Firetrol MarkIII+ Electric Fire Pump Controller

FTA3130S - Variable Speed Starting with Soft Starter Bypass

Specifications

1.0 Main Fire Pump Controller

The MarkIII+ FTA 3130S provides a variable frequency drive (VFD) to control the speed of a centrifugal pump for the purpose of limiting the system pressure in a sprinkler system used for fire protection. The controller shall control a fire pump motor having the horsepower, voltage, phase and frequency rating shown on the plans and drawings. The controller shall be equipped with both automatic and manual bypass to start and run the motor should a problem arise with the VFD. The controller shall be provided with a soft starting bypass.

1.1 Standards, Listings & Approvals

The controller shall conform to all the requirements of the latest editions of:
NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*
NFPA 70, *National Electrical Code*.

The controller shall be listed by:
Underwriters Laboratories, Inc., in accordance with UL218, *Standard for Fire Pump Controllers* Canadian Standards Association CSA-C22.2, *Standard for Industrial Control Equipment* (cUL)

The controller shall be approved by:
Factory Mutual (IEC 62091)

1.2 Enclosure

The controller components shall be housed in a NEMA Type 12 (IEC IP54) drip-proof, floor mounted enclosure with powder coat finish. The enclosure shall include conductor entry gland plates, enclosure lifting brackets and lockable door.

1.3 Withstand Ratings (Short Circuit Current Ratings)

All controller components shall be front mounted, wired and front accessible for maintenance. The minimum withstand rating of the controllers shall not be less than 100,000 Amps RMS Symmetrical at 200-480 Volts and 50,000 Amps RMS at 600V. See product information for details.

1.4 Isolation Switch and Circuit Breaker

The controller shall include a motor rated combination isolating disconnect switch/circuit breaker, mechanically interlocked and operated with a single, externally mounted handle. The isolating disconnect switch/circuit breaker shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated bypass mechanism. The isolating disconnect switch/circuit breaker shall be capable of being padlocked in the OFF position for installation and maintenance safety, and shall also be capable of being locked in the ON position without affecting the tripping characteristics of the circuit breaker. The circuit breaker trip curve adjustment shall be factory set and tested.

1.5 Operator Interface

The operator interface shall be a 7.0" LCD color touch screen (HMI technology) powered by an embedded microcomputer with software PLC logic. Included shall be keypad type push-buttons for START, STOP, RUN TEST and TRANSFER SWITCH TEST.
The screen shall include menus for: *Home · Alarms · Configuration · History · Service · Manuals · Language*.

The HMI shall graphically display the following: *Voltage and Amperage of all 3 phases simultaneously using true RMS Technology for both the Normal and Alternate Power Sources · Transfer Switch Status · Motor Stopped/Running · Starting Cause · Actuation Mode · Controller Type · Shutdown Mode · Date & Time · Pump Room Temp. · System Pressure*
System pressure shall be capable of being displayed as: *PSI, kPa, Bar, Feet of Head or Meters of Water.*

The HMI shall allow programming and display of: *Cut In & Cut Out Pressure Settings · Minimum Run Timer · Sequential Start Timer · Periodic Test Timer*

The controller shall provide visual indication for: *VFD Fault · VFD Bypass · Locked Rotor Current · Failed to Start · Under/Over Current · Over/Under Voltage · Phase Imbalance · Phase Reversal · Transducer Fault · Low Pump Room Temperature*

The HMI allows the user to select the language of the system and download the manual or view the manual on screen.

1.6 Ammeter/Voltmeter

The fire pump controller operator interface shall be capable of displaying true RMS digital motor voltage and current measurements for all three phases simultaneously. Displays requiring push-button and selector switches to toggle between phases or current and voltage shall not be accepted. Voltage and current shall be measured by True RMS technology to provide the most accurate measurement for all sine waves, including non-sinusoidal waveforms. Average responding meters will not be accepted.

1.7 Solid State Pressure Transducers

The controller shall be supplied with two solid state pressure transducers with a operating range of 0-500 psi (0-34.5 bar) ±1 psi. One transducer shall be an input to the MarkIII+ and for display of the system pressure and the other transducer shall be a pressure input to the drive for speed control. Start, Stop and System Pressure shall be digitally displayed and adjustable through the user interface. Field connections shall be made externally at the controller couplings to prevent distortion of the pressure sensing elements.

1.8 VFD Modes of Operation

The controller shall operate a variable frequency drive (VFD) to control the speed of a centrifugal pump for the purpose of limiting the system pressure in a sprinkler system used for fire protection. The drive controls the speed of the AC induction motor driving the pump to maintain the system pressure at the set point.
The operator interface as the overall fire pump control device is to respond automatically to a low pressure condition with a call to start of the VFD. The MarkIII+ shall monitor and control the operation of the VFD. The VFD shall be entirely configured by the MarkIII+.
Upon detection of a failure in the drive, it shall bypass and isolate the VFD through the line and load isolation contactors, and run the pump via the Soft Starter at rated speed. The operator may choose to manually operate the drive in BYPASS or VFD. Operation in Bypass mode produces both an audible local alarm and a remote alarm for annunciation of an abnormal condition in the controller.
Set pressure is maintained until the min. run time of 10 minutes expires whereupon the controller temporarily lowers the set pressure in order to ramp the drive down sufficiently in speed to perform a sincerity check on system pressure for a period of 5-10 seconds. If system pressure remains above the start pressure during the sincerity check, then system pressure is stable, indicating there is no longer a demand for flow. Since the low pressure condition no longer exists, the MarkIII+ soft stops the drive.

1.9 VFD Mode - Manual Operation

The pump may be operated manually via the local start and stop push-buttons. If the VFD is Ready, the controller will soft start the drive which will ramp the pump up to the speed required to maintain set pressure.

Set pressure is maintained until the operator presses stop, whereupon the controller temporarily lowers the set pressure in order to ramp the drive down sufficiently in speed to perform a sincerity check on system pressure for a period of 5-10 seconds. If system pressure remains above the start pressure during this sincerity check, then system pressure is stable, indicating there is no longer a demand for flow, and the MarkIII+ proceeds to soft stop the drive.

If system pressure falls below the start pressure during the sincerity check, a low pressure condition has developed which the MarkIII+ recognizes as an automatic call to start. The MarkIII+ responds to the call to start by ramping the pump back up set pressure. The controller will continue operating in automatic until system pressure stabilizes indicating there is no longer a demand for flow.

2.0 VFD Mode - Emergency Run

If an attempt to engage the emergency run bar is made in VFD mode, the MarkIII+ shall drop the drive out of the circuit and go to bypass using the hard stop drive procedure. An over pressure event will be captured and displayed as an alarm message on the MarkIII+ if system pressure is equal to or greater than 115% of Set pressure. A time delay used in the Over Pressure alarm logic shall be applied to avoid nuisance alarms.

2.1 Weekly Test and Service Message

Controller shall have the ability to program the time, date, and frequency of the weekly test. In addition, the controller shall have the capability to display a preventative maintenance message for a service inspection. The message text and frequency of occurrence shall be programmable through the user interface.

2.2 Power Transfer Switch (If ordered)

The power transfer switch shall be NEMA Type 12 (IEC IP54) drip-proof enclosure attached directly to or in close proximity to the fire pump controller. The fire pump controller/power transfer switch shall be factory assembled, wired and tested as a unit prior to shipment. Voltage and frequency on both the normal and emergency sources shall be continuously monitored. Source status screens shall be provided for both normal and emergency to provide digital readout of voltage frequency and phase rotation on all 3 phases.

2.3 Event Recording

Memory - The controller shall record all operational and alarm events to system memory. All events shall be time and date stamped and include an index number. The system memory shall have the capability of storing events and allow the user access to the event log via the user interface. The user shall have the ability to scroll through the stored messages.

2.4 USB Host Controller

The controller shall have a built-in USB Host Controller. A USB port capable of accepting a USB Flash Memory Disk shall be provided. The controller shall save all operational and alarm events to the flash memory on a daily basis. Each saved event shall be time and date stamped. The total amount of historical data saved shall solely depend on the size of the flash disk utilized. The controller shall have the capability to save settings and values to the flash disk on demand via the user interface.

2.5 Manufacturer

The controller shall be a Firetrol brand.

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