

# NC400-6

## Communication Protocol

### 1. SERIAL COMMUNICATION

#### 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** Bidirectional data line.
  - D0** Bidirectional inverted data line.
  - C** Communication common signal. Interconnect this terminal in all devices of the bus for protection (optional).

#### General Characteristics

- Optically isolated serial interface
- Baud rate: 9600 bps.
- Data bits: 8
- Parity: None
- Stop Bits: 1

#### Communication Protocol

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

The available Modbus commands are:

03 - Read Holding Register

16 - Write Multiple Registers

Each "03" (Read Holding Register) and "16" (Write Multiple Registers) command can accept the reading/writing of up to 4 registers.

#### 1.1 CONFIGURATION OF NC400-6

NC400-6 devices with RS485 serial communication interface will have the **AddrES** parameter in its Hardware Configuration cycle. This parameter must be set with the Modbus address of the device on the communication bus. Each device must have a unique address. Valid addresses must be between 1 and 247.

<b>AddrES</b>	Device communication address. Each device must have a unique address.
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#### 1.2 REGISTERS TABLE

Registers are internal parameters of the device. Each parameter of the table is a 16 bit signed (two's complement) word.

Holding Registers	Parameter	Register Description
0000	Main Counter (HIGH)	Read: Main Counter, most significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0001	Main Counter (LOW)	Read: Main Counter, less significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0002	Batch Counter (HIGH)	Read: Batch Counter, most significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0003	Batch Counter (LOW)	Read: Batch Counter, less significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0004	Totalizer Counter (HIGH)	Read: Totalizer Counter, most significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0005	Totalizer Counter (LOW)	Read: Totalizer Counter, less significant word Write: Not allowed. Format: Floating Point (IEEE-754)
0006	Set point 1 Main Counter (HIGH)	Read: Set point 1 for the Main Counter, most significant word Write: Set point 1 for the Main Counter, most significant word Format: Floating Point (IEEE-754)
0007	Set point 1 Main Counter (LOW)	Read: Set point 1 for the Main Counter, less significant word Write: Set point 1 for the Main Counter, less significant word Format: Floating Point (IEEE-754)
0008	Set point 2 Main Counter (HIGH)	Read: Set point 2 for the Main Counter, most significant word Write: Set point 2 for the Main Counter, most significant word Format: Floating Point (IEEE-754)

0009	Set point 2 Main Counter (LOW)	Read: Set point 2 for the Main Counter, less significant word Write: Set point 2 for the Main Counter, less significant word Format: Floating Point (IEEE-754)
0010	Set point Batch Counter (HIGH)	Read: Set point for the Batch Counter, most significant word Write: Set point for the Batch Counter, most significant word Format: Floating Point (IEEE-754)
0011	Set point Batch Counter (LOW)	Read: Set point for the Batch Counter, less significant word Write: Set point for the Batch Counter, less significant word Format: Floating Point (IEEE-754)
0012	Set point Totalizer Counter (HIGH)	Read: Set point for the Totalizer Counter, most significant word Write: Set point for the Totalizer Counter, most significant word Format: Floating Point (IEEE-754)
0013	Set point Totalizer Counter (LOW)	Read: Set point for the Totalizer Counter, less significant word Write: Set point for the Totalizer Counter, less significant word Format: Floating Point (IEEE-754)
0014	Status	Read: Output Status, Overflow, MAX and MIN. Write: Not allowed. Format: Binary  <b>Bit - Function</b>  0 - OUT1 1 - OUT2 2 - MAX (Main Counter) 3 - MAX (Batch Counter) 4 - MAX (Totalizer Counter) 5 - MIN (Main Counter) 6 - MIN (Batch Counter) 7 - MIN (Totalizer Counter) 8 - HOLD 9 - Overflow (Main Counter) 10 - Overflow (Batch Counter) 11 - Overflow (Totalizer Counter)
0015	Serial Number (HIGH)	Read: Device serial number, most significant word Write: Not allowed. Format: Decimal
0016	Serial Number (LOW)	Read: Device serial number, less significant word Write: Not allowed. Format: Decimal

Table 1 - Registers table

#### Note:

The Floating Point coding format used follows the standard IEEE-754 in mode HIGH:LOW.

#### 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 device 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, no write is done (the parameter keeps the value it had before the command) and an Error Code 03 is returned as a response.

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

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

Table 2 - Exception response error codes