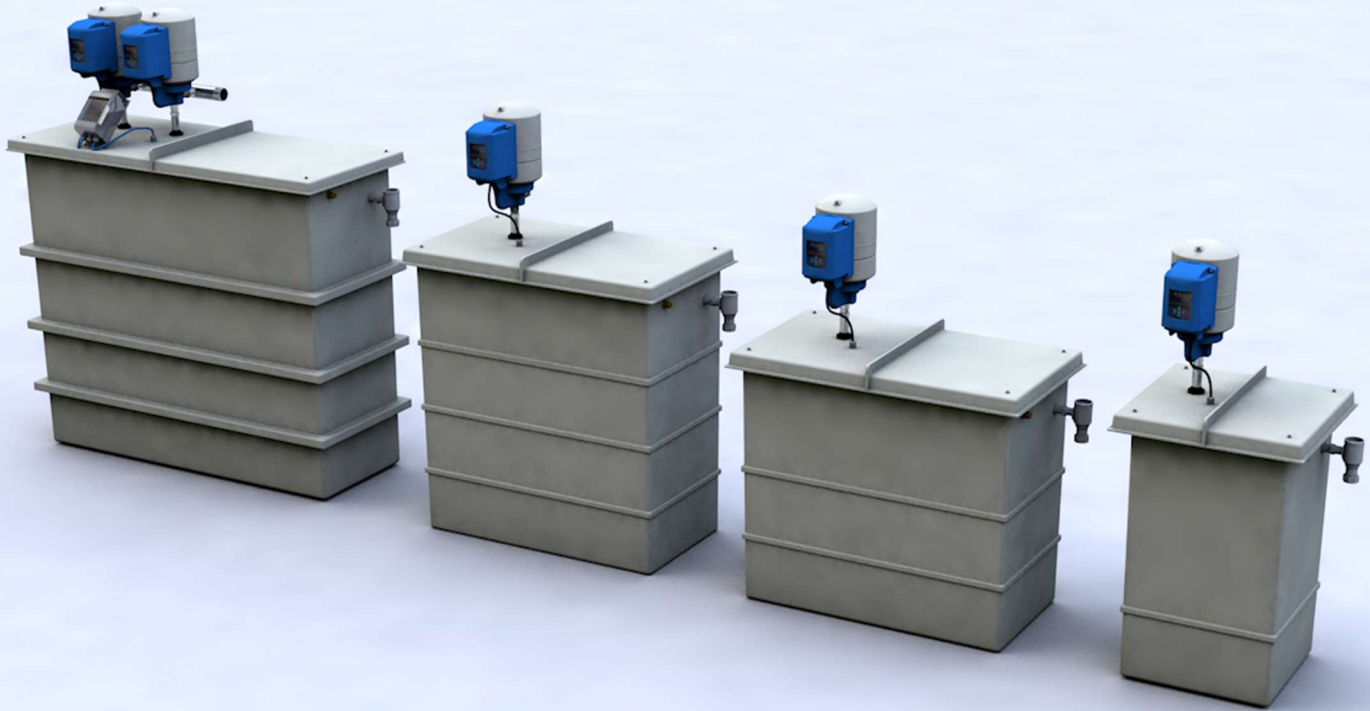
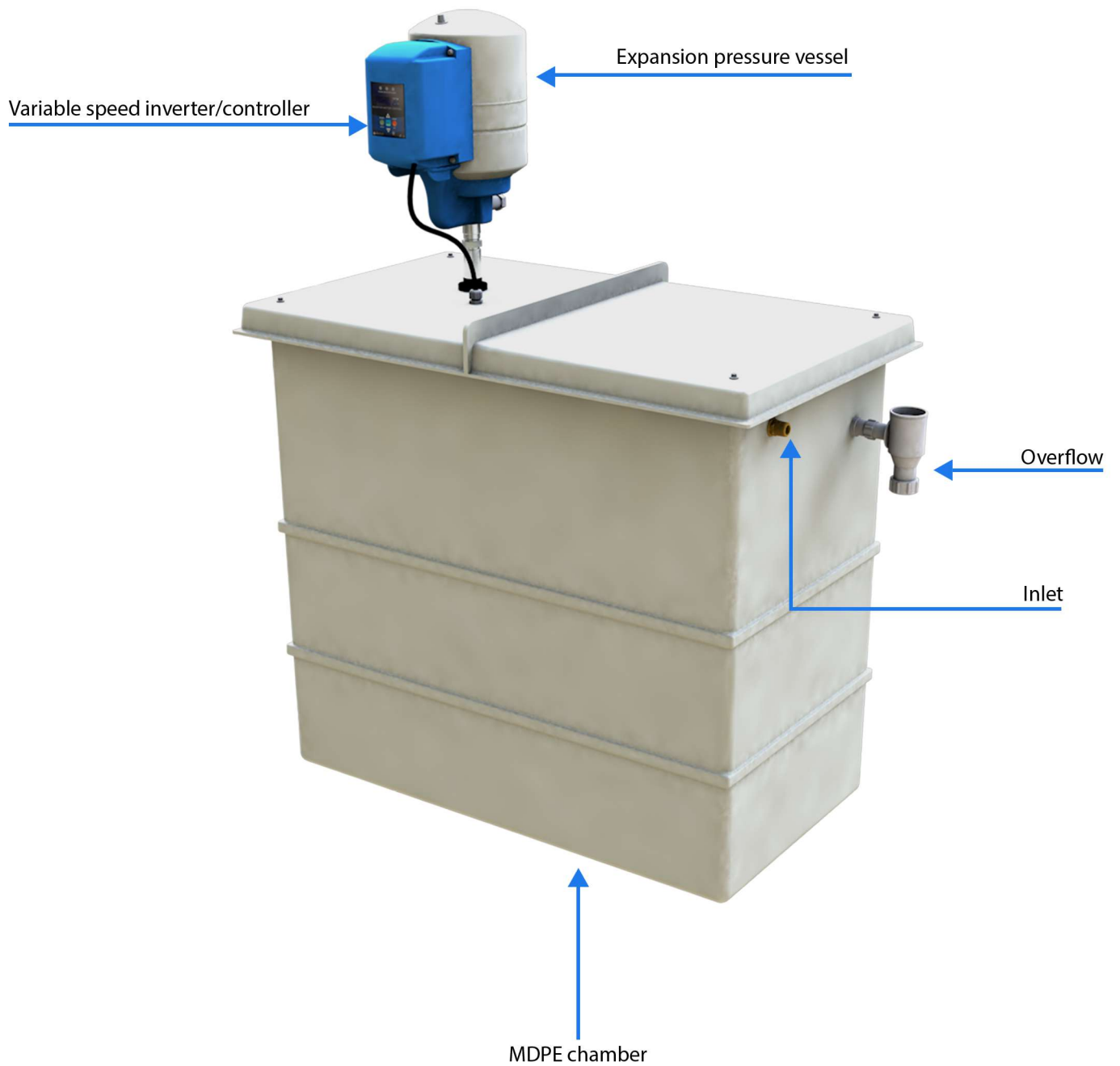




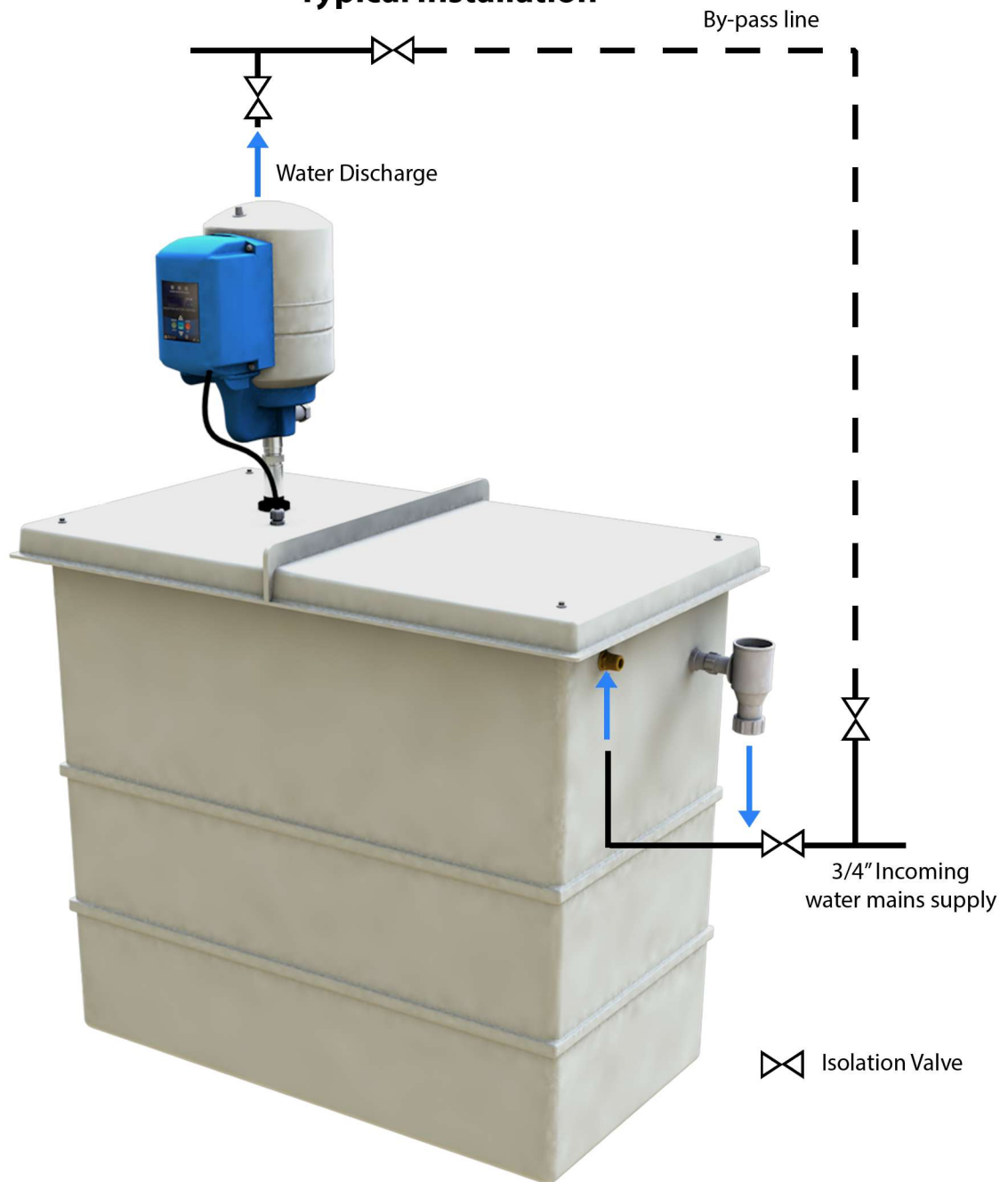
FlyVar Compact

O&M Guide

Product Overview



Typical Installation



Introduction

We strongly suggest that the operator carefully reads and follows the information contained in this instruction manual for the frequency converter.

The Frequency Converter should NEVER be opened or tampered with, the guards that come with it should never be removed.

The frequency converter must be installed, adjusted, and maintained by qualified personnel who understand the risks involved.

The booster set is designed to start automatically. Make hydraulic connections and prime the pumps before making any electrical connections. The connection of the control panels must be performed by a qualified electrician in accordance with the present electrical standards.

The booster set and control panels must be connected to an efficient earthing system in accordance with the electrical standards. The connection of the earth must be performed first.

The connection of the alarms can distribute power even when the frequency converter is turned off. Ensure that there is no residual voltage on the terminals of the alarms. All the power terminals and other terminals must be inaccessible after installation is completed.

The maximum output frequency must not exceed the design frequency of the pump being controlled. Operating at a frequency higher than the allowable frequency can cause higher current absorption and damage to the device.

If it is necessary to remove the frequency converter, remove only the covers required in order to disconnect the electrical cables. Take care not to damage the electronic cards. Failure to comply with the safety regulations not only causes risk to personal safety and damage to the equipment, but also invalidates every right to assistance under warranty.

The Booster set is designed and built to ensure a constant pressure, specifically suitable for domestic applications and small or medium systems for civil, agricultural, or industrial uses. Booster sets strengths and benefit: constant pressure, low noise operation, low running costs, low water consumption, protection against dry running.

Construction features of the FlyVar inverter are as follows: -

Nr. 1 or 2 electric pumps WRAS approved.

Variable speed inverter designated for each pump, mounted onto the pressure vessel

GRP pre insulated water storage tank

Stainless steel manifolds, threaded

Ball valves WRAS approved on discharge of each pump

Check valve included for each inverter with flow passage

Stainless steel end caps for manifolds

Pressure vessel WRAS approved

Electrical section

The INVERTER system is a device installed onto the pressure vessel which is fixed to the pump's discharge outlet. It includes a pressure transducer into the 5-way valve situated underneath the vessel. Installed on the outlet discharge line of each electronic pump, it controls the pump's speed rotation which is connected and maintain a fixed pressure at the set flow rate.

Functioning

In case of pressure drop or reduction, caused by water withdrawal, the first pump starts to satisfy at the requested flow rate. In parallel inverter installations (booster sets with two or three pumps), the MASTER inverter fully controls the SLAVE inverters, which can operate independently only when the MASTER is turned off.

In case of standard operating is possible: to display the system pressure, to display motor absorption (if the motor is running), to display the power supply voltage (if the motor is not running), to display the working frequency, to display any pump alarm conditions, to put the pump out of service, to set the parameters. In units with more than one pump, the MASTER inverter allows you to check that the inverters communicate correctly using the system status display.

Communication between each inverter is done via Bluetooth connectivity and automatically looks for a second inverter once that option is selected, all of which is done during assembly prior to despatch.

Dry Run Protection

If the system has been stopped due to lack of water, the inverter makes automatic and predefined times to re-attempt starting.

Connecting the float contact or other NC contact

To connect and enable Normally Closed contacts, use the poles 2 (Enable) and 5 (common) of J5 (fig. 15,16) or between EN e +15V(1diJ1) ,fig.14.

When the contact is open, the Inverters stop the pump; when the contact is closed, the pump may re-start at previous working condition. For the connection of the float switch contact you need to change the three poles cable of the sensor with a four poles cable, passing on the same central exit of the transducer cable.

The new connections of pressure transducer and float switch contact must be done out of the Inverter box, protecting them from humidity, water and dust.

Do not place other holes in the Inverter case to avoid damages as this will invalidate any and all warranties on the product.

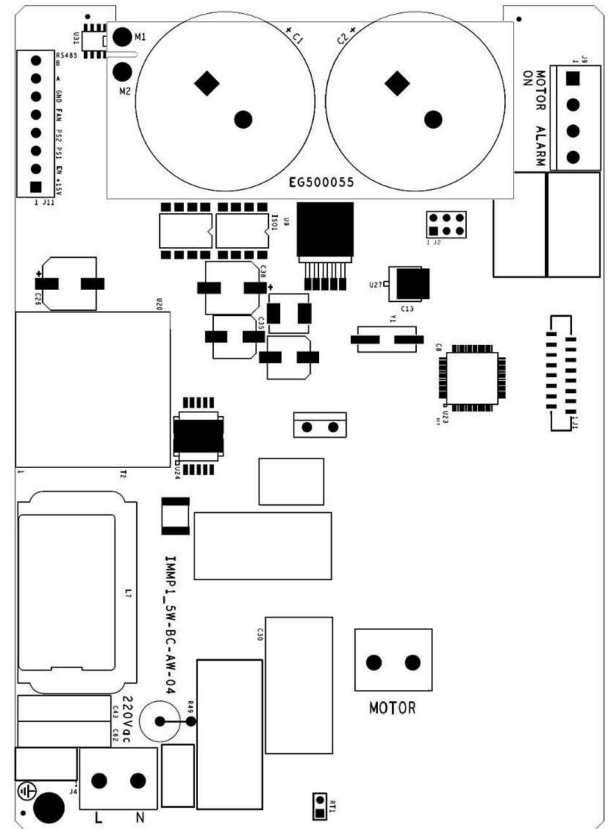
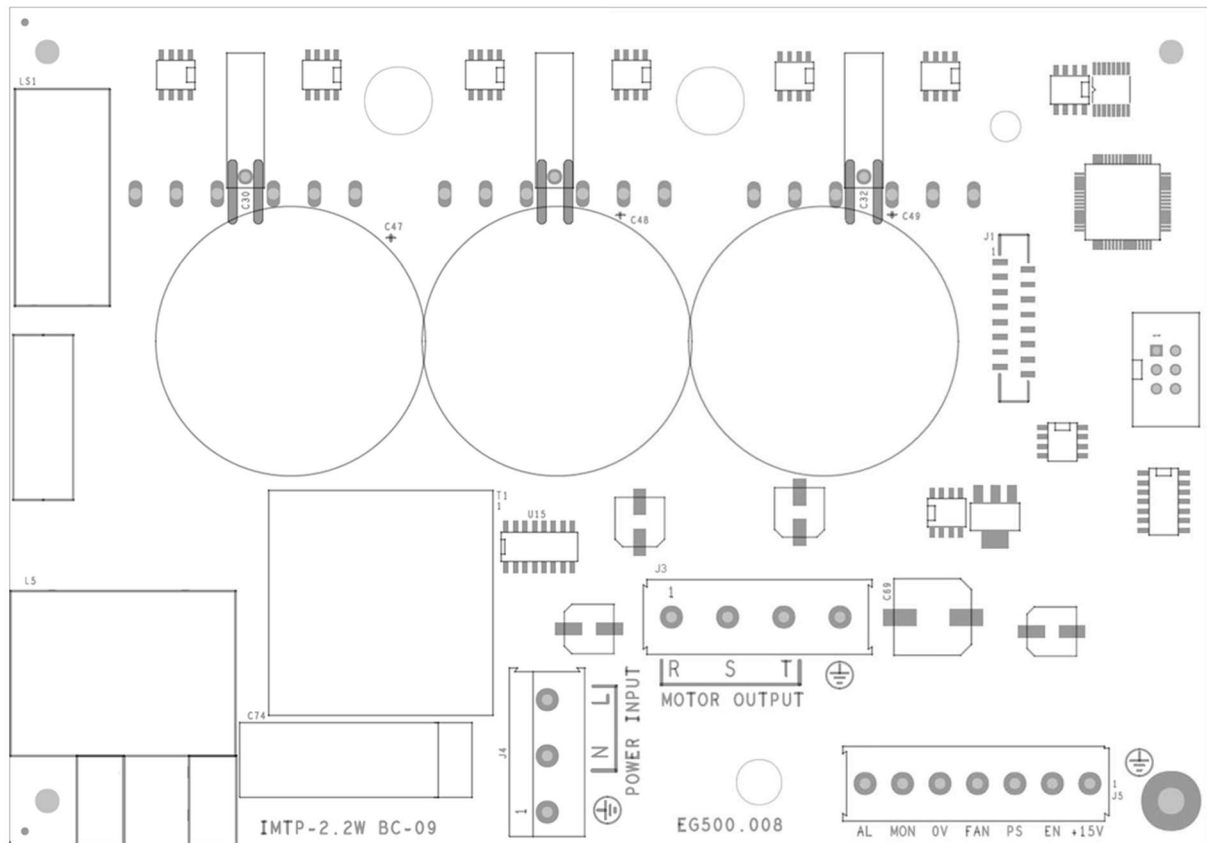


Fig.14: Electronic board AW04 IMMP1.1/1.8/2.2W-BC type



Priming the System

Using the bleed down valves, see image below, to remove the air from the system during first fill, this will allow the inverter to start the pump and run to reach target pressure and switch off once reached.

Any air in the system can be purged out of the line with the below valve, make sure this is tighten once installation has been complete.



Check the pump stop to output closed

At the first installation open the output on the pump flow, press START, wait a few seconds for the plant go to pressure set, then close the output flow (slowly) and make sure that the motor stops (after a few seconds) showing on display "MINIMUM FLOW".

In case the motor doesn't stop you must select MOTOR DATA - POWER STOP and set a higher value than the default (102%) set by the constructor. The absolute stop power value is presented at regular times on display at the top-central position (see fig. 17).

Check Pump Dry-Working

After installing, if is possible, close the suction/intake line in order to simulate a dry run situation of the pump and check that, after approximately 40 seconds (or the delay time setting), the pump stop and the display show the message "DRY WORKING".

If, after this time, the pump does not stop, you must enter into MOTOR DATA and set a higher value of DRY WORKING STOP POWER (default 80%), otherwise enter on ADVANCED FUNCTIONS – PRESSURE CONTROL setting a higher value of the parameter COSFI LIMIT (by default set to 0.50). Save data after modifying.



LCD Display data on the FlyVar

Access to the electronic board

In case it is necessary to change damaged cables, pressure transducer or to add the float switch contact, you need to open the Inverter case.

The operations of a component for the inverter must be performed only by experienced personnel qualified by the manufacturer, using only original spare parts supplied by the manufacturer.

Any action with open box of the Inverter must be made after at least 2 minutes after open line with appropriate switch or the physical separation from the power supply cable;

In case of failure to one of the cables or the pressure transducer, for the replacement of that should be opened by unscrewing the inverter cover the N° 12 screws in the back on the heat sink.

For the extraction of a cable, unscrew the three screws that close the cable triangular plate. Remember to always replace the O-ring seal on the cable under the plate.

Control Panel Commands

Command	Description
FUN	To enter on main functions menu
START/ENTER	Pump start / To enter on the function and modify the values
▲+	It allows scrolling up the items on the menu or positive change in the value of variables; after the variation press ENTER. Encrease the reference pressure during functioning.
▼-	It allows scrolling down the items on the menu or negative change in the value of variables; after the variation press ENTER. Decrease the reference pressure during functioning.
STOP/ESC	Pump stop / To exit to the function and automatically saving

LED	Description
Power ON	Green fixed: input voltage supply ON
Motor ON	- Green fixed: Motor running; - Green flashing: before stopping for minimum flow
Alarm	- Red fixed: Alarm (see Alarm list – table 7). Require manually re-start (STOP+START) - Red flashing high frequency: Alarm and motor stop with automatic re-start; - Red flashing low frequency: Problem at the pressure sensor on group functioning – without stopping pump

Alarm List

Alarm N°	Alarm Type	Description
1	Current Peak	Immediately stop probably caused by short circuit Automatic re-start; final stop after 10 consecutive events
2	Over-Voltage	Normally caused by over voltage pick supply. Automatic re-start; final stop after 10 consecutive events
3	Inverter Temperature	Over temperature IGBT protection (90°C) Automatic re-start; final stop after 10 consecutive events
4	Thermal protection	Motor thermal protection related to nominal current set, for motor insulations saving at high temperatures. Automatic re-start; final stop after 10 consecutive events
5	Dry operating	Null input flow or air presence; Automatic re-start; final stop after 5 consecutive events
6	Pressure sensor problem	Pressure sensor output problem Automatic re-start; final stop after 10 consecutive events
7	Under-Voltage	Input voltage under the minimum working limit. Automatic re-start; final stop after 10 consecutive events
8	Enable OFF	Open contact between EN e C (figure 14-15-16): stop the motor; the motor restart when the contact will close again
9	Over-Current IGBT	Over current on the IGBT, overtaking a current limit value setting Automatic re-start; final stop after 10 consecutive events (for models with AW04 El. Board)
10	INPUT-OUTPUT inverted	Connection mistake: Voltage supply connected on the output and Motor cable connected on the entrance: reverse in order to enable the motor.
11*	Fault IGBT 0-1	IGBT 0-1 problem. Automatic re-start; final stop after 10 consecutive events. * Alarm n°11 only for IMMP1.1/1.8/2.2 models, board AW-04.
12*	Fault IGBT 2-3	IGBT 2-3 problem. Automatic re-start; final stop after 10 consecutive events. * Alarm n°12 only for IMMP1.1/1.8/2.2 models, board AW-04.
13**	Minimum Flow	The pump stop for minimum flow limit achievement. It's a normal working condition of the system (no demand of water on the delivery) even thug is on the alarm list, Automatic re-start; no limits. *Alarm n°13 only for IMMP1.1/1.8/2.2 models, board AW-04; **Alarm n°11 only for IMTP1.5/2.2 models, board BC-09 and ITTP1.5/2.2/3.0 models.

Alarm List Continued

12*	Current Peak phase S	Immediately stop probably caused by peak-current S phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 12 only for IMTP1.5/2.2, board BC-09.
13*	Current Peak phase T	Immediately stop probably caused by peak-current T phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 13 only for IMTP1.5/2.2, board BC-09.
14*	Current Peak phase R	Immediately stop probably caused by peak-current R phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 14 only for IMTP1.5/2.2, board BC-09.

Troubleshooting Guide

N	Possible problem	Possible solution
1	Pressing start button the motor don't start or start and stop after few seconds and the inverter show Over-Current alarm or Current Pick alarm	Check if the input/output of the inverter are respectly connected between line and motor, without inversion (Warning: input/output inversion can damage the electronic board of the inverter). Check the correct connection of the pump (star/delta): possible mistake. Check if all the three wires to the motor are connected good and the three current are balanced. Check if the motor power size is not so high on respect to the inverter size. Check if the inverter is not on Master-Slave condition (Advanced Functions -> Group Functioning) set to slave, without the Master inverter connected and switched on: in this
2	Pressing start button the motor don't start or start and stop immediately and the inverter show Under Voltage alarm	Check that all the input voltage supply wires are connected good on the entrance of the inverter: if the inverter input is three-phases but on the connection there are only two, the inverter switch on and can start the motor, but haven't enough power to supply it. Check that before the inverter the supply line wires size are good to have a limited voltage drop, then a sufficient voltage
3	During working at the maximum power the inverter reduce continuously the output power to the motor then stop the motor and the inverter show Over Temperature IGBT alarm /Inverter Temperature	Temperature of the electronic board of the inverter is too high and the inverter must remain stop for few minutes to reduce the internal temperature before the automatic restart. For wall mounting type be sure that the inverter stand on a wall, in vertical position, protected from directly sunlight, and the air flow is totally free; for motor mounting type check that the air flow from the motor fan is good to limit the aluminum temperature of the inverter case under 60°C; the inverter cannot work continuously at the maximum power with a ambient temperature higher than 40°C and with high temperature can reduce automatically the output
4	Pressure Transducer don't measure the correct pressure value (error > 1 Bar)	Check if the pressure transducer is connected on the delivery of the pump on a correct position, not so close to the impellers and before the valve to close the flow.
5	Pressure Transducer measure a pressure too high when the motor is running then the Inverter reduce the motor velocity at the minimum value (low	Check that the pressure cable is separated from the motor cable, that is a source of noise; specially when the cable of the pressure transducer is too long (long distance between inverter and motor) it's very important to use a shielded type two wire cable, as far as possible to the motor supply cable. Connect the shield to ground only on one terminal, if possible connect it directly on a metal screw to ground near the motor.

Troubleshooting Guide

6	The Inverter cannot work because remain in Pressure Transducer Problem alarm condition	Check If the wires of the pressure transducer are correctly connected brown on +, white on S contact on the board. Check wiring connection on the cable of the pressure transducer. Warning: In case you need to cut the pressure transducer cable to add a longer cable be sure to switch off the inverter at least 1 minute before to cut this cable, otherwise you can cause a short circuit on the transducer input of the electronic board (damage) if the internal capacitors are not totally
7	The distance between Pressure transducer and Pump is high (long pipe) and the pressure continuously go	You must reduce the velocity of the feedback control reducing the Proportional factor and the Integral factor (Advanced Functions -> P.I.D. Factors). Try to set these values to half and test the system, then, if not enough, reduce more and test again until the pressure control remain stable.
8	The Inverter stop the motor for Minimum Flow with a high flow condition and then re-start and stop again, continuously	A small water membrane Tank charged with 1.5-2 Bar air pressure is required for a correct working; check it. The condition may also caused by a not correct pump curve saving during the automatic check: possibly the delivery was not totally closed and the Inverter checked a higher curve of the pump; repeat the automatic check (Pump data -> check ON, then exit to the menu and press START) closing totally the outlet and try again the functioning. Verify if there is a no-return inlet valve on the pump and if it's working good without loses. It's possible to reduce the flow before stopping reducing the parameter F1 It's possible to reduce the flow before stopping reducing the parameter Minimum Flow Power stop
9	The inverter don't switch off the pump when the valve on delivery is totally closed	Probably check was done with pump not perfectly filled up; remake the check procedure after a complete filling of the pump and try again if pump switch off correctly in minimum flow condition. If the problem remain, try to grow up the function: Advanced Functions -> Motor data -> Minimum flow power stop, upgrading 2% every time and testing pump, till find
10	The hydraulic system have a big tank (>40 l) and, after check did correctly with closed delivery, the pump stop for minimum flow with a high flow, and then re-start and stop again,	Probably during the automatic check there was a flow of water to full up the big tank, for that the pump curve saved by the inverter is not the correct curve (with null flow and maximum pressure). Maintain full of water the tank (pressure near maximum value); repeat the automatic check (Pump data -> check ON, then exit to the menu and press START). When the check finish try to work again testing the minimum flow stop condition of the motor that must be with a small flow.

Troubleshooting Guide

1 1	The Inverter stop the motor for Dry Working condition	Sometimes the problem is caused by the same Automatic Check error that previous point (see possible solution like
		In other cases possibly there is air mixed with the water on the inlet of the pump (verify pipes and junctions).
1 2	The pump don't switch off for dry working when the inlet pipe and the pump are empty	In normal working condition, with pump and pipes filled up, remake a check procedure (Pump data -> Check=ON) and try again. If the problem remain grow up the parameter: Motor Data -> Dry Working power stop, from 80% default value doing 10% steps, testing every time the pump. If the problem cannot disappear also with Dry working power stop more than 100%, verify that pump haven't any defect (fault seal, impellers, etc) that can cause a big
1 3	A group of two or more inverters cannot communicate between each other in Master-Slave mode	For the BC inverters type read on left. For the RS type check the correct connection RS485 by a two wires cable (A to A and B to B). Verify the communication set to Master-Slave on Advanced Functions -> Group Functioning (code 0 for the inverter Master, code 1, 2, etc for all the others Inverters Slave)
1 4	The Inverter conduct on the input voltage supply line electromagnetic noises that disturb other electronic	Check Ground cable connections (Ground system must be radial type, with resistance less than 10 Ohm). All the Inverters have an internal Input EMC filtering stadium, but is available also an additional EMC Input filter (various types, contact the service) for bigger noise suppression with sensitive devices connected on the line.
1 5	With a long cable between Inverter and Motor sometimes the inverter stop the motor in Pick Current alarm	The motor can have high pick voltage value caused by the high frequency of the PWM combined with the high capacitance to ground of the long cable: we suggest to use an additional inverter output filter for cable longer than 40 meters connecting it directly on the Inverter output. Available various types of output filters, contact the service to receive informations.
1 6	The Differential Circuit Breaker on the line sometimes switch	Check the Ground system resistance (must be less than 10 Ohm). Use only differential circuit breaker type A (specific for Inverters).
1 7	The Magneto-Thermal Circuit Breaker on the line switch off the inverter when the pump run at the maximum power	All the inverters may have a high pick value of the sinusoidal caused by the harmonics (5 th , 7 th , 11 th , etc.) and depending by the resistance of the line, but this condition don't increase the energy absorbing value depending by the area under this current curve. Only you need to use a Magneto-Thermal Circuit Breaker with a higher Current value than the value that you can use for the direct pump controlled. Usually it's enough a switch one step higher than the switch useful for the simple motor (see table of the Magneto-Thermal



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