Current Sensor 16 channels

1. General

PE1384 is a current measuring unit with Profibus DP connection. The unit is enclosed in a aluminum enclosures with metal end panels.
Profibus electrical with DSUB-9 connector.
RS232 service connection is made with DSUB-9 connector.

2. Technical description

2.1 Dimension and mounting

PE1384 is mounted on a DIN rail in a cubicle or in a separate enclosure together with 24V DC power supply.

Size:	164 x 125 x 60mm (height x width x deep)
Mounting:	DIN rail

2.2 Technical data

Power supply	18-36V DC
Current consumption	24V supply 120mA
Enclosure class	IP20
Operation	5..+40 °C., Storage -40..+70 °C.

Communication on ProfiBus

Connection electrical	DSUB-9 pole Male connector (Standard type with built in termination is recommended)
Transmission speed	Auto baudrate detection support 9 baud rates. 9.6k, 19.2k, 93.75k, 187.5k, 500k, 1.5M

Service Communication on RS232

Connection type	9 pole female D-SUB connector
Transmission speed	19.2k
Protocol	Modbus RTU

Current Measuring channel 1-16

Connection type	PHOENIX GMVSTBR 2,5/2- ST, Cable area max 2,5 mm^2
Max current	10A
Current peak/duration	100A /3,0 s, 150A /0,3s, 200A /0,02s
Max Voltage	400V
Isolation voltage	630V
Recommended Protection breaker	10A B type, Magnetic and Termic type

2.3 Led indications on PE1384 board

Green Led indicate Power ON.
Yellow Led indicate data transfer on Profibus DP.

2.3 Switch and Strappings on PE1384

Address switches are located on the left side behind the metal end panel.

Nr	DEFAULT	FUNCTION
SW1	1	BCD Rotary switch for ProfiBus DP slave addr node number x10
SW2	5	BCD Rotary switch for ProfiBus DP slave addr node number x1

2.4 Connection terminals on PE1384

Conn	Signal	Comment
1-2	Ch1	AC or DC current , DC in at 1 and out on 2 give positive result.
3-4	Ch2	AC or DC current , DC in at 3 and out on 4 give positive result.
5-6	Ch3	AC or DC current , DC in at 5 and out on 6 give positive result.
7-8	Ch4	AC or DC current , DC in at 7 and out on 8 give positive result.
9-10	Ch5	AC or DC current , DC in at 9 and out on 10 give positive result.
11-12	Ch6	AC or DC current , DC in at 11 and out on 12 give positive result.
13-14	Ch7	AC or DC current , DC in at 13 and out on 14 give positive result.
15-16	Ch8	AC or DC current , DC in at 15 and out on 16 give positive result.
17-18	Ch9	AC or DC current , DC in at 17 and out on 18 give positive result.
19-20	Ch10	AC or DC current , DC in at 19 and out on 20 give positive result.
21-22	Ch11	AC or DC current , DC in at 21 and out on 22 give positive result.
23-24	Ch12	AC or DC current , DC in at 23 and out on 24 give positive result.
25-26	Ch13	AC or DC current , DC in at 25 and out on 26 give positive result.
27-28	Ch14	AC or DC current , DC in at 27 and out on 28 give positive result.
29-30	Ch15	AC or DC current , DC in at 29 and out on 30 give positive result.
31-32	Ch16	AC or DC current , DC in at 31 and out on 32 give positive result.
51	+24V	Current consumption on 24V is 120mA
52	0V	
53	GND	Connected to Groundplane and Enclosure
RS232 Service	RS232 serial comm	9 pole DSUB female connector
Profibus DP	Profibus DP electrical	9 pole DSUB female connector

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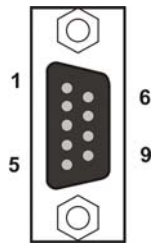
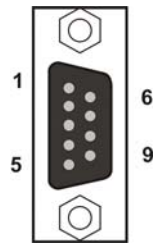
RS232 Service female connector



Pin	Signal	Comment
1		
2	TX	Data to PE1384
3	RX	Data from PE1384
4		
5	0V	
6		
7		
8		
9		

Profibus female connector



Pin	Signal	Comment
1	NC	
2	NC	
3	Data B	Data+
4	NC	
5	0VR	Used for external termination
6	+5VR	Used for external termination
7	Data A	Data-
8	NC	
9	NC	

2.5 Mapping of Profibus communication data

Data To PE1384

ProfiBus address	Short name	Function	Description
M00_QW00			
M00_QW02			
M00_QW04	OCEnable	Bit0 =Ch1 Overcurrent Bit1 =Ch1 Overcurrent Bit2 =Ch3 Overcurrent Bit3 =Ch4 Overcurrent Bit4 =Ch5 Overcurrent Bit5 =Ch6 Overcurrent Bit6 =Ch7 Overcurrent Bit7 =Ch8 Overcurrent Bit8 =Ch9 Overcurrent Bit9 =Ch10 Overcurrent Bit10 =Ch11 Overcurrent Bit11 =Ch12 Overcurrent Bit12 =Ch13 Overcurrent Bit13 =Ch14 Overcurrent Bit14 =Ch15 Overcurrent Bit15 =Ch16 Overcurrent	16 bit word for Enable of Over Current Indication
M00_QW06			
M00_QW08			
M00_QW10			
M00_QW12			
M00_QW14			
M00_QW16			
M00_QW18			
M00_QW20			
M00_QW22			
M00_QW24			
M00_QW26			
M00_QW28			
M00_QW30			

Current Sensor 16 channels

Data From PE1384

ProfiBus address	Short name	Function	Description
M01_IW00	Status		
M01_IW02	Version	Shows actual version	PE1384 Version number
M01_IW04	OCStatus	Bit0 =Ch1 Overcurrent Bit1 =Ch1 Overcurrent Bit2 =Ch3 Overcurrent Bit3 =Ch4 Overcurrent Bit4 =Ch5 Overcurrent Bit5 =Ch6 Overcurrent Bit6 =Ch7 Overcurrent Bit7 =Ch8 Overcurrent Bit8 =Ch9 Overcurrent Bit9 =Ch10 Overcurrent Bit10 =Ch11 Overcurrent Bit11 =Ch12 Overcurrent Bit12 =Ch13 Overcurrent Bit13 =Ch14 Overcurrent Bit14 =Ch15 Overcurrent Bit15 =Ch16 Overcurrent	16 bit word for Indication of Over Current
M01_IW06			
M01_IW08			

AC Current indication

ProfiBus address	Short name	Function	Description
M02_IW00	ACCur1	AC current peak to peak	Ch1 current in mA
M02_IW02	ACCur2	AC current peak to peak	Ch2 current in mA
M02_IW04	ACCur3	AC current peak to peak	Ch3 current in mA
M02_IW06	ACCur4	AC current peak to peak	Ch4 current in mA
M02_IW08	ACCur5	AC current peak to peak	Ch5 current in mA
M02_IW10	ACCur6	AC current peak to peak	Ch6 current in mA
M02_IW12	ACCur7	AC current peak to peak	Ch7 current in mA
M02_IW14	ACCur8	AC current peak to peak	Ch8 current in mA
M02_IW16	ACCur9	AC current peak to peak	Ch9 current in mA
M02_IW18	ACCur10	AC current peak to peak	Ch10 current in mA
M02_IW20	ACCur11	AC current peak to peak	Ch11 current in mA
M02_IW22	ACCur12	AC current peak to peak	Ch12 current in mA
M02_IW24	ACCur13	AC current peak to peak	Ch13 current in mA
M02_IW26	ACCur14	AC current peak to peak	Ch14 current in mA
M02_IW28	ACCur15	AC current peak to peak	Ch15 current in mA
M02_IW30	ACCur16	AC current peak to peak	Ch16 current in mA

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DC Current indication

ProfiBus address	Short name	Function	Description
M03_IW00	DCCur1	DC current	Ch1 current in mA
M03_IW02	DCCur2	DC current	Ch2 current in mA
M03_IW04	DCCur3	DC current	Ch3 current in mA
M03_IW06	DCCur4	DC current	Ch4 current in mA
M03_IW08	DCCur5	DC current	Ch5 current in mA
M03_IW10	DCCur6	DC current	Ch6 current in mA
M03_IW12	DCCur7	DC current	Ch7 current in mA
M03_IW14	DCCur8	DC current	Ch8 current in mA
M03_IW16	DCCur9	DC current	Ch9 current in mA
M03_IW18	DCCur10	DC current	Ch10 current in mA
M03_IW20	DCCur11	DC current	Ch11 current in mA
M03_IW22	DCCur12	DC current	Ch12 current in mA
M03_IW24	DCCur13	DC current	Ch13 current in mA
M03_IW26	DCCur14	DC current	Ch14 current in mA
M03_IW28	DCCur15	DC current	Ch15 current in mA
M03_IW30	DCCur16	DC current	Ch16 current in mA

One shot over current indication

ProfiBus address	Short name	Function	Description
M04_IW00	OverCur1	DC current	Ch1 current in mA
M04_IW02	OverCur2	DC current	Ch2 current in mA
M04_IW04	OverCur3	DC current	Ch3 current in mA
M04_IW06	OverCur4	DC current	Ch4 current in mA
M04_IW08	OverCur5	DC current	Ch5 current in mA
M04_IW10	OverCur6	DC current	Ch6 current in mA
M04_IW12	OverCur7	DC current	Ch7 current in mA
M04_IW14	OverCur8	DC current	Ch8 current in mA
M04_IW16	OverCur9	DC current	Ch9 current in mA
M04_IW18	OverCur10	DC current	Ch10 current in mA
M04_IW20	OverCur11	DC current	Ch11 current in mA
M04_IW22	OverCur12	DC current	Ch12 current in mA
M04_IW24	OverCur13	DC current	Ch13 current in mA
M04_IW26	OverCur14	DC current	Ch14 current in mA
M04_IW28	OverCur15	DC current	Ch15 current in mA
M04_IW30	OverCur16	DC current	Ch16 current in mA

2.6 Function

Totally there are 32 measurements. Each channel are measured with gain 1 and with gain 22. The A/D converter have 10 bits.
Sensitivity from Hall element is 56mV/A.
The current on each channel are sampled 25 times for 40ms. All 16 channels are sampled within 320ms.

2.6.1 AC Current measurement

The AC current value is calculated from the 25 samples (MaxValue-MinValue)/2.
If the Gain 22 value is near maximum (> 225) the gain 1 value is selected else Gain 22 value is selected. The value is then scaled to mA indication.

2.6.2 DC Current measurement

The DC current value is calculated from Medianvalue of the 25 samples.
If the Gain 22 value is near maximum (> 225) the gain 1 value is selected else Gain 22 value is selected. The value is then scaled to mA indication.

2.6.3 Over current indication

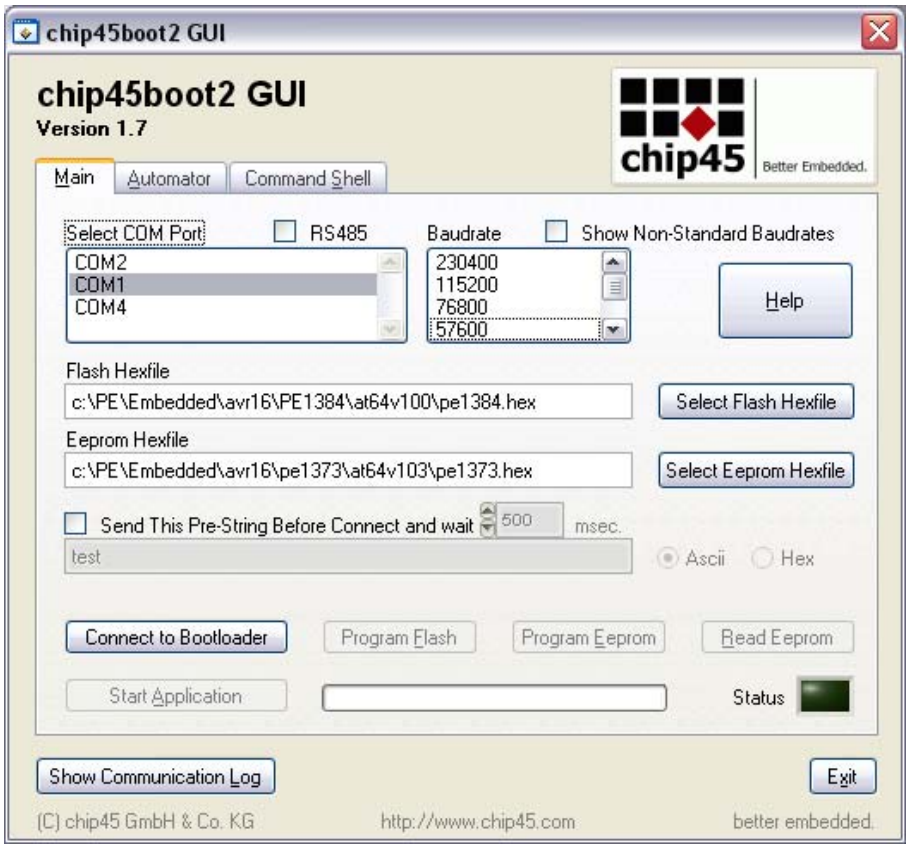
The Hall element chip include a fast overcurrent indication bit. The level is fixed at 22A. The function is enabled with the Control bit OCEnable. The status bit OCStatus indicate that an overcurrent has been detected. When an Overcurrent is detected the CPU is interrupted and the CPU will make a snap shot of the actual Overcurrent. This value is shown in OverCur1-16. Normally this value will be around 22.000 (22A) because the trigger point is 22A.
To prepare a new over current trigging the enable bit in OCEnable must be cleared and then set again. The snap shot value OverCur will then be cleared.
Note that if over current comes on many channels at same time then the value OverCur1-16 will differ from 22A.

2.6.4 Zero Calibration

CurrentDC value can be zero calibrated. All channels are calibrated and the calibration values are saved in EEProm.
Calibration sequence.
1. All Channels 1-16 must be disconnected.
2. Set node address to 99.
3. Set node address to 00.
4. Set node addr back to wanted Node address.

2.7 Firmware uppgrade

The RS232 Service port is used when upgrading firmware.
The new firmware is delivered as an Intel HEX file.
Use the free version of Chip45boot2 ver 1.7 or newer.



1.
Select comport number and baud.Recommended 19200. (Up to 56700 can be used)
2.
Click on Select Flash Hexfile and select the file with new Firmware.
3.
Remove 24V power from PE1384.
4.
Connect the PC com port to PE1384 RS232 Service port with a straight RS232 cable.
5.
Click on button “Connect to Bootloader”
6.
Connect 24V power to PE1384.
7.
Now Status indication shall turn into green.
8.
Click onbutton “Program Flash”
9.
When ready click on “Start Application”