EBARA

E-SPD+

Speed Driver

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EN

INDEX

1 - PRESENTATION

The following product is an electronic device for the control and protection of pump systems according to the frequency of the pump's power supply. The inverter can be connected to any pump to manage its operation and maintain a constant pressure. In this way, the pump or pump system is only activated when needed, avoiding unnecessary waste of energy and prolonging its useful life.

The following symbol has been used in this instruction booklet:

Risk of harm to people or property.

2 - INSTRUCTIONS

Before installing and using the product:

- Carefully read the whole of this manual before using the device for the first time and keep it for future reference.

The user must strictly observe the accident prevention regulations in force in their respective country. Check at the time of receipt of the product that there is no damage to the product and/or missing components. If so, report to the supplier immediately.

- Check that the data indicated on the plate is what is required and appropriate for the installation, and in particular that the nominal current of the motor is compatible with the data indicated on the specifications plate of the frequency inverter.

- The installation and maintenance must be carried out solely and exclusively by authorised personnel, responsible for making the electrical connections in accordance with the current safety regulations.

- The Inverter converter must not be used by people with reduced physical, sensory or mental capabilities, or without the due experience or knowledge, except if a person responsible for their safety has explained the instructions and supervised their operation of their Inverter.

- Do not let children play with the Inverter.

- Do not use the product in a manner other than that specified in the following instruction manual.

- The manufacturer accepts no liability for damage caused by improper use of the product and shall not be held responsible for damage caused by maintenance or repairs carried out by unqualified or unauthorized staff and/or with non-original replacement parts.

3 - TECHNICAL DATA

Nominal values:

	Units	E-SPD+ MT 2200	E-SPD+ TT 4000	E-SPD+ TT 11000
Power supply voltage	**V**	220-240V Single phase	400V Three phase	400V Three phase
Motor Voltage	**V**	230V Three phase	400V Three phase	400V Three phase
Working frequency	**Hz**	50/60	50/60	50/60
Maximum current at frequency converter output	**A**	11	11	30
Maximum current at frequency converter input	**A**	20	12	31
Maximum motor rated power output	**kW**	2,2	4	11
Range of apparent output power	**kVA**	3,3	5,4	14,1
Efficiency level		--	96,73% (50Hz) - 97,61% (60 Hz)	97,64% (50Hz) - 97,66% (60 Hz)
Protection rating		IP 55*	IP 55*	IP 55*
Protection degree		2	2	2
Type of action		2B	2B	2B
Operation		S1	S1	S1
Grounding systems distribution		IT, TN-C, TN-S TT	IT, TN-C, TN-S TT	IT, TN-C, TN-S TT

*The auxiliary fan supplied for wall mounting has a protection rating of IP54

Limits of use:

- Minimum ambient temperature: -10ºC
- Maximum ambient temperature: +40ºC
- Variation in the supply voltage: +/- 10%
- Humidity range: 5% to 95% without condensation and vapour
- Maximum altitude: 2.000 meters

Eco-Design:

	Stand-by Loss	Load Point								IE Class
		25;25	25;50	25;100	50;25	50;50	50;100	90;50	90;100	
	(W)	Relative Loss [%] *1)2)3)								
E-SPD+ TT 4000	6,13	90,50	92,96	91,62	93,32	96,14	84,76	97,61	96,73	IE2
E-SPD+ TT 11000	9,03	88,59	93,73	93,68	96,83	95,98	96,39	97,66	97,64	IE2

	Units	E-SPD+ TT 4000	E-SPD+ TT 11000
Power Supply Voltage	**V**	400	400
Supply Frequency	**Hz**	50/60	50/60
Maximum current IP	**A**	12	31
Motor Voltage	**V**	400 3Ph	400 3Ph
Rated Output Current	**A**	11	30
Maximum Current OP	**A**	11	30
Apparent Output Power	**(kVA)**	7,6	20,8
Recommended Motor Power	**(kW)**	4	11

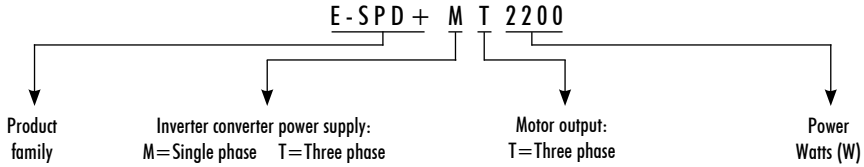
Note:

1) Loss values were determined at 4 kHz switching frequency.

2) Loss values include +10% of supplement in IEC 61800-9-2.

3) Relative losses in relation to the device rated apparent power.

4 - PRODUCT IDENTIFICATION



5 - SIZE AND WEIGHT

	Dimensions		Volume		Weight	
	Speed Drive	Packaging	Speed Drive	Packaging	Speed Drive	Packaging
E-SPD+ MT 2200	230x183x149	330x230x170	0,0063 m^3	0,013 m^3	2,8 Kg	3,5 Kg
E-SPD+ TT 4000	230x183x149	330x230x170	0,0063 m^3	0,013 m^3	2,8 Kg	3,5 Kg
E-SPD+ TT 11000	316x276x198	330x295x210	0,017 m^3	0,020 m^3	6,4 Kg	7,1 Kg

6 - STORAGE

The product must be stored in a covered and dry place, away from sources of heat and protected from dirt and vibrations, moisture, heat sources and possible mechanical damage. Do not place heavy objects on top of the packaging.

7 - INSTALLATION AND ASSEMBLY

Before installing the inverter, carefully read the whole of this manual and consult the safety regulations in force in the country in which it will be used.

The installation must be carried out by a qualified technician.

a) Installation of the inverter:

- It must be installed in a well ventilated area, protected from damp and direct exposure to the sun and rain.

- Before making the electrical connections, ensure the cable used to provide power to the Inverter is not live.

- Carefully verify the electrical data indicated in the specifications plate of the Inverter before connecting the electric current.

- The electric power cables to the Inverter, and from the Inverter to the pump, must be of the correct size for the nominal consumption of the motor and the length of cable required, according to the regulations in force in the

country in question. A table with the maximum recommended lengths according to the cross-section of the electrical cable can be found below.

	Section of frequency converter input (mm^2)			Section of frequency converter output (mm^2)		
	1,5	2,5	4	1,5	2,5	4
	Maximum distance (meters)			Maximum distance (meters)		
E-SPD+ MT 2200	8	19	35	12	28	51
E-SPD+ TT 4000	46	76	120	49	81	134
E-SPD+ TT 11000	-	38	61	-	40	64

- Each interface cable length for communication and/or pressure transducer should be shorter than 3 meters.

- Use the appropriate cable glands to attach the cable.

- Also ensure that the grid has electrical protection; a high-sensitivity dedicated differential switch (30 mA, class A for domestic applications, Class B for industrial applications) is particularly recommended.

⚠ The type B should be installed for all the residual current-operated protective or monitoring from an inverter up to the supply voltage.

- In addition to the differential switch, it is advisable to install magneto thermal protection and a voltage disconnect switch to control the power supply to each Inverter individually.

⚠ Ground cable must be connected properly. If the ground cable is not connected, there is an increased risk of electric shock or fire.

- Use recommended circuit breakers on the supply side as a protection in case of a component failure inside the inverter. Recommended circuit breaker size are as follows:

Voltage Supply	E-SPD+ Model	Circuit breaker size
1~ 230 Vac	MT 2200	20 A
3~ 400 Vac	TT 4000	16 A
3~ 400 Vac	TT 11000	32 A

b) Installation of pressure units with an inverter:

- The multiple pump units must always consist of pumps that are the same and that, therefore, have the same power and hydraulic performance. Failure to comply with this point can cause the pump system to malfunction.

- For the Inverter to work, it is essential to use a pressure transducer (4-20 mA).

- The location of the pressure transducer must always be as close as possible to the pump unit, as close as possible to the pressure tank, and always after the non-return valve of the pump unit. It is essential to install a general cut-off valve for the pump unit, after the physical location of the pressure transducer.

- If there is more than one pressure transducer in a multiple pump unit (more than one Inverter with a pressure

transducer connected), the network of interconnected Inverters will decide automatically, and with prior reliability tests of the readings of the existing transducers, which is the transducer that will be used as the general pressure sensor for the whole group.

- If the designated transducer functions erroneously, (indicated on the display with *) the set of Inverters will decide to automatically change the principal transducer for another that provides more precise readings. The rest of the transducers will remain on standby ready to be used when required.

c) Installation on a motor:

- Replace the cover of the motor terminal box with the motor support adapter (parts 5 and 11a) provided.

- Screw the metal radiator to the motor support adapter with the help of the 2 screws provided for this purpose (parts 9 and 11b).

-Tighten the appropriate cable glands to guarantee the declared protection rating (part 10).

- Carry out the electrical connections between the power circuit and the motor using the electric cables supplied (item 6).

- Connect the power circuit to the cover + control circuit (part 1) using the flat cable.

- Screw the assembly together (part 13).

d) Installation on a wall bracket:

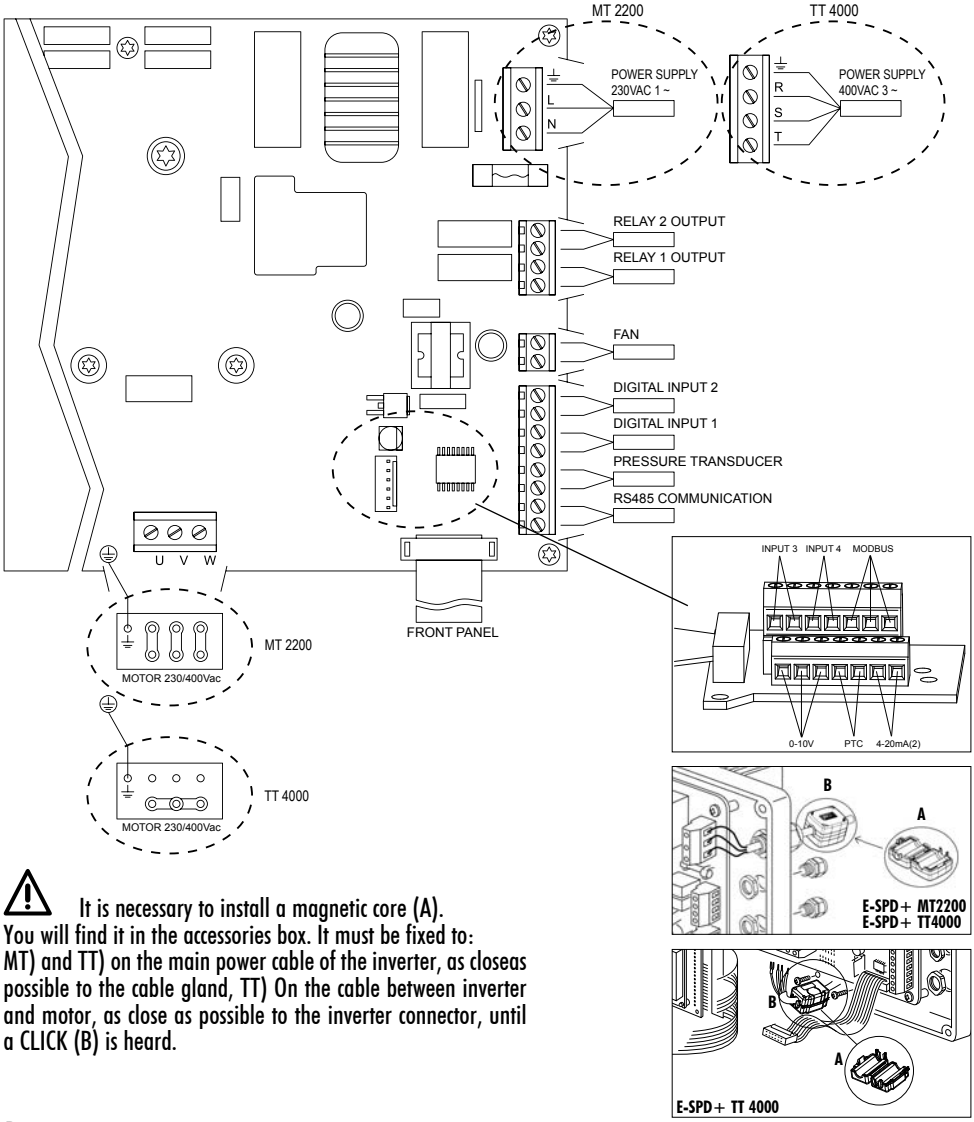
- Fix the wall bracket to the wall through the 3 rear holes of the wall bracket (part 7).

- Place the fan at the base of the wall bracket, ensuring upwards airflow (part 8).

- Place the inverter assembly inside the wall bracket, ensuring that the 2 ends of the metal radiator are inside the wall bracket.

- Fix the inverter to the wall bracket using the 2 side screws drilled into the metal radiator (part 14).

8 - ELECTRICAL CONNECTIONS

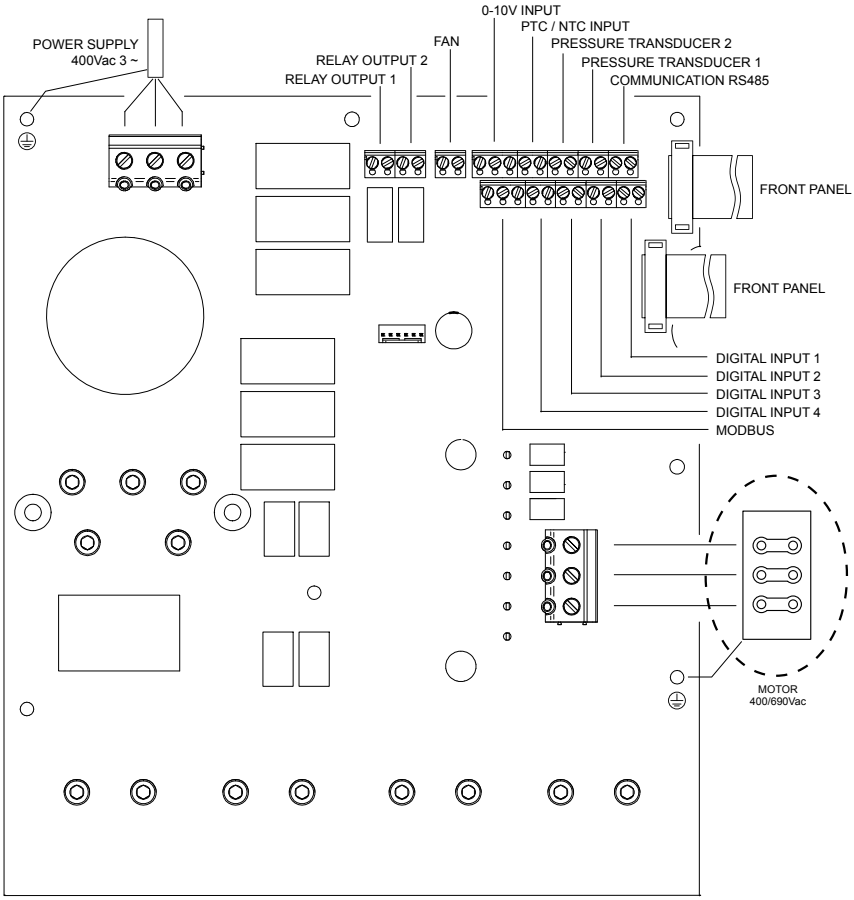


⚠ It is necessary to install a magnetic core (A).
You will find it in the accessories box. It must be fixed to:
MT) and TT) on the main power cable of the inverter, as closeas possible to the cable gland, TT) On the cable between inverter and motor, as close as possible to the inverter connector, until a CLICK (B) is heard.

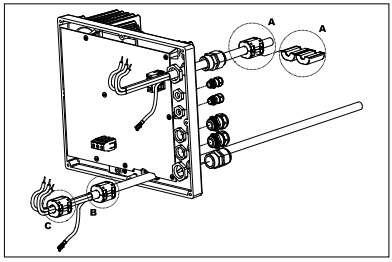
Power connections

Model	Power supply	Motor
E-SPD+ MT2200	Single phase 230 V	Three-phase 230 Vac (DELTA connection*)
E-SPD+ TT4000	Three-phase 400 V	Three-phase 400 Vac (STAR connection*)

*For 230/400 V motors



⚠ It is necessary to install the magnetic cores (A, B and C). You will find them in the accessory box.
In the power cable of the frequency converter, one will be installed on the outside, as close as possible to the cable gland (A).
In the cable between the frequency converter and the motor, one must be installed that groups all the cables (B) and another that only groups the 3 phases without the ground (C).

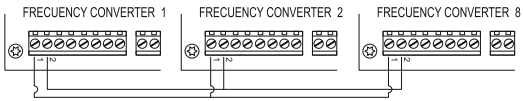


Power connections

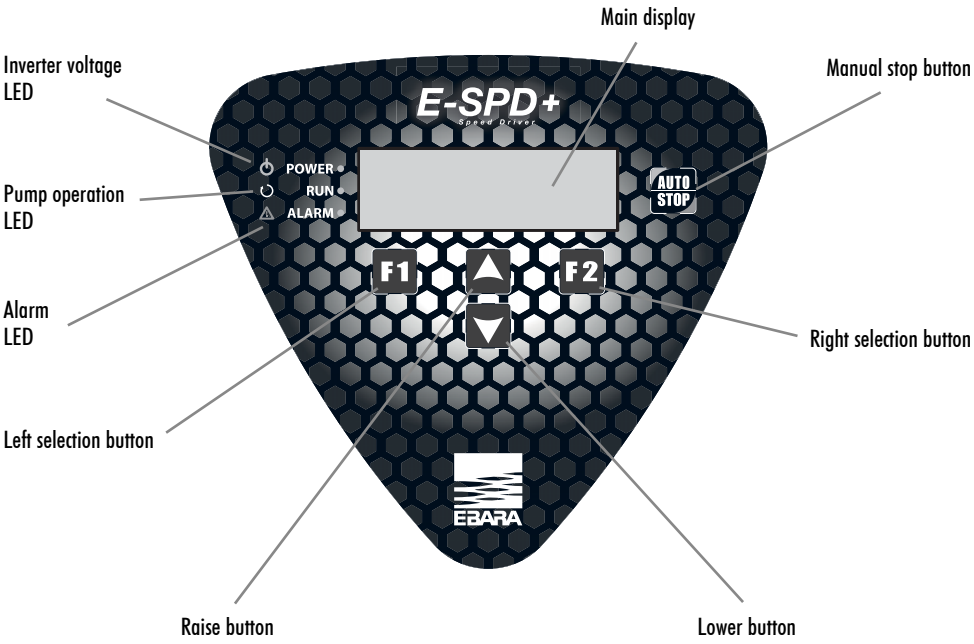
Model	Power supply	Motor
E-SPD+ TT11000	Three-phase 400 V	Three-phase 400 Vac (DELTA connection*)

*For 400/690 V motors

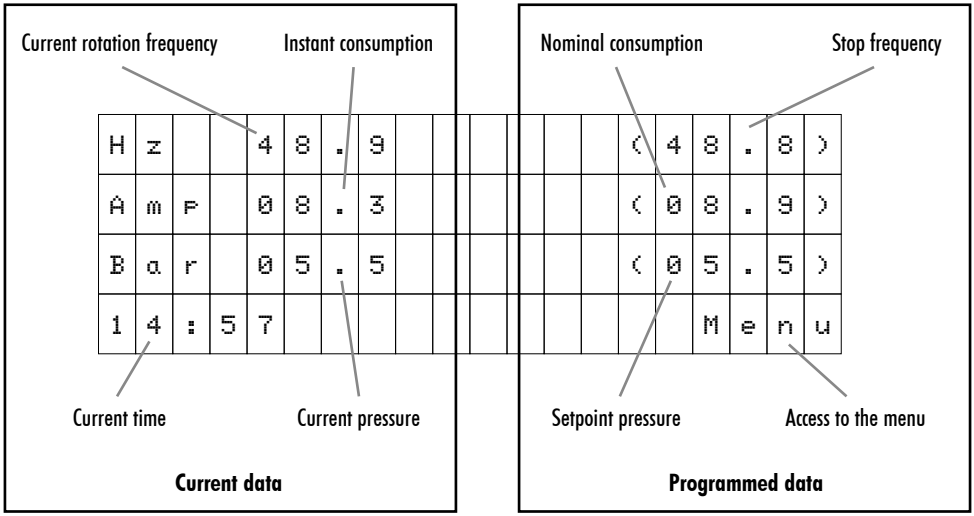
EN

SIGNAL	DESCRIPTION
Relay 1 **Relay 2**	Outputs that act as programmed in section 5. ADVANCED PARAMETERS These outputs are potential free and with a maximum load of 5 amps at 230Vac.
FAN	In the operating mode with wall support, since we do not have the cooling of the motorfan itself, we will use the ventilation system that is equipped with said support as standard to carry out this cooling. This output is 24Vdc and is activated whenever the inverter is activating the motor.
IN1 **IN2** **IN3** **IN4**	In these inputs we can connect any potential-free contact that will perform the functions programmed in section 5. ADVANCED PARAMETERS. **NOTE:** Do not supply these inputs with voltage!
PTC (NTC)	In this input we can connect a motor temperature probe, which will allow us to monitor its status. Allows the connection of a PTC or NTC probe. The type of probe can be selected as programmed in section 5. ADVANCED PARAMETERS.
4-20mA	Connection of the pressure transducer or temperature sensor (always 4-20 mA), maintaining the correct polarity shown in the connections diagram of the transducer itself. In case of one sensor only, always connect to 4-20mA(1) input In case of second sensor, connect it to 4-20mA(2) input
0-10 V	External input that allows modifying the motor turning speed with the help of a potentiometer as specified in section 5. ADVANCED PARAMETERS. The input has 3 contacts: +10, AI1, GND. ①If you have a potentiometer with its own power at 10V, connect the signal between between AI1 and GND. ②If you have a potentiometer that does not have its own power supply, connect the potentiometer input between +10 and GND and the potentiometer output to AI1. This function can be enabled by closing one of the digtal input port and set it to ""Slave 0-10V" in 5. ADVANCED PARAMETERS. The logic control is: In modes A (Constant Pressure), B (Differential Pressure), D (Constant Temperature) and E (DifferentialTemperature): (Figure 3a on Page no. 383) - Stop under 1V. - Maximum speed above 9V. - Linear acceleration/deceleration between 1V and 9V. In mode C (Fixed Speed) logic depends on Slave 1V Setpoint and Slave 9 Setpoint value a) Slave 1V setpoint is less than Slave 9V setpoint: (Figure 3b on Page no. 383) - Stop under 0,5V - Input signal under 1V and OFF --> Pump OFF - Input signal under 1V and pump ON --> Slave 1V Setpoint - Linear acceleration/deceleration between 1V and 9V. - Input signal above 9V --> Slave 9V Setpoint b) Slave 1V setpoint is greater than Slave 9V setpoint: (Figure 3c on Page no. 383) - Stop above 9,5V - Input signal above 9V and Pump OFF --> Pump OFF - Input signal above 9V and pump ON --> Slave 9V Setpoint - Linear acceleration/deceleration between 1V and 9V. - Input signal under 1V --> Slave 1V Setpoint
MODBUS	It allows the monitoring of the frequency inverter through the MODBUS communication protocol. We can adjust the MODBUS communication configuration as programmed insection 6. FINE SETTINGS. Note: For MODBUS parameter, refer to MODBUS section.
RS485	In these terminals, the interconnection of the different drives that we want tocommunicate must be carried out (maximum 8). The connection is made point-to-point.Terminals 1 must be connected to each other in the same way as terminals 2. 

9 - SCREEN FORMAT



10 - MAIN SCREEN



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11 - OPERATION MODE

11a) Constant pressure

1) Single Pump unit

By the direct reading of the pressure transducer, the variable speed drive is responsible for managing the rotation speed of the electric motor of the pump, guaranteeing the mains pressure remains fixed and unaltered, inside the pump's performance range regardless of the instantaneous demand for flow required. When the demand for flow is at its greatest, the pressure of the water network decreases. In this point the pressure transducer, which continuously informs the inverter of the current pressure, causes the inverter to make the electric motor rotate more quickly, guaranteeing the established working pressure. In contrast, when the demand for flow decreases, the inverter makes the electric motor rotate more slowly so the pressure of the water network remains unaffected.

For typical hydraulic installation scheme (figure 1) on page no 382.

2) Unit with several pumps (Multi Inverter)

When there is a network of two or more inverters connected together, the system decides in an alternate and orderly manner which pump must start up first, when there is demand for flow. Once this pump starts to rotate, if it stops because there is no more demand for flow, the system will start up a different pump the next time it starts up, rotating all the pumps that comprise the network of inverters so that all the pumps in the inverter network are started up the same number of times.

If a pump is running and reaches maximum rotational speed and the network pressure does not reach the established working pressure, the system will decide whether to start up one more pump, to support the first one or however many are running at that time. At that time the network of inverters will calculate the rotational speed of the motors that guarantee the minimum electricity demand at the same time as maintaining the working pressure.

Similarly, and with this same premise of maximum energy savings, the system will continually calculate when it can disconnect each pump that is running at any time.

11b) Differential pressure

In this mode, inverter maintains a differential pressure between the discharge side and suction side of the pump in circulation system irrespective of the system flow.

The inverter continuously senses the discharge side and suction side pressure. When the demand for flow is at greatest, the differential pressure decreases. In this point, inverter causes the electric motor to rotate more quickly, guaranteeing the set differential pressure. In contrast, when the demand for flow decreases, the inverter makes the electric motor rotate more slowly so the differential pressure of the water network remains unaffected.

This control mode requires either a differential pressure sensor or 2 pressure transducers of same pressure ratings.

Note: In case of a differential pressure sensor, it is necessary to connect the sensor to analog input 4-20mA (1).

In case of two pressure transducers, it is necessary to connect the discharge side sensor to analog input 4-20mA (1) and suction side sensor to analog input 4-20mA (2).

For typical hydraulic installation scheme (figure 2) on page no 382.

11c) Fixed speed

In this mode, the inverter maintains a fixed motor speed set by the operator.

The speed of the motor then can be changed manually.

11d) Constant temperature

In this mode, inverter ensures a constant temperature in the system. For this operation mode, a temperature sensor should be placed at the location where temperature is to be controlled.

Note: For heating system, set 6. FINE TUNING parameter 6.03 to Positive and for cooling system, set 6. FINE TUNING parameter 6.03 to Negative.

Caution: Use correct type of temperature sensor depending on the application.

11e) Differential temperature

In this mode, inverter ensures a constant differential temperature in the system. This operation mode requires either a differential temperature sensor or two temperature sensors of same temperature ratings.

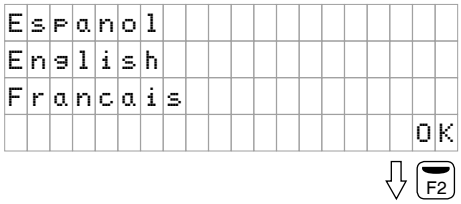
Caution: Use correct type of temperature sensor depending on the application.

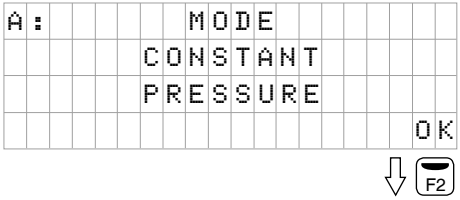
Note: For temperature control mode, proportional and integral control setting may have to be adjusted according to the distance between the temperature sensor and the heat exchanger.

12 - START-UP WIZARD

The first time you connect the voltage to your unit, a start-up wizard will run in which you can configure the basic parameters to be able to start up the pump unit. For operation modes with more than 1 pump, this wizard only runs on one of the units regardless of the total that are connected.

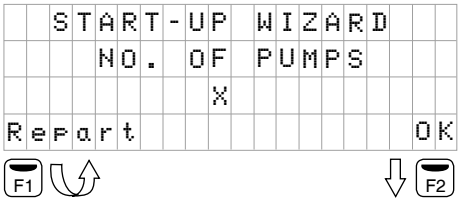
While using this wizard the red LED will blink indicating that this process is under way.





You must choose between the different operating modes of the system, which are:

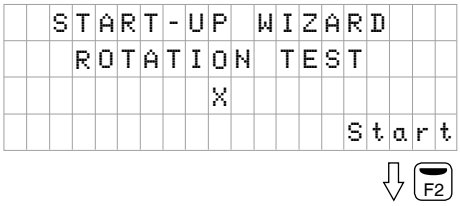
MODE A: CONSTANT PRESSURE
MODE B: DIFFERENTIAL PRESSURE
MODE C: FIXED SPEED
MODE D: CONSTANT TEMPERATURE
MODE E: DIFFERENTIAL TEMPERATURE



The system automatically indicates the number of Inverters (x) interconnected to your network. It is an indicative parameter and cannot be modified.

With F1 button you can repeat the automatic search if the value shown "x" is different from the real value.

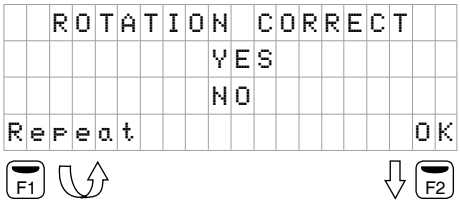
If you perform various searches and the value still does not coincide, there is probably a connection error in the network of inverters.



Before carrying out this point, you must use the graphic sign on the pump motor to check its rotation direction, as it may be clockwise or anti-clockwise depending on the pump model.

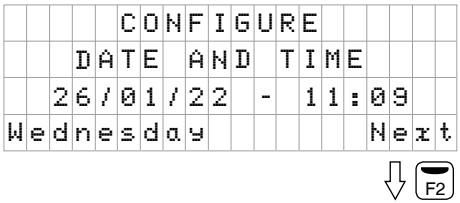
In this point you can see how the motor makes a sequence of slow turns so you can easily see whether the rotation direction is correct. It performs 6 rotation tests and stops the motor.

F1 button restarts the rotation test.



If the rotation direction is not correct, select NO with the arrows and restart the test by pressing F1 to verify that the rotation direction has been changed successfully.

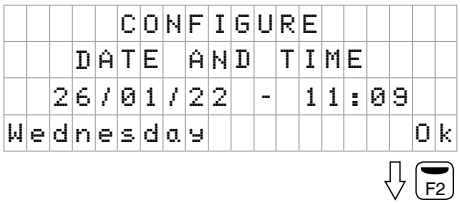
Once you have verified that the rotation direction is correct, select YES and then accept it with F2 button.



Use the arrow keys to increase or decrease the value that is blinking and use F2 button to change to the next value. The sequence of values is:

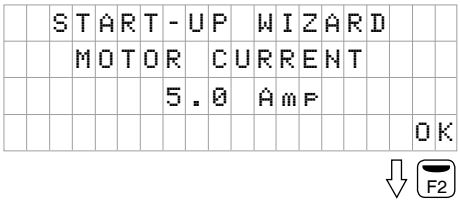
DAY → MONTH → YEAR → HOUR → MINUTES

The lower left part of the display indicates the day of the week calculated automatically according to the date entered.



When you modify the last value (minutes) you can accept the changes by pressing F2 button.

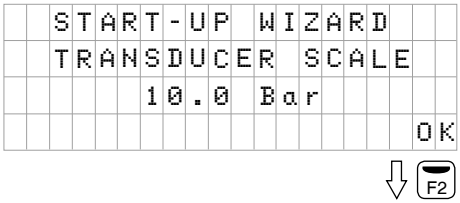
Note: At any point of the date you can go back to the previous value by pressing F1 button.



In this point you must enter the nominal consumption of the motor, increase or decrease the value using the arrow keys and validating with F2 button.

Note: The nominal consumption is indicated on the name plate of the motor. You must choose the correct value, for example if you connect an inverter MT select the value 230 V and for the inverter TT, select 400 V.

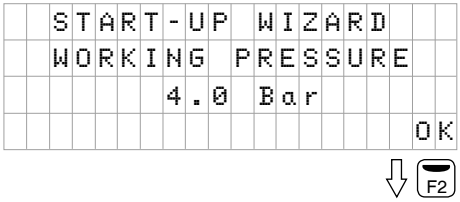
12a) Mode A: CONSTANT PRESSURE



Use the arrow keys to enter the maximum pressure scale of the connected pressure transducer.

This value is indicated on the data plate of the pressure transducer, and must always be between 4 and 20 mA.

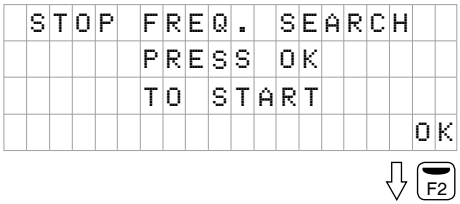
Validate this with F2 button.



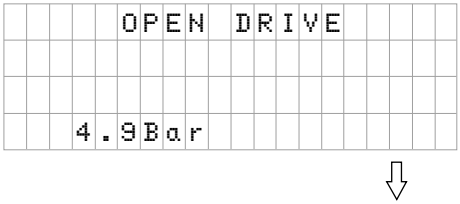
Use the arrow keys to enter the pressure at which you want the unit to work.

You must take great care that this value is always within the working curve of the pump, and always try to avoid the extremes of the curve, in other words with flows near 0 or very low pressures.

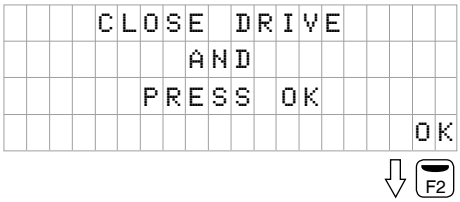
Validate this with F2 button.



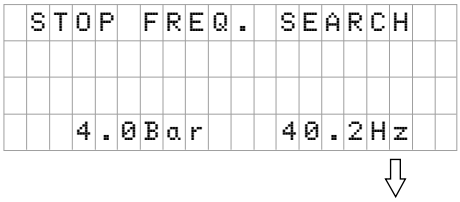
Once you have reached this point, the frequency converter will program itself to know when it no longer has any demand for flow and should stop. To do this it will ask for help to understand the features of the installation to which it is connected.



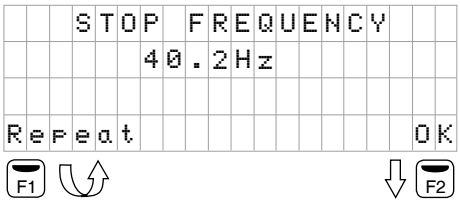
If at this time it is detected that the pressure of the installation is equal to or greater than the working pressure, the user will be informed that it is necessary to open the water supply of the equipment in order to reduce the pressure below the working pressure.



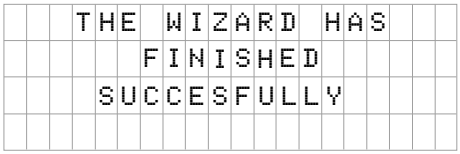
Once the drive detects that the water pressure in the installation is lower than the working pressure, the installer will be asked to completely close the water outlet from the equipment to the installation.



For a few seconds and depending on the capacity of the installation, the equipment will reach the working pressure in order to automatically calculate which the stop frequency of the equipment is.



Once the stop frequency has been calculated, the configuration wizard will show the calculated stop frequency and request validation of the calculated frequency from the installer.



It shows a text for a few seconds indicating that the wizard has finished successfully before showing the main screen.

Note: All the data entered or calculated in the wizard can be modified later through the unit menu.

START-UP WIZARD IN SYSTEMS WITH TWO OR MORE PUMPS

In systems with two or more pumps, the start-up wizard will run in all the units at same time.

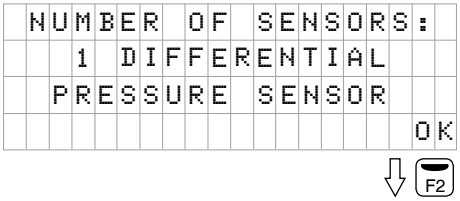
Once the wizard has finished in one of these units, the other units on the network will be fully programmed with the same data. It will only remain to run the rotation test of its wizard in all the other pumps.

Once their rotation tests have been performed, the inverters will be fully programmed.

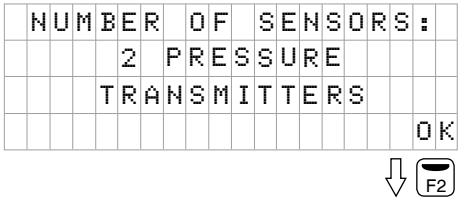
12b) Mode B: DIFFERENTIAL PRESSURE

In this point, the user can select whether they have 1 differential pressure sensor or 2 independent pressure sensors. The selection of one option or another varies the start-up wizard. Use the arrow keys to select Option A or Option B. By pressing the F2 button we select the option.

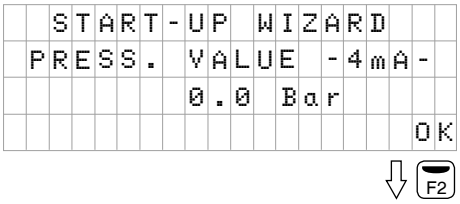
OPTION A



OPTION B

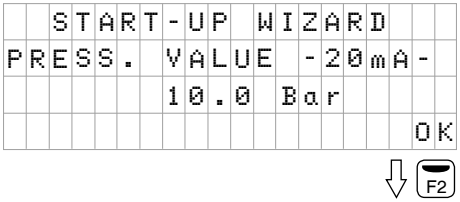


OPTION A: 1 DIFFERENTIAL PRESSURE SENSOR



We select the minimum scale range of the differential pressure transducer, that is, the reading in bar that we will have when the transducer gives the inverter a reading of 4mA.

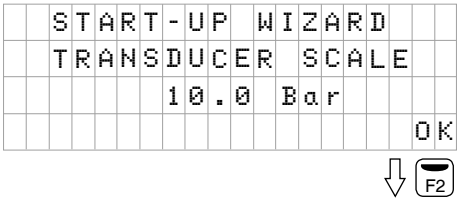
By pressing the F2 button we select the value.



We select the maximum scale range of the differential pressure transducer, that is, the reading in bar that we will have when the transducer gives the inverter a reading of 20mA.

By pressing the F2 button we select the value.

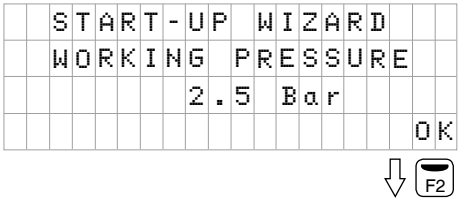
OPTION B: 2 PRESSURE TRANSMITTERS



Use the arrow keys to enter the maximum pressure scale of the connected pressure transducer. This value is indicated on the data plate of the pressure transducer, and must always be between 4 and 20 mA.

Validate this with F2 button.

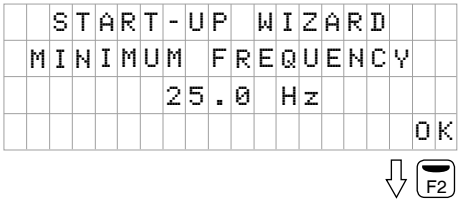
COMMON FOR BOTH OPTIONS A (1 DIFFERENTIAL PRESSURE SENSOR) AND B (2 PRESSURE TRANSMITTERS)



Use the arrow keys to enter the pressure at which you want the unit to work.

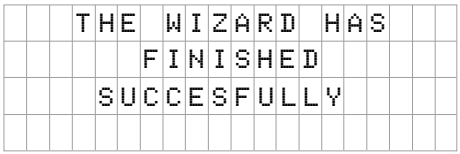
You must take great care that this value is always within the working curve of the pump, and always try to avoid the extremes of the curve, in other words with flows near 0 or very low pressures.

Validate this with F2 button.



Using the buttons we can select the minimum operating frequency for the pump.

Validate this with F2 button.

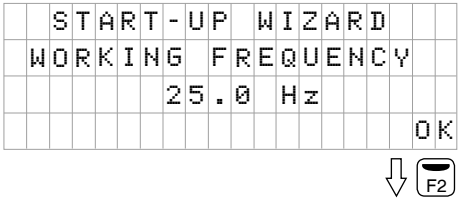


It shows a text for a few seconds indicating that the wizard has finished successfully before showing the main screen.

12c) Mode C: FIXED SPEED

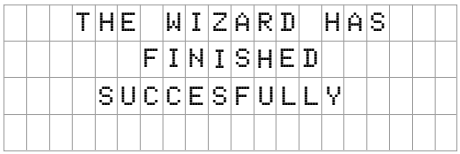
In this mode, the inverter maintains a fixed motor speed set by the operator.

The speed of the motor then can be changed manually.



By pressing the arrow buttons we set the continuous operating frequency of the pump.

Validate this with F2 button.



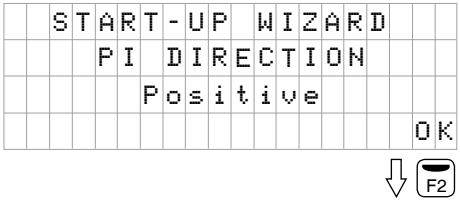
It shows a text for a few seconds indicating that the wizard has finished successfully before showing the main screen.

12d) Mode D: CONSTANT TEMPERATURE

In this mode, inverter ensures a constant temperature in the system. For this operation mode, a temperature sensor should be placed at the location where temperature is to be controlled.

Note: For heating system, set 6. FINE TUNING parameter 6.03 to Positive and for cooling system, set 6. FINE TUNING parameter 6.03 to Negative.

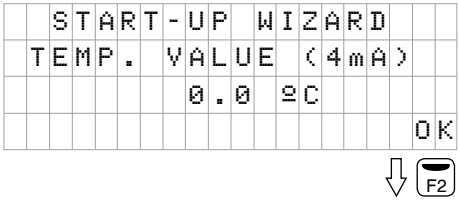
Caution: Use correct type of temperature sensor depending on the application.



We can select how we want the frequency inverter to behave based on the detected temperature, that is, if the temperature increases and we set the PI direction to positive, the motor will decelerate.

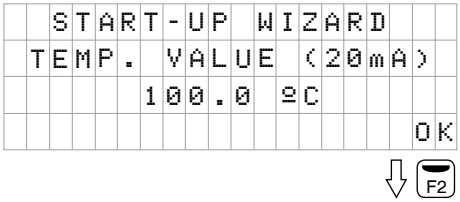
On the other hand, if the temperature increases and we set the value to negative, the motor will accelerate.

By pressing the F2 button we valid it.



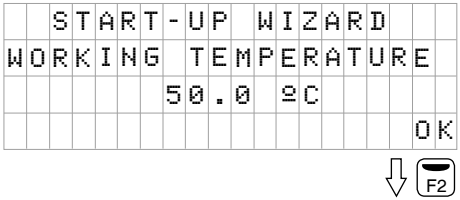
We select the temperature that we want to detect when the temperature sensor reaches its minimum value (4mA).

By pressing the F2 button we set the value.



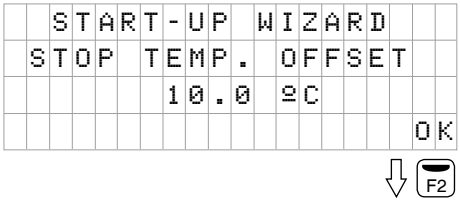
We select the temperature that we want to detect when the temperature sensor reaches its maximum value (20mA).

By pressing the F2 button we set the value.



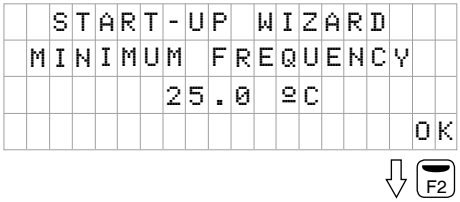
We set the constant temperature we want in the system.

By pressing the F2 button we set the value.



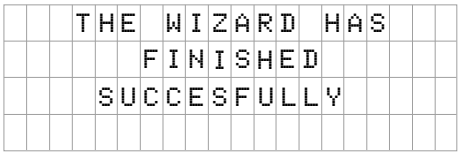
The system will accelerate or brake the pump to always maintain the constant temperature set in the previous point, but if the temperature reaches the differential indicated on this screen, above (if positive PI has been selected) or below (in if negative PI is selected), the pump will stop.

By pressing the F2 button we valid it.



Using the buttons we can select the minimum operating frequency for the pump.

Validate this with F2 button.



It shows a text for a few seconds indicating that the wizard has finished successfully before showing the main screen.

12e) Mode E: DIFFERENTIAL TEMPERATURE

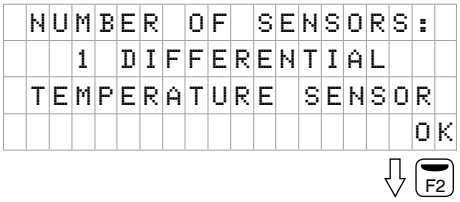
In this mode, inverter ensures a differential temperature in the system. This operation mode requires either a differential temperature sensor or two temperature sensors of same temperature ratings.

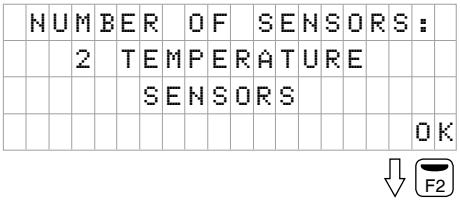
Caution: Use correct type of temperature sensor depending on the application.

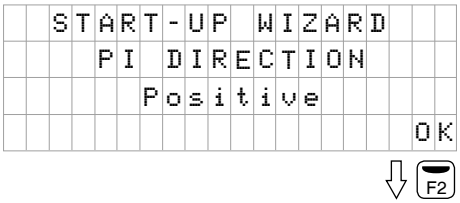
Note: For temperature control mode, proportional and integral control setting may have to be adjusted according to the distance between the temperature sensor and the heat exchanger.

In this point, the user can select whether they have 1 differential temperature sensor or 2 independent temperature sensors. Use the arrow keys to select Option A or Option B.

By pressing the F2 button we select the option.



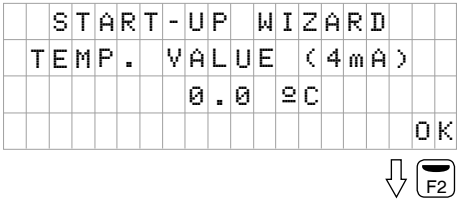




We can select how we want the frequency inverter to behave based on the detected temperature, that is, if the temperature increases and we set the PI direction to positive, the motor will decelerate.

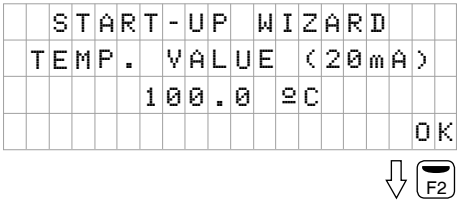
On the other hand, if the temperature increases and we set the value to negative, the motor will accelerate.

By pressing the F2 button we valid it.



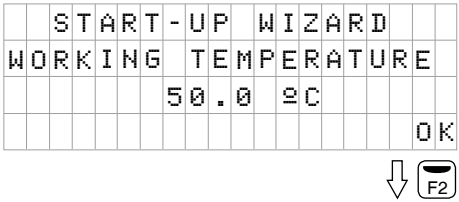
We select the temperature that we want to detect when the temperature sensor reaches its minimum value (4mA).

By pressing the F2 button we set the value.



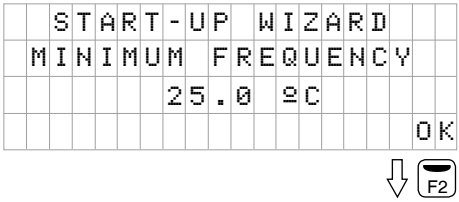
We select the temperature that we want to detect when the temperature sensor reaches its maximum value (20mA).

By pressing the F2 button we set the value.



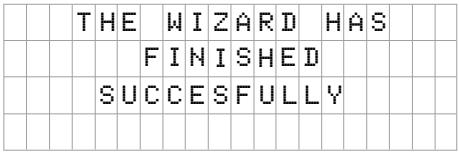
We set the constant temperature we want in the system.

By pressing the F2 button we set the value.



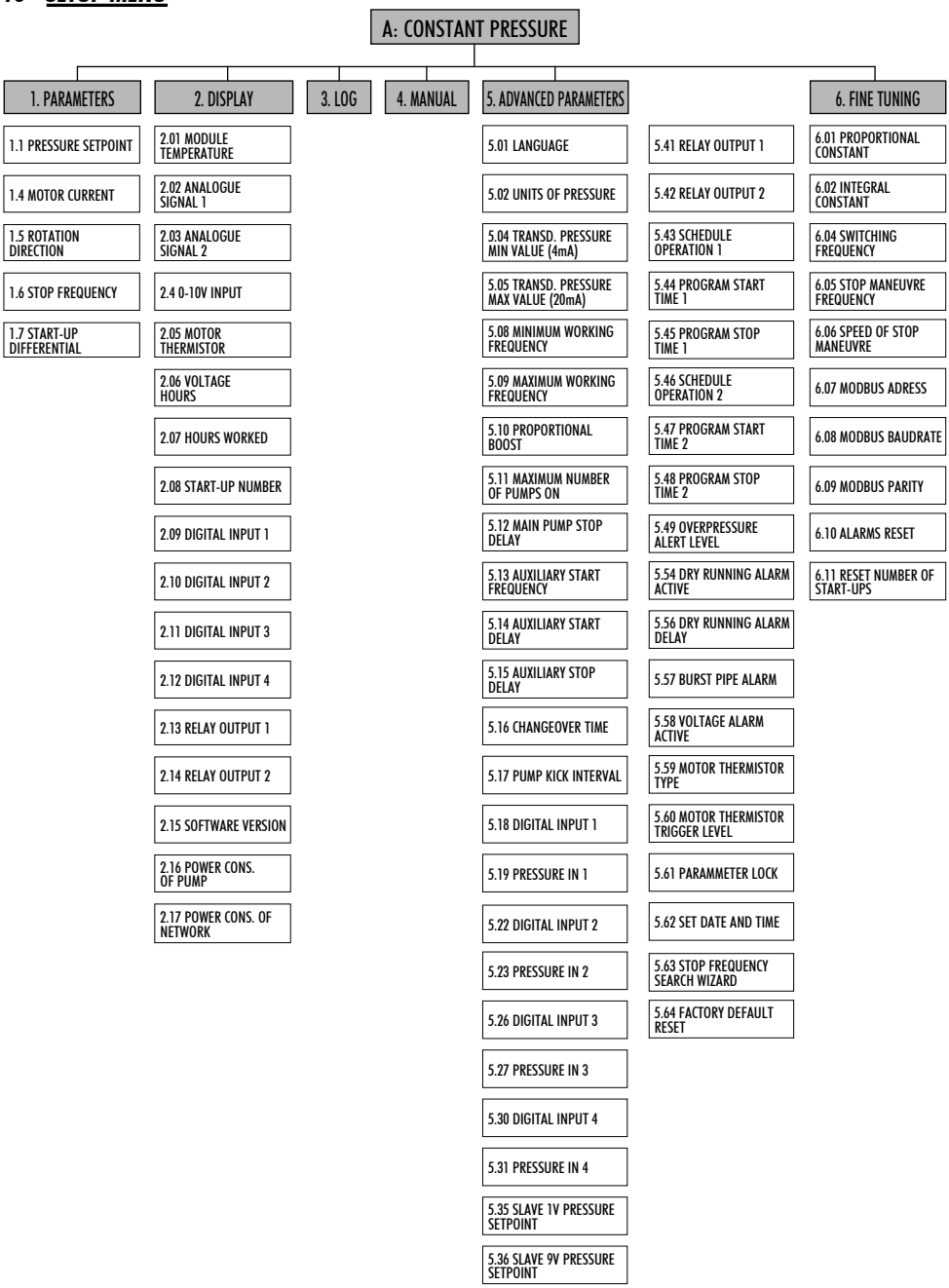
Using the buttons we can select the minimum operating frequency for the pump.

Validate this with F2 button.



It shows a text for a few seconds indicating that the wizard has finished successfully before showing the main screen.

13 - SETUP MENU



EN

B: DIFFERENTIAL PRESSURE

1. PARAMETERS
- 1.1 PRESSURE SETPOINT
- 1.4 MOTOR CURRENT
- 1.5 ROTATION DIRECTION

2. DISPLAY
- 2.01 MODULE TEMPERATURE
- 2.02 ANALOGUE SIGNAL 1
- 2.03 ANALOGUE SIGNAL 2
- 2.4 0-10V INPUT
- 2.05 MOTOR THERMISTOR
- 2.06 VOLTAGE HOURS
- 2.07 HOURS WORKED
- 2.08 START-UP NUMBER
- 2.09 DIGITAL INPUT 1
- 2.10 DIGITAL INPUT 2
- 2.11 DIGITAL INPUT 3
- 2.12 DIGITAL INPUT 4
- 2.13 RELAY OUTPUT 1
- 2.14 RELAY OUTPUT 2
- 2.15 SOFTWARE VERSION
- 2.16 POWER CONS. OF PUMP
- 2.17 POWER CONS. OF NETWORK

3. LOG

4. MANUAL

5. ADVANCED PARAMETERS
- 5.01 LANGUAGE
- 5.02 UNITS OF PRESSURE
- 5.04 TRANSD. PRESSURE MIN VALUE (4mA)
- 5.05 TRANSD. PRESSURE MAX VALUE (20mA)
- 5.08 MINIMUM WORKING FREQUENCY
- 5.09 MAXIMUM WORKING FREQUENCY
- 5.10 PROPORTIONAL BOOST
- 5.11 MAXIMUM NUMBER OF PUMPS ON
- 5.13 AUXILIARY START FREQUENCY
- 5.14 AUXILIARY START DELAY
- 5.15 AUXILIARY STOP DELAY
- 5.16 CHANGEOVER TIME
- 5.17 PUMP KICK INTERVAL
- 5.18 DIGITAL INPUT 1
- 5.19 PRESSURE IN 1
- 5.22 DIGITAL INPUT 2
- 5.23 PRESSURE IN 2
- 5.26 DIGITAL INPUT 3
- 5.27 PRESSURE IN 3
- 5.30 DIGITAL INPUT 4
- 5.31 PRESSURE IN 4
- 5.35 SLAVE 1V PRESSURE SETPOINT
- 5.36 SLAVE 9V PRESSURE SETPOINT
- 5.41 RELAY OUTPUT 1
- 5.42 RELAY OUTPUT 2
- 5.43 SCHEDULE OPERATION 1
- 5.44 PROGRAM START TIME 1
- 5.45 PROGRAM STOP TIME 1
- 5.46 SCHEDULE OPERATION 2
- 5.47 PROGRAM START TIME 2
- 5.48 PROGRAM STOP TIME 2
- 5.49 OVERPRESSURE ALERT LEVEL
- 5.50 PRESS DIFFERENTIAL ALARM LEVEL
- 5.54 DRY RUNNING ALARM ACTIVE
- 5.55 DRY RUNNING TRIGGER LEVEL
- 5.58 VOLTAGE ALARM ACTIVE
- 5.59 MOTOR THERMISTOR TYPE
- 5.60 MOTOR THERMISTOR TRIGGER LEVEL
- 5.61 PARAMMETER LOCK
- 5.62 SET DATE AND TIME
- 5.64 FACTORY DEFAULT RESET

6. FINE TUNING
- 6.01 PROPORTIONAL CONSTANT
- 6.02 INTEGRAL CONSTANT
- 6.04 SWITCHING FREQUENCY
- 6.07 MODBUS ADRESS
- 6.08 MODBUS BAUDRATE
- 6.09 MODBUS PARITY
- 6.10 ALARMS RESET
- 6.11 RESET NUMBER OF START-UPS

C: FIXED SPEED

1. PARAMETERS

- 1.2 SPEED SETPOINT
- 1.4 MOTOR CURRENT
- 1.5 ROTATION DIRECTION

2. DISPLAY

- 2.01 MODULE TEMPERATURE
- 2.02 ANALOGUE SIGNAL 1
- 2.03 ANALOGUE SIGNAL 2
- 2.4 0-10V INPUT
- 2.05 MOTOR THERMISTOR
- 2.06 VOLTAGE HOURS
- 2.07 HOURS WORKED
- 2.08 START-UP NUMBER
- 2.09 DIGITAL INPUT 1
- 2.10 DIGITAL INPUT 2
- 2.11 DIGITAL INPUT 3
- 2.12 DIGITAL INPUT 4
- 2.13 RELAY OUTPUT 1
- 2.14 RELAY OUTPUT 2
- 2.15 SOFTWARE VERSION
- 2.16 POWER CONS. OF PUMP
- 2.17 POWER CONS. OF NETWORK

3. LOG

4. MANUAL

5. ADVANCED PARAMETERS

- 5.01 LANGUAGE
- 5.02 UNITS OF PRESSURE
- 5.04 TRANSD. PRESSURE MIN VALUE (4mA)
- 5.05 TRANSD. PRESSURE MAX VALUE (20mA)
- 5.08 MINIMUM WORKING FREQUENCY
- 5.09 MAXIMUM WORKING FREQUENCY
- 5.11 MAXIMUM NUMBER OF PUMPS ON
- 5.16 CHANGEOVER TIME
- 5.17 PUMP KICK INTERVAL
- 5.18 DIGITAL INPUT 1
- 5.20 SPEED IN 1
- 5.22 DIGITAL INPUT 2
- 5.24 SPEED IN 2
- 5.26 DIGITAL INPUT 3
- 5.28 SPEED IN 3
- 5.30 DIGITAL INPUT 4
- 5.32 SPEED IN 4
- 5.37 SLAVE 1V SPEED SETPOINT
- 5.38 SLAVE 9V SPEED SETPOINT
- 5.41 RELAY OUTPUT 1
- 5.42 RELAY OUTPUT 2
- 5.43 SCHEDULE OPERATION 1
- 5.44 PROGRAM START TIME 1
- 5.45 PROGRAM STOP TIME 1
- 5.46 SCHEDULE OPERATION 2
- 5.47 PROGRAM START TIME 2
- 5.48 PROGRAM STOP TIME 2
- 5.54 DRY RUNNING ALARM ACTIVE
- 5.55 DRY RUNNING TRIGGER LEVEL
- 5.58 VOLTAGE ALARM ACTIVE
- 5.59 MOTOR THERMISTOR TYPE
- 5.60 MOTOR THERMISTOR TRIGGER LEVEL
- 5.61 PARAMMETER LOCK
- 5.62 SET DATE AND TIME
- 5.64 FACTORY DEFAULT RESET

6. FINE TUNING

- 6.04 SWITCHING FREQUENCY
- 6.07 MODBUS ADRESS
- 6.08 MODBUS BAUDRATE
- 6.09 MODBUS PARITY
- 6.10 ALARMS RESET
- 6.11 RESET NUMBER OF START-UPS

EN

D: CONSTANT TEMPERATURE

1. PARAMETERS

- 1.3 TEMPERATURE SETPOINT
- 1.4 MOTOR CURRENT
- 1.5 ROTATION DIRECTION
- 1.8 STOP TEMPERATURE OFFSET

2. DISPLAY

- 2.01 MODULE TEMPERATURE
- 2.02 ANALOGUE SIGNAL 1
- 2.03 ANALOGUE SIGNAL 2
- 2.4 0-10V INPUT
- 2.05 MOTOR THERMISTOR
- 2.06 VOLTAGE HOURS
- 2.07 HOURS WORKED
- 2.08 START-UP NUMBER
- 2.09 DIGITAL INPUT 1
- 2.10 DIGITAL INPUT 2
- 2.11 DIGITAL INPUT 3
- 2.12 DIGITAL INPUT 4
- 2.13 RELAY OUTPUT 1
- 2.14 RELAY OUTPUT 2
- 2.15 SOFTWARE VERSION
- 2.16 POWER CONS. OF PUMP
- 2.17 POWER CONS. OF NETWORK

3. LOG

4. MANUAL

5. ADVANCED PARAMETERS

- 5.01 LANGUAGE
- 5.03 UNITS OF TEMPERATURE
- 5.06 TEMP. SENSOR MIN VALUE (4mA)
- 5.07 TEMP. SENSOR MAX VALUE (20mA)
- 5.08 MINIMUM WORKING FREQUENCY
- 5.09 MAXIMUM WORKING FREQUENCY
- 5.11 MAXIMUM NUMBER OF PUMPS ON
- 5.12 MAIN PUMP STOP DELAY
- 5.16 CHANGEOVER TIME
- 5.17 PUMP KICK INTERVAL
- 5.18 DIGITAL INPUT 1
- 5.21 TEMPERATURE IN 1
- 5.22 DIGITAL INPUT 2
- 5.25 TEMPERATURE IN 2
- 5.26 DIGITAL INPUT 3
- 5.29 TEMPERATURE IN 3
- 5.30 DIGITAL INPUT 4
- 5.33 TEMPERATURE IN 4
- 5.39 SLAVE 1V TEMPERATURE SETPOINT
- 5.40 SLAVE 9V TEMPERATURE SETPOINT
- 5.41 RELAY OUTPUT 1
- 5.42 RELAY OUTPUT 2
- 5.43 SCHEDULE OPERATION 1
- 5.44 PROGRAM START TIME 1
- 5.45 PROGRAM STOP TIME 1
- 5.46 SCHEDULE OPERATION 2
- 5.47 PROGRAM START TIME 2
- 5.48 PROGRAM STOP TIME 2
- 5.51 MIN TEMPERATURE ALERT LEVEL
- 5.52 MAX TEMPERATURE ALERT LEVEL
- 5.54 DRY RUNNING ALARM ACTIVE
- 5.55 DRY RUNNING TRIGGER LEVEL
- 5.58 VOLTAGE ALARM ACTIVE
- 5.59 MOTOR THERMISTOR TYPE
- 5.60 MOTOR THERMISTOR TRIGGER LEVEL
- 5.61 PARAMMETER LOCK
- 5.62 SET DATE AND TIME
- 5.64 FACTORY DEFAULT RESET

6. FINE TUNING

- 6.01 PROPORTIONAL CONSTANT
- 6.02 INTEGRAL CONSTANT
- 6.03 PI DIRECTION
- 6.04 SWITCHING FREQUENCY
- 6.07 MODBUS ADRESS
- 6.08 MODBUS BAUDRATE
- 6.09 MODBUS PARITY
- 6.10 ALARMS RESET
- 6.11 RESET NUMBER OF START-UPS

E: DIFFERENTIAL TEMPERATURE

- 1. PARAMETERS
  - 1.3 TEMPERATURE SETPOINT
  - 1.4 MOTOR CURRENT
  - 1.5 ROTATION DIRECTION
- 2. DISPLAY
  - 2.01 MODULE TEMPERATURE
  - 2.02 ANALOGUE SIGNAL 1
  - 2.03 ANALOGUE SIGNAL 2
  - 2.4 0-10V INPUT
  - 2.05 MOTOR THERMISTOR
  - 2.06 VOLTAGE HOURS
  - 2.07 HOURS WORKED
  - 2.08 START-UP NUMBER
  - 2.09 DIGITAL INPUT 1
  - 2.10 DIGITAL INPUT 2
  - 2.11 DIGITAL INPUT 3
  - 2.12 DIGITAL INPUT 4
  - 2.13 RELAY OUTPUT 1
  - 2.14 RELAY OUTPUT 2
  - 2.15 SOFTWARE VERSION
  - 2.16 POWER CONS. OF PUMP
  - 2.17 POWER CONS. OF NETWORK
- 3. LOG
- 4. MANUAL
- 5. ADVANCED PARAMETERS
  - 5.01 LANGUAGE
  - 5.03 UNITS OF TEMPERATURE
  - 5.06 TEMP. SENSOR MIN VALUE (4mA)
  - 5.07 TEMP. SENSOR MAX VALUE (20mA)
  - 5.08 MINIMUM WORKING FREQUENCY
  - 5.09 MAXIMUM WORKING FREQUENCY
  - 5.11 MAXIMUM NUMBER OF PUMPS ON
  - 5.16 CHANGEOVER TIME
  - 5.17 PUMP KICK INTERVAL
  - 5.18 DIGITAL INPUT 1
  - 5.21 TEMPERATURE IN 1
  - 5.22 DIGITAL INPUT 2
  - 5.25 TEMPERATURE IN 2
  - 5.26 DIGITAL INPUT 3
  - 5.29 TEMPERATURE IN 3
  - 5.30 DIGITAL INPUT 4
  - 5.33 TEMPERATURE IN 4
  - 5.39 SLAVE 1V TEMPERATURE SETPOINT
  - 5.40 SLAVE 9V TEMPERATURE SETPOINT
  - 5.41 RELAY OUTPUT 1
  - 5.42 RELAY OUTPUT 2
  - 5.43 SCHEDULE OPERATION 1
  - 5.44 PROGRAM START TIME 1
  - 5.45 PROGRAM STOP TIME 1
  - 5.46 SCHEDULE OPERATION 2
  - 5.47 PROGRAM START TIME 2
  - 5.48 PROGRAM STOP TIME 2
  - 5.51 MIN TEMPERATURE ALERT LEVEL
  - 5.52 MAX TEMPERATURE ALERT LEVEL
  - 5.53 TEMP. DIFFERENTIAL ALARM LEVEL
  - 5.54 DRY RUNNING ALARM ACTIVE
  - 5.55 DRY RUNNING TRIGGER LEVEL
  - 5.58 VOLTAGE ALARM ACTIVE
  - 5.59 MOTOR THERMISTOR TYPE
  - 5.60 MOTOR THERMISTOR TRIGGER LEVEL
  - 5.61 PARAMMETER LOCK
  - 5.62 SET DATE AND TIME
  - 5.64 FACTORY DEFAULT RESET
- 6. FINE TUNING
  - 6.01 PROPORTIONAL CONSTANT
  - 6.02 INTEGRAL CONSTANT
  - 6.03 PI DIRECTION
  - 6.04 SWITCHING FREQUENCY
  - 6.07 MODBUS ADRESS
  - 6.08 MODBUS BAUDRATE
  - 6.09 MODBUS PARITY
  - 6.10 ALARMS RESET
  - 6.11 RESET NUMBER OF START-UPS

14 - LIST OF PARAMETERS

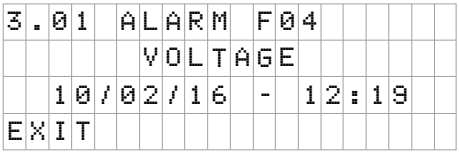
MODE			
A	CONSTANT PRESSURE	D	CONSTANT TEMPERATURE
B	DIFFERENTIAL PRESSURE	E	DIFFERENTIAL TEMPERATURE
C	FIXED SPEED		

Wizard: This parameter is the one entered or calculated in the start-up wizard.
FS: Full-scale value of the transducer (entered in the start-up wizard).

1. PARAMETERS											
Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
1.1	PRESSURE SETPOINT	Bar	Wizard	0,5	FS	Pressure you wish to maintain in the system.	X	X			
1.2	SPEED SETPOINT	Hz	Wizard	10	65	Speed you wish to maintain in the system.			X		
1.3	TEMPERATURE SETPOINT	°C	Wizard			Temperature you wish to maintain in the system.				X	X
1.4	MOTOR CURRENT	Amp	Wizard	0,1	11 (MT 2200) 11 (TT 4000) 30 (TT 11000)	Current of the motor in amperes. Taking into account whether your motor is wired as three phase 230V or three phase 400V. Insert nominal value.	X	X	X	X	X
1.5	ROTATION DIRECTION			0	1	You can change the rotation direction of the motor by modifying this parameter from 0 to 1 or vice versa.	X	X	X	X	X
1.6	STOP FREQUENCY	Hz	Wizard	0,1	99,9	The system will stop when the Inverter has been working for a certain time (see parameter 5.12) under this frequency.	X				
1.7	START-UP DIFFERENTIAL	Bar	0,5	0,3	3	This is the differential that enables you to reduce the pressure to start the pump using the value entered in parameter 1.1.	X				
1.8	STOP TEMPERATURE OFFSET	°C	Wizard	0,1	100	This is the offset temperature for the temperature setpoint.				X	

2. DISPLAY										
Par.	Description	Units	Notes	Application						
				A	B	C	D	E		
2.01	MODULE TEMPERATURE	°C	This indicates the temperature the electronic module of the inverter.			X				
2.02	ANALOGUE SIGNAL 1	mA	This indicates the value in mA of the pressure transducer 1. This data will be 4 mA for 0 Bar and 20 mA for the upper limit of the transducer connected.			X				
2.03	ANALOGUE SIGNAL 2	mA	This indicates the value in mA of the pressure transducer 2. This data will be 4 mA for 0 Bar and 20 mA for the upper limit of the transducer connected.			X				
2.04	0-10V INPUT	V	This indicates the value of the 0-10V signal if it is enabled in one of the inputs.			X				
2.05	MOTOR THERMISTOR	kohm	This indicates the value of the NTC/PTC signal if it is enabled on settings.			X				
2.06	VOLTAGE HOURS	Hours	This indicates the total number of hours the inverter has been connected to an electricity grid.			X				
2.07	HOURS WORKED	Hours	This indicates the total number of hours worked (providing an output voltage) of the inverter.			X				
2.08	START-UP NUMBER		This indicates the total number of start-ups from zero that the unit has made.			X				
2.09	DIGITAL INPUT 1		This indicates whether digital input 1 is ON or OFF.			X				
2.10	DIGITAL INPUT 2		This indicates whether digital input 2 is ON or OFF.			X				
2.11	DIGITAL INPUT 3		This indicates whether digital input 3 is ON or OFF.			X				
2.12	DIGITAL INPUT 4		This indicates whether digital input 4 is ON or OFF.			X				
2.13	RELAY 1 OUTPUT		This indicates whether the relay 1 output is ON or OFF.			X				
2.14	RELAY 2 OUTPUT		This indicates whether the relay 2 output is ON or OFF.			X				
2.15	SOFTWARE VERSION		Version of the unit software.			X				
2.16	CONS. POWER OF PUMP	W	Instantaneous power consumed in output terminals toward pump.			X				
2.17	CONS. POWER OF GROUP	W	Power consumed instantaneously by all of the pumps.			X				

3. LOG



When you access the log menu you will find a list in chronological order of alarms that have been triggered in your unit, indicating the date and the time they occurred.

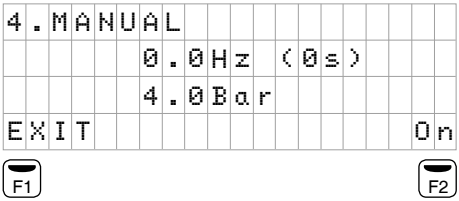
Use the arrows to move forward or back to view the different alarms that have been triggered.

Press F1 to exit this menu.

4. MANUAL

The system is prepared to carry out speed and operation tests manually through this menu. When you access this menu, regardless of the status of the system, the unit from which you are accessing stops its functions and therefore stops the pump.

When you access this menu this screen appears:

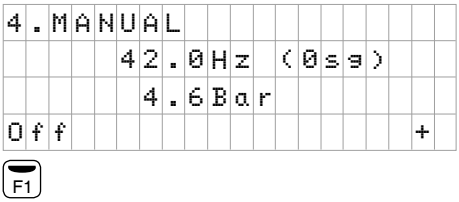


Where you can see the frequency, an operation timer and the pressure at that precise moment read by the transducer.

Press F1 to exit this menu.

When you press ON (with the F2 key) you will start the motor and you can increases or reduce the frequency using the arrow keys. At the same time you can see how the countdown begins for 2 minutes of operation. If you do not press any keys, after 2 minutes the motor will stop automatically. If you press the F2 key during the countdown, it will be increased to 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 8 hours and 24 hours for each press.

Press F1 to exit, stop the motor and return to the wait screen of this menu.



⚠ ATTENTION

Improper use of the manual mode can cause overpressures in the installation.

5. ADVANCED PARAMETERS												
Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
5.01	LANGUAGE		Spanish	Spanish English French Italian Portuguese German	Dutch Polish Russian Swedish	You can select between different languages for the menu and the warnings.	X	X	X	X	X
5.02	UNITS OF PRESSURE	Bar	Bar	Bar - PSI - mwc		Units of working pressure on display.	X	X	X		
5.03	UNITS OF TEMPERATURE	ºC	ºC	ºC ºF …		Can see 3 differents units for temperature: ºC (Celsius) ºF (Farenhait) … (no units. It will be very useful for example if user can run depending of speed, or counting,…)				X	X
5.04	TRANSDUCER PRESSURE MIN VALUE (4 mA)	Bar	Wizard	-1	10	Value of pressure transducer at 4mA	X	X	X		
5.05	TRANSDUCER PRESSURE MAX VALUE (20 mA)	Bar	Wizard	5	40	Value of pressure transducer at 20mA	X	X	X		
5.06	TEMPERATURE SENSOR MIN VALUE (4 mA)	mA	Wizard	-100	200	Value of temperature sensor at 4mA				X	X
5.07	TEMPERATURE SENSOR MAX VALUE (20 mA)	mA	Wizard	-100	200	Value of temperature sensor at 20mA				X	X
5.08	MINIMUM WORKING FREQUENCY	Hz	25	10	50	Minimum frequency at which you allow the pump to work	X	X	X	X	X
5.09	MAXIMUM WORKING FREQUENCY	Hz	50	25	65	Maximum frequency at which you allow the pump to work	X	X	X	X	X
5.10	PROPORTIONAL BOOST	Bar	0	0	MAX PUMP PRESSURE	Pressure boost at the maximum frequency of pump	X	X			
5.11	MAXIMUM NUMBER OF PUMPS ON		8	1	8	Maximum number of pumps that can function in the system simultaneously	X	X	X	X	X
5.12	MAIN PUMP STOP DELAY	Sec	10	10	100	Time from the moment the main pump is working at a speed below the stop frequency (parameter 1.6) until it stops fully.	X			X	
5.13	AUXILIARY START FREQUENCY	Hz	49,5	25	50	When the pump in operation reaches this frequency it sends a command to the auxiliary to start up.	X	X			
5.14	AUXILIARY START DELAY	Sec	2	1	200	Time from the moment the condition of parameter 5.09 occurs until the auxiliary pump starts.	X	X			
5.15	AUXILIARY STOP DELAY	Sec	2	1	10	Time from when a system of two or more pumps is working below parameter 1.6 until the auxiliary pumps stop.	X	X			
5.16	CHANGEOVER TIME	Hours	24	OFF	72	Parameter to set time period for changeover between pumps.	X	X	X	X	X
5.17	PUMP KICK INTERVAL	Hours	24	OFF	72	Parameter to set time period for periodic start-up of pump. If the pump is inactive for this set time period it will rotate at minimum frequency for 2 or 3 times.	X	X	X	X	X

Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
5.18	DIGITAL INPUT 1		Not used	Not used Total Stop Total Stop INV Local Stop Local Stop INV IN Setpoint IN Setpoint INV Flow Sensor Flow Sensor INV Slave 0-10V		Selecting "Not used" will not affect the system. We can use the digital input as a system start-stop or only one pump start-stop choosing the Total Stop or Local Stop options. It can also be used as a different default set pressure in the same way. Choosing IN Setpoint you can be select another different set pressure on parameter 5.19. Flow Sensor option is used when a flow sensor is available, which will stop the pump. Slave 0-10V option is used if a 0-10V active device or a potentiometer (passive device) is connected to the 0-10V input. **Note:** INV options are used for NC inputs.	X	X	X	X	X
5.19	PRESSURE IN 1	Bar	4	0,5	FS	A different setpoint can be set if the input is active.	X	X			
5.20	SPEED IN 1	Hz	25	10	65				X		
5.21	TEMPERATURE IN 1	ºC		-100	200					X	X
5.22	DIGITAL INPUT 2		Not used	See parameter 5.18		See parameter 5.18	X	X	X	X	X
5.23	PRESSURE IN 2	Bar	4	0,5	FS	A different setpoint can be set if the input is active.	X	X			
5.24	SPEED IN 2	Hz	25	10	65				X		
5.25	TEMPERATURE IN 2	ºC		-100	200					X	X
5.26	DIGITAL INPUT 3		Not used	See parameter 5.18		See parameter 5.18	X	X	X	X	X
5.27	PRESSURE IN 3	Bar	4	0,5	FS	A different setpoint can be set if the input is active.	X	X			
5.28	SPEED IN 3	Hz	25	10	65				X		
5.29	TEMPERATURE IN 3	ºC		-100	200					X	X
5.30	DIGITAL INPUT 4		Not used	See parameter 5.18		See parameter 5.18	X	X	X	X	X
5.31	PRESSURE IN 4	Bar	4	0,5	FS	A different setpoint can be set if the input is active.	X	X			
5.32	SPEED IN 4	Hz	25	10	65				X		
5.33	TEMPERATURE IN 4	ºC		-100	200					X	X
5.35	SLAVE 1V PRESSURE SETPOINT	Bar	Par 1,1	0,5	Par. 5.05	If a 0-10V device is installed, here you can set the pressure value for the 1 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.	X	X			
5.36	SLAVE 9V PRESSURE SETPOINT	Bar	Par 1,1	0,5	Par. 5.05	If a 0-10V device is installed, here you can set the pressure value for the 9 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.	X	X			
5.37	SLAVE 1V SPEED SETPOINT	Hz	25	25	65	If a 0-10V device is installed, here you can set the speed value for the 1 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.			X		
5.38	SLAVE 9V SPEED SETPOINT	Hz	25	25	65	If a 0-10V device is installed, here you can set the speed value for the 9 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.			X		
5.39	SLAVE 1V TEMPERATURE SETPOINT	ºC	50	Par. 5.06	Par. 5.07	If a 0-10V device is installed, here you can set the temperature value for the 1 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.				X	X
5.40	SLAVE 9V TEMPERATURE SETPOINT	ºC	50	Par. 5.06	Par. 5.07	If a 0-10V device is installed, here you can set the temperature value for the 9 volt signal. *This parameter is available when any of the digital input is set to Slave 0-10V.				X	X

Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
5.41	RELAY OUTPUT 1		OFF	OFF Alarm (NO) Alarm (NC) Start Clock (NO) Clock (NC) Dry running External stop Overpressure (NO) Overpressure (NC)		The aim of this parameter is to enable signals remotely. **OFF:** The relay is never activated. **Alarm (NO):** The relay closes before an alarm. **Alarm (NC):** The relay opens before an alarm. **Start:** The relay is energised when the unit is running. **Clock (NO):** The relay closes depending on the time data programmed in parameters 5.44 to 5.48. **Clock (NC):** The relay opens depending on the time data programmed in parameters 5.44 to 5.48. **Dry running:** The relay is energised if the inverter detects dry running. **External stop:** The relay is energised when there is an external stop. (For this condition we must have programmed a digital input as "Local Stop"). **Overpressure (NO):** The relay closes if there is overpressure alert (parameter 5.49). **Overpressure (NC):** The relay opens if there is overpressure alert (parameter 5.49).	X	X	X	X	X
5.42	RELAY OUTPUT 2		OFF	See parameter 5.41		See parameter 5.41	X	X	X	X	X
5.43	SCHEDULE OPERATION 1		OFF	OFF M-Su M-F Sa-Su M ….. Su		In this parameter you can choose not to have a schedule program (OFF) or the days of the week that you want this program to run. You can choose between whole weeks (M-Su), weekdays (M-F), weekends (Sa- Su) or individual days. The schedule program will act on the output relay programmed for this purpose.	X	X	X	X	X
5.44	PROGRAM START TIME 1		00:00	00:00	23:59	Start time of schedule program 1.	X	X	X	X	X
5.45	PROGRAM STOP TIME 1		00:00	00:00	23:59	Stop time of schedule program 1.	X	X	X	X	X
5.46	SCHEDULE OPERATION 2		OFF	See parameter 5.43		Same as parameter 5.43 but for a second schedule program.	X	X	X	X	X
5.47	PROGRAM START TIME 2		00:00	00:00	23:59	Start time of schedule program 2.	X	X	X	X	X
5.48	PROGRAM STOP TIME 2		00:00	00:00	23:59	Stop time of schedule program 2.	X	X	X	X	X
5.49	OVERPRESSURE ALERT LEVEL		FS	Par 1,1	FS	Parameter to set the maximum pressure value of the Hydraulic system.	X	X(1)			
5.50	PRESSURE DIFFERENTIAL ALARM LEVEL		FS	Par 1,1	FS	Parameter to set the maximum differential pressure value of the hydraulic system.		X			
5.51	MINIMUM TEMPERATURE ALERT LEVEL	ºC	0	0	100	Parameter to set the minimum temperature of the hydraulic system.				X	X(2)
5.52	MAXIMUM TEMPERATURE ALERT LEVEL	ºC	100	0	100	Parameter to set the maximum temperature of the hydraulic system.				X	X(2)
5.53	TEMP. DIFFERENTIAL ALARM LEVE	ºC	100	0	100	Parameter to set the maximum differential temperature of the hydraulic system.					X
5.54	DRY RUNNING ALARM ACTIVE		YES	YES	NO	Parameter for enabling or disabling the low water level alarm. In the case of being active and cause notice, the drive will start attempts by the following sequence: 5 minutes, 15 minutes, 1 hour, 6 hours or 24 hours. The display shows the remaining time start attempt. Pressing F2 we force the reset of the notice, still unfinished countdown. If after the 24-hour notice is detected again dry running, the drive will lock indefinitely until you press F2.	X	X	X	X	X

Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
5.55	DRY RUNNING TRIGGER LEVEL	%	25	10	90	Allows you to fine-tune the sensitivity of the protection triggering by detection of dry running.		X	X	X	X
5.56	DRY RUNNING ALARM DELAY	Sec	5	1	99	Time from when the system calculates a low water level until the moment the alarm is activated for this reason.	X				
5.57	BURST PIPE ALARM		YES	YES	NO	Parameter for enabling or disabling the detection of the broke pipe.	X				
5.58	VOLTAGE ALARM ACTIVE		YES	YES	NO	Parameter for enabling or disabling the alarm due to a power cut.	X	X	X	X	X
5.59	MOTOR THERMISTOR TYPE		OFF	OFF PTC NTC		By this parameter, select the type of motor thermistor available for motor protection.	X	X	X	X	X
5.60	MOTOR THERMISTOR TRIGGER LEVELL	kohm	1	0,5	99,9	By this parameter, set the trigger level of motor thermistor connected.	X	X	X	X	X
5.61	PARAMETER LOCK		NO	NO	YES	**YES:** Editing the values of the parameters is locked. **NO:** Editing the values of the parameters is unlocked. To change this parameter from YES to NO, you must enter the password **1357** or another password generated previously by the user.	X	X	X	X	X
5.62	SET DATE AND TIME		NO	NO	YES	When you change this parameters to "YES" this screen for editing the date and time will appear. Once editing is completed, the parameter returns to "NO".	X	X	X	X	X
5.63	STOP FREQUENCY SEARCH WIZARD		NO	NO	YES	If you change this parameter from "NO" to "YES" the stop frequency search wizard will be launched.	X				
5.64	FACTORY DEFAULT RESET		NO	NO	YES	To reset the unit and leave it with the factory settings, change this parameter to "YES" and after you have entered the code **1357** the unit will launch the start-up wizard.	X	X	X	X	X

(1) In B mode, is only available with 2 transducers
(2) In E mode, is only available with 2 transducers

6. FINE TUNNING												
Par.	Description	Units	Programming			Notes	Application				
			Default	Min.	Max.		A	B	C	D	E
6.01	PROPORTIONAL CONSTANT		100	0	999		X	X		X	X
6.02	INTEGRAL CONSTANT		100	0,1	999		X	X		X	X
6.03	PI DIRECTION		Positive	Positive	Negative	For Temperarture Control Mode: For heating system, set this parameter to Positive. For cooling system, set this parameter to Negative.				X	X
6.04	SWITCHING FREQUENCY	kHz	7,7	2,5	16		X	X	X	X	X
6.05	STOP MANEUVER FREQUENCY	Bar	0,1	0	0,5		X				
6.06	SPEED OF STOP MANEUVER		1	1	64		X				
6.07	MODBUS ADDRESS		1	1	250		X	X	X	X	X
6.08	MODBUS BAUDRATE	kbps	19,2	4,8 9,6 19,2			X	X	X	X	X
6.09	MODBUS PARITY		0	0	2	0=even // 1=odd // 2=no parity	X	X	X	X	X
6.10	ALARM LOG RESET		NO	NO	YES	If you change this parameter from "NO" to "YES" you will reset the alarms log and the parameter automatically returns to "NO".	X	X	X	X	X
6.11	START-UP NUMBER LOG RESET		NO	NO	YES	If you change this parameter from "NO" to "YES" you will reset the number of start-ups and the parameter automatically returns to "NO".	X	X	X	X	X

To enter menu 6, a password is required (2468)
If installed on a borehole pump, it is reccomended to modify the 6.04 value (switching frequency) to minimum (2.5 kHz).
ATTENTION: Before modifying the menu 6 parameters, please contact our assistance service as, incorrect settings could cause improper functioning of the inverter and/or pump damage.

15 - MODBUS SETTINGS

MODBUS is an application-layer messaging protocol, positioned at level 7 of the OSI model. It provides client/server communication between devices connected on different types of buses or networks.

In the inverter, the MODBUS connectivity is made under the "Asynchronous serial transmission over EIA/TIA-485-A. Transmission mode is RTU (ASCII not supported)". For more technical information on its operation, you can go to the web **www.modbus.org**.

You can find the readable settings (input registers) on Technical Data section, page no 384.

Also, you can find the editable/readable settings (holding registers) on Technical Data section, page no 386.

16 - WARNING MANAGEMENT

One of the main principles of the Inverter is to try to avoid the failure of the hydraulic supply. To do this, the Inverter has systems that, in the event any reading for the pressure/consumption of the motor is outside of the established limits, it may partially lose its ability to try to avoid the Inverter locking and, therefore, avoid the failure of the hydraulic supply.

A clear example is an excessive consumption of the electric motor. In this specific scenario, the Inverter will limit the rotational speed of the motor to avoid its deterioration, maintaining the consumption of the motor equal to the nominal consumption, thus the hydraulic installation will continue to receive flow from the pump, not at the working pressure established, but at a somewhat lower pressure.

A table specifying the current state of the system operation, according to visual warnings that are shown using both the LEDS and the main screen can be found below:

WARNING	REASON	EXPLANATION / SOLUTION
The POWER LED blinks	The pump to which the Inverter is connected is not operative for automatic running.	Check that there is no manual shutdown (AUTO/STOP button on the keypad), a remote stop (auxiliary input active remote stop) or a general stop of the network of Inverters (occurs when any general critical parameter is being modified).
The RUN LED blinks	The Inverter is in the process of stopping the pump.	
The ALARM LED blinks	The start-up wizard is running.	The LED will stop blinking once the initial configuration wizard has finished.
	The pump is in a state of alarm (indicated on the display).	Consult the section on Alarms in this manual to resolve the incident.
The current frequency data blinks	The Inverter is limiting the rotational frequency of the motor due to a high temperature in the electronics, in addition to excessive consumption of the electric motor.	Consult the section on Alarms in this manual to resolve the incident.Check the Inverter is properly ventilated.
The stop frequency data blinks	The stop frequency calculated exceeds the maximum frequency permitted for pump operation.	We recommend running the stop frequency setup wizard again (find the stop frequency wizard on 5. ADVANCED PARAMETERS). If this warning persists after running the wizard again, you must reduce the working pressure, as the pump that is connected will not be able to reach it.
The current consumption data blinks	The Inverter is limiting the rotational frequency of the motor due to excessive consumption of the motor.	Check that the motor current is that indicated on the specifications plate.
Next to the current pressure data, there is an asterisk that blinks	The Inverter with this warning does not have any pressure transducer connected.If there is a transducer connected, it is not connected with the correct polarity.	Disconnect the transducer from the electrical terminal block and invert the polarity of the connecting cable.
	The transducer's reading has a difference of 0.5 bar from the other transducers connected on the network of Inverters.	We recommend changing the transducer because it is not reading correctly.

17 - ALARMS

MESSAGE	REASON	SOLUTION(S)
ALARM F01 **OVERCURRENT**	Indicates excessive consumption in the motor.	Check that the nominal consumption data has been entered correctly. Check that the pump rotates freely with no obstructions.
ALARM F02 **SHORT CIRCUIT**	The motor is shor circuited or has burnt out. Not all wires have been connected. Internal fault in the Inverter.	Disconnect the motor from the Inverter and check that the message disappears. If this is not the case, contact your nearest technical service. Check that all the cables of the motor are correctly connected to the motor itself and also to the Inverter. Also supervise the correct wiring of the Inverter's power supply. Contact your nearest technical service.
ALARM F03 **EXCESS TEMPERATURE OF THE MODULE**	The power module has reached a very high temperature, compromising its reliability.	Ensure the ambient temperature does not exceed the extremes set out in this manual. If it is assembled on the pump, ensure the pump has a fan and that the fan cover has been fitted. If it is assembled on a wall mount, ensure the fan of the mount functions correctly when the motor is running.
ALARM F04 **INPUT VOLTAGE**	The Inverter is not receiving electric current, of is outside of the upper and lower limits.	The electrical supply to the Inverter has been interrupted. The electrical connection cable from the mains electricity to the inverter has been disconnected. The electrical voltage entering the Inverter is outside the limits specified in the technical data section.
ALARM F05 **TRANSDUCER**	The Inverter does not receive a correct reading from the pressure transducer.	The pressure transducer is wired in the frequency converter with the polarity reversed.The pressure transducer is broken.The pressure transducer has a range other than 4-20 mA.
ALARM F06 **MOTOR FAULT**	The motor is short circuited or has burnt out. Fault/poor connection of the phases	Disconnect the motor from the Inverter and check that the message disappears. If this is not the case, contact your nearest technical service. Some of the cables that communicate the motor with the frequency converter are not making good electrical contact. The motor is connected to receive a voltage other than that provided by the Inverter. The consumption of the input phases is not balanced.
ALARM F07 **LOW WATER LEVEL**	The Inverter detects that the pump is working partially at no load.	Ensure the pump aspirates the fluid correctly.
ALARM F08 **BURST PIPES**	The Inverter detects that the pump is working at a very low pressure and at a speed high for a time.	Check that the water network has no leaks greater than those required for regular demand.

MESSAGE	REASON	SOLUTION(S)
ALARM A09 **FREQUENCY PARAMETERS INCOHERENT**	There is a parameter related to the frequency in conflict with the values considered normal.	Check that the minimum frequency is greater than 10 Hz. Check that the maximum frequency is lower than 65 Hz. Check that the minimum frequency entered is lower than the maximum frequency. Check that the minimum operating frequency for the auxiliary pumps is lower than the maximum frequency. Check that the minimum operating frequency for the auxiliary pumps is greater than the minimum frequency.
ALARM A10 **TIME PARAMETERS**	The stop delays of the auxiliary pumps exceeds the stop delay of the main pump.	
ALARM A11 **PRESSURE PARAMETERS**	The start-up pressure differential exceeds the working pressure.	Reduce the start-up pressure differential of the pump, or increase the working pressure above this value.
ALARM A12 **MOTOR OVERHEATING**	The detected value of the NTC or PTC thermistor is higher or lower than the indicated value.	Wait for the Motor to cool down. Check PTC or NTC cable connection.
ALARM A15 **OVERPRESSURE**	The alert threshold indicated in the section relating to overpressure alert level has been exceeded.	Check the overpressure warning alert level.
ALARM A16 **TEMPERATURE OFF LIMITS**	The alert indicates that the temperature are OFF limits.	Check the Min. Temperature Alert Level and Max. Temperature Alert Level on 5. ADVANCED PARAMETERS settings.
ALARM X13 **INTERNAL ERROR**	There is no communication between the control panel with the button pad and display, and the power plate screwed into the radiator. Internal fault in the Inverter.	Check that the flat cable that communicates both electronic circuits are well connected and tightened. It may be due to an occasional error in the firmware of the Inverter or the spot reading of a parameter deemed to be outside of the limits. In this case we recommend cutting the power to the Inverter for a few minutes. If after a few minutes, when the power is reconnected to the Inverter, the message remains, contact your nearest technical service.
ALARMA X14 **INTERNAL ERROR**	The communication between electronic boards of the same drive, or the information shared between drives has failures or data integrity errors.	Check that the flat cable that communicates both electronic circuits are well connected and tightened. Check that the cables connectingthe drives are correctly wired and tight. It may be due to an occasional error in the firmware of the Inverter or the spot reading of a parameter deemed to be outside of the limits. This error is self-resetting, so the system will usually return to normal after a few minutes.

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18 - MAINTENANCE AND REPAIR

We recommend monitoring the inverter periodically and regulating its operation.

19 - WARRANTY

Failure to comply with the instructions provided in this instruction manual and/or any manipulation of the inverter not carried out by an authorized technical service and/or the use of non-original spare parts will invalidate the warranty and exempt the manufacturer from any liability in case of accidents to people or damage to property and/or to the product itself.

Once the product has been received, check that it has not suffered significant breaks or dents. Otherwise, inform the delivery person. Once the inverter has been removed from its packaging, check that it has not been damaged in transit. In the event of any damage, inform the distributor.

Check that the characteristics displayed on the rating plate are those you requested.

If fault is not included in the "ALARMS" table, please contact the nearest authorized dealer.

20 - DISPOSAL AND ENVIRONMENTAL ASPECTS

To dispose of the parts that comprise the frequency converter, you must abide by the current regulations and laws of the country where the product is used. In any event, do not throw away parts that may pollute the environment.

This symbol on the product indicates that it should not be disposed of with other household waste.

This stipulation only refers to the disposal of equipment within the European Union (2012/19 /EU). It is the user's responsibility to dispose of the equipment by delivering it to a designated collection point for the recycling and disposal of electrical equipment. For more information about equipment collection points, contact your local waste disposal agency.