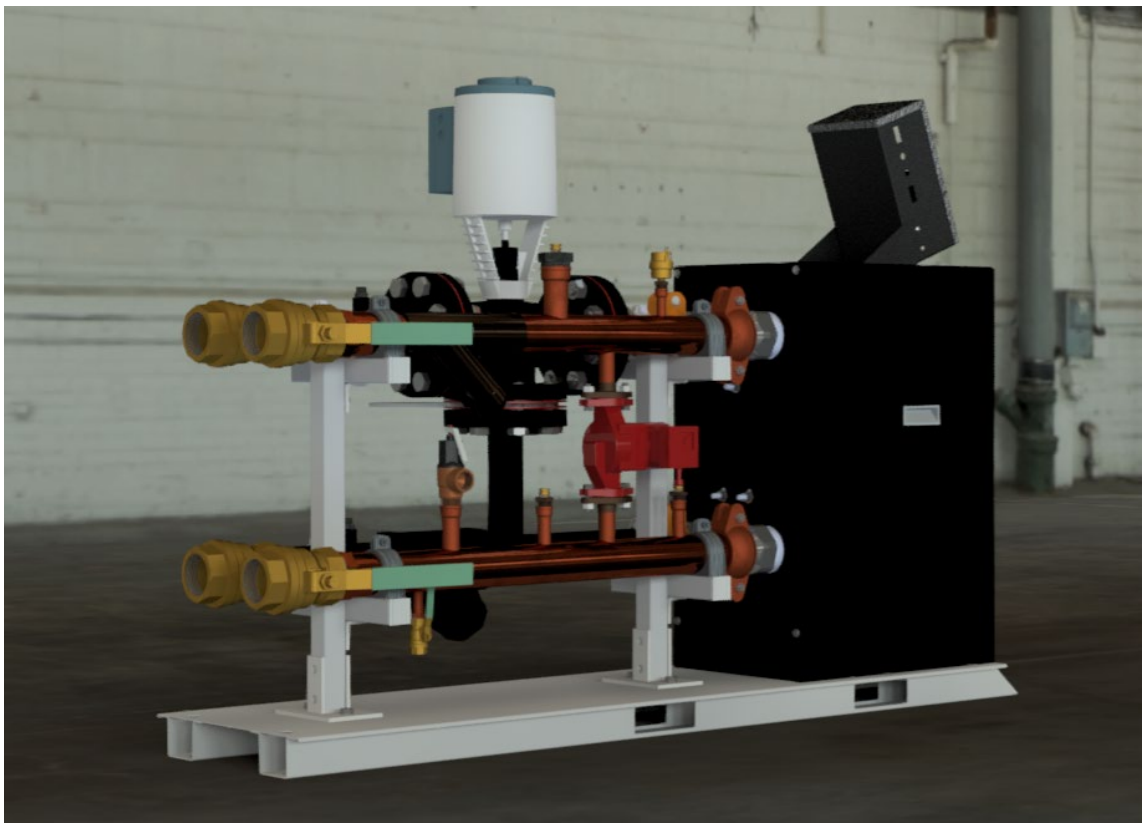
DynaFLO Series

Installation and Service Manual

Indirect Domestic Hot Water Heater
Models DOWB-1 thru DOWB-9



Certified to NSF/ANSI 372

H HLW

WARNING
If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.
WHAT TO DO IF YOU SMELL GAS
• Do not try to light any appliance, • Do not touch any electrical switch; do not use any phone in your building, • Immediately call your gas supplier from a neighbour's phone. Follow the gas supplier's instructions, • If you cannot reach your gas supplier, call the fire department. **A Qualified installer, service agency or the gas supplier must perform installation and service.**
WARNING
Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other appliance.
TO THE INSTALLER: After installation, these instructions must be given to the end user or left on or near the appliance. **TO THE END USER:** This booklet contains important information about this appliance. Retain for future reference.

Contents

Part 1 - General Information

1.1 – Special Instructions to Owner

This manual supplies information for the installation, operation and servicing of the appliance. It is strongly recommended that this manual be reviewed completely before proceeding with an installation.

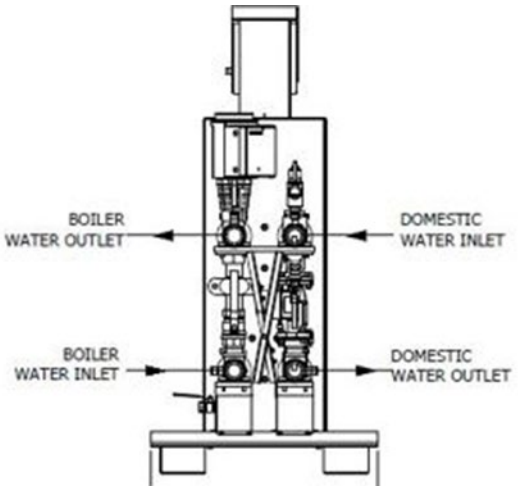
NOTE: RETAIN THIS MANUAL FOR FUTURE REFERENCE
WARNING
IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE can cause injury or property damage. Refer to this manual. For additional information, consult a qualified installer, service agency or gas supplier.
DO NOT
Do not use this appliance if any part of it has been **under water**. The possible damage to a flooded appliance can be extensive and present numerous safety hazards. Any appliance that has been **under water** must be replaced.
DO NOT
Do not turn this appliance on unless the pipes are filled with water, failure to do so will damage the circulator pump.
IMPORTANT
Consult and follow local Building and Fire Regulations and other Safety Codes that apply to this installation. Contact the local gas utility company to authorize and inspect all gas and flue connections. **Installation and service must be performed by CAMUS qualified factory trained service technicians.** Boilers and water heaters are heat producing appliances. To avoid damage or injury, do not store materials against the appliance or the vent-air intake system. Use proper care to avoid unnecessary contact (especially children) with the appliance and vent-air intake components. Never cover your appliance, lean anything against it, store trash or debris near it, stand on it or in any way block the flow of fresh air to your appliance. **UNDER NO CIRCUMSTANCES** may flammable materials such as gasoline or paint thinner be used or stored in the vicinity of this appliance, vent-air intake system or any location from which fumes could reach the appliance or vent-air intake system.
TO: Owners, Operators and/or Maintenance Personnel
This operating manual presents information that will help to properly operate and care for the equipment. Study its contents carefully. The unit will provide good service and continued operation if proper operating and maintenance instructions are followed. No attempt should be made to operate the unit until the principles of operation and all of the components are thoroughly understood. It is the responsibility of the owner to provide training and advice in all aspects of safety not only to his or her personnel, but to any contractors' personnel who will be servicing, repairing, or operating the equipment. CAMUS equipment is designed and engineered to give long life and excellent service on the job. The electrical and mechanical devices supplied as part of the unit were chosen because of their known ability to perform; however, proper operating techniques and maintenance procedures must be followed at all times. Any “automatic” features included in the design do not relieve the attendant of any responsibility. Such features merely eliminate certain repetitive chores, allowing more time for the proper upkeep of equipment. It is solely the operator’s responsibility to properly operate and maintain the equipment. No amount of written instructions can replace intelligent thinking and reasoning and this manual is not intended to relieve the operating personnel of the responsibility for proper operation. On the other hand, a thorough understanding of this manual is required before attempting to operate, maintain, service, or repair this equipment. Operating controls will normally function for long periods of time and we have found that some operators become lax in their daily or monthly testing, assuming that normal operation will continue indefinitely. Malfunctions of controls lead to uneconomical operation and damage and, in most cases, these conditions can be traced directly to carelessness and deficiencies in testing and maintenance. The operation of this equipment by the owner and any operating personnel must comply with all requirements or regulations of the insurance company and/or other authority having jurisdiction. In the event of any conflict or inconsistency between such requirements and the warnings or instructions contained herein, please contact CAMUS before proceeding.

1.2 – Product Overview

DynaFLO is a prefabricated product mounted on a skid that provides controlled heat exchange between a boiler loop and a DHW (domestic hot water) loop. Heat is extracted from the boiler loop and through a very compact and efficient stainless steel brazed plate heat exchanger is transferred to the cold domestic water supply. Each DynaFLO model has been designed for an application with specific flow and temperature ranges on the DHW side as well as the boiler side.

All DynaFLO models come with a color digital display touch-screen control, DHW outlet temperature transmitter, anti-scaling circulator, isolation valves, drain valves, Victaulic for easy removal of heat exchanger, strainers, lead free pressure relief valve or lead-free temperature and pressure relief valve (Optional), air-vent, high limit switch, and a very precise electro-hydraulic 3-way actuator that can be turned into a 2-way operation. If your DynaFLO model is equipped with the IntelliFLO option your DynaFLO will also have a flowmeter installed on the DHW inlet.

To avoid any confusion throughout this manual, an image labelling each pipe is provided below:



1.3 – Product Ratings

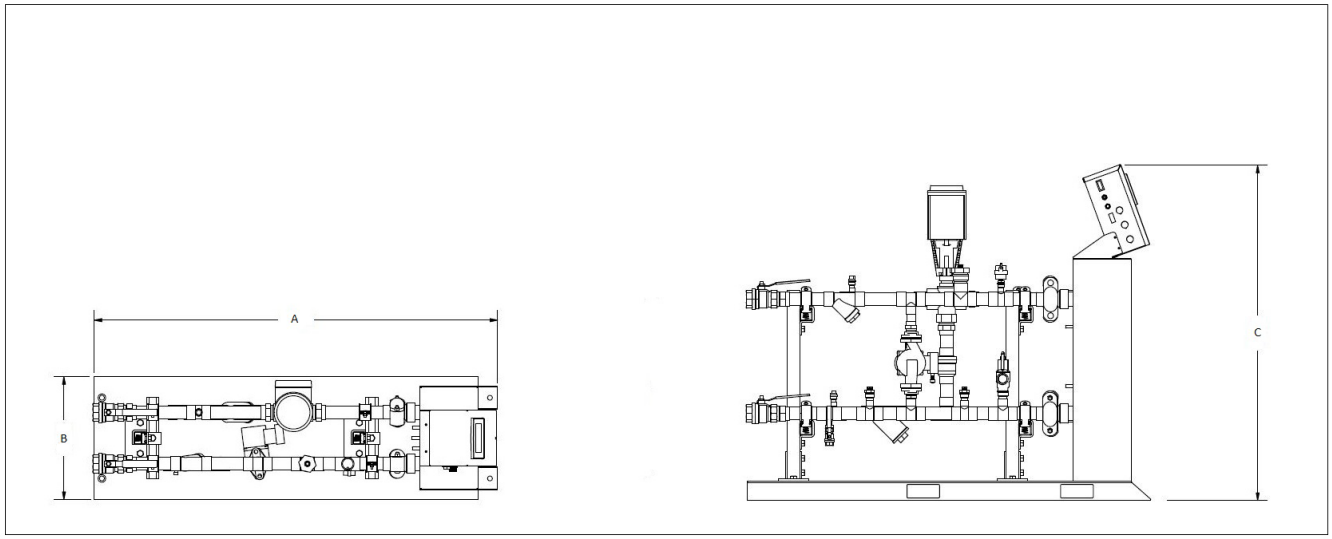
1.3.1 – Capacity Ratings

MAWP, DHW Side [PSI]		MAWP, Boiler Side [PSI]	
All other models	**D3-D9 Stainless Steel #250 option**	**All other models**	**D7-D9 Black Iron**
150	250	160	250

1.3.2 – Electrical Ratings

Voltage	Max. Amp. Draw	Connectivity	Analog Inputs	Analog Outputs	Digital Outputs
110-120V/1/50-60Hz	3 Amps	1 X Modbus RS-485 Port (Port 2 located on PLC) 1 X USB (For Data Logging or Software Updates)	1 X RTD DHW Outlet temperature 1 X 4-20mA Flowmeter (If provided)	1 X 4-20mA Electro Hydraulic Actuator	1 X Remote Alarm/Contact 1 X Alarm Indicator/Lamp

1.3.3 – Dimensions and Connections



Camus Model	A	B	C
S1-S5; D1-D3	52-1/2”	16”	44”
S6; D4-D6	58-1/4”	16”	44”
D7-D9	63.57”	16”	44”

Camus Model	Outlet Connections
DOWB-S1-	1.5" FNPT
DOWB-S2-	1.5" FNPT
DOWB-S3-	2" FNPT
DOWB-S4-	2" FNPT
DOWB-S5-	2" FNPT
DOWB-S6-	2" FNPT

Camus Model	Outlet Connections
DOWB-D1-	1.5" FNPT
DOWB-D2-	1.5" FNPT
DOWB-D3-	2" FNPT
DOWB-D4-	2" FNPT
DOWB-D5-	2" FNPT
DOWB-D6-	2" FNPT
DOWB-D7-	2.5" FNPT
DOWB-D8-	2.5" FNPT
DOWB-D9-	2.5" FNPT

1.4 – Sequence of Operation

1. Power is supplied as per Section 4.2
2. The appliance is filled with water (or a water-glycol mixture) in all pipes and the heat exchanger.
3. The power switch is placed in the “ON” position. 120 VAC power is supplied to the control and actuator transformers. 120 VAC is also applied to the actuator.
4. The circulator installed on the DHW side starts running.
5. The touch-screen digital display mounted on the DynaFLO turns ON.
6. The built-in PID integrated in the control keeps monitoring the DHW outlet temperature and calculates the difference in value between the DHW outlet temperature and the user selected set point. It continuously attempts to achieve a difference of 0 by modulating the electro-hydraulic actuator thereby regulating the amount of heat exchanged in the heat exchanger.

Please refer to Part 5 for more details about operation and configuration of the control.

1.5 – Codes

The equipment shall be installed in accordance with those installation regulations in force in the local area where the installation is to be made. These shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before installations are made. All electrical wiring must be done in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with National Electrical Code, ANSI/NFPA70 and/or the Canadian Electrical Code part 1 CSA C22.1. Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ASME CSD-1.

1.6 – Warranty

- Factory warranty (shipped with unit) does not apply to units improperly installed or improperly operated.
- Factory warranty shall apply only when the appliance is installed in accordance with local plumbing and building codes, ordinances and regulations, the printed instructions provided with it and industry best practices.
- Excessive **water hardness** causing a scale buildup in the stainless steel heat exchanger or pipes is not a fault of the appliance and is not covered by warranty. Consult the factory for usage recommendations in hard water areas.
- Using or storing **corrosive chemicals** in the vicinity of this appliance can rapidly attack the stainless steel tubes and coils and voids warranty.
- Damage caused by **freezing or dry firing** voids warranty.
- The manufacturer shall **NOT** be held liable for any personal injury or property damage due to condensation of any exterior part of the appliance including pipes.

Part 2 – Installation

2.1 – Checking the Equipment

Check for signs of shipping damage upon receiving equipment. Pay particular attention to parts accompanying the appliance, which may show signs of being hit or otherwise being mishandled. Verify total number of pieces shown on packing slip with those actually received. In case there is damage or a shortage, immediately notify carrier.

2.2 – Mechanical Environment

Install this appliance in a clean, dry location with adequate air supply.

The mechanical room MUST NOT be used to store corrosive or flammable chemicals, such as gasoline or paint thinner. Such chemicals must not be stored in the vicinity of this appliance. Chillers or other equipment utilizing refrigerant should also not be installed in the same mechanical room as fuel burning appliances.

2.3 – Locating the Equipment

The appliance should be located close to a floor drain in an area where leakage from the appliance or connections will not result in damage to the adjacent area or to lower floors in the structure. Under no circumstances is the manufacturer to be held responsible for water damage in connection with this unit, or any of its components.

2.4 – Clearances

This appliance is suitable for installation with minimum clearances to combustibles as follows:

Table 1: Clearances From Combustibles

Clearances, All Models	
Top	12" (30cm)
Sides	12" (30cm)
Rear	12" (30cm)

Part 3 – Heat Exchanger

3.1 – Overview

The heat exchanger installed in the DynaFLO is a very compact assembly composed of stainless steel plate packs sealed together by means of brazing metal (Copper) along the border of the units. This eliminates the need for traditional gaskets or external pressure retaining parts. All of the heat exchangers used in DynaFLO models are ASME certified, have CRN and are NSF 372 certified. The plate packs making up the heat exchanger have special corrugation patterns that promote turbulent flow which in turn dramatically increases rate of heat transfer. Regular maintenance and cleaning of the heat exchangers are required. The manufacturer is not responsible for damages caused by lack of cleaning and maintenance of the heat exchanger. This appliance is equipped with victaulics on all

connection points to the heat exchanger for easy removal of the heat exchanger for maintenance and cleaning.

3.2 – Double Wall Models

The design of the double wall brazed plate heat exchanger prevents cross contamination of fluid streams if there is an internal leak within the fluid. Two stainless steel plate walls separate the fluid streams, with an air gap in between. In the event of a leak, the affected fluid will flow in the air gap and escape out of the heat exchanger, enabling visual detection of the leak.

The double-wall models are designed to minimize the risk of cross contamination by allowing for visual notice of internal leak(s) – prompting the user to take action before the issue propagates. In the event that a failure is left undetected, and the product not promptly removed from service, the structural integrity of the product may become compromised, resulting in further damage to the product.

The user is responsible for systematic and periodic monitoring of the product to detect potential leaks – failure to do so defeats the purpose of the double-wall design.

3.3 – Cleaning

As previously mentioned, the heat exchangers used in all DynaFLO models have special corrugation patterns that promote turbulent flow. As a result, the heat exchangers operate with high turbulence flow, even at low flow rates. This high turbulence keeps small particles in suspension minimizing fouling and scaling. However, in some applications the fouling tendency can be very high (e.g. using extremely hard water at high temperatures). In such cases, it is always possible to clean the heat exchanger by circulating a cleaning liquid. All DynaFLO models are equipped with Victaulics right downstream of each heat exchanger inlet and outlet connection. The Victaulics allow for easy removal of the heat exchanger for cleaning:

1. Before shutting off the unit close the portion of the boiler loop leading to the boiler side of the DynaFLO while letting the domestic side run for 5 to 10 minutes. This will cause the cold domestic supply to take away any heat left on the boiler side before shutting down.
2. Once the heat exchanger has cooled down, close down the domestic supply to DynaFLO.
3. Turn off the DynaFLO by switching the power button.
4. Drain the unit by using the drain valves provided on DynaFLO.
5. Remove the Victaulics.
6. Remove the heat exchanger shroud
7. Slowly remove the heat exchanger while sliding it on the built-in stool inside the heat exchanger cabinet.
8. Use a tank with a descaling solution that is safe for domestic water applications and is compatible with stainless steel, copper, brass and bronze.
9. Pump the cleaning liquid through the heat exchanger. For optimum cleaning, the cleaning solution flow rate should be a minimum of 1.5 times the normal flow rate, or as per the table below, preferably in a back-flush mode.

Recommended Flow for Effective Back-Flush Mode

Model	Flow (GPM)
Single Wall	
DOWB-S1-	19
DOWB-S2-	20
DOWB-S3-	38
DOWB-S4-	46
DOWB-S5-	53
DOWB-S6-	59
Double Wall	
DOWB-D1-	12
DOWB-D2-	25
DOWB-D3-	31
DOWB-D4-	43
DOWB-D5-	54
DOWB-D6-	63
DOWB-D7-	73
DOWB-D8-	83
DOWB-D9-	92

Note: Flow can deviate from the nominal value on the table

10. After use, do not forget to rinse the heat exchanger carefully with clean water.
11. Only use chemicals which do not attack copper and stainless steel. Consult a cleaning specialist in case of doubt.

Part 4 – Electrical

4.1 – Overview

See Electrical Schematics in Appendix B

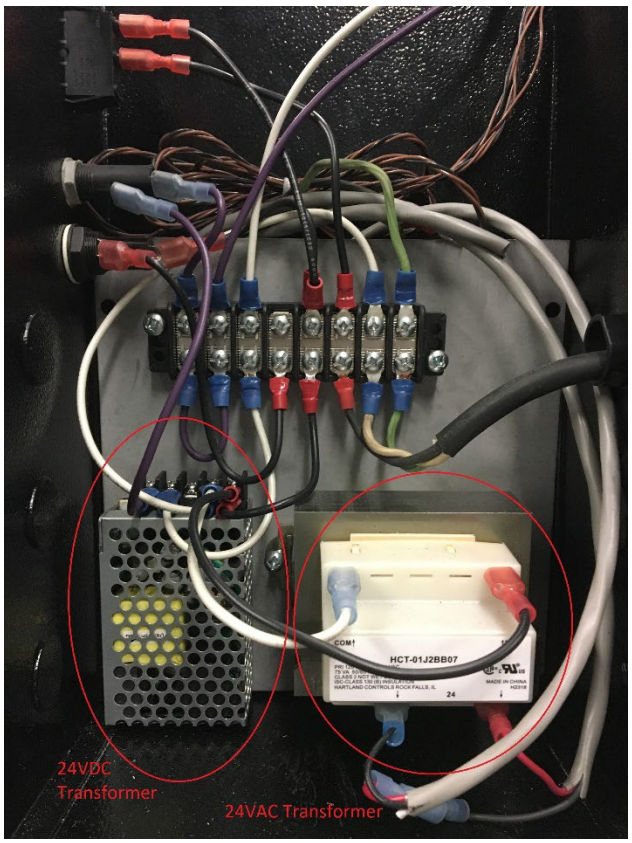
The appliance, when installed, must be electrically grounded in accordance with the requirements of the authority having jurisdiction or in the absence of such requirements, with the latest edition of the National Electrical Code ANSI/NFPA No. 70. When the unit is installed in Canada, it must conform to the Canadian Electrical Code, C22.1, Part 1 and/or local Electrical Codes. All wiring between the appliance and field installed devices shall be made with wire having minimum 220ºF (105ºC) rating. Line voltage wire external to the appliance must be enclosed in approved conduit or approved metal clad cable.

To avoid serious damage, **DO NOT ENERGIZE** the appliance until the pipes are full of water. Ensure that all air is removed from the pump housing and piping before beginning initial operation. Provide the appliance with proper overload protection.

WARNING
THIS PRODUCT MUST BE PROPERLY GROUNDED BEFORE ANY ELECTRIC CURRENT IS APPLIED TO THE BLOWER OR CONTROLS!

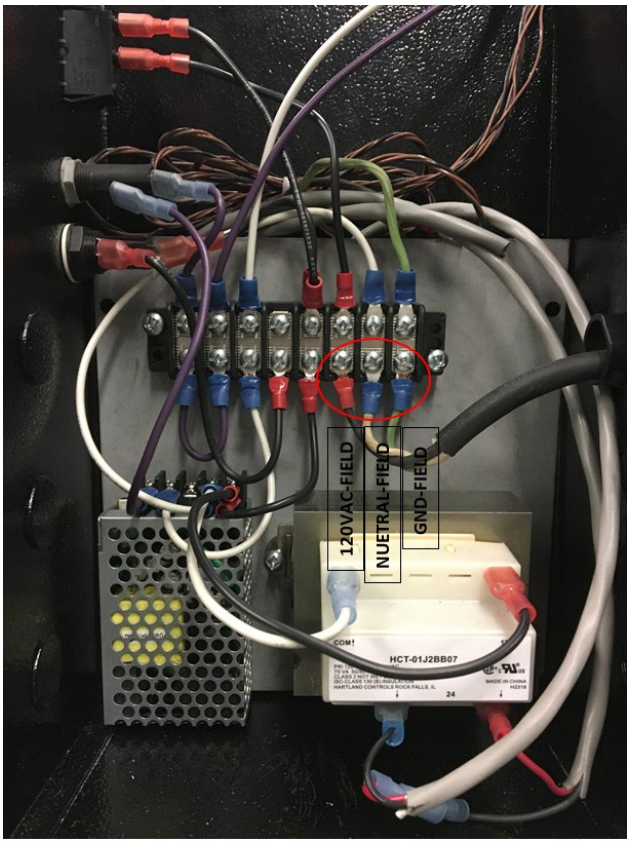
This appliance uses two transformers to supply a low DC voltage circuit for energizing the control as well as a low AC voltage to energize the actuator. The voltage on the secondary side of the DC transformer should be 24 VDC when measured with a voltmeter. The voltage on the secondary side of the AC transformer should be 24 VAC. A 3.3A circuit breaker is provided on the secondary side of the AC transformer. A tripped circuit breaker indicates a short in the 24VAC energizing the actuator and must be corrected.

The 24VDC transformer that energizes the control is located inside the control box on the bottom left. The 24VAC transformer which energizes the actuator is located inside the control box on the bottom right. They can be seen in the image below:



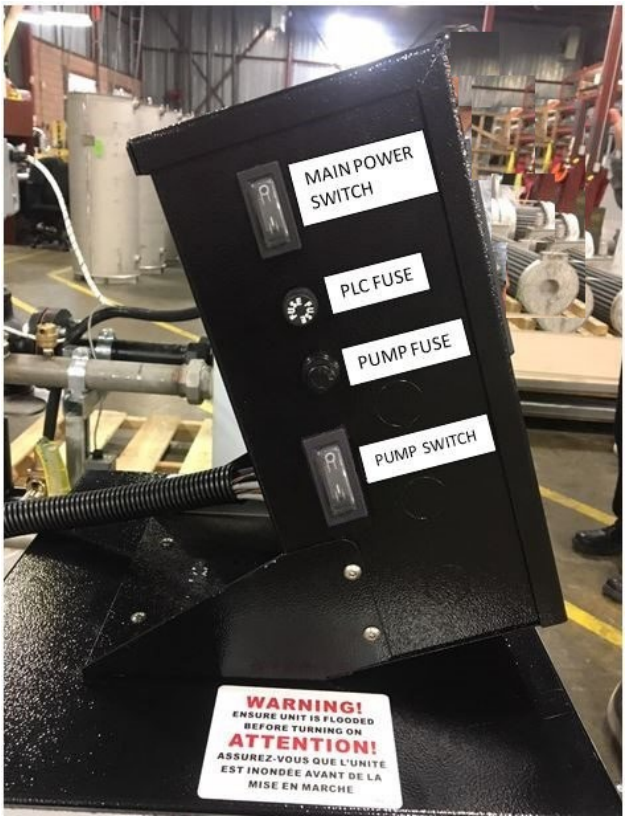
4.2 – Field Power Supply

The main field 120VAC power supply can be inserted through the knock-out holes that are placed on the sides of the control box mounted on top of the heat exchanger cabinet. This connection must be made by a licensed electrician, when the unit is not energized, and in accordance with section 4.1 of this manual. A strain relief should be used. The connections should be made to the terminals that are shown in the image below (the product will have actual labels on the electrical mounting plate):



4.3 – Fuses

The DynaFLO is equipped with two fuses. One is to protect the pump and the other fuse is to protect the controller. These two fuses are shown in the image below. The fuse holder on the top contains a glass cylinder 1Amp fuse that protects the controller. The fuse holder on the bottom contains a bigger glass cylinder fuse that is rated for 2Amps which protects the pump.



4.4 – Digital Output Wiring

The controller mounted on the DynaFLO is equipped with four digital relay outputs. Outputs O0 (Output 0) and O1 (Output 1) are programmed to open and close in relation to alarms. O2 and O3 are to control a DHW and/or a Boiler pump in relation to demand as explained in section 5.2.3.5. These output channels can be located on the bottom of the controller.

O0 is intended to be used for closing a circuit that energizes an alarm lamp or indicator. This contact will continuously open and close if there is an active unacknowledged alarm, remains closed whenever there is an acknowledged active alarm and opens whenever there are no alarms. More details about alarms are explained in section 5.2.2.

O1 on the other side is intended to be used with remote systems such as a BMS (Building Management System), or a building alarm panel as this contact is either continuously ON whenever there is an active alarm (regardless of acknowledged or not) or continuously OFF whenever there are no alarms. This is to protect other contacts or electrical systems that might be present in a remote system circuit.

The electrical specifications of the relays can be seen below:

Digital Outputs

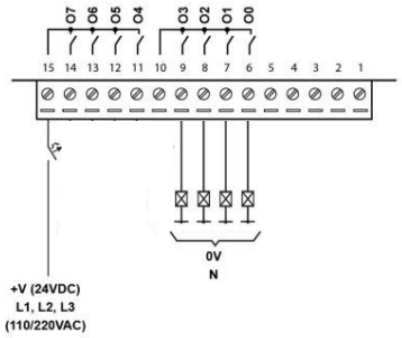
Output type	SPST-NO (Form A)
Isolation	By relay
Type of relay	Tyco PCN-124D3MHZ or compatible
Output current (resistive load)	3A maximum per output 8A maximum total per common
Rated voltage	250VAC / 30VDC
Minimum load	1mA, 5VDC
Life expectancy	100k operations at maximum load
Response time	10ms (typical)
Contact protection	External precautions required (see *Increasing Contact Life Span* in the product's Installation Guide)

Notes:

Outputs 0, 1, 2 and 3 share a common signal.

Depending on the type of load and circuit that O0, O1, O2 and O3 are intended to switch ON and OFF, power up to either 30VDC or 250VAC needs to be provided to terminal 10 as shown in the next figure while conforming to electrical specifications in the above table. More details about the wiring can be seen in Appendix B.

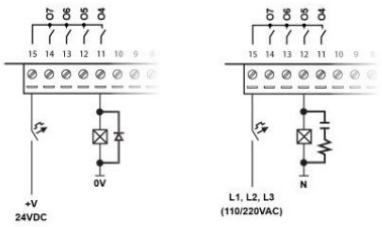
Relay Outputs



Increasing Contact Life Span:

To increase the life span of the relay output contacts and protect the device from potential damage by reverse EMF, connect:

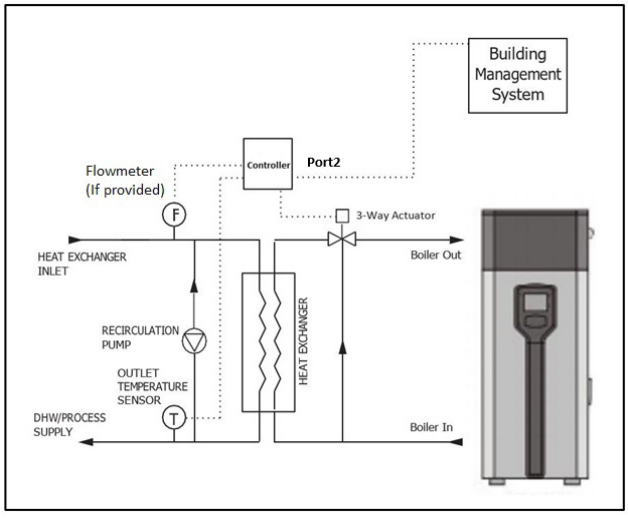
- A clamping diode in parallel with each inductive DC load.
- An RC snubber circuit in parallel with each inductive AC load.



Part 5 – Control

5.1 – Overview

The controller mounted on the DynaFLO is equipped with a 4.3” touch-screen display as well as built-in I/O, networking and data-logging capability. The controller constantly monitors the outlet temperature of the DHW (Domestic Hot Water) side through an accurate 3 wire RTD. Based on the feedback from the outlet RTD it then sends a signal to the 3-way electro-hydraulic actuator that’s on the boiler side to regulate the amount of heat coming through the heat exchanger. The controller does this modulation on a continuous basis based on a PID loop such that the outlet temperature on the DHW side remains within +/-1°F of user-selected set point in steady-state conditions. The PID parameters that define the way the controller modulates are protected by a factory level password. The default parameters have been fine-tuned after extensive testing and it is recommended not to change them. The image below demonstrates the relationship between the controller and other components:



For alarms, the controller also has a digital output (O1) that is programmed to turn ON and stay ON once there is a new alarm, this output could be used for remote operations. The controller also has another digital output (O0) that starts switching ON and OFF once there is a new alarm, this output could be used with a flashing lamp. More details about digital alarm outputs are explained in 5.2.2 and 5.2.3.

The Controller has a Modbus (RS-485) port for communications. Port 2 (shown in the image below) allows communication with a Modbus Master such as a BMS. A Modbus Master can read and write the set point, get alarm notifications and clear alarms, directly control the actuator and etc. More information about the parameters that can be accessed by a Modbus Master is given in section 5.2.1. The Modbus Map table on the following page lists all the parameters that can be accessed by a Modbus Master.

Port 2 is a RJ11 type connection, 6POS2C (A and B signals).

Modbus Map				
Parameter	**Register***	**Traditional Modbus Reference****	**Read/Write**	**Notes**
16 Bit Registers		40010	R	
DHW Out Temp. Read	MI 9			
Set Point Read	MI 97	40005	R	
Actuator Position (%) Read	MI 95	40096	R	
Set point Write	MI 87	60088	W	Only Possible when the control is set to Remote Setpoint
Actuator Position Write (%)	MI 96	60097	W	Only Possible when the control is set to Remote Direct
Memory Bits		10024	R	
Low Temp. Alarm Active Notifier	MB 23			
High Temp. Alarm Active Notifier	MB 26	10027	R	
RTD1 Alarm Active Notifier	MB 29	10029	R	
AI1 Failure Alarm Notifier	MB 35	10036	R	
Low Battery Alarm Notifier	MB 38	10039	R	
One or more Alarms is Active	MB 20	10021	R	
Clear All Pending Alarms and Rescan	MB 19	50020	W	If all conditions for all alarms have been satisfied, this can ACK any pending alarm that is not active anymore. However, this also clears such alarms from alarm history.

WARNING!
MODBUS MASTER SHALL NOT WRITE INTO ANY REGISTER THAT IS NOT INCLUDED IN THE ABOVE TABLE!

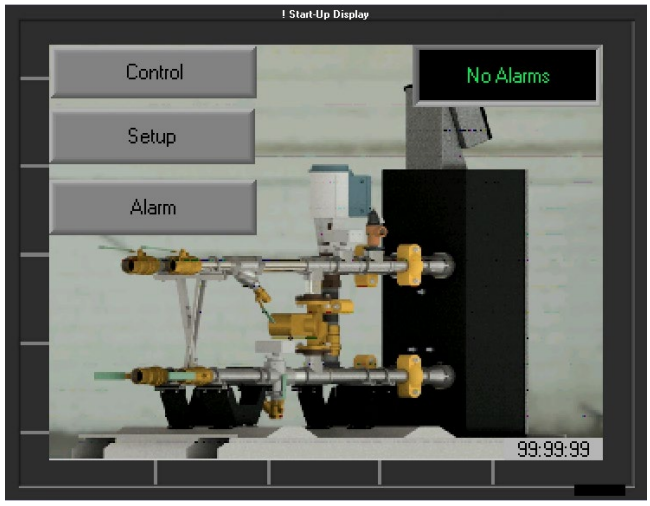
* Note: DynaFLO's PLC's Registers are 0-based thereby for e.g. MI0 = Modbus 40001 (Unless the Modbus software also uses its own offset in which case the specific software has to be consulted.)

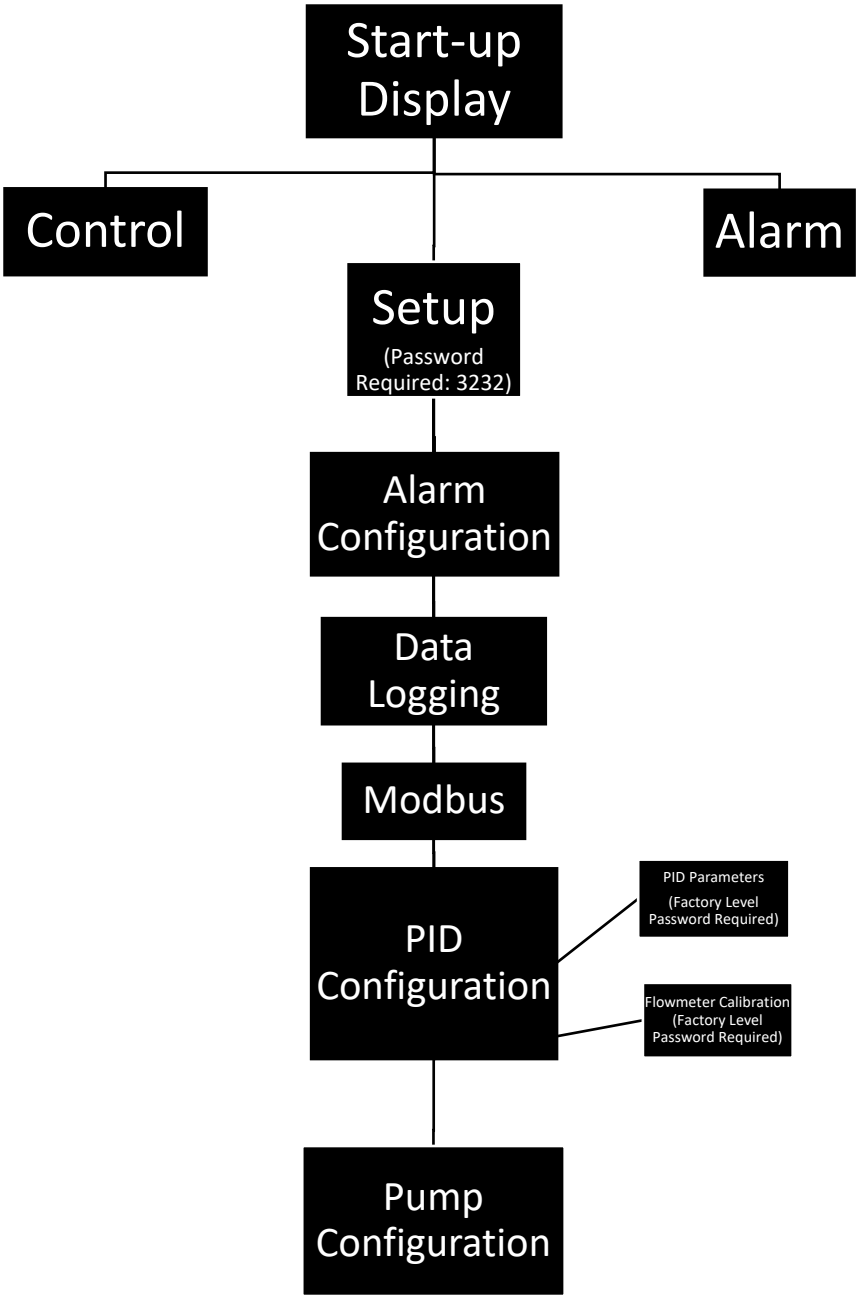
** Note: These commands are for reference only as each Modbus software has a different interface with different options and ways of converting commands.

5.2 – Screen Navigation

The chart below shows the controller's menu structure.
The start-up screen lists three options, <Control>, <Setup> and <Alarm>. Each option is explained in the next section. On the top right there is a display that indicates that status of alarms.

The controller uses a two-tiered password protection scheme. The low level password is needed to access the Setup menu. The higher level password is needed for configuring the P, I and D parameters as these parameters are no recommended to be changed.




Start-up Display
Control
Alarm
Setup
(Password Required: 3232)
Alarm Configuration
Data Logging
Modbus
PID Configuration
PID Parameters
(Factory Level Password Required)
Flowmeter Calibration
(Factory Level Password Required)
Pump Configuration

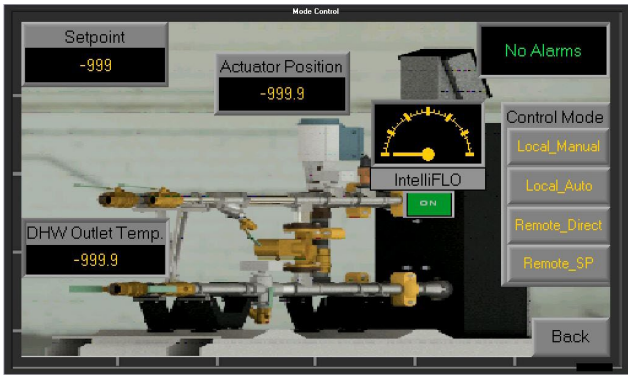
5.2.1 – <Control>

In the Control screen all the necessary information about the instantaneous performance of DynaFLO can be viewed. <DHW Outlet Temp.> displays the reading from the RTD sensor mounted on the outlet (bottom pipe) of the DHW side of DynaFLO. <Setpoint> is a touch-screen display that shows the current user-selectable setpoint which could be changed by just touching it. This setpoint sets the target temperature of the DHW outlet. The control will modulate the actuator to regulate the amount of heat that is allowed to enter the heat exchanger in order to always keep the DHW outlet temperature within +/-1°F in steady-state.

NOTE

IF THE CONTROL IS SET TO OPERATE IN ANY <Remote> MODE <Setpoint> CANNOT BE CHANGED FROM THE SCREEN.

When the control is in <Remote_Direct> or <Remote_SP> mode, the setpoint can only be changed by sending a Modbus command from a master. The <Actuator Position> displays the position of the three-way electro-hydraulic actuator mounted on the boiler side of the DynaFLO. This position is displayed in percentage. 100% means the actuator is fully open, 0% means the actuator is closed and the heat exchanger is bypassed. This display is greyed out in all modes except in <Local_Manual>. As mentioned before, the PID loop keeps comparing the outlet temperature to the target setpoint, and it outputs a signal to the actuator correspondingly. However, when in <Local_Manual> the automatic function of the built-in PID is bypassed and user can manually control the position of the actuator. In that case the <Actuator Position> display stops being greyed out to indicate that the actuator is not being controlled by the local built-in PID. In that case the user can insert the position by simply touching the <Actuator Position> display.



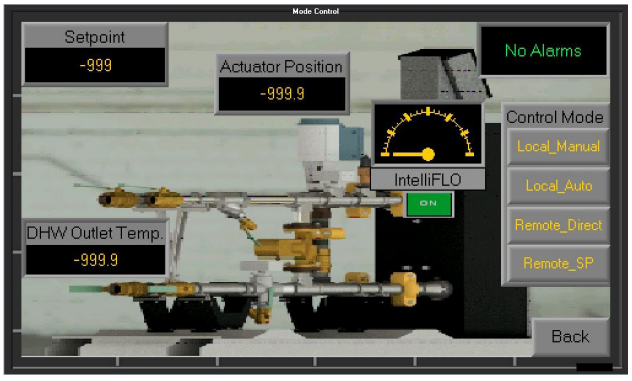
On the right hand side under “Control Mode” there are four options. The four options are generally distinguished by whether the performance is controlled locally by the PLC or remotely through Modbus. When control is in <Local_Manual> or <Local_Auto> important parameters vital to maintaining the target DHW outlet temperature such as PID, setpoint and actuator’s position can be configured locally from the touch-screen. However when <Remote_Direct> or <Remote_SP> is selected, those parameters can only be configured by sending Modbus commands.

The first option, <Local_Manual> as mentioned bypasses the local built in PID and makes the <Actuator Position> display touch accessible such that the user can control the actuator by inserting the position into this display. This could become useful in calibrating or troubleshooting the actuator.

<Local_Auto> will disable the touch accessibility of the <Actuator Position> (display becomes greyed out). In this case the local built-in PID controls the actuator position and <Actuator Position> just displays the current position of the actuator that is being changed by the built-in PID on the control. The performance of the built in PID is controlled by <P> for proportional, <I> for integration, and <D> for derivative that are located in < PID Parameters> in <PID Configuration> in <Setup>. However access to these parameters is only available with a factory level password as these parameters are not recommended to change.

<Remote_Setpoint> is similar to <Local_Auto> in a sense that the local built-in PID integrated in the control operates the actuator position and thereby maintaining the target outlet temperature. While the local PID on the control is being used, the <Setpoint> becomes greyed out since it is configured by a Modbus command sent from a Modbus Master.

The alarm indicator display located on the top right corner of the screen indicates the status of alarms. If there is an active alarm that is not yet acknowledged, the display shows <Unack’d Alarm>. In this case going to the <Alarm> screen located on the Start-Up display shows the details of active alarms at which point they could become acknowledged. More details regarding alarms are explained in the next section. If active alarms are acknowledged the alarm indicator displays <Ack’d Alarm>, if there are no active alarms the indicator displays <No Alarms>.

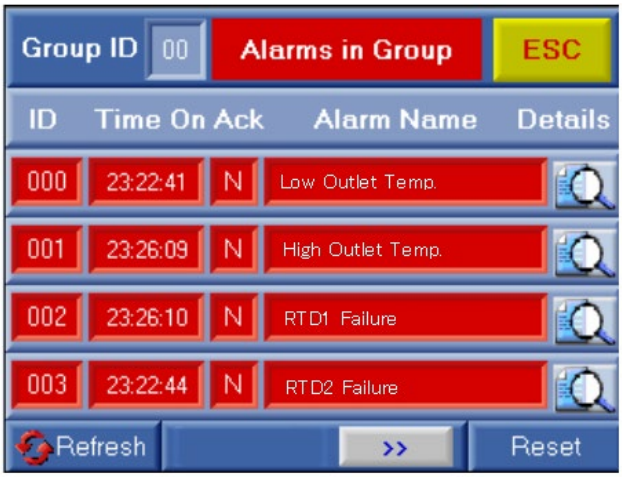


5.2.2 – <Alarm>

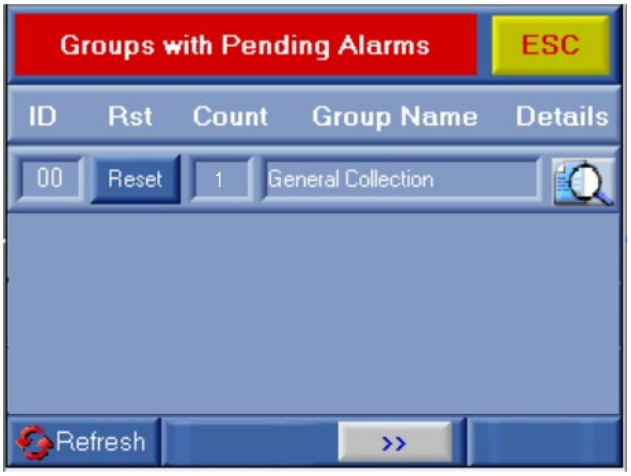
The <Alarm> screen displays active alarms, regardless of whether they are acknowledged yet or not. Details about each specific active alarm is shown in the “Alarm Details” screen, details such as name of the alarm, priority level, time of trigger and whether the alarm is acknowledged or not. Unacknowledged alarms will appear with an “Ack” button on the bottom left corner of the screen. Pressing the

"Ack" button will acknowledge the alarm. Pressing "ESC" takes the user through two more screens, namely "Alarms in Group" and "Groups with Pending Alarms".

"Alarms in Group" lists a summary of all the alarms active in DynaFLO in one page, if there is more than one active alarm. However this page does not go into as much detail for each alarm as "Alarm Details" page.



"Groups with Pending Alarms" would show all the groups of alarms that have an active alarm, however in DynaFLO all alarms are under Group 00 and therefore this alarm page will always only list Group 00 if there is ever an active alarm.



Pressing the "ESC" button one more time from here will then take the user back to the Start-Up screen.

Alternatively through the registers listed in Modbus Map table in section 5.1, a Modbus Master Is notified about each specific alarm in the group that is triggered. The Modbus Master is also notified if in general there is one or more active alarms. The Modbus Master can also ACK and Clear all alarms provided that all the conditions of triggering the alarms are satisfied. If not satisfied, even if Modbus Master acknowledges and clears the alarms, the alarms show up again instantaneously since the condition that triggered them is not yet satisfied. It should be noted that if Modbus Master acknowledges and clears alarms, alarms are also cleared from the <Alarm History> which is explained in the next section. The corresponding registers relating to alarms are tabulated in the Modbus Map table in section 5.1.

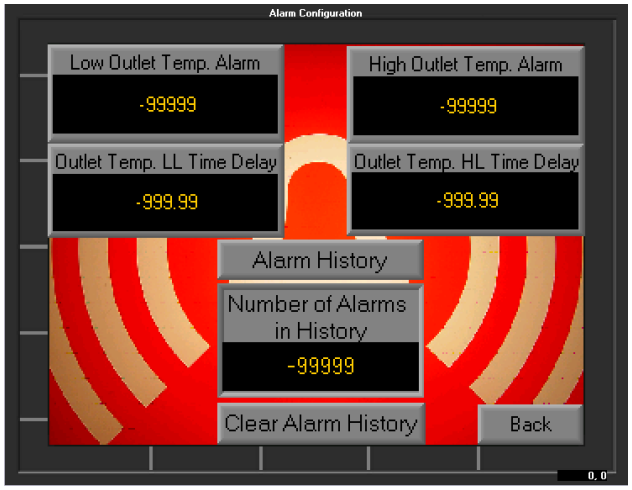
As mentioned in section 4.4, two digital outputs are associated with alarms, O0 and O1. Whenever there is an active alarm, regardless of the alarm acknowledged or not, O1 will come on and it will stay on for as long as the new alarm remains active even if it becomes acknowledged, O1 will go off when alarm is satisfied. This digital output is suitable for use with remote systems such as a BMS (Building Management System) or with a building alarm panel, buzzers or etc. O0 however will switch between ON and OFF whenever there is a new unacknowledged alarm. And once the alarm is acknowledged it turns to a solid ON. And once the alarm is satisfied it will go OFF. This output is therefore recommended for connecting to an alarm light to follow the sequence that was just described. The electrical wiring of these two digital outputs is explained in section 4.4 and in Appendix B.

5.2.3 – <Setup> (Installer Level Password: 3232)

5.2.3.1 – <Alarm Configuration>

When in <Alarm Configuration> low limit and high limit for DHW outlet temperature can be selected. Once these selections are made, <Setpoint> in <Control> cannot take a value higher than <High Outlet Temp. Alarm> or a value lower than <Low Outlet Temp. Alarm>. If the DHW outlet temperature rises above the value chosen in <High Outlet Temp. Alarm>, a new alarm will activate after <Outlet Temp. HL Time Delay> seconds. Similarly if the DHW outlet temperature falls below the value chosen in <Low Outlet

Temp. Alarm>, a new alarm will activate after < Outlet Temp. LL Time Delay > seconds. Should the DHW outlet temperature fall back within the range set between <Low Outlet Temp. Alarm> and <High Outlet Temp. Alarm> before the time set in the time delays is reached, the alarm will not activate.



Down from DHW outlet temperature high and low limit alarms, pressing <Alarm History> will take the user to a screen that shows details about the history of alarms:

While the <Number of Alarms in History> is a display that shows the number of alarms currently held in <Alarm History>, pressing <Clear Alarm History> will clear all alarms in history turning <Number of Alarms in History> to zero. It should be noted that a Modbus Master can also clear alarms from the history provided that they are no longer active. Please refer to Modbus Mapping table in section 5.1.

5.2.3.2 – <Data Logging>

To use the data logging feature of DynaFLO's controller a computer, a software called DataXport and a USB cable are needed.

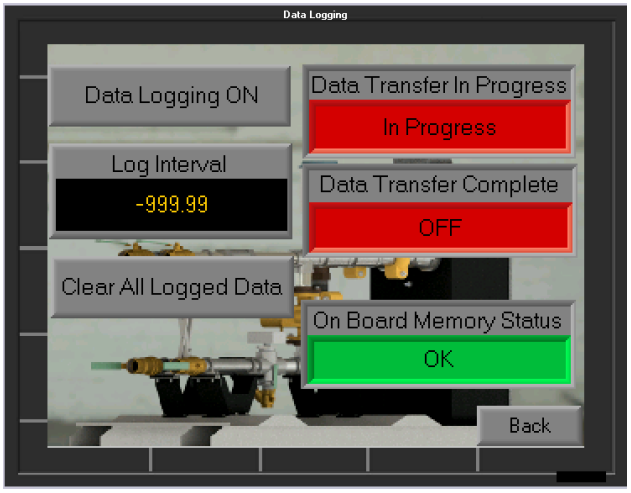
DataXport allows the user to set automatic schedules for data that has already been collected by DynaFLO's controller to be transferred to a computer. Once data has been transferred to the computer onto DataXport, CSV, Text or Excel files can be generated.

DataXport can be downloaded for free from: https://unitronicsplc.com/software-visilogic-for-programmable-controllers/

Instructions on how to use DataXport are given in the next section.

Once DataXport is set up and DynaFLO's controller is connected to the computer using a USB cable, data logging can begin. On DynaFLO's controller, the following parameters are logged when <Data Logging ON/OFF> is turned ON:

- RTD1
- Actuator Position
- Setpoint
- Total Number of Alarms Pending for Acknowledgement
- Date and Time



<Log Interval> allows the user to select the time interval for logging data. Once <Log Interval> is set and <Data Logging ON/OFF> is switched ON data is then collected onto a table that is built into the controller's internal memory. This table has a 1000 rows, therefore depending on what the <Log Interval> is set at, the table fills up. For example if the <log Interval> is set at 1 second, after a 1000 seconds (16.66 minutes) the table fills up. If <Log Interval> is set at 60 seconds, table fills up after 60,000 seconds (16.66 hours) and so on. Data is accumulated onto the built in table in FIFO (First In First Out) which means that once the 1000 rows in the data table are filled up, the controller starts from the beginning of the table again overwriting the values previously stored in row 1.

Pressing <Clear All Logged Data> clears the built in data table instantly, regardless of whether it is yet transferred to DataXport or is filled up.

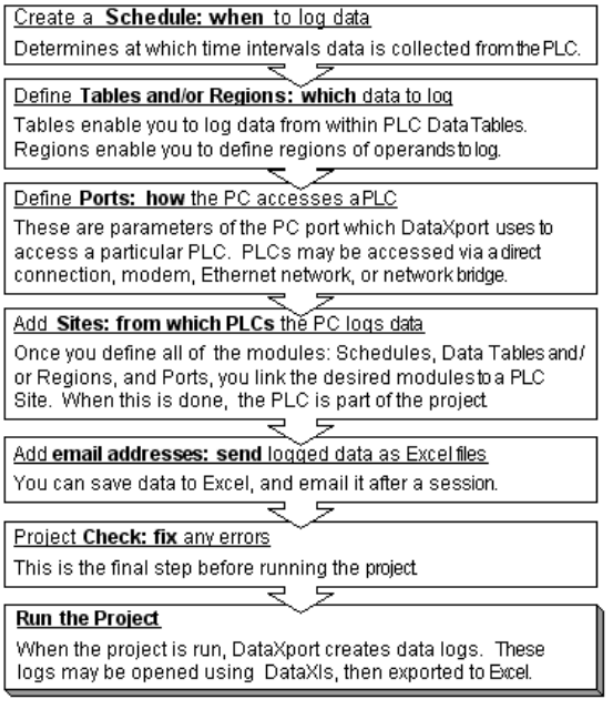
<Data Transfer In Progress> is an indicator that turns <In Progress> when DataXport is in the middle of copying data from DynaFLO's built in data table in the controller. <Data Transfer Complete> is another indicator that turns ON once

DataXport is finished with copying data from the built-in data table in DynaFLO's controller.

If the built-in data table in DynaFLO's controller requires more memory than what is available in the controller <On Board Memory Status> will change from <OK> to <On Board Memory Full>.

5.2.3.3 – DataXport

To build a DataXport project, you first define the project's modules listed below. These modules determine when the data is logged, which data is logged, and how DynaFLO's controller can be accessed.

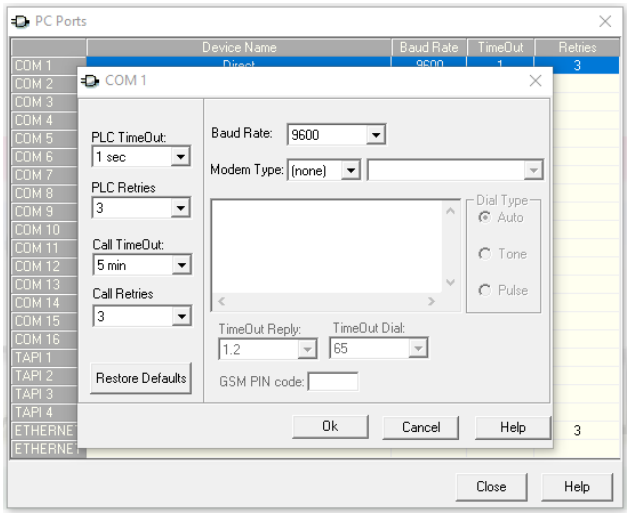


How to Access DynaFLO's Controller:

"Ports" determine the parameters of the communication link that is used by the PC running DataXport In order to access PLC and log data.

NOTE
The controller name must be identical to the name assigned in the controller's ladder application. This name is: DynaFLO PLC

1. Select PC Ports from the Design Menu; PC Ports window opens.
2. Double-click a line that corresponds to the COM number that is used with the USB cable connecting the PC to DynaFLO's controller.
3. Make the desired selections as follows:

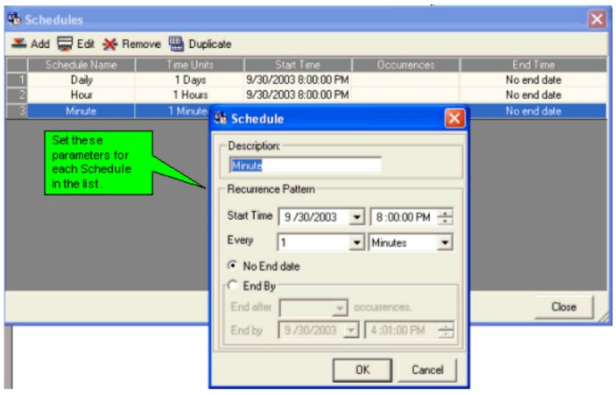


4. Click "OK" then "Close".

When to Log:

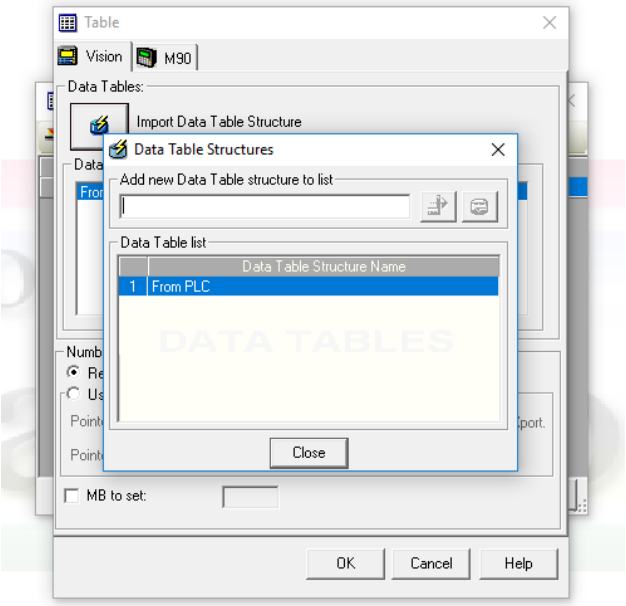
The schedule determines the time intervals between data log actions.

1. Select Schedules from the Design Menu.
2. Click Add to create a new schedule, click Edit or double-click a line to redefine an existing schedule, the schedule open.
3. Make the appropriate entries, then click OK to add the schedule to the list.



What to log:

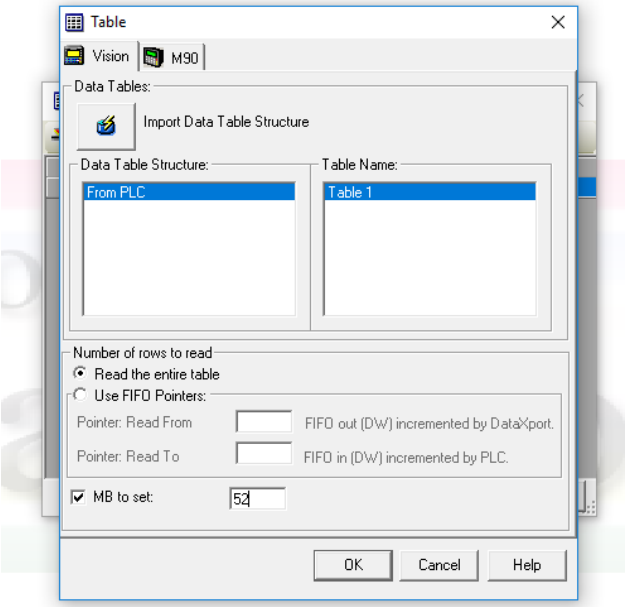
1. Select Tables from the Design Menu.
2. Click Add, then click on the Import Data Table Structure button.
3. Name the Data Table Structure.
4. Read the structure from the PLC.
5. Select the Data Table Structure that was just read from the controller under the name you chose.
6. Click "Close".



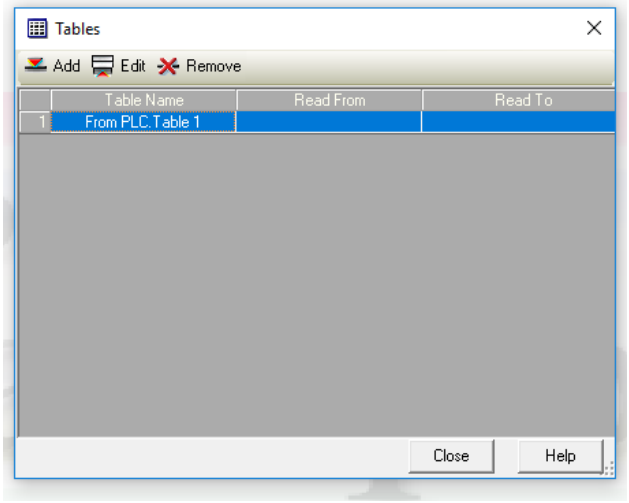
NOTE

The controller name must be identical to the name assigned in the controller's ladder application as describer in "How to access DynaFLO's Controller". Otherwise the table will not be read from the controller in this step.

7. Under "Data Table Structure" select the name you chose.
8. Under "Table Name" you should see "Table 1", select "Table 1".
9. Select "Read the entire table"
10. Select "MB to set" to "52".

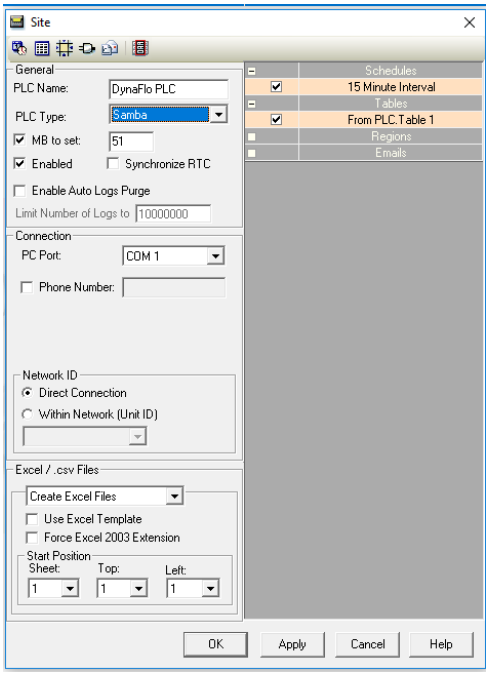


11. Click "Ok". The table should now be listed in "Tables".
12. Click "Close" to close the "Tables" window.



Finalizing the project

1. Once all the modules have been set up, select Add Site from the Design Menu; the PLC window opens.
2. In the left-hand pane, for "PLC Name" enter: DynaFLO PLC
3. Select the module parameters that you have created displayed on the right-hand side of the PLC window. Select desired schedules that you have previously created.
4. Select the "PLC Type" as: Samba
5. Select "MB to Set" 51
6. Select the PC Port on your computer that is using the USB cable connected to DynaFLO's controller.
7. Select "Enabled" to include this project/site when DataXport project is run.
8. Select "Create Excel Files" so that DataXport creates Excel files whenever a data log is created. Note that DataXport creates a separate Excel file for each data log.



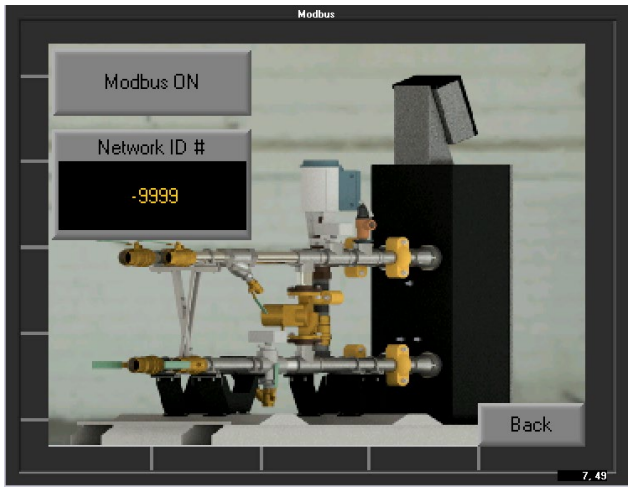
1. Click OK, the project is now added and displayed in the DataXport Design window.

Running the project

2. Select “Run Project” from the “Actions” menu, (Save and name your project) DataXport begins exporting the requested data via your defined port and defined schedules.
3. You can also cause DataXport to enter “Run” mode whenever the project is opened by selecting that option from the “Actions” menu.
4. You can also force DataXport to enter “Run” mode by selecting “Run Project” and then clicking the “Force Call” button.

5.2.3.3 – <Modbus>

The user can assign a network ID or slave address to DynaFLO’s controller by pressing <Network ID #> and inserting a number.

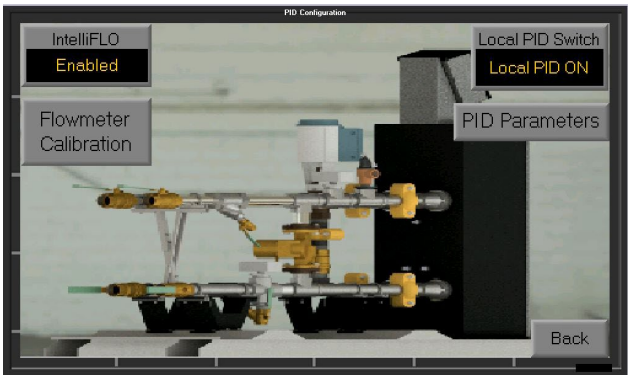


When <Modbus ON/OFF> switch turns ON it opens Port 2 on DynaFLO’s controller and sets the controller as a Modbus Slave with the following parameters:

Baud Rate: 19200
Data Bits: 8
Parity: None
Stop Bits: 1
Standard: RS485

A Modbus Master at this point can send commands to DynaFLO’s controller based on section 5.2.1 and the Modbus Mapping table in section 5.1.

5.2.3.4 – <PID Configuration and IntelliFLO>



The <Local PID ON/OFF> switch turns the built-in PID loop in DynaFLO’s controller ON and OFF. This could become handy for troubleshooting or to restart the local PID loop in case it got stuck in what is called an integral wind down or an integral windup; which may happen in case <Setpoint> is suddenly changed by the user by a large amount.

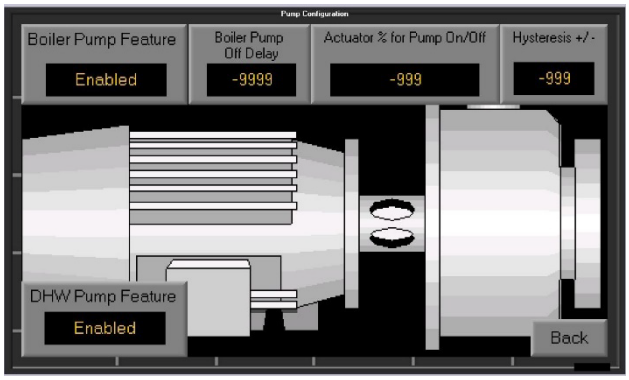
PID Parameters> will take the user to a display that allows the user to change the Proportional, Integral and Derivative parameters that govern the performance of the local built-in PID loop. However these parameters have been fine-tuned through extensive testing specifically for DynaFLO and changing these parameters are not recommended as the performance of the local PID loop is very sensitive to a change in these parameters. Therefore access to this screen requires factory level password which may only be provided in special situations.

The <IntelliFLO> button enables/disables the IntelliFLO (Patent pending) feature. Upon enabling IntelliFLO, the controller proactively adjusts the actuator upon sensing rapid DHW load changes to prevent temperature spikes. If DHW flow is stable and IntelliFLO is still enabled, the main fine-tuned feedback PID loop is still in charge of hundred percent of the control. IntelliFLO is smart and automatic in a sense that it is always watching the DHW load and it only takes over control of the actuator in case there is a sudden flow change. Once flow is stabilized again, IntelliFLO gives the control back to the main feedback PID loop. As a result there are no parameters to be adjusted by the installer or the user, only to enable or disable the entire feature.

If your DynaFLO is not equipped with the optional IntelliFLO technology, <IntelliFLO> should be switched to “Disabled”.

Under <Flowmeter Calibration>, a constant (K Factor) can be adjusted to adjust the IntelliFLO’s flowmeter reading. However factory should be consulted before changing this constant as it is recommended to leave the constant unchanged.

5.2.3.5 – <Pump Configuration>



This feature can be used to control a system pump on the boilers side and/or the DHW side in relation to DHW demand. It is important to note that turning this feature On or Off does not affect the operation of the circulator pump built into DynaFLO on the DHW side described in section 6.4. That circulator pump is hard wired and operates continuously (unless it's switched off) to stop sediment build up within the heat exchanger. The purpose for the feature described here is to turn on a boiler pump and/or a DHW pump whenever the actuator position rises above a certain limit, indicating the need for heat or presence of demand.

If <Boiler Pump Feature> is enabled, output relay O2 will energize once the actuator position moves above the value set for <Actuator % for Pump On/Off> + the value set for <Hysteresis>. Similarly, when the actuator position drops below the value set for <Actuator % for Pump On/Off> - the value set for <Hysteresis> output relay O2 deenergizes after the time value set for <Boiler Pump Off Delay> lapses.

Therefore, output relay O2 can be connected to another contactor or relay that can control the operation of a boiler pump in a fashion described above. If output relay O2 is to be connected directly to operate a pump the electrical specifications of output relay O2 described in section 4.4 should be checked in terms of amp draw, voltage draw and more importantly horsepower against the electrical specifications of the pump.

Similarly, if <DHW Pump Feature> is enabled, output relay O3 will energize once the actuator position moves above the value set for <Actuator % for Pump On/Off> + the value set for <Hysteresis>. When the actuator position drops below the value set for <Actuator % for Pump On/Off> - the value set for <Hysteresis> output relay O3 deenergizes instantly.

NOTE
It is recommended not to set a value too high in <Actuator % for Pump On/Off> because that can cause the boiler and/or DHW pump to turn on late. A value around 5% to 10% should be satisfactory. If the actuator is dropping below 5%, it most likely is an indication of the actuator trying to shut off completely as there is most likely no longer a demand.

NOTE
A value set too low for <Hysteresis> can cause output relays O2 and O3 to have intermittent tripping. A value around 3% or higher should be satisfactory.

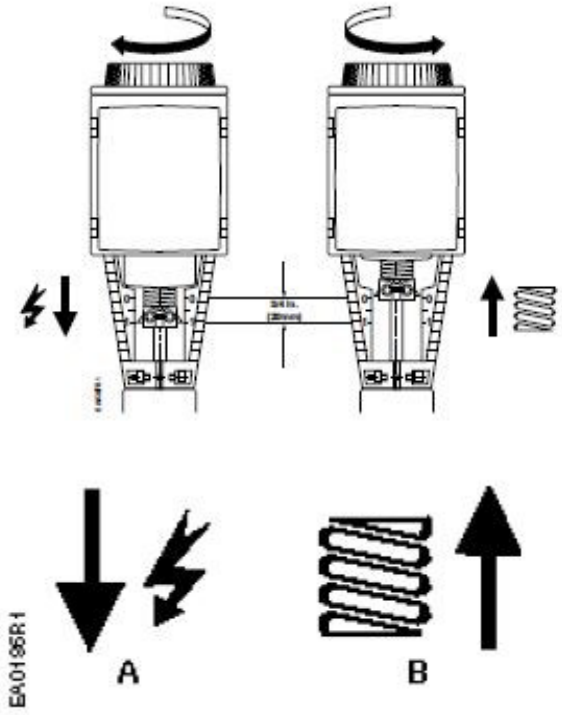
NOTE
Once the above values are set, the operation of pump(s) in relation to the actuator position should be verified and the values may need to be adjusted a few times to reach smooth control of pump(s).

Part 6 – Components

6.1 – Electro-Hydraulic Actuator

6.1.1 – Operation

The Electrohydraulic Actuator mounted on DynaFLO requires a 24 VAC supply and a 4 to 20mA control signal to proportionally control the actuator position. The actuators mounted on DynaFLO have a 3/4-inch (20 mm) stroke. The actuator communicates with the control through a 4 to 20 mA control signal. The actuator mounted on a valve, produces a stroke proportional to the input signal. When power is turned off or in the event of a power failure, the actuator spring returns the valve to its closed location which bypasses the heat exchanger.



6.1.2 – Stroke Calibration

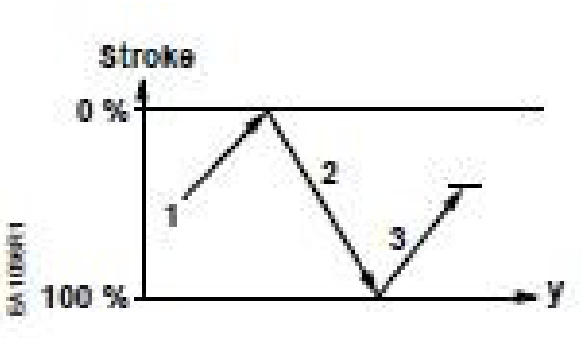
To determine the stroke positions 0% and 100% in the valve, calibration is required when the valve/actuator are commissioned for the first time. The actuator must be

mechanically connected to a valve and must have a 24 VAC power supply. The calibration procedure can be repeated as often as necessary.

WARNING

Before starting calibration, be sure the manual adjuster is set to automatic to register the actual values.

There is a slot on the printed circuit boards of the actuators. To initiate the calibration procedure, the contacts inside this slot must be short-circuited, for example, with a screwdriver. Automatic calibration can then proceed as depicted in the following image:

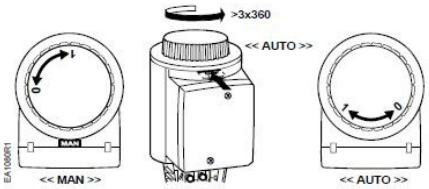


- Actuator runs to the 0 stroke position (1), green LED flashes.
- Actuator then runs to the 100 stroke position (2), green LED flashes.
- Measured values are stored in the EPROM.
- The actuator now moves to the position defined by control signal Y or Z (3), and the green LED now glows steadily (normal operation).
- Throughout this procedure, output U is inactive; meaning, the values only represent actual positions when the green LED stops flashing and remains on continuously.

LED	Display	Function	Action
Green	ON	Normal Operation	Automatic operation
	Flashing	Stroke calibration In Progress	Wait for calibration to be completed (LED stops flashing)
Red	ON	Faulty stroke calibration Internal Error	- Check mounting - Restart stroke calibration (by short-circuiting calibration slot) - Replace electronics
	Flashing	Inner valve jammed	Check the valve
	OFF	• No power supply • Faulty electronics	-Check mains -Replace electronics

6.1.3 – Manual Operation

- Turn the manual setting knob clockwise for manual operation.
- If a signal is sent to the actuator while it is in manual operation, the actuator will move but the control will not be accurate.
- The valve cannot be commanded to its 0% position while in manual operation.



6.2 – Temperature and Pressure Relief Valve (If Supplied)

6.2.1 – Overview

The combined 2-in-1 temperature and pressure relief valve mounted on DynaFLO provides proven means for protection against both excessive temperature and pressure in emergency conditions. It provides full automatic temperature and pressure relief protection based on the latest ANSI Z21.22 listing requirements for temperature discharge capacity.

WARNING

The valve lever MUST be operated AT LEAST ONCE A YEAR to ensure that the water-ways are clear. Certain naturally occurring mineral deposits may adhere to the valve, rendering it inoperative. When manually operating the lever, water will discharge and precautions must be taken to avoid contact with hot water and to avoid water damage. BEFORE operating lever, check to see that a discharge line is connected to this valve directing the flow of hot water from the valve to a proper place of disposal otherwise personal injury may result. If no water flows, valve is inoperative. TURN OFF THE UNIT AND CALL A PLUMBER IMMEDIATELY.

NOTE

This device is designed for emergency safety relief and shall not be used as an operating control.

NOTE

The Lead Free automatic re-setting T&P relief valve shall comply with states codes and standards, where requiring reduced lead content. The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

No valve is to be placed between the relief valve and the appliance. To prevent water damage, the discharge from the relief valve shall be piped to a suitable floor drain for disposal when relief occurs. No reducing couplings or other restrictions shall be installed in the discharge line. The discharge line shall allow complete drainage of the valve and line. Relief valves should be manually operated at least once a year. If a relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. **Do not plug the relief valve.**

CAUTION

Avoid contact with hot discharge water.

NOTE

A relief valve functions in an emergency by discharging water. Therefore, it is essential that a discharge line be piped from the valve in order to carry the overflow to a safe place of disposal. The discharge line must be the same size as the valve outlet and must pitch downward from the valve and terminate at least 6"(152mm) above the floor drain where any discharge will be clearly visible.

6.2.2 – Re-inspection of T&P relief valve

Temperature and Pressure Relief Valves should be re-inspected AT LEAST ONCE EVERY TWO TO FOUR YEARS by a licensed plumbing contractor or authorized inspection agency, to insure that the product has not been affected by corrosive water conditions and to insure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative.

Such conditions are not detectable unless the valve and its components are physically removed, and inspected. Do not attempt to conduct this inspection on your own. Contact your plumbing contractor for a re-inspection to assure continuing safety.

WARNING

FAILURE TO REINSPECT THIS VALVE AS DIRECTED COULD RESULT IN UNSAFE TEMPERATURE OR PRESSURE BUILD-UP, WHICH CAN RESULT IN SERIOUS INJURY OR DEATH AND/OR SEVERE PROPERTY DAMAGE.

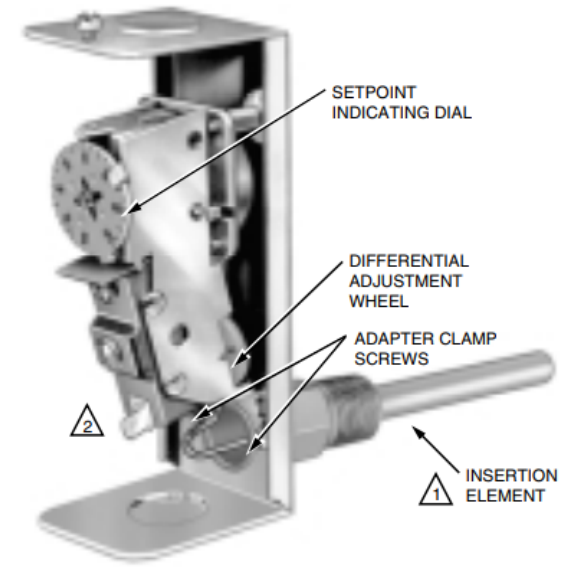
6.3 – Aquastat (Manual Reset)

To adjust the setpoint:

Insert a screwdriver in the slotted head visible through the cover, and turn the indicating dial to the control point.

Differential (on adjustable differential models): Remove cover and move the differential adjustment wheel (Figure below) to a point on the scale corresponding to the desired differential. Replace cover.

Manual Reset (L4008E): After water temperature has dropped to a point below the high limit setting, less differential, the reset button at the front of the case must be pushed before the burner can operate.



6.4 – Circulator Pump

6.4.1 – Overview

The circulators mounted on DynaFLO (Item 5 in Parts List section 7) are maintenance free, Self-lubricated by the system fluid. These circulators have no seal to leak or coupling to break. These circulators are to continuously run water through the DHW side of the heat exchanger to avoid build ups specially in applications where water hardness level is high. Unless the “Pump Switch” button mounted on the side of the control panel is turned off, the circulator pump will therefore run continuously.

NOTE

Fill THE SYSTEM WITH WATER BEFORE STARTING THE APPLIANCE TO AVOID DAMAGING THE CIRCULATOR PUMP.

WARNING

NEVER OPERATE THE CIRCULATOR DRY AS PERMANENT DAMAGE MAY OCCUR. NEVER SHUT OFF THE DISCHARGE OR RESTRICT SUCTION FLOW WIHILE THE CIRCULATOR IS OPERATING.

The speed of these pumps can be adjusted with a 3-speed rotary switch. On speed setting 1, the pump operates at approximately half the performance of the speed setting 3 (maximum speed) and consumes about half the power of full speed operation.

WARNING

THE CIRCULATORS ON DYNAFLO HAVE BEEN EVALUATED FOR USE WITH WATER ONLY AND WATER/GLYCOL MIXTURE (ETHYLENE, PROPYLENE ONLY).

The venting of the rotor chamber may be done automatically. However, to assure proper and faster venting of this circulator, we recommend the manual venting procedure as follows:

1. Place a container under the back of the circulator to catch any water that may run out.
2. Be sure power to the circulator is off at the fuse or circuit breaker.
3. Loosen plug on the back of the motor but do not remove.
4. Continue until water appears.
5. After a sufficient amount of water free of air bubbles has passed, retighten the plug.
6. The circulator can now be started.

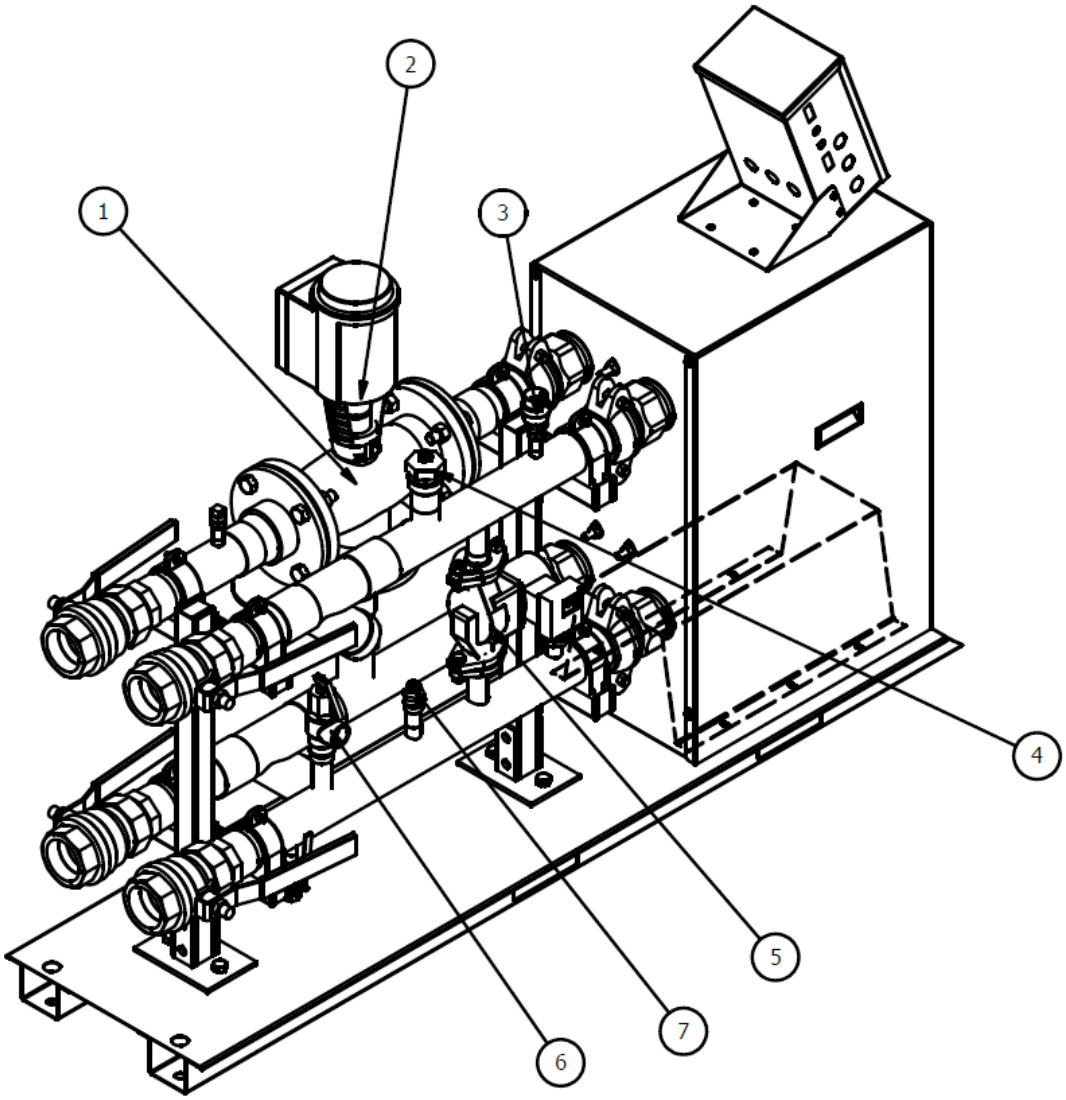
6.4.2 – Troubleshooting

SYMPTOM	POSSIBLE CAUSE	ANALYSIS
Pump stopped, no power	Power supply interrupted	• Check the power supply. • Attach external power control if necessary.
	Fuse tripped or circuit breaker opened	• Repair short-circuited wire. Repair loose contact. • Check for the properly rated fuse. • Check pump motor and lead.
Pump stopped, power supply present	Thermal switch has actuated	• Reduce ambient temperature. • Clean blocked or slow rotating pumps.
	Pump does not start	• Open air vent screw and unlock shaft. Clean pump. • Increase speed/set point. • Replace pump.
Noisy Pump	Air in pump	• Open bleed screw and vent pump. Vent and top up system with water. • Check expansion tank. • Install air separator.
	Cavitation sounds	• Increase inlet pressure. • Reduce temperature. • Throttle back pump. • Reduce speed.
	Resonance noises	• Use sound insulation material between the pump and surface to reduce resonance noise. • Install expansion joints. • Install fixture to change system's natural frequency. • Adjusts pump speed. • Replace pump/motor.
	Knocking from foreign bodies in the pump/or on valve	• Turn valve around if installed incorrectly. • Clean impeller • Adjust valve pressure. • Adjust valve spring. • Replace pump.
Noise From Radiator	Excessive pressure passing the thermostatic valve	• Reduce the speed setting. Flow decreases will reduce system pressure and eliminate the noise.
The radiator is not giving off any heat	The thermostatic valve is jammed or blocked.	• Shut off all other radiators in the system, and set the pump at maximum speed. Once the blockage has been dislodged, reopen the radiators and adjust pump to original speed setting.
Pump generates little or no output	Dirty impeller	• Open pump and clean the impeller Note: Close isolation valves if present
	Suction port blocked	• Open pump and clean housing Note: Close isolation valves if present
	Dirty strainer	• Clean Strainer
	Air in the pump	• Switch off pump and open bleed screw to vent
	Pump at lowest/medium speed level	• Set pump to the next higher speed level.

Part 7 – Parts List

7.1 – DynaFLO Parts List

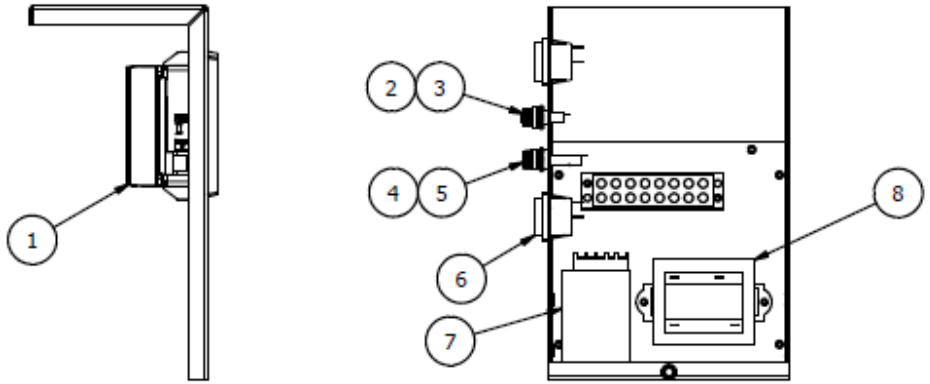
Figure A: DynaFLO Assembly



7.1.1 – DynaFLO Assembly Parts

ITEM #	FIGURE	PART DESCRIPTION	PART NUMBER	DYNAFLO MODELS												
				Boiler						DHW						
				Copper			Black			Copper			SS			SS #250
				S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	D3-D9
1	A	Valve Body	949-00503-000	x			x									
			949-00505-000		x			x								
			949-00540-000						x							
			949-00506-000			x										
2	A	Actuator	269-00459-000	x	x		x	x								
			269-00305-000			x			x							
3	A	Air Vent	957-05174-000							x						x
4	A	Flowmeter (if ordered)	891-00012-000							x						x
5	A	Pump/Circulator	695-03081-000							x						
6	A	Pressure Relief Valve (if ordered)	001-02002-000							x						
7	A	RTD Sensor	833-00017-000							x						x
8	A	Aquastat/High Limit	817-11064-000							x						x

Figure B: Control Box



7.1.2 – Control Box Parts

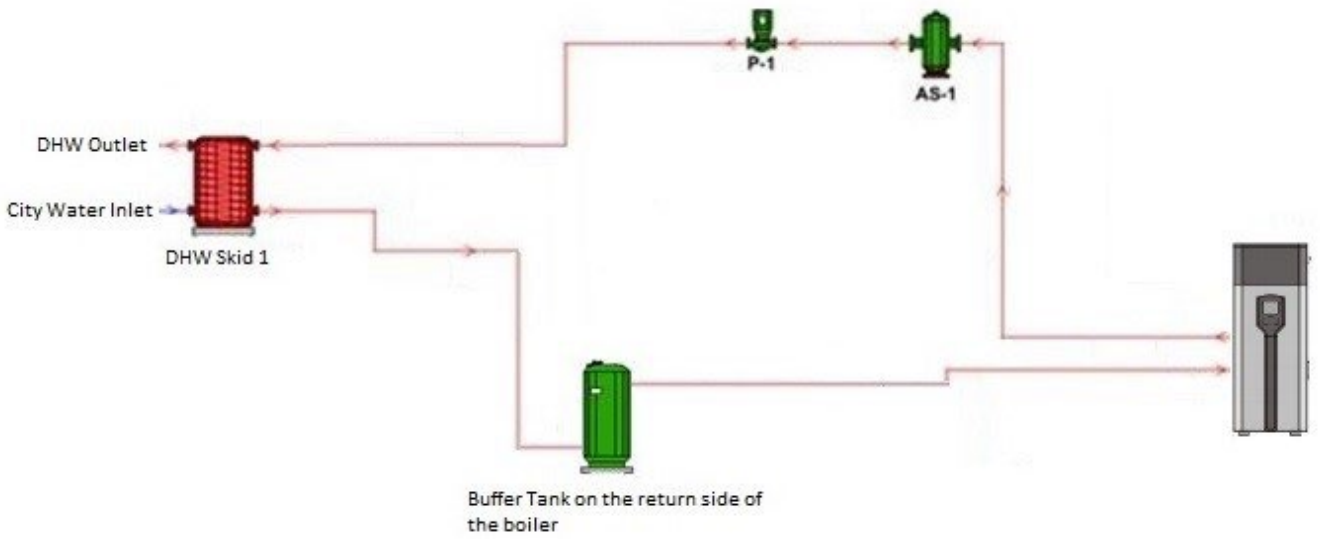
ITEM #	FIGURE	PART DESCRIPTION	PART NUMBER	DYNAFLO MODELS											
				Boiler						DHW					
				Copper			Black			Copper			SS		
				S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9	S1,S2, D1,D2	S3-S6, D3-D6	D7-D9
1	B	Controller	833-04131-000	x											
2	B	Fuse 1	174-00019-000	x											
3	B	Fuse Holder 1	848-02037-000	x											
4	B	Fuse 2	174-00168-000	x											
5	B	Fuse Holder 2	848-02036-000	x											
6	B	E-Switch	817-11058-000	x											
7	B	Power Supply	178-00133-000	x											
8	B	Transformer	834-03852-000	x											
9	B	Wire Harness	826-00389-000	x											

7.1.3 – Heat Exchangers Used

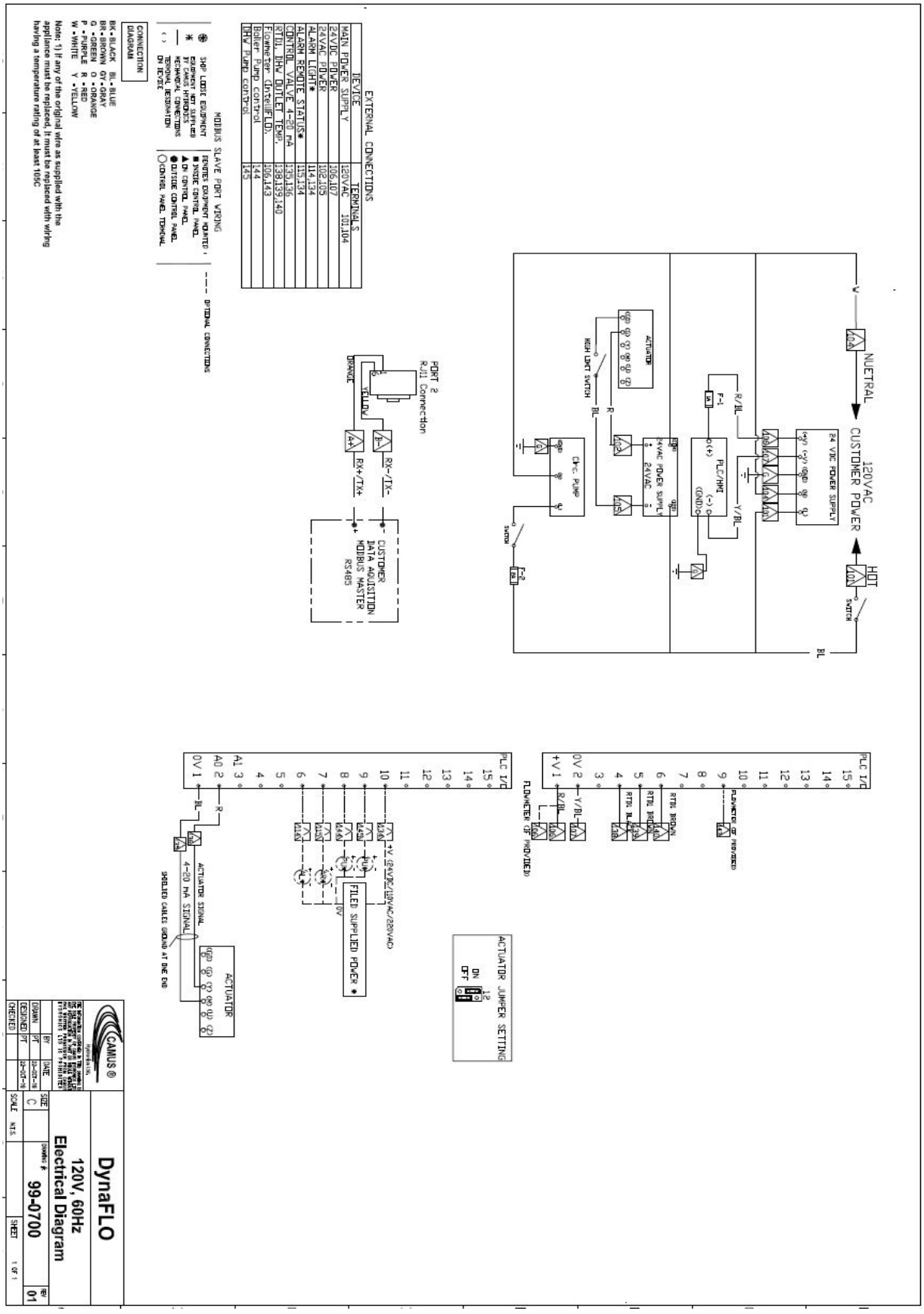
MODEL	Part Number
DOHB-S1	651-00380-020
DOHB-S2	651-00380-030
DOHB-S3	651-00380-040
DOHB-S4	651-00380-050
DOHB-S5	651-00380-060
DOHB-S6	651-00380-070
DOHB-D1	651-00381-020
DOHB-D2	651-00381-040
DOHB-D3	651-00381-050
DOHB-D4	651-00381-070
DOHB-D5	651-00381-090
DOHB-D6	651-00381-110
DOHB-D7	651-00380-071
DOHB-D8	651-00380-080
DOHB-D9	651-00404-000

Appendix A – Special Considerations for low volume boilers dedicated only to a DHW load

The diagram below demonstrates a situation where there are no loads other than a DHW load to take the heat coming from the boiler (such as space heating or etc.). In such cases if the DHW load on DynaFLO is suddenly reduced, the actuator starts closing down and bypassing the heat exchanger. As a result, all of the unwanted heat coming from the boiler will have to divert right back into the boiler (since there is no other load). Boilers typically cannot modulate down as fast as a small appliance such as DynaFLO (due to safety reasons), and therefore for a few minutes, they apply the same firing rate to the now very hot incoming boiler water. This leads to an even hotter boiler outlet temperature which can trip the high limit switch on the boiler in the matter of a few minutes. This situation is more common if the boiler and piping are small and do not contain a significant volume of water to absorb the extra heat. In these situations, the use of a buffer tank on the return side of the boiler as depicted below can eliminate the short cycling. By using a buffer tank, the hot water that is rejected by DynaFLO, due to a sudden reduction in load, will first have to fill up the buffer tank before returning to the boiler, which can buy the boiler enough time to modulate down and avoid short cycling.



Appendix B – Electrical Schematics – DynaFLO



DynaFLO LIMITED WARRANTY

GENERAL
CAMUS Hydronics Limited ("CAMUS") extends the following LIMITED WARRANTY to the owner of this appliance, provided that the product has been installed and operated in accordance with the Installation Manual provided with the equipment. CAMUS will furnish a replacement for, or at CAMUS option repair, any part that within the period specified below, shall fail in normal use and service at its original installation location due to any defect in workmanship, material or design. The repaired or replacement part will be warranted for only the unexpired portion of the original warranty. This limited warranty does not cover failures or malfunctions resulting from: (1) Failure to properly install, operate or maintain the equipment in accordance with CAMUS' manual; (2) Abuse, alteration, accident, fire, flood, foundation problems and the like; (3) Sediment or lime build-up, freezing, or other conditions causing inadequate water circulation; (4) Pitting and erosion caused by high water velocity; (5) Failure of connected systems devices, such as pump or controller; (6) Use of non-factory authorized accessories or other components in conjunction with the system; (7) failing to eliminate air from, or replenish water in, the connected water system; (8) Chemical contamination of combustion air or use of chemical additives to water; (9) Production of noise, odours, discolouration or rusty water; (10) Damage to surrounds or property caused by leakage or malfunction; (11) All labour costs associated with the replacement and/or repair of the unit; (12) Any failed component of the hydronic system not manufactured as part of the product.

HEAT EXCHANGER
Within 18 months of the appliance having declared FOB from CAMUS, a heat exchanger shall prove upon examination by CAMUS to be defective in material or workmanship, CAMUS, at its option, will exchange or repair such part or portion if deemed warranty. Camus shall accept no responsibility if the heat exchanger has been improperly installed, operated, or maintained, or if any unauthorized modification, adjustment, and/or repairs have been made to the item.

The exchanged or repaired heat exchanger will carry the balance of the remaining original warranty provided with the appliance based on the FOB date. In the event a replacement heat exchanger is delivered and if the defective heat exchanger is deemed to be repairable by CAMUS the repaired heat exchanger will be returned to the customer and a credit will not be issued.

ANY OTHER PART
If any other part fails within one (1) year after installation, or eighteen (18) months of the appliance having declared FOB from CAMUS whichever comes first CAMUS will furnish a replacement or repair that part. Replacement parts will be shipped FOB our factory.

DURATION OF LIMITED WARRANTY
Any limited warranty, including the warranty of merchantability imposed on the sale of the product under the laws of the state or province of sale are limited in duration to one year from date of original installation.

STATE LAW & LIMITED WARRANTY
Some states or provinces do not allow:
a) Limitations on how long an implied warranty lasts
b) Limitations on incidental or consequential damages.

The listed limitations may or may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state and province to province.

CONDITIONS
We will not:
a) Repair or replace any product, or part, subject to conditions outlined in 'This Limited Warranty Does Not Cover'
b) Reimburse any costs associated with repair and/or replacement
c) Replace and/or repair any product without complete model number/serial number
d) Replace any product without prior receipt of actual rating plate from the appliance.

HOW TO MAKE A CLAIM
Any claim under this warranty shall be made directly to CAMUS Hydronics Limited Representative in your area. Please visit our website at www.camus-hydronics.com and use our "Rep Finder" tool to locate your local CAMUS representative.

SERVICE LABOR RESPONSIBILITY
CAMUS shall not be responsible for any labour expenses to service, repair or replace the components supplied. Such costs are the responsibility of the owner.

DISCLAIMERS
CAMUS shall not be responsible for any water damage. Provisions should be made that in the event of a water/appliance or fitting leak, the resulting flow of water will not cause damage to its surroundings.

CAMUS Hydronics is a manufacturer of replacement parts for most copper finned and stainless steel water heaters and heating boilers as well as a supplier of specialty HVAC products. Our service line is open 24 hours, 7 days a week. The CAMUS CERTIFIED seal assures you that Reliability, Efficiency & Serviceability are built into every single unit. For more information on our innovative products from CAMUS Hydronics Limited, call 905-696-7800 today.

Hydronics Ltd.