ENVIRONMENTAL SENSOR

STHI

Available models:

- MODEL 150113-T: TEMPERATURE
- MODEL 150113-TH: TEMPERATURE AND HUMIDITY
- MODEL 150113-C: CO_2
- MODEL 150113-Q: CO
- MODEL 150113-H: H_2 o LPG

Manual reviews:

- V1.00 - 25-04-2015

Ingeniería Electrónica

TABLE OF CONTENTS

1. Overview.

The environmental sensors Arduino-based architecture STHI that provides us the ability to remotely monitor and read values of temperature, humidity, CO2, CO, H2, ... via the standard RS485 MODBUS RTU protocol.

They can be combined, request any of the various sensors available. Optionally it can be ordered with relay output.

Thanks to RS485 port, it is recommended for applications such as distributed automation, industrial PLCs connection, climate control, weather stations, etc.

All inputs and outputs are accessible through robust screw terminals.

The sensor STHI is delivered mounted in a discreet and rugged polycarbonate enclosure for wall mounting.

2. Common features.

- Microcontroller Atmel ATMega328P, Arduino compatible
- Default Protocol: RS485 MODBUS RTU
- 8 dipswitch for Modbus addressing and changing communication parameters.
- Optionally output relay.
- RS485 communications bus with automatic detection of direction.
- Wide range power supply 6.5 to 30VDC.
- High efficiency switching power supply regulator.
- Screw terminals 5.08mm.
- IP66 Protection for temperature and humidity measures.
- Protection against reverse polarity of power.
- Available sensors: temperature, humidity, CO2, CO and H2

3. Microcontroller.

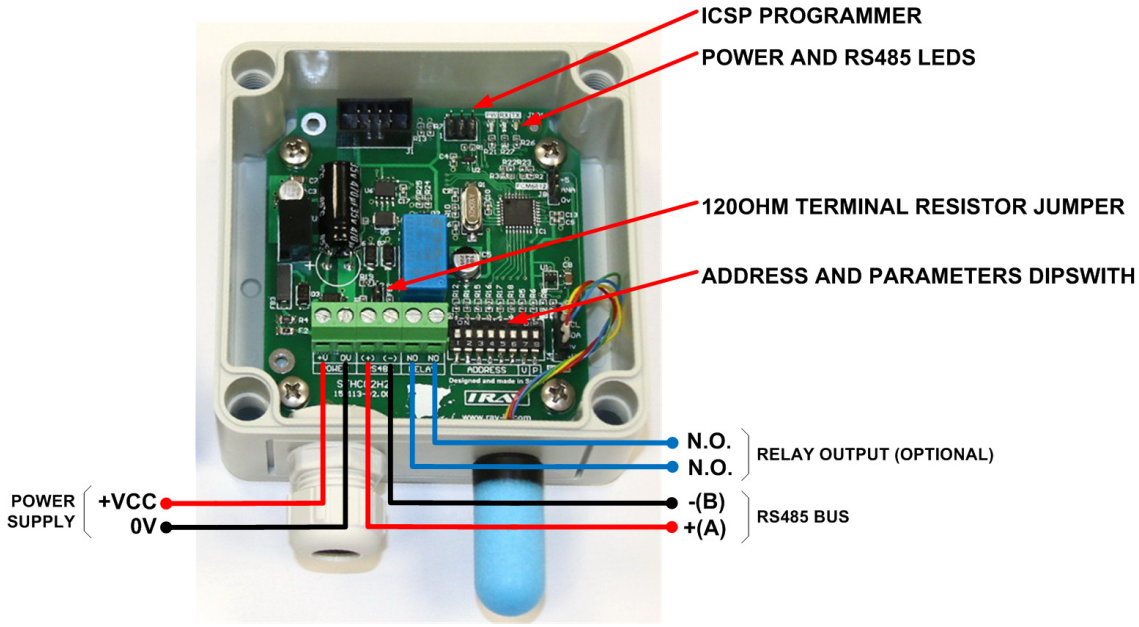
STHI architecture is based on Arduino and we can use any of the Arduino development environment if we need to reprogram our firmware sensor.

The equivalence between the Arduino E/S and STHI are:

E/S STHI	E/S Arduino
RELAY	4
DIPSWITCH 1	5
DIPSWITCH 2	6
DIPSWITCH 3	7
DIPSWITCH 4	8
DIPSWITCH 5	9
DIPSWITCH 6	10
DIPSWITCH 7	A6
DIPSWITCH 8	A7
SENSOR MQ-7	A1
SENSOR FCM6812	A2
SENSOR CMD8S RX	2
SENSOR CMD8S TX	3
SENSOR SHT21	I2C

4. Connections and setup.

To access the terminals, remove the four screws on the top with the help of a screwdriver.



The SHTI sensor is protected against reverse polarity connection of the power.

Before powering the sensor, set the MODBUS address and communication parameters by dipswitch a standard binary encoding. So, switch number 1 is the least significant bit and the 6th most significant. You can address up to 63 devices on the bus:

	SW1 - SW6 ADDRESS	**SW7 BAUD RATE**	**SW8 PARITY**
ON	63	19200	Even
OFF	0	9600	None

If necessary, you can enable the RS485 bus termination resistor activating the jumper S2. This resistance has a nominal value of 120 Ohm.

5. MODBUS MAP.

MODO R: FUNCTION 3 - READ BLOCK HOLDING REGISTERS

MODO W: FUNCTION 6 - WRITE SINGLE HOLDING REGISTER

ADDRESS	TYPE	MODE	FORMAT	MAX.	MIN.	UNITS	DESCRIPTION
0x0000	int	R	0000.0	+0155.0	-0055.0	ºC	TEMPERATURE
0x0001	uint	R	00000	00100	00000	%	HUMIDITY
0x0002	int	R	0000.0	+0155.0	-0055.0	ºC	DEW POINT
0x0003	int	R	00000	00001	00000	---	SENSOR OK = 0 (SHT21 only)
0x0004	int	R/W	00000	00001	00000	---	RELAY
0x0005	int	R	00000	00255	00000	---	DIPSWITCH STATUS
0x0006	int	R	00000	+14000	00000	ppm	LPG o H2
0x0007	int	R	00000	+05000	00000	ppm	CO (preheating 2 hours)
0x0008	int	R	00000	+05000	00000	ppm	CO (no preheating)
0x0009	int	R	00000	+32000	00000	ppm	CO2

6. General technical specifications.

- Voltage input range: 6.5 ~ 30VDC
- Voltage input protection: reverse polarity
- Overvoltage protections: RS485
- Max. power at 24VDC: 50mA (1.2W)
- Microcontroller: Atmega328P @ 16Mhz
- Flash memory: 32K
- RAM memory: 2Kb
- Maximum current relay outputs: 3A
- Maximum output voltage relay: 250VAC, 30VDC
- RS485 port: Not isolated, ¼ unit load,
  +/- 15Kv ESD protection
  Automatic data management.
  Max. 500Kbps.
- Operating temperature: -40 ~ 85 ºC
- Width: 94 mm
- High: 94 mm
- Deep: 57 mm
- Weight: 120 g.

7. Temperature sensor specifications.

- Model: 150113-T
- Sensor type: DS18B20+ (DALLAS-MAXIM)
- Interface: 1-wire
- Temperature resolution: 0.1ºC
- Measurement range: -40 ~ 85ºC
- Typical precision: +/- 0.1ºC
- Maximum precision: +/- 1ºC
- Grade protection IP: IP66

8. Specifications sensor temperature and humidity

- Model: 150113-TH
- Sensor type: SHT21 (SENSIRION)
- Interface: I2C
- Temperature resolution: 0.1ºC
- Measurement range: -40 ~ 85ºC
- Typical precision: +/- 0.3ºC
- Maximun precision: +/- 1ºC
- Resolution humidity: 1%
- Measuring range: 0 ~ 100%RH
- Typical precision: +/- 2%RH
- Maximum precision: +/- 5%RH
- Grade protection IP: IP66

9. Specifications CO2 sensor.

- Model: 150113-C
- Sensor type: CDM8S (SENSE AIR)
- Sensor technology: Infrared
- Interface: SERIAL TTL
- Resolution: 1ppm
- Measurement range: 400 ~ 10000ppm
- Typical precision: +/- 0.02% (volumen CO_2)
  +/- 3% (lectura)
- Operating temperature range: 0ºC ~ 50ºC
- Humidity operating range: 0 ~ 85%RH
- Grade protection IP: IP40

10. Specifications sensor CO.

- Model: 150113-Q
- Sensor type: MQ-7
- Sensor technology: Thermo-catalytic
- Interface: Analogic
- Resolution: 1ppm
- Measurement range: 20 ~ 4000ppm
- Operating temperature range: 0ºC ~ 50ºC
- Humidity operating range: 0 ~ 85%RH
- Grade protection IP: IP40

11. Specifications sensor H_2 o LPG (methane, butane, propane...).

- Model: 150113-H
- Sensor type: FCM6812 (FIGARO)
- Sensor technology: Thermo-catalytic
- Interface: Analogic
- Resolution: 1ppm
- Measurement range: 0 ~ 14000ppm (H_2)
- Operating temperature range: -10ºC ~ 60ºC
- Humidity operating range: 5 ~ 95%RH
- Grade protection IP: IP40