Line N322

Communication Protocol V2.0x A

1. COMMUNICATION SERIAL

The optional serial interface RS485 allows to address up to 247 controllers in a network communicating remotely with a host computer or master controller.

RS485 Interface

- Compatible line signals with RS485 standard
- 2 wire connection from master to up to 31 slaves indicators in a multidrop bus. It is possible address 247 nodes with multiple outputs converters.
- Maximum communication distance: 1000 meters
- The RS485 signals are:

D1	D	D+	B	Bidirectional data line.
D0	$\overline{D}$	D-	A	Inverted bidirectional data line.
C				Communication common. Interconnect between all network devices for protection.
GND				

General Characteristics

- Serial interface not isolated from input circuitry.
- Serial interface isolated from input circuitry, except in 24 V powered model.
- Baud rate: 9600
- Data Bits: 8
- Parity: None
- Stop Bits: 1

Communication Protocol

The MOSBUS RTU slave is implemented, available in most SCADA softwares in the market.

All configurable parameters can be accessed (for reading or writing) through the Registers Table. Broadcast commands are supported as well (address 0).

The available Modbus commands are:

03 - *Read Holding Register*

06 - *Preset Single Register*

The registers are arranged in a table in such a way that several registers can be read in the same request.

1.1 CONFIGURATION OF SERIAL COMMUNICATION PARAMETERS

Two parameters must be configured in the device for serial communication:

Addr	Device communication address. Each device must have an exclusive address.

1.2 REGISTERS TABLE

The Modbus registers hold the internal controller parameters. Each parameter is a 16-bit word, with negative values represented as 2's complement.

Holding Registers	Parameter	Description
0000	SP1	Read: OUTPUT1 *Setpoint* (control output). Write: OUTPUT1 *Setpoint* (control output). Range: from **SPL** to the value specified in **SPH**. Note: In the N320, this address also corresponds to the Process Variable "PV" parameter.
0001	PV	Read: input temperature as measured by the sensor. Write: not allowed. Span: according to the sensor type used.
0002	IHM Status1	Read: IHM Status. Write: not allowed. Value format: Bit 0 – OUT1 LED Bit 1 – OUT2 LED Bit 10 – decimal Point Bit 12 – negative signal
0003	Control Status1	Read: measurement and OUTPUT1 status. Write: not allowed. Value format: Bit 0 – Input Underflow Bit 1 – Input Overflow Bit 8 – OUTPUT1 status Bit13 – defrost
0004	Value of the parameter being displayed	Read: Value of the parameter being presented on the display. Write: not allowed. Max. Span: -199 to 999. The actual span depends on the parameter being displayed.

Holding Registers	Parameter	Description
0005	Firmware version Parameter sequence number	Read: controller firmware version & the sequential number that identifies the parameter currently being displayed. Write: not allowed. Value format: XXYYh, where: $XX \rightarrow$ Firmware version; $YY \rightarrow$ Parameter number.
0006	Serial number (High)	Read: first 3 digits of the serial number. Write: not allowed. Value format: XXXXh.
0007	Serial number (Low)	Read: last 3 digits of the controller serial number. Write: not allowed. Value format: XXXXh.
0008	Hysteresis 1	Read: OUTPUT1 hysteresis. Write: OUTPUT1 hysteresis. Range: 0.1 a 50.0
0009	Control Status2	Read: OUTPUT2 Status. Write: not allowed. Value format: Bit 0 – status de OUTPUT2
0010	SP2	Read: OUTPUT2 Setpoint. Write: OUTPUT2 Setpoint. Range: from **SPL** to the value specified in **SPH**.
0011	Hysteresis 2	Read: OUTPUT2 hysteresis. Write: OUTPUT2 hysteresis. Range: 0.1 a 50.0.
0012	Offset	Read: Offset value. Write: Offset value. Range: -10.0 a 10.0
0013	**ACt**	Output 1 Action
0014	**ACt2**	Output 2 Action

Table 1 - Modbus registers table

Note:

1- The SP, PV and Hysteresis values are always multiplied by 10 to account for the decimal point.

1.3 EXCEPTION RESPONSES – ERROR CONDITIONS

The MODBUS RTU protocol checks the CRC in the data blocks received.

Reception errors are detected by the CRC, causing the controller to discard the packet, not sending any reply to the master.

After receiving an error-free packet, the controller processes the packet and verifies whether the request is valid or not, sending back an exception error code in case of an invalid request. Response frames containing error codes have the most significant bit of the Modbus command set.

If a WRITE command sends an out-of-range value to a parameter, the controller will clamp the value to the parameter range limits, replying with a value that reflects these limits (maximum or minimum value allowed for the parameter).

The controller ignores broadcast READ commands; the controller processes only broadcast WRITE commands.

Error Code	Error Description
01	Invalid Command
02	Invalid Register Number or out of range
03	Invalid Register Quantity or out of range

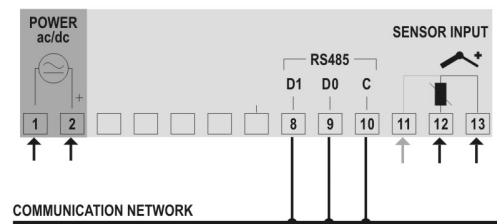**Table 2** – Error code

1.4 ELECTRICAL CONNECTIONS

Fig. 1 – Connections