D2-260/D2-262 Key Features

D2-260 & D2-262 CPUs

D2-260 *Retired*
D2-262

D2-260/D2-262 can serve as network master

Easily connect programming devices or HMI to CPU ports

16 PID

MODBUS® RTU or DirectNET™ network protocol

Connect operator interfaces to port 1 on the slaves

Use port 2 on D2-262/D2-260 or D2-250-1 to network slaves

Use D2-DCM module if D2-250-1, D2-260 or D2-262 port 2 is occupied

D2-260/D2-262: Our most powerful DL205 CPUs

Our D2-260 and D2-262 CPUs provide all the capabilities of the other DL205 CPUs (as well as our D4-450 and D4-454 CPU), plus several additional features rarely found in a PLC of this size. With such an incredible array of features, you may be able to replace PLCs costing hundreds (or thousands) more.

*Direct*SOFT is required to program the D2-260 and D2-262. If you're using a handheld programmer, version 2.10 of the handheld programmer firmware is required. Here are a few key features about the D2-260 and D2-262 CPUs.
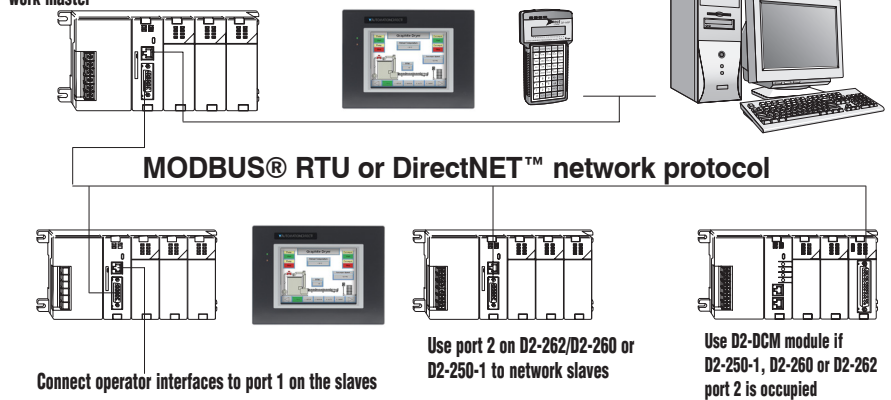
Local expansion I/O

The D2-260 and D2-262 support local expansion up to five total bases (one CPU base and four expansion bases). Expansion bases are commonly used when there are not enough slots available in the CPU base, when the base power budget will be exceeded, or when placing an I/O base at a location away from the CPU base (but within the expansion cable limits). All local and expansion I/O points are updated on every CPU scan. Each local expansion base requires the D2-CM module in the CPU slot. The local CPU base requires the D2-EM Expansion Module, as well as each expansion base. For more information on local expansion, refer to the Expansion Modules pages later in this section.

Powerful built-in CPU communications

Each D2-260 and D2-262 CPU offers two communications ports that provide a vast array of communication possibilities. The top RJ-12 RS-232 port can be used for connection to a *C-more* operator interface panel or as a single K-sequence or *Direct*NET slave. The 15-pin bottom port (port 2) supports RS-232 or RS-422/RS485. This port offers several different protocol options such as:

- K-sequence
- *Direct*NET Master/Slave
- Modbus RTU Master/Slave
- ASCII In/Out Communications

Port 2 can also serve as a remote I/O master. Both the D2-260 and D2-262 support the Ethernet Communication module and Data Communication Module for additional communications ports.
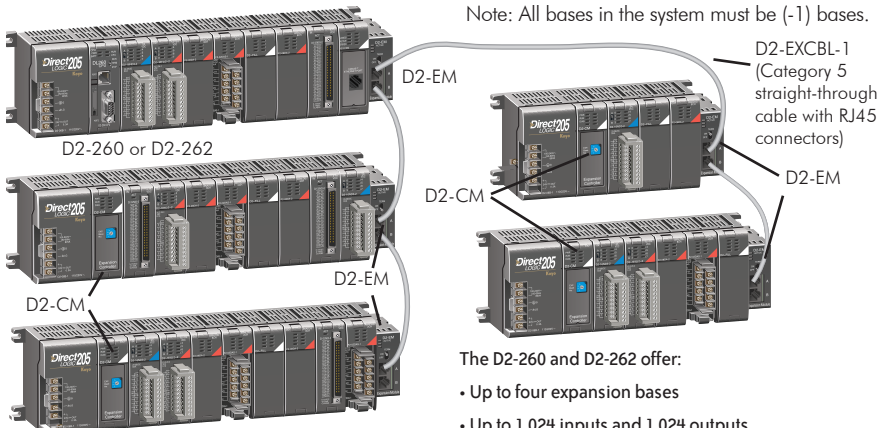
loops with auto-tuning

The D2-260 and D2-262 CPUs can process up to 16 PID loops directly in the CPU. You can select from various control modes including automatic, manual, and cascade. There are also a wide variety of alarms including Process Variable, Rate of Change, and Deviation. The loop operation parameters (Process Variable, Setpoint, Setpoint Limits, etc.) are stored in V-memory, which allows easy access from operator interfaces or HMIs. Setup is accomplished with easy-to-use setup menus and monitoring views in *Direct*SOFT programming.

The auto-tuning feature is easy to use and can reduce setup and maintenance time. Basically, the CPU uses the auto- tuning feature to automatically determine near optimum loop settings. See the D2-250-1 CPU section for a PID loop control block diagram.

D2-260/D2-262 local expansion system

Note: All bases in the system must be (-1) bases.

D2-EM

D2-260 or D2-262

D2-CM

D2-EM

D2-CM

D2-EM

D2-EXCBL-1 (Category 5 straight-through cable with RJ45 connectors)

D2-EM

The D2-260 and D2-262 offer:
- Up to four expansion bases
- Up to 1,024 inputs and 1,024 outputs
- Up to 30m (98ft) total expansion system cable

D2-260/D2-262 Key Features

Full array of instructions

The right instruction can greatly simplify your programming task and can save hours of programming time.

The D2-260 and D2-262 support over 280 powerful instructions, such as:

- Four types of drum sequencers
- Leading / trailing edge triggered one-shots
- Bit-of-word manipulation
- Floating point conversions
- Trigonometric functions
- Table instructions
- ASCII IN/OUT instructions

For a complete list of instructions supported by all DL205 CPUs, see the end of this section.

Modbus RTU instructions

The D2-260 and D2-262 CPUs support easy-to-use Modbus Read/Write instructions that expand our existing Modbus network instruction capabilities. The MRX or MWX instructions allow you to enter native Modbus addressing in your ladder program with no need to perform octal-to-decimal conversion. We added Function codes 05, 06 and the ability to read Slave Exception Codes. These flexible instructions allow the user to select the following parameters within one instruction window:

- 584/984 or 484 Modbus data type
- Slave node (0-247)
- Function code
- Modbus starting master / slave memory address
- Number of bits
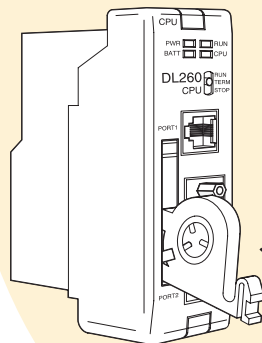- Exception code starting address

Examples of MRX and MWX instructions in *Direct*SOFT
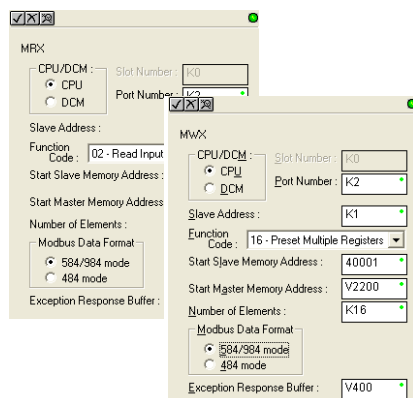
Port 1 Pinouts

Pin	Signal
1	0V
2	5V
3	RXD (RS-232)
4	TXD (RS-232)
5	5V
6	0V
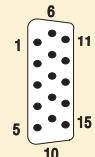
Port 2 Pinouts

Pin	Signal
1	5VDC
2	TXD2 (RS-232)
3	RXD2 (RS-232)
4	RTS2 (RS-232)
5	CTS2 (RS-232)
6	RXD2– (RS-422/485)
7	0VDC
8	0VDC
9	TXD2+ (RS-422/485)
10	TXD2– (RS-422/485)
11	RTS2+ (RS-422/485)
12	RTS2– (RS-422/485)
13	RXD2+ (RS-422/485)
14	CTS2+ (RS-422/485)
15	CTS2– (RS-422/485)

CPU Status Indicators		
RUN	ON	CPU is in RUN mode
	OFF	CPU is in PROGRAM mode
BATT	ON	Battery backup voltage is low
	OFF	Battery backup voltage is OK or disabled
CPU	ON	CPU internal diagnostics detects error
	OFF	CPU is OK
PWR	ON	CPU power good
	OFF	CPU power failure

Mode Switch	
RUN	Puts CPU into RUN mode
TERM	Allows peripherals (HPP, *Direct*SOFT) to select the mode of operation
STOP	Forces CPU out of RUN mode

Port 1	
Protocols	K-sequence slave, *Direct*NET™ slave, Modbus RTU slave
Devices	Can connect w/HPP, *Direct*SOFT, *C-more*, O/I panels, or any *Direct*NET master
Specs.	6P6C phone jack connector RS-232 9,600 baud Fixed address Odd parity only 8 data bits one start, one stop asynchronous, half-duplex, DTE

Port 2	
Protocols	K-sequence slave, *Direct*NET Master/Slave, Modbus RTU Master/Slave, ASCII IN/OUT, Remote I/O Master
Devices	Can connect w/many devices, such as PCs running *Direct*SOFT, DSData, HMI packages, *C-more*, other O/I panels, any *Direct*NET or Modbus RTU master or slave, or ASCII devices
Specs.	HD15 connector RS-232, RS-422/485* 300/600/1200/2400/4800 9600/19.2K/38.4K baud Odd, even, or no parity Selectable address (1-90, HEX 1 – 5A) 8 data bits, one start, one stop Asynchronous, Half-duplex, DTE

Battery (Optional)	
D2-BAT-1	Coin type, 3.0V Lithium battery, 560mA, battery number CR2354

Note: Batteries are not needed for program backup. However, you should order a battery if you have parameters in V-memory that must be maintained in case of a power outage.

*RS485 for Modbus protocol only

*ZIP*Link communications adapter modules

*ZIP*Link cables and communications adapter modules offer fast and convenient screw terminal connection for the bottom port of the D2-260 and D2-262 CPUs. The adapter modules are RS232/422/485 compatible and are offered with or without indicating LEDs and surge protection. See the Terminal Blocks and Wiring Solutions section in this catalog for more information.

ZL-CMA15L shown

On-board memory

The D2-260 and D2-262 have 15.5K words of flash memory on board for your program plus 14.2K words of data registers. With flash memory, you don't have to worry about losing the program due to a bad battery.

Built-in remote I/O connection

The bottom port on the D2-260 and D2-262 can be used as a master for serial remote I/O networks.

MRX

- CPU/DCM: CPU / DCM
- Slot Number: K0
- Port Number: K2
- Slave Address:
- Function Code: 02 - Read Input
- Start Slave Memory Address:
- Start Master Memory Address
- Number of Elements:
- Modbus Data Format: 584/984 mode / 484 mode
- Exception Response Buffer:

MWX

- CPU/DCM: CPU / DCM
- Slot Number: K0
- Port Number: K2
- Slave Address: K1
- Function Code: 16 - Preset Multiple Registers
- Start Slave Memory Address: 40001
- Start Master Memory Address: V2200
- Number of Elements: K16
- Modbus Data Format: 584/984 mode / 484 mode
- Exception Response Buffer: V400

D2-260/D2-262 Key Features

ASCII communications instructions

The D2-260 and D2-262 CPUs support several easy-to-use instructions that allow ASCII strings to be read into and written from the PLC communications ports.

Raw ASCII: Port 2 can be used for either reading or writing raw ASCII strings, but not for both.

Embedded ASCII characters: The D2-260 and D2-262 can decipher ASCII embedded within a supported protocol (K-Sequence, DirectNet, Modbus, Ethernet) via the CPU ports, H2-ECOM or D2-DCM.

Here's how the D2-260 and D2-262 can receive ASCII input strings:

1. **ASCII IN (AIN) -** This instruction configures port 2 for raw ASCII input strings with parameters such as fixed and variable length ASCII strings, termination characters, byte swapping options, and instruction control bits. Use barcode scanners, weight scales, etc. to write raw ASCII input strings into port 2 based on the (AIN) instruction's parameters.

2. Write embedded ASCII strings directly to V-memory from an external HMI or similar master device via a supported communications protocol using the CPU ports, H2-ECOM(100) or D2-DCM. The AIN instruction is not used in this case.

3. If a D2-260 or a D2-262 PLC is a master on a network, the Network Read instruction (RX) can be used to read embedded ASCII data from a slave device via a supported communications protocol using port 2, H2-ECOM(100) or D2-DCM. The RX instruction places the data directly into V-memory.

Here's how the D2-260 and D2-262 can write ASCII output strings:

1. **Print from V-memory (PRINTV)** - Use this instruction to write raw ASCII strings out of port 2 to a display panel or a serial printer, etc. The instruction features the starting V-memory address, string length, byte swapping options, etc. When the instruction's permissive bit is enabled, the string is written to port 2.

2. **Print to V-memory (VPRINT)** - Use this instruction to create pre-coded ASCII strings in the PLC (i.e. alarm messages). When the instruction's permissive bit is enabled, the message is loaded into a pre-defined V-memory address location. Then the (PRINTV) instruction may be used to write the pre-coded ASCII string out of port 2. American, European and Asian Time/Date stamps are supported.

3. **Print Message (PRINT) -** This existing instruction can be used to create pre-coded ASCII strings in the PLC. When the instruction's permissive bit is enabled, the string is written to port 2. The VPRINT/PRINTV instruction combination is more powerful and flexible than the PRINT instruction.

4. If a D2-260 or D2-262 PLC is a master on a network, the Network Write instruction (WX) can be used to write embedded ASCII data to an HMI or slave device directly from V-memory via a supported communications protocol using port 2, H2-ECOM(100) or D2-DCM.

Example of AIN instruction in *Direct*SOFT

Additional instructions that help manage the ASCII strings

The following instructions can be very helpful in managing the ASCII strings within the CPU's V-memory:

ASCII Find (AFIND) - Finds where a specific portion of the ASCII string is located in continuous V-memory addresses. Forward and reverse searches are supported.

ASCII Extract (AEX) - Extracts a specific portion (usually some data value) from the ASCII find location or other known ASCII data location.

Compare V-memory (CMPV) - This instruction is used to compare two blocks of V-memory addresses and is usually used to detect a change in an ASCII string. Compared data types must be of the same format (i.e. BCD, ASCII, etc.).

Swap Bytes (SWAPB) - Usually used to swap V-memory bytes on ASCII data that was written directly to V-memory from an external HMI or similar master device via a communications protocol. The AIN and AEX instructions have a built-in byte swap feature.

Example of VPRINT instruction in *Direct*SOFT

DL205 CPU Specifications

DL205 CPU Comparison		
System Capacity	**D2-250-1**	**D2-260/D2-262**
Total memory available (words)	14.8K	30.4
Ladder memory (words)	7680 Flash	15872 Flash
V-memory (words)	7168	14592
Battery backup	Yes	Yes
Total CPU memory I/O pts. available *(actual I/O pts. depend on I/O configuration method selected)*	2048 *(512 X + 512 Y + 1024 CR)*	8192 *(1024 X + 1024 Y + 2048 CR + 2048 GX + 2048 GY)*
Local I/O (pts.)	256	256
Local Expansion I/O (pts.)	768 (2 exp. bases max) *(Including local I/O)*	1280 (4 exp. bases max.) *(Including local I/O)*
Serial Remote I/O (pts.)	2048 max. *(Including local and exp.I/O)*	8192 max. *(Including local & exp. I/O)*
Remote I/O channels	8 (7+1 CPU port)	8 (7+1 CPU port)
I/O per remote channel	2048	2048
Ethernet Remote I/O	Yes	Yes
Discrete I/O pts.	2048 max. *(Including local and exp.I/O)*	8192 *(Including local and exp.I/O)*
Analog I/O channels	Map into V-memory	Map into V-memory
Remote I/O channels	Limited by power budget	Limited by power budget
I/O per remote channel	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)
Performance		
Contact execution (Boolean)	0.61 µs	0.61 µs
Typical scan (1K Boolean)	1.9 ms	1.9 ms
Programming and Diagnostics		
RLL Ladder Style	Yes	Yes
RLL*PLUS*/Flowchart Style (Stages)	Yes/1024	Yes/1024
Run time editing	Yes	Yes
Supports Overrides	Yes	Yes
Variable/fixed scan	Variable	Variable
Instructions	174	231
Control relays	1024	2048
Timers	256	256
Counters	128	256
Immediate I/O	Yes	Yes
Subroutines	Yes	Yes
For/Next loops	Yes	Yes
Timed Interrupt	Yes	Yes
Integer Math	Yes	Yes
Floating-point Math	Yes	Yes
Trigonometric functions	No	Yes
Table Instructions	No	Yes
PID	Yes, 4 loops	Yes, 16 loops
Drum Sequencers	Yes	Yes
Bit of Word	Yes	Yes
ASCII Print	Yes	Yes
Real-time clock/calender	Yes	Yes
Internal diagnostics	Yes	Yes
Password security	Multi-level	Multi-level
System and user error log	Yes	Yes
Communications		
Built-in ports	Port 1 RS-232 Port 2 RS-232/422	Port 1 RS-232 Port 2 RS-232/422/485
K-sequence (proprietary protocol)	Yes	Yes
*Direct*NET™	Yes	Yes
Modbus RTU master/slave	Yes	Yes
ASCII communications	OUT	IN/OUT
Maximum baud rate	38.4K port 2	38.4K port 2