

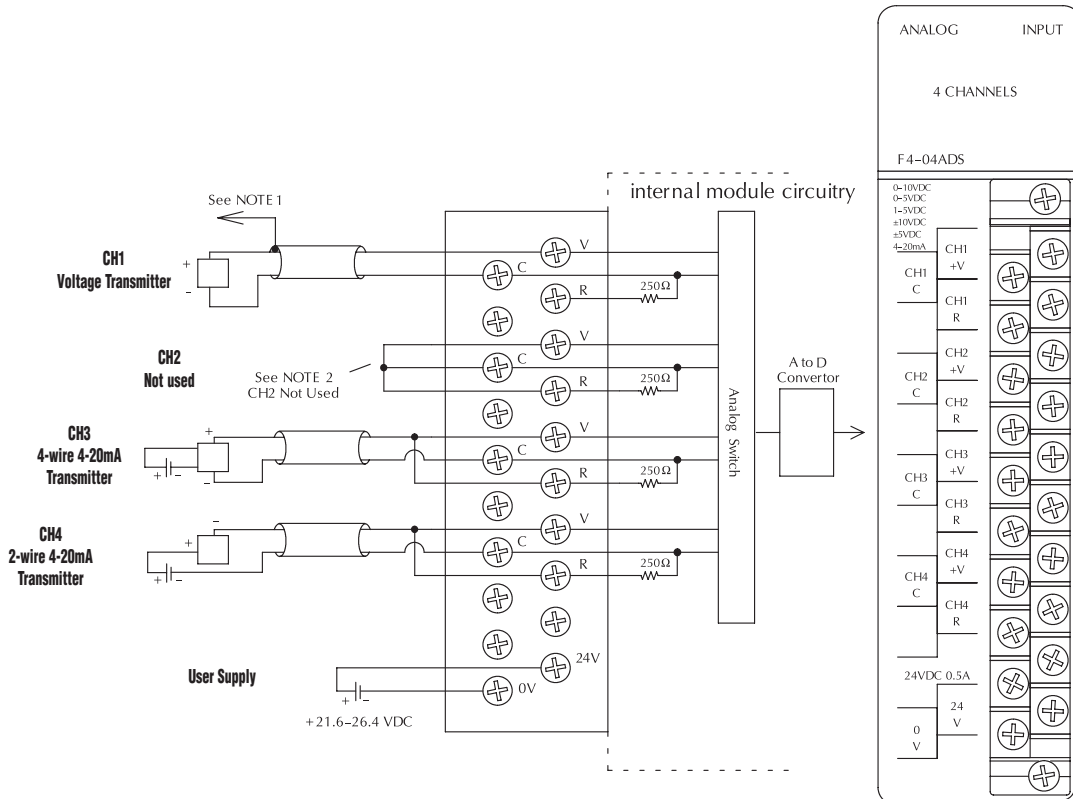
Analog Input Modules

| F4-04ADS 4-Channel Isolated Analog Input | |
|---|---|
| Number of Channels | 4 |
| Input Ranges | 0–5 V, 0–10 V, 1–5 V, ±5V, ±10V 0–20 mA, 4–20 mA |
| Channels Individually Configurable | Yes |
| Resolution | 12 bit (1 to 4,096) |
| Conversion Method | Successive Approximation |
| Input Type | Differential |
| Max. Common Mode Voltage | ± 750V peak continuous transformer isolation |
| Noise Rejection Ratio | Common mode: -100dB @ 60Hz |
| Active Low-pass Filtering | -3dB at 20Hz, -12 dB per octave |
| Input Impedance | 250Ω ± 0.1%, 1/2W current input 200kΩ voltage point |
| Absolute Maximum Ratings | -45mA to + 45mA, current input ± 100V voltage input |
| Conversion Time | 1ms per selected channel |
| Linearity Error: unipolar bipolar | ± 1 count (0.025% of full scale) max. ± 2 counts (0.025% of full scale) max. |
| Full Scale Calibration Error | ± 8 counts maximum (V _{in} = 20mA) |
| Offset Calibration Error | ± 8 counts maximum (V _{in} = 4mA) |

| | |
|--------------------------------------|--|
| PLC Update Rate | 1 channel per scan |
| Digital Input Points Required | 16 (X) input points (12 binary data bits, 4 active channel indicator bits) |
| Accuracy vs Temperature | ± 100 ppm/°C maximum full scale (including maximum offset) |
| Terminal Type (included) | Removable |
| Base Power Required 5V | 370mA |
| External Power Supply | 24VDC, ± 10%, 120mA, class 2 |
| Recommended Fuse | 0.032 A, Series 217 fast-acting, current inputs |
| Operating Temperature | 32° to 140°F (0 to 60°C) |
| Accuracy vs. Temperature | ±100ppm /°C maximum full scale (including maximum offset) |
| Storage Temperature | -4 to 158°F (-20 to 70°C) |
| Relative Humidity | 5 to 95% (non-condensing) |
| Environmental Air | No corrosive gases permitted |
| Vibration | MIL STD 810C 514.2 |
| Shock | MIL STD 810C 516.2 |
| Noise Immunity | NEMA ICS3-304 |

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4,096).
NOTE 1: Shields should be grounded at signal source
NOTE 2: Unused channels should have V & C & R of the channels jumpered

See Wiring Solutions for part numbers of ZIPLink cables and connection modules compatible with this I/O module.



Check the Power Budget

Verify your power budget requirements

Your I/O configuration choice can be affected by the power requirements of the I/O modules you choose. When determining the types and quantity of I/O modules you will be using, it is important to remember there is a limited amount of power available from the power supply.

The chart on the opposite page indicates the power supplied and used by each DL405 device. The adjacent chart shows an example of how to calculate the power used by your particular system. These two charts should make it easy for you to determine if the devices you have chosen fit within the power budget of your system configuration.

If the I/O you have chosen exceeds the maximum power available from the power supply, you can resolve the problem by shifting some of the modules to an expansion base or remote I/O base (if you are using remote I/O).

Warning: It is extremely important to calculate the power budget correctly. If you exceed the power budget, the system may operate in an unpredictable manner which may result in a risk of personal injury or equipment damage.

Use ZIPLinks to reduce power requirements

If your application requires a lot of relay outputs, consider using the ZIPLink AC or DC relay output modules. These modules can switch high current (10A) loads without putting a load on your base power budget. Refer to Wiring System for DL405 PLCs later in this section for more information.

This logo is placed next to I/O modules that are supported by the ZIPLink connection systems.

See the I/O module specifications at the end of this section.



Calculating your power usage

The following example shows how to calculate the power budget for the DL405 system. The example is constructed around a single 8-slot base using the devices shown. It is recommended you construct a similar table for each base in your system.

| A | | | | |
|----------|---|--------------------|----------------------|-----------------------------------|
| | Base Number 0 | Device Type | 5 VDC (mA) | External 24 VDC Power (mA) |
| B | CURRENT SUPPLIED | | | |
| | CPU/Expansion Unit /Remote Slave | D4-454 CPU | 3700 | 400 |
| C | CURRENT REQUIRED | | | |
| | SLOT 0 | D4-16ND2 | +150 | +0 |
| | SLOT 1 | D4-16ND2 | +150 | +0 |
| | SLOT 2 | F4-04DA | +120 | +100 |
| | SLOT 3 | D4-08NA | +100 | +0 |
| | SLOT 4 | D4-08NA | +100 | +0 |
| | SLOT 5 | D4-16TD2 | +100 | +0 |
| | SLOT 6 | D4-16TD2 | +100 | +0 |
| | SLOT 7 | D4-16TR | +1000 | +0 |
| D | OTHER | | | |
| | BASE | D4-08B-1 | +80 | +0 |
| | Handheld Programmer | D4-HPP-1 | +320 | +0 |
| E | Maximum Current Required | | 2820 | 100 |
| F | Remaining Current Available | | 3700-2820=880 | 400-100=300 |
| | 1. Using a chart similar to the one above, fill in column 2. 2. Using the tables on the opposite page, enter the current supplied and used by each device (columns 3 and 4). Pay special attention to the current supplied by the CPU, Expansion Unit, and Remote Slave since they differ. Devices which fall into the "Other" category (Row D) are devices such as the Base and the Handheld programmer, which also have power requirements, but do not plug directly into the base. 3. Add the current used by the system devices (columns 3 and 4) starting with Slot 0 and put the total in the row labeled "maximum current required" (Row E). 4. Subtract the row labeled "Maximum current required" (Row E), from the row labeled "Current Supplied" (Row B). Place the difference in the row labeled "Remaining Current Available" (Row F). 5. If "Maximum Current Required" is greater than "Current Supplied" in either column 3 or 4, the power budget will be exceeded. It will be unsafe to use this configuration and you will need to restructure your I/O configuration. Note the auxiliary 24VDC power supply does not need to supply all the external power. If you need more than the 400mA supplied, you can add an external 24VDC power supply. This will help keep you within your power budget for external power. | | | |

DL405 CPU power supply specifications and power requirements

| Specification | AC Powered Units | 24 VDC Powered Units |
|---------------------------------------|--|--|
| Part Numbers | D4-454, D4-EX (expansion base unit), D4-RS (remote slave unit) | D4-454DC-1, D4-EXDC (expansion base unit) |
| Voltage Withstand (dielectric) | 1 minute @ 1,500 VAC between primary, secondary, field ground, and run relay | |
| Insulation Resistance | > 10MΩ at 500VDC | |
| Input Voltage Range | 85-132 VAC (110V range) 170-264 VAC (220V range) | 20-28 VDC (24VDC) with less than 10% ripple |
| Maximum Inrush Current | 20A | 20A |
| Maximum Power | 50VA | 38W |

Power Requirements

| Power Supplied | | | | | |
|--|---|---|--|--|---|
| <i>CPUs/Remote Units/ Expansion Units</i> | <i>5 VDC Current Supplied in mA</i> | <i>24V Aux Power Supplied in mA</i> | <i>CPUs/Remote Units/ Expansion Units</i> | <i>5V Current Supplied in mA</i> | <i>24V Aux Power Supplied in mA</i> |
| D4-454 CPU D4-454DC-1 | 3100 3100 | 400 NONE | D4-EX D4-EXDC D4-RS H4-EBC | 4000 4000 3700 3470 | 400 NONE 400 400 |
| Power Consumed | | | | | |
| <i>Power-consuming Device</i> | <i>5V Current Consumed</i> | <i>External 24VDC Current Required</i> | <i>Power-consuming Device</i> | <i>5V Current Consumed</i> | <i>External 24VDC Current Required</i> |
| <i>I/O Bases</i> | | | <i>Analog Modules (continued)</i> | | |
| D4-04B-1 D4-06B-1 D4-08B-1 | 80 80 80 | NONE NONE NONE | F4-16AD-1 F4-16AD-2 F4-04DA-1 F4-04DA-2 F4-04DAS-1 F4-08DA-1 F4-08DA-2 F4-16DA-1 F4-16DA-2 F4-08RTD F4-08THM-n F4-08THM | 75 75 70 90 60 90 80 90 80 80 120 110 | 100 100 75+20 per circuit 90 60 per circuit 100+20 per circuit 150 100+20 per circuit 25 max. NONE 50 60 |
| <i>DC Input Modules</i> | | | <i>Remote I/O</i> | | |
| D4-16ND2 D4-16ND2F D4-32ND3-1 D4-64ND2 | 150 150 150 300 max. | NONE NONE NONE NONE | H4-ERM100 H4-ERM-F D4-RM | 320(300) 450 300 | NONE NONE NONE |
| <i>AC Input Modules</i> | | | <i>Communications and Networking</i> | | |
| D4-08NA D4-16NA | 100 150 | NONE NONE | H4-ECOM100 D4-DCM F4-MAS-MB | 300 500 235 | NONE NONE NONE |
| <i>AC/DC Input Modules</i> | | | <i>CoProcessors</i> | | |
| D4-16NE3 | 150 | NONE | F4-CP128-1 | 305 | NONE |
| <i>DC Output Modules</i> | | | <i>Specialty Modules</i> | | |
| D4-16TD1 D4-16TD2 D4-32TD1 D4-32TD2 D4-64TD1 | 200 400 250 350 800 | 125 NONE 140 120 (4A max including loads) NONE | H4-CTRIO D4-16SIM F4-4LTC | 400 150 280 | NONE NONE 75 |
| <i>AC Output Modules</i> | | | <i>Programming</i> | | |
| D4-08TA D4-16TA | 250 450 | NONE NONE | D4-HPP-1 (Handheld Prog.) | 320 | NONE |
| <i>Relay Output Modules</i> | | | <i>Operator Interface</i> | | |
| D4-08TR F4-08TRS-1 F4-08TRS-2 D4-16TR | 550 575 575 1000 | NONE NONE NONE NONE | DV-1000 | 150 | NONE |
| <i>Analog Modules</i> | | | C-more Micro-Graphic | 210 | NONE |
| F4-04AD F4-04ADS F4-08AD | 150 370 75 | 100 120 90 | | | |

Wiring Solutions using the ZIPLink Wiring System

ZIPLinks eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using half the space at a fraction of the cost of standard terminal blocks. There are several wiring

solutions available when using the ZIPLink System ranging from PLC I/O-to-ZIPLink Connector Modules that are ready for field termination, options for connecting to third party devices, GS, DuraPulse and SureServo Drives, and specialty relay, transorb and communications modules. Pre-printed I/O-specific adhesive label strips for quick marking of ZIPLink modules are provided with ZIPLink cables. See the following solutions to help determine the best ZIPLink system for your application.

Solution 1: DirectLOGIC I/O Modules to ZIPLink Connector Modules

When looking for quick and easy I/O-to-field termination, a ZIPLink connector module used in conjunction with a prewired ZIPLink cable, consisting of an I/O terminal block at one end and a multi-pin connector at the other end, is the best solution.

Using the PLC I/O Modules to ZIPLink Connector Modules selector tables located in this section,

1. Locate your I/O module/PLC.
2. Select a ZIPLink Module.
3. Select a corresponding ZIPLink Cable.



Solution 2: DirectLOGIC I/O Modules to 3rd Party Devices

When wanting to connect I/O to another device within close proximity of the I/O modules, no extra terminal blocks are necessary when using the ZIPLink Pigtail Cables. ZIPLink Pigtail Cables are prewired to an I/O terminal block with color-coded pigtail with soldered-tip wires on the other end.

Using the I/O Modules to 3rd Party Devices selector tables located in this section,

1. Locate your PLC I/O module.
2. Select a ZIPLink Pigtail Cable that is compatible with your 3rd party device.



Solution 3: GS Series and DuraPulse Drives Communication Cables

Need to communicate via Modbus RTU to a drive or a network of drives?

ZIPLink cables are available in a wide range of configurations for connecting to PLCs and SureServo, SureStep, Stellar Soft Starter and AC drives. Add a ZIPLink communications module to quickly and easily set up a multi-device network.

Using the Drives Communication selector tables located in this section,

1. Locate your Drive and type of communications.
2. Select a ZIPLink cable and other associated hardware.



Solution 4: Serial Communications Cables

ZIPLink offers communications cables for use with *DirectLOGIC*, CLICK, and Productivity3000 CPUs, that can also be used with other communications devices. Connections include a 6-pin RJ12 or 9-pin, 15-pin and 25-pin D-sub connectors which can be used in conjunction with the RJ12 or D-Sub Feedthrough modules.

Using the Serial Communications Cables selector table located in this section,

1. Locate your connector type
2. Select a cable.

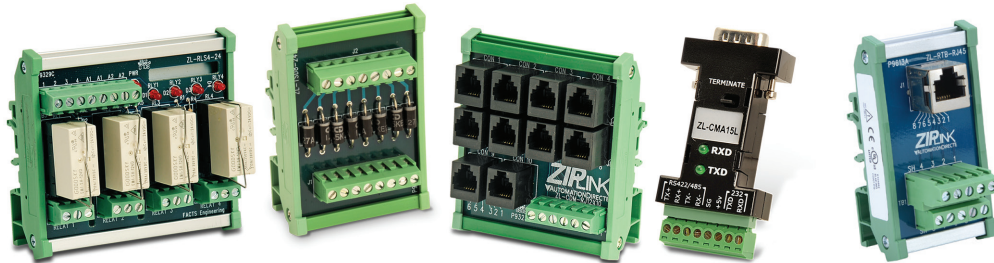


Solution 5: Specialty ZIPLink Modules

For additional application solutions, ZIPLink modules are available in a variety of configurations including stand-alone relays, 24VDC and 120VAC transorb modules, D-sub, RJ12 and RJ45 feedthrough modules, communication port adapter and distribution modules, and SureServo 50-pin I/O interface connection.

Using the ZIPLink Specialty Modules selector table located in this section,

1. Locate the type of application.
2. Select a ZIPLink module.



Solution 6: ZIPLink Connector Modules to 3rd Party Devices

If you need a way to connect your device to terminal blocks without all that wiring time, then our pigtail cables with color-coded soldered-tip wires are a good solution. Used in conjunction with any compatible ZIPLink Connector Modules, a pigtail cable keeps wiring clean and easy and reduces troubleshooting time.

Using the Universal Connector Modules and Pigtail Cables table located in this section,

1. Select module type.
2. Select the number of pins.
3. Select cable.



PLC I/O Modules to ZIPLink Connector Modules - DL405

| DL405 PLC Input Module ZIPLink Selector | | | | | | |
|---|------------|-------------|-----------------|--|--|--|
| PLC | ZIPLink | | | | | |
| Input Module | # of Terms | Component | Module Part No. | Cable Part No. | | |
| D4-16ND2 | 20 | See Note 3 | | | | |
| D4-16ND2F | | | | | | |
| D4-32ND3-1 ² | 40 | Feedthrough | ZL-RTB40 (-1) | straight conn: ZL-D24-CBL40 ZL-D24-CBL40-1 ZL-D24-CBL40-2 | | |
| D4-32ND3-2 ² | | Sensor | ZL-LTB32-24-1 | | | |
| D4-64ND2 ^{1,2} | | Feedthrough | ZL-RTB40 (-1) | 45 deg conn: ZL-D24-CBL40-X ZL-D24-CBL40-1X ZL-D24-CBL40-2X | | |
| | | Sensor | ZL-LTB32-24-1 | | | |
| D4-08NA | 11 | See Note 3 | | | | |
| D4-16NA | 20 | | | | | |
| D4-16NA-1 | | | | | | |
| D4-16NE3 | | | | | | |

| DL405 PLC Output Module ZIPLink Selector | | | | | | |
|--|------------|-------------|--------------------------------|--|--|--|
| PLC | ZIPLink | | | | | |
| Output Module | # of Terms | Component | Module Part No. | Cable Part No. | | |
| D4-08TD1 | 11 | See Note 3 | | | | |
| D4-16TD1 | 20 | | | | | |
| D4-16TD2 | | | | | | |
| D4-32TD1 ² | 40 | Feedthrough | Feedthrough ZL-RTB40 (-1) | straight conn: ZL-D24-CBL40 ZL-D24-CBL40-1 ZL-D24-CBL40-2 | | |
| D4-32TD2 ² | | Fuse | | | | |
| D4-64TD1 ^{1,2} | | Feedthrough | Fused ⁴ ZL-RFU40 | 45 deg conn: ZL-D24-CBL40-X ZL-D24-CBL40-1X ZL-D24-CBL40-2X | | |
| | | Fuse | | | | |
| D4-08TA | 11 | See Note 3 | | | | |
| D4-16TA | 20 | | | | | |
| D4-08TR | 11 | | | | | |
| F4-08TRS-1 | 20 | | | | | |
| F4-08TRS-2 | | | | | | |
| D4-16TR | | | | | | |

| DL405 PLC Analog Module ZIPLink Selector | | | | |
|--|--------------|------------|--------|-------|
| PLC | ZIPLink | | | |
| Analog Module | # of Terms | Component | Module | Cable |
| F4-04AD | 20 | See Note 3 | | |
| F4-04ADS | | | | |
| F4-08AD | | | | |
| F4-16AD-1 | | | | |
| F4-16AD-2 | | | | |
| F4-04DA-1 | | | | |
| F4-04DA-2 | | | | |
| F4-08DA-1 | | | | |
| F4-16DA-1 | | | | |
| F4-08DA-2 | | | | |
| F4-16DA-2 | | | | |
| F4-04DAS-1 | | | | |
| F4-08THM | | | | |
| F4-08THM-n | | | | |
| F4-08RTD | Matched Only | | | |

Tables Footnotes:

- ¹ The D4-64ND2 and D4-64TD1 modules have two 32-point connectors and require two ZIPLink cables and two ZIPLink connector modules.
- ² To make a custom cable for the 32 or 64-point modules, use: Ribbon-style Connector ZL-D24-CON-R, Solder-style 180° connector ZL-D24-CON or Solder-style 45° connector ZL-D24-CON-X
- ³ These modules are not supported by the ZIPLink wiring system.
- ⁴ Note: Fuses (5 x 20 mm) are not included. See Edison Electronic Fuse section for (5 x 20 mm) fuse. S500 and GMA electronic circuit protection for fast-acting maximum protection. S506 and GMC electronic circuit protection for time-delay performance. Ideal for inductive circuits. To ensure proper operation, do not exceed the voltage and current rating of ZIPLink module. ZL-RFU20 = 2A per circuit; ZL-RFU40 = 400 mA per circuit.



NOTE: ZIPLINK CONNECTOR MODULE SPECIFICATIONS FOLLOW THE COMPATIBILITY MATRIX TABLES IN THE ZIPLINK SECTION.