

Vari-RS Manual

Single, Twin, and Triple Sets with Variable Speed Inverter

Introduction

We strongly suggest that the operator carefully reads and follows the information contained in this instruction manual for the Vari-RS Cold water Booster & the RS frequency inverter.



This symbol indicates high voltage hazard. It draws attention to components or procedures that could represent a potential danger to the health and welfare of the operator. This symbol is used to draw the operator's attention to situations of potential danger for people or for operations that could cause damage to the product.

Special warnings regarding the frequency converter.

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

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 inverters must be connected to an efficient earthing system in accordance with the electrical standards of the country in which it is installed. 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.

Booster Set

The Booster sets are 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 and protection against dry running. It is highly recommended to use the booster sets with the pressure vessel(s) provided.

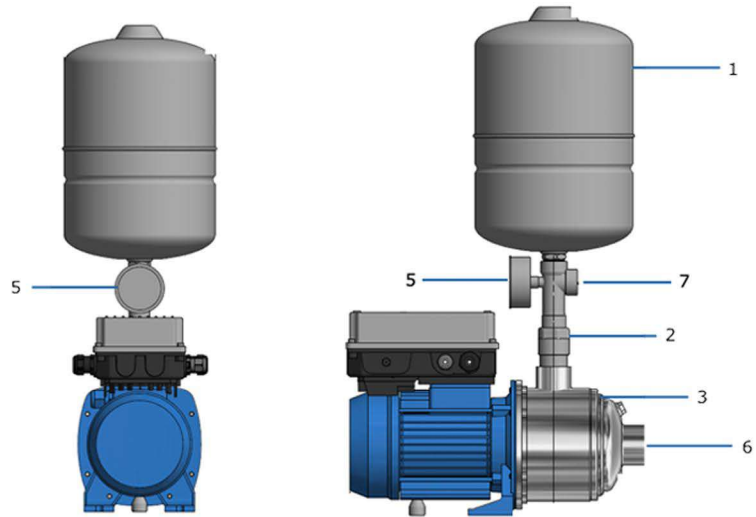
Booster Set Configuration

The Vari-RS cold water booster set is assembled with only fully AISI 304 stainless steel. Every pump on the set comes equipped with a variable speed frequency inverter mounted to the pump body with RS485 communication cable for 2 and 3 pump sets.

Each pump on the set also featured a WRAS approved pressurised expansion, this will need setting at the correct point during commissioning, this is detailed further on in this manual.

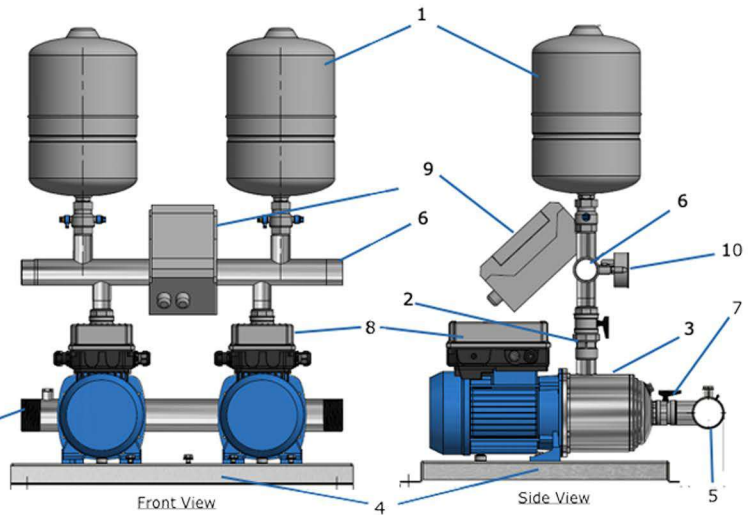
Please see the following Diagrams overleaf that shows the configuration of our 1, 2 and 3 pump standard build booster sets.

- 1 - Expansion Vessel
- 2 - Non-Return Valve
- 3 - Multi-Stage Pump
- 4 - Variable Speed Inverter
- 5 - Pressure Gauge
- 6 - Suction Port
- 7 - Delivery Port



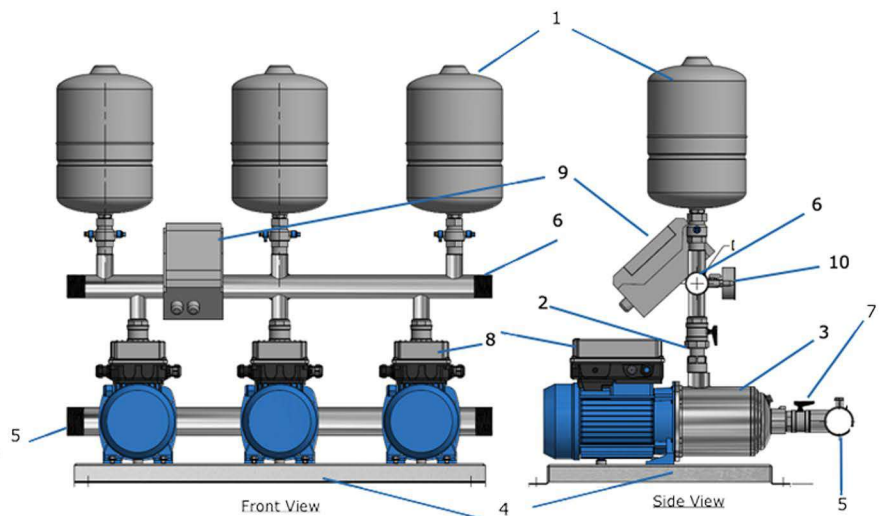
- 1 - Expansion Vessel*
- 2 - Non-Return Valve
- 3 - Multi-Stage Pump*
- 4 - Base Plate
- 5 - Suction Manifold
- 6 - Discharge Manifold
- 7 - Isolation Ball Valve
- 8 - Variable Speed Inverter*
- 9 - Protection Control Device
- 10 - Pressure Gauge*

The 1 Pump sets only come with the items marked * as standard design.



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Functioning

During a pressure drop, caused by a demand on the water supply, the first pump starts, and aims to satisfy at the predetermined 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.

Dry running protection

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

This manual is aimed at giving the necessary information regarding the installation, use and maintenance of booster sets with variable speed by frequency inverter consisting of various pumps. It is vital that the user reads this manual prior to using the system. Improper use may cause damage to the machine as well as the lapse of the guarantee.

READ THE INSTRUCTION MANUALS OF EVERY PUMP, MOTOR, CONTROL PANEL AND ALL COMPONENTS. FOLLOW THE PROVISIONS OF THE SAFETY AND PERFORM THE PLANNED MAINTENANCE RECOMMENDED IN THE INSTRUCTION MANUALS

Danger, Risk of electric shock Warning

The set must be fitted in a well-ventilated place, protected from unfavourable weather conditions. When handling the set, lift it by the base. Do not lift the set by the delivery manifold or you risk of damage to the inverter modules.

Position the set in such a way that any maintenance jobs can be carried out without difficulty.

Ensure that the system pipes are independently supported and do not weigh down on the set manifolds to avoid deformation or breaking of any of its components.

Power supply must be admitted on working condition; do not lift or carry booster set by the inverter, lift via the mounting skid.

It is also advisable to insert vibration-damping couplings on the system manifolds. Make the intake section following all the precautions necessary to keep load losses to a minimum and to avoid the formation of air pockets, for example:

Position the set as close as possible to the power supply source. Consider a suction pipe diameter never smaller than that of the manifold.

Lay the suction pipe horizontally or sloping slightly upwards towards the set. Avoid using elbows or couplings that cause sudden changes in direction. If necessary, use bends with a wide radius.

Installation Guidelines

Installation must be performed by skilled and authorised installers only to prevent risk of voiding warranty.

During installation, apply all safety behaviours issued by the competent bodies and suggested by common sense. Install the unit in a dry well-ventilated place.

Rest the unit on a flat, regular, and solid surface (rubber feet) or disassemble the rubber feet and fix the unit to the base using the relevant screws. Vibrations must not occur during functioning. The unit can only be installed in the horizontal position. In the applications with positive suction head, the suction pipe must not be smaller than that of the intake manifold.

In the applications with a negative suction head, in particular cases, there may be the necessity to replace the intake manifold with an individual supply for each pump, to prevent preferential flows to one or several pumps. Generally, in negative suction head applications, the intake pipes must be as short and straight as possible, they must have a diameter greater than or equal to the diameter of the pump intake (or the manifold if present).

They must also be supplied with foot-valve and have a slight slope to the pumps, to prevent the formation of air pockets. Functioning with leaks in intake can damage the unit pumps. Carefully fix the piping in order not to transmit stress of any type to the pump.

Fasten the piping to the respective manifolds, without excessive force so as not to cause damage. Booster sets can be shifted in different ways depending on the configuration of the machine and equipment available to the installer.

Wiring to the mains power supply

The booster set is designed to start automatically. Make hydraulic connections and prime the pumps before making any electrical connections.

The units are delivered ready for power supply connection, which must be carried out by a skilled, authorised installer, in compliance with the Standards in force in the country of installation. During installation, apply all safety behaviours suggested by law and common sense. Make sure that the electric power supply network is protected by ground connections in compliance with Standards.

Check the correspondence between the plate data and line nominal values. Before making the connections, make sure that the ends of the line wires are not live.

Make the connection when you are sure of the existence of an efficient ground circuit. The ground wire must be longer than the phase wires and must be the first to be connected during assembly and the last to be disconnected during disassembly.

The installation of a differential switch is recommended, whose nominal functioning differential current does not exceed 30 mA (use overly sensitive differential circuit breakers 30 mA, in Class A or AS).

Pressure Vessel – IMPORTANT – must be fitted.

An 8L Pressure vessel(s) is pressurised fitted during product and for testing, it is then depressurised for safety, prior to shipping. There is an 8Ltr vessel for each pump in the set and should always be fitted on the discharge manifold close to the transducer to stabilize the pressure signal.

The vessel air charge should be maintained at 0.5 bar below the systems nominal operating pressure.

e.g., Target System Pressure = 4.0 bar
Vessel Air Pressure = 3.5 bar

Wiring the booster set to the power supply.

The power supply cable must have 3 wires (2 phase + grouor the section of the cable to use, for line length up to 30 m, m be at least 2.5mm². The connection to the power supply line will be performed on the L, N and Earth/Ground clamps of the inverter (see below pictures).

Single Pump Terminal Connections

On a single pump system, the mains power supply connection is made directly to the inverter housing as seen below. The output to the motor is already connected.



Live
Neutral
Earth/ground



Optional
For low level float protection, replace the red link with the black and blue core from the float switch.

Twin Pump Terminal Connections

On a Twin pump system, the mains power supply connection is made directly to the protection control device which houses the pump breakers, as seen below. The output to the motor is already connected.

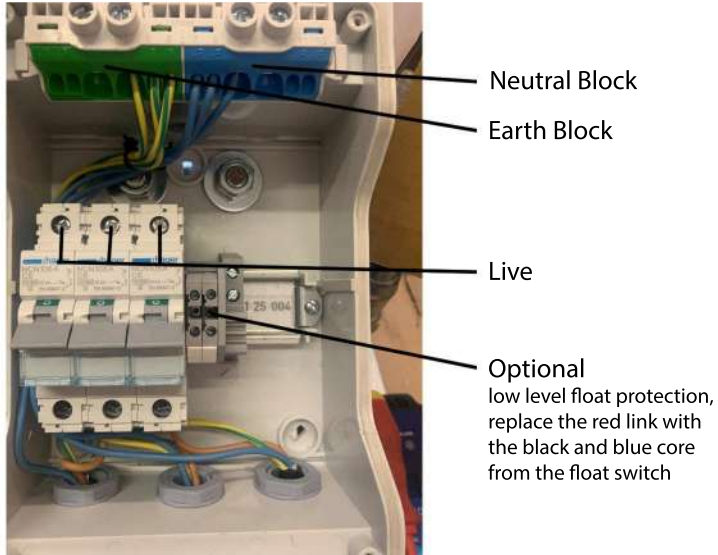


Neutral Block
Earth Block
Live

Optional
low level float protection, replace the red link with the black and blue core from the float switch

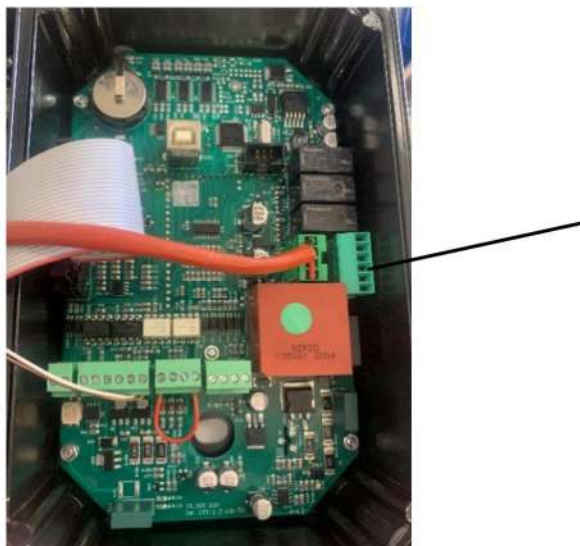
Triple Pump Terminal Connections

On a Triple pump system, the mains power supply connection is made directly to the protection control device which houses the pump breakers, as seen below. The output to the motor is already connected.



Alarm output connections

Relay output contact capacity 250V, 2 Ampere max. closed when the inverter is in an alarm condition, between the terminals marked ALARM (pole 2 & of the below) and COM (pole 3 of the below).



Priming

A pumping system must never be started dry for any reason. Dry running of the pumps, even for very brief periods, can cause irreversible damage to mechanical sealing and internal rotating couplings.

All pumps must be primed before starting the system by unscrewing the filler cap and filling the pump body with water (and the intake piping connected to it). When the operation has been completed, tighten the cap, and start the pump.

If, after a few seconds, the pump is not primed, switch it off, check that the intake is free, that there are no air pockets upstream from the inlet, that the body is full of water and then repeat the operation. In the units, priming is performed for each individual pump, turning off the other pumps and performing the operations described above for each pump.

Installer check – First time Operation

Check the booster system reaches target pressure and switches off.

At the first installation open the delivery on the pump outlet, press START, wait a few seconds for the pumps to start up, after 30 seconds or sooner depending on volume of the plumbing system. Slowly close the pump delivery valve and make sure that the motor stops (after a few seconds) showing on display "MINIMUM FLOW", this tests that target pressure has been reached and the system switches off as required and is operating correctly.

Once the system switches off after displaying "MINIMUM FLOW", close all outlets where possible and allow the booster set to pressurise the plumbing system. If there is no demand on the system, the set will switch off, ready for use.

In case the motor does not stop, you must consult the troubleshooting guide on page 10-11 or contact your supplier to be put through to the manufacturer's technical department.

Booster Set RS Inverter Alarm List

Current Peak	Immediately stop probably caused by short-circuit. Automatic re-start; final stop after 10 consecutive occurrences
Over-Voltage	Caused by over voltage pick supply. Automatic re-start. Final stop after 10 consecutive occurrences
Inverter Temperature	Over temperature IGBT protection (90°C) Automatic re-start; final stop after 10 consecutive occurrences
Motor overheating	Motor thermal protection related to nominal current set, for motor insulations saving at high temperatures. Automatic re-start; final stop after 10 consecutive occurrences
Dry working	Null input flow or air presence
Pressure sensor problem	Pressure sensor output problem Automatic re-start; final stop after 10 consecutive occurrences
Minimum flow	The pump stops for minimum flow limit achievement. It is the normal working condition of the system (no demand of water on the delivery) even though it is on the alarm list, Automatic re-start; no limits
Enable OFF	Opened contact EN: stop the motor; the motor restarts when the contact will close again
Input Voltage under limit	Input voltage under the minimum working limit. Automatic re-start; final stop after 10 consecutive occurrences
Delivery/Suction Pressure Transducers inverted	Inversion delivery/suction on the pressure reading, caused by an uncorrected wiring (only for Differential pressure control mode).

Replacing the lithium battery

The 3V lithium battery is used exclusively for storing date and time even in the absence of power supply for a long time (the battery can live 6-8 years without inverter power supply). The lithium battery should be replaced when the user notices that the inverter does not maintain stored date and time in the absence of power supply.

NOTE: Even with exhausted or absent lithium battery, the data will remain stored and all inverter functional settings stored indefinitely.

1. Disconnect the power cable from the line.
2. Open the inverter box.
3. Wait for the complete shutdown of the led which indicates the charge of capacitors before touching any part of the electronic boards.
4. Replace the battery present under the cover of the inverter.

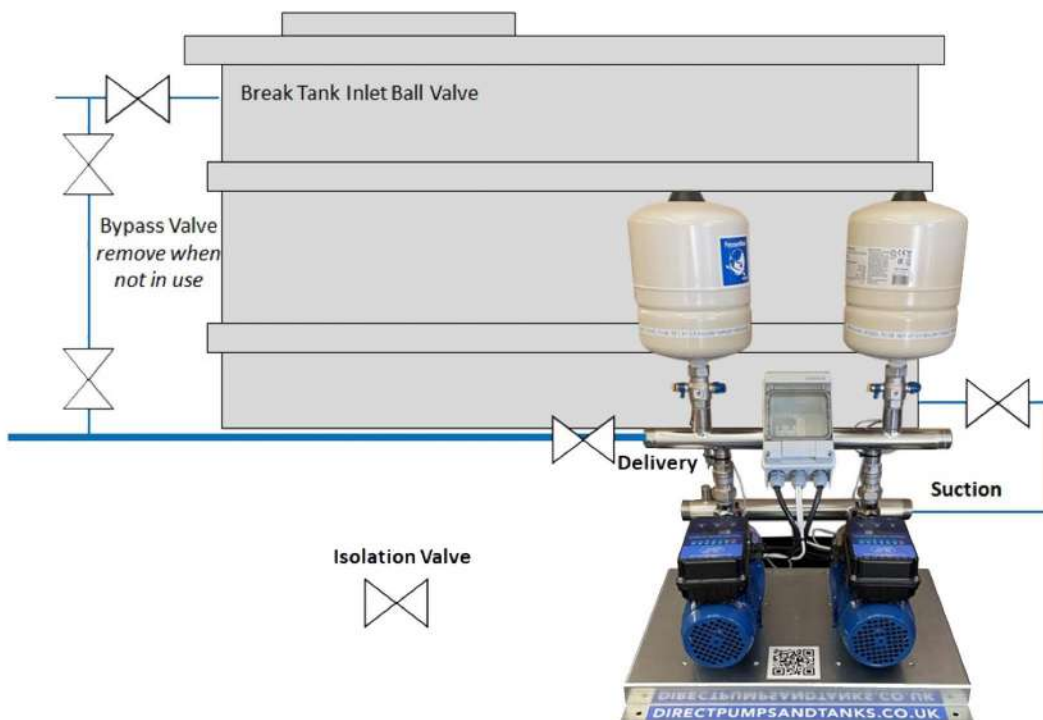
Troubleshooting Guide

13	Input Voltage under limit	Input voltage under the minimum working limit. Automatic re-start; final stop after 10 consecutive occurrences
14	Unbalanced current	Unbalanced currents on the three phases (>15% on RMS value) Automatic re-start; final stop after 10 consecutive occurrences
15	INPUT-OUTPUT cables inverted	Connection error: Voltage supply connected on the output and Motor cable connected on the entrance: reverse in order to enable the motor.
16	Delivery/Suction Pressure Transducers inverted	Inversion delivery/suction on the pressure reading, caused by an uncorrected wiring (only for Differential pressure control mode).
17	Maximum pressure	The pressure has exceeded the set-point value + percentage value of the set-point. Increase the maximum pressure percentage to 200%. Menu>Advanced functions>Pressure control>Maximum pressure.

Typical Installation

See below a typical installation of a Vari-RS booster set, it is vital when planning in the installation of the booster set that it is located as close to the break tank as possible.

This is to eliminate the risk of the booster set running the suction pipe dry before the atmospheric pressure which occurs on the water level in the break tank can press the water into the suction pipe. The longer the suction pipe to the booster set the greater the risk you run of emptying the pipe, causing a dry run.





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