
# ViRA®

# Fiammac

## STEAM BOILER CONTROL SYSTEMS AND STEAM EQUIPMENTS

- Level Control Systems
- Blowdown Systems
- Condensate Contamination Control Systems
- Level Gauges
- Seperators
- Flash Steam Tanks
- Flow Meters
- Condensate Pump

Vira is an expert, dynamic and experienced company in the design and production of control systems and steam equipments. We offer a variety of products, complete systems, and smart solutions engineered to function with maximum reliability with a combination of our application experience, choosing the right products or systems, ongoing technical support, correct installation, and commissioning ability. Vira provides durable, high-quality control systems and steam equipments that are used in many different industries such as petrochemistry, food and beverage, textile, hotels, hospitals, pulp and paper, and pharmaceutical.

Vira control systems and steam equipments are used wherever steam is generated, distributed, or used. We make flow savings in energy are possible, and be always aware of our important role in environmental protection.

Our goal is to save energy, to help increasing the system efficiency and system reliability. We meet the expectations of our customers with our experience in the sector and focus on customers, we provide permanent value for our company with our talented personnel and expanding product range.

We aim to create a chain of people and institutions that will successfully represent our brand in the world. With this objective, we continue to expand by adding new institutions to our family in different countries.

Vira is intending to always follow the latest standards and meet the highest efficiency and safety in addition to fulfilling legal safety requirements.

**As a company, we aim and pledge:**

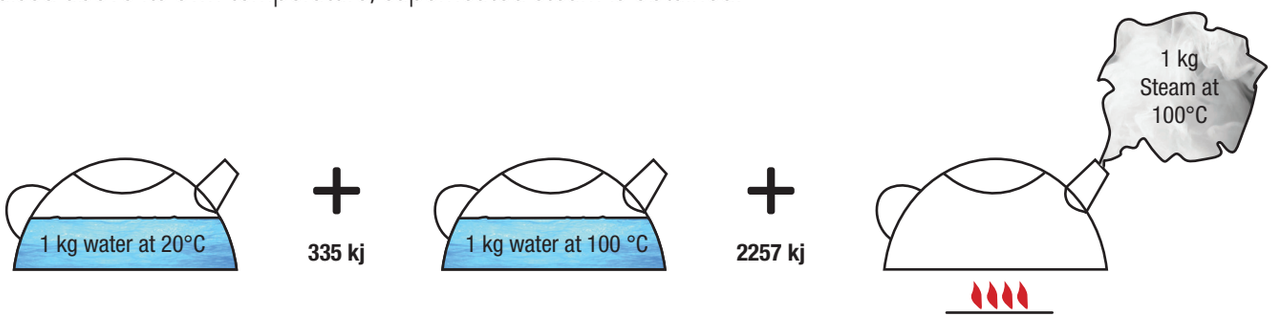
- To be an experienced and reliable business partner for our stakeholders
- To improve productivity, production volume and total profitability.
- To acquire, promote and retain highly qualified and multi-skilled employees
- To reduce maintenance and total energy costs
- To supply products, services and solutions that are leaders in the industry
- To shorten service effort and production time
- To reduce spare parts and inventory costs
- Throughout the value-added and supply chain, we insist that our products are manufactured with a desire to preserve resources, and are environmentally friendly and save energy during their subsequent use.
- We always act in compliance with the general legal conditions and consider these to be the minimum standard.

**“Quality means doing it right when no one is looking”.**
**- Henry Ford**

# İÇİNDEKİLER

# WHAT IS STEAM?

Steam is the gaseous state of water. When water is heated and reaches a certain temperature, it becomes a state where it can no longer remain liquid. This state is called saturation point. The saturation temperature of the water at 1 bar absolute pressure is 100 ° C. Giving heat to water at this pressure does not change the temperature of the water. This heat turns water into steam. This steam obtained is called saturated steam. When the saturated steam is raised above its own temperature, superheated steam is obtained.




Steam is an ideal fluid to carry energy. For this reason, it is widely used in many areas. Main usage areas of steam can be specified as industrial facilities such as textile, paper, chemical, pharmaceutical, beverage, tea and milk factories, power plants and heating systems.

**Why Steam?**

- Access to high temperatures at high pressures.
- Large heat loads can be transported by small volumes.
- Temperature is constant in heat transfer surfaces.
- Temperature control can be done precisely.
- No need for circulation pump. It can reach desired places with its own pressure.
- Steam is more advantageous in terms of heat capacity and heat transfer coefficient compared to other fluids.
- Steam is a clean and hygienic energy carrier. It is environmentally friendly.

**Steam Generation**

Steam used in the industry is produced in devices called steam boilers. A steam boiler is a pressurized vessel in which solid, liquid or gas is burned and electrical or nuclear energy sources are used in order to obtain steam at the desired temperature and pressure from the water inside.

**Boiler Types**

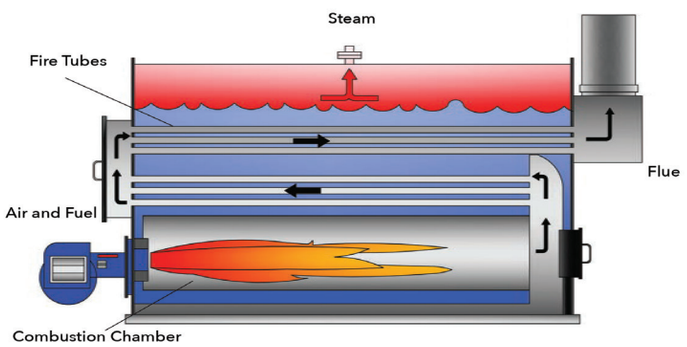
Steam boilers are classified in many different ways according to the place of use, boiler pressure, type of furnace, type of fuel used and construction. However, the two most suitable types in industrial facilities according to their structure;  fire tube and water tube boilers.

## 1- Fire Tube Boilers

Fire tube boilers are typically designed with cylindrical body and horizontal pipes, taking into account the EN 12953 standard. In this type of boiler, the combustion process is carried out in the cell called "combustion chamber". The gases released as a result of burning pass through the smoke pipes in the boiler and transfer the energy to the boiler water.

Fire tube boilers are generally characterized according to the number of passes. The number of passes is taken into account while the combustion gases provide heat transfer to water throughout the boiler. With each pass, it is aimed to transfer the maximum energy from the flue gas to the water until it leaves the boiler by directing the flue gases in opposite directions within the pipes.

Boilers with fire tubes contain large amounts of water, so they need longer time to meet the initial evaporation and steam pressure changes. However, they can easily respond to small pressure and load changes. At the same time, fire tube boilers, which have a large surface area, produce the steam in the body parts, so the amount of pressure they can produce is limited. They are generally produced up to a maximum operating pressure of 25 bar.

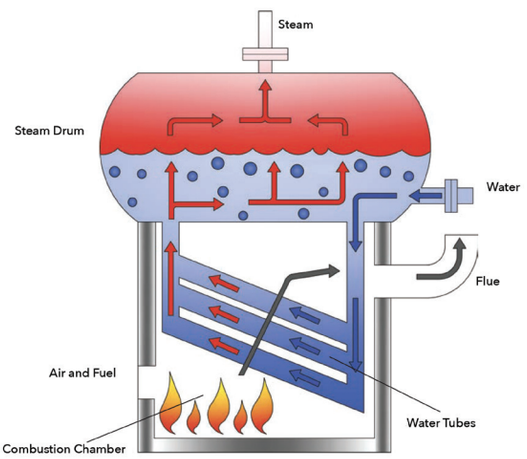



## 2- Water Tube Boilers

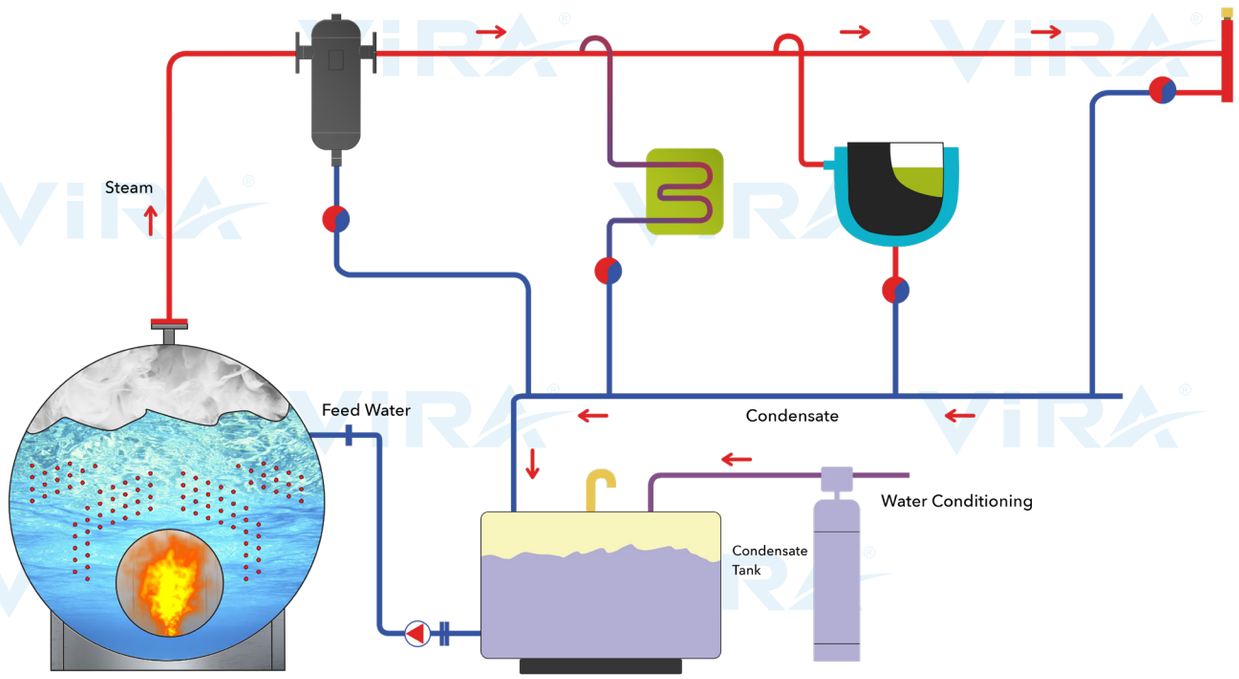
Water tube steam boilers are boilers in which water circulates and evaporates in the pipe. These are steam boilers developed and produced for businesses that need high steam capacity and high pressure. Water tube boilers are designed in accordance with the EN 12952 standard.

Boilers with water pipes are designed as membrane walls that are lined vertically between two drums and are sealed by welding with a plate. In the system, water evaporates in pipe sections and collects in the upper drum. In terms of security, the circulation of water in the pipes makes the system safer. Level controls of the boiler, feed water inlet, surface blowdown system, safety valves and necessary outlet flanges are located on the upper drum.

Since the amount of water contained in water tube boilers is low, they do not need a long time to meet the initial evaporation and vapor pressure changes. The difference of water tube boilers from fire tube boilers is that the boilers with low explosion risk are safer, but it is very important that water conditioning is well done during operation.



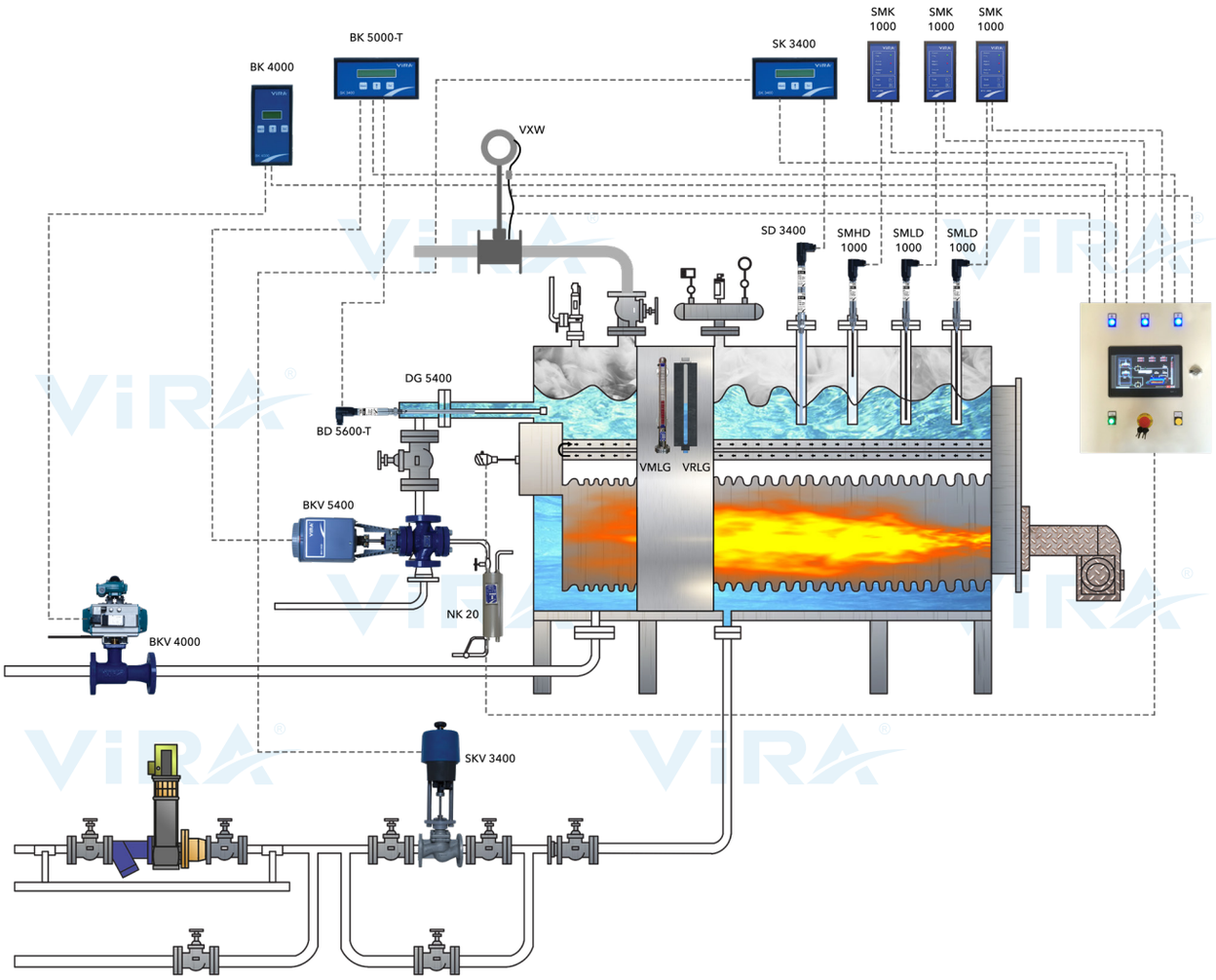
The steam produced in the boiler is transmitted to the places where the heat energy will be used by means of pipes. During this conduction, as soon as the steam leaves the boiler, it begins to give off some of its enthalpy from any low temperature surface. Starting with the main steam lines, heat conduction continues with small branches towards the devices using steam. By opening the valve at the entrance of a device that uses steam, it penetrates into the device through the steam distribution pipes and condenses, leaving the evaporation heat. The condensate is carried in the direction of flow towards the bottom of the pipe and is sent to the condensate tank to be returned by passing through the steam traps.



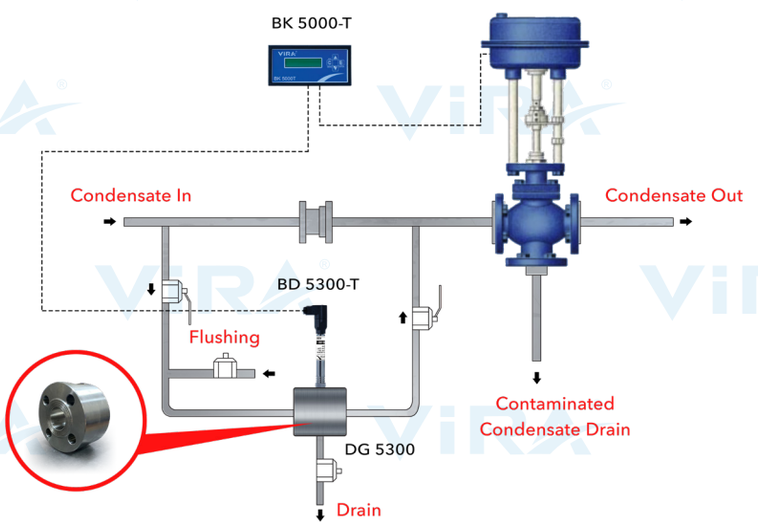

Where possible, the condensate is recycled for reuse and collected in the condensate tank. In addition to the boiler, if heated water is given instead of cold water, the amount of enthalpy required to bring the water to boiling point will decrease. As a result, the amount of fuel to be used for steam generation will be significantly reduced. The condensate formed in the steam lines and devices is a valuable water suitable for use as boiler feed water and should not be wasted.

Steam production must continue as long as processes need steam. For the continuity of this process, it should be added instead of the water that is lost and it is necessary to feed the boiler with fuel.

# STEAM BOILER AUTOMATION SYSTEMS

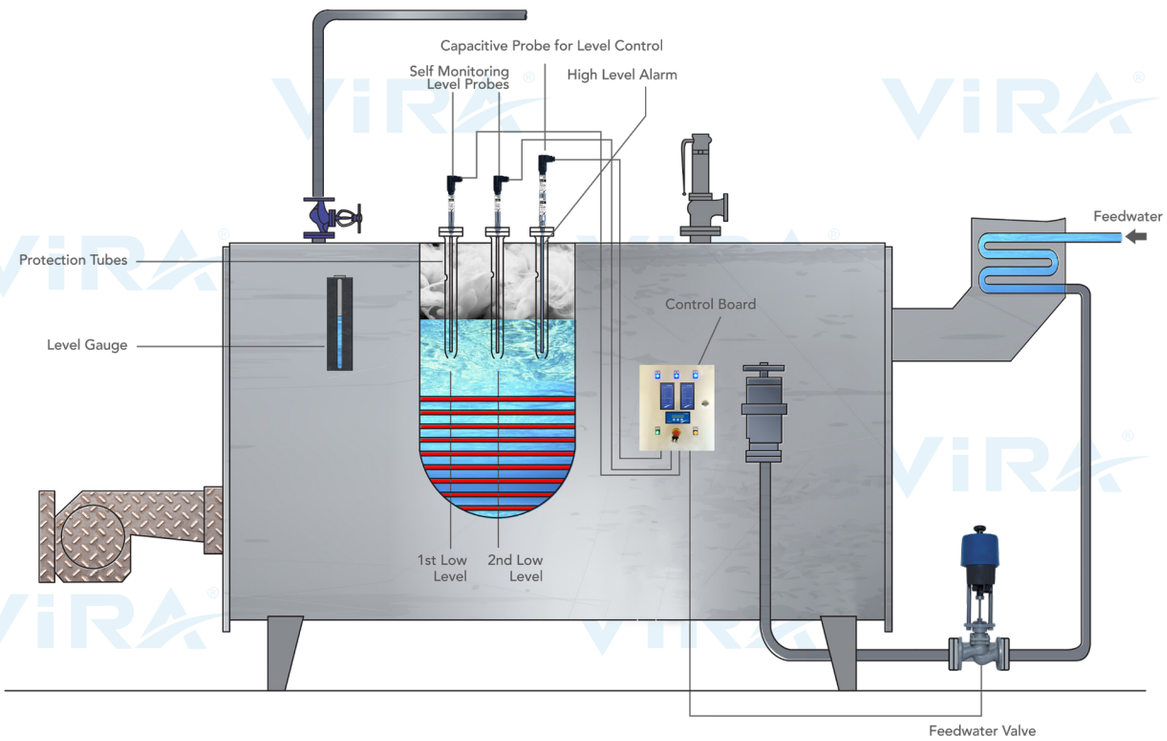



## Condensate Monitoring



# BOILER WATER LEVEL CONTROL

In steam boilers, the water level decreases with the convert of the water into steam and the decreasing water is completed by the operation of the boiler feedwater pump. Depending on the amount of steam produced in the steam boiler, since the water temperature entering the boiler is lower than the boiler temperature and due to changes in steam pressure, a constant fluctuation in the water level occurs. For the efficient and safe operation of boilers, the water level must always be checked. This check may include a sound or light alarm, shutting down the feedwater supply, and shutting down the burner. It is also essential to provide an outside drum level indicator such as magnetic or reflex level gauges.




**High integrity, self-monitoring, modulating control system**

**Note:** Level probes can be both installed in a protection tube or a level tube.

It is undesirable for the water to drop below the desired level in steam boilers. If it does, it can cause costly damage to the boilers and even fatal accidents. In case of low water level, check the following reasons.

**Causes of Low Level**

- Lack of feedwater
- Sudden load changes
- Feedwater pump failure
- Safety valve leaks
- Control valve malfunction
- Malfunction of boiler water level controller

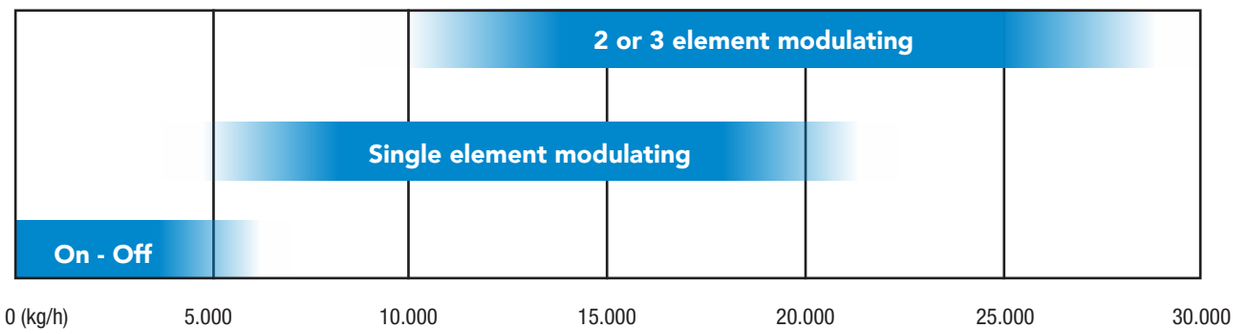
To ensure the safe operation of the boiler, all elements that affect the level control must be monitored and make sure they are working. In case of failure, the boiler operator must understand the cause of the problem and should take action most appropriately.

### Boiler Water Level Control Systems

In steam boilers, feed water should be added instead of missing water during steam production. Automatic level control systems are applied in steam boilers produced with modern technology. Automatic feedwater control systems have two different applications: On / Off Level control and modulating level control.

Depending on the boiler capacity; On-Off level control system should be used for the boilers with the capacity up to 5000 kg/h. for the boiler with the capacity up to 15.000 kg/h single element modulating control and higher capacity than 15.000 kg/h 2 or 3 element modulating level control systems should be used.

- **Single Element Modulating** : Modulating level control system only
- **2 Element Modulating** : Modulating level control system, steam production amount measurement with modulating level control system and steam flow meter
- **3 Element Modulating** : Modulating level control system, steam production amount measurement with steam flow meter and feed water amount measurement for the boiler with water flow meter




It will not be correct to decide which level control system to use just by considering the boiler capacity. Knowing the steam consumption behavior of the system that the steam boiler serves is also an important criterion for choosing a level control system. On-off level control system will not be sufficient in a low-capacity system with sudden load changes.

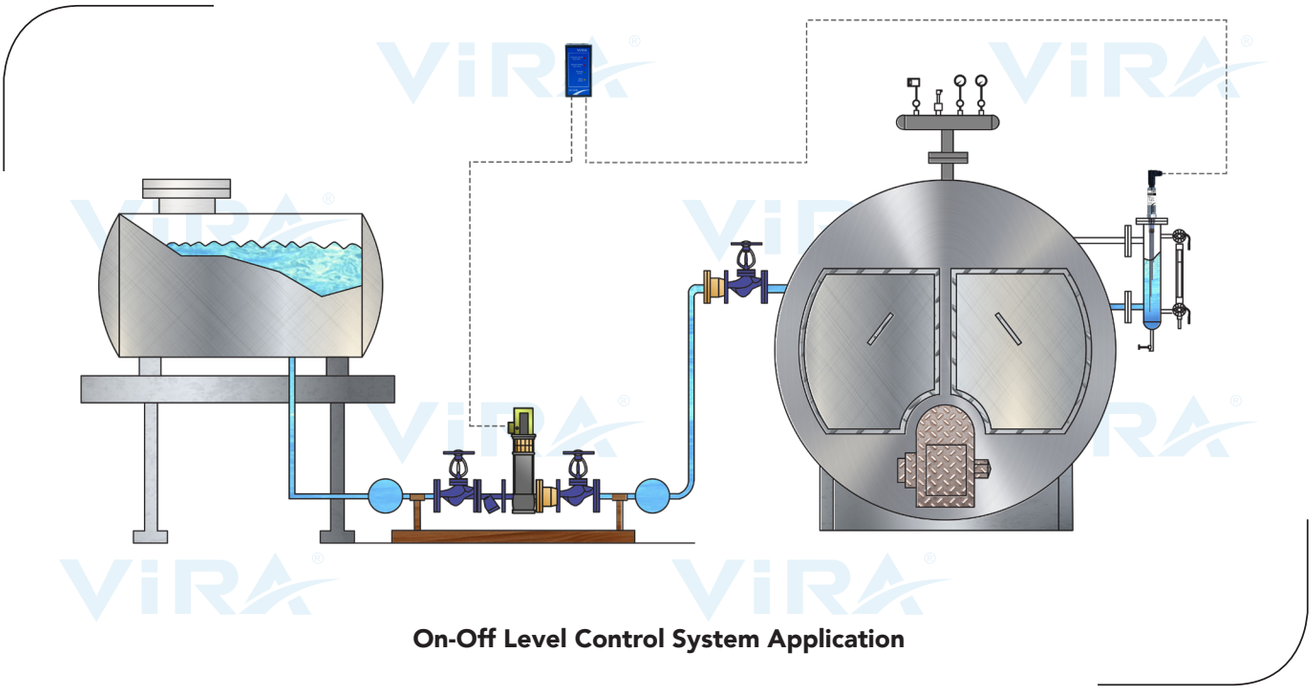
Another reason to use modulating level control system is energy efficiency. At high flow rates, adding cooler water instead of evaporating water will cause both energy loss and thermal stresses.

Therefore, adding water as much as the amount of steam consumption allows us to use steam continuously and efficiently as well as providing energy efficiency.

# LEVEL CONTROL AND ALARM SYSTEMS

# On-Off Level Control System

On-Off Automatic Level control system consists of a conductivity probe and a controller. The feed water pump is started when the water level in the boiler reaches the specified lower level and is stopped when the water reaches the specified upper level. The working principle of the system is conductivity. The pump is allowed to start or stop depending on whether the electrodes are in contact with water.



**On-Off Level Control System Application**

For a safe operation, all steam boilers should have low and high level alarm systems. Additional high and low level alarms can be received from the On-Off level control system.

On-Off Level control and alarm system is used;

- In boilers with a capacity of 5,000 kg/h and less
- Where constant steam load and pressure are not critical
- In backup boilers
- Feed water tanks
- In condensate tanks

# SK 2000

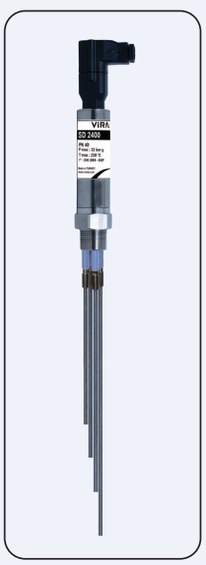
## On-Off Level Control and Alarm System

### On-Off Level and Alarm Controller

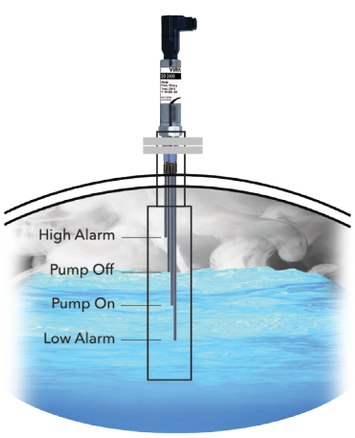
**Type** : SK 2400
**Mains Supply** : 230 VAC (+5% / -10%) 50/60Hz
**Enclosure** : Panel Mounting
**Function** : Pump On-Off, High Alarm, Low Alarm
**Output** : Pump On-Off Relay, Two Alarm Relay
**Max. Ambient Temp.** : 55 °C

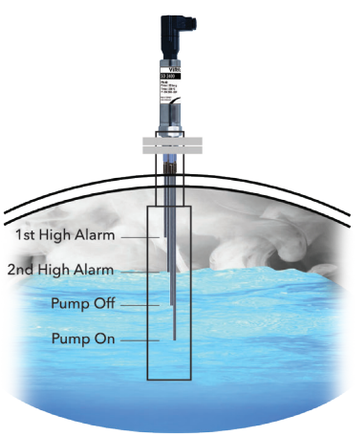

### On-Off Level Control and Alarm Probe

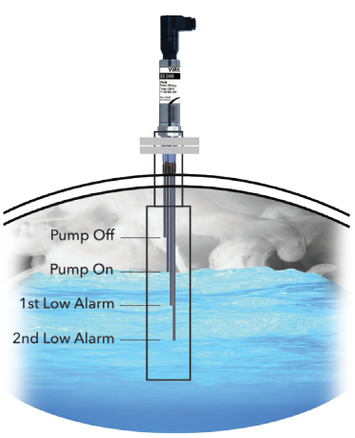
**Type** : SD 2400
**Nominal Pressure** : PN 40
**Max. Operat. Temp.** : 239 °C
**Max. Operat. Press.** : 32 Bar g
**Connection** : 1" BSP Screwed
**Length** : 500 - 1000 - 1500 mm
(Can be cut to desired level)
**Max. Ambient Temp.** : 70 °C



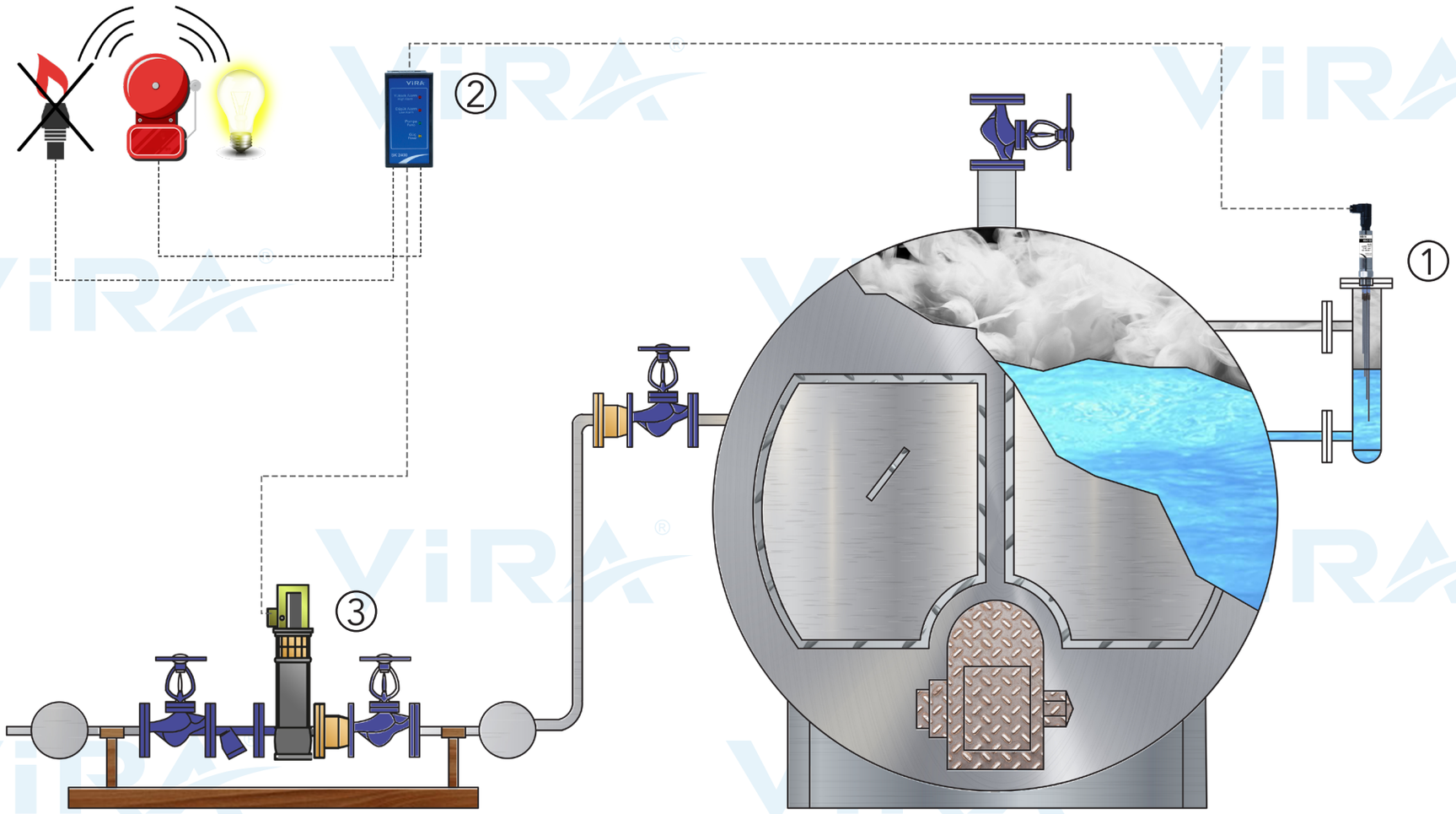
## Application Examples



# SK 2000 On-Off Level Control and Alarm System




**1-** Level Probe **2-** Level Controller **3-** Feed Water Pump

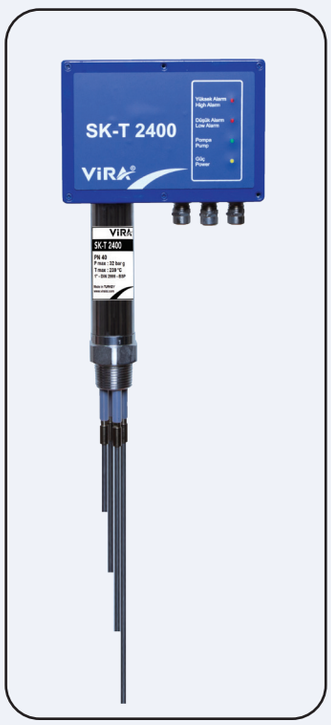
info@fiammac.com
vira.fiammac@gmail.com

# SK-T 2400

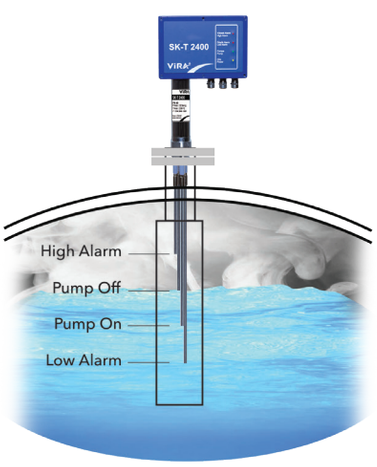
## Compact On-Off Level Control and Alarm System

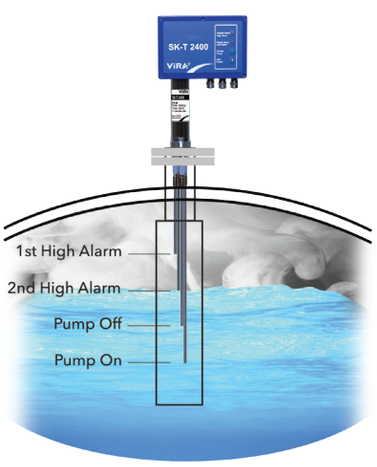
### Compact On-Off Level Control and Alarm System

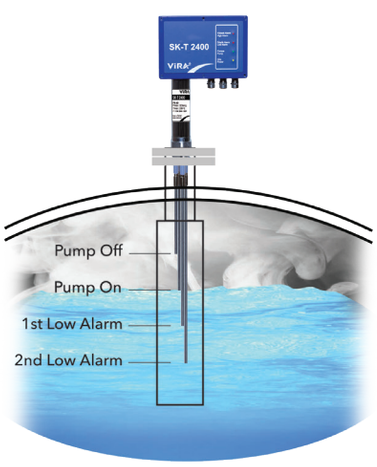
| | |
|---|---|
| **Type** | : SK-T 2400 |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Function** | : Pump On-Off, High Alarm, Low Alarm |
| **Output** | : Pump On-Off Relay, Two Alarm Relay |
| **Nominal Pressure** | : PN 40 |
| **Max. Operat. Temp.** | : 239 °C |
| **Max. Operat. Press.** | : 32 Bar g |
| **Connection** | : 1" BSP Screwed |
| **Length** | : 500 - 1000 - 1500 mm<br>(Can be cut to desired level) |
| **Max. Ambient Temp.** | : 70 °C |



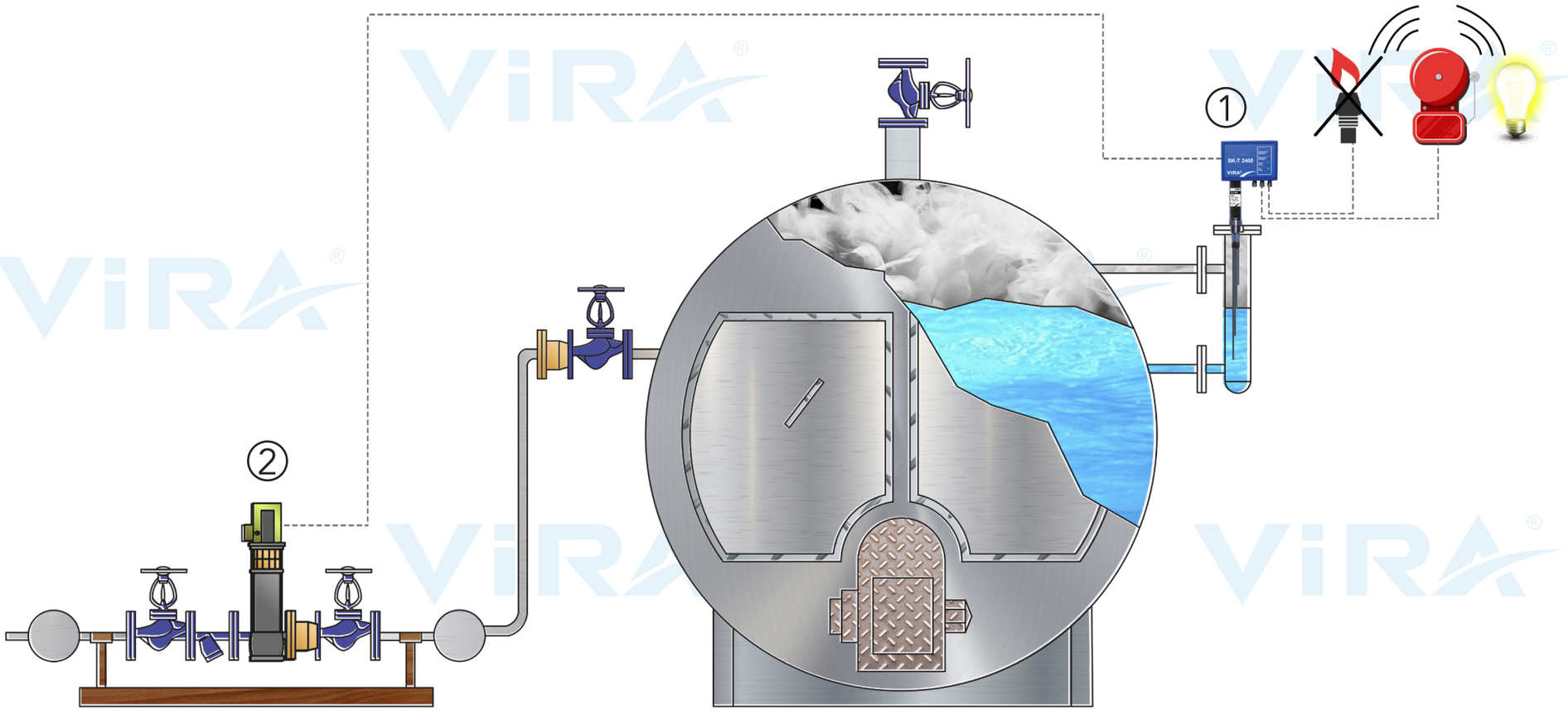

## Application Examples



# SK-T 2400 Compact On-Off Level Control and Alarm System



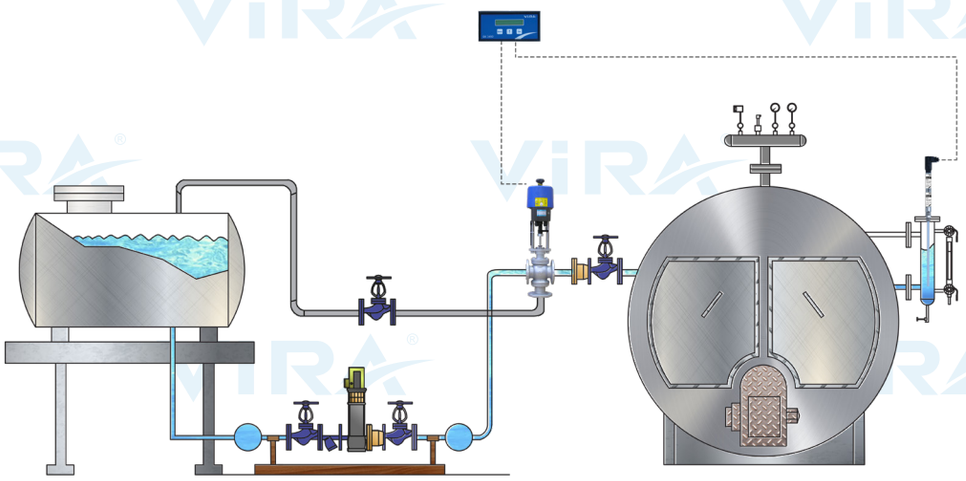

**1-** Compact On-Off Level Control and Alarm System **2-** Feed Water Pump

info@fiammac.com
vira.fiammac@gmail.com

# MODULATING LEVEL CONTROL SYSTEM

Modulating level control system consists of a capacitive probe, a controller and a 2 or 3-way valve. The water level, which varies with the phase change of the water in the boiler, is determined by the capacitive level probe and is continuously compared with the previously set value by the level controller. In any determined deviation, it sends a signal to the feedwater valve in order to take the required feedwater amount into the boiler.

The probe used in the modulating level control system works according to the capacitance principle. Capacitance value is measured according to the amount of water. The controller opens and closes the proportional control valve through signals from the capacitive probe and the water level is kept at the desired level. Thus, the flow rate and pressure of the steam obtained are constant. It also has a low moisture content.



**Modulating Level Control System Application**

**Note:** The control valve may either be a 2-way or 3-way valve according to the user's application.

For a safe operation, all steam boilers should have low and high level alarm systems. Additional high and low level alarms can be received from the modulating level control system.

Modulating level control and alarm system can be used;

- Boilers with a capacity higher than 5.000 kg / h
- Where steam load and pressure are critical

# SK 3000

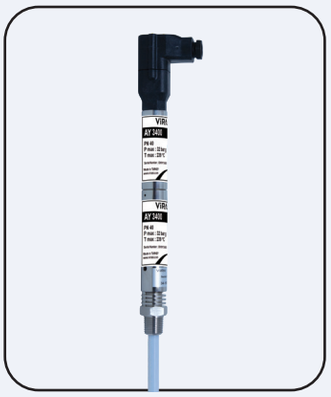
## Modulating Level Control System

### Modulating Level Control System

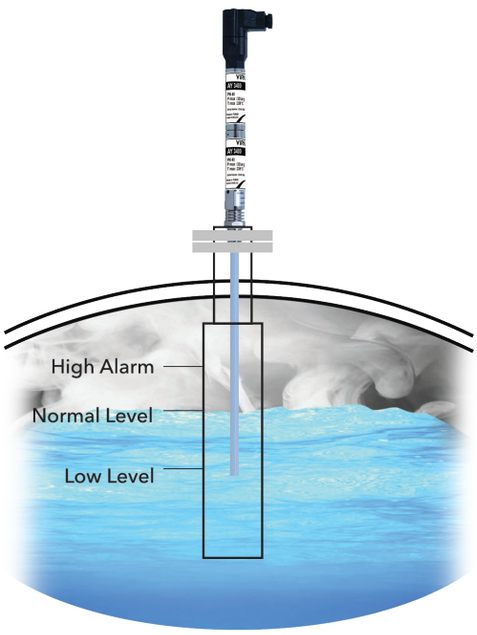
**Type** : SK 3400
**Mains Supply** : 230 VAC (+5% / -10%) 50/60Hz
**Enclosure** : Panel Mounting
**Function** : Modulating Level Control, High Alarm, Low Alarm
**Output** : 4-20 mA Output, Low Alarm Relay, High Alarm Relay, Valve Control Relay
**Max. Ambient Temp.** : 55 °C


### Modulating Level Control Probe

**Type** : SD 3400
**Nominal Pressure** : PN 40
**Max. Operat. Temp.** : 239 °C
**Max. Operat. Press.** : 32 Bar g
**Connection** : 1/2" BSP Screwed
**Length** : 300 - 1500 mm (The length must be specified in the order.)
**Max. Ambient Temp.** : 70 °C



**Application Example**



# SKV 3400

## Modulating Level Control Valves

### Modulating Level Control Valve 2-Way

| | |
|---|---|
| **Type** | : SKV 3400 - 2 |
| **Enclosure** | IP 65 |
| **Sizes** | : DN 15 to DN 300 |
| **Max. Operating Temp.** | : 220 - 250 °C |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Max. Ambient Temp.** | : 60 °C (Actuator) |
| **Control Mode** | : Floating Control |
| **Pressure Class** | : PN 16 - 25 - 40 ANSI 150 and ANSI 300 |

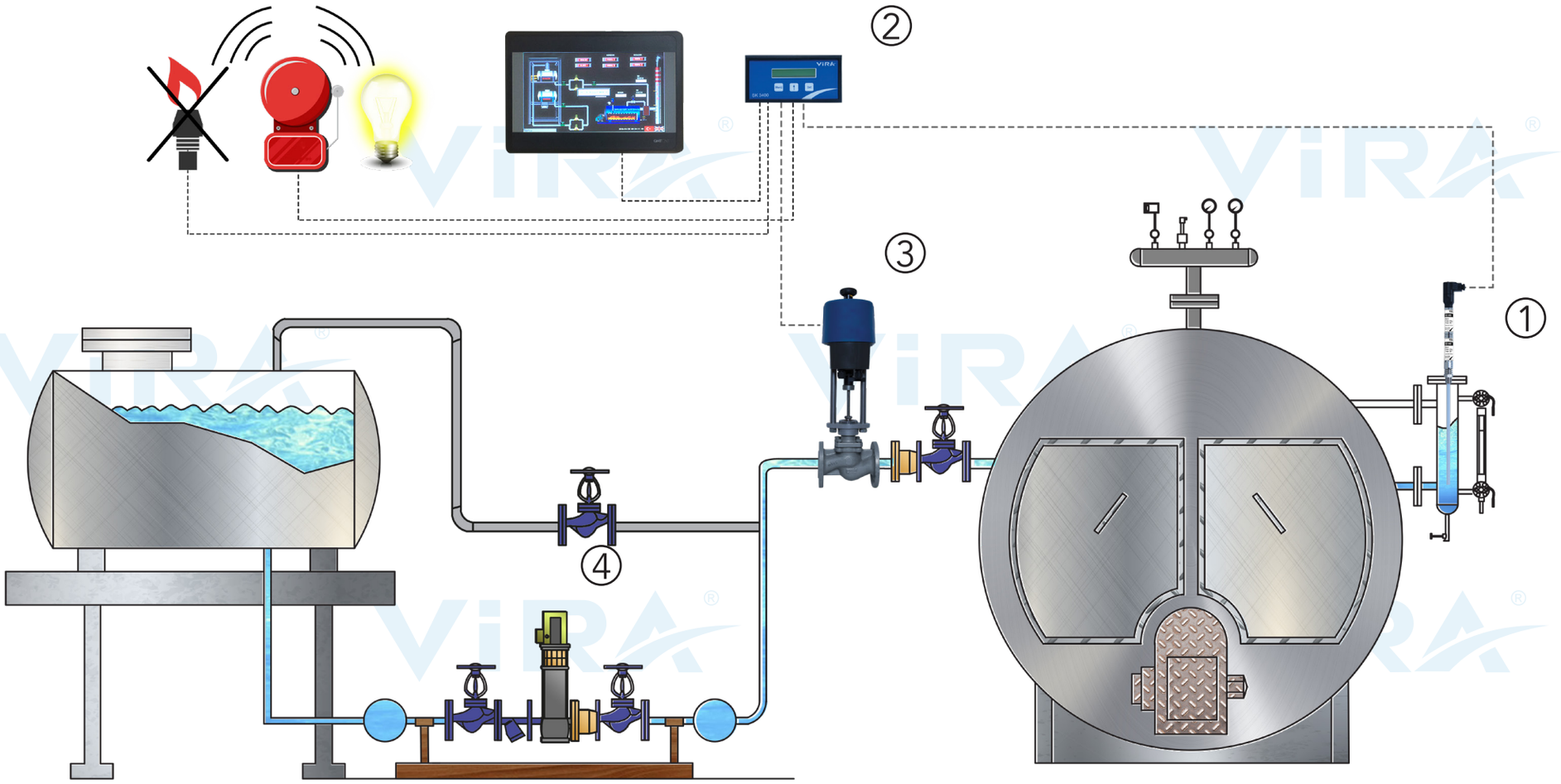
### Modulating Level Control Valve 3-Way

| | |
|---|---|
| **Type** | : SKV 3400 - 3 |
| **Enclosure** | : IP 65 |
| **Sizes** | : DN 15 to DN 300 |
| **Max. Operating Temp.** | : 220 - 250 °C |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Max. Ambient Temp.** | : 60 °C (Actuator) |
| **Control Mode** | : Floating Control |
| **Pressure Class** | : PN 16 - 25 - 40 ANSI 150 and ANSI 300 |

### Advantages

- Constant steam flow and pressure
- Low moisture content steam
- Low thermal stress on boiler surfaces
- Long lifetime for pumps and burners

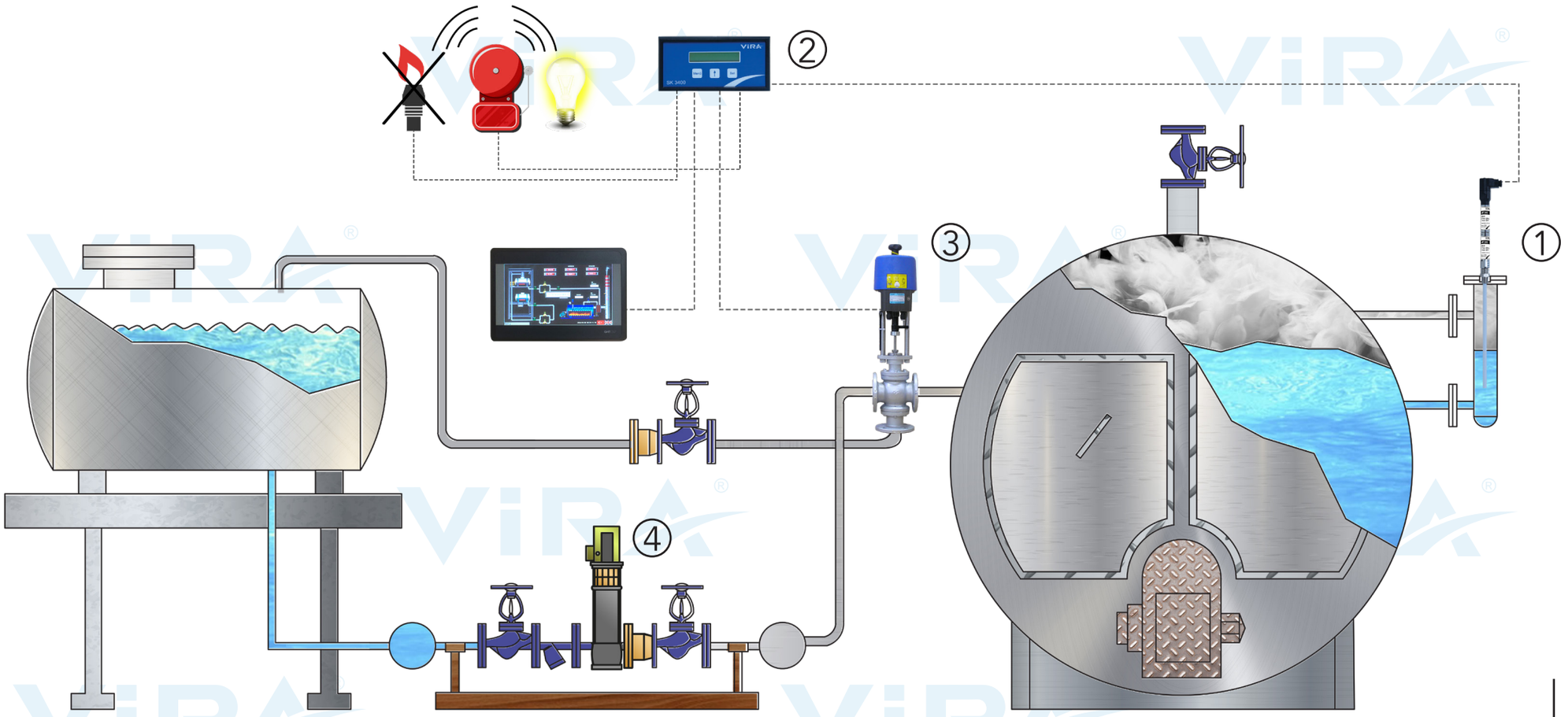
# SK 3000 2-Way Modulating Level Control and Alarm System




**1-** Capacitive Level Probe **2-** Level Controller **3-** 2 Way Level Control Valve **4-** Feedwater Pump

info@firammac.com
vira.firammac@gmail.com

# SK 3000 3-Way Modulating Level Control and Alarm System




**1-** Capacitive Level Probe **2-** Level Controller **3-** 3 Way Level Control Valve **4-** Feedwater Pump

# SD-AY 420A

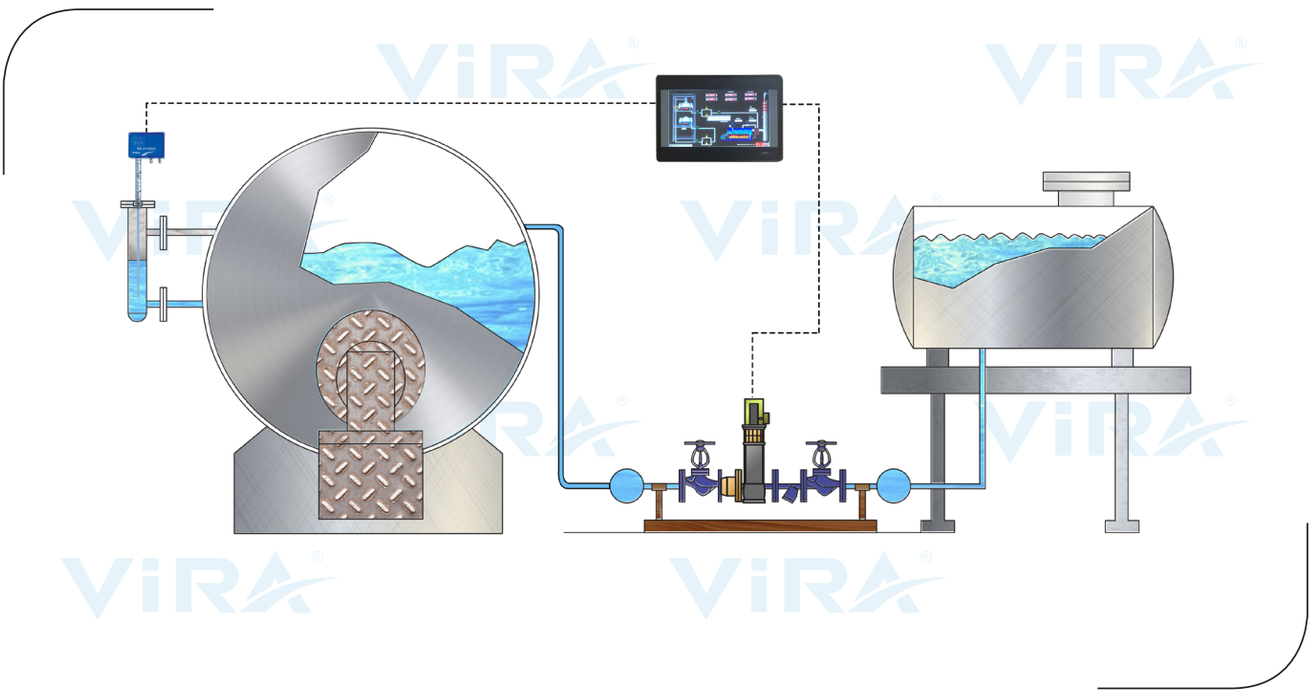
## SD-AY 420A Capacitive Level Transmitter

### Capacitive Level Transmitter

| | |
|---|---|
| **Type** | : SD-AY 420A |
| **Mains Supply** | : 230 VAC (+5% / - 10% ), 50/60 Hz, 24 Vdc<br>24 VDC (Optional) |
| **Output** | : 4-20 mA Output |
| **Nominal Pressure** | : PN 40 |
| **Max. Operat. Temp.** | : 239 °C |
| **Max. Operat. Press.** | : 32 Bar g |
| **Connection** | : 1/2" BSP Screwed |
| **Length** | : 300 - 1500 mm |
| **Max. Ambient Temp.** | : 70 °C |

(The length must be specified in the order.)


**SD-AY 420A System Application**



## Self Monitoring Level Alarm System

Self monitoring level alarm system is presented in two different ways.

SMH 1000 high level alarm system consisting of SMK 1000 level alarm controller and SMHD 1000 high level alarm probe and SML 1000 low level alarm system consisting of SMK 1000 level alarm controller and SMLD 1000 low level alarm probe.

The features that distinguish the self monitoring level alarm system from normal level alarm systems are as follows;

**1.** It checks for open circuit (cable break) / short circuit (contact of cables) in the cables between controller and probe.

**2.** It checks whether the probe level tip touches the boiler body.

**3.** It checks the leakages that may occur on the probe.

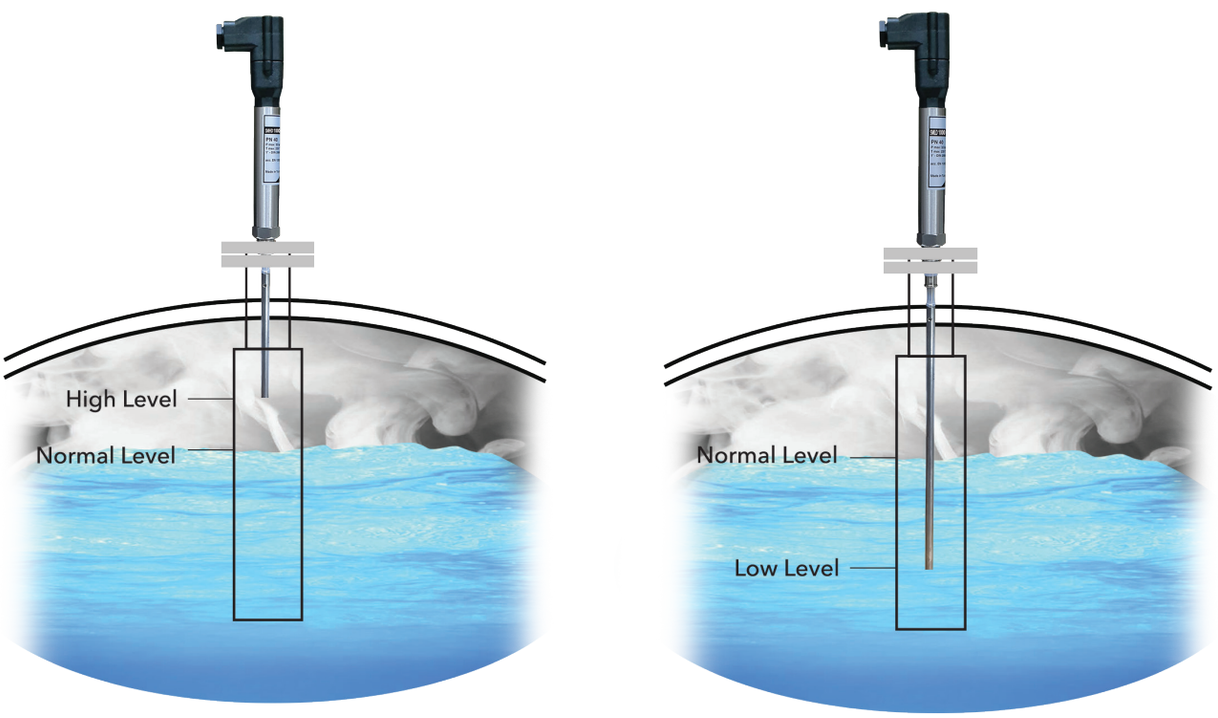
**4.** It controls the contamination (formation of dirt and scaly layer) at the connection points of the level electrode to the probe body.

**5.** The controller periodically checks whether the internal circuits are functioning properly.

**6.** The controller gives the alarm as a result of an error occurring as a result of the above controls.

**Note:** SMH 1000 and SML 1000 Self monitoring level alarm systems are suitable to be used in unattended operation standards for 72 hours according to EN 12952 and EN 12953 standards.

### Application Example



# SML-H 1000

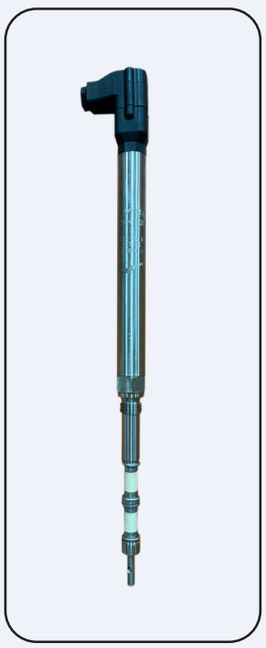
## High Pressure Self Monitoring Low Level Alarm System

### Self Monitoring Level Alarm Controller

| | |
|---|---|
| **Type** | : SMK 1000 |
| **Enclosure** | : Panel Mounting |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Function** | : Self-Monitoring High-Low Level Alarm |
| **Output** | :Two Alarm Relay, RS 485 Modbus Output |
| **Max Ambient Temperature** | : 55 °C |

### High Pressure Self Monitoring Low Level Alarm Probe

| | |
|---|---|
| **Type** | : SMLD-H 1000 |
| **Nominal Pressure** | : PN 250 |
| **Max. Operat. Temp.** | : 367 °C |
| **Max. Operat. Press.** | : 200 Bar g |
| **Connection** | : ½" BSP Screwed |
| **Length** | : 500, 1000, 1500 mm |



Level Alarm Probe


Controller

# SMH-H 1000

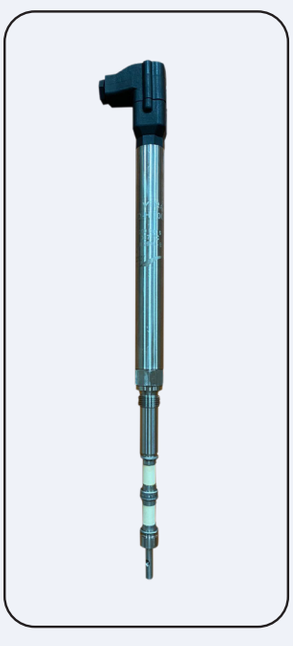
## High Pressure Self Monitoring High Level Alarm System

### Kendi Kendini Kontrol Edebilen Seviye Alarm Kontrolörü

| | |
|---|---|
| **Type** | : SMK 1000 |
| **Enclosure** | : Panel Mounting |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Function** | : Self-Monitoring High-Low Level Alarm |
| **Output** | :Two Alarm Relay, RS 485 Modbus Output |
| **Max Ambient Temperature** | : 55 °C |

### High Pressure Self Monitoring High Level Alarm Probe

| | |
|---|---|
| **Type** | : SMHD-H 1000 |
| **Nominal Pressure** | : PN 250 |
| **Max. Operat. Temp.** | : 367 °C |
| **Max. Operat. Press.** | : 200 Bar g |
| **Connection** | : ½" BSP Screwed |
| **Length** | : 500, 1000, 1500 mm |



Level Alarm Probe


Controller

# SMH 1000

## Self Monitoring High Level Alarm System

### Self Monitoring Level Alarm Controller

| | |
|---|---|
| **Type** | : SMK 1000 |
| **Enclosure** | : Panel Mounting |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Function** | : Self-Monitoring High-Low Level Alarm |
| **Output** | : Two Alarm Relay, RS 485 Modbus Output |
| **Max Ambient Temp.** | : 55 °C |

### Self Monitoring High Level Alarm Probe

| | |
|---|---|
| **Type** | : SMHD 1000 |
| **Nominal Pressure** | : PN40 |
| **Max. Operat. Temp.** | : 239 °C |
| **Max. Operat. Press.** | : 32 Bar g |
| **Connection** | : ½" BSP Screwed |
| **Length** | : 500, 1000, 1500 mm |
| **Max. Ambient Temp.** | : 70 °C |

Level Alarm Probe


Controller

# SML 1000

## Self Monitoring Low Level Alarm System

### Self Monitoring Level Alarm Controller

| | |
|---|---|
| **Type** | : SMK 1000 |
| **Enclosure** | : Panel Mounting |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Function** | : Self-Monitoring High-Low Level Alarm |
| **Output** | :Two Alarm Relay, RS 485 Modbus Output |
| **Max. Ambient Temp.** | : 55 °C |

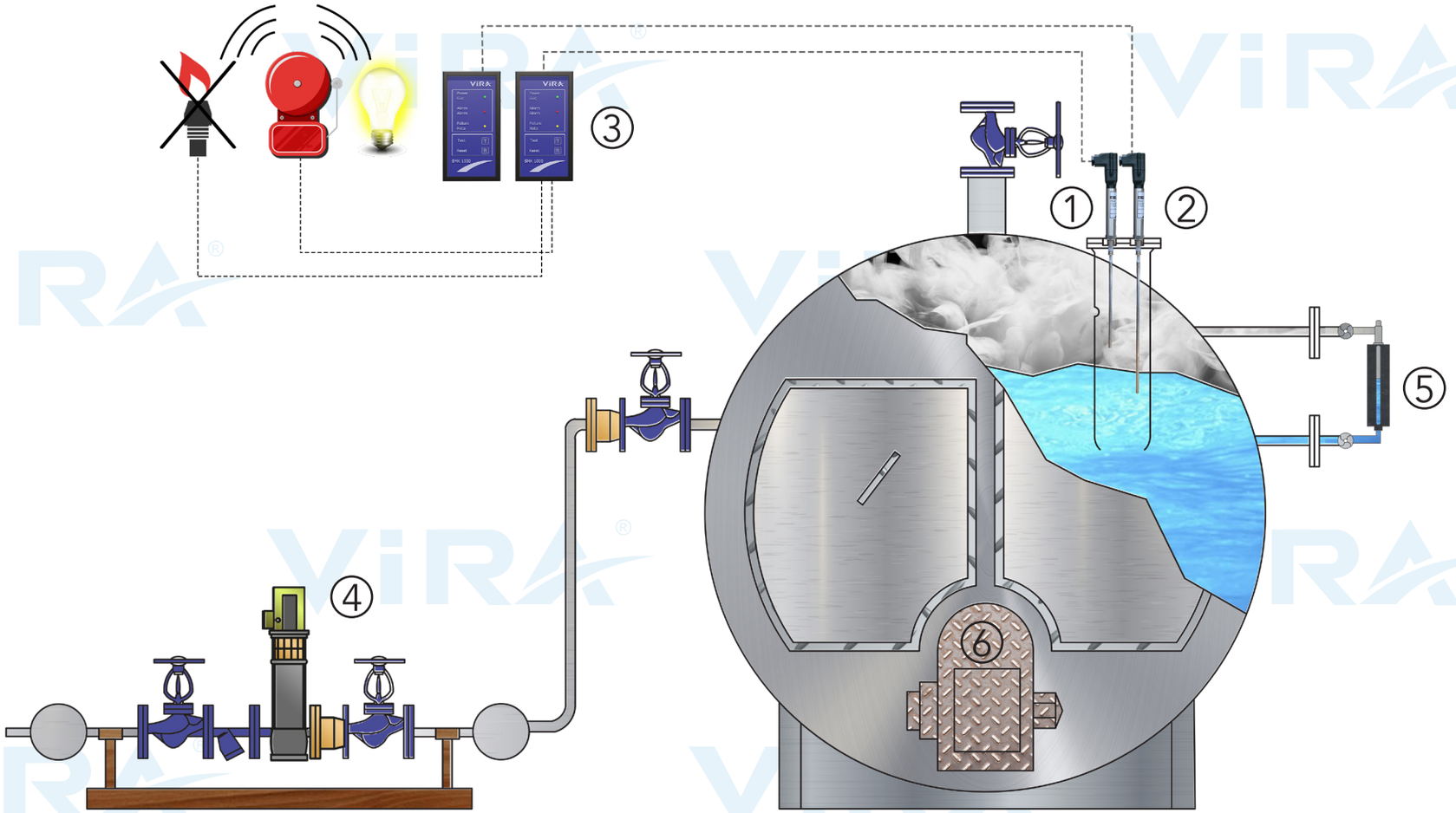
### Self Monitoring Low Level Alarm Probe

| | |
|---|---|
| **Type** | : SMLD 1000 |
| **Nominal Pressure** | : PN 40 |
| **Max. Operat. Temp.** | : 239 °C |
| **Max. Operat. Press.** | : 32 Bar g |
| **Connection** | : ½" BSP Screwed |
| **Length** | : 500, 1000, 1500 mm |
| **Max. Ambient Temp.** | : 70 °C |

Level Alarm Probe


Controller

# High and Low Self Monitoring Level Alarm Systems




**1-** High Level Alarm Probe **2-** Low Level Alarm Probe **3-** Level Alarm Controller

**4-** Feedwater Pump **5-** Level Gauge **6-** Burner

info@fiammac.com
vira.fiammac@gmail.com

# SK 1000

## Level Alarm System

### Level Alarm Controller

| | |
|---|---|
| **Type** | : SK 1200 |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Enclosure** | : Panel Mounting |
| **Function** | : High Alarm, Low Alarm |
| **Output** | : Two Alarm Relay |
| **Max. Ambient Temp.** | : 55 °C |

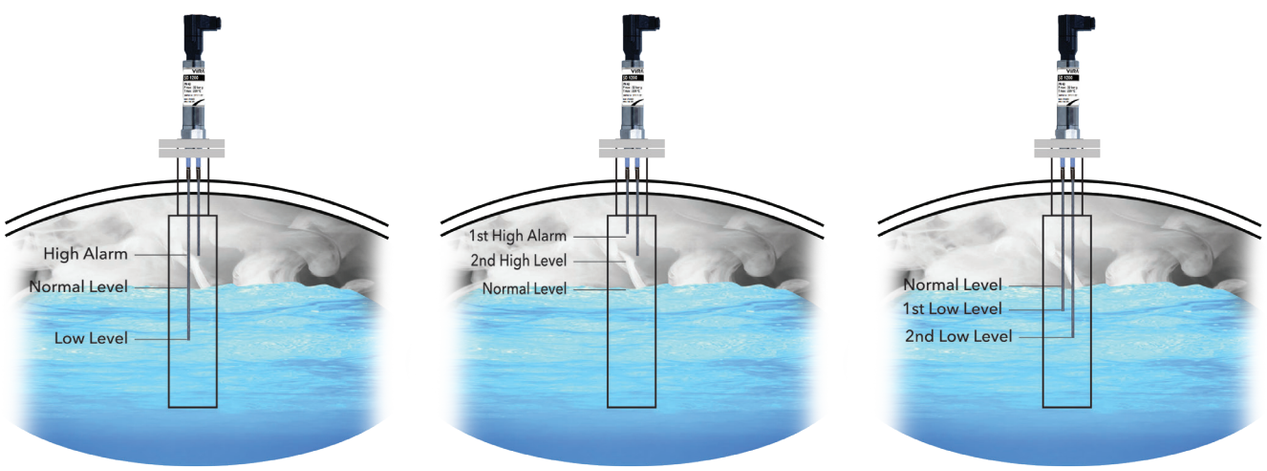

### Level Alarm Probe

| | |
|---|---|
| **Type** | : SD 1200 |
| **Nominal Pressure** | : PN 40 |
| **Max. Operat. Temp.** | : 239 °C |
| **Max. Operat. Press.** | : 32 Bar g |
| **Connection** | : 1" BSP Screwed |
| **Length** | : 500 - 1000 - 1500 mm |

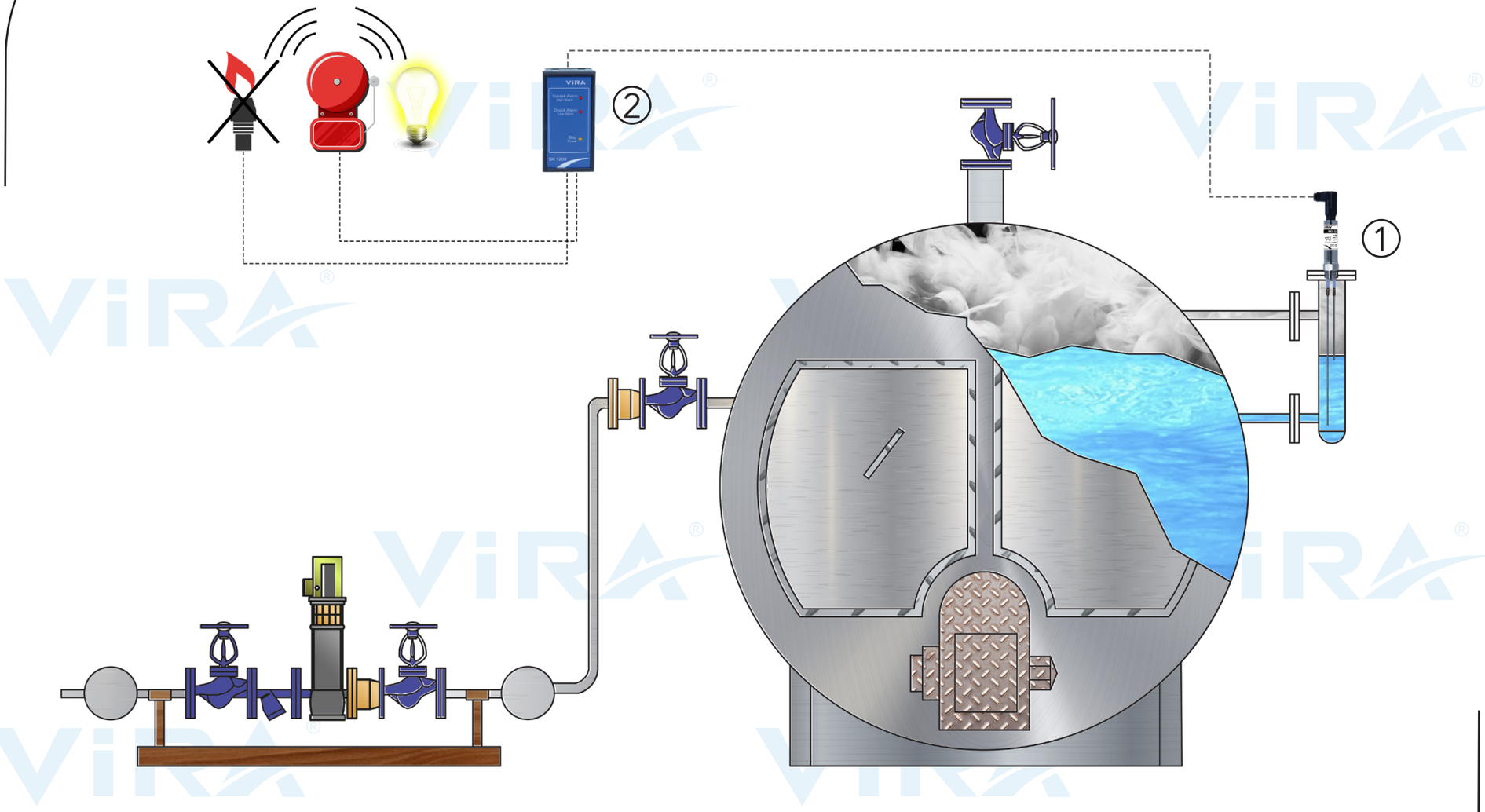
(Can be cut to desired level)

| | |
|---|---|
| **Max. Ambient Temp.** | : 70 °C |

## Application Example



# SK 1000 Level Alarm System



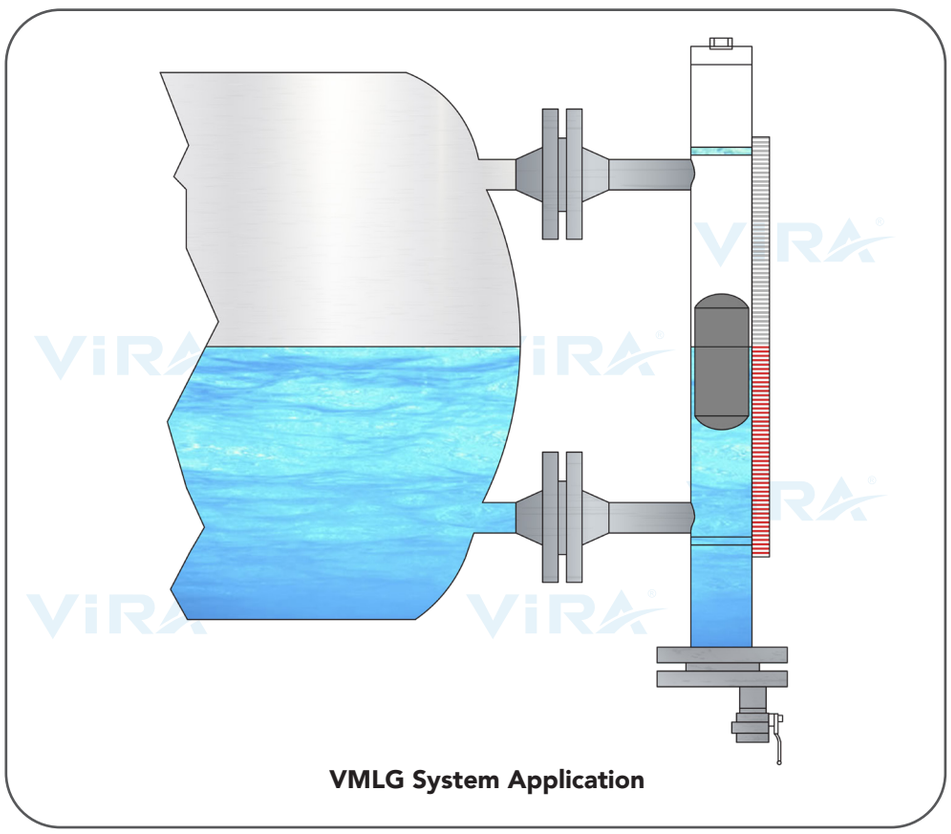

**1-** Level Alarm Probe **2-** Level Alarm Controller

info@fiammac.com
vira.fiammac@gmail.com

# VMLG

## Magnetic Level Gauges

A magnetic level gaugeis an externally mounted chamber with clear, high clarity indication of liquid level by visual indicators that are completely isolated from the process liquid. Inside the chamber, there is a magnetic float that rises and falls with the level of the liquid. When the magnetic float moves, it causes indicators inside the chamber to turn, and mark the level. Float size and weight are determined by the process fluid, pressure, temperature and the specific gravity of the process fluid. Float chamber is typically constructed with the non-magnetic pipe having process connections that match to the vessel connections.

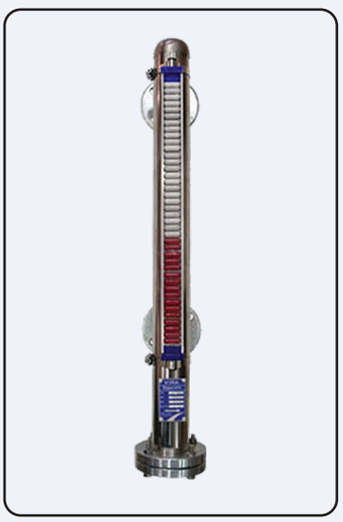


**VMLG System Application**

**Areas of Application**

- Water Tanks
- Condensate Tanks
- Fuel Tanks
- Steam Boilers
- Chemical Industry
- Liquid and Liquefied Gas
- Degassers
- Underground tanks
- Refineries

| | |
|---|---|
| **Type** | : VMLG |
| **Body** | : AISI 304 / 316 Stainless Steel |
| **Float** | : AISI 316L Stainless Steel |
| **Flaps** | : Plastic / Aluminum |
| **Max. Operat Press.** | : 16 Bar g |
| **Max. Operat. Temp.** | : 160°C |
| **Flange** | : Carbon Steel / Stainless Steel |

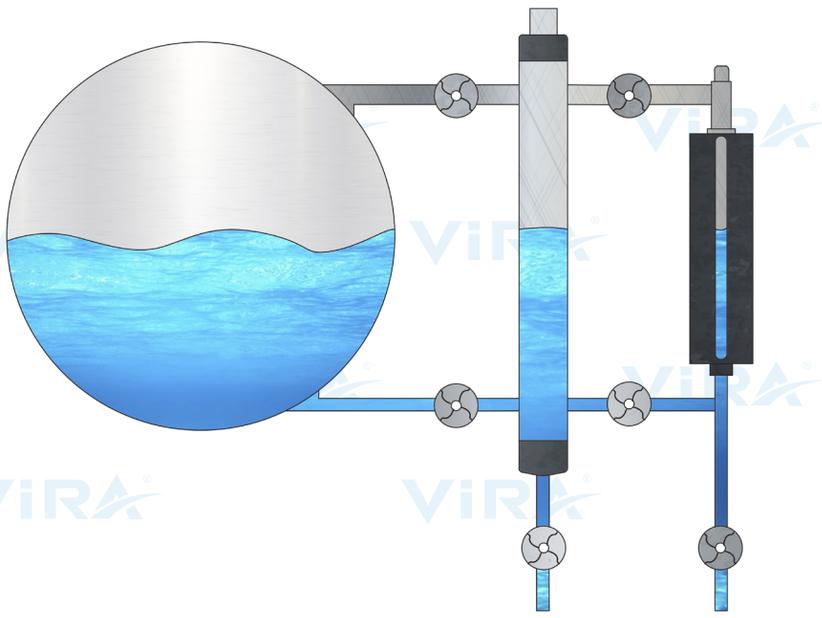


# VRLG

## Reflex Level Gauge

Reflex level indicators are designed for applications that involve high temperature, high pressure and use of corrosive fluids. The colorless fluid used in this apparatus gives better clarity for level indication. This type of level gauges' working principle is based on the light refraction and reflection laws.

During the operation, the gauge chamber is filled with liquid in the lower zone and vapors in the upper zone. The liquid level is distinguished by different brightness of the glass in the liquid and in the gas/vapor zone.

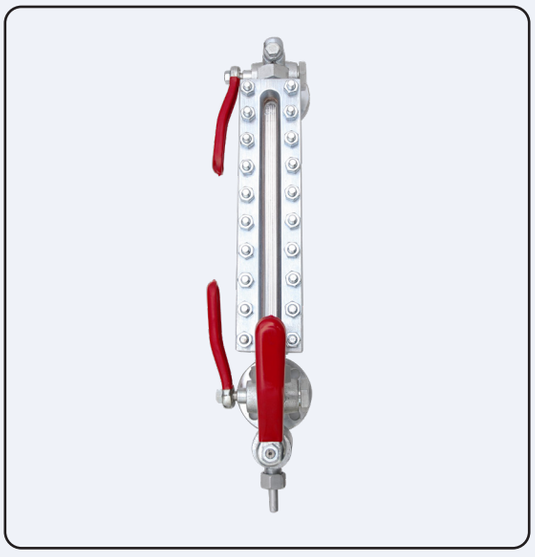


**VRLG System Application**

**Areas of Application**

- Oil Refinery Plants
- Petrochemical Industry
- Pharmaceutical Plants
- Tank and Boilers
- Chemical Processes
- Textile Industry
- Shipyards
- Paper Industry

| | |
|---|---|
| **Valves** | : GGG 42 |
| **Reflex Glass** | : MAXOS |
| **Shaft** | : 304-316 Stainless Steel |
| **Sealing** | : Klingerite |
| **Cover** | : ST 37 Carbon Steel |
| **Nominal Pressure** | : PN 32 |
| **Operating Pressure** | : PN 16 kg/cm² |
| **Max. Operating Temp.** | : 250°C |



# AUTOMATIC BLOWDOWN SYSTEMS

# BOILER BLOWDOWN

**Why is it necessary to blowdown in steam boilers?**

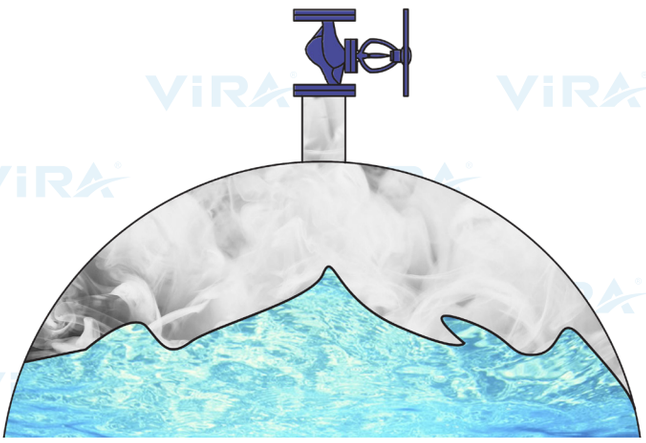
Many industries use boilers to generate steam for their energy needs. The water used to feed the boilers contains varying levels of impurities:

- Dissolved solids - Scale forming substances
- Suspended solids - Sludge forming substances
- Dissolved gasses - Corrosive gasses such as oxygen and carbon dioxide.

Boiler feedwater could contain a high level of dissolved salts and minerals, even if there is a feedwater treatment. When steam evaporates, the concentration of the salt and minerals in the boiler water increases. This causes TDS increase in the boiler water and high TDS may cause;

- Carryover of the boiler water
- Formation of sludge
- Scaling of the boiler tubes

Carryover of the water in steam lines may cause water hammer, corrosion, and deposits. Deposits on the heat transfer surfaces decrease the efficiency and cause control valves and steam traps to malfunction.



**Water Carryover**

Suspended solids accumulate at the bottom of the boiler and if they are not removed those solids prevent heat transfer from the boiler fire tube which will overheat and may even fail. Sludge formation can lead to malfunction of level control devices.

Scaling on the heating surfaces in the boiler will increase fuel cost, reduce heat transfer, and efficiency. 1 mm calcium carbonate scale increases %3 or 1mm Silicate scale increases %8 in fuel cost.

**Why Automatic Blowdown?**

The blowdown rate can be controlled manually or automatically.

**With manual blowdown control,** if the level of TDS is higher than the allowed level, it may cause loss of water, heat and chemicals from the boiler. Boiler blowdown automation helps to reduce fuel, water, chemical and manpower costs.

**Automatic blowdown** system ensures a maximum of dissolved solids and suspended solids are removed with a minimal loss of water and heat from the boiler

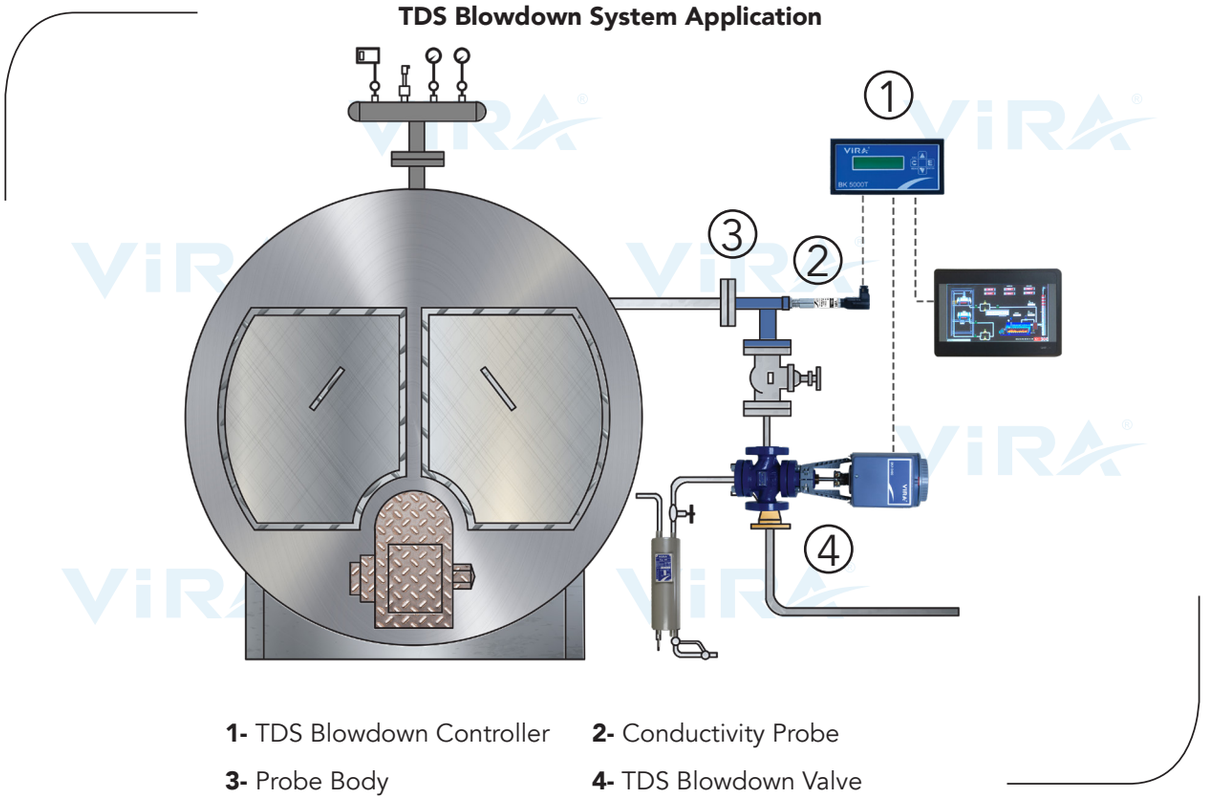
# BS4-T

## Automatic Surface Blowdown (TDS) Control

As the water in the boiler drum turns into steam, the concentration of dissolved solids in the boiler water increases. Dissolved substances are moved to the installation with dragging steam and water cause malfunctions in the system and solid materials accumulate on the heat transfer surfaces causing the heat efficiency to decrease. The blowdown process cannot eliminate scaling by itself. In addition to dosing and degassing of boiler feed water, it helps to keep the water in the boiler at the desired TDS level.

Vira offers two types of surface blowdown systems, BS4 and BS4-T. Unlike BS4 system, BS4-T system has temperature compensation feature. This feature adjusts the system's performance to compensate for the effects caused by changes in temperature. As a result, the BS4-T system is not affected by temperature and pressure changes in the boiler and does not require calibration in every change.

**TDS Blowdown System Application**




**1-** TDS Blowdown Controller
**2-** Conductivity Probe
**3-** Probe Body
**4-** TDS Blowdown Valve

The conductivity probe where located in the boiler shell continuously monitors the conductivity of the boiler water. The measured conductivity value is compared with the Set Point in the controller. If the water conductivity is higher than the set value the blowdown valve will be continuously working until the conductivity value drops below the set value. If it is lower than the Set Point the blowdown valve will remain its closed position.

**Advantages of Automatic TDS Blowdown:**

- Reduced maintenance and repair costs (minimized carryover and deposits)
- Cleaner and more efficient steam
- Energy Savings
- Reduced operating costs (less feedwater consumption; chemical treatment and higher heating efficiency)
- Potential savings from a blowdown heat recovery system (where installed).
- The labor-saving advantages of automation.

# BS4-T

## Automatic TDS Blowdown System with Temperature Compensation Feature

### Temperature Compensation Type TDS Blowdown Controller


**Type** : BK 5000-T

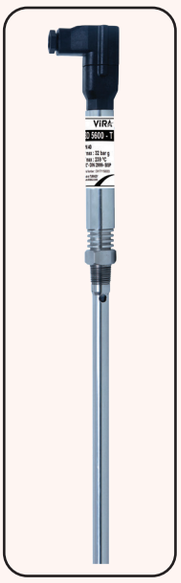
**Mains Supply** : 230 VAC (+5% / -10%) 50/60Hz

**Enclosure** : Panel Mounting

**Functions** : Continuous Blowdown Valve Control, High TDS Alarm

**Output** : 4-20 mA Output, High TDS Alarm Relay, Valve Relay, RS 485 Modbus Output

**Features** : Conductivity Set Value, Alarm Set Value, Valve Relay Test, Alarm Relay Test, Temperature Compensation



### Temp. Compensation Type TDS Blowdown Probe

**Type** : BD 5600-T

**Nominal Pressure**: PN 40

**Max. Operat. Temp**: 239 °C

**Max. Operat. Press.**: 32 Bar g

**Connection**: 1/2" BSP Screwed

**Length**: 500 mm

**Max. Ambient Temp.** : 70 °C

BS4-T temperature compensated automatic tds blowdown system consists of BK 5000-T tds blowdown controller, BD 5600-T conductivity probe, BKV 5400 continuous blowdown valve and DG 5400 probe body.

Increasing the boiler water temperature means an increase in the conductivity value within the boiler. This increase amount is 2% for every 1 ° C. The Vira BD 5600-T probe can perform both conductivity measurement and temperature compensation on the same probe.

# BS4

## Automatic TDS Blowdown System

### TDS Blowdown Controller


**Type** : BK 5000-T

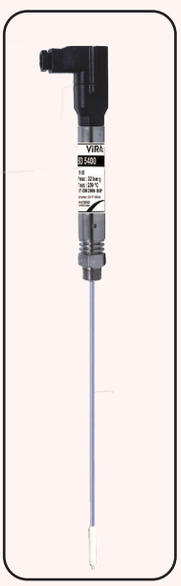
**Mains Supply** : 230 VAC (+5% / -10%) 50/60Hz

**Enclosure** : Panel Mounting

**Functions** : Continuous Blowdown Valve Control, High TDS Alarm

**Output** : 4-20 mA Output, High TDS Alarm Relay, Valve Relay, RS 485 Modbus Output

**Features** : Conductivity Set Value, Alarm Set Value, Valve Relay Test, Alarm Relay Test



### TDS Blowdown Probe

**Type** : BD 5400

**Nominal Pressure**: PN 40

**Max. Operat. Temp**: 239°C

**Max. Operat. Press.**: 32 Bar g

**Connection**: 1/2" BSP Screwed

**Length**: 500 mm

**Max. Ambient Temp.** : 70 °C

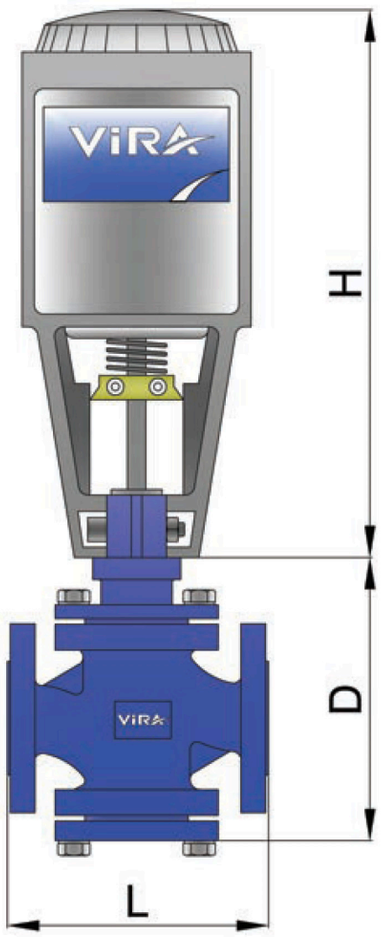
BS4 automatic tds blowdown system consists of BK 5000-T tds blowdown controller, BD 5400 conductivity probe, BKV 5400 continuous blowdown valve and DG 5400 probe body.

BS4 Tds blowdown system is used in constant pressure boilers that do not require temperature compensation. It is calibrated at maximum pressure. The Vira BD 5400 probe can only measure conductivity.

## Automatic TDS Blowdown Valve

**Type** : BKV 5400
**Nominal Pressure** : PN 40
**Max. Operat. Temp.** : 239°C
**Max. Operat. Press.** : 32 Bar g
**Size** : DN 20
**Body** : GGG 40
**Sample Cooler Outlet** : 1/4" BSP Screwed

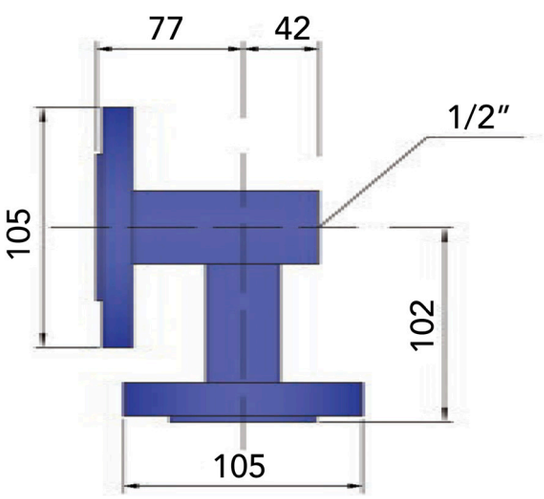
| Valve Blowdown Capacity (for DN 20) | |
|---|---|
| Pressure bar g | Capacity kg/h |
| 3 | 525 |
| 5 | 750 |
| 7 | 1200 |
| 10 | 1500 |
| 12 | 1550 |
| 15 | 1650 |




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| Type | Size | H mm | D mm | L mm | Weight kg |
| BKV 5420 | DN 20 | 340 | 105 | 150 | 10 kg |

## TDS Blowdown Probe Body

**Type** : DG 5400
**Nominal Pressure** : PN 40
**Max. Operat. Temp.** : 239 °C
**Max. Operat. Press.** : 32 Bar g
**Size** : DN 20
**Body** : Carbon Steel




| DIMENSIONS | | | | | | |
|---|---|---|---|---|---|---|
| Type | Size | A mm | B mm | C mm | D mm | Weight kg |
| DG 5420 | DN 20 | 77 | 42 | 102 | 105 | 3,7 kg |

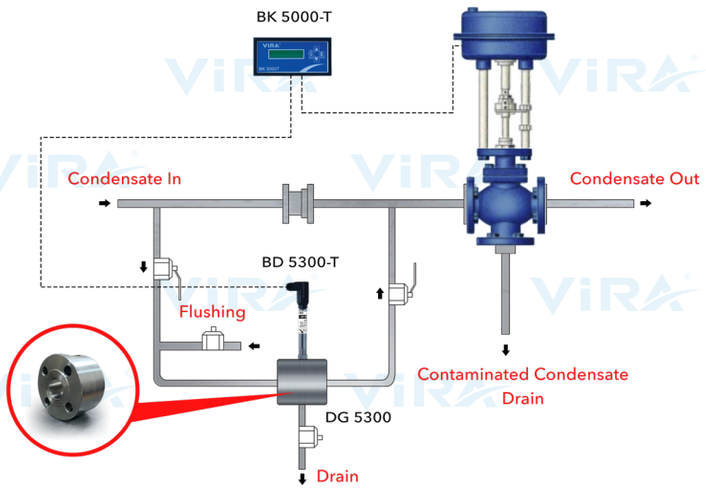
# BS3-T

## Condensate Contamination Control System

Condensate is very valuable for steam producing plants and needs to be recycled. It must be ensured that the returned condensate is clean. Leakage in one of the devices used for heat transfer may cause the heated fluid to mix into the condensate water.

The condensate contamination control system monitors and displays the conductivity of the condensate. It automatically diverts the condensate to drain by a 3 way valve instead of back to the boiler system.

When the conductivity drops to the desired level, the condensate is allowed to return to the boiler system, thus minimizing heat and water wastage, as well as avoiding the possibility of contaminating the feedwater.




**BS3-T System Application**

**Note:** BS3-T Vira Condensate Contamination Control system performs contamination control with electrical conductivity measurement.

**BS3-T Condensate Contamination Control System Components**


### Conductivity Controller

**Type** : BK 5000-T

**Mains Supply** : 230Vac (+5% / -10%) 50/60Hz

**Enclosure** : Panel Mounting

**Functions** : Valve Control, High TDS Alarm

**Output** : 4-20 mA Output, High TDS Alarm Relay, Valve Relay, RS 485 Modbus Output

**Features** : Conductivity Set Value, Alarm Set Value, Valve Relay Test, Alarm Relay Test, Temperature Compensation

### Probe Body

**Type** : DG 5300

**Body** : AISI 304 SS, AISI 316 SS

**Flange Connection** : DN 15 - DN 50

**Probe Connection** : 1/2'' , 3/4', 1''

**Drain Size** : 1/4''

**Nominal Pressure** : PN 16, PN 25, PN 32, PN 40, PN 63

### Temp. Compensation Type Conductivity Probe

**Type** : BD 5300-T

**Nominal Pressure** : PN 40

**Max. Operat. Temp.** : 239°C

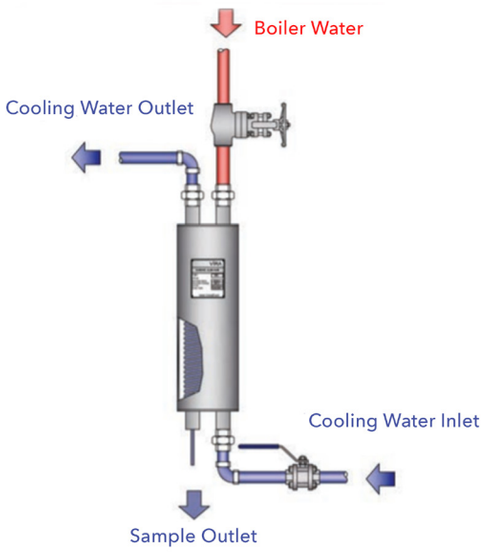
**Max. Operat. Press.** : 32 Bar g

**Connection** : 1/2'' BSP Screwed

**Max. Ambient Temp.** : 70 °C

# NK 20

## Sample Cooler

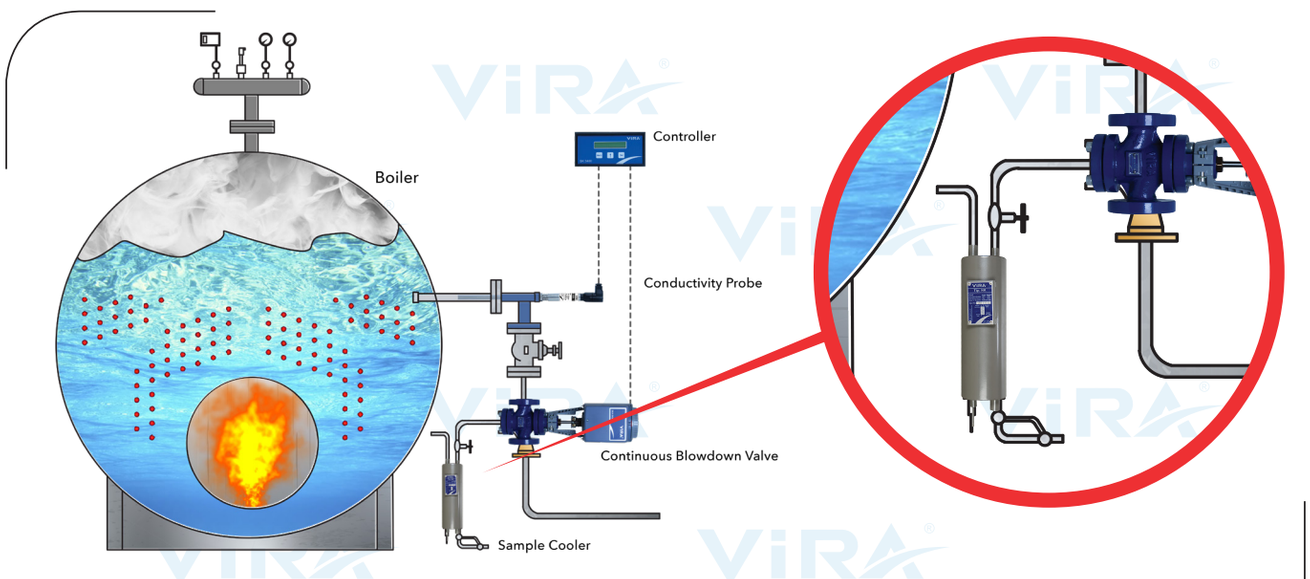

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Type | A mm | B mm | C mm | Weight kg |
| NK 20 | 350 | 100 | 30 | 5 |

### Sample Cooler

| | |
|---|---|
| **Type** | : NK 20 |
| **Body** | : AISI 304 Stainless Steel |
| **Coil** | : AISI 304 Stainless Steel |
| **Coil Nominal Pressure** | : PN 40 |
| **Max. Operating Pressure** | : 32 Bar g |
| **Max. Operating Temp.** | : 239 °C |
| **Cooling Water Connection** | : 1/2" BSP Screwed |
| **Sample Connection** | : 1/4" BSP Screwed |

### Sample Cooler Montage Set

| | |
|---|---|
| **Type** | : NK 20 - MS |
| **Needle Valve** | : 1/4" |
| **Street Elbow** | : 1/4" |
| **Pipe** | : 1/4", 50 cm, Ø6mm |
| **Reduction** | : 1/2" - 1/4" |
| **Connector** | : 1/4", Ø6mm |
| **Valve** | : 1/2" male-female DKV-2 Brass |



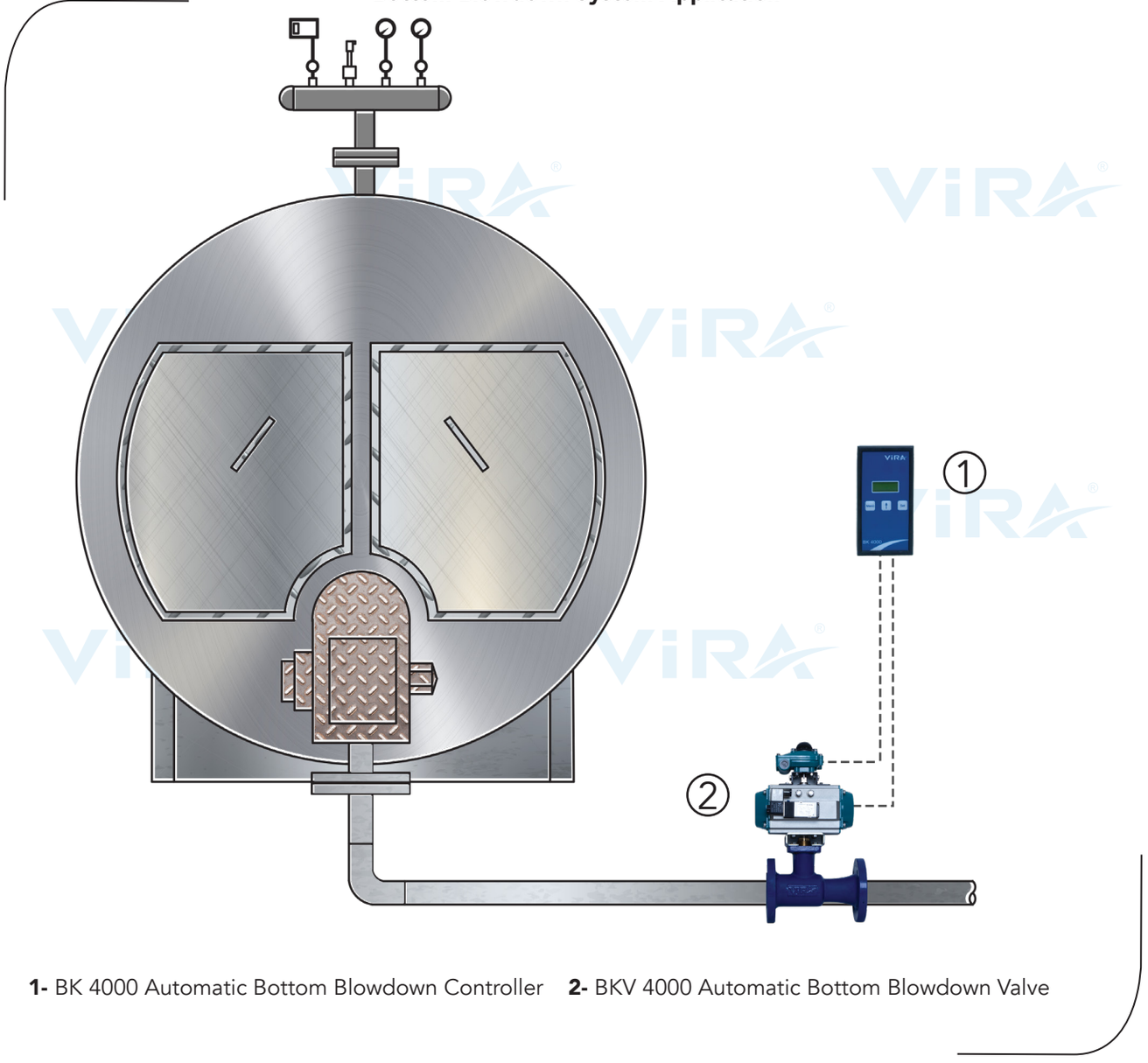

**NK 20 System Application**

# DB2

## Automatic Bottom Blowdown System

Some impurities, and salts (rust, oil and dirt that may come from the installation) precipitate to the bottom of the boiler to form a sludge layer. By an actuated valve, at least four-second blowdown is performed in every eight hours (once in a shift). As a result of this process, the sludge and sediment accumulated at the bottom of the boiler are moved out of the boiler. Thus blowdown is made on time and enough by an automatic blowdown valve. By this way, both over blowdown and forgetting of blowdown is avoided.

**Bottom Blowdown System Application**




**1-** BK 4000 Automatic Bottom Blowdown Controller **2-** BKV 4000 Automatic Bottom Blowdown Valve

**Difference between Vira BK 4000 Controller and Ordinary Timers**

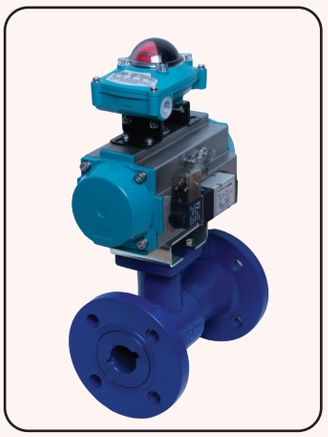
1. It controls the position of the valve. If the valve is in a different position than it should be, it gives an alarm.
2. It prevents simultaneous blowdown in boilers operating side by side and connected to a single blowdown line. Before the blowdown process in a boiler is finished, other boilers are prevented from blowdown.
3. If desired, the blowdown during burner operation is delayed until the burner is switched off.

# DB2

## Automatic Bottom Blowdown System


### Bottom Blowdown Controller

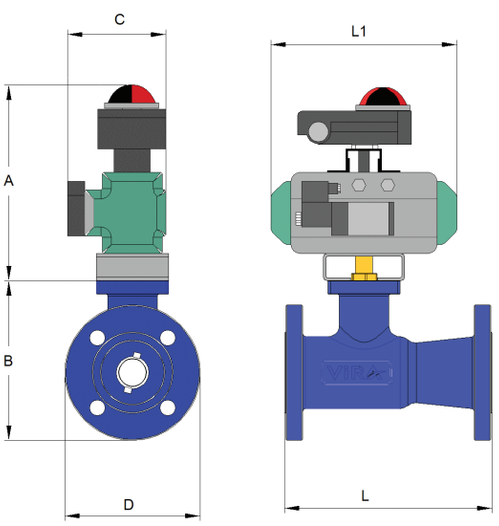
| | |
|---|---|
| **Type** | : BK 4000 |
| **Mains Supply** | : 230 VAC (+5% / -10%) 50/60Hz |
| **Enclosure** | : Panel Mounting |
| **Function** | : Valve Open/Close, Valve Open/Close Failure Alarm |
| **Output** | : Control Relay, Alarm Relay |
| **Features** | : Intercontroller Communication, Blowdown Remaining Time, Blowdown Set Time, Blowdown Interval, Blowdown Valve Test, Alarm Test, Blowdown Counter |



### Bottom Blowdown Valve

| | |
|---|---|
| **Type** | : BKV 4000 |
| **Nominal Pressure** | : PN 25 |
| **Max. Operat. Temp.** | : 205 °C |
| **Max. Operat. Press.** | : 16 bar g |
| **Size** | : DN 25 to DN 50 |
| **Body** | : GGG 40 , Monoblock |

## Dimensions



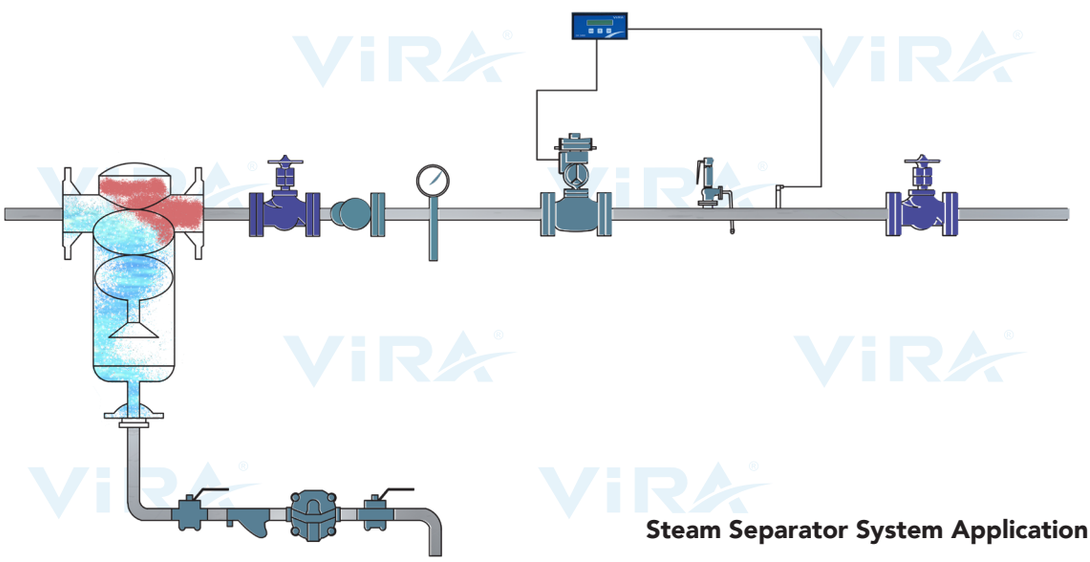

| DIMENSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Size | "A mm" | "B mm" | "C mm" | "D mm" | "L mm" | "L1 mm" | Weight |
| BKV 4025 | DN 25 | 196 | 125 | 122 | 115 | 125 | 240 | 7 |
| BKV 4032 | DN 32 | 220 | 145 | 140 | 140 | 130 | 280 | 10 |
| BKV 4040 | DN 40 | 243 | 177 | 140 | 150 | 230 | 230 | 15 |
| BKV 4050 | DN 50 | 250 | 170 | 160 | 165 | 150 | 350 | 17 |
| BKV 4065 | DN 65 | 250 | 190 | 190 | 185 | 170 | 350 | 20 |

# STEAM EQUIPMENTS

# SEPARATORS

Steam leaving the boiler may contain water particles and cause water to be carried out of the boiler. 'Wet' steam is an important problem in the steam system as it can cause some problems such as maintenance and process problems, lower efficiency, erosion and corrosion. Vira **Vortex and Cyclone** type steam separators are designed to efficiently remove moisture from the steam flow. A correctly selected separator can increase the dryness of the steam up to 98%.

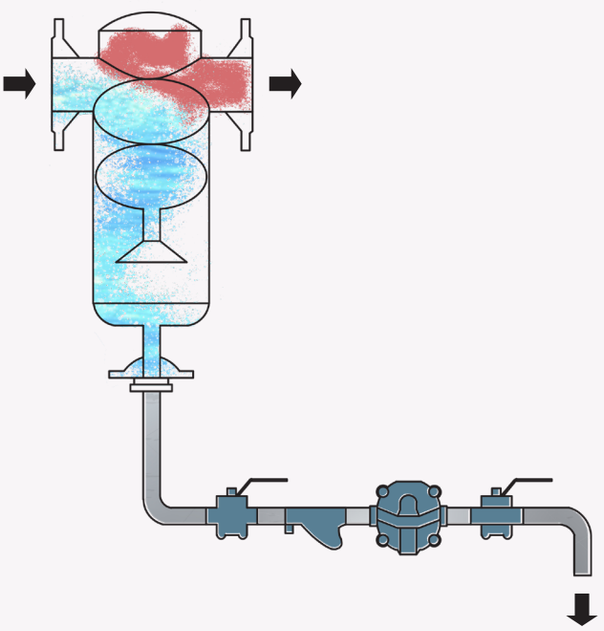
**Note:** Seperator should be chosen considering; the line diameter, velocity and pressure drop.



Steam Separator System Application

**Where to use;**

- Outlet of the steam boilers
- Steam flow meter inlets
- Inlet of control valves (temperature, pressure or flow control)



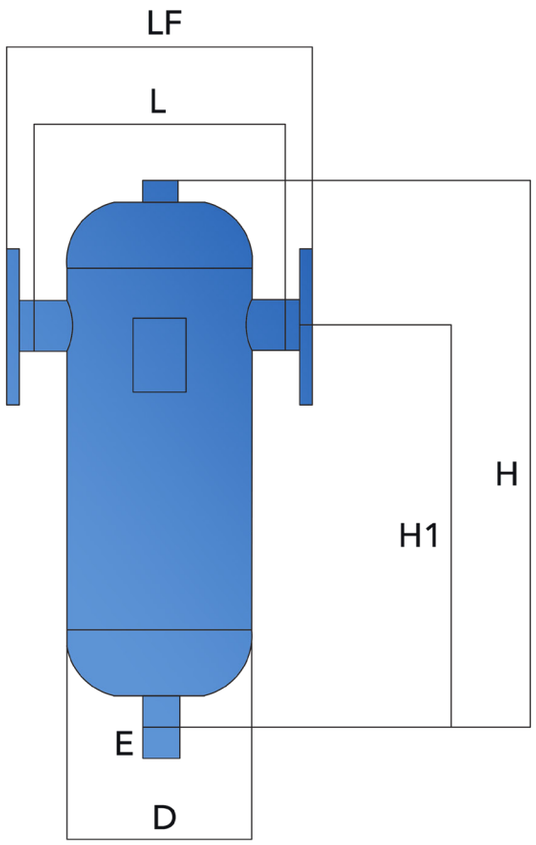
**Benefits**

- Carbon steel or stainless steel construction
- High efficiency over wide flow range
- No required maintenance
- Economical choice for most applications
- Removes 99% of all water particles
- Gas, steam, or air applications

# STEAM SEPARATOR

## Type: VS-VSF Vortex Steam Separator
## Type: SS-SSF Cyclone Steam Separator

Vira steam separators are Vortex and Cyclone type separators. It takes advantage of the difference in specific gravity of liquid and gas by using centrifugal force to separate steam, air and water particles. Steam or compressed air is directed into a spiral flow down the inner wall of the separator. It is then pulled under the separator where a steam trap station is placed to drain the condensate with the help of gravity. Vira steam separators can be produced with different connection types and material options.




**VS** : Vortex Threaded Carbon Steel
**VSF** : Vortex Flanged Carbon Steel
**VS - S** : Vortex Threaded Stainless Steel
**VSF-S** : Vortex Flanged Stainless Steel
**SS** : Cyclone Threaded Carbon Steel
**SSF** : Cyclone Flanged Carbon Steel
**SS - S** : Cyclone Threaded Stainless Steel
**SSF - S** : Cyclone Flanged Stainless Steel
**Sizes** : 1/2" - 4" / DN 15 - DN 300
**Nominal Press.** : PN 16, PN 25, PN 40
**Max. Operat. Temp.** : 300 °C

| DIMENSIONS | | | | | | |
|---|---|---|---|---|---|---|
| DN | D (mm) | H (mm) | H1 (mm) | E (inch) | LF (mm) | L (mm) |
| 15 | 114,3 | 300 | 210 | 1/2" | 230 | 180 |
| 20 | 114,3 | 300 | 210 | 1/2" | 230 | 180 |
| 25 | 114,3 | 350 | 210 | 1/2" | 230 | 180 |
| 32 | 139,7 | 435 | 300 | 1" | 260 | 240 |
| 40 | 139,7 | 435 | 300 | 1" | 260 | 240 |
| 50 | 168,3 | 500 | 370 | 1" | 300 | 270 |
| 65 | 219,1 | 570 | 410 | 11/2" | 380 | 340 |
| 80 | 219,1 | 610 | 460 | 11/2" | 400 | 360 |
| 100 | 273 | 905 | 660 | 11/2" | 485 | 450 |
| 125 | 323,9 | 905 | 660 | 2" | 550 | 500 |
| 150 | 350 | 1000 | 710 | 2" | 585 | 535 |
| 200 | 400 | 1285 | 1005 | 2" | 650 | 600 |

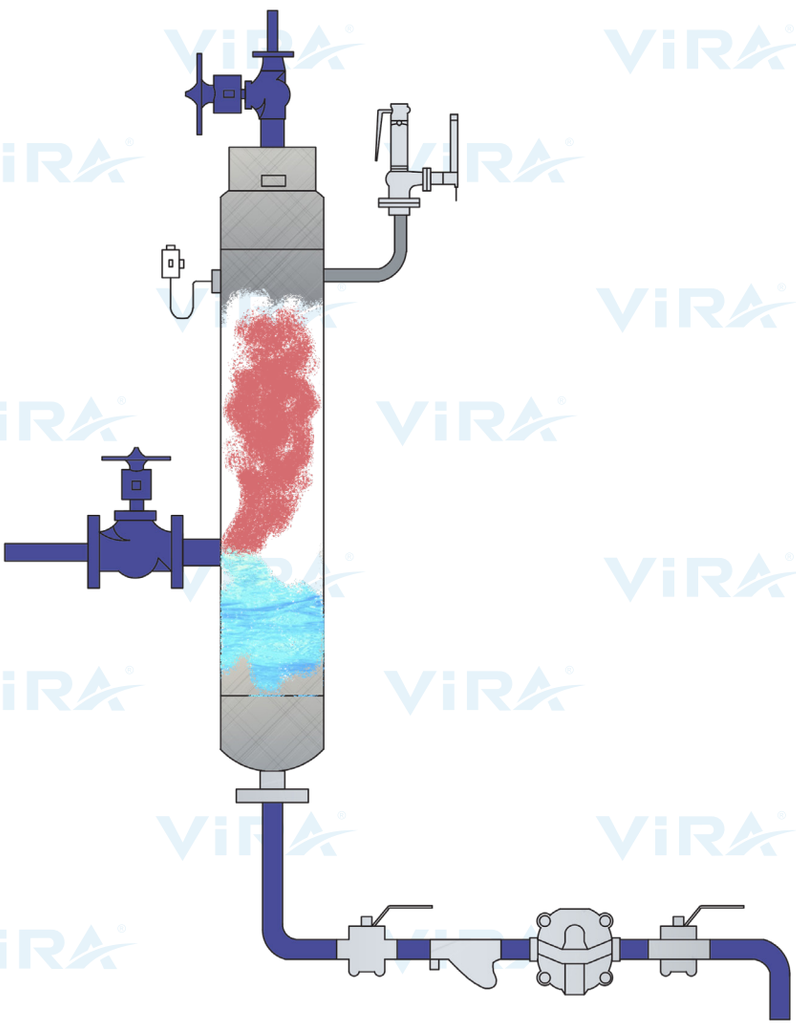
**Note:** Datas on the table are according to VSF-16 model

# FLASH STEAM

Flash steam is produced when high-pressure condensate is discharged to a lower pressure. The word 'flash' describes the way it is formed.

Inside steam piping or any pressurized vessel, steam is generally utilized at a pressure above the atmospheric pressure. When this steam loses its heat either by transferring it to the product being heated or by radiation loss to the environment, condensate is formed. This condensate which is formed is also at the same pressure and temperature as that of steam.

This pressurized condensate is exposed to atmospheric pressure and it has energy more than it can contain at atmospheric pressure. This excess energy is used to convert a portion of this condensate into steam. This phenomenon is called flashing and the steam so generated is referred to as flash steam. ır.



**Condensate can be reused in many different ways;**

- As heated feedwater, by sending hot condensate back to the boiler's deaerator, for any applicable heating system.
- As hot water, for cleaning equipment or other cleaning applications
- As steam, by reusing flash steam.

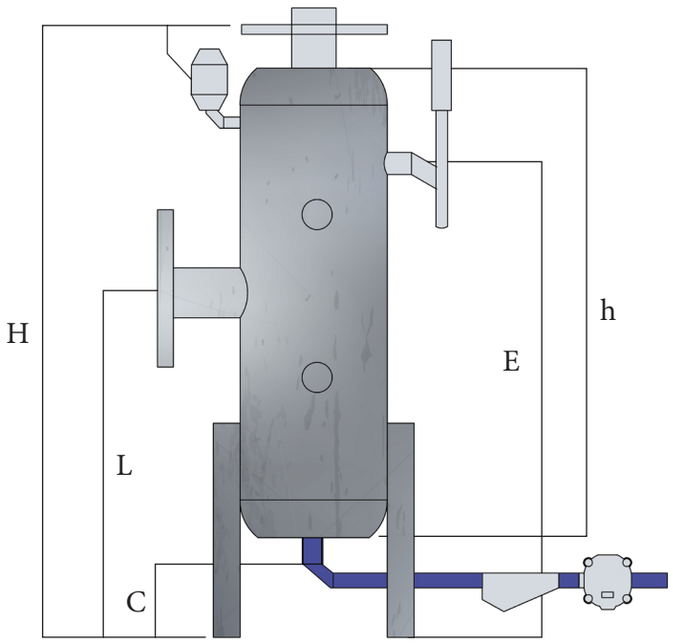
**Benefits;**

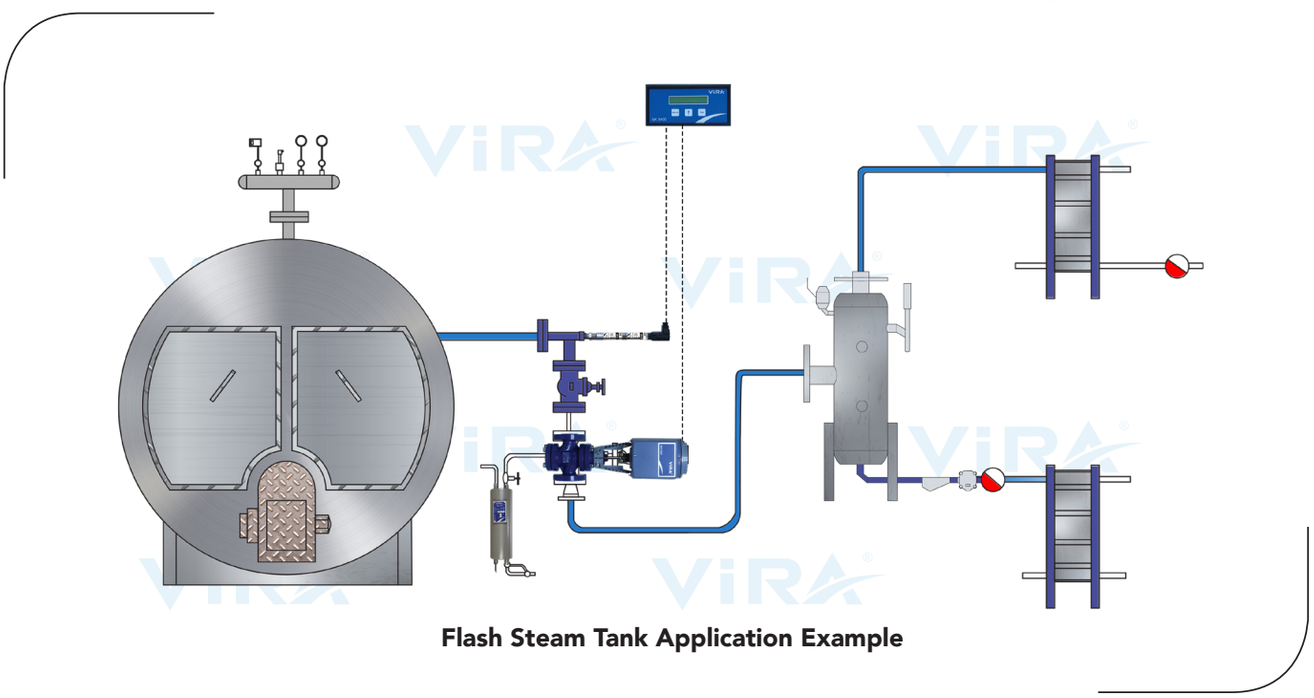
- Reduced fuel costs
- Lower water treatment expenses
- Environmentally safe and friendly

# VFS

## Flash Steam Tank

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Model No | VFS-6 | VFS-8 | VFS-12 | VFS-16 |
| | mm | mm | mm | mm |
| h | 914 | 914 | 1016 | 1219 |
| L | 533 | 533 | 584 | 660 |
| C | 241 | 241 | 241 | 241 |
| H | 1295 | 1321 | 1407 | 1613 |
| E | 914 | 914 | 1016 | 1219 |



**Flash Steam Tank Application Example**

To achieve maximum flash steam, the maximum amount of condensate is required. For this reason, the capacity of the steam traps should be carefully selected taking into account the counter-pressure capacity. Also, in systems with temperature control valves, it should be taken into account that the pressure will drop as soon as the valve is closed.

The use of flash steam should be close to the outlet of the high pressure condensate. Transporting low pressure flash steam requires larger diameters and increases the cost of insulation. In addition, the heat losses that will occur in large diameters will reduce the benefits to be obtained from the recovery of flash steam.

There should be a suitable area for flash steam usage. Usage areas should be in capacities equal to or above the flash steam amount. In places where flash steam is missing, steam can be used from a higher pressure steam line by reducing the pressure.

Since the flash steam used in heating is not necessary in the summer, the flash steam recovery system will be ineffective.

# VXW

## Vortex Flowmeter

VXW Series vortex flowmeter is manufactured according to Karman vortex principle. It is widely used to measure liquid, gas, steam flow in the closed pipeline. The frequency emitted by the Vortex is proportional to the flow rate. From the VXW series, a trepozoidal object is used for vortex creation. This structure ensures that all liquids and gases, even steam, create highly reliable vortexes. The well-designed sharp corner of the upright and wide object that forms the vortex guarantees excellent linearity.

**Technical Features**

- Compact structure
- No moving parts, long service time
- Long time stability

| | |
|---|---|
| **Display** | : Total flow and instant flow |
| **Working Pressure** | : 1.6 to 32 Mpa |
| **Ambient Temperature** | : - 25 °C to +60 °C |
| **Power** | : 24 VDC or 220 VAC |
| **Relative Humidity** | : %5 - %95 |
| **Atm. Pressure** | : 86 - 106 Kpa |
| **Measurable Fluid** | : Liquid, Gas, Steam |
| **Accuracy** | : %1 (Liquid), 1.5% (Gas and Steam) |
| **Anti Explosion Grade** | : Exd Bt4 |
| **LCD Digital Display** | : L/min, m/h, kg/h, etc. |
| **Output Signal** | : 4-20 mA Current (2 Wire System)<br>Standard Pulse Ouput ( 3 Wire System)<br>Digital Communication Modbus RTU |
| **Medium Temp.** | : 100 - 300°C (High Temp. Type) |
| **Reynolds No. Range** | : $2x10^4$ - $7x10^6$ (DN 25 – DN 100)<br>$4 x10^4$ - $7x10^6$ (DN 150 – DN 300) |

**Where to use;**

- Liquid, Gas and Steam Flow Measurement
- Boiler Efficiency Monitoring

**Benefits;**

- Calculation of steam costs by measuring the steam consumption of the plant and various units.
- Checking whether steam is supplied to the processes in operation at the correct amount and pressure.
- The efficiency of the plants and processes are monitored with steam flow meters.

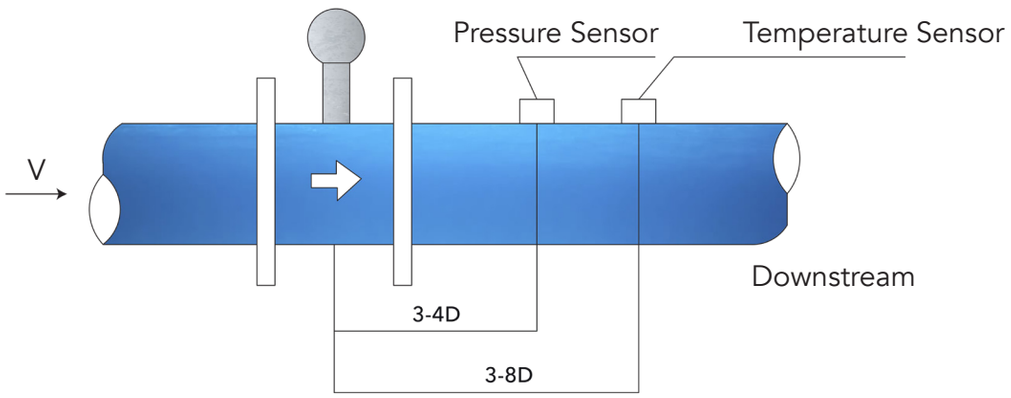
# Saturated Steam Flow Range

| DN (mm) | Flow Range | Measurable Flow Range | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 bar | 2 bar | 4 bar | 6 bar | 8 bar | 10 bar | 15 bar | 20 bar |
| 25 | Min. | 10,2 | 14.9 | 24.9 | 33 | 41.9 | 50.8 | 72.7 | 94.9 |
| | Maks. | 62.2 | 90.8 | 146.9 | 201.9 | 255.8 | 310.2 | 444.4 | 579.7 |
| 40 | Min. | 24.9 | 36.3 | 58.7 | 80.7 | 102.3 | 124.1 | 177.8 | 231.9 |
| | Maks. | 226 | 330 | 534 | 734 | 930 | 1128 | 1616 | 2108 |
| 50 | Min. | 40.7 | 59.4 | 96.1 | 132.1 | 167.4 | 203 | 290.9 | 379.4 |
| | Maks. | 361.6 | 528 | 854.4 | 1174.4 | 1488 | 1804.8 | 2585.6 | 3372.8 |
| 80 | Min. | 84.8 | 123.8 | 200.3 | 275.3 | 348.8 | 423 | 606 | 790.5 |
| | Maks. | 709.6 | 1036.2 | 1676.8 | 2304.8 | 2920.2 | 3541.9 | 5074.2 | 6619.1 |
| 100 | Min. | 146.9 | 214.5 | 347.1 | 477.1 | 604.5 | 733.2 | 1050.4 | 1370.2 |
| | Maks. | 1243 | 1815 | 2937 | 4037 | 5115 | 6204 | 8888 | 11594 |
| 150 | Min. | 316.4 | 462 | 747.6 | 1027.6 | 1302 | 1579.2 | 2262.4 | 2951.2 |
| | Maks. | 2531,2 | 3696 | 5980.8 | 8220.8 | 10416 | 12633.6 | 18099.2 | 23609.6 |
| 200 | Min. | 655.4 | 957 | 1548.6 | 2128.6 | 2697 | 3271.2 | 4686.4 | 6113.2 |
| | Maks. | 4746 | 6930 | 11214 | 15414 | 19530 | 23688 | 33936 | 44268 |
| 250 | Min. | 1096.1 | 1600,5 | 2589.9 | 3559.9 | 4510.5 | 5470.8 | 7837.6 | 10223.8 |
| | Maks. | 6215 | 9075 | 14685 | 20185 | 25575 | 31020 | 44440 | 57970 |
| 300 | Min. | 1649.8 | 2409 | 3898.2 | 5358.2 | 6789 | 8234.4 | 11796.8 | 15388.4 |
| | Maks. | 9040 | 13200 | 21360 | 29360 | 37200 | 45120 | 64640 | 84320 |

## Standard Pipe Length Requirement

| Connection Pipe Form | Least Reuqirement of Straight Pipe | |
|---|---|---|
| | Upper Flow | Down Flow |
| **Concentric Shrink Pipe** | 15D | 5D |
| **Concentric Flare Pipe** | 35D | 5D |
| **One 90° Turning** | 20D | 5D |
| **Two 90° Turning in Same Plane** | 25D | 5D |
| **Two 90° Turning in Different Plane** | 30D | 5D |
| **Full Open Valve** | 20D | 5D |
| **Half Open Valve** | 40D | 5D |

**Note :** D means the nominal diameter of flowmeter If need install temperature sensor and/or pressure sensor in the pipe system, sensor should be installed the down flow of the flowmeter as the below figure shown.

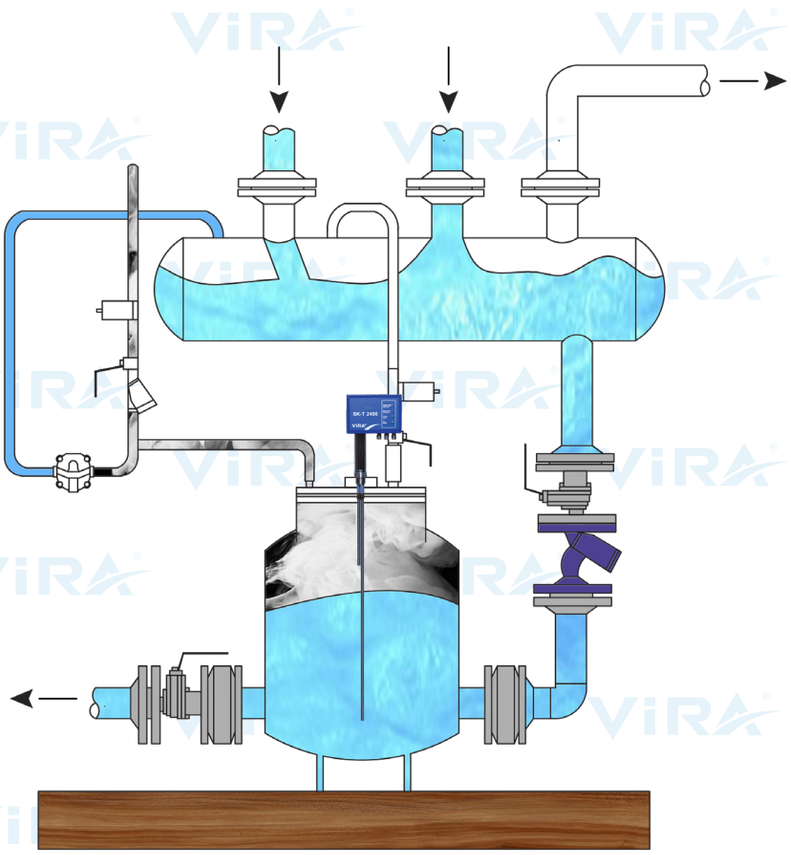


# CONDENSATE PUMP

The condensate needs to be recovered considering the energy it contains. Increasing the boiler feed water temperature is essential. Every 6 ° C increase in feedwater can save approximately 1% energy. Besides, at high condensate temperatures, flash steam generated on the suction side of the electric pumps will cause cavitation. Condensate pumps should be used where electrical pumps are not suitable for returning the condensate. Vira float free condensate pumps, pump high-temperature liquids-condensate by using steam or compressed air.

**Advantages;**

- Increasing the feed water temperature every 6 ° C can save approximately 1% energy.
- Water treatment chemicals are saved.
- Water is saved with return.
- Fuel and water savings are achieved by reducing blowdowns
- Energy saving is provided when used instead of an electric pump.
- The condensate pump will not have these malfunctions as electric pumps will often deteriorate the couplings due to high temperature.
- The cavitation in electrical pumps and related failures are prevented.
- There is no need to increase the pipe diameter as it is in the electrical pumps, which brings an additional cost for the condensate to be pumped properly
- In some cases, no additional circulation pump (pressurization pump) is required on the suction side to overcome the counter-pressure.



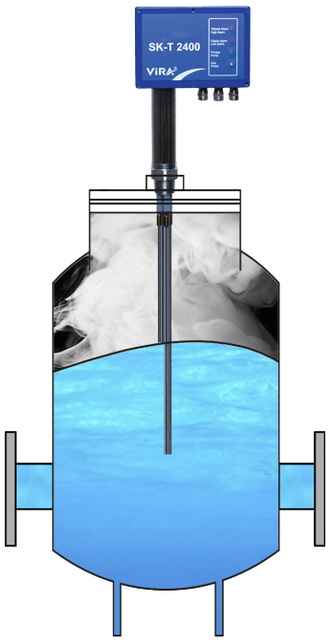
As the temperature control valve is used in the heat exchanger systems, "condensate lock" or ''stall'' can be seen when the steam pressure after the control valve is equal to or less than the counter-pressure after the trap. In systems with condensate lock, a Vira float free condensate pump must be used to deliver condensate to the desired tank or back to the condensate line.

To size Vira float free condensate pump the following informations must be known;

- The maximum condensate flowrate reaching the collector.
- The motive pressure of steam or air available to drive the pump.
- The selection of steam or air will depend on the application and site circumstances.
- The filling head available between the receiver and pump.
- The total delivery head of the condensate system.

# Vira Float Free Condensate Pump

Vira float free condensate pumps are designed to remove and recover condensate under all operating conditions and provide opportunity to solve all condensate handling problems.

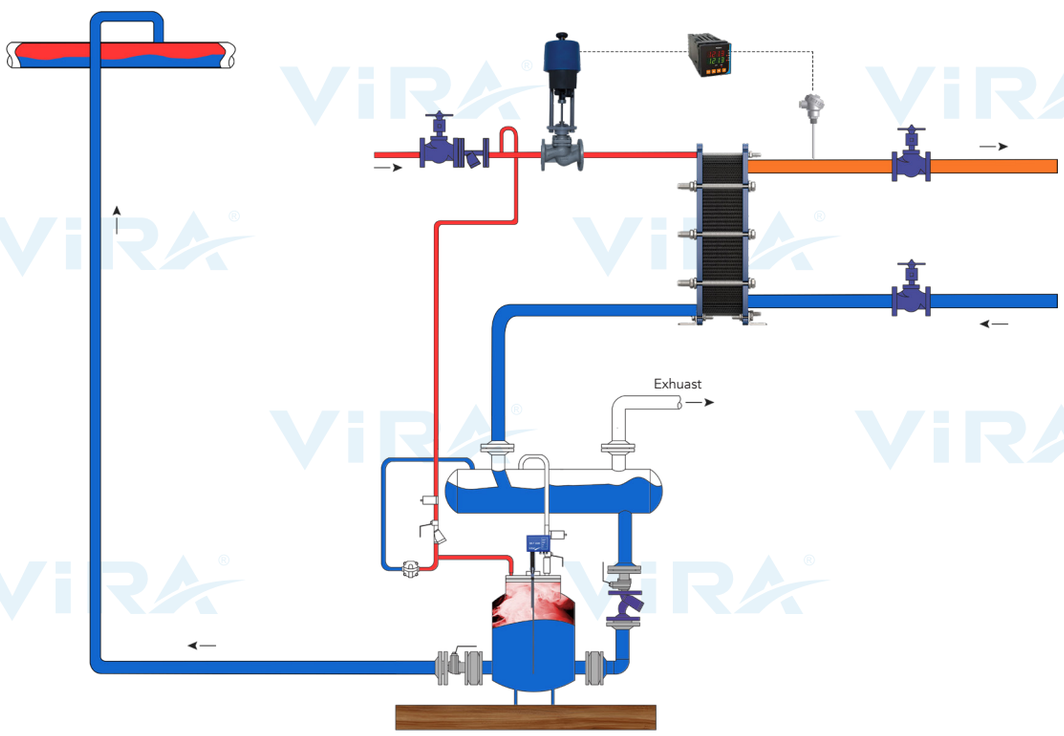



Vira condensate pumps are steam pressure driven pumps that return condensate back to the boiler room; normally using steam pressure as the motive force. Vira float free condensate pumps can be supplied as individual pump units – which include a pump tank and compact level control unit - or as a complete packaged system which also includes the steam valves, steam collector, steam traps, piping, solenoid valves , and ball valves.

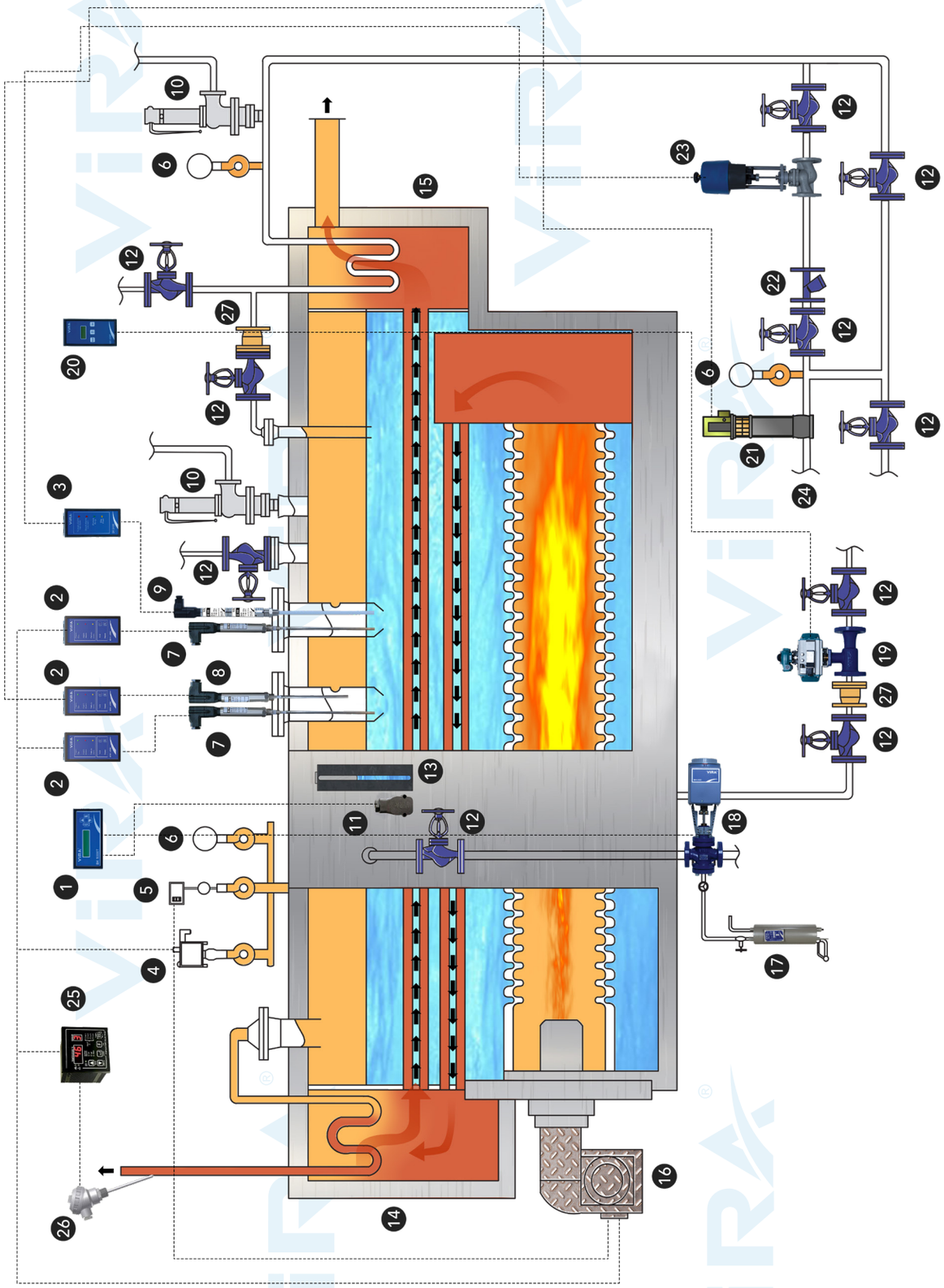
There are no moving parts in Vira float free condensate pumps. This helps to reduce plant maintenance problems. It provides no leakage, no cavitation, no spare part need and provides easy installation. The pump can also be monitored, and get alarm remotely by the Compact Level control unit.

| Model | Steam Inlet | Condensate Outlet | Body Material | Collector Inlet | Pressure Class | Collector Vent | Pump Exhaust |
|---|---|---|---|---|---|---|---|
| KP-14 | DN 15 | DN 25 | ST 37 Carbon Steel | DN 50 x 2 | PN 16 | DN 50 | DN 15 |
| KP-16 | DN 15 | DN 40 | | DN 50 x 2 | | DN 50 | DN 15 |
| KP-18 | DN 15 | DN 50 | | DN 80 x 2 | | DN 80 | DN 15 |
| KP-20 | DN 15 | DN 80 | | DN 80 x 2 | | DN 80 | DN 15 |

**Note:** It can be customized according to different system needs.




**Condensate Recovery System**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# 72h Operation Without Constant Supervision as per EN 12953

| Vira Kodu | No | Fonksiyon |
|---|---|---|
| SML 1000 | 7 | SMLD 1000 High Integrity Self Monitoring Low Level Alarm Probe |
| | 2 | SMK 1000 High Integrity Self Monitoring Level Alarm Controller |
| SMH 1000 | 8 | SMHD 1000 High Integrity Self Monitoring High Level Alarm Probe |
| | 2 | SMK 1000 High Integrity Self Monitoring Level Alarm Controller |
| SK 3000 | 9 | SD 3400 Capacitive Level Control Probe with High and Low Level Alarm |
| | 3 | SK 3400 Modulating Level Controller with High and Low Level Alarm |
| | 23 | SKV 3400 Electrical Control Valve 2/3 Way |
| | 10 | Safety Valve |
| | 12 | Stop Valve |
| | 4 | Pressure Limiter |
| | 5 | Pressure Transmitter |
| | 6 | Pressure Gauge |
| BST-4 | 1 | BK 5000-T Conductivity Controller; Conductivity measurement and continuous blowdown |
| | 11 | BD 5600-T Conductivity Probe; Conductivity measurement and continuous blowdown |
| | 18 | BKV 5400 Conductivity Blowdown Valve; Conductivity measurement and continuous blowdown |
| NK 20 | 17 | NK 20 Sample Cooler |
| | 13 | Water Level Gauge |
| | 16 | Burner |
| DB2 | 19 | BKV 4000 Intermittent Blowdown / Bottom Blowdown Valve |
| | 20 | BK 4000 Intermittent Blowdown / Bottom Blowdown Controller |
| | 27 | Non-Return Valve |
| | 21 | Feedwater Pump |
| | 22 | Strainer |
| BS3-T | 24 | Feedwater / Condensate Monitoring |
| | 14 | Superheater |
| | 25 | Safety Temperature Limiter Controller |
| | 26 | Resistance Thermometer |
| | 15 | Economizer |

# Steam Pipe Sizing Table

| Pressure **Bar g** | Speed m/s | 15 mm | 20 mm | 25 mm | 32 mm | 40 mm | 50 mm | 65 mm | 80 mm | 100 mm | 125 mm | 150 mm | 200 mm | 250 mm | 300 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0,5 | 15 | 7 | 14 | 24 | 37 | 52 | 99 | 145 | 213 | 394 | 648 | 917 | 1606 | 2590 | 3678 |
| | 25 | 10 | 25 | 40 | 62 | 92 | 162 | 265 | 384 | 675 | 972 | 1457 | 2806 | 4101 | 5936 |
| | 40 | 17 | 35 | 64 | 102 | 142 | 265 | 403 | 576 | 1037 | 1670 | 2303 | 4318 | 6909 | 9500 |
| 0,7 | 15 | 7 | 16 | 25 | 40 | 59 | 109 | 166 | 250 | 431 | 680 | 1006 | 1708 | 2791 | 3852 |
| | 25 | 12 | 25 | 45 | 72 | 100 | 182 | 287 | 430 | 716 | 1145 | 1575 | 2816 | 4629 | 6204 |
| | 40 | 18 | 37 | 68 | 106 | 167 | 298 | 428 | 630 | 1108 | 1712 | 2417 | 4532 | 7251 | 10323 |
| 1 | 15 | 8 | 17 | 29 | 43 | 65 | 112 | 182 | 260 | 470 | 694 | 1020 | 1864 | 2814 | 4045 |
| | 25 | 12 | 26 | 48 | 72 | 100 | 193 | 300 | 445 | 730 | 1160 | 1660 | 3099 | 4869 | 6751 |
| | 40 | 19 | 39 | 71 | 112 | 172 | 311 | 465 | 640 | 1150 | 1800 | 2500 | 4815 | 7333 | 10370 |
| 2 | 15 | 12 | 25 | 45 | 70 | 100 | 182 | 280 | 410 | 715 | 1125 | 1580 | 2814 | 4545 | 6277 |
| | 25 | 19 | 43 | 70 | 112 | 162 | 295 | 428 | 656 | 1215 | 1755 | 2520 | 4815 | 7425 | 10575 |
| | 40 | 30 | 64 | 115 | 178 | 275 | 475 | 745 | 1010 | 1895 | 2925 | 4175 | 7678 | 11997 | 16796 |
| 3 | 15 | 16 | 37 | 60 | 93 | 127 | 245 | 385 | 535 | 925 | 1505 | 2040 | 3983 | 6217 | 8743 |
| | 25 | 26 | 56 | 100 | 152 | 225 | 425 | 632 | 910 | 1580 | 2480 | 3440 | 6779 | 10269 | 14316 |
| | 40 | 41 | 87 | 157 | 250 | 357 | 595 | 1025 | 1460 | 2540 | 4050 | 5940 | 10476 | 16470 | 22950 |
| 4 | 15 | 19 | 42 | 70 | 108 | 156 | 281 | 432 | 635 | 1166 | 1685 | 2460 | 4618 | 7121 | 10358 |
| | 25 | 30 | 63 | 115 | 180 | 270 | 450 | 742 | 1080 | 1980 | 2925 | 4225 | 7866 | 12225 | 17304 |
| | 40 | 49 | 116 | 197 | 295 | 456 | 796 | 1247 | 1825 | 3120 | 4340 | 7050 | 12661 | 19663 | 27816 |
| 5 | 15 | 22 | 49 | 87 | 128 | 187 | 352 | 526 | 770 | 1295 | 2105 | 2835 | 5548 | 8586 | 11947 |
| | 25 | 36 | 81 | 135 | 211 | 308 | 548 | 885 | 1265 | 2110 | 3540 | 5150 | 8865 | 14268 | 20051 |
| | 40 | 59 | 131 | 225 | 338 | 495 | 855 | 1350 | 1890 | 3510 | 5400 | 7870 | 13761 | 23205 | 32244 |
| 6 | 15 | 26 | 59 | 105 | 153 | 225 | 425 | 632 | 925 | 1555 | 2525 | 3400 | 6654 | 10297 | 14328 |
| | 25 | 43 | 97 | 162 | 253 | 370 | 568 | 1065 | 1520 | 2530 | 4250 | 6175 | 10629 | 17108 | 24042 |
| | 40 | 71 | 157 | 270 | 405 | 595 | 1025 | 1620 | 2270 | 4210 | 6475 | 9445 | 16515 | 27849 | 38697 |
| 7 | 15 | 29 | 63 | 110 | 165 | 260 | 445 | 705 | 952 | 1815 | 2765 | 3990 | 7390 | 12015 | 16096 |
| | 25 | 49 | 114 | 190 | 288 | 450 | 785 | 1205 | 1750 | 3025 | 4815 | 6900 | 12288 | 19377 | 27080 |
| | 40 | 76 | 177 | 303 | 455 | 690 | 1210 | 1865 | 2520 | 4585 | 7560 | 10880 | 19141 | 30978 | 43470 |
| 8 | 15 | 32 | 70 | 126 | 190 | 285 | 475 | 800 | 1125 | 1990 | 3925 | 4540 | 8042 | 12625 | 17728 |
| | 25 | 54 | 122 | 205 | 320 | 465 | 810 | 1260 | 1870 | 3240 | 5220 | 7120 | 13140 | 21600 | 33210 |
| | 40 | 84 | 192 | 327 | 510 | 730 | 1370 | 2065 | 3120 | 5135 | 8395 | 12470 | 21247 | 33669 | 46858 |
| 10 | 15 | 41 | 95 | 155 | 250 | 372 | 626 | 1012 | 1465 | 2495 | 3995 | 5860 | 9994 | 16172 | 22713 |
| | 25 | 66 | 145 | 257 | 405 | 562 | 990 | 1530 | 2205 | 3825 | 6295 | 8995 | 15966 | 25860 | 35890 |
| | 40 | 104 | 216 | 408 | 615 | 910 | 1635 | 2545 | 3600 | 6230 | 9880 | 14390 | 26621 | 41011 | 57560 |
| 14 | 15 | 50 | 121 | 205 | 310 | 465 | 810 | 1270 | 1870 | 3220 | 5215 | 7390 | 12921 | 20538 | 29016 |
| | 25 | 85 | 195 | 331 | 520 | 740 | 1375 | 2080 | 3120 | 5200 | 8500 | 12560 | 21720 | 34139 | 47128 |
| | 40 | 126 | 305 | 555 | 825 | 1210 | 2195 | 3425 | 4735 | 8510 | 13050 | 18630 | 35548 | 54883 | 76534 |
| 15 | 15 | 85 | 148 | 241 | 417 | 567 | 935 | 1335 | 2061 | 3548 | 5574 | 8052 | 13943 | 21977 | 31521 |
| | 25 | 141 | 247 | 402 | 695 | 945 | 1559 | 2224 | 3434 | 5913 | 9292 | 13420 | 23239 | 36629 | 52536 |
| | 40 | 226 | 395 | 643 | 1112 | 1513 | 2494 | 3559 | 5495 | 9461 | 14868 | 21427 | 37182 | 58607 | 84057 |
| 17 | 15 | 96 | 167 | 271 | 470 | 639 | 1053 | 1503 | 2321 | 3996 | 6278 | 9067 | 15702 | 24749 | 35497 |
| | 25 | 159 | 278 | 453 | 783 | 1064 | 1756 | 2505 | 3864 | 6659 | 10464 | 15113 | 26170 | 41249 | 59162 |
| | 40 | 255 | 445 | 724 | 1252 | 1704 | 2809 | 4008 | 6188 | 10654 | 16743 | 24180 | 41872 | 65999 | 94659 |
| 20 | 15 | 112 | 195 | 317 | 549 | 747 | 1232 | 1758 | 2715 | 4673 | 7343 | 10606 | 18365 | 28948 | 41519 |
| | 25 | 186 | 325 | 530 | 915 | 1245 | 2054 | 2929 | 4523 | 7788 | 12239 | 17677 | 30609 | 48247 | 69199 |
| | 40 | 298 | 520 | 847 | 1465 | 1993 | 3285 | 4688 | 7238 | 12463 | 19548 | 28282 | 48975 | 77196 | 110718 |
| 24 | 15 | 133 | 232 | 378 | 654 | 889 | 1466 | 2094 | 3232 | 5565 | 8744 | 12629 | 21868 | 34468 | 49437 |
| | 25 | 221 | 387 | 631 | 1090 | 1482 | 2445 | 3488 | 5386 | 9274 | 14573 | 20048 | 36448 | 57448 | 82396 |
| | 40 | 355 | 620 | 1008 | 1744 | 2373 | 3912 | 5582 | 8618 | 14839 | 23319 | 33676 | 58316 | 91918 | 131833 |
| 28 | 15 | 154 | 269 | 437 | 757 | 1029 | 1696 | 2422 | 3739 | 6437 | 10114 | 14608 | 25296 | 39871 | 57186 |
| | 25 | 256 | 448 | 729 | 1261 | 1714 | 2828 | 4035 | 6230 | 10728 | 16868 | 23347 | 42161 | 66453 | 95312 |
| | 40 | 410 | 717 | 1167 | 2017 | 2745 | 4525 | 6457 | 9969 | 17164 | 26974 | 38955 | 67457 | 106326 | 152498 |
| 34 | 15 | 186 | 324 | 528 | 913 | 1241 | 2047 | 2923 | 4512 | 7767 | 12205 | 17627 | 30523 | 48112 | 69004 |
| | 25 | 309 | 541 | 880 | 1522 | 2069 | 3413 | 4869 | 7518 | 12944 | 20342 | 29378 | 50874 | 80186 | 115009 |
| | 40 | 495 | 865 | 1408 | 2434 | 3312 | 5460 | 7791 | 12029 | 20712 | 32548 | 47005 | 81397 | 128299 | 184013 |
| 42 | 15 | 231 | 401 | 654 | 1131 | 1537 | 2535 | 3620 | 5588 | 9620 | 15117 | 21833 | 37806 | 59591 | 85469 |
| | 25 | 382 | 670 | 1090 | 1885 | 2562 | 4227 | 6030 | 9311 | 16033 | 25195 | 36388 | 63013 | 99319 | 142451 |
| | 40 | 613 | 1071 | 1744 | 3015 | 4103 | 6763 | 9650 | 14900 | 25654 | 40315 | 58221 | 100819 | 158913 | 227920 |

# SATURATED STEAM TABLE

| Gauge Pressure Pg | Absolute Pressure Pa | Temperature T | Specific Volume V | Saturated Water hf | Evaporation hfg | Saturated Steam hg |
|---|---|---|---|---|---|---|
| (Bar g) | (Bar) | (°C) | ($m^3$/kg) | (kj/kg) | (kj/kg) | (kj/kg) |
| 0 | 1,013 | 100 | 1,673 | 419,04 | 2257 | 2676 |
| 0,2 | 1,213 | 105,1 | 1,414 | 440,8 | 2243,4 | 2684,2 |
| 0,4 | 1,413 | 109,55 | 1,225 | 459,7 | 2231,3 | 2691 |
| 0,6 | 1,613 | 113,56 | 1,088 | 476,4 | 2220,4 | 2696,8 |
| 0,8 | 1,813 | 117,14 | 0,971 | 491,6 | 2210,6 | 2702,1 |
| 1 | 2,013 | 120,42 | 0,881 | 505,6 | 2201,1 | 2706,7 |
| 1,2 | 2,213 | 123,46 | 0,806 | 518,7 | 2192,8 | 2711,5 |
| 1,4 | 2,413 | 126,28 | 0,743 | 530,5 | 2184,8 | 2715,3 |
| 1,6 | 2,613 | 128,89 | 0,689 | 541,6 | 2177,3 | 2718,9 |
| 1,8 | 2,813 | 131,37 | 0,643 | 552,3 | 2170,1 | 2722,4 |
| 2 | 3,013 | 133,69 | 0,603 | 562,2 | 2163,1 | 2725,5 |
| 3 | 4,013 | 143,75 | 0,461 | 605,3 | 2133,4 | 2738,7 |
| 4 | 5,013 | 151,96 | 0,374 | 640,7 | 2108,1 | 2748,8 |
| 5 | 6,013 | 158,92 | 0,315 | 670,9 | 2086 | 2756,9 |
| 6 | 7,013 | 165,04 | 0,272 | 697,5 | 2066 | 2763,5 |
| 7 | 8,013 | 170,5 | 0,24 | 721,4 | 2047,7 | 2769,1 |
| 8 | 9,013 | 175,43 | 0,215 | 743,1 | 2030,9 | 2774 |
| 9 | 10,013 | 179,97 | 0,194 | 763 | 2015,1 | 2778,1 |
| 10 | 11,013 | 184,13 | 0,177 | 781,6 | 2000,1 | 2718,7 |
| 11 | 12,013 | 188,02 | 0,163 | 798,8 | 1986 | 2784,8 |
| 12 | 13,013 | 191,68 | 0,151 | 815,1 | 1972,5 | 2787,6 |
| 13 | 14,013 | 195,1 | 0,141 | 830,4 | 1959,6 | 2790 |
| 14 | 15,013 | 198,35 | 0,132 | 845,1 | 1947,1 | 2792,2 |
| 15 | 16,013 | 201,45 | 0,124 | 859 | 1935 | 2794 |
| 16 | 17,013 | 204,38 | 0,117 | 872,3 | 1923,4 | 2795,7 |
| 17 | 18,013 | 207,17 | 0,11 | 885 | 1912,1 | 2797,1 |
| 18 | 19,013 | 209,9 | 0,105 | 897,2 | 1901,3 | 2798,5 |
| 19 | 20,013 | 212,47 | 0,1 | 909 | 1890,5 | 2799,5 |
| 20 | 21,013 | 214,96 | 0,0994 | 920,3 | 1880,2 | 2800,5 |
| 22 | 23,013 | 219,65 | 0,0868 | 941,9 | 1860,1 | 2802 |
| 24 | 25,013 | 224,02 | 0,0797 | 962,2 | 1840,6 | 2803,1 |
| 26 | 27,013 | 228,15 | 0,074 | 981,6 | 1882,2 | 2803,8 |
| 28 | 29,013 | 232,05 | 0,0689 | 999,7 | 1804,4 | 2804,4 |
| 30 | 31,013 | 235,78 | 0,0645 | 1017 | 1787 | 2804,1 |
| 32 | 33,013 | 239,28 | 0,0605 | 1033,9 | 1770 | 2803,9 |

www.viraisi.ir
www.fiammac.com

Tell: +98 913 007 8050
Mail: info@fiammac.com
Mail: vira.fiammac@gmail.com