

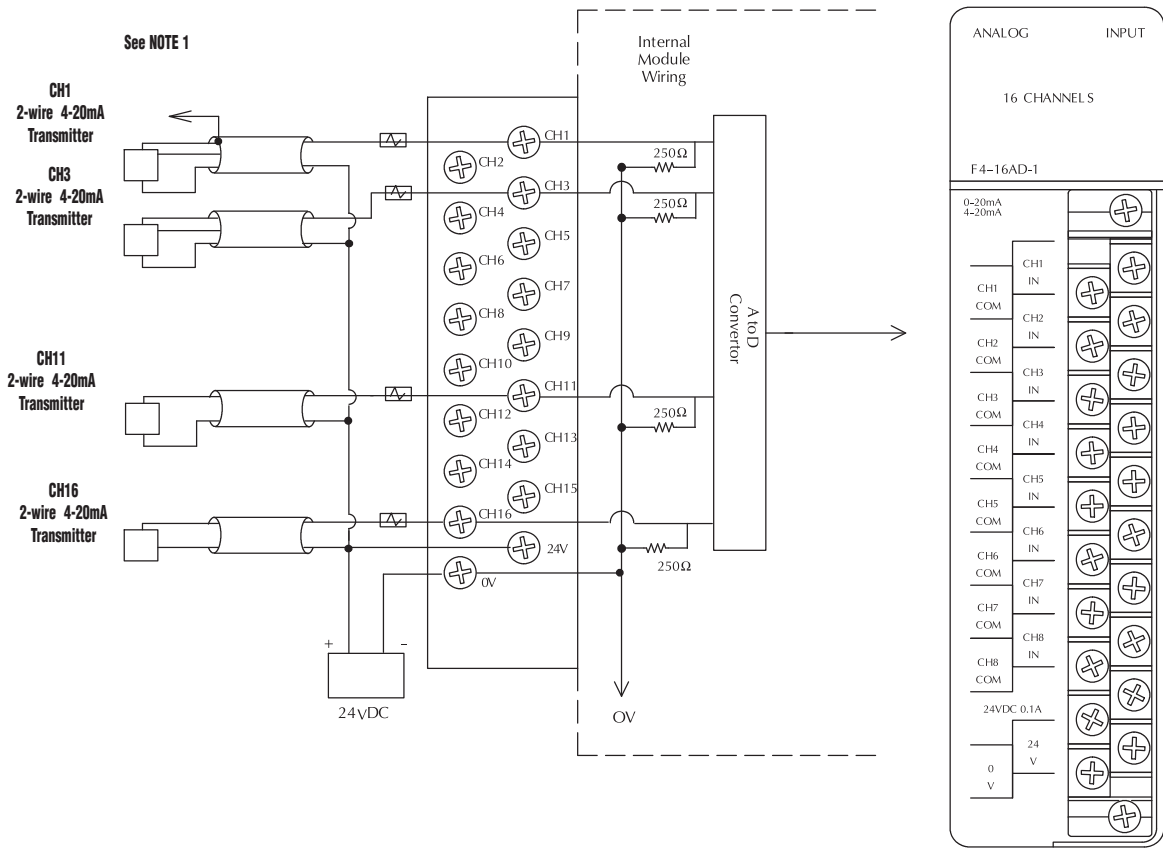
# Analog Input Modules

F4-16AD-1 16-Channel Analog Current Input <--->	
<b>Number of Channels</b>	16, single ended (one common)
<b>Input Ranges</b>	0-20mA, 4-20mA
<b>Channels Individually Configurable</b>	No. Each channel can be configured for current or voltage but must be same range.
<b>Resolution</b>	12 bit (1 to 4,096)
<b>Active Low-pass Filtering</b>	-3dB at 20Hz, -12 dB per octave
<b>Input Impedance</b>	250Ω ± 0.1%, 1/2W current input >20MΩ voltage input 1 MΩ minimum
<b>Absolute Maximum Ratings</b>	-45mA to + 45mA, current input -75V to +75V, voltage input
<b>Conversion Time</b>	2ms per channel (module conversion)
<b>Linearity Error (End to End)</b>	± 2 count (0.025% of full scale) max.
<b>Input Stability</b>	± 1 count
<b>Full Scale Calibration Error (Offset error not included)</b>	± 12 counts max. @ 20mA current input
<b>Offset Calibration Error</b>	± 3 counts max., 4mA current input

<b>PLC Update Rate</b>	1 channel per scan min., 16 per scan, max.
<b>Digital Input Points Required</b>	16 (X) input points (12 binary data bits, 4 active channel bits)
<b>Base Power Required 5V</b>	100mA
<b>Terminal Type (included)</b>	Removable (D4-16IOCON)
<b>External Power Supply</b>	21.6-26.4VDC, 100mA, class2
<b>Recommended Fuse</b>	0.032 A, Series 217 fast-acting, current inputs
<b>Operating Temperature</b>	32° to 140°F (0 to 60°C)
<b>Accuracy vs. Temperature</b>	± 50 ppm/°C maximum full scale (including maximum offset change of 2 counts)
<b>Storage Temperature</b>	-4 to 158°F (-20 to 70° C)
<b>Relative Humidity</b>	5 to 95% (non-condensing)
<b>Environmental Air</b>	No corrosive gases permitted
<b>Vibration</b>	MIL STD 810C 514.2
<b>Shock</b>	MIL STD 810C 516.2
<b>Noise Immunity</b>	NEMA ICS3-304

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096).  
 NOTE 1: Shields should be grounded at the signal source.  
 A Series 217, 0.032A, fast-acting fuse is recommended for 4-20mA current loops.  
 If the power supply common of an external power supply is not connected to 0VDC on the module, then the output of the external transmitter must be isolated.  
 To avoid "ground loop" errors, recommended 4-20mA transmitter types are:  
 2 or 3 wire: Isolation between input signal and power supply.  
 4 wire: Isolation between input signal, power supply and 4-20mA output.

See page 6-58 for part numbers of ZIPLink cables and connection modules compatible with this I/O module.



<b>Step 1</b>	Locate the I/O module part number.
<b>Step 2</b>	Locate Connector Module Type. (Feedthrough Module, Fuse Module, etc...)
<b>Step 3</b>	Select the cable length by replacing the # symbol with: Blank = 0.5m, -1 = 1.0m, -2 = 2.0m <sup>1</sup>
<sup>1</sup> Note: Cable part number denotes compatibility between Connector Module and I/O Modules.	

ZipLink Wiring System Compatibility Matrix for DL405 PLCs Continued										
Step 2: Connector Module Type		Feedthrough Modules		Fuse Modules		Relay Modules		Pigtail Cable		
Step 1: I/O Module	Number of Terminals	ZL-RTB20	ZL-RTB40	ZL-RFU20	ZL-RFU40	ZL-RRL16-24	ZL-RRL16-120	ZL-LTB16-24	ZL-LTB32-24	
Step 3: Cables										
Analog										
<b>I/O Module</b>	<b>F4-04AD</b>	20	ZL-D4-CBL20#							
	<b>F4-04ADS</b>	20	ZL-D4-CBL20#							
	<b>F4-08AD</b>	20	ZL-D4-CBL20#							
	<b>F4-16AD-1</b>	20	ZL-D4-CBL20#							
	<b>F4-16AD-2</b>	20	ZL-D4-CBL20#							
	<b>F4-04DA-1</b>	20	ZL-D4-CBL20#							
	<b>F4-04DA-2</b>	20	ZL-D4-CBL20#							
	<b>F4-08DA-1</b>	20	ZL-D4-CBL20#							
	<b>F4-16DA-1</b>	20	ZL-D4-CBL20#							
	<b>F4-08DA-2</b>	20	ZL-D4-CBL20#							
	<b>F4-16DA-2</b>	20	ZL-D4-CBL20#							
	<b>F4-04DAS-1</b>	20	ZL-D4-CBL20#							
	<b>F4-04DAS-2</b>	20	ZL-D4-CBL20#							
	<b>F4-08THM*</b>	21								
	<b>F4-08THM-n*</b>	21								
	<b>F4-08RTD*</b>	20								

\* The F4-08THM, F4-08THM-n and F4-08RTD modules are not supported by the ZIPLink wiring system. These modules require wire specific to the signal type.

# 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 page 6-57 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.

<b>A</b>			
<b>Base Number</b>	<b>Device Type</b>	<b>5 VDC (mA)</b>	<b>External 24 VDC Power (mA)</b>
<b>B CURRENT SUPPLIED</b>			
<b>CPU/Expansion Unit /Remote Slave</b>	D4-440 CPU	3700	400
<b>C CURRENT REQUIRED</b>			
<b>SLOT 0</b>	D4-16ND2	+150	+0
<b>SLOT 1</b>	D4-16ND2	+150	+0
<b>SLOT 2</b>	F4-04DA	+120	+100
<b>SLOT 3</b>	D4-08ND3S	+100	+0
<b>SLOT 4</b>	D4-08ND3S	+100	+0
<b>SLOT 5</b>	D4-16TD2	+100	+0
<b>SLOT 6</b>	D4-16TD2	+100	+0
<b>SLOT 7</b>	D4-16TR	+1000	+0
<b>D OTHER</b>			
<b>BASE</b>	D4-08B	+80	+0
<b>Handheld Programmer</b>	D4-HPP	+320	+0
<b>E Maximum Current Required</b>		<b>2820</b>	<b>100</b>
<b>F Remaining Current Available</b>		<b>3700-2820=880</b>	<b>400-100=300</b>
1. Using a chart similar to the 3 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 24 VDC 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	125 VDC Powered Units
<b>Part Numbers</b>	D4-450, D4-440, D4-430, D4-EX (expansion base unit), D4-RS (remote slave unit)	D4-450DC-1, D4-440DC-1, D4-EXDC (expansion base unit), D4-RSDC (remote slave unit)	D4-450DC-2, D4-440DC-2
<b>Voltage Withstand (dielectric)</b>	1 minute @ 1,500 VAC between primary, secondary, field ground, and run relay		
<b>Insulation Resistance</b>	> 10MΩ at 500VDC		
<b>Input Voltage Range</b>	85-132 VAC (110 range) 170-264 VAC (220 range)	20-28 VDC (24 VDC) with less than 10% ripple	90-146 VDC (125 VDC) with less than 10% ripple
<b>Maximum Inrush Current</b>	20 A	20 A	20 A
<b>Maximum Power</b>	50 VA	38 W	30 W

# Power Requirements

Power Supplied					
CPUs/Remote Units/ Expansion Units	5 VDC Current Supplied in mA	24V Aux Power Supplied in mA	CPUs/Remote Units/Expansion Units	5V Current Supplied in mA	24VAux. Power Supplied in mA
D4-430 CPU	3700	400	D4-EX	4000	400
D4-440 CPU	3700	400	D4-EXDC	4000	NONE
D4-440DC-1 CPU	3700	NONE	D4-EXDC-2	3700	NONE
D4-440DC-2 CPU	3700	NONE	D4-RS	3700	400
D4-450 CPU	3100	400	D4-RSDC	3700	NONE
D4-450DC-1 CPU	3100	NONE	H4-EBC	3470	400
D4-450DC-2 CPU	3100	NONE	H4-EBC-F	3300	400
Power Consumed					
Power-consuming Device	5V Current Consumed	External 24VDC Current Required	Power-consuming Device	5V Current Consumed	External 24VDC Current Required
I/O Bases			Analog Modules (continued)		
D4-04B-1	80	NONE	F4-16AD-1	75	100
D4-06B-1	80	NONE	F4-16AD-2	75	100
D4-08B-1	80	NONE	F4-04DA-1	70	75+20per circuit
<b>DC Input Modules</b>			F4-04DA-2	90	90
			F4-04DAS-1	60	60 per circuit
			F4-04DAS-2	60	60 per circuit
			F4-08DA-1	90	100+20 per circuit
			F4-08DA-2	80	150
			F4-16DA-1	90	100+20 per circuit
			F4-16DA-2	80	25 max.
			F4-08RTD	80	NONE
			F4-08THM-n	120	50
			F4-08THM	110	60
AC Input Modules			Remote I/O		
D4-08NA	100	NONE	H4-ERM	320	NONE
D4-16NA	150	NONE	H4-ERM-F	450	NONE
AC/DC Input Modules			D4-RM	300	NONE
D4-16NE3	150	NONE	Communications and Networking		
F4-08NE3S	90	NONE	H4-ECOM100	300	NONE
DC Output Modules			H4-ECOM	530	NONE
D4-08TD1	150	35	H4-ECOM-F	670	NONE
F4-08TD1S	295	NONE	D4-DCM	500	NONE
D4-16TD1	200	125	F4-MAS-MB	235	NONE
D4-16TD2	400	NONE	FA-UNICON	NONE	65
D4-32TD1	250	140	CoProcessors		
D4-32TD1-1	250	140 (15V)	F4-CP128-1	305	NONE
D4-32TD2	350	120 (4A max including loads)	Specialty Modules		
D4-64TD1	800	NONE	H4-CTRIO	400	NONE
AC Output Modules			D4-INT	100	NONE
D4-08TA	250	NONE	D4-HSC	300	NONE
D4-16TA	450	NONE	F4-16PID	160	NONE
Relay Output Modules			F4-8MPI	225	170
D4-08TR	550	NONE	D4-16SIM	150	NONE
F4-08TRS-1	575	NONE	F4-4LTC	280	75
F4-08TRS	575	NONE	Programming		
D4-16TR	1000	NONE	D4-HPP-1 (Handheld Prog.)	320	NONE
Analog Modules			Operator Interface		
F4-04AD	85	100	DV-1000	150	NONE
F4-04ADS	270	120	C-more Micro-Graphic	210	NONE
F4-08AD	75	90			