

User Guide - English



RackCDU Monitoring System User Guide

Edition February 2016

This document contains a guide on how to setup and use the different functionalities of the RackCDU Monitoring System.

Document History:

Revision History:

Revision Number	Summary of Changes	Revision Date
1.0	Initial	08-12-2015
1.5	Captured all webpage figures using administrator rights; changed description for harness version; updated SNMP description and examples	2-2-2016

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1 References

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2 Asetek RackCDU Monitoring Software Requirement Description

The next bullet list is taken from the Product requirement Description (PRD).

The PRD for the product is as follows:

- Maintain cooling of a Server Rack i.e. RackCDU liquid cooling system.
- Controlling a RackCDU.
- Monitoring a RackCDU.
- Energy saving. Save as much energy as possible.
- External requirements. Due point. Facility liquid operation temperature.

The Software Requirement Description is extracted from the PRD, and is explained in the following.

2.1 Software Requirement Description

From the PRD the following sensors and actuators are specified.

- 4 temperature sensors.
- 2 pressure gauges.
- 1 flow meter.
- 1 valve.

The SW must be able to monitor these sensors. The monitoring in automated form can be achieved by a Web standard called Small Network Management Protocol or in short SNMP. The monitoring requires both input and output from the system, which both can be achieved by SNMP. Additionally for Demo and smaller business clients, the monitoring and setup of this, can be achieved by a Web interface. Additionally warning and alarm notifications via SMTP is required for smaller business clients.

Furthermore the SW must be able to control the temperature of the facility liquid, and thereby also indirectly control the server liquid, by means of the valve. Setup of this control system in automated form can be achieved by means of SNMP. Additionally for Demo and smaller business clients, the setup of the control system can be achieved by a Web interface.

Secondarily the flow can be controlled to fulfill the maintenance requirements from the PRD regarding liquid temperature and liquid flow rates.

3 Software Requirement Specification

The SW module is specified to contain the following modules:

- SNMP module - CLI interface for input/output, which can be automated.
- WEB module (HTML5, CSS3) – GUI for manual input/output.
- SMTP module – warning/alarm notification by E-mail.
- TCPIPV4 – Transport layer for the other Ethernet modules.
- Measurement module – Sensor input.
- Controller module – controlling the RackCDU valve.
- Ethernet bug fixing module – Software update.

The above mentioned items are collected in a module called Agent module. For managing more Agent modules, a Manager module is specified:

- Manager module – for management of more Agents.

The SW modules are based on a RTOS for real time preemptive task scheduling, and for debug purposes is required an RS232 connection.

4 Updating Asetek RackCDU Monitoring Software

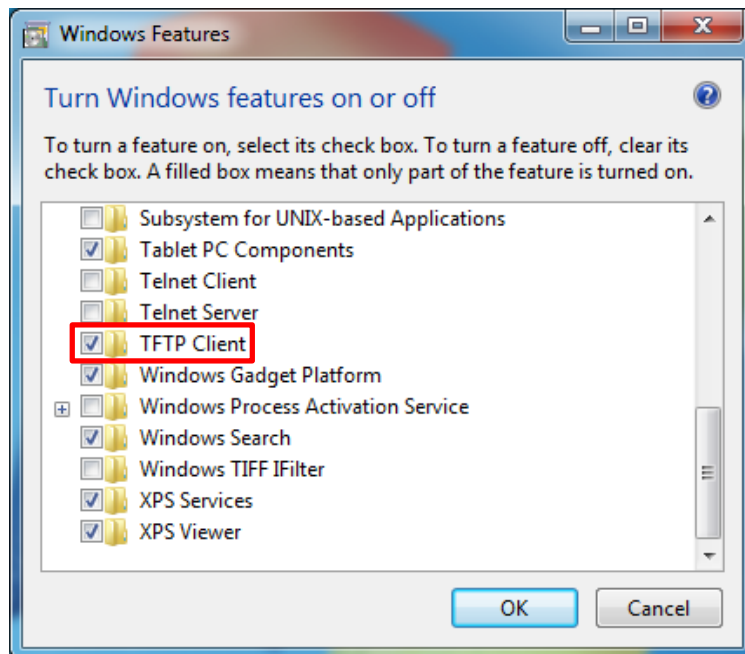
The firmware update is supported in two environments, these are at the moment Windows7, and Linux (tested on Ubuntu Server 10.04 32bit). The firmware is updated via the internet Trivial File Transport Protocol (TFTP). In the next two sections updating in windows and updating in Linux environment will be explained.

4.1 FW update in Windows

1. Make sure that TFTP is enabled in windows:

Open the Control Panel and go to “*Control Panel\Programs\Programs and Features*”.

Open “*Turn Windows features on or off*” in the left navigation menu and make sure that “*TFTP Client*” is checked.



2. Use Windows Command Prompt to update the software:

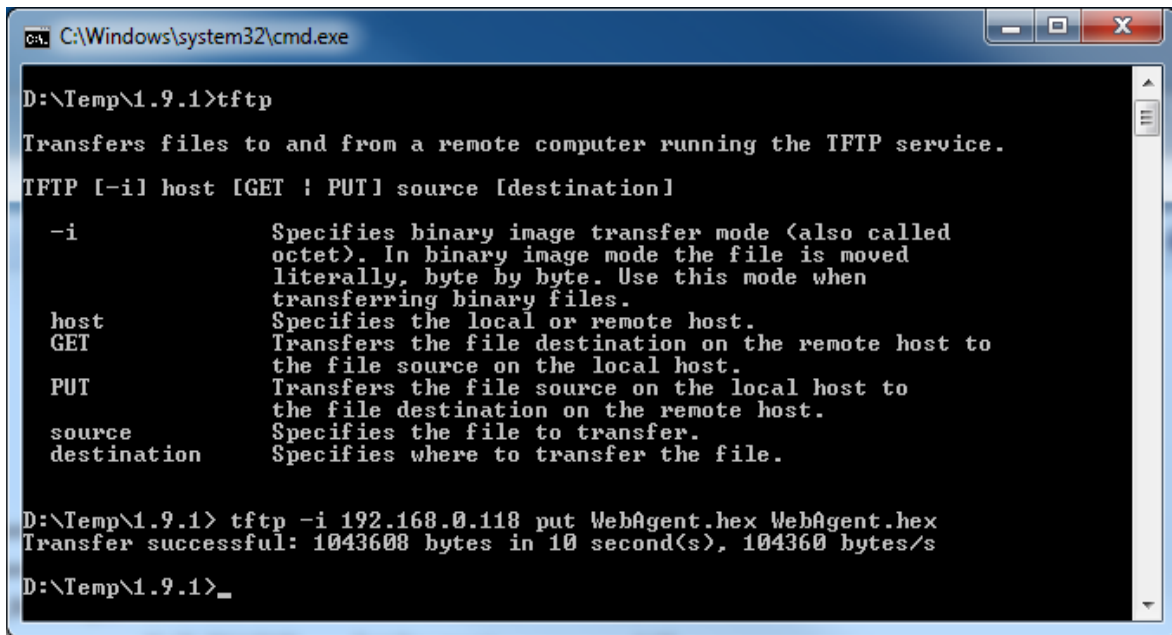
Open Windows Command Prompt

Change directory to the location of the software binary [*WebAgent.hex*]

Type *tftp -i {IP address} put WebAgent.hex WebAgent.hex*

(E.g. *tftp -i 192.168.0.118 put WebAgent.hex WebAgent.hex*)

The command will return a transfer successful message after around 10 seconds.



```
C:\Windows\system32\cmd.exe

D:\Temp\1.9.1>tftp

Transfers files to and from a remote computer running the TFTP service.
TFTP [-i] host [GET | PUT] source [destination]

-i          Specifies binary image transfer mode (also called
            octet). In binary image mode the file is moved
            literally, byte by byte. Use this mode when
            transferring binary files.
host        Specifies the local or remote host.
GET         Transfers the file destination on the remote host to
            the file source on the local host.
PUT         Transfers the file source on the local host to
            the file destination on the remote host.
source      Specifies the file to transfer.
destination Specifies where to transfer the file.

D:\Temp\1.9.1> tftp -i 192.168.0.118 put WebAgent.hex WebAgent.hex
Transfer successful: 1043608 bytes in 10 second(s), 104360 bytes/s

D:\Temp\1.9.1>_
```

3. Make sure that the software has been updated:

Open the RackCDU Monitoring Website

Go to the **ABOUT** page and verify that the software version number is correct. Current supported Web Browsers are: Internet Explorer, Chrome and Firefox.



User: Admin

Mode: Agent

Rack Number: SNMAGENT

SENSORS

SETTINGS

NETWORK

SMTP

SNMP

UNITS

ALARMS

CONTROL

ABOUT

INFORMATION PAGE

Build Information:

Software Revision: \$Revision: 1.26 \$
Hardware Revision: Revision 5.0
Revision Date: \$Date: 2015/03/27 08:51:01 \$
Stack Version: v5.41
MAC Address: 00-1E-C0-BF-2A-C6
Rack ID: 0xBFC0D82A
Build Date: Mar 27 2015 10:49:29
Build By: kjf

Network Settings:

Description: Value:
Rack Number: SNMAGENT
Description: DEMO
IP: 192.168.0.101
Gateway: 192.168.0.1
Subnet Mask: 255.255.255.0
Primary DNS: 10.100.20.235
Secondary DNS: 0.0.0.0

Notification Settings:

Description:	Warning:	Alarm:
Max temperature, facility water SUPPLY: °C	50	55
Max temperature, facility water RETURN: °C	55	60
Max temperature, server liquid SUPPLY: °C	45	50
Max temperature, server liquid RETURN: °C	55	60
Min pressure, RackCDU: bar	0.000	0.000
Max pressure, RackCDU: bar	0.100	0.300
Min pressure, facility: bar	0.000	0.000
Max pressure, facility: bar	3.000	3.500
Min flow, facility: l/h	150.000000	75.000000
Max flow, facility: l/h	3400.000000	3500.000000

Comments:

Please enter your comments here!

SAVE

CANCEL

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4.2 FW update in Linux

1. Use tftp to update the software:

Change directory to the location of the software binary [*WebAgent.hex*]

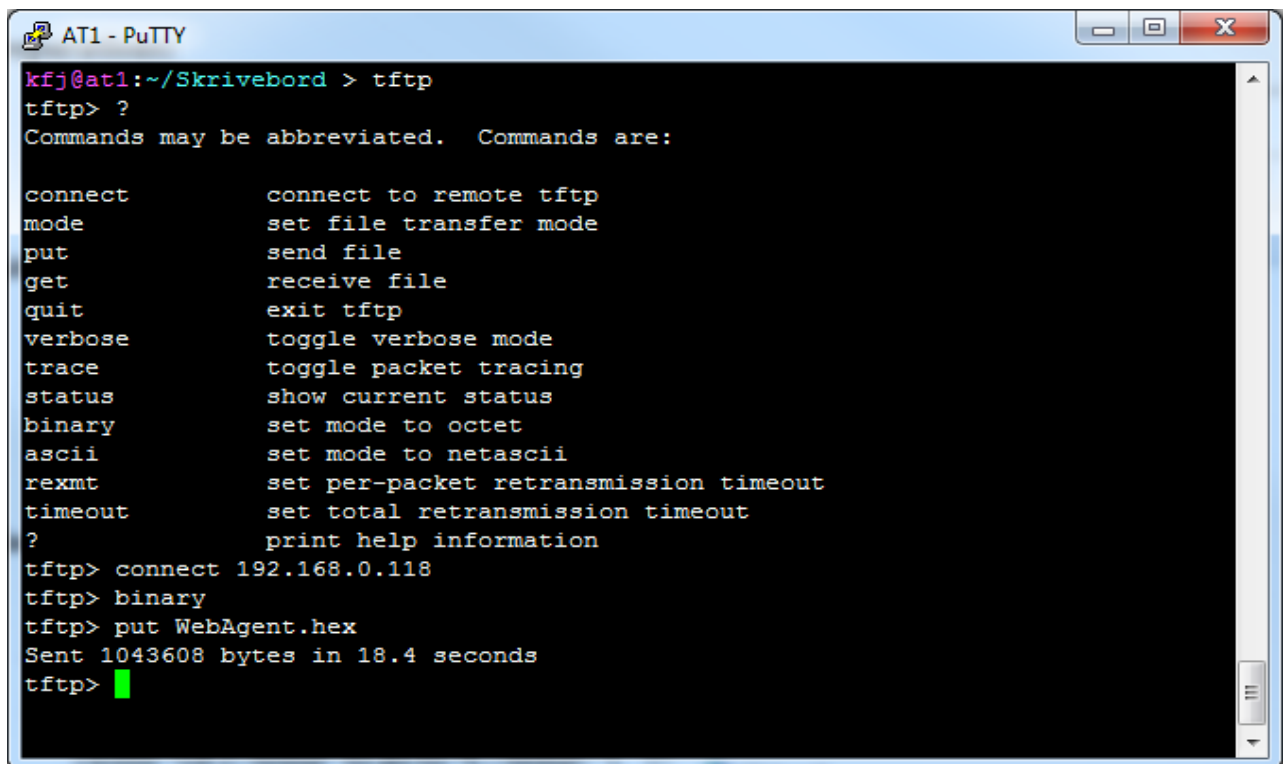
Write tftp

Type *connect {IP address}* (e.g. *connect 192.168.0.118*)

Type *binary*

Type *put WebAgent.hex*

The command will return a transfer successful message after around 10 seconds.



```
AT1 - PuTTY
kfj@at1:~/Skrivebord > tftp
tftp> ?
Commands may be abbreviated.  Commands are:

connect      connect to remote tftp
mode         set file transfer mode
put          send file
get          receive file
quit         exit tftp
verbose      toggle verbose mode
trace        toggle packet tracing
status       show current status
binary       set mode to octet
ascii        set mode to netascii
rexmt        set per-packet retransmission timeout
timeout      set total retransmission timeout
?            print help information
tftp> connect 192.168.0.118
tftp> binary
tftp> put WebAgent.hex
Sent 1043608 bytes in 18.4 seconds
tftp> █
```

2. Make sure that the software has been updated:

Open the RackCDU Monitoring Website

Go to the **ABOUT** page and verify that the software version number is correct.



User: Admin

Mode: Agent

Rack Number: SNMPAGENT

SENSORS

SETTINGS

NETWORK

SMTP

SNMP

UNITS

ALARMS

CONTROL

ABOUT

INFORMATION PAGE

Build Information:

Software Revision: \$Revision: 1.26 \$
Hardware Revision: Revision 5.0
Revision Date: \$Date: 2015/03/27 08:51:01 \$
Stack Version: v5.41
MAC Address: 00-1E-C0-BF-2A-C6
Rack ID: 0xBFC0D82A
Build Date: Mar 27 2015 10:49:29
Build By: kjf

Network Settings:

Description: **Value:**
Rack Number: SNMPAGENT
Description: DEMO
IP: 192.168.0.101
Gateway: 192.168.0.1
Subnet Mask: 255.255.255.0
Primary DNS: 10.100.20.235
Secondary DNS: 0.0.0.0

Notification Settings:

Description:	Warning:	Alarm:
Max temperature, facility water SUPPLY: °C	50	55
Max temperature, facility water RETURN: °C	55	60
Max temperature, server liquid SUPPLY: °C	45	50
Max temperature, server liquid RETURN: °C	55	60
Min pressure, RackCDU: bar	0.000	0.000
Max pressure, RackCDU: bar	0.100	0.300
Min pressure, facility: bar	0.000	0.000
Max pressure, facility: bar	3.000	3.500
Min flow, facility: l/h	150.000000	75.000000
Max flow, facility: l/h	3400.000000	3500.000000

Comments:

Please enter your comments here!

SAVE

CANCEL

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5 Additional Information

5.1 Asetek TCPIP Discovery Tool

- Asetek TCPIP Discovery Tool is a small java application which is able to detect RackCDU Monitoring Control Boxes on the local subnet.

Open the TCPIP Discovery Tool ***TCPIP Discoverer.jar*** from the desktop or type ***java -jar TCPIP Discoverer.jar*** in a command prompt.

Click on Discover Devices to scan for connected RackCDU Monitoring Control Boxes.

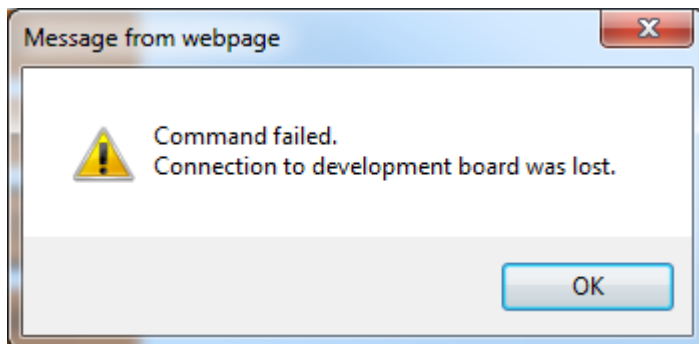
Click on the name of the desired RackCDU Monitoring Control Box to access the monitoring website.

Reset Asetek RackCDU Monitoring Control System to Factory Default:

- From website:

Go to the **UNITS** page and click on the **FACTORY DEFAULT** button.

After a couple of seconds the internet browser will return a Command failed message.



Click **OK** and enter the website on the newly assigned IP address (DHCP) on the default static IP address (192.168.0.199).

- From hardware:

Remove the control box from the RackCDU.

Remove the cover on the control box.

Press the button marked SW2 for about 5 – 10 seconds.

WARNING: This will reset all settings to factory default including the IP settings!

5.2 Default IP settings

1. Static IP address: 192.168.0.199
2. Subnet mask: 255.255.255.0
3. Gateway: 192.168.0.252
4. DHCP: ON

5.3 Default User Credentials

5. User – Allowed to view website but is not allowed to access and alter settings menus:

Username: user
Password: user

6. Admin – Allowed to view website and to access settings menu to configure the RackCDU Control Monitoring System:

Username: admin
Password: admin

NOTICE: For normal operation the user login should be used. This will allow reading from the RackCDU, only when settings are needed to be changed should the admin account be used.

6 Web Page description

Following is a description of the current existing web pages of the RackCDU.

6.1 Web page settings - SENSORS

The screenshot displays the Asetek RackCDU Monitoring System web interface. At the top, the Asetek logo and 'DATA CENTER LIQUID COOLING' text are visible. Below the header, a navigation menu on the left includes buttons for SENSORS, SETTINGS, NETWORK, SMTP, SNMP, UNITS, ALARMS, CONTROL, and ABOUT. The main content area is titled 'SENSOR OVERVIEW: SnmpAgent' and contains a table of sensor data. Each row in the table includes a description, a value, and a green status indicator.

Description:	Value:	Status
Facility water temperature SUPPLY:	10.6 °C	OK
Facility water temperature RETURN:	12.0 °C	OK
Server liquid temperature SUPPLY:	11.3 °C	OK
Server liquid temperature RETURN:	14.8 °C	OK
RackCDU™ liquid level:	OK	OK
RackCDU™ leak detection:	No Leak	OK
RackCDU™ pressure:	0.000 bar	OK
Facility pressure:	2.276 bar	OK
Facility water flow:	140.00 l/h	OK
Heat Load: (600 sec)	0.39 kW	

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The measured sensors are listed on this page. These sensors are temperature, leak and level, pressure and flow. Last in the list is a calculated heat load of the facility liquid energy.

6.1.1 Settings SENSORS - Facility liquid temperature supply (IN)

The **Facility liquid temperature supply (IN)** is measured in the liquid pipe coming in from the facility.

6.1.2 Settings SENSORS - Facility liquid temperature return (OUT)

The **Facility liquid temperature return (OUT)** is measured in the liquid pipe going out to the facility.

6.1.3 Settings SENSORS - Server liquid temperature supply (IN)

The **Server liquid temperature supply (IN)** is measured in the liquid pipe going in to the server rack.

6.1.4 Settings SENSORS - Server liquid temperature return (OUT)

The **Server liquid temperature return (OUT)** is measured in the liquid pipe going out of the server rack.

All temperatures can be represented in either Celsius [°C] or Fahrenheit [°F]. This can be changed on the UNITS page.

6.1.5 Settings SENSORS - RackCDU liquid level

The **liquid level** is measured in the liquid tank in the RackCDU. This sensor will indicate if liquid level is adequate or low in the server loop of the RackCDU.

6.1.6 Settings SENSORS - RackCDU liquid leak detection

The **liquid leak indicator** will tell if liquid is detected in the spill tray in the bottom of the RackCDU.

6.1.7 Settings SENSORS - RackCDU pressure

The **RackCDU pressure** is measured in the closed loop of the server liquid.

6.1.8 Settings SENSORS - Facility pressure

The **Facility pressure** is measured in the return (OUT) pipe of the facility liquid.

The Pressure can be represented in either bar or psi. This can be changed on the UNITS page.

6.1.9 Settings SENSORS - Facility liquid flow

The **Facility liquid flow** is measured in the facility supply (IN) pipe. The Flow can be represented in either liter per hour [l/h], cubic meter per hour [m³/h] or in gallons per minute [gpm]. This can be changed on the UNITS page.

6.1.10 Settings SENSORS - Heat Load

The **heat load** is calculated based on flow and the delta temperature of the facility liquid flow. The calculation is averaged over in this example 600 seconds which equals 10 min. The range of the average time is [1..60*60*24*365] sec, which is equal to [1..31536000] sec, which again is from one second to one year of average. Typical numbers are 1 min = 60, 10 min = 600, 1 hour = 3600, 24 hours = 86400 and so on. The average time is setup on the **UNITS** page.

6.2 Web page settings - NETWORK

The screenshot shows the Asetek RackCDU Monitoring System web interface. The header includes the Asetek logo and the text "DATA CENTER LIQUID COOLING". Below the header, a status bar shows "User: Admin", "Node: 0", "Mode: Agent", and "Rack Number: SnmpAgent". The main content area is titled "NETWORK SETTINGS". On the left, there is a vertical menu with buttons for "SENSORS", "SETTINGS", "NETWORK" (highlighted), "SMTP", "SNMP", "UNITS", "ALARMS", "CONTROL", and "ABOUT". The "NETWORK SETTINGS" section contains the following fields and controls:

- Mode of Operation:** Agent ☒ Manager ☐
- Use Local Settings:** ☐
- Broadcast Settings:** ☒
- Force as Master:** Click
- Rack Number:** SnmpAgent
- Description:** Demo Setup
- DHCP:** ☐
- Rack IP:** 192.168.0.65
- Gateway:** 192.168.0.252
- Subnet Mask:** 255.255.255.0
- Primary DNS:** 10.100.20.235
- Secondary DNS:** 10.100.20.235
- Username (website):** admin
- Password (website):** ••••••••
- SAVE** **CANCEL**

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6.2.1 Settings NETWORK – Mode of Operation: Agent or Manager

The **Mode of Operation: Agent** bullet will enable the RackCDU to function as an SNMP Agent. The bullet Manager will enable the RackCDU to function as a SNMP Manager. Simply put the **Agent** will monitor the Rack it is installed on. The **Manager** can also monitor all other **Agents** on the same sub net.

6.2.2 Settings NETWORK – Use Local Settings

The **Use Local Settings** checkbox, when checked and when operating as **Agent**, will disregard the settings sent from the **Manager** and use local settings for the **Agent**.

6.2.3 Settings NETWORK – Broadcast Settings

The **Broadcast Settings** checkbox, when checked and when operating as **Manager**, will broadcast its settings to Agents on the subnet.

6.2.4 Settings NETWORK – Force as Master

The **Force as Master** click box will force all other RackCDUs on the subnet to become **Agents**, and set itself to become a **Manager**.

6.2.5 Settings NETWORK – Rack Number & Description

The **Rack Number & Description** are simple strings which can be set to any string including numbers. They can help identify the RackCDU.

6.2.6 Settings NETWORK – DHCP

The **DHCP** checkbox, when checked, will enable the **D**ynamic **H**ost **C**onfiguration **P**rotocol which is a standardized network protocol used by servers on the IP network to allocate IP addresses to computers.

6.2.7 Settings NETWORK – Rack IP

The **Rack IP** is the IP address of the RackCDU.

6.2.8 Settings NETWORK – Gateway

The **Gateway** is the IP gateway address of the network. The gateway is normally the router of the local TCP/IP network.

6.2.9 Settings NETWORK – Subnet Mask

The **Subnet Mask** is used as a filter or mask on the TCP/IP network.

6.2.10 Settings NETWORK – DNS Primary and secondary

The **DNS Primary and Secondary** address is used to set the address of the **D**omain **N**ame **S**ystem on the network. It is used to translate IP addresses into human friendly names.

6.2.11 Settings NETWORK – Username & Password (Website)

The **Username & Password (Website)** is used to set the username and password other than the default.

6.3 Web page settings – SMTP

The screenshot displays the Asetek Data Center Liquid Cooling web interface. At the top, the Asetek logo and tagline are visible. Below the header, a navigation menu on the left includes buttons for SENSORS, SETTINGS, NETWORK, SMTP, SNMP, UNITS, ALARMS, CONTROL, and ABOUT. The main content area is titled 'SMTP SETTINGS'. It contains the following fields and buttons:

- SMTP Server:** smtp-relay.ip.nianet.dk
- SMTP Port:** 25
- E-mail:** min@asetek.com
- Username (e-mail):** (empty field)
- Password (e-mail):** (empty field)
- SAVE** and **CANCEL** buttons.

At the bottom of the interface, the copyright notice 'Copyright © 2013 Asetek, Inc.' is displayed.

6.3.1 Settings SMTP – SMTP Server

The **SMTP Server** is the receiving mail server. It can be set to a trustworthy mail server as in this case. This trustworthy mail server will function as a relay server, and is used in order to avoid the mail being caught in the spam filter. The receiving mail server can however be any mail server.

6.3.2 Settings SMTP – SMTP Port

The **SMTP Port** is the receiving mails servers TCP-port. The default port for SMTP is port 25.

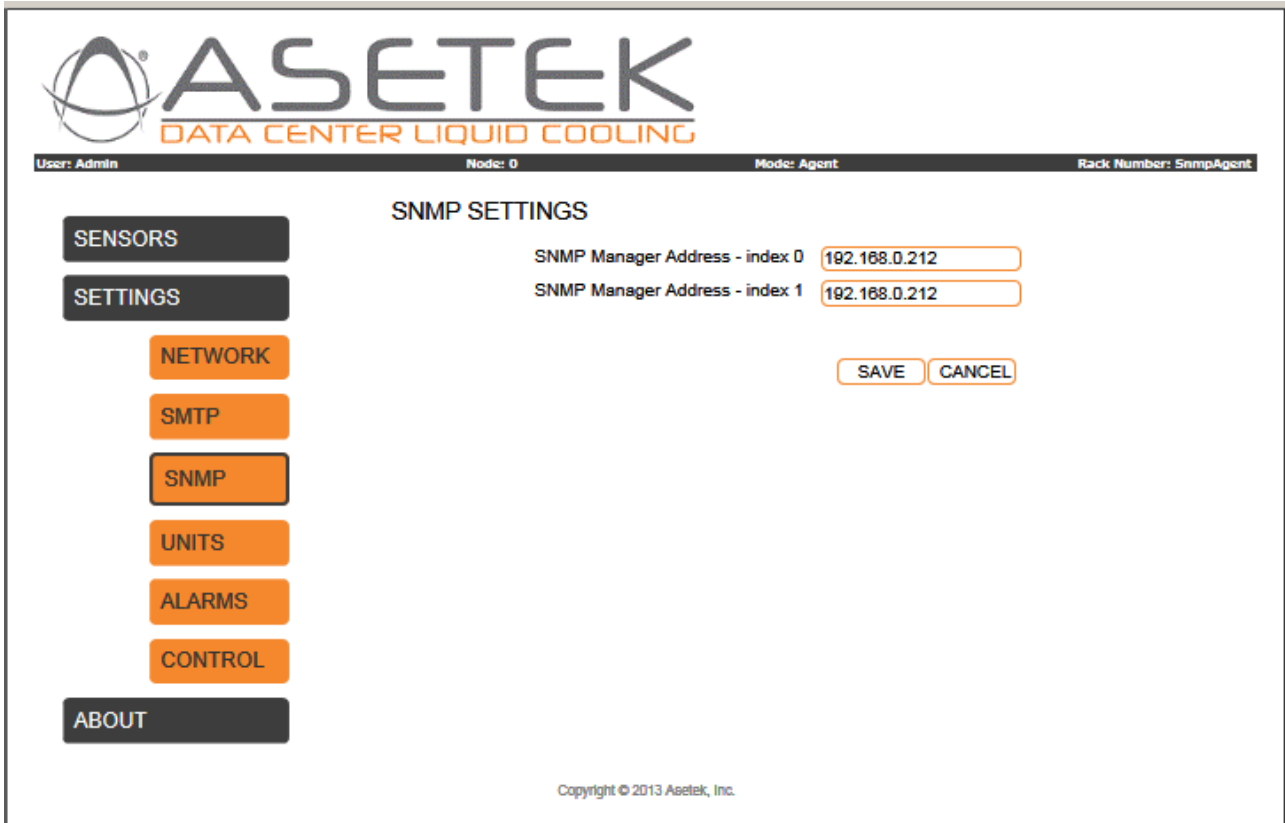
6.3.3 Settings SMTP – E-mail

The **E-mail** is the receiving e-mail address.

6.3.4 Settings SMTP – Username (e-mail) & Password (e-mail)

The **Username (e-mail) & Password (e-mail)** is username and password for the receiving SMTP Server. The **smtp-relay.ip.nianet.dk** is an open relay server without username and password.

6.4 Web page settings - SNMP



The screenshot displays the Asetek web interface for the RackCDU Monitoring System. The header features the Asetek logo and the text "DATA CENTER LIQUID COOLING". Below the header, a status bar shows "User: Admin", "Node: 0", "Mode: Agent", and "Rack Number: SnmpAgent". The main content area is titled "SNMP SETTINGS". On the left, there is a vertical menu with buttons for "SENSORS", "SETTINGS", "NETWORK", "SMTP", "SNMP", "UNITS", "ALARMS", "CONTROL", and "ABOUT". The "SETTINGS" button is highlighted. In the "SNMP SETTINGS" section, there are two input fields for "SNMP Manager Address - index 0" and "SNMP Manager Address - index 1", both containing the value "192.168.0.212". Below these fields are "SAVE" and "CANCEL" buttons. At the bottom of the page, there is a copyright notice: "Copyright © 2013 Asetek, Inc."

6.4.1 Settings SNMP – SNMP Manager Address

The **SNMP Manager Address – index 0** and **index 1** are used to setup two SNMP Manager receiving address. Which means two SNMP Managers can monitor the SNMP agent simultaneously. These addresses correspond with the 6.6.1 – **Enable SNMP notifications index 0** and **index 1**. The enable checkbox in 6.6.1 must be checked in order to enable the Trap notification sent to the SNMP Managers.

6.5 Web page settings – UNITS

The screenshot shows the Asetek Data Center Liquid Cooling web interface. At the top, the Asetek logo and "DATA CENTER LIQUID COOLING" text are displayed. Below the logo, a status bar shows "User: Admin", "Node: 0", "Mode: Agent", and "Rack Number: SmpAgent". The main content area is titled "UNITS SETTINGS". On the left, there is a vertical menu with buttons for "SENSORS", "SETTINGS", "NETWORK", "SMTP", "SNMP", "UNITS", "ALARMS", "CONTROL", and "ABOUT". The "UNITS SETTINGS" page contains several input fields and dropdown menus: "Flow Compensation [-]" with a value of 5.400000, "Fluid Heat Capacity [J/Kg*K]" with a value of 4180, "Heat Average Factor [sec]" with a value of 800, "Harness Version" with a dropdown set to 2, "Temperature Unit" with a dropdown set to Celcius, "Flow Unit" with a dropdown set to l/h, and "Pressure Unit" with a dropdown set to bar. There are "SAVE" and "CANCEL" buttons at the bottom right, and a "FACTORY DEFAULT" button. The footer of the page reads "Copyright © 2013 Asetek, Inc."

6.5.1 Settings UNITS - Flow compensation

The **Flow compensation** can be used to calibrate the Facility liquid flow meter. Normally this number should be 1.0.

6.5.2 Settings UNITS - Fluid Heat Capacity

The **Facility Fluid Heat Capacity** is used in the heat load calculation. The mathematical description is C_p , and the unit is joule per kilo per kelvin [J/kg*K]. The C_p must be found for the facility liquid given the amount and type of additive. For pure water the $C_p = 4180 \text{ J/kg*K}$ and for water with 35% glycol @ 40 °C, $C_p = 3868 \text{ J/kg*K}$.

6.5.3 Settings UNITS - Heat Average Factor

The **Heat average Factor** is used to mean the heat load calculation. This can be averaged in the range from 1 second up to a year = 31536000 seconds.

6.5.4 Settings UNITS - Harness Version

The **Harness Version** determines which sensor suite the RackCDU monitoring system should use to obtain measurements. This value is per default set to the correct harness version from the factory and should not be changed unless specifically instructed following a software update or if the monitoring control box has been replaced by a new. Changing the harness version could result in erroneous sensor values which might produce false notifications or no notification at all.

6.5.5 Settings UNITS - Temperature Unit

The **Temperature Unit** is used to change the unit of the web page temperature output. The units can be either Celsius [°C] or Fahrenheit [°F].


6.5.6 Settings UNITS - Flow Unit

The **Flow Unit** is used to change the unit of the web page Flow output. The units can be either liter per hour [l/h], cubic meter per hour [m³/h] or gallons per minute [gpm].

6.5.7 Settings UNITS - Pressure Unit

The **Pressure Unit** is used to change the unit of the web page pressure output. The units can be either bar or psi.

6.6 Web page settings – ALARMS



User: Admin
Node: 0
Mode: Agent
Rack Number: SnmpAgent

SENSORS

SETTINGS

NETWORK

SMTP

SNMP

UNITS

ALARMS

CONTROL

ABOUT

ALARM SETTINGS

Send notifications:

Enable SNMP notifications - index 0: ☒

Enable SNMP notifications - index 1: ☐

Send warning notifications (SNMP): ☒

Send alarm notifications (SNMP): ☒

Send warning notifications (E-mail): ☐

Send alarm notifications (E-mail): ☐

Thresholds:

Facility Water SUPPLY: °C

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Facility Water RETURN: °C

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Server Liquid SUPPLY: °C

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Server Liquid RETURN: °C

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Low Liquid Level:

Alarm (min): ☒

Leak Detection:

Alarm (min): ☒

RackCDU™ Pressure: bar

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Facility Pressure: bar

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

Facility Flow: l/h

Warning (min): ☒ (max): ☒

Alarm (min): ☒ (max): ☒

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6.6.1 Settings ALARMS – Send notifications

Enable SNMP notifications index 0 and index 1. When checked, these checkboxes will enable the Trap generation for respectively index 0 and index 1. The SNMP Trap notification has a corresponding SNMP Manager Address – index 0 and index 1 on the SNMP web page. When this address is setup to point to a SNMP Manager and the Enable SNMP notification is checked for either index 0 or index 1, the Trap notification is enabled.

6.6.2 Settings ALARMS –Send warnings/alarm notifications (SNMP)

The **Send warning notifications (SNMP)** or **Send alarm notifications (SNMP)** checkbox will enable Trap generation on the SNMP interface of respectively either warnings or alarms for the sensor thresholds on the bottom of the ALARMS web page.

6.6.3 Settings ALARMS –Send warnings/alarm notifications (SMTP)

The **Send warning notifications (SMTP)** or **Send alarm notifications (SMTP)** checkbox will enable Trap generation on the SMTP interface of respectively either warnings or alarms for the sensor thresholds on the bottom of the ALARMS web page.

6.6.4 Settings ALARMS – Thresholds

Each sensor has a minimum and maximum limit for respectively warning Traps and alarm Traps. And for each of these limits the sensor has an enable checkbox which will arm the given threshold. An exception is the leak and level which only have enable checkboxes. The leak and level are either on or off and have therefor no thresholds.

A common rule is the range of the warning must be smaller than the range of the alarm for a given sensor. The Table below shows the generated trap types, as output of the triggered events and the enabled traps.

Enabled Traps	Triggered Events				
		No	warning	alarm	Both
No	No	-	-	-	-
Warning	Warning	-	W	W	W
Alarm	Alarm	-	-	A	A
Both	Both	-	W	A	A

Table 1 – Trap output as function of triggered events and as function of enabled traps.

The thresholds for min and max for warning and alarm, when set and enabled by the checkbox, the Trap for this sensor will be armed. A total of 4 Traps can therefore be armed for each sensor. If the measured value is crossing the warning range and below the alarm threshold a warning trap is generated. If the measured value is crossing the alarm threshold an alarm Trap is generated. See table 1.

6.6.5 Settings ALARMS Thresholds – Facility liquid Temperature supply (IN)

See 6.6.4

6.6.6 Settings ALARMS Thresholds – Facility liquid Temperature return (OUT)

See 6.6.4

6.6.7 Settings ALARMS Thresholds – Server liquid Temperature supply (IN)

See 6.6.4

6.6.8 Settings ALARMS Thresholds – Server liquid Temperature supply (OUT)

See 6.6.4

6.6.9 Settings ALARMS Thresholds – level

The notification for level is enabled by checking the checkbox. If the level is too low an alarm Trap is generated.

6.6.10 Settings ALARMS Thresholds – leak

The notification for leak is enabled by checking the checkbox. If the leak sensor detects liquid in the spill tray an alarm Trap is generated.

6.6.11 Settings ALARMS Thresholds – RackCDU pressure

See 6.6.4

6.6.12 Settings ALARMS Thresholds – Facility pressure

See 6.6.4

6.6.13 Settings ALARMS Thresholds – Facility Flow

See 6.6.4

6.7 Web page settings – CONTROL

The temperature is controlled by a PID-controller. The control of the proportional valve is managed by the settings on the Control screen (click the orange Control button).

ASETEK
DATA CENTER LIQUID COOLING

User: Admin Node: 0 Mode: Agent Rack Number: SmpAgent

TEMPERATURE CONTROL

Control Parameters:

Proportional Gain: -	<input type="text" value="0.128000"/>
Integral Gain: -	<input type="text" value="0.052000"/>
Differential Gain: -	<input type="text" value="2.000000"/>
Proportional Alpha: -	<input type="text" value="1.000"/>
Integral Alpha: -	<input type="text" value="1.000"/>
Differential Alpha: -	<input type="text" value="1.000"/>
Controller Out Alpha: -	<input type="text" value="1.000"/>
Maximum Out Delta: %	<input type="text" value="1.000"/>
Maximum PWM limit: %	<input type="text" value="100.00"/>
Minimum PWM limit: %	<input type="text" value="35.00"/>
Facility Temperature RETURN (setpoint): °C	<input type="text" value="25.0"/>
Maximum Server Temperature RETURN: °C	<input type="text" value="60.0"/>
Minimum Allowed Facility Flow: l/h	<input type="text" value="50.00"/>

Controller Output:

Facility Flow: l/h	140.03
Server Temperature RETURN: °C	16.0
Facility Temperature RETURN: °C	14.0
Current Temperature Error: °C	-11.05
Controller Output: %	39.71
Controller Delta: -	0.000
Proportional Delta: -	-15.620
Integral Delta: -	-0.606
Differential Delta: -	0.000

SAVE CANCEL

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The controls on this screen are described below (from top to bottom):

6.7.1 Settings CONTROL - Proportional Gain

The **Proportional Gain** also called the **P** gain, depend on the *present* error. Multiplied directly on the current temperature error - the error between the desired set point: **Facility Temperature RETURN (Set point)** and the actual measured: **Facility Temperature RETURN**. A larger **P** will cause a larger change in the output **Facility Flow**, but may also cause the system to become unstable if it's too large!

6.7.2 Settings CONTROL - Integral Gain

The **Integral Gain** also called the **I** gain, depend on the accumulation of *past* errors. It improves the movement towards the set point and minimizes the residual steady-state error.

6.7.3 Settings CONTROL - Differential Gain

The **Differential Gain** also called the **D** gain, depend on the prediction of *future* errors, based on current rate of change. It reduces overshoot and improves stability.

6.7.4 Settings CONTROL – Proportional Alpha

The **Proportional Alpha** is used to average the **P** gain.

6.7.5 Settings CONTROL – Integral Alpha

The **Integral Alpha** is used to average the **I** gain.

6.7.6 Settings CONTROL – Differential Alpha

The **Differential Alpha** is used to average the **D** gain.

6.7.7 Settings CONTROL – Controller Out Alpha

The **Controller Out Alpha (α)** is used to average the controller output to the valve. The average is done by the following calculation:

$$out_{new} = (\alpha * out) + (1 - \alpha) * out_{old}$$

The calculation performs a filter called a sliding window.

6.7.8 Settings CONTROL – Maximum Out Delta

The **Maximum Out Delta** is used to limit the controller out for each iteration. The Delta can be in the range [0 -100]. It is set to 1 in our current setup.

6.7.9 Settings CONTROL – Maximum and Minimum PWM Limit

The PWM output can be in the range from [0 – 100] %, where 0 corresponds to a minimum flow and 100 corresponds to a maximum flow. The PWM output can be limited for both min and max value. These limits are to adjust the used type of proportional valve. Currently one type of proportional valve is supported, which is the Belimo **LF24-SR**.

The flow rate through the RackCDU is controlled by the proportional valve which is controlled by the PWM output.

Maximum PWM Limit: This value restricts the maximum allowed flow through the RackCDU by limiting how far the proportional valve will open. The Maximum PWM can be restricted if the flow exceeds a certain level, in case the flow capacity is abundant. The Maximum PWM can also be set to improve the linearity the valve, if the flow stops rising above a certain PWM level, it is recommended to set the Maximum PWM to this value.

Minimum PWM Limit: This value controls the minimum allowed flow through the RackCDU limiting how far the proportional valve will close. The flow must always be above zero. For the Belimo valve this Minimum PWM limit is around 35 %. The PWM MIN is set at the point where the valve starts to open or a bit above. (Because of the positive displacement pump in the Lytron, this setting must be set in conjunction with the settings on the bypass flow valves to avoid making the system behave unexpectedly.)

6.7.10 Settings CONTROL – Controller Temperatures

The **Facilities Temperature RETURN (set point)**, sets the desired facility liquid return temperature. As the amount of power being drawn by the servers decrease, the proportional valve will close in an effort to keep the Facility return liquid at this temperature. This valve does not control how hot the return liquid can get. Maximum return temperature is a function of maximum flow and the server load.

The **Maximum Server Temperature RETURN**, sets an upper limit for the **Server Output Temperature** (same as the max. alarm value for **Server liquid OUT** in “Alarms” page). If the measured **Server Temperature Return** is above this value the PID controller will disregard the **Facility Temperature RETURN (set point)**, and entirely set the PWM output to regulate the measured **Server Temperature Return** to be below this value.

6.7.11 Settings CONTROL – Minimum Allowed Facility Flow

The **Minimum Allowed Facility Flow**, sets a lower bound which the measured “**Facility Flow**” must be above. If the “**Facility Flow**” is below this value the facility temperature measurements are inaccurate due to nonlinearity in the flow through the whole system, hence it is desired to keep the minimum flow above a certain limit. This limit could be set to around 50-100 l/h. On the other hand it is desired to keep the flow as low as possible in cold environments due to heat loss caused by the facility flow.

6.7.12 Settings CONTROL – Controller Output

The remaining fields report the current condition of the system, enabling the user to observe the impacts of any changes made in the above fields on system performance.

Facility Flow, **Server Temperature RETURN**, and **Facility Temperature RETURN** are the same as shown on the **SENSORS** page.

Current Temperature Error: shows the current difference between the desired “**Facility Temperature RETURN (set point)**” and the measured “**Facility Temperature RETURN**”.

Controller Output: The current control value being sent by the RackCDU to the proportional valve in % (0 = closed, 100 = fully open). The **Controller Output** is the sum of the **P**, **I** and **D** Deltas below.

Proportional Delta: This is the proportional part of the output calculated by the RackCDU.

Integral Delta: This is the integral part of the output calculated by the RackCDU.

Derivative Delta: This the derivative part of the output calculated by RackCDU.

6.7.13 Settings CONTROL – Controller Recommendations

The **P**, **I** and **D** values below are the currently best known configuration values for the Controller and should be changed with caution:

P = 0.128, **I** = 0.05 and **D** = 2.0

If the **P**, **I** and **D** must be changed, set all 3 to zero and change them in the order of **P**, **D** and **I**. First set the **P** so there is plenty of overshoot. Next set the **D** to a value where the overshoot is acceptable. And third set the **I** to improve the steady state tracking. The **P** and **D** adjustment must be continued in an iterative process until a desired and stable result is reached.

Maximum and minimum PWM limits can be changed, however the Minimum PWM limit must be set near or just above the value where the flow is zero (0) l/h. The controller will adjust the minimum flow to the **Minimum Allowed Facility Flow**, setting the **Minimum PWM limit** close to this value will make the auto adjustment track faster.

6.8 Web page – ABOUT



User: Admin

Mode: Agent

Rack Number: SNMPAGENT

SENSORS

SETTINGS

NETWORK

SMTP

SNMP

UNITS

ALARMS

CONTROL

ABOUT

INFORMATION PAGE

Build Information:

Software Revision: \$Revision: 1.26 \$
Hardware Revision: Revision 5.0
Revision Date: \$Date: 2015/03/27 08:51:01 \$
Stack Version: v5.41
MAC Address: 00-1E-C0-BF-2B-E7
Rack ID: 0xBFC0F92B
Build Date: Mar 27 2015 10:49:29
Build By: kfj

Network Settings:

Description: Value:
Rack Number: SNMPAGENT
Description: DEMO
IP: 192.168.0.100
Gateway: 192.168.0.1
Subnet Mask: 255.255.255.0
Primary DNS: 10.100.20.235
Secondary DNS: 0.0.0.0

Notification Settings:

Description:	Warning:	Alarm:
Max temperature, facility water SUPPLY: °C	50	55
Max temperature, facility water RETURN: °C	55	60
Max temperature, server liquid SUPPLY: °C	45	50
Max temperature, server liquid RETURN: °C	55	60
Min pressure, RackCDU: bar	0.000	0.000
Max pressure, RackCDU: bar	0.100	0.300
Min pressure, facility: bar	0.000	0.000
Max pressure, facility: bar	3.000	3.500
Min flow, facility: l/h	150.000000	75.000000
Max flow, facility: l/h	3400.000000	3500.000000

Comments:

Please enter your comments here!

SAVE

CANCEL

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The about page contains information about the HW and SW revision, network settings and sensor information. The purpose of this page is to give a quick overview of the most important output from the RackCDU.

7 Using RackCDU SNMP Features

7.1 Introducing SNMP – Small Network Management Protocol

The **Small Network Management Protocol - SNMP** is a tool for management of devices connected to a computer network that includes managers (software) communicating with agents (software) installed on the managed devices. Managers are tasked with collecting information such as **status**, and in some cases exercising **control** over devices. Agents are responsible for responding to manager requests, as well as sending unsolicited **traps** to managers that report on important device events. SNMP refers to the totality of this scheme as well as to the protocol itself (Walsh, 2008).

The RackCDU is an **SNMP agent**.

7.2 Introducing MIB – Management Information Base

The **Management Information Base – MIB** is a file containing strict syntax (called the **Structure of Management Information - SMI**), which is a hierarchical (tree-structured) virtual data base description of objects to be managed. It serves as a contract of information that enable agents and managers to communicate. MIBs are defined as the first step in providing SNMP support – agents are then coded based on MIB content. Managers load or (compile) MIBs into their data base, and this shared knowledge is the basis of useful manager-agent communication.

For setting up the SNMP Manager, enabling it to retrieve and set information in the RackCDU SNMP-agent, a MIB-file is provided. For further information of supported MIB entries see the file (Asetek A/S, 2015).

7.3 SNMP Prerequisites

For accessing the SNMP Agent in the RackCDU, different tools can be used. A standardized SNMP CLI-tool exists on Windows and Linux platforms. Or dedicated standalone SNMP manager packages exist like **iReasoning MIB Browser** or **MG-SOFT MIB Browser**. Common for these tools, is they are able to set and get information in the SNMP agent.

7.4 SNMP CLI commands

The SNMP Command Line Interface **CLI** commands include **snmpwalk**, **snmpset** and **snmpget**. The SNMP CLI in Linux will be explained in the following.

- **Snmpwalk** - retrieve a subtree of management values using SNMP GETNEXT requests.
- **Snmpget** - communicates with a network entity using SNMP GET requests.
- **Snmpset** - communicates with a network entity using SNMP SET requests.

In the following usage of these CLI-commands for interfacing the RackCDU SNMP Agent are explained.

7.5 Get general system information:

- Syntax: **snmpwalk -v 2c -c {community} {IP address} {OID}**
(e.g. **snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.2.1**) to get the SNMPv2-MIB system entries.

[Example – type in command prompt]

```
kfj@at1:~ > snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.2.1
```

```
RFC1213-MIB::sysDescr.0 = STRING: "Asetek RackCDU Monitoring System"
```

```
RFC1213-MIB::sysObjectID.0 = OID: ASETTEK-RACKCDU-SMI-V1-MIB-V16::rackCDU
```

```
RFC1213-MIB::sysUpTime.0 = Timeticks: (70991622) 8 days, 5:11:56.22
```

```
RFC1213-MIB::sysContact.0 = STRING: "Administrator"
```

```
RFC1213-MIB::sysName.0 = STRING: "Asetek RackCDU"
```

```
RFC1213-MIB::sysLocation.0 = STRING: "Server Room"
```

```
RFC1213-MIB::sysServices.0 = INTEGER: 7
```

7.6 Get RackCDU Software revision information:

- Syntax: **snmpwalk -v 2c -c {community} {IP address} {OID}**
(e.g. **snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.1**)

[Example – type in command prompt]

```
kfj@at1:~ > snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.1
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::name.0 = STRING: "Asetek RackCDU Monitoring Control Box"
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::version.0 = STRING: "$Revision: 1.26 $ "
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::date.0 = STRING: "$Date: 2015/03/27 08:51:01 $"
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::rackNumber.0 = STRING: "SNMPAGENT "
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::description.0 = STRING: "DEMO"
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::status.0 = INTEGER: error(3)

7.7 Get RackCDU measurements:

- Syntax: ***snmpwalk -v 2c -c {community} {IP address} {OID}***
(e.g. ***snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.3***)

[Example – type in command prompt]

```
kfj@at1:~ > snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.3
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityIn.0 = INTEGER: 218

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityOut.0 = INTEGER: 251

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerIn.0 = INTEGER: 234

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerOut.0 = INTEGER: 272

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureAmbient.0 = INTEGER: 336

ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureServer.0 = Gauge32: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureFacility.0 = Gauge32: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLeak.0 = Gauge32: 1

ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLevel.0 = Gauge32: 2

ASETEK-RACKCDU-SMI-V1-MIB-V16::flowFacility.0 = Gauge32: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::heatload.0 = Gauge32: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOut.0 = Gauge32: 1000

Get specific value from the RackCDU measurements:

- Syntax: ***snmpget -v 2c -c {community} {IP address} {OID}***
(e.g. ***snmpget -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.3.100.0***)

NOTICE: Don't forget the index (instance sub identifier). SNMP is consistent in requiring an instance for all MIB objects - even scalar objects.

[Example – type in command prompt]

```
kfj@at1:~ > snmpget -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.3.100.0
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityIn.0 = INTEGER: 218

7.8 Setup RackCDU trap notifications:

- Syntax: ***snmpset -v 2c -c {community} {IP address} {OID} a {receiver IP address}***
(e.g. ***snmpset -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.2.1.1.3.0 a 192.168.0.125***)
to set the IP address of the receiving host
- Syntax: ***snmpset -v 2c -c {community} {IP address} {OID} i {1 (disable) / 2 (enable)}***
(***snmpset -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.2.1.1.2.0 i 2***) to enable
transmission of the traps
- Syntax: ***snmpwalk -v 2c -c {community} {IP address} {OID}***
(e.g. ***snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.2***) to verify the current
settings

[Example – type in the command prompt]

```
kfj@at1:~ > snmpwalk -v 2c -c public 192.168.0.197 1.3.6.1.4.1.39829.1.2
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.0 = INTEGER: 0
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.1 = INTEGER: 1
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0 = INTEGER: no(1)
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.1 = INTEGER: no(1)
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0 = IpAddress: 192.168.10.0
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.1 = IpAddress: 192.168.10.0
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.0 = Hex-STRING: 00
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.1 = Hex-STRING: 00
```

8 Linux bash SNMP test script

A Linux bash script file called **snmp_test** is provided as a tool to set and get SNMP entries in the RackCDU SNMP Agent. For further information about included SNMP please see (Asetek A/S, 2015).

8.1 Using snmpwalk

The snmpwalk command will list the items for OID branches for the RackCDU, e.g.:

```
min@at1:~/snmp > snmpwalk -v 2c -c public 192.168.0.65 1.3.6.1.4.1.39829.1
```

This SNMP command will list the entire branch with all sub branches, of the SNMP capability.

8.2 Using snmpget

The snmpget command will get a desired RackCDU OID entry or leaf, e.g.:

```
min@at1:~/snmp > snmpget -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.93.0  
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0 = IpAddress: 192.168.0.65
```

This SNMP command will get the RackCDU IP address.

8.3 Using snmpset

The snmpset command will set a desired RackCDU OID entry or leaf, e.g:

```
min@at1:~/snmp > snmpset -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.93.0 a 192.168.0.65  
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0.0 = IpAddress: 192.168.0.65
```

This SNMP command will set the RackCDU IP address.

To make the change take place a store to flash and a reboot must be performed. This will happen when executing the following snmpset command:

```
min@at1:~/snmp > snmpset -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.99.0 i 2  
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0 = INTEGER: reboot(2)
```

The RackCDU will now store the configuration in flash and reboot. Reading the (OID - 1.3.6.1.4.1.39829.1.4.99.0) will now show a 2 indicating the box has been reset. This will indicate the reset

operation was successful. This internal variable must be cleared manually after each snmp reset. Otherwise it will be stuck at 2. This means the following snmpget will be 2 if reset was successful and 1 if reset failed.

```
min@at1:~/snmp > snmpget -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.99.0
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0 = INTEGER: reboot(2)
```

To clear the **ipReboot** flag back to 1, execute the following snmpset command.

```
min@at1:~/snmp > snmpset -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.99.0 i 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0.0 = INTEGER: normal(1)
```

8.4 Preparing the script

Find the RackCDU IP address. This IP should be inserted in the script. In this case the IP is found to be 192.168.0.101, the IP can be found by using the **TCPIP Discoverer.jar**. Other variables can be set as desired or if needed. Those variables are **KEY**, **VER** and **ASETEK_OID**.

8.4.1 Valid settings for IP, KEY, VER & ASETEK_OID

- IP - e.g. **192.168.0.101**, which is the IP on which the RackCDU is located.
- KEY - **public**, **private** or any user defined.
- VER - **2c**
- ASETEK_OID - **1.3.6.1.4.1.39829.1**, which is the MIB OID for this product.

```
#!/bin/bash
### snmp_test v1.26 - used to set and get entries in RackCDU

#set IP to ControlBox Address
IP=192.168.0.115

KEY=public
VER=2c
ASETEK_OID=1.3.6.1.4.1.39829.1
...
```

8.5 Calling the script

From a Linux terminal type and execute the following command, and the output will be:

```
kfj@KFJ-TESTPC:~$ ./snmp_test
ASETEK-RACKCDU-SMI-V1-MIB-V16::name.0 = STRING: "Control Box Test"
ASETEK-RACKCDU-SMI-V1-MIB-V16::version.0 = STRING: "$Revision: 1.26 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::date.0 = STRING: "$Date: 2015/03/27 08:51:01 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::rackNumber.0 = STRING: "SnmpAgent"
ASETEK-RACKCDU-SMI-V1-MIB-V16::description.0 = STRING: "Demo Setup"
ASETEK-RACKCDU-SMI-V1-MIB-V16::status.0 = INTEGER: error(3)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.1 = INTEGER: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0 = INTEGER: yes(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.1 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.1 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.0 = STRING: "tEsT0"
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.1 = STRING: "tEsT1"
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureAmbient.0 = INTEGER: 338
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureServer.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLeak.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLevel.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::flowFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatload.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOut.0 = Gauge32: 1000
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::modeOfOperation.0 = INTEGER: agent(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0 = IpAddress: 192.168.0.101
ASETEK-RACKCDU-SMI-V1-MIB-V16::priDNS.0 = IpAddress: 10.100.20.235
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::secDNS.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::netMask.0 = IpAddress: 255.255.255.0
ASETEK-RACKCDU-SMI-V1-MIB-V16::gateway.0 = IpAddress: 192.168.0.1
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipSrc.0 = INTEGER: dhcp(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainProportional.0 = STRING: "0.128000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainIntegral.0 = STRING: "0.051000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainDifferential.0 = STRING: "2.000000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::deltaOutMax.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMax.0 = Gauge32: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMin.0 = Gauge32: 35
ASETEK-RACKCDU-SMI-V1-MIB-V16::setpointFacilityOut.0 = INTEGER: 25
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOutAlpha.0 = STRING: "0.250000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::fluidHeatCapacity.0 = Gauge32: 4180
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatAverageFactor.0 = Gauge32: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::harnessVersion.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsAlarmEnable.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsWarningEnable.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsAlarmEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsWarningEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFi.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFi.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFo.0 = INTEGER: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSi.0 = INTEGER: 45
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSi.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFlow.0 = INTEGER: 41666
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFlow.0 = INTEGER: 944444
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFlow.0 = INTEGER: 20833
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFlow.0 = INTEGER: 972222
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureServer.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureServer.0 = INTEGER: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureServer.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureServer.0 = INTEGER: enabled(2)

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureServer.0 = INTEGER: 300
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureFacility.0 = INTEGER: 3400
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureFacility.0 = INTEGER: 3500
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLeak.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLevel.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::name.0.0 = STRING: "Control Box Test"
ASETEK-RACKCDU-SMI-V1-MIB-V16::rackNumber.0.0 = STRING: "SnmpAgent"
ASETEK-RACKCDU-SMI-V1-MIB-V16::description.0.0 = STRING: "Demo Setup"
ASETEK-RACKCDU-SMI-V1-MIB-V16::name.0 = STRING: "Control Box Test"
ASETEK-RACKCDU-SMI-V1-MIB-V16::version.0 = STRING: "$Revision: 1.26 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::date.0 = STRING: "$Date: 2015/03/27 08:51:01 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::rackNumber.0 = STRING: "SnmpAgent"
ASETEK-RACKCDU-SMI-V1-MIB-V16::description.0 = STRING: "Demo Setup"
ASETEK-RACKCDU-SMI-V1-MIB-V16::status.0 = INTEGER: error(3)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0.0 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.1.0 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0.0 = IpAddress: 192.168.0.211
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.1.0 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.0.0 = STRING: "tEsT0"
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.1.0 = STRING: "tEsT1"
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.1.0 = INTEGER: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.1.0 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0 = IpAddress: 192.168.0.211
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.1.0 = IpAddress: 192.168.0.212
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.0 = STRING: "tEsT0"
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.1.0 = STRING: "tEsT1"
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureAmbient.0 = INTEGER: 338
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureServer.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLeak.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLevel.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::flowFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatload.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOut.0 = Gauge32: 1000
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::modeOfOperation.0.0 = INTEGER: agent(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0.0 = IpAddress: 192.168.0.101
ASETEK-RACKCDU-SMI-V1-MIB-V16::priDNS.0.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::secDNS.0.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::netMask.0.0 = IpAddress: 255.255.255.0
ASETEK-RACKCDU-SMI-V1-MIB-V16::gateway.0.0 = IpAddress: 192.168.0.1
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipSrc.0.0 = INTEGER: dhcp(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::modeOfOperation.0 = INTEGER: agent(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0 = IpAddress: 192.168.0.101
ASETEK-RACKCDU-SMI-V1-MIB-V16::priDNS.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::secDNS.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::netMask.0 = IpAddress: 255.255.255.0
ASETEK-RACKCDU-SMI-V1-MIB-V16::gateway.0 = IpAddress: 192.168.0.1
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipSrc.0 = INTEGER: dhcp(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainProportional.0.0 = STRING: "0.128"

ASETEK-RACKCDU-SMI-V1-MIB-V16::gainIntegral.0.0 = STRING: "0.051"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainDifferential.0.0 = STRING: "2.000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::deltaOutMax.0.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMax.0.0 = Gauge32: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMin.0.0 = Gauge32: 35
ASETEK-RACKCDU-SMI-V1-MIB-V16::setpointFacilityOut.0.0 = INTEGER: 25
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOutAlpha.0.0 = STRING: "0.25"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainProportional.0 = STRING: "0.128000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainIntegral.0 = STRING: "0.051000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainDifferential.0 = STRING: "2.000000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::deltaOutMax.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMax.0 = Gauge32: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMin.0 = Gauge32: 35
ASETEK-RACKCDU-SMI-V1-MIB-V16::setpointFacilityOut.0 = INTEGER: 25
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOutAlpha.0 = STRING: "0.250000"
ASETEK-RACKCDU-SMI-V1-MIB-V16::fluidHeatCapacity.0.0 = Gauge32: 4180
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatAverageFactor.0.0 = Gauge32: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::harnessVersion.0.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::fluidHeatCapacity.0 = Gauge32: 4180
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatAverageFactor.0 = Gauge32: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::harnessVersion.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsAlarmEnable.0.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsWarningEnable.0.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsAlarmEnable.0.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsWarningEnable.0.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFi.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFi.0.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFi.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFi.0.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFi.0.0 = INTEGER: enabled(2)

ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFo.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFo.0.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFo.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFo.0.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSi.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSi.0.0 = INTEGER: 45
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSi.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSi.0.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSi.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSo.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSo.0.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSo.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSo.0.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSo.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFlow.0.0 = INTEGER: 41666
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFlow.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFlow.0.0 = INTEGER: 944444
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFlow.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFlow.0.0 = INTEGER: 20833
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFlow.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFlow.0.0 = INTEGER: 972222
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFlow.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureServer.0.0 = INTEGER: 0

ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureServer.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureServer.0.0 = INTEGER: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureServer.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureServer.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureServer.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureServer.0.0 = INTEGER: 300
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureServer.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureFacility.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureFacility.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureFacility.0.0 = INTEGER: 3400
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureFacility.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureFacility.0.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureFacility.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureFacility.0.0 = INTEGER: 3500
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureFacility.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLeak.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLevel.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsAlarmEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsWarningEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsAlarmEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsWarningEnable.0 = INTEGER: disabled(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFi.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFi.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFo.0 = INTEGER: enabled(2)

ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSi.0 = INTEGER: 45
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSi.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFlow.0 = INTEGER: 41666
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFlow.0 = INTEGER: 944444
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFlow.0 = INTEGER: 20833
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFlow.0 = INTEGER: 972222
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureServer.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureServer.0 = INTEGER: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureServer.0 = INTEGER: 0

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureServer.0 = INTEGER: 300
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureFacility.0 = INTEGER: 3400
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureFacility.0 = INTEGER: 3500
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLeak.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLevel.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0.0 = INTEGER: yes(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0.0 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsAlarmEnable.0.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsWarningEnable.0.0 = INTEGER: enabled(2)
```

8.6 Snmp_test groups

The script is divided into a number of smaller groups which are described in the following sections. Each group is calling snmpset and then followed by snmpget, which will help to verify the set values are correct.

8.6.1 Product group

The **product group** contains the following 6 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.1
ASETEK-RACKCDU-SMI-V1-MIB-V16::name.0 = STRING: "Control Box Test"
ASETEK-RACKCDU-SMI-V1-MIB-V16::version.0 = STRING: "$Revision: 1.26 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::date.0 = STRING: "$Date: 2015/03/27 08:51:01 $"
ASETEK-RACKCDU-SMI-V1-MIB-V16::rackNumber.0 = STRING: "SnmpAgent"
ASETEK-RACKCDU-SMI-V1-MIB-V16::description.0 = STRING: "Demo Setup"
```



```
ASETEK-RACKCDU-SMI-V1-MIB-V16::status.0 = INTEGER: error(3)
```

The following is a snip from the snmp_test script, which shows the product default setup:

```
...
#####
# product      - 1
#####

### set

# Product name - string[]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.1.0 s "Asetek RackCDU Monitoring Control Box"

# Software version (RO): string[]
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.2.0

# Software revision date (RO): string[]
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.3.0

# RackCDU number: string[]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.4.0 s "SNMPAGENT"

# RackCDU description: string[]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.5.0 s "DEMO"

# RackCDU status: {1:OK, 2:WARNING, 3:ALARM, 5:UNKNOWN}
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.1.6.0

### get

snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.1.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.2.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.3.0
```

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.4.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.5.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.1.6.0
...
```

8.6.2 Setup group

The **setup group** contains the following 8 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.2
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverNumber.1 = INTEGER: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.0 = INTEGER: yes(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyEnabled.1 = INTEGER: no(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.0 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyReceiverIPAddress.1 = IpAddress: 192.168.0.212
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.0 = STRING: "tEsT0"
ASETEK-RACKCDU-SMI-V1-MIB-V16::notifyCommunity.1 = STRING: "tEsT1"
```

The following is a snip from the snmp_test script, which shows the setup group default setup:

```
#####
# setup      - 2
#####

### set

# (RO)
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.1.0 i 0
```

```
# (RO)
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.1.1 i 0

# Index of notification receiver - [0..1]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.2.0 i 1

# Indicates if this notify entry is enabled or not - [1..2]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.2.1 i 1

# Notification receiver IP address - i.e IP for destination PC
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.3.0 a 192.168.10.0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.3.1 a 192.168.10.0

# Notification community to be used by agent to send trap
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.4.0 s ""
snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.4.1 s ""

### get
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.1.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.1.1
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.2.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.2.1
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.3.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.3.1
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.4.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.4.1
...
```

8.6.3 Measurements group

The **Measurements group** contains the following 12 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.3
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureFacilityOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerIn.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureServerOut.0 = INTEGER: -750
ASETEK-RACKCDU-SMI-V1-MIB-V16::temperatureAmbient.0 = INTEGER: 335
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureServer.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::pressureFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLeak.0 = Gauge32: 1
ASETEK-RACKCDU-SMI-V1-MIB-V16::serverLevel.0 = Gauge32: 2
ASETEK-RACKCDU-SMI-V1-MIB-V16::flowFacility.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatload.0 = Gauge32: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOut.0 = Gauge32: 1000
```

The following is a snip from the `snmp_test` script, which shows the measurements default setup:

```
...
#####
# measurements - 3
#####

# temperature Facility in: Fi - [°C]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.100.0

# temperature Facility out: Fo - [°C]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.101.0

# temperature Server in: Si - [°C]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.102.0

# temperature Server out: So - [°C]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.103.0

# obsolete
```

```
# temperature Ambient Ta - [°C]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.104.0

# pressure Server: Ps - Milli bar [mbar]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.105.0

# pressure Facility: Pf - Millibar [mbar]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.106.0

# leak Server: Leak - ok(1), leak(2)
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.107.0

# level Server: Level - ok(1), low(2)
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.108.0

# flow facility: flow - Milliliters per second [ml/s]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.109.0

# heatload: E - [Watt]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.110.0

# controller out: Out - [promille]
snmpget -c $KEY -v $VER $IP $ASETEK_OID.3.111.0

...
```

8.6.4 Network group

The **Network group** contains the following 9 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.4
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipStoreFlash.0 = INTEGER: normal(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::modeOfOperation.0 = INTEGER: agent(1)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipAddr.0 = IpAddress: 192.168.0.101
ASETEK-RACKCDU-SMI-V1-MIB-V16::priDNS.0 = IpAddress: 10.100.20.235
```

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::secDNS.0 = IpAddress: 10.100.20.235
ASETEK-RACKCDU-SMI-V1-MIB-V16::netMask.0 = IpAddress: 255.255.255.0
ASETEK-RACKCDU-SMI-V1-MIB-V16::gateway.0 = IpAddress: 192.168.0.1
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipSrc.0 = INTEGER: dhcp(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::ipReboot.0 = INTEGER: normal(1)
```

The **network group** has some configuration which needs to be set. They are explained in the following sections:

```
...
### network configuration
NW_STORE_FLASH=2 # 1 = nothing, 2 = store flash
NW_MODE_OF_OP=1 # 1 = agent, 2 = master
NW_IP=$IP # set new IP here
NW_DHCP=2 # 1 = static ip, 2 = dhcp
NW_RESET=1 # 1 = do nothing, 2 = reset
```

8.6.4.1 NW_STORE_FLASH

The **NW_STORE_FLASH** variable can be either 1 or 2. 1 will reset it back to zero and do nothing more. 2 will initiate a store to FLASH.

The FLASH must be updated after any configuration changes of all the mentioned groups from product group to notifications group. The changes will be stored into FLASH when a 2 is set with snmpset command:

```
min@at1:~/snmp > snmpset -c public -v 2c 192.168.0.65 1.3.6.1.4.1.39829.1.4.91.0 u 1
SNMPv2-SMI::enterprises.39829.1.4.91.0.0 = Gauge32: 1
```

8.6.4.2 NW_MODE_OF_OP

The **NW_MODE_OF_OP** variable can be either 1 or 2. 1 will configure the Control Box as agent, which means it will monitor only one Server Rack. 2 will configure it as manager, which means it will be able to find all agents on the sub-net. The manager is able to show information for all connected agents.

8.6.4.3 *NW_IP*

The **NW_IP** must be set to the IP address of which the Control Box is required to operate. The IP format is of type IPV4.

8.6.4.4 *NW_DHCP*

The **NW_DHCP** variable can be either 1 or 2. 1 will set the Control Box to use a static IP address. 2 will set the ControlBox to use dynamic IP address, which will then be set by the router in the network.

8.6.4.5 *NW_RESET*

The **NW_RESET** variable can be either 1 or 2. 1 means the snmp_test script will reset the internal bStoreFlash to 1. 2 means the snmp_test script will set the bStoreFlash to 2. When bStoreFlash is set to 2, the changed configuration is stored into FLASH, and the Control Box is reset.

The following is a snip from the snmp_test script, which shows the network default setup:

```
...
#####
# network      - 4
#####

### set

# the "real" command is moved to bottom of script as the flash must be saved in order to make any changes
permanent
# Store settings to Flash - nothing(0), stored(1)
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.91.0 u $NW_STORE_FLASH
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.91.0 u 1

# Mode of operation of ControlBox, can be agent or master - agent(1), master(2)
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.92.0 u $NW_MODE_OF_OP

# IP address of ControlBox eg. 192.168.0.192
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.93.0 a $NW_IP

# Primary DNS address of ControlBox - xxx.xxx.xxx.xxx
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.94.0 a 10.100.20.235
```

```
# Secondary DNS address of ControlBox - xxx.xxx.xxx.xxx
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.95.0 a 0.0.0.0

# netmask of ControlBox - 255.255.255.000
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.96.0 a 255.255.255.0

# Gateway of ControlBox - xxx.xxx.xxx.xxx
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.97.0 a 192.168.0.1

# IP address source of ControlBox, eg. static or dhcp - static(1), dhcp(2)
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.98.0 u $NW_DHCP

# reboot - normal(1), reboot(2)
snmpset -c $KEY -v $VER $IP $ASETEK_OID.4.99.0 u $NW_RESET

### get
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.91.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.92.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.93.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.94.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.95.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.96.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.97.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.98.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.4.99.0
...
```

8.6.5 Controller group

The **controller group** contains the following 8 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.5
```



```
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainProportional.0 = STRING: "0.128000"  
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainIntegral.0 = STRING: "0.051000"  
ASETEK-RACKCDU-SMI-V1-MIB-V16::gainDifferential.0 = STRING: "2.000000"  
ASETEK-RACKCDU-SMI-V1-MIB-V16::deltaOutMax.0 = Gauge32: 1  
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMax.0 = Gauge32: 100  
ASETEK-RACKCDU-SMI-V1-MIB-V16::limitPwmMin.0 = Gauge32: 35  
ASETEK-RACKCDU-SMI-V1-MIB-V16::setpointFacilityOut.0 = INTEGER: 25  
ASETEK-RACKCDU-SMI-V1-MIB-V16::controllerOutAlpha.0 = STRING: "0.250000"
```

The following is a snip from the snmp_test script, which shows the product default setup:

```
...  
#####  
# controller  - 5  
#####  
  
### set  
  
# Proportional Gain - kp [-]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.80.0 s "0.128"  
  
# Integral Gain - ki [-]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.81.0 s "0.051"  
  
# differential Gain - kd [-]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.82.0 s "2.000"  
  
# Max Controller Out Delta [%]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.83.0 u 1  
  
# max pwm output of controller [%]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.84.0 u 100
```

```
# min pwm output of controller [%]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.85.0 u 35

# Setpoint for Facility Out Temperature [15 - 50] deg Celcius
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.86.0 i 25

# Controller Out Alpha - used to filter the controller output [-]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.87.0 s "0.25"

#snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.87.0 i 60
#snmpset -c $KEY -v $VER $IP $ASETEK_OID.5.88.0 u 41

### get

snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.80.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.81.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.82.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.83.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.84.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.85.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.86.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.87.0
#snmpget -c $KEY -v $VER $IP $ASETEK_OID.5.88.0

...
```

8.6.5.1 Controller PID settings

The purpose for the controller is to keep the Facility Out Temperature (Fo), at a given set point.

The temperature controller uses a PID scheme. Which means a proportional (kp), an integral (ki) and a differential gain (kd) component, is needed by the controller. These gains must all be larger than or equal to zero. If the gain is set to zero, the particular component will have no influence on the output.

Otherwise if the gain is large, the influence on the output is also large. The three parts of the PID controller is used in a weighted sum, to adjust the controller output, making the error minimal. These values can be

interpreted in terms of time: k_p depends on the present error, k_i on the accumulation of past errors, and k_d is a prediction of future errors, based on current rate of change.

8.6.5.2 Controller Max Out Delta setting

The **Max Controller Out Delta** is set to limit the output in each iteration. This value can be in the range [0-100]. The current value is 1, which means the output of each iteration can't exceed the value of one. This limit is set to stabilize the system, as the output should be in the same range as the speed of the valve or a bit below.

8.6.5.3 Controller Max PWM Output

The **max pwm output of controller** is set to help linearize the flow valve characteristics. When the output is slowly increased it can be seen when the flow stops rising. The output when this happens should be set as the "max pwm output of controller". Above this point the output will have no effect on the flow.

8.6.5.4 Controller Min PWM Output

The **min pwm output of controller** is set to help linearize the flow valve characteristics. When the output is slowly decreased it can be found when the flow stops entirely. The point where this happens should be set as the "min pwm output of controller". Below this point the output will have no effect on the flow, as the flow will be zero. It is okay to set this value a bit lower, as the controller will auto adjust the output to avoid flow is completely cut off. Setting this value too low will make this auto adjust take longer time until it finds the set point for the min flow. **If using a positive displacement pump the flow should always be larger than zero.**

8.6.6 Units group

The **units group** contains the following 3 items, which can be found using the `snmpwalk` command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.6
ASETEK-RACKCDU-SMI-V1-MIB-V16::fluidHeatCapacity.0 = Gauge32: 4180
ASETEK-RACKCDU-SMI-V1-MIB-V16::heatAverageFactor.0 = Gauge32: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::harnessVersion.0 = Gauge32: 2
```

The following is a snip from the `snmp_test` script, which shows the **units group** default setup:

```
...
```

```
#####  
# units      - 6  
#####  
  
### set  
# Specific Heat Capacity Cp [ J/Kg*K ]  
snmpset -c $KEY -v $VER -l r $IP $ASETEK_OID.6.70.0 u 4180  
  
# Heat load is averaged over HeatAverageFactor seconds [sec]  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.6.71.0 u 600  
  
# Harness Version of the physical harness, defines which sensores are mounted  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.6.72.0 u 2  
  
### get  
snmpget -c $KEY -v $VER $IP $ASETEK_OID.6.70.0  
snmpget -c $KEY -v $VER $IP $ASETEK_OID.6.71.0  
snmpget -c $KEY -v $VER $IP $ASETEK_OID.6.72.0  
...
```

8.6.7 Notifications group

The **notifications group** contains the following 62 items, which can be found using the snmpwalk command:

```
kfj@KFJ-TESTPC:~$ snmpwalk -v 2c -c public 192.168.0.101 1.3.6.1.4.1.39829.1.7  
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsAlarmEnable.0 = INTEGER: enabled(2)  
ASETEK-RACKCDU-SMI-V1-MIB-V16::snmpTrapsWarningEnable.0 = INTEGER: enabled(2)  
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsAlarmEnable.0 = INTEGER: disabled(1)  
ASETEK-RACKCDU-SMI-V1-MIB-V16::smtpTrapsWarningEnable.0 = INTEGER: disabled(1)  
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFi.0 = INTEGER: 0  
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFi.0 = INTEGER: enabled(2)  
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFi.0 = INTEGER: 50  
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFi.0 = INTEGER: enabled(2)
```

ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFi.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSi.0 = INTEGER: 45
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSi.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSi.0 = INTEGER: 50
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSi.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxSo.0 = INTEGER: 55
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinSo.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxSo.0 = INTEGER: 60
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableSo.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinFlow.0 = INTEGER: 41666
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxFlow.0 = INTEGER: 944444
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinFlow.0 = INTEGER: 20833

```
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxFlow.0 = INTEGER: 972222
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnableFlow.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureServer.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureServer.0 = INTEGER: 100
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureServer.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureServer.0 = INTEGER: 300
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureServer.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxPressureFacility.0 = INTEGER: 3400
ASETEK-RACKCDU-SMI-V1-MIB-V16::warningMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinPressureFacility.0 = INTEGER: 0
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMinEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxPressureFacility.0 = INTEGER: 3500
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmMaxEnablePressureFacility.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLeak.0 = INTEGER: enabled(2)
ASETEK-RACKCDU-SMI-V1-MIB-V16::alarmEnableLevel.0 = INTEGER: enabled(2)
```

The following is a snip from the snmp_test script, which shows the **notifications group** default setup:

```
...
#####
# notifications - 7
#####

### set

# snmp
```

snmpTrapsAlarmEnable - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.150.0 i 1

snmpTrapsWarningEnable - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.151.0 i 1

smtp

smtpTrapsAlarmEnable - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.152.0 i 1

smtpTrapsWarningEnable - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.153.0 i 1

Fi

Set FacilityIn Min Warning level - Degree Celsius [°C]

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.154.0 i 0

enable FacilityIn Min Warning level - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.155.0 i 2

Set FacilityIn Max Warning level - Degree Celsius [°C]

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.156.0 i 50

enable FacilityIn Max Warning level - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.157.0 i 2

Set FacilityIn Min Alarm level - Degree Celsius [°C]

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.158.0 i 0

enable FacilityIn Min Alarm level - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.159.0 i 2

```
# Set FacilityIn Max Alarm level - Degree Celsius [°C]
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.160.0 i 55

# enable FacilityIn Max Alarm level - disabled(1), enabled(2)
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.161.0 i 2

# Fo
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.162.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.163.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.164.0 i 55
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.165.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.166.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.167.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.168.0 i 60
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.169.0 i 2

# Si
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.170.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.171.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.172.0 i 45
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.173.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.174.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.175.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.176.0 i 50
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.177.0 i 2

# So
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.178.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.179.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.180.0 i 55
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.181.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.182.0 i 0
```



```
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.183.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.184.0 i 60
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.185.0 i 2
```

Flow

```
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.186.0 i 41666
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.187.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.188.0 i 944444
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.189.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.190.0 i 20833
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.191.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.192.0 i 972222
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.193.0 i 2
```

Pressure Server

```
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.194.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.195.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.196.0 i 100
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.197.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.198.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.199.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.200.0 i 300
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.201.0 i 2
```

Pressure Facility

```
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.202.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.203.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.204.0 i 3400
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.205.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.206.0 i 0
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.207.0 i 2
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.208.0 i 3500
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.209.0 i 2
```

leak

enable leak detection - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.210.0 i 2

level

enable low liquid level detection - disabled(1), enabled(2)

snmpset -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.211.0 i 2

get

smtp

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.150.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.151.0

snmp

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.152.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.153.0

Fi

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.154.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.155.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.156.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.157.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.158.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.159.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.160.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.161.0

Fo

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.162.0

snmpget -c \$KEY -v \$VER \$IP \$ASETEK_OID.7.163.0

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.164.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.165.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.166.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.167.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.168.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.169.0
```

Si

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.170.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.171.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.172.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.173.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.174.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.175.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.176.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.177.0
```

So

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.178.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.179.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.180.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.181.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.182.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.183.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.184.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.185.0
```

Flow

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.186.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.187.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.188.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.189.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.190.0
```

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.191.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.192.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.193.0
```

Pressure Server

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.194.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.195.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.196.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.197.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.198.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.199.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.200.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.201.0
```

Pressure Facility

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.202.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.203.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.204.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.205.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.206.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.207.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.208.0
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.209.0
```

leak

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.210.0
```

level

```
snmpget -c $KEY -v $VER $IP $ASETEK_OID.7.211.0
```

...

There are two enable flags for SNMP traps, one for warnings (snmpTrapsWarningEnable) and one for Alarms (snmpTrapsAlarmEnable). These flags are used to either disable or enable the SNMP trap functionality. Where zero (1) means disabled and one (2) means enabled.

Similarly there are two enable flags for SMTP traps, one for warnings (smtpTrapsWarningEnable) and one for Alarms (smtpTrapsAlarmEnable). These flags are used to either disable or enable the SMTP trap functionality. Where zero (1) means disabled and one (2) means enabled.

There are a total of 9 sensors. The sensors are 4 Temperature sensors Facility Out (Fo), Facility In (Fi), Server Out (So), Server In (Si). The liquid flow sensor is 1 Facility Flow (Flow). The 2 pressure sensors are Server Pressure (PressureServer) and Facility pressure (PressureFacility). And last the 2 leak (leak) and level (level) sensors.

8.7 Setting up individual sensor traps

As described in the Notifications Group, section 8.6.7, the notification can be triggered by a number of sensors. Each of the sensors has a minimum and a maximum threshold for generating warnings and alarms. Each of these 4 thresholds has an enable flag. If the given sensor output should cross one of these thresholds, the enable flag will decide if the trap will be transmitted or not. This scheme is valid for most of the sensors.

However a few of them like leak and level, have only one threshold, which is treated like an alarm, and there for these two sensors, have only one enable flag each.

8.8 Setting up Trap Generation

Traps can be set to generate warnings or Alarms. For a description of arming the traps see table in section 6.6.4.

The traps, when detected, will be sent to a receiving IP address, which in SNMP terms is called an SNMP Manager. The trap system can handle two independent SNMP Manager at the moment. An index is used to distinguish between the two receiving SNMP Managers.

In order to enable traps for each index, the following must be set:

- notifyReceiverIPAddress - set the IP address for the TRAP receiver/ SNMP Manager.
- notifyEnabled - enable the trap detection.
- snmpTrapsAlarmEnable - enable SNMP trap alarms.
- snmpTrapsWarningEnable - enable SNMP trap warnings.

The individual trap setup for each sensor is done in the Notifications group section see 8.6.7.

The snip from the script will enable both warnings and alarms for index 0, and the traps will be transmitted to the SNMP Manager with IP address of 192.168.0.212.

```
#####  
# enable traps for index 0  
#####  
  
### script enables traps  
if [ "$TRAP_ENABLE_FLAG" -eq 1 ];then  
    # enable Traps for index 0  
    # Indicates if this notify entry is enabled or not - [1..2]  
    snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.2.0 i 2  
  
    # set receiving IP address for index 0  
    # Notification receiver IP address - i.e IP for destination PC  
    snmpset -c $KEY -v $VER $IP $ASETEK_OID.2.1.1.3.0 a 192.168.0.212  
  
# snmp  
  
# enable both warnings and alarm  
# snmpTrapsAlarmEnable - disabled(1), enabled(2)  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.150.0 i 2  
  
# snmpTrapsWarningEnable - disabled(1), enabled(2)  
snmpset -c $KEY -v $VER $IP $ASETEK_OID.7.151.0 i 2  
fi
```