PLANT WIDE CONTROLLER (PWC)
Overview

- **Programmable Function Controller (PFC)**
  Large 704 “Block” memory, six (6) I/O board Rack (Chassis).

- **LCD Operator and Setup Display**
  160x240 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**

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.

Easy to Use

- **Easy Installation** – The PWC integrates a powerful Programmable Function Controller (PFC), I/O boards, hardwired and LCD HMI, power distribution, 24 VDC 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 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.
**PLANT WIDE CONTROLLER (PWC)**

**Applications**

**Tank Monitoring Applications**
- **Tank Level Gauges** - The PWC interfaces with wire float, ultrasonic, pressure-based, and other types of tank gauges. Multiple tanks can be monitored through one PWC.
- **Tank Level Switches** - Digital inputs are provided to monitor tank high and low level contacts, pump off, pump on, and overfill contacts.
- **Leak Detection** - Digital inputs are available for multiple leak detection inputs including interstitial or annular space leak detection, as well as engine room leak detection.
- **Unmanned Facilities** - Provides for off-site monitoring and control using internal modem or RS485 interface. Serves as a single plant monitoring point for Building Automation Systems and personal computers.

**Pump Control and Monitoring Systems**
- **Transfer Pump Control** – Multiple headered transfer pumps can be start/ stopped, or put on a timed rotation schedule to even wear among pumps.
- **Pump Proving** – Inputs from multiple pump flow switches can be configured to prove pumps are running normally.
- **Return Pump Control** - When gravity return systems are not practical, the PWC can activate return pumps to prevent overfilling of day tanks.
“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™.
PLANT WIDE CONTROLLER (PWC)

Configuration

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.
PLANT WIDE CONTROLLER (PWC)

Communication

Control Network
The PWC includes an RS485 Modbus port to communicate 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

Mechanical
- **Case Size:** 35" H x 20" W x 10" D
- **Enclosure Type:** Wall mounted
- **Case:** 7 Slot, (CPU + 6 I/O Slots)
- **Weight:** 55 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

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™ spreadsheet 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 mA DC for external use
PLANT WIDE CONTROLLER (PWC)
Specifications

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.

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

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-AOUT) 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

“Hand-Off-Auto” Relay Output Board. Toggle switch directly activates output in “Hand” and “Off.”
### PLANT WIDE CONTROLLER (PWC)

**Ordering Information**

Catalog Number: PWCN4 -C a b c d e f - [#I]-[# P]

<table>
<thead>
<tr>
<th>Optional Input/Output Boards (slots a - f):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>None</td>
</tr>
<tr>
<td>A</td>
<td>AIN 8 ch. Universal, Switch Selectable</td>
</tr>
<tr>
<td>D</td>
<td>DIN 15 ch. 120 VAC, Optically Isolated</td>
</tr>
<tr>
<td>H</td>
<td>HOA-ROUT 5 ch. Relay, 8A, 120VAC</td>
</tr>
<tr>
<td>R</td>
<td>ROUT 8 ch. Relay, 8A, 120VAC</td>
</tr>
<tr>
<td>O</td>
<td>A/M-AOUT 5 ch. 4-20 mADC or 0-135 ohm</td>
</tr>
</tbody>
</table>

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)
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 proved 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.