



Exploration & Production

GENERAL SPECIFICATION

INSTRUMENTATION

GS INS 102

Instrumentation identification

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1. Scope

This document specifies:

- the coding system used for instruments and functions for instrumentation design,
- the symbolic representation of instruments and functions on Piping and Instrument Diagrams (P&ID's) and other drawings,
- the use of the coding system for the computerized creation and administration of lists of instruments and functions.

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
ANSI/ISA-5.1	Instrumentation Symbols and Identification

Professional Documents

Reference	Title
AISI	Data sheet 904L
AISI	Data sheet 316L
NAS 1638	Cleanliness Requirements of Parts used in Hydraulic Systems

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	



Total General Specifications

Reference	Title
GS PVV 111	Piping design specification
GS EXP 501	Equipment numbering

3. Departures from the reference documents

The services provided shall conform to the reference document, amended by the differences, choice of options and complementary information specified below.

ISA-5.1 section	Title	Comments
1	Purpose	Fully applicable
2	Scope	Fully applicable
3	Definitions	Fully applicable
4	Outline of the Identification System	Adaptation of ISA-5.1 for the computerized creation and administration of instrument lists
5	Tables	Definition of identification fields left as "user's choice" by ISA-5.1 + special features
6	Drawings	Additional symbols

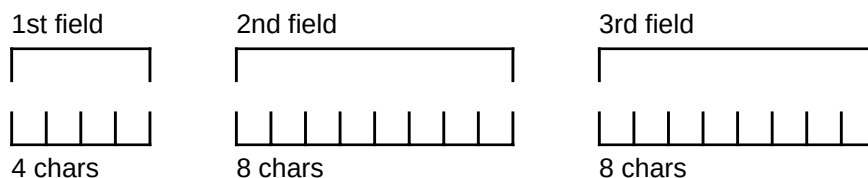
3.1 Differences from section 4 of ISA-5.1

Sections 3.1.1 to 3.1.7 of this document supplement and replace section 4 of ISA-5.1.

Principle: An instrument is identified by its functions and not by its type or its operating principles, except in exceptional circumstances detailed later.

3.1.1 Code structure

The alphanumeric code system used to identify instrumentation loops comprises three fields:



- 1st field:** **Plant or construction** (optional, not displayed if blank): Up to four alphanumeric characters.
- 2nd field:** **Function or instrument:** Up to eight alphanumeric characters. The first character, which must be a letter, represents the initiating variable (process measured variable or, exceptionally, the first letter of a group of letters with a special meaning).
- 3rd field:** **Instrument loop and extension loop serial number:** Up to eight alphanumeric characters. A loop can be defined as the whole instruments and functions related to the same measured variable.

The code structure set out above represents a maximum. It is important to ensure that the control system and computer design tools support its use.

3.1.2 First field encoding principles

This code is the same as the one used at process level. It uses the plant numbering system.

3.1.3 Second field encoding principles

The detailed meaning of the codes used for the second field for instruments or functions must be indicated on a project P&ID cover page.

The code system for instruments or functions complies with the ISA specifications, apart from the differences and additions listed in the table in section 3.2.1. The code comprises a group of letters plus an extension where necessary (prefix or suffix).

The first letter must represent the initiating variable, except in the case of electrical equipment (section 3.1.5) or valves. The subsequent letters define the function or instrument, in the order set out in section 3.2.2.

Within a particular loop, there can be several instruments or functions with the same second field code (split range valves, dual scale instruments). If the instruments are interchangeable, the extension shall comprise a separator "/" followed by a letter. In all other cases, the extension shall comprise a number followed by the separator "/".

Examples:

1 st field			2 nd field				3 rd field			
6	4	C	F	V	1	/	1	0	0	4
6	4	C	F	V	2	/	1	0	0	4

1 st field			2 nd field				3 rd field			
6	4	C	L	T	/	A	1	0	3	0
6	4	C	L	T	/	B	1	0	3	0

3.1.4 Third field encoding principles

All instruments or functions of a particular loop share the same number.

The first two digits represent a section of the installation. The subsequent digits should, wherever possible, be in a chronological order representative of the direction of flow of the fluids defined in the P&ID's.

Two loops can have the same number if their respective initiating variables are different.

Instruments on identical process lines may have the same code. They shall be distinguished by an extension of the third field. This extension comprises the "/" separator and the literal or numeric code used to identify the equipment.

3.1.5 Special coding principles for electrical consumers

The coding system used for the functions of electrical consumer uses the prefix "M" in front of the initiating variable. The numeric code in the third field is replaced by the identifier of the equipment, according to the following examples:

- MII P101 Pump P101 current indication
- MHK K102 Compressor K102 hand control

These functions are mainly related to the Control Systems; the purpose of this specific coding is to have a direct relationship between functions and equipment.

The system used to identify information concerning the electrical consumers is defined in the following non-exhaustive list. Missing tag names will be defined by combining letters from table in section 3.2.1 following the prefix "M".

- MHKH "On" hand control without automatic control
- MHKL "Off" hand control without automatic control
- MHKA Auto selection
- MHKM Manual selection
- MHKU Local selection
- MHKR Remote selection
- MY Motor fault

- MI Intensity of current
- MXXH On by automatic control
- MXXL Off by automatic control
- MYH On state
- MYL Off state

3.1.6 Special coding principles for valves accessories

In order to keep the same number for accessories as for the valves the first or first two letters of the valves identification will be used as initiating variable for limit switches or solenoid valves.

BDV	SDV	ESDV	DHSV	SSV	XV	FV (1)	Function
BY	SY	ESY	DHY	SSY	XY	FY	Solenoid valve
BZH	SZH	ESZH	DHSZH	SSZH	XZH	FZH	Limit switch " open "
BZL	SZL	ESZL	DHSZL	SSZL	XZL	FZL	Limit switch " closed "
						FZT	Position transmitter

(1) "F" or any other initiating letter for control valve loop

3.1.7 Other special cases

The instruments in the tables below have a special coding system:

3.1.7.1 Process instruments

Instruments or functions	Code
Restriction orifice	FO
Blow down valve	BDV
Emergency ShutDown Valve	ESDV
ShutDown Valve	SDV
Surface Safety Valve	SSV
Annulus Master Valve	AMV
Production Master Valve	PMV
Production Wing Valve	PWV
Down Hole Safety Valve	DHSV
Surface Controlled SubSurface Safety Valve	SCSSSV

3.1.7.2 Gas detection

Gas sensors	Code
Catalytic gas detector	GDC
Toxic gas detector	GDT
Infra-Red gas detector	GDIR
Infra-red Beam gas detector	GDB

3.1.7.3 Fire instruments

Instruments or functions	Code
Early Warning smoke detector	RDEW
Heat rate of Rise detector	RDHR
Ionisation Smoke detector	RDIS
Heat detector – thermostatic	RDH
Fusible Plug	RDFP
Infra-Red flame detector	RDIR
Optical Smoke detector	RDOS
UV/IR flame detector	RDUI
UV/UV flame detector	RDUV
Fire Damper	RFD
Manual Alarm Call point (MAC)	RMAC
Fire push button	RHS
Fire audible alarm	RK
Fire visual alarm	RL
Deluge Valve	RVD

3.2 Differences from section 5 of ISA-5.1

Sections 3.2.1 to 3.2.3 specify the differences from the ISA coding system and the attributes of the fields left free by the ISA document (ISA-5.1, Tables 1 and 2).

Table 3 of ISA-5.1 is fully applicable.



3.2.1 Additions to and differences from Table 1 of [ISA-5.1](#)

Letters of the second field used to encode functions and instruments.

Reading the table:

- Normal characters = initiating variables or functions strictly identical to the ISA document (relevant ISA notes also apply)
- *Italic characters* = fields left free by ISA and specified by COMPANY
- **Bold characters** = differences between ISA and COMPANY specifications
- Notes between brackets: details on the use of the letter in section 3.2.2
- Numbers in brackets: used to identify the position of the letter in the code (see section 3.2.3).

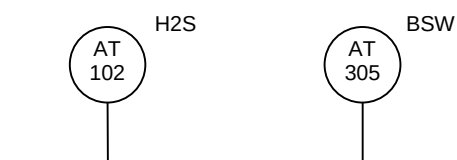
Letter	Position of function letter in second field			
	1 st letter initiating variable	2 nd letter function	3 rd letter function	Subsequent letters functions
A	Analyzis (Note 1)	Alarm (Note 6) (11)	----->	
B	Burner, Combustion			
C	Camera	Control (15)	----->	
D	Specific Gravity, Density	Differential, Interface, Ratio (6)	----->	
E	Voltage	Sensor, Primary Element (2)		
F	Flow Rate			
G	Gas Detection (explosivity or toxicity) (Note 2)	Instrument with local indication and no other function (7)	----->	
H	Hand		High, Open, On (18)	High, Open, On (19)
I	Current (Electrical)	Indication (12)	----->	
J	Power			
K	Time	Control Station (17)	----->	
L	Level	Light (16)	Low, Closed, Off (20)	Low, Closed, Off (21)
M	Electrical Consumer (as prefix to initiating variable)			
N	User's Choice			
O	User's Choice	Orifice (3)		
P	Pressure, Vacuum			
Q	Quantity	Totalize, Integrate (5)	----->	
R	Radiation, Fire (Note 3)	Record (Note 7) (14)	Remote	
S	Speed, Frequency	Switch, Safety (9)	----->	
T	Temperature	Transmitter (13)	----->	
U	Multivariable		Local	
V	Vibration, Mechanical Analysis	Valve (23)	----->	
W	Weight, Force	Well (4)		
X	Unclassified, <i>Sequence</i>	Automatic Control Function (Note 9) (10)		
Y	State, Event, Presence (Note 4)	Compute, Convert (Note 10) (22)		
Z	Position (Note 5)	Position, Limit Switch (note 8) (8)	----->	

The -----> symbols mean that the last function is valid for subsequent positions.

3.2.2 Notes concerning the table in section 3.2.1

Note 1: Analysis (letter A as initiating variable)

The letter A covers analyses not described by specific letters. The identification of the analysis or of the element detected is specified by the attributes above and to the right of the circle containing the instrument identifier:



Commonly used attributes are:

Attribute	Function	Attribute	Function
CO ₂	CO ₂ analysis	CH	Chromatography
O ₂	Oxygen analysis	CH ₄	Methane analysis
CA	Calorimeter	H ₂ O	Water analysis (liquid)
HC	Hydrocarbon analysis	S	Sulphur
DCO	DCO, CBO, DTO meter	H ₂ S	H ₂ S analysis
C	Conductivity, resistivity	SO ₂	SO ₂ analysis
M	Gas humidity	RSH	Mercaptans
BSW	Water and sediments in crude		

Note 2: Gas detection (letter G as initiating variable)

Gas detectors shall be named using the codes as defined in section 0.

These codes shall be used as loop name (2nd field) in the instrument computerized database. Naming of associated functions in the database shall use the code letters as per the table.

Note 3: Fire (letter R as initiating variable)

Fire detectors shall be named using the codes as defined in section 0.

These codes shall be used as loop name (2nd field) in the instrument computerized database. Naming of associated functions in the database shall use the code letters as per the table with the exception of the reserved codes in section 0.

Note 4: State, Event, Presence (letter Y as initiating variable)

The letter Y as the initiating variable identifies the functions that cannot be classified in the normal process variables. These are "non-process" faults, states or events, such as:

- Faults, states or events deriving from auxiliaries or utilities (inverters, chargers, electrical distribution, etc.)
- Faults, states or events deriving from PLC's, systems, miscellaneous packages or computers
- Etc.



Note 5: Position (letter Z as initiating variable)

The letter Z is used only for the position of a mechanical element other than a valve (or similar).

Note 6: Alarm (letter A from the second position)

The letter A is used only for a loop generated by a contact and having a single alarm function.

For analogue measurements required to generate alarms, the alarms are indicated as attributes to the symbol of the function.

Safety functions shall be identified using the letter A in association with the doubled modifying terms "LL" or "HH".

Note 7: Record (letter R in second position)

The record function "R" is used only where this function is provided by a recorder. It is implicit when using a DCS.

Note 8: Position (letter Z as 2nd or 3rd position)

The letter Z in the second position (or subsequent position) is used for valves position monitoring devices (see section 3.1.6).

Note 9: Automatic control function (letter X in second position)

The letter X in the second position (or subsequent positions) can only be used to mean an automatic control function concept.

Note 10: Compute - Convert (letter Y in second position)

The letter Y identifies a computation or conversion function. The computation or conversion function is specified by the attributes located above and to the right of the symbol. The attributes commonly used are listed in Table 3, section 5 of [ISA-5.1](#).

3.2.3 Order of letters in the second field used to encode functions and instruments

This field contains, in order:

- The prefix M in the case of loops containing current-using equipment.
- The initiating variable from the first position of the table in section 3.2.1.
- The function letters from the second position in the same table, in the following order:

Function	Second and subsequent letters	Number in table in section 3.2.1
Primary element	E	(2)
Operator - Orifice	O	(3)
Thermowell	W	(4)
Totalize - Integrate	Q	(5)
Differential – Ratio - Interface	D	(6)
Local indication	G	(7)
Position	Z	(8)
Safety	S	(9)
Logic function	X	(10)
Alarm	A	(11)
Remote indication	I	(12)
Transmitter	T	(13)
Record	R	(14)
Control (including on/off)	C	(15)
Light	L	(16)
Control station	K	(17)
High - Open - On	H	(18)
High high	H	(19)
Low - Closed - Off	L	(20)
Low low	L	(21)
Compute - Convert	Y	(22)
Valve (analogue control or on/off)	V	(23)

3.3 Differences from section 6 of [ISA-5.1](#)

The graphical symbols used to represent instruments and functions shall be given on a cover page of the P&ID's.