


FUNCTIONAL DESCRIPTION

MOTVAL01

Non-Position Motorized Valve

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1 General

MOTVAL01 is a functional unit designed for the control of motorized ON/OFF valves in different processes.

The functional unit is standardized to a high degree to simplify the work of designing presentation, dialog and control logic. MOTVAL01 normally performs its control function without help from other elements.

MOTVAL01 is used in the control of motorized valves from various locations such as:

Operate^{IT} Operator Stations

Control desks

Switch Gear

Local control stations

The valves can also be controlled from a master control function e.g. Group Start or Other higher level control functions.

2 Configuration

MOTVAL01 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.

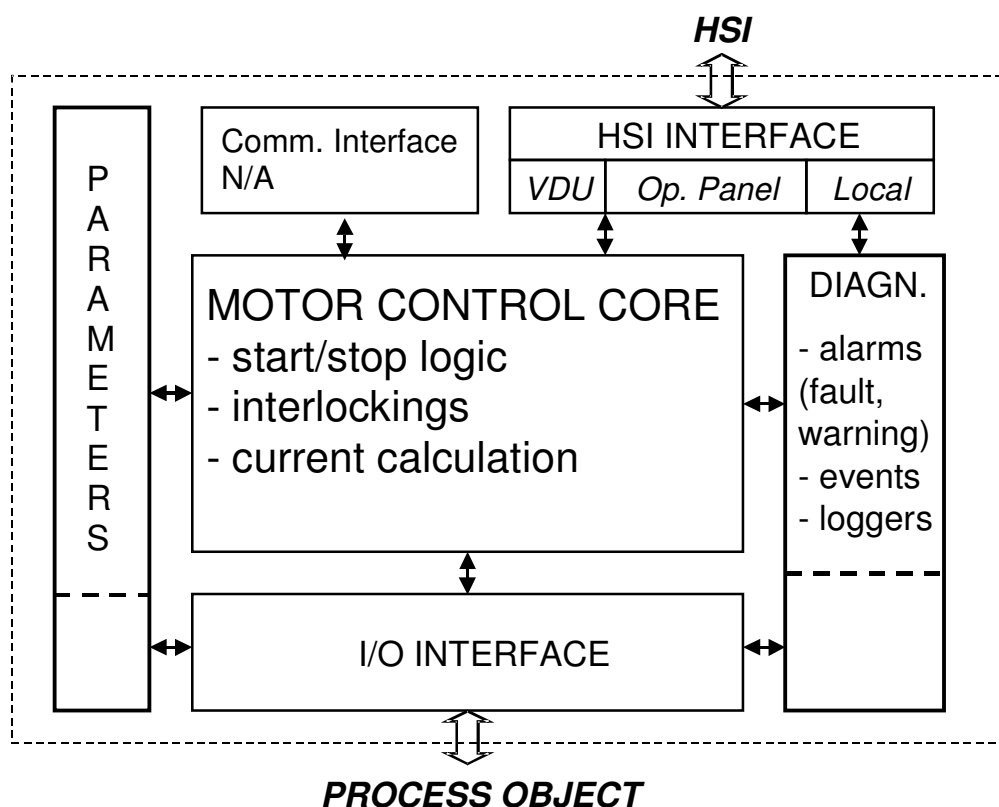


Figure 2-1. The Structure of the Functional Unit

3 Function Block MOTVAL01

FUNCTION OF INPUT TERMINALS	MOTVAL01		FUNCTION OF OUTPUT TERMINALS
Object name	Name	NoInt	No Interlocks
Object description	Description	NoICInt	No Safety Interlocks (IC)
Enable object	Enable	NoIBInt	No Process Interlocks (IB)
Enable control circuit alarm	ME	NoIAInt	No Sequence Interlocks (IA)
Control voltage	M1	Trip	Trip
Overload	M2	Blk	Standby
Motor breaker	M3	RFS	Ready for start
Emergency stop	M4	IPOS	Intermediate position
Short Circuit	M5	OPN	Open order
Safety Interlock 1	IC1	OPNL	Limit switch open is reached
Safety Interlock 2	IC2	CLS	Close order
Safety Interlocks	ICs	CLSL	Limit switch close is reached
Process Interlock 1	IB1	SACK	Start order acknowledgement
Process Interlock 2	IB2	Run	Running
Process Interlock 3	IB3	JogInd	Jog mode
Process Interlock 4	IB4	NoJogInt	No Jog Interlocks
Process Interlocks	IBs	LocalInd	Local mode
Sequence Interlock 1	IA1	ManInd	Man mode
Sequence Interlock 2	IA2	E1Ind	E1 mode
Sequence Interlocks	IAs	E2Ind	E2 mode
Maximum travelling Time	T1	PEO	Position Error Open
Supervision Time	T2	PEC	Position Error Close
Start alarm delay Time	T3	Curr	Actual current (%)
Torque Limit Switch Open	TorqOpn	NormCurr	Normal current (%)
Function of Open on torque switch (1 = Open on torque open switch)	TorqOpnFunc	OutPar	Out Parameter
Torque Limit Switch Close	TorqCls	Opr	Operator order
Function of Close on torque switch (1 = Close on torque close switch)	TorqClsFunc		
Limit Switch Open	LSOpn		
Limit Switch Close	LSCls		
Open order in E1 mode	E1Opn		
Close order in E1 mode	E1Cls		
Open order in E2 mode	E2Opn		
Close order in E2 mode	E2Cls		
Stop order in external mode	Stop		
Selection of MCC run feedback (0 = 2 MCC feedback, 1 = 1 MCC feedback)	Ack1Func		
Main contactor acknowledge open	Ack1		
Main contactor acknowledge close	Ack2		
Motor current	MC		
Actuator position	ActPos		
Order mode to Jog	JogEnbl		
Open order in Jog mode	JogOpn		
Close order in Jog mode	JogCls		
Jog start hold function	JogFunc		
Order mode to Local	LEnbl		
Open order in Local mode	LOpn		
Close order in Local mode	LClS		
Local Stop order	LStop		
Order mode to Man	SeqMan		
Order mode to E1	SeqE1		
Order mode to E2	SeqE2		
Block alarm	AlcBik		
Acknowledge alarm	AlarmAck		
MC alarm configuration	MCAIarm		
In Parameter	InPar		
Event name	EventName		

Figure 3-1. MOTVAL01 Function Block, Complete symbol

Table 3-1 below illustrates the default properties of each terminal of the MOTVAL01 function block.

Name	Data Type	Attributes	Direction	FD Port	Initial value	Description
Name	string	coldretain	in	yes	'Motval01'	Object name
Description	string	coldretain	in	yes	'Descr'	Object description
Enable	bool	coldretain	in	yes	true	Enable object
ME	bool	retain	in	yes	true	Enable control circuit alarm
M1	bool	retain	in	yes	true	Control voltage
M2	bool	retain	in	yes	true	Overload
M3	bool	retain	in	yes	true	Motor breaker
M4	bool	retain	in	yes	true	Emergency stop
M5	bool	retain	in	yes	true	Short Circuit
IC1	bool	retain	in	yes	true	Safety Interlock 1
IC2	bool	retain	in	yes	true	Safety Interlock 2
ICs	ICConn	by_ref	in	yes		Safety Interlocks
IB1	bool	retain	in	yes	true	Process Interlock 1
IB2	bool	retain	in	yes	true	Process Interlock 2
IB3	bool	retain	in	yes	true	Process Interlock 3
IB4	bool	retain	in	yes	true	Process Interlock 4
IBs	IBConn	by_ref	in	yes		Process Interlocks
IA1	bool	retain	in	yes	true	Sequence Interlock 1
IA2	bool	retain	in	yes	true	Sequence Interlock 2
IAs	IAConn	by_ref	in	yes		Sequence Interlocks
T1	time	coldretain	in	yes	60s	Maximum travelling Time
T2	time	coldretain	in	yes	4s	Supervision Time
T3	time	coldretain	in	yes	5s	Start alarm delay Time
TorqOpn	bool	retain	in	yes	true	Torque Limit Switch Open
TorqOpnFunc	bool	coldretain	in	yes	false	Function of Open on torque switch (1 = Open on torque open switch)
TorqCls	bool	retain	in	yes	true	Torque Limit Switch Close
TorqClsFunc	bool	coldretain	in	yes	false	Function of Close on torque switch (1 = Close on torque close switch)
LSOpn	bool	retain	in	yes		Limit Switch Open
LSCls	bool	retain	in	yes		Limit Switch Close
E1Opn	bool	retain	in	yes		Open order in E1 mode
E1Cls	bool	retain	in	yes		Close order in E1 mode
E2Opn	bool	retain	in	yes		Open order in E2 mode
E2Cls	bool	retain	in	yes		Close order in E2 mode
Stop	bool	retain	in	yes	true	Stop order in external mode
Ack1Func	bool	coldretain	in	yes	false	Selection of MCC run feedback (0 = 2 MCC feedback, 1 = 1 MCC feedback)
Ack1	bool	retain	in	yes		Main contactor acknowledge open
Ack2	bool	retain	in	yes		Main contactor acknowledge close
MC	real	retain	in	yes		Motor current
ActPos	real	retain	in	yes		Actuator position
JogEnbl	bool	retain	in	yes		Order mode to Jog
JogOpn	bool	retain	in	yes		Open order in Jog mode
JogCls	bool	retain	in	yes		Close order in Jog mode
JogFunc	bool	retain	in	yes		Jog start hold function
LEnbl	bool	retain	in	yes		Order mode to Local
LOpn	bool	retain	in	yes		Open order in Local mode
LCls	bool	retain	in	yes		Close order in Local mode
LStop	bool	retain	in	yes	true	Local Stop order
SeqMan	bool	retain	in	yes		Order mode to Man
SeqE1	bool	retain	in	yes		Order mode to E1
SeqE2	bool	retain	in	yes		Order mode to E2
AlcBlk	bool	retain	in	yes		Block alarm
AlarmAck	bool	retain	in	yes		Acknowledge alarm
MCAAlarm	AlarmPar	by_ref	in	yes		MC alarm configuration
InPar	Motval01_I	by_ref	in	yes		In Parameter

Name	Data Type	Attributes	Direction	FD Port	Initial value	Description
	nPar					
EventName	string	coldretain	in	yes	' Motval01_ '	Event name
NoInt	bool	retain	out	yes		No Interlocks
NoClnt	bool	retain	out	yes		No Safety Interlocks (IC)
NoIBInt	bool	retain	out	yes		No Process Interlocks (IB)
NoIAInt	bool	retain	out	yes		No Sequence Interlocks (IA)
Trip	bool	retain	out	yes		Trip
Blk	bool	retain	out	yes		Standby
RFS	bool	retain	out	yes		Ready for start
IPOS	bool	retain	out	yes		Intermediate position
OPN	bool	retain	out	yes		Open order
OPNL	bool	retain	out	yes		Limit switch open is reached
CLS	bool	retain	out	yes		Close order
CLSL	bool	retain	out	yes		Limit switch close is reached
SACK	bool	retain	out	yes		Start order acknowledgement
Run	bool	retain	out	yes		Running
JogInd	bool	retain	out	yes		Jog mode
NoJogInt	bool	retain	out	yes		No Jog Interlocks
LocalInd	bool	retain	out	yes		Local mode
ManInd	bool	retain	out	yes		Man mode
E1Ind	bool	retain	out	yes		E1 mode
E2Ind	bool	retain	out	yes		E2 mode
PEO	bool	retain	out	yes		Position Error Open
PEC	bool	retain	out	yes		Position Error Close
Curr	real	retain	out	yes		Actual current (%)
NormCurr	real	retain	out	yes		Normal current (%)
OutPar	Motval01_ OutPar	by_ref	out	yes		Out Parameter
Opr	Motval01_ Opr	by_ref	out	yes		Operator order

Table 3-1. Terminal properties.

4 MOTVAL01 Datatypes

4.1 MOTVAL01_InPar

Name	Data Type	Attributes	Initial value	ISP value	Description
Class	dint	coldretain	500		AE class
Severity	dint	coldretain	1000		AE severity
ActPosRange	RangeReal	coldretain			Actuator Range
InitMode	dint	coldretain	5		Init mode (5 = Man ; 7 = E1 ; 8 = E2)
JogBlk	bool	coldretain	false		Block operator order Jog mode
LocalBlk	bool	coldretain	false		Block operator order Local mode
ManBlk	bool	coldretain	false		Block operator order Man mode
E1Blk	bool	coldretain	false		Block operator order E1 mode
E2Blk	bool	coldretain	false		Block operator order E2 mode
OpenBlk	bool	coldretain	false		Block operator order Open command
CloseBlk	bool	coldretain	false		Block operator order Close command
StopBlk	bool	coldretain	false		Block operator order Stop command
AlcBlkEvBlk	bool	coldretain	true		Block event for AlcBlk
LEnblEvBlk	bool	coldretain	true		Block event for LEnbl
JogEnblEvBlk	bool	coldretain	true		Block event for JogEnbl
SeqManEvBlk	bool	coldretain	true		Block event for SeqMan
SeqE1EvBlk	bool	coldretain	true		Block event for SeqE1
SeqE2EvBlk	bool	coldretain	true		Block event for SeqE2
LSOpnEvBlk	bool	coldretain	true		Block event for LSOpn
LSCIsEvBlk	bool	coldretain	true		Block event for LSCIs
ExtOpenEvBlk	bool	coldretain	true		Block event for ExtOpen
ExtCloseEvBlk	bool	coldretain	true		Block event for ExtClose
ExtStopEvBlk	bool	coldretain	true		Block event for ExtStop
IABlockNotExtMode	bool	coldretain	true		IA blocked when not in E1 or E2 mode
IA1	IAInParType2	coldretain			Configuration for IA1
IA2	IAInParType2	coldretain			Configuration for IA2
IAs1	IAInParType2	coldretain			Configuration for IAs.IA1
IAs2	IAInParType2	coldretain			Configuration for IAs.IA2
IB1	IBInParType2	coldretain			Configuration for IB1
IB2	IBInParType2	coldretain			Configuration for IB2
IB3	IBInParType2	coldretain			Configuration for IB3
IB4	IBInParType2	coldretain			Configuration for IB4
IBs1	IBInParType2	coldretain			Configuration for IBs.IB1
IBs2	IBInParType2	coldretain			Configuration for IBs.IB2
IBs3	IBInParType2	coldretain			Configuration for IBs.IB3
IBs4	IBInParType2	coldretain			Configuration for IBs.IB4
IBs5	IBInParType2	coldretain			Configuration for IBs.IB5
IBs6	IBInParType2	coldretain			Configuration for IBs.IB6
IBs7	IBInParType2	coldretain			Configuration for IBs.IB7
IBs8	IBInParType2	coldretain			Configuration for IBs.IB8
IC1	ICInParType2	coldretain			Configuration for IC1
IC2	ICInParType2	coldretain			Configuration for IC2
ICs1	ICInParType2	coldretain			Configuration for ICs.IC1
ICs2	ICInParType2	coldretain			Configuration for ICs.IC2
RatedCurr	real	coldretain	100.0		Rated current
NormalCurr	real	coldretain	50.0		Normal current
CurrUnit	string	coldretain	'A'		Current unit
ShowCurrent	bool	coldretain	false		Show current presentation
AEConfigLSErr	dint	coldretain	1		AE configuration for Limit Sw Exceed
AEConfigM1	dint	coldretain	1		AE configuration for M1
AEConfigM2	dint	coldretain	1		AE configuration for M2
AEConfigM3	dint	coldretain	1		AE configuration for M3
AEConfigM4	dint	coldretain	1		AE configuration for M4
AEConfigM5	dint	coldretain	1		AE configuration for M5
AEConfigMCErr	dint	coldretain	1		AE configuration for Main Contactor Error
AEConfigPosErr	dint	coldretain	1		AE configuration for Position Error

Name	Data Type	Attributes	Initial value	ISP value	Description
AEConfigPosErrC	dint	coldretain	1		AE configuration for Pos Error Close
AEConfigPosErrO	dint	coldretain	1		AE configuration for Pos Error Open
AEConfigTorqCls	dint	coldretain	1		AE configuration for Torque Close
AEConfigTorqOpn	dint	coldretain	1		AE configuration for Torque Open
OUTIncDec	real	coldretain	2.0		Increase/Decrease step of output (in seconds)

4.2 MOTVAL01_OutPar

Name	Data Type	Attributes	Initial value	ISP value	Description
AlarmBlk	bool	retain			Alarm blocked
IntlkBlk	bool	retain			Interlock blocked
IntlkBlkActive	bool	retain			Interlock blocked active
EnOverrideAll	bool	retain			Override All button enabled
Mode	dint	retain			Active mode
NormalMode	bool	retain			Normal mode (Active mode = Init mode)
IA1Ind	bool	retain			IA1 interlocked
IA2Ind	bool	retain			IA2 interlocked
IAs1Ind	bool	retain			IAs1 interlocked
IAs2Ind	bool	retain			IAs2 interlocked
IB1Ind	bool	retain			IB1 interlocked
IB2Ind	bool	retain			IB2 interlocked
IB3Ind	bool	retain			IB3 interlocked
IB4Ind	bool	retain			IB4 interlocked
IBs1Ind	bool	retain			IBs1 interlocked
IBs2Ind	bool	retain			IBs2 interlocked
IBs3Ind	bool	retain			IBs3 interlocked
IBs4Ind	bool	retain			IBs4 interlocked
IBs5Ind	bool	retain			IBs5 interlocked
IBs6Ind	bool	retain			IBs6 interlocked
IBs7Ind	bool	retain			IBs7 interlocked
IBs8Ind	bool	retain			IBs8 interlocked
IC1Ind	bool	retain			IC1 interlocked
IC2Ind	bool	retain			IC2 interlocked
ICs1Ind	bool	retain			ICs1 interlocked
ICs2Ind	bool	retain			ICs2 interlocked
HCurr	AlarmInd	retain			Alarm Indication for HCurr
LSErr	AlarmInd	retain			Alarm Indication for LSErr
M1	AlarmInd	retain			Alarm Indication for M1
M2	AlarmInd	retain			Alarm Indication for M2
M3	AlarmInd	retain			Alarm Indication for M3
M4	AlarmInd	retain			Alarm Indication for M4
M5	AlarmInd	retain			Alarm Indication for M5
MCErr	AlarmInd	retain			Alarm Indication for MCErr
PosErr	AlarmInd	retain			Alarm Indication for PosErr
PosErrC	AlarmInd	retain			Alarm Indication for PosErrC
PosErrO	AlarmInd	retain			Alarm Indication for PosErrO
TorqCls	AlarmInd	retain			Alarm Indication for TorqCls
TorqOpn	AlarmInd	retain			Alarm Indication for TorqOpn

4.3 MOTVAL01_Opr

Name	Data Type	Attributes	Initial value	ISP value	Description
BlockAlarm	bool	retain			Operator block alarms
Jog	bool	retain			Operator order Jog mode
Local	bool	retain			Operator order Local mode
Man	bool	retain			Operator order Manual mode

Name	Data Type	Attributes	Initial value	ISP value	Description
E1	bool	retain			Operator order E1 mode
E2	bool	retain			Operator order E2 mode
Open	bool	retain			Operator order Open command
Close	bool	retain			Operator order Close command
Stop	bool	retain			Operator order Stop command
Incr	real	retain			Operator order Increase SP command
Decr	real	retain			Operator order Decrease SP command
OverrideAll	bool	retain			Operator override all interlocks
IB1Override	bool	retain			Operator override IB1 interlock
IB2Override	bool	retain			Operator override IB2 interlock
IB3Override	bool	retain			Operator override IB3 interlock
IB4Override	bool	retain			Operator override IB4 interlock
IBs1Override	bool	retain			Operator override IBs.IB1 interlock
IBs2Override	bool	retain			Operator override IBs.IB2 interlock
IBs3Override	bool	retain			Operator override IBs.IB3 interlock
IBs4Override	bool	retain			Operator override IBs.IB4 interlock
IBs5Override	bool	retain			Operator override IBs.IB5 interlock
IBs6Override	bool	retain			Operator override IBs.IB6 interlock
IBs7Override	bool	retain			Operator override IBs.IB7 interlock
IBs8Override	bool	retain			Operator override IBs.IB8 interlock
IA1Override	bool	retain			Operator override IA1 interlock
IA2Override	bool	retain			Operator override IA2 interlock
IAs1Override	bool	retain			Operator override IAs.IA1 interlock
IAs2Override	bool	retain			Operator override IAs.IA2 interlock

5 Function

5.1 Basic Properties

The MOTVAL01 functional unit is designed for control of non-position motorized valves. MOTVAL01 units consist of the following basic functions.

- Supervision of control circuits
- Evaluation of interlocks
- Control of on/off
- Supervision of motor current
- Running of tests from the valve site
- Control from the local operator's panel
- Manual/External running
- Supervision of operations via Operate^{IT} Operator Station

5.2 Control Modes

MOTVAL01 is intended for control from Operate^{IT} Operator Station, i.e. from a central control room. However, it is also possible to select other modes of control and thus control MOTVAL01 from other locations.

All the control modes can be selected from the central operator station. The LOCAL control mode may also be selected from the local control station.

The different modes of control are as follows:

- Jog
- Local
- Manual
- External 1
- External 2

5.3 Ready for Start

Ready for start means that all the interlocks are satisfied, that there are no alarms and that the control mode is not JOG or that the control is DISABLED.

Ready for start is indicated by the MOTVAL01 displays in the Operate^{IT} Operator Station and by the output terminal :RFS (Ready For Start).

5.4 Start-up

An initialization phase begins at start of the system. The result of this becomes:

The outputs are reset (to zero) except for the ManInd terminal, which is set (to 1).

Manual is the default control mode at system initialization. With an additional circuit it is possible to force the control mode to other modes at system initialization.

5.5 Interlocks

The motor operated valve control can be interlocked by signals from the process and also by signals from the control logic. The interlocks are divided into four groups with the following designations and functions.

Safety Interlocks, which interlock the object for safety purposes. The two safety interlocks, IC1Opn and IC2Cls, cannot be blocked. IC1Opn is used to force open the valve when interlock occurs and IC2Cls is used to force close the valve when interlock occurs.

Process Interlocks. There are 4 normal process interlocks, IB1 - IB4. All four interlocks can be configured to accept blocking by the operator. In the same scheme all four can be configured as start interlocks. Start interlock prevents the valve from opening, but does not close an open valve.

External (Sequence) Interlocks. These interlocks (Function block input :IA1Opn and :IA2Cls) are used if the object is to be interlocked against other objects such as a pump motor or a group start or other conditions in an automatic sequence. The interlocks cannot be blocked and the interlocks are not included in the conditions for indication of Ready for start. IA1Opn is used to force open the valve when interlock occurs and IA2Cls is used to force close the valve when interlock occurs.

If *IA blocked when not Ext* is equal to 1

The IA1Opn is effective in E1 mode and IA2Cls is effective in E2 mode.

If *IA blocked when not Ext* is equal to 0

IA1Opn and IA2Cls is effective in all mode except in Jog Mode.

5.6 Control Modes

By selecting control mode, the operator decides from which location the valve is to be controlled. All control modes may be selected through dialog in Operate^{IT} Operator Station. However, the LOCAL control mode may also be selected from the local control station through the Function Block input :LEnbl, provided that the current control mode is neither JOG, nor DISABLE.

For the different control modes, MOTVAL01 is controlled as follows. For a summary of the control modes, see Table 2-1.

5.6.1 Control mode JOG

The control mode JOG is suitable for testing the motor operated valve in the field. The valve is supposed to be controlled from an open/close station adjacent to the valve. Control from other locations is blocked.

The supervision of interlocks is limited. Only the safety interlocks IC1Opn and IC2Cls as well as faults in the control voltage chain (the inputs :M1 - :M5) prevent starting.


The valve is opened and closed through the inputs :JogOpn, JogCls and :JogFunc.

:JogOpn, Open order from field-mounted start/stop station

:JogCls, Close order from field-mounted start/stop station

:JogFunc, Stop/Hold function from field-mounted start/stop station

The function of these inputs is set out in tabular form below.

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:JogOpn	:JogCls	:JogFunc	
1	0	0	Open order.
0	1	0	Close order
0	0	0	Stop order
1	0	1	Open order.
0	1	1	Close order.
0	0	1	No change (last order obtained)

When :JogFunc=1, the motor operated valve is stopped by breaking the control voltage chain, i.e. signified by any of the :M1 - :M5 inputs going low, or in some cases there is a jog stop push button available at field to stop the order, the jog stop from the field is connected to function block input :Stop.

5.6.2 Control mode LOCAL

The valve is controlled from a local desk or panel. Control from other locations is blocked.

LOCAL control mode, like other points of control, may be selected from Operate^{IT} Operator Station. In addition, LOCAL control mode may be selected from the local control panel through the input :LEnbl as follows:

Lenbl= 1: The control mode is LOCAL, as long as the Operate^{IT} Operator Station operator does not request JOG or STAND BY.

Lenbl -> 0: MOTVAL01 resumes the latest control mode called for from Operate^{IT} Operator Station.

The operator controls the valve through the inputs :Lopn, LCIs and :Lstop.

:Lstop Local stop order (active low)

:Lopn Local Open order

:LCIs Local Close order

The function of these inputs is set out in tabular form below.

:Lstop	:Lopn	:LCIs	
0	X	X	Stop order. Note In order for the valve to start when Lstop has been low, Lstop must be set high and LOPN must make a low-to-high transition
1	0	0	No change (Last order obtained)
1	1	0	Open order
1	0	1	Close order

5.6.3 Control mode MANUAL

The valve is controlled from Operate^{IT} Operator Station. Control from other locations is blocked. This is the default control mode. To open, the operator has to press the key

Open. To close, operator has to press the key Close. To stop the valve, the key STOP has to be pressed.

5.6.4 Control mode EXTERNAL 1

The valve is controlled from an external signal, e.g. from a process signal. Control from other locations is blocked. This mode is e.g. used for open/close control of levels and for automatic startup and shutdown of valves.

The process controls the valve through the inputs :E1Opn, E1Cl and Stop. The operator is able to stop the valve by issuing stop order from Operate^{IT} Operator Station. The control mode then changes to Manual, to prevent that the valve is reopened.

5.6.5 Control mode EXTERNAL 2

The valve is controlled from a superior program, e.g. from a group start, sequence or a process signal. Control from other locations is blocked. This mode is e.g. used for open/close control of levels and for automatic startup and shutdown of valves

The process controls the valve through the inputs: E2Opn, E2Cl and Stop. The operator is able to stop the valve by issuing stop order from Operate^{IT} Operator Station. The control mode then changes to Manual, to prevent that the valve is reopened.

The inputs used for open, close and stop orders in control mode External 1 and External 2 are:

:Stop Stop order (active low)

:ExOpn Open order

:ExCl Close order

The function of these inputs is set out in tabular form below:

:Stop	:ExOpn	:ExCl	
0	X	X	Stop order
1	0 -> 1	0	Open order
1	0	0 ->1	Close order

:ExOpn and **:ExCl** are dynamic inputs, i.e. it triggers on the rising edge.

5.6.6 Control mode DISABLED

The valve is stopped and all orders to it are blocked.

5.6.7 Operator Order and Order Blocking

The different orders given by the operator can be read at the output terminal :OprOrder.

Blocking of operator order also possible from the control program by setting the corresponding bits in the terminal :OrdBlk.

5.7 Open, Close and Stop

Open, Close and stop commands for MOTVAL01 may originate from dialog with Operate^{IT} Operator Station or from Function Block inputs, depending on the control mode selected (See Section 5.6 Control Modes, and Table 2-1).

When an Open or a Close command is issued to MOTVAL01, it is forwarded to the motor through the Function Block output :OPN (Open order, Forwards/High/Up) and it is reversed the motor through Function Block output :CLS (Close order, Reverse/Low/Down). See Section 5.7.3 Start Order Selection. The open order on the output :OPN and the close order on the output :CLS are continuous outputs.

The main contactor of the motor acknowledges the open order :OPN or close order :CLS by setting the input :ACK1 high for Open and :ACK2 high for Close. The main contactor must acknowledge within the time determined by the input :T2.

There are certain MCC circuits which connect the ACK1 and ACK2 inside the MCC and only send one feedback to DCS system as open and close acknowledges, in this case the ACK1 on the Function Block input :ACK1 to be set to high or 1.

If the main contactor acknowledges the open order :OPN within the time T2, MOTVAL01 sets the open order output :OPN high and keeps it high. The time T3 after the main contactor having responded, MOTVAL01 starts supervising the motor current. The time T3 is determined by the input :T3

If the main contactor does not acknowledge the start order within the time T2, the start attempt is deemed abortive. Consequently, MOTVAL01 issues an alarm about the contactor failure (Main Contactor Err.) and a new attempt at starting may be made.

The contactor failure alarm indication on the object display of MOTVAL01 disappears when the operator acknowledges the alarm.

MOTVAL01 also issues an alarm about main contactor failure when the contactor acknowledges open or close orders falsely, i.e. when it sets the inputs :ACK1 high without any open order being issued. MOTVAL01 transmits the alarm the time T2 after the input having been set.

5.7.1 Open and Close on Torque

Inputs :TorqOpnFunc and :TorqClsFunc selects opening and/or closing function (Limit sw. or Torque sw and Limit sw.)

:TorqOpnFunc = 0 Opening stops on limit switch :LSOpn.

:TorqOpnFunc = 1 Opening stops on torque switch :TorqOpn.

:TorqClsFunc = 0 Closing stops on limit switch :LSCls.

:TorqClsFunc = 1 Closing stops on torque switch :TorqCls.

If the torque switches are activated before the limit switches, with the torque function selected, an alarm is given. This means that the limit switches of the actuator must be adjusted so that they are made before the torque switches.

5.7.2 Open, Close and Stop Order at Different Control Modes

The table below describes the commands, which can be given at the different control modes of MOTVAL01.

Table 2-1. Relation between commands and control modes

Order	Jog	Local	Manual	Ext1	Ext2
Input JogOpn	Open Stop	-	-	-	-
Input JogCls	Close Stop	-	-	-	-
Input Lopn	-	Open	-	-	-
Input LCls	-	Close	-	-	-
Input Lstop	-	Stop	-	-	-
Operator Open	-	-	Open	-	-
Operator Close	-	-	Close	-	-
Operator stop	Stop	Stop*	Stop	Stop	Stop
Input E1Opn	-	-	-	Open	-
Input E1Cls	-	-	-	Close	-
Input E2Opn	-	-	-	-	Open
Input E2Cls	-	-	-	-	Close
Input Stop	Stop	-	-	Stop	Stop

- Only when local mode is selected from Operate II keyboard

5.7.3 Start Order Selection

The Function Block MOTVAL01 has one open order and one close order outputs:

- :OPN Open order, Forwards/High/up
- :CLS Close order, Reverse/Low/Down

The activation of the outputs is determined as follows from the different points of control.

Control mode JOG

FB input :JogOpn

FB input :JogCls

Control mode LOCAL

FB input :Lopn

FB input :LCls

Control mode MAN

The operator issues a Start order from Operate^{IT} Operator Station.

Control mode Ext1 and EXT2

A superior control program sets the input :ExOpn or ExCls to issue a new open or close order.

See the table below.

:ExOpn	:ExCls	Stop	Descr
0	0	1	No change.
1	0	1	Open order.
0	1	1	Close order
X	X	0	Stop order

Control mode DISABLE

The valve cannot be opened.

5.8 Fault Evaluation in the Control Circuit

Evaluation is performed in the priority order M1, M2, M5, M3 and M4. This means that if the Input :M1 =0, the inputs :M2 - :M5 are not regarded etc. The signal ME interlocks the complete evaluation. ME=0 is used to prevent incorrect alarms with, for example, a total control voltage failure. The inputs M1 to M5 are to be TRUE when there are no errors. The evaluation presupposes that the control circuit consists of a number of breaking contacts in series.

5.9 Supervision of Motor Current

The input MC is connected to the process signal for motor current. In the FB element MOTVAL01, the value which corresponds to 100 % load (rated current) is given for the variable NomCurr. The motor current is compared with NomCurr and an alarm indication is obtained if the current is greater Current Alarm Limit During start up, the comparison is blocked during the time T3. The value presented on the display screen is given as a percentage of the rated current (rated current = 100 %).

5.10 Event handling

Event are generated for status change on the signals defined in interaction window in chapter 5.11.4 Alarm and Event Block

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.

5.11 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}.

5.11.1 MOTVAL01 Interaction Window

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

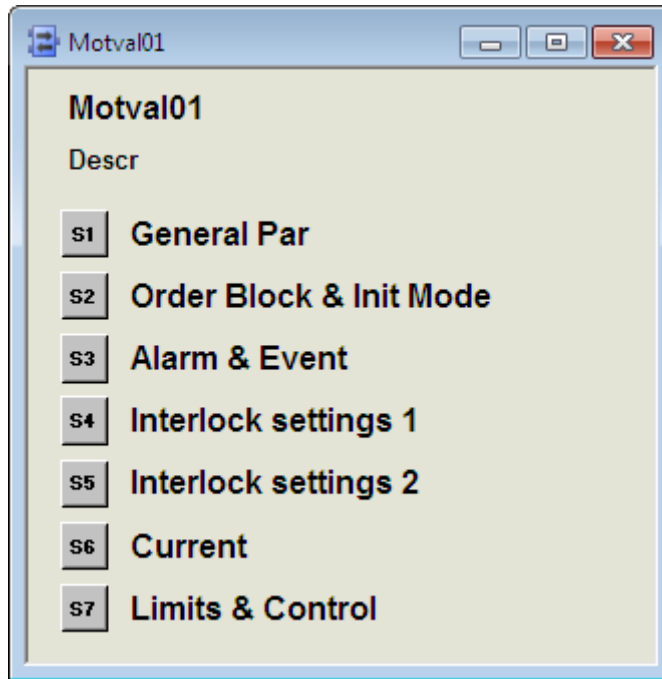


Figure 4-1 Main Interaction Window.

5.11.2 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.

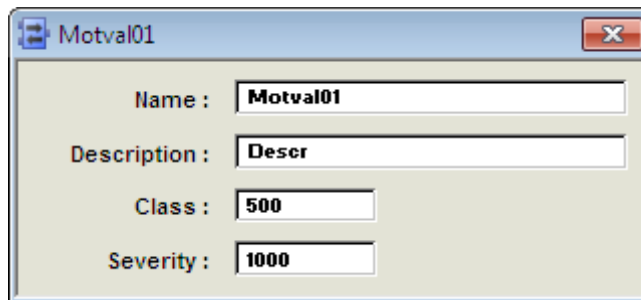


Figure 4-2 General Parameters.

5.11.3 Order & Order Event Block

Blocking of operator order and event handling of these are entered in this window.

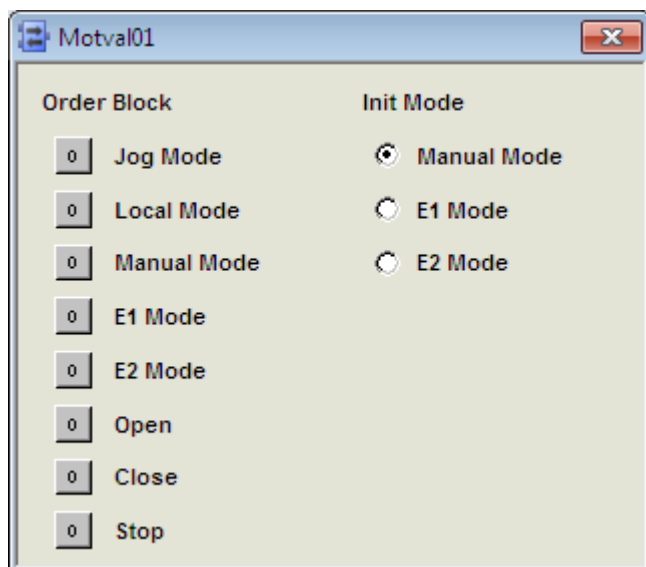


Figure 4-3 Order Block.

5.11.4 Alarm and Event Block

Alarm and Events are generated for status change on the signals defined in interaction window.

The layout of the alarm and event is described in chapter 0.

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.

For Alarm Configuration the following values are valid

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

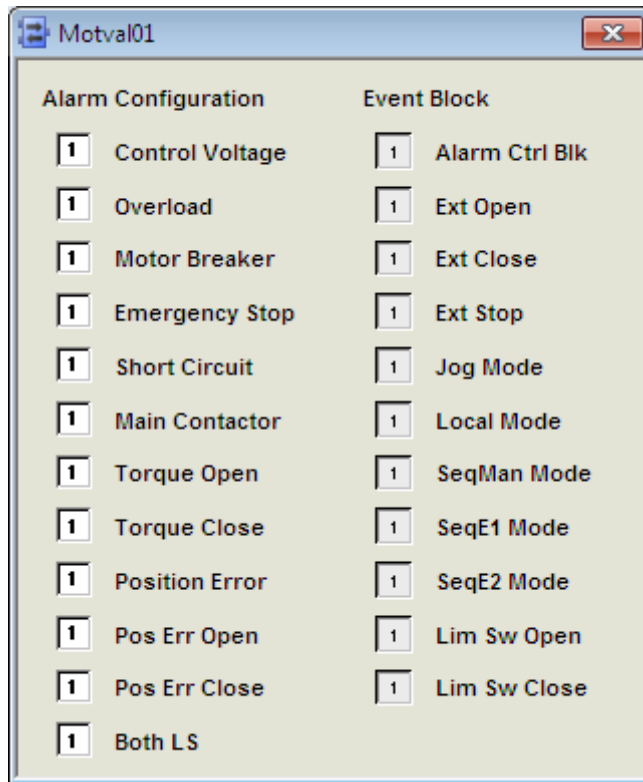


Figure 4-4 Indication Event Block.

5.11.5 Interlock Settings

The different settings for interlocks are entered in this window.

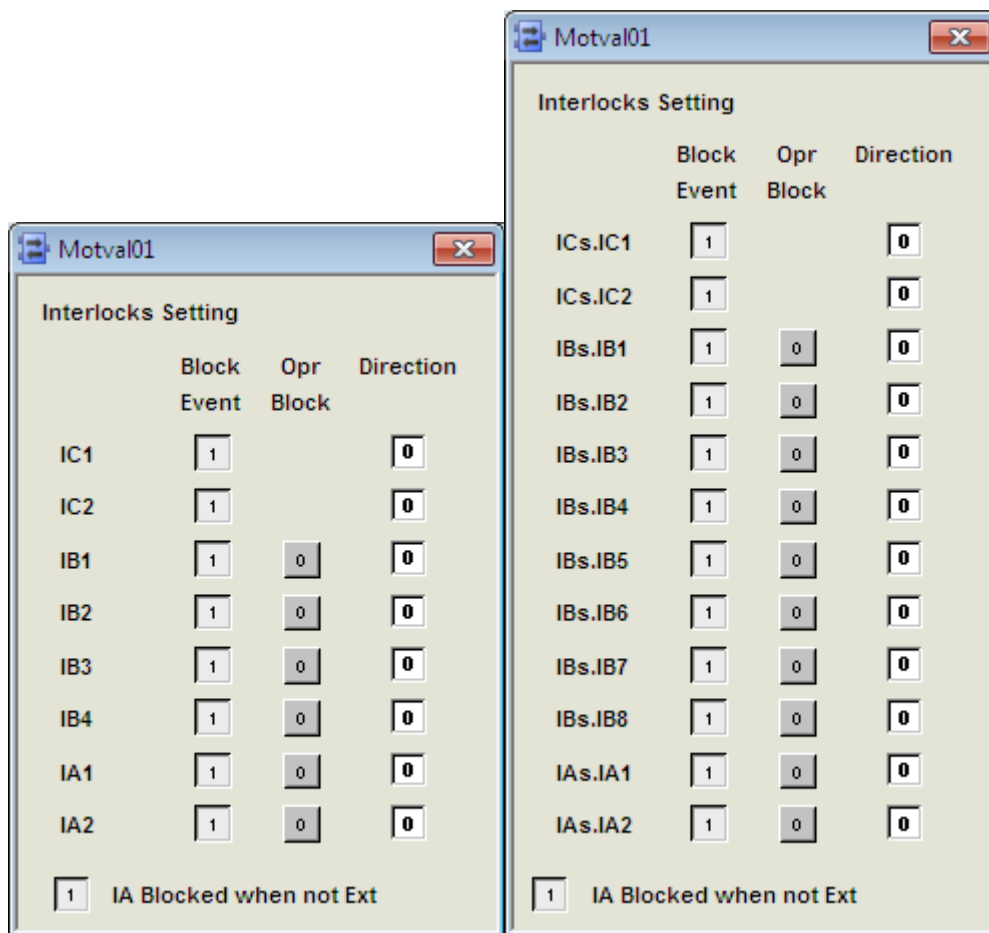


Figure 4-5 Interlock Settings.

5.11.6 Current settings

Motor nominal (rated) current and normal current is entered in this window. The actual current is also indicated.

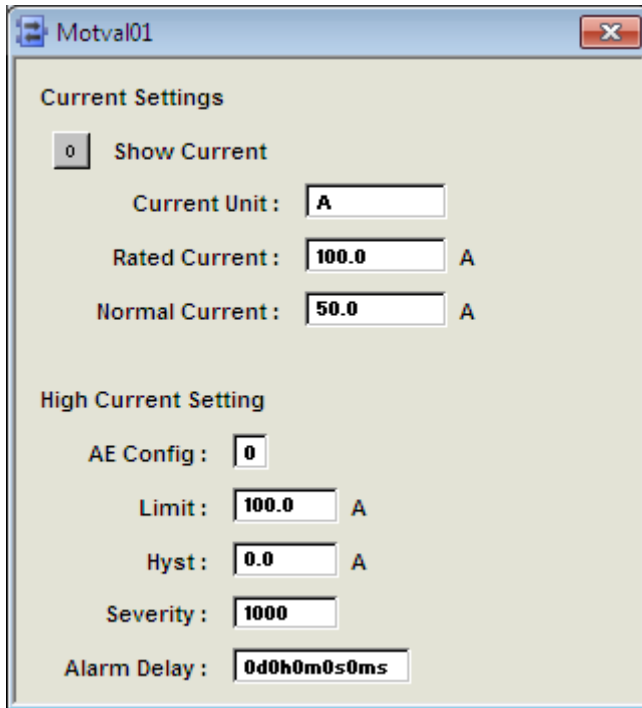


Figure 4-6 Current settings.

5.11.7 Texts

The different interlock and information texts are entered in the aspect Text Properties. The length of the text is limited to about 60 characters, by the size of presentation element in the Interlock Display.

Name	Value	Type	Description	Readable?	R/Permission	Writable?	W/Permission	Deploy Scheme
M1Text	Control Voltage	String	M1 Text	Yes		Yes	Configure	Always Repla
M2Text	Overload	String	M2 Text	Yes		Yes	Configure	Always Repla
M3Text	Motor Breaker	String	M3 Text	Yes		Yes	Configure	Always Repla
M4Text	Emergency Stop	String	M4 Text	Yes		Yes	Configure	Always Repla
M5Text	Short Circuit	String	M5 Text	Yes		Yes	Configure	Always Repla
IC1Text		String	IC1 Interlock Text	Yes		Yes	Configure	Always Repla
IC2Text		String	IC2 Interlock Text	Yes		Yes	Configure	Always Repla
ICs								
IC1Text		String	ICs.IC1 Interlock Te	Yes		Yes	Configure	Always Repla
IC2Text		String	ICs.IC2 Interlock Te	Yes		Yes	Configure	Always Repla
IB1Text		String	IB1 Interlock Text	Yes		Yes	Configure	Always Repla
IB2Text		String	IB2 Interlock Text	Yes		Yes	Configure	Always Repla
IB3Text		String	IB3 Interlock Text	Yes		Yes	Configure	Always Repla
IB4Text		String	IB4 Interlock Text	Yes		Yes	Configure	Always Repla
IBs								
IB1Text		String	IBs.IB1 Interlock Te	Yes		Yes	Configure	Always Repla
IB2Text		String	IBs.IB2 Interlock Te	Yes		Yes	Configure	Always Repla
IB3Text		String	IBs.IB3 Interlock Te	Yes		Yes	Configure	Always Repla
IB4Text		String	IBs.IB4 Interlock Te	Yes		Yes	Configure	Always Repla
IB5Text		String	IBs.IB5 Interlock Te	Yes		Yes	Configure	Always Repla
IB6Text		String	IBs.IB6 Interlock Te	Yes		Yes	Configure	Always Repla
IB7Text		String	IBs.IB7 Interlock Te	Yes		Yes	Configure	Always Repla
IB8Text		String	IBs.IB8 Interlock Te	Yes		Yes	Configure	Always Repla
IA1Text		String	IA1 Interlock Text	Yes		Yes	Configure	Always Repla
IA2Text		String	IA2 Interlock Text	Yes		Yes	Configure	Always Repla
IAs		String	RunInt2 Interlock Te	Yes		Yes	Configure	Always Repla
IA1Text		String	IAs.IA1 Interlock Te	Yes		Yes	Configure	Always Repla
IA2Text		String	IAs.IA2 Interlock Te	Yes		Yes	Configure	Always Repla
Info1Text		String	Info 1 Text	Yes		Yes	Configure	Always Repla
Info2Text		String	Info 2 Text	Yes		Yes	Configure	Always Repla

Figure 4-7 Texts.

5.11.8 Limits & Control

Max, min ranges and units are entered in this window.

Motval01

Limits & Control

Act. Pos. Max :

Act. Pos. Min :

Act. Pos. Unit :

Act. Pos Dec :

OUT Inc/Dec : s

Figure 4-9 Limits & Control.

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 MOTVAL01.

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
- Interlock display

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

6.1.1.1 Object Display

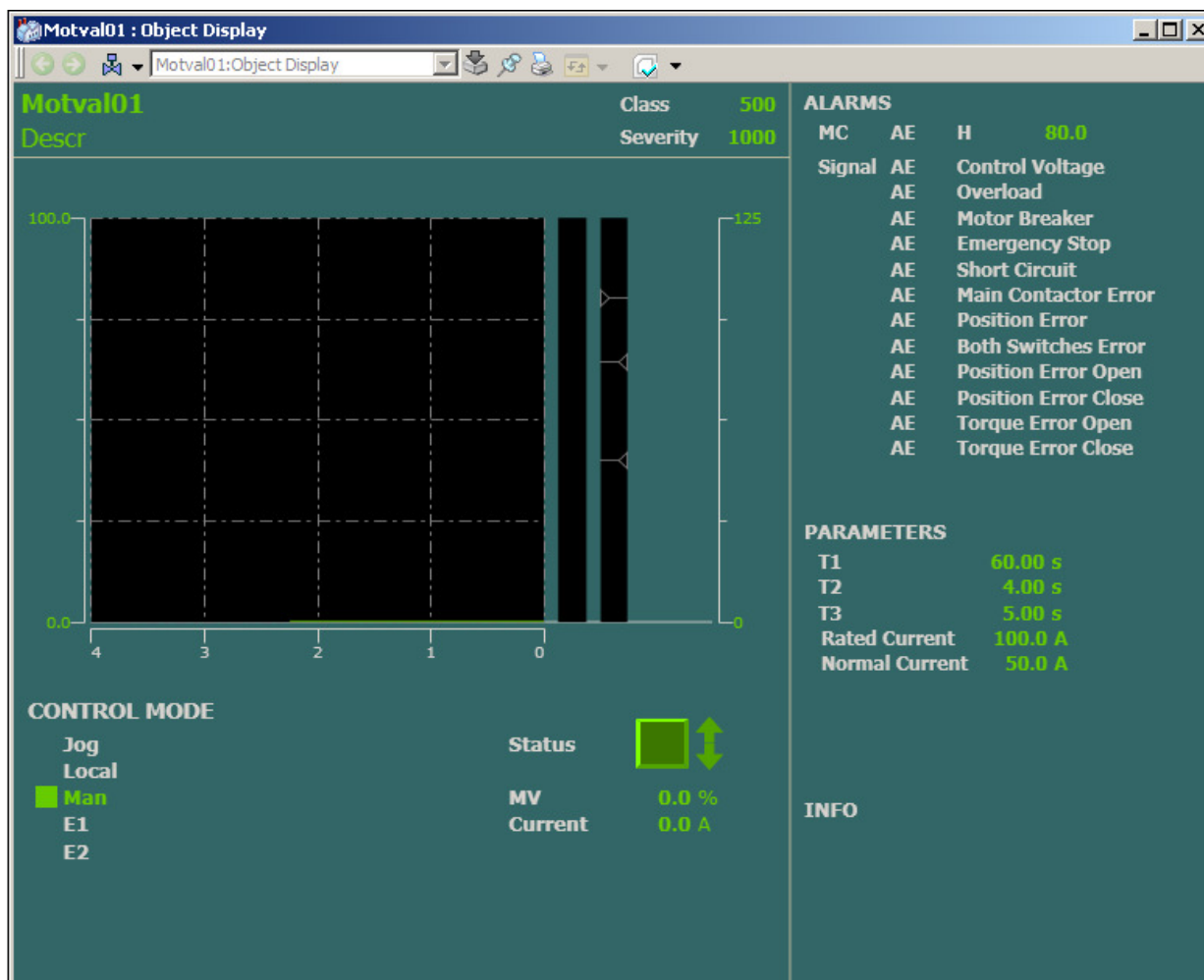


Figure 5-1. Object Display.

6.1.1.2 Process Display

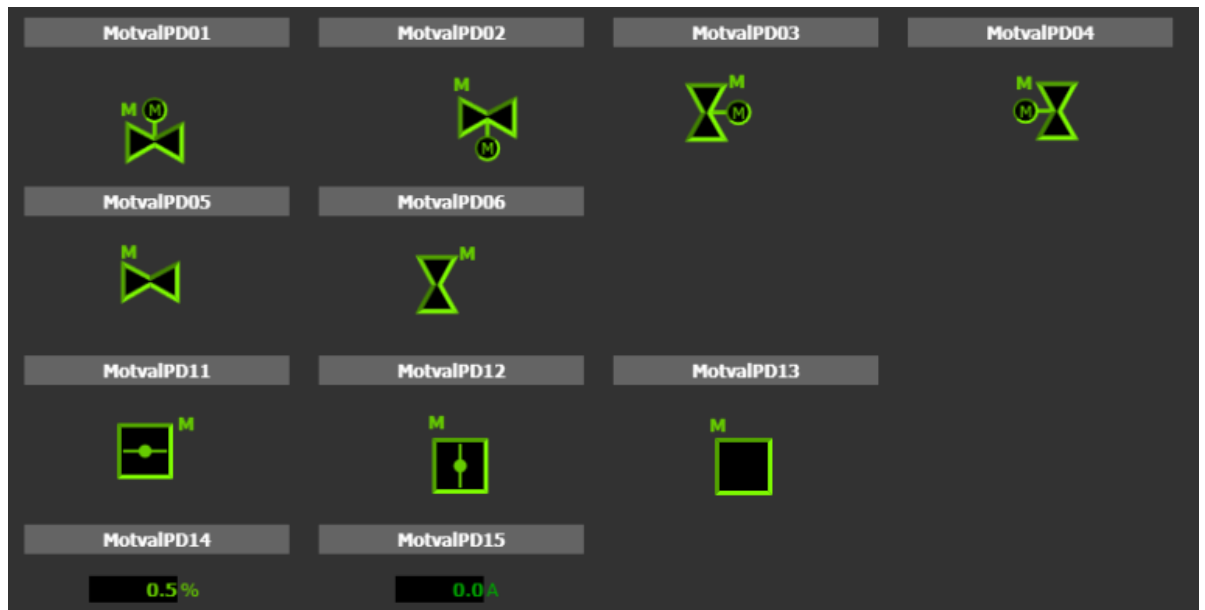


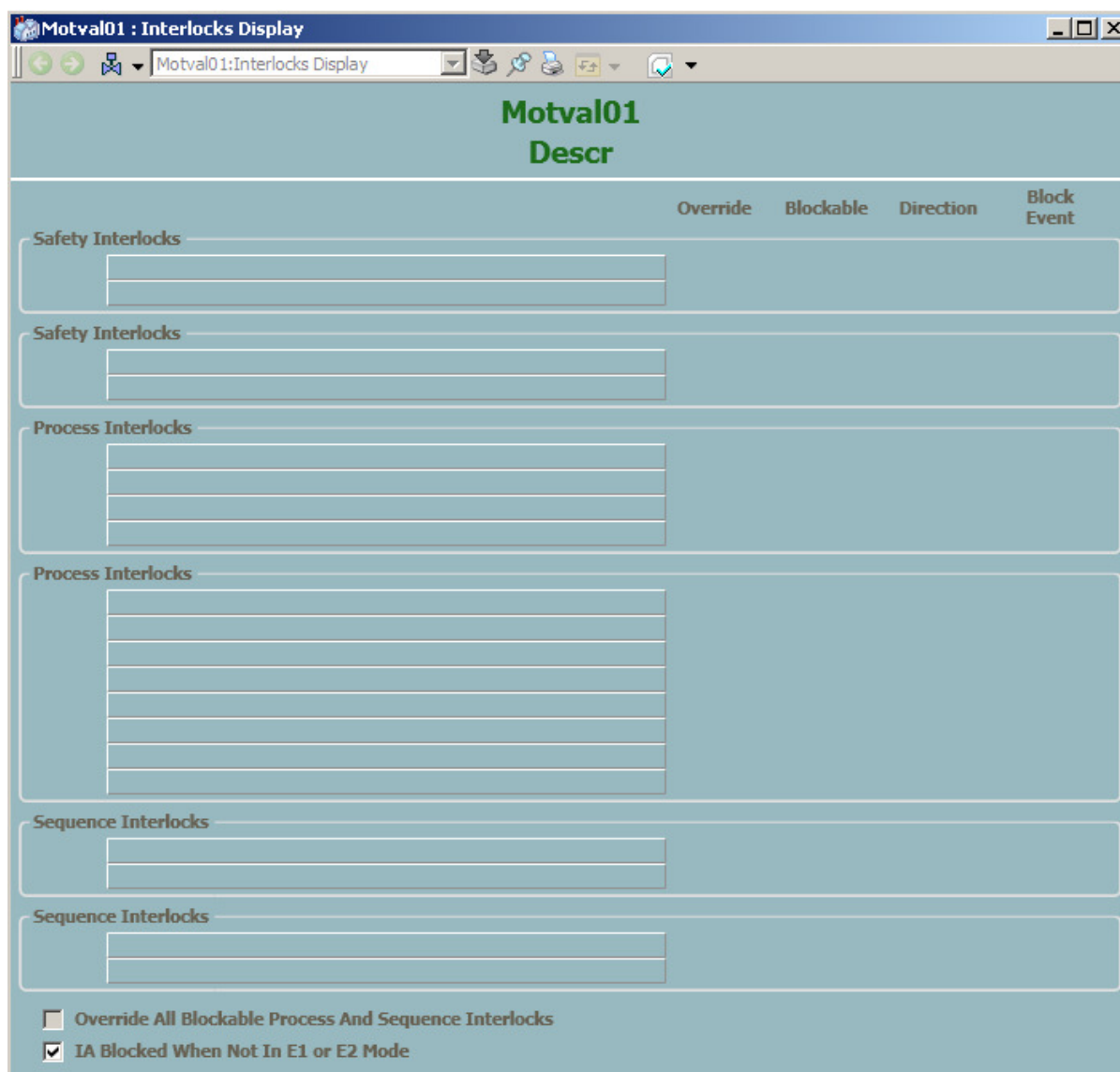
Figure 5-2. MOTVAL01 Graphic elements

6.1.1.3 Interlock display

This display shows the actual status of all Interlock. The operator can override individual interlocks or all interlock.

Interlocks that can be override must be set to Blockable. This can be done from this display if the user has permission Configure or from the Interaction Window see chapter 5.11.5 .

Start Interlock, Block Event and IA Blocked when no in E1 or E2 mode are parameters that can be set from this display if the user has Permission Configure or from Interaction Window



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. All properties for the object MOTVAL01 are available to be logged on the trend curves.

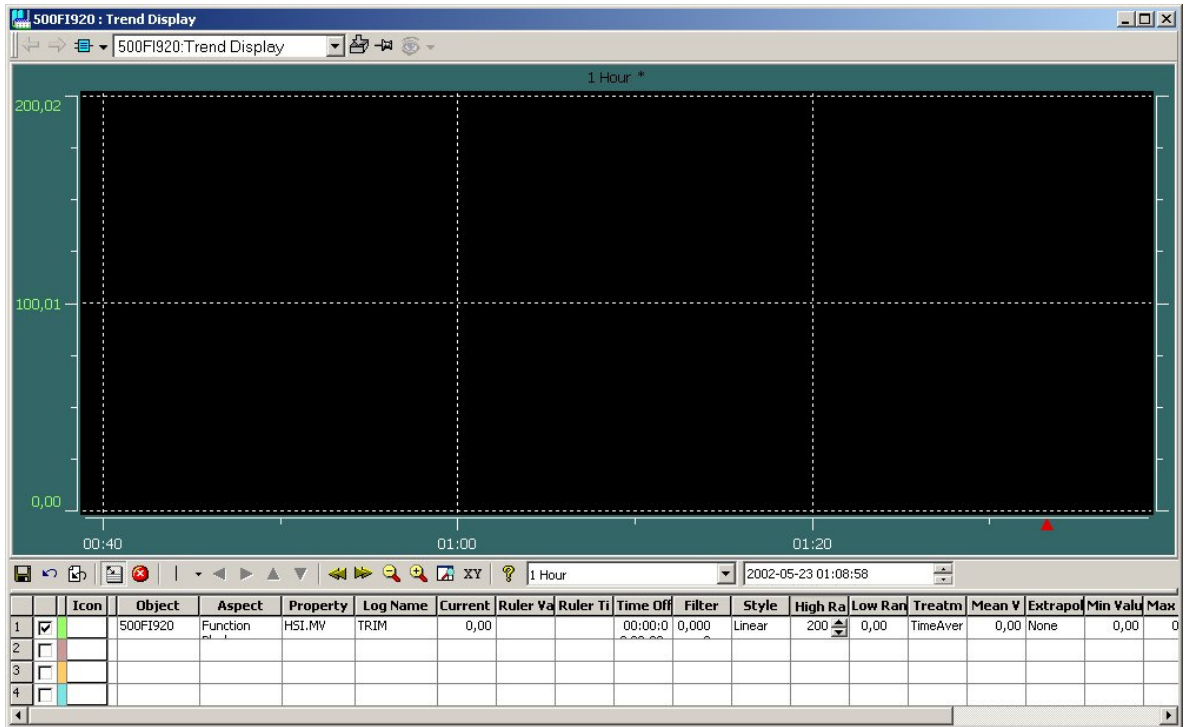


Figure 5-3 Trend Curve

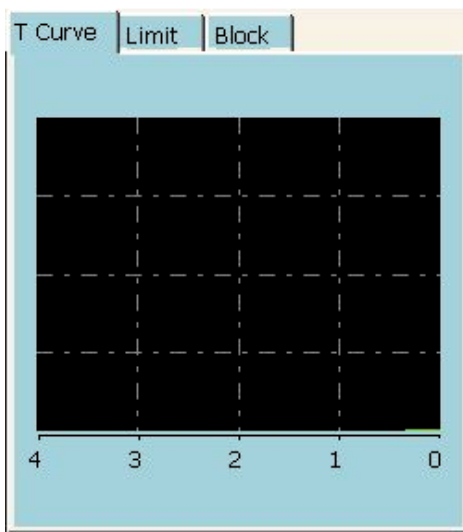


Figure 5-4 Extended Faceplate (T Curve)

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 5-11 below and overleaf illustrate the various presentations of the faceplate.

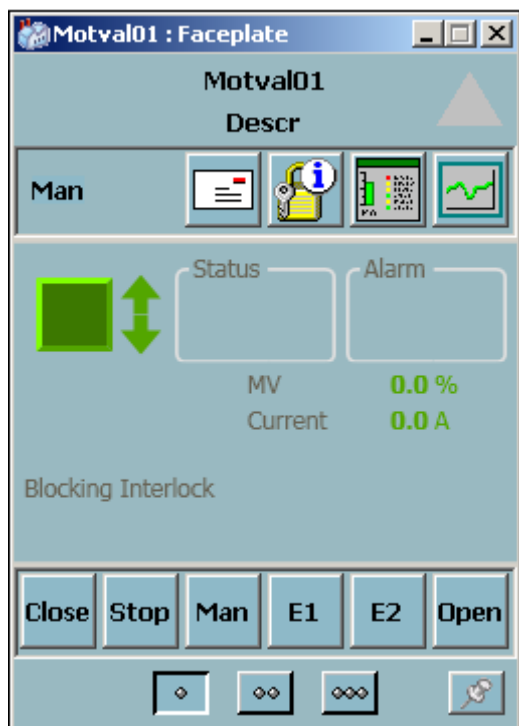


Figure 5-5 Reduced Faceplate.

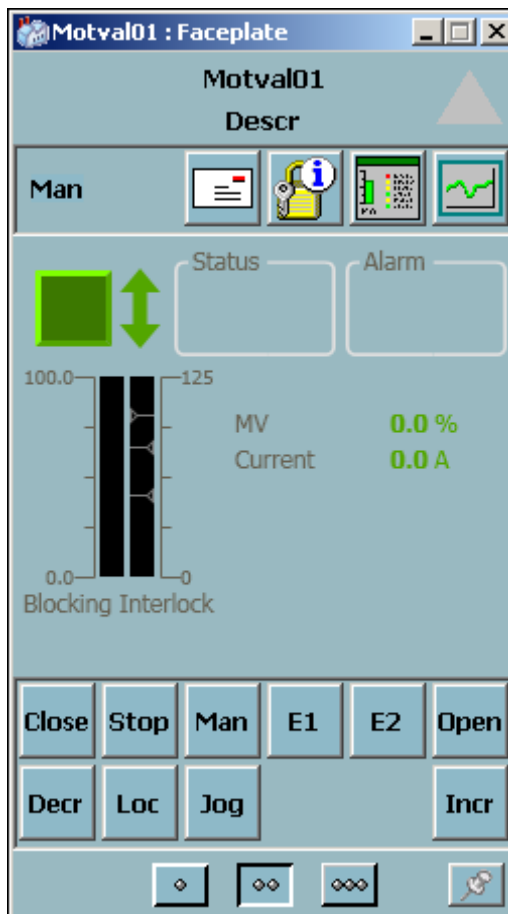


Figure 5-6 Faceplate.

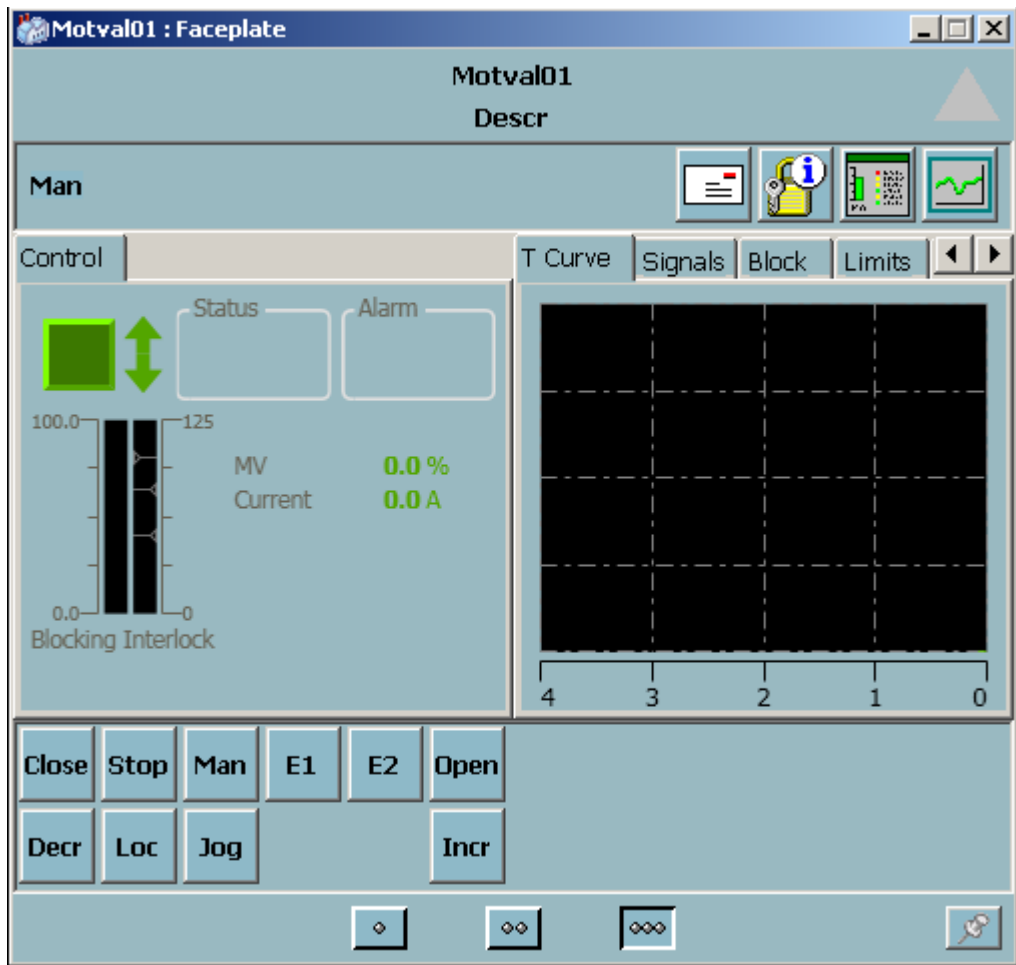


Figure 5-7 Extended Faceplate

6.3 Alarm and Event Handling

6.3.1 General

This section contains a description of all alarms and events in the functional unit MOTVAL01.

When a measured value deviates from the controllers limits or fails 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 MOTVAL01 can be controlled individually

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

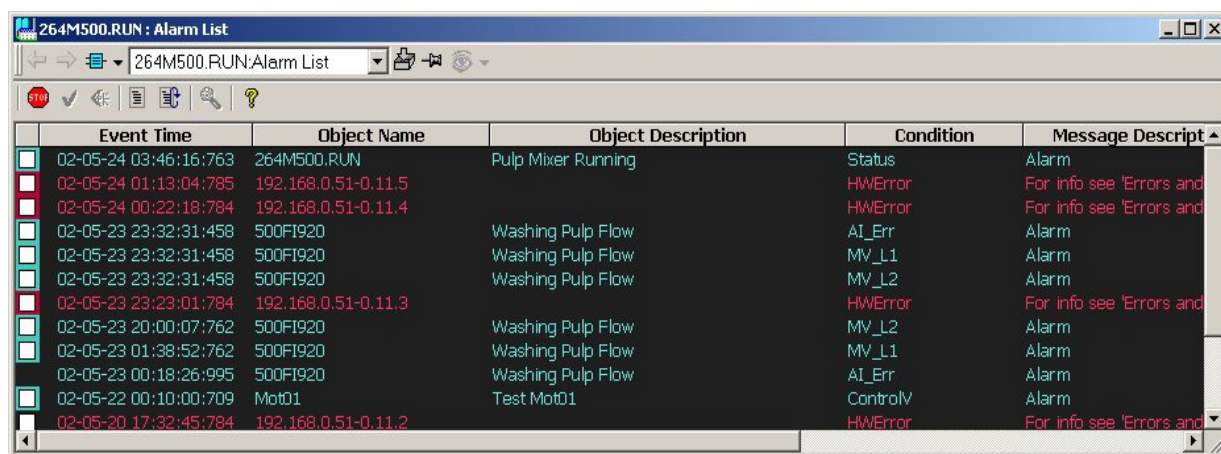


Figure 5-8 Alarm List

6.3.2 Alarm and Event Message

The following alarm texts are generated by the functional unit Motval01. 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>	Pos Error	Alarm
<Name>	<Description>	Control Voltage	Alarm
<Name>	<Description>	Emergency Stop	Alarm
<Name>	<Description>	High Current	Alarm
<Name>	<Description>	LimitSwErr	Alarm
<Name>	<Description>	Pos Error Close	Alarm
<Name>	<Description>	Pos Error Open	Alarm
<Name>	<Description>	Main Contactor	Alarm
<Name>	<Description>	Overload	Alarm
<Name>	<Description>	Short Circuit	Alarm
<Name>	<Description>	Motor Breaker	Alarm
<Name>	<Description>	TorqueCls	Alarm
<Name>	<Description>	TorqueOpn	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.

-) Ext Open/Close is a combination of all Open/Close orders from Application.

SourceName	ObjectDescription	Condition	Message Description
<Name>	<Description>		SeqE1 Mode
<Name>	<Description>		SeqE2 Mode
<Name>	<Description>		SeqMan Mode

<Name>	<Description>		Local Mode
<Name>	<Description>		Ext Open *)
<Name>	<Description>		Ext Close *)
<Name>	<Description>		IC1 On
<Name>	<Description>		IC1 Off
<Name>	<Description>		IC2 On
<Name>	<Description>		IC2 Off
<Name>	<Description>		IB1 On
<Name>	<Description>		IB1 Off
<Name>	<Description>		IB2 On
<Name>	<Description>		IB2 Off
<Name>	<Description>		IB3 On
<Name>	<Description>		IB3 Off
<Name>	<Description>		IB4 On
<Name>	<Description>		IB4 Off
<Name>	<Description>		IA1 Opn On
<Name>	<Description>		IA1 Opn Off
<Name>	<Description>		IA2 Cls On
<Name>	<Description>		IA2 Cls Off
<Name>	<Description>		Limit Sw Open
<Name>	<Description>		Limit Sw Close
<Name>	<Description>		Alarm Acknowledge
<Name>	<Description>		Alarm Control Block

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 and alarm printouts. When the block alarm and block printout check boxes are active then all alarms are blocked as indicated by the yellow text in the indicator button row and by the limit indicator on the bar graph.

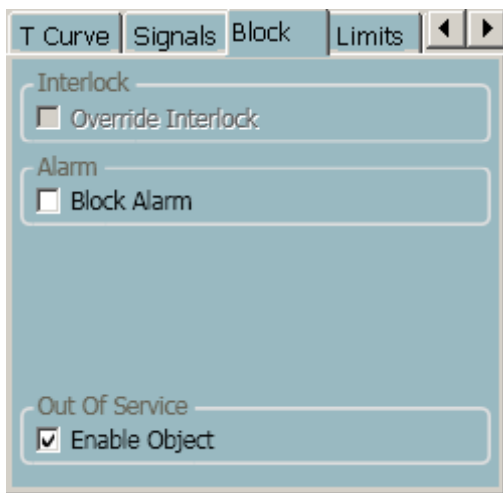


Figure 5-9 Extended Faceplate (Block)

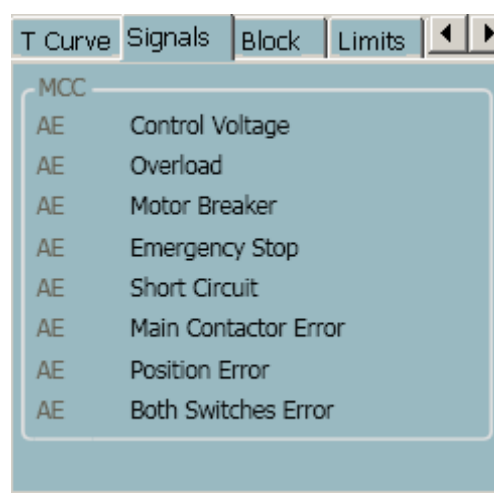
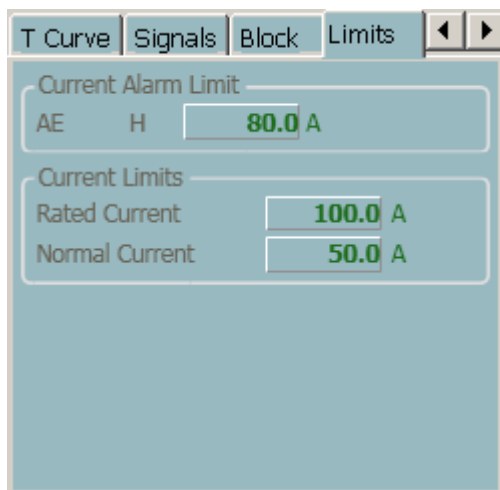


Figure 5-10 Extended Faceplate (Signals)

6.4.2 Limits



6.4.3 Info text



REVISION

Rev.	Page (P) Chapt. (C)	Description	Date Dept./Init.
-		First version	
A		Rev 1.3/0	021106/MP
B		Rev 2.0/0	03-05-26/MP
C	5, 8	Initialization	04-04-15/FM
D	3, 4	Rev 3.1/2	050319/MP
E	4,5	Event Handling is added. Interaction Window's are updated	050303/BP
F	3	Rev 4.0/1	050706/MP
G	3	Rev 4.0/2	060512/BP
H	3	Param connection removed Rev4.0/5	070511/BP
I		Rev 5.0-1 Interlock functionality	081203/BP
J		Update Rev 5.1-0	101103/BP