

**TDS CONDUCTIVITY PROBE
IN-LINE CONDUCTIVITY MEASUREMENT
(Two-pole cells with ATC Pt 100)
SPS-20**

DESCRIPTION

The ADCATROL SPS-20 conductivity probe is used to measure the conductivity (TDS) of the superheated water of boilers or condensate.

The probe is used in conjunction with the ADCATROL BCS controller and VPC valve series.

Two-pole cells for conductivity measurement of water in steam generators or boilers.

It is provided with Pt100 sensor for ATC temperature compensation in order to obtain an accurate reading of conductivity while operating with controllers provided with ATC input such as BCS-210 series.

The water contains impurities in form of dissolved solids and solid in suspension whose concentration increases when it is vaporized. Water treatment can reduce impurities to a certain level but it does not eliminate them completely and in certain conditions it might even increase them. As steam starts to be produced, the concentration of total solid in suspension (TDS) increases in the boiler's water. In case the TDS concentration is too high, dissolved salts concentration will be increased. This effect can contaminate the steam and cause damage to the system due to corrosion and salts incrustation of on thermal transference surfaces, (among other problems).

This high concentration is harmful and it is not acceptable in applications where steam is used for treatment of food, drinks and sterilization processes.

In order to limit the concentration of TDS to a suitable level a certain amount of the water of the boiler must be periodically eliminated (purge action) and replace by treated water.

SPS-20 probe together with BCS controller has been developed to purge all types of steam generators based on the measurement of TDS in the water of boiler. It activates the purge valve with a controlled cadence to avoid that an excess of purges generate energy losses and high consumption of treated water.



MAIN FEATURES

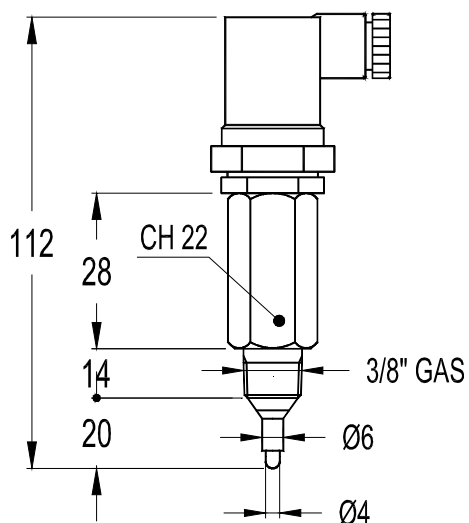
- Cell constant $K=2$
- Range $100 \mu\text{S/cm-1}$ to $10000 \mu\text{S/cm-1}$
- Two-pole electrodes in SS316L
- Body in SS316 and PFA (PEEK in option)
- Pressure 25 BAR (max. 32 bar)
- Temperature $200 \text{ }^\circ\text{C}$ (max. $240 \text{ }^\circ\text{C}$)
- Temperature compensation (ATC) by Pt100 (optional Pt1000)
- Calibration by buffers in the controller
- Compact design for piping installation
- Process connection DIN 43650 (IEC 4440)
- Resistance to vibrations: max. 5 G RMS
- Protected against aggressive environments

OPTIONS: Flanged or threaded probe chambers
USE: Superheated boiler water and condensate
AVAILABLE MODELS: SPS-20
SIZES: DN 3/8" and DN 1/2"
CONNECTIONS: Screwed ISO 7/1 RP (BS21)
 ANSI B1.20.1 (NPT)
INSTALLATION: Horizontal or vertical installation

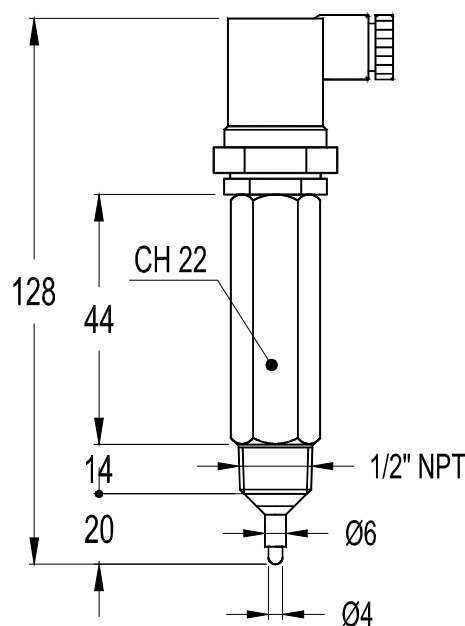
ORDER REQUIREMENTS : SPS-20 probe for TDS with Pt100 sensor for measurements up to 10000 $\mu\text{S}/\text{cm}^{-1}$, process connection 3/8" GAS or 1/2" NPT.

LIMITING CONDITIONS	
Maximum boiler pressure	32 bar
Maximum temperature	240 °C
Maximum ambient temperature	80 °C
Minimum distance from boiler tubes	20 mm
Maximum cable length (from probe to controller)	20 to 30 m
Minimum conductivity	100 μS
Protection rating	IP65

MATERIALS	
DESIGNATION	MATERIAL
Body	AISI 316L / 1.4404
EC electrodes	AISI 316L / 1.4404
Insulation	FPA (PEEK on request)



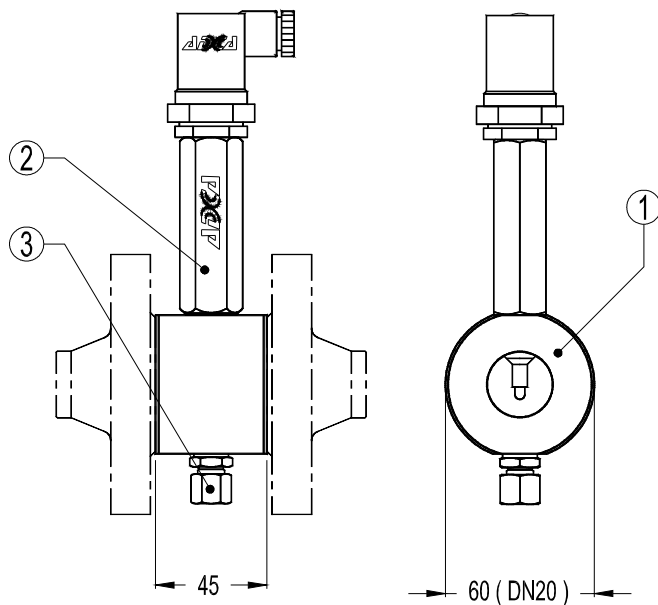
WEIGHT: 0,12 Kg



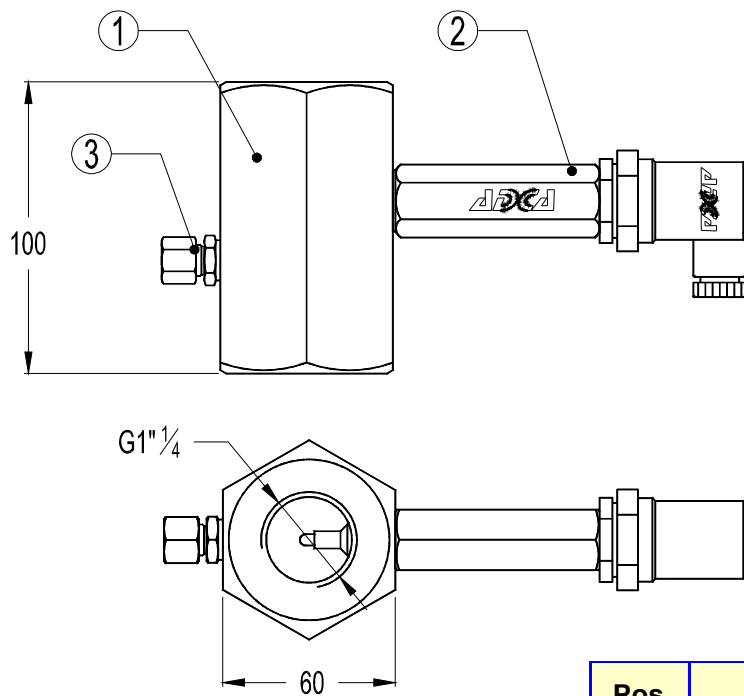
WEIGHT: 0,16 Kg

INSTALLATION: Can be fit into a "T" connection or into our standard chamber providing that the probe is always in contact with the water.
 Any metallic parts near the probe must be at a minimum of 20mm from the central end pole.

TYPE F-2020 FLANGED SENSOR CHAMBER (SANDWICHED DESIGN)

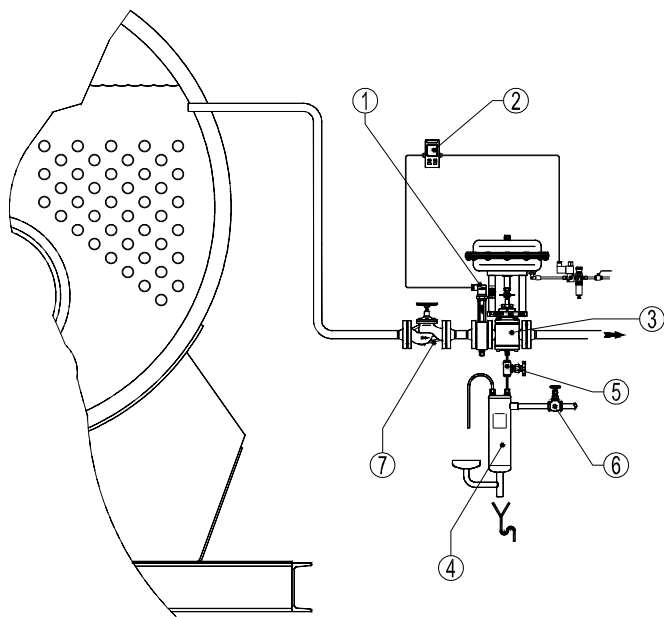


TYPE T-2032 THREADED SENSOR CHAMBER



Pos.	Designation
1	Sensor chamber
2	SPS-20 Conductivity probe
3	Compression fitting for sample collection (optional)

TYPICAL INSTALLATION FIRETUBE BOILER AND PNEUMATIC ACTUATED VALVE



OPERATION

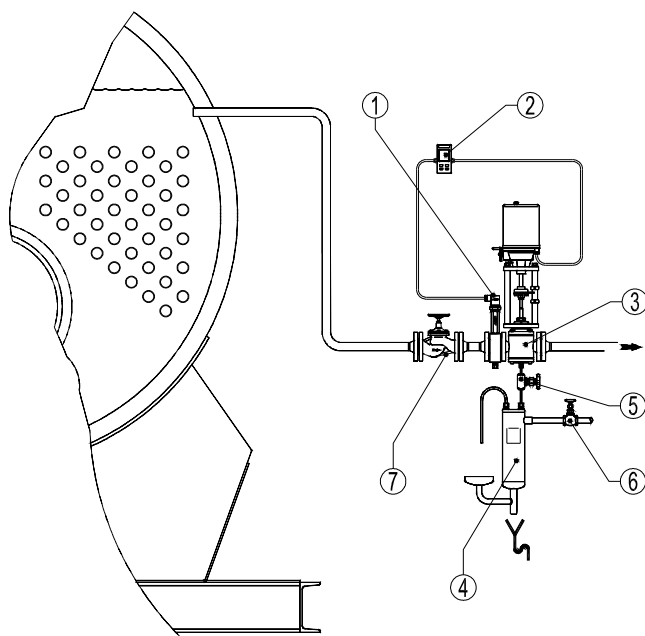
The VPC blowdown valve is programmed to open periodically in order to purge a certain amount of water. The BCS controller will then measure the electrical conductivity of boiler water (closed related to the TDS) and compare it with the set point selected in the controller. It close the valve after the purge if the measured value is lower, or it will keep the valve open until the measured value stay below the set point, if it is higher.

To avoid energy waste due to boiler stand-by or low load, it is recommended to relate the system operation to the burner firing.

It is also recommended to install a heat recovery system (flash vessel, heat exchanger, etc) before connecting the wasted water to the BEX.

Pos.	Designation
1	Adcatrol SPS-20 TDS probe with chamber
2	Adcatrol BSC-210 TDS controller
3	Adcatrol VPC-32 Blowdown valve
4	Adca SC32SS Sample cooler
5	Adca NV-400 Needle valve
6	GV32B Bronze globe valve
7	Adca VF Bellow sealed globe valve

TYPICAL INSTALLATION FIRETUBE BOILER AND ELECTRIC ACTUATED VALVE



Note: Sensor chamber is rotated 90° for catalogue only.

WIRING DIAGRAM	
EXAMPLE OF CONNECTION CONTROLLER BCS-210	
1	Power supply 85...265 V ac/dc
2	optional: 12 or 24 V ac/dc
3	+
4	-
RS-485 Modbus RTU communication	
5	+
6	-
Auxiliary power supply 24 Vdc 40 mA	
7	+
8	+
Common to 24 Vdc and AO1 - AO2 outputs (option)	
9	+
10	+
AO1 Analog output 4-20 mA of Conduct. (option)	
11	+
AO2 Analog output 4-20 mA of Temp. (option)	
12	⊗
DO1 Blow-down output of TDS. SPST Relay	
13	⊗
Common	
14	⊗
DO2 Hi and Lo Limit output of EC. SPST Relay	
15	⊗
ATC by Pt100 input (Pt1000 in option)	
16	⊗
Performing input for sensors of:	
2-poles Conductivity EC probes	

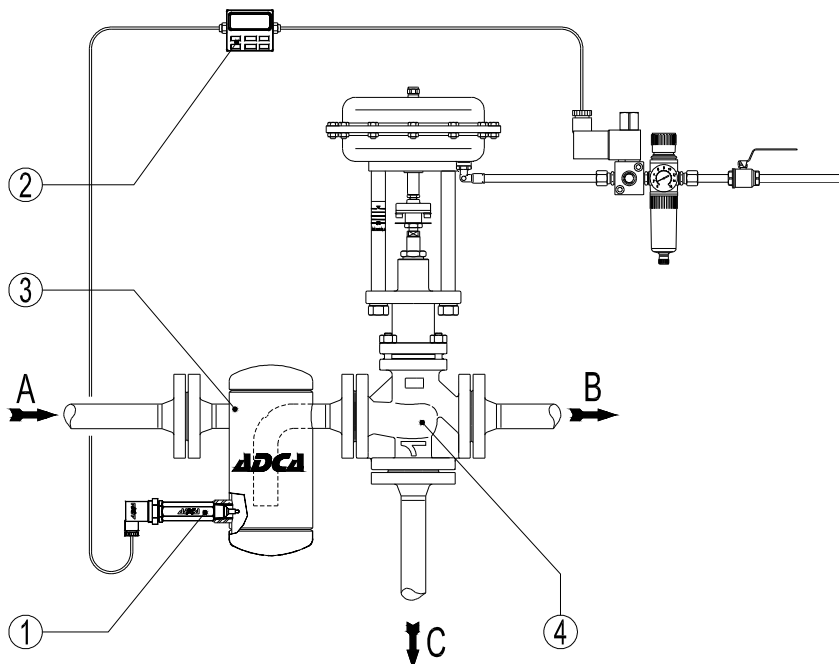
TYPICAL INSTALLATION
WATER TUBE COIL BOILER – PROBE INSTALLED IN THE CONDENSATE RETURN LINE

OPERATION

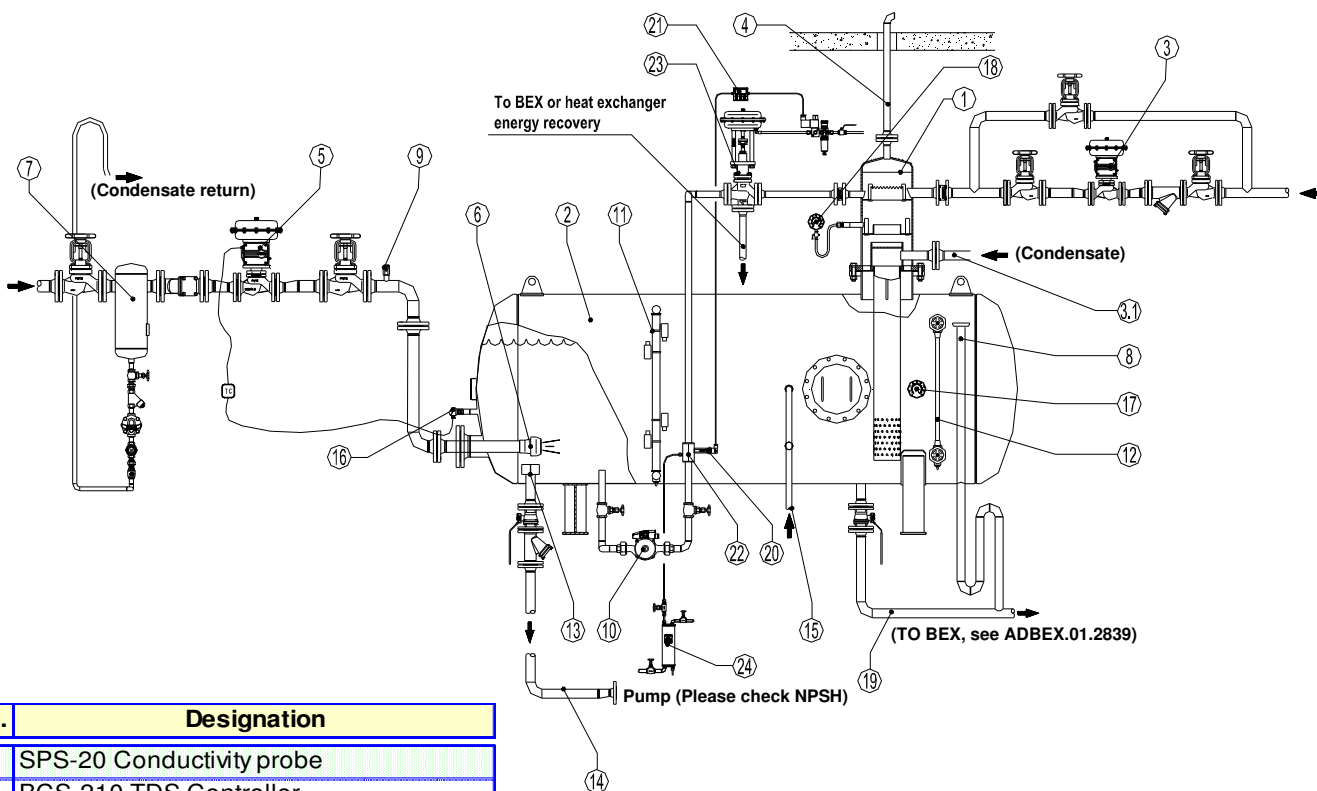
The BCS controller (2) is programmed to continuously measure (1) the electrical conductivity of boiler return condensate (closed related to the TDS) and, compare it with the set point selected in the controller, it will invert the flow of the three way valve (4) from B to C if the measured value is higher, or keep the valve flow from A to B until the measured value exceed the set point .

The chamber (3) guaranties that the probe (1) is always in contact with the measured medium (condensate).

It is recommended to install a heat recovery system (flash vessel, heat exchanger, etc) before connecting the wasted condensate (C) to the BEX.



TYPICAL INSTALLATION
WATER TUBE COIL BOILER – PROBE INSTALLED IN THE RECIRCULATING PIPE



Pos.	Designation
20	SPS-20 Conductivity probe
21	BCS-210 TDS Controller
22	Probe chamber
23	Adcatrol PV253 3 way control valve
24	SC32 Sample cooler system

Complete description: ADADGV.06.3676

OPERATION

Similar to the previous one but in this case the pump (10) is recirculating the make-up water across the probe (22).