



STOCKTROL

CV210/CV310/CV410/CV510

Single rod vibrating level switch for reliable level control of all kinds of powdered, grained and granular bulk solids.

Also available: **STOCKTROL-SEDIMENT**, a special model of the **STOCKTROL** designed for detecting material, e.g. sand, that has settled in water.

Description

The STOCKTROL is a piezoelectric driven vibration type level switch that detects high, mid and low level in bins, silos and hoppers, filled with grained or powdered materials, (bulk solids). The product can be used for overfill protection, for high or low level alarm and in a special configuration for the detection of interfaces, e.g. sand that has settled in water (special model **SEDIMENT**).

Advantages

Low subsequent costs due to state-of-the-art vibration technique:

- no calibration required: the function is not effected by material characteristics, e.g. dielectricity; therefore these products are ideal to use at applications where material changes are common
- no readjustment required: the function is not affected by environmental changes like temperature, pressure, humidity ect.
- no wear-out, no sealing problems: the vibration technique includes no moving parts
- no maintenance required
- durable

High performance and reliability

- The single rod design with its sharp edged vibrating blade prevents bridging of material typically associated with the dual rod „tuning fork“ design
- the sword shaped blade lets material easily flow and thus prevents material build-up
- material sticking on the container wall has no influence on the function of the STOCKTROL as only the tip of the vibrating blade is sensitive and not the base
- no false alarms due to rat-holing: the probes get driven with very low energy only for which reason they do not dig hollow spaces inside the material in which they could vibrate
- the high quality and a sophisticated fine-tuning of the vibrating system enable the products to reliably detect extremely light materials with densities down to 20 grams per litre; special models allow even lighter materials with densities down to 10 grams per litre



highest quality

- strong stainless steel construction
- enclosure aluminium diecast IP66 / 67
- wide range power supply with relay output and fail safe function, alternatively DC-versions with 3-wire transistor output and 2-wire 8/16mA-output available
- designed and manufactured at PTL in Germany according to DIN EN ISO9001:2008 with the background of over 25 years of experience in the field of vibrating level switches.

Function and Application

The vibrating system of the STOCKTROL gets forced to vibrate on its resonance frequency by a piezo crystal drive. If filling material, (bulk solids), covers the vibrating blade of the probe, its vibration gets damped. This is sensed by the electronic circuit causing a binary output signal to switch. When the blade gets uncovered due to declining level, the probe restarts to vibrate and the output switches back.

The STOCKTROL is designed for the detection of all kinds of dry bulk solids, powdered, grained or in granular state. Its robust design and its high sensitivity



make it perfect for a wide range of applications: heavy materials in rough environments as well as lightest materials and powders. The special model **SEDIMENT** is used in special applications where settled material, e.g. sand, has to be detected in water.

Typical applications are mentioned below:

tea (leaves)	powdered milk	wood shavings
salt	frozen chips	chalk
flour	beans	styrofoam
spices	sugar	cellulose
soda	sweets	glass ground
pellets	coffee beans	granular plastics
animal food	coffee ground	powdered clay
carbon black	peanuts	polystyrene
chemicals	tobacco	gravel
foundry sand	grain	sawdust

Models

➤ Standard model: **STOCKTROL CV210**

The standard model CV210 has a fix insertion length of approx. 190 mm and gets installed to the silo from top or from side for both high or low level detection.

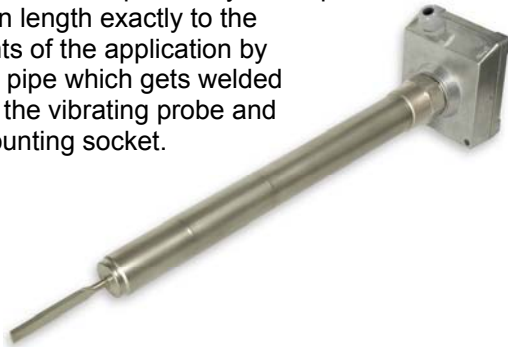


Connection to the container is made via thread 1 1/2" DIN, (equals BSPT), or NPT. Material sticking onto the container wall has no influence on the function of the CV210 as only the vibrating blade is sensitive and not the 90mm long base which is located between blade and mounting thread.

➤ Pipe extension welded: **STOCKTROL CV310**

If the application requires longer insertion lengths the CV310 is the right choice.

This model offers the possibility to adapt the insertion length exactly to the requirements of the application by means of a pipe which gets welded in between the vibrating probe and the 1 1/2" mounting socket.



This way insertion lengths between 290 and maximum 2000mm can be accomplished. The CV310 is suitable for top mounting. Side mounting is possible for insertion lengths shorter than 1 meter and if the extension pipe is adequately supported. The CV310 gets connected to the silo by thread 1 1/2" DIN, (equals BSPT), or NPT.

Alternatively the CV310 is available with process connection "**Tri-Clamp**" according to DIN32626

➤ Threaded pipe extension: **STOCKTROL CV410**

The CV410 provides the possibility of insertion lengths up to 4,0 meters. The extension is performed by a 1" pipe with threads on both ends. This pipe simply gets screwed in between the vibrating probe and the 1 1/2" mounting socket.



As no special equipment is necessary for making the extension it is possible that the customer obtains and mounts the extension tube at the site which helps to save costs for equipment and transport. The CV410 is suitable for top mounting. Side mounting is possible for insertion lengths shorter than 1 meter and if the extension pipe is adequately supported. The CV410 gets connected to the silo by thread 1 1/2" DIN, (equals BSPT), or NPT.

The type of the 1" inside thread for the extension tube, (DIN or NPT), equals the type of the 1 1/2" outside thread for process connection.

➤ Flexible cable extension: **STOCKTROL CV510**

The CV510 is a cable extended model.

The polyurethane sheathed, steel rope reinforced cable allows insertion lengths up to 20 meters.

A 1 1/2" mounting socket, (DIN or NPT), connects it to the silo.



The CV510 helps to reduce shipment costs. Long insertion lengths fit into compact boxes for shipment.

➤ Remote electronics installation

There are applications where it is necessary to keep the electronics away from the silo, e.g. if very high temperatures or heavy vibrations and/or shocks are present.



For these applications the remote electronics installation can be used. It is available for all STOCKTROL models. The standard length of the cable between probe and electronics is 2 meters. Longer cables are possible.

➤ High temperature model

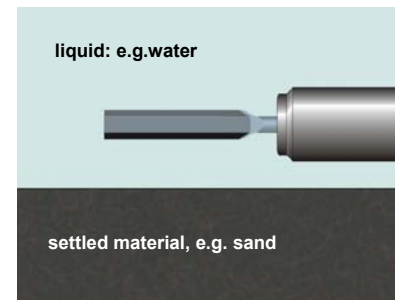
The standard version of the STOCKTROL is designed for process temperatures up to max. 80°C. For higher process temperatures the special model "HT" must be used. It can withstand process temperatures up to 150°C and is available for CV210, CV310 and CV410.



To protect the electronics from too high temperatures, a temperature insulating tube gets mounted in between the mounting socket and the enclosure. Instead it is as well possible to install the electronics at a place with lower ambient temperature by using the remote electronics installation.

➤ special model SEDIMENT

The special model SEDIMENT is designed to detect material that has settled in liquids. A typical application is the detection of sand and dirt in front of pumping systems. The probe vibrates in the liquid: if the sediment reaches the vibrating blade, it damps the vibration and causes the output to switch.



Options

The following options are available:

- second cable gland M20 x 1,5 (not available in combination with remote electronics installation)
- enclosure powder coated grey, blue, orange or beige
- test facility: function test to be performed when probe is vibrating: the vibration can be stopped by closing a contact. The output of the electronics switches accordingly enabling the test of all further signals and actions.
- process connection "Tri-Clamp" according to DIN32626, (available for CV310 only)
- externally visible LED for indicating output status (not available in combination with ex approval)
- ex approvals according ATEX directive 94/9/EC for CV210, CV310, CV510
- special material AISI316 for probes
- special model "Extreme Sensitivity": senses material down to 10g/l

Approvals

- CE-approval for all instruments according to the following directives:
 - EMC-directive 2004/108/EG
 - Low Voltage-directive 2006/95/EG
- Ex-approval according to ATEX 94/9/EC available for CV210, CV310 and CV510:
 - Dust-Ex: ATEX II 1/2D for zones 20/21/22
 - Gas-Ex: ATEX II 1G Ex ia IIB T4 Ga
or 1/2G Ex ia IIB T4 Ga
for zones 0, 1 or 2

For detailed information see page 6 and 7.

Specifications

- Enclosure:** die cast aluminum, (option powder coated)
 protection IP 66 and IP 67 (IP65 for remote electronics installation)
 1 cable gland M20 x 1,5 (option: second cable gland)
- Electronics:** **Wide range power supply 20 ... 250V AC/DC with relay output:**
 two potential-free change-over contacts (DPDT)
 max. switching datas AC: 250V-AC, 8A, 2000VA, $\cos\phi = 1$
 max. switching datas DC: 8,0A at 24V-DC / 1,5A at 48V-AC
 min. switching datas DC: 24V / 100mA
 Power consumption: < 3 VA
- or: **24V-DC power supply with transistor output:**
 potential free, NPN or PNP type
 350mA @ 24V-DC, shorttime max. 1A, max. power 20W
 power loss max. 3V, max. leakage current 100 μ A; short circuit proof
 power consumption at blocked transistor: < 1 W
- or: **power supply 20...30V-DC with 8/16mA-output (2-wire):**
 power consumption: < 0,5 W
 The probe can be supplied by the supply and analyzing unit CV2000AE e.g.
 Gas-Ex approval with protection concept *intrinsic safety* is available for this version.
- Time Delay: 1 second from stop of vibration
 2 to 5 seconds for start of vibration
- Indication: red LED on PCB (option: externally visible)
- Probe:** Material: stainless steel 1.4301 / AISI 304 (optionally 1.4571 / AISI316)
 connection: thread 1 1/2" DIN 2999 (equals BSPT) or 1 1/2" NPT
 resonance frequency: approx. 290 Hz
 max. load upon the end of the blade: 100 N
 max. tensile load of cable CV510: 200 kg
- Material to be detected:** non sticky bulk solids
 min. density 20 grams per litre
 (down to 10g/l at special model "Extreme Sensitivity")
 grain size from powder to max. 20mm
- Max. pressure inside bin: 10 bar
- Ambient temperature electronics: -40°C ... + 70°C (max. +60°C for ATEX approved models)
- Process temperature: standard: -40°C ... + 80°C (CV510: max. 70°C)
 probe HT: -40°C ... + 150°C



Products with ATEX Approval: Protection Level, Marking, Zones

➤ **Dust-Ex, Protection by Enclosure: CV210StEx, CV310StEx, CV510StEx**

The vibrating level switches CV210StEx/CV310StEx/CV510StEx can be used in the presence of combustible dust according to ATEX directive 94/9/EC: equipment group II, category 1/2D or 1/3D for remote electronics installation.

Marking according to directive 94/9/EC:

The vibrating level switches CV210StEx / CV310StEx / CV510StEx have a nameplate on the enclosure showing the following data:
 e.g: CV210 StEx with wide range power supply, standard unit, (no high temp)

	PTL Hermann GmbH Kellermatten 3 - 79618 Rheinfelden - Germany - info@ptl-hermann.com www.ptl-hermann.com
	STOCKTROL CV210DIN-StEx Power Supply: 20...250V AC/DC Ser.No.: xxxxxxStEx Relay Output: max. 8A @ 250V Power Consumption: 3 VA II 1/2D Ex ta/tb IIIC T95°C Da/Db IBEU03ATEX1033 IP6X T _{amb} (Gehäuse, Zone 21): -20...+60°C T _{process} (Sonde, Zone 20): -20...+80°C

Allocation of Categories, EPL and Zones:

Component	Category	EPL Equipment Protection Level	can be used in Zone
Probe	1 D	Da	20, 21 or 22
Enclosure with PCB	2 D	Db	21 or 22
Remote Electronics Installation	3 D	Dc	22

Protection according to EN 60079-31:

- protection by dust-tight enclosure IP6X
- limited surface temperatures of the apparatus

Maximum surface temperatures:

Zone	max. permissible amb. temperature	max. surface temperature at failure	heat up due to failure
Zone 20	80°C for standard units 70°C for CV510 150°C for high temperature (= process temp.)	80°C for standard 70°C for CV510 150°C for high temp	0 K 0 K 0 K
Zone 21/22	60°C	95°C	+35 K

The 35K maximum heat up of the enclosure surface results on 25K heat up of the electronics at failure and additional 10K due to heat conduction via the probe in cases the process temperature is higher than 60°C.

➤ **Gas-Ex, Protection Concept Intrinsic Safety: CV210Exi, CV310Exi, CV510Exi**

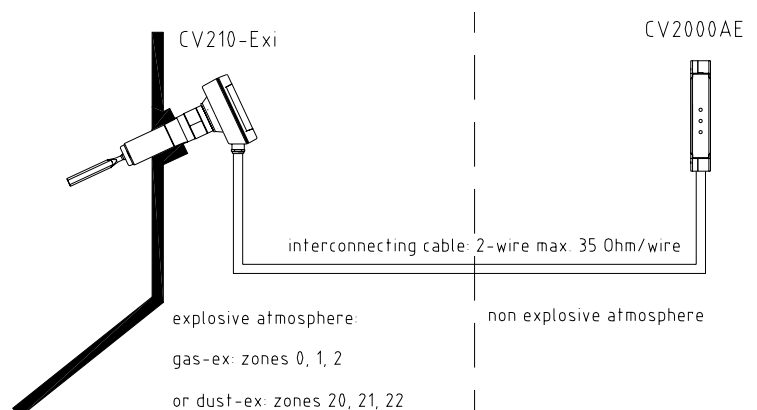
The vibration type level switches STOCKTROL CV210Exi / CV310Exi / CV510Exi have approval according to ATEX directive 94/9/EC for the use in explosive atmospheres as follows:

- Gas-Ex: II 1 G Ex ia IIB T4 Ga or II 1/2G Ex ia IIB T4 Ga
- Dust-Ex: II 1 D Ex ia IIIC TX Da or II 1/2D Ex ia IIIC TX Da

Architecture

The units come with a split architecture allowing the probe with low energy 8/16mA-output to be installed within the explosive atmosphere whereas the supply and analyzing unit CV2000AE[Exi] with wide range power supply and relay output must be installed at the non explosive area.

For installation it is important to know that the associated apparatus CV2000AE[Exi] is not galvanically isolated. Special requirements according to EN60079-14 have to be considered.



Applied standards: EN60079-0, EN60079-11, EN60079-26, EN60079-31.

Marking according ATEX directive 94/9/EC:

The units have a nameplate showing the following details:

e.g. Cat. 1 apparatus CV210Exi

	PTL Hermann GmbH Kellermatten 3 - 79618 Rheinfelden - Germany		www.ptl-hermann.com info@ptl-hermann.com
		STOCKTROL CV210DIN-Exi Ser.No.: xxxxxxExi IBExU09ATEX1005X	Ui=23,7V-DC Ii=167mA Pi=958mW Ci: neglig.; Li: neglig. Ta=-20...+60°C IP6X
	II 1G Ex ia IIB T4 Ga II 1D Ex ia IIIC TX Da	II 1/2G Ex ia IIB T4 Ga II 1/2D Ex ia IIIC TX Da	

Allocation of Categories and Zones:

Apparatus type	Marking	Component	Category	for Gas-Ex Zones	for Dust-Ex Zones
Cat.1-apparatus	1G Ex ia IIB T4 Ga 1D Ex ia IIIC TX Da	Probe	1G or 1D	0, 1 or 2	20, 21 or 22
		Encl. with electronics	1G or 1D	0, 1 or 2	20, 21 or 22
Cat.1/2-apparatus	1/2G Ex ia IIB T4 Ga 1/2D Ex ia IIIC TX Da	Probe	1G or 1D	0, 1 or 2	20, 21 or 22
		Encl. with electronics	2G or 2D	1 or 2	21 or 22

Allowed ambient temperatures Tamb:

Apparatus type	Unit type	Temp.-class	max. surface temperature	Tamb at electronics	Tamb at probe without temp. insul. tube	Tamb at probe with temp. insul. tube
Cat.1-apparatus	Standard units CV210Exi/CV310Exi/ CV510Exi	T4	Probe: 60°C Encl.: 75°C	-20 ... +60°C	-20 ... +60°C	combination not available
Cat.1/2-apparatus	Standard units CV210Exi/CV310Exi/ CV510Exi	T4	Probe: 60°C Encl.: 85°C	-20 ... +60°C	-20 ... +80°C	combination not available
	High temp. units CV210Exi-HT CV310Exi-HT	T4	Probe: 108°C Encl.: 85°C	-20 ... +60°C	combination not available	-20 ... +108°C *
	High temp. units CV210Exi-HT CV310Exi-HT	T3, T2, T1	Probe: 150°C Encl.: 85°C	-20 ... +60°C	combination not available	-20 ... +150°C *

* listed temperatures already include reduction to 80% according to EN1127-1 chpt. 6.4.2

Technical data referring to intrinsic safety:

- Ui=23,7V, Ii=167mA, Pi=958mW, Li: negligible, Ci: negligible
- Power supply and signal conversion is made by the associated apparatus CV2000AE[Exi].

Special requirements according to EC-Type Examination No. IBExU09ATEX1005X:

- For functional reasons the probes are connected to earth. The enclosure of the apparatus must be connected to the equipotential bonding system.
- Special requirements for associated apparatus without galvanic isolation according EN 60079-14 have to be observed.
- In case the units are used as category 1 apparatus in zones 0 or 20 the units must be installed in a way that the generation of sparks due to friction or strokes on the aluminium housing is eliminated.
- The allowed temperature range and the mounting instructions according to the instruction manual have to be observed.
- In case the units are used as category 1 / 2 apparatus at gas explosive atmospheres the 1 1/2" thread which serves for process connection and separation of zones 0 and 1 must be sealed in a way that protection IP67 according to EN60529 is achieved.

➤ CV2000AE[Exi]

The CV2000AE is a supply and analysing unit for the vibration type level switches STOCKTROL CV210/310/410/510 with 8/16mA output. For the intrinsically safe probes CV210Exi / CV310Exi / CV510Exi the CV2000AE [Exi] has approval according to ATEX 94/9/EC as the associated apparatus.

Function:

The CV2000AE supplies the connected vibration type level switch with a DC voltage. Depending on the level inside the bin, (probe covered with filling material or not), the electronics of the probe takes more or less current. This current change is sensed by the CV2000AE and gets converted into a relay output. The interconnecting cable between probe and CV2000AE gets monitored permanently for short circuit and line break. In case of short circuit or line break an additional relay output switches.



Technical Data:

Enclosure: Polyamid enclosure for carrier rail mounting 35mm according to EN50022 dimensions 114x35x99mm; protection IP20

Electronics: Power Supply: 20...250V AC/DC; max. 3VA
 Output power supply for probe: 20V-DC (without load)
 Relay Output: one potential free change over contact (SPDT), max. 5A/250V
 Failure indication: detection of line break and short circuit by add. relay max. 5A/250V
 Connection cable to probe: 2-wire, max. 35 Ohms per wire
 Indication: yellow LED: power supply
 green LED: relay status
 red LED: failure indication (line break and short circuit)

Temperature: -20°C ... + 60°C

Approvals:

The CV2000AE meets the following European directives: - EC EMC directive 2004/108/EC
 - EC low voltage directive 2006/95/EC




The following standards have been applied: - EN 61326 05.04
 - EN 61010-1



The CV2000AE [Exi] has approval according to ATEX 94/9/EC as the associated apparatus for intrinsically safe vibration type level switches as follows:

Gas: II (1) G [Ex ia Ga] IIB

Dust: II (1) D [Ex ia Da] IIIC

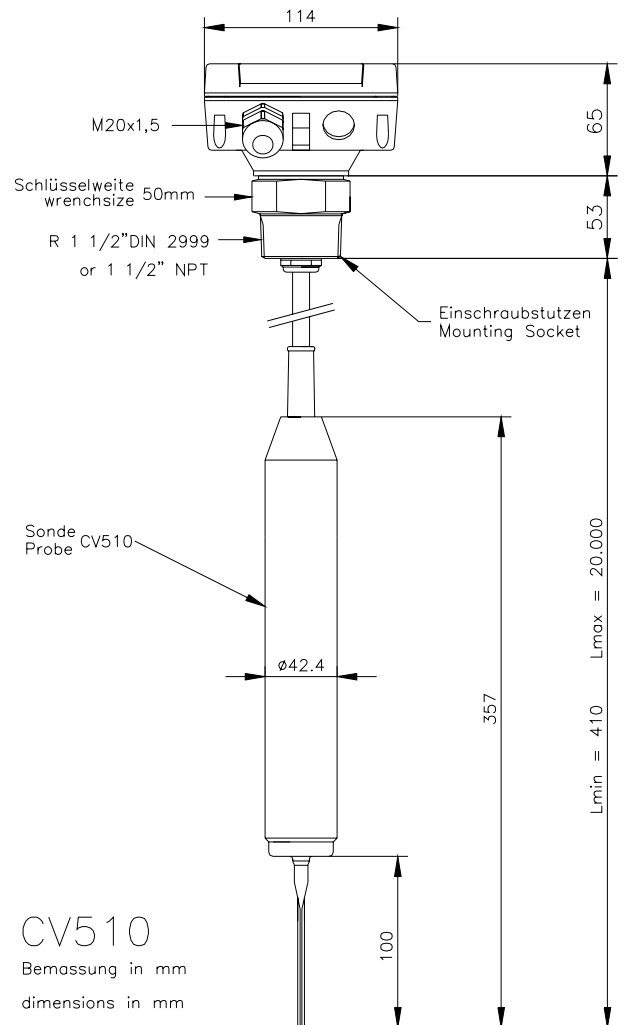
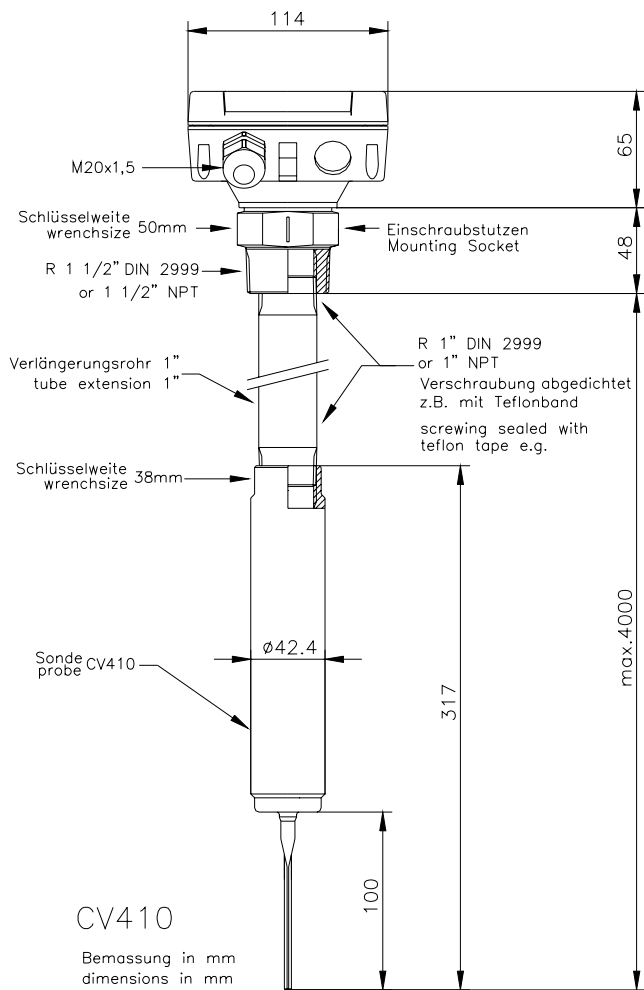
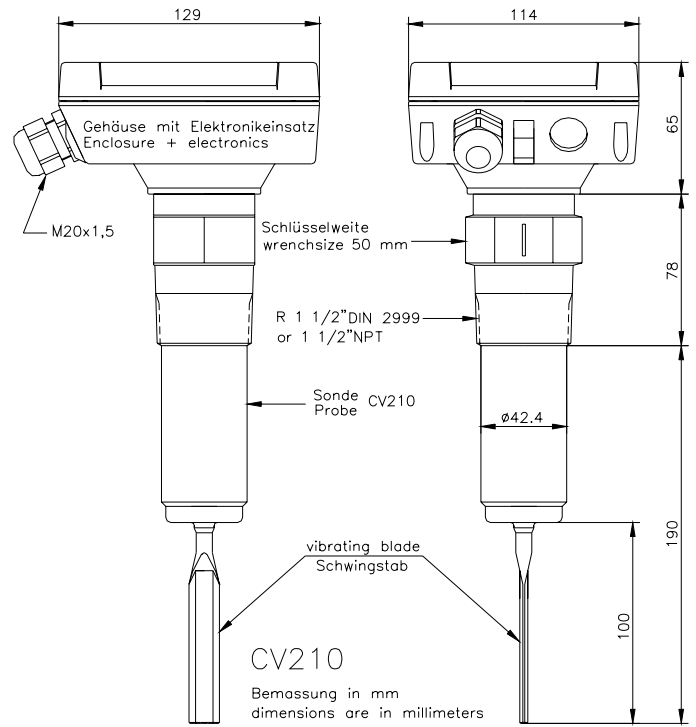
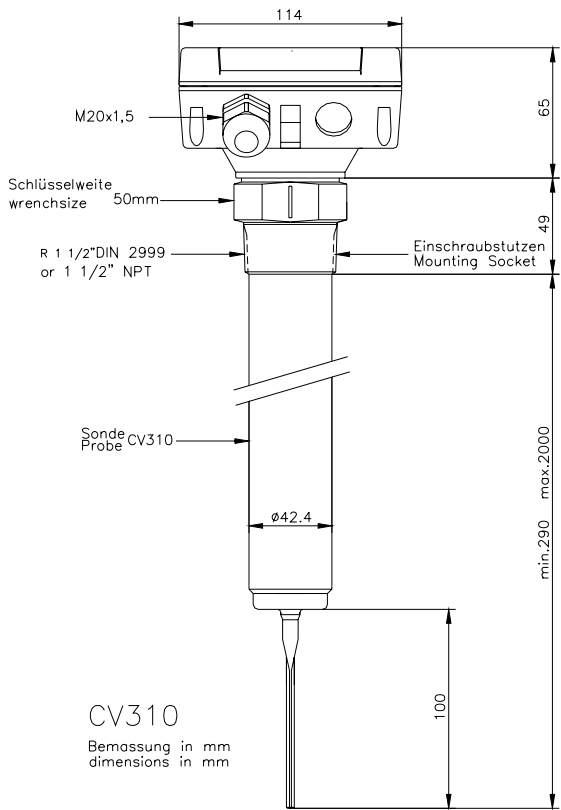
	PTL Hermann GmbH Kellermatten 3 - 79618 Rheinfelden - Germany - info@ptl-hermann.com	www.ptl-hermann.com
	CV2000AE [Exi] Ser.No.: xxxxxxExi	Power Supply: 20...250V AC/DC Power Consumption: 3VA U ₀ =23,7V; I ₀ =166mA; U _m =375V C ₀ =390nF; L ₀ =4,3mH, Kennlinie linear
	II (1) G [Ex ia Ga] IIB II (1) D [Ex ia Da] IIIC	IBExU09ATEX1006 X Ta=-20 ... +60°C

Special requirements according to EC-Type Examination No. IBExU09ATEX1006X:

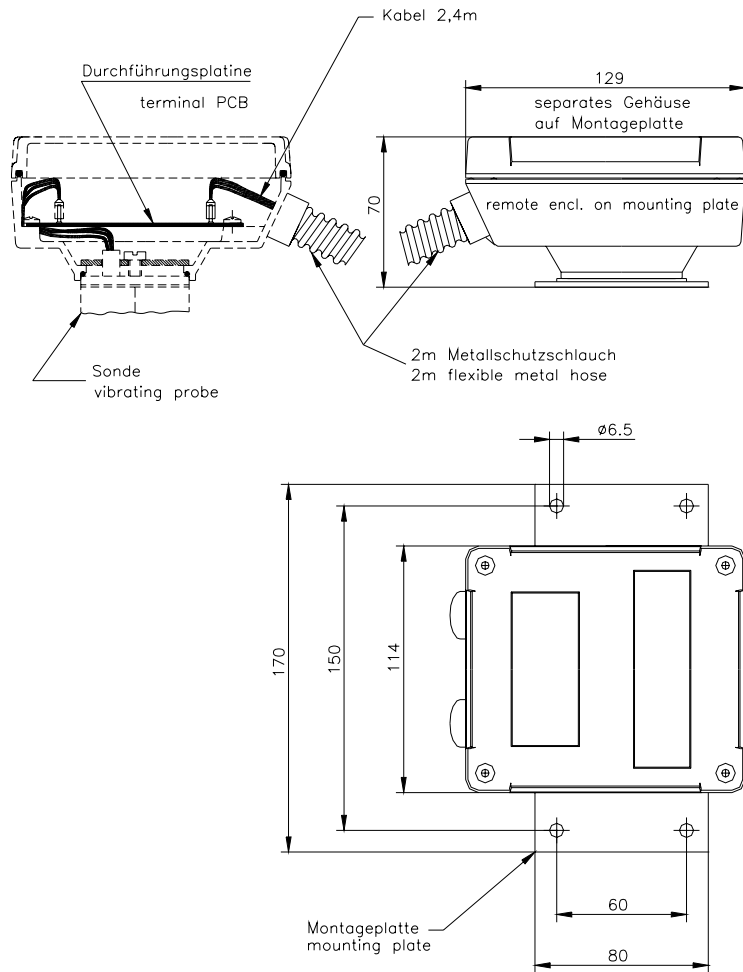
According to the EC-Type Examination Certificate of the CV2000AE [Exi] the following special requirements have to be fulfilled:

At the installation the additional requirements for associated apparatus without galvanic isolation according to EN 60079-14 have to be considered.

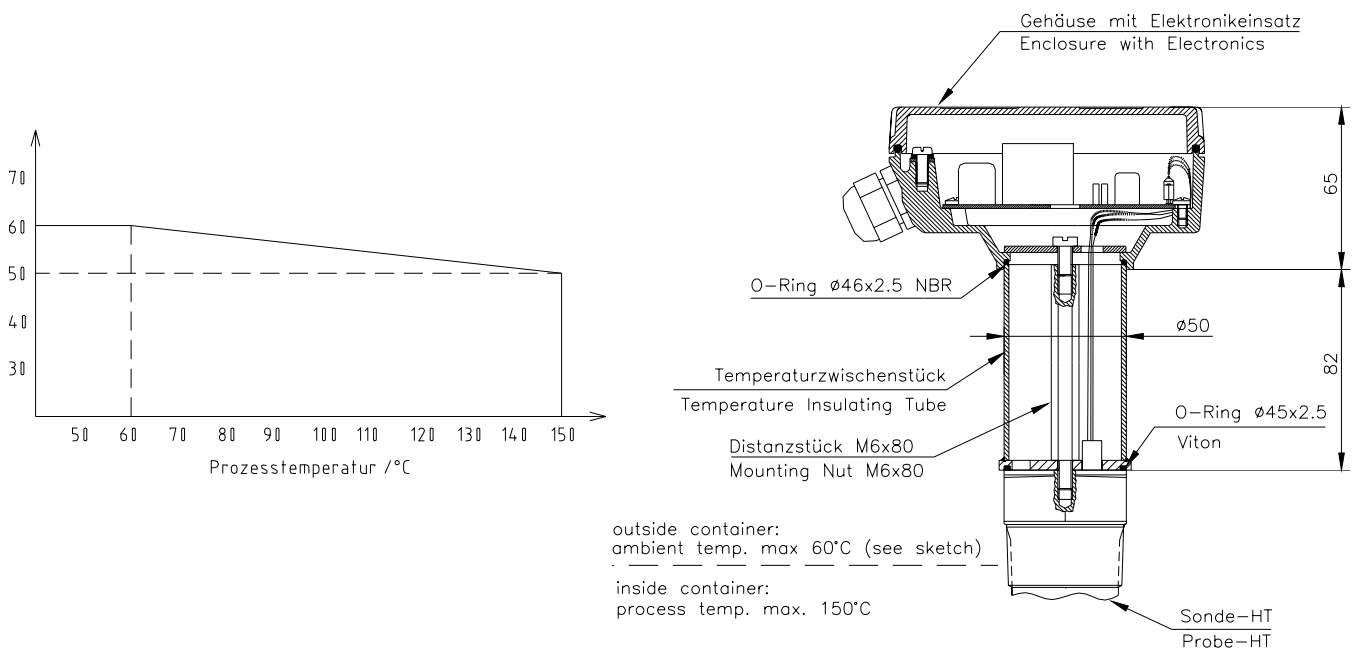
Dimension



➤ Remote Electronics Installation



➤ Special Model HT with Temperature Insulating Tube



➤ CV2000AE[Exi]

