



for a greener tomorrow



OIL & GAS INDUSTRY

Innovative partnerships for your upstream application and automation success.



- Reduced power consumption and downtime for upstream applications
- More than 17 years of digitalization experience
- High reliability products: as low as 0.01% failure rate

GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliances

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.



TODAY'S CHALLENGES FOR OIL & GAS PRODUCTION

CHANGING WORLD

After decades of production, extracting the remaining oil or gas from a given field is becoming more difficult. Fortunately, new shale-based reserves have been opened up and now with the use of advances in technology such as artificial intelligence and the Internet of Things they are becoming more efficient and cost effective.

Similarly, new technologies and techniques are allowing fields to be opened up that were previously considered too difficult to work profitably. These can encompass both upstream and midstream processes, using state of the art extraction techniques and ensuring distribution systems are set up for and maintained at maximum efficiency and the lowest costs.

- Traditional hydrocarbon reserves are being depleted
- Shale-based fields are being brought on stream
- Advanced technological solutions are improving efficiency and reducing costs



Like many industries oil and gas is experiencing an aging and declining workforce, with fewer people entering the profession. This creates a need to simplify individual tasks within the wider processes, while also reducing the need for physical labor. Fortunately, there is a suite of automation technologies to enable such advances, from automatic data collection and interpretation to plant and machinery operation. These solutions are able to run 24/7, to constantly optimize efficiency and to reset instantly in response to changing order levels and production requirements.

NEW REQUIREMENTS

Safety has always been a primary concern for oil and gas operators, and it is notable that standards and expectations are always increasing. Furthermore, regions where safety was once a secondary issue have now adopted worldwide standards for protecting the workforce.

Environmental protection has also risen up the agenda in recent years, with hydrocarbon companies now required to limit emissions and washout, and to have equipment, plans and practised personnel in place for dealing with any emergencies. There is also increasing need to ensure cyber security.

Technology can play a major part in achieving these goals. Designed correctly, security and protection systems can offer appropriate responses from simple logging to raising an alarm or initiating an automatic response.

GREATER EFFICIENCY

Advances in computerization, digitalization and automation technology make it possible to improve production efficiency while meeting all current challenges and future requirements, ensure safety and maintain reliability. For instance, upstream drilling and pumping are fields where digitalization offer the potential for significant efficiency improvement.

- Automation solutions can simplify operational tasks and optimize production 24/7
- Personnel safety, environmental safety and cyber security can be built into automation
- Digital technologies can ensure efficiency, reliability and optimization

MEETING THE UPSTREAM AUTOMATION CHALLENGE

HIGHEST QUALITY, PROVEN RELIABILITY

Hardware quality and software reliability are critically important in the oil and gas industry. When the malfunction of one small component can potentially stop a whole plant, or a momentary delay can result in hours of lost production, then failure is simply not an option.

All Mitsubishi Electric products, are built to the highest quality standards, tested rigorously and proven through generations of use.

For instance, as a world class inverter company – supplying over 20 million units annually – Mitsubishi Electric’s quality ensures an ultra-low failure rate; for every 1,000,000 products we produce it is less than 100 products. Each inverter is subjected to a raft of tests, such as for EMC resilience and highly accelerated life tests to ensure reliability.

A HISTORY OF INNOVATION

Mitsubishi Electric has always been a leader in high tech production and control products. We pioneered the development of PLCs (programmable logic controller), which are now found throughout hydrocarbon facilities, as well as being the backbone of automotive and automated manufacturing plants.

We have pushed the envelope in SCADA (supervisory control and data acquisition), often defining the path that other suppliers have followed. Equally, our process visualization solutions such as HMIs (human-machine interfaces) were among the first on the market and remain the best today. Variable speed drives, or inverters, have always been part of Mitsubishi Electric’s DNA; we lead the field for all sizes and types.

In a 2002 industry first, Mitsubishi Electric introduced the concept of Smart Manufacturing. Offering a complete portfolio of automation products, our e-F@ctory program reduces total cost of ownership as well as operation and offers advanced data collection and analysis capabilities. CC-Link IE and other open communications networks, SCADA MC Works, all allow the easy development of sophisticated yet adaptable automation systems.

PROACTIVE PARTNER, GLOBAL EXPERIENCE

With a commitment to working in close partnership with clients, Mitsubishi Electric has a 100-year track record at the cutting-edge of control engineering. Our proactive approach has enabled us to become pioneers in driving up efficiency, safety and quality over many decades.

Today, Mitsubishi Electric solutions can be found at oil and gas facilities all over the world, opening up operations, optimizing production and maintaining mature fields.

With our proven automation products and solutions, innovation and expertise we can improve efficiency and reduce costs for upstream OEMs and partners across the whole oil and gas industry.

- For 100 years Mitsubishi Electric has set the gold standard for quality and reliability in automation
- Always at the cutting-edge, Mitsubishi Electric continues to develop new products, innovations and solutions
- We form seamless partnerships with operating company clients, passing on expertise, experience and confidence



AUTOMATION SOLUTIONS FOR OIL & GAS APPLICATIONS

Mitsubishi Electric has products, technologies and solutions suitable for automating every aspect of oil and gas production, particularly the upstream and midstream processes. These can save energy, optimize production and throughput, revitalize mature fields, ensure safety as well as facilitate remote monitoring over any distance.

PRODUCT CHARACTERISTICS

- Durability in harsh environments
- Reliable reduction of application downtime
- Safe and easy operation
- Enables remote monitoring to minimize on-site working
- Energy saving to reduce production costs
- Optimal system cost with wide product ranges
- Facility management tools to support diminishing technical skills

OFFSHORE DRILLING OFFSHORE PRODUCTION

DRILLING / EXPLORATION

- Top Drive Systems
- Draw Works
- Mud Pumps

SEPARATOR STATION

- Water injection pumps
- Compressors
- Remote / Mobile Monitoring

BOOSTER PUMP STATION

- Booster Pumps

OIL PRODUCTION WELL

- Water injection
- Compressors
- Rod Pumps
- Remote / Mobile Monitoring

GAS WELL HEAD ESP

- Water injection
- Compressors
- Remote / Mobile Monitoring

PIPELINE

- Pipeline monitoring

OIL RESERVES

GAS RESERVES



FREQROL INVERTER SERIES

- Energy saving / regenerative inverters
- Safety standard
- AI supported maintenance
- Small to large capacity



GOT SERIES HMI

- Durable HMI for harsh environments
- High operability
- High brightness for easy reading in any environment



MELSEC iQ-F SERIES PLC

- Suited to upstream applications
- Compact and robust design
- Easy installation and maintenance



MELSEC iQ-R SERIES PLC

- Redundant PLCs for non-stop system operation
- System switching time of 10 ms or less



MC WORKS SCADA

- Highly functional monitoring control system
- Energy management tools, remote and wide monitoring
- Facility management tools

PROVEN EXPERTISE WORLDWIDE

Mitsubishi Electric is an established supplier of automation solutions to the oil and gas production sectors with many innovative projects completed in North America, Russia and around the world. In the upstream and mid-stream arena our technology and expertise continue to help improve efficiency, drive profitability and extend the life of mature drilling fields.

Application:
**Total Drilling
Information System**

Country: **Netherlands**



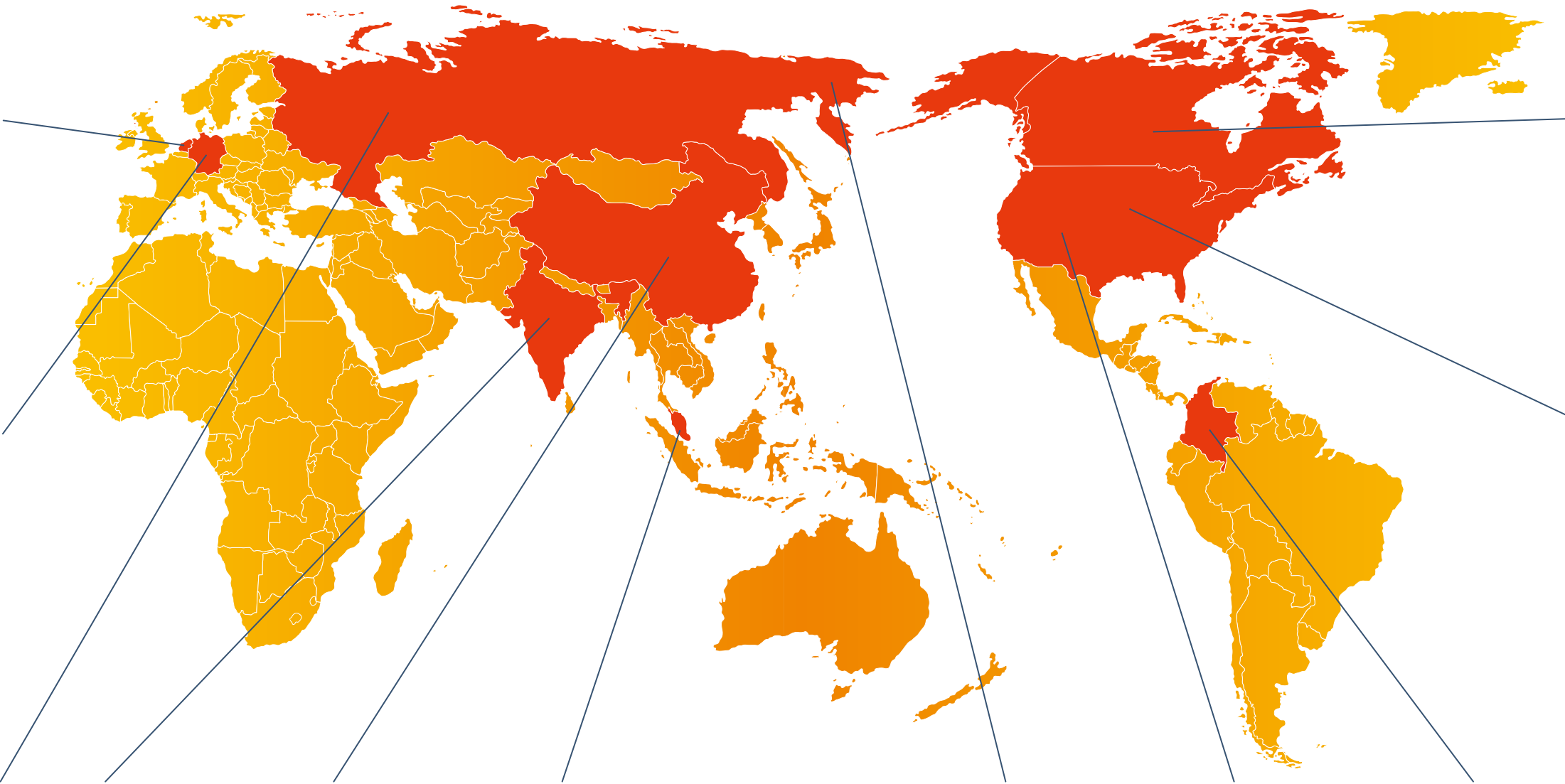
Application:
**ESP (Electrical
Submersible Pump)**

Country: **Germany**



Application:
**Rod Pump
Control**

Country: **Russia**



Application:
**Water Injection
Control Pump**

Country: **Canada**



Application:
**Offshore Drill
Control**

Country: **USA**



Application:
**Water Injection
Pump**

Country: **India**



Application:
**Separator Station
Monitoring**

Country: **China**



Application:
FPSO

Country: **Malaysia**



Application:
**Booster Pump
Control**

Country: **Russia**



Application:
**Oil Production Well
Monitoring**

Country: **USA**



Application:
**ESP (Electric
Submersible Pump)**

Country: **Colombia**



INDUSTRY SOLUTIONS Q&A

COST SAVING
Q: Power consumption is a major cost for us. Can we reduce this?

A: Inverters allow you to control the speed of electric motors, making it possible to **optimize energy consumption** over the duty cycle of most equipment including upstream pumps and compressors. In most cases this creates substantial **energy savings** and **prolongs motor lifespan**. Moreover, **regenerative inverters** can be used to pass captured energy back to equipment such as rod pumps.



EFFICIENCY IMPROVEMENTS
Q: Can I improve my process efficiency?

A: Processes can be **improved** through the introduction of **advanced automation**. By installing **variable speed inverters**, **PLCs** and other hardware, and managing them with a **plant-wide visualization** and control systems such as **SCADA MC Works**, operators can drive up **performance** and **efficiency**, even across multiple network-types.

EFFICIENCY IMPROVEMENTS
Q: How do I minimize downtime?

A: SCADA systems like Mitsubishi Electric's **MC Works** allow the remote surveillance of operational status and can be set up to include **predictive maintenance** programs that continually monitor all plant and machinery. They provide data in **real time** to detect early signs of pending breakdowns allowing potential problems to be addressed before they occur.

A: In addition, utilizing our highly regarded, quality components, offers operators increased reliability and resultingly reduces the need for maintenance-related downtime.



COST SAVING
Q: What else can be done to control operating costs?



A: Mitsubishi Electric offers a full suite of automation equipment, all of which is available in a range of sizes and capabilities suited to various upstream and midstream tasks. From **inverters** and **PLCs** to **low-voltage** power distribution equipment and **HMI**s, or **ultra-reliable** products are optimized to integrate easily into legacy technologies ensuring increased efficiency that drives down costs and gives **superior return on investment** at locations such as well heads and separator stations.

COST SAVING
Q: Can I constantly monitor and manage energy consumption?

A: Mitsubishi Electric SCADA MC Works Advanced Energy Management Software – **AX Energy** – provides an energy visualization program which can be customized to individual wells, separator stations, or pipelines, monitoring every point of power consumption. The software enables energy and CO₂ emissions monitoring to support or enhance environmentally friendly practices throughout the process or plant.



INDUSTRY SOLUTIONS Q&A

SAFETY & SUSTAINABILITY
Q: Can SCADA also help with safety?

A: SCADA reduces the need for site visits and allows remote monitoring, so the whole site or process can be constantly checked from the safety of a control room. With **MC Works MC Mobile**, safety data can also be forwarded to mobile devices, enabling off-site monitoring and removing the need for unnecessary travel in often difficult locations and environments.

SAFETY & SUSTAINABILITY
Q: And how about security?

A: CCTV cameras can be operated over Mitsubishi Electric's SCADA systems, so the whole site can be **monitored constantly** for intruders, **machine breakdowns**, spills and to ensure **personnel safety**.

A: In addition, our range of **MELSEC PLCs** offers **security enhancements** enabling operators to secure their processes by preventing unauthorized access across the network and **maintain supply**.



SAFETY & SUSTAINABILITY
Q: Upstream equipment has to be ultra-reliable. Can this be guaranteed?

A: Mitsubishi Electric set up continuous improvement quality systems in 1952, so reliability is bred into all our products. Today's generation meet or exceed **all international safety standards** including Safety Standard IEC 61508 and it is this coupled with **exceptional product reliability** that helps to mitigate risks such as equipment failure and accidents at oil and gas production sites.

SKILLED WORKFORCE
Q: Across the world workforces are aging. Can technology offset this?

A: Upstream process automation reduces the need for skilled personnel on-site, freeing up staff to focus on more critical operations and offering **costs savings** and **efficiency improvements**. At the same time Mitsubishi Electric software tools such as **MC Works AX Facility** can automatically manage assets, diagnose faults, investigate alarms and **prioritize fault-recovery operations**, offsetting reliance on workforces that are in decline and bridging specialist knowledge and experience gaps.

HIGH QUALITY FREQROL SERIES INVERTERS

Mitsubishi Electric has always been a leader in the design and manufacture of variable speed inverter drives. Today it offers a truly comprehensive range of products from tiny 0.4kW units to powerful 1.35MW* and larger super drives, with functions and capabilities to meet every need. Every Mitsubishi Electric inverter is built to the highest standards so that it is rugged, reliable and able to provide a long, trouble-free operating life, even when installed in the most demanding environments.



- Slim Model
- 400V, 200KW

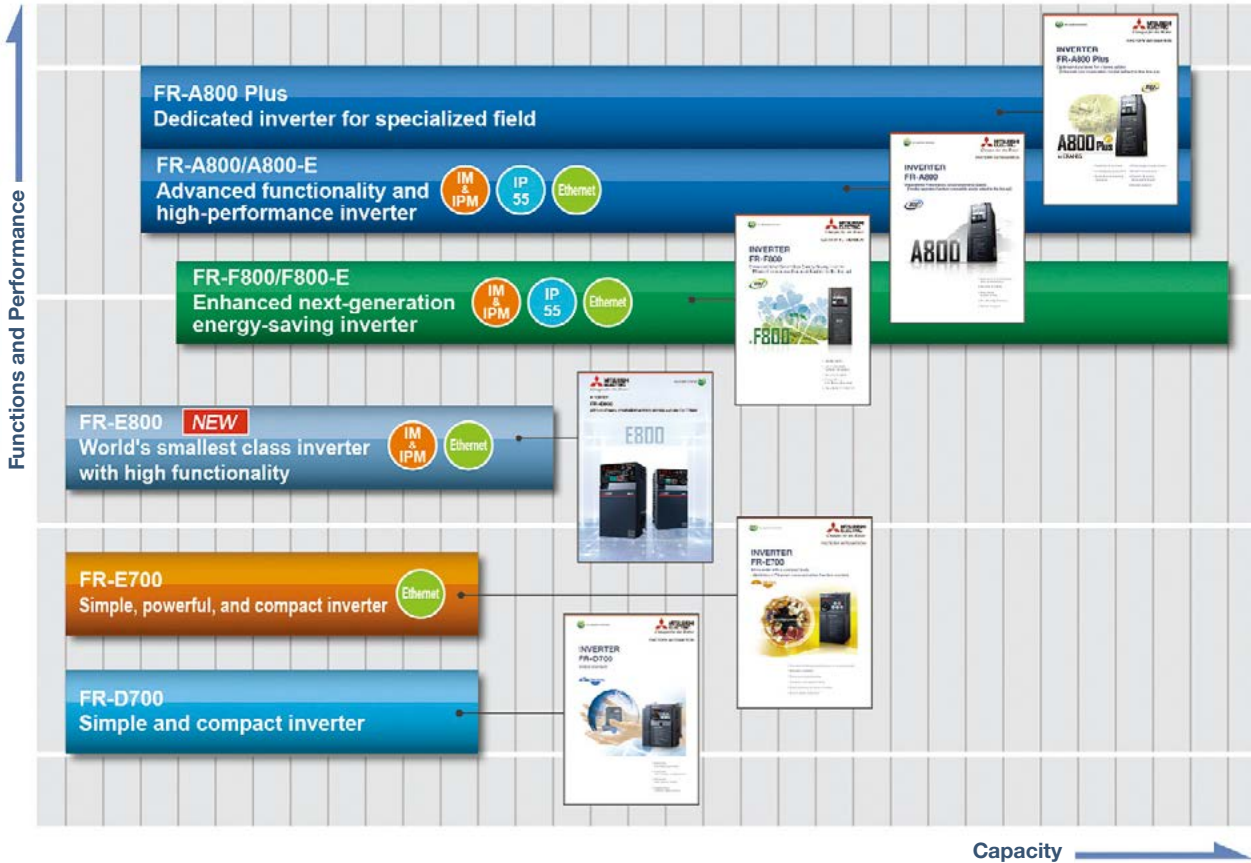
As a world class manufacturer of inverters, we set the global standards for product reliability and operational safety, ease of installation and integration, simple programming, flexibility and adaptability.

Moreover, the real-time control of motor speed on pumps and other assets, enables huge energy savings. This can be further enhanced with regenerative operation and high dynamic response options.

The inclusion of special features and optional extras means Mitsubishi Electric inverters are simple to integrate into automation systems, reducing costs and maximizing return on investment.

Our range includes compact, powerful, sensorless vector units that offer big drive performance; specialist energy-saving pump and fan drives; ultra-high performance drives; harsh environment units; harmonic mitigation and medium voltage inverters.

All of these have connectivity options for the full range of communications strategies, including fieldbus, open comms and specialist protocols for easy integration into digital and automation systems.



Reliability and Safety

- World class supplier of inverters
- Superb reliability (failure rate of less than 0.01% in 2018)
- Designed and built in house. HALT (Highly Accelerated Life Test) carried out to ensure highest product quality
- Robust: IP20-rated, withstands extreme ambient temperatures up to 50°C
- Safety: IEC61508-rated, SIL2-3 certified, corrosion detection

Saving Energy and System Cost

- Speed control ensures huge energy savings
- Power module designed in house and optimized for energy efficiency
- Energy saving operation with the Regenerative Converter
- Wide range of features and options enables optimal system costs

Connectivity for Digitalization and Visualization

- Multiple networks connectivity – Modbus, Profinet, Ethernet/IP, CC-Link etc
- Easy installation into existing systems
- Best-in-class inverters for digitalization and visualization

Wide Product Range to Suit Every System Design

- Range from 0.4kW to 560kW, with options up to 1,350kW using parallel drives
- Voltages from 100V to 690V
- Compact design throughout the range with slim model inverters also available



- Slim Model
- Converter + Inverter
- 690V, 560KW

The large capacity MV drive series is available from Toshiba Mitsubishi Electric Industrial Systems Co. Ltd. (TMEIC)

RELIABLE MONITORING & CONTROL

PLC SYSTEMS

Mitsubishi Electric is a world class producer of programmable logic controllers (PLCs) and offers a range that encompasses the simplest relay-replacement unit and extends to the ultimate high-end controllers for mission critical process control. All Mitsubishi Electric PLCs are fully modular and scalable, so can be used to build sophisticated multi-function control systems that remain flexible for subsequent reconfiguration and extension.



Next generation Micro PLCs designed for upstream applications

MELSEC iQ-F Series

The Mitsubishi Electric MELSEC iQ-F Series programmable logic controller (PLC) represents the next generation of control technology. It offers an enhanced high-speed bus, wide range of built-in functions. It has a spring clamp terminal block, making wiring easier and offering more durability against vibration. Set up is easy with its intuitive development/programming environment and simple parameter settings using our GX Works3 engineering software. It can be used as a standalone device or networked into an automation system.

Highly reliable PLCs for continuous process control

MELSEC iQ-R Series

As the oil and gas industry seeks next generation automation solutions to improve productivity, the Mitsubishi Electric MELSEC iQ-R Series PLC adds value while reducing total cost of ownership. It has been developed to reduce installation and operating costs, provide long term reliability and facilitate the adaptation and reuse of existing plant. It has high connectivity so can be used with most existing and future networks, ensuring security.



Reliability and Safety

- World class PLC from global manufacturer
- Safety assured: SIL2 Certified
- Robust and reliable: operating temperature range -20 °C to 55 °C; Humidity: 5 – 95%
- Unauthorized access protection safeguards IP
- Supports redundant system configuration(iQ-R Series)

Saving System Cost

- Supreme reliability through quality and robustness
- High-speed and accurate operation
- Intuitive engineering tools minimize development costs
- Easily integrates with existing assets and new technology

Connectivity for Digitalization and Visualization

- Web server and real-time monitoring function aids easy visualization
- Multiple network options for easy installation
- Direct data correction and analysis
- Real time data acquisition (iQ-R Series)

Wide Range of PLCs to Suit Every System Design

- iQ-F Series for upstream rod pumps, ESPs, booster pumps, transfer pumps, oil heaters etc.
- iQ-R Series for separator station equipment like separation tanks, water injection, sumps, compressors, centralized monitoring and control

SCADA SOLUTIONS

Mitsubishi Electric has set the pace for developing SCADA (supervisory control and data acquisition) control systems in the oil and gas industries.

Mitsubishi Electric SCADA MC Works64 provides a highly functional, next generation control system and offers a solution for every requirement in oil and gas automation, including redundancy emergency functions and 2D and 3D visualization.

MC Works64 is a series of functional modules that enable simple systems building and reconfiguration

In addition, it can be used for comprehensive remote monitoring solutions based on any communications network, including open comms, dedicated networks, telecoms and Cloud access, with total security built in.

With decades of experience in mission-critical control systems, Mitsubishi Electric delivers productivity, visualization, performance, safety and security.



Reliability and Safety

- Proven worldwide
- Sophisticated multi-view screen displays
- Comprehensive remote monitoring
- Enables preventive maintenance and fault prediction

Saving Energy and System Cost

- Energy management tools visualize power consumption and CO₂ emissions
- Reduces development cost through intuitive engineering tools

Connectivity for Visualization and Digitalization

- Mobile monitoring

Wide Variety of Tools to Suit Every Visualization Need

- Video surveillance system can be setup and networked with sites
- AX Facility supports operational and maintenance functions
- AX Energy helps to optimize power consumption and reduces CO₂ emissions
- Many more management tools are available



BEST-IN-CLASS GOT2000 HMIs

Mitsubishi Electric's GOT2000 graphical operator terminals or HMIs (Human Machine Interfaces) are the state of the art way to visualize production progress and machine condition. They enable a vast amount of detailed information to be seen via simple schematics and live data feeds. The new GOT2000 Rugged is designed to cope with the most demanding conditions found in the oil and gas industry and, with the introduction of the new 'e-F@ctory Starter Package', are an easy way to implement visualization solutions.

Reliability and Safety

- Rugged construction for harsh environments
- Wide operating temperature: -20 °C to 65 °C
- High brightness, clear visibility under daylight – 2x brighter than non-rugged models
- UV resistant
- Vibration and shock resistant – 2x stronger than non-rugged models
- Water resistant – IP66F and IP67F models available
- Compliant with multiple safety standards and maritime certification

Saving System Cost

- Wide range of products to meet specific requirements for upstream applications

Connectivity for Digitalization and Visualization

- Multiple networks connectivity
- Designed for safe installation / Dedicated installation fittings
- Software that enables GOT functions on a PC is also available (Soft GOT)

Wide Range of Product Options

- Models to meet individual user requirements



e-F@ctory Starter Package



PROJECT:
ESP (Electrical Submersible Pump)

INSTALLED PRODUCT:
MELSEC iQ-F Series Compact PLC, GOT2000 Series HMI, FR-A800 Series Inverter

LOCATION:
Germany

CHALLENGE

An electrical submersible pump (ESP) had provided many years of service but was coming towards the end of its life. The operator asked Mitsubishi Electric to develop a state of the art replacement solution that would be more energy efficient than the existing equipment and also more reliable so that uptime increased and maintenance decreased.

SOLUTION

The quality built into all Mitsubishi Electric products means the reliability of systems built from them is virtually guaranteed. The wide range of options within all its products ranges means an optimum system could be designed to meet the specific needs of the project, in terms of power, capacity, visualization, robustness and flexibility.

As a submersible installation, the working environment was obviously going to be harsh, so system engineering based on robust products was a given from the start. As access for maintenance, repair and reconfiguration was very limited, overall systems reliability was also designed in as a fundamental requirement. Similarly, safety had to be a major consideration within this demanding oil and gas environment.

The inverter was chosen to provide sufficient torque to meet the most extreme requirements of the application, such as the need to temporarily increase pump throughput and raise production. However, to balance this against the need to optimize energy consumption, an inverter with an advanced optimum excitation control function was specified.

This was integrated with appropriate Mitsubishi Electric HMIs and PLCs, while the connecting industrial network was chosen for ease of integration with existing systems.

OUTCOME

Using Mitsubishi Electric as a single source supplier, every automation product was high quality and easily integrated. Significant energy savings were achieved, which along with the user friendly operation has spurred the client to use Mitsubishi Electric products in subsequent projects.



SUMMARY

- Project to replace life expired ESP
- Inclusion of an advanced inverter reduced energy consumption
- Using high quality Mitsubishi Electric equipment throughout guaranteed a super reliable system that reduced maintenance costs and minimized downtime

RESULT

- The new pump system has proven reliable and is delivering constant cost savings compared to the old one. The client is now specifying Mitsubishi Electric equipment on future automation projects.



PROJECT:
Sucker pump control

INSTALLED PRODUCT:
FR-A800 Series Regenerative Inverter, Compact PLC, GOT1000 Series HMI,

LOCATION:
North America

CHALLENGE

Reserves in a mature land-based oil field were running low and operational efficiency was decreasing because of unexpected system stops. So a leading oil and gas producer asked Mitsubishi Electric to develop a new control system to improve extraction using a highly reliable and simple process.

SOLUTION

Regenerative energy is usually released as heat via a brake resistor or returned to the power supply with a regenerative converter. However, by using the regeneration-avoidance function built into Mitsubishi Electric FR-A800 inverters, regeneration is prevented as soon as it is detected by adjusting the inverter's frequency. This made it possible to develop a simple, reliable and stable extraction system.

OUTCOME

We selected the A800 inverter with its built-in regeneration avoidance function and installed one on each pump. Alongside these we installed FX3G programmable logic controllers (PLCs) so that pump operation could be adjusted in real time and constantly re-optimized.

Each PLC also helps drive a local GT14 series touchscreen HMI operator terminal and communicates with a remote control center, where all the pumps can be monitored through a Mitsubishi Electric SCADA system.

With the new control system installed and commissioned many benefits quickly became apparent. The inverters have improved pump performance by continuously and smoothly adjusting the speed of the asynchronous drive motor to constantly maintain the target strokes per minute. This generates a steady flow of recovered oil, allowing even operation of subsequent processes.

Pump performance data along with data from well and environment sensors is collected by the PLC and sent to the local touchscreen where it can be monitored and acted upon by a site engineer. It is also sent to the central SCADA system where it is amalgamated with operating data from all the other pumps in the field so that overall production can be managed and optimized.



SUMMARY

- To improve recovery while reducing down time of the oil field systems
- Fitting regenerative avoidance functionality to the sucker pumps enabled continuous stable extraction
- Operational efficiency has been significantly increased, leading to fewer stoppages and increased production

RESULT

- A reliable, simple and stable system has reduced downtime and raised production targets



PROJECT:
Oil Rig Monitoring

INSTALLED PRODUCT:
**SCADA MC Works,
MELSEC iQ-F Series
Compact PLC**

LOCATION:
Netherlands

CHALLENGE

Oil and gas companies need to monitor and control all the processes of their drilling rigs. This includes collecting data in real time as well as monitoring the multiple extreme forces on a drill bit and processing it to provide the drilling operator with graphical data displays that visualize the entire operation.

SOLUTION

A leading company has used the Mitsubishi Electric SCADA MC Works to develop a data acquisition system focused on the requirements of its drilling rigs. It provides a comprehensive drilling information system that can provide information in easily understood graphical form, plot trends in data streams and manage alarms.

The system works by gathering data from sensors around the rig via a PLC and server and processing it into clear information, which is presented to drill floor operators on a touchscreen HMI.

The information is also transmitted, along with information concerning screen types, scales, alarm limits and manual entries by the operator (depth, bit depth, pump efficiency etc.), wirelessly via an 802.11b network protocol to the engineering and management teams.

OUTCOME

The system is designed to be a user selectable graphical and alphanumeric display software suite, with alarm monitoring of all the primary instrumentation. It has a modular structure that makes it highly customizable and easy to reconfigure or upgrade.

It monitors drill speed, depth, pump pressure, temperature and tank levels. These values are displayed on several graphical screens and can be used to calculate penetration rate, weight on drill bit, hole volume, running time and pipe counts. For clarity the large amounts of information collected and analyzed by are presented in clear graphical displays. The operator can choose which information to view on the touchscreen and also to reset parameters and alarm conditions as required.



SUMMARY

- To constantly collect data from drilling operation and provide the operators with real time visualization
- Mitsubishi Electric SCADA MC Works has been used to develop a total drilling information system
- Clear concise information is displayed on touchscreens, to save costs, improve reliability and optimize productivity

RESULT

- Massive amounts of data need to be closely monitored for successful drilling. The new system does this automatically and presents the derived information in clear concise displays on touchscreens. It saves costs, improves reliability and ensures productivity



PROJECT:
**Oil & Gas Plant Control
Monitoring**

INSTALLED PRODUCT:
SCADA MC Works

LOCATION:
North America

CHALLENGE

A large international integrated energy company wanted to manage a vast oilfield – with more than 3,000 drilling wells – over the web, monitoring all oil well performance, production analysis and maintenance operations.

SOLUTION

Mitsubishi Electric SCADA MC Works was used to create a high-capability control system which included SQL logging, alarm management, trend analysis, web and multimedia capabilities.

PLCs are used to monitor and control steam plants, sulfur plants, oil pumps, and oil storage then transfer the readings to the control system, with all I/O points being monitored constantly. The system's open connectivity easily provides process data, graphics and trends with live data to any registered user via the web.

OUTCOME

Initially a pilot system was installed at one part of the oilfield. When this proved successful the system was expanded to five control systems and two web servers with 50 client licenses in use.

Mobile device and multimedia capabilities were added to provide wireless access and notification for operators in the field. Approximately 15,000 I/O tags are monitored and controlled through these systems.

As a result, local operators, technical supervisors and senior management can now view trend data from the entire system via the web to manage the flow of oil through the plants and into the distribution and storage network. In addition, all alarms, events and actions are archived.

Several local operator stations are equipped with the Mitsubishi Electric SCADA MC Works so that supervisors and operators may be notified via pagers and telephones when immediate attention is required.



SUMMARY

- To monitor and manage +3000 oil wells via the web
- Mitsubishi Electric SCADA MC Works was integrated with on-site PLCs to communicate live data via the web
- Uptime and operating efficiency increased through constant monitoring and analysis

RESULT

- Benefits of the system include faster responses to equipment shutdowns through automated notification and increased generator energy efficiency through trend analysis and remote monitoring





PROJECT:
Oil Volume and Composition

INSTALLED PRODUCT:
MELSEC iQ-F Series Compact PLC, GOT2000 Series HMI

LOCATION:
Russia

CHALLENGE

Process efficiency and commercial profitability of oil handing operations can be improved by the accurate and timely measurement of the amount of oil at each step of the process.

SOLUTION

Mitsubishi Electric has developed Meter Skid, which measures the volume of oil available for transfer to the distribution pipeline network. As well as the measuring lines, it incorporates a calibration unit and an oil quality measuring unit.

Meter Skid is designed to determine both the gross weight of crude oil, accurate to $\pm 0.25\%$ and the net crude oil weight, accurate to $\pm 0.40\%$. It also includes a sampling tool which monitors the amount of water entrained in the oil. This information is displayed at the operator's workstation in real time and is also logged for report generation.

OUTCOME

The Meter Skid is based on a Mitsubishi Electric FX5U compact PLC with additional analogue input modules. The crude oil flow is measured directly using mass flowmeters in the measuring lines, with readings transferred to the PLC as standard 4–20mA signals.

The controller carries out a net mass calculation by deducting water, solids and chlorides content from the gross mass. The water content is determined using densitometers, while the percentage of impurities is determined periodically by sampling.

Based on all this data the controller is able to calculate the quantity and quality of oil delivered to the pipeline. It produces an operational report every two hours, plus shift, daily and monthly reports, delivery and acceptance certificates. All of these can be displayed on local GOT2000 operator terminals and in the central control room.



SUMMARY

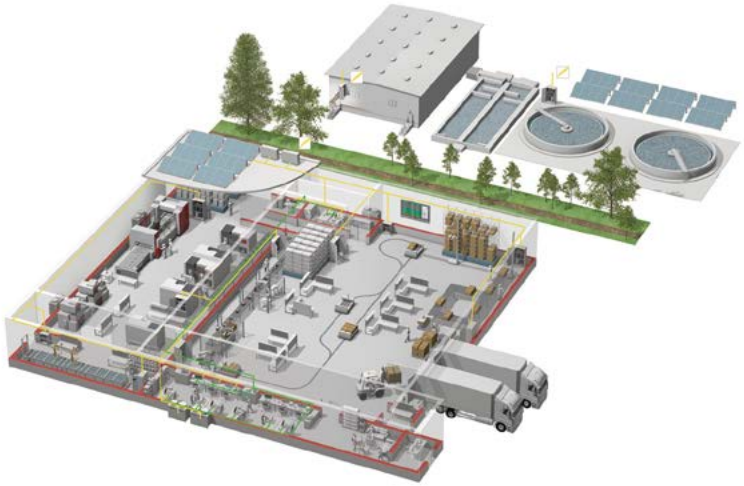
- To accurately measure oil flow through production processes
- Flowmeters feed oil mass readings to a PLC, which also monitors quality values
- Improved accounting for both oil amount and quality

RESULT

- Meter Skid enables the implementation of an accurate oil accounting system that records both the volume of oil delivered and its compositional quality



YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution – because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over \$40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.



Low voltage: MCCB, MCB, ACB



Medium voltage: VCB, VCC



Power monitoring, energy management



Compact and Modular Controllers



Inverters, Servos and Motors



Visualisation: HMIs



Numerical Control (NC)



Industrial / Collaborative Robots

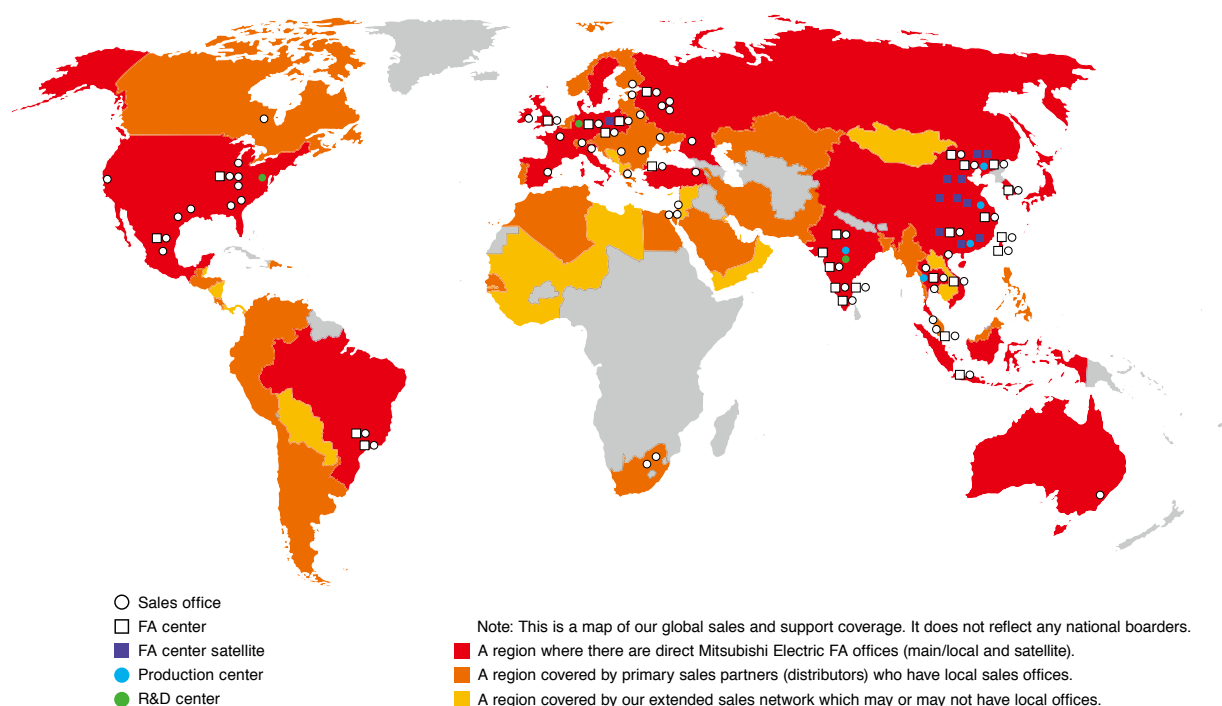


Processing machines: EDM, Lasers, IDS



Transformers, Air conditioning, Photovoltaic systems

Global Partner. Local Friend.



Our service and support concept is ingrained in everything we do

Country/ Region	Sales office	Tel/ Fax			
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253	Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD. 307, Alexandra Road, Mitsubishi Electric Building, Singapore 159943	Tel : +65-6473-2308 Fax : +65-6476-7439
Mexico	MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch Mariano Escobedo #69, Col. Zona Industrial, Tlalnepanitla Edo, C.P.54030, Mexico	Tel : +52-55-3067-7500	Thailand	MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD. 12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpan, Khet Yannawa, Bangkok 10120, Thailand	Tel : +66-2682-6522 Fax : +66-2682-6020
Brazil	MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA. Avenida Adelino Cardana, 293 21 andar, Bethaville, 06401-147, Barueri SP, Brazil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016	Vietnam	MITSUBISHI ELECTRIC VIETNAM CO., LTD. Unit 01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam	Tel : +84-8-3910-5945 Fax : +84-8-3910-5947
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120	Indonesia	PT. MITSUBISHI ELECTRIC INDONESIA Gedung Jaya 11th Floor, J.L. MH. Thamrin No.12, Jakarta Pusat 10340, Indonesia	Tel : +62-21-3192-6461 Fax : +62-21-3192-3942
China	MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Shanghai, China	Tel : +86-21-2322-3030 Fax : +86-21-2322-3000	India	MITSUBISHI ELECTRIC INDIA PVT. LTD. Pune Branch Emerald House, EL -3, J Block, M.I.D.C Bhosari, Pune - 411026, Maharashtra, India	Tel : +91-20-2710-2000 Fax : +91-20-2710-2100
Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan, R.O.C.	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509	Australia	MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD. 348 Victoria Road, P.O. Box 11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. 7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 157-801, Korea	Tel : +82-2-3660-9530 Fax : +82-2-3664-8372			

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
<http://Global.MitsubishiElectric.com>