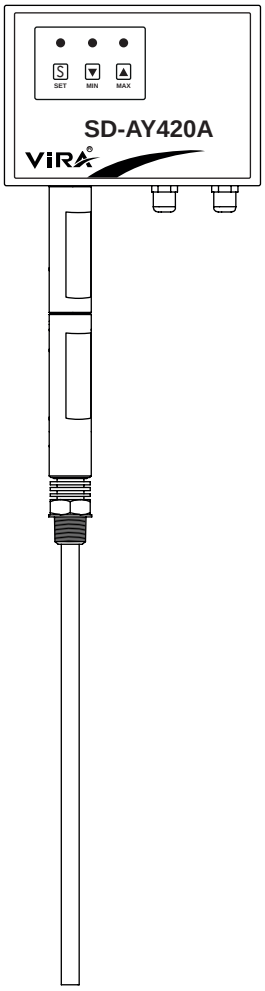
SD-AY 420A
Capacitance Level Transmitter

Installation, Operating and Maintenance Instructions



Local regulations may restrict the use of this product to below the conditions quoted.
In the interests of development and improvement of the product, we reserve the right to change the specification without notice.

EN
ENGLISH

1. Safety Information

The equipment may only be installed, electrically connected and commissioned by suitable persons with the relevant instruction/training.

Maintenance and modification may only be performed by authorised staff who have undergone specific instruction/training.

The terminal blocks of the equipment are live during operation!

There is a risk of serious injury due to electrical shock!

Always cut off the power supply to the equipment before installing, removing or connecting terminal blocks!

The name plate specifies the features of the equipment. Do not comission or operate any item of equipment that does not have its own specific name plate.

1.1 Directives and Standards

The SD-AY 420A capacitive level transmitter is type approved to the TUV. The TUV "EN 12952 and EN 12953 " describes the requirement for water level control and limiting equipment.

LV (Low Voltage) Directive and EMC (Electromagnetic Compability)

The equipment conforms to the requirements of the Low Voltage Directive 2014/35/EU, the EMC Directive 2014/30 EU.

ATEX (Atmosphere Explosive)

The equipment must not be used in potentially explosive atmospheres, in accordance with European Directive 2014/34/EU.

Danger!

When loosing the level electrode steam or hot water might to escape. This presents the danger of severe scalds to the whole body.

Do NOT remove the level probe unless the boiler pressure is verified to be 0 bar.

The level switch becomes hot during operation.

Risk of severe burns to face, hands and arms.

Before carrying out installation and maintenance work make sure that the equipment is cold.

Tools

Before starting work, make sure that you have suitable tools and consumables available.
Use only genuine Vira replacement parts.

Temperature

After isolation, let the temperature to cool down to avoid danger of burns.

Freezing

Required precautions must be taken to protect products in environments where they may be exposed to temperatures below freezing point.

Pressure

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Do not assume that the system has depressurized even when the pressure gauge indicates zero. exposed to temperatures below freezing point.

Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

Residual Hazards

The external surface of the product may be very hot. Take essential care when removing the product from an installation.

Hazardous Environment

Plant rooms are explosion-risk areas. There may be a lack of oxygen, dangerous gases, extremes of temperature, hot surfaces, fire hazards excessive noise, and moving machinery.

Protective Clothing

In order to be protected against the hazards of chemicals, high temperature, radiation, noise, falling objects, and dangers to eyes and face, anyone around requires protective clothing suitable in the plant room.

Supervision

All work must be carried out or supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Operation Instructions.

Disposal

Unless otherwise stated in the Installation and Operation Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

Returning Products

When returning products to “Vira Isı ve Endüstriyel Ürünler A.Ş” the customers must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk.

Safety Note – Specific for level control and alarm (limiting) Products in steam boilers

•Two independent low water limiting / alarm systems must be installed on steam boilers. Level probes must be installed in separate protection tubes/chambers, with sufficient clearance between the tips, and earth.

•Each probe must be connected to an independent controller. The alarm relays must isolate the boiler heat supply at low alarm status.

•A high water alarm may be part of the water level control, or a separate system. An independent high water alarm system must be fitted if it is considered a safety requirement. In this case, the relays must simultaneously isolate the feedwater supply and the boiler heat supply at high alarm status. All boiler water limiters/alarms require regular functional testing.

•A suitable water treatment system must be used to ensure continuous safe and correct operation of the control and alarm (limiter).

Products / systems must be selected, installed, operated and tested in accordance with:

- Local or National standards and regulations (EN 12952, EN 12953, TS 2025 and etc.)
- The requirements of Approval Authorities (Local or International)
- Boiler Insurance Bodies
- Boiler Manufacturer's Specifications
- Consult a competent water treatment company.

Note: SD-AY 420A is a level transmitter and it does not have self monitoring function. Therefore, it should not be considered as an independent level limiter. An additional self monitoring level limiter must be used.

2. General Information

2.1 Intended Use

The level transmitters SD-AY 420A is designed for continuous level monitoring in steam boilers, pressurized hot-water systems, as well as condensate and feedwater tanks.

2.2 Function

The SD-AY 420A level transmitter is a compact solution combining a level measurement electrode with a pre-amplifier and an integrated electronic module housed in the terminal box.

Using the capacitance measurement principle, the transmitter accurately converts liquid level changes into a 4-20 mA current signal. The measurement range is determined by the length of the electrode rod, ensuring flexibility for various applications.

The transmitter can be installed inside steam boilers, tanks, or external level pots. For installations inside boilers or tanks, a protective tube is required to ensure optimal performance and reliability (refer to the Examples of Installation section, page 10 and 11).

Additionally, the SD-AY 420A can be combined with a Vira level limiter system (SMH 1000 or SML 1000) for safety-critical applications such as low water limiting or high-level alarms. Both components can be installed together in a shared protective tube or within an external level pot.

Typical Applications

- Pressurized steam systems
- Hot-Water plants
- Condensate and feedwater tanks

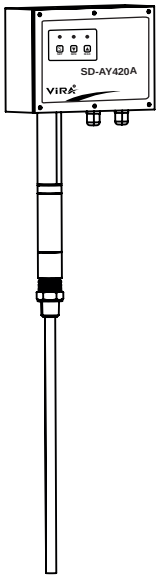


Figure 1 : Perspective View of SD-AY 420A

2.3 How It Works?

The probe is designed with a fully insulated metal rod encased in durable PTFE sheathing to prevent contact with the liquid. It operates on the principle of capacitance measurement, where changes in the water level cause variations in capacitance. An increase in water level results in a proportional increase in the output signal.

The integrated preamplifier measures the capacitance and transmits it as a DC signal to the controller. Control and switching levels can be easily configured within the controller to suit the application requirements.

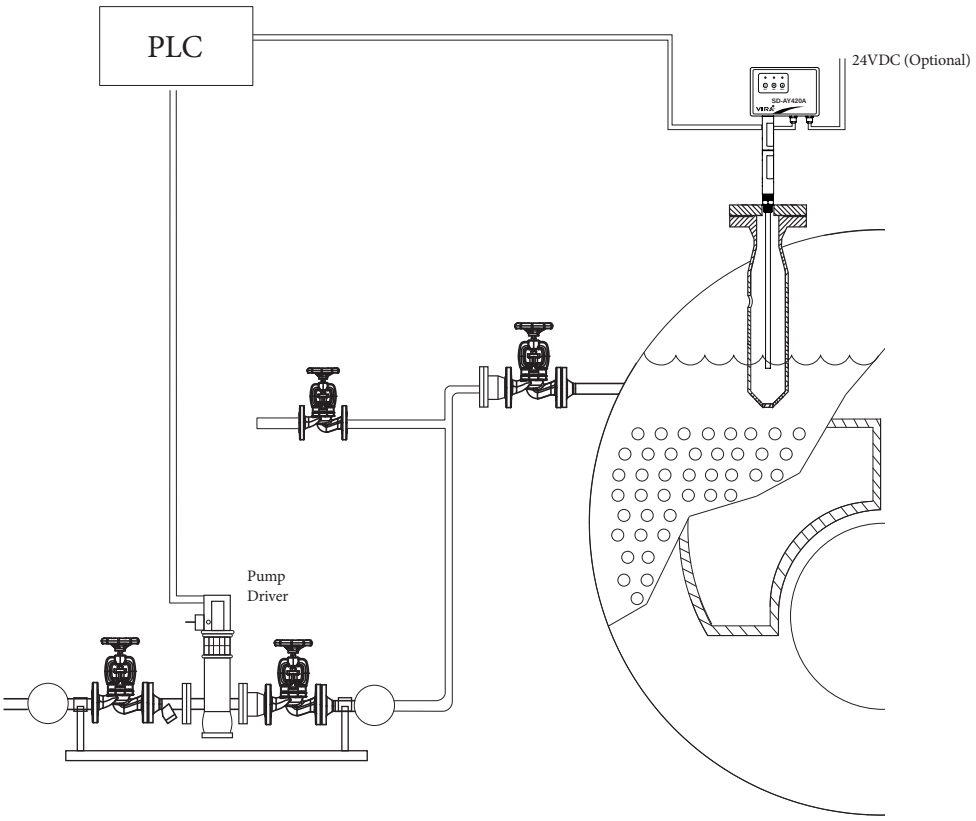


Figure 2 : SD-AY 420A System application

Scope of Supply

- 1 *SD-AY 420A Capacitive Level Transmitter
- 1 *Installation and Maintenance Instructions
- 1 *Joint Ring

3. Technical Information

3.1 Technical Information of Mechanical Part

Service Pressure and Temperature
PN 40, 32 Bar g at 239°C

Mechanical Connection
BSPT 1/2"

Maximum Ambient Temperature : 75°C
Minimum Ambient Temperature : 5°C

Maximum cold hydraulic test pressure : 78 Bar g

Materials

Screw-in Body **:** Stainless Steel
Connector Housing **:** PA

Electrode

Available Lengths **:** 300 to 1500 mm
Sensing Depth **:** Probe Length - 25 mm (dead zone)

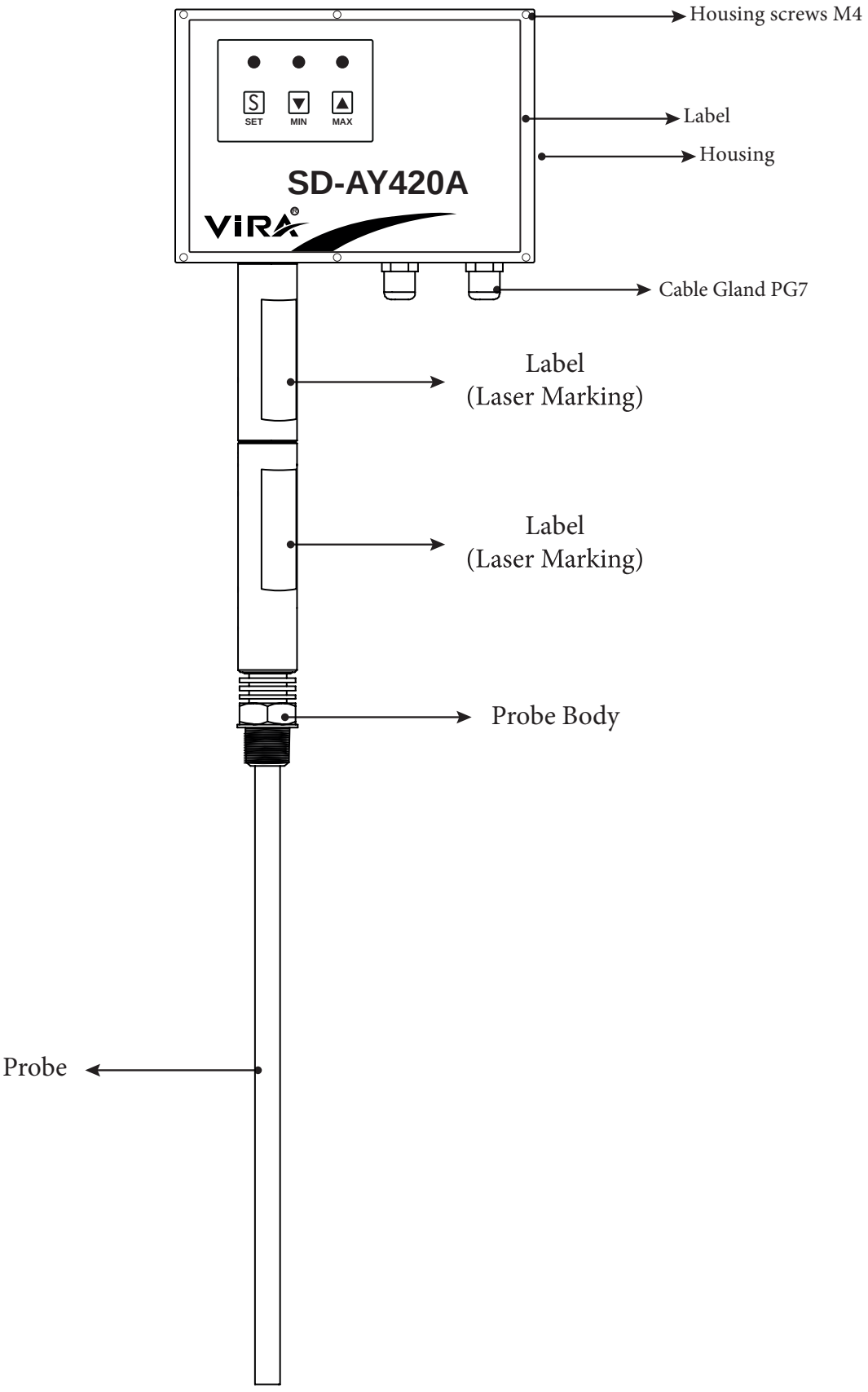
Note : Probe length includes 25 mm “dead zone” at its tip.
The probe shall not be cut to length.
Probe is recommended to be installed vertically.
In vertical installations it is allowed to be installed up to 45° inclined from the vertical and 500 mm probe length.

Maximum Cable Length **:** See controller installation, operating and maintenance instructsions.
Minimum Conductivity **:** 5 µS/cm

3.1 Technical Information of Electrical Part

Supply Voltage	24VDC, (Optional: 230VAC +%5 / -10%, 50/60 Hz)
Power Consumption	2.5 W
Electrical Connection of Compact Level Transmitter	2 * PG 7 Gland
Sensitivity	> 5 µS/cm (water conductivity at 25 °C),
Outputs	4-20 mA Analog Output
Displays and Controls	3 Leds, 3 Buttons
Housing	Aluminum
Degree of Protection	Housing: IP 65 to EN 60529
Weight	Approx. 1.8 kg with 500 mm measuring range (dependent on length of electrode)
Ambient Temperature	0 °... 75 °C
Transport Temperature	–20 ... +80 °C
Storage Temperature	–20 ... +75 °C
Relative Humidity	max. 95%, no moisture condensation
Approvals	CE Type Approval, EMC and LVD, Machine Directive

Table 1 : Technical Informations



Weights (approximate) in kg															
Probe length	**400**	**500**	**600**	**650**	**700**	**750**	**800**	**900**	**950**	**1000**	**1 050**	**1 100**	**1 200**	**1 300**	**1 500**
Weight	2	2	2.4	2.4	2.4	2.6	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.2

Table 2 : Length vs Weight

4. Installation

4.1 Installation of Level Probe

A protection tube with minimum 80 mm nominal bore is required in steam boilers or any other tank where turbulence is likely. This tube should be as long as possible and at least long enough to cope with the longitudinal expansion of the probe at maximum operating temperature.

Note : Allow 20 mm clearance for probes up to 750 mm and 38 mm for longer probes in length.

- Install the level probe only in vertical position!
- Do not bend probe when mounting!
- Do not insulate probe body thread with hemp or PTFE tape!
- Observe the minimum distances for the installation of the electrode!
- Do not expose probe to physical shocks!
- Do not apply conduvtive paste or grease to the electrode thread! Do not use excessive tape!
- Make sure that the air distance between the probe tips and is not less than 14mm!

Warning !

The SD-AY 420A probe must not be cut to length. Do not install the probe outdoors without additional weather protection. Do not block the drain or the vent holes.

General

- For steam boiler applications, the probe may be installed in an external chamber or inside the boiler.
- For the approval of the boiler standpipe the relevant regulations must be considered.
- Refer to page 11 and 12 for typical installation examples.

4.2 Installation of Preamplifier

The O-ring supplied with the unit is supplied attached to the male thread on the capacitance probe.

Note : Under normal conditions the AY3400 current amplifier is supplied attached to the SD-AY 420A probe.

Caution !
Over-tightening by hand or use of a wrench will cause damage to the 'O' ring and may damage the preamplifier.

Caution !
Do not install the AY 3400 outdoors without additional weather protection.

Installation Note :

Probe length in mm	Maximum expansion in mm (inc. 'dead' length
400	11
500	14
600	16
650	17
700	19
750	20
800	21
900	23
950	26
1 000	27
1 050	28
1 100	30
1 200	33
1 300	34
1 500	38

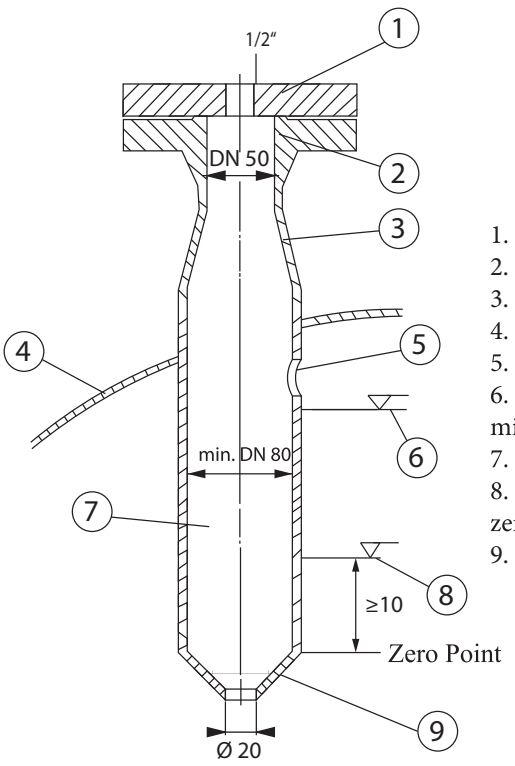
Table 3 : Expansions in Max. Pressure

4.3 Examples of Installation

Warning !

In the places where two low level probes required to be installed in one protection tube, these must be installed in separate protection tubes or chambers with two different controllers.

- The boiler manufacturer should be consulted for advice on the working and alarm levels.



1. Mounting flange for probe SD-AY 420A
2. Flange DN 50 PN 40
3. Reducer 88,9*60,3 t:3,2mm
4. Boiler body
5. Vent hole, as close as to boiler body
6. High water level mark (at least 20mm below middle of vent hole)
7. Protection tube (>= DN 80)
8. Lowest possible LW mark (min. 10mm from zero point)
9. Reducer 88,9*60,3 t:3,2mm

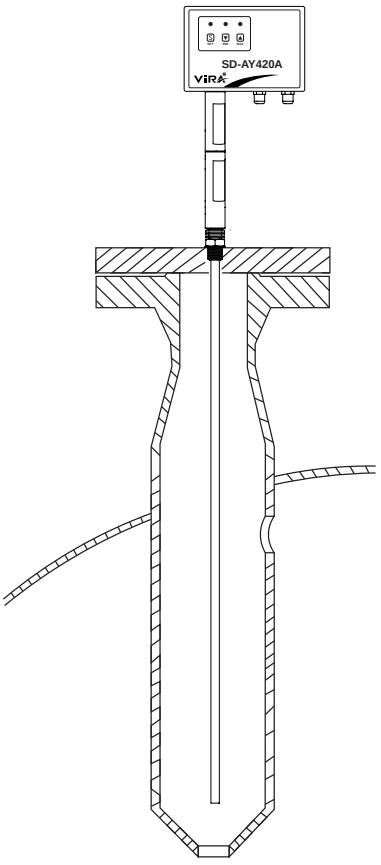
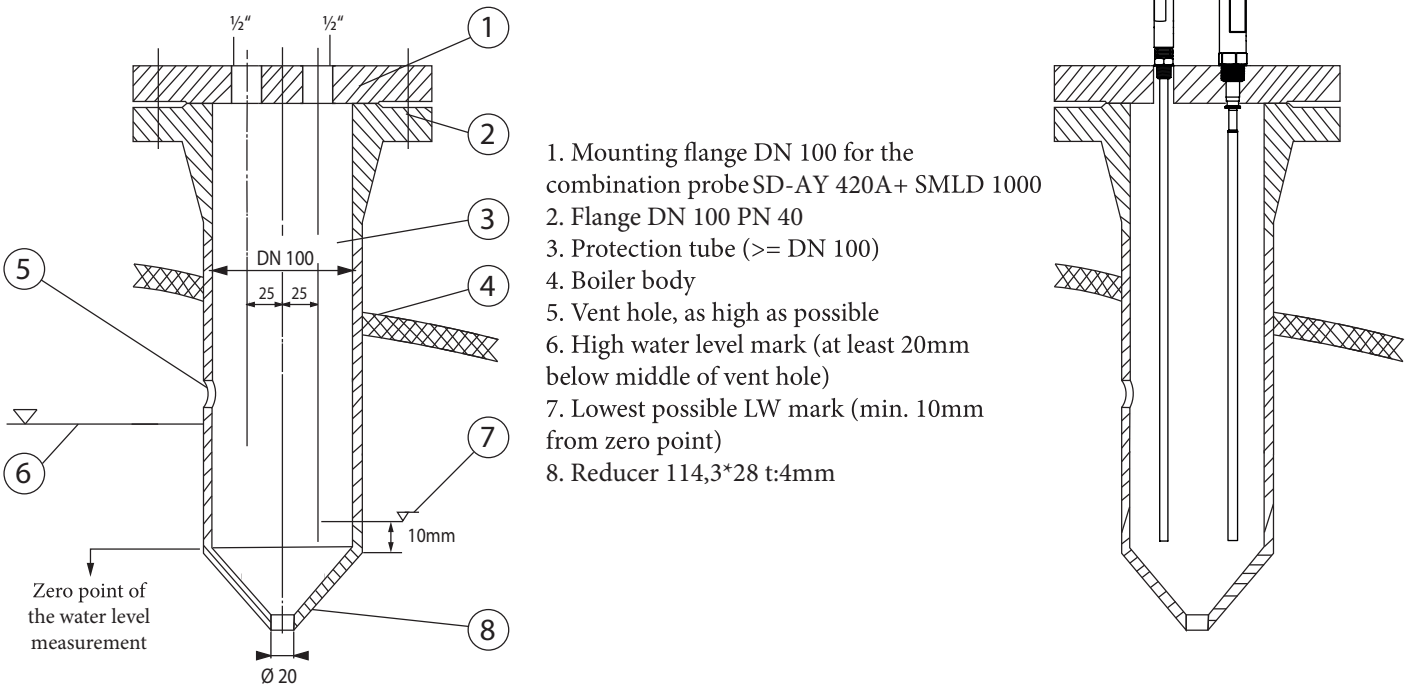
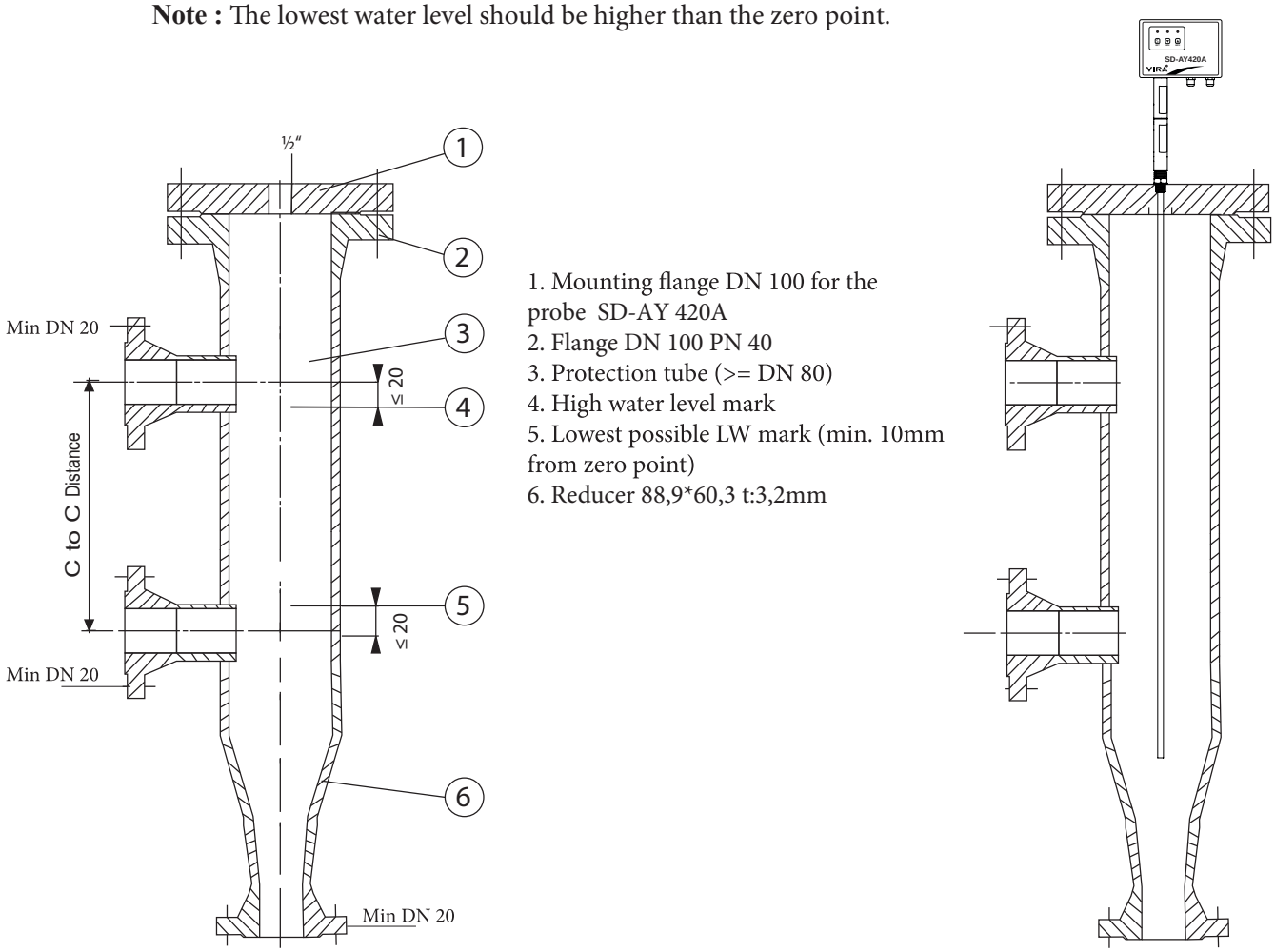


Figure 3 : Installation example 1, usage with protection tube inside the boiler.



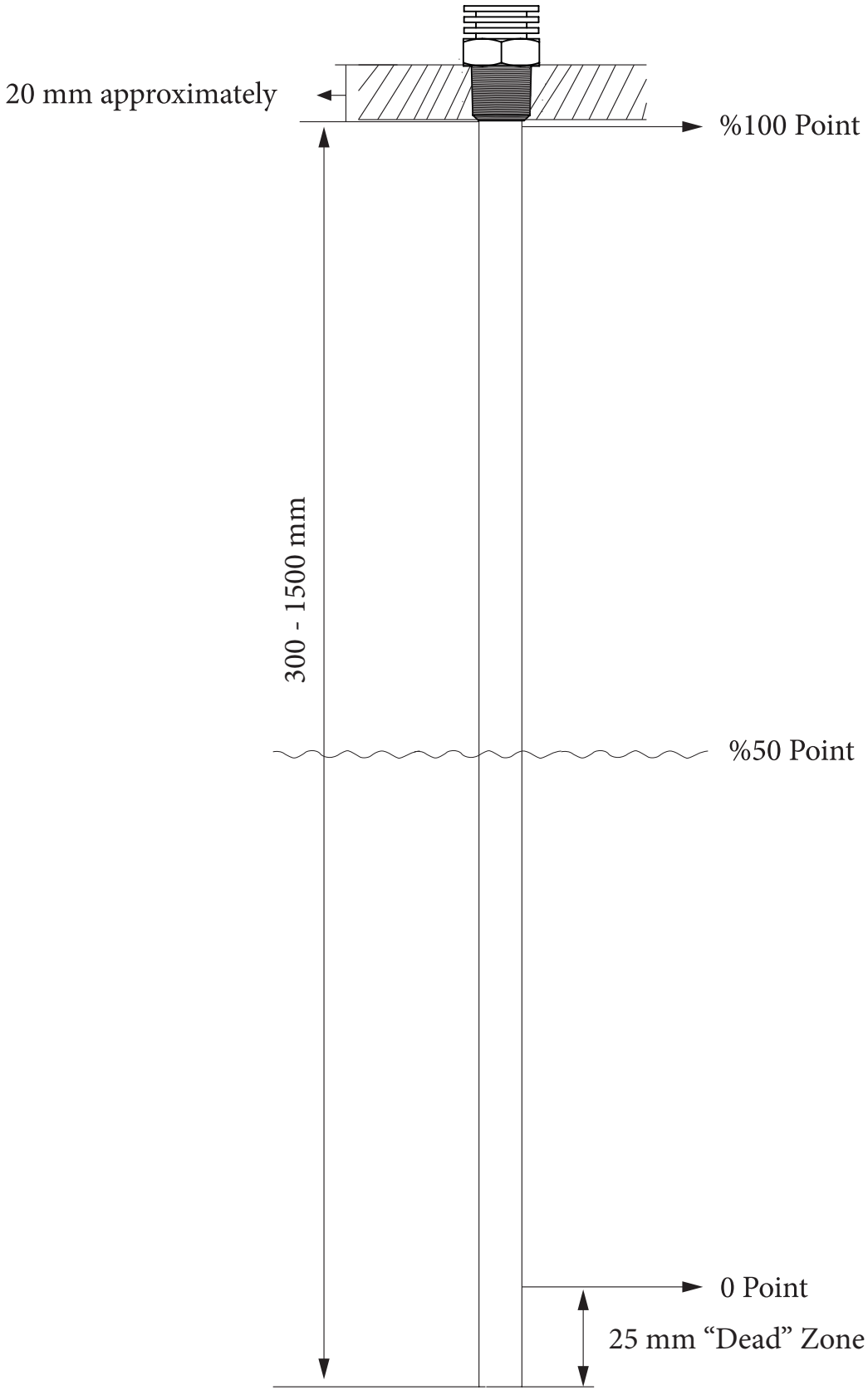
1. Mounting flange DN 100 for the combination probe SD-AY 420A+ SMLD 1000
2. Flange DN 100 PN 40
3. Protection tube (>= DN 100)
4. Boiler body
5. Vent hole, as high as possible
6. High water level mark (at least 20mm below middle of vent hole)
7. Lowest possible LW mark (min. 10mm from zero point)
8. Reducer 114,3*28 t:4mm

Figure 4 : Installation example 2, combination with self monitoring low level alarm probe SMLD 1000
Note : The lowest water level should be higher than the zero point.



1. Mounting flange DN 100 for the probe SD-AY 420A
2. Flange DN 100 PN 40
3. Protection tube (>= DN 80)
4. High water level mark
5. Lowest possible LW mark (min. 10mm from zero point)
6. Reducer 88,9*60,3 t:3,2mm

Figure 5 : Installation example 3, usage with protection tube outside the boiler.


20 mm approximately
%100 Point
300 - 1500 mm
%50 Point
0 Point
25 mm “Dead” Zone

4.1.5 Dimensions and Material Description

Item	
1	Max Led.
2	Min Led.
3	Set Led
4	Led Display and Buttons
5	Label
6	Housing screws M4
7	Cable Gland PG 7
8	Label (Laser Marking)
9	Probe Body
10	1/2" BSPT Thread
11	PTFE Sheat

Table 3 : Material Description

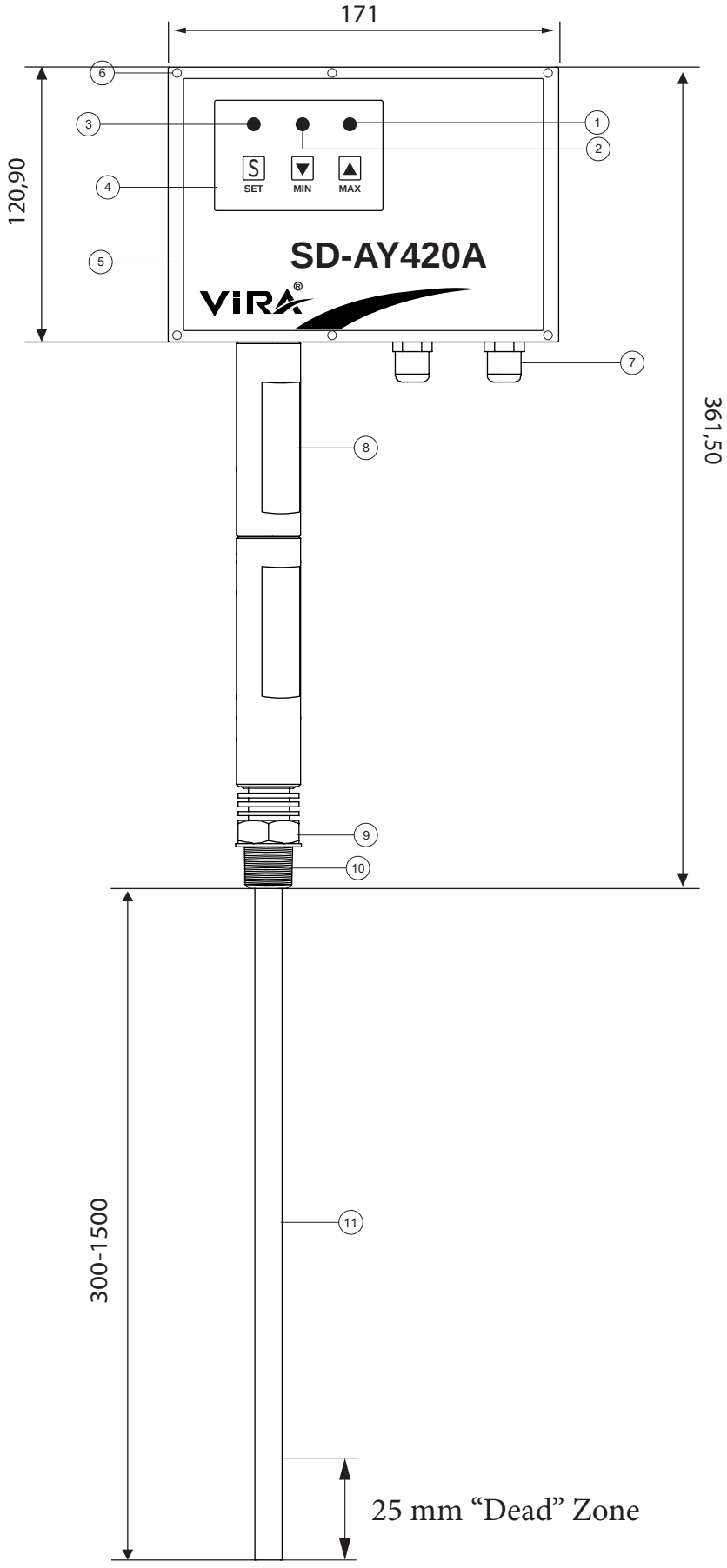


Figure 6 : SD-AY 420A Capacitive Level Transmitter

4.2 Electrical Installation

4.2.1 Wiring Diagram

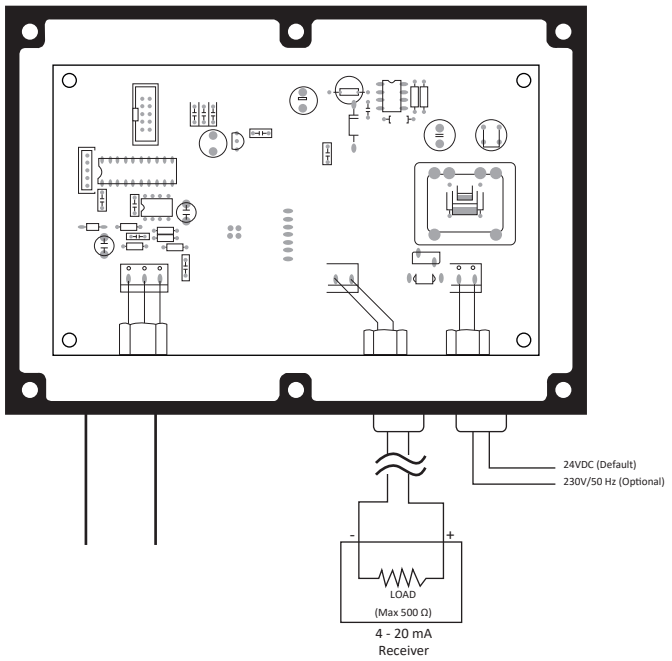


Figure 7: Electrical Wiring Diagram (Active 4-20 mA - Default)

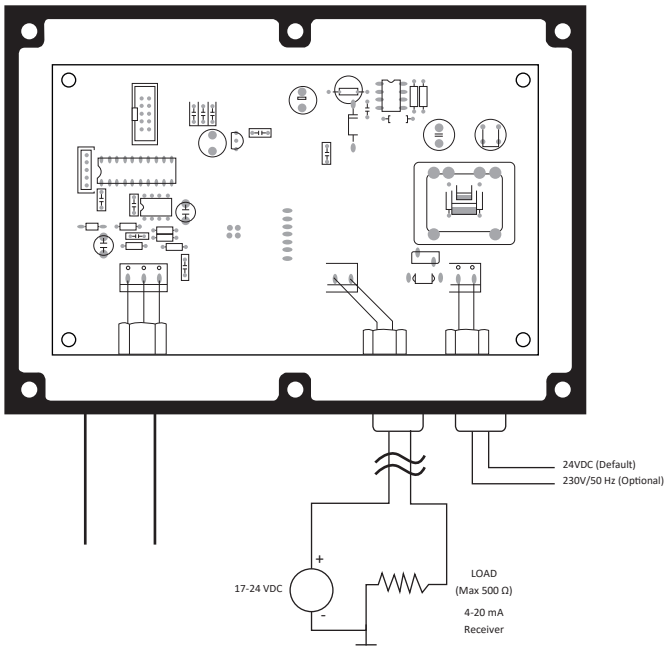


Figure 8: Electrical Wiring Diagram 2 (Passive 4-20mA Connection - Optional)

4.2.2 Supply Voltage Connection

The equipment must be supplied with 24VDC from a power supply. An external 0.5A slow blow fuse fuse must also be fitted.

4.2.3 Actual Value Output

Make sure that the connecting cable is segregated and runs separately from power cables. Please observe the max. load of 500 ohm.

4.2.5 Tools

Screwdriver size 3 x 100 mm.

4.3 Name Plate

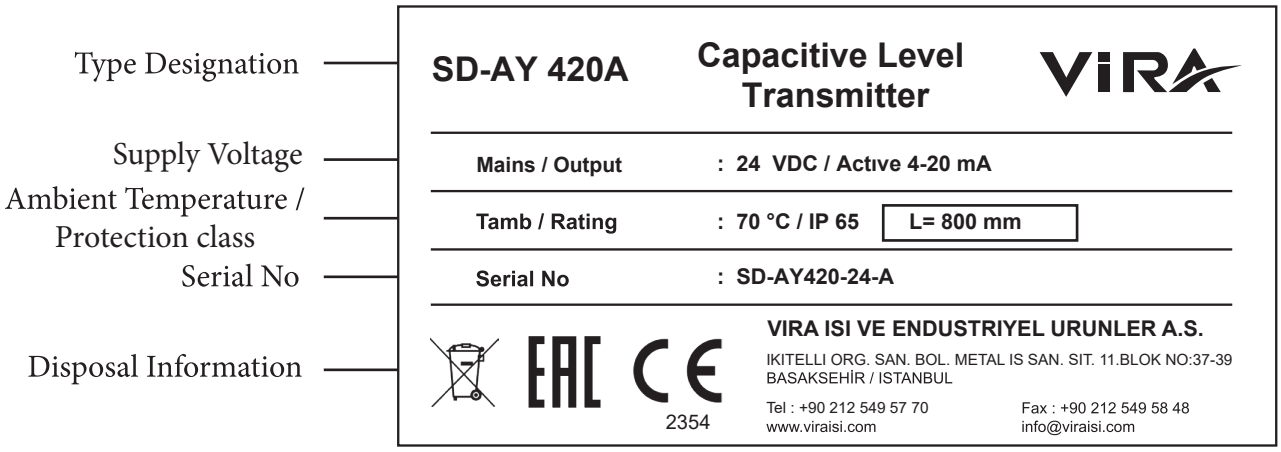


Figure 9 : SD-AY 420A Name Plate

5. Commissioning

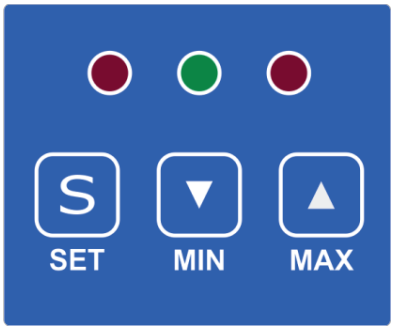


Figure 10: Buttons and LEDs for Settings

The SD-AY420A can be adjusted to output between 4-20 mA for liquid levels easily.

Adjusting Lower Measuring Point (4 mA):

a. Fill boiler or vessel with liquid until lower measuring point is reached.

b. Press and hold **(SET- S)** button for 6 second until the left red LED lights up and other 2 LEDs go out.

c. Press and hold **(Min)** button for 2 seconds.

Adjusting Upper Measuring Point (20 mA):

a. Fill the boiler or vessel with liquid until upper measuring point is reached.

b. Press and hold **(SET- S)** button for 6 second until the left red LED lights up and other 2 LEDs go out.

c. Press and hold **(Max)** button for 2 seconds.

Operational Malfunctions:

a. If the green LED lights up and the red LEDs go out, the equipment is working normally.

b. If all three LEDs are blinking, it shows that the equipment does not work accurately. Possible cause is an incorrect setting. A common fault is the changing of the lower and upper set points, set them a wrong point. In this case, the settings are made again.

d. If the green LED is blinking and the left red LED lights up, the liquid level may be less than the adjusted lower level.

e. If the green LED is blinking and the right red LED lights up, the liquid level may be more than the adjusted upper level.

6. Torubleshooting

6.1 Fault Finding

Fault The green LED is blinking, and the red LEDs are off.	**Remedy** This indicates that the device is operating normally. No action is required.
Fault The green LED is blinking, and the left red LED is on.	**Remedy** The water level has dropped below the set minimum value. This is not a fault but an indicator.
Fault The green LED is blinking, and the right red LED is on.	**Remedy** The water level has risen above the set maximum value. This is not a fault but an indicator.
Fault No LED lights up when the device is powered on.	**Remedy** Ensure that the power is correctly connected and that power is reaching the device. If there is power at the terminals, check the fuse.
Fault Minimum and maximum values cannot be adjusted.	**Remedy** Check the current pre-amplifier.
Fault While the device is powered on, the voltage at terminals 1-2 does not change between 1-7 Volts when the water level changes.	**Remedy** The current amplifier is faulty. Check the current amplifier and replace it if necessary.
Fault No current is measured at the 4-20 mA output.	**Remedy** The 4-20 mA output is an active output (if not ordered passive). You can directly measure it using a milliammeter in the mA range. If no current is measured, the device should be returned to the Vira service department.
Fault While adjusting the minimum and maximum settings, all LEDs are blinking.	**Remedy** This indicates that the device settings are not correctly configured or the current amplifier is faulty. Possible faults are as follows: 1- The minimum and maximum settings may have been reversed. (For example, setting the maximum value when the water level is at minimum o r setting the minimum value when the water level is at maximum.) 2-Both the minimum or both the maximum settings may have been applied when the water level is at either maximum or minimum. 3-If the level information from the current amplifier does not change despite the water level changing, the current amplifier may be faulty or there may be an issue with the connections.

Table 4 : Fault finding table

7. Maintenance

The probe does not normally need regular maintenance. Remove, clean, and check the probe annually.

Where regular tests are carried out properly in a well run boiler house with good water treatment, it may be that only twice or an annual inspection of the probe is required. This inspection programme must be determined by the boiler inspector.

Please follow this procedure during the inspection;

- Depressurise and vent boiler or vessel.
- Before carrying out installation and maintenance work, make sure that the equipment is cold.
- Disconnect the electrical supply to controller.
- Remove probe upper connector.
- Remove probe. When loosening the level electrode steam or hot water might escape. This presents the danger of severe scalds to the whole body.
- Check condition of probe.
- Clean probe tips and insulation if necessary. Use a soft brush or cloth dampened with tap water. Use of other cleaning materials could damage the product and invalidate the warranty. Do not use abrasive or conductive products such as steel wool.
- Inspect the wiring between probe and controller, and the controller supply wiring.
- Check the controller for damage.
- Reassemble and carry out a full functional check of the equipment.

8. Technical Assistance

For technical assistance or service requests, please directly contact Vira service center by making a phone call or sending an e-mail to **servis@viraisi.com.**

Return faulty or service items to Vira itself or authorized agency in your area. Ensure all items are suitably packed for transit (preferably in the original cartons).

Please provide the following information with any equipment being returned:

- Your name, company name, address and telephone number, order number and invoice and return delivery address.
- Description and the serial number of equipment.
- Full description of the fault or repair required.
- If the equipment is being returned under warranty, please indicate the date of purchase.

The manufacturer reserves the right to make change without prior notification.

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