Ethernet Remote I/O Master Modules

Ethernet Remote I/O Master Module

H4-ERM <--->
H4-ERM100 <--->
H4-ERM-F <--->

Ethernet remote I/O master

The Ethernet Remote Master H4-ERM (100, -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-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-ERM(100) module. In these cases, an additional H4-ERM(100) 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.

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.

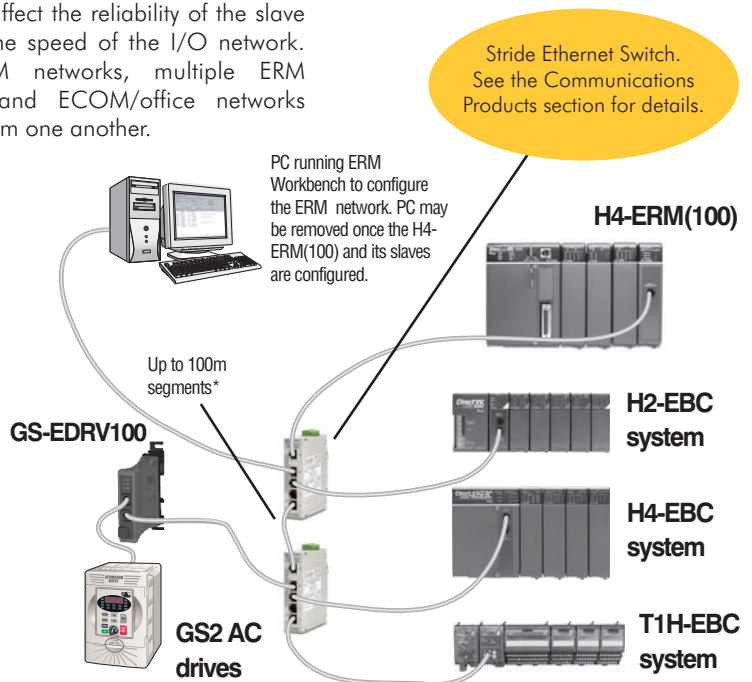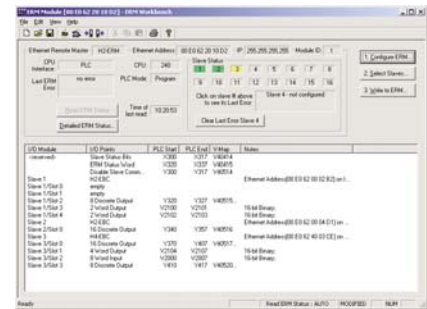### Networking ERMs with other Ethernet devices

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-ERM100	H4-ERM-F
Communications	10BaseT Ethernet	10/100BaseT Ethernet	10BaseFL Ethernet
Data Transfer Rate	10 Mbps	100 Mbps	10 Mbps
Link Distance	100 meters (328 ft)		2K meters (6560 ft)
Ethernet Port	RJ45		ST-style fiber optic
Ethernet Protocols	TCP/IP, IPX	TCP/IP, IPX, Modbus TCP/IP, DHCP, HTML configuration	TCP/IP, IPX
Power Consumption	320 mA @5 VDC		450 mA @5 VDC
Manufacturer	Host Automation Products, L.L.C.		

PC running ERM Workbench to configure the ERM network. PC may be removed once the H4-ERM(100) and its slaves are configured.

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

Up to 100m segments*

GS-EDRV100

GS2 AC drives

H4-ERM(100)

H2-EBC system

H4-EBC system

T1H-EBC system

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

Modbus Network Master

Modbus RTU Network Master Module
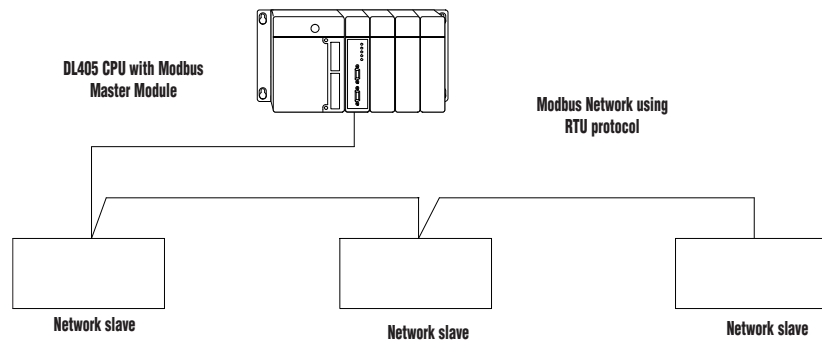
F4-MAS-MB   <--->

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

DL405 CPU with Modbus Master Module

Modbus Network using RTU protocol

Network slave

Network slave

Network slave

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

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

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Part # Index

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 *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		Device Type	5 VDC (mA)	External 24 VDC Power (mA)
	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 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
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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	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
DC Input Modules			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.
D4-32ND3-2	150	NONE	F4-08RTD	80	NONE
D4-64ND2	300 max.	NONE	F4-08THM-n	120	50
			F4-08THM	110	60
AC Input Modules			**Remote I/O**		
D4-08NA	100	NONE			
D4-16NA	150	NONE	H4-ERM(100)	320	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
D4-08TD1	150	35	H4-ECOM-F	670	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)			
D4-64TD1	800	NONE	F4-CP128-1	305	NONE
AC Output Modules			**Specialty Modules**		
D4-08TA	250	NONE			
D4-16TA	450	NONE	H4-CTRIO	400	NONE
			D4-INT	100	NONE
Relay Output Modules			D4-HSC	300	NONE
			F4-16PID	160	NONE
D4-08TR	550	NONE	F4-8MPI	225	170
F4-08TRS-1	575	NONE	D4-16SIM	150	NONE
F4-08TRS	575	NONE	F4-4LTC	280	75
D4-16TR	1000	NONE	**Programming**		
			D4-HPP-1 (Handheld Prog.)	320	NONE
Analog Modules			**Operator Interface**		
			DV-1000	150	NONE
F4-04AD	85	100			
F4-04ADS	270	120	*C-more* Micro-Graphic	210	NONE
F4-08AD	75	90			