

# QUICK GUIDE

## Reference Probe Modbus RTU (HA010406)

### General Information

The Reference Probe Modbus RTU supplies fixed values for a multitude of measurands, see the Modbus register map below. It is dedicated for easily testing the correct function and accuracy of the Sigma 05 sensor hub, as well as of the measurement or control loop including Sigma 05. For this, the Reference Probe shall be connected to Sigma 05 instead of the E+E measurement probe.

### Test Modes

#### Plug-and-Play

The plug-and-play test mode uses the Reference Probe out of the box. With factory setup, this simulates a generic RH / T sensing probe. The Sigma 05 automatically recognizes the Reference Probe and assigns the default fix RH and T values to the outputs and to the optional display according to the Probe Combinations and Automatic Discovery spreadsheet in the Sigma 05 Quick Guide and User Manual.

#### Probe Simulation

Beside the generic RH / T probe (factory setup), the reference probe can simulate any other Sigma compatible probe in the field. For this, set the Reference Probe's device name, Modbus address, full scale (for CO<sub>2</sub> and air velocity probes only), baud rate, data bits, parity and stop bits to the same values as the specific probe to be replaced (see section "Modbus Communication Setup" below).

### Test Procedure

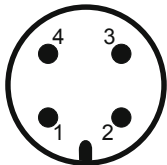
1. Power off Sigma 05.
2. Plug off the measurement probe and plug in the Reference Probe instead.
3. Power on Sigma 05 and check its outputs and/or display. In case of correct operation, the readings match the fix values from the selected register addresses (see Modbus register map below).

### Electrical Connection



#### Important note:

The manufacturer cannot be held responsible for personal injuries or damage to property as a result of incorrect handling, installation, wiring, power supply and maintenance of the device.



M12 device plug front view

Pin number	Function
1	Supply voltage 10 - 28 V DC
2	RS485 B (D-)
3	GND
4	RS485 A (D+)

### Modbus Communication Setup

	Factory settings	Selectable values
<b>Baud rate</b>	9600	9600, 19200, 38400, 57600, 115200
<b>Data bits</b>	8	8
<b>Parity</b>	Even	None, even, odd
<b>Stop bits</b>	1	1, 2
<b>Modbus address</b>	232	1...247

The recommended settings for multiple devices in a Modbus RTU network are 9600, 8, Even, 1. The Reference Probe represents 1 unit load in a Modbus network.

Device name, Modbus address, baud rate, parity, stop bits and full scale (for CO<sub>2</sub> and air velocity probes only) as well as the default value of each parameter of the Modbus Register Map can be set via:

1. PCS10 Product Configuration Software and the appropriate configuration adapter HA011018. The PCS10 can be downloaded free of charge from [www.epluse.com/PCS10](http://www.epluse.com/PCS10).
2. Modbus protocol in the register 60001 (0x00) and 60002 (0x01), see Modbus Application Note AN0103.

The serial number in ASCII format is located at read register address 30001-30008 (16 bits per address). The firmware version is located at register address 30009 (bit 15...8 = major release; bit 7...0 = minor release). The Reference Probe name is located at register address 30010.

Communication settings (INTEGER 16 bit)		
Parameter	Register number <sup>1)</sup> [DEC]	Register address <sup>2)</sup> [HEX]
<b>Write register: function code 0x06</b>		
Modbus address	1	0x00
Modbus protocol settings <sup>3)</sup>	2	0x01
Device information (INTEGER 16 bit)		
Parameter	Register number <sup>1)</sup> [DEC]	Register address <sup>2)</sup> [HEX]
<b>Read register: function code 0x03 / 0x04</b>		
Serial number (as ASCII)	1	0x00
Firmware version	9	0x08
Device name (as ASCII)	10	0x09
Status/Error Information	602	0x259

1) Register number starts from 1.

2) Protocol address starts from 0.

3) For Modbus protocol settings see Modbus Application Note AN0103.

## Modbus Register Map

Parameter	Unit	FLOAT 32		
		Register number <sup>1)</sup> [DEC]	Register address <sup>2)</sup> [HEX]	Default value <sup>3)</sup>
<b>Read register: function code 0x03 / 0x04<sup>3)</sup></b>				
Temperature T	[°C]	1003	0x3EA	25
Temperature T	[°F]	1005	0x3EC	70
Temperature T	[K]	1009	0x3F0	300
Relative humidity Uw	[%]	1021	0x3FC	50
(Air) Velocity/Flow v	[m/s]	1041	0x410	3
(Air) Velocity/Flow v	[ft/min]	1043	0x412	590
Standardized (Air) Velocity/Flow vn	[m/s]	1045	0x414	0.45
Standardized (Air) Velocity/Flow vn	[ft/min]	1047	0x416	88.5
CO <sub>2</sub> mean value	[ppm]	1061	0x424	750
CO <sub>2</sub> raw	[ppm]	1063	0x426	800
Water vapor partial pressure e	[mbar]	1101	0x44C	20
Water vapor partial pressure e	[psi]	1103	0x44E	0.5
Dew point temperature Td	[°C]	1105	0x450	-10
Dew point temperature Td	[°F]	1107	0x452	10
Wet bulb temperature Tw	[°C]	1109	0x454	20
Wet bulb temperature Tw	[°F]	1111	0x456	60
Absolute humidity dv	[g/m <sup>3</sup> ]	1113	0x458	10
Absolute humidity dv	[gr/ft <sup>3</sup> ]	1115	0x45A	5
Mixing ratio r	[g/kg]	1121	0x460	8
Mixing ratio r	[gr/lb]	1123	0x462	60
Specific enthalpy h	[kJ/kg]	1125	0x464	45
Specific enthalpy h	[ft lbf/lb]	1127	0x466	19450
Specific enthalpy h	[BTU/lb]	1129	0x468	25
Frost point temperature Tf	[°C]	1131	0x46A	-10
Frost point temperature Tf	[°F]	1133	0x46C	20
Water activity aw	[1]	1135	0x47C	0.5
(Humidity) Saturation S	[%]	1137	0x4D4	50
Water content X	[ppm]	1141	0x4D6	20
Wet bulb temperature Tw	[K]	1145	0x4D8	250
Dew point temperature Td	[K]	1147	0x47A	200
Frost point temperature Tf	[K]	1149	0x47C	220

1) Register number starts from 1.

2) Register address starts from 0.

3) If needed, the default value can be changed with PCS10 Product Configuration Software.

FLOAT 32

Parameter	Unit	Register number <sup>1)</sup> [DEC]	Register address <sup>2)</sup> [HEX]	Default value <sup>3)</sup>
<b>Read register: function code 0x03 / 0x04<sup>3)</sup></b>				
Volume concentration Wv	[ppm]	1151	0x47E	10000
Volume concentration Wv	[%]	1155	0x482	1.4
Volume concentration Wv	[%]	1157	0x484	12
Air / ambient pressure p	[mbar]	1201	0x4B0	1013
Air / ambient pressure p	[psi]	1203	0x4B2	75
Air / ambient pressure p	[bar]	1209	0x4B8	1
Differential pressure Δp	[mbar]	1213	0x4BC	5
Differential pressure Δp	[Pa]	1215	0x4BE	50
Differential pressure Δp	[kPa]	1217	0x4C0	120
Differential pressure Δp	[inch WC]	1219	0x4C2	20
Saturation vapor pressure above water ew	[mbar]	1221	0x4C4	300
Saturation vapor pressure above water ew	[psi]	1223	0x4C6	0.4
Saturation vapor pressure above ice ei	[mbar]	1225	0x4C8	2.6
Saturation vapor pressure above ice ei	[psi]	1227	0x4CA	0.04
Saturation ratio rs	[g/kg]	1233	0x4D0	18
Saturation ratio rs	[gr/lb]	1235	0x4D2	125
Ice bulb temperature Ti	[°C]	1237	0x4D4	-10
Ice bulb temperature Ti	[°F]	1239	0x4D6	20
Ice bulb temperature Ti	[K]	1241	0x4D8	250
Specific humidity qv	[g/kg]	1247	0x4DE	8
Specific humidity qv	[gr/lb]	1249	0x4E0	60

1) Register number starts from 1.

2) Register address starts from 0.

3) If needed, the default value can be changed with PCS10 Product Configuration Software.

## Test Report

The test report according to DIN EN 10204-2.2 is available for download at <https://certificates.epluse.com>.



## INFORMATION

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