


FUNCTIONAL DESCRIPTION

AIC01

Analog Input Calculated

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1 General

AIC01 is a functional unit for defining internal analog inputs in Control^{IT}, to be operated from an Operate^{IT}, Operator Station. A program can treat the calculated signals as if they came from the process. An AIC01 normally performs a complete function independently.

AIC01 has the following functions and properties:

- Different control modes set by operator or by control logic.
- Limiting of output signal.
- Function for bumpless change between different control modes.
- Alarm and event handling of important control signals.

2 Configuration

AIC01 comprises a function block type for control and logic functions in Control^{IT}, a faceplate and an object display in Operate^{IT} for operator functions and control parameters.

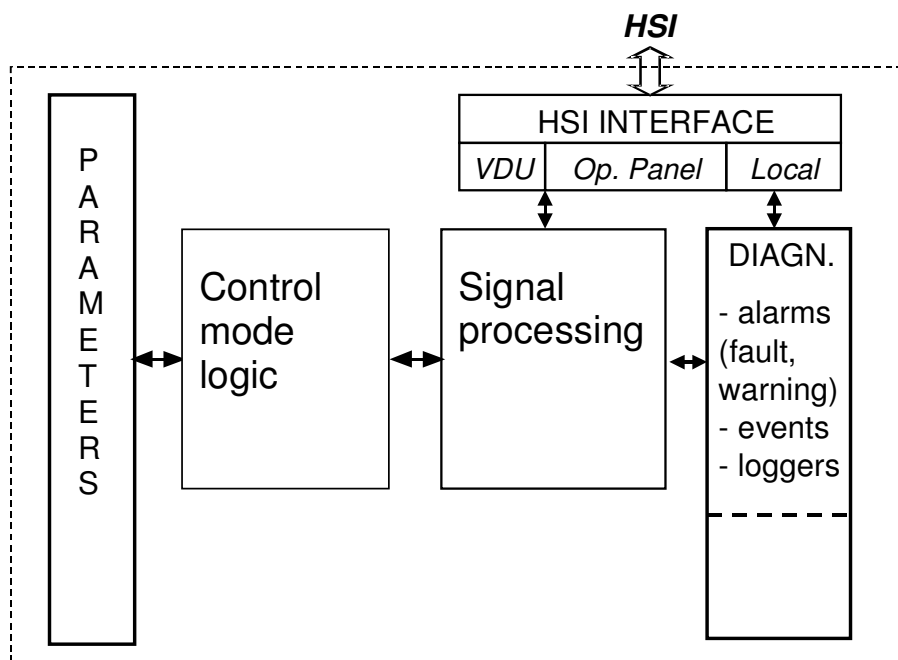


Figure 1. The Structure of the Functional Unit

3 Function Block AIC01

FUNCTION OF INPUT TERMINALS	AIC01		FUNCTION OF OUTPUT TERMINALS
Object name	Name	Value	Value
Object description	Description	Man	Man mode
Enable object	Enable	E1	E1 mode
Measured Value	MV	MV_GT_H2	MV greater than or equal to High High Limit (H2)
Order mode to Man	SeqMan	MV_GT_H1	MV greater than or equal to High Limit (H1)
Order mode to E1	SeqE1	MV_LT_L1	MV less than or equal to Low Limit (L1)
Block alarm	AL_P_Blk	MV_LT_L2	MV less than or equal to Low Low Limit (L2)
Acknowledge alarm	AlarmAck	OutPar	Out Parameter
External control	ExtCtrl	Opr	Operator order
MV alarm configuration	MVAlarms		
In Parameter	InPar		
Event name	EventName		

Figure 3-1. Function Block Type, Complete symbol

Table 3-1 below illustrates the default properties of each terminal of the AIC01 function block.

Name	Data Type	Attributes	Direction	FD Port	Initial value	Description
Name	string	coldretain	in	yes	'AIC01'	Object name
Description	string	coldretain	in	yes	'Descr'	Object description
Enable	bool	coldretain	in	yes	true	Enable object
MV	real	retain	in	yes		Measured Value
SeqMan	bool	retain	in	yes		Order mode to Man
SeqE1	bool	retain	in	yes		Order mode to E1
AL_P_Blk	bool	retain	in	yes		Block alarm
AlarmAck	bool	retain	in	yes		Acknowledge alarm
ExtCtrl	Ext_Analog	by_ref	in	yes		External control
MVAlarms	Alarm4Limit	by_ref	in	yes		MV alarm configuration
InPar	AIC01_InPar	by_ref	in	yes		In Parameter
EventName	string	coldretain	in	yes	' AIC01_'	Event name
Value	real	retain	out	yes		Value
Man	bool	retain	out	yes		Man mode
E1	bool	retain	out	yes		E1 mode
MV_GT_H2	bool	retain	out	yes		MV greater than or equal to High High Limit (H2)
MV_GT_H1	bool	retain	out	yes		MV greater than or equal to High Limit (H1)
MV_LT_L1	bool	retain	out	yes		MV less than or equal to Low Limit (L1)
MV_LT_L2	bool	retain	out	yes		MV less than or equal to Low Low Limit (L2)
OutPar	AIC01_OutPar	by_ref	out	yes		Out Parameter
Opr	AIC01_Opr	by_ref	out	yes		Operator order

Table 3-1. Terminal properties.

4 AIC01 Datatypes

4.1 AIC01_InPar

Name	Data Type	Attributes	Initial value	ISP value	Description
Class	dint	coldretain	500		AE class
Severity	dint	coldretain	1000		AE severity
Range	RangeReal	coldretain			Range
InitMode	dint	coldretain	7		Init mode (5 = Man ; 7 = E1)
ManBlk	bool	coldretain	false		Block operator order Man mode
E1Blk	bool	coldretain	false		Block operator order E1 mode
SeqManEvBlk	bool	coldretain	true		Block event for SeqMan
SeqE1EvBlk	bool	coldretain	true		Block event for SeqE1
AlcBlkEvBlk	bool	coldretain	true		Block event for AlcBlk
FilterP	time	coldretain	0s		Signal filter time

4.2 AIC01_OutPar

Name	Data Type	Attributes	Initial value	ISP value	Description
AlarmBlk	bool	retain			Alarm blocked
Mode	dint	retain			Active mode
NormalMode	bool	retain			Normal mode (Active mode = Init mode)
MVH2	real	retain			Active High High MV alarm limit
MVH1	real	retain			Active High MV alarm limit
MVL1	real	retain			Active Low MV alarm limit
MVL2	real	retain			Active Low Low MV alarm limit
ALB_H2	bool	retain			High High MV alarm blocked
ALB_H1	bool	retain			High MV alarm blocked
ALB_L1	bool	retain			Low MV alarm blocked
ALB_L2	bool	retain			Low Low MV alarm blocked
AU_MVH2	bool	retain			UnAcknowledge alarm for MV > H2
AU_MVH1	bool	retain			UnAcknowledge alarm for MV > H1
AU_MVL1	bool	retain			UnAcknowledge alarm for MV < L1
AU_MVL2	bool	retain			UnAcknowledge alarm for MV < L2

4.3 AIC01_Opr

Name	Data Type	Attributes	Initial value	ISP value	Description
BlockAlarm	bool	retain			Operator block alarms
ALB_H2	bool	retain			Operator block alarm limit H2
ALB_H1	bool	retain			Operator block alarm limit H1
ALB_L1	bool	retain			Operator block alarm limit L1
ALB_L2	bool	retain			Operator block alarm limit L2
Man	bool	retain			Operator order Manual mode
E1	bool	retain			Operator order E1 mode
ManOut	real	coldretain	0.0		Operator enter value

5 Function

5.1 Basic Properties

The AIC01 functional unit is designed for a standard analog input signal.

AIC01 has the following basic functions:

- Control Modes and Updating
- Filtering
- Scaling and Units
- Limit Check
- Alarm and event handling.
- Operator Functions

5.2 Control Modes and Updating

The analog signal is read at intervals determined by the controllers task scan-time. You should set scan time to the requirements of your system.

The control modes can individually be blocked for operator access.

5.2.1 E1

E1 is the initial control mode of the AIC01, where the value is obtained from the variable at input terminal :MV.

The control mode E1 is activated by:

- By clicking on the E1 button on the operator's faceplate. E1 is indicated on the object display and Faceplate.
- Input terminal SeqE1 when activated by a pulse.

5.2.2 Manual

In this mode the operator directly sets the output value from the operator station.

- Clicking on the Man button on the operator's faceplate activates the control mode MAN. Man is indicated on the object display and Faceplate and a dialog entry window is available on the faceplate for the operator to enter the required value.
- Input terminal SeqMan when activated by a pulse.

5.3 Filtering

You may select software filtering of the MV value. The Filter Parameter time constant is entered directly in time format. A filter time >0 but less than the task scan-time (TS) will be set equal to TS. The filter corresponds to a one-pole low-pass filter. The filter is set from the interaction window.

5.4 Scaling and Engineering Units

All values are used in the system as engineering units. Using the interaction window enters Max, Min, Unit and Fraction (Decimal).

5.5 Limit check

In the Limit check part of the function block you determine whether and how a limit check will be performed. The result is stored in the output terminals and is thus available to other programs. The limits can be set from the extended faceplates limits tab or from the interaction window.

5.6 Alarm and Alarm Limitation Functions

The following alarms are monitored in the function block:

- Measured value MV with two upper and two lower alarm limits

When an alarm limit is exceeded, an alarm, which must be acknowledged, is transmitted to the operator station (and printer, if provided). Alarms are also available as outputs on the Function Block.

The time stamping of the alarm is done when the function block is executed.

5.6.1 Alarm Limits

When determining the MV alarm limits, the following equation applies:

$$H\ 2 \geq H\ 1 \geq L\ 1 \geq L\ 2$$

If an attempt is made to cross the alarm limits with each other, the operation is not permitted. There is no change of the limit. The limits are set by entering values in the interaction window or in the extended faceplate under the limits tab.

5.6.2 Alarm Blocking

The Alarm Block function disables alarm Supervision of the measured value (MV).

The event handling function makes it possible to block all alarms from the operator's station or from the function block via terminal ExtCtrl.

The following errors can be blocked:

$$MV \geq H\ 2$$

$$MV \geq H\ 1$$

$$MV \leq L\ 1$$

$$MV \leq L\ 2$$

Using Event handling to block alarms means that the printer and operator's station and updating of the error list are blocked. The PC outputs are not affected.

The following terminals are used for alarm handling.

MV_GT_H2 Measured value exceeds H2

MV_GT_H1 Measured value exceeds H1

MV_LT_L1 Measured value less than L1

MV_LT_L2 Measured value less than L2

5.6.3 Event handling

Event are generated for status change on the signals defined in interaction window in chapter 4.9.4.

The layout of the event is described in chapter 6.3.

All Operator Events are reported by Audit Trail Functionality and not included in the FunctionBlock.

The individual text string for each event is stored in the Alarm and Event Translator aspect. This text can be NLS handled.

5.7 Process connections

The AIC01 is connected to the process via the following two input terminals.

- MV Connection for measured value e.g. a variable showing the result of a calculation.
- Value. MV output to e.g. a Ratio controller or to the operator's displays.

5.8 Interaction Window

The interaction window is available in the Control^{IT} Control Builder. The interaction window is an engineering aid used to simplify configuration and blocking of signals not available on the faceplates. Changes to values in the Interaction window are only available in 'Online' mode in Control^{IT}.

5.8.1 AIC01 Interaction Window

Interaction window overview. Name and description are shown. The buttons are links to sub-windows.

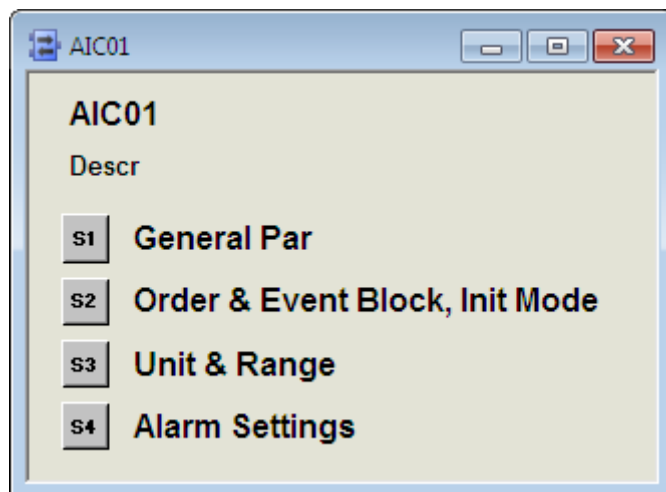


Figure 4-1 Main Interaction Window.

5.8.2 General Parameters

“Class” defines the process section or area in which alarms are grouped. By utilizing class the alarms can be filtered. Valid values are user defined. A suggestion would be to use mill area numbers as class values.

“Severity” defines the alarm priority for general alarms. The severity for MV-alarms is entered in window “Alarm & Event”. Valid values are 1 –1000 where 1000 is the highest priority.

AIC01

Name :

Description :

Class :

Severity :

Figure 4-2 General Parameters.

5.8.3 Units and Range

Decimal resolution, engineering units and minimum and maximum range are shown and filter time entered in this window.

AIC01

Unit & Range

Range Max :

Range Min :

Unit :

No. of Dec :

Filter_P :

Figure 4-3 Units & Range.

5.8.4 Alarm & Event handling

Alarm limits, Severity and Enabling of the alarms for measured value as well as hysteresis and alarm delay time is entered in this window.

For AE config the following values are valid

- 0 No Alarm or Event are generated
- 1 Alarm and Event are generated
- 2 Event is generated

AIC01

Alarm Settings

	L2 Limit	L1 Limit	H1 Limit	H2 Limit
AE Config :	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>
Limit :	<input type="text" value="10.0"/>	<input type="text" value="20.0"/>	<input type="text" value="80.0"/>	<input type="text" value="90.0"/>
Hyst :	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>
Severity :	<input type="text" value="1000"/>	<input type="text" value="1000"/>	<input type="text" value="1000"/>	<input type="text" value="1000"/>
Alarm Delay :	<input type="text" value="0d0h0m0s0ms"/>	<input type="text" value="0d0h0m0s0ms"/>	<input type="text" value="0d0h0m0s0ms"/>	<input type="text" value="0d0h0m0s0ms"/>

Figure 4-4 Alarm

5.8.5 Order Block and Event Block

Order Block:

“Manual Mode” blocks the input signal. A value can then be entered from faceplate. Mode is Man.

“E1 mode” reads the input signal MV and displayed the value on the faceplate. Mode is E1.

A 1 will remove the possibility to select the mode form the faceplate

Init Mode define the mode of the object when is started in Cold start

Event Block is used for blocking the event message. A 1 will block the event message

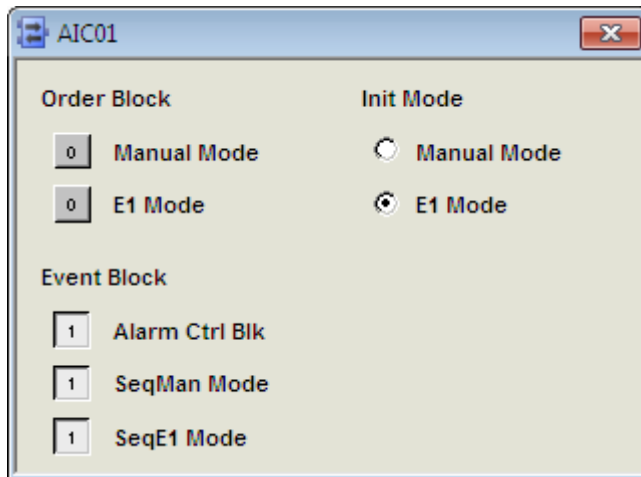


Figure 4-5 Blocking of Orders and Events

5.8.6 Text

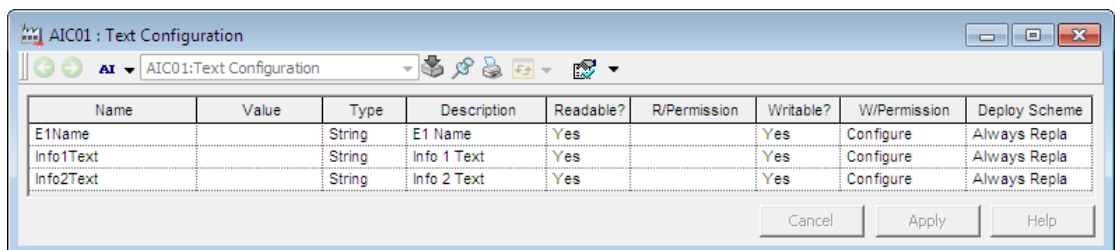


Figure 4-6 Text.

6 Operator Functions

The Operator functions are divided in principle into 3 parts:

- Presentation (Display elements, Time logged properties)
- Faceplate (Dialog)
- Alarm and Event handling

6.1 Presentation

6.1.1 Display Elements

Display elements, which can be used for different display types, are available for use in the functional unit AIC01.

The display elements show the status and the controls of the process with different degrees of detail and are intended for the following displays:

- Object display
- Process display

Examples of different display elements, which could be used, are given in the following sections.

6.1.1.1 Object Display

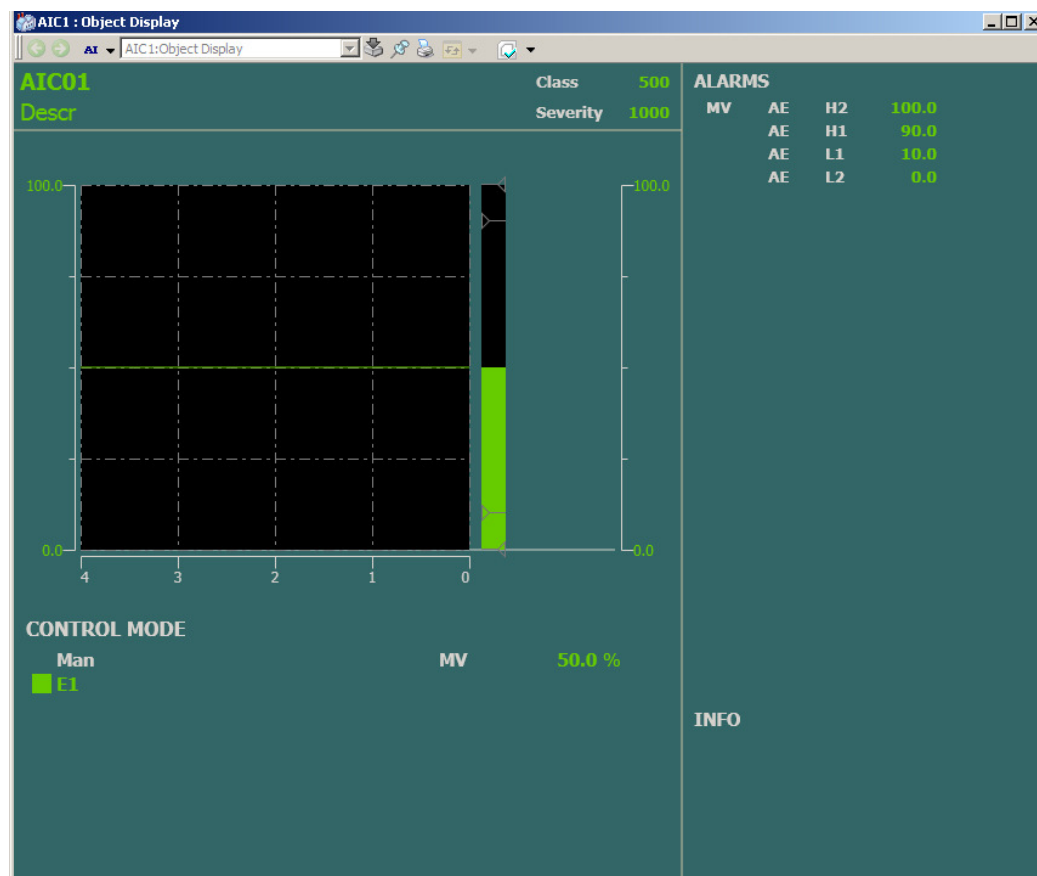


Figure 5-1 Object Display.

6.1.1.2 Process Display

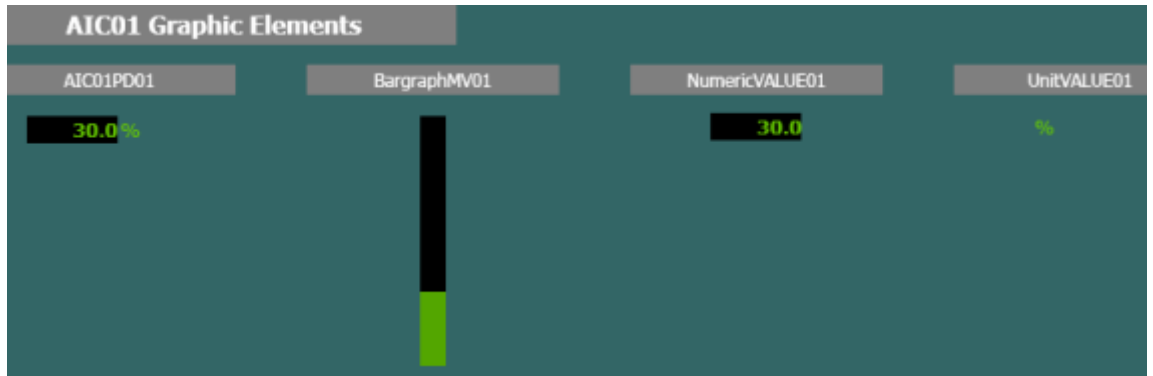


Figure 5-2 Process Display Elements.

6.1.2 Time-logged Properties

Measured values stored can be presented graphically in the form of curves on the display screen. Such a display, a **Trend display**, can consist of 1- 4 curves as standard. All properties for the object AIC01 are available to be logged on the trend curves.

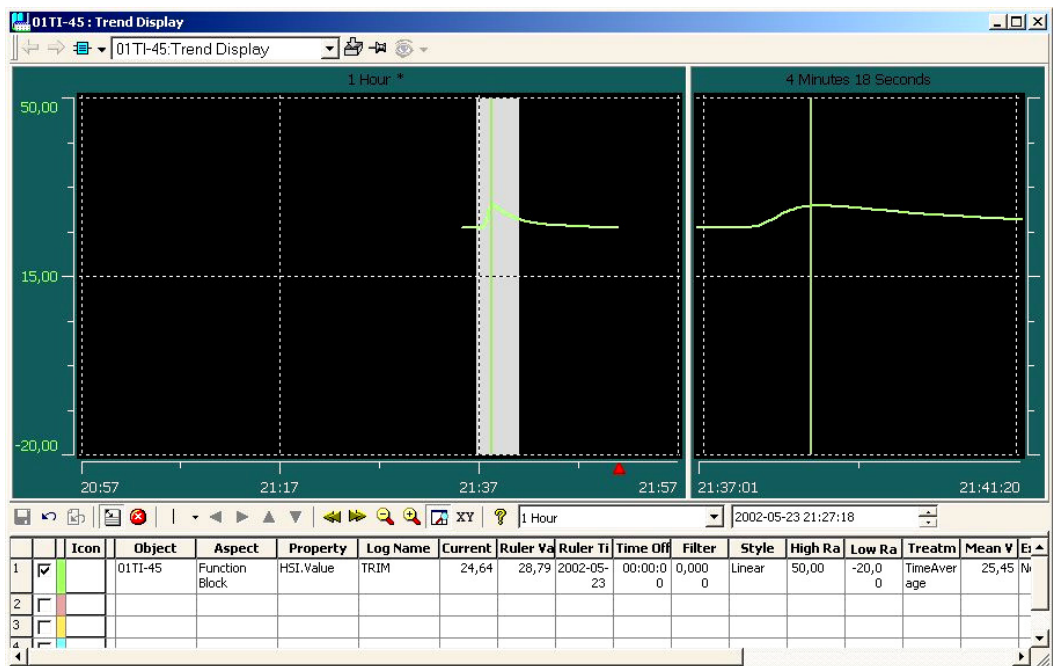


Figure 5-3 Trend Curve

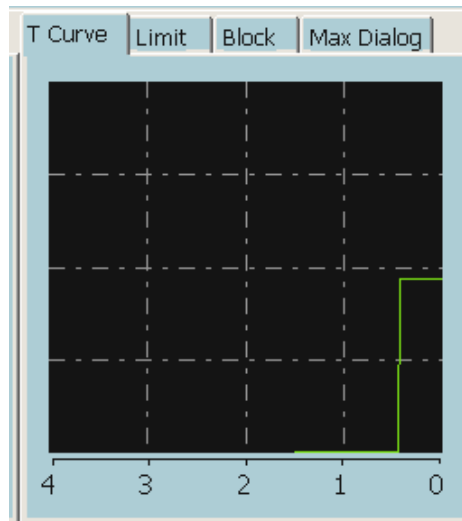


Figure 5-4 Extended Faceplate (T Curve)

6.2 Faceplate(Dialog)

The display screen is supplemented with a mouse and keyboard for operator communication with the functional unit/object.

By using Operate^{IT} Operator Station the operator can view and control the process through faceplates. The dialogue consists of buttons, indicators and graphic presentations within a Faceplate. A faceplate has three levels of dialogue, which are presented by the following three runtime views:

- Reduced Faceplate, where the size and contents typically have been optimized to cover most of the normal process operator actions. Minimum dialogue. This is the default view.
- Faceplate, which typically covers all normal process operator actions. This view is disabled as default.
- Extended Faceplate, with functions and information intended for the process engineer or the advanced operator. Maximum dialogue.

The *figures 5-5 to 5-7* below and overleaf illustrate the various presentations of the faceplate.

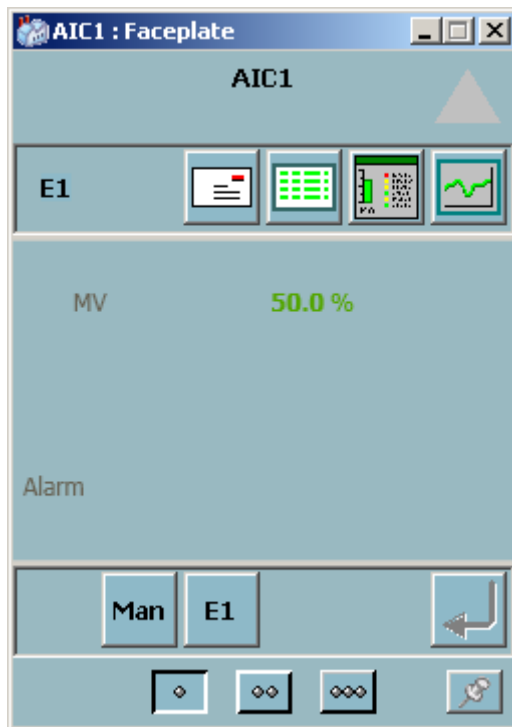


Figure 5-5 Reduced Faceplate.

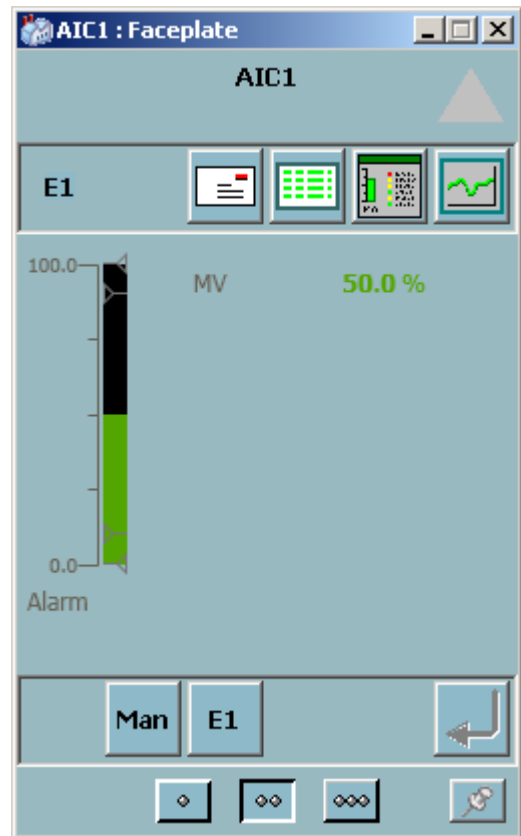


Figure 5-6 Faceplate.

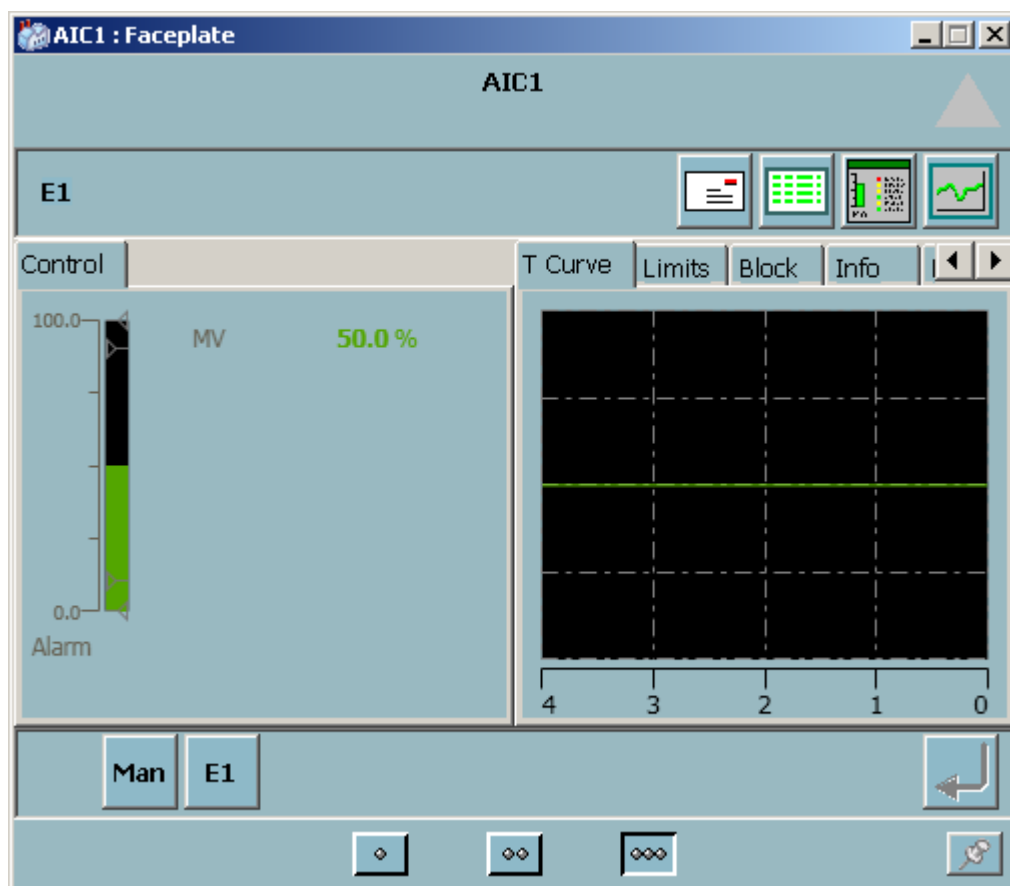


Figure 5-7 Extended Faceplate

6.3 Alarm and Event Handling

6.3.1 General

This section contains a description of all alarms and events in the functional unit AIC01.

When a measured value deviates from the controller's limits or fails, an alarm and an event is generated. These alarms and events can be viewed on the Operate^{IT} Operator Station. The alarms are indicated in the faceplate, object display and in the alarm and event list. The alarm limits for AIC01 can be controlled individually.

Event Time	Object Name	Object Description	Condition	Message Description
02-05-23 21:53:55:763	01TI-45	Environmental Temp(°C)	MV_L1	Alarm

Figure 5-8 Alarm List

6.3.2 Alarm and Event Message

The following alarm texts are generated by the functional unit AIC01. The "Message Description" is "hard coded" in the function block and can not be modified.

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The “Condition” text are stored in the Alarm and Event Translator aspect and can be NLS handled.

Object Name	Object Description	Condition	Message Description
<Name>	<Description>	MV>H1	Alarm
<Name>	<Description>	MV>H2	Alarm
<Name>	<Description>	MV<L1	Alarm
<Name>	<Description>	MV<L2	Alarm

The following event texts are generated. The “Message Description” text are stored in the Alarm and Event Translator aspect and can be NLS handled.

ObjectName	ObjectDescription	Message Description
<Name>	<Description>	SeqMan Mode
<Name>	<Description>	SeqE1 Mode
<Name>	<Description>	Alarm P Blk
<Name>	<Description>	Acknowledge Alarm

6.4 Faceplate tabs

6.4.1 Alarm and Event Blocking

By using the extended faceplate it is possible for the process engineer to block alarms. The check box “Enable Object”, is used to set the object out of service.

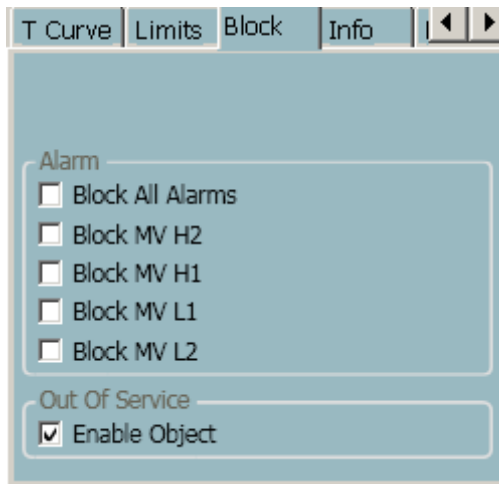


Figure 5-9 Extended Faceplate (Block)

6.4.2 Order Blocking

By using the extended faceplate it is possible for the process engineer to limit the operator access to different control modes.

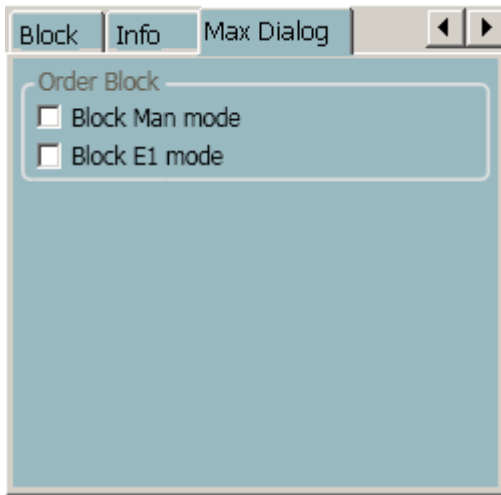


Figure 5-10 Extended Faceplate (Max Dialog)

6.4.3 Limits

By using the extended faceplate it is possible to adjust the limits for the measured value. The faceplate elements in the extended faceplate below illustrate this.

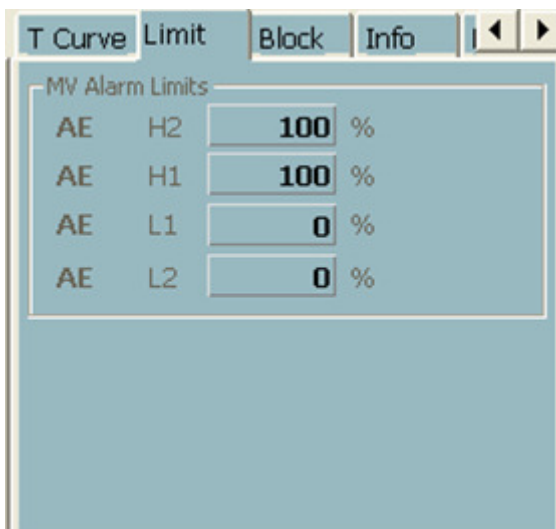


Figure 5-11 Extended Faceplate (Limits)

6.4.4 Info

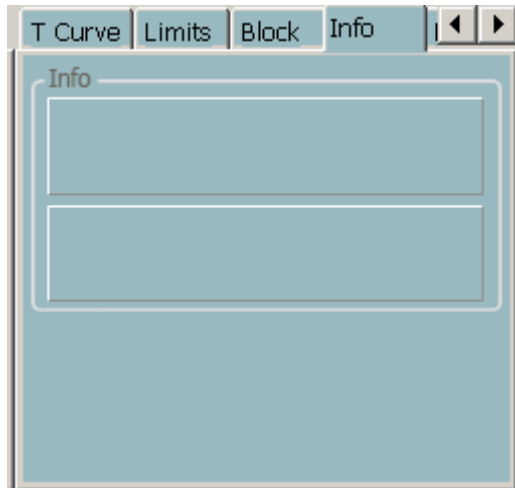


Figure 5-12 Extended Faceplate (Info)

REVISION

Rev.	Page (P) Chapt. (C)	Description	Date Dept./Init.
A		Release 2.0/0	03-01-28/MP
B		Orderblock added	03-11-06/MP
C	5, 6	Initialization	04-04-14/FM
D	3, 4	Input terminals, Alarm & Event blocking	05-02-21/MP
E	4,5	Event handling	05-02-23/BP
F	5	Faceplate, Rev 4.0/1	05-08-26/MP
G	3	Rev 4.0/5	070510/BP
H		Rev 5.0-1	081230/BP
I	5.1.1.2	Process Display updated	090909/BP
J		Update for Rev 5.1-0	101101/BP