

## **SE-330/SE-330AU/SE-330HV PROFIBUS-DP INTERFACE**

**Preliminary**

**May 22, 2007**

Copyright © 2007 Startco Engineering Ltd.

All rights reserved.



## TABLE OF CONTENTS

	PAGE
<b>1. General</b> .....	<b>1</b>
<b>2. Hardware</b> .....	<b>1</b>
2.1 Interface Connector .....	1
2.2 Network Termination.....	1
2.3 Settings .....	1
2.4 Status Display LED's .....	1
<b>3. Configuration File</b> .....	<b>1</b>
<b>4. Cyclic I/O</b> .....	<b>2</b>
4.1 Meter and Pre-Trip Data (Input) .....	4
4.2 Reset and Remote Trip (Output).....	5

## DISCLAIMER

Specifications are subject to change without notice. Startco Engineering Ltd. is not liable for contingent or consequential damages, or for expenses sustained as a result of incorrect application, incorrect adjustment, or a malfunction.

## LIST OF FIGURES

	PAGE
2.1 SE-330/SE-330AU/SE-330HV Top View.....	1

## LIST OF TABLES

	PAGE
2.1 Terminal Pin Function .....	1
2.2 Baud Rate .....	1



## 1. GENERAL

The Profibus-DP slave interface on the SE-330/SE-330AU/SE330HV is used to access meter data and provide reset functions. Set points can be read but not written.

## 2. HARDWARE

### 2.1 INTERFACE CONNECTOR

A 6-pin plug-in terminal block provides connection to the Profibus network. See Table 2.1

TABLE 2.1 Terminal Pin Function

PIN	FUNCTION
1	+5
2	GND BUS
3	A-Line, RS-485
4	B-Line, RS-485
5	Shield
6	RTS

### 2.2 NETWORK TERMINATION

The end nodes of the Profibus-DP network require termination devices. Set the termination switch to ON to enable termination and OFF to disable termination.

### 2.3 SETTINGS

Two rotary switches are used to set the slave address. The setting range is 1 to 99. Address switches are read on power up only. Cycle supply voltage after the address is set.

No baud rate selection is required because the Profibus interface has automatic baud rate detection for the following baud rates.

TABLE 2.2 Baud Rate

BAUD RATES
9.6 kbits/s
19.2 kbits/s
93.75 kbits/s
187.5 kbits/s
500 kbits/s
1.5 Mbits/s
3 Mbits/s
6 Mbits/s
12 Mbits/s

### 2.4 STATUS DISPLAY LED'S

Two LED's on the Profibus module indicate module status; "ON LINE" (green), "OFF LINE" (red), see Fig. 2.1.

## 3. CONFIGURATION FILE

A configuration tool uses se330.gsd to configure the master to access the interface module on the SE-330/SE-330AU/SE-330HV. The input and output area sizes defined by the SE-330/SE-330AU/SE-330HV meter data and reset commands must be setup within the configuration phase. Setup the configuration such that the total INPUT size is 64 bytes (meter data from the SE-330/SE-330AU/SE-330HV into the network) and the total OUTPUT size is 2 bytes.

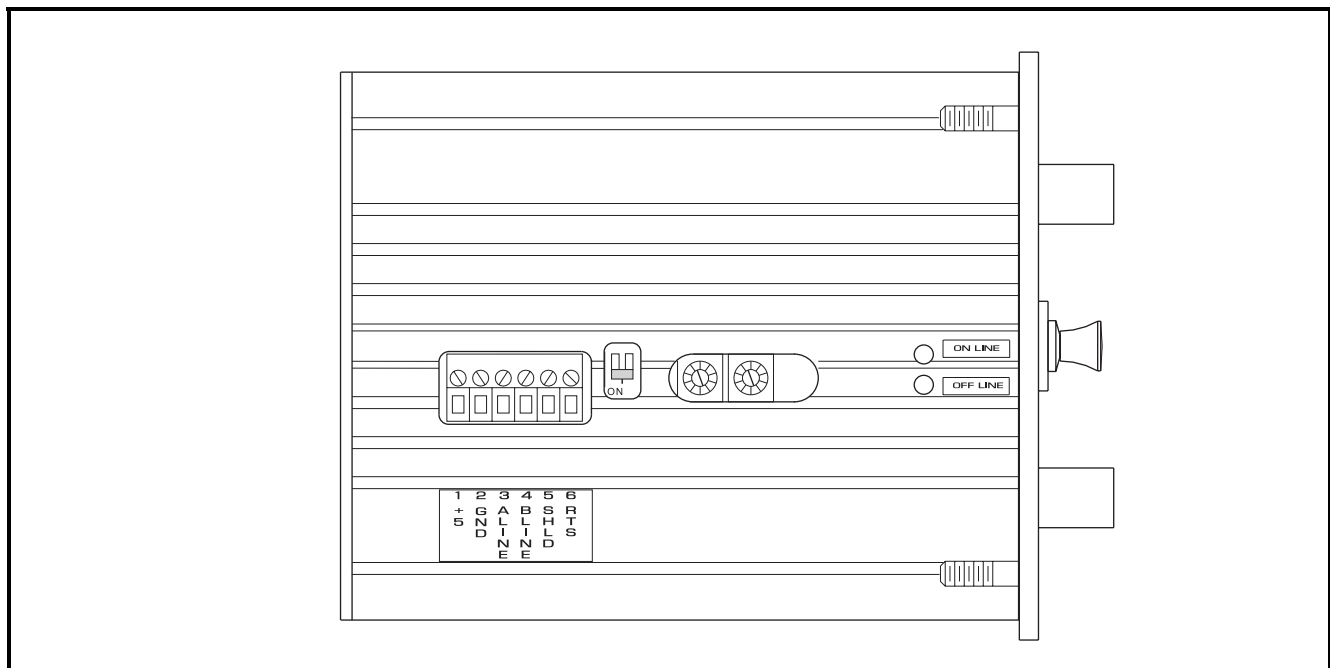


FIGURE 2.1 SE-330/SE-330AU/SE-330HV Top View



#### 4. CYCLIC I/O

Cyclic I/O data listed in Sections 4.1 and 4.2 use attributes defined in the following table.

##### Attribute Definitions

ATTRIBUTE NAME	DESCRIPTION
Trip Status Pre-Trip Status	Bit string of fault bits Bit 0, EF/GF: 1 = Earth/Ground Fault Trip 0 = No Trip Bit 1, RF: 1 = Resistor Fault Trip 0 = No Trip Bit 2, CAL: 1 = Calibration Error <sup>(1)</sup> 0 = No Error Bit 3, ADC: 1 = A/D Error <sup>(1)</sup> 0 = No Error Bit 4, GRV: 1 = Voltage Trip 0 = No Trip Bit 5, EE: 1 = EEPROM Error 0 = No Error Bit 6, SYS: 1 = Internal Fault 0 = No Internal Fault (Will cause a EF/GF and RF trip) Bit 7, RMT: 1 = Remote Trip 0 = No Trip (Will cause a EF/GF and RF trip)  <sup>(1)</sup> These bits do not activate the EF/GF indication relay.
Pending Trips	Bit string of status bits Bit 0, EF/GF: 1 = EF/GF Current > Set Point 0 = EF/GF Current < Set Point Bit 1, RF: 1 = NER/NGR Resistance Exceeding Limits 0 = NER/NGR Resistance Within Limits
Relay Status	Bit string indicating the state of output relays Bit 1, K3: 1 = RF Indication Relay Energized 0 = Not Energized Bit 2, K2: 1 = EF/GF Indication Relay Energized 0 = Not Energized Bit 3, K1: 1 = Trip/Pulse Relay Energized 0 = Not Energized
Switches	Bit string indicating the state of the configuration switches Bit 0, S4: 1 = RF Latch 0 = RF Not Latched Bit 1, S3: 1 = EF/GF Latched 0 = EF/GF Not Latched Bit 2, S5: 1 = 20 k Sensor (200 k for SE-330HV) 0 = 100 k Sensor Bit 3, S6: 1 = 50 Hz 0 = 60 Hz Bit 4, S2: 1 = Fail Safe Trip-Relay Operation 0 = Non Fail Safe Operation S2 not used with SE-330AU Bit 5, S1: 1 = Trip Configuration (K1) 0 = Pulsing Configuration (K1) S1 not used with SE-330HV and SE-330AU
Record x (x = 0 to 9)	A trip record consists of the following: Trip Status Current Voltage Delta Ohms



**Attribute Definitions (Continued)**

ATTRIBUTE NAME	DESCRIPTION																																																
Command Request	This value specifies the command. Command Request codes are as follows: Reset Command: Transition from 0 to 1 Remote Trip: Transition from 0 to 2																																																
EF/GF Trip Time	Positions on front-panel EF/GF Trip Time Selector. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Position</th> <th>SE-330/SE-330HV</th> <th>SE-330AU</th> </tr> </thead> <tbody> <tr><td>0</td><td>100 ms</td><td>100 ms</td></tr> <tr><td>1</td><td>200 ms</td><td>120 ms</td></tr> <tr><td>2</td><td>300 ms</td><td>140 ms</td></tr> <tr><td>3</td><td>400 ms</td><td>160 ms</td></tr> <tr><td>4</td><td>500 ms</td><td>180 ms</td></tr> <tr><td>5</td><td>700 ms</td><td>200 ms</td></tr> <tr><td>6</td><td>1 s</td><td>250 ms</td></tr> <tr><td>7</td><td>2 s</td><td>300 ms</td></tr> <tr><td>8</td><td>3 s</td><td>350 ms</td></tr> <tr><td>9</td><td>5 s</td><td>400 ms</td></tr> <tr><td>10</td><td>10 s</td><td>500 ms</td></tr> </tbody> </table>	Position	SE-330/SE-330HV	SE-330AU	0	100 ms	100 ms	1	200 ms	120 ms	2	300 ms	140 ms	3	400 ms	160 ms	4	500 ms	180 ms	5	700 ms	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												
Position	SE-330/SE-330HV	SE-330AU																																															
0	100 ms	100 ms																																															
1	200 ms	120 ms																																															
2	300 ms	140 ms																																															
3	400 ms	160 ms																																															
4	500 ms	180 ms																																															
5	700 ms	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																																															
EF/GF Level	Positions on front-panel EF/GF Trip Level Selector. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Position</th> <th>SE-330/SE-330HV</th> <th>SE-330AU EFCT-x</th> <th>SE-330AU CS30-x</th> </tr> </thead> <tbody> <tr><td>0</td><td>2% CT Rating</td><td>125 mA</td><td>0.75 A</td></tr> <tr><td>1</td><td>4% CT Rating</td><td>250 mA</td><td>1.5 A</td></tr> <tr><td>2</td><td>6% CT Rating</td><td>300 mA</td><td>1.8 A</td></tr> <tr><td>3</td><td>8% CT Rating</td><td>400 mA</td><td>2.4 A</td></tr> <tr><td>4</td><td>10% CT Rating</td><td>500 mA</td><td>3.0 A</td></tr> <tr><td>5</td><td>15% CT Rating</td><td>750 mA</td><td>4.5 A</td></tr> <tr><td>6</td><td>20% CT Rating</td><td>1 A</td><td>6.0 A</td></tr> <tr><td>7</td><td>40% CT Rating</td><td>2 A</td><td>12.0 A</td></tr> <tr><td>8</td><td>60% CT Rating</td><td>3 A</td><td>18.0 A</td></tr> <tr><td>9</td><td>80% CT Rating</td><td>4 A</td><td>24.0 A</td></tr> <tr><td>10</td><td>100% CT Rating</td><td>5 A</td><td>30.0 A</td></tr> </tbody> </table>	Position	SE-330/SE-330HV	SE-330AU EFCT-x	SE-330AU CS30-x	0	2% CT Rating	125 mA	0.75 A	1	4% CT Rating	250 mA	1.5 A	2	6% CT Rating	300 mA	1.8 A	3	8% CT Rating	400 mA	2.4 A	4	10% CT Rating	500 mA	3.0 A	5	15% CT Rating	750 mA	4.5 A	6	20% CT Rating	1 A	6.0 A	7	40% CT Rating	2 A	12.0 A	8	60% CT Rating	3 A	18.0 A	9	80% CT Rating	4 A	24.0 A	10	100% CT Rating	5 A	30.0 A
Position	SE-330/SE-330HV	SE-330AU EFCT-x	SE-330AU CS30-x																																														
0	2% CT Rating	125 mA	0.75 A																																														
1	4% CT Rating	250 mA	1.5 A																																														
2	6% CT Rating	300 mA	1.8 A																																														
3	8% CT Rating	400 mA	2.4 A																																														
4	10% CT Rating	500 mA	3.0 A																																														
5	15% CT Rating	750 mA	4.5 A																																														
6	20% CT Rating	1 A	6.0 A																																														
7	40% CT Rating	2 A	12.0 A																																														
8	60% CT Rating	3 A	18.0 A																																														
9	80% CT Rating	4 A	24.0 A																																														
10	100% CT Rating	5 A	30.0 A																																														
Pulse Time (Not applicable to SE-330HV or SE-330AU)	Value is detent position of front-panel Pulse Time Setting. 0 = 1.0                      6 = 2.2 1 = 1.2                      7 = 2.4 2 = 1.4                      8 = 2.6 3 = 1.6                      9 = 2.8 4 = 1.8                      10 = 3.0 5 = 2.0																																																
NER/NGR Current Pre-Trip Current	NER/NGR current reading in percent of CT Primary Rating																																																
NER/NGR Voltage Pre-Trip Voltage	NER/NGR voltage reading in percent of Vn trip level setting on the front panel																																																
NER/NGR Change Pre-Trip Change	Resistance deviation from calibrated setting																																																
Record Head	Pointer to the latest of 10 pre-trip records. 255 indicates no trips recorded.																																																
Fault Reset	0 to 1 transition causes a reset																																																
Remote Trip	0 to 1 transition causes a remote trip																																																



#### 4.1 METER AND PRE-TRIP DATA (INPUT)

##### I/O Input

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	Firmware Revision Number							
1	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
2							RF Detect	EF/GF Detect
3	EF/GF Trip Time Setting (Detent 0 to 10)							
4	EF/GF Level Setting (Detent 0 to 10)							
5	Pulse Time Setting (Detent 0 to 10), Not Applicable to SE-330HV or SE-330AU							
6	NER/NGR Current (% of CT Rating)							
7	NER/NGR Voltage (% of Setting)							
8	Delta Ohms (High) (ohms)							
9	Delta Ohms (Low) (ohms)							
10					K1	K2	K3	
11		S7	S1	S2	S6	S5	S3	S4
12	Reserved							
13	Record Head							
<b>Record 0</b>								
14	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
15	NER/NGR Current (% of CT Rating)							
16	NER/NGR Voltage (% of Setting)							
17	Delta Ohms (High) (ohms)							
18	Delta Ohms (Low) (ohms)							
<b>Record 1</b>								
19	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
20	NER/NGR Current (% of CT Rating)							
21	NER/NGR Voltage (% of Setting)							
22	Delta Ohms (High) (ohms)							
23	Delta Ohms (Low) (ohms)							
<b>Record 2</b>								
24	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
25	NER/NGR Current (% of CT Rating)							
26	NER/NGR Voltage (% of Setting)							
27	Delta Ohms (High) (ohms)							
28	Delta Ohms (Low) (ohms)							
<b>Record 3</b>								
29	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
30	NER/NGR Current (% of CT Rating)							
31	NER/NGR Voltage (% of Setting)							
32	Delta Ohms (High) (ohms)							
33	Delta Ohms (Low) (ohms)							
<b>Record 4</b>								
34	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
35	NER/NGR Current (% of CT Rating)							
36	NER/NGR Voltage (% of Setting)							
37	Delta Ohms (High) (ohms)							
38	Delta Ohms (Low) (ohms)							



**I/O Input (Continued)**

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
<b>Record 5</b>								
39	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
40	NER/NGR Current (% of CT Rating)							
41	NER/NGR Voltage (% of Setting)							
42	Delta Ohms (High) (ohms)							
43	Delta Ohms (Low) (ohms)							
<b>Record 6</b>								
44	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
45	NER/NGR Current (% of CT Rating)							
46	NER/NGR Voltage (% of Setting)							
47	Delta Ohms (High) (ohms)							
48	Delta Ohms (Low) (ohms)							
<b>Record 7</b>								
49	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
50	NER/NGR Current (% of CT Rating)							
51	NER/NGR Voltage (% of Setting)							
52	Delta Ohms (High) (ohms)							
53	Delta Ohms (Low) (ohms)							
<b>Record 8</b>								
54	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
55	NER/NGR Current (% of CT Rating)							
56	NER/NGR Voltage (% of Setting)							
57	Delta Ohms (High) (ohms)							
58	Delta Ohms (Low) (ohms)							
<b>Record 9</b>								
59	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
60	NER/NGR Current (% of CT Rating)							
61	NER/NGR Voltage (% of Setting)							
62	Delta Ohms (High) (ohms)							
63	Delta Ohms (Low) (ohms)							

**4.2 RESET AND REMOTE TRIP (OUTPUT)**

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0							Remote Trip	Fault Reset
1								



This page intentionally left blank.