# M A S T E R  C O N T R O L  S Y S T E M S, I N C.

**Lake Bluff, Ill. 60044**

## Product Information
**- on -**
## Variable Speed Fire Pump Controller
**- for -**
## Electric Motor Driven Fire Pumps

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Master Control Systems, Inc. is please to announce their two new series of *Variable Speed* Fire Pump Controllers for Electric Motor Driven Fire Pumps. These U.L. Listed controllers are fully compliant with NFPA-20, the National Fire Protection Association standard on fire pump installations. These controllers limit the maximum pressure that a fire pump can deliver which solves a number of over-pressure problems. No other solution preserves the water supply while eliminating troublesome pressure regulating devices in the pump discharge path.

The new ECV series is used for single power source installations while the new ECVRT series is used where emergency or alternate back-up power is used. These units consist of both a full speed complete fire pump controller plus a variable speed drive to control pump pressure to safe limits. They are fully automatic and are capable of both variable speed and full speed running. The unit makes use of a Variable Speed Drive (VFD) to provide the voltage, current and frequency to the fire pump motor to control its running speed under various pump load conditions. These units are both complete full speed fire pump controllers *and* variable speed units.

Operating Functions Provided:

- Pressure Transducer monitors system pressure during pump running and adjusts the motor speed to provide the required system pressure and also limit the pressure to a predetermined maximum pressure set point.
- Pressure switch monitors the need for fire water to start the fire pump and also to stop the pump if the controller is set for automatic stop operation.
- Provides both Soft Starting (Ramp-up) and Soft Stopping (Ramp-down) to minimize both water surges and water hammer.
- VFD operation results in extremely low starting currents to minimize the power load on an emergency generator (gen-set) when used.
- Complete full speed fire pump controller to provide bypass and emergency running including fully functional Mechanical Emergency Run Manual Operator.
- Operating Mode Switch allows manual selection of either Full Speed or Variable Speed pump operation.

Standard Equipment Features Provided:

- Line Power Conditioning Filter Reactor extends VFD operating life and reduces line current harmonics.
- Pressure Switch Timer to change mode to full speed Bypass running if event of failure of the VFD to provide needed system pressure.
- Drive Ready timer to change mode to full speed Bypass running if event the VFD fails initialization tests.
- VFD Line Fuses prevent tripping of the controllers Fire Pump Breaker upon a drive fault.
- Re-start delay provided to minimize excessive motor transient currents during switching.
- Both Line Side and Load Side Isolation Contactors to protect the VFD from voltage spikes and to extend the VFD operating life.
- Both Electrical and Mechanical Interlocking of Load and Bypass Contactors provided to minimize chance of VFD damage.
- Two Stop Pushbuttons to provide both Normal Ramp-down stopping and Emergency instant pump stopping.
- Proportional-Integral-Differential (PID) process controller provided to control Speed and System Pressure.
- Motor Re-Start Delay to avoid excessive motor currents during any switching operation.

Optional Equipment and Modifications Available:
- Motor dV/dT Filter to reduce motor voltage spikes on long wiring runs
- All available EC Series Options and Modifications are available
- Controller rating up to Service Factors up to 1.15 available.
- Reduced Inrush Primary Reactor Starting to reduce inrush currents and starting power load on gen-set.

System Requirements:
- Relief Valve required per NFPA-20 for all variable speed fire pumps.
- Motor suitable or rated for VFD operation. Note that most new industrial motors are suitable for VFD use.
- System operating pressure and pump starting pressure set point information.
- Motor large enough to limit the running current to rated FLA or less.

Advantages and Benefits Provided:
- Accommodates effects of changing and higher pressures due to the following effects, among others:
  - City water main pressures under no flow (churn) conditions,
  - inlet (suction) piping and back flow preventer friction losses during churn,
  - discharge piping friction loss with no flow,
  - Pump Curve during churn, and
  - Driver (motor) speed increase during no flow conditions.
- Limits System Pressure to avoid damage to piping system and components (valves, sprinkler heads, etc.) due to excessive pressure.
- Eliminates the need for Break Tanks or discharge pressure control regulating (PRV) valves to control varying city main pressures.
- Provides very close control of pump discharge pressure for varying flows from zero to full rated.
- Eliminates discharge of water from pressure relief valve during the required weekly testing.
- Reduces the need or the amount of high pressure piping and components including sprinkler heads.
- Possible eliminate a zone for certain building heights and system designs.

Availability:
- Orders being accepted and units being shipped.
- U.L. Listed Models from fractional horsepowers to 400 Horsepower.
- Models Currently Available (Shipping):
  - ECV-*hh*-*vv*-*xx* -- Across-the-Line starting in the Bypass Mode,
  - ECVR-*hh*-*vv*-*xx* -- Primary Reactor Reduced Inrush Starting in the Bypass Mode
  - ECVT-*hh*-*vv*-*xx* -- Across-the-Line starting in the Bypass Mode,
  - ECVRT-*hh*-*vv*-*xx* -- Primary Reactor Reduced Inrush Starting in the Bypass Mode.
- where: *hh* = Motor Horse Power, *vv* = Motor Voltage and *xx* = Options & Modification Codes.
- Future Models: Soft Starting and Stopping in the Bypass Path to reduce water surges and water hammer.
- Contact Master Controls factory for pricing and delivery information.

Additional Considerations and Advantages:

- Meets the requirements of the 2007 Edition of NFPA-20.
- Excellent for Pressure Limiting (175 psi).
- Also excellent for Pressure Control (typically in the range of 60 to 120 psi). Useful for older sites and/or dual use jobs.
- Useful for vertical deep well pumps, either oil or water lubricated.
- Excellent tunability for systems with dynamic hydraulics or long time constants. Proven stable operation on small, large and very large systems.
- Two controllers in one; Variable Speed Branch (path) and a Complete Full Service Fire Pump Controller in the Bypass branch (path). Enhances reliability.
- Fused Variable Speed Branch to avoid tripping the Fire Pump Circuit Breaker on any fault in that branch. Fuse curve fully coordinated with the circuit breaker curve over short, medium and long times.
- Name Brand VFD unit (General Electric / Fuji). Soft Switching IGBT technology for reduced motor insulation stress.
- Dual Use units operating with hundreds of hours on some units and thousands of hours on others.
- Complete with both a Drive Ready timer and Low Pressure bypass timers.
- Dual filtering to avoid capacitor overvoltage shutdown. Both 5% Line Reactor and D.C. Link Reactor (Choke) standard in all units. Highly tolerant G.E. VFD used to further avoid overvoltage shutdown.
- All M.C.S. Fire Pump Controllers feature "Instant On" operation. No boot-up required for pump operation.
- No passwords or menu manipulation required for controller operation.
- Three Demand Classes: Static, Momentary & Local to differentiate stop and shutdown operation.
- Numerous installations with first units shipped in 2003.
- Multiple Demand and Multiple Pump installations with fully independent operation per NFPA-20 2007.
- Successful installations with horsepowers ranging from 30 Hp to 300 Hp.
- Separate VFD Feedback Pressure Transducer.
- Separate and Independent Paperless Pressure and Alarm Recorder with Separate Pressure Transducer.
- Separate Pressure Switch for pump Start and Stop control.
- Separate Digital Pressure Switch Option in addition to standard Pressure Switch.
- No "sincerity" test used or needed. Pump speed and pressure regulation are under PID control only.
- No PLD used for pump or pressure control. No processors used in pump starting or control path.
- Non-vented construction. NEMA 12 (Type 12) or better. NEMA 12 or better Air to Air Passive Heat Pipe Technology cooling units used. No dirt, dust, moisture or contaminants drawn into the controller.
- Full Thermal (cooling) coordination for long service life.
- Highly Efficient VFD unit. Heat rejection less than that from the motor itself.
- Keypad & Display supplied with each controller.
- Triple VFD Parameter and Program Storage:
  - VFD internal non-volatile memory,
  - Keypad internal non-volatile memory,
  - Factory stored Parameter File storage.
- Highly Efficient VFD unit. Controller heat rejection is less than that of the pump motor.

For more information, visit the company's web site at: **mastercontrols.com** -or-

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