OUTDOOR SENSORS

DATASHEET REV. 0, JULY 2005

Light - Temperature - Humidity

Outdoor Sensor Datasheet. Modified 05-07-27 by RL

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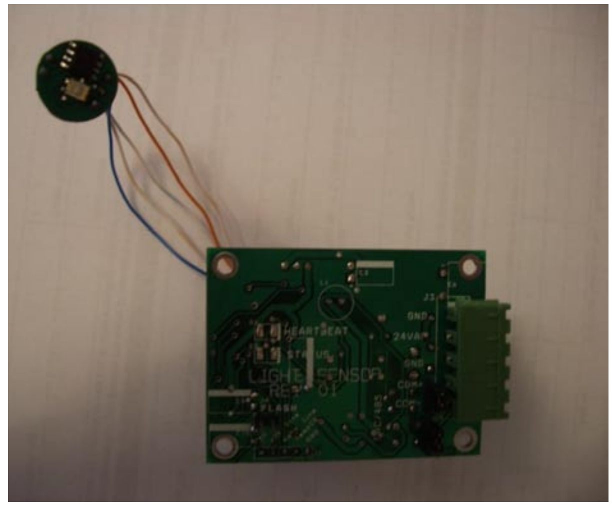
LIGHT - TEMPERATURE - HUMIDITY

The outdoor sensor is a simple to use multi-purpose device which can detect light intensity, ambient temperature and surrounding humidity. The device will output the data in a 0-10V analog signal or through a RS485 communication line using Modbus protocol.



Highlights:
- Compensates for infrared to approximate the human eye response
- Outputs can be 0-10V signal or RS485 data line
- Light intensity given in LUX units
- Temperature can be in degree C or degree F
- Humidity in percentage
- High impact enclosure provides durability in commercial environments.
- Standard modbus protocol allows for up to 254 unique devices on one RS485 network.

TECHNICAL DATA

OUTDOOR SENSOR

Temperature range ……..............…..................……..…............… 10-50°C (50-99°F)

Supply voltage ……....................…....................……..….......... 24VAC ±20%, 50-60Hz

Power consumption ...…...................…..................…....……................ 40mA at 12VDC

Ambient temperature:
- Operation……............…...................…..…............…… 10-50°C (50-99°F)
- Storage………….......…....................……...................... 2-50°C (35-120°F)

Ambient humidity…………...........…...................……..............................… 10-90 %Rh

Material, enclosure……….........…................………

Enclosure rating…………………….................……….

Light sensor……..........…...................…….......…........TSL2550 with SMBus Interface
- low power consumption..1mW
- supply voltage..5V
- recommended operating temperature condition............0-70°C (32-158°F)

Temperature sensor:
- sensor type 1 ....…....................……................ National LM74CIM
- sensor type 2 ....…...................……..................... 10K Thermistor

Humidtiy sensor element..……............ HS 1101

Colour………………………....….................……......

Weight ………………...................…..................……....

STANDARD OPERATION

The Outdoor sensor can be attached to two sensor module:

- The Light and Temperature module
- The Humidity module

Each module can be used independently or simultaneously. The device will then output the sensor reading in two jumper selected modes: RS485 Communcation Data Line or 0-10V Analog Voltage.

****show picture****

LIGHT SENSOR MODULE

This module is equiped with the “tsl 2550” ambient light sensor from TAOS. It combines the work of two photodiodes and converts the analog signal into a digital signal. One of the sensor element is sensitive to light of all wavelength where the other is primarily sensitive to infrared light. This method approximates the response of the human eye which can then be used as compensating factor to control display backlight or other devices. Data being read from the Light sensor module can either be in LUX relative to one calibrating point or in percentage relative to two calibrating point.

TEMPERATURE SENSOR MODULE

HUMIDITY SENSOR MODULE

CALIBRATION

ONE POINT CALIBRATION

The Outdoor Sensor Device has a calibration feature that allows adjustements of +/-1000LUX. This offset is set by register 13. Default value is 100 which represent an offset of zero. Having register 13 at value 0 represent an offset of -1000. Similarly a value 200 represent an offset of +1000.

Address	Bytes	Register and Description
13	1	Calibration register – used to calibrate the outputs.
102	2	Light Sensor - LUX reading

Typical Lux readings example:

Conditions	LUX (footcandles)
sunny time	10,000
partly cloudy	5,000
overcast	2,000
office room	200
storage room	50
late evening	10
night time	0

TWO POINT CALIBRATION

The Outdoor Sensor Device also has a two point calibration feature which allows the user to select a min and max point. Any value below the min point will be 0% and any value above the max point will be 100%. Any point in between will be represented by a percentage relative to the min and max point.

Address	Bytes	Register and Description
103	2	Light Sensor - LUX reading percentage
104	2	Light Sensor - Calibration point 1
105	2	Light Sensor - Calibration point 2

Writing to the corresponding addresses using Modbus Protocol will adjust the desired values. Accessing registers via a serial communication is explained below.

HUMIDITY AND TEMPERATURE MODULE

This module is equiped with the “HS1101” sensor element. Combined with the delay timer 555 chip the module can evaluate the percentage humidity in the surrounding environment.

ANALOG OUTPUT CALIBRATION

The T3-8IO-A has an output calibration feature that allows for an adjustment of +/- 1.28V. Calibration is controlled via the calibration register located at register address 13. By default, this is 128, which corresponds to 0V calibration. A value of 0 would give a –1.28V offset. A value of 255 would give a +1.28V offset. *It is recommended that the calibration be determined while the output is set to 5V.* The calibration value is located in flash memory and will be restored upon power-up.

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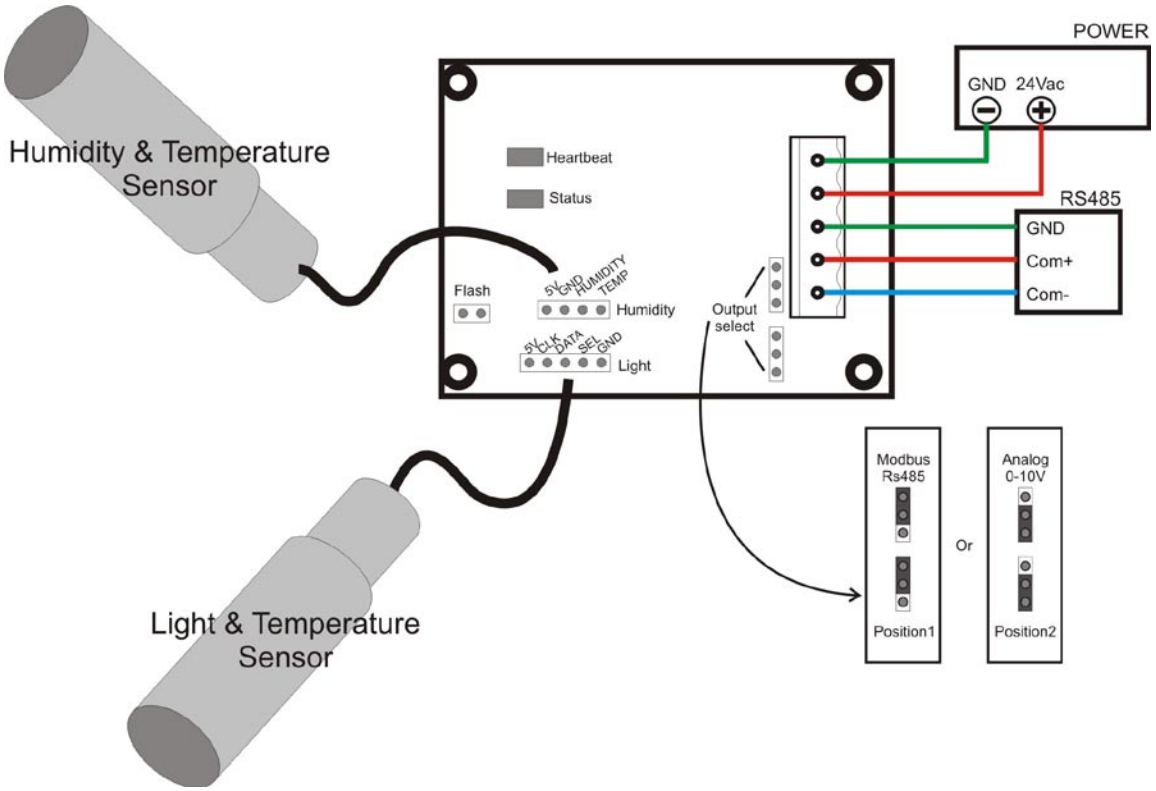
INSTALLATION AND MOUNTING

The Outdoor Sensor Modules can take voltages of 12 to 24V DC or AC. Its power consumption at 12Vdc is rated at 40mA. In order to enable communication the communication jumper select must be in position 1 or position 2 as shown in the figure below.

CONNECTING THE MODULE

There are two modules provided with the device which are mounted with the sensors:

- Humidity sensor chip and Thermistor
- Light Sensor chip and Temperature sensor chip



COMMUNICATION VIA ANALOG OUTPUT

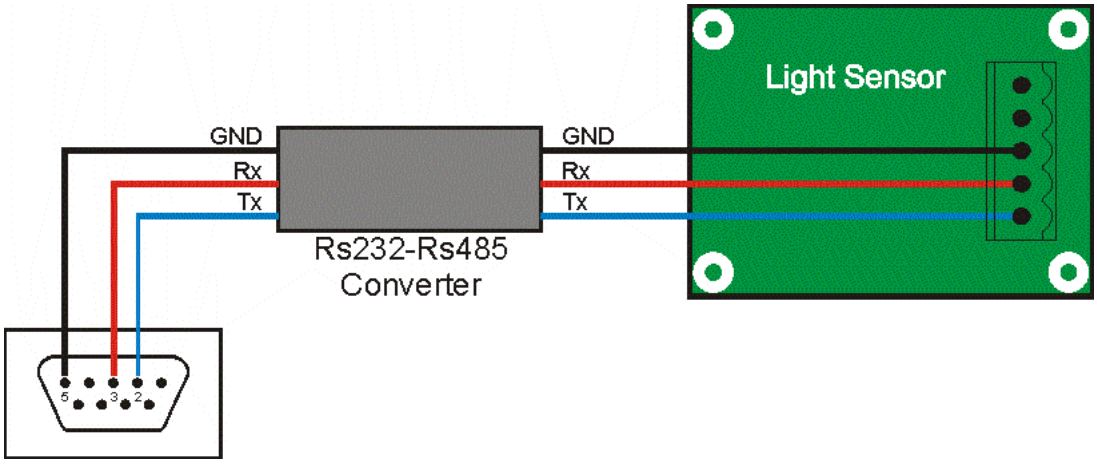
The Outdoor Sensor Modules have a built-in Pulse-Width Modulation which allows it to output voltages of 0 to 10V at increments of 10mV. When the communcation select jumper as set in position 2, the Com+ and Com- line become analog signals in reference to the GND line.

COMMUNICATION VIA SERIAL OUTPUT

The Outdoor Sensor Modules have a built-in serial interface for communication over an RS485 network. Communication is currently implemented using Modbus Protocol. However, future versions of the T3 modules will work with both BACnet and TCP/IP Protocols. For detailed information on Modbus Protocol, see the chapter entitled Modbus Serial Communications.

CONNECTING THE MODULE TO A COMPUTER

The Outdoor Sensor modules connect to a computer serially via the RS485 interface. An RS232 to RS485 converter is required in order to communicate with a standard PC. The figure below shows how the Sensor module should be connected to the serial port of a PC.



List of registers in the Outdoor Sensor Module

Note: When using the Modbus Poll software, addressing should be set to “Protocol Addresses (Base 0)” under the “Display” menu.

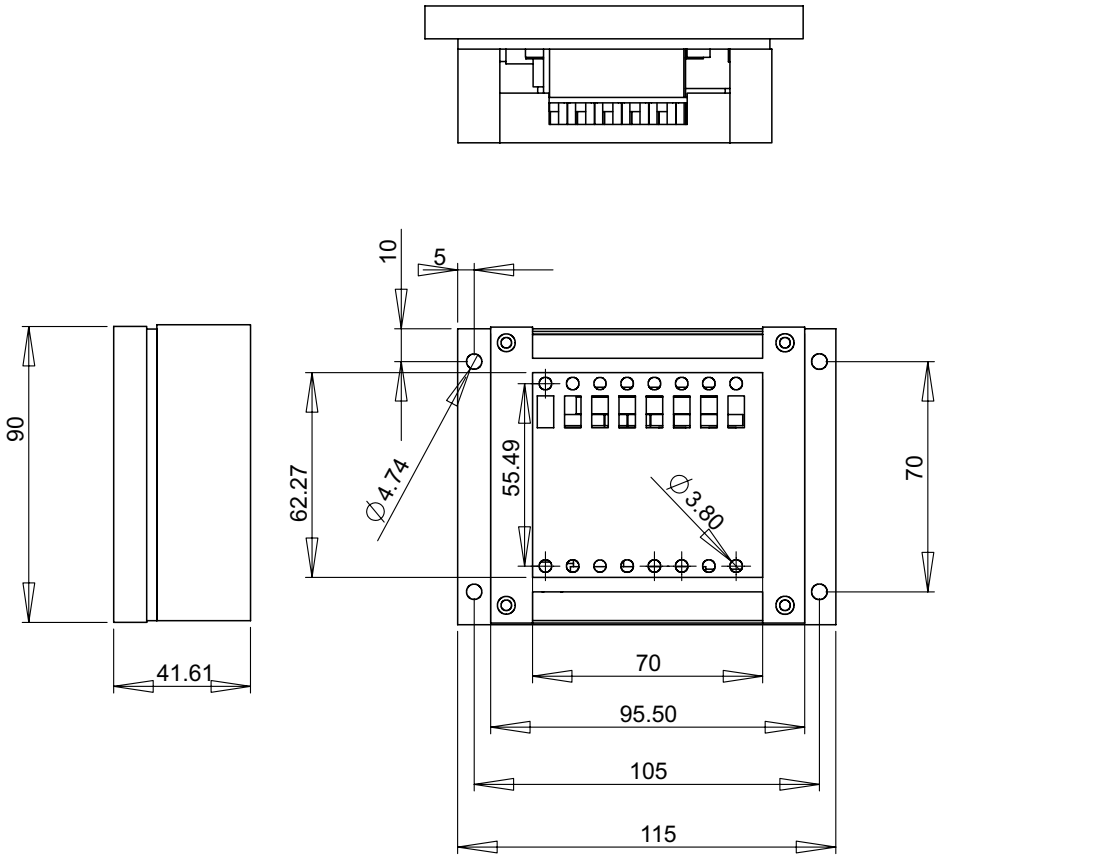
Address	Bytes	Register and Description
0 to 3	4	Serial Number, 4 byte value
4	1	EEPROM hardware Version Number
5	1	Firmware Version Number
6	1	ADDRESS. Modbus device address
7	1	Product Model
8	1	Hardware Revision
9	1	PIC Version NUmber
13	1	Calibration register – used to calibrate the outputs.
14 to 99		Blank, for future use
100	2	Light Sensor - Channel 0 reading
101	2	Light Sensor - Channel 1 reading
102	2	Light Sensor - LUX reading
103	2	Light Sensor - LUX reading percentage
104	2	Light Sensor - Calibration point 1
105	2	Light Sensor - Calibration point 2
106	2	Humidity Sensor
107	2	Humidity Sensor

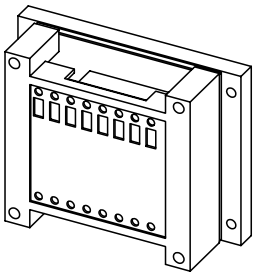
Note about registers when updating the firmware

There are two registers that will tell the CPU information about the model and hardware of the device. NOTE: after updating the firmware you MUST setup these registers first or the module may not function properly.

Product Model is register address 7. The corresponding values are as follows:
Hardware revision is register address 8. The hardware revision can be found by removing the front cover of the module. It is written in white silkscreen on one edge of the board.

Revision history:





		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±		NAME	DATE
			DRAWN		
			CHECKED		
			ENG APPR.		
			MFG APPR.		
			Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

T3 Series Enclosure

Plastic Enclosure
for T3 series modules

SIZE	DWG. NO.	REV.
A	Assem2	
SCALE:1:5	WEIGHT:	SHEET 1 OF 1