



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 (ΣP) 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.

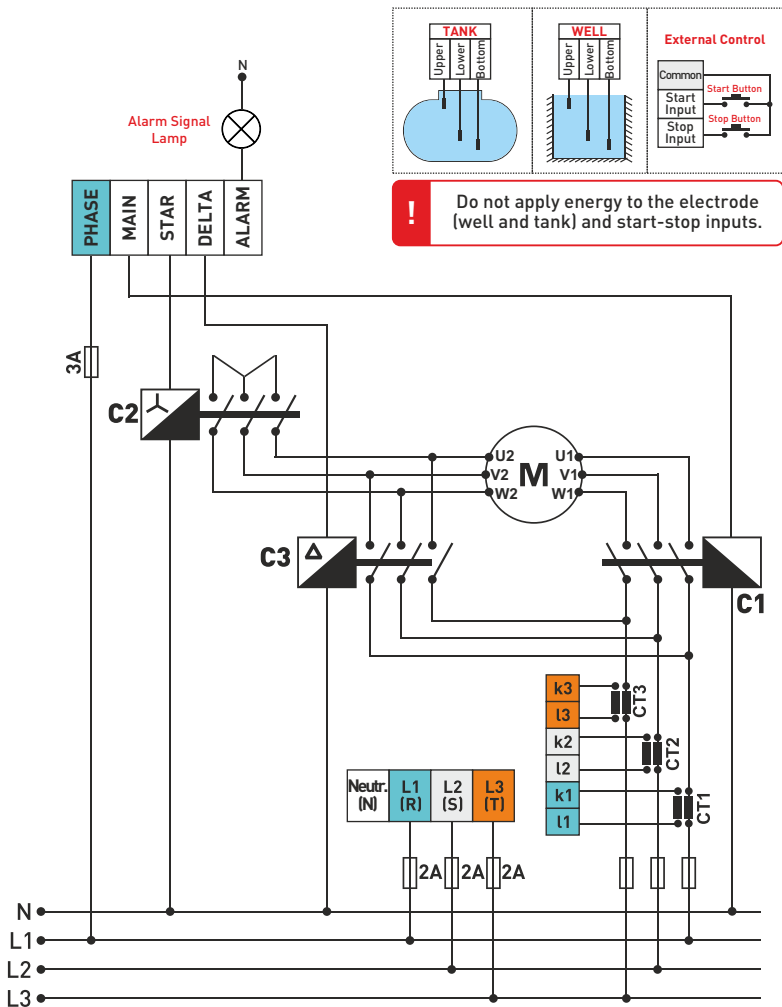
SET Button: Enters menu, submenu and parameter. Exits the parameter by saving the change in the parameter.

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

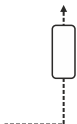
DOWN Button: It enables to move between the measured values outside the menu. Allows to move through the sub-menus in the menu. Decreases the selected value while in the parameters.

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

Connection Diagram



Measurement Screens



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

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.























Demurrage Current Control

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 (Menu 1.10) every time the pump is started.

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

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.**

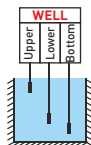
If the cosine value is below the low cosine set value, the device counts for 3 seconds and then stops the pump. Then it waits until the reset time (Menu 3.7) and the device starts the pump again. The reset time must be entered as long as the well can be filled again.

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.**

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.

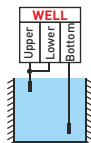
After the device gives the "well full" warning, it counts the well electrode delay time (Menu 3.3) and starts the pump after the time expires.

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.

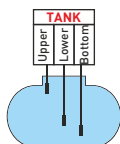
Note: If you don't want to check the well. Short circuit all 3 electrodes.

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.

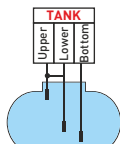
After the tank is empty, the device counts the tank electrode delay time (Menu 3.5) and starts the pump after the time expires.

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.

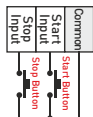
Note: If you don't want to check the tank. Open-circuit all 3 electrodes. Do not make any connections.

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



2 Electrodes

External Start Stop Control



You can also control the device by using 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.

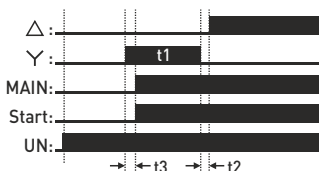
Factory Values

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	-	-	-

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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

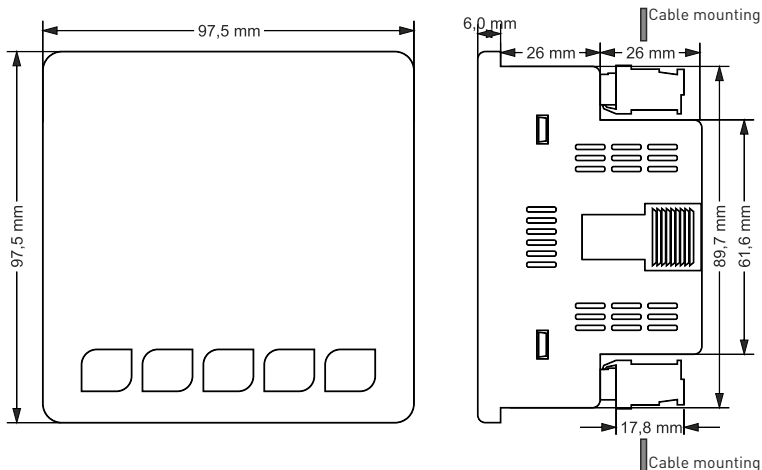


t1: Star Waiting Time: Menu 4.5.0

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	

