



# Errata Sheet

This Errata Sheet contains corrections or changes made after the publication of this manual.

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**Product Family:** DL405 **Date:** December 11, 2018  
**Manual Number:** D4-USER-M  
**Revision and Date:** 4th Edition, Rev. A; March 2013

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## Changes to Chapter 2. Installation, Wiring, and Specifications

Page 2-4. Safety Guidelines; Class 1, Division 2 Approval

*Delete this section, including the two warnings. The DL405 system is NOT Class 1, Division 2 approved.*

Page 2-44. D4-32TD1-1, 5-15VDC Output

*Add the following NOTE to the specifications table for this module:*

**NOTE:**The D4-32TD1-1 module operates on reverse logic. Voltage is present when Output is Off; no voltage is present when output is On.

## Changes to Chapter 4. System Design and Configuration

Page 4-8. Calculating the Power Budget; Module Power Requirements

*Change the "5V Current Required (mA)" values in the table for these analog modules:*

*F4-04AD: Change from 85 mA to 150 mA*

*F4-04ADS: Change from 270 mA to 370 mA*

Page 4-18. Network Connections to MODBUS and DirectNET; Configuring the CPU's Comm Ports

*Change the NOTE near the bottom of the page to say:*

*NOTE: The recommended cable for RS-232 and RS-422 is AutomationDirect L19772-1 (Belden 8102) or equivalent.*

## Changes to Chapter 5. Standard RLL Instructions; Accumulator Logic Instructions

Page 5-85. Compare with Stack (CMPS)

*The table below has more accurate descriptions for the discrete bit flags than the descriptions in the manual:*

Discrete Bit Flags	Description
SP60	On when the value in the Accumulator is less than the first level value in the Accumulator Stack.
SP61	On when the value in the Accumulator is equal to the first level value in the Accumulator Stack.
SP62	On when the value in the Accumulator is greater than the first level value in the Accumulator Stack.



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## Changes to Chapter 8. PID Loop Operation (DL450 only)

Page 8-36. Monitor Limit Alarms. Add the following note at the end of this page:



**NOTE:** PID deviation alarm only works in Auto mode.

## Changes to Chapter 9. Maintenance and Troubleshooting

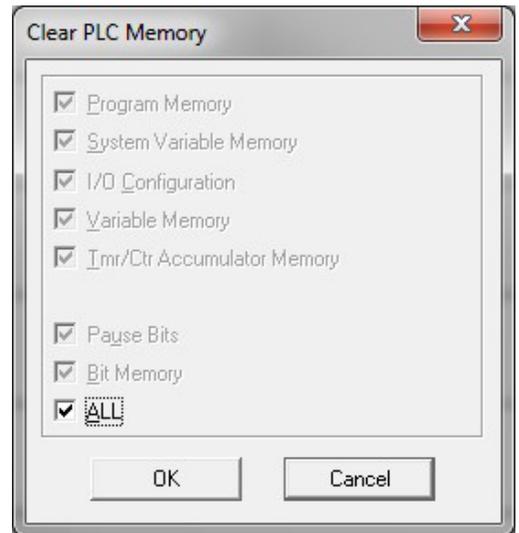
Page 9-26. Add the following to the end of this chapter (right after BREAK Instruction placement):

### Reset the PLC to Factory Defaults

**NOTE:** Resetting to factory defaults will not clear any password stored in the PLC.

Resetting a DirectLogic PLC to Factory Defaults is a two-step process. Be sure to have a verified backup of your program using “Save Project to Disk” from the File menu before performing this procedure. Please be aware that the program as well as any settings will be erased and not all settings are stored in the project. In particular you will need to write down any settings for Secondary Communications Ports and manually set the ports up after resetting the PLC to factory defaults.

Step 1 – While connected to the PLC with DirectSoft, go to the PLC menu and select; “Clear PLC Memory”. Check the “ALL” box at the bottom of the list and press “OK”.



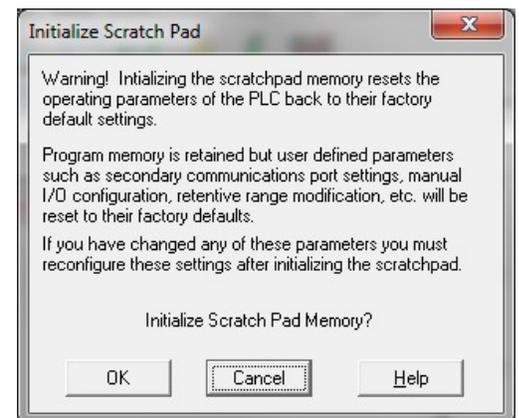
Step 2 – While connected with DirectSoft, go the PLC menu and then to the “Setup” submenu and select “Initialize Scratch Pad”. Press “Ok”.

**NOTE:** All configurable communications ports will be reset to factory default state. If you are connected via Port 2 or another configurable port, you may be disconnected when this operation is complete.

**NOTE:** Retentive ranges will be reset to the factory settings.

**NOTE:** Manually addressed IO will be reset to factory default settings.

The PLC has now been reset to factory defaults and you can proceed to program the PLC.





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## Changes to Appendix I. European Union Directives (CE)

Page I-4. Special Installation Manual

*Delete this section. Manual D-EU-M is no longer available. Instead, refer to the websites listed below:*

Page I-4: Other Sources of Information

*Replace the text that follows the sentence "It may be possible to obtain this information locally; however, the official source of applicable Directives and related standards is:" with the following updated information:*

Publications Office

2, rue Mercier

2985 Luxembourg

LUXEMBOURG

Quickest contact is via the web at:

<http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards>

Another source is the British Standards Institution at:

British Standards Institution – Sales Department, Linford Wood:

Milton Keynes, MK14 6LE, United Kingdom.

The quickest contact is via the web at <http://www.bsigroup.com>

Another source is

The 'Blue Guide' on the implementation of EU product rules 2016

[https://ec.europa.eu/commission/index\\_en](https://ec.europa.eu/commission/index_en)

Page I-10. Items Specific to the DL405

*Ignore the reference to manual D-EU-M in the first paragraph of this section. That manual is no longer available. See the websites listed above.*

# European Union Directives (CE)

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In This Appendix. . . .

- European Union (EU) Directives
- Basic EMC Installation Guidelines

## European Union (EU) Directives



**NOTE:** The information contained in this section is intended as a guideline and is based on our interpretation of the various standards and requirements. Since the actual standards are issued by other parties and in some cases Governmental agencies, the requirements can change over time without advance warning or notice. Changes or additions to the standards can possibly invalidate any part of the information provided in this section.

This area of certification and approval is absolutely vital to anyone who wants to do business in Europe. One of the key tasks that faced the EU member countries and the European Economic Area (EEA) was the requirement to harmonize several similar yet distinct standards together into one common standard for all members. The primary purpose of a harmonized standard was to make it easier to sell and transport goods between the various countries and to maintain a safe working and living environment. The Directives that resulted from this merging of standards are now legal requirements for doing business in Europe. Products that meet these Directives are required to have a CE mark to signify compliance.

### Member Countries

As of January 1, 2007, the members of the EU are Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. Iceland, Liechtenstein, and Norway together with the EU members make up the European Economic Area (EEA) and all are covered by the Directives.

### Applicable Directives

There are several Directives that apply to our products. Directives may be amended, or added, as required.

**Electromagnetic Compatibility Directive (EMC)** — this Directive attempts to ensure that devices, equipment, and systems have the ability to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to anything in that environment.

**Machinery Safety Directive** — this Directive covers the safety aspects of the equipment, installation, etc. There are several areas involved, including testing standards covering both electrical noise immunity and noise generation.

**Low Voltage Directive** — this Directive is also safety related and covers electrical equipment that has voltage ranges of 50-1000VAC and/or 75-1500VDC.

**Battery Directive** — this Directive covers the production, recycling, and disposal of batteries.

### Compliance

Certain standards within each Directive already require mandatory compliance. The EMC Directive, which has gained the most attention, became mandatory as of January 1, 1996. The Low Voltage Directive became mandatory as of January 1, 1997.

Ultimately, we are all responsible for our various pieces of the puzzle. As manufacturers, we must test our products and document any test results and/or

installation procedures that are necessary to comply with the Directives. As a machine builder, you are responsible for installing the products in a manner which will ensure compliance is maintained. You are also responsible for testing any combinations of products that may (or may not) comply with the Directives when used together. The end user of the products must comply with any Directives that may cover maintenance, disposal, etc. of equipment or various components. *Although we strive to provide the best assistance available, it is impossible for us to test all possible configurations of our products with respect to any specific Directive. Because of this, it is ultimately your responsibility to ensure that your machinery (as a whole) complies with these Directives and to keep up with applicable Directives and/or practices that are required for compliance.*

As of January 1, 1999, the DL05, DL06 DL205, DL305, and DL405 PLC systems manufactured by either Koyo Electronics Industries, FACTS Engineering or Host Engineering, when properly installed and used, conform to the Electromagnetic Compatibility (EMC) and Low Voltage Directive requirements of the following standards.

#### **EMC Directive Standards Relevant to PLCs**

- EN50081-1 Generic immunity standard for residential, commercial, and light industry
- EN50081-2 Generic emission standard for industrial environment.
- EN50082-1 Generic immunity standard for residential, commercial, and light industry
- EN50082-2 Generic immunity standard for industrial environment.

#### **Low Voltage Directive Standards Applicable to PLCs**

- EN61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.

#### **Product Specific Standard for PLCs**

- EN61131-2 Programmable controllers, equipment requirements and tests. This standard replaces the above generic standards for immunity and safety. However, the generic emissions standards must still be used in conjunction with the following standards:
  - EN 61000-3-2—Harmonics
  - EN 61000-3-2—Fluctuations

#### **Warning on Electrostatic Discharge (ESD)**

We recommend that all personnel take necessary precautions to avoid the risk of transferring static charges to the inside of the control cabinet, and clear warnings and instructions should be provided on the cabinet exterior. Such precautions may include the use of earth straps, similar devices or the powering down of the equipment inside the enclosure before the door is opened.

#### **Warning on Radio Interference (RFI)**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

**General Safety**

External switches, circuit breakers or external fusing, are required for these devices.

The switch or circuit breaker should be mounted near the PLC equipment.

AutomationDirect is currently in the process of changing their testing procedures from the generic standards to the product specific standards.

**Special Installation Manual**

See Errata Sheet at the beginning of this file. Manual DA-EU-M is no longer available.

The installation requirements to comply with the requirements of the Machinery Directive, EMC Directive and Low Voltage Directive are slightly more complex than the normal installation requirements found in the United States. To help with this, we have published a special manual which you can order:

~~DA-EU-M This is an EU Installation Manual that covers special installation requirements to meet the EU Directive requirements. Order this manual to obtain the most up to date information.~~

**Other Sources of Information**

Although the EMC Directive gets the most attention, other basic Directives, such as the Machinery Directive and the Low Voltage Directive, also place restrictions on the control panel builder. Because of these additional requirements it is recommended that the following publications be purchased and used as guidelines:

BSI publication TH 42073: February 1996 - covers the safety and electrical aspects of the Machinery Directive

EN 60204-1:1992 - General electrical requirements for machinery, including Low Voltage and EMC considerations

IEC 1000-5-2: EMC earthing and cabling requirements

IEC 1000-5-1: EMC general considerations

It may be possible for you to obtain this information locally; however, the official source of applicable Directives and related standards is:

~~The Office for Official Publications of the European Communities L-2985 Luxembourg; quickest contact is via the World Wide Web at <http://euro-op.eu.int/indexn.htm>~~

~~Another source is:~~

~~British Standards Institution - Sales Department  
Linford Wood  
Milton Keynes  
MK14 6LE~~

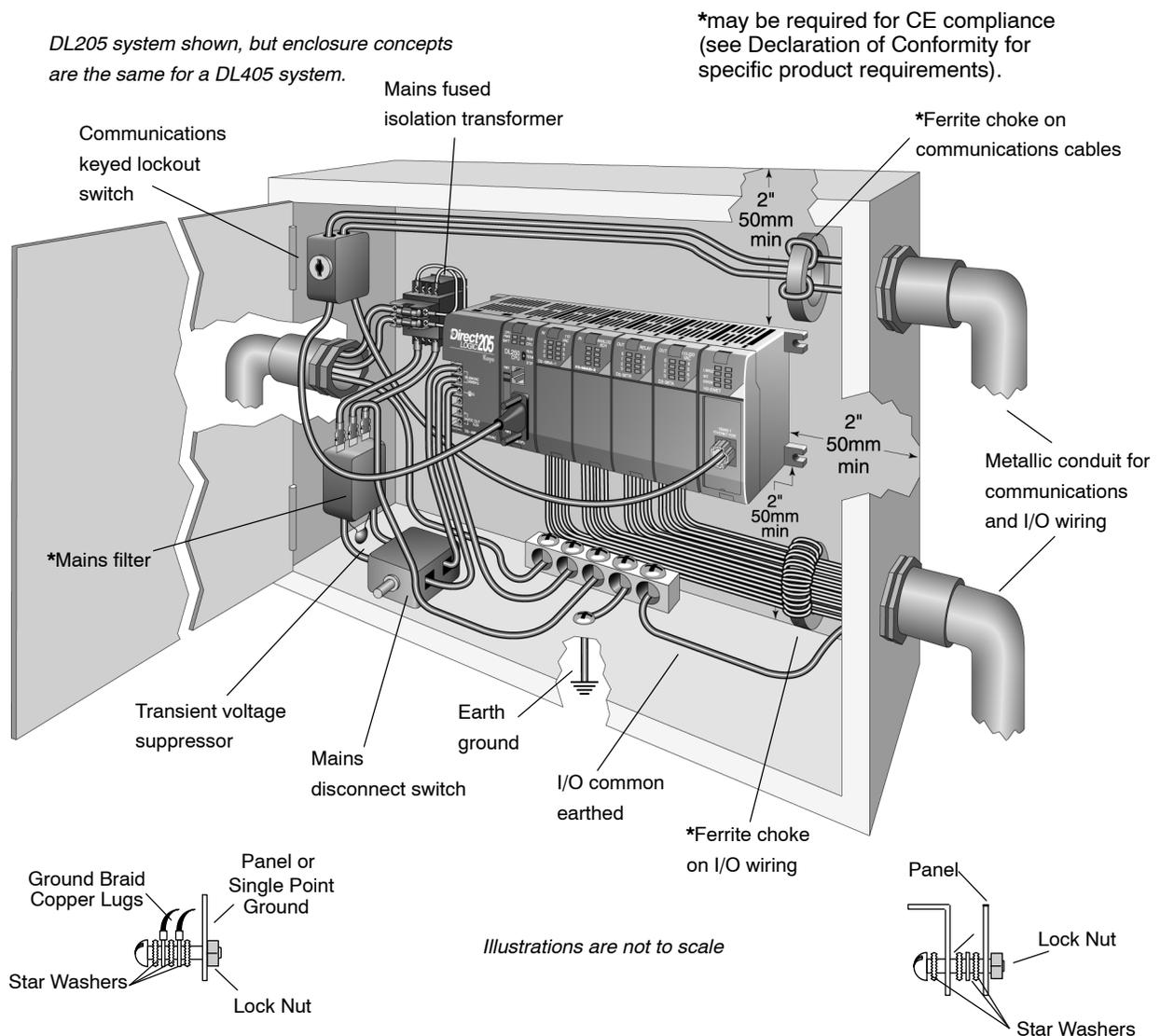
~~United Kingdom: the quickest contact is via the internet at <http://www.bsi.org.uk>~~

See Errata Sheet at the beginning of this file. Replace the text in this box with the updated website urls and information provided.

# Basic EMC Installation Guidelines

## Enclosures

The simplest way to meet the safety requirements of the Machinery and Low Voltage Directives is to house all control equipment in an industry standard lockable steel enclosure. This normally has an added benefit because it will also help ensure that the EMC characteristics are well within the requirements of the EMC Directive. Although the RF emissions from the PLC equipment, when measured in the open air, are below the EMC Directive limits, certain configurations can increase emission levels. Holes in the enclosure, for the passage of cables or to mount operator interfaces, will often increase emissions.



Appendix I  
EU Directives

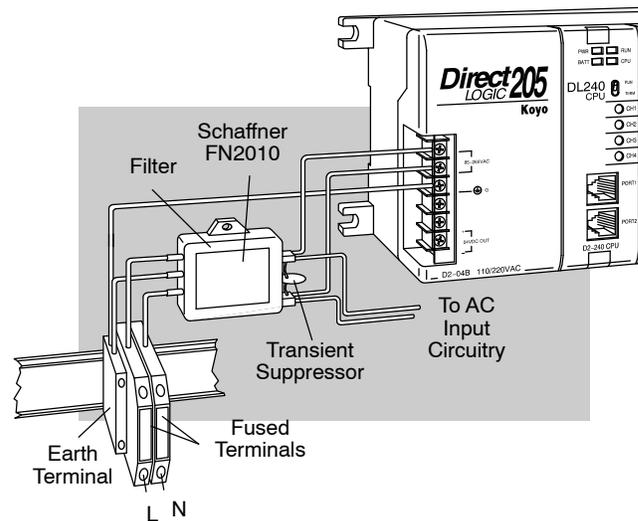
## Electrostatic Discharge (ESD)

We specify in all declarations of conformity that our products are installed inside an industrial enclosure using metallic conduit for external wire runs; therefore, we test the products in a typical enclosure. However, we would like to point out that although our products operate normally in the presence of ESD, this is only the case when mounted within an enclosed industrial control cabinet. When the cabinet is open during installation or maintenance, the equipment and or programs may be at risk of damage from ESD carried by personnel.

We therefore recommend that all personnel take necessary precautions to avoid the risk of transferring static electricity to components inside the control cabinet. If necessary, clear warnings and instructions should be provided on the cabinet exterior, such as recommending the use of earth straps or similar devices, or the powering off of equipment inside the enclosure.

## AC Mains Filters

The DL205 and DL305 AC powered base power supplies require extra mains filtering to comply with the EMC Directive on conducted RF emissions. All PLC equipment has been tested with filters from Schaffner, which reduce emissions levels if the filters are properly grounded (earth ground). A filter with a current rating suitable to supply all PLC power supplies and AC input modules should be selected. We suggest the FN2010 for the DL205 systems and the FN2080 for DL305 systems. The DL05, DL06 and DL405 systems do not require extra filtering.



**NOTE:** Very few mains filters can reduce problem emissions to negligible levels. In some cases, filters may increase conducted emissions if not properly matched to the problem emissions.

## Suppression and Fusing

In order to comply with the fire risk requirements of the Low Voltage and Machinery Directive electrical standards EN 61010-1, and EN 60204-1, by limiting the power into “unlimited” mains circuits with power leads reversed, it is necessary to fuse both AC and DC supply inputs. You should also install a transient voltage suppressor across the power input connections of the PLC. Choose a suppressor such as a metal oxide varistor, with a rating of 275VAC working voltage for 230V nominal supplies (150VAC working voltage for 115V supplies) and high energy capacity (eg. 140 joules).

Transient suppressors must be protected by fuses and the capacity of the transient suppressor must be greater than the blow characteristics of the fuses or circuit breakers to avoid a fire risk. A recommended AC supply input arrangement for Koyo PLCs is to use twin 3 amp TT fused terminals with fuse blown indication, such as DINnectors DN-F10L terminals, or twin circuit breakers, wired to a Schaffner FN2010 filter or equivalent, with high energy transient suppressor soldered directly across the

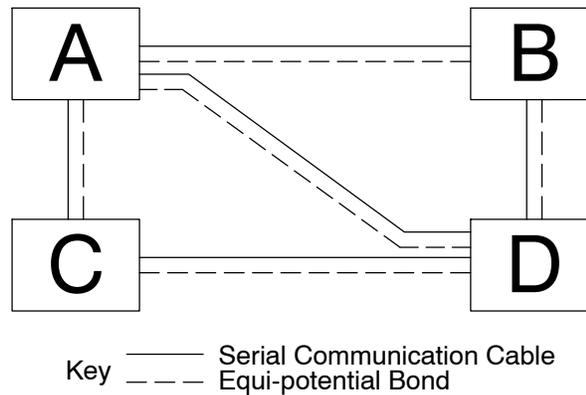


output terminals of the filter. PLC system inputs should also be protected from voltage impulses by deriving their power from the same fused, filtered, and surge-suppressed supply.

### Internal Enclosure Grounding

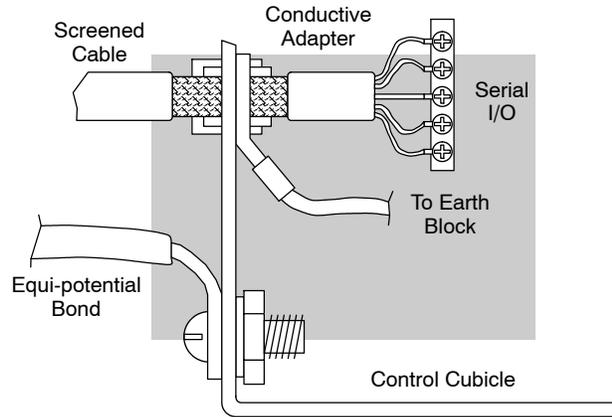
A heavy-duty star earth terminal block should be provided in every cubicle for the connection of all earth ground straps, protective earth ground connections, mains filter earth ground wires, and mechanical assembly earth ground connections. This should be installed to comply with safety and EMC requirements, local standards, and the requirements found in IEC 1000-5-2. The Machinery Directive also requires that the common terminals of PLC input modules, and common supply side of loads driven from PLC output modules should be connected to the protective earth ground terminal.

### Equi-potential Grounding



Adequate site earth grounding must be provided for equipment containing modern electronic circuitry. The use of isolated earth electrodes for electronic systems is forbidden in some countries. Make sure you check any requirements for your particular destination. IEC 1000-5-2 covers equi-potential bonding of earth grids adequately, but special attention should be given to apparatus and control cubicles that contain I/O devices, remote I/O racks, or have inter-system communications with the primary PLC system enclosure. An equi-potential bond wire must be provided alongside all serial communications cables, and to any separate items of the plant which contain I/O devices connected to the PLC. The diagram shows an example of four physical locations connected by a communications cable.

## Communications and Shielded Cables



Good quality 24 AWG minimum twisted-pair shielded cables, with overall foil and braid shields are recommended for analog cabling and communications cabling outside of the PLC enclosure. To date, it has been a common practice to only provide an earth ground for one end of the cable shield in order to minimize the risk of noise caused by earth ground loop currents between apparatus. The procedure of only grounding one end, which primarily originated as a result of trying to reduce hum in audio systems, is no longer applicable to the complex industrial environment. Shielded cables are also efficient emitters of RF noise from the PLC system, and can interact in a parasitic manner in networks and between multiple sources of interference.

The recommendation is to use shielded cables as electrostatic “pipes” between apparatus and systems, and to run heavy gauge equi-potential bond wires alongside all shielded cables. When a shielded cable runs through the metallic wall of an enclosure or machine, it is recommended in IEC 1000-5-2 that the shield should be connected over its full perimeter to the wall, preferably using a conducting adapter, and not via a pigtail wire connection to an earth ground bolt. Shields must be connected to every enclosure wall or machine cover that they pass through.

**NOTE:** Cables, whether shielded or not, connecting to the following modules **MUST** be enclosed within earthed metal conduit or other metallic trunking when outside the PLC enclosure: H4-EBC, H4-ECOM, F4-CPxxx-x and F4-SDS.

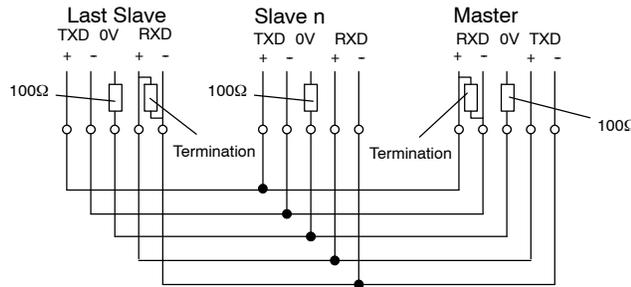


### Analog and RS232 Cables

Providing an earth ground for both ends of the shield for analog circuits provides the perfect electrical environment for the twisted pair cable as the loop consists of signal and return, in a perfectly balanced circuit arrangement, with connection to the common of the input circuitry made at the module terminals. RS232 cables are handled in the same way.

**Multidrop Cables**

RS422 twin twisted pair, and RS485 single twisted pair cables also require a 0V link, which has often been provided in the past by the cable shield. It is now recommended that you use triple twisted pair cabling for RS422 links, and twin twisted pair cable for RS485 links. This is because the extra pair can be used as the 0V inter-system link. With loop DC power supplies earth grounded in both systems, earth loops are created in this manner via the inter-system 0v link. The installation guides encourage earth loops, which are maintained at a low impedance by using heavy equi-potential bond wires. **To account for non-European installations using single-end earth grounds, and sites with far from ideal earth ground characteristics, we recommend the addition of 100 ohm resistors at each 0V link connection in network and communications cables.**



**Shielded Cables within Enclosures**

When you run cables between PLC items within an enclosure which also contains susceptible electronic equipment from other manufacturers, remember that these cables may be a source of RF emissions. There are ways to minimize this risk. Standard data cables connecting PLCs and/or operator interfaces should be routed well away from other equipment and their associated cabling. You can make special serial cables where the cable shield is connected to the enclosure's earth ground at both ends, the same way as external cables are connected.

**Additional Caution about RF Interference to Analog Modules**

The readings from all analog modules can be affected by the use of devices that exhibit high field strengths such as mobile phones and motor drives. All AutomationDirect products are tested to withstand field strength levels up to 10V/m. which is the maximum required by the relevant EU standards. While all products pass this test, analog modules will typically exhibit deviations of their readings. This is quite normal, however, systems designers should be aware of this and plan accordingly.

When assembling a control system using analog modules, these issues must be adhered to and should be integrated into the system design. This is the responsibility of the system builder/commissioner.

**Network Isolation**

For safety reasons, it is a specific requirement of the Machinery Directive that a keyswitch must be provided that isolates any network input signal during maintenance, so that remote commands cannot be received that could result in the operation of the machinery. The FA-ISOCAN does not have a keyswitch! Use a keylock and switch on your enclosure which when open removes power from the FA-ISOCAN. To avoid the introduction of noise into the system, any keyswitch assembly should be housed in its own earth grounded steel box and the integrity of the shielded cable must be maintained.

Again, for further information on EU directives we recommend that you get a copy of our EU Installation Manual (DA-EU-M). Also, if you connect to the World Wide Web, you can check the EU Commission's official website at: [http://ec.europa.eu/index\\_en.htm](http://ec.europa.eu/index_en.htm).

**DC Powered Versions**

Due to slightly higher emissions radiated by the DC powered versions of the DL405, and the differing emissions performance for the different DC supply voltages, the following stipulations must be met:

The PLC must be housed within a metallic enclosure with a minimum amount of orifices.

I/O and communications cabling existing in the cabinet must be contained within metallic conduit/trunking.

**Items Specific to the DL405**

See Errata Sheet at the beginning of this file. Manual DA-EU-M is no longer available. Refer to the websites listed on the Errata Sheet for installation information.

This equipment must be properly installed ~~while adhering to the guidelines of the PLC installation manual DA-EU-M,~~ and is suitable for EN 61010-1 installation categories 1 or 2.

The rating between all circuits in this product are rated as **basic insulation only**, as appropriate for single fault conditions.

The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer.

It is the responsibility of the system designer to earth one side of all control and power circuits, and to earth the braid of screened cables.

Input power cables must be externally fused and have an externally mounted switch or circuit breaker, preferably mounted near the PLC.

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**NOTE:** The DL405 internal base power supply has a 2A@250V slow blow fuse; however, it is not replaceable, so external fusing is required.

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When needed, carefully clean the outside plastic case of PLC components using a dry cloth.

For hardware maintenance instructions, see the Maintenance and Troubleshooting section in this manual. This section also includes battery replacement information. Also, only replacement parts supplied by **Automationdirect.com** or its agents should be used.

