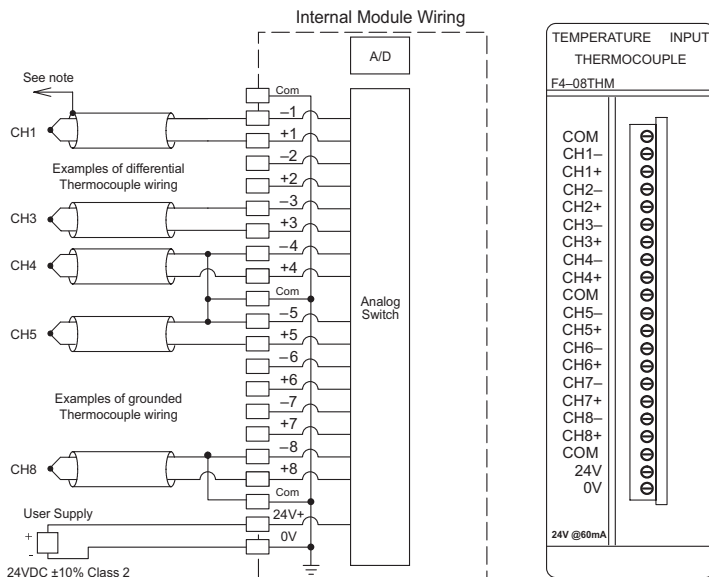


# Temperature Input Modules

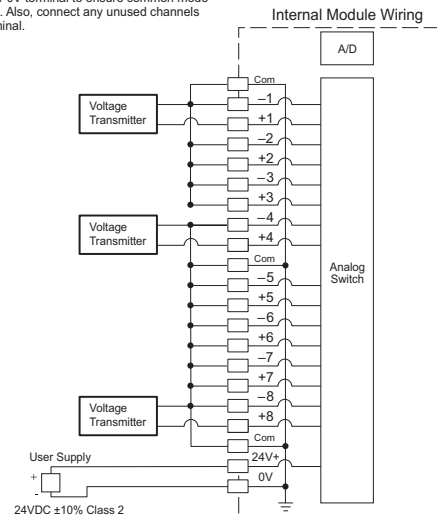
F4-08THM 8-Channel Thermocouple Input \$610.00			
General Specifications		Thermocouple Specifications	
<b>Number of Channels</b>	8, differential	<b>Input Ranges*</b>	Type J -190 to 760°C -310 to 1400°F
<b>Common Mode Range</b>	± 5VDC		Type E -210 to 1000°C -346 to 1832°F
<b>Common Mode Rejection</b>	90dB min. @ DC, 150dB min. @ 50/60Hz.		Type K -150 to 1372°C -238 to 2502°F
<b>Input Impedance</b>	1M Ω		Type R 65 to 1768°C 149 to 3214°F
<b>Absolute Maximum Ratings</b>	Fault-protected inputs to ± 50VDC	<b>Display Resolution</b>	± 0.1°C or ± 0.1°F
<b>Accuracy vs. Temperature</b>	± 5ppm/°C maximum full scale calibration (including maximum offset change)	<b>Cold Junction Compensation</b>	Automatic
<b>PLC Update Rate</b>	8 channels per scan max	<b>Conversion Time</b>	100ms per channel
<b>Digital Inputs</b>	16 binary data bits, 2 channel ID bits, 4 diagnostic bits	<b>Warm-Up Time</b>	30 minutes typically ± 1°C repeatability
<b>Input Points Required</b>	32 points (X) input module	<b>Linearity Error (End to End)</b>	± .05°C maximum, ± .01°C typical
<b>Terminal Type (included)</b>	Removable (D4-1610CON)		
<b>External Power Supply</b>	60mA maximum, 18 to 26.4VDC	<b>Maximum Inaccuracy</b>	± 3°C (excluding thermocouple error)
<b>Power Budget Requirements</b>	110mA max., 5VDC (supplied to base)	Voltage Input Specifications	
<b>Operating Temperature</b>	0° to 60°C (32° to 140°F)	<b>Voltage Ranges</b>	0-5V, ± 5V, 0-156.25mV, ± 156.25mVDC
<b>Storage Temperature</b>	-20° to 70°C (-4° to 158°F)	<b>Resolution</b>	16 bit (1 in 65535)
<b>Relative Humidity</b>	5 to 95% (non-condensing)	<b>Full Scale Calibration Error (Offset error Included)</b>	± 13 counts typical, ± 33 maximum
<b>Environmental Air</b>	No corrosive gases permitted	<b>Offset Calibration Error</b>	± 1 count maximum, @ 0V input
<b>Vibration</b>	MIL STD 810C 514.2	<b>Linearity Error (End to End)</b>	± 1 count maximum
<b>Shock</b>	MIL STD 810C 516.2	<b>Maximum Inaccuracy</b>	± 0.2% @ 25°C (77°F)
<b>Noise Immunity</b>	NEMA ICS3-304	NOTE 1: Terminate shields at the respective signal source NOTE 2: Leave unused channels open (no connection) *Thermocouple type is selected by setting internal jumpers NOTE 3: This module is not compatible with the ZIPLink wiring system.	

**Thermocouple Input Wiring Diagram**



**Voltage Input Wiring Diagram**

Note 3: When using 0-156mV and 5V ranges, connect CH- terminal to Com or 0V terminal to ensure common mode range acceptance. Also, connect any unused channels to Com or 0V terminal.

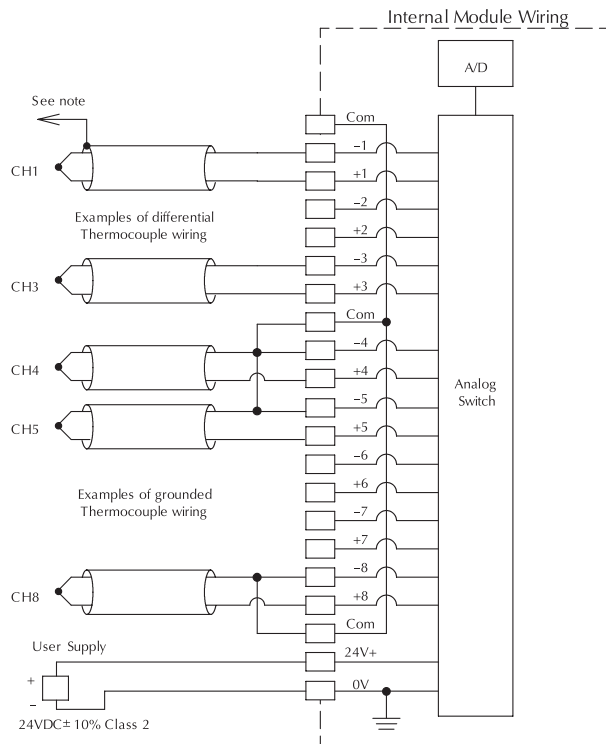


# Temperature Input Modules

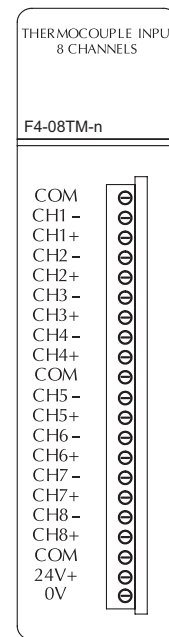
F4-08THM-n 8-Channel Thermocouple Input <b>\$645.00</b>	
When you order the module, replace the "n" with the type of Thermocouple needed. For example, to order a Type J thermocouple module, order part number F4-08THM-J or part number F4-08THM-K for a Type K module.	
<b>Number of channels</b>	8, differential inputs
<b>Input Ranges</b>	Type J -210/760°C, -350/1390°F Type K -270/1372°C, -450/2502°F Type T -270/400°C, -450/752°F
<b>Resolution</b>	12 bit (1 in 4,096)
<b>Input Impedance</b>	27KΩ
<b>Absolute Maximum Ratings</b>	Fault protected input, 130 Vrms or 100VDC
<b>Cold Junction Compensation</b>	Automatic
<b>Conversion Time</b>	15ms per channel, minimum 1 channel per CPU scan
<b>Converter Type</b>	Successive Approximation, 574

<b>Linearity Error</b>	± 1 count (0.03% of full scale) maximum
<b>Full Scale Calibration Error</b>	± 0.35% of full scale
<b>Maximum Inaccuracy*</b>	± 1°C for type J, K, and T
<b>PLC Update Rate</b>	1 ch. per scan min., 8 per scan max.
<b>Digital Input Points Required</b>	16 (X) input points (12 binary data bits, 3 channel ID bits, 1 sign bit)
<b>Base Power Required 5V</b>	120mA
<b>Terminal Type (included)</b>	Non-removable
<b>External Power Supply</b>	24VDC ±10%, 50mA current
<b>Operating Temperature</b>	32 to 140°F (0 to 60°C)
<b>Storage Temperature</b>	-4 to 158°F (-20 to 70°C)
<b>Accuracy vs Temperature*</b>	57 ppm/°C maximum full scale
<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

Note 1: Terminate shields at the respective signal source  
 Note 2: Leave unused channels open (no connection)  
 Note 3: This module is not compatible with the ZIPLink wiring system.



\*Max. inaccuracy is not guaranteed for temperatures lower than:  
 -220°C for type T  
 -200°C for types J & K

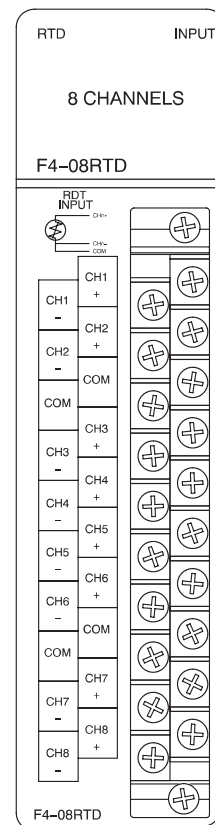
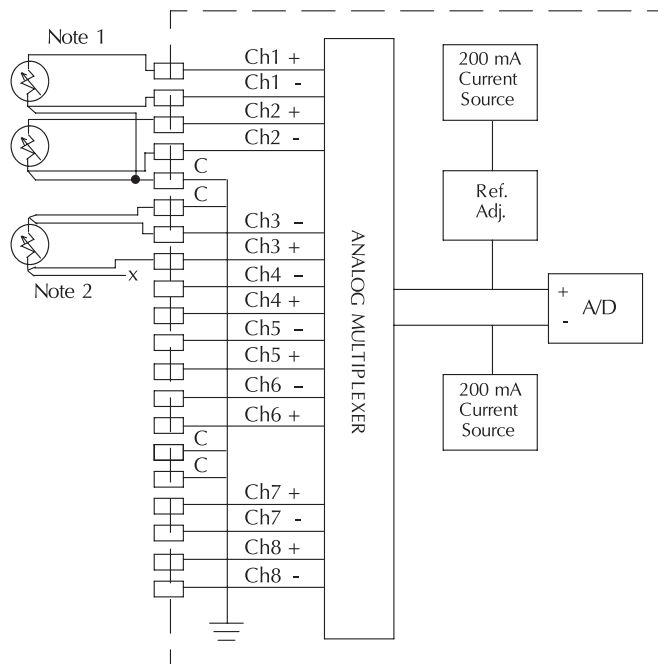


# Temperature Input Modules

F4-08RTD 8-Channel RTD Input \$500.00	
<b>Number of Channels</b>	8
<b>Input Ranges</b>	Type Pt100: -200/850°C, -328/1562°F Type Pt1000: -200/595°C, -328/1103°F Type jPT100: -38/450°C, -36/842°F Type CU-10/25W: -200/260°C, -328/500°F
<b>Resolution</b>	16 bit (1 in 65535)
<b>Input Impedance</b>	27K Ω
<b>Display Resolution</b>	± 0.1°C, ±0.1°F (±3276.7)
<b>RTD Excitation Current</b>	200µA
<b>Input Type</b>	Differential
<b>Notch Filter</b>	>100db notches at 50/60Hz -3db=-13.1 Hz
<b>Maximum Settling Time</b>	100msec (full-scale step input)
<b>Common Mode Range</b>	0-5 VDC

<b>Absolute Maximum Ratings</b>	Fault protected inputs to ±50 VDC
<b>Converter Type</b>	Charge Balancing
<b>Linearity Error</b>	± 1°C maximum, ±0.1°C typical
<b>Full Scale Calibration Error</b>	± 1°C
<b>PLC Update Rate</b>	1 ch. per scan min., 8 per scan max.
<b>Digital Input Points Required</b>	32 (X) input points (15 binary data bits, 3 channel ID bits, 1 sign bit, 8 fault bits)
<b>Base Power Required 5V</b>	80mA @ 5VDC
<b>Terminal Type (included)</b>	Removable (D4-16IOCON)
<b>Operating Temperature</b>	32° to 140°F (0 to 60°C)
<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

Notes:  
 1. the three wires connecting the RTD to the module must be the same type and length. Do not use the shield or drain wire for the third connection.  
 2. If an RTD sensor has 4 wires, the plus sense wire should be left unconnected as shown.  
 3. This module is not compatible with the ZIPLink wiring system.



# 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				
	<b>Base Number</b>	<b>Device Type</b>	<b>5 VDC (mA)</b>	<b>External 24 VDC Power (mA)</b>
	0			
<b>B</b>	<b>CURRENT SUPPLIED</b>			
	<b>CPU/Expansion Unit /Remote Slave</b>	D4-440 CPU	3700	400
<b>C</b>	<b>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</b>	<b>OTHER</b>			
	<b>BASE</b>	D4-08B-1	+80	+0
	<b>Handheld Programmer</b>	D4-HPP-1	+320	+0
<b>E</b>	<b>Maximum Current Required</b>		<b>2820</b>	<b>100</b>
<b>F</b>	<b>Remaining Current Available</b>		<b>3700-2820=880</b>	<b>400-100=300</b>
	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 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>	D4-454, D4-450, D4-440, D4-EX (expansion base unit), D4-RS (remote slave unit)	D4-454DC-1, D4-440DC-1, (expansion base unit), (remote slave unit) D4-EXDC D4-RSDC	D4-450DC-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					
<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>
D4-440 CPU	3700	400	D4-EX	4000	400
D4-440DC-1 CPU	3700	NONE	D4-EXDC	4000	NONE
D4-450 CPU	3700	400	D4-RS	3700	400
D4-454 CPU	3100	400	D4-RSDC	3700	NONE
D4-450DC-2 CPU	3100	NONE	H4-EBC	3470	400
D4-454DC-1	3100	NONE	H4-EBC-F	3300	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	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
			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
<i>DC Input Modules</i>			<i>Remote I/O</i>		
D4-08ND3S	100	NONE	H4-ERM100	320(300)	NONE
D4-16ND2	150	NONE	H4-ERM-F	450	NONE
D4-16ND2F	150	NONE	D4-RM	300	NONE
D4-32ND3-1	150	NONE			
D4-64ND2	300 max.	NONE			
<i>AC Input Modules</i>			<i>Communications and Networking</i>		
D4-08NA	100	NONE	H4-ECOM100	300	NONE
D4-16NA	150	NONE	D4-DCM	500	NONE
			F4-MAS-MB	235	NONE
			FA-UNICON	NONE	65
<i>AC/DC Input Modules</i>			<i>CoProcessors</i>		
D4-16NE3	150	NONE	F4-CP128-1	305	NONE
F4-08NE3S	90	NONE	F4-CP128-T	350	NONE
<i>DC Output Modules</i>			<i>Specialty Modules</i>		
F4-08TD1S	295	NONE	H4-CTRIO	400	NONE
D4-16TD1	200	125	D4-INT	100	NONE
D4-16TD2	400	NONE	F4-16PID	160	NONE
D4-32TD1	250	140	F4-8MPI	225	170
D4-32TD1-1	250	140 (15V)	D4-16SIM	150	NONE
D4-32TD2	350	120 (4A max including loads)	F4-4LTC	280	75
D4-64TD1	800	NONE			
<i>AC Output Modules</i>			<i>Programming</i>		
D4-08TA	250	NONE	D4-HPP-1 (Handheld Prog.)	320	NONE
D4-16TA	450	NONE			
<i>Relay Output Modules</i>			<i>Operator Interface</i>		
D4-08TR	550	NONE	DV-1000	150	NONE
F4-08TRS-1	575	NONE			
F4-08TRS-2	575	NONE	C-more Micro-Graphic	210	NONE
D4-16TR	1000	NONE			
<i>Analog Modules</i>					
F4-04AD	150	100			
F4-04ADS	370	120			
F4-08AD	75	90			