

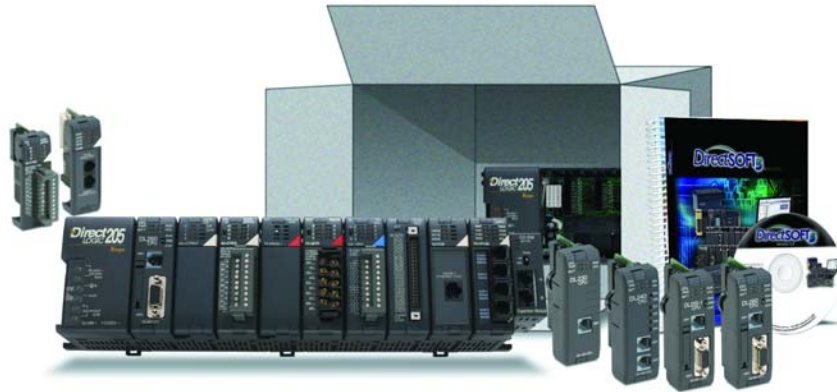
# 7 Steps to Specifying a DL205 System

The following 7 steps will help you specify a DL205 PLC system. They are also covered in more detail on the pages that follow. Your first priority when designing a system should be safety. Please make sure that all of the components in your system will operate within the product's environmental and operating specifications. This catalog is intended to provide abbreviated product descriptions, benefits and prices. It is not intended to be a substitute for the product manuals.

Before you begin selecting products for your DL205 PLC system, be sure to evaluate all of your application needs and any future growth potential.

## STEP 1 Review the DL205 family of products

The DL205 family offers a wide variety of products. Please review the product offering starting on page 4–23.



## STEP 2 Select a CPU, programming tool and cable

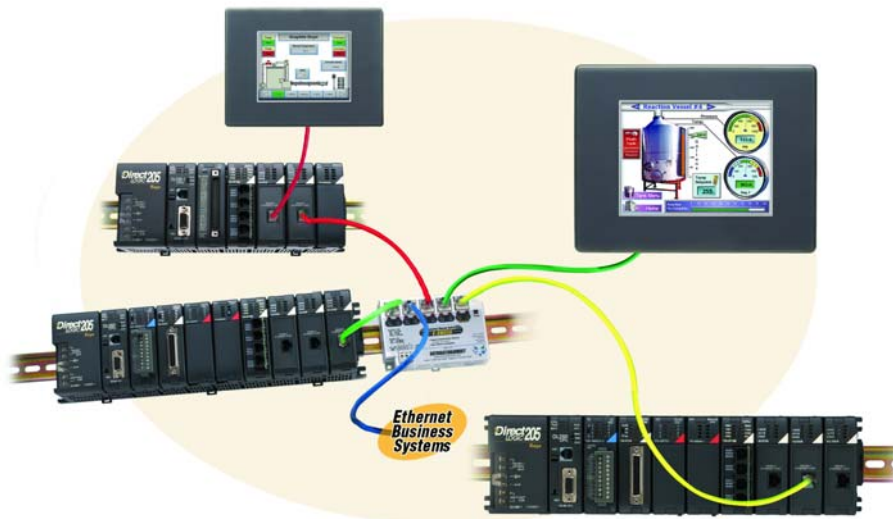
The DL205 family offers four traditional CPUs: the D2-260, D2-250-1, D2-240 and D2-230. The WinPLC, a Windows® CE-based CPU, is also covered in this step. Please take the time to understand the features and specifications of each CPU model (i.e. built-in communications ports protocols, instructions, etc.).

To program the DL205 CPUs, choose between the Windows-based **DirectSOFT** programming software and PC cable or handheld programmer. The WinPLC requires Think & Do Studio or Think & Do Live! for programming. CPU-slot slave base controllers are also introduced in this step.



## STEP 3 Additional communications ports needed?

If your application requires more than the built-in CPU communications ports, then select the H2-ECOM Ethernet Communications Module, or the D2-DCM Serial Communications Module. These modules add more ports for networking or connection to an HMI, etc. The H2-SERIO serial communications module can be used with the WinPLC to add more communications ports.



# 7 Steps to Specifying a DL205 System

## **STEP 4** Select the discrete, analog and specialty I/O modules

Since there are several different types of I/O and specialty modules available for the DL205 system, it is important to review the module specifications in detail when selecting them for your system. The hardware specifications for the modules are described at the end of this DL205 section, starting with the specialty modules and followed by the discrete and analog I/O modules.



## **STEP 5** Choose an I/O configuration method

The DL205 offers several configurations of I/O. Choose among local I/O, local expansion I/O and remote I/O. A DL205 system can be developed using a combination of the configuration arrangements. It is important to understand the octal addressing scheme and I/O module placement restrictions that are described in this step.



## **STEP 6** Check the power budget

It is very important to verify that the selected CPU and I/O modules will operate within the base power budget. Tables list the power supplied and consumed by each DL205 device. This step also describes base dimensions and mounting requirements.



## **STEP 7** Place your order!

Place your order either online at [www.automationdirect.com](http://www.automationdirect.com), by calling 1-800-633-0405 or by faxing your order to 1-770-889-7876. See the Ordering section in this catalog for details.

## Three Ways to Order: Phone, Fax, or Online





# Step 1: Review the DL205 Product Family

## CPUs

- D2-260 – 30.4K words total memory  
2 communications ports  
16 built-in PID loops with auto-tuning  
D2-250-1 – (Replaces D2-250)  
14.8K words total memory  
2 communications ports  
4 built-in PID loops with auto-tuning  
D2-240 – 3.8K total memory,  
2 communications ports  
D2-230 – 2.4K total memory  
1 communications port  
Windows CE CPUs  
WinPLC (H2-WPLC\*-\*\*)

## Programming tools

- DirectSOFT** Programming Software for Windows Handheld Programmer (D2-HPP)

## Bases

- 3-slot base (includes power supply)  
110/220 VAC (D2-03B-1)  
12/24 VDC (D2-03BDC1-1)
- 4-slot base (includes power supply)  
110/220 VAC (D2-04B-1)  
12/24 VDC (D2-04BDC1-1)
- 6-slot base (includes power supply)  
110/220 VAC (D2-06B-1)  
12/24 VDC (D2-06BDC1-1)  
125 VDC (D2-06BDC2-1)
- 9-slot base (includes power supply)  
110/220 VAC (D2-09B-1)  
12/24 VDC (D2-09BDC1-1)  
125 VDC (D2-09BDC2-1)

## Local expansion modules

- (D2-250-1 or D2-260 using D2-0\*B-1 or D2-0\*BDC\*-1 only)
- Base expansion module (D2-EM)
- Expansion base controller module (D2-CM)
- Expansion base cable (D2-EXCBL-1)

## Discrete input modules

- DC input**  
8-pt. 12-24 VDC sink/source (D2-08ND3)  
16-pt. 24 VDC sink/source (D2-16ND3)  
32-pt. 24 VDC sink/source (D2-32ND3)  
32-pt. 5-12 VDC sink/source (D2-32ND3-2)

## Discrete input modules (continued)

- AC input**  
8-pt. 110 VAC (D2-08NA-1)  
16-pt. 110 VAC (D2-16NA)  
8-pt. 220 VAC (D2-08NA-2)

## Discrete output modules

- DC output**  
4-pt. 12-24 VDC sink (D2-04TD1)  
8-pt. 12-24 VDC sink (D2-08TD1)  
8-pt. 12-24 VDC source (D2-08TD2)  
16-pt. 12-24 VDC sink (D2-16TD1-2)  
16-pt. 12-24 VDC source (D2-16TD2-2)  
32-pt. 12-24 VDC sink (D2-32TD1)  
32-pt. 12-24 VDC source (D2-32TD2)
- AC output**  
8-pt. 18-220 VAC (D2-08TA)  
8-pt. 20-125 VAC (F2-08TA)  
12-pt. 18-110 VAC (D2-12TA)
- Relay output**  
4-pt. 4A/pt (Isolated) (D2-04TRS)  
8-pt. 1A/pt (D2-08TR)  
8-pt. 10A/pt. (F2-08TR)  
8-pt. 7A/pt (Isolated) (F2-08TRS)  
12-pt. 1.5A/pt (D2-12TR)

## Combination discrete modules

- 4-pt. 24 VDC in/4pt Relay Out (D2-08CDR)

## Analog modules

- Analog input**  
4-ch. in, 12 bit, current (F2-04AD-1)  
4-ch. in, 12 bit, voltage (F2-04AD-2)  
8-ch. in, 12 bit, current (F2-08AD-1)  
8-ch. in, 12 bit, voltage (F2-08AD-2)
- Analog output**  
2-ch. out, 12 bit, current (F2-02DA-1)  
2-ch. out, 16 bit, current (Isolated) (F2-02DAS-1)  
2-ch. out, 12 bit, voltage (F2-02DA-2)  
2 -ch. out, 16 bit, voltage (Isolated) (F2-02DAS-2)  
8-ch. out, 12 bit, current (F2-08DA-1)  
8-ch. out, 12 bit, voltage (F2-08DA-2)

- Combination analog in/out**  
4-ch. in/2-ch. out, 12 bit, current (F2-4AD2DA)  
8-ch. in/4-ch. out, 16 bit, current (F2-8AD4DA-1)  
8-ch. in/4-ch. out, 16 bit, voltage (F2-8AD4DA-2)
- Temperature input**  
4-ch. in, RTD (F2-04RTD)



4-ch. in, Thermocouple (F2-04THM)

## Communications/networking modules

- Ethernet Communications Module (H2-ECOM (-F))  
(H2-ECOM 100)
- Data Communications Module (D2-DCM)

## Remote I/O modules

- Ethernet**  
Ethernet Remote Master Module (H2-ERM(-F))  
Ethernet Base Controller (slave) (H2-EBC(-F))  
(H2-EBC 100)
- Serial**  
Remote Master Module (D2-RMSM)  
Remote Slave Module (D2-RSSS)

## Specialty modules

- Basic CoProcessor (F2-CP128)  
8-pt. Input Simulator (F2-08SIM)  
Counter I/O (H2-CTRIO)  
Counter Interface (D2-CTRINT)

## CPU-slot slave controllers

- Ethernet Base Controller (H2-EBC)  
DeviceNet Slave (F2-DEVNETS-1)  
Profibus Slave (H2-PBC)  
SDS Slave (F2-SDS-1)

## Operator interface

- See the **C-more** and HMI sections in this catalog for a complete line of compatible text and touch panels and configuration software.

## Connection systems

- See the Terminal Blocks and Wiring section in this catalog for information on **DIN**ector terminal blocks, **ZIPL**ink connection systems and other connection accessories for use with the DL205 system.

|                    |
|--------------------|
|                    |
| PLC Overview       |
| DL05/06 PLC        |
| DL105 PLC          |
| <b>DL205 PLC</b>   |
| DL305 PLC          |
| DL405 PLC          |
| Field I/O          |
| Software           |
| C-more HMIs        |
| Other HMI          |
| AC Drives          |
| Motors             |
| Steppers/Servos    |
| Motor Controls     |
| Proximity Sensors  |
| Photo Sensors      |
| Limit Switches     |
| Encoders           |
| Pushbuttons/Lights |
| Process            |
| Relays/Timers      |
| Comm.              |
| TB's & Wiring      |
| Power              |
| Enclosures         |
| Appendix           |
| Part Index         |

# Step 2: Select the CPU, Programmer and Cable

There are many things to consider when choosing a CPU, most of which depend on your particular application. The facing page provides a comparison between the CPUs. This section provides a quick summary of the key features for each CPU.

## System capacity

System capacity is the ability of the CPU to accommodate a variety of applications. Consider both ladder memory and data registers (V-memory). For ladder memory, most Boolean instructions require one word. Some other instructions, such as timers, counters, etc. require two or more words.

Our V-memory locations are 16-bit words and are useful for data storage, etc.

If you think you may exceed 256 local I/O points, then select the D2-250-1 or the D2-260 CPU which support local expansion of up to two or four additional bases, respectively.

The D2-240, D2-250-1 and D2-260 support the Ethernet and standard Remote Master module that are used to build a remote I/O network. Port 2 on the D2-250-1 and D2-260 can also serve as a remote I/O master.

## Performance

If you are using basic Boolean instructions and speed is not the primary concern, then the D2-230 or D2-240 will do the job. For applications that require fast scan times, additional communications or advanced instructions, choose the D2-250-1 or D2-260 CPU. The D2-260 is our fastest CPU for performing even the most basic of math or data instructions, and will provide better overall performance than the other DL205 CPUs.

## Programming and diagnostics

Our CPUs offer an incredible array of instructions and diagnostic features that can save you many hours of programming and debug time. From basic Boolean contact logic to PID and floating point math, we have it covered! The table on the next page covers some of the basic instruction categories, but for more details, see our complete list of instructions at the end of this section. If you already have **DirectSOFT** and/or a Handheld Programmer, you may have to upgrade the software/firmware to accommodate the D2-260.

## Built-in CPU communications

Every DL205 CPU provides at least one built-in RS-232 communication port. If you're using an operator interface, then you should choose the D2-240, D2-250-1 or D2-260 CPU. The D2-240, D2-250-1 and D2-260 CPUs offer two built-in communication ports. The D2-240 supports our **DirectNET**™ slave protocol on the bottom port, which provides a quick and easy network connection to any **DirectNET** master. If you need the most flexibility possible, then consider the D2-250-1 or D2-260 CPU. These CPUs offer built-in **DirectNET** slave support capability on the top and bottom ports, and **DirectNet/Modbus RTU** master/slave support on the bottom. The bottom port supports baud rates up to 38.4K baud. The D2-260 provides support for ASCII IN/OUT communications.

If you require more than two ports, we also offer an Ethernet Communications Module that can be used to quickly add a communication port to a DL205 system with a D2-240, D2-250-1 or D2-260 CPU. The D2-DCM module can also be added to these CPUs to provide an additional serial communications port.

*The WinPLC brings PLC and PC technologies together by providing a Windows CE operating system environment for DL205 hardware. See the WinPLC pages later in this section for details on the WinPLC.*



D2-260



D2-250-1



D2-240



D2-230



H2-WPLC\*-\*\*



# DL205 CPU Specifications

| <b>DL205 CPU Comparison</b>                                                                                |               |                                   |                                                                                      |                                                                                      |
|------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>System Capacity</b>                                                                                     | <b>D2-230</b> | <b>D2-240</b>                     | <b>D2-250-1</b>                                                                      | <b>D2-260</b>                                                                        |
| Total memory available (words)                                                                             | 2.4K          | 3.8K                              | 14.8K                                                                                | 30.4                                                                                 |
| Ladder memory (words)                                                                                      | 2048 EEPROM   | 2560 EEPROM                       | 7680 Flash                                                                           | 15872 Flash                                                                          |
| V-memory (words)                                                                                           | 256           | 1024                              | 7168                                                                                 | 14592                                                                                |
| Battery backup                                                                                             | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Total CPU memory I/O pts. available ( <i>actual I/O pts. depend on I/O configuration method selected</i> ) | 256           | 896<br>(320 X + 320 Y + 256 CR)   | 2048<br>(512 X + 512 Y + 1024 CR)                                                    | 8192 (1024 X + 1024 Y + 2048 CR + 2048 GX + 2048 GY)                                 |
| Local I/O (pts.)                                                                                           | 256           | 256                               | 256                                                                                  | 256                                                                                  |
| Local Expansion I/O (pts.)                                                                                 | none          | none                              | 768 (2 exp. bases max)<br>(Including local I/O)                                      | 1280 (4 exp. bases max.)<br>(Including local I/O)                                    |
| Serial Remote I/O (pts.)                                                                                   | N/A           | 896 max.<br>(Including local I/O) | 2048 max.<br>(Including local and exp. I/O)                                          | 8192 max.<br>(Including local & exp. I/O)                                            |
| Remote I/O channels                                                                                        | N/A           | 2                                 | 8 (7+1 CPU port)                                                                     | 8 (7+1 CPU port)                                                                     |
| I/O per remote channel                                                                                     | N/A           | 2048 (limited to 896)             | 2048                                                                                 | 2048                                                                                 |
| Ethernet Remote I/O                                                                                        | N/A           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Discrete I/O pts.                                                                                          | N/A           | 896 max.<br>(Including local I/O) | 2048 max.<br>(Including local and exp. I/O)                                          | 8192<br>(Including local and exp. I/O)                                               |
| Analog I/O channels                                                                                        | N/A           | Map into V-memory                 | Map into V-memory                                                                    | Map into V-memory                                                                    |
| Remote I/O channels                                                                                        | N/A           | Limited by power budget           | Limited by power budget                                                              | Limited by power budget                                                              |
| I/O per remote channel                                                                                     | N/A           | 16,384 (limited to 896)           | 16,384 (16 fully expanded H4-EBC slaves using V-memory and bit-of-word instructions) | 16,384 (16 fully expanded H4-EBC slaves using V-memory and bit-of-word instructions) |
| <b>Performance</b>                                                                                         |               |                                   |                                                                                      |                                                                                      |
| Contact execution (Boolean)                                                                                | 3.3µs         | 1.4µs                             | 0.61µs                                                                               | 0.61µs                                                                               |
| Typical scan (1K Boolean)                                                                                  | 4-6ms         | 10-12ms                           | 1.9ms                                                                                | 1.9ms                                                                                |
| <b>Programming and Diagnostics</b>                                                                         |               |                                   |                                                                                      |                                                                                      |
| RLL Ladder Style                                                                                           | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| RLL <sup>FLS</sup> /Flowchart Style (Stages)                                                               | Yes/256       | Yes/512                           | Yes/1024                                                                             | Yes/1024                                                                             |
| Run time editing                                                                                           | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Variable/fixed scan                                                                                        | Variable      | Variable                          | Variable                                                                             | Variable                                                                             |
| Instructions                                                                                               | 113           | 129                               | 174                                                                                  | 231                                                                                  |
| Control relays                                                                                             | 256           | 256                               | 1024                                                                                 | 2048                                                                                 |
| Timers                                                                                                     | 64            | 128                               | 256                                                                                  | 256                                                                                  |
| Counters                                                                                                   | 64            | 128                               | 128                                                                                  | 256                                                                                  |
| Immediate I/O                                                                                              | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Subroutines                                                                                                | No            | Yes                               | Yes                                                                                  | Yes                                                                                  |
| For/Next loops                                                                                             | No            | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Timed Interrupt                                                                                            | No            | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Integer Math                                                                                               | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Floating-point Math                                                                                        | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| Trigonometric functions                                                                                    | No            | No                                | No                                                                                   | Yes                                                                                  |
| Table Instructions                                                                                         | No            | No                                | No                                                                                   | Yes                                                                                  |
| PID                                                                                                        | No            | No                                | Yes, 4 loops                                                                         | Yes, 16 loops                                                                        |
| Drum Sequencers                                                                                            | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| Bit of Word                                                                                                | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| ASCII Print                                                                                                | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| Real-time clock/calendar                                                                                   | No            | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Internal diagnostics                                                                                       | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Password security                                                                                          | Yes           | Multi-level                       | Multi-level                                                                          | Multi-level                                                                          |
| System and user error log                                                                                  | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| <b>Communications</b>                                                                                      |               |                                   |                                                                                      |                                                                                      |
| Built-in ports                                                                                             | Port 1 RS-232 | Port 1 RS-232 and Port 2 RS-232   | Port 1 RS-232 and Port 2 RS-232/422                                                  | Port 1 RS-232 and Port 2 RS-232/422/485)                                             |
| K-sequence (proprietary protocol)                                                                          | Yes           | Yes                               | Yes                                                                                  | Yes                                                                                  |
| DirectNET™                                                                                                 | No            | Yes                               | Yes                                                                                  | Yes                                                                                  |
| Modbus RTU master/slave                                                                                    | No            | No                                | Yes                                                                                  | Yes                                                                                  |
| ASCII communications                                                                                       | No            | No                                | OUT                                                                                  | IN/OUT                                                                               |
| Maximum baud rate                                                                                          | 9600          | 19.2K port 2                      | 38.4K port 2                                                                         | 38.4K port 2                                                                         |

PLC Overview

DL05/06 PLC

DL105 PLC

**DL205 PLC**

DL305 PLC

DL405 PLC

Field I/O

Software

C-more HMI

Other HMI

AC Drives

Motors

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Pushbuttons/Lights

Process

Relays/Timers

Comm.

TB's & Wiring

Power

Enclosures

Appendix

Part Index