

MPE SC2000E Station Controller Specification

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The Controller shall control up to four pumps to perform liquid level control. The Controller shall be capable of controlling a mix of constant speed and variable speed pumps. The Controller shall be capable of alternating the pumps, shall provide lag pump delays and high and low level alarms, and shall perform both pump-down and pump-up operation.

The Controller shall be standard “off the shelf” equipment with published literature and fully tested hardware and operating program. The Controller must be field configurable from the front of the unit, and require no special tools or software to set-up or operate.

The Controller shall be UL listed as Industrial Control Equipment, UL 508.

The Controller shall accept an input signal in the following forms: a 4-20 mA analog signal, inputs from a Conductance Level Probe, or Float Switches.

All connections to the Controller shall be made to removable, “Phoenix” style combination connector/plugs.

The Controller shall be a microcontroller-based device and not require a battery to maintain the operating program. All set-up values shall be stored in non-volatile memory.

A numerical level display shall be provided on the front of the unit. It shall have a 3 digit, 7 segment LED display and show levels in feet and tenths of feet. All setup parameter values shall be viewed or changed from the front of the Controller.

The Controller shall not require an external power supply or any external I/O modules to be a fully functioning unit. An analog input (4-20mA) with zero and span adjustments shall be provided for the scaling of the wet-well level input.

The status of all of the discrete inputs shall also be viewable from the front of the unit.

All electrical connections, for power or I/O, shall be by quick disconnect phoenix style connectors.

The Controller shall have a connector for a conductance level probe of ten sensor points.

Relay outputs shall be provided as standard for high and low level alarms and for the control of up to three pumps.

If not being used, the ten conductance level probe inputs shall be available for use as ten additional discrete SCADA inputs, or for control via float switches.

The Controller shall remember which pump was in the lead position during a power outage.

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The Controller shall have 18 discrete inputs. The inputs shall be transient protected and be programmable for the following functions:

- Pump disable with HOA in OFF, or pump fault
- Freeze wet well level during a bubbler tube purge
- External Lead Pump Selector Switch
- Limit number of pump called to run on emergency power
- All Pump Disable – for connection to Phase Monitor
- Sequence Input for Lead Lag Select Switches
- High and Low Level Alarms
- Pump disable upon low level – for connection to low level float switch
- Float switch backup
- Low Level Pump Cutoff
- Start Flush Cycle
- Call Pump Last
- Inputs for user selectable SCADA functions

The Controller shall include a fault indicator on the front of the unit and retrievable fault codes to aid in troubleshooting.

A level simulation feature shall also be available from the front of the unit. The Controller shall automatically return to monitoring wetwell level after sixty seconds, if left in simulation mode.

An RS232 serial port with the Modbus RTU protocol shall be provided for SCADA. Programming shall be in place to collect and transmit the station status, and to allow for the remote control of the pumps.

The Controller shall provide an RS232 Serial Port as a standard feature, and shall have an Ethernet port available as an option.

The Pump On/Off levels, high level alarm, and low level alarm setup values shall be viewable and changeable from a remote location.

Pump elapsed time meters shall be viewable and resettable remotely, and shall be stored in non-volatile memory during a power outage.

The Controller shall be able to perform float back-up using from two to six floats.

The Controller shall be able to supply (as an option) up to four isolated 4-20mA Analog Outputs that shall be used for VFD speed control, or for sending out a copy of the level input signal.

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The Controller shall be able to supply (as an option) up to four isolated 4-20mA Auxiliary Analog Inputs to be used to collect analog data for SCADA.

The Controller shall have adjustable lag pump(s) delay.

The Controller shall have a security code that can be set to lock the parameters beyond the on – off setpoints from being changed.

The Controller shall have a parameter setting to select the number of pumps to control.

The Controller shall have a parameter setting to select the number of pumps to run at one time.

The Controller shall have a parameter setting to select the number of pumps allowed to run while on generator power.

Menu selectable alternation modes shall include:

- Standard Alternation

- Jockey pump (Pump 1 stays on when other pumps turn on)

- Jockey Pump (Pump 1 turns off when other pumps turn on)

- Split alternation (Pumps 1&2, Pumps 3&4)

- Fixed sequence (Pump 1 always lead)

- Stepped on/off (Only one pump runs at a time)

Menu selectable First-On/First-Off or First-On/Last-Off alternation sequences shall be available.

The Controller shall contain a parameter setting to allow the disabling of the automatic alternation.

The Controller shall contain a parameter to allow the Controller to be used in either a Pump Up or a Pump Down configuration.

The Controller shall have a straightforward setup for VFD Control. The parameter settings shall include parameters for Minimum Speed, Level at Minimum Speed, Pump Start Boost time.

The Controller shall provide a parameter setting to remotely set the speed of the VFD.

The Controller shall have parameters for calibrating the zero and span of the level input signal.

The Controller shall contain a parameter for setting the slave address of the Controller when used in a SCADA application.

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The Controller shall contain parameter registers for the set up of the RS232 port.

The Controller shall contain a parameter to limit malicious attempts to control the pumps remotely or to change the setup parameters.

The Controller shall be able to force lead pump position by parameter selection.

The Controller shall be able to perform an automatic flush cycle to reduce sludge build up within the wetwell.

The Controller shall have a wetwell flush cycle that is able to be remotely controlled via SCADA.

The Controller shall contain a flow calculator that provides the following:

- Latest Inflow Rate

- Average Daily Flow (Average of the last 7 days)

- Pump Outflow Rate (Latest Rate for each pump)

The Controller shall provide a parameter setting to provide signal conditioning for the analog Level input signal.

The Controller shall provide a parameter setting to allow disabling of the low level alarm.

The Controller shall have a parameter selection to select time for time-based forced alternation.

The Controller shall contain pump disable discrete inputs shall cause the alternation routine to skip over disabled pumps. These pump disable discrete inputs shall be able to be inverted by a parameter setting.

The Controller shall contain registers for quick verification of the firmware revision level.

The Controller shall have a fault code register to aid in troubleshooting.

The Controller shall also have parameters to allow level probe to be a back-up to the analog transducer input.

The Controller shall have parameter based setup for the 18 discrete inputs.

The Controller shall contain a discrete input for connection to an external time clock to force pump alternation.

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The Controller shall have a parameter setting to allow the analog input level to be a 4-20mA signal from a transducer, a conductance level probe, or a remote level input signal from SCADA.

The Controller shall have a parameter to select the level probe type by the selection of the distance between the electrodes.

The Controller shall have a level offset parameter to enable the transducer or conductance level probe to be placed off the bottom of the wetwell, while maintaining an accurate representation of the wetwell depth.

The Controller shall have a choice of sensitivity settings for use with a conductance probe.

The Controller's unused output relays shall be able to be programmed through SCADA for additional control uses.

The Controller shall contain parameters to view the status of the Level Probe electrodes.

The Controller shall monitor the squarewave signal at the Level Probe inputs, and shall create a fault code if an improper squarewave is detected.

The Controller shall contain the ability to perform the following SCADA features:

Monitor the status of:

Wetwell Level

All Discrete Inputs

- Pump On, Pump Off, High and Low Alarm Levels

- Individual Pump Disable Status

- All Pump Disable Status

- Float Backup Status

- On Generator Status

- Level Probe Backup Status

- Pump Forced On Status

- ETMs

- Relay Remote Control Status

- Forced Alternation Status

- Pump Run Status

- Pump Forced On Status

- Current Lead Pump Status

- Level Probe Electrode Status

- Fault Code Status

- Last Fault Code Status

Monitor the status of: (continued)

- Internal 5V Power Supply Status
- Internal 24V Power Supply Status
- Controller Program Revision Number
- Flush Cycle Operation
- Flow Calculator, Latest Inflow Rate
- Flow Calculator, Average Daily Flow
- Flow Calculator, Outflow Rate per Pump
- Flow Calculator, Daily Inflow Total for last 7 days

Control:

- Remotely Change Pump On, Pump Off, High and Low Alarm Levels
- Remotely Reset ETM's
- Remotely Force Pumps On
- Remotely Disable Pumps
- Remotely Force Alternation
- Remotely Select Lead Pump
- Remotely Reset Fault Code Register
- Remotely Reset Last Fault Code Register
- Remotely Control Unused Relays
- Remotely Start Wetwell Flush Cycle
- Remotely Stop Wetwell Flush Cycle
- Remotely Set VFD Speed

Fault Codes:

The following Fault Codes shall be available for Controller Troubleshooting:

- Communication Fault
- Parameter Setup Faults
- Normal Operation Disabled
- Pump Operation on Float Backup
- Backup Float Out-of-Sequence
- All Pump Disable
- Level Probe Fault
- Level Probe Out-of-Sequence
- Pumps called to run by Level Probe Back-Up
- Flow Calculator Setup Fault
- VFD Speed Reference Setup Fault

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The Controller shall offer the following optional features:

4-20mA Analog Level input may be ordered as an isolated input

An optional Ethernet Port that will perform both Modbus TCP and Modbus RTU protocols.

Part Number: SC2000E-XX

The first "X" denotes the number of optional analog outputs (0 thru 4).

The second "X" denotes the number of optional auxiliary inputs (0 thru 4).

Part Number Options:

To order with the Analog Level Input isolated, add S to the end of part number.

To order with an Ethernet Port, add E to the end of the part number.

The SC2000E-XX Controller shall be manufactured by Motor Protection Electronics of Apopka, Florida, (407) 299-3825.