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.

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 DL405 system.

A				
	Base Number 0	***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 3one 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 unit)	D4-440DC-1, D4-EXDC (expansion unit) D4-450DC-1	D4-440DC-2 D4-450DC-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 24VD Current Required
I/O Bases		
D4-04B-1	80	NONE
D4-06B-1	80	NONE
D4-08B-1	80	NONE
DC Input Modules		
D4-08ND3S	100	NONE
D4-16ND2	150	NONE
D4-16ND2F	150	NONE
D4-32ND3-1	150	NONE
D4-32ND3-2	150	NONE
D4-64ND2	300 max.	NONE
AC Input Modules		
D4-08NA	100	NONE
D4-16NA	150	NONE
AC/DC Input Modules		
D4-16NE3	150	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		
D4-08TA	250	NONE
D4-16TA	450	NONE
Relay Output Modules		
D4-08TR	550	NONE
F4-08TRS-1	575	NONE
F4-08TRS	575	NONE
D4-16TR	1000	NONE
Analog Modules		
F4-04AD	85	100
F4-04ADS	270	120
F4-08AD	75	90

Power-consuming Device	5V Current Consumed	External 24VDC Current Required
Analog Modules (continued)		
F4-16AD-1	75	100
F4-16AD-2	75	100
F4-04DA	120	100
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
Remote I/O		
H4-ERM	320	NONE
H4-ERM-F	450	NONE
D4-RM	300	NONE
Communications and Networking		
H4-ECOM	530	NONE
H4-ECOM-F	670	NONE
D4-DCM	500	NONE
F4-MAS-MB	235	NONE
FA-UNICON	NONE	65
CoProcessors		
F4-CP128-1	305	NONE
F4-CP128-T	350	NONE
Specialty Modules		
H4-CTRIO	400	NONE
D4-INT	100	NONE
D4-HSC	300	NONE
F4-16PID	160	NONE
F4-08MPI	225	170
D4-16SIM	150	NONE
F4-4LTC	280	75
Programming		
D4-HPP-1 (Handheld Prog.)	320	NONE
Operator Interface		
DV-1000	150	NONE
C-more Micro-Graphic	210	NONE

Dimensions and Installation

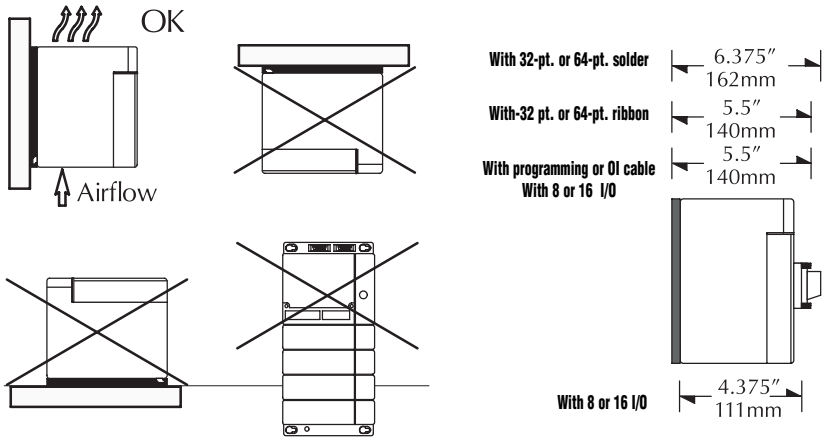
It is important to understand the installation requirements for your DL405 system. This will help ensure that the DL405 products operate within their environmental and electrical limits.

Plan for safety

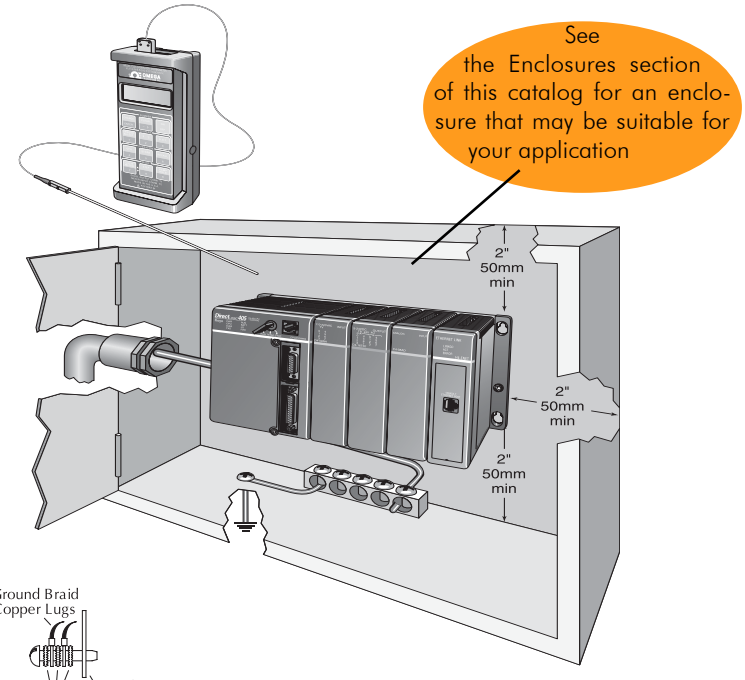
This catalog should never be used as a replacement for the user manual. The user manual, D4-USER-M, contains important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

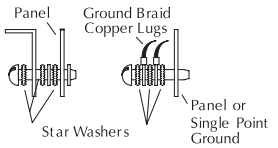
Base dimensions and mounting orientation

Use the diagrams to the right to make sure the DL405 system can be installed in your application. To ensure proper airflow for cooling purposes, DL405 bases must be mounted horizontally. It is important to check these dimensions against the conditions required for your application. For example, it is recommended that you leave 1.5" depth for ease of access and cable clearance. However, your distance may be greater or less. Also, check the installation guidelines for the recommended cabinet clearances.



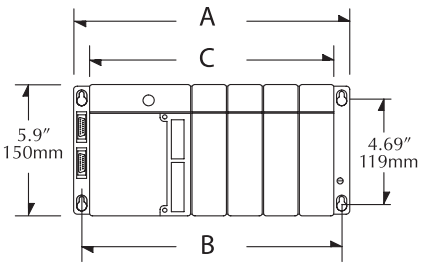
Specification	Rating
Storage Temperature	-4°F - 158°F (-20°C to 70°C)
Ambient Operating Temperature	32°F - 140°F (0° to 60°C)
Ambient Humidity	30% - 95% relative humidity (non-condensing)
Vibration Resistance	MIL STD 810C, Method514.2
Shock Resistance	MIL STD810C, Method516.2
Noise Immunity	NEMA(ICS3-304)
Atmosphere	No corrosive gases





Note: there is a minimum of 2" (50mm) clearance required between the panel door or any devices mounted in the panel door and the nearest DL405 component.

DL405 base



Base	Price	A		B		C	
D4-04B-1	<--->	11.53"	293mm	10.82"	275mm	10.50"	267mm
D4-06B-1	<--->	14.44"	367mm	13.74"	349mm	13.42"	341mm
D4-08B-1	<--->	17.36"	441mm	16.65"	423m	16.32"	423mm

Base Configurations

Four, six, and eight-slot bases

The DL405 product family offers four, six, and eight-slot I/O bases.

Expansion units

The expansion units are only necessary when you want to use local expansion. They are installed in the CPU slot of the expansion bases. They appear very similar to CPUs, but they only contain a power supply. One of the most often asked questions for the DL405 family is, "Does the CPU consume an I/O slot?" The answer is no. The CPU has a special slot in the base and does not consume any of the available I/O slots. The same is true for Expansion Units

- D4-EX 110/220 VAC power supply <--->
- D4-EXDC 24 VDC power supply <--->
- D4-EXDC-2 125 VDC power supply <--->

and the Remote Slave Units

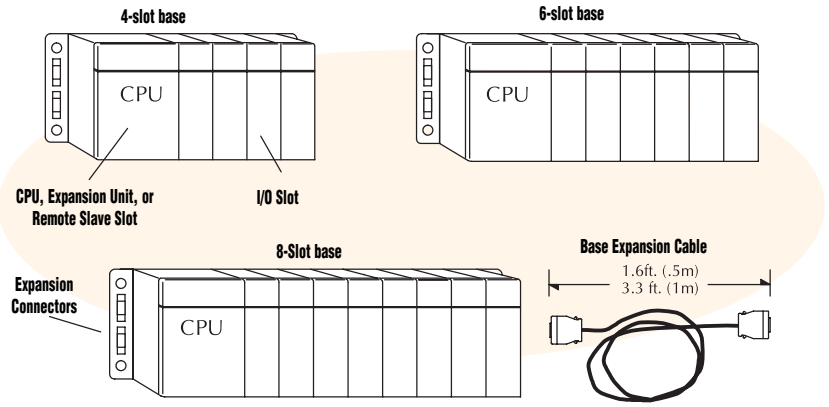
- D4-RS 110/220 VAC power supply <--->

An expansion cable is required to connect each of the expansion bases to the CPU base

- D4-EXCBL 3.08 ft (1m) cable <--->
- D4-EXCBL-2 1.54 ft (0.5m) cable <--->

D4-450 and –1 bases

In the past, a DL405 system has been limited to only accepting specialty modules in the local CPU base. The –1 bases must be used with the D4-450 CPU to remove this limitation. The part numbers for the bases are D4-04B-1, D4-06B-1, and D4-08B-1. (Note: you cannot simply add a –1 base to an existing system to gain specialty modules in expansion bases. Instead, you must replace the CPU base and all other expansion bases as well.) You can add the –1 bases in an older system, but they are subject to the limitations of the regular bases.



Specialty modules in expansion bases