docs

ATOM / Fieldbus / ModbusTCP

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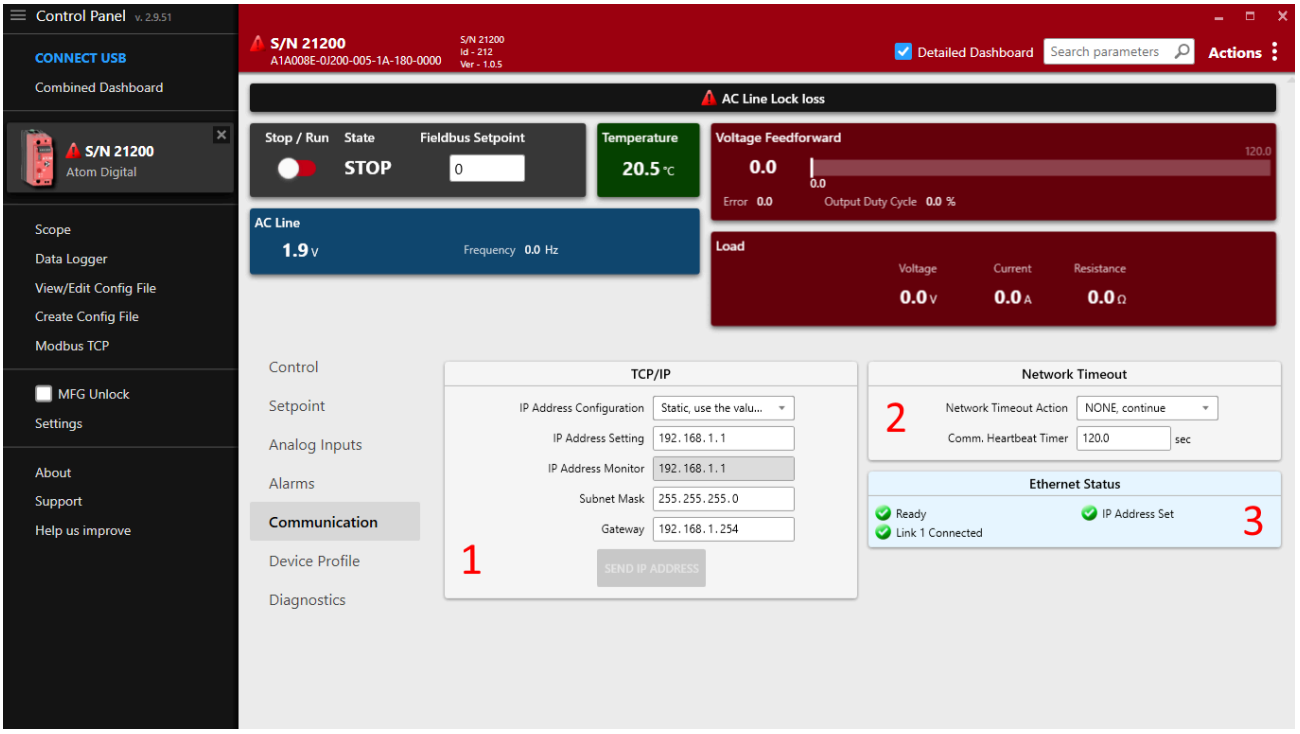
Atom supports the following ModbusTCP operations:

- Read Holding Registers (Function code `3`)
- Write Single Holding Register (Function code `6`)
- Write single coil/command (Function code `5`)

> **INFO**
>
> ModbusTCP is always available and running, even if you're using Profinet or EtherNet/IP. ModbusTCP exposes more parameters than the other fieldbus protocols and may be useful for more advanced configuration.

Control Panel Communication Settings



Some communication settings can be configured in the **Communication** tab in Control Panel.

- Section `1`: TCP/IP settings
  - **IP Address Configuration**
    - `Static`: Use the IP address, subnet mask, and gateway specified below.
    - `DHCP`: Use DHCP to obtain an IP address.
  - **IP Address Setting**: The IP address of the ATOM controller.
  - **IP Address Monitor**: The current IP address of the ATOM controller.
  - **Subnet Mask**: The subnet mask of the ATOM controller.
  - **Gateway**: The gateway address for the ATOM controller.
- Section `2`: Network Timeout
  - The EtherNet/IP heartbeat timeout (Encapsulation Inactivity Timeout) in seconds.
  - You can configure a network timeout action to perform when the device loses communication with the PLC:
    - `None`: Do nothing

    - `STOP, fault shutdown`: STOP the controller, disabling output
    - `Use network timeout setpoint`: Configure an alternative setpoint to use when the controller loses communication with the PLC.
- Section `3`: Ethernet status
    - Indicates the status of both RJ45 ports, IP address configuration, conflict detection, and any other errors with the EtherNet/IP connection.

> **INFO**
>
> ## Control Panel and PLC software
>
> These settings are synchronized with your PLC environment. You do not have to use Control Panel to change these settings - you can stay in your PLC software. Control Panel merely provides them as an altnerative way to configure ATOM's EtherNet/IP settings.
>
> You can use Control Panel simultaneously with your PLC software without issues.

> **WARNING**
>
> ## IP Address Conflict Detection
>
> ATOM uses **IP Address Conflict Detection** to detect IP address conflicts on the network. If ATOM detects another device using the same IP address, it will disable all network communication until the conflict is resolved.
>
> Please ensure all devices on the network are assigned unique a IP address.

Hardware considerations

WARNING

Daisy chaining

As ATOM has two RJ45 ports, it can be easily daisy-chained. When daisy-chaining ATOM, take care to avoid a loop in the network. In some loop configurations, ATOM is susceptible to network broadcast storms, which can cause the controller to become unresponsive. If you are daisy-chaining ATOM, ensure that the network is loop-free.

ATOM works with both unmanaged and managed switches. We recommend a managed switch for larger networks to give you more control over the network topology.

Registers

Register #	Name	Default	Min	Max	Scale	Unit
2	Feedback Type	1	1	2		
3	Firing Mode	5	1	6		
4	Slew Rate	10	1	100		
5	Control Loop	1	0	1		
6	Full Scale Voltage	480.0	10.0	600.0	10	v

Register #	Name	Default	Min	Max	Scale	Unit
7	Full Scale Current	80.0	2.0	100.0	10	A
8	Voltage Limit	700	10	700		v
9	Current Limit	84.0	1.0	105.0	10	A
10	Current Trip	240	5	245	1	A
11	Analog Setpoint Zero threshold	0	0	0		
12	Analog Setpoint Type	0	1	2		
13	Analog Setpoint Low Cmd	0.00	-5.00	25.00	100	v, ma
14	Analog Setpoint Low Out	0.00	0.00	125.00	100	%
15	Analog Setpoint High Cmd	0.00	-5.00	25.00	100	v,ma
16	Analog Setpoint High Out	0.00	0.00	125.00	100	%
17	Partial Load	0	0	1		

Register #	Name	Default	Min	Max	Scale	Unit
	Fault Enable					
18	PLF Tolerance	8.0	0.0	100.0	10	%
19	Partial Load Fault Resistance	8.00	0.10	655.35	100	ohm
20	PLF Alarm Delay time	10	1	120		sec
21	Relay Alarm Mask	384	0	65535		
22	Shorted SCR detect enable	0	0	2		
23	Open Load detect enable	0	0	1		
24	Digital Setpoint 1 (EEPROM)	0	0	10000		
25	Digital Setpoint 2 (RAM) 1	0	0	10000		
26	Digital RUN Enable	0	0	1		
27	Setpoint Select	2	2	2		

Register #	Name	Default	Min	Max	Scale	Unit
28	Digital RUN Enable power-up default	0	0	1		
29	PLF Teach Enable	0	0	1		
30	Communications Heartbeat Time	0	0	65535		
31	Network Timeout Action	0	0	2		
32	Network Timeout Setpoint	0	0	10000		
33	IP Address Configuration method	1	0	1		
34	IP Address, OCTET 1	192	0	255		
35	IP Address, OCTET 2	168	0	255		
36	IP Address,	71	0	255		

Register #	Name	Default	Min	Max	Scale	Unit
	OCTET 3					
37	IP Address, OCTET 4	250	0	255		
38	Subnet Mask, OCTET 1	255	0	255		
39	Subnet Mask, OCTET 2	255	0	255		
40	Subnet Mask, OCTET 3	255	0	255		
41	Subnet Mask, OCTET 4	0	0	255		
42	Gateway IP Address, OCTET 1	192	0	255		
43	Gateway IP Address, OCTET 2	168	0	255		
44	Gateway IP Address, OCTET 3	0	0	255		

Register #	Name	Default	Min	Max	Scale	Unit
45	Gateway IP Address, OCTET 4	100	0	255		
46	Relay Normal State	0	0	1		sec
		Format				
201	Active Setpoint	X				
202	Analog Setpoint %	SXXX.X			10	%
203	Analog Setpoint Cmd	SXXX.X			10	V,A
204	Analog Setpoint Signal	SXX.XX			10	v,ma
205	Inhibit Alarm Status	XXXXXXXX				
206	Controller Status	X				
207	AC Line Frequency	XX.X			10	Hz

Register #	Name	Default	Min	Max	Scale	Unit
208	Line Voltage	XXX.X			10	V
209	Load Voltage	XXX.X			10	V
210	Load Current	XXX.X			10	A
211	Load Resistance	XXXX.X			10	ohm
212	Heatsink temp	XXX.X			10	C
213	Controller State	X				
214	Output Duty Cycle %	XXX.X			10	%
215	Setpoint Reference	XXX.X			10	V,A
216	Feedback	XXX.X			10	V,A
217	Control Loop Error	SXXX.X			10	V,A
218	Warning Alarm Status	XXXXXXXX				100
219	Partial Load	XXX.XX			100	ohm

Register #	Name	Default	Min	Max	Scale	Unit
	Fault Target Res					
220	Partial Load Fault Resistance	XXX.XX			100	ohm
221	PLF Resistance Deviation	SXXX.X			10	%
222	Partial Load Fault Status	XXXXXXXX				
310	In Service Time HI	XXXXXXXXXX				
311	In Service Time LO					
312	Processor Temperature	XXX.X			10	C
330	EE Calibration bits	XXXX				
331	Calibration ADC bits In	XXXX				
332	Firmware ID	XXXXX				

Register #	Name	Default	Min	Max	Scale	Unit
333	Firmware Revision	XX.XX			100	
334	Minor Revision	XX				
335	Feedback Read status	X				
336	Misc Status	XXXXXXXX				
337	EEPROM Status	XXXXXXXXXXXXXXXX				
338	AC Line Status	XXXXXXXX				
339	Load Status	XXXXXXXX				
340	Error Latch	XXXXXXXX				
341	Ethernet status	XXXXXXXXXXXXXXXX				
342	Network Heartbeat Timer	XXXXX				

Register #	Name	Default	Min	Max	Scale	Unit
343	IP Address in use, OCTET 1	XXX				
344	IP Address in use, OCTET 2	XXX				
345	IP Address in use, OCTET 3	XXX				
346	IP Address in use, OCTET 4	XXX				

Additional parameter descriptions

Inhibit Alarm Status

Inhibit alarm status is a 8-bit bitfield:

7	6	5	4	3	2	1
Reserved	Reserved	Reserved	Reserved	Feedback Loss	Over Temperature	Over Current Trip

If any bit is set to 1, the controller will *not* be allowed to run.

Warning Alarm Status

Warning alarm status is a 8-bit bitfield:

7	6	5	4	3	2	1	0
Reserved	Reserved	High temperature	Shorted SCR	Open Load	Partial Load Fault	Current Limit	Voltage Limit

Warning alarms are not considered critical and will not prevent the controller from running.

Feedback Read Status

Feedback status is a 8-bit bitfield:

7	6	5	4	3	2	1	
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Ti

Indicates whether the controller has acquired feedback on the line. If any bit is set to 1, then the controller has lost feedback.

AC Line Status

AC Line status is a 8-bit bitfield:

7	6	5	4	3	2	1	0
Reserved	Reserved	Sync-Locked (to AC Line)	Pre-Lock 2	Pre-Lock 1	Reserved	AC Line B OK	AC Line A OK

Bits 5 must be set to 1 before the controller can provide power to the load.

Load Status

Load status is a 8-bit bitfield:

7	6	5	4	3	2	1	0
Reserved	Reserved	Reserved	Open Load	Reserved	Reserved	Reserved	Short SCR

Controller Status

Controller status is one of:

Value	Description
0	Disabled
1	Initialization
2	Normal, operating
3	Calibration
4	Diagnostic

Controller State

Controller state is one of:

Value	State	Description
0	STOP	The state the controller is in when AC Line voltage is not present.
1	RUN	The state the controller is in when AC Line voltage is present and the controller is synchronized to the AC line.
2	FAULT	A latching state of output shutdown caused by over current or over temperature alarms. A power cycle or processor reset is required to clear this state.
3	FAULT RESET	Used as a temporary state to transition from FAULT to RUN once again.

EEPROM Status

EEPROM status is an 16-bit bitfield. EEPROM is used to store controller configuration and calibration data. Any errors in EEPROM may indicate that the firmware is corrupted.

Bit	Description
0	EEPROM Initialization
1	SP Table Error
2	MFG CP Table Error
3	Calibration Table Error
4	Reserved

Bit	Description
5	Reserved
6	Backup Calibration Table Error
7	Bottom Board Calibration Table Error
8	SP Definition Table needs updating
9	Bottom Board Calibration Backup Error
10	Reserved
11	Reserved
12	EEPROM is write protected
13	Reserved
14	Reserved
15	Feedback Calibration Table has changed, store to EEPROM

Error Latch

Error latch is a 8-bit bitfield:

7	6	5	4	3	2	1	0
Reserved	Reserved	Reserved	Feedback loss	SCR timing loss	Line Frequency failure	Phase loss or missing cycle	Line Lock Loss

Error latch is provided as a diagnostic troubleshooting aid.

Miscellaneous Status

Miscellaneous status is an 8-bit bitfield:

7	6	5	4	3	2	1
Reserved	Initialization in progress	Reserved	Reserved	Waiting for ENTER key during initialization	Reserved	USB Powered

Data types

All Modbus registers are 2-bytes (WORD).

Registers may be an unsigned integer (most commonly), bitfield, integer, bool, or decimal.

Most of these are straightforward. Decimals are stored as integers with a scale in our controllers.

The **Scale** column indicates how much you should *divide* the value by when reading it, and how much you should *multiply* it by when writing it.

Commands

CMD #	Name	Description
6	Factory reset	Reset to factory settings
13	Reset parameter	Resets user parameters to defaults
24	Store to EEPOM	Saves all parameters to permanent storage
198	Identify	Flashes LEDs on controller
248	Reset	Effectively restarts the controller

Miscallaneous

IMPORTANT

You may notice that ModbusTCP parameter numbers are one less than the same parameters in other ATOM fieldbus profiles. This is because ModbusTCP uses zero-based addressing and subtracts 1 from all register numbers. The table above lists the actual register numbers you should use in your PLC project.