Errata Sheet

This Errata Sheet contains corrections or changes made after the publication of this manual.

Product Family:	DirectLOGIC PLCs	**Date**:	January 2019
Manual Number	H24-EBC-M		
Revision and Date	3rd Ed., Rev. A, May 2014		

Changes to Chapter 2. Installing the H2-EBC(100), H2-EBC-F or H4-EBC(-F)

Page 2-2. Setting the Module ID; Setting the Module ID with DIP Switches

Add the following to this section:

This table describes the DIP switch settings for the various EBC modules.

Module Type	Release Version	Dipswitch							
		7	6	5	4	3	2	1	0
H2-EBC H2-EBC-F	v2.1.80	Not used		Module ID					
H2-EBC100	v4.0.477	Not used		Module ID					
	v4.0.490	Not used	Recover	Module ID					
H4-EBC H4-EBC-F	v2.1.1	Not used		Module ID					

<u>Recover</u> - Dipswitch used to reset IP settings back to factory default on power-up in case device is lost on network.
<u>Module ID</u> - Bit-weighted for manual setting of this parameter.

Changes to Apppendix A. General Specifications

Page A-2. H2 Series and H4 Series EBC Specifications

In the top table, change the "Serial Port (RJ12)" specification in the third column for the H2-EBC100 to read:

"K-Sequence, ASCII IN/OUT, Modbus RTU, Provides 5V 220mA"

Page A-2. Serial Port Specifications

In this table change the description for pin 2 to read:

"5V Power Out, 220 mA"

Installing the H2-EBC(100), H2-EBC-F or H4-EBC(-F)

2

In This Chapter. . . .

EBC Network Identifiers

Each EBC module must be assigned at least one unique identifier to make it possible for PCs or other clients (masters) to recognize it on the network. Two methods of identifying the EBC module give it the flexibility to fit most networking schemes.

The identifiers are:
- Module ID (IPX protocol only)
- IP Address (for TCP/IP and MODBUS TCP/IP protocols); see Chapter 3

Setting the Module ID

If using the IPX protocol for network communications, each Ethernet Base Controller must have a Module ID (Node Address) in order to be recognized on the network, and each Module ID must be unique. Duplicate Module ID on the same network will cause unpredictable results and must be avoided.

Several Methods for Setting Module ID

There are several methods for setting the Module ID:
- The **DIP switch** on the EBC module
- The **NetEdit3** software utility (see Chapter 3)
- HTML Configuration (after IP address is assigned to module using NetEdit3; described in Chapter 5; H2–EBC100 only)
- The software utility in your **PC-based Control software** (if a utility is provided)

Setting Module ID with DIP Switches

We recommend using the DIP switch to set the Module ID because the DIP switch is simple to set, and the Module ID can be determined by looking at the physical module, without reference to a software utility.

See Errata Sheet at the beginning of this file for additional DIP switch information.

You can use the DIP switch to set the Module ID to a number from 1 – 63. Do not use Module ID 0 *for communications.*

If the DIP switch is set to a number greater than 0, the software tools are disabled from setting the Module ID. The software tools will only allow changes to the Module ID if the DIP switch setting is 0 (all switches OFF).

The DIP switch settings are read only at powerup. You must cycle power if you change the DIP switches.

Setting Module ID with Software Tool

Software changes to the Module ID do not require cycling power. To set the Module ID using one of the available software tools, do the following:
- Check to be sure all DIP switches are set to the off position, Module ID = 0 (see page 2–3 to 2–4)
- Insert the module in the base (see page 2–5)
- Connect the power wiring (see page 2–6 to 2–7)
- Connect module to the Ethernet network (see page 2–8 to 2–10)
- Apply power
- Link to the module and change the Module ID using the software of your choice. Remember to update the module before exiting the software. See note below.
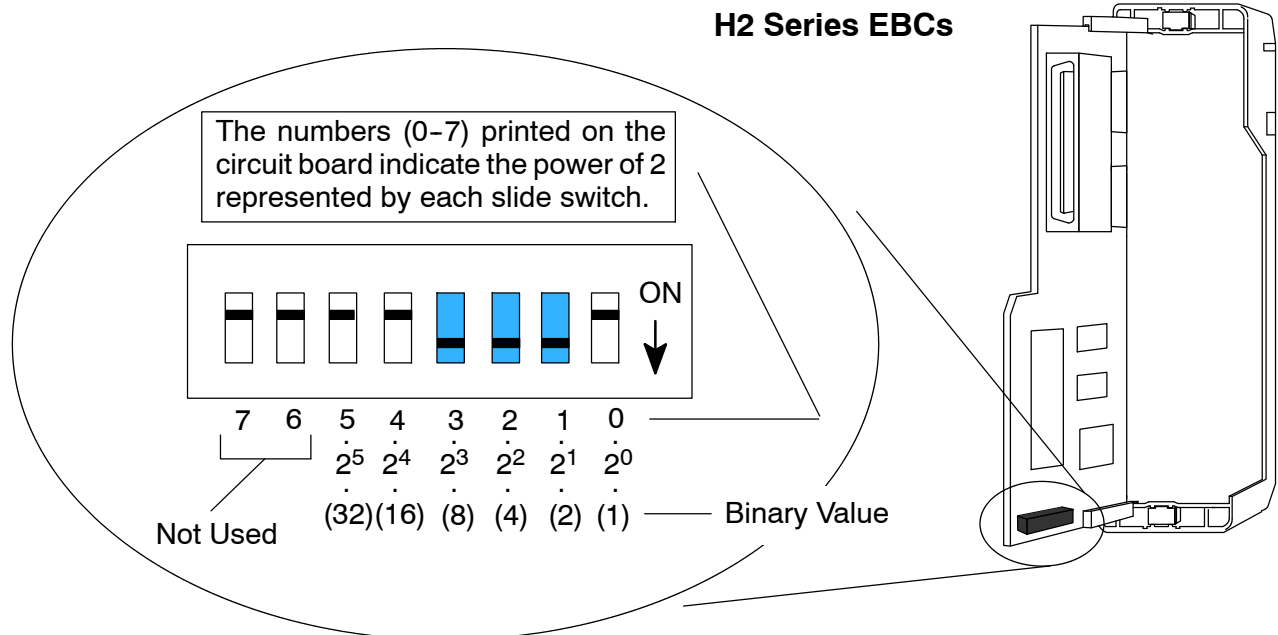
NOTE: Set the Module ID using the method recommended for your PC-based Control software. The use of NetEdit3 to set the Module ID is described in Chapter 3. Some PC-based Control software packages may make automatic updates to the EBC module configuration, overwriting the configuration developed in NetEdit3.

The H2 Series EBC DIP Switch

The H2-EBC(100) & H2-EBC-F DIP Switch

The EBC DIP switch contains eight individual switches, but only six of these are active. You will find that the printed circuit board is labeled 0 – 7. The numbers on the printed circuit board indicate the power of 2 represented by each individual switch. For example, switch 0 represents 2^0 (or 1), switch 1 is 2^1 (or 2), switch 2 is 2^2 (or 4), and so on. The figure below shows the binary value of each switch in parentheses ( ).

H2 Series EBCs

The numbers (0–7) printed on the circuit board indicate the power of 2 represented by each slide switch.

ON

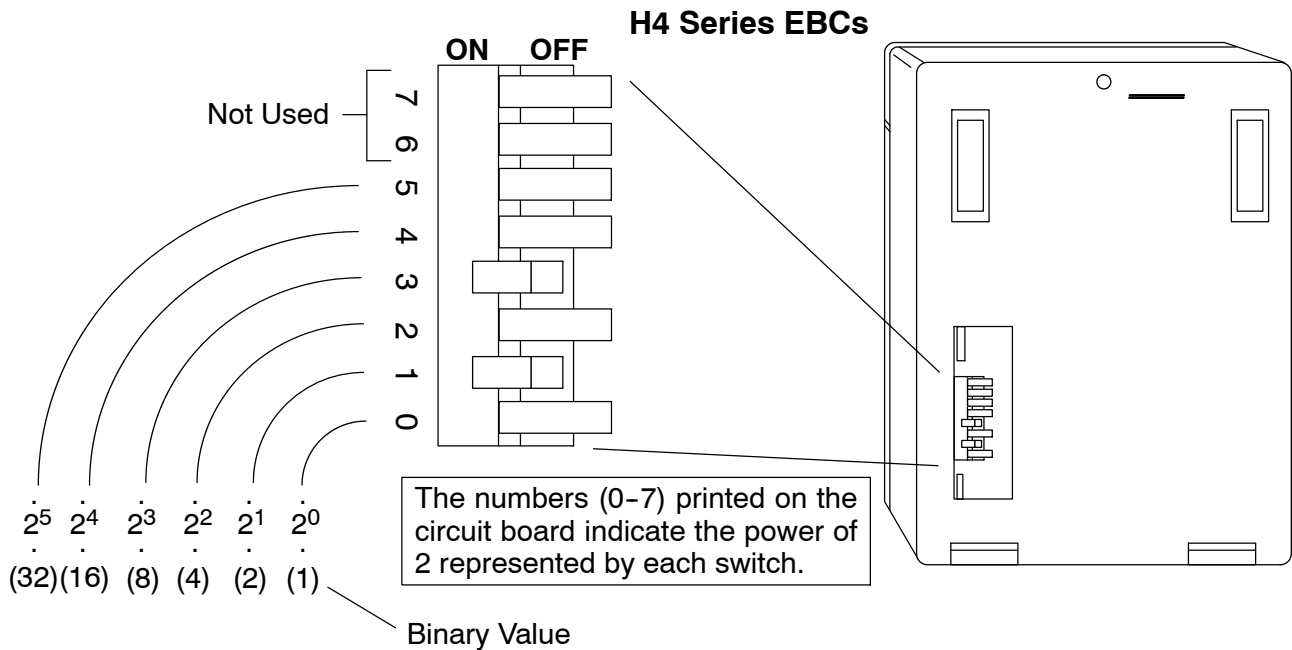| 7	6	5	4	3	2	1	0
		2^5	2^4	2^3	2^2	2^1	2^0
		(32)	(16)	(8)	(4)	(2)	(1)

Not Used

Binary Value

The Module ID equals the *sum* of the binary values of the slide switches set in the ON position. For example, if you set slide switches 1, 2, and 3 to the ON position, the Module ID will be 14. This is found by adding 8+4+2=14. The maximum value you can set on the DIP switch is 32+16+8+4+2+1=63. This is achieved by setting switches 0 through 5 to the ON position.

Installation and Setup

The H4 Series EBC DIP Switch

The H4–EBC(–F) DIP Switch

The EBC DIP switch contains eight individual switches, but only six of these are active. Two are not used. Notice that the individual switches are labeled 0 – 7 on the printed circuit board. The numbers on the printed circuit board indicate the power of 2 represented by each individual switch. For example, switch 0 represents 2^0 (or 1), switch 1 is 2^1 (or 2), switch 2 is 2^2 (or 4), and so on. The figure below shows the binary value of each switch in parentheses ( ).

H4 Series EBCs

Not Used

ON   OFF

7
6
5
4
3
2
1
0

2^5 2^4 2^3 2^2 2^1 2^0

(32)(16) (8) (4) (2) (1)

The numbers (0–7) printed on the circuit board indicate the power of 2 represented by each switch.

Binary Value

The Module ID equals the *sum* of the binary values of the individual switches set in the ON position. For example, if you set switches 1 and 3 to the ON position, the Module ID will be 10. This is found by adding 8+2=10. The maximum value you can set on the DIP switch is 32+16+8+4+2+1=63. This is achieved by setting switches 0 through 5 to the ON position. The DIP switch must be set to a number greater than zero.

Inserting the H2 Series EBC into the Base

The EBCs plug into the CPU slot of any DL205 base.

- Locate the grooves on the inside top and bottom of the DL205 base.
- Align the module with the grooves and slide the module into the slot until the face of the module is flush with the power supply.
- Push in the retaining clips to secure the module.

Align the EBC module with grooves in the base and slide it in.

Push the retaining clips in to secure the module in the DL205 base.
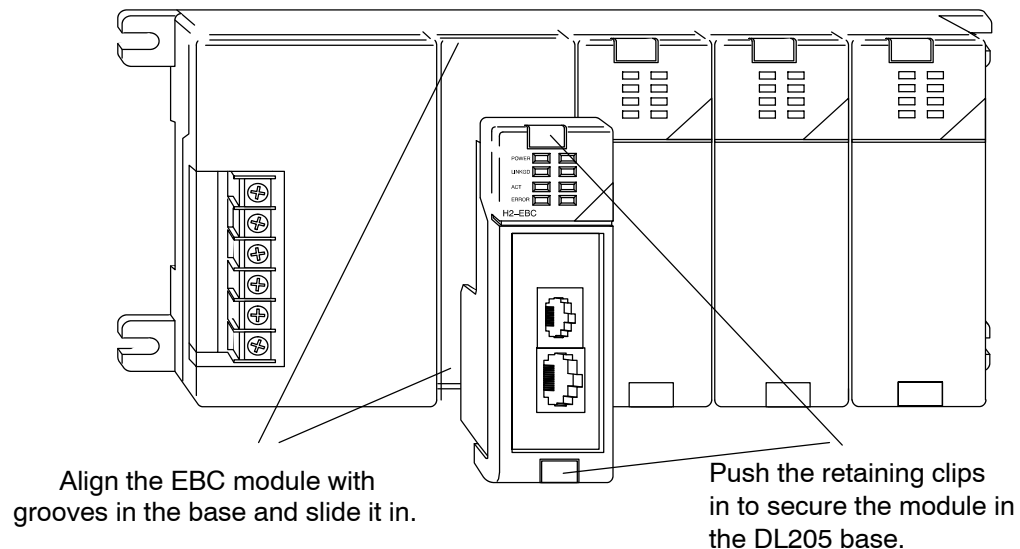
# Intalling the H4 Series EBCs onto the Base

The EBCs installs in the CPU position of any DL405 I/O base.

- The EBC has two plastic tabs at the bottom and a screw at the top.
- With the device tilted as shown, hook the plastic tabs into the notches at the bottom of the base.
- Gently push the top of the module toward the base until the back of the module is flush with the base.
- Tighten the screw at the top of the device to secure it to the base.

Spring loaded securing screw

Installation
and Setup
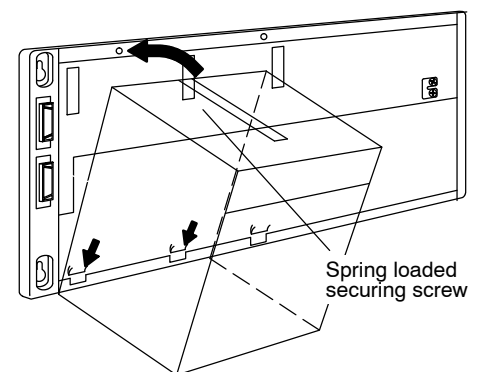
DL205 Power Wiring and Grounding

The power wires for the DL205 are *not* connected directly to the H2 Series EBCs as they are on the H4 Series EBCs. The DL205 power supply is an integral part of the base and separate from the EBC. The DL205 also has three power options: 12/24VDC, 125VDC, and 120/240VAC.
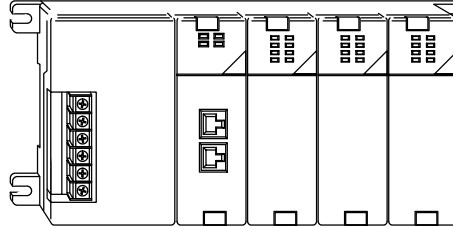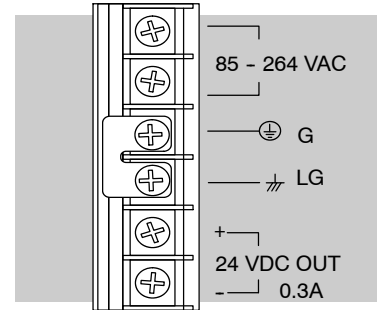

Base Wiring

The diagrams show the terminal connections located on the power supply of the DL205 bases. The base terminals can accept up to 16 AWG. You may be able to use larger wiring depending on the type of wire used, but 16 AWG is the recommended size. Do not overtighten the connector screws; recommended torque value is 7.81 pound-inches (0.882 N•m).

NOTE: You can connect either a 115 VAC or 220 VAC supply to the AC terminals. Special wiring or jumpers are not required as with some of the other *Direct*LOGIC™ products.

110/220 VAC Base Terminal Strip

85 – 264 VAC

G

LG

+
24 VDC OUT
-      0.3A

12/24 VDC Base Terminal Strip

+
12 – 24 VDC
-

G

LG

125 VDC Base Terminal Strip

115 – 264 VDC

G

LG

+
24 VDC OUT
-      0.3A
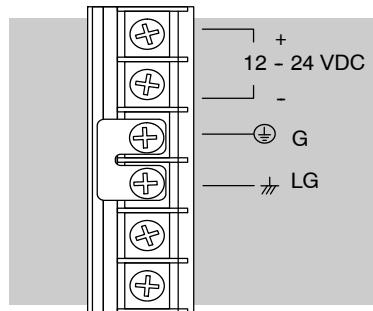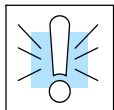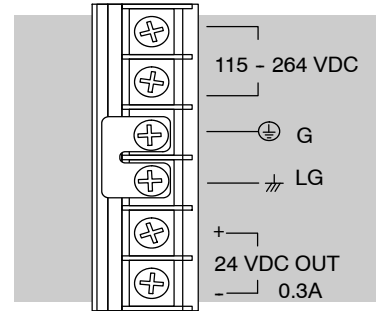
WARNING: Once the power wiring is connected, install the plastic protective cover. When the cover is removed there is a risk of electrical shock if you accidentally touch the wiring or wiring terminals.

H4 Series EBC Power Wiring and Grounding

The power connection terminals are under the front cover of the Ethernet Base Controller. The list below describes the function of each of the terminal screws.

- **Relay** – normally-open contact indicates that the EBC's link to hub or PC is good. Link Good indicator light is also on.

- **24VDC Auxiliary Power** – can be used to power field devices or I/O modules requiring external power. It supplies up to 400 mA of current at 20–28VDC, ripple less than 1 V P-P.

- **Logic Ground** – internal ground to the system which can be tied to field devices or communication ports to unite ground signals.

- **Chassis Ground** – where earth ground is connected to the unit.

- **AC Power** –where the line (hot) and the neutral (common) connections are made to the EBC.

- **110/220 Voltage Select** – a jumper across two of the terminals determines the voltage selection. Install the jumper to select 110VAC input power, or remove the jumper to select 220VAC power input.
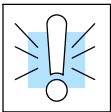
WARNING: Damage will occur to the power supply if 220 VAC is connected to the terminal connections with the 115 VAC jumper installed. Once the power wiring is connected, install the protective cover to avoid risk of accidental shock.

EBC Wiring

The following diagram shows the appropriate connections for each terminal. Note that you should install a jumper between logic ground and chassis ground for best noise immunity.
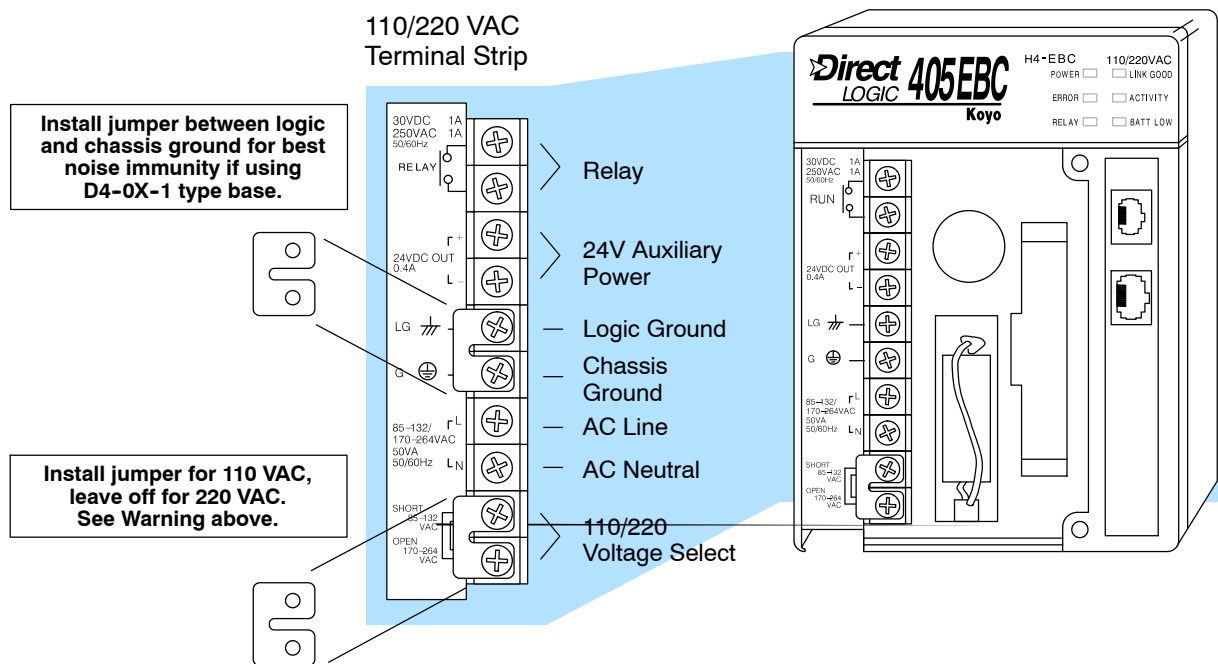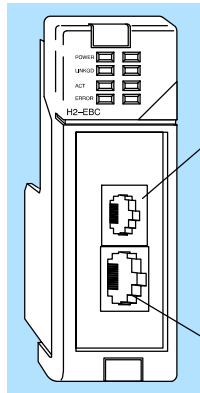
10BaseT/100BaseT Network Cabling

EBC Supports Two Standards

Two types of EBC modules are available. One type supports the Ethernet 10/100BaseT standard, and the other supports the 10BaseFL standard. The 10/100BaseT standard uses twisted pairs of copper wire conductors, and the 10BaseFL standard is for fiber optic cabling.

H2-EBC(100)

H4-EBC

RJ12
Serial
Port
RS232
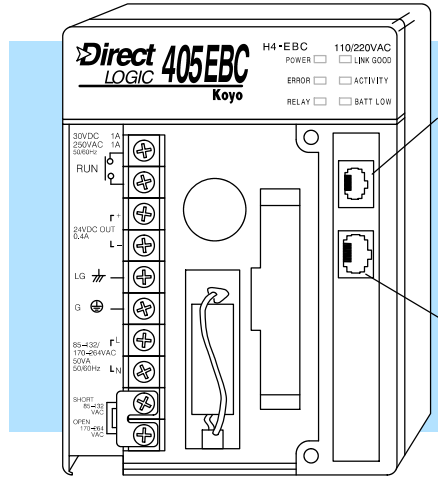
RJ45
for
10BaseT

RJ12
Serial
Port
RS232

RJ45
for
10BaseT

10/100BaseT Connections

The 10BaseT and 100BaseT EBCs have an eight-pin modular jack that accepts RJ45 connector plugs. UTP (Unshielded Twisted-Pair) cable is rated according to its data-carrying ability (bandwidth) and is given a category number. We strongly recommend using a Category 5 (CAT5) cable for all Ethernet 10/100BaseT connections. For convenient and reliable networking, we recommend that you purchase commercially manufactured cables (cables with connectors already attached).

10/100BaseT

1 2 3 4 5 6 7 8

8-pin RJ45 Connector
(8P8C)

To connect an EBC (or PC) to a hub or repeater, use a **patch cable** (sometimes called a straight-through cable). The cable used to connect a PC *directly* to an EBC or to connect two hubs is referred to as a **crossover cable**.

Patch (Straight-through) Cable

EBC			HUB
TD+ 1	OR/WHT	OR/WHT	1 RD+
TD- 2	OR	OR	2 RD-
RD+ 3	GRN/WHT	GRN/WHT	3 TD+
4	BLU	BLU	4
5	BLU/WHT	BLU/WHT	5
RD- 6	GRN	GRN	6 TD-
7	BRN/WHT	BRN/WHT	7
8	BRN	BRN	8
RJ45			RJ45

Crossover Cable

EBC			PC
TD+ 1	OR/WHT	GRN/WHT	1 TD+
TD- 2	OR	GRN	2 TD-
RD+ 3	GRN/WHT	OR/WHT	3 RD+
4	BLU	BLU	4
5	BLU/WHT	BLU/WHT	5
RD- 6	GRN	OR	6 RD-
7	BRN/WHT	BRN/WHT	7
8	BRN	BRN	8
RJ45			RJ45
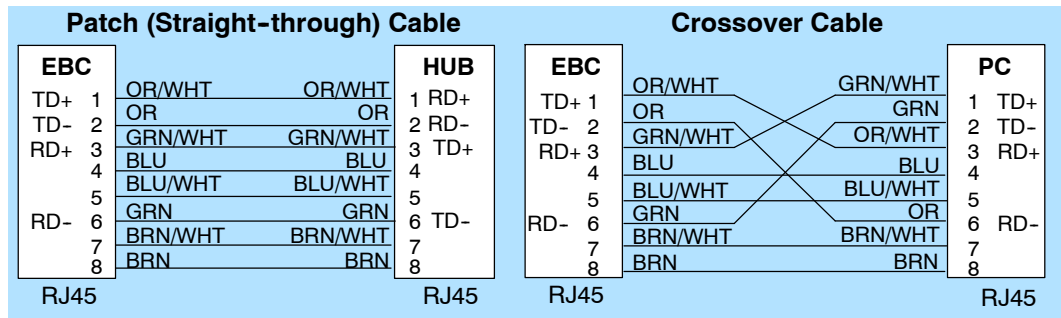
This diagram illustrates the standard wire positions in the RJ45 connector.
We recommend all EBC 10/100BaseT cables to be **Category 5**, UTP cable.

NOTE: See page 2–10 for 10/100BaseT distance limitations.

10BaseFL Network Cabling

EBC Supports Two Standards

Two types of EBC modules are available. One type supports the Ethernet 10/100BaseT standard, and the other supports the 10BaseFL standard. The 10/100BaseT standard uses twisted pairs of copper wire conductors, and the 10BaseFL standard is for fiber optic cabling.

H2-EBC-F

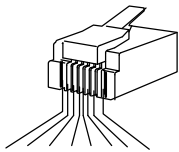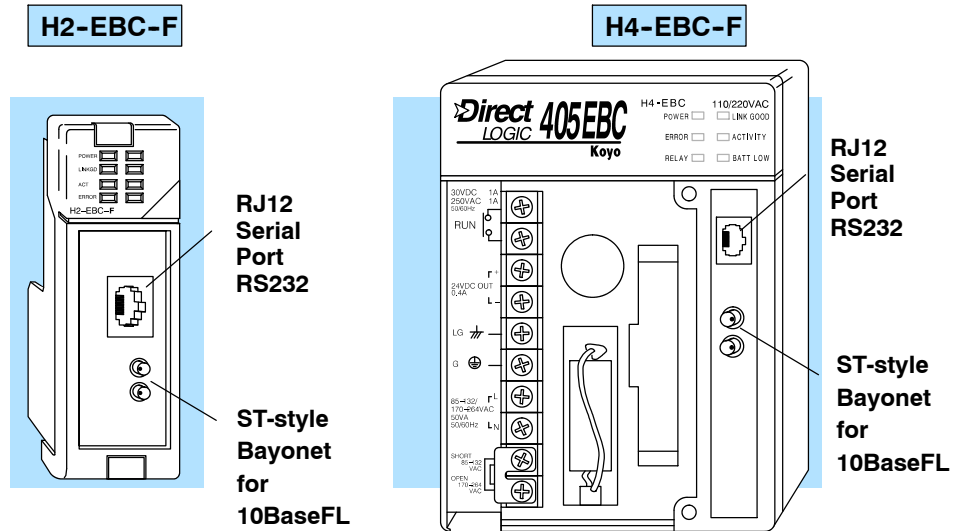RJ12 Serial Port RS232

ST-style Bayonet for 10BaseFL

H4-EBC-F

RJ12 Serial Port RS232

ST-style Bayonet for 10BaseFL

Installation and Setup

10BaseFL Connections

Each module has two ST-style bayonet connectors. The ST-style connector uses a quick release coupling which requires a quarter turn to engage or disengage. The connectors provide mechanical and optical alignment of fibers.

Each cable segment requires two strands of fiber: one to transmit data and one to receive data. The ST-style connectors are used to connect the H4-EBC-F module to a PC or a fiber optic hub or repeater. The modules themselves cannot act repeaters.

Fiber Optic Cable

The H4-EBC-F module accepts 62.5/125 multimode fiber optic (MMF) cable. The glass core diameter is 62.5 micrometers, and the glass cladding is 125 micrometers. The fiber optic cable is highly immune to noise and permits communications over much greater distances than 10/100BaseT.

Fiber Optic Module ST Connector

Multimode Fiber Optic (MMF) Cable

Transmit

Receive

62.5/125 MMF cable with bayonet ST-style connectors

Transmit   Transmit

Receive   Receive
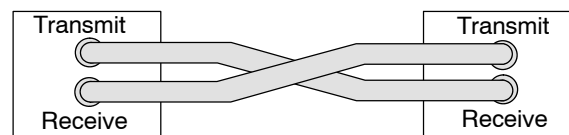
Connecting your fiber optic EBC to a network adapter card or fiber optic hub

NOTE: See page 2-10 for 10BaseFL distance limitations.

Maximum Ethernet Cable Length

The maximum distance per 10BaseT cable segment is 100 meters or 328 feet. Repeaters extend the distance. Each cable segment attached to a repeater can be 100 meters. Two repeaters connected together extend the total range to 300 meters.

10/100BaseT Distance Limitations

100 meters
(328 feet)

100 meters
(328 feet)

100 meters
(328 feet)

100 meters
(328 feet)
Between
Repeaters
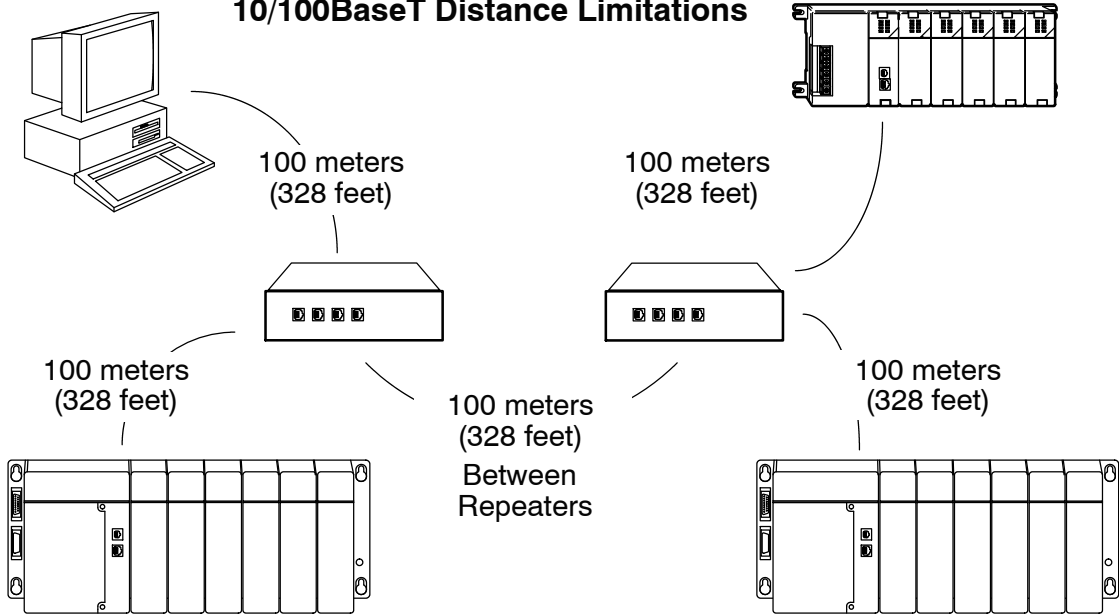
100 meters
(328 feet)

The maximum distance per 10BaseFL cable segment is 2,000 meters or 6,560 feet. Repeaters extend the distance. Each cable segment attached to a repeater can be 2,000 meters. Two repeaters connected together extend the total range to 6,000 meters.

10BaseFL Distance Limitations

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)
Between
Repeaters

2,000 meters
(6,560 feet)
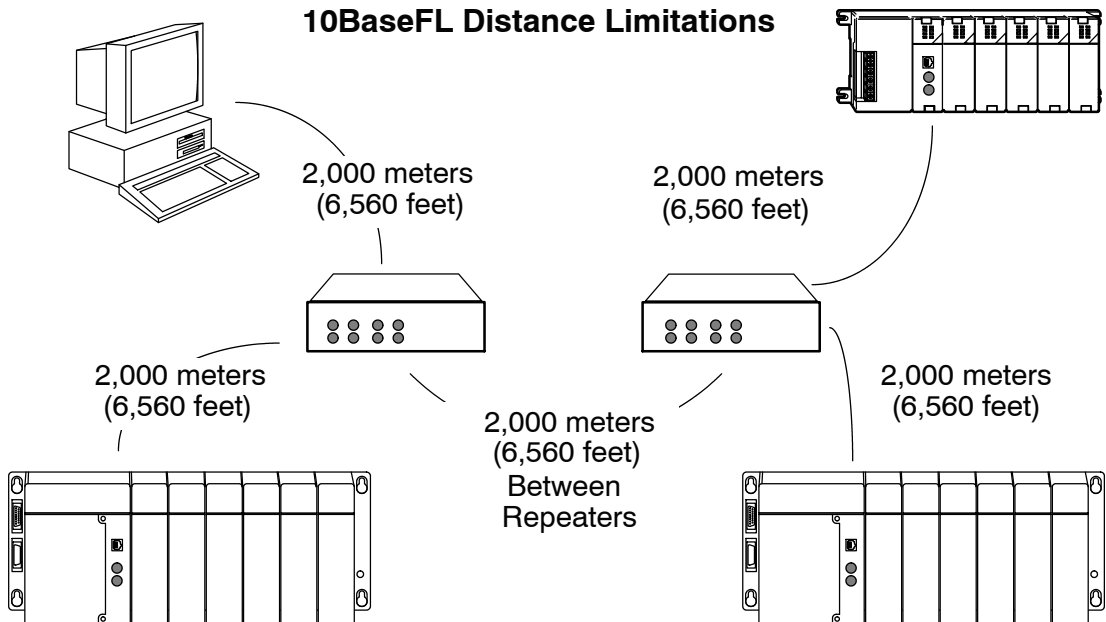
Calculating the Power Budget for the DL205 with H2 Series EBCs

Managing your Power Resource

When determining which I/O modules you will be using in the DL205 EBC system, it is important to remember that there is a limited amount of power available from the power supply. We have provided a table showing the power available from the various DL205 base power supplies and a table showing the maximum power consumed by the EBC and each of the I/O modules supported by the EBC. If any device is connected to the EBC's serial port that uses the 5VDC supply pin, be sur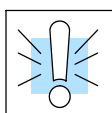e to include the device's power consumption in your 5VDC power budget calculation. Following these two tables is an example of a completed power budgeting worksheet and then a blank worksheet you can use for your own calculations.

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.

EBC Power Specifications

The following table shows the amount of electrical current available at the two voltages supplied from the DL205 base. Use these values when calculating the power budget for you system.

The Auxiliary 24V power source mentioned in the table is available at the base terminal strip. You can connect to external devices or DL205 I/O modules that require 24VDC, but be sure not to exceed the maximum current supplied.

Bases	5V Current Supplied	Auxiliary 24VDC Current Supplied
D2–03B–1	2600 mA	300 mA
D2–04B–1	2600 mA	300 mA
D2–06B–1	2600 mA	300 mA
D2–09B–1	2600 mA	300 mA
D2–03BDC1–1	2600 mA	None
D2–04BDC1–1	2600 mA	None
D2–06BDC1–1	2600 mA	None
D2–09BDC1–1	2600 mA	None
D2–06BDC2–1	2600 mA	300 mA
D2–09BDC2–1	2600 mA	300 mA

Module Power Requirements

The chart on the next page shows the maximum amount of electrical current required to power each of the DL205 EBC or I/O modules. Use these values when calculating the power budget for your system.

Power Consumption Chart (DL205 Modules)

Device	5VDC Base Power Required	External Power Required	Relay Output Modules	5VDC Base Power Required	External Power Required
DC Input Modules			D2–04TRS	250	0
D2–08ND3	50	0	D2–08TR	250	0
D2–16ND3–2	100	0	F2–08TRS	670	0
D2–32ND3(–2)	25	0	F2–08TR	670	0
AC Input Modules			D2–12TR	450	0
D2–08NA–1	50	0	**Combination Modules**		
D2–08NA–2	100	0	D2–08CDR	200	0
D2–16NA	100	0	**EBCs and Specialty Modules**		
DC Output Modules			D2–08SIM	50	0
D2–04TD1	60	20	H2–EBC	320	0
D2–08TD1(–2)	100	0	H2–EBC100	350	0
D2–16TD1–2	200	80	H2–EBC–F	450	0
D2–16TD2–2	200	0	H2–CTRIO	400	0
D2–32TD1(–2)	350	0	H2–SERIO	210	0
AC Output Modules					
D2–08TA	250	0			
F2–08TA	250	0			
D2–12TA	350	0			
Analog Modules					
F2–04AD–1(L)	50	18–30 VDC @ 80 mA max; (–L) 10–15VDC @ 90mA			
F2–04AD–2(L)	60	18–26.4 VDC @ 80 mA max; (–L) 10–15VDC @ 90mA			
F2–08AD–1	50	18–26.4 VDC @ 80 mA max			
F2–08AD–2	60	18–26.4 VDC @ 80 mA max			
F2–02DA–1(L)	40	18–30VDC @ 60mA; (L) 10–15VDC @ 70mA (add 20mA / loop)			
F2–02DA–2(L)	40	18–30 VDC @ 60 mA max; (–L) 10–15VDC @ 70mA			
F2–08DA–1	30	18–30VDC @ 50mA per channel (add 20mA / loop)			
F2–08DA–2	60	18–30 VDC @ 80 mA max			
F2–02DAS–1	100	18–30VDC @ 50mA per channel			
F2–02DAS–2	100	21.6–26.4 VDC @ 60 mA per channel			
F2–4AD2DA	60	18–26.4VDC @ 80mA; add 20mA / loop			
F2–04RTD	90	0			
F2–04THM	100	18–26.4 VDC @ 60 mA max			
F2–8AD4DA–1	35	18–26.4 VDC @ 100 mA max (add 20mA / loop)			
F2–8AD4DA–2	35	18–26.4 VDC @ 80 mA max			

Power Budget Calculation Example

The following example shows how to calculate the power budget for the DL205 system.

Base # 1	Module Type	5 VDC (mA)	Auxiliary Power Source 24 VDC Output (mA)
Available Base Power	D2–09B–1	2600	300
EBC	H2–EBC	+ 320	+ 0
Slot 0	D2–16ND3–2	+ 100	+ 0
Slot 1	D2–16NA	+ 100	+ 0
Slot 2	D2–16NA	+ 100	+ 0
Slot 3	F2–04AD–1	+ 50	+ 80
Slot 4	F2–02DA–1	+ 40	+ 100
Slot 5	D2–08TA	+ 250	+ 0
Slot 6	D2–08TD1	+ 100	+ 0
Slot 7	D2–08TR	+ 250	+ 0
Other (OI, etc.)			
Maximum Power Required		1310	180
Remaining Power Available		2600–1310= **1290**	300 – 170 = **120**

1. Using the table on the previous page, fill in the information for the base power supply, the EBC, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. If any device is connected to the EBC's serial port that uses the 5VDC supply pin, be sure to include the device's power consumption in your 5VDC power budget calculation.

2. Add the current columns starting with the row for Slot 0 and working your way down to the "**Other**" category. Put the total in the row labeled "**Maximum power required**".

3. Subtract the row labeled "**Maximum power required**" from the row labeled "**Available Base Power**". Place the difference in the row labeled "Remaining Power Available".

4. If "**Maximum Power Required**" is greater than "**Available Base Power**" in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O.

Installation
and Setup

Power Budget Calculation Worksheet

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

Base # ___0___	Module Type	5 VDC (mA)	Auxiliary Power Source 24 VDC Output (mA)
Available Base Power			
CPU Slot			
Slot 0			
Slot 1			
Slot 2			
Slot 3			
Slot 4			
Slot 5			
Slot 6			
Slot 7			
Other (OI, etc.)			
Total Power Required			
Remaining Power Available			

1. Using the table on the previous page, fill in the information for the base power supply, the EBC, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. If any device is connected to the EBC's serial port that uses the 5VDC supply pin, be sure to include the device's power consumption in your 5VDC power budget calculation.

2. Add the current columns starting with the row for Slot 0 and working your way down to the **"Other"** category. Put the total in the row labeled "**Maximum power required**".

3. Subtract the row labeled "**Maximum power required**" from the row labeled "**Available Base Power**". Place the difference in the row labeled "**Remaining Power Available**".

4. If **"Maximum Power Required"** is greater than "**Available Base Power**" in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O.

Calculating the Power Budget for the H4 Series EBCs

Managing your Power Resource

When determining which I/O modules you will be using in the DL405 EBC system, it is important to remember that there is a limited amount of power available from the power supply. We have provided a table showing the power available from the H4–EBC and H4–EBC–F or Expansion Unit power supplies and a table showing the maximum power consumed by each of the I/O modules supported by the EBC. If any device is connected to the EBC's serial port that uses the 5VDC supply pin, be sure to include the device's power consumption in your 5VDC power budget calculation. Following these two tables is an example of a completed power budgeting worksheet and then a blank worksheet you can use for your own calculations.

If the I/O modules you chose exceed the maximum power available from the power supply you can resolve the problem by shifting some of the modules to an expansion base which contains another power supply.

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.

EBC and Expansion Base Power Specifications

The following chart shows the amount of electrical current available at the two voltages supplied by the EBCs and Expansion units. Use these current values when calculating the power budget for your system.

The Auxiliary 24VDC Power Source mentioned in the table is available at the H4–EBC terminal strip (see page 2–7). You can use this power source to connect to external devices or DL405 I/O modules that require 24VDC.

CPUs	5VDC Current Supplied in mA.	Auxiliary 24VDC Power Source Current Supplied in mA.
H4–EBC	3680	400
H4–EBC–F	3550	400
Expansion Units	**5VDC Current Supplied in mA.**	**Auxiliary 24VDC Power Source Current Supplied in mA.**
D4–EX	4000	400

Module Power Requirements

The chart on the next page shows the maximum amount of electrical current required to power each of the DL405 I/O modules. Use these values when calculating the power budget for your system.

Power Consumption Chart (DL405 Modules)

Device	5V Current Required (mA)	External 24V Current Req. (mA)
I/O Bases		
D4–04B, D4–04BNX, D4–04B–1	80	None
D4–06B, D4–06BNX, D4–06B–1	80	None
D4–08B, D4–08BNX, 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
F4–08NES	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 (5–15VDC)
D4–32TD2	350	120 / (4A max including loads)
D4–64TD1	800 (max)	None
Specialty Modules		
D4–HSC	300	None
D4–16SIM	150	None
H4–CTRIO	400	None

Device	5V Current Required (mA)	External 24V Current Req. (mA)
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–2	575	None
D4–16TR	1000	None
Analog Modules		
D4–04AD	200	200
F4–04AD	85	100
F4–04ADS	270	120
F4–08AD	75	90
F4–16AD–1	75	100
F4–16AD–2	75	100
D4–02DA	250	300
F4–04DA	120	180
F4–04DA–1	70	75 + 20 per circuit
F4–04DA–2	70	75 + 20 per circuit
F4–08DA–1	70	100 + 20 per circuit
F4–08DA–2	80	150
F4–16DA–1	70	100 + 20 per circuit
F4–16DA–2	80	150
F4–08THM	110	60
F4–08THM–n	120	50 + 20 per circuit
F4–08RTD	80	None
F4–04DAS–1	60	60 per circuit
F4–04DAS–2	60	60 per circuit

Power Budget Calculation Example

The following example shows how to calculate the power budget for the DL405 system.

Base # 1	Module Type	5 VDC (mA)	Auxiliary Power Source 24 VDC Output (mA)
EBC/ Expansion Unit	H4–EBC	3680	400
Slot 0	D4–16ND2	+ 150	+ 0
Slot 1	D4–16ND2	+ 150	+ 0
Slot 2	D4–02DA	+ 250	+ 300
Slot 3	D4–08ND3S	+ 100	+ 0
Slot 4	D4–08ND3S	+ 100	+ 0
Slot 5	D4–16TD2	+ 400	+ 0
Slot 6	D4–16TD2	+ 400	+ 0
Slot 7	D4–16TR	+ 1000	+ 0
Base	D4–08B	+ 80	+ 0
Other (OI, etc.)			
Maximum power required		2630	300
Remaining Power Available		3680–2630= 1050	400 – 300 = 100

1. Using the table on the previous page, fill in the information for the EBC/Expansion Unit, I/O modules, and any other devices that will use system power including devices that use the 24 VDC output. If any device is connected to the EBC's serial port that uses the 5VDC supply pin, be sure to include the device's power consumption in your 5VDC power budget calculation.Pay special attention to the current supplied by the H4–EBC, the H4–EBC–F or the Expansion Unit. Each one supplies a different amount of current.

2. Add the current columns starting with the row for Slot 0 and working your way down to the **"Other"** category. Put the total in the row labeled **"Maximum power required".**

3. Subtract the row labeled "**Maximum power required**" from the row labeled "**EBC**/Expansion Unit". Place the difference in the row labeled "**Remaining Power Available**".

4. If **"Maximum Power Required"** is greater than "**EBC**/**Expansion Unit**" in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O. You may need to add expansion bases to accommodate your current requirements.

Installation
and Setup

Power Budget Calculation Worksheet

You may copy and use the following blank chart for your power budget calculations.

| Base # _____	Module Type	5 VDC (mA)	Auxiliary Power Source 24 VDC Output (mA)
EBC/ Expansion Unit			
Slot 0			
Slot 1			
Slot 2			
Slot 3			
Slot 4			
Slot 5			
Slot 6			
Slot 7			
Base			
Other (OI, etc.)			
Maximum Power Required			
Remaining Power Available			

1. Using the tables at the beginning of the Power Budgeting section of this chapter fill in the information for the EBC/Expansion Unit, 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 H4–EBC, the H4–EBC–F or the Expansion Unit since they do differ.
2. Add the current columns starting with the row for Slot 0 and working your way down to the **"Other"** category. Put the total in the row labeled **"Maximum power required".**
3. Subtract the row labeled "**Maximum power required**" from the row labeled "**EBC**/**Expansion Unit**". Place the difference in the row labeled "**Remaining Power Available**".
4. If **"Maximum Power Required"** is greater than "**EBC**/**Expansion Unit**" in either of the two columns, the power budget will be exceeded. It will be unsafe to use this configuration, and you will need to restructure your I/O. You may need to add expansion bases to accommodate your current requirements.

DL405 Local and Expansion I/O

The H4 Series EBCs support the use of DL405 series I/O local and local expansion bases.

Local Base and I/O   The local base is the base in which the EBC resides. Local I/O modules reside in the same base as the EBC. For example, placing 32-point modules in all eight slots in an 8-slot base will use 256 I/O points .
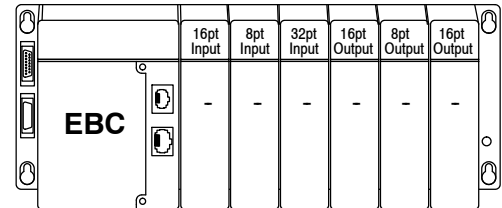
Local Expansion Base and I/O

Use local expansion bases when you need more I/O points or a greater power budget than the local base provides. The expansion bases require a Local Expansion Unit (rather than an EBC) and a cable (either D4–EXCBL–1 or D4–EXCBL–2) to connect to the local EBC base.

The following figure shows one EBC base and three expansion bases. The I/O modules are shown as examples of a usable configuration, but any configuration of I/O modules could be used if it is supported by the power budget. See page 2–15 for information about calculating the power budget.

H4–EBC and H4–EBC–F modules support one local base and a maximum of three expansion bases.

The H4–EBC(–F) supports up to three expansion bases.