



Specification

MultiSmart Pump Controller Specification

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1 Standard functions

The field hardware shall provide “Out of the box” control of a typical pump station, with an intuitive user-interface. The product shall come with pre-built configuration parameters which are selectable via the user interface and a PC configuration program, including:

- Setpoint adjustment for pump activation/deactivation and level alarms
- Level device from 4-20mA or conductive probe
 - Redundant level device handling
- Selectable between fill / empty
- Functionality for advanced pump control of up to 9 pumps including grouping and alternation
- Station optimization including
 - Max off time (odour reduction)
 - Maximum pumps to run (overload protection)
 - Maximum starts per hour (pump protection)
 - Inter-pump start and stop delays
 - Maximum run time (turn off inefficient or partially blocked pumps)
 - Blocked pump detection
 - Well washer controls
 - Well clean out (periodic pump down to snore point)
- Multiple profiles of setpoints for spill management, off peak pumping, tariffing, etc
- Datalogger of 50,000 events
- 3-phase supply monitoring and supply protection
 - Under-voltage
 - Over-voltage
 - Phase fail
 - Phase rotation
- Monitoring of dc supply, battery voltage, and internal temperature

2 Optional functions

- Motor protection & power module including:
 - Over- and under-current
 - Ground/earth fault
 - Insulation resistance testing for motor windings
 - KVA, kW and power factor measurement
- Calculated flow via draw down test
- VFD control algorithm

3 Programmability

The product shall have the option of a logic engine to enhance/interact with the pump controller.

The product shall have the option of IEC61131-3 PLC programming language to enhance/interact with the pump controller.

4 I/O

The I/O shall be expandable to many hundreds of I/O points per unit.

Available I/O types shall include:

- Digital inputs (voltage free input), also configurable as counters
- Digital outputs (240V, 5A resistive)
- Analog inputs (10bit)
- Analog outputs (10bit)

4.1 Digital Inputs configurable for seal, thermistor, and other pump station requirements

Additionally, the Digital Inputs shall be selectable as pump station specific I/O to reduce components in the panel and therefore save cost, e.g. remove pump relays such as mini-CAS relays, MAS relays.

- Seal sensor
- PTC Thermistor
- Flygt FLS & CLS
- Conductive probe (for liquid level sensing)

4.2 Specific I/O for motor protection and monitoring

The product shall have I/O cards to minimise additional components which include:

- Insulation resistance test (IRT) to 1000v
- 3-phase current monitoring, derived from CT's, 0.5% resolution
- 3-phase supply monitoring, 0.5% resolution. Up to 630V phase to phase.

5 User interface

The field hardware shall include a user interface for operations and configuration. The display shall provide status of most aspects of the pump station, control of pumps, resetting of faults, and configuration of parameters.

5.1 Status

The following parameters shall be displayed on the main screen:

- Level
- Setpoints for alarms and pump start/stop
- Pump running/stopped
- Pump available
- 3-phase current for each motor (when motor protection card installed)
- Pump fault
- 3-phase supply

The screen will also have buttons to allow the user to access Faults, History, Information and Settings.

5.2 Information screens

The following parameters shall be available via a user key press from the main screen:

- Hours Run accumulators for each pump & the station with the following comparisons
 - last minutes run
 - this hour, last hour
 - today, yesterday
 - this week, last week
 - total hours run
- Starts accumulators for each pump & the station with the following comparisons
 - this hour, last hour
 - today, yesterday
 - this week, last week
 - total starts
- Flow values, either derived from calculations or via a flowmeter, including inflow, pump flow rate, total volume
- Any overflow information, including start time, duration, estimated volume
- Insulation resistance value for each motor
- Status of all I/O

5.3 Control

The following aspects of the system, as a minimum, shall be controlled intuitively through the user-interface:

- Pump mode, for each pump, between Auto/ Manual (Hand)/ Off
- Pump fault reset
- Level alarm reset

5.4 Fault screen

The main screen shall include a Fault button which takes the user to a Fault screen and allows them to check all current and unacknowledged alarms.

The fault screen will detail the fault (e.g. contactor fail, seal fault, motor overtemp, over-current, etc) along with date/time each fault occurred and cleared.

A reset option for a fault will be presented to the user when faults can be acknowledged/reset.

5.5 History screen

The main screen shall include a History button which takes the user to a History screen and allows them to check all faults and events along with date/time. The History screen shall include the ability to filter to view only faults, only events, or narrow down to events relating to specific types of data.

5.6 Configuration

The user interface should allow intuitive configuration of the system, including as a minimum:

- Set-points, including alarm and pump setpoints
- Enable/disable level alarms (so that for example, the low level alarm can be easily activated or deactivated)
- Start, stop and alarm delays
- Alternation/ fixed sequence and grouping of pumps where necessary
- Configure I/O
 - Assign primary/backup level to any input, e.g. 4-20mA or conductive probe
 - Assign pre-defined (or user-defined) faults, e.g. thermal overload, contactor fail, to any digital input
 - Zero and span analog inputs
 - Set Digital outputs to change state with any digital tag in the system
 - Set Analog outputs to follow any analog value, including primary level
- Fault configuration
 - Set each fault as either: display only; manual/SCADA restart; auto restart with configurable restart time
- Pump station optimisation parameters such as:
 - Max off time (odour reduction)
 - Maximum pumps to run (overload protection)
 - Maximum starts per hour (pump protection)
 - Inter-pump start and stop delays
 - Maximum run time (turn off inefficient or partially blocked pumps)
 - Well washer controls
 - Well clean out (periodic pump down to snore point)
- Supply protection
 - Under- and over-voltage alarm points
 - DC-supply alarm point
- Motor protection parameters, including under- and over-current, ground/earth fault, phase fail
- Communications ports, speeds and addresses

The configuration of the unit will also allow the user to save a known good configuration on the unit itself that they can revert back to at any time.

5.7 Maintainability

The supplier shall also demonstrate that their system is maintainable in the future, especially that future applications do not incur any user-interface development cost on the customer, i.e., the user-interface shall be an integral part of the system.

6 Communications

6.1 Physical

The product shall include:

- Ethernet 10Mbit/s
- Multiple RS232 ports to 115kBit/s

6.2 Media

The system shall support a variety of communications networks including:

- Private radio over RS232
- PSTN
- Wireless LAN
- Cellular voice and cellular data

6.3 Protocols

The communications protocol will be an open protocol such as DNP3 which includes:

- Change of state reporting
- Native date/time and quality stamps for each data point
- Event buffering for different classes of data

Modbus master/slave protocol will also be provided



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