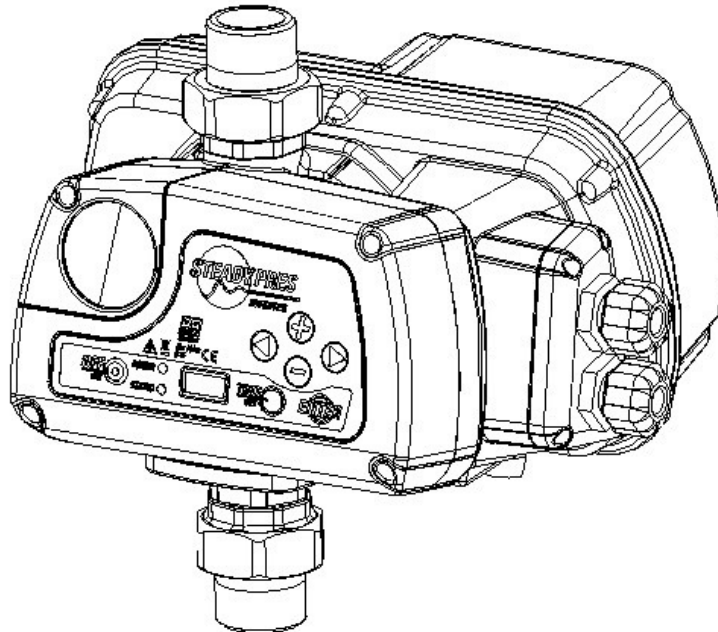


VARIABLE FREQUENCY DRIVE (INVERTER)

OPERATOR'S AND MAINTENANCE MANUAL





| Model | V in | V out | A | P (kW) | P (HP) |
|----------------|-------------|--------------|----------|---------------|---------------|
| M/M 8.5 | 1 ~ 230V | 1 ~ 230V | 8,5 | 1,1 | 1,5 |
| M/M 11 | 1 ~ 230V | 1 ~ 230V | 11 | 1.5 | 2.0 |
| M/M 16 | 1 ~ 230V | 1 ~ 230V | 16 | 2,2 | 3,0 |
| M/T 7 | 1 ~ 230V | 3 ~ 230V | 7 | 1,1 | 1,5 |
| M/T 12 | 1 ~ 230V | 3 ~ 230V | 12 | 2,2 | 3,0 |
| T/T 6 | 3 ~ 400V | 3 ~ 400V | 6 | 2,2 | 3,0 |
| T/T 8 | 3 ~ 400V | 3 ~ 400V | 8 | 3,0 | 4,0 |

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10169907A.4 - 1502

SAFETY STANDARDS

Safety important instructions.

| | |
|---|--|
|  | <i>This symbol warns that failure to comply with the prescription leads to a risk of electric shocks.</i> |
|  | <i>This symbol warns that failure to comply with the prescription leads to a risk of injury/damage to persons/objects.</i> |

Before installation and use of the product:

- *read this manual completely and thoroughly*
- *Check that the **nameplate data** are those desired and appropriate to the system, and in particular that the **rated current of the motor** is compatible with the **rated current of the inverter***
- *Installation and maintenance must be carried out by qualified staff, responsible for performing the hydraulic and electric connections according to the applicable Standards in force*
- *The manufacturer declines all responsibility for damage deriving from improper use of the product and is not liable for damage caused by maintenance or repairs that are carried out by unqualified staff and/or using non-original spare parts*
- *The use of non-original spare parts, tampering or improper use, make the product warranty null and void.*

During first installation or when carrying out maintenance make sure that:

- **the electric power supply network is not live**
- *The power supply network is equipped with protections and in particular of **high-sensitivity differential switch** (30 mA in class A for domestic application, class B for industrial applications) and grounding comply with the Standards.*
- **Before removing the inverter cover** or starting interventions on it, the system must be disconnected from the mains electricity and you must wait for 5 mins until the intermediate circuit condensers, have the time to discharge via the built-in discharge resistors.
- **do not disconnect the pumps if STEADYPRES is in operation; before you disconnect the pumps, stop the control and disconnect the power supply.**
- *WARNING: out of service (flashing red LED) STEADYPRES remains in tension; prior to any work on the pump or inverter is required, cut off power from the group.*

Emergency stop

An emergency stop can be performed while the inverter is running, by pressing the START/STOP key.

In parallel inverters installations, only the MASTER inverter stops the whole system.

INDEX

| | |
|--------------------------|---|
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|--------------------------|---|

PART 1 – QUICK INSTALLATION GUIDE





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- PART 2 – OPERATOR'S AND MAINTENANCE MANUAL

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PART 1 - QUICK INSTALLATION GUIDE

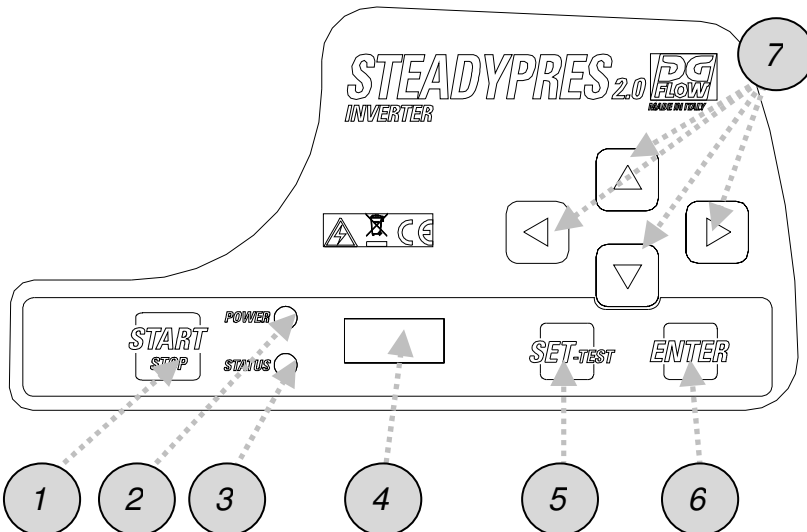
PRELIMINARY CHECKS

| | |
|--|--|
|  | During the initial installation and maintenance, make sure that ends of the line wires are not live. |
|  | During the initial installation and maintenance, make sure that the system is not under pressure |
|  | to ACCESS THE DRIVE WIRING , open the front cover as shown on p. 5 DO NOT OPEN INVERTER COVERS , except for the connector cover |
|  | Models T / T (three-phase IN / three-phase OUT) do not have the switch on board, for these models the inverter supply line must be protected in accordance with the regulations |

- **Install the inverter in a place:**

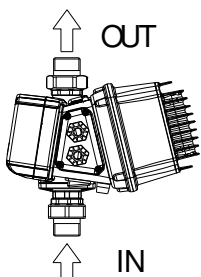
- o protected from the elements
- o ventilated, free from excessive humidity or excessive dust
- o as close as possible to the pump
- o make sure that does not receive harmful vibrations or mechanical stress from connected pipelines

- **Control panel:**



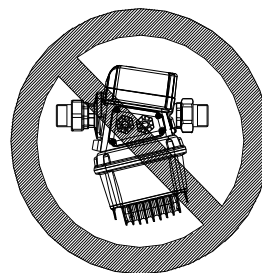
- 1- START/STOP button
- 2- Red LED (power)
- 3- Green LED (status)
- 4- Display
- 5- SET button
- 6- Confirm button
- 7- Scrolling UP / DOWN / RIGHT / LEFT

INSTALLATION AND HYDRAULIC CONNECTIONS



OK

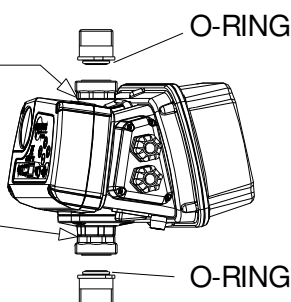
Install in a **vertical** position



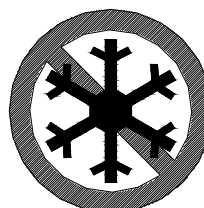
NC

Do not install in a horizontal position

NO SEALING
NO CANAPA
NO TEFLON



Do not use sealant in the three-pieces joint; are already equipped with O-Ring



The freezing of the liquid contained in the inverter body causes irreversible damage to the inverter

POWER CONNECTIONS



Open the side cover
(4 screws)



Wire the cables as indicated in the diagrams below:

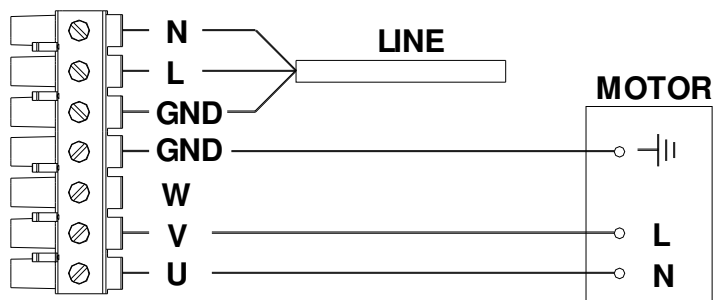
A = inverter supply cable

B = output motor cable



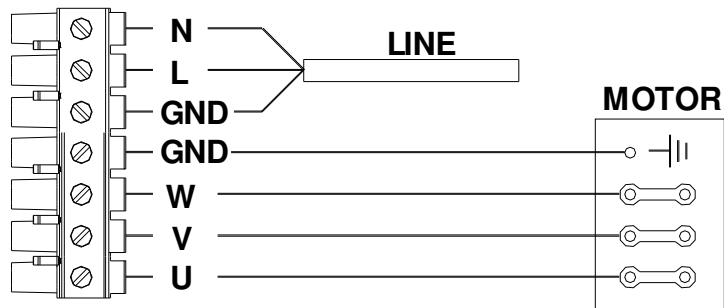
Insert the connector and close the side cover.

CAUTION : to overcome **problems associated with long cables** (between Inverter and pump motor) , evaluate the application of inverter output sinusoidal filter. It aids smooth running of motors eliminating negative effect of voltage peaks



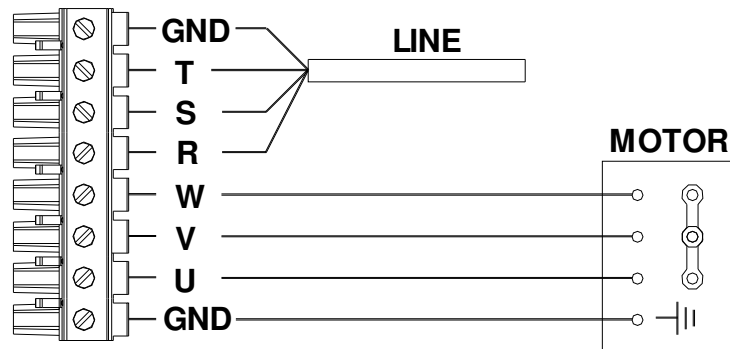
SINGLE-PHASE IN (line)
SINGLE-PHASE OUT (motor)
(M / M)

Pump supply voltage:
230 V single-phase
(or 115 V single-phase)



SINGLE-PHASE IN (line)
THREE-PHASE OUT (motor)
(M / T)

Pump supply voltage:
230/400 V three-phase
Motor connection : DELTA

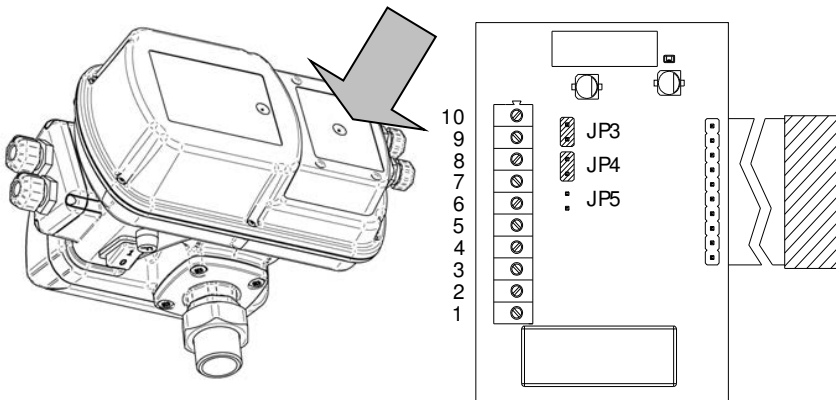


THREE-PHASE IN (line)
THREE-PHASE OUT (motor)
(T / T)

Pump supply voltage:
230/400 V three-phase
Motor connection : STAR

SIGNAL CONNECTIONS

Expansion board: is located in the back of the inverter (see fig. below)



Terminal clamp operation description:

10: not connected

9: RS 485 +

8: RS 485 -

7: not connected

6: not connected

5: level input

4: GND

3: NC output signal

2: comune C

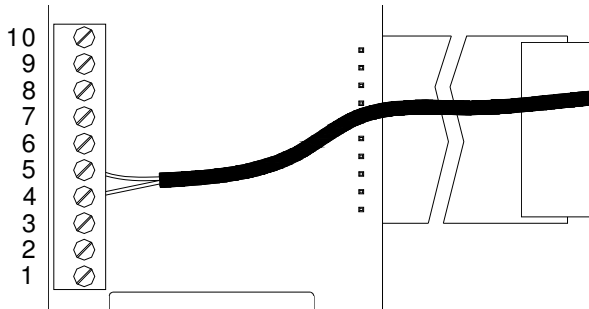
1: NO output signal

JP3: standard comm. 2 / 4 wires

JP4: standard comm. 2 / 4 wires

JP5: load resistance for long cables (> 10 m)

- LEVEL SIGNAL CONNECTION



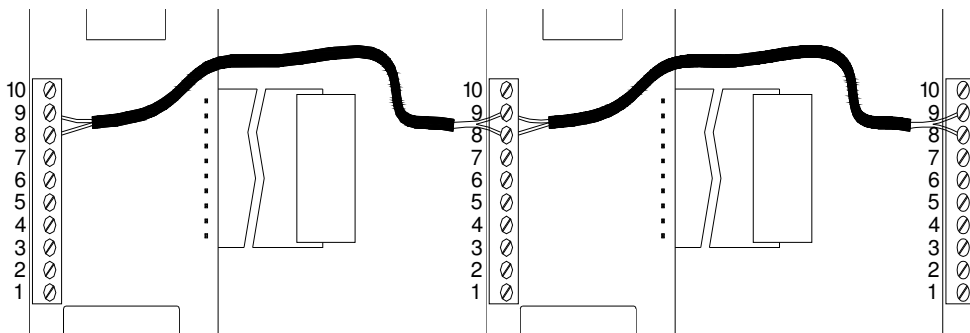
(or other input signal)

Connect the signal cable to **clamps**

4 e 5

In applications with parallel inverters, the wiring must be carried out on the **MASTER**

- RS485 SIGNAL CONNECTION



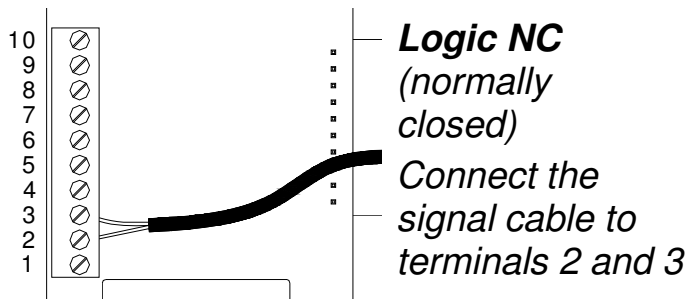
Connect the **terminals n° 8** of the inverters in parallel (RS 485 -)

Connect the **terminals n° 9** of the inverters in parallel (RS 485 +)

as shown aside.

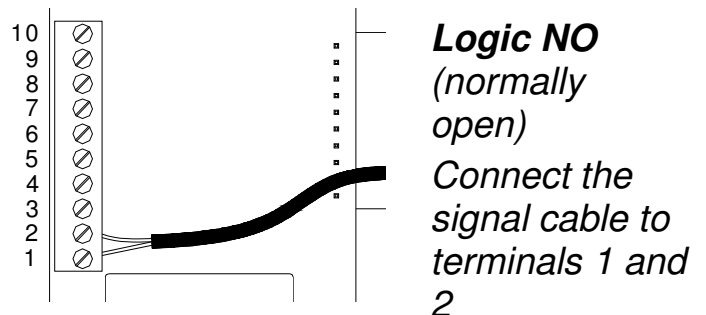
- ALARM SIGNAL CONNECTION

(In applications with parallel inverters, the wiring must be carried out on the MASTER)



Logic NC
(normally closed)

Connect the signal cable to terminals **2 and 3**



Logic NO
(normally open)

Connect the signal cable to terminals **1 and 2**

STARTING UP

Switch on and wait the **STARTING** time (ab. 10 sec.)



By pressing the button

START
STOP

you put

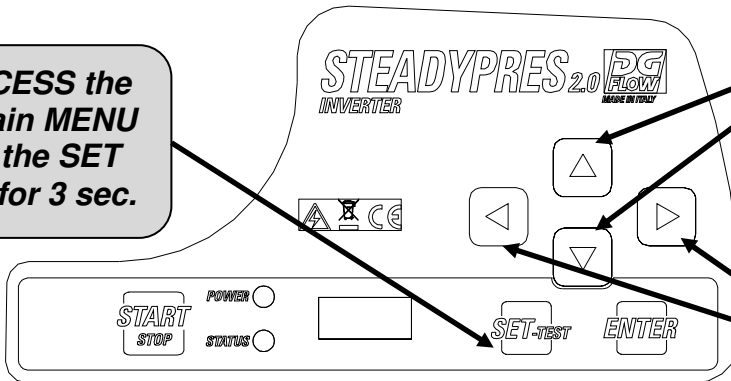
IN SERVICE
OUT OF SERVICE

the inverter.



ACCESS TO MAIN MENU

To **ACCESS** the four main **MENU** Press the **SET** button for 3 sec.



To **SCROLL** the 4 **MAIN MENU** use the buttons

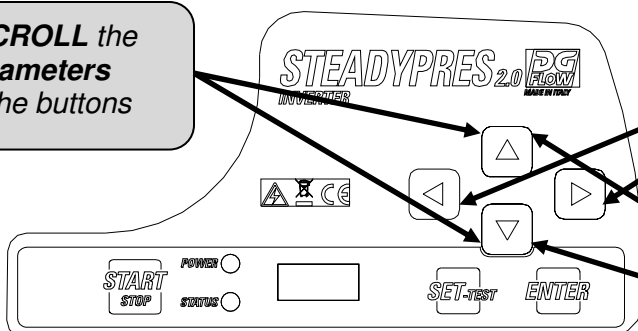
To **ACCESS** and **EXIT** the **MAIN MENU** use the buttons

MAIN MENU

| | | | |
|--------------|---|--|--|
| BASIC | ▶ | BASIC MENU parameters | BASIC PARAMETERS for the configuration of the drive. |
| ADV | ▶ | ADVANCED MENU parameters | ADVANCED PARAMETERS for the detailed configuration of the drive. |
| INSP | ▶ | INSPECTION MENU parameters | INSPECTION PARAMETERS, display the hours of work, the number of starts, alarm history, etc.. |
| TEST | | TEST mode (only in OFF mode) | TEST mode allows you to start and stop the pump in manual mode (START / STOP button) and change the frequency in steps of 1 Hz. It also allows to control the operating parameters of the motor and inverter. WARNING: DURING MANUAL OPERATION, AUTOMATIC CONTROLS ARE EXCLUDED, AND THE OPERATOR MUST AVOID ANY INCORRECT OPERATION. |

ACCESS TO PARAMETERS

To **SCROLL** the parameters use the buttons



To **ENTER** and **EXIT** the parameters use the buttons

To **MODIFY** the parameters use the buttons

MENU STRUCTURE

SET

BASIC

| | |
|-----------|---|
| P | SET PRESSURE |
| 2P | SECOND SET PRESSURE |
| A | MOTOR CURRENT |
| RO | MOTOR DIRECTION OF ROTATION (<i>models with three-phase output</i>) |

ADV

| | |
|--------------|--|
| d | DIFFERENTIAL PRESSURE FOR RESTART |
| MF | NOMINAL MOTOR FREQUENCY |
| LF | MINIMUM OPERATION FREQUENCY |
| HF | MAXIMUM OPERATION FREQUENCY |
| Td | STOP DELAY FOR DRY RUNNING |
| PF | MINIMUM POWER FACTOR (<i>only T/T models</i>) |
| TPF | STOP DELAY FOR POWER FACTOR (<i>only T/T models</i>) |
| TP | RESTART INTERVAL FOR DRY RUNNING |
| TF | STOP DELAY FOR NO FLOW |
| RF | INVERTER REACTIVITY |
| FS | MODULE SWITCHING FREQ |
| US | NO GRIP STARTUPS |
| EI | INPUT SIGNAL |
| EO | OUTPUT SIGNAL |
| AI | RECYCLE FUNCTION |
| AT | RECYCLE ACTIVATION TIME |
| W | INVERTER ADDRESS |
| V | MAINS POWER SUPPLY VOLTAGE |
| Pd | iDRY PRESSURE (%) |
| FM | FLAT MODULATION |
| SET.F | RESTORE FACTORY SETTINGS |


INSP

| | |
|------------|---------------------------|
| WH | OPERATING HOURS |
| TH | TOTAL OPERATING HOURS |
| NS | NO. START-UPS |
| SH | AVERAGE NO. START-UPS |
| E1 | LAST FAULT |
| E1H | TIME OF LAST FAULT |
| | |
| E4 | FOURTH LAST FAULT |
| E4H | TIME OF FOURTH LAST FAULT |
| EE | ERROR RESET |

TEST

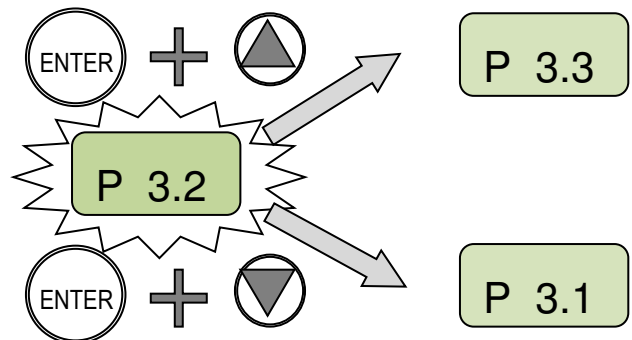
BASIC PARAMETERS

The basic parameters for the configuration of the inverter must necessarily be set during installation

| | Param. | description | m.u. | Default | Min | Max | Step | |
|---|---|---|---------|---------|---------|-----|------|------|
| BASIC  | P 3.5 SET PRESSURE (bar) | Sets the constant working pressure in the system. | bar | 3,5 | 1 | 10 | 0,1 | |
| | | | psi | 50 | 15 | 130 | 1,5 | |
| | 2P 2.5 SECOND SET PRESSURE (bar) | Sets a second working pressure. To activate configure parameter EI in ADV. parameters. | bar | 2,5 | 1 | 10 | 0,1 | |
| | | | psi | 35 | 15 | 130 | 1,5 | |
| | A 6.0 MOTOR CURRENT (A) | Sets the motor rated current at the inverter output (rated current of the motor) At low supply voltages , the current set should leave a margin (eg. + 15%) to compensate for the low voltage. | | m.u. | Default | Min | Max | Step |
| | | | M/M 8.5 | A | 8.5 | 1 | 8,5 | 0,1 |
| | | | M/M 11 | A | 11 | 1 | 11 | 0,1 |
| | | | M/M 16 | A | 16 | 1 | 16 | 0,1 |
| | | | M/T 7 | A | 7 | 1 | 7 | 0,1 |
| | | | M/T 12 | A | 12 | 1 | 12 | 0,1 |
| T/T 6 | | | A | 6 | 1 | 6 | 0,1 | |
| T/T 8 | | | A | 8 | 1 | 8 | 0,1 | |
| RO → | MOTOR DIRECTION OF ROTATION | ONLY FOR THREE-PHASE OUTPUT - Set the direction of rotation of the three-phase motor (CW / CCW) | | | | | | |

Set pressure quick adjustment

To increase 0,1 bar press **SIMULTANEOUSLY**



To decrease 0,1 bar press **SIMULTANEOUSLY**

display the firmware version (FW)

To display the FW version of the CONTROL BOARD (FWI) and the POWER BOARD (FWP)



Bring STEADYPRES out of service (OFF)





Press simultaneously



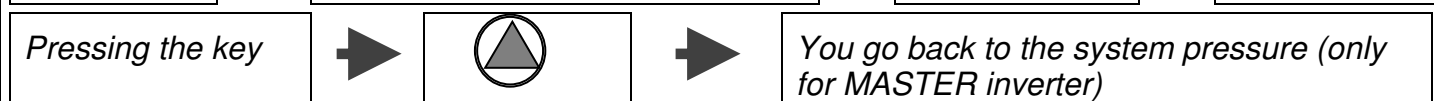
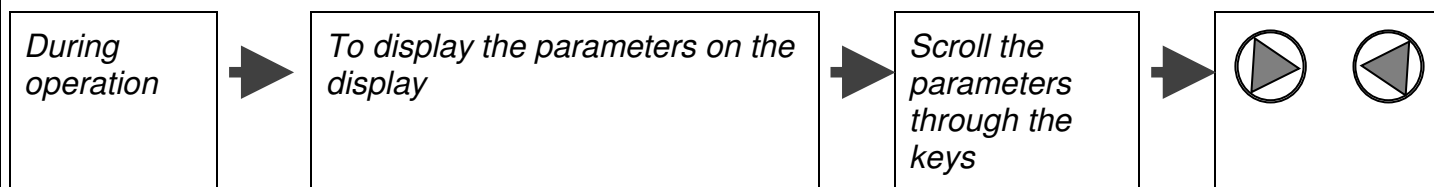
ADVANCED PARAMETERS

Listed below the **ADVANCED PARAMETERS** for the configuration of the inverter

| | Param. | description | u.m. | Default | Min | Max | Step | |
|---|---------------|---|---|------------|-------------|-------------|-------------|-------------|
| ADV | d 0.40 | DIFFERENTIAL PRESSURE FOR RESTART | Sets the difference between the selected pressure (SETPOINT) and the effective restart pressure | bar | 0,5 | 0,4 | 1,0 | 0,1 |
| | | | | psi | 6 | 6 | 15 | 1,5 |
|  | MF 50 | NOMINAL MOTOR FREQUENCY | Sets the nominal frequency of the motor The set value MUST be the same as the value indicated on the motor plate | Hz | 50 | 50 | 60 | - |
| | LF30 | MINIMUM OPERATION FREQUENCY | Sets the minimum operating frequency | Hz | 30 | 25 | 40 | 1 |
| | HF 50 | MAXIMUM OPERATION FREQUENCY | Sets the maximum operation frequency. CAUTION!! Increasing the maximum frequency above the nominal frequency may cause significant motor overload. | Hz | MF | MF-5 | MF+3 | 1 |
| | Td 10 | STOP DELAY FOR DRY RUNNING | Sets the pump stop delay under dry running conditions CAUTION: high values of the stop delay may damage the pump | sec | 10 | 1 | 100 | 1 |
| | PF .50 | MINIMUM POWER FACTOR (only T/T models) | Sets the minimum value for the power factor below which the inverter stops the pump. By setting the minimum power factor value, read the value of the motor running with closed valves and deducting 0.03 to it; | - | 0.50 | 0.50 | 0.99 | 0.01 |
| | TPF 0 | STOP DELAY FOR POWER FACTOR (only T/T models) | Sets the time delay before the drive will perform the minimum power factor alarm. Setting the value to 0 (zero) disables this feature. | sec | 0 | 0 | 3 | 1 |
| | TP10 | RESTART INTERVAL FOR DRY RUNNING | Sets the interval between two successive automatic attempts to restart following stops for "dry running" Setting the value to "0" excludes attempts for automatic restarts | min | 10 | 0 | 100 | 1 |
| | TF 3 | STOP DELAY FOR NO FLOW | Sets the pump stop delay under no flow conditions | sec | 3 | 1 | 15 | 1 |
| | RF 4 | INVERTER REACTIVITY | Sets the inverter response speed to pressure changes The response value selected depends on the characteristics of the system | - | 3 | 1 | 5 | 1 |

| | Param. | description | u.m. | Default | Min | Max | Step |
|---|-----------------------------------|---|------------|-----------|-------------------------|------------|----------|
| ADV  | FS 10 | MODULE SWITCHING FREQ Sets the switchover frequency for the power module. <i>In case of long power cable, without a sinusoidal filter, set this value at the minimum</i> | kHz | 8 | 4 | 12 | 2 |
| | US 0 | NO GRIP STARTUPS Sets the interval between two consecutive automatic "no grip" start-ups (When the pump will be inoperative for a long). <i>Setting the value to "0" disables the function.</i> | min | 0 | 0 | 999 | 1 |
| EI 0 | INPUT SIGNAL | Sets the digital input FUNCTION (clean contact type) <i>EI = 0: NO FUNCTION; the input state is ignored EI = 1: WATER LEVEL; Level signal input with NC logic EI = 2: EXT ENABLE; Start and disabling by external signal (NC) EI = 3: PRESS SET 2; enabling the second pressure level SETPOINT2 (NC). EI = 4: EXTERNAL LEVEL SIGNAL INPUT with NC logic; replaces the signal from the non-return valve. EI = 5: ALARM RESET SIGNAL INPUT</i> | - | 0 | 0/ 1/ 2/ 3/ 4/ 5 | | |
| EO 0 | OUTPUT SIGNAL | Sets the digital output FUNCTION (clean contact type) <i>EO = 0: NO FUNCTION; the state of the output is never activated. EO = 1: ALARM OUTPUT; condition of stop due to fault. EO = 2: PUMP OPERATING OUTPUT; there is at least one operating pump. EO = 3: recirculation; activates the relay output time intervals defined by the parameter AI</i> | - | 0 | 0/ 1/ 2/ 3 | | |
| AI 60 | RECYCLE FUNCTION | Sets the output activation interval (clean contact type) configured as recycle function (Eo=3) | min | 60 | 1 | 999 | 1 |
| AT 10 | RECYCLE ACTIVATION TIME | Sets the duration of the activation of the output signal (clean contact type) | sec | 10 | 1 | 999 | 1 |
| W NC | INVERTER ADDRESS | Activates communication between two or more inverters, defining the function of each unit: MS (MASTER unit) , S1/S2 (SLAVE unit), NC (operation with a single inverter) | - | NC | NC/ MS/ S1/ S2 | | |
| V 230 | MAINS POWER SUPPLY VOLTAGE | Sets the mains power supply voltage. 230 V for single phase power supply versions 400V for three phase power supply versions | V | | | | |
| Pd 70 | iDRY PRESSURE (%) | Sets the minimum pressure value (expressed as % of the SET pressure) that must be reached in no flow, otherwise an alarm of dry running | % | 70 | 10 | 100 | 1 |
| FM | FLAT MODULATION | Enable / disable the FLAT modulation; FLAT modulation reduces the heating of the power components of the inverter | - | 1 | 0 | 1 | 1 |
| SET.F | RESTORE FACTORY SETTINGS | Base and Advanced menu will be factory restored. To reset the factory parameters, press the ENTER key and hold until "OK" appears on the display (ENTER → **** → OK) | | | | | |

DISPLAY THE OPERATING PARAMETERS



| Display | Description | m.u.. |
|---------------|---|-------|
| P 3.2 | SYSTEM PRESSURE Displays the system pressure (only for MASTER inverter) | bar |
| F 45 | OPERATING FREQUENCY Displays the motor revolution Frequency. | Hz |
| A 6.5 | ABSORBED CURRENT Displays the motor absorbed current (RMS value) CAUTION! Standard ammeter may read input and output current values different from the one shown by inverter. | A |
| V 230 | DYNAMIC VOLTAGE It matches to the power supply 'voltage value' - only with pump in standby. | V |
| PF .85 | Power factor (COSFI): Shows the instantaneous value of the power factor (only T/T models) | |
| Tm 50 | POWER MODULE TEMPERATURE Displays the inverter's electronic module temperature. | °C |
| Ti 30 | INVERTER BOX INTERNAL TEMP. Displays the box internal Temperature (only T/T models) | °C |
| Tc 50 | INVERTER BOX INTERNAL TEMP. Displays the box internal Temperature (only T/T models) | °C |
| In 0 | INPUT ACTIVATION STATUS Displays the input signal activation Status 1= enabled input / 0= input not enabled | |
| Ou 0 | OUTPUT ACTIVATION STATUS Displays the output relay activation Status 1= enabled input / 0= input not enabled | |
| S1-S2 | STATUS RS 485 (SLAVE connection) Displays the status of the inverter SLAVE connected to the inverter MASTER. The parameter is not displayed in applications STAND-ALONE (parameter W = NC). XX-XX = no SLAVE inverter connected S1-XX = inverter SLAVE1 connected XX-S2 = inverter SLAVE2 connected S1-S2 = inverter SLAVE1 e SLAVE2 connected | |

TEST

to start and adjust the pump manually



Enter the TEST mode
see ACCESS TO MAIN MENU



Proceed as shown below to start and adjust the pump speed



During the test, you can view all the operating parameters (see DISPLAY OF OPERATING PARAMETERS)

CAUTION: TEST mode is not active on the SLAVE unit; to make a TEST on the SLAVE unit, switch off temporarily the MASTER unit, so that the SLAVE unit becomes independent and is able to perform the TEST normally

| Key | instruction | display |
|-------|--|---------|
| | <i>in TEST mode the word "TEST" is displayed</i> | TEST |
| START | start the pump by pressing the START / STOP button, the pump starts at the minimum frequency | P 2.0 |
| | Display the operating frequency by scrolling with the RIGHT arrow | F 30 |
| | set the operation frequency by pressing the keys (step 1 Hz) | F 35 |
| | display the operating parameters by pressing the keys | A 3.5 |
| STOP | To stop the TEST, press the A START / STOP button | OFF |

PRIMING AND STARTING UP

- **Do not run pumps dry**
- Before starting the pump, make the **filling of all pumps**
- **In the pressure units**, the filling is for single pump by turning off all other pumps
- When the pump is completely filled with water, bring in TEST mode (manual operation) and **prime the pump** by opening the discharge valve gradually
- When the pump is primed, stop the manual mode by pressing STOP and **switch to automatic mode** by pressing START.

ALARMS

| | |
|---|---|
| OVER CURRENT % | The current exceeded the allowable tolerance on the current set. The inverter stops the pump, the rearm is only manual. |
| CURRENT LIMIT | The current exceeded the module current capacity . The inverter stops the pump, the rearm is only manual. |
| i DRY (only with flow sensor) | Occurs if, in the absence of flow, the pump cannot reach the SET pressure, but can reach at least a pre-determined percentage of the SET pressure, defined through the parameter Pd. The inverter does not stop the pump. |
| DRY RUNNING (applications WITH flow sensor) | Occurs if, in the absence of flow, the pump fails to reach the pressure of the set but does not even reach a predetermined percentage of the SET pressure , expressed by the parameter Pd; the inverter stops the pump. The error is reset after the time TP and the inverter re-starts in automatic mode. |
| DRY RUNNING PF (only T/T models) | Occurs if the electrical parameter COSFI (power factor) falls to a value indicating the unload operation of the engine . the inverter stops the pump. the error is reset after the time TP |
| LOW PRESS | Occurs if the pump is running at maximum frequency (50/60 Hz), in the presence of flow, and the pressure doesn't reach 0.3 bar ; the inverter stops the pump. The error is reset after the time TP and the inverter re-starts in automatic mode. |
| VOLTAGE ERROR L | a voltage drop has occurred beyond minimum operating threshold. The inverter stops the pump. The error is reset after one minute, and the inverter re-starts in automatic mode. |
| HIGH TEMP. BOX (only T/T models) | The temperature inside the inverter has reached 65 °C; is automatically limited the maximum frequency of 5 Hz but the drive continues to run , the error is reset below 60 °C |
| OVER TEMP. BOX (only T/T models) | The temperature inside the inverter has reached 80 °C, the inverter stops the pump , the error is reset below 60 °C and the drive will restart automatically |
| HIGH TEMPERATURE MOD | The module temperature has reached the first alarm threshold; the maximum working frequency is automatically limited, but the drive continues to run , the error is reset when the module temperature returns below 70 °C |
| OVER TEMP MOD | The module temperature has reached the second alarm threshold, the inverter stops the pump , the error is reset when the module temperature returns below 70 °C and the drive will restart automatically |
| INPUT ERROR | There has been a reversal of the power connections / output to the motor. the inverter is locked, the error is reset by connecting the cables correctly in the terminal |
| COM ERROR | communication has been interrupted between the control board and the power board; the causes could be the integrity of the cable and of the connection ports or an electronic board fault. |
| PHASE ERROR | (only for models with three-phase output) lack of a phase towards the motor during operation. The inverter stops the pump ; reset is manual only. |
| LOW LEVEL | this occurs when the digital input EI is configured as "WATER LEVEL" (level signal) and there is no signal . When the signal returns, the message disappears and the inverter operates normally again. |
| EXT OFF | this occurs when the digital input EI is configured as "EXT ENABLE" (control enabled from outside) and there is no signal . When the signal returns (external enabling) the message disappears and the inverter operates normally again. |

PART 2

OPERATOR'S AND MAINTENANCE MANUAL

GENERAL REMARKS

STEADYPRES is a speed controller with the following features:

- Powered by AC single-phase or three-phase
- Output AC single-phase or three-phase
- It maintains the system at **constant pressure** (VARIABLE SPEED CURVES)
- It carries out **continuous controls** on electric and functioning parameters, saving the pumping unit from all common failures (over-currents, dry running, etc)
- It works in **stand-alone configuration or in parallel** with other units, through serial connection.
- applications in parallel, with a MASTER inverter and SLAVE inverters, controlled by the MASTER.
- The MASTER receives the programming of the parameters and controls the operating data, and activates and deactivates the SLAVE as needed.

If the MASTER is turned off, the SLAVE becomes independent and will continue to operate independently.

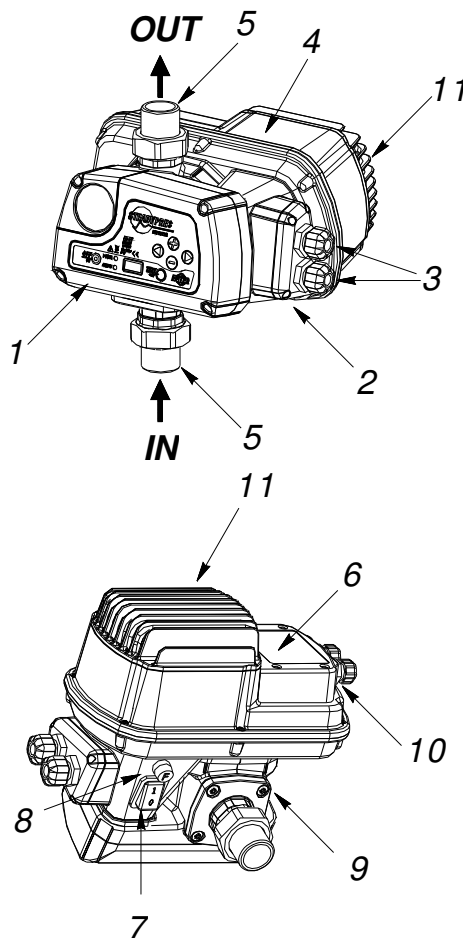
- **Adapts to any type of system** pressurization, even existing
- Limits the peak currents during starts and operation, **energy-saving**.
- Allows the selection of the power supply and output voltage.

PART LIST

- 1- control system
- 2- removable electric connector
- 3- I/O power cable bushing
- 4- power board cover
- 5- three-piece joint
- 6- tecnica data plate
- 7- master switch (not present in T/T models)
- 8- fuse (not present in T/T models)
- 9- non-return valve unit
- 10- expansion board cover
- 11- capacitors box

NOTE: master switch and fuse are only available in versions with single-phase power supply, while the models with three-phase power supply (T/T models) are without.

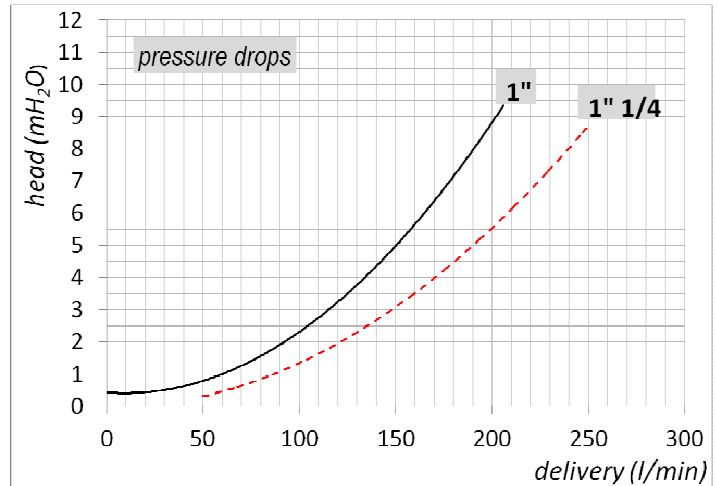
For the T/T models the inverter supply line must be protected by suitable devices in conformity with applicable standards.



- In **applications in parallel**, there is a MASTER inverter that controls one or two **SLAVE inverter**. **The MASTER receives the programming of the parameters** and controls the operating data, and activates and deactivates the SLAVE as needed.
If the MASTER is turned off, the SLAVE goes back to being self-employed and will continue to operate independently

WORKING LIMITS

- **maximum working pressure:** 10 bar (140 p.s.i)
- **fluids accepted:** clean water and liquids that are chemically non-aggressive. If there are impurities in the liquid, install a strainer upstream
- **fire / explosion:** inverters **STEADYPRES ARE NOT SUITABLE** for operation in environments with risk of explosion.
- **Maximum ambient temperature:** 40 °C; D
- **minimum ambient temperature:** 0 °C
- **max liquid temperature:** 55 °C
- **min liquid temperature:** 0 °C
- **supply voltage tolerance:** + / - 10% compared to the nameplate data
- **flow rates and pressure drops:** in side figure is represented the loss of load (in mH₂O) through the inverter, to vary the flow rate



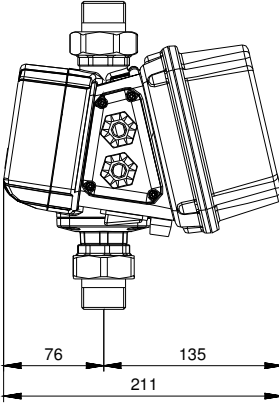
TECHNICAL DATA

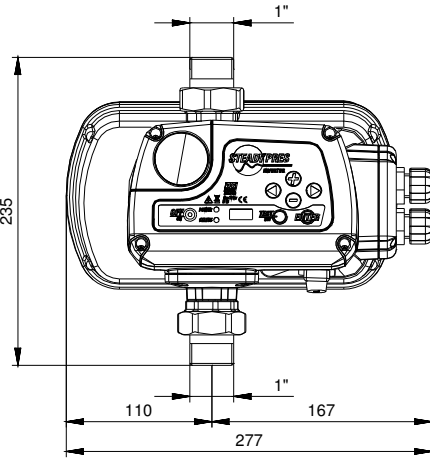
| | | | |
|----------------------------|---|--------------------|---|
| main voltage supply | 230 +/- 10% Vac single-phase | (models M/M e M/T) | WARNING: IN CASE OF LOW VOLTAGE (NOMINAL VALUE -10%) OVERCURRENTS CAN OCCUR DURING STARTING OR FULL LOAD OPERATION. |
| | 400 +/- 10% Vac three-phase | (models T/T) | |
| output voltage | 230 Vac single-phase | (models M/M) | |
| | 230 Vac three-phase | (models M/T) | |
| | 400 Vac three-phase | (models T/T) | |
| frequency | 50 – 60 Hz | | |
| enclosure | IP 65 | | |
| working position | vertical, with the liquid inlet from the bottom and top exit. | | |

Current and power table

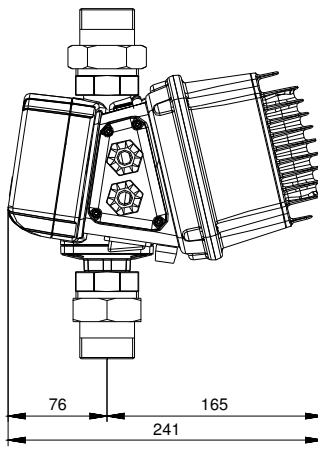
| Model | V in | V out | A out | P2 max (kW) | P2 max (HP) |
|----------------|----------|----------|-------|-------------|-------------|
| M/M 8.5 | 1 ~ 230V | 1 ~ 230V | 8,5 | 1,1 | 1,5 |
| M/M 11 | 1 ~ 230V | 1 ~ 230V | 11 | 1.5 | 2.0 |
| M/M 16 | 1 ~ 230V | 1 ~ 230V | 16 | 2,2 | 3,0 |
| M/T 7 | 1 ~ 230V | 3 ~ 230V | 7 | 1,1 | 1,5 |
| M/T 12 | 1 ~ 230V | 3 ~ 230V | 12 | 2,2 | 3,0 |
| T/T 6 | 3 ~ 400V | 3 ~ 400V | 6 | 2,2 | 3,0 |
| T/T 8 | 3 ~ 400V | 3 ~ 400V | 8 | 3,0 | 4,0 |

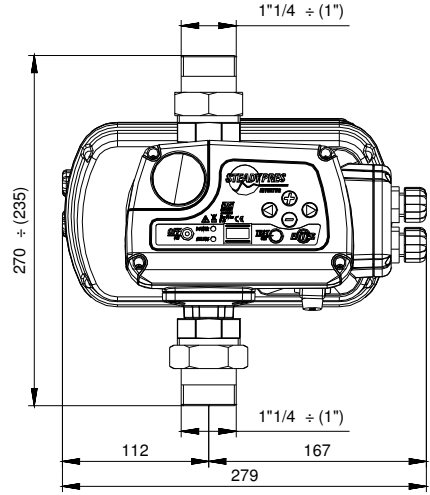
DIMENSIONS AND WEIGHTS





Mod.
M/M 8.5
M/M 11
M/T 7
M/T 12



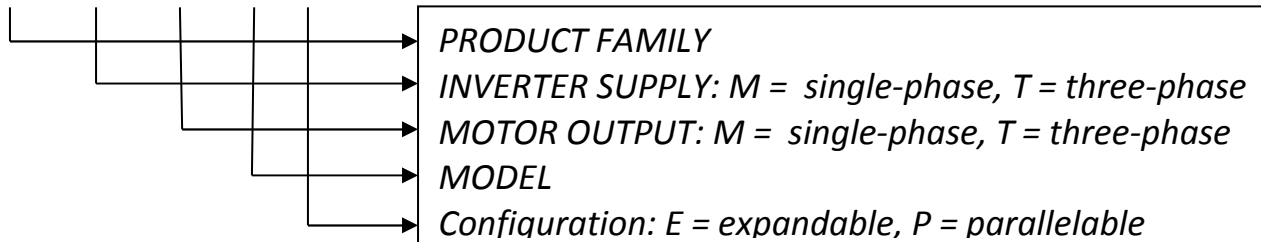


Mod.
M/M 16
T/T 6
T/T 8

| Model | connection | weight (kg) | Packaging dimensions (A x B x H - mm) |
|--|---------------|----------------|--|
| M/M 8.5 - M/M 11 - M/T 7 - M/T 12 | 1" | 2,9 | 260 x 200 x H 260 |
| M/M 16 - T/T 6 | 1" | 3,7 | 260 x 200 x H 260 |
| T/T 8 | 1" 1/4 | 4,1 | 260 x 200 x H 260 |

PRODUCT IDENTIFICATION CODE

ST M / T 10 P



SURGE TANK

- accumulates water under pressure to minimize the start-up of the pumps
- it is essential in the presence of small system leakages
- absorbs overpressures from the system
- the minimum tank volume, in liters (for diaphragm models) is approx. equal to 10% of the maximum capacity of the single pump, expressed in l/min; example in a standard application:
 $Q_{max} = 80 \text{ l/min} \rightarrow V = 80 \times 10\% = 8 \text{ liters}$
 rounded up to commercial size
- **pre-charge: a. 50% of the working pressure: e.g.:**
 $P_{set} = 4 \text{ bar} \rightarrow P_{pre-charge} = 2 \text{ bar}$

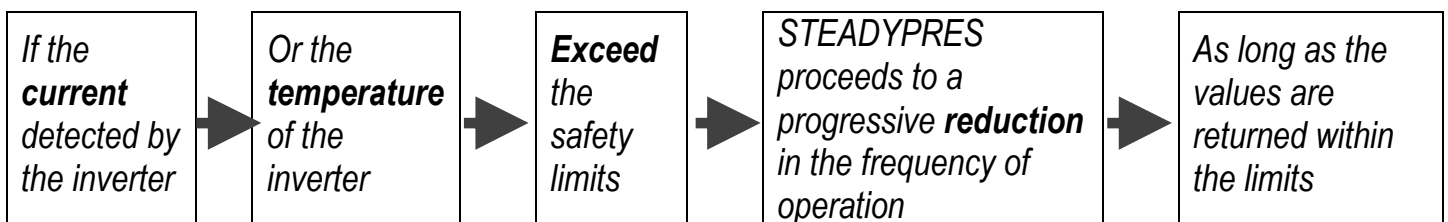
INSTALLATION

Before installing and using STEADYPRES:

- read this manual thoroughly and carefully and refer to the Safety Standards.
- Before making the connections, make sure that the ends of the line wires are not live.
- Make sure also that the electric power supply network is protected by thermal magnet and differential protections according to the applicable Standard in force. The **differential switch must be high-sensitivity type** (30 mA in class A for domestic application, class B for industrial applications)
- **Ground connections** must be in compliance with Standards.
- Check that the plate data is that required and suitable for the system
- The **cable section (power supply cable and connection cable between the inverter and the motor)** must be dimensioned according to:
 - o Voltage (230 V single-phase, 230 V three-phase, 400 V three-phase)
 - o Pump power
 - o Cable length
- The power supply cable and the motor cable must be sized to curb any **power voltage drop within 3%**.
- The power supply cable and the motor cable must be suitably **shielded** to comply with EMC standards.
- In case of **long cables** between Inverter and pump motor, evaluate the application of inverter output sinusoidal filter. It aids smooth running of motors eliminating negative effect of voltage peaks

For **CONNECTIONS** see **QUICK INSTALLATION GUIDE**

SELF-LIMITING OVERLOAD



While operating in self-limitation, **DISPLAY** and **LED** flash to indicate the fault status

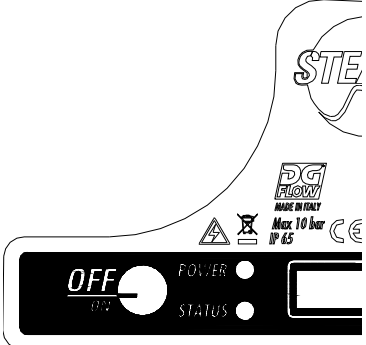
STARTING UP

- Before running, this Manual must have been carefully read and the instructions followed; wrong settings and operations are thus prevented that could cause operating faults
- Before starting the system, the pumps must be primed (filling and air bleeding)
- After performing the operations described in the **INSTALLATION** chapter, the inverter can be started.
- When STEADYPRES is switched on, it enters the **STARTING** phase, which lasts 10 seconds, after which **STEADYPRES returns to the same operating conditions in which it was when it was last switched off**:
 - o in **WORK** mode if at the time of the last shutdown was **IN SERVICE**

- in **OUT OF SERVICE** mode if at the time of the last shutdown was **OUT OF SERVICE (OFF)**
- In case of accidental fall of the power line, if it **STEADYPRES** was in service, when the power returns, it automatically returns in service
- To put **STEADYPRES IN SERVICE / OUT OF SERVICE**, beat the **START / STOP** button.
- In applications with parallel inverters (**MASTER / SLAVE**) is just the **MASTER** inverter that receives input from the keyboard
- **SLAVE** inverters operate independently only if the **MASTER** is turned off, in which case they receive input from its own keyboard.
- In each group can be only one **MASTER**, one **SLAVE 1** and one **SLAVE 2**.
- In normal operation, you can view the status parameters.

For visualization of the operating parameters see **QUICK INSTALLATION GUIDE**

LIGHT SIGNALS

| keyboard | ● ON | | ○ OFF | | ◐ BLINKING | |
|-----------------|---|---------------|---------------|--|--|--|
| |  | ○ | STATUS | ○ | STEADYPRES does not detect power supply. WARNING: cannot guarantee the absence of power supply, the electronic board may be faulty, but under tension | |
| | ○ | POWER | ○ | | | |
| | ○ | STATUS | ● | STEADYPRES is live, but the pump is not running (STANDBY) | | |
| | ● | POWER | ● | STEADYPRES is live, and the pump is running | | |
| | ○ | STATUS | ◐ | STEADYPRES is live, but out of service; the re-arm is only manual | | |
| | ◐ | POWER | ◐ | | | |
| | ◐ | STATUS | ● | is only manual STEADYPRES is in ALARM mode, re-arm | | |
| | ● | POWER | ● | | | |

INSPECTION MENU

the menu **INSP** (inspection) allows you to view the history of the inverter: the operating hours, number of starts, alarm recording.

| | | | |
|---|-----------|------------------------------|---|
| <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">INSP</div> <div style="margin-left: 20px;">▶</div> | WH | OPERATING HOURS | Operating hours with the pump running |
| | TH | TOTAL OPERATING HOURS | Total No. Hours working |
| | NS | NO. START-UPS | total Number of start-ups |
| | SH | AVERAGE NO. START-UPS | Average number of start-ups per working hour. |
| | E1 | LAST FAULT | last fault that occurred in chronological order |
| | EH | TIME OF LAST FAULT | time at which the fault occurred (referred to TH) |
| | EE | ERROR RESET | to reset the error log press the ENTER key and hold, until "OK" is confirmed on the display (ENTER → **** → OK) |

TROUBLESHOOTING

- Check that the inverter has been correctly connected to the power line (which is on)
- Check that the motor pumps have been correctly connected to the inverter
- Check that all the cables and connections are operative.

| Problem | Message | Cause | intervention |
|---|-------------------------------------|---|---|
| The pump is not feeded | none | Interruption of power supply | Replace the power supply |
| | | Burned fuses | Substitute the fuses |
| | | Intervention of the line protections | Check the correct protections setting |
| | INPUT ERROR | I collegamenti LINEA e MOTORE sono stati invertiti | Verificare i collegamenti LINEA e MOTORE e ricollegare correttamente |
| The current circuit breaker has tripped to protect the DGBOX power line | | The residual current circuit breaker is inadequate for inverter supply | Replace the residual current circuit breaker with a model suitable for the pulsating components and in direct current (class A or AS) |
| The pump fails to start | OFF | The pump is out of service (placed manually out of service) | Put the pump back into service by pushing START |
| The pump stopped and fails to re-start | OVER CURRENT | overcurrent absorption compared to set value (parameter A in BASE PARAMETER) | Check: - the correct current setting - the power voltage under load at pump terminals (min 205 V) - make sure the motor pump is turning freely and is not braked - check the correct direction of rotation - check the correct sizing of the wires |
| | CURRENT LIMIT | Serious overcurrent absorption which inverter cannot cope with | Make sure the motor pump is not blocked, reduce the motor acceleration by means of the ACCELERATION parameter. |
| | DRY RUNNING (DRY RUNNING PF) | - Lack of water at suction - pump not primed - suction blocked - wrong direction of motor rotation | - Check correct suction conditions - prime the pump - check the suction piping - check the correct direction of motor rotation |
| | LOW PRESSURE | The system does not reach the minimum pressure | Check that there are no broken pipes. |
| | VOLTAGE ERROR L | Inverter power voltage too low | Check the supply voltage and the section and length of the inverter power cables |
| | OVER TEMP BOX | internal overheating due to overload or excessive ambient temperature | Make sure the air cooling channels are free and that the fans are working, check the pump load |
| | OVER TEMP MODULE | Module overheating due to overload or excessive ambient temperature | Make sure the air cooling channels are free and that the fans are working, check the pump load |
| | COM ERROR | No communication between control board and power board | Check the integrity of the connection cable and connections; the power board could be damaged |
| | LOW LEVEL | No level signal with level signal input on | Make sure there is water at suction or check level signal operation |
| | EXT OFF | Placing out of service by means of external signal | Check the external signal |

| problem | Message | Cause | intervention |
|--|-------------------------|--|---|
| | normal operation | Pressure sensor fault | Inspect and check the pressure sensor, re-calibrate or substitute |
| Pump always running even when not required | normal operation | System leaks greater then 2 l/min | Identify the leaks and repair |
| | normal operation | Flow sensor fault or locked open | Inspect and check the flow sensor |
| | normal operation | Minimum OFF FREQUENCY setting too low | Set a higher minimum frequency |
| The pump stops too soon when requested | normal operation | Minimum OFF FREQUENCY setting too high | Set a lower minimum frequency |
| | | Flow rate sensor fault | Check the flow rate sensor |
| Low pump performance | normal operation | Air inside suction manifold | Bleed the suction system |
| | | Pump blocked or damaged | Inspect the pump and eliminate the problem |

MAINTENANCE

REPLACEMENT OF THE PRESSURE SENSOR

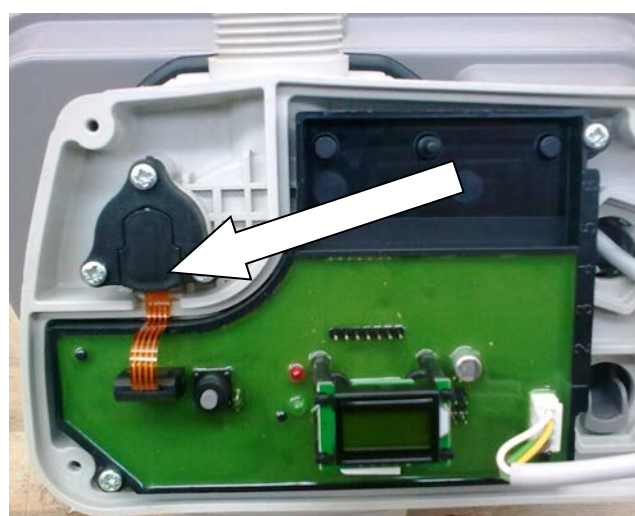
- Disconnect the inverter main power supply and wait 2 minutes (capacitors discharge)
- Open the front cover and disassembly the pressure sensor as shown below
- Install the new sensor in reverse order of removal.



Open the front cover by unscrewing the 4 screws



Before removing the cover, disconnect the ribbon cable of the display



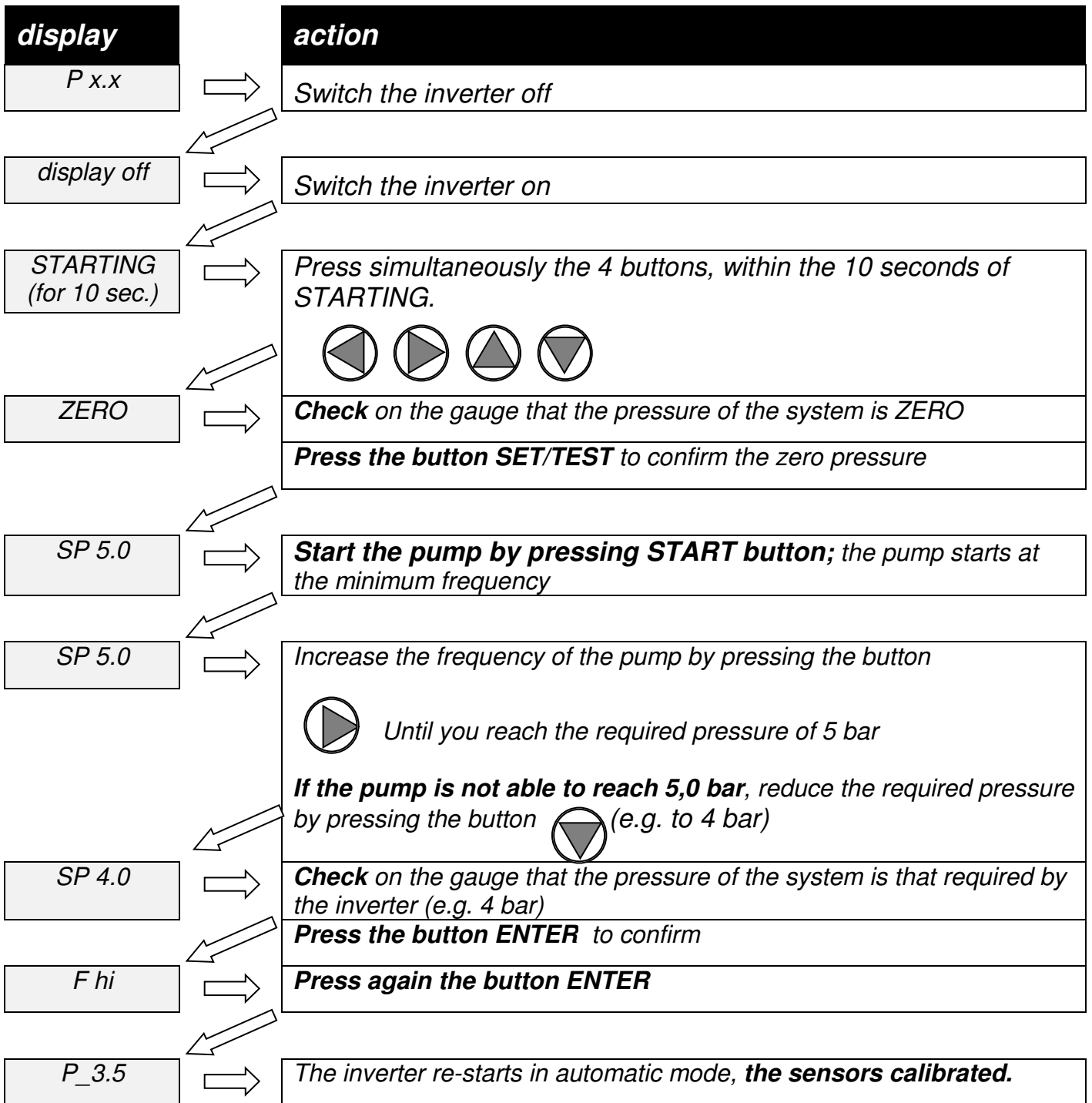
Remove the pressure sensor (shown) by unscrewing the 3 screws.



Replace the pressure sensor, and reassemble.

CALIBRATION OF THE PRESSURE SENSOR

- You need an **auxiliary gauge** near STEADYPRES
- **bring the system (and STEADYPRES) pressure to zero (0 bar)**
- **Start the calibration** of the pressure sensor according to the diagram below.

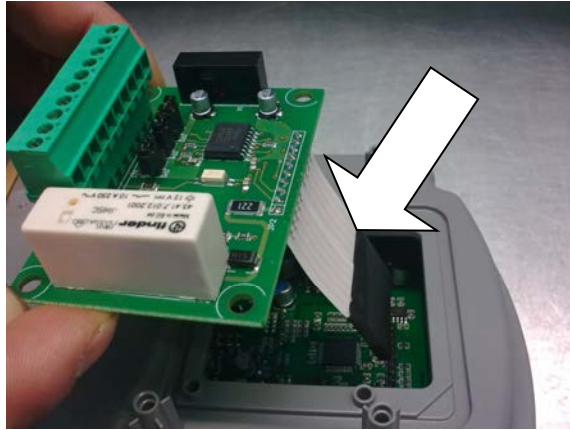
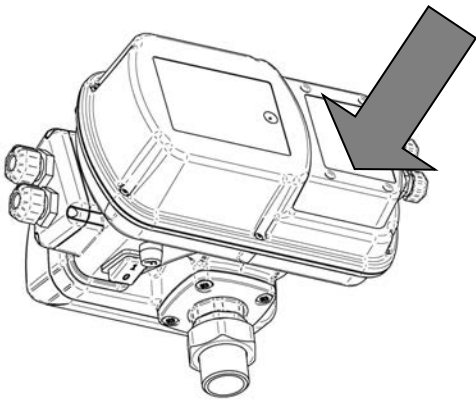


FITTING THE EXPANSION BOARD

- Switch off power to the inverter and wait 2 minutes for the capacitors discharge
- Open the back cover as shown in the figure on next page
- Insert the flat cable of the expansion board (see picture on next page) on the mating connector mounted on the power board of the inverter

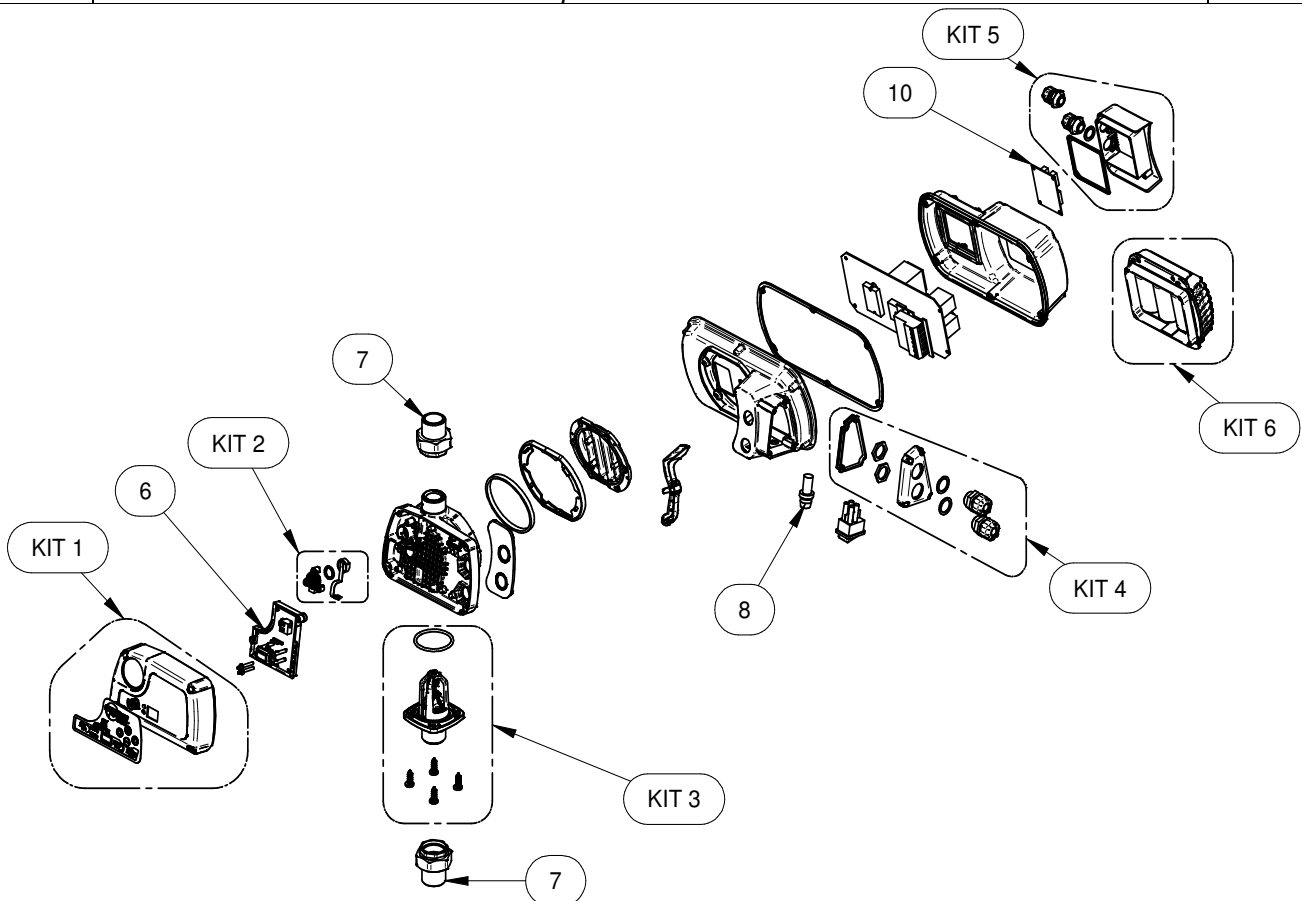
- WARNING: PAY ATTENTION TO PROPERLY FIT THE CONNECTOR

- Block the expansion board with 4 screws
- Connect signals (see **SIGNALS CONNECTION.**)
- Close the back cover



SPARE PARTS DIAGRAM

| N° | Description | Quantità |
|-------|---------------------------------------|----------|
| KIT 1 | Cover Kit with keyboard | 1 |
| KIT 2 | Pressure sensor Kit | 1 |
| KIT 3 | Non-return valve / flow sensor Kit | 1 |
| KIT 4 | Cable bushing cover Kit | 1 |
| KIT 5 | Expansion board cover Kit | 1 |
| KIT 6 | Capacitor box Kit | 1 |
| 7 GAS | three-piece joint 1" GAS M Kit | 2 |
| 7 NPT | three-piece joint 1" NPT M Kit | 2 |
| 8 | Fuse (only for single phase versions) | 1 |
| 10 | RS485 expansion board + alarms | 1 |



WARRANTY

Before installation and use of the product, read this manual completely and thoroughly. Installation and maintenance must be carried out by qualified staff, responsible for performing the hydraulic and electric connections according to the applicable Standards in force.

The manufacturer declines all responsibility for damage deriving from improper use of the product and is not liable for damage caused by maintenance or repairs that are carried out by unqualified staff and/or using non-original spare parts. The use of non-original spare parts, tampering or improper use making the warranty null and void.

DISPOSAL

For the disposal of DGBOX components, follow the Standards and Laws in force in the countries where the unit is used.

Do not disperse pollutant parts in the environment

DECLARATION OF CONFORMITY



We declare, under our own responsibility, that the product in question is in compliance with the following European Directives and national implementation provisions.

2006/95/CEE Low Voltage Directive

2002/95/CEE Dangerous substances in electronic appliances (RoHS)

2002/96/CEE e 2003/108/ CEE Dangerous substances in electronic appliances (WEEE)

2004/108/CE Electromagnetic Compatibility Directive (EMC):

Models with single-phase power (M/M 8.5, M/M 11, M/M 16, M/T 7, M/T 12):

EN 55014-1 (emission)

EN 61000-3-2 (emission)

EN 61000-3-3 (emission)

EN 55014-2 (immunity)

EN 61000-4 (immunity)

Models with three-phase power (T/T 6, T/T 8):

EN 61800-3

EN 55011 (emission)

EN 61000-3-2 (emission)

EN 61000-3-3 (emission)

EN 55014-2 (immunity)

EN 61000-4 (immunity)

Bigarello, 20/02/2015

DGFLOW S.r.l.

President

Stefano Concini