



# Systems Manager Software User's Guide

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## REVISION HISTORY

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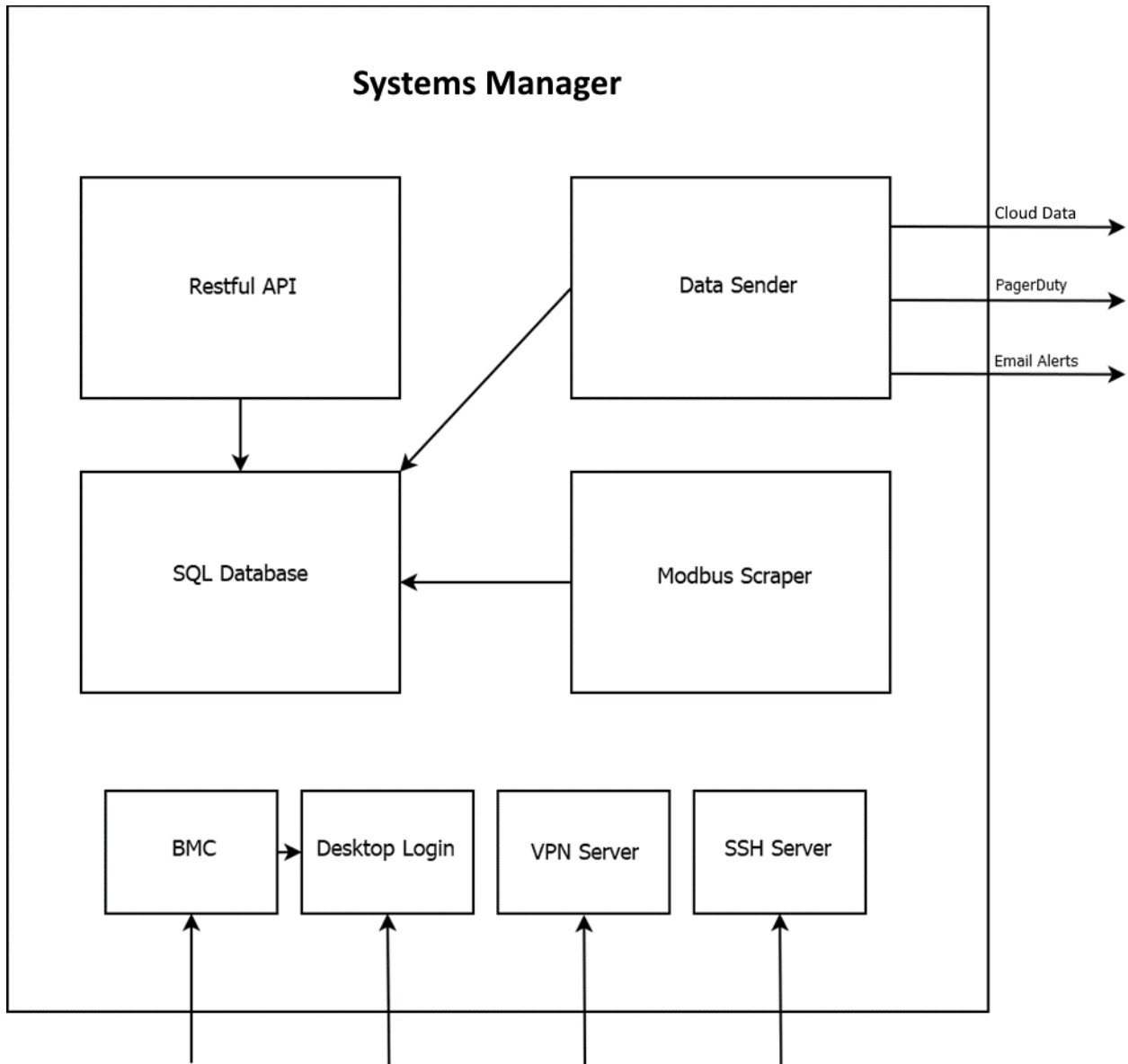
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# 1.0 OVERVIEW

The Systems Manager is responsible for several processes and features of the ICeraQ control system. A single Systems Manager is required for an entire site, as it can aggregate and store data from multiple CDUs. Because both the Systems Manager is a networked device, an active, routing network is required for operation.



## 2.0 ALERTS

Alerts are generated on the Systems Manager with data pulled from the PLC. For a comprehensive list of alerts and their meanings, please refer to the PLC Software User's Guide (SW-016-06708). While the PLC can generate its own alerts, any generated alerts will not be delivered to a notification service without the GRC Systems Manager or a properly configured 3<sup>rd</sup> party DCIM.

All alerts are assigned a priority level. This priority level is used to determine the severity of the alert, impacting the notification intervals. If an alert is detected it will continue to notify on the following intervals until the alert is cleared:

- P1 Alert: 1 hour
- P2 Alert: 4 hours
- P3 Alert: 24 hours

### 2.1. TABLE OF ALERTS

Priority	Description
1	PLC Offline Alert
1	Coolant Temp High Alert
1	Coolant Temp Low Alert
1	Secondary Pump Command Error Alert
1	Primary Pump Communication Error Alert
1	Temperature Sensor Continuity Alert
1	Water Pump Communication Error Alert
1	Rack 1 Float Low Alert
1	Rack 2 Float Low Alert
1	Rack 3 Float Low Alert
1	Rack 4 Float Low Alert
2	Secondary Pump Power Alert
2	Secondary Power Breaker Off Alert
2	Primary Power Breaker Off Alert
2	Water Pressure Hot High Alert
2	Water Pressure Hot Low Alert
2	Water Pressure Cold High Alert
2	Water Pressure Cold Low Alert
2	Manifold Pressure High Alert
2	Manifold Pressure Low Alert
2	Containment CDU Alert
2	Containment Manifold Alert

2	Containment Rack 1 Alert
2	Containment Rack 2 Alert
2	Containment Rack 3 Alert
2	Containment Rack 4 Alert
3	Water Pressure Hot Continuity Alert
3	Water Pressure Cold Continuity Alert
3	Manifold Pressure Continuity Alert
3	Container Leak Alert
3	Primary Pump VFD is in Local Control Alert
3	Water Pump VFD is in Local Control Alert
3	Zone 1 Sump Float Alert
3	Zone 2 Sump Float Alert
3	Zone 3 Sump Float Alert
3	Zone 4 Sump Float Alert
3	Ambient Temperature High Alert

Please note that the alerts available and generated by the alert system will vary by model.

## 2.2. PAGERDUTY

PagerDuty integration is optional. During the alert cycle, if the Systems Manager has been configured to integrate the CDU into PagerDuty, requests will be submitted to the PagerDuty API to create new or update existing incidents. The intervals of these notifications are determined by the class of the alert and will follow the same rules described in the alerts section.

## 3.0 WEB INTERFACE

The Web Interface of the Systems Manager is the primary method in which to configure and view collected data and generated alerts. It is split up into 6 subpages:

### 3.1. SITE STATUS

The Site Status page displays any active alerts as well as the latest PLC status updates from GRC CDUs. All PLCs added to the PLC Configuration section that are enabled will show up on this page. The Site Status Page does not require a login to view.

System	Code	Information	Time Generated
Micro Black	101	PLC Offline Alert	5/5/2021, 12:03:41 PM

System	Set Point	Highest Rack Temp	Exchange In	Exchange Out	Pump Speed	Update Time
Inhouse-24u	40.0 C	31.1 C	24.6 C	26.2 C	22.0 Hz	5/13/2021, 5:37:28 PM
Micro Black	40.0 C	22.9 C	23.2 C	22.7 C	0.0 Hz	4/26/2021, 10:41:47 AM

#### 3.1.1. ACTIVE ALERTS

If there are no active alerts, the section will not appear at all, and only the PLC Status section will remain. The alerts will automatically appear when they are detected and will automatically be removed when the alerting condition is cleared.

The alerts visible here correspond with the alerts listed in the Alerts section of this document.

#### 3.1.2. PLC STATUS

The PLC Status section shows the last update collected from all enabled PLCs. More detailed information may be obtained by clicking on the PLC's information row.



### 3.2. REPORTS

The reports page allows users to obtain historical data from all enabled CDU PLCs. Users must select a valid date and time range, and the CDU for the data. Once the selections are made, the user may submit their query. Filters may be applied before or after the Submit button is pressed to show only relevant data.

The export function may be used to compress all data for the selected CDU and date range into a CSV and downloaded to the user's computer.

The Reports page is available to anyone with a User login or higher.

**GRC Systems Manager**

Site Status

**Reports**

PLC Config

Systems Manager Config

Services

User Administration

## Reports

Query: Start MM/DD/YYYY x End MM/DD/YYYY x CDU ▾ Submit Export

00:00 ▾ 00:59 ▾

Filters: Temperature ▾ Pressure ▾ Power ▾ Binary ▾ Misc ▾

### 3.3. PLC CONFIG

The PLC configuration page is used for adding, editing, and removing CDU PLCs. Enabled PLCs are displayed in black text, while PLC's in a disabled state will be displayed in red text.

The PLC Configuration page is available to anyone with a Site Admin login or higher.

**GRC Systems Manager**

Site Status

Reports

**PLC Config**

Systems Manager Config

Services

User Administration

## PLC Configuration

System Name	IP Address	MAC	Config type	Sw Version	Mb Address	Mb Port
+						

#### 3.3.1. ADD PLC

A PLC may be added by clicking the + icon on the lower left corner of the table. All fields must be filled out before the Add button may be clicked.

**Add PLC**

System Name: GRC-CDU-1

IP Address: 10.0.0.100

Software Version: 1.1

Config Type: MicroV1

Modbus Address: 1

Modbus Port: 502

MAC Address: AA:BB:CC:DD:EE:FF

Buttons: Add, Cancel

### Add / Edit PLC Fields

Field	Description
System Name	How the PLC appears in the Status page and alerts
IP Address	The network location of the PLC
Software Version	PLC software version
Config Type	CDU Type – Determines what alerts should be generated
Modbus Address	Modbus node address - this should always remain as 1
MAC Address	MAC of the PLC, used for additional identification
MA Header	Machine Adviser Header – for PLCs with optional Machine Adviser Integration
MA Server	Machine Adviser Server Link – for PLCs with optional Machine Adviser Integration
Enabled	Enables or disables data collection and alerting on a PLC without removing the historical data from the database

### 3.3.2. EDIT PLC

Users may edit an existing PLC by clicking the PLC's row in the table. Any field in the popup can be edited. To add or edit optional fields, click the Optional button.

### Edit PLC

System Name	<input type="text" value="Inhouse-24u"/>
IP Address	<input type="text" value="192.168.1.173"/>
Software Version	<input type="text" value="1.1"/>
Config Type	<input type="text" value="MicroV1"/>
Modbus Address	<input type="text" value="1"/>
Modbus Port	<input type="text" value="502"/>
MAC Address	<input type="text" value="00:18:BB:01:96:47"/>
<b>Optional</b>	
MA Header	<input type="text" value="Authorization;SharedAccessSignature s"/>
MA Server	<input type="text" value="https://cnm-ih-na.azure-devices.net/de"/>
Enabled	<input checked="" type="checkbox"/>

A PLC may be deleted through the Edit menu. Note that all historical data will be erased when performing this action. If a user wants the alerts and data collection to be halted, the PLC should be disabled instead.

### 3.4. SYSTEMS MANAGER CONFIG

The Systems Manager Config page is used to set up alerting information and routing. The Systems Manager Config page is only available to Site Admins or higher.

# Systems Manager Configuration

GENERAL

Customer Name

ALERTING ACCOUNT INFORMATION

Alert Email Account

Alert Email Password

Alert Email Recipients

**Systems Manager Config Fields Table**

Field	Description
Customer Name	Name of the customer or customer site
Alert Email Account	Email address from which alert emails are originated
Alert Email Password	Password for origination email address
Alert Email Recipients	Email addresses for alert email recipients separated with ;
Contact Name	Displayed in Alert Email - Site contact to be notified by GRC Support if necessary
Contact Email Address	Displayed in Alert Email – Site contact’s email address to be notified by GRC if necessary
Contact Phone Number	Displayed in Alert Email – Site contact’s phone number to be notified by GRC if necessary
API Key	PagerDuty API key if connected to a PagerDuty account

### 3.5. SERVICES

The Services page is used to turn on or off various services running on the Systems Manager. Services may be enabled or disabled by clicking on their row in the table and clicking the confirmation popup. Services that are running appear in black text. Services that have been stopped appear in red text.

Only Site Admins or higher may access the Services page.

Service Name	CPU %	Memory	Restarts	Status
API	0%	61.3mb	0	online
AlertWatchdog	0%	56.8mb	0	online
DataSender	0%	0b	19	stopped

### 3.5.1. API

The Systems Manager features a full RESTful API for accessing the data collected from the PLCs. The API is secured with cookies and can only be accessed after the Systems Manager has been configured to add API users. For a list of the API routes and specifics on authentication methods, please contact GRC Engineering.

The API also hosts the Web HMI. For this reason, it cannot be enabled or disabled through the Services page.

### 3.5.2. ALERT WATCHDOG

The AlertWatchdog service monitors the alerts database on the Systems Manager and sends alerts via email and PagerDuty as necessary. Only active alerts will be used to generate notifications. Past alerts that have had their alerting conditions cleared will be marked as inactive but retained in the database.

### 3.5.3. MODBUS SCRAPER

The Modbus Scraper is responsible for pulling the data from the PLCs. After the data from the PLCs is collected, it parses the data to perform diagnostics, records any new alerts to the database, updates any existing alerts, and resolves any alerts that have their conditions cleared.

### 3.5.4. DATA SENDER

The Data Sender scans the database to find updates and alerts recorded by the Modbus Scraper that haven't been uploaded to Schneider's Machine Adviser Cloud DCIM. Once these updates and notifications have been identified, a list of updates and a list of alerts are generated and attempted to be uploaded. If an update is not successful, it will not be marked as transmitted and the system will try again during the next cycle.

### Note on Machine Adviser:

Machine Adviser is a cloud based DCIM-like service provided by Schneider Electric. Integration into this service is optional and requires a subscription.

## 3.6.USER ADMINISTRATION

The User Administrator page is where users for the Systems Manager Web HMI and the API are added, modified, or removed.

User Name	Email Address	Role
GRC Support	support@grcooling.com	GRCADMIN

### 3.6.1. USER ROLES

Users can have 3 roles:

**User:** Basic user with view only capabilities. A User cannot edit or delete any PLC or Systems Manager information. Cannot add or remove any other users.

**SiteAdmin:** Can add, edit, or delete PLC information as well as Systems Manager Information. SiteAdmins can add or remove any user with a SiteAdmin role or below.

**GRCAdmin:** Can add, edit, or delete any PLC or Systems Manager information. Can add or remove any other user in any role except for GRC Admin account.

### 3.6.2. ADDING A USER

A new user may be added by clicking the + button at the bottom left of the table. All fields must be filled before submitting. The type of user that can be added is restricted by the role of the user adding it.

### 3.6.3. EDITING A USER

A user's Name, Email, Password, and Role may be edited by clicking on the user row in the user table. Editing permissions are role based, and users with a lesser role will not be able to edit another user with greater privileges.

A user may be deleted from the Systems Manager through the editing menu by clicking the Delete button. The GRC Support user may not be edited or deleted.

## 4.0 BMC

The BMC, or Base Management Controller is a piece of equipment internal to the Systems Manager that allows for remote access, control, and monitoring of the Systems Manager. Access to the BMC is achieved by pointing a web browser to the IP address assigned to the BMC.

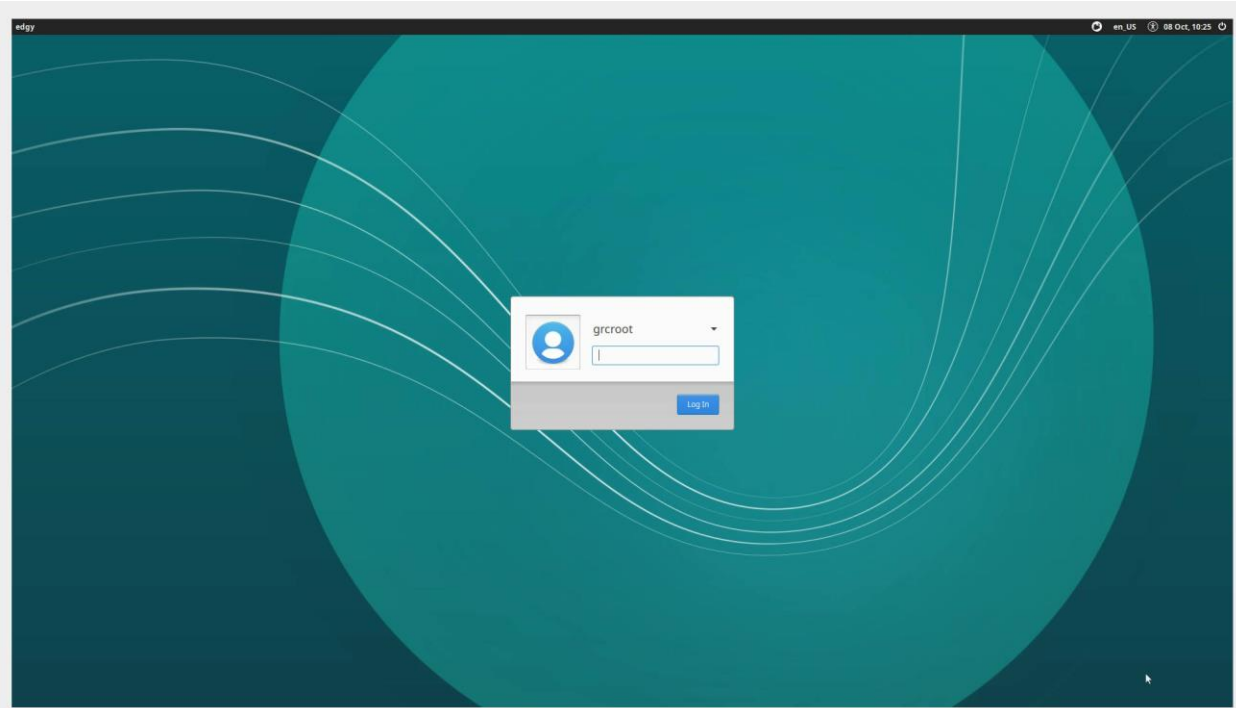
The screenshot displays the BMC web interface. At the top left is the SUPERMICR logo. To its right is a 'Host Identification' box containing 'Server: 192.168.1.151' and 'User: ADMIN (Administrator)'. Further right are navigation icons and a language dropdown set to 'English'. Below this is a horizontal menu with tabs: System, Server Health, Configuration, Remote Control, Virtual Media, Maintenance, Miscellaneous, and Help. The 'System' tab is active, showing a left sidebar with 'System', 'FRU Reading', and 'Hardware Information'. The main content area is titled 'System' and lists the following information:

Firmware Revision: 01.58	IP Address: 192.168.001.151
Firmware Build Time: 11/20/2019	BMC MAC Address: 3c:ec:ef:47:f7:0c
BIOS Version: 1.1c	System LAN1 MAC Address: 3c:ec:ef:47:f4:d0
BIOS Build Time: 07/18/2019	System LAN2 MAC Address: 3c:ec:ef:47:f4:d1
Redfish Version: 1.0.1	System LAN3 MAC Address: 3c:ec:ef:47:f4:d2
	System LAN4 MAC Address: 3c:ec:ef:47:f4:d3

Below the information is a 'Remote Console Preview' section with a large empty box and a 'Refresh Preview Image' button. At the bottom is a 'Power Control' section showing 'Host is currently on.' and three buttons: 'Power On', 'Power Down', and 'Reset'.

From the BMC, one can power up or down the Systems Manager remotely or access the Desktop login as if with a mouse, keyboard, and monitor.





#### **4.1. DESKTOP LOGIN**

The Systems Manager features a full desktop environment. The desktop environment has the standard suite of tools and software available, including a web browser that can be used to access the web HMI on the PLC. Access on the desktop is restricted to a user account, however, network settings for all users can be configured with the user account.

#### **4.2. VPN SERVER**

The Systems Manager contains an optional VPN server that can be deployed once on-site. The VPN utilized is OpenVPN Community Edition. While a VPN is not required for normal operation, for full support by GRC, a VPN is necessary.

#### **4.3. SSH SERVER**

The Systems Manager also hosts an SSH server for remote administration and troubleshooting. Both the grcroot and the grcuser accounts have access to the SSH server.