

N1540 INDICATOR

COMMUNICATION MANUAL – V 2.0x A

1 SERIAL COMMUNICATION

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

RS485 INTERFACE

- Compatible line signals with RS485 standard.
- 3-wire connection between the master and up to 31 slave controllers in bus topology. It is possible address 247 nodes with multiple outputs converters.
- Maximum communication distance: 1000 meters
- The RS485 signals are:
 - D1 = D: Bidirectional data line.
 - D0 = \bar{D} : Bidirectional inverted data line.
 - C = GND: Optional connection which left communication better.

GENERAL CHARACTERISTICS

- Optical isolation on serial interface.
- Programmable Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps.
- Data Bits: 8.
- Parity: None, Even or Odd.
- Stop Bits: 1.

COMMUNICATION PROTOCOL

The Mosbus RTU slave protocol is supported, available in most SCADA software on the market.

All configurable parameters can be accessed (for reading or writing) through the Registers Table. In Broadcast mode, it is also allowed to write to the Registers, using the address 0.

The available Modbus commands are:

- 03 - Read Holding Register;
- 05 - Force Single Coil;
- 06 - Preset Single Register;
- 16 - Preset Multiple Register.

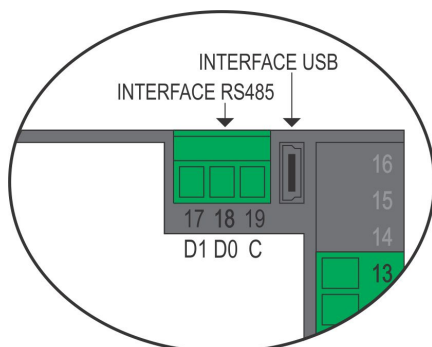
The registers are arranged in a table in such a way that several registers can be read in the same request.

2 CONFIGURATION OF SERIAL COMMUNICATION PARAMETERS

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

- Baud:** Baud rate. All devices have the same Baud Rate.
- Addr:** Device communication address. Each device must have an exclusive address.
- Prty:** Parity.

3 CONNECTIONS



4 REGISTERS TABLE

Equivalent to Holding Registers (reference 4x).

The Holding Registers are the internal indicator parameters. From address 12, all registers can be written and read. Up to this address, most registers are read-only. It is necessary to check each case.

Each table parameter is a 16-bit word with a sign represented in addition to 2.

HOLDING REGISTERS	PARAMETER	REGISTER DESCRIPTION
0000	PV	Read: Process Variable. Write: Not allowed. In case of temperature reading, the value read is always multiplied by 10, independently of dPPa value.
0001	PV minimum	Read: Minimum value of PV. Write: Not allowed.
0002	PV maximum	Read: Maximum value of PV. Write: Not allowed.
0003		Reserved.
0004	Display Value	Read: Current value shown on display. Write: Current value shown on display. Range: -2000 to 30000. The range depends on the displayed parameter.
0005	Prompt index	Read: Current prompt position in the parameters flowchart. Write: Not allowed. Range: 0000 h to 060 Ch. Prompt number format: XYyYh, where: XX → Menu cycle number; YY → Prompt number.
0006	Status Word 1	Read: Status bits. Write: Not allowed. Read Value: See Table 2 .
0007	Software Version	Read: The firmware version of indicator. If V1.00, the read value will be 100. Write: Not allowed.
0008	ID	Read: Indicator identification number: 69 (45h) Write: Not allowed.
0009	Status Word 2	Read: Status bits. See Table 2 . Write: Not allowed.
0010	Status Word 3	Read: Status bits. See Table 2 . Write: Not allowed.
0011	Key	Key simulation. 1 → Key press P (Go to next level of parameters); 2 → Key press F1 ; 4 → Key press F2 ; 8 → Key press < ; 9 → Key press P (Go to next level of cycle).
0012	Serial Number H	First four digits of Serial Number. Range: 0 to 9999. Read only.
0013	Serial Number L	Last four digits of Serial Number. Range: 0 to 9999. Read only.
0014-0016	Reserved	Internal use.
0017	RLrF	Differential alarm reference. Maximum range: SPLL to SPHL (or the sensor span).
0018	SP.R1	Alarm setpoint.
0019	SP.R2	
0020	SP.R3	

0021	SPR4	
0022	FuR1	Alarm function.
0023	FuR2	Range: 0 to 8.
0024	FuR3	0 → oFF ;
0025	FuR4	1 → Lo ; 2 → h r ; 3 → d iF ; 4 → d iFL ; 5 → d iFh ; 6 → iErr .
0026	H4R1	Alarm hysteresis.
0027	H4R2	
0028	H4R3	
0029	H4R4	
0030–0037	Reserved	Internal use.
0038	bLR1	Alarm power-up inhibit. 0 → No; 1 → Yes.
0039	bLR2	
0040	bLR3	
0041	bLR4	
0042	SP1E	Controls the presence of the parameter SPA1 in the indicator operation cycle. 0 → Disables (Hides SPA1); 1 → Enables (Shows SPA1).
0043	SP2E	Controls the presence of the parameter SPA2 in the indicator operation cycle. 0 → Disables (Hides SPA2); 1 → Enables (Shows SPA2).
0044	FLSh	Allows visual signalization of an alarm occurrence by flashing the indication of PV in the operation level. 0 → Disables; 1 → Enables.
0045–0049	Reserved	Internal use.
0050	tYPE	PV input type. Range: 0 a 22. See operation manual.
0051	unIt	Temperature unit. Range: 0 a 1. 0 → °C; 1 → °F.
0052	dPPo	PV decimal point position. Range: 0 to 3. 0 → X.XXX; 1 → XX.XX; 2 → XXX.X; 3 → XXXX.
0053	FLtr	Read/Write: PV digital filter gain. Range: 0 – 20.
0054	FrEQ	Read/Write: Mains frequency. Range: 0 → 60 Hz; 1 → 50Hz.
0055	Reserved	Internal use.
0056	oFFS	PV Offset (Process Variable). Range: From SPLL to SPHL .
0057	inLL	Defines the minimum PV indication value for analog input types (used to scale the analog inputs).
0058	inHL	Defines the indication higher limit of the PV indication (used to scale the analog inputs).

0059-0066	Reserved	Internal use.
0067	Addr	Communication slave address. Range: 1 to 247.
0068	bAud	Communication Baud Rate. Range: 0 to 7. 0 → 1200; 1 → 2400; 2 → 4800; 3 → 9600; 4 → 19200; 5 → 32400; 6 → 57600; 7 → 115200.
0069	Prty	Serial communication parity. Range: 0 to 2. 0 → No parity; 1 → Even parity; 2 → Odd parity.
0070–0079	Reserved	Internal use.
0080	Calibration PV First	Enter the low input value currently applied in the PV input for calibration purposes.
0081	Calibration PV End	Enter the high input value currently applied in the PV input for calibration purposes.
0082	rStr	Restores original default calibration. Range: 0 to 1; 0 → Do not restore; 1 → Restore calibration.
0083	Reserved	Internal use.
0084	Prot	Password protection level. Range: 1 to 3. Check instruction manual for further details.

Table 01 – Registers table

5 STATUS WORDS

REGISTER	VALUE FORMAT
Status Word 1	bit 0 – Alarm 1 (0 - Inactive; 1 - Active); bit 1 – Alarm 2 (0 - Inactive; 1 - Active); bit 2~7 – Reserved; bit 8 – Hardware detection value; bit 9 – Hardware detection value; bit 10~15 – Reserved.
Status Word 2	bit 0 – Reserved; bit 1 – Reserved; bit 2 – Reserved; bit 3 – Reserved; bit 4 – Reserved; bit 5 – Alarm 1 power-up inhibit (0 - No; 1 - Yes); bit 6 – Alarm 2 power-up inhibit (0 - No; 1 - Yes); bit 7 – Reserved; bit 8 – Reserved; bit 9 – Unit (0 - °C; 1 - °F); bit 10~15 – Reserved.
Status Word 3	bit 0 – Very low PV conversion (0 - No; 1 - Yes); bit 1 – Negative conversion after calibration (0 - No; 1 - Yes); bit 2 – Very high PV conversion (0 - No; 1 - Yes); bit 3 – Exceeded linearization limit (0 - No; 1 - Yes); bit 4 – Very high Pt100 cable resistance (0 - No; 1 - Yes); bit 5 – Self zero conversion out of range (0 - No; 1 - Yes); bit 6 – Self span conversion out of range (0 - No; 1 - Yes); bit 7~15 – Reserved.

Table 02 - Values of Status Words

Writing to a digital output is only possible if the corresponding alarm is configured as "oFF".

COIL STATUS	OUTPUT DESCRIPTION
0	Output 1 Status (ALM1).
1	Output 2 Status (ALM2).

Table 03 – Output description

6 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 indicator to discard the packet, not sending any reply to the master.

After receiving an error-free packet, the indicator 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 (the value 80H is added to the response).

If a WRITE command sends an out-of-range value to a parameter, the indicator 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 indicator ignores broadcast READ commands; the indicator processes only broadcast WRITE commands.

ERROR CODE	ERROR DESCRIPTION
01	Invalid command or not available.
02	Invalid Register Number or out of range.
03	Invalid Register Quantity or out of range.

Table 04 - Exception response error codes