

# 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.

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# 4848 Reactor Controller



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

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

## A 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

## B Electrical Supply

-EB	115 VAC
-EE	230 VAC

## C 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