Modbus, rotary heat exchanger controls

SILVER RX

Introduction

This protocol contains the Modbus addresses and registers which are available in the heat exchanger controller.

Modbus can access single addresses or several addresses simultaneously, either reading or writing 1-bit or 16-bit values. A Modbus address contains either a 1-bit value or a 16-bit integer.

Supported Modbus commands

Function code	Description
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Registers
8	Diagnostics. Sub-function 00 Only - Return Query Data (loop back).
15	Force Multiple Coils
16	Preset Multiple Registers

Communication parameters

For factory settings and setting ranges, see table 2.

Table 2				
	Range	**Unit**	**Factory setting**	**Alt. factory settings:**
Address	1-247	n/a	54 dec.	54 dec.
Baud rate	9.600, 19.200, 38.400, 57.600, 115.200	bps	38.400	115.200
Parity	None, even, odd	n/a	Even	Even
Stop bit(s)	0, 1, 2	n/a	2	2
Comm. timeout	0-240	Sec.	10	10

n/a=not applicable

Supported Modbus commands

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Specifications are subject to alteration without notice

Modbus addressing

From factory the Modbus ID is pre-set to: 79

Modbus ID can be changed using a Modbus tool (e.g. Modbus Poll).

Communication parameters

Communication parameters (see table 1) can be changed using a Modbus tool (e.g. Modbus Poll).

Table 1				
	Range	**Unit**	**Default setting**	**Alternative setting**
Address	1-247	n/a	79	3
Baud rate	9.600, 19.200, 38.400, 57.600, 115.200	bps	38.400	115.200
Parity	None, even, odd	n/a	None	Even
Stop bit(s)	0, 1, 2	n/a	1	2

n/a=not applicable

Modbus register list

Coil Stat Bits – Available Coil Stat Bits: According to the table below (see table 2)

Standard-MODBUS (RTU)

Coil Stat Bits: 11 (R/W)
0x01: Read
0x05: Write Single Coil (NOTE: ON => output value = 0xFF00)
0x0F: Write Multiple Coils

Table 2					
Register	**Address**	**Function**	**Range**	**Active state**	**Factory**
0x0001	0	Motor ON/OFF	0 - 1	1 = ON	0
0x0002	1	Reset Alarms	0 - 1	1 = Reset	0
0x0004	3	Rotation direction	0 - 1	1 = CounterClockWise	0
0x0008	7	Control mode	0 - 1	0 = Modbus, 1 = 0-10V	1
0x0009	8	Use altern. comm. settings	0 - 1	1 = Alternative	0
0x0010	9	Autodetect communication [1]	0 - 1	1 = Enable	1
0x0011	10	Analog start signal	0 - 1	1 = Enable	1
0x0012	11	Autodetect control mode	0 - 1	1 = Enable	1
0x0015	14	High speed resolution	0 - 1	0 = Resolution = 0.1 RPM 1 = Resolution = 0.01 RPM	1
0x0016	15	K-factor for Modbus	0 - 1	1 = K-factor not used for Modbus	1
0xx17	17	Enable auto saving of UDF	0 - 1	1 = UDF stored automatically	0

[1]: Factory setting (0x0010: Autodetect communication) is "1"=Enabled.
This means that even if the communication parameters of the heat exchanger controller have changed to the alternative settings (4x0014 – 4x0017), it will always be possible to communicate on the default communication settings (Modbus ID 79, baudrate 38.400, no parity, 1 stop bit).If Autodetect communication is "0"=Disabled and the communication parameters of the DRHX have changed to the alternative settings, it will only be possible to communicate on these alternative settings.

Input Stat Bits – Available Input Stat Bits: According to the table below (see table 3)
Input Stat Bits: 23 (R)
0x02: Read

Table 3				
Register	**Address**	**Function**	**Range**	**Active state**
1x0001	0	Rotorguard Alarm	0 - 1	1 = Alarm
1x0002	1	V LO Alarm	0 - 1	1 = Alarm
1x0003	2	V HI Alarm	0 - 1	1 = Alarm
1x0004	3	I HI Alarm (Motor out short)	0 - 1	1 = Alarm
1x0005	4	Temperature High	0 - 1	1 = Warning
1x0009	8	Rotorguard Signal	0 - 1	1 = Pulse
1x0010	9	Overload / I_Limit	0 - 1	1 = Warning
1x0011	10	Internal Stop	0 - 1	1 = Alarm (Stop)
1x0012	11	Rotor Blocked	0 - 1	1 = Alarm
1x0013	12	EEPROM error	0 - 1	1 = Warning
1x0015	14	Motor Phase Error	0 - 1	1 = Alarm
1x0016	15	Ripple	0 - 1	1 = Warning
1x0020	19	MOC in bootloader	0 - 1	1 = Alarm
1x0024	23	Rotation OK	0 - 1	1 = OK
1x0025	24	Test function active	0 - 1	1 = Active
1x0026	25	Purging active	0 - 1	1 = Active

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Input Registers – Available Input Registers: According to the table below (see table 4)
Input Registers: 31 (R)
0x04: Read

Table 4					
Register	**Address**	**Function**	**Range**	**Resolution**	**Unit**
3x0001	0x0000	DHX Type	0 - 14	1	-
3x0003	0x0002	PrcOut	0 - 10000	0.01	%
3x0004	0x0003	Intern Temp	-5000 - 15000	0.01	°C
3x0005	0x0004	Motor Speed Out	0 - 40000	0.01	RPM
3x0006	0x0005	V In	0 - 300	1	V
3x0007	0x0006	I Out (RMS)	0 - 10000	1	mA
3x0008	0x0007	Power In	0 - 1000	1	W
3x0010	0x0009	Operation Day	0 - 9999	1	Day
3x0011	0x000A	Operation Minutes	0 - 1439	1	Min.
3x0012	0x000B	I Ripple [4]	0 - 10000	1	mA
3x0013	0x000C	V Ripple	0 - 100	1	V
3x0014	0x000D	Config file variant	AA - ZZ	2 ASCII characters	
3x0015	0x000E	Config file version	100 - 32000	0.01	-
3x0016	0x000F	MOC SW version	0 - ?	0.01	-
3x0017	0x0010	Rotor Speed Out	0 - 40000	0.01	RPM
3x0018	0x0011	Torque	0 - 1500	0.01	Nm
3x0020	0x0014	MOC Boot SW	0 - ?	0.01	-
3x0021	0x0015	Motor Cfg. Var.	0 - 65535	1	-
3x0022	0x0016	Motor Cfg. Ver.	0 - 65535	0.01	-
3x0023	0x0017	Rotor Cfg. Var.	0 - 65535	1	-
3x0024	0x0018	Rotor Cfg. Ver.	0 - 65535	0.01	-
3x0025	0x0019	User Data Var.	0 - 65535	1	-
3x0026	0x001A	User Data Ver.	0 - 65535	0.01	-
3x0028	0x001C	V DC Bus (Peak)	0 – 400	1	V
3x0029	0x001D	V Motor (Peak)	0 – 400	1	V

Holding Registers – Available Holding Registers: According to the table below (see table 5)

Holding Registers: 32 (R/W)
0x03: Read
0x06: Write Single
0x10: Write Multiple

Table 5						
Register	**Address**	**Function**	**Range**	**Resolution**	**Unit**	**Factory**
4x0001	0x0000	Setpoint / PrcSet	0 - 10000	0.01	%	-
4x0002	0x0001	Min. Motor Speed	100 - Max.	0.01	RPM	100
4x0003	0x0002	Max. Motor Speed	Min. - 40000	0.01	RPM	25000
4x0004	0x0003	Start I Out (Boost)	0 - ?	1	mA (RMS)	I_{max} + 50%
4x0005	0x0004	Start Time (Boost)	0 - ?	1	Sec.	10
4x0009	0x0008	Prc Holding Torque	0 - 1000	0.1	% of max	0
4x0010	0x0009	UpRampTime	15 - 300	1	Sec.	60
4x0011	0x000A	DownRampTime	15 - 300	1	Sec.	60
4x0012	0x000B	SwitchMode	0	(Auto)		
			1	8	kHz	
			2	10	kHz	X
4x0013	0x000C	DHX Type	0 - ?	1	-	0 [3]
4x0014	0x000D	Alternative Modbus ID	1 - 247	1	-	3
4x0015	0x000E	Alternative BaudRate	0	9600	bps	
			1	19200	bps	
			2	38400	bps	
			3	57600	bps	
			4	115200	bps	X
4x0016	0x000F	Alternative Parity	0	None	-	
			1	Odd	-	
			2	Even	-	X
4x0017	0x0010	Alternative Stop Bits	0	INVALID	-	
			1	1	-	
			2	2	-	X

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