FUNCTIONAL DESCRIPTION

DOS01

Digital Output Signal
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1 General

DOS01 is a functional unit for digital output signals in ControlIT, to be operated from OperateIT, Operator Station. DOS01 normally performs a complete function independently.

DOS01 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

DOS01 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 the Structure of the Functional Unit](image)

*Figure 1. The Structure of the Functional Unit*
## 3 Function Block DOS01

### Table 3-1 below illustrates the default properties of each terminal of the DOS01 function block.

<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>Signal</td>
<td>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>“DOS01” 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>MV</td>
<td>bool</td>
<td>retain</td>
<td>in</td>
<td>yes</td>
<td>E1 Reference</td>
<td></td>
</tr>
<tr>
<td>SeqMan</td>
<td>bool</td>
<td>retain</td>
<td>in</td>
<td>yes</td>
<td>Order mode to Man</td>
<td></td>
</tr>
<tr>
<td>SeqE1</td>
<td>bool</td>
<td>retain</td>
<td>in</td>
<td>yes</td>
<td>Order mode to E1</td>
<td></td>
</tr>
<tr>
<td>InPar</td>
<td>DOS01_InPar</td>
<td>by_ref</td>
<td>in</td>
<td>yes</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>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>OutPar</td>
<td>DOS01_OutPar</td>
<td>by_ref</td>
<td>out</td>
<td>yes</td>
<td>Out Parameter</td>
<td></td>
</tr>
<tr>
<td>Opr</td>
<td>DOS01_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. Terminal properties.
## DOS01 Datatypes

### 4.1 DOS01_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></td>
<td>AE class</td>
</tr>
<tr>
<td>Severity</td>
<td>dint</td>
<td>coldretain</td>
<td>1000</td>
<td></td>
<td>AE severity</td>
</tr>
<tr>
<td>InitMode</td>
<td>dint</td>
<td>coldretain</td>
<td>7</td>
<td></td>
<td>Init mode (5 = Man ; 7 = E1)</td>
</tr>
<tr>
<td>ManBlk</td>
<td>bool</td>
<td>coldretain</td>
<td>false</td>
<td></td>
<td>Block operator order Man mode</td>
</tr>
<tr>
<td>E1Blk</td>
<td>bool</td>
<td>coldretain</td>
<td>false</td>
<td></td>
<td>Block operator order E1 mode</td>
</tr>
<tr>
<td>SeqManEvBlk</td>
<td>bool</td>
<td>coldretain</td>
<td>true</td>
<td></td>
<td>Block event for SeqMan</td>
</tr>
<tr>
<td>SeqE1EvBlk</td>
<td>bool</td>
<td>coldretain</td>
<td>true</td>
<td></td>
<td>Block event for SeqE1</td>
</tr>
</tbody>
</table>

### 4.2 DOS01_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>Mode</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td></td>
<td>Active mode</td>
</tr>
<tr>
<td>NormalMode</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td></td>
<td>Normal mode (Active mode = Init mode)</td>
</tr>
<tr>
<td>HWStatus</td>
<td>HwStatus</td>
<td>retain</td>
<td></td>
<td></td>
<td>Hardware status</td>
</tr>
<tr>
<td>SubStatus</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td></td>
<td>Hardware substatus</td>
</tr>
<tr>
<td>IOStatus</td>
<td>dint</td>
<td>retain</td>
<td></td>
<td></td>
<td>Hardware I/O status quality</td>
</tr>
</tbody>
</table>

### 4.3 DOS01_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>Man</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td></td>
<td>Operator order Manual mode</td>
</tr>
<tr>
<td>E1</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td></td>
<td>Operator order E1 mode</td>
</tr>
<tr>
<td>Ord_On</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td></td>
<td>Operator order ON command</td>
</tr>
<tr>
<td>Ord_Off</td>
<td>bool</td>
<td>retain</td>
<td></td>
<td></td>
<td>Operator order OFF command</td>
</tr>
</tbody>
</table>
5 Function

5.1 Basic Properties

The DOS01 functional unit is designed for an operator entry of a digital output.

DOS01 has the following basic functions:

- Control Modes and Updating.
- Error Handling.
- Event handling.
- Operator Functions.

5.2 Control Modes and Updating

The digital 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 DOS01, where the value is obtained from the input terminal: MV. The control mode E1 can be commanded from the operator's station. Enabling the blocking function from the interaction window blocks the E1 order.

The control mode E1 is activated by:

- Clicking on the E1 button on the operator's faceplate. E1 is indicated on the object Display and Faceplate.
- A program activating the input terminal: SeqE1.

5.2.2 Manual

In this mode the operator directly sets the output value from the operator station. Enabling the blocking function from the interaction window blocks the Man order.

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.
- A program activating the input terminal: SeqMan.

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 Error handling
The control function of a DO 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 DO-module are copied to the error handling function of the DOS01 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 DOS01 function block can be connected to programs where the desired function may be built.

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

5.5 Alarm Functions
The DOS does not have any alarm functions only events.

5.5.1 Event handling
Event are generated for status change on the signals defined in interaction window in chapter 6.3
The layout of the event is described in 5.4.1
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.

5.6 Process connections
The DOS01 is connected to the process via the following terminals.
• IOSignal Connection for output to the I/O module e.g. to open an On/Off valve.
• Value Connection for output value, which also can be forced.
• MV External Reference input is connected.
5.7 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.

5.7.1 DOS01 Interaction Window

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

![Figure 4-1 Main Interaction Window.](image)

5.7.2 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.

![Figure 4-2 General Parameters.](image)

5.7.3 Order and Event Blocks

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 from 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 faceplate. Mode is E1
5.7.4 Text

Figure 4-4 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 DOS01.

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

![Object Display](image-url)

*Figure 5-1 Object Display.*
6.1.1.2 Process Display

![Figure 5-2 Process Display Elements.](image)

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 DOS01 are available to be logged on the trend curves.

![Figure 5-3 Trend Curve](image)
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™ 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.
6.3 Event Handling

6.3.1 General

This section contains a description of all alarms and events in the functional unit DOS01. When an output value changes state an an event is generated and can be viewed on the OperateIT Operator Station. The events are indicated in the event list.

The following Event texts are generated by the functional unit DOC01. 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>SeqMan Mode</td>
</tr>
<tr>
<td>&lt;Name&gt;</td>
<td>&lt;Description&gt;</td>
<td></td>
<td>SeqE1 Mode</td>
</tr>
</tbody>
</table>

6.4 Faceplate tabs

6.4.1 Block

The check box “Enable Object”, is used to set the object out of service.
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 Info
6.4.4 Status

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

![Extended Faceplate (Status)](image)

*Figure 5-12 Extended Faceplate (Status)*
<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>Release 2.0</td>
<td>030212</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, Rev 4.0/1</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>Updated rev 5.1/0</td>
<td>101102</td>
<td>BP</td>
</tr>
</tbody>
</table>