

Elexant 450c-Modbus

Modbus Protocol Interface Mapping

Firmware version V2.1.1



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1. INTRODUCTION

This manual details the Modbus registers of the nVent RAYCHEM Elexant 450c-Modbus. It is intended to be used by the users' system integrators who wish to interface with their external device (i.e. DCS or Building management system -BMS- system) to the using the Modbus protocol. The manual includes details of the system's current configuration, availability resources, set-up parameters, current conditions, alarm status, log info and numerous other fixed and variable data points.

1.1 How to Use This Manual

The Elexant 450c-Modbus register can be accessed by DCS or BMS systems. However, this should only be done by expert users who understand that the system makes use of extensive semaphore fields to assure synchronization between the possibility of multiple users and conflicting instructions. These portions of the Modbus register map provide access to the current set-up and real time values being measured by the system. A snap shot of the current conditions, data for trending, alarm status, the current setting for the alarm thresholds and setpoints can be easily read without any risk to the system performance.

The entire Modbus register map is included in this document for completeness. Writing to the database is within the capability of most Modbus host devices. However, we strongly recommend that system integrators who write to the database must thoroughly test their system to ensure it is working properly and that there are no unintended consequences.

1.2 Modbus Communications

The controller acts as Modbus slave device. A modbus master device can read and write to the controller. This enables the possibility to monitor, configure and view the alarms remotely. The protocol used is Modbus RTU via RS485.

Variable	Description	Default	Range/options
Address	Modbus Station Address used to identify the controller.	1	1 to 247
Baud	The data rate at which communications occur on the serial network.	9600	2400, 4800, 9600, 19200
Parity	Parity Defines the type of parity bit to be used with any of the three serial communications ports.	None	None, Odd, Even
Stop Bits	Defines the number of stop bits used with any of the three serial communications ports.	1	1,2

The host defaults are:

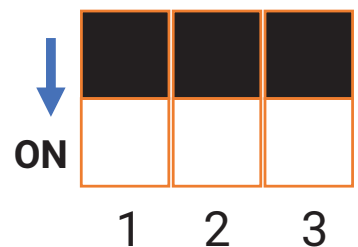
- Modbus Address: 1
- Baud Rate: 9600

The standard configuration is: 8 data bits, no parity and one stop bit.

The dip switches (below terminal 26 and 27):

Button	Resistor
1 -	Pull down resistor
2 -	Pull up resistor
3 -	Termination resistor

Push the button to ON (as the arrow indicates) side will connect the corresponding resistor in.



2. MODBUS REGISTER MAP

2.1 Alarm Status Coils

Modbus Function Code: 1

Modbus Start Address: 0

Modbus Block Size: 17

Number of Blocks: 1

Description	Modbus Address	Function	Comments
High TS 1 Alarm	0	1	0 = no alarm, 1 = alarm
Low TS 1 Alarm	1	1	0 = no alarm, 1 = alarm
TS 1 Failure	2	1	0 = no alarm, 1 = alarm
High TS 2	3	1	0 = no alarm, 1 = alarm
Low TS 2	4	1	0 = no alarm, 1 = alarm
TS 2 Failure	5	1	0 = no alarm, 1 = alarm
Internal Error	15	1	0 = no internal error, 1 = internal error
Panel Alarm status	16	1	0 = no alarm, 1 = alarm

2.2 Controller Setup Parameters

Modbus Function Code: 1,5,15

Modbus Start Address: 145

Modbus Block Size: 9

Number of Blocks: 1

Description	Modbus Address	Function	Comments
TS1 Fail Mode	145	1, 5, 15	0 = Fail off, 1 = Fail on
TS2 Fail Mode	146	1, 5, 15	0 = Fail off, 1 = Fail on
Test Program	147	1, 5, 15	0 = no, 1 = yes, test program is running
Alarm Buzzer	148	1, 5, 15	0 = no, buzzer off 1 = yes, buzzer on
TS1 high alarm feature off	149	1, 5, 15	0 = alarm active, 1 = alarm deactive
TS1 high alarm feature off	150	1, 5, 15	0 = alarm active, 1 = alarm deactive
TS1 low alarm feature off	151	1, 5, 15	0 = alarm active, 1 = alarm deactive
TS1 low alarm feature off	152	1, 5, 15	0 = alarm active, 1 = alarm deactive
Panel Alarm Control	153	1, 5, 15	0 = alarm deactive, 1 = alarm active

2.3 Controller Status

Modbus Function Code: 2

Modbus Start Address: 3

Modbus Block Size: 3

Number of Blocks: 1

Description	Modbus Address	Function	Comments
Raw Switch Output1	3	2	0 = HC1 relay off, 1 = HC1 relay on
Keylock Status	4	2	0 = no, 1 = yes, locked
Raw Switch Output2	5	2	0 = HC2 relay off, 1 = HC2 relay on

2.4 INPUT Parameters

Modbus Function Code: 3, 6, 16

Modbus Start Address: 0

Modbus Block Size: 20

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Control Temperature Setpoint 1	0	3, 6, 16	0°C to 80°C (0°C to 245°C for PT100)	°C	10ths _*
PASC Minimum Pipe Size 2	1	3, 6, 16	10,15,20,25,32,40,50,60,70,80,100, 125 if invalid value 25 is used	DN	1
Switch Control Mode	2	3, 6, 16	4 = Line/Line, 5 = PASC/PASC, 6 = Line/PASC, 7 = PASC/Line, 8 = Line/OFF, 9 = PASC/OFF, 10 = OFF/Line, 11 = OFF/PASC, 12 = OFF/OFF	–	1
Deadband 1	3	3, 6, 16	1.0°C to 5°C	°C	10ths _*
PASC Minimum Ambient Temperature 1	4	3, 6, 16	–40°C to 0°C	°C	10ths _*
PASC Minimum Pipe Size 1	5	3, 6, 16	10,15,20,25,32,40,50,60,70,80,100, 125 if invalid value 25 is used	DN	1
PASC Power Adjust	6	3, 6, 16	70,80,90,100,110,120,130,140	%	1
Sensor Setup	7	3, 6, 16	bit 1 = TS 1 assign for Circuit 1 bit 2 = TS 2 assign for Circuit 1 bit 5 = TS 1 assign for Circuit 2 bit 6 = TS 2 assign for Circuit 2 bit 0,3,4,7 = NA 0 = No (No select) 1 = Yes (Select)	–	1
Language	8	3, 6, 16	0 = DANISH, 1 = GERMAN, 2 = DUTCH, 3 = ENGLISH, 4 = FRENCH, 5 = ITALIAN, 6 = SWEDISH, 7 = NORWEGIAN, 8 = FINNISH, 9 = RUSSIAN, 10 = CZECH, 11 = POLISH	–	1

* Temperature displayed in 1/10th of °C (example: 10°C = 100)

Description	Modbus Address	Function	Comments	Units	Scaling
Country	9	3, 6, 16	0 = GERMANY, 1 = AUSTRIA, 2 = SWITZERLAND, 3 = UK, 4 = FRANCE, 5 = ITALY, 6 = POLAND, 7 = CZECH_REPUBLIC, 8 = DENMARK, 9 = BELGIUM, 10 = RUSSIA, 11 = CHINA, 12 = JAPAN, 13 = SWEDEN, 14 = NORWAY, 15 = LITHUANIA, 16 = SLOVAKIA, 17 = NETHERLANDS, 18 = FINLAND, 19 = IRELAND	–	1
Cable type 1	10	3, 6, 16	0 = 10XL2_ZH, 1 = 15XL2_ZH, 2 = 26XL2_ZH, 3 = 31XL2_ZH, 4 = FS_C10_2X, 5 = OTHER	–	1
Cable type 2	11	3, 6, 16	0 = 10XL2_ZH, 1 = 15XL2_ZH, 2 = 26XL2_ZH, 3 = 31XL2_ZH, 4 = FS_C10_2X, 5 = OTHER	–	1
Deadband 2	12	3, 6, 16	1.0°C to 5°C	°C	10ths _*
Date-Year	13	3, 6, 16	00 – 99	year	1
Date-Month	14	3, 6, 16	1 – 12	month	1
Date-Day	15	3, 6, 16	1 – 31	day	1
Time-Hour	16	3, 6, 16	0 – 23	hour	1
Time-Minute	17	3, 6, 16	0 – 59	minute	1
Control Temperature Setpoint 2	18	3, 6, 16	0°C to 80°C (0°C to 245°C for PT100)	°C	10ths _*
PASC Minimum Ambient Temperature 2	19	3, 6, 16	–40°C to 0°C	°C	10ths _*

* Temperature displayed in 1/10th of °C (example: 10°C = 100)

2.5 Temperature Sensor Parameters

Modbus Function Code: 3, 6, 16

Modbus Start Address: 20

Modbus Block Size: 4

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
High TS 1 Alarm Setpoint _{**}	20	3, 6, 16	2°C – 90°C (2°C to 250°C for PT100)	°C	10ths _*
Low TS 1 Alarm Setpoint _{**}	21	3, 6, 16	–40°C – 78°C (–40°C to +245°C for PT100)	°C	10ths _*
High TS 2 Alarm Setpoint _{**}	22	3, 6, 16	2°C – 90°C (2°C to 250°C for PT100)	°C	10ths _*
Low TS 2 Alarm Setpoint _{**}	23	3, 6, 16	–40°C – 78°C (–40°C to 245°C for PT100)	°C	10ths _*

* Temperature displayed in 1/10th of °C (example: 10°C = 100)

** Can be disabled through section 2.2

2.6 Override

Modbus Function Code: 3, 6, 16

Modbus Start Address: 34

Modbus Block Size: 2

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Remote Override Status 1	34	3, 6, 16	0 = Override not active 1 = Force on Override active 2 = Force off Override active	–	–
Remote Override Status 2	35	3, 6, 16	0 = Override not active 1 = Force on Override active 2 = Force off Override active	–	–

2.7 Controller's Identification Tag

Modbus Function Code: 3, 6, 16

Modbus Start Address: 90

Modbus Block Size: 10

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Controller's Identification Tag	90 to 99	3, 6, 16	Letters(A-Z) numbers(0-9), /.()_# Two characters per address. String terminators = Null or space Note: LSByte of 99 is always Null. Input the ascii code for the characters above, for example, input 0x4142 (Hex or 16706 in Dec) for register 90, and 0x3031 (in Hex or 12337 in Dec) for register 91, then the controller ID will be AB01.	–	–

2.8 Console Parameters

Modbus Function Code: 3, 6, 16

Modbus Start Address: 120

Modbus Block Size: 2

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Keylock Passcode	120	3, 6, 16	1 to 9999: Incorrect passcode input will be ignored, and correct input will be valid for 2 minutes. (used to enter the code to unlock access to register 121)	–	–
Lock Enable/Disable	121	3, 6, 16	0 = Keylock inactive, 1 = Keylock active	–	–

2.9 Temperature Sensor Parameters

Modbus Function Code: 3, 6, 16

Modbus Start Address: 147

Modbus Block Size: 1

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Communications Activity Time-out	147	3, 6, 16	Used for load shedding and remote override 0–255	sec	1

2.10 General Controller Information

Modbus Function Code: 4

Modbus Start Address: 0

Modbus Block Size: 4

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Device Type	0	4	Fixed value = 450	–	1
Firmware Version	1	4	Firmware Version-Major 0-255	–	1
Firmware Version	2	4	Firmware Version-Minor 0-255	–	1
Firmware Version	3	4	Firmware Version-Build 0-255	–	1

2.11 Dynamic Output Status

Modbus Function Code: 4

Modbus Start Address: 50

Modbus Block Size: 15

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Control Output Duty Cycle 1	50	4	0 = full off, 100 = full on	%	1
Tracing Control Status	51	4	2 digits, the first for circuit 1 and the second for circuit 2 (for example, 0 means both are normal, 15 means circuit 1 = force off, circuit 2 = force on) 0 = normal temperature control 1 = output override force off 2 = test program in progress 5 = output override force on	–	1
PASC On-Count 1	52	4		sec	1
PASC Off-Count 1	53	4		sec	1
PASC Next Switch Count 1	54	4		sec	1
PASC Percent On 1	55	4	0 = full off, 100 = full on	%	1
PASC Output State 1	56	4	0 = Off, 1 = On	–	1

Description	Modbus Address	Function	Comments	Units	Scaling
PASC Total Time 1	57	4		sec	1
Control Output Duty Cycle 2	58	4	0 = full off, 100 = full on	%	1
PASC On-Count 2	59	4		sec	1
PASC Off-Count 2	60	4		sec	1
PASC Next Switch Count 2	61	4		sec	1
PASC Percent On 2	62	4	0=full off, 100=full on	%	1
PASC Output State 2	63	4	0 = Off, 1 = On	–	1
PASC Total Time 2	64	4		sec	1

2.12 Analog Readings

Modbus Function Code: 4

Modbus Start Address: 81

Modbus Block Size: 2

Number of Blocks: 1

Description	Modbus Address	Function	Comments	Units	Scaling
Current TS 1 Temperature	81	4	TS 1 failure = +3000.0 °C TS 1 not used = +3200.0 °C	°C	10ths*
Current TS 2 Temperature	82	4	TS 2 failure = +3000.0 °C TS 2 not used = +3200.0 °C	°C	10ths*

* Temperature displayed in 1/10th of °C (example: 10°C = 100)

2.13 Disclaimer

MODBUS map information is proprietary and confidential. Use of this information is permitted solely in order to implement a communications link between customer equipment and nVent RAYCHEM controllers. It may not be used for any other purpose, and it is not to be disclosed to 3rd parties without the written consent of nVent Thermal LLC.

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