

Technical Note

Modbus Reference DRYCAP® Dewpoint Transmitter DMT143



Default Communication Settings

Table 1 Default Modbus Serial Communication Settings

Description	Default Value
Serial bit rate	19200
Parity	N
Number of data bits	8
Number of stop bits	2
Modbus device address	240
Serial delay	0
Communication mode	Modbus RTU

Function Codes

Table 2 Modbus Function Codes

Function Code (Decimal)	Function Code (Hexadecimal)	Name
03	03 _{hex}	Read Holding Registers
16	10 _{hex}	Write Multiple Registers
43 / 14	2B _{hex} / 0E _{hex}	Read Device Identification



Data Encoding

32-Bit Floating Point Format

Registers using "32-bit float" data format are encoded using the "binary32" encoding defined in IEEE 754 (also known as "single-precision floating point format").

The least significant 16 bits of a floating point number are placed at the Modbus register listed in the table, while the most significant 16 bits are placed in the register with number/address + 1, as specified in Open Modbus TCP Specification, Release 1.0. This is also known as "little-endian" or "Modicon" word order.

Despite the specification, some Modbus masters may expect "big-endian" word order (most significant word first). In such case, you must select "word-swapped" floating point format in your Modbus master for the Modbus registers of the device.

Reading the measurement data registers with incorrect floating point format setting may occasionally result in correct-looking values. It is highly recommended to first try reading the register number 7938 (floating point test) to see that you have configured the floating point format correctly on your Modbus host system.

 A complete 32-bit floating point value should be read and written in a single Modbus transaction.

16-Bit Integer Format

Some 16-bit integer values in the data registers are scaled to include the necessary decimals. The scaling factors for those values are shown in the register tables.

Table 3 16-bit Signed Integer Format Details

Value	Description
0000 _{hex} ... 7FFE _{hex}	Value in range 0 ... 32766
7FFF _{hex}	Value is 32767 or larger
8002 _{hex} ... FFFF _{hex}	Value in range -32766 ... -1 (2's complement)
8000 _{hex}	Value is not available (quiet NaN)

 Some values may exceed the signed 16-bit range even in normal operation. To access such values, use the floating point registers instead.

Modbus Registers

**CAUTION!** Registers are numbered in decimal, starting from one. Register addresses in actual Modbus messages (Modbus Protocol Data Unit (PDU)) start from zero.
Please check the reference documentation of your Modbus host (PLC) for the notation of Modbus register addresses.

Measurement Data Registers

Table 4 Modbus Measurement Data Registers (Read-Only)

Register Number (Decimal)	Address (Hexadecimal)	Register Description	Data Format	Unit
1	0000 _{hex}	Relative humidity (RH)	32-bit float	%RH
7	0006 _{hex}	Dew/frost point temperature ($T_{d/f}$)	32-bit float	°C
11	000A _{hex}	Dew/frost point temperature at 1 atm ($T_{d/fa}$)	32-bit float	°C
21	0014 _{hex}	Water concentration (ppm)	32-bit float	ppm
257	0100 _{hex}	Relative humidity (RH*100)	16-bit signed integer	%RH
260	0103 _{hex}	Dew/frost point temperature ($T_{d/f}$ *100)	16-bit signed integer	°C
262	0105 _{hex}	Dew/frost point temperature at 1 atm ($T_{d/fa}$ *100)	16-bit signed integer	°C
267	010A _{hex}	Water concentration (ppm)	16-bit signed integer	ppm

Accessing unavailable (temporarily missing) measurement data does not generate an exception. “Unavailable” value (a quiet NaN for floating point data or 8000_{hex} for integer data) is returned instead.

Status Registers

Table 5 Modbus Status Registers (Read-Only)

Register Number (Decimal)	Address (Hexadecimal)	Register Description	Data Format	Notes
513	0200 _{hex}	Error status	16-bit integer	1 = No errors
514	0201 _{hex}	Online status	16-bit integer	1 = Data available 0 = Outputs frozen due to autocal or purge
515	0203 _{hex}	Error code	32-bit integer	0 = No errors

Configuration Registers

Table 6 Modbus Configuration Data Registers (Writable)

Register Number (Decimal)	Address (Hexadecimal)	Register Description	Data Format	Unit / Valid Range
Settings				
769	0300 _{hex}	Pressure, power-up default value	32-bit float	bar (absolute) 0.001 ... 50
771	0302 _{hex}	Pressure	32-bit float	bar (absolute) 0.001 ... 50
795	031A _{hex}	Filtering factor	32-bit float	0.00001 ... 1
Communication				
1537	0600 _{hex}	Address	16-bit integer	1 ... 247
1538	0601 _{hex}	Bit rate (b/s)	16-bit integer	5 = 9600 6 = 19200
1539	0602 _{hex}	Parity, data, stop bits	16-bit integer	0 = N81 1 = N82 2 = E81 3 = E82 4 = O81 5 = O82
1540	0603 _{hex}	Response delay	16-bit integer	0 ... 1020 ms
1541	0604 _{hex}	Interface mode	16-bit integer	6 = MODBUS
1542	0605 _{hex}	Restart device	16-bit integer	1 = Restart the device
LED Alarm				
3073	0C00 _{hex}	Indicator mode	16-bit integer	0 = Off 1 = Status only 2 = Alarm
3074	0C01 _{hex}	Alarm parameter	16-bit integer	6 = $T_{d/f}$
3075	0C02 _{hex}	Alarm setpoint	32-bit float	-70 °C ... +60 °C
Factory Settings				
7681	1E00 _{hex}	Restore settings	16-bit integer	1 = Restore factory settings

Test Value Registers

Read the known test values from the test registers to verify the functionality of your Modbus implementation.

Table 7 Modbus Test Registers (Read-Only)

Register Number (Decimal)	Address (Hexadecimal)	Register Description	Data Format	Value
7937	1F00 _{hex}	Signed integer	16-bit integer	-12345
7938	1F01 _{hex}	Floating point	32-bit float	-123.45
7940	1F03 _{hex}	Text string	7-character ASCII string	"-123.45"

Device Identification Objects

Table 8 Device Identification Objects

Object Id (Decimal)	Object Id (Hexadecimal)	Object Name	Example Contents
0	00 _{hex}	VendorName	"Vaisala"
1	01 _{hex}	ProductCode	DMT143
2	02 _{hex}	MajorMinorVersion	Software version (for example "1.4.2")
3	03 _{hex}	VendorUrl	"http://www.vaisala.com/"
4	04 _{hex}	ProductName	Vaisala DRYCAP® Dewpoint Transmitter DMT143
5	05 _{hex}	ModelName	Configuration code (for example "G1A1A1A0A0ASX")
128	80 _{hex}	SerialNumber ¹⁾	Serial number of the device (for example "J1140501")
129	81 _{hex}	CalibrationDate ¹⁾	Main calibration date in YYYY-MM-DD format. Empty string if not set/valid.
130	82 _{hex}	CalibrationText ¹⁾	Main calibration information text. Empty string if not set/valid.

¹⁾ Vaisala-specific device identification object.