

# Modbus Network Master

## Modbus RTU Network Master Module

F4-MAS-MB <--->



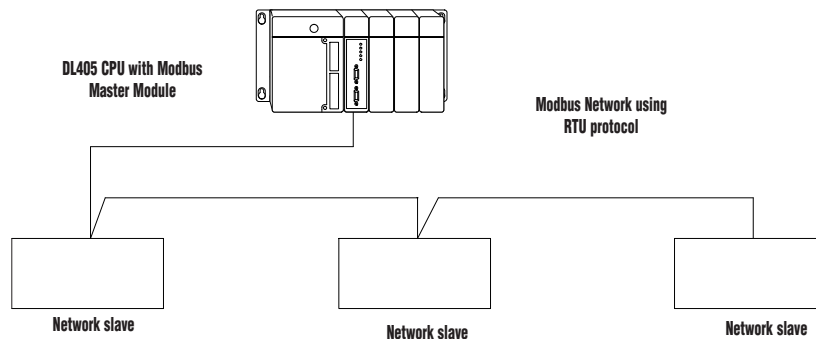
### Overview

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	
<b>Modules per CPU</b>	Eight maximum, any slot in CPU base
<b>F4-MAS-MB</b>	Ports 1 and 2, RS-232/422/485 selectable, maximum baud rate of 115.2K baud. <b>Note:</b> 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.
<b>Recommended Cable</b>	Belden 9841 or equivalent (RS-485) Belden 9729 or equivalent (RS-422)
<b>Power Required</b>	235mA max at 5VDC (supplied by base power supply); 350mA for F4-MAS-MBR
<b>Environment</b>	0°C to 60°C (32°F to 140°F), 5% to 95% humidity (non-condensing)
<b>Manufacturer</b>	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.

<b>A</b>			
<i>Base Number</i>	<i>Device Type</i>	<i>5 VDC (mA)</i>	<i>External 24 VDC Power (mA)</i>
<b>0</b>			
<b>B CURRENT SUPPLIED</b>			
<i>CPU/Expansion Unit /Remote Slave</i>	D4-440 CPU	3700	400
<b>C CURRENT REQUIRED</b>			
<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
<b>D OTHER</b>			
<i>BASE</i>	D4-08B	+80	+0
<i>Handheld Programmer</i>	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



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																					
<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																					
AC Input Modules			Remote I/O																							
D4-08NA	100	NONE	H4-ERM	320	NONE																					
D4-16NA	150	NONE	H4-ERM-F	450	NONE																					
AC/DC Input Modules			D4-RM	300	NONE																					
D4-16NE3	150	NONE	Communications and Networking																							
F4-08NE3S	90	NONE	<table border="1"> <tr> <td>H4-ECOM100</td> <td>300</td> <td>NONE</td> </tr> <tr> <td>H4-ECOM-F</td> <td>670</td> <td>NONE</td> </tr> <tr> <td>D4-DCM</td> <td>500</td> <td>NONE</td> </tr> <tr> <td>F4-MAS-MB</td> <td>235</td> <td>NONE</td> </tr> <tr> <td>FA-UNICON</td> <td>NONE</td> <td>65</td> </tr> </table>			H4-ECOM100	300	NONE	H4-ECOM-F	670	NONE	D4-DCM	500	NONE	F4-MAS-MB	235	NONE	FA-UNICON	NONE	65						
H4-ECOM100	300	NONE																								
H4-ECOM-F	670	NONE																								
D4-DCM	500	NONE																								
F4-MAS-MB	235	NONE																								
FA-UNICON	NONE	65																								
DC Output Modules			CoProcessors																							
D4-08TD1	150	35	<table border="1"> <tr> <td>F4-CP128-1</td> <td>305</td> <td>NONE</td> </tr> </table>			F4-CP128-1	305	NONE																		
F4-CP128-1	305	NONE																								
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																								
AC Output Modules			Specialty Modules																							
D4-08TA	250	NONE	<table border="1"> <tr> <td>H4-CTRIO</td> <td>400</td> <td>NONE</td> </tr> <tr> <td>D4-INT</td> <td>100</td> <td>NONE</td> </tr> <tr> <td>D4-HSC</td> <td>300</td> <td>NONE</td> </tr> <tr> <td>F4-16PID</td> <td>160</td> <td>NONE</td> </tr> <tr> <td>F4-8MPI</td> <td>225</td> <td>170</td> </tr> <tr> <td>D4-16SIM</td> <td>150</td> <td>NONE</td> </tr> <tr> <td>F4-4LTC</td> <td>280</td> <td>75</td> </tr> </table>			H4-CTRIO	400	NONE	D4-INT	100	NONE	D4-HSC	300	NONE	F4-16PID	160	NONE	F4-8MPI	225	170	D4-16SIM	150	NONE	F4-4LTC	280	75
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F4-8MPI	225	170																								
D4-16SIM	150	NONE																								
F4-4LTC	280	75																								
D4-16TA	450	NONE																								
Relay Output Modules						Programming																				
D4-08TR	550	NONE	<table border="1"> <tr> <td>D4-HPP-1 (Handheld Prog.)</td> <td>320</td> <td>NONE</td> </tr> </table>			D4-HPP-1 (Handheld Prog.)	320	NONE																		
D4-HPP-1 (Handheld Prog.)	320	NONE																								
F4-08TRS-1	575	NONE																								
F4-08TRS	575	NONE	Operator Interface																							
D4-16TR	1000	NONE	<table border="1"> <tr> <td>DV-1000</td> <td>150</td> <td>NONE</td> </tr> <tr> <td>C-more Micro-Graphic</td> <td>210</td> <td>NONE</td> </tr> </table>			DV-1000	150	NONE	C-more Micro-Graphic	210	NONE															
DV-1000	150	NONE																								
C-more Micro-Graphic	210	NONE																								
Analog Modules																										
F4-04AD	85	100																								
F4-04ADS	270	120																								
F4-08AD	75	90																								