



Exploration & Production

GENERAL SPECIFICATION

INSTRUMENTATION

GS INS 165

**Low Voltage Motor, High Voltage Motor
standard function
- MOT -**

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1. Scope

The purpose of this document is to define the Standard Function for a MOTOR.

Motors may be operated by both operator or automatic control function (PCS) and tripped by the PSS.

The following options are available :

- **MOT** : Low voltage motor and High voltage motor with fuse contactor ($P \leq 1500$ kW)

This option corresponds to standard functionality

- **MOT_BK** : High voltage motor with circuit breaker ($P > 1500$ kW)

This option is described in chapter 8.

- **MOT_ST** : Motor status only

This option is described in chapter 9.

In order to assist in understanding, the document should be read in conjunction with **GS INS 150**, Design Methods for System Configuration Standard Functions.

This Standard Function is a fundamental building block. It may either be used standalone, or integrated with other standard functions to create a more complex function, e.g. with the Pump Unit Standard Function (P.U.).

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
Not applicable	

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

**Codes**

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS INS 150	Design Method for System Configuration Standard Functions

3. General description of functions

3.1 List of main functions

- Handling of field inputs and outputs with status and discrepancy detection
- Interface with higher level Standard Function (e.g. P.U.) :
status and fault, open/close command, standalone/cascade mode
- Use of Operator commands : Start / Stop, maintenance inhibit
- Maintenance monitoring (running time, start-up counter) (in option as per project specifications)

4. Description of interface

4.1 General description

INPUTS				OUTPUTS		
Field	HMI	Internal		Internal	HMI	Field
			<i>Interface with higher level automatic control (e.g. : PU)</i>			
		- Standalone/Cascade mode - Start/Stop command (in Cascade Mode only)	Standard function MOT	- Status (running/stopped) - Discrepancy Status		
	- Start/Stop command (in Standalone mode only) - Maintenance inhibit command			- Operating command status - Status (running/stopped) - Available status - Discrepancy status - Input/output fault status - Maintenance inhibit status - Running time - Start-up counter	- Alm - Alm - Alm - Opt - Opt	
		<i>Interlocks :</i> - Suction valve open status - Safety trip (from concerned safety bar)		Start/Stop operating command (DO)		
- Status (running/stopped) (DI) - Available (DI)						
Alm = Alarm Opt = Option						

4.2 Specific description of field interface

Corresponding field interface are :

MXSL (1 DO) :	Safety Stop command :	0 = Stop
MXXHL (1 DO) :	Start/Stop operating command :	0 = Stop
MYHL (1 DI) :	Status (running/stopped) :	1 = Running
MY (1 DI) :	Available :	1 = Available

Available input reports the healthy and no tripped status of the electrical drawer, as per project specifications.

5. Detailed description of functions

5.1 Modes and commands

5.1.1 Specific description

5.1.1.1 Standalone/Cascade mode

Standalone/cascade mode is set by higher level automatic control (e.g. "pump unit" standard function)

When this control is not implemented, standalone/cascade mode is forced to standalone.

5.1.1.2 Start / Stop command

Start/Stop command is available to the operator from pump control display when the motor is in Standalone mode.

Start/Stop command is issued from the higher level automatic control when the motor is in cascade mode.

Start/Stop command is forced to stop upon :

- Open status of the suction valve not active
- Safety trip
- Discrepancy status
- Unavailable status

5.1.1.3 Maintenance inhibit

Maintenance inhibit command is available to the operator in maintenance access level.

Maintenance inhibit status is active if maintenance inhibit command is set

When the maintenance inhibit is active :

- Status input (running/stopped) is no more considered in internal status handling
- Discrepancy is no longer active

5.2 Status definition

5.2.1 Operating command status :

Operating command status is aligned with the Start/Stop command

5.2.2 Motor Status :

HMI motor status is aligned with the status input (running/stopped).

Internal Status is active when :

- The status input is active and the maintenance inhibit status not active
- or
- The operating command status and the maintenance inhibit status are active

5.2.3 Available status :

Available status is aligned with the available input, which is active in normal situation : i.e. no electrical fault, no safety trip and no local emergency stop and withdrawable electrical drawer connected.

5.2.4 Discrepancy status :

Discrepancy status is active when :

- (Operating command status in start) and (motor status not in running) and (discrepancy timer elapsed) and (maintenance inhibit status not active)

Or

- (Operating command status in stop) and (motor status not in stopped) and (discrepancy timer elapsed) and (maintenance inhibit status not active)

Discrepancy timer is launched upon status change of the operating command

Discrepancy is no longer active when the motor is not available.

5.2.5 Input / Output fault status :

This status will report a hardware fault related to an associated I/O cards (field inputs/outputs)

5.3 Start command and running time counters :

Dedicated counters will report the number of changes of the operating command status (from stop to start) , as well as the running time.

The counter reset commands will be issued manually by the operator from the HMI (a dedicated pop-up window at maintenance access level).

Note this monitoring function may be implemented into the Process Data Server by means of a supervisory tool, as per the project specifications.

6. Tuning parameters and variables

PARAMETER	ACCESS LEVEL
Discrepancy timer pre-set value	Method

7. Representation and animation description (HMI)

7.1 Events and values to be recorded

7.1.1 Events

- Start/Stop command (operator)
- Maintenance inhibit command
- Operating command Status
- Available status
- Discrepancy Status
- Input / output fault status

7.1.2 Values

- Running time (option)
- Running operating number (option)

7.2 Alarm handling

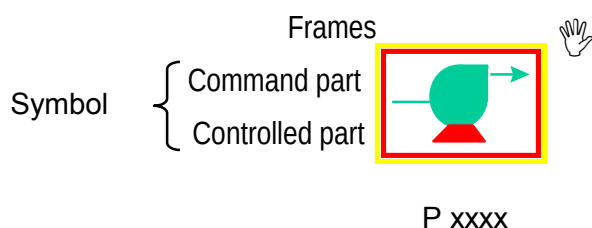
Alarm Description	Priority
Available status	Level 1
Discrepancy Status	Level 1
Input fault Status	Level 2

7.3 Control display

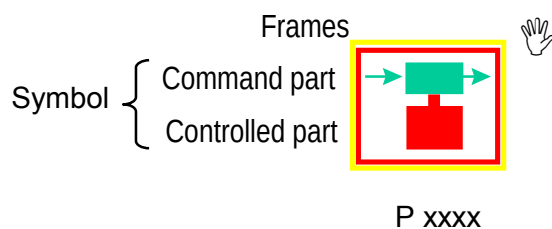
The hereafter description gives examples of representation. However, they may be amended dependant on the DCS features.

7.3.1 Pump representations

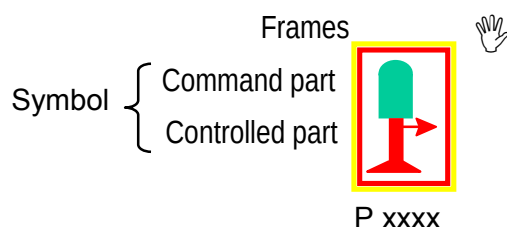
7.3.1.1 Centrifugal pump :



7.3.1.2 Reciprocating pump



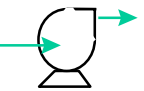
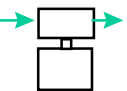
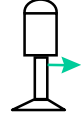
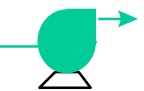
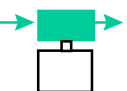
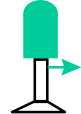
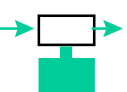
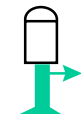
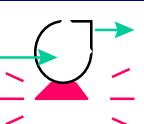
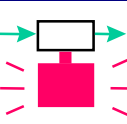
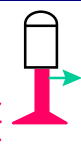
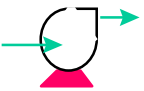
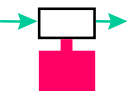
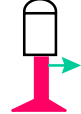
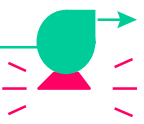
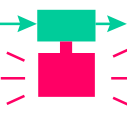
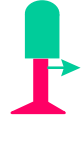
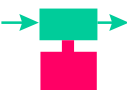
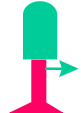
7.3.1.3 Immersed pump



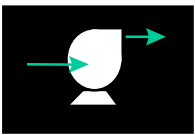
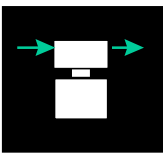
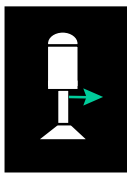
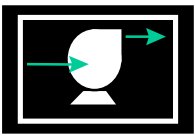
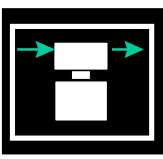
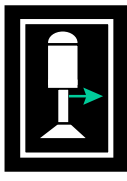
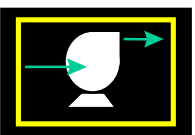
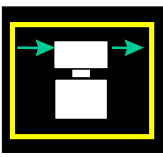
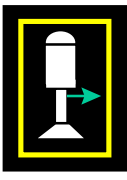
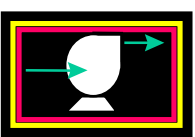
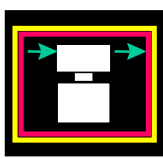
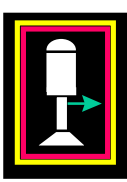
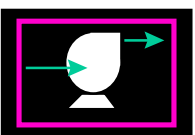
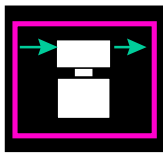
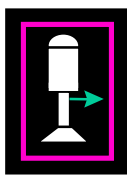
7.3.2 Miscellaneous

- P xxxx equipment label is permanently displayed
- P xxxx equipment label is used as a target area for the maintenance inhibit command
- A "hand" symbol (full yellow) appears near pump when Start/Stop command is available to the operator

7.3.3 Animation of the symbol

Display description	Display for Centrifugal	Display for Reciprocating	Display for Immersed	Symbol	Colour of tag on safety logic display
Stopped or communication or system fault				White White	White
Start-up command but stopped				Fluid White	White
Running				Fluid Fluid	Blue
Stop command but running				White Fluid	Blue
(Discrepancy when stop command or unavailable) before acknowledgement and no maintenance inhibit				White Red flashing	Red flashing
(Discrepancy when stop command or unavailable) after acknowledgement Or (unavailable and maintenance inhibit active)				White Red	Red
(Discrepancy when Start-up command or unavailable) before acknowledgement and no maintenance inhibit				Fluid Red flashing	Red flashing
(Discrepancy when Start-up command or unavailable) after acknowledgement Or (unavailable and maintenance inhibit active)				Fluid Red	Red

7.3.4 Animation of the Frames

Display description	Display	Display	Display	Frames (
Normal status				
Safety trip				External frame : White
Maintenance inhibit				External frame : Yellow
Input/output fault (and maintenance inhibit)				Internal frame : Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault				Signalling frame : Magenta

The events which drive these frame displays may not be mutually exclusive. Therefore, the precedence on the display, from most to least important, shall be : magenta, white, blue, yellow

8. MOT_BK option : high voltage motor with circuit breaker (P > 1500 kw)

8.1 Specific feature

MOT_BK motor requires 2 pulse outputs (DO) :

- one for start-up
- one for stop

8.2 Description of interface

8.2.1 General description

INPUTS				OUTPUTS		
Field	HMI	Internal		Internal	HMI	Field
			<i>Interface with higher level automatic control (e.g. : "PU"):</i> ● Standalone/Cascade mode ● Start/Stop command (in Cascade Mode only)			
			Standard function MOT-BK	● Status (running/stopped) ● Discrepancy Status		
	●	Start/Stop command (in Standalone mode only) ● Maintenance inhibit command		Operating command status Status (running/stopped) Available status Discrepancy status Input/output fault status Maintenance inhibit status Running time Running operating number	● ● ● Alm ● Alm ● Alm ● Opt Opt	
			<i>Interlock</i> ● Suction valve open status ● Safety trip (from safety bar)			
●		Status (running/stopped) (DI)		Start operating command (DO)		●
●		Available (DI)		Stop operating command (DO)		●
			Opt = Option Alm = Alarm			

8.2.2 Specific description of field interface

Corresponding field interface are :

MXSL (1 DO) :	Safety Stop command :	0 = Stop
MXXH (1 DO) :	Start command :	1 = Stop (pulse)
MXXL (1DO) :	Stop command :	1 = Stop (pulse)
MYHL (1 DI) :	Status (running/stopped) :	1 = Running
MY (1 DI) :	Available :	1 = Available

Available input reports the healthy and no tripped status of the electrical drawer.

8.3 Detailed description of functions

Special feature (compared with above MOT description) :

8.3.1 Available status :

Available status is aligned with the available input, which is active in normal situation : no electrical fault, no safety trip, no local emergency stop, local/remote selector set to remote position and withdrawable electrical drawer connected.

8.3.2 Start/Stop operating commands :

- The pulse of the start operating command is activated upon start activation of the Operating command status
- The pulse of the stop operating command is activated upon stop activation of the Operating command status

9. Option : MOT_ST : motor status

9.1 Specific features

Such motors are operated locally only, with monitoring by the PCS, but tripped by the PSS.

9.2 List of main functions

- Handling of field inputs with status and discrepancy detection
- Maintenance inhibit command
- Maintenance monitoring (running time, start-up counter) (in option as per project specifications)

9.3 Description of interface

Compared with the above MOT description

9.3.1 General description

INPUTS				OUTPUTS		
Field	HMI	Internal		Internal	HMI	Field
			Standard function MOT_ST	Status (running/stopped)	●	●
	●			Available status	●	Alm
				Input fault status		Alm
				Maintenance inhibit status		●
		●		Running time		Opt
				Running operating number		Opt
●						
●						

Opt = Option

Alm = Alarm

9.3.2 Specific description of field interface

Corresponding field interface are :

MXSL (1 DO) :	Safety Stop command :	0 = Stop
MYHL (1 DI) :	Status (running/stopped) :	1 = Running
MY (1 DI) :	Available :	1 = Available

Available input reports the healthy and no tripped status of the electrical drawer, as per project specifications.

9.4 Events to be recorded

- Maintenance inhibit command
- Status (running/stopped)
- Available status
- Input fault status

9.5 Representation and animation description (HMI)

9.5.1 Control display

The hereafter description gives examples of representation. However, they may be amended dependant on the DCS features.

9.5.1.1 Pump representations

- Centrifugal pump : Frames

Single part symbol

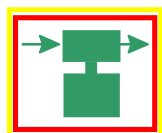


P xxxx

- Reciprocating pump :

Frames

Single part symbol

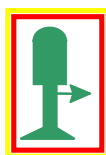


P xxxx

- Immersed pump :

Frames

Single part symbol

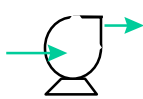
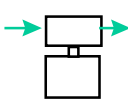
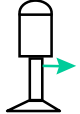
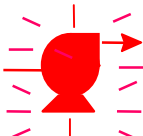
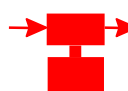


P xxxx

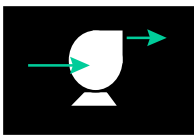
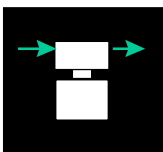
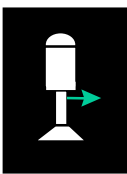
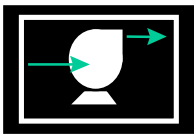
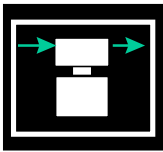
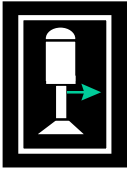
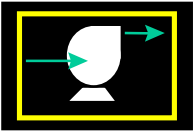
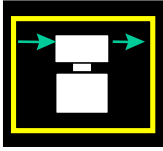
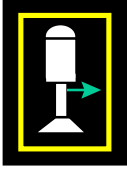
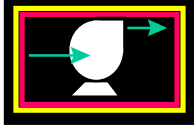
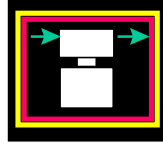
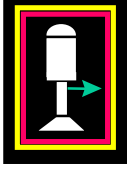
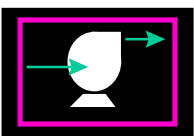
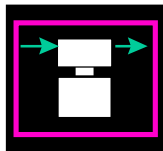
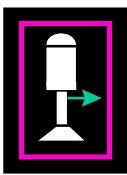
9.5.1.2 Miscellaneous

- P xxxx equipment label is permanently displayed
- P xxxx equipment label is used as target area for maintenance inhibit command.

9.5.1.3 Animation of the symbol (controlled parts)

Display description	Display for Centrifugal	Display for Reciprocating	Display for Immersed	Symbol	Colour of tag on safety logic display
Stopped or communication or system fault				White	White
Running				Fluid	Blue
Unavailable before acknowledgement if not maintenance inhibit				Red flashing	Red flashing
Unavailable after acknowledgement or Both unavailable and maintenance inhibit status active				Red	Red

9.5.1.4 Animation of the Frames

Display description	Display	Display	Display	Frames
Normal status				
Safety trip				External frame : White
Maintenance inhibit				External frame : Yellow
Input fault (and maintenance inhibit)				Internal frame : Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault				External frame : Magenta

The events which drive these frame displays may not be mutually exclusive. Therefore, the precedence on the display, from most to least important, shall be: magenta, white, blue, yellow