

Installation and operating instructions



3760 Digital Controller

File No: 37.209
Date: AUGUST 30, 2023
Supersedes: NEW
Date: NEW

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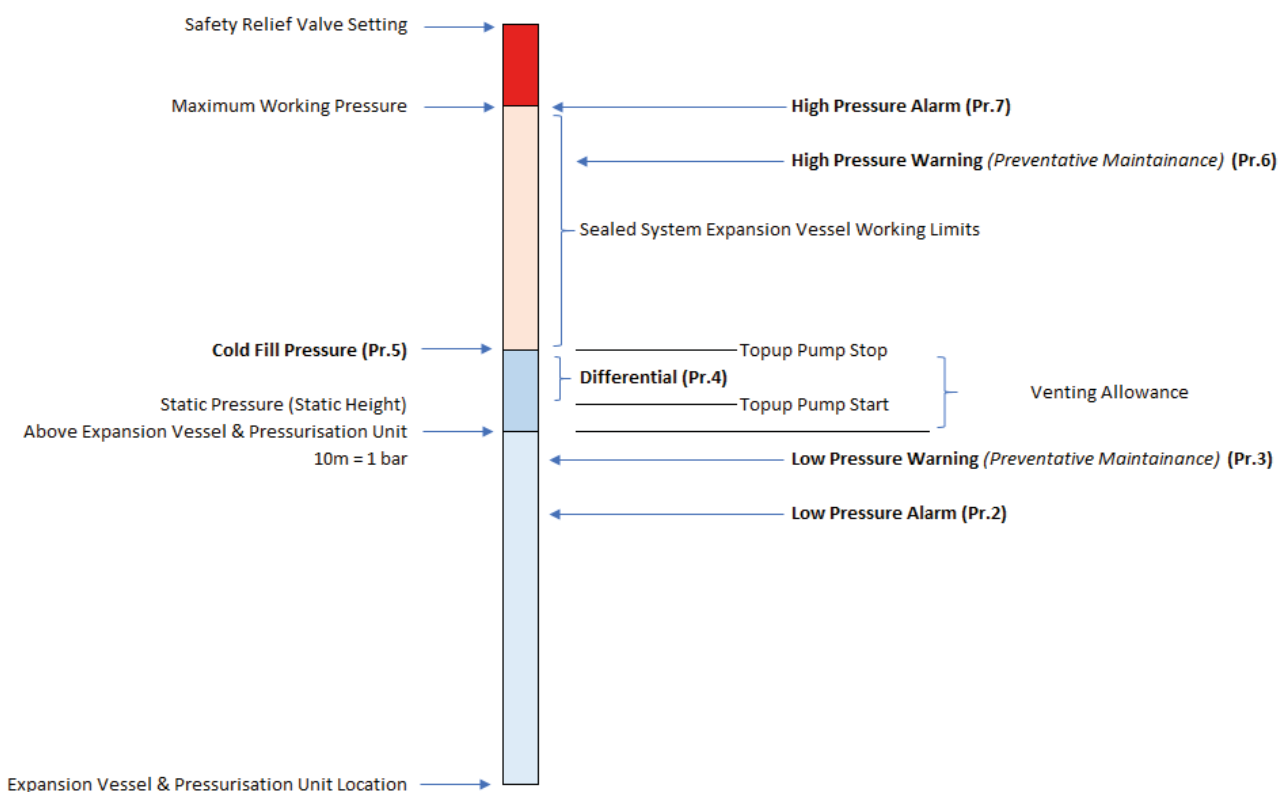
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Pressures in A Sealed System

Below is an overview of how the settings on a pressurisation unit must be considered for normal topup operation.

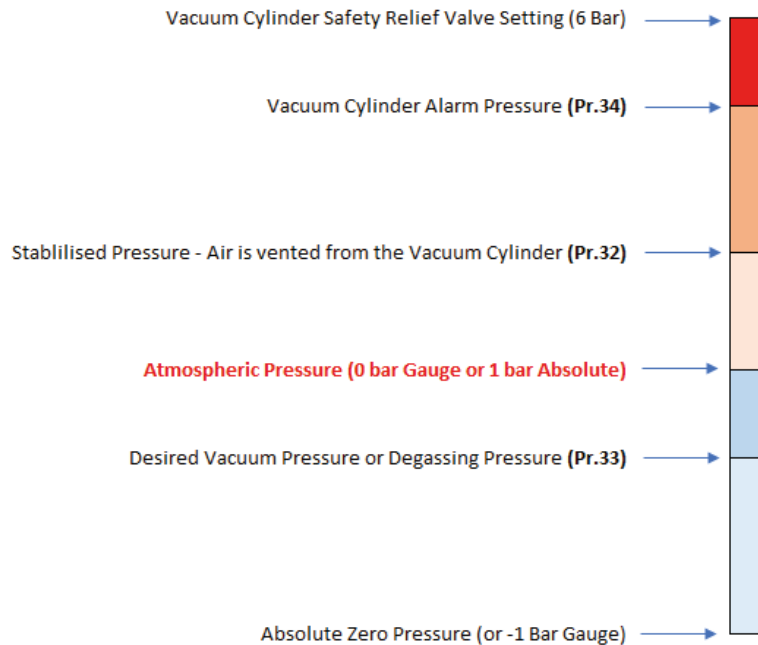
Close, conflicting or overlapping settings will cause system instability and nuisance alarm conditions. If in any doubt please seek advice from a Sealed System professional.



A typical venting allowance is 0.3 bar, added to the static height to give the cold fill pressure.

The Differential setting represents the allowable pressure loss before the pump activates and restores the cold fill pressure. The Differential setting must not be greater than the system venting allowance. This will ensure that the system remains fully flooded during normal topup conditions.

When the equipment contains a degassing element/function, the following pressures must also be taken into account:



The degassing element will connect and disconnect from the main system as required to perform its normal function, a pressure reducing valve is also incorporated into the assembly to prevent overpressure of this equipment. As a result, the vacuum cylinder is protected with a 6 bar Safety Relief valve regardless of the main hydronic system pressure.

Typically, the Vacuum Cylinder Alarm Pressure is factory set to 4 bar, the Stabilised Pressure is set to 1 bar and the Desired Vacuum Pressure is set to -0.5 bar. These can be adjusted at the time of commissioning if required.

On Heating systems, the Desired Vacuum Pressure must be adjusted to meet the Steam Tables for the incoming fluid temperatures. It is important to note that at 70 deg. C, water subjected to a vacuum pressure of -0.5 bar (Gauge) will turn to low temperature steam and be vented from the equipment. This can affect the integrity of the Hydronic System and also negatively influence the chemical dosing regime.

Close, conflicting or overlapping settings will cause system instability and nuisance alarm conditions. If in any doubt please seek advice from a Sealed System professional.

About this Manual

This Operation and Maintenance Manual contains all the necessary information to install, commission, operate and maintain the Armstrong equipment.

It is recommended to read all parts of this manual before undertaking any work on the equipment.

Conventions used in this Manual

This manual makes use of symbols to identify key pieces of information. Please take note of the following symbols and their meaning:



DANGER - Important safety related information intended to prevent injury and/or damage to the equipment, system or property.



CAUTION - Important information intended to prevent damage to the equipment, system or property.



IMPORTANT - Important information intended to ensure that the equipment functions correctly.



USEFUL - Useful information which may be helpful but is not necessarily required for the unit to function correctly.

Typography

This manual makes use of different typography to identify different types of information.

Italics	Key words and phrases
(Round Brackets)	Used to identify a button on the digital controller
[Square Brackets]	A parameter on the digital controller
<Inequality Symbols>	A message/fault code displayed on the digital controller

Where to find more Information

For further information please visit the Armstrong Fluid Technology Website at the following URL:

www.armstrongfluidtechnology.com

Alternatively, please contact the Armstrong Fluid Technology office using the details below:

Phone: 0161 233 2323

Email: ukservice@armstrongfluidtechnology.com

Electrical Power Supply

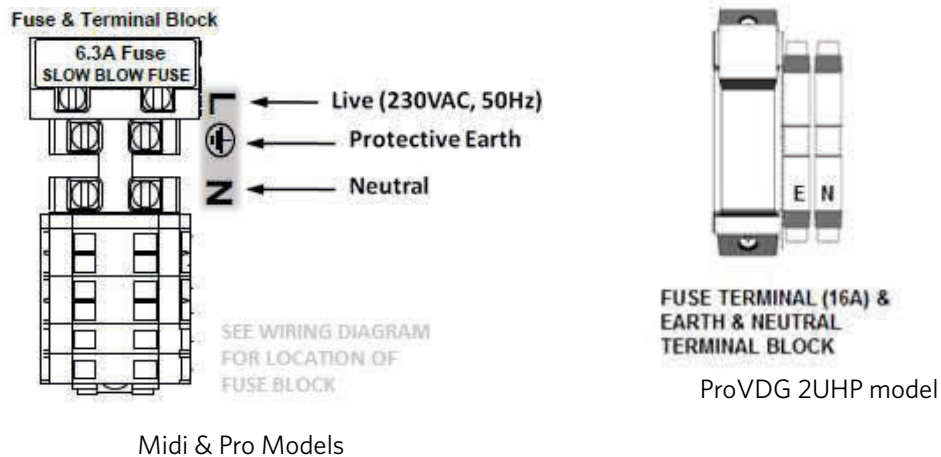


This equipment must be electrically isolated before removing the covers. Cables connected to the volt free contacts may be supplied from another source and may remain live after the unit is isolated. These must be isolated elsewhere.



All electrical connections must be carried out by a suitably qualified and competent person.

The mains power supply to the pressurisation unit must be connected as shown below:



It is a requirement to supply power to the pressurisation unit via a lockable isolator. This should be installed within 2m of the equipment.

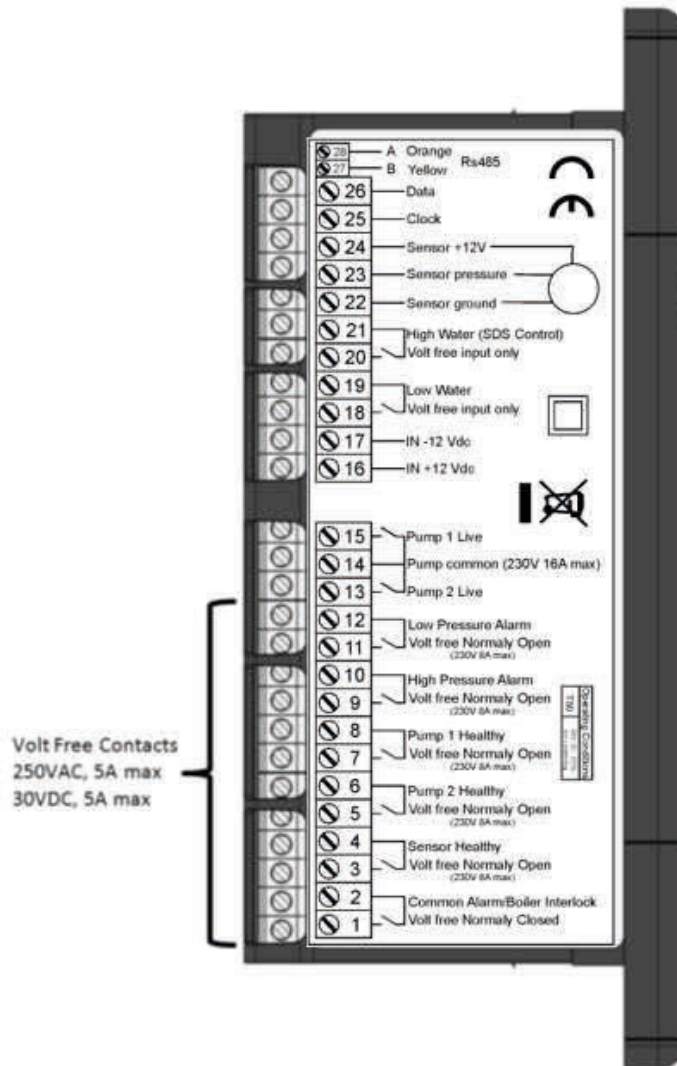


This equipment can be damaged by the high voltages produced by electrical installation testing equipment. When performing electrical installation tests, the equipment must be isolated from the mains supply.

Micro Controller

Fault contacts

There are 6 volt free fault contacts which can be used for connection to a BMS system, located on terminals 1-12 on the digital controller.



With the exception of the Common Alarm, it is possible to convert all other fault contacts to normally closed. For further information please refer to the commissioning section of this manual.



The other volt free contacts can be connected to the BMS and when the alarm is triggered this is shown on the Pressurisation unit and the BMS.

With the expansion board there are additional volt free contacts and inputs available.

Feature	3760 Controller	3760 Controller & Expansion Board
	Low Pressure Alarm	√
	Low Pressure Warning	√
	Common Alarm	√
	High Pressure Warning	√
Volt Free Contact (For Customers BMS)	High Pressure Alarm	√
	Pump 1 Topup Run	√
	Pump 2 Topup Run	√
	Low Additive	√
	Pump 1 Health	√
	Pump 2 Health	√
	Topup Sensor Health	√
	Low Water	√
	SPC Interface	√
	Volt Free Inputs For Controller Operation	High Water Switch
Low Additive Switch		√
Low Water Switch		√
Vacuum Sensor		√ (Must choose one, configurable alternatives)
System Pressure Sensor		√

Controller Overview

The following image shows the front of the pressurisation unit digital controller. 4 buttons are provided for programming, and an LED display which shows scrolling messages.



When the controller is first powered up, it will display the controller version number. This manual relates to controller version >10.0. If the controller is of a different version, there may be differences in the menu items available.

When in normal operation, the controller will display the current system pressure. If a fault occurs, the controller will display a fault code and produce an audible alarm.

In normal operation, the functions of the buttons are as follows:

Button	Function	
	Press	Hold
SET	-	Show Current System Pressure
MUTE	Mute Audible Alarm	Reset Unit
+	-	Enter Programming Menu
-	-	Enter Programming Menu

Controller Programming



Do not alter any settings without first understanding the implications of doing so. Incorrect settings may cause damage to the equipment, wider system or property.

To enter the programming menu, hold the (+) button until “enter code” appears on the screen, followed by “9999” with a flashing cursor after the first digit.

To gain access to the programming menu, the following code must be entered:

Standard Code

Standard set of options

2601

To enter the code, change the first digit with the (+) and (-) buttons, then press (SET) to move onto the next digit. Repeat for all digits, then once the correct code is shown on the display, press (SET) to enter the programming menu.

Once a correct code has been entered, the first option PROO - **Language** will appear, select E for English or change as appropriate, and then press and hold (SET) & (+) to move to next menu.

Once in the main menu, the value of the current menu item can be changed using the (+) and (-) buttons. Once the current variable has been set, pressing the (SET) & (+) buttons together to move to the next option or (SET) & (-) buttons together to move back an option is you made an error.

Once the programming is complete press and hold the (SET) button for few seconds to save the settings.



If the controller loses power while in the programming menu, all changes made up to that point will be erased. To confirm all changes, the end of the menu must be reached or press and hold the (SET) button for few seconds to save the settings

Key:

(SET) & (+) = Move to next menu

(SET) & (-) = Move back to pervious next menu

Hold down (SET) & (+) = Speed through to desired menu item

Hold down (SET) & (-) = Speed through to desired menu item

Hold down (SET) = Hold (SET) button down for few seconds saves the menu

Program Parameter List - Customer Code

The table below gives details of all menu items, in the order that they will appear:

PR No	Customer Code - 2601	Notes	Default	Unit
0	Language	E=English I=Italian D=Deutsch F=French N=Netherlands	E	

2	Low Pressure Alarm	Recommend Fill Pressure -0.5 Bar	0.5	Bar	STANDARD OPTION
3	Low Pressure Warning	Recommend Fill Pressure -0.3 Bar	0.6	Bar	
4	Differential	Pressure Drop From Fill Pressure For Pump Activation	0.2	Bar	
5	Fill Pressure	Recommend Static Pressure + 0.3 Bar Venting Allowance	1.0	Bar	
6	High Pressure Warning	Recommend High Pressure Alarm -0.1 Bar	2.6	Bar	
7	High Pressure Alarm	Recommend System Safety Valve - 10%	2.7	Bar	
8	Flood Limit	Maximum Pump Run Time	10	minutes	
9	Excessive Start Quantity	Frequency Alarm (Linked To Parameter 10)	0		
10	Excessive Start Time	Frequency Alarm (Linked To Parameter 9)	8	hours	
28	Fill system	Override Flood Limit Timer For A 24 Hour Period While The System Is First Filled	N		

45	Service Reminder Y/N	12 Monthly Service Reminder	N	
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48	ID Number	MODBUS ID Number	1	
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49	Review Logs		N	
50 (*)	P1 Topup Count	Counter For P1 Used For Topup		
51 (*)	P1 Topup Hours	Hours Run For P1 Topup		
52 (*)	P2 Topup Count	Counter For P2 Used For Topup		
53 (*)	P2 Topup Hours	Hours Run For P2 Topup		
54 (*)	P1 Total Hours	Total Hours Run P1 (Inc Degassing)		
55 (*)	P2 Total Hours	Total Hours Run P2 (Inc Degassing)		
56 (*)	Alarm Count	Alarm Counter		
57 (*)	Power Interrupted Count	Power Interrupted Counter		

Operation

Once commissioned, the pressurisation unit should operate without any user intervention.

Under normal operating conditions, the display will show the current system pressure in Bar.

While the unit is filling, the display will show <PUMP 1 RUN> or <PUMP 2 RUN> depending on which pump is currently running.

If the unit identifies a fault, the display will show the relevant fault code.



If the pressurisation unit is showing a fault code on the display, holding down the [SET] button will cause the current system pressure to be temporarily shown on the display.

Fault Codes

The following table gives the meanings of all fault codes used on the digital controller:

Fault code	Description	Auto/Manual Reset
Low H2O	The break-tank low level float switch has been activated	Auto Reset
High H2O	The break-tank high level float switch has been activated	Auto Reset
Hw Communication Error	Communication failure between controller and expansion board	Manual Reset
Pressure Sensor Fail	System pressure not registering and sensor may have failed	Manual Reset
Degasser Sensor Fail	Pressure within the cylinder not registering and sensor may have failed	Manual Reset
Excessive Demand	There have been too many pump starts within the set period period	Manual Reset
Flood Limit	The respective pump has run for longer than the [FLOOD LIMIT] period	Manual Reset
Pump Timeout	The pump has not achieved the required vacuum pressure in the required timeframe, check for airlock and blockages	Manual Reset
High Pressure Alarm	The system pressure is above the [HIGH PRESSURE] set point.	Auto Reset
Low Pressure Alarm	The system pressure is below the [LOW PRESSURE] set point.	Auto Reset
Pump1 Failure	The controller has detected a fault (incorrect current draw) on the respective pump	Manual Reset
Pump2 Failure		
Insufficient Vacuum	The low water switch has been activated, Vacuum pressure has not been achieved, check non return valve on cylinder and joint integrity for air ingress	Manual Reset
Degassing Pump Failure	Pump not reaching the require pressure within degassing mode	Manual Reset
Vac Cylinder high Pressure	Cylinder pressure alarm reached	Manual Reset
Stabilization Timeout	The Stabilisation pressure has not been achieved in the specified timeframe, check PRV for setting and blockages	Manual Reset

Fault code	Description	Auto/Manual Reset
Low Additive	Additive tank requires manual topup	Auto Reset
Low Pressure Warning	The system pressure is below the [LOW PRESSURE WARNING] set point.	Auto Reset
High Pressure Warning	The system pressure is above the [HIGH PRESSURE WARNING] set point.	Auto Reset
Maintain Pump1	Lifetime usage of pump has been reached	Replace pump
Maintain Pump2		
Service	The pressurisation unit is due an annual service	Manual Reset
Reset Required	Unit need to be restarted	Manual Reset

Terminal Layout

Flamco Version V10 Controller & Expansion Board Layout

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Common Alarm VFC 5 amp Max. Normally Closed	Sensor Health VFC 5 amp Max. Normally Open	Pump 2 Health VFC 5 amp Max. Normally Open	Pump 1 Health VFC 5 amp Max. Normally Open	High Pressure VFC 5 amp Max. Normally Open	Low Pressure VFC 5 amp Max. Normally Open	P2 Live Switched Input Live Pump Power 230V 16A Max.	+12Vdc -12Vdc Power In DC Voltage Only	Low H2O Break Tank VFC Input Only	High Water Low Additive Break Tank VFC Input Only	Ground Pressure 4-20 mamp Pressure Sensor	+12V Clock Expansion Board Optional	Yellow	Orange	A RS485 MODBUS RTU													

MAIN CONTROLLER

29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
DC Voltage Only To Main Controller Power Out +12Vdc -12Vdc	Live Earth Power In 110V/230V 50/60Hz	Neutral	Live Earth Power Out 10A Fused Dependent on Input (23/30/31)	Earth Neutral Power Out 10A Fused Dependent on Input (23/30/31)	Neutral Earth Power Out 10A Fused Dependent on Input (23/30/31)	Neutral Earth Power Out 2A Common Fuse Dependent on Input (23/30/31)	Live Earth Power Out	Low Additive VFC 5 amp Max. Normally Closed	High Pressure Warning VFC 5 amp Max. Normally Closed												

EXPANSION BOARD V10

51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
DC Voltage Only To Main Controller Power Out +12Vdc -12Vdc	VFC Input Only Automat Option SPC Interface	VFC Input Only Vacuum Option Low Vacuum	VFC Input Only Auxiliary	VFC Input Only Dosing Option Low Additive	VFC Input Only Vacuum Sensor 4-20 mamp +12V Pressure	Normally Closed 5 amp Max. VFC Low Water Break Tank	Normally Closed 5 amp Max. VFC P1 Run Topup	Normally Closed 5 amp Max. VFC P2 Run Topup	Normally Closed 5 amp Max. VFC Low Pressure Warning													

Customer Contacts/Wiring
Factory Wiring/Flamco Engineer Wiring

07.02.2019

MODBUS Mapping

MODBUS RTU

Board rate: 9600

Stop bits: 1 stop bit

Parity: no parity

Default ID Number: 1

REGISTER	TYPE	BYTES	DESCRIPTION (MB MAIN CONTROLLER, EB EXPANSION BOARD)	TYPE OF VARIABLE	UNIT/NOTES
40001	READ	2	REALTIME SYSTEM PRESSURE	ANALOG	DECIMAL OF BAR (GAUGE)
40002	READ	2	TOPUP SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40003	READ	2	VACUUM SENSOR PRESSURE	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40004	READ	2	DEGASSING SET POINT	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40005	READ	2	LIVE OPERATION MODE	DISCRETE 1=TOPUP 0=DEGASSING	LIVE OPERATING MODE
40006	READ	2	PUMP1 STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS PUMP1 IN USE? (TOPUP OR DEGASSING)
40007	READ	2	PUMP2 STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS PUMP2 IN USE? (TOPUP OR DEGASSING)
40008	READ	2	LOW WATER INPUT STATUS (MB 18/19)	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A LOW WATER SIGNAL BEING RECEIVED?
40009	READ	2	HIGH WATER INPUT STATUS (MB 20/21)	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A HIGH WATER SIGNAL BEING RECEIVED?
40010	READ	2	HIGH PRESSURE ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A HIGH PRESSURE ALARM BEING PROCESSED? (CRITICAL-STOP)
40011	READ	2	HIGH PRESSURE WARNING STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A HIGH PRESSURE WARNING BEING PROCESSED?
40012	READ	2	LOW PRESSURE WARNING STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A LOW PRESSURE WARNING BEING PROCESSED?
40013	READ	2	LOW PRESSURE ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A LOW PRESSURE ALARM BEING PROCESSED?

40014	READ	2	SLAMSHUT SOLENOID STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS A HIGH VACUUM CYLINDER PRESSURE ACTIVATING THE PROTECTIVE SLAMSHUT SOLENOID?
40015	READ	2	PURGE SOLENOID STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THE PURGE SOLENOID ACTIVE?
40016	READ	2	BREAKTANK SOLENOID STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS BREAKTANK SOLENOID ACTIVE?
40017	READ	2	LOW ADDITIVE SWITCH STATUS (INPUT)	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THERE A LOW ADDITIVE SIGNAL?
40018	READ	2	SPC SWITCH STATUS (INPUT)	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THERE AN SPC INTERLOCK SIGNAL?
40019	READ	2	LOW VACCUM SWITCH STATUS (INPUT)	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THERE A LOW VACUUM ALARM?
40020	READ	2	AUXILIARY SWITCH INPUT	DISCRETE 1=ACTIVE 0=NOT ACTIVE	
40021	READ	2	LOW ADDITIVE ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THE LOW ADDITIVE OUTPUT VFC ACTIVE?
40022	READ	2	LOW WATER ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THE LOW WATER OUTPUT VFC ACTIVE?
40023	READ	2	EXPANSION BOARD PRESENT?	DISCRETE 1=PRESENT 0=NOT PRESENT	IS THE EXPANSION BOARD THERE?
40024	READ	2	STATUS OF COMMUNICATION BETWEEN CONTROLLER AND EXPANSION BOARD	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THE COMMUNICATION LINK BETWEEN THE MAIN CONTROLLER AND THE EXPANSION BOARD ACTIVE?
40025	READ	2	SENSOR HEALTH ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS THE PRESSURE SENSOR HEALTHY?
40026	READ	2	PUMP1 HEALTH ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	HAS P1 FAILED?
40027	READ	2	PUMP2 HEALTH ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	HAS P2 FAILED?
40028	READ	2	COMMON ALARM ALARM STATUS	DISCRETE 1=ACTIVE 0=NOT ACTIVE	COMMON ALARM
40029	READ	2	STABILISED PRESSURE SETPOINT (DEGASSING EQUIPMENT)	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40030	READ	2	PUMP1 ACTIVE FOR TOPUP	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS PUMP1 RUNNING FOR TOPUP?
40031	READ	2	PUMP2 ACTIVE FOR TOPUP	DISCRETE 1=ACTIVE 0=NOT ACTIVE	IS PUMP2 RUNNING FOR TOPUP?

40032	READ	2	STATE CHANGE STRING (MULTIPLE EVENTS IN ONE BINARY STRING)	BIT X=1 ACTIVE BIT=0 NOT ACTIVE BINARY: NNNN NNNN NNNN NNNN
			ALARM TYPE ACTIVE IF BIT =1 ALARM TYPE NOT ACTIVE IF BIT =0	
		BIT 1	COMMUNICATION FAILURE BETWEEN MAIN BOARD AND EXPANSION BOARD	
		BIT 2	PRESSURE SENSOR FAILURE	
		BIT 3	VACUUM SENSOR FAILURE	
		BIT 4	EXCESSIVE DEMAND ALARM	
		BIT 5	FLOOD LIMIT ALARM	
		BIT 6	TIMEOUT (DEGASSING ALARM ON VALVE TIME)	
		BIT 7	FILL NOT ACHIEVED IN 24 HOURS	
		BIT 8	HIGH PRESSURE ALARM	
		BIT 9	LOW PRESSURE ALARM	
		BIT 10	TOPUP PUMP1 FAILURE	
		BIT 11	TOPUP PUMP2 FAILURE	
		BIT 12	INSUFFICIENT VACUUM ALARM	
		BIT 13	DEGASSING PUMP FAIL	
		BIT 14	VACUUM CYLINDER HIGH PRESSURE ALARM	
		BIT 15	TIMEOUT (DEGASSING ALARM ON PUMP TIME)	
		BIT 16	LOW ADDITIVE ALARM	

40051	READ/WRITE	2	LANGUAGE FOR MENU AND MESSAGES	DISCRETE 3=E 4=I 5=DE 6=F 7=NE	E ENGLISH F FRENCH DE GERMAN NE DUTCH I ITALIAN
40052	READ/WRITE	2	TOPUP ACTION ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	IS UNIT SET TO TOPUP MODE (TOPUP PRIORITY)?
40053	READ/WRITE	2	LOW PRESSURE ALARM SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40054	READ/WRITE	2	LOW PRESSURE WARNING SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40055	READ/WRITE	2	DIFFERENTIAL PRESSURE SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40056	READ/WRITE	2	TOPUP SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40057	READ/WRITE	2	HIGH PRESSURE WARNING SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40058	READ/WRITE	2	HIGH PRESSURE ALARM SETPOINT	ANALOG	DECIMAL OF BAR (GAUGE)
40059	READ/WRITE	2	FLOOD LIMIT TIMER THRESHOLD	ANALOG	MINUTES
40060	READ/WRITE	2	EXCESSIVE START FREQUENCY	ANALOG	REQUIRED NUMBER OF STARTS IN (TIME) TO TRIGGER AN ALARM AND CRITICAL STOP
40061	READ/WRITE	2	EXCESSIVE START TIMEFRAME	ANALOG	HOURS (ZERO DISABLES THE FUNCTION)
40062	READ/WRITE	2	PHYSICAL NUMBER OF PUMPS		UNIT CONFIGURATION
40063	READ/WRITE	2	PUMP TYPE	DISCRETE 8=C 9=P 10=R	8 CENTRIFUGAL 9 PISTON 10 RELAY
40064	READ/WRITE	2	PUMP MINIMUM CURRENT (ALARM SETTING)	ANALOG	HUNDRED OF MA
40065	READ/WRITE	2	CURRENT SENSE ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40066	READ/WRITE	2	PERIODIC PULSE ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION

40067	READ/WRITE	2	SENSOR MAXIMUM PRESSURE RATING	ANALOG	DECIMAL OF BAR (GAUGE)
40068	READ/WRITE	2	SENSOR MINIMUM VOLTAGE	ANALOG	DECIMAL OF VOLTS (SET TO 2)
40069	READ/WRITE	2	SENSOR MAXIMUM VOLTAGE	ANALOG	DECIMAL OF VOLTS (SET TO 10)
40070	READ/WRITE	2	SLAVE UNIT ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40071	READ/WRITE	2	ADDITIVE UNIT MODE ENABLED	DISCRETE 1=PRESENT 0=NOT PRESENT	ZERO DISABLES THE FUNCTION
40072	READ/WRITE	2	OVER RUN TIMER FOR TOPIUP PUMP	ANALOG	SECONDS
40073	READ/WRITE	2	AUTORESET FOR PRESSURE ALARM ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40074	READ/WRITE	2	VFC CONTACT IN FAIL SAFE MODE ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40075	READ/WRITE	2	TANK SOLENOID ENABLED	DISCRETE 1=PRESENT 0=NOT PRESENT	ZERO DISABLES THE FUNCTION
40076	READ/WRITE	2	OVERRUN TIMER FOR TANK SOLENOID	ANALOG	SECONDS
40077	READ/WRITE	2	ZERO START OPTION ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40078	READ/WRITE	2	CASCADE OPTION ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40079	READ/WRITE	2	INITIAL FILL OF SYSTEM ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40080	READ/WRITE	2	DEGASSING OPTION ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	IS UNIT SET TO DEGASSING MODE?
40081	READ/WRITE	2	EXTENDED MODE OPTION ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	IS UNIT CONFIGURED TO WORK WITH THE EXPANSON BOARD?
40082	READ/WRITE	2	EXPANSON BOARD PRESENT?	DISCRETE 1=PRESENT 0=NOT PRESENT	IS UNIT CONFIGURED TO WORK WITH THE EXPANSON BOARD?

40083	READ/WRITE	2	SETPOINT FOR STARTING DEGASSING ACTION	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40084	READ/WRITE	2	SETPOINT FOR ENDING DEGASSING ACTION	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40085	READ/WRITE	2	VACUUM CYLINDER ALARM PRESSURE	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40086	READ/WRITE	2	MAX TIME FOR RECOVERING THE SYSTEM PRESSURE AFTER DEGASSING	ANALOG	MINUTES
40087	READ/WRITE	2	TIME FOR PURGE SEQUENCE (DEGASSING UNIT ONLY)	ANALOG	SECONDS
40088	READ/WRITE	2	OVERRUN AT END OF DEGASSING CYCLE	ANALOG	SECONDS
40089	READ/WRITE	2	TURBO MODE ENABLED (DEGASSING)	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40090	READ/WRITE	2	TIME LIMIT FOR TURBO ACTION	ANALOG	HOURS
40091	READ/WRITE	2	DWELL TIME BETWEEN NORMAL ACTION	ANALOG	MINUTES
40092	READ/WRITE	2	MINIMUM PRESSURE FOR VACUUM SENSOR	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40093	READ/WRITE	2	MAXIMUM PRESSURE FOR VACUUM SENSOR	ANALOG	DECIMAL OF BAR PLUS 10 POINTS (ABSOLUTE)
40094	READ/WRITE	2	MAXIMUM VOLTAGE FOR VACUUM SENSOR	ANALOG	DECIMAL OF VOLTS (SET TO 2)
40095	READ/WRITE	2	MINIMUM VOLTAGE FOR VACUUM SENSOR	ANALOG	DECIMAL OF VOLTS (SET TO 10)
40096	READ/WRITE	2	SERVICE REMINDER MESSAGE ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	ZERO DISABLES THE FUNCTION
40097	READ/WRITE	2	MAXIMUM RUNNING HOURS FOR PUMP1 FOR CHANGE MESSAGE	ANALOG	PUMP1 UPPER LIFE LIMIT
40098	READ/WRITE	2	MAXIMUM RUNNING HOURS FOR PUMP2 FOR CHANGE MESSAGE	ANALOG	PUMP2 UPPER LIFE LIMIT
40099	READ/WRITE	2	ADDRESS OF THE CONTROLLER FOR MODBUS COMMUNICATION	ANALOG	
40100	READ/WRITE	2	REVIEW OF THE LOGS ENABLED	DISCRETE 0=NOT ENABLE 1=ENABLE	

40101	READ	2	NUMBER OF STARTS FOR TOPUP ACTION FOR PUMP1	ANALOG	
40102	READ	2	CUMULATIVE TIME FOR TOPUP ACTION FOR PUMP1	ANALOG	HOURS
40103	READ	2	NUMBER OF STARTS FOR TOPUP ACTION FOR PUMP2	ANALOG	
40104	READ	2	CUMULATIVE TIME FOR TOPUP ACTION FOR PUMP2	ANALOG	HOURS
40105	READ	2	CUMULATIVE TIME FOR TOPUP AND DEGASSING ACTION FOR PUMP1	ANALOG	HOURS
40106	READ	2	CUMULATIVE TIME FOR TOPUP AND DEGASSING ACTION FOR PUMP2	ANALOG	HOURS
40107	READ	2	CUMULATIVE COUNTER OF ALARMS	ANALOG	
40108	READ	2	COUNTER OF POWER LINE INTERRUPTION	ANALOG	
40114	READ	2	FACTORY CALIBRATION VALUE FOR CURRENT SENSING	ANALOG	

BACNET Mapping (Requires Additional TITAN Gateway)

Slave Address	Primary Table	Data Address	Object Name	Object Type	Instance Number	Poll Rate	Notes
1	Holding Register	1	RealTimeSystemPressure	Analog Value	101	10	
1	Holding Register	2	TopUp Setpoint	Analog Value	102	10	
1	Holding Register	3	VacuumSensorPressure	Analog Value	103	10	
1	Holding Register	4	DegassingSetpoint	Analog Value	104	10	
1	Holding Register	5	LiveOperationMode	Binary Value	101	10	
1	Holding Register	6	Pump1Status	Binary Value	102	10	
1	Holding Register	7	Pump2Status	Binary Value	103	10	
1	Holding Register	8	LowWaterInputStatus	Binary Value	104	10	
1	Holding Register	9	HighWaterInputStatus	Binary Value	105	10	
1	Holding Register	10	HighPressureAlarmStatus	Binary Value	106	10	
1	Holding Register	11	HighPressureWarningStatus	Binary Value	107	10	
1	Holding Register	12	LowPressureWarningStatus	Binary Value	108	10	
1	Holding Register	13	LowPressureAlarmStatus	Binary Value	109	10	
1	Holding Register	14	SlamshutSolenoidStatus	Binary Value	110	10	
1	Holding Register	15	PurgeSolenoidStatus	Binary Value	111	10	
1	Holding Register	16	BreakTankStatus	Binary Value	112	10	
1	Holding Register	17	LowAdditiveSwitchStatus	Binary Value	113	10	
1	Holding Register	18	SPC SwitchStatus	Binary Value	114	10	
1	Holding Register	19	LowVacuumSwitchStatus	Binary Value	115	10	
1	Holding Register	20	AuxiliarySwitchStatus	Binary Value	116	10	
1	Holding Register	21	LowAdditiveAlarmStatus	Binary Value	117	10	

1	Holding Register	22	LowWaterAlarmStatus	Binary Value	118	10
1	Holding Register	23	ExpansionBoardPresent	Binary Value	119	10
1	Holding Register	24	StatusCommsControllerToExpansion	Binary Value	120	10
1	Holding Register	25	SensorHealthAlarmStatus	Binary Value	121	10
1	Holding Register	26	Pump1HealthAlarmStatus	Binary Value	122	10
1	Holding Register	27	Pump2HealthAlarmStatus	Binary Value	123	10
1	Holding Register	28	CommonAlarmStatus	Binary Value	124	10
1	Holding Register	29	StabilisedPressureSetpoint	Analog Value	105	10
1	Holding Register	30	Pump1ActiveForTopup	Binary Value	125	10
1	Holding Register	31	Pump2ActiveForTopup	Binary Value	126	10
1	Holding Register	51	Language	Analog Value	106	10
1	Holding Register	52	TopupActionEnabled	Binary Value	127	10
1	Holding Register	53	LowPressureAlarmSetpoint	Analog Value	107	10
1	Holding Register	54	LowPressureWarningSetpoint	Analog Value	108	10
1	Holding Register	55	DifferentialPressureSetpoint	Analog Value	109	10
1	Holding Register	56	TopupSetpoint	Analog Value	110	10
1	Holding Register	57	HighPressureWarningSetpoint	Analog Value	111	10
1	Holding Register	58	HighPressureAlarmSetpoint	Analog Value	112	10
1	Holding Register	59	FloodLimitTimerThreshold	Analog Value	113	10
1	Holding Register	60	ExcessiveStartFrequency	Analog Value	114	10
1	Holding Register	61	ExcessiveStartTimeframe	Analog Value	115	10
1	Holding Register	62	PhysicalNumberOfPumps	Analog Value	116	10
1	Holding Register	63	PumpType	Analog Value	117	10
1	Holding Register	64	PumpMinimumCurrent	Analog Value	118	10
1	Holding Register	65	CurrentSenseEnabled	Binary Value	128	10
1	Holding Register	66	PeriodicPulseEnabled	Binary Value	129	10
1	Holding Register	67	SensorMaxPressureReading	Analog Value	119	10
1	Holding Register	68	SensorMinVoltage	Analog Value	120	10
1	Holding Register	69	SensorMaxVoltage	Analog Value	121	10
1	Holding Register	70	SlaveUnitEnabled	Binary Value	130	10

1	Holding Register	71	AdditiveUnitModeEnabled	Binary Value	132	10
1	Holding Register	72	OverrunTimerTopupPump	Analog Value	122	10
1	Holding Register	73	AutoresetPressureAlarm	Binary Value	133	10
1	Holding Register	74	VFC ContactFailSafeMode	Binary Value	134	10
1	Holding Register	75	TankSolenoidEnabled	Binary Value	135	10
1	Holding Register	76	OverrunTimeTankSolenoid	Analog Value	123	10
1	Holding Register	77	ZeroStartOptionEnabled	Binary Value	136	10
1	Holding Register	78	CascadeOptionEnable	Binary Value	137	10
1	Holding Register	79	InitialFillSystemEnabled	Binary Value	138	10
1	Holding Register	80	DegassingOptionEnabled	Binary Value	139	10
1	Holding Register	81	ExtendedModeOptionEnabled	Binary Value	140	10
1	Holding Register	82	Expansion BoardPresent2	Binary Value	141	10
1	Holding Register	83	SPStartDegassingAction	Analog Value	124	10
1	Holding Register	84	SPEndDegassingAction	Analog Value	125	10
1	Holding Register	85	VacuumCylinderAlarmPressure	Analog Value	126	10
1	Holding Register	86	MaxTimeRecoveringAfterDegas	Analog Value	127	10
1	Holding Register	87	TimePurgeSequence	Analog Value	128	10
1	Holding Register	88	OverrunAtEndOfDegassing	Analog Value	129	10
1	Holding Register	89	TurboModeEnabled	Binary Value	142	10
1	Holding Register	90	TimelimitForTurboAction	Analog Value	130	10
1	Holding Register	91	DwellTimeBetweenNormAction	Analog Value	131	10
1	Holding Register	92	MinPressureVacuumSensor	Analog Value	132	10
1	Holding Register	93	MaxPressureVacuumSensor	Analog Value	134	10
1	Holding Register	94	MinVoltageVacuumSensor	Analog Value	135	10
1	Holding Register	95	MaxVoltageVacuumSensor	Analog Value	136	10
1	Holding Register	96	ServiceReminder	Binary Value	143	10
1	Holding Register	97	MaxRunHoursPump1	Analog Value	137	10
1	Holding Register	98	MaxRunHoursPump2	Analog Value	138	10
1	Holding Register	99	AddressOfControllerModbus	Analog Value	139	10
1	Holding Register	100	ReviewOfLogsEnabled	Binary Value	144	10

1	Holding Register	101	NumStartsTopupActPump1	Analog Value	140	10
1	Holding Register	102	CumulativeTimeTopupActPump1	Analog Value	141	10
1	Holding Register	103	NumStartsTopupActPump2	Analog Value	142	10
1	Holding Register	104	CumulativeTimeTopupActPump2	Analog Value	143	10
1	Holding Register	105	CumulativeTimeTopupDegasPump1	Analog Value	144	10
1	Holding Register	106	CumulativeTimeTopupDegasPump2	Analog Value	145	10
1	Holding Register	107	CumulativeCounterAlarms	Analog Value	146	10
1	Holding Register	108	CounterOffPowerLineInterrupt	Analog Value	147	10
1	Holding Register	114	FactoryCalValCurrentSensing	Analog Value	148	10

Troubleshooting

If for any reason the pressurisation unit does not seem to be functioning correctly, please refer to the table below for a list of solutions to known problems.



If the pressurisation unit is showing a fault code on the display, holding down the [SET] button will cause the current system pressure to be temporarily shown on the display.

Symptom	Problem	Solution
LOW PRESSURE fault is displayed and the pumps do not run	The internal isolation valve within the unit is closed	Open the internal isolation valve
	The system pressure has fallen below the LOW PRESSURE set point	Increase system pressure using a filling loop, or enable the SYSTEM FILL option
	The SPC CONTROLLER option is enabled	Disable the SPC CONTROLLER option
	The LOW PRESSURE set point is too high	Review the system specifications
HIGH PRESSURE fault is displayed	The internal isolation valve within the unit is closed	Open the internal isolation valve
	The system pressure has risen above the HIGH PRESSURE set point	Decrease system pressure using a suitable drain point
	The expansion vessel has failed or lost its pre-charge	Check the expansion vessel pre-charge and re-charge if necessary
	The expansion vessel is undersized	Review the expansion vessel selection
	The HIGH PRESSURE set point is too low	Review the system specifications
FLOOD LIMIT is displayed	A large amount of water has been lost from the system	Investigate cause
	The relevant pump is air-locked and not pumping water	Bleed the pump
	The unit is undersized for the system	Review unit selection
	The FLOOD LIMIT time is too short.	Consult Armstrong

Symptom	Problem	Solution
Pump1 and/or Pump2 Failure is displayed	The PUMP TYPE option is set incorrectly.	Review PUMP TYPE setting
	The relevant pump has failed	Replace pump
Pump2 Failure is displayed but the unit is a single pump model	The PUMPS NUMBER option is incorrectly set to 2	Set PUMPS NUMBER to 1
LOW H2O fault is displayed	The mains water supply to the unit has been isolated	Turn on the mains water supply
	The mains pressure is poor	The fault will clear once the break tank has been re-filled
	A non-standard electrical connection has been made into terminals 19 & 20	Remove all non-standard electrical connections
	The low water float switch has failed	Replace low water float switch
	The digital controller has failed	Replace digital controller
HIGH H2O fault is displayed	A non-standard electrical connection has been made into terminals 21 & 22	Remove all non-standard electrical connections
	The digital controller has failed	Replace digital controller
Pressure reading does not match actual system pressure.	The internal isolation valve within the unit is closed	Open the internal isolation valve
	The SENSOR TYPE option is set incorrectly	Review SENSOR TYPE setting
	A non-return valve has been installed between the unit and the system	Remove non-return valve
	The pressure sensor has failed	Replace pressure sensor
Pump runs but does not make up pressure	The pump is air-locked and not pumping water	Bleed the pump
The pump is persistently becoming air-locked	The wrong/no flow restrictor is installed in the float valve (mini and midi units only)	Check float valve flow restrictor selection (mini and midi units only)
Hw Communication Error	Communication between controller and expansion board not registering	Check wiring between DATA & CLOCK
Pressure Sensor Fail	System pressure not registering correctly	Check voltage between 24 & 22
	System pressure showing higher pressure than installation pressure	Check settings
Degas Sensor Fail	Cylinder pressure not detected	Check voltage between VACUUM SENSOR com & 12V
	Cylinder pressure showing higher pressure than should be	Check settings

Symptom	Problem	Solution
The break tank is overflowing and discharging water to drain or over the weir	The wrong/no flow restrictor is installed in the float valve (mini and midi units only)	Check float valve flow restrictor selection (mini and midi units only)
	The float valve position is set incorrectly	Set the float valve to its lowest possible position
	The float valve has failed	Replace float valve
	A pump non-return valve has failed	Replace non-return valve
The pump is repeatedly running in short bursts	The internal isolation valve within the unit is partially closed	Fully open the internal isolation valve
	The restriction in the connecting pipe work is too great	Increase bore/ reduce number of bends/ reduce length of connecting pipe work
	A pump non-return valve has failed	Replace non-return valve
	The expansion vessel has failed or lost its pre-charge	Check the expansion vessel pre-charge and re-charge if necessary
	The point of connection of the unit is too far away from the expansion vessel	Move unit/expansion vessel connection points closer together.
The buttons on the digital controller do not respond	The plastic housing of the digital controller has come apart and the PCB has moved	Reassemble the digital controller housing and ensure that the PCB is properly seated
The digital controller parameters are being corrupted	The controller is being subject to power spikes	Fit a suitable power filter
The digital controller does not power up when the unit is switched on	The fuse has blown	Replace the fuse
	The mains power supply is at an incorrect voltage or frequency	Check mains power supply
	The 12V transformer has failed	Replace Transformer
	The digital controller has failed	Replace digital controller
SERVICE is displayed on the screen	The unit is due an annual service	Contact service engineer

Symptom	Problem	Solution
Vac Cylinder High Pressure	The internal pressure within the vacuum cylinder has reached the high pressure alarm limit, probably due to the pressure reducing valve being contaminated with debris.	The safety solenoid valve will automatically close and the system will attempt to self-reset during the next degassing cycle. Repeated High pressure alarms will require the pressure reducing valve to be inspected and cleaned.
Insufficient Vacuum	The Vacuum cylinder is full of air and the low-level switch is stopping further pump activation to prevent the pump(s) running dry. There is an air leak on the cylinder, the bypass solenoid is contaminated with debris or the air intake preventer is contaminated with debris	Clean the air intake preventer, and test the unit. If this fails then check the bypass solenoid and pipework for contamination. Finally replacing the automatic air vent assembly is the best course of action.
Stabilization Timeout	The vacuum cylinder has not been able to return to the start pressure in the allotted time	Check the bypass solenoid valve is not blocked (1 mm bypass hole), replace if required. Check the setting on the pressure reducing valve and the internal filter of the pressure reducing valve.
Stabilization Timeout	The required vacuum has not been generated in the allotted time	Check the pump operation and that the system pressure is within the operational pressures of the equipment. Replace the Pump as required. Check the bypass solenoid is functioning correctly and closing after the purge cycle.
All Pumps Failure	Pumps have failed and not making up pressure	Replace pump
	The PUMP TYPE option is set incorrectly.	Review PUMP TYPE setting
	The relevant pump has failed	Replace pump
Maintain Pump1	Pump are at an end of the lifetime usage and need replacing	Replace pump
Maintain Pump2		

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For further information on the 3760 Pressurisation unit range
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