

7. ALARMS & MONITORS

ATOM power controllers offer numerous monitors and internal systems that continuously oversee and audit critical processes. Reporting consists of LED indicators on the controller. Diagnostic and status data available is also accessible through the fieldbus interface on digital models. The Control Panel software when connected over USB to the controller displays all live data and configuration options and can access additional resources available on the controller.

Additionally all models include a solid state relay that can be mapped to the various alarms allowing signaling or response of external hardware in the event of abnormal system operation.

7.1. Warning Alarms

Warning alarms are unexpected events that require alerting the operator to unusual or dangerous conditions that should be investigated or monitored, but controller output will be allowed to continue while the alarm is active. Controller output may be limited as with the case of Voltage or Current Limit alarms.

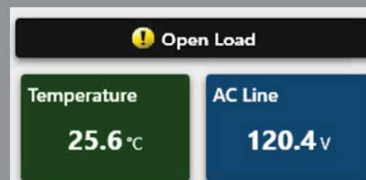
Warning alarms will be displayed in the Control Panel status bar and the Status LED on the controller will turn orange.

NOTE: When a condition that triggered the warning alarm returns to its normal range the warning alarm will clear automatically.



FIND IN CONTROL PANEL WARNING ALARMS

Active Warning alarms are displayed with a yellow icon in the “Status” section of the Control Panel dashboard



7.1.1. Voltage Limit

The controller voltage output has reached the value set in the Voltage Limit [SP-7] parameter. When this occurs the controller will restrict voltage output to the voltage parameter value regardless of an increase in setpoint passed the output duty-cycle percent where the voltage limit was reached.

7.1.2. Current Limit

The controller current output has reached the value set in the Current Limit [SP-8] parameter. When this occurs the controller will restrict current output to the current limit parameter value regardless of an increase in setpoint passed the output duty-cycle percent where the current limit was reached.

7.1.3. Partial Load Fault

Partial Load Fault is enabled and the controller has detected a variation in load resistance that is outside the tolerance value of the target resistance. For additional information and settings see the *Partial Load Fault Detection* section.

7.1.4. Open Load

Open Load Detection is enabled and the controller detects a change in load current outside of the expected range. For additional information and settings see the *Open Load Detection* section.

7.1.5. Shorted SCR

Shorted SCR Check is enabled and the controller has detected the SCR has become shorted. It is important to note that when the SCR is shorted and the controller is outputting, it will continue to output regardless of the run/stop/fault and setpoint states. For settings and additional information see the *Shorted SCR Detection* section.

7.1.6. High Temperature

The controller has exceeded the high temperature threshold of 100° C. The controller will continue to operate but a high temperature warning will be displayed on the Control Panel dashboard until the temperature returns to the normal range.

7.2. Inhibit Alarms

Inhibit alarms are detected conditions that are considered serious enough that controller output should be stopped until the condition causing the alarm returned to a normal state or is corrected.

When an inhibit alarm occurs the controller status [SP-212] will be set to FAULT (2) and controller output will be disabled. The status LED on the controller lid will turn red to indicate the output is in inhibit state.

To resume operation after an inhibit alarm is active on a digital model ATOM the controller RUN Enable [SP-25] must be set to STOP (0) which will put the controller FAULT RESET, then if the RUN Enable is set back to the RUN (1) setting and the condition has cleared, output will resume according to the commanded setpoint.

On the Analog ATOM model the only way to resume output after an inhibit alarm is to power cycle or reset the controller using the hardware switch.

7.2.1. AC Line Lock Loss

If there is an interruption or loss of AC line voltage to the controller during operation this inhibit alarm will trigger.

The Power LED will turn red to indicate the loss of AC Line Lock and the Status LED will turn red to indicate the controller is in Fault state.

7.2.2. Over Current Trip

Current through the load has exceeded the value of the Current Trip parameter [SP-9].

The over-current limit is set to 240 amps from the factory and cannot be changed.

7.2.3. Over Temperature

The controller has exceeded the maximum safe operating temperature. If this condition occurs check all mounting clearances and airflow for the controller. If the ATOM controller is equipped with a fan, ensure it is unobstructed and operating normally. The over temperature limit is set to 105° C.

7.2.4. Feedback Loss

A malfunction has occurred in the internal feedback circuit in the controller. If the Feedback Read Status [MP-334] indicated a fault the controller has sustained an internal malfunction or unexpected condition. If this alarm does not reset after a power cycle the controller has failed and will need to be replaced.

7.3. Relay Alarm Mask

ATOM controllers are equipped with one normally open relay accessible on pins 1 and 2 of the 6-pin command connector.

When a relay alarm mask is set for an alarm the relay will close any time that alarm is triggered. All alarms mapped to the relay are OR'ed together so any or all alarm states can control the relay simultaneously. The relay will open when an existing alarm clears unless another triggered relay mask alarm has also closed the relay.

Alarm	Description
Memory Error Watchdog Timeout Error Trap	An internal processor error has occurred during initialization or operation.
Communications Error	A fieldbus network error occurred
AC Line Loss	AC phase loss has been detected
Voltage Limit	Load voltage has reached the Load Voltage Limit parameter value
Current Limit	Load current has reached the Load Current Limit parameter value
Shorted SCR	The controller has detected that the SCR is shorted.
PLF/Open Load	A partial load fault or open load condition has been detected
Over Temperature	Controller operating temperature has exceeded the over temperature rating
Over-current Trip	Load current has exceeded the Current Trip parameter value

The relay alarm mask is enabled for Over Temperature and Over-current Trip by default.



FIND IN CONTROL PANEL RELAY ALARM MASK

Alarms → Relay 1

Relay 1

Relay Alarm Mask

☐ Memory Error, Watchdog timeout, Error Trap
☐ Communications Error
☐ AC Line loss
☐ Voltage Limit
☐ Current Limit
☐ Shorted SCR
☐ Partial Load Fault/Open Load
☒ Over Temperature
☒ Over Current Trip

Alarm Relay Specifications:

Normally open, Solid State, Form A
60 Vdc 100 mA / 42 Vac 100 mA RMS

7.4. Partial Load Fault Detection

The Partial Load Fault (PLF) Detection is a “watch-dog” feature that monitors the load for changes in resistance. This is useful for detecting an element failure in loads with multiple parallel elements. The detection circuit reads the actual load resistance and compares it against the saved target resistance. If it falls outside the tolerance value percent the system will trigger the partial load fault warning alarm. The controller status LED will flash orange while this alarm is active. A warning will also be displayed on the Control Panel dashboard status bar and in the PLF status frame under Alarms.

PLF Detection is only active when the controller is outputting.

NOTE: Partial Load Fault Detection will not work properly with transformer-coupled loads or resistive loads whose resistance varies greater than 10%. PLF should never be enabled in those instances.



FIND IN CONTROL PANEL PARTIAL LOAD FAULT DETECT

Alarms → Partial Load Fault Detection

Partial Load Fault Detection

Detection Enable ☒ Enabled

Tolerance %

Target Resistance Ohms

Alarm Delay Time s

Status

☒ Enabled
☒ Active

Target Resistance Ω

Resistance Ω

Deviation %

PARTIAL LOAD FAULT TEACH

Partial Load Fault Status

The status frame in Control Panel displays the current state of the detection circuit. The status values are as follows:

Status	Description
OK	PLF Detection is disabled
Enabled	PLF Detection is enabled
Active	The PLF circuit is monitoring the load for resistance changes
Partial Load Fault A	A load fault has been detected (warning alarm is active)

Changing Target Resistance / Teach Mode

In Control Panel the target resistance can be set manually by changing the value in the Target Resistance parameter [SP-18] or set from the current load resistance by pressing the Partial Load Fault Teach button in the PLF frame.

Using the Teach Button on the Controller

The live calculated load resistance can be saved by using the Teach button¹ on the ATOM controller.

To set the Target Resistance with the Teach Button:

Momentary press the Teach/Reset button on the controller - The Status LED should begin flashing orange

Press the Teach button again within 5 seconds to save the resistance to the controller

If the button is not pressed a second time the teach mode will cancel and the controller will resume normal operation.

Partial Load Fault Detection will not be active when in teach mode.

¹ Manual Teach button is not available on EtherCAT models.

7.4.1. Tolerance [SP-17]

The value of this parameter is the percentage of deviation allowed between the expected target resistance and the actual resistance of the attached load before a partial load fault alarm is triggered.

7.4.2. Target Resistance [SP-18]

This value is the expected resistance of the attached load, either manually entered, or learned via the teach function.

7.4.3. Alarm Delay Time [SP-19]

The time in seconds the Partial Load Fault circuit should wait before triggering a warning alarm after a load fault has been detected. The time is configurable by the operator and is defaulted to 10 seconds.

7.5. Shorted SCR Detection

Shorted SCR detection is always performed when AC Line is ON and the controller's output is OFF. Due to feedback signal delay, the output must be off for at least 8 half cycles (4 line cycles) before the shorted SCR check can be performed.



Firing modes Zero-cross & Fast Zero-cross may be checked during off periods, between firing, or if the off periods are less than 4 cycles the output will be turned off every 30 seconds for 4 cycles in order to check for a shorted SCR.

This is performed when the controller's output duty cycle% is less than 95%.

Shorted SCR load current threshold for detection: $\frac{1}{4}$ Full Scale Current setting (SP-6) with a minimum = 1 A

If the Load current, while the output is OFF, is greater than the threshold it is determined to be a shorted SCR.

The Shorted SCR Detection Enable parameter [SP-21] enables or disables this monitor.

7.6. Open Load Detection

The controller detects an open load by monitoring its output duty-cycle and load current while outputting.

When the output duty cycle is at least 10% and the load current is less than 5% of the Full Scale Current [SP-6] setting (or 250 mA minimum) the controller will trigger an open load warning alarm.

This alarm has a 5 second delay after detection before the alarm is set or cleared.

The Open Load Detection Enable parameter [SP-22] enables or disables this monitor.