ETNA®



HYDROKON
Motor-Mounted Frequency Drive for Pump Systems
User Manual

Dear Customer,

Thanks for selecting our product. To use this product correctly, make sure that you read this manual carefully and keep the manual safe together with the warranty card.

Warnings

• Cut off the power supply before assembling the device.

NOTE: Standard power loss (Watt) = 3% of device power
ΔT = Temperature difference in the cabin (°C)
3.1 = Specific heat of air at sea level
Min. Operating Temperature = 0°C
Max. Operating Temperature = 50°C

• Wait for 5 minutes before opening the cover after the power is cut postoperation (for the discharging of DC capacitors).

Attention!

If the device is not connected in line with the specified rules, there is always the risk of mild and severe injury, death and material damage. Thus, all settings should be done by expert personnel paying ultimate attention to the security warnings and precautions.

Warranty Conditions

- Do not drop the device, expose it to frequent shock.
- Operate the device in a non-vibrating environment.
- Do not assemble the device near an electromagnetic radiation source.
- Ensure the cable connections of the device are correct and complete.
- Prevent any arc on the connection cables.
- Ensure the grid frequency is 47Hz-63Hz.
- Take additional precautions against stroke of lightning on the grid.
- Prevent instantaneous voltage fluctuations on the grid.
- Keep the grid voltage in the given range.

Note: The device will be out of warranty in any failure that will arise due to the reasons mentioned above.

General Features

- 2* 16 characters LCD screen.
- Power On / Running / General Error LEDs
- Assembly on the standard electrical motor with special apparatus
- Driving a total of 4 pumps with Hydrokon driver (1 master + 3 slaves)
- IP55 protection class
- Easy programming
- 120% loading for 60 seconds
- Operating temperature range between 0°C and 50°C
- Programmable start and stop ramps
- High and low voltage protection
- Short circuit protection on motor terminals
- Programmable sleep and wakeUp times (for the main pump)
- Programmable start and stop times (for the stand by pumps)
- Pump recognition
- Data transfer to building automation system through MODBUS via RS485 interface
- Operation with 1 unit of 4-20mA pressure transmitter in booster mode and 2 units of 4-20mA pressure transmitters in circulation mode
- Hydrokon frequency controler has a harmonics filter technology against harmful electrical stress.
- Hydrokon passed the tests which are in the scope of IEC 60204-1: 2006/AC 2010 standart succesfully.
- Hydrokon compliances 2006/42/AT directive and EN ISO 12100:2010 harmonics standart and it passed the tests succesfully.
- Relay dry contact outputs for pump in operation and fault status information
- In case of a master drive failure, the system continues to operate via the slave drives
- Up to 4 drives can operate simultaneously in booster systems, and up to 3 drives in circulation systems

Protections

• **Low Voltage Protection:** Low voltage fault appears on screen in case sUpply voltage is lower than %20 of nominal value

• **High Voltage Protection:** High voltage fault appears on screen in case sUpply voltage is higher than %20 of nominal value

• **Overheating Protection:** Overheating fault appears on screen in case the body temperature of device is higher than 80 °C

• **Phase Protection:** Phase fault appears in case there is a missing phase on three phase version of device

• **Short circuit protection:** Motor short circuit fault appears in case there is a short circuit on motor connections.

• **Protection against lack of water operation with float switch**

Electrical Assembly

- Cable thickness and fuse capacities should be selected according to the device input and output current values.
- Power sUpply line cables and cables that control inductive load such as relay windings must be aparted from each other and located vertically not horizontally. Control cables must be used isolated type.
- Earth connection of device should not be short-circuited with neutral line.

Mains Supply - Device Connection

• Ensure the power sUpply voltage and current are compatible with the device, and there are compatible circuit breakers between the mains and the device.

• Cut off the power on the mains before connecting the device.

• Connect the device by tightening the connectors well without leaving any naked cable or causing short circuits.

Caution! Never use the same cable conduit.

Driver – Motor Connection

- Driver and motor current values must be checked if they are compatible
- Any kind of fuse must not be located between driver and motor.
- Motor driver connections must be four wired and shielded and connected to U,V,W terminals of motor. In addition to this shield of cable must be connected to earth terminal of motor and driver. Total cable length can not exceed 25 m.

NOTE : Please refer to the technical specifications section of user manual for cable thickness.

Control Cables Connection

Shielded cable mut be used as control cables and shiled part must be grounded. (Please do not connect to neutral)

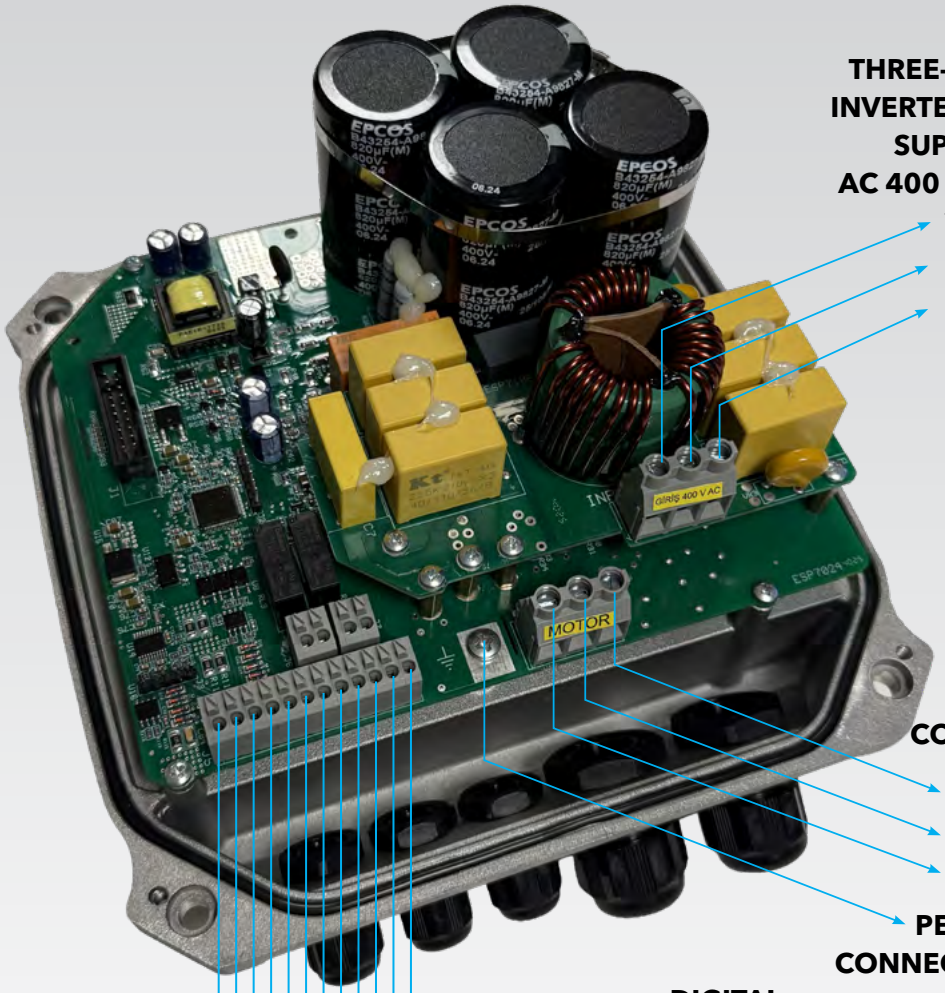
ATTENTION: Control cables, power sUpply and motor cables must be separated. **CAN NOT BE LOCATED** in the same cable channel.

Frequency Inverter Assembly

1 Take out the inverter from the box.
2 Check whether there is a physical damage.
3 Locate the inverter as aluminium side Up and balanced on the motor fan cover.
4 Take out the assembly clamps of the inverter.
5 Disassemble the Upper cover by unbolting the 4 bolts located on the corner of the cover.
6 Locate M5 x 50 mm sized screws on the inverter aluminium body.
7 Fix assembly clamps by screwing M5 x 50 mm screws.
8 Fix assembly clamps to motor fan cover.
9 Fix the inverter to the by screwing the assembly clamp screws. (M5 x 50 mm fixing screw heads must be inside of the screw slots otherwise Upper cover and gasket can not be located properly and the parts can not be sealed.
10 Disassemble the sealing component inside the cable glands and locate cables inside the glands.
11 Connect Transmitter, Floater and RS485 cables to spring terminals.
12 Connect motor cables including earth connection.
13 Connect power supply cables including earth connection.
14 Assemble Upper cover to aluminium bosy properly.
15 DO NOT switch on the power until Upper cover located properly.
16 Make sure that Upper cover is located properly.
17 Switch on the power sUpply .
18 Set the parameters according to the working condition.
19 The device will be on operation mode after leaving the set parameter mode.



Note: Device images may vary depending on the kW rating. They are provided for illustrative purposes only.


THREE-PHASE
INVERTER INPUT
SUPPLY
AC 400 V ±15%
T
S
R
MOTOR
CONNECTION
W
V
U
PE
CONNECTION
DIGITAL
CONNECTIONS
12) BMS Connection (-)
11) BMS Connection (+)
10) Transmitter 2 (+)
9) Transmitter 2 (-)
8) Contact – For external start
7) Contact – For external start
6) Transmitter 1 (+)
5) Transmitter 1 (-)
4) Floater
3) Floater
2) Internal Communication (-)
1) Internal Communication (+)

220 V AC (MONOPHASE) POWER-SUPPLIED INVERTER CONNECTION CHART



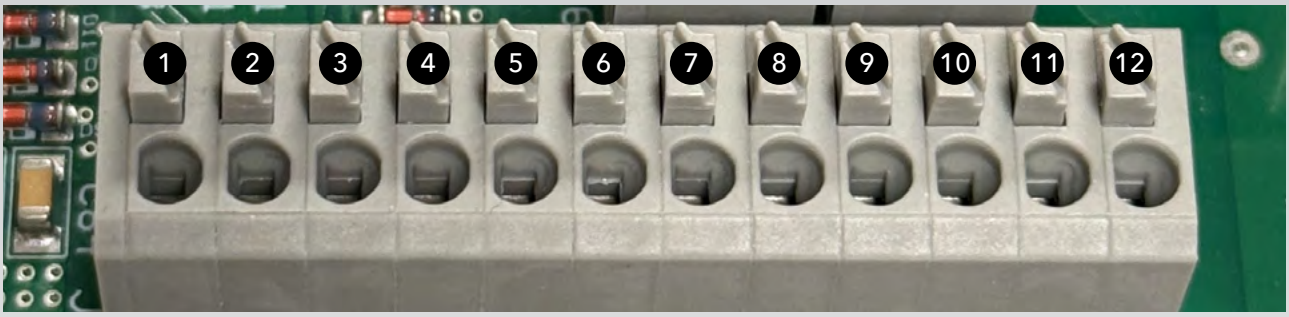
PE CONNECTION

MOTOR CONNECTION

W
V
U

SINGLE-PHASE INVERTER INPUT SUPPLY
AC 230 V ±15%

220 V
0 (NÖTR)



Connector No. 1 : RS485 communication (+) terminal
Connector No. 2 : RS485 communication (-) terminal
Connector No. 3 : 1. External contact tip (0v) GND.
Connector No. 4 : First external contact terminal (float switch)
Connector No. 5 : 1. Pressure sensor (4-20 mA) (-)
Connector No. 6 : 1. Pressure sensor (4-20 mA) (+)
Connector No. 7 : Second external contact terminal (0V) GND (external start)
Connector No. 8 : Second external contact terminal (external start)
Connector No. 9 : 2. Pressure sensor (4-20 mA) (-)
Connector No. 10 : 2. Pressure sensor (4-20 mA) (+)
Connector No. 11 : BMS Communication (RS485) (+)
Connector No. 12 : BMS Communication (RS485) (-)

Terminals 1-2 – RS485 Communication (Master/Slave)
Terminals 1 and 2 (RS485 + / -) are used for communication between devices in multi-drive systems. RS485 communication between the master and slave devices is established through these terminals.

Terminals 3-4 – 1st External Contact Input - Reserve Tank Float Input
A reserve tank level float switch is connected to terminals 3 and 4. In booster systems, the water level in the reserve tank is monitored through this input. If no float switch is used in the system (for example, in circulation systems), terminals 3 and 4 must be bridged.

Terminals 5-6 – 1st Pressure Transmitter Input
Terminals 5 and 6 are used for the connection of the 1st pressure transmitter. In booster systems, the 4-20 mA pressure transmitter used to measure the system pressure must be connected to these terminals. Observe the correct (+) and (-) polarity during connection.

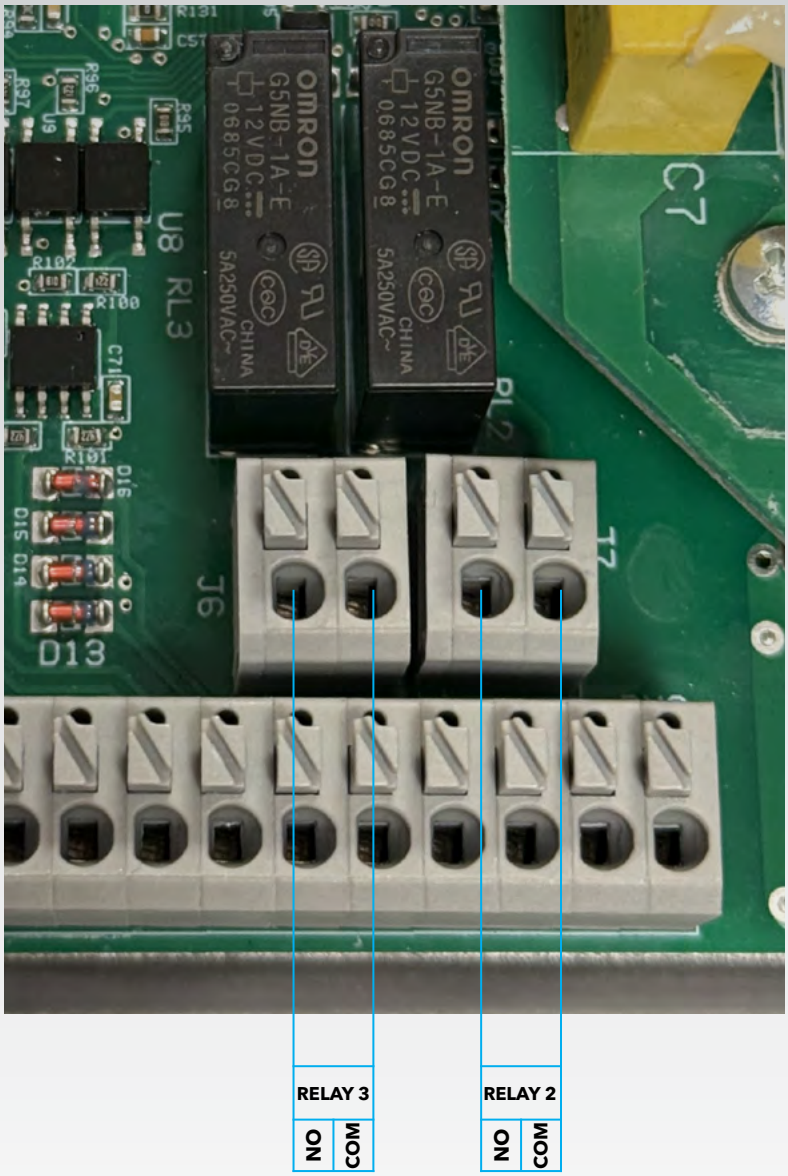
Terminals 7-8 – 2nd External Contact Input - External Start Input
Terminals 7 and 8 are used to provide an external start command in semi-automatic operating mode. When semi-automatic mode is active, bridging these terminals or closing them via an external contact causes the motor to start operating at the fixed frequency set in the menu.

This input is active only in semi-automatic operating mode. In semi-automatic mode, the reserve tank float input is disabled.

Terminals 9-10 – 2nd Pressure Transmitter Input
Terminals 9 and 10 are used for the connection of the 2nd pressure transmitter. In systems where a second pressure measurement is required, for example in circulation applications, the 2nd pressure transmitter must be connected to these terminals. Observe the correct (+) and (-) polarity during connection.

Terminals 11-12 – BMS RS485 Communication
Terminals 11 and 12 are used for RS485 communication between the device and a Building Management System (BMS) or an external automation system. Operating, status, and measurement data defined in the Modbus register table can be monitored through this communication interface.

RELAY CONNECTIONS



NO : Normally Open Contact
COM : Common Contact

RELAY 3 (RL3): Output active during operation (Drive Running).
RELAY 2 (RL2): Output active during fault (Drive Fault).

Sample Parameter Setting

Setting Booster Parameters

NOTE: These settings are for the Master device.

Enter the motor current to the parameter P0007. Enter the operating pressure to the parameter P0009 (Ex. 4.0 bar). Enter the maximum pressure of the pump to the parameter P0015. Or set parameter P0018 and exit the program. (Note: After turning off the valve in the delivery part (given that there are no expansion tanks between the valve and the pump), set the autoset parameter.)

NOTE: Parameters P0009 and P0015 are also must be set for slave devices same as master.

Setting Circulating Pump Parameters

Enter the differential pressure value of the system to the parameter P0009 (ΔP, ex. 1bar). Enter the maximum pressure of the pump to the parameter

1. STEP

Press **P** button and PASSWORD screen will be displayed.



2. STEP

Move indicator to the right using right arrow button (►).



3. STEP

Enter correct password by using Up (▲) and Down (▼) buttons. Approve password by using Left arrow button (◄). You can proceed to parameter settings if password is correct.



If the password is not correct, wrong password will be displayed on screen.
Repeat the steps from the beginning of step 2 until enter the correct password

WARNING: To exit the parameter menu, you must be on Parameter P0

4. STEP

P 1 Display Select ..... 0 - 3
[0]

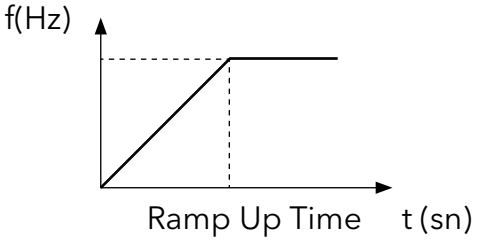
Display selection:
0 = Output Frequency (Hz)
1 = Motor current (A)
2 = DC bar voltage (V Dc)
3 = Device temperature (°C)



Press **P** button and enter correct password. Afterwards change **P0000_** value to **P0001_** by pressing Up and Down buttons. Move the cursor to right by pressing Right button. You can set the parameter while device is in operating mode by using Up and Down buttons and set by pressing left button. After completing parameter set, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 2 Ramp Up Time 0-10,0
(SECOND) [2,0]

This duration shows the time from total stop to maximum frequency set by parameter 6

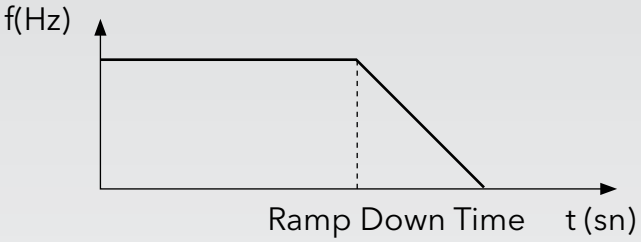




Press **P** button and enter the correct password. Change **P0000_** value to **P0002_** by using Up and Down buttons. Move the cursor to right by using right button and increase or decrease the parameter value by using Up and Down buttons, set the parameter by using left button and leave parameter, after completing parameter set, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 3 Ramp Down Time 0-10,0
[2,0]

This time represents the duration from maximum frequency set by parameter 6 to total stop.





Press **P** button and enter the correct password. Change **P0000_** value to **P0003_** by using Up and Down buttons. Move the cursor to right by using right button and increase or decrease the parameter value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 4 Manual Operation .....15,0 - 50,0
Start frequency (Hz) [15,0]

Manual Operation start frequency value

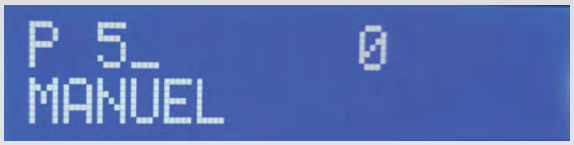


Press **P** button and enter the correct password. Change **P0000_** value to **P0004_** by using Up and Down buttons. Move the cursor to right by using right button and increase or decrease the parameter value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 5 Operation Mode ..... 0 – 3
0 = Manuel
1 = Automatic
2 = Semi Automatic
3 = Fully Automatic

0= Manual Operation Mode:

In manual operation mode, the motor runs at the maximum frequency set in the menu. If the operating mode is set to manual, pressing the left arrow button starts the motor, while pressing the right arrow button stops it.



1 = Automatic Operation Mode:

In automatic mode, the system operates by comparing the line pressure measured via the pressure transmitter with the preset pressure. In booster systems, float switches must be connected to Connectors No. 3 and 4. When the water level in the tank drops, the motor stops. In circulation systems, Connectors No. 3 and 4 must either be short-circuited or connected to a remote automation system for control.



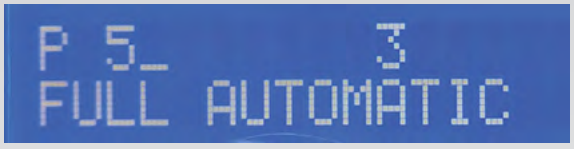
2 = Semi-Automatic Operation Mode:

If the pressure transmitter fails or in similar cases, the system can be operated via a pressure switch by switching to semi-automatic mode. In this mode, a pressure switch can be connected to Connectors No. 7 and 8. When these connectors are short-circuited, the motor runs at the maximum frequency set in the menu; when they are open, the motor stops. In this mode, the float switch is deactivated, so the system should not be operated in this mode for extended periods except in emergencies.



3 = Fully Automatic Operation Mode:

This mode is designed for multi-pump and multi-drive systems. Operation is controlled via pressure transmitters. All drives must be set to fully automatic mode, interconnected with internal communication cables, and assigned communication addresses sequentially.
If the master drive fails and all devices are connected to pressure transmitters, the system automatically continues operation through the slave drives.



If Parameter **5** is set to **FULLY AUTOMATIC mode (3),** each pump can temporarily become the Master when needed (i.e., when no Master is present in the system) and continue operating. Once the actual Master device re-joins the system, the temporary **Master** reverts to its previously defined role as configured in Parameter **P31**.

For the system to operate correctly in this mode, all settings configured on the Master device (such as pump pressure, operating pressure, etc.) must also be set identically on all other devices in the system (Master, Slave 1, Slave 2, Slave 3, etc.).

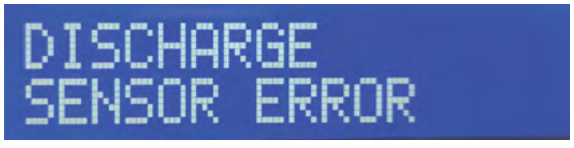
Each device must have its own connections for a pressure **transmitter, float** switch, and communication cable. The display on each device shows the pressure value received from its own transmitter. If the transmitter of the Master device fails, it will automatically switch to a functioning transmitter from another unit in sequence (Slave 1, Slave 2, Slave 3).

While the system is running, each device monitors its connected **transmitter and float** switch. If a fault occurs, it will be displayed on the device's screen; however, the device will remain in standby mode, ready to operate within the system.

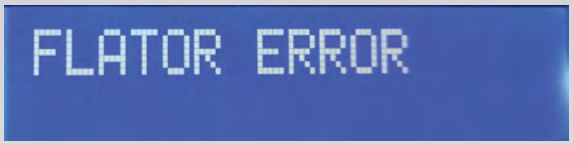
If the system is stopped and there is a sensor fault,
"(Outlet Sensor Error)" is displayed on the screen.



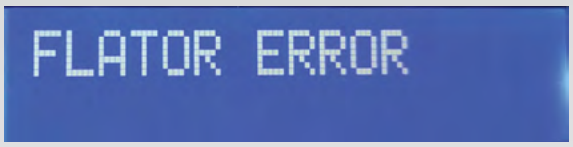
If the system is running and a sensor fault occurs,
"(Outlet Sensor Error)" is displayed on the screen. The operation (RUN) continues.



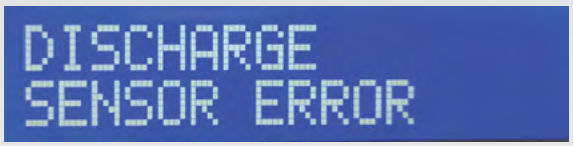
If the system is stopped and a float switch fault occurs,
"(Float Switch Error)" is displayed on the screen.

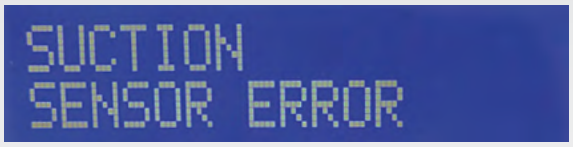


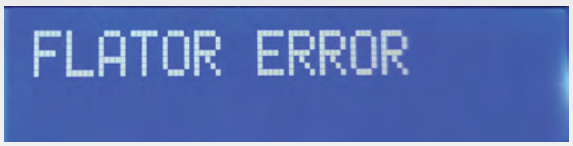
If the system is running and a float switch fault occurs, "(Float Switch Error)" is displayed on the screen. The operation (RUN) continues.



If the devices are in circulation mode, both sensors are checked. In case of a fault, the following messages are displayed on the screen in order: Outlet Sensor Fault, Inlet Sensor Fault, Float Switch Fault.

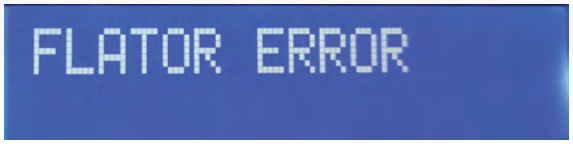






If the system is running and a sensor or float switch fault occurs, the corresponding error messages are displayed on the screen. The operation (RUN) continues.





If all sensors in the system are faulty, "Sensor Fault" is displayed on the Master device screen, and all devices in the system stop. The system remains in standby until the faults are resolved.

If all float switches in the system are faulty, "Float Switch Fault" is displayed on the Master device screen, and all devices in the system stop. The system remains in standby until the faults are resolved.

P6 Motor frequency (Hz) ..... 50.0 - 60.0
[50.0]

Enter the frequency value written on the motor label. (Hz)



Press **P** button and enter the correct password. Change **P0000_** value to **P0006_** by using Up and Down buttons. Move the cursor to right by using right button and increase or decrease frequency value to the same value written on motor label by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 7 Motor Current ..... 0 - 8

When the inverter works with a smaller capacity motor, this parameter should be set to motor label value.On other conditions, not necessary.



Press **P** button and enter the correct password. Change **P0000_** value to **P0007_** by using Up and Down buttons. Move the cursor to right by using right button and increase or decrease current value to the same value written on motor label by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 8 Transmitter Pressure ..... 0,1 - 100,0
(Bar) [16,0]
Transmiitter in the system pressure value (bar)



Press **P** button and enter the correct password. Change **P0000_** value to **P0008_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the maximum transmitter value same as the transmitter available on the system by using Up and Down, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 9 Operating Pressure ..... 0,1 - 100,0
(Bar) [3,0]



System operating pressure value (bar) in Automatic Mode, Differential pressure (Δp) in Circulation Systems. Press P button and enter the correct password. Change **P0000_** value to **P0009_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the operating pressure value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 10 Diff. Pressure ..... 0,1 - 3,0
(Bar) [0,5]
Hysteresis value of set pressure for operation and stop



Press **P** button and enter the correct password. Change **P0000_** value to **P0010_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the hysteresis value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 11 Stop Delay ..... 0,1 - 30,0 Sec) [30,0]
Time delay to stop when the system reaches set pressure



Press **P** button and enter the correct password. Change **P0000_** value to **P0011_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the stop delay value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 12 Minimum motor .....0 - 60,0 frequency (Hz) [15,0]
Indicates minimum motor frequency value (Hz).



Press **P** button and enter the correct password. Change **P0000_** value to **P0012_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the motor minimum frequency value by using Up and Down buttons ,set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button. (This frequency is calculated automatically in automatic operation mode.)

P 13 Maximum motor .....0 - 60,0 frequency (Hz) [50,0]
Indicates maximum frequency output of the inverter (Hz)



Press **P** button and enter the correct password. Change **P0000_** value to **P0013_** by using Up and Down buttons. Move the cursor to right by using right button and adjust maximum frequency value by using Up and Down buttons, set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 14 Factory Settings .....0 – 1



Press **P** button and enter the correct password. Change **P0000_** value to **P0014_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the parameter by using Up and Down buttons (Y). Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 15 Automatic Pump Pressure .....0 – 1
Maximum pump pressure is entered manually or inverter calculates this value in automatic mode by itself and saves.



Press **P** button and enter the correct password. Change **P0000_** value to **P0015_** by using Up and Down buttons. Move the cursor to right by using right button and adjust maximum pump pressure value by using Up and Down buttons, set the parameter by using left button and leave parameter set mode by pressing **P** button or you can activate **P0018** parameter and inverter calculates this parameter automatically.

P 16 Operation according to motor ..... 1 – 2
[2]

1) Normal operation
2) Pump operation



Press **P** button and enter the correct password. Change **P0000_** value to **P0016_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the parameter by using Up and Down buttons (Pump). Set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 17 Language Selection ..... 0 - 1
[0]

1) Turkish
2) English



Press **P** button and enter the correct password. Change **P0000_** value to **P0017_** by using Up and Down buttons. Move the cursor to right by using right button and adjust the language setting by using Up and Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing **P** button

P 18 Automatic test ..... 0 - 1
[0]

Inverter runs motor and saves parameters automatically when this parameter is set to 1.



Press **P** button and enter the correct password. Change **P0000_** value to **P0018_** by using Up and Down buttons. Move the cursor to right by using right button and adjust parameter to 1 Set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button Inverter runs motor and sets pump parameters automatically.
Attention: Please set this parameter after closing the valve on discharge line (Expansion tank must not be available between valve and pump).

P 19 Slave inverter .....0 - 60,0
Start delay time (Sec) [5,0]

Start delay time for slave pumps on multiple inverter applications.



Press **P** button and enter the correct password. Change **P0000_** value to **P0019_** by using Up and Down buttons. Move the cursor to right by using right button and adjust parameter by using Up and Down buttons. Set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 20 Slave inverter..... 0 – 60,0
Stop delay time (Sec) [5,0]
Stop delay time for slave pumps on multiple inverter applications.



Press **P** button and enter the correct password. Change **P0000_** value to **P0020_** by using Up and Down buttons. Move the cursor to right by using right button and adjust parameter by using Up and Down buttons. Set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 21 Min frequency hysteresis 0-10,0
Frequency [1,0]
Inverter minimum frequency value when the system reaches set pressure.
Min frequency + Hysteresis



Press **P** button and enter the correct password. Change **P0000_** value to **P0021_** by using Up and Down buttons. Move the cursor to right by using right button and adjust hysteresis parameter by using Up and Down buttons. Set the parameter by using left button, Press Down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 22 Pump Type ..... 1 - 2
[2]
1) Booster
2) Circulation



Press **P** button and enter the correct password. Change **P0000_** value to **P0022_** by using Up and Down buttons. Move the cursor to right by using right button and adjust pump type parameter by using Up and Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing **P** button.

P 23 BMS BMS Communication Address ..... 1 - 255
[1]

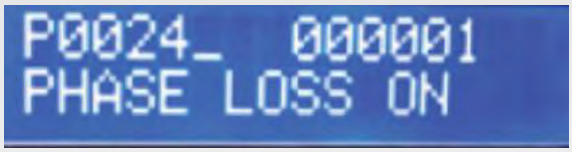
Master inverter address is set by this parameter in Building Management Systems.



Press P button and enter the correct password. Change P0000_ value to P0023_ by using Up and Down buttons. Move the cursor to right by using right button and adjust building management system communication address parameter by using Up and Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing P button.

P 24 Phase fault ..... 0 - 1
[1]

Phase protection is ON, in case there is phase loss on input, the inverter protects itself and motor and phase fault written on display



Press P button and enter the correct password. Change P0000_ value to P0024_ by using Up and Down buttons. Move the cursor to right by using right button and adjust phase protection parameter by using Up and Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing P button. Inverter can not protect itself and motor in case this protection is inactive.

P 25 Operating Hours (h)

Indicates inverter total operating hours information (just readable)



P 27 Total duration on power (h)
Indicates inverter total duration on power (just readable)



P 29 Number of Start
Indicates inverter total number of start-Up information (just readable)

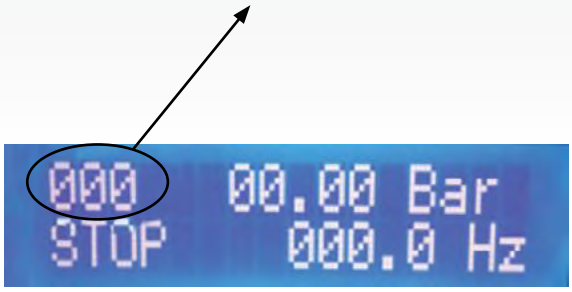


P 31 Inverter Operation Condition..... 0-3
Press P button and enter the correct password. Change P0000_ value to P0031_ by using Up and Down buttons. Move the cursor to right by using right button and adjust master and slave selection parameter by using Up and Down buttons. Press down button until reach to P0 and leave parameter set mode by pressing P button.

0- Master
1- Slave1
2- Slave2
3- Slave3



Inverter Operation Condition Indicator on Internal Communication Line



P 32 Lack of Water
This parameter used to protect the system aginst lack of water. This parameter block the system if there is no increase of 0.1 bar in the pressure value during 99 seconds after the engine has started the system blocks itself.



To disable this parameter; Press **P** button and enter the correct password. Change **P0000_** value to **P0032_** byusing Up and Down buttons. Move the cursor to right by using right button and set this parameter to 0 by using Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing **P** button Inverter can not protect itself and motor in case this protection is inactive.

NOTE: In transfer pump and garden irrigation booster applications, this parameter must be set to '0'.

P33 Low Current Limit
This parameter is used to set the percentage current value for dry-run protection of the pump. To modify this parameter when necessary:

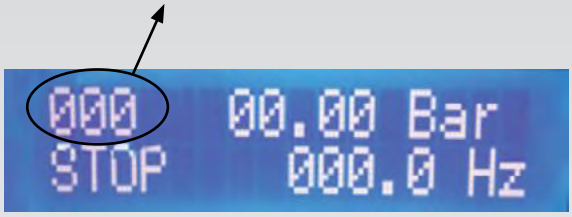


To change this parameter; Press **P** button and enter the correct password. Change **P0000_** value to **P0033_** byusing Up and Down buttons. Move the cursor to right by using right button and set this parameter to desigre percentege value by using Up or Down buttons. Set the parameter by using left button, Press down button until reach to P0 and leave parameter set mode by pressing **P** button.

BOOSTER

In the system, one device is set as Master and the others as Slaves (Slave 1, Slave 2, Slave 3). Sensor and float switch connections, as well as parameter settings (such as motor pressure, operating pressure, etc.), are configured on the Master device. All devices in the line must have Parameter P5 set to Automatic and Parameter P22 set to Booster mode. A communication cable must be connected between the Master device and the Slave devices.

Status indicator of devices on the internal communication line



Operating time is displayed in hours. The device with the least operating hours is activated first. Subsequently, the other devices are activated in order of increasing operating hours. In this system, the difference in operating hours between devices is 1 hour. Until the hours are equalized, the device with fewer hours will be activated first. Once the operating pressure set in Parameter P9 is reached, the devices stop in the reverse order—starting with the one with the most operating hours.

CIRCULATION

In the system, one device is set as Master and the others as Slaves (Slave 1, Slave 2). Sensor and float switch connections, as well as parameter settings (such as motor pressure, operating pressure, etc.), are configured on the Master device. All devices in the system must have Parameter P5 set to Automatic and Parameter P22 set to Circulation mode. A communication cable must be connected between the Master and Slave devices.

If the system is configured as 1 main + 1 standby, one device is set as Master and the other as Slave. If the operating hours are equal, the Master device starts first and the Slave remains on standby. Once a 24-hour difference in runtime is reached, the device with more hours stops, and the one with fewer hours starts. In this way, the devices alternate every 24 hours.

If the system is configured as 2+1 (2 main + 1 standby), the two devices with the lowest operating hours start and run together, while the third device remains on standby. When a 24-hour difference is reached, the device with the highest operating hours stops, and the standby device starts. In this cycle, two devices operate while one remains as a standby backup.

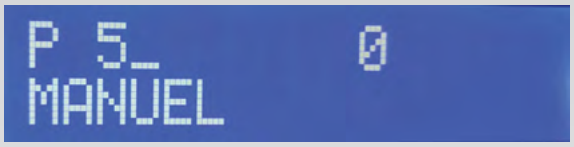
ERRORS	CAUSE	SOLUTION
Motor Short-Circuit	"Motor terminals are not connected properly. Increase the start ramp (P2). Short circuit on motor terminals. Motor burst. Output module failed."	"Check the motor connections. Check the motor cable. Check the motor. Send the inverter to the service."
Low Temperature	Inverter cooler temperature is lower than -10°C.	"Wait for the inverter cooler temperature to exceed -10°C."
High Temperature	Inverter cooler temperature is higher than 85°C.	Inverter operating environment should not be higher than 50°C. Ventilate properly.
Overload	"Motor current ran more than 60 seconds in 100-120% range."	Check pump stuck.
Overcurrent	"Motor current exceeded 120% and didn't fall Down for 3 seconds."	Check pump stuck. Increase the start ramp (P2).
Low Voltage	Inverter sUpply voltage is 15% below the nominal voltage (Nominal voltage: 380V or 220V depending on the device model).	Ensure the inverter sUpply voltage is within the operating range.
High Voltage	Inverter sUpply voltage is 15% above the nominal voltage (Nominal voltage: 380V or 220V depending on the device model). Regeneration effect	"Ensure the inverter sUpply voltage is within the operating range. Increase the inverter stop ramp (P3)."
Phase Error	Valid for triphase devices. One of the phases is cut or below the operating values.	"Check the inverter sUpply phases. Check inverter cables for any looseness."
Floater Error (No Water)	Floater connector contact is open.	Ensure there is enough water in the tank. Check the floater and connections.
Suction Sensor Error	Valid for circulation pumps. Suction sensor (Transmitter 2) connection is not detected by the inverter.	Check the Transmitter 2 connection. Terminals are reverse. Transmitter is broken.
Discharge Sensor Error	Discharge sensor (Transmitter 1) connection is not detected by the inverter.	Check the Transmitter 1 connection. Terminals are reverse. Transmitter 1 is broken. Send the inverter to the service.
Insufficient Capacity	Pump capacity is not enough.	Check the pump capacity. Check P9 and P15. If the value of P9 is larger than the value of P15, then capacity warning is triggered.
Installation Leak	There is a leak in the inverter installation.	Check the installation. Initial operation of the system while there is no water. Reset the system and rerun.

Communication System = RS485
Communication protocol = MODBUS 8 NONE 1 ASCII
Communication speeed = 9600 Baud
Communication distance = 1000 metre

ADRES (Hex)	EXPLANATION	PARAMETER
0x1100	System Pressure	400 (4 Bar)
0x2000	Master Inverter connected to System	1 = Connected 0 = Not connected
0x2001	Master Inverter Operation	1 = Operating 0 = Not operating
0x2002	Master Inverter Frequency (Hz).	500 (i.e.)
0x2003	Master Inverter Fault.	10,20,21,24,25,26,27,28,30,40,50,60,61,62
0x2004	Master Inverter Operating hours	1250 (i.e.)
0x2005	Master Inverter Operating days	650 (i.e.)
0x2010	Slave_1 Inverter connected to System	1 = Connected 0 = Not connected
0x2011	Slave_1 Inverter Operation.	1 = Operating 0 = Not operating
0x2012	Slave_1 Inverter Frequency (Hz).	500 (i.e.)
0x2013	Slave_1 Inverter Fault.	10,20,21,24,25,26,27,28,30,40,50,60,61,62
0x2014	Slave_1 Inverter Operating hours.	1250 (i.e.)
0x2015	Slave_1 Inverter Operating days.	650 (i.e.)
0x2020	Slave_2 Inverter connected to System	1 = Connected 0 = Not connected
0x2021	Slave_2 Inverter Operation.	1 = Operating 0 = Not operating
0x2022	Slave_2 Inverter Frequency (Hz).	500 (i.e.)
0x2023	Slave_2 Inverter Fault.	10,20,21,24,25,26,27,28,30,40,50,60,61,62
0x2024	Slave_2 Inverter Operating hours.	1250 (i.e.)
0x2025	Slave_2 Inverter Operating days.	650 (i.e.)
0x2030	Slave_3 Inverter connected to System	1 = Connected 0 = Not connected
0x2031	Slave_3 Inverter Operation.	1 = Operating 0 = Not operating
0x2032	Slave_3 Inverter Frequency (Hz).	500 (i.e.)
0x2033	Slave_3 Inverter Fault.	10,20,21,24,25,26,27,28,30,40,50,60,61,62
0x2034	Slave_3 Inverter Operating hours.	1250 (i.e.)
0x2035	Slave_3 Inverter Operating days.	650 (i.e.)
0x2006	Inverter speed value	15.0 Hz - 50.0 Hz
0x2007	Inverter Start-Stop	(Start = 1 - Stop = 0)

Modbus ASCII

To send Start-Stop commands and speed values to the device via Modbus, the device must be set to MANUAL mode (Parameter P5 = Manual). The BMS address (Parameter P23) must also be configured (range: 1–127).



Modbus Error Codes

1 = FOC operation time error
2 = Overvoltage error
4 = Undervoltage error
8 = Overtemperature error
21 = Phase error (for three-phase devices)
22 = Motor phase error
24 = Undercurrent error
25 = Installation leakage
26 = Outlet sensor error
27 = Inlet sensor error
28 = Float switch error (No water)
40 = Overcurrent
50 = Overload
64 = Overcurrent (Motor short circuit)
128 = Software error

MASTER SCREEN CODES

These indicator codes are only displayed on the screen of the device selected as MASTER.

MASTER SCREEN	
INDICATOR CODE	**DESCRIPTION**
100	Only Slave 1 Enabled
010	Only Slave 2 Enabled
001	Only Slave 3 Enabled
110	Slave1 and Slave 2 Enabled
101	Slave1 and Slave 3 Enabled
011	Slave 2 and Slave 3 Enabled
111	Slave 1, Slave 2 and Slave 3 Enabled
000	Only MASTER Enabled
111	If the display of more than one device on the line shows (111), it means that more than one MASTER has been set on the line. (Incorrect selection. Only 1 MASTER can be selected on the line.)

Fault Codes

10 = Motor Short Circuit
20 = Low Voltage
21 = Faz Fault (for three phase inverters)
24 = Insufficient Capacity
25 = Water Leakage
26 = Output Sensor Fault
27 = Suction Sensor Fault
28 = Floater Fault (No water)
30 = High Voltage
40 = Over Current
50 = Overload
60 = Temperature Fault
61 = High Temperature Fault
62 = Low Temperature Fault

THREE PHASE INVERTERS								
Input Voltage Range		**AC 400 V ± %15**						
Input Voltage Range		**1,1 kW**	**1,5 kW**	**2,2 kW**	**3 kW**	**4 kW**	**5,5 kW**	**7,5 kW**
Motor output power		2,22 kVA	2,91 VA	4,10 kVA	5,36 kVA	7,26 kVA	9,31 kVA	12,6 kVA
Continuous Output		2,8	3,7	5,2	6,8	9,2	11,8	17
Output Current (nominal)(A)		3,08	4,07	5,72	7,48	10,12	12,98	18,5
"Output Current (max. continuous) (A)"		3,7	4,9	5,9	10	12,5	16	25
Input current (A)		10		16		20		32
Recommended Cable Diameter (mm^2)	Input	1,5			2,5			4
	Output	1,5				2,5		4
Dimensions (mm) (w x l x d)		200 X 200 X 127						
Weight (kg)		2,5						

Input Voltage Range	**AC 230 V ± %15**		
Motor Output Power	**1,1 kW**	**1,5 kW**	**2,2 kW**
Continuous Output	2,22 kVA	2,91 kVA	4,10 kVA
Output Current (Nominal) (A)	5,0	6,5	9,2
Output Current (Max. Continuous) (A)	6,0	7,5	10,5
Input Current (A)	7,0	9.1	12,5
Recommended Input Fuse (A)	16	16	16
Recommended Cable Cross-Section (mm^2)	1,5	1,5	2,5
Output	1,5	1,5	2,5
Dimensions (mm) (H x W x D)	200 X 200 X 127		
Weight (kg)	2,5		

NOTES

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ETNA®

Dudullu Organize Sanayi Bölgesi 2. Cadde No: 14
34775 Ümraniye İstanbul / Turkey
Tel : +90 216 561 47 74 (Pbx) • Fax : +90 216 561 47 50
www.etna.com.tr/en • info@etna.com.tr