

# Ethernet Communication Modules

## Ethernet Communications Module

- H4-ECOM** <--->
- H4-ECOM100** <--->
- H4-ECOM-F** <--->



## Overview

Ethernet Communications Modules offer features such as:

- High-speed peer-to-peer networking of PLCs
- Fast updates with **DirectSOFT** Programming Software
- High-performance access for Human Machine Interface (HMI), ERP, MES or other Windows-based software
- Industry standard Modbus TCP/IP Client/Server Protocol (H4-ECOM100)
- Free SDK for custom drivers
- Easy setup

The Ethernet Communication (ECOM) Modules support high-speed peer-to-peer networking of PLCs. No longer are you forced to designate a single PLC to be the network master. Any PLC can initiate communications with any other PLC. Link your PLCs with PCs using industry standard Modbus TCP/IP protocol connected through standard cables, hubs, and repeaters. Or, use our **KEPDirect** I/O Server to link to your favorite HMI/SCADA, data historian, MES or ERP software to **DirectLOGIC** PLCs. Our Lookout**Direct** HMI and our DataWorx data collection software include ECOM drivers. **DirectSOFT** Programming Software can be used to monitor or update the program in any **DirectLOGIC** PLC on the network.

## Simple connections

Use Category 5 UTP cables or 62.5/125 ST-style fiber optic cables depending on the requirements of your application. Inexpensive UTP cables can be run up to 100 meters between nodes, and fiber optic cables can be run up to 2,000 meters. Fiber optic cables virtually eliminate electrical noise problems. Use repeaters to extend distances and expand the number of nodes.

Our HA-TADP (10/100Base-T) PC network adapter card is compatible with the ECOM modules. See the Communications Products section in this catalog for information on the adapter card.

## ECOM starter kit

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The H4-ECOM-START gives you everything you need to make your first Ethernet network simple to build. It contains an H4-ECOM module and instruction manual, a network adapter card (PCI) for your PC, a crossover cable, and a Software Product Showcase Demo CD. The CD contains demo versions of our software products that support the ECOM Modules. See the Software Products section in this catalog for information on the available software packages.

Specifications	H4-ECOM	H4-ECOM100	H4-ECOM-F
<b>Communications</b>	10Base-T Ethernet	10/100Base-T Ethernet	10Base-FL Ethernet
<b>Data Transfer Rate</b>	10Mbps max.	100Mbps max.	10Mbps max.
<b>Link Distance</b>	100 meters (328 ft)	100 meters (328 ft)	2,000 meters (6,560 ft)
<b>Ethernet Port</b>	RJ45	RJ45	ST-style fiber optic
<b>Ethernet Protocols</b>	TCP/IP, IPX	TCP/IP, IPX, MODBUS TCP/IP, DHCP, HTML configuration	TCP/IP, IPX
<b>Power Consumption</b>	530mA @ 5VDC	300mA @ 5VDC	670mA @ 5VDC
<b>Manufacturer</b>	Host Automation Products, L.L.C.		

## H4-ECOM100



The H4-ECOM100 supports the Industry Standard Modbus TCP/IP Client/Server Protocol

## H4-ECOM100 IBox communications instructions

Over 25 communications IBox instructions are available when using the H4-ECOM100 with a DL450 PLC and **DirectSOFT5** programming software. These easy-to-use instructions allow you to:

- Enable/disable module DHCP
- Read/write module IP, Gateway and Subnet Mask addresses
- Read/write module ID, Name and Description
- Send E-mail messages
- Read/Write PLC memory to networked Hx-ECOM100 modules
- Read/Write PLC memory to networked Hx-ECOM(-F) modules

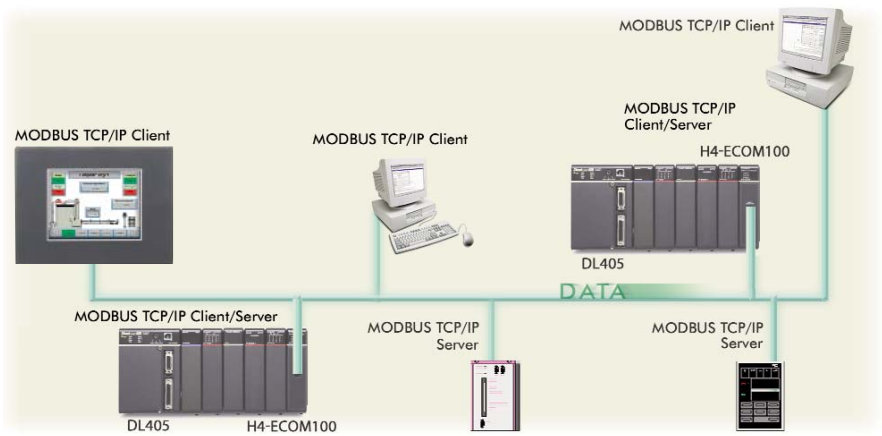
See the following page for example communications IBox instructions.

# Ethernet Communication Modules

## Modbus TCP/IP support

The H4-ECOM100 supports the industry standard Modbus TCP/IP Client/Server protocol in addition to the standard IP and IPX protocols. This allows the DL405 PLC with an H4-ECOM100 module to serve as a client (master) or as a server (slave) on a Modbus TCP/IP Ethernet network. The H4-ECOM100 can actively issue Modbus commands to other nodes or devices on the Modbus TCP/IP network or simply respond to connected Modbus TCP/IP clients.

## Modbus TCP/IP communications architecture



## PLC-to-PLC communications

PLC-to-PLC or PLC to a Modbus TCP/IP device communications can be accomplished using standard Read from Network (RX) and Write to Network (WX) instructions (DL430/440/450, all H4 series ECOMs and all *DirectSOFT* versions). If you're using our *DirectSOFT5* programming software, a DL450 PLC and an H4-ECOM100, you can use fill-in-the-blank *IBox* instructions to simplify your communications programming. The H4-ECOM100 supports the ECOM100 Configuration *IBox* for use with the ECRX and ECWX *IBox* instructions to read/write to other ECOM(100)s. All H4 series ECOM modules support the NETCFG Configuration *IBox* for use with the NETRX and NETWX *IBox* instructions to read/write to other ECOM modules (remember DL450/DSOFT5 required). The communications *IBox* instructions execute with built-in interlocking to greatly simplify communications programming.

### ECOM100 Configuration *IBox*

ECOM100 Config		IB-710
ECOM100 #	K0	
Slot	K1	
Status	V400	
Workspace	V400	
Msg Buffer (65 WORDs)	V400	

### ECOM100 Read Network *IBox*

ECOM100 RX Network Read		IB-740
ECOM100 #	K0	
Workspace	V400	
Slave ID	K0	
From Slave Element (Src)	C0	
Number Of Bytes	K1	
To Master Element (Dest)	TA0	
Success	C0	
Error	C0	

## Choose your slot

The ECOM modules plug into any I/O slot of any local DL405 I/O base. The module maintains identification data, descriptive information, and communication parameters for PLC-to-PLC communications in flash memory. Disconnect power before installing or removing any PLC module.

## H4-ECOM100 has e-mail capability!

The H4-ECOM100 Send EMail (ECEMAIL) *IBox* instruction will allow the module to behave as an e-mail client and send an SMTP request to your SMTP Server to send a specified e-mail message to the e-mail addresses in the *IBox*'s **To:** field. The **Body:** field allows you to embed real-time data in your e-mail message. The DL450 CPU and *DirectSOFT5* are required to use the *IBox* instructions.

## NetEdit3 software

NetEdit3 Software ships free with the ECOM User Manual. Use NetEdit3 to configure the ECOM modules for your network. Flexible addressing allows you to use your choice of protocols and identifying methods. Assign each module a number or a name or both. You don't have to use an IP address, but you can if it's necessary for your network. NetEdit3 uses two protocols for PC-to-PLC communications: IPX and TCP/IP. The NetEdit3 screen displays all identifiers and troubleshooting information for each module on the network. You can use NetEdit3 to adjust parameters for PLC-to-PLC communications by clicking on Advanced Settings. The network identifiers can also be changed from *DirectSOFT* Programming Software.

### ECOM100 Send EMail *IBox*

ECOM100 Send EMail		IB-711
ECOM100 #	K0	
Workspace	V400	
Success	C0	
Error	C1	
Error Code	V400	
To	steve@work.com	
Subject	Machine Offline	
Body	"Machine #" V5010:B "went offline at" _time:24 "on" _date:us	

# 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 page 6-57 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.

<b>A</b>			
<b>Base Number</b>	<b>Device Type</b>	<b>5 VDC (mA)</b>	<b>External 24 VDC Power (mA)</b>
<b>0</b>			
<b>B CURRENT SUPPLIED</b>			
<b>CPU/Expansion Unit /Remote Slave</b>	D4-440 CPU	3700	400
<b>C CURRENT REQUIRED</b>			
<b>SLOT 0</b>	D4-16ND2	+150	+0
<b>SLOT 1</b>	D4-16ND2	+150	+0
<b>SLOT 2</b>	F4-04DA	+120	+100
<b>SLOT 3</b>	D4-08ND3S	+100	+0
<b>SLOT 4</b>	D4-08ND3S	+100	+0
<b>SLOT 5</b>	D4-16TD2	+100	+0
<b>SLOT 6</b>	D4-16TD2	+100	+0
<b>SLOT 7</b>	D4-16TR	+1000	+0
<b>D OTHER</b>			
<b>BASE</b>	D4-08B	+80	+0
<b>Handheld Programmer</b>	D4-HPP	+320	+0
<b>E Maximum Current Required</b>		<b>2820</b>	<b>100</b>
<b>F Remaining Current Available</b>		<b>3700-2820=880</b>	<b>400-100=300</b>
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
<b>Part Numbers</b>	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
<b>Voltage Withstand (dielectric)</b>	1 minute @ 1,500 VAC between primary, secondary, field ground, and run relay		
<b>Insulation Resistance</b>	> 10MΩ at 500VDC		
<b>Input Voltage Range</b>	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
<b>Maximum Inrush Current</b>	20 A	20 A	20 A
<b>Maximum Power</b>	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	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
<b>DC Input Modules</b>			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
			Remote I/O		
<b>AC Input Modules</b>			H4-ERM	320	NONE
			H4-ERM-F	450	NONE
			D4-RM	300	NONE
AC/DC Input Modules			Communications and Networking		
D4-16NE3	150	NONE	H4-ECOM100	300	NONE
F4-08NE3S	90	NONE	H4-ECOM	530	NONE
<b>DC Output Modules</b>			H4-ECOM-F	670	NONE
			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 (15V)
			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	H4-CTRIO	400	NONE
D4-16TA	450	NONE	D4-INT	100	NONE
<b>Relay Output Modules</b>			D4-HSC	300	NONE
			D4-08TR	550	NONE
			F4-08TRS-1	575	NONE
			F4-08TRS	575	NONE
			D4-16TR	1000	NONE
			F4-16PID	160	NONE
			F4-8MPI	225	170
			D4-16SIM	150	NONE
F4-4LTC	280	75			
Analog Modules			Programming		
			D4-HPP-1 (Handheld Prog.)	320	NONE
			Operator Interface		
			DV-1000	150	NONE
			C-more Micro-Graphic	210	NONE