VersaMax® Nano, Micro and Micro PLUS Controller CPUs

Important Product Information

This document contains important information about the following VersaMax Nano PLC and Micro PLC models:

IC200NAL110-DG	IC200UDD040-DD	IC200UDR006-DK
IC200NAL211-DG	IC200UDD064-DH	IC200UDR010-DK
IC200NDD010-FJ	IC200UDD104-DL	IC200UDR020-CD
IC200NDD101-FJ	IC200UDD110-DK	IC200UDR040-DD
IC200NDR001-FJ	IC200UDD112-DL	IC200UDR064-DH
IC200NDR010-FJ	IC200UDD120-DK	IC200UDR120-CD
IC200UAA003-DL	IC200UDD164-DH	IC200UDR140-DD
IC200UAA007-DK	IC200UDD212-DK	IC200UDR164-DH
IC200UAL004-DK	IC200UDD220-CD	IC200UDR228-CD
IC200UAL005-DK	IC200UDD240-DD	IC200UDR440-DD
IC200UAL006-EL	IC200UDR001-DL	IC200UMB001-B
IC200UAR014-DL	IC200UDR002-DL	IC200USB001-B
IC200UAR028-DK	IC200UDR003-DL	IC200USB002-B
IC200UDD020-CD	IC200UDR005-DK	IC200UUB001-B

The suffix letters following CPU part numbers indicate the hardware version followed by the firmware version. Expansion units do not have firmware, so only the hardware version is indicated.

This firmware release resolves an issue with SNP and adds enhancements in RTU protocol.

Functional Compatibility

- **Programming software:** Release 4.01 features require Proficy® Machine Edition (PME) version 6.0 SIM 1 or later.

- **Micro 20/40/64 CPU Firmware Compatibility:** Release 4.01 requires the CPUs with 512 KB of SRAM (new CPU revision levels listed above). This release is not compatible with the older CPU versions (with 256 KB SRAM).

  Release 3.84 is compatible with the old and new revision of CPU hardware.

- **Minimum Hardware Versions for Micro-20, -40, -64 CPU Compatibility with Firmware Version 4.00:**

  These 20/40/64pt models with enhanced SRAM are referred to as *Micro PLUS* controllers to differentiate from earlier Micro 20/40/64pt models.

  IMPORTANT: Releases 4.00 and later require the CPUs with enhanced memory (Micro PLUS CPUs). This release is not compatible with the older versions of CPUs. But firmware of earlier releases (i.e. before 4.0) is compatible with the new revision of CPU hardware.

      IC200UDD020-Bx
      IC200UDD220-Bx
      IC200UDR020-Bx
      IC200UDR120-Bx
      IC200UDD040-Bx
      IC200UDD240-Bx
      IC200UDR040-Bx
      IC200UDR140-Bx
      IC200UDR440-Bx
      IC200UDD064-Bx
      IC200UDD164-Bx
      IC200UDR064-Bx
      IC200UDR164-Bx

- **Config equality with New PME (6.0 SIM1 and above) and Old Firmware (prior to Rel 3.83):** After auto configuration, upon upload of configuration from PLC with older firmware revisions, the status bar of PME window shows Config NE. This issue is applicable to all VMNM CPUs.

  Note that this issue is not present with the new (Rel 3.83 and above) firmware.

- VersaMax Micro 64 requires Proficy Machine Edition 5.5 SP2 SIM5 or later.

- Support for Micro Motion Modules in the VersaMax Micro PLC system requires Proficy Machine Edition 5.7 SIM 3 or later.

- The motion functionality available on VersaMax Micro CPUs is not compatible with VersaMotion servo amplifiers IC800VMA012, 022, 042, 072, 102, 202, or 302.

- Performance: Review the *VersaMax Nano/Micro PLC User's Manual*, GFK-1645J or later for updated performance information.

- Micro-40 CPU and Ethernet Option Module: Micro-40 CPUs are compatible with Ethernet Option Module IC200UEM001-AB and later revisions only.

- Firmware version 3.59 is compatible with all previous hardware revisions of the Micro 14, Nano, Analog Nano, Micro 23, Micro 28 and Micro 28 ESCP CPUs.

- VersaPro 2.04/PME 5.0 and later releases can be used with firmware release 3.59 (Micro 14, Nano, Analog Nano, Micro 23, Micro 28 and Micro 28 ESCP CPUs).

- Micro 14, Nano, Analog Nano, CPU Hardware Compatibility:
  The CPU hardware versions listed below require version 3.56 firmware or later. They are not compatible with any prior firmware release.

      IC200NAL110-Cx
      IC200NAL211-Cx
      IC200NDD010-Dx
      IC200NDD101-Dx
      IC200NDR001-Dx
      IC200NDR010-Dx
      IC200UAA003-Cx
      IC200UAR014-Cx
      IC200UDD104-Cx
      IC200UDD112-Cx
      IC200UDR001-Cx
      IC200UDR002-Cx
      IC200UDR003-Cx

- All VersaMax Micro CPUs support 8- and 16-point expansion units even though older programming packages may not have them in the configuration. To configure these expansion units with VersaPro, allow the CPU to autoconfigure the expansion units, and upload the configuration into VersaPro.

- Battery: Backup battery options are available for 20/23/28/40/64-point VersaMax Micro PLCs to preserve the RAM memory contents and CPU's real-time clock. Two types of backup batteries are available, IC200ACC403 (coin type, 3.0 VDC @210MAH) and IC200ACC414 (cylinder type, 3.6 VDC @790MAH).

Firmware Upgrade Kits

Available at www.ge-ip.com/support.

82A1605-MS10-000-A1	R4.01 for Micro PLUS-64 CPUs with 512K RAM
82A1604-MS10-000-A1	R4.01 for Micro PLUS-40 CPUs with 512K RAM
82A1603-MS10-000-A1	R4.01 for Micro PLUS-20 CPUs with 512K RAM
44A752236-G10	R3.71 for Micro-14 CPUs
44A752239-G07	R3.71 for all Nano CPUs except IC200NAL110/211
44A752240-G07	R3.71 for Analog Nano CPUs IC200NAL110/211
44A752237-G10	R3.71 for all Micro-23, and -28 CPUs except IC200UDD120
44A752238-G10	R3.71 for Micro-28 CPU with ESCP, IC200UDD120

44A753290-G05	R3.84 upgrade kit for Micro 20pt Models with 256K RAM
44A753291-G05	R3.84 upgrade kit for Micro 40pt Models with 256K RAM
44A753036-G10	R3.84 upgrade kit for Micro 64pt Models with 256K RAM

Protocol Upgrade Kits (Ethernet Drivers)

Available at www.ge-ip.com/support.

82A1587-MS10-000-B0	SRTP upgrade kit
82A1588-MS10-000-B0	Modbus TCP upgrade kit
82A1589-MS10-000-B0	Pass through upgrade kit

Electronic Documentation Available

VersaMax Nano/Micro PLC user documentation, specifications and CAD drawings are available for download from the Technical Support website, www.ge-ip.com/support.

Problems Resolved in this Release

1. Micro PLC port gets stuck in SNP mode. While the Micro PLC is communicating as RTU Slave, when it is connected to PME and then connected back to RTU Master, it does not return to RTU Slave configuration and remains in SNP mode.

2. The RTU Port gets locked up when communicating with Radio modems. The RTU implementation generates errors when time gaps between characters are more than the specified Modbus timeout. This issue also causes port lockup in RTU Master. This release adds the ability to configure *End of frame timeou*t and *Receive to transmit delay* for both RTU Master and Slave.

New Features and Enhancements in this Release

Configuration for *Receive to transmit delay* in RTU Master Configuration COMMREQ

Applies to RTU Master only. This configuration provides option for user to select *Receive to transmit delay* for RTU Master. This delay will be forced by the device after the last byte received in the last frame is transmitted out of current port.

Receive to transmit delay configuration is not linked to *End of Frame timeout*. User has to take care of inter-operability of these configurations.

Receive to transmit delay can be configured at Word 23 of the RTU Master Configuration COMMREQ. This is an 8-bit configuration having 10 millisecond units. The value range is 0 to 255. The default value is 0, which configures this delay as 3.5 character times at current baud rate.

Configuration for *End of Frame Timeout* in RTU Slave Configuration COMMREQ

Applies to RTU Slave Only. This feature will allow the user to configure *End of frame timeout* in the RTU Slave configuration COMMREQ.

This configuration can be set at Word 19 of RTU Slave Configuration COMMREQ. This is 16-bit configuration with unit of 100 microsecond and Value range from 0 to 65535. The default value is 0, which configures this delay as 3.5 character time at current baud rate. The minimum value for this configuration is 3-character time at current baud rate.

Smart recognition of End of Frame by calculating expected number of bytes

Applies to RTU Master and Slave. This feature allows the device operating as either RTU Master or Slave to ignore invalid data appended to any valid RTU message. The RTU Master will compare the received bytes with expected number of bytes. The expected number of bytes in the Master is calculated while the COMMREQ information is processed to create the query.

The RTU Slave determines the message length by examining the Function code in the query message during reception. The slaveI determines the expected query message length after receiving at least two characters and no more than seven characters of the message.

Different Error Code for Incomplete Frame and CRC Error

Applies to RTU Master only. If the Master receives the incomplete frame and if the CRC is invalid, the error code 0607H is returned.

Restrictions/Operating Notes

- *Selection of communication protocols in VersaMax Nano/Micro PLCs:* When devices such as Operator Interface/HMI communicate with VersaMax Nano Micro, the use of Modbus Protocol is recommended for better performance.

- *Piggyback Status using SNP Master:* An SNP Master Protocol Long Attach COMMREQ may return all zeros in the piggyback status word for the slave device when using a modem or when used at 38400 bps.

- *Data transfer between PLCs using a SET (Serial Ethernet) module.* CPU with a SET module connected on the Port 2, when configured for Serial IO with a data rate of 38400, does not allow the slave PLC to read the data written by the master PLC, that is, the values returned are all zeros. The data is read correctly when an Ethernet option board is used instead of the SET module.

- *CPU becomes non functional when HSC is configured for minimum count span and subjected to higher input frequency.* When HSC (16-bit/32-bit) counter is configured for a minimum count span of 0, 1 or 2 at the maximum frequency, 100 kHz, the Watchdog timer expires, the OK LED is switched OFF, and only the Power LED glows.

- *Under specific high and low limit ranges, the HSC one shot mode is not working as per the information provided in the user manual.* For HSC one shot mode, the user manual states that for up counting the counter stops at N+1 and for down counting the counter stops at N-1. The expected behavior is observed when both high and low limits are configured with negative values, or high limit is configured with positive value and low limit is configured with negative value.

  But if both high and low limits are configured with positive values, when down counting, the counter stops at N instead of N-1. When up counting with this configuration, the counter stops at N+1 as expected.

  Example: If the low limit is 10 and high limit is 100, for up counting it stops at 101 (i.e N+1) but for down count it stops at 10 (i.e. N) instead of 9 (i.e. N-1).

- *At higher input frequencies, HSC Type-B 32-bit counter doesn't count input pulses properly.* At higher input frequencies, say 100kHz, the number of "A quad B" phase inputs given does not match the counts counted by the Type B 32-bit counter.

- *Modbus/TCP Client feature stops working while the CPU is fully loaded, or Modbus/TCP Client (Rx3i) gives error 0x0B91 for one of seven TCP server channels opened in the VersaMax Nano/Micro PLC.* Under full load conditions (Example: Port 1 and Port 2 engaged in Modbus RTU communication, PTO at 65KHz, 3 HSC channels configured as counters, and 4 expansion modules connected), sometimes the Micro does not respond to one of the Modbus commands. Under such full load conditions, Micro's UART occasionally fails to process one-byte information, which is the cause of the problem. This issue is not observed with 175K bps rate. To correct this problem, have the Client PLC resend the command when the error 0x0B91 is received.

- *Watchdog times out when SNPX write command is triggered after Update real time datagram command.* Whenever a SNPX write command is fired after update real time datagram command, the watchdog times out for the few combinations of SNP timer values

  Example: T1 = 100, T2 = 0 (Disabled), T3 = 0 (Disabled), T4 = 2000, T5 = 0 (Disabled).

- *Winloader is able to update the firmware with OEM locked.* When OEM key is enabled, updating the firmware should be possible only by entering the OEM key password. Currently, even when the OEM key is enabled, firmware update is possible without password prompt.

- *Uploading the logic with real data, results in losing the precision of the real constant values.* When user logic containing the REAL data values is uploaded, its precision is lost in PME and hence Equality of the logic

is lost. This is because PME represents the value of real number in scientific notation with precision of 6 digits after decimal point.

For example, if a value of 2147483648.0 is uploaded, it is represented in PME as 2.147484e+009 (i.e. only 6 digits after decimal), which is equivalent to 2147484000.0 (round off, which is an error). If this value is downloaded to the CPU, it is stored as 2147483904.0 (rounded off, which is expected as per the IEE-754 32 bit representation of the REAL type).

- *Changing retentive property through RMS may cause an error.* When the retentive property of a variable is changed and a Run Mode Store is subsequently performed, Machine Edition's controller status display is updated to Logic EQ. Also the Feedback zone shows that particular program block is downloaded. However, the Feedback zone displays the following Warning: "Warning 8545-Project and Controller logic are equal. Run mode store will not be performed".

  Similar behavior sometimes occurs while changing the data type of a reference.

- *Verify Equality does not work properly after attempting an invalid word for word change.* If an attempt to make a word for word change results in Logic Not Equal, then undoing the change or reverting back to the original logic does not result in Logic Equal. To make the Logic in PME and CPU equal again, the logic needs to be downloaded to the CPU.

- *Under a few conditions, changing Ethernet Board configuration causes the CPU to go to Blink mode.* This issue is present when Port 2 is configured for Ethernet with Modbus Client Enabled and under the following conditions: PME hardware configuration is downloaded to the Micro, with Ethernet Option Module configuration changed, particularly from 175K to 38.4K baud with also change in parity. Subsequently saving the Ethernet Module configuration causes the Stop Faulted mode of Micro, with its OK LED blinking. To recover from this faulted mode, cycle power to the Micro PLC. (Micro 20/40/64)

- *In PME, uploading a configuration and then changing the Port 2 Configuration in CPU Settings can result in non default values being displayed on the Port 2 settings tab.* To work around this issue, change the Port Mode setting of Port 2 to a different protocol and then back again. (For example, change Port Mode from SNP to RTU and back to SNP again.) After this procedure, the Port 2 tab will show default settings. (Micro 20/40/64)

- *Micro PLC port fails to restore to RTU protocol; port stays in SNP Mode.* When a Micro port configured as RTU Slave (in communication with RTU Master) is connected to programmer, it switches port protocol to SNP and communicates to programmer. After disconnecting the programmer, the port will switch back to RTU protocol after 12 seconds. If any data is sent to Micro during this 12 second delay the micro port will be locked in the SNP mode and a power cycle is required to resume the operation. (Micro 20/40/64)

- *Analog Expansion Module Failures.* When an analog expansion module (IC200UEX616, IC200UEX626, IC200UEX636) fails, it drives a signal low, which in turn causes the loss of all other analog expansion units in the system. Discrete expansion units cabled after the first analog expansion unit will also be lost. This failure can also subsequently affect the operation of any discrete expansion units, should any of them later be powered down. Consult the user's manual, GFK-1645, for detailed troubleshooting instructions to be used in isolating expansion unit failures. (Micro 20/40/64)

- *DIP Switch Controls Analog Scaling Range.* DIP Switch SW6 on an analog expansion unit controls the maximum value for the unit's analog inputs and analog outputs as follows:

  SW6:　OFF $\Rightarrow$ 4096 (32767 counts = 10V)
  　　　ON　$\Rightarrow$ 4000 (32000 counts = 10V, 32767 counts = 10.23V)

  By default, DIP Switch SW6 should be set in the OFF position (32726 counts = 10V). (Micro 14/23/28/28 ESCP/20/40/64)

- *PWR LED Status on Analog Expansion Units.* On the analog expansion units (IC200UEX616, IC200UEX626, IC200UEX636), the PWR LED will be on if any other expansion unit or the CPU to which it is connected is powered up. This is due to a "power bleed" issue in the cabling to the unit. (Micro 20/40/64)

- *Input References Used by the High-speed Counter.* For all Nano and Micro PLCs that support High-speed Counters, input references %I489 - %I493 are reserved for the embedded HSC function, and are not available to the application program.

  Recommendation: Avoid using references %I489 - %I493 (which are located immediately before the rest of the HSC input references) in the application program.

- *High-speed Counter COMMREQs*: For all Nano and Micro PLC types that support High-speed Counters, when sending data commands to the High-speed Counter using the COMMREQ function, the CPU ignores the data type and start location parameters. These parameters specify where the command and data words are located in CPU memory. The CPU expects these three parameters to be located immediately after the command block.

  Recommendation: Be sure the command word and data words are located contiguously in memory, with the rest of the COMMREQ command block. They should immediately follow the "Start Location of Command Word" in the COMMREQ command block.

- *Hardware Flow Control:* For all Nano and Micro PLC CPUs, hardware flow control should only be configured if the Micro PLC will be used with a modem or other device that requires that functionality. In a point-to-point setup, configuring the units for hardware flow control may cause the units to fail to respond. The default setting is no flow control.

- *RTU Communications*: Micro-23, -28, and -64 PLC CPUs, RTU communications on port 2 are not reliable with large programs when scan times are above 140 milliseconds. Using Constant Sweep mode may improve communications by allowing a larger communications window at the end of the sweep.

- When uploading a configuration from the CPU to the Programmer, 8 and 16 point expansion units may show up in the configuration as other expansion modules, but with similar I/O sizes.

- *Serial Option Module Signal Pins*: Option Modules IC200USB001 and USB002 for Micro-20/40/64 PLCs do not contain RTS/CTS signal lines. These ports cannot be used with modems and repeaters that require hardware flow control.

- *Memory Option Module Write-Protect Switch*: The Memory Option module IC200UMB001 for Micro-20/40/64 CPUs has a Write-Protect switch. The default for this switch is to allow all write operations. If the switch is changed to prevent writing to the memory module, there is no feedback to the CPU that the write has not occurred. ***Use caution when changing this switch position.***

- *Communicating through USB*: When using the USB Option module with a 20/40/64 Point CPU, the Machine Edition configuration parameters for Port 2 should be left at their defaults: 19200, Odd parity, 1 stop bit, no flow control. These parameters match the FTDI USB driver configuration in Windows.

  Do not unplug the USB cable while communicating with the unit. Windows requires that the device to be stopped through the USB driver before disconnecting the cable.
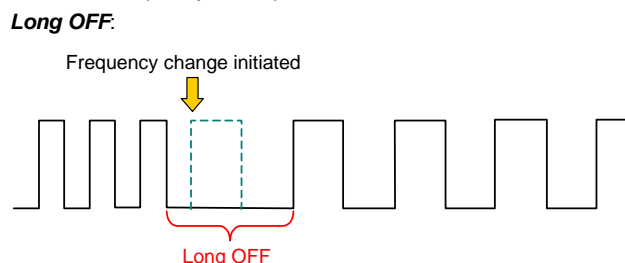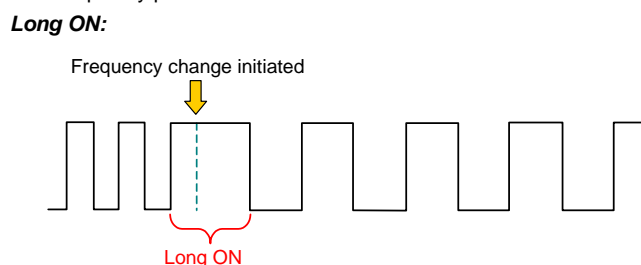
- *Logic-Driven Write to Flash*: Parameters stored to a Micro-14/23/28/20/40/64 CPU using the Logic Driven write to Flash feature are erased during a firmware upgrade.

- *Counter Disabled Functionality for PTO*: For all Nano and Micro PLC types that support High-speed Counters, when a channel is being configured for PTO or PTO w/Ramp, if the Counter Disabled parameter is visible in the programming software, it has no effect. Counter Disabled is only used for channels configured as Type A or B High-speed Counter.

- *Communication Timing at 4800* bps *and Lower:* For all Nano and Micro PLC CPUs, care must be taken setting timeouts and message lengths when operating at 4800 bps or lower. Messages at this rate are longer in duration, and may cause various timeouts within a system. This can become worse on the Micro-64 CPU because the scan times on this unit are typically slightly longer.

- *Monitoring Using Proficy Machine Edition*: When opening multiple monitoring windows in PME or VersaPro while *connected* to a CPU, one of the following error messages may be observed: "0x010D: Lost communication with COM server", or Monitoring Error: "Too many windows open." If this happens, close the error window; exit the PME application, and then reopen PME to resume monitoring. Disconnecting and reconnecting Machine Edition may solve the problem.

- *High-Speed Counter Signal Frequency*: For all Nano and Micro PLC types that support High-speed Counters, the timebase register does not provide consistent results when the HSC is used to measure signals of continuously varying frequency (the data values are not consistent). This does not happen while measuring a signal with constant frequency.

- *Shorting Signals on Port 2 Causes Reset*: On Micro-23, -28, and -64 PLC CPUs, a short on the 5V line on Port 2 causes the CPU to power off. Power returns when the short is removed.

- *Ethernet Option Module on Micro-20/40/64 CPU:* If four SRTP channels are active at the same time, communication does not take place on COM1, so the CPU cannot communicate with the Machine Edition programmer on COM1. Communications can take place on COM1 as long as not more than three SRTP channels are active.

- *Positive or negative transition coils in a jump region or a sub block:* If the application program includes any transition coils within a jump region, sub-block, or similar area, and the transition coils are not executed in the scans after the coils set their reference address, and the PLC is placed in Stop No I/O mode, the coils' reference will not respond as expected after a Clear Initial Values command. In such a situation, use the Clear All command instead.

- *Output Waveform During PWM Frequency Change*: During PWM frequency change, a Long OFF or Long ON may occur at the first pulse of the new frequency. Examples are illustrated below.

Long OFF:

Frequency change initiated

Long OFF

If the transition occurs while the pulse is OFF, the maximum time the output is OFF is equal to the old frequency OFF state duration plus the new frequency pulse duration.

Long ON:

Frequency change initiated

Long ON

If the transition occurs while the pulse is ON, the maximum time for which the output is ON is equal to the old frequency ON state duration plus the new frequency pulse duration. (Micro 20/40/64)

- *Compatibility with old PME (below version 6.0), and new firmware (3.83 or later) for Ethernet throughput enhancement.* Old PME allows data rates 300 through 38400 bps for the Ethernet option module on Port2. But the new firmware supports only 19200, 38400, and 175000 bps. When any data rate lower than 19200 bps is configured, communication with the Ethernet Option module is not guaranteed.

- *The RS-232/USB module is auto configured as an Ethernet Option module with SNP protocol and 175Kbps data rate.* Auto-configuration with these option modules connected will result in Port 2 being configured to 175000bps, which is not supported for these modules. To configure Port 2 to a valid data rate, connect to Port 1 and download a configuration with a valid data rate for Port 2.

- *Watchdog timeout during SVC_REQ 52:* When this service request is used to read the reference memory from flash when the size of the stored data is more than 35Kbytes, the watchdog expires. This happens because a stored block that exceeds 35K requires more than 200ms to search, which causes the watchdog timer to expire. It is recommended that, you limit the usage of user flash to a maximum of 35KB to avoid the watchdog expiration. This restriction applies to Micro 14, Micro 23, Micro 28 and Micro 28 ESCP models, which have 64KB of logic driven user flash.

- *Nano and Analog Nano models go to blink mode when a firmware update is aborted:* If the update is aborted (due to power failure or unplugging of serial communication cable) after downloading 2-3 blocks, the unit goes into blink mode after power cycling. (The OK LED blinks continuously.) To return the PLC to normal operation, power cycle the unit with the external RUN/STOP switch in RUN mode.

- *Serial to Ethernet Adapter Module IC200SET001: data rate for serial I/O*. If two VersaMax Micro CPUs will exchange data via Serial to Ethernet Adapter Modules (IC200SET001), and they will use Serial I/O Protocol, the data rate for the modules must be less than 38400 bps. For a Micro-20/40/64 CPU, this problem can be avoided by using an Ethernet Option Module instead of the Serial to Ethernet Adapter module.

Installation in Hazardous Locations

- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

- WARNING - EXPLOSION HAZARD - DO NOT REPLACE MODULES UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT CABLE UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

- WARNING: FIRE, EXPLOSION, AND SEVERE BURN HAZARD. DO NOT RECHARGE, DISASSEMBLE, HEAT ABOVE 212°F (100°C), INCINERATE, OR EXPOSE CONTENTS TO WATER.

- RECOMMENDATION - IF PLC IS USED IN CHEMICAL ENVIRONMENT, IT COULD AFFECT AND DEGRADE RELAY DEVICES. IT IS RECOMMENDED TO INSPECT THE SEALED RELAY DEVICE PERIODICALLY AND TO CHECK FOR ANY DEGRADATION OF THE MATERIALS AND TO REPLACE THE COMPLETE PRODUCT, NOT THE SEALED DEVICE, IF ANY DEGRADATION IS FOUND.