



TMR and Duplex Safety System Technology

TüV AK Class VI SIL3 Certified

*Genius® Modular Redundancy
Offers High Flexibility and
Scalable Redundancy*

A Flexible System With Variable Redundancy...

Preventing accidents that could result in significant risk to personnel, plant, and the environment is a pressing industry concern. Government safety and related current environmental policies must be met. Global awareness has resulted in the creation of new laws, regulations, and requirements that are more rigorous, mandating safety guidelines for the 28,000 firms involved in the process industries. In particular, these guidelines have focused on process hazards in the petrochemical, and oil and gas industries.

Complying with these laws, regulations, and guidelines is not always easy. It requires a comprehensive understanding of safety system issues, time-tested technology, and mastery of the regulatory requirements. To meet these needs, GE Fanuc offers a wide range of solutions for safety systems and high availability control, backed up by a highly responsive global support network of dedicated, experienced personnel.

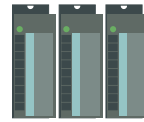
At the heart of GE Fanuc critical control systems is Genius® Modular Redundancy (GMR), combining the Series 90™-70 PLC

GE Fanuc's GMR system includes both digital and analog input voting, output voting for digitals, input and output autotesting, and extensive fault reporting. There is no need to write special purpose code. Tested code is already embedded for you. Simply configure the system and develop the logic for your specific application as if writing for a simplex system.

and our field-proven Genius I/O. These are time-tested components: worldwide there are more than 20,000 Series 90-70 CPUs and more than one million Genius blocks installed. Readily available GMR modules provide a scaleable solution, allowing customers to match the degree of redundancy to the level of risk.

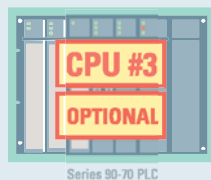
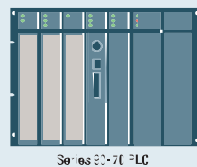
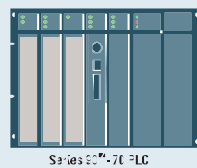
In addition to the process-related solutions, GE Fanuc Critical Control solutions have been successfully implemented in many industries such as transportation systems, crane controls, gas turbine control, and many others.

Genius Modular Redundancy: A Time Tested Approach to Safety Systems

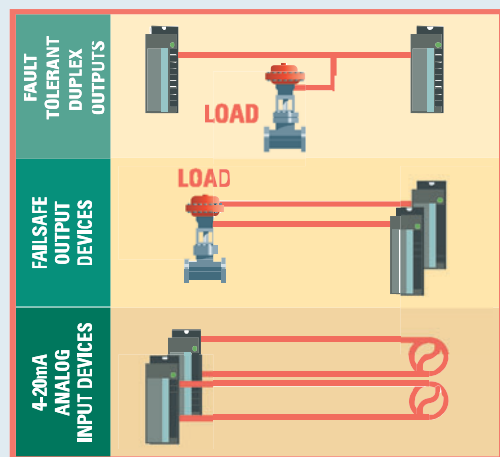


Genius Modular Redundancy (GMR), developed by GE Fanuc, provides an ideal Simplex (1oo1D), Duplex (2oo2) or (1oo2D), or Triple Modular Redundant (TMR) (2oo3) solution for emergency shutdown (ESD) and fire and gas (F&G) applications. These systems are based on time-tested, globally available PLC products.

In both dual and triplicated configurations, GMR includes physically and electrically isolated PLCs and extensive diagnostics operating as a single functional unit.



Each Genius remote I/O location can incorporate any mix of analog or digital I/O.



Each discrete output circuit incorporates current and voltage sensors that provide output and load state diagnostics, extending fault coverage to the control element.

Genius remote I/O capability eliminates expensive field

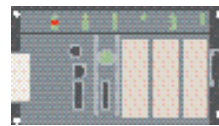
The Flexibility for Variable Redundancy

GMR is an extremely flexible system that provides variable redundancy all the way from the input modules through one, two, or three PLC CPU processors to the output modules. GMR gives you the option of configuring your less critical inputs and outputs for simplex or duplex operation, while configuring critical control elements for fault tolerance.

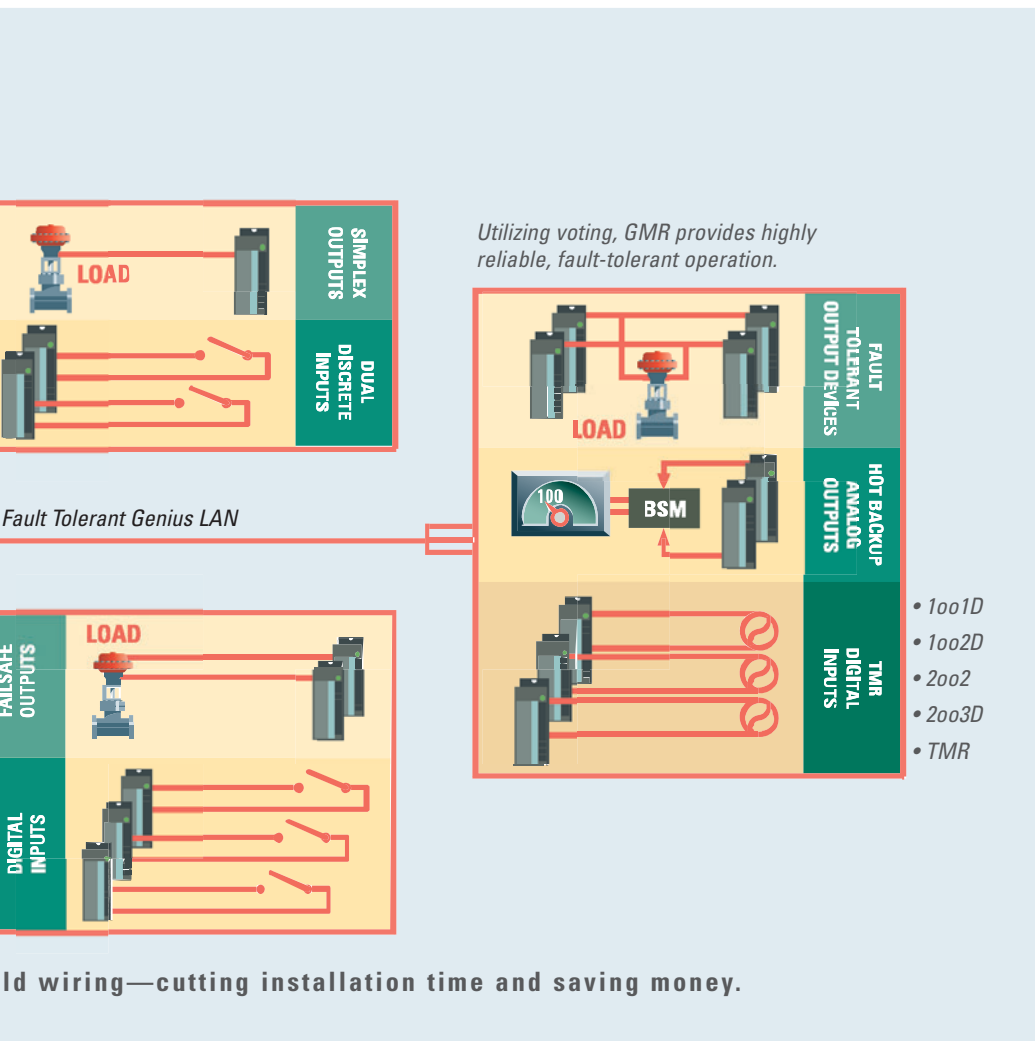
Choose the Communication Option that Meets Your Needs

A variety of communications options make it possible to interface GMR to distributed control systems (DCS), operator interfaces or workstations. Standard interface options such as Modbus™ and Ethernet are available. Additionally, PLC memory is secured within its own CPU so that no failure of an external communicating device can corrupt the memory of your PLC system.

Easy to Configure and to Program



With GMR, system configuration and programming are accomplished from a personal computer, either on-line or off-line from the PLC. The GMR system itself is shipped as a complete package providing safety system functions such as voting diagnostics and start-up control. From the programmer, all PLCs appear as one for downloading and verifying application programs, saving time and enhancing system integrity.



A Host of Special Features for More Exacting Control

GMR offers a number of features not found in typical ESD systems:

- Point Level redundancy makes it possible to customize system hardware to specific application requirements.
- Genius' unique Smart Switch technology eliminates the need for fuses.
- Fault identification is carried down to the point level, reducing MTTR.
- Before CPU installation, GMR users can stage and debug input and output circuitry using a local monitor.
- GMR modules are readily available through worldwide distribution channels.
- GMR's configuration utility is self-documenting.
- GMR's unique hardware architecture is designed to avoid common cause failure.

Meeting the Needs of a Variety of Customers

GMR systems are ideal for applications that require high system availability and reliability, including equipment protection, environmental release protection, and life safety protection systems.

For Consulting Engineering Firms

GE Fanuc offers a variety of services designed specifically for consultants, including a full range of publications and product information, as well as guide-form specifications. We also distribute a quarterly newsletter featuring GE Fanuc products, services, and applications.

Turnkey System Integration

With the complex safety and environmental demands on process industries, customers are looking for state-of-the-art, user-friendly solutions. GE's Industrial Control Solutions Integration centers have been developed to provide turnkey services for hydrocarbon processing and other industries where high reliability and availability are key factors.

For End Users

When you take delivery of a GE Fanuc GMR system, you can be confident you are not only getting a high quality product, but superior service as well. For immediate answers to pressing issues, GE Fanuc provides a toll-free telephone hotline service staffed by well-trained, experienced engineers to answer technical questions and to isolate and diagnose problems. Qualified service engineers, located worldwide, are ready to respond to calls for on-site assistance. In addition, GE Fanuc offers flexible service contracts, spot service, and start-up assistance programs.

Training

Comprehensive global training in GMR systems is provided by our experienced factory-trained instructors at our facilities worldwide. Professionally developed courses for maintenance and engineering personnel can be customized to your specific needs.

Assuring You the Highest Standards of Quality

At GE Fanuc, quality comes first. The benefit to our customers is reliability you can depend on.

- *The Series 90-70 PLC and Genius I/O system at the core of GE Fanuc's GMR system have exceptional mean time between failure (MTBF). In addition they are both approved for hazardous location, Class I, Division II installation (IEC CLASS I, ZONE 2).*
- *GMR components are built in our award-winning Charlottesville, Virginia facility which has been ISO-9001 certified since 1991.*
- *TüV has certified GMR* for TMR AK Class VI (2v3), duplex Classes VI (1v2) and VI (2v2), Class IV (1v1) according to the DIN V19250/DIN V VDE 0801 standards.*

*SIL3 according to IEC 61508



GE Fanuc Automation Information Centers

**USA and the Americas: 1-800-GE FANUC
or (434) 978-5100**

Europe, Middle East, and Africa: (352) 727979-1

Asia Pacific: 86-21-3222-4555

Additional Resources

For detailed technical specifications and product ordering information, please visit the GE Fanuc website at:

www.gefanuc.com

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GFA-162C
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