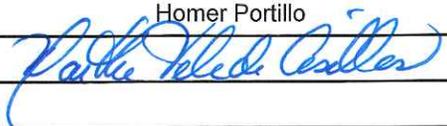


CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION
FOR
MOTOR OPERATOR, ELECTROMECHANICAL

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL
06/24/09	Roy Priebe	Revision	Homer Portillo
03/01/16	Roy Priebe	Revision	

REASON FOR REVISION	AFFECTED PARAGRAPHS

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.
Retain for future reference.

CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT PURCHASE SPECIFICATION FOR MOTOR OPERATOR, ELECTROMECHANICAL

1.0 SCOPE AND CLASSIFICATION

1.1 SCOPE

- 1.1.1 The City of Austin Electric Utility Department, d/b/a Austin Energy (AE) sets forth this specification as the minimum requirements for operating characteristics and safety features for one (1) electro-mechanical motor operator.

Hydraulic type motor operators are not acceptable under this specification.

- 1.1.2 The manufacturer shall have a minimum of five (5) years of experience in the production of electro-mechanical motor operators for the United States utility market.
- 1.1.3 The device furnished under this specification shall have been in commercial service in a utility in the United States for a minimum of five (5) years in the configuration being offered.

1.2 CLASSIFICATION

- 1.2.1 This specification covers outdoor electro-mechanical motor operators for 69 kV and 138 kV, 3-pole, group operated air switches. Air switches may be center break, vertical break, or double end-break type.
- 1.2.2 The motor operator will be installed in an outdoor electric utility substation below an altitude of 1,000 meters and subject to an annual ambient temperature variance of -25° C to +45° C at 100% humidity. The average temperature for any twenty-four (24) hour period will not exceed 30° C.

2.0 APPLICABLE STANDARDS

The motor operator furnished under this specification shall conform to the latest NEMA, IEEE, ANSI/IEEE, ANSI standards applicable to motor operators. In case of a conflict between any of the standards mentioned in this specification and the content of this document, the Austin Energy specification shall govern.

3.0 FUNCTIONAL REQUIREMENTS

The electrically powered motor operator will be used to mechanically operate 69 kV and 138 kV, 3-pole, group operated air switches in transmission and distribution substations.

4.0 PERFORMANCE REQUIREMENTS

- 4.1 Motor voltage: 125 volts dc nominal [range 105-140 volts dc]
- 4.2 Control voltage: 125 volts dc nominal [range 105-140 volts dc]
- 4.3 Heater voltage: 120 volts ac
- 4.4 Operating time: 6 seconds [maximum] for rotation from fully open to fully closed position
- 4.5 Operating torque output: 17,000 inch-pounds [minimum] at minimum supply voltage

5.0 MATERIAL REQUIREMENTS

5.1 Mounting

- 5.1.1 Mounting brackets of sufficient strength and rigidity to insure against distortion and misalignment during operation shall be provided.
- 5.1.2 Mounting brackets shall be constructed of 36 kips steel conforming to ASTM A36/A36M-94 and shall be hot dip galvanized after fabrication in accordance with ASTM A123-89A.
- 5.1.3 The motor operator shall be suitable for installation on an AE steel structure. The mounting brackets shall be fabricated so that field drilling by AE construction forces is held to a minimum.
- 5.1.4 All equipment mounting bolts and hardware for installing the motor operator on the AE steel structure shall be furnished with the motor operator. All steel mounting hardware shall be hot dip galvanized according to ASTM A153/A153M-95. The AE will not accept mounting brackets that require field welding to the structure.
- 5.1.5 All parts necessary to connect the motor operator to the 2" IPS vertical operating pipe provided by the air switch manufacturer shall be provided.

5.2 Control Cabinet

- 5.2.1 All operating mechanism equipment, control equipment, field connections, and other circuits shall be housed in a single cabinet.
- 5.2.2 The control cabinet shall be NEMA 4 equivalent, weatherproof construction, either non-rusting stainless steel or aluminum. Design of the control cabinet shall be such that overlapping metal surfaces are sealed to prevent leaks and corrosion. All cabinet and door hardware shall be non-rusting stainless steel. The cabinet door(s) shall be provided with provisions for padlocking.
- 5.2.3 The motor, motor contactors, and drive mechanism housed in the control cabinet shall be located to permit easy access for operation, maintenance, and replacement.
- 5.2.4 The cabinet shall be provided with lifting eyes capable of supporting and lifting the complete unit.
- 5.2.5 The control cabinet and doors shall be sufficiently rigid to prevent warping of the doors and outer walls. Doors shall be hinged and shall have heavy duty type handle latches. The control cabinet doors shall be supplied with wind latches.
- 5.2.6 Open-cell foam rubber and RTV silicone rubber are not acceptable as gasket material for the purpose of weatherproofing.
- 5.2.7 The control cabinet shall accommodate an uncut, non-magnetic bottom entrance plate large enough to handle two (2) 2" rigid conduits on 4 ½" centers. A clear path shall be provided between the conduit entrance and all terminal blocks.
- 5.2.8 The control cabinet shall be equipped with one (1) single barrel lug on the outside to connect the control cabinet to the AE ground grid. The lug shall be sized to handle #6 bare copper wire.

- 5.2.9 The control cabinet shall be provided with one (1) or more non-thermostatically controlled heaters with personnel protective barriers. These heaters shall be rated for 240 V AC and connected to operate at 120 V AC. The total power dissipated in the control cabinet shall be approximately equal to three (3) Watts per cubic foot of space contained therein. The conductors connected to the heater(s) shall have high temperature electrical insulation suitable for continuous operation at elevated temperature encountered in service.

5.3 Wiring and Terminal Blocks

- 5.3.1 All other control wiring shall be wired to #10-32 barrier type terminal blocks properly sized to handle the loads. The terminal blocks shall be General Electric Type EB-25 or AE Engineer-approved equivalent. Terminal blocks for control wiring shall be solid molded blocks, rated 600 Volts and a minimum of 30 Amperes per terminal and able to accommodate wire sizes up to and including #10 AWG wire size. A white marking strip shall be furnished, marked, and attached so that terminal points are identified.
- 5.3.2 One (1) twelve (12) point terminal block shall be provided in the control cabinet for future field use. This terminal block shall be located at the bottom of the control box near the conduit entrance.
- 5.3.3 The use of "plug-in" or non-solid terminal blocks will not be allowed.
- 5.3.4 All wire terminals and exposed conducting parts shall be provided with barriers to prevent personnel contact or injury.
- 5.3.5 All auxiliary wiring shall be a minimum of No. 12 AWG copper wire, 600 V insulation, NEC THW rated.
- 5.3.6 All wiring shall be flame resistant, oil resistant, heat resistant, and moisture resistant. All wiring shall be complete and performed in a professional, workmanlike manner and bundled or contained.
- 5.3.7 Splices will not be allowed in factory wiring. However, terminal blocks are allowed for point-to-point connection.
- 5.3.8 All wiring shall be permanently identified with captive wire markers at both ends. The method of permanently tagging the conductor ends shall be approved by the AE engineer. Wire ends shall be permanently fitted with compression type, ring lugs before attaching securely to terminal blocks.
- 5.3.9 The layout of the electrical wiring in the control cabinet shall segregate the factory wiring from the field wiring. Terminal blocks shall be wired with one side reserved for the factory and one side reserved for the field. Factory wiring shall not be terminated on the side of the terminal blocks reserved for field use.
- 5.3.10 All electrical control components shall be clearly and permanently identified with reference designation numbers and/or letters on or near them. These reference designations shall match the wiring and schematic diagrams.

5.4 Control Requirements

- 5.4.1 All relays and contactors provided shall be rated for a minimum mechanical life of 500,000 operations, and a minimum electrical life of 50,000 operations at rated load.
- 5.4.2 An operations counter shall be provided which is visible from outside the control cabinet. Counter shall increment for each open operation.

- 5.4.3 An auxiliary switch with a minimum of 10 stages (5- normally open and 5- normally closed) shall be provided for customer use. Each stage shall be wired to a field accessible terminal block located at the bottom of the control box near the conduit entrance. Each individual stage shall be independently adjustable.
- 5.4.4 Limit switches to set the travel set points of the motor operator and switch shall be provided. These limit switches shall be individually field adjustable with set screw type collars.
- 5.4.5 Push buttons to open and close the motor operator shall be provided in the control box. The open push button shall be green and the close push button shall be red.
- 5.4.6 A remote/local switch to permit local or remote operation of the motor operator shall be provided. The switch shall disable local switch operating capability when in the remote position, and disable remote switch operating capability when in the local position.
- 5.4.7 One (1) 125 V DC, 2-wire circuit and one (1) 120 V AC, 1 phase, 2-wire circuit will be provided for the motor operator.
- 5.4.8 Main circuit breakers shall be provided to protect the loads located within the control cabinet. Circuit breakers are to be used exclusively. Knife switches and fuses are not allowed. All circuit breakers shall have an interrupting rating of 10 kA.
- 5.4.9 A separate terminal block shall be supplied for all field wiring connections. This terminal block shall be located at the bottom of the control box near the conduit entrance. Terminal points for the following field connection shall be provided:

<u>Point Identification</u>	<u>Number of Points</u>
AC supply to control box	2
DC supply to control box	2
Remote Open	1
Remote Close	1
Remote Common [DC positive]	1
Close interlock (for both remote and local)	2
Open interlock (for both remote and local)	2
Remote close indication ['b' contact]	2
Remote open indication ['a' contact]	2

5.5 Motor and Drive Train

- 5.5.1 All motor bearings and gear drive bearings shall be of the ball or roller type.
- 5.5.2 All motor bearings, gears, and gear drive bearings shall be permanently sealed and shall require no lubrication for the life of the motor operator.
- 5.5.3 The gearbox shall be a worm gear reducer so as to not allow the mechanism to be back driven from the output shaft while in the rested position.
- 5.5.4 An electrical dynamic brake shall be provided to stop the motor mechanism at the limit switch position. Solenoid actuated brakes are not acceptable.
- 5.5.5 The housing shall be constructed so that the motor can be easily removed or replaced without requiring removal of a coupling half or gear.

5.6 Operation

- 5.6.1 Switch blades shall be under positive control at all times and the travel from the fully closed to the fully open position shall be accomplished with a continuous smooth motion.
- 5.6.2 The motor operator shall be furnished with one (1) detachable manual hand crank control handle for operation of the motor mechanism and auxiliary switches. Electrical control of the switch shall be disabled by the insertion of the manual hand crank control handle. The maximum hand crank to operating shaft ratio shall be 30:1 when operating the switch using the hand crank. Provisions shall be made to mount the manual crank handle on the inside of the control cabinet door for storage.
- 5.6.3 The angle of operation shall be adjustable over a minimum range of 0-180 degrees.
- 5.6.4 The direction of rotation shall be reversible to allow the motor operator to be used on switches that are clockwise closing or counter-clockwise closing. The direction of rotation shall be field changeable by reversal of two (2) wires at the motor only. All other wiring shall remain unchanged.

5.7 Operating Mechanism

- 5.7.1 A hand-grip type decoupling mechanism to disengage the motor operator from the switch control pipe shall be provided. The decoupler shall allow the motor operator to operate without moving the position of the switch. Locking brackets with provisions for padlocking shall be provided to lock the motor operator in the coupled or decoupled position. One hot-dip galvanized detachable 2" OD swing handle, at least 3' long, shall be provided for manual operation of the switch.

5.8 Nameplate

- 5.8.1 A nameplate shall be provided with each motor operator. The nameplate shall be permanently secured to the outside of the motor operator cabinet. All nameplates shall be made from non-rust stainless steel. The information contained on the nameplates shall be inscribed and painted black. All the information shall be in English and in standard non-metric units of measure.
- 5.8.2 The following minimum information shall be present on the nameplate:
 - a. Manufacture's name and address
 - b. Manufacture's model and model number
 - c. Unique Serial Number
 - d. Control Voltage
 - e. Heater Voltage
 - f. Output Torque
 - g. Operating Cycle Time
 - h. Motor Voltage
 - i. Year of Manufacture
 - j. Shop Order Number
 - k. AE Purchase Order (P.O.) Number

- 5.8.3 Nameplate information shall remain permanently legible throughout the useful life of the motor operator.
- 5.9 Spare Parts
 - 5.9.1 A set of manufacturer's recommended spare parts shall be supplied for each order of five (5) or less motor operator(s). The list of spare parts shall include, but are not limited to, the following:
 - a. One (1) motor
 - b. One (1) motor contactor
 - c. One (1) auxiliary switch
 - d. One (1) motor drive chain
 - e. One (1) open-close push-button

The cost of the set of spare parts shall be included in the tender offer.

6.0 TEST REQUIREMENTS

6.1 Control and Power Wiring Tests

Low frequency withstand voltage tests shall be performed on all control and secondary wiring in accordance with ANSI/IEEE C37.09-1979. All low voltage wiring, including control and indication wiring shall be given full functional tests.

6.2 Quality control and assurance tests results shall be made available upon request.