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5 Measurements

5.1 Description

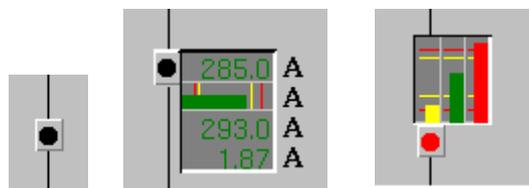


Figure 1. Three types of measurement symbols: symbol, horizontal and vertical

The purpose of the measurement function is to provide an easy and a fast way to monitor the processes on the picture. The measurements are presented as numerical values, as bars or just as a measurement symbol depending on the configuration. The advantage of presenting the measurements as bars is that the alarm and warning limits are shown together with the measurement, hence the level of the measurement compared to the limits is very obvious. Different colors show the state (normal, warning or alarm) of the measurement. The measurement dialog is opened by clicking the measurement symbol. The subfunctions can be opened or settings can be changed in this dialog. The presentation of the measurements (except for the fast trending function) is thought using the configuration made by the Standard Configuration Tool, when the picture is opened next time. Each measurement function consists of 1 to 4 measurement values of the analog input (AI) type or pulse counters (PC) for energy measurements.

The measurement also contains 6 subfunctions under the More button in the Measurement dialog. These functions are described separately in this document, a brief summary is provided below:

Subfunction	Description
Alarm state	Shows persisting or fleeting alarms for the measurements, and the unacknowledged alarms can be acknowledged.
Blockings	Makes blockings for the database in MicroSCADA.
Edit Limits	Sets the alarm and warning levels for the measurements in the MicroSCADA database and, in some cases, sends the limits down to used device.
Fast Trending	Enables fast trending of the measurement and can be used as small or zoomed Fast Trend. Settings can be made in a separate Settings dialog in the zoomed FT.
Deadband	Setting of the zero deadband for the measurement.
Object messages	Presents the object state.
Freeze Counters	Possibility to Freeze or Freeze and reset counters, only with DNP 3.0 protocol.

There is also a function to show all/show predefined/erase all measurement values and bars within the picture. This is to make it easier to provide necessary information for the operators in all situations.

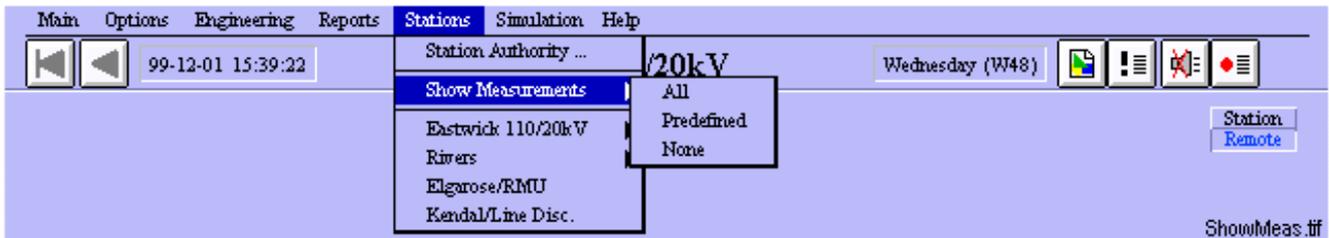


Figure 2. The selections for measurement views

5.2 Features/Options

- Installation to process picture
- Up to four measurements per standard function
- Bar/Unit presentation
- Measurement Dialog
- Minimum and maximum values presented
- Alarm state
- Blockings
- Edit limits
- Fast trending
- Deadband settings
- Object messages
- Freeze Counters (Only with DNP 3.0 protocol)

5.3 Process Commands

- Freeze counters
- Freeze and reset counters

5.4 Measurement Dialogs

The dialogs for measurement are found in the directory /LIB4/FMOD/MVPROCESS/USE and they are opened in the measurement picture function or in the measurement's subfunctions.

The measurement dialog is used for monitoring and controlling the measurements. One standard measurement function can be used to present 1-4 measurements (AI/PC objects).

5.4.1 Object Presentation

The current state is presented by different symbols. The color of the symbol gives additional information about the status. Please refer to the General chapter in this MV Process Operator's Manual regarding the color and the corresponding status.

NOTE! The symbol is common to all four measurements!

5.4.2 Main Dialog

Figure 2 presents the measurement main dialog which is opened in the measurement picture function.

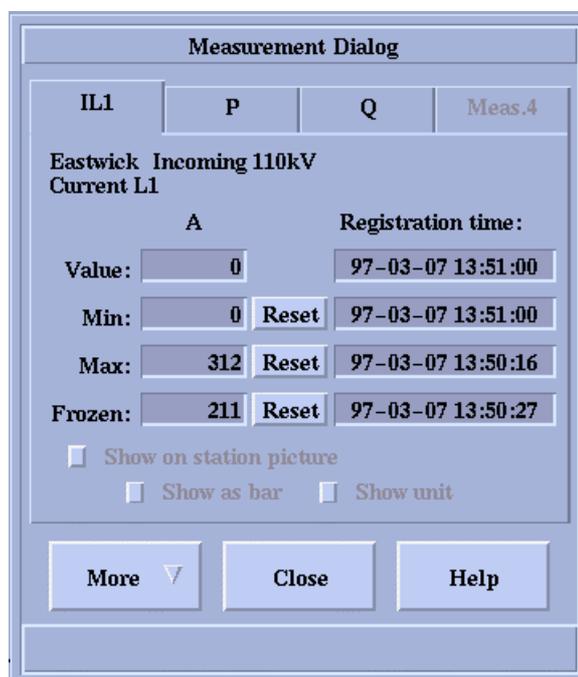


Figure 2. The measurement dialog

Table 1 The measurement main dialog contains the following buttons:

Button	Functionality
Reset	Resets the registered value to the last collected
Show on station picture	The value is shown in the picture
Show as bar	The value is shown as a bar
Show unit	The unit for the measurement is shown
More	Opens the subfunction programs
Close	Closes the window without saving
Help	Shows the help dialog

Operations can be made, if the authorization level of the operator authorization is Control (1) or higher.

Available measurements can be viewed by clicking the active folders.

For energy measurements (pulse counters) there are no Minimum and Maximum values and therefore, they are not shown.

The measurement value and the minimum and maximum values are dynamically updated in case they change in the MicroSCADA database.

The frozen value presents the object value at the moment the dialog is opened or when it is reset by the Reset button.

With the toggle buttons Show on station picture, Show as bar and Show unit the outlook of the measurements on the station picture can be changed. The changes are active while the picture is open. When the picture is closed, the default settings are returned. The defaults can be modified by the means of the Standard Configuration Tool. If the measurement is not connected to the actual process, the values can be entered to the value field. At the same time they are written into the MicroSCADA database.

The dialog shows messages of the object state on the information bar. Only the most important message is shown, but all active messages can be seen in the Object messages dialog by selecting it under the More.. button. Active messages can be seen in the Object messages dialog, and more detailed explanations of their meaning can be found in Help.

Access to other supported features is made available by the More.. button. Help on each subdialog is found by clicking the Help button in the subdialog.

5.4.3

More... Menu

The More... menu in the Measurement main dialog contains several subfunctions (Figure 3).



Figure 3. The More menu with the subfunctions in the Measurement main dialog

5.4.4 Alarm State Dialog

The dialog presents persisting or fleeting alarms for the measurements, and the unacknowledged alarms can be acknowledged.

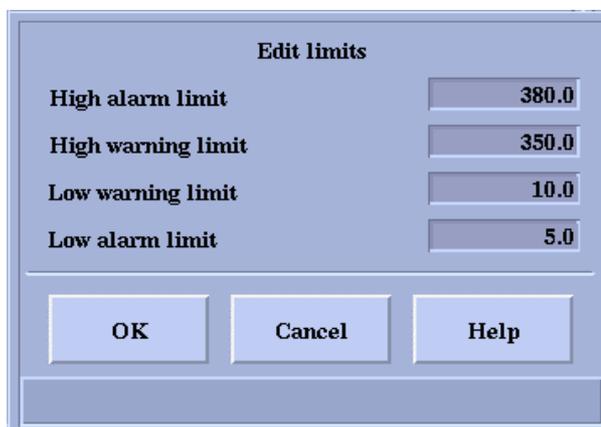
The Acknowledge alarm button is active, if an unacknowledged alarm is present and the authorization level of the operator is Control (1) or higher. For details, please refer to the General chapter in this MV Process Operator's Manual, which contains more detailed information about the Alarm state dialog.

5.4.5 Blockings Dialog

The Measurement blockings dialog is for making the blockings within the selected Measurement object in the MicroSCADA/SCS database. For details, please refer to the General chapter in this MV Process Operator's Manual, which contains more detailed information about the Blockings dialog.

5.4.6 Edit Limits Dialog

The Edit Limits dialog is for setting the alarm and warning limits for measurements in the MicroSCADA database. In some cases the limits are sent down to the used device if limits are supervised by the device itself. This can be the case when using RTUs with EDU with the RP570 protocol or SACO 16A3 with the SPA protocol or REF5** with the LON/SPA protocol. (Please see MV Process Configuration Manual (1MRS751396-MEN), Measurement, chapter 5.4.)



Edit limits	
High alarm limit	380.0
High warning limit	350.0
Low warning limit	10.0
Low alarm limit	5.0

OK Cancel Help

Figure 4. Dialog for defining alarm and warning limits

The limits in the fields can be edited, if the authorization level is Control (1) or higher. The settings may be saved by pressing OK and cancelled by pressing Cancel.

5.4.7 Fast Trending

Overview

The Fast Trend (FT) is a graphical on-line follow-up for process data of the analog input data type (AI data). This process data is selected from the Measurement dialog. There are two sizes of the fast trend, a small FT and a zoomed FT. The FT can also be configured to start automatically when the station picture is opened.

One supervised process data is shown in each trend. Several trends can be open at the same time on a single monitor, but only one trend can be open for each measured value. The same trend can be shown in other monitors as well. The FT window is movable on the station picture and the latest location is saved and used next time the trend is used.

The trending of e.g. measurements in MicroSCADA is normally done with sampling intervals between 30 s to 10 min. However, sometimes there is a need for faster sampling, e.g. in industrial and power plant applications. The Fast Trend is capable of using shorter sampling periods, from 1 s and upwards (steps: 1, 2, 5, 10, 20, 50 and 100 s).

The trend curve function can be applied on all process objects of the type Analog Inputs, AI.

The alarm and warning levels are shown in the FT window. The scaling on the Y axis is by default set to show - 10% below the lower and + 10 % above the upper alarm limits. If no alarm limits are set, the maximal and minimal values for the process data in question will be used instead. The Y axis scale can also be set in the Settings dialog.

The colors for the background and the curve can be changed in the Settings dialog where also sampling interval and step size can be changed. The curve shows approximately 180 samples backwards (a full trend in the FT window).

The labels for the trend curves can be changed in the Settings dialog.

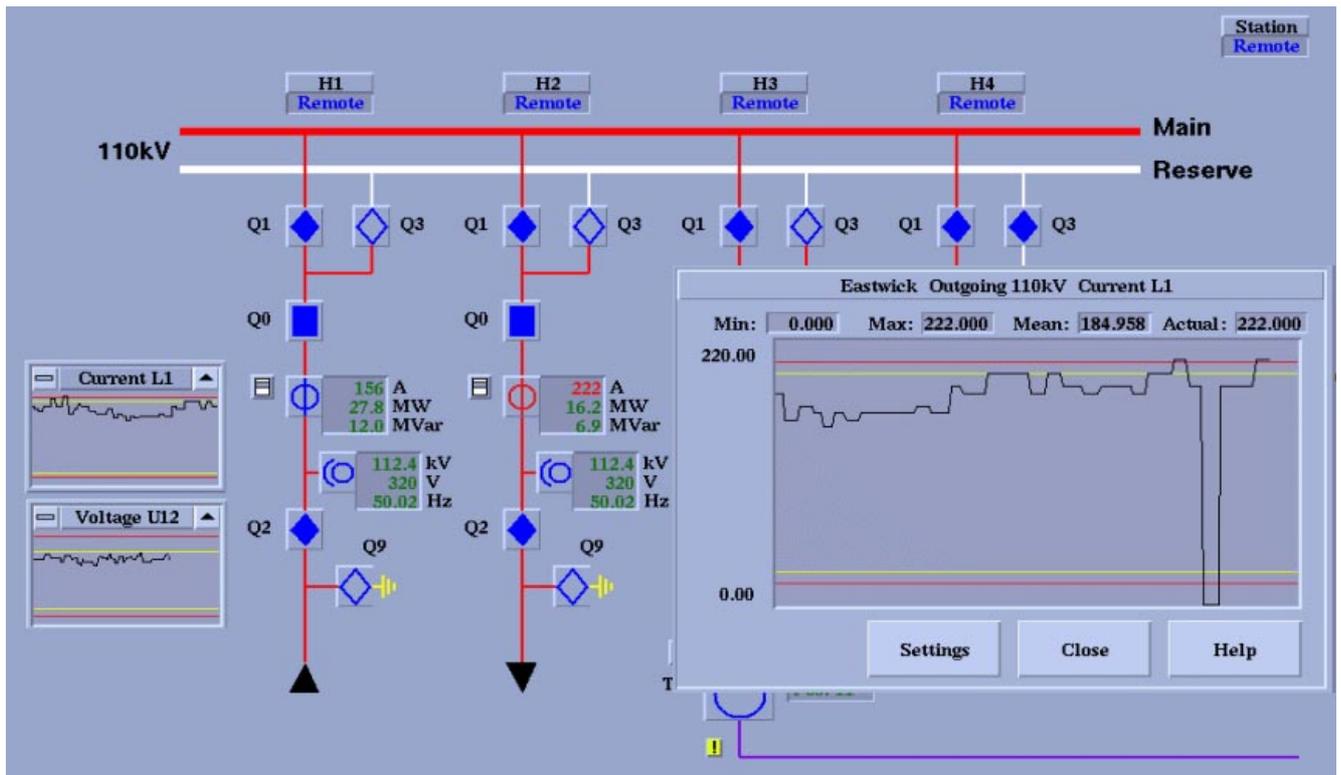


Figure 5. A single line diagram with two small Fast Trends and a zoomed Fast Trend

Features/Options

- The FT function is easy to use
- Can be relocated on the screen at any time, reopens on the latest location with last settings
- One measurement per FT
- Two sizes; one small and one zoomed Fast Trend
- Same trend in several monitors
- Settable sampling interval of the trend
- Settable shifting leftwards of the curve, when the curve reaches the end of the graph
- Uses the alarm limits or min or max values for Y-axis scaling
- Fast trending can automatically be taken into use when the station picture is opened

Process Database

The Fast Trend function utilises the process database connected to the measurement picture function for getting the needed data for the curves.

Summary of Functional Description

The Fast Trend is opened from the measurement symbol in the station picture. The first of the four measurements on the folders as well as the option Fast trending... from the More pull down menu have to be selected. This opens the small Fast Trend, while the zoomed Fast Trend is opened from the small Fast Trend. The Fast Trend is opened on a default location if opened for the first time, thereafter it is opened from the latest location, but can be moved into another location when needed by dragging with the mouse on the label bar. There can also be several trend curves open at the same time. The FT shows the selected measurement in the form of a graph, hence enabling a short historic of the measurement. The alarm and warning limits are marked with lines in the FT window. The trend curves can also be opened automatically when the station picture is opened.

The trends are drawn from the measurement values (process objects) taken from the process database. The process database is updated with new values according to the system configuration, mostly based on delta values. As a result, updating is spontaneous when the delta value is exceeded. This means that the trend is using this process value, in other words, the FT can be updated faster than new values come to the process data base. This is no problem, the same value will be provided by the process data base until a new value is received.

Settings for the Fast Trends are made from the zoomed Fast Trend by clicking Settings.

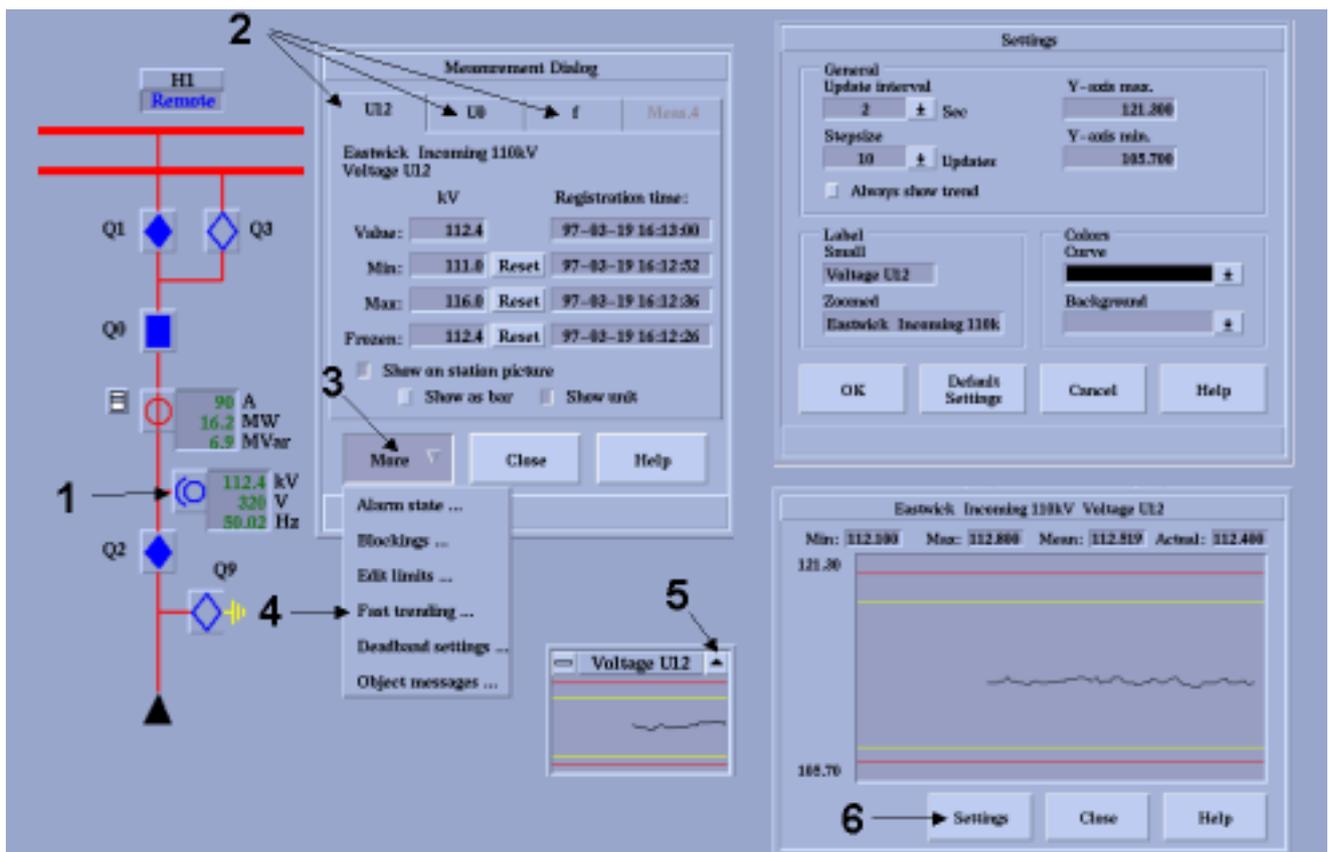


Figure 6. Navigation procedure, starting from the measuring symbol.

Procedure for how to navigate:

1. Start by clicking the Measurement symbol
2. Select the measurement to monitor (among the listed process objects on the folders)
3. Select the option More
4. Select Fast trending...
5. Click the upper right arrow, this opens the zoomed FT
6. Click Settings in the zoomed FT

The list above describes navigation from measurement symbol to the Settings dialog. Each of the windows and dialogs in Figure 6 is described in the following sections.

Common Functionality for Small FT and Zoomed FT

Most of the functionality is similar for both the small Fast Trend and the zoomed Fast Trend.

The Fast Trend windows can be moved on the station picture by dragging its labelbar with the mouse onto the new location. This position is saved and the next time FT is started, it will automatically be located in that place. The FT window is a graph with X-axis for time and Y-axis for the monitored process object. Scrolling backwards the historic data is possible within the time axis. The alarm and warning limits are also drawn as lines in the graph. By default, (first start-up) the trend is set to set the Y-axis scale to minus 10 % of the lower and plus 10 % of the upper alarm limit, which can also be done from the Settings dialog (available in the zoomed FT). The sampling interval is by default 2 seconds, but can be set between 1 s and 100 s in steps of 1, 2, 5, 10, 20, 50 or 100 s. The Settings dialog also admits the change of background and drawing colors. These settings are stored when closing the small FT and taken into use when the following sampling is performed.

If the alarm limits are not set, the min and max values will be recorded since the last reset of registered values (done from the measurement window) can be used for the scaling of the Y-axis. If the min and max are similar and no alarm levels are set, the FT is shown just around the actual value.

When the measured values are outside the alarm limits, the curve is drawn as a line up or down in the trend curve window.

The curve is continued from the last sampling and goes from left to right. The amount of samplings that the curve is moved leftwards after reaching the end of the X-axis is set from the Settings dialog (Stepsize). The curve can contain upto about 180 samplings.

The Fast Trend is equipped with a label bar that contains identification about the measured object. This label is changed from the Settings dialog. By dragging this label bar with the mouse, the FT can be moved into another location.

Fast Trend, Small Size

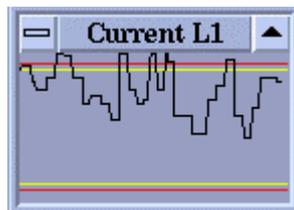


Figure 7. Example of the small fast trend window.

Table 2 The bar in the upper part of the window contains the following functions from right to left.

Button	Function
Close	Closes the trend presentation
Label	The FT is moved by dragging the label bar by the mouse. By default, the label is given the OX attribute for the process object. The label can be set in the Settings dialog.
Zoom	Opens the zoomed FT

Zoomed Fast Trend

The zoomed fast trend window will show the same curve that is shown in small FT window, but there are also scalings for the graph and a numerical presentation of the measured values.

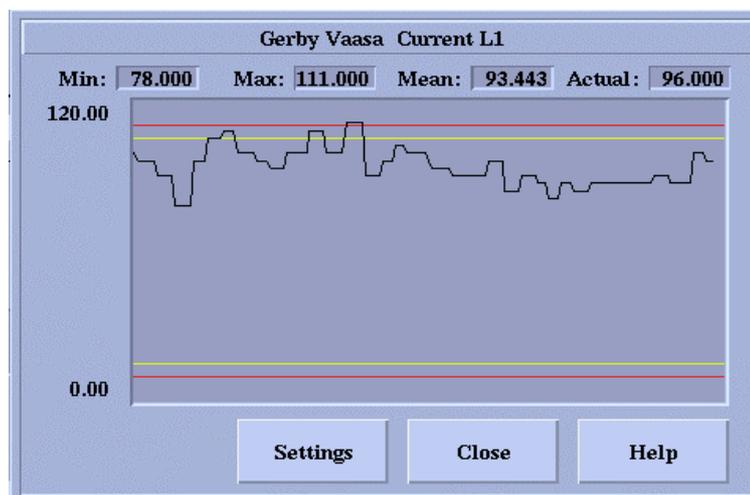


Figure 8. Zoomed fast trend window.

Numerical Presentations

Common for the Min, Max and Mean values is that they are calculated on the basis of the curve drawn in the FT.

Presentation	Function
Min	Gives the minimum value
Max	Gives the maximum value
Mean	Gives calculated average value
Actual	Gives the last sampled value

These values are also presented when the actual curve is outside the defined scales on the Y-axis.

Table 3 Buttons found in the zoomed Fast Trend:

Button	Function
Label	The zoomed FT is moved by dragging the label bar by the mouse. By default, the label is given the IO and OX attributes for the process object. The label can be set in the Settings dialog.
Close	Returns to the small FT (zoomed FT is closed).
Settings	Opens the setting dialog.
Help	Opens the standard help dialog that shows fast trend help information.

Settings Dialog

The Settings dialog contains settable variables for both the small FT and the zoomed FT. Upon pressing OK the settings are stored and taken into use by the first performed sampling. At the same time the Settings dialog is closed. The settings are also used the following time the Fast Trend is opened from the measurement. The settings and the location of the FT on the screen are saved in a file including also other settings from the station picture.

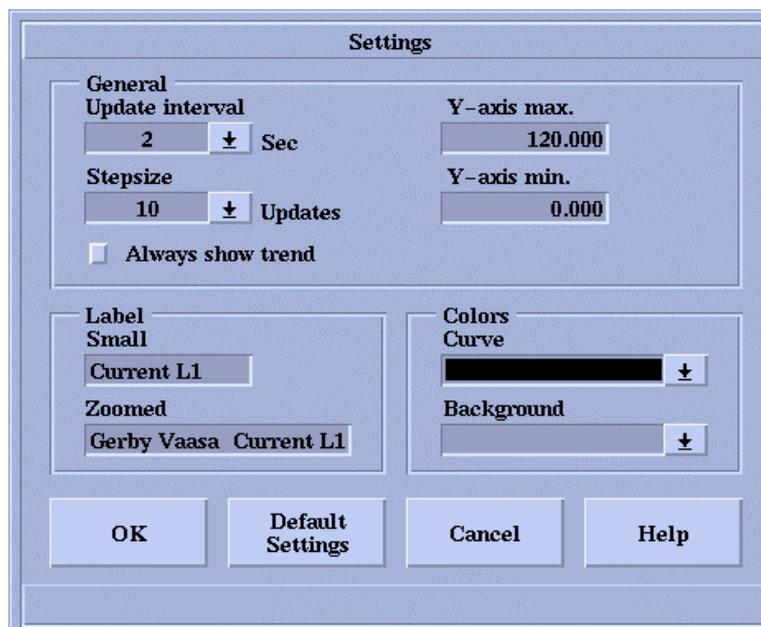


Figure 9. Settings dialog for the Fast Trend

Table 4 The General settings are valid both for small and zoomed trend curve.

Setting	Explanation
Update interval	Sampling time, in steps of 1, 2, 5, 10, 20, 50 upto 100 seconds. This time defines how often the trend is updated with new values from the process data base.
Stepsize	Curve transfer on the left in steps of 1, 2, 5, 10, 20, 50 or 100 values. When the curve reaches the end of the X-axis, this setting defines how many points (equals to samplings) the curve is moved to the left. In other words, the curve is cut with x measurements from the right. The curve continues from the last measurement value as normal.
Y-axis max	Y-axis max is the value that will be used for the upper level of the Y-axis (default is 10 % over the upper alarm position).
Y-axis min	Y-axis min is the value that will be used for the lower level of the Y-axis (default is 10 % below the lower alarm position).
Always show trend	When the check box is marked, the FT will be shown automatically when the station picture is shown.
Label Small	Label for the title field in the small FT (by default the OX attribute). A maximum of 9 characters can be given a small FT.
Label Zoomed	Label for the title field in zoomed FT (by default OI and OX attributes). A maximum of 45 characters can be given a zoomed FT.
Color Curve	Sets the color for the curve in the trend, default is light black.
Color Background	Sets the color for the background behind the curve, default is grey.

Table 5 Buttons found in the Settings dialog:

Button	Function
OK	Saves the settings and closes the dialog. (New settings are taken into use when next sampling is performed).
Default settings	Sets all settings to default values. Then min and max values for the Y-axis will use the minus 10 % of the lower and plus 10 % of the upper alarm limit (updates if changed) or the Min and Max values if alarm limits are similar, and is updated the following time the Fast Trends is reopened (if not manually changed from the Settings dialog).
Cancel	Closes the dialog without saving any settings.
Help	Opens the help dialog that shows FT settings dialog help information.

5.4.8 Deadband Settings Dialog

The deadband settings dialog is used for setting the zero deadband for the selected measurement. For example, a current measurement can indicate a small current even though the switching device is open. In order to prevent this, the process values inside the deadband are taken as zero by the system.

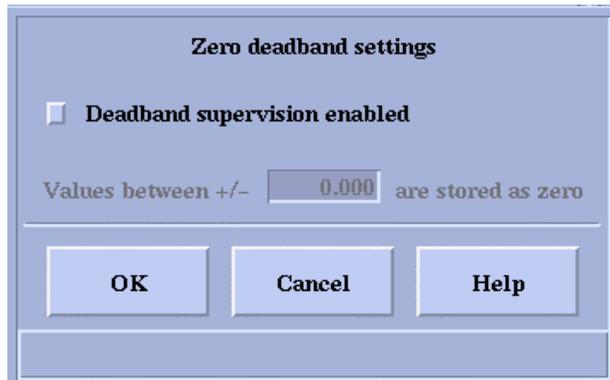


Figure 10. Zero deadband settings dialog for the measurements

The zero deadband settings supervision can be enabled and the deadband value can be modified, if the authorization level of the user is Control (1) or higher. The settings can be saved by pressing the OK button or cancelled by pressing the Cancel button.

5.4.9 Object Messages Dialog

An overall picture of the measurement state can be seen in the dialog. The dialog shows information messages active at the moment the dialog is opened. The most important active message is also shown at the information bar of the main dialog.

A new "snapshot" can be shown by pressing the Refresh button. The dialog can be closed by pressing the Close button. If messages do not fit into one view, they can be viewed with the help of the scrollbar. For details, please refer to the General chapter in this MV Process Operator's Manual which contains more detailed information about the Object messages dialog.

Message	Explanation
STATION LOCAL/REMOTE-SWITCH MISSING	The database object for the station local/remote-switch does not exist (or there is a configuration error).
BAY LOCAL/REMOTE-SWITCH MISSING	The database object for the bay local/remote-switch does not exist (or there is a configuration error).
OBJECT IS MISSING	The database object(s) for the measurement does not exist.
NOT AUTHORIZED CONTROL CENTER	The control center is not included in the list of authorized control centers for the station. The currently authorized centers can be viewed by selecting the option Station authority which can be found in the Station menu.
NOT AUTHORIZED TO CONTROL	The personal authority level of the user is View (0) only.
MEASUREMENT IS ALARMING (UNACKNOWLEDGED)	The measurement value is alarming and it has not been acknowledged yet.
MEASUREMENT IS ALARMING (ACKNOWLEDGED)	The measurement value is alarming but it has already been acknowledged.
WARNING LIMIT EXCEEDED	The value of measurement has exceeded the predefined warning limit.
NOT CONNECTED TO PROCESS	The measurement object is not connected to the actual process. The measurement values can be given manually into the value field to simulate the measurement.
MEASUREMENT VALUE IS NOT UPDATED	The value of the measurement has not been updated from the process.
MEASUREMENT VALUE IS OBSOLETE	The value is not up to date. The reason may be that the object is update blocked or the process device has marked the value as obsolete.
UPDATE BLOCKED	The updating of the measurement value is blocked (UB=1). The blockings can be set with the Blockings dialog.
ALARM BLOCKED	The alarms of the measurement are blocked (AB=1). The blockings can be set with the Blockings dialog.
EVENT BLOCKED	The events of the measurement are blocked (HB=1). The blockings can be set with the Blockings dialog.
PRINTOUT BLOCKED	The printouts of the measurement are blocked (PB=1). The blockings can be set with the Blockings dialog.
REPROCESS BLOCKED	The event activation (reprocessing) of the measurement is blocked (XB=1). The blockings can be set with the Blockings dialog.

5.4.10

Freeze Counters

With this dialog the pulse counters of the process device can be frozen or unfrozen and reset. This dialog is available only when selected measurement is type of pulse counter and the communication protocol is DNP3.0.

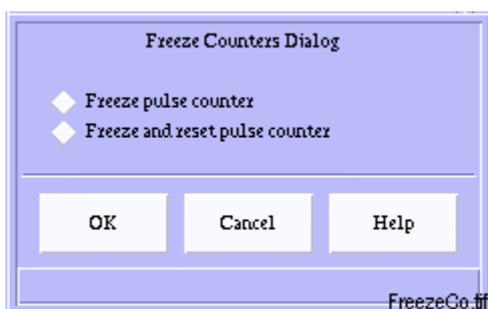


Figure 11. Zero deadband settings dialog for the measurements

Select the wanted operation with the toggle buttons and click OK to activate the execution.

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