

Ethernet Remote I/O Master Modules

Ethernet Remote I/O Master Module

H4-ERM <--->
H4-ERM-F <--->



Ethernet remote I/O master

The Ethernet Remote Master H4-ERM (-F) connects DL430, DL440 and DL450 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-EBC), 16 Terminator I/O EBC systems (T1H-EBC), 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-ERM module. In these cases, an additional H4-ERM may be required.

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

Simple connections

The ERM connects to your control network using Category 5 UTP cables for cable runs up to 100 meters. Use repeaters to extend distances and expand the number of nodes. Our fiber optic version uses industry standard 62.5/125 ST-style fiber optic cables and can be run up to 2,000 meters.

The CPU, ERM and EBC slave modules work together to update the remote I/O points. These three scan cycles are occurring at the same time, but asynchronously. It is recommended that critical I/O points that must be monitored every scan be placed in the CPU base.

Networking ERMs with other Ethernet devices

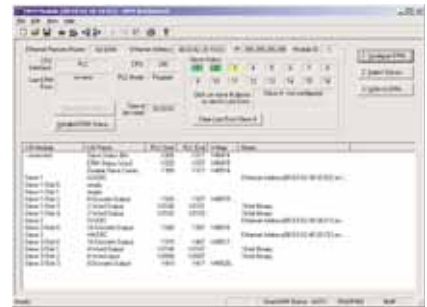
It is required that a dedicated Ethernet remote I/O network be used for the ERM and its slaves. While Ethernet networks can handle a very large number of data transactions, and normally handle them very quickly, heavy Ethernet traffic can adversely affect the reliability of the slave I/O and the speed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

Software configuration

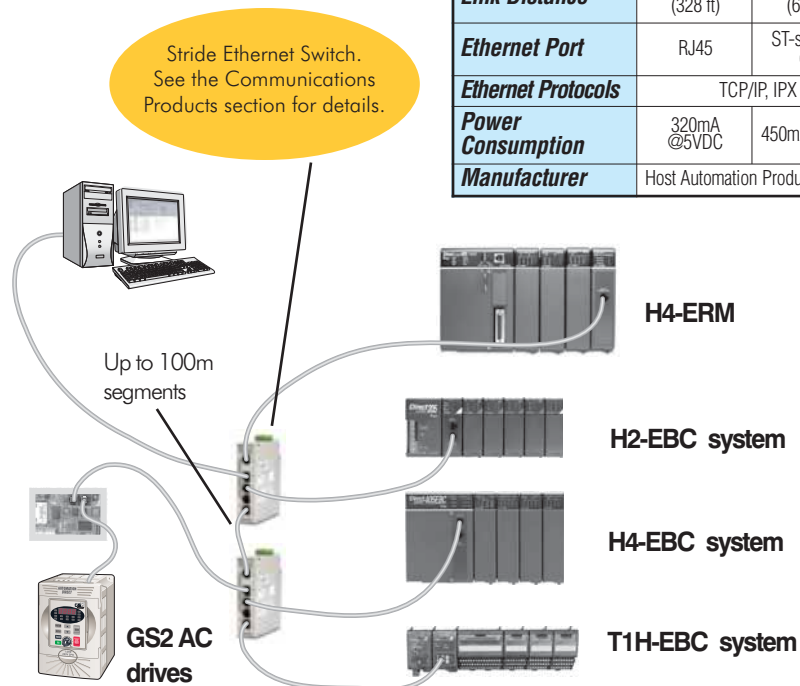
ERM Workbench is a software utility that must be used to configure the ERM and its remote Ethernet slaves. ERM workbench supports two methods of configuring the ERM I/O network:

- 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-ERM	H4-ERM-F
Communications	10BaseT Ethernet	10BaseFL Ethernet
Data Transfer Rate	10Mbps	
Link Distance	100 meters (328 ft)	2K meters (6560 ft)
Ethernet Port	RJ45	ST-style fiber optic
Ethernet Protocols	TCP/IP, IPX	
Power Consumption	320mA @5VDC	450mA @5VDC
Manufacturer	Host Automation Products, L.L.C.	



Ethernet Base Controller Modules

Ethernet Base Controller Module

H4-EBC <---->
H4-EBC-F <---->

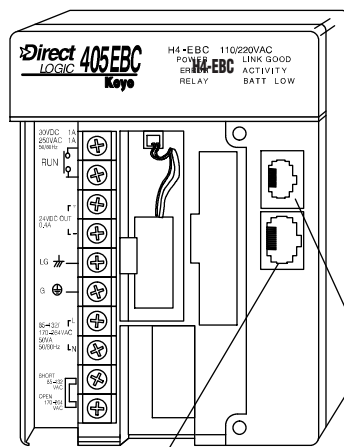


Use EBCs for PC-based control and for H4-ERM remote I/O slaves

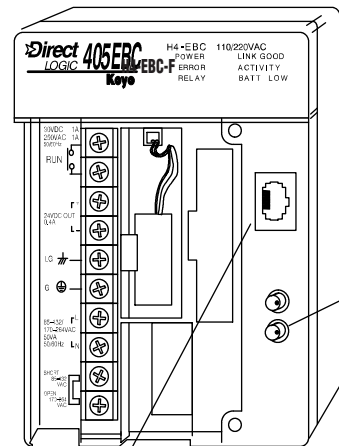
The H4-EBC and H4-EBC-F Ethernet Base Controller modules provide a high-performance, low-cost Ethernet link between your PC-based control system or H4-ERM Ethernet remote I/O system and DL405 I/O. The H4-EBC module supports industry standard 10Base-T Ethernet communications, and the H4-EBC-F module supports 10Base-FL (fiber optic) Ethernet standards. Both modules offer 10Mbps transfer rates between your PC application and your DL405 I/O base. The EBC modules are 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 Hx-ERM module).

Specifications	H4-EBC	H4-EBC-F
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
Power Supplied	3470mA @ 5VDC 400mA @ 24VDC	3300mA @ 5VDC 400mA @ 24VDC
Manufacturer	Host Automation Products, L.L.C.	Host Automation Products, L.L.C.



RJ45 port for 10BaseT



ST bayonet for 10BaseFL

RJ12 serial port

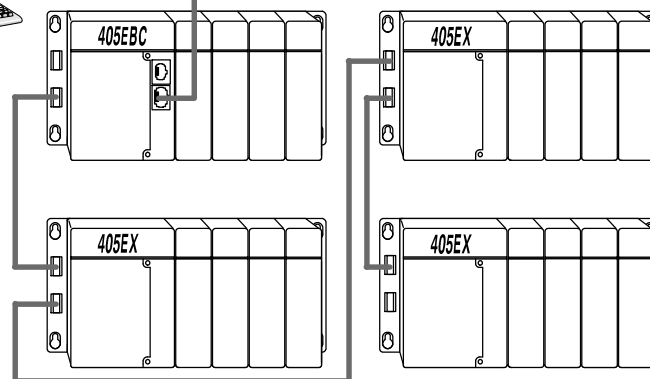
Easy to use, reliable and fast

The H4-EBC(-F) module plugs into the CPU slot of any DL405 I/O base. The 10Base-T or 10Base-FL port can be networked using commercially available cabling, hubs, and repeaters. The

H4-EBC(-F) module supports all DL405 discrete and analog I/O modules. The H4-EBC module also supports the H4-CTRIO and D4-HSC, but no other intelligent modules are supported.



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



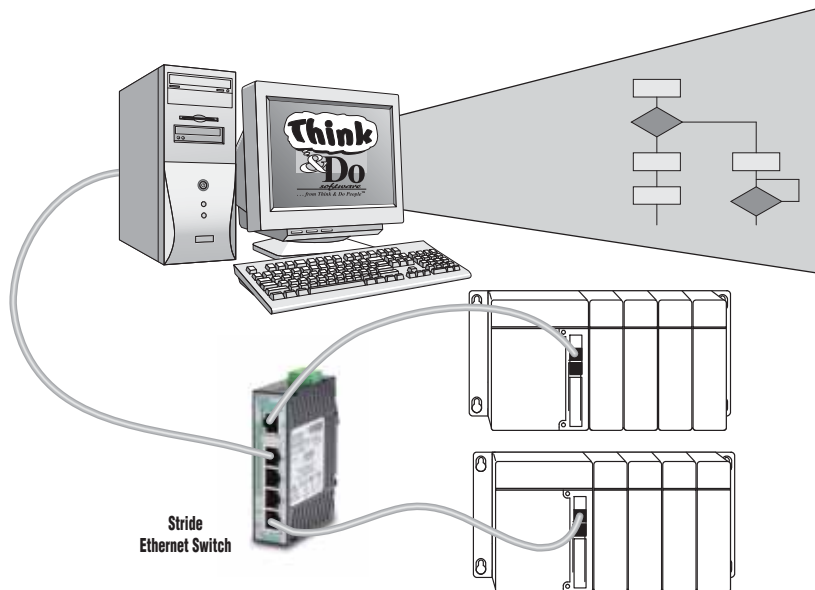
Ethernet Base Controller Modules

Off-the-shelf solutions

You can purchase PC-based control software that is ready to use with the H4-EBC(-F) 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(-F). 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.



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.

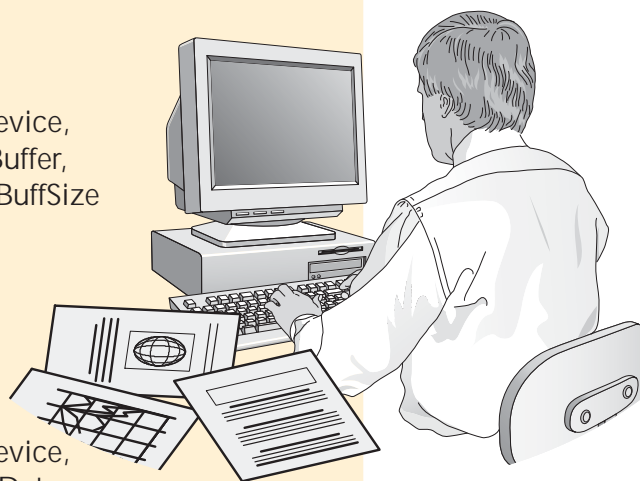
Vendor	Product	Web Address
AUTOMATIONDIRECT	KEPDirect EBC I/O Server	www.automationdirect.com
Phoenix Contact	Think & Do Live!	www.phoenixcon.com/software
KEPware	KEPServerEX	www.kepware.com
Wonderware	InControl	www.wonderware.com

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
);
```



Modbus Network Master

Modbus RTU Network Master Module

F4-MAS-MB <--->



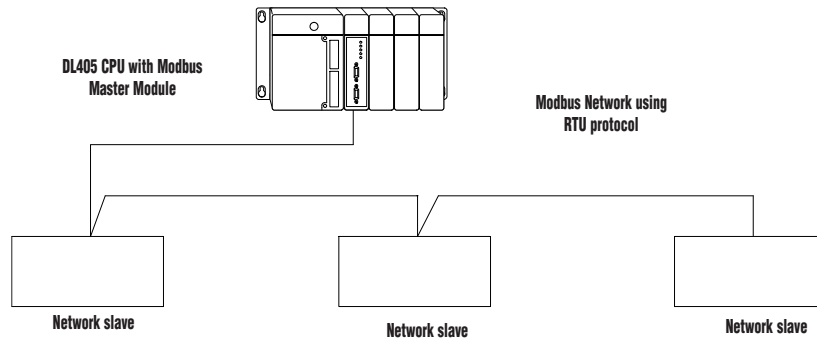
Overview

Our Modbus Master module allows you to use a DL405 PLC as the network master for a Modbus RTU network. The module communicates with any network slave by using high level Modbus commands.

Easy setup and operation

Module setup is accomplished by loading values into special V-memory locations inside the DL405 CPU. The data read or written is also stored in the CPU's V-memory area, which makes it easily accessible for use in control schemes. If simplicity is your primary concern, you can use the DL405 RX and WX instructions in your ladder program to initiate read and write requests. Minimal setup is required with this option and it is especially useful for event-triggered data exchanges. If you have more complex data requirements, you can use the Table Read/Write capability. By filling in a special block of the CPU's V-memory, you can specify a slave address, starting data address, and number of bytes to transfer. This option requires more setup, but it is also more useful if you need to constantly exchange data with several slave stations.

Specifications	
Modules per CPU	Eight maximum, any slot in CPU base
F4-MAS-MB	Ports 1 and 2, RS-232/422/485 selectable, maximum baud rate of 115.2K baud. Note: Select port 1 or port 2 as the Modbus port (only one can be configured as a Modbus port.) If port 2 is configured as the Modbus port, then port 1 can be configured as a debug port.
Recommended Cable	Belden 9841 or equivalent (RS-485) Belden 9729 or equivalent (RS-422)
Power Required	235mA max at 5VDC (supplied by base power supply); 350mA for F4-MAS-MBR
Environment	0°C to 60°C (32°F to 140°F), 5% to 95% humidity (non-condensing)
Manufacturer	FACTS Engineering



Typical network slaves might include PLCs, drives, PC, etc

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			
<i>Base Number</i>	<i>Device Type</i>	<i>5 VDC (mA)</i>	<i>External 24 VDC Power (mA)</i>
0			
B CURRENT SUPPLIED			
<i>CPU/Expansion Unit /Remote Slave</i>	D4-440 CPU	3700	400
C CURRENT REQUIRED			
<i>SLOT 0</i>	D4-16ND2	+150	+0
<i>SLOT 1</i>	D4-16ND2	+150	+0
<i>SLOT 2</i>	F4-04DA	+120	+100
<i>SLOT 3</i>	D4-08ND3S	+100	+0
<i>SLOT 4</i>	D4-08ND3S	+100	+0
<i>SLOT 5</i>	D4-16TD2	+100	+0
<i>SLOT 6</i>	D4-16TD2	+100	+0
<i>SLOT 7</i>	D4-16TR	+1000	+0
D OTHER			
<i>BASE</i>	D4-08B	+80	+0
<i>Handheld Programmer</i>	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 3 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	D4-450, D4-440, D4-430, D4-EX (expansion base unit), D4-RS (remote slave unit)	D4-450DC-1, D4-440DC-1, D4-EXDC (expansion base unit), D4-RSDC (remote slave unit)	D4-450DC-2, D4-440DC-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



Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/ Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

Enclosures

Tools

Pneumatics

Safety

Appendix

Product Index

Part # Index

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 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
			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
DC Input Modules			Remote I/O		
D4-08ND3S	100	NONE	H4-ERM	320	NONE
D4-16ND2	150	NONE	H4-ERM-F	450	NONE
D4-16ND2F	150	NONE	D4-RM	300	NONE
D4-32ND3-1	150	NONE			
D4-32ND3-2	150	NONE			
D4-64ND2	300 max.	NONE			
AC Input Modules			Communications and Networking		
D4-08NA	100	NONE	H4-ECOM100	300	NONE
D4-16NA	150	NONE	H4-ECOM-F	670	NONE
			D4-DCM	500	NONE
			F4-MAS-MB	235	NONE
			FA-UNICON	NONE	65
AC/DC Input Modules			CoProcessors		
D4-16NE3	150	NONE	F4-CP128-1	305	NONE
F4-08NE3S	90	NONE			
DC Output Modules			Specialty Modules		
D4-08TD1	150	35	H4-CTRIO	400	NONE
F4-08TD1S	295	NONE	D4-INT	100	NONE
D4-16TD1	200	125	D4-HSC	300	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			
AC Output Modules			Programming		
D4-08TA	250	NONE	D4-HPP-1 (Handheld Prog.)	320	NONE
D4-16TA	450	NONE			
Relay Output Modules			Operator Interface		
D4-08TR	550	NONE	DV-1000	150	NONE
F4-08TRS-1	575	NONE			
F4-08TRS	575	NONE	C-more Micro-Graphic	210	NONE
D4-16TR	1000	NONE			
Analog Modules			C-more		
F4-04AD	85	100			
F4-04ADS	270	120			
F4-08AD	75	90			