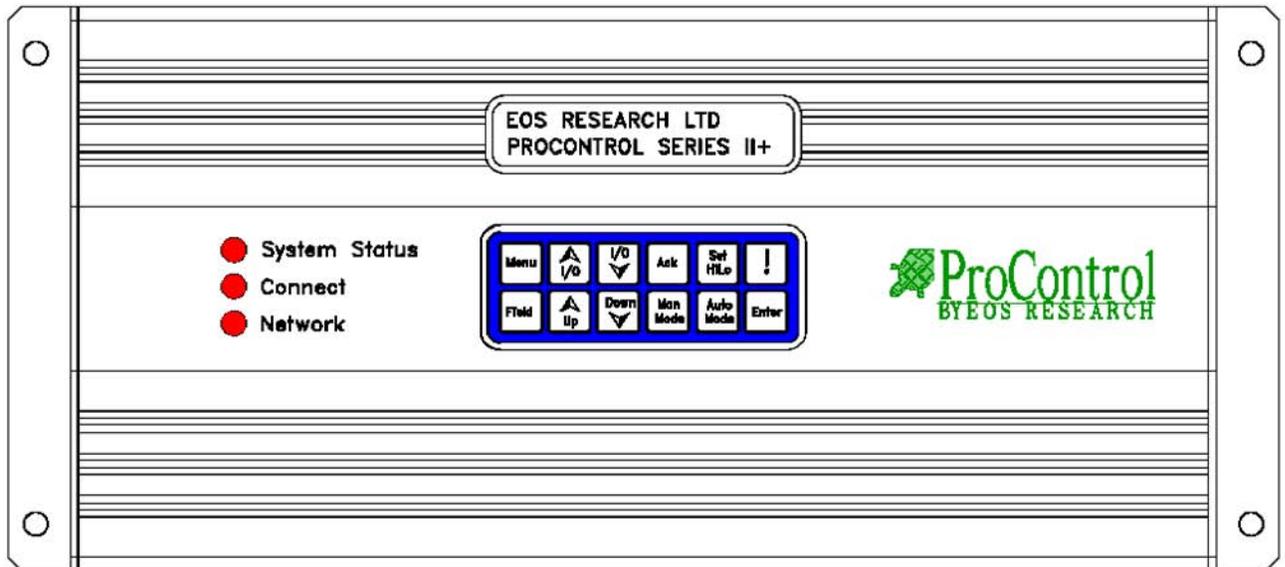


PROCONTROL

SERIES 2^{plus} USER MANUAL



Version 2.2X

EOS Research, Ltd.

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APPENDIX A - Typical ProControl Wiring

Please see the ProView User's Guide for operation of the remote access software which is supplied with the ProControl Series *2^{plus}*.

1.0 SYSTEM OVERVIEW

1.1 General

The *ProControl Series 2^{plus}* is a small but powerful supervisory control and data acquisition (SCADA) system. By combining process control and remote capabilities in one unit, the Series *2^{plus}* can act as a central supervisory and data management tool for any stand-alone operation. The *ProControl Series 2^{plus}* can perform multiple tasks:

- **Stand-Alone Control:** The *ProControl Series 2^{plus}* provides powerful and straightforward, event-driven process control; everything from simple on/off control to complex startup sequences and PID control loops. It can interface with up to 78 electrical devices (float switches, pressure transducers, pH transmitters, flow meters, pumps, blowers, etc.), and will simultaneously execute several control routines for your operation. It is an extremely versatile process controller.
- **Remote Control and Monitoring:** The *ProControl Series 2^{plus}* gives you a window into your operation from any remote location, with our easy-to-use PROVIEW™ software and reliable, proven communications via broadband internet, cellular data connection or land-line modem. You'll have the same level of control as if you were at the site. No other SCADA controller gives you the ProControl's level of real-time remote control capability.
- **Reporting:** The *ProControl Series 2^{plus}* will keep you informed, with scheduled email or fax status reports, and instant text/pager messages for alarm conditions. No longer do you have to assume what's happening at your remote operation.....the ProControl will tell you exactly.
- **Datalogging:** As your information manager, the *ProControl Series 2^{plus}* will record all operating conditions in its internal memory, while keeping track of flow totals, duty cycles, etc. Have your data emailed to you, or access your system remotely for download or review at any time. The ProControl is an invaluable tool for reporting, troubleshooting and trend graphing.

One or more of these features can be used in your installation; they are standard in every ProControl unit.

1.2 Key Concepts

The following are the building blocks of any Series *2^{plus}* monitoring and control system.

Inputs and Outputs (I/O's)

No system can be effective in the real world without communication and one of the principal ways the ProControl communicates is by responding to information collected by sensors and by issuing "commands" to other electronic or electrical devices. Sensor information constitutes an *Input* while a "command" to another device constitutes an *Output*. The Series *2^{plus}* works with all of the more important types of I/O devices in general use. Appendix A demonstrates how a variety of I/O devices are connected to the ProControl.

Digital Inputs

These inputs are designed to detect the closure of switch contacts such as those found on float switches or overpressure sensors. They can respond to any normally open or normally closed dry contact. The Series *2^{plus}* provides its own wetting (supply) voltage of 5 volts DC for each digital input circuit. The Series *2^{plus}* can respond to changes in state as fast as 4 Hz or 3 Hz (cycles per second) depending on the model purchased. Digital inputs are "debounced" for 125 or 150 milliseconds, respectively. This means that a switch or other input that changes state (becomes open or closed) must stay in that state for 125 or 150 milliseconds before the Series *2^{plus}* will respond to the change.

Up to eight high-speed digital inputs can also be used for traditional digital (pulse-output) flow meters. These inputs can detect signal changes at up to a 200/500 Hz rate. All high-speed digital inputs are "debounced" for 1250/500 microseconds. The faster rate applies only to Type A ProControl units.

Analog Inputs

These inputs are compatible with sensors which send out a 4 - 20 milliamp (mA) signal. Most analog sensors are available with this type of signal, examples being pressure transducers, pH transmitters, and many flow meters. These inputs allow the operator to read the actual "value" of a parameter, such as pressure, instead of an on/off signal.

Digital Outputs

Digital outputs turn things like pumps, solenoid valves, and alarm lights on and off. The Series *2^{plus}* digital outputs are relay outputs designed to switch small loads directly, such as motor starters, lamps, and solenoid valves.

Analog Outputs	Analog outputs are typically used in process control schemes where a controlled piece of equipment can accept a signal which is variable over a range. This output is expressed as a percentage (0 - 100%) and is used to control pump speeds, chemical dosing rates, etc., instead of conventional on/off operation. The equipment that the ProControl sends the analog output to must accept a 4 - 20 mA signal. Often, an analog output is used in conjunction with an analog input such as a pH transmitter to form a control scheme known as <i>feedback control</i> . In essence, the input and output will work together to maintain a user set input level. This concept is described further in the next section under <i>Analog Output Processes</i> .
Tagnames	Each input and output is given a descriptive <i>Tagname</i> by the user that uniquely identifies it to the system operator. For instance, a digital input could be called □TANKHI□, an analog input could be called □AIRFLO□ and a digital output could be called □PUMP_1□. This tagname is used by the local LCD display, the email/fax reports and by the ProView software. The analog inputs are also given a <i>Units Tagname</i> which identifies the unit of measure associated with the input sensor. Each tagname can be up to six characters long and each units tagname can be up to three characters long (□PSI□ for instance). The tagnames can include the uppercase letters A-Z, the numbers 0-9, a blank space, and the underscore (□) character.

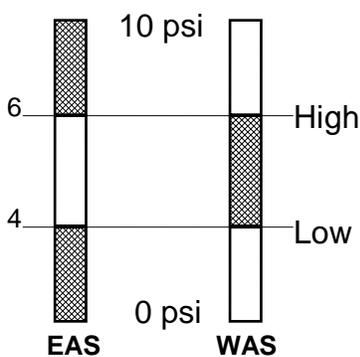
1.3 Control Basics

The status of all inputs or outputs can easily be monitored both locally and remotely. What gives the Series **2^{plus}** its real power, however, is the ability to automatically initiate actions based on the status of the inputs and your pre-programmed instructions (this is often called *Process Control*). These actions can include switching certain outputs, sending an email report, sending an text message, shutting down the entire system or sounding the local alarm. Process control functions are programmed into your ProControl by EOS Research or one of our technology partners according to your specifications.

Active State Central to the use of control on the Series 2^{plus} is the concept of *Active State*. Each input on the ProControl receives certain signals from a sensor which constitute normal operation and other signals which constitute an exception to normal operation.

A digital input can monitor only two states, ON or OFF (alternatively, CLOSED or OPEN). The *Active State* would be the state in which the controller would respond to the digital input, and perform certain actions or generate an alarm. For example, if a high level float switch in a tank is tripped (turned ON) by rising fluid level, we can say that its *Active State* correlates to a situation in which the fluid level is high. The active state of the float switch could cause the Series 2^{plus} to trigger an alarm, turn off a pump, or initiate some other action. The Series 2^{plus} can be set up so that either ON or OFF is the active state.

An analog input sensor can take on many states (or values) between the minimum and maximum of its measurement range. The ProControl operator, however, can set two threshold values which divide the total input span into two functional regions. These threshold values are more commonly called the *Low Alarm Limit* and the *High Alarm Limit*, although on the Series 2^{plus} these thresholds are somewhat more flexible in use than those names imply. An analog input which has transcended either its Low Alarm Limit or High Alarm Limit is said to be in its active state.



For instance, consider an analog input sensor which measures pressure from 0 to 10 PSI. The system operator could set the low limit to 4 PSI and the high limit to 6 PSI. In this case the *Active State* would usually be considered as the input state greater than 6 PSI or less than 4 PSI. This interpretation is called *Endpoint Active State* (EAS) on the Series 2^{plus} because the endpoints of the range are the areas which need to trigger action or generate alarms. The opposite interpretation (though rarely used) is also possible and is called *Window Active State* (WAS). Any input values between 4 PSI and 6 PSI would trigger action or generate alarms.

Figure 1. Active State

If the ProControl has *Alarms Set*, when any input enters its active state, a local beeper will sound on the ProControl. The word *Alarm* here applies only to the sounding of a local beeper and is not associated with any process control. The active state condition is indicated on the LCD display and can be acknowledged by the operator. The beeper is silenced when it has been acknowledged or after 30 seconds have elapsed. The beeper only operates when the system is operating in Manual mode.

Startup Sequence The *Startup Sequence* is a series of control algorithms or steps which run in succession and which are designed to place the system in its normal operating mode. It can be as simple as turning all the outputs on simultaneously, or as complex as a multi-stage delay with many conditions. Up to 8 or 16 individual startup steps can be declared depending on the model of the controller. The ProControl can be configured to automatically run this sequence when the unit is powered up.

Process Tasks A *Process Task* is an ongoing control algorithm which runs continuously. Think of each process task as an IF-THEN statement, in which an action is initiated if a certain condition or combination of conditions exists. Some examples are:

- IF Tank Level Sensor 2 is on, THEN turn Pump 2 off
- IF Air Flow Rate < 10 cfm AND Reactor Temperature > 250^o, THEN open Bleed Valve 2

Up to 32 or 64 separate process tasks can be run simultaneously depending on the model of the controller. Process tasks can trigger email reports, text message alerts, and system shutdowns.

Shutdown Sequence The *Shutdown Sequence* is a series of control steps which run in succession and which are designed to shut your system down in a manner which is best for the equipment or treatment processes involved. The shutdown sequence can be activated manually or automatically due to an alarm condition. Here is an example shutdown sequence:

- Turn off Well Pumps 1 and 2
- Wait 5 minutes, then turn off Air Stripper Blower
- Open Bleed Valve 2
- When Oxidizer Temperature < 150^o, turn off SVE Blower

Automatic Operation The use of the startup sequence, process tasks, and the shutdown sequence constitutes *Automatic Operation* of your system with the ProControl Series **2^{plus}** (otherwise known as *Auto Mode*). The Series **2^{plus}** will be placed into auto mode (automatically) when your system has been started up using the programmed startup sequence. If one condition of the programmed startup sequence is not met during the startup process, your system will be completely shut down by the ProControl as a safety measure. Once the startup sequence has been successfully completed, the ProControl begins running the process tasks continuously. **PROCESS TASKS WILL RUN ONLY WHEN IN AUTO MODE.** Please note that the audible beeper will not sound even if the ProControl has *Alarms Set* when it is in Auto Mode, since the process tasks will control these situations as the user has specified.

<i>Manual Operation</i>	You can override the Series 2 ^{plus} programmed control functions by operating in <i>Manual Mode</i> . In manual mode, your process will respond only to operator input from the keypad of the ProControl, or to commands issued from the ProView software. PLEASE NOTE THAT PROCESS TASKS AND THEIR ERROR-CHECKING MECHANISMS DO NOT RUN DURING MANUAL MODE! Manual mode is useful when you wish to troubleshoot your system, but none of the system safeguards built into auto mode are available. You can place your operation into auto mode any time by issuing the command from the keypad.
<i>Analog Output Processes</i>	In some cases, you may want to use an analog output to control equipment that maintains an analog input at a certain constant level. For example, you may wish to automatically maintain a pH of 8.5 in a reaction tank by varying the dosing rate of a chemical feed pump. The pH you wish to maintain (8.5) is called the <i>SetPoint</i> of the analog output process. An analog input to the ProControl (in this case, a pH transmitter) is said to provide <i>feedback</i> to the unit, and combined with an analog output, constitute <i>feedback control</i> .
<i>PID Loops</i>	A reliable type of feedback control can be obtained through a <i>PID Loop</i> . PID stands for <i>Proportional-Integral-Derivative</i> , and is a commonly-used process control technique. We'll skip the details of the mathematics involved, but suffice it to say that a PID loop is the favored control technique for most analog output processes. With only a <i>Proportional</i> term applied in the equation, the analog output is controlled based on an error signal generated from the difference between the SetPoint and the actual analog input. The PID loop can also improve its performance as it continues to run if an <i>Integral</i> term is used, and can respond to quick changes in the controlling analog input if a <i>Derivative</i> term is used. EOS Research or your control system integrator will configure your PID loops for you and can provide further information if necessary.
<i>Proportional Outputs</i>	In some cases, it may be desirable to base an analog output signal on an analog input value. In this situation, no specific SetPoint is used because there is a direct relationship between the output and input values. For example, if you wanted to base the output of a metering pump on some flow rate, you might use a proportional output to relate the amount of chemical metered to the flow rate.

2.0 ON-SITE OPERATION

2.1 LCD

Display

If your unit did not come with an LCD display, the following sections *do not* apply.

The 2 line x 20 character LCD display is used to display and control system operations. The display is divided into separate areas or fields, as outlined below.

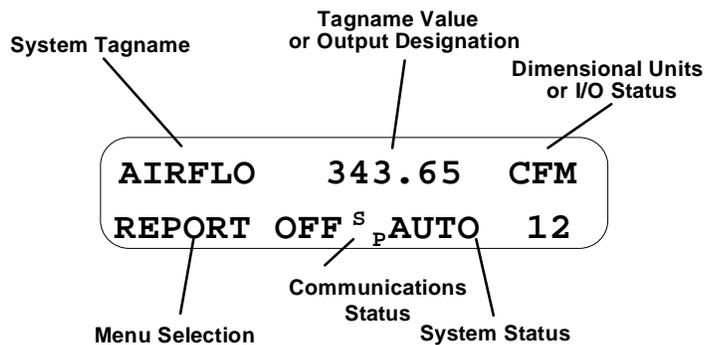


Figure 2. Display Fields

System Tagname

This six-character field is used to identify the I/O point displayed. Descriptive names such as WELL1 or BLOWER are used.

Tagname Value

For analog inputs, this field displays the value of the input, the high alarm limit, or the low alarm limit. For digital outputs, OUTPUT is displayed. For digital inputs, this field is unused. For analog outputs, this field displays the output percentage, the output level, or the associated input setpoint.

Dimensional Units or I/O Status

For analog inputs, this three-character field displays the dimensional units associated with the input sensor, such as GPM or PSI. For digital inputs and outputs, this field displays either ON or OFF. For analog outputs, this field abbreviates percent with PCT. In the case of digital outputs, if the particular output displayed has been designated a lamp output (*see ProView manual*), and a lamp test is currently running, an asterisk (*) will appear before ON or OFF to indicate the lamp is illuminated despite the indicated output status (the output will return to this indicated status once the lamp test has been completed).

Menu Selection

This field displays the current menu selection.

<i>Communications Status</i>	This field displays one of five different descriptors which indicate any of several special functions of the ProControl. If no communications action is being taken,  will appear. Communications messages include: SP (Sending Page or text message) - indicates that the unit is attempting to send either an alphanumeric or numeric message; EF (Encoding Fax) - indicates that the unit is presently encoding a facsimile report as a result of a request by either the operator or the unit itself; SF (Sending Fax) - indicates that the unit is attempting to send a fax report; SE (Sending Email) - indicates the unit is sending an email; and DC (Data Communications) - indicates that the unit is presently interfaced with ProView.
<i>System Status</i>	This area displays the current system status: AUTO, MANUAL, START, or SHUTD and an associated process task number indicating the last successfully completed Auto process, current Startup process, or current Shutdown process.

2.2 Keypad

The Series *2^{plus}* keypad contains 12 buttons which are used along with the LCD Display to control the operations of the system. The Type C ProControl has a 4-key keypad with more limited functionality.

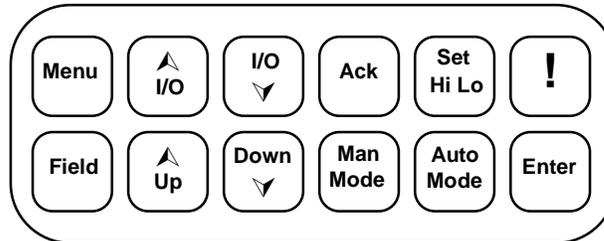
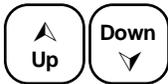


Figure 3. Series *2^{plus}* Keypad

- | | |
|---|--|
|  | This key is used to scroll through a series of options which are displayed on the LCD screen, and which allow the user to configure various aspects of system behavior. |
|  | These keys are used to display information about particular I/O points on the LCD Screen. The keys allow the user to scroll through all of the system I/O points either forward or backward. |
|  | The Acknowledge key is used to silence the audible beeper or to acknowledge a memo sent from a remote ProView user. |
|  | The Set Hi Lo key allows the user to change the high and low alarm limits for analog inputs or to toggle the display in the I/O Summary. |
|  | The Emergency Shutdown key is used to turn off all outputs and return the system to manual mode. The programmed shutdown sequence is <u>not</u> executed using this key. |
|  | The Field key is used to select a character position to be edited. It is used in conjunction with any direct alphanumeric entry. |
|  | These keys are used to toggle system variables from one state to the next or to scroll through possible character entries when used in conjunction with the Field key. |
|  | This key is used to place the system in manual mode. |
|  | This key is used to place the system in auto mode. |
|  | The Enter key is used to initiate certain actions selected by other keys or to confirm alphanumeric editing done using other keys. |

2.3 Password

When the system is first turned on the password screen is displayed and the user is prompted to enter the password to gain access to the system. [EOS] is the default password. The password on the Series 2^{plus} was designed as a *low-level* security feature. It is not sufficient in and of itself to withstand a determined effort at system entry. The ProControl unit can be configured to bypass the password screen when the unit is powered up.



CUSTOMER ID TAGNAME
ENTER PASSWORD: BAA

Use the Up and Down keys to change the character displayed above the cursor.



CUSTOMER ID TAGNAME
ENTER PASSWORD: BAA

The Field key is used to move the cursor to the next character to be edited.



CUSTOMER ID TAGNAME
ENTER PASSWORD: EOS

The enter key submits the password for approval.

If the password was entered correctly, the following screen will be displayed for about a second before the operations screen is displayed:

Password Accepted
VER 2.XXX : 1

ROM Version #

User Setup Version #

Otherwise, the following message will be displayed for a second and the user will be returned to the password menu:

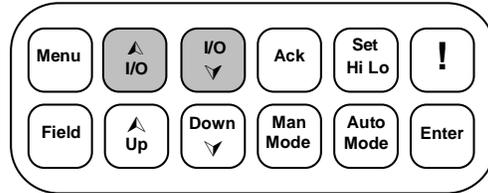
Incorrect Password

2.4 Operations Screen

After the password has been entered correctly, the operations screen is displayed. The operations screen allows the user to set system parameters and to review the status of all system inputs and outputs.

WELL1 OFF
ALARMS SET >MANUAL

2.5 I/O Keys



Pressing the I/O Up or I/O Down keys will scroll through the operational I/O points in the system. Data relevant to a particular I/O point will be displayed to right of the point's Tagname.

Forward scroll through I/O points

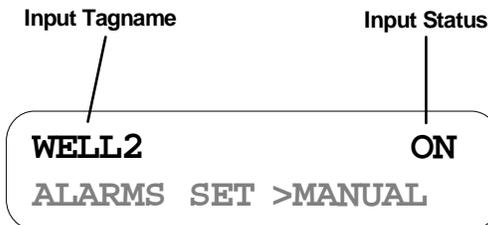


Forward scroll through I/O points



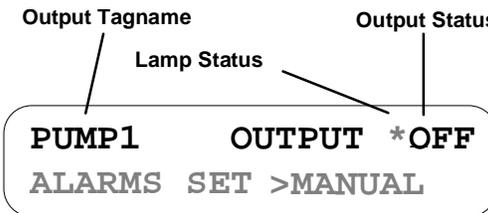
Backward scroll through I/O points

2.6 Digital Input Menu



A digital input displayed in the operations screen will be displayed as shown. When the input is in its Active State [ON] will be displayed in the Input Status area. Otherwise, [OFF] will be displayed.

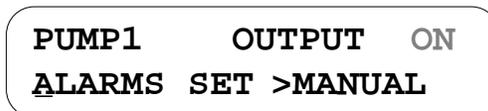
2.7 Digital Output Menu



A digital output displayed in the operations screen will appear as shown. When the output has been turned on, [ON] will be displayed in the Output Status area. Otherwise, [OFF] will be displayed. The cursor is displayed under the first character in the status field to indicate that it can be changed. The Lamp Status character (*) will be shown for a lamp output if a *lamp test* is running regardless of the output's true state.



Pressing the Up or Down key will toggle the digital output state and turn the corresponding relay OFF or ON.



Pressing the Field key will move the cursor to the Menu selection field.

2.8 Analog Input Menu

	<p>Analog Tagname Analog Value Units</p> <p>H2OFLO 54.6 GPM</p> <p>ALARMS SET >MANUAL</p>
Set Hi Lo	<p>H2OFLO 20.0 GPM</p> <p>LOW ALARM >MANUAL</p>
Set Hi Lo	<p>H2OFLO 80.0 GPM</p> <p>HIGH ALARM >MANUAL</p>
Set Hi Lo	<p>H2OFLO 120817 GAL</p> <p>TOTAL FLOW >MANUAL</p>
Up Down	<p>H2OFLO 30.0 GPM</p> <p>LOW ALARM >MANUAL</p>
Field	<p>H2OFLO 30.0 GPM</p> <p>LOW ALARM >MANUAL</p>
Enter	<p>H2OFLO 30.0 GPM</p> <p>LOW ALARM >MANUAL</p>

An analog input displayed in the operations screen will be displayed as shown to the left. The value of the analog input will be shown along with the dimensional units. In the case of a pulse accumulator (totalizer only), you will see only TOT where units is normally displayed.

Use the Set Hi Lo key to set the low alarm limit.

Press the Set Hi Lo key again to set the high alarm limit.

Press the Set Hi Lo key again to see the total flow on a flow type input, and once more to return.

The Up and Down keys are used to change the value of the current character, as denoted by the cursor.

The Field key is used to move to the next character to be edited.

To save the low alarm limit changes, press the enter key.

2.9 Analog Output Menu

Set Hi Lo

Analog Tagname Percentage

VRPUMP 25.0 PCT
ALARMS SET >MANUAL

Set Hi Lo

VRPUMP 25.0 PCT
OUTPUT LVL >MANUAL

Up Down

WTRLVL 33.0 FT
SETPOINT >MANUAL

Field

VRPUMP 35.0 PCT
OUTPUT LVL >MANUAL

Enter

VRPUMP 35.0 PCT
OUTPUT LVL >MANUAL

VRPUMP 35.0 PCT
OUTPUT LVL >MANUAL

An analog output displayed in the operations screen will be displayed as shown to the left. The percentage of full scale output will be displayed as well.

The Set Hi Lo key can be used to set the output percentage.

Press the Set Hi Lo key again to declare the SetPoint of an associated analog input. The SetPoint is used only if a PID control loop is in use as an analog output process.

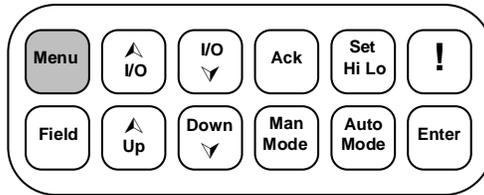
Pressing Set Hi Lo again returns to the original menu.

The Up and Down keys are used to change the value of the current character, as denoted by the cursor.

The Field key is used to move to the next character to be edited.

To save the output level changes, press the enter key.

2.10 Menu Key



When pressed, the Menu key will scroll through a series of items which allow the user to configure various aspects of system behavior. A description of these items appear in a 10 character field at the bottom left of the display. Either the Up and Down keys or the Enter key is used to change the item.

ALARMS Use the Up and Down keys to enable or disable Alarms (audible beeper).

Menu

TAGNAM	DIM	
ALARMS OFF	>MANUAL	

Up Down

TAGNAM	DIM	
ALARMS SET	>MANUAL	

REPORT Use the Up and Down keys to enable or disable the unit's reporting capabilities (email, fax or text message/page).

Menu

TAGNAM	DIM	
REPORT OFF	>MANUAL	

Up Down

TAGNAM	DIM	
REPORT ON	>MANUAL	

FAX NOW Use the Enter key to send a FAX report immediately (dial-up modem communication units only).

Menu

TAGNAM	DIM	
FAX NOW	>MANUAL	

Enter

EMAIL NOW Use the Enter key to send an email report immediately (Ethernet and cell data communication units only).

Menu

TAGNAM	DIM	
EMAIL NOW	>MANUAL	

Enter

STARTUP Use the Enter key to run the Startup Sequence.



SHUTDOWN Use the Enter key to run the Shutdown Sequence.



LAST SHUTDOWN This display item shows what input or output caused the last shutdown.

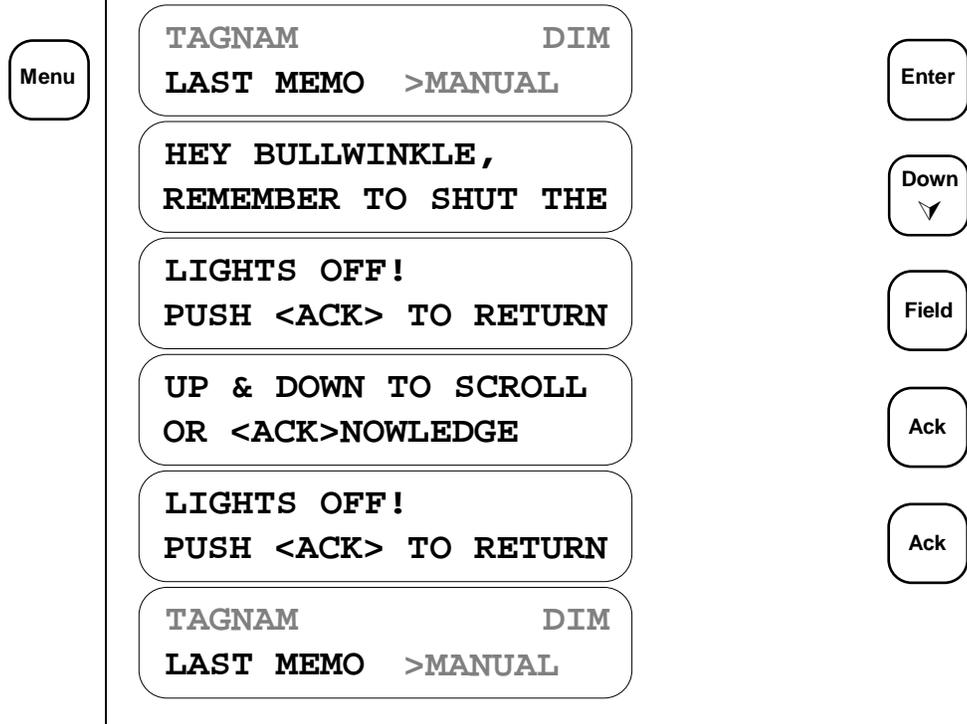


LOG OFF Use the Enter key to Log Off the system and return to the password menu.



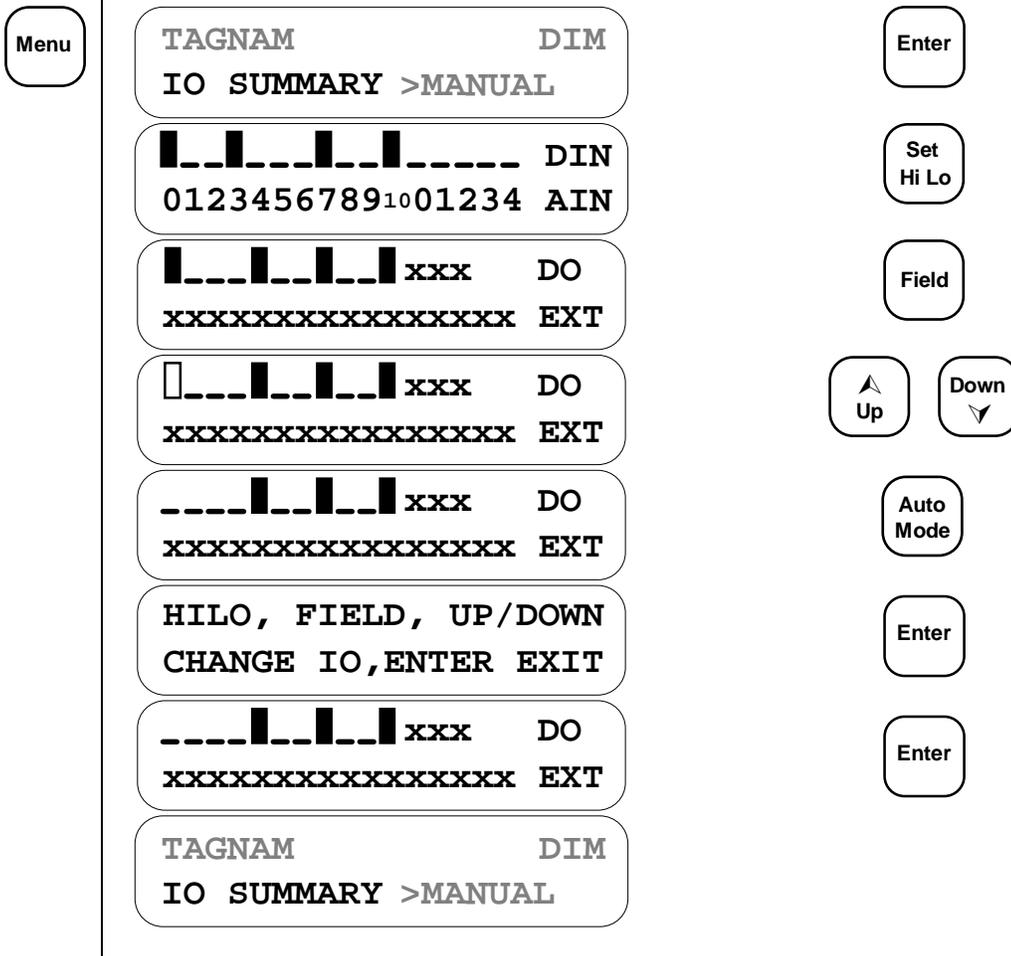
LAST MEMO

Use the Enter key to see the last memo sent from the remote ProView user. Up and Down are used to scroll through the message, and Ack is used to return to the ProControl menus. If you hit any other key you will see an informative message telling you which keys are valid. The message will be displayed for 3 seconds if no keys are pressed, but can be acknowledged before the 3-second period by pressing either the Ack or Enter keys.



IO SUMMARY

Use the Enter key to enter the I/O summary. The analog input values 0-10 represent a percentage of full scale (i.e. 2 ≅ 4 mA, 5 ≅ 12 mA). Set HiLo is used to toggle between input/output summaries. An underscore represents an open input or an unswitched output. A block indicates a closed input or a switched output. An x or X is displayed when an output is not enabled and is unswitched or switched, respectively. An asterisk (*) will be displayed if an output is declared as a lamp and a lamp test is currently being performed. The Field key can be used to move the blinking cursor through the outputs. The Up/Down keys can be used to toggle the state of the output whose position is covered by the blinking cursor. The Enter key will return the ProControl back to its standard menus. If you press any other keys you will see an informative message telling you which keys are valid. The message will be displayed for 3 seconds if no keys are pressed, but can be interrupted before the 3-second period by pressing the Enter key.



NETWORK Use the Up and Down keys to enable or disable Networking (networked units only)

Menu

TAGNAM DIM
NETWORK OFF >MANUAL

TAGNAM DIM
NETWORK ON >MANUAL

▲
Up

Down
▼

DHCP Use the Up and Down keys to enable or disable a dynamically-assigned IP address via DHCP (Ethernet units only)

Menu

TAGNAM DIM
DHCP OFF >MANUAL

TAGNAM DIM
DHCP ON >MANUAL

▲
Up

Down
▼

WAN IP Use the ENTER key to view the WAN IP address (Ethernet or cellular IP units only).

Menu

TAGNAM DIM
WAN IP >MANUAL

WAN XXX.XXX.XXX.XXX
WAN IP >MANUAL

Enter

LAN IP Pressing the UP or DOWN key will toggle between WAN IP and LAN or local IP address (Ethernet communication units only).

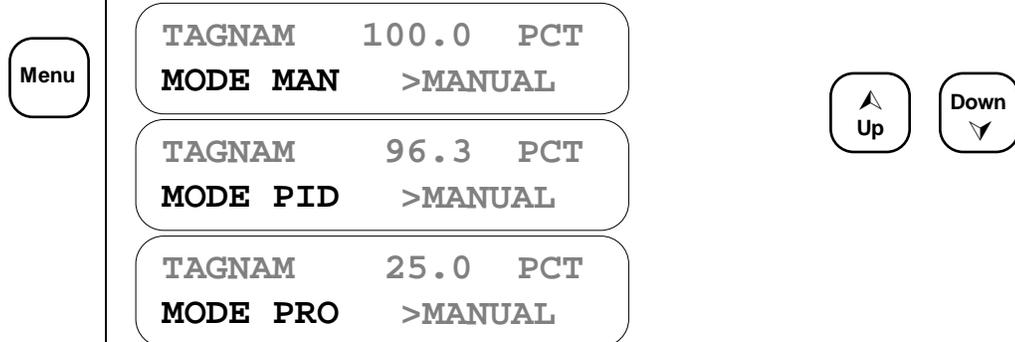
TAGNAM DIM
LAN IP >MANUAL

LAN XXX.XXX.XXX.XXX
LAN IP >MANUAL

▲
Up

Down
▼

MODES Use the Up and Down keys to toggle an Analog Output from Manual control to PID control or Proportional control, depending on which analog output process is being used. This selection will only appear if an analog output tagname is displayed and the analog output is part of an analog output process.



2.11 LED Indicators

Your ProControl unit has three status LEDs to the left of the keypad, which are used to indicate the following:

- System Status:** Normally ON when unit is powered.
One blink - The system has internally reset.
Two blinks - An internal error has occurred.
- Connect:** ON if user is remotely or locally connected.
ON if system is emailing, faxing or sending text message.
Slow blink - last email, fax or text message failed, press ACK to clear.
Fast blink - local connect cable inadvertently left plugged in or cellular data modem not found; press ACK to clear.
- Network:** Rapid blinking indicates an active network connection.

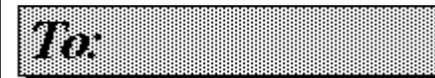
3.0 REPORTING FEATURES

3.1 Fax Report (Dial-up Modem Units)

The ProControl unit will keep you informed of your system's operations with facsimile status reports. With the supplied ProView software you can configure the unit to send fax reports to up to two different numbers. You can also have these reports sent on a daily basis, at regular intervals during the day, or when triggered by specific process tasks. You can send one at any time by using the *Fax Now* option either from the menu on the ProControl's display, or through the ProView software.

The fax report you receive will contain several fields, each denoted by a shadow box. The number of fields will depend on the configuration of your system. For instance, you would not see a field indicating *Analog Outputs* if your system does not contain any of these.

The fields as you will see them are shown below. All information enclosed in brackets is variable and depends on your particular system configuration.

To: 
<FAX RECIPIENT>

will indicate the intended fax recipient's name.

From: 
THE <SYSTEM NAME> SYSTEM IN <SITE LOCATION> AT <TIME> ON <DATE>
SETUP VERSION X : ROM VERSION 2.x : MODEL B1

will indicate the name and location of your system, the date and time at which the fax report was initiated, your current ProView setup version, and the current firmware version 2.X.

System Status:

```
<MODE><PXX> : LAST SHUTDOWN AT <TIME> ON <DATE> BY <SHUTDOWN CAUSE>
                FAX REPORT INITIATED BY <FAX CAUSE>
```

will indicate the current <MODE> of the controller and associated process. For example, if the controller is running the startup or shutdown sequence, you would see either START or SHUTD followed by the current algorithm. Similarly, in auto mode, you would see AUTO followed by the last successfully completed process task.

The LAST SHUTDOWN indicates when the system last initiated the shutdown sequence and what caused it to happen. For example, if the shutdown sequence were initiated by a key press, the cause you would see would be KEYPAD. Similarly, if the shutdown sequence were caused by a process task such as a high pressure sensor whose tagname was HIPRES, you would see HIPRES as the <SHUTDOWN CAUSE>. If multiple inputs or outputs caused the shutdown (i.e. a process task was dependent on more than one input being in the active state and/or multiple outputs being ON), the most recent one which changed will appear as the cause.

Similarly, the FAX REPORT INITIATED BY line will indicate the tagname of the I/O point which caused the fax to be sent, provided there was only one I/O point responsible. If multiple I/O points were responsible, the process itself will be indicated. Consider, for example, a process task where a shutdown was caused by HIPRES and BLOWER, and a fax was also generated. The <FAX CAUSE> would be PROCESS XX, where XX is the number of this process task. In the case where *Fax Now* was selected from the menu option on the LCD, the <FAX CAUSE> would be KEYPAD. The <FAX CAUSE> from a ProView generated *Fax Now* command would be REMOTE. This line will not appear on daily or interval scheduled fax reports.

Discrete Inputs:

```
<TAGNAME> is <STATE> <TAGNAME> is <STATE> ...
```

will indicate the status of all of the digital inputs in four columns. Inputs which are in the active state will appear as ON and those which are in their normal state will appear as OFF.

Discrete Outputs:

```
<TAGNAME> is <STATE> <TAGNAME> is <STATE> ...
```

will indicate the status of all of the digital outputs in four columns.

Analog Inputs:

```
<TAGNAME> is <VALUE> <DIM> LIMITS are L: <LO-LIM> <DIM> H: <HI-LIM>
<DIM>
<TAGNAME> is <VALUE> <DIM> TOTAL FLOW is <FLOW> <DIM>
<TAGNAME> TOTAL FLOW is <FLOW> <DIM>
...
```

will indicate the current value, dimensional units, low alarm limit, and high alarm limit for all analog inputs that are not flow-type inputs. The precision of the values displayed can be selected through ProView. Any flow-type analog input which is responsible for maintaining a flow totalizer will display that flow in place of the alarm limits. Any pulse-type digital input used for a digital flow meter will appear here since the information being obtained by that type of flow meter is analog in nature. In addition, pulse accumulators (volume totalizers) will appear here.

Analog Outputs:

```
<TAGNAME> <PCT> PCT <MODE> <TAGNAME> <PCT> PCT <MODE>
...
```

will indicate the output percentage and mode of operation of all analog outputs. The precision is fixed to one decimal place and will range from 0.0 to 100.0, expressed as a percentage. The <MODE> of operation will be PID if the analog output is currently being used in a PID loop, or PRO if the analog output is currently being used in a Proportional scheme, otherwise it will be MAN indicating that the analog output is under manual control.

**3.2 Text
Message or
Page Alerts**

The ProControl unit can alert you to important conditions at your site via a text message or page alert. Any system that is not in manual mode, that is, executing process tasks or the startup or shutdown sequences, can send a message up to eighty characters in length to a mobile phone or alphanumeric pager or up to nineteen digits in length to a numeric pager. With ProView you can select up to two mobile phones or pager numbers to be alerted. Each process task or startup/shutdown algorithm is capable of sending a message to either or both of the recipients. The text messages are configured by your system integrator according to your specifications.

An example message is shown below:

```
ANYTOWN SITE  
High water level EQ Tank  
System shut down!  
Call Fred to fix: 555-6789
```

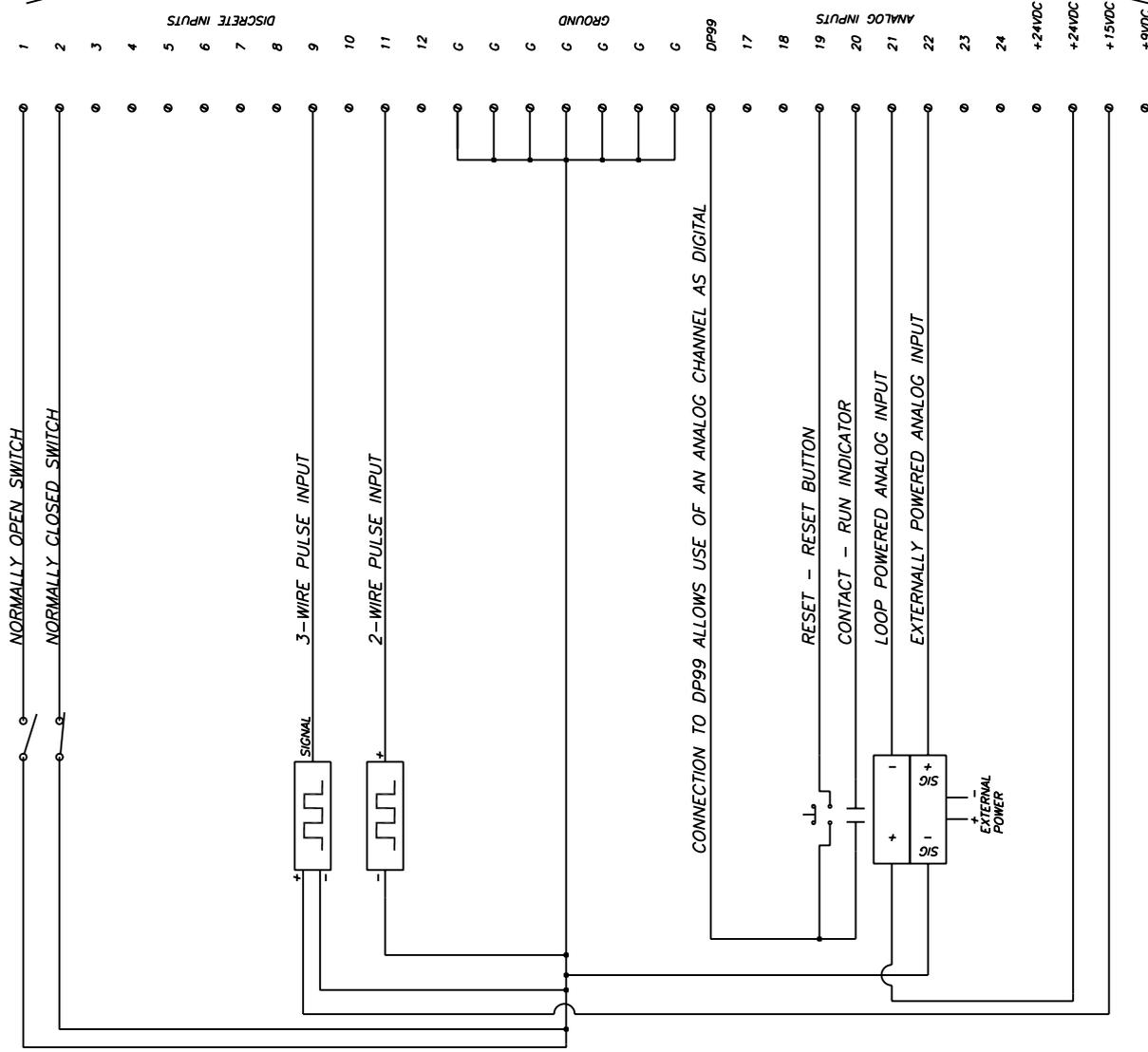
**3.3 Email
Report
(Ethernet and
Cellular Data
Units)**

The ProControl unit will keep you informed of your system's operations with email status and alarm reports. The status reports can also include logged data files in .csv format at user defined intervals, which can be opened with Microsoft Excel. With the supplied ProView software you can configure the unit to email reports to up to five different email addresses. You can also have these reports sent on a daily basis, at regular intervals during the day, or when triggered by specific process tasks. You can send one at any time by using the *Email Now* option either from the menu on the ProControl's display, or through the ProView software.

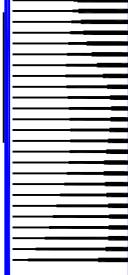
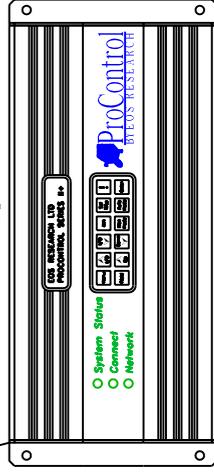
The email report you receive will contain the same fields as described in section 3.1 Fax Reports but will also include the WAN or LAN address as applicable to the unit.

APPENDIX A

EXAMPLE WIRING DIAGRAM



SERIES 2 *plus* Type BI-B2, AI-A2

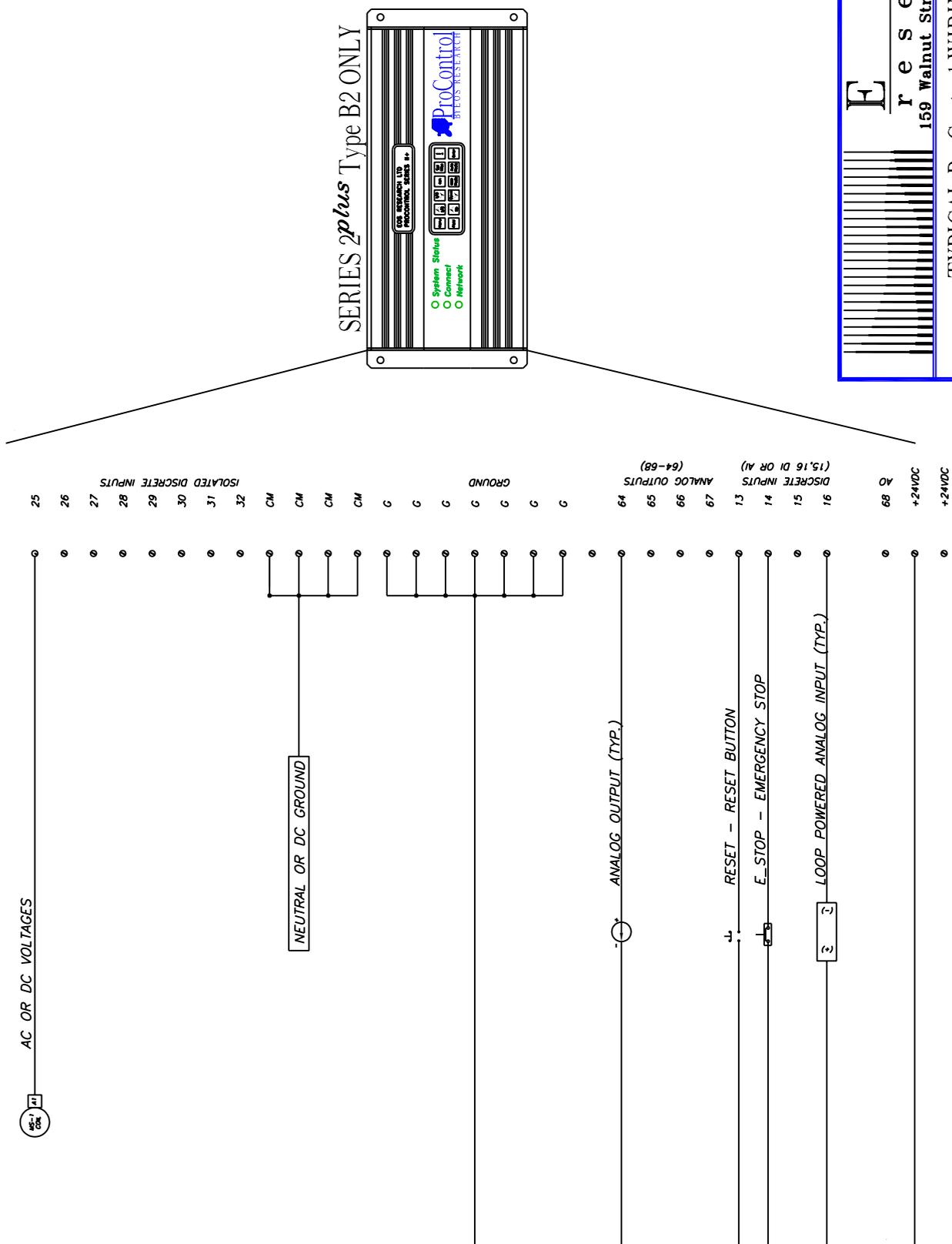


E O S
r e s e a r c h
 159 Walnut Street, Rochester, NH

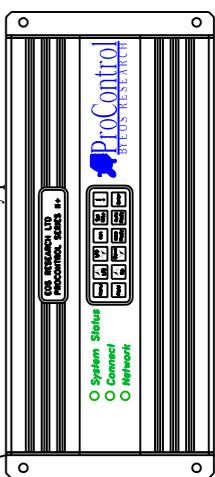
TYPICAL ProControl WIRING
 DIGITAL & ANALOG INPUTS - BOTTOM LEFT SIDE

- NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
 2. INPUT IMPEDANCE FOR SERIES 2PLUS ANALOG INPUTS IS 135 OHMS.
 3. ACTIVE DISCRETE INPUTS WILL SOURCE 17mA WHEN GROUND.
 4. THE ProControl SOURCES 5VDC FOR DISCRETE INPUTS.
 5. DISTRIBUTE ANALOG INSTRUMENTS EVENLY ACROSS +24VDC TERMINALS.

EXAMPLE WIRING DIAGRAM



SERIES 2plus Type B2 ONLY

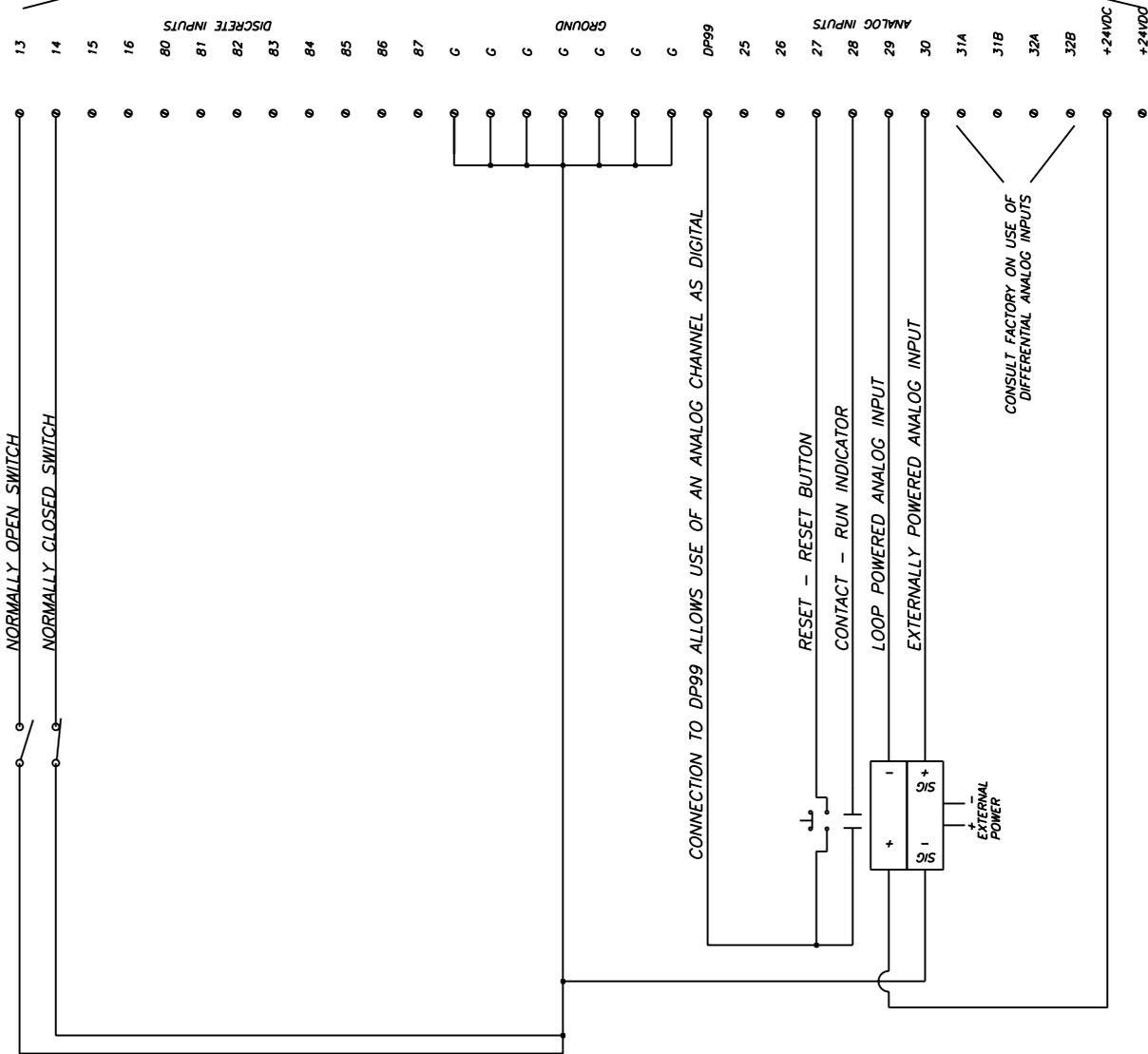


S O S
r e s e a r c h
 159 Walnut Street, Rochester, NH

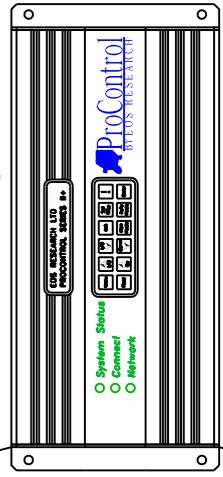
TYPICAL ProControl WIRING
 DIGITAL INPUTS & ANALOG OUTPUTS
 TYPE B2 - TOP LEFT SIDE

- NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
 2. INPUT IMPEDANCE FOR SERIES 2plus ANALOG INPUTS IS 135 OHMS.
 3. MAXIMUM ISOLATED DISCRETE INPUT VOLTAGE 120V. ALL INPUTS MUST BE SAME VOLTAGE AND SHARE THE SAME COMMON OR NEUTRAL!
 4. CM REPRESENTS COMMON FOR INPUTS 25-32; (ie. 120VAC, CM=NEUTRAL, 24VDC, CM=DC GROUND)

EXAMPLE WIRING DIAGRAM



SERIES *2plus* Type A1-A2

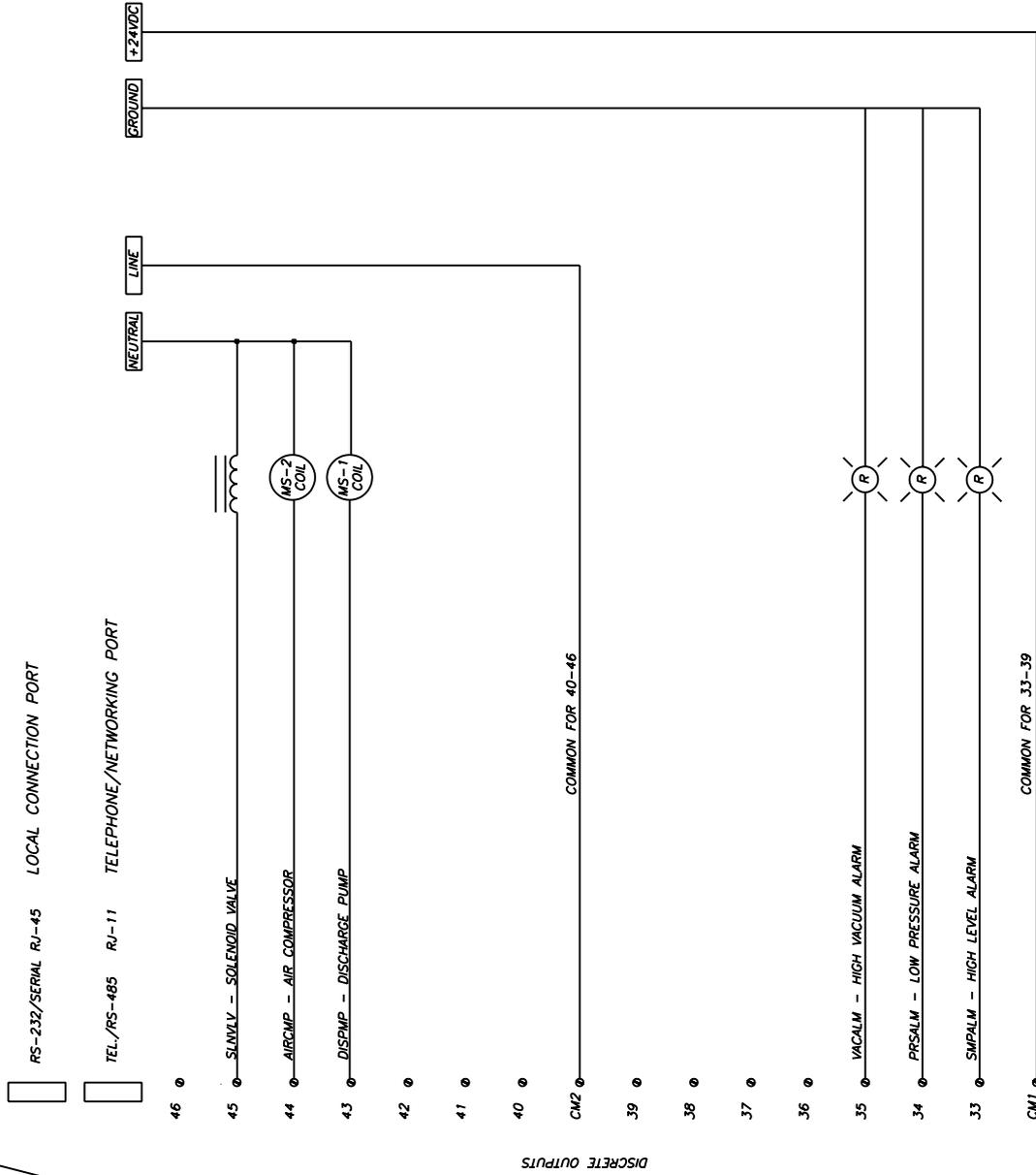


E O S
r e s e a r c h
 159 Walnut Street, Rochester, NH

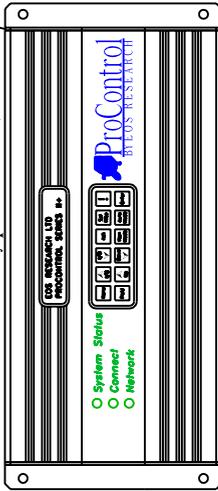
TYPICAL ProControl WIRING
 DIGITAL & ANALOG INPUTS -
 TYPE A - TOP LEFT SIDE

- NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
 2. INPUT IMPEDANCE FOR SERIES 2plus ANALOG INPUTS IS 135 OHMS.
 3. ACTIVE DISCRETE INPUTS WILL SOURCE I_{ma} WHEN GROUNDED.
 4. THE ProControl SOURCES 5VDC FOR DISCRETE INPUTS.
 5. DISTRIBUTE ANALOG INSTRUMENTS EVENLY ACROSS +24VDC TERMINALS.

EXAMPLE WIRING DIAGRAM



SERIES 2plus Type B1-B2, A1-A2



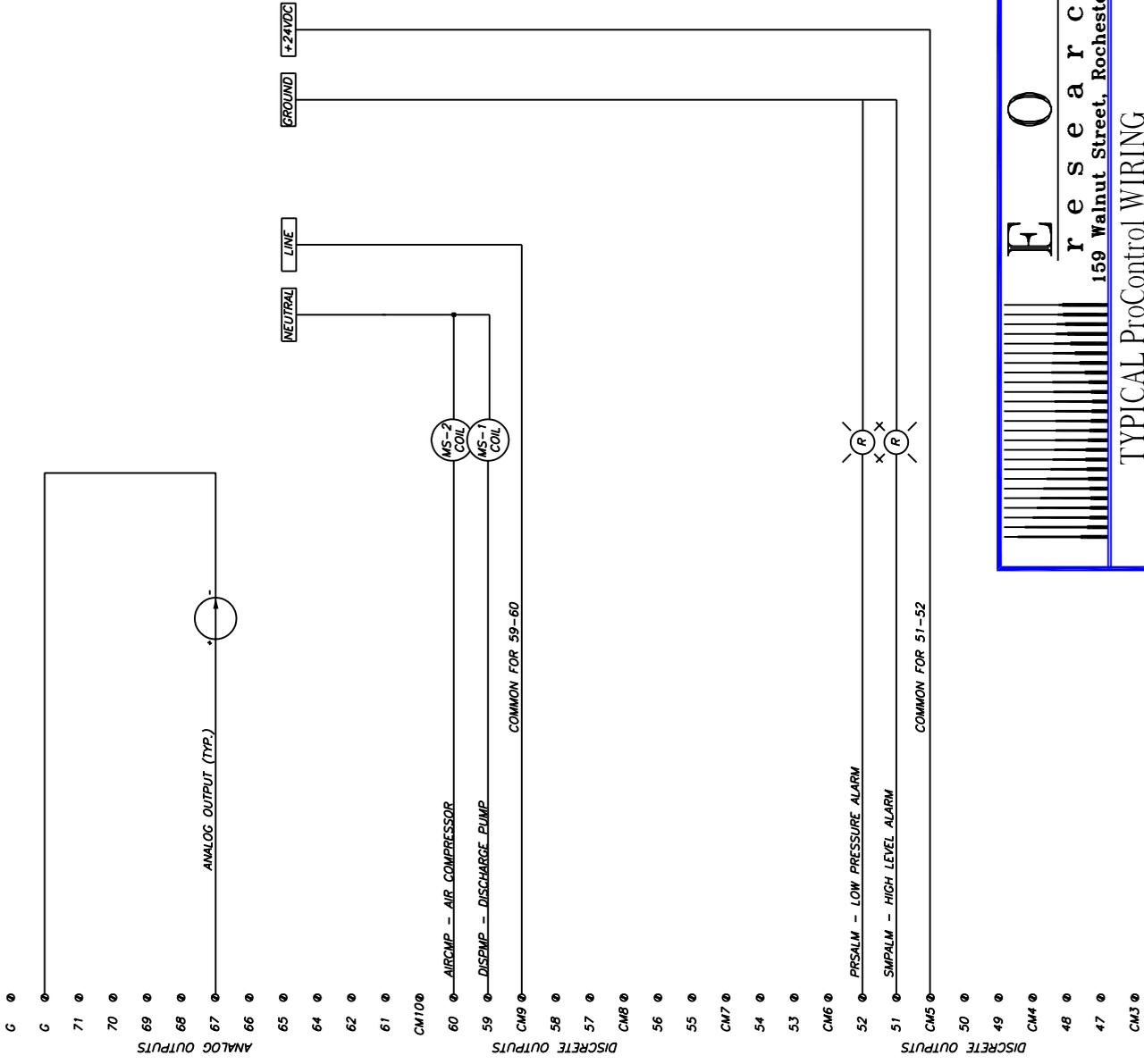
INPUT POWER 10VAC
 10VAC TRANSFORMER SUPPLIED WITH ProControl UNIT. (REV 4 AND ABOVE)
 NOTE: 20VAC-CT TRANSFORMER SUPPLIED PRIOR TO REV 4. DO NOT USE 20VAC TRANSFORMER ON REV 4 AND ABOVE!

- NOTES:
1. OUTPUT RELAYS RATED AT 125VAC/0.5A, 24VDC/0.5A
 2. UNITS SHIPPED AFTER 12/1/99 RATED AT 125VAC/1.0A, 24VDC/1.0A
 3. CM1 IS SWITCHED TO 33-39 AND CM2 IS SWITCHED TO 40-46 WHEN OUTPUT IS ACTIVE.
3. DO NOT USE +24VDC FROM ProControl TO DRIVE OUTPUTS. FOR TRANSUDCER POWER ONLY.

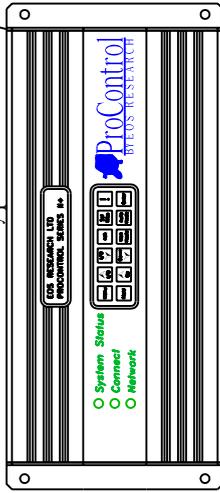
E O S
 Research
 159 Walnut Street, Rochester, NH

TYPICAL ProControl WIRING
 DIGITAL OUTPUTS - RIGHT SIDE

EXAMPLE WIRING DIAGRAM



SERIES 2plus Type A1-A2

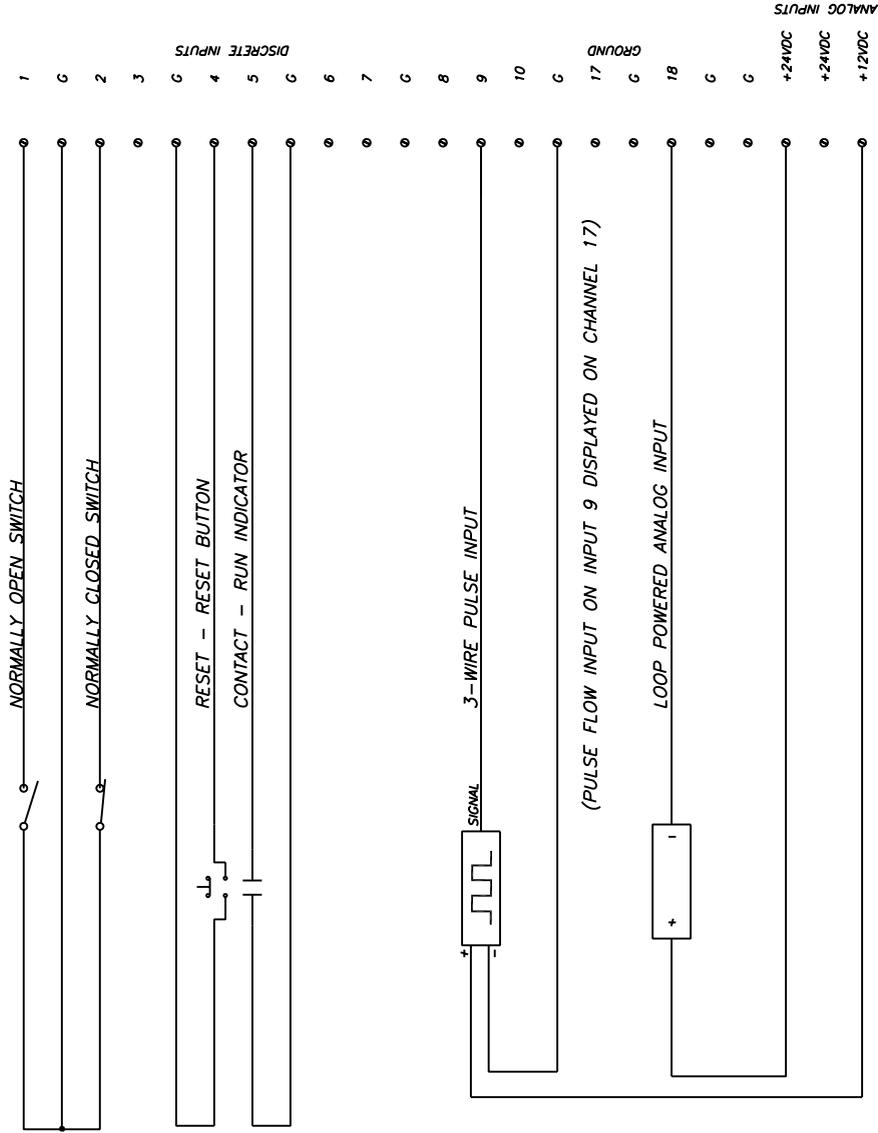


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Research
159 Walnut Street, Rochester, NH

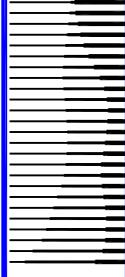
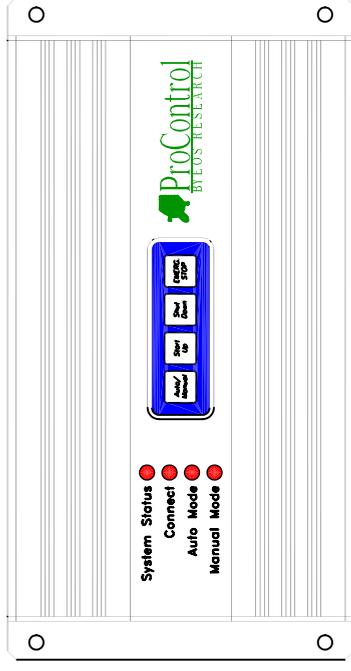
TYPICAL ProControl WIRING
DIGITAL & ANALOG OUTPUTS
TYPE A - TOP RIGHT SIDE

- NOTES:
1. OUTPUT RELAYS ARE RATED AT 125VAC/0.5A, 24VDC/0.5A
 2. CM3 IS SWITCHED TO 47-48, CM4 IS SWITCHED TO 49-50, ETC. WHEN OUTPUT IS ACTIVE.
 3. DO NOT USE +24VDC FROM ProControl TO DRIVE OUTPUTS. FOR TRANSDUCER POWER ONLY.

EXAMPLE WIRING DIAGRAM



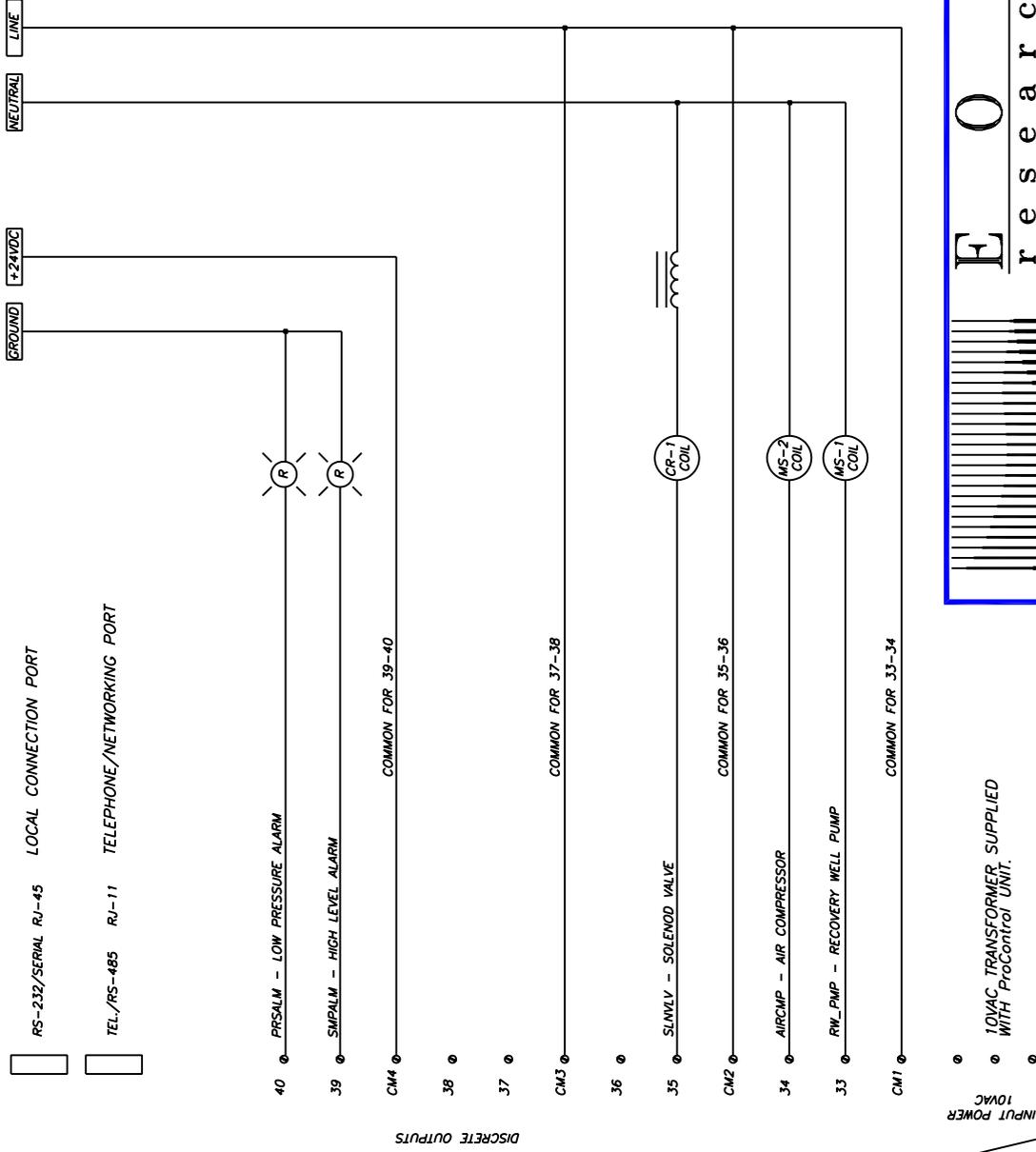
SERIES 2 *plus* Type CI



F O S
 r e s e a r c h
 159 Walnut Street, Rochester, NH

- NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
 2. INPUT IMPEDANCE FOR SERIES 2PLUS ANALOG INPUTS IS 135 OHMS.
 3. ACTIVE DISCRETE INPUTS WILL SOURCE 17mA WHEN GROUNDED.
 4. THE ProControl SOURCES 5VDC FOR DISCRETE INPUTS.
 5. DISTRIBUTE ANALOG INSTRUMENTS EVENLY ACROSS +24VDC TERMINALS.

EXAMPLE WIRING DIAGRAM



10VAC TRANSFORMER SUPPLIED WITH ProControl UNIT.

- NOTES:
1. OUTPUT RELAYS RATED AT 125VAC/1.0A. 24VDC/1.0A
 2. CM1 IS SWITCHED TO 33-34 AND CM2 IS SWITCHED TO 35-36. CM3 IS SWITCHED TO 37-38. CM4 IS SWITCHED TO 39-40 WHEN OUTPUT IS ACTIVE.
 3. DO NOT USE +24VDC FROM ProControl TO DRIVE OUTPUTS. FOR TRANSDUCER POWER ONLY.

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TYPICAL ProControl TYPE C WIRING
DIGITAL OUTPUTS - RIGHT SIDE