

MEDIUM VOLTAGE MX³ CONTROL FEATURES

MULTIPLE STARTING MODES:

- Voltage ramp
- Current ramp
 - Adjustable initial current
 - Adjustable maximum current
 - Adjustable ramp time
- Torque ramp (TruTorque)
 - Adjustable initial torque
 - Adjustable maximum torque
 - Adjustable ramp time
- Power ramp
 - Adjustable initial torque
 - Adjustable maximum torque
 - Adjustable ramp time
- Linear/tach feedback control
- CYCLO converter control

MOTOR PROTECTION:

- Motor thermal overload
- Independent starting and running OLs
- Up to speed timer exceeded
- Low line voltage
- Low line frequency
- High line frequency
- Phase reversal
- Phase loss
- Instantaneous overcurrent
- Overcurrent
- Undercurrent
- Current imbalance
- Ground fault (residual or zero sequence)
- Shorted or open SCR
- Disconnect fault
- Inline contactor fault
- Control power low
- Stack over temperature
- Motor PTC input
- RTD modules

METERING:

- Accuracy:
 - 3% out-of-box
 - 2% factory calibrated
- Average current
- L1 current
- L2 current
- L3 current

- Current imbalance %
- Ground fault current
- Average volts
- L1 – L2 voltage
- L2 – L3 voltage
- L3 – L1 voltage
- Overload %
- Power factor
- Watts
- VA
- VARS
- KW hours
- MW hours
- Phase order
- Line frequency
- Analog input
- Analog output
- Run time – days
- Run time – hours
- # of starts
- TruTorque %
- Power %
- Peak starting current
- Last starting duration
- RTD temperatures
- Real-time clock

8 DIGITAL INPUTS CONFIGURABLE TO:

- Stop
- Fault
- Fault reset
- Bypass/inline confirm
- OL reset
- Local/remote selection
- Heater enable
- Heater disable
- Dual ramp selection
- 1 dedicated start input
- Disconnect
- Slow speed
- Brake enable
- Brake disable

6 RELAY OUTPUTS CONFIGURABLE TO:

- Faulted
- Running
- Up to speed

- Alarm condition
- Ready condition
- Locked out
- Overcurrent
- Undercurrent
- OL alarm
- Shunt trip
- Ground fault
- Energy saver indication
- Heating indication
- Slow speed forward/reverse
- DC braking
- Cooling fan

1 ANALOG 4–20 MA/0–10 VDC INPUT CONFIGURABLE TO:

- Trip high level
- Trip low level

1 ANALOG 4–20 MA/0–10 VDC OUTPUT CONFIGURABLE TO:

- Current (0–200%/0–800%)
- Voltage (0–150%)
- OL (0–150%)
- KW (0–10 KW/0–100 KW)
- MW (0–1 MW)
- Analog input (0–100%)
- Firing (0–100%)
- Calibration

USER INTERFACE:

- Event log (99 events)
- Door-mounted LCD display
 - Set/examine operating parameters
 - View status information, line current, voltage and frequency
 - Start and stop the solid state starter

1 COMMUNICATION PORT:

- Modbus/RS485

ADVANCED FUNCTIONALITY:

- Dual ramp selection
- Adjustable kick current
- Programmable decel modes
- MV BIST test (built-in self test)

PREPACKAGED SOLID STATE STARTERS WITH ATL BYPASS



MVRXE SERIES — SEVERE DUTY WITH ACROSS-THE-LINE BYPASS

MVRXE SERIES PRODUCT HIGHLIGHTS:

The Benshaw Medium Voltage Starter is a microprocessor-controlled solid state reduced voltage starter for three-phase induction motors. The starter provides a closed-loop current ramp for smooth stepless motor acceleration. Supplied in a free-standing enclosure.

Enclosures are available in NEMA 12 or NEMA 3R configurations. The medium voltage enclosure consists of two distinct compartments. The medium voltage or power pole section is located in the main body of the enclosure, whereas the low voltage section containing the control logic is located behind the door as an isolated compartment.

Each starter is supplied with a load break isolation switch, Class "R" motor fuses, inline vacuum contactor, solid state power poles and a vacuum bypass contactor, which is used to bypass the SCR power poles once the motor is up to full speed.

The logic control incorporates the MX³ computer that has all the circuitry required to drive the power semiconductors, which are located in the power section.

MVRXE starters provide solid state reduced voltage starting for normal operation and full voltage emergency back-up starting, with complete electronic motor protection at the flip of a switch.

This unique redundant design is ideal for critical applications where downtime is extremely disruptive and cannot be tolerated.

MX³ solid state controls provide precise digital starting and stopping, motor protection, metering, diagnostics and communications standard.



MVRXE starter with load break fusible disconnect and emergency ATL bypass

Guaranteed ... for three full years.

Only Benshaw has a three year guarantee.

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer.



*3 year warranty requires authorized startup — 1 year warranty without authorized startup

PREPACKAGED SOLID STATE STARTERS WITH ATL BYPASS

MVRXE SERIES — SEVERE DUTY WITH ACROSS-THE-LINE BYPASS

STANDARD FEATURES:

- NEMA 12, solid state starter, UL347 listed, Class E-2.
- 45 kV BIL
- 50 KAIC (4800 VAC)/ 50 KAIC (2600 VAC) short circuit fault rated
- 500% — 30 seconds rated solid state starter — UL347 certified and listed.
- 8,000 PIV — UL347 certified and listed at 2.4 kV
- 12,000 PIV — UL347 certified and listed at 4.2 kV
- Fiber optic firing
- Selectable solid state or emergency full voltage operation via selector switch mounted inside of LV compartment
- Load matched Class R fusing with blown fuse indication
- 400 A load break, 600 A continuous, 5 kV rated disconnect switch, with viewing window, grounding assembly and lockable handle mechanism; mechanically interlocked for safety
- Fixed mounted, start duty rated vacuum contactors for isolation and SCR bypass, wired for normal bypass operation and full voltage start operation, with 2 NO and 2 NC auxiliary contacts

- Separately mounted “SPE” series electronic overload device has the following standard features:
 - Class 10–30 adjustable
 - Phase imbalance protection
 - 1 NO/1 NC trip contact
 - Phase reversal protection
 - “Trip-free” design
 - Phase loss protection
- Built-in self test (BIST) features for “quick commissioning”
- 120 VAC, 1000 VA CPT with primary and secondary fusing, with 500 VA available for customer use
- Door-mounted start and stop push-buttons.
- Door-mounted LCD keypad
- Door-mounted run indication light
- Door-mounted local-off-remote switch
- Door-mounted reset button
- Terminal strip mounted inside LV compartment for:
 - Remote start/stop control
 - Remote up-to-speed indication
 - Remote run indication
 - Remote fault indication
- Benshaw MX³ controller with complete soft start, soft stop and motor protection capabilities
- 485 communications capabilities — local through-door connection or remote from starter (optional)
- Modbus communications standard

KEY ADVANTAGES:

- NEMA 12, UL 347 listed
- 45 kV BIL
- Service entrance labeled (optional)
- Built-in self test (BIST) features for “quick commissioning”
- Solid state reduced voltage starting — normal operations
- 400 amp load break/600 amp continuous fused disconnect switch
- Switch selectable emergency back-up full voltage starter
- MX³-embedded digital control
- Fiber optic firing
- Advanced motor protection
- Advanced metering
- Power quality protection
- Diagnostics and Modbus RTU485 communications standard

PREPACKAGED SOLID STATE STARTERS WITH ATL BYPASS



MVRXE SERIES — SEVERE DUTY WITH ACROSS-THE-LINE BYPASS AND LOAD BREAK FUSIBLE DISCONNECT

THE UPGRADED/ENHANCED DESIGN OF BENSHAW'S LEGACY PRODUCT THAT ESTABLISHED INDUSTRY STANDARDS FOR PERFORMANCE AND RELIABILITY.

KEY ADVANTAGES:

- NEMA 12, UL 347 listed
- 45 kV BIL
- Built-in self test (BIST) features for "quick commissioning"
- 425 A load break
- Switch-selectable emergency back-up full voltage starter
- MX³ embedded digital control

STANDARD FEATURES:

- 50 KAIC (4800 VAC)/ 50 KAIC (2600 VAC) short circuit fault rated
- 500%–30 seconds rated solid state starter — UL 347 certified and listed
- "R" class fusing protection
- Door-mounted controls
- Modbus communications standard



MVRXE12 - 2300 V

Model Number	HP	Dimensions (in.)				Weight (lbs.)
		A	H	W	D	
MVRXE12-550-2300**	550	131	92	36	32	1,800
MVRXE12-750-2300** †	750	200	92	36	32	1,800
MVRXE12-900-2300**	900	225	92	36	32	1,800
MVRXE12-1500-2300** †	1500	330	92	36	32	1,800

MVRXE18 - 4160 V

Model Number	HP	Dimensions (in.)				Weight (lbs.)
		A	H	W	D	
MVRXE18-1000-4160**	1000	131	92	36	32	2,000
MVRXE18-1500-4160** †	1500	200	92	36	32	2,000
MVRXE18-1700-4160**	1700	225	92	36	32	2,000
MVRXE18-3000-4160** †	3000	330	92	36	32	2,000

Starters are top entry/bottom exit — top exit available upon request. Dimensions and weights are approximate.

** Insert appropriate option code as shown: NEMA 12 = 12/NEMA 3R = 3R

† Only 350% for 30 Seconds

MODULAR OPTIONS

Model Number	Description
A406	8-Channel RTD Module, 100 ohm Platinum (Also Available for Remote Mounting)
A407	16-Channel RTD Module(s), 100 ohm Platinum (Also Available for Remote Mounting)
A409	Service Entrance Label
A875	Ground Fault CT, 2000:1, 4.0:Dia. (For MX ³ Use)

Power fuses ship loose. Must provide motor full load amps at time of order for proper fuse sizing.

SPARE PART KITS



**WANT TO MINIMIZE DOWNTIME LOSS OF PRODUCTION?
TAKE ADVANTAGE OF BENSCHAW'S SPECIAL PRICING ON OUR NEW SPARE PARTS
KIT PACKAGES WHEN PURCHASED WITH AN MVRXE AND/OR BTO STARTER.**

RECOMMENDED SPARE PARTS KITS INCLUDE THE FOLLOWING:

- Power phase/stack assembly (x1)
Includes the following packaged heat sink assembly:
 - Fiber optic SCR firing card
 - SCRs (x6)
 - dV/dt filter cards (x3)
- Main control board
- Voltage divider board
- “R” class line fuses (x3)
- Primary fuses for CPT (x2)
- Secondary fuses for CPT (x3)
- Door-mounted keypad
- Door-mounted pilot lights, push-buttons and switches
- Overload relay
- Control relays



Model Number	Motor Amps
1000 HP STARTERS	
MVRXE-400101-SP	46 to 55 A
MVRXE-400102-SP	56 to 75 A
MVRXE-400103-SP	76 to 90 A
MVRXE-400104-SP	91 to 131 A
1700 HP AND 3000 HP STARTERS	
MVRXE-400107-SP	46 to 55 A
MVRXE-400108-SP	56 to 75 A
MVRXE-400109-SP	76 to 90 A
MVRXE-400110-SP	91 to 131 A
MVRXE-400111-SP	132 to 180 A
MVRXE-400112-SP	181 to 270 A
MVRXE-400113-SP	271 to 361 A

*Amp range not shown; consult factory.