Modbus TCP communication with X2 devices

Communication specifications Modbus TCP over Wi-Fi and Ethernet

Standard:	IEC 61158
Transport layer:	TCP/IP
Port:	502

LED indicators

The Modbus slave features a green LED and a red LED for indication of traffic on the RS-485 bus. The green LED is lit when an incoming packet is received, and the red LED is lit when an outgoing packet is transmitted to the bus. At power-up, both LED blink twice simultaneously as a sign of the boot process being completed. A constantly lit LED serves as an indication of a fault condition in the reception or sending process.

Supported Modbus commands

- 03 (0x03): Read multiple registers
- 06 (0x06): Write single register
- 16 (0x10): Write multiple registers

In commands 03 and 16 the allowed number of registers ranges from 1 to 32. Although Modbus specification would allow more registers to be read and written, a maximum of 32 Modbus registers are supported in one packet. One Modbus register is 16 bits wide. The Modbus slave transmits the values as signed 16 bit integers.

In an event of an out-of-range command addressing or an unsupported command, the Modbus slave responds with an exception message according to the Modbus specification.

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Configuration of X2-MOD devices

The communication parameters may be set via operation terminals. Login to the controller as follows:

1. Press UP/DOWN buttons simultaneously for three seconds. The display will show firmware version and revision number. Press the OPTION button to start login.
2. CODE is shown in small display.
3. Select 241 using UP/DOWN buttons.
4. Press OPTION after selecting the correct code.
5. Once logged in with 241 control modules are displayed (Lp1, Lp2, 1u, 2u, etc.) – select with UP/DOWN the communication parameters **CO** and open with OPTION. As soon as the module is open its parameters are displayed.
6. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. Three arrows are displayed to indicate that the parameter may be modified. Use UP/DOWN buttons to adjust the value.
7. After you are done, press OPTION to save the new value and return to the selection level (arrows disappear when selection is saved). Pressing left hand POWER button without pressing OPTION will discard the value and return without saving. For control parameters press POWER again to leave parameter selection and return to control module selection.

Press the POWER to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

More detailed information on the X2 TCP/IP configuration and operation can be found in the 70-00-0900 "X2 Wi-Fi and Ethernet Communication Manual".
The manual can be found on our website www.vectorcontrols.com.

COM parameters

Parameter	Static address	Modbus TCP		Default
CO 00	13000	Bus plug-in id	(read only)	5
CO 01	13001	Bus plug-in software version	(read only)	-
CO 02	13002	Bus plug-in software revision	(read only)	-
CO 03	13003	IPv4 address octet IP0 (192.168.xxx.**yyy**)		101
CO 04	13004	IPv4 address octet IP1 (192.168.**xxx**.yyy)		170
CO 05	13005	IPv4 address octet IP2 (192.**168**.xxx.yyy)		168
CO 06	13006	IPv4 address octet IP3 (**192**.168.xxx.yyy)		192
CO 07	13007	Enable DHCP 0 = Static IP 1 = DHCP enabled		0
CO 08	13008	Enable access point (for Wi-Fi only) 0 = Access point disabled when connected to (W)LAN 1 = Access point always enabled		0
CO 09	13009	Restore default configuration 0 = Normal Mode 1 = Reset to defaults immediately 7 = Reset to defaults on power up		0
CO 10	13010	Enable Base 1 (PLC Style) Addresses 0 = Modbus addresses are "Base 0" 1 = Modbus addresses are "Base 1" (PLC style)		0
CO 11	13011	User specific storage		00
CO 12	13012	User specific storage		00
CO 13	13013	User specific storage		01
CO 14	13014	User specific storage		0
CO 15	13015	Automatic address increment of CO03 0 = Auto increment function is disabled 1 = Auto increment function is enabled		0

Automatic address increase function

When this function is enabled and an automatic AEC-PMx parameter load is executed at power up of the controller, the communication / IP address on CO03 is incremented and written back to the AEC-PMx unit.

Changing address register through broadcast message

It is not possible to change network address register through broadcast message.

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Available properties for different X2 products

The same module for Modbus communication is used over the entire X2 product range. When the module initializes, it reads the properties from the X2 device, such as in and outputs, control loops, alarms, time schedules and so forth.
It then activates and assigns its properties to the available physical points.
If an output or an input is not physical present in the scope of the product, its object will not be generated.
The available physical properties for each device may be found in its product datasheet under the scope table.
Here is a brief overview.

Available inputs

	TCX2-40863	TCX2-23343	TCX2-24273	TCX2-14050	TCI2	SXC2-200	SXC2-210	TRI2
UI1	Universal1	NTC	NTC	NTC	Universal2	Sensor	Sensor	Sensor
UI2	Universal1	NTC	NTC	NTC	Universal2	Sensor	Sensor	Sensor
UI3	Universal1	NTC	NTC	NTC	Universal2	Sensor	Sensor	Sensor
UI4	Universal1	VDC	NTC	NTC	Universal2	Sensor	Sensor	NTC
UI5	Universal1	VDC	VDC	Virtual 1	Virtual 1	Sensor	Sensor	NTC
UI6	Universal1	VDC	VDC	Virtual 2	Virtual 2	Virtual 1	NTC	VDC
UI7	Universal1	Virtual 1	Virtual 1	Virtual 3	Virtual 3	Virtual 2	Virtual 1	Virtual 1
UI8	Universal1	Virtual 2	Virtual 2	Virtual 4	Virtual 4	Virtual 3	Virtual 2	Virtual 2
UI9	Virtual 1	Virtual 3	Virtual 3			Virtual 4	Virtual 3	Virtual 3
UI10	Virtual 2	Virtual 4	Virtual 4				Virtual 4	Virtual 4
UI11	Virtual 3							
UI12	Virtual 4							

There are the following different input types for X2 devices:

- Sensor inputs: sensors that measure for example temperature, relative Humidity, CO2, Air quality.
- Universal1 inputs: Selectable with jumper for NTC, VDC, mA signals
- Universal2 inputs: Selectable with jumper for NTC, PT1000, VDC, mA signals
- Voltage inputs: VDC
- Passive inputs: NTC
- Virtual inputs

Available outputs

	TCX2-40863	TCX2-23343	TCX2-24273	TCX2-14050	TCI2-204.202	SxC2-201.102	SxC2-200.101	TRI2-221.202
AO1	AO1	AO1	AO1		AO1	AO1	AO1	AO1
AO2	AO2	AO2	AO2		AO2	AO2		AO2
AO3	AO3	AO3	AO3					
DO1	DO1	DO1	DO1	DO1	DO1	DO1	DO1	DO1
DO2	DO2	DO2	DO2	DO2	DO2			DO2
DO3	DO3	DO3	DO3	DO3				
DO4	DO4	DO4	DO4	DO4				
DO5	DO5		DO5	DO5				
DO6	DO6		DO6					
DO7			DO7					

Properties of digital outputs.

The available objects for digital outputs depend on their configuration. The reason is that an output assigned to a fan module will have different objects than if assigned to a floating or binary output.
There are 4 different object tables for digital objects:

- Digital output in fan configuration (applies to all binary outputs that are part of the fan module)
- Digital output in 3-point floating configuration (Always two binary outputs)
- Digital output in PWM configuration
- Digital output in binary configuration

Available control loops

TCX2-40863	TCX2-23343	TCX2-24273	TCX2-14050	TCI2	SxC2	TRI2
LP1	LP1	LP1	LP1	LP1	LP1	LP1
LP2	LP2	LP2		LP2	LP2	LP2
LP3						
LP4						

Available alarms

All devices have 8 alarms.

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Dynamic address list

Note: Values with decimal point: The Modbus TCP standard format is 16 Bit signed. Thus, no decimal points can be used for values. For all descriptions with "value x10" it means that the value is multiplied by 10.
Example: Input value with 22.5 °C ≙ 225

Controller information

Address	Description	R/W
1000	Product series information	R
1001	Product type information	R
1002	Controller Firmware Version	R
1003	Controller Firmware Revision	R

Controller state

Address	Description	R/W
1050	Operation State: OFF - ON 0 = OFF, **1 = ON,**	R/W
1051	Operation state: Occupied – Unoccupied **0 = Occupied**, 1 = Unoccupied	R/W
1052	Operation State: Cool – Heat 0 = Cool, **1 = Heat**	R/W
1053	Operation state: Celsius – Fahrenheit **0 = Celsius**, 1 = Fahrenheit	R/W
1054	Operation state: Fan Only **0 = Fan Only disabled,** 1 = Fan Only enabled	R/W
1055	Operation state: Time Schedules **0 = Time Schedules disabled,** 1 = Time Schedules enabled	R/W
1056	Operation state: Manual override for heat / cool mode **0 = Auto Mode,** 1 = Manual Override Mode	R/W

Errors

Address	Module	Description	R/W
1060	Err	0: no Error 1: Communication Error 2: Internal data error 3: Initial power-up error 4: Parameter configuration error 5: Parameter copy error - Communication failed 6: Parameter copy error - External data corrupt 7: Lead-Lag function error	R/W

Note: write 0 to confirm alarm

Operation terminal access

Address	Description	R/W
2000	Enable access to operation modes 0 = Disabled, 1 = Enabled	R/W
2001	Enable access to set points 0 = Disabled, 1 = Enabled	R/W
2002	Enable manual control in cascade and for fan speeds 0 = Disabled, 1 = Enabled	R/W
2003	Enable change of heating/cooling mode for 2 pipe systems 0 = Disabled, 1 = Enabled	R/W
2004	Enable access to time programs 0 = Disabled, 1 = Enabled	R/W

Special controller flags

Address	Description	R/W
2022	No-reply-mode: No-reply-mode allows connecting one operation terminal to multiple controllers. One controller must be in normal operation mode and all the others must be set to no-reply-mode. These controllers will follow each command issued by the operation terminal. They will not send responses and their alarm conditions are not monitored by the operation terminal. 0 = **normal operation**, 1 = no-reply-mode	R/W
2023	Wink function: activates LED on top of controller 0 = **LED has normal operation**, 1 = LED is constantly on	R/W
2024	Operation state Summer – Winter (used to switch set point limits for 4-pipe systems) 0 = **Summer mode** 1 = Winter mode	R/W

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Clock setting

Address	Description		R/W
1080	Century	(always = 20)	R
1081	Year	0-99	R/W
1082	Month	1-12	R/W
1083	Day	1-31	R/W
1084	Weekday	1-7	R/W
1085	Hour	0-23	R/W
1086	Minute	0-59	R/W
1087	Second	0-59	R/W

Inputs

Maximum number of 12 inputs: Sensor inputs (SI), universal inputs (UI) and virtual inputs (VI) are combined.

Address	Input	Description	R/W
1100	Input 1	State: 0 = not active / error 1 = active Normal (for Modbus RTU/ASCII) For Modbus TCP only: **SI (Sensor Input):** 1 = Temperature 2 = Relative humidity 3 = Temperature from humidity sensor 4 = Air quality VOC (TCOC ppb) 5 = Air quality VOC CO2 equivalent (ppm) 6 = CO2 sensor (ppm) 7 = Differential pressure / air flow 8 = Air flow **UI (Universal Input):** 21 = 0-10V or 0-20mA 22 = 2-10V or 4-20mA 23 = NTC sensor 24 = Open contact direct 25 = Open contact reversed 26 = Potentiometer input 27 = Light control mode 28 = Pulse counting input 29 = Pt1000 sensor **VI (Virtual Input):** 41 = OPxx-VC 42 = Comm. module (Webserver/ Modbus TCP) 43 = Special function for virtual inputs	R
1101	Input 1	Unit: 0 = no unit 1 = % (percentage) 2 = °C / °F (celsius / Fahrenheit) 3 = Pa (Pascals)	R
1102	Input 1	Input offset calibration (= X2 input parameter 01u6) x10	R/W
1103	Input 1	Input Value x10*	R/W
1700	Input 1	Long value high word for pulse count mode**	R
1701	Input 1	Long value low word for pulse count mode**	R
1104	Input 2	State	R
1105	Input 2	Unit	R
1106	Input 2	Input offset calibration (= X2 input parameter 02u6) x10	R/W
1107	Input 2	Input Value x10*	R/W
1702	Input 2	Long value high word for pulse count mode**	R
1703	Input 2	Long value low word for pulse count mode**	R
1108	Input 3	State	R
1109	Input 3	Unit	R
1110	Input 3	Input offset calibration (= X2 input parameter 03u6) x10	R/W
1111	Input 3	Input Value x10*	R/W
1704	Input 3	Long value high word for pulse count mode**	R
1705	Input 3	Long value low word for pulse count mode**	R
1112	Input 4	State	R
1113	Input 4	Unit	R
1114	Input 4	Input offset calibration (= X2 input parameter 04u6) x10	R/W
1115	Input 4	Input Value x10*	R/W

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Address	Input	Description	R/W
1706	Input 4	Long value high word for pulse count mode**	R
1707	Input 4	Long value low word for pulse count mode**	R
1116	Input 5	State	R
1117	Input 5	Unit	R
1118	Input 5	Input offset calibration (= X2 input parameter 05u6) x10	R/W
1119	Input 5	Input Value x10*	R/W
1708	Input 5	Long value high word for pulse count mode**	R
1709	Input 5	Long value low word for pulse count mode**	R
1120	Input 6	State	R
1121	Input 6	Unit	R
1122	Input 6	Input offset calibration (= X2 input parameter 06u6) x10	R/W
1123	Input 6	Input Value x10*	R/W
1710	Input 6	Long value high word for pulse count mode**	R
1711	Input 6	Long value low word for pulse count mode**	R
1124	Input 7	State	R
1125	Input 7	Unit	R
1126	Input 7	Input offset calibration (= X2 input parameter 07u6) x10	R/W
1127	Input 7	Input Value x10*	R/W
1712	Input 7	Long value high word for pulse count mode**	R
1713	Input 7	Long value low word for pulse count mode**	R
1128	Input 8	State	R
1129	Input 8	Unit	R
1130	Input 8	Input offset calibration (= X2 input parameter 08u6) x10	R/W
1131	Input 8	Input Value x10*	R/W
1714	Input 8	Long value high word for pulse count mode**	R
1715	Input 8	Long value low word for pulse count mode**	R
1132	Input 9	State	R
1133	Input 9	Unit	R
1134	Input 9	Input offset calibration (= X2 input parameter 09u6) x10	R/W
1135	Input 9	Input Value x10*	R/W
1716	Input 9	Long value high word for pulse count mode**	R
1717	Input 9	Long value low word for pulse count mode**	R
1136	Input 10	State	R
1137	Input 10	Unit	R
1138	Input 10	Input offset calibration (= X2 input parameter 10u6) x10	R/W
1139	Input 10	Input Value x10*	R/W
1718	Input 10	Long value high word for pulse count mode**	R
1719	Input 10	Long value low word for pulse count mode**	R
1140	Input 11	State	R
1141	Input 11	Unit	R
1142	Input 11	Input offset calibration (= X2 input parameter 11u6) x10	R/W
1143	Input 11	Input Value x10*	R/W
1720	Input 11	Long value high word for pulse count mode**	R
1721	Input 11	Long value low word for pulse count mode**	R
1144	Input 12	State	R
1145	Input 12	Unit	R
1146	Input 12	Input offset calibration (= X2 input parameter 12u6) x10	R/W
1147	Input 12	Input Value x10*	R/W
1722	Input 12	Long value high word for pulse count mode**	R
1723	Input 12	Long value low word for pulse count mode**	R

* See chapter "Virtual inputs" below for additional information.
** See chapter "Pulse count mode" below for additional information.

Virtual inputs

The X2 controller can operate with external inputs. To activate, program the virtual input to use it as external input of the communication module: for example 9u00 = 2 (Address 3800 = 2) or 10u00 = 2 (Address 3900 = 2).
See chapter: X2-Parameter access through MODBUS
Then program the master to write to the input address the value to the corresponding input. For example Address 1135 for virtual input 1 and 1139 for virtual input 2. Observe the specified time out limitations in the virtual input settings of the X2 device. If the input is not re-written within the time out limits, the X2 device will disable the corresponding virtual input and with it all associated control functions.

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Pulse count mode

The pulse count value has also to be interpreted with factor 10 (value 10 times too high as there is no decimal point) and the values have to be interpreted as 32 bit value. Two 16 Bit addresses are used with the format "signed long inverse":

Lower address (e.g., 1700) = High word (16 Bit)
Higher address (e.g., 1701) = Low word (16 Bit)

Example:

Lower address (high word) = 1
Higher address (low word) = 7164

Pulse count value = (high word) *65536 + (low word) = 1*65536+7164 = 72700 (-> 72700/10=**7270**)

Control loops

Address	Loop	Description	R/W
1200	Loop 1	Control loop input state: 0 = Not Active / Error, 1 = Active	R
1201	Loop 1	Control loop sequence: 0 = cooling, 1 = heating	R
1202	Loop 1	Control loop input unit: 0 = no unit 1 = % (percentage) 2 = °C / °F (Celsius / Fahrenheit) 3 = Pa (Pascals)	R
1203	Loop 1	Control input value x10	R
1204	Loop 1	Set point x10	R/W
1205	Loop 1	Calculated set point x10 - Set point shift for summer/winter compensation - Set point shift when cascade control is used	R
1206	Loop 1	Proportional output x10: 0-1000 = 0-100%	R
1207	Loop 1	Active binary sequence	R
1208	Loop 2	Control loop input state	R
1209	Loop 2	Control loop sequence	R
1210	Loop 2	Control loop input unit	R
1211	Loop 2	Control input value	R
1212	Loop 2	Saved Set point x10	R/W
1213	Loop 2	Calculated Set point x10	R
1214	Loop 2	Proportional output x10	R
1215	Loop 2	Active binary sequence	R
1216	Loop 3	Control input state	R
1217	Loop 3	Control loop sequence	R
1218	Loop 3	Control input unit	R
1219	Loop 3	Control input value	R
1220	Loop 3	Saved Set point x10	R/W
1221	Loop 3	Calculated Set point x10	R
1222	Loop 3	Proportional output x10	R
1223	Loop 3	Active binary sequence	R
1224	Loop 4	Control input state	R
1225	Loop 4	Control loop sequence	R
1226	Loop 4	Control input unit	R
1227	Loop 4	Control input value	R
1228	Loop 4	Saved Set point x10	R/W
1229	Loop 4	Calculated Set point x10	R
1230	Loop 4	Proportional output x10	R
1231	Loop 4	Active binary sequence	R

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Analog Outputs

Address	Output	Description	R/W
1300	AO1	State 0 = Not active or in error state 1 = Normal mode 2 = Manual control mode	R
1301	AO1	Current value x10 0-1000 = 0-100%	R
1302	AO1	Override value x10 (Only applies if output is set to manual mode)	R/W
1303	AO2	State	R
1304	AO2	Current value x10	R
1305	AO2	Override value x10 (Only applies if output is set to manual mode)	R/W
1306	AO3	State	R
1307	AO3	Current value x10	R
1308	AO3	Override value x10 (Only applies if output is set to manual mode)	R/W

Digital Outputs

Address	DO	Description	R/W
1400	DO1	State 0 = Not active or in error state 1 = Normal mode 2 = Manual control mode	R
1401	DO1	Value: 0-1 in binary mode 0-1000 in PWM mode (0-1000 = 0-100%)	R
1402	DO1	Manual override value (Only applies if output is set to manual mode) 0-1 in binary mode 0-1000 in PWM mode (0-1000 = 0-100%)	R/W
1403	DO2	State	R
1404	DO2	Value	R
1405	DO2	Manual override value (Only applies if output is set to manual mode)	R/W
1406	DO3	State	R
1407	DO3	Value	R
1408	DO3	Manual override value (Only applies if output is set to manual mode)	R/W
1409	DO4	State	R
1410	DO4	Value	R
1411	DO4	Manual override value (Only applies if output is set to manual mode)	R/W
1412	DO5	State	R
1413	DO5	Value	R
1414	DO5	Manual override value (Only applies if output is set to manual mode)	R/W
1415	DO6	State	R
1416	DO6	Value	R
1417	DO6	Manual override value (Only applies if output is set to manual mode)	R/W
1418	DO7	State	R
1419	DO7	Value	R
1420	DO7	Manual override value (Only applies if output is set to manual mode)	R/W

Digital outputs: Floating mode (3-position valve)

Note: Available for Modbus TCP only

Address	Module	Description	R/W
1440	FLT1	State FLT1 (DO1 / DO2) 0 = Not active or in error state 1 = Normal mode	R
1441	FLT1	Value: Position 0-1000 = 0-100%	R
1442	FLT1	Manual override value (Only applies if output is set to manual mode) 0-1000 = 0-100%	R/W
1443	FLT2	State FLT2 (DO3 / DO4)	R
1444	FLT2	Value: Position	R
1445	FLT2	Manual override value (Only applies if output is set to manual mode)	R/W
1446	FLT3	State FLT3 (DO5 / DO6)	R
1447	FLT3	Value: Position	R
1448	FLT3	Manual override value (Only applies if output is set to manual mode)	R/W

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Digital outputs: Runtime totalizer and runtime alarm

Address	Output	Description	R/W
1460	DO1	Runtime totalizer in hours	R
1461	DO1	Runtime alarm 0 = inactive 1 = active	R
1462	DO2	Runtime totalizer in hours	R
1463	DO2	Runtime alarm	R
1464	DO3	Runtime totalizer in hours	R
1465	DO3	Runtime alarm	R
1466	DO4	Runtime totalizer in hours	R
1467	DO4	Runtime alarm	R
1468	DO5	Runtime totalizer in hours	R
1469	DO5	Runtime alarm	R
1470	DO6	Runtime totalizer in hours	R
1471	DO6	Runtime alarm	R
1472	DO7	Runtime totalizer in hours	R
1473	DO7	Runtime alarm	R

Fans

Address	Module	Description	R/W
1500	FAN1	State 0 = Not active or in error state 1 = Normal mode 2 = Manual control mode	R
1501	FAN1	Current value 0 = Off 1 = Low (fan speed 1) 2 = Medium (fan speed 2) 3 = High (fan speed 3)	R
1502	FAN1	Override value 0 = Off (fan off) 1 = Low (fan speed 1) 2 = Medium (fan speed 2) 3 = High (fan speed 3) 4 = Auto (automatic mode)	R/W
1503	FAN2	State	R
1504	FAN2	Current value	R
1505	FAN2	Override value	R/W

Lead-Lag (Rotation mode)

Address	Module	Description	R/W
1500	FAN1	State 0 = Not active or in error state 1 = Normal mode 2 = Manual control mode	R
1501	FAN1	Active Lead-Lag stage 0 = Off 1 = Stage/Group 1 2 = Stage/Group 2 3 = Stage/Group 3	R
1502	FAN1	Manual Override Value for lead-lag stag 0 = Off 1 = Stage/Group 1 2 = Stage/Group 2 3 = Stage/Group 3 4 = Auto	R/W
1520	FAN1	Remaining time in hours until next switch of lead-lag stage	R
1503	FAN2	State	R
1504	FAN2	Active Lead-Lag stage	R
1505	FAN2	Manual Override Value for lead-lag stage	R/W
1521	FAN2	Remaining time in hours until next switch of lead-lag stage	R

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Alarms

Note: write 0 to confirm alarm.

Address	Module	Description	R/W
1600	ALA1	State: 0 = confirmed, no alarm 1 = confirmation pending 2 = alarm active	R/W
1602	ALA2	State	R/W
1604	ALA3	State	R/W
1606	ALA4	State	R/W
1608	ALA5	State	R/W
1610	ALA6	State	R/W
1612	ALA7	State	R/W
1614	ALA8	State	R/W

Time Schedules

All devices support 12 individual time schedules (TS1 – TS12).

Address	Description	R/W
1055	Operation state: Time Schedules **0 = Time Schedules disabled,** 1 = Time Schedules enabled	R/W

Weekly time schedules

Address	Module	Description	R/W
1800	TS1	Type of time schedule object 0 = OFF (TS1 disabled) 1 = OP (Operation mode) 2 = LP (Control loop set point) 3 = AO (Analog output set point) 4 = FAN (Fan output) 5 = DO (Digital output) 6 = HDAY (Holiday)	R/W
1801	TS1	Type group ID - Valid only for the following types LP: LP**1** … LP**x** AO: AO**1** … AO**x** FAN: FAN**1** … FAN**x** DO: DO**1** … DO**x** Example: 1800 = 3 (**AO**), 1801 (group ID) = **1** Result: **AO1** (TS1 controls AO1)	R/W
1802	TS1	Active days: (options)* -1 = invalid option (read only) 0 = No active days 1 = Day 1 – Day 7 (all) 2 = Day 1 – Day 6 3 = Day 1 – Day 5 4 = Day 6 – Day 7 5 = Day 1 6 = Day 2 7 = Day 3 8 = Day 4 9 = Day 5 10 = Day 6 11 = Day 7	R/W
1803	TS1	Time of event hours: 0 – 23	R/W
1804	TS1	Time of event minutes (rounded to 15) 0 = 00 Min. 15 = 15 Min. 30 = 30 Min. 45 = 45 Min.	R/W
1805	TS1	Set point according Type OP: 0 = OFF (Protection), 1 = ECO (Unoccupied), 2 = ON (Occupied) LP: Value x10 AO: 0-1000 = 0-100% FAN: 0-3 = fan speed, 4 = fan auto mode DO: 0 = OFF, 1 = ON or 0-1000 = 0-100% for PWM, FLOAT	R/W
1810	TS2	Type of time schedule object	R/W
1811	TS2	Parameter number	R/W
1812	TS2	Active days (options)*	R/W
1813	TS2	Time of event: Hours	R/W

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Address	Module	Description	R/W
1814	TS2	Time of event: Minutes	R/W
1815	TS2	Set point	R/W
1820	TS3	…	…
…	…	…	…
1830	TS4	…	…
…	…	…	…
1840	TS5	…	…
…	…	…	…
1850	TS6	…	…
…	…	…	…
1860	TS7	…	…
…	…	…	…
1870	TS8	…	…
…	…	…	…
1880	TS9	…	…
…	…	…	…
1890	TS10	…	…
…	…	…	…
1900	TS11	…	…
…	…	…	…
1910	TS12	…	…
…	…	…	…

* If active days (options) returns (-1): Option does not exist from 0-11 is stored in X2. Please use "Active Days (bit masked)" to check which days are activated. Alternatively write a valid option (0-11) to overwrite the active days in the X2 controller.

Annual time schedules (holidays)

Address	Module	Description	R/W
1800	TS1	Type of time schedule object 0 = OFF 1 = OP (Operation mode) 2 = LP (Control loop set point) 3 = AO (Analog output set point) 4 = FAN (Fan output) 5 = DO (Digital output) **6 = HDAY (Holiday)**	R/W
1801	TS1	Start day of holiday 1 = first day of the month	R/W
1802	TS1	Start month of holiday 1 = January, 12 = December	R/W
1803	TS1	End day of holiday 1 = first day of the month	R/W
1804	TS1	End month of holiday 1 = January, 12 = December	R/W
1805	TS1	Not used	-
1810	TS2	Type of time schedule object	R/W
1811	TS2	Start day of holiday	R/W
1812	TS2	Start month of holiday	R/W
1813	TS2	End day of holiday	R/W
1814	TS2	End month of holiday	R/W
1815	TS2	Not used	-
1820	TS3	…	…
…	…	…	…
1830	TS4	…	…
…	…	…	…
1840	TS5	…	…
…	…	…	…
1850	TS6	…	…
…	…	…	…
1860	TS7	…	…
…	…	…	…
1870	TS8	…	…
…	…	…	…
1880	TS9	…	…
…	…	…	…
1890	TS10	…	…
…	…	…	…

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Address	Module	Description	R/W
1900	TS11	…	…
…	…	…	…
1910	TS12	…	…
…	…	…	…

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X2-Parameter access through MODBUS

Static Address List

Generally, we do not encourage changing parameter value through external communications. It can however be done as a work around. This application note explains how access is given and how to interpret the associated values.

With the address table below the parameter settings of the controller may be accessed. The values in the table correspond to the first parameter of each list for the addressed X2 controller. For example, 3400 will point to 5U00. 3408 will point to 5U08.

Note: This address will deliver the raw unconditioned 8bit parameter value. Further information is required to interpret those values correctly. See chapter *interpretation of values based on parameter type*.

Description	Parameter Address											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
User settings	2000											
Universal input	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100
Control Loop	5000	5100	5200	5300								
Analog Output	6000	6100	6200									
Binary Output	7000	7100	7200	7300	7400	7500	7600	7700				
Fan output	8000	8100										
Alarm	9000	9100	9200	9300	9400	9500	9600	9700				
Function	10000	10100	10200	10300	10400							
Time Schedules	11100	11200	11300	11400	11500	11600	11700	11800	11900	12000	12100	12200
Communication	13000											

Parameter interpretation

All parameters are converted into a readable format by the communication module:

1. Parameters with whole numbered integers are shown 1:1 without conversion:
    a. Selections of input, outputs indexes
    b. Selections of mode or type indexes
    c. Fan speed
    d. …
2. Parameters with values which can hold decimals, the parameter value is multiplied by 10
    a. Input depending values such as input offset, min/max values for inputs and loops
    b. 0-100% values. Example: 10.5% -> 105
    c. …
3. Time delays are shown in seconds
4. OFF/ON parameters are shown as 0/1

Note: With the "read-modify-write" method it helps to understand the correct parameters format which has to be used in order to modify a parameter value correctly.

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