



MOTOR CONTROL PANELS FOR ROTARY ELECTRIC VIBRATORS

Often hoppers, bins, conveyors and other material storage vessels and pathways need the assistance of vibration to achieve and maintain material flow. Often this is done with rotary electric vibrators, due to their high efficiency and ease of control.

To avoid downtime, these vibrators require well-designed control plus effective overload protection.

FACT: ROTARY ELECTRIC VIBRATORS ARE THE MOST COMMONLY OVERLOADED MOTORS USED IN BULK MATERIAL FACILITIES.

Advanced VSR has decades of experience supplying standard and custom control panels to power rotary electric vibrators, much of this experience gained from their manufacture of vibratory stress relief systems, which have become a fixture in the precision metal working industry.



COMMON FEATURES:

DUST-TIGHT METAL OR FIBERGLASS ENCLOSURES

HIGHEST QUALITY OVERLOAD PROTECTION

600 VOLT MACHINE-TOOL GRADE WIRING

SPIRAL-WRAPPED DOOR WIRE HARNESS W/TERMINAL STRIP

LED PILOT LIGHTS

GOLD FLASHED CONTACTS

LASER-ETCHED LEGEND PLATES

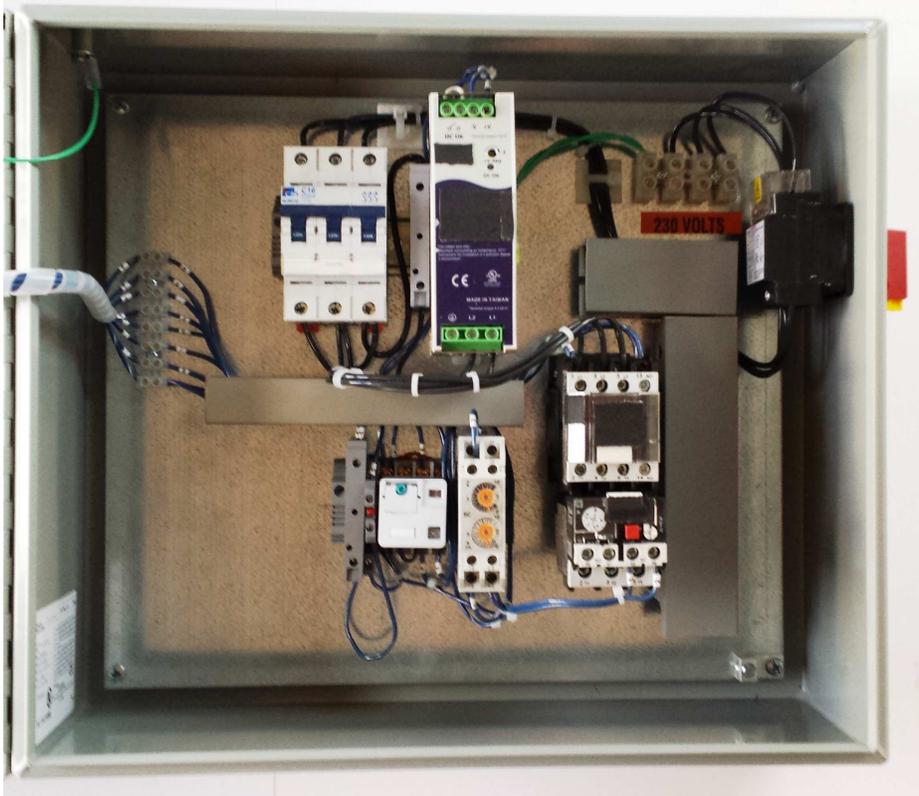
LAMINATED SCHEMATIC AFFIXED TO DOOR INTERIOR

FULLY ILLUSTRATED MANUAL

TWO YEAR FACTORY WARRANTY

A 230 V, 3 phase motor starter with disconnect switch, circuit breaker, recycling timer and “sync” terminals (sync’s with nearby equipment, thru dry contact closure).

Interior view of motor starter



3 position switch allows choice of either continuous run (ON) or timer-controlled recycling (RECYC), with industry-recognized symbols. Switch lights when vibrator is running. Synchronizing motor energizing can be done in either mode.

Internal view of 3 phase motor starter. Panel includes lockable disconnect (right side wall mounted) and circuit breaker. Customer does not need to install a nearby disconnect or short-circuit protection for this panel, since it already includes these features.

Door wire harness is spiral-wrapped, and lands on panel mounted finger-safe terminal strip. This type of terminal strip (as is also the power input terminal strip) provides meter probe test-points, easing testing, while enhancing safety.

Blue loop of wire on bottom – near left is the sync jumper. Remove and connect to N.O. contacts that close when vibration is required. Red LED on sync terminal illumines when external dry contacts close. Use of the “sync” contacts minimizes energy use and also vibrator run-time, extending vibrator life.

Recycling timer controls ON and OFF times of motor run; adjustment-range is from 1 second to 10 hours for each, factory preset to 10 minutes.

Individual conduit runs for three phase and 24 VDC control wiring: One type of wiring never touches or crosses the other. Larger-width conduit run on right is solely for 3 phase power input feed; that on the left is solely for 24 VDC control wiring.

24 VDC is one of the easiest control voltages to integrate into automation systems: Many electronic control devices, including wireless remote controls, web-controlled relays, PLC's and DCS's use 24 VDC.

Two Output 480 VAC VFD Control Panel

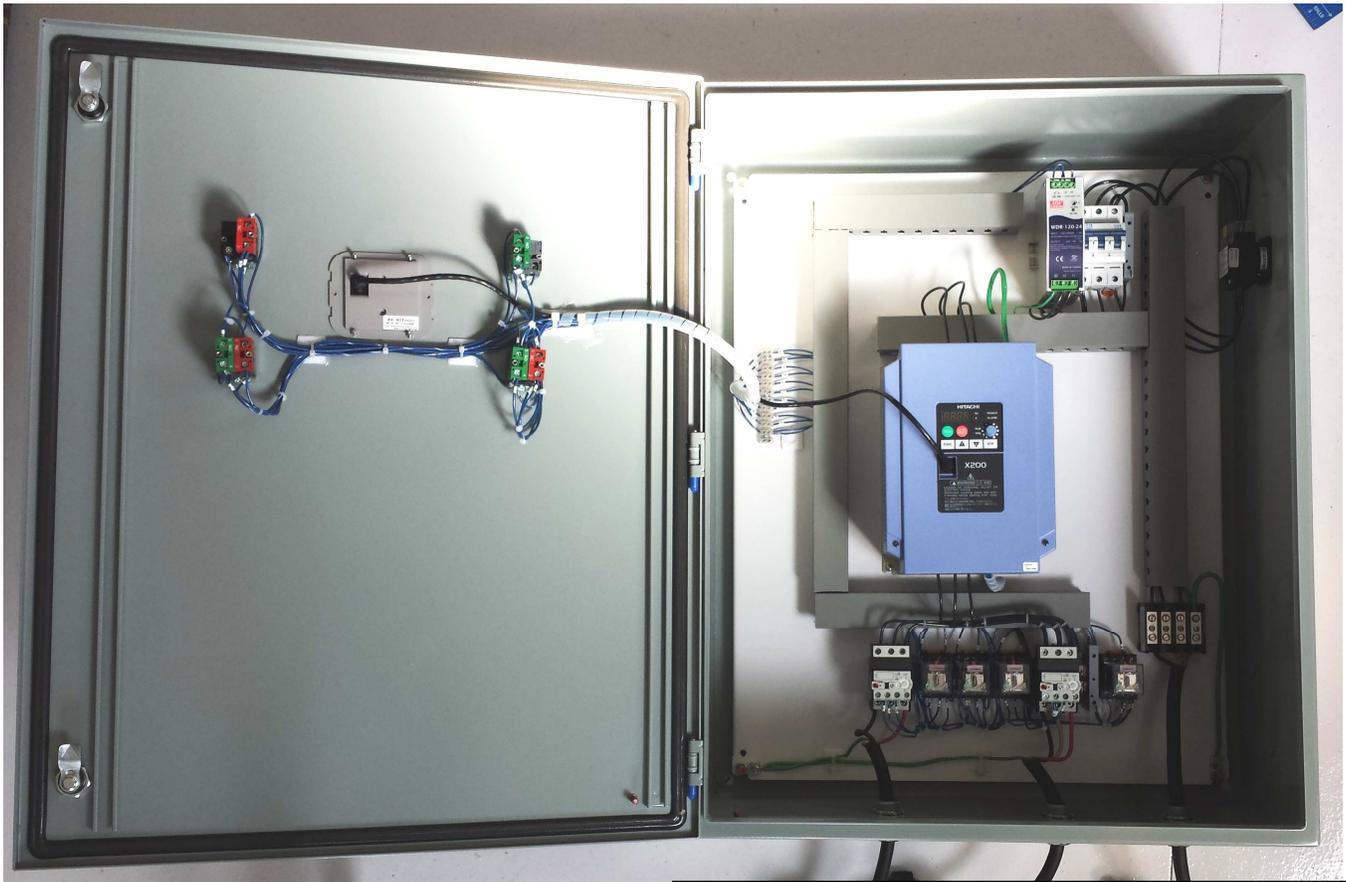


30 inch high, 24 inch wide, NEMA 4 enclosed, 480 Volt 7.5 HP 3 phase VFD control panel, with START / STOP and individual RESET pushbuttons for a pair of 3 HP vibrators. Green START P/B alights when vibrators running; red mushroom STOP P/B alights when power is present, but vibrators off.

Centrally located HMI¹ display allows speed control of vibrators, and displays total amp draw. In the event of an overload, both vibrators turn off, and the overload that tripped is indicated by which RESET P/B is lit. Reset is allowed after three minute "time-out", achieved by pushing the lit RESET P/B.

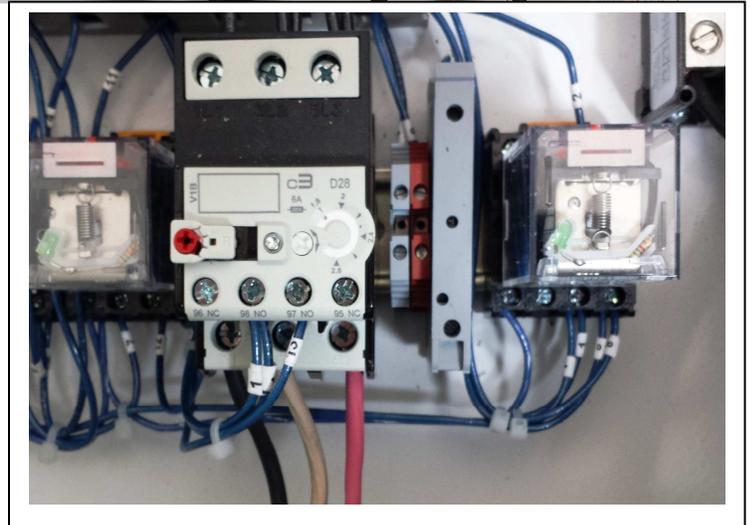
Remote START / STOP possible by connecting dry contacts to terminals (see next photo).

¹ HMI = Human Machine Interface



Interior of VFD panel:

- Upper right, circuit breaker & 24 VDC supply
- 7.5 HP VFD (light blue) in center
- Door wire harness / terminal strip on left.
Wire harness, which includes a Cat5 feed to the HMI display, is spiral-wrap protected, avoiding “door-pinch” problems.
- Overload and control relays below
- Separate conduit runs for 24 VDC and 480
- Close-up of lower right in box == =>>



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Red / grey terminals plus fused terminals (^^^) in the center of close-up view provide 3-wire remote START and STOP functions, which can be done with a two button pendant or control station, or a PLC.

Note: In upper photo, at bottom are shown the incoming power (lower right) and two outgoing power runs. These are “pigtails” that extend ~ 1 foot below the enclosure floor, that then terminate into water-proof, NEMA 4X / IP65 rated 480 VAC connectors. See next photo.

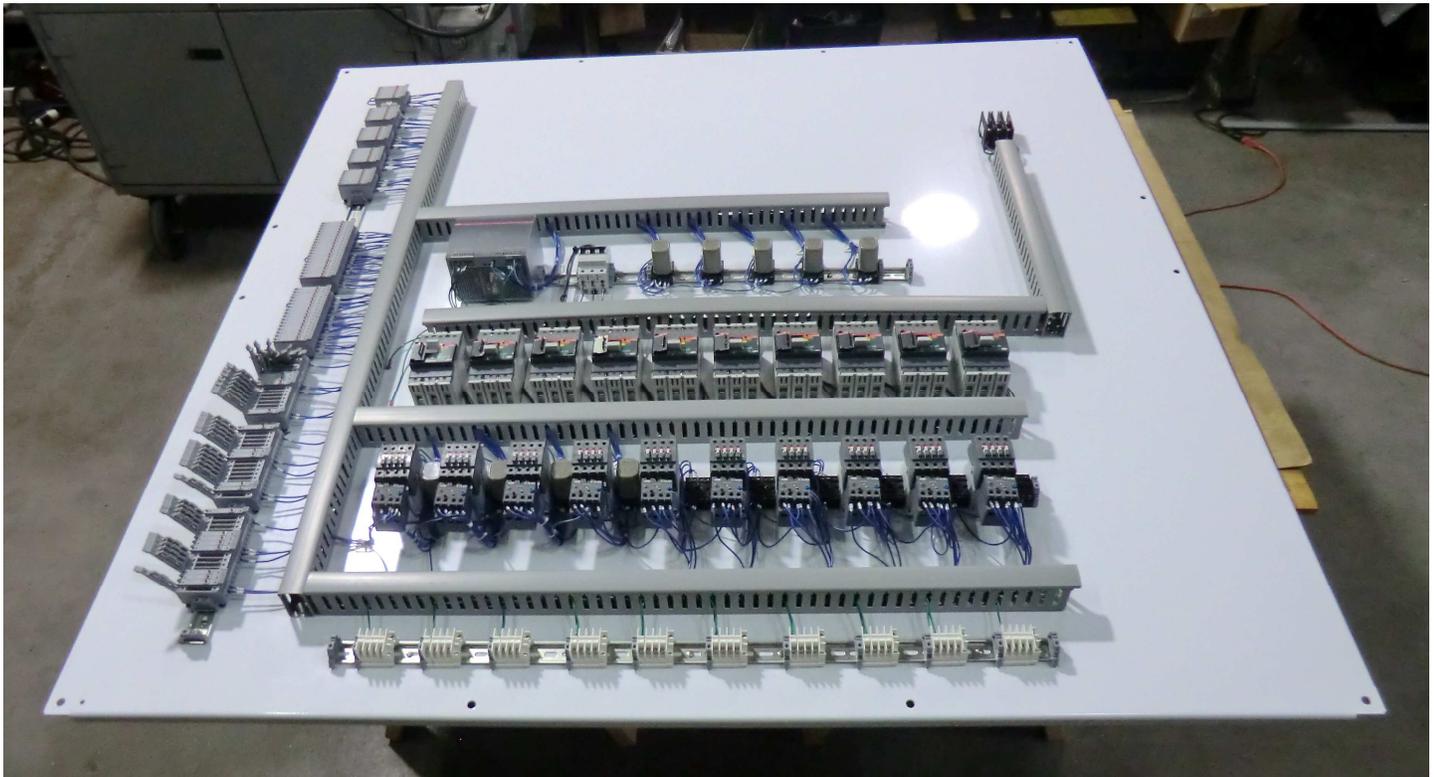


¾ view of VFD panel shows right-side wall mounted lockable disconnect, plus pigtails for power inlet and outlets to vibrators. Pigtails extend one foot below enclosure floor, and terminate in water-proof 480 volt 30 amp connectors. 30 foot long mating extensions (vibrator cords pre-wired into vibrator conduit boxes) were supplied with order. Water-proof connectors also available in hi-vis yellow.

This arrangement simplified the installation steps: All the customer had to do was mount the panel, mount and plug-in the vibrators, and connect the 480 three phase feed to the power cable. Markings of direction of rotation were made on the vibrator end-bells, further assisting the installation, in other words

TRUE PLUG AND PLAY

480 Volt 3 Phase, Hazardous-Duty-Grade 10 Motor Starter MCC
for Coal-Fired Power Plant



Internal panel of MCC nearing completion, before being installed in two door, stand-alone NEMA 4 enclosure.

- Each motor has short-circuit protection via a molded-case CB (circuit breaker). Overall short-circuit protection provided by bank of 100 amp fuses in disconnect enclosure.
- Each CB can be locked-out, and also has aux contacts wired to terminals on the left that close (alarm) if the CB is either tripped or turned off.
- Each motor overload protected with a solid-state overload relay, which even detects single-phasing, or unequal voltage / phase problems.
- Two vibrators are mounted on each coal-silo. Both energize, if receiving command from one of the 5 (top row) nitrogen-filled (no contact corrosion, ever !!), hermetically sealed, hazardous-duty relays.
- To the left of the bank of 5 relays is a 240 watt, 24 VDC power supply. Again, no heavy transformers, and almost no heat generated by this 85 – 90% efficiency, very reliable control voltage source.
- The terminal strips are fused, each having an LED that lights if power is attempted to be fed thru, but a short circuit has blown the fuse.
- Lower bank of white terminal blocks are outputs to motors, which include ground connections, simplifying installation of wiring.
- Enclosure (see next photo) is rated NEMA 4, but has an additional safety aspect: Separate disconnect enclosure affixed to the right wall of the enclosure. In the event the disconnect is turned either on or off, an arc is often produced across the almost touching contacts. With the disconnect in a separate enclosure, such a flash event is shielded from the main panel's motor control components.



Completed two-door, 10 output, MCC panel, being prepped for shipment. Upper bank of 10 red pilot lites are LED indicators of motor energized / running; lower bank of 10 amber pushbuttons indicate if an overload event occurred, and, after a 3 minute “time-out period”, will permit overload resetting. All pilot devices are hazardous-location grade. Allen-Bradley disconnect switch used in right-most enclosure, sealed from main enclosure, to contain arc-flash events. Laser-etched sign on left door bears overload tripping / resetting information. Comprehensive CAD dwgs were supplied with this order, for design-review (by consulting-engineering firm and utility engineering staff), installation and maintenance purposes.

Many options:

- Service voltages from 120 thru 575 VAC
- Experience with coordinating / supplying medium voltage controls (2160, 4160, etc.) from ABB or other manufacturers.
- Experience working with design engineering firms (Black & Veatch, Bechtel)
- Control panels for rotary electric vibrators, conveyors, or air cannons our specialty
- Hazardous-location grade design experience
- Multiple motor outputs
- Disconnect switches
- “Pigtails” with water-proof connectors, matching connector extension cords, provide “PLUG AND PLAY” easy install.
- Fuse or CB short-circuit protection
- Full speed or variable frequency control
- Remote, i.e., wired, wireless (key-fob) or Ethernet control
- “Sync” terminals in any MS with a control voltage (24 VDC preferred) allows simple automation of vibrator or other device activation with adjacent equipment.
- PLC, DCS (central plant computer), Ethernet interfaces
- Standard NEMA 4, stainless, fiberglass (NEMA 4X) or explosion-proof (NEMA 7, 9) enclosures

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