

N120/N125 CONTROLLER

Communication Manual – V1.1x

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

General Characteristics

- Optically isolated serial interface
- Programmable baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps.
- Data Bits: 8
- Parity: None, Even or Odd.
- 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
- 16 - Preset Multiple Registers (Block write to multiple holding registers)

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.

Prty: Parity.

1.3 REGISTERS TABLE

Equivalent to the registers referenced as 4XXXX.

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 SP	Read: Active control SP (main SP, from ramp and soak or from remote SP). Write: to main SP Range: from SPLL to SPHL .
0001	PV	Read: Process Variable. Write: Not allowed. Range: Minimum value is the one configured in SPLL and the maximum value is the one configured in SPHL . Decimal point position depends on dPPo value. In case of temperature reading, the value read is always multiplied by 10, independently of dPPo value.

0002	MV	Read: Output Power in automatic or manual mode. Write: Not allowed. See address 28. Range: 0 to 1000 (0.0 to 100.0%).
0003	Remote SP type	Read/Write: Selected input type for remote SP. Range: 0 to 3
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	Screen number	Read: Current screen number. Write: not allowed. Range: 0000h to 060Ch Prompt number format: XXYYh, where: XX→menu cycle number (check item 4 - INSTALLATION/CONNECTIONS) YY→prompt number (index).
0006	Status Word 1	Read: Status bits. See table 2. Write: not allowed. Read values: See table 2
0007	Software Version	Read: The firmware version of controller. Write: not allowed. Read values: If V1.00, the read value will be 100.
0008	ID	Read: controller identification number. Write: not allowed. Values: 32 – N120 Controller 37 – N125 Other values: special instruments.
0009	Status Word 2	Read: Status bits. Write: not allowed. Read values: See table 2.
0010	Status Word 3	Read: Status bits. Write: not allowed. Read values: See table 2.
0011	Ir	Integral Rate (in repetitions/min) Range: 0 to 9999 (0.00 to 99.99)
0012	dt	Derivative Time (in seconds). Range: 0 to 3000 (0.0 to 300.0)
0013	Pb	Proportional Band (in percentage) Range: 0 to 5000 (0.0 to 500.0)
0014	tBAS	Read/Write: Time base for the ramp and soak programs. Range: 0 – 1 (seconds/minutes)
0015	ct	Cycle Time (PWM, in seconds) Range: 5 to 1000 (0.5 to 100.0)
0016	FrE9	Read/Write: Mains frequency. Range: 0 – 1 (60/50Hz)
0017	HYSL	On/Off Control Hysteresis (in selected type engineering unit). Range: 0 to SPHL - SPLL
0018	FLtr	Read/Write: PV digital filter gain. Range: 0 – 20
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	Reserved	Internal use.
0022	Reserved	Internal use.

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 <i>Setpoint</i> (Prompt <i>Setpoint</i>). Range: from SPLL to SPHL .
0026	SPLL	<i>Setpoint</i> Low limit. Range: minimum value depends on the input type selected in LYPE (see Table 1) to SPHL .
0027	SPHL	<i>Setpoint</i> High limit. Range: minimum value is SPLL and maximum depends on the input type selected in LYPE (see Table 1).
0028	Reserved	Internal use.
0029	oFF5	Offset value of PV(Process value). Range: from SPLL to SPHL .
0030	dPPo	PV decimal point position Range: 0 to 3 0→0.000; 1→00.00; 2→000.0; 3→0000
0031	SPR1	Alarm 1 Setpoint. Range: From SPLL to SPHL for non differential; and SPHL - SPLL for differential alarm.
0032	SPR2	Alarm 2 Setpoint. Range: same as in SPR1 .
0033	SPR3	Alarm 3 Setpoint. Range: same as in SPR1 .
0034	SPR4	Alarm 4 Setpoint. Range: same as in SPR1 .
0035	FUR1	Alarm 1 Function. Range: 0 to 8 0 → oFF 1 → IErr 2 → tEnd 3 → rS
0036	FUR2	4 → Lo 5 → H I 6 → d IF
0037	FUR3	7 → d IFL ; 8 → d IFH ;
0038	FUR4	
0039	HYR1	Alarm 1 Hysteresis. Range: 0 to 9999 (0.00 to 99.99%)
0040	HYR2	Alarm 2 Hysteresis. Range: same as in HYR1 .
0041	HYR3	Alarm 3 Hysteresis. Range: same as in HYR1 .
0042	HYR4	Alarm 4 Hysteresis. Range: same as in HYR1 .
0043	LYPE	PV input type: 0 = J 1 = K 2 = T 3 = N 4 = R 5 = S 6 = B 7 = E 8 = Pt100 9 = 0-20 mA 10 = 4-20 mA 11 = 0-50 mV 12 = 0-5 V 13 = 0-10 V
0044	Addr	Communication slave address. Range: 1 to 247
0045	bAud	Communication Baud-Rate: 0→1200;1→2400;2→4800;3→9600; 4→19200; 5→38400; 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→direct; 1→reverse.
0049	Atun	Auto tune enable: 0= off;1= Fast; 2= Full; 3= Self; 4= rSLF; 5= tGHT;
0050	bLAR1	Alarm power-up inhibit. Range: 0→no; 1→yes.
0051	bLAR2	
0052	bLAR3	
0053	bLAR4	
0054	Key	Key press remote action. Range: 0 to 9 1: tecla P 2: tecla ^ 4: tecla v 8: tecla B 9: teclas P e B
0062	AlT1	Alarm 1 Time 1. Range: 0 to 6500s. Refer to operation manual for more details.
0063	AlT2	Alarm 1 Time 2 (in seconds). Range: same as in AlT1 .
0064	AlT1	Alarm 2 Time 1 (in seconds). Range: same as in AlT1 .
0065	AlT2	Alarm 2 Time 2 (in seconds). Range: same as in AlT1 .
0066	SFS	Soft-Start time (in seconds). Range: 0 to 9999
0067	unit	Temperature unit. Range: 0 to 1. 0→°C; 1→°F.
0068	bIAS	Bias. Range: -100 to +100%.
0070	R&S Segment	Ramp and Soak segment being executed (read only). Range: 0 to 9.
0071	Pr n	Ramp and Soak segment to be viewed or edited. Range: 1 to 20.
0072	E Pr	Ramp and Soak segment to be executed. Range: 0 to 20.
0073	Remaining time R&S	Indicates the remaining time of the Ramp and Soak segment.
0074	Sqr	Square root of a linear input. Range: 0->Disable;1->Enable.
0075	Calibration PV Low	Enter the low input value currently applied in the PV input for calibration purposes.
0076	Calibration PV High	Enter the high input value currently applied in the PV input for calibration purposes.
0077	Calib. remote SP Low	Enter the low input value currently applied in the remote setpoint input for calibration purposes.
0078	Calib. remote SP High	Enter the high input value currently applied in the remote setpoint input for calibration purposes.
0081	FLSh	Enables the top display blinking as a function of the selected alarm: 0-> Disable 1-> Enable to alarm 1 2-> Enable to alarm 2 3-> Enable to alarm 1 and 2
0086	rSt	Restores original default calibration. Range: 0 to 1; 0-> do not restore; 1-> restore calibration

0087	PRSS	Write: 0
0089	Prty	Serial communication parity. 0-> no parity; 1 -> even parity; 2 -> odd parity;
0090	ctYP	Customized input type.
0091	t uE	Timer set value.
0092	rPEE	Maximum rate of PV.
0093	Reserved	Internal use
0094	Fud I	Digital input function: 0 - OFF 1 - rRn 2 - rUn 3 - HPrG 4 - Pr I
0100	PE 1	Segment 1 Event of R&S Program 1. Range: 0 to 15. Check table 6 of the instruction manual.
0101	PE2	Segment 2 Event of R&S Program 1. Range: same as in PE 1
0102	PE3	Segment 3 Event of R&S Program 1. Range: same as in PE 1 .
0103	PE4	Segment 4 Event of R&S Program 1. Range: same as in PE 1 .
0104	PES	Segment 5 Event of R&S Program 1. Range: same as in PE 1 .
0105	PE6	Segment 6 Event of R&S Program 1. Range: same as in PE 1 .
0106	PE 7	Segment 7 Event of R&S Program 1. Range: same as in PE 1 .
0107	PE8	Segment 8 Event of R&S Program 1. Range: same as in PE 1 .
0108	PE9	Segment 9 Event of R&S Program 1. Range: same as in PE 1 .
0109	PE 1	Segment 1 Event of R&S Program 2. Range: same as in PE 1 of Program 1.
0110	PE2	Segment 2 Event of R&S Program 2. Range: same as in PE 1 .
0111	PE3	Segment 3 Event of R&S Program 2. Range: same as in PE 1 .
0112	PE4	Segment 4 Event of R&S Program 2. Range: same as in PE 1 .
0113	PES	Segment 5 Event of R&S Program 2. Range: same as in PE 1 .
0114	PE6	Segment 6 Event of R&S Program 2. Range: same as in PE 1 .
0115	PE 7	Segment 7 Event of R&S Program 2. Range: same as in PE 1 .
0116	PE8	Segment 8 Event of R&S Program 2. Range: same as in PE 1 .
0117	PE9	Segment 9 Event of R&S Program 2. Range: same as in PE 1 .

0119	PE 1	Segment 1 Event of R&S Program 3. Range: same as in PE 1 of Program 1.
0120	PE2	Segment 2 Event of R&S Program 3. Range: same as in PE 1 .
0118	PE3	Segment 3 Event of R&S Program 3. Range: same as in PE 1 .
0121	PE4	Segment 4 Event of R&S Program 3. Range: same as in PE 1 .
0122	PES	Segment 5 Event of R&S Program 3. Range: same as in PE 1 .
0123	PE6	Segment 6 Event of R&S Program 3. Range: same as in PE 1 .
0124	PE 7	Segment 7 Event of R&S Program 3. Range: same as in PE 1 .
0125	PE8	Segment 8 Event of R&S Program 3. Range: same as in PE 1 .
0126	PE9	Segment 9 Event of R&S Program 3. Range: same as in PE 1 .
0127	PE 1	Segment 1 Event of R&S Program 4. Range: same as in PE 1 of Program 1.
0128	PE2	Segment 2 Event of R&S Program 4. Range: same as in PE 1 .
0129	PE3	Segment 3 Event of R&S Program 4. Range: same as in PE 1 .
0130	PE4	Segment 4 Event of R&S Program 4. Range: same as in PE 1 .
0131	PES	Segment 5 Event of R&S Program 4. Range: same as in PE 1 .
0132	PE6	Segment 6 Event of R&S Program 4. Range: same as in PE 1 .
0133	PE 7	Segment 7 Event of R&S Program 4. Range: same as in PE 1 .
0134	PE8	Segment 8 Event of R&S Program 4. Range: same as in PE 1 .
0135	PE9	Segment 9 Event of R&S Program 4. Range: same as in PE 1 .
0136	PE 1	Segment 1 Event of R&S Program 5. Range: same as in PE 1 of Program 1.
0137	PE2	Segment 2 Event of R&S Program 5. Range: same as in PE 1 .
0138	PE3	Segment 3 Event of R&S Program 5. Range: same as in PE 1 .
0139	PE4	Segment 4 Event of R&S Program 5. Range: same as in PE 1 .
0140	PES	Segment 5 Event of R&S Program 5. Range: same as in PE 1 .
0141	PE6	Segment 6 Event of R&S Program 5. Range: same as in PE 1 .
0142	PE 7	Segment 7 Event of R&S Program 5. Range: same as in PE 1 .

0143	PEB	Segment 8 Event of R&S Program 5. Range: same as in PE 1 .
0144	PE9	Segment 9 Event of R&S Program 5. Range: same as in PE 1 .
0145	PE 1	Segment 1 Event of R&S Program 6. Range: same as in PE 1 .
0146	PE2	Segment 2 Event of R&S Program 6. Range: same as in PE 1 .
0147	PE3	Segment 3 Event of R&S Program 6. Range: same as in PE 1 .
0148	PE4	Segment 4 Event of R&S Program 6. Range: same as in PE 1 .
0149	PE5	Segment 5 Event of R&S Program 6. Range: same as in PE 1 .
0150	PE6	Segment 6 Event of R&S Program 6. Range: same as in PE 1 .
0151	PE7	Segment 7 Event of R&S Program 6. Range: same as in PE 1 .
0152	PEB	Segment 8 Event of R&S Program 6. Range: same as in PE 1 .
0153	PE9	Segment 9 Event of R&S Program 6. Range: same as in PE 1 .
0154	PE 1	Segment 1 Event of R&S Program 7. Range: same as in PE 1 for Program 1.
0155	PE2	Segment 2 Event of R&S Program 7. Range: same as in PE 1 .
0156	PE3	Segment 3 Event of R&S Program 7. Range: same as in PE 1 .
0157	PE4	Segment 4 Event of R&S Program 7. Range: same as in PE 1 .
0158	PE5	Segment 5 Event of R&S Program 7. Range: same as in PE 1 .
0159	PE6	Segment 6 Event of R&S Program 7. Range: same as in PE 1 .
0160	PE7	Segment 7 Event of R&S Program 7. Range: same as in PE 1 .
0161	PEB	Segment 8 Event of R&S Program 7. Range: same as in PE 1 .
0162	PE9	Segment 9 Event of R&S Program 7. Range: same as in PE 1 .
0163	PE 1	Segment 1 Event of R&S Program 8. Range: same as in PE 1 of Program 1.
0164	PE2	Segment 2 Event of R&S Program 8. Range: same as in PE 1 .
0165	PE3	Segment 3 Event of R&S Program 8. Range: same as in PE 1 .
0166	PE4	Segment 4 Event of R&S Program 8. Range: same as in PE 1 .
0167	PE5	Segment 5 Event of R&S Program 8. Range: same as in PE 1 .

0168	PE6	Segment 6 Event of R&S Program 8. Range: same as in PE 1 .
0169	PE7	Segment 7 Event of R&S Program 8. Range: same as in PE 1 .
0170	PEB	Segment 8 Event of R&S Program 8. Range: same as in PE 1 .
0171	PE9	Segment 9 Event of R&S Program 8. Range: same as in PE 1 .
0172	PE 1	Segment 1 Event of R&S Program 9. Range: same as in PE 1 of Program 1.
0173	PE2	Segment 2 Event of R&S Program 9. Range: same as in PE 1 .
0174	PE3	Segment 3 Event of R&S Program 9. Range: same as in PE 1 .
0175	PE4	Segment 4 Event of R&S Program 9. Range: same as in PE 1 .
0176	PE5	Segment 5 Event of R&S Program 9. Range: same as in PE 1 .
0177	PE6	Segment 6 Event of R&S Program 9. Range: same as in PE 1 .
0178	PE7	Segment 7 Event of R&S Program 9. Range: same as in PE 1 .
0179	PEB	Segment 8 Event of R&S Program 9. Range: same as in PE 1 .
0180	PE9	Segment 9 Event of R&S Program 9. Range: same as in PE 1 .
0181	PE 1	Segment 1 Event of R&S Program 10. Range: same as in PE 1 of Program 1.
0182	PE2	Segment 2 Event of R&S Program 10. Range: same as in PE 1 .
0183	PE3	Segment 3 Event of R&S Program 10. Range: same as in PE 1 .
0184	PE4	Segment 4 Event of R&S Program 10. Range: same as in PE 1 .
0185	PE5	Segment 5 Event of R&S Program 10. Range: same as in PE 1 .
0186	PE6	Segment 6 Event of R&S Program 10. Range: same as in PE 1 .
0187	PE7	Segment 7 Event of R&S Program 10. Range: same as in PE 1 .
0188	PEB	Segment 8 Event of R&S Program 10. Range: same as in PE 1 .
0189	PE9	Segment 9 Event of R&S Program 10. Range: same as in PE 1 .
0190	PE 1	Segment 1 Event of R&S Program 11. Range: same as in PE 1 of Program 1.
0191	PE2	Segment 2 Event of R&S Program 11. Range: same as in PE 1 .
0192	PE3	Segment 3 Event of R&S Program 11. Range: same as in PE 1 .

0243	PE9	Segment 9 Event of R&S Program 16. Range: same as in PE 1 .
0244	PE 1	Segment 1 Event of R&S Program 17. Range: same as in PE 1 of Program 1.
0245	PE2	Segment 2 Event of R&S Program 17. Range: same as in PE 1 .
0246	PE3	Segment 3 Event of R&S Program 17. Range: same as in PE 1 .
0247	PE4	Segment 4 Event of R&S Program 17. Range: same as in PE 1 .
0248	PE5	Segment 5 Event of R&S Program 17. Range: same as in PE 1 .
0249	PE6	Segment 6 Event of R&S Program 17. Range: same as in PE 1 .
0250	PE 7	Segment 7 Event of R&S Program 17. Range: same as in PE 1 .
0251	PE8	Segment 8 Event of R&S Program 17. Range: same as in PE 1 .
0252	PE9	Segment 9 Event of R&S Program 17. Range: same as in PE 1 .
0253	PE 1	Segment 1 Event of R&S Program 18. Range: same as in PE 1 of Program 1.
0254	PE2	Segment 2 Event of R&S Program 18. Range: same as in PE 1 .
0255	PE3	Segment 3 Event of R&S Program 18. Range: same as in PE 1 .
0256	PE4	Segment 4 Event of R&S Program 18. Range: same as in PE 1 .
0257	PE5	Segment 5 Event of R&S Program 18. Range: same as in PE 1 .
0258	PE6	Segment 6 Event of R&S Program 18. Range: same as in PE 1 .
0259	PE 7	Segment 7 Event of R&S Program 18. Range: same as in PE 1 .
0260	PE8	Segment 8 Event of R&S Program 18. Range: same as in PE 1 .
0261	PE9	Segment 9 Event of R&S Program 18. Range: same as in PE 1 .
0262	PE 1	Segment 1 Event of R&S Program 19. Range: same as in PE 1 of Program 1.
0263	PE2	Segment 2 Event of R&S Program 19. Range: same as in PE 1 .
0264	PE3	Segment 3 Event of R&S Program 19. Range: same as in PE 1 .
0265	PE4	Segment 4 Event of R&S Program 19. Range: same as in PE 1 .
0266	PE5	Segment 5 Event of R&S Program 19. Range: same as in PE 1 .
0267	PE6	Segment 6 Event of R&S Program 19. Range: same as in PE 1 .

0268	PE 7	Segment 7 Event of R&S Program 19. Range: same as in PE 1 .
0269	PE8	Segment 8 Event of R&S Program 19. Range: same as in PE 1 .
0270	PE9	Segment 9 Event of R&S Program 19. Range: same as in PE 1 .
0271	PE 1	Segment 1 Event of R&S Program 20. Range: same as in PE 1 of Program 1.
0272	PE2	Segment 2 Event of R&S Program 20. Range: same as in PE 1 .
0273	PE3	Segment 3 Event of R&S Program 20. Range: same as in PE 1 .
0274	PE4	Segment 4 Event of R&S Program 20. Range: same as in PE 1 .
0275	PE5	Segment 5 Event of R&S Program 20. Range: same as in PE 1 .
0276	PE6	Segment 6 Event of R&S Program 20. Range: same as in PE 1 .
0277	PE 7	Segment 7 Event of R&S Program 20. Range: same as in PE 1 .
0278	PE8	Segment 8 Event of R&S Program 20. Range: same as in PE 1 .
0279	PE9	Segment 9 Event of R&S Program 20. Range: same as in PE 1 .
0280	PEtoL	R&S Program 1 Tolerance Range: From 0 to (SPPL - SPPL).
0281	PEtoL	R&S Program 2 Tolerance Range: From 0 to (SPPL - SPPL).
0282	PEtoL	R&S Program 3 Tolerance Range: From 0 to (SPPL - SPPL).
0283	PEtoL	R&S Program 4 Tolerance Range: From 0 to (SPPL - SPPL).
0284	PEtoL	R&S Program 5 Tolerance Range: From 0 to (SPPL - SPPL).
0285	PEtoL	R&S Program 6 Tolerance Range: From 0 to (SPPL - SPPL).
0286	PEtoL	R&S Program 7 Tolerance Range: From 0 to (SPPL - SPPL).
0287	PEtoL	R&S Program 8 Tolerance Range: From 0 to (SPPL - SPPL).
0288	PEtoL	R&S Program 9 Tolerance Range: From 0 to (SPPL - SPPL).
0289	PEtoL	R&S Program 10 Tolerance Range: From 0 to (SPPL - SPPL).
0290	PEtoL	R&S Program 11 Tolerance Range: From 0 to (SPPL - SPPL).
0291	PEtoL	R&S Program 12 Tolerance Range: From 0 to (SPPL - SPPL).
0292	PEtoL	R&S Program 13 Tolerance Range: From 0 to (SPPL - SPPL).

0293	PtoL	R&S Program 14 Tolerance Range: From 0 to (SPPL - SPLL).
0294	PtoL	R&S Program 15 Tolerance Range: From 0 to (SPPL - SPLL).
0295	PtoL	R&S Program 16 Tolerance Range: From 0 to (SPPL - SPLL).
0296	PtoL	R&S Program 17 Tolerance Range: From 0 to (SPPL - SPLL).
0297	PtoL	R&S Program 18 Tolerance Range: From 0 to (SPPL - SPLL).
0298	PtoL	R&S Program 19 Tolerance Range: From 0 to (SPPL - SPLL).
0299	PtoL	R&S Program 20 Tolerance Range: From 0 to (SPPL - SPLL).
0300	LP	R&S Program 1 Link. Range: 0 to 20.
0301	LP	R&S Program 2 Link. Range: 0 to 20.
0302	LP	R&S Program 3 Link. Range: 0 to 20.
0303	LP	R&S Program 4 Link. Range: 0 to 20.
0304	LP	R&S Program 5 Link. Range: 0 to 20.
0305	LP	R&S Program 6 Link. Range: 0 to 20.
0306	LP	R&S Program 7 Link. Range: 0 to 20.
0307	LP	R&S Program 8 Link. Range: 0 to 20.
0308	LP	R&S Program 9 Link. Range: 0 to 20.
0309	LP	R&S Program 10 Link. Range: 0 to 20.
0310	LP	R&S Program 11 Link. Range: 0 to 20.
0311	LP	R&S Program 12 Link. Range: 0 to 20.
0312	LP	R&S Program 13 Link. Range: 0 to 20.
0313	LP	R&S Program 14 Link. Range: 0 to 20.
0314	LP	R&S Program 15 Link. Range: 0 to 20.
0315	LP	R&S Program 16 Link. Range: 0 to 20.
0316	LP	R&S Program 17 Link. Range: 0 to 20.
0317	LP	R&S Program 18 Link. Range: 0 to 20.

0318	LP	R&S Program 19 Link. Range: 0 to 20.
0319	LP	R&S Program 20 Link. Range: 0 to 20.
0320	Pt 1	Time 1 of Program 1. Range: 0 to 9999 minutes.
0321	Pt 2	Time 2 of Program 1. Range: 0 to 9999 minutes.
0322	Pt 3	Time 3 of Program 1. Range: 0 to 9999 minutes.
0323	Pt 4	Time 4 of Program 1. Range: 0 to 9999 minutes.
0324	Pt 5	Time 5 of Program 1. Range: 0 to 9999 minutes.
0325	Pt 6	Time 6 of Program 1. Range: 0 to 9999 minutes.
0326	Pt 7	Time 7 of Program 1. Range: 0 to 9999 minutes.
0327	Pt 8	Time 8 of Program 1. Range: 0 to 9999 minutes.
0328	Pt 9	Time 9 of Program 1. Range: 0 to 9999 minutes.
0329	Pt 1	Time 1 of Program 2. Range: 0 to 9999 minutes.
0330	Pt 2	Time 2 of Program 2. Range: 0 to 9999 minutes.
0331	Pt 3	Time 3 of Program 2. Range: 0 to 9999 minutes.
0332	Pt 4	Time 4 of Program 2. Range: 0 to 9999 minutes.
0333	Pt 5	Time 5 of Program 2. Range: 0 to 9999 minutes.
0334	Pt 6	Time 6 of Program 2. Range: 0 to 9999 minutes.
0335	Pt 7	Time 7 of Program 2. Range: 0 to 9999 minutes.
0336	Pt 8	Time 8 of Program 2. Range: 0 to 9999 minutes.
0337	Pt 9	Time 9 of Program 2. Range: 0 to 9999 minutes.
0338	Pt 1	Time 1 of Program 3. Range: 0 to 9999 minutes.
0339	Pt 2	Time 2 of Program 3. Range: 0 to 9999 minutes.
0340	Pt 3	Time 3 of Program 3. Range: 0 to 9999 minutes.
0341	Pt 4	Time 4 of Program 3. Range: 0 to 9999 minutes.
0342	Pt 5	Time 5 of Program 3. Range: 0 to 9999 minutes.
0343	Pt 6	Time 6 of Program 3. Range: 0 to 9999 minutes.
0344	Pt 7	Time 7 of Program 3. Range: 0 to 9999 minutes.
0345	Pt 8	Time 8 of Program 3. Range: 0 to 9999 minutes.
0346	Pt 9	Time 9 of Program 3. Range: 0 to 9999 minutes.
0347	Pt 1	Time 1 of Program 4. Range: 0 to 9999 minutes.
0348	Pt 2	Time 2 of Program 4. Range: 0 to 9999 minutes.
0349	Pt 3	Time 3 of Program 4. Range: 0 to 9999 minutes.
0350	Pt 4	Time 4 of Program 4. Range: 0 to 9999 minutes.
0351	Pt 5	Time 5 of Program 4. Range: 0 to 9999 minutes.
0352	Pt 6	Time 6 of Program 4. Range: 0 to 9999 minutes.
0353	Pt 7	Time 7 of Program 4. Range: 0 to 9999 minutes.
0354	Pt 8	Time 8 of Program 4. Range: 0 to 9999 minutes.
0355	Pt 9	Time 9 of Program 4. Range: 0 to 9999 minutes.
0356	Pt 1	Time 1 of Program 5. Range: 0 to 9999 minutes.
0357	Pt 2	Time 2 of Program 5. Range: 0 to 9999 minutes.
0358	Pt 3	Time 3 of Program 5. Range: 0 to 9999 minutes.
0359	Pt 4	Time 4 of Program 5. Range: 0 to 9999 minutes.
0360	Pt 5	Time 5 of Program 5. Range: 0 to 9999 minutes.
0361	Pt 6	Time 6 of Program 5. Range: 0 to 9999 minutes.
0362	Pt 7	Time 7 of Program 5. Range: 0 to 9999 minutes.

0547	PSP7	Setpoint 7 of Program 5 (R&S) Range: same as in PSP0 .
0548	PSP8	Setpoint 8 of Program 5 (R&S) Range: same as in PSP0 .
0549	PSP9	Setpoint 9 of Program 5 (R&S) Range: same as in PSP0 .
0550	PSP0	Setpoint 0 of Program 6. Range: From SPLL to SPHL .
0551	PSP1	Setpoint 1 of Program 6 (R&S) Range: same as in PSP0 .
0552	PSP2	Setpoint 2 of Program 6 (R&S) Range: same as in PSP0 .
0553	PSP3	Setpoint 3 of Program 6 (R&S) Range: same as in PSP0 .
0554	PSP4	Setpoint 4 of Program 6 (R&S) Range: same as in PSP0 .
0555	PSP5	Setpoint 5 of Program 6 (R&S) Range: same as in PSP0 .
0556	PSP6	Setpoint 6 of Program 6 (R&S) Range: same as in PSP0 .
0557	PSP7	Setpoint 7 of Program 6 (R&S) Range: same as in PSP0 .
0558	PSP8	Setpoint 8 of Program 6 (R&S) Range: same as in PSP0 .
0559	PSP9	Setpoint 9 of Program 6 (R&S) Range: same as in PSP0 .
0560	PSP0	Setpoint 0 of Program 7. Range: From SPLL to SPHL .
0561	PSP1	Setpoint 1 of Program 7 (R&S) Range: same as in PSP0 .
0562	PSP2	Setpoint 2 of Program 7 (R&S) Range: same as in PSP0 .
0563	PSP3	Setpoint 3 of Program 7 (R&S) Range: same as in PSP0 .
0564	PSP4	Setpoint 4 of Program 7 (R&S) Range: same as in PSP0 .
0565	PSP5	Setpoint 5 of Program 7 (R&S) Range: same as in PSP0 .
0566	PSP6	Setpoint 6 of Program 7 (R&S) Range: same as in PSP0 .
0567	PSP7	Setpoint 7 of Program 7 (R&S) Range: same as in PSP0 .
0568	PSP8	Setpoint 8 of Program 7 (R&S) Range: same as in PSP0 .
0569	PSP9	Setpoint 9 of Program 7 (R&S) Range: same as in PSP0 .
0570	PSP0	Setpoint 0 of Program 8. Range: From SPLL to SPHL .

0571	PSP1	Setpoint 1 of Program 8 (R&S) Range: same as in PSP0 .
0572	PSP2	Setpoint 2 of Program 8 (R&S) Range: same as in PSP0 .
0573	PSP3	Setpoint 3 of Program 8 (R&S) Range: same as in PSP0 .
0574	PSP4	Setpoint 4 of Program 8 (R&S) Range: same as in PSP0 .
0575	PSP5	Setpoint 5 of Program 8 (R&S) Range: same as in PSP0 .
0576	PSP6	Setpoint 6 of Program 8 (R&S) Range: same as in PSP0 .
0577	PSP7	Setpoint 7 of Program 8 (R&S) Range: same as in PSP0 .
0578	PSP8	Setpoint 8 of Program 8 (R&S) Range: same as in PSP0 .
0579	PSP9	Setpoint 9 of Program 8 (R&S) Range: same as in PSP0 .
0580	PSP0	Setpoint 0 of Program 9. Range: From SPLL to SPHL .
0581	PSP1	Setpoint 1 of Program 9 (R&S) Range: same as in PSP0 .
0582	PSP2	Setpoint 2 of Program 9 (R&S) Range: same as in PSP0 .
0583	PSP3	Setpoint 3 of Program 9 (R&S) Range: same as in PSP0 .
0584	PSP4	Setpoint 4 of Program 9 (R&S) Range: same as in PSP0 .
0585	PSP5	Setpoint 5 of Program 9 (R&S) Range: same as in PSP0 .
0586	PSP6	Setpoint 6 of Program 9 (R&S) Range: same as in PSP0 .
0587	PSP7	Setpoint 7 of Program 9 (R&S) Range: same as in PSP0 .
0588	PSP8	Setpoint 8 of Program 9 (R&S) Range: same as in PSP0 .
0589	PSP9	Setpoint 9 of Program 9 (R&S) Range: same as in PSP0 .
0590	PSP0	Setpoint 0 of Program 10. Range: From SPLL to SPHL .
0591	PSP1	Setpoint 1 of Program 10 (R&S) Range: same as in PSP0 .
0592	PSP2	Setpoint 2 of Program 10 (R&S) Range: same as in PSP0 .
0593	PSP3	Setpoint 3 of Program 10 (R&S) Range: same as in PSP0 .
0594	PSP4	Setpoint 4 of Program 10 (R&S) Range: same as in PSP0 .

0595	PSP5	Setpoint 5 of Program 10 (R&S) Range: same as in PSP0 .
0596	PSP6	Setpoint 6 of Program 10 (R&S) Range: same as in PSP0 .
0597	PSP7	Setpoint 7 of Program 10 (R&S) Range: same as in PSP0 .
0598	PSP8	Setpoint 8 of Program 10 (R&S) Range: same as in PSP0 .
0599	PSP9	Setpoint 9 of Program 10 (R&S) Range: same as in PSP0 .
0600	PSP0	Setpoint 0 of Program 11. Range: From SPLL to SPHL .
0601	PSP 1	Setpoint 1 of Program 11 (R&S) Range: same as in PSP0 .
0602	PSP2	Setpoint 2 of Program 11 (R&S) Range: same as in PSP0 .
0603	PSP3	Setpoint 3 of Program 11 (R&S) Range: same as in PSP0 .
0604	PSP4	Setpoint 4 of Program 11 (R&S) Range: same as in PSP0 .
0605	PSP5	Setpoint 5 of Program 11 (R&S) Range: same as in PSP0 .
0606	PSP6	Setpoint 6 of Program 11 (R&S) Range: same as in PSP0 .
0607	PSP7	Setpoint 7 of Program 11 (R&S) Range: same as in PSP0 .
0608	PSP8	Setpoint 8 of Program 11 (R&S) Range: same as in PSP0 .
0609	PSP9	Setpoint 9 of Program 11 (R&S) Range: same as in PSP0 .
0610	PSP0	Setpoint 0 of Program 12. Range: From SPLL to SPHL .
0611	PSP 1	Setpoint 1 of Program 12 (R&S) Range: same as in PSP0 .
0612	PSP2	Setpoint 2 of Program 12 (R&S) Range: same as in PSP0 .
0613	PSP3	Setpoint 3 of Program 12 (R&S) Range: same as in PSP0 .
0614	PSP4	Setpoint 4 of Program 12 (R&S) Range: same as in PSP0 .
0615	PSP5	Setpoint 5 of Program 12 (R&S) Range: same as in PSP0 .
0616	PSP6	Setpoint 6 of Program 12 (R&S) Range: same as in PSP0 .
0617	PSP7	Setpoint 7 of Program 12 (R&S) Range: same as in PSP0 .
0618	PSP8	Setpoint 8 of Program 12 (R&S) Range: same as in PSP0 .

0619	PSP9	Setpoint 9 of Program 12 (R&S) Range: same as in PSP0 .
0620	PSP0	Setpoint 0 of Program 13. Range: From SPLL to SPHL .
0621	PSP 1	Setpoint 1 of Program 13 (R&S) Range: same as in PSP0 .
0622	PSP2	Setpoint 2 of Program 13 (R&S) Range: same as in PSP0 .
0623	PSP3	Setpoint 3 of Program 13 (R&S) Range: same as in PSP0 .
0624	PSP4	Setpoint 4 of Program 13 (R&S) Range: same as in PSP0 .
0625	PSP5	Setpoint 5 of Program 13 (R&S) Range: same as in PSP0 .
0626	PSP6	Setpoint 6 of Program 13 (R&S) Range: same as in PSP0 .
0627	PSP7	Setpoint 7 of Program 13 (R&S) Range: same as in PSP0 .
0628	PSP8	Setpoint 8 of Program 13 (R&S) Range: same as in PSP0 .
0629	PSP9	Setpoint 9 of Program 13 (R&S) Range: same as in PSP0 .
0630	PSP0	Setpoint 0 of Program 14. Range: From SPLL to SPHL .
0631	PSP 1	Setpoint 1 of Program 14 (R&S) Range: same as in PSP0 .
0632	PSP2	Setpoint 2 of Program 14 (R&S) Range: same as in PSP0 .
0633	PSP3	Setpoint 3 of Program 14 (R&S) Range: same as in PSP0 .
0634	PSP4	Setpoint 4 of Program 14 (R&S) Range: same as in PSP0 .
0635	PSP5	Setpoint 5 of Program 14 (R&S) Range: same as in PSP0 .
0636	PSP6	Setpoint 6 of Program 14 (R&S) Range: same as in PSP0 .
0637	PSP7	Setpoint 7 of Program 14 (R&S) Range: same as in PSP0 .
0638	PSP8	Setpoint 8 of Program 14 (R&S) Range: same as in PSP0 .
0639	PSP9	Setpoint 9 of Program 14 (R&S) Range: same as in PSP0 .
0640	PSP0	Setpoint 0 of Program 15. Range: From SPLL to SPHL .
0641	PSP 1	Setpoint 1 of Program 15 (R&S) Range: same as in PSP0 .
0642	PSP2	Setpoint 2 of Program 15 (R&S) Range: same as in PSP0 .

0643	PSP3	Setpoint 3 of Program 15 (R&S) Range: same as in PSP0 .
0644	PSP4	Setpoint 4 of Program 15 (R&S) Range: same as in PSP0 .
0645	PSP5	Setpoint 5 of Program 15 (R&S) Range: same as in PSP0 .
0646	PSP6	Setpoint 6 of Program 15 (R&S) Range: same as in PSP0 .
0647	PSP7	Setpoint 7 of Program 15 (R&S) Range: same as in PSP0 .
0648	PSP8	Setpoint 8 of Program 15 (R&S) Range: same as in PSP0 .
0649	PSP9	Setpoint 9 of Program 15 (R&S) Range: same as in PSP0 .
0650	PSP0	Setpoint 0 of Program 16. Range: From SPLL to SPHL .
0651	PSP 1	Setpoint 1 of Program 16 (R&S) Range: same as in PSP0 .
0652	PSP2	Setpoint 2 of Program 16 (R&S) Range: same as in PSP0 .
0653	PSP3	Setpoint 3 of Program 16 (R&S) Range: same as in PSP0 .
0654	PSP4	Setpoint 4 of Program 16 (R&S) Range: same as in PSP0 .
0655	PSP5	Setpoint 5 of Program 16 (R&S) Range: same as in PSP0 .
0656	PSP6	Setpoint 6 of Program 16 (R&S) Range: same as in PSP0 .
0657	PSP7	Setpoint 7 of Program 16 (R&S) Range: same as in PSP0 .
0658	PSP8	Setpoint 8 of Program 16 (R&S) Range: same as in PSP0 .
0659	PSP9	Setpoint 9 of Program 16 (R&S) Range: same as in PSP0 .
0660	PSP0	Setpoint 0 of Program 17. Range: From SPLL to SPHL .
0661	PSP 1	Setpoint 1 of Program 17 (R&S) Range: same as in PSP0 .
0662	PSP2	Setpoint 2 of Program 17 (R&S) Range: same as in PSP0 .
0663	PSP3	Setpoint 3 of Program 17 (R&S) Range: same as in PSP0 .
0664	PSP4	Setpoint 4 of Program 17 (R&S) Range: same as in PSP0 .
0665	PSP5	Setpoint 5 of Program 17 (R&S) Range: same as in PSP0 .
0666	PSP6	Setpoint 6 of Program 17 (R&S) Range: same as in PSP0 .

0667	PSP7	Setpoint 7 of Program 17 (R&S) Range: same as in PSP0 .
0668	PSP8	Setpoint 8 of Program 17 (R&S) Range: same as in PSP0 .
0669	PSP9	Setpoint 9 of Program 17 (R&S) Range: same as in PSP0 .
0670	PSP0	Setpoint 0 of Program 18. Range: From SPLL to SPHL .
0671	PSP 1	Setpoint 1 of Program 18 (R&S) Range: same as in PSP0 .
0672	PSP2	Setpoint 2 of Program 18 (R&S) Range: same as in PSP0 .
0673	PSP3	Setpoint 3 of Program 18 (R&S) Range: same as in PSP0 .
0674	PSP4	Setpoint 4 of Program 18 (R&S) Range: same as in PSP0 .
0675	PSP5	Setpoint 5 of Program 18 (R&S) Range: same as in PSP0 .
0676	PSP6	Setpoint 6 of Program 18 (R&S) Range: same as in PSP0 .
0677	PSP7	Setpoint 7 of Program 18 (R&S) Range: same as in PSP0 .
0678	PSP8	Setpoint 8 of Program 18 (R&S) Range: same as in PSP0 .
0679	PSP9	Setpoint 9 of Program 18 (R&S) Range: same as in PSP0 .
0680	PSP0	Setpoint 0 of Program 19. Range: From SPLL to SPHL .
0681	PSP 1	Setpoint 1 of Program 19 (R&S) Range: same as in PSP0 .
0682	PSP2	Setpoint 2 of Program 19 (R&S) Range: same as in PSP0 .
0683	PSP3	Setpoint 3 of Program 19 (R&S) Range: same as in PSP0 .
0684	PSP4	Setpoint 4 of Program 19 (R&S) Range: same as in PSP0 .
0685	PSP5	Setpoint 5 of Program 19 (R&S) Range: same as in PSP0 .
0686	PSP6	Setpoint 6 of Program 19 (R&S) Range: same as in PSP0 .
0687	PSP7	Setpoint 7 of Program 19 (R&S) Range: same as in PSP0 .
0688	PSP8	Setpoint 8 of Program 19 (R&S) Range: same as in PSP0 .
0689	PSP9	Setpoint 9 of Program 19 (R&S) Range: same as in PSP0 .
0690	PSP0	Setpoint 0 of Program 1. Range: From SPLL to SPHL .

0691	PSP1	Setpoint 1 of Program 1 (R&S) Range: same as in PSP0 .
0692	PSP2	Setpoint 2 of Program 1 (R&S) Range: same as in PSP0 .
0693	PSP3	Setpoint 3 of Program 1 (R&S) Range: same as in PSP0 .
0694	PSP4	Setpoint 4 of Program 1 (R&S) Range: same as in PSP0 .
0695	PSP5	Setpoint 5 of Program 1 (R&S) Range: same as in PSP0 .
0696	PSP6	Setpoint 6 of Program 1 (R&S) Range: same as in PSP0 .
0697	PSP7	Setpoint 7 of Program 1 (R&S) Range: same as in PSP0 .
0698	PSP8	Setpoint 8 of Program 1 (R&S) Range: same as in PSP0 .
0699	PSP9	Setpoint 9 of Program 1 (R&S) Range: same as in PSP0 .
0700	Reserved	Internal use

Status Word 2	bit 0 – Automatic (0- manual; 1- automatic) bit 1 – Run (0-stop; 1-run) bit 2 – Control Action (0-direct; 1-reverse) 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 – Reserved 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

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 0 – I/O 5 (0- inactive; 1- active) bit 5 – Input 1 – I/O 3 (0- inactive; 1- active) bit 6 – Input 2 – I/O 4 (0- inactive; 1- active) bit 7 – Reserved bit 8 – Hardware detection value bit 9 – Hardware detection value bit 10 – Reserved bit 11 – Reserved bit 12 – Reserved bit 13 – Reserved bit 14 – Reserved bit 15 – Reserved

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
0	Output 1 Status (I/O1)
1	Output 2 Status (I/O2)
2	Output 3 Status (I/O3)
3	Output 4 Status (I/O4)
4	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 – Exception response error codes