<table>
<thead>
<tr>
<th>Prep. /</th>
<th>10-11-30</th>
<th>Function Description</th>
<th>DIS01 Functional Description</th>
<th>No. of p.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appr. PA/R/ Bengt Persson</td>
<td>Approved</td>
<td>DIS01 Functional Description</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Resp. dept.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FUNCTIONAL DESCRIPTION**

DIS01

Digital Input Signal
Contents

1 General ........................................................................................................................................ 4
2 Configuration .................................................................................................................................. 4
3 Function Block DIS01 .................................................................................................................. 5
4 DIS01 Datatypes .......................................................................................................................... 6
  4.1 DIS01_InPar ............................................................................................................................ 6
  4.2 DIS01_OutPar .......................................................................................................................... 6
  4.3 DIS01_Opr .................................................................................................................................. 6
5 Function .......................................................................................................................................... 7
  5.1 Basic Properties ....................................................................................................................... 7
  5.2 Control Modes and Updating .................................................................................................... 7
    5.2.1 E1 ....................................................................................................................................... 7
    5.2.2 Manual .............................................................................................................................. 7
    5.2.3 Manual Forced ................................................................................................................... 7
  5.3 Filtering ..................................................................................................................................... 8
  5.4 Error handling ......................................................................................................................... 8
  5.5 IO Status ................................................................................................................................... 8
  5.6 Alarm Functions ....................................................................................................................... 8
    5.6.1 Alarm Blocking .................................................................................................................. 8
    5.6.2 Event handling .................................................................................................................. 8
  5.7 Process connections .................................................................................................................. 9
  5.8 Interaction Window ................................................................................................................... 9
    5.8.1 DIS01 Interaction Window ............................................................................................... 9
    5.8.2 General Parameters ........................................................................................................... 9
    5.8.3 Orders and Events Block ................................................................................................... 10
    5.8.4 Alarm & Event ................................................................................................................... 10
    5.8.5 Texts ................................................................................................................................... 11
6 Operator Functions ....................................................................................................................... 12
  6.1 Presentation .............................................................................................................................. 12
    6.1.1 Display Elements ................................................................................................................ 12
    6.1.2 Time-logged Properties ..................................................................................................... 13
  6.2 Faceplate(Dialog) ....................................................................................................................... 14
  6.3 Alarm and Event Handling ........................................................................................................ 16
    6.3.1 General ............................................................................................................................. 16
    6.3.2 Alarm and Event Message ................................................................................................. 16
  6.4 Faceplate tabs ........................................................................................................................... 16
    6.4.1 Alarm and Event Blocking ................................................................................................. 16
    6.4.2 Order Blocking .................................................................................................................. 17
    6.4.3 Status .................................................................................................................................. 17
    6.4.4 Info .................................................................................................................................... 18
1 General

DIS01 is a functional unit for digital input signals in ControlIT, to be operated from OperateIT, Operator Station. DIS01 normally performs a complete function independently.

- DIS01 has the following functions and properties:
- Different control modes set by operator or by control logic.
- Alarm and event handling of important control signals.

2 Configuration

DIS01 comprises a function block type for control and logic functions in ControlIT, a faceplate and an object display in OperateIT for operator functions and control parameters.

![Diagram of DIS01 Functional Unit](image-url)

*Figure 1. The Structure of the Functional Unit*
3 Function Block DIS01

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Type</th>
<th>Attributes</th>
<th>Direction</th>
<th>FD Port</th>
<th>Initial value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOSignal</td>
<td>BoolIO</td>
<td>in_out</td>
<td>yes</td>
<td></td>
<td>Signal from I/O-board(s)</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>string</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>'DIS01' Object name</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>string</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>'Descr' Object description</td>
<td></td>
</tr>
<tr>
<td>Enable</td>
<td>bool</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>true Enable object</td>
<td></td>
</tr>
<tr>
<td>Inverted</td>
<td>bool</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>false Signal inverted</td>
<td></td>
</tr>
<tr>
<td>SignalID</td>
<td>string</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>Hardware address, for SOE I/O</td>
<td></td>
</tr>
<tr>
<td>AL_P_Blk</td>
<td>bool</td>
<td>retain</td>
<td>in</td>
<td>yes</td>
<td>Block alarm</td>
<td></td>
</tr>
<tr>
<td>AlarmAck</td>
<td>bool</td>
<td>retain</td>
<td>in</td>
<td>yes</td>
<td>Acknowledge alarm</td>
<td></td>
</tr>
<tr>
<td>InPar DIS01_InPar</td>
<td>by_ref</td>
<td>in</td>
<td>yes</td>
<td></td>
<td>In Parameter</td>
<td></td>
</tr>
<tr>
<td>EventName</td>
<td>string</td>
<td>coldretain</td>
<td>in</td>
<td>yes</td>
<td>'</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>IO_Value</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>I/O value</td>
<td></td>
</tr>
<tr>
<td>Err</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Error</td>
<td></td>
</tr>
<tr>
<td>Err_Type</td>
<td>string[20]</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Error type</td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Man mode</td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>E1 mode</td>
<td></td>
</tr>
<tr>
<td>Forced</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Channel is forced</td>
<td></td>
</tr>
<tr>
<td>Disturb</td>
<td>bool</td>
<td>retain</td>
<td>out</td>
<td>yes</td>
<td>Alarm</td>
<td></td>
</tr>
<tr>
<td>OutPar DIS01_OutPar</td>
<td>by_ref</td>
<td>out</td>
<td>yes</td>
<td></td>
<td>Out Parameter</td>
<td></td>
</tr>
<tr>
<td>Opr</td>
<td>DIS01_Opr</td>
<td>by_ref</td>
<td>out</td>
<td>yes</td>
<td>Operator order</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3-1. Function Block Type, Complete symbol

Table 3-1 below illustrates the default properties of each terminal of the DIS01 function block.

Table 3-1. Terminal properties.
4 DIS01 Datatypes

4.1 DIS01_InPar

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Type</th>
<th>Attributes</th>
<th>Initial value</th>
<th>ISP value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>dint</td>
<td>coldretain</td>
<td>500</td>
<td>AE class</td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td>dint</td>
<td>coldretain</td>
<td>1000</td>
<td>AE severity</td>
<td></td>
</tr>
<tr>
<td>InitMode</td>
<td>dint</td>
<td>coldretain</td>
<td>7</td>
<td>Init mode: 5 = Man ; 7 = E1</td>
<td></td>
</tr>
<tr>
<td>ManBlk</td>
<td>bool</td>
<td>coldretain</td>
<td>false</td>
<td>Block operator order Man mode</td>
<td></td>
</tr>
<tr>
<td>E1Blk</td>
<td>bool</td>
<td>coldretain</td>
<td>false</td>
<td>Block operator order E1 mode</td>
<td></td>
</tr>
<tr>
<td>AlcBlkEvBlk</td>
<td>bool</td>
<td>coldretain</td>
<td>true</td>
<td>Block event for AlcBlk</td>
<td></td>
</tr>
<tr>
<td>AEConfigStatus</td>
<td>dint</td>
<td>coldretain</td>
<td>0</td>
<td>AE configuration for Disturbance</td>
<td></td>
</tr>
<tr>
<td>NormPos</td>
<td>bool</td>
<td>coldretain</td>
<td>false</td>
<td>Normal position</td>
<td></td>
</tr>
<tr>
<td>AlarmDelay</td>
<td>time</td>
<td>coldretain</td>
<td>0s</td>
<td>Alarm delay</td>
<td></td>
</tr>
<tr>
<td>AlarmText</td>
<td>string</td>
<td>coldretain</td>
<td>'Alarm'</td>
<td>Alarm text</td>
<td></td>
</tr>
</tbody>
</table>

4.2 DIS01_OutPar

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Type</th>
<th>Attributes</th>
<th>Initial value</th>
<th>ISP value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlarmBlk</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Alarm blocked</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td>Active mode</td>
<td></td>
</tr>
<tr>
<td>NormalMode</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Normal mode (Active mode = Init mode)</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>AlarmInd</td>
<td>retain</td>
<td></td>
<td>Alarm indication for Status</td>
<td></td>
</tr>
<tr>
<td>HWStatus</td>
<td>HwStatus</td>
<td>retain</td>
<td></td>
<td>Hardware status</td>
<td></td>
</tr>
<tr>
<td>SubStatus</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td>Hardware substatus</td>
<td></td>
</tr>
<tr>
<td>IOStatus</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td>Hardware I/O status quality</td>
<td></td>
</tr>
</tbody>
</table>

4.3 DIS01_Opr

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Type</th>
<th>Attributes</th>
<th>Initial value</th>
<th>ISP value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlockAlarm</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Operator block alarms</td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Operator order Manual mode</td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Operator order E1 mode</td>
<td></td>
</tr>
<tr>
<td>Ord_On</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Operator order ON command</td>
<td></td>
</tr>
<tr>
<td>Ord_Off</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td>Operator order OFF command</td>
<td></td>
</tr>
</tbody>
</table>
5 Function

5.1 Basic Properties
The DIS01 functional unit is designed for a standard digital input signal. DIS01 has the following basic functions:
- Control Modes and Updating
- Filtering
- Error Handling
- Alarm and event handling.
- Operator Functions

5.2 Control Modes and Updating
The digital signal is read at intervals determined by the controller's 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 DIS01, where the value is obtained from the I/O-module at input terminal :IOSignal. The control mode E1 can be commanded from the operator's station.
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.

5.2.2 Manual
In this mode the operator directly sets the output value from the operator station.
The control mode MAN is activated by:
- Clicking on the Man button on the operator's faceplate activates the control mode MAN. Man is indicated on the object display and on the Faceplate.

5.2.3 Manual Forced
Manual Forced is a control mode, where the operator blocks the I/O-module input and can write directly to the I/O-module input variable.
- Enabling the Forced check box in the I/O Hardware section of the controller activates the control mode FORCED.

Examples of use:
During a plant stop I/O conditions could prevent opening of e.g. a valve. ManFd enables the operator to still use the I/O for value testing etc.
5.3 Filtering

A filter time is set directly on the I/O module, which can be used to remove noise. The value may be 2ms, 4ms, 8ms or 16ms.

5.4 Error handling

The control function of a DI signal indicates errors via Err and Err_Type. Different types of errors can occur, that are caused by the system.

This occurs if the I/O-module function is determined non-functional. Typical causes of this type of error are:

- Missing or faulty hardware
- Incorrectly installed hardware or software
- Error in the bus communication.

Errors in the DI-module are copied to the error handling function of the DIS01 and the error flag Err is set to 1 and the type of error can be read at terminal Err_Type.

The Err and Err_Type terminals of the DIS01 function block can be connected to programs where the desired function may be built.

5.5 IO Status

The status of the connected IO devices can be indicated on the faceplate of the DIS01 object on tab “Status”.

5.6 Alarm Functions

The following alarms are monitored in the function block:

- OPC Status.
- Input I/O Signal if changing state from the normal position.

When an alarm state is activated, an alarm, which must be acknowledged, is transmitted to the operator station (and printer, if provided). The Alarm is also available as an output on the disturbance terminal of the Function Block. The inverted input terminal of the function block can be used to invert the presentation of the signal.

The time stamping of the alarm is done when the function block is executed. With SOE I/O-units e.g. DI830 the time stamping is done in the hardware unit. To transfer this time stamp to the FB, the hardware address of the I/O-channel is entered in terminal “SignalID”.

5.6.1 Alarm Blocking

The Alarm Block function disables the alarm supervision of the input value.

The alarm and event handling function makes it possible to block alarms from the operator’s station or from the function block.

By blocking alarms, the printer and operator’s stations updating of the Alarm list are blocked.
5.6.2 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 DIS01 is connected to the process via the following terminals.
- IOSignal Connection for input value e.g. a pressure switch.

5.8 Interaction Window

The interaction window is available in the ControlIT 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 ControlIT.

5.8.1 DIS01 Interaction Window

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

![Main Interaction Window](image)

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. Valid values are 1 –1000 where 1 is the lowest priority.
5.8.3 Orders and Events Block

“Manual Mode” blocks the possibility to enter input signal from faceplate.

“E1 Mode” blocks the possibility to enter input signal from application program.

The “Alarm Ctrl Blk” controls the sending of an Event when the Input parameter AL_P_Blk is activated. If Event Block is set to 1 no Event is sent.

Init Mode define the mode of the object when is cold started.

5.8.4 Alarm & Event

Alarm handling, Normal position and alarm delay time is entered in this window.

For Alarm Treatment config the following values are valid:

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

Alarm text is defining the text that will be presented in the message field in the alarm list.
### 5.8.5 Texts

![Text Configuration](image)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Type</th>
<th>Description</th>
<th>Readable?</th>
<th>RWPermission</th>
<th>Writable?</th>
<th>WPermission</th>
<th>Display Schema</th>
</tr>
</thead>
<tbody>
<tr>
<td>OnText</td>
<td></td>
<td>String</td>
<td>On Text</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Always Replace</td>
</tr>
<tr>
<td>OffText</td>
<td></td>
<td>String</td>
<td>OFF Text</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Always Replace</td>
</tr>
<tr>
<td>InfoText</td>
<td></td>
<td>String</td>
<td>Info Text</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Always Replace</td>
</tr>
<tr>
<td>Info2Text</td>
<td></td>
<td>String</td>
<td>Info 2 Text</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Always Replace</td>
</tr>
</tbody>
</table>
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 DIS01.

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.](image_url)
6.1.1.2 Process Display

![Process Display Elements](Image)

Figure 5-2 Process Display Elements.

6.1.2 Time-logged Properties

Digital values stored can be presented graphically in the form of traces on the display screen. Such a display, a Trend display, can consist of 1-4 traces as standard. All properties for the object DIS01 are available to be logged on the trend curves.

![Trend Curve](Image)

Figure 5-3 Trend 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 OperateIT 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 DIS01. When an input value fails or changes state an alarm and an event is generated and 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 DIS01 can be controlled individually.

![Alarm List]

Figure 5-8 Alarm List

6.3.2 Alarm and Event Message

The following alarm texts are generated by the functional unit DIS01. The “Message Description” text is hard coded and can not be changed. The “Condition” text are stored in the Alarm and Event Translator aspect and can be NLS handled.

<table>
<thead>
<tr>
<th>Object Name</th>
<th>Object Description</th>
<th>Condition</th>
<th>Message Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Name&gt;</td>
<td>&lt;Description&gt;</td>
<td>Status</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Source Name</th>
<th>Object Description</th>
<th>Condition</th>
<th>Message Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Name&gt;</td>
<td>&lt;Description&gt;</td>
<td></td>
<td>Alarm P Blk</td>
</tr>
<tr>
<td>&lt;Name&gt;</td>
<td>&lt;Description&gt;</td>
<td></td>
<td>Acknowledge Alarm</td>
</tr>
</tbody>
</table>

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 alarm.
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.

6.4.3 Status

The “Status” tab of the extended faceplate is showing the type of device and it’s status for the measured value. The faceplate elements in the extended faceplate below illustrate this.
6.4.4 Info

Figure 5-11 Extended Faceplate (Status)

Figure 5-12 Extended Faceplate (Info)
## REVISION

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Page (P)</th>
<th>Chapt. (C)</th>
<th>Description</th>
<th>Date</th>
<th>Dept./Init.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td>Version 2.0</td>
<td>03-02-10</td>
<td>MP</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td>Orderblock added</td>
<td>031106</td>
<td>MP</td>
</tr>
<tr>
<td>C</td>
<td>5, 6</td>
<td></td>
<td>Initialization</td>
<td>04-04-14</td>
<td>FM</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td>Rev 3.1/2</td>
<td>050223</td>
<td>MP</td>
</tr>
<tr>
<td>E</td>
<td>4, 5</td>
<td></td>
<td>Event handling is added. Update of Faceplate and Interaction window elements</td>
<td>050324</td>
<td>BP</td>
</tr>
<tr>
<td>F</td>
<td>4, 5</td>
<td></td>
<td>Faceplate</td>
<td>05-08-26</td>
<td>MP</td>
</tr>
<tr>
<td>G</td>
<td>3</td>
<td></td>
<td>Rev 4.0/5</td>
<td>070510</td>
<td>BP</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td>Rev 5.0-1</td>
<td>081230</td>
<td>BP</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td>Update Rev 5.1/0</td>
<td>101102</td>
<td>BP</td>
</tr>
</tbody>
</table>