

## Calculating the Power Budget

### Managing your Power Resource

When you determine the types and quantity of I/O modules you will be using in the DL305 system it is important to remember there is a limited amount of power available from the power supply. We have provided a chart to help you easily see the amount of power available with each base. The following chart will help you calculate the amount of power you need with your I/O selections. At the end of this section you will also find an example of power budgeting and a worksheet for your own calculations.

If the I/O you choose exceeds the maximum power available from the power supply you can resolve the problem in one of two ways:

- Shift some of the modules to an expansion base which contains another power supply.
- If a 5 slot base is being used, replace it with an 8 or 10 slot base. This will provide more power on the 9V and 24V power supplies.

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**WARNING:** It is *extremely* important to calculate the power budget. 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.

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### Auxiliary Base Power Source

There is 24 VDC available from the 24 VDC output terminals on the bases (except D3-05BDC). The 24 VDC can be used to power external devices or DL305 modules that require external 24 VDC. The power used from this supply reduces the internal system 24 VDC available to the modules by an equal amount. When using the 24 VDC output at the base terminal it is not recommended to exceed 100mA.

### Base Power Specifications

This chart shows the amount of current available for the three voltages supplied on DL305 bases. Use these currents when calculating the power budget for your system.

Bases	5V Power Supplied in mA	9V Power Supplied in mA	24V Power Supplied in mA	Auxiliary 24 VDC Output at Base Terminal
D3-05B	1400	800	500	Yes
D3-05BDC	1400	800	500	None
D3-08B	1400	1700	600	Yes
D3-10B	1400	1700	600	Yes

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**NOTE:** The total current for the D3-05B and D3-05BDC should not exceed 2.3 Amps. The base currents listed for the D3-08B and the D3-10B are for operating ambient temperatures between 0° C and 50° C.

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## Module Power Requirements

The next three pages show the amount of maximum current required for each of the DL305 modules. The column labeled “External Power Source Required” is for module operation and is not for field wiring. Use these currents when calculating the power budget for your system. If 24 VDC is needed for external devices, the 24 VDC (100mA maximum) output at the base terminal strip may be used as long as the power budget is not exceeded.

	5V Power Required in mA	9V Power Required in mA	24V Power Required in mA	External Power Source Required
<b>CPUs</b>				
D3-330	300	50	0	None
D3-330P	300	50	0	None
D3-340	300	20	0	None
<b>Specialty CPUs</b>				
F3-OMUX-1	300	0	0	None
F3-OMUX-2	300	0	150	None
F3-PMUX	500	0	0	None
F3-RTU	300	0	0	0
<b>DC Input Modules</b>				
D3-08ND2	0	10	112	None
D3-16ND2-1	0	25	224	None
D3-16ND2-2	0	24	209	None
D3-16ND2F	0	25	224	None
F3-16ND3F	0	148	68	None
<b>AC Input Modules</b>				
D3-08NA-1	0	10	0	None
D3-08NA-2	0	10	0	None
D3-16NA	0	100	0	None
<b>AC/DC Input Modules</b>				
D3-08NE3	0	10	0	None
D3-16NE3	0	130	0	None

Module Power Requirements  
(continued)

	5V Power Required in mA	9V Power Required in mA	24V Power Required in mA	External Power Source Required
<b>DC Output Modules</b>				
D3-08TD1	0	20	24	None
D3-08TD2	0	30	0	None
D3-16TD1-1	0	40	96	None
D3-16TD1-2	0	40	96	None
D3-16TD2	0	180	0	None
<b>AC Output Modules</b>				
D3-04TAS	0	12	0	None
F3-08TAS	0	80	0	None
D3-08TA-1	0	96	0	None
D3-08TA-2	0	160	0	None
F3-16TA-1	0	160	0	None
D3-16TA-2	0	400	0	None
<b>Relay Output Modules</b>				
D3-08TR	0	360	0	None
F3-08TRS-1	0	296	0	None
F3-08TRS-2	0	296	0	None
D3-16TR	0	480	0	None
<b>Analog</b>				
D3-04AD	0	55	0	24VDC @ 65mA max
F3-04ADS	0	183	50	None
F3-08AD	0	25	37	None
F3-08TEMP	0	25	37	None
F3-08THM-n	0	50	34	None
F3-16AD	0	33	47	None
D3-02DA	0	80	0	24VDC @ 170mA max
F3-04DA-1	0	144	108	None
F3-04DA-2	0	144	108	None
F3-04DAS	0	154	145	None

	5V Power Required in mA	9V Power Required in mA	24V Power Required in mA	External Power Source Required
<b>Communications and Networking</b>				
D3-232-DCU	500	0	0	Optional 5VDC @ 500mA
D3-422-DCU	500	0	0	Optional 5VDC @ 500mA
F3-UNICON	0	0	0	(24 VDC or 5 VDC) @ 100mA
<b>ASCII BASIC Modules</b>				
F3-AB128-R	0	205	0	None
F3-AB128-T	0	205	0	None
F3-AB128	0	90	0	None
F3-AB64	0	90	0	None
<b>Specialty Modules</b>				
D3-08SIM	0	10	112	None
D3-HSC	0	70	0	None
D3-PWU	800	0	0	Optional 5VDC @ 800mA
<b>Programming</b>				
D3-HP	50	50	0	Optional
D3-HPP	50	50	0	Optional

### Power Budget Calculation Example

The following example shows how to calculate the power budget for the DL305 system.

Base # _____1_____	Module Type	5 VDC (mA)	9 VDC (mA)	24 VDC (mA) and/or Auxiliary Base Power Source 24 VDC Output (mA)
<b>Base Used</b>	D3-05B	<b>1400</b>	<b>800</b>	<b>500</b>
<b>Slot 1</b>	D3-330	+ 300	+ 50	+ 0
<b>Slot 2</b>	D3-16NE3	+ 0	+ 130	+ 0
<b>Slot 3</b>	D3-16NE3	+ 0	+ 130	+ 0
<b>Slot 4</b>	F3-16TA-1	+ 0	+ 160	+ 0
<b>Slot 5</b>	F3-16TA-1	+ 0	+ 160	+ 0
<b>Slot 6</b>				
<b>Slot 7</b>				
<b>Slot 8</b>				
<b>Slot 9</b>				
<b>Slot 10</b>				
<b>Other</b>	D3-232-DCU	+ 500	+ 0	+ 0
<b>Maximum power required</b>		<b>800</b>	<b>630</b>	<b>0</b>
<b>Remaining Power Available</b>		1400 – 800 = <b>600</b>	800 – 630 = <b>170</b>	500 – 0 = <b>500</b>

- Using the tables at the beginning of the Power Budgeting section of this chapter fill in the information for the Base, CPU, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. Pay special attention to the current supplied by the base which you have selected since they do differ. Devices which fall into the “**Other**” category are devices such as the Data Communications Unit and the Handheld programmer which plug onto the CPU.
- Add the current columns starting with slot 1 and put the total in the row labeled “**Maximum power required**”.
- Subtract the row labeled “**Maximum power required**” from the row labeled “**Base Used**”. Place the difference in the row labeled “**Remaining Power Available**”.
- If “**Maximum Power Required**” is greater than “**Base Used**” in any of the three columns, the power budget will be exceeded. It will be unsafe to use this configuration and you will need to restructure your base/module configuration.

**Power Budget  
Calculation  
Worksheet**

This blank chart is provided for you to copy and use in your power budget calculations.

Base # _____	Module Type	5 VDC (mA)	9 VDC (mA)	24 VDC (mA) and/or Auxiliary Base Power Source 24 VDC Output (mA)
<b>Base Used</b>				
<b>Slot 1</b>				
<b>Slot 2</b>				
<b>Slot 3</b>				
<b>Slot 4</b>				
<b>Slot 5</b>				
<b>Slot 6</b>				
<b>Slot 7</b>				
<b>Slot 8</b>				
<b>Slot 9</b>				
<b>Slot 10</b>				
<b>Other</b>				
<b>Maximum power required</b>				
<b>Remaining Power Available</b>				

- Using the tables at the beginning of the Power Budgeting section of this chapter fill in the information for the Base, CPU, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. Pay special attention to the current supplied by the base which you have selected since they do differ. Devices which fall into the **"Other"** category are devices such as the Data Communications Unit and the Handheld programmer which plug onto the CPU.
- Add the current columns starting with slot 1 and put the total in the row labeled **"Maximum power required"**.
- Subtract the row labeled **"Maximum power required"** from the row labeled **"Base Used"**. Place the difference in the row labeled **"Remaining Power Available"**.
- If **"Maximum Power Required"** is greater than **"Base Used"** in any of the three columns, the power budget will be exceeded. It will be unsafe to use this configuration and you will need to restructure your base/module configuration.