docs

ATOM / Fieldbus / EtherCAT / Overview

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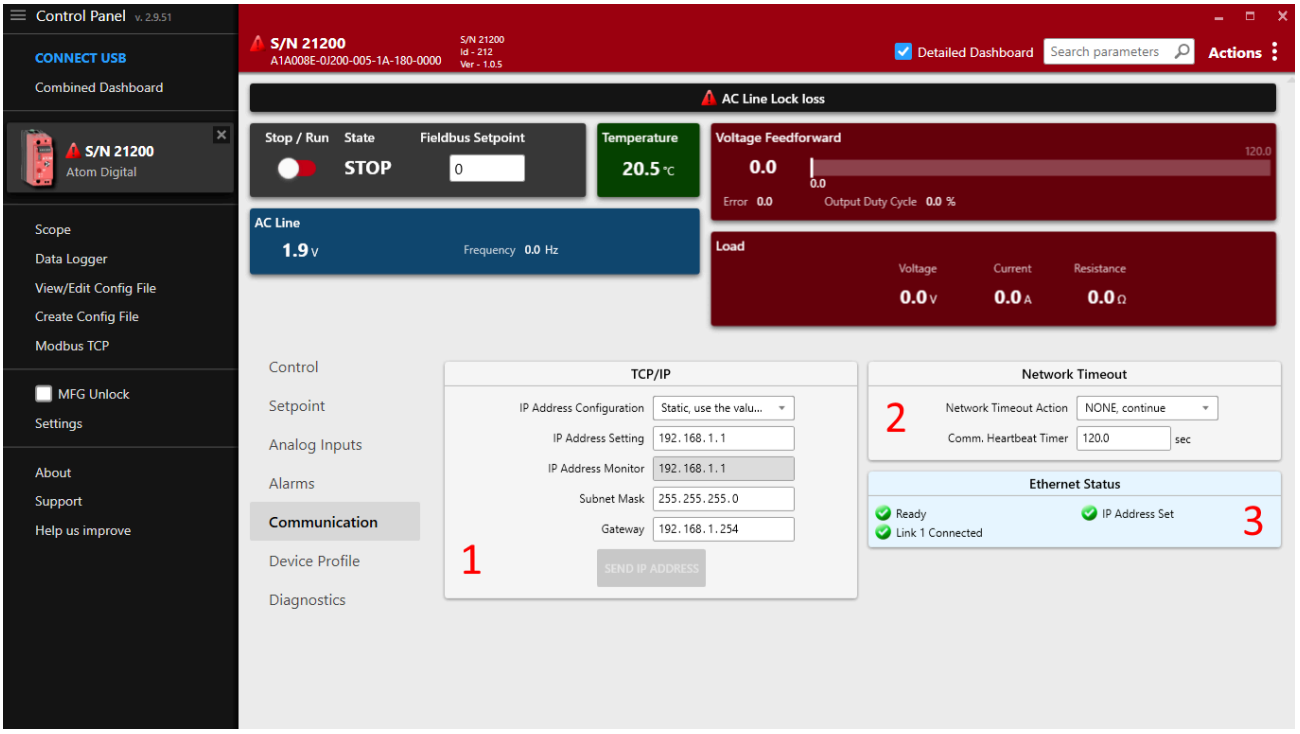
ATOM / Fieldbus / EtherCAT / Overview

> **NOTE**
>
> Control Concepts has run the EtherCat Conformance Test Tool to verify that ATOM is fully compliant with the EtherCAT standard.

ESI file

> **INFO**
>
> Download ATOM's ESI file: Atom.xml.

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.

Parameters

Overview

The following is an overview of the parameters available over EtherCAT. These parameters can be accessed and modified through TwinCAT or other EtherCAT master software.

Inputs (`DT6000`)

Index	Name	Type	Description
0x6000:01	Line Voltage	UINT	Input AC line voltage in tenths of a volt (i.e. `800` = `80.0 V`)
0x6000:02	Load Voltage	UINT	Load Voltage in tenths of a volt (i.e. `800` = `80.0 V`)

Index	Name	Type	Description
0x6000:03	Load Current	UINT	Load Current in tenths of an amp (i.e. `800` = `80.0 A`)
0x6000:04	Load Resistance	UINT	Load resistance in tenths of an Ohm (i.e. `800` = `80.0 Ohms`)
0x6000:05	Heatsink Temp	UINT	Heatsink temperature in tenths of a Celsius (i.e. `800` = `80.0 C`)
0x6000:06	AC Line Frequency	UINT	AC Line Frequency in tenths of a Hertz (i.e. `800` = `80.0 Hz`)
0x6000:07	Controller State	UINT	See controller state description
0x6000:08	Output Duty Cycle	UINT	Indicates the amount, in tenths of a percent (`800` = `80.0%`), that the output of the controller is ON
0x6000:09	Setpoint Reference	UINT	The command reference input to the control compensation loop in `V`, or `A` (per the feedback parameter)
0x6000:10	Feedback	UINT	The control output supplied to the load in units determined by the ?Feedback? selection
0x6000:11	Setpoint selected	UINT	Active setpoint. `1` = Analog setpoint, `2` = Digital setpoint, `3` = Fieldbus setpoint

Index	Name	Type	Description
0x6000:12	Inhibit Alarm Status	UINT	Indication of alarms that cause the controller to be shut OFF and not allowed to RUN. See inhibit alarm status description
0x6000:13	Controller Status	UINT	Indicates the operational status of the controller. See controller status description
0x6000:14	Warning Alarm	UINT	Indication of conditions that cause specific warning alarms. See warning alarm description

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.

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.

Value	State	Description
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.

Outputs (`DT7000`)

Index	Name	Type	Description
0x7000:01	Fieldbus setpoint	UINT	A value between 0 and 10,000 indicating the desired output current. The value is scaled to the output range of ATOM. For example, if the output range is 0-100A, a value of 5000 would set the output to 50A. `0 = 0%`, `10,000 = 100%`
0x7000:02	Digital Run Enable	UINT	`0` = Disable output, `1` = Enable output. When disabled, the output current is set to 0A.

Configuration (`DT8000`)

Index	Name	Type	Description
0x8000:01	Feedback Type	UINT	Sets the signal type used for feedback by the control loop. `1` = Voltage Feedforward, `2` = Load Current.
0x8000:02	Firing mode	UINT	Selects the desired type of firing mode.
0x8000:03	Slew rate	UINT	`1-100`: Sets the control loop response for Phase Angle and Half-Cycle DC firing modes. Higher value = slower response, Lower value = faster response.
0x8000:04	Control Loop	UINT	Closed loop compares the feedback with the setpoint to achieve the correct output. Open loop adjusts the output duty cycle of the controller directly without adjusting for feedback.
0x8000:05	Full Scale Voltage	UINT	Set to the expected output voltage when the controller output is fully ON 100%. This equates to the voltage output command when feedback type is set to Voltage feedforward and the setpoint is at 100% (maximum)
0x8000:06	Full Scale Current	UINT	Set to the expected output current when the controller output is fully ON 100%. This equates to the current output command when feedback type is set to Load Current and the setpoint is at 100% (maximum)

Index	Name	Type	Description
0x8000:07	Voltage Limit	UINT	`10 - 700`: Sets the maximum output voltage allowed by the controller.
0x8000:08	Current Limit	UINT	`1.0 - 84.0`: Sets the maximum output current allowed by the controller.
0x8000:09	Partial Load Fault Enable	UINT	`0` = Disable partial load fault detection & alarm, `1` = Enable partial load fault detection & alarm.
0x8000:10	Partial Load Fault Tolerance	UINT	`0.0 - 100.0` Sets the maximum percent load resistance deviation from the ?Partial Load Fault Resistance? value. Deviations outside this band will trigger a Partial Load Fault alarm.
0x8000:11	Partial Load Fault Resistance	UINT	`0.10 - 655.35` - Sets the nominal resistance of the load. This is used for comparison in determination of a partial load fault alarm condition.
0x8000:12	Partial Load Fault Alarm Delay Time	UINT	Sets the delay time, in seconds, after detection of a partial load fault until the alarm is indicated.
0x8000:13	Relay Alarm Mask	UINT	See relay mask bitfield
0x8000:14	Shorted SCR Check Enable	UINT	Enables and disables shorted SCR detection and alarm indication. Shorted SCR detection is

Index	Name	Type	Description
			always performed when AC Line is ON and the controller?s output is OFF.
0x8000:15	Open Load Detect Enable	UINT	Enables and disables open load detection and alarm indication.

Relay mask

Relay mask is an 16-bit bitfield:

15-9	8	7	6	5	4	3	
Reserved	Over Current Trip	Over Temperature	Partial Load Fault/Open Load	Shorted SCR	Current Limit	Voltage Limit	A Li Lo