

USask Master Specification Directions: The master specifications are intended to be incorporated into the Consultant's final, project specific specification package. The project specific specifications are expected to include any and all sections or portions of sections (Part 1, Part 2, Part 3) that are required to create a fully executable project specification. USask Master Specs only provide information that USask **requires** be a part of the final specification package. Components or sections not included in the Master USask Specifications may still be required for a complete, well-designed project. **It is the consultant's responsibility to ensure all specifications match USask requirements. Any deviations or revisions to any section included in the master specifications requires written consent from the USask Engineering department. The consultant is liable for any omissions, errors, or incorrect equipment or components supplied to site.** The Master Specifications shall be used in conjunction with USask's Design Guidelines. Any conflicts shall be brought to the attention of USask Engineering staff for clarification.

Part 1 General

Part 2 Products

.1 Materials

- .1 Starters: NEMA Rated.
 - .1 Half size starters not acceptable.
 - .2 Class II, Type B.

.2 Manual Motor Starters

- .1 Manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break.
 - .2 Overload heater(s), manual reset, trip indicating handle.
- .2 Accessories:
 - .1 As indicated.
 - .2 Locking tab to permit padlocking in "ON" or "OFF" position.

.3 Full Voltage Magnetic Starters (See motor schedule)

- .1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components.
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Power and control terminals.
 - .4 Wiring and schematic diagram inside starter enclosure in visible location.
 - .5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Combination type starters to include motor circuit interrupter with operating lever on outside of enclosure to control motor circuit interrupter, and provision for:
 - .1 Locking in "OFF" position with up to 3 padlocks.
 - .2 Locking in "ON" position.

- .3 Independent locking of enclosure door.
- .4 Provision for preventing switching to "ON" position while enclosure door opener.
- .3 Accessories:
 - .1 See existing control drawings on electrical drawings.
 - .2 Indicating lights: standard type and color as indicated.
 - .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.
- .4 Solid State Starters
 - .1 For motors 37 KW and larger where VFD's are not specified, motor starter shall be solid state, operating in a ramped current limit 'soft-start' mode and with a current limited 'soft-stop'. The controller shall be capable of controlling motors rated as shown. Controllers requiring isolation transformers are not acceptable.
 - .2 Starters shall include an up-to-speed contactor. Contactor shall only be energized after the soft starter has brought the load up to speed.
 - .3 The controller shall incorporate an adjustable acceleration ramp time of 2 to 30 seconds with an adjustable initial torque range of 10% to 80% of locked rotor torque and incorporate an adjustable deceleration ramp time of 2 to 60 seconds. The control logic shall operate at 120V, AC 60 Hz. Control terminals shall be provided and shall be easily accessible for wiring. The terminals shall be UL rated for 300V, 20A maximum.
 - .4 The controller shall protect the motor and itself from over current, over temperature, stalled motor, under voltage, line faults and phase loss. Upon detection of these conditions, the controller shall be inhibited from starting, or the controller shall shut down if in operation. It shall also incorporate dv/dt transient protection.
 - .5 There shall be colour coded LED indicators provided for controller status and fault annunciation. LED's shall indicate: Control voltage present, line voltage present, motor starting, motor running, motor stopping, over current fault, motor stalled, over temperature, line fault, phase loss, and under voltage.
 - .6 The controller shall have Form 'C' auxiliary contacts, one (1) N.O. and one (1) N.C. which shall change state on the initiating of START OR STOP.
 - .7 The controller shall be equipped with lugs for acceptance of a range of wire sizes for control power and incoming power.
 - .8 The power section shall incorporate full wave silicon controlled rectifiers (SCR's) c/w heat sink. They shall have a minimum repetitive peak inverse voltage rating of 2000V at 600VAC.
 - .9 The controller shall be capable of operating at overload current of 115% continuously.
 - .10 The controller shall form part of the Motor Control Centres. The motor controller shall incorporate auxiliary contacts from external control units into its motor stopping and starting control loop.
 - .11 Operator controls shall be accessible from the front of the control board and consist of:
 - .1 hand/off/auto selection switch
 - .2 programming selector button
 - .3 programming scroll buttons
 - .4 start/stop buttons – on soft start unit only
 - .12 The controller shall also incorporate an appropriate control circuit transformer for

- any associated options requiring 120VAC such as the thermistor tripping unit.
- .13 Each input and output in the unit shall be colour coded and identified with permanent labels on all terminations.
- .14 A battery back-up of all digitally stored setpoints, if present, shall be incorporated within the controller. The battery shall be capable of continuous operation in 50C temperature.
- .15 The drive shall maintain a minimum line side power factor of 0.95 throughout the entire speed range with a total voltage distortion on the input being less than 5%.
- .16 Control power input terminals shall be separate from the input terminals to facilitate start-up, trouble-shooting, and diagnostics.
- .17 Control boards, adjustments, and power devices must be mounted behind a protective cover that allows for viewing of the controller status display.
- .18 The starter shall be equipped with an automatic start mode that shall restart the motor after a power failure. This option shall be controlled by internal parameter controls.
- .19 The control system shall incorporate high speed voltage sensing circuitry to detect momentary power outages and shut down the system entirely. After a suitable time delay, and upon re-application of voltage, the starter shall automatically restart in a soft start current limiting mode.

.4 Control Transformer

- .1 Single phase, dry type, control transformer with primary voltage as indicated and 120 V secondary, complete with secondary fuse, installed in with starter as indicated.
- .2 Size control transformer for control circuit load plus 20% spare capacity.

.5 Finishes

- .1 Apply finishes to enclosure in accordance with existing MCC finishes.

.6 Equipment Identification

- .1 Provide equipment identification in accordance with Electrical - General Provisions.
- .2 Manual and magnetic starter designation labels: size 1, engraved as indicated.
- .3 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

Part 3 Execution

.1 Installation

- .1 Install starters, connect power and control as indicated.
- .2 Ensure correct fuses and overload devices elements installed.
- .3 Where manual motor starters are to be controlled by CCMS, provide a motor rated relay or contactor in a 6 x 6 junction box adjacent to the starter. Coordinate with USask Electrical Details.

.2 Tests

- .1 Perform tests in accordance with Electrical - General Provisions and manufacturer's instructions.
- .2 Operate switches, contactors to verify correct functioning.
- .3 Perform starting and stopping sequences of contactors and relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION