SULLAIR®

FlowLogic™

Flow Pressure Controller

SFE- 9000 CFM

OPERATOR'S MANUAL

KEEP FOR FUTURE REFERENCE

Part Number

02250161-404

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SECTION 1
SAFETY

1.1 GENERAL

Sullair Corporation designs and manufactures all of its products so they can be operated safely. However, the responsibility for safe operation rests with those who use and maintain our products. The following safety precautions are offered as a guide, which, if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment.

This Sullair FlowLogic™ Flow Pressure Controller should be operated only by those who have been trained and delegated to do so, and who have read and understand this Operator's Manual. Failure to follow these instructions, procedures and safety precautions in the manual may increase the possibility for injury.

Never activate the FlowLogic Controller unless it is safe to do so.

DO NOT attempt to operate the FlowLogic Controller with a known unsafe condition. Use bypass and isolation valving or other suitable means to render the unit inoperative. If needed, disconnect the power and lock out at the source. Be sure to tag the FlowLogic Controller inoperative so others may know of the unsafe conditions.

Install, use and operate the FlowLogic Controller only in full compliance with all pertinent OSHA regulations and/or any applicable Federal, State and Local codes, standards and regulations.

DO NOT modify the FlowLogic Controller in any way without written factory approval.

While not specifically applicable to all systems, most of the precautionary statements contained herein are applicable to most systems and the concepts behind these statements are generally applicable to all systems.

Prior to installing or operating the FlowLogic Controller, owners, employees, and users should become familiar with, and comply with all applicable OSHA regulations, and/or any other applicable Federal, State and Local codes, standards and regulations relative to personal protection equipment.

1.2 PERSONAL PROTECTIVE EQUIPMENT

Prior to installing or operating the FlowLogic Flow Pressure Controller, owners, employers, and users should become familiar with, and comply with, all applicable OSHA regulations and/or any applicable Federal, State and Local codes, standards, and regulations relative to personal protective equipment, such as eye and face protective equipment, respiratory protective equipment, equipment intended to protect the extremities, protective clothing, protective shields and barriers, pressure relief devices and electrical protective equipment, as well as noise exposure administrative and/or engineering controls and/or personal hearing protective equipment.

1.3 PRESSURE RELEASE

A. Prior to installing the FlowLogic Flow Pressure Controller make sure that the equipment is suitable and rated to be installed at the maximum potential pressure in the compressed air system.

B. Prior to inspecting or performing maintenance on the FlowLogic Pressure Controller after it has been rendered inoperative, locked out and tagged, be sure the control pressure and line pressure to the unit has been shut off, vented and the pressure gauges or transducers read zero (0).

C. DO NOT allow the system to exceed the rated pressure during operation. Be sure that the high discharge pressure switches and safety relief valves in the system are properly set and in working condition prior to making adjustments or initially starting the unit or damage and or personal injury could occur.

C. Keep personnel out of line with and away from the points of compressed air discharge.

D. Use air pressure less than 30 psig (2.1 bar) for cleaning purposes, and then only with effective chip guarding and personal protection equipment per OSHA standards.

E. Secure all connections and tubing with suitable retaining devices to prevent accidental disconnection and expulsion or shorting.

F. Vent **ALL** internal pressure prior to opening any line, fitting, hose, valve, drain plug, connection or other FlowLogic system component. To avoid hazardous expulsion of system components always verify that system pressure has been reduced to zero and proper bleed down time has been allowed for before attempting to remove pressurized components from the system. Also always be very attentive and careful when removing equipment and listen and feel for signs of escaping pressurized air to avoid hazardous expulsions.

G. DO NOT engage in horseplay with compressed air as serious injury or death may result**.**

SECTION 1
SAFETY

1.4 FIRE AND EXPLOSION

A. Clean up spills of lubricant or other combustible substances immediately if they occur.

B. DO NOT permit fluids to accumulate on, under or around the external or internal surface of the FlowLogic Controller as fire may result.

C. Disconnect and lock out all power at the source prior to attempting repairs or cleaning of the FlowLogic Flow Pressure Controller.

D. Keep electrical wiring, including all terminals and pressure or other controls in good condition. Replace any wiring that has cracked, become cut, abraded or otherwise degraded. Replace terminals that are worn, discolored or corroded. Keep all terminals and pressure connections clean and tight.

E. Keep grounded and/or conductive objects, such as tools, away from exposed live electrical parts such as terminals to avoid arcing which might serve as a source of ignition.

F. Keep a suitable fully charged class BC or ABC fire extinguisher nearby when operating or servicing the FlowLogic Controller.

G. DO NOT attempt to operate the FlowLogic Controller in any classification of hazardous environment unless the FlowLogic Controller has been specifically designed and manufactured for that duty.

1.5 MOVING PARTS

A. Wear snug fitting clothing and confine long hair when working around this equipment, especially when exposed to hot or moving parts.

B. Disconnect and lock out all power at source and verify that all circuits are de-energized to minimize the possibility of accidental start-up or operation prior to attempting repairs.

C. Keep a first aid kit handy. Seek medical attention promptly in case of injury. **DO NOT** ignore small cuts and bruises as they may lead to infection.

1.6 ELECTRICAL SHOCK

A. The FlowLogic Controller should be installed and maintained in full compliance with all applicable Federal, State and Local codes, standards and regulations, including those of the National Electric Code, and also including those relative to equipment grounding conductors, and only by personnel that are trained, qualified and delegated to do so.

B. Keep all parts of the body and any hand-held tools or other conductive objects away from exposed live parts of the electrical system. Maintain dry footing, stand on insulating surfaces and **DO NOT** contact any other part of the FlowLogic Controller when making adjustments or repairs to similar exposed parts of the electrical system. Make all such adjustments or repairs with one hand only, so as to minimize the possibility of creating a current path through the heart.

C. Attempt repairs only in clean, dry, ventilated and

well-lit areas.

D. DO NOT leave the FlowLogic Controller unattended with an open electrical enclosure. If it is necessary to do so, then disconnect, lock out and tag all power at source so others will not inadvertently restore power.

E. Disconnect, lockout and tag all power at source prior to attempting repairs and prior to handling any ungrounded conductors.

1.7 LIFTING

DO NOT attempt to lift if the FlowLogic Controller is more weight than you can safely handle by yourself during installation. Get assistance of either personnel or mechanical means as required.

1.8 DECALS

The FlowLogic Controller contains several decals, which contain necessary information for safe performance. These decals should never be removed. If a decal becomes damaged, contact your nearest Sullair Distributor or the Sullair Corporation factory Service Department for replacement parts (Note: When ordering new decals, use part number printed on decal face when possible.). For more information on decals, consult Section *3.17 Decals* of this manual.

SECTION 2
SFE CONTROLLER

2.1 INSTALLATION

The FlowLogic Flow Pressure Controller Unit has been air tested for functions and leaks and is ready for installation. Sullair suggests that an in-line strainer be installed on the inlet side of the FlowLogic Controller to guard against contaminants and ensure proper operation.

1) Inspect unit upon receipt. Immediately report any damage to the shipping carrier.
2) The Sullair FlowLogic unit has an "IN" and "OUT" with labels and/or directional flow arrows cast right into the Control Element. Orient the FlowLogic unit in accordance with compressed air system flow.
3) The Sullair FlowLogic unit can be installed in any plane. The headers are capable of supporting the weight of the unit for either vertical or horizontal mounting.

⚠ CAUTION

Do not support the unit from the control elements or the associated control piping.

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4) Install a 3 Valve Bypass around the FlowLogic to allow routine maintenance and insure that compressed air will always be available for plant use. The bypass can be supplied with the FlowLogic Unit as an OPTION or can be field installed using full line size service valves. An automatic bypass is also available as an OPTION and is described later in the Manual.
5) Mount the control panel where most convenient for the operator. The appropriately labeled connections are on top of the panel. Do not exceed 150 feet from the FlowLogic header to the control panel.
6) Pilot air tubing between the FlowLogic header and the control panel is 1/4" OD. See the general arrangement drawing for control panel pneumatic connections.

2.1.1 LEAK TEST

Pressurize system and check the installation for leaks before starting.

2.1.2 PANEL WIRING:

1) Connect 115 VAC/Single Phase to the labeled terminal block. A grounding lug is provided next to the terminal block for grounding the control panel enclosure.

NOTE

Open the manual bypass before applying power.

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2) Grounding: It is mandatory that the FlowLogic control panel be grounded. Use an adequate ground with the conductor sized to NEC specifications.
3) During shipments, wire connections may become loose. As recommended by U. L. specification, torque terminal screws inside enclosure to 20 in. lbs.

2.2 START UP AND OPERATION

Refer to the ID and Wiring Diagram drawings. Prior to start up, check for unusual pressure drops and restrictions to flow between the air storage receiver and the FlowLogic unit. The air compressor system characteristics change after the FlowLogic unit is put on line resulting in consequential events. During start up, relief valves in the storage portion of the system may open. Observe operation during start up.

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1) Close the control panel door and turn the power switch on. The digital display on the Electronic Controller will back light indicating it is powered.

NOTE

Do not press the green start key on the electronic control at this time.

Pressure must be set in accordance with instructions below before any attempt is made to operate with the FlowLogic Unit. The IN and OUT pressures displayed in the windows will be the same with the bypass open. The menu window displays the "OFF" status of the FlowLogic.

2) Set the desired FlowLogic target control pressure by touching the "+" key 3 times in succession. The menu display will read "Target Pressure" and indicate the default setting. Press the "Enter" key and the pressure display flashes. Use the "+/-" keys to change the pressure setting to the desired target and press "Enter" again to load the new setting into the Controller. The pressure display stops flashing when it is accepted.

NOTE

Lower the set target pressure in small increments to ensure the system balances and the controller can zero in quickly.

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3) Press the "down" arrow key to display the "Alarm Dp Low pressure". Press "Enter" and set the alarm point pressure at the desired differential below the FlowLogic control set point. This is the low pressure condition threshold that activates the solenoid to supply full line pressure to the servo circuit to drive the control valve modules to full open. On FlowLogic units equipped with automatic bypass, the bypass valve actuator is de-pressurized and the bypass valve springs open. Press the "Enter" key again to load the set point. When the display stops flashing, the setting is accepted and the "Reset" key can be pressed to return to the opening menu display with all the new settings held in memory.

4) The FlowLogic Flow Pressure Controller can now be started by pushing the "green" tactile key. The menu display will show "Auto", and the unit will begin to control.

5) Close the manual bypass after observing the unit is activated.

6) The Electronic Controller has been programmed with default settings typical of the most common industrial compressed air system profiles. Tune the Electronic PID functions if desired in small incremental adjustment allowing the system to stabilize between changes.

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SFE CONTROLLER

⚠ CAUTION

Failure to adjust the SFE in this manner may result in a system draw-down. Watch the displayed pressure during the initial operation to ensure it remains within acceptable boundaries. Pressing the "Red" stop key at any time will abort the start up and activate the servo pressure override and, if so equipped, the auto bypass.

Maximum inlet pressure is shown on the FlowLogic nameplate. Maximum regulating pressure is 5 PSI below the maximum inlet pressure.

SFE ELECTRONIC CONTROLLER

2.3 INTRODUCTION

The Electronic Controller is a cost effective solution for the control of a FlowLogic Flow Pressure Controller. This type of application requires a controller which is reliable, easy to use and provides advanced control functions. This section details the installation, configuration and operation of the controller.

2.3.1 WARNING

⚠ WARNING

DO NOT install, operate, maintain, adjust or service this unit without thoroughly reading this manual.

2.3.2 DISCLAIMER

The information in this document is subject to change without notice. While Sullair Corporation assumes and believes the information contained herein to be accurate, the company assumes no responsibility for any errors or omissions. The Electronic Controller must be properly wired to get the full function capabilities to include alarm and auto bypass if an unsafe condition is detected.

2.3.3 COPYRIGHT NOTICE

2.4 INPUT / OUTPUT FUNCTIONAL DESCRIPTION

2.4.1 DIGITAL INPUTS

Emergency Stop Input 1: (nc)

This is the only fixed input, it must always be considered to be a normal closed input and its function can not change. This is due to the fact that the Electronic Controller hardware also uses this signal to switch

off the output relays in response to an emergency stop activation. The signal is usually derived from a locking mushroom type push button.

Seven of the following digital input functions may be selected to provide custom operational software for a particular compressor type.

Remote/Local Input: (no/nc)
This input provides for inter-connectivity with a remote analog input. Closing this contact will select remote pressure setpoint control, opening it selects local pressure setpoint control.

Immediate Air Supply: (no/nc)
This input is used to override the pressure schedule. Closing this contact will disable the pressure schedule, opening will enable the pressure schedule.

DP Filter A: (no/nc)
This input is used to detect a high differential pressure across filter A. If this signal is detected an alarm warning will be given. The signal is derived from a suitable differential pressure switch.
DP Filter B: (no/nc)
This input is used to detect a high differential pressure across filter B. If this signal is detected an alarm warning will be given. The signal is derived from a suitable differential pressure switch.

DP Filter C: (no/nc)
This input is used to detect a high differential pressure across filter C. If this signal is detected an alarm warning will be given. The signal is derived from a suitable differential pressure switch.

DP Filter D: (no/nc)
This input is used to detect a high differential pressure across filter D. If this signal is detected an alarm warning will be given. The signal is derived from a suitable differential pressure switch.

DP Filter E: (no/nc)
This input is used to detect a high differential pressure across filter E. If this signal is detected an alarm warning will be given. The signal is derived from a suitable differential pressure switch.

Drain Alarm A: (no/nc)
This input is used to detect a drain failure. If this signal is detected an alarm warning will be given. The signal is derived from a suitable alarm switch on a drain.

Drain Alarm B: (no/nc)
This input is used to detect a drain failure. If this signal is detected an alarm warning will be given. The signal is derived from a suitable alarm switch on a drain.

Drain Alarm C: (no/nc)
This input is used to detect a drain failure. If this signal is detected an alarm warning will be given. The signal is derived from a suitable alarm switch on a drain.

Drain Alarm D: (no/nc)
This input is used to detect a drain failure. If this signal is detected an alarm warning will be given. The signal is derived from a suitable alarm switch on a drain.

Drain Alarm E: (no/nc)
This input is used to detect a drain failure. If this signal is detected an alarm warning will be given. The signal is derived from a suitable alarm switch on a drain.

Service Alarm: (no/nc)
This input signal can be used for general purpose service indications (e.g.: combined air filters/ drain alarms service indication)

2.4.2 ANALOG INPUTS

Delivered Air Pressure Input 1:
This input is used to measure the delivered FlowLogic air pressure, the value provides FlowLogic pressure control and, when compared to a defined alarm setpoint, opens the auto bypass.
Inlet Air Pressure Input 2:
This input is used to display the inlet FlowLogic air pressure.

Two of the following analog input functions may be selected to provide custom display and operational software for a particular FlowLogic type.

We offer an additional eight analog input module. This option is an adder to the base controller package.

Remote Setpoint
This input is used to provide a remote setpoint from a sequencer, PLC, or building management system.

Pressure A
This input is used to display an extra pressure labeled A.

Pressure B
This input is used to display an extra pressure labeled B.

Pressure C
This input is used to display an extra pressure labeled C.

Pressure D
This input is used to display an extra pressure labeled D.

Flow A
This input is used to display flow, labeled A.

Flow B
This input is used to display flow, labeled B.

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Flow C
This input is used to display flow, labeled C.

Flow D
This input is used to display flow, labeled D.

Dewpoint A
This input is used to display dewpoint, labeled A.

Dewpoint B
This input is used to display dewpoint, labeled B.

Dewpoint C
This input is used to display dewpoint, labeled C.

Dewpoint D
This input is used to display dewpoint, labeled D.

Power
This input is used to display kw power.

Current
This input is used to display current.

Delivery Temperature
This input is used to display delivery temperature.

Outlet Temperature
This input is used to display outlet temperature.
Water Temperature
This input is used to display water temperature.

Temperature A
This input is used to display an extra temperature labeled A.

Temperature B
This input is used to display an extra temperature labeled B.

Retransmission
Select the input channel to be retransmitted. The retransmit signal will be a 1-5 VDC signal.
Retransmission Feedback
This input is used to inform the Electronic Controller that the retransmission output generated by the Controller is correct. Input 3 is reserved for the retransmission feedback if the retransmit feature is used.

2.4.3 OUTPUTS (DIGITAL AND ANALOG)

Output 1: Delivery Pressure Low dP alarm (relay within unit)
Contact is open when Delivery Pressure Low dP alarm is active.
Contact is closed when Delivery Pressure Low dP alarm is not active.

Output 2: Dry Contact Delivery Pressure Low dP alarm (relay within unit)
Contact is closed when Delivery Pressure Low dP alarm is active.
Contact is open when Delivery Pressure Low dP alarm is not active.

Output 3: Dry Contact Service Alarm (relay within unit)
Contact is closed when service alarm is active.
Contact is open when service alarm is not active.

Output 4: Dry Contact Fault Alarm (relay within unit)
Contact is closed when fault alarm is active.
Contact is open when fault alarm is not active.

Output 5: Dry Contact Warning Alarm (relay within unit)
Contact is closed when fault alarm is active.
Contact is open when fault alarm is not active.

Output 6: Totalization Output (20 VDC)
Pulse output for flow or power totalizer. (option not standard - adder to base price)

Output 7: Retransmission Output
Provides analog retransmittion signal through an external PWM/I converter.

Output 8: Control Output
Provides analog control signal through an external PWM/I converter.

The above relay outputs are rated for 8A/240VAC resistive.

2.5 GENERAL OPERATION

Through the connected analog inputs the controller acquires data about the FlowLogic's operational state. Based on this data, the user command input and a pre-programmed configuration the FlowLogic primary analog control valve is managed. A second controller opens or closes trim valves based on the analog signal generated by the electronic control. Speed control valves connected to the pilot air lines of the trim valve actuators ensure a smooth transition as trim valves actuate. The controller provides all functions necessary to operate an SFE, these functions include:

- user interface
- delivered air pressure control
- fault and alarm function

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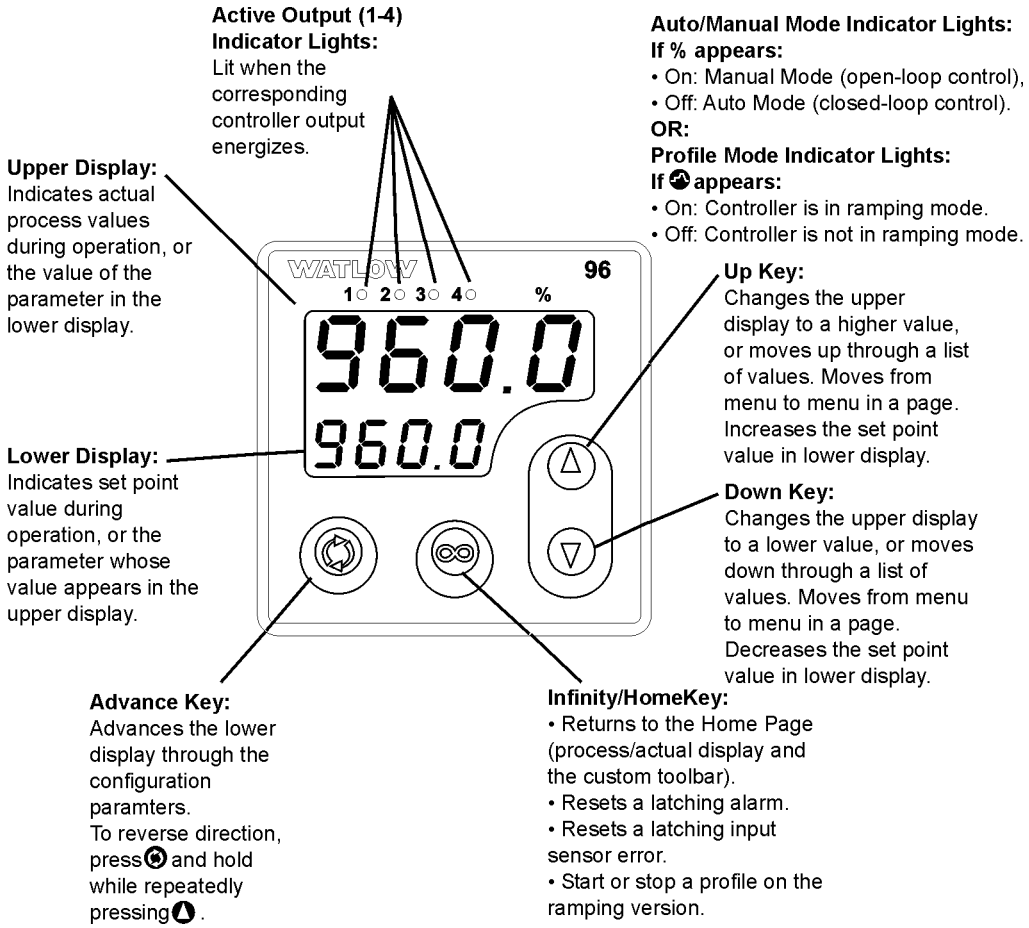
- display and totalization function

There are two electronic control units on the SFE controller (Reference 3.2). The DPTC controls the parallel trim valve(s). The main control unit is the main user interface, and provides all other control functions.

2.5.1 Digital Parallel Trim Controller (DPTC)

The DPTC is a NEMA 4x front panel device with one universal input, a second auxillary input and four outputs. Depending on the configuration required, one input and one to four outputs may be used. The input is configured for 4 – 20 mA process signal and the outputs are Form C relay contacts.

2.5.2 Features and Functions of the DPTC



2.5.3 DPTC SETUP

The DPTC controls the parallel trim valve(s) based on the process signal driving the primary analog flow control valve. The parallel trim valves are intended to close at the upper band and open at the lower band of the control signal, keeping the primary analog control valve in the most linear area of travel. Percentage of drive signal at which parallel trim valves change state (open or closed) is dependent on the number of trim parallels installed in system. Trim valve pilot lines are to be piped to 4-way solenoid

valves controlled by the DPTC so that the trim valves fail in the open position. Speed control valves installed on the 4-way solenoid valves should be set to limit trim valve actuation speed to 5 seconds.

4 Trim Parallels:

Valve #	-	Open/Closed (% of Drive Signal)
1	-	75% - 25%
2	-	90% - 10%
3	-	80% - 20%
4	-	85% - 15%

3 Trim Parallels:

Valve #	-	Open/Closed (% of Drive Signal)
1	-	70% - 30%
2	-	90% - 10%
3	-	80% - 20%

2 Trim Parallels:

Valve #	-	Open/Closed (% of Drive Signal)
1	-	75% - 25%
2	-	90% - 10%

1 Trim Parallel:

Valve #	-	Open/Closed (% of Drive Signal)
1	-	75% - 25%

Input 1:	Setup for a 4 - 20 mA signal from a PWM analog converter, scaled to 0-100%. (Note: 4-20mA process signal generated by electronic control microprocessor to drive primary analog control valve, wired to the analog valve positioner and DPTC in series)
Input 2:	Not Used
Output 1:	Is a Form C contact used for control of a 4 way valve. L1 LED
Output 2:	Is a Form C contact used for control of a **optional** 4 way valve. L2 LED
Output 3:	Is a Form C contact used for control of a **optional** 4 way valve. L3 LED
Output 4:	Is a Form C contact used for control of a **optional** 4 way valve. L4 LED

NOTE

The following setup menus were installed at the factory. Any changes may effect the operation of the digital parallel trim controller.

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SFE CONTROLLER

2.5.4 DPTC Menu Settings

Press the Up and Down arrow keys simultaniously and hold for 6 seconds to reach the Setup Menus. The Setup Menus and settings are outlined below. Use the Up-arrow key to select a menu. Use the Advance key to go to the desired parameter. See the basic navigation for new users example on page 12. *Due to different parallel configurations alternate menu settings are written in italics.*

User Menu

- Auto-Manual (A-M) setup Auto
- Auto Tune (Aut) setup OFF
- Auto-tune Set Point (AtSP) setup 90
- Calibration Offset (Cal1) setup 0

PID1 Menu

- Propband (Pb1) setup 0
- Hysteresis 1 (hyS1) setup 50
- *Hysteresis 1 –* ***Alternate 3 trim parallels*** *(hyS1) setup 40*

Alarm Menu

- Alarm 2 High (A2hi) setup 90

Input Menu

- Sensor Type 1 (SEn1) setup Proc
- Input 1 (In1) setup 4-20
- Range Low 1 (rL1) setup 0.0
- Range High 1 (rH1) setup 100.0
- Decimal 1 (dEC1) setup 0.0
- Software Filter 1 (Ftr1) setup 0.5

Output Menu

- Output 1 (Ot1) setup hEAt

- Output 2 (Ot2) setup AL
- Alarm 2 Type (Aty2) setup Proc
- Alarm Hysteresis 2 (Ahy2) setup 80
- Laching 2 (LAt2) setup no
- Silencing 2 (SIL2) setup yes
- Active Alarm Sides 2 (Sid2) setup hi
- Alarm Logic 2 (Lgc2) setup AL0
- Alarm Annunciation 2 (Anu2) setup no

- *Output 2 -* ***Alternate 1 trim parallel*** *(Ot2) setup OFF*

- Output 3 (Ot3) setup AL

- Alarm 3 Type (Aty3) setup Proc
- Alarm Hysteresis 3 (Ahy3) setup 60
- Laching 3 (Lat3) setup no
- Silencing 3 (SIL3) setup yes
- Active Alarm Sides 3 (Sid3) setup hi
- Alarm Logic 3 (Lgc3) setup AL0
- Alarm Annunciation 3 (Anu3) setup no

- *Output 3 -* ***Alternate 1 or 2 trim parallels*** *(Ot3) setup OFF*

- Output 4 (Ot4) setup AL
- Alarm 4 Type (Aty4) setup Proc
- Alarm Hysteresis 4 (Ahy4) setup 70
- Laching 4 (Lat4) setup no
- Silencing 4 (SIL4) setup yes
- Active Alarm Sides 4 (Sid4) setup hi
- Alarm Logic 4 (Lgc4) setup AL0
- Alarm Annunciation 4 (Anu4) setup no

- *Output 4 -* ***Alternate 1, 2 or 3 trim parallels*** *(Ot4) setup OFF*

Global Menu

- Units Type (Unit) setup US
- Error Latching (Err) setup nLAt
- Failure Mode (Fail) setup bPLS
- Power Limit Set Point (PLSP) setup 999
- High Power Limit Above (PLA) setup 100.0
- High Power Limit Below (PLb) setup 100

The above flow control parameters (which are factory set) are key to the operation of the Digital Parallel Trim Controller. Settings should be checked before putting the system on line.

2.5.5 BASIC NAVIGATION FOR NEW USERS (DPTC)

Use this example task to learn how to use the keys and displays. To configure the control to suit your application, go to the Setup Page, enter the menus and set the parameters for the system, its inputs and outputs.

1. Press and hold the Up-arrow and Down-arrow keys simultaniously for 6 seconds. After 3 seconds, the Operations Page appears in the lower display; after 6 seconds the Setup Page appears in the lower display. A menu is in the upper display.

2. Use the Up-arrow key to select a menu. The Setup Page remains in the lower display while menu names appear in the upper display.

3. Use the Advance key to go to the desired parameter. The menu's parameters appear in the lower display and the values appear in the upper display. NOTE: When you enter a menu, the display changes. Instead of the Setup Page and menu, the parameter and value are displayed.

4. To choose a value, use the Up-arrow key until you reach the desired value. Values appear in the upper display when parameters appear in the lower display.

5. To set a value and go on to the next parameter, use the Advance key when the chosen value is displayed. You will see the chosen value in the upper display. After pressing the Advance key, the next parameter appears in the lower display with one of its values in the upper display. Values auto-enter after 5 seconds.

Summary:

- To make a selection or choice, press the Up or Down arrow ley.
- To move or change location in a page or menu, press the Advance key or the Home/Infinity key.

The following electronic control parameters (which are factory set) are key to the operation of the Air Delivery System. They should be checked before putting the system on line.

2.5.6 MAIN CONTROL UNIT - FLOWLOGIC START

The Electronic Controller goes into Auto Mode.

2.5.7 PRESSURE CONTROL SYSTEM

The controller incorporates four modes to control the delivered air pressure. These modes are selectable:

- **Auto Mode (Press the "Start" Button to Activate)**

  The FlowLogic algorithm drives the output % to control the delivery pressure at the target setpoint.

- **Auto Mode - remote (Press the "Start" Button to Activate)**

  The FlowLogic algorithm drives the output % to control the delivery pressure at the remote target setpoint. The remote target pressure is activated by a remote/local switch or by setting the "press. ctrl." to "rem". An analog input must be configured for proper operation.

- **Auto Mode - schedule (Press the "Start" Button to Activate)**

  The FlowLogic algorithm drives the output % to control the delivery pressure at the scheduled target setpoint. The pressure schedule is activated in the operational setting menu.

- **Manual Mode (Press the "Stop" Button to Activate)**

  The user selects the output % with the up and down arrows. The output % goes to 100% when changing from Auto to Manual. A "Delivery Low Pressure Dp Alarm" will force the FlowLogic into Manual Mode and the output % to 100% which, will force the control valves full open.

2.5.8 FLOWLOGIC STOP

The Electronic Controller goes into Manual Mode.

2.5.9 POWER FAILURE AUTOMATIC RESTART

The control software provides the ability to restart the Electronic Controller automatically after a power failure. The following must apply:

- The automatic restart feature must be enabled
- The Electronic Controller must be running (auto mode active) prior to the power failure

2.6 OPERATORS' INTERFACE

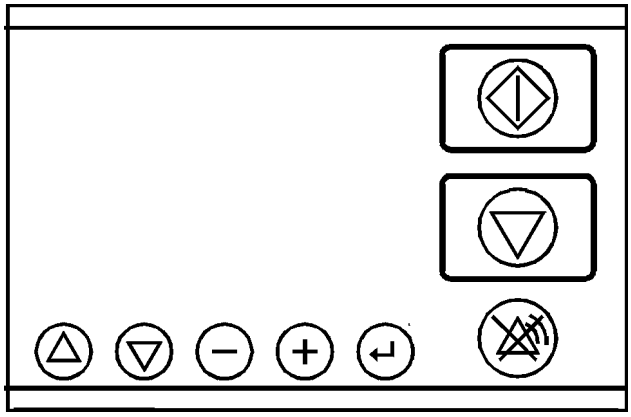
2.6.1 PRESSURE DISPLAYS

The top LCD displays indicate the inlet pressure (left display) and delivered pressure (right display) with the units of measurement identified.

2.6.2 INFORMATION AND MENU DISPLAY

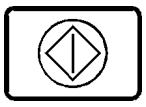
This display is the primary interface to obtain detailed information about the status of the FlowLogic unit. It also provides access to the configuration menus.

2.6.3 KEYBOARD



The Electronic Controller has an eight button, tactile keyboard.

2.6.4 START KEY



This key has only one function. Pressing it will start the Auto Mode.
The start function is disabled in the following cases:

- when the unit shows an error condition (e.g.: faulty pressure sensor).
- during modification of certain parameters through the keyboard or accessing certain menus.

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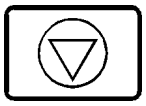
SFE CONTROLLER

2.6.5 STOP KEY



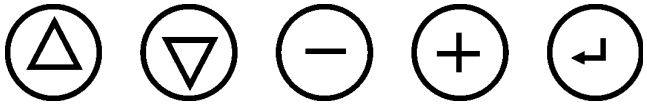
This key has only one function. Pressing it will **stop** the Auto Mode. The unit will go into Manual Mode.

2.6.6 RESET KEY

This key has two functions:

- Reset faults (e.g.: faulty pressure sensor) when the normal status/readout menu is displayed.
- Return to the normal status/readout menu from any other menu.

2.6.7 MENU KEYS



Keys to access, navigate and modify menus and parameters.

- ⇒ From a menu, the various items within it can be viewed by scrolling with the "Δ" and/or "∇" key.
- ⇒ Menus are accessed with the "+" key. Depressing this key while a sub-menu is displayed will activate that particular sub-menu.
- ⇒ Menus are exited with "-" key. Depressing this key will activate a menu one level higher than the current one.
  - ⇒ Parameter modification is accomplished with the "+" and "-" keys in the following sequence
  - ⇒ Depress the "↲" key. If a security code is required then the code input screen will be displayed. When the correct code is or has been entered then the displayed parameter will blink.
  - ⇒ While the value blinks, depress the "+" or "-" key to select (increase or decrease) the value.
  - ⇒ Depressing the "↲" key again will enter the new parameter and restore the normal function of the "+" and "-" keys.

2.6.8 MENU / PARAMETER MODIFICATION ACCESS CODES

The Electronic Controller is configured to limit access to designated menus. A specific access code must be entered prior to allowing parameter modification. This is a security measure to prevent unauthorized changes and protect settings. *Access codes are available from the factory or authorized dealer.*

The following procedure applies to code entry:

- ⇒ Navigate to the menu that contains the parameter to be modified. Refer to section 2.6.7 for navigation instructions.
- ⇒ The top line of the Information & Menu Display will maintain the same menu or sub-menu heading however, the bottom line will display the security code input screen.

Menu Heading	
CODE:	?

- ⇒ A question mark will appear in the bottom right-hand corner of the display.
- ⇒ Depress the "+" until the correct code number appears.

⇒ If the entered code is correct the parameter to be modified will return to the display and flash. If the code is wrong, the display will automatically return to the status/readout menu.
⇒ The parameter or value can now be modified.
⇒ To modify another parameter within the same menu, scroll to the new parameter and depress the "↵" key. As long as the menu in which the correct code was entered remains active, the code does not need to be re-entered.

NOTE

Some parameters are further limited (prevented) from modification while the unit is operating. This limitation prevents potential low discharge pressure.

2.6.9 MENU TREE

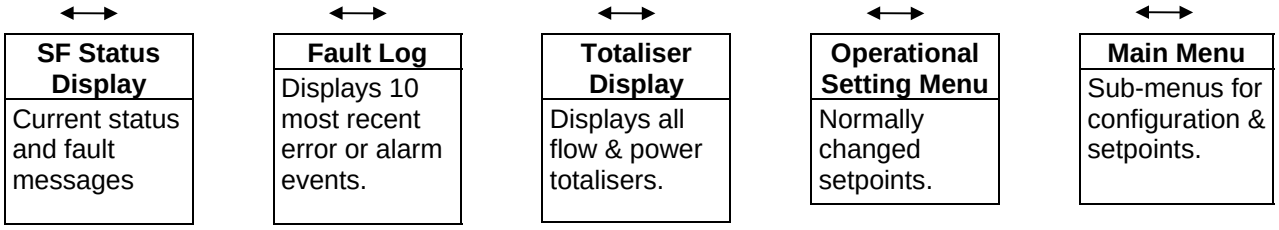
Refer to Figure 2-2. The Electronic Controller has several menus for configuration and operational parameters. These menus and sub-menus are functionally grouped and organized in a tree-like structure. The Menu Tree, as depicted on the continuing pages is organized as follows:

- Thick and thin line boxes show the contents of the data that will be displayed on the upper and lower line.
- Access to and from the menus and related menus are shown by means of connecting lines.

2.7 DISPLAYS, CONFIGURATION AND SETPOINTS

The Electronic Controller has several display groupings and menus for configuration and operational parameters. The menus appear in the information display. These display groups, menus and sub-menus are functionally grouped:

⇒ NOTE: To navigate across, use "-" and "+" keys.



SECTION 2
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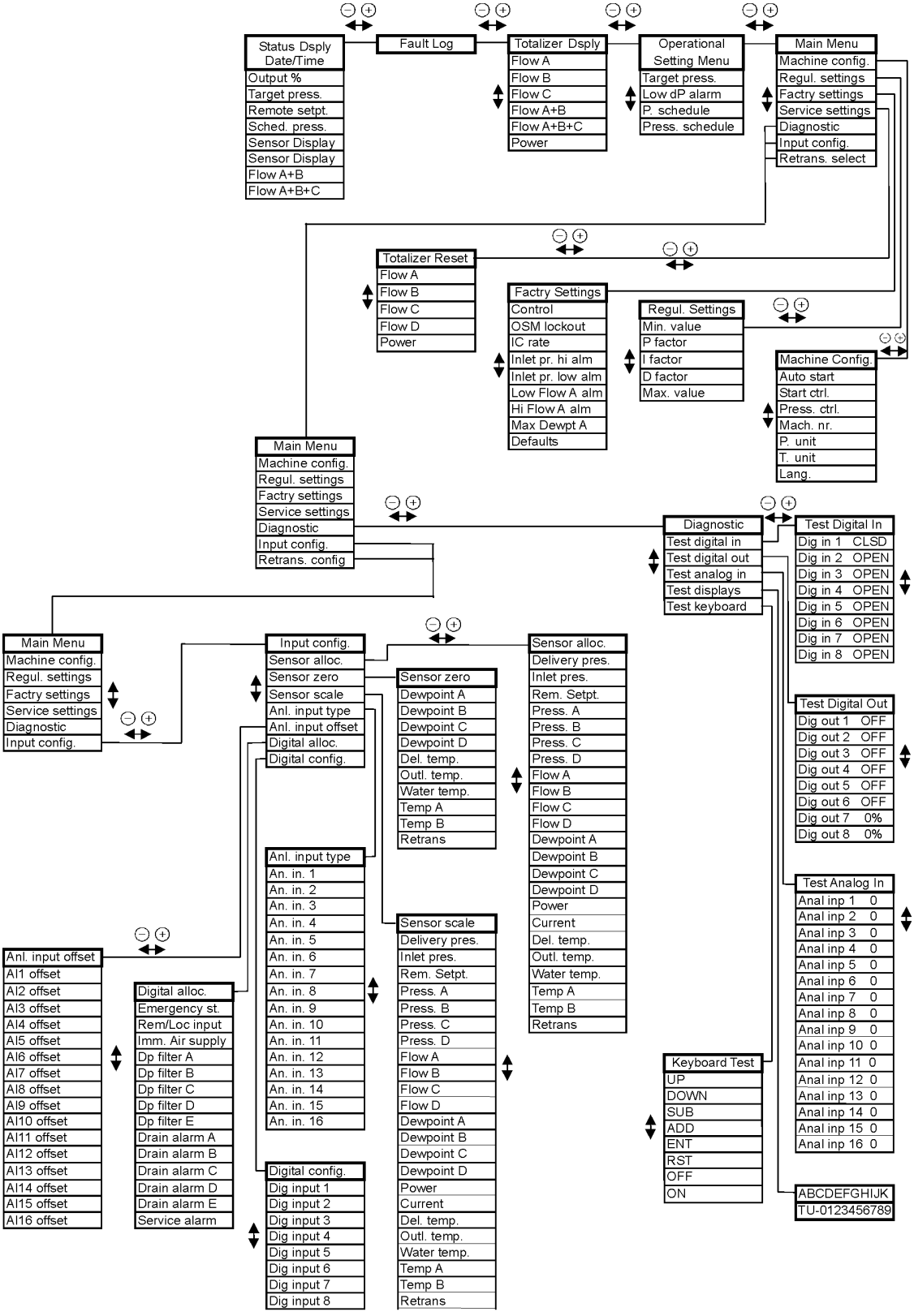
Figure 2-2 Menu Tree



2.7.1 STATUS DISPLAY

This is the default and general status display. Status and current active faults are indicated.

2.7.2 FAULT LOG

This display provides the 10 most recent faults.

2.7.3 TOTALISER DISPLAY

Totaliser Display
V.A (flow) cf
V.B (flow) cf
V.C (flow) cf
V.D (flow) cf
V.AB
V.ABC
V.ABCD
Ener (Power Kwh)

This is a display only for flow and power totalisers. Values can be reset in the Totaliser Reset menu.

2.7.4 OPERATIONAL SETTINGS MENU

This menu provides for the normal operational setpoints of the FlowLogic unit as follows:

Operational Settings Menu	Description
Target Pressure	Default = 100 PSI ; min = 0 psi ; max = max. input range
Low Dp Alarm	default = 10 PSI ; min = 0 psi ; max = max. input range
P. Schedule	default = off ; off / on
Press. Schedule	actual date/time ; schedules of day/time pressure setting

2.7.5 MAIN SELECTION MENU

This menu is a directory for the following primary sub-menus:

Main Menu	Description
Machine config.	Reference 2.7.5.1
Regul. settings	Reference 2.7.5.2
Factory settings	Reference 2.7.5.3
Totaliser reset	Reference 2.7.5.4
Diagnostics	Reference 2.7.5.5
Input config.	Reference 2.7.5.6

⇒ Note: All following menus require access code for display/parameter modification.

SECTION 2
SFE CONTROLLER

2.7.5.1 MACHINE CONFIGURATION REPROGRAM MENU

Machine config.	Description
Auto start	Auto restart after power failure (off / automatic).
Start ctrl	Start / stop source selection (local / remote).
Press. ctrl	Pressure control source selection (local / remote).
Mach. nr.	Controller number.
P. unit	Pressure measurement units (bar / psi).
T. unit	Temperature measurement units (C / F).
Lang.	Language selection

2.7.5.2 MODULATION PARAMETERS REPROGRAM MENU

This menu sets the modulation PID control algorithm sensitivity.

Regul. Settings	Description
Min. value	PID control output min. value: default = 0; min = 0; max = 100
P Factor	PID control proportional factor: default = 40; min = 0; max = 100
I Factor	PID control integral factor: default = 10; min = 0; max = 100
D Factor	PID control derivative factor: default = 10; min = 0; max = 100
Max. value	PID control output max. value: default = 100; min = 0; max = 100

- Increasing the Min. Value will limit the analog output used for modulation. For example a Min. Value of 50 will limit a 4-20 mA output to 12-20 mA output.
- Increasing the P, I, or D factor will increase the response time for the modulating control.
  D**e**creasing the Max. Value will limit the analog output used for modulation. For example a Max. Value of 50 will limit a 4-20 mA output to 4-12 mA output.

2.7.5.3 FACTORY SETTINGS

This menu provides the parameters for sensor protection features.

Factory settings	Description
Control (0-100%)	default = 4-20 ; 4-20 (0% = 4, 100% = 20) / 20-4 (0% = 20, 100% = 4)
OSM lockout	**Operation Settings Menu Lockout; default = off ; off/on**
SF rate (target pr. rate)	**Rate for Target setpt. changes, default = 0 sec/psi; min = 0 sec/psi; max = 240 sec/psi.**
Inlet pr. high alm.	default = 145 psi; min = inlet pr. low alm. ; max = max. input range psi
Inlet pr. low alm .	default = 0 psi; min = 0 psi; max = inlet pr. high alm.
Flow low alm.	default = 0 cfm; min = 0 cfm; max = flow high alarm
Flow high alm.	default = 10000 cfm; min = flow low alarm ; max = max. input range
Dewpt. max. alm.	default = 32 ‘F; min = min. input range; max = max. input range
Defaults	Reprograms all factory settings and input config. settings to default values.

2.7.5.4 TOTALISER RESET

This menu resets the totalisers for flow and power.

Totaliser reset	Description
V.A (flow)	Flow A totalised cf
V.B (flow)	Flow B totalised cf
V.C (flow)	Flow C totalised cf
V.D (flow)	Flow D totalised cf
Ener. (power)	Power totalised Kwh

2.7.5.5 DIAGNOSTICS MENU

This is a sub-directory containing additional calibration and configuration sub-menus.

Diagnostics	Description
Digital test in	Reference 2.7.5.5.1
Digital test out	Reference 2.7.5.5.2
Test analog in	Reference 2.7.5.5.3
Test displays	Reference 2.7.5.5.4
Test keyboard	Reference 2.7.5.5.5

2.7.5.5.1 DIGITAL TEST IN

This sub-menu shows the current state of each input.

Digital test in	Description
Dig in 1	CLSD / OPEN
Dig in 2	CLSD / OPEN
Dig in 3	CLSD / OPEN
Dig in 4	CLSD / OPEN
Dig in 5	CLSD / OPEN
Dig in 6	CLSD / OPEN
Dig in 7	CLSD / OPEN
Dig in 8	CLSD / OPEN

2.7.5.5.2 DIGITAL TEST OUT

⇒ This menu is to be used only by qualified service technicians.

This sub-menu allows the qualified service technician to force outputs.

Digital test out	Description
Dig out 1	OFF / ON
Dig out 2	OFF / ON
Dig out 3	OFF / ON
Dig out 4	OFF / ON
Dig out 5	OFF / ON
Dig out 6	OFF / ON
Dig out 7	OFF / ON
Dig out 8	OFF / ON

2.7.5.5.3 TEST ANALOG IN

This sub-menu shows the current state of each input.

Test analog in	Description
An. Inp. 1	0.00V – 5.00V
An. Inp. 2	0.00V – 5.00V
An. Inp. 3	0.00V – 5.00V
An. Inp. 4	0.00V – 5.00V
An. Inp. 5 - 8	0.00V – 5.00V
An. Inp. 9 - 16	0.00V – 5.00V

2.7.5.5.4 TEST DISPLAYS

When this sub-menu is activated all display segments and LED's will illuminate. The alphanumeric display will show the text as indicated. Pressing the "-" or "reset" key restores the display to its normal condition.

ABCDEFGHIJKLMNOP
QRSTU-0123456789

2.7.5.5.5 TEST KEYBOARD

This sub-menu is activated for testing the keyboard. Once active each key pressed will show the appropriate text as shown in the table below. To exit the menu the "∧" and "∨" keys must be pressed simultaneously.

Test keyboard
UP
DOWN
SUB
ADD
ENT
RST
OFF
ON

2.7.5.5.6 INPUT CONFIGURATION

This is a sub-directory containing additional calibration and configuration sub-menus.

Input config.	Description
Sensor alloc.	Reference 2.7.5.5.6.1
Sensor zero	Reference 2.7.5.5.6.2
Sensor scale	Reference 2.7.5.5.6.3
Anl. input type	Reference 2.7.5.5.6.4
Anl. input Offset	Reference 2.7.5.5.6.5
Digital alloc.	Reference 2.7.5.5.6.6
Digital config.	Reference 2.7.5.5.6.7

2.7.5.5.6.1 SENSOR ALLOCATION

This sub-menu allows for the selection of which channel (analog input terminal designation) is used for each sensor. The standard Electronic Controller has four available channels. Note: for the standard Electronic Controller only channels 1 – 4 can be used. The Electronic Controller has an optional 8-channel analog module. If this option is included channels 1 – 4, 9 - 16 can be used. Only 4-20 mA or PT-1000 temperature sensors can use channels 9 – 16. The sensor selected for channel 2 will use the top left display. Inlet pressure is typically set to channel 2. Delivery pressure is always set to channel 1 and uses the top right display. All sensors are displayed by pressing the down arrow button in the Status Display (default display).

Sensor alloc.	Description
Delivery press	1
Inlet press	-- (not active), 2 - 4, 9 - 16
Remote setpt	-- (not active), 2 - 4, 9 - 16
Press A…D	-- (not active), 2 - 4, 9 - 16
Flow A…D	-- (not active), 2 - 4, 9 - 16
Dewpt A…D	-- (not active), 2 - 4, 9 - 16
Power	-- (not active), 2 - 4, 9 - 16
Current	-- (not active), 2 - 4, 9 - 16
Del temp	-- (not active), 2 - 4, 9 - 16
Outl temp	-- (not active), 2 - 4, 9 - 16
Water temp	-- (not active), 2 - 4, 9 - 16
Temp A	-- (not active), 2 - 4, 9 - 16
Temp B	-- (not active), 2 - 4, 9 - 16
Retransmit ch	-- (not active), 2 - 4, 9 - 16

2.7.5.5.6.2 SENSOR ZERO

This sub-menu allows for the selection of the sensor's low end (zero). For example, a temperature sensor's low end (zero) may be 14 °F.

Sensor zero	Description
Dewpt A…D	default = 14 °F, min = -99 °F, max = 999 °F
Del temp	default = 14 °F, min = -99 °F, max = 999 °F
Outl Temp	default = 14 °F, min = -99 °F, max = 999 °F
Oil Temp.	default = 14 °F, min = -99 °F, max = 999 °F
Temp A	default = 14 °F, min = -99 °F, max = 999 °F
Temp B	default = 14 °F, min = -99 °F, max = 999 °F
Water temp	default = 14 °F, min = -99 °F, max = 999 °F
Retransmit ch	default = 14 °F, min = -99 °F, max = 999 °F

2.7.5.5.6.3 SENSOR SCALE

This sub-menu allows for the selection of the sensor's scale (range). For example a temperature sensor's scale (range) may be 255 °F. The sensor scale can also be used to calibrate the sensor's reading. For example, if a temperature sensor is reading 1 °F higher than it should the normal setting of 255 °F may be set to 254 °F to compensate.

Sensor scale	Description
Delivery press	Default = 232 psi, min = 15 psi, max = 999 psi
Inlet press	Default = 255 °F, min = 0 °F, max = 999 °F
Remote setpt	Default = 232 psi, min = 15 psi, max = 999 psi
Press A…D	Default = 232 psi, min = 15 psi, max = 999 psi
Flow A…D	Default = 1000 CFM, min = 0 CFM, max = 9,999 CFM
Dewpt A…D	Default = 32 °F, min = -99 °F, max = 999 °F
Power	Default = 100 KW, min = 0 KW, max = 999 KW
Current	Default = 100 A, min = 0 A, max = 999 A
Del temp	Default = 255 °F, min = 0 °F, max = 999 °F
Outl temp	Default = 255 °F, min = 0 °F, max = 999 °F
Water temp	Default = 255 °F, min = 0 °F, max = 999 °F
Temp A	Default = 255 °F, min = 0 °F, max = 999 °F
Temp B	Default = 255 °F, min = 0 °F, max = 999 °F
Retransmit ch	Default = 232 psi, min = -99, max = 9,999

2.7.5.5.6.4 ANALOG INPUT TYPE

This sub-menu allows for the selection of which type of input each channel is configured for. Analog inputs 1 – 4 each have a hardware jumper that must be in the proper position.

Anl. input type	Description
An. in. 1	OFF, 0-20mA, 0-5V, 4-20mA, 1-5V, 0.5-4.5V, KTY10 (temp. sensor)
An. in. 2	OFF, 0-20mA, 0-5V, 4-20mA, 1-5V, 0.5-4.5V, KTY10 (temp. sensor)
An. in. 3	OFF, 0-20mA, 0-5V, 4-20mA, 1-5V, 0.5-4.5V, KTY10 (temp. sensor)
An. in. 4	OFF, 0-20mA, 0-5V, 4-20mA, 1-5V, 0.5-4.5V, KTY10 (temp. sensor)
An. in. 5 - 8	Not Used, Set to OFF
An. in. 9 - 16	OFF, 4-20 mA, PT1000 (temp. sensor)

2.7.5.5.6.5 ANALOG INPUT OFFSET

This sub-menu allows for the offset calibration of each input.

Offset procedure:

- Analog input for desired sensor must be measuring the low end of its scale (pressure sensor that has a range of 0–232 psi should be connected to 0 psi).
- Press the "+" or "-" button until the desired reading is displayed (pressure sensor that has a range of 0-232 psi should read 0).

Anl. input Offset	Description
AI1 Offset	0
AI2 Offset	0
AI3 Offset	0
AI4 Offset	0
AI5 - 8 Offset	0
AI9 - 16 Offset	0

2.7.5.5.6.6 DIGITAL ALLOCATION

This sub-menu allows for the selection of which channel (digital input terminal designation) is used for each sensor. The Electronic Controller has eight available channels.

Digital alloc.	Description
Emergency st.	C1
REM/LOC	-- (not active), C2 – C8
Imm air supply	-- (not active), C2 – C8
Dp air filter A	-- (not active), C2 – C8
Dp air filter B	-- (not active), C2 – C8
Dp air filter C	-- (not active), C2 – C8
Dp air filter D	-- (not active), C2 – C8
Dp air filter E	-- (not active), C2 – C8
Drain alarm A	-- (not active), C2 – C8
Drain alarm B	-- (not active), C2 – C8
Drain alarm C	-- (not active), C2 – C8
Drain alarm D	-- (not active), C2 – C8
Drain alarm E	-- (not active), C2 – C8
Service alarm	-- (not active), C2 – C8

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2.7.5.5.6.7 DIGITAL CONFIGURATION

This sub-menu allows for the selection of which type of input each channel is configured for.

Digital config.	Description
Dig input 1	NC
Dig input 2	NC / NO
Dig input 3	NC / NO
Dig input 4	NC / NO
Dig input 5	NC / NO
Dig input 6	NC / NO
Dig input 7	NC / NO
Dig input 8	NC / NO

2.8 SAFETY FUNCTIONS & ERROR MESSAGES

The controller incorporates a number of safety functions to protect the plant and/or its user from dangerous conditions. These functions are divided into the following categories:

- **Shutdown Conditions.** These are conditions that if continued may cause a low pressure condition. When these conditions occur the FlowLogic unit goes to manual mode 100% output.

- **Alarm / Warning Conditions**. These are conditions that cause poor air quality and wasteful conditions. When running, the FlowLogic unit is not stopped but the alarms are signalled to draw attention to the condition for corrective action.

- **Service Conditions**. These are conditions that are signaled to indicate that routine maintenance, in accordance with the manufacturer's recommendations, is necessary to keep the plant's air system running smoothly and efficiently.

- **Start Inhibit Functions.** This function prevents the FlowLogic unit from starting in a condition that may cause a low pressure condition.

The various safety functions are:

- Emergency Stop
shutdown condition
digital input signal
checked continuously

- Low Delivery Pressure (dP alarm)
shutdown condition
analog reading comparison with setting
checked continuously

- Delivery Pressure Probe Fault
shutdown condition
check on delivery air pressure sensor operation
checked continuously

- Inlet Pressure Probe Fault
shutdown condition
check on inlet air pressure sensor operation

checked continuously

- Low Inlet Pressure
alarm warning condition
comparison of pressure reading to min. pressure setting.
checked continuously

- High Inlet Pressure
alarm warning condition
comparison of pressure reading to max. pressure setting.
checked continuously

- Low Flow A…D
alarm warning condition
comparison of flow reading to min. pressure setting.
checked continuously

- High Flow A…D
alarm warning condition
comparison of flow reading to max. pressure setting.
checked continuously

- Maximum Dewpt. A…D
alarm warning condition
comparison of dewpt. reading to max. dewpt. setting.
checked continuously

- Misc. Probe Fault (Flow, Temp, Press A-D, Dewpt)
alarm warning condition
check on sensor operation
checked continuously

- DP Air Filter High
alarm warning condition
digital input signal
checked continuously

- Drain
alarm warning condition
digital input signal
checked continuously

- Motor Power Failure Detect
shutdown condition, start inhibit or auto restart trigger
special detection: The 50(60) Hz mains supply is monitored. mains interrupts etc., are detected
checked continuously: start delay when detected at standstill, shutdown if the Electronic Controller's in Auto mode. Triggers auto restart if auto restart function enabled.

SECTION 2
SFE CONTROLLER

2.9 START UP PROCEDURES

⚠ WARNING

All FlowLogic safety and shut down features must be operational. Sullair Corporation is not responsible for any personal injury and/or machine damage caused by mis-wiring of the unit.

Once all connections are made and checked, apply power to the Electronic Controller.

NOTE

Do <u>not</u> press the START button.

Configure the Electronic Controller with the appropriate settings. All menu screens should be checked for correct settings.

⚠ WARNING

Factory default settings may not be correct for your unit. Starting the unit with in-correct settings may result in personnel hazard and/or low pressure condition. Access codes are required for setting modifications. Call Sullair Corporation or an authorized dealer for these codes.

Verify the pressure displays.

Verify all menu settings.

Press the START button to initiate the start sequence. Keep a log of relevant settings.

2.10 PROCEDURE FOR ORDERING PARTS

Parts should be ordered from the nearest Sullair Representative or the Representative from whom the FlowLogic unit was purchased. If for any reason parts cannot be obtained in this manner, contact the factory directly at the addresses, fax or phone numbers below.

SULLAIR ASIA, LTD.
Sullair Road, No. 1
Chiwan, Shekou
Shenzhen, Guangdong PRV.
PRC POST CODE 518068
Telephone: 755-6851686
Fax: 755-6853473
www.sullair-asia.com

SULLAIR CORPORATION
3700 East Michigan Boulevard
Michigan City, Indiana 46360 U.S.A.
www.sullair.com
Telephone: 1-800-SULLAIR (U.S.A. Only)
or 1-219-879-5451
Fax: (219) 874-1273

PARTS DEPARTMENT
1-888-SULLAIR (U.S.A. Only)
Fax: (219) 874-1835
www.sullair.com

SERVICE DEPARTMENT
Fax: (219) 874-1205
www.sullaircompressors.com

SULLAIR EUROPE, S.A.
Zone Des Granges BP 82
42602 Montbrison Cedex, France
Telephone: 33-477968470
Fax: 33-477968499
www.sullaireurope.com

CHAMPION
COMPRESSORS, LTD.
Princes Highway
Hallam, Victoria 3803
Australia
Telephone: 1-800-810-015 (for Australia-wide
Branch Network Only)
Telephone: 61-3-9796-4000
Fax: 61-3-9703-8053

SECTION 2
SFE CONTROLLER

2.11 TROUBLESHOOTING

SYMPTOMS	CAUSE	*REMEDY*
LOW FLOWLOGIC PRESSURE	Pneumatic control tubing is leaking or damaged.	*Repair leak.*
	Control modules on header are stuck closed.	*Check modules for contamination. Clean, repair or replace.*
HIGH FLOWLOGIC DISCHARGE PRESSURE	Bypass valve is open.	*Inlet and outlet gauges read the same pressure. Close the manual bypass or repair auto bypass.*
	Electro-pneumatic I/P is defective.	*Replace.*
	Control modules are stuck open.	*Check modules for contamination. Clean, repair or replace.*
UNSTABLE DISCHARGE PRESSURE	Inlet air pressure is within 4 psi of discharge air pressure set point.	*Increase inlet air pressure and/or decrease discharge air pressure set point.*
	Pneumatic servo control line and/or fittings are leaking. This line should be bubble-tight.	*Check for leak from servo pilot to each control module. Repair leak.*
	Electro-pneumatic I/P is defective.	*Replace.*
	Control modules are contaminated and/or have torn or cracked o-rings.	*Clean, repair or replace.*
LOW PRESSURE ALARM MODE ACTIVATES	Auto bypass valve failed to open.	*Check bypass solenoid and replace if bad. Clean or replace bypass actuator.*
CONTROL VALVES VENT CONTINUOUSLY	Control modules stuck.	*Clean, repair or replace.*
NO FLOWLOGIC CONTROL PANEL POWER	Fuse is blown.	*Replace and check for possible cause.*

FlowLogic™ Flow Pressure Controller Warranty

Warranties and Limitation of Liability: Sullair Corporation ("the Company") warrants that it will, in its sole discretion, either repair or replace Products and/or Components of Products sold by it, or its distributors, which have defects in material or workmanship (covering Components and reasonable labor) provided: **(a)** Customer notified the Company of any claim of defect in material or workmanship within fourteen (14) months from date of shipment from the Company's factory or twelve (12) months from the date of initial operation of Product, whichever occurs first; **(b)** Customer holds the Product or Component for inspection by the Company's representative; **(c)** Customer returns the Product(s) or Component(s) only with Company authorization, within thirty (30) days after such authorization, with transportation charges prepaid and shipped pursuant to the Company's directions; and **(d)** the Product(s) or Component(s) are found defective in materials or workmanship upon examination by the Company. Products or Components shall not be considered defective if they substantially fulfill performance requirements set forth in the Company literature and are manufactured in accordance with the Company's specifications or government specifications when applicable. Replacement/spare Components will be warranted for six (6) months from the date of shipment, or for the balance of the original warranty period (or extended warranty period, see below), whichever is longer (parts only).

Available Extended Warranty: In addition to the above warranty, for Sullair FlowLogic Flow Pressure Controllers: **(i)** the above warranty will be extended to twenty-four (24) months from the date of shipment from the Company's factory (covering Components only) as to such specified products and **(ii)** the Company warrants that it will, in its sole discretion, either repair or replace valves on controllers for defects in material or workmanship (covering Components only) provided: **(a)** Customer notified the Company of any claim of defect in material or workmanship within sixty (60) months from date of shipment from the Company's factory; **(b)** Customer holds the Product or Component for inspection by the Company's representative; **(c)** Customer returns the Component(s) only with Company authorization, within thirty (30) days after such authorization, with transportation charges prepaid and shipped pursuant to the Company's directions; and **(d)** the Component(s) are found defective in materials or workmanship upon examination by the Company. Components shall not be considered defective If they substantially fulfill performance requirements set forth in the Company literature and are manufactured in accordance with the Company's specifications or government specifications when applicable. These extended valve warranties cover only parts, not labor, and are not pro-rated in any way.

What is Not Covered By This Warranty. This warranty is **strictly conditioned** on the use of genuine Sullair replacement parts (such as filters and separators) and the recommended Sullair lubricant. Use of replacement parts or lubricants not supplied or recommended by Sullair will void all coverage hereunder, as will any disassembly of the products by anyone other than an authorized Sullair repair person. This warranty **does not** cover (i) expenses associated with the removal of defective products or the re-installation of repaired or replacement products by anyone other than an authorized Sullair Distributor; (ii) defects caused by Purchaser's failure to provide a suitable installation environment; (iii) defects caused by abuse or use of products for purposes other than those for which designed; (iv) defects caused by unauthorized attachments or modifications; or (v) damage that occurred during shipping.

Disclaimer of Warranty. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Remedies. In no case shall Sullair be liable for any special, incidental, or consequential damages based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory. Such damages include, but are not limited to, loss of profits, loss of savings or revenue, loss of use of the products or any associated equipment, cost of capital, cost of any substitute equipment, facilities or services, downtime, the claims of third parties including customers, and injury to property.

Time Limit for Bringing Suit. Any action for breach of warranty must be commenced within 3 months after the applicable warranty period has expired.

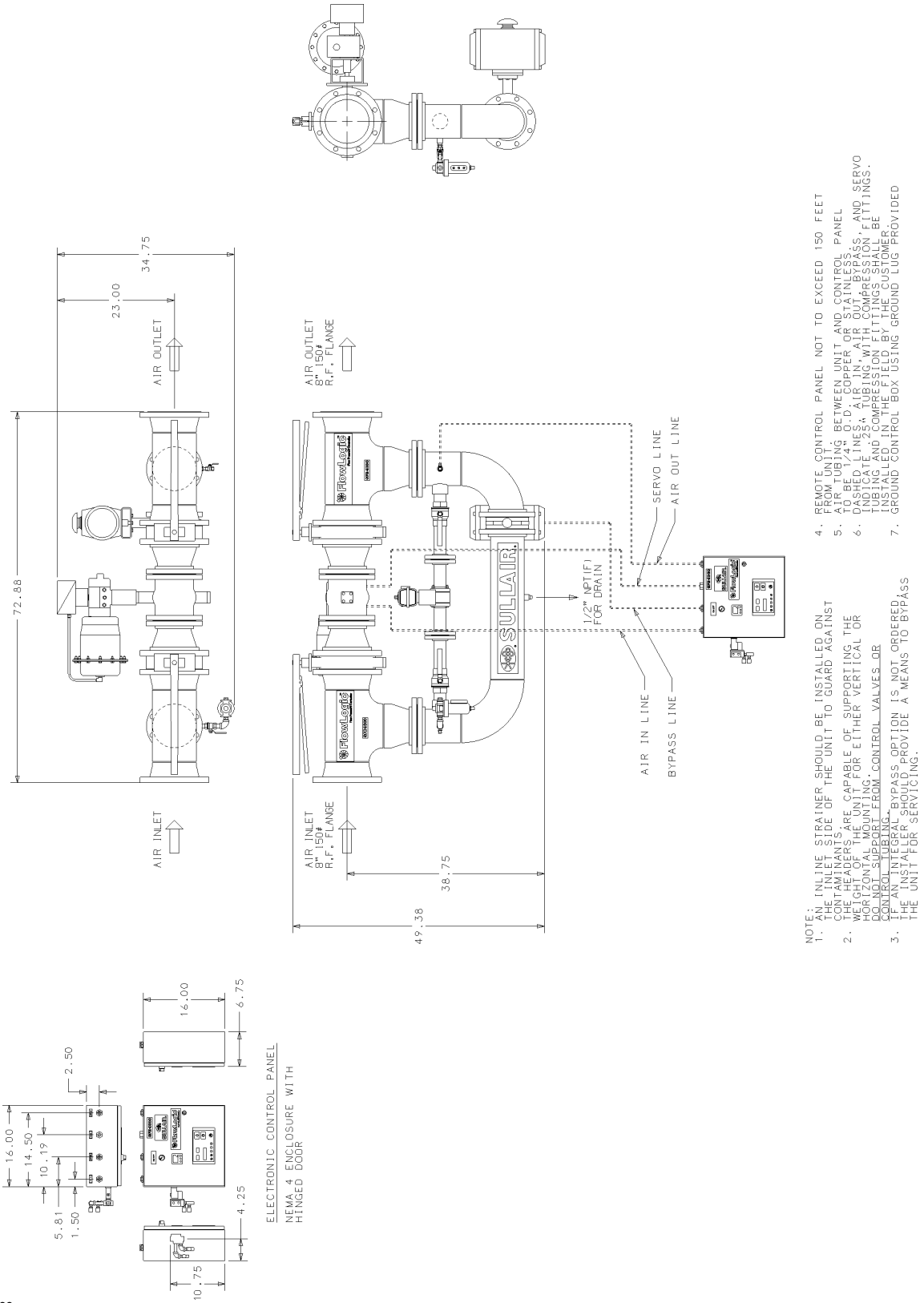
No Other Warranties. Unless modified in a writing signed by both parties, this Limited Warranty is understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written, and all other communications between the parties relating to warranties. No employee of Sullair or any other part is authorized to make any warranty in addition to those made herein.

Allocation of Risks. Purchaser acknowledges that this Limited Warranty allocates the risks of product failure between Sullair and Purchaser and that this allocation is reflected in the price of the products. Purchaser acknowledges that it has read and understands this Limited Warranty, and is bound by its terms.

NOTES

SECTION 3
ILLUSTRATIONS

3.1 INSTALLATION DRAWING – SFE 9000 CFM FLOW CONTROLLER



NOTES:
1. AN INLINE STRAINER SHOULD BE INSTALLED ON THE INLET SIDE OF THE UNIT TO GUARD AGAINST CONTAMINANTS
2. THE HEADERS ARE CAPABLE OF SUPPORTING THE WEIGHT OF THE UNIT FOR EITHER VERTICAL OR HORIZONTAL MOUNTING. CONTROL SUPPORT FROM CONTROL VALVES OR PIPING.
3. IF AN INTEGRAL BYPASS OPTION IS NOT ORDERED, THE INSTALLER SHOULD PROVIDE A MEANS TO BYPASS THE UNIT FOR SERVICING.
4. REMOTE CONTROL PANEL NOT TO EXCEED 150 FEET FROM UNIT
5. AIR TUBING BETWEEN UNIT AND CONTROL PANEL TO BE 1/4" O.D. COPPER OR STAINLESS.
6. DASHED LINES, AIR IN, AIR OUT, BYPASS, AND SERVO INDICATE .25" TUBING WITH COMPRESSION FITTINGS. TUBING END CONNECTIONS TO BE INSTALLED BY THE FIELD TECHNICIAN.
7. GROUND CONTROL BOX USING GROUND LUG PROVIDED

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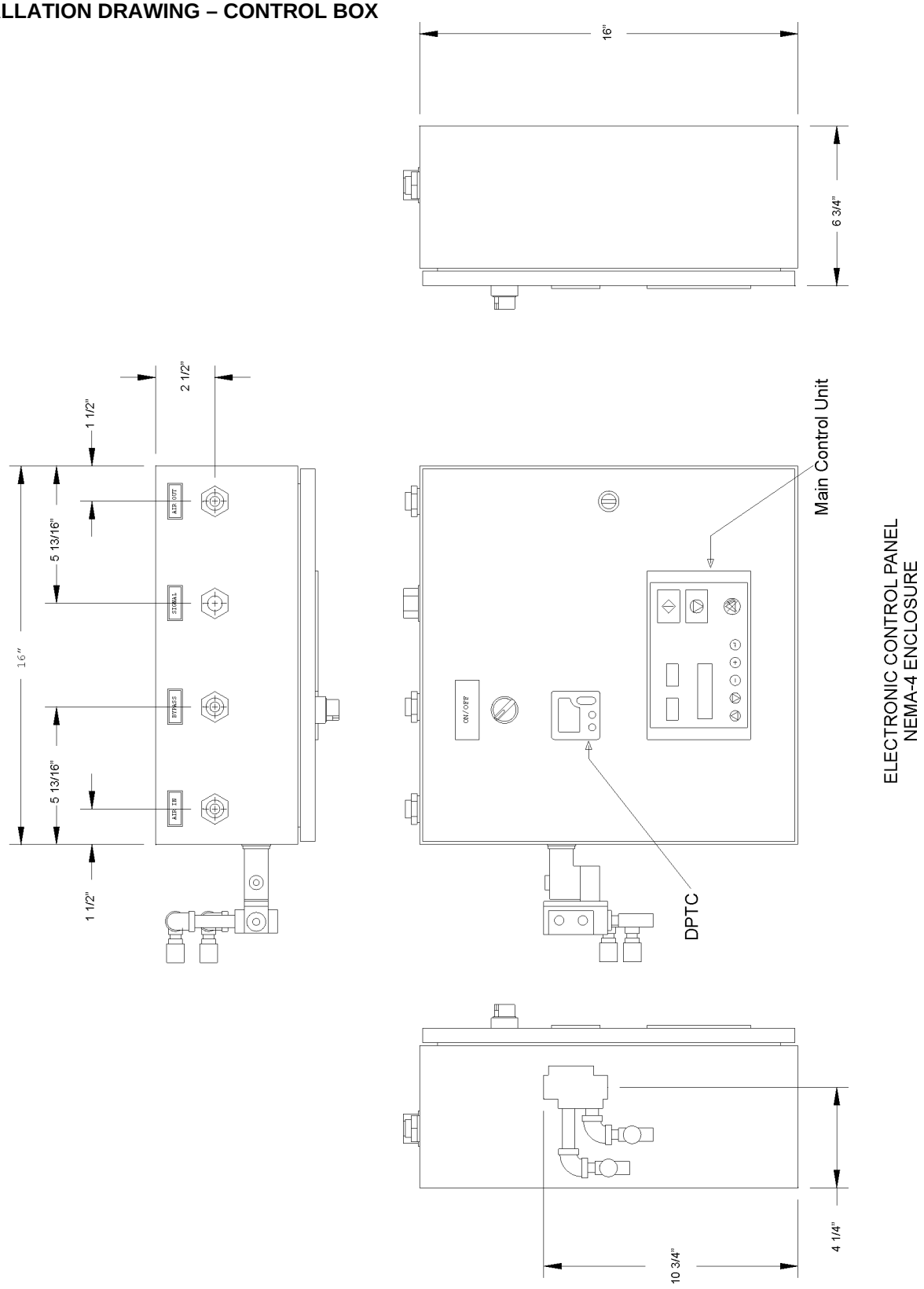
SECTION 3
ILLUSTRATIONS

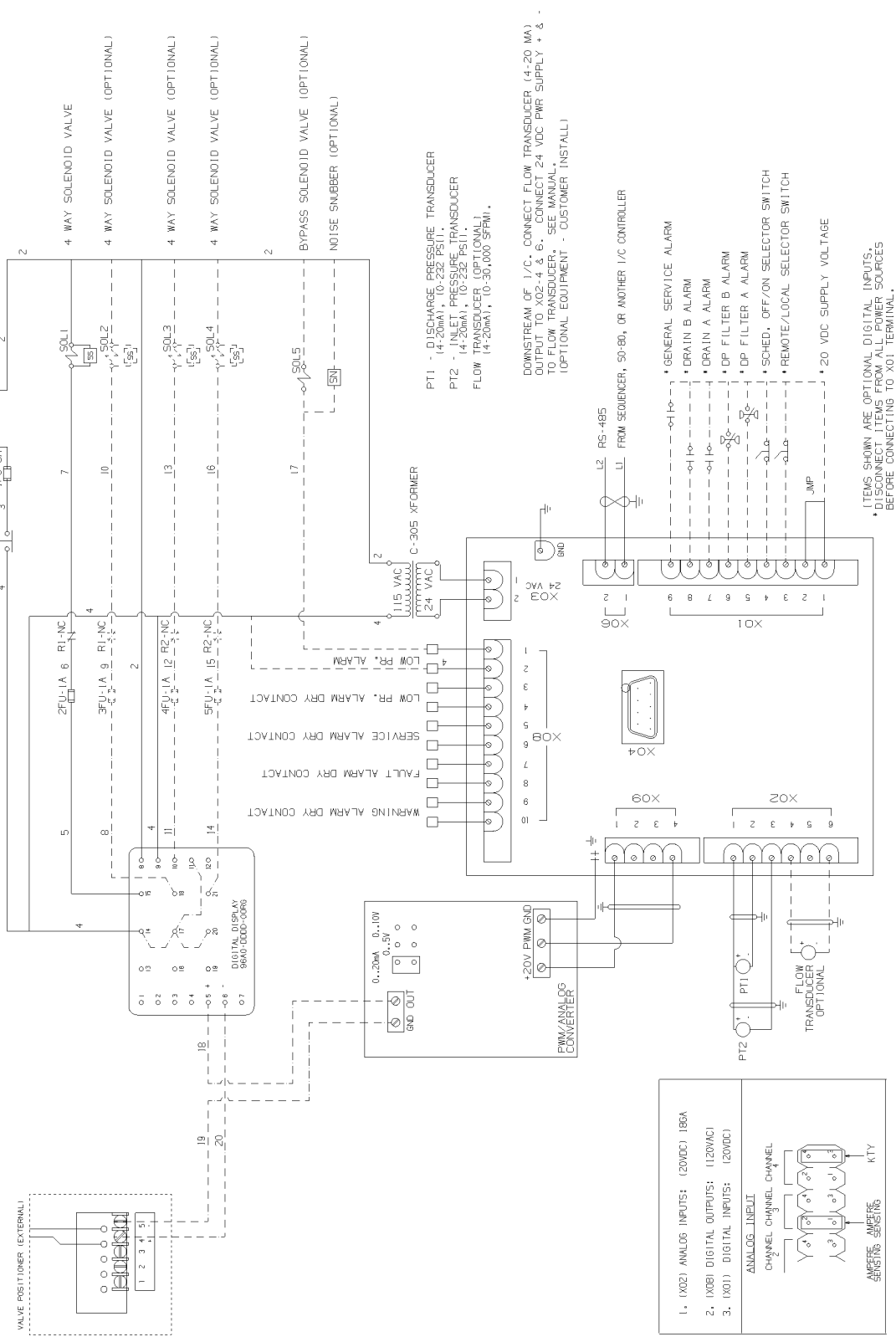
3.2 INSTALLATION DRAWING – CONTROL BOX



ELECTRONIC CONTROL PANEL
NEMA-4 ENCLOSURE

SECTION 3
ILLUSTRATIONS

3.3 WIRING DIAGRAM



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