



## ME-Automation Projects

*Performance. Precision. Partnership.*

A Group Company of



ME-Automation Projects GmbH

# PMSXpro DCS

PMSXpro, the leading distributed control system is ideally suited for managing your plant's operations not only due to its robust reliability that ensures smooth processes, but also because it serves as advanced digitalization platform to ensure optimal business performance and efficiency throughout the entire lifecycle.

*Performance. Precision. Partnership.*





# ME-Automation Projects

Performance. Precision. Partnership.

## COMPANY OVERVIEW



## WHO WE ARE AND WHAT WE DO

ME-Automation Projects GmbH (MEAG), a 100% subsidiary of Mitsubishi Electric Corporation, provides cutting edge solutions and services in the automation and electrification space. As a daughter company of Mitsubishi Electric Corporation,

MEAG is also driven by the corporate motto 'Changes for the better' in order to constantly strive for higher standards in the course of change and growth.



WHAT WE DO

# PERFORMANCE. **PRECISION.** PARTNERSHIP.

*Our clear commitment to our customers.*

## *Performance.*

MEAG always performs to the highest standards, within budget and on time – likewise, our products exhibit fast, non-stop performance.

## *Precision.*

Our experienced teams take care of every detail to meet our customer's exact requirements and deliver projects with utmost precision.

## *Partnership.*

We build lasting and successful partnerships with our customers by working together with them, reducing risk and apprehension – simply delivery working solutions.

We recognize that our customers require the latest, appropriate technology for their plants delivered by experienced suppliers that ensure its successful and timely commissioning. We at MEAG always select the correct technology and combine this with exceptional services that gives our customers the exact and best solution for their plant – a fully comprehensive package provided by MEAG to give our clients peace of mind. MEAG matches its experienced engineering services to our clients' requirements to provide robust solutions to ensure a most cost-effective and optimally operable outcome for the client's investment.

With the experience gathered over more than 40 years, we deliver all-inclusive systems for process control and automation projects. Our systems range from smaller installations up to large, turnkey plants with large data volumes, time-critical sequences, and remote stations with a widely distributed system architecture – from a single, world-recognized supplier. In addition, we supply complete, turnkey Electrical, Instrumentation & Control (EIC) solutions based around its PMSXpro distributed control system, complementing this with our medium and low voltage switchgear plus services such as project management, engineering, installation, commissioning and a lifecycle maintenance offering.



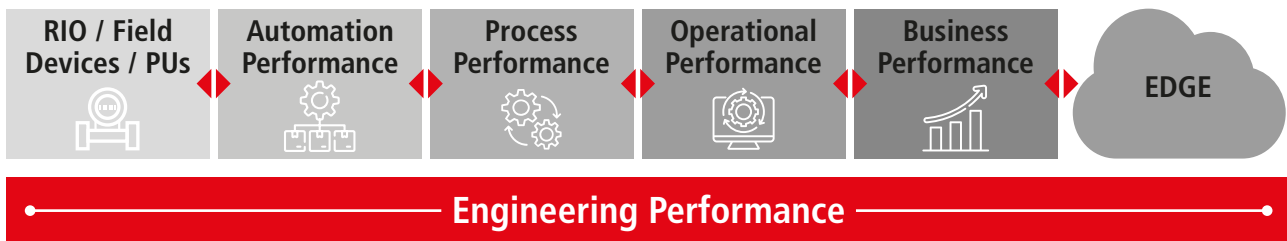


## LEADING PERFORMANCE

# THE PMSXpro DCS – PERFORMANCE AT ALL LEVELS

The leading process control system is ideally suited to your plant thanks to its flexible adaptability and robust architecture. It ensures smooth processes, optimal availability, and maximum efficiency throughout the entire lifecycle. PMSXpro has been designed from the ground up to meet the demanding

operational plant requirements of availability, efficiency, cyber-security and flexibility coupled with a high level of harmonized hardware and software, rich selection of hot-swappable process IO modules and fieldbus interfaces.



PMSXpro's leading control architecture constantly monitors and drives plant productivity, maximizing asset utilization, process efficiency and production quality. A focus on availability, safety and cyber security ensures the protection of your people, assets and equipment.

## GUIDING YOUR OPERATIONS



### Management

A rich palette of plant data intelligence dashboards is available to produce actionable information via meaningful reporting along with a powerful self-service business intelligence portal bringing together all needed data sources in a single business intelligence environment.

### Operations

The operator interface is modern and easy to operate, which makes its use extremely very intuitive, due to the rich and effective operator support tools.



### Engineering

Its strict VGB R170 A+B norm conformity and end-to-end fault-tolerance ensures maximal resilience and availability. Live control viewer (VGB R170 C) enables hassle-free troubleshooting. Online changes to the control system are made during operation – 100% as-built documentation is available at the push of a button. The extensive engineering library allows consistent, fast engineering with all regular control and application-related objects included.

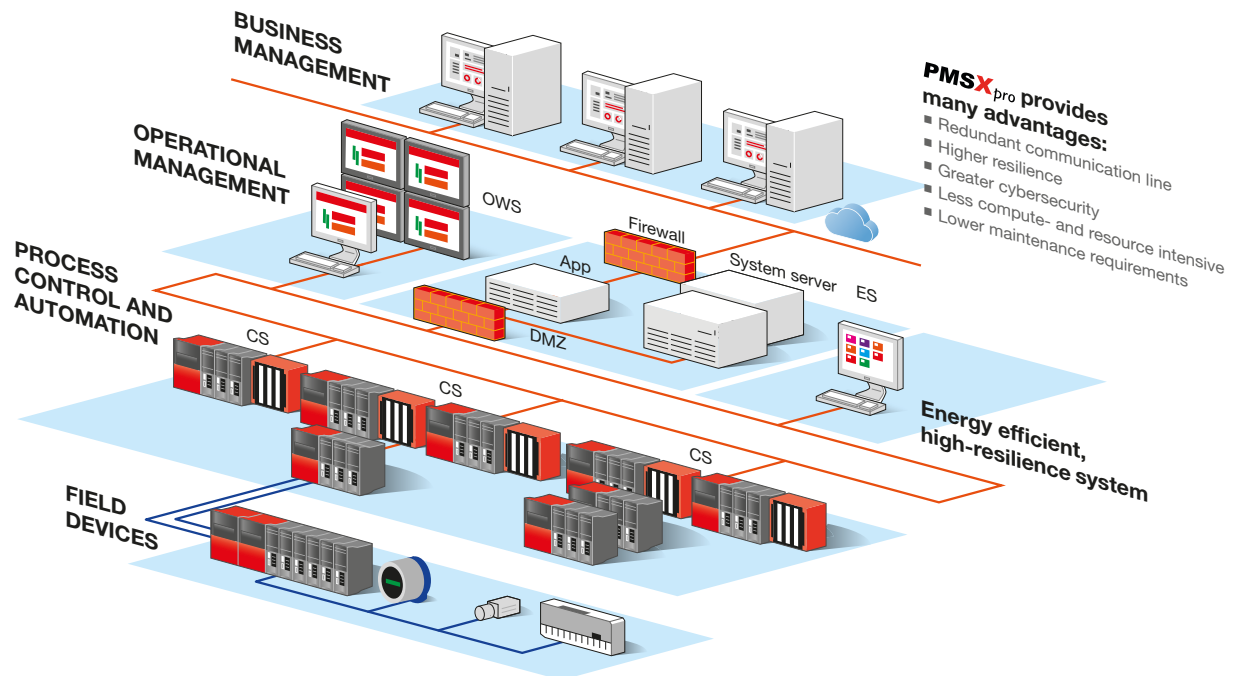
### Maintenance

Both DCS system health and plant operational health indicators are generated and tracked by PMSXpro, while support is provided to manage on-call rosters, shift handover and the like.





## BUSINESS PERFORMANCE



OWS - Operator Work Station App - Application Server DMZ - Demilitarized Zone ES - Engineering Stations CS - Control Stations

PMSXpro Distributed Control System's built-in Plant Data Warehouse (PDW) and Business Analytics transform plant data into actionable information. This contributes directly to increasing plant throughput, efficiency and sustainability. Pre-built as well as self-service dashboards can be used – with no special IT skills – based on:

- Complete integration of plant data with business-relevant information sources
- Self-service, non-IT skilled dashboard creation: slicing & dicing, drilling, pivoting, filtering as well as dashboard editing, scheduling and distribution

This has the benefit of delivering:

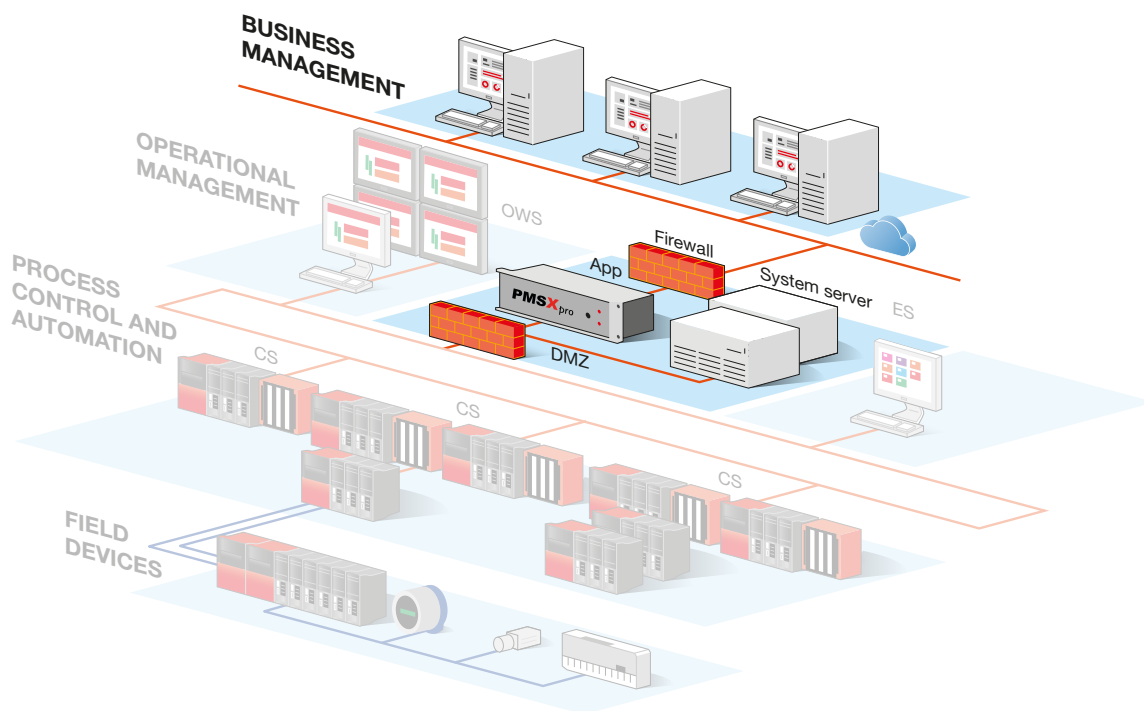
- Decision-ready, consolidated information where and when needed – without need for experts
- Better business performance – actionable intelligence for improving plant and process productivity, efficiency, quality and sustainability

Fast and reliable processing of data – from the plant floor up to management level – ensures that all stakeholders get a clear overview of plant issues and their interaction with the business (especially under critical or off-design operating conditions), thus permitting fast, confident response and improved plant profitability.

**BUSINESS PERFORMANCE**



By maintaining tight controls over raw material consumption, plant energy levels and waste by-products, the PMSXpro DCS solution helps to significantly improve plant economics whilst – crucially – reducing environmental impact.



OWS - Operator Work Station App - Application Server DMZ - Demilitarized Zone ES - Engineering Stations CS - Control Stations



# ME-Automation Projects

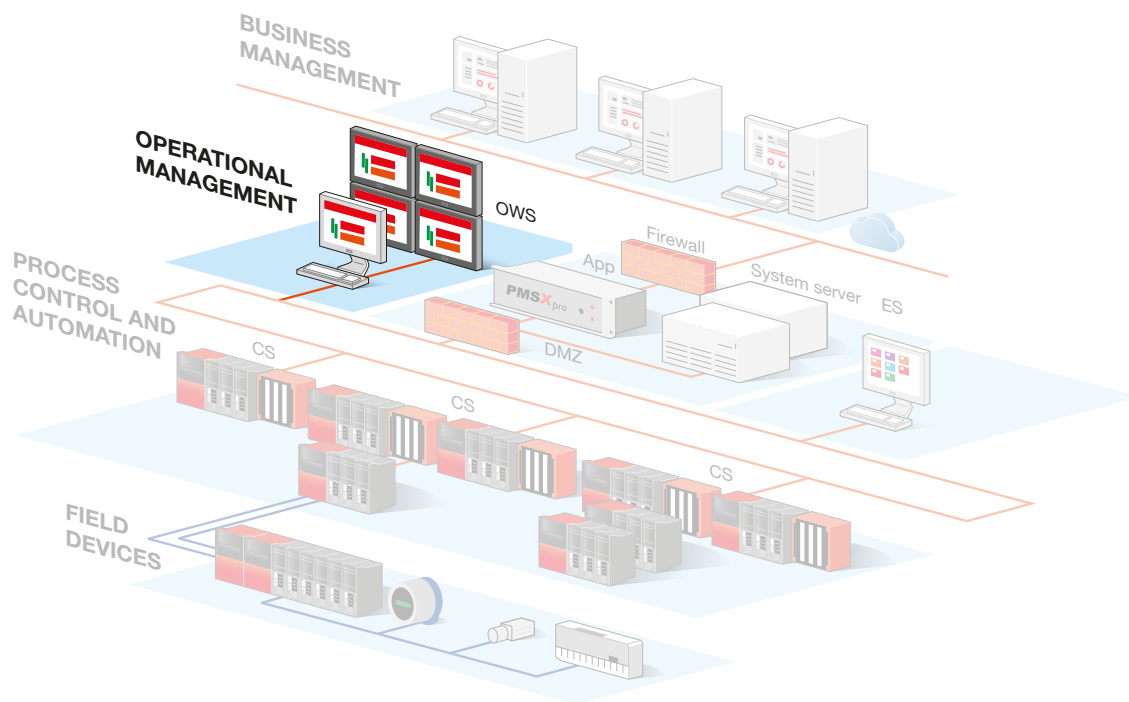
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## OPERATIONAL PERFORMANCE

PMSXpro delivers Operational Performance by enabling and enhancing control room and field operators' understanding of what's happening in the plant. Our Operator Work Stations (OWS) are a transparent, readily comprehensible interface between the human operators and the process.

PMSXpro's operator interface design devotes special attention to clear information transfer, ergonomics and functionality – basing this on the international ISA101 norms, making

process operation with PMSXpro simple, consistent, and intuitive. Alarms, messages, operator guidance, and entries are presented as plain text, while intelligent alarm management ensures that the process never gets out of control. In addition, clear context-dependent menus reduce the number of actions required from the operator – leading to consistent, mindful operational actions.



OWS - Operator Work Station App - Application Server DMZ - Demilitarized Zone ES - Engineering Stations CS - Control Stations

Continuous enhancement of the Operator Work Station (OWS) ergonomics over the years have made PMSXpro easy to use with fast problem identification and drill-down tools for their diagnosis and resolution. Ultra-quick screen call-up reduces operator stress and fatigue, leading to safer, more efficient plant operation and performance.

High inherent redundancy exists since OWS stations have system-wide data access, while also backing each other up – in the event of a failure of an OWS, operators can simply log in on another OWS, retaining all their access privileges, display profiles, etc. to continue managing the plant without interruption.

Today's energy and process industries assure the fundamentals of modern living — supported by a trusted automation technology such as PMSXpro. Our DCS solution monitors and manages every aspect of plant operations 365/24/7, helping its customers ensure the safety of people and equipment, the quality and efficiency of production, while at the same time reducing the environmental impact.

## OPERATIONAL PERFORMANCE

### Plant operators receive powerful decision support through:

- Integrated issue resolution guidance (from live logic views to linked operating procedures)
- Integrated support functions such as maintenance tickets, operator logbook and reports
- Post-event analysis tools (100% process graphics historical replay)
- Enterprise data integration for business-contextualizing plant information
- Strong suite of reporting tools and KPI calculations
- Operator Logbook: capture, track and manage maintenance and operational activities - better information exchange sharing at shift-handover and with service departments
- Office Access Vault: trustful access to PMSXpro information by plant office users, cybersecure and safe
- On-Call Register: operators know whom to call - by discipline - for support 24/7
- Schematic Browser: contextual, fast display of equipments' electrical schematics\* directly from within the Operator Work Station (OWS)

\* EPLAN format schematics

### The business benefits that are realized this way include:

- Provision of a broad palette of additional operator-assist functions on all Human Machine Interface (HMI) types – we call this “Any Glass” where field operators are equally empowered using their regular Operator Work Station (OWS) monitors, tablets or smartphones
- Process graphics replays represent a great operator training tool, since mis-operations or poor operator response can be reviewed simply by stepping back in history and replaying the pre- and post-event actions, thus identifying correct actions and procedures for the future.

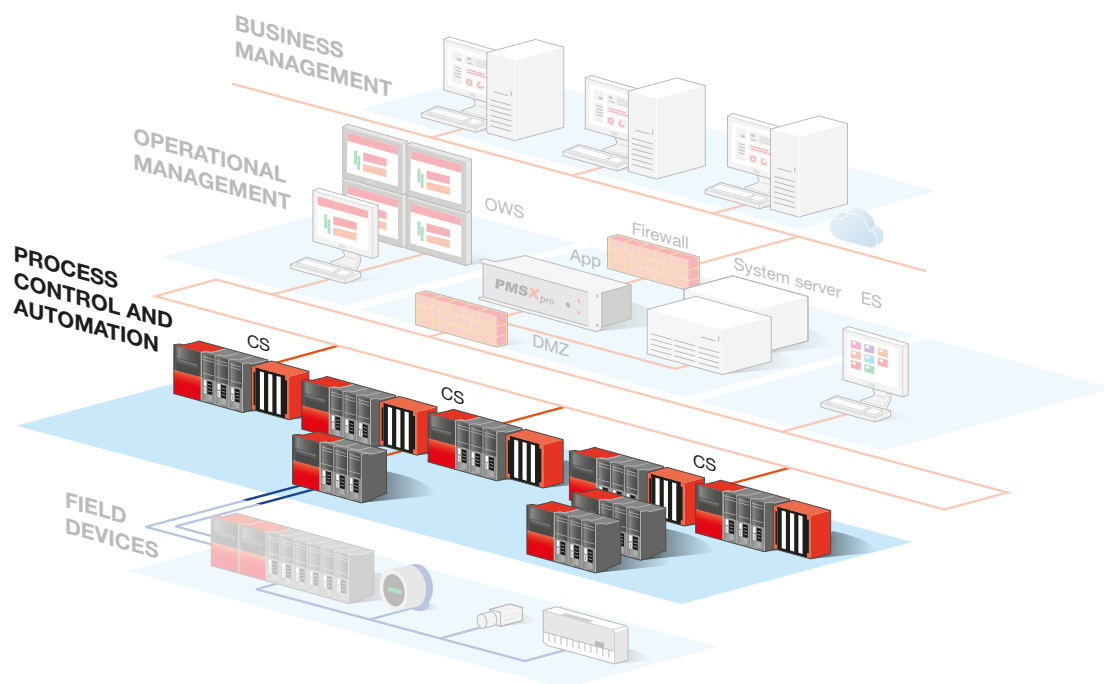




## PROCESS PERFORMANCE

As before the Process Station (PS) functions track the plant's state 24/7 second-by-second, performing process alarm and event surveillance while also serving as the plant's real time and historical data repository. PS hardware is physically located as close to the plant as possible to reduce network and com-

munication path distances and failures to the maximum extent possible. In addition, process stations are typically set up in redundant pairs, representing a further attribute of our process performance level – no single failure will lead to loss of any functionality or safety.



OWS - Operator Work Station App - Application Server DMZ - Demilitarized Zone ES - Engineering Stations CS - Control Stations

Process stations and their associated automation stations are typically matched functionally to process units within the plant, so that a large degree of autonomy is achieved within the plant – eventual control and process supervision disturbances are confined to only one plant section, meaning an even higher level of plant availability is assured.

Cyber-criminals are constantly searching for vulnerabilities to launch cyber-attacks with the aim of extorting money, damaging or destroying equipment, disrupting production, etc. PMSXpro, is designed in line with the IEC 62243 Standard for Security Technologies in Industrial Automation & Control System, this is helping to prevent the increasing danger of cyber attacks and their consequences for its users.

## PROCESS PERFORMANCE

### High resilience deterministic cycle times:

PMSXpro's architecture deliberately separates plant operation and supervision tasks from control and automation, resulting in high resilience, consistent performance, deterministic behavior, and fast cycle times. PMSXpro-controlled plants benefit from super high-speed, robust surveillance and continuous monitoring of plant performance. The system also provides an open-format, information

distribution hub that delivers the plant's process image to both operators and business users as context-bearing information. Additionally, it integrates Industrial Internet of Things (IIoT) data through a dedicated Message Queueing Telemetry Transport (MQTT) broker/hub, effectively bridging non-classic process data into the business environment to support further optimization.

### Other key functions of the Process Station are:

- To enable very light bus traffic with event-driven data exchange between itself and the system stations which it serves
- Data provision to third party systems and Edge/Cloud through open interfaces like OPC UA, IEC 60870-5-104, SNMP or simple CSV data exchange

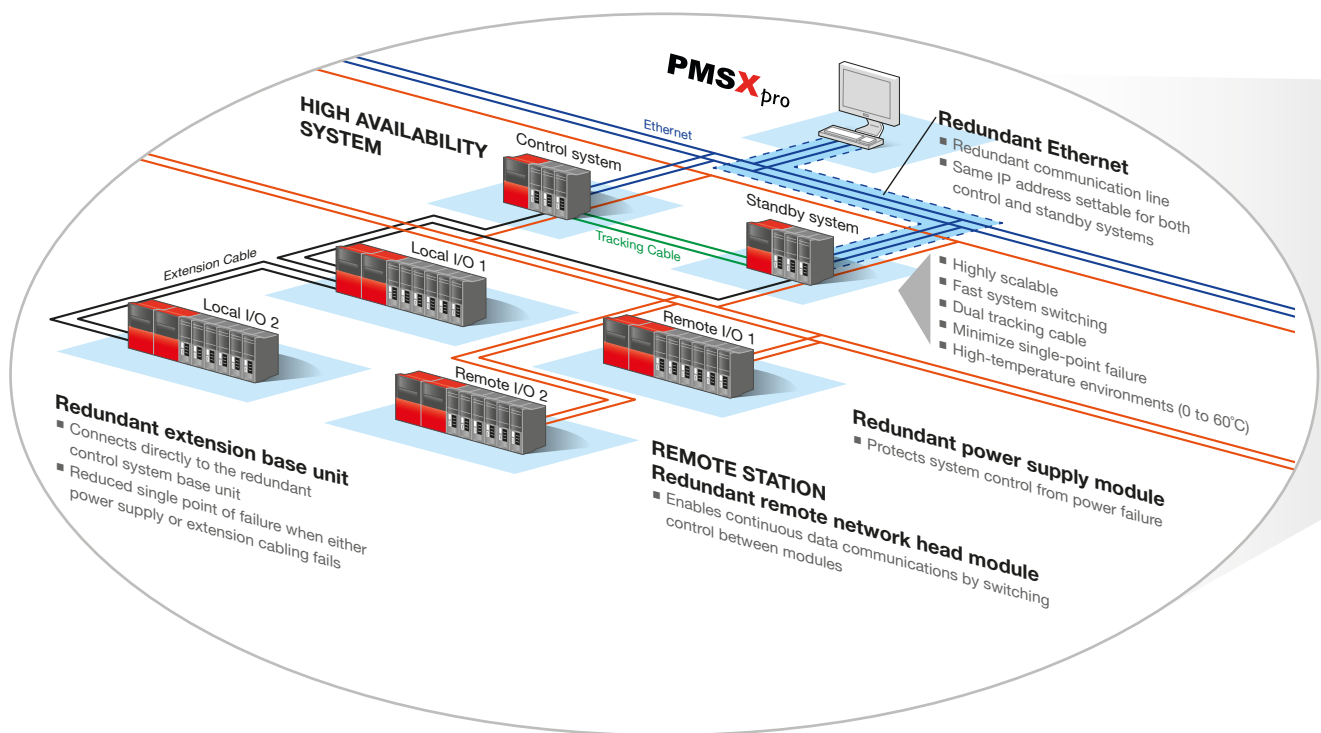




## AUTOMATION PERFORMANCE

Forming the basis of PMSXpro's exceptional Automation Performance are Mitsubishi Electric's world-leading iQ-R series Automation Stations (AS). The iQ-R series automation platform is the flagship of Mitsubishi Electric's automation platform range, which continues to be the number 1 selling device in this category. This platform provides 100% redundancy features, ranging from dual-redundant CPUs, hot-swappable functional modules, duplicated power supplies, dual networks in ring topology, to full Input/Output duplication.

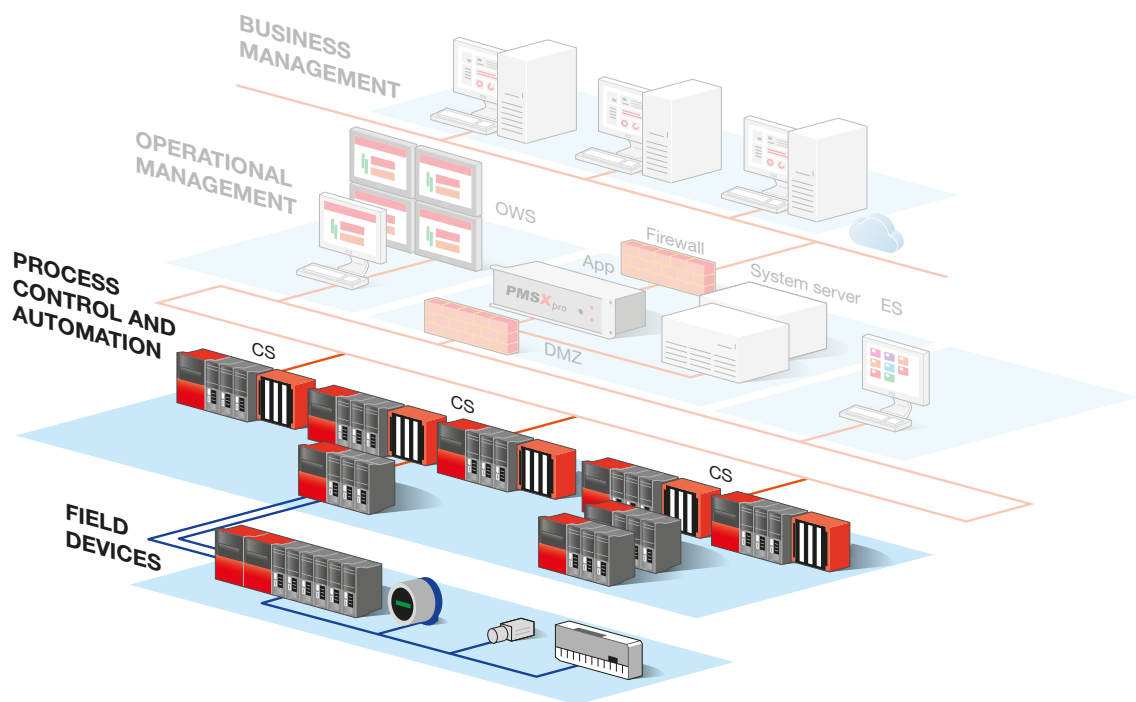
This latest generation control platform, with fastest processing times coupled with comprehensive best-practise function block libraries optimized for both continuous and discrete control, plus failsafe online control scheme modifications, makes PMSXpro so powerful as a DCS – suitable for deployment in critical processes, whether these be in power generation, wastewater treatment or elsewhere.



Of course, we offer existing PMSXpro customers an affordable and effortless upgrade path from their older Q-Series automation platform – a staged upgrade is possible: customers can decide in which sequence to do this - from a CPU upgrade, to a network refresh, or Input/Output rack and modules, or all at once. Whichever route is taken, backward compatibility is assured: for

example, at one end of the spectrum existing control and automation application code can be machine upgraded – reducing errors and engineering costs – while at the Input/Output module level, field wiring can remain untouched since System-Q connectors are directly pluggable into iQ-R modules. The result: reduced errors, no rechecking of loops and cost optimisation.

## AUTOMATION PERFORMANCE



*OWS - Operator Work Station App - Application Server DMZ - Demilitarized Zone ES - Engineering Stations CS - Control Stations*

PMSXpro Automation Stations can be equipped at customer's wish with either central or remote Input/Output (I/O) modules – for both options, solutions are available that have been optimally tuned to the PMSXpro. Compact hot-swappable I/O modules are available for PMSXpro automation stations, includes high-density digital I/O modules (up to 64 channels), high-resolution analog I/O modules (up to 16 channels), plus special modules for temperature measurement, positioning, fast counters, time stamping of the input signals at source (by the I/O modules), galvanically isolated modules, HART-compatibility (Highway Addressable Remote Transducer)

and support of FDT/DTM (Field Device Tool/Device Type Manager) technologies as well as diverse Fieldbus technologies (Profibus/-Net, Modbus, IEC 61850 and 60870-5-104). For resilience, all remote I/O modules are connected to the automation stations in a self-healing CC-Link IE Field ring topology fibre-optic network – with PMSXpro's robust process connectivity you'll never lose touch with your plant. Whether you're building a new plant or revamping your existing one, your investment in PMSXpro's Automation Performance means faster time to sustained "on-quality and on-throughput" plant production and quicker time-to-cash.



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### ENGINEERING PERFORMANCE

The centralized, system-wide engineering is carried out via the PMSXpro Engineering Station (ES), where, by means of graphical interfaces, it provides all of the system's engineering functions. Object orientation is used, with all engineering outcomes (configuration information) being managed by an integrated engineering database. Bulk engineering as well as individual engineering object management is possible, all based on PMSXpro-integrated libraries of preconfigured engineering modules consisting of automation function blocks through to the visualization faceplates at the operator workstation level. Simple drag-drop like functions allow easy selection and insertion into the project.

The automation logic is programmed according to the international standard IEC 61131-3. During programming, simulation, commissioning, maintenance, and diagnosis, the systems engineer is supported by the powerful development environment, whilst a VGB R170 conformant documentation system provides

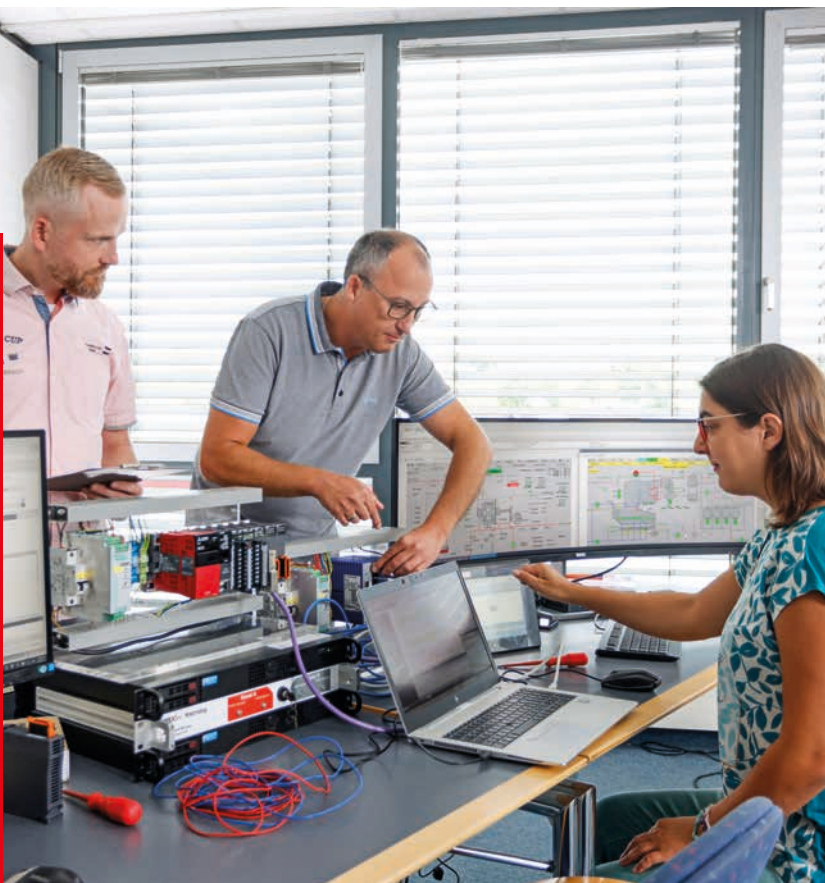
up-to-date, as-built documentation at any time, with a single mouse-click.

As owner of a plant automated by PMSXpro, you get high engineering efficiency, higher precision and correct engineering, leading to faster start-up and lifecycle maintainability.

New projects are simplified and speeded up, by our „I/O cloud“ capability, which makes all physical and fieldbus I/O signals available to any Automation Station (AS) in the system - enabling control and automation logic to be developed 100% independently of the physical signals' I/O allocations. Then, once the instrument engineers have finished their job and connected-up all field (and fieldbus) signals to the system's I/O modules, „late binding“ of I/O to the application program's I/O fields can be performed and testing can start. No need to continuously coordinate with (and wait for) the instrument and field engineers - just presume all signals and start programming!

#### PMSXpro – your path to digital transformation

PMSXpro with its Mitsubishi Electric ICONICS Genesis64 plug-ins makes it easier than ever to implement digital solutions – its Engineering Workbench 2.0 makes it both simple and secure to choose which process data and alarms/events to publish to Mitsubishi Electric's Genesis64's HyperHistorian and thence to AnalyticsBI and KPI Works for business or operational contextualisation (or on-forwarding to the corporate cloud). The powerful Genesis64 environment excels at removing complexity and other barriers usually encountered when implementing digital solutions.



## SYSTEM PERFORMANCE



**PMSXpro has been developed over the years to a highly robust, fault-tolerant and super-resilient DCS platform. This encompasses three key aspects of the system:**

- Cyber resilient products and hardened network architecture
- Built-in and automated disaster recovery techniques
- Ultra-fast, optimized and secure system communications

### Cyber resilience

In line with IEC 62443-3-3, PMSXpro has already for many years implemented rigid user identification enforcement (with Lightweight Directory Access Protocol (LDAP) for user and group management). Its access control can optionally enforce MFA (multi-factor authentication), is based on user, role and location – at either object or individual attribute level – restricting “who is allowed to take what actions from where, with which object.”

Further cyber security measures include peer communication station white-listing, Virtual Local Area Networks (VLANs) to establish IEC 62443-4-2 mandated zones and conduits, triple firewalling between office and system networks, segregated field and supervisory networks, among others.

### Automated backup and restore (disaster recovery)

To comply with IEC 62443-2-4, PMSXpro provides automated backups (where every change is backed-up and periodically), such that when a station fails and is replaced, the system auto-senses the new, unconfigured station and downloads its configuration with no user intervention needed – all that is

needed is the original station’s IP address to be allocated to the replacement station. This leads to very short down times with no loss of data, thanks to store-and-forward techniques in all PMSXpro stations.

### Fast, secure and robust system communications

In PMSXpro, system or supervisory network communication is based on latest industrial Ethernet switching technology. Redundant and high-availability Rapid Spanning Tree Protocol (RSTP) ring topology ensures reliable data exchange between all plant components. Industrial-grade managed switches provide data transfer rates in 1Gbps speed range over fibre-optic media. Efficient tools are available for network management and diagnostics. In case of network aberrations, operators and system engineers are immediately alerted via PMSXpro. Communication with intelligent field equipment and remote I/O modules is via 1Gbps fibre-optic media, again set up as Rapid Spanning Tree Protocol (RSTP) rings for resilience, but deploying CC-Link IE Field as the network protocol, which provides high-speed deterministic communications to PMSXpro’s I/O modules, while at the same time permitting other Ethernet based fieldbuses such as Profinet, Modbus, etc. to be co-transmitted on the same medium.



### PMSXpro EXTENSIONS

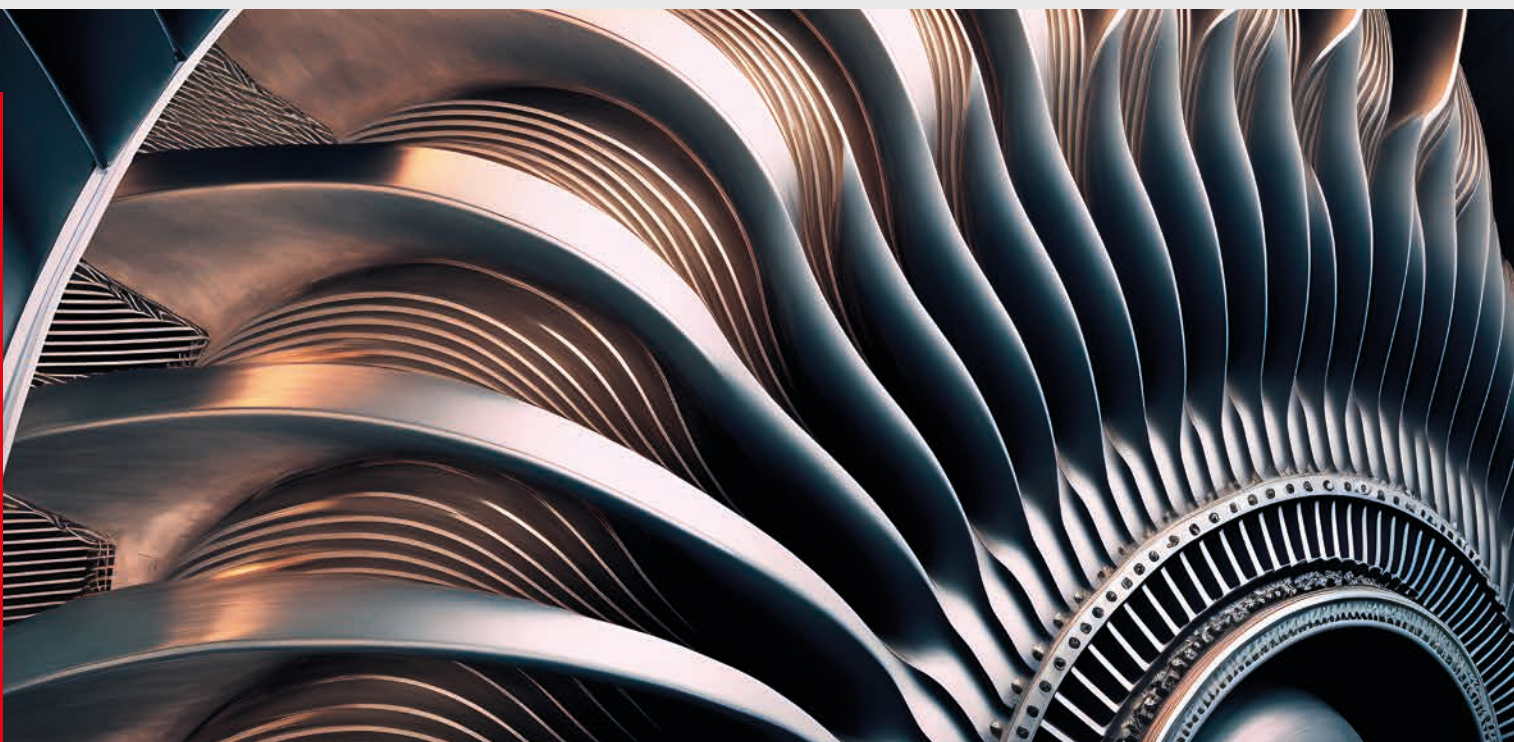
PMSXpro – reducing costs and complexity while improving the integration of all relevant plant equipment and systems.

#### **PMSXsas – take control of the plant's substations**

With a built-in electrical control functionality, the PMSXsas (Substation Automation System) module provides integration of your complete electrical distribution system into the control room, from high-voltage switchgear to low-voltage motor control. Whether together with PMSXpro or as a standalone system, PMSXsas is the ideal solution as your Electrical Control System (ECS), helping to reduce costs and improve availability and reliability of electrical equipment control. PMSXsas provides comprehensive IEC 61850 tools and support to ease the integration of your electrical switchgear into the system, including auto-discovery of the primary and secondary network topology and configuration from the IEC 61850-based substation's Substation Configuration Language (SCL) files. Where older substations require integration, PMSXsas has standard electrical Remote Terminal Unit (RTU) hardware, as well as using Modbus for communications with non-61850 Intelligent Electronic Devices (IEDs)

#### **Turbiset – integrate turbine control and protection into PMSXpro**

The Turbiset steam turbine control and protection solution represents a comprehensive suite for both utility and industrial turbine applications. With many decades of experience in control and protection of steam turbines, Turbiset is the culmination of this depth of experience relating to all aspects of turbine operation, safety and efficiency – reliability from deploying our packaged, pre-validated turbine libraries. Since it is based on the same iQ-R automation and protection platform as PMSXpro, integration into our DCS via a dedicated CC-Link IE Control network between Turbiset's and PMSXpro controllers, is virtually plug-and-play. Join the many Turbiset users who enjoy this optimized turbine control, linked directly to the plant's control system.



## PMSXpro EXTENSIONS

### PMSXcm – condition-based maintenance management

PMSXcm is an add-on module for PMSXpro that utilizes AI-based smart sensors for predictive insights into rotating equipment health. Its smart sensors and PMSXpro's standard condition surveillance offers real-time and remote monitoring, advanced predictive analytics through failure anticipation algorithms, AI-powered and cost-effective maintenance by eliminating the need for expensive central vibration monitoring equipment. Moreover, operators and maintenance personnel are informed about changes in the equipment's condition with the information generated by the PMSXcm sensors directly via the DCS' alarm and event system as well as locally in the field with RED, AMBER, GREEN visual indicators on the sensors.

PMSXcm smart sensors are easy to install, connect, set up (plug-and-play style with a self-learning function), and to integrate in PMSXpro. PMSXcm's innovative online system can be used on multiple equipment types with no need of experts and unlike other systems it looks beyond only vibration monitoring.





### PMSXcare – LIFELONG SUPPORT FOR YOUR SYSTEM



Market forces relentlessly compel you to become leaner, more competitive and dynamic, meaning there is no room for production downtime – maximum plant availability and throughput is critical. At Mitsubishi Electric, we recognize this and place utmost emphasis on providing the services you need for the timely and correct maintenance of your DCS system – to keep it running smoothly. When problems occur, we do everything possible to get your DCS – and plant – back to 100% performance.

By taking advantage of our PMSXcare service offering (choosing from any of 3 service levels: Standard, Pro, Pro+), you would receive dedicated lifetime support from ME-Automation Projects, ensuring that your PMSXpro system's uptime is maximized while at the same time reducing maintenance costs.

As a PMSXcare customer, you are supported both remotely (through secure access mechanisms) and as needed on-site with a team of specialists. Regular reports keep you informed about the effectiveness of the support your system received. Your PMSXpro receives service support with active issue management (both problem and incident management) via PMSXcare, whilst – in addition – the operating system drivers are regularly updated. Hardware and applications are secured with up-to-date anti-virus programs and malware protection in accordance with local cyber security regulations and your ISO 27001-compliant Information Security Management System (ISMS).

In short, your PMSXpro system is always up to date and always supported – whichever option you choose.

*PEACE OF MIND, KNOWING YOUR DCS IS IN THE BEST HANDS ...*

**TECHNICAL DATA**

System configuration (maximum values)	
Networkable systems	30
Operating stations per system	60
Process stations per system	60
Data points per system	1 000 000
Process graphics per system	10 000
Printers per system	100
Automation stations per system	150
System performance	
Display build-up time	≤ 1 s
Update rate of process data	≤ 1 s
Alarm resolution	1 ms
Timing precision of alarms	10 ms (typ.)
Process Stations	
Type	Hardened IPC, fan-less
Data security (optional)	RAID-1
Network technology	Ethernet (IEEE 802.3)
Min. data transfer rate	1 Gbps
Monitoring	Temperatures, PSU
System bus	
Network technology	Ethernet (IEEE 802.3)
Network protocol	TCP/IP
Transmission media	Fiber optic
Min. data transfer rate	1 Gbps
Redundancy	RSTP Ring
Network management	SNMP, Web interface
Fieldbus	
Standard:	CC-Link IE Field, 1 Gbps
Transmission media	Fibre optic
Redundancy	Ring topology
Others as needed	Modbus, Profibus/-Net, IEC 61850, IEC 60870-5-104, DNP3, S7
Transfer rate	Per respective fieldbus spec.
Field instrument management	FDT/DTM

Operator Workstations	
Full-HD screens per workstation	1 to 4
Windows per screen	1 to N (adjustable)
Input devices	Keyboard, mouse, touchscreen
Process graphics	> 1 000
Trend displays	> 1 000
Variables per trend display	> 18
Storable alarms/messages	> 1 000 000
Engineering / programming	
Graphical programming	IEC 61131-3
Documentation guidelines	VGB-R 170 C/IEC 61131-3
Automation Stations	
Model	iQ-R Series (iQ-F for small, non-critical applications)
Multi-processor system	1 to 4 CPUs
Redundancy	Full 1:1 hot backup
Inputs/outputs per station	Local IO: 4096 / Remote IO: 8192
Live module replacement	Hot swap
IO Monitoring option	Open- & short- circuit leads
Time stamping	by CPU or I/O module (option)
System Servers (incl. Archiving)	
Type	19-inch industrial housing
Storage capacity	Up to 4 x 4 TB
Hard disks	Up to 16 (hot swappable)
Data redundancy	RAID-1 or -6
Redundancy	Power supplies, hard disks, cooling fans

**PMSX<sup>®</sup>pro**



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