# SECTION II

# SPECIFICATIONS FOR LOAD MANAGEMENT SWITCHES

# NOVEMBER 12, 2014

# GREENVILLE UTILITIES COMMISSION

SPECIFICATIONS FOR LOAD MANAGEMENT SWITCHES

October 8, 2014

1.0 General Description (3 Relays)

1.01 Switches to be supplied shall be radio-controlled receiver-decoder type for purposes of load shedding such equipment as residential air-conditioners, heat strips or electric furnaces, and water heaters on Commission's electric utility system.

1.02 Switches shall be compatible with Commission's existing base control equipment, including Survalent controller, and Motorola type "Micor" base transmitters.

1.03 Switches shall be of solid-state design and construction, and mounted in outdoor, weatherproof cases. Cases shall provide a threaded nipple with a physical barrier suitable for separation of Class 1 and Class 2 wiring. The nipple shall enter a junction box that is rain tight and will provide physical separation of Class 1 and Class 2 wiring. The junction box shall have a minimum size of 42 cubic inches with approximate dimensions of 5" x 5" x 2". The junction box shall be rated NEMA 4 and shall have an access door that is hinged and shall be user-sealable by a meter type seal. The junction box shall also have provisions for user installed conductor entrances and exits. These entrance and exit points shall be as follows: three (3) ½" knockouts on the left hand lower voltage wiring side. They shall be arranged as follows: one (1) ½" knockout exiting the rear of the junction box, one (1) ½" knockout exiting the bottom of the junction box, and should be one (1) ½" knockout exiting the side of the junction box. The same configurations shall be on the right hand or high voltage side. Said junction box shall be made of LEXAN plastic, or comparable material, as to prevent a shock or fire hazard. Manufacturer must submit a sample or detailed drawing of the entire application for approval prior to the acceptance of the bid.

1.04 The switch housing design shall incorporate provisions for sealing unauthorized entry into the device with electric-meter-type seals (seals furnished by Commission), while maintaining ease of access to the switch interior by service personnel.

1.05 Each housing shall prominently display a label on the exterior with descriptive literature concerning switch application. Switch address code, model number, serial number, switch contact rating, and operating voltage shall be provided.

1.06 Housing cases and junction boxes shall be electrically insulated as to not present a shock hazard, and shall be Underwriters Laboratories listed as industrial control equipment, meeting laboratory standards as to shock hazard and fire safety for mounting in residential dwellings.

1.07 The receiver-switches shall be listed under UL 916, and shall conform to File E73065, FCC verified, Energy Management Equipment.

1.08 Deferral of loads connected through the receiver-switch shall be accomplished by use of digital FSK decoding circuits, and three sets of normally-closed Form B contacts within the receiver-switch.

1.09 Each receiver-switch shall be assigned a particular digital address. When the assigned address is received and decoded by the receiver-switch, the normally-closed utility-load-carrying contacts shall open, thereby shedding utility load.

1.10 The receiver-switch shall allow the switching contacts to self-restore deferred loads after a period of 7.5 minutes (+/- 20%) without need to transmit a "restore" command.

1.11 Each receiver-switch shall be designed to accommodate up to four (4) individually switched outputs, each individually addressable. Output numbers 1 and 3 shall be equipped with 30 amp Form B relays.

Output number 2 shall be equipped with a 5 amp Form B relay. Output numbers 1, 2, 3, or 4 shall be selectable by field personnel. This shall be accomplished by using quick connect solderless connectors either at the relay connection or the drive connections on the printed circuit board. This will allow the desired flexibility to select any driver to control any relay by field personnel with minimal time and effort. All outputs and relays shall be prewired and self contained within the switch housing.

1.12 Each receiver-switch shall include light emitting diodes (LED), visible from the face of the housing, to indicate that the numbers 1, 2, 3, or 4 output relays have been addressed and energized. The LED shall be recessed for visibility in direct sunlight.

1.13 Each receiver-switch shall retain memory of state for twenty (20) seconds following loss of input voltage. Restoration of power within the 20 second aperture shall cause the switch to set relays to the correct state of memory. Interruption of power input exceeding 20 seconds shall cause the relays to reset to the normally-closed position at output number 1.

2.0 Receiver Characteristics

2.01 Receiver-switches shall respond to discrete digitally-coded frequency-shift-keyed signals transmitted at a carrier frequency of 154.463750 MHz.

2.02 Receiver shall be narrow band, double conversion, crystal controlled type with minimum receiver sensitivity of 1 microvolt into 50 ohms.

2.03 Receivers shall operate successfully over a temperature range of –30 degrees Celsius to +60 degrees Celsius, 10% to 95% non-condensing humidity. Frequency stability shall be +/- 0.002% over aforementioned temperature range, with deviation not to exceed +/- 1.8 kilohertz.

2.04 Spurious and image rejection shall be –40 dB from carrier reference for 50 ohm matched impedance. Selectivity shall be –50 dB or better at +/- 30 kHz.

2.05 Receiver antennas shall be configured to ensure state sensitivity and coverage for all directions and polarizations.

2.06 The receiver shall meet FCC specifications pertaining to emission per FCC Rules, Part 15, Subpart C, Section 15.6.

3.0 Receiver-Decoding

3.01 Decoding of assigned addresses by the receiver-switch will be accomplished by General Electric's REMS-100 or REMS-101 addressing.

3.02 The receiver-switch shall employ digital decoding via microprocessor via user-programmable post and shunt, allowing field assignment of each receiver-switch address.

3.03 Receivers shall be capable of successfully decoding frequency-shift-keyed tones of:

1200 Hz:Mark and 1000 Hz:Space at 51 baud for REMS-100 or REMS-101 format

3.04 Addresses shall be segmented by both "Group" allotment and by individual switch or "Unit" allotment. Such allocations shall allow:

SCRAM, or 100% deferral of all "Groups" of receivers simultaneously ("All Call");

Group Call, or 100% deferral of all switches ("Units") within a particular group;

Selective deferral of any switch ("Unit") within a group;

Reset on demand any relay, switch, or group before switch time-out period has elapsed.

4.0 Power Supply

4.01 All receiver-switches to be designated for load deferral shall use dual voltage 120/240 VAC as voltage supply to power the receiver.

4.02 Power consumption of the receiver in the stand-by mode shall not exceed 3.5 watts. Power consumption of the receiver in the operational mode, during activation of contacts, shall not exceed 5.0 watts.

4.03 Receiver-switch power supply shall include surge protection to limit storm and surge related damage to receiver-switch electronics, per ANSI C37.90a.

5.0 Wiring Connections

5.01 The method of electrical connection shall be an eight (8) wire with three (3) load-controlling contacts isolated from input power supply.

5.02 One red and one black color-coded conductor of No. 12 AWG stranded tinned copper or larger shall be used for 240 VAC power input. A third conductor, colored violet, of No. 12 AWG stranded tinned copper or larger shall be provided for 120 VAC power input. Power input leads shall be insulated 600-volt class, 105 degrees Celsius temperature rated, and 18 inches minimum length.

5.03 Two yellow, two blue and two orange color-coded conductors of No. 12 AWG stranded tinned copper shall be used for load-carrying contacts. Load-carrying conductors shall be insulated for 600-volt class, 105 degree Celsius temperature rated, and 8 inches minimum length.

5.04 Load-carrying contacts for relays #1 and #3 shall be rated for 240 VAC, 40 amps resistive.

5.045 Load-carrying contacts for relay #2 shall be rated at 120 volts, 5 amps resistive.

5.05 The receiver-switch circuit board shall provide a means of low-power connection for an additional relay identified as output #4.

5.06 The use of quick-connect style lugs should be limited to one per conductor (total of eight (8)) for the termination of power input and load-carrying leads within the enclosure.

5.07 Switches programmed with group address 3 shall be shipped with power leads (red, black, violet) and switch relay leads from the F-1 relay pulled into the same side of the junction box that contains the ¾" knockout exiting the bottom.

5.08 Switches programmed with group address 2 shall be shipped with power leads (red, black, violet) and switch relay leads from the F-3 or F-4 interchangeable relay pulled into the same side of the junction box that contains the ¾" knockout exiting the bottom.

6.0 Warranty

6.01 Receiver-switches shall be warranted to be free of defects in materials and workmanship for a period of eighteen months from date of receipt of materials by the Commission, or twelve months from the date of installation, whichever comes first.

6.02 The bidder shall provide labor and materials as necessary to repair or replace defective receiver-switches for the full warranty period.

6.03 All equipment and associated components shall be new.

7.0 Awawrd and Shipment

7.02 Award of bids will be based on price, delivery, adherence to specifications, and previous Commission experience with manufacturer's product.

7.03 Delivery time is to be stated on the attached proposal form.

7.04 Greenville Utilities shall have the option to purchase up to an additional 2,500 switches at the same price, providing requests for additional switches equal or exceed 1,000 switches per request within a 12 month period from the date of award.

**SUBMIT BID ON ATTACHED PROPOSAL FORM**

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