CM MultiPower

Installation and Operating Manual

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1. Introduction of the 4HS submersible pumps range

4HS is a 4" centrifugal submersible pump for clean water composed by:
- three phase pump with wet rotor and canned type resin filled stator.
- Built-in inverter on board.
- Multi stage pump entirely made of AISI 304 stainless steel.

Pump driving made by inverter allows:
- Modify the pump speed. In this way the pump is operated only and when needed thus avoiding unnecessary waste of energy and granting longer system life.
- Implement the soft start and the soft stop to increase the system life and reducing the current peaks.
- Protect the pump from overloading and dry running , overvoltage, undervoltage and possible abnormal conditions.

4HS is used on residential and industrial sectors for water pressurized systems, granting:
- Energy saving.
- Simplified and quick installation.
- Long life reliability.

4HS MultiPower pumps can be fed both AC and DC with wide margins of operating voltage (90-265 VAC or 90-400 VDC). This means that the same pump can be powered by photovoltaic panels, by wind or diesel generator or by batteries. The hydraulic performance will be adjusted automatically according to the power source and the power available.

In the application with photovoltaic panels an MPPT algorithm maximizes, for various conditions of irradiation and temperature, the electric power obtained from the panels thus the amount of water extracted.

Pump speed is adjusted in relation to solar irradiation. When solar irradiation increases, pump will run faster thus pumping more water. When solar irradiation decreases (clouds moving or different hours of the day) pump will reduce its frequency and so delivery but it continues pumping till solar irradiation reaches the minimum value necessary for working.

4HS MultiPower pumps can be installed with or without the surface control module.
When installed, the CM MP monitors and records:
- Running hours.
- Input voltage, current and power.
- Alarms: dry running, overload, overvoltage.

Digital inputs make it possible to connect a float switch, a pressure switch, a start and stop signal, etc...
Running and alarm status are given by two digital outputs.
Analogical inputs can be used to connect sensors (i.e. flow meter).

2. Safety Instructions

The manufacturer strongly suggests to reading carefully this operation manual before using and installing its products.

Any operation (installation, maintenance and repair) must be carried out by trained, skilled and qualified personnel.

Failure to observe and follow the instruction of this manual may result fatal in dangerous electric shock.

	The unit must be connected to the power supply by a switch granting the complete visual disconnection (separation) from the line before any operation. **Disconnect the unit from the power supply before any operation.** **Do not remove for any reason, the cover of the CM MP and the cable guard without having visually disconnected the unit from the power supply and having waited at least 5 minutes.** **CM MP and pump system must be grounded properly before operation.** **For the entire period the CM MP is powered a high voltage is present on the output terminals independently if it is running or not the pump.** **Do not start the pump for any reason if not completely immersed in water.**

Avoid any shock or serious impact during transportation.

Check the product immediately upon delivery and check for damage and/or missing parts. In either case, immediately notify the supplier.

Damages due to transportation, incorrect installation, or improper use of the device will null and void the warranty.

The manufacturer cannot be held responsible for any damage to people and/or property due to improper use of its products.
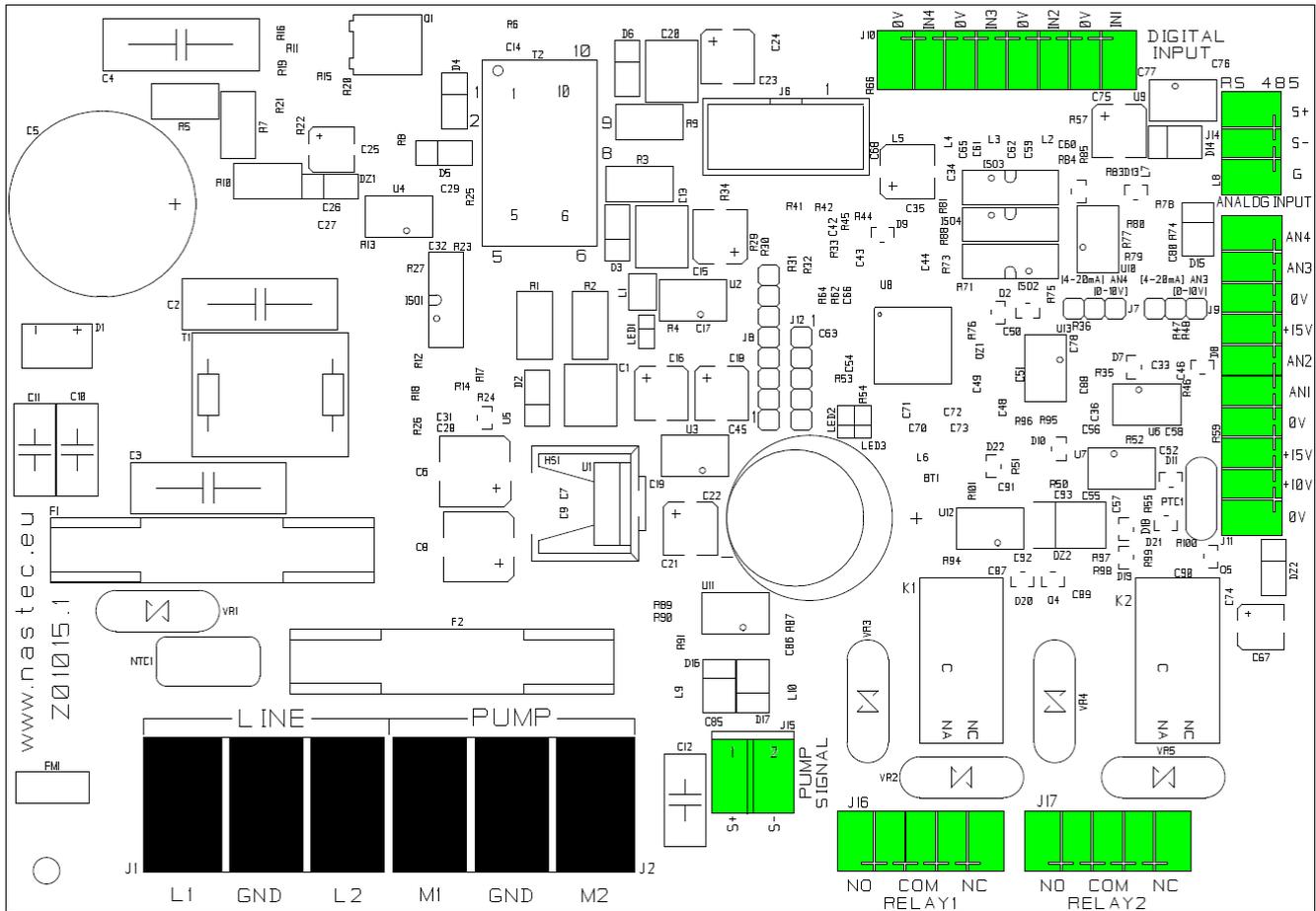
3. CM MP installation

The CM MP can be easily fixed to the wall using 2 screws through the holes shown.
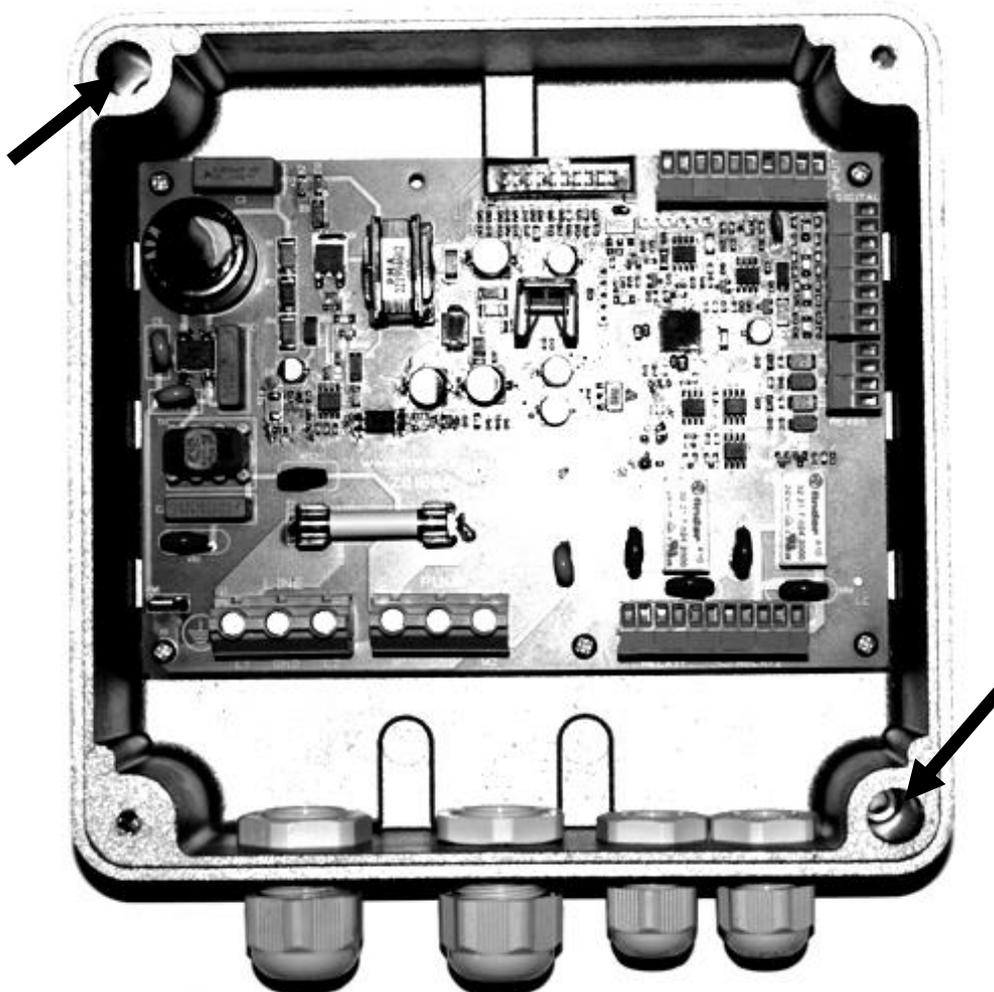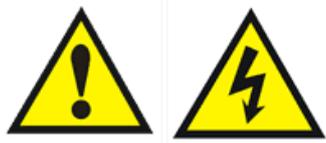

Then using the special inserts thus cover can be fixed firmly.

The IP55 protection degree enables the CM MP installation even in humid and dusty environments. However it is recommended to protect the CM MP from the direct exposure to weather and sunlight.
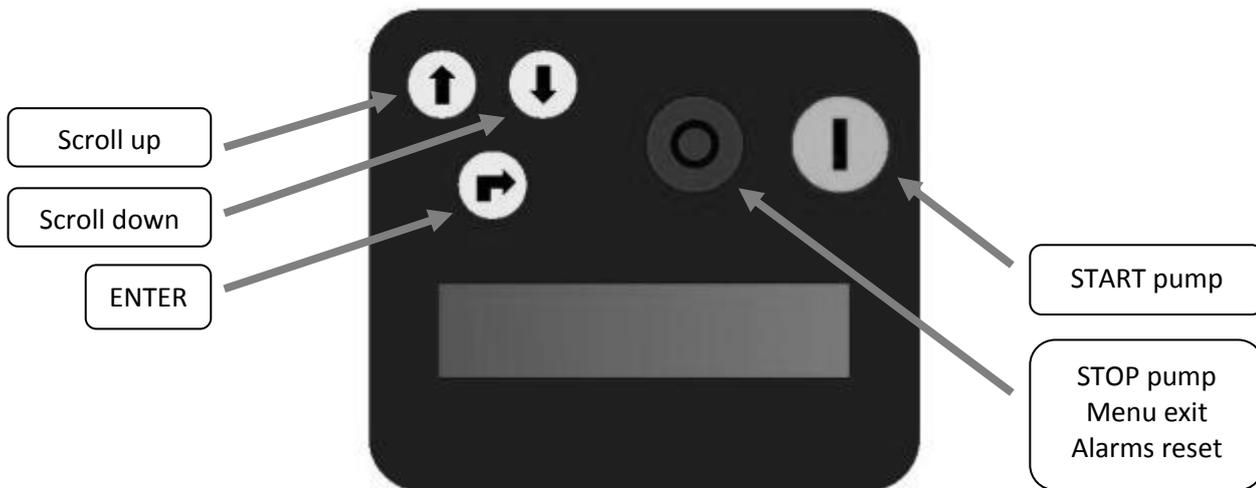
3.1 Electric wiring

Input power line (LINE): • **L1,L2 power line** • **GND ground**	Output power line (PUMP): • **M1,M2 terminals** • **GND ground**		Pump signal: • **S+ (red)** • **S- (white)**
Analog inputs (10 or 15 Vdc): 1. AN1: 4-20 mA: sensor 1 2. AN2: 4-20 mA: sensor 2 3. AN3: 4-20 mA / 0 - 10 Vdc (settable by jumper C.C.): external set 4. AN4: 4-20 mA / 0 - 10 Vdc (settable by C.C.): trimmer for frequency regulation / external set 2	Digital inputs (pump start/stop): • IN1 • 0V • IN2 • 0V • IN3 • 0V • IN4 • 0V	Communication auxiliary (RS485): • S+ • S- • G	Digital outputs (relays): • RELAY1: pump run signal NO: normally opened COM: common NC: normally closed • RELAY2: alarm signal NO: normally opened COM: common NC: normally closed **Relays of digital outputs are free contacts relays (no voltage) Max voltage is 250 V AC and max current is 5 A.**
⚠ ⚡	**Read carefully the Guidelines for safety before installing the device.** **At the end of the installation check that no other objects are inside the CM MP or deposited on the electronic board.** **It is recommended to tighten all 4 screws with washers of the cover before powering the device. Otherwise, you may fail to connect to ground the cover with a risk of electric shock or even death.**		

4. CM MP use and programming

Scroll up

Scroll down

ENTER

START pump

STOP pump
Menu exit
Alarms reset

4.1 Initial views

Inv: ON/OFF Mot: ON/OFF p = XX.X [bar]	*p is the pressure value read by the pressure transducer.*
Inv: ON/OFF Mot: ON/OFF V_in = XXX [V]	V_in is the line voltage.
Inv: ON/OFF Mot: ON/OFF I_in = XX.X [V]	I_in is the line current.
Inv: ON/OFF Mot: ON/OFF cosphi = X.XX	cosphi index means the angle phi between the voltage and current absorbed by the pump.
Inv: ON/OFF Mot: ON/OFF P = XXXXX [W]	P is the power absorbed from the line.
Inv: ON/OFF Mot: ON/OFF STATUS: NORMAL Inverter Life xxxxx h : xx m Motor Life xxxxx h : xx m %f 25 50 75 100 %h XX XX XX XX	NORMAL status means no alarms. If an alarm occurs, a message blinks on the display and an audible signal is activated. Pressing ENTER accesses: Inverter lifetime, pump lifetime, consumption statistic, alarm list. To return to previous views, press ENTER.

XXXXXXXXXXXXXX XXXXXXX h : XX m	
Menù ENT to access	

4.2   Installer parameters

Pressing ENTER where you are in [MENU' / ENT to access], the following MENU is displayed:

MENU Instal. param.	Password required to enter (default 001)

To exit the Menu level and return to INITIAL DISPLAY is enough to press STOP button.

Parameter	Def.	Description
Control mode • MPPT • Constant value • Fix speed • Const.value 2set • Fix speed 2 val. • External speed	MPPT	Mode of control: • MPPT: pump speed is adjusted in order to obtain maximum power available from PV panels. • Constant value: pump changes its speed to keep the set value constant regardless water demand. • Fix speed: the pump runs at set frequency. • Const. value 2 set: the two values are selected by opening or closing the digital input IN2. • Fix speed 2 val: the two valus are selected by opening or closing the digital input IN2. • External speed: control pump frequency by using analog input AN4.
Control mode: MPPT		
Unit XXXXX	bar	Unit
F. scale sensor p = XX.X [bar]	16	Sensor full scale.
Min value sensor p = XX.X [bar]	0	Sensor minimum value.
Max alarm value XXX.X [bar]	10	Maximum value allowed in the system. If the readen value goes over this value, an alarm occurs and the pump is stopped.

Parameter	Def.	Description
		Pump is automatically restarted if the readen value goes below the maximum value for a period of at least 5 seconds.
Min alarm value XXX.X [bar]	0	Minimum value allowed in the system. If the readen value goes lower than this value, an alarm occurs and the pump is stopped. Pump is automatically restarted if the readen value goes higher than the minimum value for a period of at least 5 seconds.
Freq.min.control XXX [Hz]	80	Minimum frequency below which the pump tries to stop.
Stop delay XX [s]	60	Delay for which the pump tries to stop below freq.min.control.
MPPT: volt. gap dV = XX.X [V]	XX	MPPT voltage gap.
MPPT: time gap dt = XX.X [s]	XX	MPPT time gap.
MPPT: freq. gap df = XX.X [Hz]	XX	MPPT frequency gap.
Ki XX	50	Kp and Ki parameters allow the dynamic control of the system. set values (Ki=50, Kp=005) are usually enough to get a valid dynamic control.
Kp XX	5	Kp and Ki parameters allow the dynamic control of the system. set values (Ki=50, Kp=005) are usually enough to get a valid dynamic control.
Dry run thresh. Dr_thr = X.XX	0.5	Threshold of water level sensor.
Restarts delay XX [min]	1	Restart delay after a dry running alarm. At each tentative (max 5) restart delay will be doubled.
Digital input 1 N.O. / N.C.	N.O.	By selecting N.A. (normally open) CM MP runs the pump if the digital input 1 is open; pump will be stopped if the digital input 1 is closed. By selecting N.C. (normally closed) CM MP runs the pump if the digital input 1 is closed; pump will be stopped if the digital input 1 is opened.
Digital input 2 N.O. / N.C.	N.O.	By selecting N.A. (normally open) CM MP runs the pump if the digital input 2 is open; pump will be stopped if the digital input 2 is closed. By selecting N.C. (normally closed) CM MP runs the pump if the digital input 2 is closed; pump will be stopped if the digital input 2 is opened.

Parameter	Def.	Description
Digital input 3 N.O. / N.C.	N.O.	By selecting N.A. (normally open) CM MP runs the pump if the digital input 3 is open; pump will be stopped if the digital input 3 is closed. By selecting N.C. (normally closed) CM MP runs the pump if the digital input 3 is closed; pump will be stopped if the digital input 3 is opened.
Digital input 4 N.O. / N.C.	N.O.	By selecting N.A. (normally open) CM MP runs the pump if the digital input 4 is open; pump will be stopped if the digital input 4 is closed. By selecting N.C. (normally closed) CM MP runs the pump if the digital input 4 is closed; pump will be stopped if the digital input 4 is opened.
Dig.In.2/3 delay t= XX [s]	3	Digital input IN2 and IN3 delay. Digital input IN1 and IN4 have 1 second fix delay.
Change PASSWORD1 ENT		Pressing ENT allows the installer level password (1st level) (default 001) to be changed.

4.3 Advanced parameters

Pressing ENTER where you are in [MENU' / ENT to access], the following MENU is displayed:

MENU Advanced param.	Password required to enter (default 002)

To exit the Menu level and return to INITIAL DISPLAY is enough to press STOP button.

Parameter	Def.	Description
Max input Amp. I = XX.X [A]	16	Max input current.
Max motor freq. XXX [Hz]	XX	Maximum motor frequency. Note: by reducing the maximum motor frequency, maximum current will be reduced as well.
Autorestart ON/OFF	OFF	If ON is selected, after a lack of voltage, the pump returns to its normal status; if the pump was running before the voltage drop, it resumes to run automatically. <u>Warning</u>, review the advice in chapter 1.
Periodic autorun t = XX [h]	0	Pump periodic autorun after XX hours of inactivity. Value 0 makes function disabled. <u>Warning</u>, review the advice in chapter 1.
AN1,AN2 function XXXXXX	Independent	Function logic for analog input AN1,AN2 (independent, lower value, higher value, difference 1-2).

Parameter	Def.	Description
Offset input 1 [%]	20%	Zero correction for analog input 1 (4-20 mA) (20 mA x 20% = 4 mA).
Offset input 2 [%]	20%	Zero correction for analog input 2 (4-20 mA) (20 mA x 20% = 4 mA).
Offset input 3 [%]	0%	Zero correction for analog input 3 (0-10V) (10V x 00% = 0 V).
Offset input 4 [%]	0%	Zero correction for analog input 4 (0-10V) (10V x 00% = 0 V).
Language XXXXXX	XXXX	End user communication language

5. Protections and alarms

Anytime a protection occurs a blinking message is displayed; on STATUS on INITIAL VIEW the protection is displayed; by pressing STOP button (only and exclusively from the this position of STATUS on INITIAL VIEW) is possible to try to reset the alarm; if CM MP does not reset the alarm it is displayed again.

ALARM MESSAGE	ALARM DESCRIPTION	POSSIBLE SOLUTION
OVERCURRENT MOT.	Pump overload	Check possible causes about the overload.
UNDER VOLTAGE	Supply voltage too low	Check possible causes of undervoltage
OVER VOLTAGE	Supply voltage too high	Check possible causes of overvoltage
OVER TEMP. INV.	Inverter over temperature	Make sure than ambient temperature is less than 35 °C.
NO WATER	Pump is running dry.	Check water level. Check the level sensor is completely immersed in water. CM MP tries to run the pumps every 5 minutes. WARNING: if dry running protection occurs, CM MP tries to start the pump automatically without any advice.
IGBT TRIP ALARM	Electronics overload	Check possible causes about the overload.

ALARM MESSAGE	ALARM DESCRIPTION	POSSIBLE SOLUTION
MAX. VALUE ALARM	Measured value has reached the maximum value accepted by the system.	• Check possible causes of reaching max value • Check the max alarm value setting.
MIN. VALUE ALARM	Measured value has reached the lowest value accepted by the system.	• Check possible causes reaching min value (i.e. broken pipe, open pressure relief valve, etc.) • Check the min alarm value setting.
NO COMMUNICATION	Communication between CM MP and 4HS has been interrupted.	• Check the wiring connections.
KEYBOARD FAULT	A Button on the keyboard has been pressed for more than 150 seconds	• Make sure buttons are not depressed • Call service assistance
ACTIVE DIG.IN.X	Digital input X opened /closed	• Check the input digital configuration (Installer Parameters menu)

NOTE