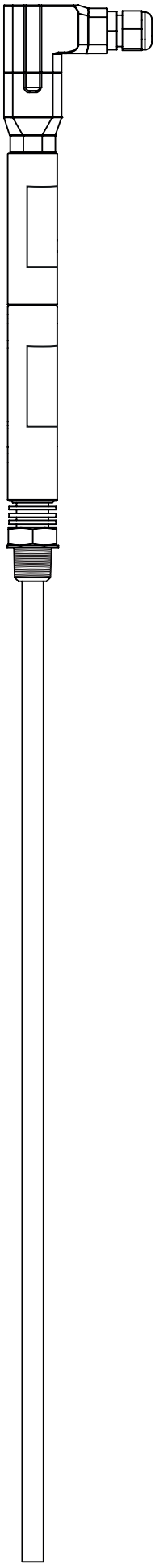


SD 3400
Capacitance Level Probe

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 Notes

The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Maintenance Instructions, could cause damage to the product and may cause injury or fatality to personnel.

If this product is not used in the manner specified by this user manual, then the protection provided may be impaired.

1.1 Intended Use

SD 3400 is designed for use in conjuction with the Vira level preamlifier AY 3400 and Vira SK 3400 level controller.

Use this installation and operating instructions and the technical data sheet to check whether the device is suitable for the intended use/application. The device complies with the European Pressure Equipment Directive 2014/68/EU requirements.

The maximum values of the pressure and temperature range of the device must be checked before installation. If the maximum allowable operating values of the device are lower than those of the system on which it is to be installed, protective instruments for the device, such as pressure reducers or similar, must be provided to avoid limit situations.

Vira products are not designed to withstand the external stresses they may be exposed to in any system in which they are installed. It is the installer's responsibility to consider these stresses and take adequate measures to minimize them.

The operator of the facility is obliged to familiarise himself with the compatibility of the medium and the device. In case of doubt, contact the relevant installation manager or site manager. The correct installation position, alignment and flow direction of the device must be observed! Before installing the VIRA product on boilers or containers, it is essential to remove all protective covers.

Safe operation of this product can only be guaranteed if these conditions are satisfied. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment, must also be complied with.

Warning!

The probe is not suitable for outside installation without additional environmental protection.

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
- Guidance Notes systems. Consult a competent water treatment company.

2. General Information

2.1 Description

The Vira SD 3400 is a capacitance probe designed for modulating level control in conductive liquids when used with a AY 3400 preamplifier (sold together). It can also be utilized for adjustable on/off control.

The probe is normally installed in a steam boiler or metal tank where it is earthed through the ½" BSPT screwed connection, the boiler or tank forming the earth return path.

The AY 3400 preamplifier, is screwed to the top of the probe and hand tightened, enabling easy removal without the need to disturb the probe.

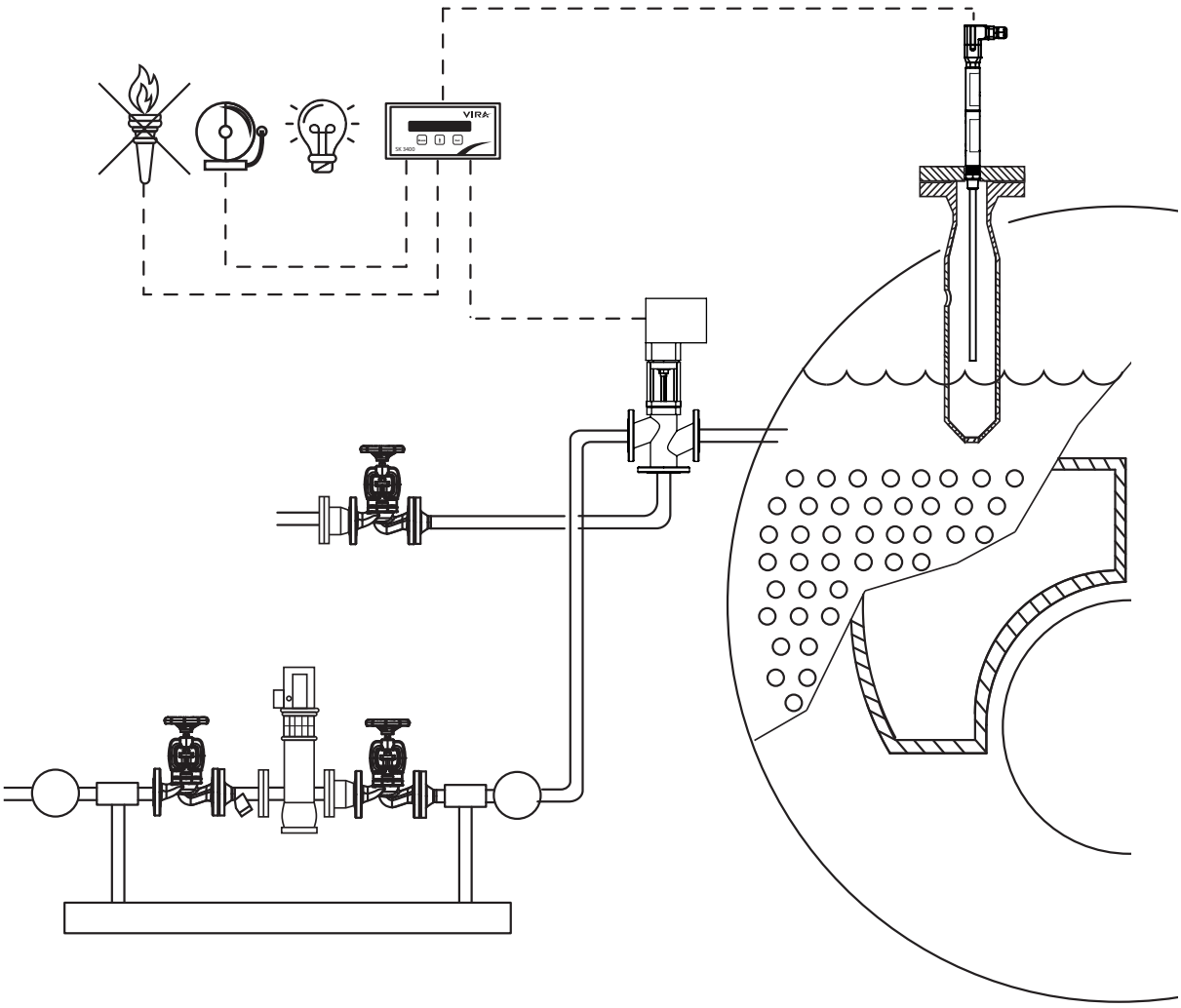


Figure 1 : SK 3000 System Aplication

2.2 Technical Data

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

Mechanical Connection
BSPT 1/2"

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

Maximum cold hydraulic test pressure : 60 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 : 10 µS/cm

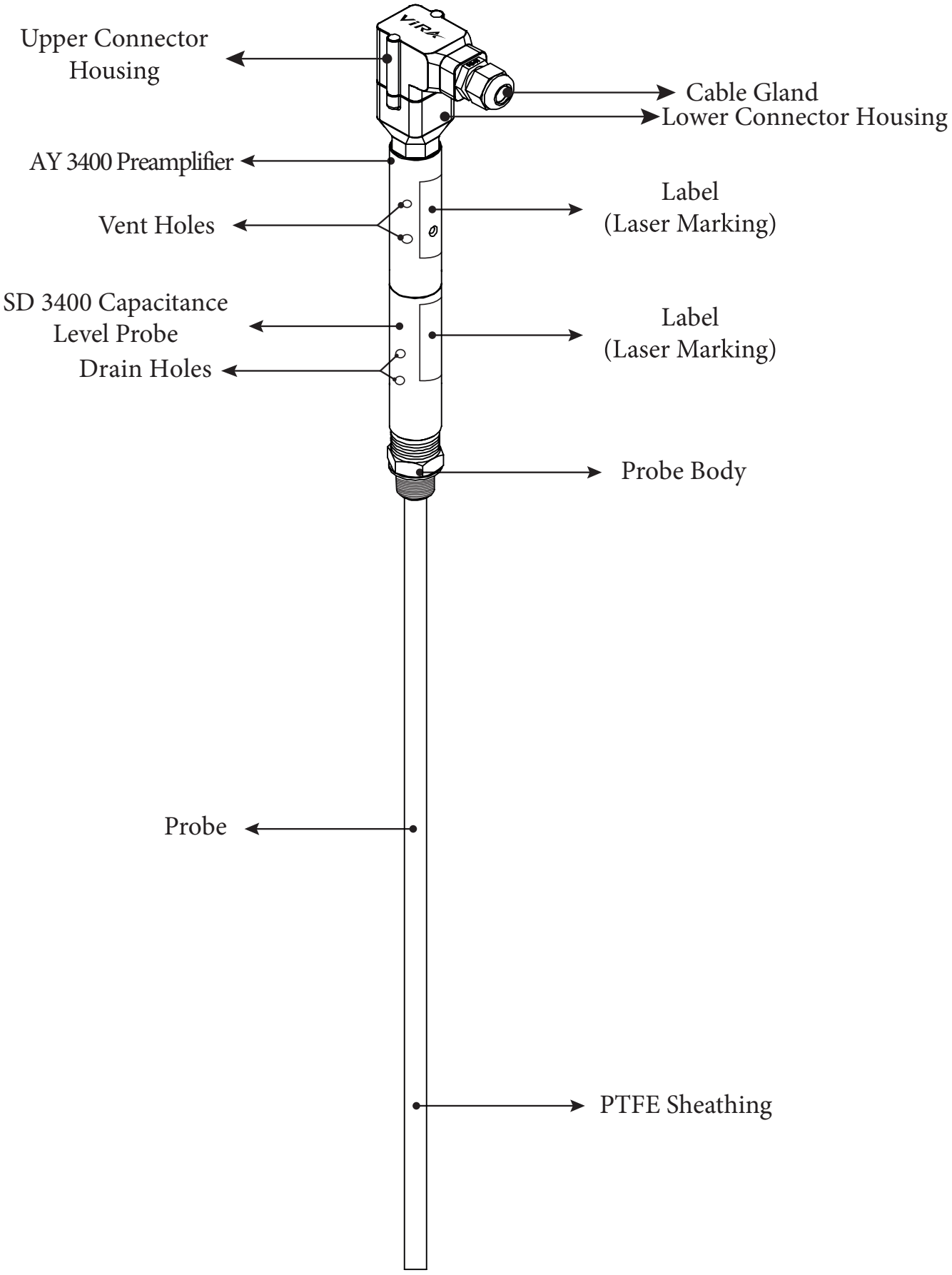


Figure 2 : Material description of SD 3400

2.3 How it Works?

The SD 3400 probe consists of a metal rod completely sealed from liquid with a PTFE sheath.

A change in water level also means a change in capacitance value. The change in capacitance value outputs a proportional increase in water level.

The capacitance value is measured by the pre-amplifier and transmitted to the controller as a DC signal. Control band alarm levels and switching levels are set in the controller.

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

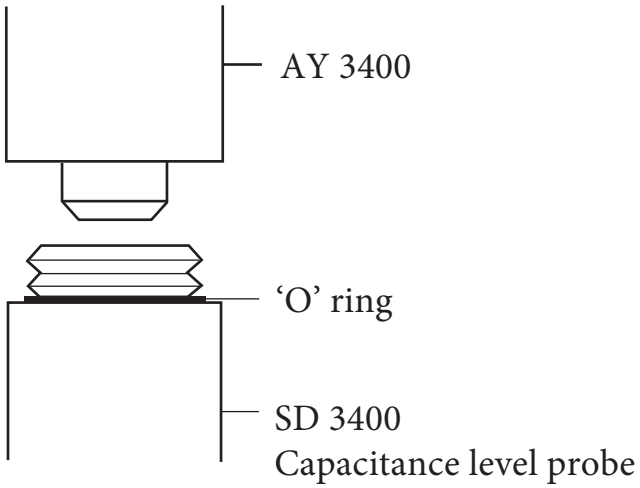


Figure 3 :AY 3400 Preamplifier Assembly

3. AY 3400 Level Preamplifier

The AY 3400 preamplifier is used with a Vira capacitance probe to amplify a measured capacitance and convert it to a voltage output proportional to a liquid level.It consists of a tubular austenitic stainless steel body which screws onto the top of the probe,and has a connector with a Pg 11 cable gland Maximum ambient temperature is 75°C (167°F)and minimum ambient temperature is 5°C (41°F).

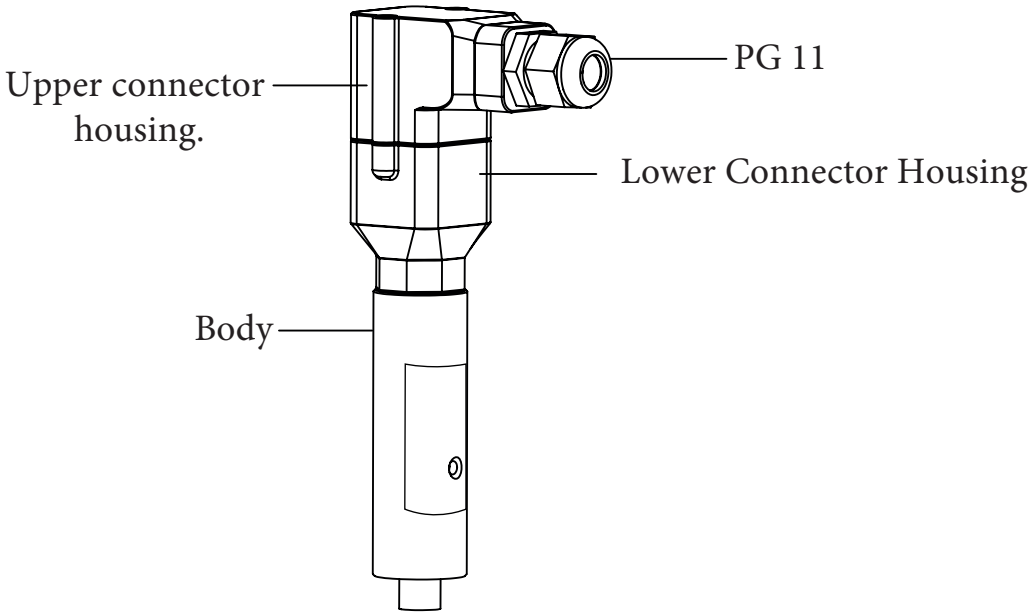


Figure 4 : AY 3400 Material Description

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 tips when mounting!
- Do not insulate electrode thread with hemp or PTFE tape!
- Observe the minimum distances for the installation of the electrode!
- Do not expose electrode tips 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 electrode tips and is not less than 14mm!
- The tip steady provides lateral support as well as insulating the tips from each other.

Warning !

The SD 3400 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 3400 probe.

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

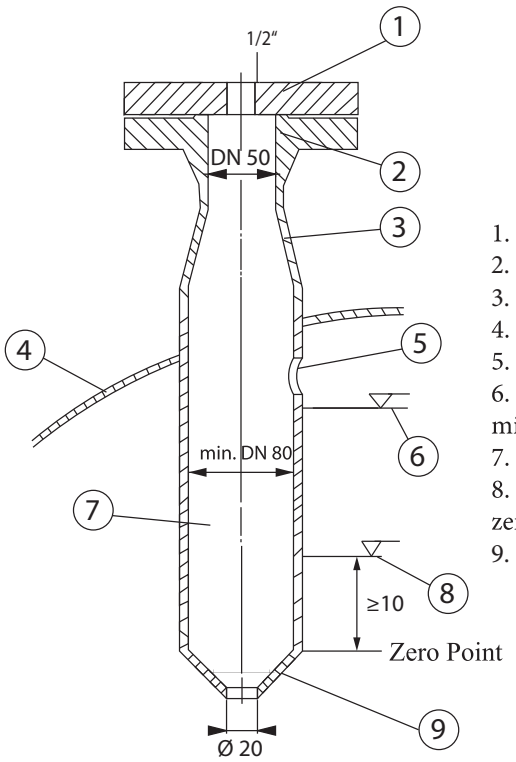
Caution !
Do not install the AY 3400 outdoors without additional weather protection.

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 3400
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

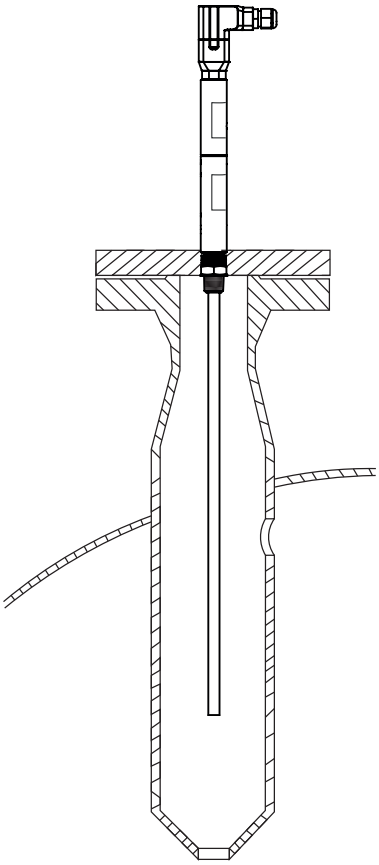
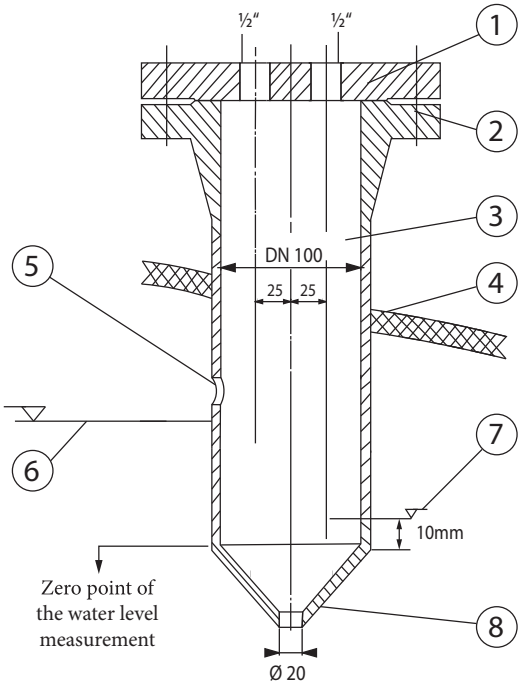


Figure 5 : Installation example 1, usage with protection tube inside the boiler.



1. Mounting flange DN 100 for the combination probe SD 3400 + 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

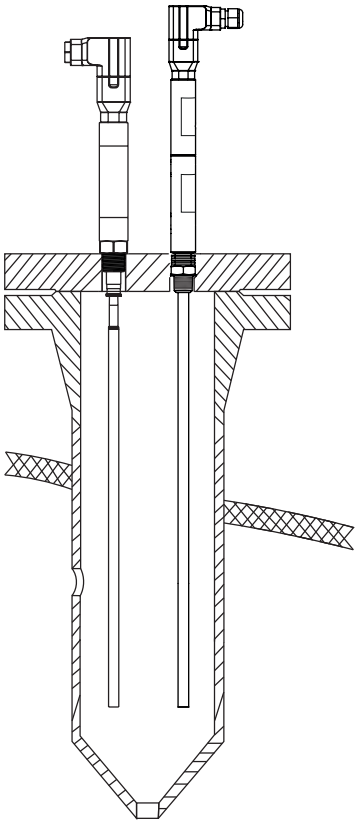
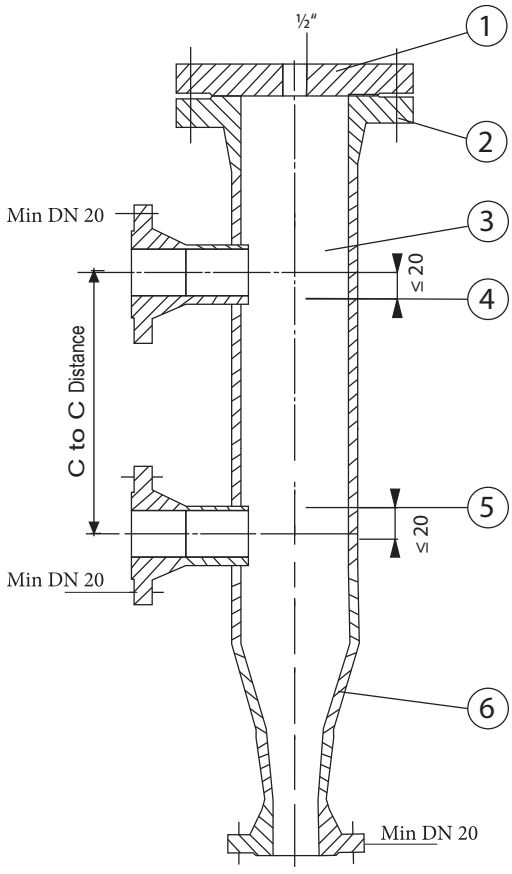


Figure 6 : Installation example 2, combination with self monitoring low level alarm probe SMLD 1000

Note : The lowest water level should be higher than the zero point.



1. Mounting flange DN 100 for the probe SD 3400
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

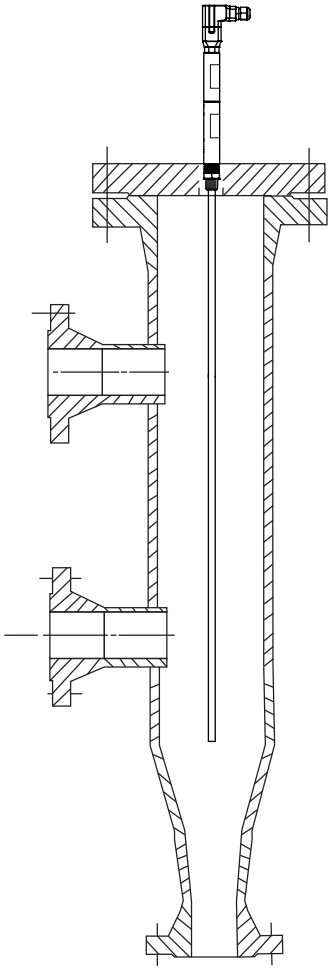


Figure 7 : Installation example 3, usage with protection tube outside the boiler.

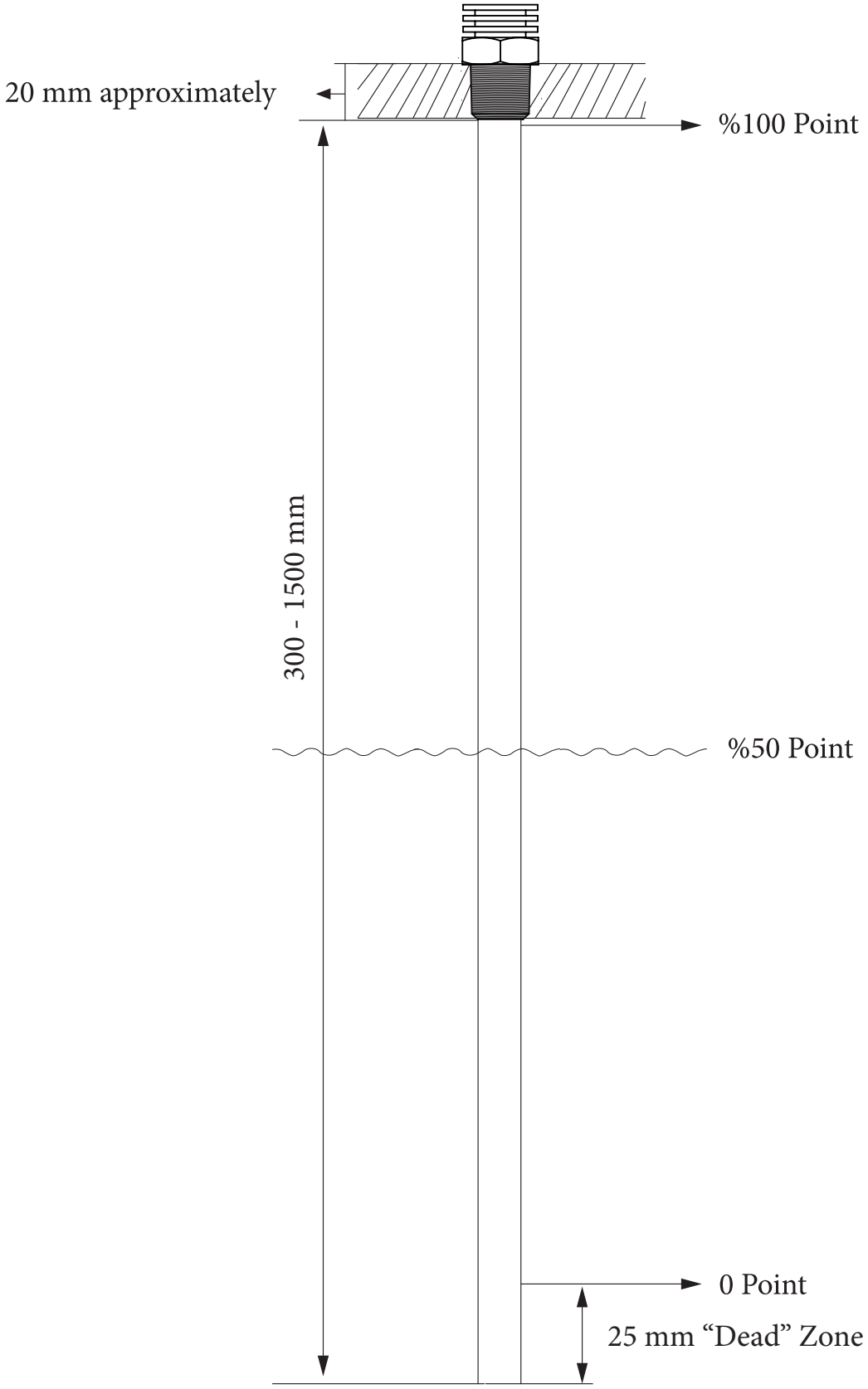


Figure 8 : Electrode length indication.

5. Wiring

Refer to the AY 3400 preamplifer and SK 3400 controller Installation and Maintenance Instructions for wiring details and diagrams.

5.1 General Informations

The AY 3400 is compatible with all Vira voltage input controllers/transmitters. Wiring should be carried out in 3-core, min 0.5 mm^2 mm^2 , high temperature screened cable, with a maximum length of 100 m (328 ft).

5.2 Wiring Connections

Terminal 1	(Brown)	Supply
Terminal 2	(Red)	Output
Terminal 3	(Orange)	Sensitivity*
Earth terminal	(Black)	Common

Note: The connections between terminals and preamplifier specified above are shared for informational purposes only. These settings are adjusted and sent by VIRA at the factory according to the ordered length.

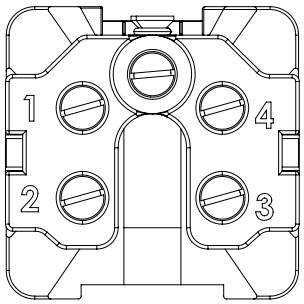
CAUTION!

Do not install signal cables near high voltage cables or switchgear.
Probe cabling must not use the same conduit / wiring trays as power cables.
Suitable anti-static precautions must be observed during installation and maintenance.

5.3 Connection

Use 3-core (2-core and earth) min 0.5 mm^2 mm high-temperature cable. **The Cable must be screened!** For detailed cable specifications check SK 3400 controller Installation, Operating and Maintenance Instructions. The SD 3400 probe is supplied with heavy duty connector with 5 terminal. 2 of them is for connection to the probe tips and 1 for the probe body earth connection.

Note: Please do not use unconnected terminals.



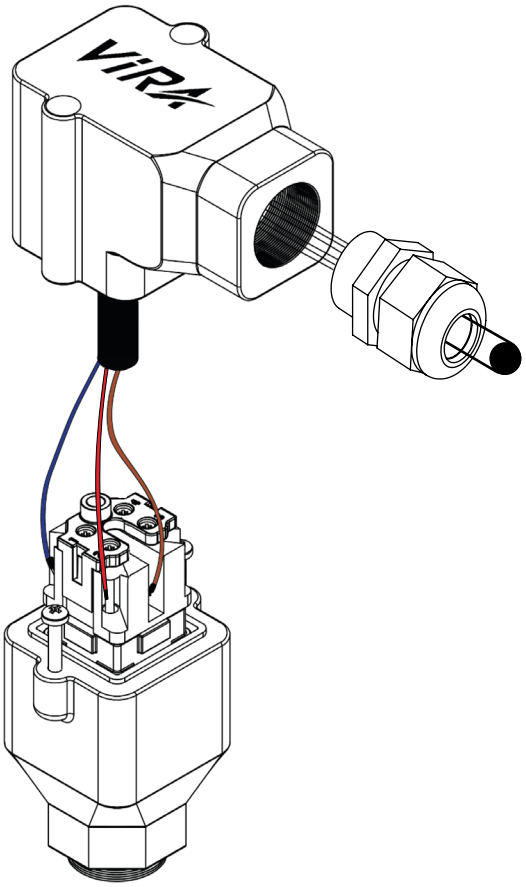


Figure 9 : Top view of Connector

Note: The wire colors are for illustration purposes only. Different colors can be used in the actual application

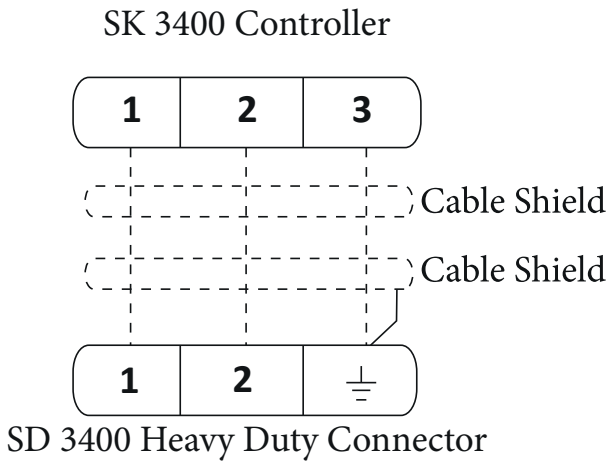


Figure 10 : Wiring diagrams

Note: As shown in figure 10 the cable shield is left unconnected in controller side. Please only wire cable shield on the probe side.

5.3 Sensitivity Settings

Note: The sensitivity settings specified below are shared for informational purposes only. These settings are adjusted and sent by VIRA at the factory according to the ordered length.

5.3.1 Length up to 500 mm

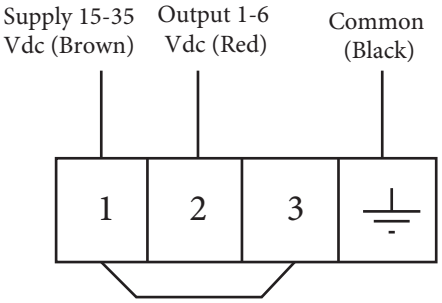


Figure 11: High sensitivity

(Up to 500 mm (20") immersed length) **Link 1+3**

(Including all probes up to 550 mm length)

5.3.2 Length up to 1050 mm

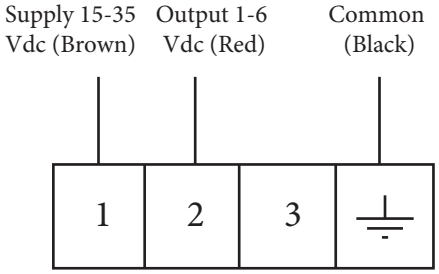


Figure 12 : Medium sensitivity

(Up to 1050 mm (41*) immersed length) **No link**

5.3.3 Length longer than 1050 mm

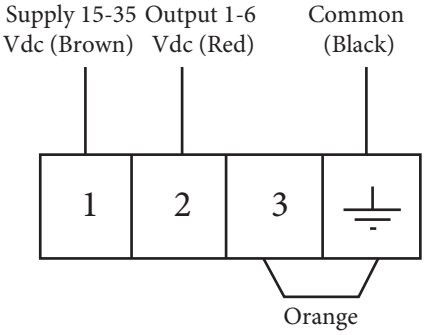


Figure 13: Low sensitivity

(Longer immersed lengths) **Link 3+** ⏚

6. 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.

7. Technical Assitance

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).

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 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.

VİRA ISI VE ENDÜSTRİYEL ÜRÜNLER A.Ş

Metal İş Sanayi Sitesi 11.Blok No:37-39 İkitelli/İstanbul

Phone: +90 212 549 57 70 Fax: +90 212 549 58 48

Web: www.viraisi.com E-mail: info@viraisi.com