



TDK-96 and TDK-96H SUBMERSIBLE PUMP CONTROL RELAY USER MANUAL



Work without
Electrode



Total Working
Hours



Number of
Stop/Start



TR/EN
Menu Language



Energy
Meter



Error
Logs

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About Device

Submersible pump control relays are designed to control submersible pumps and motors used in wells and similar places, and to protect them from adverse situations that may arise from waterless operation, high or low voltage and current.

Device Maintenance

Power off the device and disconnect it from the connections. Clean the body of the device with a slightly damp or dry cloth. Do not use conductive or other chemicals that may damage the device as a cleaning agent. After cleaning the device, make the connections and make sure that the device is energized and working.

Specifications

- ◆ Easy Installation and Operation with 2.9"(128x64) Graphic LCD
- ◆ Remote Communication with RS485 (Modbus RTU) (Only in models with communication)
- ◆ Easy to Use Menu
- ◆ Turkish and English Language Option
- ◆ Voltage (V), Current (A) and Cosine (Cos) can be Monitored on the Same Screen
- ◆ Active Power (P), Apparent Power (S) and Cosine (Cos) can be Monitored on the Same Screen
- ◆ Total Active Energy (Σ +P) can be Monitored
- ◆ High and Low Cosine Set Value Adjustable
- ◆ High and Low Voltage Set Value Adjustable
- ◆ High and Low Current Set Value Adjustable
- ◆ Voltage Asymmetry Set Value Adjustable
- ◆ Current Asymmetry Set Value Adjustable
- ◆ Well Upper Electrode Waiting Time Adjustable
- ◆ Tank Upper Electrode Waiting Time Adjustable
- ◆ Liquid Sensitivity Adjustable
- ◆ Error Logs (9999 records for each event)
- ◆ Star-Delta Contact Output
- ◆ Phase Sequence Protection Adjustable
- ◆ Start/Stop Memory (Operating from the last position)
- ◆ Notifies Pump Maintenance Time
- ◆ Manual, Semi-Automatic and Fully Automatic Reset Mode
- ◆ External Start/Stop Input
- ◆ 1x Adjustable Alarm Output
- ◆ Electrodeless Well Control
- ◆ The Number of Pump Starts/Stops and the Total Working Time can be Monitored

Warnings

- Use the device in accordance with the instructions given by us.
- In order not to damage the LCD screen, be careful not to get direct sunlight.
- After the device is mounted, leave a space of at least 10 cm behind it.
- Fix the device to the front cover of the panel with the apparatus in the box.
- Regulate the indoor and outdoor temperature so that there is no condensation on the metal panels. This situation is dangerous for open connection busbars.
- Include a switch or circuit breaker in the installation.
- Mark the switch and circuit breaker as disconnection element for the device.
- Keep the switch and circuit breaker close to the device and within easy reach of the operator.
- There should be no electricity in the connecting cables during assembly.
- Shielded and twisted cord cable should be used for input and output lines that are not connected to the mains. These cables should not be passed near high power lines and devices.
- Do not apply energy to the electrode (well and tank) and start-stop inputs.

Considerations in Current Transformer Connection

- Current transformer outputs and phase inputs must be in the same order. Connect the k-l terminals of the current transformer connected to the L1 phase to the k1-l1 terminals, the k-l terminals of the current transformer connected to the L2 phase to the k2-l2 terminals and the k-l terminals of the current transformer connected to the L3 phase to the k3-l3 terminals.
- Pass the current transformer output cables away from the high voltage line.
- Fix it to the busbar, cable or rail so that the current transformers are not shaken.

Introduction of Screen and Buttons



1- Graphic LCD: It is the screen where all measurements, settings and notifications about the device are transferred to the user.

2- Button Function Definition: The buttons on the device are defined for more than one function. The button functions that appear at the bottom of the screen are divided into four separate buttons as F1, F2, F3 and F4. For example, if SET is written above the F2 function, it will enter the setting menu when you press the F2 button.

3- Buttons: The functions of the buttons are associated with the definitions that appear on the screen. Button functions are described below.

RESET Button: It enables the device to be reset when the device is in error.

START Button: It takes the device in the start position and starts the pump.

STOP Button: It takes the device in the stop position and stops the pump.

ESC Button: Returns to the upper menu without saving the changed value while in the menu.

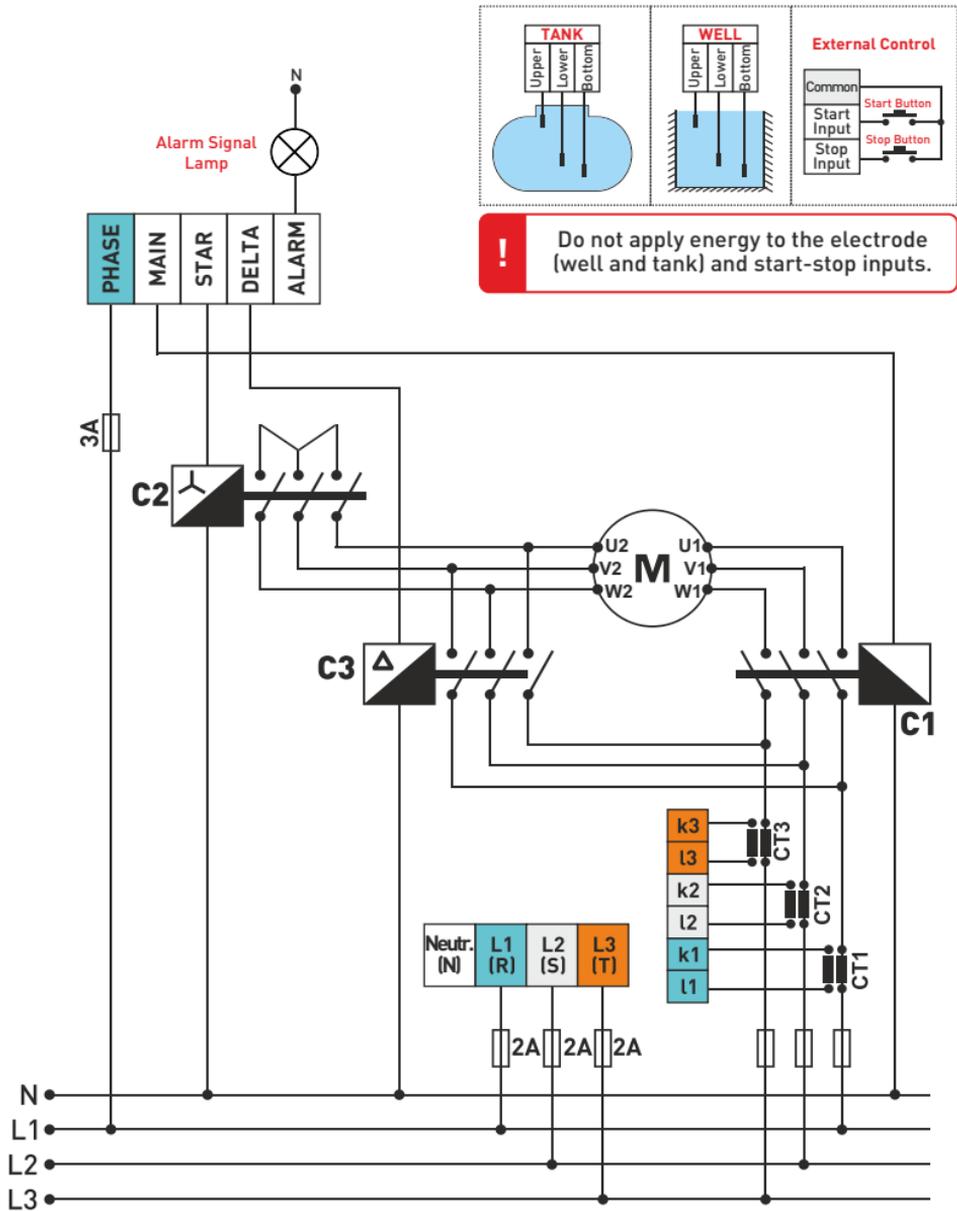
SET Button: Enters menu, submenu and parameter. Exits the parameter by saving the change in the parameter.

UP Button: Allows to move through the sub-menus in the menu. Increases the selected value while in the parameters.

DOWN Button: It enables to move between the measured values outside the menu. Allows to move through the sub-menus in the menu. Decreases the selected value while in the parameters.

RIGHT Button: Allows you to switch between the password steps on the password screen to enter the menu.

Connection Diagram



Measurement Screens

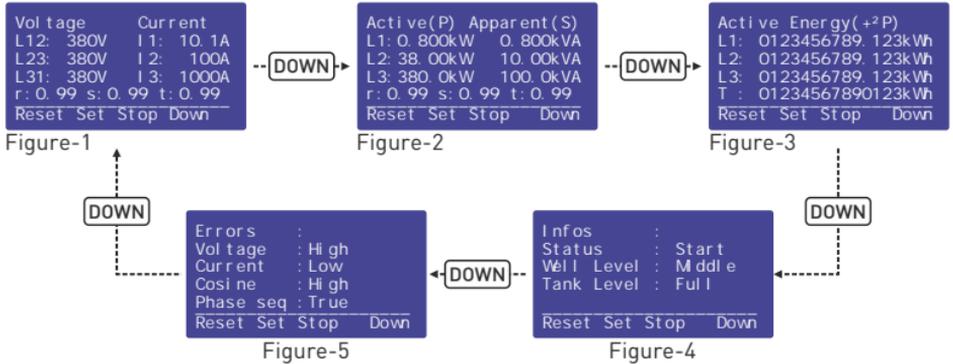


Figure-1: Phase-phase voltage values, phase-neutral current values and cosine values of each phase are displayed on the screen.

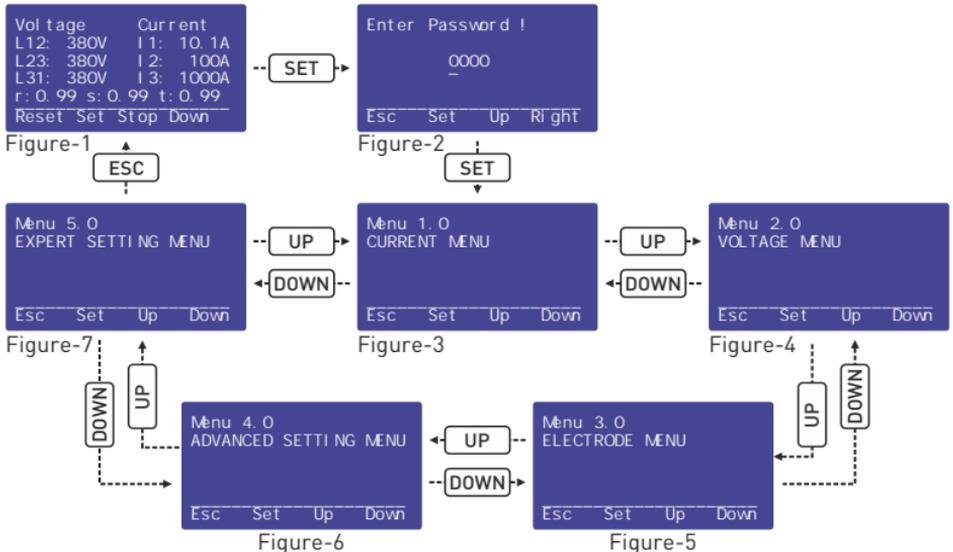
Figure-2: Active power values, apparent power values and cosine values of each phase are displayed on the screen.

Figure-3: The total active (export) energy values of each phase are displayed on the screen.

Figure-4: Device status (Start/Stop) and well and tank level (full/medium/empty) are displayed on the screen.

Figure-5: Error conditions (true/reverse for high/low phase sequence for voltage, current and cosine values) are displayed on the screen.

Menu Screens



Entering Settings: When the SET button is pressed while on any measurement page, the PASSWORD page (Figure-2) is displayed to enter the menu.

While on this page, press the SET button to enter the menu.

(The password value is "0000" by default. If the password has been changed by the user, the password specified by the user must be used to enter the menu.)

For password entry, you can switch between the steps with the RIGHT button. You can change the value of the digit with the UP button.

If no button is pressed for 30 seconds in the menu, the device returns to the main screen.

CURRENT MENU (Menu 1.0): It is the first menu that appears when you proceed by pressing the UP button after entering the settings menu (Figure-3). In this menu, high/low current set values, error delays, automatic reset delays, automatic reset numbers, demurrage multiplier and demurrage time and current asymmetry set value settings can be set.

VOLTAGE MENU (Menu 2.0): It is the second menu that appears when you proceed by pressing the UP button after entering the settings menu (Figure-4). In this menu, high/low voltage set values, error delays, automatic reset delays, voltage asymmetry set value and phase sequence protection feature set value settings can be set.

ELECTRODE MENU (Menu 3.0): It is the third menu that appears when you proceed by pressing the UP button after entering the settings menu (Figure-5). In this menu, electrode set value, well and tank electrode reading values, electrode delay times, high/low cosine set values, cosine automatic reset delays set value settings can be set.

ADVANCED SETTING MENU (Menu 4.0): It is the fourth menu that appears when you proceed by pressing the UP button after entering the settings menu (Figure-6). In this menu, starting time, Modbus RTU communication settings, start/stop memory, star waiting time, panel control feature, alarm relay assignment set value settings can be set.

EXPERT SETTING MENU (Menu 5.0): It is the fifth menu that appears when you proceed by pressing the UP button after entering the settings menu (Figure-7). In this menu, engine operation information, voltage, current and cosine error records can be displayed. Factory values can be restored, menu language and password values and screen light off time set value settings can be set.

Settings  Current Menu

Menu 1.0
CURRENT MENU

Esc Set Up Down

It is the first menu that appears after you enter the settings menu. In this menu, high/low current set values, error delays, automatic reset delays, automatic reset numbers, demurrage multiplier and demurrage time and current asymmetry set value settings can be set.

To enter the Current Menu, press the SET button while the Current Menu page is on the screen. Use UP and DOWN buttons to access other settings in the menu.

Settings  Current Menu  High Current Set Value

Menu 1.1
High Current Set

50.0A

Esc Set Up Down

It determines the maximum operating current (overload) of the pump.

To change this value, press the SET button while the High Current Set page is on the screen. "Menu 1.1.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu High Current Error Entrance Delay

Menu 1.2
High Current Error
Entrance Delay
5 Sc.

Esc Set Up Down

It determines the time the device will wait before stopping the pump when it enters a high current error.

To change this value, press the SET button while the High Current Error Entrance Delay page is on the screen. "Menu 1.2.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu High Current Auto Reset Delay

Menu 1.3
High Current Auto
Reset Delay
OFF

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a high current error.

To change this value, press the SET button while the High Current Auto Reset Delay page is on the screen. "Menu 1.3.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu High Current Auto Reset Number

Menu 1.4
High Current Auto
Reset Number
OFF

Esc Set Up Down

It determines how many times the pump will be restarted automatically after the device enters a high current error.

To change this value, press the SET button while the High Current Automatic Reset Number page is on the screen. "Menu 1.4.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Low Current Set Value

Menu 1.5
Low Current Set
OFF

Esc Set Up Down

It determines the minimum operating current of the pump.

To change this value, press the SET button while the Low Current Set page is on the screen. "Menu 1.5.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Low Current Error Entrance Delay

Menu 1.6
Low Current Error
Entrance Delay
5 Sc.

Esc Set Up Down

It determines the time the device will wait before stopping the pump when it enters a low current error.

To change this value, press the SET button while the Low Current Error Entrance Delay page is on the screen. "Menu 1.6.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Low Current Auto Reset Delay

Menu 1.7
Low Current Auto
Reset Delay
OFF

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a low current error.

To change this value, press the SET button while the Low Current Auto Reset Delay page is on the screen. "Menu 1.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu High Current Auto Reset Number

Menu 1.8
Low Current Auto
Reset Number
OFF

Esc Set Up Down

It determines how many times the pump will be restarted automatically after the device enters a low current error.

To change this value, press the SET button while the Low Current Automatic Reset Number page is on the screen. "Menu 1.8.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Demurrage Multiplier

Menu 1.9
Demurrage Multiplier

2.0 10.0A
Esc Set Up Down

It determines the maximum current that the pump connected to the device can draw in demurrage (start-up). (Demurrage current = Demurrage Multiplier x High Current Set Value) (The value on the left of the screen represents the demurrage multiplier, and the value on the right represents the demurrage current.)

If the pump draws current above this value while in demurrage, the device stops the pump without waiting.

To change this value, press the SET button while the Demurrage Multiplier page is on the screen. "Menu 1.9.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Demurrage Time

Menu 1.10
Demurrage Time

10 Sc.
Esc Set Up Down

It determines the time until the pump returns to the normal current level after each energization.

To change this value, press the SET button while the Demurrage Time page is on the screen. "Menu 1.10.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Current Menu Current Asymmetry Set Value

Menu 1.11
Current Asymmetry Set

50 %
Esc Set Up Down

It determines the percentage of the maximum difference that will occur between the currents drawn by the pump.

To change this value, press the SET button while the Current Asymmetry Set page is on the screen. "Menu 1.11.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu

Menu 2.0
VOLTAGE MENU

Esc Set Up Down

It is the second menu that appears after you enter the settings page. In this menu, high/low voltage set values, error delays, automatic reset delays, voltage asymmetry set value and phase sequence active/passive set value settings can be set.

To enter the Voltage Menu, press the SET button while the Voltage Menu page is on the screen. Use UP and DOWN buttons to access other settings in the menu.

Settings Voltage Menu High Voltage Set Value

Menu 2.1
High Voltage Set

420 V

Esc Set Up Down

It determines the maximum operating voltage (phase-phase) of the pump

To change this value, press the SET button while the High Voltage Set page is on the screen. "Menu 2.1.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu High Voltage Error Entrance Delay

Menu 2.2
High Voltage Error
Entrance Delay
5 Sc.

Esc Set Up Down

It determines the time the device will wait before stopping the pump when it enters a high voltage error.

To change this value, press the SET button while the High Voltage Error Entrance Delay page is on the screen. "Menu 2.2.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu High Voltage Auto Reset Delay

Menu 2.3
High Voltage Auto
Reset Delay
OFF

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a high voltage error. This feature is activated when all voltages fall below 10V of the High Voltage Set Value.

To change this value, press the SET button while the High Voltage Auto Reset Delay page is on the screen. "Menu 2.3.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu Low Voltage Set Value

Menu 2.4
Low Voltage Set

330 V

Esc Set Up Down

It determines the minimum operating voltage (phase-phase) of the pump

To change this value, press the SET button while the Low Voltage Set page is on the screen. "Menu 2.4.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu Low Voltage Error Entrance Delay

Menu 2.5
Low Voltage Error
Entrance Delay
5 Sc.

Esc Set Up Down

It determines the time the device will wait before stopping the pump when it enters a low voltage error.

To change this value, press the SET button while the Low Voltage Error Entrance Delay page is on the screen. "Menu 2.5.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu Low Voltage Auto Reset Delay

Menu 2.6
Low Voltage Auto
Reset Delay
OFF

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a low voltage error. This feature is activated when all voltages rise above 10V above the Low Voltage Set Value.

To change this value, press the SET button while the Low Voltage Auto Reset Delay page is on the screen. "Menu 2.6.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu Voltage Asymmetry Set Value

Menu 2.7
Voltage Asymmetry Set
20 %

Esc Set Up Down

It determines the percentage of the maximum voltage difference that will occur between the phases.

To change this value, press the SET button while the Voltage Asymmetry Set page is on the screen. "Menu 2.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Voltage Menu Phase Sequence Protection

Menu 2.8
Phase Seq. On / Off
On : Active

Esc Set Up Down

It determines whether or not phase sequence control is performed. From here, phase sequence protection can be activated/deactivated.

To change this value, press the SET button while the Phase Seq. On/Off page is on the screen. "Menu 2.8.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu

Menu 3.0
ELECTRODE MENU

Esc Set Up Down

It is the third menu that appears after you enter the settings page. In this menu, electrode set value, well and storage electrode reading values, electrode delay times, high/low cosine set values, cosine automatic reset delays set value settings can be set.

To enter the Electrode Menu, press the SET button while the Electrode Menu page is on the screen. Use UP and DOWN buttons to access other settings in the menu.

Settings Electrode Menu Electrode Set Value

Menu 3.1
Electrode Set

75 %

Esc Set Up Down

It determines the conductivity of the liquid with which the electrodes come into contact. This value should be kept low in liquids with high conductivity (domestic water, etc.) and high in liquids with low conductivity (drinking water, etc.).

To change this value, press the SET button while the Electrode Set page is on the screen. "Menu 3.1.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu Well Electrodes Reading Values

Menu 3.2
Well Electrode Read
Top Electrode: 5
Bottom Electrode: 4

Esc Set Up Down

It shows the liquid conductivity value of the well electrodes. If the electrode reading value is lower than the electrode set value, it means that the electrodes are in contact with the liquid. If it is high, it means that the electrodes are not in contact with the liquid.

You can change the electrode set (Menu 3.1) value according to the values here.

Settings Electrode Menu Well Electrode Delay Time

Menu 3.3
Well Electrode Delay
Time
1 Sc.

Esc Set Up Down

It determines the time the device will wait to start the pump after the liquid level in the well reaches the upper electrode. This feature allows the pump to run more efficiently and also supports two-electrode usage.

To change this value, press the SET button while the Well Electrode Delay Time page is on the screen. "Menu 3.3.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu Tank Electrodes Reading Values

Menu 3.4
Tank Electrode Read
Top Electrode: 5
Bottom Electrode: 4

Esc Set Up Down

It shows the liquid conductivity value of the tank electrodes. If the electrode reading value is lower than the electrode set value, it means that the electrodes are in contact with the liquid. If it is high, it means that the electrodes are not in contact with the liquid.

You can change the electrode set (Menu 3.1) value according to the values here.

Settings Electrode Menu Tank Electrode Delay Time

Menu 3.5
Tank Electrode Delay
Time
5 Sec.

Esc Set Up Down

It determines the time the device will wait to stop the pump after the liquid level in the tank reaches the upper electrode. This feature allows the pump to run more efficiently and also supports two-electrode usage.

To change this value, press the SET button while the Tank Electrode Delay Time page is on the screen. "Menu 3.5.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu Low Cosine Set Value

Menu 3.6
Low Cosine Set
OFF

Esc Set Up Down

It is used to determine the full/empty information of the well when no electrode is used to measure the liquid level in the well. It determines the minimum working cosine value of the pump.

To change this value, press the SET button while the Low Cosine Set page is on the screen. "Menu 3.6.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu Low Cosine Auto Reset Delay

Menu 3.7
Low Cosine Auto
Reset Delay
10 Sec.

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a low cosine error.

To change this value, press the SET button while the Low Cosine Auto Reset Delay page is on the screen. "Menu 3.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu High Cosine Set Value

Menu 3.8
High Cosine Set
OFF

Esc Set Up Down

It is used to determine the full/empty information of the well when no electrode is used to measure the liquid level in the well. It determines the maximum working cosine value of the pump.

To change this value, press the SET button while the High Cosine Set page is on the screen. "Menu 3.8.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Electrode Menu High Cosine Auto Reset Delay

Menu 3.9
High Cosine Auto
Reset Delay
10 Sec.

Esc Set Up Down

It determines the time the device will wait for the pump to restart (reset) after entering a high cosine error.

To change this value, press the SET button while the High Cosine Auto Reset Delay page is on the screen. "Menu 3.9.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu

Menu 4.0
ADVANCED SETTING MENU

It is the fourth menu that appears after you enter the settings page. In this menu, start (first power-on) time, Modbus RTU communication settings, start/stop memory, star waiting time, panel control feature, alarm relay assignment set value settings can be made.

To enter the Advanced Setting Menu, press the SET button while the Advanced Setting Menu page is on the screen. Use UP and DOWN buttons to access other settings in the menu.

Settings Advanced Setting Menu Starting Time

Menu 4.1
Starting Time

5 Sc.

Esc Set Up Down

It determines the starting delay time to protect the pump from voltage fluctuations after power failure.

To change this value, press the SET button while the Starting Time page is on the screen. "Menu 4.1.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu Start Stop Memory

Menu 4.2
Start Stop Memory

On : Active

Esc Set Up Down

It determines in which (start or stop) position the device will be opened after a power cut. If this value is "on", the device turns on in the same position it was in before the power was cut off. If it is in the "off" position, it opens in the "stop" position.

To change this value, press the SET button while the Start Stop Memory page is on the screen. "Menu 4.2.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu Star Waiting Time

Menu 4.3
Start Waiting Time

5 Sc.

Esc Set Up Down

It determines the operating time of the three-phase pumps in the star contact. At the end of this time, the star contact output is cut off and switches to the delta contact.

To change this value, press the SET button while the Star Waiting Time page is on the screen. "Menu 4.3.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu Panel Control

Menu 4.4
Panel Control

On : Active

Esc Set Up Down

It enables start/stop via external dry contact or button. When this setting is "on", you can switch the device to start and stop position with external dry contact or button connection.

To change this value, press the SET button while the Panel Control page is on the screen. "Menu 4.4.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu Alarm Relay Assignment

Menu 4.5
Alarm Relay Assgn.

OFF

Esc Set Up Down

It provides output from the alarm contact related to voltage, current, cosine, well empty and tank full states (whichever is selected).

To change this value, press the SET button while the Alarm Relay Assing. page is on the screen. "Menu 4.5.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Settings Advanced Setting Menu ModBus Baudrate

Menu 4.6
Modbus Boudrate
9600 Bps.
DataBit=8
StopBit=1 Parity=None
Esc Set Up Down

It determines the baudrate (communication speed) setting for remote communication and displays databit, stopbit, parity value.

To change this value, press the SET button while the Modbus Baudrate page is on the screen. "Menu 4.6.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

This feature is only available on models with communication.

Settings Advanced Setting Menu ModBus RTU Address

Menu 4.7
Modbus Address
1 ID

Esc Set Up Down

It determines the ID (address) value for remote communication.

To change this value, press the SET button while the Modbus Address page is on the screen. "Menu 4.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

This feature is only available on models with communication.

Settings Expert Setting Menu

Menu 5.0
EXPERT SETTING MENU

Esc Set Up Down

It is the fifth menu that appears after you enter the settings page. In this menu, pump operation information, voltage, current, cosine error logs and device model and version information can be displayed. Factory values can be restored, menu language and password values and screen light off time set value settings can be set.

To enter the Expert Setting Menu, press the SET button while the Expert Setting Menu page is on the screen. Use UP and DOWN buttons to access other settings in the menu.

Settings Expert Setting Menu Engine Operation Info

Menu 5.1
Engine Operation Info
Time : 15532 Hour
Number : 65535

Esc Set Up Down

It shows how many times the pump connected to the device has been activated (stop/start) and how many hours it has worked in total. The maximum number of records is as follows.

Maximum number of start/stop 65535,
Maximum operating time 65535 hours.

Settings Expert Setting Menu Current Error Logs

```
Menu 5.2
Current Error Logs
High Current : 0000
Low Current : 0000
Current Asym : 0000
-----
Esc Set Up Down
```

It shows how many times the pump connected to the device has error depending on the current. (High current (high current + inrush), low current and current asymmetry error numbers are displayed separately.)

Error logs are 9999 for each event.

To reset current error logs; Press and hold the SET button for 1 second, then (without releasing the set button) keep pressing the UP and DOWN buttons for 3 seconds.

Settings Expert Setting Menu Voltage Error Logs

```
Menu 5.3
Voltage Error Logs
High Voltage : 0000
Low Voltage : 0000
Voltage Asym : 0000
-----
Esc Set Up Down
```

It shows how many times the pump connected to the device has error depending on the voltage. (High voltage, Low voltage and voltage asymmetry error numbers are displayed separately.)

Error logs are 9999 for each event.

To reset voltage error logs; Press and hold the SET button for 1 second, then (without releasing the set button) keep pressing the UP and DOWN buttons for 3 seconds.

Settings Expert Setting Menu Cosine Error Logs

```
Menu 5.4
Cosine Error Logs
High Cosine : 0000
Low Cosine : 0000
-----
Esc Set Up Down
```

It shows how many times the pump connected to the device has error depending on the cosine. (High cosine and Low cosine error numbers are displayed separately.)

Error logs are 9999 for each event.

To reset cosine error logs; Press and hold the SET button for 1 second, then (without releasing the set button) keep pressing the UP and DOWN buttons for 3 seconds.

Settings Expert Setting Menu Factory Default Reset

```
Menu 5.5
Factory Default Reset
Yes ( )
No ( *)
-----
Esc Set Up Down
```

It allows the settings in the device to be returned to the factory default values.

To return to the factory values, press the SET button while the Factory Default Reset page is on the screen. "Menu 5.5.0" will appear on the screen. Select "Yes" using the UP or DOWN buttons and press the SET button again.

Settings Expert Setting Menu Menu Language

```
Menu 5.6
Select Menu Language
Turkish (*)
English ( )
-----
Esc Set Up Down
```

It allows the device language to be changed to Turkish or English.

To change this value, press the SET button while the Select Menu Language page is on the screen. "Menu 5.6.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Menu 5.7
Change Password

Password : 0000

Esc Set Up Down

It allows to change the password to enter the menu. If the password is not changed, the default password is "0000".

To change this value, press the SET button while the Change Password page is on the screen. "Menu 5.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Menu 5.8
Screen Off Time

Time : 5 Min.

Esc Set Up Down

It determines the time when the backlight will turn off. If the buttons of the device are not pressed within the set time, the backlight is turned off.

To change this value, press the SET button while the Screen Off Time page is on the screen. "Menu 5.8.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Menu 5.9
Tense Electronics
TDK-96H
Version : 1.000

Esc Set Up Down

It is the menu where information about the device is accessed.

You can access the device model and software version number on this screen.

Alarm Relay Assignment

Menu 4.5
Alarm Relay Assgn.

OFF

Esc Set Up Down

It provides output from the alarm contact related to voltage, current, cosine, well empty and tank full states (whichever is selected). The alarm relay contact activates output according to the errors in the table.

OFF	Alarm relay assignment off
High Voltage Error	High voltage and voltage asymmetry errors
Low Voltage Error	Low voltage fault
High Current Error	High current, current asym. and demurrage errors
Low Current Error	Low current error
High Cosine Error	High cosine error
Low Cosine Error	Low cosine error
Well Empty Error	Well empty error
Tank Full Error	Tank full error
Well/Tank Errors	All well and tank errors
Voltage/Current Errors	All voltage and current errors

Changing the Password to Enter the Menu

Menu 5.7
Change Password

Password : 0000

Esc Set Up Down

It allows to change the password to enter the menu. If the password is not changed, the default password is "0000".

To change this value, press the SET button while the Change Password page is on the screen. "Menu 5.7.0" will appear on the screen. Enter the new value to the device using the UP and DOWN buttons and press the SET button to save.

Example: If it is desired to enter the password value "2580", the UP button is kept pressed until the value "2580" is displayed on the screen, then the password value is saved by pressing the SET button. After changing the password, the newly determined password must be used to enter the menu.

Voltage Asymmetry

Menu 2.7
Voltage Asymmetry Set

20 %

Esc Set Up Down

Voltage asymmetry is calculated as the ratio of the maximum difference between the phase-to-phase voltage values to the phase-to-phase voltage value. The higher the voltage asymmetry, the more irregular the motor will run and it may fail over time. In addition, by using this feature, you can detect the return voltage caused by the phase interruption while the pump is running and prevent the motor from being damaged.

Formula: $[(LLmax-LLmin)/LLmax]*100$

Example: L12=350V, L23=380V and L31=420V LLmax=L31=425V and LLmin=L12=350V.

When applied to the formula; $[(425-350)/425]*100=(75/425)*100=0.176*100=17.6=17\%$.

If you want the pump to operate at these voltages, you must enter the set (Menu 2.7) value above 18%. If you want the pump not to operate at these voltages, you must enter the set (Menu 2.7) value below 17%.

If the voltage asymmetry value is greater than the voltage asymmetry set value, the device starts counting time (Menu 2.2). The device stops the pump after the time has elapsed. When the voltage asymmetry value falls below 2% of the voltage asymmetry set value (if the set is 20%, when the asymmetry value is 18%), the reset time (Menu 2.3) starts counting. The device restarts the pump after the time has elapsed.

Current Asymmetry

Menu 1.11
Current Asymmetry Set

50 %

Esc Set Up Down

The current asymmetry is calculated as the ratio of the maximum difference between the current values to the current value. The higher the current asymmetry, the more irregular the pump will run and it may fail over time. In addition, by using this feature, you can detect the return current caused by the phase interruption while the pump is running and prevent the motor from being damaged.

Formula: $[(Imax-Imin)/Imax]*100$

Example: I1=25A, I2=30A and I3=35A Imax=I3=35A and Imin=I1=25A

When applied to the formula; $[(35-25)/35]*100=(10/35)*100=0.285*100=28.5\%=28\%$.

If you want the pump to operate at these current values, you must enter the set (Menu 1.11) value above 28%. If you want the pump not to operate with these current values, you must enter the set (Menu 1.11) value below 28%.

If the current asymmetry value is greater than the current asymmetry set value, the device starts counting for 2 seconds. The device stops the pump after the time has elapsed. The device does not automatically start the motor (reset) after entering the current asymmetry error. You have to press the reset button.

Note: You can detect the situation that occurs when a phase is cut off while the motor is running, with current asymmetry. In these cases, we recommend using this feature.

Demurrage Current Control

Menu 1.9
Demurrage Multiplier

2.0 10.0A

Esc Set Up Down

The time taken until the pumps resist the connected load and reach the nominal current levels each time they are started is called the demurrage time and the highest current value in this time is called the demurrage current. Both values vary depending on the power of the pump, the voltage value and the amount of load forcing the pump.

It allows the inrush current to draw through the inrush time (Menu1.10) every time the pump is started.

Menu 1.10
Demurrage Time

10 Sc.

Esc Set Up Down

The demurrage current is obtained by multiplying the high current set (Menu 1.1) value with the demurrage multiplier (Menu 1.9).

Demurrage Current = Demurrage Multiplier x High Current Set

The value on the left of the screen represents the demurrage multiplier, and the value on the right represents the demurrage current.

If one of the currents drawn after the pump is started goes above the demurrage current set value, the device stops the pump without delay. The device does not automatically restart the pump. To start the pump, it is necessary to press the reset button manually.

Electrodeless Well Control

Menu 3.6
Low Cosine Set

OFF

Esc Set Up Down

Cosine control can be used to detect the water in the well by the device. In general, the cosine value decreases when the water runs out while the pump is running. Low cosine settings are used here.

While the pump is operating at nominal values, cosine values appear on the 5th line on the screen. Low cosine setpoint (Menu 3.6) can be entered as 0.15 minus the nominal cosine value of the pump. **For example: If the cosine value is 0.82, the low cosine set value of 0.67 can be entered.**

Menu 3.7
Low Cosine Auto
Reset Delay
10 Sc.

Esc Set Up Down

If the cosine value is below the low cosine set value, the device counts for 3 seconds and then stops the pump. Then it waits until the reset time (Menu 3.7) and the device starts the pump again. The reset time must be entered as long as the well can be filled again.

Menu 3.8
High Cosine Set

OFF

Esc Set Up Down

Although very little, some pumps increase the cosine value when the water runs out due to their structure. High cosine settings are used here.

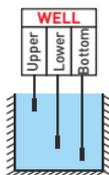
While the pump is operating at nominal values, cosine values appear on the 5th line on the screen. High cosine setpoint (Menu 3.8) can be entered as 0.10 plus the nominal cosine value of the pump. **For example: If the cosine value is 0.82, the high cosine set value of 0.92 can be entered.**

Menu 3.9
High Cosine Auto
Reset Delay
10 Sc.

Esc Set Up Down

If the cosine value is above the high cosine set value, the device counts for 3 seconds and then stops the pump. Then it waits until the reset time (Menu 3.9) and the device starts the pump again. The reset time must be entered as long as the well can be filled again.

Well Control



3 Electrodes

A well is simply a source of water (lake, pond, river, etc.). Generally, 3 electrodes are used for the device to detect the presence of water in the well. If the electrode reading (Menu 3.2) is below the electrode set (Menu 3.1) value, there is water, and if it is above it, there is no water. If you are sure that the electrodes are in the water and the reading is still high, you can increase the electrode set value. If the device screen still says "the well is empty", check the electrode connections.

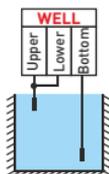
After the device gives the "well full" warning, it counts the well electrode delay time (Menu 3.3) and starts the pump after the time expires.

Note: If the well will be controlled with 2 electrodes, we recommend using the well electrode delay time (Menu 3.3) setting.

Note: The well can also be controlled by connecting a float. Floater connection is made to the lower electrode tip and the upper electrode tip. In the float connection, use the short-circuited ends when the well is full.

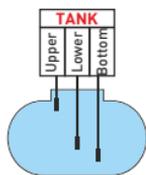
Note: If you don't want to check the well. Short circuit all 3 electrodes.

Note: Do not apply energy to the well electrode terminals.



2 Electrodes

Tank Control



3 Electrodes

The tank is where water is stored for later use. Floaters are generally used for the device to detect the presence of water in the tank. However, it can also be used with 3 electrodes for more precise control. If the electrode reading (Menu 3.4) is below the electrode set (Menu 3.1) value, there is water, and if it is above it, there is no water. If you are sure that the electrodes are in the water and the reading is still high, you can increase the electrode set value. If "tank empty" is still written on the device screen, check the electrode connections.

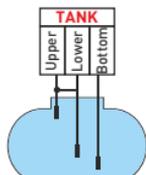
After the tank is empty, the device counts the tank electrode delay time (Menu 3.5) and starts the pump after the time expires.

Note: If the tank will be controlled with 2 electrodes, we recommend using the tank electrode delay time (Menu 3.5) setting.

Note: The tank can also be controlled by connecting a float. Floater connection is made to the lower electrode tip and the upper electrode tip. In the float connection, use the short-circuit terminals when the tank is full.

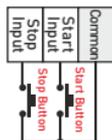
Note: If you don't want to check the tank. Open-circuit all 3 electrodes. Do not make any connections.

Note: Do not apply energy to the tank electrode terminals.



2 Electrodes

External Start Stop Control



You can also control the device by using a another button (dry contact) other than the start/stop button on it. You can use this feature by setting the panel control (Menu 4.6) to "Active".

Note: Do not apply energy to external start-stop terminals.

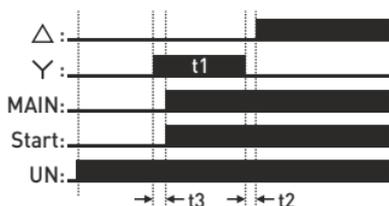
Factory Values

Setting Name	Setting Code	Factory Value	Min. Value	Max. Value	Increase Value	Hysteresis	Unit
High Current Set Value	1.1.0	50.0	1.0	250.0	0.2	-	A
High Current Error Entrance Delay	1.2.0	5	0	99	1	-	sec.
High Current Auto Reset Delay	1.3.0	Off	Off/1	9999	1	-	sec.
High Current Auto Reset Number	1.4.0	Off	Off/1	99	1	-	times
Low Current Set Value	1.5.0	Off	1.0	250.0	0.2	-	A
Low Current Error Entrance Delay	1.6.0	5	0	99	1	-	sec.
Low Current Auto Reset Delay	1.7.0	Off	Off/1	9999	1	-	sec.
Low Current Auto Reset Number	1.8.0	Off	Off/1	99	1	-	times
Demurrage Multiplier	1.9.0	2.0	1.5	10.0	0.5	-	-
Demurrage Time	1.10.0	10	1	99	1	-	sec.
Current Asymmetry Set Value	1.11.0	50	1	99	1	-	%
Current Asymmetry Error Entrance Delay (Fixed)	2						sec.
Current Asymmetry Auto Reset Delay (Fixed)	Off						-
High Voltage Set Value	2.1.0	420	390	470	1	10	V
High Voltage Error Entrance Delay	2.2.0	5	1	99	1	-	sec.
High Voltage Auto Reset Delay	2.3.0	5	Off/1	99	1	-	sec.
Low Voltage Set Value	2.4.0	330	210	370	1	10	V
Low Voltage Error Entrance Delay	2.5.0	5	1	99	1	-	sec.
Low Voltage Auto Reset Delay	2.6.0	5	Off/1	99	1	-	sec.
Voltage Asymmetry Set Value	2.7.0	20	1	99	1	2	%
Voltage Asymmetry Error Entrance Delay	High Voltage Error Entrance Delay Values Valid						
Voltage Asymmetry Auto Reset Delay	High Voltage Auto Reset Delay Values Valid						
Phase Sequence Control	2.8.0	On	On	Off	-	-	-

Fabrika Çıkış Değerleri

Setting Name	Setting Code	Factory Value	Min. Value	Max. Value	Increase Value	Hysteresis	Unit
Electrode Set Value	3.1.0	75	1	100	1	-	-
Well Electrode Delay Time	3.3.0	1	1	6000	1	-	sec.
Tank Electrode Delay Time	3.5.0	1	1	999	1	-	sec.
Low Cosine Set Value	3.6.0	Off	Off/0.10	0.99	0.01	-	-
Low Cosine Error Entrance Delay (Fixed)	3						sec.
Low Cosine Auto Reset Delay	3.7.0	300	1	6000	1	-	sec.
High Cosine Set Value	3.8.0	Off	Off/0.10	0.99	0.01	-	-
High Cosine Error Entrance Delay (Fixed)	3						sec.
High Cosine Auto Reset Delay	3.9.0	300	1	6000	1	-	sec.
Starting Time	4.1.0	5	0	999	1	-	sec.
Start Stop Memory	4.2.0	On	On	Off	-	-	-
Star Waiting Time	4.3.0	5	5	99	1	-	sec.
Panel Control	4.4.0	On	On	Off	-	-	-
Alarm Relay Assignment	4.5.0	Off, U>, U<, I>, I<, Cos>, Cos<, Well Empty, Tank Full					
Modbus Baudrate	4.6.0	9600	2400	38400	-	-	bps.
Modbus Parity (Fixed)	None						-
Modbus Stopbit (Fixed)	1						-
Modbus Databit (Fixed)	8						-
Modbus Adresi (ID)	4.7.0	1	1	247	1	-	-
Factory Default	5.5.0	No	Yes	No	-	-	-
Menu Language	5.6.0	Türkçe	Türkçe	English	-	-	-
Password	5.7.0	0000	0000	9999	-	-	-
Screen Off Time	5.8.0	5	Off/1	30	1	-	min.

Star-Delta Operation Characteristic

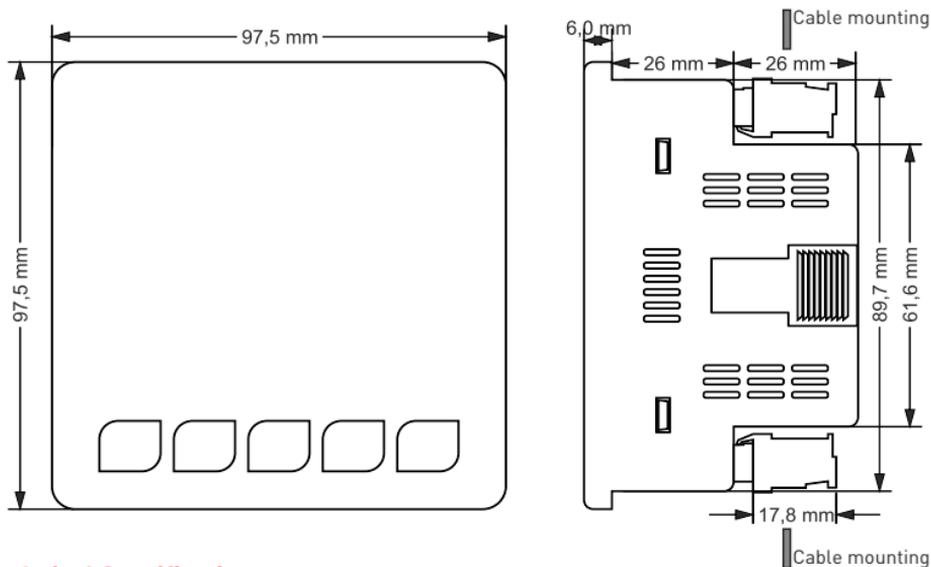


t1: Star Waiting Time: Menu 4.5.0

t2: Star → Delta Pass Time : 10 msec. (Fixed)

t3: 100 msec. (Star contact activates first before main contact) (Fixed)

Dimensions



Technical Specifications

	TDK-96 (CT-300)	TDK-96H (CT-300)
Operating Voltage	400V AC (L2-L3)	
Operating Frequency	50/60Hz.	
Operating Temperature	-20°C.....55°C	
Operating Power	< 6VA	
Operating Current Range	1A - 250A AC 50/60 Hz.	
Panel Hole Sizes	92 x 92 mm.	
Weight	<0.30 kg. (Device) , <0.25 kg (Current Tranformers)	
Connection Type	Terminal Bağlantı	
Output Contacts	3A 250V AC (Resistive Load)	
Communication	-	Modbus RTU
Display	2.9" 128x64 Graphic LCD	
Cable Diameter	1.5 mm ²	
Mounting	Mounting on front panel	
Protection Class	IP41 (Front Panel), IP20 (Body)	
Operating Altitude	<2000 meters	



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