# Serial Data Communications Module

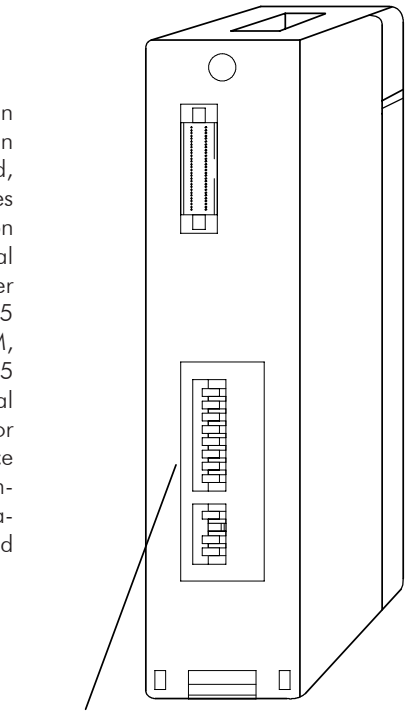

## Overview

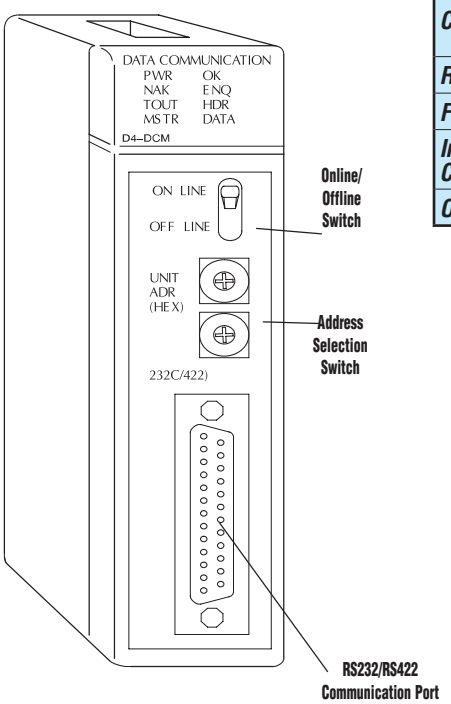
The DL405 Data Communication Module (DCM) is a general purpose communications interface for the DL405 family of PLCs. This module is primarily used for three reasons:

- Extra general purpose communications port to connect a personal computer, operator interface, etc.
- Network interface to a ***Direct***NET network
- Network interface to a Modbus network using the RTU protocol as slave.

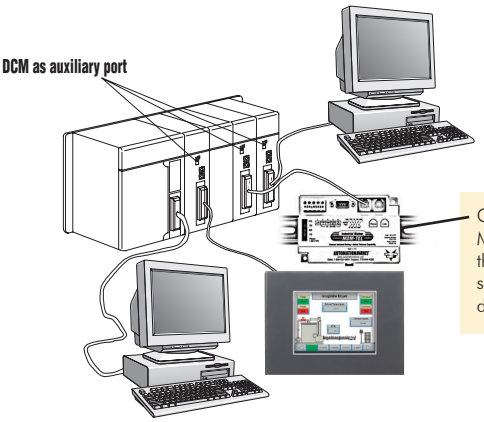
## Extra communications port

All DL405 CPUs offer four built-in communication ports. However, if even more communication ports are needed, additional Data Communication Modules can be added. As an extra communication port, the DCM has specifications identical to port 1 on the DL405 CPUs. Whatever can be connected to port 1 of the DL405 CPU can be connected to the DCM, just make sure the device has a DL405 compatible driver. This allows additional connections of devices, such as operator interfaces, personal computers, etc. Since the DCM does not require any programming, you can set the DCM communication parameters, connect the cables, and start transferring data.




| Specifications | |
|---|---|
| ***Module Type*** | Intelligent |
| ***Modules per CPU*** | 7 Maximum, any slot in CPU Base |
| ***Communications*** | RS232/422, DirectNET, SIMATIC®TI405™, or Modbus (slave only) RTU protocol. Baud rate selectable from 300 to 38.4K baud. Odd or no parity. HEX or ASCII mode |
| ***Recommended Cable*** | Belden 9729 or equivalent (for RS422) |
| ***Field Wiring Connector*** | 25-Pin D-shell connector |
| ***Internal Power Consumption*** | 500mA maximum at 5VDC, (supplied by base power supply) |
| ***Operating Environment*** | 0°C to 60°C (32°F to 140°F), 5% to 95% humidity (non-condensing) |




Connect the DCM to our MDM-TEL serial modem. See the Communication Products section of this catalog for details on the modem.

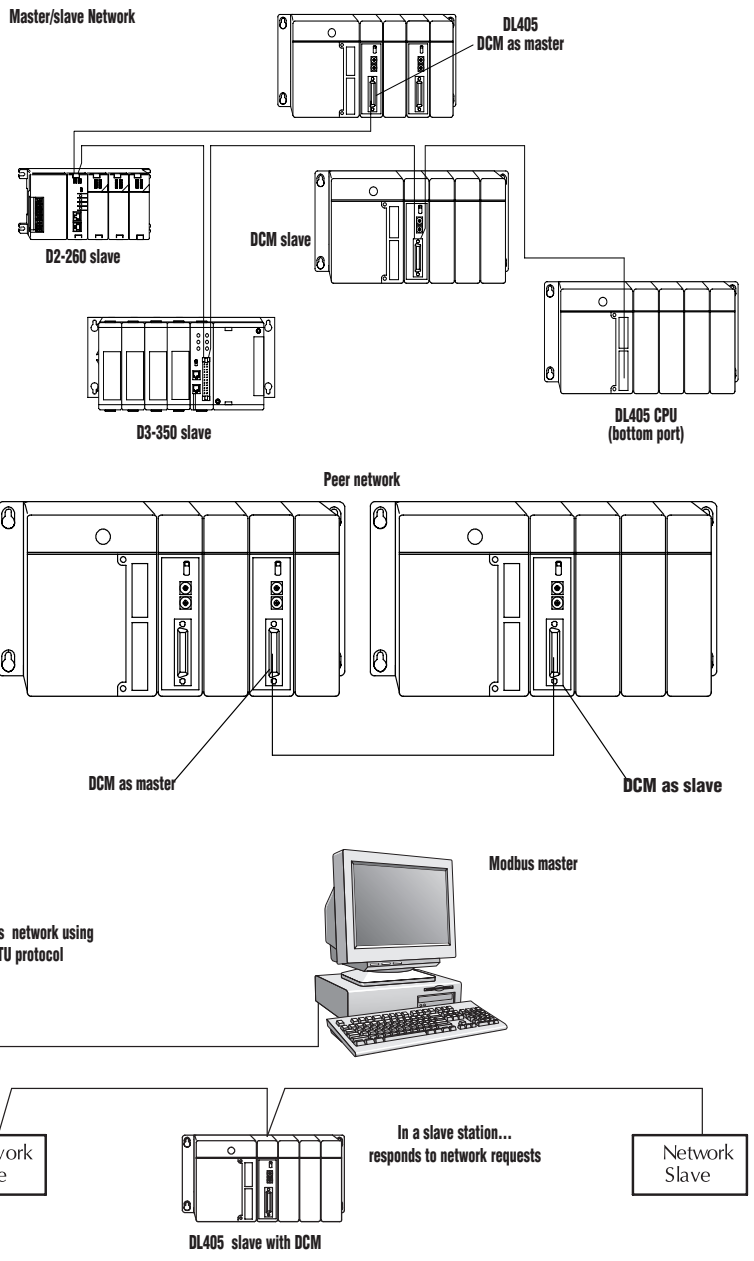
# Serial Data Communications Module

## *Direct*NET network interface

The DCM can be used as a network interface for applications requiring data to be shared between PLCs, or between PLCs and an intelligent device such as a host computer. The DCM connects easily to *Direct*NET. This network allows you to upload or download virtually any type of system data including timer/counter data, I/O information, and V-memory information from any of our PLCs or compatible PLC. The DCM allows the DL405 PLC to function as a master or a slave of *Direct*NET.

Network Master - The DCM allows the DL405 to serve as a master of a *Direct*NET Network. The DCM takes communication requests issued from the PLC program (the network part of the program can be very simple, as few as seven words) and automatically converts these requests into network commands to read data from or write data to another PLC on the network. This capability also allows a peer to peer configuration of two DL405 systems with DCMs. For other options, consider the H4-ECOM100 module.

Network Slave - The DL405 CPUs have a built-in network slave port. If this port is occupied, a DCM can be added to provide an additional network slave port. In this case, the DCM "listens" to the network for any messages containing the DCM's address. The DCM deciphers the network commands, carries out the request to read or write data, and sends confirmation and/or information to the master station. Since the DCM does not require any programming, you can set the DCM communication parameters, connect the cables and start transferring data.




## Modbus interface

The DCM can be used as a slave station interface to connect your DL405 system to the Modbus network using the Modbus RTU protocol. The host system must be capable of issuing the Modbus commands to read or write the appropriate data.

# 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 *ZIP*Link 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*** | D4-454 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*** | D4-08NA | +100 | +0 |
| | ***SLOT 4*** | D4-08NA | +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 24VDC 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 |
|---|---|---|
| ***Part Numbers*** | D4-454,<br>D4-EX (expansion base unit),<br>D4-RS (remote slave unit) | D4-454DC-1, D4-EXDC (expansion base unit) |
| ***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 (110V range)<br>170-264 VAC (220V range) | 20-28 VDC (24VDC)<br>with less than 10% ripple |
| ***Maximum Inrush Current*** | 20A | 20A |
| ***Maximum Power*** | 50VA | 38W |

# 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*** |
| D4-454 CPU | 3100 | 400 | D4-EX | 4000 | 400 |
| D4-454DC-1 | 3100 | NONE | D4-EXDC | 4000 | NONE |
| | | | D4-RS | 3700 | 400 |
| | | | H4-EBC | 3470 | 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+20 per circuit |
| ***DC Input Modules*** | | | F4-04DA-2 | 90 | 90 |
| | | | F4-04DAS-1 | 60 | 60 per circuit |
| D4-16ND2 | 150 | NONE | F4-08DA-1 | 90 | 100+20 per circuit |
| D4-16ND2F | 150 | NONE | F4-08DA-2 | 80 | 150 |
| D4-32ND3-1 | 150 | NONE | F4-16DA-1 | 90 | 100+20 per circuit |
| D4-64ND2 | 300 max. | NONE | 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-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 | ***Communications and Networking*** | | |
| ***DC Output Modules*** | | | H4-ECOM100 | 300 | NONE |
| | | | D4-DCM | 500 | NONE |
| D4-16TD1 | 200 | 125 | F4-MAS-MB | 235 | NONE |
| D4-16TD2 | 400 | NONE | ***CoProcessors*** | | |
| D4-32TD1 | 250 | 140 | | | |
| D4-32TD2 | 350 | 120 (4A max including loads) | F4-CP128-1 | 305 | NONE |
| D4-64TD1 | 800 | NONE | ***Specialty Modules*** | | |
| ***AC Output Modules*** | | | | | |
| D4-08TA | 250 | NONE | H4-CTRIO | 400 | NONE |
| D4-16TA | 450 | NONE | D4-16SIM | 150 | NONE |
| ***Relay Output Modules*** | | | F4-4LTC | 280 | 75 |
| D4-08TR | 550 | NONE | ***Programming*** | | |
| F4-08TRS-1 | 575 | NONE | D4-HPP-1 (Handheld Prog.) | 320 | NONE |
| F4-08TRS-2 | 575 | NONE | ***Operator Interface*** | | |
| D4-16TR | 1000 | NONE | DV-1000 | 150 | NONE |
| ***Analog Modules*** | | | C-more Micro-Graphic | 210 | NONE |
| F4-04AD | 150 | 100 | | | |
| F4-04ADS | 370 | 120 | | | |
| F4-08AD | 75 | 90 | | | |