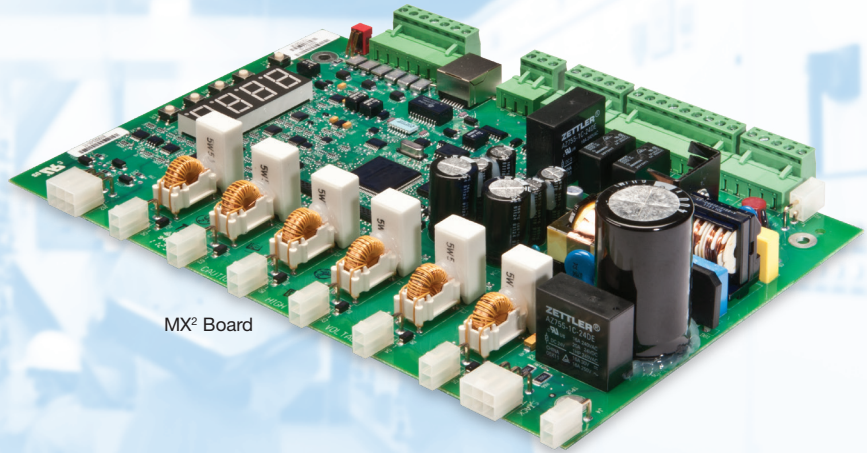# MX^2 Control Technology

Next Generation Intelligent Motor Control

Next Generation Intelligent Motor Control

- Mission critical reliability
- Patented soft start technology
- Integral digital protection and metering
- Continuous and integral bypass chassis
- RXE redundant configurations
- MXP modular, prepackaged starters
- Reversing, two-speed, wound rotor
- Synchronous, dc injection braking
- 24/7 service and support

MX^2 Board

Optional Keypad

MX^2 Control Highlights

The MX^2 control technology from Benshaw provides a powerful, flexible, intelligent low voltage motor control platform. MX^2-based controls offer multiple, user selectable starting modes, an increased selection of configurable digital and analog I/O's, comprehensive built-in metering capabilities, unprecedented onboard protection and an easy to use, intuitive user interface.

Our control board terminal configuration—coupled with programmable burden CT settings—makes Benshaw's MX^2 technology an excellent choice for a wide range of intelligent, soft start motor control applications.

Benshaw's MX^2-based low voltage motor controls raise the bar for intelligent, low-cost, soft start motor control.

When you factor in our unique three-year factory warranty and 24/7 comprehensive technical support, we think you'll find Benshaw's MX^2-based controls to be an excellent value.

Standard Features:

- High performance motor control with multiple starting modes built in
- Jogging 7 and 14% speed
- 3 user configurable digital inputs
- 2 fixed inputs for start and bypass confirm
- 3 user configurable output relays and 1 fixed bypass confirm
- User configurable analog I/O
- Programmable burden CT settings
- Residual ground fault
- Advanced line / motor metering
- DC braking light duty

- Power stack thermistor
- Data snapshot of each fault
- Power up on start
- 1,000 V capable
- Energy saver
- Remote keypad ready
- UL, CUL, NEMA compliance
- Built-in self-testing (BIST)
- Modbus 485 plus expanded communications capabilities with optional MXDE3 communications module

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
- Jogging 7 and 14% speed

Motor Protection:

- Motor thermal overload
- Independent starting and running OL's
- 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
- Shorted SCR
- Disconnect fault
- Inline contactor fault
- Control power low
- Stack over temperature

Metering:

- ± 2% accuracy
- Average current
- L1 current
- L2 current
- L3 current
- Current imbalance %
- Ground fault amps/ residual
- 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

3 Digital Inputs Configurable to:

- Stop
- Fault
- Fault reset
- Bypass/confirmation & inline
- OL reset
- Local/remote selection
- Heater enable
- Heater disable
- Dual ramp selection
- 1 dedicated start input
- 1 dedicated bypass

3 Relay Outputs Configurable to:

- Starter off
- Faulted fail safe and non fail safe
- Running
- Up to speed
- Alarm condition
- Ready condition
- Locked out
- Overcurrent trip
- Undercurrent trip
- OL alarm
- Shunt trip fail safe and non fail safe
- Ground fault
- Energy saver indication
- Heating indication
- Slow speed forward/reverse
- DC braking
- Cooling fan
- 1 fixed bypass

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:

- Standard board-mounted LED interface
- Optional remote mount LCD display
  - Set/examine operating parameters
- View status information
- View line current, voltage and frequency in real time
- Start and stop the solid state starter

1 Communication Port Included:

- Modbus RTU / RS485
-

Optional with MXDE3:

- DeviceNet
- Ethernet
- Ethernet/IP
- Modbus TCP

Advanced Functionality:

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