Parr Instrument Company

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Chapter 6 Start

This pdf is just one chapter from our Catalog 4500. Please refer to
all eight chapters to make the proper equipment choice for your needs.

Stirred Reactors and Pressure Vessels

Designing and Building Quality Pressure Apparatus for 120 Years

Inside this chapter you will find:

Parr Controller Overview

The Model 4848 Reactor Controller is our general-purpose reactor controller. It can control temperature and stirring speed, and it can be equipped to monitor a redundant temperature and pressure. It can datalog and be operated remotely from a PC.

The Model 4848B Reactor Controller is an expanded reactor controller. It has the same capabilities as the 4848 but with a larger chassis. The 4848B can accommodate up to six meters, plus the Primary Temperature Module.

The Model 4838 Reactor Controller is offered to control temperature in non-stirred pressure vessels. It can be expanded to include an optional pressure or redundant temperature module.

The Model 4871 Process Controller is a full featured process controller, which can handle either a single reactor with a wide variety of inputs and outputs or multiple reactors running independently. It controls the entire process including gas and liquid flows through a PC interface custom tailored to the application.

Parr Instrument Company offers a full line of reactor controllers to monitor, control, datalog, and archive test data.

The Model 4848M is a controller for Master/Slave setups. It is most often used with large reactors with multi-zone heaters where each zone draws enough power to require its own power supply.

The Model 4848A is a reactor controller for use with AC Motors.

The A2110E is a Motor Controller. It can be provided with or without a tachometer display.

The A2200E is a Mass Flow Controller Interface. It can handle up to four Mass Flow Controllers at one time.

The 4875 Power Controller is utilized with a 4871 Process Controller or a 4848M Master Controller.

The 4876 Power Controller is utilized with a 4871 Process Controller or 4848M Master Controller. It can handle up to three heater outputs and is only available in 230V.

The 4877 Valve Controller is utilized with a 4871 Process Controller to actuate valves.

The A3504HC SpecView Software is enhanced software for use with the 4848 or 4838 Controllers. It provides superior datalogging and has an excellent user interface.

The Model 4848T Reactor Controller is a touchscreen controller for use with a single reactor system. It has the same control capabilities as a fully-loaded 4848 with Motor Control Module, Pressure Display Module, and secondary temperature module, with touchscreen interface and VNC communication capability.

Application:	**4848** One Stirred Reactor	**4848B** One Stirred Reactor	**4848T** One Stirred Reactor	**4838** One Non-Stirred Pressure Vessel (No Motor Control or cooling)	**4871** Advanced Systems*
Features:					
Temperature Control	One	One	One	One	Multiple
Pressure Monitoring	Optional	Optional	One	Optional	Multiple
Motor Speed Control	One	One	One	None	Multiple
Auxiliary I/O	None	Up to two inputs	None	None	Multiple
Redundant Temperature Monitoring	Optional	Optional	One	Optional	Multiple
PC User Interface with Datalogging	Optional	Optional	VNC	Optional	Included
Digital Communications	RS-485	RS-485	Ethernet	RS-485	Ethernet
Expansion Modules	Up to Three	Up to Six	Three Included	Up to One	Unlimited
Number of Reactors Controlled	One	One	One	One	Multiple

* Contact a Parr Customer Service Representative for your custom application needs.

4848 Reactor Controller

4848 Reactor Controller shown with PTM, MCM, PDM, and HTM Modules installed.

The 4848 Reactor Controller brings digital communications to all of the functions of this modular reactor controller. The 4848 offers all of the features expected in a Parr general purpose reactor controller, namely:

- PID programming with Auto-tuning capability for precise temperature control and minimum overshoot
- Ramp and soak programming
- Separate heating and cooling control loops
- Optional Solenoid Valve Module for cooling control
- Motor speed control
- High or low power heater switch
- Lockout relay and reset for over temperature protection
- Optional expansion modules for tachometer, pressure, and high temperature alarm

With the Parr 4848 Reactor Controller, all of the expansion modules as well as the primary temperature control module are equipped with bi-directional digital communications [RS-485] that enable the user to not only log all current readings to a PC, but also to send set points, stirrer speeds, and alarm values from the PC to the 4848 Controller.

Modular Design

A total of seven different modules are offered for the 4848 Controller. A maximum of three expansion modules in addition to the primary temperature control can be installed in the 4848 Controller. The user can select either the Tachometer Display Module or the Motor Control Module. This either/or option also applies to the High Temperature Cut Off and External Temperature Limit Modules.

The 4848B has a larger chassis to accommodate up to six expansion modules.

1. Primary Temperature Control Module (PTM)

The temperature control module can accept either thermocouples or RTD temperature sensors. It has three outputs that are used for heating and cooling control and for alarm-actuated heater cut off. The control function is a full proportional, integral and derivative (PID) control with auto-tune capabilities. The controller provides ramp and soak programming with up to 49 segments.

2. Pressure Display Module (PDM)

This pressure monitoring module is set up to accept its input from a pressure transducer mounted on the reactor or attached accessory. It can be set to accept a wide variety of operating ranges. Operating pressures are transmitted continuously to the PC. These modules are available calibrated in either psi, bar, or mPa. The output from the pressure monitoring module is connected to the alarm relay to shut off power to the heater if the high pressure limit set by the operator is reached during operation.

3. Tachometer Display Module (TDM)

In this configuration, the module will display the stirrer speed and will continuously transmit it to the PC for display and logging. The stirrer speed is set manually using a potentiometer on the face of the 4848 Controller.

4. Motor Control Module (MCM)

In this configuration, the module provides true closed loop feedback control of the reactor stirring speed. The primary output of this module is wired to dynamically adjust the motor voltage in response to changes in motor loading. This provides better reactor stirring speed regulation than the standard open loop speed control, especially with reactions that involve changing viscosities. Additionally, the use of this module allows the stirring speed set point to be adjusted remotely from the host PC. A by-product of this closed loop speed control scheme is that the value of the primary controller output directly reflects the degree of loading on the motor in order to maintain a constant stirring speed. While not a direct torque measurement, this is a useful option for those who want to monitor the progress of a reaction where there is a change in viscosity as the reaction proceeds.

5. Motor Torque Module (MTM)

The MTM will display motor output from an MCM. It is particularly useful for applications with changing viscosities.

6. High Temperature Cut Off Module (HTM)

The high temperature cut off module or limit controller augments the operation of the main control module. Its redundant sensor can be mounted either internally or externally to the reactor. The primary output of the module is wired to activate the lockout relay in order to provide safety shutdown should the reactor reach an unsafe temperature.

4848 back panel for 115V model.

7. External Temperature Limit Module (ETLM)

This configuration uses the same aforementioned HTM Module with its sensor mounted in such a way to monitor the reactor's outside wall temperature. The primary output of this module is used to limit the external temperature of the reactor. This is done by interrupting the control signal from the main temperature controller when the external temperature exceeds a predetermined value. The secondary output of this module is used to activate the lockout relay in a non-latching manner if the outside wall temperature exceeds a preset unsafe temperature. The use of this module provides an effective alternative to cascade control, offering improved temperature regulation in systems with large thermal lags, such as those found in non-stirred reactors or systems that use PTFE liners, as well as systems where the reactants have low heat capacities, such as gas phase reactions.

8. Solenoid Valve Module (SVM)

This package includes a solenoid valve and a flow adjustment valve with all of the parts required to assemble an automatic system to control the flow of coolant through a cooling coil in any reactor. It plugs into the cooling output socket on the 4848. It is designed for use with tap water as the cooling media.

4848 Reactor Controller

The 4848B Reactor Controller is a larger version of the 4848 with up to six expansion modules

4848B Expanded Reactor Controller
The 4848B Expanded Reactor Controller is a larger version of the 4848 Reactor Controller. It has the same Primary Temperature Control Module as the 4848, and can accommodate up to six expansion modules. It will also communicate with the A3504HC SpecView software.

The 4848B is most useful when the process requires more modules than a single 4848 can handle. A common application would be a stirred reactor which requires a pressure display showing internal pressure and the pressure of an external gas burette. The 4848B has a chassis with enough space to handle both burettes and associated cables and other infrastructure.

The 4848B also has two optional Auxiliary modules. These will read an analog signal, most commonly 4-20 mA or 0-5 VDC. These can be fed into the chassis through a dedicated auxiliary input slot.

4848M Master Controller
The 4848M Master Controller is typically used with multi-zone heaters such as those used on our 4555 Series Stirred Reactors. It will interface with one or more slave boxes, allowing a dedicated power supply to be used for each zone.

4848A Reactor Controller for AC motors
The 4848A can be used with AC Motors. DC motors are more or less ubiquitous in Parr equipment, but some specialty applications require AC motors. The 4848A allows a tachometer display or motor control module to be used with an AC motor.

4848 Ordering Guide

A composite identification number to be used when ordering a 4848 Reactor Controller can be developed by combining individual symbols from the separate sections.

Example: A 4848 Reactor Controller, 115V electrical, with Tachometer Display Module, Solenoid Valve Module, RS-485 to USB Cable, and SpecView Package would be listed as:

No. 4848-EB-TDM-SVM-A1925E4-A3504HC

A. Model	B. Voltage	C. Options	C. Options	C. Options	C. Options
4848	-EB	-TDM	-SVM	-A1925E4	-A3504HC

Ⓐ Base Model
PID, Ramp & soak digital communications with motor speed control and software

Model No.	Description
4848	Reactor Controller for use with up to three additional display modules
4848B	Reactor Controller for use with up to six additional display modules
4848M	Master Controller
4848A	Reactor Controller for AC Motors

Ⓑ Electrical Supply
-EB	115 VAC
-EE	230 VAC

Ⓒ Options
-TDM	Tachometer Display Module
-MCM	Tachometer w/Motor Control Module
-PDM	Pressure Display Module
-HTM	High Temperature Cut Off Module
-ETLM	External Temperature Limit Module
-MTM*	Motor Torque Module
-SVM	Solenoid Valve Module (for Cooling Control)
-AUX	0-5 VDC, 4-20 MA (4848B Only)
-A1925E4	RS-485 to USB Cable for 4848 Controller (required for data logging)
-A1925E6	RS-485 to USB Converter, isolated, 30-ft
-A2208E**	RS-485 Daisy Chain for Multiple Controllers, 10-ft
-A3504HC	SpecView Software Package

*The MTM module must be installed in conjunction with the MCM.

**Must be used with A1925E6.

Dimensions			
Model	Width, in.	Height, in.	Depth, in.
4848	11.1	9.7	11.3
4848B	13.6	9.6	11.3
4848M	11.1	9.7	11.3
4848A	13.6	9.6	11.3

4848T Touchscreen Reactor Controller

The Parr Model 4848T Controller brings a new touchscreen design to our controller line. This full featured controller has the same functionality as a fully populated 4848 Reactor Controller but with a touchscreen interface.

Connectivity

The Model 4848T is designed for superior connectivity via network communications. After connecting to your network, the Model 4848T can communicate with your tablet, phone, or PC via a built-in web or VNC server.

Module Features of 4848T

The Model 4848T Controller is offered as a fully populated controller with Primary Temperature Control, Motor Control Module, Pressure Display Module, and secondary temperature module.

Primary Temperature Control Module (PTM)

The temperature control module can accept either a thermocouple or RTD temperature sensor. It has three outputs that are used for heating and cooling control and for alarm-actuated heater cut off. The control function is a full proportional, integral and derivative (PID) control with auto-tune capabilities. The controller provides ramp and soak programming with up to 64 steps.

Pressure Display Module (PDM)

This pressure monitoring module is set up to accept its input from a pressure transducer mounted on the reactor or attached accessory. It can be set to accept a wide variety of operating ranges. Operating pressures are displayed

4848T Reactor Controller

continuously. These modules are available calibrated in either psi, bar, or mPa. The output from the pressure monitoring module is connected to the alarm relay to shut off power to the heater if the high pressure limit set by the operator is reached during operation.

Motor Control Module (MCM)

In this configuration, the module provides true closed loop feedback control of the reactor stirring speed. The primary output of this module is wired to dynamically adjust the motor voltage in response to changes in motor loading. This provides better reactor stirring speed regulation than the standard open loop speed control, especially with reactions that involve changing viscosities. A by-product of this closed loop speed control scheme is that the

value of the primary controller output directly reflects the degree of loading on the motor in order to maintain a constant stirring speed. While not a direct torque measurement, this is a useful option for those who want to monitor the progress of a reaction where there is a change in viscosity as the reaction proceeds.

High Temperature Cut Off Module (HTM)

The high temperature cut off module or limit controller augments the operation of the main control module. Its redundant sensor can be mounted either internally or externally to the reactor. The primary output of the module is wired to activate the lockout relay in order to provide safety shutdown should the reactor reach an unsafe temperature.
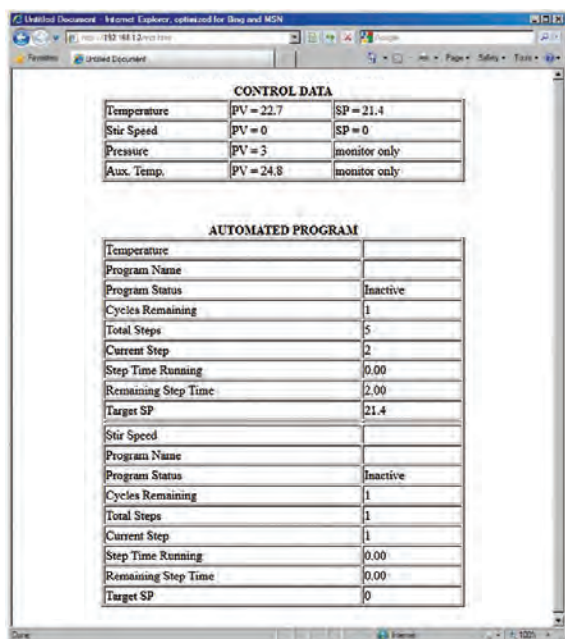
4848T Touchscreen Reactor Controller

4848T back panel for 115V model.

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External Temperature Limit Module (ETLM)

This configuration uses the same aforementioned HTM Module with its sensor mounted in such a way to monitor the reactor's outside wall temperature. The primary output of this module is used to limit the external temperature of the reactor. This is done by interrupting the control signal form the main temperature controller when the external temperature exceeds a predetermined value. The secondary output of this module

is used to activate the lockout relay in a non-latching manner if the outside wall temperature exceeds a preset unsafe temperature. The use of this module provides an effective alternative to cascade control, offering improved temperature regulation in systems with large thermal lags, such as those found in non-stirred reactors or systems that use PTFE liners, as well as systems where the reactants have low heat capacities, such as gas phase reactions.

4848T Communications via IP Network

Series 4848T Ordering Guide

A composite identification number to be used when ordering a 4848T Reactor Controller can be developed by combining individual symbols from the separate sections.

Example: A 4848T Reactor Controller, 115V electrical, with High Temperature Module, for use with 1/4 HP motor would be listed as:

No.**4848T**-**EB**-**HTM**-**VS.25**

A. Model	B. Voltage	C. Options	D. Motor
4848T	-EB	-HTM	-VS.25

Ⓐ Base Model

Touchscreen, PID, Ramp & soak digital communications with motor speed control and software

| Model No.	Description
4848T	Touchscreen Controller with Primary Temperature Control, Motor Control Module, Pressure Display Module, and either High Temperature Module or External Temperature Limit Module

Ⓑ Electrical Supply

-EB	115 VAC
-EE	230 VAC

Ⓒ Secondary Temperature Option

-HTM	High Temperature Module with redundant thermocouple
-ETLM	External Temperature Limit Module with external thermocouple mounted through heater VAC

Dimensions			
Model	Width, in.	Height, in.	Depth, in.
4848T	11.5	12.7	13.3
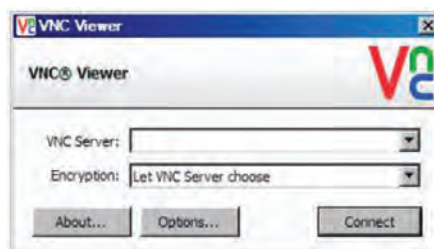
4848T Communications via VNC

4838 Reactor Controller

The 4838 Reactor Controller is designed to control the temperature in our line of non-stirred pressure vessels. No provision is made for the current or future expansion to control motor stirring speeds or to actuate cooling water. The controller contains the same Primary Temperature Control Module used in the 4848 Controller and provides identical control and communications capabilities. A high/low heater switch feature, as well as a lockout relay and reset for over temperature protection, are also included. The 4838 Reactor Controllers can be enhanced with the addition of either a Pressure Display Module (PDM) or High Temperature Cut Off Module (HTM). An External Temperature Limit Module (ETLM) can be substituted for the HTM.

Features found on the 4838 Reactor Controller are:

- PID programming with Auto-tuning capability for precise temperature control and minimum overshoot
- Ramp and soak programming
- High or low power heater switch
- Lockout relay and reset for over temperature protection.

Parr 4838 Reactor Controller shown with optional HTM Module

Series 4838 Ordering Guide

A composite identification number to be used when ordering a 4838 Reactor Controller can be developed by combining individual symbols from the separate sections.

Example: A 4838 Reactor Controller, 115V electrical, with optional Pressure Display Module and SpecView Software would be listed as:

No.4838-EB-PDM-A3504HC-A1925E4

A. Model	B. Voltage	C. Options	C. Options	C. Options
4838	-EB	-PDM	-A3504HC	-A1925E4

A Base Model

For Non-Stirred Vessels, PID, Ramp and Soak, Digital Communications and Software

Model No.	Description
4838	Reactor Controller

B Electrical Supply

-EB	115 VAC
-EE	230 VAC

C Options

|	
-PDM	Pressure Display Module
-HTM	High Temperature Cut Off Module
-ETLM	External Temperature Limit Module
-A1925E4	RS-485 to USB Converter with 30-ft. Cable
-A1925E6	RS-485 to USB Converter, isolated, with 30-ft. Cable
-A3504HC	SpecView Software Package for 4848 and 4838

Dimensions			
Model	Width, in.	Height, in.	Depth, in.
4838	10.19	7.11	7.92

SpecView® Software for 4848 and 4838 Controllers
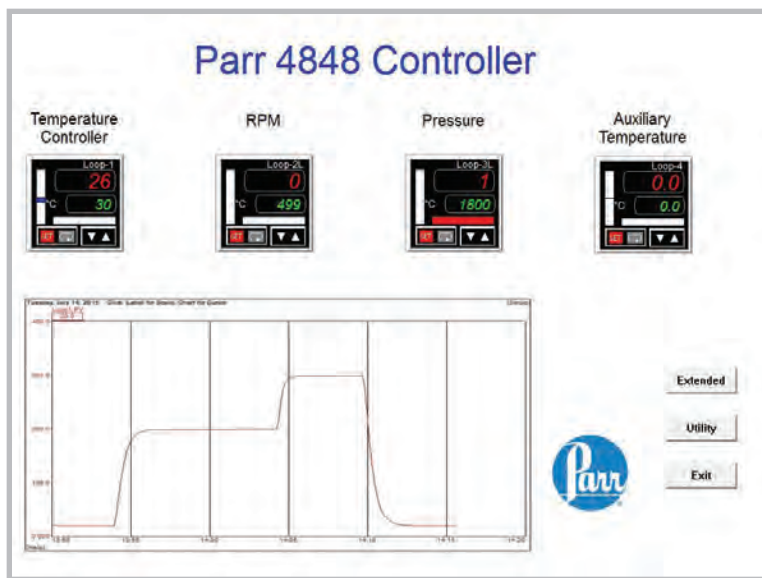
SpecView Graphic User Interface for 4848 and 4838 Controllers

SpecView Software

The unified Modbus communication architecture of the 4848 allows us to bring the power and convenience of SpecView to the 4848 and 4838 Series Controllers. This version of SpecView provides support for up to eight individual loop or limit controllers.

SpecView Features and Benefits:
- Real time charting
- Datalogging
- Alarm and event logging
- Superior alarm annunciation
- Customizable graphical user interface

This powerful program is highly customizable and configurable to show variables beyond the process value such as heater output, motor output or alarm status. Notes are easily inserted into the interface and data, and the entire interface can be rearranged and edited for the intended process.

PC Requirements:
SpecView runs on the following Windows operating systems:
- Windows 10, 8, 8.1, & 7; 32 bit & 64 bit
  Note: SpecView does not work on Windows 8 RT (as found on some Microsoft Surface tablets)

Parr recommends a minimum of:
- Intel Pentium processor or equivalent AMD
- 2GB RAM
- 1GB hard disk space for SpecView and related utilities
- Additional disk space for datalogging
- Display adapter capable of operating at 1024 x 768 pixels and at least 16-bit color
- 2 USB ports
- A CD-ROM drive

4871 Process Controller

The 4871 Process Controller has been developed to provide an integrated stand alone control system for controlling either a single reactor with multiple feed and product controls or multiple reactors operating independently or in parallel. The 4871 is the ideal choice for all of Parr Instrument Company's custom systems, including: tubular reactors, multiple reactor systems (both batch and cascade systems), continuous flow stirred reactors, and fluidized bed reactors.

Control Module
The control module of the Parr 4871 Process Controller is a Honeywell HC900 Hybrid Controller. This controller combines analog and logic control into a versatile, cost-effective controller designed specifically for process applications requiring analog measurement combined with programmable control actions.

| Function	
Analog Input (AI) Maximum Channels	480
Analog Output (AO) Maximum Channels	200
Digital I/O Maximum Channels	1920
Remote I/O	Yes
Control Loops	Per Memory
Logic Scan	25-50 ms
Loop Scan	500 ms
Ethernet Communications	Yes
Peer to Peer Communications	Yes
Modbus Master	Yes
Modbus Slave	Yes
On-line Programming	Yes
Function Blocks	2000
Sequential Functions	Yes
E-mail Alarms	Yes

Input / Output
The controller is adapted to each user's requirements by adding to the control chassis input and output modules. Each module provides for between four and sixteen individual inputs or outputs fully isolated from one another.

These modules include:

Input Modules
The analog inputs are of universal type and are most commonly used for thermocouple or RTD temperature sensors, strain gage type pressure transducers, and similar devices with mV, V, or resistance inputs. Input isolation, cold junction compensation, and burnout protection are incorporated into the circuitry. Each analog input module provides for eight separate inputs.
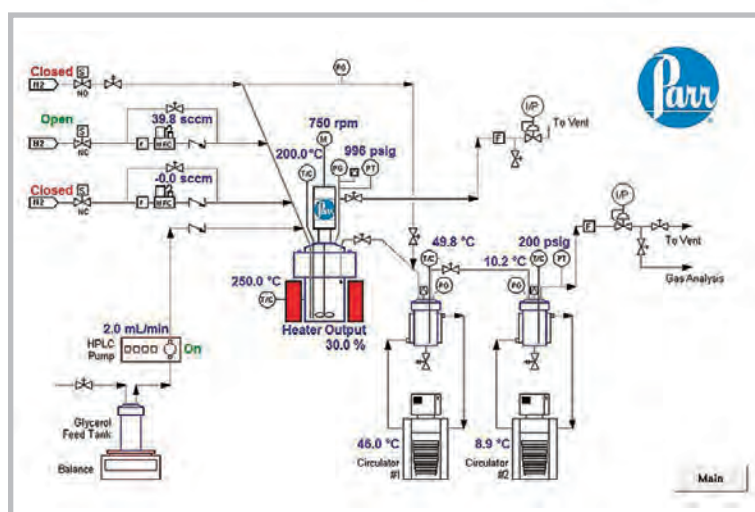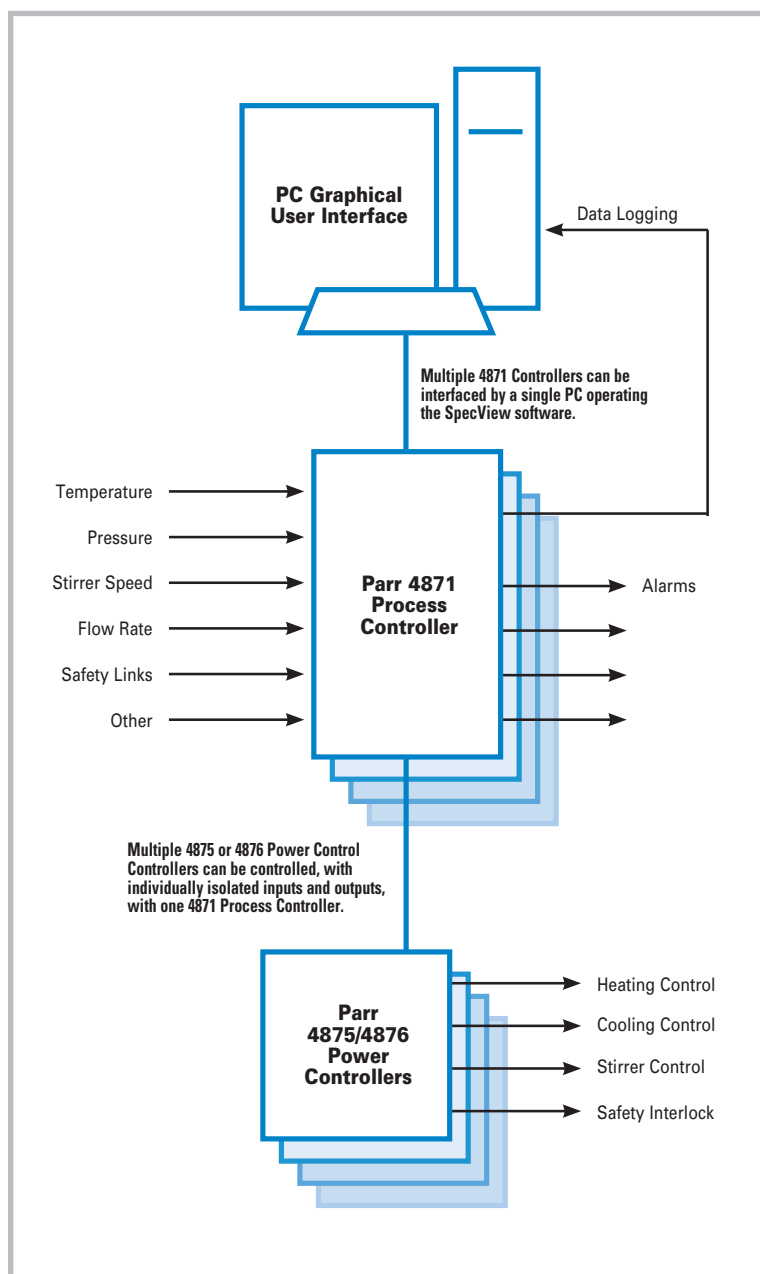
Process Flow Diagram for stirred reactor system.

The digital inputs can be logic inputs or contact closures. These are typically used for sensing valve positions or conditions of safety devices. Each digital input module provides for sixteen separate inputs.

4871 Process Controller

Output Modules

The analog outputs are 0-20 mA. A suitable dropping resistor can be used to convert this to 0-5 or 0-10 VDC. Analog outputs are commonly used to set stirrer motor operating speeds, position control valves, or drive mass flow controllers or pumps. Each analog output module is capable of controlling four separate devices or functions.

The digital outputs are open collector type capable of sinking up to 300 mA. They are commonly used to control heaters, solenoid valves for cooling or other flow control, system safety shut down, visual and/or audible alarms, and similar devices. Each digital output module is capable of controlling sixteen separate devices or functions.

Control Loops

The controller can provide any number of PID or ON/OFF control loops, limited solely by the available CPU memory.

The PID control algorithm includes auto-tuning and fuzzy logic overshoot suppression for each control loop. For heating and cooling control, the PID control loops provide time proportioning of the associated digital output.

Many temperature control applications utilize two separate time proportioning outputs with one PID controller; one for heating and one for cooling.

Control loops can be linked together to provide cascade, feed forward or ratio control for difficult or advanced control applications.

Both high and low limit values can be entered for each control loop to sound alarms or initiate safety control schemes.

4871 Process Controller Input/Output Diagram.

The 4871 Process Controller combines the following components into a single control system:
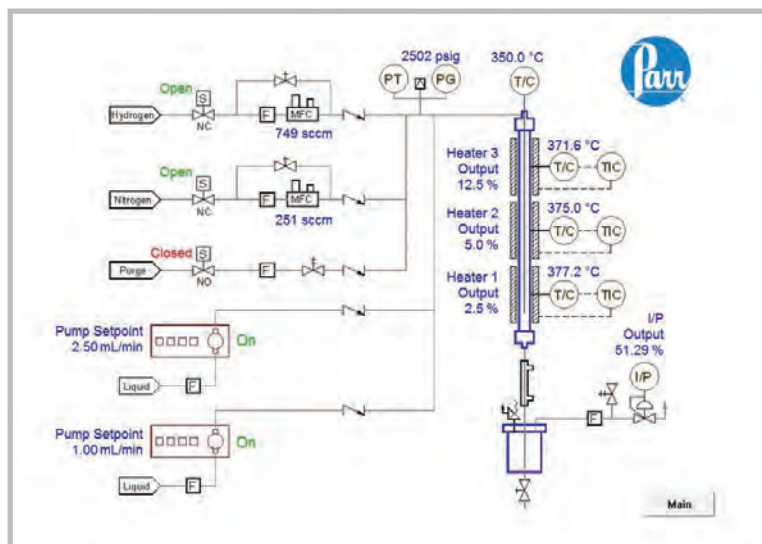
Control Module:
- Honeywell HC900 Hybrid Controller

Flexible, Powerful Software:
- SpecView SCADA software
- System set up with graphical user interface configured to individual requirements

Power Controller:
- 4875 or 4876 Power Controllers for handling heating, cooling, safety, and motor control devices

Process Flow Diagram for a tubular reactor with real-time process renderings.
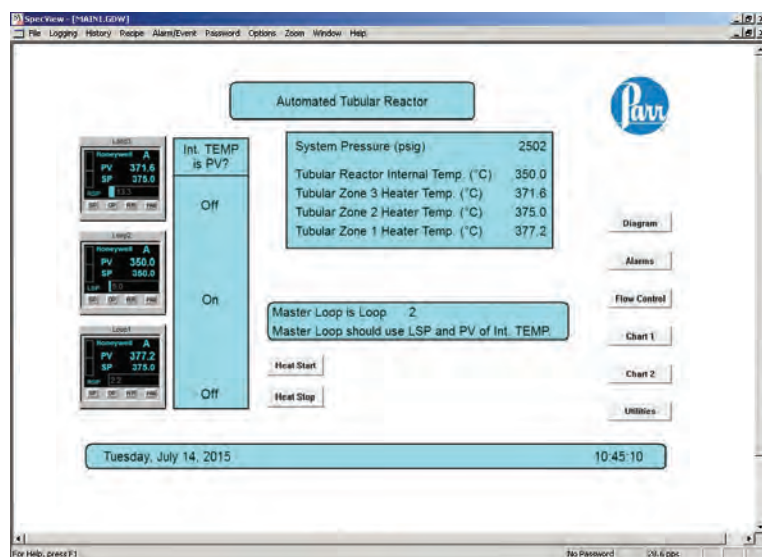
Screenshot of a 4871 Controller user interface for automated control of a tubular reactor system.

4871 Dimensions			
Model	Width, in.	Height, in.	Depth, in.
4871A	12.86	15.12	11.00
4871B	16.98	21.56	13.00
4871C	29.78	21.56	13.00

Set Point Programming

Ramp/Soak profiles for controlling the entire process of a reactor can be written using the set point profiler incorporated into the control firmware. A single profile may be from 2 to 50 segments in length.

A typical profile might be a ramp and soak of the reactor temperature but, in addition, the analog and digital outputs can be tied to the basic profile to start and stop flows, activate stirrers or accessories, or change alarms. Any of the set points within the profile can be protected with the set point guarantee function that assures that the process variable will be within the entered limits before the profile can proceed.

The number of set point profiles is limited by the amount of available memory in the controller CPU. Typically, at least eight separate profiles can be running simultaneously. For example, eight reactors can be running a unique program at the same time.

While a maximum of 99 profiles can be stored in the controller itself, an unlimited number can be stored in the operator's PC for rapid transfer to the controller.

In addition to the set point profiling capability, the controller is also equipped with a set point scheduling function. This feature can operate up to 8 profiles operating on a common time base.

The 4871 Controller includes Operational Sequence Control

The sequence control function offered by the 4871 Controller greatly expands the capabilities of this control for users who wish to control reactor systems. The operation of valves, pumps and other peripheral devices can be programmed on either a time or an event driven basis. Sequences can be very simple timed events or they can be very complex with multiple nested default sequences programmed to occur only if process feedback indicates a need to take alternative actions.

Communications Channels

Each 4871 Controller is equipped with an RS-485 and Ethernet communication ports. The RS-485 port is used for initial configuration and communications setup. The Ethernet port provides communication with the host PC when using the SpecView GUI program. Multiple controllers, each with a unique address, can be networked on the Ethernet interface with a single connection to the PC.

The principal advantage of the Ethernet interface is that it allows the user to use an existing network infrastructure to connect the controller to the PC. As a result, one can operate the controller over the network from anywhere within your facility.

4871 Process Controller

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Additionally, internet access from remote locations becomes possible. This type of connectivity offers unique possibilities, for example, related to remote diagnostics and system troubleshooting.

Three Models Available
Parr 4871 Process Controllers are available in three different models to cover a wide range of applications. The 4871A will accept four I/O modules (typically up to 36 inputs and outputs). The 4871B will accept up to eight I/O modules, and the 4871C will accept up to twelve I/O modules. If more than 100 inputs and outputs are required, multiple controllers can be linked.

SpecView SCADA Software
SpecView describes their product as "Software for people with other jobs". That seems to be an excellent description of this software package used with the 4871 Controller to:

- Interface with the control package
- Develop the graphical screen layout
- Establish the data logging profiles
- Prepare custom reports
- Create bar graphs
- Generate time trend graphs
- Monitor alarms
- Create flexible recipes
- Retrieve and replace logged data
- Operate the reactor system(s).

The full software package, not just a run-time version, is supplied with the 4871 Controller so operators can enhance their system as their needs change or expand/change their applications. Download a demo at www.specview.com.

Graphical User Interface
An integral part of the Honeywell Controller is the hybrid control designer software. This is the "Drag and Drop" software that enables Parr to rapidly establish the controller's internal logic and adapt it to individual systems requirements.

The user can employ this same software to change or enhance the fundamental logic of the controller as additional components are added to the system or as functions need to change.

Current Industrial Standards
Modbus, Ethernet, auto-tuning, fuzzy logic, auto-configuring Man Machine Interface (MMI), supervisory control and data acquisition (SCADA), multi-loop control; these are a few of the terms and capabilities designed into the hardware and software incorporated into the Parr 4871 controller.
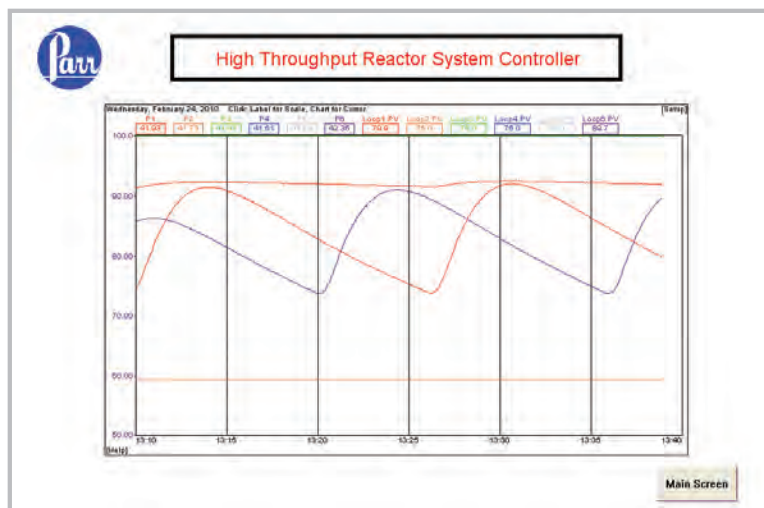
Screenshot from remote PC showing logged data in Data Logging Mode.

This modern and powerful package enables Parr to configure and build turnkey systems within weeks of order at very attractive prices.

PC Requirements
In most laboratory and pilot plant applications, a PC will be used for the operator interface. A touch screen interface is also available. For plant or production applications, an industrial type user interface box with a color graphic LCD is available.

The PC used with the 4871 serves several functions. It is the operator's user interface for controlling the process. It also logs all of the operating data generated during a process run. It can also store multiple setups for rapid transfer to the 4871 Process CPU.

Any modern PC with current Windows operating system can be used with these controllers.

It is important to note that the control of the process always resides within the 4871 Controller, and not in the PC itself.

4871 Ordering Guide
Each 4871 Controller will be specified and assembled to match the user's intended application. These applications can vary from a single reactor with full process control to eight reactors operating in parallel. The 4871 Process Controller connects to a customer-supplied PC with a current Windows Operating System.

Please contact a Parr Customer Service Representative to discuss configuring a 4871 Process Controller to your specific application.

> **Please contact a Parr Customer Service Representative to discuss configuring a 4871 Process Controller to your specific application.**

4871 Accessories

The 4875 Power Controller module is flexible and can be used in remote locations from the system being controlled.

4875 Power Controller back panel for 230V model.

4875 Power Controller

The power controller(s) will be designed for each individual system, but as an example, a 4875 Power Controller includes:

1. A solid-state relay sized to handle the current drawn by the vessel heater. This is commonly a 25-amp relay with its protective fuses.

2. A solid-state relay sized to drive a solenoid valve to control the flow of cooling water to the vessel.

3. A motor speed controller that converts the analog output signal from the controller to the electrical signal required to drive the specific stirrer motor. A circuit breaker for the motor is also provided.

4. A lockout relay to shut down the heater circuit should an alarm condition be detected.

5. Status lights for the principal functions.

6. Connections of appropriate style for the power input and device outputs.

4875 Dimensions

Model	Width, in.	Height, in.	Depth, in.
4875	9.40	5.00	10.50

Power Controllers

Parr designs, builds and furnishes power controllers to adapt the analog and digital outputs from the 4871 Controllers to the reactors or systems being controlled. These power controllers handle all of the high current power circuits so that the control circuitry is isolated from these loads. This also makes it possible to install the controller in a control room some distance from the system being controlled.

4876 Power Controller

Back panel for 4876 Power Controller

4876 Power Controller

The 4876 Power Controller is equipped with three solid state relays, three lockout relays, and a single motor control. It is used with the 4871 to control up to three separate heaters and one motor. It can only be used in 230V systems.

4876A Power Controller

The 4876A Power Controller is the same as the 4876 described above but without motor control capability.

4876 Dimensions

Model	Width, in.	Height, in.	Depth, in.
4876	16.18	4.98	13.00
4876A	9.40	5.00	10.50

Additional Controllers

4877 Valve Controller

The 4877 Valve Controller is used with the 4871 Process Controller to remotely actuate valves. It requires a dry air supply.

4877 Dimensions			
Model	Width, in.	Height, in.	Depth, in.
4877 (1-4 valves)	15.00	5.00	16.00
4877 (5-8 valves)	19.00	5.00	16.00
4877 (9-12 valves)	24.00	5.00	16.00

Series 5000 Multi Reactor System (MRS): a six station multi-reactor system. Each reactor is equipped with it's own constant pressure gas delivery system. The 4871 Controller maintains all of the important system parameters, including temperature and stirring speed, and records the gas consumption of each of the reactors.

A2200E Flow Controller Interface

The A2200E Flow Controller Interface can be used to send a set point and receive flow rate information from up to four MFCs. It is a basic control box for use with distributed control systems. Users needing more advanced features like PC communication and totalization should consider our 4871 Process Controller.

A2200E Dimensions			
Model	Width, in.	Height, in.	Depth, in.
A2200E	9.40	5.00	10.50

A2110E Motor Controller

The A2110E Motor Controller is a stand alone box which can be used for a single motor. It may be equipped with a Motor Control Module expansion for setpoint control of RPM. A version of this controller with 4-20mA I/O capability for integration into existing systems is available.

A2110E Dimensions			
Model	Width, in.	Height, in.	Depth, in.
A2110E	9.00	4.64	13.00

This custom order is set up to run sixteen reactors, two 4871 Process Controllers, with sixteen 4875 Power Controllers all through one PC.