AutoMonX
The Monitoring Automation Company

HPE 3PAR and Primera

Sensor pack for PRTG

by AutoMonX

Deployment guide

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Web : https://www.automonx.com Fax : +972-3-5423689
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Date	Change	Author
19.11.2017	Initial Release	AutoMonX
01.02.2018	Updated Content	AutoMonX
10.03.2018	Updated troubleshooting tips	AutoMonX
05.06.2018	Added new sensor features	AutoMonX
08.07.2018	Fixed some typos	AutoMonX
08.10.2018	Updated to Release Version 2	AutoMonX
22.10.2018	Added Password management section	AutoMonX
23.11.2018	Auto discovery and monitoring automation UI, new directory structure	AutoMonX
27.01.2019	Fix Disk space description	AutoMonX
26.03.2019	Updated screenshots and CLI	AutoMonX
03.04.2019	Update internal links	AutoMonX
23.05.2019	Added delimiter choices	AutoMonX
18.10.2019	Added CLI examples, fixed typos and added security requirements	AutoMonX
18.02.2020	Replaced plink.exe with internal SSH module, UI updates and fixes, VLUN monitoring improvements	AutoMonX
2.04.2020	Added 3Par CPG Performance sensor and new sensor features	AutoMonX
25.05.2020	New credential storage options, migration from previous versions	AutoMonX
12.06.2020	New UI options, new 3PAR sensor service, supported software, 3PARSensor.ini explained	AutoMonX
14.12.2020	Added support for Hewlett-Packard Enterprise Primera storage, new CLI options, CPG sensor update	AutoMonX
05.08.2021	Fixed VLUN monitoring to handle disappearing VLUNs, Our UI now requires PRTG username and password instead of passhash. Upgrade procedure updated.	AutoMonX

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1 Purpose

The purpose of this document is to provide a detailed explanation of how to deploy and configure the AutoMonX 3PAR and Primera sensor pack for PRTG.

2 3PAR PRTG Sensor pack overview

AutoMonX has developed custom PRTG sensor pack for monitoring the Hewlett-Packard Enterprise 3PAR and Primera storage devices. These unique sensors are utilizing the power of PRTG to monitor the various aspects of 3PAR and Primera hardware and their performance. HPE Primera storage support is available in the 3PAR sensor starting with version 2.7.4. Below is a list of currently available sensors:

- 3PAR/Primera Cage sensor
- 3PAR/Primera Battery sensor
- 3PAR Disk Pool Space sensor
- 3PAR/Primera CPG sensor
- 3PAR/Primera Node sensor
- 3PAR/Primera Virtual Volume sensor
- 3PAR/Primera CPU Sensor
- 3PAR/Primera Cache Sensor
- 3PAR/Primera VLUN Sensor
- 3PAR/Primera Cluster Quorum Status Sensor

Important: All the sensors will function correctly both on 3PAR and Primera devices. Our Auto-discovery and Monitoring Automation will automatically adapt the sensor configuration to the device type. The names of the sensors will be updated accordingly (Primera or 3PAR as needed)

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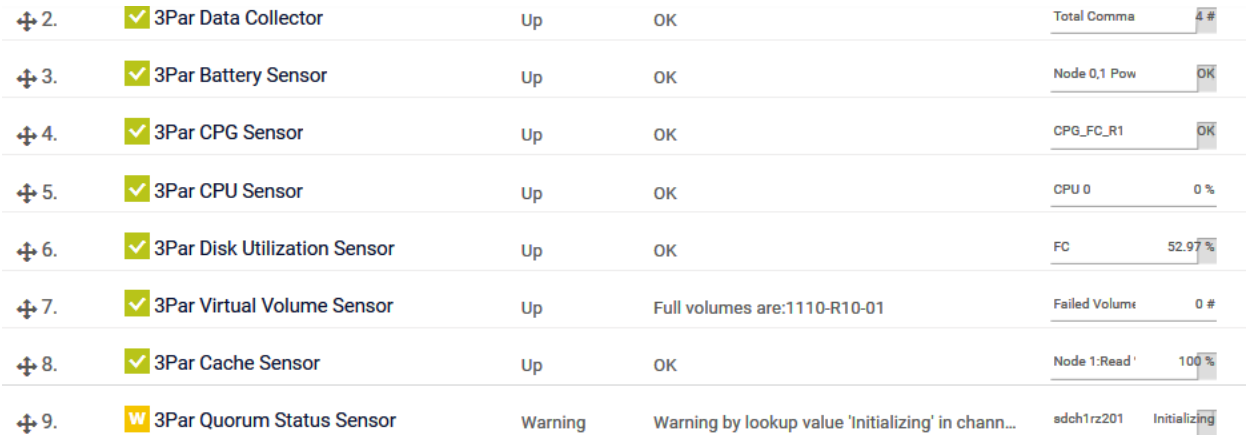
Below are examples of 3PAR sensors



Below are examples of Primera sensors

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3 Getting started with 3PAR Sensor pack for PRTG

3.1 Supported Software versions

The 3PAR Sensor pack has been tested to support the following software:

Software Type	Versions	Comments
Windows OS	2008R2 (64bit), 2012R2, 2016, 2019	Standard and Enterprise editions
Virtual Infrastructure	VMWare	
PRTG Software Core and Probe deployments	17.x,18.x,19.x, 20.x	All On-Prem PRTG license types supported
PRTG Cloud	N/A	Contact support@automonx.com before deployment

3.2 Downloading the 3PAR sensor pack

Obtain the zip archive file by downloading it from the AutoMonX web site at https://www.automonx.com/downloads

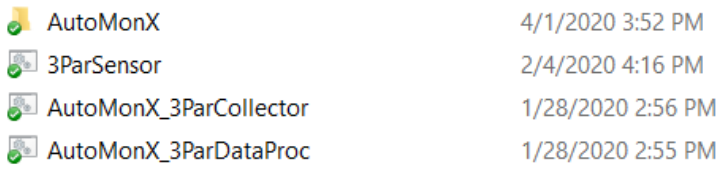
3.3 Placing the 3PAR sensor pack files

Extract the 3PAR Sensor files to the following directory on the PRTG Probe server:

<Program Files (x86)>\PRTG Network Monitor\Custom Sensors\EXEXML\

The 3PAR PRTG sensor will not function anywhere else. The extracted files will create a directory structure as seen below:

Root directory under EXEXML:



AutoMonX directory content:

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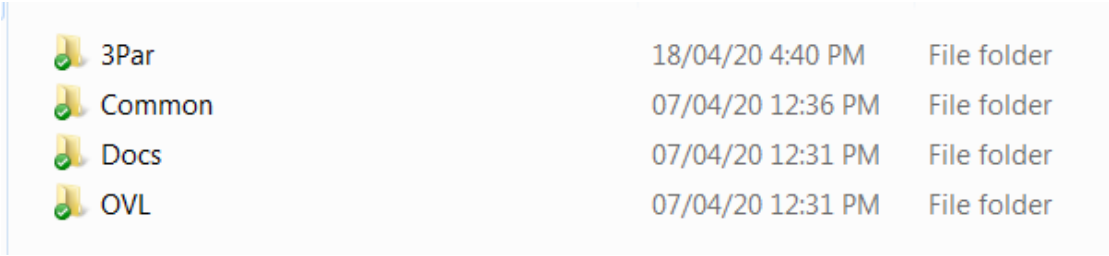

The Common directory would include the following files

Filename	Purpose
FileHelpers.dll FileHelpers.xml ExecutableActivation.dll SensorAutoDisco_UI.Lib.dll SensorAutoDisco_UI.ini ValidationConfiguration.ini	Discovery and monitoring User Interface files
LicDetailsLocator.exe	Utility to gather the required details for license generation
AutoMonX_PRTG_Automation.exe AutoMonX _PRTG_Automation.ini	Monitoring automation utility for PRTG

The 3PAR directory would include the following files:

Filename	Purpose
Data directory	The 3PAR sensor working directory where temporary monitoring files and logs are stored including AutoMonX Discovery file, Data Collector commands files, and the 3Par Data Collector log files.
3parSensor.exe	3PAR sensor main executable
AutoMonX_3ParCollector.exe	3PAR sensor data collector
AutoMonX_3ParDataProc.exe	3PAR sensor data processor

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AutoMonX_3ParService.exe	3PAR Sensor Service that controls the overall behavior of the sensor
3parSensor.ini	3PAR sensor configuration file
DiscoveryParams.ini	3PAR Auto discovery configuration file
AutoMonX3PARLicense.dat	3PAR sensor license file
ShowDiskSpace.ini	3PAR sensor monitoring configuration files
Default_credentials.cred <3PAR_IP>_credentials.cred	3PAR device encrypted credentials files, created during the sensor configuration
Migrate.exe	An executable for migration of settings from previous versions (2.x)
AutoMonX_SConn.Dll libcrypto-1_1-x64.Dll libgcc_s_seh-1.dll libstdc++-6.dll libwinpthread-1.dll	SSH-related DLLs

The OVL directory would include the following files:

Filename	Purpose
automonx.customLookup.3par.quorum	PRTG custom lookup file for 3PAR sensor pack
automonx.customLookup.3par.status	PRTG custom lookup file for 3PAR sensor pack

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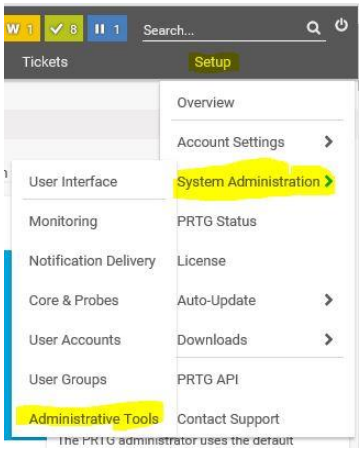
3.4 Deploying Custom Lookup files

Copy the following lookup files from the OVL directory to the "<Program Files (x86)>\PRTG Network Monitor\lookups\custom" directory:

- automonx.customLookup.3par.quorum.ovl.
- automonx.customLookup.3par.status.ovl.

After copying the Lookup files to the PRTG Core Server, you would need to reload the PRTG Lookup database by the following action:

From the PRTG upper menu -> Setup -> System Administration -> Administrative Tools -> Reload Lookup Files



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3.5 Requesting a License for the 3PAR PRTG sensor pack

The initial license file used by the 3PAR sensor pack, part of the downloaded zip file, is empty and functions as a place holder. You must activate the sensor by obtaining a license.

To successfully activate the 3PAR PRTG sensor, you must contact AutoMonX via email sales@automonx.com and provide the following information:

- Your first and last name
- Your contact details (email, phone)
- Your business addresses.
- The hostname of the PRTG Probe server machine
- The IP address of the PRTG Probe server

Important: The hostname is case sensitive. Please use the LicDetailsLocator.exe utility to obtain the hostname and IP address

Instead, you can fill the license request form at https://www.automonx.com/3par

AutoMonX would provide you with a fully functional software evaluation license that lasts for 30 days. After the end of the evaluation period, you would be required to purchase a perpetual license.

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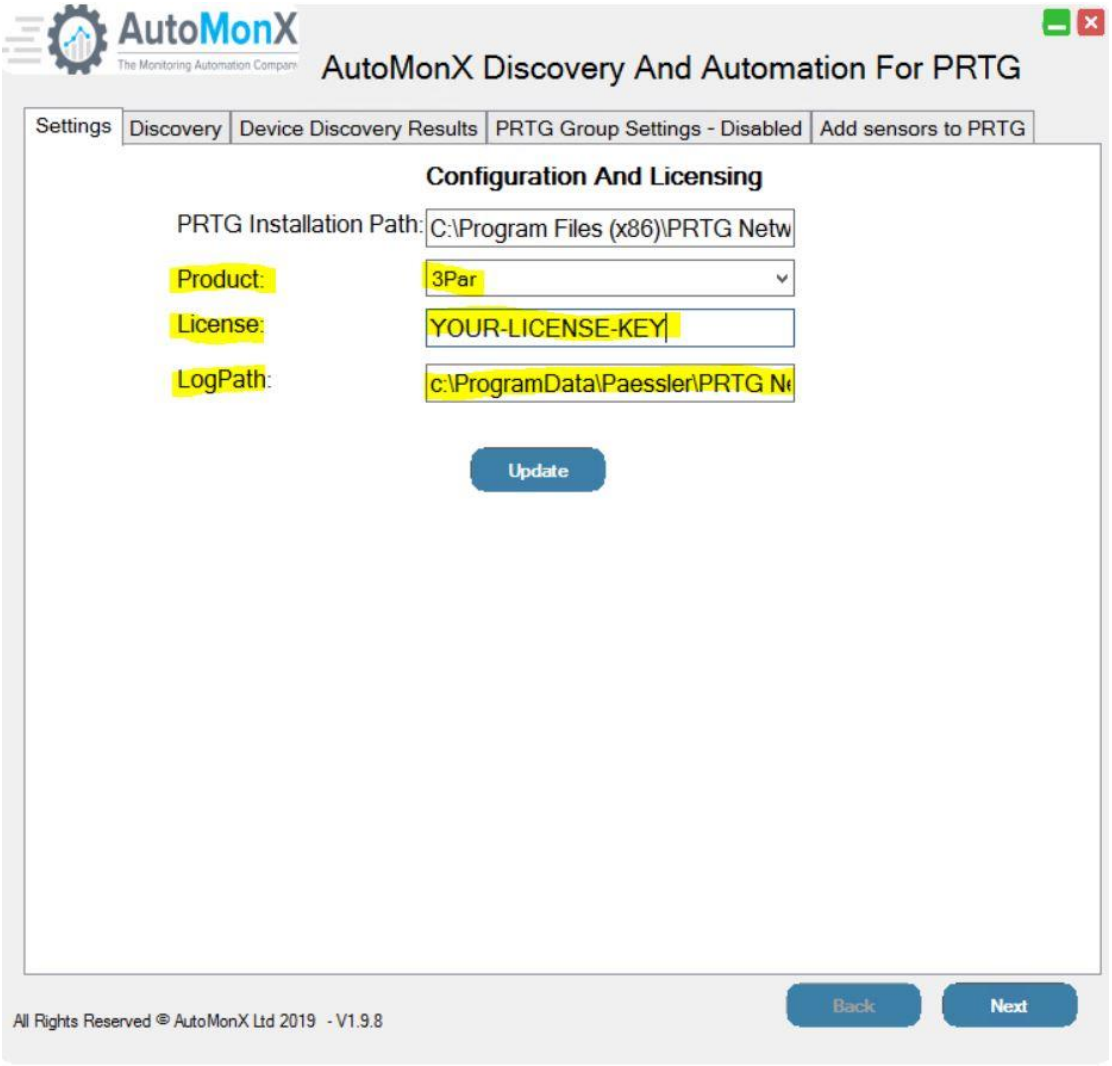
3.6 Activating the 3PAR Sensor pack License

In version 2.7 and higher, you can activate the license of the 3PAR sensor pack by opening our UI and selecting the Settings Tab. Select “3Par” from the Product drop-down list (if not selected) and paste the license string you have received via email.



You can also activate the 3PAR sensor pack by editing the AutoMonX3PARLicense.dat file via notepad, pasting the license string you have received via email and saving the file.

Important: Make sure to place the license file in the same directory as the rest of the 3PAR sensor files (see paragraph 3.2).

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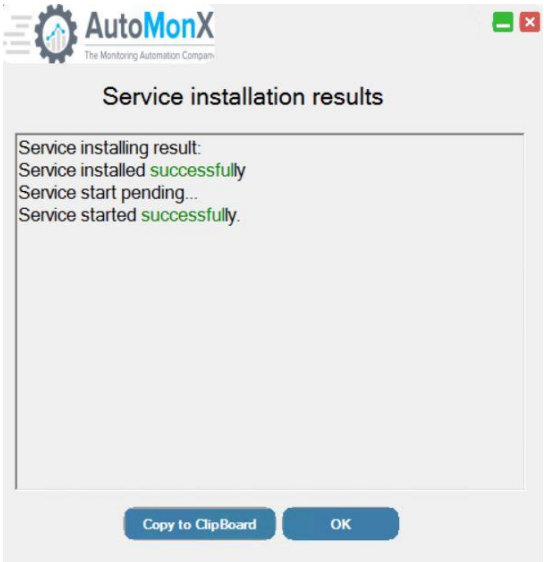
3.7 Installing the 3PAR Sensor Service

Starting with version 2.7, the 3PAR sensor requires to use a new windows service that supervises the 3PAR sensor activity. In order to install the service, start the 3PAR sensor UI, click on Discovery tab and press “Install Service” button.

Successful service installation will pop-up the following window:



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Manual service installation is also possible by running the following command from a cmd started as Administrator:

AutoMonX_3ParService.exe -install

3.8 Upgrading from Previous Versions

3.8.1 Upgrading from 3Par Sensor pack Versions 1.8x-2.6x

The section below describes the upgrade procedure from previous versions of 3PAR sensor pack from versions 1.8.x-2.6.x to the latest version (2.7.x and higher).

Important: This version introduces a new encryption scheme. You must request a new license key from our sales team sales@automonx.com (for customers with valid support contracts). You must also run the Credentials migration step as specified below.

1. Download the latest build from https://www.automonx.com/downloads
2. Extract the zip file to a temporary directory (i.e. C:\Temp)
3. Copy the following files to the Custom Sensors/EXEML directory of PRTG:
    a. 3ParSensor.cmd
    b. AutoMonX_3ParCollector.cmd
    c. AutoMonX_3ParDataProc.cmd

4. Copy the following files to EXEML/AutoMonX/3Par directory:
    a. 3ParSensor.exe
    b. AutoMonX_3ParCollector.exe
    c. AutoMonX_3ParDataProc.exe
    d. AutoMonX_3ParService.exe
    e. Migrate.exe
    f. AutoMonX_SConn.Dll
    g. libcrypto-1_1-x64.Dll
    h. libgcc_s_seh-1.dll
    i. libstdc++-6.dll
    j. libwinpthread-1.dll

5. Copy all the files from Common to EXEML/AutoMonX/Common directory. Replace any file you will be asked to in this directory.

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6. Copy the updated lookup files to their location as described in section Copy the custom Lookup files

7. Add the following lines to the existing 3ParSensor.ini file (located in the 3Par directory):

```
RUN_TIME_LOG_FILE=3ParDataCollectLogs
DISREGARD_DYNAMIC_VLUNS=TRUE
DYNAMIC_VLUNS_TIMEOUT=60
SERVICE_MODE=RUN
```

8. **Migration of credentials:** To migrate your existing credentials to new encryption scheme run:
   3ParSensor.exe -migrate

9. Install the 3PAR Sensor service as explained in paragraph 3.6

10. Optional - Remove plink.exe file from the EXEML/AutoMonX/3Par.

11. Copy all the files from Common directory of the extracted zip to EXEXML/AutoMonX/Common directory. Allow to replace the files

12. Remove any existing VLUN sensors from PRTG before re-discovering and adding VLUN sensors as this monitoring functionality was significantly updated.

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3.8.2 Upgrading from 3Par Sensor pack Versions 2.7.x

The section below describes the upgrade procedure from previous versions of 3PAR sensor pack from versions 2.7.x to the latest version.

1. Download the latest build from https://www.automonx.com/downloads
2. Extract the zip file to a temporary directory (i.e. C:\Temp)
3. Copy the following files to the Custom Sensors/EXEML directory of PRTG:
    a. 3ParSensor.cmd
    b. AutoMonX_3ParCollector.cmd
    c. AutoMonX_3ParDataProc.cmd

4. Copy the following files to EXEML/AutoMonX/3Par directory:
    d. 3ParSensor.exe
    e. AutoMonX_3ParCollector.exe
    f. AutoMonX_3ParDataProc.exe

5. Resume the 3Par sensors

Special post upgrade notes:

6**. CPG Sensors** - If the 3PAR software version is higher than 3.30 you need to rediscover and re-add the CPG sensor.

7. **Primera** – If you have used the regular 3PAR sensors to monitor Primera storage, you would need to rediscover these sensors and re-add them to PRTG.

8. **VLUNs** – You need to re-discover the VLUNs while upgrading from v2.7.4 to v2.7.4.4 and higher

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4 Preparing the environment to run the 3PAR Sensor

4.1 Windows user account

You need to prepare a Windows user account that would run the 3PAR PRTG sensor. This user must have administrative rights on the PRTG Probe server and must also have full permissions on the PRTG Probe directories as indicated below:

<ProgramData>\Paessler\PRTG Network Monitor\Logs

<Program Files>\Paessler\ PRTG Network Monitor\Custom Sensors\EXEXML\AutoMonx

4.2 3PAR Credentials Management

Starting with AutoMonX 3PAR Sensor version 2.x, the sensor can store the 3PAR username and password in a secure encrypted file. It has the following benefits:

- The username and password are not configured in PRTG in clear text
- Credentials can be changed automatically when needed via command line or GUI, without any impact on monitoring
- PRTG doesn't need to be reconfigured to accept new credentials

All sensor types and most of the features support the encrypted username and password option. The password update procedure and the auto sensor addition do not support the read from file options.

4.2.1 3PAR Credentials Options

The 3PAR Sensor pack stores credentials in the following encrypted formats:

- Default credentials file that the 3PAR sensor uses for all devices is stored in a file named: Default_credentials.cred
- Specific (per IP) credential file(s) that are used per the IP address of the 3PAR devices are stored in files named in the following format: <3PAR_IP>_credentials.cred

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4.2.2 Configuring 3PAR Credentials

Use the 3PAR sensor pack UI to configure the encrypted credentials. Fill in the details of the 3PAR device (IP address, username, password and the device name) you wish to add to PRTG.

Choose the credentials saving method (Save as Default or Device) and Press Apply. If you choose default, the credentials would be saved for all the 3PAR devices. Otherwise it will be used only for a specific 3PAR device.

Save as Default – These credentials will be used for all 3PAR devices
Save as Device - These credentials will be used for a specific device

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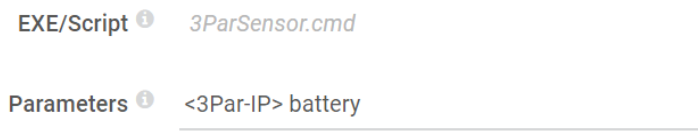
4.2.3 Using Encrypted Credentials

The AutoMonX Monitoring Automation would configure the new sensors to automatically use encrypted credentials.

In cases you would like to manually modify existing sensors, edit the 3PAR sensor settings in PRTG and make sure to specify the 3PAR IP address and the AutoMonX 3PAR Sensor type parameter. Make sure to generate the encrypted credentials file as explained in section 4.3.

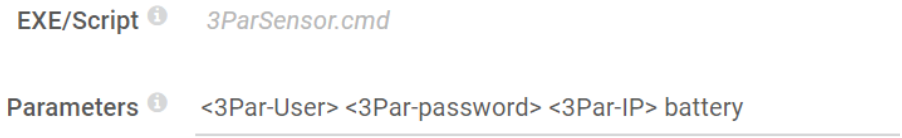
In version 2.x and above, the configuration would look as seen below:



4.2.4 Using Clear Text Credentials

If you wish to continue to use previously configured clear text credentials as in versions 1.x, you can keep the existing sensor configuration in PRTG.

3PAR sensor configuration in versions 1.x looked like this:



4.3 The 3PAR Sensor Configuration files

4.3.1 Disk Sensor configuration

The 3PAR Disk sensor requires a special configuration file, named 'ShowDiskSpace.ini'. The value in this file is called 'DISK_TYPES' and it accepts FC, SSD or NL as values. It can have one or more values, separated by a comma, with no spaces. For more information on the disk sensor please read section 9.4 3Par Disk Pool Space Sensor in this document.

4.3.2 Quorum Sensor configuration – Removed

The 3PAR Quorum sensor no longer requires a special configuration file. The file ShowQStatus.ini was removed from the sensor pack starting from version 2.7.x.

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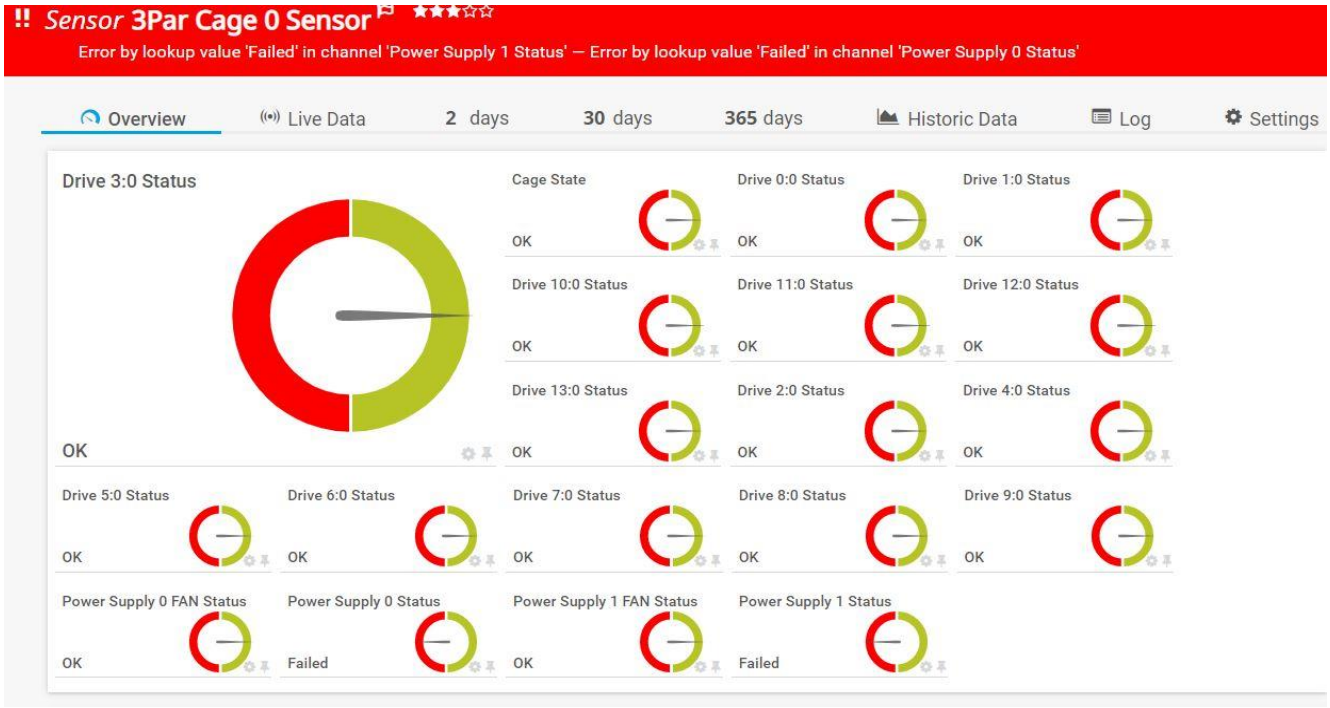
5 How does it work?

The 3PAR PRTG sensor connects via SSH to one or more HPE 3PAR or HPE Primera storage devices, runs various commands and collects information regarding the operation, health and performance of the 3PAR machine. It reports back to PRTG the relevant values in a form understandable by PRTG.

As a result, PRTG would display the gathered information in an easy to understand fashion as seen in the screen shoot below:



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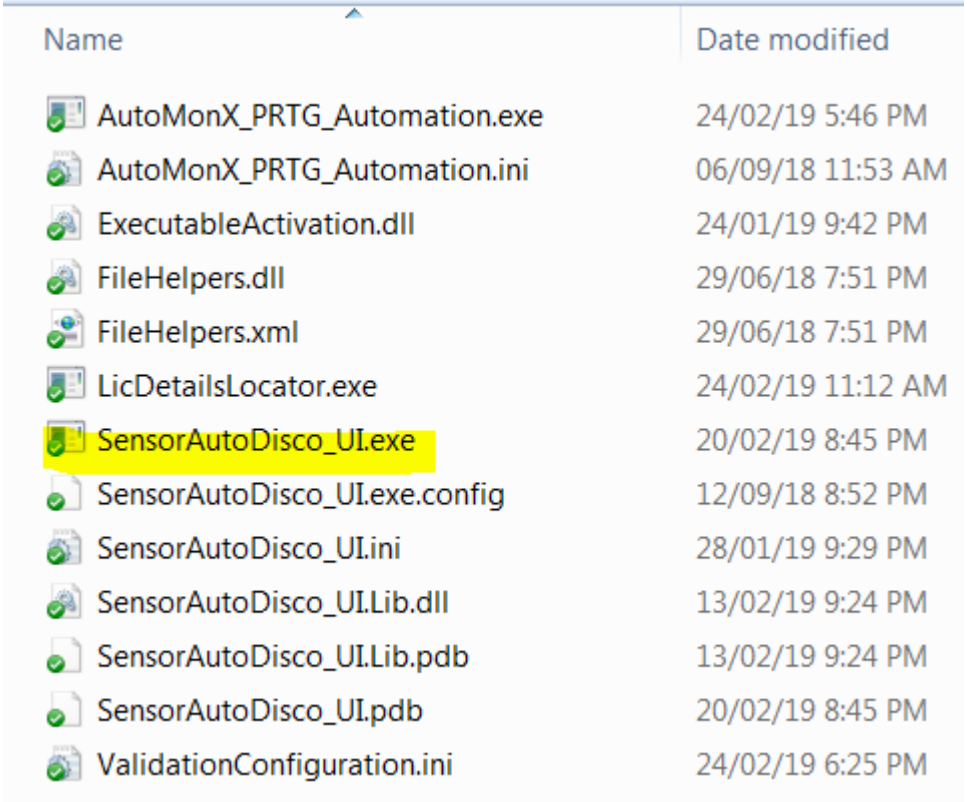
6 3PAR Sensors Discovery and Monitoring Automation

In 3PAR sensor pack version 2.x, new capabilties were added to make it easier to discover 3PAR resouces and automatically configure the 3PAR sensor pack in PRTG.

6.1 Start the Discovery and Automation GUI

Start the Discovery and Automation GUI for PRTG by selecting the SensorAutoDisco_UI.exe in the AutoMonX\Common directory and run it as an **Administrator**



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6.3 3PAR Sensors Auto-Discovery

Configure all the parameters in the UI as seen below and click on Apply to commit changes.

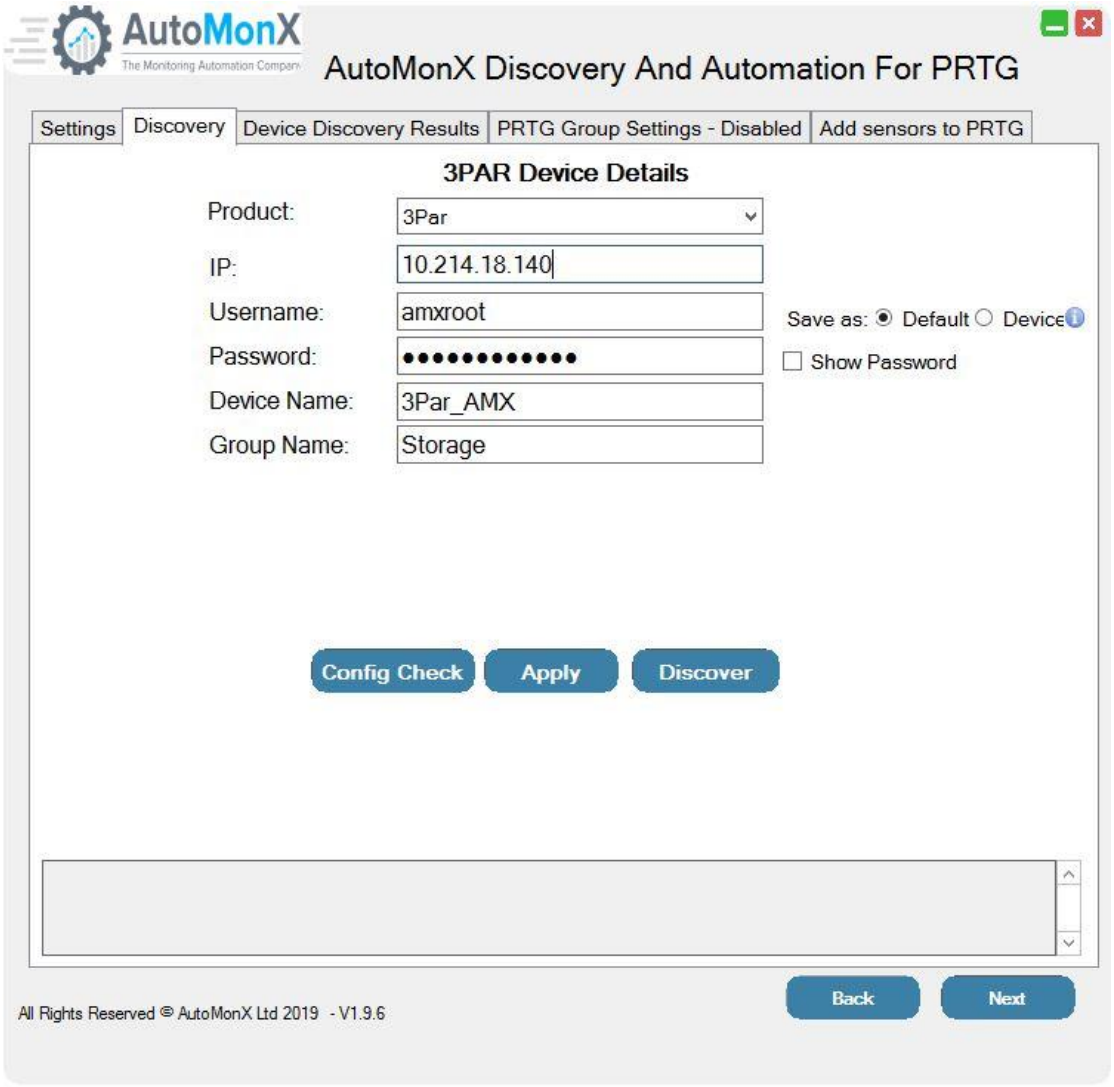
IP – 3PAR IP Address

Username: 3PAR Username (for SSH connectivity)

Password: 3PAR password

Device Name: How you wish to name the 3PAR that would be added to PRTG, or the name of a device that already exists in PRTG and you want to add sensors to it.

Group Name: Target group where the new device will be created, or it's current location.



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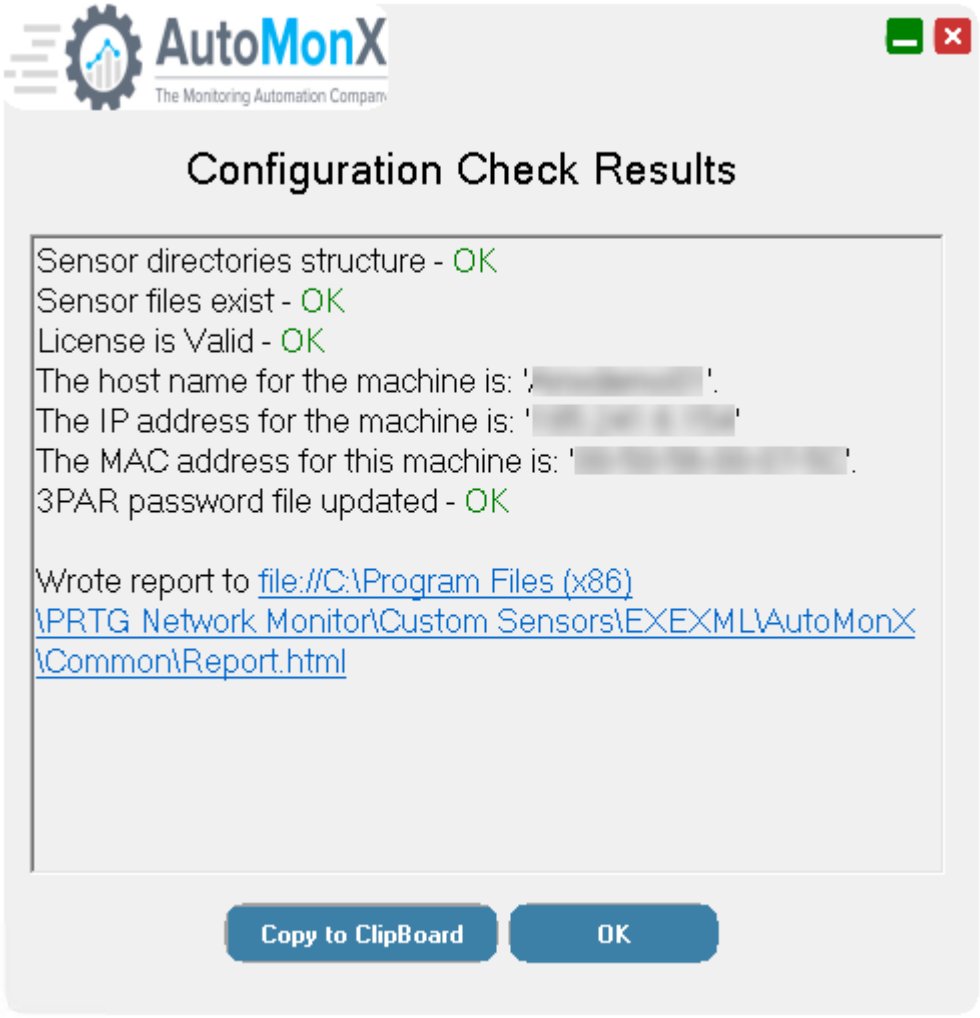
6.4 Check Your configuration

Make sure you have filled all the details and clicked Apply. Click on the Config Check button to initiate a self-check to make sure everything was configured correctly. Successful test will look like the following screen:



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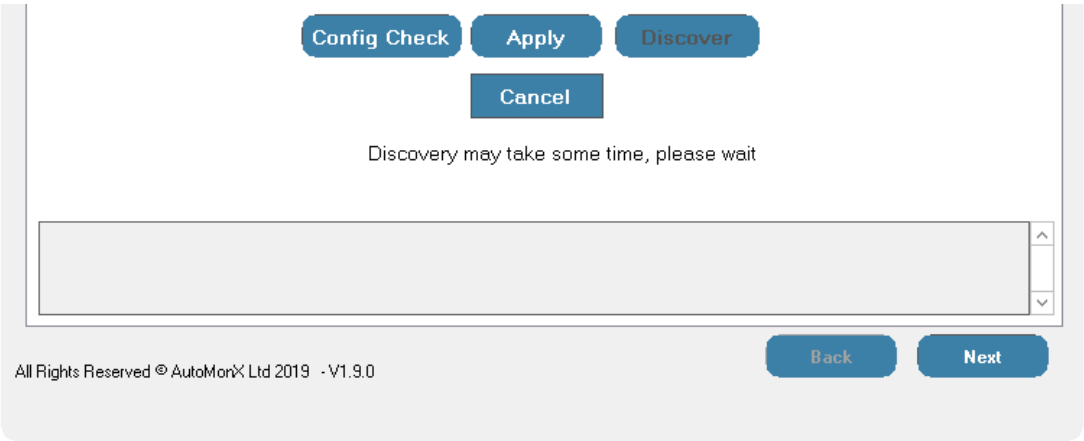
6.5 3PAR sensors Discovery

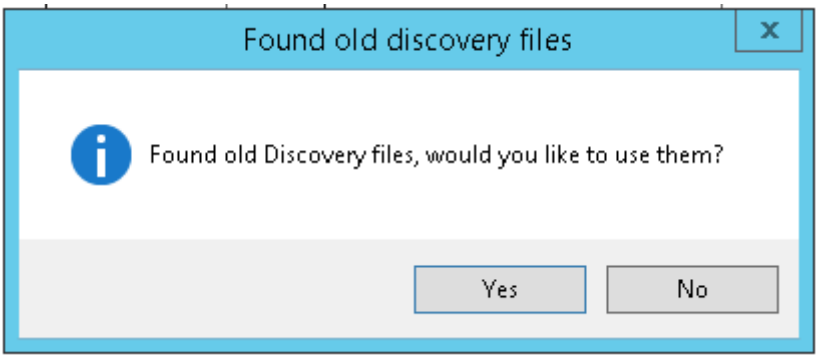
Start the 3PAR Discovery by pressing on the "Apply" and then “Discover” button. At this stage, the auto-discovery will take place.

Note: It will take a few minutes to complete, depending on your network connection and 3PAR response time.

You can cancel the discovery process while it is running by pressing the “Cancel” button.



You can use previous discovery results to add more sensors if needed without re-discovering the device. If a previous discovery results are found, the following pop-up will be seen:



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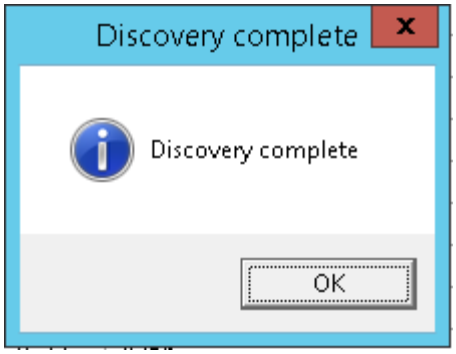
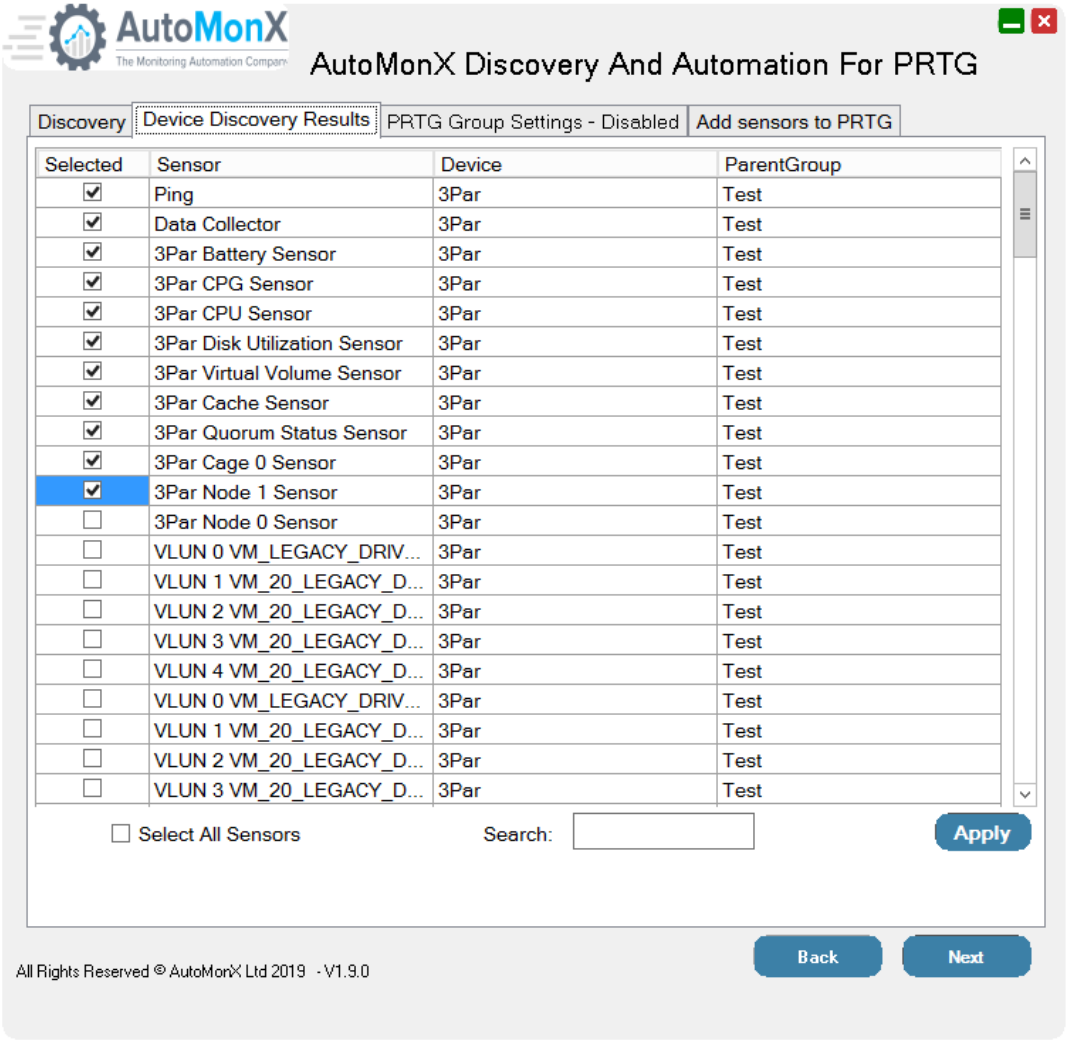
When discovery has completed, the following window will pop-up:



6.6 Selecting the 3PAR sensors

Press “Next” to move to the next tab. All the 3PAR discovered resources would be presented



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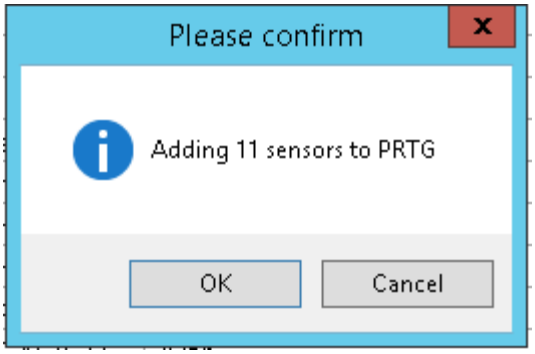
Select the sensors you want to add to PRTG by clicking on relevant checkbox on the left side of the tab. You can also click on “Select All” to mark all the sensors.

Search function is also available to allow finding specific Sensors.

Click “Appply” to save your settings. A confirmation window will pop-up. Click “OK” to confirm or “Cancel”.



Press “Next” to proceed to the “Add sensors to PRTG” tab.

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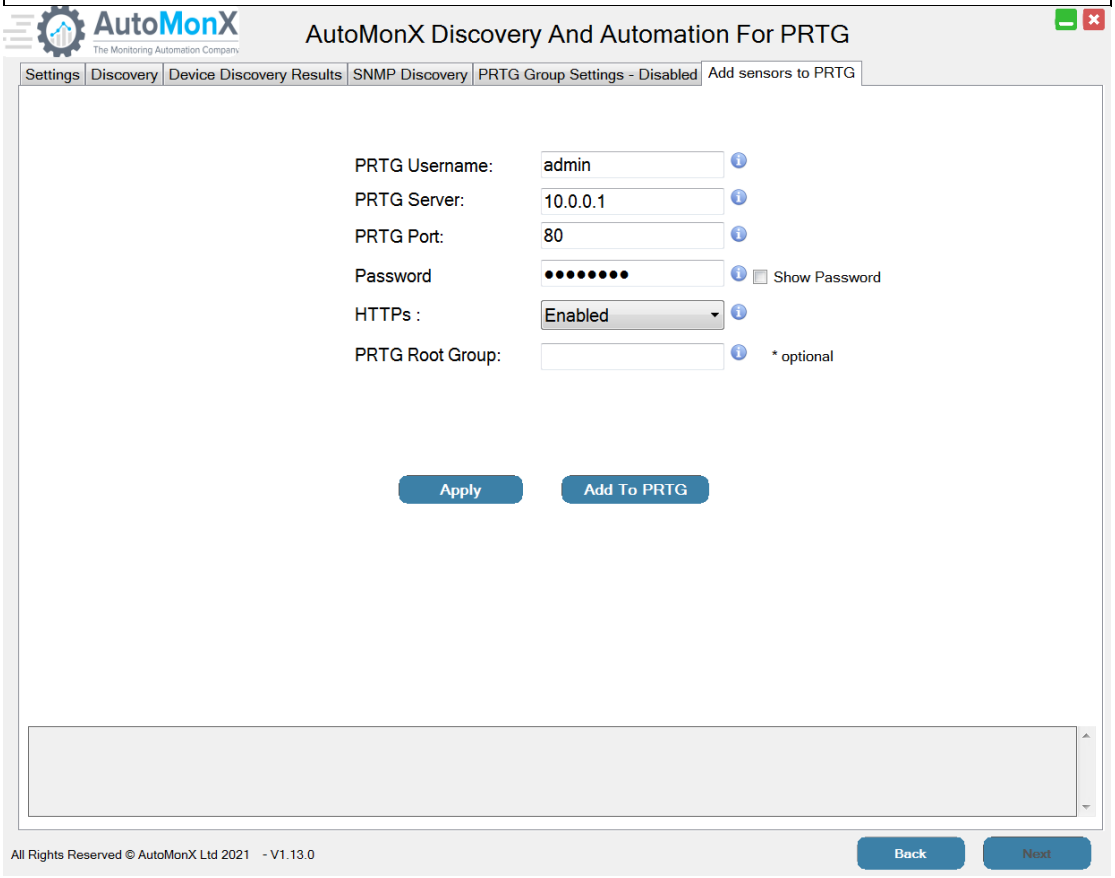
6.7 Automatically Adding 3PAR Sensors to PRTG

Important:

- Fill-in your PRTG credentials and make sure that the PRTG Web interface connection details (username, password, server IP, port and if HTTPs was enabled) for this step to succeed
- Using Passhash is no longer required!
- You need to **manually** create a target group in PRTG that will contain the 3PAR devices before running “Add sensors to PRTG”. You can create a group with a name of your choice and indicate it in the “PRTG Group” field.



Press “Apply” to save your settings.

Press “Add to PRTG” to add the device and the sensors to PRTG. Confirm the group in PRTG that the 3PAR device would be added to.

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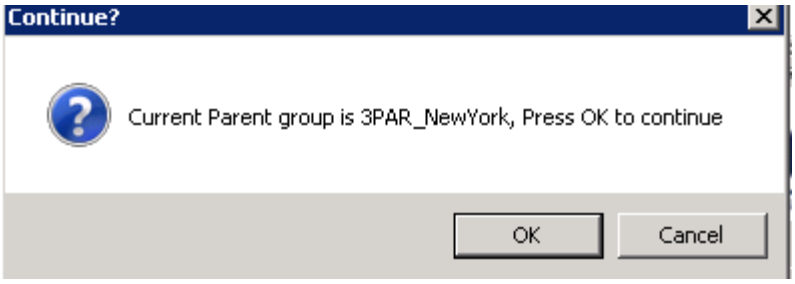


Allow the AutoMonX monitoring automation to add the device and its sensors to PRTG. This could take several minutes depending on the size of the PRTG installation and the number of sensors that were added

As soon as adding the 3PAR device and its sensors to PRTG is completed, a pop-window will provide a summary of the last action.

7 3PAR Sensor Manual configuration

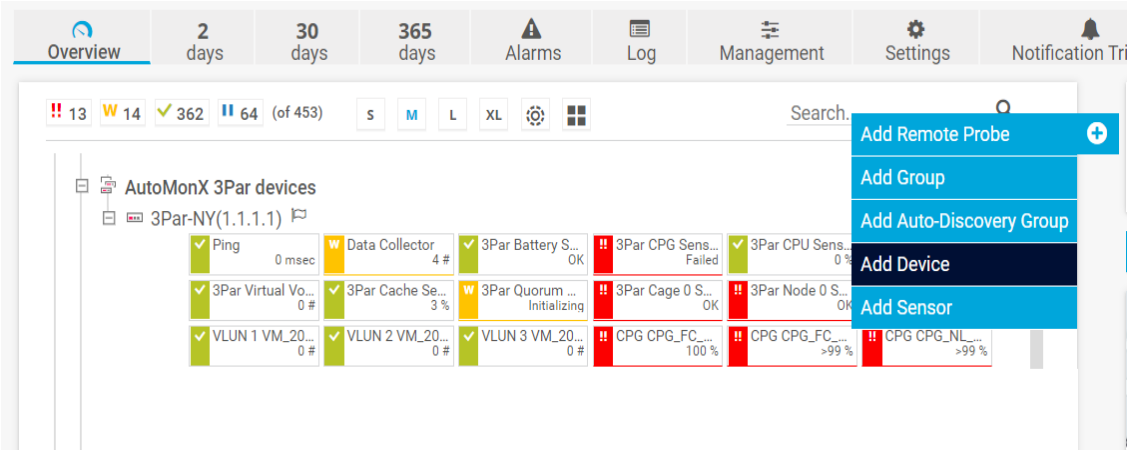
It is required to strictly follow the procedure below to successfully configure and operate the 3PAR PRTG sensor.

7.1 Creating a 3PAR device

7.1.1 Manually creating a device in PRTG

The desired outcome of this step is for the sensor to appear to be running on the 3PAR system. Create a device that would have the 3PAR device name and IP address. Follow the instructions below to setup a device:

1. Select a probe device that has network connectivity to the monitored 3PAR system and click "Add Device" as seen in the picture below:



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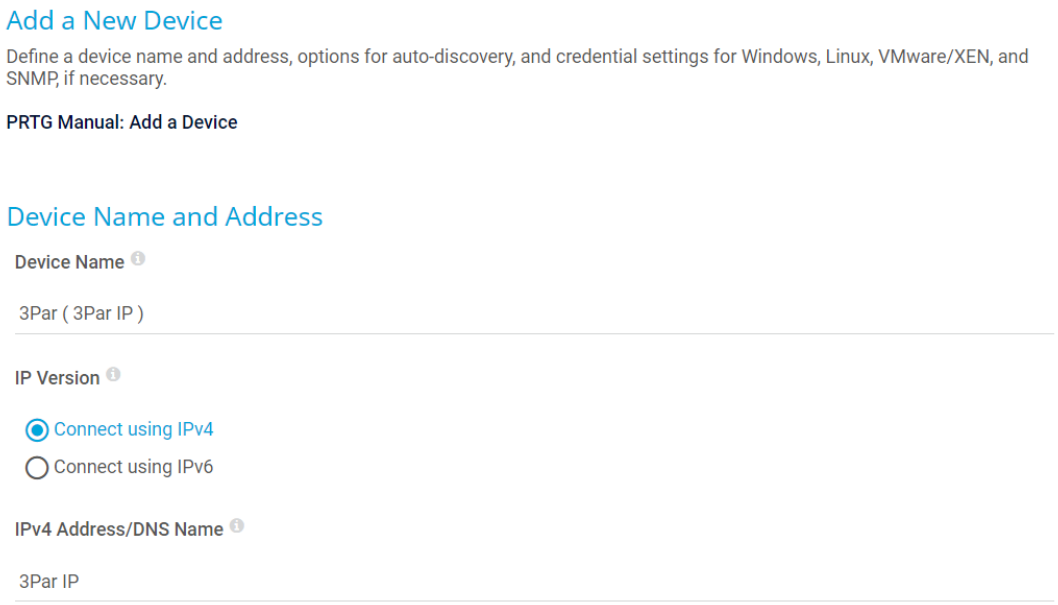
2. In the “Add a New Device” screen, use the Name field to fill the name of the 3PAR system you want to monitor. In the IPv4 field, enter the IP Address of the 3PAR device.



8 Manually Adding Sensors

The preferred way to add the 3PAR sensors is to use our Auto Discovery and Monitoring Automation user interface. This section explains how to manually add 3PAR sensors to PRTG.

8.1 Ping sensor

Add a Ping sensor and set it to "**Master object for parent**" so when the probe can't reach the 3PAR device via ping, all other sensors will be automatically put into Paused state.

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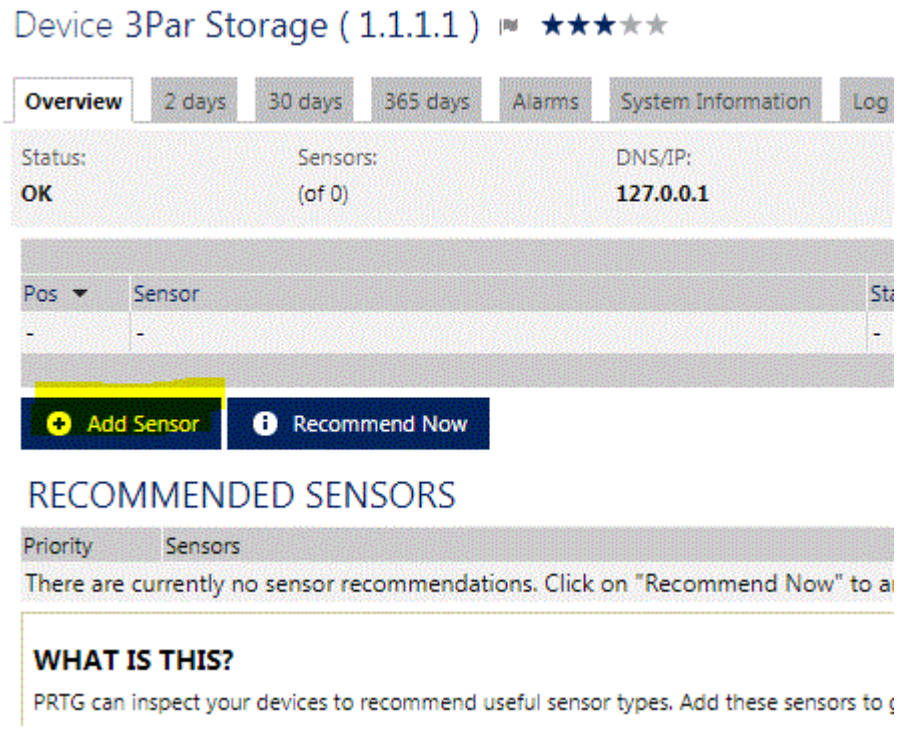
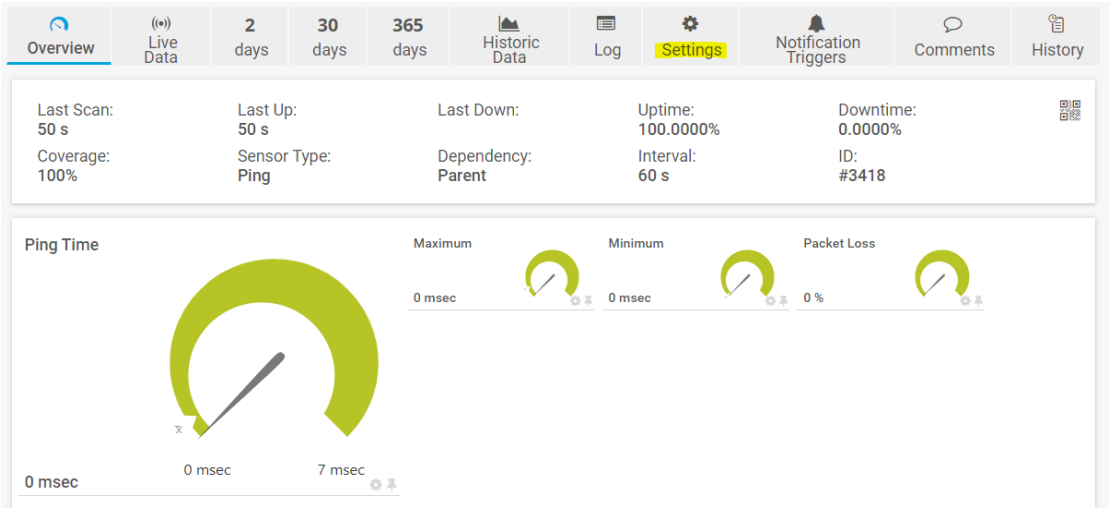
1. Click the device to select it and click “Add Sensor”.



2. Open the Ping sensor you have just created and click the Settings tab



3. Scroll down to "SCHEDULES, DEPENDENCIES, AND MAINTENANCE WINDOW", uncheck the checkbox and tick "Master object for parent", and click save.

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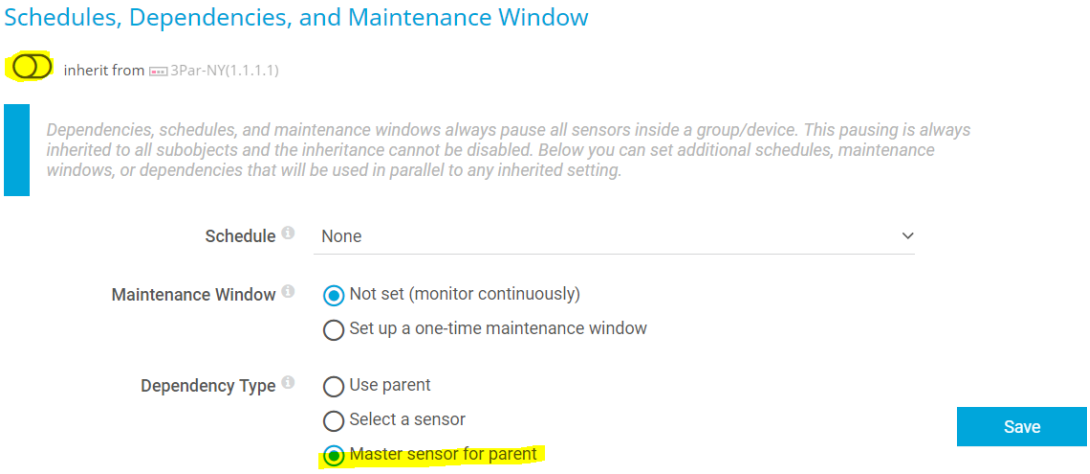
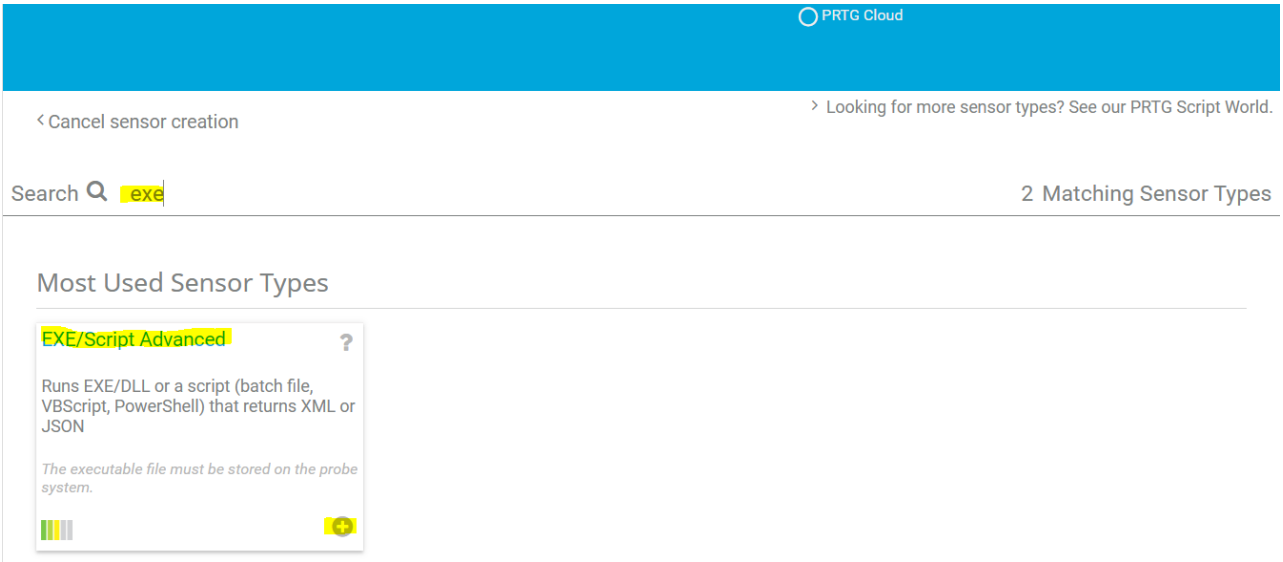


8.2 Add the AutoMonX 3PAR sensor

Before adding a 3PAR sensor to the device, please make sure you have copied the 3PAR sensor files to the correct place, as described in paragraph 3. Click the device you want to add 3PAR sensor to and then click “Add Sensor”.

1. On the “Add Sensor” page, search for EXE sensor and select "EXE/Script Advanced".



2. Set the name of the sensor according to the function you want it to fill and select the 3ParSensor.cmd file from the drop-down menu.

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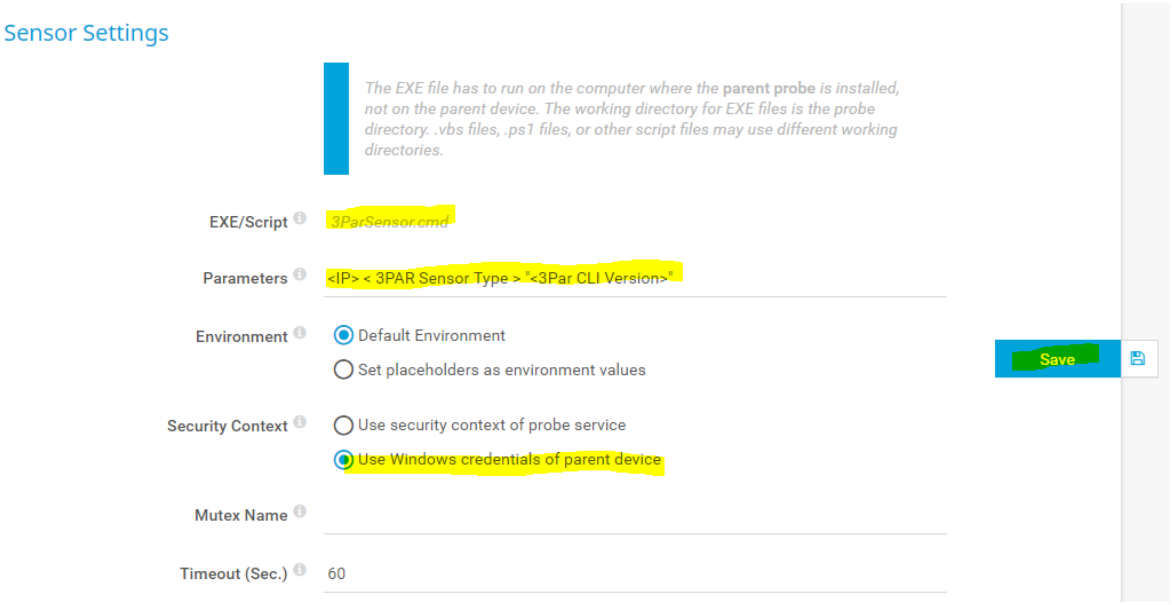
In the “Parameters” field enter the following:

a. 3PAR IP address
b. Sensor type (i.e. disk, cage<number>, node, battery, etc.).
c. The 3PAR CLI Version. See 12.3.1 for more details.

3. Change the "Security Context" from "Use security context of probe service" to "Use windows credentials of parent device".



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9 Sensor types and their Usage

There are currently eleven different sensor types available for HPE 3PAR and HPE Primera. This section of the document will briefly explain each sensor type, it's results and how to configure it.

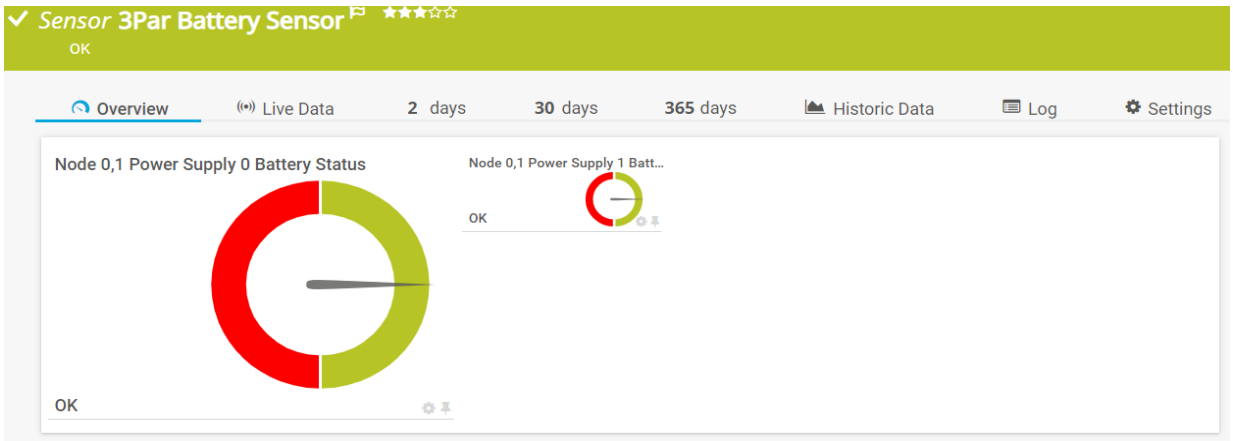
Important: Please don't clone any of the 3PAR/Primera sensors, rather create new ones by running Auto-discovery and Monitoring Automation for every new 3PAR device you need to monitor. The 3PAR PRTG sensor sends all the required data to PRTG (including channels, units, thresholds and actual data). Cloning will duplicate non-existent channels which would stay idle/gray as they cannot be deleted by the 3PAR PRTG sensors nor manually due to the design of PRTG.

9.1 3PAR/Primera Battery Sensor

Each storage processing unit has room for two power supplies. Each processing unit power supply has a battery installed in it. This battery is meant to allow for a proper power off in case of a total power loss. To make sure that the battery will fulfill its role in case of power outage, you need to monitor the battery condition.

The values for this sensor can be "OK" for a battery in good condition or "Failed" for a battery in a bad condition (degraded, failed or any other issue).

To use this sensor, type 'battery' (without ") in the Parameters section as the sensor type when configuring the sensor.



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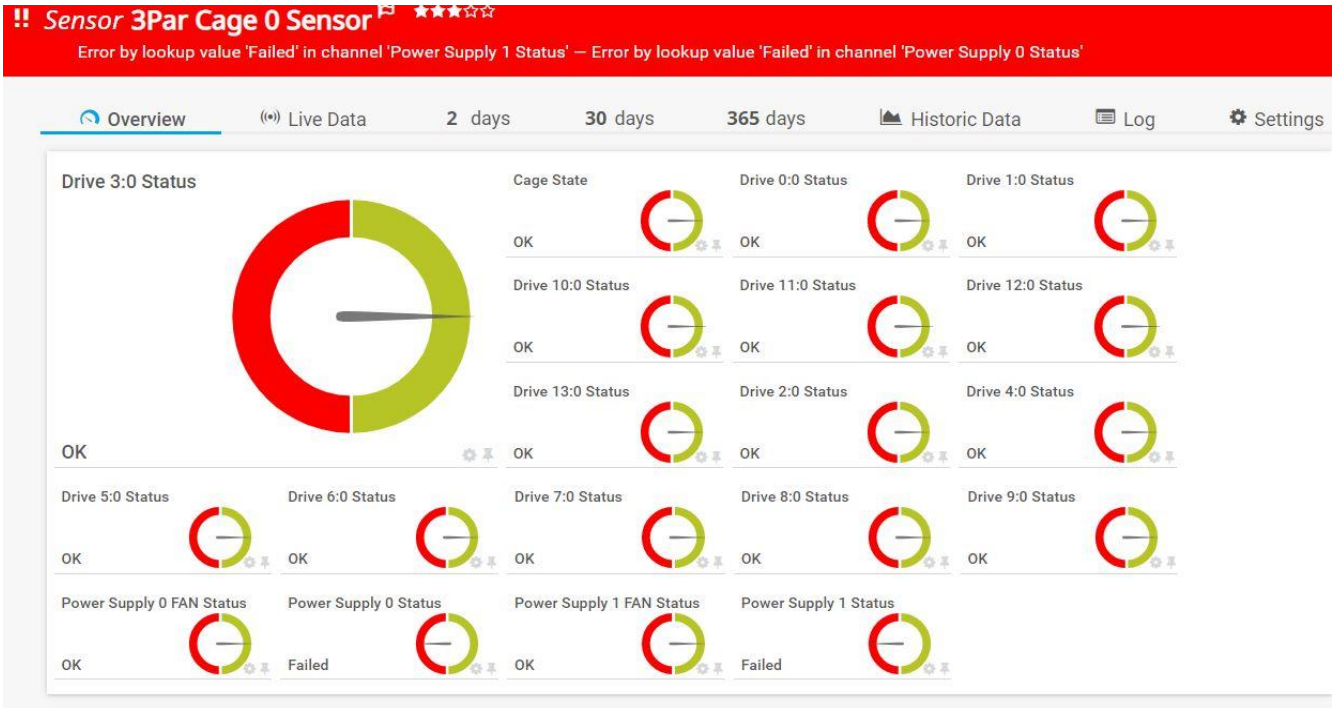
9.2 3PAR/Primera Cage Sensor

A 3PAR cage is a physical unit housing processing unit, disks or both and has two power supply units. A 3PAR storage system will contain one or more units. This sensor will provide data about the status of each power supply, power supply fan and the status of each disk. An additional channel will provide data about the status of the processing units installed in the cage, if any.

The values for this sensor can be “OK” or “Failed” (degraded, failed or any other issue) for each channel.
To use this sensor, enter 'cagex' (without ''), where x is the cage number (starting from 0), in the Parameters section, as the sensor type when configuring the sensor.



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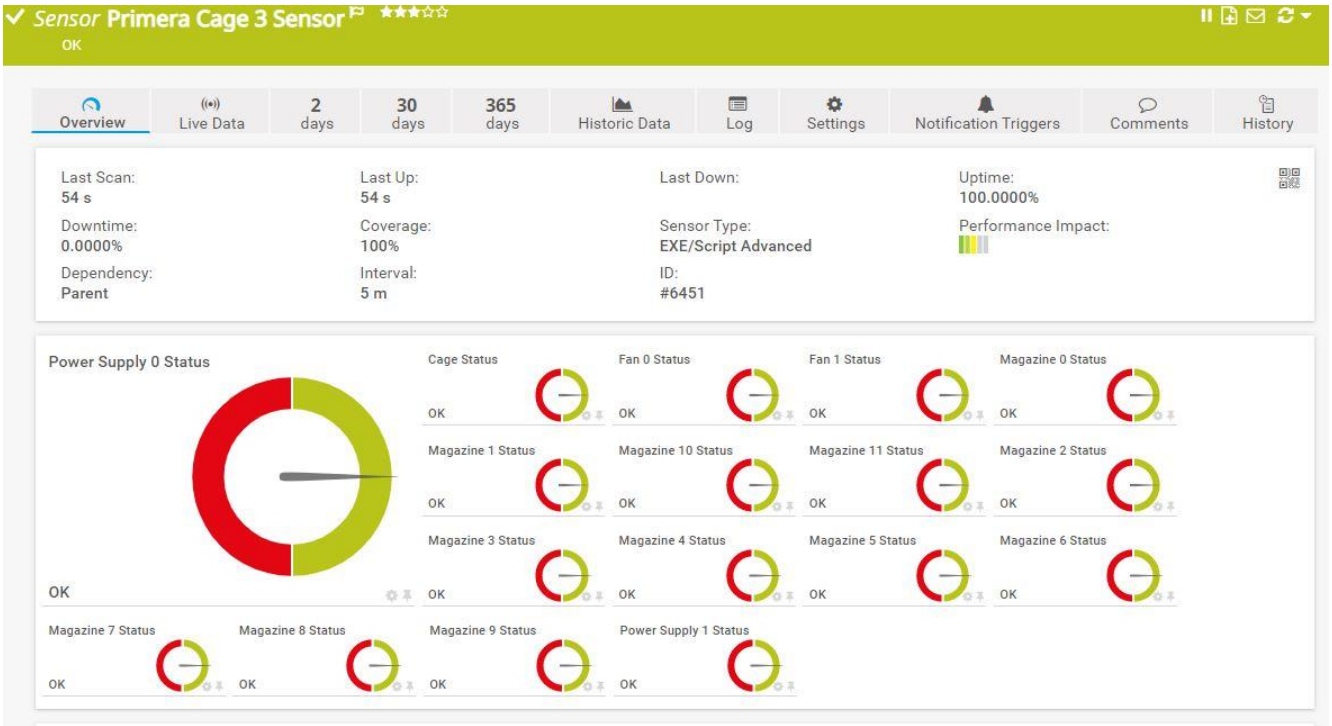
Please be note some of the HPE Primera channels names are different.



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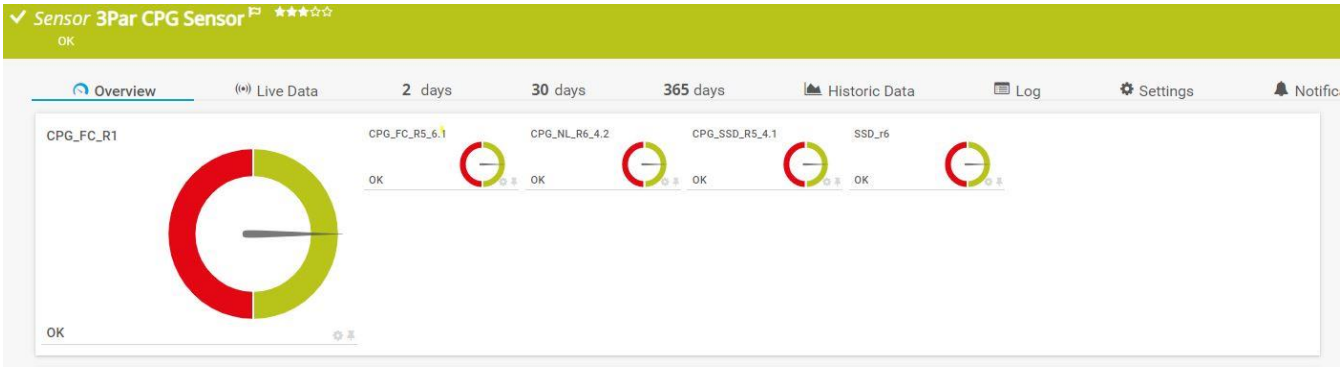
9.3 3PAR/Primera CPG Sensor

A CPG (Common Provisioning Group) is a pool of Logical Disks that provides a means for a Virtual Volume to consume disk space. The CPG sensor shows the status of logical pools of virtual disks as created in the 3PAR storage configuration.

The values of this sensor can be “OK” or “Failed” (degraded, failed or any other issue) for each channel.
To use this sensor, enter 'cpg' (without ') in the Parameters section as the sensor type when configuring the sensor.



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9.4 3PAR/Primera Disk Pool Space Sensor

The Disk Pool space provides data about the physical disk pool in the 3PAR system. There are 3 types of disks:

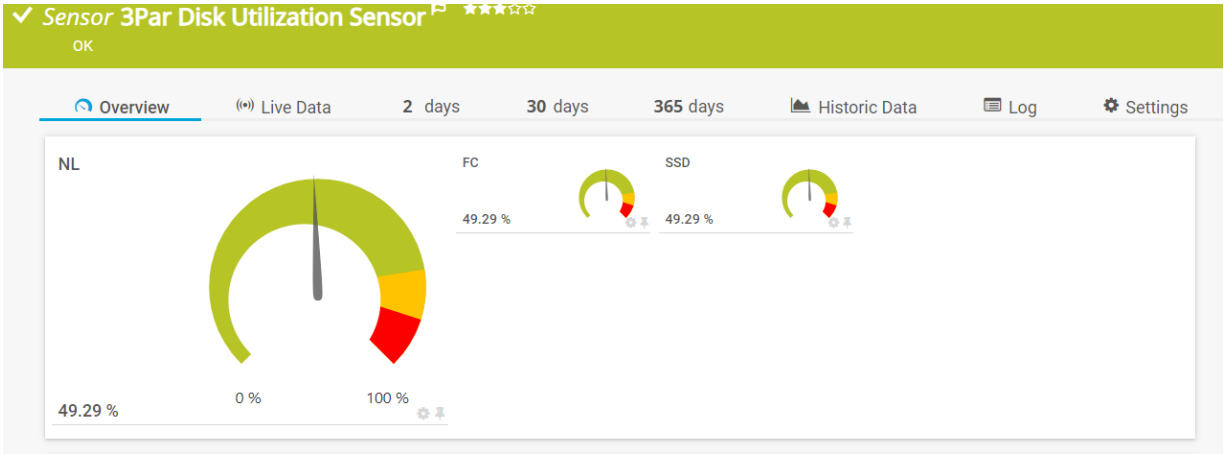
- NL – Near Line, SATA disks
- FC – Disks connected via Fiber Channel
- SSD - Solid Sate Disks.

This sensor requires a special configuration file, named 'ShowDiskSpace.ini'. The value in this file is called 'DISK_TYPES' and it can have FC, SSD or NL as values. It can have one or more values, separated by a comma, with no spaces. In the example below the sensor will show values for SSD and Fiber Channel disks only:

DISK_TYPES=SSD,FC

The values for this sensor are the percentage of Used Space of the 3PAR physical disks. Since each 3PAR system has different usage values, it's warning, and error values are set manually in the PRTG web interface.

Each channel can have its own limits depending on its data growth rate.
To use this sensor, enter 'disk' (without '') in the Parameters section as the sensor type when configuring the sensor.



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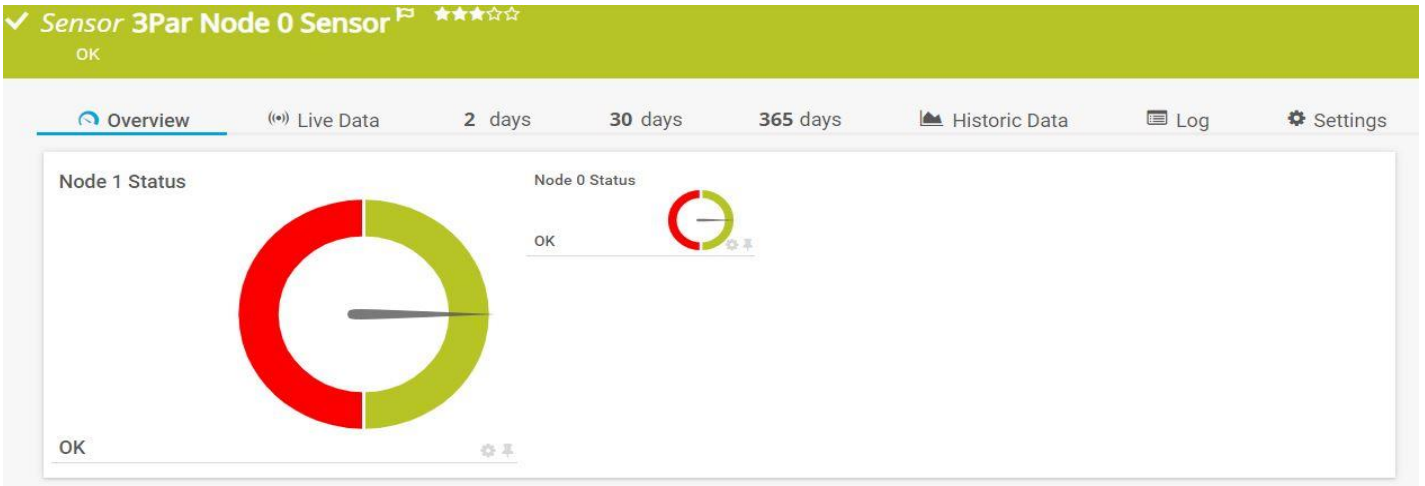
9.5 3PAR/Primera Node Sensor

The 3PAR Node sensor monitors the 3PAR node status. A node is a physical processing unit installed in a cage. The possible number of nodes are 2, 4, or 8. The sensor will assume two nodes unless provided with the parameter.

The values for this sensor can be “OK” for a node in good condition or “Failed” for a node in a bad condition (degraded, failed or any other issue).
To use this sensor, enter 'nodex' (without '), where x is the number of nodes that are physically installed in a 3PAR system.

The sensor has no way to know how many physical nodes should be present in the 3PAR system. The nodeX parameter provides that information to the sensor so it would mark a node as down if from some reason it is missing from the polling result.



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9.6 3PAR/Primera Virtual Volume sensor

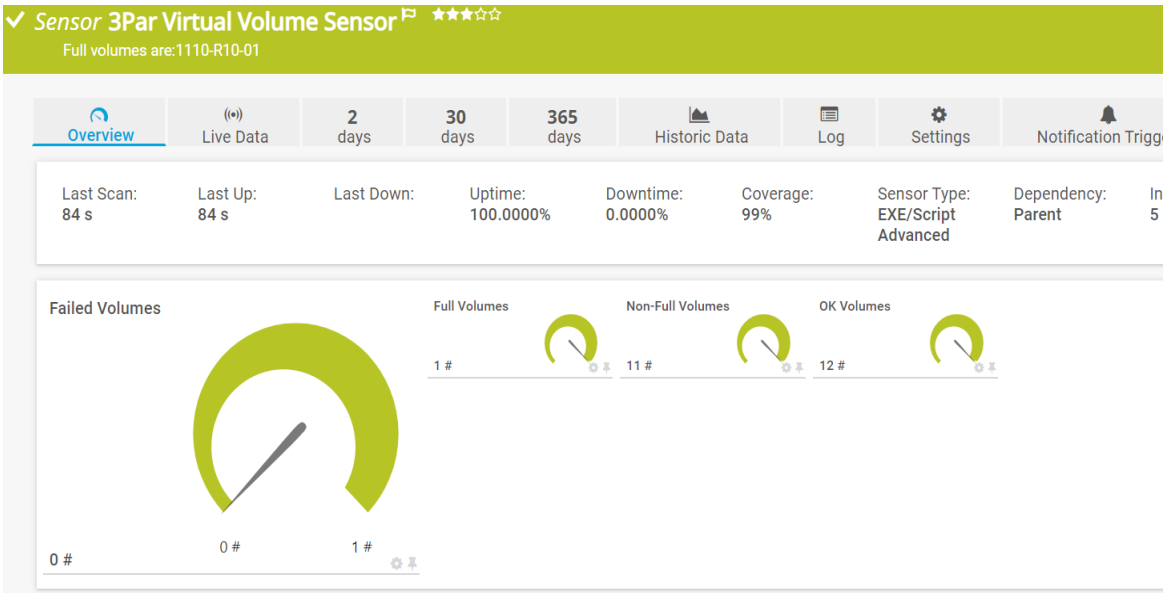
The 3PAR Virtual Volume (also referenced as LUN) is getting its capacity from a CPG and is normally connected to hosts such as ESXi machines and servers as datastores. The 3PAR virtual volume sensor monitors the status of 3PAR virtual volumes. Because virtual volumes (VV) can be frequently created or deleted, there is no dedicated channel per VV. Instead, the channels count the number of VV's that have space, full, good or failed. A channel is created for each parameter.

The number reported by each channel represents the number of Virtual Volumes in this state (failed/good/full etc).

All Virtual Volumes may appear twice:

1. Good\Failed channel
2. Free space\Full channel.

Important: The Limits of this channel must be set manually.



In case of an error, both channels would report that Full or Failed volumes exist.

Because there is not enough space in the PRTG Sensor "Last Message" field, when there are many full and/or failed volumes, their details would be stored in special log files as explained below.

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There could be two cases of sensor status:

1. When more than 5 Virtual Volumes are full and/or more than 5 virtual volumes have failed, their details will appear in the "Last Message" field.

2. When one or both channels will have more than 5 volumes in full\error status, the "Last Message" line will report "There are more than five full\failed volumes in the system."

The Virtual Volume sensor logs can be found in the following location:

<ProgramData>\Paessler\PRTG Network Monitor\Logs (Sensors)

- Full volumes: AutoMonX _3PAR_Sensor_fullVols_3PAR<IP>.log.
- Failed Volumes: AutoMonX _3PAR_Sensor_failedVols_3PAR<IP>.log

To use this sensor, enter 'vvolx' (without '). X is the minimum percent of free space a VV should have to be considered as free.

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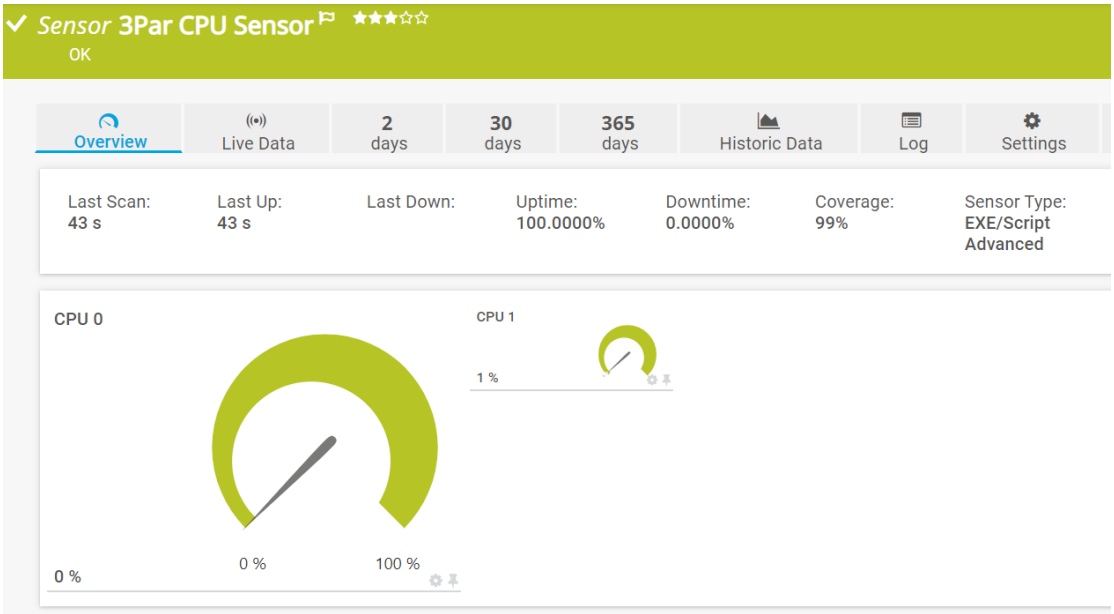
9.7 3PAR/Primera CPU Sensor

The 3PAR CPU sensor monitors the status of the 3PAR CPU. The Sensor measures the CPU utilization and presents their values in percent (%).

To use this sensor, enter ' cpu' (without ').



Note: the limits for this sensor are set manually as each 3PAR system works in different workloads.

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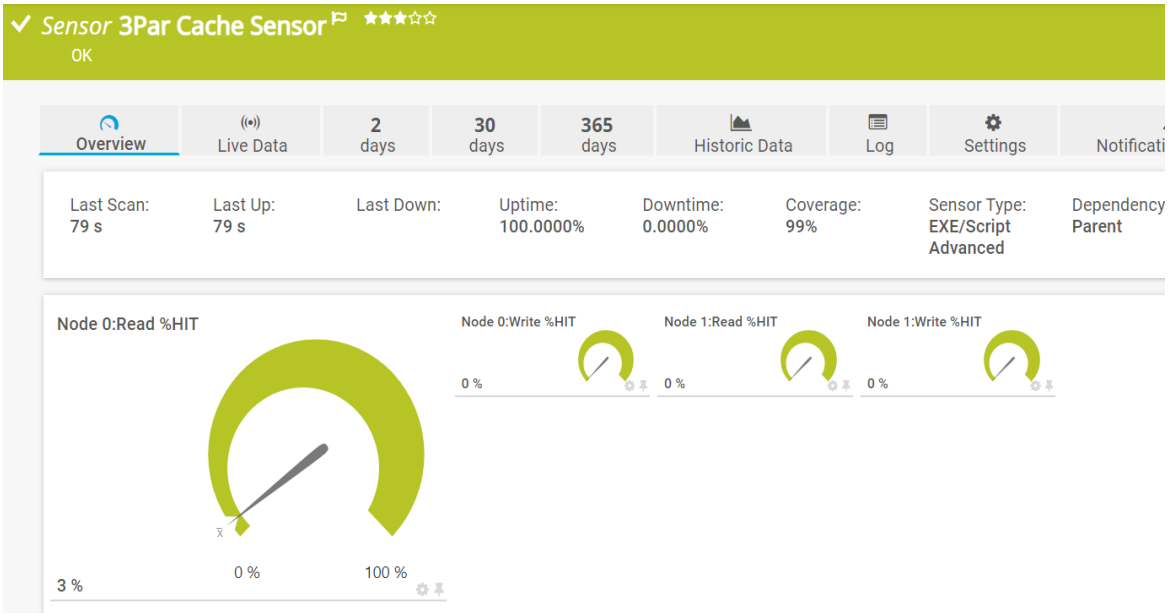
9.8 3PAR/Primera Cache Sensor

The 3PAR cache sensor monitors the status of the entire 3PAR cache performance. The sensor measures cache hits percentage for the read and write operations.

To use this sensor, enter ' cache' (without ').



Note the limits for this sensor are set manually as each system works in different workloads.

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9.9 3PAR/Primera VLUNs Sensor

The 3PAR VLUN sensor monitors the status of a single Virtual LUN (VLUN). This Sensor monitors IOPs and the rate of Read and Write operations in Kbytes per second. This sensor has two modes: discovery and the monitoring.

9.9.1 VLUN Discovery

The discovery mode is used to get a list of all VLUNs found in the system. To get the list of VLUNs, open a command line window on the probe server and run the sensor as follows:

1. cd "\Program Files (x86)\PRTG Network Monitor\Custom Sensors\EXEXML"
2. Run 3ParSensor.cmd <3PAR IP> "vlun,list"

This will result in a table with the following columns:
LUN VV_NAME HOST PORT

```
C:\Program Files (x86)\PRTG Network Monitor\Custom Sensors\EXEXML>3parSensor.cmd 127.0.0.1 "vlun,list"
LUN  VV_NAME                  HOST            PORT
0    ILSHOLEST01_drive-X      ILSHOLEST01     0:2:1
0    ILSHOLEST01_drive-X      ILSHOLEST01     0:2:2
```

9.9.2 VLUN Monitoring configuration

The 3PAR sensor pack starting version 2.7 can auto-discover VLUNs and add them automatically to PRTG.

Important: It is strongly suggested to use the 3PAR Sensor UI to re-discover and re-add all the VLUNs, as this functionality was completely re-written.

Below is an explanation of the manual procedure to add VLUNs:

To monitor a VLUN, you need to specify the following parameters:

"<ip> vlun,<LUN ID>;<VLUN NAME>;<HOST NAME>;<PORT>,;"

The parameters should be delimited by a comma, the VLUN identifier should be delimited by a character not found in the VLUN's name. almost any character can be used as a delimiter, however there are some characters that are not allowed and will result in unpredicted behavior or crushes. It is recommended to use ";" as a delimiter.

For recommended delimiters please refer to Appendix B, in this document.

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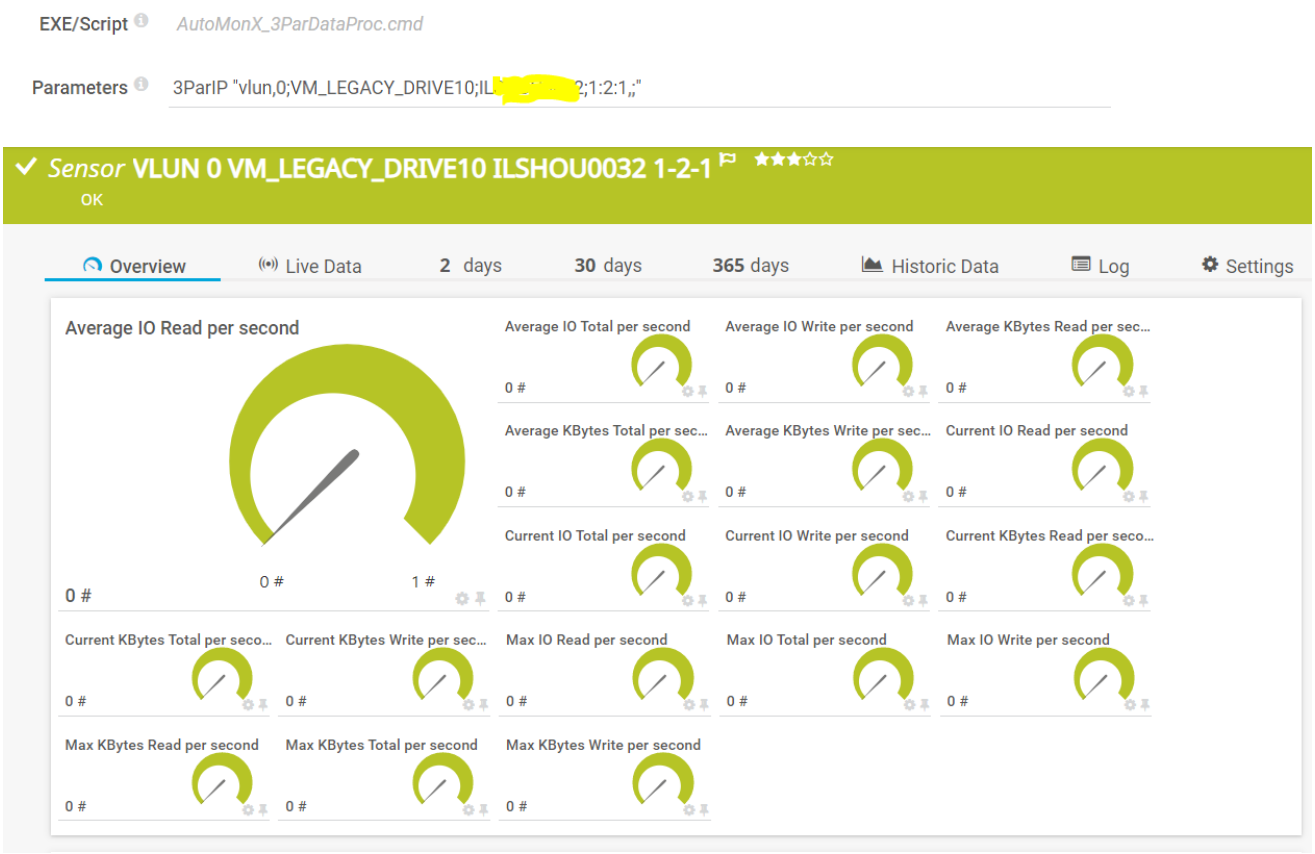
So, for a table line:

10 ESX_LUN_10 srv1esx01 0:2:1

The configuration line should like:

127.0.0.1 "vlun,10;ESX_LUN_10; srv1esx01;0:2:1,;"

Note: If you have a previous sensor delimited by a dot (.) and no delimiter was specified, it will function anyway.



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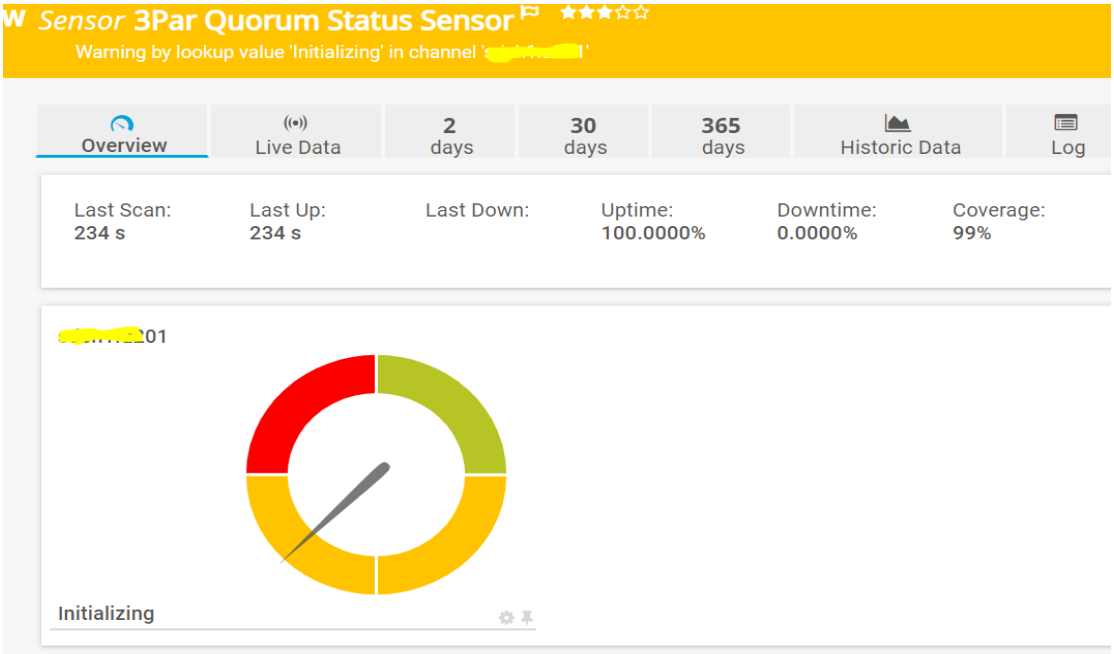
9.10 3PAR/Primera Cluster Quorum Status

The 3PAR Cluster Quorum Status sensor monitors the status of the cluster. The Sensor tests the status for a single node.

To use this sensor, enter ' qstatus' (without ').



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9.11 3PAR/Primera CPG Performance Sensor

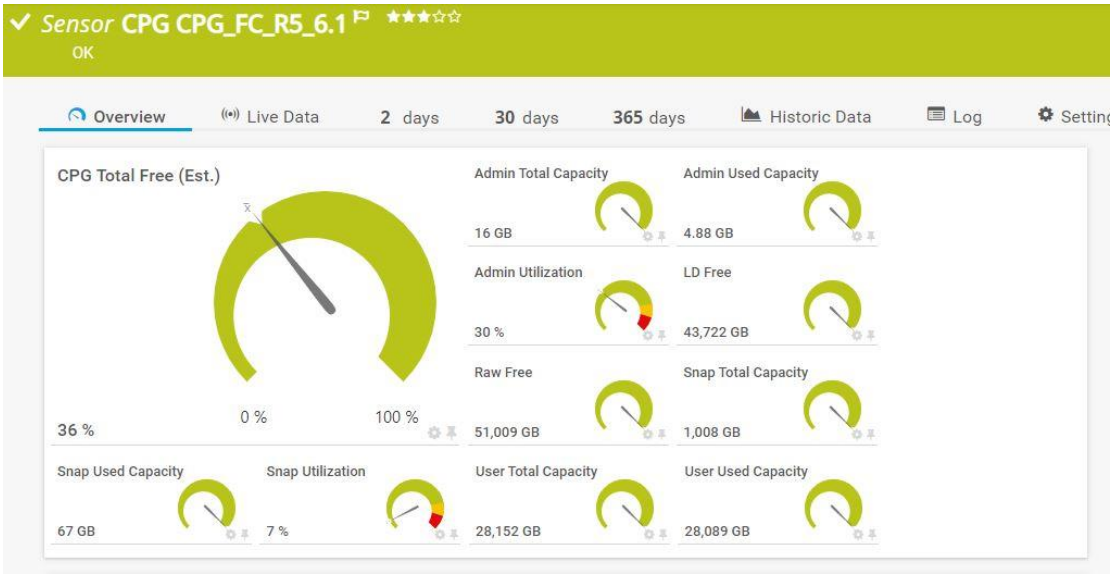
A common provisioning group (CPG) is a template for creation of logical disks that allocate space to VVs on demand. The 3PAR CPG Performance sensor monitors the performance and capacity of a CPG. It features multiple channels with wealth of information regarding each CPG:

CPG Total Free (Est.) - The **estimated** CPG free space in percent.

User, Admin and Snap Capacity and Utilization in GB and Percentage

It counts the numbers of Snap VVs, TDVVs and TPVVs

For 3Par version 3.3.1 and below:



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For 3Par version 3.3.1 and later (Including HPE Primera):

To use this sensor, enter “cpg, <CPG-NAME>”

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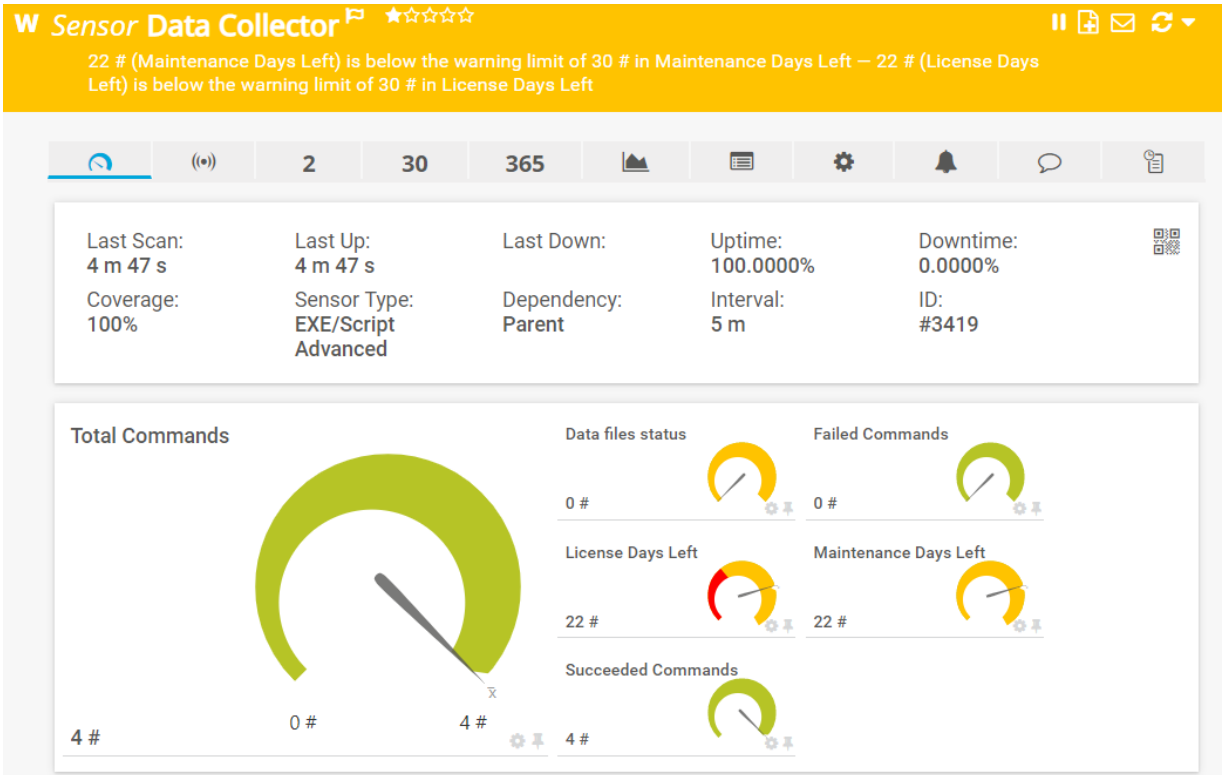
9.12 3PAR/Primera Data Collector Sensor

The 3Par/Primera Data Collector sensor was designed to control the flow of commands to a specific 3Par. It connects to 3Par devices and moderately performs all the necessary commands for their monitoring. The output of the commands is stored in the Data directory for the sensor executables to consume when they are executed. The sensor has the following channels:

Channel Name	Function
Total Commands	Total commands that were executed in the last sensor run
Succeeded Commands	Successful commands in the last sensor run – must be equal to the Total Commands counter
Failed Commands	Failed commands in the last sensor run
Data Files Status	Data files creation / deletion was OK
License Days Left	How many days are left until the license expires
Maintenance Days Left	How many days left until the software maintenance expires



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10 The 3PARSensor.ini file

The 3PAR Sensor functionality and behavior is controlled by the 3PARSensor.ini file, located under the EXEXML/AutoMonX/3PAR directory. Below is an explanation of the parameters in the ini file:

Parameter	**Purpose**
OUTPUT_FILE=3ParDevices.csv	The name of the Monitoring automation file created during the Auto-discovery phase
LOG_DIR= c:\ProgramData\Paessler\PRTG Network Monitor\Logs (Sensors) Or (from version 20.x) c:\ProgramData\Paessler\PRTG Network Monitor\Logs\sensors	Points to the directory where the 3PAR sensor stores its logs. **Must** be updated if the location of the PRTG sensor log files was modified.
VIRTUAL_VOLUMES_THRESHOLD=10	The number of Virtual volumes
DEVICE_NAME=	Modified by the 3PAR sensor UI during the discovery phase
TARGET_PRTG_GROUP_NAME=	Modified by the 3PAR sensor UI during the Auto Discovery and/or Add to PRTG phases
RUN_TIME_LOG_FILE=3ParDataCollectLogs	The name of the file that holds the Data collector activity log.
DISREGARD_DYNAMIC_VLUNS=TRUE	If set to true, the 3PAR sensor will disregard dynamic VLUNs disappearances for a specific period as defined by the DYNAMIC_VLUNS_TIMEOUT parameter.
DYNAMIC_VLUNS_TIMEOUT=60	How long (minutes) the Data Collector will wait for the VLUN to re-appear before considered as down.
SERVICE_MODE=RUN	The 3PAR Sensor service mode.

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11 3PAR Sensor Troubleshooting

There are several issues that can cause the 3PAR sensor to malfunction. This section covers the most common ones.

11.1 Cases and resolutions

Symptom / Sensor Message	Resolution
"3PAR Username Password\ sensor type\ IP address was not provided in the sensor Parameters section"	Provide the parameters in the parameters section in the following order: username password IP Address sensor type Example (cage sensor): root p@ssw0rd 1.1.1.1 cage0
"The 3PAR sensor has not provided valid results"	This issue can result from several reasons. The most common reason is lack of permissions to the probe device running the sensor program. You need to make sure that the virtual device created has the correct user name and password configured (see "7.1.2 Creating a 3PAR device" for details), and that the sensor's Security Context is set to "Use Windows credentials of parent device" (see "8.2 Add a 3PAR PRTG sensor" for details). If these two options fails, please see "10.2 General troubleshooting" bellow.
"The 3PAR sensor type you have configured is invalid (sensor type)"	The sensor type provided in the parameters section in not supported in the 3PAR PRTG sensor pack. Valid sensors are: 1. battery (see "9.1 3PAR Battery Sensor") 2. cage (see "9.2 3PAR Cage Sensor") 3. CPG (see "9.3 3PAR CPG Sensor") 4. Disk Pool Space (see "9.4 3PAR Disk Pool Space Sensor") 5. Node (see "9.5 3PAR Node Sensor") 6. Virtual Volume (see "9.6 3PAR Virtual Volume Sensor") 7. CPU (see "9.7 3PAR CPU Sensor") 8. Cache (see "9.8 3PAR Cache Sensor") 9. Virtual LUN (see "9.9 3PAR VLUNs Sensor") 10. Cluster Quorum (see "9.10 3PAR Cluster Quorum Sensor")

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	11. CPG Performance (see "9.11 3PAR CPG Performance Sensor") 12. Data Collector (see "9.11 3PAR Data Collector")
"The 3PAR Sensor license has expired, please contact AutoMonX sales team"	The PRTG Sensor license has expired. Contact AutoMonX sales team at sales@automonx.com to renew your license.
"The 3PAR Sensor license is invalid for this server, please contact AutoMonX sales team"	The PRTG Sensor license is based on specific IP address and hostname, therefore it cannot be moved to other PRTG probes. To resolve this issue please contact AutoMonX sales team at sales@automonx.com to re-host your license.
The PRTG 3PAR Sensor shows wrong numbers of Disks or volumes etc.	Please make sure that you create a new sensor instead of cloning it. The PRTG 3PAR sensors send the channel data to PRTG and cannot delete or re-use old/existing channels (this is by design by PRTG)
"A required privilege is not held by the client. (0x522)"	This is probably a permissions problem. Please try the following actions: • Restart the PRTG Probe and check if the situation was resolved • Make sure the user that runs the PRTG probe has sufficient permissions • Verify that UAC has been disabled for the user that runs the 3PAR PRTG sensor • Please create a new sensor on the same probe, with a demo batch file - "Demo Batch file - Returns static values in four channels.bat". Configure the sensor exactly like the AutoMonX 3PAR sensor. If you get the same error message, please open a case with Paessler support
"3Par data is too old, check if the 3Par Data Collector Sensor status."	This is probably a problem of the Data Collector Sensor. • Verify the Data Collector Sensor is running, and the Sensor status is OK • Make sure the user that runs the PRTG Probe service has sufficient permissions to read and write to the 3Par Sensor Data folder
Connection Error messages such as: AMXE Connection error to device: Socket Packet Error. 1 AMXE Connection error to device: Failure establishing SSH session: -43	There are communication issues between the PRTG probe and the 3PAR device. Please verify you can freely communicate with the remote device (ping and SSH without packet loss or disconnects)

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11.2 General troubleshooting

In cases when the basic troubleshooting did not resolve the issues you have encountered or the issue you are experiencing is not listed above, below are some additional general troubleshooting steps.

11.2.1 Collecting 3Par sensor Discovery Debug

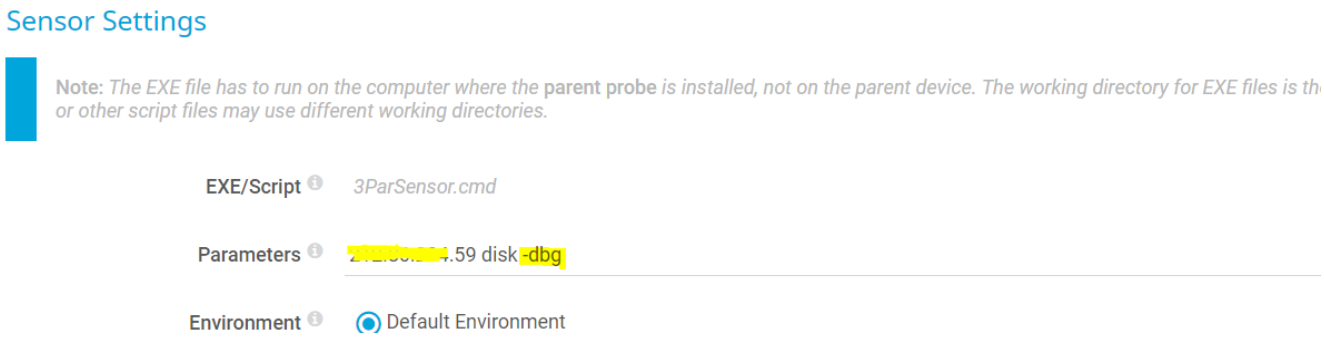
Activate the collection of 3Par sensor discovery by running discovery manually via the following command:

3parSensor.exe -u <3PAR user> -p <3PAR password> -ip <3PAR IP> -delim ; -mode discovery -paramFile DiscoveryParams.ini -debug

The log file that would be generated:
C:\ProgramData\Paessler\PRTG Network Monitor\Logs\sensors\AutoMonX_3Par_discovery_Sensor_<3PAR_IP>_dbg.log

11.2.2 Collecting 3Par sensor Debug information

To activate the 3Par debugger, open the sensor “Settings” window and add the -dbg parameter to “Parameter” field.



This will activate the debug mode upon the next start of the sensor.

During debug mode, a special log file is created. This file tracks all the 3Par sensor operations. This file needs to be examined by the AutomonX support team to detect any issues. Open a case with our support team at support@automonx.com. You would need to provide the following file:

- 3Par sensor Debugger file - Automonx_3Par_<SENSOR-NAME>_Sensor_<DEVICE-IP>_.dbg

The files are in the PRTG sensors logs directory**:**

<DISK>:\ProgramData\Paessler\PRTG Network Monitor\Logs (Sensors)

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Starting with release 20.x of PRTG, logs have been moved to:

<DISK>:\ProgramData\Paessler\PRTG Network Monitor\Logs\ sensors

11.2.3 Collecting 3Par Sensor Service Debug information

Collecting the 3PAR Sensor Service debug information requires to set the SERVICE_MODE parameter in 3ParSensor.ini as follows:

SERVICE_MODE=DEBUG

You need to restart the 3PAR Sensor service for the debug mode to start. After collecting the debug logs, return the service to its default setting:

SERVICE_MODE=RUN

11.2.4 Manually Running the 3PAR sensor

Execute the following steps to troubleshoot the 3PAR sensor:

1. Connect to the PRTG Probe that runs the 3PAR Sensor using remote desktop.
2. Open a new CMD window with the credentials provided in the "7.1.2 Creating a virtual device" section.
3. Navigate to the EXEXML directory by typing:
   cd "<Program Files (x86)>\PRTG Network Monitor\Custom Sensors\EXEXML"
4. Copy the parameters from the parameters section as provided in the "8.2 Add a 3PAR PRTG sensor" section.
5. In the cmd window type: 3parSensor.cmd and paste the parameters copied in the stage 4.
6. The output should be of the following form

```
<prtg>
   <result>
        <channel> </channel>
       <value> </value>
   </result>
</prtg>
```

Any other response would not be accepted by PRTG as a valid (the result tag can repeat multiple times). If files or permissions are missing, you would get a corresponding error message.

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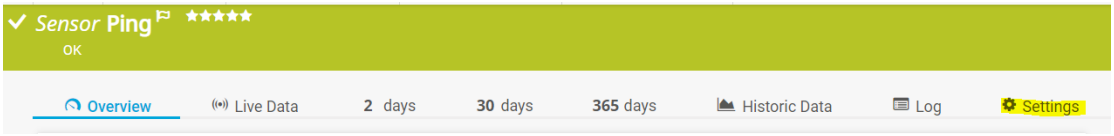
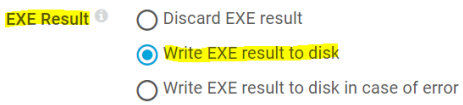
11.2.5 Enable sensor logging

If the actions described in "8.2.1 Manually Running 3PAR sensor" resulted in a correctly formed xml printed to the screen, you need to determine what result the PRTG server receives. To achieve this goal, take the following steps:

1. Click the settings tab on the sensor page

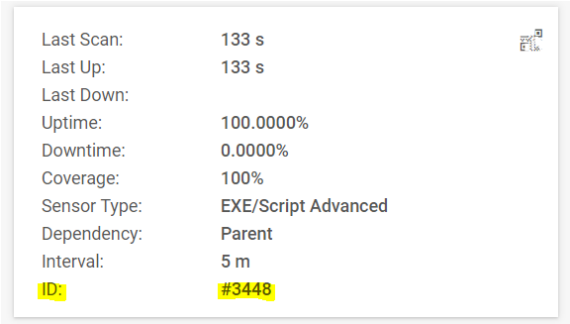


2. In the settings tab scroll down to "EXE Result" and select the " Write EXE result to disk" option.



3. Click save in the bottom of the page.

4. Locate the sensor ID number from the top right side of the sensor page



5. On the PRTG probe server open the run line (windows key + r) and type:
   %ProgramData%\Paessler\PRTG Network Monitor\Logs (Sensors) or

   %ProgramData%\Paessler\PRTG Network Monitor\Logs\sensors

6. In this directory you will find two files for each sensor that has logging enabled. You need to find the file with the ID from step 4, and a .txt extension (not .data.txt).

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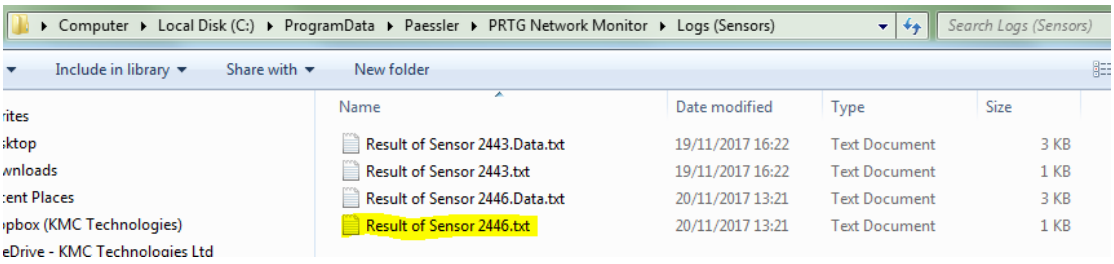

7. In the .txt file you can find the result as the PRTG probe receives it. If something went wrong, it would be recorded in this log file. If you know how to fix it, do so (permissions, missing files, etc.).

8. If you cannot resolve this issue, please contact AutoMonX at support@automonx.com.

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12 3PAR Sensor pack Command line options

There are three command-line options available for the AutoMonX 3PAR sensor pack. They have been modified to support the HPE Primera storage devices.

- 3PAR sensors Auto Discovery
- Sensor Monitoring Automation for PRTG
- Sensor Monitoring CLI options

12.1 3PAR Auto-Discovery Command Line Options

The 3PAR auto discovery option is used for scanning the 3PAR system, obtain its monitoring resources and store them in a CSV file. The file can later be used to automatically create sensors for this 3PAR by the monitoring automation option.

To use auto discovery from command line run the following command:

3parSensor.exe -u <3PAR user> -ip <3PAR IP> -p <3PAR password> -delim <delimiter>
-mode discovery -paramFile DiscoveryParams.ini

Below are the required parameters:

- **u -** 3PAR user - A username that will be used to connect to the 3PAR system. The user must have sufficient privileges to collect data.
- **ip** - The 3PAR IP address
- **3PAR password**
- **mode**: Instructs the AutoMonX 3PAR sensor to create a settings file specific to the 3PAR machine.
- **DiscoveryParams.ini** - Specifies the configuration file to be used.
- **delim** – a delimiter to be used for the VLUN sensor parameters. For additional details please refer to section 9.9.1 Vlun Discovery of this document. For allowed delimiters please refer to Appendix 1 – Disallowed characters of this document.

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12.2 Automatically Adding Sensors to PRTG via Command Line

This option allows you to add the discovered sensors to PRTG via our Monitoring Automation.

To automatically add the 3PAR sensors from command line, run the following command:

```
3parSensor.exe -u <PRTG user> -ip <PRTG ip> -p <PRTG passhash>
 -mode add -paramFile DisoveryParams.ini
```

Below are the required parameters:

- **PRTG user -** A user with enough permission to create devices and sensors in PRTG.
- **IP** – PRTG Core server IP address
- **PRTG passhash -** The user passhash used to authenticate the user via API. For more information check the PRTG Manual: Account Settings—My Account.
- **Mode**: Instructs the AutoMonX 3PAR sensor to add the sensors from the CSV file (11.1 3PAR Auto Discovery).

- **DiscoveryParams.ini** - Specifies the configuration file to be used.

Important: if you must use a different delimiter for each VLUN, this can be achieved via manual setting only. Please refer to section 9.9 3PAR VLUNs Sensor of this document for details on how to achieve this goal.
*it is possible to use automation and change the parameters manually later.

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12.3 3PAR Sensor - CLI options

Below is the summary of the monitoring command-line options of the sensor:

Sensor Name	PRTG Command
3Par Battery	3parSensor.cmd <3ParIP> battery "<3Par-CLI-Version>"
3Par Virtual Volume	3parSensor.cmd <3ParIP> vvol16 "<3Par-CLI-Version>"
3Par CPU	3parSensor.cmd <3ParIP> cpu "<3Par-CLI-Version>"
3Par CPG	3parSensor.cmd <3ParIP> cpg "<3Par-CLI-Version>"
3Par Cage	3parSensor.cmd <3ParIP> cage0 "<3Par-CLI-Version>"
3Par Cache	3parSensor.cmd <3ParIP> cache "<3Par-CLI-Version>"
3Par VLUN	AutoMonX_3ParDataProc.cmd <3ParIP> "vlun,5;GB2-VMFS6.81-NON-G-01;GB2ESX02;1:1:1,;" "<3Par-CLI-Version>"
3Par Quorum Status	3parSensor.cmd <3ParIP> qstatus "<3Par-CLI-Version>"
3Par Disk Utilization	3parSensor.cmd <3ParIP> disk "<3Par-CLI-Version>"
3Par Node 0 Sensor	3parSensor.cmd <3ParIP> node0 "<3Par-CLI-Version>"
3Par CPG Performance	AutoMonX_3ParDataProc.cmd <3ParIP> "cpg,<CPG-NAME>" "<3Par-CLI-Version>"
3Par Collector	AutoMonX_3ParCollector.cmd <3ParIP> "<3Par-CLI-Version>"

Important: The <3Par-CLI-Version> parameter is available in 3PAR Sensor Pack v2.7.4 and above.

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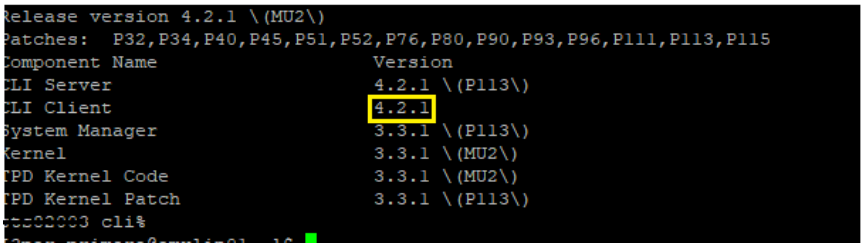
12.3.1 How to obtain the 3Par CLI version?

Please take the following easy steps to obtain the 3PAR CLI Version:

1. Connect to the 3PAR via SSH.
2. Execute “showversion” command
3. Copy the version number as seen below:



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13 Appendices

13.1 Appendix A – Port and Anti-Virus Requirements

The AutoMonX 3Par Sensor Pack requires the following ports to be open for it to function correctly. Please make sure that the local firewall / anti-virus and the external firewall are configured correctly to allow the sensor pack to function correctly.

Port	Purpose	Direction
TCP 22	Access to 3PAR/Primera devices	From PRTG Probe to 3Par/Primera devices
TCP 443 (or 80, 8080 depending on PRTG Core configuration)	Connect to PRTG Core server API	From PRTG Probe to PRTG Core
ICMP	Ping the 3Par devices	From PRTG Probe to 3Par/Primera devices

Make sure to exclude the following directories in the Anti-Virus / Anti Malware from on-access scanning:

<Program Files (x86)>\PRTG Network Monitor\Custom Sensors\EXEXML\

<ProgramData>\Paessler\PRTG Network Monitor\Logs (Sensors)

Or for PRTG versions 20.x and higher:

%ProgramData%\Paessler\PRTG Network Monitor\Logs\sensors

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13.2 Appendix B – Characters to use in VLUN monitoring settings

In order to reduce possible monitoring errors, it is recommended to use the default delimiter of semi-colon (;) as the delimiter in the 3Par Sensor pack configuration of VLUNs. The delimiter should not be part of the VLUN's name.

If the configuration convention in your organization doesn't allow to use semi-colons (;), you can use almost any other character as your delimiter with the following exceptions:

1. The delimiter is not part of the VLUNs' name.
2. The delimiter is not one of the following characters:
   = Equation sign
   # Hashtag
   ~ Tilde
   : Colon
   , Apostrophe

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