



DP Series Super High Temperature Probes Installation & Operation Manual

IMPORTANT:

For safety reasons and for proper function of these instruments it is strongly recommended to carefully read this instruction manual before installation!

Description

The Super High Temperature probes (SHT) are a piezoelectric driven vibration type level control instrument that detects the minimum and maximum level in bins, silos and hoppers, filled with grained or powdered materials, (bulk solids), which can have temperatures up to 250°C. The instrument can be used as overfill protection, for high or low level alarm. The signal from the electronic circuit of the SHT excites the blade of the instrument to vibrate on its resonance frequency of 285 Hz. When material covers the blade of the probe, the vibration stops. This is sensed by the electronic circuit which forces its output to switch. When the blade gets uncovered the vibration will restart and the output signal will switch back.

IMPORTANT:

The instruments cannot be used for detecting materials which are sticky and tend to build a deposit on the instruments !

General Notes:

- Installation and maintenance must be performed by qualified technical personnel only.
- The *SHT* must be used only in the manner outlined in this instruction manual.
- The *SHT* level control devices are sensitive instruments which need to be handled with care. Never expose these instruments to mechanical loads and temperatures higher than indicated in the technical data. Do not make any changes on these instruments.

Models

Additional to the *SHT120* two models with tube extension are available:

- *SHT130* model with welded tube extension
- *SHT140* model with threaded tube extension

Technical Data

Enclosure:	Powder coated aluminium protection IP66 and I 67 (IP65 for remote electronics installation) 1 cable gland M20 x 1,5 (option: second cable gland) for cables Ø7 ... 13mm		
Electronics:	Wide Range Power Supply 20 ... 250V AC/DC with Relay Output: 1 potential-free change-over contact (SPDT), (option: DPDT) max. switching AC: 250V-AC, 8A, 2000VA, cosφ = 1 max. switching DC: 8,0A at 24V-DC / 1,5A at 48V-DC min. switching DC: 24V / 100mA power consumption: < 3 VA		
or:	24V-DC Power Supply with Transistor Output: potential free, NPN or PNP type 350mA @ 24V-DC, short time max. 1A, max. power 20W power loss max. 3V, max. leakage current 100µA short circuit proof power consumption (blocked transistor): < 1 VA		
	indication:	red LED on PCB (option: externally visible)	
	time delay:	1 second from stop of vibration, 2 to 5 seconds for start of vibration	
	max. wire size:	solid max. 2,5mm², flexible with wire end sleeve max. 1,5mm²	
Probe:	material:	stainless steel 1.4301 / AISI 304	
	connection:	thread 11/2" DIN 2999 (equals BSPT) or 11/2" NPT	
	resonance frequency:	approx. 285 Hz	
	max. vertical load upon the end of the blade:	1000N	
	max. horizontal load upon the end of the blade:	150N	
Material to be detected:	non sticky bulk solids min. density 20 grams per liters grain size: from powder to max. 40mm		
Max. pressure inside bin:	10 bar		
Safety:	protection class I / installation category III / pollution degree 2 / altitude max. 2000m		
Temperatures:	ambient temperature electronic: -20°C ... + 70°C		
	process temperature probe:	-20°C ... + 250°C	250°C-version
	or	-20°C ... + 200°C	200°C-version

CE-Conformity

The vibration type level switches LEVEL SWITCH CV120 / CV130 / CV140 and CV150 meet the requirements of the following regulations:

- EC-EMC-directive 89 / 336 / EWG
- EC-Low Voltage Directive 73 / 23 / EWG

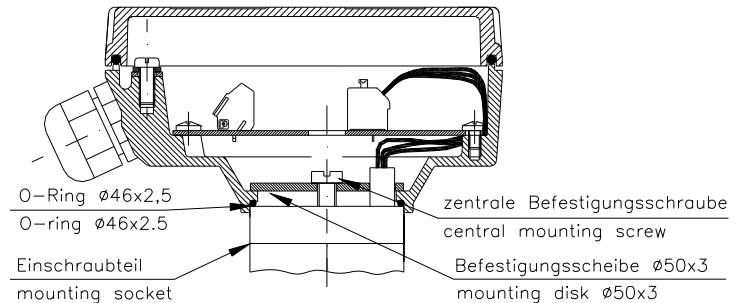
The following standards are applied:

- EN 61326-05.04
- EN 61010 -1

Assembling

Usually the instruments get supplied already completely assembled. In some occasions however, e.g. for easier packing and shipment, the instruments get supplied unassembled in parts: probe, enclosure with electronics and mounting socket with temperature insulating sleeve. In this case the instruments have to be assembled according to the following description and the sketch aside:

- loosen the 4 screws in the cover and open the enclosure
- loosen the 3 screws the electronics is fixed with and take out the electronics
- put O-ring $\varnothing 46 \times 2,5$ in its appropriate position at the enclosure
- fix enclosure onto the temperature insulating sleeve by means of the disk $\varnothing 50 \times 3$ and the central mounting screw, use torque 3 Nm.
- fix electronics inside the enclosure with the three screws, the cables must be located according to the sketch
- after mounting and wiring, (see following chapters), fasten the cover firmly onto the enclosure, apply torque 3 Nm, watch the appropriate position of the sealing in the cover!
- the cable ducts must be screwed firmly into the housing wall and tightened by means of an open end wrench, (torque 3 to 4 Nm).
- Cable ducts which are not used must get sealed!



IMPORTANT:

For protection IP66 and IP67 it is essential to assemble the instruments according to above description. It is very important to watch the appropriate location of the seals and to apply the correct torques!

Assembling of tube extension SHT140

The SHT140 usually gets supplied in parts: probe, enclosure with electronics, extension cable and mounting socket with temperature insulating tube. The extension tube with 1"-threads on both ends must be supplied and assembled by the customer. A detailed instruction manual on how to do this gets supplied with the instrument.

Mounting

Correct Mounting Position

When choosing the mounting position of the *SHT* at the bin the following has to be considered:

- The switching point of the *SHT* depends on the density of the material: for heavy materials only a few millimetres of the vibrating rod have to be covered for damping the vibration. At very light materials the material must cover the vibrating rod completely in order to damp its vibration.
- The *SHT* must not be mounted in or near the filling curtain of the bin. The filling stream could damage the probe and the turbulences of the pneumatic conveying system could lead to false signals.
- In order to keep the ambient temperature of the PCB within the allowed range of -20 to $+70^{\circ}\text{C}$ the housing should be protected from direct sunlight by installing a sun shield.
- The insulation of the bin should not completely cover the temperature insulating tube of the probe. The temperature insulating tube must be free in air for a length of at least 50mm in order to assure sufficient thermal emission.
- In cases where continuous vibrations of the bin are present, the PCB must be installed in a separate housing apart from the vibrations.
- For side mounting it is recommended to screw the *SHT* inside the bin wall with the rod pointing slightly downwards so that material can easily flow away.

- For low level detection a shield, for example an angle iron with side length approx. 50mm, must be installed approx. 150mm over the rod in order to protect the probe against falling material.
- Be sure to install the instrument in an area where no material can settle, (like in edges of the bin).
- The *SHT* must be mounted at a position where it cannot get damaged when the bin gets cleaned or inspected.

Mounting

The *SHT* gets installed by screwing the mounting socket of the instrument into the bin wall by means of a 50 mm open-end wrench.

Do not screw by turning the housing!

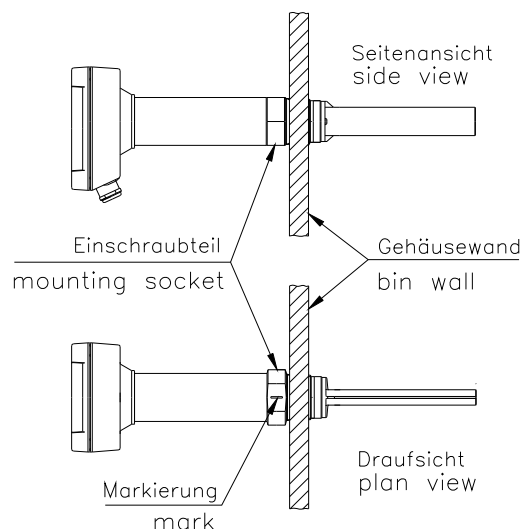
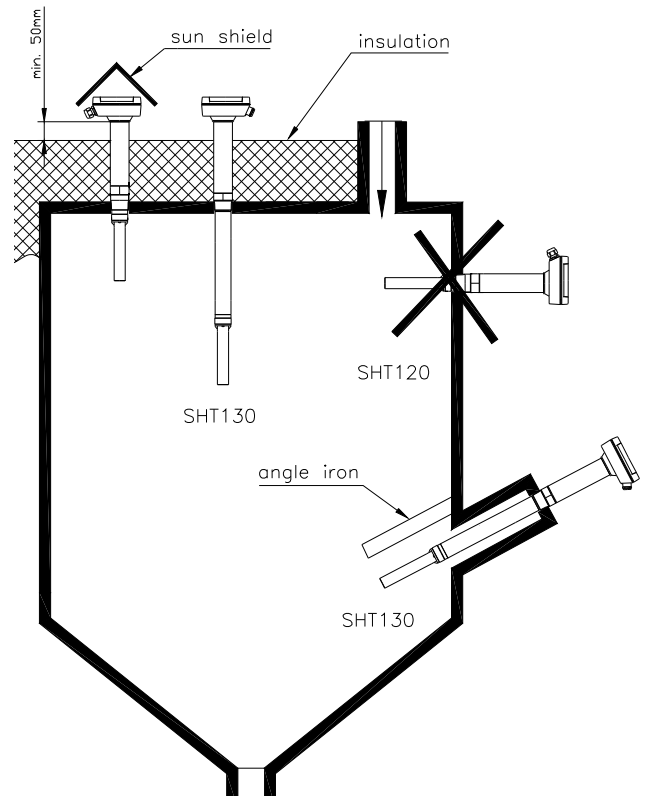
The cable ducts must always point downwards to prevent moisture seeping inside the housing. If the housing is not in the correct position after the probe has been firmly screwed into the bin wall, proceed as follows:

- remove the cover of the housing
- loosen the screw in the centre of the PCB
- turn the housing into the correct position (cable ducts pointing downwards)
- tighten the screw in the centre of the PCB
- replace the cover of the housing.

The *SHT* is normally screwed into the bin wall at the level to be monitored in horizontal direction or with the blade pointing slightly downwards.

The probe must be kept out of the path of falling material to avoid damage. If this is not possible a shield, for example an angle iron, must be installed over the blade. Such a shield must always be installed when the instrument is used for low level indication.

When the probe is inserted horizontally into the bin, it must be turned until the blade is vertically oriented, so that material can flow freely over the blade and does not rest on it causing false alarm. Alignment of the blade is verified by the two slots in the mounting socket. These will be facing up and down when the orientation of the blade is correct.



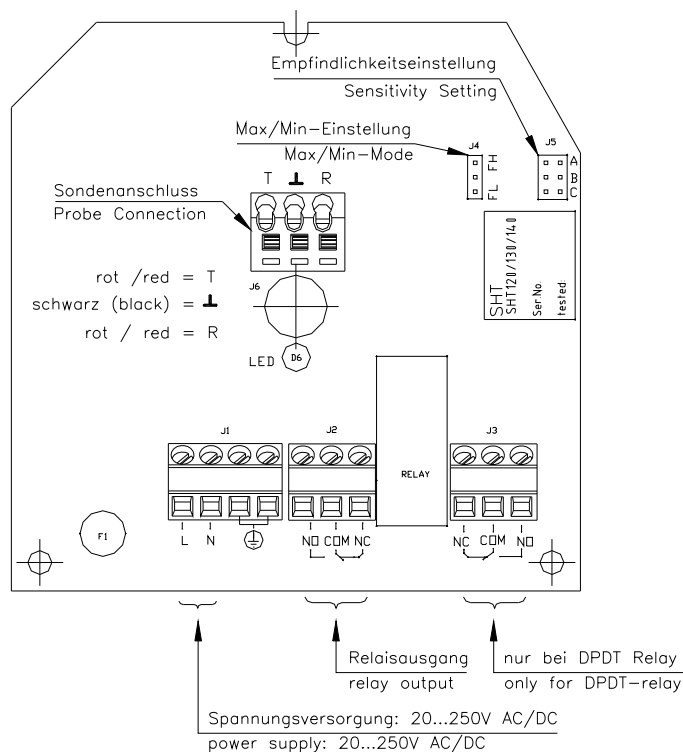
Wiring

Safety Guidelines:

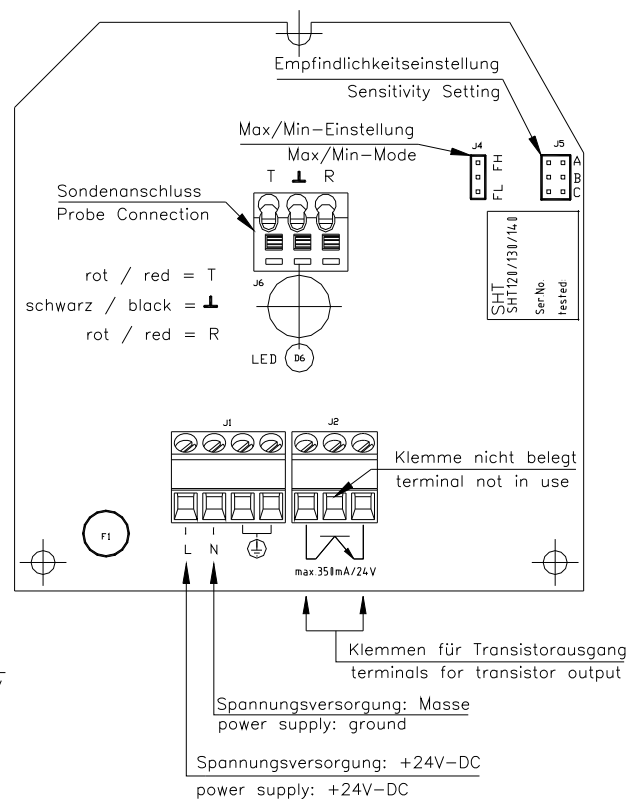
- The instruments must be used only at fixed installation of the cables for supply voltage and output signal.
- Wiring of these instruments must only be performed by qualified technical personnel.
- Before opening the cover make sure that power supply on all wires has been switched off.
- According to DIN EN 61010-1 a main switch for this instrument has to be installed nearby the instrument with which power supply for this instrument **and** its relay output can be switched off. This switch must be marked as main switch of the instrument.
- For power supplies $\geq 50V$ protective earth has to be connected to the terminal on the enclosure.
- If power supply and relay signal do not have the same source the connecting wires of the power supply have to be separated from the connecting wires of the relay by means of wire fasteners in order to prevent the connecting wires of the power supply getting in touch with the relay terminals and vice versa, (which might be possible in case of an error, e.g. brake of a wire).

The cables for supply voltage and output signal get connected to the PCB according the following sketch.
The maximum lead diameter is 2,5mm² for solid wires and 1,5mm² for flexible wires with wire end sleeves.

Wide Range Power supply with Relay Output



Power Supply 24V-DC with Transistor Output



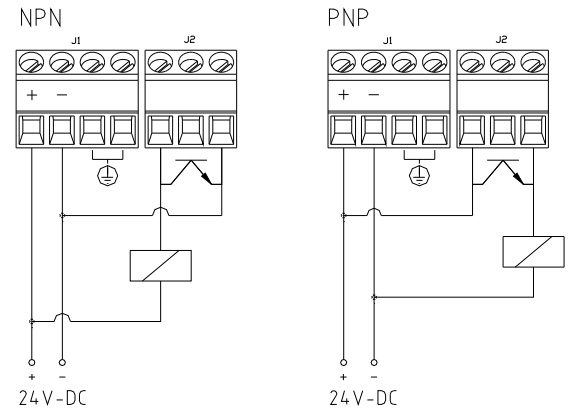
Probe Connection

The three wires of the probe get connected to the PCB via spring cage clamps: push the button of the clamp by means of a small screw driver and insert the wire end sleeve into the clamp, then release the button.

24V-DC with transistor output

Depending on the wiring the transistor output can be either PNP or NPN type, see sketch aside.

The transistor output is potential free. Therefore instead of the supply voltage also other voltages can be switched onto the load. The max switching power of 20W and the max. current of 350mA have to be considered.



Adjustment

Failsafe high (FH) / Failsafe low (FL):
Switching Logic: see following sketch.

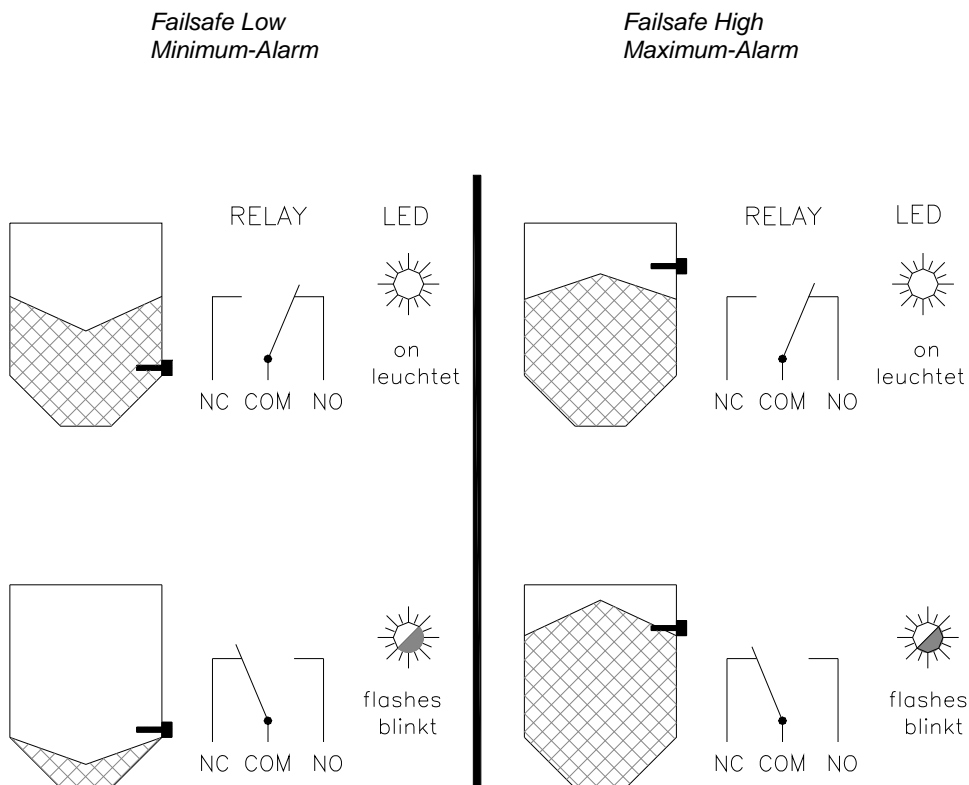
Failsafe high:
high level alarm, jumper in position FH:

the relay is de-energized, transistor blocked, red LED flashing, when the blade is covered by material.

Failsafe low:
low level alarm, jumper in position FL:

the relay is de-energized, transistor blocked, red LED flashing, when the blade is free, (not covered by material).

Output signals alarm as well at power failure. If power fails the LED is off.



Sensitivity:

selectable by jumper (see sketch page 7).

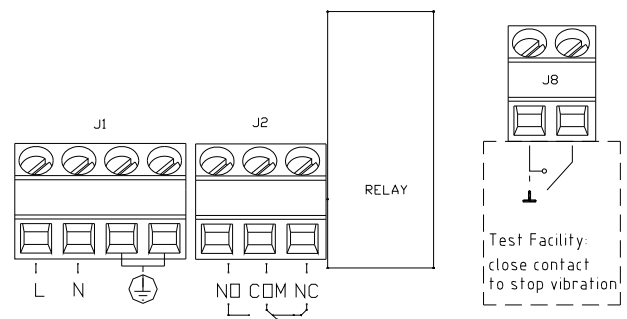
- Pos. A: use this setting only for very light material with densities down to 20g/l, The sensitivity is very high at this setting.
- Pos. B: standard setting, sufficient for most materials.
- Pos. C: for heavy materials with high densities which may form a deposit on the vibrating blade. As the sensitivity of the instrument is low at position C, very light material cannot be detected at this setting!

Options

The following options are available:

- enclosure powder coated
- second cable gland (not available in combination with remote enclosure installation)
- double pole relay (DPDT)
- externally visible LED for output status
- test facility: (not available together with DPDT relay)

Function test to be performed when probe is vibrating:
close contact of clamp J8, the vibration stops and the output switches accordingly. Open contact, the probe restarts to vibrate, the output signal switches back. For installation use a standard pushbutton and connect it to the clamp J8 by a shielded cable. Use the screen of the cable for ground, (left clamp of J8).



Spare Parts

The following spare parts are available:

- vibrating probe
- electronics
- enclosure
- mounting socket with temperature insulating tube (for SHT140 only)

Contact the distributor who has supplied you with this instrument for spare parts or contact PTL directly.

Spare parts must be mounted by qualified personnel only according to the descriptions in this instruction manual.

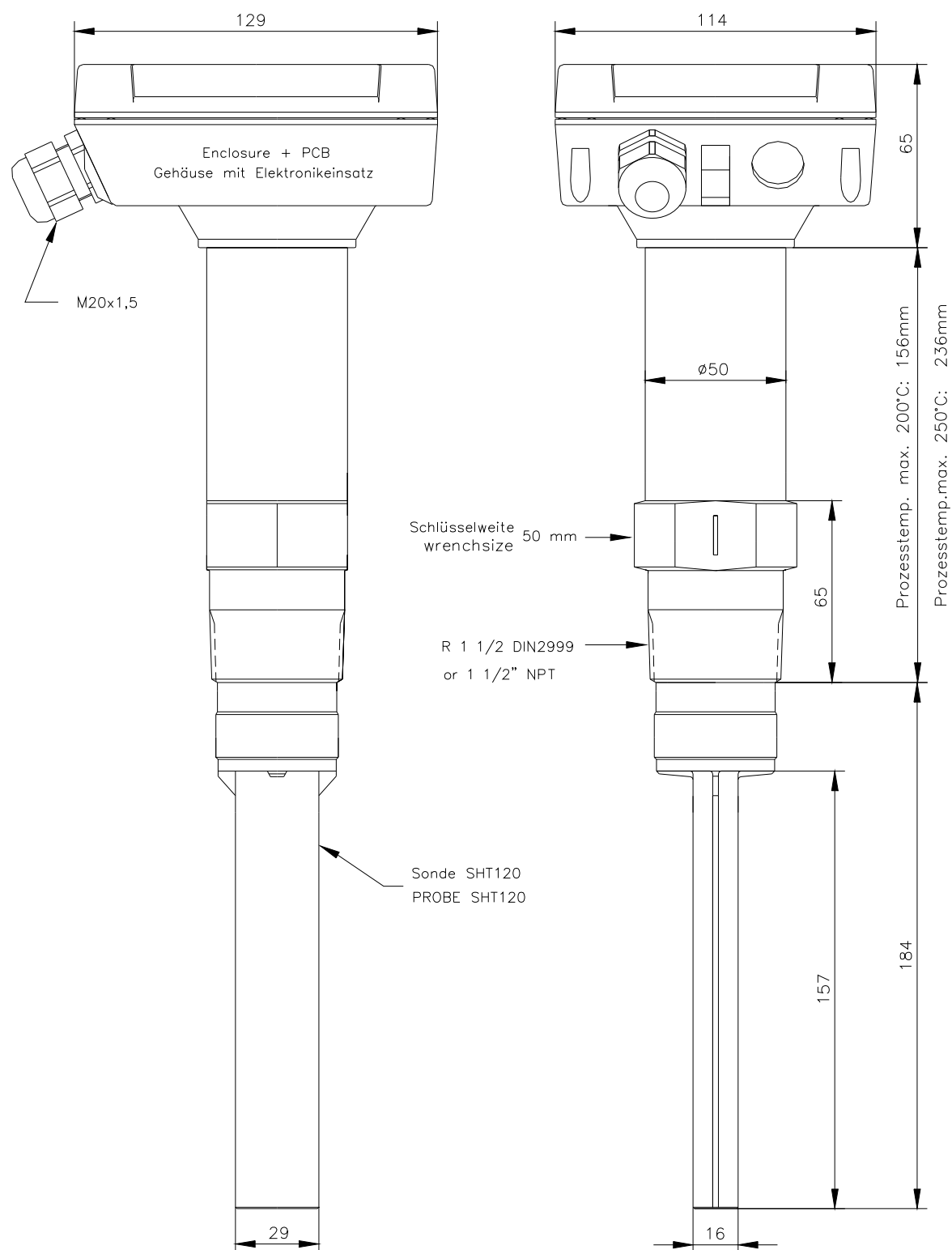
Maintenance

The SHT vibrating type level switches require no maintenance.

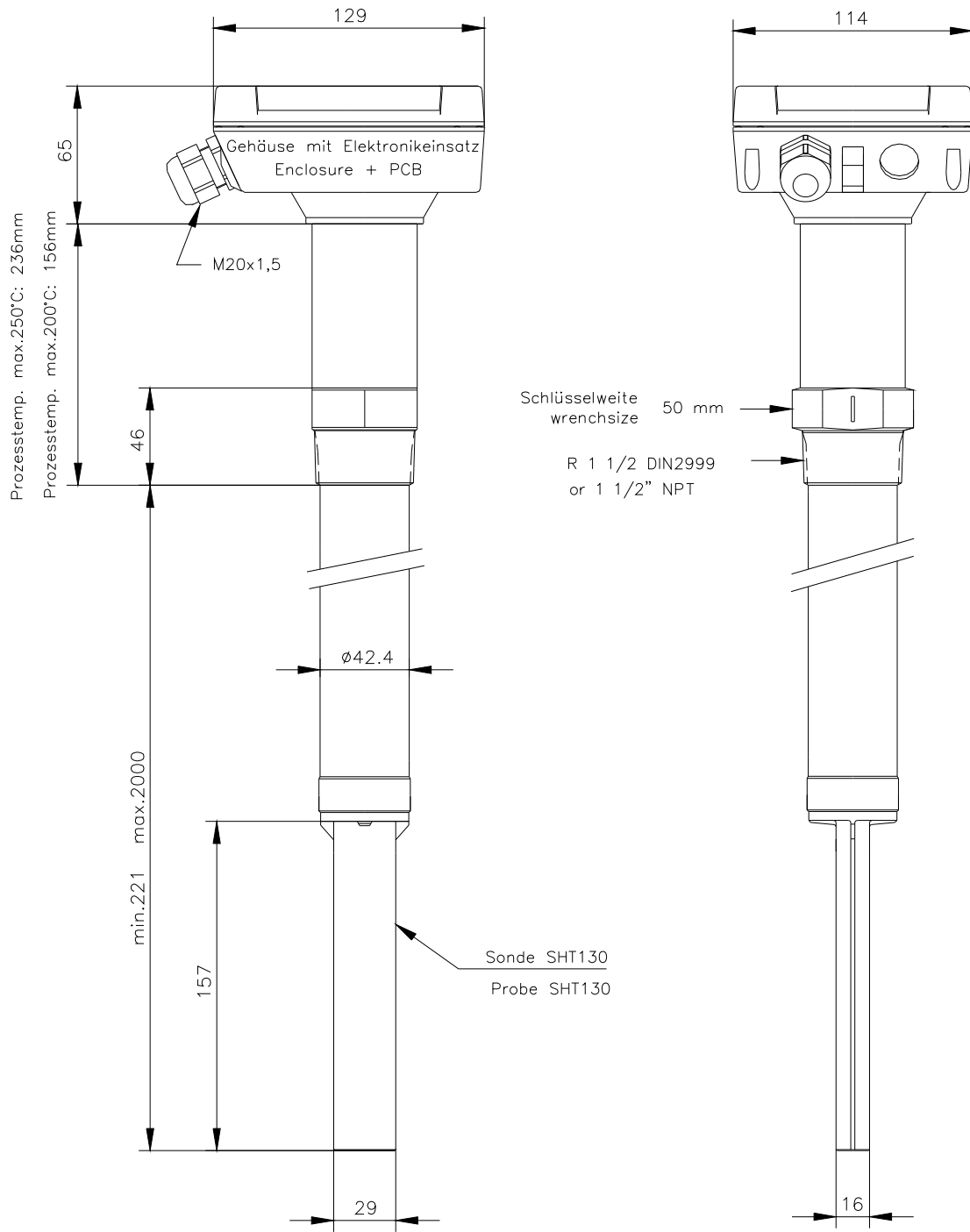
For applications with materials that are a little bit sticky we recommend to clean the vibrating blade of the instrument in certain periods of time. If the instruments are exposed to corrosive atmosphere they must be inspected in certain periods of time regarding corrosion of probe and enclosure in order to ensure the protection of the instruments.

Dimensions

SHT120

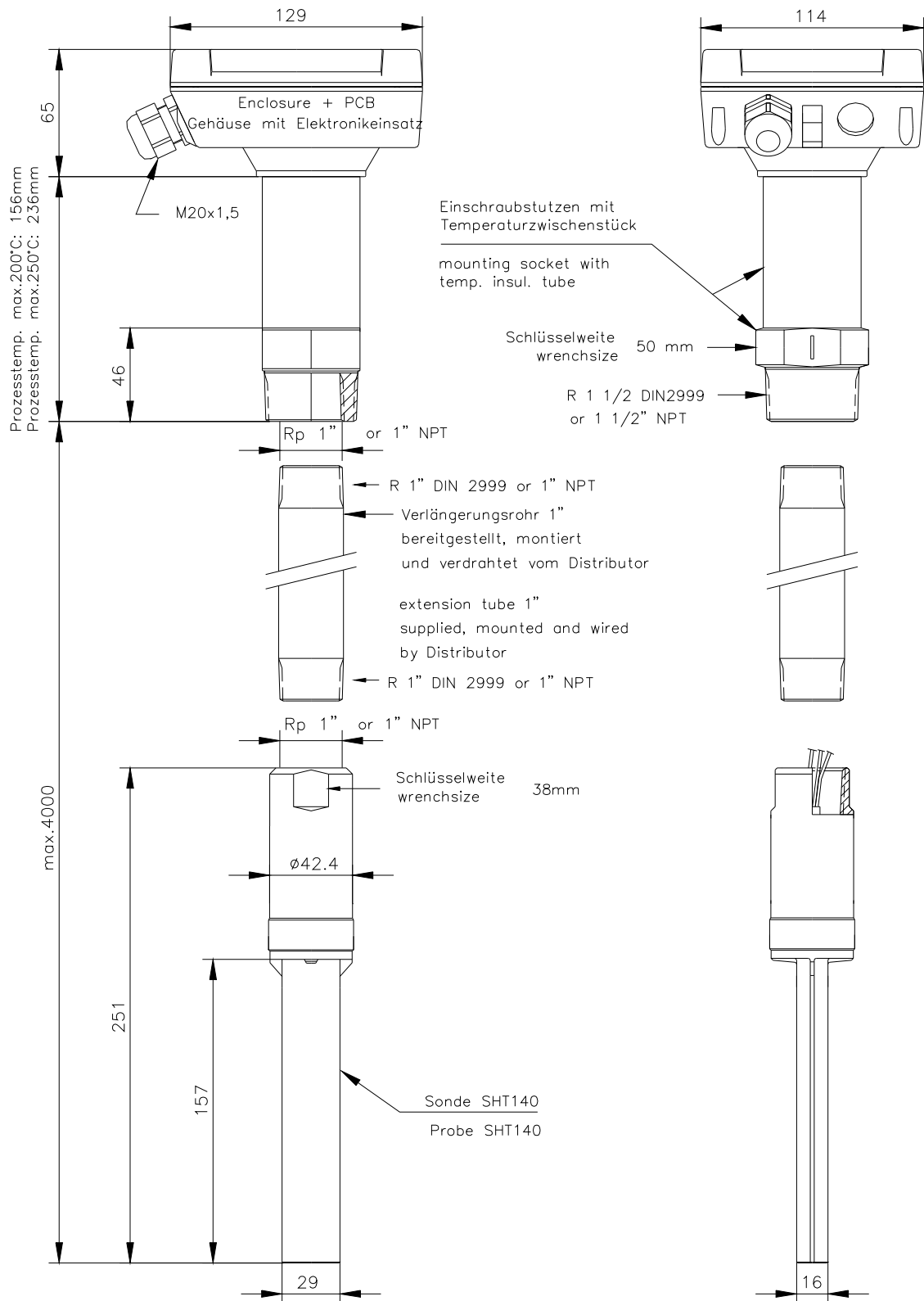


SHT130



Bemassung in mm wenn nicht anders angegeben
all dimensions are in millimeters unless otherwise stated

SHT140

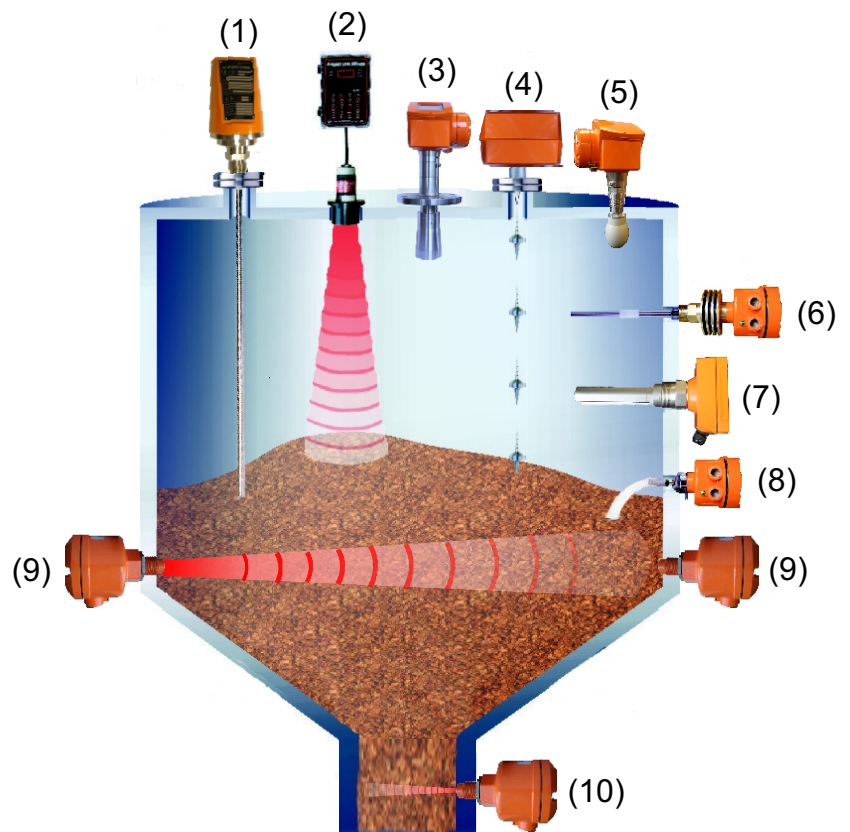


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all dimensions are in millimeters unless otherwise stated

HYCONTROL LEVEL TECHNOLOGIES

Product Range For Solids :-

- (1) TDR Radar For Solids
- (2) Ultrasonic, 'Through Air'
- (2) 2 Wire Ultrasonic Transmitter
- (3) FMCW 2 Wire Radar
- (4) Continuous 'Servo' Level Indicator
- (5) FMCW 2 Wire Radar
- (6) Capacitance Level Switch
- (7) Vibrating Probe Level Switch
- (8) Rotating Paddle Level switch
- (9) Microwave Level Switch
- (10) Doppler Flow Switch



Product Range For Liquids :-

- (1) By-Pass Level Indicator With Radar
- (2) TDR Radar For Liquids
- (3) 2 Wire Ultrasonic Transmitter
- (4) FMCW 'Horn' Radar 2 Wire
- (5) Magnetic Float Switches
- (6) FMCW 2 Wire Radar
- (7) Capacitance Level Switch
- (8) RF Admittance Level Switch
- (9) Side Mounting 316 SS Float Switch
- (10) Tuning Fork Level Switch
- (11) Tuning Fork Level Switch
- (12) Ultrasonics 'Through Wall'
- (13) Mini Magnetic Float Level Switch

