DUTYPOINT SETTING THE BAR

Dutypoint VT Cold Water Booster Sets



Operation and Maintenance Manual

DOC-VTOM2201

DUTYPOINT SETTING THE BAR

About us.

Applied knowledge. Shared know-how. Fearless innovation.

Together, we are Dutypoint. Since 1976, we've been building up industry-defining expertise in fluid technology.

This knowledge means we solve complex challenges with straightforward solutions that are built around meeting and exceeding our clients' needs. We approach everything with the same philosophy: how will we go above and beyond?

Our commitment to collaboration and sharing knowledge galvanises and cements robust relationships. Relationships that are built to last, because our clients are our partners.

Our focus for the future? Innovation. We want to be the future of our industry, globally. Where we benchmark thought leadership, expertise and customer care.

We set the bar.

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1. Important Safety Information

1.1 Health & Safety at Work Act 1974

Section 6(a) of this Act requires manufacturers to advise their customers on the safety and the handling precautions to be observed when installing, operating, maintaining and servicing their products. The user's attention is therefore drawn to the following:

- The appropriate sections of this manual must be read before working on the equipment.
- Installation, operating and maintenance must only be carried out by suitably trained/qualified personnel.
- Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.

Refer to Dutypoint for any technical advice or product information. It is the responsibility of the customer and/or the contractor:

- To ensure that anyone working on the equipment is wearing all necessary protective gear/clothing;
- Is aware of appropriate health & safety warnings and to read the information in this manual.

1.2 Safety Messages and Hazard Statement

Message Level	Definition
DANGER	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION	A hazardous situation which, if not avoided, could result in minor injury or moderate injury
ELECTRICAL HAZARD	Risks associated with electricity will cause hazards if not properly avoided
Note	A situation which may arise resulting in undesirable conditions and/or will not cause direct hazards to persons

Table 1.1: Hazard Notice Definitions

1.3 Qualified Personnel

WARNING

This product is intended for operation by qualified personnel only

- Only qualified personnel are allowed to install or operate this equipment
- Qualified personnel are defined as trained staff, who are authorised to install, commission and maintain equipment, systems and circuits in accordance with relevant laws and regulations. Personnel must be familiar with the instructions and safety procedures described in this document.
- This product should not be used by anyone with mental disabilities, or anyone without the relevant experience and knowledge, unless they have received instructions on using the equipment and on the associated risks, or are supervised by a responsible person.
- · Children must be supervised to ensure they do not play on or around the equipment.

1.4 Environmental Protection

All local regulations and codes regarding emissions and waste disposal must be followed. This may include:

Reporting of emissions to appropriate authorities

- · Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills
- Separate disposal of electrical components from domestic waste

1.5 Mechanical Device Servicing

- Familiarise yourself with the relevant contents of this manual
- Installation, maintenance and repair work must only be carried out by trained, skilled and suitably qualified personnel.
- Disconnect or lock-out the power source to ensure that the item(s) will remain inoperative. Locking out the equipment by switching off the release mechanism or set value WILL NOT prevent accidental starting.
- Allow the item(s) to cool if over-heated.
- CLOSE the isolating valves on the suction and discharge connections of the affected item(s).
- If working on pump, VENT slowly and cautiously Refer to the relevant section of this manual.
- DRAIN the pump(s).

1.6 Pump Hand Control Mode (Where Fitted)

In the 'HAND' position the pump(s) controlled by the switch will normally run at full speed and completely independently of any control devices, and can result in pump(s) running against a closed valve head if there is no draw. This can cause the system to be maintained at the maximum pressure produced by the pump plus any incoming pressure and additional pressure caused by water surge and can potentially damage the pump and other parts of the system.

The 'HAND' option should only be used with a competent operator in attendance, or when there is a continued demand sufficient to provide constant flow through the pumps to maintain the running pressure of the system to an acceptable level.

1.7 Personal Protective Equipment

Use personal safety equipment according to the site conditions and employer regulations. This may include, but may not be limited to:

- Hard hat
- Safety goggles with side shields
- Protective footwear
- Protective gloves
- Respirator
- Ear protection
- First aid kit
- Safety devices

1.8 Precautions Before Commencing Work

Ensure that the following safety precautions are complied with before commencing work:

- Provide a suitable barrier around the work area
- Ensure all safety guards and in place and secure
- Ensure you have a clear path of exit
- Ensure that the product cannot roll or fall over and cause damage to persons or property
- Ensure all lifting equipment is in good condition and rated for the intended task
- Use a lifting harness, safety line and respirator as required
- Allow hot components to cool before handling them
- Ensure that product has been thoroughly cleaned
- Disconnect and lock out power supply, ensuring that it cannot be accidentally re-connected

Check for any risk of explosion before using hand tools

1.9 Precautions During Work

- Never work alone
- Always wear protective clothing and hand protection
- Stay clear of suspended loads
- Always use appropriate lifting devices
- Beware of risks of sudden starts of any automated equipment such as level control
- Beware of starting jerks of electric motors these can be powerful
- Do not exceed the stated operating limits of equipment
- Do not remove vent plugs from a pressurised system ensure pressurised components are relieved of
 pressure before disassembly
- Ensure guards are in place during operation

1.10 Hazardous Fluids and Chemicals

If hazardous chemicals come into contact with skin or eyes, use the following procedures:

Condition	Action
Chemicals or hazardous fluids in eyes	 Hold your eyelids apart forcibly with your fingers Rinse the eyes with eyewash or running water for at least 15 minutes Seek medical attention
Chemicals or hazardous fluids on skin	 Remove contaminated clothing Wash the skin with soap and water for at least 1 minute Seek medical attention

1.11 Electrical Safety - High Voltages

This information is especially applicable when Variable Speed Controllers (Inverters) are fitted to pumps. When the inverter variable speed drive head is connected to the power supply the components of the power unit as well as certain components of the master control unit – are also connected to the power supply.

DANGER!

Touching these components can seriously endanger life!

- Before removing the frequency inverter cover, the system must be disconnected from the power supply
- After switching off the power supply wait at least 5 minutes before starting work on or in the inverter drive head the capacitors in the intermediate circuit must be given time to discharge completely via the discharge restors.

ELECTRICAL HAZARD

Up to 800V can be present - if there are faults this can be higher

• All work carried out when the frequency inverter is open must be performed only by suitably qualified and properly authorised personnel.

ELECTRICAL HAZARD

THE SYSTEM MUST ONLY BE OPERATED WHEN IT HAS BEEN CORRECTLY EARTHED AND PIPES BONDED TO EARTH IN ACCORDANCE WITH IEE REGULATIONS

• When connecting external control wires care must be taken not to short circuit adjacent components. Bare cable ends which are not in use must be insulated.

1.12 Electronic Safety Devices

- Inverter drives contain electronic safety devices which switch off the control element in the event of a fault developing.
- A motor can also be stopped by 'mechanical blocking'
- If it is switched off electronically, the motor is disconnected from the mains voltage supply via the electronics in the inverter drive.
- Voltage fluctuation and power failures (temporary outages) can cause the motor to switch itself off.

WARNING

A motor will have zero current but will remain energised as it stops

· Take necessary precautions - the motor is not voltage-free in the circuit itself

WARNING

Repair of faults can cause items to start up again unexpectedly

Ensure the motor is isolated before commencing any work

WARNING

High voltage tests of inverters may damage the electrical components.

- Bridge before the incoming/outgoing terminals L-L2-L3 and U-V-W.
- To avoid incorrect metering by capacitors incorporated in the electronic circuits, isolate the motor from the inverter drive head.

1.13 Spare Parts

WARNING

Use of non-genuine spare parts may cause damage to equipment, damage to property and voiding of warranty

- Use genuine, Dutypoint-approved spare parts only
- If in doubt, contact Dutypoint Service on 01452 300590.

1.14 Transportation and Lifting

WARNING: LIFTING HAZARDS

- Stay clear of suspended loads
- · Observe accident prevention regulations in force
- Do not damage the cables during transports; so not squeeze, bend or dray the cable
- Always keeps the cable ends dry
- · Secure the unit against tipping over and slipping until it is mounted and fixed in its final location
- Lift and handle the product carefully, using suitable lifting equipment (stacker, crane, crane mounting device, lifting blocks, sling ropes, etc.)
- Always lift the unit by its lifting handle
- This equipment has not been designed to lift people, and should not be used in this way.

WARNING: ASSEMBLED SYSTEMS ARE HEAVY

- This equipment has been designed to be lifted by crane
- Failure to properly lift and support this equipment can result in serious physical injury and/or equipment damage,
- Lift equipment only at the specifically identified lifting points.
- Lifting devices such as eye bolts, slings and spreaders must be rated, selected and used for the entire load being lifted
- Select the appropriate lifting points
- Slings should be sized in accordance with the gross weight of the product that is being lifted.
- To minimise tension in legs a sling angle of 20-30° is recommended & appropriate lifting shackles should be used. See *Figure 1.1: Lifting best practice* (p. 9).
- 1) Inspect the package
 - a) Inspect the package for damage or missing items upon delivery
 - b) Note any damaged or missing items on the shipping paperwork and contact Dutypoint immediately
 - c) File a claim with the shipping company if anything is out of order
 - d) If the product has been picked up at a distributor, file a claim with the distributor
- 2) Inspect the unit
 - a) Remove packing materials from the product
 - b) Dispose of all packing materials in accordance with local regulations
 - c) Inspect the product to determine if any parts have been damaged or are missing
 - d) If applicable, unfasten the product by removing any screw, bolts or straps. For your personal safety, be careful when you handle nails and straps.
 - e) Contact Dutypoint if you have any issues.
- 3) Attach appropriate lifting equipment



1.15 Storage

The product must be stored in a covered and dry location free from heat, dirt and vibrations. **NOTE:** Protect the product against humidity, heat sources and mechanical damage **NOTE:** Do not place heavy weights on the packed product

1.16 Disposal

At the end of its working life, this product should not be disposed of with standard household waste, but rather dropped off at a collection point for the disposal of Waste Electrical and Electronic Equipment (WEEE) for recycling.

Figure 1.2: Waste Symbol



This is confirmed by the *Waste Symbol* found on the product, user manual or packaging.

Depending on their characteristics the materials may be recycled. Through recycling and other forms of processing Waste Electrical and Electronic Equipment, you can make a significant contribution towards helping to protect the environment.

Please contact your local authorities for information on the collection point nearest you.

1.17 Potable Water Safety

According to HSE guidance, all water systems should be cleaned, flushed and disinfected as specified in BS EN 806 and BS 8558.

A risk assessment should be performed before commissioning to identify and take into account the potential for stagnation as this may lead to microbial growth where buildings are not to be fully occupied immediately.

WARNING

The temperature of stored water must be kept below 23° to prevent bacteria growth.

- Storage cisterns should be regularly checked for signs of stagnation or microbial growth
- See HSE guidance for more details: www.hse.gov.uk/legionnaires

2. System Specifications

Table 2.2: Range Specifications

Application	Pressure boosting of potable water
Pumps	2or3 Dutypoint TPX Vertical Multistage. See 7. Vertical Multistage Pumps (p. 34)
Duty flow rate range	1-28 litres/second
Duty head range	1-13 bar
Liquid temperature range	1-23°C
Ambient temperature range	5-40°C
Humidity	Max 50%
Controller type	Dutypoint Smart Control Panel. See 3. System Control Panel User Guide (p. 16).
Maximum system pressure	15 bar
Volt free contacts	 Common fault (normally open) Low water level (normally open) High water level (normally open)
External on/off contacts (normally closed)	This feature allows the system to be remotely deactivated, for example by a BMS system. When not deactivated, the system will run as normal in automatic mode.
Override mode (normally closed)	This feature enables switching to an alternative required pressure, which is triggered by an external input.

Figure 2.3: Product codes

-	VT	2-	05-	015	T
Number of pumps				[[
Nominal flow (m ³ /h)					
Motor kW per pump					
Power supply					;

2.1 Pump Curves - Individual pump curves

VTX-05-005 Performance



Flow (m³/hr)

















Individual Pump Curves continued

VTX-10-011



VTX-10-022



VTX-10-030



VTX-10-040



VTX-10-055







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VTX-15-015

Individual Pump Curves continued



VTX-15-030



VTX-15-040



VTX-15-055 Performance





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Individual Pump Curves continued

VTX-20-022



VTX-20-040

Head (metres)



VTX-20-055



VT3-20-075



3. System Control Panel User Guide

The Dutypoint Smart Control Panel allows access to important system information and adjustment of key parameters. Please note that in the course of normal system operation it should not be necessary to make any adjustments or to refer to the control panel display. If there is a fault with the system, the screen will normally show details of the fault and give details of suggested actions. Because most parameters are controlled using the touch screen HMI, the front of the control panel has a main isolator switch only. Individual pumps can be isolated using the breaker switches inside the control panel.

DANGER - ELECTRICAL HAZARD

Risk of electric shock

- Only those with suitable electrical training should open the control panel
- Do not open the control unless you are a qualified electrician or electrical engineer

WARNING

The control panel should only be operated by trained and competent persons

Contact Dutypoint on 01452 300590 if you require assistance

This guide relates to PLC version SmartBoost_021220_3512 (fitted with all-black HMI controller), released 06/2021.

3.1 Navigation panel



- HOME: loads the home screen
- SETTINGS: loads the settings screen
- ALARMS: loads the alarms viewer
- SERVICE: loads the service screen

3.2 Status Notification

Pump 3 Speed (

Tank Level OK

Text in the bottom left corner of the screen will display tank status messages as follows:

- Tank Level OK: this is displayed if the tank level is sufficient and the low level float switch is not activated.
- No Water: this is displayed if the tank level has dropped to a minimum level and the low level float switch has been activated in this state no pumps will be permitted to run.
- Tank OK Initializing Pumps: this is displayed once the tank level has deactivated the low level float switch the system delays the restart for a period of time to ensure a stable water supply while the tank is re-filling from a low level

3.3 Home Screen

Set Pressure	5.00	Bar		HOME	ft
Actual Pressure	5.36	Bar		SETTINGS	° ¢
Pump 1 Speed	0.0	Hz	Pump Ready - Auto		
Pump 2 Speed	0.0	Hz	Pump Ready - Auto	ALARMS	Ъ
Pump 3 Speed	0.0	Hz	Pump Ready - Auto	SERVICE	Je.

Tank Level OK

PUMPS | SYSTEMS | SERVICING | KNOW-HOW

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- SET PRESSURE: Required system pressure setpoint
- ACTUAL PRESSURE: Actual system pressure
- PUMP 1 SPEED: Displays pump 1 running speed and operational status
- PUMP 2 SPEED: Displays pump 2 running speed and operational status
- PUMP 3 SPEED (If fitted): Displays pump 3 running speed and operational status

3.4 Settings 1



- PRESSURE: Loads the pressure setpoints screen
- ASSIST: Loads the pump assist settings screen
- INVERTER: Loads the inverter settings screen
- MANUAL: Loads the pump manual control screen
- SENSORS: Loads the sensor settings screen
- HiRISE: Loads the HiRISE settings screen
- NEXT: Loads settings 2 page

3.5 Settings 2



- BURST PIPE SETTINGS: Loads the burst pipe protection settings screen
- ANTI-SEIZE: Loads the pump anti-seize settings screen
- STATUS: Loads the pump status screen
- RUN TIMES: Loads the system & pump run time screen
- DATE TIME: Loads the date and time setting screen
- OVERRIDE MODE: Loads the override mode settings screen
- BACK: Returns to settings 1 page
- NEXT: Loads the settings 2 page

3.6 Settings 3



- LOGIN: Loads the change user login dialog. Admin user username and password as below
 - o Username admin99
 - o Password admin
- BACK: Returns to Settings 2 screen

3.7 Pressure Settings

Pressure Settings



PUMPS I SYSTEMS | SERVICING | KNOW-HOW

- REQUIRED PRESSURE: Desired system pressure set point
- OVER PRESSURE ALARM SETPOINT: Desired over pressure alarm setpoint (this pressure is added to the Required Pressure setpoint) the actual over pressure setpoint is displayed to the right of the value
- OVER PRESSURE ALARM DELAY: Delay time after over pressure has been reached before the pumps are shutdown.
- PRESSURE DROP TO START PUMP: Required pressure drop below setpoint to start pump operation

3.8 Assist

Assist Settings

Assist Start Frequency	59.0	Hz		HOME	fi
Assist Stop Frequency	49.0	Hz		SETTINGS	°¢
Assist Ramp Time	5	Sec		ALARMS	Ä
Assist Pump Start Delay Time	5	Sec			_
Assist Pump Stop Delay Time	60	Sec		SERVICE	J.S.
			DUTY	POIN	۸L ۵
			PUMPS SYSTEMS S	ERVICING I KNOW	/-HOW

- ASSIST START FREQUENCY: Frequency which the running pump needs to reach before starting an assist pump (if enabled)
- ASSIST STOP FREQUENCY: Frequency for the running pumps to reach before stopping an assist pump (if enabled)
- ASSIST RAMP TIME: Assist pump inverter ramp up time how fast the pump spins up to speed
- ASSIST PUMP START DELAY TIME: Delay time before starting an assist pump once the assist start speed has been reached
- ASSIST PUMP STOP DELAY TIME: Delay time before stopping an assist pump once the assist stop speed has been reached

3.9 Inverter Settings 1



- PUMP MAX SPEED: Maximum rated pump speed (as per pump data plate)
- PUMP MAX HEAD (Hmax): Maximum pump head (Hmax) as per pump data plate
- MIN DUTY SPEED: Automatically calculated minimum pump running speed (read only)
- MIN RUN TIME: How long the pump should idle for once duty has been reached before shutting the pump down
- NUMBER OF PUMPS FITTED: Number of pumps physically fitted to the booster
- NEXT: Loads Inverter Settings 2 screen

3.10 Inverter Settings 2

Inverter Settings 2



- NUMBER OF DUTY PUMPS: Number of pumps required to fulfil the duty required.
 le, 2 pump booster running Duty/Assist = 2. 2 Pump booster running Duty/Standby = 1.
- AUTOMATIC PUMP CHANGEOVER TIME: If one pump runs continuously for this time (in hours) it will be automatically stopped and the next pump with the lowest run time will be started. This can also be enabled or disabled if desired
- RAMP UP TIME: Initial pump start ramp up time
- RAMP DOWN TIME: pump stop ramp down time
- MOTOR RATED CURRENT: Motor rated current as per motor data plate (ensure correct amps for booster voltage is entered.)
- BACK: Returns back to Inverter Settings 1 screen

3.11 Manual Control

Manual Control

Pump 1	Pump 2	Pump 3		HOME	î
PUMP AUTO	PUMP AUTO	PUMP AUTO		SETTINGS	Ŷ
				ALARMS	Ä
Manual Speed	30.0			SERVICE	Jan .
This manual overri protection. Pumps cause premature sy damage due using	de function will disre will run continuously vstem or pump failure this mode will void th	gard any system which may e. Failure or ne warranty.	DUTY	POIN	۱L م
			PUMPS I SYSTEMS I S	SERVICING I KNOW	-HOW
Manual Control					
Pump 1	Pump 2	Pump 3		HOME	fi
PUMP AUTO	PUMP AUTO	PUMP AUTO		SETTINGS	°¢
STOP 🗹				ALARMS	Ä
Manual Speed	30.0			CEDVICE	<u>s</u>
CAUTION This manual over protection. Pumps	ide function will disre will run continuously	egard any system y which may			ر م
damage due using	y this mode will void t	he warranty.			нож

This is where the pumps can be manually controlled if required. When in automatic mode the pumps will start and stop as required by the system. Pressing the PUMP AUTO will stop the pump running in automatic mode. The STOP button can be pressed to manually start the pump. Pressing the stop button or the Pump Auto button will stop the pump and return it back to automatic mode.

Placing any pump into manual mode will trigger the alarm which can only be reset once the pump is put back into automatic mode.

Number of pumps fitted will depend on how many pump manual control buttons appear in the screen

If the pump is running when put into manual mode, the next available pump will start to maintain the pressure requirements to the system

NOTE, the manual override function will disregard any system protection. Pumps could run continuously which may cause premature system or pump failure. Failure or damage due to using this mode will void the warranty.

3.12 Sensor Settings



- PRESSURE SENSOR MAX RANGE: Maximum range of the fitted pressure transducer
- PRESSURE SENSOR MIN RANGE: Minimum range of the fitted pressure transducer (normally 0)

3.13 HiRISE Settings

HiRISE Settings HOME Sec HiRISE Run Time 90 SETTINGS Number of HiRISE Pumps 2 % BAR HiRISE Setpoint (% of Required 3.0 60 Pressure) ALARMS Low Water Recovery Time 60 Sec SERVICE Sec HiRISE Ramp Time 20 RESTART HIRISE PUMPS | SYSTEMS | SERVICING | KNOW-HOW

- HIRISE RUN TIME: How long the HIRISE function will run for on power restoration or low water event
- NUMBER OF HIRISE PUMPS: How many pumps to run during the HiRISE function
- HIRISE SETPOINT: Required pressure for HiRISE (actual pressure automatically calculated from % of required pressure) Actual setpoint is displayed on the right.
- LOW WATER RECOVERY TIME: Delay time after the low water float is reset before the system restarts – this is to prevent any short cycling if demand is higher than incoming water supply
- HIRISE RAMP TIME: Ramp up time for the inverters while in HiRISE mode
- RESTART HiRISE: This will stop the booster running in pressure control mode and restart the HiRISE function. If there is an active demand on the system a pressure reduction in the system will be caused.

3.14 Burst Pipe Settings



- BURST PIPE PRESSURE SETPOINT: Pressure below setpoint with pumps running to trigger the burst pipe alarm (All duty pumps need to be running before this is activated) Pressure drop below setpoint actual alarm setpoint displayed to the right
- BURST PIPE DELAY: Delay time once the alarm pressure has been reached before alarm is triggered and pumps are shut down alarm requires manual reset
- BURST ENABLE: Enabled/Disables burst pipe monitoring function

3.15 Anti-Seize settings

Anti Seize Settings



- SPIN SPEED: Required pump speed while anti seize spin is functional
- MAX IDLE TIME: Maximum permitted idle time required to elapse before pump is started to prevent seizing
- ANTI SEIZE SPIN TIME: How long to spin the pump for
- ANTI-SEIZE BUTTON: Enables/disables anti seize function

3.16 Pump Status

Pump Status

DUTY SHIFT

Pump 1	Pump 1	Pump 1
Pump Ready - Auto	Pump Ready - Auto	Pump Ready - Auto
0.0 Hz	0.0 Hz	0.0 Hz
0.0 A	0.0 A	0.0 A



- Pump status: Displays pump status if it is in auto, manual, low water etc
- Hz: Displays current motor running speed
- A: Displays current motor current draw in Amps

Duty Shift - This function will stop any running pump and start the pump with the next lowest pump run time. This function will cause a slight pressure drop in the system as one shuts down and the next starts.

3.17 Pump Run Times



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- SYSTEM RUN TIME: Displays total system up time
- PUMP 1 RUN TIME: Displays pump total run time
- PUMP 2 RUN TIME: Displays pump total run time
- PUMP 3 RUN TIME (If fitted): Displays pump total run time

3.18 Date & Time



If the date and time need changing – enter the correct date/time in the relevant box and press the set button to save the new value. To compensate for BST an hour may need to be removed from the new hour value

3.19 Override Mode



- OVERRIDE REQUIRED PRESSURE: Required system pressure while in override mode
- NUMBER OF OVERRIDE PUMPS: Number of duty pumps required while in override mode
- DISABLE LOW PRESSURE CUTOUT: Enables/Disables low system pressure monitoring function
- DISABLE LOW WATER CUTOUT: Enables/Disables low water cut out. If disabled then the booster set will be able to run dry and not shut down fatal pump damage can be caused.

Override mode is a function which can alter the required pressure based on an external input to the booster.

An example would be for a separate duty for fire sprinklers. The booster can accept an input from a fire alarm panel (normally closed) which on activation will change the booster setpoint to suit the duty required for the sprinklers.

This mode allows the overriding of important booster safety features such as the low level float switch, care must be taken that the booster/building systems do not sustain serious damage while using this function.

NOTE: This feature us for use in an emergency situation only and must only ne activated by suitably qualified competent persons. Use of this functionality is logged in detail to memory which cannot be deleted. Extended use/misuse will invalidate warranty.

Dutypoint LTD cannot be held responsible for damage occurred/sustained while this function is active

3.20 Alarms

Alarms



Any active alarms will be displayed in the window. Self-resetting alarms will automatically reset and normal booster operation will resume

Any alarms which require a manual reset will remain active in the window – Reset Alarms button will attempt to reset the alarm, providing the fault condition has been resolved.

Historical stored alarms are saved to the memory and can be viewed by pressing the ALARMS HISTORY button – this will load the alarm history screen

A list of alarms is listed at the end of this document.

Alarm History:

	HOME	Descriptio	Value	State	Name	Timestamp
		Pump 1 in ma	0	Not Triggered	Pump1Manua	31/12/20 - 03:36:30
_		Pump 1 in ma	1	Triggered	² ump1Manua	31/12/20 - 03:34:47
٩,	SETTINGS	Low Wate	0	Not Triggered	LowWater	31/12/20 - 00:01:20
	JETTINGS	Booster disabled (0	Not Triggered	ExternalDisabl	31/12/20 - 00:00:20
_		Low Wate	1	Triggered	LowWater	31/12/20 - 00:00:20
		Booster disabled (1	Triggered	ExternalDisabl	31/12/20 - 00:00:20
Γ ΄	ALARMS	Low Wate	0	Not Triggered	LowWater	05/12/18 - 21:46:32
		Low Wate	1	Triggered	LowWater	05/12/18 - 21:46:13
		High pressure sh	0	Not Triggered	HighPressure	30/11/18 - 06:16:24
		High pressure sh	1	Triggered	HighPressure	30/11/18 - 06:15:50
	SERVICE	Low Wate	0	Not Triggered	LowWater	30/11/18 - 05:07:04
L C						

PUMPS I SYSTEMS I SERVICING I KNOW-HOW

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Historical alarms are saved and can be viewed in the historical alarm viewer. The triggered alarms will display in red with a white double entry once the alarm has cleared.

This list cannot be reset or cleared by the user.
3.21 Service Contact

Service Contact		HOME	ft
Dutypoint Ltd Shepherd Rd Gloucester GL2 5EL		SETTINGS	°¢
service@dutypoint.com 01452 300 590		ALARMS	Ä
Serial Number	12345		
PLC Version	SmartBoost_021220_3512	SERVICE	J
HMI Version	SmartBoost_VT_090421		ഗ
Service Due In (Days)	184		Т

This page displays Dutypoint contact details, the booster Serial Number, PLC & HMI software versions and how many days remain until the next service is due. This cannot be reset by anyone other than a qualified Dutypoint engineer.

3.22 Alarms & resolutions

Alarm	Cause	Resolution	Reset
Burst Pipe	System has detected low system pressure with all duty pumps running.	 Check pumps are vented Check there is water in the storage tank Check system for major leaks 	Manual
Inverter 1 Comms	Controller has detected loss of communication to inverter 1	 Check inverter is powered on and MCB/ fuse hasn't tripped Check inverter doesn't have an error on the screen Check cables between controller & inverter are tight (CAT 5 cables) 	Auto
Inverter 2 Comms	Controller has detected loss of communication to inverter 2	 As above 	Auto
Inverter 3 Comms (if fitted)	Controller has detected loss of communication to inverter 3	As above	Auto
Inverter 4 Comms (if fitted)	Controller has detected loss of communication to inverter 4	As above	Auto
Inverter 5 Comms (if fitted)	Controller has detected loss of communication to inverter 5	As above	Auto
Inverter 6 Comms (if fitted)	Controller has detected loss of communication to inverter 6	 As above 	Auto
External Disable	Booster has been disabled by an external source ie BMS etc	 Check BMS or other externally connected control systems If there are no connections to BMS or an external control system, check that the link wire between the external on/off terminals is in place. 	Auto
Inverter 1 Disable	Inverter 1 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	Check terminals 1 & 2 on inverter are still connected	Auto

Alarm	Cause	Resolution	Reset
Inverter 2 Disable	Inverter 2 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	As above	Auto
Inverter 3 Disable (if fitted)	Inverter 3 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	 As above 	Auto
Inverter 4 Disable (if fitted)	Inverter 4 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	As above	Auto
Inverter 5 Disable (If fitted)	Inverter 5 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	 As above 	Auto
Inverter 6 Disable (if fitted)	Inverter 6 has been disabled locally – will only appear if terminals on inverter 1 & 2 have become disconnected	 As above 	Auto
Override Mode	Booster has been put into a 2 nd required value mode by an external control source – this may be a fire alarm etc.	 Check BMS or Fire alarm panels for external signal 	Auto
High Pressure	Controller has detected high system pressure	 Pump speed set too high for duty Pressure vessel failed Pump ramp time too fast 	Manual
Pump 1 Manual	Pump 1 has been put into manual control	 Pump has been put in to manual control in the HMI settings 	Auto
Pump 2 Manual	Pump 2 has been put into manual control	 Pump has been put in to manual control in the HMI settings 	Auto
Pump 3 Manual (if fitted)	Pump 3 has been put into manual control	 Pump has been put in to manual control in the HMI settings 	Auto
Pump 4 Manual (if fitted)	Pump 4 has been put into manual control	 Pump has been put in to manual control in the HMI settings Pump has been put in to manual control in the HMI settings 	Auto

Alarm	Cause	Resolution	Reset
Pump 5 Manual (if fitted)	Pump 5 has been put into manual control		Auto
Pump 6 Manual (if fitted)	Pump 6 has been put into manual control	 Pump has been put in to manual control in the HMI settings 	Auto
Pump 1 No Load	Controller has detected pump 1 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual
Pump 2 No Load	Controller has detected pump 2 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual
Pump 3 No Load (if fitted)	Controller has detected pump 3 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual
Pump 4 No Load (if fitted)	Controller has detected pump 4 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual
Pump 5 No Load (if fitted)	Controller has detected pump 5 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual
Pump 6 No Load (if fitted)	Controller has detected pump 6 isn't drawing any current	 Check motor power cables from inverter to motor terminals Motor has failed Check motor is connected to pump housing 	Manual

Alarm	Cause	Resolution	Reset
Pump 1 Overload	Controller has detected pump 1 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual
Pump 2 Overload	Controller has detected pump 2 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual
Pump 3 Overload (if fitted)	Controller has detected pump 3 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual
Pump 4 Overload (if fitted)	Controller has detected pump 4 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual
Pump 5 Overload (if fitted)	Controller has detected pump 5 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual
Pump 6 Overload (if fitted)	Controller has detected pump 6 is drawing more current than permitted	 Check pump & motor for signs of seizing Check motor rated current is correct in settings Motor windings failing Check for correct input voltage 	Manual

Alarm	Cause	Resolution	Reset
Service Due	Booster service due	 Book service with Dutypoint 	Engineer only
Transducer failure	Controller has detected a transducer has failed	 Check transducers are plugged in Check isolation valve is open 	Auto

Changing the IP address:

- Press and hold a blank area of any screen to bring up the Context menu

4. Commissioning

4.1 Installation and Commissioning Overview

Before shipment, all Dutypoint pump sets are pre-commissioned. Whilst important procedures such as venting and rotational direction checks need to be carried out on site, initial parameters including pressure settings and delay timers will be adjusted to suit the site conditions previously advised to Dutypoint.

In practice, a system can almost invariably be made to perform more efficiently if commissioning is carried out on site.

Please note that engineer visits by Dutypoint are priced at one visit to commission one pump set. If there are multiple units on a site, special terms can be negotiated. To arrange a commissioning visit, please call the Technical Service Help line 01452 300590.

The following checks should be carried out at the initial installation before any run tests are performed.

WARNING

• Ensure that you have read and understood Section 1. Important Safety Information (p. 4).

4.2 Pipework and mechanical components

- 1) Ensure that the mounting area and any associated groundwork provides adequate support for the pump set.
- 2) Ensure all supports/brackets are in place and secure.
- 3) Verify all pipe joints are sealed and tight.

4.3 Electrical

WARNING

- These checks MUST be carried out by a competent electrician.
- Ensure that the power source is sufficient to allow the running of all pumps together where there are multiple pumps in the system. This also applies to 'standby' pumps.
- 1) Check the motor voltage and frequency information on all the motor nameplates and on controllers etc. corre-spond with that of the source power supply.
- 2) Check that all electrical connections are correctly made and secure. Pay particular attention to earth and bonding connections.
- 3) Carry out specific checks for earth bonding.
- 4) Carry out NICEIC certification checks as required for the installation, e.g Earth Loop Impedance, Insulation Tests, etc.
- 5) Carry out any other pre-start checks recommended by the pump manufacturer. Refer to the pump manual in the Appendix of this manual. DO NOT POWER UP AT THIS STAGE.

4.4 Low Level Float Switch Wiring

Terminal 1 and 3 require a normally closed contact in order to allow the pump set to operate. To facilitate this the unit will be supplied with a wire loop between 1 and 3. To install a low level float switch this loop has to be removed and the float switch wired to operate as an open on fail scenario.

If 2 or more float switches are required (due to twin compartment or multiple tanks) all float switches are wired into terminals 1 and 3 in parallel.

8 0

If installing a Dutypoint FS-series float switch, the following terminals should be used:



4.5 Final Checks Before Commissioning

- 1) Re-check all equipment for any accidental damage caused during installation.
- 2) Carry out the pre-charging and venting procedures described next.

4.6 Pressure Vessel Pre-Charging (If fitted)

Figure 4.9: Pressure Vessel Pre-charge



(bar)

Before commissioning starts the pre-charge of the pressure vessels should be checked.

On variable speed systems the pre-charge air pressure for vessels should be 90% of the maximum pressure generated by the pump in the pipework system

e.g: If the maximum pressure generated by the pump in a system is 6 bar, this will require a pre-charge pressure of $6 \times 90\% = 5.4$ bar.

To verify the pre-charge pressure:

- 1) First check that the expansion or pressure vessel(s) are totally drained of water, and that the system is switched off and no electrical parts are live.
- 2) Locate the charging valve on each vessel, accessed by removing the plastic cover on the top of the vessel
- 3) Connect a portable pressure gauge with a measuring range compatible with the expected pressures in your application, which has a flexible hose and Schrader-type connector to the charging valve.
- 4) Check the pre-charge pressure above the diaphragm in each pressure vessel correspond to criteria given in the text above.
- 5) If necessary, release or add additional air to correct.

4.7 Venting Pumps

It is important to bleed all air from the pump body before initial start-up.

4.8 Procedure for flooded suction

Flooded Suction is defined as the condition where there is positive pressure on the suction (inlet) side of the pump(s) as is the case where the storage tank water level is at the same or higher level than the pump bleed point.

This procedure should be carried out individually for each pump in the pump set.

- 1) Open all valves on the suction (inlet) side of the pump.
- 2) Using the vent screw at the top of the pump (refer to Appendix to locate), allow any air in the pump body and suction pipework to vent to atmosphere.
- 3) When water (under pressure from the storage tank feeding the pump on the suction side) escapes through the vent screw hole and no more air bubbles can be seen close the vent screw.
- 4) Switch on the electrical supply to the pump motor and start the pump in AUTO mode. As each motor starts verify that the direction of rotation correctly corresponds with the direction of the arrow shown on the body of the pump. If rotation is backward STOP, switch off the pump and investigate.
- 5) Slowly open the valve on the discharge manifold outlet to the system allowing water to be pumped into the system.
- 6) Switch off, re-close the discharge valve and repeat steps 3 to 6 several times to ensure that all air is released from the pump body and local pipework.

The above procedure should be carried out individually for each pump in the pump set.

It may be necessary to add the suction head of the break tank to the maximum head parameter for greater accuracy and to enable smoother running.

4.9 Procedure for Lift Suction

Lift Suction is defined where the water storage tank is at a lower level than the pump set. In this case a negative pressure condition may exist at the pump suction.

NOTE: The "Lift Suction" mode of operation requires specific venting procedures. Please call Dutypoint Systems Technical Support on +44 (0)1452 300590 for advice before attempting to vent the pump(s).

The advised procedure should then be carried out individually for each pump in the pump set.

4.10 Programming the Controller

Dutypoint Systems fit a design of Inverter/Controller that is most suitable for the design duty of the pump set.

Manufacturer's information for them is detailed in the Appendices to this manual.

Carefully follow the appropriate step-by-step setting-up procedures contained in the manual, ensuring that any data required to be entered by the end user is accurately inserted where requested.

Default login details: Refer to Section 3.6

If in doubt please call Dutypoint Systems Technical Support on 01452 300590 for advice.

4.11 Operation and Performance Tests

Having checked that the pump set is installed, pre-charged, vented in accordance with the procedures set out earlier, carry out following running tests before handing over the pump set for operational use.

- 1) Run each pump by selecting HAND (Manual) control.
- 2) Re-select to AUTO mode.
- 3) Create the conditions for a normal start and run and allow the selected 'Duty' pump to run. Whilst running observe the pressure values. Verify the pump motor speeds up / slows down in accordance with the desired control philosophy.

4.12 Duty/Standby Twin Pump Sets

- 1) On Duty/Standby sets, wait for a normal stop to take place (or create the conditions where this would happen) and check that the 'Duty' pump stops. Whilst stopped simulate a fault by inhibiting the 'Duty' pump and then recreate the conditions for a normal start to take place. Check that the 'Standby' Pump now starts and runs in place of the inhibited 'Duty' pump and observe the pressure values. Verify that the pump motor speeds up / slows down in accordance with the desired control philosophy.
- 2) Wait for a normal stop to take place (or create the conditions where this would happen) and check the 'Standby' pump stops. Whilst stopped undo the inhibit to the 'Duty' pump which should now return to normal.

4.13 Duty/Assist Twin Pump Sets

- 1) For 'Duty/Assist' applications, run the system up to pressure using the 'Duty' Pump only, then deliberately create the condition(s) which will require the 'Assist' Pump to operate as well. (e.g: open taps to reduce the pressure in the system to a point where one pump only cannot maintain the required output. Verify that the 'Assist' Pump starts and runs together with the 'Duty' Pump and that the desired pressure is duly restored and maintained.
- 2) Close the taps again (thereby reducing the demand) and check the 'Assist' Pump slows down and stops, allowing the 'Duty' Pump to continue on its own.

4.14 Commissioning/Handover Check

- 1) Record any indicated voltage / amperage / pressure data / controller passwords for future reference.
- 2) Re-check all isolating valves are fully open and replace any cover(s).
- 3) With all the isolators ON and the switches and/or control programs set to AUTO, the pump set is now fully operational in automatic control mode.

NOTE: No manual operation or attendance is required other than for routine servicing and maintenance checks. Other than for maintenance purposes, the supply to the Controller(s) and the Pump motor(s) should never be switched off.

5. User Maintenance

Routine user maintenance for Dutypoint pump sets.

Dutypoint pump sets have been designed to keep major maintenance requirements to a minimum. Planned maintenance of the pumps and other principal components should therefore be undertaken at the intervals recommended in the manuals referenced below.

It is essential that a full test following the Pre-Commissioning procedure on is carried out on an annual basis.

In addition, the operator in charge should routinely make visual checks of the equipment during use, noting particularly any unusual noises or vibrations. This will give an immediate indication of any irregularity in the operation of the system.

DANGER!

Do not commence any work until:

- You have read 1. Important Safety Information (p. 4)
- · You have the appropriate personal protective equipment
- · You have all necessary safety equipment to hand

Refer to the appropriate manufacturer's information that is provided in the appendices of this manual for the equipment being serviced.

Table 5.8: Periodic User Checks for Pump Sets

Timing	Checks
Weekly	 Visually check the complete pump set Observe the running of the pump(s) and note any unusual vibrations or sounds.
Quarterly	 Visually check the complete pump set Observe the running of the pump(s) and note any unusual vibration, etc. Check the cooling fan and vents on the Control Unit(s) and clear any dust or other obstructions Operate each manual isolating valve three times to ensure continued efficient working
6-monthly	The pressure vessel (if fitted) should be drained and the pre-charge pressure checked. See the relevant section for more details.
12-monthly (essential)	Carry out the full pre-commissioning procedure to verify safe operation - see <i>4. Commissioning</i> (p. 26).

6. Booster Set Troubleshooting

The information in this section is common to all Dutypoint pump sets. More detailed troubleshooting information that is specific to the type and model of pump and controller used in this product, can be found in other sections of this manual.

FIRST STEP WHEN A FAULT OCCURS:

- When a fault first occurs, turn off the main power to the pump set and leave off for around 1 minute.
- Switching power back on and re-energising the system may be sufficient to clear the fault.

6.1 Booster Set Problems, Causes and Recommended Actions

Problem	Possible Causes	Recommended Action
Pump will not start	No electrical power	Check and rectify
	Blown fuse	Check and rectify
	Overload trip	Check and rectify
Low or zero output discharge	The rotating part(s) of the pump is/are partially or completely obstructed, e.g. impeller obstructed by foreign matter	Strip the pump to inspect and rectify
	Pump not primed - WARNING: running the pump 'dry' can cause serious damage to the mechanical seal.	Having first checked the mechanical seal for damage, prime and air-bleed the pump and try again
	Valve in suction pipework closed or partially closed.	Check all appropriate valves are fully open.
	Incorrect pump rotation	Check wiring and rectify.
Pump vibrates and/or is noisy	Pump is cavitating	Increase the discharge back pressure slightly by progressively closing a manual isolating valve on the discharge side until the cavitation stops.
	Motor bearings worn	Check and rectify
	The rotating part(s) of the pump is(are) partially or completely obstructed. E.g. impeller obstructed by foreign matter.	Strip the pump to inspect and rectify
Pump runs continuously	If the pump has a "Hand Control" option on it's control panel.	Switching to "Auto" should restore normal control. If normal control is not returned an immediate service visit is required.
	Pump has no "Hand Control" option.	An immediate service visit is required.

Problem	Possible Causes	Recommended Action
Overload trip	Pipework or the pump chamber has a partial blockage.	Check and rectify
	Momentary loss of one phase of power supply	Check and try again
	Discharge flow rate too high	Reduce by the discharge flow rate by increasing the discharge back pressure slightly, progressively closing a manual isolating valve on the discharge side: then try again
	Overload trip setting too low for rated duty	Check and (if necessary) reset the overload trip value

7. Vertical Multistage Pumps

WARNING: ELECTRICAL HAZARD

- · All instructions in this section of the manual should be observed when working on the pumps
- · Failure to observe these instructions may result in electric shock, with serious risk of death or injury

WARNING: HOT SURFACES

Follow all safety instructions

WARNING: NOT SAFE FOR CHILDREN OR THOSE WITH REDUCED PHYSICAL, SENSORY OR MENTAL ABILITIES

- This equipment must not be used by children, those with reduced abilities or those lacking in experience, expertise, unless supervised or instructed
- · Children should not be allowed to use the equipment or play in the vicinity

NOTE: The pump should not be used outside the limits described in the technical specifications. It is necessary to observe the instructions regarding the nature, density, temperature and volume of the pumped liquid, rotation speed and direction, pressure and motor power as well as all the other instructions contained in this manual or the documentation attached to the contract. The data plate indicates the model, the main service specifications and the serial number. It is important to provide these indications when requesting repairs or support and for requesting spare parts.

NOTE: The manufacturer declines all liability for any damage that may, directly or indirectly, be caused to people or things as a result of failure to observe all of the provisions indicated in the instructions manual provided and in particular the warnings concerning installation, use and maintenance of the electric pump or in conditions other than those specified on the data plate. The warranty expires definitively in the case of negligence or incorrect use of the product.

7.1 Identification of Pump Model and Specification

Figure 7.10: Dutypoint TPX Pumps Type Indicator



Figure 7.11: Pump Data Plate

7.2 Approved Applications

The pump is suitable for the following applications:

- Civil and industrial water distribution systems
- Irrigation
- Water treatment
- Washing systems

7.3 Forbidden Uses

The pump is not suitable for:

- Pumping liquids not compatible with construction materials.
- Pumping hazardous liquids (for example toxic, explosive, inflammable or corrosive liquids)
- Pumping food grade liquids other than water (for example wine or milk)
- Pumping liquids containing abrasive, solid or fibrous substances
- Working outside of the rated capacity field specified on the data plate
- Environments with explosive or corrosive atmospheres
- Outdoor installations without protection from atmospheric agents (e.g. sun, rain, high or freezing temperatures)

7.4 Special Uses

Contact Dutypoint in the following cases:

- If the pump is used to pump liquids with viscosity or density greater than water (a motor with a proportionately higher power should be used).
- The water to be pumped has been chemically treated (softened, chlorinated, de-mineralised etc.)
- In any other situation other than those listed under permitted use.

7.5 Operating Limits

Table 7.9: Temperatures and Altitudes

Liquid Temperature	EPDM seals: -30°C to+120°C	
	VITON/KFKM seals: -10°C to +120°C	
Ambient Temperature	Max 40°C (when motor works at full capacity)	
Altitude	Max 1,000m above sea level (when motor works at full capacity)	

Power (kW)	2 Poles	4 Poles
0.37 - 0.55	100	250
0.75 - 3	60	140
4 - 7.5	30	60
11 - 22	15	30
30 - 55	8	15
55 - 200	4	8

Table 7.10: Maximum starts per hour

7.6 Checking Rotation Direction

Check the correct direction by looking at the arrows on the casing label, or the arrow on the motor bracket.

WARNING

• Before any repairs to the pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations.

Start up the motor for 1-2 seconds and check the direction of rotation through the motor fan cover.

If the direction is incorrect:

- 1) Disconnect the power supply
- 2) In the terminal box of the motor, exchange the position of two phases of the power cable
- 3) Close the lid of the terminal box again,
- 4) Check the direction of rotation again.

7.7 Starting the Pump

Before start-up, check that:

- The pump is primed correctly
- The pump is correctly connected to the power supply
- The gate valve is closed and the inlet valve is open

Starting procedure:

- 1) Ensure pump is switched off.
- 2) Gradually open the valve on the delivery side of the pump

3) After a few seconds of noisy operation to expel any air, the pump should function quietly and regularly without any changes in pressure. If not, refer to the Troubleshooting table.

7.8 Emptying the Pump

If it is necessary to empty the pump, for example for maintenance or long periods of inactivity:

- 1) Close the valves of the delivery and suction pipework
- 2) Discharge the pressure of the pump
- 3) Partially unscrew the pin on the filling cap
- 4) Completely remove the discharge tap and wait for the pump to be empty
- 5) Once emptying is complete, replace and tighten the discharge tap and the pin of the filling cap.

NOTE: Some liquid may remain in the pump following this procedure. In order to remove all liquid, the pump must be completely disassembled.

WARNING: LIQUID CAN CAUSE DAMAGE

· Pay attention to the discharged liquid to ensure that is does not cause damage to persons or property

7.9 Maintenance and Support

WARNING : RISK OF ELECTRIC SHOCK

• Before any repairs to the pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations

WARNING: HOT AND HAZARDOUS LIQUIDS

- If the pump is used for hot and/or hazardous liquids, the personnel carrying out repair work must be informed.
- · Clean the pump in order to ensure the safety of the operator

WARNING: RISK OF IMPROPER USE

- The pump must be serviced and repaired by authorised personnel
- Improper maintenance can void warranty and cause additional hazards

WARNING: LIQUID CAN CAUSE DAMAGE

 Pay attention to the discharged liquid to ensure that is does not cause damage to persons or property

For the spare parts see:

Figure 7.12: Spare Parts: TPX1, TPX 3, TPX5, TPX10 (p. 55),

Figure 7.13: Spare Parts: TPX15, TPX20 (p. 56)

Figure 7.15: Spare Parts: TPX30, TPX45, TPX65, TPX95 (p. 58).

For special maintenance instructions, please contact our Service department.



Figure 7.13: Spare Parts: TPX15, TPX20



Figure 7.14: Spare Parts: TPX15, TPX20

#	EN
#	PART DESCRIPTION
10.00	Pump casing
10.01	Pump base
10.02	Draining plug
10.03	Tie bolts, washers and nuts
10.06	Upper flange
20.00	Outer case
20.02	Motor flange
20.03	Motor bracket
20.04	Coupling guard
20.05	Filler cap
20.06	Bearing kit
20.07	Motor flange, coupling and bearing kit
20.08	Coupling
20.10	Motor shaft adapter
20.11	Lifting eyelets and bolts
30.00	Pump shaft
30.01	Mechanical seal kit
30.02	Mechanical seal fastening kit
30.03	O-ring kit
40.00	Stage housing and diffuser
40.01	Stage Centring outlet
40.02	Floating neck ring
40.03	Initial stage housing
40.04	Last stage housing
40.06	Stage housing and diffuser with bearing
50.00	Impeller
50.01	Impeller spacers
50.02	Intermediate sleeve
50.03	Intermediate sleeve spacers
60.00	Motor assembly
60.03	Fan
60.04	Fan cover and screws
60.07	Motor housing foot
60.08	Terminal box cover and base
60.09	Terminal board
60.20	Front motor casing



	EN
#	PART DESCRIPTION
10.00	Pump casing
10.01	Pump base
10.02	Draining plug
10.03	Tie bolts, washers and nuts
10.05	Flange kit
10.06	Upper flange
20.00	Outer case
20.02	Motor flange
20.03	Motor bracket
20.04	Coupling guard
20.05	Filling plug
20.06	Bearing kit
20.07	Motor flange, coupling and bearing kit
20.08	Coupling
20.10	Motor shaft adapter
20.11	Lifting eyelets and bolts
30.00	Pump shaft
30.01	Mechanical seal kit
30.02	Mechanical seal fastening kit
30.03	O-rings kit
40.00	Stage housing and diffuser
40.01	Stage Centring outlet
40.02	Floating neck ring
40.05	Initial stage centring flange
40.06	
40.07	Flange clamping neck ring
40.08	Spring ring
40.09	Secondary sleeve with ring
50.00	Impeller
50.05	Wear ring
51.01	Split cone
51.02	Intermediate sleeve nut
51.03	Journal sleeve
51.04	Split cone nut
51.05	Intermediate impeller with screw
60.00	Motor assembly
60.03	Fan
60.04	Fan cover and screws
60.07	Motor housing foot
60.08	Terminal box cover and base
60.09	Terminal board
60.20	Endshield drive end

7.10 Replacing the Electric Motor

For all versions of the pump with motor of rated power less or equal to 4kW, first remove the coupling safety casings to access the motor clamping screws.

For all other versions, the motor clamping screws are easily accessible on the exterior. The motor shaft must have a key drive.

NOTE: It is not necessary to carry out any operations on the pump shaft and motor shaft connection joints.

WARNING: FAILURE TO OBSERVE THESE INSTRUCTIONS MAY CAUSE PERSONAL INJURY

· Replace the safety casings where necessary

Figure 7.17: Motor Rotation Procedure (Less than 4kW)





Figure 7.18: Motor Rotation Procedure (Greater than 4kW)







7.11 Replacing the Mechanical Seal



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Figure 7.20: Replacing the Electric Motor - Pumps greater than 4kW



Figure 7.21: Replacing the Mechanical Seal - Pumps greater than 4kW





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5 Nm

7.12 General Information for Vertical Multistage Pumps

TPX - 1

	50 Hz									60 Hz								
Channe (I)	Pun	np ⁽²⁾	MOTOR (3)						Pun	np ⁽²⁾	MOTOR ⁽³⁾							
Stages ^w	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]		
2	322	12,5	0,37	71	216	134	18,3	2	322	12,5	0,37	71	216	110	18,3	3,0		
3	345	13	0,37	71	216	134	18,8	3	345	13	0,37	71	216	110	18,8	4		
4	367	13,5	0,37	71	216	134	19,3	4	367	13,5	0,37	71	216	110	19,3	6		
5	390	14	0,37	71	216	134	19,8	5	390	14	0,55	71	216	110	20,2	7		
6	412	14,5	0,37	71	216	134	20,3	6	412	14,5	0,55	71	216	110	20,7	9		
7	435	15	0,37	71	216	134	20,8	7	435	15	0,75	80	232	129	24,5	10		
8	457	15,5	0,55	71	216	134	21,7	8	457	15	1,1	80	232	129	26,1	12		
9	480	15,5	0,55	71	216	134	21,7	9	480	15,5	1,1	80	232	129	26,6	14		
10	502	16	0,55	71	216	134	22,2	10	502	16	1,1	80	232	129	27,1	15		
11	525	16,5	0,55	71	216	134	22,7	11	525	16,5	1,1	80	232	129	27,6	17		
12	547	17	0,75	80	232	150	26,5	12	547	17	1,5	90	267	138	31	18		
13	570	17,5	0,75	80	232	150	27	14	570	17,5	1,5	90	267	138	31,5	19		
14	592	18	0,75	80	232	150	27,5	15	592	18	1,5	90	267	138	32	19		
15	615	18,5	0,75	80	232	150	28	16	615	18,5	2,2	90	267	138	34,5	19		
17	660	19,5	1,1	80	232	150	30,6	18	660	19	3	100	290	138	37	18		
19	705	20,5	1,1	80	232	150	31,6	20	705	20	3	100	290	138	38	17		
22	772	22	1,1	80	232	150	33,1	19	772	21,5	3	100	290	138	39,5	16		
23	795	22	1,5	90	267	160	36	19	-	-	-	-	-	-	-	-		
25	840	23	1,5	90	267	160	37	18	840	23	3	100	290	138	41,5	15		
27	885	24	1,5	90	267	160	38	18	-	-	-	-	-	-	-	-		
30	952	25,5	1,5	90	267	160	39,5	17	-	-	-	-	-	-	-	-		
32	997	26	3	100	306	145	48,8	16	-	-	-	-	-	-	-	-		
34	1042	27	3	100	306	145	49,8	16	-	-	-	-	-	-	-	-		
37	1110	28,5	3	100	306	145	51,3	15	-	-	-	-	-	-	-	-		

* See paragraph 5.2



TPX - 3

	50 Hz									60 Hz								
Channe (I)	Pun	np ⁽²⁾	MOTOR (3)							np ⁽²⁾	MOTOR (3)							
Stages ^w	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]		
2	322	12,5	0,37	71	216	134	18,3	2	322	12,5	0,37	71	216	110	18,3	3		
3	345	13	0,37	71	216	134	18,8	3	345	13	0,55	71	216	110	19,2	4		
4	367	13,5	0,37	71	216	134	19,3	4	367	13,5	0,55	71	216	110	19,7	6		
5	390	14	0,55	71	216	134	20,2	5	390	14	1,1	80	232	129	25,1	7		
6	412	14,5	0,55	71	216	134	20,7	6	412	14,5	1,1	80	232	129	25,6	9		
7	435	15	0,75	80	232	150	24,5	7	435	15	1,1	80	232	129	26,1	10		
8	457	15,5	0,75	80	232	150	25	8	457	15	1,5	90	267	138	29	12		
9	480	15,5	0,75	80	232	150	25	9	480	15,5	1,5	90	267	138	29,5	14		
10	502	16	1,1	80	232	150	27,1	10	502	16	2,2	90	267	138	32	15		
11	525	16,5	1,1	80	232	150	27,6	11	525	16,5	2,2	90	267	138	32,5	17		
12	547	17	1,1	80	232	150	28,1	12	547	17	2,2	90	267	138	33	18		
13	570	17,5	1,1	80	232	150	28,6	14	570	17,5	2,2	90	267	138	33,5	19		
14	592	18	1,5	90	267	160	32	15	592	18	2,2	90	267	138	34	18		
15	615	18,5	1,5	90	267	160	32,5	16	615	18,5	3	100	290	138	36,5	18		
16	637	19	1,5	90	267	160	33	17	637	18,5	3	100	290	138	36,5	18		
17	660	19,5	1,5	90	267	160	33,5	18	660	19	3	100	290	138	37	17		
18	682	20	2,2	90	267	160	36	18	682	19,5	3	100	290	138	37,5	17		
19	705	20,5	2,2	90	267	160	36,5	18	705	20	3	100	290	138	38	17		
21	750	21,5	2,2	90	267	160	37,5	17	750	21	4	112	306	145	43,8	15		
23	795	22,5	2,2	90	267	160	38,5	17	795	22	4	112	306	145	44,8	14		
25	840	23	2,2	90	267	160	39	16	-	-	-	-	-	-	-	-		
27	885	24	3	100	306	145	46,8	15	-	-	-	-	-	-	-	-		
29	930	25	3	100	306	145	47,8	14	-	-	-	-	-	-	-	-		
31	975	26	3	100	306	145	48,8	13	-	-	-	-	-	-	-	-		
33	1020	27	3	100	306	145	49,8	13	-	-	-	-	-	-	-	-		

* See paragraph 5.2



TPX - 5

	50 Hz									60 Hz									
C	Pun	np ⁽²⁾	MOTOR (3)							ו p ⁽²⁾	MOTOR ⁽³⁾								
Stages ^w	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]			
2	329	13	0,37	71	216	134	18,8	3	329	13	0,55	71	216	110	19,2	4			
3	355	13,5	0,37	71	216	134	19,3	4	355	13,5	0,75	80	232	129	23	7			
4	381	14	0,55	71	216	134	20,2	6	381	14	1,1	80	232	129	25,1	9			
5	407	14,5	0,75	80	232	150	24	8	407	14,5	1,1	80	232	129	25,6	11			
6	433	15	0,75	80	232	150	24,5	9	433	15	1,5	90	267	138	29	14			
7	459	15,5	1,1	80	232	150	26,6	11	459	15,5	2,2	90	267	138	31,5	16			
8	485	16	1,1	80	232	150	27,1	12	485	16	2,2	90	267	138	32	18			
9	511	16,5	1,1	80	232	150	27,6	14	511	16,5	2,2	90	267	138	32,5	20			
10	537	17	1,5	90	267	160	31	16	537	17	2,2	90	267	138	33	20			
11	563	17,5	1,5	90	267	160	31,5	17	563	17	3	100	290	138	35	19			
12	589	18	1,5	90	267	160	32	19	589	17,5	3	100	290	138	35,5	19			
13	615	18,5	1,5	90	267	160	32,5	20	615	18	3	100	290	138	36	18			
14	641	19	2,2	90	267	160	35	19	641	19	3	100	290	138	37	18			
15	667	19,5	2,2	90	267	160	35,5	19	667	19,5	4	112	306	145	42,3	17			
16	693	20	2,2	90	267	160	36	19	693	20	4	112	306	145	42,8	16			
17	719	20,5	2,2	90	267	160	36,5	18	719	20,5	4	112	306	145	43,3	16			
18	745	21	2,2	90	267	160	37	18	745	21	4	112	306	145	43,8	15			
19	771	21,5	3	100	306	145	44,3	18	983	41	5,5	132	328	160	75	14			
20	797	22	3	100	306	145	44,8	17	1009	41,5	5,5	132	328	160	75,5	14			
21	823	22,5	3	100	306	145	45,3	16	1035	42,5	5,5	132	328	160	76,5	13			
23	875	23,5	3	100	306	145	46,3	16	1087	43,5	5,5	132	328	160	77,5	13			
25	927	24,5	3	100	306	145	47,3	15	-	-	-	-	-	-	-	-			
28	1005	26	4	112	306	145	52,5	14	-	-	-	-	-	-	-	-			
30	1057	27	4	112	306	145	53,5	13	-	-	-	-	-	-	-	-			
33	1135	28,5	4	112	306	145	55	12	-	-	-	-	-	-	-	-			
36*	1425	50	5,5	132	328	160	83,6	10	-	-	-	-	-	-	-	-			

* See paragraph 5.2

* Modello 6/36 disponibile solo con connessioni Victaulic[®] / * Model 6/36 only available with Victaulic[®] connections / * Modelo 6/36 disponible solo con conexiones Victaulic[®] / * Modell 6/36 nur mit Anschlüssen vom Typ Victaulic[®] enhältlich / * Modele 6/36 disponible uniquement avec des connexions Victaulic[®] / ®Victaulic[®] are a توصيلات 36/6 متوفر فقط مع توصيلات 36/6 «Wictaulic[®] / * Model 6/36 on saadaval ainult Victaulic[®] i ühendustega[®] / * Malli 6/36 saatavilla vain Victaulic[®] liitoksilla


				50) Hz							60) Hz			
Channe (I)	Pun	np ⁽²⁾			MOT	OR (3)			Pur	np ⁽²⁾		-	MOT	OR (3)		
Stages ***	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
2	350	14	0,75	80	232	150	23,5	4	350	14	1,1	80	232	129	25,1	6
3	380	14,5	1,1	80	232	150	25,6	6	380	14,5	2,2	90	267	138	30,5	9
4	410	15	1,5	90	267	160	29	8	410	15	2,2	90	267	138	31	12
5	440	16	1,5	90	267	160	30	10	440	15,5	3	100	290	138	33,5	15
6	470	16,5	2,2	90	267	160	32,5	12	470	16	4	112	306	145	38,8	18
7	500	17	2,2	90	267	160	33	15	500	17	4	112	306	145	39,8	19
8	530	17,5	3	100	306	145	40,3	17	742	37,5	5,5	132	328	160	71,5	19
9	560	18	3	100	306	145	40,8	19	772	38	5,5	132	328	160	72	18
10	590	19	4	112	306	145	45,5	20	802	38,5	7,5	132	350	160	74,5	17
11	620	19,5	4	112	306	145	46	19	832	39,5	7,5	132	350	160	75,5	16
12	650	20	4	112	306	145	46,5	19	862	40	7,5	132	350	160	76	16
13	680	21	4	112	306	145	47,5	18	892	40,5	7,5	132	350	160	76,5	15
15	952	42	5,5	132	328	160	75,6	17	972	45	11	160	425	194	103	13
17	1012	43	5,5	132	328	160	76,6	16	1032	46,5	11	160	425	194	104,5	12
19	1072	44,5	7,5	132	350	160	80,5	15	-	-	-	-	-	-	-	-
21	1132	46	7,5	132	350	160	82	14	-	-	-	-	-	-	-	-
23	1192	47	7,5	132	350	160	83	14	-	-	-	-	-	-	-	-
24	1242	51	11	160	425	194	110	12	-	-	-	-	-	-	-	-

* See paragraph 5.2



				50	Hz							60	Hz			
Channe (I)	Pun	np ⁽²⁾			MOT	OR (3)			Pur	np ⁽²⁾			MOT	OR (3)		
Stages ···	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
1	396	19	0,75	80	232	150	28,5	5	396	18,5	1,5	90	267	138	32,5	7
2	396	20	1,5	90	267	160	34	11	396	20	3	100	290	138	38	15
3	444	21,5	2,2	90	267	160	37,5	16	444	21,5	4	112	306	145	44,3	20
4	492	22,5	3	100	306	145	45,3	20	704	42,5	5,5	132	328	160	76,5	20
5	540	24	4	112	306	145	50,5	20	752	44	7,5	132	350	160	80	20
6	800	45,5	5,5	132	328	160	79,1	20	820	48,5	11	160	425	194	106,5	18
7	848	46,5	5,5	132	328	160	80,1	20	868	50	11	160	425	194	108	17
8	896	48	7,5	132	350	160	84	20	916	51,5	11	160	425	194	109,5	17
9	944	49,5	7,5	132	350	160	85,5	19	964	53	15	160	476	194	117	16
10	1012	54	11	160	425	194	113	18	1012	54,5	15	160	476	194	118,5	15
11	1060	55,5	11	160	425	194	114,5	18	1060	55,5	15	160	476	194	119,5	14
12	1108	57	11	160	425	194	116	17	1108	57	18,5	160	542	238	154,5	12
13	1156	58,5	11	160	425	194	117,5	16	-	-	-	-	-	-	-	-
14	1204	60	11	160	425	194	119	16	-	-	-	-	-	-	-	-
15	1252	61	15	160	476	194	129	15	-	-	-	-	-	-	-	-
16	1300	62,5	15	160	476	194	130,5	15	-	-	-	-	-	-	-	-
17	1348	64	15	160	476	194	132	14	-	-	-	-	-	-	-	-

* See paragraph 5.2



				50	Hz							60	Hz			
Channe (I)	Pun	np ⁽²⁾			MOT	OR (3)			Pun	np ⁽²⁾			MOT	OR (3)		
Stages **	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
1	396	19	1,1	80	232	150	30,1	5,0	396	18,5	2,2	90	267	138	34,5	7
2	396	20	2,2	90	267	160	36	11	396	20	4	112	306	145	42,8	15
3	444	21,5	3	100	306	145	44,3	16	656	41	5,5	132	328	160	75	20
4	492	22,5	4	112	306	145	49	20	704	42,5	7,5	132	350	160	78,5	20
5	752	44	5,5	132	328	160	77,6	20	772	47	11	160	425	194	105	20
6	800	45,5	7,5	132	350	160	81,5	19	820	48,5	11	160	425	194	106,5	18
7	848	46,5	7,5	132	350	160	82,5	19	868	50	15	160	476	194	114	17
8	916	51,5	11	160	425	194	110,5	17	916	51,5	15	160	476	194	115,5	16
9	964	53	11	160	425	194	112	17	964	53	18,5	160	542	238	150,5	15
10	1012	54,5	11	160	425	194	113,5	16	1012	54,5	18,5	160	542	238	152	14
11	1060	55,5	15	160	476	194	123,5	15	-	-	-	-	-	-	-	-
12	1108	57	15	160	476	194	125	14	-	-	-	-	-	-	-	-
13	1156	58,5	15	160	476	194	126,5	13	-	-	-	-	-	-	-	-
14	1204	60	15	160	476	194	128	13	-	-	-	-	-	-	-	-
15	1252	61,5	18,5	160	542	238	165,5	11	-	-	-	-	-	-	-	-
16	1300	62,5	18,5	160	542	238	166,5	10	-	-	-	-	-	-	-	-
17	1348	64	18,5	160	542	238	168	10	-	-	-	-	-	-	-	-

* See paragraph 5.2



	50 Hz								60 Hz							
Channa (I)	Pun	np ⁽²⁾			MOT	OR (3)			Pun	np ⁽²⁾			MOT	OR (3)		
Stages **	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
1-1a	-	-	-	-	-	-	-	-	431	48	3	100	290	138	66	2
1	431	48,5	2,2	90	267	138	64,5	3	431	48	4	112	306	145	70,8	7
2-2a	513	52	4	112	306	145	78,5	3	724	73	5,5	132	328	160	106,5	5
2-1a	513	52	4	112	306	145	78,5	7	724	73	7,5	132	350	160	108,5	10
2	724	72,5	5,5	132	328	160	106,1	9	744	76	11	160	425	194	134	15
3-2a	806	76,5	5,5	132	328	160	110,1	9	826	80	11	160	425	194	138	13
3-1a	806	76,5	7,5	132	350	160	112,5	13	826	80	11	160	425	194	138	18
3	806	76,5	7,5	132	350	160	112,5	14	826	80	15	160	476	194	144	20
4-2a	888	80,5	7,5	132	350	160	116,5	14	908	84	15	160	476	194	148	20
4-1a	908	84	11	160	425	194	143	18	908	84	15	160	476	194	148	20
4	908	84	11	160	425	194	143	20	908	84	18,5	160	542	238	181,5	20
5-2a	991	88	11	160	425	194	147	20	991	88	18,5	160	542	238	185,5	20
5-1a	991	88	11	160	425	194	147	20	991	88	18,5	160	542	238	185,5	20
5	991	88	15	160	476	194	156	20	991	88	22	180	542	238	196,5	20
6-2a	1073	92	15	160	476	194	160	20	1073	92	22	180	542	238	200,5	20
6-1a	1073	92	15	160	476	194	160	20	1073	92	22	180	542	238	200,5	19
6	1073	92	15	160	476	194	160	20	1078	95	30	200	658	297	323	17
7-2a	1155	96	15	160	476	194	164	20	1160	99	30	200	658	297	327	18
7-1a	1155	96	15	160	476	194	164	20	1160	99	30	200	658	297	327	17
7	1155	96	18,5	160	542	238	200	20	1160	99	30	200	658	297	327	15
8-2a	1237	100	18,5	160	542	238	204	20	1242	103	30	200	658	297	331	16
8-1a	1237	100	18,5	160	542	238	204	20	1242	103	37	200	658	297	345	15
8	1237	100	18,5	160	542	238	204	20	1242	103	37	200	658	297	345	13
9-2a	1319	103,5	22	180	542	238	209,5	20	-	-	-	-	-	-	-	-
9-1a	1319	103,5	22	180	542	238	209,5	18	-	-	-	-	-	-	-	-
9	1319	103,5	22	180	542	238	209,5	18	-	-	-	-	-	-	-	-
10-2a	1401	107,5	22	180	542	238	213,5	18	-	-	-	-	-	-	-	-
10-1a	1401	107,5	22	180	542	238	213,5	18	-	-	-	-	-	-	-	-
10	1406	111	30	200	658	297	387	17	-	-	-	-	-	-	-	-
11-2a	1488	115	30	200	658	297	391	16	-	-	-	-	-	-	-	-
11-1a	1488	115	30	200	658	297	391	15	-	-	-	-	-	-	-	-
11	1488	115	30	200	658	297	391	15	-	-	-	-	-	-	-	-
12-2a	1570	119	30	200	658	297	395	14	-	-	-	-	-	-	-	-
12-1a	1570	119	30	200	658	297	395	14	-	-	-	-	-	-	-	-
12	1570	119	30	200	658	297	395	13	-	-	-	-	-	-	-	-
13-2a	1652	122,5	30	200	658	297	398,5	13	-	-	-	-	-	-	-	-
13-1a	1652	122,5	30	200	658	297	398,5	12	-	-	-	-	-	-	-	-
13	1652	122,5	30	200	658	297	398,5	11	-	-	-	-	-	-	-	-



	50 Hz Pump ⁽²⁾ MOTOR ⁽³⁾									60 Hz								
	Pur	np ⁽²⁾			MOT	OR (3)			Pur	np ⁽²⁾			MOT	OR (3)				
Stages ⁽¹⁾	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]		
1-1a	466	54	3	100	306	145	76,8	7	677	74,5	5,5	132	328	160	108,5	10		
1	466	54	4	112	306	145	80,5	7	677	74,5	7,5	132	350	160	110,5	10		
2-2a	759	78,5	5,5	132	328	160	112,1	14	779	81,5	11	160	425	194	139,5	20		
2-1a	759	79	-	-	-	-	-	-	779	81,5	11	160	425	194	139,5	20		
2	759	78,5	7,5	132	350	160	114,5	14	779	81,5	15	160	476	194	145,5	20		
3-2a	861	85,5	11	160	425	194	144,5	20	861	85,5	18,5	160	542	238	183	20		
3-1a	861	86	-	-	-	-	-	-	861	85,5	18,5	160	542	238	183	20		
3	861	85,5	11	160	425	194	144,5	20	861	85,5	18,5	160	542	238	183	20		
4-2a	943	89,5	15	160	476	194	157,5	20	943	89,5	22	180	542	238	198,5	20		
4-1a	943	90	-	-	-	-	-	-	948	92,5	30	200	658	297	320,5	20		
4	943	89,5	15	160	476	194	157,5	20	948	92,5	30	200	658	297	320,5	20		
5-2a	1026	93,5	18,5	160	542	238	197,5	20	1031	96,5	30	200	658	297	324,5	20		
5-1a	1026	94	-	-	-	-	-	-	1031	96,5	30	200	658	297	324,5	20		
5	1026	93,5	18,5	160	542	238	197,5	20	1031	96,5	37	200	658	297	338,5	20		
6-2a	1108	97,5	22	180	542	238	203,5	20	1113	100,5	37	200	658	297	342,5	20		
6-1a	1108	98,5	-	-	-	-	-	-	1113	100,5	37	200	658	297	342,5	19		
6	1108	97,5	22	180	542	238	203,5	20	1113	100,5	37	200	658	297	342,5	18		
7-2a	1195	104,5	30	200	658	297	380,5	20	1195	106,5	45	225	699	328	414,5	18		
7-1a	1195	105,5	-	-	-	-	-	-	1195	106,5	45	225	699	328	414,5	17		
7	1195	104,5	30	200	658	297	380,5	20	1195	106,5	45	225	699	328	414,5	17		
8-2a	1277	108,5	30	200	658	297	384,5	20	-	-	-	-	-	-	-	-		
8	1277	108,5	30	200	658	297	384,5	20	-	-	-	-	-	-	-	-		
9-2a	1359	112,5	37	200	658	297	395,5	20	-	-	-	-	-	-	-	-		
9	1359	112,5	37	200	658	297	395,5	18	-	-	-	-	-	-	-	-		
10-2a	1441	116,5	37	200	658	297	399,5	18	-	-	-	-	-	-	-	-		
10	1441	116,5	37	200	658	297	399,5	17	-	-	-	-	-	-	-	-		
11-2a	1523	122,5	45	225	699	328	492,5	17	-	-	-	-	-	-	-	-		
11	1523	122,5	45	225	699	328	492,5	15	-	-	-	-	-	-	-	-		
12-2a	1605	126,5	45	225	699	328	496,5	15	-	-	-	-	-	-	-	-		
12	1605	126,5	45	225	699	328	496,5	14	-	-	-	-	-	-	-	-		
13-2a	1687	130,5	45	225	699	328	500,5	14	-	-	-	-	-	-	-	-		



				50	Hz							60) Hz			
	Pun	np ⁽²⁾			MOT	OR (3)			Pun	np ⁽²⁾			MOT	OR (3)		
Stages (1)	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
1-1a	526	60	4	112	306	145	86,5	3	737	80,5	7,5	132	350	160	116,5	5
1	737	80,5	5,5	132	328	160	114,1	7	757	84	11	160	425	194	142	11
2-2a	829	85	7,5	132	350	160	121	7	849	89	15	160	476	194	152,5	11
2-1a	849	88,5	11	160	425	194	147,5	11	849	89	18,5	160	542	238	186	17
2	849	88,5	11	160	425	194	147,5	15	849	88	22	180	542	238	197	20
3-2a	941	93	15	160	476	194	161	15	941	93	22	180	542	238	201,5	20
3-1a	941	93	15	160	476	194	161	19	946	96	30	200	658	297	324	18
3	941	93	18,5	160	542	238	197	20	946	96	30	200	658	297	324	17
4-2a	1033	97,5	18,5	160	542	238	201,5	20	1038	101	37	200	658	297	342,5	16
4-1a	1033	97	22	180	542	238	203	19	1038	101	37	200	658	297	342,5	17
4	1033	97	22	180	542	238	203	18	1038	103	45	225	699	328	410,5	15
5-2a	1131	105	30	200	658	297	381	18	1131	107	45	225	699	328	415	13
5-1a	1131	105	30	200	658	297	381	17	1131	107	45	225	699	328	415	15
5	1131	105	30	200	658	297	381	16	-	-	-	-	-	-	-	-
6-2a	1223	109,5	30	200	658	297	385,5	16	-	-	-	-	-	-	-	-
6-1a	1223	109,5	37	200	658	297	392,5	15	-	-	-	-	-	-	-	-
6	1223	109,5	37	200	658	297	392,5	14	-	-	-	-	-	-	-	-
7-2a	1315	113,5	37	200	658	297	396,5	14	-	-	-	-	-	-	-	-
7-1a	1315	113,5	37	200	658	297	396,5	14	-	-	-	-	-	-	-	-
7	1315	116	45	225	699	328	486	13	-	-	-	-	-	-	-	-
8-2a	1407	120,5	45	225	699	328	490,5	13	-	-	-	-	-	-	-	-
8-1a	1407	120,5	45	225	699	328	490,5	12	-	-	-	-	-	-	-	-
8	1407	120,5	45	225	699	328	490,5	11	-	-	-	-	-	-	-	-



				50	Hz							60	Hz			
	Pun	np ⁽²⁾			MOT	OR (3)			Pur	np ⁽²⁾			MOT	OR (3)		
Stages (1)	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]	L1 [mm]	Weight ⁽⁴⁾ [Kg]	P _N [kW]	IEC	L2 [mm]	N [mm]	Weight ⁽⁴⁾ [Kg]	P1 _{max} * [bar]
1-1a	737	82	5,5	132	328	160	115,6	7	757	85,5	11	160	425	194	144	11
1	737	82	7,5	132	350	160	118	13	757	86	15	160	476	194	150	18
2-2a	849	89	11	160	425	194	148	15	849	89	18,5	160	542	238	187	19
2-1a	-	-	-	-	-	-	-	-	849	89	22	180	542	238	198	20
2	849	89	15	160	476	194	157	20	854	92	30	200	658	297	320	20
3-2a	941	93	18,5	160	542	238	197	20	946	96	37	200	658	297	338	19
3-1a	-	-	-	-	-	-	-	-	946	96	37	200	658	297	338	19
3	941	92,5	22	180	542	238	198,5	20	946	98	45	225	699	328	406	18
4-2a	1038	99,5	30	200	658	297	375,5	19	1038	102	45	225	699	328	410	18
4-1a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	1038	99,5	30	200	658	297	375,5	17	-	-	-	-	-	-	-	-
5-2a	1131	103	37	200	658	297	386	17	-	-	-	-	-	-	-	-
5-1a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	1131	103	37	200	658	297	386	16	-	-	-	-	-	-	-	-
6-2a	1223	109	45	225	699	328	479	16	-	-	-	-	-	-	-	-
6-1a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	1223	109	45	225	699	328	479	14	-	-	-	-	-	-	-	-





7.2 Lifting guide for individual Vertical Multistage Pumps



7.21 Vertical Multistage Pump major components



	Кеу
1	Electric motor
2	Pump
3	Shields
4	Coupling
5	Motor bracket
6	Mechanical seal
7	Hydraulic connections
8	Fixing plate



7.3 Troubleshooting

WARNING : RISK OF ELECTRIC SHOCK

• Before any repairs to the pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations

WARNING: HOT AND HAZARDOUS LIQUIDS

- If the pump is used for hot and/or hazardous liquids, the personnel carrying out repair work must be informed.
- · Clean the pump in order to ensure the safety of the operator

WARNING: RISK OF IMPROPER USE

- The pump must be serviced and repaired by authorised personnel
- · Improper maintenance can void warranty and cause additional hazards

Problem	Possible Causes	Action
The pump runs but does not deliver	The internal parts are blocked by foreign bodies:	Disassemble the pump and clean.
	Clogged suction pipe	Clean the pipe
	Air inside the suction pipe	Check the watertight integrity of the entire pipe up to the pump and waterproof it.
	The pump is not primed:	Prime the pump. Check the tightness of the foot valve.
	The suction pressure is too low and generally accompanied by cavitation noises:	Too many pressure drops on the suction side or the suction height is too high (check the NPSH of the installed pump).
	Insufficient motor voltage:	Check the voltage of the motor terminals and the correct cross-section of the conductors.
The pump vibrates	Faulty anchoring to the surface:	Check and fully tighten the nuts of the stud bolts.
	Foreign bodies obstruct the pump:	Disassemble the pump and clean.
	Obstructed pump rotation:	Check that the pump turns freely without any abnormal resistances.
	Faulty electrical connection:	Check the connections to the pump.
The motor heats up abnormally	Insufficient voltage:	Check the voltage at the motor terminals. The voltage must be $\pm 6\%$ of the rated voltage.
	Pump obstructed by foreign bodies:	Disassemble the pump and clean.
	Room temperature exceeding +40°C:	The motor is designed to operate at a maximum room temperature of + 40°C.
	Connection error in the terminal block:	Follow the instructions in the motor manual, refer to the installation instructions.
Pump performance low	The motor does not run at normal speed (foreign bodies or faulty power supply, etc.):	Dismantle the pump and correct the anomaly.
	Faulty motor:	Replace it.
	Poor pump filling:	Repeat the pump filling procedure
	The motor turns in the wrong direction (three-phase motor):	Reverse the direction of rotation by crossing 2 phase wires at the terminal block of the motor or the cut-out switch.
	The drain-priming plug or its insert are not screwed in completely:	Check and screw it again.
	Insufficient motor voltage:	Check the voltage to the motor terminals and the correct crosssection of the conductors.

Problem	Possible Causes	Action
The circuit breaker trips	Thermal relay value too low:	Check the intensity with an ammeter or record the intensity value according to the motor rating plate.
	Voltage too low:	Check that the cross-section of the electrical cable conductors is correct.
	Phase down:	Check and replace the electric cable or fuse if required.
	Faulty thermal relay:	Replace it.
The flow rate is not regular	The suction height has not been adhered to:	Review the installation conditions and recommendations provided in this manual.
	The suction pipe diameter is smaller than that of the pump:	The suction pipe must have the same diameter as the pump suction hole.
	The strainer and the suction pipe are partially clogged.	Clean the suction pipe.
Metallic noise during rotation	The coupling is not in position	Follow the instructions for INSTALLING THE MOTOR to position the coupling; use the positioning template

8. Pressure Vessel

The pressure vessel supplied as part of your Dutypoint product is used to absorb and conserve the potential energy of pressurised liquid. Stored energy from liquid under pressure is transferred to the water system when required.

8.1 Installation Safety Notes

These notes are taken from the pressure vessel installation manual:

- This product is designed the to hold water up to installation +110°C.
- Never exceed the maximum working pressure and temperature of the expansion tank; ensure appropriate controls are installed for this purpose.
- During installation prepare adequate systems for drainage to limit damage caused by leakage from the tank, draining and venting.
- During installation the installer should account for external stress such as traffic, wind and earthquakes.
- Always install the appliance in conformity to current legislation.
- This product must be installed and regularly inspected by qualified personnel only.
- The manufacturer shall not be held liable for any personal or material damage caused by the product if installed and/or used improperly or in way anyhow diversely from manufacturer's specifications.
- Exceeding temperature and pressure limits specified by the manufacturer will give cause to cancel any guarantee covering the product as well as any manufacturer's liability.
- For fluids other than water, check compatibility before installing.
- The appliance must be installed in a safe place with access for authorized personnel only.
- The appliance must be protected by an appropriate earthing systems or isolated from the system by a dielectric joint.

8.2 Periodic Maintenance

Periodic maintenance is recommended at least twice a year and should be carried out by authorised specialised personnel only.

- 1) First check that the pressure vessel is totally drained of water, and that the system is switched off and no electrical parts are live.
- 2) Check and, if necessary reset the pre-charge pressure, using the instructions below. Ensure that the pressure does not exceed the value specified in the procedure.

8.3 Checking and Adjusting Pressure Vessel Pre-Charge

Before commissioning starts and during every routine service, the pre-charge of the pressure vessels should be checked according to the following chart and instructions.

Figure 8.19: Pressure Vessel Pre-charge



On variable speed systems the pre-charge air pressure for vessels should be 90% of the maximum pressure generated by the pump in the pipework system

e.g: If the maximum pressure generated by the pump in a system is 6 bar, this will require a pre-charge pressure of $6 \times 90\% = 5.4$ bar.

To verify the pre-charge pressure:

- 1) First check that the expansion or pressure tank is totally drained of water and isolated.
- 2) Refer to Figure 8.20: Pre-Charging a Pressure Vessel (p. 54). Remove the air vent cover.
- 3) Unscrew the air valve cap.

4) Connect a pressure gauge. Verify that the pre-charge pressure is correct. If it is low then the vessel pre-charge must be corrected by additional inflation of the diaphragm.

5) When the pre-charge pressure is correct replace the air valve cap and vent cover.

Figure 8.20: Pre-Charging a Pressure Vessel



8.4 General Maintenance and Repair

Disconnect all electrical equipment before starting on any maintenance jobs or checking the installation pressure and temperature. The pre-charge pressure should be checked and if necessary corrected during any maintenance work.

8.5 Diaphragm Replacement

To replace a diaphragm:

- 1) Empty the expansion tank
- 2) Remove the pre-charging by releasing the air vent.
- 3) Loosen the M8 screws fastening the flange
- 4) Remove the flange
- 5) Extract the diaphragm and replace it

8.6 Installing a Replacement Vessel

Read these instructions carefully before installing the product:

- 1) Make sure the product is in good condition. If the product is damaged do not start on installation but take it back to the seller for immediate replacement.
- 2) The product must be installed in the position (vertical or horizontal) specified in the technical specifications.
- 3) While the system is cold, measure the static pressure with a gauge, at the point where the tank has to be installed.

- 4) Set the pre-charge pressure, using the procedure earlier in this section. Ensure that the pressure does not exceed the value specified in the procedure.
- 5) The appliance must be supplied with efficient and sufficient safety and control facilities, in particular the safety valve must be connected to the appliance and be free from interference and must be gauged to the quantity of fluid to be discharged. The safety valve should also be designed to ensure that the pressure does not permanently exceed the maximum tolerated pressure (a temporary pressure peak, limited to 10% of the maximum tolerated pressure, is allowed).
- 6) Make sure the cap of the valve is fitted tightly after pre-loading and that there is no leakage.

9. Control Panel Wiring Diagrams

No. Pumps	Voltage	kW	Wiring Diagram
2	400/3/50	1.5- 5.5	9.1 Twin Pump 3-Phase 400V (p. 93)
	240/1/50	1.5 - 4	9.2 Twin Pump 1-Phase 230V (p. 96)
3	400/3/50	1.5 - 4	9.8 Triple Pump 1-Phase 230V (p. 99)
	240/1/50	1.5 - 7.5	9.9 Triple Pump 3-Phase 400V (p. 102)

Note: the following wiring diagrams show MCB's fitted, but these may be swapped out for motor-rated fuses in some cases due to specific site requirements. Ask if you are unsure.

9.1 Twin Pump 1.5 - 5.5kW 3-Phase 400V

Figure 9.21: Sheet 1 of 3



Figure 9.22: Sheet 2 of 3



Figure 9.23: Sheet 3 of 3



9.2 Twin Pump 1.5 - 4kW 1-Phase 230V

Figure 9.24: Sheet 1 of 3



Figure 9.25: Sheet 2 of 3



Figure 9.26: Sheet 3 of 3



9.3 Triple Pump 1.5 - 4kW 1-Phase 230V

Figure 9.27: Sheet 1 of 3



Figure 9.28: Sheet 2 of 3



Figure 9.29: Sheet 3 of 3



9.3 Triple Pump 1.5 - 7.5kW 3-Phase 400V

Figure 9.3: Sheet 1 of 3



Figure 9.31: Sheet 2 of 3





10. Controls and Inverters Reference Guide

Please read the IMPORTANT SAFETY INFORMATION below, and all Warning and Caution information elsewhere when carrying out any work on the inverter drives. This information is provided for reference purposes and should be not be referred to in normal operation of the product. The majority of the inverter parameters are controller by the touch screen display. If in doubt, consult Dutypoint before making any adjustments.

10.1 Important Safety Information

DANGER: RISK OF ELECTRIC SHOCK.

- This variable speed drive product is intended for professional incorporation into complete equipment or systems as part of a fixed installation. If installed incorrectly it may present a safety hazard. The system uses high voltages and currents, carries a high level of stored electrical energy, and is used to control mechanical plant that may cause injury. Close attention is required to system design and electrical installation to avoid hazards in either normal operation or in the event of equipment malfunction. Only qualified electricians are allowed to install and maintain this product.
- System design, installation, commissioning and maintenance must be carried out only by personnel who have the necessary training and experience. They must carefully read this safety information and the instructions in this Guide and follow all information regarding transport, storage, installation and use of the inverter, including the specified environmental limitations.
- Do not perform any flash test or voltage withstand test on the product. Any electrical measurements required should be carried out with the product disconnected. Internal surge arrestors are fitted, intended to protect against damage due to mains borne spikes, which will result in the product failing the flash test
- Electric shock hazard! Disconnect and ISOLATE the product before attempting any work on it. High voltages are present at the terminals and within the drive for up to 10 minutes after disconnection of the electrical supply. Always ensure by using a suitable multimeter that no voltage is present on any drive power terminals prior to commencing any work.
- Where supply to the drive is through a plug and socket connector, do not disconnect until 10 minutes have elapsed after turning off the supply.
- Ensure correct earthing connections and cable selection as per defined by local legislation or codes. The drive may have a leakage current of greater than 3.5mA; furthermore the earth cable must be sufficient to carry the maximum supply fault current which normally will be limited by the fuses or MCB. Suitably rated fuses or MCB should be fitted in the mains supply to the drive, according to any local legislation or codes.
- Do not carry out any work on the drive control cables whilst power is applied to the drive or to the external control circuits.

DANGER: RISK OF DAMAGE TO PROPERTY

- Within the European Union, all machinery in which this product is used must comply with Directive 98/37/EC, Safety of Machinery. In particular, the machine manufacturer is responsible for providing a main switch and ensuring the electrical equipment complies with EN60204-1.
- The level of integrity offered by the inverter control input functions for example stop/start, forward/reverse
 and maximum speed, is not sufficient for use in safety-critical applications without independent channels of

protection. All applications where malfunction could cause injury or loss of life must be subject to a risk assessment and further protection provided where needed.

- The driven motor can start at power up if the enable input signal is present.
- The STOP function does not remove potentially lethal high voltages. ISOLATE the drive and wait 10 minutes before starting any work on it. Never carry out any work on the Drive, Motor or Motor cable whilst the input power is still applied.
- The inverter can be programmed to operate the driven motor at speeds above or below the speed achieved when connecting the motor directly to the mains supply. Obtain confirmation from the manufacturers of the motor and the driven machine about suitability for operation over the intended speed range prior to machine start up.
- Do not activate the automatic fault reset function on any systems whereby this may cause a potentially dangerous situation.
- Inverters are intended for indoor use only
- When mounting the drive, ensure that sufficient cooling is provided. Do not carry out drilling operations with the drive in place, dust and swarf from drilling may lead to damage.
- The entry of conductive or flammable foreign bodies should be prevented. Flammable material should not be placed close to the drive
- Ensure that the supply voltage, frequency and no. of phases (1 or 3 phase) correspond to the rating of the inverter as delivered.
- Never connect the mains power supply to the Output terminals U, V, W.
- Do not install any type of automatic switchgear between the drive and the motor. This may cause the drive protection to activate, resulting in a trip and loss of operation.
- Wherever control cabling is close to power cabling, maintain a minimum separation of 100 mm and arrange crossings at 90 degrees
- Ensure that all terminals are tightened to the appropriate torque setting
- Do not attempt to carry out any repair of the inverter. In the case of suspected fault or malfunction, contact Dutypoint for further assistance.

10.2 Commissioning

The information in this section is required to operate the motor with the best possible efficiency level, to protect the motor against damage from overload,

Table 10.11: Motor Nameplate Information

The inverter uses the information from the motor nameplate to operate the motor with the best possible efficiency level and protect the motor against possible damage due to operation in overload condition. In order to achieve this, the inverter requires that the following information from the motor nameplate is entered into the parameters

Code	Required Information	Description
P1-07	Motor Rated Voltage	This is the operating voltage for the motor in its present wiring configuration (Star or Delta). The maximum output voltage from the inverter can never exceed the incoming supply voltage.
P1-08	Motor Rated Current	This is the full load current of the motor from the nameplate
P1-09	Motor Rated Frequency	This is the standard operating frequency of the motor, generally 50 or 60Hz
P1-10	Motor Rated Speed	This parameter can optionally be set to the RPM shown on the motor nameplate. When this parameter is entered, all speed related parameters in the drive are displayed in RPM. When the parameter is set to zero, all speed related parameters are displayed in Hz.

Table 10.12: Minimum and Maximum Frequencies/Speeds

The inverter units are factory set to operate the motor from zero up to base speed (50 or 60Hz output). In general, this operating range is suitable for a wide range of requirements, however in some cases it may be desired to adjust these limits, e.g. where the maximum speed of a fan or pump may provide excessive flow, or where operation below a certain speed is never required. In this case, the following parameters can be adjusted to suit the application :-

Code	Required Information	Description			
P1-01	Maximum Frequency.	In general this should match the motor rated frequency. If operation above this frequency is desired, confirmation from the motor manufacturer, and the manufacturer of any connected fan or pump should be sought that this is permissible, and will not cause damage to the equipment.			
P1-02	Minimum Frequency	A suitable minimum can be set to prevent the motor operating at low speed, which may cause the motor to overheat. In some applications, such as a pump circulating water through a boiler, it may be necessary to set a speed to ensure the boiler does not run dry during operation.			

Table 10.13: Acceleration and Deceleration Ramp Times

Inverter units are factory set with acceleration and deceleration ramp rates set to 30 seconds. The default value is suit-able for the majority of applications but can be altered by changing the values in parameters P1-03 and P1-04. Care must be taken to ensure the driven load is capable of performing the specified ramps and that nuisance trips due to excessively short ramp times are not produced.

The ramp times entered in the parameter set always specify the time taken to ramp between 0Hz and motor rated speed P1-09.For example; If ramp rate = 30 seconds and P1-09 (motor vase speed) = 50Hz, and assuming the motor is currently running at 25Hz and the drive is commanded to accelerate to 50Hz. The time taken to reach 50Hz would be 30 seconds (P1-03) / 50 (P1-09) * 25 (required change in speed) = 15(s)

Code	Required Information	Description		
P1-03	Acceleration Ramp Rate	Time taken for the drive to accelerate the motor from 0Hz to Motor base speed, P1-09 in seconds.		
P1-04	Deceleration Ramp Rate	Time taken for the drive to decelerate the motor from Motor base speed, P1-09 to 0Hz in seconds.		

Table 10.14: Stop Mode Selection

Inverter units can be programmed to either apply a fixed deceleration to the motor during stopping, or to release control of the motor and allow it to coast or free-wheel to a stop. The default selection is for the drive is ramp to stop and behaviour is programmed using parameter P1-05.

Code	Required Information	Description	
P1-05	Stop Mode Select	Defines how the motor will be stopped in the event of the enable input being removed from the drive. Ramp to stop (P1-05 = 0) will ramp the drive to stop using the value for deceleration entered in P1-04. Coast to stop (P1-05 = 1) will allow the motor to coast to stop (uncontrolled).	

Table 10.15: Voltage Boost

Voltage boost is used to increase the applied motor voltage at low output frequencies, in order to improve low speed and starting torque. Excessive boost levels may result in increased motor current and temperature, and force ventila-tion of the motor may be required.

Code	Required Information	Description
P4-01	Torque Mode	The default value for Torque boost is set 0.0%, and this should only be increased if the starting torque is insufficient. Ensure that the correct Constant or Variable Torque mode is set in P4-01 before adjusting the boost.

10.3 Advanced Parameters

The inverter advanced parameter set consists of 7 groups as follows:

- Group 1 Basic Parameter Set
- Group 2 Extended Parameter Set
- Group 3 User PID Control Parameter Set
- Group 4 Motor Control Parameters
- Group 5 Field Bus Communications Parameter Set
- Group 8 Application Specific Functions Parameter Set
- Group 0 Monitoring and Diagnostic Parameters (Read

Only) When the inverter is reset to factory defaults, or is in its factory supplied state, only Group 1 Parameters can be accessed. In order to allow access to parameters from the higher level groups, P1-14 must be set to the same value as P2-40 (Default setting = 101). With this setting, parameter groups 1 - 5 and group 8 can be accessed, along with the first 39 parameters in Group 0. These parameters are listed in the tables below. For advanced parameter access, P1-14 can be set to the same value as P6-30 (Default setting = 201), which allows access to all parameter groups and ranges. Advanced parameter descriptions are listed in the advanced user guide. Values given in brackets () are default settings for horsepower rated drive models.

Table 10.16: Parameter Group 1 - Basic Parameters Set

Par	Parameter Name	Minimum	Maximum	Default	Units			
P1- 01	Maximum Speed Limit	P1-02	500.0	50.0(60. 0)	Hz/R PM			
	Maximum output frequency or motor speed limit – Hz or rpm. If P1-10 >0, the value entered / displayed is in Rpm Note : The maximum possible setting of is limited to the lowest value of: 5 x P1-09 • 5 x P1-10 • P2-24 / 16 • 500.0Hz							
P1- 02	Minimum Speed Limit	0.0	P1-01	0.0	Hz/R PM			
	Minimum speed limit – Hz or RPM. If P1-10 >0, the value entered / displayed is in Rpm							
P1- 03	Acceleration Ramp Time	0.0	6000.0	30.0	Secon ds			
	Acceleration ramp time from 0 to base speed (P-1-09) in seconds.							
P1- 04	Deceleration Ramp Time	0.0	6000.0	30.0	Sedo nds			
	Deceleration ramp time from base speed (P1-09) to standstill in seconds.							
Parr	Parameter Name	Minimum	Maximum	Default	Units			
-----------	---	--	--	---	---	--	--	--
P1- 05	Stop Mode Select	0	1	0	-			
	 0: Ramp To Stop. When the enable signal is removed, the drive will ramp to stop, with the rate controlled by P1-04 as described above. 1: Coast to Stop. When the enable signal is removed the motor will coast (freewheel) to stop 2: AC Flux Braking. Provides additional braking torque capability when decelerating. 							
P1-	Reserved	-		-	-			
06	-	1	1	I				
P1-	Motor Rated Voltage	0	Drive dependent		Volts			
07	For Induction Motors - Enter the rated (nameplate) voltage of the motor (Volts) For PM & BLDC Motors - Enter the back EMF at rated motor speed							
P1- 08	Motor Rated Current	Drive depende nt	Drive rated current	100% drive rated current	Amps			
	This parameter should be set to the rated (nameplate) current of the motor							
P1-	P1- Motor Rated Frequency 25 500 50(Hz			
09	This parameter should be set to the rated (nameplate) freque	This parameter should be set to the rated (nameplate) frequency of the motor						
P1-	Motor Rated Speed	0	30000	0	RPM			
10	This parameter can optionally be set to the rated (nameplate) rpm of the motor. When set to the def value of zero, all speed related parameters are displayed in Hz, and the slip compensation for the m is disabled. Entering the value from the motor nameplate enables the slip compensation function, at the Optidrive display will now show motor speed in estimated rpm. All speed related parameters, su as Minimum and Maximum Speed, Preset Speeds etc. will also be displayed in Rpm.				default e motor and such			
P1- 11	Torque Boost	0.0	0.0	Drive depend ent	%			
	Torque Boost is used to increase the applied motor voltage ar This can improve low speed and starting torque. Increasing the low speed, which may result in the motor temperature rising - required. In general, the lower the motor power, the higher the For IM motors, a suitable setting can usually be found by ope conditions at approximately 5Hz, and adjusting P1-11 until the magnetising current This parameter is also effective when using alternative motor boost current level is defined as 4 x P1-11 x P1-08	nd hence cur ne boost leve force ventila e boost settin rating the mo e motor curre types, P4-07	rent at low o el will increa ition of the r ng that may ptor under v ent is approv I = 3, 4 or 5	butput frequ se motor cu notor may ti be safely u ery low or n kimately the . In this cas	encies. rrent at nen be sed. o load e, the			
P1-	Control Mode Select	0	6	0	-			
12	 0: Terminal Control. The drive responds directly to signals app 1: Uni-directional Keypad Control. The drive can be controlled internal or remote Keypad 2: Uni-directional Keypad Control. As above. 3: PID Control. The output frequency is controlled by the inter 4: Fieldbus Control by the selected Fieldbus (Group 5 Parame 5: Slave Mode. The drive acts as a Slave to a connected Opti 6: BACnet Mode. Drive communicates / responds as a slave 	plied to the c d in the forwar rnal PID cont eters) – Excl drive operati within a BAC	ontrol termin ard direction roller. uded BACno ng in Maste Cnet network	nals. only using et (see option r Mode K.	the on 6)			

Parr	Parameter Name	Minimum	Maximum	Default	Units		
P1-	Digital Input Function	0	14	1	-		
13	Defines the function of the digital inputs. When set to 0 the inputs are user defined using group 9 parameters or the PLC software function in the OptiTools Studio software package. When set to a value other than 0 the digital input configuration is defined by digital input definition table						
P1-	Extended Menu Access 0 30000 0 -						
14	Parameter Access Control. The following settings are applicable: P1-14 > P2-40 and P1-14 > P6-30: Allows access to Parameter Group 1 only P1-14 = P2-40 (101 default): Allows access to Parameter Groups 0 – 5 and group 8 P1-14 = P6-30 (201 default): Allows access to Parameter Groups 0 - 9						

Table 10.17: Digital Input Configuration Parameter P1-13

P1-4-	Local Hand Control Function	Digital Input 2 (Terminal 2)	Digital Input 2 (Terminal 3)	Digital Input 3 (Terminal 4)	Analogue Input 1 (Terminal 6)	Analogue Input 2 (Terminal 10)	Notes
0	N/A) All functions user defined or configured through PLC function.					
1	Analogu e Input 2	O: Stop C: Run/Enable	O: Normal Operation C: Preset 1 / PI Set-Point 2	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	When input 3 in closed:
2		O: No function C: Momentary Start	O: Stop/Disable C: Run permit	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	Speed referenc e = Analogu e Input 2 Start
3		O: Stop C: Run/Enable	O: Forward C: Reverse	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	comman d = Input 1. In PI Mode,
4		O: Stop C: Run /Enable	O: Fire mode C: Normal operation	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	Analogu e Input 1 must be used for feedbac k

P1- 13	Local (Hand) Control Function	Digital Input 2 (Terminal 2)	Digital Input 2 (Terminal 3)	Digital Input 3 (Terminal 4)	Analogue Input 1 (Terminal 6)	Analogue Input 2 (Terminal 10)	Notes
5	Preset Speeds	O: Stop C: Run/Enable	O: Preset speed 1 C: Preset speed 2	O: Remote Control C: Local Control	Analogue In 1	O: Ext Trip C: Normal Operation	When Input 3 is closed:
6		O: No function C: Momentary start	O: Stop/Disable C: Run permit	O: Remote Control C: Local Control	Analogue In 1	O: Preset 1 C: Preset 2	Speed referenc e = preset speed 1/2 Start
7		O: Stop C: Run/Enable	O: Forward C: Reverse	O: Remote Control C: Local Control	Analogue In 1	O: Preset 1 C: Preset 2	comman d = input 1
8		O: Stop C: Run/Enable	O: Fire mode C: Normal operation	O: Remote Control C: Local Control	Analogue In 1	O: Preset 1 C: Preset 2	
9	Keypad Speed Referen ce	O: Stop C: Run/Enable	O: Normal Operation C: Preset 1 / PI Set-Point 2	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	When input 3 is closed: Speed
10		O: Stop C: Run/Enable	O: Normal Operation C: Preset 1 / PI Set-Point 2	O: Remote Control C: Local Control	Analogue In 1	O: Ext Trip C: Normal Operation	refernce = keypad Start comman
11		O: No function C: Momentary start	O: Stop/Disable C: Run permit	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	d = determin ed by P2-37
12		O: Stop C: Run fwd	O: Forward C: Reverse	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	
13		O: Stop C: Run fwd	O: Fire mode C: Normal operation	O: Remote Control C: Local Control	Analogue In 1	Analogue In 2	

P1- 13	Local (Hand) Control Functio n	Digital Input 2 (Terminal 2)	Digital Input 2 (Terminal 3)	Digital Input 3 (Terminal 4)	Analogue Input 1 (Terminal 6)	Analogue Input 2 (Terminal 10)	Notes
14		O: Stop C: Run	O: Forward C: Reverse	Digital Input 3	Analogue Input 1	Analogue Input 2	Preset Speed
				Off	Off	Off	1
				On	Off	Off	2
				Off	On	Off	3
				On	On	Off	4
				Off	Off	On	5
				On	Off	On	6
				Off	On	On	7
				On	On	On	8

10.4 RS-485 Communications

The inverter has an RJ45 connector located within the wiring enclosure of the drive. This connector allows the user to set up a drive network via a wired connection. The connector contains two independent RS485 connections, one for the inverter's proprietary protocol and one for Modbus RTU / BACnet. Both connections can be used simultaneously.

Figure 10.66: RJ45 Connector



WARNING: THIS IS NOT AN ETHERNET CONNECTION

- Do not connect directly to an Ethernet port
- When using Modbus RTU or BACnet, ensure that the 0V signal (T3) is also used to avoid comms errors and potentially damaging common mode voltages

10.5 Emergency manual control mode in case of HMI failure

WARNING

Take extreme care when performing this operation

- · Do not attempt to implement this procedure unless you understand the implications fully
- The control panel should only be opened by a qualified electrician
- · This should only be attempted by a qualified and competent person

NOTE: This operation enables a single pump to be run directly by its individual inverter drive in case of failure of the HMI controller.

NOTE: It is advisable to disable the other pumps by switching off their drive isolators

- 1) Open panel and locate drive 1 (far left hand drive)
- 2) Press and hold the *Inverter Navigate button* until P-01 appears on screen

Figure 10.67: Inverter Navigate button



- Press the up arrow until P-02 is shown and press the navigate button and change the value to the minimum required frequency to maintain pressure at the required pressure (what the controller displays under Settings > Inverter > Pump Min Speed
- 4) Press the Up arrow until P-12 is shown and press the Navigate button again
- 5) Change the value using the up and down arrows to read 5 and press the navigate button again to return to the main menu
- 6) Press the up arrow until P-14 is displayed, press the navigate button and using the arrows enter the value 201, then press the navigate button again
- 7) Press the up arrow until P-45 is shown and press the Navigate button enter a pressure set point value this value needs to be in % of the maximum range of the transducer (16BAR) so 0% will be 0BAR and 100% will be 16BAR. Press the Navigate button to save the set point
- 8) Press the up arrow until P-46 is shown and press the Navigate button and change the value to read 1 and press the Navigate button to save the value
- 9) Press the up arrow until P-48 is shown and press the Navigate button and change the value to 20 press the navigate button to save the value
- 10) Press the up arrow until P-49 is shown and press the Navigate button and change the value to 1 press the navigate button to save the value.

The system will now run in single pump mode. Once the fault has been rectified, normal operation must be manually restored by following this procedure:

- 1) Press and hold the Navigate button until P-01 is displayed
- 2) Press the up button until P-02 is displayed and press the navigate button. Change the value to 0 and press the Navigate button to save the value
- 3) Press the up button until P-12 is displayed and press the navigate button. Change the value to 4 and press the Navigate button to save the value

10.6 BMS Interface

Either of the 2 Ethernet ports can be used for BMS connection. The protocol is Modbus over Ethernet.

Table 10.18: BMS Tags

Modbus Connectivity

- Protocol: Modbus Over Ethernet TCP
- IP Address: As setup in IP Settings
- Port: 502
- Memory Type, Function 16 Read Holding Registers

0 based registers

Registers:

Register	Description	Data Type
400000	Actual Pressure	USINT
400001	Required Pressure	USINT
400002	Pump 1 Speed	USINT
400003	Pump 2 Speed (if fitted)	USINT
400004	Pump 3 Speed (if fitted)	USINT
400005	Pump 4 Speed (if fitted)	USINT
400006	Pump 1 Run Time	STRING
400007	Pump 2 Run Time (if fitted)	STRING
400008	Pump 3 Run Time (if fitted)	STRING
400009	Pump 4 Run Time (if fitted)	STRING
400010	Low Water (True active)	BOOL
400011	Transducer Failure (true	BOOL
	active)	
400012	Override Mode Active (true	BOOL
	active)	
400013	Low Pressure Alarm (true	BOOL
	active)	
400014	External Disabled (true	BOOL
	active)	
400015	High Pressure Alarm (true	BOOL
	active)	
400016	General Fault (true active)	BOOL

11. Dutypoint Standard Warranty

Your Dutypoint Systems standard product warranty is valid for a period of 12 months from date of delivery. The full terms and conditions are on the reverse of this certificate.

If you need to contact us regarding your warranty or any issue regarding your Dutypoint product, please contact our service department:

- Tel: +44(0)14523 00 590
- Email: service@dutypoint.com

Once your standard product warranty has expired, you may wish to take out our infinity service contract for an extended amount of cover. For more information visit our website: www.dutypoint.com/infinity

11.1 Terms and Conditions

- 1) The Company warrants that on delivery, and for a period of 12 months from the date of delivery, or such longer period as agreed by the Company in writing, (Warranty Period), the Goods shall:
 - a) conform in all material respects with their description as set out in the Agreement;
 - b) be free from material defects in design, material and workmanship; and
 - c) be of satisfactory quality (within the meaning of the Sale of Goods Act 1979).
- 2) Subject to Clause 3, if:
 - a) the Customer gives notice in writing to the Company during the Warranty Period within a reasonable time of discovery that some or all of the Goods do not comply with the warranty set out in Clause 1; and
 - b) the Company is given a reasonable opportunity to examine such Goods; and
 - c) the Customer (if asked to do so by the Company) returns such Goods to the Company's place of business, the Company shall, at its option, repair or replace the defective Goods, or refund the price of the defective Goods in full.
- 3) The Company shall not be liable for the failure of the Goods to comply with the warranty set out in Clause 1 in any of the following events:
 - a) the Customer makes any further use of such Goods after giving notice in accordance with Clause 2;
 - b) the defect arises because the Customer failed to follow the Company's oral or written instructions as to the storage, commissioning, installation, use and maintenance of the Goods or (if there are none) good trade practice regarding the same;
 - c) the defect arises as a result of the Company following any drawing, design or Specification supplied by the Customer;
 - d) the Customer alters or repairs such Goods without the written consent of the Company;
 - e) the defect arises as a result of fair wear and tear, wilful damage, negligence, or abnormal storage or working conditions; or
 - f) the defect arises as a result of the Customer's negligence or the Customer's breach of the Agreement.
- 4) Clause is the Customer's sole remedy in respect of the matters described therein.
- 5) The terms implied by sections 13 to 15 of the Sale of Goods Act 1979 are, to the fullest extent permitted by law, excluded from the Agreement.
- 6) The terms and conditions of the Agreement apply to any repaired or replacement Goods supplied by the Company.

Declaration of Conformity UKCA & CE

We: Dutypoint Limited

Of: Quedgeley West Business Park, Gloucester, Gloucestershire, United Kingdom in accordance with the following directives:

- 2006/42/EC : Machinery Directive
- S.I. 2008:1597 The Supply of Machinery (Safety) Regulations 2008
- 2014/68/EU : Pressure Equipment Directive
- S.I. 2016:1105 Pressure Equipment (Safety) Regulations 2016
- 2014/30/EU : Electromagnetic Compatibility Directive
- S.I. 2016:1091 Electromagnetic Compatibility Regulations 2016
- 2014/35/EU : Low Voltage Directive.
- S.I. 2016:1101 Electromagnetic Compatibility Regulations 2016

Hereby declare that the equipment:

Product Range	Dutypoint Cold Water Booster

Is in conformity with the applicable requirements of the following documents:

- EN 809:1998+A1:2009: Pumps and pump units for liquids Common safety requirements
- EN 60204-1:2018: Safety of machinery Electrical equipment of machines Part 1: General requirements
- EN ISO 12100:2010: Safety of machinery General principles for design
- EN 61000-6-2:2019: Electromagnetic compatibility (EMC) Part 6-2: Generic standards
- EN 61000-6-4:2019: Electromagnetic compatibility (EMC) Part 6-4: Generic standards

I hereby declare that the equipment described above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable essential requirements of the directives.

Nigel Freeman, Director Dutypoint Ltd Unit A, Quedgleley West Business Park, Hardwicke, Gloucester GL2 4PA United Kingdom



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