

# Plant Wide Controller (PWC)

## Overview

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### State-of-the-Art Sequencing, Monitoring and Control

The **Plant Wide Controller (PWC)** is a state-of-the-art equipment sequencing, control and monitoring system. The PWC combines innovative ease of operation, communication and expansion capabilities with boiler plant control application expertise. Off-the-shelf, standard applications for boiler modulating lead/ lag, cooling towers and air compressors can be expanded to include additional monitoring or control additional pumps, variable speed drives and valves. Multiple communication protocols allow simultaneous communication to a personal computer or SCADA Systems using a control network. The PWC is a complete plant monitoring, control and communication interface.

- Programmable Function Controller (PFC)  
Large 704 "Block" memory, six (6) I/O board Rack (Chassis).
- LCD Operator and Setup Display  
160 x 240 pixel LCD display with Membrane, tactile feedback keyboard, cursor arrow and full numeric keypad.
- Hardwired Panel  
Status lights, switches and control dials provide simple manual control for easy troubleshooting and service.
- Alarm/ Event Summary  
200 point, alarms, system events and operator actions are listed in "first in first out" order with time/date stamp.
- Optically Isolated RS485 Modbus Data Highway  
SCADA (Supervisor Control and Data Acquisition) remote monitoring and/or control.
- 120 VAC Power Distribution  
Fuses, terminals and internal 24 VDC power supply.
- Wall or Pump Set Mounted Enclosure  
UL508A NEMA 4 Enclosure
- Universal Analog Input Board
- Capabilities
- Overview

**Easy Installation:** The PWC integrates a powerful Programmable Function Controller (PFC), I/O boards, hardwired and LCD HMI, power distribution, 24VDC power supplies, external communications, isolation relays into a single wall mountable controller. No external control devices are required.

**Easy to Operate:** Large LCD Display, intuitive operation, setup, alarm / event summary and historical trend displays allow quick process assessment and maintenance monitoring.

**Easy to Configure:** PWC configuration tools maintain the look and feel of the PCC-III and offer advanced features. The PWC uses an intuitive "Blockware" configuration language with multiple block outputs and special purpose "Super" blocks that greatly simplify complex logic such as Outdoor Air Reset and boiler sequencing.

### Historical Trend Display

Each Chart can display up to 4 traces, called 'Pens'. The bottom of the screen shows the symbol and name of each Pen. Charts can be a mixture of analog and discrete data. A specific chart is displayed by selecting a Menu line that is linked to the chart. The PWC can save up to 32 analog values plus up to 32 discrete values every 1, 5, 15, or 60 seconds in the 32 Mb non-volatile memory. The 32

Mb Historical Memory can store up to 1-6 months of data (number of points monitored, sample interval, and data compression ratio affect duration).

**Pen Selection:** Each "Pen" trace has a unique name, chart scale, and engineering units. However, only one Pen Scale can be displayed at a time. The Up and Down Cursor Arrows may be used to display the desired Pen Scale.

**Chart Cursor Readout:** When a chart is first displayed, the Chart Cursor is located at the right hand edge of the screen. Using the Numeric keypad Arrows the operator may move the Chart Cursor. The number on the top line of the screen is the value of the currently selected Pen trace where it touches the Chart Cursor. Use the Cursor Up and Down Arrows to display the values for the other Pens.

**Start Time Panning:** Use the Cursor Left and Right Arrows to shift the Start Time backward or forward in time. The time is shifted 7/8 of the span to provide chart display overlap.

**Changing Chart Span:** Using the PAGE UP and PAGE DOWN keys, the operator may change the Chart Span between 8 minutes, 40 minutes, 2 hours, 8 hours, or 24 hours.

'Span', Start Time and Date Selection: When a Chart is selected, the first screen that appears is the "Setup Display." This display allows the operator to easily select "Span" (width), Start Time and Date. This screen defaults to the current time and date with a 40 minute wide chart.



Plant Wide Controller

Specs found here



# Plant Wide Controller (PWC)

## Configuration

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### “Blockware”

The PWC uses an intuitive “blockware” configuration language. Functions (AIN, PID, LOALM, F(x)... ) are simply copied into a configuration, and then the control signals are “wired” from block to block. Preferred’s innovative PWC\_Draw™ for MS Windows® uses a graphical, “drag and drop” interface. It allows the user to print or plot blockware drawings, and then download them to a PWC via a standard RS232 port. Additionally, blockware and displays may be edited from the spreadsheet style PWC\_Edit™.

### LCD Display Commissioning

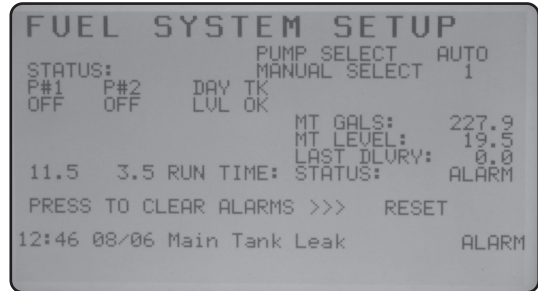
Plant wide controller configurations are designed to allow commissioning to be accomplished from the controller mounted displays. Project specific tuning displays may be created to present and group key “blockware” parameters for field tuning. Additionally, any block parameter may be edited from the front panel display using the “parameter edit” mode. Laptop computers are only required when it is necessary to change wiring between blocks or add additional blocks.

### PWC\_Edit™

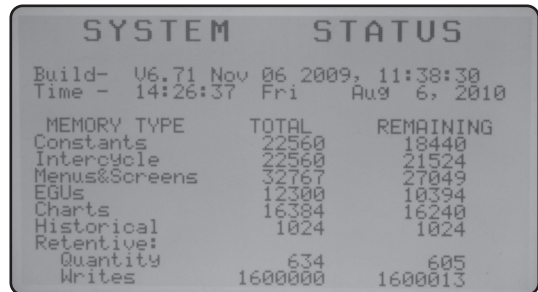
The “point and click” simplicity of the PWC\_Edit software makes “blockware” configuration simple and intuitive. The program uses a straightforward spreadsheet format with a convenient fill-in-the-blanks approach. Each block has an unlimited length “comments” field for clear documentation. The “blockware” data and comments can be printed to any MS Windows® compatible printer. PWC\_Edit offers fill-in-the-blanks style display generation. Display text can be presented as either regular or bold. Dynamic-text, softbuttons, status, numeric values, time values and alarms may be added to any display. The “chart edit” display allows configuration of trace and chart selections using a menu style system. The generated configurations are then easily downloaded using a standard RS232 DB9F cable.

### PWC\_Draw™

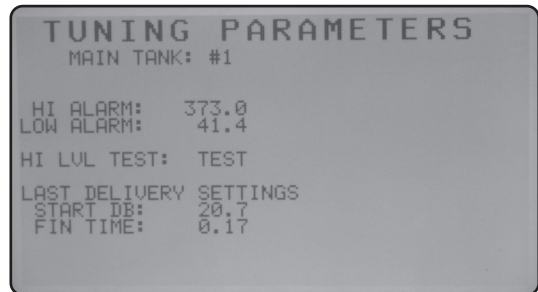
The powerful object-oriented CAD interface in PWC\_Draw makes the program the ideal choice for rapid “blockware” programming in a visual environment. The program is built on a Visio® platform with extensive visual basic automation. Standard functions are included in menus of pre-drawn figures for each PWC Blockware function type. Functions are simply dragged onto the drawing page and connected with “smart connector” lines to interconnect the blocks. Block inputs are automatically generated by placing the block connections. Double clicking on any block allows the user to edit data within the block. Drawings can be saved as AutoCAD® drawings and can be printed on any MS Windows® compatible printer or plotter. “Blockware” data can also be printed in the PWC\_Edit tabular format.



Fuel System Setup



System Status



Tuning Parameters

# Plant Wide Controller (PWC)

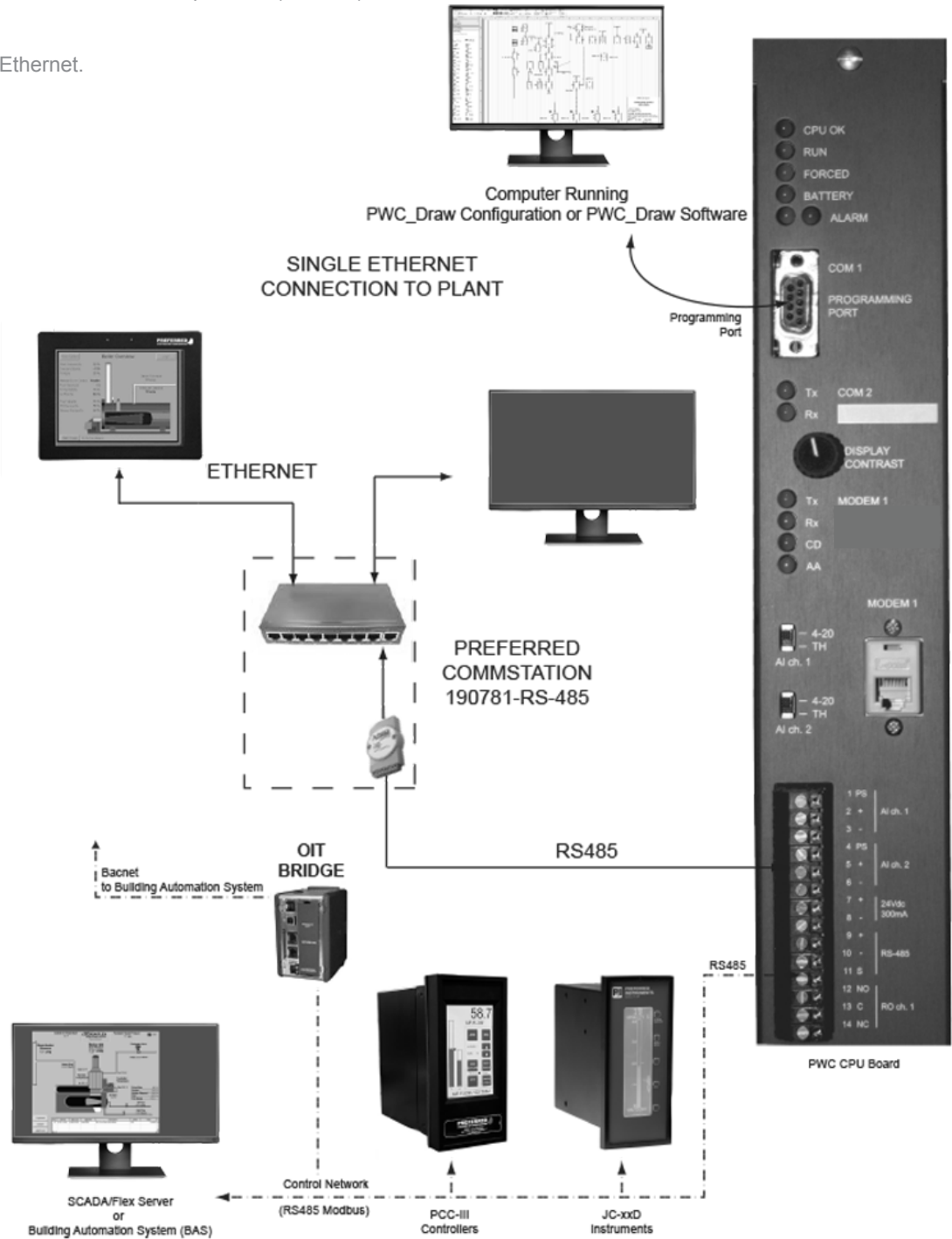
Communication

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## Control Network

The PWC includes an RS485 Modbus port to communication with Building Automation System (BAS), Building Management System (BMS) or Supervisory Control and Data Acquisition (SCADA) systems.

Bacnet and Modbus over Ethernet.



# Plant Wide Controller (PWC)

## Specifications

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### Mechanical

Case Size: 35" H x 20" W x 10 D

Enclosure Type: Wall mounted

Case: 7 Slot, (CPU + 6 I/O Slots)

Weight: 65.70 lbs.

### Environmental

Operating Temp: 32° to 122° F (0° to 50° C)

Storage Temp: -20° to 150° F (-28° to 65° C)

Humidity Limits: 15 to 95% (noncondensing)

Enclosure: NEMA 4

### Performance

Accuracy: 0.025% Analog I/O

Resolution: 16 bit input/12 bit output

Microprocessor: 32 bit, 128k EEPROM

Execution Cycle: Five per second

Time/Date Clock: (battery backed)

### Operator Control Panel

LCD Graphic Display: 2.9" H x 5.1" W

Keyboard: Membrane, tactile feedback

### Configuration

Standard Lead/Lag: Menu style  
"Fill-In-The-Blanks" setup.

Control Language: Function block style,  
60 functions, 600 Blocks

Security: 2 password levels Custom Blockware

Configuration Software: PWC\_Edit™ spread sheet based  
or PWC\_Draw™ graphical, editor.  
(Windows PC Required)

### Communication

#### Control Network:

Protocol: Modbus (ASCII or RTU mode)

Speed: 1200 to 38,400 baud

Type: RS485, optically isolated

### Programming Port

Speed: 38,400 baud

Type: RS232, DB9F connector

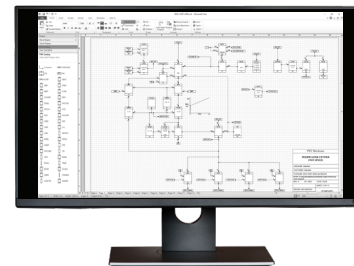
### Electrical

Input Power: 120 VAC (+/- 15%), 12A total,  
0.7A internal  
Built in surge suppressors

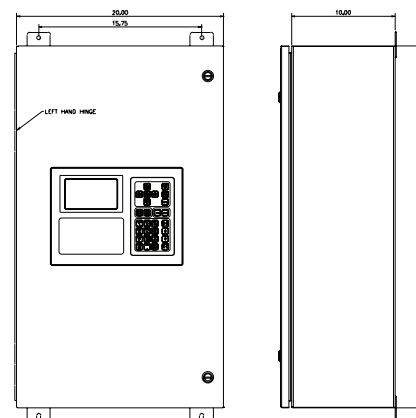
Internal Power Supply: 24 VDC @ 300 mADC for  
external use



PWC\_Edit Overview Display Screen Setup



PWC\_Draw Screen



PWC Dimensions

# Plant Wide Controller (PWC)

## Specifications

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### Input/Output Specifications

#### CPU Board:

Analog Inputs:      Quantity: 2  
                          Type: 4-20 mADC or  
                              -20°F to +300°F Thermistor

Relay Output:        Quantity: 1  
                          Type: SPDT, 8A, ½ HP, 120VAC

#### Hand-Off-Auto Relay Output (HOA-ROUT) Board:

Relay Output:        Quantity: 5  
                          Type: SPST, 8A, ½ HP, 120VAC

Toggle Switches:    Quantity: 5  
                          Type: Hand-Off-Auto (hardwired)  
                              SPDT, 8A, ½ HP, 120VAC

LED Indicators:     Quantity: 10  
                          Type: "Call for Operation" and  
                              "Output Status"

#### Auto/Manual Analog Output (A/M-AOUI) Board:

Analog Output:       Quantity: 5  
                          Type: 4-20 mADC or 0-135 ohm  
                              (any combination)

Toggle Switches:    Quantity: 5  
                          Type: Auto-Manual

Control Dial:        Quantity: 5  
                          Type: 0-100%  
                              (Manual Potentiometer)

Bargraphs:          Quantity: 5  
                          Type: 0-100%, 10 segment

#### Discrete Input (DIN) Board:

Digital Inputs:      Quantity: 15  
                          Type: 120 VAC, optically isolated

LED Indicators:     Quantity: 15  
                          Type: Status Indication

#### Analog Input (AIN) Board:

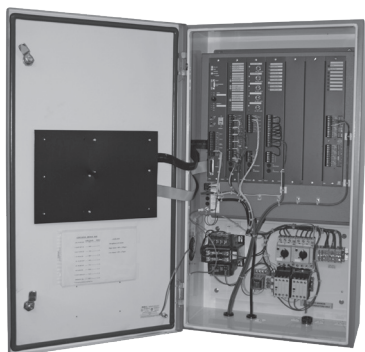
Analog Input:        Quantity: 8  
                          Type: Universal,  
                              Switch Selectable as:  
                              - 4-20 mADC, 2 wire  
                              - Thermistor, -20°F to 300°F,  
                              Thermocouple Type J,  
                              0-1200° F, 0-5 VDC, or  
                              Potentiometers  
                              - Pulse, 0.01 – 4000 Hz,  
                              0-15 VDC

LED Indicators:     Quantity: 8  
                          Type: Status Indication

#### Relay Output (ROUT) Board:

Relay Output:        Quantity: 8  
                          Type: (2) SPDT, (6) SPST-NO,  
                              8A, ½ HP, 120 VAC

LED Indicators:     Quantity: 8  
                          Type: Status Indication



PWC shown with door open, pump motor starters and circuit breakers with step down transformer installed on a removable subplate.



Expandable - Plug-in I/O expansion modules are easy to install. "Blockware" configuration language allows control strategies to be easily adapted to on-site conditions.

"Hand-Off-Auto" Relay Output Board. Toggle switch directly activates output in "Hand" and "Off."

# Plant Wide Controller (PWC)

Ordering Information

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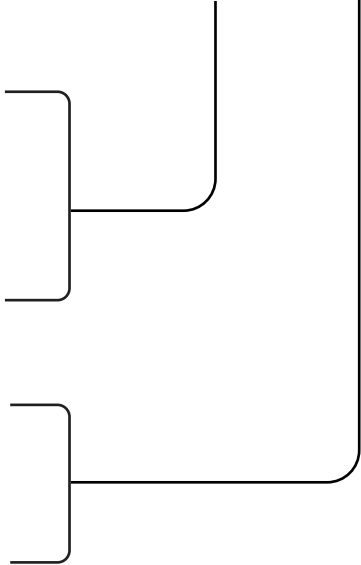
**PWCN4 - C - \_\_\_ - [#I]-[# P]**

**Optional Input/Output Boards (slots a - f):**

x	None		
A	AIN	8 ch.	Universal, Switch Selectable
D	DIN	15 ch.	120 VAC, Optically Isolated
H	HOA-ROUT	5 ch.	Relay, 8A, 120VAC
R	ROUT	8 ch.	Relay, 8A, 120VAC
O	A/M-AOUT	5 ch.	4-20 mADC or 0-135 ohm

**Specify A/M-AOUT output channel cards:  
(one required per active channel, any combination)**

	1 ch	4-20 mADC (#I = quantity)
	1 ch	135ohm pot (#P = quantity)



# Plant Wide Controller (PWC)

## Suggested Specifications

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### 1. General

Supply a microprocessor-based control system with field expandable plug-in Input/ Output modules. Control logic shall be either Ladder Logic or Function Block based. Any/all loop controllers, programmable logic controllers, and/or historical trend recorders within the Control System shall be interconnected via serial links to minimize wiring of internal control signals from device to device. The control system logic and calibration data shall be stored in a non-volatile memory that does not require battery backup. A field replaceable battery back-up shall be included to maintain the system time/date clock. The control system shall operate on 120 VAC and include a surge suppressor. The control system shall include a 24 VDC power supply with 300 mADC available for external use that is UL508A rated for 120° F.

### 2. Enclosure

A pump set or wall mounted, factory assembled, NEMA 4, continuous seam welded, steel enclosure shall be provided. The enclosure shall incorporate ¼ turn latches for securing the enclosure closed and ease of opening. The enclosure shall be provided with a formed steel hinge and stainless steel hinge pins. The enclosure is to incorporate a 10" x 17 ¾ removable sub-plate for the monitoring of control hardware items. The enclosure is to be prime coated and painted, with the exterior finish of gray textured enamel and the interior being white baked enamel.

### 3. Operating Displays

The control System shall have a flat panel LCD Display for operator control, alarm listing, control tuning and troubleshooting functions. Provide tactile feedback, numeric keypad for data entry. Provide dedicated pushbuttons for "alarm silence" and to view a plant overview displays. The display shall be 5" x 2.9", 8 line x 40 character or larger. The control system shall include a password protected menu system for controller tuning functions.

### 4. Alarm And Event Management

Alarms, events and operator actions shall be logged with time/ date stamp and English language description. The control system shall include a 200 point memory minimum. Provide an "alarm display" page for viewing the most recent 8 alarms/ events with scrolling capability to view the complete 200 point alarm/ event memory. New alarms shall trigger the common alarm output relay. Events shall be recorded, but shall not trigger an alarm. A dedicated "alarm silence" button shall silence the alarm output.

### 5. Control Panel Mounted Indicators

Provide individual long life LED status indicators for all controlled equipment. All indicators shall be labeled with a permanent marking.

### 6. Input/Output Signal Types

The control system shall include the following input/ output signal types: Analog inputs shall be universal type and must be field selectable between 4-20 mADC, Thermistor, Thermocouple,

Potentiometer and pulser. Analog outputs shall be 4-20 mADC and 0-135 ohm. Discrete inputs shall be 120 VAC, optically isolated type. Relay outputs shall be SPDT and SPST, 8A, ½ HP, 120VAC.

### 7. Reliability

Field wiring shorts or ground loops within one pump, valve or fan shall not affect automatic or manual operation of other devices. Provide electrically isolated relay contact and isolated 4-20 mADC/0-135 ohm modulating control outputs. Each transmitter and sensor shall have individual power supply short circuit protection. "Hard manual" backup stations shall be provided to ensure continued central operator control in the event of CPU memory corruption or failure. Include hardwired "hand-off-auto" control switches inserted directly into every boiler, pump, damper, fan, etc., and start/ stop circuit. Each 4-20 mADC or 0-135 ohm modulating control output must include a hardwired manual backup station with auto/ manual switch, output control knob or pushbuttons, and output level indicator (bargraph, analog meter or digital display). The manual station hardware must function when the CPU is not functioning.

### 8. Control Network

In addition to the remote monitoring features, the control system must include a RS485 Modbus communication interface to a supervisory Control And Data Acquisition (SCADA) System, Building Automation System (BAS), or Building Management System (BMS).

### 9. Quality Assurance

The control enclosure shall be manufactured and labeled in accordance with UL508A (CSA C22.2 #14 for use in Canada). Simply supplying UL recognized individual components is not sufficient. The assembled control enclosure, as a whole, must be inspected for proper wiring methods, fusing, etc., and must be labeled as conforming to UL508A. Inspection and labeling shall be supervised by UL or other OSHA approved Nationally Recognized Test Lab (NRTL). Lack of an NRTL certified UL508A wiring methods inspection and labeling will be grounds for control enclosure rejection.