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SINEAX CAM

Parameterization of IEC61850 bus card

Version: 1.01

Creation Date: 15.02.2011
Release Date: 30.08.2011

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Revision History

Author	Department	Changes	Version	Date
R. Rölli	Camille Bauer / TMA		1.00	15.02.2011
R. Rölli	Camille Bauer / TMA	Correction of example on page 15	1.01	30.08.2011

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1. Introduction

1.1 Parameterization via web server

In the first part of this document the limited options of the web server in conjunction with the CAM are described. Only the *online* configuration via TCP/IP is shown and those functions described in more detail which serve for parameterization and commissioning of the CAM IEC61850 bus card. The *offline* parameterization by means of a local web server, called TeleConfig, is not shown.

By means of the web server all parameters may be set which allow the data exchange between measurement device and and IEC61850 bus card. Be aware, a subsequent changing of these data may lead to the situation that measurements are not correctly mapped to the bus card and therefore requests via IEC interface will not provide correct measurement results. Note the appropriate warnings in the following chapters.

1.2 Parameterization via ICD editor

In the second part some hints are given, what you have to consider when changing the ICD file by means of a manufacturer independent ICD editor resp. SCL tool. The consistency of the data must be maintained in any case. Otherwise the bus card may not start correctly.

1.3 Used terms

Term	Definition
IED	Intelligent Electronic Device. Common description for a device which supports the IEC61850 protocol.
ICD	IED Capability Description. This is the configuration file in XML format, which describes the complete functionality of an IEC61850 device. It is initially loaded in the work and may be modified by the user to fit his specific needs. The original file is also stored on the CD or may be downloaded via www.camillebauer.com.
CID	Configured IED Description. This file is an adapted version of the ICD file to fit the user needs for a specific IED. It has the same data format than the ICD.
Logical node	This is a substation function predefined by the standard, which has a number of measurements, possibly with user specific extensions.
Logical device	The sum of all logical nodes which are part of an IED.
Client	An IEC61850 control system or receiver device, which may receive data from the connected IEDs.
Server	The device, here the SINEAX CAM, which sends reports to the control system (client) or answers system requests.
Reporting	The SINEAX CAM supports an unbuffered reporting, by which spontaneously the complete information of a node is sent to the IEC61850 client when measurement data has changed.

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2. Web server

2.1 Starting the web server

To start the web server in the browser (Internet Explorer, Firefox etc.) just enter the IP address of the SINEAX CAM, e.g.:

http://192.168.57.216/

Hint: The setting of the network parameters IP address, subnet mask and gateway address can be performed by means of the CB-Manager software only using one of the local interfaces (Modbus or USB) od the device.

2.2 General information

The successful launch of the web server assumes that the device is accessible via network. This requires that the network settings of the PC allow a direct addressing of the IP address of the CAM or establishing a connection via gateway.

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2.3 Tree structure of the menu
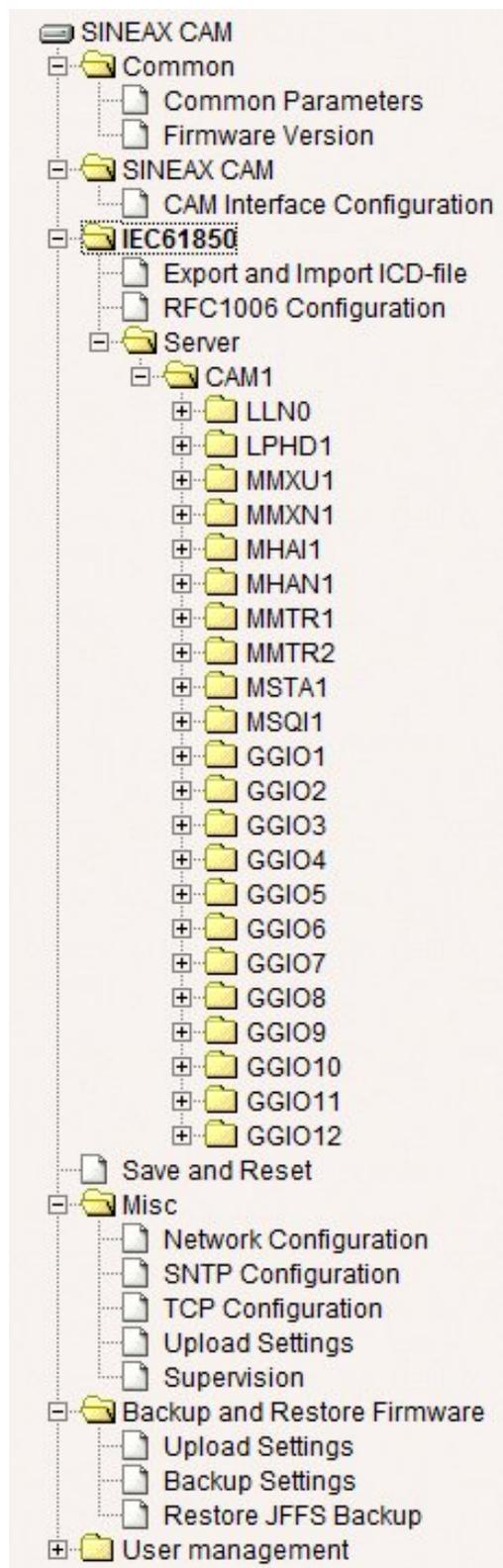
In the left part a tree structure is shown. By opening and selecting a tree item in the right part an associated parameter form is displayed, similar to the *Windows File Explorer*.

Most of the parameter forms have an „*Ok*" and a „*Cancel*" button.

- Using „*Ok*" possible changes will be accepted, but will be valid not until a subsequent reset. More precise information is given in the appropriate chapter below.

- „*Cancel*" discards all previous entries.

The description of the user management in the web server is not part of this document. You may use the existing user with full access rights.

Attention

The web server replaces other processes and should be operated only if there is no active IEC connection.

The tree structure corresponds to the **delivery status** of the device. If e.g. the node structure of the device is reduced to optimize the application to the requirements on-site, the displayed structure may differ from what is shown here.

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2.4 Parameters overview

Hint: All parameters which may be modified via web interface will be stored in the ICD file of the device. Thereby the name of the ICD file will not be changed. In order to make clear that the original file is no longer active, you have to store the active ICD file, rename it and then reload it to the device (see *2.4.4*).

2.4.1 Common parameters

⚠️ **Neither change any of the predefined parameters, nor confirm them by means of „Ok". The system may be damaged !**

2.4.2 Firmware version

The form "Firmware Version" shows information about the version of the application software. This information is accessible via web server of the IEC61850 bus card only.
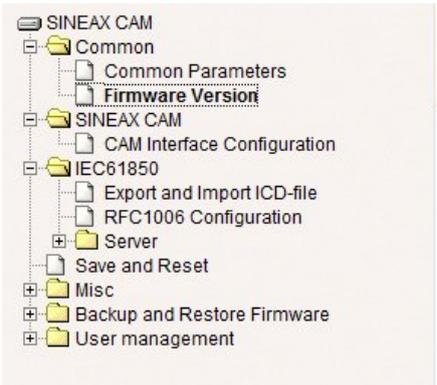
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2.4.3 CAM-Interface Configuration

These parameters control the data exchange of the interface of the CAM IEC61850 bus card to the CAM basic unit. They can't be changed by the user, because otherwise the data exchange would not work anymore.

2.4.4 Export and import of the ICD file

The export and import of the ICD file can be performed using the appropriate menu item. The ICD (**I**ED **C**apability **D**escription) describes the possible functionality of the device.

The delivery state of this file is part of the supplied software CD. Modifications to this file may be performed via web page or by experienced users using specialized configuration tools. After loading (Import) an improperly modified ICD file, the communication with the device may no longer be possible.

Hint: When exporting an ICD file the extension ".ICD" is replaces by ".XML". To use the file in an ICD editor the extension possibly has to be changed to ".ICD". To import an ICD file the extension „.ICD" is a must.

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2.4.5 RFC1006 configuration

RFC1006 is a protocol extension for the TCP protocol to allow a message oriented communication. The RFC1006 configuration is specially designed for the IEC61850 stack. The description of the parameters is not part of this document.

> The predefined values should be changed on request only!

2.4.6 IED-Server Configuration

In the "IED-Server Configuration" the IED name and its description can be changed.

> **Hint: The IED name has to be unique within the network.**

Only by means of an ICD or SCL configuration tool you can change the description of the instance as well, in the above example „CAM_PMon" instead of „CAM1". See also *3.1*.

Via Browser only the description text can be changed. The name of the instance is shown in gray and can't be modified.

> ⚠️ **IED name and instance description must be set that way, that the length of the concatenated string (here „CAM_PowerMonitorCAM_PMon") is not larger than 25 Characters !**

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2.4.7 Save and Reset

After changes you have to select „*Save configuration*" and „*Reset interface SINEAX CAM*" in the menu
„*Save and Reset*". By selecting „OK" the activation of the modification is initiated.

Hint: Depending on the modifications performed the activation may take a long time (10…20 min) !

2.4.8 Logical Node Configuration

Presently only the description of the logical nodes may be modified. Depending on the ICD file all nodes with parametrizable attributes will be shown. Some nodes may have multiple instances. So in MMTR1 high tariff meters are mapped and in MMTR2 low tariff meters, which requires an active tariff switching. GGIO1 up to GGIO12 map the data of possible analog or digital inputs 1 up to 12, which are optional and therefore possibly do not exist.

You have to activate modifications by means of „*Save and Reset*".

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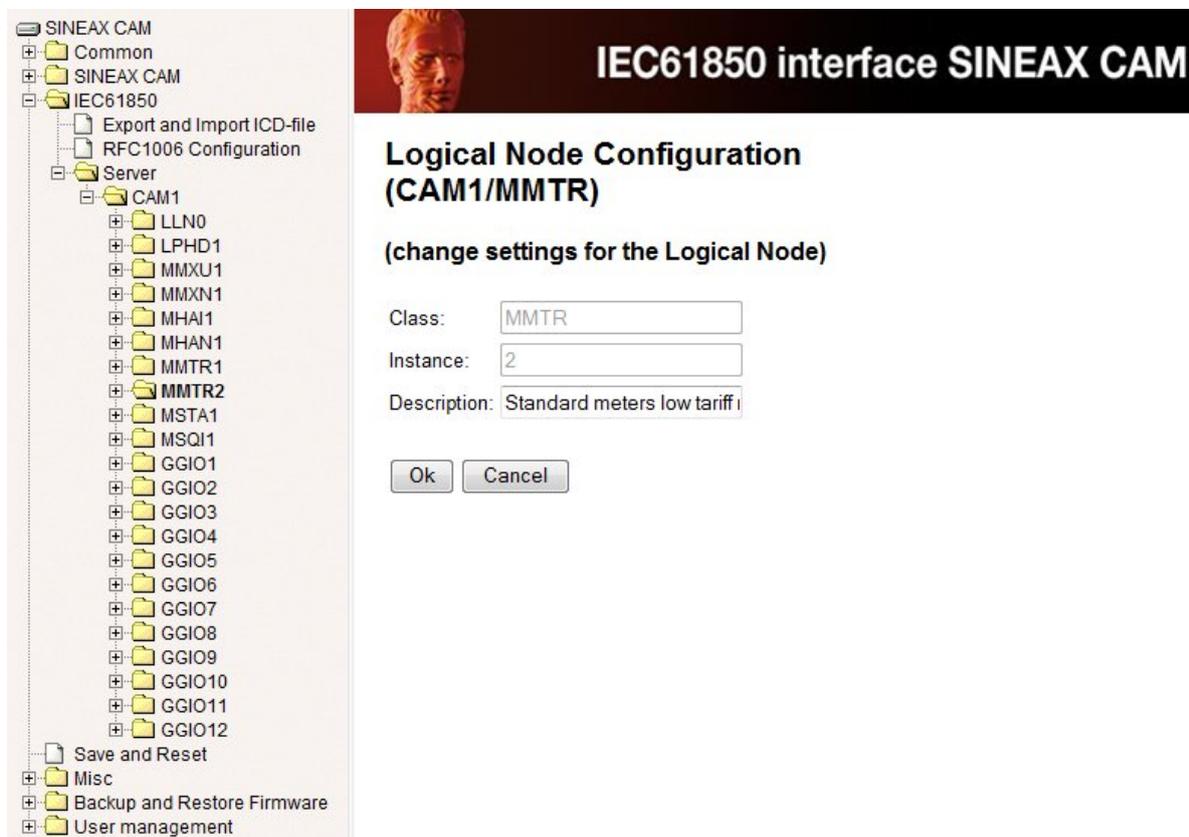
2.4.9   Data Attribute Configuration

The parametrizable data attributes are defined by the ICD file. These attributes have a private data approach of type „*sAddr*" in the area of the IED DOI. This data set defines e.g. if an IEC61850 state value / measurement or an IEC61850 control value has been defined.

⚠	**The data attributes almost exclusively define the data interface between CAM measurement device and IEC61850 bus card. A modification may cause that measurements are no longer correctly mapped to the IEC61850 interface!**

Dead band for Reporting

The only parameter which should be modified in the data attribute configuration is „**Dead-band**". This parameter defines the value a measured quantity has to change to initiate a corresponding reporting.

Each Report Control Block contains multiple measurement quantities whose changing is monitored in parallel. If at least one of these values leaves the dead band, a complete report containing all measurements is sent to the client.

The specification of the dead-band is performed in [%] and this value is applied to the instantaneous value of the measured quantity. As a result, the sensitivity decreases the greater the value is. If the measurement leaves the dead-band, the subsequent reported value will be used as the new reference value for the symmetrical dead band.

Modifications to the settings must be activated „*Save and Reset*" (see *2.4.7*).

The dead band can also be changed by means of an ICD configuration tool, see *3.4*

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Mode / Behavior / Health

For each node the status values Mode, Behavior and Health are available. These values will be inherited from the identical values of the Common Logical Nodes LLN0.

The corresponding data attribute values are fixed and should not be changed by the user.
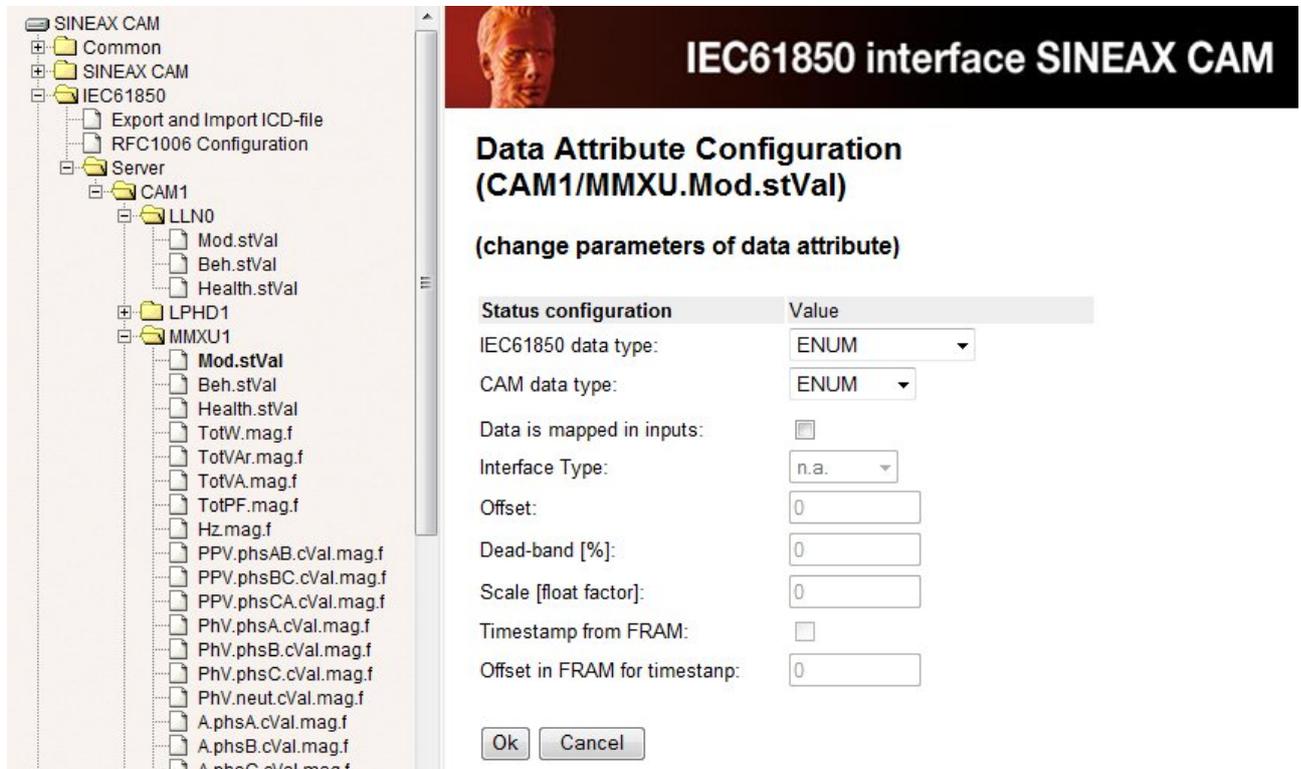
Object	Description
Mod	The Mode is not changeable. Initially the value is 5 (OFF) and when the communication is successfully established 1 (ON).
Beh	Initially the value for Behavior is 5 (OFF) and when the communication is successfully established 1 (ON).
Health	Initially the value for Health is 3 (BAD) and when the communication is successfully established 1 (GOOD).

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2.4.10 Miscellaneous

Network Configuration

The network configuration shows the success of reading the network parameters from the CAM basic unit during start-up. If addresses are displayed as „0.0.0.0" reading of the parameters from the CAM unit was not successful. Other addresses than „0.0.0.0" are valid addresses.

The values can only be set by means of the CB-Manager Software via one of the local interfaces. A modification via web interface or via ICD file is not possible.
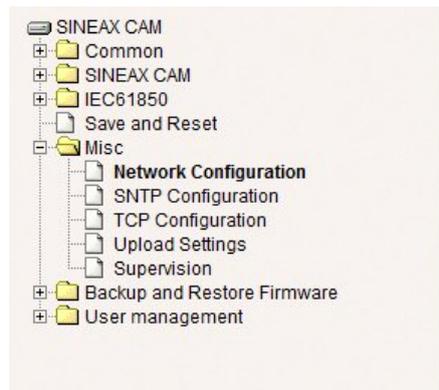
SNTP Configuration

The SNTP configuration controls the time synchronization via NTP time reference source (server). It is defined by means of an IP Address. At least a preferred time source must be specified, in addition a backup source can be defined which is used when the preferred time source fails. The values can only be set by means of the CB-Manager Software via one of the local interfaces. A modification via web interface or via ICD file is not possible.

If the IP address defines a real existing device in the network, the SNTP process assumes that the device with this IP address has a running NTP server process which can be accessed.
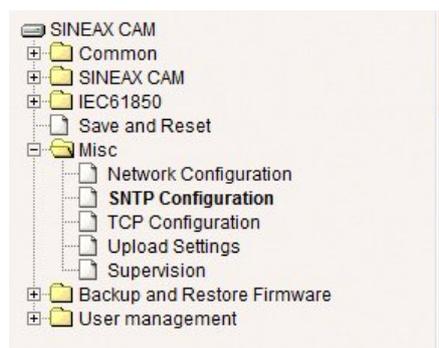
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TCP Configuration

Die TCP configuration allows the modifications of settings which are required for a fast detection of a TCP level disconnect. Of course this monitoring does work only if it is supported by the client.

When selecting „Ok" modifications will be directly written to the files „*tcp_keepalive_*.meta*" and are valid after a restart.

Parameter	Default	Description
Keep alive time	10s	If during this time there is no communication between client and server, the device sends a TCP keep-alive request to the client and expects to receive an acknowledge from it that the connection is still active.
Keep alive probes	4	The number „Keep alive probes" (default: 4) defines how many unacknowledged keep-alive requests are accepted until the connection is considered "dead" and will be closed by server initiative.
Keep alive interval	2s	The repetition of unacknowledged keep-alive requests is performed separated by the „Keep alive interval".

Upload Settings / Supervision

These functions should be used on manufacturer request only.

2.4.11 Backup and Restore Firmware

These functions should be used on manufacturer request only.

2.4.12 User management

The description of the user management via web server is not part of this document. You can use the existing user with all access rights.

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3. Modification of the ICD using a IEC61850 configuration tool

The images used in this chapter have been created using the Substation Configuration Tool of the company H&S (Hard & Software Technology GmbH), Dortmund (Germany).

3.1   Modifying IED name and device instance description

The default of the IED name corresponds to the ICD file name (CAM.V2.10.090519). It can be changed as desired. The changing can be performed via web page of the device as well (see *2.4.6*).

The name of the Device instance (default: CAM1) can be modified by changing the name of the instance as desired. This modification is applied to all data objects, except the Report Control Blocks. There is no way to change the description via web interface.

For all Report Control Blocks the device instance has to be changed **manually** by overwriting the Report-ID, because this is not done automatically. These are one to five modifications, depending on the node.

> ⚠ **IED name and instance description must be set that way, that the length of the concatenated string (here „ Substation.North.Feeder_1 ") is not larger than 25 Characters !**

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3.2 Removing node instances
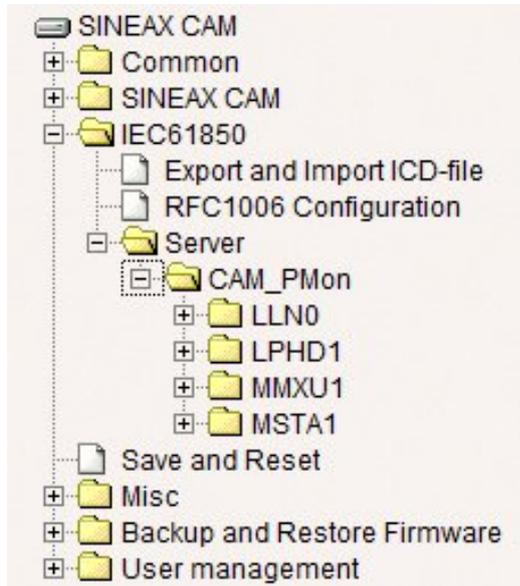
A reduction of the functionality of the device to the functions really needed has a few advantages:

- Reduction of the server start-up time

- Reduction of complexity

In the example on the left the server has been reduced to the nodes MMXU and MSTA. LLN0 and LPHD are not allowed to be removed, because they contain data which are valid for all nodes.

Nodes can be removed very easy using appropriate tools, normally one click per node is sufficient. Normally the nodes are not really removed from the ICD file but the instruction to build the corresponding instances during start-up.

Hint: There is no way to remove nodes via web server of the device.

3.3 Removing measurements from node instances

The SINEAX CAM sends, if activated, data reports on a regular base to the IEC61850 client. The transmission occurs spontaneously, if at least one of the measurements of the appropriate nodes has changed a definable percentage value. Depending on the configuration of the measurement functionality of the CAM this may occur after each cycle of the system frequency, in addition for each individual node monitored. This can produce large amount of data, which possibly cannot be processed by the control system. There are two methods for limiting the data volume.

A) Extending the dead bands for the Reporting (see **3.4**)

B) Reduction of data reports by removing quantities from the nodes

For reducing a data report you just have to delete the undesired values from the appropriate nodes. As for deleting complete nodes, deleting measurements will normally remove the instruction to build the associated measurement instance only.
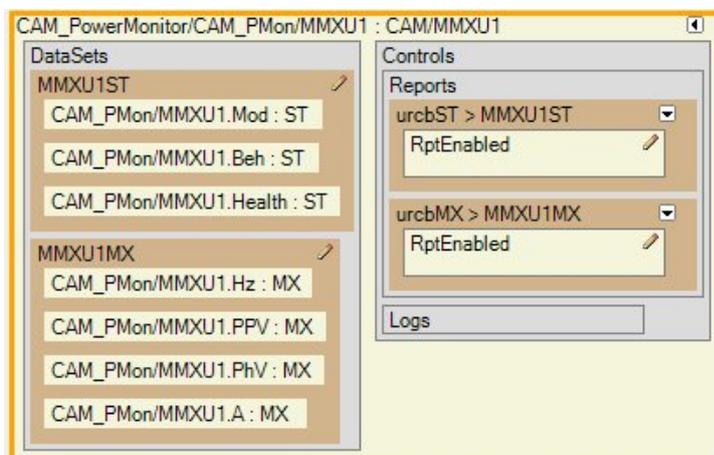
Reduced MMXU node, with remaining measurements voltages, currents and frequency only

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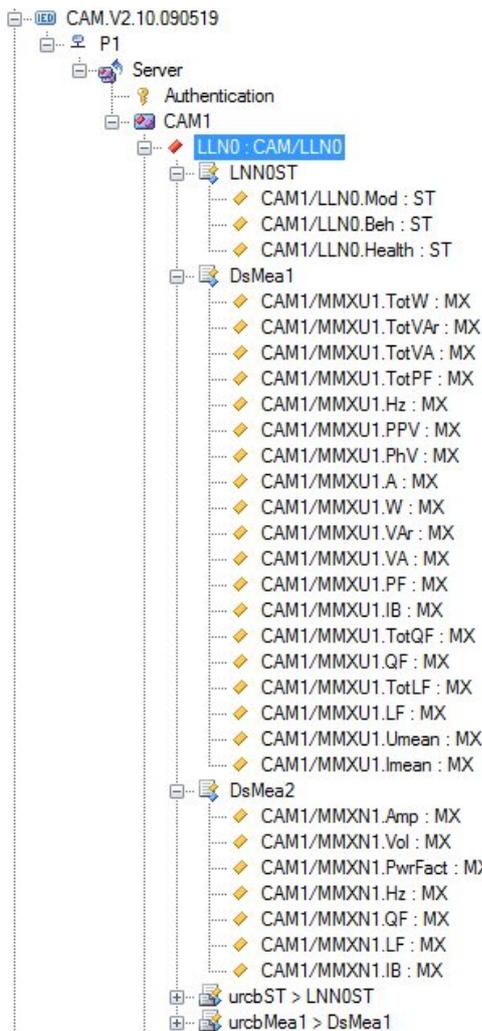
The **node LLN0** contains for **test purposes** data sets of the nodes MMXN and MMXU. If quantities of MMXN / MMXU or even the complete node is deleted, these quantities must be removed from the data sets DSMea1 and/or DsMeas2 as well.

For the above example the node LLN0 results as follows:

3.4 Setting dead bands for the Reporting

The dead band for the reporting can be modified via we b interface as well. As described in *2.4.9*, the dead band can be selected for each measurement individually. In the following example for V12 you can see which parameter contains the appropriate information (here 0.1%).