



FJ |

Integral
Supply

MONITORING AND CONTROL SYSTEM PRIOR





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PRIOR | VAL

PRIOR is a system developed by Fernández Jove for automation and remote control of valves in fluid systems. It is a system specifically designed for the naval sector which provides a global vision of the state of the equipment, offering the operator a complete control interface from one or several points of the installation.

Thanks to its modular and flexible concept, PRIOR adapts to the specific needs of each Project.

TOTAL INTEGRATION

PRIOR has several modules for predefined applications which can be combined to offer a complete control system that integrates different sort of equipment.

TOTAL CONNECTIVITY

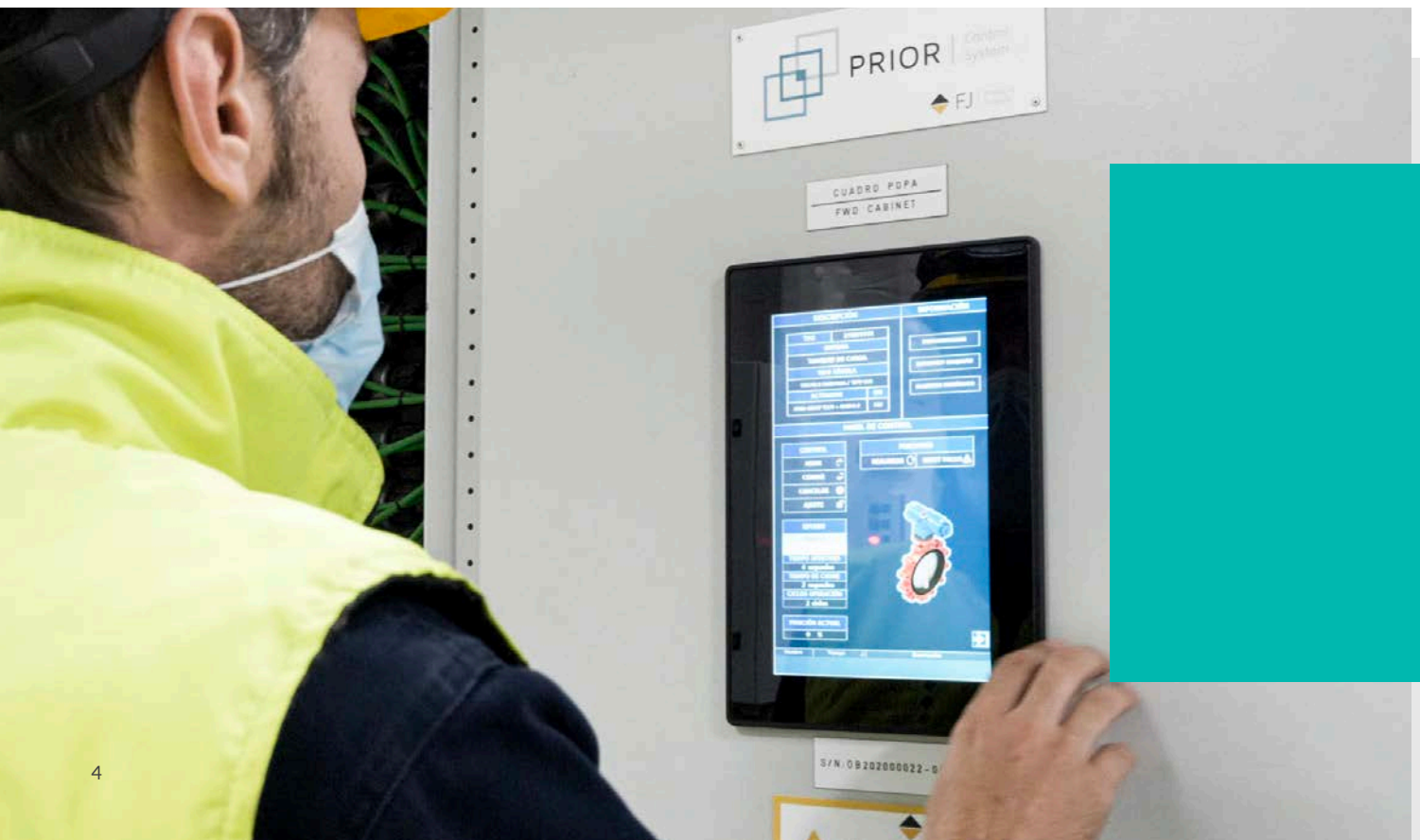
PRIOR connects to equipment and systems (both its own and those of others) using the most common universal communication protocols (Modbus, Profibus, etc.). This makes it possible to take control from a superior entity such as the IAS - Integrated Automation Systems - (on a ship) or a SCADA (in a land-based installation).

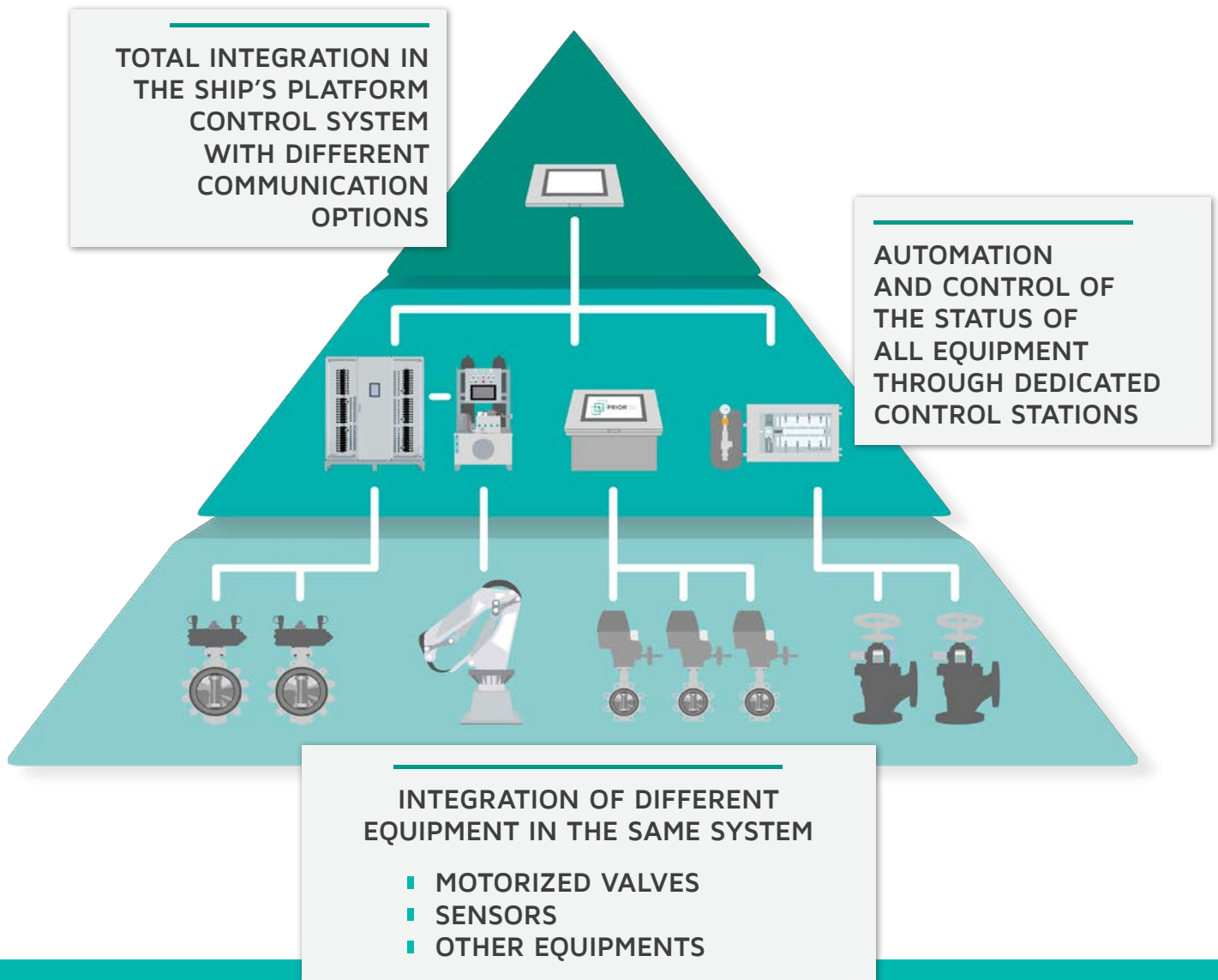
TOTAL CONTROL

PRIOR is capable of handling and managing several types of signals (analogue, digital, remote commands, etc.) as well as integrating automatism that facilitate control by the user.

FLEXIBILITY

PRIOR is a modular and scalable system, fully adaptable to the needs of each project. This allows customizing the control and monitoring options as required in each case, integrating different types of equipment and systems.





TYPES OF VALVE CONTROL SYSTEMS

There are several versions of the PRIOR control system that allow having remote control of the valves using different types of actuators: electric, hydraulic and pneumatic.

- ◆ Electrically actuated valve systems
- ◆ Hydraulically actuated valve systems
- ◆ Pneumatically actuated valve systems

Each type of system has its advantages and disadvantages. On a regular basis, electric actuators are used whenever it is possible in the naval industry, leaving pneumatic or hydraulic actuators for those cases in which using the electric one is not possible.

In any of the scenarios described above, the PRIOR system allows remote control of the valves installed, displaying all the information directly to the end user or doing it communicating through other systems, such as the ship's platform control system.



PRIOR|VAL allows taking control of the valves using the screens in the control stations, from where a global vision of the systems and the status of the equipment are displayed.



DESCRIPTION

529BI-VA-148	
SYSTEM	
IN SYSTEM	
VALVE TYPE	
VALVE / LUG TYPE	
ACTUATOR	DN
M 12.1	150

INFORMATION

- DOCUMENTATION
- DATASHEET



- SERVICE
- BILGE SYSTEM
- FIRE FIGHTING SYSTEM
- DRAIN SYSTEM
- SYSTEM
- HYDRAULIC SYSTEM STATUS
- ELECTRICAL SYSTEM STATUS
- ALARMS
- ALARMS HISTORY
- MAINTENANCE ALARMS
- MAINTENANCE HISTORY
- OPTIONS
- LOGIN
- RESOURCES
- CONFIGURATION

CONTROL PANEL

- CONTROL
- OPEN
- CLOSE
- CANCEL
- ADJUSTMENT

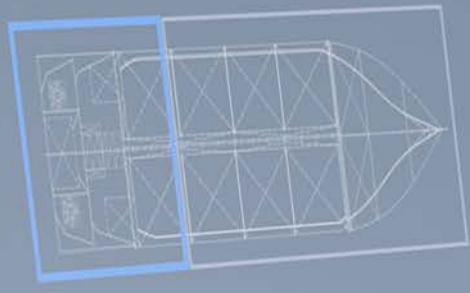
- ### FUNCTIONS
- REALIGN
 - FAILURE RESET



- STATUS
- OPENED
- NO FAILURE
- OPENING TIME: 10 seconds
- CLOSING TIME: 0 seconds
- OPERATION CYCLES: 1 cycles

SET POINT 100 (%)

RUN



VALVE SYSTEMS WITH ELECTRIC ACTUATORS

The use of motorized valve systems with electrical actuation are becoming more frequent due, among other things, to the upgrades in actuator controls, the implementation of new and more modern communication protocols, a low installation cost and a high positioning accuracy.

Regardless of the means of communication used with the actuators, PRIOR control system is capable of controlling and automating electric valve systems in different arrangements, depending on the needs and requirements of each project.

- ◆ Point-to-point arrangement
- ◆ Daisy chain arrangement
- ◆ Loop arrangement
- ◆ Special or combined systems

The most modern electric actuators transmit a large amount of information to the control system, which allows the deployment of health diagnostics and condition monitoring applications.

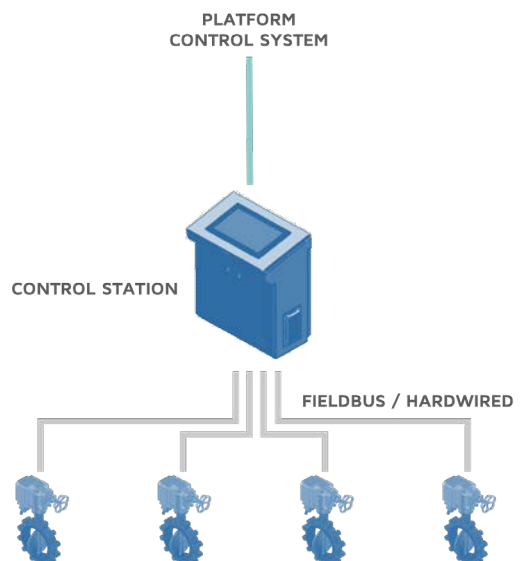
PRIOR control screens allows the user to read all the health and maintenance data, as well as the alarms and any other important information.



SYSTEM ARRANGEMENTS

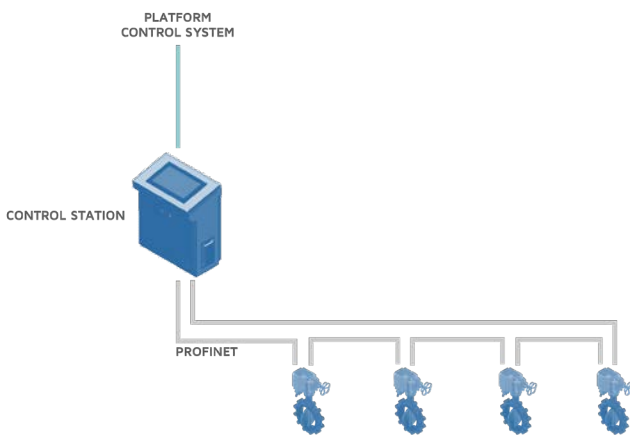
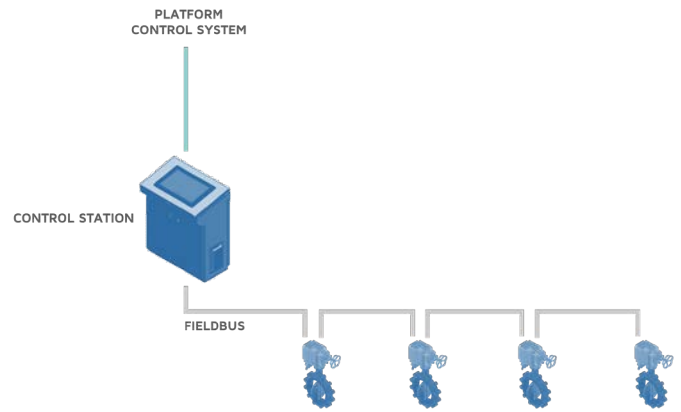
POINT-TO-POINT ARRANGEMENT

- ◆ Each actuated valve is independently connected to the control station
- ◆ This arrangement is possible when using serial communications (Modbus RTU), Ethernet communications (Modbus TCP/IP and Profinet) or analog/digital wiring
- ◆ Although the wiring is greater than in other arrangements, a simple failure in an actuator or cable does not affect the rest of the equipment in the system



DAISY CHAIN ARRANGEMENT

- ◆ Each actuated valve is connected to the previous one following a chain arrangement
- ◆ Available with serial communications (Modbus RTU) and Ethernet communications (Modbus TCP/IP and Profinet)
- ◆ There are limitations on the number of valves in each line, depending on the communication protocol
- ◆ No additional switches or equipment is required for the connection

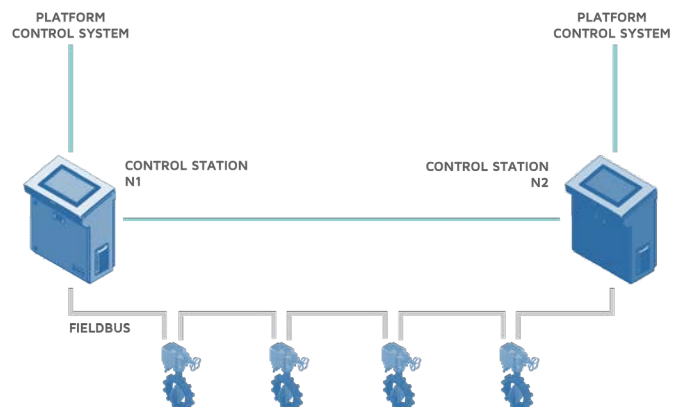


LOOP ARRANGEMENT

- ◆ The valves are linked forming a loop/ring, where the first and the last one are connected to the control station
- ◆ Redundancy: the system remains operational in the event of a simple failure
- ◆ It is available with Ethernet communications (Profinet)
- ◆ In specific cases, it is available with serial communications (Modbus RTU)

SPECIAL OR COMBINED SYSTEMS

In addition to the most traditional architectures, PRIOR can also be designed for more complex systems which use a mixed communication (using more than one protocol or combining arrangements) or even for redundant hot-standby systems, where there are two control stations that can control the same group of valves.



COMMUNICATION WITH ACTUATED VALVES

PRIOR control system is able to communicate with the actuated valves using the most widespread communication protocols, as well as through standard digital controls.

- ◆ Parallel control
- ◆ Modbus RTU control
- ◆ Profinet control
- ◆ Other protocols

PARALELE CONTROL

All the orders and signals are wired directly between the actuator and the control system using a point-to-point arrangement:

- ◆ Digital commands to open/stop/close the valve
- ◆ Digital or analogue indications of the valve position
- ◆ Digital indications of failures and alarms in the equipment

MODBUS RTU CONTROL

All the orders and signals are transmitted through the field bus using Modbus RTU/RS-485 protocol.

Modbus is a widely used communication protocol that is very common in the industry, simple to implement and with ample data transmission capacity. A single transmitter unit (master) is capable of controlling several receiver units (slaves) simultaneously, with transmission speeds of up to 19.200 bps.

In a standard arrangement, Modbus RTU supports up to 31 actuators per line. In special arrangements, and using repeaters, up to 247 units can be linked, although performance in terms of operating speeds is drastically reduced.

PROFINET CONTROL

All the orders and signals are transmitted through Ethernet using the Profinet protocol.

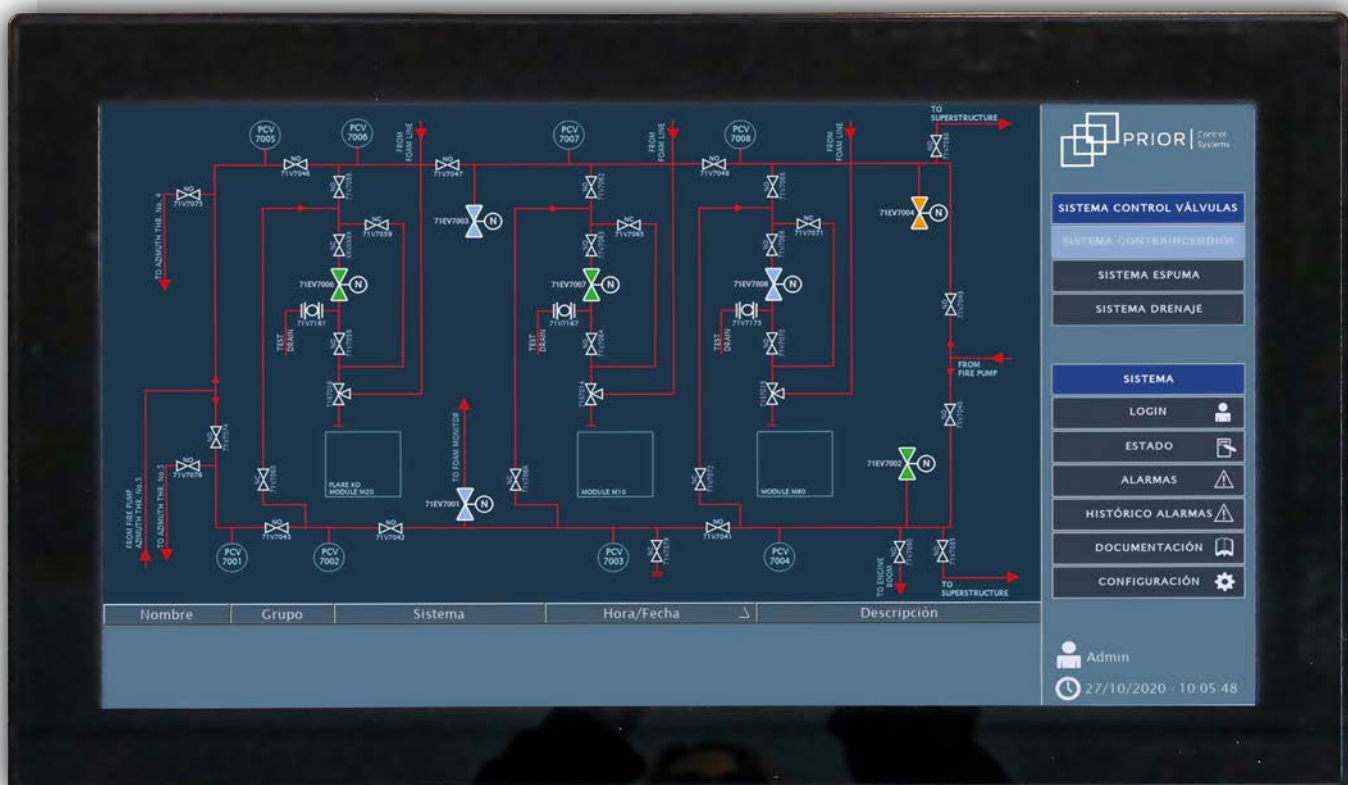
Profinet is a real-time communication protocol very widespread in the industry. It supports a large amount of data and is easy to implement in motorized valve systems.

This protocol has control redundancy thanks to loop/ring arrangements, connecting the actuated valves to the PRIOR system by two pathways. In the event of failure in the wiring or in one of the equipment, the communication is maintained so that the user does not experience availability problems at any time.

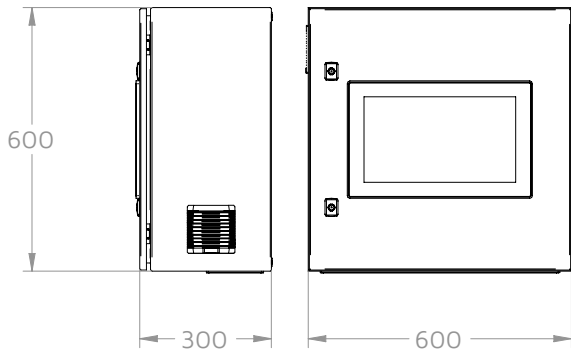
In a standard arrangement, motorized valve loops of up to 50 units can be implemented without facing any time reduction in data transmission.

OTHER PROTOCOLS

PRIOR is capable of operating with motorized valves that use other communication protocols, such as Profibus, Modbus TCP/IP, Canbus or Foundation Fieldbus.



CONTROL STATION FOR MOTORIZED VALVES STANDARD ARRANGEMENT



GENERAL CHARACTERISTICS

Control screen	Standard	15", TFT LED HD, 1366x768
	Optional	Without screen
Power supply	Standard	Main: 230 VAC; Emergency: 24 VDC
	Optional	Main: 24 VDC; Emergency: 24 VDC

PHYSICAL CHARACTERISTICS

Dimensions	Standard (with screen)	600x600x300 mm
	Optional (without screen)	400x600x210 mm
Weight	Standard (with screen)	Approx. 32kg
	Optional (without screen)	Approx. 20kg
Assembly	Standard	Wall-mounted
Protection	Standard	IP66
Colour	Standard	RAL7035
Temperature range	Standard	0 - 45°C
Humidity range	Standard	0 - 95% (no condensation)

- ◆ Other arrangements or control station designs are available, depending on the specific needs of the project.
- ◆ For parallel control, the control station is dimensioned according to the number of devices which are to be controlled.

COMMUNICATION CHARACTERISTICS		
IAS communication	Standard	Modbus TCP/IP
	Optional	Dual Modbus TCP/IP communication
	Optional	Modbus RTU, RS-485 (2 wires)
Valve communication	Standard	Modbus RTU, RS-485 (2 wires) <ul style="list-style-type: none"> • Groups of up to 30 actuators, daisy chain • Maximum of 4 groups per station (120 valves)
	Optional	Modbus TCP/IP <ul style="list-style-type: none"> • Groups of up to 30 actuators, daisy chain or point-to-point • Maximum of 4 groups per station (120 valves)
	Optional	Profinet <ul style="list-style-type: none"> • Groups of up to 50 actuators, daisy chain, loop or point-to-point
	Optional	Other options under specific request (Canbus, Profibus, etc.)

SOFTWARE CHARACTERISTICS		
Control capabilities	Standard	Valves information (TAG, service, etc.)
		Status display (open/closed/position [%]/error)
		Order (open/close/position[%])
		Active alarms (alarm, date, time)
		Historical alarms (alarm, date, time)
		System diagnosis (communications, power supply, etc.)
		System documentation (user's manual)
		Role-based access control (administrator, operator)
	Optional	Service mimics (piping, other equipment, etc.)
		Valves information (DN, PN, service, etc.)
		Valves documentation (2D models, manuals, etc.)
		System documentation (2D models, electrical diagrams, etc.)
		Role-based access control (monitoring users, etc.)



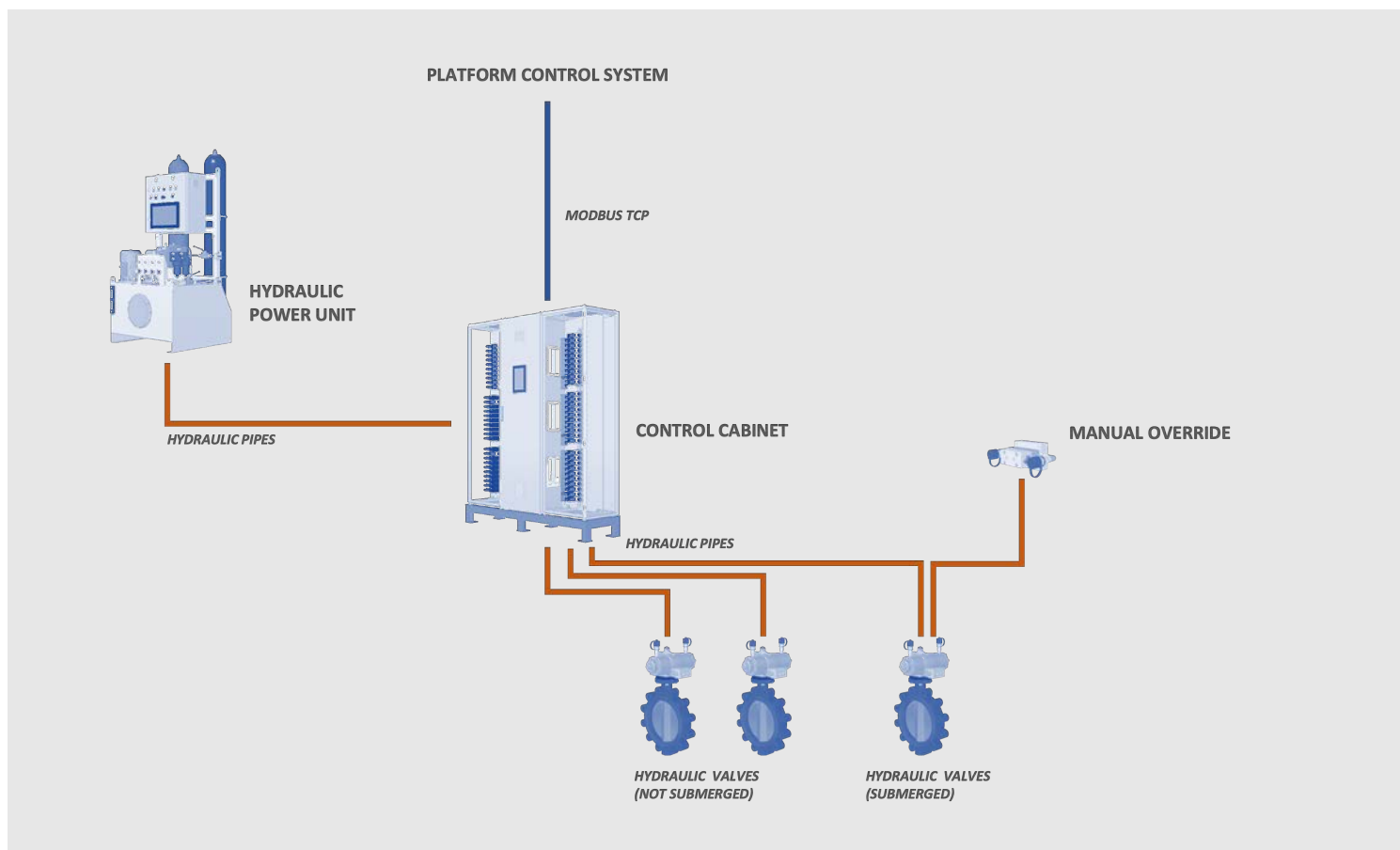
VALVE SYSTEMS WITH HYDRAULIC ACTUATORS

Motorized valve systems with hydraulic actuators are commonly used in those applications where the installation of electrical equipment is not suitable. They are especially used in sea water or fuel systems where the valves have to be submerged.

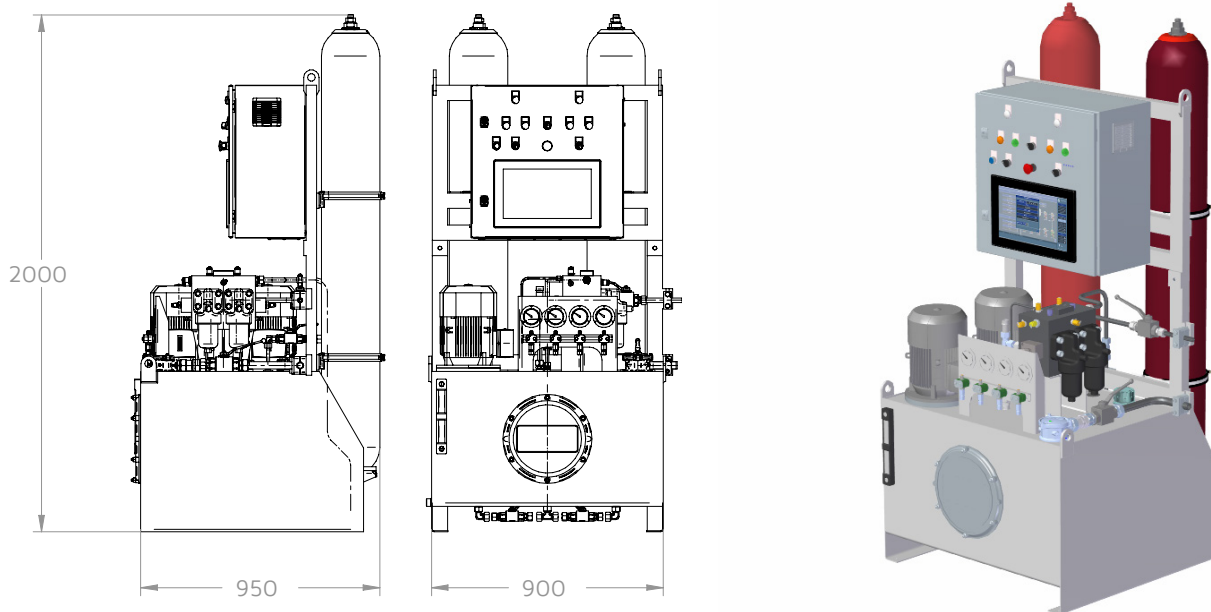
The basic architecture of this type of system is as follows:

- ◆ One or several hydraulic power units, depending on the characteristics of the project
- ◆ One or several control cabinets, which control the valves through sets of solenoid valves
- ◆ Valves individually connected to the control panel through hydraulic piping
- ◆ The position indication of the valves can be received:
 - ◇ Measuring directly using limit switches (wired)
 - ◇ Measuring indirectly using volumetric indicators (valid for submerged valves)

PRIOR hydraulic valve control system includes automation of the main system variables (such as pressures, temperatures and flow rates), which allows diagnosing possible failures, alarms or anomalous situations.



HYDRAULIC POWER UNIT – HPU STANDARD ARRANGEMENT



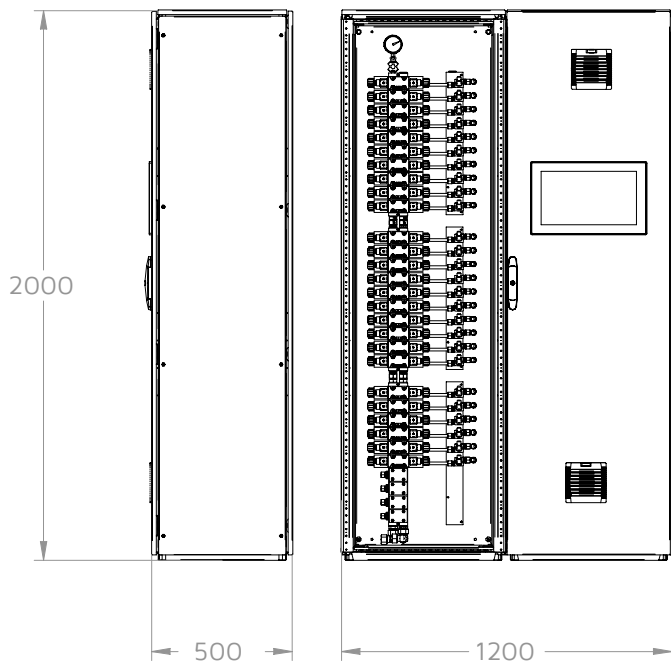
GENERAL CHARACTERISTICS

Power supply	Standard	Power: 3 x 380/440 VAC 50/60Hz Control: 230 VAC
	Optional	Power: 3 x 220/240 VAC 50/60Hz Control: 230 VAC
	Optional	Power: 3 x 380/440 VAC 50/60Hz Control: 24 VDC
	Optional	Power: 3 x 220/240 VAC 50/60Hz Control: 24 VDC
Number of motors	Standard	2
Power of motors	Standard	2,2 kW
Number of accumulators	Standard	2
	Optional	1
Type of accumulators	Standard	Hydropneumatic with nitrogen bladder
Accumulator pressure	Standard	250 bar
Working pressure	Standard	150 bar
Pressure connection	Standard	DIN 2353 20
Return connection	Standard	DIN 2353 22
Tank capacity	Standard	160 L

PHYSICAL CHARACTERISTICS		
Dimensions	Standard	960x910x2030 mm
Weight	Standard	Approx. 660kg (without oil)
Assembly	Standard	Floor-mounted
Colour	Standard	RAL7035
Temperature range	Standard	0 - 45°C
Humidity range	Standard	0 - 95% (no condensation)
COMMUNICATION CHARACTERISTICS		
IAS communication	Standard	Modbus TCP/IP
	Optional	Dual Modbus TCP/IP communication
	Optional	Modbus RTU, RS-485 (2 wires)
CONTROL CHARACTERISTICS		
Control screen	Optional	15", TFT LED HD, 1366x768
Operating modes	Standard	Manual
		Automatic
External controls	Standard	Manual/off/automatic selector
		On/off manual selector for motor 1
		On/off manual selector for motor 2
		Emergency stop
Indication lights	Standard	Power supply
		Control power supply
		Motor 1 on
		Motor 2 on
		Motor 1 failure
		Motor 2 failure

SOFTWARE CHARACTERISTICS		
Control capabilities	Standard	Display of HPU variables <ul style="list-style-type: none"> • Accumulator pressure • Working pressure • Pump 1 pressure • Pump 2 pressure • Mode (manual/automatic)
		Active alarms (alarm, date, time) <ul style="list-style-type: none"> • Oil level low • Oil level too low • N1 filter clogged • N2 filter clogged
		Historical alarms (alarm, date, time)
		System diagnosis (communications, power supply, etc.)
		System documentation (user's manual)
		Role-based access control (administrator, operator)
		Service mimics (piping, other equipment, etc.)
	Optional	Valves information (DN, PN, service, etc.)
	Optional	Valves documentation (2D models, manuals, etc.)
	Optional	System documentation (2D models, electrical diagrams, etc.)
Optional	Role-based access control (monitoring users, etc.)	

CONTROL CABINET FOR HYDRAULIC VALVES STANDARD ARRANGEMENT



GENERAL CHARACTERISTICS

Control modules	Standard	2 (30 valves per cabinet)
	Standard	3 (60 valves per cabinet)
Control screen	Standard	10", TFT LED HD, 1366x768
	Optional	15", TFT LED HD, 1366x768
Power supply	Standard	Main: 230 VAC; Emergency: 24 VDC
	Optional	Main: 24 VDC; Emergency: 24 VDC

PHYSICAL CHARACTERISTICS

Dimensions	Standard (2 modules)	1200x540x2130 mm
	Optional (3 modules)	1800x540x2130 mm
Weight	Standard (2 modules)	Approx. 420 kg
	Optional (3 modules)	Approx. 640 kg
Assembly	Standard	Floor-mounted
Protection	Standard	IP66
Colour	Standard	RAL7035
Temperature range	Standard	0 - 45°C
Humidity range	Standard	0 - 95% (no condensation)

COMMUNICATION CHARACTERISTICS		
IAS communication	Standard	Modbus TCP/IP
	Optional	Dual Modbus TCP/IP communication
	Optional	Modbus RTU, RS-485 (2 wires)
SOFTWARE CHARACTERISTICS		
Control capabilities	Standard	Valves information (TAG, service, etc.)
		Status display (open/closed/position[%]/error)
		Order (open/close/position[%])
		Active alarms (alarm, date, time)
		Historical alarms (alarm, date, time)
		System diagnosis (communications, power supply, etc.)
		System documentation (user's manual)
		Role-based access control (administrator, operator)
	Optional	Service mimics (piping, other equipment, etc.)
		Valves information (DN, PN, service, etc.)
		Valves documentation (2D models, manuals, etc.)
		System documentation (2D models, electrical diagrams, etc.)
		Role-based access control (monitoring users, etc.)



VALVE SYSTEMS WITH PNEUMATIC ACTUATORS

Pneumatically actuated valve systems are simple and generally inexpensive, making them widely used in the shipping industry. They are especially useful in fail-safe applications and in those situations where fast valve operations are required.

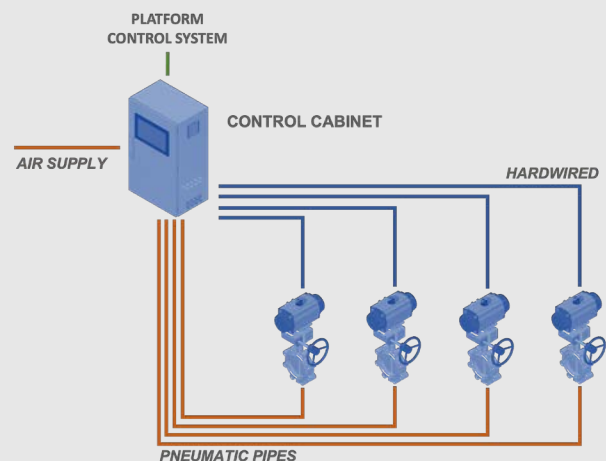
Depending on the position of the solenoid valves, there are mainly two possible arrangements for these systems:

- ◆ Solenoid valves installed in the control panel, with air inlet in the cabinet.
- ◆ Solenoid valves installed on the actuators, with air inlet coming from a common manifold.

Optionally, air accumulators or other emergency systems such as a UPS can be installed.

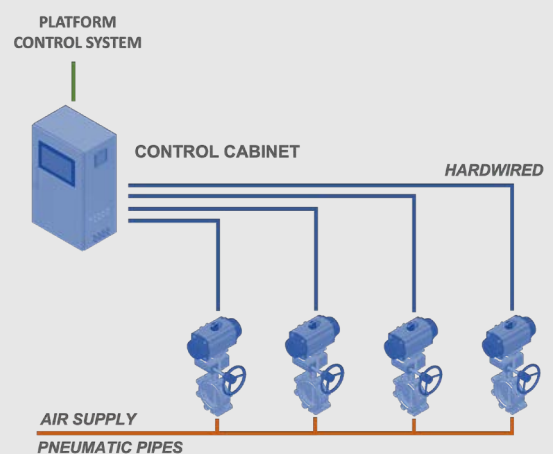
SOLENOID VALVES INSTALLED IN THE CONTROL PANEL

- ◆ The control cabinet is connected to the ship's compressed air system
- ◆ Each valve is independently connected to the control panel through pneumatic piping
- ◆ The position indication of the valves is received measuring directly using limit switches or inductive sensors (wired)

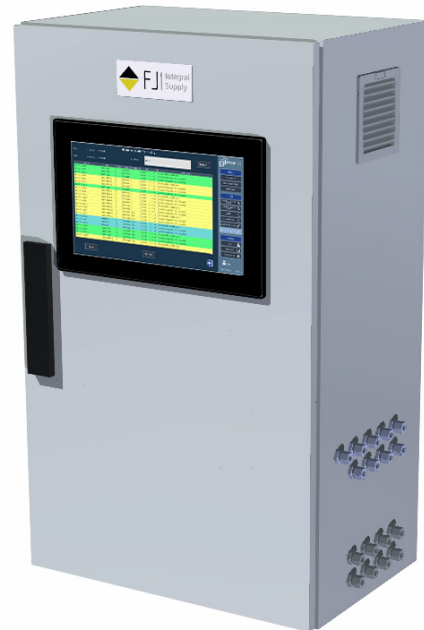
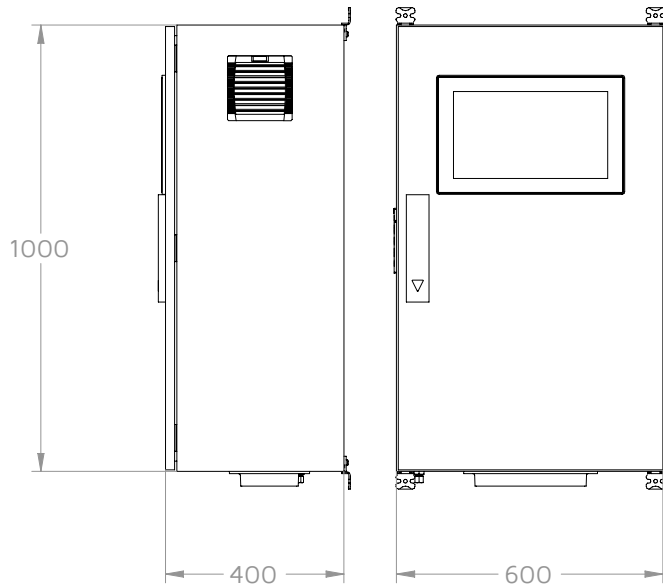


SOLENOID VALVES INSTALLED ON THE ACTUATORS

- ◆ The control cabinet does not need to be connected to the ship's air system
- ◆ The solenoid valves are installed on the actuator body itself
- ◆ The actuators are connected to a common pressurized air manifold
- ◆ The position indication of the valves is received measuring directly using limit switches or inductive sensors (wired)



CONTROL CABINET FOR PNEUMATIC VALVES STANDARD ARRANGEMENT



CONTROL PANEL

GENERAL CHARACTERISTICS

Number of valves	Standard	Maximum 20
	Optional	Other special provisions
Control screen	Standard	15", TFT LED HD, 1366x768
	Optional	10", TFT LED HD, 1366x768
	Optional	No screen
Power supply	Standard	Main: 230 VAC; Emergency: 24 VDC
	Optional	Main: 24 VDC; Emergency: 24 VDC
Input connection	Standard	ø 12mm
Output connections	Standard	ø 10mm

PHYSICAL CHARACTERISTICS

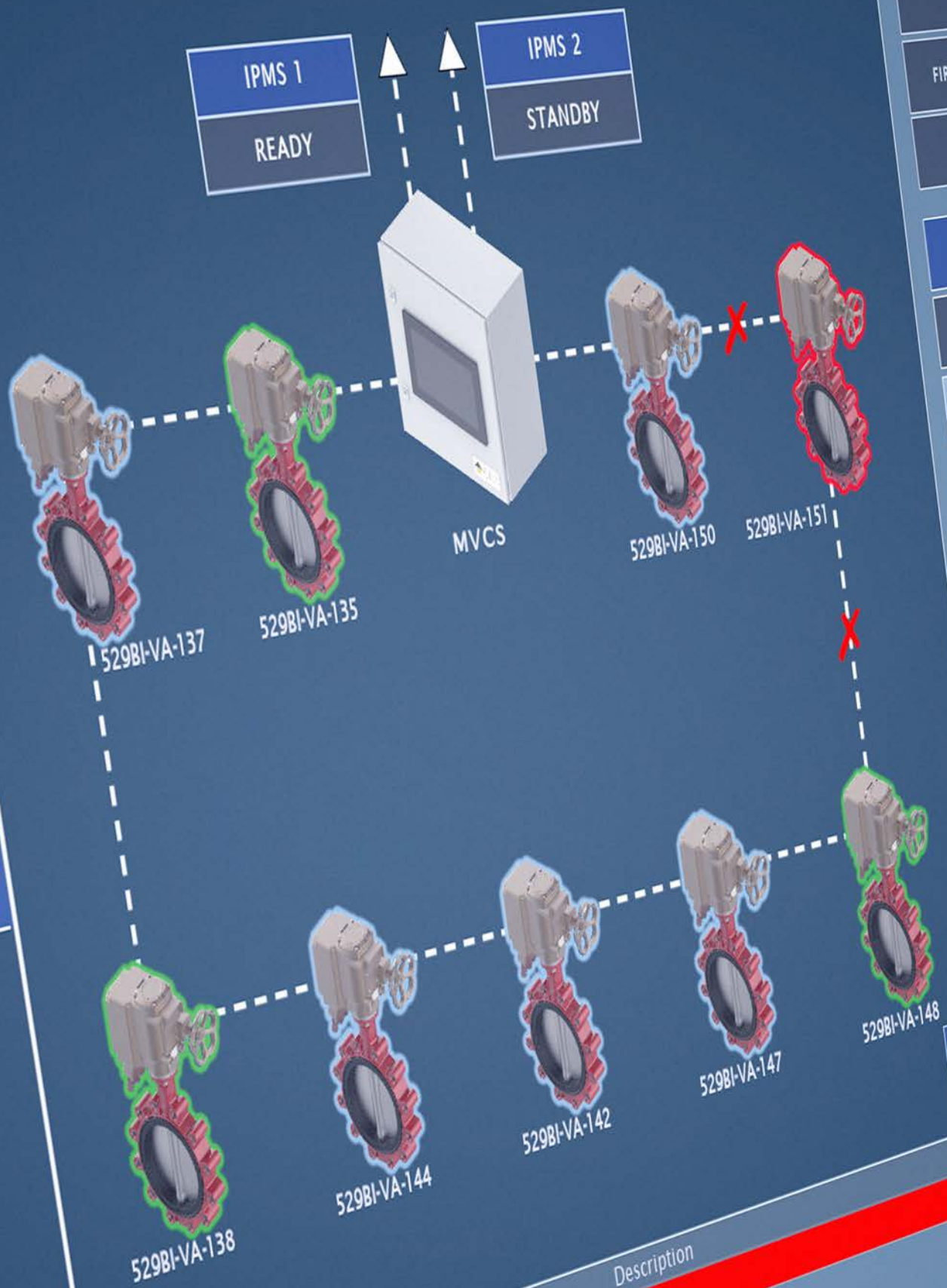
Dimensions	Standard (2 modules)	400x600x1100 mm
Weight	Standard (2 modules)	Approx. 65 kg
Assembly	Standard	Wall-mounted
Protection	Standard	IP66
Colour	Standard	RAL7035
Temperature range	Standard	0 - 45°C
Humidity range	Standard	0 - 95% (no condensation)

COMMUNICATION CHARACTERISTICS		
IAS communication	Standard	Modbus TCP/IP
	Optional	Dual Modbus TCP/IP communication
	Optional	Modbus RTU, RS-485 (2 wires)
SOFTWARE CHARACTERISTICS		
Control capabilities	Standard	Valves information (TAG, service, etc.)
		Status display (open/closed/position[%]/error)
		Order (open/close)
		Active alarms (alarm, date, time)
		Historical alarms (alarm, date, time).
		System diagnosis (communications, power supply, etc.)
		System documentation (user's manual)
	Optional	Role-based access control (administrator, operator)
		Service mimics (piping, other equipment, etc.)
		Valves information (DN, PN, service, etc.)
		Valves documentation (2D models, manuals, etc.)
		System documentation (2D models, electrical diagrams, etc.)
		Role-based access control (monitoring users, etc.)

DRIVEN VALVES CONTROL SYSTEM STATUS



COMMUNICATIONS



- SERVICE
- BILGE SYSTEM
- FIRE FIGHTING SYSTEM
- DRAIN SYSTEM

- SYSTEM
- HYDRAULIC SYSTEM STATUS
- ELECTRICAL SYSTEM STATUS

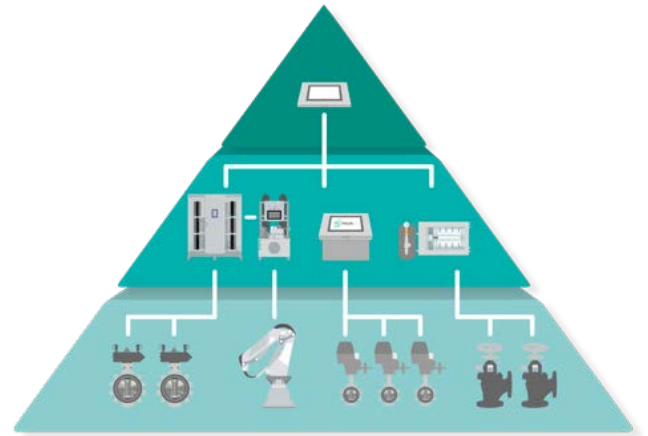
- ALARM
- ALARMS HISTORY
- MAINTENANCE
- MAINTENANCE HISTORY



Description

COMMUNICATION WITH THE SHIP'S PLATFORM CONTROL SYSTEM

PRIOR is able to work independently (stand-alone) or integrated into a ship's platform control system. This allows the equipment to be controlled remotely from another system, as well as reading and analyzing all the information such as alarms, events, etc.

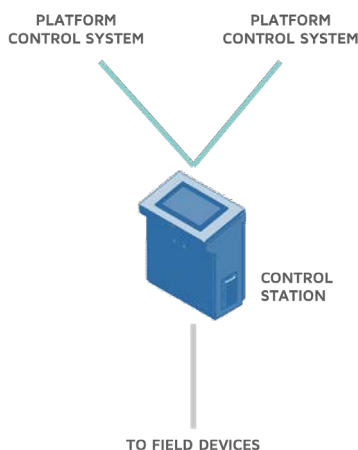
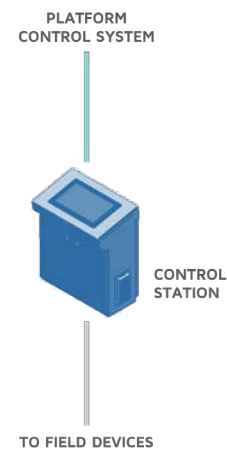


SIMPLE COMMUNICATION

Communications with the IAS / IPMS or a superior control system can be done directly with a single point, using serial or Ethernet communications.

As standard, there will be communication via Modbus TCP/IP in the case of Ethernet, and Modbus RTU in the case of serial communication.

All the information in the system can be transparently transmitted to the IAS, facilitating control and supervision tasks.



DOUBLE COMMUNICATION

In special cases where redundancy in control is required, or where the communication is done with two IAS masters, double communication may be used.

In case of operating with Modbus TCP/IP, the RSTP protocol can be used and connect to two IAS points for redundancy in control.

CONTROL INTERFACE CHARACTERISTICS

The control is done directly from touch panels installed in the control stations. This provides easy operation of the system, always available to the user. It is especially useful for equipment that is regularly operated in local mode, when an emergency actuation from the panels is required, as well as for the commissioning, testing or maintenance phases of a system.

Optionally, control systems can be designed without an interface, working only as a gateway cabinet between the equipment and a superior control system, such as the ship's IAS.

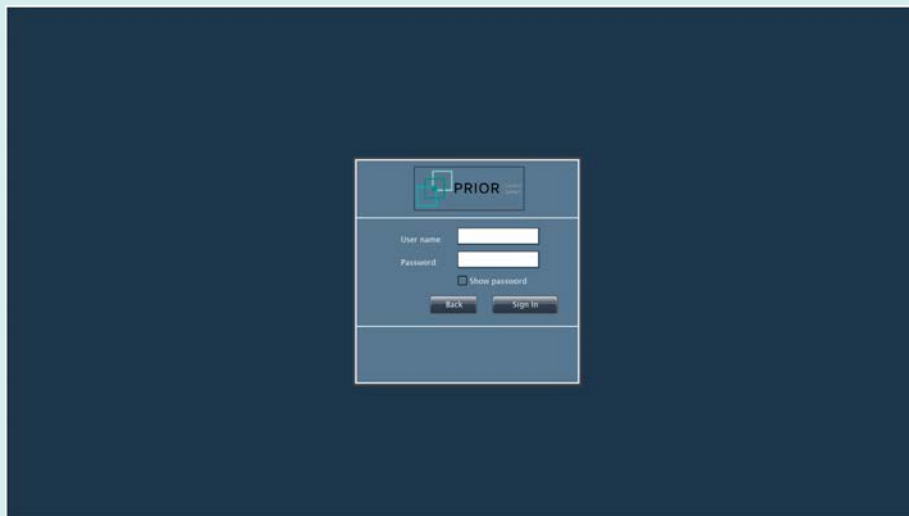
In addition to this, it is possible to integrate external control commands like keypads, buttons, etc.



CHARACTERISTICS		
Control capabilities	Standard	Valves information (TAG, service, etc.)
		Status display (open/closed/position[%]/error)
		Order (open/close/position[%])
		Active alarms (alarm, date, time)
		Historical alarms (alarm, date, time)
		System diagnosis (communications, power supply, etc.)
		System documentation (user's manual)
		Role-based access control (administrator, operator)
	Optional	Service mimics (piping, other equipment, etc.)
		Valves information (DN, PN, service, etc.)
		Valves documentation (2D models, manuals, etc.)
		System documentation (2D models, electrical diagrams, etc.)
		Role-based access control (monitoring users, etc.)

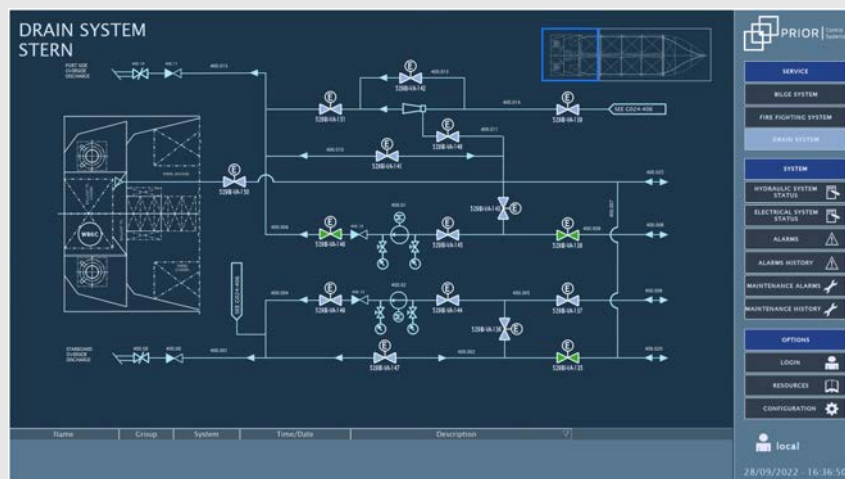
ROLE-BASED ACCESS CONTROL

By default, the system has two user roles, each with different permissions: administrator and operator. Access to each role is done through security credentials, preventing unauthorized personnel from accessing to certain system arrangements options (these will remain locked). Optionally, other types of roles can be implemented (monitoring, etc.).



SERVICES MIMICS

Optionally, diagrams of the vessel services (ballast systems, fuel systems, etc.) can be displayed, facilitating the operation of valves and other equipment.



EQUIPMENT INFORMATION

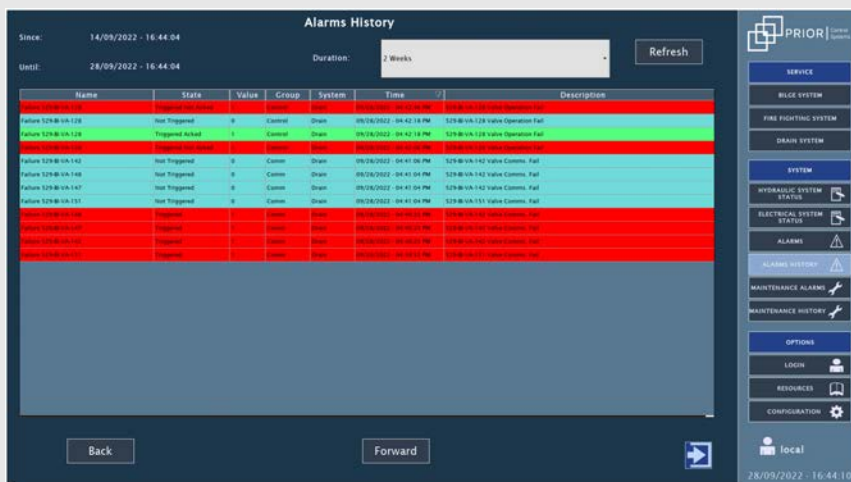
There are access icons/symbols of each device from which the user can access the specific control screens, where its basic information is included (such as TAG, location, type of device, etc.) as well as basic usage data (number of usage cycles, etc.).

Optionally, related documentation such as 2D models or electrical diagrams can be included.



ALARMS AND HISTORICAL DATA MANAGEMENT

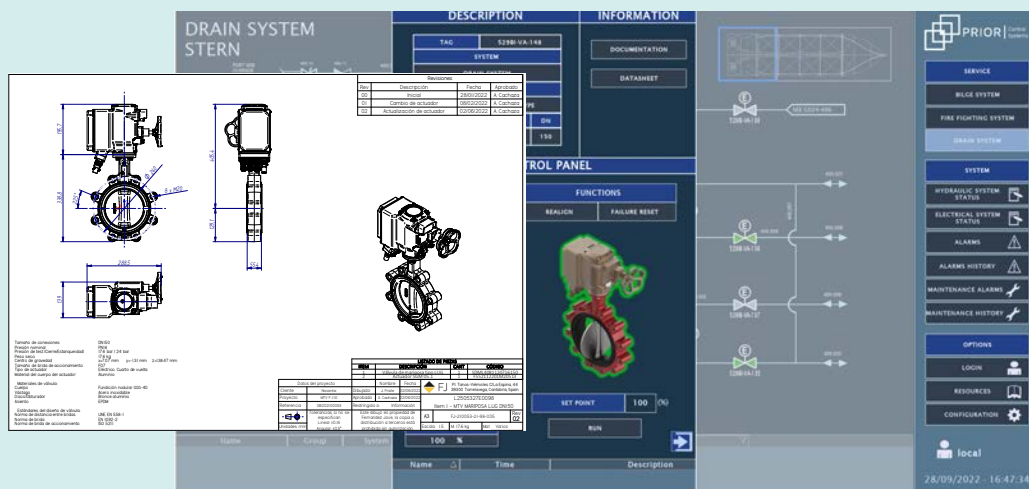
PRIOR has specific screens for the management of active and historical alarms, which show a detailed description of the incident, the equipment affected, as well as the time it was recorded (date and time).



SYSTEM DOCUMENTATION

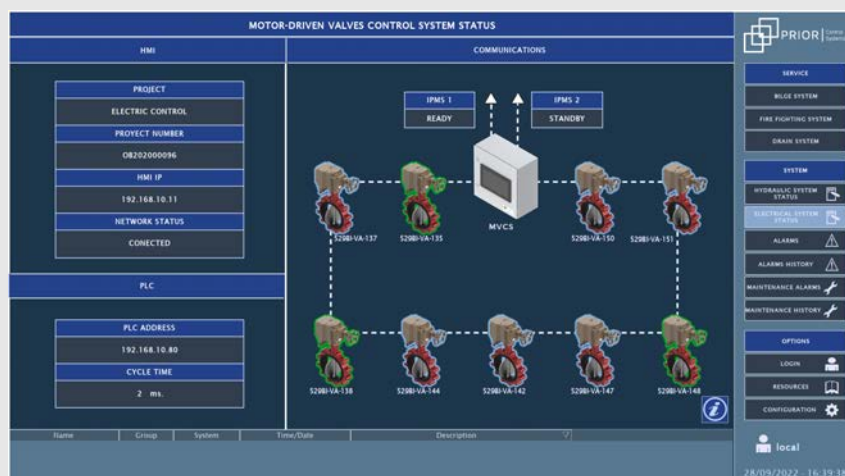
The system stores basic documentation to give support during trials, commissioning, operation and equipment maintenance. This documentation includes user manuals, wiring diagrams, etc. The user can access this information directly on the screen through the different navigation menus.

Optionally, it would be also possible to store more specific documentation such as certifications, etc.



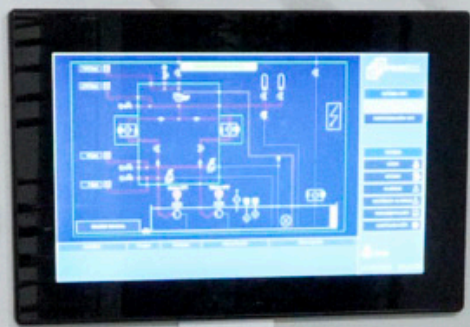
DIAGNOSTIC TOOLS

PRIOR has specific system diagnostic screens, which allow looking up the status of communications, analog signals (pressures, temperatures, etc.), and other data that is especially useful in the commissioning, testing, and maintenance phases.





FJ Integral Supply



PUMP 2



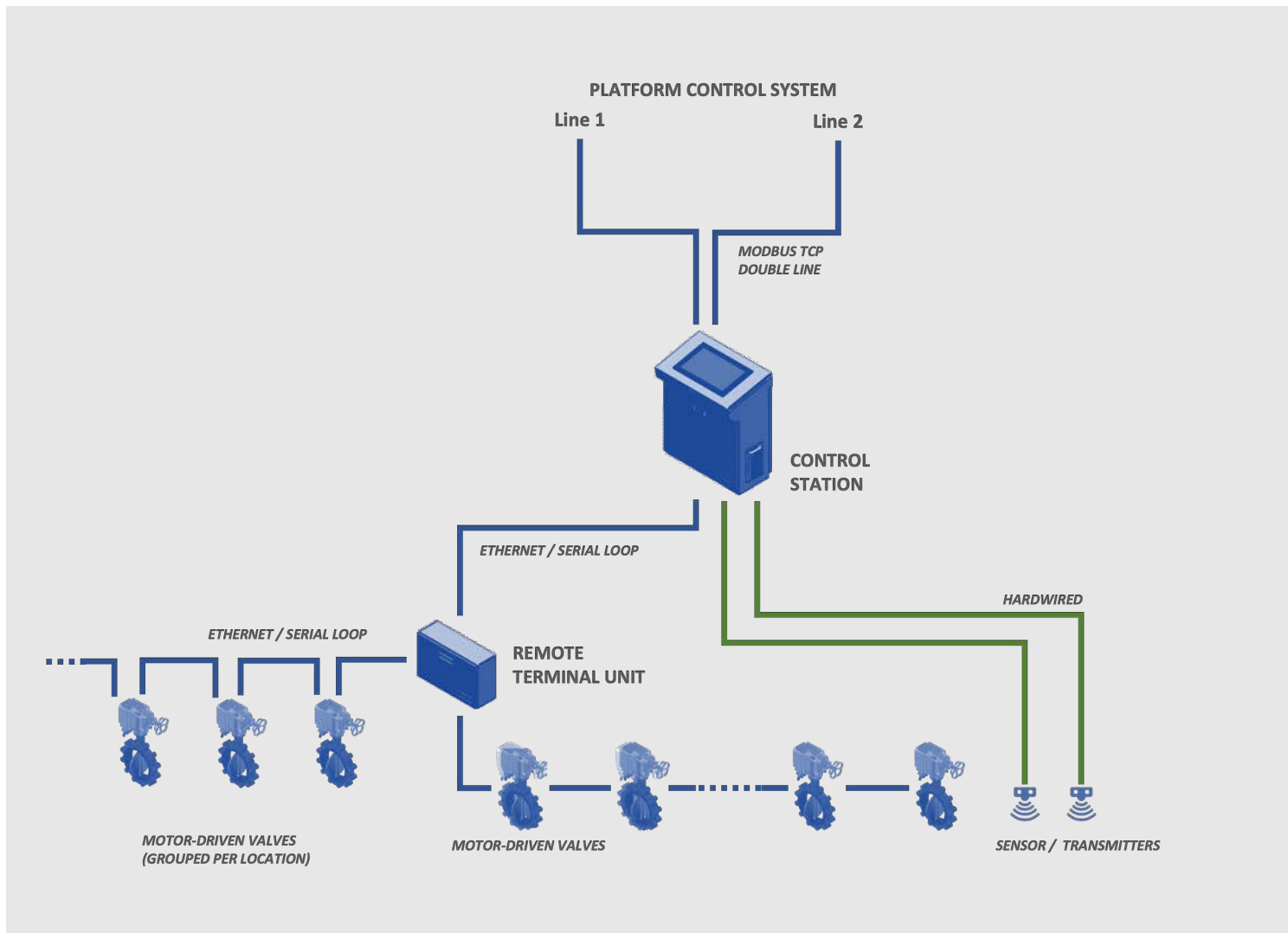
LOW LEVEL
LOW LOW LEVEL



SPECIAL OR COMBINED SYSTEMS

PRIOR allows the integration of other equipment under the same control system, such as pumps or motors. This way, the control of an entire fluid system can be carried out from the same stations. Therefore, it is possible to integrate complete systems and create a distributed control system using remote terminal units (RTUs).

For more information on integration capabilities, please consult with our experts.



OTHER APPLICATIONS

PRIOR|MEQ

PRIOR|MEQ is a specific PRIOR Control solution for the automation and control of maneuvering equipment, mainly hydraulic and pneumatic. By connecting these type of equipment to PRIOR|MEQ, it is possible to control it 100% remotely.

PRIOR|MEQ offers the user a complete, comfortable and intuitive interface that allows to operate the equipment reliably and safely. At the same time, PRIOR can collect critical data from the equipment (such as operating pressures, temperatures, etc.) and present it to the operator.

RECURRENT PRIOR|MEQ APPLICATIONS

- ◆ Hydraulic power unit management
- ◆ Control of pneumatic drives
- ◆ Control of hydraulic agitators



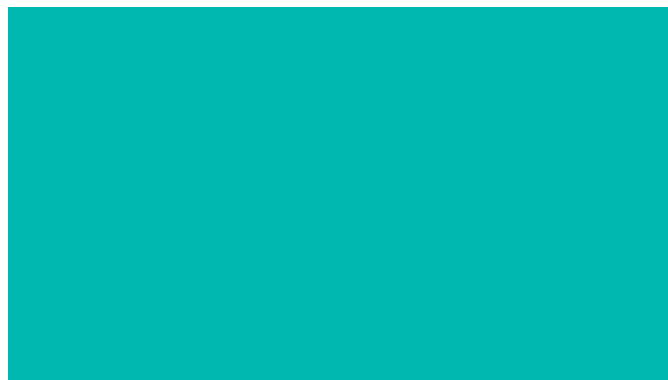
PRIOR|SENS

PRIOR|SENS is a specific PRIOR Control solution for monitoring sensors, transmitters or switches systems.

RECURRENT PRIOR|SENS APPLICATIONS

- ◆ Level measurements in fuel tanks
- ◆ Measurement of temperatures and pressures in fluid lines
- ◆ Data recording of complex hydraulic systems
- ◆ High/Very high-level alarm systems in tanks





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