MPE SC1000E Station Controller Specification

The Controller shall control up to three pumps to perform liquid level control. The Controller shall be capable of alternating the pumps, and 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 Controller shall have 12 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 Alternator 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
- Inputs for user selectable SCADA functions

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.

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 have adjustable lag pump(s) delay.

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, Pump 3)
　　　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 pave 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.

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 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 12 discrete inputs.

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

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
      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

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

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 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 SC1000E Controller shall be manufactured by Motor Protection Electronics of Apopka, Florida, (407) 299-3825.