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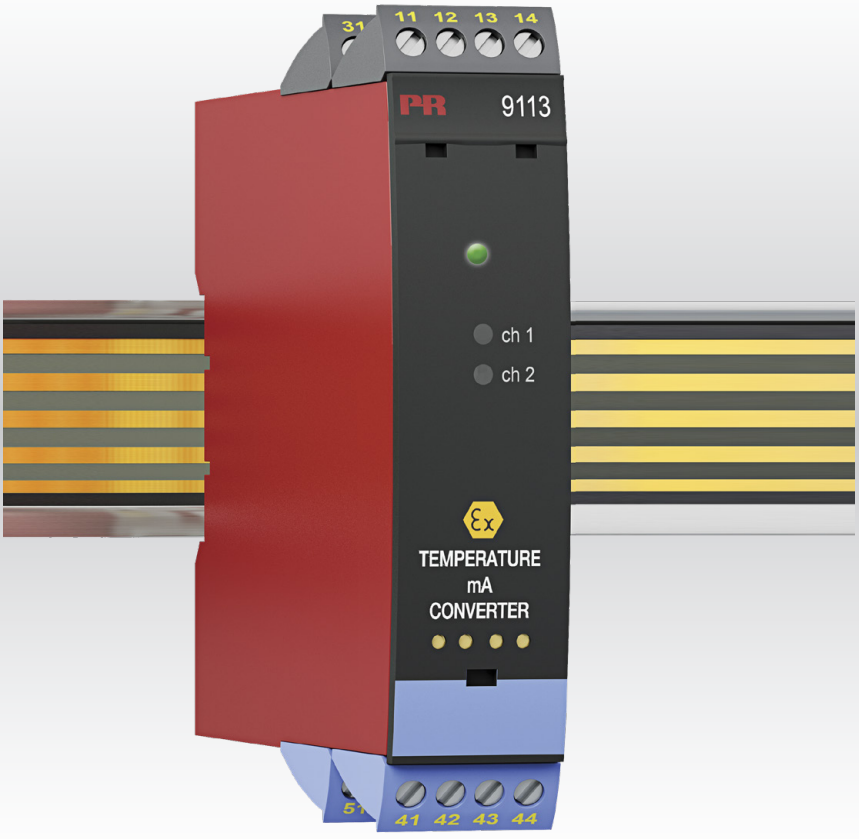
Configuration Manual
9113 / 4511
Modbus RTU configuration of
9113 Temperature / mA converter



TEMPERATURE | I.S. INTERFACES | COMMUNICATION INTERFACES | MULTIFUNCTIONAL | ISOLATION | DISPLAY

No. 9113MCM101-UK
For 4511 devices from ser. no. 141590001

PR electronics

6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.

Temperature

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.

I.S. Interface

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.

Communication

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. All the interfaces are detachable, have a built-in display for readout of process values and diagnostics, and can be configured via push-buttons. Product specific functionality includes communication via Modbus and Bluetooth and remote access using our PR Process Supervisor (PPS) application, available for iOS and Android.

Multifunction

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.

Isolation

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.

Display

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.

Contents

Introduction

This configuration manual

contains the necessary information for configuring a PR 9113 device which is connected to a PR 4511 Modbus RTU enabler.

Modbus is a "master-slave" system,

where the "master" communicates with one or multiple "slaves".

The master typically is a PLC (Programmable Logic Controller), DCS (Distributed Control System), HMI (Human Machine Interface), RTU (Remote Terminal Unit) or PC.

The three most common Modbus versions used are: MODBUS ASCII, MODBUS RTU and MODBUS/TCP.

In Modbus RTU, data is coded in binary, and requires only one communication byte per data byte. This is ideal for use over multi-drop RS485 networks, at speeds up to 115,200 bps.
The most common speeds are 9,600 bps and 19,200 bps.

Modbus RTU is the most widely used industrial protocol and is supported by the 4511.

Modbus RTU

To communicate with a slave device, the master sends a message containing:

Device Address - Function Code - Data - Error Check

The Device Address is a number from 0 to 247.

Messages sent to address 0 (broadcast messages) will be accepted by all slaves, but numbers 1-247 are addresses of specific devices. With the exception of broadcast messages, a slave device always responds to a Modbus message so the master knows the message was received.

4511 Supported Modbus Function Codes

Command	Function code
Read Holding Registers*	03
Read Input Registers*	04
Write Single Register	06
Diagnostics	08
Write Multiple Registers	16

*Holding Registers and Input Registers contain identical data in PR 4511.

The Function Code defines the command that the slave device is to execute, such as read data, accept data, report status. Some function codes have sub-function codes.

The Data defines addresses in the device's memory map for read functions, contains data values to be written into the device's memory, or contains other information needed to carry out the function requested.

The Error Check is a 16-bit numeric value representing the Cyclic Redundancy Check (CRC).

Maximum number of registers which can be read or written at once

For a read command, the limit is 8 registers at a baud rate up to 38,400 bps,
16 registers @ 57,800 bps and 32 registers @ 115,200 bps.

For a write command, the limit is 123 registers at baud rates up to 115,200 bps.

4511 Modbus parameter settings

Automatic Baudrate Detection:	Can be configured YES or **NO**
Supported baudrates:	2400, 4800, 9600, **19.2k**, 38.4k, 57.6k, 115.2k bps
Parity Mode:	**Even**, Odd or None parity
Stop Bits:	**1** or 2 stop bits
Response delay:	0...1000 ms **(0 ms = default)**
Modbus slave addressing range:	1 - 247 **(247 = default address)**
Modbus Parameter Storage:	Saved in non-volatile memory in the 4511 device

(Factory Default Values are marked in **bold**)

Modbus RTU segment line termination

A 120 Ohm resistor should be installed on both ends of a RS485 Modbus RTU segment loop to prevent signal echoes from corrupting data on the line.

9113 Parameter Lists

9113 Configuration Parameter List

Category	Parameter Name	Modbus Address	Register Size	Read/ Write	Type	Description	Values
GENERAL	DEVICE TYPE	0	1	RO	UNSIGNED INTEGER	Defines the actual device type	9113A = 4410 (0x113A) 9113B = 4411 (0x113B)
GENERAL	DEVICE VERSION	1	1	RO	UNSIGNED INTEGER	Product version	0
INPUT 1	INPUT TYPE CH1	2	1	R/W	INTEGER	Selected input type (Temperature or Current)	TEMP = 0 CURR = 1
INPUT 1	INPUT CURRENT RANGE CH1	3	1	R/W	INTEGER	Fixed input range for current measurements	0...20 mA = 0 4...20 mA = 1
INPUT 1	CONNECTION TYPE CH1	4	1	R/W	INTEGER	Sensor connection type for RTD measurements	2-wire = 0 3-wire = 1 4-wire = 2
INPUT 1	TEMP UNIT CH1	5	1	R/W	INTEGER	Temperature units	°C = 0 °F = 1
INPUT 1	TEMP SENSOR TYPE CH1	6	1	R/W	INTEGER	Temperature sensor type	TC = 0 Ni = 1 Pt = 2
INPUT 1	PT TYPE CH1	7	1	R/W	INTEGER	Pt value (Pt10, Pt20, Pt50...)	Pt10 = 0 Pt20 = 1 Pt50 = 2 Pt100 = 3 Pt200 = 4 Pt250 = 5 Pt300 = 6 Pt400 = 7 Pt500 = 8 Pt1000 = 9
INPUT 1	NI TYPE CH1	8	1	R/W	INTEGER	Ni value (Ni50, Ni100, Ni120...)	Ni50 = 0 Ni100 = 1 Ni120 = 2 Ni1000 = 3
INPUT 1	TC TYPE CH1	9	1	R/W	INTEGER	Thermocouple type (TCB, TCK etc.)	TC type B = 0 TC type E = 1 TC type J = 2 TC type K = 3 TC type L = 4 TC type N = 5 TC type R = 6 TC type S = 7 TC type T = 8 TC type U = 9 TC type W3 = 10 TC type W5 = 11 TC type Lr = 12
INPUT 1	CJC TYPE CH1	10	1	R/W	INTEGER	CJC compensation type for TC temperature types (internal or connector)	INTERNAL = 0 CONNECTOR = 1
DISPLAY 1	DISPLAY LOW CHANNEL 1	16	1	R/W	INTEGER	Low display range for display read out of non-temperature input types. DISPLAY UNIT and DECIMAL POINT is forced to "mA" and "xx.xx"	Only the values 0 or 400 corresponding to 0.00 mA or 4.00mA is applicable. (depending on selected INPUT CURRENT RANGE).
DISPLAY 1	DISPLAY HIGH CHANNEL 1	17	1	R/W	INTEGER	High display range for display read out of non-temperature input types. DISPLAY UNIT and DECIMAL POINT is forced to "mA" and "xx.xx"	Only the value 2000, corresponding to 20.00mA, is applicable.
OUTPUT 1	CURRENT OUTPUT RANGE CH1	32	1	R/W	INTEGER	Fixed output range for current output	0...20 mA = 0 4...20 mA = 1 20...0 mA = 2 20...4 mA = 3
OUTPUT 1	OUTPUT ERROR CH1	33	1	R/W	INTEGER	Analog output action on error. This sets the output error signaling value (If set to none sensor error detection is disabled)	NONE = 0 0 mA = 1 3.5 mA = 2 23 mA = 3
OUTPUT 1	OUTPUT LOW CH1	34	2	R/W	INTEGER	Temperature for output low value for temperature input types 1/10°	Range equals the measurement range for the selected sensor type, see table 2. Must be 10 (1.0°) lower than OUTPUT HIGH CH1
OUTPUT 1	OUTPUT HIGH CH1	36	2	R/W	INTEGER	Temperature for output high value for temperature input types in 1/10°	Range equals the measurement range for the selected sensor type, see table 2. Must be 10 (1.0°) higher than OUTPUT LOW CH1
OUTPUT 1	OUTPUT RESPONSE TIME CH1	38	1	R/W	UNSIGNED INTEGER	Analog output response time in 1/10 seconds	0..600 (0 to 60.0sec)

Category	Parameter Name	Modbus Address	Register Size	Read/ Write	Type	Description	Values
INPUT 1	CALIB RANGE LOW CH1	39	2	R/W	FLOAT	Actual process value for low calibration point in either display values or 1/10°C	**For mA input:** the range is DISPLAY LOW...DISPLAY HIGH **For temperature input types:** the range equals the measurement range for the selected sensor type
INPUT 1	CALIB RANGE HIGH CH1	41	2	R/W	FLOAT	Actual process value for high calibration point in either display values or 1/10°C	As CALIB RANGE LOW
INPUT 1	CALIB POINT LOW CH1	43	2	R/W	FLOAT	Measured process value for low calibration point in either display values or 1/10°C. (Must be copied from PROCESS DATA)	As CALIB RANGE LOW
INPUT 1	CALIB POINT HIGH CH1	45	2	R/W	FLOAT	Measured process value for high calibration point in either display values or 1/10°C. (Must be copied from PROCESS DATA)	As CALIB RANGE LOW
INPUT 1	USE CALIB CH1	47	1	R/W	INTEGER	Use the applied calibration values	NO = 0 YES = 1
INPUT 2	INPUT TYPE CH2	102	1	R/W	INTEGER	Selected input type (Temperature or Current)	TEMP = 0 CURR = 1
INPUT 2	INPUT CURRENT RANGE CH2	103	1	R/W	INTEGER	Fixed input range for current measurements	0...20 mA = 0 4...20 mA = 1
INPUT 2	CONNECTION TYPE CH2	104	1	R/W	INTEGER	Sensor connection type for RTD measurements	2-wire = 0 3-wire = 1 4-wire = 2
INPUT 2	TEMP UNIT CH2	105	1	R/W	INTEGER	Temperature units	°C = 0 °F = 1
INPUT 2	TEMP SENSOR TYPE CH2	106	1	R/W	INTEGER	Temperature sensor type	TC = 0 Ni = 1 Pt = 2
INPUT 2	PT TYPE CH2	107	1	R/W	INTEGER	Pt value (Pt10, Pt20, Pt50...)	Pt10 = 0 Pt20 = 1 Pt50 = 2 Pt100 = 3 Pt200 = 4 Pt250 = 5 Pt300 = 6 Pt400 = 7 Pt500 = 8 Pt1000 = 9
INPUT 2	NI TYPE CH2	108	1	R/W	INTEGER	Ni value (Ni50, Ni100, Ni120...)	Ni50 = 0 Ni100 = 1 Ni120 = 2 Ni1000 = 3
INPUT 2	TC TYPE CH2	109	1	R/W	INTEGER	Thermocouple type (TCB, TCK etc.)	TC type B = 0 TC type E = 1 TC type J = 2 TC type K = 3 TC type L = 4 TC type N = 5 TC type R = 6 TC type S = 7 TC type T = 8 TC type U = 9 TC type W3 = 10 TC type W5 = 11 TC type Lr = 12
INPUT 2	CJC TYPE CH2	110	1	R/W	INTEGER	CJC compensation type for TC temperature types (internal or connector)	INTERNAL = 0 CONNECTOR= 1
DISPLAY 2	DISPLAY LOW CHANNEL 2	116	1	R/W	INTEGER	Low range for display read out of current input type. DISPLAY UNIT and DECIMAL POINT is forced to "mA" and "xx.xx")	Only the values 0 or 400, corresponding to 0.00 mA or 4.00mA is applicable. (depending on selected INPUT CURRENT RANGE).
DISPLAY 2	DISPLAY HIGH CHANNEL 2	117	1	R/W	INTEGER	High range for display read out of current input type. DISPLAY UNIT and DECIMAL POINT is forced to "mA" and "xx.xx".	Only the value 2000, corresponding to 20.00mA, is applicable.
OUTPUT 2	CURRENT OUTPUT RANGE CH2	132	1	R/W	INTEGER	Fixed output range for current output	0...20 mA = 0 4...20 mA = 1 20...0 mA = 2 20...4 mA = 3
OUTPUT 2	OUTPUT ERROR CH2	133	1	R/W	INTEGER	Analog output action on error. This sets the output error signaling value (If set to none sensor error detection is disabled)	NONE = 0 0 mA = 1 3.5 mA = 2 23 mA = 3

Category	Parameter Name	Modbus Address	Register Size	Read/ Write	Type	Description	Values
OUTPUT 2	OUTPUT LOW CH2	134	2	R/W	INTEGER	Temperature for output low value for temperature input types in 1/10°	Range equals the measurement range for the selected sensor type, see table 2. Must be 10 (1.0°) lower than OUTPUT HIGH CH2
OUTPUT 2	OUTPUT HIGH CH2	136	2	R/W	INTEGER	Temperature for output high value for temperature input types in 1/10°	Range equals the measurement range for the selected sensor type, see table 2. Must be 10 (1.0°) higher than OUTPUT LOW CH2
OUTPUT 2	OUTPUT RESPONSE TIME CH2	138	1	R/W	UNSIGNED INTEGER	Analog output response time in 1/10 seconds	0...600 (0 to 60.0 s)
INPUT 2	CALIB RANGE LOW CH2	139	2	R/W	FLOAT	Actual process value for low calibration point in either display values or 1/10°C	**For mA input:** the range is DISPLAY LOW...DISPLAY HIGH **For temperature input types:** the range equals the measurement range for the selected sensor type
INPUT 2	CALIB RANGE HIGH CH2	141	2	R/W	FLOAT	Actual process value for high calibration point in either display values or 1/10°C	As CALIB RANGE LOW
INPUT 2	CALIB POINT LOW CH2	143	2	R/W	FLOAT	Measured process value for low calibration point in either display values or 1/10°C (Must be copied from PROCESS DATA)	As CALIB RANGE LOW
INPUT 2	CALIB POINT HIGH CH2	145	2	R/W	FLOAT	Measured process value for high calibration point in either display values or 1/10°C. (Must be copied from PROCESS DATA)	As CALIB RANGE LOW
INPUT 2	USE CALIB CH2	147	1	R/W	INTEGER	Use the applied calibration values	NO = 0 YES = 1
GENERAL	PASSWORD	200	1	R/W	UNSIGNED INTEGER	Write this parameter to change password value	0...9999
GENERAL	PASSWORD ATTEMPT	201	1	R/W	UNSIGNED INTEGER	Write the value of PASSWORD to this parameter to open device for configuration if password is set	0...9999
DISPLAY	DISPLAY CONTRAST	202	1	R/W	UNSIGNED INTEGER	Contrast in the LCD display	Range: 0...9
DISPLAY	DISPLAY BACKLIGHT	203	1	R/W	UNSIGNED INTEGER	Backlight intensity in LCD	Range: 0...9
DISPLAY 1	TAG TEXT	204	3	R/W	ASCII CHAR	Tag of the device (5 characters)	Range: ASCII values from 32 to 90 ('-' to 'Z').
DISPLAY 2	TAG TEXT	207	3	R/W	ASCII CHAR	Tag of the device (5 characters)	Range: ASCII values from 32 to 90 ('-' to 'Z').
DISPLAY	LINE FUNCTION	210	1	R/W	UNSIGNED INTEGER	Information shown in line 2/3 of display in monitor mode (normal mode).	INPUT VALUE = 0 OUTPUT VALUE = 1 TAG = 2 ALTERNATING = 3
GENERAL	ENABLE PASSWORD	211	1	R/W	UNSIGNED INTEGER	Password protect configuration	NO = 0 YES = 1
GENERAL	HELP TEXT LANGUAGE	213	1	R/W	UNSIGNED INTEGER	Language for the help texts shown on display	UK = 0 DK = 1 DE = 2 FR = 3 SE = 4 IT = 5 ES = 6
GENERAL	ENABLE RAIL ERROR SIGNAL	214	1	R/W	UNSIGNED INTEGER	Rail error relay function	NO = 0 YES = 1
GENERAL	ENABLE SIL MODE	215	1	RO	UNSIGNED INTEGER	Shows if the device is SIL Locked	NO = 0 YES = 1
GENERAL	CHECK SUM	300	1	RO	UNSIGNED INTEGER	CRC16 checksum of the configuration	Range 0...65536
GENERAL	Configuration counter	301	1	RO	UNSIGNED INTEGER	This counter will count the number of times the configuration has been changed. The counter is reset on power-up	Range 0...65536

9113 Process Parameter List

Parameter Name	Register Address	Register Size	Read/ Write	Type	Description	Values
PROCESS VALUE CH1	1000	2	RO	FLOAT	The measured process value. **Temperature** is represented as 1/10 of degrees (i.e. with fixed decimal point at 0.1°C or 0.1°F) If the selected temperature unit is different from °C and the selected measurement type is a temperature type, the process value is converted to the selected temperature unit. **When measuring a mA** signal the process value will be the configured display range and decimal point. (0.00...20.00 or 4.00...20.00)	**Range for temperature input types:** equals the measurement range for the selected sensor type **Range for mA input types:** DISPLAY LOW...DISPLAY HIGH
OUTPUT VALUE CH1	1002	1	RO	INTEGER	The output 1 value in µA.	Range: 0...23000 (23 mA)
MEASURE STATUS CH1	1004	1	RO	UNSIGNED INTEGER	The actual measurement status	LEAD_BREAKAGE bit 0 SHORT_CIRCUIT bit 1 INPUT_OVERRANGE bit 2 INPUT_UNDERRANGE bit 3 Not used bit 4-7
ERROR STATUS CH1	1005	1	RO	UNSIGNED INTEGER	The actual error status (device errors)	RAM_ERROR bit 0 FLASH_ERROR bit 1 SOFTWARE_ERROR bit 2 ADC_ERROR bit 3 OUTPUT_SUPPLY_ERROR bit 4 INPUT_SUPPLY_ERROR bit 5 CJC_ERROR bit 6 EXT_CJC_ERROR bit 7 CALIB_ERROR bit 8 CONFIG_ERROR bit 9 BAD_OUTPUT_ERROR bit 10 MAIN_CPU_ERROR bit 11 RELAY_ERROR bit 12 INIT_ERROR bit 13 RESET_ERROR bit 14 INPUTCOM_ERROR bit 15
CONFIGURA-TION STATUS CH1	1006	2	RO	ASCII CHAR	Status of the last approved configuration	**"FAIL"** No valid configuration has been received **"OPEN"** Actual configuration is NOT locked (non-SIL) **"LOCK"** Actual configuration is locked (SIL) **"INIT"** Initial status after a power-up/reset
PROCESS VALUE CH2	1100	2	RO	FLOAT	The measured process value. **Temperature** is represented as 1/10 of degrees (i.e. with fixed decimal point at 0.1°C or 0.1°F) If the selected temperature unit is different from °C and the selected measurement type is a temperature type, the process value is converted to the selected temperature unit. **When measuring a mA** signal the process value will be the configured display range and decimal point. (0.00...20.00 or 4.00...20.00)	**Range for temperature input types:** equals the measurement range for the selected sensor type **Range for mA input types:** DISPLAY LOW...DISPLAY HIGH
OUTPUT VALUE CH2	1102	1	RO	INTEGER	The output 2 value in µA	Range: 0...23000 (23 mA)
MEASURE STATUS CH2	1104	1	RO	UNSIGNED INTEGER	The actual measurement status	LEAD_BREAKAGE bit 0 SHORT_CIRCUIT bit 1 INPUT_OVERRANGE bit 2 INPUT_UNDERRANGE bit 3 Not used bit 4-7
ERROR STATUS CH2	1105	1	RO	UNSIGNED INTEGER	The actual error status (device errors)	RAM_ERROR bit 0 FLASH_ERROR bit 1 SOFTWARE_ERROR bit 2 ADC_ERROR bit 3 OUTPUT_SUPPLY_ERRORbit 4 INPUT_SUPPLY_ERROR bit 5 CJC_ERROR bit 6 EXT_CJC_ERROR bit 7 CALIB_ERROR bit 8 CONFIG_ERROR bit 9 BAD_OUTPUT_ERROR bit 10 MAIN_CPU_ERROR bit 11 RELAY_ERROR bit 12 INIT_ERROR bit 13 RESET_ERROR bit 14 INPUTCOM_ERROR bit 15

CONFIGURA-TION STATUS CH2	1106	2	RO	ASCII CHAR	Status of the last approved configuration	**"FAIL"** No valid configuration has been received **"OPEN"** Actual configuration is NOT locked (non-SIL) **"LOCK"** Actual configuration is locked (SIL) **"INIT"** Initial status after a power-up/reset
ERROR STATUS	1200	1	RO	UNSIGNED INTEGER	Status of common device errors. If any bits in the ERROR STATUS parameter are set, both channels have entered a safe state, where the analog outputs is forced below 3.5 mA and the relay contact is de-energized (only 9113). All other process data values are then unpredictable, and shall not be relied upon nor used for any user information!	MAIN_CH1_COMM_ERROR bit 0 MAIN_CH2_COMM_ERRORbit 1 MAIN_CONFIG_ERROR bit 2 MAIN_FLASH_ERROR bit 3 MAIN_RAM_ERROR bit 4 MAIN_SUPPLY_ERROR bit 5 MAIN_INIT_ERROR bit 6 MAIN_PRGFLOW_ERROR bit 7
OUT STATE	1201	1	RO	UNSIGNED INTEGER	Status of LEDs and error relay / power rail error signal.	Power LED, bit 0 0 = OFF, 1 = ON. Relay LED, bit 1 0 = OFF, 1 = ON. Channel 1 Status LED, bit 2 0 = OFF, 1 = ON. Channel 2 Status LED, bit 3 0 = OFF, 1 = ON. Power Rail signal, bit 4 0 = Open, 1 = Closed Status Relay (N.C.), bit 5 0 = Energized, 1 = De-energized Not used bit 6-7

9113 Simulation Parameter List

Parameter Name	Register Address	Register Size	Read/ Write	Type	Description	Values
MEASUREMENT CONTROL CH1	2000	1	R/W	UNSIGNED INTEGER	Controls various updates of process values and configuration. All simulation functions are ignored if ENABLE SIL MODE = YES	**Bit 0-2:** Disables updating of various process parameters enabling simulation using SIMULATION VALUE Value 0: NONE - All simulation disabled. Value 1: RELAY_SIM - The updating of the relay (RELAYSTATUS) is disabled. Value 2: OUT_SIM - The updating of the analog output (OUTPUT VALUE) is disabled. Value 3: SETP_SIM - SETPOINT for the relay is overwritten with SIMULATION VALUE enabling temporary fast setting of relay. Value 4: MEAS_SIM -The updating of input value (PROCESS VALUE) is disabled. Value 5: PROCESS_SIM - When set, PROCESS VALUE is updated without user calibrated values, facilitating a new process calibration Value 6-7: Unused **Bit 3:** RELAY_INV 1 = Current relay state is inverted. **Bit 4-7:** Reserved - must be set to 0!
SIMULATION VALUE CH1	2001	2	R/W	INTEGER	Common simulation parameter. Function is dependent on the bits set in MEASUREMENT CONTROL: If single bit values are simulated, a zero will indicate an inactive output. Integer values are always represented from the LSB and up.	The entered simulation values must match the corresponding simulated data type dependent on the value of MEASUREMENT CONTROL CH1 bit 0-2: RELAY_SIM: Simulates RELAY STATUS CH1 OUT_SIM: Simulates OUTPUT VALUE CH1 (in µA) SETP_SIM: Simulates RELAY SETPOINT CH1 MEAS_SIM: Simulates PROCESS VALUE CH1 (display values) PROCESS_SIM: N.A.
MEASUREMENT CONTROL CH2	2100	1	R/W	UNSIGNED INTEGER	As MEASUREMENT CONTROL CHANNEL 1	
SIMULATION VALUE CH2	2101	1	R/W	INTEGER	As SIMULATION VALUE CHANNEL 1	
OUT STATE	2200	1	R/W	UNSIGNED INTEGER	This parameter is used to simulate the process parameter with the same name.	Power LED, 0 = OFF, 1 = ON. bit 0 Relay LED, 0 = OFF, 1 = ON.bit 1 Channel 1 Status LED, bit 2 0 = OFF, 1 = ON. Channel 2 Status LED, bit 3 0 = OFF, 1 = ON. Power Rail signal, bit 4 0 = Open, 1 = Closed Status Relay (N.C.), bit 5 0 = Energized, 1 = De-energized Not used bit 6-7
MEASUREMENT CONTROL COMMON	2201	1	R/W	UNSIGNED INTEGER	Disables various updates of process values and configuration, enabling simulation using OUT STATE. All simulation functions, except bit 0 and 7, are ignored if ENABLE SIL MODE = YES. All bits, except for bit 0 and bit 7, are cleared when the parameter SIMULATION TIMEOUT reaches zero.	**Bit 0:** If set, all errors are cleared and configuration is reread from external flash. The bit is automatically cleared when executed. **Bit 1-2:** Reserved - must be set to 0! **Bit 3:** If set, the updating of Power Rail status is disabled, enabling simulation and test. **Bit 4:** If set the updating of status relay is disabled, enabling simulation and test. **Bit 5:** If set, the updating of all LED's is stopped so they can be controlled from OUT STATE. **Bit 6:** Unused. **Bit 7:** If set, all LEDs will be turned off until cleared or 10 scans after the last successfull communication.
SIMULATION TIMEOUT	2202	1	R/W	UNSIGNED INTEGER	Timeout counter disabling all simulation, ensuring that normal measure status is re-established. The counter is decremented every 75 ms until it reaches zero (timeout). Can be used to set different timeouts, i.e. setting the value to 133 will make the timeout occur appr. (133 * 0.075 ms) = 10 seconds after it was set.	Minimum timeout value is 0 s (which will also disable all simulation values before they take effect). Maximum timeout value is 255 * 0.075 s = 19.13 s.

Table 1: Display units

0	°C	10	mils	20	in/s	30	t	40	kJ	50	kA	60	m^3/h
1	°F	11	yd	21	ips	31	kg	41	Wh	51	mA	61	l/s
2	K	12	m^3	22	ft/s	32	g	42	MWh	52	µA	62	l/min
3	%	13	l	23	in/min	33	N	43	kWh	53	V	63	l/h
4	m	14	s	24	ft/min	34	Pa	44	W	54	kV	64	gal/min
5	cm	15	min	25	in/h	35	MPa	45	GW	55	mV	65	gal/h
6	mm	16	m/s	26	ft/h	36	kPa	46	MW	56	Ω	66	t/h
7	µm	17	mm/s	27	m/s^2	37	hPa	47	kW	57	S	67	mol
8	ft	18	m/min	28	rpm	38	bar	48	hp	58	µS	68	pH
9	in	19	m/h	29	Hz	39	mbar	49	A	59	m^3/min	69	[blank]

9113 Input Types and Ranges

Input type	Min. value	Max. value	Standard
mA	0 mA	20 mA	-
Pt10...Pt1000	-200°C	+850°C	IEC 60751
Ni50...Ni1000	-60°C	+250°C	DIN 43760
TC B	0°C	+1820°C	IEC 60584-1
TC E	-100°C	+1000°C	IEC 60584-1
TC J	-100°C	+1200°C	IEC 60584-1
TC K	-180°C	+1372°C	IEC 60584-1
TC L	-200°C	+900°C	DIN 43710
TC N	-180°C	+1300°C	IEC 60584-1
TC R	-50°C	+1760°C	IEC 60584-1
TC S	-50°C	+1760°C	IEC 60584-1
TC T	-200°C	+400°C	IEC 60584-1
TC U	-200°C	+600°C	DIN 43710
TC W3	0°C	+2300°C	ASTM E988-90
TC W5	0°C	+2300°C	ASTM E988-90
TC LR	-200°C	+800°C	GOST 3044-84

4511 Modbus Parameter Lists

4511 Modbus Configuration Parameter List

Parameter Name	Register Address	Register Size	Read/ Write	Type	Description	Values
ENABLE MODBUS	3000	1	R/W	INTEGER	Enable Modbus communication. If disabled, 4511 ignores all frames sent from the Modbus master and the only way to re-enable Modbus communication is by using the 4511 menu.	NO = 0 YES = 1
BAUDRATE	3001	1	R/W	INTEGER	The baud value used for Modbus communication	2400 BAUD = 0 4800 BAUD = 1 9600 BAUD = 2 19200 BAUD = 3 38400 BAUD = 4 57600 BAUD = 5 115200 BAUD = 6
ENABLE AUTOBAUD	3002	1	R/W	INTEGER	Enable automatic baudrate detection. If enabled, 4511 determines the baudrate automatically by listening to frames sent on the Modbus line.	NO = 0 YES = 1
PARITY	3003	1	R/W	INTEGER	Configures parity check on Modbus frames	NONE = 0 EVEN PARITY = 1 ODD PARITY = 2
STOP BITS	3004	1	R/W	INTEGER	Configures the number of stop bits in Modbus frames	ONE STOP BIT = 1 TWO STOP BITS = 2
ADDRESS	3005	1	R/W	INTEGER	Configures the Modbus address of the 4511 (Address 0 is broadcast address)	Range: 1...247
RESPONSE DELAY	3006	1	R/W	INTEGER	Configures minimum delay for Modbus response in ms	Range: 0...1000

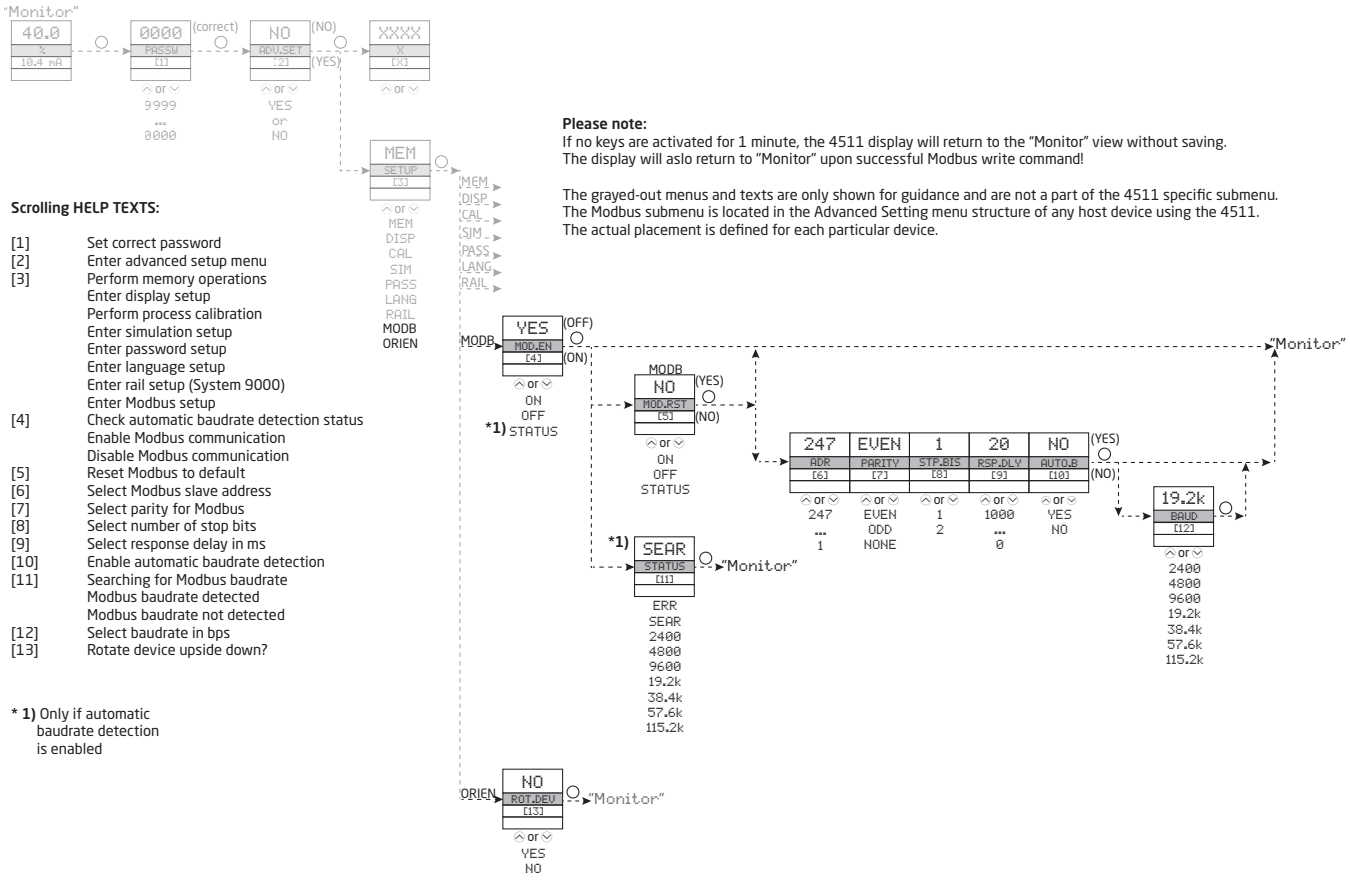
4511 Additional Parameter List

Parameter Name	Register Address	Register Size	Read/ Write	Type	Description	Values
ROTATE DEVICE	3100	1	R/W	INTEGER	Enables the display and key buttons to be used normally when the host device is mounted upside down	NO = 0 YES = 1

4511 Modbus Status Parameter List

Parameter Name	Register Address	Register Size	Read/ Write	Type	Description	Values
AUTOBAUD STATUS	4000	1	RO	INTEGER	Actual state of automatic baudrate detection	2400 BAUD = 0 4800 BAUD = 1 9600 BAUD = 2 19200 BAUD = 3 38400 BAUD = 4 57600 BAUD = 5 115200 BAUD = 6 SEARCHING = 7 ERROR = 8
IDENTIFY DEVICE	4001	1	R/W	INTEGER	Enables the device to flash the LCD background with approx. 4 Hz. **Value will automatically return to NO if not written within 10 seconds!**	NO = 0 YES = 1
MAXIMUM READ REGISTERS	4002	1	RO	INTEGER	Maximum allowed number of registers that can be read in one command, with the given/detected baudrate	Range: 8...32

4511 Modbus Front Programming Parameter Menu



Please note:
If no keys are activated for 1 minute, the 4511 display will return to the "Monitor" view without saving.
The display will aslo return to "Monitor" upon successful Modbus write command!

The grayed-out menus and texts are only shown for guidance and are not a part of the 4511 specific submenu.
The Modbus submenu is located in the Advanced Setting menu structure of any host device using the 4511.
The actual placement is defined for each particular device.

Scrolling HELP TEXTS:

[1]	Set correct password
[2]	Enter advanced setup menu
[3]	Perform memory operations
	Enter display setup
	Perform process calibration
	Enter simulation setup
	Enter password setup
	Enter language setup
	Enter rail setup (System 9000)
	Enter Modbus setup
[4]	Check automatic baudrate detection status
	Enable Modbus communication
	Disable Modbus communication
[5]	Reset Modbus to default
[6]	Select Modbus slave address
[7]	Select parity for Modbus
[8]	Select number of stop bits
[9]	Select response delay in ms
[10]	Enable automatic baudrate detection
[11]	Searching for Modbus baudrate
	Modbus baudrate detected
	Modbus baudrate not detected
[12]	Select baudrate in bps
[13]	Rotate device upside down?

*** 1)** Only if automatic baudrate detection is enabled

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