- High-precision conductivity, temperature and pressure measurements
- RS485 interface with Modbus RTU protocol
- SDI-12 interface as 36XiW-CTD, ideal for battery operation
- Excellent long-term stability
- For many years of maintenance-free operation

Technology

- Conductivity measurement with 6 titanium electrodes in 4-wire technology
- Temperature measurement with Pt1000 sensor
- Piezoresistive pressure sensor chip, encapsulated insulated
- High-quality pressure transducer and tried-and-tested mathematical compensation
- Robust stainless-steel housing

Typical applications

- Water quality measurement
- Salt content measurement
- Hydrostatic pressure measurement
- Groundwater, surface water, water tanks

Accuracy of pressure measurement
± 0,05 %FS
Accuracy of temperature measurement
± 0,1 °C
Accuracy of conductivity measurement
± 2,5 %FS

Modbus RTU SDI-12

Series 36XW-CTD

Edition 05/2025
Subject to alterations
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Series 36XW-CTD – Specifications

Standard pressure ranges

Water column approx.	Relative pressure PR	Absolute pressure PAA	Proof pressure
0…3	0…0,3		3
0…10	0…1		
		0,8…2	9
0…30	0…3	0,8…4	
0…100	0…10	0,8…11	30
0…200	0…20	0,8…21	40
mH2O	bar rel.	bar abs.	bar
	Reference pressure at atmospheric pressure	Reference pressure at 0 bar abs. (vacuum)	In relation to reference pressure
Note	PAA 0,8…2 bar: For installations at altitudes greater than 2000 m above sea level, special measuring ranges are required.		

Performance

Pressure

Digital non-linearity	≤ ± 0,02 %FS	Best fit straight line (BFSL)
Accuracy @ RT (20…25 °C)	≤ ± 0,05 %FS	Non-linearity (best fit straight line, BFSL), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation.
Total error band (0…50 °C)	≤ ± 0,1 %FS	Maximum deviation within the specified pressure and temperature range. Experience shows that, outside the compensated temperature range, the total error band in the ambient temperature range is expanded by 0,1 %FS.
Compensated temperature range	0…50 °C	
Long-term stability	≤ ± 0,1 %FS	Per year under reference conditions, annual recalibration recommended.
Position dependency	≤ ± 2 mbar	Calibrated in vertical installation position with pressure connection facing downwards.
Resolution	0,0005 %FS	
Signal stability	0,0025 %FS	Noise-free
Internal measurement rate	240 Hz	
Pressure range reserve	± 10 %	
Note	For pressure ranges < 1 bar, all data apply with reference to a full-range signal (FS) of 1 bar.	

Temperature

Accuracy	≤ ± 0,1 °C	The temperature is also measured in the conductivity module by a Pt1000 sensor located in the titanium electrodes.
Resolution	≤ ± 0,01 °C	
Internal measurement rate	1 Hz	
Note	The data applies within the compensated temperature range.	

Series 36XW-CTD – Specifications

Conductivity

Selectable ranges	0…200 µS/cm 0…2 mS/cm 0…20 mS/cm 0…200 mS/cm	Standard settings: 0…2 mS/cm
Accuracy	≤ ± 2,5 %	of the selectable range
Resolution	≤ 0,05 %	
Internal measurement rate	1 Hz	
Temperature compensation method	Standardised in accordance with EN 27888 In the case of linear compensation: 0 to 8 %/K up to 25 °C or 0 to 8 %/K up to 20 °C In the case of non-linear compensation: in accordance with table in EN 27888 up to 25 °C	Standard settings: Linear compensation with 2,2 %/K standardised at 25 °C. Other default settings available on request. Can be reconfigured later by the customer using software.
Note	The data applies within the compensated temperature range. In SDI-12 mode, the conductivity probe is only ever switched on if a conductivity measurement is requested. In RS485 mode, the conductivity probe can be switched on and off to save energy.	

Electrical data

Series	36XW-CTD	36XiW-CTD
Connectivity	Digital	Digital
Digital interface	RS485	SDI-12 (RS485)
Voltage supply with lightning protection (advanced surge protection)	4,5…32 VDC	6…32 VDC
Voltage supply without lightning protection	3,2…32 VDC	N/A
Power consumption (without communication)	< 14 mA	< 0,1 mA (sleep mode) < 13 mA (active mode)
Overvoltage and reverse polarity protection	± 32 VDC	± 24 VDC
Pressure at start-up time (power supply ON)	< 300 ms	< 1 s
Conductivity at start-up time (power supply ON)	typ. 3 s, 6 s max.	< 3 s
GND case insulation	> 10 MΩ @ 300 VDC	
Note		Only one interface can be active.

Series 36XW-CTD – Specifications

Digital interface RS485

Type	RS485	Half-duplex
Communication protocols	Modbus RTU	
	KELLER bus protocol	Proprietary
Identification	Class.Group: 5.21	Standard settings: bus address 1, baud rate 9600 bit/s. Other default settings available on request. Can be reconfigured later by the customer using software.
Unit of pressure	bar	
Unit of temperature	°C	
Unit of conductivity	mS/cm	
Data type	Float32 and Int32	
Baud rates	9600 and 115'200 bit/s	
Cable lengths	up to 1,2 km	

Digital interface SDI-12

Type	SDI-12	Half-duplex
Communication protocol	SDI-12 V1,3	
Identification	Pressure mode + type	Standard settings: bar, °C, bus address 0 Other default settings available on request. Can be reconfigured later by the customer using software.
Units of pressure	bar, mbar, mH20, psi, ftWC, inWC	
Units of temperature	°C, °F, K	
Units of conductivity	mS/cm	
Data type	ASCII	
Baud rates	1'200 bit/s	
Cable lengths	Up to 250 m	The maximum cable length depends on the number of bus subscribers.

Electrical connection

Cable for water applications	PR: polyethylene (PE) ø 5,8 mm	Integrated capillary
	PAA: polyolefin (PE-based) ø 5,8 mm	
Standard cable lengths	5 m, 10 m, 15 m, 25 m, 40 m, 100 m, 200 m	Others options on request

Electromagnetic compatibility

CE-Conformity as per 2014/30/EU (EMC)	EN IEC 61326-1 / EN IEC 61326-2-3 / EN IEC 61000-6-1 / EN IEC 61000-6-2 / EN IEC 61000-6-3 / EN IEC 61000-6-4	
Surge protection in accordance with EN 61000-4-5	Standard for 36XW-CTD (RS485)	Line-line: 50 A @ 8/20 µs
		Line-CASE: 200 A @ 8/20 µs
Lightning protection (advanced surge protection) in accordance with EN 61000-4-5	Standard for 36XiW-CTD (SDI-12, RS485) Optional for 36XW-CTD (RS485)	Line-line: 10 kA @ 8/20 µs
		Line-CASE: 2 kA @ 8/20 µs

Series 36XW-CTD – Specifications

Mechanical data

Materials in contact with media

Housing	Stainless steel AISI 316L
Pressure transducer diaphragm	Stainless steel AISI 316L
Conductivity sensor housing	PEEK
Conductivity sensor electrodes	Titanium
Pressure transducer seal and conductivity module (internal)	FKM
Cable gland seal (internal)	FKM
End cap	POM
Cable sheath	PR: polyethylene (PE)
	PAA: polyolefin (PE-based)

Other materials

Pressure transducer oil filling	Silicone oil

Further details

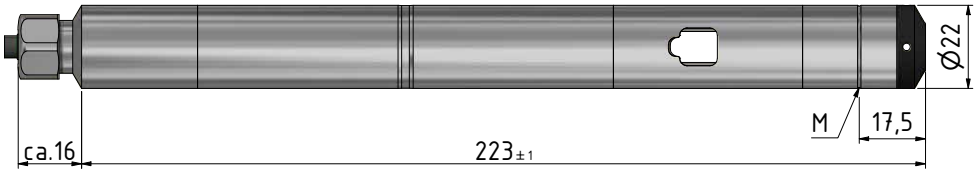
Pressure connection	None (end cap)
Diameter × length	ø 22 mm × approx. 240 mm
Weight (excluding cable)	approx. 300 g

Environmental conditions

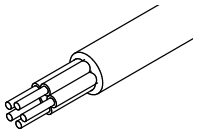
Medium temperature range	-5…55 °C		Icing not permitted
Ambient temperature range	-20…85 °C		
Storage temperature range	-20…85 °C		
Protection	IP68	Cable gland	For relative pressure, use a cable with integrated capillary.
Vibration resistance	10 g, 10…2000 Hz, ± 10 mm	IEC 60068-2-6	
Shock resistance	50 g, 6 ms	IEC 60068-2-27	

Series 36XW-CTD – Dimensions and variants

Electrical connections



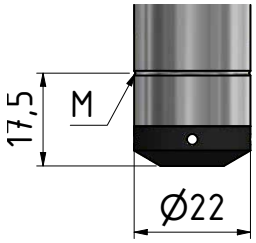
M: marking of diaphragm position

Cable gland	36XW-CTD		36XiW-CTD	
Cable	RS485		SDI-12	
	WH	GND	WH	GND
	RD	n.c.	RD	SDI-12
	BK	+Vs	BK	+Vs
	BU	RS485A	BU	(RS485A)
	YE	RS485B	YE	(RS485B)
	Shield on CASE		Shield on CASE	

For the Series 36XiW-CTD, the RS485 interface is to be understood as a manufacturer and communication interface, e.g. for recalibration of the conductivity sensor.

Available pressure connections

Standard

End cap

Restored diaphragm (M)

Customised configurations on request

- Other compensated pressure ranges
- Other cable sheath materials
- Other oil fillings pressure transducer
- Metal parts that come into contact with media made from titanium
- Modifications to customer-specific applications

Examples of similar products

- Series 26X: Highly accurate level probe with RS485 and analog interface
- Series 26Xi: Highly accurate level probe with SDI-12 interface
- Series 36XW: Level probe with excellent accuracy and RS485 and analog interfaces
- Series 36XiW: level sensor with excellent accuracy and SDI-12 interface

Series 36XW-CTD – Software, scope of delivery and accessories

RS485 Modbus interface

The X-line products have a digital interface (RS485 half-duplex), which supports the MODBUS RTU and KELLER bus protocols. Details of the communication protocols can be found at www.keller-pressure.com. To integrate the communication protocol into your own software, documentation, a Dynamic Link Library (DLL) and various program examples are available.

Interface converters

The connection to a computer is established via an RS485-USB interface converter To ensure smooth operation, we recommend the K-114 with the corresponding mating plug, robust driver module, fast RX/TX switching and connectable bias and terminating resistors.

“Conductivity Calibration Tool” software

The licence-free Conductivity Calibration Tool software configures the conductivity sensor for the measuring medium prior to the measurement being taken. This software contains step-by-step instructions on configuring for conductivity, and can be found at keller-pressure.com.

It can only be communicated with via the RS485 interface. If SDI-12 mode is activated, a suitable command line tool must be used to switch to the RS485 interface via an SDI-12 interface converter. The commands required for this can be found in our in-house SDI-12 communication protocol at keller-pressure.com.

"CCS30" software

The free licence CCS30 software is used to perform configurations and record measured values.

Record of measured values

- Live visualisation
- Configurable measuring and storage interval
- Export function
- Parallel recording in bus operation
- Up to 100 measured values per second

Configuration

- Call up of information (pressure and temperature range, software version, serial number etc.)
- Readjustment of zero point and amplification
- Adjustment of low-pass filter
- Selection of instrument address and baud rate

SDI-12 interface

SDI-12 is a tried-and-tested standard for connecting data recording units and digital sensors within the context of environmental monitoring. The SDI-12 interface is optimised for use in battery-operated systems with a data recording unit and several sensors on the same bus. The bus protocol is ASCII-based and standardised. Details of the SDI-12 communication protocols can be found at www.keller-pressure.com.

The level probe is only active when the data recording unit communicates with it or when it is recording measurements. In all other cases, the level probe remains in standby mode and, at < 0.1 mA, requires very little electricity.

Standard commands:

- Reading measured values with or without checksums
- Changing the sensor address
- Reading identification

Additional commands:

- Setting pressure and temperature units
- Configurable zero point and amplification
- Configurable gravitational constant for increased measurement accuracy
- Programming a user-specific identification
- Configurable continual measurement with adjustable measurement intervals and averaging of up to 8 pressure values
- Switching to RS485

Note: Further details about the interface can be found in the document “SDI-12 A Serial Digital Interface Standard for Microprocessor-Based Sensors” (https://sdi-12.org/specification).

Series 36XW-CTD – Software, scope of delivery and accessories

Scope of delivery

Calibration certificate

Issued by KELLER Pressure.

Accessories

Calibration certificate	Interface converters to RS485 interface
	
Issued by an external calibration laboratory accredited by DakkS or SAS.	K-114 • Analog measurement 0…10 V and 4…20 mA • 12 V measuring device supply via USB • USB interface galvanically isolated • Bias and terminating resistors can be activated