Division 59

NEMA TS2 Type 1 Fully-Actuated Advanced Traffic Controller

This specification sets forth the minimum requirements for a shelf-mounted, two (2) through sixteen (16) phase, fully-actuated, digital, solid-state traffic controller. The controller shall be configurable to meet, at a minimum, all applicable sections of the NEMA Standards Publications for TS2 and NTCIP 1202 and ATC standard 6.10. Where differences occur, these specifications shall govern. Controller version shall comply with NEMA TS2 Type 1. Must operate and communicate within the EcoTrafiX Central Traffic Management System Software.

Hardware Enclosure

2. The controller shall be compact so as to fit in limited cabinet space. It shall require no more than 7" shelf depth. External dimensions shall not be larger than 8.5" x 15.2 1/4" x 6.375" (H x W x D). 2.1.1. The top and bottom of the chassis shall be made from extruded aluminum and include an integral handle on the back for easy transport

2.1.2. The sides shall be constructed of injection molded polycarbonate.

2.1.3. The model, serial number, and program information shall be displayed on the outside of the controller.

Electronics

2.1.4. The electronics shall be modular in design and shall consist of vertical circuit boards. Horizontal circuit boards shall not acceptable.

2.1.5. In the interest of reliability, no sockets shall be used for any electronic device. All devices shall be directly soldered to the printed circuit board. Surface mount parts shall be used for the majority of the electronic components in the controller.

2.1.6. A built-in, high-efficiency switching power supply shall generate the primary, +5VDCinternal voltage, an isolated +24 VDC for internal and external use, VSTANDBY, LINESYNC, POWERUP and POWERDOWN signals. All voltages shall be regulated.

2.1.7. The 120 or 220VAC fuse shall be mounted on the front of the controller. Protection for the 24VDC supply shall be provided by a resettable electronic fuse.

2.1.8. All printed circuit boards shall meet the requirements of the NEMA Standard plus the following requirements to enhance reliability: 2.1.8.1. Both sides of the printed circuit board shall be covered with a solder mask material.

2.1.8.2. The circuit reference designation for all components and the polarity of all polarized capacitors and two-leaded diodes shall be clearly marked adjacent to the component. Pin 1 for all integrated circuit packages shall be designated on all printed circuit boards.

2.1.8.3. All printed circuit board assemblies shall be coated on both sides with a clear moisture-proof and fungus-proof sealant.

2.1.9. Timing of the controller traffic application shall be derived from the AC power line.

2.1.10. To facilitate the transfer of user-programmed data from one controller to another, a data-key receptacle for using a separate 2070-style, serial flash memory device shall be an available hardware option. In addition, two USB sockets and one SD Card socket shall be provided for memory devices that can be used for data transfer. These data transfer devices shall be easily removable and directly accessible from the outside of the controller. The controller will not require this data-key, USB memory thumb drive, or SD Card to be present for proper operation.

2.1.11. All controller software shall be stored in Flash Memory devices. The controller software shall be easily updated without the removal of any memory device from the controller. The use of removable PROMS or EPROMS from the controller shall not be acceptable. The controller shall include an option that allows updating software using a Windows based computer, a USB memory thumb drive, or an SD card.

ATC Engine Board

2.1.12. The controller shall include an ATC engine board compliant to ATC standard 5.2b and proposed version 6.10.

2.1.13. The engine board shall include a PowerPC 83XX family processor with QUICC engine.

2.1.14. The engine board shall have a minimum of the following memory: 2.1.14.1. 128Mbytes of DDR2 DRAM memory used for application and OS program execution

2.1.14.2. 64 Mbytes of FLASH memory used for storage of OS Software and user applications

2.1.14.3. 2MB of SRAM memory used for non-volatile parameter storage

2.1.15. The engine board shall provide the seven ATC serial ports, Ethernet, USB and all other control signal required by ATC standard.

2.1.16. The operating system shall be Linux 2.6.35 or later

Graphical User Interface

2.1.17. The controller shall include an advanced graphics card.

2.1.18. The graphics card shall enable: 2.1.18.1. Graphical display of status and programming selections 2.1.18.1.1. The status displays shall include direction arrows for each of the phases and overlaps.

2.1.18.1.2. The selection of programming sections menus shall be by use of icons.

2.1.18.1.3. Programming shall use touch data entry, allowing touch gestures to select yes/no, select enable/disable, pull-down list selections, and more.

2.1.18.2. Touch selection of status and programming

2.1.18.3. Swiping to advance from one screen to the next

2.1.19. Program values shall be entered through either the keypad or the touch screen.

2.1.20. The controller shall allow connection of a tablet to the controller. 2.1.20.1. The tablet connection shall be by Wi-Fi connection either by a Wi-Fi to USB adapter or an Ethernet to Wi-Fi adapter.

2.1.20.2. Once connected it shall be possible to observe the exact same graphics displays as are visible on the touch screen of the controller.

2.1.20.3. It shall be possible to change the controller's programming values from the tablet while it is connected.

Front Panel

2.1.21. The front of the controller shall consist of a panel for the display, keyboard and connectors for all necessary user connections.

2.1.22. The display shall be a seven-inch (7"), color, TFT (Thin Film Transistor) LCD (Liquid Crystal Display) with high brightness. It shall be readable in direct sunlight. The display shall perform over the NEMA temperature range and shall have a resolution of 800 X 480 with an 18 bit color depth. The luminous intensity shall be a minimum of 800 nits. The display shall include an industrial, resistive touch screen that can be operated with gloved hands. The touch screen and display shall not be affected by condensation or water drops.

2.1.23. Front-panel operator inputs shall be via touch screen or by clearly labeled elastomeric keypad. These shall include a 10-digit numeric keypad, Main and Sub keys, toggle keys, special function and enter keys, six function keys, status and help keys and a large four-direction cursor control key.

2.1.24. The front panel shall include a built in speaker for enhanced controller audio feedback.

2.1.25. The front panel shall include a tri-color status LED.

Ethernet Ports

2.1.26. The controller shall have the capability of supporting Ethernet communications, using TCP/IP communications protocols.

2.1.27. The controller shall provide four front-panel Ethernet ports

2.1.28. Two of the ports shall be connected to Ethernet switch ENET1 and the other two shall be connected to Ethernet switchENET2

USB Ports

2.1.29. The controller shall provide two USB 2.0 ports.

2.1.30. USB ports shall be used for USB thumb drives to update software, upload or download configuration, or uploading logged data.

Connectors

2.1.31. All non-optional interface connectors shall be accessible from the front of the controller in the NEMA Configured Controller model NEMA TS2 Type 1

2.1.32. To facilitate special applications the controller shall have the capability of assignment of any input or output function to any input or output pin respectively on the interface connectors, with the exception of Flashing Monitor, Controller Voltage Monitor, AC+, AC-, Chassis Ground, 24VDC, Logic Ground and TS2 Mode bits.

2.1.33. The controller shall as a minimum have the following communications ports:

a. Port 1 SDLC for communications to other devices in the cabinet

b. Port 2 serial port for systems communications

c. Console serial port for local communications

An optional telemetry module shall utilize TDM/FSK data transmission at 1200 baud or 9600 baud over two pairs of wires. This module shall include a 25-pin D-sub connector.

d. Ports on ATC-2070 communication slots – see section 2.10.2 2.1.35. Serial communications shall operate at from 1200 to 115.2 K baud

Serviceability

2.1.36. All electronic modules including the power supply shall be easily removable from the controller using a screwdriver as the only tool. All power and signal connections to the circuit boards shall be via plug-in connectors.

Hardware Options

2.1.37. Optional Data Key 2.1.37.1. A data-key and receptacle shall be available for use as a database storage device (backup) or as a database transfer module. It shall be capable of storing a minimum 2MB of data.

2.1.37.2. The data-key shall be hot swappable, so that it can be inserted and removed without powering down the controller.

2.1.37.3. The data-key shall be capable of storing the entire controller database and shall retain the information without use of battery or capacitor backup.

2.1.37.4. The controller shall not require this key to be present during normal operation.

2.1.37.5. If the data-key is present the controller shall automatically backup the database to the data key 20 minutes following the last data change.

MEASUREMENT OF PAYMENT: This item will not be measured as a separate pay item but will be paid for under the lump sum price of the traffic signal shown on the unit price table as traffic signal.