

Modulated Level System Controller

SK 3400

Installation and Operating Instructions

EN

English

CONTENT

1.SAFETY INFORMATIONS	II
2.GENERAL INFORMATIONS	1
2.1 Description	1
2.2 Approvals	2
3.TECHNICAL SPESIFICATIONS	3
4.INSTALLATION and WIRING	3
4.1 Installation.....	3
4.2 Wiring.....	4
5.FUNCTIONS and CONFIGURATIONS	5
5.1 Display Definitions and Button Functions	5
5.2 Changing Functions and Configurations	6
5.2.1 Startup Screen.....	6
5.2.2 Password.....	6
5.2.3 Auto-Man Mode	7
5.2.4 Probe Min Level	8
5.2.5 Probe Max Level	8
5.2.6 Valve Min.....	9
5.2.7 Valve Max	9
5.2.8 Control Type.....	10
5.2.9 Set Point.....	11
5.2.10 Control Band	12
5.2.11 Low Alarm.....	12
5.2.12 High Alarm.....	12
5.2.13 Alarm Relay.....	13
5.2.14 Change Password.....	13
5.3 Configuration Table.....	14
6.TROUBLESHOOTING	14
7.MAINTANANCE	15

1. SAFETY INFORMATION

Installation, commissioning and maintenance of this device must be done by a qualified personnel in compliance with the operating instructions. Otherwise device and related equipments may be damaged and personnel may be injured. 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.

National and local regulations must be taken into consideration.



Warning!

Please make sure to remove the main supply before installation. Otherwise this may cause damage to the product, personal injuries or even death

1.1 Tools

Before starting work, make sure that you have suitable tools and consumables available.

1.2 Temperature

Let the temperature to cool down after isolation to avoid danger of burns.

1.3 Freezing

Required precautions must be taken at the places where they may be exposed to temperatures below freezing point.

1.4 Lighting

Make sure there is enough lighting, particularly where detailed or tough work is required.

1.5 Pressure

Make sure that any pressure is isolated and safely vented to atmospheric pressure. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.6 Access

Before attempting to work on the product, safe Access must be ensured. If necessary, lifting gear should be used.

1.7 Residual hazards

The external surface of the product may be very hot. If used at the maximum operating conditions according to the specs, the surface temperature of some products may reach temperatures of 239°C.

1.8 Hazardous environment

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

1.9 Suitable 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.

1.10 Hazardous liquids or gases

Be aware of that it cannot be known what may have been in the pipeline at previous usage. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.11 Supervision

All work must be carried out or be 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.

1.12 Disposal

Unless otherwise stated in the Installation and Operation Instructions, this product is recyclable and no ecological hazard.

1.13 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.

2. GENERAL INFORMATION

2.1 Description

As steam is generated, the water in the boiler evaporates and water must be added with a feed water pump to maintain the level of the boiler. Water should be kept at the right level to avoid damaging the boiler and to ensure efficient operation.

For this reason, a level control system that monitors and controls the water level, detects whether the water level is low and gives an alarm, performs the necessary actions to shut off the feed water pump or burner.

Of course, it is recommended to have an external indicator, such as level gauges, to see the water level step by step. Another suggestion is to have a secondary level control system in case of damage to the primary one.

In the modulating level control system, the feed pump runs continuously and an automatic valve (between the feed pump and the boiler) controls the feed water flow rate to meet the steam demand.

Level Controller SK 3400, Capacitance Level Probe SD 3400 and Level Control Valve SKV 3400 working in conjunction with the capacitance principle of conductive liquids provides level control. The controller and probe are suitable for use in liquids of all different properties such as water, condensate, boiler water. The Modulating Level Control System can be used in waters with a conductivity of more than $10 \mu\text{S} / \text{cm}$ (at 25°C).

In the Modulating Level Control System, the water level of the boiler is controlled by opening and closing the SKV 3400 Level Control Valve SKV 3400 at the water levels determined by the Capacitance Level Probe SD 3400. There are also two different alarm outputs, low and high.

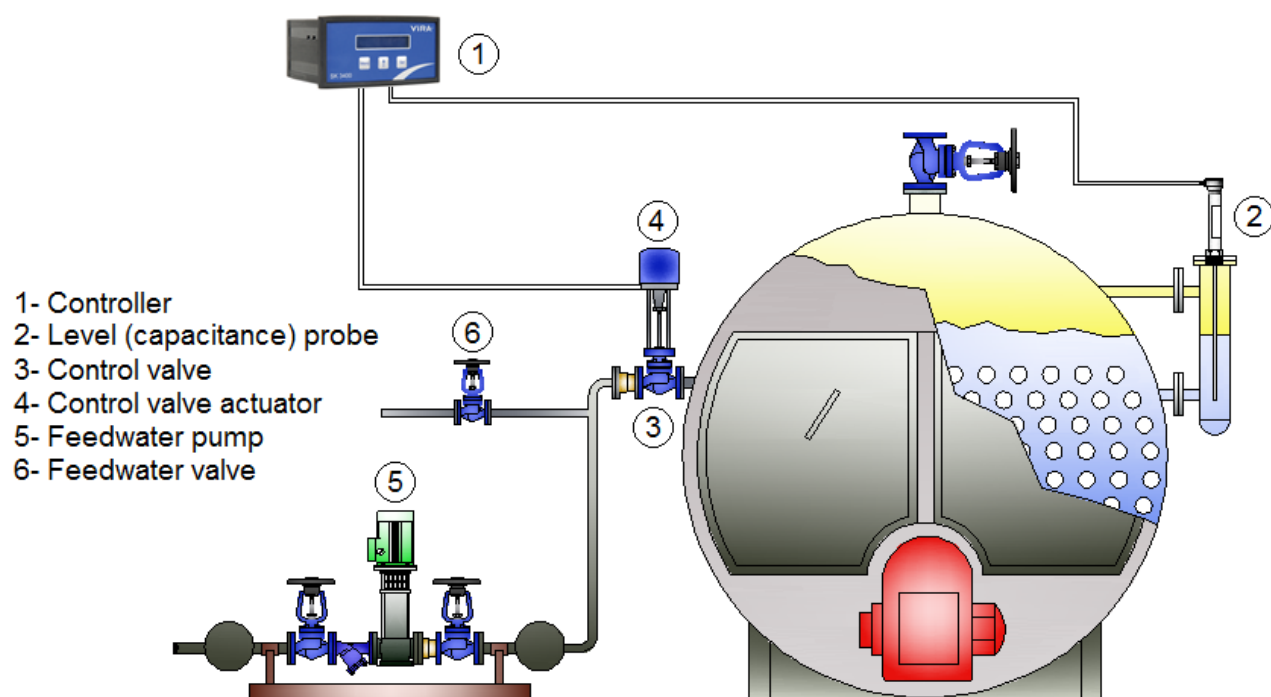


Figure 1: Modulating Level Control System Application

2.2 Approvals

The SK3400 complies with Electromagnetic Compatibility Directive and all its requirements. This product is suitable for industrial environments. A fully detailed EMC assessment has been made and has the reference number A 0442 21143 00 EY.

The SK3400 complies with the Low Voltage Directive (2014/35/EU) by meeting the standards of:

- EN 61010-1: 2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

- Water level designation of a steam boiler can be applied like shown in figure below.

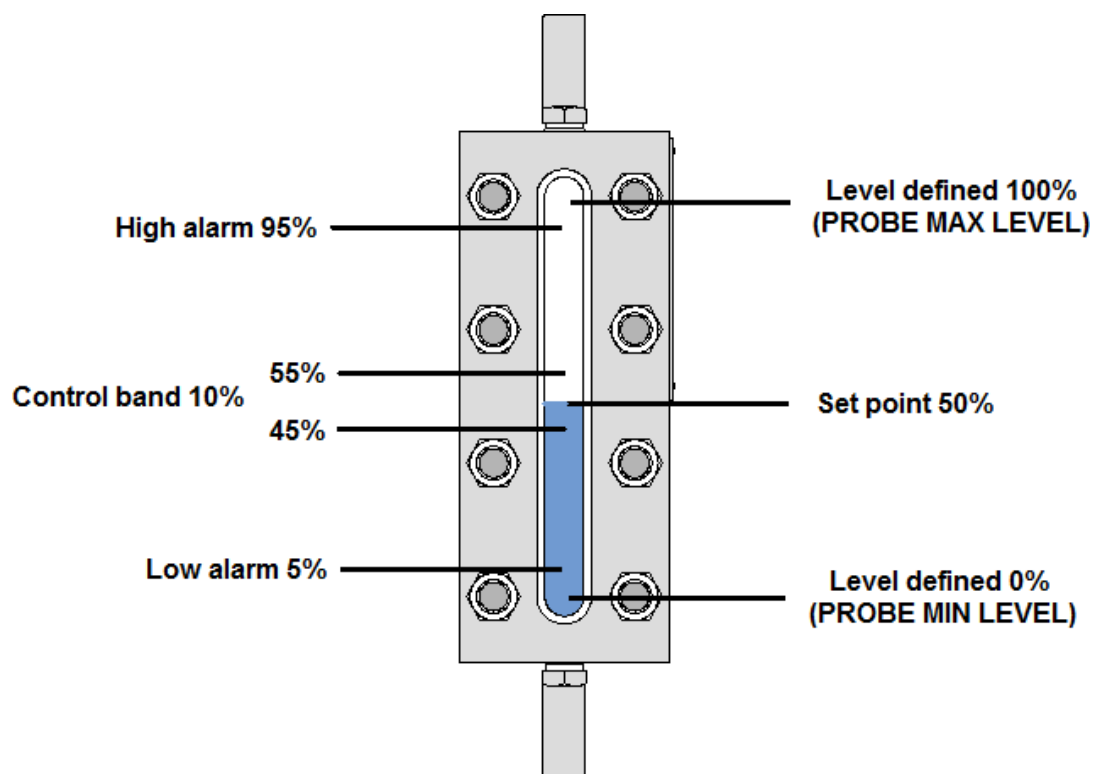


Figure 1: Example Water Level Designation in Modulating Level Control System

Level defined 0% : Lowest level that is wanted to be detected by probe. (**Probe Min Level**)

Level defined 100% : Highest level that is wanted to be detected by probe. (**Probe Max Level**)

Set point : Reference water level that is wanted to be stable.

Control band : Range of water that is wanted to be stable.

Low alarm : Water level that is wanted to take low alarm signal.

High alarm : Water level that is wanted to take high alarm signal.

3. TECHNICAL SPECIFICATIONS

Enclosure	: IP 54
Maximum ambient temperature	: 55 °C
Maximum wire length	: 100 m (Controller to probe)
Main supply voltage	: 220 V
Frequency	: 50 Hz
Maximum power consumption	: 3 VA
Dimensions (height x depth x width)	: 72 x 110 x 144 mm
Weight	: 0.5 kg

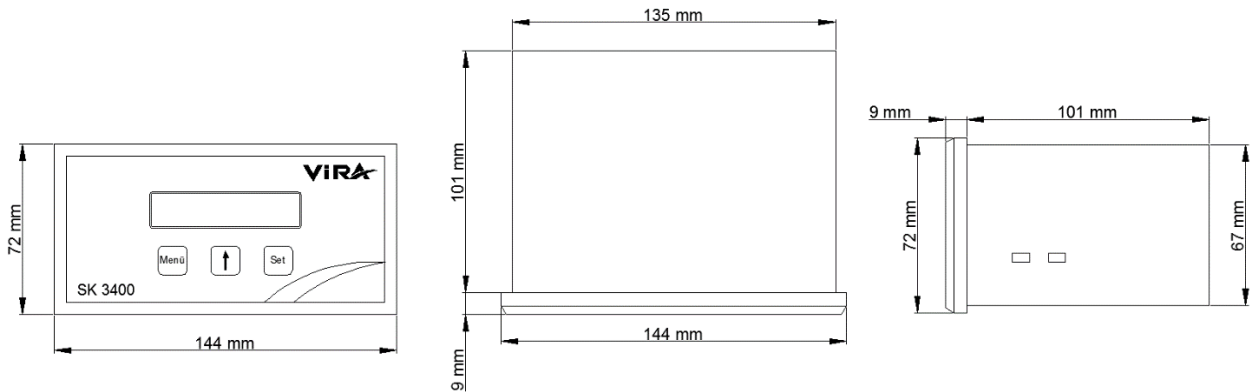


Figure 2: SK 3400 Modulating Level Controller Case Dimensions

4. INSTALLATION and WIRING

4.1 Installation

SK 3400 Modulating Level Controller is front panel mounting enclosure type and can be applied to the front panel with two screw clamps supplied. Allow 20 mm minimum clearance all round the unit for air circulation.

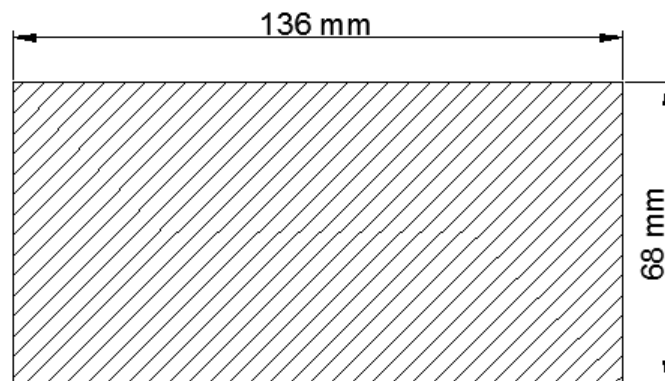


Figure 3: Panel Cut Out Dimensions of SK 3400 Modulating Level Controller

4.2 Wiring

For wiring probe 3x1 mm² screened (shielded) cable, for wiring of valve potentiometer 2x1 mm² screened (shielded) cable and for wiring of valve control connection 3x1 mm² normal cable can be used.

Avoid changing terminal blocks places.

There are phase inputs between 10th and 20th terminal connections of the controller. So, from 1st to 9th terminal connections must not connect to from 10th to 20th terminal connections or vice versa.

Otherwise, device can be damaged even it causes personal injuries.

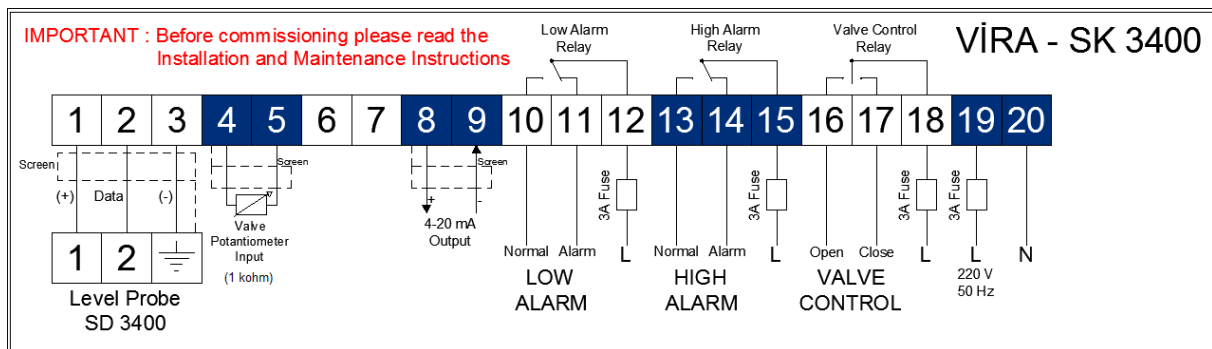


Figure 5: SK 3400 Modulating Level Controller Wiring Diagram



At the all phase inputs of the controller, must be used 3A fuse (non-delay type).

Probe cable screen (shield) must be only connected to earth $\text{---}\text{---}\text{---}$ terminal of probe (Figure 5). **Controller side of the screen must be left unconnected.**

Avoid connecting any other earth to 3rd terminal input and must not connected with the other earth on the clipboard.

Valve potentiometer cable screen (shield) must be only connected to 4th terminal of controller (Figure 5). **Valve potentiometer (actuator) side of the screen must be left unconnected.**

Note: For wiring of SD 3400 Capacitance Level Probe, please refer to “SD 3400 Capacitance Level Probe Installation and Operating Instructions” and for wiring of BKA 3400 Level Control Valve Actuator, please refer to “BKV 3400 Level Control Valve Installation and Operating Instructions”.

5. FUNCTIONS and CONFIGURATIONS

5.1 Display Definitions and Button Functions

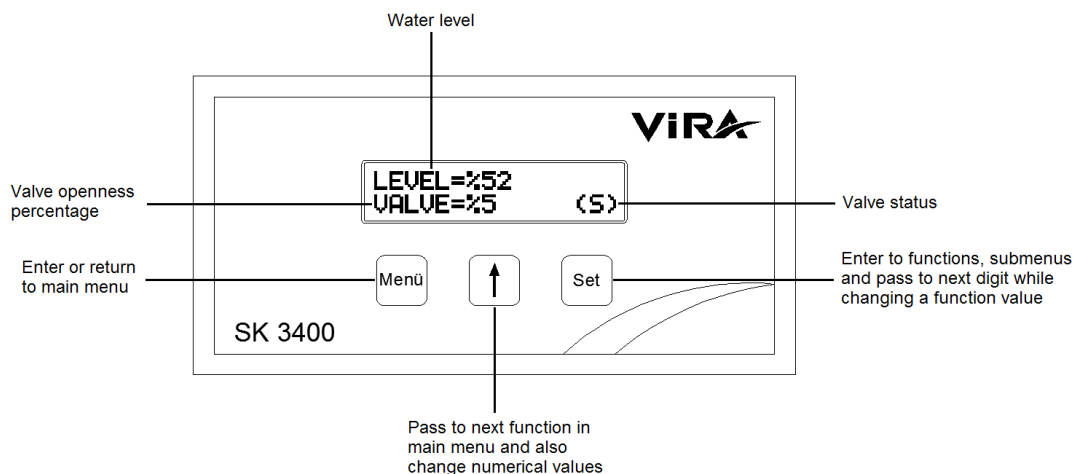


Figure 6: Display and Button Functions



button is used to enter main menu or return to main menu.



button is used to pass to next function in main menu and also is used to change the numerical values.



button is used to enter to functions, submenus and is used to pass to next digit while changing a functions value.

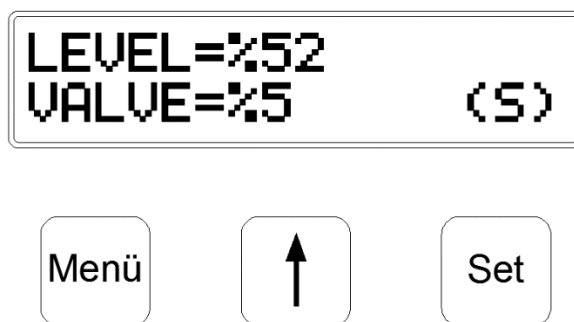


Figure 7: Main screen of SK 3400

The screen seen above is the main screen of SK 3400. On display, upper row shows water level and lower row shows valve openness percentage.

(S) Valve is stable at its current position.

(+) Valve is being opened.

(-) Valve is being closed.

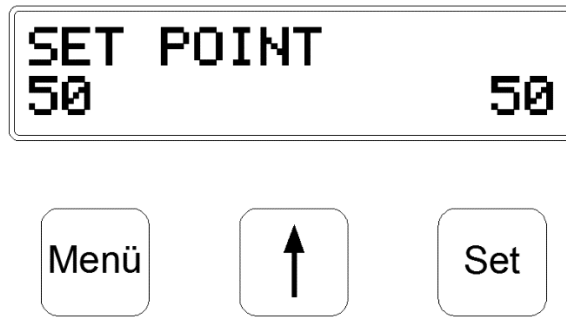







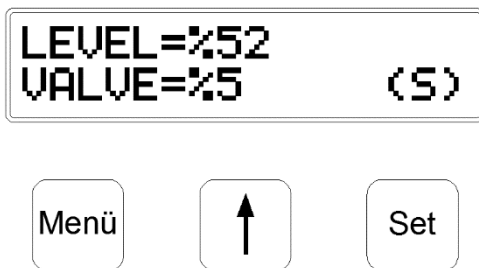



Figure 8: Example Screen Image of a Function Menu

To access the main menu, press and hold  button during 3 seconds.  button is used to pass to next function while on main menu. To enter a function  button is used. When enter a function,  button is used to change digits. To pass to next digit  button is used. To save the changed function value, press  button after the last digit is changed. To return to main menu without saving changed function value,  button is used.

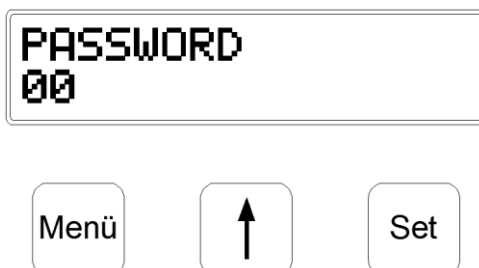
5.2 Changing Functions and Configurations




5.2.1. Startup Screen



When device is powered, the screen likes the figure on the left. To enter the main menu, press and hold  button during 3 seconds.

5.2.2. Password



To obstruct unauthorized interferences, SK 3400 has password protection.  button changes each digit and  button passes to next digit. After change the last digit,  button accepts the password and if it is true, it automatically enters the main menu.


5.2.3. Auto-Man Mode

AUTO-MAN MODE

Menü



Set

This function is used to set the operating mode of SK 3400. There are two operating modes; AUTOMATIC and MANUAL. In automatic mode, valve is controlled full automatically by SK 3400. In manual mode, user controls valve manually by using SK 3400. Press  button to enter to function menu.

SET * AUTO * MAN
AUTOMATIC

Menü



Set

Menü

(SET) Save changes and return to main menu.



(AUTO) Automatic operating mode.

Set



(MAN) Manual operating mode.

LEVEL=%52 M-O-C
VALVE=%5 (S)

Menü



Set

When manual mode is active, main screen is like the figure on the left. To control the valve  and  buttons are used.

Menü

(M) Enter to main menu.



(O) Open the valve.

Set

(C) Close the valve.

While valve is opening “+” symbol is appeared and while valve is closing “-” symbol is appeared between the parentheses.

5.2.4. Probe Min Level


PROBE MIN LEVEL





<MENU> <MinSET>
0364 485



This function is set the lowest water level (level defined 0%) that is wanted to be detected by probe.

Press  button to enter to function menu.

On this screen, number on the right shows previous PROBE MIN LEVEL value. Number on the left shows currently measured water level value. To set new probe min level, press  button when desired water level value is reached. To return to main menu without saving the value,  button is used.

5.2.5. Probe Max Level


PROBE MAX LEVEL





<MENU> <MaxSET>
0511 528

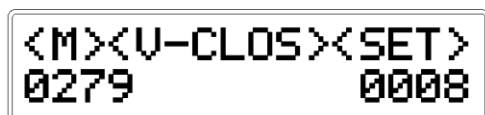


This function is set the highest water level (level defined 100%) that is wanted to be detected by probe.


Press  button to enter to function menu.

On this screen, number on the right shows previous PROBE MAX LEVEL value. Number on the left shows currently measured water level value. To set new probe min level, press  button when desired water level value is reached. To return to main menu without saving the value,  button is used.


5.2.6. Valve Min





This function is used to set fully closed valve position.

Press  button to enter to function menu.

On this screen, number on the right shows previous VALVE MIN value. Number on the left shows currently measured valve openness value. To set fully


closed valve position, first press and hold  button until valve is fully closed. When valve is fully closed, <SET> appears right of the screen. Make sure with your eyes that hand lever on the valve is not rotating

any more. Then press  button to set valve min value. To return to main menu without saving the value,  button is used.


5.2.7. Valve Max





This function is used to set fully opened valve

position. Press  button to enter to function menu.

On this screen, number on the right shows previous VALVE MAX value. Number on the left shows currently measured valve openness value. To set fully

opened valve position, first press and hold  button until valve is fully opened. When valve is fully opened, <SET> appears right of the screen. Make sure with your eyes that hand lever on the valve is not

rotating anymore. Then press  button to set valve min value. To return to main menu without saving the value,  button is used.

5.2.8. Control Type


CONTROL TYPE

Menü



Set

This function is used to set the control type of SK 3400. There are two control types; PROPORTIONAL and ON-OFF. In proportional control, water level is controlled by using signals sent to valve proportionally. In on-off control, valve/pump is controlled based on control band. If water level is under the control band, valve/pump is being opened/started. If water level is over the control band,

valve/pump is being closed/stopped. Press  button to enter to function menu.

SET*PRO*ON-OFF
PROPORTIONAL

Menü



Set

Menü

(SET) Save changes and return to main menu.



(PRO) Proportional control type.

Set

(ON-OFF) On-off control type.

LEVEL=%52 (OFF)

Menü




Set

When on-off control type is active, main screen is like the figure on the left. When valve/pump is being opened/operated, (ON) appears left of the screen. When valve/pump is being closed/stopped, (OFF) appears left of the screen.


5.2.9. Set Point





Set point is the reference water level that is wanted to be stable. This value is between PROBE MIN LEVEL (0% water level) and PROBE MAX LEVEL (100%


water level) values. Press  button to enter to function menu.

On this screen, number on the right shows the set point value adjusted previously. From the left part,

new set point value can be entered.  button

changes each digit and  button passes to next


digit. After change the last digit,  button saves the new value and returns to main menu. To return to

main menu without saving the changed value,  button is used.


5.2.10. Control Band





This function is used to set the control range of water level. This value uses SET POINT as reference/base point. For example, if control band is set to 10%, water level is controlled between 55% and 45%. It is valid both proportional control and on-off control.


Press  button to enter to function menu.

On this screen, number on the right shows the control band value adjusted previously. From the left part,

new control band value can be entered.  button


changes each digit and  button passes to next





digit. After change the last digit,  button saves the new value and returns to main menu. To return to

main menu without saving the changed value,  button is used.

5.2.11. Low Alarm








SK 3400 gives low alarm relay output when boiler water level is critically low. Press  button to enter to function menu.

On this screen, number on the right shows the low alarm value adjusted previously. From the left part, new low alarm value can be entered.  button changes each digit and  button passes to next digit. After change the last digit,  button saves the new value and returns to main menu. To return to main menu without saving the changed value,  button is used.

5.2.12. High Alarm




SK 3400 gives high alarm relay output when boiler water level is critically high. Press  button to enter to function menu.





On this screen, number on the right shows the high alarm value adjusted previously. From the left part, new high alarm value can be entered.  button changes each digit and  button passes to next digit. After change the last digit,  button saves the new value and returns to main menu. To return to main menu without saving the changed value,  button is used.

5.2.13. Alarm Delay

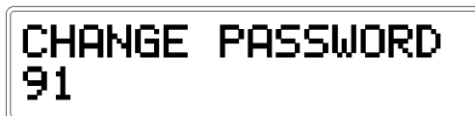
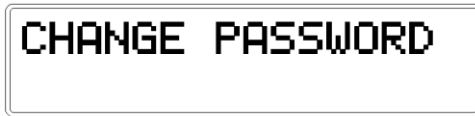



This function is used to avoid wrong alarms caused by water fluctuations. Alarm delay displays in seconds.





Press  button to enter to function menu.

On this screen, number on the right shows the alarm delay time adjusted previously. From the left part, new alarm delay time can be entered.  button changes each digit and  button passes to next digit. After change the last digit,  button saves the new value and returns to main menu. To return to main menu without saving the changed value,  button is used.

5.2.14. Change Password



To obstruct unauthorized interferences, SK 3400 has password protection. This function is used to change the password of device. Press  button to enter to function menu.

 button changes each digit and  button passes to next digit. After change the last digit,  button saves the new password and returns to main menu. To return to main menu without saving the changed value,  button is used.

Note: Please note the new password above or somewhere you want.

Default password	00
Changed password	

5.3. Configuration Table

In the following table, default factory settings are shown. Please note the new function values to this table. This provides convenience later on.

Functions	Default Settings	Commissioning	New Settings
Probe Min Level (%0)	-		
Probe Max Level (%100)	-		
Valve Min	-		
Valve Max	-		
Control Type	Modulating		
Set Point	50%		
Control Band	10%		
Low Alarm	10%		
High Alarm	95%		
Alarm Delay	5 seconds		
Output Signal	0-10 V		
Password	00		

6. TROUBLESHOOTING

Most faults that occur on commissioning are due to incorrect wiring or setting up. In the case of problems, the following checklist may be helpful.

Symptom	Solution
Display not illuminating	Check all wiring is correct.
Problems when opening or closing of valve	<ul style="list-style-type: none"> - Check the wirings between actuator and controller. - Enter CONTROL TYPE function from controller, select MAN (manual operating) then open and close the valve manually to check out it is working correctly. - When valve is opened, 4th terminal has 0 V output and when closed 2.1 V output must be read. Please check these values.
100% or 0% is shown on display.	Check the wirings of level probe

7. MAINTANANCE



Warning!

Please make sure to remove the main supply before detach the device. Otherwise this may cause damage to the product, personal injuries or even death.

When any fault situation occurs or maintenance is necessary, please contact with “**Vira Isı Service Department**”.

Vira Isı ve Endüstriyel Ürünler A.Ş.

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

İkitelli / İSTANBUL

Tel : 0 212 549 57 70

Fax : 0 212 549 48 58

E-mail : info@viraisi.com

: servis@viraisi.com

Web : www.viraisi.com

