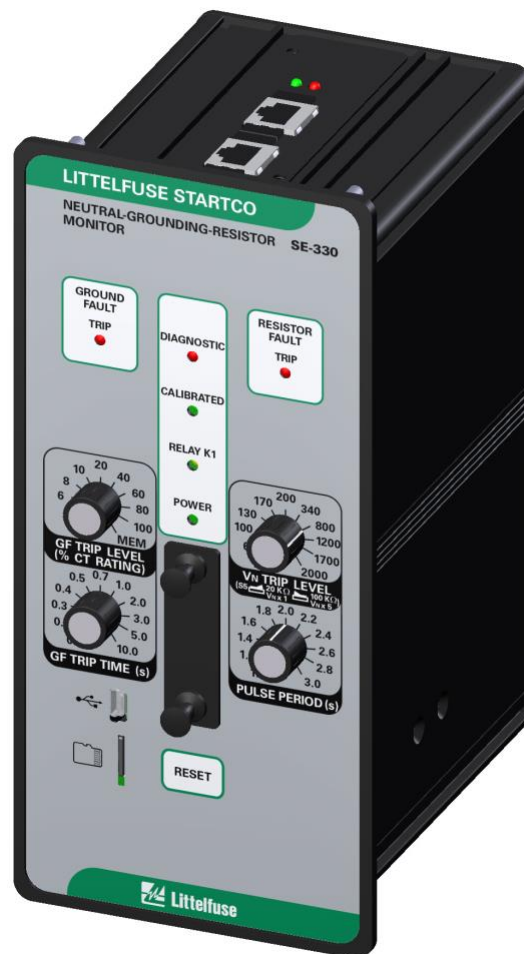


## SE-330 SERIES (NEW REVISION) MODBUS/TCP INTERFACE

Revision 0-E-121117



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## 1. GENERAL

This document describes the Modbus/TCP features supported by the new revision SE-330, SE-330AU, and SE-330HV. Unless otherwise indicated, “SE-330” refers to all three monitor series in general. The Ethernet network communications interface supports the Modbus-RTU protocol over TCP/IP using an encapsulating protocol called Modbus/TCP.

SE-330 ordering options 3, 4, 5, 6, 7 and 8 include dual Ethernet ports with support for fiber-optic or RJ45 interfaces. See Figs. 1, 2, and 3.

## 2. MODBUS PROTOCOL

The SE-330 implements the Modbus® TCP protocol on port 502. The SE-330 is a server (slave) and can communicate simultaneously with 5 clients (masters).

Modicon Modbus® is a registered trademark of Schneider Electric.

All Modbus/TCP messages are essentially Modbus-RTU messages encapsulated with a Modbus/TCP header, both of which are encapsulated in a TCP and an IP header. The TCP/IP-header and Modbus RTU framing is beyond the scope of this document.

### 2.1 PROTOCOL SETUP

The SE-330 can be configured using SE-MON330 (version 3.2 or higher). The IP address, subnet mask, and gateway can all be set for each of the network ports.

For more information, see the SE-MON330 help file.

Note: Ensure that each port is configured with a unique IP address even if not used.

### 2.2 ERROR CHECKING

Modbus/TCP uses the TCP/IP checksum and error correction techniques to ensure reliable communications.

If the checksum is correct but the internal data in the message is not correct, the SE-330 will respond with an exception code.

### 2.3 FUNCTION CODES SUPPORTED

The SE-330 Modbus Protocol supports the following function codes:

- Read Holding Registers (Function Code 3)
- Read Input Registers (Function Code 4)
- Write Single Register (Function Code 6)
- Write Multiple Registers (Function Code 16)
- Command Instruction (Function Code 5)

#### 2.3.1 READ INPUT/HOLDING REGISTERS (CODE 4/3)

Function Codes 3 and 4 are used to read the register attributes listed in Appendix A.

Function Codes 3 and 4 perform the same function in the SE-330.

Registers in Modbus start at 40001 decimal and this register address refers to register/attribute 0.

Note: For hexadecimal numbers, 0x precedes the value.

#### 2.3.2 WRITE SINGLE REGISTER (CODE 6)

Function Code 6 writes a single 16-bit value to the SE-330.

Provided no errors occurred, the slave (SE-330) will return the original message to the master. The response message is returned only after the ‘write’ has been executed by the slave.

#### 2.3.3 WRITE MULTIPLE REGISTERS (CODE 16)

Function Code 16 is used to write multiple registers to the SE-330.

The slave will reply with the slave address, function code, register address, and the quantity of registers written.

#### 2.3.4 COMMAND INSTRUCTION (CODE 5)

Modbus Function Code 5 (Force Single Coil) is used to issue commands to the SE-330. The command code actions and corresponding coil number are listed in Table 1.

TABLE 1. SUPPORTED COMMANDS

| COMMAND CODE | COIL NUMBER | ACTION              |
|--------------|-------------|---------------------|
| 0x0001       | 2           | Remote Trip         |
| 0x0002       | 3           | Clear Event Records |
| 0x0005       | 6           | Set to Defaults     |
| 0x0008       | 9           | Remote Reset        |
| 0x0010       | 17          | Remote Calibration  |

Except for a broadcast address, the slave will return the original packet to the master.

#### 2.3.5 COMMAND INSTRUCTIONS USING REGISTER WRITES

For PLCs not supporting Function Code 5, commands can be issued using Write Single Register (Code 6) and Write Multiple Register (Code 16).

Commands are written to SE-330 register 6 (Modbus register 40007). Supported commands are listed in the COMMAND CODE column in Table 1.

When using the Write Multiple Registers function code, the write should be to the single SE-330 Register 6. If multiple registers are written starting at SE-330 Register 6, the first data element will be interpreted as the command code but no other registers will be written. If the command is successful, the SE-330 will return a valid response message.

## 2.4 ERROR RESPONSES

The SE-330 supports the following exception responses:

- 01: Illegal Function – The function code (Byte 2 of the Modbus-RTU packet or Byte 8 of the entire Modbus/TCP message) is not supported
- 02: Illegal Data Address – All accesses to communication registers must be within the specified address range
- 03: Illegal Data Value – This error code is returned if there is a data value outside the allowable value for the slave

## 2.5 SE-330 DATABASE

Appendix A contains the Modbus Register Table. The table starts at register 0 (Modbus 40001) and each register/attribute is 16-bits wide. Types “long” and “float” are 32-bit values. For both long and float types, the low-order word is transmitted first followed by the high-order word. Word values have the high byte followed by the low byte. Float types are per the IEEE 754 Floating-Point Standard. All bytes of long and float types must be written using one message or an error will result. This does not apply for read commands.

For compatibility with the previous Modbus TCP/IP implementation, registers 80 through 90 are provided. The previous trip record format is not supported.

## 2.6 NETWORK STATUS AND INDICATION

Communication status LED's are located on the top panel of the SE-330. The Network Status (NS) LED will indicate solid green when there is link activity, flashing green when there are no active connections and will flash red when any link has timed out.

## 3. DATA RECORDS

Event record information is located starting at SE-330 register 60.

Only one event record can be read at a time. Record data is for the record indicated by the Record Selector. To select a record, write the record number to Record Selector with the first message and then read the values in the record with a second message. Record Head points to the most recent record. If there are no records available, Record Head returns a value of 100.

The Record Selector must be in the range of 0 to 99. Values outside this range will select record 0.

## 4. SPECIFICATIONS

|                            |  |
|----------------------------|--|
| Protocol.....              | Modbus/TCP   |
| Ports .....                | 2  |
| IP Addresses.....          | 1 per port   |
| Port 1 Default.....        | 192.168.1.100  |
| Port 2 Default.....        | 192.168.2.100  |
| Number of Connections..... | 8 total  |
| Connectors.....            | Copper and/or fiber, refer to Figs. 1, 2, and 3 and ordering information in the product manual |

### Copper:

|                |                      |
|----------------|----------------------|
| Connector..... | RJ45                 |
| Cable.....     | CAT5                 |
| Length.....    | 100 m (328')         |
| Interface..... | 10BASE-T, 100BASE-Tx |

### Fiber:

|                           |                              |
|---------------------------|------------------------------|
| Connector.....            | SC                           |
| Cable.....                | SC Multimode                 |
| Length.....               | 2,000 m (6,561') per segment |
| Interface.....            | 100BASE-Fx                   |
| Center Wavelength .....   | 1300 nm                      |
| Operating Wavelength..... | 1270 to 1380 nm              |

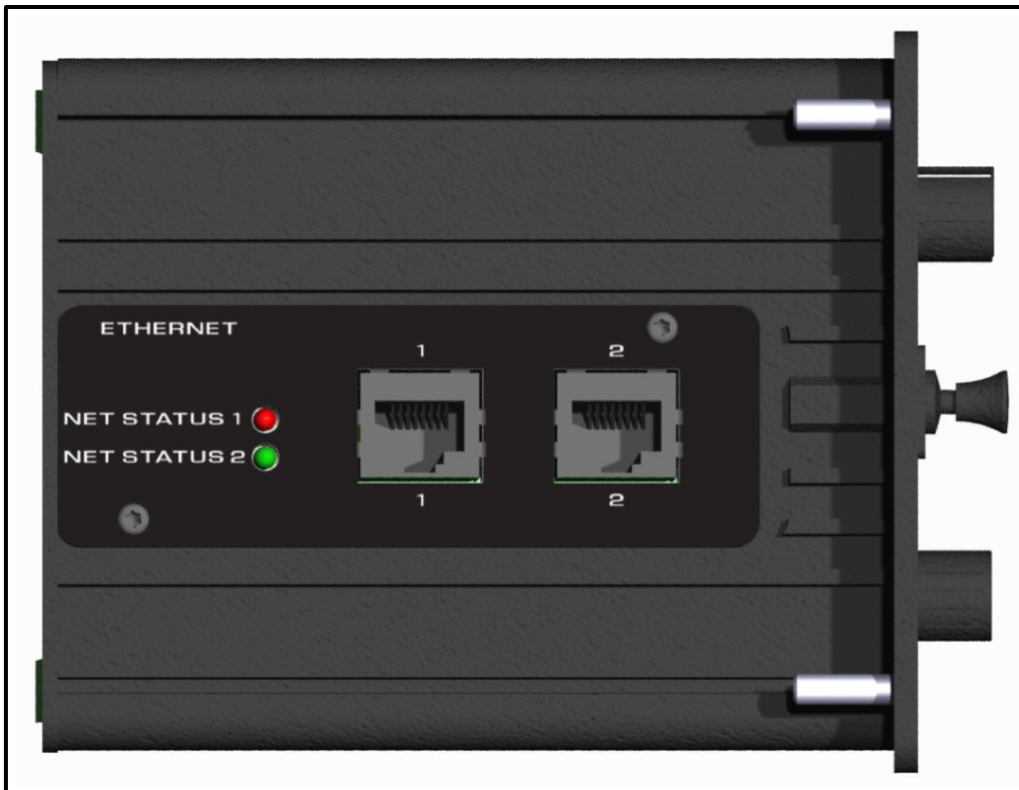


FIGURE 1. Top View of SE-330 (SE-330-X3-XX) with Dual RJ-45 Ethernet Network Communications.



FIGURE 2. Top View of SE-330 (SE-330-X4-XX) with Single Fiber SC and Single RJ-45 Ethernet Network Communications.

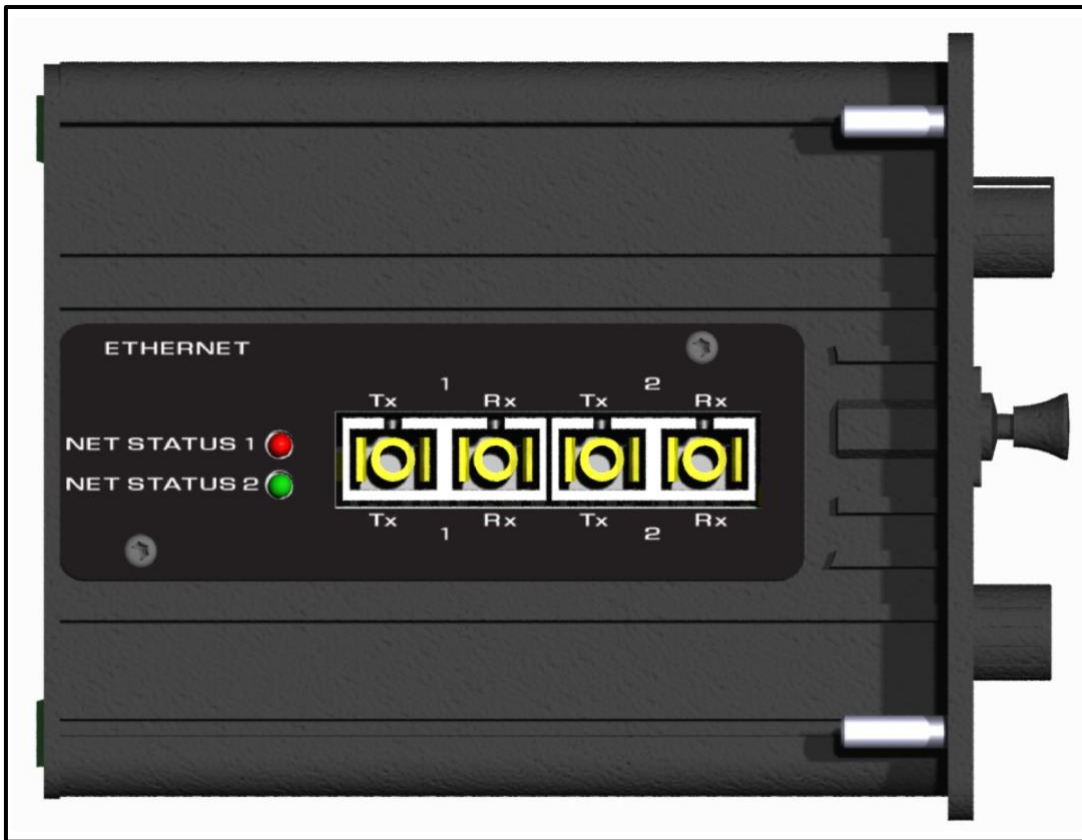


FIGURE 3. Top View of SE-330 (SE-330-X5-XX) with Dual Fiber SC Ethernet Network Communications.



## APPENDIX A

### MODBUS REGISTER TABLE

| ATTRIBUTE NUMBER | ATTRIBUTE NAME                   | SERVICES   | DATA TYPE | NOTES  |
|------------------|----------------------------------|------------|-----------|--|
| 0                | Model Code                       | Read Only  | T1        | Always Reads 330                                 |
| 1                | Software Version                 | Read Only  | T1        | Where 100 = 1.00                                 |
| 2                | Serial Number                    | Read Only  | T2 (Low)  |  |
| 3                |                                  | Read Only  | T2 (High) |  |
| 4                | Model Type                       | Read Only  | T3        |  |
| 5                | Communication Code               | Read Only  | T4        |  |
| 6                | Command Register                 | Write Only | T5        |  |
| 7                |                                  |            |           |  |
| 8                |                                  |            |           |  |
| 9                |                                  |            |           |  |
| 10               | Date                             | Read Only  | T6 (Low)  |  |
| 11               |                                  | Read Only  | T6 (High) |  |
| 12               | Time                             | Read Only  | T7 (Low)  |  |
| 13               |                                  | Read Only  | T7 (High) |  |
| 14               | EF/GF Trip Time (s)              | Read Only  | T15       |  |
| 15               | EF/GF Trip Level (%)             | Read Only  | T16       |  |
| 16               | EF/GF MEM Trip Level (%)         | R/W        | T1        |  |
| 17               | Pulse Period (s)                 | Read Only  | T19       | Not used on SE-330AU or SE-330HV.                |
| 18               | Vn Trip Level (V)                | Read Only  | T1        |  |
| 19               | NGR Calibration Value            | Read Only  | T20       | Signed 16-Bit Value                              |
| 20               | K1 Configuration                 | Read Only  | T8        |  |
| 21               | K1 Mode                          | Read Only  | T9        | Not used on SE-330AU or SE-330HV.                |
| 22               | EF/GF-Trip Latch                 | Read Only  | T10       | Not used on SE-330AU or SE-330HV.                |
| 23               | RF-Trip Latch                    | Read Only  | T10       |  |
| 24               | Sensing Resistor Selection       | Read Only  | T11       |  |
| 25               | Frequency                        | Read Only  | T12       |  |
| 26               | Spare                            | Read Only  | T1        |  |
| 27               | Upgrade Enable                   | Read Only  | T13       |  |
| 28               | Pulse Enable State               | Read Only  | T14       | Not used on SE-330AU or SE-330HV                 |
| 29               | SD Card Status                   | Read Only  | T17       |  |
| 30               | Remote Reset State               | Read Only  | T14       |  |
| 31               | Calibration State                | Read Only  | T14       |  |
| 32               | K2 Mode                          | R/W        | T18       |  |
| 33               | K3 Mode                          | R/W        | T18       |  |
| 34               | CT Primary                       | R/W        | T1        | See “Effective CT Primary” Setting in SE-MON330. |
| 35               | NGR Current (%FS)                | Read Only  | T1        |  |
| 36               | NGR Voltage (% Setting)          | Read Only  | T1        |  |
| 37               | Resistance Change (Ohms)         | Read Only  | T20       |  |
| 38               | CT Detection                     | Read Only  | T1        | SE-330AU Only                                    |
| 39               | Geo-Magnetic Filter              | R/W        | T31       |  |
| 40               | Resistor-Fault Trip Time (s)     | R/W        | T1        |  |
| 41               | Resistor-Fault Trip Level (ohms) | R/W        | T1        |  |
| 42               | Diagnostic LED behavior          | R/W        | T34       |  |
| 43               |                                  |            |           |  |
| 44               |                                  |            |           |  |
| 45               |                                  |            |           |  |
| 46               | K1 Trip Relay                    | Read Only  | T21       |  |
| 47               | K2 GF Relay                      | Read Only  | T21       |  |
| 48               | K3 RF Relay                      | Read Only  | T21       |  |
| 49               | Drive Polarity Output            | Read Only  | T1        | 1 = Negative 0 = Positive                        |
| 50               |                                  |            |           |  |

| ATTRIBUTE NUMBER | ATTRIBUTE NAME           | SERVICES  | DATA TYPE  | NOTES  |
|------------------|--------------------------|-----------|------------|--|
| 51               |                          |           |            |  |
| 52               |                          |           |            |  |
| 53               |                          |           |            |  |
| 54               | Diagnostic               | Read Only | T30        |  |
| 55               | Trip Status              | Read Only | T22        |  |
| 56               | Set-Point Status         | Read Only | T23        |  |
| 57               |                          |           |            |  |
| 58               |                          |           |            |  |
| 59               |                          |           |            |  |
| 60               | RECORDHEAD               | Read Only | T1         |  |
| 61               | RECORDCOUNT              | Read Only | T1         |  |
| 62               | RECORD_INDEX             | R/W       | T1         |  |
| 63               | RECORD_DATE              | Read Only | T6 (Low)   |  |
| 64               | RECORD_DATE              | Read Only | T6 (High)  |  |
| 65               | RECORD_TIME              | Read Only | T7 (Low)   |  |
| 66               | RECORD_TIME              | Read Only | T7 (High)  |  |
| 67               | RECORD_NGRCURRENT        | Read Only | T1         |  |
| 68               | RECORD_NGRVOLTAGE        | Read Only | T1         |  |
| 69               | RECORD_NGRCHANGE         | Read Only | T20        |  |
| 70               | RECORD_TRIPSTATUS        | Read Only | T22        |  |
| 71               | RECORD_SETPOINTSTATUS    | Read Only | T23        |  |
| 72               |                          |           |            |  |
| 73               |                          |           |            |  |
| 74               |                          |           |            |  |
| 75               | Watchdog                 | Read Only | T1         | Always reads 0. Consult factory if not 0.              |
| 76               | Flash Healthy            | Read Only | T24        |  |
| 77               | Boot Section             | Read Only | T25        |  |
| 78               |                          |           |            |  |
| 79               |                          |           |            |  |
| 80               | Firmware Version         | Read Only | T1         | Start of SE-330 Backwards Compatibility Register Block |
| 81               | Trip Status              | Read Only | T22        |  |
| 82               | Setpoint Status          | Read Only | T23        |  |
| 83               | EF/GF Trip Time (s)      | Read Only | T15        |  |
| 84               | EF/GF Trip Level (%)     | Read Only | T16        |  |
| 85               | Pulse Period (s)         | Read Only | T19        |  |
| 86               | NGR Current (%FS)        | Read Only | T1         |  |
| 87               | NGR Voltage (% Setting)  | Read Only | T1         |  |
| 88               | Resistance Change (Ohms) | Read Only | T20        |  |
| 89               | Relay Status             | Read Only | T26        |  |
| 90               | Switches                 | Read Only | T27        | End of SE-330 Backwards Compatibility Register Block   |
| 91               |                          |           |            |  |
| 92               |                          |           |            |  |
| 93               |                          |           |            |  |
| 94               |                          |           |            |  |
| 95               |                          |           |            |  |
| 96               |                          |           |            |  |
| 97               |                          |           |            |  |
| 98               |                          |           |            |  |
| 99               |                          |           |            |  |
| 100              |                          |           |            |  |
| 101              | IP Address 1             | R/W       | T28 (Low)  |  |
| 102              |                          | R/W       | T28 (High) |  |
| 103              | Subnet Mask 1            | R/W       | T28 (Low)  |  |
| 104              |                          | R/W       | T28 (High) |  |

| ATTRIBUTE NUMBER | ATTRIBUTE NAME   | SERVICES  | DATA TYPE           | NOTES |
|------------------|------------------|-----------|---------------------|-------|
| 105              | Gateway 1        | R/W       | T28 (Low)           |       |
| 106              |                  | R/W       | T28 (High)          |       |
| 107              | MAC Address 1    | Read Only | T29 (Word0)         |       |
| 108              |                  | Read Only | T29 (Word1)         |       |
| 109              |                  | Read Only | T29 (Word2)         |       |
| 110              | IP Address 2     | R/W       | T28 (Low)           |       |
| 111              |                  | R/W       | T28 (High)          |       |
| 112              | Subnet Mask 2    | R/W       | T28 (Low)           |       |
| 113              |                  | R/W       | T28 (High)          |       |
| 114              | Gateway 2        | R/W       | T28 (Low)           |       |
| 115              |                  | R/W       | T28 (High)          |       |
| 116              | MAC Address 2    | Read Only | T29 (Word0)         |       |
| 117              |                  | Read Only | T29 (Word1)         |       |
| 118              |                  | Read Only | T29 (Word2)         |       |
| 130              | Hardware Version | Read Only | T32<br>(char 0 + 1) |       |
| 131              |                  | Read Only | T32<br>(char 2 + 3) |       |
| 132              |                  | Read Only | T32<br>(char 4 + 5) |       |
| 133              |                  | Read Only | T32<br>(char 6 + 7) |       |
| 160              | SNTP IP Address  | R/W       | T28 (Low)           |       |
| 161              |                  | R/W       | T28 (High)          |       |
| 162              | SNTP Poll Rate   | R/W       | T6 (Low)            |       |
| 163              |                  | R/W       | T6 (High)           |       |
| 164              | SNTP Time Out    | R/W       | T6 (Low)            |       |
| 165              |                  | R/W       | T6 (High)           |       |
| 166              | SNTP Status      | Read Only | T33 (Low)           |       |
| 167              |                  | Read Only | T33 (High)          |       |
| 168              | SNTP Enable      | R/W       | T31                 |       |

### Data Types

| TYPE | C TYPE | DESCRIPTION                   | NOTES |
|------|--------|-------------------------------|-------|
| T1   | Short  | 16-Bit Unsigned Integer       |       |
| T2   | Long   | 32-Bit Unsigned Integer       |       |
|      |        | (High) Bits 31..16            |       |
|      |        | (Low) Bits 15..0              |       |
| T3   | Short  | 1 = Standard                  |       |
|      |        | 2 = AU                        |       |
|      |        | 3 = HV                        |       |
| T4   | Short  | 0 = No Communications         |       |
|      |        | 1 = DeviceNet                 |       |
|      |        | 2 = Reserved                  |       |
|      |        | 3 = Ethernet (Dual RJ45)      |       |
|      |        | 4 = Ethernet (Fiber and RJ45) |       |
|      |        | 5 = Ethernet (Dual Fiber)     |       |
|      |        | 6 = 61850 (Dual RJ45)         |       |
|      |        | 7 = 61850 (Fiber and RJ45)    |       |
|      |        | 8 = 61850 (Dual Fiber)        |       |
| T5   | Short  | SE-330 Command                |       |
|      |        | 1 = Remote Trip               |       |
|      |        | 2 = Clear Event Records       |       |
|      |        | 5 = Return to Default Values  |       |
|      |        | 8 = Remote Reset              |       |
|      |        | 16 = Remote Calibration       |       |

**Data Types (continued)**

| TYPE | C TYPE | DESCRIPTION                                     | NOTES                         |
|------|--------|---|-------------------------------|
| T6   | Long   | Date  |                               |
|      |        | Bits 31..16: Year in Binary                     |                               |
|      |        | Bits 15..8: 1-12 Months in Binary               |                               |
|      |        | Bits 7..0: 1-31 Days in Binary                  |                               |
| T7   | Long   | Time  |                               |
|      |        | Bits 31..24: 0-23 Hours in Binary               |                               |
|      |        | Bits 23..16: 0-60 Minutes in Binary             |                               |
|      |        | Bits 15..8: 0-60 Seconds in Binary              |                               |
|      |        | Bits 7..0: 0-99 Hundredths of Seconds in Binary |                               |
| T8   | Short  | 1 = Trip Configuration (K1)                     |                               |
|      |        | 0 = Pulsing Configuration (K1)                  |                               |
| T9   | Short  | 1 = Fail Safe Trip-Relay Operation              |                               |
|      |        | 0 = Non Fail Safe Operation                     |                               |
| T10  | Short  | 1 = Latched                                     |                               |
|      |        | 0 = Not Latched                                 |                               |
| T11  | Short  | 1 = 20 k Sensor (200 k for SE-330HV)            |                               |
|      |        | 0 = 100 k Sensor                                |                               |
| T12  | Short  | 1 = 50 Hz                                       |                               |
|      |        | 0 = 60 Hz                                       |                               |
| T13  | Short  | 1 = Run Mode                                    |                               |
|      |        | 0 = Upgrade Enable                              |                               |
| T14  | Short  | 1 = Open  | State of External Contact     |
|      |        | 0 = Closed                                      |                               |
| T15  | Short  | SE-330/SE-330HV                                 | SE-330AU                      |
|      |        | 0 = 0.1 s                                       | 100 ms                        |
|      |        | 1 = 0.2 s                                       | 120 ms                        |
|      |        | 2 = 0.3 s                                       | 140 ms                        |
|      |        | 3 = 0.4 s                                       | 160 ms                        |
|      |        | 4 = 0.5 s                                       | 180 ms                        |
|      |        | 5 = 0.7 s                                       | 200 ms                        |
|      |        | 6 = 1 s   | 250 ms                        |
|      |        | 7 = 2 s   | 300 ms                        |
|      |        | 8 = 3 s   | 350 ms                        |
|      |        | 9 = 5 s   | 400 ms                        |
|      |        | 10 = 10 s                                       | 500 ms                        |
| T16  | Short  | SE-330/SE-330HV                                 | SE-330AU                      |
|      |        | 0 = 2%  | 0 = 0.125 A                   |
|      |        | 1 = 4%  | 1 = 0.25 A                    |
|      |        | 2 = 6%  | 2 = 0.3 A                     |
|      |        | 3 = 8%  | 3 = 0.4 A                     |
|      |        | 4 = 10%   | 4 = 0.5 A                     |
|      |        | 5 = 20%   | 5 = 1 A                       |
|      |        | 6 = 40%   | 6 = 2 A                       |
|      |        | 7 = 60%   | 7 = 3 A                       |
|      |        | 8 = 80%   | 8 = 4 A                       |
|      |        | 9 = 100%  | 9 = 5 A                       |
|      |        | 10 = MEM  |                               |
| T17  | Short  | 0 = No Card                                     | 5 = Card Format Error         |
|      |        | 1 = Card Inserted                               | 6 = Card Initialization Error |
|      |        | 2 = Card Logging                                | 7 = Card Format in Progress   |
|      |        | 3 = Card Full                                   |                               |
|      |        | 4 = Card Error                                  |                               |
| T18  | Short  | 0 = Non-Fail-Safe                               |                               |
|      |        | 1 = Fail-Safe                                   |                               |

**Data Types (continued)**

| TYPE | C TYPE | DESCRIPTION           | NOTES   |
|------|--------|-----------------------|---|
| T19  | Short  | 0 = 1.0               |   |
|      |        | 1 = 1.2               |   |
|      |        | 2 = 1.4               |   |
|      |        | 3 = 1.6               |   |
|      |        | 4 = 1.8               |   |
|      |        | 5 = 2.0               |   |
|      |        | 6 = 2.2               |   |
|      |        | 7 = 2.4               |   |
|      |        | 8 = 2.6               |   |
|      |        | 9 = 2.8               |   |
|      |        | 10 = 3.0              |   |
| T20  | Short  | 16-Bit Signed Integer |   |
| T21  | Short  | 0 = De-Energized      |   |
|      |        | 1 = Energized         |   |
| T22  | Short  | Bit 0, EF/GF          | 1 = Earth/Ground Fault Trip<br>0 = No Trip  |
|      |        | Bit 1, RF             | 1 = Resistor Fault Trip<br>0 = No Trip  |
|      |        | Bit 2, CAL            | 1 = Calibration Error<br>0 = No Error   |
|      |        | Bit 3, ADC            | 1 = A/D Error<br>0 = No Error   |
|      |        | Bit 4, GRV            | 1 = Voltage Trip<br>0 = No Trip   |
|      |        | Bit 5, NVRam Error    | 1 = NVRam Error<br>0 = No Error   |
|      |        | Bit 6, Watchdog       | 1 = Internal Fault<br>0 = No Internal Fault<br>(Will cause a EF/GF and RF trip)       |
|      |        | Bit 7, RMT            | 1 = Remote Trip<br>0 = No Trip<br>(Will cause a EF/GF and RF trip)                    |
|      |        | Bit 8, Hardware Error | 1 = Internal Fault<br>0 = No Internal Fault<br>(Will cause a EF/GF and RF trip)       |
|      |        |                       |   |
|      |        | Bit 0, EF/GF          | 1 = Earth/Ground Fault Current >= Setting<br>0 = Earth/Ground Fault Current < Setting |
|      |        | Bit 1, RF             | 1 = Resistance >= Trip Level<br>0 = Resistance < Trip Level                           |
|      |        | Bit 2, CAL            | 1 = Calibration Error<br>0 = No Error   |
|      |        | Bit 3, ADC            | 1 = A/D Error<br>0 = No Error   |
|      |        | Bit 4, GRV            | 1 = NGR Voltage >= Vn Trip Setting<br>0 = NGR Voltage < Vn Trip Setting               |
|      |        | Bit 5, Not Used       |   |
|      |        | Bit 6, CT Error       | 1 = CT Error (SE-330AU Only)<br>0 = No CT Error                                       |
|      |        | Bit 7, CT Latch       | 1 = CT Trip (SE-330AU Only)<br>0 = No CT Trip   |
|      |        | Bit 8, SD Card Error  | 1 = SD Card Error/Full<br>0 = No Error  |
|      |        | Bit 9, Upgrade Error  | 1 = Upgrade Error<br>0 = No Error   |

**Data Types (continued)**

| TYPE | C TYPE       | DESCRIPTION               | NOTES   |
|------|--------------|---------------------------|---|
| T24  | Short        | 1 = Healthy               |   |
|      |              | 0 = Not Healthy           |   |
| T25  | Short        | 0 = NONE                  |   |
|      |              | 1 = Factory Default 0     |   |
|      |              | 2 = Factory Default 1     |   |
|      |              | 3 = Upgrade 0             |   |
|      |              | 4 = Upgrade 1             |   |
| T26  | Short        | Bit 1, K3                 | 1 = RF Indication Relay Energized<br>0 = Not Energized            |
|      |              | Bit 2, K2                 | 1 = EF/GF Indication Relay Energized<br>0 = Not Energized         |
|      |              | Bit 3, K1                 | 1 = Trip/Pulse Relay Energized<br>0 = Not Energized               |
| T27  | Short        | Bit 0, S4                 | 1 = RF Latched<br>0 = RF Not Latched                              |
|      |              | Bit 1, S3                 | 1 = EF/GF Latched<br>0 = EF/GF Not Latched                        |
|      |              | Bit 2, S5                 | 1 = 20 k Sensor (200 k for SE-330HV)<br>0 = 100 k Sensor          |
|      |              | Bit 3, S6                 | 1 = 50 Hz<br>0 = 60 Hz  |
|      |              | Bit 4, S2                 | 1 = Fail Safe Trip-Relay Operation<br>0 = Non Fail Safe Operation |
|      |              |                           | S2 not applicable to SE-330AU.                                    |
|      |              | Bit 5, S1                 | 1 = Trip Configuration (K1)<br>0 = Pulsing Configuration (K1)     |
|      |              |                           | S1 not applicable to SE-330AU, SE-330HV.                          |
|      |              | Bit 6, Not Used = 0       |   |
|      |              | Bit 7, Not Used = 0       |   |
| T28  | Long         | IP Address (a.b.c.d)      |   |
|      |              | (High) Bits 31..24 = a    |   |
|      |              | (High) Bits 23..16 = b    |   |
|      |              | (Low) Bits 15..8 = c      |   |
|      |              | (Low) Bits 7..0 = d       |   |
| T29  | Long<br>Long | MAC Address (a:b:c:d:e:f) |   |
|      |              | (Word2) Bits 47..40 = a   |   |
|      |              | (Word2) Bits 39..32 = b   |   |
|      |              | (Word1) Bits 31..24 = c   |   |
|      |              | (Word1) Bits 23..16 = d   |   |
|      |              | (Word0) Bits 15..8 = e    |   |
|      |              | (Word0) Bits 7..0 = f     |   |
| T30  | Short        | 0 = None                  |   |
|      |              | 1 = Calibration Error     |   |
|      |              | 2 = Remote Trip           |   |
|      |              | 3 = CT Latch Error        |   |
|      |              | 4 = ADC Error             |   |
|      |              | 5 = SD Card Error         |   |
|      |              | 6 = Watchdog Trip         |   |
|      |              | 7 = Hardware Error        |   |
|      |              | 8 = NVRAM Error           |   |
|      |              | 9 = Flash Upgrade Error   |   |
|      |              | 10 = USB Error            |   |
| T31  | Short        | 0 = Disabled              |   |
|      |              | 1 = Enabled               |   |

**Data Types (continued)**

| TYPE | C TYPE | DESCRIPTION   | NOTES |
|------|--------|---|-------|
| T32  | Char   | Register +0: Char[0] and Char[1]. Char[0] at MSByte         |       |
|      |        | Register +1: Char[2] and Char[3]. Char[2] at MSByte         |       |
|      |        | Register +N: Char[N*2] and Char[N*2+1]. Char[N*2] at MSByte |       |
| T33  | Long   | -1 = Initializing   |       |
|      |        | 0 = SNTP Synced   |       |
|      |        | 4355 = Server Not Running                                   |       |
|      |        | 5122 = No Route to Host                                     |       |
|      |        | 5392 = No Route to Host                                     |       |
| T34  | Short  | 0 = All Diagnostic Codes                                    |       |
|      |        | 1 = Critical Diagnostic Codes Only                          |       |

## APPENDIX B SE-330 SERIES (NEW REVISION) MODBUS/TCP INTERFACE REVISION HISTORY

| MANUAL RELEASE DATE | MANUAL REVISION |
|---------------------|-----------------|
| December 11, 2017   | 0-E-121117      |
| June 25, 2015       | 0-D-062515      |
| July 17, 2014       | 0-C-071714      |
| February 3, 2014    | 0-B-020314      |
| November 29, 2013   | 0-A-112913      |

### MANUAL REVISION HISTORY

#### REVISION 0-E-121117

##### SECTION 2

Note added in Section 2.1.

##### SECTION 4

Specifications updated.

#### REVISION 0-D-062515

##### SECTION 4

IP Addresses updated.

##### APPENDIX A

Modbus registers 34 and 39-41 updated. Registers 130-133 and 160-168 added.

Data types 31, 32 and 33 added.

#### REVISION 0-C-071714

Remote calibration feature added.

##### SECTION 2

Remote calibration added to Table 1.

##### APPENDIX A

Remote calibration added to data types.

#### REVISION 0-B-020314

##### SECTION 2

Figs. 1, 2, and 3 added.

##### SECTION 4

Specifications updated.

#### REVISION 0-A-112913

Initial release.