SIEMENS

SIMATIC

Process Control System PCS 7
PowerControl Library Objects

Function Manual

08/2021
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Security information 1

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

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2 Introduction

The PCS 7 PowerControl library provides a basic block of technological function blocks which are largely independent of the IED type:

- Processing of counters
- Processing of measured values
- Processing of alarms
- Processing of setpoints
- Processing of commands

Technological processing functions such as these are implemented in the PCS 7 PowerControl server:

- Raw value adjustment
- Limit monitoring & alarming
- Interval calculation
- Forcing & value substitution
- Command interlocking
- Command timeout supervision

Therefore, these function blocks usually expect only data point objects provided by the IED's and can also be used with IED's that have limited capabilities for implementing technological functions.

Function blocks are also provided to integrate the following series of Siprotec devices:

- Siprotec-7UT6
- Siprotec-7SJ6
- Siprotec-7UM62
- PC_FEEDER
- PC_TRAFO
- PC_SYNC
- PC_LINE

In addition to the technological function blocks the PCS 7 PowerControl library also offers a diagnostics object for controlling the communication function with IEDs.

A library object (also called a "Type") consists of the following parts:

- A description of a tag structure that is provided with each instance of the type.
  The tag structure consists of input tags and output tags.
  Input tags may be external input tags providing process information from the IED and internal input tags that contain configuration information.
  Output tags may also be external - for sending information to the IED - or internal for maintaining the result of calculations.
- A list of messages (sometimes also referred to as alarms) that can be triggered by the object, where each message has the following set of attributes:
  - Message Number (Symbolic)
  - Message Priority
  - Message Class - Determining alarm & acknowledge behavior
  - Message Type - Determining visual representation of alarm line
  - Message Text - A generic alarm text that will form the individual alarm text if combined with the description of the object instance
  - Configuration state - Either enabled or disabled

  Note

  Some, but not all of these attributes can be changed per object instance.
- A list of graphics attributes that determine the visual representation of the object instance:
  - Symbol Name – Name of the WinCC graphics symbol to be used
  - Symbol File – Reference to the symbol container
  - Comment – The description text for the object instance that will be shown together with the symbol
- A list of operation attributes that define the instance-specific parameters for the technological function. Typically, these attributes correspond with internal input tags used for holding the configuration information.
- A list of output tags available for archiving (logged tags).
  Archiving may be switched on or off and the archiving frequency and archive location (short term or long term archive) may be selected for each object instance.
- A set of symbols – these typically are WinCC user defined objects that reside in a symbol file.
  The "Symbol Name" attribute defines which particular symbol out of the symbol set shall be used for a particular object instance.
  The symbols also contain a definition of the dynamic behavior (color changes etc.), based on the values of the tags in the tag structure.
- Faceplate - this defines the pop-up window that will be shown to the operator when clicking on the symbol in a process picture. The faceplate offers different task-related views on the instance that can be selected from a drop down list.
  Examples for views are: Standard view, Message view, Curve view, Parameter view.

You can find detailed information on working with the PCS 7 Operator Station in the manual *SIMATIC Process Control System PCS 7 V9.1 PCS 7 OS Process Control Operating Instructions*.

You can find detailed information on configuring the PCS 7 Operator Station (for example for configuring the authorization levels) in the manual *SIMATIC Process Control System PCS 7 V9.1 Operator Station Configuration Manual*.

For details concerning the general use of faceplates in a PCS 7 Operator Station, refer to *SIMATIC PCS 7 Faceplates Programming and Operating Manual*.

For the technological objects two sets of faceplates are provided, PCS 7 Classic style and APL style. The APL style faceplate features are introduced in Appendix A of this document.

Technological Objects 3

3.1 Analog Value Library Objects

3.1.1 Analog Value

Analog value types are provided that allows for optional scaling and alarming.

See also

Analog Value (Page 15)

Scaled Analog Value (Page 23)

Simple Analog Value (Page 28)

3.1.2 Analog Value

3.1.2.1 Analog Value Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item (configurable as *Operation* parameter in DBA); Item available for **Archive**

Abbrevia-tion	Name	Type	Data Type	De-fault Val-ue	Opera-tor Visible	Description
#comment	Comment	Int	String	-	Config	Description of the object instance
#areaname	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on Plant View placement)
RV	RTU Value	Ext	Float	-	-	Raw value from RTU
SRLL	Scaling lower range limit	Int	Float	0	Config	Lower range limit for raw value
SRUL	Scaling upper range limit	Int	Float	1	Config	Upper range limit for raw value
PLL	Physical value lower range limit	Int	Float	0	Config	Lower range limit in physical units
PUL	Physical value up-per range limit	Int	Float	1	Config	Upper range limit in physical units
H	High Limit	Int	Float	0	Config	Warning high limit

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
HH	High High Limit	Int	Float	0	Config	Alarm high limit
L	Low Limit	Int	Float	0	Config	Warning low limit
LL	Low Low Limit	Int	Float	0	Config	Alarm low limit
HY	Hysteresis	Int	Float	0	Config	Alarm hysteresis - 0 to 100%, interpreted as percent of range
HY_ZERO	Zero Value Hysteresis	Int	Float	0	Config	Zero value hysteresis - PV values below this value are set to 0

3.1.2.2 Analog Value Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PV	Present Value	Int	Float	-	Output, Archive	Analog value's current value.
ALM	Alarm	Int	Word	-	Output	Aggregate alarm

3.1.2.3 Analog Value Description

The Analog Value provides for scaling and, optionally, limit-check alarming of an analog quantity.

Scaling is done to compute a PV via linear interpolation of the RV based on (SRLL,PLL) and (SRUL,PUL). If the input value is not within the scale range (SRLL - SRUL), the scaled value is extrapolated, but a high or low range violation alarm is generated.

The following messages are defined for the Analog Value object type.

Calculation of the Quality Code

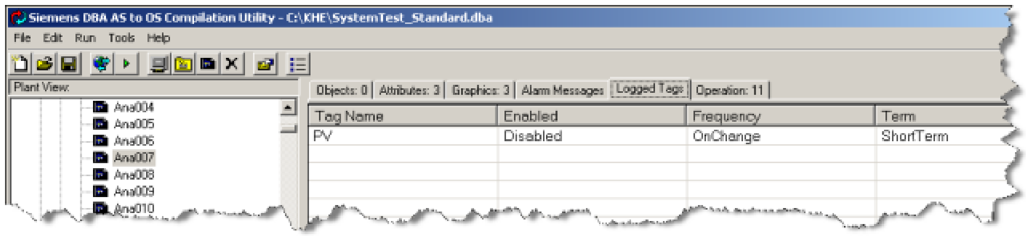
For all external tags, the quality code is provided by the Channel DLL. For all internal configuration tags (inputs), by default the quality code is always "GOOD". For all internal derived tags (outputs), by default the quality code is the same as for RV.

3.1.2.4 Analog Value Archiving

The following Analog Value tags are preconfigured as available for archiving.

Tag Name	Archiving Behavior
PV	Spontaneous archiving of scaled process data on value change

Tag logging is disabled by default, but can be enabled in DBA. Select an Analog Value object instance from the Plant View and select the "Tag Logging" tab of the Attribute Edit window in the upper right hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.



3.1.2.5 Analog Value Alarming

All alarms are integrated into the ALM tag, with one bit representing each alarm condition. Alarm limits are defined in separate tags.

The range limits are checked for validity. The scaling and physical lower limits must be less than the corresponding upper limits. When incorrect, a configuration error alarm is activated and the measured value is not calculated. The alarm is reset when a new value is received and the range limits are valid.

When the input value (RV) is outside the range limits, a High Range Alarm or Low Range Alarm is triggered, but PV is calculated.

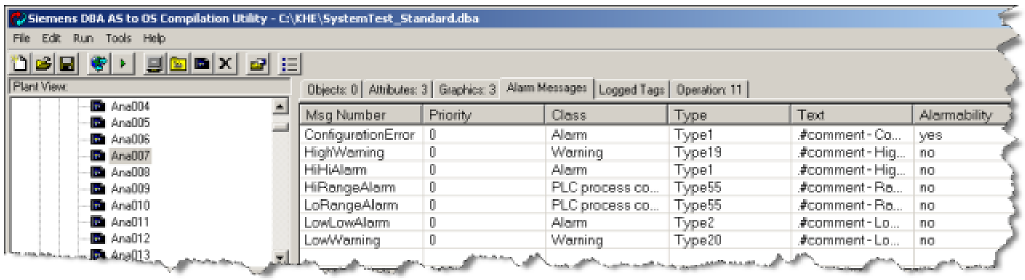
The PV is checked against High High Alarm / High Warning / Low Warning / Low Low Alarm limits. A violation is alarmed. The going condition is only detected if PV leaves the "alarm zone" by more than HY.

All of these alarm conditions are summarized in the table below.

Name	Class	Type	Configured by Default	Condition Description
High High Alarm	Alarm	Alarm Hgh	Yes	PV > HH
High Warning	Warning	Warning High	Yes	PV > H
Low Warning	Warning	Warning Low	Yes	PV < L
Low Low Alarm	Alarm	Alarm Low	Yes	PV < LL
High Range Alarm	Process Control System	Error	Yes	RV > SRUL
Low Range Alarm	Process Control System	Error	Yes	RV < SRLL
Configuration Error	Process Control System	Error	Yes	SRUL <= SRLL

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an Analog Value object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The **Alarmability** column of this window can be used to permanently enable or disable any alarm.

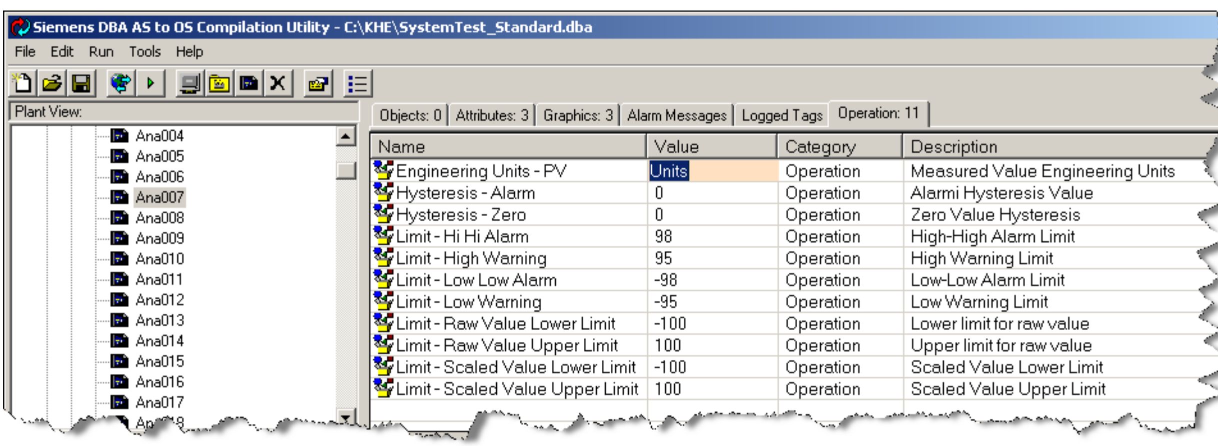


3.1.2.6 Analog Value Operational Parameters

Configuring operational characteristics

The operational characteristics of an Analog Value object instance can be configured in DBA.

1. Select an Analog Value object instance from the Plant View.
2. Select the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Engineering Units - PV

The text that will be used to identify the PV value of the Analog Value on HMI pictures. Free form text entry is allowed.

Hysteresis - Alarm

A hysteresis value that is used for returning from alarm. For any of the 4 Analog Value limit alarms (High Alarm, High Warning, Low Warning, Low Alarm), the alarm condition is reported as "gone" only when the PV value crosses the alarm limit by a percentage of the complete range that is greater this hysteresis value. This can be useful for eliminating nuisance alarms when a PV has a tendency to fluctuate by a small amount around an alarm limit. Any floating point value between 0 and 100 can be configured.

Hysteresis - Zero

If, after scaling, the absolute value of PV is smaller than the zero value hysteresis, PV is set to zero. Any floating point value can be configured.

Limit –Hi Hi Alarm

When the PV exceeds this value, a High Alarm will be generated. Any floating point value can be configured.

Limit –Hi Warning

When the PV exceeds this value, a High Warning will be generated. Any floating point value can be configured.

Limit – Lo Lo Alarm

When the PV becomes lower than this value, a Low Alarm will be generated. Any floating point value can be configured.

Limit – Lo Warning

When the PV becomes lower than this value, a Low Warning will be generated. Any floating point value can be configured.

Limit – Raw Value Lower Limit

Represents the lower limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Upper Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes lower than this value, a Low Range Alarm will be generated. Any floating point value can be configured. (If the *Raw Value Lower Limit* is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Raw Value Upper Limit

Represents the upper limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Lower Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes higher than this value, a High Range Alarm will be generated. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Scaled Value Lower Limit

Represents the lower limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Upper Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

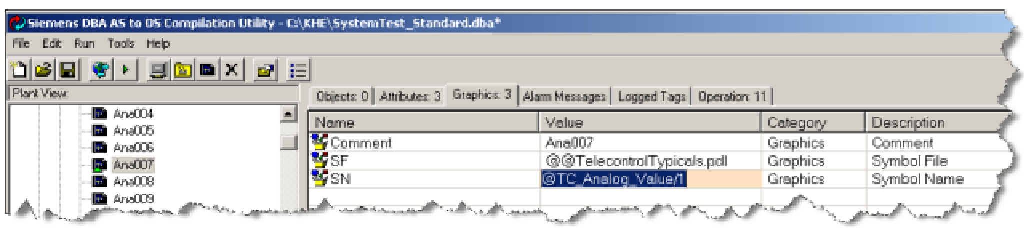
Limit – Scaled Value Upper Limit

Represents the upper limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Lower Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

3.1.2.7 Analog Value Symbol Display

One Analog Value symbol is provided by default. This shows the current PV and any active alarm conditions.

While a single symbol is provided, the Graphics Designer can be used to create additional Analog Value symbols. If new symbols are created, the symbol to be used for any instance of an Analog Value object can be changed using DBA. To change these, in DBA, select an Analog Value object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.1.2.8 Analog Value Faceplate

The Analog Value faceplate has four views: standard, limits, alarm, and trend.

Level 6 permissions are required to modify values on the limits pane.

Color is used to show the quality of PV. The background color is green when quality is good. Otherwise it is gray.

Standard view

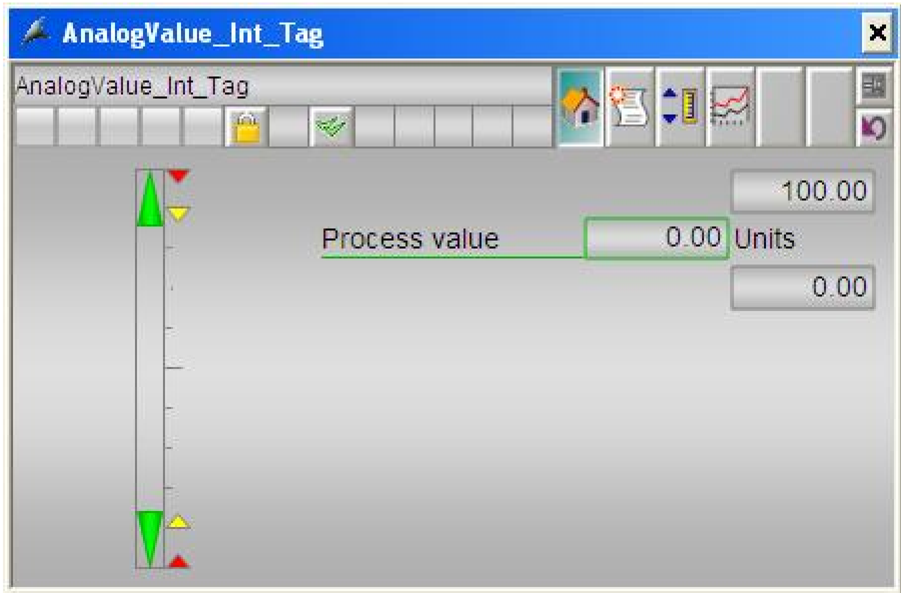


Table 3-1 Indicators

Indicators	Meaning	Tag(s)	Colors
PV	Process Value	PV	Green = Good Quality Yellow = Substitute Quality Gray = Bad Quality
Left Value Bar	Process Value	PV	Green
Right Value Bar	Limits	HH, H, L, LL	HH and LL limits are red H and L limits are yellow

Note

Color under the PV

The colored line under the PV indicates the color of the pen used in the trend pane.

Limits view

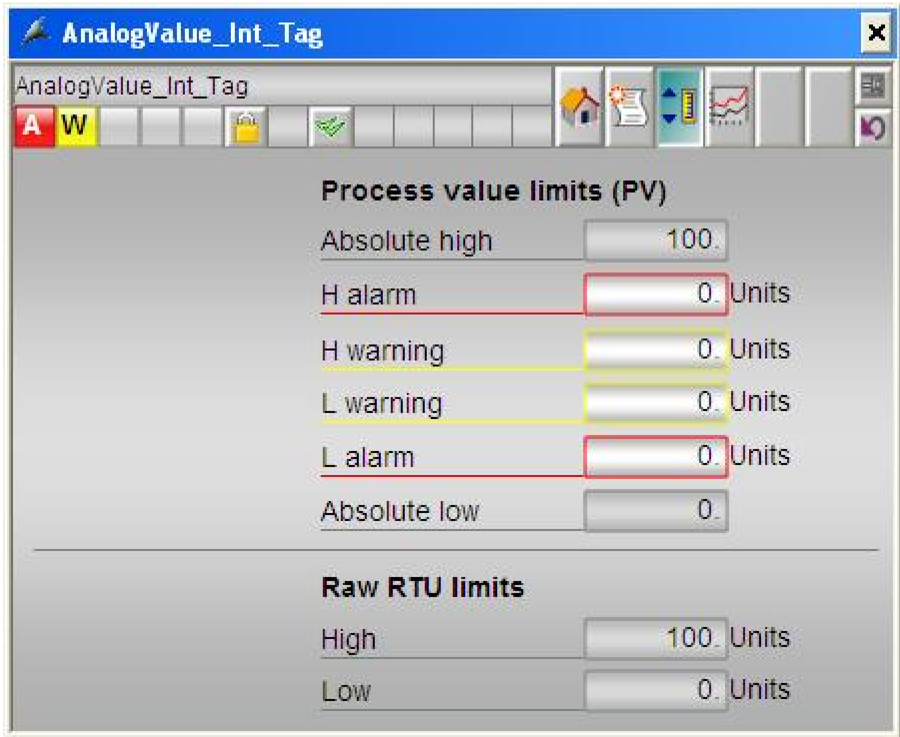


Table 3-2 Data Entry/Indications

Entry field	Actions	Description
Absolute H	N/A	Shows the Scaled Value Upper Limit (PUL)
Current HH	HH=entered value	Allows entry of the value which is used in generating a High Alarm when PV > HH
Current H	H=entered value	Allows entry of the value which is used in generating a High Warning when PV > H
Current L	L=entered value	Allows entry of the value which is used in generating a Low Warning when PV < L
Current LL	LL=entered value	Allows entry of the value which is used in generating a Low Alarm when PV < LL
Absolute L	N/A	Shows the Scaled Value Lower Limit (PLL)
Raw RTU Limit High	N/A	Shows the Raw RTU Upper Limit (SRUL)
Raw RTU Limit Low	N/A	Shows the Raw RTU Lower Limit (SRLL)

Note

Permission levels

Level 6 permissions are required to enter values.

For Trend and message views see general description.
The value trended is the PV (process value).

3.1.3 Scaled Analog Value

3.1.3.1 Scaled Analog Value Inputs

The Scaled Analog Value type allows for the display and entry of analog data, which may be scaled.

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RF	RTU Value	Ext	Float	-	-	Raw feedback value from RTU
SRLL	Scaling lower range limit	Int	Float	0	Config	Lower range limit for raw value
SRUL	Scaling upper range limit	Int	Float	1	Config	Upper range limit for raw value
PLL	Physical value lower range limit	Int	Float	0	Config	Lower range limit in physical units
PUL	Physical value upper range limit	Int	Float	1	Config	Upper range limit in physical units
Units	Measurement Units	Int	String	-	Config	Measurement units of the setpoint

3.1.3.2 Scaled Analog Value Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RSP	Raw setpoint	Ext	Float	-	-	Raw setpoint output to RTU (may address the same data area in the RTU than RF)
F	Feedback	Int	Float	-	Output	Scaled Feedback value from RTU, based on RV
RA	Range violation indication	Int	Binary	-	Output	The input value was not within (SRLL,SRUL)

3.1.3.3 Scaled Analog Value Description

The Scaled Measured Value type gets a value from the RTU and scales it before it is displayed. There are no alarms associated. If the configured range is invalid, an indicator with the text "RA" is displayed.

Scaling of operator input value

The operator input value TSP is scaled into RSP after data entry from physical units into an RTU value based on (PLL, SRLL) and (PUL, SRUL). Invalid (out of range) operator input is rejected by the analog input box. The RSP value is then sent to the RTU.

Feedback

The RV feedback value received from the RTU is scaled into F via linear interpolation based on (SRLL, PLL) and (SRUL, PUL).

If the feedback value is not within the scale range (SRLL – SRUL), the scaled value is extrapolated, but the range violation indication RA is set.

Calculation of the quality code

The quality code from the raw value (provided by the driver) is propagated to the F output. In addition, if the RF input value is not within the scale range (SRLL – SRUL), the QC of the PV output is set to "BAD" with substatus "Configuration Error".

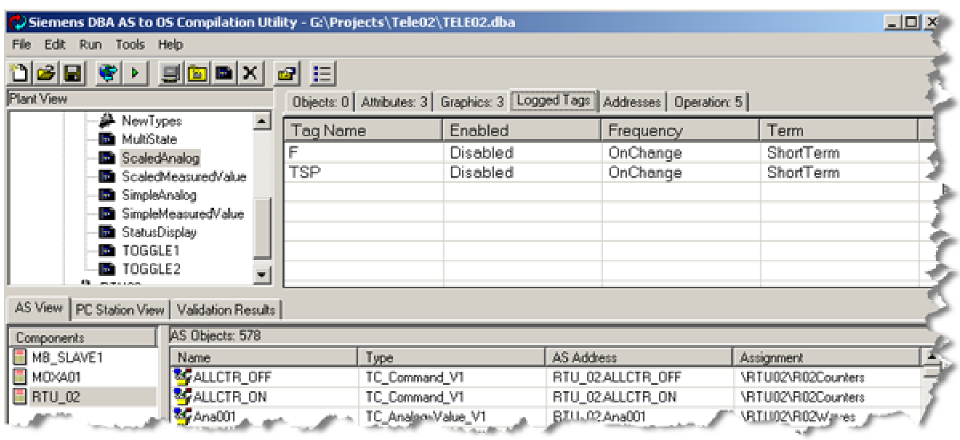
3.1.3.4 Scaled Analog Value Archiving

Archiving

The following values are preconfigured as available for archiving.

Tag	Archiving behavior
TSP	spontaneous archiving of target setpoint value on value change
F	spontaneous archiving of feedback value on value change

Tag logging is disabled by default, but can be enabled in DBA. Select an Scaled Analog Value object instance from the Plant View and select the "Tag Logging" tab of the Attribute Edit window in the upper right-hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.

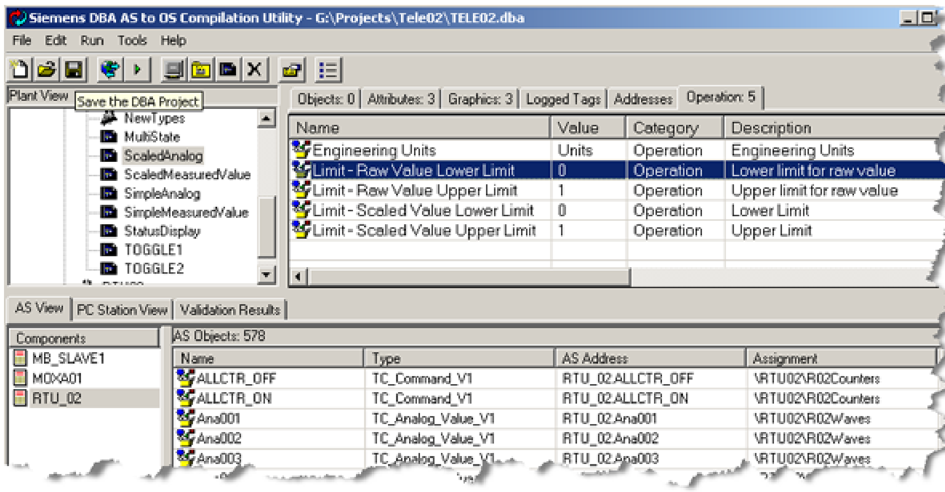


3.1.3.5 Scaled Analog Value Operational Parameters

Configurable operational characteristics

The operational characteristics of a Scaled Analog Value object instance can be configured in DBA.

1. Select a Scaled Analog Value object instance from the Plant View.
2. Select the Operations tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Engineering Units - PV

The text used to identify the PV value of the Scaled Analog Value on HMI pictures. Free form text entry is allowed.

Limit – Raw Value Lower Limit

Represents the lower limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Upper Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes lower than this value, a range error indicator is shown on any symbol that is showing the value. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, the range error indicator is also shown.)

Limit – Raw Value Upper Limit

Represents the upper limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Lower Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes greater than this value, a range error indicator will be shown on any symbol that is showing the value. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, the range error indicator will also be shown.)

Limit – Scaled Value Lower Limit

Represents the lower limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Upper Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a range error indicator will be displayed on any symbol showing the value.)

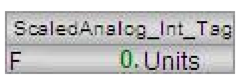
Limit – Scaled Value Upper Limit

Represents the upper limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Lower Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a range error indicator will be displayed on any symbol showing the value.)

3.1.3.6 Scaled Analog Valuel Display

Default symbol

One Scaled Analog Value symbol is provided by default. This shows the current PV, engineering units, and an indicator ("RA") that indicates when there is a range error (range configuration or value out of configured range).



Although a single symbol is provided, the Graphics Designer can be used to create additional Scaled Analog Value symbols. If new symbols are created, the symbol to be used for any instance of an Analog Value object can be changed using DBA. To change these, in DBA, select a Scaled Analog Value object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.

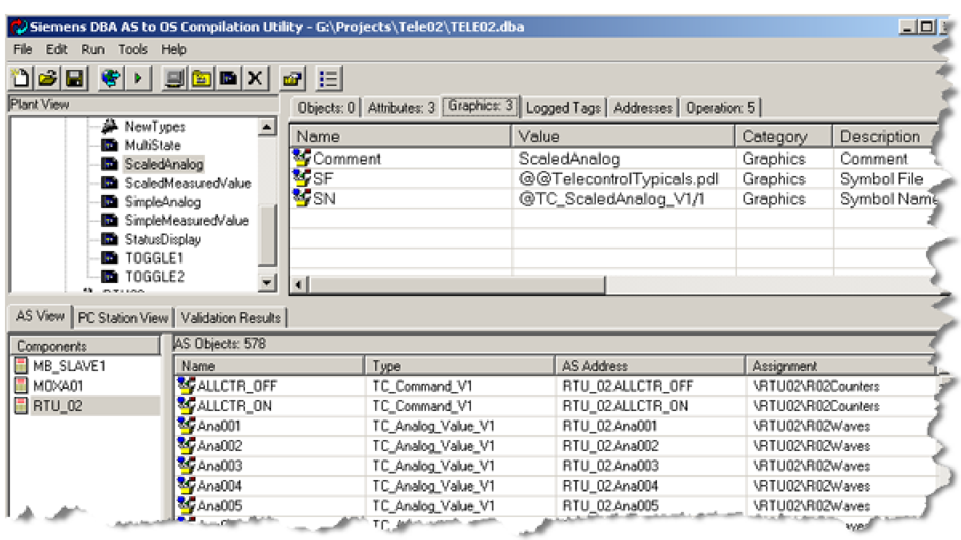


Figure 3-1 This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.1.3.7 Scaled Analog Value Data entry

There is no faceplate required for the Scaled Analog Value type. The target value (RSP) can be changed by clicking the symbo to invoke the standard PCS 7 analog value data entry dialog.

3.1.4 Simple Analog Value

Overview

The Simple Analog Value type allows for display and entry of unscaled analog data.

3.1.4.1 Simple Analog Value Inputs

Type:	One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator visible:	Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RSP	RTU Setpoint Value	Ext	Float	-	Input	Setpoint value to RTU
Units	Measurement Units	Int	String	-	Config	Measurement units of the setpoint.

3.1.4.2 Simple Analog Value Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
F	Feedback	Ext	Float	-	Output	Feedback value from RTU

3.1.4.3 Simple Analog Value Description

The Simple Analog type displays a scaled value from the RTU and allows the user to enter a new value. There are no alarms or faceplates associated with it If the configured range is invalid, an indicator with the text "RA" is displayed.

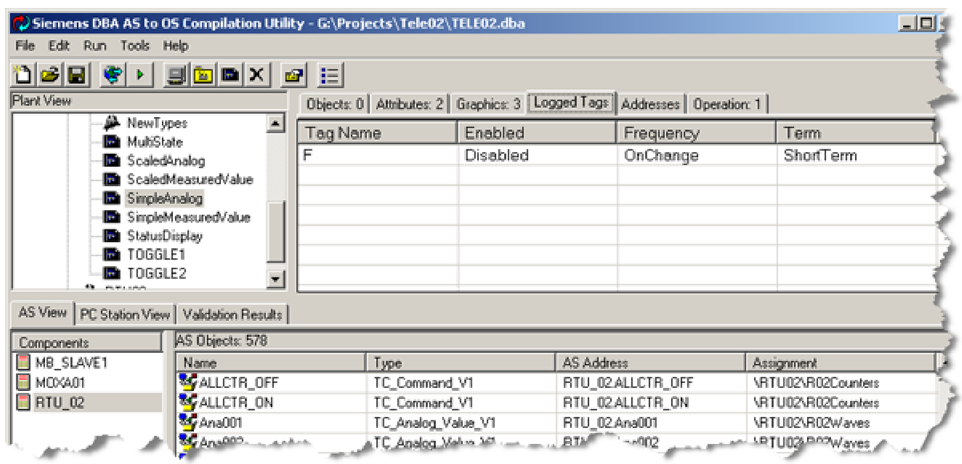
3.1.4.4 Simple Analog Value Archiving

Archiving

The following values are preconfigured as available for archiving.

Tag	Archiving behavior
F	spontaneous archiving of feedback value on value change

Tag logging is disabled by default, but can be enabled in DBA. Select an Scaled Analog Value object instance from the Plant View and select the "Tag Logging" tab of the Attribute Edit window in the upper right-hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.

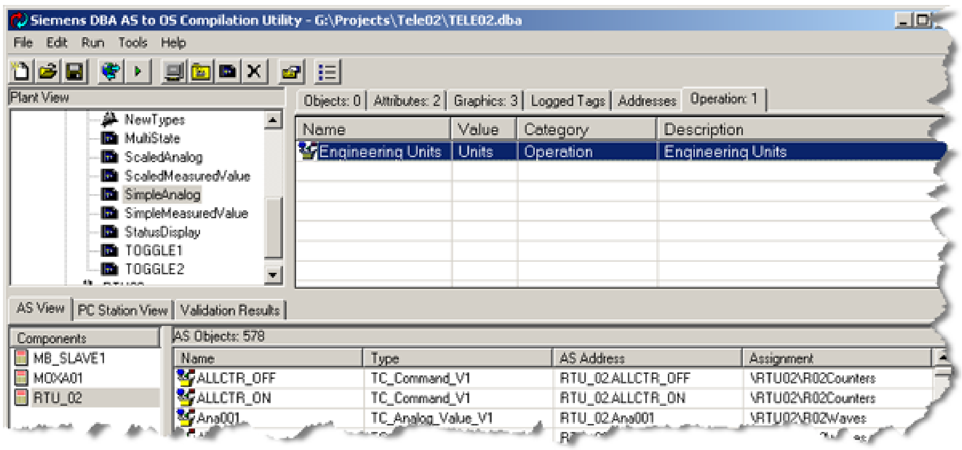


3.1.4.5 Simple Analog Value Operational Parameters

Configuring operational characteristics

The operational characteristics of a Simple Analog Value object instance can be configured in DBA.

1. Select a Simple Analog Value object instance from the Plant View.
2. Select the Operations tab of the Attribute Edit window in the upper right-hand quadrant of the screen.



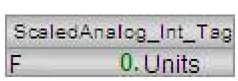
Engineering Units - PV

The text used to identify the PV value of the Si mple Analog Value on HMI pictures. Free form text entry is allowed.

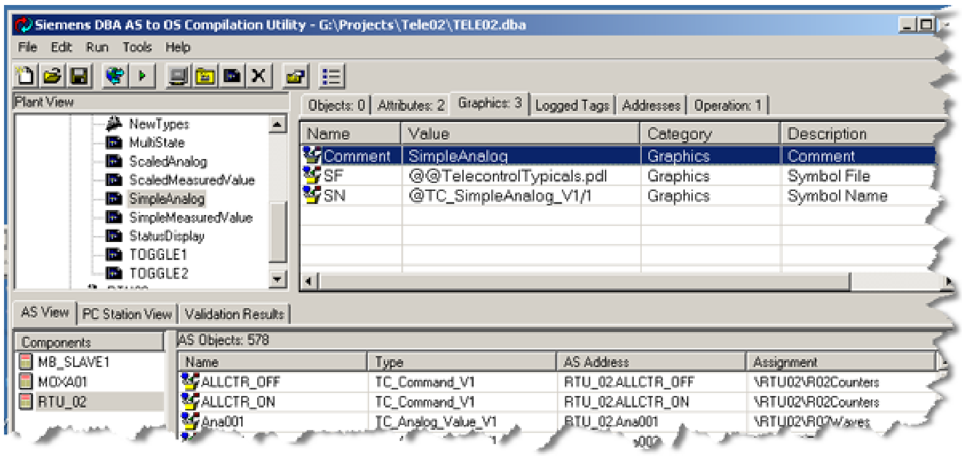
3.1.4.6 Simple Analog Value Symbol Display

Default Symbol

One Simple Analog Value symbol is provided by default. This shows the current PV and engineering units.



Although a single symbol is provided, the Graphics Designer can be used to create additional Simple Analog Value symbols. If new symbols are created, the symbol to be used for any instance of a Simple Analog Value object can be changed using DBA. To change these, in DBA, select a Simple Analog Value object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right-hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.1.4.7 Simple Analog Value Data Entry

There is no faceplate required for the Simple Analog Value type. The target value (RSP) can be changed by clicking on the symbol. This invokes the standard PCS 7 analog value data entry dialog.

3.1.5 IEC850 Analog Value

The IEC850 Analog Value is identical to the Analog Value type described in section Analog Value (Page 15) except for the differences described in the sections below.

IEC Analog Value Outputs

The IEC Analog Value Outputs are identical to the Analog Value Outputs described in section Analog Value Outputs (Page 16) , with one additional tag added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)

3.2 BitAlarm Types

3.2.1 BitAlarm

The Bit Alarm provides a mechanism for generating an alarm on the transition of a binary value. Alarming is possible on the transition to the 0 state or the 1 state.

3.2.1.1 BitAlarm Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
ICommand	Object Command	Ext	Integer	-	-	Reserved for future use

3.2.1.2 BitAlarm Internal Variables

None

3.2.1.3 BitAlarm Description

The BitAlarm is essentially an alarm based on one bit. By using bit addressing in the RV address, the appropriate bit is singled out.

The alarm is configured via DBA, which includes its sense. The Sense is configured in DBA on a per instance basis. It indicates whether the alarm is triggered when RV = 0 or when RV = 1.

3.2.1.4 BitAlarm Alarming

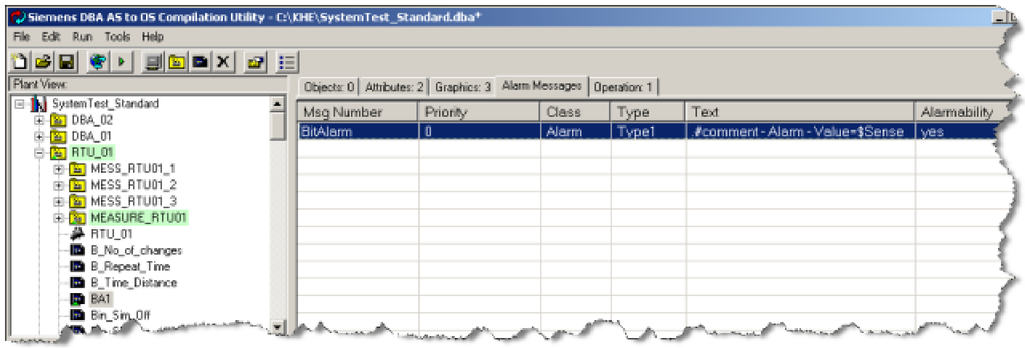
The Bit Alarm is calculated at runtime such that when RV = Sense, an alarm is triggered. (Where Sense is an operational attribute that can be configured in DBA; by default, Sense=1).

This alarm condition is summarized in the table below.

Name	Class	Type	Configured by Default	Condition Description
BitAlarm	Alarm	High Alarm	Yes	RV=$SENSE

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select a BitAlarm object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The **Alarmability** column of this window can be used to permanently enable or disable any alarm.

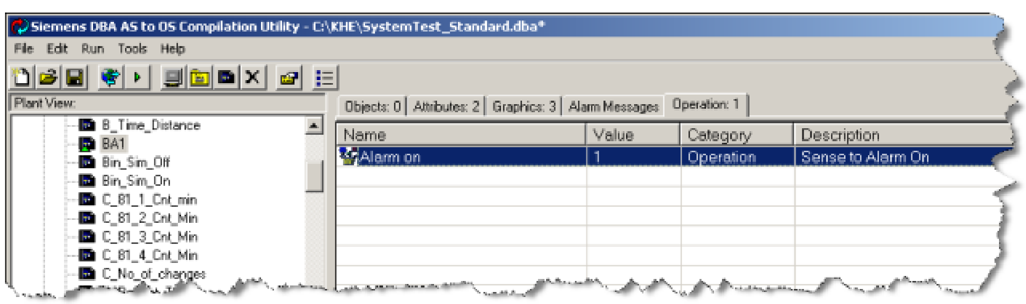


3.2.1.5 BitAlarm Operational Parameters

Configuring operational characteristics

The operational characteristics of a BitAlarm object instance can be configured in DBA.

1. Select a BitAlarm object instance from the Plant View.
2. Select the Operations tab of the Attribute Edit window in the upper right hand quadrant of the screen.



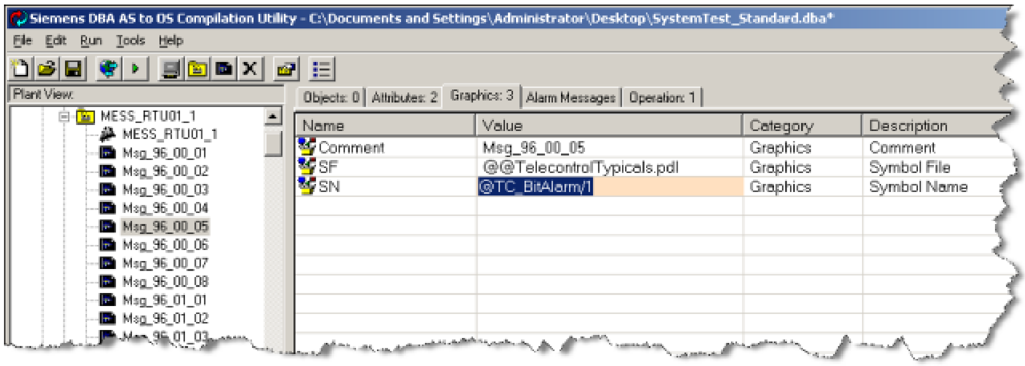
Alarm On

Indicates the value on which the alarm will act. Enter any integer value between 0 and 65535.

3.2.1.6 BitAlarm Symbol Display

One BitAlarm symbol is provided by default. This shows any active alarm conditions.

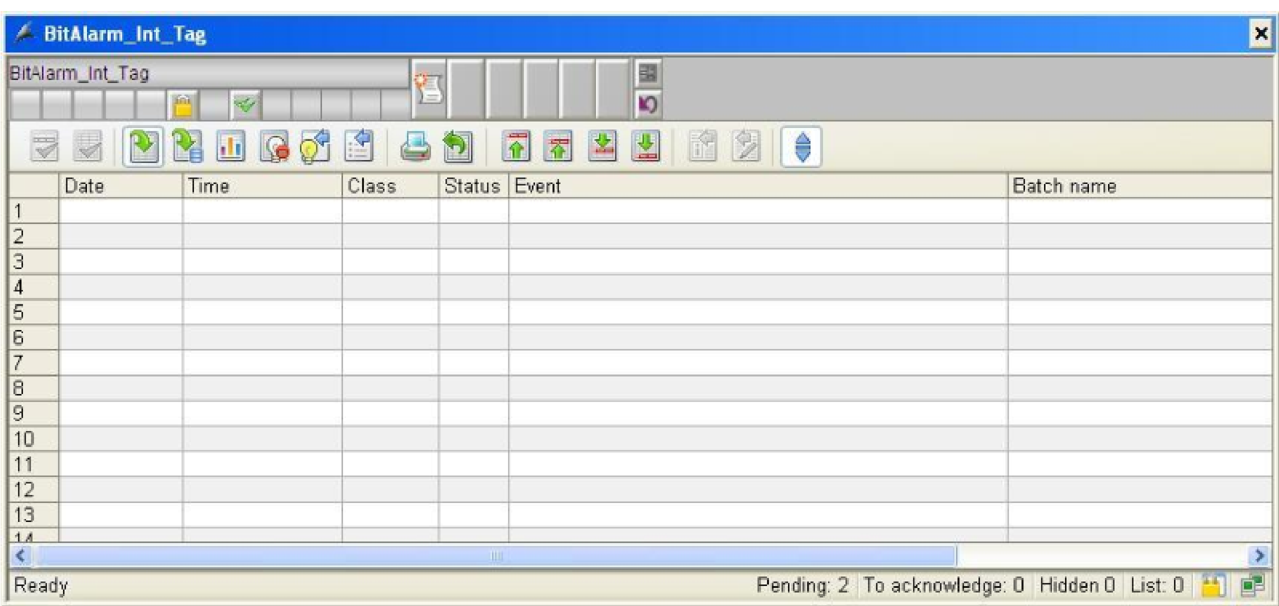
While a single symbol is provided, the Graphics Designer can be used to create additional BitAlarm symbols. If new symbols are created, the symbol to be used for any instance of a BitAlarm object can be changed using DBA. To change these, in DBA, select a BitAlarm object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.2.1.7 BitAlarm Faceplate

The only faceplate view for the BitAlarm is the standard alarm view. There is no loop display.



3.2.2 IEC850 BitAlarm

IEC850 BitAlarm

The IEC850 BitAlarm is identical to the BitAlarm type described in BitAlarm (Page 32) except for the differences described in the sections below.

3.2.2.1 IEC 61850 BitAlarm Outputs

IEC 61850 BitAlarm Outputs

The IEC BitAlarm Outputs are identical to the BitAlarm Outputs described in section BitAlarm Outputs (Page 32) , with one additional tag added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)

3.3 Command Types

3.3.1 Command

As not all RTU's support full command processing, a Command Type has been provided that allows the checking of Interlocks and feedback monitoring to be performed in the TeleControl server.

3.3.1.1 Command Inputs

Type:	One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator visible:	Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item (configurable as *Operation* parameter in DBA); Item available for **Archive**

Abbreviation	**Name**	**Type**	**Data Type**	**Default Value**	**Operator Visible**	**Description**
#comment	Comment	Int	String	-	Config	Description of the object instance

#areaname	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on Plant View placement)
F	Feedback	Ext	Byte	-	Output	Feedback from RTU
FSense	Sense	Int	Bit	-	Config	Sense of the Feedback from RTU – whether the expected feedback is 0 or 1
CmdSense	Command Sense	Int	Bit	1	Config	Sense of the Command written to the RTU: • SINAUT - 1 • Modbus - 0 or 1
Timeout	Timeout	Int	Int	-	Input	Number of seconds in which Feedback should match FSense after being sent to RTU
ILK1	Interlock 1	Ind	Bit	-	-	If configured, disables input from faceplate if TRUE and not overridden
ILK2	Interlock 2	Ind	Bit	-	-	If configured, disables input from faceplate if TRUE and not overridden
ILKText	Interlock Text	Int	String	Interlocked	Config	Interlock description
Cmd#string_0	Command Text	Int	String	DoCommand	Config	Text shown on the Faceplate Command Button
F#string_0	String 0 Text	Int	String	Done	Config	Text shown on symbol/faceplate when F=0
F#string_1	String 1 Text	Int	String	Not Done	Config	Text shown on symbol/faceplate when F=1
FeedbackReq	Feedback Required	Int	Bit	1	Config	Indicates whether or not feedback is expected from the command

3.3.1.2 Command Outputs

Abbreviation	**Name**	**Type**	**Data Type**	**Default Value**	**Operator Visible**	**Description**
RCmd	RTU Command	Ext	Byte	-	Output	Command send to RTU
DA	Discrepancy Alarm	Int	Bit	-	Only as alarm	Triggers Discrepancy Alarm

3.3.1.3 Command Internal Variables

Abbreviation	**Name**	**Type**	**Data Type**	**Default Value**	**Operator Visible**	**Description**
Cmd	Command	Int	Bit	-	-	DoCommand button on Faceplate writes to this tag
Timing Out	Timing Out	Int	Bit	-	-	A timeout is in progress (Operator requested command and waiting for time to expire when feedback will be checked for discrepancy).
CmdResetTimeout	Command Reset	Int	Bit	-	-	Reset button on the Faceplate writes to this tag

3.3.1.4 Command Description

The **Command** button on the faceplate (Cmd) allows the operator to send a command to the RTU. When it is pressed, a bit in the RCmd byte is set and then RCmd is sent to the RTU. Feedback (F) is received from the RTU when the command is completed.

Interlocking

The indirect tags ILK1 and ILK2 are used to specify other tags whose values determine if an interlock exists. The tags to be used as interlocks are configured from DBA on a per instance basis. If either of the tags designated by ILK1 or ILK2 is set true, the operator is not allowed to send a command or enter a timeout value unless he has an appropriate authorization to override the interlock.

The user can override the interlocks if he has level 6 permissions and the Override checkbox is checked on the faceplate. Override behaves as follows:

- All instances of the command faceplate open with override unchecked.
- The checkbox is only operable if user has level 6 permissions
- The checkbox only affects the ability to override on the faceplate from which the box was checked. Other instances of the faceplate on the same screen or on other screens do not know that an override is being done.
- Checking Override in a group view, does not check Override in the loop view and vice versa.
- If the view (group or loop) in which the override check is made is closed, the override is no longer in effect.
- For a group view, override remains in effect as long as the box is checked and the view is not closed. That means that the override state persists while interchanging panes.

Note

Interlocks can be configured using the Data tab of the DBA Instance Editor by specifying linkages to other tags in the configuration. Configuration of linkages is optional. It is possible to configure 0, 1 or 2 interlocks.

Feedback

The feedback value F received from the RTU is not an indication of success or failure, but rather is based on the operation triggered by the command. For example, if the command causes a motor to be turned on or off, the feedback will probably show the state of the motor. Therefore, the feedback sense FSense must be configured accordingly; i.e., it should be set to 1 if the motor is being turned on, and set to 0 if the command causes the motor to be turned off.

In addition, the Feedback State 0 and State 1 values must be configured in DBA to agree with FSense. By default, FSense is set to 1, Feedback State 0 will display "Not Done" on the faceplate, and Feedback State 1 will display "Done". However, if the feedback sense is set to 0, the state strings should also be changed so that the result of the command is properly shown.

Timeout

When a command is sent to the RTU, the feedback F is checked after TIMEOUT seconds to determine if the feedback matches the feedback sense. During this timeout, the TimingOut flag is set to 1. When the TimingOut flag is set to 1, the faceplate disables the **Command** button.

The TimingOut flag is reset to 0 when the timeout expires, at which time a check will be made for the feedback to match the feedback sense. The TimingOut flag is also reset to 0 when a user with level 6 permissions presses the Reset button on the faceplate, in which case the feedback will not be checked against the feedback sense. In either case, the **Command** button on the faceplate will be re-enabled.

3.3.1.5 Command Alarming

A Discrepancy Alarm is generated (DA set to 1) when Feedback does not match FSense in Timeout number of seconds after RCmd is sent to the RTU. (If Timeout is configured as 0 seconds, then no Discrepancy Alarm is generated).

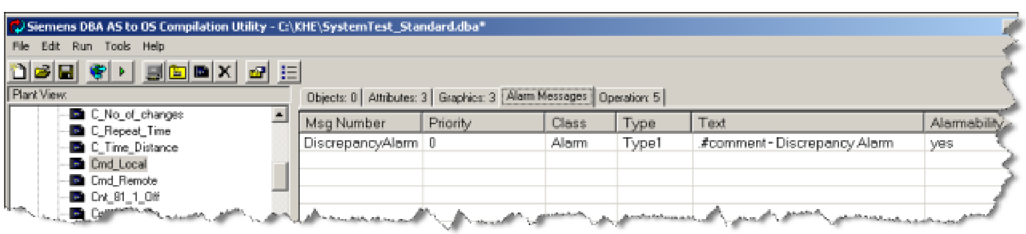
The Discrepancy Alarm is automatically cleared (DA set to 0) after 60 seconds.

This alarm condition is summarized in the table below.

Name	Class	Type	Configured by Default	Condition Description
DiscrepancyAlarm	Process Control System	Error	Yes	DA=1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select a Command object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The **Alarmability** column of this window can be used to permanently enable or disable any alarm.

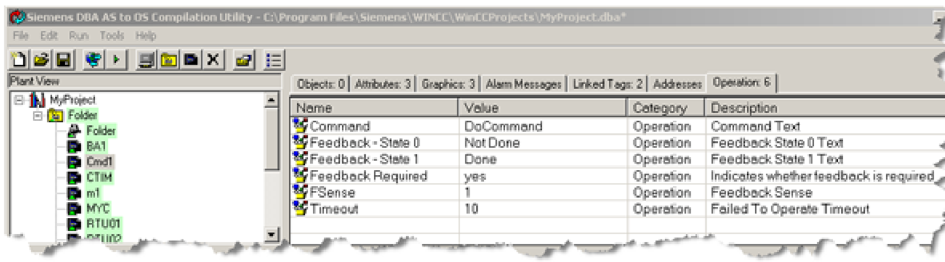


3.3.1.6 Command Operational Parameters

Configuring operational characteristics

The operational characteristics of a Command object instance can be configured in DBA.

1. Select a Command object instance from the Plant View.
2. elect the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Command

The text string that appears on the Command Button of the faceplate. Free form text entry is allowed.

Feedback – State 0

The text string that appears on the command symbol and faceplate when the Feedback (F) is indicating state "0". Free form text entry is allowed.

Feedback – State 1

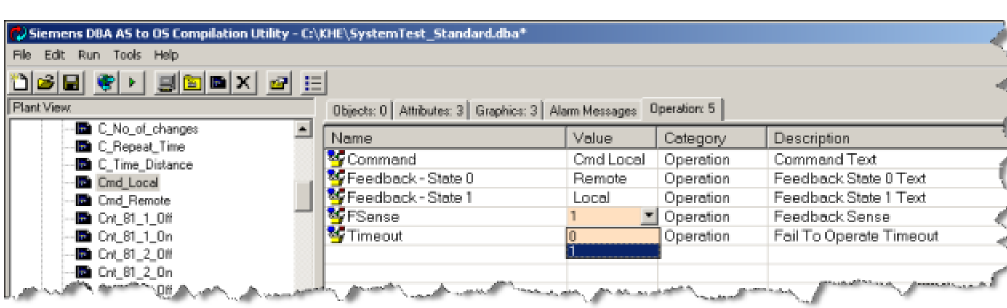
The text string that appears on the command symbol and faceplate when the Feedback (F) is indicating state "1". Free form text entry is allowed.

Feedback Required

Indicates whether feedback is expected for the command. A drop-down list is provided for selection of "Yes" or "No". If "No" is selected, then the faceplate will not show any feedback indicator.

FSense

The expected feedback from the Command. If a Timeout has been configured, if the Feedback variable (F) does not correspond to the value of FSense within the timeout period, a Discrepancy Alarm is generated. Clicking on the Value column provides a drop list from which a value of "1" or "0" can be selected. (The default value is "1").

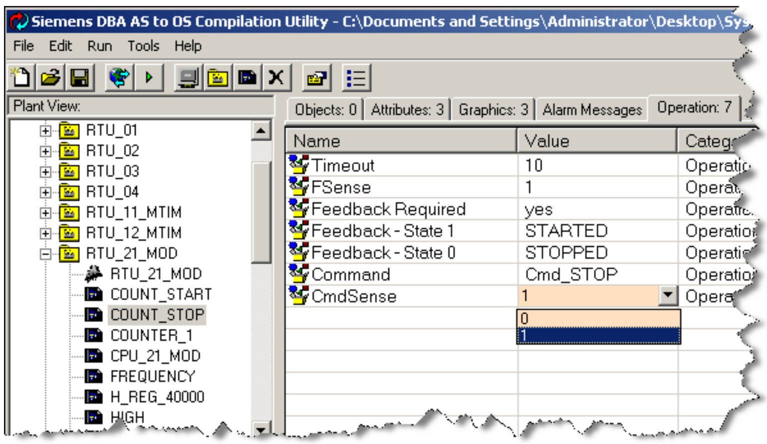


Timeout

Timeout value in units of seconds. If a Timeout has been configured, if the Feedback variable (F) does not correspond to the value of FSense within the timeout period, a Discrepancy Alarm is generated. Any integer value can be specified.

CmdSense (Modbus, IEC and DNP Only)

The sense of the command to be written. (The default value is "1").

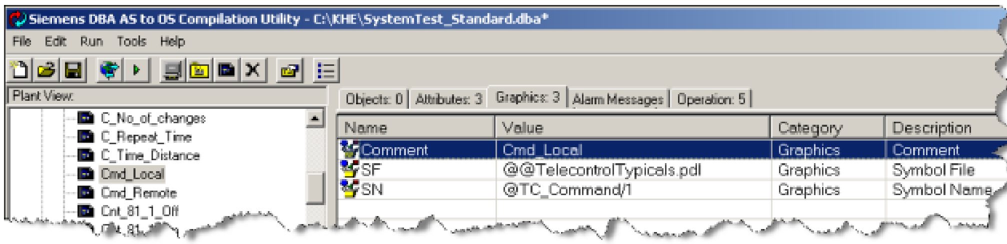


3.3.1.7 Command Symbol Display

Default symbols

Two Command symbols are provided by default. One symbol shows the current requested command and the current feedback and the other shows the current request command with no feedback. Both also show any active alarm conditions.

Although a single symbol is provided, the Graphics Designer can be used to create additional Command symbols. If new symbols are created, the symbol to be used for any instance of a Command object can be changed using DBA. To change these, in DBA, select a Command object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.

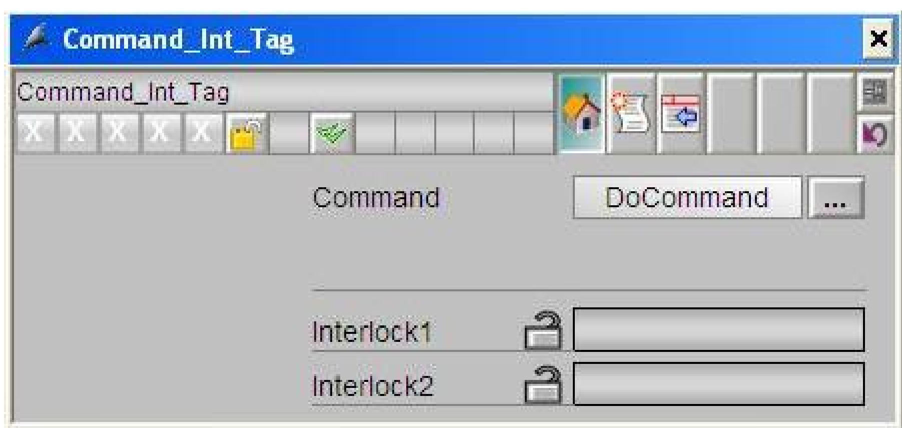


This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.3.1.8 Command Faceplate

The command faceplate has three views – standard, maintenance, and alarm. Level 6 permissions are required to make changes on the maintenance pane. During normal operation, the operator can click the **Command** button to send a command to the RTU. Users with level 6 permissions can change the timeout after which the feedback will be checked against the feedback sense. In addition, users with level 6 permissions can override interlocks.

Command Faceplate – Standard View



Note

The feedback indicator is not shown if the operational parameter "Feedback Required" has been set to "No"

Buttons

Note

Level 5 permissions are required to be able to press the **Command** or **Reset** button.

Button	Action	Description
Command	Cmd=1	Triggers a write of RCmd=1 to the RTU, and if Timeout>0, arms a "Failed To Operate" timer. During this period the button is disabled. Note 1 : the enabling of this button is subject to interlock processing as described in the sections above. Note 2: the label on the button corresponds to Cmd#string_0 tag text (as configured in DBA)
Reset	Reset=1	This button only appears if Timeout >0 and the Command button has been pressed. It appears during the Timeout period to allow the cancellation of the "Failed To Operate" timer.

Indicators

Indicator	Meaning	Tag	Colors	Note
Feedback	Command Feedback from the RTU	F	Black on Gray	
Interlock 	Interlock Status	ILK1,ILK2	Black	Only shown if ILK1 or ILK2 has been configured (non-blank tag name). When at least one of the interlocks is true, the lock symbols on the faceplate will be closed and the Command button and entry of the timeout period will be disabled.

Command Faceplate – Maintenance View

Data Entry

Note

Level 6 permissions are required to be able to change any of the Data Entry fields in this view.

Entry Field	Action	Description
Override	Allows temporary override of an Interlock	Checkbox allows override. When checked, this will re-enable the Command button and allow entry of the timeout, and the padlock symbols will appear with a red slash through them to indicate the override. The override is only valid for the instance of the faceplate where it was initiated.
Timeout	Timeout=entered value	Clicking on this field invokes an analog entry input box that allows a timeout value to be specified. The timeout is the amount of time required before proper feedback is received before a Discrepancy Alarm is generated. The Timeout field is only shown if the FeedbackReq variable is set to 1.

Indicators

Indicator	Meaning	Tag	Note
Override	Status of Interlock Override		Checkbox indicates override status. When checked, padlock is shown with a red slash.
Interlock 1	Name of tag used for Interlock 1	ILK1	Blank if no Interlock 1 configured
Interlock 2	Name of tag used for Interlock 2	ILK2	Blank if no Interlock 2 configured
Timeout	Failed To Operate Timeout	Timeout	

For message view see general description.

3.3.2 IEC850 Command

IEC850 Command

The IEC850 Command is identical to the Command type described in section Command (Page 35) except for the differences described in the sections below.

3.3.2.1 IEC850 Command Outputs

IEC 61850 Command Outputs

The IEC Command Outputs are identical to the Command Outputs described in section Command Outputs (Page 36), with two additional tags added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)
STATUS	STATUS	Ext	BYTE	-	No	Checkback Status (See "Appendix B – Status Codes")

3.3.2.2 IEC850 Command Description

The behavior or the IEC850 Command is identical to the behavior of the Command as described in section Command Description (Page 37) except for the optional select-before-operate behavior. The IEC 61850 Command can be configured with or without Select-Before-Operate behavior. This can be controlled by changing the FLAG setting for the RCmd tag in the Address configuration tab of the DBA Attribute Editing panel.

The following FLAG settings are available:

CTL_O	Operation Only
CTL_SBO	Select-Before-Operate

When CTL_SBO is selected, PowerControl communication software will automatically initiate **select** for the RCmd tag, and only if successfully selected, initiate **operate** to complete the command.

3.3.2.3 IEC850 Command Alarms

IEC Command Alarming

In addition to the DiscrepancyAlarm described in section Command Alarming (Page 38) , the IEC850 Command includes the followiing alarm condition:

Name	Type	Class	Configured by Default?	Condition Description
BadCheckback	Process Control System	Error	Yes*	STATUS <> 0

The message type, class, priority and alarm text can be changed on a per-instance basis

To change these, in DBA, select an IEC850 Command object instance from the Plant View and select the Alarm Messages tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Enabled column of this window can be used to permanently enable or disable any alarm.

3.4 Counter Types

3.4.1 Counter

Counters provide important information about product volumes and energy transferred in a pipeline network. A standard counter is provided that provides scaling, increment calculation, totalizing, substitution and alarming. Secondary counter functions are also possible, such as integration of a measured value, counting of operating hours, switch counting, or counting of disturbance times.

3.4.1.1 Counter Inputs

Type:	One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator Visible:	Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item (configurable as *Operation* parameter in DBA); Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
#comment	Comment	Int	String	-	Config	Description of the object instance
#areaname	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on Plant View placement)
RV	RTU Value	Ext	Integer	-	-	Raw value from RTU
FV	'First value' Flag	Ext	Binary	0	-	'First value' status flag from RTU (if present)
FVSense	FV Sense	Int	Binary	0	-	RV is flagged as first value when it matches FVSense
SV	Substitution Value	Int	Float	0	Input	Substitution value
MV	Measured Value	Ind	Float	-	-	Measured value
CALC	Calculation Trigger	Ind	Bool	-	-	Trigger calculation on 0 -> 1 transition, even if input values have not changed. In modes 2 and 7, a new counter value will only be computed when CALC changes. Useful with modes 3-5 if input values do not change often and the system wants to 'close' the interval calculation (trigger set at interval end). The time stamp of last update will be set to current system time both for RV and MV.

Mode	Counter Mode	Int	Integer (1-8)	1	Config	1: RV is absolute counter value 2: RV is counter increment since last transmission 3: RV is status, count time where status was 1 (e.g. count operating hours) 4: Integrate from indirectly addressed measured value 5: MV is status, count time where status was 1 (e.g. count operating hours) 6: RV is absolute counter value, use measured value for weighing of counter increment before accumulation (e.g. calculate energy equivalents from gas volume and heating value) 7: RV is increment, use measured value to calculate weighted increment before accumulation 8: RV is absolute counter value. CV is synchronized with RV and rolls over when RV rolls over.
TB	Time Basis	Int	String	1h	Config	Time basis for time counting and gradient check. Used for counter mode 3,4,5 and for gradient check. One of 1D, 1h, 1m, 1s
OV	Overflow value	Int	Integer	-	Config	Value after which raw value from RTU restarts from zero
TIL	Interval Length	Int	String	0s	Config	Length of interval for aggregation. Valid values: 1W, 1D, 1h, 30m, 20m, 15m, 12m, 10m, 6m, 5m, 4m, 3m, 2m, 1m, 0s. 0s = No aggregation.
TIS	Interval Start	Int	String		Config	Time after which first interval starts. Relative to interval length. Valid values: 1-6D, 1-23h, 1-59m Interval Start must be < Interval Length. E.g. TIL = 1D, TIS = 6h means a day's interval running from 6:00 to 6:00.
SF	Scale Factor	Int	Float	1	Config	RTU value will be multiplied by scale factor prior to any further processing.
GHL	Gradient High Limit	Int	Float	0	Config	Rate of change beyond which counter change will generate alarm; in units / time basis. Inactive if set to zero.
GLL	Gradient Low Limit	Int	Float	0	Config	Rate of change below which counter change will generate alarm; in units / time basis. Inactive if set to zero.
H	High Limit	Int	Float	0	Config	Warning high limit (e.g. for maintenance warning when operating hours are reached)
HH	High High Limit	Int	Float	0	Config	Alarm high limit (e.g. for maintenance alarm when operating hours are reached)
SET_CV	Force counter	Int	Float	-	Input	Force counter to specific value (force to 0 for reset). E.g. used to reset an operating hour counter after maintenance

R	Reset	Ext	Integer	-	Input	RTU: Reset RV to 0 on 0 -> 1 transition
SUBS	Substitution mode	Int	Integer	0	In/Out	0: No substitution 1: Substitute value is a manually entered absolute value 2: Use last gradient to calculate new values in 1 minute intervals. 3: Use substitution value given in SV as gradient to calculate new values in 1 minute intervals. Substitution mode 3 is not usable with counter modes 3, 4 and 5.
QCPCT	Quality Code Percentage	Int	Integer	100	Config	Used for L1QC, L2QC calculation. Percentage of time during which QC needs to be at least x in order to result in an aggregated quality code of x. E.g. if QCPT = 80 and QC is "GOOD" for 84% of the time, resulting QC is "GOOD".
SForcing	Forced Substitution	Int	Binary	0	Input	When set to 1, calculate CV from substituted value regardless of the quality of RV/MV
Resettable	Counter can be reset	Int	Binary	0	Config	When set to 1, the Reset button is displayed on the faceplate; pressing that button causes the counter in the RTU to reset to 0
IMODE	Calculate interval values from substituted CV	Int	Binary	0	Config	When set to 1, and the CV is a substituted value that has changed, then interval values are calculated. When set to 0, interval values are only calculated when CVABS changes and is used as the new CV
GAVP	Gradient Gliding Average Period	Int	Word	-	-	Gliding average period for the gradient computation, in units of seconds [allows for gradient smoothing]

3.4.1.2 Counter Outputs

Abbreviation	Name	Type	Data Type	Default-Value	Operator Visible	Description
CV	Counter Value	Int	Double	-	Output, Archive	Counter’s current in use value. A copy of either CVABS or CVSUBS
ALM	Alarm	Int	Word	-	-	Bit-Map of alarm conditions (Bit set indicates active) Bit 0 – High Limit Alarm Bit 1 – High Limit Warning Bit 5 – Configuration Error Bit 6 – Gradient Alarm
INC	Increment	Int	Float	-	Output	Counter increment in current interval
GRAD	Gradient	Int	Float	-	Output	Rate of change (in Units / TB)

L1CV	Last counter value	Int	Float	-	Output	Counter's displayed value at end of last interval
L1INC	Last increment	Int	Float	-	Output	Counter increment in last interval
L2CV	2nd Last counter value	Int	Float	-	-	Counter's absolute value at end of 2nd last interval
L2INC	2nd Last increment	Int	Float	-	-	Counter increment in 2nd last interval

Gradient Smoothing

It is possible to introduce gradient smoothing through the use of the configuration variable GAVP. This variable allows the specification of a number of seconds over which to smooth the gradient. If set to 0, then no smoothing is done. If non-zero, the gradient is maintained as a gliding average over the number of seconds indicated by GAVP, as shown in the formula below:

GRAD = ((GRAD/TB_in_secs * (GAVP - deltaT) + INC) / GAVP) * TB_in_secs
Where,
TB_in_secs :is the TB converted to units of seconds
deltaT :is the time difference in seconds between counter readings

Limit Alarms

There are two limit violations that can be configured:
High Alarm : CV > HH
High Warning : CV > H
For a high alarm condition, bit 0 of the ALM word is set. For a high warning condition, bit 1 of the ALM word is set.

3.4.1.3 Counter Internal Variables

Abbreviation	Name	Type	Data Type	Default-Value	Operator Visible	Description
CVABS	Current absolute CV value	Int	Double	-	-	Current counter value calculated from last received RV or MV as appropriate
CVSUBS	Current substituted CV value	Int	Double	-	-	Current counter value calculated from substitute value
LCV	Last CV Value	Int	Double	-	-	Last calculated CV
LGCV	Last known "GOOD" CV	Int	Double	-	-	Last known "GOOD" CV
LRV	Last RTU Value	Int	Integer	-	-	Last raw value from RTU for calculating increments in modes 1, 6, 8
LMV	Last MV	Int	Float	-	-	Last Measured Value in modes 4, 5, 6, 7
LRVD	Timestamp of last raw value	Int	Double	-	-	Timestamp of last raw value (RV in modes 1, 2, 3, 6, 7, 8, or MV in modes 4, 5)
L1D	Timestamp of last interval	Int	Double	-	-	Timestamp of last interval
LCVD	Timestamp of last counter value	Int	Double	-	-	Timestamp of last counter value

TGOOD	"Good" time	Int	Integer	-	-	Number of seconds in current interval during which QC was "GOOD"
TSUBS	"Substituted" Time	Int	Integer	-	-	Number of seconds in current interval during which QC was "SUBSTITUTED"
TBAD	"Bad" Time	Int	Integer	-	-	Number of seconds in current interval during which QC was "BAD"

3.4.1.4 Counter Description

Introduction

The TeleControl Counter calculates a Counter Value (CV) using raw values from the RTU or based on substitution rules.

Two candidate values for CV are continually calculated: CVABS and CVSUBS. CVABS is a value based on a raw RTU value, and CVSUBS is a substitute value based on the current substitution rule.

CVABS is calculated each time a new raw value is received from the RTU. CVABS is copied to CV if the raw value quality is good, substitution is not being forced, and it differs from the previous CVABS.

CVSUBS is calculated once every minute. CVSUBS is copied to CV if the raw value quality is bad or substitution is being forced, and CVSUBS differs from the previous CVSUBS.

Counter Modes - Calculating CVABS

There are 8 counter modes. The table below shows the mnemonic used for each mode:

Mode	Mnemonic
1	RV Abs
2	RV Inc
3	RV Time
4	MV Abs
5	MV Time
6	RV/MV Abs
7	RV/MV Inc
8	RV Sync

The counter mode determines the rules used to calculate the new CVABS increment and what raw value is used as input. That increment is then added to the last good quality CV (LGCV) and that becomes the new CVABS. The table below shows how the increment in each mode is computed.

Mode	Raw Input Value	Raw Value is interpreted as	First Value flag (FV) may apply	How Raw Increment is Calculated	Overflow correction applied as needed (OV)	Increment is scaled by SF	Increment weighted by multiplying by MV
1	RV	An actual value	Y	NewRV - OldRV	Y	Y	N

2	RV	An increment since the last RV	N	RV	N	Y	N
3	RV	A trigger to use the elapsed time since the last RV	N	NewRVTime - OldRVTime	N	N	N
4	MV	An actual value	N	OldMV + NewMV 2 x Elapsed Time	N	N	N
5	MV	A trigger to use the elapsed time since the last MV	N	NewMVTime - Old-MVTime	N	N	N
6	RV	An absolute value	Y	NewRV - OldRV	Y	Y	Y
7	RV	An increment since the last RV	N	RV	N	Y	Y
8	RV	An actual value	Y	NewRV - OldRV	N	Y	N

Note

When MV is used to weight the increment, and MV < 0, a value of 0 is used for MV.

Coldstart

When the system starts for the first time, basis time values are set to 0. That means that when the first CV is calculated, the previous CV time values will be 0, which is a long time prior to the time of the incoming CV. Hundreds, perhaps thousands, of time interval values could be computed. To avoid this situation, the counter uses the first incoming raw value or the first attempt to calculate a substitute value, whichever comes first, to set the basis times. This means that the first computation does not calculate a new CV.

Handling Overflows

In modes 1, 6, and 8, the raw RTU value can overflow. It has an upper bound and when it reaches that bound it restarts at zero.

In modes 1 and 6, the counter detects this situation and adjusts its calculations accordingly. The user sets the value of OV to indicate the upper bound of the raw RTU value (e.g., 65535 for a 16 bit RV). If the old raw value was 65500 and the new value is 500, then using the above overflow value, the adjusted raw increment was 535. The formula for this is (NewRV – OldRV + OV). To turn off overflow adjustment OV can be set to 0.

In mode 8 overflow correction is never made. That means that CVABS (and by implication, CV) tracks the ebb and flow of the RV. On some occasions, the increment will be negative.

IMODE

The IMODE tag is used to indicate that the RTU in which a counter runs does not support buffering telegrams while there is a communication loss. This is indicated by setting the IMODE tag to 1 in DBA. Side effects of setting this tag to 1 are:

- Substitute values are used to calculate interval values when substitution is in effect.
- CVSUBS is copied to CVABS when substitution is in effect.

Handling RTU Reset

The raw counter value may be reset by the RTU to zero or some other value. The RTU can indicate this by setting the flag FV (first value). In modes 1, 6, and 8 when FV is set, the raw RTU value is not used to calculate a new CVABS. It is used as a basis for future CVABS.

The FVSense flag determines which value (0 or 1) the counter should use as an indication of first value. The user configures the value of FVSense to match the value that will be sent by the RTU. It is up to the RTU to reset the flag for the next time.

Manual RTU Reset

Setting the R tag to 1 or pressing the **Reset RTU** button on the faceplate causes the RTU to reset the raw value to 0. The **Reset RTU** button is not displayed if the RTU does not support reset. This makes sense only if:

- The RTU supports resetting the counter and - in order not to lose any increments - transmits the last value of the counter before the reset.
- Overflow handling must be switched off (OV = 0), otherwise the next reading after the reset would be treated as an overflow
- Counter mode is 1, 6 or 8
- If the external reset should be visible with CV, CV must be synchronized with the RTU using mode 8.

Forcing a New CV

A new CV value may be forced in one of two ways:

- The SET_CV tag can be set to a specific value, or the SET_CV button can be pressed on the faceplate. This forces the CV to take on the new value specified. This new value has no effect on any aggregate, historical or interval calculations. It merely changes the value of CV.
- A new calculation of CVABS, and by extension CV, can be forced as if a new raw value was received from the RTU. This is triggered by the indirect tag linked to the CALC tag changing from 0 to 1. Recalculation is useful when a long period has elapsed with no incoming value and interval values need to be calculated or when the counter mode is 2 or 7 (RV is an increment) and the same raw value is continually coming in. In the latter case, the counter will not recognize a change, so the indirect tag linked to the CALC tag can be used to force a calculation. The RTU can send a raw value and then change indirect tag linked to the CALC tag from 0 to 1. The indirect tag linked to the CALC tag should be a BIT (Boolean) tag and it is up to whatever mechanism changes its value to 1 to reset it to 0 for the next time.

Substitution Modes – Calculating CVSUBS

CVSUBS is calculated once every minute. It is copied to CV if it changed, and

- The quality of RV in counter modes 1, 2, 3, or 8 is bad
- The quality of MV in counter modes 4 or 5 is bad
- The worst quality of RV and MV is bad in counter modes 6 or 7
- Substitution is being forced

Substitution may be forced by setting the SForcing tag to 1 or checking the Force Substitution checkbox on the faceplate.

There are 4 substitution modes. The substitution mode determines the rules used to calculate the new CVSUBS and what value is used as input.

Substitution Mode (SUBS)	Input Value	How CVSUBS is calculated	When CVSUBS is calculated
0 (None)	None	Not calculated	Not calculated
1 (SVAbs)	SV	SV is used as CVSUBS	When SV changes
2 (LastGrad)	GRAD	GRAD used as gradient to calculate new CVSUBS from previous CVSUBS	Once every minute
3 (SVGrad)	SV	SV used as gradient to calculate new CVSUBS from previous CVSUBS	Once every minute

Note

Substitution modes 2 (Last Grad) and 3 (SV Grad) are not allowed when the counter mode is 3 (RV Inc) or 5 (MV Inc). Setting the substitution mode to 2 or 3 when the counter mode is 3 or 5 results in a configuration alarm and not calculating CV nor CVABS nor CVSUBS.

Note

During periods when substitution is forced and RV/MV quality is good, CVABS continues to be calculated. No data is being buffered in the RTU to be sent when substitution is turned off and good RV/MV changes are still being received. Forced substitution results in CV being calculated based on substitution rules instead of from raw RV/MV values.

Gradient – Calculating GRAD

Whenever CVABS or CVSUBS is copied to CV, a new gradient, GRAD, is calculated. The gradient is the rate of change of the CV. The user specifies what time basis, TB, to use to calculate this gradient. For example, if the new CV is 120 units more than the old CV and this change occurred in one hour then the raw rate of change is 120 units/hour. If the user specified that the gradient should be calculated per minute by setting TB to "1m", then GRAD would become 2 – 2 units/minute.

The gradient can be checked against upper and lower limits by setting GHL, the high limit, and GLL, the low limit, to non-zero values. Limit checking is turned on if GHL > 0. A gradient alarm is triggered when GRAD < GLL or GRAD > GHL, Bit 6 of ALM is set to 1.

Quality of Non-Interval-Related Tags

The quality of all external tags is the quality provided by the channel – the WinCC quality.

The quality of all internal configuration tags (inputs) is always good.

The quality of CVSUBS is always SUBSTITUTED

The quality of CVABS is always the worst of the raw values used: either RV in modes 1, 2, 3, or 8, MV in modes 4 and 5, RV and MV in modes 6 and 7.

The quality of CV and GRAD are as follows:

Counter Mode	Quality of RV	Quality of MV	Substitution is being Forced	Resulting Quality
1	Good	-	N	Good
1	Good	-	Y	Substitute
1	Bad	-	-	Substitute
2	Good	-	N	Good
2	Good	-	Y	Substitute
2	Bad	-	-	Substitute
3	Good	-	N	Good
3	Good	-	Y	Substitute
3	Bad	-	-	Substitute
4	-	Good	N	Good
4	-	Good	Y	Substitute
4	-	Bad	-	Substitute
5	-	Good	N	Good
5	-	Good	Y	Substitute
5	-	Bad	-	Substitute
6	Good	Good	N	Good
6	Good	Good	Y	Substitute
6	Good	Bad	-	Substitute
6	Bad	Good	-	Substitute
6	Bad	Bad	-	Substitute
7	Good	Good	N	Good
7	Good	Good	Y	Substitute
7	Good	Bad	-	Substitute
7	Bad	Good	-	Substitute
7	Bad	Bad	-	Substitute
8	Good	-	N	Good
8	Good	-	Y	Substitute
8	Bad	-	-	Substitute

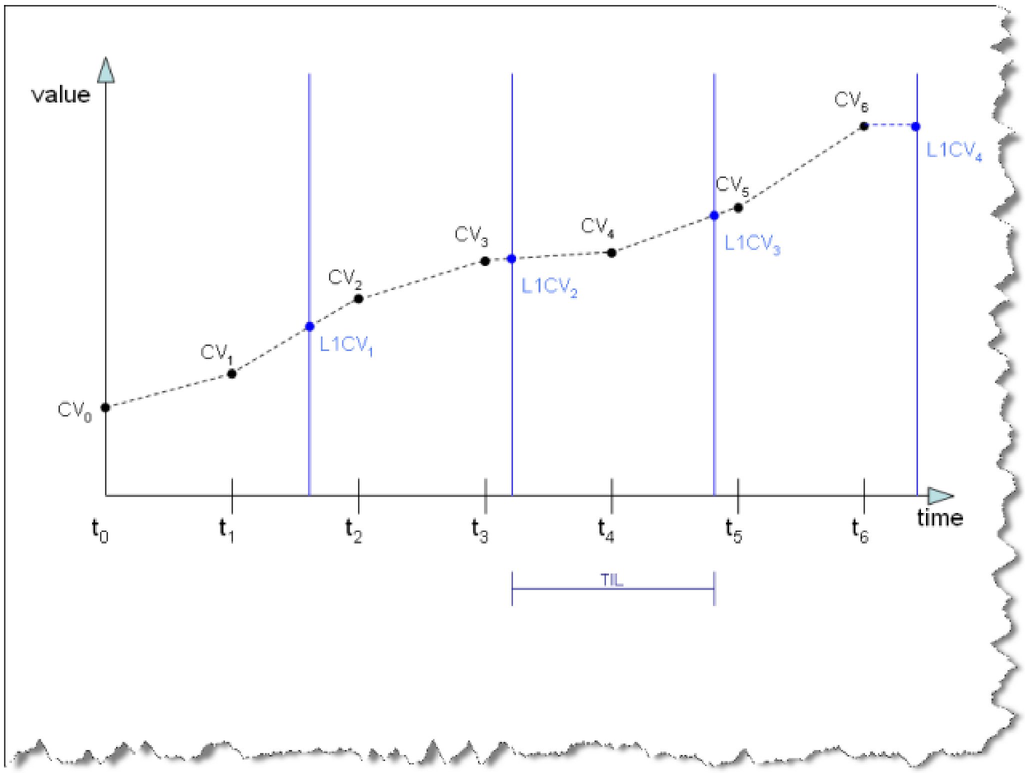
Note

If the substitution mode is 0 (SUBS=0) and the quality of the raw value (RV or MV depending on counter mode) is bad, then the quality of the CV is bad.

Interval Calculations

Under normal circumstances when the RTU is properly connected and communicating, CV is calculated whenever RV or MV changes, depending on the counter mode. The application may require that the counter value be calculated on a schedule that differs from the schedule on which RV or MV is changing. In such a case, the user can specify the interval for which the counter value is calculated in addition to the usual calculation of CV.

The specification of the interval time is done by setting two special tags. TIL specifies the time interval. TIS specifies the starting point within the interval. For example, if TIL is "1D" and TIS is "15h", then interval calculations are done from 3pm to 3pm daily. Every day, new interval values are calculated whenever 3pm is between the time of a newly calculated CV and the time of the previously calculated CV.



Note

When TIL and TIS are "0s", no interval calculations are done.

Note

Interval calculations are not done using substituted CVs unless IMODE = 1.

Interval Value Calculations – Current Interval

When a new CV is calculated the current interval is partially complete. At that time, if interval calculations are being done, the increment so far in the interval since the last L1CV is calculated and stored in INC.

INC = CV – L1CV.

Interval Value Calculations – Previous Intervals

If when a new CV is calculated, and one or more intervals ended in the elapsed time since the last CV, interval value calculations are made. If more than one interval completed, each interval's value is calculated so that they may be archived.

Interval calculations are done by linear interpolation using the gradient between two regularly calculated values of CV.

Interval calculation of the counter value is stored in L1CV. This represents the counter value at the end of the last interval. An increment during the interval is also calculated and stored in L1INC. L1INC represents the difference between L1CV and the previous L1CV. .

Whenever L1CV and L1INC are calculated the previous values of L1CV and L1INC are copied to L2CV and L2INC.

Interval Quality Calculation – Current Interval

Three tags, TGOOD, TBAD, and TSUBS, are maintained to represent the number of seconds the CV's quality was GOOD, BAD, or SUBSTITUTED in the current interval. Whenever a new CV is calculated, these are updated.

These three tags along with QCPCT are used to calculate the quality for current interval so far. QCPCT is a percentage (0-100). The following algorithm shows how the quality is calculated:

```
If (TGOOD / Elapsed Time) >= QCPCT
            Quality is GOOD
Else if ((TGOOD + TSUBS) / Elapsed Time) >= QCPCT
            Quality is SUBSTITUTED
Else
            Quality is BAD
```

INC, TGOOD, TBAD, and TSUBS are stored with this quality.

Interval Quality Calculation – Previous Intervals

At the end of each interval, TGOOD, TBAD, TSUBS, and QCPCT are used to determine the overall quality of the completed interval using the above algorithm. L1CV and L1INC are stored with resulting quality. L2CV and L2INC are stored with the quality of the previous L1CV and L1INC.

Configuration Error Alarm

Some combinations of configurations do not make sense or result in a CVABS or GRAD that are negative. In such a case bit 5 of ALM is set to 1 and a configuration error alarm is triggered. This alarm is reset the next time CVABS is calculated and no configuration error was detected.

The following conditions trigger the configuration alarm:

- OV < 0
- SF < 0
- Mode < 1 or Mode > 8
- TIL = ""
- TIL ≠ "0s" and TIS = ""
- SForcing = 1 and SUBS = 0
- ((SForcing = 1) or (RV/MV quality is bad)) and (SUBS < 0 or SUBS > 3)
- (SUBS = 2 or 3) and ((SForcing = 1) or (RV/MV quality is bad)) and (Mode = 3 or 5)
- CV < 0
- GRAD < 0

Timestamping, Interval Processing and Daylight Saving Time

Intervals 1D, 1W will be extended / shortened by 1 hour (or ½ hour for time zones using ½ hour DST) on the DST switching days.

For Intervals <= 1 hour, additional intervals will be added affecting L1... and L2... attributes.

All internal calculations are strictly done using UTC which avoids any ambiguities or special behavior.

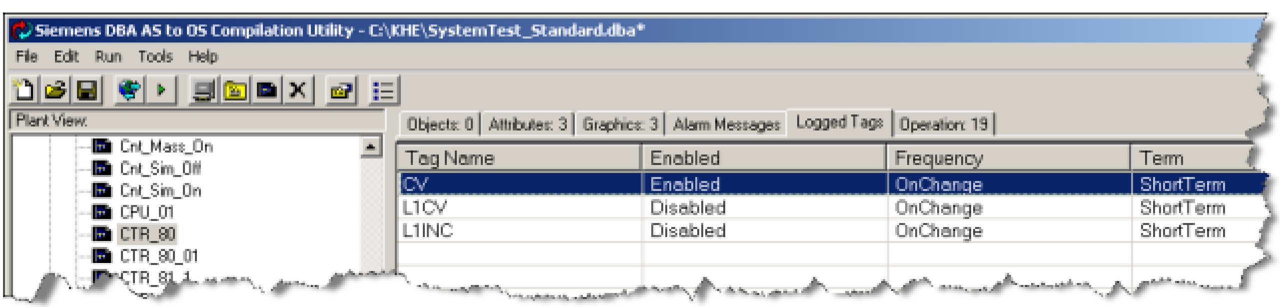
Any input timestamps are converted from local time as early as possible. Only the result timestamps are converted back to local time.

3.4.1.5 Counter Archiving

The following values are available for archiving:

Tag Name	Archiving Behavior
CV	spontaneous archiving on value change
L1INC	spontaneous archiving on value change
L1CV	spontaneous archiving on value change
CVABS	Spontaneous archiving on non-substituted CV value computation

Tag Archiving for all of these tags is disabled by default, but can be enabled in DBA. Select a Counter object instance from the Plant View and select the **Logged Tags** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.



3.4.1.6 Counter Alarming

The gradient (which is always positive) is checked against GHL / GLL limits if these are non-zero. A violation is alarmed.

A new CV is checked against H / HH limits, if these are non-zero. A violation is alarmed.

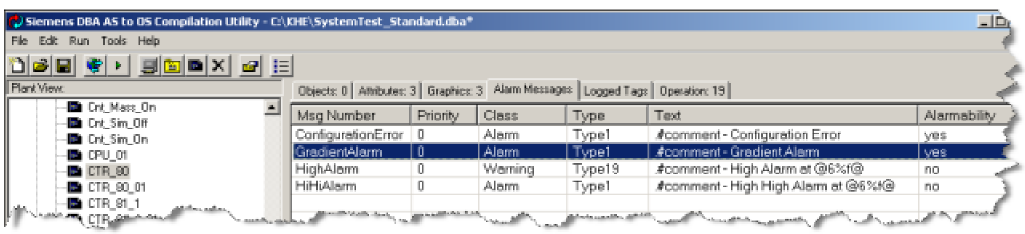
Basic configuration that if incorrect could lead to an invalid Counter is checked. When incorrect, a configuration error alarm is activated and that prevents calculation of the counter value. A negative counter value and a negative gradient also trigger the configuration alarm. The alarm is reset the next time a valid CV is calculated.

All of these alarm conditions are summarized in the table below.

Name	Class	Type	Configured by Default	Condition Description
High High Alarm	Alarm	Alarm High	ALM Bit 0 set	CV > HH
High Warning	Warning	Warning High	ALM Bit 1 set	CV > H
Configuration Error	Process Control System	Error	ALM Bit 5 set	CEA=1
Gradient Alarm	Alarm	Alarm High	ALM Bit 6 set	GA=1 (GRAD > GHL or GRAD < GLL)

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an Analog Value object instance from the Plant View and select the "Alarm Messages" tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Alarmability" column of this window can be used to permanently enable or disable any alarm.

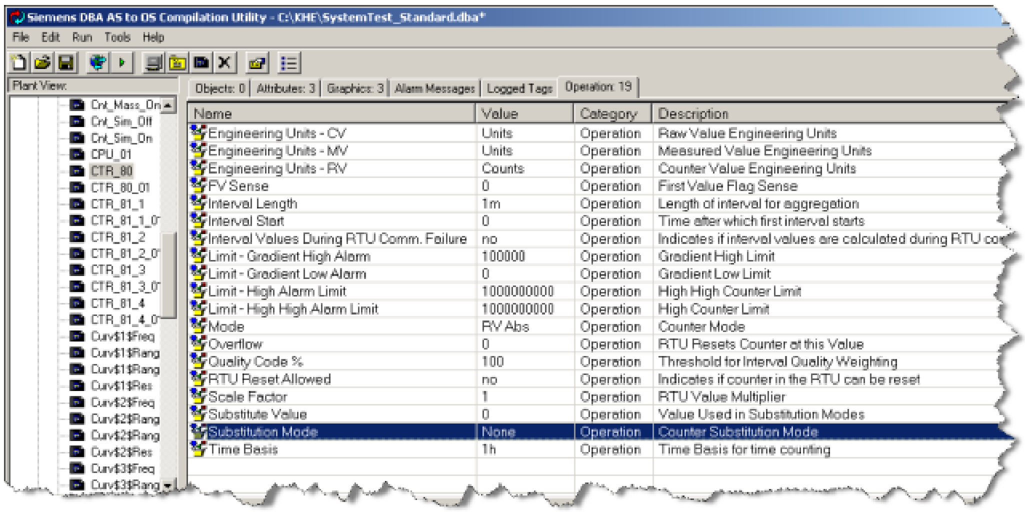


3.4.1.7 Counter Operational Parameters

Configuring operational characteristics

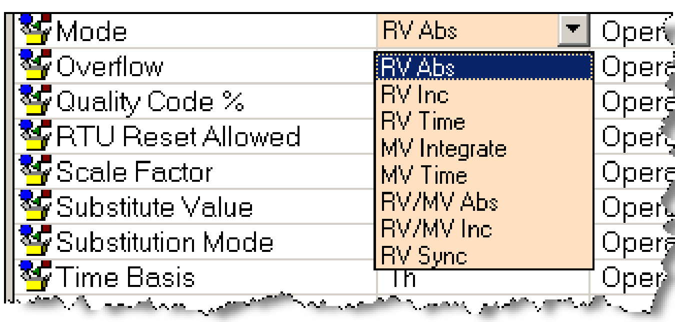
The operational characteristics of a Counter object instance can be configured in DBA.

1. Select a Counter object instance from the Plant View.
2. elect the "Operations" tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Mode

Indicates the calculation mode for the Counter. Clicking on the Value column provides a drop list from which a mode can be selected.

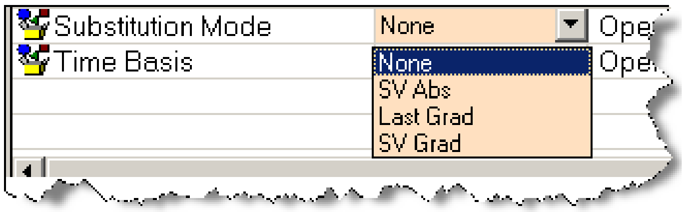


The following modes are available:

- **RV Abs** - RV is absolute counter value
- **RV Inc** - RV is counter increment since last transmission
- **RV Time** - RV is status, count time where status was 1 (e.g. count operating hours)
- **MV Integrate** - Integrate from indirectly addressed measured value
- **MV Time** - MV is status, count time where status was 1 (e.g. count operating hours
- **RV/MV Abs** - RV is absolute counter value, use measured value for weighing of counter increment before accumulation (e.g. calculate energy equivalents from gas volume and heating value)
- **RV/MV Inc** - RV is increment, use measured value to calculate weighted increment before accumulation
- **RV Sync** - RV is absolute counter value. CV is synchronized with RV and rolls over when RV rolls over.

Substitute Mode

Indicates the substitution mode. The substitution mode is employed when the input value (RV or MV) has bad quality, for example. Clicking on the Value column provides a drop list from which a substitution mode can be selected.



The following substitution modes are available:

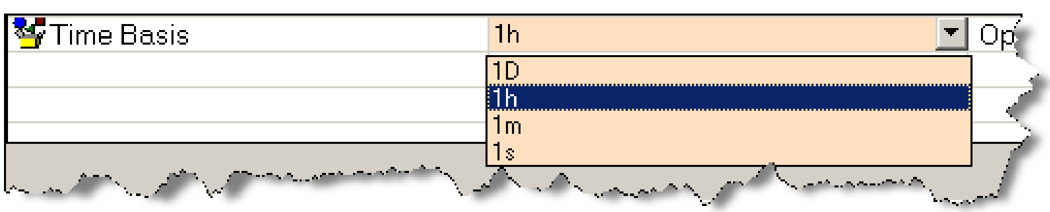
- **None** - No substitution
- **SV Abs** - Substitute value is a manually entered absolute value
- **Last Grad** - Use last gradient to calculate new values in 1 minute intervals
- **SV Grad** - Use substitution value given in SV as gradient to calculate new values in 1 minute intervals

Substitute Value

Indicates the initial substitute value to be used for substitution when Substitute Mode is "SV Abs". Any floating point value can be configured.

Time Basis

The time basis to be used for the gradient calculation and for counting. Clicking on the Value column provides a drop list from which a Time Basis can be selected.

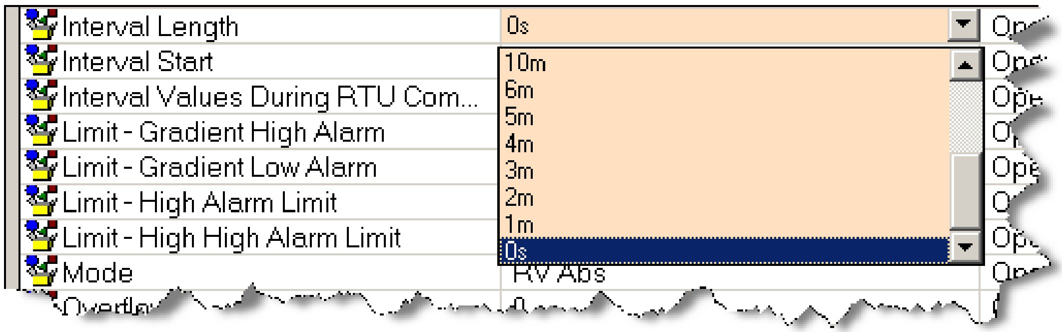


The following gradient Time Basis can be selected

- 1D - Gradient computed in terms of changes per day
- 1h - Gradient computed in terms of changes per hour
- 1m - Gradient computed in terms of changes per minute
- 1s - Gradient computed in terms of changes per second

Interval Length

Length of interval for interval aggregation. Clicking on the Value column provides a drop list from which an Interval Length can be selected.

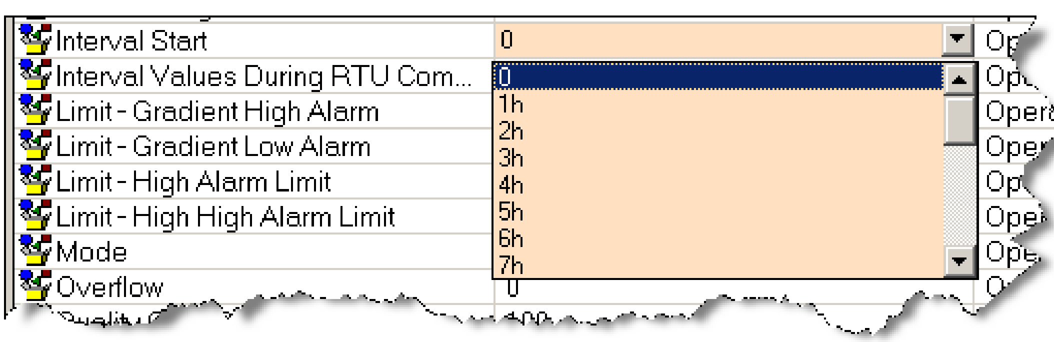


The following interval lengths can be configured:

- 0s - no interval calculation
- 1W - Interval is 1 Week
- 1D - Interval is 1 Day
- 1h - interval is 1 hour
- 30m - interval is ½ hour
- 15m - interval is 1/4 hour
- 12m - interval is 12 minutes
- 10m - interval is 10 minutes
- 6m-1m - interval is 6 , 5, 4, 3, 2 or 1 minutes

Interval Start

Indicates at which point within the interval the calculation is to begin. This provides a kind of offsetting capability for the interval calculation. Clicking on the Value column provides a drop list from which an Interval Start can be selected. The exact drop down will be dependent on the interval length.



For weekly intervals, a list of the days of the week is shown.

For daily intervals, a list of the hours of the day is shown.

For hourly intervals, a list of the minutes of the hour is shown.

For any of the minute interval lengths, a list of the seconds of the minutes is shown.

In all cases, 0 can be selected if no starting offset is required.

Quality Code %

Indicates the percentage of time during an interval that must be good and/or substituted quality in order that the interval quality is not reported as "BAD". Any floating point value in the range of 0 to 100 can be specified.

Limit – Gradient High Alarm

When the GRAD exceeds this value, a Gradient Alarm will be generated. Any floating point value can be configured.

Limit – Gradient Low Alarm

When the GRAD is lower than this value, a Gradient Alarm will be generated. Any floating point value can be configured.

Limit – High High Alarm

When the CV exceeds this value, a High Alarm will be generated. Any floating point value can be configured.

Limit – High Alarm

When the CV exceeds this value, a High Warning will be generated. Any floating point value can be configured.

Overflow

Indicates the value at which the RTU will reset the counter. Any floating point value can be configured.

Scale Factor

RTU value will be multiplied by scale factor prior to any further processing. Any floating point value can be configured.

Engineering Units - CV

The text that will be used to identify the CV value of the Counter on HMI pictures. Free form text entry is allowed.

Engineering Units - RV

The text that will be used to identify the RV value of the Counter on HMI pictures. Free form text entry is allowed.

Engineering Units - MV

The text that will be used to identify the MV value of the Counter on HMI pictures. Free form text entry is allowed.

Interval Values During RTU Comm Failure

Indicator of whether or not intervals should be calculated when communication with the RTU is not possible. Clicking on the Value column provides a drop list from which a value of "Yes" or "No" can be selected.

RTU Reset Allowed

Indicator of whether or not the RTU supports resetting of the counter. The Counter faceplate will include a "Reset" button if this value is configured as "Yes". Clicking on the Value column provides a drop list from which a value of "Yes" or "No" can be selected.

FVSense

The sense of the First Value (FV) indicator for the Counter. Clicking on the Value column provides a drop list from which a value of "1" or "0" can be selected.

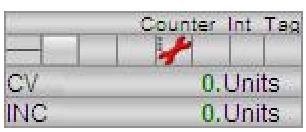
Gradient Alarm Gliding Average (GAVP)

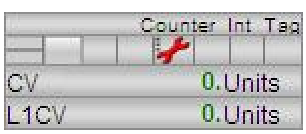
Allows for the specification of a smoothing function for the computation of the gradient. If non-zero, this indicates the time, in seconds, used to compute a "smoothed" gradient. A gliding average of all counter deltas is computed based on the period specified, and this gliding average is the basis for computing the gradient and gradient alarms.

If zero, no smoothing occurs, the gradient is computed based on the instantaneous change between individual counter changes. Note that without smoothing, it is possible that spurious gradient alarms can result if there is a large change between one reading of the counter and the next reading. Use of the gliding average can eliminate such spurious alarms.

3.4.1.8 Counter Symbol Display

There are four possible counter symbols from which to choose:



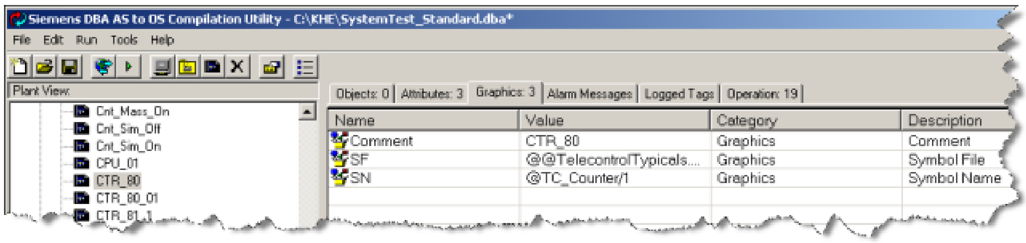


The Substitution Indicator appears when the CV is a substitute value.

The symbols are named from left to right:

@TC_COUNTER/1, @TC_COUNTER/2, @TC_COUNTER/3 and @TC_COUNTER/4.

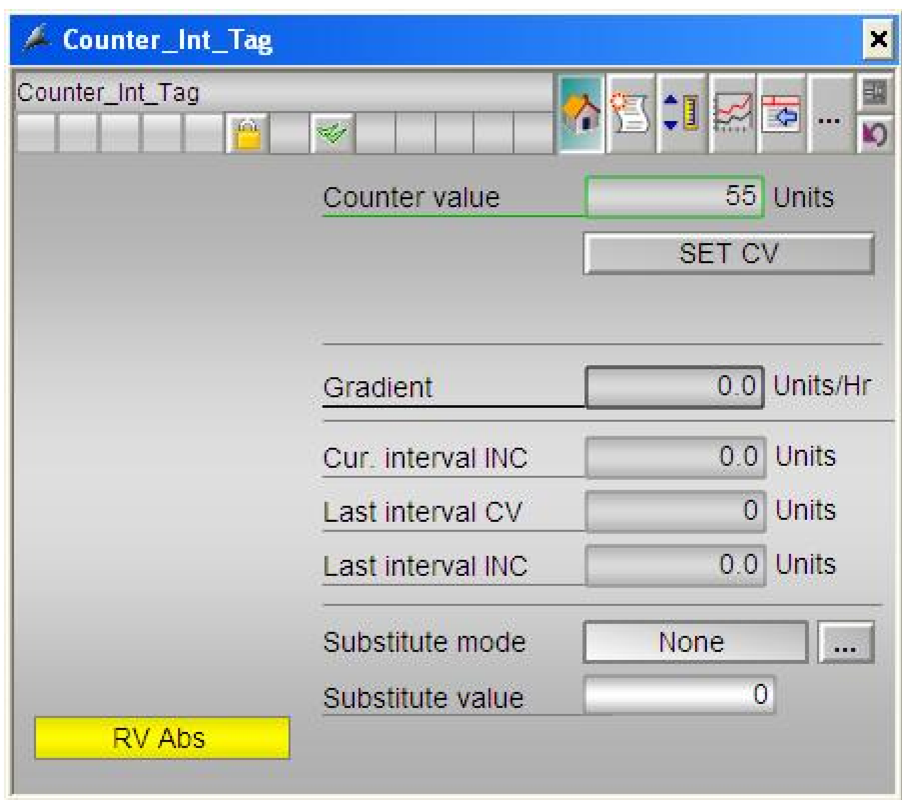
By default, symbol 1 is selected, but this can be changed on a per instance basis. In DBA, select a Counter object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.4.1.9 Counter Faceplate

Counter Faceplate: Standard View



Data Entry

Note

Level 5 permissions are required to be able to press the buttons, check the checkbox or enter values.

Entry Field	Action	Description
Forced	SForcing=1	Clicking the Forcing checkbox, causing it to be checked, turns on forced substitution. Clicking the Forcing checkbox, causing it to be unchecked, turns off forced substitution.
Reset	R=1	Reset the counter in the RTU. NOTE : Only visible if Resettable=1 (as configured in DBA)
Substitute Mode	SUBS=0-3, based on selection	Clicking the Substitute Mode field allows an operator to change the substitute mode. A panel with 4 choices is displayed. The operator selects one.
Substitute Value	SV=entered value	Clicking the Substitute Value field opens the analog input box to allow an operator to enter a new substitute value. In substitute mode 1 (SV Abs), that triggers the calculation of a new CVABS and possibly, a new CV and interval values.
Set CV	SET_CV=entered value	The Set CV button allows an operator to set a new value for the CV. Setting the CV does not trigger interval calculations. When the button is pressed, an analog input box is opened to allow the operator to enter a new CV value. NOTE : This button is not shown if Mode=8

Indicators

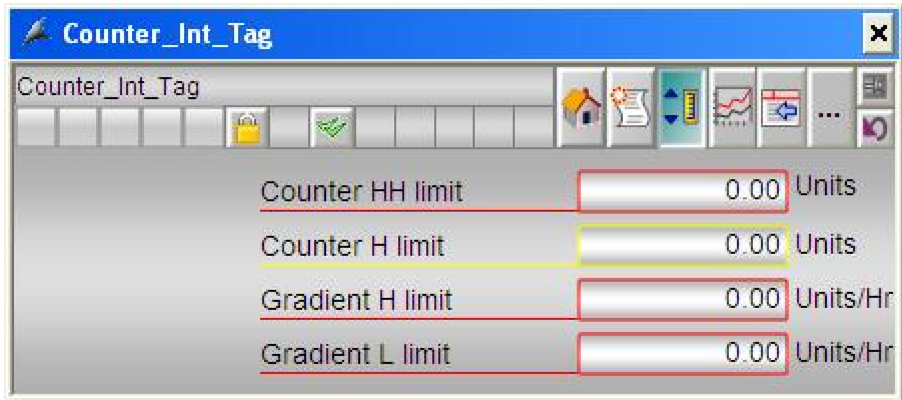
Indicator	Meaning	Tag	Note
CV	Current Value	CV	
Gradient	Current Gradient	GRAD	
Current Interval INC	Counter interval value in the current increment	INC	Based on quality of the CV computed at the end of the last interval
Last Interval CV	Counter’s displayed value at end of last interval	L1CV	Based on quality of the CV computed at the end of the last interval
Counter Mode	Counter Mode	Mode	See Mode description above in section Inputs
Substitute Mode	Substitute Mode	SUBS	See SUBS description above in section Inputs
Substitute Value	Substitute Value	SV	Only used in SUBS mode 1,3,4
Forced	Checkbox indicates if Forced Substitution is in effect	SForcing	

Note

The colored lines under the CV, Gradient, and Current Interval INC labels indicate the color of the line used in the trend pane for each of those values.

Counter Faceplate: Limits View

This view indicates the current limits set for the Counter. It also allows the limits to be changed.



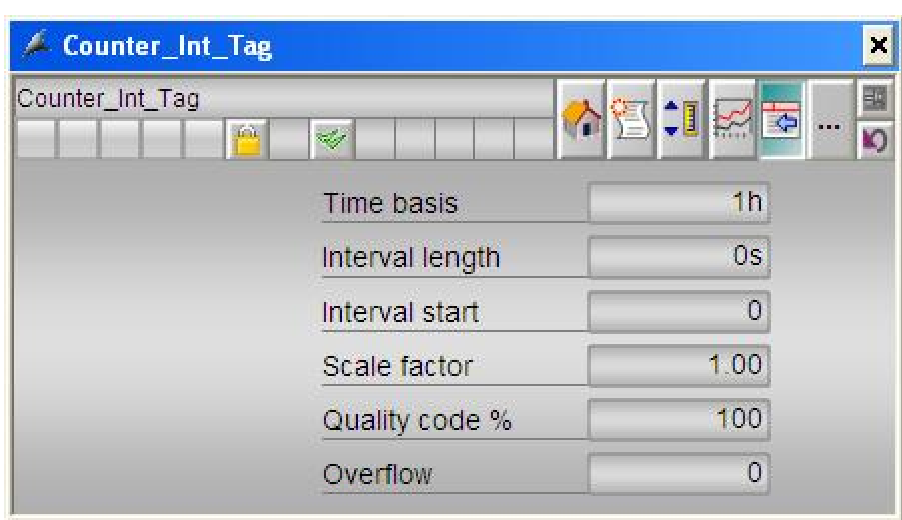
Data Entry

Note

Level 6 permissions are required to enter values.

Entry Field	Action	Description
Current High High Limit	HH=entered value	Allows entry of the value which, when exceeded by CV, will generate a High Alarm
Current High Limit	H=entered value	Allows entry of the value which, when exceeded by CV, will generate a High Warning
Gradient High Limit	GHL=entered value	Allows entry of the value which, when exceeded by GRAD, will generate a Gradient High alarm
Gradient Low Limit	GLL=entered value	Allows entry of the value which, when GRAD exceeds, will generate a Gradient Low Alarm

Counter Faceplate: Parameters View

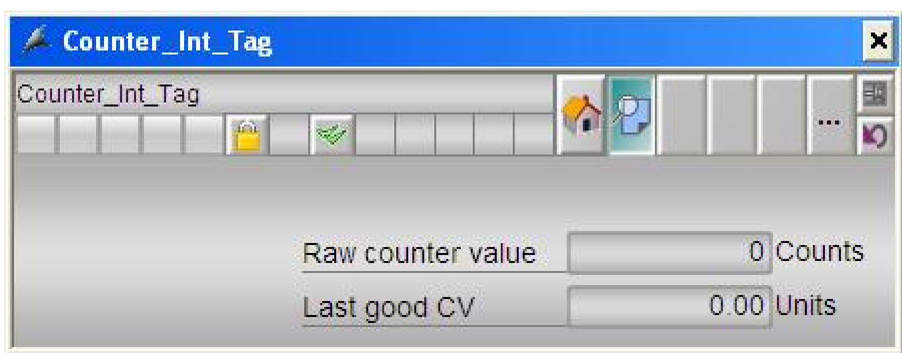


This view indicates how the Counter has been configured in DBA.

Indicators

Indicator	Meaning	Tag
Time Basis	Time basis for time counting and gradient check	TB
Interval Length	Length of interval for aggregation.	TIL
Interval Start	Time after which first interval starts.	TIS
Scale Factor	RTU value will be multiplied by scale factor prior to any further processing.	L1CV
Quality Code %	% of time good quality is required in order to report intervals as good quality	QCPCT
Overflow	Value after which raw value from RTU restarts from zero	OV

Counter Faceplate: Diagnostic View



This view indicates intermediate computed values for the Counter.

Indicators

Indicator	Meaning	Tag
Raw Counter RV	Last raw value received from the RV	RV
Last Good CV	Last CV computed with good quality	LGCV

Counter Faceplate: Alarm View

This view indicates all active Alarm conditions for the Counter.

Counter Faceplate: Trend View

This view shows a live trend for the key values of the Counter.

The following pens are defined:

- Green – CV
- Yellow - Gradient
- Magenta - Current Interval Increment

For Trend and message views see general description.

3.4.2 IEC850 Counter

The IEC850 Counter is identical to the Counter type described in section Counter (Page 45) except for the differences described in the sections below.

3.4.2.1 IEC850 Counter Inputs

IEC850 Counter Inputs

The IEC850 Counter Inputs are identical to the Counter Inputs described in section Counter Inputs (Page 45), with one additional tag added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
FV	First Value Flag	Ext	BYTE	-	No	Not Used
FVSense	First Value Sense	Int	BYTE	255	No	255, indicating that FV tag is not used and will not be checked when process-ing counter changes
R	Reset	Ext	BYTE	-	No	Not Used
Resettable	Reset Allowed	Int	BIT	0	No	0, indicatng that the Counter is not re-settable

3.4.2.2 IEC850 Counter Outputs

IEC850 Counter Outputs

The IEC850 Counter Outputs are identical to the Counter Outputs described in section Counter Outputs (Page 47), with one additional tag added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specifica-tion for details)

3.4.2.3 IEC850 Counter Description

IEC850 Counter Description

The behavior or the IEC850 Counter is identical to the behavior of the Setpoint as described in section Counter Description (Page 49) , except that First Value checking of the FV tag is not performed, as described in the subsection "Handling RTU Reset". The FVSense tag is preset to 255 (and cannot be reconfigured), which indicates that FV tag checking is not supported.

In addition, the value of the tag Resettable is preset to 0 (and cannot be reconfigured), so manual RTU Reset is not supported.

3.5 Measured Value Library Objects

Analog values such as pressures, temperatures and flows in a pipeline network are important information that need proper evaluation, averaging, and archiving. The measured value library objects provide a range of options for handling such values.

See also

Measured Value (Page 68)

Scaled Measured Value (Page 87)

Simple Measured Value (Page 92)

3.5.1 Measured Value

3.5.1.1 Measured Value Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item (configurable as *Operation* parameter in DBA); Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
#comment	Comment	Int	String	-	Config	Description of the object instance
#areaname	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on Plant View placement)
RV	RTU Value	Ext	Float	-	-	Raw value from RTU
SV	Substitution Value	Int	Float	0	Input	Substitution value
IV	Internal Input Value	Ind	Float	-	-	Indirect input value

Mode	Measured Value Mode	Int	Integer	1	Config	1: calculate from RTU value 2: use IV to calculate AVG, MIN, MAX etc. from internal input value
TB	Time Basis	Int	String	1h	Config	Time basis for gradient calculation. One of 1D, 1h, 1m, 1s
TIL	Interval Length	Int	String	0s	Config	Length of interval for aggregation. Valid values: 1W, 1D, 1h, 30m, 20m, 15m, 12m, 10m, 6m, 5m, 4m, 3m, 2m, 1m, 0s. 0s = No aggregation.
TIS	Interval Start	Int	String		Config	Time after which first interval starts. Relative to interval length. Valid values: 1-6D, 1-23h, 1-59m Interval Start must be < Interval Length. E.g. TIL = 1D, TIS = 6h means a day's interval running from 6:00 to 6:00.
SRLL	Scaling range lower limit	Int	Float	0	Config	Lower limit for raw value
SRUL	Scaling range upper limit	Int	Float	1	Config	Upper limit for raw value
PLL	Physical value lower limit	Int	Float	0	Config	Lower limit in physical units
PUL	Physical value upper limit	Int	Float	1	Config	Upper limit in physical units
H	High Limit	Int	Float	0	Config	Warning high limit
HH	High High Limit	Int	Float	0	Config	Alarm high limit
L	Low Limit	Int	Float	0	Config	Warning low limit
LL	Low Low Limit	Int	Float	0	Config	Alarm low limit
GHL	Gradient High Limit	Int	Float	0	Config	Rate of change beyond which measured value change will generate alarm; in units / time basis.
GLL	Gradient Low Limit	Int	Float	0	Config	Rate of change below which measured value change will generate alarm; in units / time basis. Negative for changes in downward direction.
HY	Hysteresis	Int	Float	0	Config	Alarm hysteresis - 0 to 100%, interpreted as percent of range
HY_ZERO	Zero Value Hysteresis	Int	Float	0	Config	Zero value hysteresis - PV values below this value are set to 0

AVGM	Averaging Mode	Int	Integer	1	Config	1: build average from spontaneously transmitted values 2: build average from averages 3: build average from spontaneously transmitted values, do not calculate intermediate intervals with no RTU value recorded 4: build average from averages, do not calculate intermediate intervals with no RTU value recorded
GAVP	Gliding Average Period	Int	Integer	0	Config	Time period for building the gliding average, given in seconds
SUBS	Substitution Mode	Int	Integer	0	In/Out	0: No substitution 1: Use last known good as PV 2: Use RAVG as PV 3: Use LAVG as PV 4: Use GAVG as PV 5: Use substitution value as PV
QCPCT	Quality Code Percentage	Int	Integer	100	Config	Percentage of time during which quality needs to be at least x in order to result in an aggregated quality of x. E.g., if QCPT = 80 and QC is "GOOD" for 84% of the time, resulting QC is "GOOD".
SForcing	Forced Substitution	Int	Binary	0	Input	When set to 1, calculate CV from substituted value regardless of the quality of RV/MV
IMODE	Calculate interval values from substituted CV	Int	Binary	0	Config	When set to 1, and the CV is a substituted value that has changed, then interval values are calculated. When set to 0, interval values are only calculated when CVABS changes and is used as the new CV

The MODE input variable indicates which mode is to be used.

When using mode 1, a valid RTU address must be configured for the RV input when the instance is created with the DBA Instance Editor. RTU addresses are configured using the **Data** tab of the Instance Editor. (In this case, the IV may remain unlinked to any tag.)

When using mode 2, a linkage must be created between the IV input and another tag in the system when the instance is created with the DBA Instance Editor. Linkages are configured using the **Data** tab of the Instance Editor. (In this case, the RV may remain as unconfigured.)

3.5.1.2 Measured Value Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PV	Present Value	Int	Float	-	Output, Archive	Measured value’s current value.
ALM	Alarm	Int	Word	-	Output	Aggregate alarm
GAVG	Gliding Average	Int	Float	-	Output	Gliding average
GRAD	Gradient	Int	Float	-	Output	Rate of change (in Units / TB)

RMAX	Running Maximum	Int	Float	-	Output	Maximum of measured value during running interval
RMIN	Running Minimum	Int	Float	-	Output	Minimum of measured value during running interval
RAVG	Running Average	Int	Float	-	Output	Average of measured value during running interval
L1MAX	Last Maximum	Int	Float	-	Output, Archive	Maximum of measured value during last interval
L1MIN	Last Minimum	Int	Float	-	Output, Archive	Minimum of measured value during last interval
L1AVG	Last Average	Int	Float	-	Output, Archive	Average of measured value during last interval
L1END	Last End Value	Int	Float	-	Output, Archive	Measured value at end of last interval
L2MAX	Last Maximum	Int	Float	-	Output, Archive	Maximum of measured value during 2nd last interval
L2MIN	Last Minimum	Int	Float	-	Output, Archive	Minimum of measured value during 2nd last interval
L2AVG	Last Average	Int	Float	-	Output, Archive	Average of measured value during 2nd last interval
L2END	Last End Value	Int	Float	-	Output, Archive	Measured value at end of 2nd last interval

L2xxx is available for use in pictures, in case the customer wants to see values from the 2nd last interval.

3.5.1.3 Measured Value Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
LPV	Last PV	Int	Float	-	-	PV calculated from last RTU raw value
LGPV	Last good PV	Int	Float	-	-	Last known good PV
TGOOD	"Good" time	Int	Integer	-	-	Number of seconds in current interval during which QC was "GOOD"
TSUBS	"Substituted" Time	Int	Integer	-	-	Number of seconds in current interval during which QC was "SUBSTITUTED"
TBAD	"Bad" Time	Int	Integer	-	-	Number of seconds in current interval during which QC was "BAD"

3.5.1.4 Measured Value Description

Introduction

The Telecontrol Measured Value calculates a value, PV, using raw values from the RTU or some other designated tag. Such values represent measurements taken in the field. These raw values are then scaled to values suitable for display and archiving.

When the quality of the field measurements is bad, substitution rules are invoked to calculate values for PV. The Measured value object also provides the ability to force substitution. A substitute PV is treated as a regular PV in the history of the measured value and in the calculation of interval values. Only the quality of calculated values might indicate that a substitution took place.

Measured Value Modes

There are 2 modes. Mode 1 uses the raw RTU value, RV, as input to all calculations. Mode 2 uses the indirect tag, IV, as input to all calculations. Mode 2 allows the use of a tag external to the measured value as input. Calculation of all measured value outputs is the same regardless of whether RV or MV is used for input.

Scaling – Calculating PV and LPV

The input value RV or IV is scaled to produce the measured value PV. Scaling is based on two ranges: SRLL/SRUL and PLL/PUL. SRLL and SRUL are the lower and upper bounds of the input value. PLL and PUL are the lower and upper bounds of the PV. PV is a result of scaling the input value from SRLL/SRUL to PLL/PUL using linear interpolation.

If the input value is outside the range SRLL/SRUL, then it is still scaled as described above, but should end up outside the PLL/PUL range. In such a case, the range violation alarm RA is triggered.

Before calculating the new PV from the input value, the current PV is copied into LPV together with its timestamp and quality.

Averaging Modes

There are four averaging modes (1-4). AVGM stores the current mode. In averaging modes 1 and 3, the values received from the RTU are measured values. In averaging modes 2 and 4, the values received from the RTU are averages. In averaging modes 3 and 4, no aggregate calculations will be done for missed intervals (no new RV/IV).

Gliding Average – Calculating GAVG

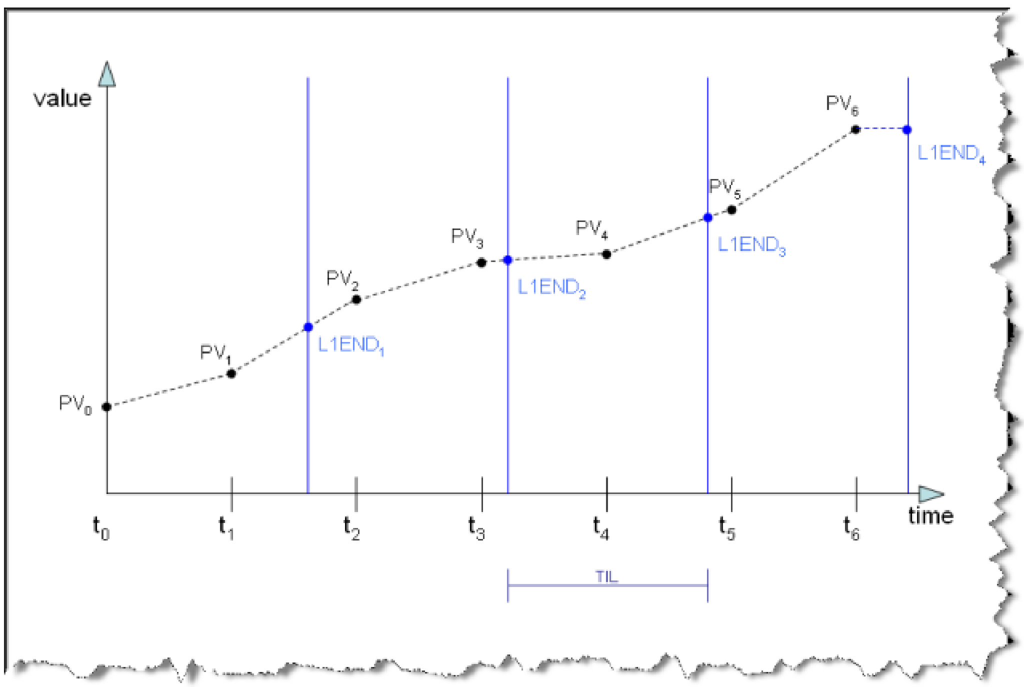
The user specifies a time, GAVP, in seconds, over which the gliding average is calculated. The following table shows how the average is calculated assuming that t1 and t2 represent the time of the LPV and PV respectively and ΔT = t2 - t1.

Average Mode (AVGM)	How GAVG is calculated
1	If ΔT >= GAVP then GAVG = LPV Else GAVG = (oldGAVG * (GAVP – ΔT) + LPV * ΔT) / GAVP
2	If ΔT >= GAVP then GAVG = PV Else GAVG = (oldGAVG * (GAVP – ΔT) + PV * ΔT) / GAVP
3	If ΔT >= GAVP then GAVG = LPV Else GAVG = (oldGAVG * (GAVP – ΔT) + LPV * ΔT) / GAVP
4	If ΔT >= GAVP then GAVG = PV Else GAVG = (oldGAVG * (GAVP – ΔT) + PV * ΔT) / GAVP

Interval Calculations

Under normal circumstances when the RTU is properly connected and communicating, PV is calculated whenever RV or IV change, depending on the mode. The user may want additional statistics calculated on a regular basis. In such a case, the user can specify the interval for the calculations.

The specification of the interval time is done by setting two tags. TIL specifies the time interval. TIS specifies the starting point within the interval. For example, if TIL is "1D" and TIS is "15h", then calculations are done daily on the interval from 3pm the previous day to 3pm the current day. New interval values are calculated at the time of the first PV after 3pm.



Interval Value Calculations – Current Interval

When a new PV is calculated the current interval is partially complete. At that time, if interval calculations are being done, additional values are calculated for the partial interval: RMIN, RMAX, and RAVG.

RMIN is the lowest value of the PVs calculated so far in the interval. RMAX is the highest value of the PVs calculated so far in the interval.

RAVG is a running average of the PVs calculated so far in the interval. The following table shows how RAVG is calculated based on the average mode, AVGM; the time of the end of the last interval, t1; the time of LPV, t2; and the time of the new PV, t3.

Average Mode (AVGM)	How RAVG is calculated
1	RAVG = (oldRAVG * (t2 – t1) + LPV * (t3 - t2)) / (t3 – t1).
2	RAVG = (oldRAVG * (t2 – t1) + PV * (t3 - t2)) / (t3 – t1).
3	RAVG = (oldRAVG * (t2 – t1) + LPV * (t3 - t2)) / (t3 – t1).
4	RAVG = (oldRAVG * (t2 – t1) + PV * (t3 - t2)) / (t3 – t1).

Interval Value Calculations – Previous Intervals

If when a new PV is calculated, one or more intervals ended in the elapsed time since LPV, interval aggregate value calculations are made. If more than one interval completed, each interval's values are calculated so that they may be archived.

Interval calculation of the measured value is stored in L1END. This represents the measured value at the end of the last interval. Additional last interval values L1MAX, L1MIN and L1AVG are also calculated.

L1MIN, L1MAX, and L1END are calculated according to the following table.

Average Mode (AVGM)	L1MIN	L1MAX	L1END
1	RMIN	RMAX	LPV
2	MIN(RMIN, PV)	MAX(RMAX, PV)	PV
3	RMIN	RMAX	LPV
4	MIN(RMIN, PV)	MAX(RMAX, PV)	PV

L1AVG is a running average of PV or LPV, and the old RAVG that was calculated when LPV was calculated. Whether PV or LPV is used depends on the averaging mode AVGM. It is calculated according to the table above that describes the calculation of RAVG.

After calculation of the last interval values, initial values for the current interval are calculated as shown in the table below.

Average Mode (AVGM)	RMIN	RMAX	RAVG
1	MIN(PV, LPV)	MAX(PV, LPV)	LPV
2	PV	PV	PV
3	MIN(PV, LPV)	MAX(PV, LPV)	LPV
4	PV	PV	PV

When multiple intervals ended since LPV, and the average mode AVGM is 1 or 2, values for the intermediate intervals during which no input value was received are calculated as:

For AVGM = 1 : L1MIN = L1MAX = L1END = L1AVG = LPV

For AVGM = 2 : L1MIN = L1MAX = L1END = L1AVG = PV

When multiple intervals ended since LPV, and the average mode AVGM is 3 or 4, aggregate values for the intermediate intervals during which no input value was received are not calculated. This is useful to avoid archiving multiple values that are the same.

Each time new L1END, L1MAX, L1MIN and L1AVG values are calculated, the previous instances are stored in L2END, L2MAX, L2MIN, and L2AVG respectively.

Interval Quality Calculation – Current Interval

Three tags, TGOOD, TBAD, and TSUBS, are maintained to represent the number of seconds the PV's quality was GOOD, BAD, or SUBSTITUTED in the current interval. Whenever a new PV is calculated, these are updated.

These three tags along with QCPCT are used to calculate the quality for the current interval so far. QCPCT is a percentage (0-100). The following algorithm shows how the quality is calculated:

```
If (TGOOD / Elapsed Time) >= QCPCT
            Quality is GOOD
Else if ((TGOOD + TSUBS) / Elapsed Time) >= QCPCT
            Quality is SUBSTITUTED
Else
            Quality is BAD
```

RMAX, RMIN, and RAVG are stored with this quality

Interval Quality Calculation – Previous Intervals

At the end of each interval, TGOOD, TBAD, TSUBS, and QCPCT are used to determine the overall quality of the completed interval using the above algorithm. L1END, L1MAX, L1MIN and L1AVG are stored with resulting quality. L2END, L2MAX, L2MIN and L2AVG are stored with the quality of the previous L1END, L1MAX, L1MIN and L1AVG.

Substitution Modes

When the quality of the RV or IV is bad, substitution rules are invoked to calculate a new PV. The substitution mode, SUBS, determines which rule is used to calculate PV.

The following table shows how PV is calculated in each substitution mode:

Substitution Mode	How PV is calculated
0	PV is calculated from bad RV or IV
1	PV = last known good PV
2	PV = RAVG
3	PV = LAVG
4	PV = GAVG
5	PV = SV

Quality of non-interval-related tags

The quality of all external tags is the quality provided by the channel – the WinCC quality.

The quality of all internal configuration tags (inputs) is always good.

The quality of PV and LPV is GOOD when calculated from an RV or IV whose quality is GOOD, SUBSTITUTED when substitution rules invoked, or BAD if RV/IV are bad and SUBS=0.

Gradient Calculation

After calculation of the PV, the gradient can be calculated as follows: GRA=PV - LPV/ΔT where ΔT is the time difference between LPV and PV, expressed in units of TB.

Gradient Smoothing

If a gliding average calculation has been configured, the gradient calculation is calculated on the gliding average instead of the PV, providing a smoothing effect. In this case, the gradient is calculated as GRAD=GAVG – GAVG_old/ ΔT expressed in units of TB, where ΔT is the time difference between LPV and PV, and GAVG_old is the previously calculated gliding average.

Timestamping, Interval Processing and Daylight Saving Time

Intervals 1D, 1W will be extended / shortened by 1 hour on the DST switching days. For Intervals <= 1 hour, additional intervals will be added affecting L1... and L2... attributes.

All internal calculations are strictly done using UTC which avoids any ambiguities or special behavior.

Any input timestamps are converted from local time as early as possible. Only the result timestamps are converted back to local time.

Zero Value Hysteresis

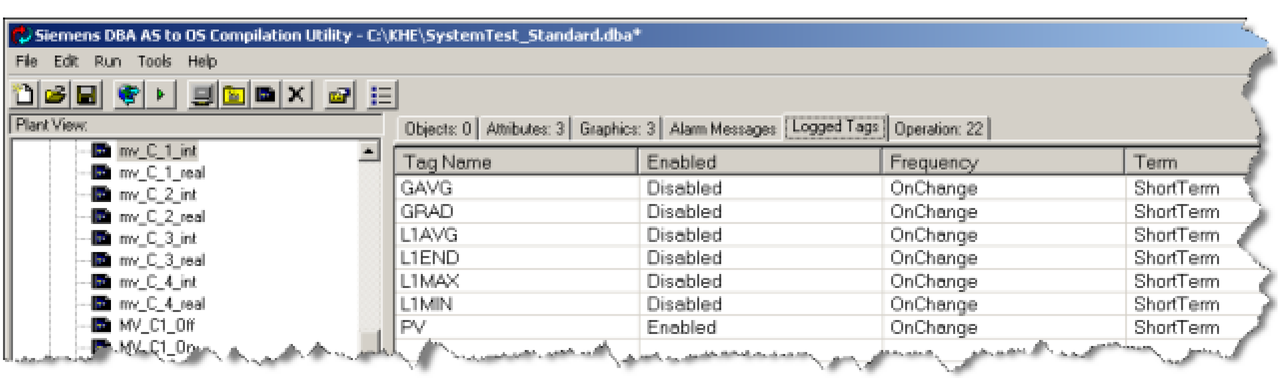
If, after scaling, the absolute value of PV is smaller than the zero value hysteresis, PV is set to zero.

3.5.1.5 Measured Value Archiving

The following values are available for archiving:

Tag Name	Archiving Behavior
PV	spontaneous archiving on value change
GAVG	spontaneous archiving on value change
GRAD	spontaneous archiving on value change
L1MAX	archiving on interval end
L1MIN	archiving on interval end
L1AVG	archiving on interval end
L1END	archiving on interval end

Tag Archiving for all of these tags is disabled by default, but can be enabled in DBA. Select a MeasuredValue object instance from the Plant View and select the **Logged Tags** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.



3.5.1.6 Measured Value Alarming

All alarms are integrated into the ALM tag, with one bit representing each alarm condition. Alarm limits are defined in separate tags.

The range limits are checked for validity. The scaling and physical lower limits must be less than the corresponding upper limits. When incorrect, a configuration error alarm is activated and the measured value is not calculated. The alarm is reset when a new value is received and the range limits are valid.

When the input value (RV or IV) is outside the range limits, a High Range Alarm or Low Range Alarm is triggered but PV is calculated.

The PV is checked against High High Alarm / High Warning / Low Warning / Low Low Alarm limits. A violation is alarmed. The going condition is only detected if PV leaves the "alarm zone" by more than HY.

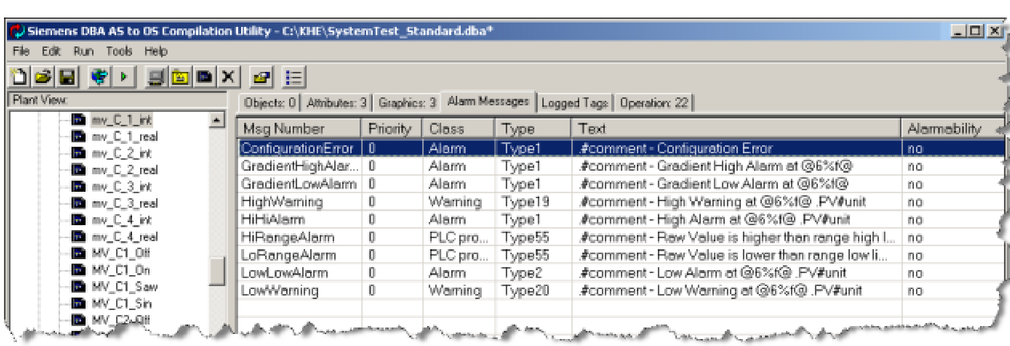
The gradient is checked against HHL (positive gradient) / GLL (negative gradient) limits. A violation is alarmed.

All of these alarm conditions are summarized in the table below.

Name	Class	Type	Configured by Default	Condition Description
High High Alarm	Alarm	Alarm Hgh	Yes	PV > HH
High Warning	Warning	Warning High	Yes	PV > H
Low Warning	Warning	Warning Low	Yes	PV < L
Low Low Alarm	Alarm	Alarm Low	Yes	PV < LL
High Range Alarm	Process Control System	Error	Yes	RV > SRUL
Low Range Alarm	Process Control System	Error	Yes	RV < SRLL
Configuration Error	Process Control System	Error	Yes	SRUL <= SRLL
Gradient High Alarm	Alarm	Alarm High	Yes	GRAD > GHL
Gradient Low Alarm	Alarm	Alarm Low	Yes	GRAD < GLL

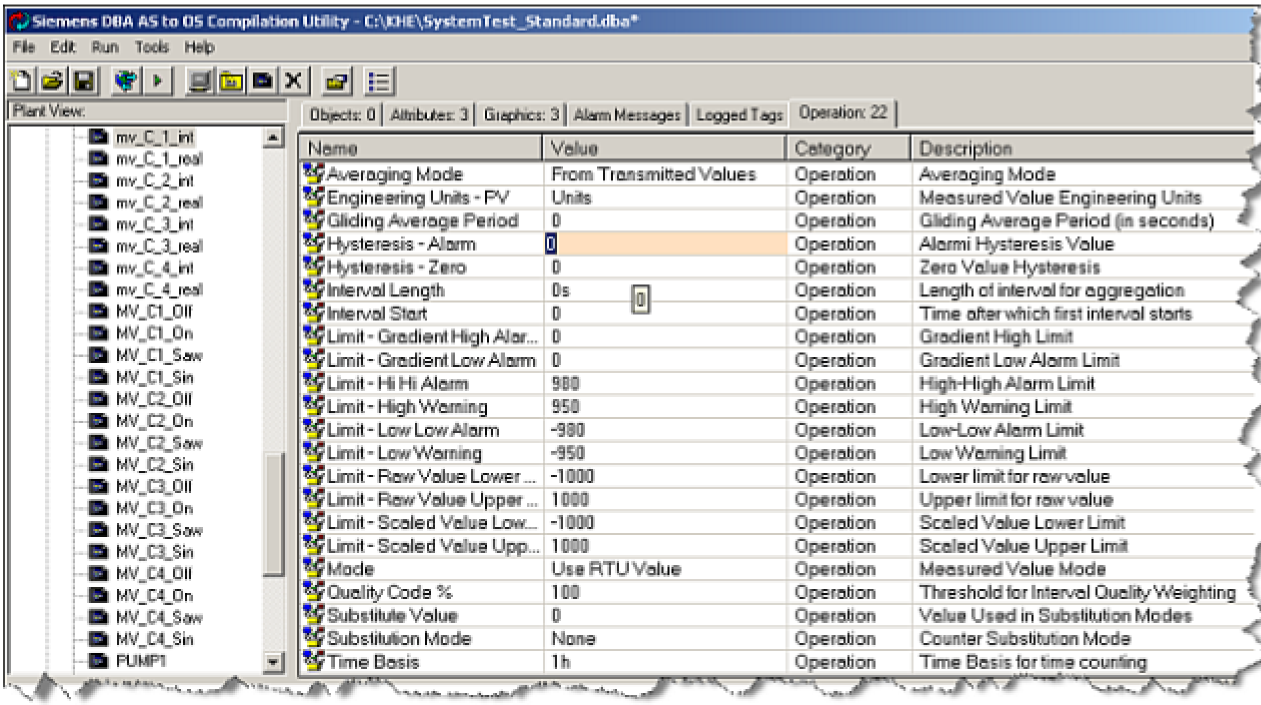
The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an Analog Value object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Alarmability" column of this window can be used to permanently enable or disable any alarm.



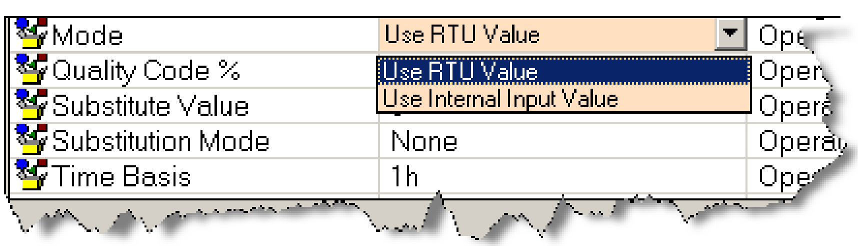
3.5.1.7 Measured Value Operational Parameters

The operational characteristics of a MeasuredValue object instance can be configured in DBA. Select a MeasuredValue object instance from the Plant View and select the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Mode

Indicates the calculation mode for the Measured Value. Clicking on the Value column provides a drop list from which a mode can be selected.

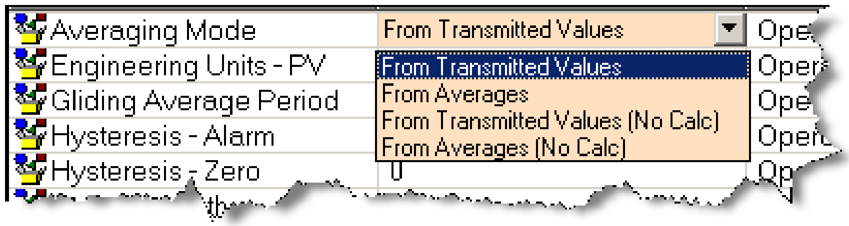


The following modes are available:

- Use RTU Value
- Use Internal Input Value

Averaging Mode

Indicates the averaging mode. Clicking on the Value column provides a drop list from which an averaging mode can be selected.

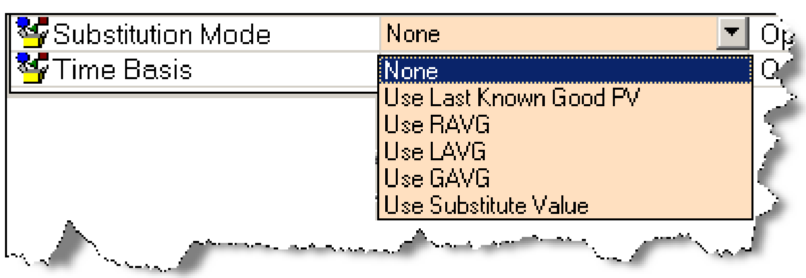


The following averaging modes are available:

- **From Transmitted Values** - build average from spontaneously transmitted values
- **From Averages** - build average from averages
- **From Transmitted Values (No Calc)** - build average from spontaneously transmitted values, do not calculate intermediate intervals with no RTU value recorded
- **From Averages (No Calc)** - build average from averages, do not calculate intermediate intervals with no RTU value recorded

Substitution Mode

Indicates the substitution mode. The substitution mode is employed when the input value (RV or IV) has bad quality. Clicking on the Value column provides a drop list from which a substitution mode can be selected.



The following substitution modes are available:

- **None** - No substitution
- **Use Last Known Good PV** - Use the last known good PV as the PV
- **Use RAVG** - Use the Running Average as the PV
- **Use LAVG** - Use the Last Interval Average (L1AVG) as the PV
- **Use GAVG** - Use the Gliding Average as the PV
- **Use Substitute Value** - Use the Substitute Value (SUBS) as the PV

Substitute Value

Indicates the initial scaled substitute value to be used for substitution when Substitute Mode is "Use Substitute Value". Any floating point value can be configured.

Gliding Average Period

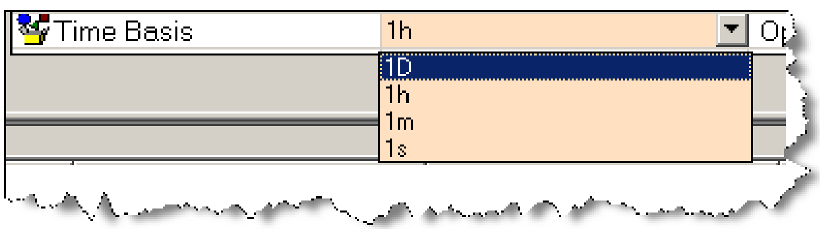
The period for the computation of a gliding average, in units of seconds. Any integer value can be specified.

Note

If gliding average period is non-zero, the computation of the gradient will be based on changes to the gliding average instead of changes between individual readings of the measured value, providing a smoothing of the gradient. Note that without smoothing, it is possible that spurious gradient alarms can result if there is a large change between one reading of the Measured Value and the next reading. Use of the gliding average can eliminate such spurious alarms.

Time Basis

The time basis to be used for the gradient calculation. Clicking on the Value column provides a drop list from which a Time Basis can be selected.

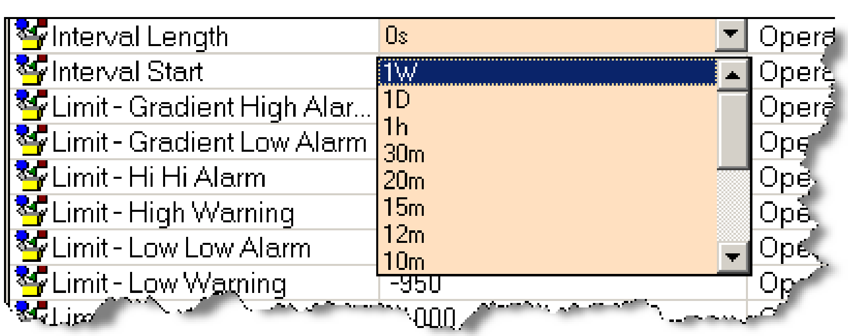


The following gradient Time Basis can be selected:

- 1D - Gradient computed in terms of changes per day
- 1h - Gradient computed in terms of changes per hour
- 1m - Gradient computed in terms of changes per minute
- 1s - Gradient computed in terms of changes per second

Interval Length

Length of interval for interval aggregation. Clicking on the Value column provides a drop list from which an Interval Length can be selected.



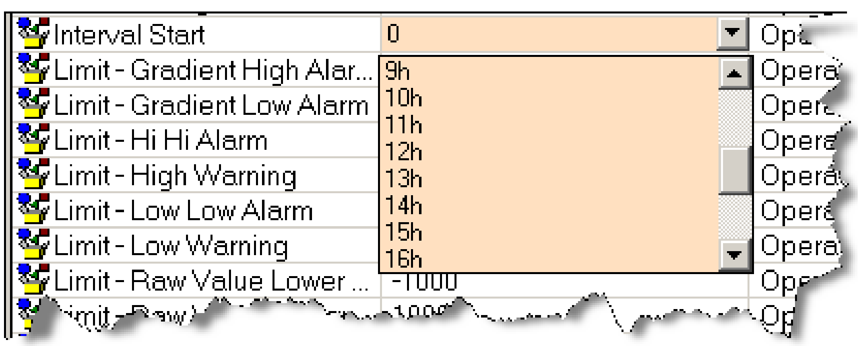
The following interval lengths can be configured:

- 0s - no interval calculation
- 1W - Interval is 1 Week

- 1D - Interval is 1 Day
- 1h - interval is 1 hour
- 30m - interval is ½ hour
- 15m - interval is 1/4 hour
- 12m - interval is 12 minutes
- 10m - interval is 10 minutes
- 6m-1m - interval is 6 , 5, 4, 3, 2 or 1 minutes

Interval Start

Indicates at which point within the interval the calculation is to begin. This provides a kind of offsetting capability for the interval calculation. Clicking on the Value column provides a drop list from which an Interval Start can be selected. The exact drop down will be dependent on the interval length.



For weekly intervals, a list of the days of the week is shown.

For daily intervals, a list of the hours of the day is shown.

For hourly intervals, a list of the minutes of the hour is shown.

For any of the minute interval lengths, a list of the seconds of the minutes is shown.

In all cases, 0 can be selected if no starting offset is required.

Quality Code %

Indicates the percentage of time during an interval that must be good and/or substituted quality in order that the interval quality is not reported as "BAD". Any floating point value in the range of 0 to 100 can be specified.

Limit – Gradient High Alarm

When the GRAD exceeds this value, a Gradient High Alarm will be generated. Any positive floating point value can be configured.

Limit –Gradient Low Alarm

When the GRAD is lower than this value, a Gradient Low Alarm will be generated. Any negative floating point value can be configured.

Engineering Units - PV

The text that will be used to identify the PV value of the Analog Value on HMI pictures. Free form text entry is allowed.

Hysteresis - Alarm

A hysteresis value that is used for returning from alarm. For any of the 4 Analog Value limit alarms (High Alarm, High Warning, Low Warning, Low Alarm), the alarm condition is reported as "gone" only when the PV value crosses the alarm limit by a percentage of the complete range that is greater this hysteresis value. This can be useful for eliminating nuisance alarms when a PV has a tendency to fluctuate by a small amount around an alarm limit. Any floating point value between 0 and 100 can be configured.

Hysteresis - Zero

If, after scaling, the absolute value of PV is smaller than the zero value hysteresis, PV is set to zero. Any floating point value can be configured.

Limit –Hi Hi Alarm

When the PV exceeds this value, a High Alarm will be generated. Any floating point value can be configured.

Limit –Hi Warning

When the PV exceeds this value, a High Warning will be generated. Any floating point value can be configured.

Limit – Lo Lo Alarm

When the PV becomes lower than this value, a Low Alarm will be generated. Any floating point value can be configured.

Limit – Lo Warning

When the PV becomes lower than this value, a Low Warning will be generated. Any floating point value can be configured.

Limit – Raw Value Lower Limit

Represents the lower limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Upper Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes lower than this value, a Low Range Alarm will be generated. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Raw Value Upper Limit

Represents the upper limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Lower Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes higher than this value, a High Range Alarm will be generated. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Scaled Value Lower Limit

Represents the lower limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Upper Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Scaled Value Upper Limit

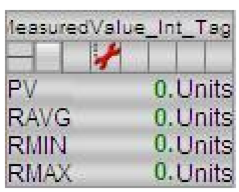
Represents the upper limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Lower Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

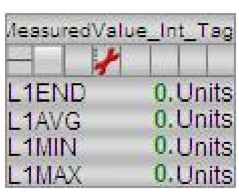
Interval Values During RTU Comm Failure

Indicator of whether intervals should be calculated when communication with the RTU is not possible. Clicking the Value column provides a drop list from which a value of "Yes" or "No" can be selected.

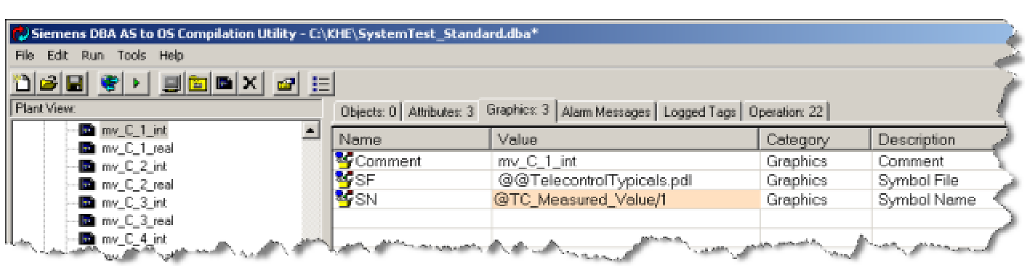
3.5.1.8 Measured Value Symbol Display

Three different symbols allow the user to choose relevant information for condensed display – current iteration values, last iteration values, or simply the current PV. All show an "S" next to the alarm group display if a substitute value is being used for PV.





By default, symbol 1 is selected, but this can be changed on a per instance basis. In DBA, select a MeasuredValue object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



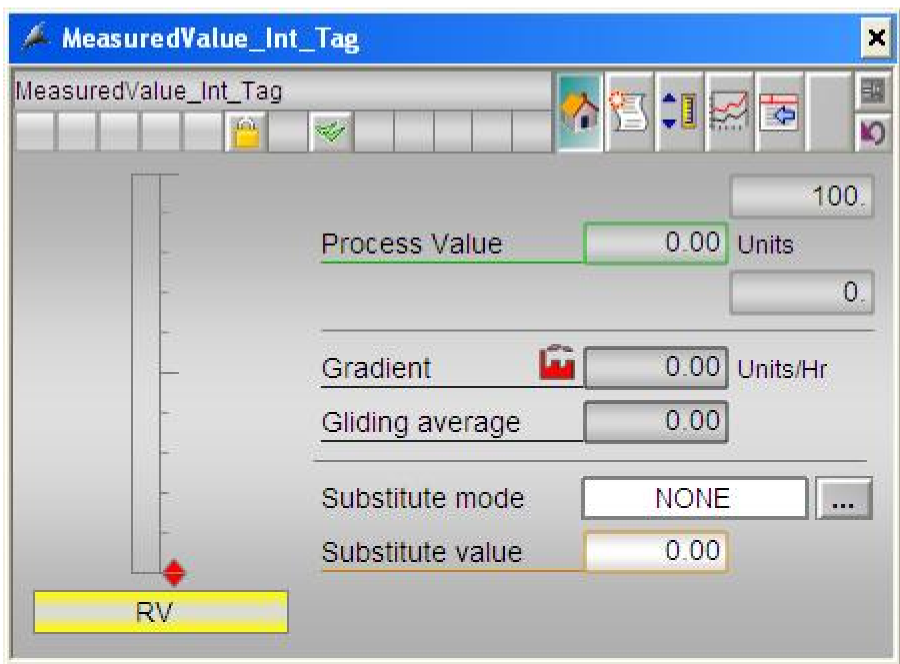
This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.5.1.9 Measured Value Faceplate

The measured value faceplate has five views – standard, intervals, limits, alarm, and trend. Level 6 permissions are required to modify values on the limits pane. The Intervals view is for display only.

Color is used to show the quality of PV and calculated values. The background color is green when quality is good, yellow if substituted, and otherwise grey.

Measured Value Faceplate: Standard View



Note

Level 5 permissions are required to be able to press the buttons, click the checkbox or enter values.

Table 3-3 Data Entry

Entry Field	Action	Description
Substitute Mode	SUBS=0-5, based on selection	Clicking the Substitute Mode field allows an operator to change the substitute mode. A panel with 5 choices is displayed. The operator selects one.
Substitute Value	SV=entered value	Clicking the Substitute Value field opens the analog input box to allow an operator to enter a new substitute value to be used only when substitution mode is 5.

Table 3-4 Indicators

Indicator	Meaning	Tag(s)	Note
	Process Value	PV	
Gradient	Current Gradient	GRAD	
Gliding Average	Current Gliding Average	GAVG	
Mode	Measured Value Mode	Mode	See Mode description above in section Inputs
Substitute Mode	Substitute Mode	SUBS	See SUBS description above in section Inputs
Substitute Value	Substitute Value	SV	Only used in SUBS mode 5
Left Value Bar	Process Value	PV	
Right Value Bar	Limits	HH, H, L, LL	
Interval Duration	Length of interval and units of interval (or 0s for no interval)	TIL	

Faceplate: Intervals View

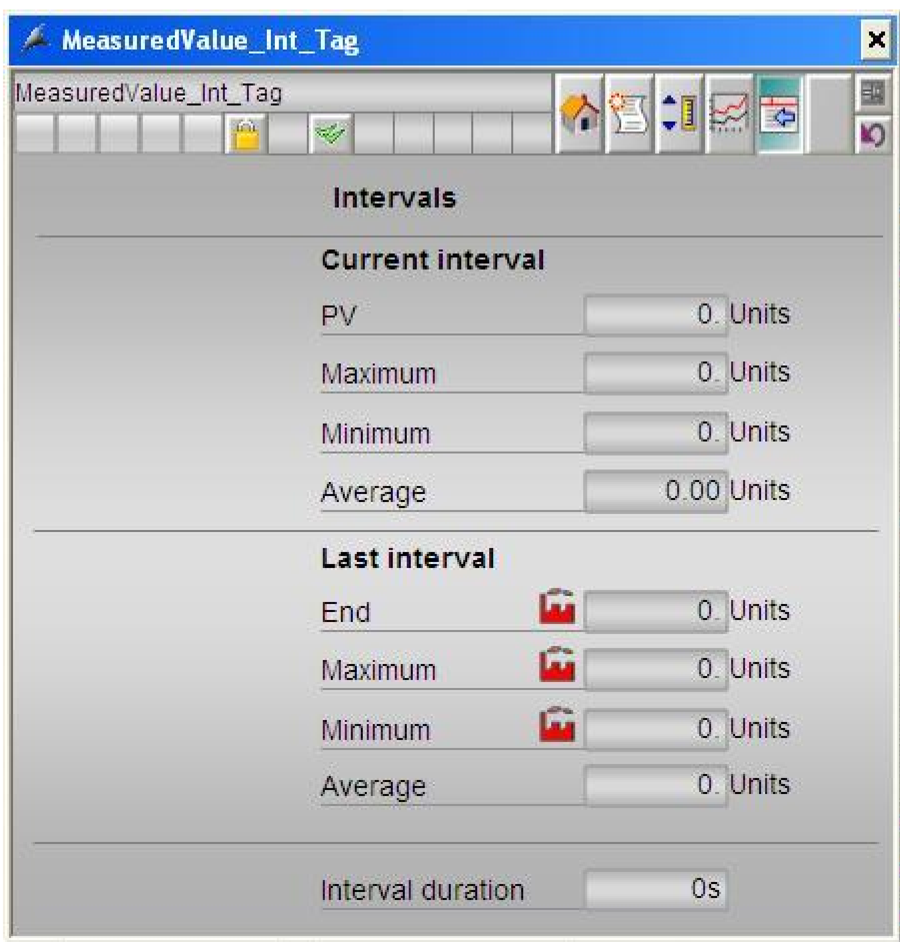
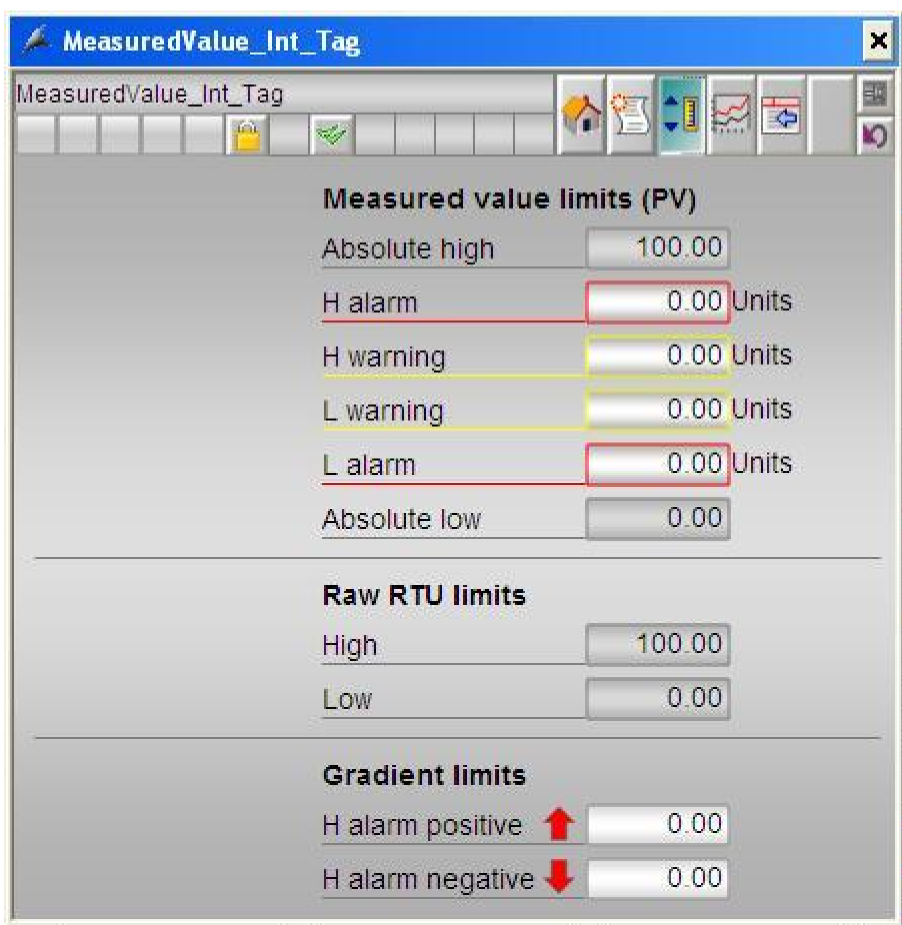


Table 3-5 **Indicators**

Indicator	Meaning	Tag	Note
Current Interval PV	Current Interval Present Value	PV	
Current Inteval Max	Maximum PV computed in current interval	RMAX	
Current Interval Min	Minimum PV computed in current interval	RMIN	
Current Interval Avg	Average of all values computed in the current interval	RAVG	
Last Interval PV	Value at end of last interval	L1END	
Last Inteval Max	Maximum PV achieved in last interval	L1MAX	
Last Interval Min	Minimum PV achieved in last interval	L1MIN	See SUBS description above in section input
Last Interval Avg	Average of all values computed in the last interval	L1AVG	Only used in SUBS mode 5

Measured Value Faceplate: Limits View



Note

Level 6 permissions are required to enter values.

Table 3-6 Data Entry/Indications

Entry Field	Action	Description
Absolute H	N/A	Shows the Scaled Value Upper Limit (PUL)
Current HH	HH=entered value	Allows entry of the value which is used in generating a High Alarm when PV > HH
Current H	H=entered value	Allows entry of the value which is used in generating a High Warning when PV > H
Current L	L=entered value	Allows entry of the value which is used in generating a Low Warning when PV < L
Current LL	LL=entered value	Allows entry of the value which is used in generating a Low Alarm when PV < LL
Absolute L	N/A	Shows the Scaled Value Lower Limit (PLL)
Raw RTU Limit High	N/A	Shows the Raw RTU Upper Limit (SRUL)
Raw RTU Limit Low	N/A	Shows the Raw RTU Lower Limit (SRLL)
Gradient High Limit	GHL=entered value	Allows entry of the value which, when exceeded by GRAD, will generate a Gradient High alarm
Gradient Low Limit	GLL=entered value	Allows entry of the value which, when GRAD exceeds, will generate a Gradient Low Alarm

For Trend and message views see general description.
The value trended is the PV (process value).
The following pens are defined:

- Green – PV
- Yellow - Gradient
- Magenta - Gliding Average

3.5.2 Scaled Measured Value

The Scaled Measured Value type allows for the display of a measured value, which may be scaled.

3.5.2.1 Scaled Measured Value Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator Visible: For **output** to the operator; Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RV	RTU Value	Ext	Float	-	-	Raw value from RTU. The QC from the raw value (set by the driver) is propagated to the PV output.
SRLL	Scaling range lower limit	Int	Float	0	Config	Lower limit for raw value
SRUL	Scaling range upper limit	Int	Float	1	Config	Upper limit for raw value
PLL	Physical value lower limit	Int	Float	0	Config	Lower limit in physical units
PUL	Physical value upper limit	Int	Float	1	Config	Upper limit in physical units
Units	Measurement Units	Int	String	-	Config	Measurement units of the measured value

3.5.2.2 Scaled Measured Value Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PV	Physical value	Int	Float	-	Output, Archive	Measured valuein physical units. The QC from the raw value is propagated to PV as well. In addition, a range violation (input value was not within (SRLL, SRUL)) can result in a "BAD" QC for PV.
RA	Range violation indicator	Int	Binary	-	Output	The input value was not within (SRLL, SRUL).

3.5.2.3 Scaled Measured Value Description

Introduction

The Scaled Measured Value type gets a value from the RTU and scales it before it is displayed. There are no alarms or faceplates associated with it. If the configured range is invalid, an indicator with the text "RA" is displayed.

Calculation of the scaled value

Scaling is done by linear interpolation based on (SRULL, PLL) and (SRUL, PUL).

If the input value is not within the scale range (SRLL - SRUL), the scaled value is extrapolated, but the range violation indicator RA is set.

Calculation of the quality code

The quality code from the raw value (provided by the driver) is propagated to the PV output.

In addition, if the input value is not within the scale range (SRLL-SRUL), the QC of the PV output is set to "BAD" with the substatus "Configuration error".

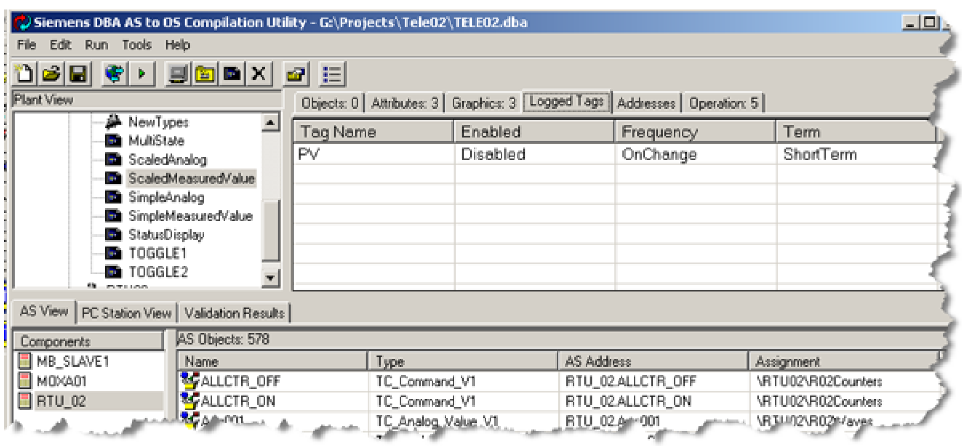
3.5.2.4 Scaled Measured Value Archiving

The following values are preconfigured for archiving:

Tag Name	Archiving Behavior
PV	Spontaneous archiving on value change

Tag Archiving is disabled by default, but can be enabled in DBA.

1. Select a MeasuredValue object instance from the Plant View.
2. Select the **Logged Tags** tab of the Attribute Edit window in the upper right-hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.

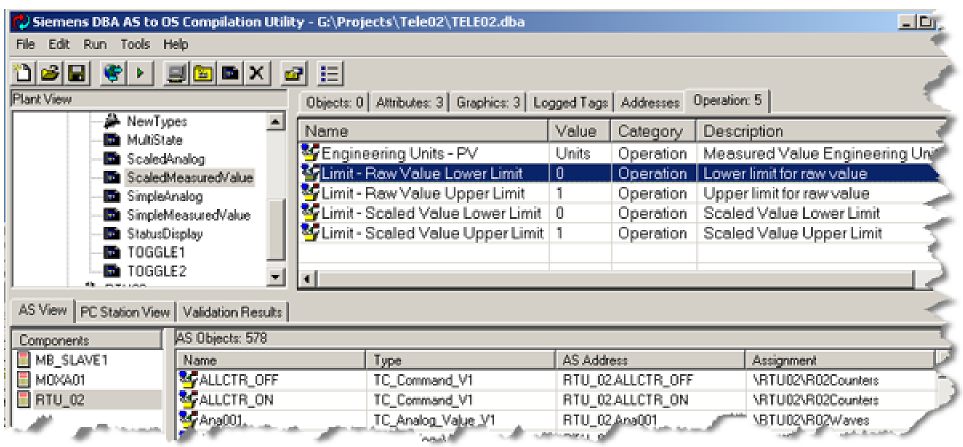


3.5.2.5 Scaled Measured Value Operational Parameters

Configuring operational characteristics

The operational characteristics of a Scaled Measured Value object instance can be configured in DBA.

1. Select a Measured Value object instance from the Plant View.
2. Select the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Engineering Units - PV

The text that will be used to identify the PV value of the Measured Value on HMI pictures. Free form text entry is allowed.

Limit – Raw Value Lower Limit

Represents the lower limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Upper Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes lower than this value, a range error indicator will be shown on any symbol that is showing the value. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, the range error indicator will also be shown.)

Limit – Raw Value Upper Limit

Represents the upper limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Lower Limit and on the range represented by the Scaled Value Upper and Lower Limit values. . If the RV becomes greater than this value, a range error indicator will be shown on any symbol that is showing the value. Any floating point value can be configured. (If the Raw Value Upper Limit is not less than the Raw Value Upper Limit, the range error indicator will also be shown.)

Limit – Scaled Value Lower Limit

Represents the lower limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Upper Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a range error indicator will be displayed on any symbol showing the value.)

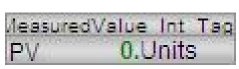
Limit – Scaled Value Upper Limit

Represents the upper limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Lower Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a range error indicator will be displayed on any symbol showing the value.)

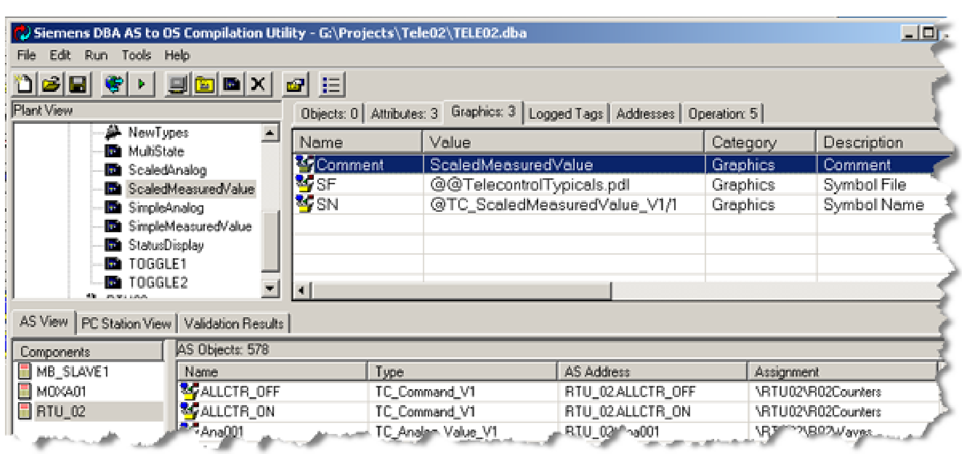
3.5.2.6 Scaled Measured Value Symbol Display

Default symbol

One Scaled Measured Value symbol is provided by default. This symbol shows the current PV, engineering units, and an indicator ("RA") that indicates when there is a range error (range configuration or value out of configured range).



Although a single symbol is provided, the Graphics Designer can be used to create additional Scaled Measured Value symbols. If new symbols are created, the symbol to be used for any instance of a Scaled Measured Value object can be changed using DBA. To change these, in DBA, select a Scaled Measured Value object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.5.3 Simple Measured Value

The Simple Measured Value type allows for the display of unscaled measured value data.

3.5.3.1 Simple Measured Value Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: For **output** to the operator; Item available for **Archive**

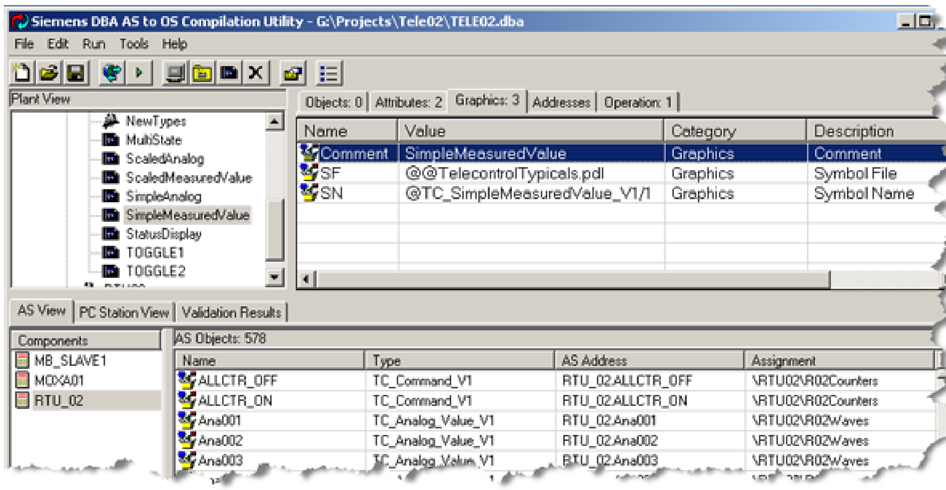
Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RV	RTU Value	Ext	Float	-	-	Raw value from RTU. The QC from the raw value (set by the driver) is propagated to the PV output.
Units	Measurement Units	Int	String	-	Config	Measurement units of the measured value

3.5.3.2 Simple Measured Value Symbol Display

Default symbol

One Simple Measured Value symbol is provided by default. This symbol shows the current PV and engineering units.

Although a single symbol is provided, the Graphics Designer can be used to create additional Simple Measured Value symbols. If new symbols are created, the symbol to be used for any instance of a Simple Measured Value object can be changed using DBA. To change these, in DBA, select a Simple Measured Value object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



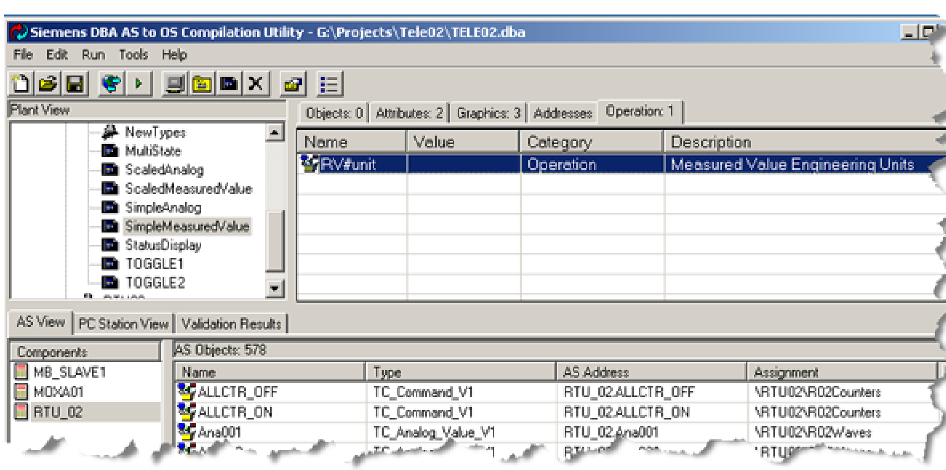
This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.5.3.3 Simple Measured Value Operational Parameters

Configuring operational characteristics

The operational characteristics of a Simple Measured Value object instance can be configured in DBA.

1. Select a Measured Value object instance from the Plant View.
2. Select the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Engineering Units - PV

The text that will be used to identify the PV value of the Measured Value on HMI pictures. Free form text entry is allowed.

3.5.4 IEC850 Measured Value

The IEC850 Measured Value is identical to the Measured Value type described in section Measured Value (Page 68) except for the differences described in the sections below.

3.5.4.1 IEC850 Measured Value Outputs

IEC 61850 Measured Value Outputs

The IEC Measured Value Outputs are identical to the Measured Value Outputs described in section Measured Value Outputs (Page 70) , with one additional tag added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)

3.6 Setpoint Types

3.6.1 Setpoint

As not all RTU's support full setpoint processing, a Setpoint Type has been provided that allows scaling, the checking of interlocks, and feedback monitoring to be performed in the TeleControl server.

3.6.1.1 Setpoint Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or
both (**in / out**); **Config**uration item (configurable as *Operation* parameter in DBA); Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
#comment	Comment	Int	String	-	Config	Description of the object instance
#areaname	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on Plant View placement)
RF	RTU Value	Ext	Float	-	-	Raw feedback value from RTU
SRLL	Scaling range lower limit	Int	Float	0	Config	Lower limit for raw value
SRUL	Scaling range upper limit	Int	Float	1	Config	Upper limit for raw value
PLL	Physical value lower limit	Int	Float	0	Config	Lower limit in physical units
PUL	Physical value upper limit	Int	Float	1	Config	Upper limit in physical units
TSP	Target Setpoint	Int	Float	0	Input	Value operator wants setpoint to become based on scaling (input value in physical units)
Disable	Disable	Int	Binary	0	In/Out	When set to 1, TSP is disabled
DL	Deviation Limit	Int	Float	0	Config	Limit of deviation range; absolute based on scaled value, i.e. abs(TSP – F) must be < DL
TIMEOUT	Timeout	Int	Integer	0	Config	If non-zero, seconds after which setpoint must be within deviation limits. The Timeout field is only shown if the FeedbackReq variable is set to 1.
ILK1	Interlock Tag 1	Ind	Binary	-	Config	Name of binary tag that when set to 1 disables TSP unless logged in user has level 6 authorizations
ILK2	Interlock Tag 2	Ind	Binary	-	Config	Name of binary tag that when set to 1 disables TSP unless logged in user has level 6 authorizations
ILKText	Interlock Text	Int	String	Interlocked	Config	Interlock description
Feedback Req	Feedback Required	Int	Binary	1	Config	When set to 1, feedback from the RTU is required.
CmdResetTimeout	Reset Timeout	Int	Bit	-	Input	Reset button on the faceplate sets this to 1
RTU_LOCAL	RTU local mode	Ext	Binary	-	Output	Local mode is set in the RTU. RSP sent to the RTU will be ignored.

3.6.1.2 Setpoint Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RSP	Raw setpoint	Ext	Float	-	-	Raw setpoint output to RTU (may address the same data area in the RTU than RF)
F	Feedback	Int	Float	-	Output	Scaled Feedback value from RTU, based on RV
DA	Discrepancy Alarm	Int	Binary	-	Output	(TSP - F) not within DL limit after TIMEOUT time.
RA	Range violation alarm	Int	Binary	-	Output	Feedback value violated the scaling range.
CEA	Configuration Alarm	Int	Binary	-	Output	A configuration error is detected.

3.6.1.3 Setpoint Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Timing Out	Timing Out	Int	Binary	0	-	A timeout is in progress (Operator requested new target setpoint and waiting for time to expire when feedback will be checked for discrepancy).

3.6.1.4 Setpoint Description

During normal operation, the operator enters a target setpoint (TSP), which is then scaled (RSP) and sent to the RTU. After receiving the request, the RTU will return the new setpoint as raw feedback (RF), which is scaled (F) and displayed on the faceplate.

Scaling of Operator Input Value

The operator input value TSP is scaled from physical units into the RTU value RSP based on PLL, SRLL and PUL, SRUL. Invalid (out of range) operator input is rejected by the faceplate; therefore it is not necessary to trigger an alarm. Invalid input written to TSP from a script is ignored.

Interlocking

The indirect tags ILK1 and ILK2 are used to specify other tags whose values determine if an interlock exists. The tags to be used as interlocks are configured from DBA on a per instance basis. If either of the tags designated by ILK1 or ILK2 is set true, the operator is not allowed to enter a new value for TSP (faceplate blocks data entry) unless he has an appropriate authorization to override the interlock. The interlock also causes the setpoint to discard any script writes to TSP.

Note

Interlocks can be configured using the **Data** tab of the DBA Instance Editor by specifying linkages to other tags in the configuration. Configuration of linkages is optional. It is possible to configure 0, 1 or 2 interlocks.

Disable Switch

The setpoint can be manually disabled by the operator by setting the Disable checkbox on the faceplate. This can be used, for example, if the RTU can be operated locally, but does not provide a LOCAL feedback.

Local / Remote Switch from RTU

Local mode can be selected in the RTU (e.g. via key switch). In this case, the RTU can inform via the RTU_LOCAL feedback, that new RSP values will be ignored. In this case, the operator is not allowed to enter a new value for TSP.

Feedback

The raw feedback value RF received from the RTU is scaled into F via linear interpolation based on SRLL, PLL and SRUL, PUL. If the feedback value is not within the scale range SRLL – SRUL, the scaled value is extrapolated, but the range violation alarm RA is set.

If the FeedbackReq flag is set to 0, feedback is not required and will not be checked against the target setpoint. However, if raw feedback is received it will be tested for a range violation.

Timeout

When a new target setpoint is requested by setting TSP with a new value, the feedback F is checked after TIMEOUT seconds to determine if the setpoint is within DL of the target. During this timeout, the TimingOut flag is set to 1. When the TimingOut flag is set to 1, the faceplate disables the target setpoint entry.

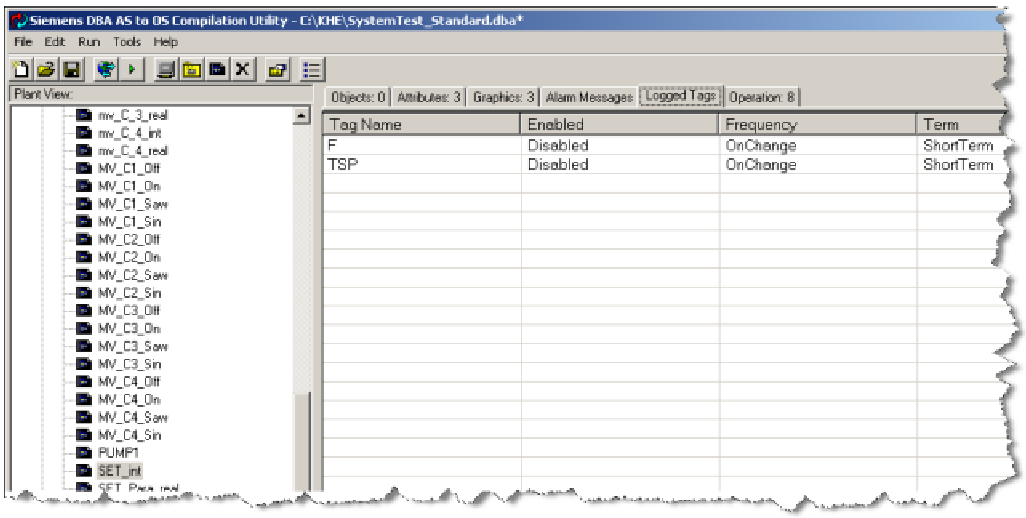
The TimingOut flag is reset to 0 when the timeout expires, at which time a check will be made for the feedback to match the target setpoint. The TimingOut flag is also reset to 0 when a user with level 6 permissions presses the Reset button on the faceplate, in which case the feedback will not be checked against the target setpoint. In either case, the target setpoint entry on the faceplate will be re-enabled.

3.6.1.5 Setpoint Archiving

The following values are available for archiving:

Tag Name	Archiving Behavior
F	spontaneous archiving of feedback value on value change
TSP	spontaneous archiving of target setpoint on value change

Tag Archiving for all of these tags is disabled by default, but can be enabled in DBA. Select a Setpoint object instance from the Plant View and select the **Logged Tags** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The archiving rate and storage type can also be changed from this window.



3.6.1.6 Setpoint Alarming

The DL parameter defines a tolerable limit between the operator entered setpoint TSP and the feedback value F (absolute, in units). The Timeout parameter defines a time in which the absolute difference between TSP and F must be within the DL limit. If this time expires and TSP – F is not within the limit, a Discrepancy Alarm DA is raised.

Note

The Discrepancy Alarm is automatically cleared 60 seconds after it is generated.

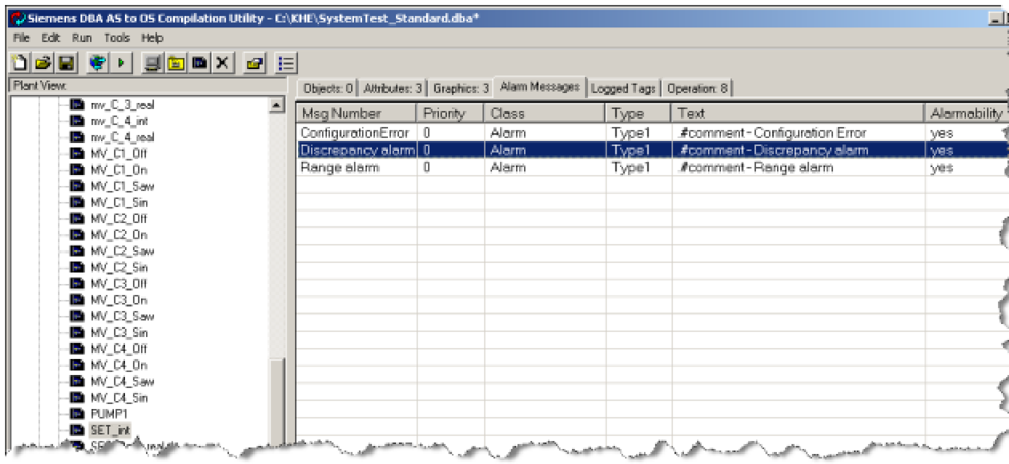
The range limits are checked for validity. The scaling and physical lower limits must be less than the corresponding upper limits. When incorrect, a configuration error alarm (CEA) is activated and the setpoint is not calculated. The alarm is reset when a new value is received and the range limits are valid.

These alarm conditions are summarized in the table below:

Name	Class	Type	Configured by Default	Condition Description
DiscrepancyAlarm	Process Control System	Error	Yes	DA=1
Configuration Error	Process Control System	Error	Yes	PUL<PLL or SRUL<SRLL
Range Alarm	Process Control System	Error	Yes	RV < SRLL or RV > SRUL

The message type, class, priority and alarm text can be changed on a per-instance basis.

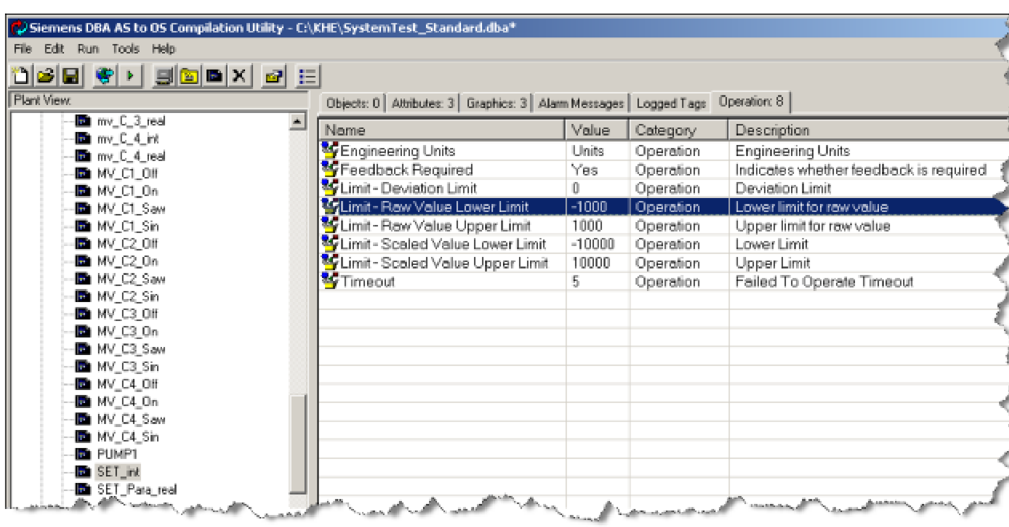
To change these, in DBA, select a Command object instance from the Plant View and select the "Alarm Messages" tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Alarmability" column of this window can be used to permanently enable or disable any alarm.



3.6.1.7 Setpoint Operational Parameters

The operational characteristics of a Setpoint object instance can be configured in DBA

1. Select a Command object instance from the Plant View.
2. Select the **Operations** tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Feedback Required

Indicator of whether or not the setpoint is configured to return feedback. If set to "Yes", then a feedback indicator is shown on the Setpoint faceplate. Also, if set to "No", a Discrepancy Alarm will never be generated for the setpoint. Clicking on the Value column provides a drop list from which a value of "Yes" or "No" can be selected.

Limit – Deviation Limit

Indicates the allowed deviation between the requested Setpoint and the feedback. A Discrepancy Alarm can only be generated if the deviation exceeds this limit. Any floating point value is allowed.

Timeout

Timeout value in units of seconds. If a Timeout has been configured, if the Feedback variable (F) does not correspond to the value of TSP+/- DL within the timeout period, a Discrepancy Alarm is generated. Any integer value can be specified.

Limit – Raw Value Lower Limit

Represents the lower limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Upper Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes lower than this value, a Low Range Alarm will be generated. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated.)

Limit – Raw Value Upper Limit

Represents the upper limit of the range of the RV. The PV value is scaled based on the range that is represented by this value and the Raw Value Lower Limit and on the range represented by the Scaled Value Upper and Lower Limit values. If the RV becomes higher than this value, a High Range Alarm will be generated. Any floating point value can be configured. (If the Raw Value Lower Limit is not less than the Raw Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Scaled Value Lower Limit

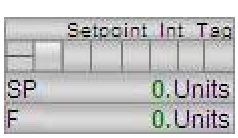
Represents the lower limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Upper Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

Limit – Scaled Value Upper Limit

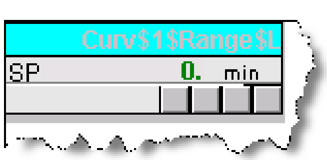
Represents the upper limit of the range of the PV. The PV value is scaled based on the range that is represented by this value and the Scaled Value Lower Limit and on the range represented by the Raw Value Upper and Lower Limit values. Any floating point value can be configured. (If the Scaled Value Lower Limit is not less than the Scaled Value Upper Limit, a Configuration Error alarm will be generated).

3.6.1.8 Setpoint Symbol Display

Two Command symbols are provided by default. Symbol 1 indicates a Setpoint with Feedback. This symbol shows the requested setpoint value (TSP) and the actual feedback (F).

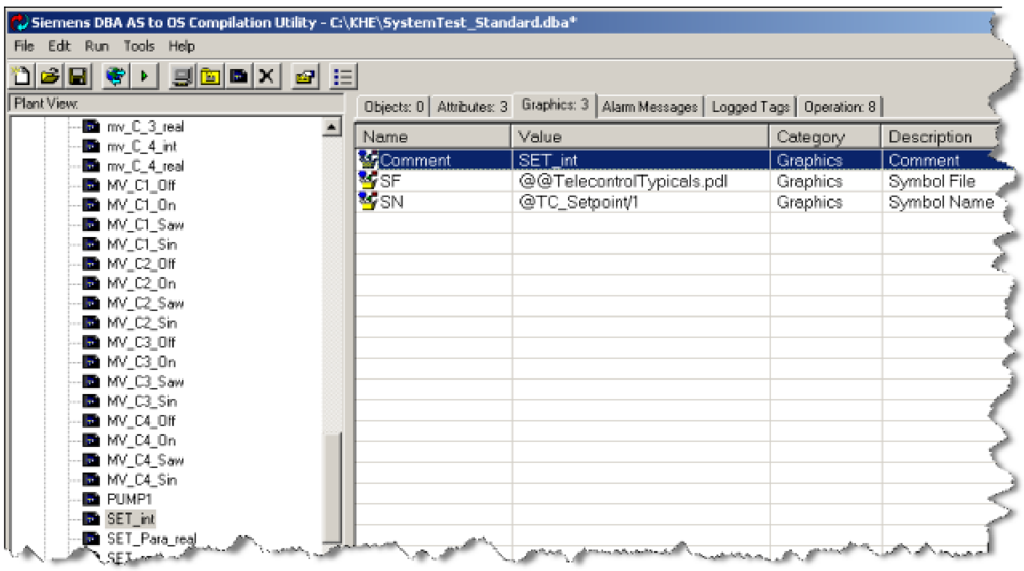


Symbol 2 is a Setpoint without Feedback. The symbol shows the current requested Setpoint (TSP).



Both symbols also show any active alarm conditions.

By default, symbol 1 is selected, but this can be changed on a per instance basis. In DBA, select a Setpoint object instance from the Plant View and select the **Graphics** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.

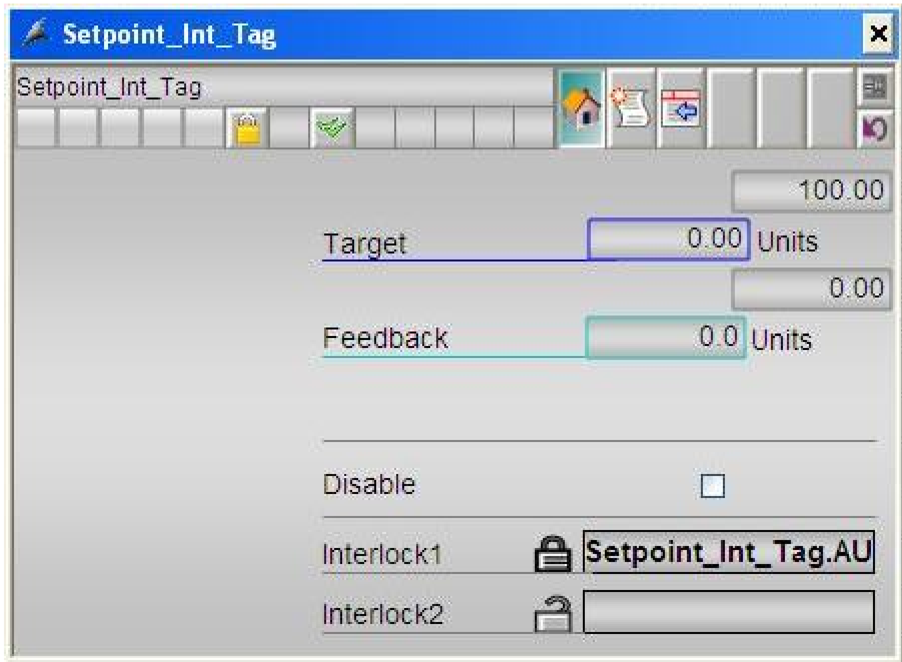


This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.6.1.9 Setpoint Faceplate

The setpoint faceplate has three views – standard, maintenance, and alarm. Level 6 permissions are required to make changes on the maintenance pane. During normal operation, the operator can enter a target setpoint or, by checking the Disable check-box, prevent entry of the setpoint. Users with level 6 permissions can change the deviation allowed between the target setpoint and the feedback and the timeout after which the feedback will be checked against the setpoint. In addition, users with level 6 permissions can override interlocks.

Setpoint Faceplate: Standard View



Data Entry Fields

Note

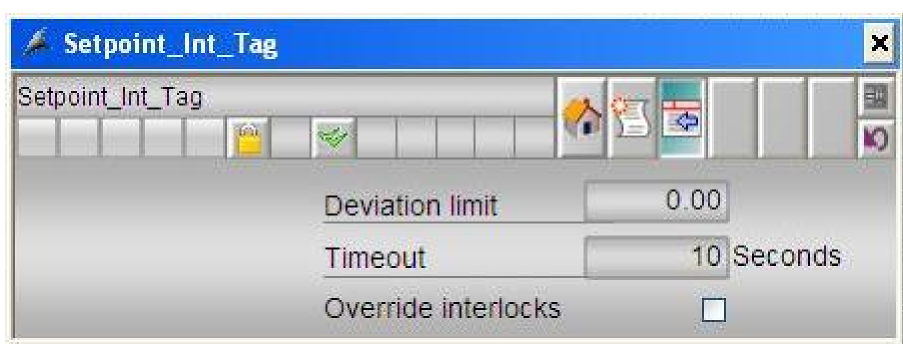
Level 5 permissions are required to be able to interact with this view.

Field	Action	Description
Disable	Disable=checkbox state	When checked, TSP entry is disallowed and grayed out. When cleared, TSP entry is allowed, subject to interlock and permission checking, etc.
Target	TSP=entered value	Clicking on this field invokes an Analog entry dialog box from which a target setpoint can be entered. After the operator has entered the target setpoint, the field will be disabled during the timeout period (unless Timeout=0). During this period the button is disabled. Note: The enabling of this button is subject to Disabled Checkbox not being set and interlock processing as described in the sections above.
Reset	Reset=1	This button only appears if Timeout >0 and a Target setpoint has been entered. It appears during the Timeout period to allow the cancellation of the "Failed To Operate" timer.

Indicators

Indicator	Meaning	Tag	Colors	Note
Target	Target Setpoint	TSP	Black on Gray (entry disabled) Black on White (entry enabled)	Last entered target setpoint
Feedback	Setpoint Feedback from the RTU	F	Black on Gray	Note : This field only appears if FeedbackReq=1, as configured in DBA.
Interlock 	Interlock Status	ILK1,ILK2	Black	Only shown if ILK1 or ILK2 has been configured (non-blank tag name). When at least one of the interlocks is true, the lock symbols on the faceplate will appear as closed and the Target entry field will be disabled.
LOCAL 	When shown, RTU Local mode is set	RTU_LOCAL	Black on Yellow	When RTU_LOCAL is true, the Local label will be displayed on the faceplate and the target setpoint will not be enterable. Note: If RTU_LOCAL is not set, this field is not shown

Setpoint Faceplate: Maintenance View



Data Entry

> **Note**
>
> Level 6 permissions are required to be able to change any of the Data Entry fields in this view.

Entry Field	Action	Description
Override	Allows temporary override of an Interlock	Checkbox allows override. When checked, this will re-enable the Target Setpoint entry field and allow entry of the timeout, and the padlock symbols will appear with a red slash through them to indicate the override. The override is only valid for the instance of the faceplate where it was initiated.

Timeout	Timeout=entered value	Clicking on this field invokes an analog entry input box that allows a timeout value to be specified. The timeout is the amount of time required before proper feedback is received before a Discrepancy Alarm is generated.
Deviation Limit	DL=entered value	Clicking on this field invokes an analog entry input box that allows a deviation limit to be specified. The deviation limit is used in the computation of a Discrepancy Alarm; in order for an alarm to be generated: abs(TSP – F) > DL

Indicators

Indicator	Meaning	Tag	Note
Override 	Status of Interlock Override		Checkbox indicates override status. When checked, the Padlock will be shown with a red slash.
Interlock 1	Name of tag used for Interlock 1	ILK1	Blank if no Interlock 1 configured
Interlock 2	Name of tag used for Interlock 2	ILK2	Blank if no Interlock 2 configured
Timeout	Failed To Operate Timeout	Timeout	The Timeout field is only shown if the FeedbackReq variable is set to 1.
Upper Limit	Scaled Value upper limit	PUL	
Lower Limit	Scaled Value upper limit	PUL	

For message view see general description.

3.6.2 IEC850 Setpoint

3.6.2.1 IEC850 Setpoint Intro

The IEC850 Setpoint is identical to the Setpoint type described in section Setpoint (Page 94) except for the differences described in the sections below.

3.6.2.2 IEC850 Setpoint Inputs

IEC850 Setpoint Inputs

The IEC Setpoint Inputs are identical to the Setpoint Inputs described in section Setpoint Inputs (Page 94), with the following changes:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RTU_LOCAL	RTU Local Mode	Int	BYTE	-	No	Not Used

3.6.2.3 IEC850 Setpoint Outputs

IEC 61850 Setpoint Outputs

The IEC Setpoint Outputs are identical to the Setpoint Outputs described in section Setpoint Outputs (Page 96), with following additional tags added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)
STATUS	STATUS	Ext	BYTE	-	No	Checkback Status (See "Appendix B – Status Codes")

3.6.2.4 IEC850 Setpoint Description

IEC850 Setpoint Description

The behavior or the IEC850 Setpoint is identical to the behavior of the Setpoint as described in section Setpoint Description (Page 96), except as described below.

Select-Before-Operate

Select-Before-Operate

The IEC 61850 Setpoint can be configured with or without Select-Before-Operate behavior. This can be controlled by changing the FLAG setting for the RSP tag in the Address configuration tab of the DBA Attribute Editing panel.

The following FLAG settings are available:

CTL_O	Operation Only
CTL_SBO	Select-Before-Operate

When CTL_SBO is selected, PowerControl communication software will automatically initiate **select** for the RSP tag, and only if successfully selected, initiate **operate** to complete the change of setpoint.

RTU Local Mode

RTU Local Mode

RTU Local Mode is not supported.

3.6.2.5 IEC850 Setpoint Alarms

IEC850 Setpoint Alarming

In addition to the DiscrepancyAlarm described in section Setpoint Alarming (Page 98) , the IEC850 Setpoint includes the following alarm condition.

Name	Type	Class	Configured by Default?	Condition Description
BadCheckback	Process Control System	Error	Yes*	STATUS <> 0

The message type, class, priority and alarm text can be changed on a per-instance basis

To change these, in DBA, select an IEC850 Setpoint object instance from the Plant View and select the Alarm Messages tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Enabled column of this window can be used to permanently enable or disable any alarm.

3.7 MultiCommand Types

3.7.1 MultiCommand

3.7.1.1 MultiCommand Introduction

Purpose and Function

The MultiCommand object sends one of 16 integral values to the RTU and displays one of 16 possible feedback values. The faceplate selects a named command and displays named feedback.

3.7.1.2 MultiCommand Inputs

Type:	One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator visible:	Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**

Inputs

Abbreviation	Name	Type	Data Type	De-fault Value	Opera-tor visi-ble	Description
#Comment	Comment	Int	String	-	Config	Description of the object instance
#AreaName	Area	Int	String	0	Config	Name of the area containing the object (automatically generated based on plant view placement)
F	Feedback	Ext	Word	0	Output	Feedback from RTU
CmdValues	List of values to send to RTU	Int	String	-	Config	Comma separated list of values (up to 16) used to command RTU
Commands	List of names of values	Int	String	-	Config	Comma separated list of names for each CmdValue. Displayed in drop-down list
Feedbacks	List of feedback values	Int	String	-	Config	Comma separated list of expected feedback values for each command
FValues	List of feedback names	Int	String	-	Config	Comma separated list of names for each feedback. Used to display feedback in symbol and faceplate
Timeout	Time in which feedback is expected	Int	Word	0	Config	The number of seconds after which the feedback should match the expected feedback (0 = no timeout). If timeout > 0 and feed back not received within timeout, DA alarm is activated. The Timeout field is only shown if the FeedbackReq variable is set to 1.
ILK1	Interlock 1	Ind	Bit	-	-	If configured, disables input from faceplate if TRUE and not overriden
ILK2	Interlock 2	Ind	Bit	-	-	If configured, disables input from faceplate if TRUE and not overriden

3.7.1.3 MultiCommand Outputs

Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator visible	Description
DA	Discrepancy alarm indicator	Int	Binary	0	Output	The feedback was not the expected value
RCmd	Command to RTU	Ext	Word	0	-	The command value written to the RTU

3.7.1.4 MultiCommand Internal Variables

Internal Variables

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
TimingOut	Timing Out	Int	Binary	0	-	Indicates that a timeout is in progress
ExpectedFeedback	Expected Feedback	Int	Word	0	-	The feedback expected from the most recent command (Selection of item from drop-down list writes to this tag)
CmdIndex	Command Index	Int	SWord	0	Input	Index (1-16) into list of commands to send to RTU (Selection of item from drop-down list writes to this tag)
CmdResetTimeout	Turn off the timeout	Int	Binary	0	Output	On 0 to 1 transition, indicates the any time-out in effect should be aborted (Reset button on faceplate writes to this tag)

3.7.1.5 Description of MultiCommand Functions

Interlocks and Overrides

The indirect tags ILK1 and ILK2 are used to specify other tags whose values determine whether an interlock exists. The tags to be used as interlocks are configured from DBA on a per-instance basis. If either of the tags designated by ILK1 or ILK2 is set true, the operators are not allowed to send a command or enter a timeout value unless they have appropriate authorization to override the interlock.

Operators can override the interlocks if they has level 6 permissions and the **Override** checkbox is selected on the faceplate. **Override** behaves as follows:

- All instances of the command faceplate open with **Override** cleared.
- The **Override** checkbox is only available if the operator has level 6 permissions
- The **Override** checkbox only affects the ability to override on the faceplate from which the box was selected. Other instances of the faceplate on the same screen or on other screens do not know that an override is being performed.
- Selecting **Override** in a group view does not select **Override** in the loop view and vice versa.
- Closing the view (group or loop) in which the override selection is made removes the override.
- For a group view, override remains in effect as long as the box is selected and the view is not closed. The override state persists while interchanging panes.

Note

Interlocks configured using the Data tab of the DBA Instance Editor

Interlocks can be configured using the Data tab of the DBA Instance Editor by specifying linkages to other tags in the configuration. Configuration of linkages is optional. It is possible to configure 0, 1, or 2 interlocks.

Sending a command to the RTU

The MultiCommand sends a value to the RTU when an item in the drop-down list is selected. The drop-down list is displayed when the command field is clicked.

The selected item corresponds to an entry in the Commands list. The corresponding value in the CmdValues list is sent to the RTU.

Example of sending a command to the RTU

Commands list:	C1,C2,C3,C4,C5
CmdValues list:	101,102,103,104,105

If the user selects C3 from the drop-down list, 03 is sent to the RTU.

In this example, assume the following:

Feeedback list:	F1,F2,F3.F4.F5
FValues list:	1001,1002,1003,1004,1005.

In this case, 1003 is the expected feedback.

If the RTU responds with 1003 on F, then the faceplate and symbol display F3.

If the RTU responds with 1004, then the faceplate and symbol display F4 and the discrepancy alarm DA is activated.

Feedback not expected

If a command does not expect a feedback, then when that command is selected from the drop-down list, the feedback field on the faceplate is hidden and changes to the feedback F are ignored. This is configured by setting the feedback value to be empty.

Example of feedback not expected

Commands list::	C1,C2,C3,C4,C5
CmdValues list:	101,102,103,104,105
Feedbacks list:	F1,F2,F3.F4.F5
FValues list:	1001,1002,,1004,1005

The third feedback value in FValues is empty, indicating that command C3 (value 103) does not expect a feedback. When C3 is selected, the feedback field on the faceplate will be hidden. All changes to F are ignored.

Feedback name not configured

If a feedback name is not configured in Feedbacks, but a feedback value is configured in FValues, then the entry in the feedback field on the faceplate and the symbol use the command name plus "OK" or "NotOK" depending on whether the value in F is the expected value.

Example of Feedback name not configured

Commands list:	C1,C2,C3,C4,C5
CmdValues list:	101,102,103,104,105
Feedbacks list:	F1,F2,.F4.F5
FValues list:	1001,1002,1003,1004,1005

The third feedback name is not configured, indicating that OK/NotOK will be used in the feedback field when 1003 is in F.

If C3 is selected and the RTU returns 1003 in F, then the feedback field on the faceplate and symbol display "C3-OK". 1003 was the expected value. If the RTU returns 1004 in F the feedback field displays "F4".

If C4 is selected and the RTU returns 1003 in F, then the feedback field on the faceplate and symbol will display "C4-NotOK" – 1003 was not the expected value. If the RTU returns 1004 in F the feedback field will display "F4".

Feedback value not configured

If the RTU returns a value in the feedback F that that is not configured in the FValues list, then the feedback field displays "command-NotOk-(Value)". For example, if C3 is selected, and a value of 9999 is received, and this value is not in the feedback list, then the field displays "C3-NotOk-(9999)".

Example of feedback value not configured

Commands list::	C1,C2,C3,C4,C5
CmdValues list:	101,102,103,104,105
Feedbacks list:	F1,F2,F3.F4.F5
FValues list:	1001,1002,1003,1004,1005

C3 is selected from the drop-down list and the RTU responds with 56 in F. The feedback field on the faceplate and symbol displays "????-NotOk-(56)".

Timeout

When a command is sent to the RTU, the feedback F is checked after TIMEOUT seconds to determine if the feedback matches the ExpectedFeedback. During this timeout, the TimingOut flag is set to 1. When the TimingOut flag is set to 1, the faceplate disables the Command drop-down list.

The TimingOut flag is reset to 0 when the timeout expires, at which time a check is made for the feedback to match the ExpectedFeedback. The TimingOut flag is also reset to 0 when a user with level 6 permissions presses the Reset button on the faceplate, in which case the feedback is not checked against the ExpectedFeedback. In either case, the Command drop-down list on the faceplate is re-enabled.

3.7.1.6 Validation of MultiCommand Configurations

Validating MultiCommand lists

The DBA utility validates the comma-separated MultiCommand lists before compiling them to WinCC. Any errors will cause the compile to abort.

The following rules are enforced:

- Number of Commands <= 16.
- Number of CmdValues <= 16.
- No duplicate CmdValues.
- Number of Commands >= Number of CmdValues.
- All CmdValues must be numeric.
- All FValues must be numeric.
- CmdValues must be contiguous – only one comma between entries.
- Commands must be contiguous – only one comma between entries.

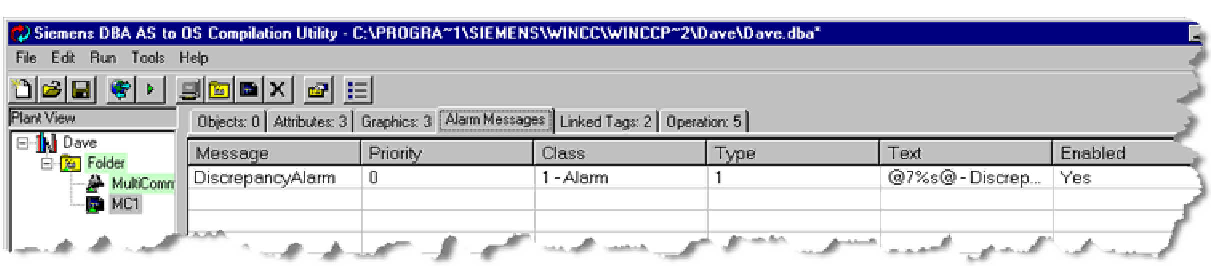
3.7.1.7 MultiCommand Alarming

Discrepancy Alarm

A Discrepancy Alarm is generated (DA set to 1) when Feedback does not match ExpectedFeedback in Timeout number of seconds after RCmd is sent to the RTU. (If Timeout is configured as 0 seconds, then no Discrepancy Alarm is generated). The Discrepancy Alarm is automatically cleared (DA set to 0) after 60 seconds.

Name	Class	Type	Configured by Default?	Condition Expressions
Discrepancy Alarm	Process Control System	Error	Yes	DA=1

The message type, class, priority and alarm text can be changed on a per-instance basis. To change these, in DBA, select a Command object instance from the Plant View and select the Alarm Messages tab of the Attribute Edit window in the upper right hand quadrant of the screen. Use the Alarmability column of this window to enable or disable any alarm permanently:

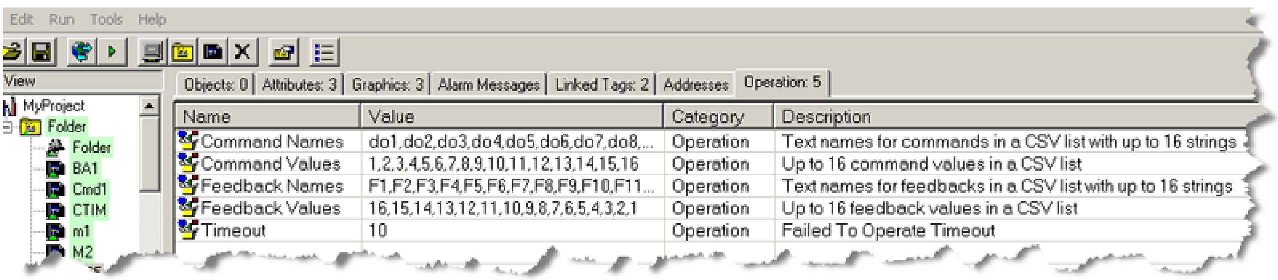


3.7.1.8 MultiCommand Operational Parameters

Configuring operational characteristics

The operational characteristics of a Command object instance can be configured in DBA.

1. Select a Command object instance from the Plant View.
2. Select the Operations tab of the Attribute Edit window in the upper right-hand quadrant of the screen.



Command Values

A comma-separated list of up to 16 integer values that can be sent to the RTU. At least one value must be specified, and up to 16 are allowed, all separated by a comma.

CommandNames

A comma-separated list of up to 16 names that can be associated with command values that can be sent to the RTU. While the number of items varies, it must match the number of CommandValues that have been configured. On the MultiCommand symbols and faceplates, the name is shown, not the number.

FeedbackValues

A comma-separated list of up to 16 expected feedback values, one each corresponding to the list specified as CommandValues. This list is totally optional. If a value is not specified corresponding to a specific CommandValue, it is assumed that there is no feedback required for that command value.

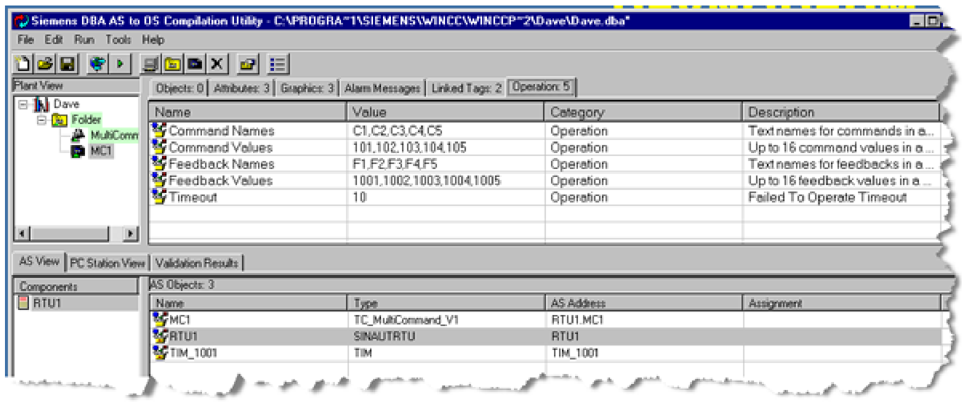
FeebackNames

A comma-separated list of the name of the up to 16 expected feedback values. If an entry is configured, symbols and faceplates will display the feedback name instead of the feedback value.

Timeout

Timeout values are in units of seconds. Any integer value can be specified. If a Timeout has been configured and if the Feedback variable (F) does not correspond to the value of ExpectedFeddback within the timeout period, a Discrepancy Alarm is generated.

The illustration below shows the fields important to operational parameters.



See also

Description of MultiCommand Functions (Page 108)

3.7.1.9 MultiCommand Symbol Display

Available symbol displays

There are two available MultiCommand symbols:

The symbols are named from left to right @TC_MULTICOMMAND/1, @TC_ MULTICOMMAND /2.

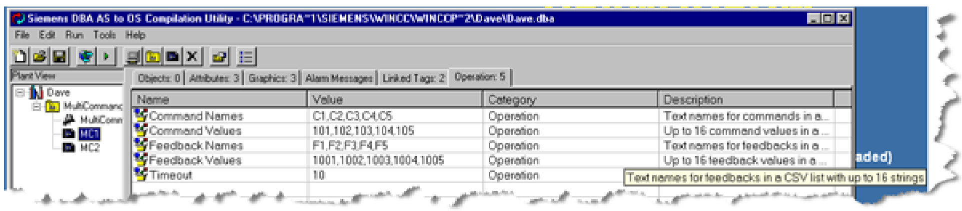
The second symbol does not display feedback and is useful if all the configured commands do not expect a feedback.

The first symbol will display a blank feedback line for commands that do not expect a feedback.

By default, symbol 1 is selected, but this can be changed on a per-instance basis.

1. In DBA, select a Counter object instance from the Plant View.
2. Select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen.

The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.7.1.10 MultiCommand Faceplate

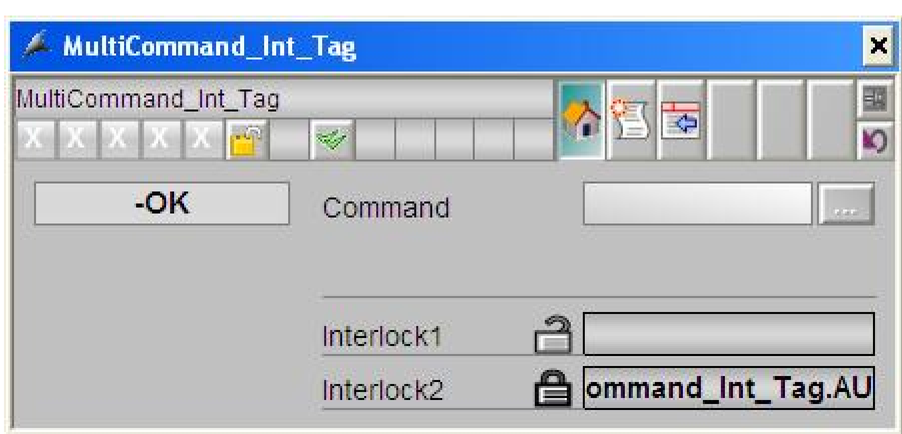
Faceplate Functions

The command faceplate has three views: standard, maintenance, and alarm. Level 6 permissions are required to make changes on the maintenance pane. During normal operation, the operator can click the Command button to send a command to the RTU. Users with level 6 permissions can change the timeout period, which is the delay before feedback is compared to the feedback sense. In addition, users with level 6 permissions can override interlocks.

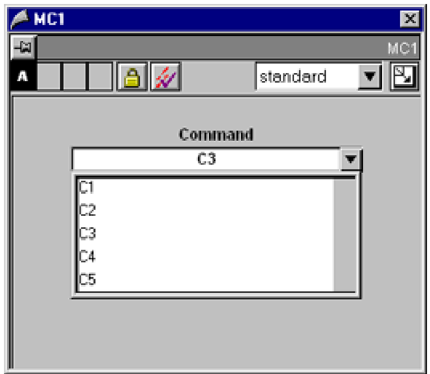
3.7.1.11 Faceplate Views

Standard View

The illustration below shows a faceplate standard view:



The illustration below shows the drop-down list box associated with the **Command** field:



Editable Fields

The command field displays a drop-down list that selects a command to be sent to the RTU. See the information under the heading "Sending a command to the RTU" in the topic titled "Description of MultiCommand Functions (Page 108)" and under the heading "Command" in the topic titled "MultiCommand Operational Parameters (Page 112)" for further details.

Field	**Action**	**Description**
Selectable item in drop-down list	CmdIndex set to selected item's position in list (0-15)	Triggers a write to RCmd with the value whose position in the CmdValues list matches CmdIndex. The command name whose position in the Comands list matches CmdIndex is written in the Command field.

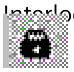
Buttons

Note

Level 5 permission is required to be able to click the Reset Timeout button

Button	Action	Description
Reset Timeout	CmdResetTimeout=1	This button only appears if Timeout >0 and a command has been selected. It appears during the Timeout period to allow the cancellation of the "Failed To Operate" timer.

Indicators

Indicator	Meaning	Tag
Feedback	Feedback from RTU	F
Interlock 		ILK1, ILK2

Maintenance View

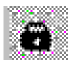
Data Entry

Note

Level 6 permissions are required to be able to change any of the data entry fields in this view.

Entry Field	Action	Description
Override	Allows temporary override of an interlock	Checkbox allows override. When checked, this will re-enable the Command button and allow entry of the timeout, and the padlock symbols will appear with a red slash through them to indicate the override. The override is only valid for the instance of the faceplate where it was initiated.
Timeout	Timeout=entered value	Clicking on this field invokes an analog entry input box that allows a timeout value to be specified. The timeout is the amount of time required before proper feedback is received before a Discrepancy Alarm is generated.

Indicators

Indicator	Meaning	Tag
Override 	Status of interlock override	
Interlock 1	Name of tag used for Interlock 1	ILK1
Interlock 2	Name of tag used for Interlock 2	ILK2

For message view see general description.

3.7.2 IEC850 MultiCommand

The IEC850 MultiCommand is identical to the MultiCommand type described in section MultiCommand (Page 106) except for the differences described in the sections below.

3.7.2.1 IEC850 MultiCommand Outputs

IEC 61850 MultiCommand Outputs

The IEC MultiCommand Outputs are identical to the MultiCommand Outputs described in section MultiCommand Outputs (Page 107) , with two additional tags added:

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q	Quality	Ext	WORD	-	No	IEC 61850 Quality (Refer to IEC 61850 Protocol specification for details)
STATUS	STATUS	Ext	BYTE	-	No	Checkback Status (See "Appendix B – Status Codes")

3.7.2.2 IEC850 MultiCommand Description

IEC850 MultiCommand Description

The behavior or the IEC850 MultiCommand is identical to the behavior of the MultiCommand as described in section Description of MultiCommand Functions (Page 108) except for the optional select-before-operate behavior. The IEC 61850 MultiCommand can be configured with or without Select-Before-Operate behavior. This can be controlled by changing the FLAG setting for the RCmd tag in the Address configuration tab of the DBA Attribute Editing panel.

The following FLAG settings are available:

CTL_O	Operation Only
CTL_SBO	Select-Before-Operate

When CTL_SBO is selected, PowerControl communication software will automatically initiate select for the RCmd tag, and only if successfully selected, initiate operate to complete the change of the MulitCommand state.

3.7.2.3 IEC850 MultiCommand Alarms

IEC850 MultiCommand Alarms

In addition to the DiscrepancyAlarm described in section MultiCommand Alarming (Page 111) , the IEC850 MultiCommand includes the following alarm condition.

Name	Type	Class	Configured by Default?	Condition Description
BadCheckback	Process Control System	Error	Yes*	STATUS <> 0

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an IEC850 Setpoint object instance from the Plant View and select the Alarm Messages tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Enabled column of this window can be used to permanently enable or disable any alarm.

3.8 Status display

3.8.1 Status Display Inputs

Type:	One of **Ext**ernal, **Int**ernal, **Ind**irect
Operator visible:	Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RV	RTU Value	Ext	Bool	-	Out, Archiving	Binary value from RTU

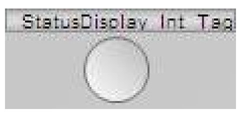
3.8.2 Status Display Description

The status display is used to indicate a 1 bit status. By using bit addressing in the RV address, the appropriate bit is identified.

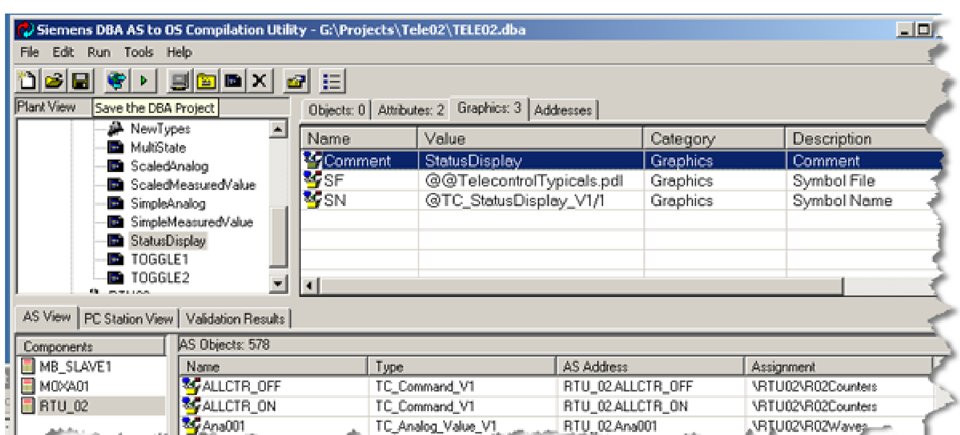
3.8.3 Status Display Symbol

Default symbol

One Status Display symbol is provided by default. This shows a circle that shows Grey for "RV=0" and Green for "RV=1". The on and off colors are exposed as symbol properties (OnColor, OffColor), so that this can be changed on a per-instance basis.



Although a single symbol is provided, the Graphics Designer can be used to create additional Status Display symbols. If new symbols are created, the symbol to be used for any instance of a Status Display object can be changed using DBA. To change these, in DBA, select an Scaled Status Display object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.9 MultiState display

3.9.1 MultiState Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**.

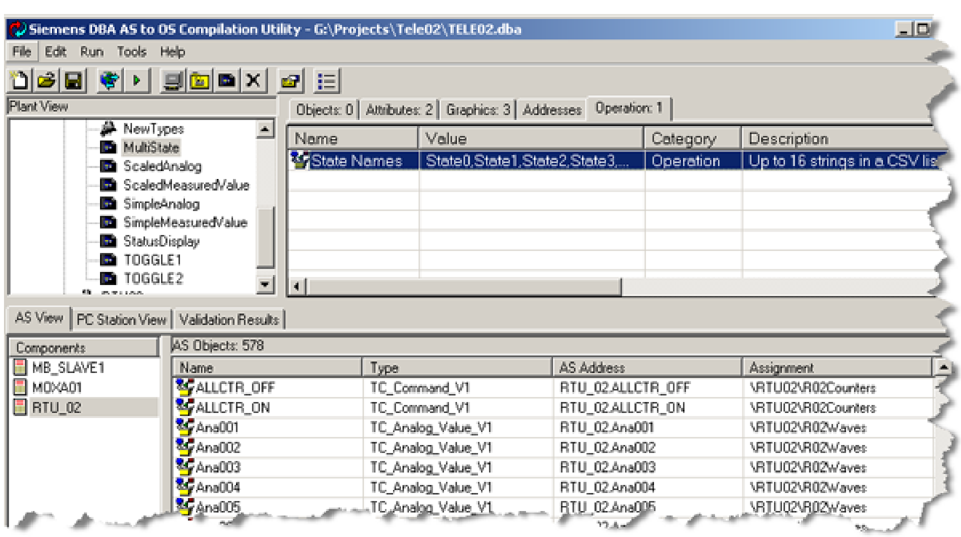
Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RV	RTU Value	Ext	Unsinged Byte	-	Out, Archiving	Binary value from RTU

3.9.2 MultiState Operational Parameters

Configuration of operational characteristics

The operational characteristics of a MultiState object instance can be configured in DBA.

1. Select a MultiState object instance from the Plant View.
2. Select the Operations tab of the Attribute Edit window in the upper right hand quadrant of the screen.



State Names

A comma-separated list of up to 16 state texts to be displayed. The MultiState symbol will display the state text corresponding to the value of RV. If a value of RV does not correspond to one of the texts configured here, "?????" will be displayed instead.

3.9.3 MultiState Display Description

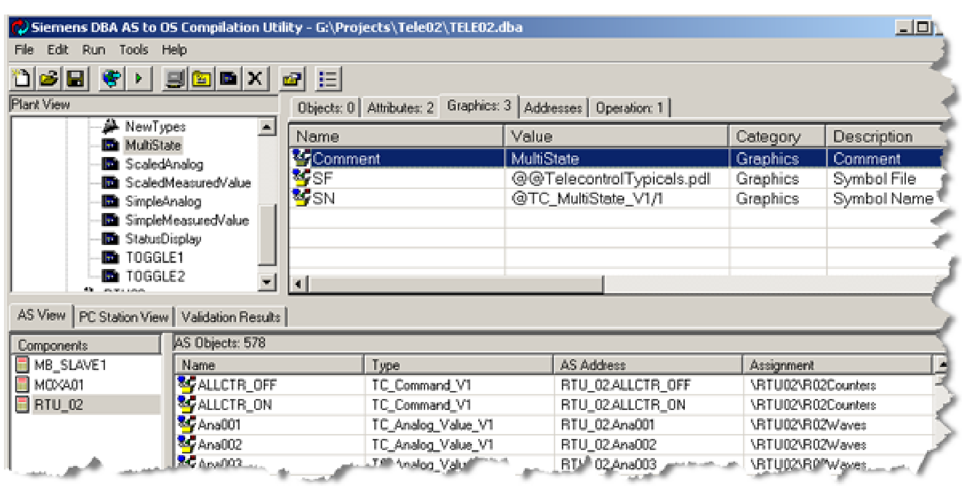
The Multiple State display displays the state of a multi-state value as text. By using bit masking in the RV address, the appropriate bits are selected out (a maximum of 4 bits).

3.9.4 MultiState Display Symbol

Default symbol

One MultiState symbol is provided by default. This symbol shows the configured State Name corresponding to the current value of RV, or "????" if the RV is not a value from 0 to 15 or no state text has been configured for the current value of RV.

Although a single symbol is provided, the Graphics Designer can be used to create additional MultiState symbols. If new symbols are created, the symbol to be used for any instance of a MultiState object can be changed using DBA. To change these, in DBA, select MultiState object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.9.5 No Multiple State Display Faceplate

The Multiple state display does not provide a faceplate.

3.9.6 IEC 61850 MultiState Operational Parameters

3.9.6.1 IEC 61850 MultiState Operational Parameters

Operational Parameters

The IEC 61850 MulitState Operational Parameters is identical to the MultiState Operational Parameters as defined in section MultiState Operational Parameters (Page 120) , except that when an instance of an IEC 61850 Multi State is created by DBA in the IED Instance Editor, any state text that is available in the ICD file is automatically assigned to the StateNames internal variable.

3.10 Toggle command

3.10.1 Toggle Command Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Conf**iguration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
F	Feedback	Ext	Binary	-	Output	Feedback from RTU

3.10.2 Toggle Command Outputs

Outputs

Abbreviation	Name	Type	Data type	Default Value	Operator Visible	Description
RCmd	RTU Command	Ext	Binary	-	Output	Command sent to RTU

3.10.3 Toggle Command Description

Setting or resetting an RTU bit

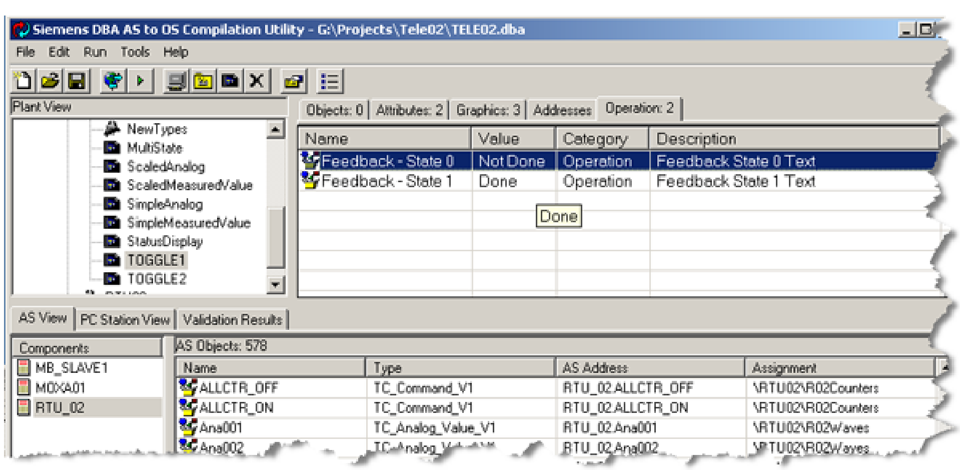
The command allows the operator to set or reset a bit in the RTU (for example, buy Modbus coil functions).

3.10.4 Toggle Command Operational Parameters

Operational characteristics

The operational characteristics of a Toggle Command object instance can be configured in DBA.

1. Select a Toggle Command object instance from the Plant View.
2. Sselect the Operations tab of the Attribute Edit window in the upper right hand quadrant of the screen.



Feedback – State 0

The text string that appears on the command symbol and faceplate when the Feedback (F) is indicating state "0". Free form text entry is allowed.

Feedback – State 1

The text string that appears on the command symbol and faceplate when the Feedback (F) is indicating state "1". Free form text entry is allowed.

3.10.5 Toggle Command Symbol

Default Symbol

One Toggle Command symbol is provided by default. This symbol shows a button with the current Feedback state (State 0 or State 1) based on the value of the F tag. The button can be pressed to immediately toggle to the opposite state (resulting in writing of the opposite value of "F" to "RCmd".

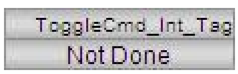
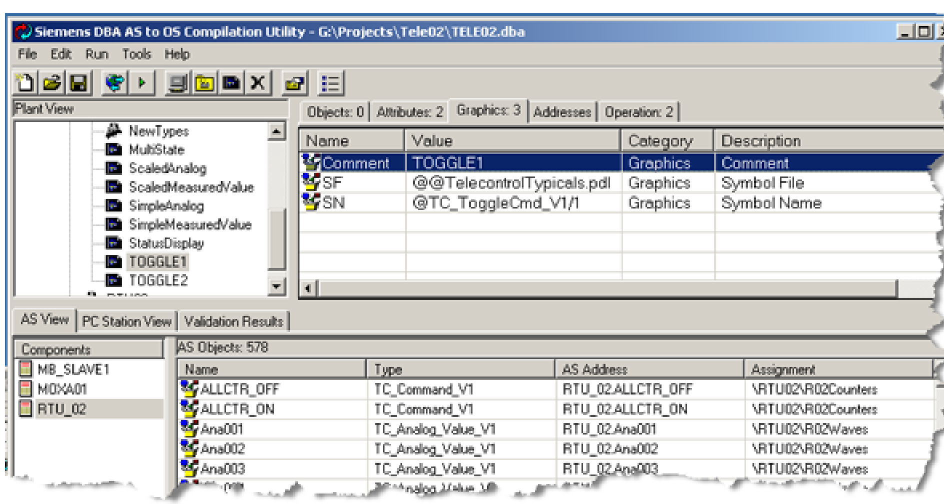


Figure 3-2 Although a single symbol is provided, the Graphics Designer can be used to create additional Toggle Command symbols. If new symbols are created, the symbol to be used for any instance of a Toggle Command object can be changed using DBA. To change these, in DBA, select Toggle Command object instance from the Plant View and select the Graphics tab of the Attribute Edit window in the upper right hand quadrant of the screen. The Symbol Name (SN) attribute represents that name of the symbol typical to be used. The Symbol File (SF) attribute represents the name of the file that contains the typical to be used.



This tab also allows the Comment for the object to be changed. The comment represents a textual description of the instance that is displayed in alarm text and on object faceplates. By default, the Comment is the name of the instance, but this can be changed if a more descriptive name is required.

3.10.6 No Toggle Command Faceplate

The toggle command does not provide a faceplate.

3.11 IEC 61850 SIP7UT612

3.11.1 IEC 61850 SIP7UT612 Inputs

IEC 61850 SIP7UT612 Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in** / **out**); **Configu**ration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Beh	Behavior	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	DWord	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
TR_Relay	Relay trip	Ext	Binary	-	Yes	Relay pickup
PU_Relay	Relay pickup	Ext	Binary	-	Yes	Relay general trip command
Error	Summary error	Ext	Binary	-	Yes	Error with a summary alarm
Warning	Summary warning	Ext	Binary	-	Yes	Alarm summary event
Pos0	Position Q0	Ext	DWord	-	Yes	Switch position Q0 0=Intermediate 1=Off 2=On 3=Bad
S	Apparent Power S	Ext	FLOAT	-	Yes	Apparent Power S
F	Frequency F	Ext	FLOAT	-	Yes	Frequency F
I1_A	Current side1 phase A	Ext	FLOAT	-	Yes	Current side 1 measuring point 1
I1_B	Current side1 phase B	Ext	FLOAT	-	Yes	Current side 1 measuring point 2
I1_C	Current side1 phase C	Ext	FLOAT	-	Yes	Current side 1 measuring point 3
I2_A	Current side2 phase A	Ext	FLOAT	-	Yes	Current side 2 measuring point 1
I2_B	Current side2 phase B	Ext	FLOAT	-	Yes	Current side 2 measuring point 2
I2_C	Current side2 phase C	Ext	FLOAT	-	Yes	Current side 2 measuring point 3

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
QCONERR0	Connection status	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication
STATUS0	Feedback Q0 Cmd	Ext	BYTE	-	Yes	Feedback of Q0 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error
PROT_PTOC1_ Str_general	I> picked up	Ext	Binary	-	Only as alarm	I> picked up
PROT_PTOC1_ Op_general	I> TRIP	Ext	Binary	-	Only as alarm	I> TRIP
PROT_PTOC2_ Str_general	I>> picked up	Ext	Binary	-	Only as alarm	I>> picked up
PROT_PTOC2_ Op_general	I>> TRIP	Ext	Binary	-	Only as alarm	I>> TRIP
PROT_PTOC3_ Str_general	Ip picked up	Ext	Binary	-	Only as alarm	Ip picked up
PROT_PTOC3_ Op_general	Ip TRIP	Ext	Binary	-	Only as alarm	Ip TRIP
PROT_PTOC7_ Str_general	3I0> picked up	Ext	Binary	-	Only as alarm	3I0> picked up
PROT_PTOC7_ Op_general	3I0> TRIP	Ext	Binary	-	Only as alarm	3I0> TRIP

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
PROT_PTOC8_Str_general	3I0>> picked up	Ext	Binary	-	Only as alarm	3I0>> picked up
PROT_PTOC8_Op_general	3I0>> TRIP	Ext	Binary	-	Only as alarm	3I0>> TRIP
PROT_PTTR1_Str_general	Thermal Overload picked up	Ext	Binary	-	Only as alarm	Thermal Overload picked up
PROT_PTTR1_Op_general	Thermal Overload TRIP	Ext	Binary	-	Only as alarm	Thermal Overload TRIP
PROT_PDIF1_Str_general	Differential protection 1 picked up	Ext	Binary	-	Only as alarm	Differential protection 1 picked up
PROT_PDIF1_Op_general	Differential protection 1 TRIP	Ext	Binary	-	Only as alarm	Differential protection 1 TRIP
PROT_PDIF2_Str_general	Differential protection 2 picked up	Ext	Binary	-	Only as alarm	Differential protection 2 picked up
PROT_PDIF2_Op_general	Differential protection 2 TRIP	Ext	Binary	-	Only as alarm	Differential protection 2 TRIP
PROT_GAPC1_Str_general	External trip 1 general picked up	Ext	Binary	-	Only as alarm	External trip 1 general picked up
PROT_GAPC1_Op_general	External trip 1 general TRIP	Ext	Binary	-	Only as alarm	External trip 1 general TRIP
PROT_GAPC2_Str_general	External trip 2 general picked up	Ext	Binary	-	Only as alarm	External trip 2 general picked up
PROT_GAPC2_Op_general	External trip 2 general TRIP	Ext	Binary	-	Only as alarm	External trip 2 general TRIP

3.11.2 IEC 61850 SIP7UT612 Outputs

IEC 61850 SIP7UT612 Outputs

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
RCmd0	Command Q0	Ext	Binary	-	Yes	Switch Q0 command 0=Open 1=Close
DA0	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

3.11.3 IEC 61850 SIP7UT612 Internal Variables

IEC 61850 SIP7UT612 Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
I1_A#shortcut	Text I1_A	Int	String	-	Config	Faceplate text for current side 1 measuring point 1
I1_B#shortcut	Text I1_B	Int	String	-	Config	Faceplate text for current side 1 measuring point 2
I1_C#shortcut	Text I1_C	Int	String	-	Config	Faceplate text for current side 1 measuring point 3
I2_A#shortcut	Text I2_A	Int	String	-	Config	Faceplate text for current side 2 measuring point 1
I2_B#shortcut	Text I2_B	Int	String	-	Config	Faceplate text for current side 2 measuring point 2
I2_C#shortcut	Text I2_C	Int	String	-	Config	Faceplate text for current side 2 measuring point 3
Cmd0	Command Q0	Int	BYTE	-	Yes	Switch Q0 command used in faceplate for trigger RCmd0 and generate some alarms on error. 0=Open 1=Close
Timeout	Command timeout	Int	WORD	-	No	Timeout of switch Q0 for discrepancy alarm
CmdSense0	Reserved for internal use	Int	Binary	-	No	Reserved for internal use
TimingOut0	Reserved for internal use	Int	Binary	-	No	Reserved for internal use

3.11.4 IEC 61850 SIP7UT612 Alarms

IEC 61850 SIP7UT612 Alarms

The following alarms are defined for the IEC 61850 SIP7UT612.

Name	Class	Type	Configured by Default	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
DiscrepancyAlarm Q0	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA0 = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1

Name	Class	Type	Configured by Default	Condition Description
I> picked up	Warning	Warning High	Yes	PROT_PTOC1_Str_general = 1
I> TRIP	Alarm	Alarm High	Yes	PROT_PTOC1_Op_general = 1
I>> picked up	Warning	Warning High	Yes	PROT_PTOC2_Str_general = 1
I>> TRIP	Alarm	Alarm High	Yes	PROT_PTOC2_Op_general = 1
Ip picked up	Warning	Warning High	Yes	PROT_PTOC3_Str_general = 1
Ip TRIP	Alarm	Alarm High	Yes	PROT_PTOC3_Op_general = 1
3I0> picked up	Warning	Warning High	Yes	PROT_PTOC7_Str_general = 1
3I0> TRIP	Alarm	Alarm High	Yes	PROT_PTOC7_Op_general = 1
3I0>> picked up	Warning	Warning High	Yes	PROT_PTOC8_Str_general = 1
3I0>> TRIP	Alarm	Alarm High	Yes	PROT_PTOC8_Op_general = 1
Thermal Overload picked up	Warning	Warning High	Yes	PROT_PTTR1_Str_general = 1
Thermal Overload TRIP	Alarm	Alarm High	Yes	PROT_PTTR1_Op_general = 1
Differential protection 1 picked up	Warning	Warning High	Yes	PROT_PDIF1_Str_general = 1
Differential protection 1 TRIP	Alarm	Alarm High	Yes	PROT_PDIF1_Op_general = 1
Differential protection 2 picked up	Warning	Warning High	Yes	PROT_PDIF2_Str_general = 1
Differential protection 2 TRIP	Alarm	Alarm High	Yes	PROT_PDIF2_Op_general = 1
External trip 1 general picked up	Warning	Warning High	Yes	PROT_GAPC1_Str_general = 1
External trip 1 general TRIP	Alarm	Alarm High	Yes	PROT_GAPC1_Op_general = 1
External trip 2 general picked up	Warning	Warning High	Yes	PROT_GAPC2_Str_general = 1
External trip 2 general TRIP	Alarm	Alarm High	Yes	PROT_GAPC2_Op_general = 1
BadCheckback Q0	PLC process control messages	Error	Yes	STATUS0 = 1
Error with a summary alarm	Alarm	Alarm High	Yes	Error = 1
Alarm summary event	Warning	Warning High	Yes	Warning = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an SIP7UT612 object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

If an IEC 61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

Objects: 0 | Attributes: 3 | Graphics: 9 | Alarm Messages | Addresses | Operation: 1

Message	Priority	Class	Type	Text	Enabled
Alarm summary event	0	2 - Warning	19	Alarm summary event	Yes
Bad Checkback Q0	0	4 - PLC process control messages...	56	@7%s@ - Bad checkback Q0 - S...	Yes
Differential protection 1 picked up	0	2 - Warning	19	Differential protection 1 picked up	Yes
Differential protection 1 TRIP	0	1 - Alarm	1	Differential protection 1 TRIP	Yes
Differential protection 2 picked up	0	2 - Warning	19	Differential protection 2 picked up	Yes
Differential protection 2 TRIP	0	1 - Alarm	1	Differential protection 2 TRIP	Yes
Discrepancy Alarm Q0	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q0	Yes
Error with a summary alarm	0	1 - Alarm	1	Error with a summary alarm	Yes
Relay GENERAL TRIP command	0	1 - Alarm	1	Relay GENERAL TRIP command	Yes
Relay PICKUP	0	2 - Warning	19	Relay PICKUP	Yes

3.11.5 IEC 61850 SIP7UT612 Operational Parameters

Configuring operational characteristics

The operational characteristics of an IEC 61850 SIP7UT612 can be configured in DBA.

1. Select an IEC 61850 SIP7UT612 object instance from the Plant View.
2. Select the "Operations" tab of the Attribute Edit window in the upper right hand quadrant of the screen.

Objects: 0 | Attributes: 3 | Graphics: 9 | Alarm Messages | Addresses | Operation: 1

Name	Value	Category	Description
Timeout	10	Operation	Failed To Operate Timeout

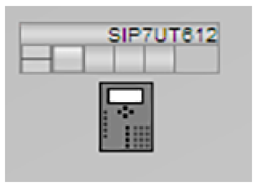
Timeout

Timeout value is in unit of seconds. Any integer value can be specified. If a Timeout has been configured and if the Feedback does not correspond to the value of expected feedback within the timeout period, a Discrepancy Alarm is generated.

3.11.6 IEC 61850 SIP7UT612 Symbol Display

IEC 61850 SIP7UT612 Symbol Display

The following IEC 61850 SIP7UT612 symbol is included as part of the PowerControl Library Objects typicals.



The symbol shows any active alarm conditions.

3.11.7 IEC 61850 SIP7UT612 Faceplate

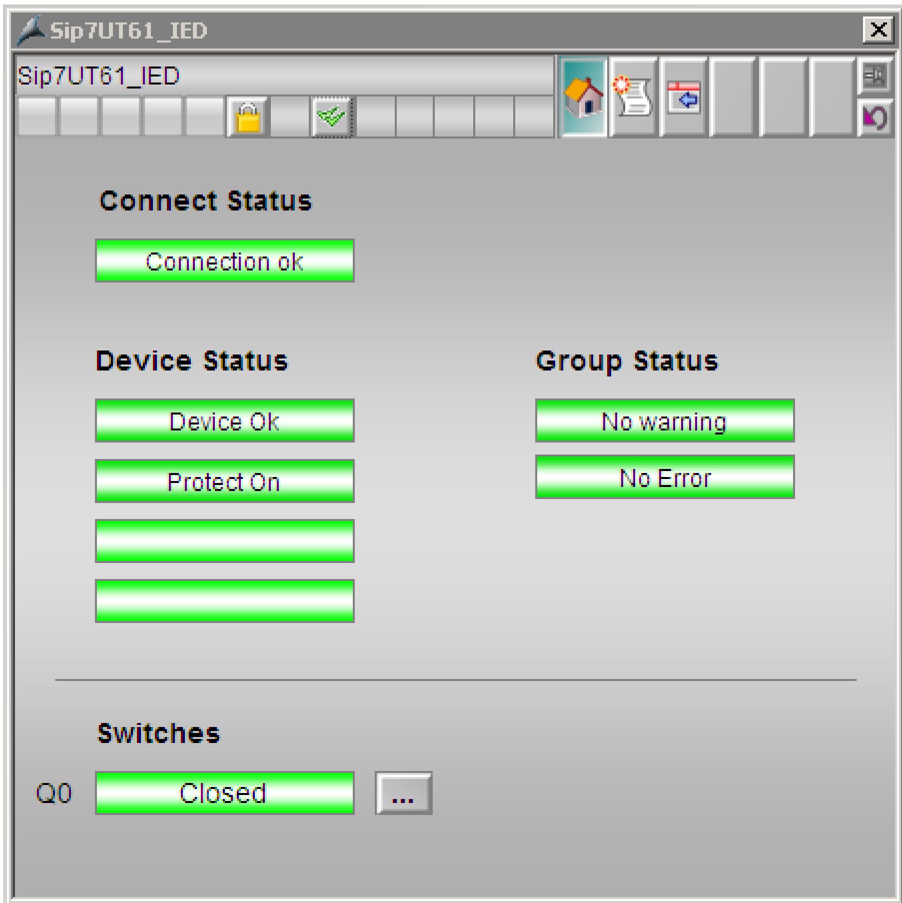
The faceplate has three views

The IEC 61850 SIP7UT612 faceplate has three views – standard, alarm and measurement.

3.11.7.1 IEC 61850 SIP7UT612 Faceplate: Standard Pane

Status of device

The view of Standard Pane shows status of device and allows operating switches.



Buttons

Note

Level 5 permissions are required to be able to press any buttons in this view.

Entry Field	Action	Description
Q0	Cmd0=0/1	Switch Q0 command. 0=Open 1=Close

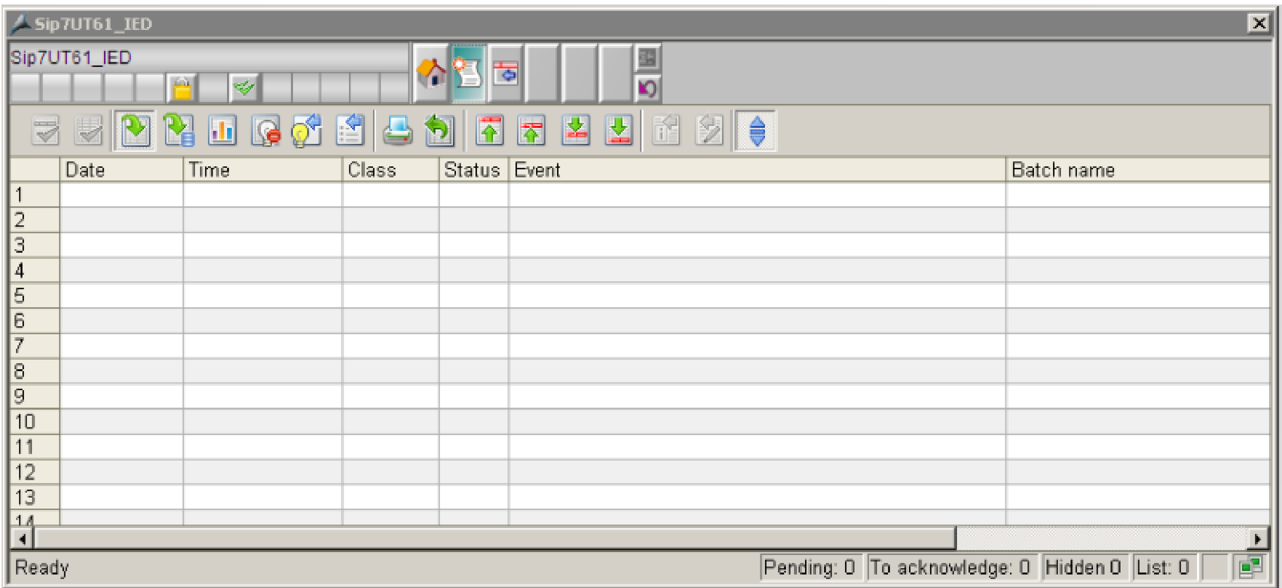
Indicators

Indicator	Meaning	Tag	Colors	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blcked) – YELLOW Beh=3 (Protect test) – RED Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Relay trip indication	TR_Relay	TR_Relay=0 () – GREEN TR_Relay=1 (Relay trip) – RED	
Device Status 4	Relay pickup indication	PU_Relay	PU_Relay=0 () – GREEN PU_Relay=1 (Relay pickup) – RED	
Group Status 1	IED group warning	Warning	Warning=0 (No warning) – GREEN Warning=1 (Warning) – RED	
Group Status 2	IED group error	Error	Error =0 (No Error) – GREEN Error =1 (Error) – RED	
Switches Q0	Switch position	Pos0	Pos0 =0 (Intermed.) – RED Pos0 =1 (Open) – GREEN Pos0 =2 (Close) – GREEN Pos0 =3 (Bad) – RED Pos0 =4 (Error) – RED	

3.11.7.2 IEC 61850 SIP7UT612 Faceplate: Alarm View

Active alarms

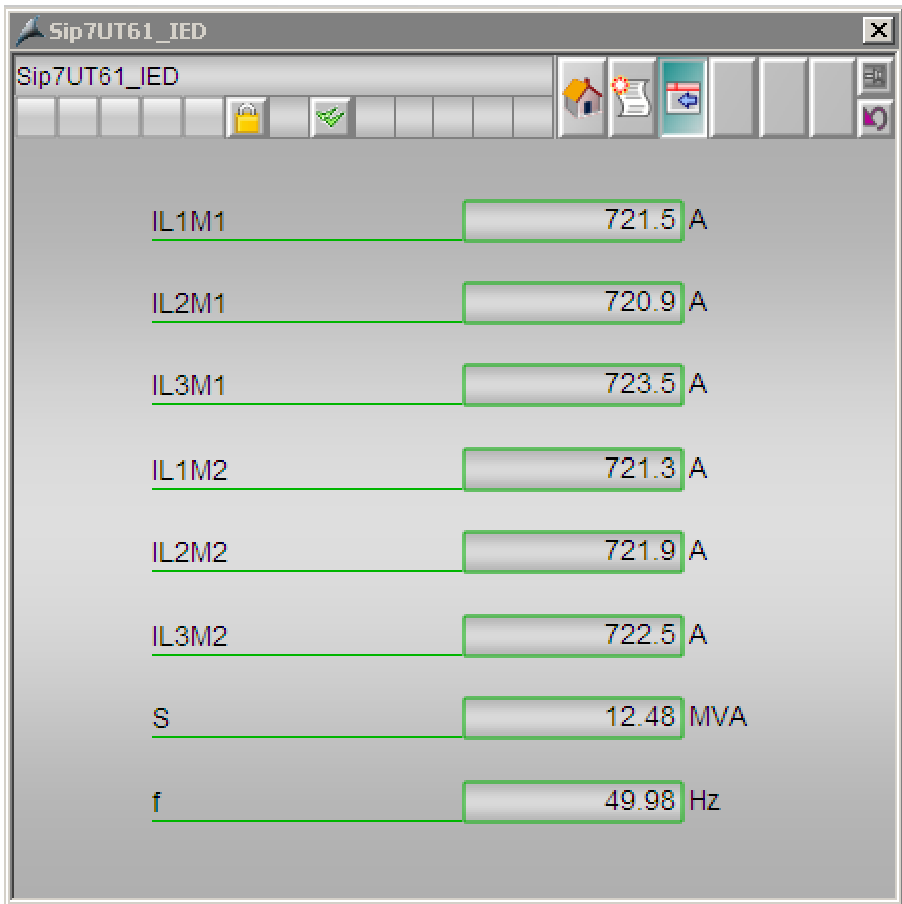
This panel shows each of the active alarms that are active for the IED.



3.11.7.3 IEC 61850 SIP7UT612 Faceplate: Measurement Pane

Measured values

The Measurement Pane shows the measured values of IED.



Indicators

Indicator	Meaning	Tag	Colors	Note
IL1M1	Current IL1 measurement 1	I1_A	GRAY	Text can be configured via DBA
IL2M1	Current IL2 measurement 1	I1_B	GRAY	Text can be configured via DBA
IL3M1	Current IL3 measurement 1	I1_C	GRAY	Text can be configured via DBA
IL1M2	Current IL1 measurement 2	I2_A	GRAY	Text can be configured via DBA
IL2M2	Current IL2 measurement 2	I2_B	GRAY	Text can be configured via DBA

Indicator	Meaning	Tag	Colors	Note
IL3M2	Current IL3 measurement 2	I2_C	GRAY	Text can be configured via DBA
S	Apparent Power	S	GRAY	
F	Frequency	F	GRAY	

3.12 IEC 61850 SIP7SJ633

3.12.1 IEC 61850 SIP7SJ633 Inputs

IEC 61850 SIP7SJ633 Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in** / **out**); **Config**uration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Beh	Behavior	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	DWord	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
TR_Relay	Relay trip	Ext	Binary	-	Yes	Relay pickup
PU_Relay	Relay pickup	Ext	Binary	-	Yes	Relay general trip command
Error	Summary error	Ext	Binary	-	Yes	Error with a summary alarm
Warning	Summary warning	Ext	Binary	-	Yes	Alarm summary event
Pos0	Position Q0	Ext	DWord	-	Yes	Switch position Q0 0=Intermediate 1=Off 2=On 3=Bad
Pos1	Position Q1	Ext	DWord	-	Yes	Switch position Q1 0=Intermediate 1=Off 2=On 3=Bad

Abbreviation	Name	Type	Data Type	De-fault Value	Opera-tor Visi-ble	Description
Pos2	Position Q2	Ext	DWord	-	Yes	Switch position Q2 0=Intermediate 1=Off 2=On 3=Bad
Pos8	Position Q8	Ext	DWord	-	Yes	Switch position Q8 0=Intermediate 1=Off 2=On 3=Bad
Pos9	Position Q9	Ext	DWord	-	Yes	Switch position Q9 0=Intermediate 1=Off 2=On 3=Bad
P	Effective Power P	Ext	FLOAT	-	Yes	Effective Power P
Q	Reactive Power Q	Ext	FLOAT	-	Yes	Reactive Power Q
PF	Power factor phi	Ext	FLOAT	-	Yes	Power factor phi
WpForward	Effective Work	Ext	SDWord	-	Yes	Effective Work
WqForward	Reactive Work	Ext	SDWord	-	Yes	Reactive Work
V_A	Voltage phase A (UL1)	Ext	FLOAT	-	Yes	Voltage measuring point 1
V_B	Voltage phase B (UL2)	Ext	FLOAT	-	Yes	Voltage measuring point 2
V_C	Voltage phase C (UL3)	Ext	FLOAT	-	Yes	Voltage measuring point 3
I_A	Current phase A (IL1)	Ext	FLOAT	-	Yes	Current measuring point 1
I_B	Current phase B (IL2)	Ext	FLOAT	-	Yes	Current measuring point 2
I_C	Current phase C (IL3)	Ext	FLOAT	-	Yes	Current measuring point 3
QCONERR0	Connection status	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
STATUS0	Feedback Q0 Cmd	Ext	BYTE	-	Only as alarm	Feedback of Q0 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
STATUS1	Feedback Q1 Cmd	Ext	BYTE	-	Only as alarm	Feedback of Q1 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
STATUS2	Feedback Q2 Cmd	Ext	BYTE	-	Only as alarm	Feedback of Q2 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	De-fault Value	Opera-tor Visi-ble	Description
STATUS8	Feedback Q8 Cmd	Ext	BYTE	-	Only as alarm	Feedback of Q8 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10=No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	De-fault Value	Opera-tor Visi-ble	Description
STATUS9	Feedback Q9 Cmd	Ext	BYTE	-	Only as alarm	Feedback of Q9 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error
PROT_PTOC6_Str_general	50-1 Overcurrent I > picked up	Ext	Binary	-	Only as alarm	50-1 Overcurrent I > picked up
PROT_PTOC6_Op_general	50-1 Overcurrent I > TRIP	Ext	Binary	-	Only as alarm	50-1 Overcurrent I > TRIP
PROT_PTOC7_Str_general	50-2 Overcurrent I >> picked up	Ext	Binary	-	Only as alarm	50-2 Overcurrent I >> picked up
PROT_PTOC7_Op_general	50-2 Overcurrent I >>TRIP	Ext	Binary	-	Only as alarm	50-2 Overcurrent I >>TRIP
PROT_PTOC8_Str_general	50N-1 Overcurrent IE > picked up	Ext	Binary	-	Only as alarm	50N-1 Overcurrent IE > picked up
PROT_PTOC8_Op_general	50N-1 Overcurrent IE > TRIP	Ext	Binary	-	Only as alarm	50N-1 Overcurrent IE > TRIP
PROT_PTOC9_Str_general	50N-2 Overcurrent IE >> picked up	Ext	Binary	-	Only as alarm	50N-2 Overcurrent IE >> picked up
PROT_PTOC9_Op_general	50N-2 Overcurrent IE >> TRIP	Ext	Binary	-	Only as alarm	50N-2 Overcurrent IE >> TRIP
PROT_PTOC10_Str_general	67-1 Directional Overcurrent I > picked up	Ext	Binary	-	Only as alarm	67-1 Directional Overcurrent I > picked up

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PROT_PTOC10_Op_general	67-1 Directional Overcurrent I > TRIP	Ext	Binary	-	Only as alarm	67-1 Directional Overcurrent I > TRIP
PROT_PTOC11_Str_general	67-2 Directional Overcurrent I >> picked up	Ext	Binary	-	Only as alarm	67-2 Directional Overcurrent I >> picked up
PROT_PTOC11_Op_general	67-2 Directional Overcurrent I >>TRIP	Ext	Binary	-	Only as alarm	67-2 Directional Overcurrent I >>TRIP
PROT_PTOC12_Str_general	67N-1 Directional Overcurrent IE > picked up	Ext	Binary	-	Only as alarm	67N-1 Directional Overcurrent IE > picked up
PROT_PTOC12_Op_general	67N-1 Directional Overcurrent IE > TRIP	Ext	Binary	-	Only as alarm	67N-1 Directional Overcurrent IE > TRIP
PROT_PTOC13_Str_general	67N-2 Directional Overcurrent IE >> picked up	Ext	Binary	-	Only as alarm	67N-2 Directional Overcurrent IE >> picked up
PROT_PTOC13_Op_general	67N-2 Directional Overcurrent IE >>TRIP	Ext	Binary	-	Only as alarm	67N-2 Directional Overcurrent IE >>TRIP

3.12.2 IEC 61850 SIP7SJ633 Outputs

IEC 61850 SIP7SJ633 Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RCmd0	Command Q0	Ext	Binary	-	Yes	Switch Q0 command 0=Open 1=Close
RCmd1	Command Q1	Ext	Binary	-	Yes	Switch Q1 command 0=Open 1=Close
RCmd2	Command Q2	Ext	Binary	-	Yes	Switch Q2 command 0=Open 1=Close
RCmd8	Command Q8	Ext	Binary	-	Yes	Switch Q8 command 0=Open 1=Close
RCmd9	Command Q9	Ext	Binary	-	Yes	Switch Q9 command 0=Open 1=Close
DA0	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
DA1	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA2	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA8	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA9	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

3.12.3 IEC 61850 SIP7SJ633 Internal Variables

IEC 61850 SIP7SJ633 Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
V_A#shortcut	Behavior enumeration	Int	String	-	No	Enumeration of behavior
V_B#shortcut	Device OK enumeration	Int	String	-	No	Enumeration of device OK
V_C#shortcut	Text I1_A	Int	String	-	Config	Faceplate text for current side 1 measuring point 1
I_A#shortcut	Text I1_B	Int	String	-	Config	Faceplate text for current side 1 measuring point 2
I_B#shortcut	Text I1_C	Int	String	-	Config	Faceplate text for current side 1 measuring point 3
I_C#shortcut	Text V_A	Int	String	-	Config	Faceplate text for voltage measuring point 1
Cmd0	Text V_B	Int	String	-	Config	Faceplate text for voltage measuring point 2
Cmd1	Text V_C	Int	String	-	Config	Faceplate text for voltage measuring point 3
Cmd2	Text I_A	Int	String	-	Config	Faceplate text for current measuring point 1
Cmd8	Text I_B	Int	String	-	Config	Faceplate text for current measuring point 2
Cmd9	Text I_C	Int	String	-	Config	Faceplate text for current measuring point 3
Timeout	Command Q0	Int	BYTE	-	Yes	Switch Q0 command used in faceplate for trigger RCmd0 and generate some alarms on error. 0=Open 1=Close
CmdSense0	Command Q1	Int	BYTE	-	Yes	Switch Q1 command used in faceplate for trigger RCmd1 and generate some alarms on error. 0=Open 1=Close

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
CmdSense1	Command Q2	Int	BYTE	-	Yes	Switch Q2 command used in faceplate for trigger RCmd2 and generate some alarms on error. 0=Open 1=Close
CmdSense2	Command Q8	Int	BYTE	-	Yes	Switch Q8 command used in faceplate for trigger RCmd8 and generate some alarms on error. 0=Open 1=Close
CmdSense8	Command Q9	Int	BYTE	-	Yes	Switch Q9 command used in faceplate for trigger RCmd9 and generate some alarms on error. 0=Open 1=Close
CmdSense9	Command timeout	Int	WORD	-	No	Timeout of switch Q0-Q9 for discrepancy alarm
TimingOut0	Reserved for internal use	Int	Binary	-	No	Reserved for internal use
TimingOut1	Reserved for internal use	Int		-	No	Reserved for internal use
TimingOut2	Reserved for internal use	Int		-	No	Reserved for internal use
TimingOut8	Reserved for internal use	Int		-	No	Reserved for internal use
TimingOut9	Reserved for internal use	Int		-	No	Reserved for internal use

3.12.4 IEC 61850 SIP7SJ633 Alarms

IEC 61850 SIP7SJ633 Alarms

The following alarms are defined for the IEC 61850 SIP7SJ633.

Name	Class	Type	Configured by Default	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
DiscrepancyAlarm Q0	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA0 = 1
DiscrepancyAlarm Q1	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA1 = 1

Name	Class	Type	Configured by Default	Condition Description
DiscrepancyAlarm Q2	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA2 = 1
DiscrepancyAlarm Q8	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA8 = 1
DiscrepancyAlarm Q9	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpcected feedback will trigger this alarm. DA9 = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
50-1 Overcurrent I > picked up	Warning	Warning High	Yes	PROT_PTOC6_Str_general = 1
50-1 Overcurrent I > TRIP	Alarm	Alarm High	Yes	PROT_PTOC6_Op_general = 1
50-2 Overcurrent I >> picked up	Warning	Warning High	Yes	PROT_PTOC7_Str_general = 1
50-2 Overcurrent I >>TRIP	Alarm	Alarm High	Yes	PROT_PTOC7_Op_general = 1
50N-1 Overcurrent IE > picked up	Warning	Warning High	Yes	PROT_PTOC8_Str_general = 1
50N-1 Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PROT_PTOC8_Op_general = 1
50N-2 Overcurrent IE >> picked up	Warning	Warning High	Yes	PROT_PTOC9_Str_general = 1
50N-2 Overcurrent IE >> TRIP	Alarm	Alarm High	Yes	PROT_PTOC9_Op_general = 1
67-1 Directional Overcurrent I > picked up	Warning	Warning High	Yes	PROT_PTOC10_Str_general = 1
67-1 Directional Overcurrent I > TRIP	Alarm	Alarm High	Yes	PROT_PTOC10_Op_general = 1
67-2 Directional Overcurrent I >> picked up	Warning	Warning High	Yes	PROT_PTOC11_Str_general = 1
67-2 Directional Overcurrent I >>TRIP	Alarm	Alarm High	Yes	PROT_PTOC11_Op_general = 1
67N-1 Directional Overcurrent IE > picked up	Warning	Warning High	Yes	PROT_PTOC12_Str_general = 1

Name	Class	Type	Configured by Default	Condition Description
67N-1 Directional Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PROT_PTOC12_Op_general = 1
67N-2 Directional Overcurrent IE >> picked up	Warning	Warning High	Yes	PROT_PTOC13_Str_general = 1
67N-2 Directional Overcurrent IE >>TRIP	Alarm	Alarm High	Yes	PROT_PTOC13_Op_general = 1
BadCheckback Q0	PLC process control messages	Error	Yes	STATUS0 = 1
BadCheckback Q1	PLC process control messages	Error	Yes	STATUS1 = 1
BadCheckback Q2	PLC process control messages	Error	Yes	STATUS2 = 1
BadCheckback Q8	PLC process control messages	Error	Yes	STATUS8 = 1
BadCheckback Q9	PLC process control messages	Error	Yes	STATUS9 = 1
Error with a summary alarm	Alarm	Alarm High	Yes	Error = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an SIP7SJ633 object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

If an IEC 61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

Objects: 0 | Attributes: 3 | Graphics: 9 | Alarm Messages | Addresses | Operation: 1

Message	Prior...	Class	Ty...	Text	Enabled
50-1 Overcurrent I > picked up	0	2 - Warning	19	50-1 Overcurrent I > picked up	Yes
50-1 Overcurrent I > TRIP	0	1 - Alarm	1	50-1 Overcurrent I > TRIP	Yes
50-2 Overcurrent I >> picked up	0	2 - Warning	19	50-2 Overcurrent I >> picked up	Yes
50-2 Overcurrent I >>TRIP	0	1 - Alarm	1	50-2 Overcurrent I >>TRIP	Yes
50N-1 Overcurrent IE > picked up	0	2 - Warning	19	50N-1 Overcurrent IE > picked up	Yes
50N-1 Overcurrent IE > TRIP	0	1 - Alarm	1	50N-1 Overcurrent IE > TRIP	Yes
50N-2 Overcurrent IE >> picked up	0	2 - Warning	19	50N-2 Overcurrent IE >> picked up	Yes
50N-2 Overcurrent IE >> TRIP	0	1 - Alarm	1	50N-2 Overcurrent IE >> TRIP	Yes
67-1 Directional Overcurrent I > pick...	0	2 - Warning	19	67-1 Directional Overcurrent I > pic...	Yes
67-1 Directional Overcurrent I > TRIP	0	1 - Alarm	1	67-1 Directional Overcurrent I > TRIP	Yes
67-2 Directional Overcurrent I >> pic...	0	2 - Warning	19	67-2 Directional Overcurrent I >> pi...	Yes
67-2 Directional Overcurrent I >>TRIP	0	1 - Alarm	1	67-2 Directional Overcurrent I >>T...	Yes
67N-1 Directional Overcurrent IE > p...	0	2 - Warning	19	67N-1 Directional Overcurrent IE > ...	Yes
67N-1 Directional Overcurrent IE > T...	0	1 - Alarm	1	67N-1 Directional Overcurrent IE > ...	Yes
67N-2 Directional Overcurrent IE >> ...	0	2 - Warning	19	67N-2 Directional Overcurrent IE >...	Yes
67N-2 Directional Overcurrent IE >>...	0	1 - Alarm	1	67N-2 Directional Overcurrent IE >...	Yes
Alarm summary event	0	2 - Warning	19	Alarm summary event	Yes
Bad Checkback Q0	0	4 - PLC process cont...	56	@7%s@ - Bad checkback Q0 - S...	Yes
Bad Checkback Q1	0	4 - PLC process cont...	56	@7%s@ - Bad checkback Q1 - S...	Yes
Bad Checkback Q2	0	4 - PLC process cont...	56	@7%s@ - Bad checkback Q2 - S...	Yes
Bad Checkback Q8	0	4 - PLC process cont...	56	@7%s@ - Bad checkback Q8 - S...	Yes
Bad Checkback Q9	0	4 - PLC process cont...	56	@7%s@ - Bad checkback Q9 - S...	Yes
Discrepancy Alarm Q0	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q0	Yes
Discrepancy Alarm Q1	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q1	Yes
Discrepancy Alarm Q2	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q2	Yes
Discrepancy Alarm Q8	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q8	Yes
Discrepancy Alarm Q9	0	1 - Alarm	1	@7%s@ - Discrepancy Alarm Q9	Yes
Error with a summary alarm	0	1 - Alarm	1	Error with a summary alarm	Yes
Relay GENERAL TRIP command	0	1 - Alarm	1	Relay GENERAL TRIP command	Yes
Relay PICKUP	0	2 - Warning	19	Relay PICKUP	Yes

3.12.5 IEC 61850 SIP7SJ633 Operational Parameters

Configuring operational characteristics

The operational characteristics of an IEC 61850 SIP7SJ633 can be configured in DBA.

1. Select an IEC 61850 SIP7SJ633 object instance from the Plant View.
2. Select the "Operations" tab of the Attribute Edit window in the upper right hand quadrant of the screen.

Objects: 0 | Attributes: 3 | Graphics: 9 | Alarm Messages | Addresses | Operation: 1

Name	Value	Category	Description
Timeout	10	Operation	Failed To Operate Timeout

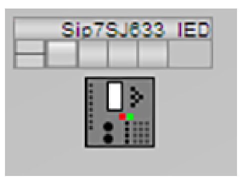
Timeout

Timeout value is in unit of seconds. Any integer value can be specified. If a Timeout has been configured and if the Feedback does not correspond to the value of expected feedback within the timeout period, a Discrepancy Alarm is generated.

3.12.6 IEC 61850 SIP7SJ633 Symbol Display

Symbol Display

The following IEC 61850 SIP7SJ633 symbol is included as part of the PowerControl Library Objects typicals.



The symbol shows any active alarm conditions.

3.12.7 IEC 61850 SIP7SJ633 Faceplate

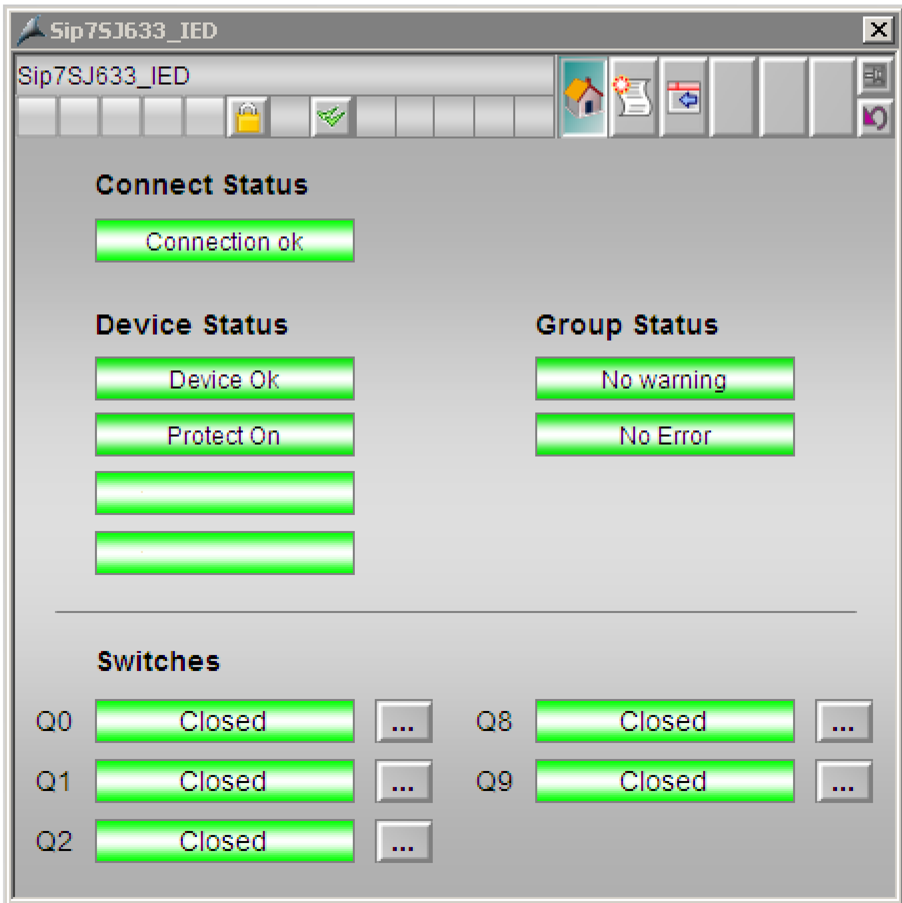
The faceplate has three views

The IEC 61850 SIP7SJ633 faceplate has three views – standard, alarm and measurement.

3.12.7.1 IEC 61850 SIP7SJ633 Faceplate: Standard Pane

Status of device

The view of Standard Pane shows status of device and allows operating switches.



Buttons

Note

Level 5 permissions are required to be able to press any buttons in this view.

Entry Field	Action	Description
Q0	Cmd0=0/1	Switch Q0 command. 0=Open 1=Close
Q1	Cmd1=0/1	Switch Q1 command. 0=Open 1=Close

Entry Field	Action	Description
Q2	Cmd2=0/1	Switch Q2 command. 0=Open 1=Close
Q8	Cmd8=0/1	Switch Q8 command. 0=Open 1=Close
Q9	Cmd9=0/1	Switch Q9 command. 0=Open 1=Close

Indicators

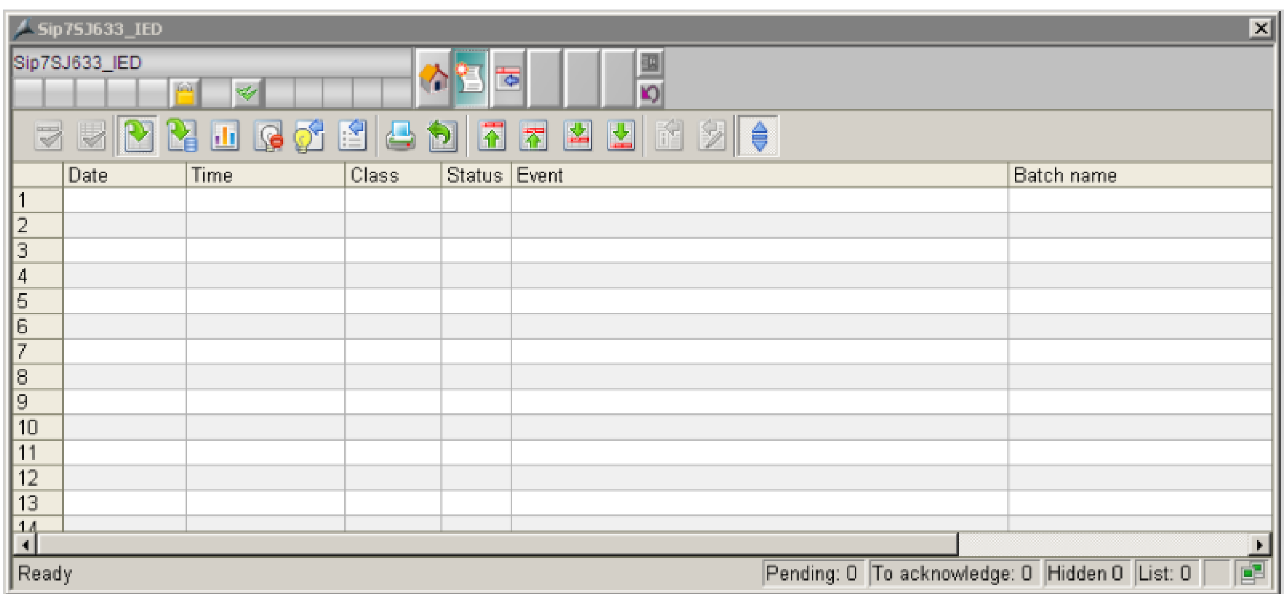
Indicator	Meaning	Tag	Colors	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blcked) – YELLOW Beh=3 (Protect test) – RED Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Relay trip indication	TR_Relay	TR_Relay=0 () – GREEN TR_Relay=1 (Relay trip) – RED	
Device Status 4	Relay pickup indication	PU_Relay	PU_Relay=0 () – GREEN PU_Relay=1 (Relay pickup) – RED	
Group Status 1	IED group warning	Warning	Warning=0 (No warning) – GREEN Warning=1 (Warning) – RED	
Group Status 2	IED group error	Error	Error =0 (No Error) – GREEN Error =1 (Error) – RED	
Switches Q0	Switch position	Pos0	Pos0 =0 (Intermed.) – RED Pos0 =1 (Open) – GREEN Pos0 =2 (Close) – GREEN Pos0 =3 (Bad) – RED Pos0 =4 (Error) – RED	
Switches Q1	Switch position	Pos1	Pos1 =0 (Intermed.) – RED Pos1 =1 (Open) – GREEN Pos1 =2 (Close) – GREEN Pos1 =3 (Bad) – RED Pos1 =4 (Error) – RED	
Switches Q2	Switch position	Pos2	Pos2 =0 (Intermed.) – RED Pos2 =1 (Open) – GREEN Pos2 =2 (Close) – GREEN Pos2 =3 (Bad) – RED Pos2 =4 (Error) – RED	

Indicator	Meaning	Tag	Colors	Note
Switches Q8	Switch position	Pos8	Pos8 =0 (Intermed.) – RED Pos8 =1 (Open) – GREEN Pos8 =2 (Close) – GREEN Pos8 =3 (Bad) – RED Pos8 =4 (Error) – RED	
Switches Q9	Switch position	Pos9	Pos9 =0 (Intermed.) – RED Pos9 =1 (Open) – GREEN Pos9 =2 (Close) – GREEN Pos9 =3 (Bad) – RED Pos9 =4 (Error) – RED	

3.12.7.2 IEC 61850 SIP7SJ633 Faceplate: Alarm View

Active alarms

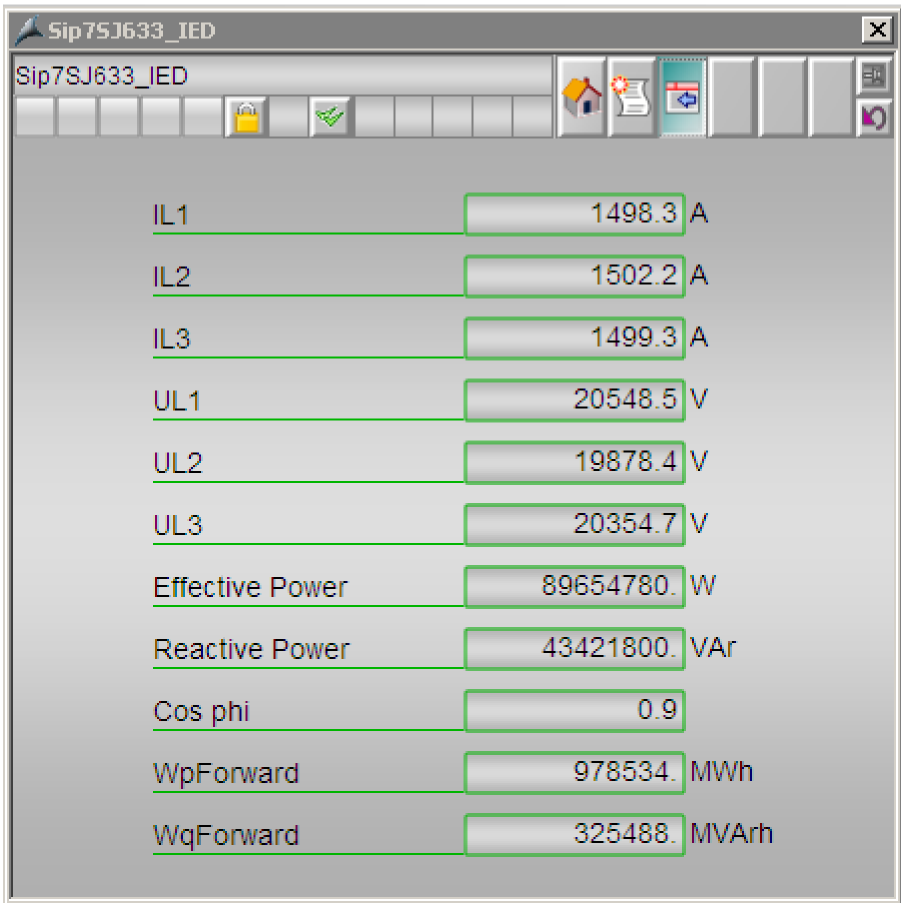
This panel shows each of the active alarms that are active for the IED.



3.12.7.3 IEC 61850 SIP7SJ633 Faceplate: Measurement Pane

Measured values

The Measurement Pane shows the measured values of IED.



Indicators

Indicator	Meaning	Tag	Colors	Note
IL1	Current IL1	I_A	GRAY	Text can be configured via DBA
IL2	Current IL2	I_B	GRAY	Text can be configured via DBA
IL3	Current IL3	I_C	GRAY	Text can be configured via DBA
UL1	Voltage UL1	U_A	GRAY	Text can be configured via DBA
UL2	Voltage UL2	U_B	GRAY	Text can be configured via DBA
UL3	Voltage UL3	U_C	GRAY	Text can be configured via DBA
Effective Power	Effective Power	P	GRAY	
Reactive Power	Reactive Power	Q	GRAY	
Cos phi	Power factor phi	PF	GRAY	

Indicator	Meaning	Tag	Colors	Note
WpForward	Effective Work WpForward	WpForward	GRAY	
WqForward	Reactive Work WpForward	WqForward	GRAY	

3.13 IEC 61850 SIP7UM62

3.13.1 IEC 61850 SIP7UM62 Inputs

IEC 61850 SIP7UM62 Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in** / **out**); **Config**uration item; Item available for **Archive**.

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Dev_OK	Device OK	Ext	DWord	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
TrpFeedVT	Status of undervoltage protection 1	Ext	DWord	-	Yes	1=Undervolt. ACT 2=Undervolt Prot. Blocked 3=>FAIL:FeedVT test 4=>FAIL:FeedVT t/blkd 5= Undervolt. OFF
TransFusF	Status of impedance protection	Ext	DWord	-	Yes	1=Imp. ACTIVE 2=VT Fuse Failure 3=>FAIL:FeedVT test 4=>FAIL:FeedVT t/blkd 5=Imp. OFF
TR_Relay	Relay trip	Ext	Binary	-	Yes	Relay pickup
PU_Relay	Relay pickup	Ext	Binary	-	Yes	Relay general trip command
Error	Summary error	Ext	Binary	-	Yes	Error with a summary alarm
Warning	Summary warning	Ext	Binary	-	Yes	Alarm summary event
P	Effective Power P	Ext	FLOAT	-	Yes	Effective Power P
Q	Reactive Power Q	Ext	FLOAT	-	Yes	Reactive Power Q
F	Frequency F	Ext	FLOAT	-	Yes	Frequency F
TMP	Temperature	Ext	FLOAT	-	Yes	Temperature (GGIO7.AnIn2)
I1_A	Current side1 phase A	Ext	FLOAT	-	Yes	Current side 1 measuring point 1
I1_B	Current side1 phase B	Ext	FLOAT	-	Yes	Current side 1 measuring point 2

Abbreviation	Name	Type	Data Type	De-fault Value	Opera-tor Visi-ble	Description
I1_C	Current side1 phase C	Ext	FLOAT	-	Yes	Current side 1 measuring point 3
I1_N	Current side1 phase neutral	Ext	FLOAT	-	Yes	Current side 1 measuring point N
I2_A	Current side2 phase A	Ext	FLOAT	-	Yes	Current side 2 measuring point 1
I2_B	Current side2 phase B	Ext	FLOAT	-	Yes	Current side 2 measuring point 2
I2_C	Current side2 phase C	Ext	FLOAT	-	Yes	Current side 2 measuring point 3
I2_N	Current side2 phase neutral	Ext	FLOAT	-	Yes	Current side 2 measuring point N
VA_B	Voltage phase A-B (UL1-UL2)	Ext	FLOAT	-	Yes	Voltage between measuring point 1 and point 2
VB_C	Voltage phase B-C (UL2-UL3)	Ext	FLOAT	-	Yes	Voltage between measuring point 2 and point 3
VC_A	Voltage phase A-B (UL3-UL1)	Ext	FLOAT	-	Yes	Voltage between measuring point 3 and point 1
QCONERR0	Connection status	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication
PROT_PDIF1_Op_general	Differential protec-tion TRIP by IDIFF>	Ext	Binary	-	Only as alarm	Differential protection TRIP by IDIFF>
PROT_PDIF1_Str_general	Differential protec-tion IDIFF> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF> picked up
PROT_PDIF2_Op_general	Differential protec-tion TRIP by IDIFF>>	Ext	Binary	-	Only as alarm	Differential protection TRIP by IDIFF>>
PROT_PDIF2_Str_general	Differential protec-tion IDIFF>> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> picked up
PROT_PDIS2_Op_general	Impedance protec-tion Z2< TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z2< TRIP
PROT_PDIS4_Op_general	Impedance protec-tion T3> TRIP	Ext	Binary	-	Only as alarm	Impedance protection T3> TRIP
PROT_PDIS4_Str_general	Impedance protec-tion T3> picked up	Ext	Binary	-	Only as alarm	Impedance protection T3> picked up
PROT_PDUP1_Op_general	Underexcitation protection Char. 1 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 1 TRIP
PROT_PDUP2_Op_general	Underexcitation protection Char. 2 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 2 TRIP
PROT_PDUP3_Op_general	Underexcitation protection Char. 3 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 3 TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PROT_PTOC10_Op_general	Unbalanced load: TRIP of I2>> current stage	Ext	Binary	-	Only as alarm	Unbalanced load: TRIP of I2>> current stage
PROT_PTOC10_Str_general	Unbalanced load: I2>> picked up	Ext	Binary	-	Only as alarm	Unbalanced load: I2>> picked up
PROT_PTOV1_Op_general	Overvoltage U> TRIP	Ext	Binary	-	Only as alarm	Overvoltage U> TRIP
PROT_PTOV1_Str_general	Overvoltage U> picked up	Ext	Binary	-	Only as alarm	Overvoltage U> picked up
PROT_PTOV2_Op_general	Overvoltage U>> TRIP	Ext	Binary	-	Only as alarm	Overvoltage U>> TRIP
PROT_PTOV2_Str_general	Overvoltage U>> picked up	Ext	Binary	-	Only as alarm	Overvoltage U>> picked up
PROT_PTUF1_Op_general	F1 TRIP	Ext	Binary	-	Only as alarm	F1 TRIP
PROT_PTUF1_Str_general	F1 picked up	Ext	Binary	-	Only as alarm	F1 picked up
PROT_PTUF2_Op_general	F2 TRIP	Ext	Binary	-	Only as alarm	F2 TRIP
PROT_PTUF2_Str_general	F2 picked up	Ext	Binary	-	Only as alarm	F2 picked up
PROT_PTUV1_Op_general	Undervoltage U< TRIP	Ext	Binary	-	Only as alarm	Undervoltage U< TRIP
PROT_PTUV1_Str_general	Undervoltage U< picked up	Ext	Binary	-	Only as alarm	Undervoltage U< picked up
PROT_PTUV2_Op_general	Overvoltage U>> TRIP	Ext	Binary	-	Only as alarm	Overvoltage U>> TRIP
PROT_PTUV2_Str_general	Overvoltage U>> picked up	Ext	Binary	-	Only as alarm	Overvoltage U>> picked up
PROT_PVOC2_Op_general	Inadvertent Energy Protection TRIP	Ext	Binary	-	Only as alarm	Inadvertent Energy Protection TRIP
PROT_PVOC2_Str_general	Inadvertent Energy Protection Picked up	Ext	Binary	-	Only as alarm	Inadvertent Energy Protection Picked up
PROT_PDOP1_Op_general	Reverse power: TRIP	Ext	Binary	-	Only as alarm	Reverse power: TRIP

3.13.2 IEC 61850 SIP7UM62 Internal Variables

IEC 61850 SIP7UM62 Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
I1_A#shortcut	Text I1_A	Int	String	-	Config	Faceplate text for current side 1 measuring point 1
I1_B#shortcut	Text I1_B	Int	String	-	Config	Faceplate text for current side 1 measuring point 2
I1_C#shortcut	Text I1_C	Int	String	-	Config	Faceplate text for current side 1 measuring point 3
I1_N#shortcut	Text I1_N	Int	String	-	Config	Faceplate text for current side 1 measuring point N
I2_A#shortcut	Text I2_A	Int	String	-	Config	Faceplate text for current side 2 measuring point 1
I2_B#shortcut	Text I2_B	Int	String	-	Config	Faceplate text for current side 2 measuring point 2
I2_C#shortcut	Text I2_C	Int	String	-	Config	Faceplate text for current side 2 measuring point 3
I2_N#shortcut	Text I2_N	Int	String	-	Config	Faceplate text for current side 2 measuring point N
VA_B#shortcut	Text VA_B	Int	String	-	Config	Faceplate text for voltage between measuring point 1 and point 2
VB_C#shortcut	Text VB_C	Int	String	-	Config	Faceplate text for voltage between measuring point 2 and point 3
VC_A#shortcut	Text VC_A	Int	String	-	Config	Faceplate text for voltage between measuring point 3 and point 1

3.13.3 IEC 61850 SIP7UM62 Alarms

IEC 61850 SIP7UM62 Alarms

The following alarms are defined for the IEC 61850 SIP7UM62.

Name	Class	Type	Configured by Default	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
Differential protection TRIP by IDIFF>	Alarm	Alarm High	Yes	PROT_PDIF1_Op_general = 1

Name	Class	Type	Configured by Default	Condition Description
Differential protection IDIFF> picked up	Warning	Warning High	Yes	PROT_PDIF1_Str_general = 1
Differential protection TRIP by IDIFF>>	Alarm	Alarm High	Yes	PROT_PDIF2_Op_general = 1
Differential protection IDIFF>> picked up	Warning	Warning High	Yes	PROT_PDIF2_Str_general = 1
Impedance protection Z2< TRIP	Alarm	Alarm High	Yes	PROT_PDIS2_Op_general = 1
Impedance protection T3> TRIP	Alarm	Alarm High	Yes	PROT_PDIS4_Op_general = 1
Impedance protection T3> picked up	Warning	Warning High	Yes	PROT_PDIS4_Str_general = 1
Underexcitation protection Char. 1 TRIP	Alarm	Alarm High	Yes	PROT_PDUP1_Op_general = 1
Underexcitation protection Char. 2 TRIP	Alarm	Alarm High	Yes	PROT_PDUP2_Op_general = 1
Underexcitation protection Char. 3 TRIP	Alarm	Alarm High	Yes	PROT_PDUP3_Op_general = 1
Unbalanced load: I2>> TRIP	Alarm	Alarm High	Yes	PROT_PTOC10_Op_general = 1
Unbalanced load: I2>> picked up	Warning	Warning High	Yes	PROT_PTOC10_Str_general = 1
Overvoltage U> TRIP	Alarm	Alarm High	Yes	PROT_PTOV1_Op_general = 1
Overvoltage U> picked up	Warning	Warning High	Yes	PROT_PTOV1_Str_general = 1
Overvoltage U>> TRIP	Alarm	Alarm High	Yes	PROT_PTOV2_Op_general = 1
Overvoltage U>> picked up	Warning	Warning High	Yes	PROT_PTOV2_Str_general = 1
F1 TRIP	Alarm	Alarm High	Yes	PROT_PTUF1_Op_general = 1
F1 picked up	Warning	Warning High	Yes	PROT_PTUF1_Str_general = 1
F2 TRIP	Alarm	Alarm High	Yes	PROT_PTUF2_Op_general = 1
F2 picked up	Warning	Warning High	Yes	PROT_PTUF2_Str_general = 1
Undervoltage U< TRIP	Alarm	Alarm High	Yes	PROT_PTUV1_Op_general = 1
Undervoltage U< picked up	Warning	Warning High	Yes	PROT_PTUV1_Str_general = 1

Name	Class	Type	Configured by Default	Condition Description
Overvoltage U>> TRIP	Alarm	Alarm High	Yes	PROT_PTUV2_Op_general = 1
Overvoltage U>> picked up	Warning	Warning High	Yes	PROT_PTUV2_Str_general = 1
Inadvertent Energy Protection TRIP	Alarm	Alarm High	Yes	PROT_PVOC2_Op_general = 1
Inadvertent Energy Protection Picked up	Warning	Warning High	Yes	PROT_PVOC2_Str_general = 1
Reverse power: TRIP	Alarm	Alarm High	Yes	PROT_PDOP1_Op_general = 1
Error with a summary alarm	Alarm	Alarm High	Yes	Error = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an SIP7UM62 object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

If an IEC 61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

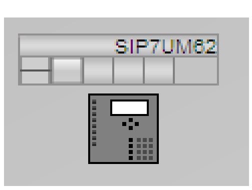
Objects: 0 | Attributes: 2 | Graphics: 14 | Alarm Messages | Addresses

Message	Priority	Class	Type	Text	Enabled
Alarm summary event	0	2 - Warning	19	Alarm summary event	Yes
Differential protection IDIFF> picked...	0	2 - Warning	19	Differential protection IDIFF> picked up	Yes
Differential protection IDIFF>> picke...	0	2 - Warning	19	Differential protection IDIFF>> picked up	Yes
Differential protection TRIP by IDIFF>	0	1 - Alarm	1	Differential protection TRIP by IDIFF>	Yes
Differential protection TRIP by IDIF...	0	1 - Alarm	1	Differential protection TRIP by IDIFF>>	Yes
Error with a summary alarm	0	1 - Alarm	1	Error with a summary alarm	Yes
F1 picked up	0	2 - Warning	19	F1 picked up	Yes
F1 TRIP	0	1 - Alarm	1	F1 TRIP	Yes
F2 picked up	0	2 - Warning	19	F2 picked up	Yes
F2 TRIP	0	1 - Alarm	1	F2 TRIP	Yes
I2>> picked up	0	2 - Warning	19	I2>> picked up	Yes
Imp.T3> TRIP	0	1 - Alarm	1	Imp.T3> TRIP	Yes
Imp.Z2< TRIP	0	1 - Alarm	1	Imp.Z2< TRIP	Yes
Impedance protection T3> picked up	0	2 - Warning	19	Impedance protection T3> picked up	Yes
Inadvert. Energ. Prot. Picked up	0	2 - Warning	19	Inadvert. Energ. Prot. Picked up	Yes
Inadvert. Energ. Prot. TRIP	0	1 - Alarm	1	Inadvert. Energ. Prot. TRIP	Yes
Overvoltage U> picked up	0	2 - Warning	19	Overvoltage U> picked up	Yes
Overvoltage U> TRIP	0	1 - Alarm	1	Overvoltage U> TRIP	Yes
Overvoltage U>> picked up	0	2 - Warning	19	Overvoltage U>> picked up	Yes
Overvoltage U>> TRIP	0	1 - Alarm	1	Overvoltage U>> TRIP	Yes
Relay GENERAL TRIP command	0	1 - Alarm	1	Relay GENERAL TRIP command	Yes
Relay PICKUP	0	2 - Warning	19	Relay PICKUP	Yes
Reverse power: TRIP	0	1 - Alarm	1	Reverse power: TRIP	Yes
Unbalanced load: TRIP of I2>> curr...	0	1 - Alarm	1	Unbalanced load: TRIP of I2>> current stage	Yes
Underexcitation protection Char. 1 T...	0	1 - Alarm	1	Underexcitation protection Char. 1 TRIP	Yes
Underexcitation protection Char. 2 T...	0	1 - Alarm	1	Underexcitation protection Char. 2 TRIP	Yes
Underexcitation protection Char. 3 T...	0	1 - Alarm	1	Underexcitation protection Char. 3 TRIP	Yes
Undervoltage U< picked up	0	2 - Warning	19	Undervoltage U< picked up	Yes
Undervoltage U< TRIP	0	1 - Alarm	1	Undervoltage U< TRIP	Yes
Undervoltage U<< picked up	0	2 - Warning	19	Undervoltage U<< picked up	Yes
Undervoltage U<< TRIP	0	1 - Alarm	1	Undervoltage U<< TRIP	Yes

3.13.4 IEC 61850 SIP7UM62 Symbol Display

Symbol Display

The following IEC 61850 SIP7UM62 symbol is included as part of the PowerControl Library Objects typicals.



The symbol shows any active alarm conditions.

3.13.5 IEC 61850 SIP7UM62 Faceplate

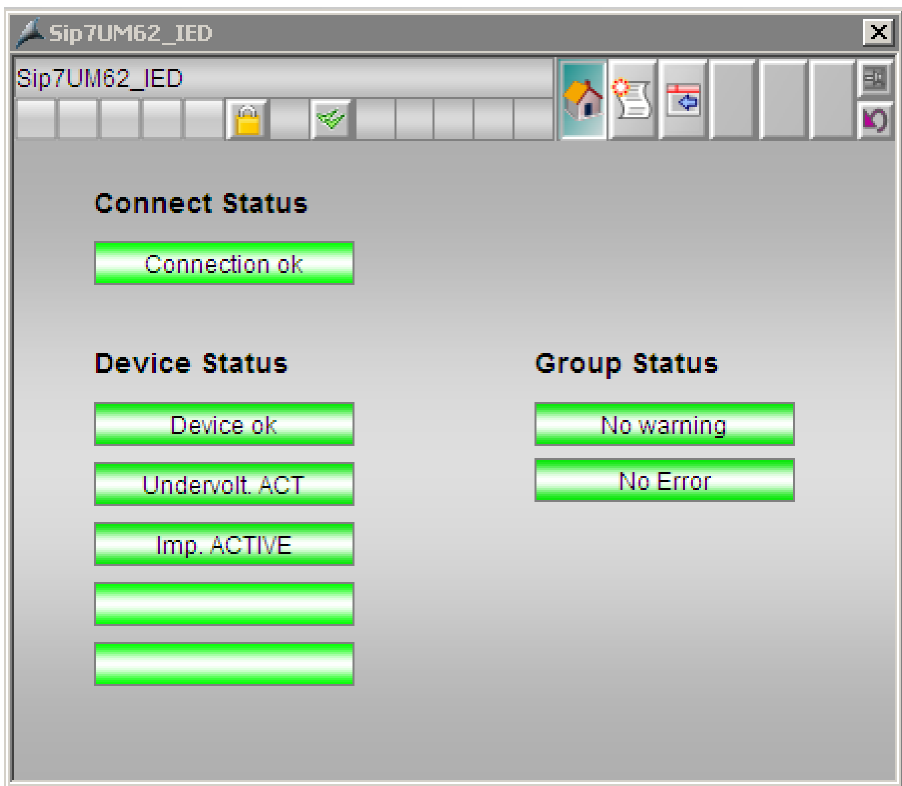
The faceplate has three views

The IEC 61850 SIP7UM62 faceplate has three views – standard, alarm and measurement.

3.13.5.1 IEC 61850 SIP7UM62 Faceplate: Standard Pane

Status of device

The view of Standard Pane shows status of device and allows operating switches.



Indicators

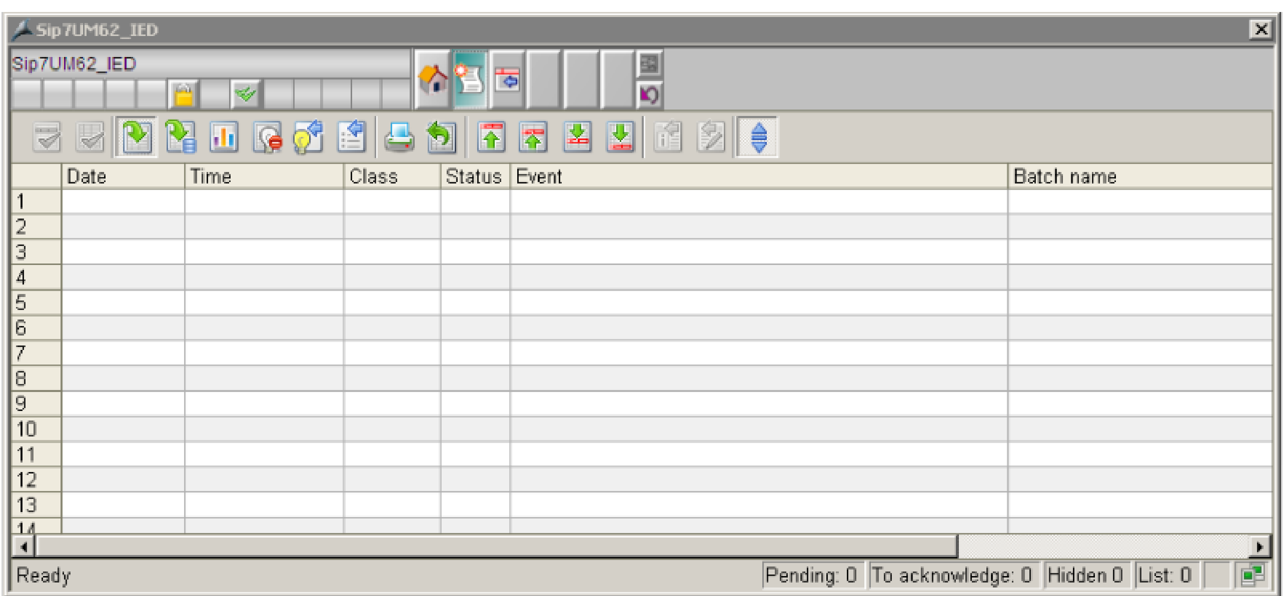
Indicator	Meaning	Tag	Colors	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	

Indicator	Meaning	Tag	Colors	Note
Device Status 2	Status of undervoltage protection 1	TrpFeedVT	TrpFeedVT =1 (Undervolt. ACT) – GREEN TrpFeedVT =2 (>BLOCK U<) – RED TrpFeedVT =3 (>FAIL:FeedVT test) – YELLOW TrpFeedVT =4 (>FAIL:FeedVT t/blkd) – RED TrpFeedVT =5 (Undervolt. OFF) – RED	
Device Status 3	Status of impedance protection	TransFusF	TransFusF =1 (Imp. ACTIVE) – GREEN TransFusF =2 (VT Fuse Failure) – RED TransFusF =3 (>FAIL:FeedVT test) – YELLOW TransFusF =4 (>FAIL:FeedVT t/blkd) –RED TransFusF =5 (Imp. OFF) – RED	
Device Status 4	Relay trip indication	TR_Relay	TR_Relay=0 () – GREEN TR_Relay=1 (Relay trip) – RED	
Device Status 5	Relay pickup indication	PU_Relay	PU_Relay=0 () – GREEN PU_Relay=1 (Relay pickup) – RED	

3.13.5.2 IEC 61850 SIP7UM62 Faceplate: Alarm View

Active alarms

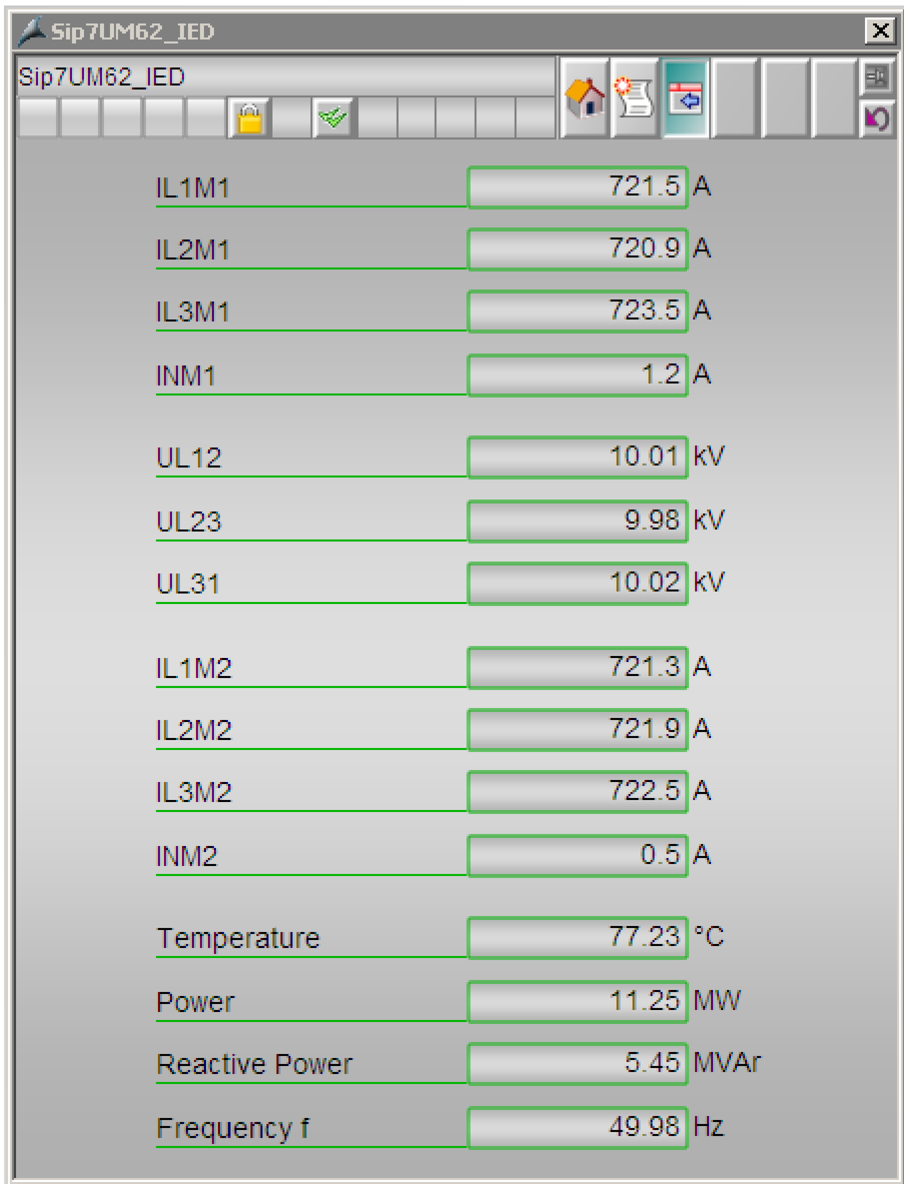
This panel shows each of the active alarms that are active for the IED.



3.13.5.3 IEC 61850 SIP7UM62 Faceplate: Measurement Pane

Measured values

The Measurement Pane shows the measured values of IED.



Indicators

Indicator	Meaning	Tag	Colors	Note
IL1M1	Current IL1 measurement 1	I1_A	GRAY	Text can be configured via DBA
IL2M1	Current IL2 measurement 1	I1_B	GRAY	Text can be configured via DBA
IL3M1	Current IL3 measurement 1	I1_C	GRAY	Text can be configured via DBA
INM1	Current N measurement 1	I1_N		Text can be configured via DBA
UL12	Voltage between UL1 and UL2	VA_B	GRAY	Text can be configured via DBA
UL23	Voltage between UL2 and UL3	VB_C	GRAY	Text can be configured via DBA
UL31	Voltage between UL3 and UL1	VC_A	GRAY	Text can be configured via DBA
IL1M2	Current IL1 measurement 2	I2_A	GRAY	Text can be configured via DBA
IL2M2	Current IL2 measurement 2	I2_B	GRAY	Text can be configured via DBA
IL3M2	Current IL3 measurement 2	I2_C	GRAY	Text can be configured via DBA
INM2	Current N measurement 2	I2_N	GRAY	Text can be configured via DBA
Temperature	Temperature	TMP	GRAY	
Power	Effective Power	P	GRAY	
Reactive Power	Reactive Power	Q	GRAY	
Frequency f	Frequency	F	GRAY	

3.14 PC_FEEDER

3.14.1 PC_FEEDER inputs

Type: **Ext**ernal or **Int**ernal or **Ind**irect

Visible for the operator: Visible in the faceplate for **output** to the operator, **input** by operator or both (**On / Off**); **Configuration value; value available for **Archive**

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
Beh	Behavior	Ext	DWord	-	Yes	Response of the Spirotec device 1 = On 2 = Locked 3 = Test 4 = Test/Locked 5 = Off
Dev_OK	Device OK	Ext	Dword	-	Yes	The device is ready for operation and protects. 1 = OK 2 = Warning 3 = Message
Warning	Warning overview	Ext	Binary	-	Yes	Message overview event
Error	Error overview	Ext	Binary	-	Yes	Error overview message
Loc	Local mode	Ext	Binary	-	Yes	Local mode
OpTm	Operating hours	Ext	SDWord	-	Yes	Operating hours of the device
SwCount	Counter value switch control	Ext	SDWord	-	Yes	Counter value switch control
RBRF1_OpEx	Switch failure TRIPPING T1	Ext	Binary	-	Message only	Switch failure TRIPPING T1
RBRF1_OpIn	Switch failure TRIPPING T2	Ext	Binary	-	Message only	Switch failure TRIPPING T2
RBRF1_Str	Switch failure Pickup	Ext	Binary	-	Message only	Switch failure Pickup
PU_Relay	Relay Pickup	Ext	Binary	-	Message only	Relay Pickup
TR_Relay	Relay tripping	Ext	Binary	-	Message only	General relay tripping command
PARSET_A	Parameter set A	Ext	Binary	-	Yes	Parameter set A active
PARSET_B	Parameter set B	Ext	Binary	-	Yes	Parameter set B active
PARSET_C	Parameter set C	Ext	Binary	-	Yes	Parameter set C active
PARSET_D	Parameter set D	Ext	Binary	-	Yes	Parameter set D active
QCONNERR	Connection error	Ext	Binary	-	Yes	Connection status 0 = Connection OK 1 = Loss of communication
GAPC1_Op	External tripping 1 TRIPPING	Ext	Binary	-	Message only	External tripping 1 TRIPPING
GAPC1_Str	External tripping 1 Pickup	Ext	Binary	-	Message only	External tripping 1 Pickup

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
PDIF1_Op	Differential protection IDIFF> TRIPPING	Ext	Binary	-	Message only	Differential protection IDIFF> TRIPPING
PDIF1_Str	Differential protection IDIFF> Pickup	Ext	Binary	-	Message only	Differential protection IDIFF> Pickup
PDIF2_Op	Differential protection IDIFF> TRIPPING	Ext	Binary	-	Message only	Differential protection IDIFF> TRIPPING
PDIF2_Str	Differential protection IDIFF> Pickup	Ext	Binary	-	Message only	Differential protection IDIFF> Pickup
PDIS1_Op	Impedance protection Z1 TRIPPING	Ext	Binary	-	Message only	Impedance protection Z1 TRIPPING
PDIS1_Str	Impedance protection Z1 Pickup	Ext	Binary	-	Message only	Impedance protection Z1 Pickup
PDIS2_Op	Impedance protection Z2 TRIPPING	Ext	Binary	-	Message only	Impedance protection Z2 TRIPPING
PDIS2_Str	Impedance protection Z2 Pickup	Ext	Binary	-	Message only	Impedance protection Z2 Pickup
PDIS3_Op	Impedance protection Z1B TRIPPING	Ext	Binary	-	Message only	Impedance protection Z1B TRIPPING
PDIS3_Str	Impedance protection Z1B Pickup	Ext	Binary	-	Message only	Impedance protection Z1B Pickup
PDIS4_Op	Impedance protection general TRIPPING	Ext	Binary	-	Message only	Impedance protection general TRIPPING
PDIS4_Str	Impedance protection general Pickup	Ext	Binary	-	Message only	Impedance protection general Pickup
PDOP1_Op	Reverse power: TRIPPING	Ext	Binary	-	Message only	Reverse power: TRIPPING
PDUP1_Op	Under-excitation protection ID 1 TRIPPING	Ext	Binary	-	Message only	Under-excitation protection ID 1 TRIPPING
PDUP2_Op	Under-excitation protection ID 2 TRIPPING	Ext	Binary	-	Message only	Under-excitation protection ID 2 TRIPPING
PDUP3_Op	Under-excitation protection ID 3 TRIPPING	Ext	Binary	-	Message only	Under-excitation protection ID 3 TRIPPING

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
PTOC1_Op	51 Overcurrent TRIPPING	Ext	Binary	-	Message only	51 Overcurrent TRIPPING
PTOC1_Str	51 Overcurrent Pickup	Ext	Binary	-	Message only	51 Overcurrent Pickup
PTOC10_Op	67-1 Rectified overcurrent I > TRIPPING	Ext	Binary	-	Message only	67-1 Rectified overcurrent I > TRIPPING
PTOC10_Str	67-1 Rectified overcurrent I > Pickup	Ext	Binary	-	Message only	67-1 Rectified overcurrent I > Pickup
PTOC11_Op	67-2 Rectified overcurrent I >> TRIPPING	Ext	Binary	-	Message only	67-2 Rectified overcurrent I >> TRIPPING
PTOC11_Str	67-2 Rectified overcurrent I >> Pickup	Ext	Binary	-	Message only	67-2 Rectified overcurrent I >> Pickup
PTOC12_Op	67N-1 Rectified overcurrent IE > TRIPPING	Ext	Binary	-	Message only	67N-1 Rectified overcurrent IE > TRIPPING
PTOC12_Str	67N-1 Rectified overcurrent IE > Pickup	Ext	Binary	-	Message only	67N-1 Rectified overcurrent IE > Pickup
PTOC13_Op	67N-2 Rectified overcurrent IE >> TRIPPING	Ext	Binary	-	Message only	67N-2 Rectified overcurrent IE >> TRIPPING
PTOC13_Str	67N-2 Rectified overcurrent IE >> Pickup	Ext	Binary	-	Message only	67N-2 Rectified overcurrent IE >> Pickup
PTOC18_Op	50-3 Overcurrent TRIPPING	Ext	Binary	-	Message only	50-3 Overcurrent TRIPPING
PTOC18_Str	50-3 Overcurrent Pickup	Ext	Binary	-	Message only	50-3 Overcurrent Pickup
PTOC2_Op	51N Overcurrent TRIPPING	Ext	Binary	-	Message only	51N Overcurrent TRIPPING
PTOC2_Str	51N Overcurrent Pickup	Ext	Binary	-	Message only	51N Overcurrent Pickup
PTOC3_Op	67-TOC Overcurrent TRIPPING	Ext	Binary	-	Message only	67-TOC Overcurrent TRIPPING
PTOC3_Str	67-TOC Overcurrent Pickup	Ext	Binary	-	Message only	67-TOC Overcurrent Pickup
PTOC4_Op	67N-TOC Overcurrent TRIPPING	Ext	Binary	-	Message only	67N-TOC Overcurrent TRIPPING
PTOC4_Str	67N-TOC Overcurrent Pickup	Ext	Binary	-	Message only	67N-TOC Overcurrent Pickup

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
PTOC5_Op	46-TOC Overcurrent TRIPPING	Ext	Binary	-	Message only	46-TOC Overcurrent TRIPPING
PTOC5_Str	46-TOC Overcurrent Pickup	Ext	Binary	-	Message only	46-TOC Overcurrent Pickup
PTOC6_Op	50-1 Overcurrent I > TRIPPING	Ext	Binary	-	Message only	50-1 Overcurrent I > TRIPPING
PTOC6_Str	50-1 Overcurrent I > Pickup	Ext	Binary	-	Message only	50-1 Overcurrent I > Pickup
PTOC7_Op	50-2 Overcurrent I >>TRIPPING	Ext	Binary	-	Message only	50-2 Overcurrent I >>TRIPPING
PTOC7_Str	50-2 Overcurrent I >> Pickup	Ext	Binary	-	Message only	50-2 Overcurrent I >> Pickup
PTOC8_Op	50N-1 Overcurrent IE > TRIPPING	Ext	Binary	-	Message only	50N-1 Overcurrent IE > TRIPPING
PTOC8_Str	50N-1 Overcurrent IE > Pickup	Ext	Binary	-	Message only	50N-1 Overcurrent IE > Pickup
PTOC9_Op	50N-2 Overcurrent IE >> TRIPPING	Ext	Binary	-	Message only	50N-2 Overcurrent IE >> TRIPPING
PTOC9_Str	50N-2 Overcurrent IE >> Pickup	Ext	Binary	-	Message only	50N-2 Overcurrent IE >> Pickup
PTOV1_Op	Overvoltage U> TRIPPING	Ext	Binary	-	Message only	Overvoltage U> TRIPPING
PTOV1_Str	Overvoltage U> Pickup	Ext	Binary	-	Message only	Overvoltage U> Pickup
PTOV2_Op	Overvoltage U>> TRIPPING	Ext	Binary	-	Message only	Overvoltage U>> TRIPPING
PTOV2_Str	Overvoltage U>> Pickup	Ext	Binary	-	Message only	Overvoltage U>> Pickup
PTUF1_Op	Frequency 1 range violation TRIPPING	Ext	Binary	-	Message only	Frequency 1 range violation TRIPPING
PTUF1_Str	Frequency 1 range violation Pickup	Ext	Binary	-	Message only	Frequency 1 range violation Pickup
PTUF2_Op	Frequency 2 range violation TRIPPING	Ext	Binary	-	Message only	Frequency 2 range violation TRIPPING
PTUF2_Str	Frequency 2 range violation Pickup	Ext	Binary	-	Message only	Frequency 2 range violation Pickup
PTUV1_Op	Undervoltage U< TRIPPING	Ext	Binary	-	Message only	Undervoltage U< TRIPPING

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
PTUV1_Str	Undervoltage U< Pickup	Ext	Binary	-	Message only	Undervoltage U< Pickup
PTUV2_Op	Undervoltage U<< TRIPPING	Ext	Binary	-	Message only	Undervoltage U<< TRIPPING
PTUV2_Str	Undervoltage U<< Pickup	Ext	Binary	-	Message only	Undervoltage U<< Pickup
PVOC2_Op	Inadvert. energy protection TRIPPING	Ext	Binary	-	Message only	Inadvert. energy protection TRIPPING
PVOC2_Str	Inadvert. Energy protection Pickup	Ext	Binary	-	Message only	Inadvert. Energy protection Pickup
Pos0	Position Q0	Ext	DWord	-	Yes	Switch position Q0 0 = Intermediate position 1 = Off 2 = On 3 = Faulty
Pos1	Position Q1	Ext	DWord	-	Yes	Switch position Q1 0 = Intermediate position 1 = Off 2 = On 3 = Faulty
Pos2	Position Q2	Ext	DWord	-	Yes	Switch position Q2 0 = Intermediate position 1 = Off 2 = On 3 = Faulty
Pos8	Position Q8	Ext	DWord	-	Yes	Switch position Q8 0 = Intermediate position 1 = Off 2 = On 3 = Faulty
Pos9	Position Q9	Ext	DWord	-	Yes	Switch position Q9 0 = Intermediate position 1 = Off 2 = On 3 = Faulty
Q0_EnaCls	Enable Q0 Close command	Ext	Binary	-	Yes	Interlock: Enable Q0 Close command
Q0_EnaOpn	Enable Q0 Open command	Ext	Binary	-	Yes	Interlock: Enable Q0 Open command
Q1_EnaCls	Enable Q1 Close command	Ext	Binary	-	Yes	Interlock: Enable Q1 Close command

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
Q1_EnaOpn	Enable Q1 Open command	Ext	Binary	-	Yes	Interlock: Enable Q1 Open command
Q2_EnaCls	Enable Q2 Close command	Ext	Binary	-	Yes	Interlock: Enable Q2 Close command
Q2_EnaOpn	Enable Q2 Open command	Ext	Binary	-	Yes	Interlock: Enable Q2 Open command
Q8_EnaCls	Enable Q8 Close command	Ext	Binary	-	Yes	Interlock: Enable Q8 Close command
Q8_EnaOpn	Enable Q8 Open command	Ext	Binary	-	Yes	Interlock: Enable Q8 Open command
Q9_EnaCls	Enable Q9 Close command	Ext	Binary	-	Yes	Interlock: Enable Q9 Close command
Q9_EnaOpn	Enable Q9 Open command	Ext	Binary	-	Yes	Interlock: Enable Q9 Open command

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
SWSTATUS0	Status of Q0	Ext	BYTE	-	Yes	Feedback of command Q0 0 = Data valid 1 = Null server 2 = Not connected 3 = No connection 4 = Flow-controlled 5 = Max. services exceeded 6 = No read data 7 = Memory error 8 = Encryption error 9 = Faulty transaction 10 = No transaction 11 = Connection closed 12 = Time expired 13 = Connection status error 14 = Application error 15 = Parameter error 16 = Confirmation error 17 = Rejection error 100 = Object was made invalid 101 = Hardware error 102 = Temporarily not available 103 = Object access denied 104 = Object not defined 105 = Invalid address 106 = Type is not supported 107 = Type is inconsistent 108 = Object attribute inconsistent 109 = Object access not supported 110 = Does not exist 111 = Invalid value 254 = Conversion error

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
SWSTATUS1	Status of Q1	Ext	BYTE	-	Yes	Feedback of command Q1 0 = Data valid 1 = Null server 2 = Not connected 3 = No connection 4 = Flow-controlled 5 = Max. services exceeded 6 = No read data 7 = Memory error 8 = Encryption error 9 = Faulty transaction 10 = No transaction 11 = Connection closed 12 = Time expired 13 = Connection status error 14 = Application error 15 = Parameter error 16 = Confirmation error 17 = Rejection error 100 = Object was made invalid 101 = Hardware error 102 = Temporarily not available 103 = Object access denied 104 = Object not defined 105 = Invalid address 106 = Type is not supported 107 = Type is inconsistent 108 = Object attribute inconsistent 109 = Object access not supported 110 = Does not exist 111 = Invalid value 254 = Conversion error

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
SWSTATUS2	Status of Q2	Ext	BYTE	-	Yes	Feedback of command Q2 0 = Data valid 1 = Null server 2 = Not connected 3 = No connection 4 = Flow-controlled 5 = Max. services exceeded 6 = No read data 7 = Memory error 8 = Encryption error 9 = Faulty transaction 10 = No transaction 11 = Connection closed 12 = Time expired 13 = Connection status error 14 = Application error 15 = Parameter error 16 = Confirmation error 17 = Rejection error 100 = Object was made invalid 101 = Hardware error 102 = Temporarily not available 103 = Object access denied 104 = Object not defined 105 = Invalid address 106 = Type is not supported 107 = Type is inconsistent 108 = Object attribute inconsistent 109 = Object access not supported 110 = Does not exist 111 = Invalid value 254 = Conversion error

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
SWSTATUS8	Status of Q8	Ext	BYTE	-	Yes	Feedback of command Q8 0 = Data valid 1 = Null server 2 = Not connected 3 = No connection 4 = Flow-controlled 5 = Max. services exceeded 6 = No read data 7 = Memory error 8 = Encryption error 9 = Faulty transaction 10 = No transaction 11 = Connection closed 12 = Time expired 13 = Connection status error 14 = Application error 15 = Parameter error 16 = Confirmation error 17 = Rejection error 100 = Object was made invalid 101 = Hardware error 102 = Temporarily not available 103 = Object access denied 104 = Object not defined 105 = Invalid address 106 = Type is not supported 107 = Type is inconsistent 108 = Object attribute inconsistent 109 = Object access not supported 110 = Does not exist 111 = Invalid value 254 = Conversion error

Abbreviation	Name	Type	Data type	Stand-ard value	Visible for the operator:	Description
SWSTATUS9	Status of Q9	Ext	BYTE	-	Yes	Feedback of command Q9 0 = Data valid 1 = Null server 2 = Not connected 3 = No connection 4 = Flow-controlled 5 = Max. services exceeded 6 = No read data 7 = Memory error 8 = Encryption error 9 = Faulty transaction 10 = No transaction 11 = Connection closed 12 = Time expired 13 = Connection status error 14 = Application error 15 = Parameter error 16 = Confirmation error 17 = Rejection error 100 = Object was made invalid 101 = Hardware error 102 = Temporarily not available 103 = Object access denied 104 = Object not defined 105 = Invalid address 106 = Type is not supported 107 = Type is inconsistent 108 = Object attribute inconsistent 109 = Object access not supported 110 = Does not exist 111 = Invalid value 254 = Conversion error
P#Value	Power	Ext	FLOAT	-	Yes	Power
S#Value	Apparent power	Ext	FLOAT	-	Yes	Apparent power
Q#Value	Reactive power	Ext	FLOAT	-	Yes	Reactive power
U#Value	Neutral voltage	Ext	FLOAT	-	Yes	Neutral voltage
F#Value	Frequency F	Ext	FLOAT	-	Yes	Frequency
PF#Value	Cos Phi - power factor	Ext	FLOAT	-	Yes	Cos Phi - power factor
I_A#Value	Current Phase A	Ext	FLOAT	-	Yes	Current Phase A
I_B#Value	Current Phase B	Ext	FLOAT	-	Yes	Current Phase B
I_C#Value	Current Phase C	Ext	FLOAT	-	Yes	Current Phase C

Abbreviation	Name	Type	Data type	Standard value	Visible for the operator:	Description
U_A#Value	Voltage Phase A	Ext	FLOAT	-	Yes	Voltage Phase A
U_AB#Value	Voltage A-B	Ext	FLOAT	-	Yes	Voltage A-B
U_B#Value	Voltage Phase B	Ext	FLOAT	-	Yes	Voltage Phase B
U_BC#Value	Voltage B-C	Ext	FLOAT	-	Yes	Voltage B-C
U_C#Value	Voltage Phase C	Ext	FLOAT	-	Yes	Voltage Phase C
U_CA#Value	Voltage C-A	Ext	FLOAT	-	Yes	Voltage C-A
WpForward#Value	Supply active energy	Ext	SDWord	-	Yes	Supply active energy
WpReverse#Value	Demand active energy	Ext	SDWord	-	Yes	Demand active energy
WqForward#Value	Supply reactive energy	Ext	SDWord	-	Yes	Supply reactive energy
WqReverse#Value	Demand reactive energy	Ext	SDWord	-	Yes	Demand reactive energy
GndFdir	Ground fault direction	Ext	DWord	-	No	Ground fault direction

3.14.2 PC_FEEDER Outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RCmd0	Command Q0	Ext	Binary	-	Yes	Switch Q0 command 0=Open 1=Close
RCmd1	Command Q1	Ext	Binary	-	Yes	Switch Q1 command 0=Open 1=Close
RCmd2	Command Q2	Ext	Binary	-	Yes	Switch Q2 command 0=Open 1=Close
RCmd8	Command Q8	Ext	Binary	-	Yes	Switch Q8 command 0=Open 1=Close
RCmd9	Command Q9	Ext	Binary	-	Yes	Switch Q9 command 0=Open 1=Close
DA0	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA1	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

Abbrevia-tion	Name	Type	Data Type	Default Value	Operator Visi-ble	Description
DA2	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA8	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA9	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

3.14.3 Internal tags of PC_FEEDER

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OpTmAlarm	Internal message bit	Int	Binary	-		Internal message bit
OpTmAlarmLimit	Alarm limit op-erating hours	Int	DWord	-		Alarm limit operating hours
OpTmWarning	Internal message bit	Int	Binary	-		Internal message bit
OpTmWarnLimit	Warning limit op-erating hours	Int	DWord	-		Warning limit operating hours
SwCountAlarm	Internal message bit	Int	Binary	-		Internal message bit
SwCountAlarmLi-mit	Alarm limit switch count	Int	DWord	-		Alarm limit switch count
SwCountWarning	Internal message bit	Int	Binary	-		Internal message bit
SwCountWarnLi-mit	Warning limit switch count	Int	DWord	-		Warning limit switch count
ST_Worst	Re-served for inter-nal use	Int	BYTE	-		Reserved for internal use
Status1	Re-served for inter-nal use	Int	DWord	-		Reserved for internal use

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Status5	Bitmask to hide fields in the Face-plate	Int	DWord	-		Bitmask to hide fields in the Faceplate
Cmd0	Com-mand Q0	Int	BYTE	-	Yes	Switch Q0 command used in faceplate for trigger RCmd0 and generate some alarms on error. 0=Open 1=Close
Cmd1	Com-mand Q1	Int	BYTE	-	Yes	Switch Q1 command used in faceplate for trigger RCmd1 and generate some alarms on error. 0=Open 1=Close
Cmd2	Com-mand Q2	Int	BYTE	-	Yes	Switch Q2 command used in faceplate for trigger RCmd2 and generate some alarms on error. 0=Open 1=Close
Cmd8	Com-mand Q8	Int	BYTE	-	Yes	Switch Q8 command used in faceplate for trigger RCmd8 and generate some alarms on error. 0=Open 1=Close
Cmd9	Com-mand Q9	Int	BYTE	-	Yes	Switch Q9 command used in faceplate for trigger RCmd9 and generate some alarms on error. 0=Open 1=Close
CmdSense0	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense1	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense2	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense8	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense9	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OCCUPIED	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut0	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut1	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut2	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut8	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut9	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
Q0_DESC	Text Q0	Int	String	CB	Yes	Text for Q0 on Faceplate
Q1_DESC	Text Q1	Int	String	DS	Yes	Text for Q1 on Faceplate
Q2_DESC	Text Q2	Int	String	Q2	Yes	Text for Q2 on Faceplate
Q8_DESC	Text Q8	Int	String	ES	Yes	Text for Q8 on Faceplate
Q9_DESC	Text Q9	Int	String	Q9	Yes	Text for Q9 on Faceplate
VisuCo-des#Field_01_Code		Int	String		No	Visualization
VisuCo-des#Field_02_Code		Int	String		No	Visualization
VisuCo-des#Field_03_Code		Int	String		No	Visualization
VisuCo-des#Field_04_Code		Int	String		No	Visualization
VisuCo-des#Field_05_Code		Int	String		No	Visualization
VisuCo-des#Field_06_Code		Int	String		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
VisuCo-des#Field_07_Code		Int	String		No	Visualization
VisuCo-des#Field_08_Code		Int	String		No	Visualization
VisuCo-des#Field_09_Code		Int	String		No	Visualization
VisuCo-des#Field_10_Code		Int	String		No	Visualization
VisuDesc#Field-Descriptor_01		Int	String		No	Visualization
VisuDesc#Field-Descriptor_02		Int	String		No	Visualization
VisuDesc#Field-Descriptor_03		Int	String		No	Visualization
VisuDesc#Field-Descriptor_04		Int	String		No	Visualization
VisuDesc#Field-Descriptor_05		Int	String		No	Visualization
VisuDesc#Field-Descriptor_06		Int	String		No	Visualization
Visu-Desc#Q0_DESC		Int	String		No	Visualization
Visu-Desc#Q1_DESC		Int	String		No	Visualization
Visu-Desc#Q2_DESC		Int	String		No	Visualization
Visu-Desc#Q8_DESC		Int	String		No	Visualization
Visu-Desc#Q9_DESC		Int	String		No	Visualization
Visu-Fields#Q0_Field		Int	BYTE		No	Visualization
Visu-Fields#Q0_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q1_Field		Int	BYTE		No	Visualization
Visu-Fields#Q1_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q2_Field		Int	BYTE		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Visu-Fields#Q2_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q8_Field		Int	BYTE		No	Visualization
Visu-Fields#Q8_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q9_Field		Int	BYTE		No	Visualization
Visu-Fields#Q9_Sub-Field		Int	BYTE		No	Visualization
VisuMisc#Cus-tomFaceplate		Int	String		No	Visualization
Visu-Misc#Unit_Power		Int	String		No	Visualization
VisuMisc#Unit_Q		Int	String		No	Visualization
VisuMisc#Unit_S		Int	String		No	Visualization
Visu-Misc#Unit_Volt-age		Int	String		No	Visualization
Visu-Misc#Unit_Cur-rent		Int	String		No	Visualization
VisuS-tates#Q0_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q0_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q1_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q1_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q2_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q2_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q8_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q8_Text-Closed		Int	String		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
VisuS-tates#Q9_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q9_Text-Closed		Int	String		No	Visualization
Q0_Btn_EN		Int	BIT		No	Visualization
Q1_Btn_EN		Int	BIT		No	Visualization
Q2_Btn_EN		Int	BIT		No	Visualization
Q8_Btn_EN		Int	BIT		No	Visualization
Q9_Btn_EN		Int	BIT		No	Visualization
Visu-Misc#Ilck_Disp		Int	BIT		No	Visualization
#TextPermanent		Int	TEXT16		No	Visualization
#StatusPerma-nent		Int	DWORD		No	Visualization
Pos0_ThrowA-larm Message		Int	BIT		No	Internal variable for alarm handling
Pos1_ThrowA-larm Message		Int	BIT		No	Internal variable for alarm handling
Pos2_ThrowA-larm Message		Int	BIT		No	Internal variable for alarm handling
Pos8_ThrowA-larm Message		Int	BIT		No	Internal variable for alarm handling
Pos9_ThrowA-larm Message		Int	BIT		No	Internal variable for alarm handling
Pos0_Internal		Int	DWORD		No	Internal variable for position handling
Pos1_Internal		Int	DWORD		No	Internal variable for position handling
Pos2_Internal		Int	DWORD		No	Internal variable for position handling
Pos8_Internal		Int	DWORD		No	Internal variable for position handling
Pos9_Internal		Int	DWORD		No	Internal variable for position handling
TrackingMode		Int	BIT		No	Tracking mode handling
Q0_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q1_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q2_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q8_Tracking-Mode		Int	BIT		No	Internal variable for TM handling

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q9_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Tracking-Mode_Btn_EN		Int	BIT		No	Internal variable for TM handling
TrackingMode #Op_Level		Int	BYTE		No	Internal variable for TM handling
Pos0_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos1_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos2_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos8_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos9_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
CB_BadPosAlarm-Delay		Int	BYTE		No	Internal variable for alarm handling
Pos0_Memory		Int	DWORD		No	Internal variable for position handling
Pos1_Memory		Int	DWORD		No	Internal variable for position handling
Pos2_Memory		Int	DWORD		No	Internal variable for position handling
Pos8_Memory		Int	DWORD		No	Internal variable for position handling
Pos9_Memory		Int	DWORD		No	Internal variable for position handling
NoticePositions		Int	BIT		No	Internal variable for position handling
NoticeConnect		Int	BIT		No	Internal variable for connection handling
Q0_Opn#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q1_Opn#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q2_Opn#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q8_Opn#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q9_Opn#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q0_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q1_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q2_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
Q8_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Q9_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable handling
BatchName		Int	TEXTREF		No	Batch message text

3.14.4 PC_FEEDER Alarms

The following alarms have been set up for PC_FEEDER.

Name	Class	Type	Default	Condition description
Alarm summary event	Warning	Overshoot warning high limit	Yes	Warning = 1
Error summary message	Alarm	Alarm High	Yes	Error = 1
Relay PICKUP	Warning	Overshoot warning high limit	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
51 Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC1_Str = 1
51 Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC1_Op = 1
51N Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC2_Str = 1
51N Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC2_Op = 1
67-TOC Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC3_Str = 1
67-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC3_Op = 1
67N-TOC Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC4_Str = 1
67N-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC4_Op = 1
46-TOC Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC5_Str = 1
46-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC5_Op = 1
50-1 Overcurrent I > picked up	Warning	Overshoot warning high limit	Yes	PTOC6_Str = 1
50-1 Overcurrent I > TRIP	Alarm	Alarm High	Yes	PTOC6_Op = 1

Name	Class	Type	Default	Condition description
50-2 Overcurrent I >> picked up	Warning	Overshoot warning high limit	Yes	PTOC7_Str = 1
50-2 Overcurrent I >> TRIP	Alarm	Alarm High	Yes	PTOC7_Op = 1
50N-1 Overcurrent IE > picked up	Warning	Overshoot warning high limit	Yes	PTOC8_Str = 1
50N-1 Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PTOC8_Op = 1
50N-2 Overcurrent IE >> picked up	Warning	Overshoot warning high limit	Yes	PTOC9_Str = 1
50N-2 Overcurrent IE >> TRIP	Alarm	Alarm High	Yes	PTOC9_Op = 1
67-1 Directional Overcurrent I > picked up	Warning	Overshoot warning high limit	Yes	PTOC10_Str = 1
67-1 Directional Overcurrent I > TRIP	Alarm	Alarm High	Yes	PTOC10_Op = 1
67-2 Directional Overcurrent I >> picked up	Warning	Overshoot warning high limit	Yes	PTOC11_Str = 1
67-2 Directional Overcurrent I >> TRIP	Alarm	Alarm High	Yes	PTOC11_Op = 1
67N-1 Directional Overcurrent IE > picked up	Warning	Overshoot warning high limit	Yes	PTOC12_Str = 1
67N-1 Directional Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PTOC12_Op = 1
67N-2 Directional Overcurrent IE >> picked up	Warning	Overshoot warning high limit	Yes	PTOC13_Str = 1
67N-2 Directional Overcurrent IE >> TRIP	Alarm	Alarm High	Yes	PTOC13_Op = 1
50-3 Overcurrent picked up	Warning	Overshoot warning high limit	Yes	PTOC18_Str = 1
50-3 Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC18_Op = 1
DiscrepancyAlarm Q0	Alarm	Alarm High	Yes	After a switch command is triggered, runtime checks for feedback within the configured timeout time. Unexpected feedback triggers this alarm. DA0 = 1
BadCheckback Q0	PLC Process Control Message	Error	Yes	STATUS0 = 1
DiscrepancyAlarm Q1	Alarm	Alarm High	Yes	After a switch command is triggered, runtime checks for feedback within the configured timeout time. Unexpected feedback triggers this alarm. DA1 = 1

Name	Class	Type	Default	Condition description
BadCheckback Q1	PLC Process Control Message	Error	Yes	STATUS1 = 1
DiscrepancyAlarm Q2	Alarm	Alarm High	Yes	After a switch command is triggered, runtime checks for feedback within the configured timeout time. Unexpected feedback triggers this alarm. DA2 = 1
BadCheckback Q2	PLC Process Control Message	Error	Yes	STATUS2 = 1
DiscrepancyAlarm Q8	Alarm	Alarm High	Yes	After a switch command is triggered, runtime checks for feedback within the configured timeout time. Unexpected feedback triggers this alarm. DA8 = 1
BadCheckback Q8	PLC Process Control Message	Error	Yes	STATUS8 = 1
DiscrepancyAlarm Q9	Alarm	Alarm High	Yes	After a switch command is triggered, runtime checks for feedback within the configured timeout time. Unexpected feedback triggers this alarm. DA9 = 1
BadCheckback Q9	PLC Process Control Message	Error	Yes	STATUS9 = 1
MaintenanceWarning-OperationTime	Alarm	Alarm High	Yes	OpTmWarning = 1
MaintenanceAlarm-OperationTime	Warning	Overshoot warning high limit	Yes	OpTmAlarm = 1
MaintenanceWarning-SwitchCount	Alarm	Alarm High	Yes	SwCountWarning = 1
MaintenanceAlarm-SwitchCount	Warning	Overshoot warning high limit	Yes	SwCountAlarm = 1
Connection error	PLC Process Control Message	Error	Yes	QCONNERR = 1
Breaker failure picked up	Warning	Overshoot warning high limit	Yes	RBRF1_Str = 1
Breaker failure TRIP T1	Alarm	Alarm High	Yes	RBRF1_OpEx = 1
Breaker failure TRIP T2	Alarm	Alarm High	Yes	RBRF1_OpIn = 1
Differential protection IDIFF> TRIP	Alarm	Alarm High	Yes	PDIF1_Op = 1
Differential protection IDIFF> picked up	Warning	Overshoot warning high limit	Yes	PDIF1_Str = 1
Differential protection IDIFF>> TRIP	Alarm	Alarm High	Yes	PDIF2_Op = 1
Differential protection IDIFF>> picked up	Warning	Overshoot warning high limit	Yes	PDIF2_Str = 1

Name	Class	Type	Default	Condition description
Impedance protection Z1 picked up	Warning	Overshoot warning high limit	Yes	PDIS1_Str = 1
Impedance protection Z2 picked up	Warning	Overshoot warning high limit	Yes	PDIS2_Str = 1
Impedance protection Z1B picked up	Warning	Overshoot warning high limit	Yes	PDIS3_Str = 1
Impedance protection general picked up	Warning	Overshoot warning high limit	Yes	PDIS4_Str = 1
Impedance protection Z1 TRIP	Alarm	Alarm High	Yes	PDIS1_Op = 1
Impedance protection Z2 TRIP	Alarm	Alarm High	Yes	PDIS2_Op = 1
Impedance protection Z1B TRIP	Alarm	Alarm High	Yes	PDIS3_Op = 1
Impedance protection general TRIP	Alarm	Alarm High	Yes	PDIS4_Op = 1
Underexcitation protection Char. 1 TRIP	Alarm	Alarm High	Yes	PDUP1_Op = 1
Underexcitation protection Char. 2 TRIP	Alarm	Alarm High	Yes	PDUP2_Op = 1
Underexcitation protection Char. 3 TRIP	Alarm	Alarm High	Yes	PDUP3_Op = 1
Overvoltage U> TRIP	Alarm	Alarm High	Yes	PTOV1_Op = 1
Overvoltage U> picked up	Warning	Overshoot warning high limit	Yes	PTOV1_Str = 1
Overvoltage U>> TRIP	Alarm	Alarm High	Yes	PTOV2_Op = 1
Overvoltage U>> picked up	Warning	Overshoot warning high limit	Yes	PTOV2_Str = 1
F1 TRIP	Alarm	Alarm High	Yes	PTUF1_Op = 1
F1 picked up	Warning	Overshoot warning high limit	Yes	PTUF1_Str = 1
F2 TRIP	Alarm	Alarm High	Yes	PTUF2_Op = 1
F2 picked up	Warning	Overshoot warning high limit	Yes	PTUF2_Str = 1
Undervoltage U< TRIP	Alarm	Alarm High	Yes	PTUV1_Op = 1
Undervoltage U< picked up	Warning	Overshoot warning high limit	Yes	PTUV1_Str = 1
Undervoltage U<< TRIP	Alarm	Alarm High	Yes	PTUV2_Op = 1

Name	Class	Type	Default	Condition description
Undervoltage U<< picked up	Warning	Overshoot warning high limit	Yes	PTUV2_Str = 1
Random energy protection TRIP	Alarm	Alarm High	Yes	PVOC2_Op = 1
Random energy protection picked up	Warning	Overshoot warning high limit	Yes	PVOC2_Str = 1
Reverse power: TRIP	Alarm	Alarm High	Yes	PDOP1_Op = 1
External Trip 1 TRIP	Alarm	Alarm High	Yes	GAPC1_Op = 1
External Trip 1 picked up	Warning	Overshoot warning high limit	Yes	GAPC1_Str = 1
Q0 switch position is invalid	Alarm	Alarm High	Yes	Q0PosError = 1
Q1 switch position is invalid	Alarm	Alarm High	Yes	Q1PosError = 1
Q2 switch position is invalid	Alarm	Alarm High	Yes	Q2PosError = 1
Q8 switch position is invalid	Alarm	Alarm High	Yes	Q8PosError = 1
Q9 switch position is invalid	Alarm	Alarm High	Yes	Q9PosError = 1
Q0 Circuit-breaker closed	Status	Status message	Yes	Q0StatusClosed = 1
Q1 Disconnector closed	Status	Status message	Yes	Q1StatusClosed = 1
Q2 Switch closed	Status	Status message	Yes	Q2StatusClosed = 1
Q8 Earthing device closed	Status	Status message	Yes	Q8StatusClosed = 1
Q9 Switch closed	Status	Status message	Yes	Q9StatusClosed = 1
Q0 Circuit breaker open	Status	Status message	Yes	Q0StatusOpened = 1
Q1 Disconnector open	Status	Status message	Yes	Q1StatusOpened = 1
Q2 Switch open	Status	Status message	Yes	Q2StatusOpened = 1
Q8 Earthing device open	Status	Status message	Yes	Q8StatusOpened = 1
Q9 Switch open	Status	Status message	Yes	Q9StatusOpened = 1
Interlock: Enable Q0 Close	Status	Status message	Yes	Q0EnableClosed = 1
Interlock: Enable Q1 Close	Status	Status message	Yes	Q1EnableClosed = 1

Name	Class	Type	Default	Condition description
Interlock: Enable Q2 Close	Status	Status message	Yes	Q2EnableClosed = 1
Interlock: Enable Q8 Close	Status	Status message	Yes	Q8EnableClosed = 1
Interlock: Enable Q9 Close	Status	Status message	Yes	Q9EnableClosed = 1
Interlock: Enable Q0 Open	Status	Status message	Yes	Q0EnableOpen = 1
Interlock: Enable Q1 Open	Status	Status message	Yes	Q1EnableOpen = 1
Interlock: Enable Q2 Open	Status	Status message	Yes	Q2EnableOpen = 1
Interlock: Enable Q8 Open	Status	Status message	Yes	Q8EnableOpen = 1
Interlock: Enable Q9 Open	Status	Status message	Yes	Q9EnableOpen = 1
Local operation	Alarm	Alarm High	Yes	LocalOperation = 1

The frame type, class, priority and text can be changed for each instance.

To change these in DBA, select a PC_FEEDER object instance from the plant view and select the **Alarms** tab of the "Edit attribute" window in the top right-hand corner of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

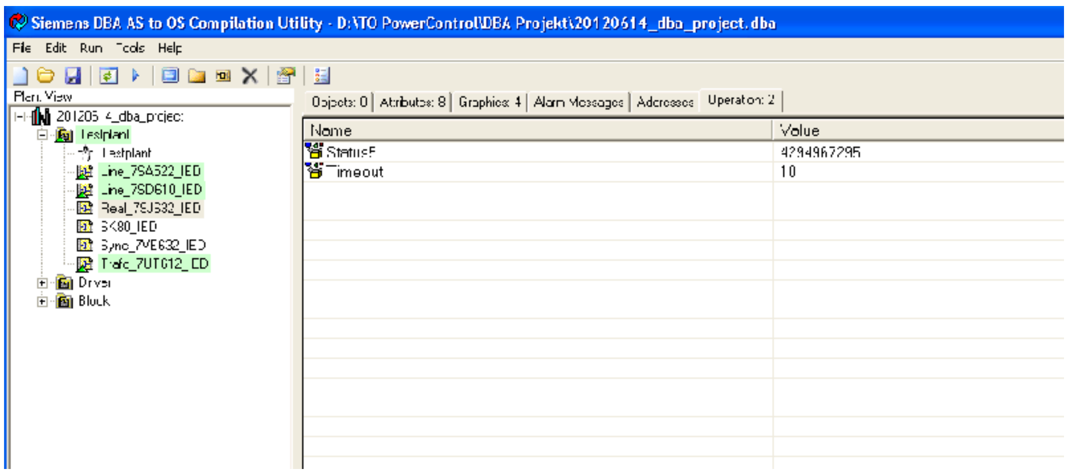
If no IEC61850 tag for triggering an alarm is found, the alarm is not created.

3.14.5 Operating parameters of PC_FEEDER

Configuring operational characteristics

The operational characteristics of a PC_FEEDER can be configured in DBA.

1. Select a PC_FEEDER object instance from the plant view.
2. Select the "Operations" tab of the "Edit attributes" window in the upper right hand quadrant of the screen.



Timeout

Timeout values are specified in seconds. Any integer value can be specified. If a timeout has been configured and if the feedback does not correspond to the value of the expected feedback within the timeout period, a discrepancy alarm is generated.

Status5

The Status5 Tag is a bitmask for hiding different values in the faceplate (e.g. if they are not available in the device). Every bit represents a value or functionality in the faceplate. Please also refer to the PC TO Engineering manual. The default value is 0xFFFFFFFF, which means 4294967295. All values in the faceplate are displayed by default.

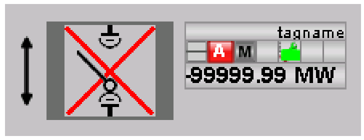
Visualization

The visualization of the faceplate is configured the "Graphic" group. You can find details on this in the documentation "PCS 7 PowerControl - OS - Option - Technological Objects".

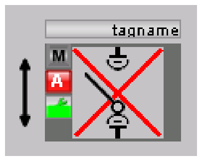
3.14.6 Symbol display of PC_FEEDER

The following PC_FEEDER icons are available as part of the standard library.

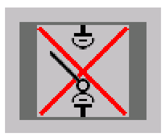
PC_FEEDER/1



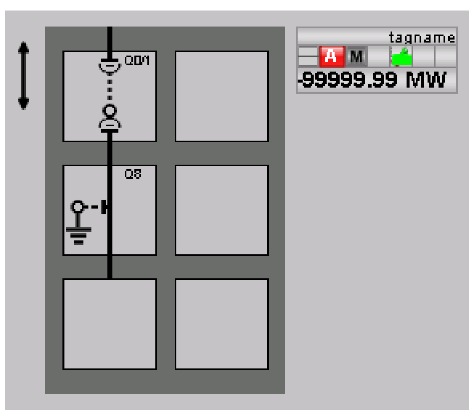
PC_FEEDER/2



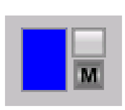
PC_FEEDER/3



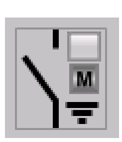
PC_FEEDER/4



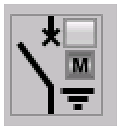
PC_FEEDER/5



PC_FEEDER/6



PC_FEEDER/7



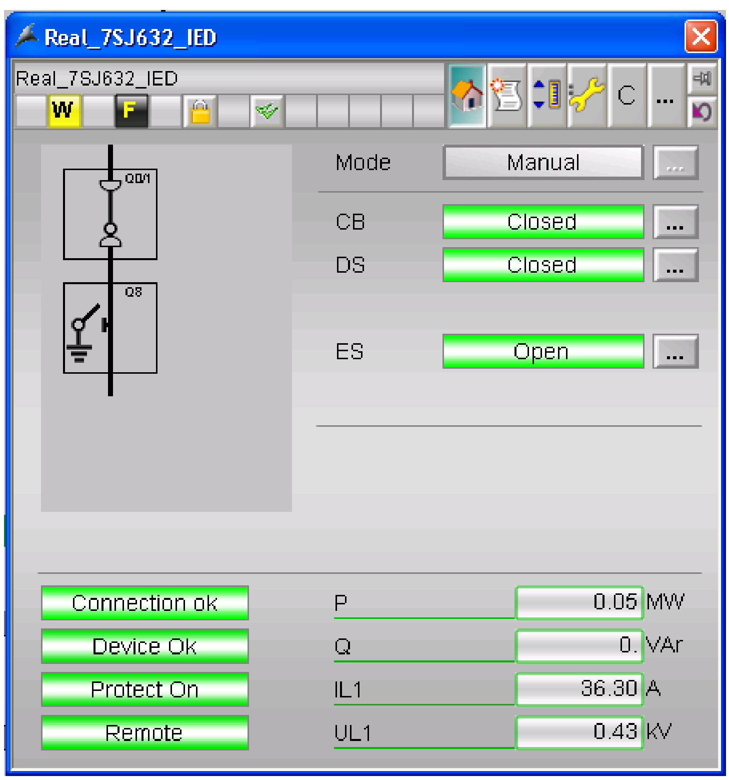
The icons show any pending messages. The configuration of the icons is described in the PCS 7 PowerControl - OS Option - Technological Objects manual".

3.14.7 PC_FEEDER Faceplate

There are 5 different views available for the PC_FEEDER:

3.14.7.1 PC_FEEDER Faceplate: Standard Pane

The view of Standard Pane shows the status of device, important measurements and allows the operator to operate the switches.



Buttons

Note

Level 5 permissions are required to be able to press any buttons in this view. The number of buttons are depending on the configuration.

Entry Field	Action	Description
Q0	Cmd0=0/1	Switch Q0 command. 0=Open 1=Close
Q1	Cmd1=0/1	Switch Q1 command. 0=Open 1=Close
Q2	Cmd2=0/1	Switch Q2 command. 0=Open 1=Close
Q8	Cmd8=0/1	Switch Q8 command. 0=Open 1=Close
Q9	Cmd9=0/1	Switch Q9 command. 0=Open 1=Close

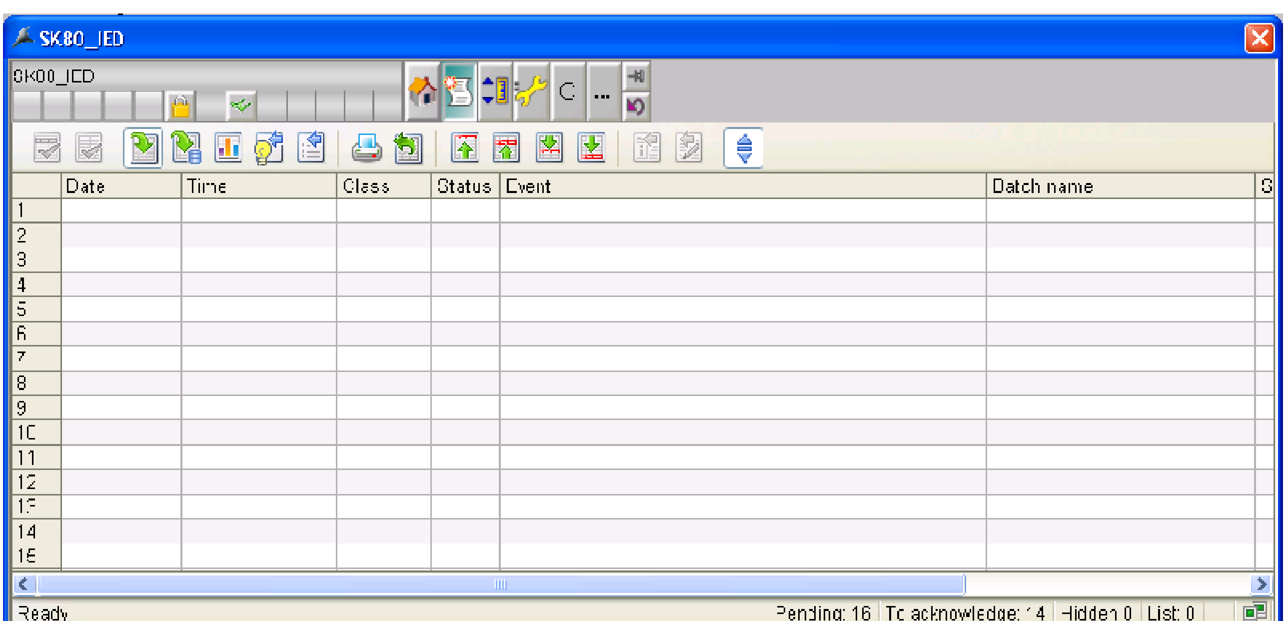
Indicators

Indicator	Meaning	Tag	Description	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blcked) – RED Beh=3 (Protect test) – YELLOW Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Local/Remote	Loc	Loc = 1: Local Loc = 0: Remote	
Switch Q0	Switch position	Pos0	Pos0 =0 (Intermed.) – RED Pos0 =1 (Open) – GREEN Pos0 =2 (Close) – GREEN Pos0 =3 (Bad) – RED Pos0 =4 (Error) – RED	
Switch Q1	Switch position	Pos1	Pos1 =0 (Intermed.) – RED Pos1 =1 (Open) – GREEN Pos1 =2 (Close) – GREEN Pos1 =3 (Bad) – RED Pos1 =4 (Error) – RED	

Indicator	Meaning	Tag	Description	Note
Switch Q2	Switch position	Pos2	Pos2 =0 (Intermed.) – RED Pos2 =1 (Open) – GREEN Pos2 =2 (Close) – GREEN Pos2 =3 (Bad) – RED Pos2 =4 (Error) – RED	
Switch Q8	Switch position	Pos8	Pos8 =0 (Intermed.) – RED Pos8 =1 (Open) – GREEN Pos8 =2 (Close) – GREEN Pos8 =3 (Bad) – RED Pos8 =4 (Error) – RED	
Switch Q9	Switch position	Pos9	Pos9 =0 (Intermed.) – RED Pos9 =1 (Open) – GREEN Pos9 =2 (Close) – GREEN Pos9 =3 (Bad) – RED Pos9 =4 (Error) – RED	
P	Power	P#Value	Power	
Q	Reactive Power	Q#Value	Reactive Power	
IL1	Current L1	I_A#Value	Current L1	
UL1	Voltage L1-Earth	U_A#Value	Voltage L1-Earth	

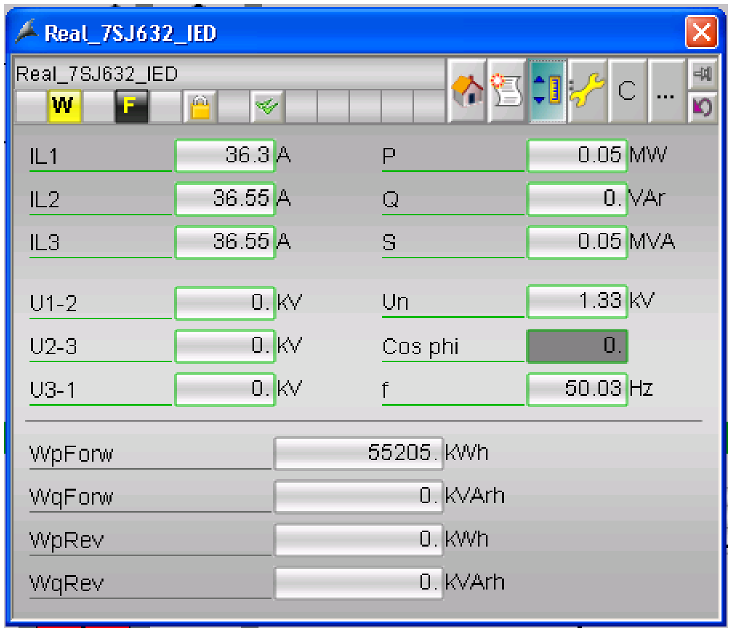
3.14.7.2 PC_FEEDER Faceplate: Alarm View

This panel shows each of the active alarms that are active for the IED.



3.14.7.3 PC_FEEDER Faceplate: Measurement Pane

The Measurement Pane shows the measured values of IED.



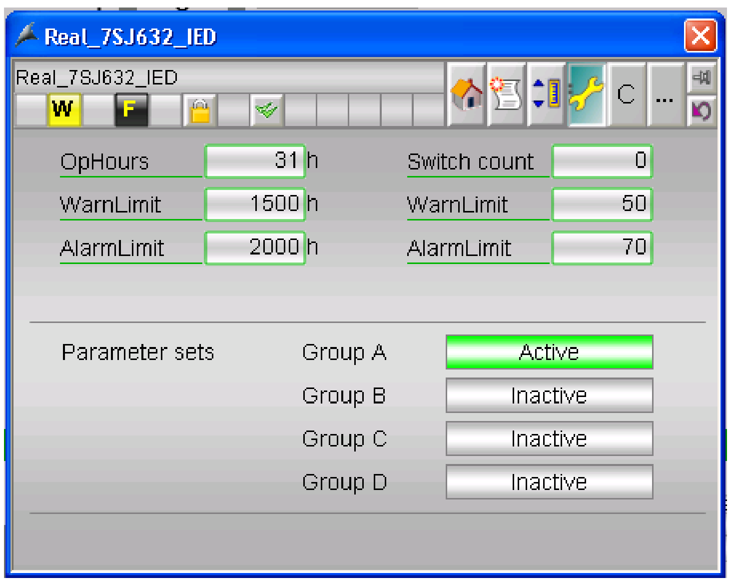
Indicators

Indicator	Meaning	Tag	Description	Note
IL1	Current L1	I_A#Value	Current L1	
IL2	Current L2	I_B#Value	Current L2	
IL3	Current L3	I_C#Value	Current L3	
U1-2	Voltage L1-L2	U_AB#Val-ue	Voltage L1-L2	
U2-3	Voltage L2-L3	U_BC#Val-ue	Voltage L2-L3	
U3-1	Voltage L3-L1	U_CA#Val-ue	Voltage L3-L1	
P	Power	P#Value	Power	
Q	Reactive Power	Q#Value	Reactive Power	
S	Apparent Power	S#Value	Apparent Power	
Un	Neutral Voltage	U#Value	Neutral Voltage	
Cos phi	Power Factor	PF#Value	Power Factor	
F	Frequency	F#Value	Frequency	
WpForw	real energy supply	WpFor-ward#Val-ue	real energy supply	
WqForw	real energy demand	WqFor-ward#Val-ue	real energy demand	

Indicator	Meaning	Tag	Description	Note
WpRev	reactive energy supply	WpReverse#Value	reactive energy supply	
WqRev	reactive energy demand	WqReverse#Value	reactive energy demand	

3.14.7.4 PC_FEEDER Faceplate: Maintenance Pane

The Maintenance Pane shows the maintenance-related information.



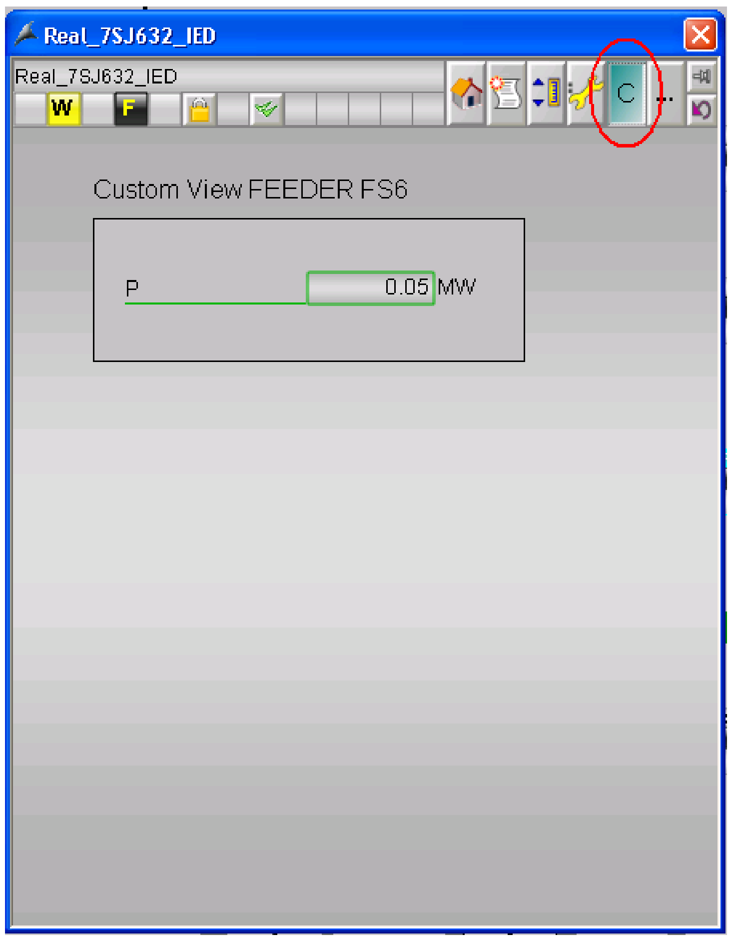
Indicators

Indicator	Meaning	Tag	Description	Note
OpHours	Operation hours	OpTm	Operation hours	
WarnLimit	Warning Limit Operation hours	OpTmWarnLimit	Warning Limit Operation hours	
AlarmLimit	Alarm Limit Operation hours	OpTmAlarmLimit	Alarm Limit Operation hours	
Switch count	Control count Q0	SwCount	Control count Q0	
WarnLimit	Warning Limit Switch Count	SwCountWarnLimit	Warning Limit Switch Count	
AlarmLimit	Alarm Limit Switch Count	SwCountAlarmLimit	Alarm Limit Switch Count	
Group A	Parameter Set A active	PARSET_A	Parameter Set A active	
Group B	Parameter Set B active	PARSET_B	Parameter Set B active	

Indicator	Meaning	Tag	Description	Note
Group C	Parameter Set C active	PARSET_C	Parameter Set C active	
Group D	Parameter Set D active	PARSET_D	Parameter Set D active	

3.14.7.5 PC_FEEDER Faceplate: Custom Pane

The Maintenance Faceplate can be adapted by he customer. Example:



3.15 PC_TRAFO

3.15.1 PC_TRAFO Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Configuration** item; Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Beh	Behaviour	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	Dword	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
Warning	Summary Warning	Ext	Binary	-	Yes	Alarm summary event
Error	Summary Error	Ext	Binary	-	Yes	Error summary alarm
Loc	Local Operation	Ext	Binary	-	Yes	Local Operation
OpTm	Operation hours	Ext	SDWord	-	Yes	Device Operation hours
SwCount	Breaker Control Count	Ext	SDWord	-	Yes	Breaker Control Count
RBRF1_OpEx	Breaker failure TRIP T1	Ext	Binary	-	Only as alarm	Breaker failure TRIP T1
RBRF1_OpIn	Breaker failure TRIP T2	Ext	Binary	-	Only as alarm	Breaker failure TRIP T2
RBRF1_Str	Breaker failure pickup	Ext	Binary	-	Only as alarm	Breaker failure pickup
PU_Relay	Relay pickup	Ext	Binary	-	Only as alarm	Relay pickup
TR_Relay	Relay Trip	Ext	Binary	-	Only as alarm	Relay general trip command
PARSET_A	Parameter Set A	Ext	Binary	-	Yes	Parameter Set A active
PARSET_B	Parameter Set B	Ext	Binary	-	Yes	Parameter Set B active
PARSET_C	Parameter Set C	Ext	Binary	-	Yes	Parameter Set C active
PARSET_D	Parameter Set D	Ext	Binary	-	Yes	Parameter Set D active
QCONNERR	Connection Error	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication
P#Value	Leistung - Power	Ext	FLOAT	-	Yes	Leistung - Power
S#Value	Scheinleistung - Apparent Power	Ext	FLOAT	-	Yes	Scheinleistung - Apparent Power
Q#Value	Blindleistung - Reactive Power	Ext	FLOAT	-	Yes	Blindleistung - Reactive Power
F#Value	Frequency F	Ext	FLOAT	-	Yes	Frequenz
PF#Value	cos phi - Power Factor	Ext	FLOAT	-	Yes	cos phi - Power Factor

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
I1_A#Value	Current 1 Phase A	Ext	FLOAT	-	Yes	Current 1 Phase A
I1_B#Value	Current 1 Phase B	Ext	FLOAT	-	Yes	Current 1 Phase B
I1_C#Value	Current 1 Phase C	Ext	FLOAT	-	Yes	Current 1 Phase C
I2_A#Value	Current 2 Phase A	Ext	FLOAT	-	Yes	Current 2 Phase A
I2_B#Value	Current 2 Phase B	Ext	FLOAT	-	Yes	Current 2 Phase B
I2_C#Value	Current 2 Phase C	Ext	FLOAT	-	Yes	Current 2 Phase C
I3_A#Value	Current 3 Phase A	Ext	FLOAT	-	Yes	Current 3 Phase A
I3_B#Value	Current 3 Phase B	Ext	FLOAT	-	Yes	Current 3 Phase B
I3_C#Value	Current 3 Phase C	Ext	FLOAT	-	Yes	Current 3 Phase C
U_AB#Value	Voltage A-B	Ext	FLOAT	-	Yes	Voltage A-B
U_BC#Value	Voltage B-C	Ext	FLOAT	-	Yes	Voltage B-C
U_CA#Value	Voltage C-A	Ext	FLOAT	-	Yes	Voltage C-A
U#Value	neutral Voltage	Ext	FLOAT	-	Yes	neutral Voltage
THETA	Theta/Theta Trip	Ext	FLOAT	-	Yes	Theta/Theta Trip
THETA_L1	Theta/Theta Trip L1	Ext	FLOAT	-	Yes	Theta/Theta Trip L1
THETA_L2	Theta/Theta Trip L2	Ext	FLOAT	-	Yes	Theta/Theta Trip L2
THETA_L3	Theta/Theta Trip L3	Ext	FLOAT	-	Yes	Theta/Theta Trip L3
WpFor-ward#Value	real energy supply	Ext	SDWord	-	Yes	real energy supply
WpRe-verse#Value	real energy de-mand	Ext	SDWord	-	Yes	real energy demand
WqFor-ward#Value	reactive energy supply	Ext	SDWord	-	Yes	reactive energy supply
WqRe-verse#Value	reactive energy demand	Ext	SDWord	-	Yes	reactive energy demand
PTOC1_Str	Overcurrent I > picked up	Ext	Binary	-	Only as alarm	Overcurrent I > picked up
PTOC1_Op	Overcurrent I > TRIP	Ext	Binary	-	Only as alarm	Overcurrent I > TRIP
PTOC2_Str	Overcurrent I >> picked up	Ext	Binary	-	Only as alarm	Overcurrent I >> picked up
PTOC2_Op	Overcurrent I >> TRIP	Ext	Binary	-	Only as alarm	Overcurrent I >> TRIP
PTOC3_Str	Overcurrent Ip picked up	Ext	Binary	-	Only as alarm	Overcurrent Ip picked up
PTOC3_Op	Overcurrent Ip TRIP	Ext	Binary	-	Only as alarm	Overcurrent Ip TRIP
PTOC7_Str	Overcurrent 3I0 > picked up	Ext	Binary	-	Only as alarm	Overcurrent 3I0 > picked up
PTOC7_Op	Overcurrent 3I0 > TRIP	Ext	Binary	-	Only as alarm	Overcurrent 3I0 > TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PTOC8_Str	Overcurrent 3I0 >> picked up	Ext	Binary	-	Only as alarm	Overcurrent 3I0 >> picked up
PTOC8_Op	Overcurrent 3I0 >> TRIP	Ext	Binary	-	Only as alarm	Overcurrent 3I0 >> TRIP
PTOC9_Str	Overcurrent 3I0p picked up	Ext	Binary	-	Only as alarm	Overcurrent 3I0p picked up
PTOC9_Op	Overcurrent 3I0p TRIP	Ext	Binary	-	Only as alarm	Overcurrent 3I0p TRIP
PTOC12_Str	Unbalanced Load I > picked up	Ext	Binary	-	Only as alarm	Unbalanced Load I > picked up
PTOC12_Op	Unbalanced Load I > TRIP	Ext	Binary	-	Only as alarm	Unbalanced Load I > TRIP
PTOC13_Str	Unbalanced Load I >> picked up	Ext	Binary	-	Only as alarm	Unbalanced Load I >> picked up
PTOC13_Op	Unbalanced Load I >> TRIP	Ext	Binary	-	Only as alarm	Unbalanced Load I >> TRIP
PTOC15_Str	Unbalanced Load I2th picked up	Ext	Binary	-	Only as alarm	Unbalanced Load I2th picked up
PTOC15_Op	Unbalanced Load I2th TRIP	Ext	Binary	-	Only as alarm	Unbalanced Load I2th TRIP
PTTR1_Str	Overload Theta picked up	Ext	Binary	-	Only as alarm	Overload Theta picked up
PTTR1_Op	Overload Theta TRIP	Ext	Binary	-	Only as alarm	Overload Theta TRIP
PTTR1_AlmThm	Overload Theta Alarm	Ext	Binary	-	Only as alarm	Overload Theta Alarm
PDIF1_Op	Differential protection IDIFF> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF> TRIP
PDIF1_Str	Differential protection IDIFF> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF> picked up
PDIF2_Op	Differential protection IDIFF>> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> TRIP
PDIF2_Str	Differential protection IDIFF>> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> picked up
PDIF3_Op	Differential protection I REF > picked up	Ext	Binary	-	Only as alarm	Differential protection I REF > picked up
PDIF3_Str	Differential protection I REF > TRIP	Ext	Binary	-	Only as alarm	Differential protection I REF > TRIP
GAPC1_Op	External Trip 1 TRIP	Ext	Binary	-	Only as alarm	External Trip 1 TRIP
GAPC1_Str	External Trip 1 picked up	Ext	Binary	-	Only as alarm	External Trip 1 picked up

3.15.2 PC_TRAFO Outputs

There are no Outputs defined for PC_TRAFO

3.15.3 Internal tags of PC_TRAFO

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OpTmAlarm	Internal message bit	Int	Binary	-		Internal message bit
OpTmAlarmLimit	Alarm limit operating hours	Int	DWord	-		Alarm limit operating hours
OpTmWarning	Internal message bit	Int	Binary	-		Internal message bit
OpTmWarnLimit	Warning limit operating hours	Int	DWord	-		Warning limit operating hours
SwCountAlarm	Internal message bit	Int	Binary	-		Internal message bit
SwCountAlarmLimit	Alarm limit switch count	Int	DWord	-		Alarm limit switch count
SwCountWarning	Internal message bit	Int	Binary	-		Internal message bit
SwCountWarnLimit	Warning limit switch count	Int	DWord	-		Warning limit switch count
ST_Worst	Reserved for internal use	Int	BYTE	-		Reserved for internal use
Status1	Reserved for internal use	Int	DWord	-		Reserved for internal use
Status5	Bitmask to hide fields in the Faceplate	Int	DWord	-		Bitmask to hide fields in the Faceplate
OCCUPIED	Reserved for internal use	Int	Binary	-	No	Reserved for internal use
VisuCodes#Symbol_Code		Int	String		No	Visualization
VisuMisc#CustomFaceplate_1		Int	String		No	Visualization
VisuMisc#CustomFaceplate_2		Int	String		No	Visualization
VisuMisc#Unit_Power		Int	String		No	Visualization
VisuMisc#Unit_Q		Int	String		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Visu-Misc#Unit_S		Int	String		No	Visualization
Visu-Misc#Unit_Voltage		Int	String		No	Visualization
Visu-Misc#Unit_Current		Int	String		No	Visualization
#TextPermanent		Int	TEXT16		No	Visualization
#StatusPermanent		Int	DWORD		No	Visualization
BatchName		Int	TEXTREF		No	Batch message text

3.15.4 PC_TRAFO Alarms

The following alarms have been set up for PC_TRAFO.

Name	Class	Type	Default	Condition description
Alarm summary event	Warning	Overshoot warning high limit	Yes	Warning = 1
Error summary message	Alarm	Alarm High	Yes	Error = 1
Relay PICKUP	Warning	Overshoot warning high limit	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
Connection error	PLC Process Control Message	Error	Yes	QCONNERR = 1
MaintenanceWarning-OperationTime	Alarm	Alarm High	Yes	OpTmWarning = 1
MaintenanceAlarm-OperationTime	Warning	Overshoot warning high limit	Yes	OpTmAlarm = 1
MaintenanceWarning-SwitchCount	Alarm	Alarm High	Yes	SwCountWarning = 1
MaintenanceAlarm-SwitchCount	Warning	Overshoot warning high limit	Yes	SwCountAlarm = 1
Overcurrent I > picked up	Warning	Overshoot warning high limit	Yes	PTOC1_Str = 1
Overcurrent I > TRIP	Alarm	Alarm High	Yes	PTOC1_Op = 1

Name	Class	Type	Default	Condition description
Overcurrent I >> picked up	Warning	Overshoot warning high limit	Yes	PTOC2_Str = 1
Overcurrent I >> TRIP	Alarm	Alarm High	Yes	PTOC2_Op = 1
Overcurrent Ip picked up	Warning	Overshoot warning high limit	Yes	PTOC3_Str = 1
Overcurrent Ip TRIP	Alarm	Alarm High	Yes	PTOC3_Op = 1
Overcurrent 3 I 0 > picked up	Warning	Overshoot warning high limit	Yes	PTOC7_Str = 1
Overcurrent 3 I 0 > TRIP	Alarm	Alarm High	Yes	PTOC7_Op = 1
Overcurrent 3 I 0 >> picked up	Warning	Overshoot warning high limit	Yes	PTOC8_Str = 1
Overcurrent 3 I 0 >> TRIP	Alarm	Alarm High	Yes	PTOC8_Op = 1
Overcurrent 3 I 0p picked up	Warning	Overshoot warning high limit	Yes	PTOC9_Str = 1
Overcurrent 3 I 0p TRIP	Alarm	Alarm High	Yes	PTOC9_Op = 1
Asymmetric load I > picked up	Warning	Overshoot warning high limit	Yes	PTOC12_Str = 1
Asymmetric load I > TRIP	Alarm	Alarm High	Yes	PTOC12_Op = 1
Asymmetric load I >> picked up	Warning	Overshoot warning high limit	Yes	PTOC13_Str = 1
Asymmetric load I >> TRIP	Alarm	Alarm High	Yes	PTOC13_Op = 1
Asymmetric load I2th picked up	Warning	Overshoot warning high limit	Yes	PTOC15_Str = 1
Asymmetric load I2th TRIP	Alarm	Alarm High	Yes	PTOC15_Op = 1
Overload Theta picked up	Warning	Overshoot warning high limit	Yes	PTTR1_Str = 1
Overload Theta TRIP	Alarm	Alarm High	Yes	PTTR1_Op = 1
Differential protection IDIFF> TRIP	Alarm	Alarm High	Yes	PDIF1_Op = 1
Differential protection IDIFF> picked up	Warning	Overshoot warning high limit	Yes	PDIF1_Str = 1
Differential protection IDIFF>> TRIP	Alarm	Alarm High	Yes	PDIF2_Op = 1
Differential protection IDIFF>> picked up	Warning	Overshoot warning high limit	Yes	PDIF2_Str = 1

Name	Class	Type	Default	Condition description
Differential protection I REF > picked up	Alarm	Alarm High	Yes	PDIF3_Op = 1
Differential protection I REF > TRIP	Warning	Overshoot warning high limit	Yes	PDIF3_Str = 1
External Trip 1 TRIP	Alarm	Alarm High	Yes	GAPC1_Op = 1
External Trip 1 picked up	Warning	Overshoot warning high limit	Yes	GAPC1_Str = 1
Breaker failure picked up	Warning	Overshoot warning high limit	Yes	RBRF1_Str = 1
Breaker failure TRIP T1	Alarm	Alarm High	Yes	RBRF1_OpEx = 1
Breaker failure TRIP T2	Alarm	Alarm High	Yes	RBRF1_OpIn = 1
Overload Theta message	Alarm	Alarm High	Yes	PTTR1_AlmThm = 1

The frame type, class, priority and text can be changed for each instance.

To change these in DBA, select a PC_TRAFO object instance from the plant view and select the **Alarms** tab of the "Edit attribute" window in the top right-hand corner of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

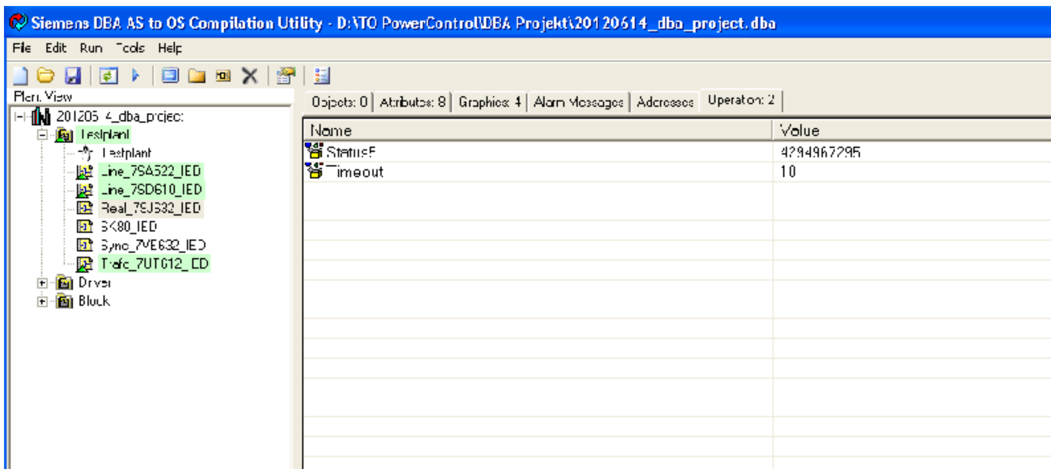
If no IEC61850 tag for triggering an alarm is found, the alarm is not created.

3.15.5 Operating parameters of PC_TRAFO

Configuring operational characteristics

The operational characteristics of a PC_TRAFO can be configured in DBA.

1. Select a PC_TRAFO object instance from the plant view.
2. Select the "Operations" tab of the "Edit attributes" window in the upper right hand quadrant of the screen.



Status5

The Status5 Tag is a bitmask for hiding different values in the faceplate (e.g. if they are not available in the device). Every bit represents a value or functionality in the faceplate. Please also refer to the PC TO Engineering manual. The default value is 0xFFFFFFFF, which means 4294967295. All values in the faceplate are displayed by default.

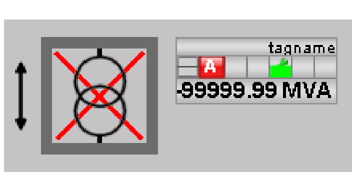
Visualization

The visualization of the faceplate is configured the "Graphic" group. You can find details on this in the documentation "PCS 7 PowerControl - OS - Option - Technological Objects".

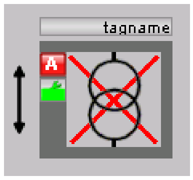
3.15.6 Symbol display of PC_TRAFO

The following PC_TRAFO icons are available as part of the standard library.

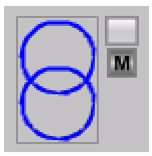
PC_TRAFO/1



PC_TRAFO/2



PC_TRAFO/3



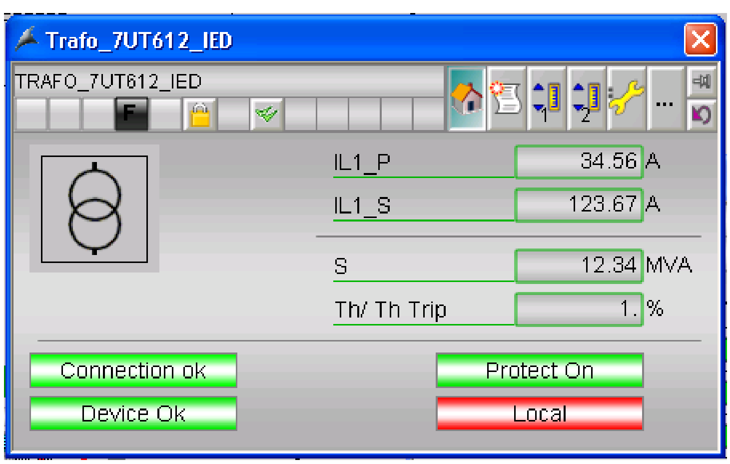
The icons show any pending messages. The configuration of the icons is described in the PC_TO Engineering manual.

3.15.7 PC_TRAFO Faceplate

There are 6 different views available for the PC_TRAFO:

3.15.7.1 PC_TRAFO Faceplate: Standard Pane

The view of Standard Pane shows the status of device and important measurements

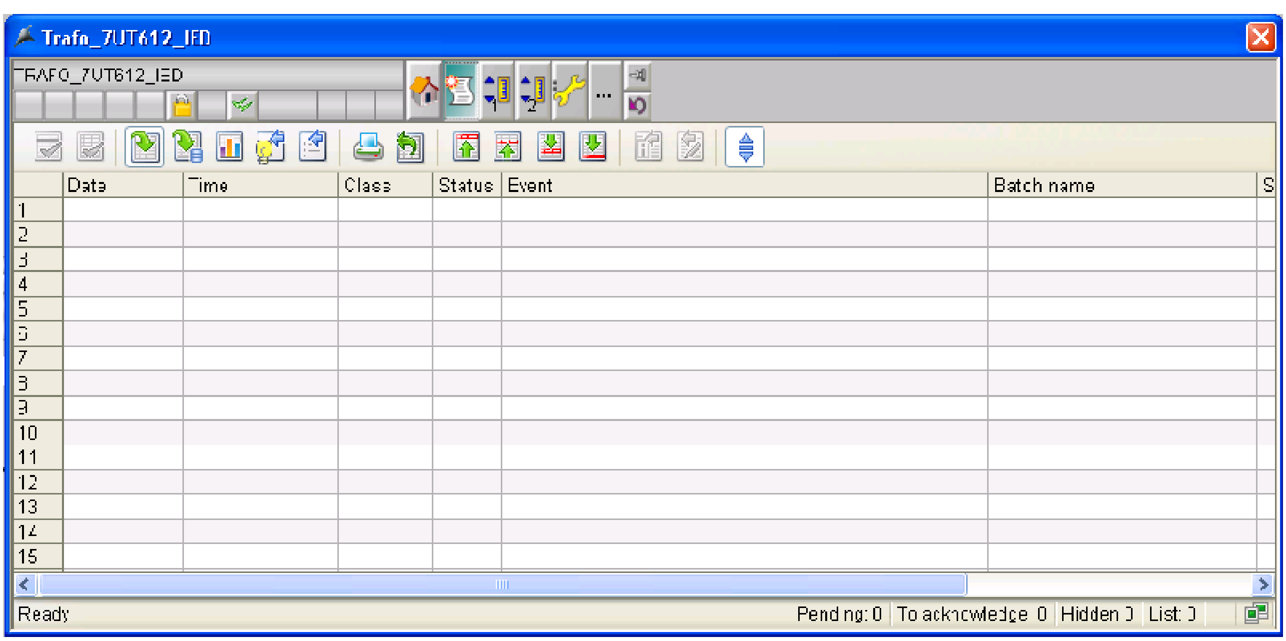


Indicators

Indicator	Meaning	Tag	Description	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blcked) – RED Beh=3 (Protect test) – YELLOW Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Local/Remote	Loc	Loc = 1: Local Loc = 0: Remote	
S	Apparent Power	S#Value	Apparent Power	
Th/Th Trip	Theta/Theta Trip	THETA#Value	Theta/Theta Trip	
IL1_P	Current L1 primary	I1_A#Value	Current L1 primary	
IL1_S	Current L1 secondary	I2_A#Value	Current L1 secondary	

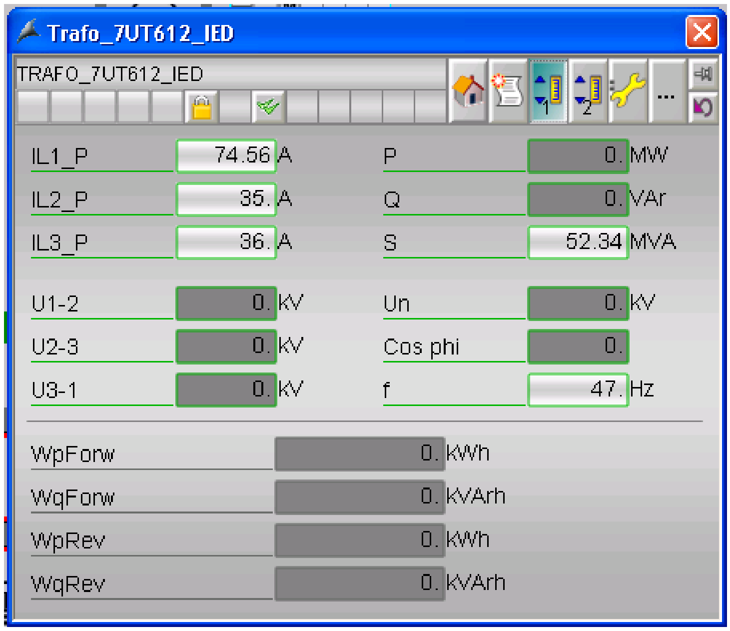
3.15.7.2 PC_TRAFO Faceplate: Alarm View

This panel shows each of the active alarms that are active for the IED.



3.15.7.3 PC_TRAFO Faceplate: Measurement Pane 1

The Measurement Pane shows the measured values of IED.

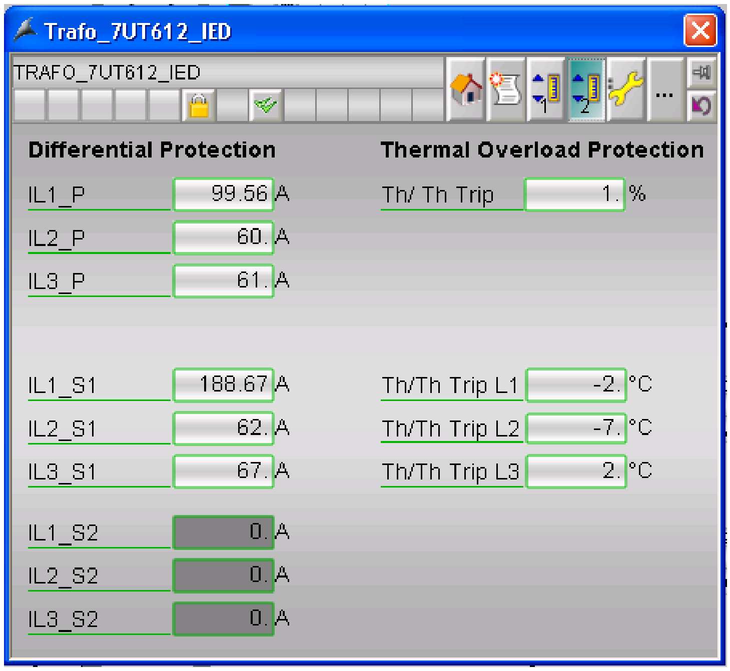


Indicators

Indicator	Meaning	Tag	Description	Note
IL1_P	Current L1 primary	I1_A#Value	Current L1 primary	
IL2_P	Current L2 primary	I1_B#Value	Current L2 primary	
IL3_P	Current L3 primary	I1_C#Value	Current L3 primary	
U1-2	Voltage L1-L2	U_AB#Value	Voltage L1-L2	
U2-3	Voltage L2-L3	U_BC#Value	Voltage L2-L3	
U3-1	Voltage L3-L1	U_CA#Value	Voltage L3-L1	
P	Power	P#Value	Power	
Q	Reactive Power	Q#Value	Reactive Power	
S	Apparent Power	S#Value	Apparent Power	
Un	Neutral Voltage	U#Value	Neutral Voltage	
Cos phi	Power Factor	PF#Value	Power Factor	
F	Frequency	F#Value	Frequency	
WpForw	real energy supply	WpForward#Value	real energy supply	
WqForw	real energy demand	WqForward#Value	real energy demand	
WpRev	reactive energy supply	WpReverse#Value	reactive energy supply	
WqRev	reactive energy demand	WqReverse#Value	reactive energy demand	

3.15.7.4 PC_TRAFO Faceplate: Measurement Pane 2

The Measurement Pane shows the measured values of IED.



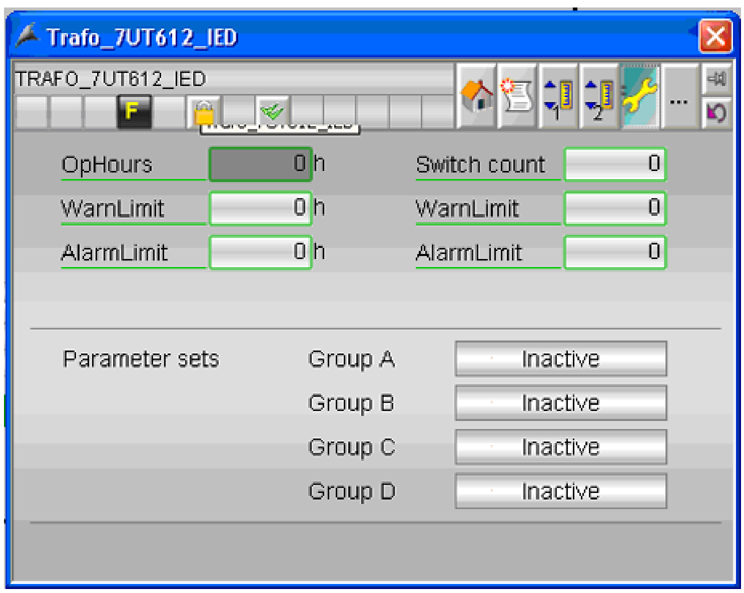
Indicators

Indicator	Meaning	Tag	Description	Note
IL1_P	Current L1 primary	I1_A#Value	Current L1 primary	
IL2_P	Current L2 primary	I1_B#Value	Current L2 primary	
IL3_P	Current L3 secondary 1	I1_C#Value	Current L3 secondary 1	
IL1_S1	Current L1 secondary 1	I2_A#Value	Current L1 secondary 1	
IL2_S1	Current L2 secondary 1	I2_B#Value	Current L2 secondary 1	
IL3_S1	Current L3 secondary 2	I2_C#Value	Current L3 secondary 2	
IL1_S2	Current L1 secondary 2	I3_A#Value	Current L1 secondary 2	
IL2_S2	Current L2 secondary 2	I3_B#Value	Current L2 secondary 2	
IL3_S2	Current L3 secondary 2	I3_C#Value	Current L3 secondary 2	
Th/Th Trip	Theta/Theta Trip	THETA#Value	Theta/Theta Trip	
Th/Th Trip L1	Theta/Theta Trip L1	THE-TA_L1#Value	Theta/Theta Trip L1	

Indicator	Meaning	Tag	Description	Note
Th/Th Trip L2	Theta/Theta Trip L2	THE-TA_L2#Value	Theta/Theta Trip L2	
Th/Th Trip L3	Theta/Theta Trip L3	THE-TA_L3#Value	Theta/Theta Trip L3	

3.15.7.5 PC_TRAFO Faceplate: Maintenance Pane

The Maintenance Pane shows the maintenance-related information.

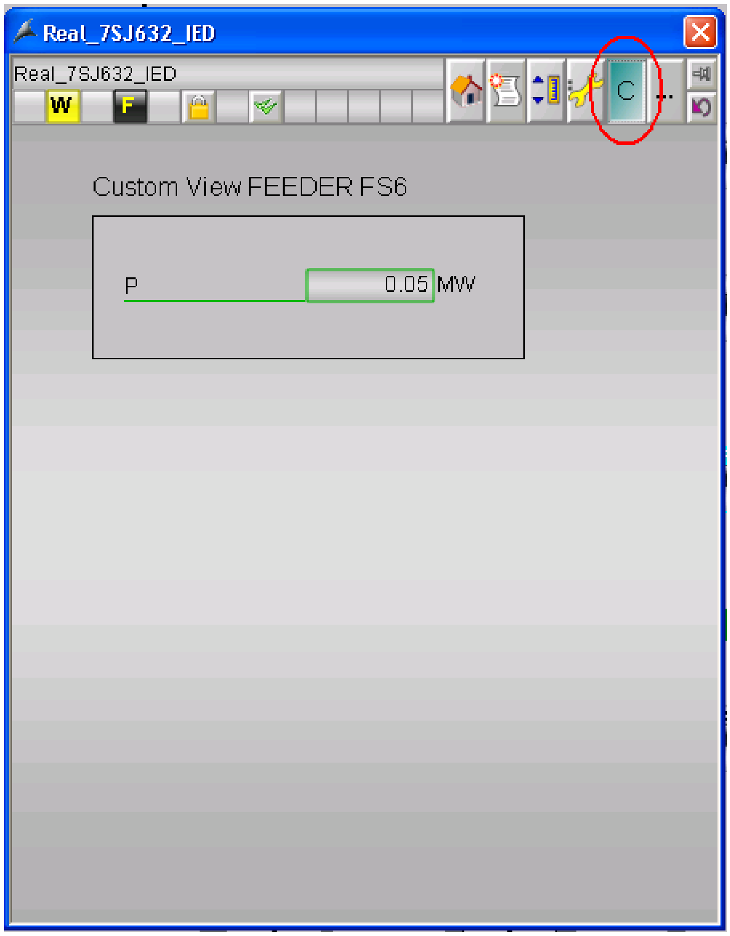


Indicators

Indicator	Meaning	Tag	Description	Note
OpHours	Operation hours	OpTm	Operation hours	
WarnLimit	Warning Limit Operation hours	OpTm-WarnLimit	Warning Limit Operation hours	
AlarmLimit	Alarm Limit Operation hours	OpTmA-larmLimit	Alarm Limit Operation hours	
Switch count	Control count Q0	SwCount	Control count Q0	
WarnLimit	Warning Limit Switch Count	SwCount-WarnLimit	Warning Limit Switch Count	
AlarmLimit	Alarm Limit Switch Count	SwCoun-tAlarmLi-mit	Alarm Limit Switch Count	
Group A	Parameter Set A active	PARSET_A	Parameter Set A active	
Group B	Parameter Set B active	PARSET_B	Parameter Set B active	
Group C	Parameter Set C active	PARSET_C	Parameter Set C active	
Group D	Parameter Set D active	PARSET_D	Parameter Set D active	

3.15.7.6 PC_TRAFO Faceplate: Custom Pane 1/2

The Maintenance Faceplates can be adapted by he customer. Example:



3.16 PC_SYNC

3.16.1 PC_SYNC Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Configuration** item; Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Beh	Behaviour	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	Dword	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
Warning	Summary Warning	Ext	Binary	-	Yes	Alarm summary event
Error	Summary Error	Ext	Binary	-	Yes	Error summary alarm
Loc	Local Operation	Ext	Binary	-	Yes	Local Operation
OpTm	Operation hours	Ext	SDWord	-	Yes	Device Operation hours
SwCount	Breaker Control Count	Ext	SDWord	-	Yes	Breaker Control Count
RBRF1_OpEx	Breaker failure TRIP T1	Ext	Binary	-	Only as alarm	Breaker failure TRIP T1
RBRF1_OpIn	Breaker failure TRIP T2	Ext	Binary	-	Only as alarm	Breaker failure TRIP T2
RBRF1_Str	Breaker failure pickup	Ext	Binary	-	Only as alarm	Breaker failure pickup
PU_Relay	Relay pickup	Ext	Binary	-	Only as alarm	Relay pickup
TR_Relay	Relay Trip	Ext	Binary	-	Only as alarm	Relay general trip command
PARSET_A	Parameter Set A	Ext	Binary	-	Yes	Parameter Set A active
PARSET_B	Parameter Set B	Ext	Binary	-	Yes	Parameter Set B active
PARSET_C	Parameter Set C	Ext	Binary	-	Yes	Parameter Set C active
PARSET_D	Parameter Set D	Ext	Binary	-	Yes	Parameter Set D active
QCONNERR	Connection Error	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication
GAPC1_Op	External Trip 1 TRIP	Ext	Binary	-	Only as alarm	External Trip 1 TRIP
GAPC1_Str	External Trip 1 picked up	Ext	Binary	-	Only as alarm	External Trip 1 picked up
GAPC2_Op	External Trip 2 TRIP	Ext	Binary	-	Only as alarm	External Trip 2 TRIP
GAPC2_Str	External Trip 2 picked up	Ext	Binary	-	Only as alarm	External Trip 2 picked up
GAPC3_Op	External Trip 3 TRIP	Ext	Binary	-	Only as alarm	External Trip 3 TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
GAPC3_Str	External Trip 3 picked up	Ext	Binary	-	Only as alarm	External Trip 3 picked up
GAPC4_Op	External Trip 4 TRIP	Ext	Binary	-	Only as alarm	External Trip 4 TRIP
GAPC4_Str	External Trip 4 picked up	Ext	Binary	-	Only as alarm	External Trip 4 picked up
PTUF1_Op	Frequency 1 < TRIP	Ext	Binary	-	Only as alarm	Frequency 1 < TRIP
PTUF1_Str	Frequency 1 < picked up	Ext	Binary	-	Only as alarm	Frequency 1 < picked up
PTUF2_Op	Frequency 2 < TRIP	Ext	Binary	-	Only as alarm	Frequency 2 < TRIP
PTUF2_Str	Frequency 2 < picked up	Ext	Binary	-	Only as alarm	Frequency 2 < picked up
PTUF3_Op	Frequency 3 < TRIP	Ext	Binary	-	Only as alarm	Frequency 3 < TRIP
PTUF3_Str	Frequency 3 < picked up	Ext	Binary	-	Only as alarm	Frequency 3 < picked up
PTUF4_Op	Frequency 4 < TRIP	Ext	Binary	-	Only as alarm	Frequency 4 < TRIP
PTUF4_Str	Frequency 4< picked up	Ext	Binary	-	Only as alarm	Frequency 4< picked up
P1_U1#Value	Voltage 1 Point 1	Ext	FLOAT	-	Yes	Voltage 1 Point 1
P1_U2#Value	Voltage 2 Point 1	Ext	FLOAT	-	Yes	Voltage 2 Point 1
P2_U1#Value	Voltage 1 Point 2	Ext	FLOAT	-	Yes	Voltage 1 Point 2
P2_U2#Value	Voltage 2 Point 2	Ext	FLOAT	-	Yes	Voltage 2 Point 2
P3_U1#Value	Voltage 1 Point 3	Ext	FLOAT	-	Yes	Voltage 1 Point 3
P3_U2#Value	Voltage 2 Point 3	Ext	FLOAT	-	Yes	Voltage 2 Point 3
P4_U1#Value	Voltage 1 Point 4	Ext	FLOAT	-	Yes	Voltage 1 Point 4
P4_U2#Value	Voltage 2 Point 4	Ext	FLOAT	-	Yes	Voltage 2 Point 4
P5_U1#Value	Voltage 1 Point 5	Ext	FLOAT	-	Yes	Voltage 1 Point 5
P5_U2#Value	Voltage 2 Point 5	Ext	FLOAT	-	Yes	Voltage 2 Point 5
P6_U1#Value	Voltage 1 Point 6	Ext	FLOAT	-	Yes	Voltage 1 Point 6
P6_U2#Value	Voltage 2 Point 6	Ext	FLOAT	-	Yes	Voltage 2 Point 6
P7_U1#Value	Voltage 1 Point 7	Ext	FLOAT	-	Yes	Voltage 1 Point 7
P7_U2#Value	Voltage 2 Point 7	Ext	FLOAT	-	Yes	Voltage 2 Point 7
P8_U1#Value	Voltage 1 Point 8	Ext	FLOAT	-	Yes	Voltage 1 Point 8
P8_U2#Value	Voltage 2 Point 8	Ext	FLOAT	-	Yes	Voltage 2 Point 8
P1_F1#Value	Frequency 1 Point 1	Ext	FLOAT	-	Yes	Frequency 1 Point 1
P1_F2#Value	Frequency 2 Point 1	Ext	FLOAT	-	Yes	Frequency 2 Point 1
P2_F1#Value	Frequency 1 Point 2	Ext	FLOAT	-	Yes	Frequency 1 Point 2
P2_F2#Value	Frequency 2 Point 2	Ext	FLOAT	-	Yes	Frequency 2 Point 2
P3_F1#Value	Frequency 1 Point 3	Ext	FLOAT	-	Yes	Frequency 1 Point 3
P3_F2#Value	Frequency 2 Point 3	Ext	FLOAT	-	Yes	Frequency 2 Point 3

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
P4_F1#Value	Frequency 1 Point 4	Ext	FLOAT	-	Yes	Frequency 1 Point 4
P4_F2#Value	Frequency 2 Point 4	Ext	FLOAT	-	Yes	Frequency 2 Point 4
P5_F1#Value	Frequency 1 Point 5	Ext	FLOAT	-	Yes	Frequency 1 Point 5
P5_F2#Value	Frequency 2 Point 5	Ext	FLOAT	-	Yes	Frequency 2 Point 5
P6_F1#Value	Frequency 1 Point 6	Ext	FLOAT	-	Yes	Frequency 1 Point 6
P6_F2#Value	Frequency 2 Point 6	Ext	FLOAT	-	Yes	Frequency 2 Point 6
P7_F1#Value	Frequency 1 Point 7	Ext	FLOAT	-	Yes	Frequency 1 Point 7
P7_F2#Value	Frequency 2 Point 7	Ext	FLOAT	-	Yes	Frequency 2 Point 7
P8_F1#Value	Frequency 1 Point 8	Ext	FLOAT	-	Yes	Frequency 1 Point 8
P8_F2#Value	Frequency 2 Point 8	Ext	FLOAT	-	Yes	Frequency 2 Point 8
P1_DU#Value	Voltage Difference Point 1	Ext	FLOAT	-	Yes	Voltage Difference Point 1
P2_DU#Value	Voltage Difference Point 2	Ext	FLOAT	-	Yes	Voltage Difference Point 2
P3_DU#Value	Voltage Difference Point 3	Ext	FLOAT	-	Yes	Voltage Difference Point 3
P4_DU#Value	Voltage Difference Point 4	Ext	FLOAT	-	Yes	Voltage Difference Point 4
P5_DU#Value	Voltage Difference Point 5	Ext	FLOAT	-	Yes	Voltage Difference Point 5
P6_DU#Value	Voltage Difference Point 6	Ext	FLOAT	-	Yes	Voltage Difference Point 6
P7_DU#Value	Voltage Difference Point 7	Ext	FLOAT	-	Yes	Voltage Difference Point 7
P8_DU#Value	Voltage Difference Point 8	Ext	FLOAT	-	Yes	Voltage Difference Point 8
P1_DF#Value	Frequency Difference Point 1	Ext	FLOAT	-	Yes	Frequency Difference Point 1
P2_DF#Value	Frequency Difference Point 2	Ext	FLOAT	-	Yes	Frequency Difference Point 2
P3_DF#Value	Frequency Difference Point 3	Ext	FLOAT	-	Yes	Frequency Difference Point 3
P4_DF#Value	Frequency Difference Point 4	Ext	FLOAT	-	Yes	Frequency Difference Point 4
P5_DF#Value	Frequency Difference Point 5	Ext	FLOAT	-	Yes	Frequency Difference Point 5
P6_DF#Value	Frequency Difference Point 6	Ext	FLOAT	-	Yes	Frequency Difference Point 6
P7_DF#Value	Frequency Difference Point 7	Ext	FLOAT	-	Yes	Frequency Difference Point 7
P8_DF#Value	Frequency Difference Point 8	Ext	FLOAT	-	Yes	Frequency Difference Point 8
P1_DANG#Value	Angle Difference Point 1	Ext	FLOAT	-	Yes	Angle Difference Point 1
P2_DANG#Value	Angle Difference Point 2	Ext	FLOAT	-	Yes	Angle Difference Point 2

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
P3_DANG#Value	Angle Difference Point 3	Ext	FLOAT	-	Yes	Angle Difference Point 3
P4_DANG#Value	Angle Difference Point 4	Ext	FLOAT	-	Yes	Angle Difference Point 4
P5_DANG#Value	Angle Difference Point 5	Ext	FLOAT	-	Yes	Angle Difference Point 5
P6_DANG#Value	Angle Difference Point 6	Ext	FLOAT	-	Yes	Angle Difference Point 6
P7_DANG#Value	Angle Difference Point 7	Ext	FLOAT	-	Yes	Angle Difference Point 7
P8_DANG#Value	Angle Difference Point 8	Ext	FLOAT	-	Yes	Angle Difference Point 8
P1_U_NOK	Point 1 Voltage Difference NOK	Ext	Binary	-	Yes	Point 1 Voltage Difference NOK
P2_U_NOK	Point 2 Voltage Difference NOK	Ext	Binary	-	Yes	Point 2 Voltage Difference NOK
P3_U_NOK	Point 3 Voltage Difference NOK	Ext	Binary	-	Yes	Point 3 Voltage Difference NOK
P4_U_NOK	Point 4 Voltage Difference NOK	Ext	Binary	-	Yes	Point 4 Voltage Difference NOK
P5_U_NOK	Point 5 Voltage Difference NOK	Ext	Binary	-	Yes	Point 5 Voltage Difference NOK
P6_U_NOK	Point 6 Voltage Difference NOK	Ext	Binary	-	Yes	Point 6 Voltage Difference NOK
P7_U_NOK	Point 7 Voltage Difference NOK	Ext	Binary	-	Yes	Point 7 Voltage Difference NOK
P8_U_NOK	Point 8 Voltage Difference NOK	Ext	Binary	-	Yes	Point 8 Voltage Difference NOK
P1_MEAS	Point 1 Measurement in Progress	Ext	Binary	-	Yes	Point 1 Measurement in Progress
P2_MEAS	Point 2 Measurement in Progress	Ext	Binary	-	Yes	Point 2 Measurement in Progress
P3_MEAS	Point 3 Measurement in Progress	Ext	Binary	-	Yes	Point 3 Measurement in Progress
P4_MEAS	Point 4 Measurement in Progress	Ext	Binary	-	Yes	Point 4 Measurement in Progress
P5_MEAS	Point 5 Measurement in Progress	Ext	Binary	-	Yes	Point 5 Measurement in Progress
P6_MEAS	Point 6 Measurement in Progress	Ext	Binary	-	Yes	Point 6 Measurement in Progress
P7_MEAS	Point 7 Measurement in Progress	Ext	Binary	-	Yes	Point 7 Measurement in Progress
P8_MEAS	Point 8 Measurement in Progress	Ext	Binary	-	Yes	Point 8 Measurement in Progress
P1_F_NOK	Point 1 Frequency Difference NOK	Ext	Binary	-	Yes	Point 1 Frequency Difference NOK

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
P2_F_NOK	Point 2 Frequency Difference NOK	Ext	Binary	-	Yes	Point 2 Frequency Difference NOK
P3_F_NOK	Point 3 Frequency Difference NOK	Ext	Binary	-	Yes	Point 3 Frequency Difference NOK
P4_F_NOK	Point 4 Frequency Difference NOK	Ext	Binary	-	Yes	Point 4 Frequency Difference NOK
P5_F_NOK	Point 5 Frequency Difference NOK	Ext	Binary	-	Yes	Point 5 Frequency Difference NOK
P6_F_NOK	Point 6 Frequency Difference NOK	Ext	Binary	-	Yes	Point 6 Frequency Difference NOK
P7_F_NOK	Point 7 Frequency Difference NOK	Ext	Binary	-	Yes	Point 7 Frequency Difference NOK
P8_F_NOK	Point 8 Frequency Difference NOK	Ext	Binary	-	Yes	Point 8 Frequency Difference NOK
P1_ANG_NOK	Point 1 Angle Difference NOK	Ext	Binary	-	Yes	Point 1 Angle Difference NOK
P2_ANG_NOK	Point 2 Angle Difference NOK	Ext	Binary	-	Yes	Point 2 Angle Difference NOK
P3_ANG_NOK	Point 3 Angle Difference NOK	Ext	Binary	-	Yes	Point 3 Angle Difference NOK
P4_ANG_NOK	Point 4 Angle Difference NOK	Ext	Binary	-	Yes	Point 4 Angle Difference NOK
P5_ANG_NOK	Point 5 Angle Difference NOK	Ext	Binary	-	Yes	Point 5 Angle Difference NOK
P6_ANG_NOK	Point 6 Angle Difference NOK	Ext	Binary	-	Yes	Point 6 Angle Difference NOK
P7_ANG_NOK	Point 7 Angle Difference NOK	Ext	Binary	-	Yes	Point 7 Angle Difference NOK
P8_ANG_NOK	Point 8 Angle Difference NOK	Ext	Binary	-	Yes	Point 8 Angle Difference NOK
P1_CL_EN	Point 1 Close Enable	Ext	Binary	-	Yes	Point 1 Close Enable
P2_CL_EN	Point 2 Close Enable	Ext	Binary	-	Yes	Point 2 Close Enable
P3_CL_EN	Point 3 Close Enable	Ext	Binary	-	Yes	Point 3 Close Enable
P4_CL_EN	Point 4 Close Enable	Ext	Binary	-	Yes	Point 4 Close Enable
P5_CL_EN	Point 5 Close Enable	Ext	Binary	-	Yes	Point 5 Close Enable
P6_CL_EN	Point 6 Close Enable	Ext	Binary	-	Yes	Point 6 Close Enable
P7_CL_EN	Point 7 Close Enable	Ext	Binary	-	Yes	Point 7 Close Enable
P8_CL_EN	Point 8 Close Enable	Ext	Binary	-	Yes	Point 8 Close Enable
P1_U2_DOWN	Point 1 Decrease U2	Ext	Binary	-	Yes	Point 1 Decrease U2
P2_U2_DOWN	Point 2 Decrease U2	Ext	Binary	-	Yes	Point 2 Decrease U2
P3_U2_DOWN	Point 3 Decrease U2	Ext	Binary	-	Yes	Point 3 Decrease U2
P4_U2_DOWN	Point 4 Decrease U2	Ext	Binary	-	Yes	Point 4 Decrease U2

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
P5_U2_DOWN	Point 5 Decrease U2	Ext	Binary	-	Yes	Point 5 Decrease U2
P6_U2_DOWN	Point 6 Decrease U2	Ext	Binary	-	Yes	Point 6 Decrease U2
P7_U2_DOWN	Point 7 Decrease U2	Ext	Binary	-	Yes	Point 7 Decrease U2
P8_U2_DOWN	Point 8 Decrease U2	Ext	Binary	-	Yes	Point 8 Decrease U2
P1_U2_UP	Point 1 Increase U2	Ext	Binary	-	Yes	Point 1 Increase U2
P2_U2_UP	Point 2 Increase U2	Ext	Binary	-	Yes	Point 2 Increase U2
P3_U2_UP	Point 3 Increase U2	Ext	Binary	-	Yes	Point 3 Increase U2
P4_U2_UP	Point 4 Increase U2	Ext	Binary	-	Yes	Point 4 Increase U2
P5_U2_UP	Point 5 Increase U2	Ext	Binary	-	Yes	Point 5 Increase U2
P6_U2_UP	Point 6 Increase U2	Ext	Binary	-	Yes	Point 6 Increase U2
P7_U2_UP	Point 7 Increase U2	Ext	Binary	-	Yes	Point 7 Increase U2
P8_U2_UP	Point 8 Increase U2	Ext	Binary	-	Yes	Point 8 Increase U2
P1_F2_DOWN	Point 1 Decrease F2	Ext	Binary	-	Yes	Point 1 Decrease F2
P2_F2_DOWN	Point 2 Decrease F2	Ext	Binary	-	Yes	Point 2 Decrease F2
P3_F2_DOWN	Point 3 Decrease F2	Ext	Binary	-	Yes	Point 3 Decrease F2
P4_F2_DOWN	Point 4 Decrease F2	Ext	Binary	-	Yes	Point 4 Decrease F2
P5_F2_DOWN	Point 5 Decrease F2	Ext	Binary	-	Yes	Point 5 Decrease F2
P6_F2_DOWN	Point 6 Decrease F2	Ext	Binary	-	Yes	Point 6 Decrease F2
P7_F2_DOWN	Point 7 Decrease F2	Ext	Binary	-	Yes	Point 7 Decrease F2
P8_F2_DOWN	Point 8 Decrease F2	Ext	Binary	-	Yes	Point 8 Decrease F2
P1_F2_UP	Point 1 Increase F2	Ext	Binary	-	Yes	Point 1 Increase F2
P2_F2_UP	Point 2 Increase F2	Ext	Binary	-	Yes	Point 2 Increase F2
P3_F2_UP	Point 3 Increase F2	Ext	Binary	-	Yes	Point 3 Increase F2
P4_F2_UP	Point 4 Increase F2	Ext	Binary	-	Yes	Point 4 Increase F2
P5_F2_UP	Point 5 Increase F2	Ext	Binary	-	Yes	Point 5 Increase F2
P6_F2_UP	Point 6 Increase F2	Ext	Binary	-	Yes	Point 6 Increase F2
P7_F2_UP	Point 7 Increase F2	Ext	Binary	-	Yes	Point 7 Increase F2
P8_F2_UP	Point 8 Increase F2	Ext	Binary	-	Yes	Point 8 Increase F2

3.16.2 PC_SYNC Outputs

There are no Outputs defined for PC_SYNC

3.16.3 Internal tags of PC_SYNC

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OpTmAlarm	Internal message bit	Int	Binary	-		Internal message bit
OpTmAlarmLimit	Alarm limit operating hours	Int	DWord	-		Alarm limit operating hours
OpTmWarning	Internal message bit	Int	Binary	-		Internal message bit
OpTmWarnLimit	Warning limit operating hours	Int	DWord	-		Warning limit operating hours
SwCountAlarm	Internal message bit	Int	Binary	-		Internal message bit
SwCountAlarmLimit	Alarm limit switch count	Int	DWord	-		Alarm limit switch count
SwCountWarning	Internal message bit	Int	Binary	-		Internal message bit
SwCountWarnLimit	Warning limit switch count	Int	DWord	-		Warning limit switch count
ST_Worst	Reserved for internal use	Int	BYTE	-		Reserved for internal use
Status1	Reserved for internal use	Int	DWord	-		Reserved for internal use
Status5	Bitmask to hide fields in the Faceplate	Int	DWord	-		Bitmask to hide fields in the Faceplate
OCCUPIED	Reserved for internal use	Int	Binary	-	No	Reserved for internal use
VisuMisc#CustomFaceplate_1		Int	String		No	Visualization
VisuMisc#CustomFaceplate_2		Int	String		No	Visualization
VisuMisc#Unit_Voltage		Int	String		No	Visualization
#TextPermanent		Int	TEXT16		No	Visualization
#StatusPermanent		Int	DOWRD		No	Visualization
BatchName		Int	TEXTREF		No	Batch message text

3.16.4 PC_SYNC Alarms

The following alarms are defined for the PC_SYNC:

Name	Class	Type	Configured by Default	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
Error summary alarm	Alarm	Alarm High	Yes	Error = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
External Trip 1 TRIP	Alarm	Alarm High	Yes	PROT_GAPC1_Op_general = 1
External Trip 1 picked up	Warning	Warning High	Yes	PROT_GAPC1_Str_general = 1
External Trip 2 TRIP	Alarm	Alarm High	Yes	PROT_GAPC2_Op_general = 1
External Trip 2 picked up	Warning	Warning High	Yes	PROT_GAPC2_Str_general = 1
External Trip 3 TRIP	Alarm	Alarm High	Yes	PROT_GAPC3_Op_general = 1
External Trip 3 picked up	Warning	Warning High	Yes	PROT_GAPC3_Str_general = 1
External Trip 4 TRIP	Alarm	Alarm High	Yes	PROT_GAPC4_Op_general = 1
External Trip 4 picked up	Warning	Warning High	Yes	PROT_GAPC4_Str_general = 1
Frequency 1 < TRIP	Alarm	Alarm High	Yes	PROT_PTUF1_Op_general = 1
Frequency 1 < picked up	Warning	Warning High	Yes	PROT_PTUF1_Str_general = 1
Frequency 2 < TRIP	Alarm	Alarm High	Yes	PROT_PTUF2_Op_general = 1
Frequency 2 < picked up	Warning	Warning High	Yes	PROT_PTUF2_Str_general = 1
Frequency 3 < TRIP	Alarm	Alarm High	Yes	PROT_PTUF3_Op_general = 1
Frequency 3 < picked up	Warning	Warning High	Yes	PROT_PTUF3_Str_general = 1
Frequency 4 < TRIP	Alarm	Alarm High	Yes	PROT_PTUF4_Op_general = 1
Frequency 4< picked up	Warning	Warning High	Yes	PROT_PTUF4_Str_general = 1
Breaker failure picked up	Warning	Warning High	Yes	RBRF1_Str = 1
Breaker failure TRIP T1	Alarm	Alarm High	Yes	RBRF1_OpEx = 1
Breaker failure TRIP T2	Alarm	Alarm High	Yes	RBRF1_OpIn = 1
MaintenanceWarning-OperationTime	Alarm	Alarm High	Yes	OpTmWarning = 1
MaintenanceAlarm-OperationTime	Warning	Warning High	Yes	OpTmAlarm = 1
MaintenanceWarning-SwitchCount	Alarm	Alarm High	Yes	SwCountWarning = 1

Name	Class	Type	Configured by Default	Condition Description
MaintenanceAlarm-SwitchCount	Warning	Warning High	Yes	SwCountAlarm = 1
Connection Error	PLC Process Control Message	Error	Yes	QCONNERR = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an PC_SYNC object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

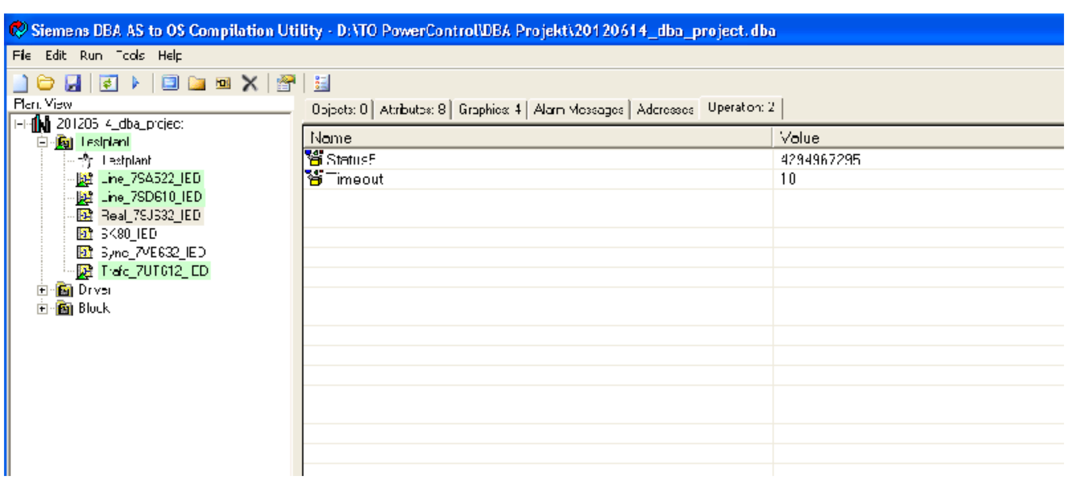
If an IEC61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

3.16.5 Operating parameters of PC_SYNC

Configuring operational characteristics

The operational characteristics of a PC_SYNC can be configured in DBA.

1. Select a PC_SYNC object instance from the plant view.
2. Select the "Operations" tab of the "Edit attributes" window in the upper right hand quadrant of the screen.



Status5

The Status5 Tag is a bitmask for hiding different values in the faceplate (e.g. if they are not available in the device). Every bit represents a value or functionality in the faceplate. Please also refer to the PC TO Engineering manual. The default value is 0xFFFFFFFF, which means 4294967295. All values in the faceplate are displayed by default.

Visualization

The visualization of the faceplate is configured the "Graphic" group. You can find details on this in the documentation "PCS 7 PowerControl - OS - Option - Technological Objects".

3.16.6 PC_SYNC Symbol Display

The following PC_SYNC symbols are available as part of the standard library.

PC_SYNC/1

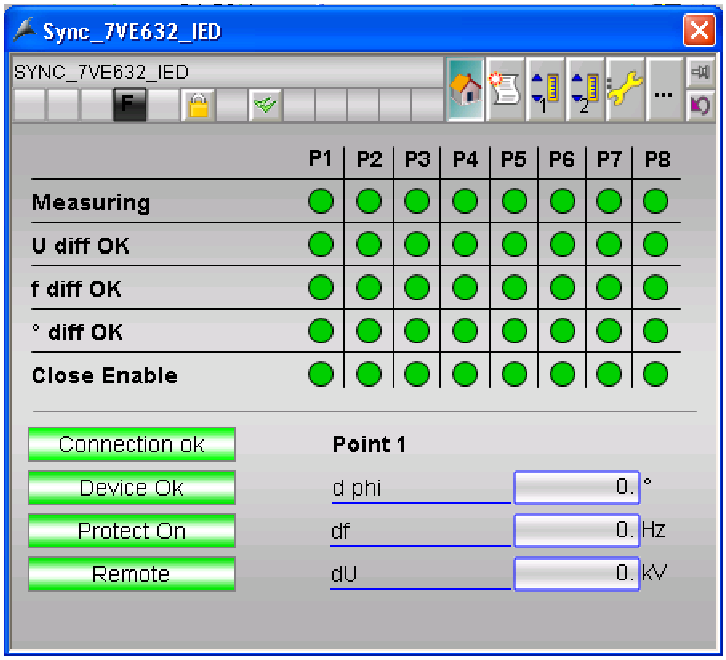
The symbols show any active alarm conditions. The configuration of the symbols is described in the PC_TO Engineering manual.

3.16.7 PC_SYNC Faceplate

There are 7 different views available for the PC_SYNC:

3.16.7.1 PC_SYNC Faceplate: Standard Pane

The view of Standard Pane shows the status of device and important measurements



Indicators

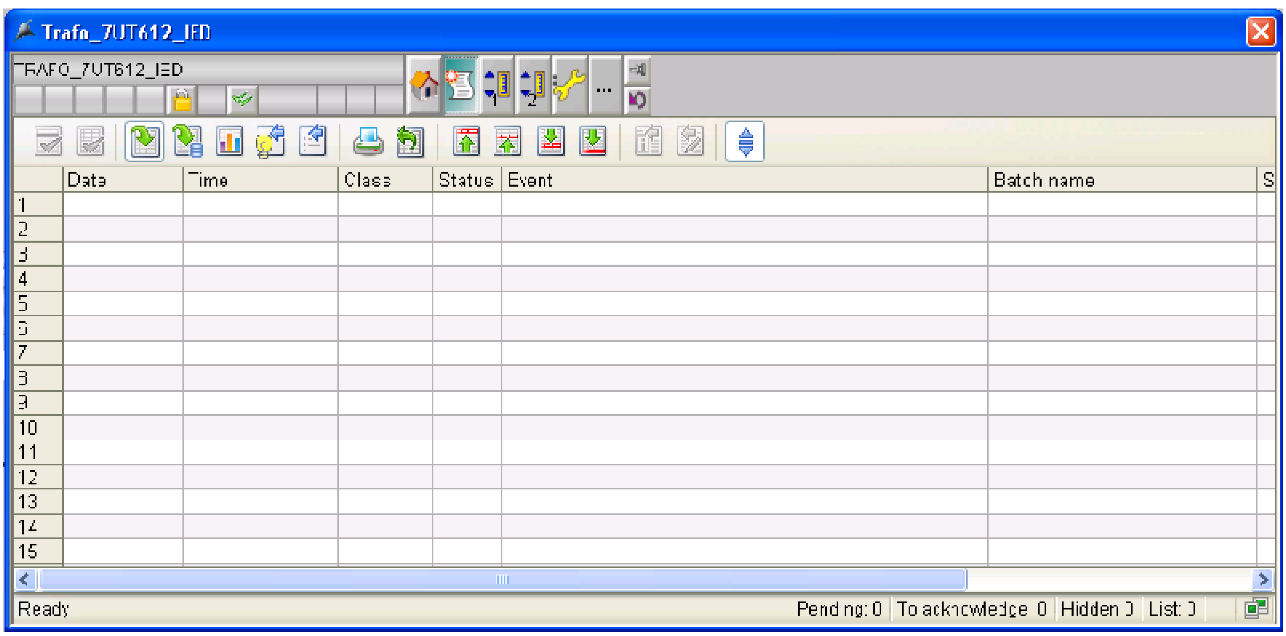
X = Point 1...8

Indicator	Meaning	Tag	Description	Note
Connect Status	Communication Status of the IED via ethernet.	QCO-NERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blocked) – RED Beh=3 (Protect test) – YELLOW Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Local/Remote	Loc	Loc = 1: Local Loc = 0: Remote	
D phi	Point 1 Angle Difference	P1_DANG#Value	Point 1 Angle Difference	
D f	Point 1 Frequency Difference	P1_DF#Value	Point 1 Frequency Difference	
D U	Point 1 Voltage Difference	P1_DU#Value	Point 1 Voltage Difference	

Indicator	Meaning	Tag	Description	Note
Measuring	Measuring	PX_MEAS	Measuring	
U diff OK	Difference Voltage OK	PX_U_NOK	Difference Voltage OK	
F diff OK	Difference Frequency OK	PX_F_NOK	Difference Frequency OK	
° diff OK	Difference Angle OK	PX_ANG_NOK	Difference Angle OK	
Close Enable	Close Enable	PX_CL_EN	Close Enable	

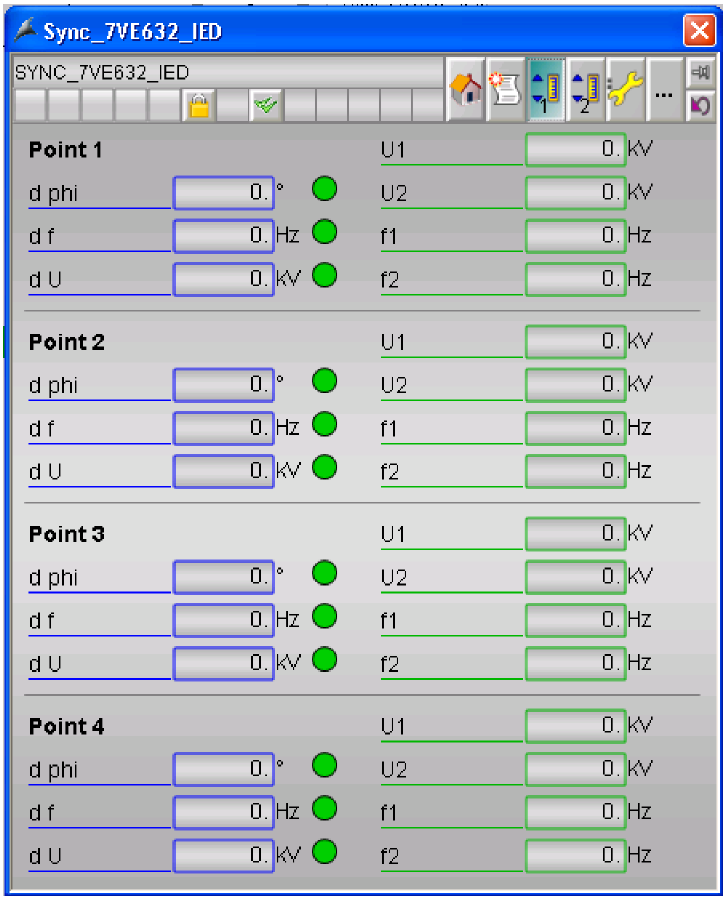
3.16.7.2 PC_SYNC Faceplate: Alarm View

This panel shows each of the active alarms that are active for the IED.



3.16.7.3 PC_SYNC Faceplate: Measurement Pane 1

The Measurement Pane shows the measured values of IED.



Indicators

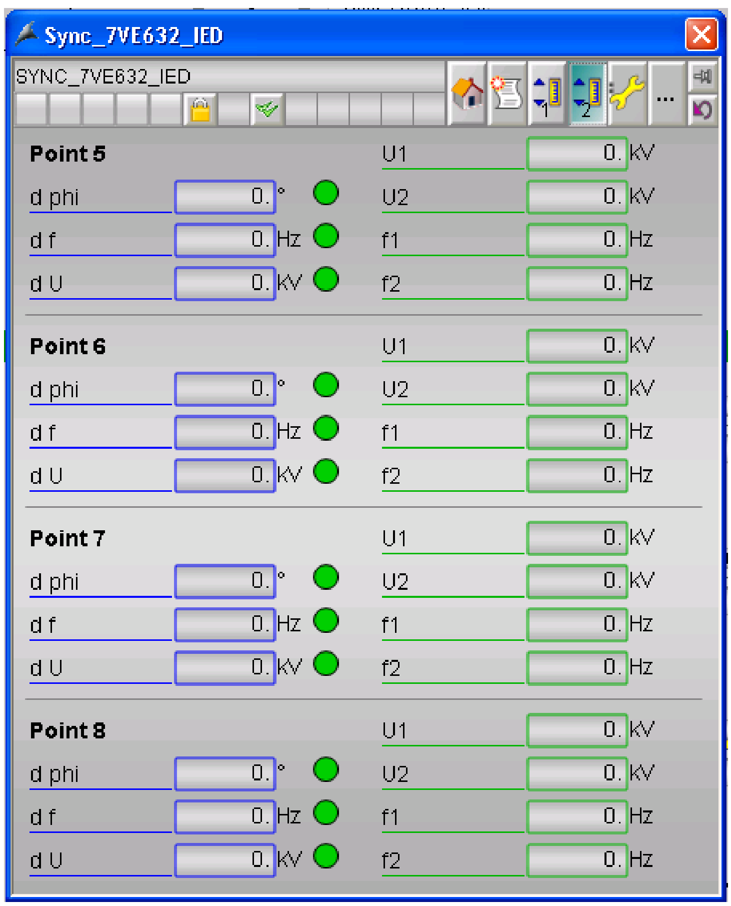
X = Point 1...4

Indicator	Meaning	Tag	Description	Note
U1	Voltage 1	PX_U1#Val-ue	Voltage 1	
U2	Voltage 2	PX_U2#Val-ue	Voltage 2	
F1	Frequency 1	PX_F1#Value	Frequency 1	
F2	Frequency 2	PX_F2#Value	Frequency 2	
D phi	Point 1 Angle Differ-ence	P1_DANG#V alue	Point 1 Angle Difference	
D f	Point 1 Frequency Dif-ference	P1_DF#Value	Point 1 Frequency Difference	
D U	Point 1 Voltage Differ-ence	P1_DU#Val-ue	Point 1 Voltage Difference	
Measuring	Measuring	PX_MEAS	Measuring	

Indicator	Meaning	Tag	Description	Note
U diff OK	Difference Voltage OK	PX_U_NOK	Difference Voltage OK	
F diff OK	Difference Frequency OK	PX_F_NOK	Difference Frequency OK	
° diff OK	Difference Angle OK	PX_ANG_NOK	Difference Angle OK	
Close Enable	Close Enable	PX_CL_EN	Close Enable	

3.16.7.4 PC_SYNC Faceplate: Measurement Pane 2

The Measurement Pane shows the measured values of IED.



Indicators

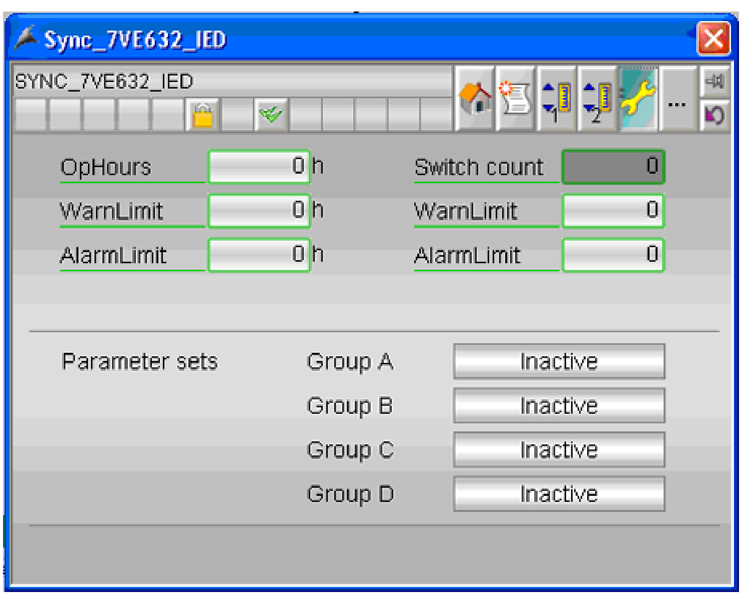
X = Point 5...8

Indicator	Meaning	Tag	Description	Note
U1	Voltage 1	PX_U1#Value	Voltage 1	
U2	Voltage 2	PX_U2#Value	Voltage 2	

Indicator	Meaning	Tag	Description	Note
F1	Frequency 1	PX_F1#Value	Frequency 1	
F2	Frequency 2	PX_F2#Value	Frequency 2	
D phi	Point 1 Angle Difference	P1_DANG#Value	Point 1 Angle Difference	
D f	Point 1 Frequency Difference	P1_DF#Value	Point 1 Frequency Difference	
D U	Point 1 Voltage Difference	P1_DU#Value	Point 1 Voltage Difference	
Measuring	Measuring	PX_MEAS	Measuring	
U diff OK	Difference Voltage OK	PX_U_NOK	Difference Voltage OK	
F diff OK	Difference Frequency OK	PX_F_NOK	Difference Frequency OK	
° diff OK	Difference Angle OK	PX_ANG_NOK	Difference Angle OK	
Close Enable	Close Enable	PX_CL_EN	Close Enable	

3.16.7.5 PC_SYNC Faceplate: Maintenance Pane

The Maintenance Pane shows the maintenance-related information.



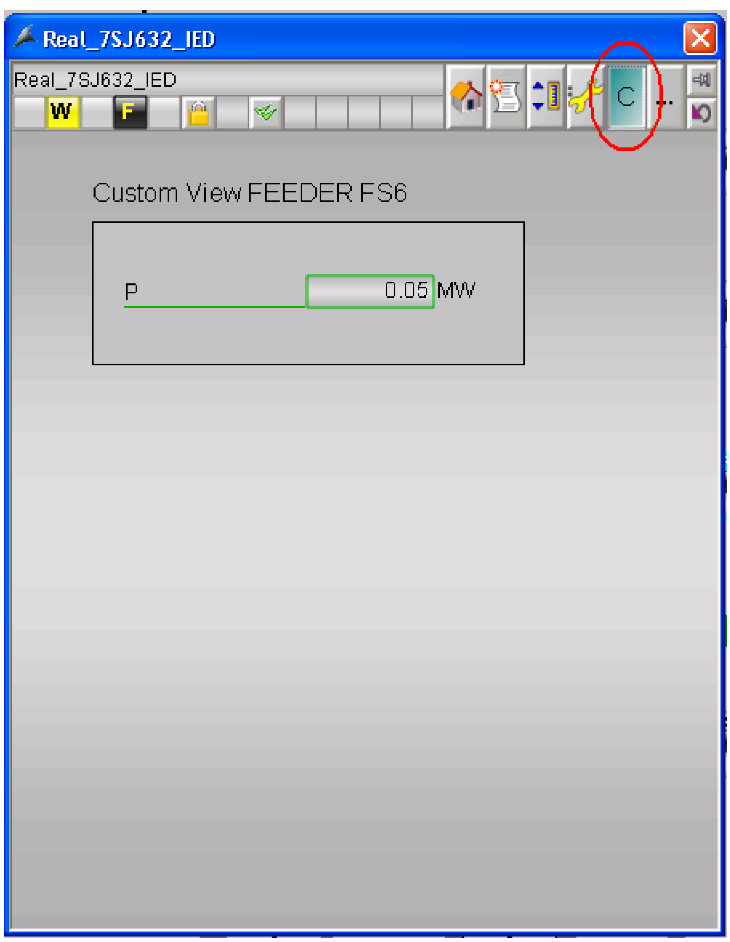
Indicators

Indicator	Meaning	Tag	Description	Note
OpHours	Operation hours	OpTm	Operation hours	
WarnLimit	Warning Limit Operation hours	OpTmWarnLimit	Warning Limit Operation hours	
AlarmLimit	Alarm Limit Operation hours	OpTmAlarmLimit	Alarm Limit Operation hours	

Indicator	Meaning	Tag	Description	Note
Switch count	Control count Q0	SwCount	Control count Q0	
WarnLimit	Warning Limit Switch Count	SwCount-WarnLimit	Warning Limit Switch Count	
AlarmLimit	Alarm Limit Switch Count	SwCoun-tAlarmLi-mit	Alarm Limit Switch Count	
Group A	Parameter Set A active	PARSET_A	Parameter Set A active	
Group B	Parameter Set B active	PARSET_B	Parameter Set B active	
Group C	Parameter Set C active	PARSET_C	Parameter Set C active	
Group D	Parameter Set D active	PARSET_D	Parameter Set D active	

3.16.7.6 PC_SYNC Faceplate: Custom Pane 1/2

The Maintenance Faceplates can be adapted by he customer. Example:



3.17 PC_LINE

3.17.1 PC_LINE Inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item; Item available for **Archive**

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
Beh	Behaviour	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	Dword	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
Warning	Summary Warning	Ext	Binary	-	Yes	Alarm summary event
Error	Summary Error	Ext	Binary	-	Yes	Error summary alarm
Loc	Local Operation	Ext	Binary	-	Yes	Local Operation
OpTm	Operation hours	Ext	SDWord	-	Yes	Device Operation hours
SwCount	Breaker Control Count	Ext	SDWord	-	Yes	Breaker Control Count
RBRF1_OpEx	Breaker failure TRIP T1	Ext	Binary	-	Only as alarm	Breaker failure TRIP T1
RBRF1_OpIn	Breaker failure TRIP T2	Ext	Binary	-	Only as alarm	Breaker failure TRIP T2
RBRF1_Str	Breaker failure pick-up	Ext	Binary	-	Only as alarm	Breaker failure pickup
PU_Relay	Relay pickup	Ext	Binary	-	Only as alarm	Relay pickup
TR_Relay	Relay Trip	Ext	Binary	-	Only as alarm	Relay general trip command
PARSET_A	Parameter Set A	Ext	Binary	-	Yes	Parameter Set A active
PARSET_B	Parameter Set B	Ext	Binary	-	Yes	Parameter Set B active
PARSET_C	Parameter Set C	Ext	Binary	-	Yes	Parameter Set C active
PARSET_D	Parameter Set D	Ext	Binary	-	Yes	Parameter Set D active
QCONNERR	Connection Error	Ext	Binary	-	Yes	Connection status 0=Connection OK 1=Loss of communication
F#Value	Frequency	Ext	FLOAT	-	Yes	Frequency

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
I_A#Value	Current L1	Ext	FLOAT	-	Yes	Current L1
I_B#Value	Current L2	Ext	FLOAT	-	Yes	Current L2
I_C#Value	Current L3	Ext	FLOAT	-	Yes	Current L3
OpTm	Operating hours	Ext	DWord	-	Yes	Operating hours
P#Value	Power	Ext	FLOAT	-	Yes	Power
PF#Value	cos phi - Power Factor	Ext	FLOAT	-	Yes	cos phi - Power Factor
Q#Value	Reactive Power	Ext	FLOAT	-	Yes	Reactive Power
S#Value	Apparent Power	Ext	FLOAT	-	Yes	Apparent Power
U#Value	neutral Voltage	Ext	FLOAT	-	Yes	neutral Voltage
U_A#Value	Voltage Phase A	Ext	FLOAT	-	Yes	Voltage Phase A
U_AB#Value	Voltage A-B	Ext	FLOAT	-	Yes	Voltage A-B
U_B#Value	Voltage Phase B	Ext	FLOAT	-	Yes	Voltage Phase B
U_BC#Value	Voltage B-C	Ext	FLOAT	-	Yes	Voltage B-C
U_C#Value	Voltage Phase C	Ext	FLOAT	-	Yes	Voltage Phase C
U_CA#Value	Voltage C-A	Ext	FLOAT	-	Yes	Voltage C-A
PDIF1_Op	Differential protection IDIFF> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF> TRIP
PDIF1_Str	Differential protection IDIFF> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF> picked up
PDIF2_Op	Differential protection IDIFF>> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> TRIP
PDIF2_Str	Differential protection IDIFF>> picked up	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> picked up
PDIS1_Str	Impedance protection Z1 picked up	Ext	Binary	-	Only as alarm	Impedance protection Z1 picked up
PDIS2_Str	Impedance protection Z2 picked up	Ext	Binary	-	Only as alarm	Impedance protection Z2 picked up
PDIS3_Str	Impedance protection Z1B picked up	Ext	Binary	-	Only as alarm	Impedance protection Z1B picked up
PDIS4_Str	Impedance protection general picked up	Ext	Binary	-	Only as alarm	Impedance protection general picked up
PDIS1_Op	Impedance protection Z1 TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z1 TRIP
PDIS2_Op	Impedance protection Z2 TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z2 TRIP
PDIS3_Op	Impedance protection Z1B TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z1B TRIP
PDIS4_Op	Impedance protection general TRIP	Ext	Binary	-	Only as alarm	Impedance protection general TRIP
PTOC1_Str	IDMT Phase Ip picked up	Ext	Binary	-	Only as alarm	IDMT Phase Ip picked up

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PTOC1_Op	IDMT Phase Ip TRIP	Ext	Binary	-	Only as alarm	IDMT Phase Ip TRIP
PTOC2_Str	DMT I > picked up	Ext	Binary	-	Only as alarm	DMT I > picked up
PTOC2_Op	DMT I > TRIP	Ext	Binary	-	Only as alarm	DMT I > TRIP
PTOC3_Str	DMT I >> picked up	Ext	Binary	-	Only as alarm	DMT I >> picked up
PTOC3_Op	DMT I >> TRIP	Ext	Binary	-	Only as alarm	DMT I >> TRIP
IDIFFL1	Idiff L1	Ext	FLOAT	-	Yes	Idiff L1
IDIFFL2	Idiff L2	Ext	FLOAT	-	Yes	Idiff L2
IDIFFL3	Idiff L3	Ext	FLOAT	-	Yes	Idiff L3
IDIFF3I0	diff 3I0	Ext	FLOAT	-	Yes	diff 3I0
IRESTL1	Irest L1	Ext	FLOAT	-	Yes	Irest L1
IRESTL2	Irest L2	Ext	FLOAT	-	Yes	Irest L2
IRESTL3	Irest L3	Ext	FLOAT	-	Yes	Irest L3
I30#Value	3I0	Ext	FLOAT	-	Yes	3I0

3.17.2 PC_LINE Outputs

There are no Outputs defined for PC_LINE

3.17.3 Internal tags of PC_LINE

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OpTmAlarm	Internal message bit	Int	Binary	-		Internal message bit
OpTmAlarmLimit	Alarm limit operating hours	Int	DWord	-		Alarm limit operating hours
OpTmWarning	Internal message bit	Int	Binary	-		Internal message bit
OpTmWarnLimit	Warning limit operating hours	Int	DWord	-		Warning limit operating hours
SwCountAlarm	Internal message bit	Int	Binary	-		Internal message bit
SwCountAlarmLimit	Alarm limit switch count	Int	DWord	-		Alarm limit switch count
SwCountWarning	Internal message bit	Int	Binary	-		Internal message bit
SwCountWarnLimit	Warning limit switch count	Int	DWord	-		Warning limit switch count

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
ST_Worst	Reserved for internal use	Int	BYTE	-		Reserved for internal use
Status1	Reserved for internal use	Int	DWord	-		Reserved for internal use
Status5	Bitmask to hide fields in the Faceplate	Int	DWord	-		Bitmask to hide fields in the Face-plate
OCCUPIED	Reserved for internal use	Int	Binary	-	No	Reserved for internal use
VisuMisc#Cus-tomFaceplate_1		Int	String		No	Visualization
VisuMisc#Cus-tomFaceplate_2		Int	String		No	Visualization
Visu-Misc#Unit_Cur-rent		Int	String		No	Visualization
#TextPerma-nent		Int	TEXT16		No	Visualization
#StatusPerma-nent		Int	DWORD		No	Visualization
BatchName		Int	TEXTREF		No	Batch message text

3.17.4 PC_LINE Alarms

The following alarms are defined for the PC_LINE:

Name	Class	Type	Configured by De-fault	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
Error summary alarm	Alarm	Alarm High	Yes	Error = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
Differential protection IDIFF> TRIP	Alarm	Alarm High	Yes	PDIF1_Op = 1
Differential protection IDIFF> picked up	Warning	Warning High	Yes	PDIF1_Str = 1
Differential protection IDIFF>> TRIP	Alarm	Alarm High	Yes	PDIF2_Op = 1
Differential protection IDIFF>> picked up	Warning	Warning High	Yes	PDIF2_Str = 1
Impedance protection Z1 picked up	Warning	Warning High	Yes	PDIS1_Str = 1
Impedance protection Z2 picked up	Warning	Warning High	Yes	PDIS2_Str = 1

Name	Class	Type	Configured by Default	Condition Description
Impedance protection Z1B picked up	Warning	Warning High	Yes	PDIS3_Str = 1
Impedance protection general picked up	Warning	Warning High	Yes	PDIS4_Str = 1
Impedance protection Z1 TRIP	Alarm	Alarm High	Yes	PDIS1_Op = 1
Impedance protection Z2 TRIP	Alarm	Alarm High	Yes	PDIS2_Op = 1
Impedance protection Z1B TRIP	Alarm	Alarm High	Yes	PDIS3_Op = 1
Impedance protection general TRIP	Alarm	Alarm High	Yes	PDIS4_Op = 1
IDMT Phase Ip picked up	Warning	Warning High	Yes	PTOC1_Str = 1
IDMT Phase Ip TRIP	Alarm	Alarm High	Yes	PTOC1_Op = 1
DMT I > picked up	Warning	Warning High	Yes	PTOC2_Str = 1
DMT I > TRIP	Alarm	Alarm High	Yes	PTOC2_Op = 1
DMT I >> picked up	Warning	Warning High	Yes	PTOC3_Str = 1
DMT I >> TRIP	Alarm	Alarm High	Yes	PTOC3_Op = 1
MaintenanceWarning-OperationTime	Alarm	Alarm High	Yes	OpTmWarning = 1
MaintenanceAlarm-OperationTime	Warning	Warning High	Yes	OpTmAlarm = 1
MaintenanceWarning-SwitchCount	Alarm	Alarm High	Yes	SwCountWarning = 1
MaintenanceAlarm-SwitchCount	Warning	Warning High	Yes	SwCountAlarm = 1
Breaker failure picked up	Warning	Warning High	Yes	RBRF1_Str = 1
Breaker failure TRIP T1	Alarm	Alarm High	Yes	RBRF1_OpEx = 1
Breaker failure TRIP T2	Alarm	Alarm High	Yes	RBRF1_OpIn = 1
Connection Error	PLC Process Control Message	Error	Yes	QCONNERR = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an PC_LINE object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

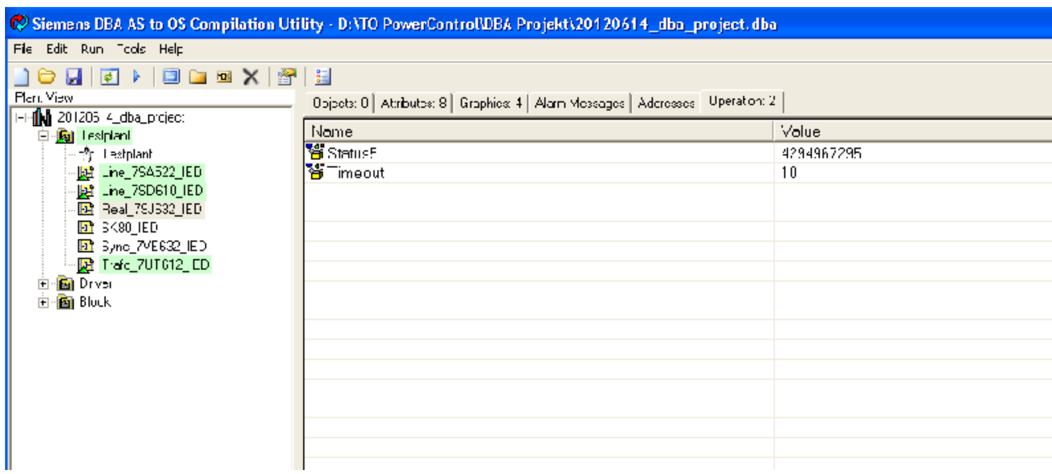
If an IEC61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

3.17.5 Operating parameters of PC_LINE

Configuring operational characteristics

The operational characteristics of a PC_LINE can be configured in DBA.

1. Select a PC_LINE object instance from the plant view.
2. Select the "Operations" tab of the "Edit attributes" window in the upper right hand quadrant of the screen.



Status5

The Status5 Tag is a bitmask for hiding different values in the faceplate (e.g. if they are not available in the device). Every bit represents a value or functionality in the faceplate. Please also refer to the PC TO Engineering manual. The default value is 0xFFFFFFFF, which means 4294967295. All values in the faceplate are displayed by default.

Visualization

The visualization of the faceplate is configured the "Graphic" group. You can find details on this in the documentation "PCS 7 PowerControl - OS - Option - Technological Objects".

3.17.6 PC_LINE Symbol Display

The following PC_LINE symbols are available as part of the standard library.

PC_LINE/1

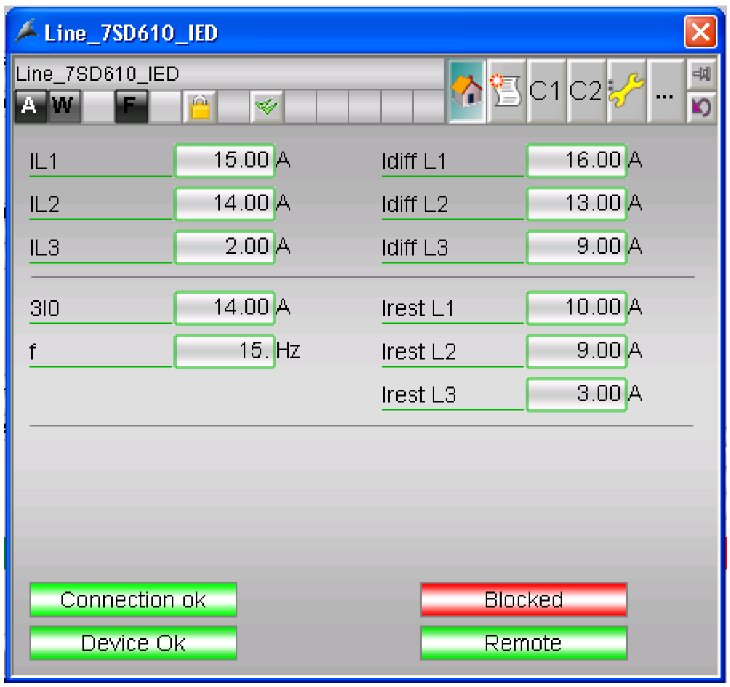
The symbols show any active alarm conditions. The configuration of the symbols is described in the PC_TO Engineering manual.

3.17.7 PC_LINE Faceplate

There are different views available for the PC_LINE:

3.17.7.1 PC_LINE Faceplate: Standard Pane

The view of Standard Pane shows the status of device and important measurements



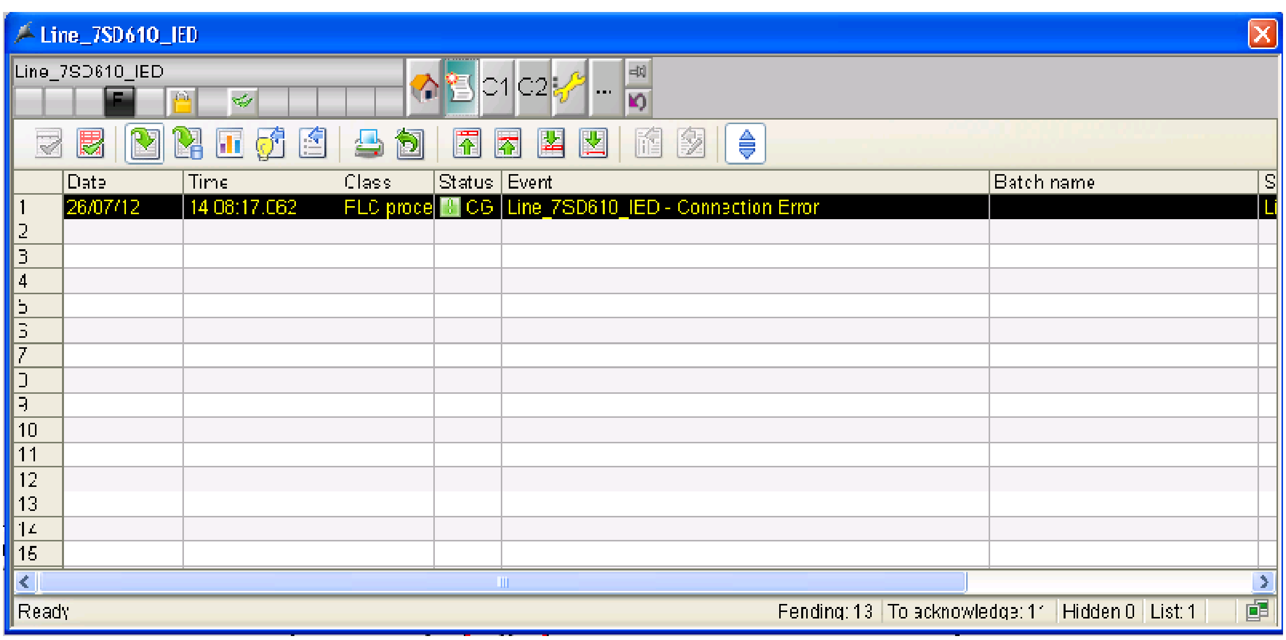
Indicators

Indicator	Meaning	Tag	Description	Note
Connect Status	Communication Status of the IED via ethernet.	QCO-NERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blcked) – RED Beh=3 (Protect test) – YELLOW Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Local/Remote	Loc	Loc = 1: Local Loc = 0: Remote	
IL1	Current L1	I_A#Value	Current L1	

Indicator	Meaning	Tag	Description	Note
IL2	Current L2	I_B#Value	Current L2	
IL3	Current L3	I_C#Value	Current L3	
3I0	3I0	I30#Value	3I0	
F	Frequency	F#Value	Frequency	
Idiff L1	Idiff L1	IDIFFL1#Value	Idiff L1	
Idiff L2	Idiff L2	IDIFFL2#Value	Idiff L2	
Idiff L3	Idiff L3	IDIFFL3#Value	Idiff L3	
Irest L1	Irest L1	IRESTL1#Value	Irest L1	
Irest L2	Irest L2	IRESTL2#Value	Irest L2	
Irest L3	Irest L3	IRESTL3#Value	Irest L3	

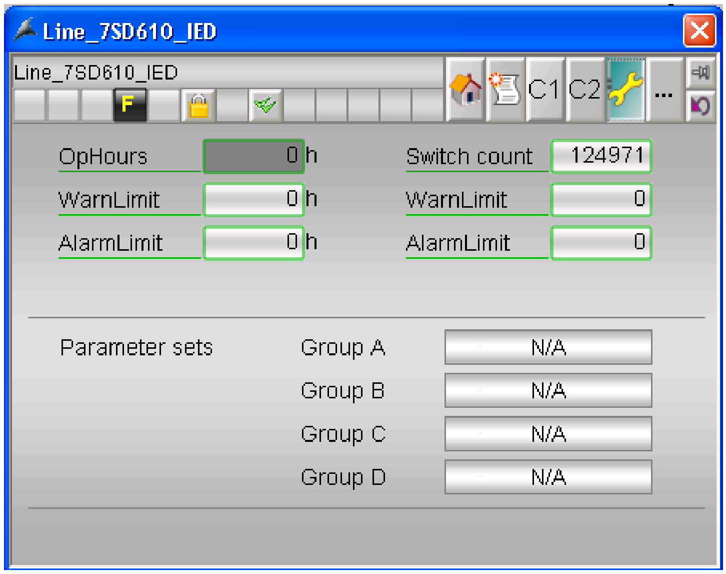
3.17.7.2 PC_LINE Faceplate: Alarm View

This panel shows each of the active alarms that are active for the IED.



3.17.7.3 PC_LINE Faceplate: Maintenance Pane

The Maintenance Pane shows the maintenance-related information.

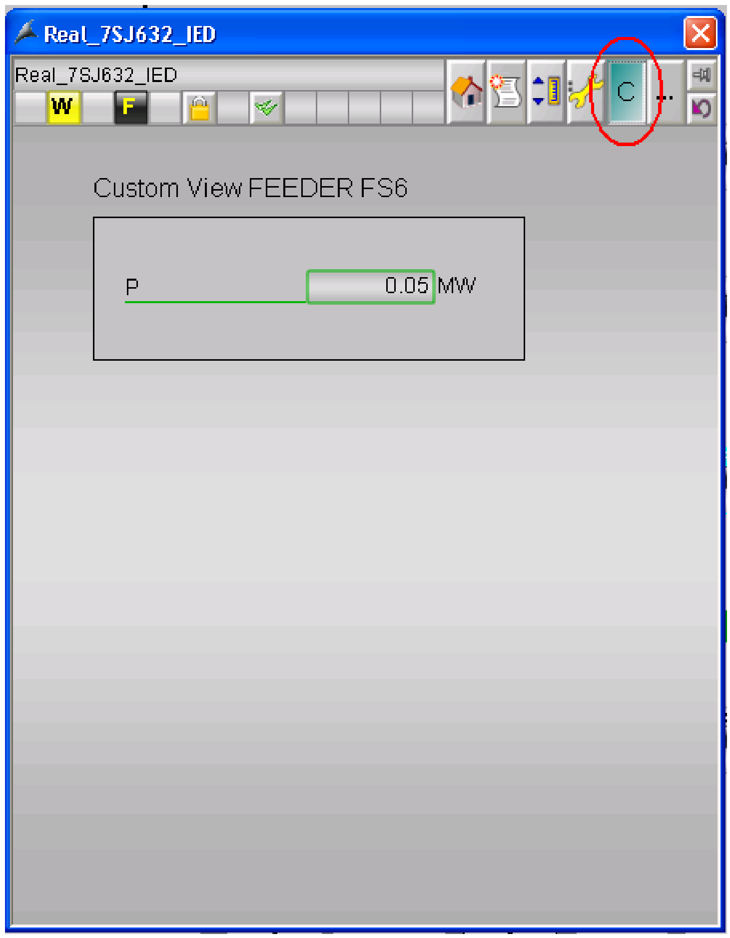


Indicators

Indicator	Meaning	Tag	Description	Note
OpHours	Operation hours	OpTm	Operation hours	
WarnLimit	Warning Limit Operation hours	OpTm-WarnLimit	Warning Limit Operation hours	
AlarmLimit	Alarm Limit Operation hours	OpTmAlarmLimit	Alarm Limit Operation hours	
Switch count	Control count Q0	SwCount	Control count Q0	
WarnLimit	Warning Limit Switch Count	SwCount-WarnLimit	Warning Limit Switch Count	
AlarmLimit	Alarm Limit Switch Count	SwCountAlarmLimit	Alarm Limit Switch Count	
Group A	Parameter Set A active	PARSET_A	Parameter Set A active	
Group B	Parameter Set B active	PARSET_B	Parameter Set B active	
Group C	Parameter Set C active	PARSET_C	Parameter Set C active	
Group D	Parameter Set D active	PARSET_D	Parameter Set D active	

3.17.7.4 PC_LINE Faceplate: Custom Pane 1/2

The Maintenance Faceplates can be adapted by he customer. Example:



3.18 PC_FEEDER_2CB

3.18.1 PC_FEEDER_2CB-inputs

Type: One of **Ext**ernal, **Int**ernal, **Ind**irect

Operator Visible: Visible in faceplate for **output** to the operator, **input** from the operator or both (**in / out**); **Config**uration item; Item available for **Archive**

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Beh	Behavior	Ext	DWord	-	Yes	Behavior of siprotec device. 1=On 2=Blocked 3=Test 4=Test/Blocked 5=Off
Dev_OK	Device OK	Ext	Dword	-	Yes	Device is operational and protecting. 1=Ok 2=Warning 3=Alarm
Warning	Summary Warning	Ext	Binary	-	Yes	Alarm summary event
Error	Summary Error	Ext	Binary	-	Yes	Error summary alarm
Loc	Local Operation	Ext	Binary	-	Yes	Local Operation
OpTm	Operation hours	Ext	SDWord	-	Yes	Device Operation hours
SwCount	Breaker Control Count	Ext	SDWord	-	Yes	Breaker Control Count
RBRF1_OpEx	Breaker failure TRIP T1	Ext	Binary	-	Only as alarm	Breaker failure TRIP T1
RBRF1_OpIn	Breaker failure TRIP T2	Ext	Binary	-	Only as alarm	Breaker failure TRIP T2
RBRF1_Str	Breaker failure pickup	Ext	Binary	-	Only as alarm	Breaker failure pickup
PU_Relay	Relay pickup	Ext	Binary	-	Only as alarm	Relay pickup
TR_Relay	Relay Trip	Ext	Binary	-	Only as alarm	Relay general trip command
PARSET_A	Parameter Set A	Ext	Binary	-	Yes	Parameter Set A active
PARSET_B	Parameter Set B	Ext	Binary	-	Yes	Parameter Set B active
PARSET_C	Parameter Set C	Ext	Binary	-	Yes	Parameter Set C active
PARSET_D	Parameter Set D	Ext	Binary	-	Yes	Parameter Set D active
QCONNERR	Connection Error	Ext	Binary	-	Yes	Connect Status 0=Connection OK 1=Loss of communication
GAPC1_Op	External Trip 1 TRIP	Ext	Binary	-	Only as alarm	External Trip 1 TRIP
GAPC1_Str	External Trip 1 pickup	Ext	Binary	-	Only as alarm	External Trip 1 pickup
PDIF1_Op	Differential protection IDIFF> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF> TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PDIF1_Str	Differential protection IDIFF> pickup	Ext	Binary	-	Only as alarm	Differential protection IDIFF> pickup
PDIF2_Op	Differential protection IDIFF>> TRIP	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> TRIP
PDIF2_Str	Differential protection IDIFF>> pickup	Ext	Binary	-	Only as alarm	Differential protection IDIFF>> pickup
PDIS1_Op	Impedance protection Z1 TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z1 TRIP
PDIS1_Str	Impedance protection Z1 pickup	Ext	Binary	-	Only as alarm	Impedance protection Z1 pickup
PDIS2_Op	Impedance protection Z2 TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z2 TRIP
PDIS2_Str	Impedance protection Z2 pickup	Ext	Binary	-	Only as alarm	Impedance protection Z2 pickup
PDIS3_Op	Impedance protection Z1B TRIP	Ext	Binary	-	Only as alarm	Impedance protection Z1B TRIP
PDIS3_Str	Impedance protection Z1B pickup	Ext	Binary	-	Only as alarm	Impedance protection Z1B pickup
PDIS4_Op	Impedance protection general TRIP	Ext	Binary	-	Only as alarm	Impedance protection general TRIP
PDIS4_Str	Impedance protection general pickup	Ext	Binary	-	Only as alarm	Impedance protection general pickup
PDOP1_Op	Reverse power: TRIP	Ext	Binary	-	Only as alarm	Reverse power: TRIP
PDUP1_Op	Underexcitation protection Char. 1 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 1 TRIP
PDUP2_Op	Underexcitation protection Char. 2 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 2 TRIP
PDUP3_Op	Underexcitation protection Char. 3 TRIP	Ext	Binary	-	Only as alarm	Underexcitation protection Char. 3 TRIP
PTOC1_Op	51 Overcurrent TRIP	Ext	Binary	-	Only as alarm	51 Overcurrent TRIP
PTOC1_Str	51 Overcurrent pickup	Ext	Binary	-	Only as alarm	51 Overcurrent pickup
PTOC10_Op	67-1 Directional Overcurrent I > TRIP	Ext	Binary	-	Only as alarm	67-1 Directional Overcurrent I > TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PTOC10_Str	67-1 Directional Overcurrent I > pickup	Ext	Binary	-	Only as alarm	67-1 Directional Overcurrent I > pickup
PTOC11_Op	67-2 Directional Overcurrent I >>TRIP	Ext	Binary	-	Only as alarm	67-2 Directional Overcurrent I >>TRIP
PTOC11_Str	67-2 Directional Overcurrent I >> pickup	Ext	Binary	-	Only as alarm	67-2 Directional Overcurrent I >> pickup
PTOC12_Op	67N-1 Directional Overcurrent IE > TRIP	Ext	Binary	-	Only as alarm	67N-1 Directional Overcurrent IE > TRIP
PTOC12_Str	67N-1 Directional Overcurrent IE > pickup	Ext	Binary	-	Only as alarm	67N-1 Directional Overcurrent IE > pickup
PTOC13_Op	67N-2 Directional Overcurrent IE >>TRIP	Ext	Binary	-	Only as alarm	67N-2 Directional Overcurrent IE >>TRIP
PTOC13_Str	67N-2 Directional Overcurrent IE >> pickup	Ext	Binary	-	Only as alarm	67N-2 Directional Overcurrent IE >> pickup
PTOC18_Op	50-3 Overcurrent TRIP	Ext	Binary	-	Only as alarm	50-3 Overcurrent TRIP
PTOC18_Str	50-3 Overcurrent pickup	Ext	Binary	-	Only as alarm	50-3 Overcurrent pickup
PTOC2_Op	51N Overcurrent TRIP	Ext	Binary	-	Only as alarm	51N Overcurrent TRIP
PTOC2_Str	51N Overcurrent pickup	Ext	Binary	-	Only as alarm	51N Overcurrent pickup
PTOC3_Op	67-TOC Overcurrent TRIP	Ext	Binary	-	Only as alarm	67-TOC Overcurrent TRIP
PTOC3_Str	67-TOC Overcurrent pickup	Ext	Binary	-	Only as alarm	67-TOC Overcurrent pickup
PTOC4_Op	67N-TOC Overcurrent TRIP	Ext	Binary	-	Only as alarm	67N-TOC Overcurrent TRIP
PTOC4_Str	67N-TOC Overcurrent pickup	Ext	Binary	-	Only as alarm	67N-TOC Overcurrent pickup
PTOC5_Op	46-TOC Overcurrent TRIP	Ext	Binary	-	Only as alarm	46-TOC Overcurrent TRIP
PTOC5_Str	46-TOC Overcurrent pickup	Ext	Binary	-	Only as alarm	46-TOC Overcurrent pickup
PTOC6_Op	50-1 Overcurrent I > TRIP	Ext	Binary	-	Only as alarm	50-1 Overcurrent I > TRIP
PTOC6_Str	50-1 Overcurrent I > pickup	Ext	Binary	-	Only as alarm	50-1 Overcurrent I > pickup
PTOC7_Op	50-2 Overcurrent I >>TRIP	Ext	Binary	-	Only as alarm	50-2 Overcurrent I >>TRIP

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
PTOC7_Str	50-2 Overcurrent I >> pickup	Ext	Binary	-	Only as alarm	50-2 Overcurrent I >> pickup
PTOC8_Op	50N-1 Overcurrent IE > TRIP	Ext	Binary	-	Only as alarm	50N-1 Overcurrent IE > TRIP
PTOC8_Str	50N-1 Overcurrent IE > pickup	Ext	Binary	-	Only as alarm	50N-1 Overcurrent IE > pickup
PTOC9_Op	50N-2 Overcurrent IE >> TRIP	Ext	Binary	-	Only as alarm	50N-2 Overcurrent IE >> TRIP
PTOC9_Str	50N-2 Overcurrent IE >> pickup	Ext	Binary	-	Only as alarm	50N-2 Overcurrent IE >> pickup
PTOV1_Op	Overvoltage U> TRIP	Ext	Binary	-	Only as alarm	Overvoltage U> TRIP
PTOV1_Str	Overvoltage U> pickup	Ext	Binary	-	Only as alarm	Overvoltage U> pickup
PTOV2_Op	Overvoltage U>> TRIP	Ext	Binary	-	Only as alarm	Overvoltage U>> TRIP
PTOV2_Str	Overvoltage U>> pickup	Ext	Binary	-	Only as alarm	Overvoltage U>> pickup
PTUF1_Op	Frequency 1 Under Range TRIP	Ext	Binary	-	Only as alarm	Frequency 1 Under Range TRIP
PTUF1_Str	Frequency 1 Under Range pickup	Ext	Binary	-	Only as alarm	Frequency 1 Under Range pickup
PTUF2_Op	Frequency 2 Under Range TRIP	Ext	Binary	-	Only as alarm	Frequency 2 Under Range TRIP
PTUF2_Str	Frequency 2 Under Range pickup	Ext	Binary	-	Only as alarm	Frequency 2 Under Range pickup
PTUV1_Op	Undervoltage U< TRIP	Ext	Binary	-	Only as alarm	Undervoltage U< TRIP
PTUV1_Str	Undervoltage U< pickup	Ext	Binary	-	Only as alarm	Undervoltage U< pickup
PTUV2_Op	Undervoltage U<< TRIP	Ext	Binary	-	Only as alarm	Undervoltage U<< TRIP
PTUV2_Str	Undervoltage U<< pickup	Ext	Binary	-	Only as alarm	Undervoltage U<< pickup
PVOC2_Op	Inadvert. Energ. Prot. TRIP	Ext	Binary	-	Only as alarm	Inadvert. Energ. Prot. TRIP
PVOC2_Str	Inadvert. Energ. Prot. pickup	Ext	Binary	-	Only as alarm	Inadvert. Energ. Prot. pickup
Pos01	Position Q01	Ext	DWord	-	Yes	Switch position Q01 0=Intermediate 1=Off 2=On 3=Bad

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
Pos1	Position Q1	Ext	DWord	-	Yes	Switch position Q1 0=Intermediate 1=Off 2=On 3=Bad
Pos2	Position Q2	Ext	DWord	-	Yes	Switch position Q2 0=Intermediate 1=Off 2=On 3=Bad
Pos8	Position Q8	Ext	DWord	-	Yes	Switch position Q8 0=Intermediate 1=Off 2=On 3=Bad
Pos02	Position Q02	Ext	DWord	-	Yes	Switch position Q02 0=Intermediate 1=Off 2=On 3=Bad
Q01_EnaCls	Enable Q0 Close command	Ext	Binary	-	Yes	Interlocking: Enable Q01 Close command
Q01_EnaOpn	Enable Q0 Open command	Ext	Binary	-	Yes	Interlocking: Enable Q01 Open command
Q1_EnaCls	Enable Q1 Close command	Ext	Binary	-	Yes	Interlocking: Enable Q1 Close command
Q1_EnaOpn	Enable Q1 Open command	Ext	Binary	-	Yes	Interlocking: Enable Q1 Open command
Q2_EnaCls	Enable Q2 Close command	Ext	Binary	-	Yes	Interlocking: Enable Q2 Close command
Q2_EnaOpn	Enable Q2 Open command	Ext	Binary	-	Yes	Interlocking: Enable Q2 Open command
Q8_EnaCls	Enable Q8 Close command	Ext	Binary	-	Yes	Interlocking: Enable Q8 Close command
Q8_EnaOpn	Enable Q8 Open command	Ext	Binary	-	Yes	Interlocking: Enable Q8 Open command
Q02_EnaCls	Enable Q02 Close command	Ext	Binary	-	Yes	Interlocking: Enable Q02 Close command
Q02_EnaOpn	Enable Q02 Open command	Ext	Binary	-	Yes	Interlocking: Enable Q02 Open command

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
SWSTATUS0	Status of Q0	Ext	BYTE	-	Yes	Feedback of Q0 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
SWSTATUS1	Status of Q1	Ext	BYTE	-	Yes	Feedback of Q1 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
SWSTATUS2	Status of Q2	Ext	BYTE	-	Yes	Feedback of Q2 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
SWSTATUS8	Status of Q8	Ext	BYTE	-	Yes	Feedback of Q8 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error

Abbreviation	Name	Type	Data Type	De-fault Value	Operator Visible	Description
SWSTATUS9	Status of Q9	Ext	BYTE	-	Yes	Feedback of Q9 command 0=Data valid 1=Null server 2=Not connected 3=No connection 4=Flow controlled 5=Max services exceeded 6=No read data 7=Memory error 8=Encoding error 9=Bad transaction 10= No transactions 11=Connection closed 12=Timed out 13=Connection state error 14=Application error 15=Parameter error 16=Confirmed error 17=Reject error 100=Object invalidated 101=Hardware fault 102=Temporarily unavailable 103=Object access denied 104=Object undefined 105=Invalid address 106=Type unsupported 107=Type inconsistent 108=Object attribute inconsistent 109=Object access unsupported 110=Non existent 111=Value invalid 254=Convert error
P#Value	Power	Ext	FLOAT	-	Yes	Power
S#Value	Scheinleistung - Apparent Power	Ext	FLOAT	-	Yes	Scheinleistung - Apparent Power
Q#Value	Reactive Power	Ext	FLOAT	-	Yes	Reactive Power
U#Value	neutral Voltage	Ext	FLOAT	-	Yes	neutral Voltage
F#Value	Frequency F	Ext	FLOAT	-	Yes	Frequency
PF#Value	cos phi - Power Factor	Ext	FLOAT	-	Yes	cos phi - Power Factor
I_A#Value	Current Phase A	Ext	FLOAT	-	Yes	Current Phase A
I_B#Value	Current Phase B	Ext	FLOAT	-	Yes	Current Phase B

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
I_C#Value	Current Phase C	Ext	FLOAT	-	Yes	Current Phase C
U_A#Value	Voltage Phase A	Ext	FLOAT	-	Yes	Voltage Phase A
U_AB#Value	Voltage A-B	Ext	FLOAT	-	Yes	Voltage A-B
U_B#Value	Voltage Phase B	Ext	FLOAT	-	Yes	Voltage Phase B
U_BC#Value	Voltage B-C	Ext	FLOAT	-	Yes	Voltage B-C
U_C#Value	Voltage Phase C	Ext	FLOAT	-	Yes	Voltage Phase C
U_CA#Value	Voltage C-A	Ext	FLOAT	-	Yes	Voltage C-A
WpForward#Value	real energy supply	Ext	SDWord	-	Yes	real energy supply
WpReverse#Value	real energy demand	Ext	SDWord	-	Yes	real energy demand
WqForward#Value	reactive energy supply	Ext	SDWord	-	Yes	reactive energy supply
WqReverse#Value	reactive energy demand	Ext	SDWord	-	Yes	reactive energy demand
GndFdir	Ground Fault direction	Ext	DWord	-	No	Ground Fault direction

3.18.2 PC_FEEDER_2CB-outputs

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
RCmd0	Command Q0	Ext	Binary	-	Yes	Switch Q0 command 0=Open 1=Close
RCmd1	Command Q1	Ext	Binary	-	Yes	Switch Q1 command 0=Open 1=Close
RCmd2	Command Q2	Ext	Binary	-	Yes	Switch Q2 command 0=Open 1=Close
RCmd8	Command Q8	Ext	Binary	-	Yes	Switch Q8 command 0=Open 1=Close
RCmd9	Command Q9	Ext	Binary	-	Yes	Switch Q9 command 0=Open 1=Close
DA0	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA1	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
DA2	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA8	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm
DA9	Discrepancy Alarm	Int	Binary	-	Only as alarm	Triggers Discrepancy Alarm

3.18.3 PC_FEEDER_2CB Internal Variables

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OpTmAlarm	Internal message bit	Int	Binary	-		Internal message bit
OpTmAlarmLimit	Alarm limit operating hours	Int	DWord	-		Alarm limit operating hours
OpTmWarning	Internal message bit	Int	Binary	-		Internal message bit
OpTmWarnLimit	Warning limit operating hours	Int	DWord	-		Warning limit operating hours
SwCountAlarm	Internal message bit	Int	Binary	-		Internal message bit
SwCountAlarmLimit	Alarm limit switch count	Int	DWord	-		Alarm limit switch count
SwCountWarning	Internal message bit	Int	Binary	-		Internal message bit
SwCountWarnLimit	Warning limit switch count	Int	DWord	-		Warning limit switch count
ST_Worst	Reserved for internal use	Int	BYTE	-		Reserved for internal use
Status1	Reserved for internal use	Int	DWord	-		Reserved for internal use

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Status5	Bitmask to hide fields in the Face-plate	Int	DWord	-		Bitmask to hide fields in the Faceplate
Cmd0	Com-mand Q0	Int	BYTE	-	Yes	Switch Q01 command used in faceplate to trigger RCmd0 and generate some alarms on error. 0=Open 1=Close
Cmd1	Com-mand Q1	Int	BYTE	-	Yes	Switch Q1 command used in faceplate for trigger RCmd1 and generate some alarms on error. 0=Open 1=Close
Cmd2	Com-mand Q2	Int	BYTE	-	Yes	Switch Q2 command used in faceplate for trigger RCmd2 and generate some alarms on error. 0=Open 1=Close
Cmd8	Com-mand Q8	Int	BYTE	-	Yes	Switch Q8 command used in faceplate for trigger RCmd8 and generate some alarms on error. 0=Open 1=Close
Cmd9	Com-mand Q9	Int	BYTE	-	Yes	Switch **Q02** command used in faceplate to trigger RCmd9 and generate some alarms on error. 0=Open 1=Close
CmdSense0	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense1	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense2	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense8	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
CmdSense9	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
OCCUPIED	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut0	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut1	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut2	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut8	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
TimingOut9	Re-served for inter-nal use	Int	Binary	-	No	Reserved for internal use
Q01_DESC	Text Q0	Int	String	CB	Yes	Text for Q01 on Faceplate
Q1_DESC	Text Q1	Int	String	DS	Yes	Text for Q1 on Faceplate
Q2_DESC	Text Q2	Int	String	Q2	Yes	Text for Q2 on Faceplate
Q8_DESC	Text Q8	Int	String	ES	Yes	Text for Q8 on Faceplate
Q02_DESC	Text Q9	Int	String	Q9	Yes	Text for Q02 on Faceplate
VisuCo-des#Field_01_Code		Int	String		No	Visualization
VisuCo-des#Field_02_Code		Int	String		No	Visualization
VisuCo-des#Field_03_Code		Int	String		No	Visualization
VisuCo-des#Field_04_Code		Int	String		No	Visualization
VisuCo-des#Field_05_Code		Int	String		No	Visualization
VisuCo-des#Field_06_Code		Int	String		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
VisuCo-des#Field_07_Code		Int	String		No	Visualization
VisuCo-des#Field_08_Code		Int	String		No	Visualization
VisuCo-des#Field_09_Code		Int	String		No	Visualization
VisuCo-des#Field_10_Code		Int	String		No	Visualization
VisuDesc#Field-Descriptor_01		Int	String		No	Visualization
VisuDesc#Field-Descriptor_02		Int	String		No	Visualization
VisuDesc#Field-Descriptor_03		Int	String		No	Visualization
VisuDesc#Field-Descriptor_04		Int	String		No	Visualization
VisuDesc#Field-Descriptor_05		Int	String		No	Visualization
VisuDesc#Field-Descriptor_06		Int	String		No	Visualization
Visu-Desc#Q01_DESC		Int	String		No	Visualization
Visu-Desc#Q1_DESC		Int	String		No	Visualization
Visu-Desc#Q2_DESC		Int	String		No	Visualization
Visu-Desc#Q8_DESC		Int	String		No	Visualization
Visu-Desc#Q02_DESC		Int	String		No	Visualization
Visu-Fields#Q01_Field		Int	BYTE		No	Visualization
Visu-Fields#Q01_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q1_Field		Int	BYTE		No	Visualization
Visu-Fields#Q1_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q2_Field		Int	BYTE		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Visu-Fields#Q2_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q8_Field		Int	BYTE		No	Visualization
Visu-Fields#Q8_Sub-Field		Int	BYTE		No	Visualization
Visu-Fields#Q02_Field		Int	BYTE		No	Visualization
Visu-Fields#Q02_Sub-Field		Int	BYTE		No	Visualization
VisuMisc#Cus-tomFaceplate		Int	String		No	Visualization
Visu-Misc#Unit_Power		Int	String		No	Visualization
VisuMisc#Unit_Q		Int	String		No	Visualization
VisuMisc#Unit_S		Int	String		No	Visualization
Visu-Misc#Unit_Volt-age		Int	String		No	Visualization
Visu-Misc#Unit_Cur-rent		Int	String		No	Visualization
VisuS-tates#Q01_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q01_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q1_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q1_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q2_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q2_Text-Closed		Int	String		No	Visualization
VisuS-tates#Q8_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q8_Text-Closed		Int	String		No	Visualization

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
VisuS-tates#Q02_Tex-tOpen		Int	String		No	Visualization
VisuS-tates#Q02_Text-Closed		Int	String		No	Visualization
Q01_Btn_EN		Int	BIT		No	Visualization
Q1_Btn_EN		Int	BIT		No	Visualization
Q2_Btn_EN		Int	BIT		No	Visualization
Q8_Btn_EN		Int	BIT		No	Visualization
Q02_Btn_EN		Int	BIT		No	Visualization
Visu-Misc#Ilck_Disp		Int	BIT		No	Visualization
#TextPermanent		Int	TEXT16		No	Visualization
#StatusPerma-nent		Int	DWORD		No	Visualization
Pos01_Throw-Alarm Message		Int	BIT		No	Internal variable for alarm handling
Pos02_Throw-Alarm Message		Int	BIT		No	Internal variable for alarm handling
Pos1_Throw-Alarm Message		Int	BIT		No	Internal variable for alarm handling
Pos2_Throw-Alarm Message		Int	BIT		No	Internal variable for alarm handling
Pos8_Throw-Alarm Message		Int	BIT		No	Internal variable for alarm handling
Pos01_Internal		Int	DWORD		No	Internal variable for position handling
Pos02_Internal		Int	DWORD		No	Internal variable for position handling
Pos1_Internal		Int	DWORD		No	Internal variable for position handling
Pos2_Internal		Int	DWORD		No	Internal variable for position handling
Pos8_Internal		Int	DWORD		No	Internal variable for position handling
TrackingMode		Int	BIT		No	Tracking mode handling
Q01_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q02_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q1_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q2_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
Q8_Tracking-Mode		Int	BIT		No	Internal variable for TM handling
TrackingMode_ Btn_EN		Int	BIT		No	Internal variable for TM handling
TrackingMode #Op_Level		Int	BYTE		No	Internal variable for TM handling

Abbreviation	Name	Type	Data Type	Default Value	Operator Visible	Description
Pos01_Enable-Bad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos02_Enable-Bad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos1_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos2_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
Pos8_EnableBad PosAlarm		Int	BIT		No	Internal variable for alarm handling
CB_BadPosAlarm-Delay		Int	BYTE		No	Internal variable for alarm handling
Pos01_Memory		Int	DWORD		No	Internal variable for position handling
Pos02_Memory		Int	DWORD		No	Internal variable for position handling
Pos1_Memory		Int	DWORD		No	Internal variable for position handling
Pos2_Memory		Int	DWORD		No	Internal variable for position handling
Pos8_Memory		Int	DWORD		No	Internal variable for position handling
NoticePositions		Int	BIT		No	Internal variable for position handling
NoticeConnect		Int	BIT		No	Internal variable for connection handling
Q01_Opn#Op_Le vel		Int	BYTE		No	Internal variable for operator control enable han-dling
Q02_Opn#Op_Le vel		Int	BYTE		No	Internal variable for operator control enable han-dling
Q1_Opn#Op_Lev el		Int	BYTE		No	Internal variable for operator control enable han-dling
Q2_Opn#Op_Lev el		Int	BYTE		No	Internal variable for operator control enable han-dling
Q8_Opn#Op_Lev el		Int	BYTE		No	Internal variable for operator control enable han-dling
Q01_Cls#Op_Lev el		Int	BYTE		No	Internal variable for operator control enable han-dling
Q02_Cls#Op_Lev el		Int	BYTE		No	Internal variable for operator control enable han-dling
Q1_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable han-dling
Q2_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable han-dling
Q8_Cls#Op_Level		Int	BYTE		No	Internal variable for operator control enable han-dling
BatchName		Int	TEXTREF		No	Batch message text

3.18.4 PC_FEEDER_2CB alarms

The following alarms are defined for the PC_FEEDER.

Name	Class	Type	Configured by Default	Condition Description
Alarm summary event	Warning	Warning High	Yes	Warning = 1
Error summary alarm	Alarm	Alarm High	Yes	Error = 1
Relay PICKUP	Warning	Warning High	Yes	PU_Relay = 1
Relay GENERAL TRIP command	Alarm	Alarm High	Yes	TR_Relay = 1
51 Overcurrent picked up	Warning	Warning High	Yes	PTOC1_Str = 1
51 Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC1_Op = 1
51N Overcurrent picked up	Warning	Warning High	Yes	PTOC2_Str = 1
51N Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC2_Op = 1
67-TOC Overcurrent picked up	Warning	Warning High	Yes	PTOC3_Str = 1
67-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC3_Op = 1
67N-TOC Overcurrent picked up	Warning	Warning High	Yes	PTOC4_Str = 1
67N-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC4_Op = 1
46-TOC Overcurrent picked up	Warning	Warning High	Yes	PTOC5_Str = 1
46-TOC Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC5_Op = 1
50-1 Overcurrent I > picked up	Warning	Warning High	Yes	PTOC6_Str = 1
50-1 Overcurrent I > TRIP	Alarm	Alarm High	Yes	PTOC6_Op = 1
50-2 Overcurrent I >> picked up	Warning	Warning High	Yes	PTOC7_Str = 1
50-2 Overcurrent I >>TRIP	Alarm	Alarm High	Yes	PTOC7_Op = 1
50N-1 Overcurrent IE > picked up	Warning	Warning High	Yes	PTOC8_Str = 1
50N-1 Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PTOC8_Op = 1
50N-2 Overcurrent IE >> picked up	Warning	Warning High	Yes	PTOC9_Str = 1
50N-2 Overcurrent IE >> TRIP	Alarm	Alarm High	Yes	PTOC9_Op = 1
67-1 Directional Overcurrent I > picked up	Warning	Warning High	Yes	PTOC10_Str = 1
67-1 Directional Overcurrent I > TRIP	Alarm	Alarm High	Yes	PTOC10_Op = 1
67-2 Directional Overcurrent I >> picked up	Warning	Warning High	Yes	PTOC11_Str = 1

Name	Class	Type	Configured by Default	Condition Description
67-2 Directional Overcurrent I >>TRIP	Alarm	Alarm High	Yes	PTOC11_Op = 1
67N-1 Directional Overcurrent IE > picked up	Warning	Warning High	Yes	PTOC12_Str = 1
67N-1 Directional Overcurrent IE > TRIP	Alarm	Alarm High	Yes	PTOC12_Op = 1
67N-2 Directional Overcurrent IE >> picked up	Warning	Warning High	Yes	PTOC13_Str = 1
67N-2 Directional Overcurrent IE >>TRIP	Alarm	Alarm High	Yes	PTOC13_Op = 1
50-3 Overcurrent picked up	Warning	Warning High	Yes	PTOC18_Str = 1
50-3 Overcurrent TRIP	Alarm	Alarm High	Yes	PTOC18_Op = 1
DiscrepancyAlarm Q01	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpected feedback will trigger this alarm. DA0 = 1
BadCheckback Q01	PLC Process Control Message	Error	Yes	STATUS0 = 1
DiscrepancyAlarm Q1	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpected feedback will trigger this alarm. DA1 = 1
BadCheckback Q1	PLC Process Control Message	Error	Yes	STATUS1 = 1
DiscrepancyAlarm Q2	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpected feedback will trigger this alarm. DA2 = 1
BadCheckback Q2	PLC Process Control Message	Error	Yes	STATUS2 = 1
DiscrepancyAlarm Q8	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpected feedback will trigger this alarm. DA8 = 1
BadCheckback Q8	PLC Process Control Message	Error	Yes	STATUS8 = 1
DiscrepancyAlarm Q02	Alarm	Alarm High	Yes	After triggering a switch command runtime will check for feedback within configured Timeout time. An unexpected feedback will trigger this alarm. DA9 = 1
BadCheckback Q02	PLC Process Control Message	Error	Yes	STATUS9 = 1
MaintenanceWarning-OperationTime	Alarm	Alarm High	Yes	OpTmWarning = 1
MaintenanceAlarm-OperationTime	Warning	Warning High	Yes	OpTmAlarm = 1

Name	Class	Type	Configured by Default	Condition Description
MaintenanceWarning-SwitchCount	Alarm	Alarm High	Yes	SwCountWarning = 1
MaintenanceAlarm-SwitchCount	Warning	Warning High	Yes	SwCountAlarm = 1
Connection Error	PLC Proc-ess Control Message	Error	Yes	QCONNERR = 1
Breaker failure picked up	Warning	Warning High	Yes	RBRF1_Str = 1
Breaker failure TRIP T1	Alarm	Alarm High	Yes	RBRF1_OpEx = 1
Breaker failure TRIP T2	Alarm	Alarm High	Yes	RBRF1_OpIn = 1
Differential protection IDIFF> TRIP	Alarm	Alarm High	Yes	PDIF1_Op = 1
Differential protection IDIFF> picked up	Warning	Warning High	Yes	PDIF1_Str = 1
Differential protection IDIFF>> TRIP	Alarm	Alarm High	Yes	PDIF2_Op = 1
Differential protection IDIFF>> picked up	Warning	Warning High	Yes	PDIF2_Str = 1
Impedance protection Z1 picked up	Warning	Warning High	Yes	PDIS1_Str = 1
Impedance protection Z2 picked up	Warning	Warning High	Yes	PDIS2_Str = 1
Impedance protection Z1B picked up	Warning	Warning High	Yes	PDIS3_Str = 1
Impedance protection general picked up	Warning	Warning High	Yes	PDIS4_Str = 1
Impedance protection Z1 TRIP	Alarm	Alarm High	Yes	PDIS1_Op = 1
Impedance protection Z2 TRIP	Alarm	Alarm High	Yes	PDIS2_Op = 1
Impedance protection Z1B TRIP	Alarm	Alarm High	Yes	PDIS3_Op = 1
Impedance protection general TRIP	Alarm	Alarm High	Yes	PDIS4_Op = 1
Underexcitation protec-tion Char. 1 TRIP	Alarm	Alarm High	Yes	PDUP1_Op = 1
Underexcitation protec-tion Char. 2 TRIP	Alarm	Alarm High	Yes	PDUP2_Op = 1
Underexcitation protec-tion Char. 3 TRIP	Alarm	Alarm High	Yes	PDUP3_Op = 1
Overvoltage U> TRIP	Alarm	Alarm High	Yes	PTOV1_Op = 1
Overvoltage U> picked up	Warning	Warning High	Yes	PTOV1_Str = 1
Overvoltage U>> TRIP	Alarm	Alarm High	Yes	PTOV2_Op = 1
Overvoltage U>> picked up	Warning	Warning High	Yes	PTOV2_Str = 1

Name	Class	Type	Configured by Default	Condition Description
F1 TRIP	Alarm	Alarm High	Yes	PTUF1_Op = 1
F1 picked up	Warning	Warning High	Yes	PTUF1_Str = 1
F2 TRIP	Alarm	Alarm High	Yes	PTUF2_Op = 1
F2 picked up	Warning	Warning High	Yes	PTUF2_Str = 1
Undervoltage U< TRIP	Alarm	Alarm High	Yes	PTUV1_Op = 1
Undervoltage U< picked up	Warning	Warning High	Yes	PTUV1_Str = 1
Undervoltage U<< TRIP	Alarm	Alarm High	Yes	PTUV2_Op = 1
Undervoltage U<< picked up	Warning	Warning High	Yes	PTUV2_Str = 1
Random energy protection TRIP	Alarm	Alarm High	Yes	PVOC2_Op = 1
Random energy protection picked up	Warning	Warning High	Yes	PVOC2_Str = 1
Reverse power: TRIP	Alarm	Alarm High	Yes	PDOP1_Op = 1
External Trip 1 TRIP	Alarm	Alarm High	Yes	GAPC1_Op = 1
External Trip 1 picked up	Warning	Warning High	Yes	GAPC1_Str = 1
Overvoltage U> TRIP	Alarm	Alarm High	Yes	PTOV1_Op = 1
Overvoltage U> picked up	Warning	Warning High	Yes	PTOV1_Str = 1
Overvoltage U>> TRIP	Alarm	Alarm High	Yes	PTOV2_Op = 1
Overvoltage U>> picked up	Warning	Warning High	Yes	PTOV2_Str = 1
F1 TRIP	Alarm	Alarm High	Yes	PTUF1_Op = 1
F1 picked up	Warning	Warning High	Yes	PTUF1_Str = 1
F2 TRIP	Alarm	Alarm High	Yes	PTUF2_Op = 1
F2 picked up	Warning	Warning High	Yes	PTUF2_Str = 1
Undervoltage U< TRIP	Alarm	Alarm High	Yes	PTUV1_Op = 1
Undervoltage U< picked up	Warning	Warning High	Yes	PTUV1_Str = 1
Undervoltage U<< TRIP	Alarm	Alarm High	Yes	PTUV2_Op = 1
Undervoltage U<< picked up	Warning	Warning High	Yes	PTUV2_Str = 1
Random energy protection TRIP	Alarm	Alarm High	Yes	PVOC2_Op = 1
Random energy protection picked up	Warning	Warning High	Yes	PVOC2_Str = 1
Reverse power: TRIP	Alarm	Alarm High	Yes	PDOP1_Op = 1
External Trip 1 TRIP	Alarm	Alarm High	Yes	GAPC1_Op = 1
External Trip 1 picked up	Warning	Warning High	Yes	GAPC1_Str = 1
Q01 switch position is invalid	Alarm	Alarm High	Yes	Q01PosError = 1
Q02 switch position is invalid	Alarm	Alarm High	Yes	Q02PosError = 1

Name	Class	Type	Configured by Default	Condition Description
Q1 switch position is in-valid	Alarm	Alarm High	Yes	Q1PosError = 1
Q2 switch position is in-valid	Alarm	Alarm High	Yes	Q2PosError = 1
Q8 switch position is in-valid	Alarm	Alarm High	Yes	Q8PosError = 1
Q01 Circuit breaker closed	Status	Status mes-sage	Yes	Q01StatusClosed = 1
Q02 Circuit breaker closed	Status	Status mes-sage	Yes	Q02StatusClosed = 1
Q1 Disconnector closed	Status	Status mes-sage	Yes	Q1StatusClosed = 1
Q2 Switch closed	Status	Status mes-sage	Yes	Q2StatusClosed = 1
Q8 Earthing device closed	Status	Status mes-sage	Yes	Q8StatusClosed = 1
Q01 Circuit breaker open	Status	Status mes-sage	Yes	Q01StatusOpened = 1
Q02 Circuit breaker open	Status	Status mes-sage	Yes	Q02StatusOpened = 1
Q1 Disconnector open	Status	Status mes-sage	Yes	Q1StatusOpened = 1
Q2 Switch open	Status	Status mes-sage	Yes	Q2StatusOpened = 1
Q8 Earthing device open	Status	Status mes-sage	Yes	Q8StatusOpened = 1
Interlock: Enable Q01 Close	Status	Status mes-sage	Yes	Q01EnableClosed = 1
Interlock: Enable Q02 Close	Status	Status mes-sage	Yes	Q02EnableClosed = 1
Interlock: Enable Q1 Close	Status	Status mes-sage	Yes	Q1EnableClosed = 1
Interlock: Enable Q2 Close	Status	Status mes-sage	Yes	Q2EnableClosed = 1
Interlock: Enable Q8 Close	Status	Status mes-sage	Yes	Q8EnableClosed = 1
Interlock: Enable Q01 Open	Status	Status mes-sage	Yes	Q01EnableOpen = 1
Interlock: Enable Q02 Open	Status	Status mes-sage	Yes	Q02EnableOpen = 1
Interlock: Enable Q1 Open	Status	Status mes-sage	Yes	Q1EnableOpen = 1
Interlock: Enable Q2 Open	Status	Status mes-sage	Yes	Q2EnableOpen = 1
Interlock: Enable Q8 Open	Status	Status mes-sage	Yes	Q8EnableOpen = 1
Local operation	Alarm	Alarm High	Yes	LocalOperation = 1

The message type, class, priority and alarm text can be changed on a per-instance basis.

To change these, in DBA, select an PC_FEEDER object instance from the Plant View and select the **Alarm Messages** tab of the Attribute Edit window in the upper right hand quadrant of the screen. The "Enabled" column of this window can be used to permanently enable or disable any alarm.

Note

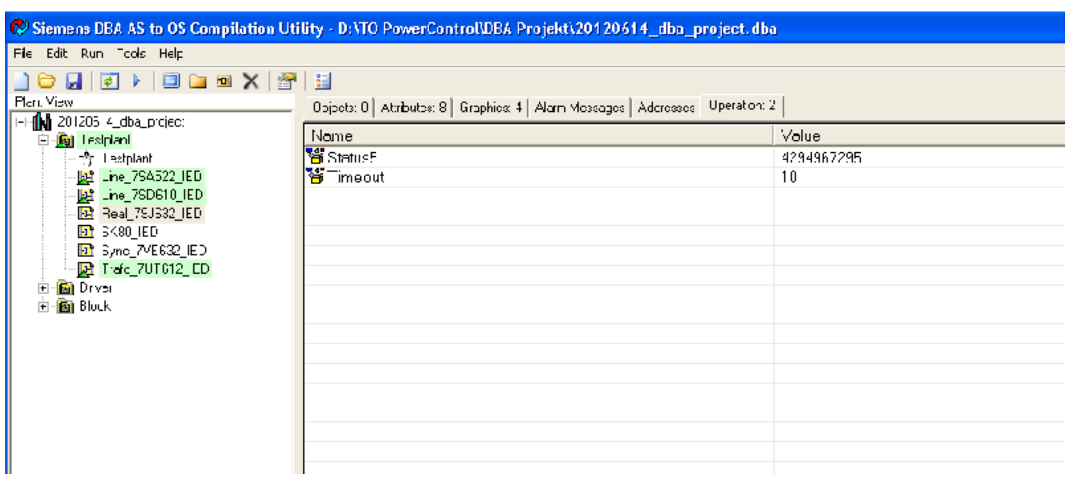
If an IEC61850 tag for trigger an alarm is not found in ICD file the alarm message will not be created.

3.18.5 PC_FEEDER_2CB Operational Parameters

Configuring operational characteristics

The operational parameters of a PC_FEEDER_2CB can be configured in DBA.

1. Select a PC_FEEDER_2CB object instance from the Plant View.
2. Select the "Operations" tab of the "Edit attributes" window in the upper right hand quadrant of the screen.



Timeout

Timeout values are specified in seconds. Any integer value can be specified. If a timeout has been configured and if the feedback does not correspond to the value of the expected feedback within the timeout period, a discrepancy alarm is generated.

Status5

The Status5 Tag is a bitmask for hiding different values in the faceplate (e.g. if they are not available in the device). Every bit represents a value or functionality in the faceplate. Please also refer to the PC TO Engineering manual. The default value is 0xFFFFFFFF, which means 4294967295. All values in the faceplate are displayed by default.

Visualization

The visualization of the faceplate is configured the "Graphic" group. You can find details on this in the documentation "PCS 7 PowerControl - OS - Option - Technological Objects".

3.18.6 PC_FEEDER_2CB faceplate

There are 5 different views available for PC_FEEDER_2CB:

3.18.6.1 PC_FEEDER_2CB faceplate: Standard Pane

The view of Standard Pane shows the status of device, important measurements and allows the operator to operate the switches.

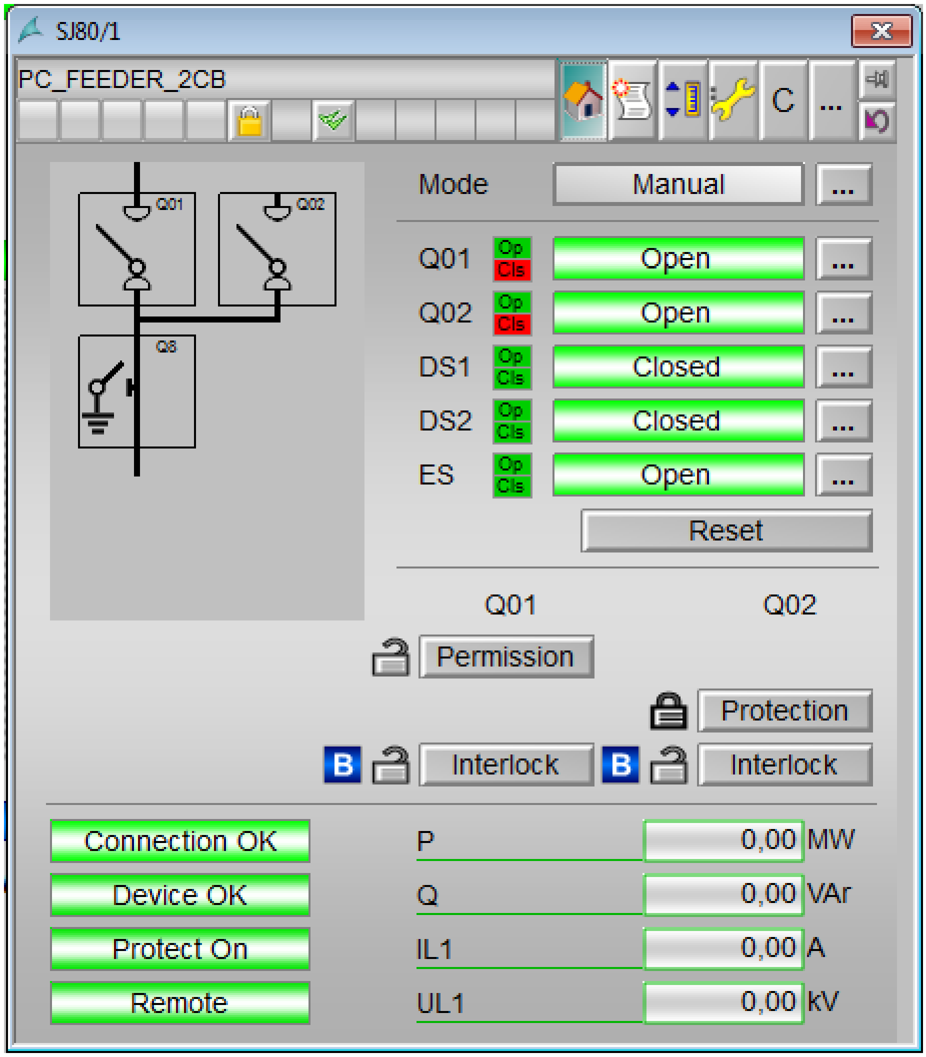


Figure 3-3 Power_Control_image_feeder_2CB_standard

Buttons

Note

Level 5 permissions are required to be able to press any buttons in this view. The number of buttons are depending on the configuration.

Entry Field	Action	Description
Q01	Cmd0=0/1	Switch Q01 command. 0=Open 1=Close
Q1	Cmd1=0/1	Switch Q1 command. 0=Open 1=Close
Q2	Cmd2=0/1	Switch Q2 command. 0=Open 1=Close
Q8	Cmd8=0/1	Switch Q8 command. 0=Open 1=Close
Q02	Cmd9=0/1	Switch Q02 command. 0=Open 1=Close

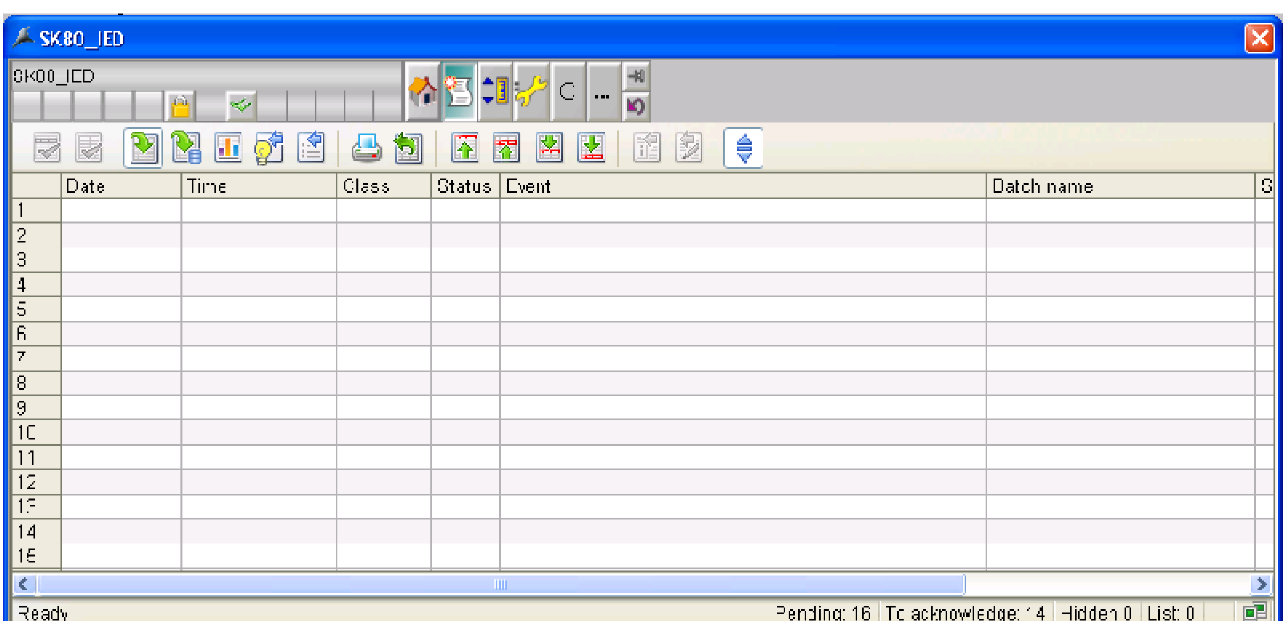
Indicators

Indicator	Meaning	Tag	Description	Note
Connect Status	Communication Status of the IED via ethernet.	QCONERR0	QCONERR0=0 (Connection OK) – GREEN QCONERR0=1 (Loss of Com) – RED	
Device Status 1	Health of IED	Dev_OK	Dev_OK=1 (Device Ok) – GREEN Dev_OK=2 (Device Warn.) – YELLOW Dev_OK=3 (Device Alarm) – RED	
Device Status 2	Behavior of IED	Beh	Beh=1 (Protect On) – GREEN Beh=2 (Protect blocked) – RED Beh=3 (Protect test) – YELLOW Beh=4 (Protect test/blkd) – RED Beh=5 (Protect Off) – RED	
Device Status 3	Local/Remote	Loc	Loc = 1: Local Loc = 0: Remote	
Switch Q01	Switch position	Pos01	Pos01 =0 (Intermed.) – RED Pos01 =1 (Open) – GREEN Pos01 =2 (Close) – GREEN Pos01 =3 (Bad) – RED Pos01 =4 (Error) – RED	
Switch Q1	Switch position	Pos1	Pos1 =0 (Intermed.) – RED Pos1 =1 (Open) – GREEN Pos1 =2 (Close) – GREEN Pos1 =3 (Bad) – RED Pos1 =4 (Error) – RED	

Indicator	Meaning	Tag	Description	Note
Switch Q2	Switch position	Pos2	Pos2 =0 (Intermed.) – RED Pos2 =1 (Open) – GREEN Pos2 =2 (Close) – GREEN Pos2 =3 (Bad) – RED Pos2 =4 (Error) – RED	
Switch Q8	Switch position	Pos8	Pos8 =0 (Intermed.) – RED Pos8 =1 (Open) – GREEN Pos8 =2 (Close) – GREEN Pos8 =3 (Bad) – RED Pos8 =4 (Error) – RED	
Switch Q02	Switch position	Pos02	Pos02 =0 (Intermed.) – RED Pos02 =1 (Open) – GREEN Pos02 =2 (Close) – GREEN Pos02 =3 (Bad) – RED Pos02 = 4 (Error) – RED	
P	Power	P#Value	Power	
Q	Reactive Power	Q#Value	Reactive Power	
IL1	Current L1	I_A#Value	Current L1	
UL1	Voltage L1-Earth	U_A#Value	Voltage L1-Earth	

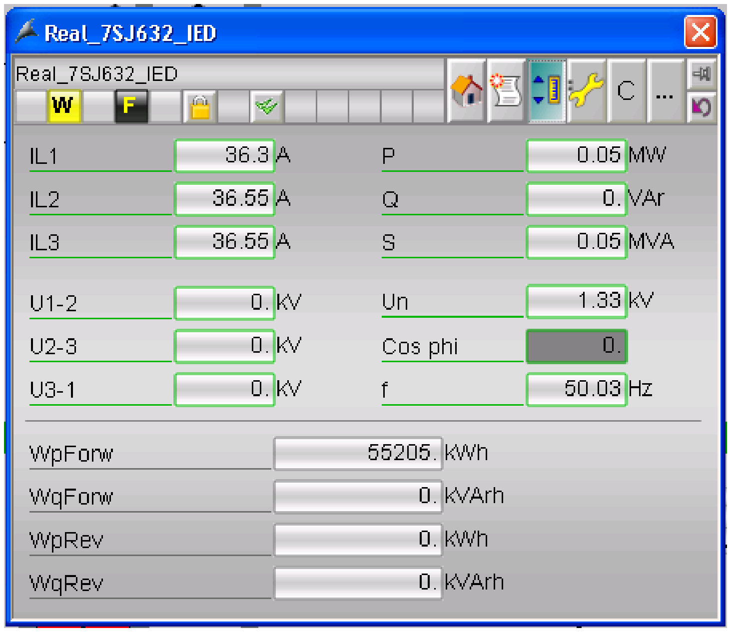
3.18.6.2 PC_FEEDER_2CB faceplate: Message view

This panel shows each of the active alarms that are active for the IED.



3.18.6.3 PC_FEEDER_2CB faceplate: Measured value window

The Measurement Pane shows the measured values of IED.



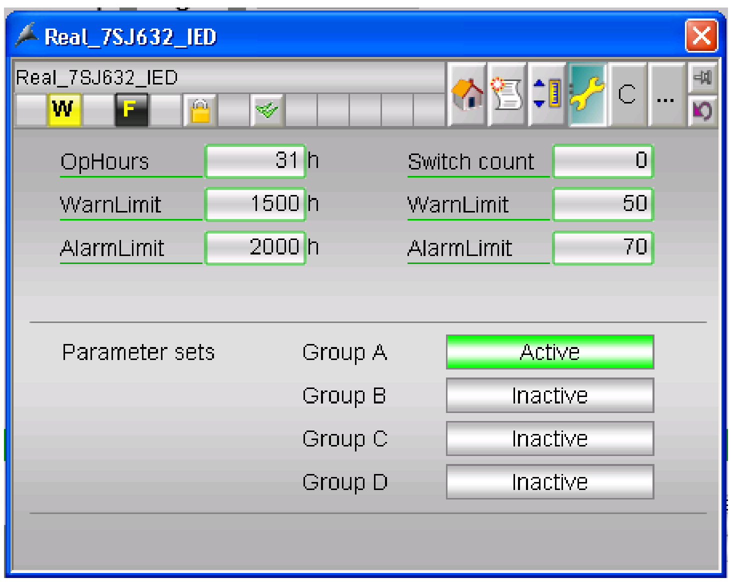
Indicators

Indicator	Meaning	Tag	Description	Note
IL1	Current L1	I_A#Value	Current L1	
IL2	Current L2	I_B#Value	Current L2	
IL3	Current L3	I_C#Value	Current L3	
U1-2	Voltage L1-L2	U_AB#Val-ue	Voltage L1-L2	
U2-3	Voltage L2-L3	U_BC#Val-ue	Voltage L2-L3	
U3-1	Voltage L3-L1	U_CA#Val-ue	Voltage L3-L1	
P	Power	P#Value	Power	
Q	Reactive Power	Q#Value	Reactive Power	
S	Apparent Power	S#Value	Apparent Power	
Un	Neutral Voltage	U#Value	Neutral Voltage	
Cos phi	Power Factor	PF#Value	Power Factor	
F	Frequency	F#Value	Frequency	
WpForw	real energy supply	WpFor-ward#Val-ue	real energy supply	
WqForw	real energy demand	WqFor-ward#Val-ue	real energy demand	

Indicator	Meaning	Tag	Description	Note
WpRev	reactive energy supply	WpReverse#Value	reactive energy supply	
WqRev	reactive energy demand	WqReverse#Value	reactive energy demand	

3.18.6.4 PC_FEEDER_2CB faceplate: Maintenance window

The Maintenance Pane shows the maintenance-related information.



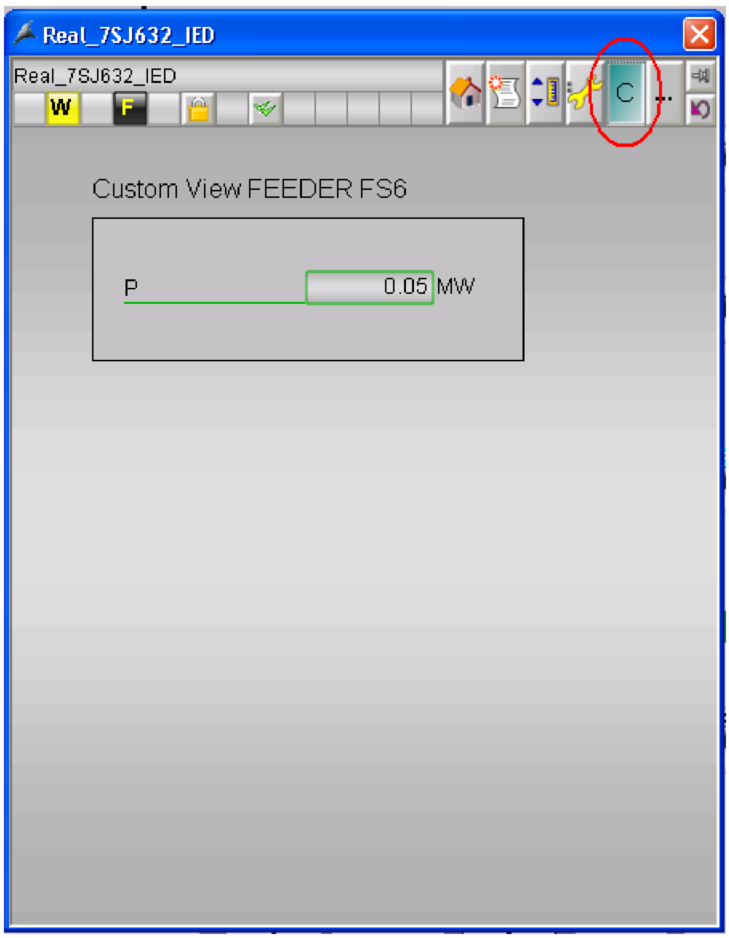
Indicators

Indicator	Meaning	Tag	Description	Note
OpHours	Operation hours	OpTm	Operation hours	
WarnLimit	Warning Limit Operation hours	OpTmWarnLimit	Warning Limit Operation hours	
AlarmLimit	Alarm Limit Operation hours	OpTmAlarmLimit	Alarm Limit Operation hours	
Switch count	Control count Q0	SwCount	Control count Q0	
WarnLimit	Warning Limit Switch Count	SwCountWarnLimit	Warning Limit Switch Count	
AlarmLimit	Alarm Limit Switch Count	SwCountAlarmLimit	Alarm Limit Switch Count	
Group A	Parameter Set A active	PARSET_A	Parameter Set A active	
Group B	Parameter Set B active	PARSET_B	Parameter Set B active	

Indicator	Meaning	Tag	Description	Note
Group C	Parameter Set C active	PARSET_C	Parameter Set C active	
Group D	Parameter Set D active	PARSET_D	Parameter Set D active	

3.18.6.5 PC_FEEDER_2CB faceplate: User-defined window

The Maintenance Faceplate can be adapted by he customer. Example:



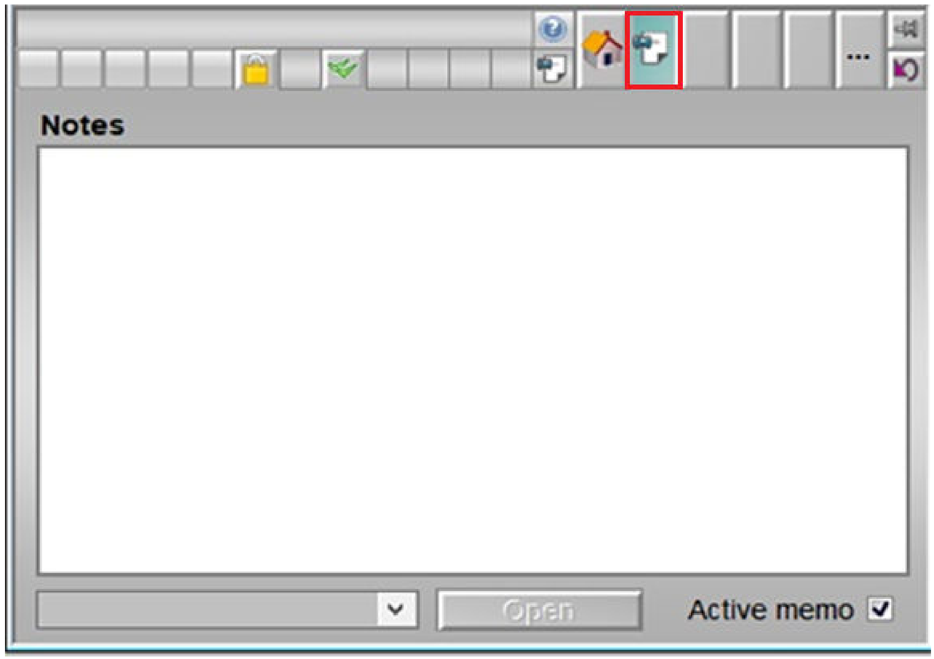
3.19 Faceplates

3.19.1 General faceplate functions

3.19.1.1 Memo view

The faceplates include the APL standard function "Memo view" (see APL documentation).

The view can be called in the toolbar with the memo button.



Diagnostic Objects

4

4.1 IEC 61850 IED

4.1.1 IEC 61850 IED inputs

IEC 61850 IED inputs

Type: **Ext**ernal or **Int**ernal or **Ind**irect

Visible for the operator: Visible in the faceplate for output to the operator, input by operator or both (**On / Off**); **Configu**ration value; value available for **Archive**

Abbreviation	Name	Type	Data type	De-fault	Visible for the oper-ator	Description
GS	GR status (master)	Ext	Binary	-	Yes	General query status of the master server 0=not started 1=GR Start requested 2=GR running 3=GR error 4= GR completed OK 5= GR ended incompletely
GS_S	GR status (standby)	Ext	Binary	-	Yes	General query status of the standby server
BLS	IED status lock	Ext	Binary	-	Yes	IED status lock 0=Not locked 1=Locked
RS	IED status	Ext	Byte	-	Yes	IED status (from server perspective) 0=OK 1=Error 2=Standby
RS_M	IED status (master)	Ext	Byte	-	Yes	IED status (from master server perspective) 0=OK 1=Error 2=Standby
RS_S	RS status (standby)	Ext	Byte	-	Yes	IED status (from standby server perspective) 0=OK 1=Error 2=Standby

TDS	Time Deviation Status	Ext	Binary	-	Yes	Status of the time deviation of the IED 0=OK 1=Time deviation error
TDV	Time Deviation Value	Ext	SDWord	-	Yes	Current value of the time deviation (seconds)
LTS	Last Timestamp	Ext	Double	-	Yes	Time stamp of the last received message frame
MR	Received message frames (master)	Ext	DWord	-	Yes	Total number of message frames sent by master server
MR_S	Received message frames (master)	Ext	DWord	-	Yes	Total number of message frames received by standby server
MRM_M	Messages Received Last Minute (master)	Ext	DWord	-	Yes	Total number of message frames received by master server in the last minute
MRM_S	Messages Received Last Minute (standby)	Ext	DWord	-	Yes	Total number of message frames received by the standby server in the last minute
MRR_M	Messages Received Without Reference (master)	Ext	DWord	-	Yes	Message frames without WinCC configuration received by the master server (with general request)
MRR_S	Messages Received Without Reference (standby)	Ext	DWord	-	Yes	Message frames without WinCC configuration received by the standby server (with general request)
MER_M	Messages Expected Without Reference (master)	Ext	DWord	-	Yes	Message frames without WinCC configuration that should have been received by the master server (with general request)
MER_S	Messages Expected Without Reference (standby)	Ext	DWord	-	Yes	Message frames without WinCC configuration that should have been received by the standby server (with general request)
MCD_M	Messages Received With Correct Datatype (master)	Ext	DWord	-	Yes	Message frames with correct station data type received by the master server (with general request)
MCD_S	Messages Received With Correct Datatype (standby)	Ext	DWord	-	Yes	Message frames with correct station data type received by the standby server (with general request)
MID_M	Messages Received With Incorrect Datatype (master)	Ext	DWord	-	Yes	Message frames with incorrect station data type received by the master server (with general request)
MID_S	Messages Received With Incorrect Datatype (standby)	Ext	DWord	-	Yes	Message frames with incorrect station data type received by the standby server (with general request)

TMI	Incorrectly transmitted messages (master)	Ext	DWord	-	Yes	Total number of message frames with transmission errors from the configured master server
TMI_S	Incorrectly transmitted messages (standby)	Ext	DWord	-	Yes	Total number of message frames with transmission errors from the configured standby server
TMC	Correctly transmitted messages (master)	Ext	DWord	-	Yes	Total number of message frames correctly transmitted by the configured master server
TMC_S	Correctly transmitted messages (master)	Ext	DWord	-	Yes	Total number of message frames correctly transmitted by the configured standby server
DSS	Data record status (master)	Ext	DWord	-	Yes	Data record configuration status (master) 0=All data records OK 1=1 or more data records configured incorrectly
DSS_S	Data record status (standby)	Ext	DWord	-	Yes	Data record configuration status (standby) 0=All data records OK 1=1 or more data records configured incorrectly
CS_M	Connection status (master)	Ext	Byte	-	Yes	Connection status (master) 0=Connection OK 1=Connection error
CS_S	Connection status (standby)	Ext	Byte	-	Yes	Connection status (standby) 0=Connection OK 1=Connection error
RFS	Read disturbance records status	Ext	Byte	-	Yes	Read disturbance records status 0 = Idle 1 = Copy process running 2 = Error

4.1.2 IEC 61850 IED outputs

IEC 61850 IED outputs

Abbreviation	Name	Type	Data type	Default Value	Visible for the operator	Description
GR X	GR Start	Ext	Binary	-	Yes	Start command general request See IEC specification for complete value range.
BL	IED lock	Ext	Binary	-	Yes	IED lock command

RMC	Reset Message Counter	Ext	Binary	-	Yes	Command for resetting the message frame counter
RFX	Start Read Files	Ext	Binary	-	Yes	Copy start command disturbance records

4.1.3 Internal IEC 61850 IED Tags

Internal Tags

Abbreviation	Name	Type	Data type	Default	Visible for the operator	Description
GR	GR Start	Ext	Binary	-	Yes	The "General request (GR)" button in the faceplate writes it to a tag whereby GRX is written to the IED
RTUTYPE	Reserved for internal assignment	Int	Byte	-	No	Reserved for internal assignment
USE_TS	Reserved for internal assignment	Int	Binary	-	No	Reserved for internal assignment
RF	Reserved for internal assignment	Int	Binary	-	No	Reserved for internal assignment
#TextPermanent		Int	TEXT16	-	No	Visualization
#StatusPermanent		Int	DWORD	-	No	Visualization

4.1.4 IEC 61850 IED Messages

Messages

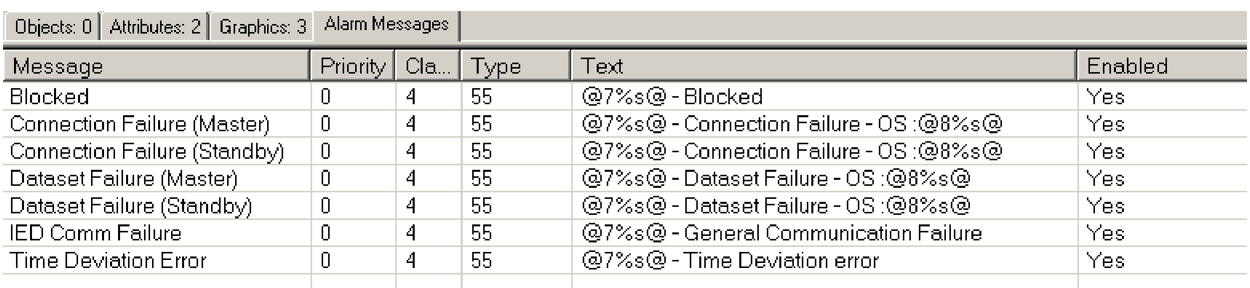
The following messages are set up for the IEC IED.

Name	Class	Type	Default	Condition description
IED communication error	Process control system	Error	Yes	IED communication error (general) [RS =1 (error)]
Connection Error (master)	Process control system	Error	Yes	IED connection error (master) [CS_M =1 (error)]
Connection error (standby)	Process control system	Error	Yes	IED connection error (standby) [CS_S =1 (error)]

Data record error (master)	Process control system	Error	Yes	IED data configuration error (master) [DS =1 (error)]
Data record error (stand-by)	Process control system	Error	Yes	IED data configuration error (standby) [DS_S =1 (error)]
Locked	Process control system	Error	Yes	IED communication locked [BLS=1 (locked]
Time Deviation Error	Process control system	Error	Yes	Time deviation error [TDS = 0 (time deviation error)]
Error during transfer of the disturbance records	Process control system	Error	Yes	Error during transfer of the disturbance records [RFS = 2]

Message frame type, class, priority and text can be changed for each instance.

To change it, select an IEC850 IED object instance in DBA in the plant view and then the **Messages** tab in the "Edit attribute" window at the top right on the screen. A message can be enabled or disabled permanently in this window with the "Enabled" column.

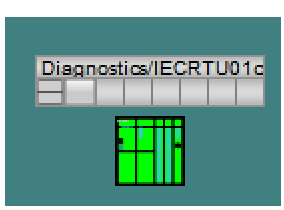

Objects: 0 | Attributes: 2 | Graphics: 3 | Alarm Messages

Message	Priority	Cla...	Type	Text	Enabled
Blocked	0	4	55	@7%s@ - Blocked	Yes
Connection Failure (Master)	0	4	55	@7%s@ - Connection Failure - OS :@8%s@	Yes
Connection Failure (Standby)	0	4	55	@7%s@ - Connection Failure - OS :@8%s@	Yes
Dataset Failure (Master)	0	4	55	@7%s@ - Dataset Failure - OS :@8%s@	Yes
Dataset Failure (Standby)	0	4	55	@7%s@ - Dataset Failure - OS :@8%s@	Yes
IED Comm Failure	0	4	55	@7%s@ - General Communication Failure	Yes
Time Deviation Error	0	4	55	@7%s@ - Time Deviation error	Yes

4.1.5 IEC 61850 IED Symbol Display

Symbol Display

The following IEC 61850 IED symbol is available as part of the standard library:



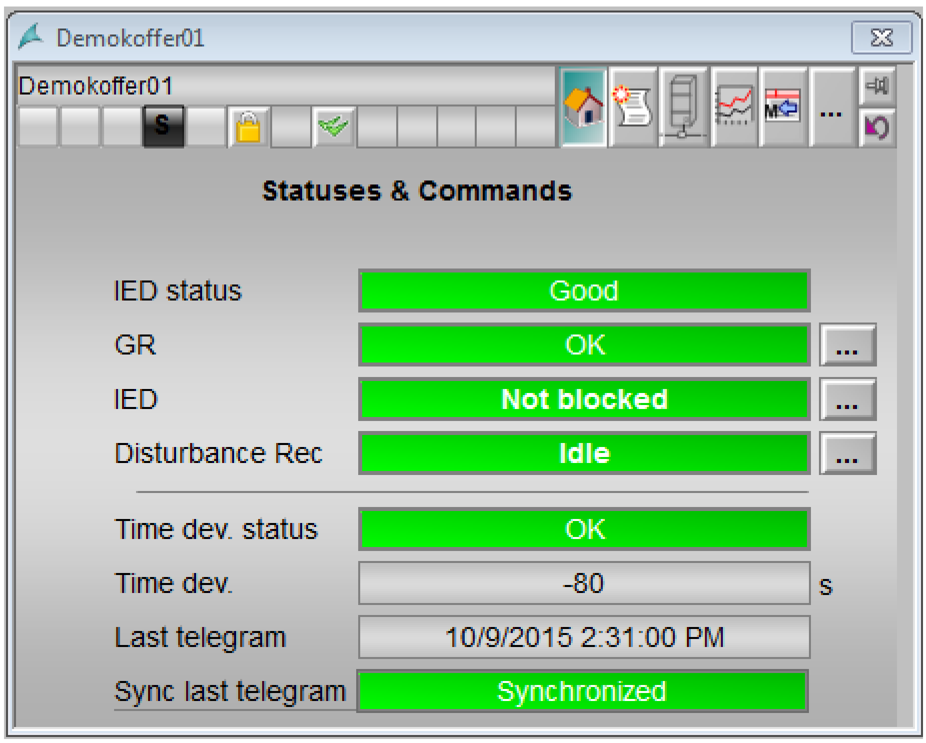
(IED Status = RS)
@IECRTU/1

4.1.6 IEC 61850 IED Faceplate

4.1.6.1 IEC 61850 IED Faceplate: Standard window (basic station)

Standard window (basic station)

Standard window for a basic station:



Buttons

Note: Operation of the buttons in this view requires authorizations of level 6.

Input field	Action	Description
GR Start	GR=1	Start general request to IED
Block IED	BL=1	Block sending all IED data to PCS 7
Copy disturb-ance records	RFX=1	Trigger copying of disturbance records

Displays

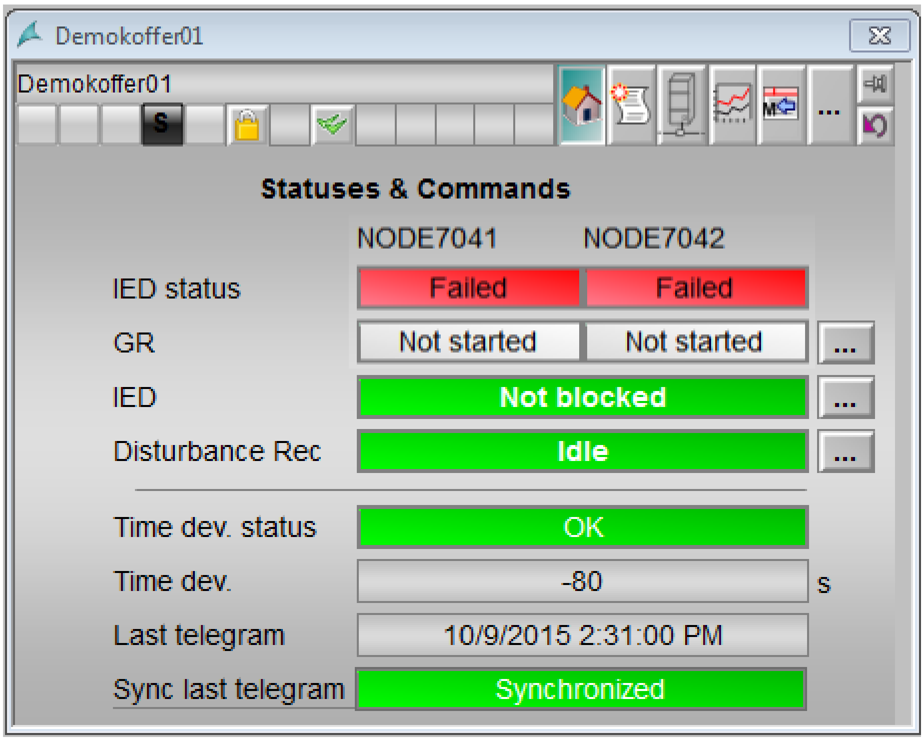
Display	Meaning	Tag	Colors	Note
IED status	Communication status of the IED	RS	RS_M=0 & RS=0 -> GREEN RS_M=0 & RS=1 -> RED RS_M=1 & RS=1 -> RED RS_M=1 & RS=0 -> YELLOW	

GR status	Status of the general request	GS	GS =1 (GR Start requested) - YELLOW GS =2=GR running - YELLOW GS=3 (GR error) - RED GS=4 (GR completed OK) - GREEN GS =5 (GR ended incompletely) - RED	
IED status lock	Specifies if the IED was locked	BLS	Black on green	
Disturbance records status	Copy disturbance records status	RFS	RFS=0 (Ready) - GREEN RFS=1 (Copying...) - YELLOW RFS=2 (Error) - RED	
Time Deviation Error	Specifies if the time deviation is currently located within the tolerance configured with DBA.	TDS	TDS=0 (OK) black on green TDS=1 (Error) black on red	
Time deviation value	Time deviation of the IED (in seconds)	TDV	Black on gray	
Last Timestamp	Time stamp of the last message frame received by the IED	LTS	Black on gray	
Synchronized time stamp of the last message frame	Shows if the time stamp of the last message frame was synchronized in the IED	TQ	0 = not synchronized (RED) 1 = synchronized (GREEN)	

4.1.6.2 IEC 61850 IED Faceplate: Standard window (redundant station)

Standard window (redundant station)

Shown below: View of the standard window on a redundant server station (status of the IED from the perspective of the configured master server and the configured standby server).



Buttons

Note

Operation of the buttons in this view requires authorizations of level 6.

Input field	Action	Description
GR Start	GR=1	Start general request to IED
Block IED	BL=1	Block sending all IED data to PCS 7
Copy disturb-ance records	RFX=1	Trigger copying of disturbance records

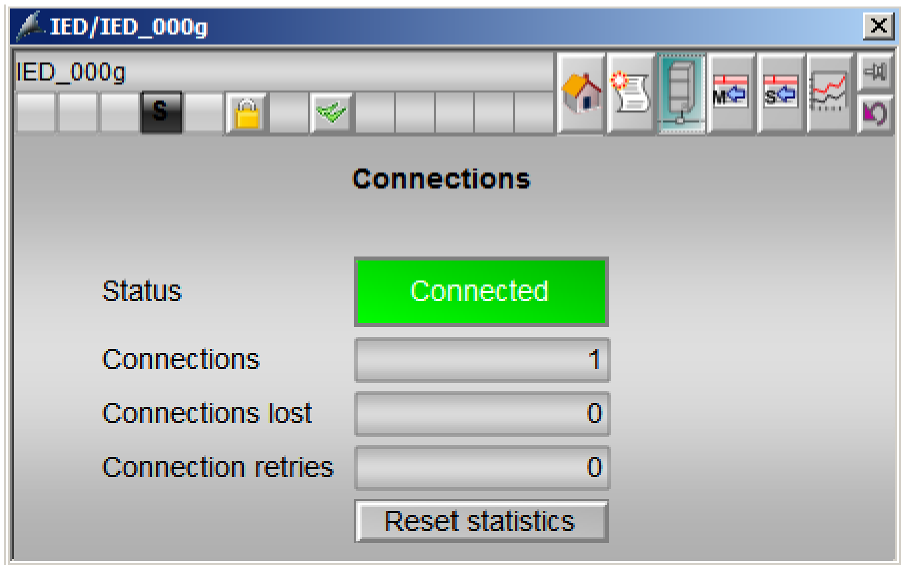
Displays

Display	Meaning	Tag	Colors	Note
Master IED status	Communication status of the IED from the perspective of the master server	RS_M	RS_M=0 & RS=0 -> GREEN RS_M=0 & RS=1 -> RED RS_M=1 & RS=1 -> RED RS_M=1 & RS=0 -> YELLOW	
Standby IED status	Communication status of the IED from the perspective of the standby server	RS_S	RS_S=0 & RS=0 -> GREEN RS_S=0 & RS=1 -> RED RS_S=1 & RS=1 -> RED RS_S=1 & RS=0 -> YELLOW	
Master GR status	Status of the general request of the IED to the configured master server	GS_M	GS_M =1 (GR Start requested) - YELLOW GS_M =2=GR running - YELLOW GS_M=3 (GR error) - RED GS_M=4 (GR completed OK) - GREEN GS _M=5 (GR ended incompletely) - RED	
Standby GR status	Status of the general request of the IED to the configured standby server	GS_S	GS_S =1 (GR Start requested) - YELLOW GS_S =2=GR running - YELLOW GS_S=3 (GR error) - RED GS_S=4 (GR completed OK) - GREEN GS_S =5 (GR ended incompletely) - RED	
IED status lock	IED status lock	BLS	Black on green	
Disturbance records status	Copy disturbance records status	RFS	RFS=0 (Ready) - GREEN RFS=1 (Copying...) - YELLOW RFS=2 (Error) - RED	
Time deviation error	Specifies if the time deviation is currently located within the tolerance configured with DBA.	TDS	TDS=0 (OK) black on green TDS=1 (Error) black on red	
Time Deviation Value	Time deviation of the IED (in seconds)	TDV	Black on gray	
Last time stamp	Time stamp of the last message frame received by the IED	LTS	Black on gray	
Synchronized time stamp of the last message frame	Shows if the time stamp of the last message frame was synchronized in the IED	TQ	0 = not synchronized (RED)1 = synchronized (GREEN)	

4.1.6.3 IEC 61850 IED Faceplate: Connection View (Single Station)

Connection Pane

The view of the Connection Pane as shown on a Single Station:



Buttons

Note

Level 6 permissions are required to be able to press any buttons in this view.

Button	Action	Description
Reset	RMC=1	Reset Statistics (Connection Counters and Message Statistics)

Indicators

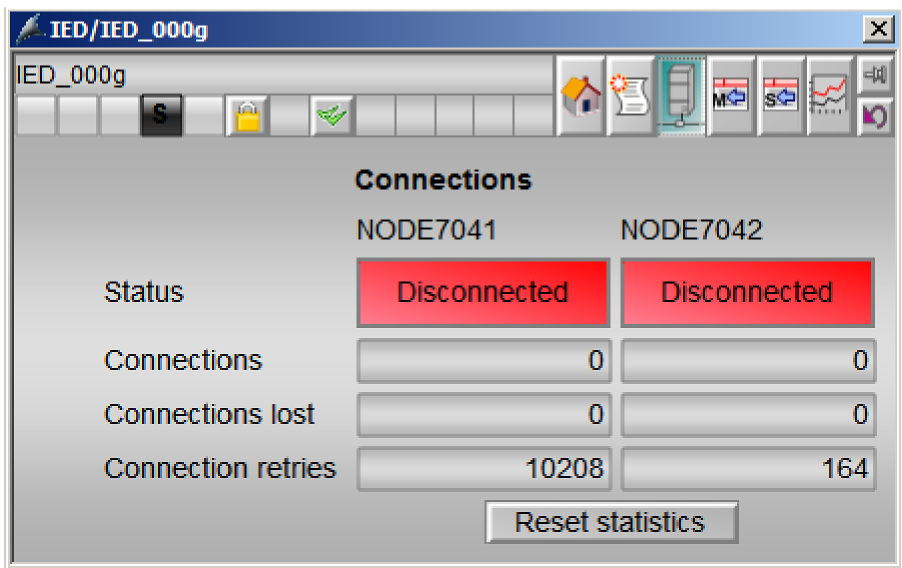
Indicator	Meaning	Tag	Colors	Note
Connection Status	Indicates Connection Status	CS_M	CS1=0 (OK) White on Green CS1=1 (Failure) White on Red CS1=2 (Inactive) White on Yellow CS1=3 (Serial Link Error)White on Red	
Connections	Number of successful connections	CCO	Black on Gray	

Indicator	Meaning	Tag	Colors	Note
Connections Lost	Number of connections lost	CCE	Black on Gray	
Connection Retries	Number of connection retries	CCR	Black on Gray	

4.1.6.4 IEC 61850 IED Faceplate: Connection View Redundant Station)

Redundant Station

The view of the Connection Pane as shown on a Redundant Server Station (the status of the Connection from the perspective of both the Configured Master and Configured Standby is shown).



Buttons

Note

Level 6 permissions are required to be able to press any buttons in this view.

Button	Action	Description
Reset	RMC=1	Reset Statistics (Connection Counters and Message Statistics)

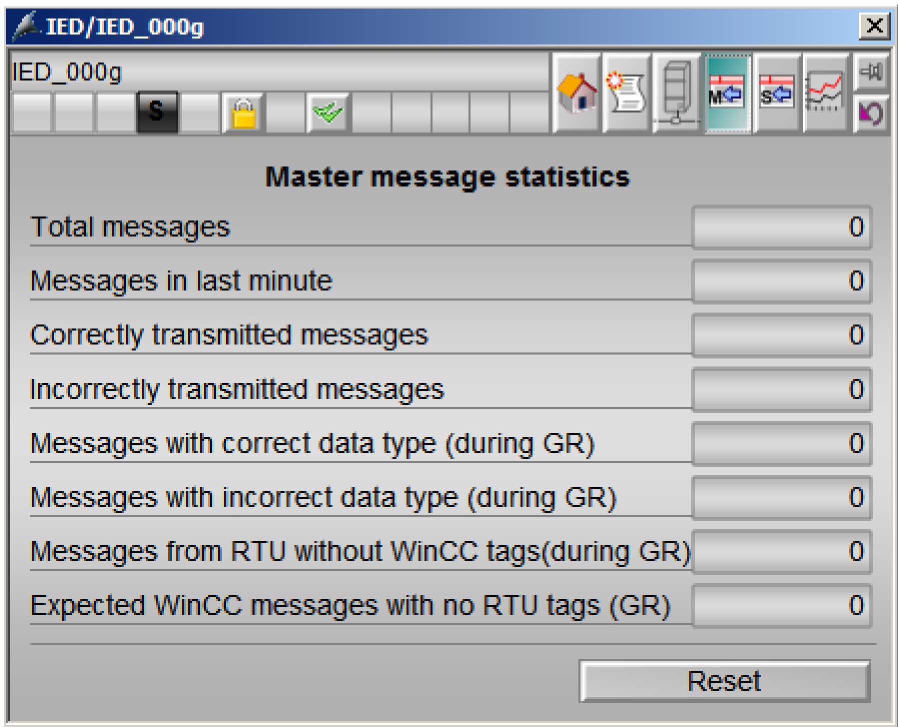
Indicators

Indicator	Meaning	Tag	Colors	Note
Connection Status (Master)	Indicates Connection Status of Configured Master	CS_M	CS1=0 (OK) White on Green CS1=1 (Failure) White on Red CS1=2 (Inactive) White on Yellow CS1=3 (Serial Link Error)White on Red	
Connection Status (Standby)	Indicates Connection Status of Configured Standby	CS_S	CS1=0 (OK) White on Green CS1=1 (Failure) White on Red CS1=2 (Inactive) White on Yellow CS1=3 (Serial Link Error)White on Red	
Connections (Master)	Number of successful connections from the configured master	CCO	Black on Gray	
Connections (Standby)	Number of successful connections from the configured standby	CCO_S	Black on Gray	
Connections Lost (Master)	Number of connections lost from the configured master	CCE	Black on Gray	
Connections Lost (Standby)	Number of connections lost from the configured standby	CCE_S	Black on Gray	
Connection Retries (Master)	Number of connection retries from the configured master	CCR	Black on Gray	
Connection Retries (Standby)	Number of connection retries from the configured standby	CCR_S	Black on Gray	

4.1.6.5 IEC 61850 IED Faceplate: Master Statistics View

Master Statistics View

This panel is shown in both Single Station servers and on each server of a redundant server pair.



Buttons

Note

Level 6 permissions are required to be able to press any buttons in this view.

Button	Action	Description
Reset	RMC=1	Reset Statistics (Message and Connection Counters)

Indicators

Note

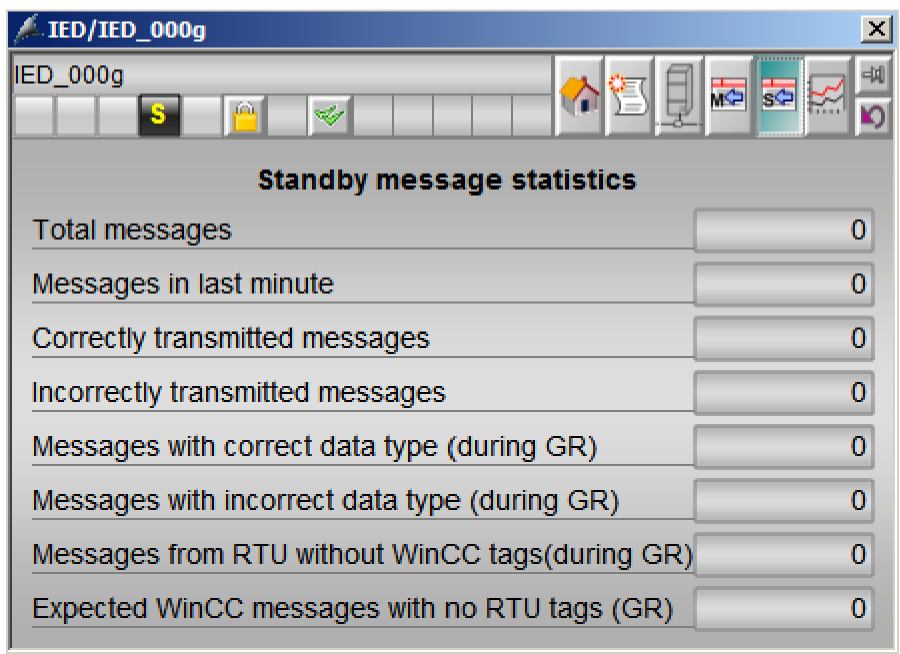
All of the indicators reflect statistics for communication between the Configured Master and the IED.

Indicator	Tag	Colors
Total Messages received	MR	Black on Gray
Messages In Last Minute received	MRM	Black on Gray
Correctly Transmitted Messages sent	TMC	Black on Gray
Incorrectly Transmitted Messages sent	TMI	Black on Gray
Messages With Correct Data Types	MCD	Black on Gray
Messages With Incorrect Data Types	MID	Black on Gray
Messages from IED without WinCC Tags	MRR	Black on Gray
Expected WinCC Messages with no IED Tags	MER	Black on Gray

4.1.6.6 IEC 61850 IED Faceplate: Standby Statistics View

Standby Statistics View

This panel is shown on both Servers of a Redundant OS Server configuration.



Indicators

Note

All of the indicators reflect statistics for communication between the Configured Standby and the IED.

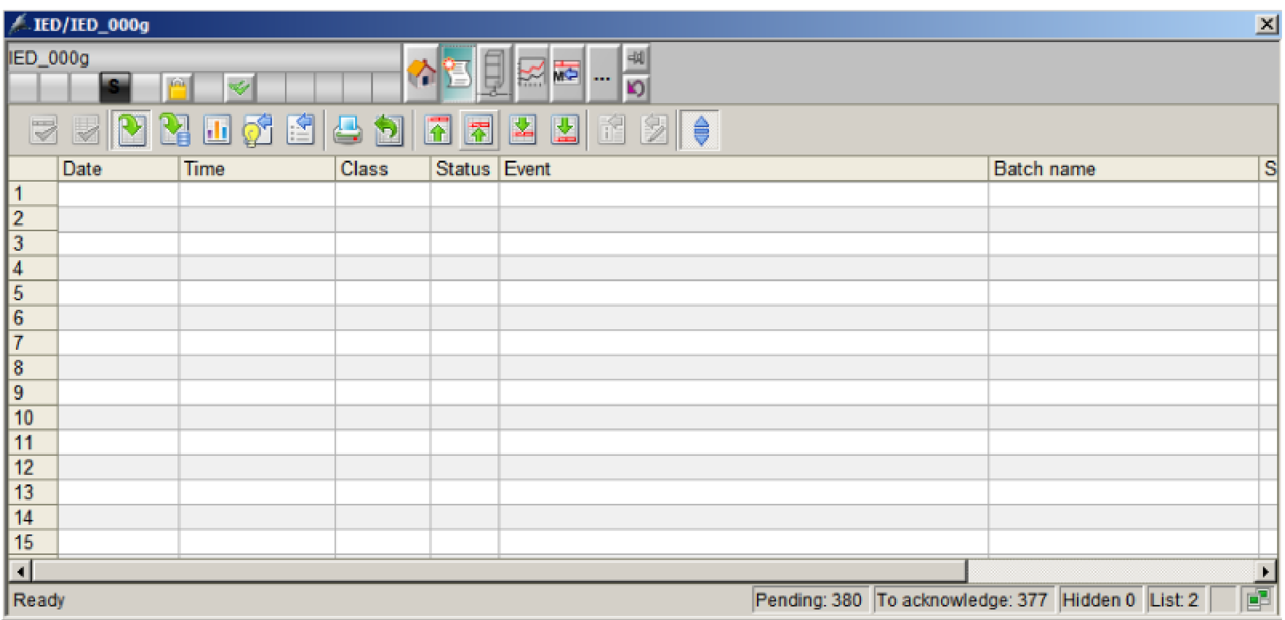
Indicator	Tag	Colors
Total Messages	MR_S	Black on Gray

Messages In Last Minute	MRM_S	Black on Gray
Correctly Transmitted Messages	TMC_S	Black on Gray
Incorrectly Transmitted Messages	TMI_S	Black on Gray
Messages With Correct Data Types	MCD_S	Black on Gray
Messages With Incorrect Data Types	MID_S	Black on Gray
Messages from IED without WinCC Tags	MRR_S	Black on Gray
Expected WinCC Messages with no IED Tags	MER_S	Black on Gray

4.1.6.7 IEC 61850 IED Faceplate: Alarm View

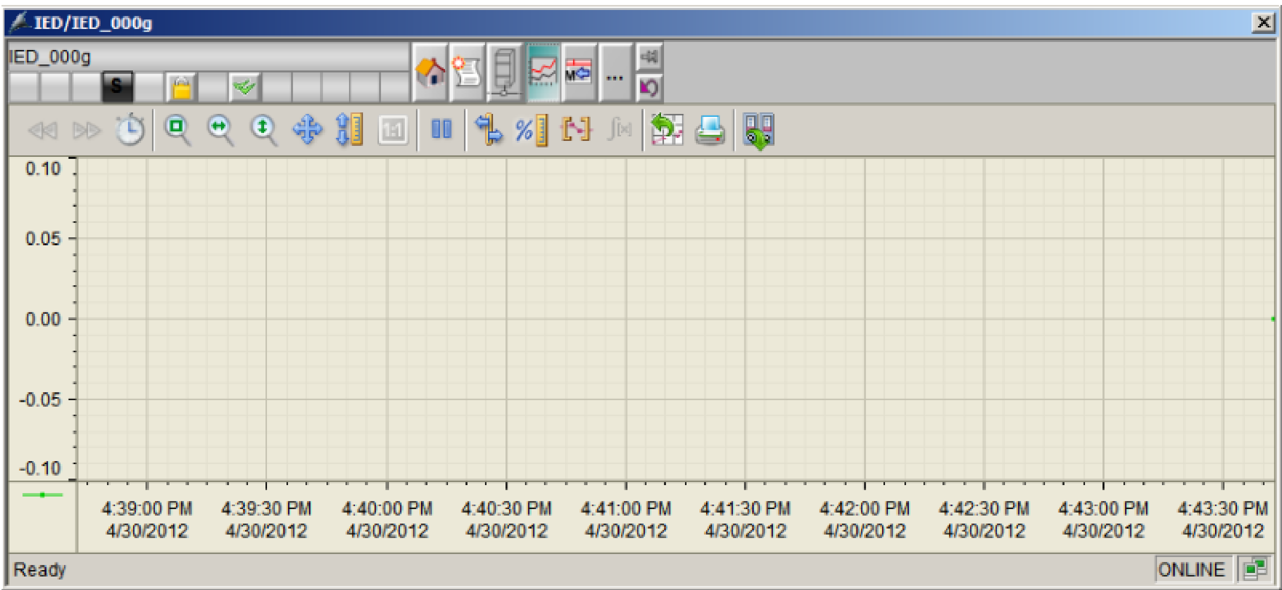
Message View

This panel shows each of the active alarms that are active for the IED.



4.1.6.8 IEC 61850 IED Faceplate: Trend View

Trend View



The following pen is defined:

Green – Messages Received Last Minute (MRM)

Appendix – Example of time synchronization message SIPROTEC 4

A

The following instruction shows you how to add a message for non-synchronized system time using a SIPROTEC 7SJ633 as an example. Changes to the protection device and the DBA types are necessary.

WARNING

The example below describes a change of the configuration of the protection device. Downloading the configuration of the device is not necessary. These changes may only be made in coordination with the person in charge of the switchgear.

Note

The DBA types of the technology objects of PCS 7 PowerControl (PC_FEEDER, PC_TRAFO, PC_SYNC, PC_LINE) are write-protected. If you want to add the time-of-day synchronization message of existing instances of these types, you must delete the instances and create them with the new, cloned types.

Part 1: Adding the message to the IEC 61850 signals of the protection device

- Open the DIGSI project of the corresponding SIPROTEC 4 protection device.
- Open the SIPROTEC device in the DIGSI project.

- Open the signal ranging with "Parameter"/"Allocation".

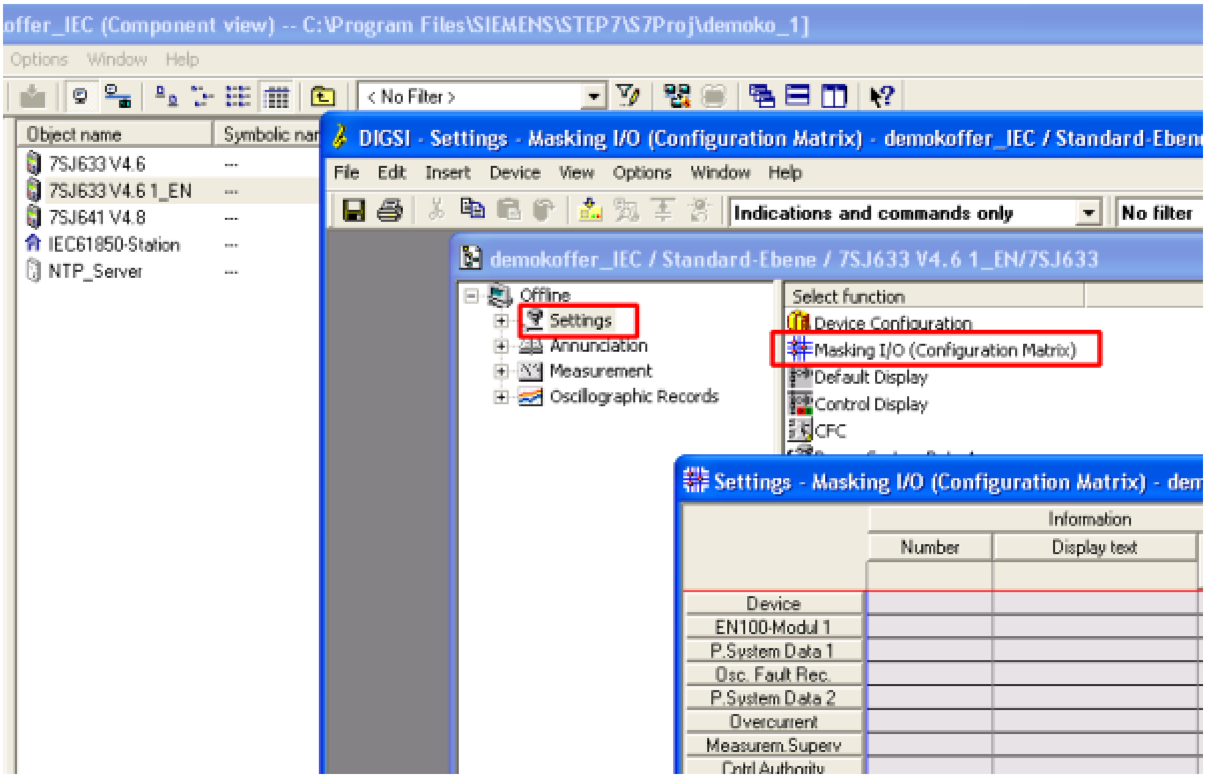


Figure A-1 Signal allocation

- In the "Device" group, the "Clock SyncError" signal must be wired to the extended system interface.

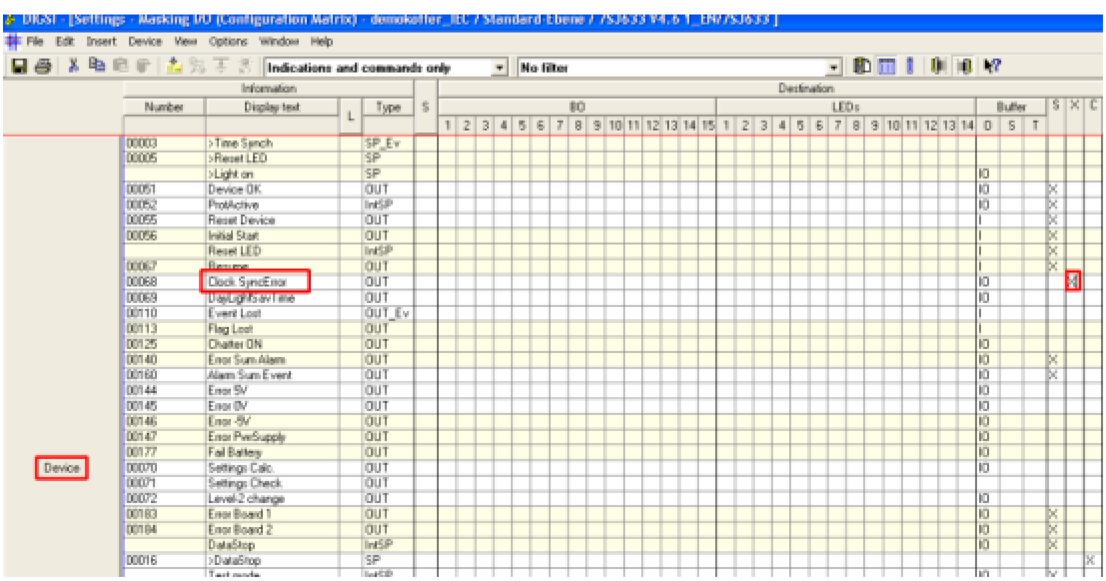


Figure A-2 Extended system interface

- Open the properties of the signal with a right-click/"Properties". The IEC 61850 data object is specified in the "IEC61850" tab (e.g. EXT/PdGGIO2/SPCSO4).
  Notice: The address of the data object can vary depending on the Siprotec device.

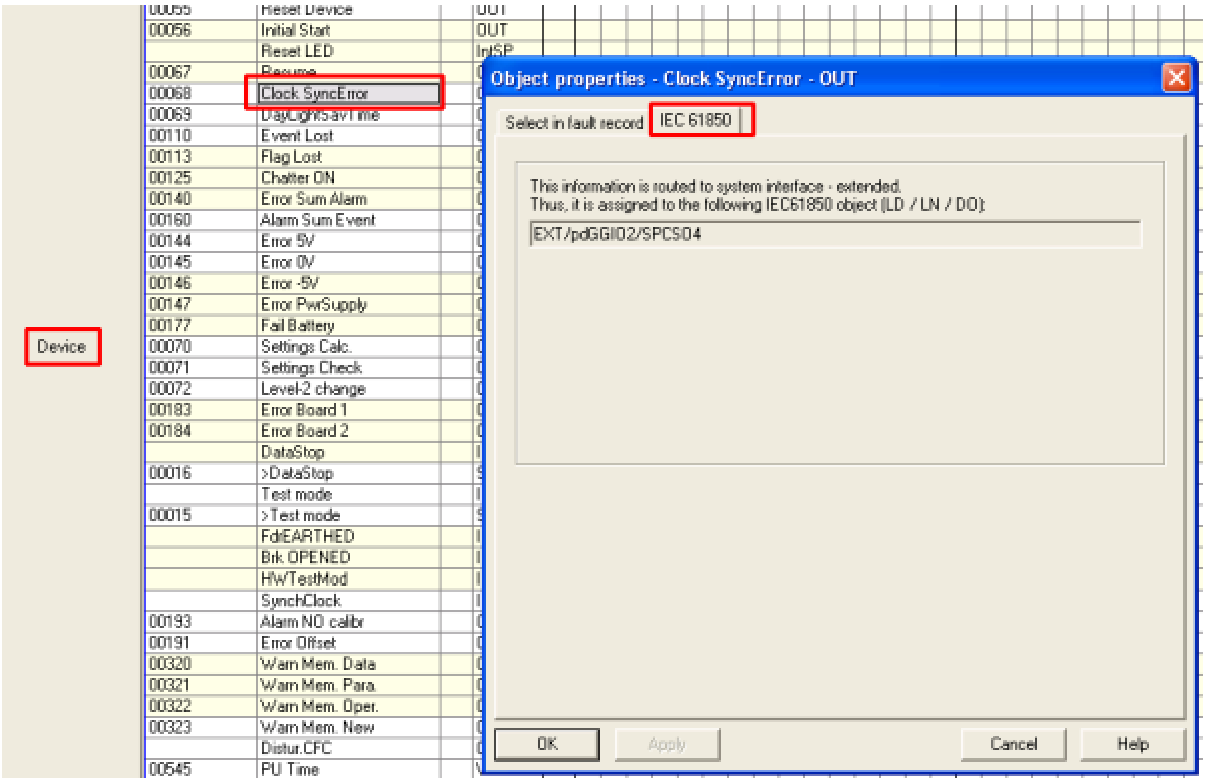


Figure A-3 IEC address

- Write down the address for creating the alarm later in DBA.
- Save the settings and close the allocation.
- Close the device in DIGSI.
- In the DIGSI project, right-click the IEC61850 station and open the object properties.
- Switch to the "Update" tab.

- Click "Update all parameter sets".

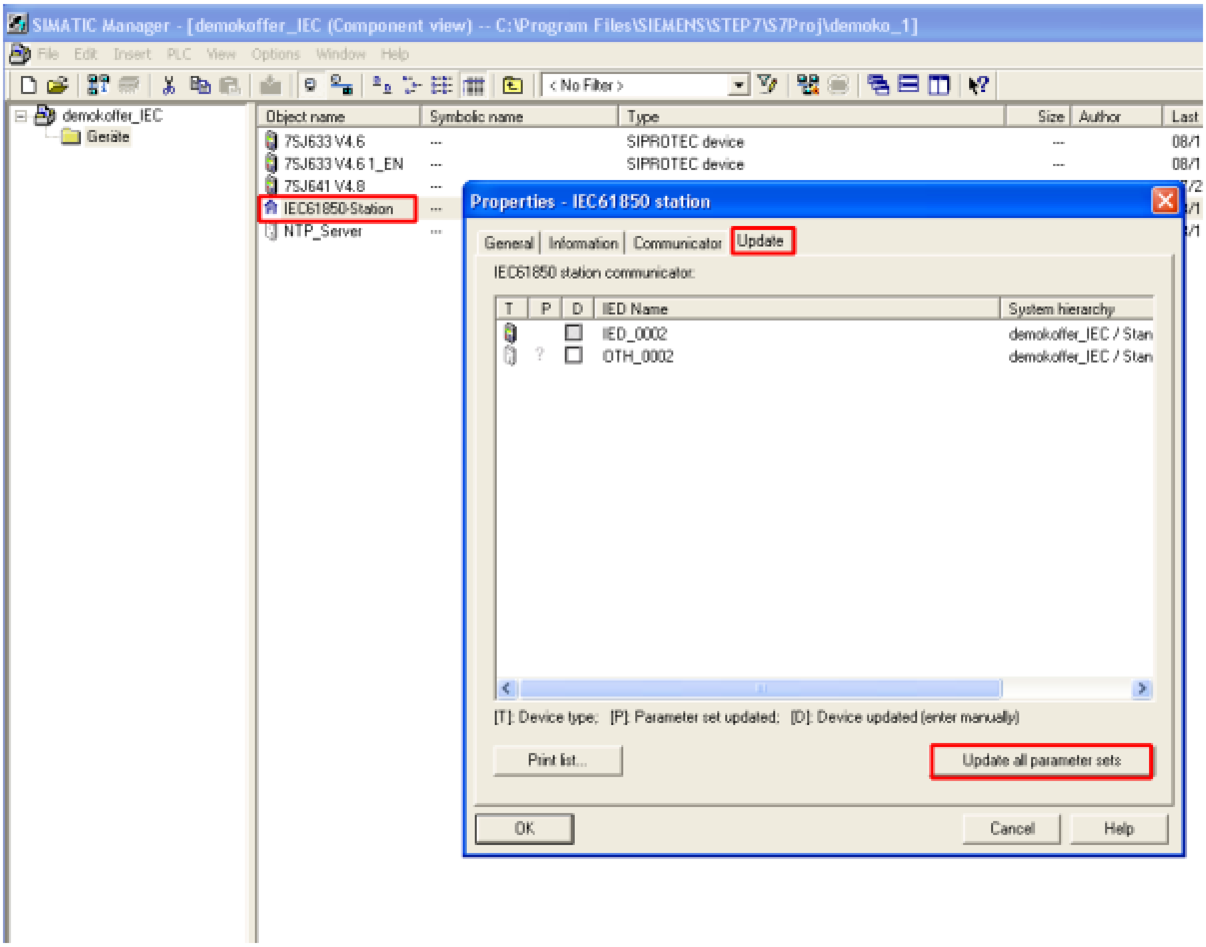


Figure A-4 Updating the parameter sets

- Download the configuration to the device again (right-click the device/“DIGSI -> Device...“).

Note

The existence and functional principle of the signal can be checked after download of the device, for example, with the help of the IEC browser. The IEC browser is located on the installation CD of the DIGSI software.

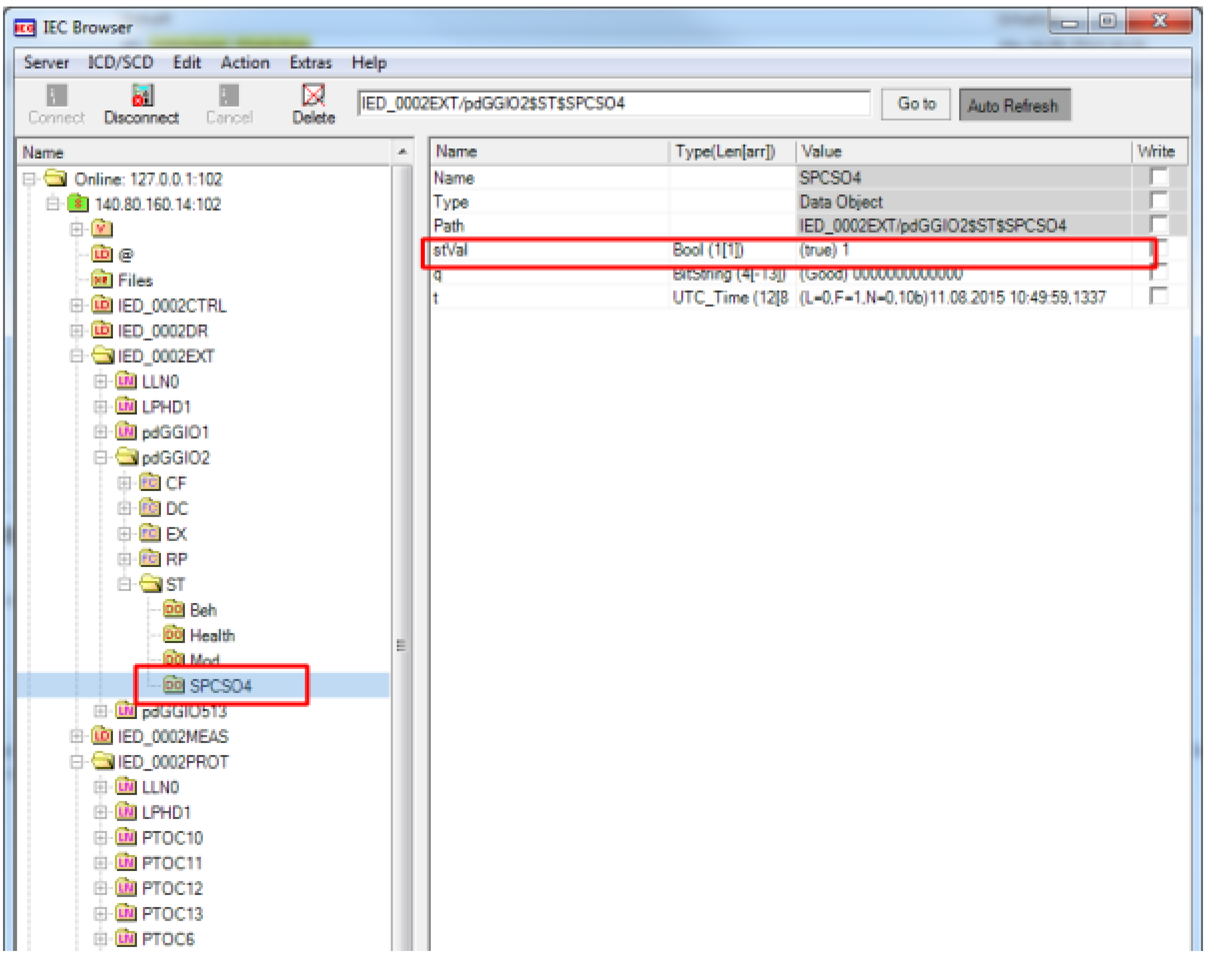


Figure A-5 IEC browser

- Export the new device description file (e.g. icd) with a right-click on the device/"Export device...".
- Copy the file to the corresponding directory where the previous file of this device was saved (configured file path in DBA)

Note

To use the automatic update of the description file in DBA, the file must have the exact same name as the file used before and it must be located in the same directory.

Part 2: Adjusting the DBA project

Note

The following steps require experience with DBA and the DBA type editor. Also consult the documentation of the DBA tool and the type editor.

- If the DBA tool is still open, close it.
- Open the DBA tool -> The corresponding device should be marked with "changed".
- Open the DBA type editor.
- Open the type utilized for the corresponding device.

Note

The DBA types of the technology objects of PCS 7 PowerControl (PC_FEEDER, PC_TRAFO, PC_SYNC, PC_LINE) are write-protected. If you want to add the time-of-day synchronization message of existing instances of these types, you must delete the instances and create them with the new, cloned types.

- Create an external tag with the IEC address from Part 1 (address of the time synchronization message)

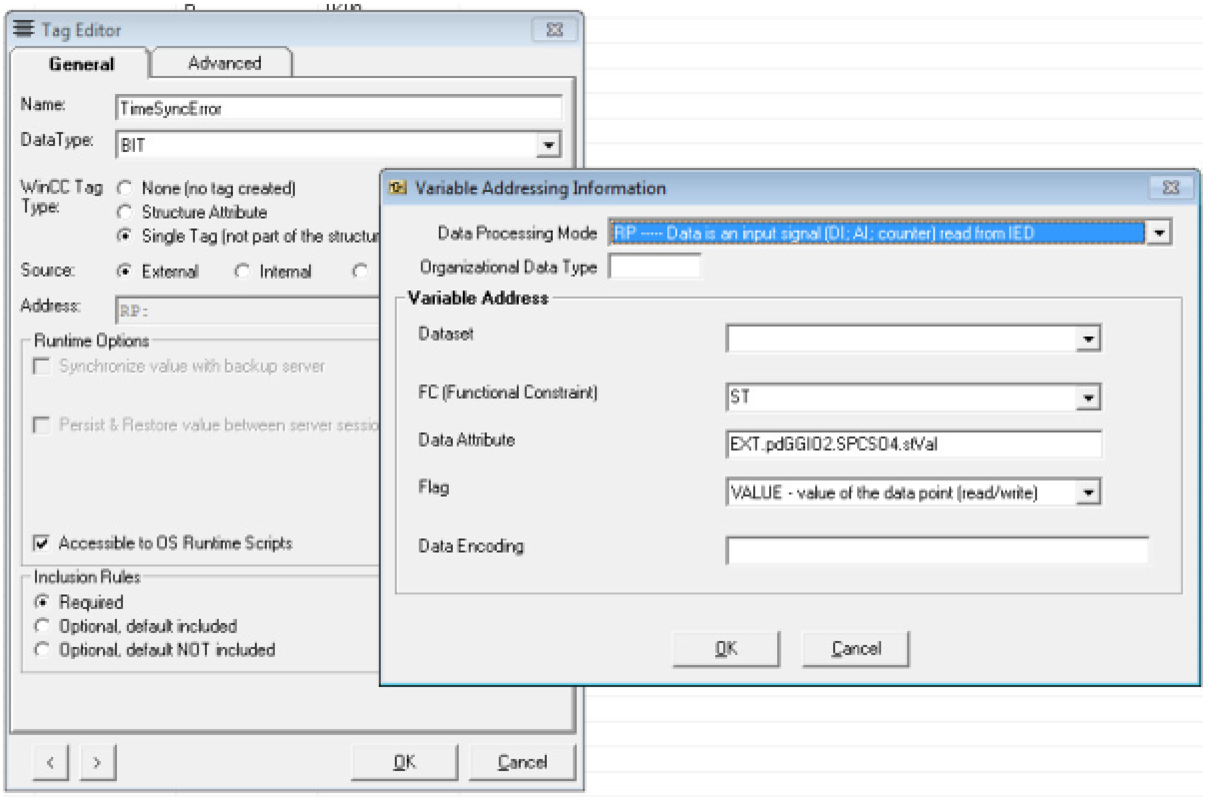


Figure A-6 Tag in DBA format

- Create a corresponding message and link it to the new tag.

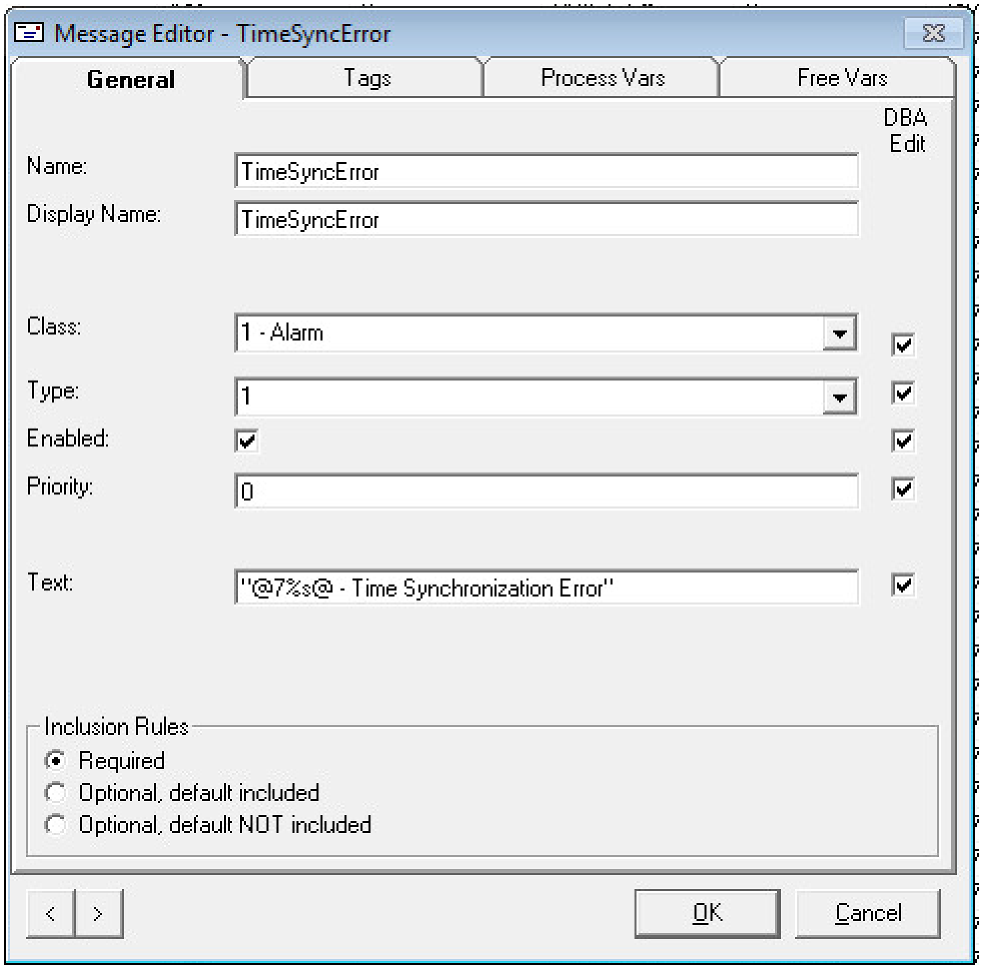


Figure A-7 Message in the DBA type

- Close the DBA type editor.
- Update the objects of the AS.
- Compile the PCS 7 OS project from the DBA tool.
- Load the OS project onto the corresponding servers.

When the device now loses the connection to the NTP time server, the message is triggered in the PCS 7 OS.

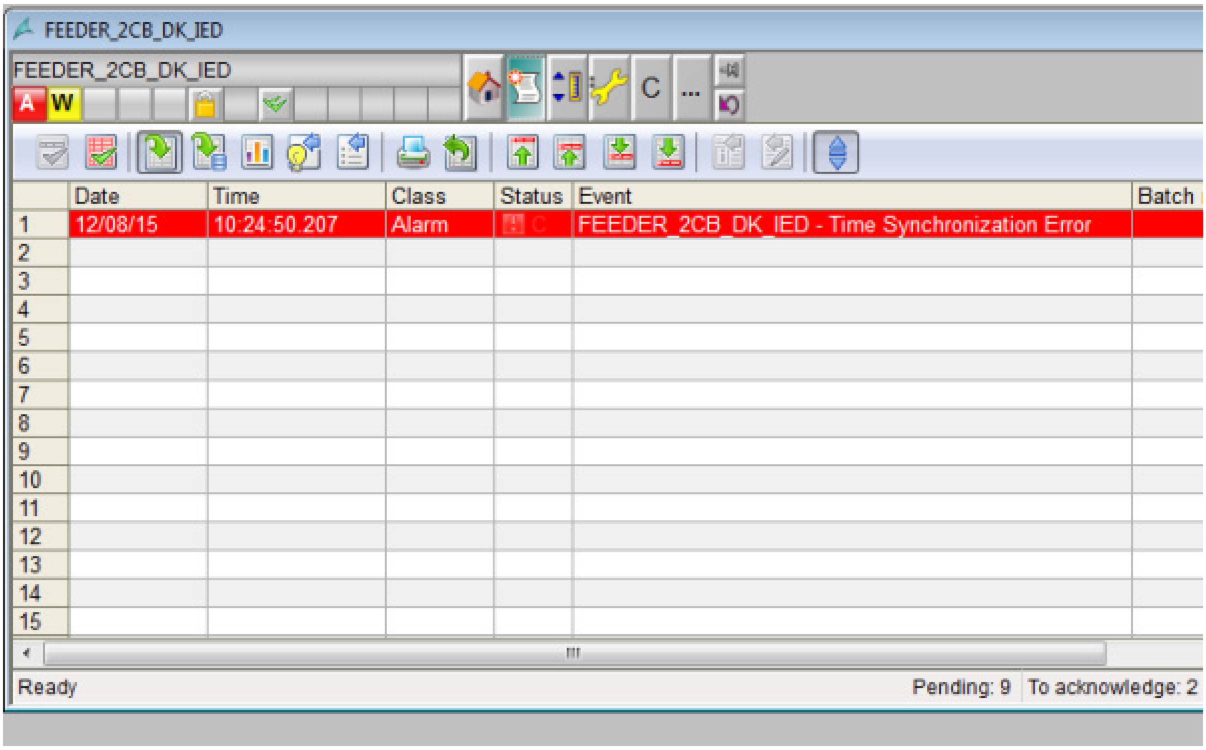


Figure A-8 Faceplate message

Appendix – Introduction to APL Style Faceplates

B

Introduction to APL Style Faceplates

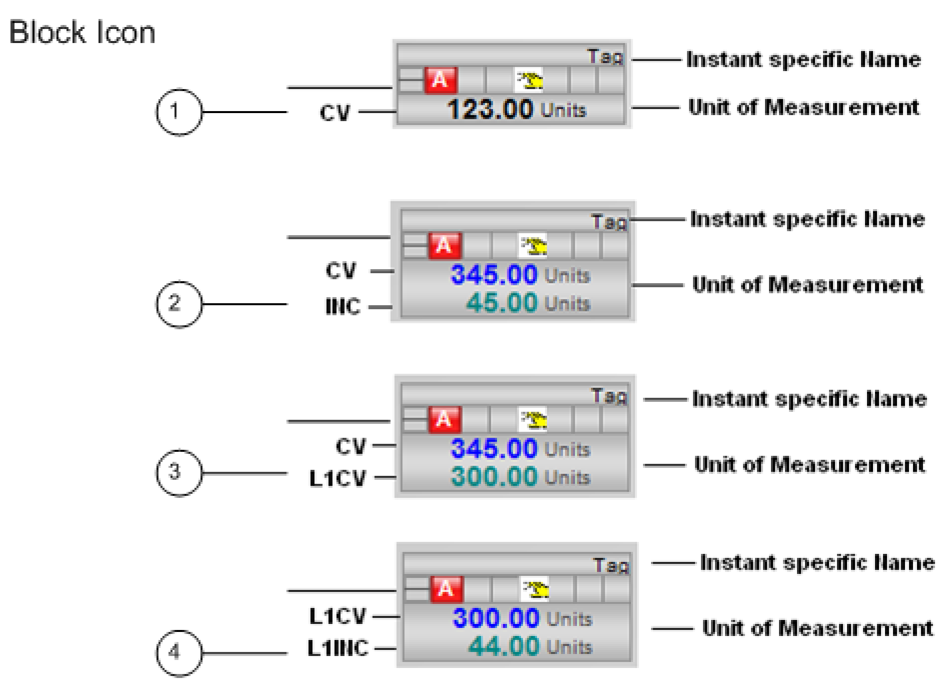
This is a very brief introduction of the APL Style Faceplates. For more information please see the manual:

"PCS 7 Advanced Process Library".

In the following the **Counter block symbol and faceplate** is used for explaining the different control elements and indicators.

Symbols:

The different block symbols and their characteristics are shown here:

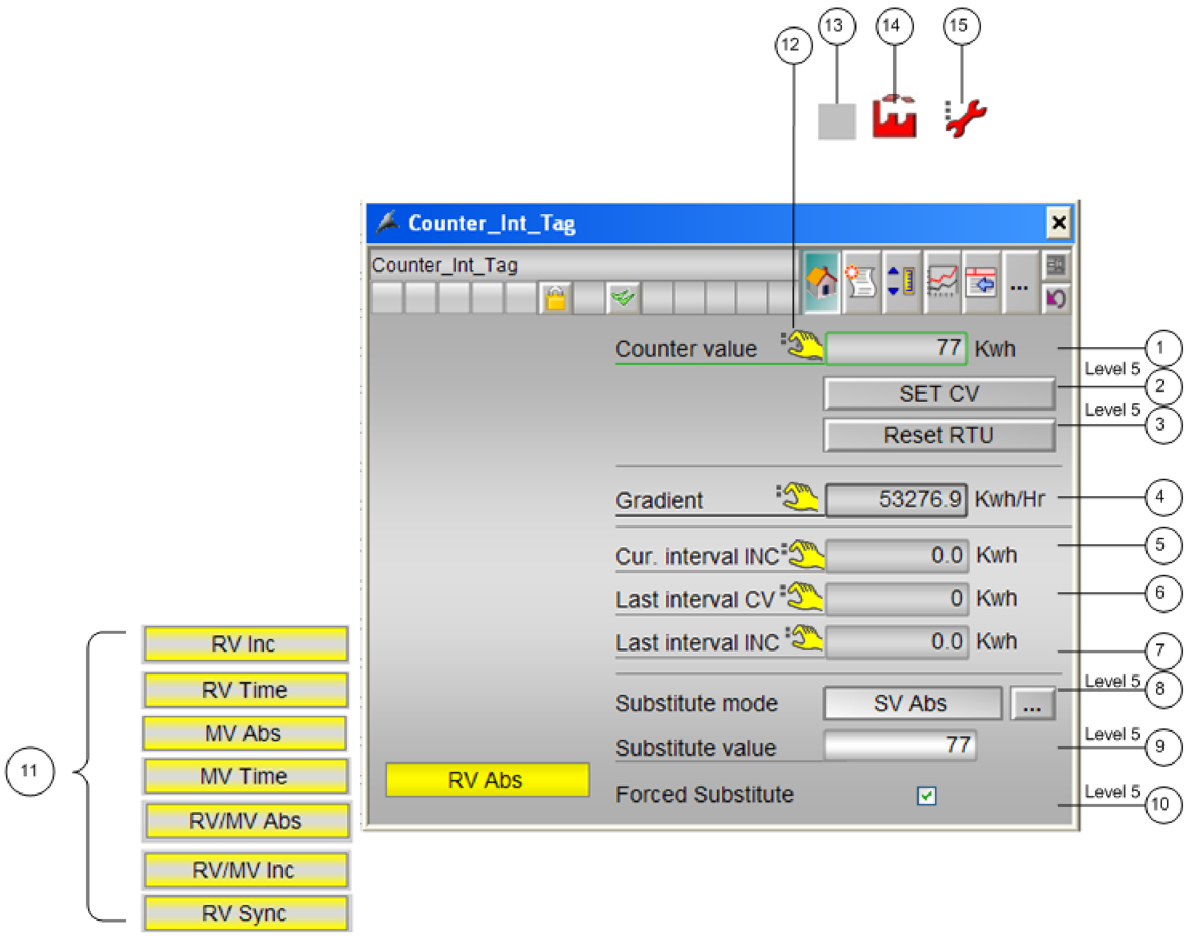


Number	Tag Name	Comment
1	CV	Counter Value
2	SET_CV	Force counter to specific value

Number	Tag Name	Comment
3	R	Reset
4	GRAD	Gradient

Faceplates

The counter faceplate is used for explaining the different control elements and indicators



Number	Tag Name	Comment
5	INC	Current Interval INC
6	L1CV	Last Interval CV
7	L1INC	Last Interval INC
8	SUBS	Substitute Mode
9	SV	Substitute Value
10	SForcing	Forced
11	Mode	Counter Mode

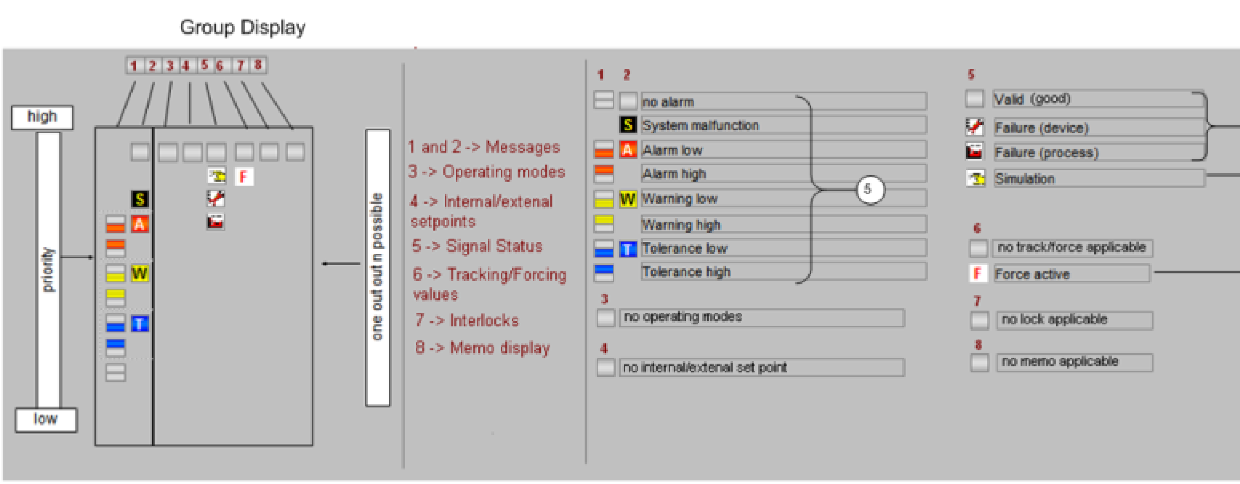
Number	Tag Name	Comment
12		Substitution mode is active and RV quality code is bad
13		RV quality code is good and CV is calculated on Raw value (quality code = ((0xC0): GOOD, (0xD8): GOOD, LOCAL OVERRIDE))
14		RV quality code is bad and SUBS = 0 (quality code = (0x1C): BAD, OUT OF SERVICE, (0x00): BAD, NOT SPECIFIED)
15		RV quality code is bad because of communication problems and SUBS = 0 (quality code = BAD, NOT_CONNECTED and (0x18): BAD, NO_COMM_NO_LUV, (0x20): BAD, WAIT_FOR_INITIAL, (0x04): BAD, CONFIG ERROR)

The mode display (11) can show the following counter modes

Number	Conter Mode (11)
1	RV Abs
2	RV Inc
3	RV Time
4	MV Abs
5	MV Time
6	RV/MV Abs
7	RV/MV Inc
8	RV Sync

Details:

This is a short description of the indicator usage.



No	Tag Name (Example is Counter)
1	CV - Counter Value
2	INC - Current Interval INC
3	L1CV - Last Interval CV

No	Tag Name (Example is Counter)
4	L1INC – Last Interval INC
5	Alarms – displayed as per the following alarm class table
6	Quality code symbols displayed based on worst quality code symbol
7	(Simulation) Substitution symbol used when any of the substitute mode used
8	When SForcing = 1

Name	Class	Type	Remark
High High Alarm	Alarm	Alarm High	
High WarningWarning	Warning	Warning High	
Configuration Error	Process Control System	Error	Use System Malfunction Symbol
Gradient Alarm	Alarm	Alarm High	

Appendix – Status Codes

C

C.1 Appendix – Status Codes

Status tag

The table below lists the values that can exist for the STATUS tag of an IEC850 Command, IEC850 Setpoint or IEC850 MultiCommand.

STATUS CODE	Description
0	no error
1	server not existent
2	not connected
3	no connection
4	send error
5	max number of services exceeded
6	read error
7	out of memory
8	encoding error
9	bad transaction
10	no transaction
11	connection closed
12	request timed out
13	wrong connection state
14	application error
15	parameter error
16	confirmed error
17	order rejected
100	object invalidated
101	hardware fault
102	service temporarily unavailable
103	object access denied
104	object undefined
105	invalid address
106	type not supported
107	type inconsistent
108	object attribute inconsistent
109	object access not supported
110	object not existent

STATUS CODE	Description
111	object value invalid
254	decoding error

Appendix – PowerControl Library Types and IEC 61850 Common Data Classes

D

D.1 Appendix – PowerControl Library Types and IEC61850 Common Data Classes

Common Data Classes and Library types

The table bellows lists IEC 61850 Common Data Classes that can be assigned to PowerControl Library types in the DBA IED Instance Editor.

Note

This table is a guideline based on the standard definition of these Common Data Classes in IEC 61850 specifications. It is possible that actual Common Data Class instances vary in detail (such as primitive data attribute types) and therefore may not be compatible with PowerControl library types.

IEC 61850 Class	IEC 61850 Class Description	Compatible PowerControl Library Types
Status Information		
SPS	Single-Point Status	IEC850 BitAlarm StatusDisplay
DPS	Double-Point Status	IEC850 MultiState
INS	Integer Status	IEC850 MultiState
SEC	Security Vioation Counting	IEC850 Counter
BCR	Binary Counter Reading	IEC850 Counter
Measurand Information		
MV	Measured Value	IEC850 MeasuredValue IEC850 AnalogValue SimpleMeasuredValue ScaledMeasuredValue
SPC	Controllable Single Point	IEC850 Command StatusDisplay IEC850 MultiState IEC850 BitAlarm
DPC	Controllable-Double Point	IEC850 MultiCommand IEC850 Setpoint IEC850 Command IEC850 BitAlarm StatusDisplay

IEC 61850 Class	IEC 61850 Class Description	Compatible PowerControl Library Types
INC	Controllable Integer Status	IEC850 Setpoint IEC850 MultiCommand IEC850 BitAlarm IEC850 MultiState StatusDisplay
BSC	Binary Controlled Step Position Information	IEC850 MultiCommand IEC850 Setpoint
ISC	Integer Controlled Step Position Information	MultiCommand Setpoint IEC850 MutliState
APC	Controllable Analog set point information	IEC850 Setpoint
ING	Integer Status Setting	IEC850 Setpoint IEC850 MultiCommand
	Controllable Analog Information	
ASG	Analog Setting	IEC850 Setpoint