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# Conversions (recalculations) in SAEAUT SNMP OPC server

## Configuring of recalculations and dead band management

### Introduction

When transferring data between an OPC Server and OPC Client, different **recalculations and data conversions** can be provided on server side. It is also possible to affect amount of data exchanged between client and server using **dead band management**. Programmer API for some conversions is defined within OPC DA2.05A and OPC DA3.0 specifications and must be implemented in OPC servers compliant to the specifications. However, **dialog boxes** for configuring of conversions and recalculations **may be OPC servers and OPC client specific**. Because of the variety different possible conversions, it is useful **to explain meaning of different settings in the dialog boxes within SAEAUT SNMP OPC Server**. Some conversions (recalculations) are configured for OPC server, some for OPC client and some for both. There are also conversions which need not be configured. Client can request a data item from server in another then canonical data type and server can either provide the type conversion or inform client that the conversion is not possible.

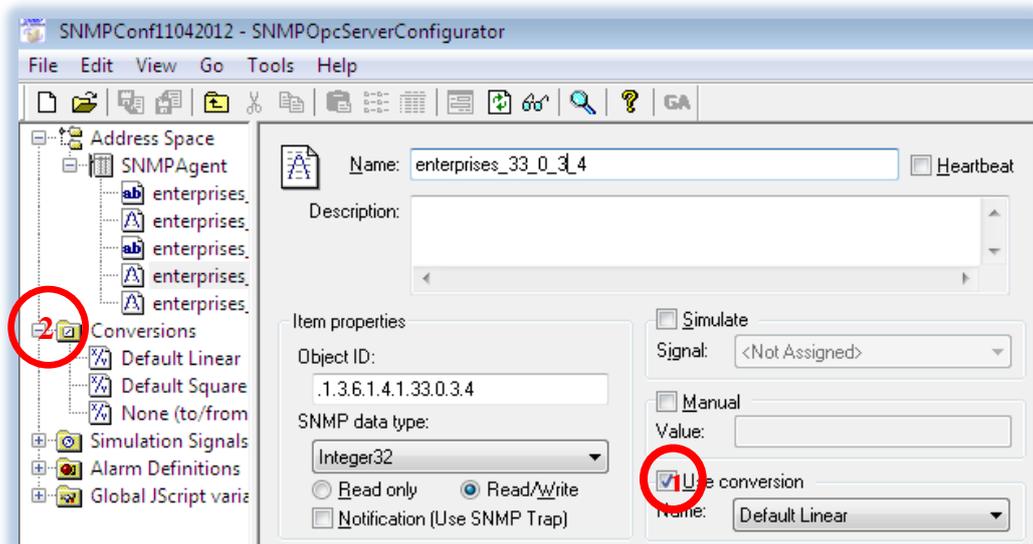


Figure 1 Chosing of a conversion type for an SNMP variable

### Using of the conversions dialog box

To apply a conversion or recalculation for an SNMP item in SAEAUT SNMP OPC Server, the check box “Use conversion” (Figure 1 - 1) must be checked and within list box bellow a

type of conversion has to be chosen either from pre-defined ones (Figure 1-2) or you can create a new type of conversion first. Dialog box for defining of the conversion/recalculation type is in the Figure 2. Using it, following operations or combinations of operations can be defined and parameterised:

- Dead band management
- Linear or Square root recalculation
- Clamping of the value

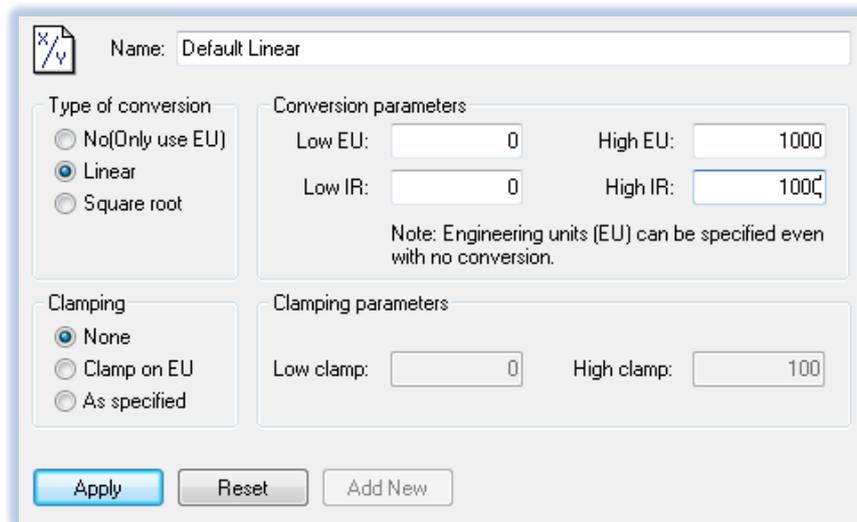
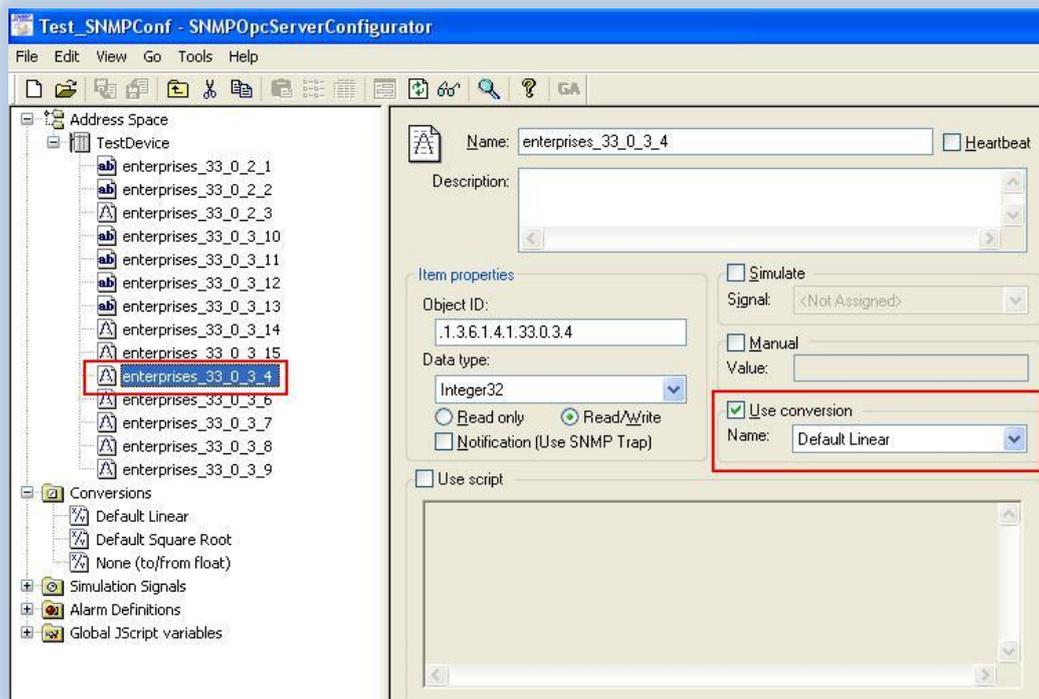


Figure 2 Dialog box for conversion settings

## Dead band management

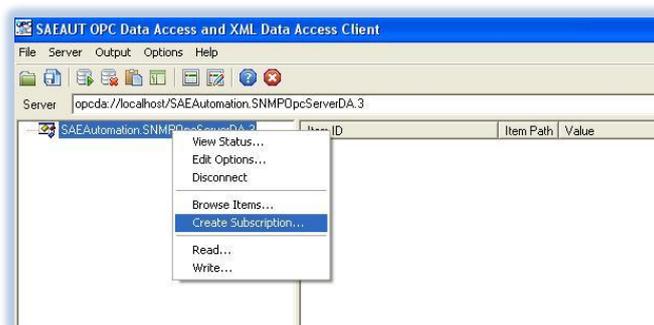
For the dead band functionality, the role of OPC client and OPC server are reversed. The client creates OPCGroup and OPCItem objects with corresponding parameter values (*PercentDeadBand*, *UpdateRate*, *ActiveState*) which enable an automatic data transfer, when subscription is enabled on OPC client. The value of **PercentDeadBand** is parameterised in OPC client. Value changes in OPC server are transferred to the client only if the difference between old and new value are bigger than defined by *PercentDeadBand*. However, as can be seen from the name the value of *PercentDeadBand*, it is given in %. It means that there must be a base from which the value of the change is counted. This value is given as difference in **High EU – Low EU** which are parameterized for OPC server (Figure 2). The meaning of **High EU and Low EU** is the engineering units used on the OPC client side. These are standard properties for OPC items defined in OPC DA3.0 specification only for analog data under ID 102 and 103.

To test the functionality of the dead band settings, the SAEAUT OPC DA and XML DA Client and SAEAUT SNMP Agent delivered within SAEAUT SNMP OPC Server installation package for test purposes can be used. After installing SAEAUT SNMP Agent and starting the SNMP service on your computer, you can create new configuration by on-line scanning of SNMP provided by SAEAUT SNMP Agent. There is SNMP variable *enterprises\_33\_0\_3\_4*



**Figure 3 Testing configuration**

which can be read or written either by OPC client or using possibility to communicate with an SNMP agent using SNMP commands SET and GET from the configurator (Figure 6). Let suppose that values has been parameterised in the configurator following way *High EU* = 1000, *Low EU* = 0 and the *PercentDeadBand* has been set in the OPC client for an OPC Group to the value 10 (Figure 4, Figure 5)



**Figure 4 Creating of group (subscription) in OPC client**

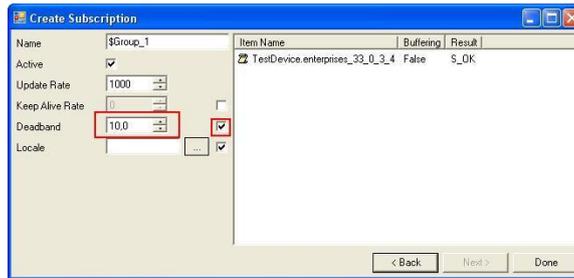


Figure 5 Setting the deadband in OPC client

The value in device must be changed minimally about  $(1000 - 0) \times 10\% = 100$  to transfer the new value from OPC server to the OPC client.

Let suppose that initial value on device has been set to 100. Then, we change it to the value 199. Because  $199 - 100 = 99 < 100$  none change in the OPC client will be seen. But, after changing the value in SNMP agent to 201, the change will be visible also in the OPC client.

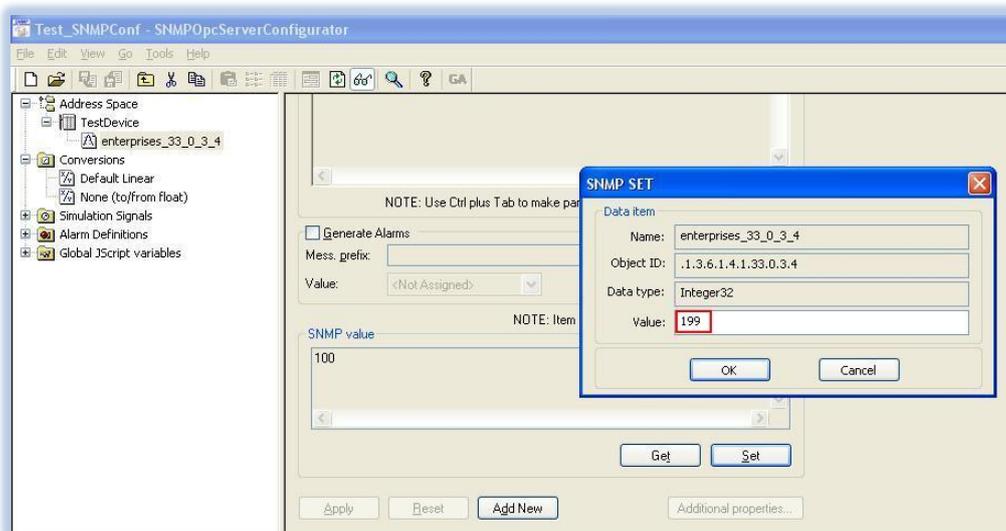


Figure 6 Using SNMP SET command from configurator

## Linear and Square root recalculations

Values read or written by OPC client can be recalculated from values read or written by OPC by using linear or square root recalculations. To parameterise them, except of engineering units used for dead band calculation, also instrument range values **Low IR** and **High IR** representing values range **on device** will be used. These are standard properties for OPC items defined in OPC DA3.0 specification only for analog data under ID 105 and 104.

### Linear conversion

- Device to client:  

$$\text{ClientValue} = \frac{\text{HighEU} - \text{LowEU}}{\text{HighIR} - \text{LowIR}} \times (\text{DeviceValue} - \text{LowIR}) + \text{LowEU}$$
- Client to device:

$$\text{DeviceValue} = \frac{\text{HighIR} - \text{LowIR}}{\text{HighEU} - \text{LowEU}} \times (\text{ClientValue} - \text{LowEU}) + \text{LowIR}$$

## Square conversion

- Device to client:

$$\text{ClientValue} = \sqrt{\frac{\text{DeviceValue} - \text{LowIR}}{\text{HighIR} - \text{LowIR}}} \times (\text{HighEU} - \text{LowEU}) + \text{LowEU}$$

- Client to device:

$$\text{DeviceValue} = \left( \frac{\text{ClientValue} - \text{LowEU}}{\text{HighEU} - \text{LowEU}} \right)^2 \times (\text{HighIR} - \text{LowIR}) + \text{LowIR}$$

## Clamping of client values

Clamping can be defined only for reading of values from OPC server by OPC client. Clamping values can be:

- identical with engineering units using **High EU, Low EU** values (radio-button *Clamp on EU* in Figure 2)
- or independent using values **Low clamp** and **High clamp** (radio-button *As specified* in Figure 2).
- Clamping can be switched off (radio-button *none* in Figure 2)

## Combination of dead band and recalculation settings

The dead band, linear and square root recalculations and clamping can be combined – it means none or all of them can be applied in the same time. The clamping is applied on the value recalculated by linear (or square root) recalculations if both are applied in the same time. Dead band does not change value of the OPC item transferred from OPC server to OPC client. It affects only if the value will be updated on OPC client or not.