Contents

1 Subject of specification 3
2 Scope of validity 3
2.1 Deviations 3
3 Hierarchy of documents 3
4 Definitions and designations 4
5 Description 4
5.1 General characteristics 4
5.2 Visualisation screens on operator stations 5
5.2.1 General characteristics of visualisation screens 5
5.2.2 Design criteria for visualisation screens 5
5.2.3 Engineering units 12
5.2.4 Usage of abbreviations and their meaning 12
5.2.5 Nomenclature of measuring points and instruments 13
5.2.6 Dynamic representation of circuits on visualisation screens 14
5.3 General principles of alarm management on operator stations 18
5.3.1 Validity level and priority of alarms connected with it 18
5.3.2 Identification of alarms on visualisation screens of operator station 18
5.3.3 Signalling of alarms 19
5.3.4 Detailed requirements for alarm indication 19
5.4 Recording of process parameters courses in real time 20
5.5 Recording of historic process parameters data 20
5.6 Printing devices 21
5.7 Access protection system to operators' stations 21
5.8 System acceptance procedure – FAT (Final Acceptance Tests) 22

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6 Relevant documents 22
7 Standards and regulations 22
7.1 Directives of European Union 23
7.2 Polish Standards 23
8 Record of changes 24

1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A., establishes minimal requirements in scope of designing, fabrication and acceptance of all equipment installed in operators' room in control room, used by them for technological process management purposes.

The specification determines guidelines for configuration of operator stations and panels operating in automatics systems, and used for process management purposes by means of acquisition, visualisation, processing and storage of process data.

2 Scope of validity

This specification shall be used when preparing both quotations and Purchase Orders concerning planned LOTOS Group S.A. new investments and modernizations.

It shall also be a base for preparation of other detailed specifications and quotations relevant for package units or other equipment deliveries.

Therefore the specification relates only to operators' stations and panels interacting with control systems, it does not deal entirely with process monitoring and control systems, nor such their elements, as:

- DCS, PLC (refer to specification GLSA 3640)
- Safety system SIS (ESD) (refer to specification GLSA 3650)
- Power supply (refer to specification GLSA 3130)
- Communication between sub-systems (refer to specification GLSA 3710)

2.1 Deviations

Any deviation from this specification and the relevant specifications, standards and related documents including proposals, which the bidder claims to be economically and / or technically superior solutions, must be submitted in writing for review and approval by Grupa LOTOS SA. Non-approved exceptions are not acceptable by Grupa Lotos S.A.

The supplier must report in writing any ambiguity in this or any other specifications of Grupa LOTOS SA or non-compliance with the referred documents / standards and obtain a written explanation from Grupa Lotos SA.

3 Hierarchy of documents

In case of conflicts existing between this specification and other documents, the following order of precedence shall govern:

- The current Polish legislation
- Terms of purchase order / contract and other requirements agreed in writing with GLSA
- Data Sheets approved by GLSA
- This specification
- Other Specifications
- Drawings and other documents
- Standards

4 Definitions and designations

GLSA - Grupa LOTOS S.A.

BMS - System of control and protections for furnaces and boilers (Burners' Management System)

CR - Control Room

DCS - Distributed Control System

ER - Engineering Room

HMI - Human – Machine Interface

I/O - Input/Output

MTBF - Mean Time Between Failures

PLC - Programmable Logic Controller

SIS (ESD) – Safety System

SIS PLC (ESD) - PLC of safety system

TIR - Technical Infrastructure Room, where system cabinets are located

UPS - Uninterruptible Power Supply

5 Description

5.1 General characteristics

Purpose:

Generally speaking, equipment located in control room (CR), in operators' room, is the equipment accessible for operator and used for process management purposes.

Equipment classification:

- Operator stations, as computers intended for human communication with process monitoring and control system for presentation of process data and entering of control commands and parameters by operator.
- Control panels (control consoles)

  Taking into consideration type of instruments mounted on the panel, two types of panels can be distinguished:

  - Control panels of pushbutton/pilot lamp type, formed by mounting on control panel such instruments, as switch, pushbutton, regulating unit, indicator, signalling lamp. In this case the panel performs function of console, which groups control instruments in place that is comfortable for operating staff. Each element placed on the panel is predominantly hardwired to control system, and enables activation of interlocks, switching process equipment on and off, signalling equipment statuses, as well as alarming danger states.
  - Computerised control panels, of functionality close to operator station. The panel housing is adapted to environment conditions present in place of panel installation. Communication with superordinated system proceeds by means of digital transmission.

  Control panels are subject of detailed specification GLSA 3630.
- Printers, as devices that are plotting and generating printouts related to plant operation, for example: alarm logs, parameter charts, production reports, etc.

- Visual displays, transmitting pictures related to plant operation from field mounted cameras (for example: picture of level indicator, monitoring water level in a boiler)
- Audio devices, serving for sending of one-way voice messages (also emergency) to various areas in the field. Wireless communication systems are described in detail in specification GLSA 3830.

5.2 Visualisation screens on operator stations

5.2.1 General characteristics of visualisation screens

- Application of process visualisation must start automatically after operator station switching on, simultaneously precluding possibility of launching any other program by operator. Switching of the application to other mode of operation (programming mode, for example) forces login into system in other mode of operation. It is recommended to protect switching of operating modes by key or card.
- During operation of visualisation application, operator access to any other programs or system console must not be granted. Closing or minimizing of the application is impossible as well.
- Possibility of the application switching over and closing, as well as access to operator station resources, can be granted only to operator who has Administrator/Engineer access level rights.
- The system must immediately inform about alarm events. Method of alarming must be clear and unequivocal for operator. The following implementations are possible:
  - console (dedicated screen) with alarm signalling
  - permanent alarm bar on station screen
- The hierarchy of visualisation screens shall be defined for the system.
- Operator station cannot execute any own algorithms, which can result in automatic action of field equipment. Such control algorithm can by implemented solely in programmable devices intended for such purpose (DCS or PLC controllers of control systems).

5.2.2 Design criteria for visualisation screens

5.2.2.1 General criteria

- The screens shall be simple and easy to understand and two-dimensional. Animation of statuses of devices and apparatus showing their movement (e.g. movement of a cart, rotation of a ventilator) is acceptable after agreement with GLSA. Colour scheme according to point 5.2.2.1 (background), 5.2.2.5 (media), 5.2.2.6 ÷ 5.2.6.5 (measuring and actuating elements).
- The screens shall be created on the grounds of P&I diagrams, or on the grounds of simplified Process Flow Diagrams (PFD). Process flow diagrams shall mainly be used for creation of Overview Displays.
- Background of all visualisation screens shall be uniform.
  - grey (Grey 25 or Grey 75)
  - black, in case when grey background is impossible to achieve (for example for operator panels with simplified graphical capabilities)
- All visualisation screens shall contain a header, consisting of identifier that determines plant and screen type, as well as description on Polish language
- Drawings of field equipment (tanks, columns, reactors, furnaces, etc.) shall correspond by their form to the shapes on P&I diagrams.

5.2.2.2 Types of visualisation screens

The following types of screens shall be defined within the system:

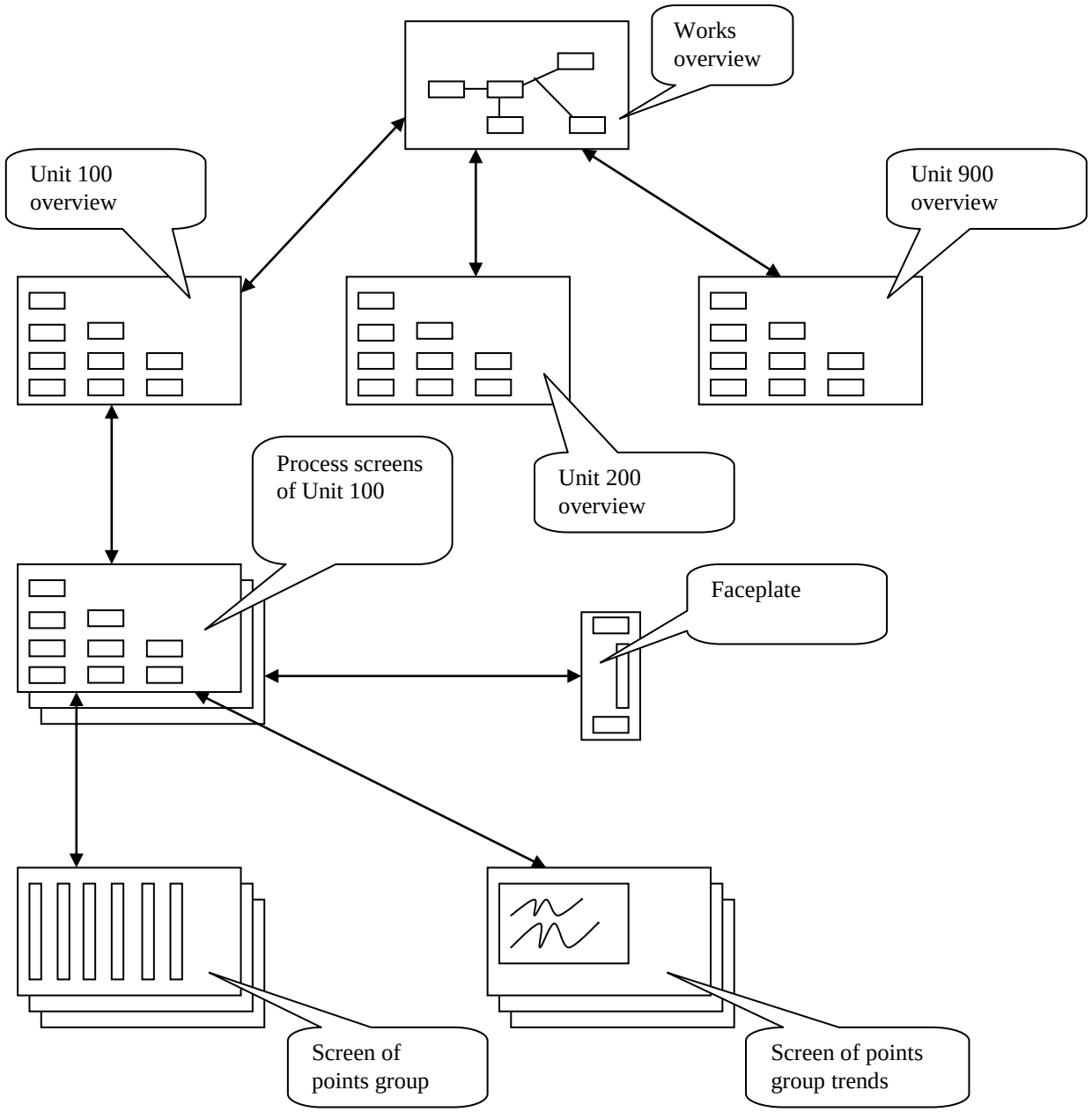
- Simplified overview drawings of plant
- Detailed process screens, as reflection of P&I diagrams
- Special, dedicated screens, closely connected with process plant operation, such as:
  - Gas detectors system
  - Fire safety system
  - Electric supply
  - Complex control loops
  - Monitoring of complex equipment (compressors, turbines, etc.)
  - Simplified diagrams of interlocks and start-up sequence of equipment, enabling activation of MOS and POS type switches
  - List of current and historic alarms, with possibility of filtering and printing
  - List of registered operator's actions, with possibility of filtering and printing
  - Charts (trends) of measuring points with possibility of printing, start and end time for chart, as well as scale factor setting,
  - Groups of measuring points as sets of faceplates, according to their connections with process.
- Diagnostic screens of system, including:
  - cassettes with control systems DCS and PLC modules diagnostic
  - buses and communication links
- Login screens for various access levels (described in detail in point 4.7).

5.2.2.3 Hierarchic structure of visualisation screens

Hierarchic structure of visualisation screens shall be as follows:

- Overview screen of works (plant) – overview of whole works (plant) with main connections between plants (sub-plants) in form of block diagram. Clicking on selected block shall result in displaying overview screen of specific plant (sub-plant).
- Overview screen of plant (sub-plant) – overview of whole plant (sub-plant), presenting main process equipment and lines/loops (form of block scheme is allowed). Clicking on selected block or equipment shall display detailed process plant (sub-plant) screen.
- Detailed process screen – detailed overview of process lines/loops, presenting all important information about the process (measurements, control loops, valves, drives, etc.), relating to manufactured product or equipment (for example: reactor, column, furnace, etc.).
- Detailed screen of measuring points group – detailed overview of measuring point group in form of bars, technologically connected one with another through control loops.
- Detailed screen of measuring points, charts (trends) – detailed overview of measuring points group in form of their time courses, technologically connected one with another through control loops.
- Faceplates of measuring points and instruments – standard windows with all parameters adequate for specific type of point or P&I equipment.

General hierarchy of visualisation screens is presented on the chart below.



5.2.2.4 Instrumentation of plant as static elements of visualisation screens

- Static elements (without dynamic animation), such as tanks, columns, exchangers, furnaces, shall have only two-dimensional representation, and shall be labelled according to specific equipment name.
- Static elements shall be presented only if this is absolutely necessary for process understanding
- Filling of big objects with colour or making them blinking is not allowed
- Changing of process lines colour is not allowed, unless necessary for indication of emergency situation

- The following elements shall not be presented, unless they are equipped with control instruments, or if necessary for better process understanding:
  - start-up lines
  - by-pass lines with manual valves
  - manual, check, relief, control valves of direct action
  - internals of columns, tanks, etc

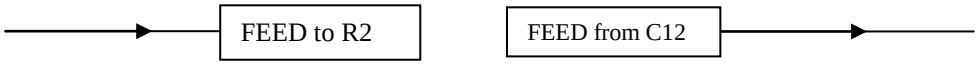
5.2.2.5 Process lines formation criteria

- Process lines on visualisation screens shall be in colour of medium according to following table:

Process medium	**Line colour**
Oil (process, fuel)	Magenta
Feed (raw) – crude oil	Brown
Gas (process, fuel)	Yellow
Steam (LS, MS, HS), Air	White
Chemicals	Violet
Water (all types)	Green
Nitrogen, flue gases	Blue
Hydrogen	Orange
Reach Amine	Green/Yellow*
Lean amine	Yellow

** Bi-colour line*

- In case where mixture of media is contained in plant, bi-colour lines shall be used (for example: orange/yellow = hydrogen / process gas)
- In order to distinguish different types of the same medium, various colour shades (saturation) shall be used (for example: light green = hot water, dark green = cold water).
- It is necessary to use various line thickness, according to following assumptions:
  - Thick solid lines – main process lines (medium)
  - Thin solid lines – auxiliary process lines (medium)
  - Thin dashed lines – connection of measuring points, control, and control loop, etc.
- The lines entering and outgoing visualisation screen must have adequate descriptions. If visualisation program enables creation of interactive references, then they shall be used in such places (displaying of suitable screen on selection of description). Such references shall be located at screen terminal edges. If the lines are ending on screen edge, then they shall be terminated only with an arrow along with adequate description.



- Process lines crossing several screens shall be allocated on the same place in passing points (on the same height).
- Media flow direction in main process lines shall go from left to right side.

- Auxiliary gas lines shall be directed upside, auxiliary lines with liquid media – downside.
- On crossing of two lines, three rules shall be observed:
  - Thin line is cut by thick line (fig. A)
  - Vertical line is cut by horizontal line (fig. B)
  - Dashed line is cut by solid line (fig. C).

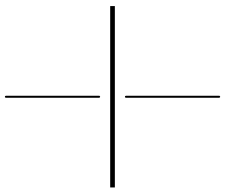


Fig. A

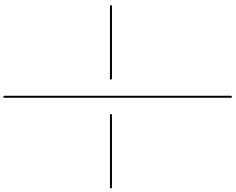


Fig. B

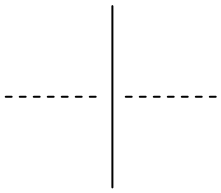


Fig. C

5.2.2.6 Faceplates of measuring points and instruments

The faceplates are standard system windows, which shall contain detailed information regarding specific measuring point (analogue signal, controller), or equipment (drive, valve). Operator shall be able to open the faceplate after selecting specific point number or graphical element associated with it.

Below are given minimum requirements regarding data to be included in faceplates:

Analogue measurement – indication

- Tag number with description in Polish
- Current measured value (PV – Process Value) in numeric form and as bar, and engineering units additionally
- Range
- Alarm thresholds with possibility to suppress, deadband
- Active alarms with dedicated acknowledge pushbutton
- Short-term time chart displaying possibility

Analogue measurement with counter – indication

- Tag number with description in Polish
- Current measured value (PV – Process Value) in numeric form and as bar, and engineering units additionally
- Range
- Alarm thresholds with possibility to suppress, deadband
- Active alarms with dedicated acknowledge pushbutton
- Values from totalizer, such as, for example:
  - current and total average
  - current and average per working shift (8h), per day (24h) (current and previous)

- Reset pushbuttons for counters

A controller

- Tag number with description in Polish
- Current measured value (PV – Process Value) in numeric form and as bar, and engineering units additionally
- Current set value (SP – SetPoint) in numeric form and optionally as bar, and engineering units as well
- Current output value (MV – Manipulated Variable) in numeric form and optionally as bar, and engineering units as well
- Range
- Alarm thresholds with possibility to suppress, deadband
- Active alarms with dedicated acknowledge pushbutton
- Manual / Auto / Cascade mode selector switch
- Possibility of displaying short-term time chart for PV, SP and MV values.

Analogue output (manual setting device) – dedicated faceplate for control valve

- Tag number with description in Polish
- Current output value (MV – Manipulated Variable) in numeric form and optionally as bar, and engineering units as well
- Manual / Auto mode selector switch

Motor (motor drive – pump, fan)

- Tag number with description in Polish
- Manual / Auto mode selector switch
- Mode indication (Local/Remote)
- Start / Stop command pushbuttons in Manual mode
- Running/Stopped/Fault/Locked status
- Active alarms with dedicated acknowledge pushbutton

ON/OFF valve

- Tag number with description in Polish
- Manual / Auto mode selector switch
- Open / Close command pushbuttons in Manual mode
- Open / Closed / Middle position status
- Active alarms with dedicated acknowledge pushbutton

Binary output – dedicated faceplates as for motor or ON/OFF valve.

5.2.3 Engineering units

- SI units for measurement shall be used in general.
- Measurement value shall be separated from unit symbol with space

Measurement variable	**Engineering unit**
Temperature	°C
Pressure, differential pressure	kPa, Mpa
Level	%
Flow	kg/h, t/h, m^3/h, Nm^3/h
Density	kg/m^3
Analyses	%, ppm, pH, etc.
Speed (rotation)	rpm
Low Explosity Limit (gas detectors)	% LEL
Output / actuation	%

5.2.4 Usage of abbreviations and their meaning

- Symbols system conforming to specification GLSA 6120 „Process identification system" shall be used in general.

Abbreviation symbol	**Abbreviation meaning – Polish ver.**	**Abbreviation meaning – English ver.**
T	**T**emperatura, Przetwornik	**T**emperature, **T**ransmitter
P	Ciśnienie	**P**ressure
DP	Różnica Ciśnień	**D**ifferential **P**ressure
L	Poziom	**L**evel
F	Przepływ	**F**low
D	Gęstość	**D**ensity
A	**A**nalizy	**A**nalyses
S	Prędkość (Rotacja)	**S**peed (Rotation)
Q	Ilość (układy sumujące, liczniki)	**Q**uantity (totalizers, counters)
I	Prąd, Wskazanie	Current, **I**ndication
V	Wibracja	**V**ibration
P	**P**ompa	**P**ump
K	**K**ompresor, Dmuchawa	Compressor, Blower
M	Tryb Sterowania Ręczny (regulator, napęd, zawór)	**M**anual Control Mode (controller, motor, valve)
A	Tryb Sterowania **A**utomatyczny (regulator, napęd, zawór)	**A**utomatic Control Mode (controller, motor, valve)
K	Tryb Sterowania **K**askadowy (regulator, napęd, zawór)	**C**ascade Control Mode (controller, motor, valve)
Z	Tryb Sterowania **Z**dalny (regulator, napęd, zawór)	Remote Control Mode (controller, motor, valve)
L	Tryb Sterowania **L**okalny (regulator, napęd, zawór)	Local Control Mode (controller, motor, valve)
PV	Wartość procesowa pomiaru (regulator, wskazanie)	**P**rocess **V**alue (controller, indication)

Abbreviation symbol	Abbreviation meaning – Polish ver.	Abbreviation meaning – English ver.
SP	Wartość zadana (regulator)	**S**et**P**oint (controller)
MV or **OP**	Wartość wyjściowa, sterująca (regulator)	**M**anipulated **V**ariable, **O**ut**P**ut (controller)
A	**A**larm	**A**larm
HH	Alarm Bardzo Wysoki	**H**igh **H**igh Alarm
H	Alarm Wysoki	**H**igh Alarm
L	Alarm Niski	**L**ow Alarm
LL	Alarm Bardzo Niski	**L**ow **L**ow Alarm
D	Alarm niezgodności stanu i komendy (napęd, zawór)	**D**iscrepancy Alarm (motor, valve)
X or **F**	Awaria toru pomiarowego (regulator, wskazanie)	Signal **F**ault (controller, indication)
POS	Procesowy przełącznik nadpisujący sygnał	**P**rocess **O**verride **S**witch
MOS	Serwisowy przełącznik nadpisujący sygnał	**M**aintenance **O**verride **S**witch
US	Blokada wyłączająca	Shutdown Interlock
CV	Zawór regulacyjny	**C**ontrol **V**alve

- Information on control mode (Manual/Auto/Cascade, as well as Remote/Local) must be put on faceplates in text form. Additionally, such information can be used on main screens at specific point or equipment in abbreviated form, if this will not detriment legibility of the screen.
- Alarm information giving failure cause in text form (for example: discrepancy alarm, measurement failure, electric failure, shutdown interlock), must be placed on faceplates.

5.2.5 Nomenclature of measuring points and instruments

- Symbols system conforming to specification GLSA 6120 „P&I and equipment identification system" shall be used in general.
- All points on screens shall be labelled according to following scheme:
  - Three or four digits – region code / unit code
  - Two up to five letters – functional code
  - Three or more digits and letter – consecutive index of point or equipment

Hypothetically:

015FC_321

015 – region of Unit 150

FC – Flow (F) controller (C)

321 – consecutive number of circuit

0150-P5A

0150 – region of Unit 150

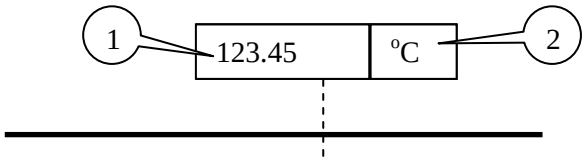
P – pump (P)

5A – consecutive number of equipment

- It is allowed to use shortened description on visualisation screens, for example FC_321 instead of 015FC_321, if whole screen relates to Unit 150 region.

5.2.6 Dynamic representation of circuits on visualisation screens

5.2.6.1 Analogue indication



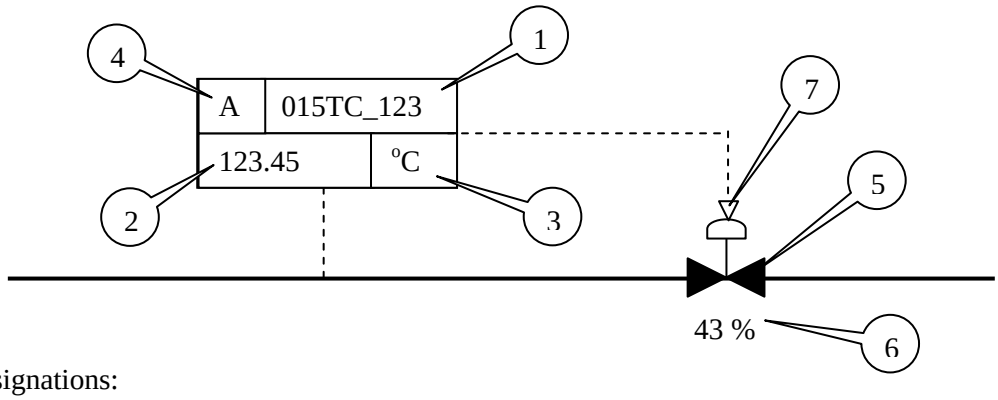
Designations:

- 1 – current process value (PV)
- 2 – engineering unit

Colour scheme of elements:

- Frame – black colour, thickness 1 pixel
- Process value – black colour, font Arial 10 or 12points
  - Normal measurement – screen background — 123.45
  - Non-critical alarm – yellow background — ...123.45
  - Critical alarm / interlock – red background — 123.45
  - Range overflow (up/down) – red background — 123.45
  - Uncertain measurement / communication error - red background
- Engineering unit – black text colour, font Arial 10 or 12 points

5.2.6.2 Control loop



Designations:

- 1 – tag number
- 2 – current process value (PV)
- 3 – engineering unit
- 4 – mode of controller operation

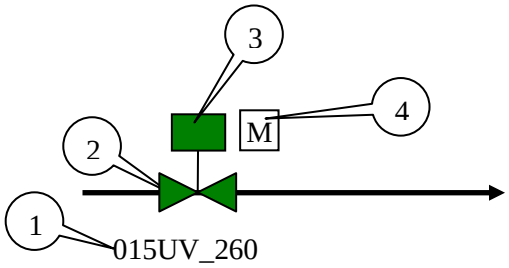
- 5 – control valve
- 6 – current value of valve actuation (controller output)
- 7 – solenoid valve

Colour scheme of elements similarly as for analogue indication.

Additionally:

- Measuring point name, mode of operation – black text colour, font Arial 10 or 12 points
- Current value of valve actuation – black text, font Arial 10 or 12 points
- Control valve
  - OPEN, if equipped with opening limit switch and signalling of its function – green colour
  - CLOSED, if equipped with closing limit switch and signalling of its action – screen background colour
  - Middle position – colour of line
  - Failure or error – red colour
- Solenoid valve (if the valve is equipped in)
  - Live – colour of line
  - Voltage free – screen background colour

5.2.6.3 ON/OFF valve actuated with electromagnetic coil (solenoid)

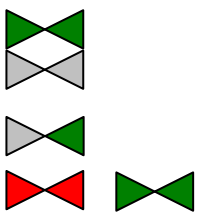


Designations:

- 1 – valve tag number
- 2 – valve ON/OFF
- 3 – electromagnetic coil
- 4 – mode of valve operation (optional)

Colour scheme of elements:

- The tag numner, mode of operation (optional) – black text colour, font Arial 10 or 12 points
- valve ON/OFF
  - OPEN – green or colour of pipeline
  - CLOSED – outline only, screen background colour
  - Middle position- green/ colour of pipeline
  - Failure on open (discrepancy alarm)

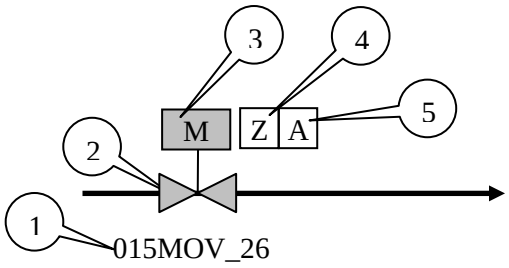


- red, pulsating (1s) / green (1s)
- red, if the alarm is acknowledged

- Failure on close (discrepancy alarm)
  - red, pulsating (1s) / screen background colour (1s)
  - red, if the alarm is acknowledged
- Error (simultaneous action of both limit switches, communication error) – cyan

- Electromagnetic coil
  - Actuation to open – green, or pipeline colour
  - Actuation to close – screen background colour

5.2.6.4 Motorized ON/OFF valve

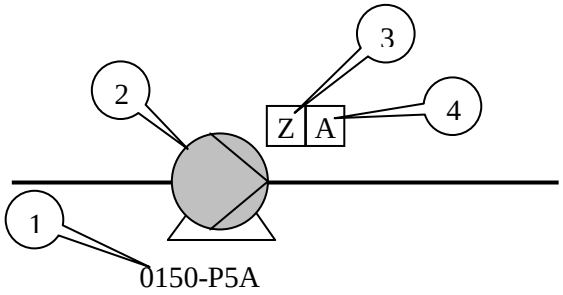


Designations:

- 1 – valve tag number
- 2 –ON/OFF valve
- 3 – motor
- 4 – mode of valve operation: Remote/Local (optional)
- 5 – mode of valve operation: Manual/Auto/Cascade (optional)

Colour scheme of elements as for ON/OFF valve actuated with electromagnetic coil

5.2.6.5 Drive (pump, fan, compressor), controlled with motor



Designations:

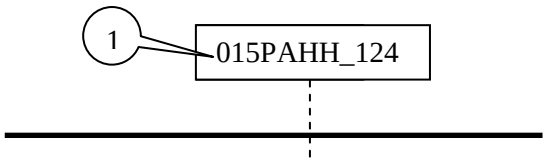
- 1 – drive tag number

- 2 – drive
- 3 – mode of drive operation: Remote/Local (optional)
- 4 – mode of drive operation Manual/Auto/Cascade (optional)

Colour scheme of elements:

- Drive tag number, mode of operation (optional) – black text colour, font Arial 10 or 12 points
- Drive
  - OPERATING – green, or pipeline colour 
  - IDLE– outline only, screen background colour 
  - Failure/error (discrepancy alarm, electric failure not ready, general alarm, communication error) - red 

5.2.6.6 Binary indication



Designations:

- 1 – tag number of measuring point

Colour scheme of elements:

- Frame – black, thickness: 1 pixel
- Measuring point tag number – black, font Arial 10 or 12 points
  - Normal signal – screen background 015PAHH_124
  - Non-critical alarm – yellow background 015PAHH_124
  - Critical alarm/ interlock – red background 015PAHH_124
  - Uncertain signal/ communication error– red background error

5.2.6.7 Additional definitions for graphical objects animation

- Font face and size for text and numerical objects, shall be agreed and approved by GLSA
- Dynamic numerical values shall be refreshed on screens in case of their change by value exceeding defined deadband value. Deadband value shall be set according to numerical format of displayed value, for example, for XXX.X format deadband value is equal to 0.1.
- Numerical format of displayed values shall be defined according below given table.

Range of displayed analogue value	**On-screen representation**	**Deadband value**
0.0 – 9.0	X.XXX	0.001
0.0 – 99.0	XX.XX	0.01
0.0 – 999.0	XXX.X	0.1

0.0 – 9999.0	XXXX	1
0.0 – 99999.0	XXXXX	10
0.0 – 999999.0	XXXXXX	100

- Pushbuttons, as objects that are made available to an operator for his action, shall be clearly distinguishable from other graphical objects and shall contain textual description or icon associated with specific action.

5.3 General principles of alarm management on operator stations

Target management structure of alarm system depends on DCS or PLC systems supplier standards, and has to be described in detail in supplier documentation.

5.3.1 Validity level and priority of alarms connected with it

In respect of validity, alarms can be divided on 4 levels:

- Level 0 (the highest): the alarm resulting in change of equipment state (drive switching off or on, valve closing or opening) in effect of protecting function action, and is activated by protecting systems (SIS PLC (ESD, BMS), machinery monitoring system) for purposes of human, plant or equipment safety protection.
- Level 1: the alarm resulting in change of equipment state (drive switching off or on, valve closing or opening) in effect of normal control function action (for example: level check in tank), and is not activated by protecting systems (SIS PLC (ESD, BMS), machinery monitoring system).
- Level 2: the alarm that does not result in change of equipment state (drive switching off or on, valve closing or opening)
- Level 3: an event representing change of status signal, for example: „Pump 0150-P5A switched on”

5.3.2 Identification of alarms on visualisation screens of operator station

Each alarm shall be identified on screen by:

- Its tag number, conforming to numbering scheme of measuring points and equipment (point 4.2.5)

  For example:

  015FAHH_321

  015 – Unit 150 region

  FAHH – high high (HH) flow (F) alarm (A)

  321 – consecutive number of circuit

- Validity level (priority), indicated on screen by adequate colour
- The alarm description, giving information additional to that already contained in alarm name, in following form:
  - The measuring point service, for example: „Feed from 0150-V3 vessel”

- The text, determining type of deviation from normal process conditions, or equipment operation (for example: „Electric failure of ventilation system")

- Designation of system or sub-system, which generated the alarm
- Time of the alarm generation, acknowledgement and disappearence

5.3.3 Signalling of alarms

Alarms shall be handled in system according to below given table:

Status of alarm cause	Alarm not already acknowledged	**Acknowledged alarm**
Current	Positive indication with flashing attribute of 1 - 3 s period Audible signal (internal „beep")	Indication without flashing attribute -
Outdated	Negative indication with flashing attribute of 1 - 3 s period Audible signal (internal „beep")	- -

In case of audible signalling, distinguishing of tone and frequency for different alarm priorities is preferred.

For alarm sequences, additional first-out logic shall be implemented in protecting systems. The alarms generated by this logic shall be indicated jointly with reset pushbuttons on dedicated visualisation screens.

5.3.4 Detailed requirements for alarm indication

- Level of validity and alarm priority connected with it, shall be indicated on all screens by means of colour use, according to below given table.

Validity level	Location of generated alarm	Alarm priority	Alarm colour
0	Protecting system (SIS (ESD, BMS), Machinery Monitoring System)	INTERLOCK ALARM or ALARM (as Warning)	Red
1	DCS or PLC	INTERLOCK ALARM	Red
2	DCS or PLC	ALARM (as Warning)	Yellow
3	Protecting system (SIS (ESD, BMS), Machinery Monitoring System, DCS or PLC)	EVENT	Green

- The system must immediately inform about alarm events. The way of alarming shall be clear and unequivocal for operator. Possible implementations are:
  - dedicated screen with alarm signalling, enabling:
    - acknowledgement
    - filtering
    - printing
  - permanent alarm bar on operator station screen, enabling alarm acknowledge
- The alarms shall be displayed in chronological order list

- Alarm lists shall enable filtering according to defined fields of alarm records, such as:
  - Unit area code (sub-unit)
  - Alarm type (process, system)
  - Priority (validity level)
  - Alarm status (acknowledged, not acknowledged)
  - Time for period

    Etc.

5.4 Recording of process parameters courses in real time

- Final structure of process parameters recording and archiving system depends on standards of DCS or PLC systems supplier, and has to be precisely described in its documentation.
- All process parameters (analogue and binary values) shall be recorded in real time and displayed in form of short-term charts.
- The courses shall be accessible from adequate measuring points faceplates.
- Sampling rate shall be equal to:
  - Flow measurements 1 s
  - Pressure measurements 1 s
  - Level measurements 5 s
  - Temperature measurements 10 s
  - ON/OFF signals 2 s
  - Other signals 10 s
- Range scale for values on charts shall correspond to full signal range expressed in engineering units. For binary On/Off signals, 0 or 1 scale shall be used.
- Time scale for control loops shall be:
  - Flow and pressure control loops 3 min. minimum
  - Level and temperature control loops 15 min. minimum
- For measuring points that are determined by process engineer and mutually connected, visualisation screens of courses shall be configured. Displaying of 6 – 8 courses and use of 1 - 3 different value scales on single chart is allowed.

5.5 Recording of historic process parameters data

- On detailed design stage one shall determine these parameters from among those being recorded in real time, which shall be stored in long-term archives, as well as determine their sampling rate and storage period.
- The operator shall be able to parameterise visualisation screens for historic data. This applies, for example, to:
  - Determination of time period to be analysed
  - Change of scale range for each parameter

- Searching for arbitrary threshold value exceeding by specific parameter

- Configured screens of parameters charts shall display 6 – 8 courses.
- It is allowed to use external mass storage devices for data storage.

5.6 Printing devices

Beside station for process visualisation and control, printing devices for documentary hard copies printing must be located in central control room.

- alarm states related to process and system
- process images
- trends of measured process values
- technological and production reports
- screenshots of operator screens

Therefore the following printers shall be installed in control room:

- Dot-matrix printer – speed higher than 400 cps, 24 dots

  for real time printing of alarms generated by process conditions and control system errors, logs of events. Printout commences immediately after an event occurrence in chronological order, and contains at least date, time, tag number, short text describing the event, process parameter value. Automatic printing in configured in advance periods of time or on demand shall be possible.

- Colour inkjet or laser printer – speed 8 ppm at least.

  for process images printing in form of screenshots from operator station, trends, texts in form of reports.

5.7 Access protection system to operators' stations

Two safety areas for operators' stations access shall be configured within the system, namely:

- Authentication, i.e. the procedure of checking if specific user is known to the system
- Authorization, i.e. the procedure of checking which actions are permitted for specific user within the system

The system accounts are used in order to limit access and rights in relation to specific stations.

Authorization shall be controlled by means of access levels and possibly access areas.

Authorization in computer operating system, and in operator's station system shall be integrated. Access to assigned areas is irrespective of a station from which login proceeded, but is limited only to this station.

The following access levels can be defined within the system:

- Viewing (only)
- Operator mode
- Engineer/Administrator mode

After login to operator's station, the operator shall have no access to other programs, operating system files, but only to control and monitoring program of DCS system installation.

Authorization method that is recommended for higher-level access is key or card. If system login is accomplished by use of password, then automatic log off to operator's level is recommended after expiration of certain period of time (one hour after login, for example.).

5.8 System acceptance procedure – FAT (Final Acceptance Tests)

Procedure of DCS and PLC/SIS PLC (ESD) system acceptance (FAT) shall be submitted and agreed with GLSA prior to acceptance tests commencement. The procedure shall contain detailed descriptions of all tests.

The tests shall include at least following checks:

- list of all purchased system elements
- mechanical structure of system cabinets and equipment mounted in them
- supply system, before the system starting
- location of modules in system cabinet
- cabling of cabinets – colour and size of cables, terminations and labelling of cables
- grounding system – stripes of individual grounding, structural elements grounding, electronics grounding
- analogue and binary inputs and outputs in the system – simulation of field signals with visualisation and control from operator station
- network configuration – addressing of elements in system network
- databases for all points along with their parameters, i.e. tag number, service, scanning time, measuring range and engineering unit, algorithm, time of saving to history base, levels and types of alarms, associated operator screens
- operator screens (mimic), faceplates as well as configuration of trends (trend groups)
- access to the system on following levels: operator, administrator/engineer
- control logic diagrams
- redundancy of servers, cables, controllers, supply.

The procedure shall also include forms for acceptance of individual system parts by parties participating in acceptance tests. The forms shall include reference to design documentation, serving as base for systems completion and configuration. Complete design documentation constituting base for system completion (the latest revision), shall be accepted by GLSA prior to FAT commencement, and shall be accessible in course of acceptance tests execution in single copy, so-called MASTER copy, on which changes will possibly be entered by parties.

6 Relevant documents

Any "Technical Specification" issued by GRUPA LOTOS S.A. listed in Contract Files.

7 Standards and regulations

Design, execution and erection shall comply with the latest editions of below listed standards and regulations.

The standards related directly to control room equipment were quoted here. The remaining standards and regulations are given in specification GLSA 3010.

7.1 Directives of European Union

2006/95/EC	Electrical equipment designed for use within certain voltage limits
2004/108/EC	Electromagnetic compatibility and repealing Directive 89/336/EEC
2008/768/EC	Commission Decision of 30 September 2008 concerning the non-inclusion of Beauveria brongniartii and potassium permanganate in Annex I to Council Directive 91/414/EEC and the withdrawal of authorisations for plant protection products containing these substances (notified under document number C(2008) 5106) (Text with EEA relevance)
93/465/EEC	Conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives

7.2 Polish Standards

PN-EN 60950	Safety of information technology equipment
PN-EN 61000	Electromagnetic compatibility (EMC)
PN-EN 55022	Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement
PN-EN 55024	Information technology equipment. Immunity characteristics. Limits and methods of measurement
PN-EN ISO 9241	Ergonomics requirements for office work with Visual Display terminals (VDTs)
PN-EN ISO 9241 Part 302	Ergonomics of human-system interaction -- Terminology for electronic visual displays
PN-EN ISO 9241 Part 302	Ergonomics of human-system interaction -- Requirements for electronic visual displays
PN-EN ISO 9241 Part 304	Ergonomics of human-system interaction -- User performance test methods for electronic visual displays
PN-EN ISO 9241 Part 305	Ergonomics of human-system interaction -- Optical laboratory test methods for electronic visual displays
PN-EN ISO 9241 Part 306	Ergonomics of human-system interaction -- Field assessment methods for electronic visual displays
PN-EN ISO 9241 Part 307	Ergonomics of human-system interaction -- Analysis and compliance test methods for electronic visual displays

8 Record of changes

No.	Date	Description	Introduced by
1	30-11-2013 (rev. 1)	Review, update, standardize and changes to the Standard within scope of order No. OK/990/2012	Editorial board coordinated by T.Wróbel
-	31-08-2015	Page layout corrections, no contents changes.	T. Wróbel