

GP 15-06-03	Programmable Logic Controllers	December 2001
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Programmable Logic Controllers

GP 15-06-03

Scope

- 1) [I] This Global Practice (GP) covers the design, installation, operation, testing and documentation of Programmable Logic Controllers (PLCs) in non-protective system applications. This includes, but is not limited to, applications such as pump and valve control, motor load shedding/reacceleration, some types of sequencing, (e.g., Drier Regeneration), and analog control using PID algorithms.
 - 2) * [I] The requirements for protective system applications or safety applications, are covered by [GP 15-07-02](#).
 - 3) [I] An asterisk (*) indicates that a decision by the Owner's Engineer is required, that additional information is to be furnished by the Owner's Engineer, or that information for the Owner's Engineer's approval is to be supplied by PLC Vendor or Contractor.
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1. Required References

[I] This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 15-06-02	Environmental Protection for Instrumentation
GP 15-07-01	Electric Power Branch Circuit Design for Instrumentation
GP 15-07-02	Protective Systems
GP 15-10-01	Instrument Transmission Systems
GP 15-11-01	Instrument Control Panels
GP 15-12-01	Instrument Wire and Cable
GP 16-01-01	Area Classification and Related Electrical Design for Flammable Liquids, Gases or Vapors
GP 16-01-03	Protection of Electrical Equipment in Contaminated Environments
GP 16-08-01	Instrument and Essential Services Power Supplies
GP 16-13-01	Field Installation and Testing of Electrical Equipment
GP 20-01-01	Inspection of Equipment and Materials

1.2. IEC–International Electrotechnical Commission

IEC 60068-2-6	Environmental Testing - Part 2: Tests - Test FC: Vibration (Sinusoidal)
IEC 60068-2-27	Basic Environmental Testing Procedures Part 2: Tests - Test Ea and Guidance: Shock
IEC 60068-2-64	Environmental Testing Part 2: Test Methods Test Fh: Vibration, Broad-Band Random (Digital Control) and Guidance
IEC 61000-1-1	Electromagnetic Compatibility (EMC) Part 1: General Section 1: Application and Interpretation of Fundamental Definitions and Terms
IEC 61000-4-2	Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
IEC 61000-4-3	Electromagnetic Compatibility (EMC) - Part 4-3: Testing and Measurement Techniques - Radiated, Radio-Frequency, Electromagnetic Field Immunity Test



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1.3. IEEE–Institute of Electrical and Electronics Engineers

IEEE C37.90.1	Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C63.2	Standard for Electromagnetic Noise and Field Strength Instrumentation, 10 Hz to 40 GHz - Specifications (ANSI/IEEE)
IEEE C62.64	Standard Specifications for Surge Protectors Used in Low-Voltage Data, Communications, and Signaling Circuits

1.4. ISA–Instrumentation, Systems and Automation Society

ISA 5.2	Binary Logic Diagrams for Process Operations
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1.5. NEMA–National Electrical Manufacturers Association

NEMA ICS 3	Industrial Control and Systems Factory Built Assemblies
NEMA ICS 6	Industrial Control and Systems Enclosures

1.6. NFPA–National Fire Protection Association

NFPA 70	National Electrical Code
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1.7. Military Standards

MIL-HDBK-217F(2)	Reliability Prediction of Electronic Equipment
MIL-HDBK-472(1)	Maintainability Prediction

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2. Definitions

Term	[I] Description
Local I/O	Local I/O refers to any input/output module sharing the same backplane as the CPU.
Off-line Programming	Off-line programming is when the application program is modified when the PLC is not executing the application; or when the application program is modified on a separate stand-alone programming device (e.g., Personal Computer) and later downloaded to the PLC's CPU memory.
On-line Programming	On-line programming is when the application program is modified while the PLC is executing the application program.
Peer-to-peer Communication	Peer-to-peer communication is data transmission from any PLC on a network to any other PLC on the same network.
PLC System	A PLC system consists of one or more programmable electronic system Central Processing Units (CPUs), power supplies, and multiple input/output (I/O) modules, which interface with field instrumentation and operator control panels/ interfaces. A communications network interface to a higher level Digital Control System (DCS) is also possible.
Programmable Logic Controller	A Programmable Logic Controller (PLC) is a programmable electronic system capable of performing logic functions traditionally performed by electro-mechanical relays and timers. It detects the change in state of input signals from push buttons, limit switches, field instruments, etc. and acts on this information to produce desired output signals to drive loads, such as pilot lights, solenoids, motor starters, and valves. Additionally, a PLC may contain analog processing, mathematical functions, and PID control capability.
Rack	A Rack (or base) is a slotted modular housing that contains and provides mechanical protection for individual PLC I/O modules. A rack also includes the electrical backplane which functions as a communication link between the CPU and the local I/O modules.
Remote I/O	Remote I/O refers to any input/output module requiring data transfer to take place over a communications link between this I/O module and the CPU.
Scan Time	Scan time is the time necessary to completely execute the entire PLC application program one time, including any system overhead processing (i.e., diagnostics, updating the I/O table, system communications) that may be performed.
Termination Assembly	A termination assembly is an electrically passive circuit board to which field wiring is attached. The termination assembly passes input and output signals between field circuits and I/O modules.