

Analog Input Modules

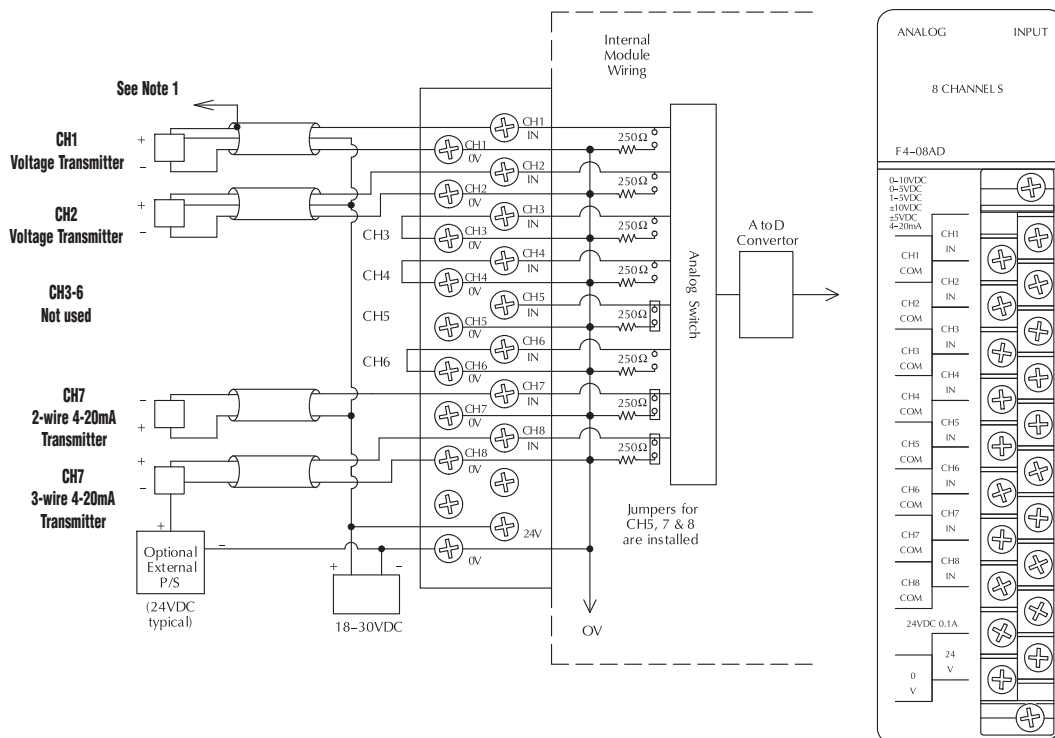
F4-08AD 8-Channel Analog Input <-->	
Number of Channels	8, single ended (one common)
Input Ranges	0-5V, 0-10V, 1-5V, ±5V, ±10V 0-20mA, 4-20mA
Channels Individually Configurable	No. Each channel can be configured for current or voltage but must be same range.
Resolution	12 bit (1 to 4,096)
Active Low-pass Filtering	-3dB at 20Hz, -12 dB per octave
Input Impedance	250Ω ± 0.1%, 1/2Vv current input >20MΩ voltage input 1 MΩ minimum
Absolute Maximum Ratings	-45mA to +45mA, current input -75V to +75V, voltage input
Conversion Time	0.4ms per channel (module conversion) 1 ms per selected channel minimum (CPU)
Linearity Error (End to End)	± 1 count (0.025% of full scale) max.
Input Stability	± 1/2 count
Full Scale Calibration Error (Offset error not included)	± 12 counts voltage input ± 12 counts max. @ 20mA current input
Offset Calibration Error	± 2 counts max., unipolar voltage input ± 4 counts max., bipolar voltage input, ± 4 counts max., 4mA current input

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



PLC Update Rate	1 channel per scan min., 8 per scan, max.
Digital Input Points Required	16 (X) input points (12 binary data bits, 3 active channel bits, 1 bit unused)
Base Power Required 5V	75mA
Terminal Type (included)	Removable (D4-16IOCON)
External Power Supply	18-30VDC, 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	± 50 ppm/°C maximum full scale (including maximum offset change of 2 counts)
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 4096).
 NOTE 1: Shields should be grounded at the signal source
 NOTE 2: Unused channels should be connected to 0V or have current jumpers installed
 More than one external power supply can be used (see channel 8)
 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.



Step 1	Locate the I/O module part number.
Step 2	Locate Connector Module Type. (Feedthrough Module, Fuse Module, etc...)
Step 3	Select the cable length by replacing the # symbol with: Blank = 0.5m, -1 = 1.0m, -2 = 2.0m ¹
¹ 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										
I/O Module	F4-04AD	20	ZL-D4-CBL20#							
	F4-04ADS	20	ZL-D4-CBL20#							
	F4-08AD	20	ZL-D4-CBL20#							
	F4-16AD-1	20	ZL-D4-CBL20#							
	F4-16AD-2	20	ZL-D4-CBL20#							
	F4-04DA-1	20	ZL-D4-CBL20#							
	F4-04DA-2	20	ZL-D4-CBL20#							
	F4-08DA-1	20	ZL-D4-CBL20#							
	F4-16DA-1	20	ZL-D4-CBL20#							
	F4-08DA-2	20	ZL-D4-CBL20#							
	F4-16DA-2	20	ZL-D4-CBL20#							
	F4-04DAS-1	20	ZL-D4-CBL20#							
	F4-04DAS-2	20	ZL-D4-CBL20#							
	F4-08THM*	21								
	F4-08THM-n*	21								
	F4-08RTD*	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.

A			
Base Number	Device Type	5 VDC (mA)	External 24 VDC Power (mA)
B CURRENT SUPPLIED			
CPU/Expansion Unit /Remote Slave	D4-440 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	D4-08ND3S	+100	+0
SLOT 4	D4-08ND3S	+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	+80	+0
Handheld Programmer	D4-HPP	+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 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
Part Numbers	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
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 (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
Maximum Inrush Current	20 A	20 A	20 A
Maximum Power	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												
DC Input Modules			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												
D4-08ND3S	100	NONE	F4-16DA-2	80	25 max.												
D4-16ND2	150	NONE	F4-08RTD	80	NONE												
D4-16ND2F	150	NONE	F4-08THM-n	120	50												
D4-32ND3-1	150	NONE	F4-08THM	110	60												
D4-32ND3-2	150	NONE	Remote I/O														
D4-64ND2	300 max.	NONE															
AC Input Modules																	
D4-08NA	100	NONE	H4-ERM	320	NONE												
D4-16NA	150	NONE	H4-ERM-F	450	NONE												
			D4-RM	300	NONE												
AC/DC Input Modules			Communications and Networking														
D4-16NE3	150	NONE	H4-ECOM100 300 H4-ECOM 530 H4-ECOM-F 670 D4-DCM 500 F4-MAS-MB 235 FA-UNICON NONE														
F4-08NE3S	90	NONE															
DC Output Modules																	
D4-08TD1	150	35															
F4-08TD1S	295	NONE															
D4-16TD1	200	125															
D4-16TD2	400	NONE															
D4-32TD1	250	140															
D4-32TD1-1	250	140 (15V)															
D4-32TD2	350	120 (4A max including loads)															
D4-64TD1	800	NONE															
AC Output Modules			CoProcessors														
D4-08TA	250	NONE	F4-CP128-1 305 NONE														
D4-16TA	450	NONE															
Relay Output Modules			Specialty Modules														
D4-08TR 550 F4-08TRS-1 575 F4-08TRS 575 D4-16TR 1000			H4-CTRIO 400 D4-INT 100 D4-HSC 300 F4-16PID 160 F4-8MPI 225 D4-16SIM 150 F4-4LTC 280														
						NONE NONE NONE NONE NONE NONE											
									NONE NONE NONE NONE NONE NONE								
												NONE NONE NONE NONE NONE NONE					
															NONE NONE NONE NONE NONE NONE		
Analog Modules			Programming														
F4-04AD 85 F4-04ADS 270 F4-08AD 75			D4-HPP-1 (Handheld Prog.) 320 NONE														
			Operator Interface														
			DV-1000 150 NONE														
			C-more Micro-Graphic 210 NONE														