# Ethernet Remote I/O Master Modules

## Ethernet Remote I/O Master Module

**H4-ERM100    $248.00**

**H4-ERM-F*    $425.00**

*Not recommended for new installations.*

### Ethernet remote I/O master

The Ethernet Remote Master H4-ERM100 connects D4-440, D4-450, and D4-454 CPU systems to Ethernet Base Controller (EBC) slave I/O over a high-speed Ethernet link.

### Need a lot of I/O?

Each ERM module can support up to 16 DL205 EBC systems (H2-EBC100), 16 Terminator I/O EBC systems (T1H-EBC100), or 16 fully expanded DL405 EBC systems (H4-EBC). See the next page for more information. Of course, combinations are fine, too. The ERM also supports Edrives. See the Drives section for details.

*Note: Applications requiring an extremely large number of T1H-EBC analog I/O or H4-EBC 16-channel analog I/O could exceed the buffer capacity of a single H4-ERM100 module. In these cases, an additional H4-ERM100 may be required.*

### Simple connections

The ERM connects to your control network using Category 5 UTP cables for cable runs up to 100 meters. Distances can be greatly extended with Ethernet/Fiber media converters like the SE-MC2U-ST.
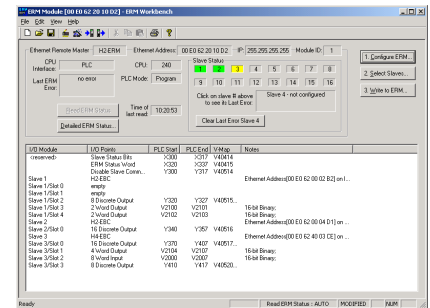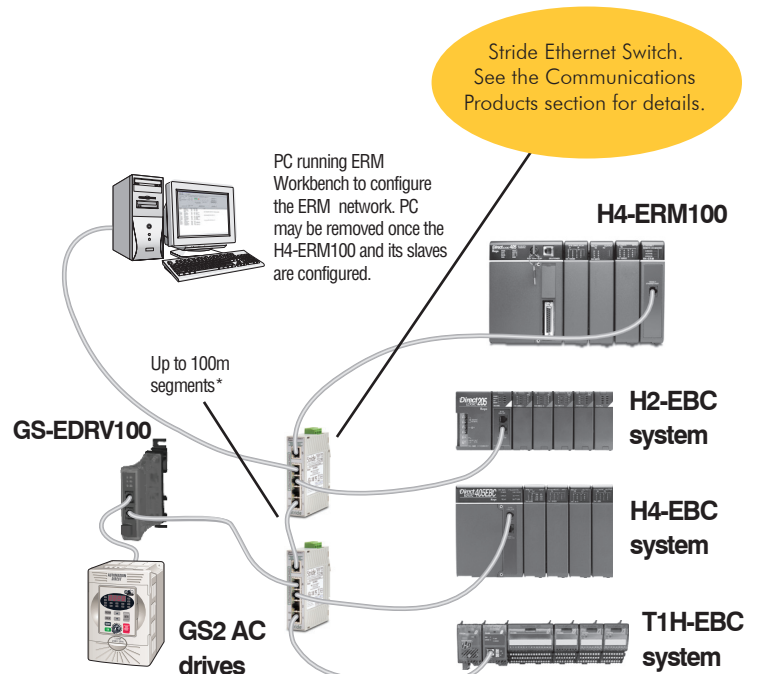
### Networking ERMs with other Ethernet devices

It is required that a dedicated Ethernet remote I/O network be used for the ERM and its slaves. While Ethernet networks can handle a very large number of data transactions, and normally handle them very quickly, heavy Ethernet traffic can adversely affect the reliability of the slave I/O and the speed of the I/O network. Keep ERM networks, multiple ERM networks and ECOM/office networks isolated from one another.

### Software configuration

ERM Workbench is a software utility that must be used to configure the ERM and its remote Ethernet slaves. ERM Workbench supports two methods of configuring the ERM I/O network:

• ERM Workbench PLC Wizard - greatly simplifies the configuration procedure when a PLC is used as the CPU interface.

• ERM Workbench - configures the I/O network whether the CPU interface is a PLC or WinPLC, and allows access to all ERM I/O network parameters.

**ERM Workbench Software**



| Specifications | H4-ERM100 | H4-ERM-F |
|---|---|---|
| NOTE: H4-ERM-F is not recommended for new installations | | |
| Communications | 10/100BaseT Ethernet | 10BaseFL Ethernet |
| Data Transfer Rate | 100 Mbps | 10 Mbps |
| Link Distance | 100 meters (328 | 2K meters (6560 ft) |
| Ethernet Port | RJ45 | ST-style fiber optic |
| Ethernet Protocols | TCP/IP, IPX, Modbus TCP/IP, DHCP, HTML configuration | TCP/IP, IPX |
| Power Consumption | 300 mA @5 VDC | 450 mA @5 VDC |

Stride Ethernet Switch. See the Communications Products section for details.

PC running ERM Workbench to configure the ERM network. PC may be removed once the H4-ERM100 and its slaves are configured.

H4-ERM100

Up to 100m segments*

GS-EDRV100

H2-EBC system

H4-EBC system

GS2 AC drives

T1H-EBC system

*Distances can be greatly extended with Ethernet/Fiber media converters like the SE-MC2U-ST.

# Ethernet Base Controller Modules

## Ethernet Base Controller Module

**H4-EBC**  $493.00

**H4-EBC-F***  $599.00

*Not recommended for new installations.

| Specifications | H4-EBC | H4-EBC-F |
|---|---|---|
| NOTE: H4-EBC-F is not recommended for new installations | | |
| Communications | 10Base-T Ethernet | 10Base-FL Ethernet |
| Data Transfer Rate | 10Mbps | 10Mbps |
| Link Distance | 100 meters (328 ft) | 2,000 meters (6,560 ft) |
| Ethernet Port | RJ45 | ST-style fiber optic |
| Ethernet Protocols | TCP/IP, IPX | TCP/IP, IPX |
| Serial Port | RJ12, K-sequence, ASCII IN/OUT | RJ12, K-sequence, ASCII IN/OUT |
| Max. Expansion Bases | 3 | 3 |
| Max. Discrete I/O | 1280 | 1280 |
| Max. Analog I/O | 512 | 512 |
| Power Supplied | 3470mA @ 5VDC 400mA @ 24VDC | 3300mA @ 5VDC 400mA @ 24VDC |

RJ45 port for 10BaseT

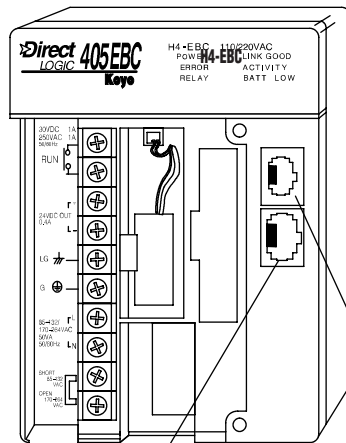ST bayonet for 10BaseFL

RJ12 serial port

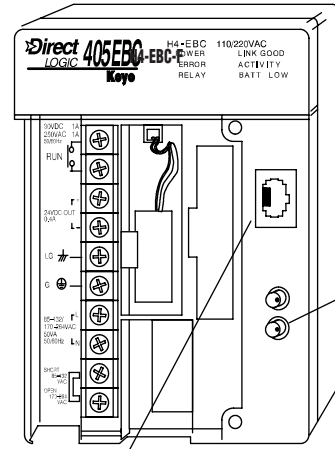## Use EBCs for PC-based control and for H4-ERM100 remote I/O slaves

The H4-EBC Ethernet Base Controller modules provide a high-performance, low-cost Ethernet link between your PC-based control system or H4-ERM100 Ethernet remote I/O system and DL405 I/O. The H4-EBC module supports industry standard 10Base-T Ethernet communication. This module offers 10Mbps transfer rates between your PC application and your DL405 I/O base. The EBC module is compatible with TCP/IP and IPX protocols for flexible PC communications. Four addressing schemes make it easy to identify the module on the network using the method that works best for you. EBCs also offer:

- Virtually unlimited number of I/O points
- I/O updates on dedicated networks
- Use off-the-shelf networking components to connect to your existing network
- Fast I/O updates (<1ms per base possible based on IO)
- On-board serial port for operator interface, etc. when used with a PC-based program like Think and Do Live. (serial port not supported when used with the H4-ERM100 module).

## Easy to use, reliable and fast

The H4-EBC module plugs into the CPU slot of any DL405 I/O base. The 10Base-T port can be networked using commercially available cabling, hubs, and repeaters. The H4-EBC module supports all DL405 discrete and analog I/O modules. The H4-EBC module also supports the H4-CTRIO but no other intelligent modules.

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

405EBC  405EX  405EX  405EX
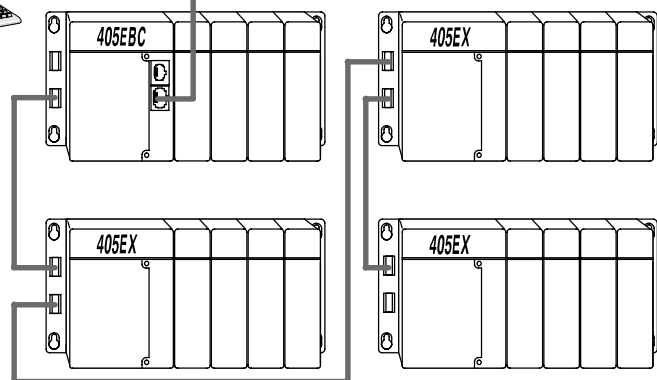
# Ethernet Base Controller Modules

## Off-the-shelf solutions

You can purchase PC-based control software that is ready to use with the H4-EBC module. PC-based control packages are equipped with compatible I/O device drivers, program development tools, and run-time environments. See the PC-based Control Products section for an integrated PC-based Control solution to make your PC into an industrial controller.

## Software developers

For programmers developing custom drivers for our I/O, we offer a free Ethernet Software Development Kit (SDK). The SDK provides a simplified API for interfacing with the H4-EBC. The software interface libraries are provided for WIN32, WIN16, and DOS operating systems. The source code is available to developers under a non-disclosure agreement. Visit the technical support link at our Web site for more information.

**Stride Ethernet Switch**
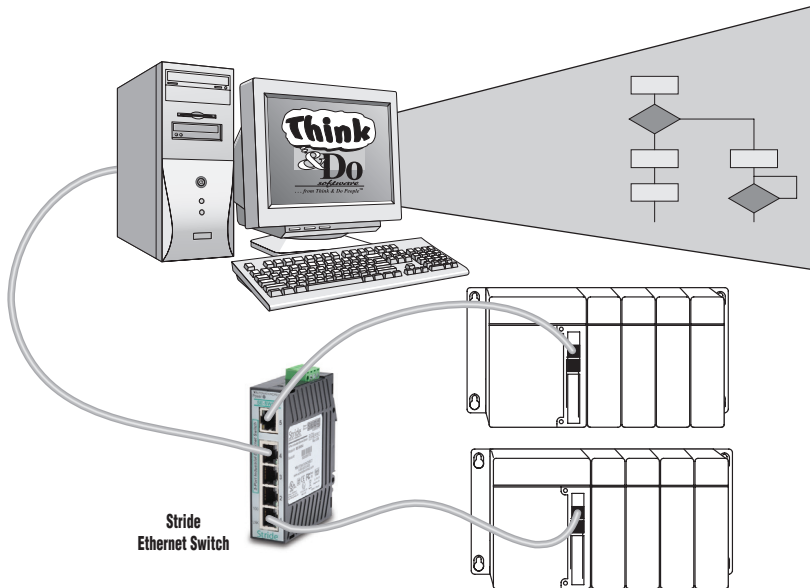
*The following vendors have PC-based Control products ready to control our I/O, or they have compatible products to be released in the future.*

| Vendor | Product | Web Address |
|---|---|---|
| AUTOMATIONDIRECT | KEP*Direct* EBC I/O Server | www.automationdirect.com |
| Phoenix Contact | Think & Do Live! | www.phoenixcon.com/software |
| KEPware | KEPServerEX | www.kepware.com |
| Wonderware | InControl | www.wonderware.com |

```
READ I/O

int HEIReadIO
        (
        HEIDevice *pDevice,
                Byte *pBuffer,
                WORD BuffSize
        );

WRITING I/O

int HEIWriteIO
        (
        HEIDevice *pDevice,
                BYTE *pData,
                WORD SizeofData,
                BYTE *pReturnData,
                WORD *pSizeofReturnData
        );
```
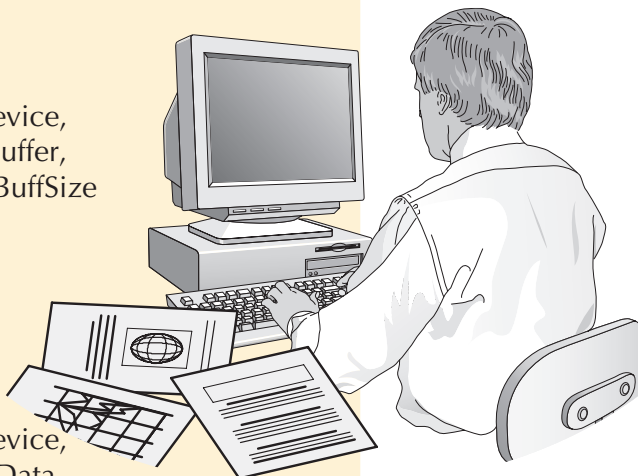
# Check the Power Budget

## 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 *ZIP*Links 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 *ZIP*Link 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 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-1 | +80 | +0 |
| | **Handheld Programmer** | D4-HPP-1 | +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 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** | D4-454, D4-450, D4-440, D4-EX (expansion base unit), D4-RS (remote slave unit) | D4-454DC-1, D4-440DC-1, (expansion base unit), D4-RSDC  D4-EXDC (remote slave unit) | 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** | **24V Aux Power Supplied in mA** |
| 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 | | | | | |
|---|---|---|---|---|---|
| **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 |
| D4-08ND3S | 100 | NONE | F4-08DA-1 | 90 | 100+20 per circuit |
| D4-16ND2 | 150 | NONE | F4-08DA-2 | 80 | 150 |
| D4-16ND2F | 150 | NONE | F4-16DA-1 | 90 | 100+20 per circuit |
| D4-32ND3-1 | 150 | NONE | F4-16DA-2 | 80 | 25 max. |
| D4-64ND2 | 300 max. | NONE | F4-08RTD | 80 | NONE |
| | | | F4-08THM-n | 120 | 50 |
| | | | F4-08THM | 110 | 60 |
| **AC Input Modules** | | | **Remote I/O** | | |
| D4-08NA | 100 | NONE | H4-ERM100 | 320(300) | NONE |
| D4-16NA | 150 | NONE | H4-ERM-F | 450 | NONE |
| **AC/DC Input Modules** | | | D4-RM | 300 | NONE |
| D4-16NE3 | 150 | NONE | | | |
| F4-08NE3S | 90 | NONE | **Communications and Networking** | | |
| **DC Output Modules** | | | H4-ECOM100 | 300 | NONE |
| F4-08TD1S | 295 | NONE | D4-DCM | 500 | NONE |
| D4-16TD1 | 200 | 125 | F4-MAS-MB | 235 | NONE |
| D4-16TD2 | 400 | NONE | FA-UNICON | NONE | 65 |
| D4-32TD1 | 250 | 140 | | | |
| D4-32TD1-1 | 250 | 140 (15V) | **CoProcessors** | | |
| D4-32TD2 | 350 | 120 (4A max including loads) | F4-CP128-1 | 305 | NONE |
| D4-64TD1 | 800 | NONE | F4-CP128-T | 350 | NONE |
| **AC Output Modules** | | | **Specialty Modules** | | |
| D4-08TA | 250 | NONE | H4-CTRIO | 400 | NONE |
| D4-16TA | 450 | NONE | D4-INT | 100 | NONE |
| **Relay Output Modules** | | | F4-16PID | 160 | NONE |
| D4-08TR | 550 | NONE | F4-8MPI | 225 | 170 |
| F4-08TRS-1 | 575 | NONE | D4-16SIM | 150 | NONE |
| F4-08TRS-2 | 575 | NONE | F4-4LTC | 280 | 75 |
| D4-16TR | 1000 | NONE | **Programming** | | |
| **Analog Modules** | | | D4-HPP-1 (Handheld Prog.) | 320 | NONE |
| F4-04AD | 150 | 100 | **Operator Interface** | | |
| F4-04ADS | 370 | 120 | DV-1000 | 150 | NONE |
| F4-08AD | 75 | 90 | C-more Micro-Graphic | 210 | NONE |