N1100 / N2000 / N3000

Communication Protocol – V3.0x A

1. SERIAL COMMUNICATION

1.1 COMMUNICATION INTERFACE

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: Bidirectional data line.
  - D0 = $\overline{D}$: Bidirectional inverted data line.
  - C = GND: Optional connection which left communication better.

General Characteristics

- Optically isolated serial interface
- Velocity programmable: 1200 a 11.200
- 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*

05 - *Force Single Coil* (Force Digital Output state)

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.

1.2 CONFIGURATION OF SERIAL COMMUNICATION PARAMETERS

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

bAud: Baud rate. All devices with same baud rate.

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

1.3 REGISTERS TABLE

Equivalent to the registers referenced as 4X.

The holding registers are basically a list of the internal indicator parameters. All registers above address 12 can be read or written. The registers up to this address in more are read only. Please verify each case. Each table parameter is a 16 bits two complement signed word.

Holding Registers	Parameter	Register Description
0000	Active SV	Read: Active control SV (main SV, from ramp and soak or from remote SV). Write: to main SV Range: from **SPLL** to **SPHL**.
0001	PV	Read: Process Variable Write: not allowed. Range: From **SPLL** to **SPHL**. The **dPPo** prompt gives the decimal point position.
0002	MV	Read: Output Power in automatic or manual mode. Write: not allowed. See address 29. Range: 0 to 1000 (0.0 to 100.0%).
0003	-	Reserved.
0004	Display value	Read: Current value shown on display. Write: Current value shown on display. Range: -1999 to 9999. The range depends on the displayed parameter.
0005	Prompt index	Read: Current prompt position in the parameters flowchart. Write: not allowed. Range: 0000h to 060Ch Prompt number format: XXYYh, where: XX→menu cycle number (see operation manual) YY→prompt number (index).
0006	Status Word 1	Read: Status bits. See table 2 Write: not allowed.
0007	Software Version	Read: The firmware version of controller. If V1.00, the read value will be 100. Write: not allowed.
0008	ID	Read: controller identification number. Write: not allowed. Values: 1 – N1100; 2 - N2000 / N3000 Other values: special instruments.
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	**Ir**	Integral Rate (in repetitions/min) Range: 0 to 3000 (0.00 to 30.00)
0012	**dt**	Derivative Time (in seconds). Range: 0 to 250
0013	**Pb**	Proportional Band (in percentage) Range: 0 to 5000 (0.0 to 500.0)
0014	**tbAS**	Program time base. 0→ seconds 1→ minutes
0015	**ct**	Cycle Time (PWM, in seconds) Range: 5 to 1000 (0.5 to 100.0)
0016	-	Reserved.
0017	**HYSt**	On/Off Control Hysteresis (in selected type engineering unit). Range: 0 to **SPHL** - **SPLL**
0018	-	Reserved.
0019	**ouLL**	Output Low Limit (minimum output power) Range: 0 to 1000 (0.0 to 100.0%).
0020	**ouHL**	Output High Limit (minimum output power) Range: 0 to 1000 (0.0 to 100.0%).
0021	**AuEn**	N2000 only. Auto/Man key Enable – 1→ Key enabled 0 → Key disabled
0022	**FFunc**	Allows defining a function for the F key. The available N2000 and N3000. 0 → Not used. 7 → Controller start/stop. 8 → Select remote SP. 9 → Ramp and soak hold. 10 → Enable ramp and soak profile 1.
0023	Serial Number H	Serial Number High (Upper display). Range: 0 to 9999. Read only
0024	Serial Number L	Serial Number Low (Lower display). Range: 0 to 9999. Read only
0025	SV	Control *Setpoint* (Prompt *Setpoint*). Range: from **SPLL** to **SPHL**.
0026	**SPLL**	*Setpoint* Low limit. Range: minimum value depends on the input type selected in **tYPE** (see op. Manual) to **SPHL**.

0027	SPHL	*Setpoint* High limit. Range: minimum value is SPLL and maximum depends on the input type selected in tYPE (see op. Manual).
0028	Manual MV	Manual output power (in percentage) Range: 0 to 1000 (0.0 to 100.0%)
0029	oFFS	PV offset Range: from SPLL to SPHL.
0030	dPPo	PV decimal point position Range: 0 to 3 0→X.XXX; 1→XX.XX; 2→XXX.X; 3→XXXX
0031 0032 0033 0034	SPA1 SPA2 SPA3 SPA4	Range: The minimum value is at SPLL for non-differential alarm or SPLL - SPLH for differential alarm The maximum value is at SPHL for non-differential alarm or at SPHL - SPLL for differential alarm.
0035 0036 0037 0038	FuA1 FuA2 FuA3 FuA4	Alarm Function. Range: 0 to 7 0→oFF 1→ lErr 2→rS 3→Lo 4→H I 5→d IFL 6→d IFH 7→d IF
0039 0040 0041 0042	HYA1 HYA2 HYA3 HYA4	Alarm Hysteresis. Range: 0 to 9999 (0.00 to 99.99%)
0043	tYPE	Input Type. tc J - (J) -110 to 950 ºC / -166 to 1742 ºF tc K - (K) -150 to 1370 ºC / -238 to 2498 ºF tc t - (T) -160 to 400 ºC / -256 to 752 ºF tc n - (N) -270 to 1300 ºC / -454 to 2372 ºF tc r - (R) -50 to 1760 ºC / -58 to 3200 ºF tc S - (S) -50 to 1760 ºC / -58 to 3200 ºF tc b - (B) 400 to 1800 ºC / 752 to 3272 ºF tc E - (E) -90 to 730 ºC / -130 to 1346 ºF Pt - Pt100 -200 to 850 ºC / -328 to 1562 ºF L0.50 - (0-50 mV) -1999 to 9999 L4.20 - (4-20 mA) -1999 to 9999 L0.5 - (0-5 V) -1999 to 9999 L0.10 - (0-10 V) -1999 to 9999 Sqrt - (square root) -1999 to 9999
0044	Addr	Communication slave address Range: 1 to 247
0045	bAud	Comunication Baud Rate. Range: 0 to 7 0→1200 1→2400 2→4800 3→9600 4→19200 5→32400 6→57600 7→115200
0046	Auto	Control Mode. Range: 0→manual; 1→automatic.
0047	run	Enable control. Range: 0→no; 1→yes.
0048	Act	Control action. Range: 0→reverse; 1→direct.
0049	Atun	Auto tune enable. Range: 0→no; 1→yes.
0050 0051 0052 0053	bLA1 bLA2 bLA3 bLA4	Alarm power-up inhibit. Range: 0→no; 1→yes.
0054	Key	Key press remote action. Range: 0 to 9 1: tecla P 2: tecla ∧ 4: tecla ∨ 8: tecla < 9: teclas P e <

0055	rSLL	Remote Setpoint Low limit Range: Minimum value depends on the input type selected in tYPE, and maximum value is in rSHL.
0056	rSHL	Remote Setpoint High limit Range: Minimum value is in rSLL, and maximum depends on the input type selected in tYPE.
0057 0058 0059 0060 0061	Io 1 Io 2 Io 3 Io 4 Io 5	Channel function I/O. See Table 4.
0062	A1t1	Alarm 1 Time 1. Range: 0 to 6500s Refer to operation manual for more details.
0063	A1t2	Alarm 1 Time 2 (in seconds) Range: same as in A1t1.
0064	A2t1	Alarm 2 Time 1 (in seconds) Range: same as in A1t1.
0065	A2t2	Alarm 2 Time 2 (in seconds) Range: same as in A1t1.
0066	SFSt	Soft-Start time (in seconds) Range: 0 to 9999
0067	un it	Temperature unit. Range: 0 to 1 0→°C; 1→°F.
0068	bIAS	Bias. Range: -100 to +100%.
0069	Io 6	Channel function I/06. The available N2000 and N3000. See Table 4.
0070	R&S Segment	Ramp and Soak segment being executed (read only). Range: 0 to 7
0071	Pr n	Ramp and Soak segment to be viewed or edited. Range: 1 to 7
0072	Pr n	Ramp and Soak segment to be executed Range: 0 to 7
0073	PE1	Segment 1 Event of R&S Program 1. Range: 0 to 15. See Table 6 of the instructions.
0074	PE2	Segment 2 Event of R&S Program 1. Range: same as in PE1.
0075	PE3	Segment 3 Event of R&S Program 1. Range: same as in PE1.
0076	PE4	Segment 4 Event of R&S Program 1. Range: same as in PE1.
0077	PE5	Segment 5 Event of R&S Program 1. Range: same as in PE1.
0078	PE6	Segment 6 Event of R&S Program 1. Range: same as in PE1.
0079	PE7	Segment 7 Event of R&S Program 1. Range: same as in PE1.
0080	PE1	Segment 1 Event of R&S Program 2. Range: 0 to 15. See Table 6 of the instructions.
0081	PE2	Segment 2 Event of R&S Program 2. Range: same as in PE1.
0082	PE3	Segment 3 Event of R&S Program 2. Range: same as in PE1.
0083	PE4	Segment 4 Event of R&S Program 2. Range: same as in PE1.
0084	PE5	Segment 5 Event of R&S Program 2. Range: same as in PE1.

0085	PE6	Segment 6 Event of R&S Program 2. Range: same as in PE 1.
0086	PE7	Segment 7 Event of R&S Program 2. Range: same as in PE 1.
0087	PE 1	Segment 1 Event of R&S Program 3. Range: 0 to 15. See Table 6 of the instructions.
0088	PE2	Segment 2 Event of R&S Program 3. Range: same as in PE 1.
0089	PE3	Segment 3 Event of R&S Program 3. Range: same as in PE 1.
0090	PE4	Segment 4 Event of R&S Program 3. Range: same as in PE 1.
0091	PE5	Segment 5 Event of R&S Program 3. Range: same as in PE 1.
0092	PE6	Segment 6 Event of R&S Program 3. Range: same as in PE 1.
0093	PE7	Segment 7 Event of R&S Program 3. Range: same as in PE 1.
0094	PE 1	Segment 1 Event of R&S Program 4. Range: 0 to 15. See Table 6 of the instructions.
0095	PE2	Segment 2 Event of R&S Program 4. Range: same as in PE 1.
0096	PE3	Segment 3 Event of R&S Program 4. Range: same as in PE 1.
0097	PE4	Segment 4 Event of R&S Program 4. Range: same as in PE 1.
0098	PE5	Segment 5 Event of R&S Program 4. Range: same as in PE 1.
0099	PE6	Segment 6 Event of R&S Program 4. Range: same as in PE 1.
0100	PE7	Segment 7 Event of R&S Program 4. Range: same as in PE 1.
0101	PE 1	Segment 1 Event of R&S Program 5. Range: 0 to 15. See Table 6 of the instructions.
0102	PE2	Segment 2 Event of R&S Program 5. Range: same as in PE 1.
0103	PE3	Segment 3 Event of R&S Program 5. Range: same as in PE 1.
0104	PE4	Segment 4 Event of R&S Program 5. Range: same as in PE 1.
0105	PE5	Segment 5 Event of R&S Program 5. Range: same as in PE 1.
0106	PE6	Segment 6 Event of R&S Program 5. Range: same as in PE 1.
0107	PE7	Segment 7 Event of R&S Program 5. Range: same as in PE 1.
0108	PE 1	Segment 1 Event of R&S Program 6. Range: 0 to 15. See Table 6 of the instructions.
0109	PE2	Segment 2 Event of R&S Program 6. Range: same as in PE 1.
0110	PE3	Segment 3 Event of R&S Program 6. Range: same as in PE 1.
0111	PE4	Segment 4 Event of R&S Program 6. Range: same as in PE 1.
0112	PE5	Segment 5 Event of R&S Program 6. Range: same as in PE 1.
0113	PE6	Segment 6 Event of R&S Program 6. Range: same as in PE 1.
0114	PE7	Segment 7 Event of R&S Program 6. Range: same as in PE 1.
0115	PE 1	Segment 1 Event of R&S Program 7. Range: 0 to 15. See Table 6 of the instructions.
0116	PE2	Segment 2 Event of R&S Program 7. Range: same as in PE 1.
0117	PE3	Segment 3 Event of R&S Program 7. Range: same as in PE 1.
0118	PE4	Segment 4 Event of R&S Program 7. Range: same as in PE 1.
0119	PE5	Segment 5 Event of R&S Program 7. Range: same as in PE 1.
0120	PE6	Segment 6 Event of R&S Program 7. Range: same as in PE 1.
0121	PE7	Segment 7 Event of R&S Program 7. Range: same as in PE 1.
0122	PtoL	R&S Program 1 Tolerance (Ramp and Soak). Range: 0 to valor de (SPHL - SPLL).
0123	LP	Program 1 Link (Ramp and Soak). Range: 0 to 7
0124	Pt 1	Time 1 of Program 1. Range: 0 to 9999 minutes.
0125	Pt2	Time 2 of Program 1. Range: 0 to 9999 minutes.
0126	Pt3	Time 3 of Program 1. Range: 0 to 9999 minutes.
0127	Pt4	Time 4 of Program 1. Range: 0 to 9999 minutes.
0128	Pt5	Time 5 of Program 1. Range: 0 to 9999 minutes.
0129	Pt6	Time 6 of Program 1. Range: 0 to 9999 minutes.
0130	Pt7	Time 7 of Program 1. Range: 0 to 9999 minutes.
0131	PSP0	*Setpoint* 0 of Program 1. Range: From SPLL to SPHL.
0132	PSP 1	*Setpoint* 1 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0133	PSP2	*Setpoint* 2 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0134	PSP3	*Setpoint* 3 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0135	PSP4	*Setpoint* 4 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0136	PSP5	*Setpoint* 5 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0137	PSP6	*Setpoint* 6 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0138	PSP7	*Setpoint* 7 of Program 1 (Ramp and Soak). Range: same as in PSP0.
0139	PtoL	R&S Program 2 Tolerance (Ramp and Soak). Range: 0 to valor de (SPHL - SPLL).
0140	LP	Program 2 Link (Ramp and Soak) Range: 0 to 7
0141	Pt 1	Time 1 of Program 2. Range: 0 to 9999 minutes.
0142	Pt2	Time 2 of Program 2. Range: 0 to 9999 minutes.
0143	Pt3	Time 3 of Program 2. Range: 0 to 9999 minutes.

0144	Pt4	Time 4 of Program 2. Range: 0 to 9999 minutes.
0145	Pt5	Time 5 of Program 2. Range: 0 to 9999 minutes.
0146	Pt6	Time 6 of Program 2. Range: 0 to 9999 minutes.
0147	Pt7	Time 7 of Program 2. Range: 0 to 9999 minutes.
0148	PSP0	*Setpoint* 0 of Program 2. Range: From SPLL to SPHL.
0149	PSP1	*Setpoint* 1 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0150	PSP2	*Setpoint* 2 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0151	PSP3	*Setpoint* 3 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0152	PSP4	*Setpoint* 4 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0153	PSP5	*Setpoint* 5 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0154	PSP6	*Setpoint* 6 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0155	PSP7	*Setpoint* 7 of Program 2 (Ramp and Soak). Range: same as in PSP0.
0156	PtoL	R&S Program 3 Tolerance (Ramp and Soak). Range: 0 to (SPHL - SPLL).
0157	LP	Program 3 Link (Ramp and Soak). Range: 0 to 7
0158	Pt1	Time 1 of Program 3. Range: 0 to 9999 minutes.
0159	Pt2	Time 2 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0160	Pt3	Time 3 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0161	Pt4	Time 4 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0162	Pt5	Time 5 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0163	Pt6	Time 6 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0164	Pt7	Time 7 of Program 3 (Ramp and Soak). Range: same as in Pt1.
0165	PSP0	*Setpoint* 0 of Program 3. Range: from SPLL to SPHL.
0166	PSP1	*Setpoint* 1 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0167	PSP2	*Setpoint* 2 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0168	PSP3	*Setpoint* 3 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0169	PSP4	*Setpoint* 4 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0170	PSP5	*Setpoint* 5 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0171	PSP6	*Setpoint* 6 of Program 3 (Ramp and Soak). Range: same as in PSP0.
0172	PSP7	*Setpoint* 7 of Program 3 (Ramp and Soak). Range: same as in PSP0.

0173	PtoL	R&S Program 4 Tolerance (Ramp and Soak). Range: 0 to (SPHL - SPLL).
0174	LP	Program 4 Link (Ramp and Soak). Range: 0 to 7
0175	Pt1	Time 1 of Program 4 (Ramp and Soak). Range: 0 to 9999 (in minutes)
0176	Pt2	Time 2 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0177	Pt3	Time 3 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0178	Pt4	Time 4 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0179	Pt5	Time 5 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0180	Pt6	Time 6 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0181	Pt7	Time 7 of Program 4 (Ramp and Soak). Range: same as in Pt1.
0182	PSP0	*Setpoint* 0 of Program 4. Range: from SPLL to SPHL.
0183	PSP1	*Setpoint* 1 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0184	PSP2	*Setpoint* 2 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0185	PSP3	*Setpoint* 3 of Program 4(Ramp and Soak). Range: same as in PSP0.
0186	PSP4	*Setpoint* 4 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0187	PSP5	*Setpoint* 5 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0188	PSP6	*Setpoint* 6 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0189	PSP7	*Setpoint* 7 of Program 4 (Ramp and Soak). Range: same as in PSP0.
0190	PtoL	R&S Program 5 Tolerance (Ramp and Soak). Range: 0 to (SPHL - SPLL).
0191	LP	Program 5 Link (Ramp and Soak). Range: 0 to 7
0192	Pt1	Time 1 of Program 5 (Ramp and Soak). Range: 0 to 9999. (in minutes)
0193	Pt2	Time 2 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0194	Pt3	Time 3 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0195	Pt4	Time 4 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0196	Pt5	Time 5 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0197	Pt6	Time 6 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0198	Pt7	Time 7 of Program 5 (Ramp and Soak). Range: same as in Pt1.
0199	PSP0	*Setpoint* 0 of Program 5. Range: from SPLL to SPHL.

0200	PSP1	*Setpoint* 1 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0201	PSP2	*Setpoint* 2 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0202	PSP3	*Setpoint* 3 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0203	PSP4	*Setpoint* 4 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0204	PSP5	*Setpoint* 5 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0205	PSP6	*Setpoint* 6 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0206	PSP7	*Setpoint* 7 of Program 5 (Ramp and Soak). Range: same as in **PSP0**.
0207	PtoL	R&S Program 6 Tolerance (Ramp and Soak). Range: 0 to (**SPHL** - **SPLL**).
0208	LP	Program 6 Link (Ramp and Soak). Range: 0 to 7
0209	Pt1	Time 1 of Program 6 (Ramp and Soak). Range: 0 to 9999. (in minutes)
0210	Pt2	Time 2 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0211	Pt3	Time 3 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0212	Pt4	Time 4 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0213	Pt5	Time 5 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0214	Pt6	Time 6 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0215	Pt7	Time 7 of Program 6 (Ramp and Soak). Range: same as in **Pt1**.
0216	PSP0	*Setpoint* 0 of Program 6. Range: from **SPLL** to **SPHL**.
0217	PSP1	*Setpoint* 1 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0218	PSP2	*Setpoint* 2 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0219	PSP3	*Setpoint* 3 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0220	PSP4	*Setpoint* 4 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0221	PSP5	*Setpoint* 5 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0222	PSP6	*Setpoint* 6 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0223	PSP7	*Setpoint* 7 of Program 6 (Ramp and Soak). Range: same as in **PSP0**.
0224	PtoL	R&S Program 7 Tolerance (Ramp and Soak). Range: 0 to (**SPHL** - **SPLL**).
0225	LP	Program 7 Link (Ramp and Soak). Range: 0 to 7
0226	Pt1	Time 1 of Program 7 (Ramp and Soak). Range: 0 to 9999. (in minutes)
0227	Pt2	Time 2 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0228	Pt3	Time 3 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0229	Pt4	Time 4 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0230	Pt5	Time 5 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0231	Pt6	Time 6 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0232	Pt7	Time 7 of Program 7 (Ramp and Soak). Range: same as in **Pt1**.
0233	PSP0	*Setpoint* 0 of Program 7. Range: from **SPLL** to **SPHL**.
0234	PSP1	*Setpoint* 1 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0235	PSP2	*Setpoint* 2 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0236	PSP3	*Setpoint* 3 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0237	PSP4	*Setpoint* 4 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0238	PSP5	*Setpoint* 5 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0239	PSP6	*Setpoint* 6 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0240	PSP7	*Setpoint* 7 of Program 7 (Ramp and Soak). Range: same as in **PSP0**.
0241	PrtY	Parity of the serial communication.
0242	Prot	Sets up the Protection Level.
0243	Er.SP	Enables remote SP. 0 - Enables Remote SP 1 - Does not enable Remoto SP
0244	r.SP	Defines the signal type for the remote SP. 0: 0-20 mA 1: 4-20 mA 2: 0-5 V 3: 0-10 V
0245-0253		Reserved.
0254	CJ	Cold Juntion compensation temperature.
0255		Reserved.
0256	FLSh	Display flashes in alarm. Range: 0 a 15. See manual for details.
0257	A3t1	Time 1 temporization alarm 3. (in seconds).
0258	A3t2	Time 2 temporization alarm 3. (in seconds).
0259	A4t1	Time 1 temporization alarm 4. (in seconds).
0260	A4t2	Time 2 temporization alarm 4. (in seconds).
0261	t.SEG	Indicative screen. Shows the current segments remaining time.
0262		Reserved.
0263		Reserved.
0264	FLtr	Digital filter for input signals. Range: 0 to 20.
0265-0269		Reserved.
0270	IEou	Percentage to be applied when the MV function safe output value is adopted.
0271	Lbdt	Time interval LBD function. Range: 0 to 9999. In minutes.

1.4 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 – Alarm 3 (0-inactive; 1-active) bit 3 – Alarm 4 (0-inactive; 1-active) bit 4 – Input – I/O 5 (0- inactive; 1- active) bit 5 – Input – I/O 3 (0- inactive; 1- active) (N1100) bit 6 – Input – I/O 4 (0- inactive; 1- active) (N1100) - Input – I/O 6 (0- inactive; 1- active) (N2000) bit 7 – Reserved bit 8 – Hardware type bit 9 – Hardware type bit 10 – Reserved bit 11 – Reserved bit 12 – Reserved bit 13 – Reserved bit 14 – Reserved bit 15 – Reserved
Status Word 2	bit 0 – Automatic (0- manual; 1- automatic) bit 1 – Run (0-stop; 1-run) bit 2 – Control Action (0- reverse; 1 - direct) bit 3 – Reserved bit 4 – Auto-tune (0-no; 1-yes) bit 5 – Alarm 1 power-up inhibit (0-no; 1-yes) bit 6 – Alarm 2 power-up inhibit (0-no; 1-yes) bit 7 – Alarm 3 power-up inhibit (0-no; 1-yes) bit 8 – Alarm 4 power-up inhibit (0-no; 1-yes) bit 9 – Unit (0-°C; 1-°F) bit 10 – Reserved bit 11 – Output 1 status bit 12 – Output 2 status bit 13 – Output 3 status bit 14 – Output 4 status bit 15 – Output 5 status
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 – Cold junction conversion out of range (0-no; 1-yes) bit 8 – Reserved bit 9 – Reserved bit 10 – Reserved bit 11 – Reserved bit 12 – Reserved bit 13 – Reserved bit 14 – Reserved bit 15 – Reserved

Table 2: Values of Status Words

Writing to an output bit is only possible if the output has no function assigned to it (the output is configured to OFF in Alarm Cycle).

Coil Status	Output description
1	Output 1 Status (I/O1)
2	Output 2 Status (I/O2)
3	Output 3 Status (I/O3)
4	Output 4 Status (I/O4)
5	Output 5 Status (I/O5)

1.5 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 3 – Error Code

1.6 CONFIGURATION PARAMETERS I/O

I/O Function	Code		I/O Type
Digital Output to be set by the serial comm.	0	oFF	Digital Output
Alarm 1 Output	1	A1	Digital Output
Alarm 2 Output	2	A2	Digital Output
Alarm 3 Output	3	A3	Digital Output
Alarm 4 Output	4	A4	Digital Output
Time interval LBD function - *Loop break detection*	5	Lbd	Digital Output
PWM Control Output	6	ctrL	Digital Output
Automatic/Manual mode change	7	MAn	Digital Input
Run/Stop mode change	8	run	Digital Input
Select Remote Set Point Input	9	rSP	Digital Input
Executes/Holds selected ramp and soak profile	10	HPrG	Digital Input
Enable/Disable R&S profile 1 selection	11	Pr 1	Digital Input
0 to 20mA Analog control output	12	C.020	Analog Output
4 to 20mA Analog control output	13	C.420	Analog Output
0 to 20mA PV retransmission	14	P.020	Analog Output
4 to 20mA PV retransmission	15	P.420	Analog Output
0 to 20mA SP retransmission	16	S.020	Analog Output
4 to 20mA SP retransmission	17	S.420	Analog Output

Table 4 – I/O functions Code