# DL05 I/O Specifications

D0-05DR-D $283.00

Wiring diagram and specifications

D0-05DR-D Specifications		
DC Power Supply Specifications	**Voltage Range**	**12–24 VDC 20W max.**
DC Input Specifications	*Number of Input Pts.*	8 (sink/source)
	Number of Commons	2 (isolated)
	Input Voltage Range	12–24 VDC
	Input Impedance	(X0-X2) 1.8K @ 12–24 VDC (X3-X7) 2.8K @ 12–24 VDC
	On Current/ Voltage Level	>5mA/10VDC
	OFF Current/ Voltage Level	<0.5 mA/<2VDC
	Response Time	X0-X2 / X3-X7
	OFF to ON Response	<100µs / <8ms
	ON to OFF Response	<100µs / <8ms
	Fuses	None
Relay Output Specifications	*Number of Output Points*	6
	Number of Commons	2 (isolated)
	Output Voltage Range	6–240 VAC, 47–63 Hz 6–27 VDC
	Maximum Voltage	264VAC, 30VDC
	Maximum Output Current	2A/point 6A/common
	Maximum Leakage Current	0.1 mA @ 246VAC
	Smallest Recommended Load	5mA @ 5VDC
	OFF to ON Response	<15ms
	ON to OFF Response	<10ms
	Status Indicators	Logic side
	Fuses	None (external recommended)
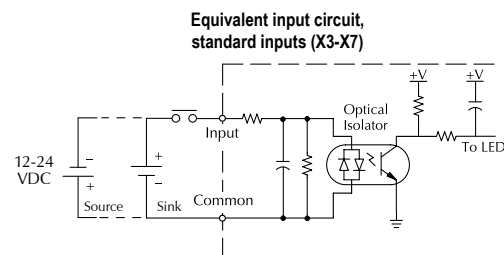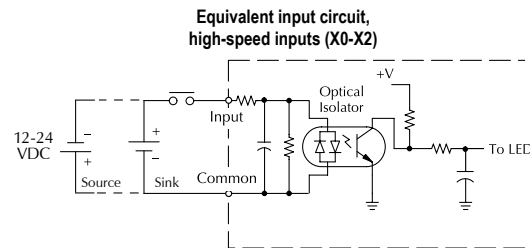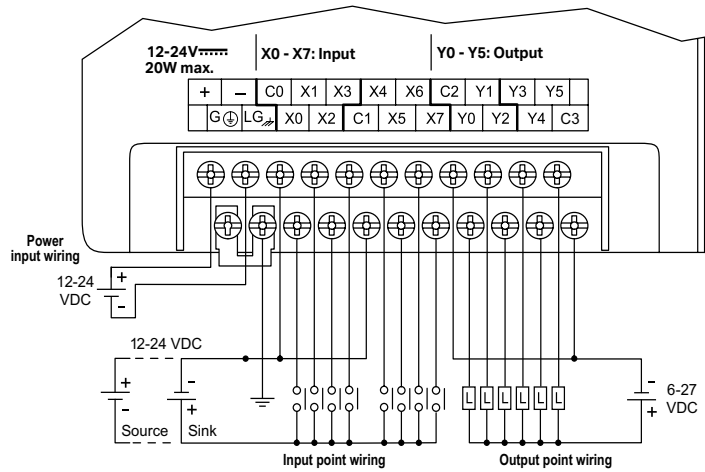
Typical Relay Life (Operations) at Room Temperature		
Voltage and Type of Load	**Load Current**	
	1A	**2A**
24 VDC Resistive	**600K**	**270K**
24 VDC Solenoid	150K	60K
110 VAC Resistive	900K	350K
110 VAC Solenoid	350K	150K
220 VAC Resistive	600K	250K
220 VAC Solenoid	200K	100K

12-24V 20W max.   X0 - X7: Input   Y0 - Y5: Output

| + | − | C0 | X1 | X3 | X4 | X6 | C2 | Y1 | Y3 | Y5 |
| G⏚ | LG⏚ | X0 | X2 | C1 | X5 | X7 | Y0 | Y2 | Y4 | C3 |

Power input wiring

12-24 VDC

12-24 VDC

Source   Sink

Input point wiring   Output point wiring

6-27 VDC

Equivalent input circuit, high-speed inputs (X0-X2)

Equivalent input circuit, standard inputs (X3-X7)

Derating chart for relay outputs

Ambient Temperature (°C/°F)

Equivalent output circuit
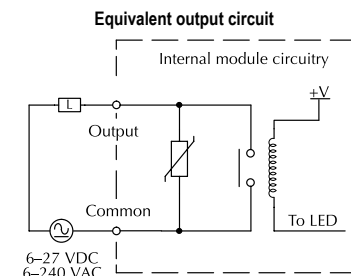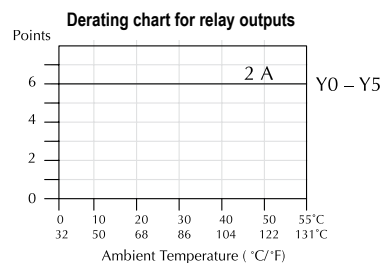
Features at a Glance

The DL05 and DL06 micro PLCs are complete self-contained systems. The CPU, power supply, and I/O are all included inside the same housing. Option modules are available to expand the capability of each PLC family for more demanding applications. The standard features of these PLCs are extraordinary and compare favorably with larger and more expensive PLCs.

The specification tables to the right are meant for quick reference only. Detailed specifications and wiring information for each model of the DL05 and DL06 PLCs can be found in those specific sections.

Program capacity

Most boolean ladder instructions require a single word of program memory. Other instructions, such as timers, counters, etc., require two or more words. Data is stored in V-memory in 16-bit registers.

Performance
The performance characteristics shown in the tables represent the amount of time required to read the inputs, solve the Relay Ladder Logic program and update the outputs.

Instructions
A complete list of instructions is available at the end of this section.

Communications
The DL05 and DL06 offer powerful communication features normally found only on more expensive PLCs.

Special features
The DC input and DC output PLCs offer high-speed counting or pulse output. Option module slots allow for discrete I/O expansion, analog I/O, or additional communication options.

DL05 CPU Specifications

System capacity
Total memory available (words)........................... 6K
Ladder memory (words)..2048
V-memory (words)..4096
User V-memory...3968
Non-volatile user V-memory..............................128
Battery backup.. Yes[1]
Total built-in I/O.. 14
Inputs.. 8
Outputs... 6
I/O expansion.. Yes[1]

Performance
Contact execution (Boolean)............................0.7 µs
Typical scan (1K Boolean)[2]..........................1.5-3 ms.

Instructions and diagnostics
RLL ladder style... Yes
RLLPLUS/flowchart style (Stages) Yes/256
Run-time editing... Yes
Supports Overrides... Yes
Scan .... Variable/fixed

Number of Instructions	133

Types of Instructions:
Control relays...512
Timers..128
Counters..128
Immediate I/O .... Yes
Subroutines... Yes
For/next loops.. Yes
Timed interrupt .... Yes
Integer math... Yes
Floating-point math .... No
PID.. Yes
Drum sequencers .... Yes
Bit of word .... Yes
ASCII print .... Yes
Real-time clock/calendar ....Yes[1]
Internal diagnostics.. Yes
Password security .... Yes
System and user error log .... No

Communications
Built-in ports.....................................Two RS-232C
Protocols supported:
K-sequence (proprietary protocol)................. Yes
DirectNet Client/Server.. Yes
Modbus RTU Client/Server.............................. Yes
ASCII out.. Yes
Baud rate
   Port 1 ....9,600 baud (fixed)
Port 2..selectable 300-38,400 baud (default 9,600)

Specialty Features
Filtered inputs..Yes[3]
Interrupt input...Yes[3]
High speed counter.....................................Yes, 5kHz[3]
Pulse output..Yes, 7kHz[3]
Pulse catch input...Yes[3]

1- These features are available with use of certain option modules. Option module specifications are located later in this section.

2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.

DL06 CPU Specifications

System capacity
Total memory available (words)...................... 14.8K
Ladder memory (words)......................................7680
V-memory (words)...7616
   User V-memory..7488
   Non-volatile user V-memory........................ 128
Built-in battery backup (D2-BAT-1)...................... Yes
Total I/O...36
Inputs..20
Outputs..16
I/O expansion.. Yes[1]

Performance
Contact execution (Boolean)............................0.6 µs
Typical scan (1K Boolean)[2] ....1-2 ms.

Instructions and diagnostics
RLL ladder style... Yes
RLLPLUS/flowchart style (Stages)............... Yes/1024
Run-time editing... Yes
Supports Overrides... Yes
Scan.. Variable/fixed
Number of Instructions.. 229

Types of Instructions:
Control relays.. 1024
Timers.. 256
Counters..128
Immediate I/O... Yes
Subroutines... Yes
For/next loops.. Yes
Table functions... Yes
Timed interrupt.. Yes
Integer math.. Yes
Trigonometric functions..................................... Yes
Floating-point math.. Yes
PID.. Yes
Drum sequencers... Yes
Bit of word.. Yes
Number type conversion.................................... Yes
ASCII in, out, print... Yes
LCD instruction.. Yes
Real-time clock/calendar.................................... Yes
Internal diagnostics.. Yes
Password security... Yes
System and user error log ....No

Communications
Built-in ports:
   One RS-232C
   One multi-function RS232C/RS422/RS485

NOTE: RS485 is for MODBUS RTU only.
Protocols sup56ported:
K-sequence (proprietary protocol)..................... Yes
DirectNet Client/Server.. Yes
Modbus RTU Client/Server.............................. Yes
ASCII in/out... Yes
Baud rate
   Port 1..,600 baud (fixed)
   Port 2.............................selectable 300-38,400 baud
   ....(default 9,600)

Specialty Features
Filtered inputs... ....Yes3
Interrupt input...Yes3
High speed counter....................................Yes, 7kHz3
Pulse output..Yes, 10kHz3
Pulse catch input...Yes3

1- These features are available with use of certain option module. Option module specifications are located later in this section.

2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.
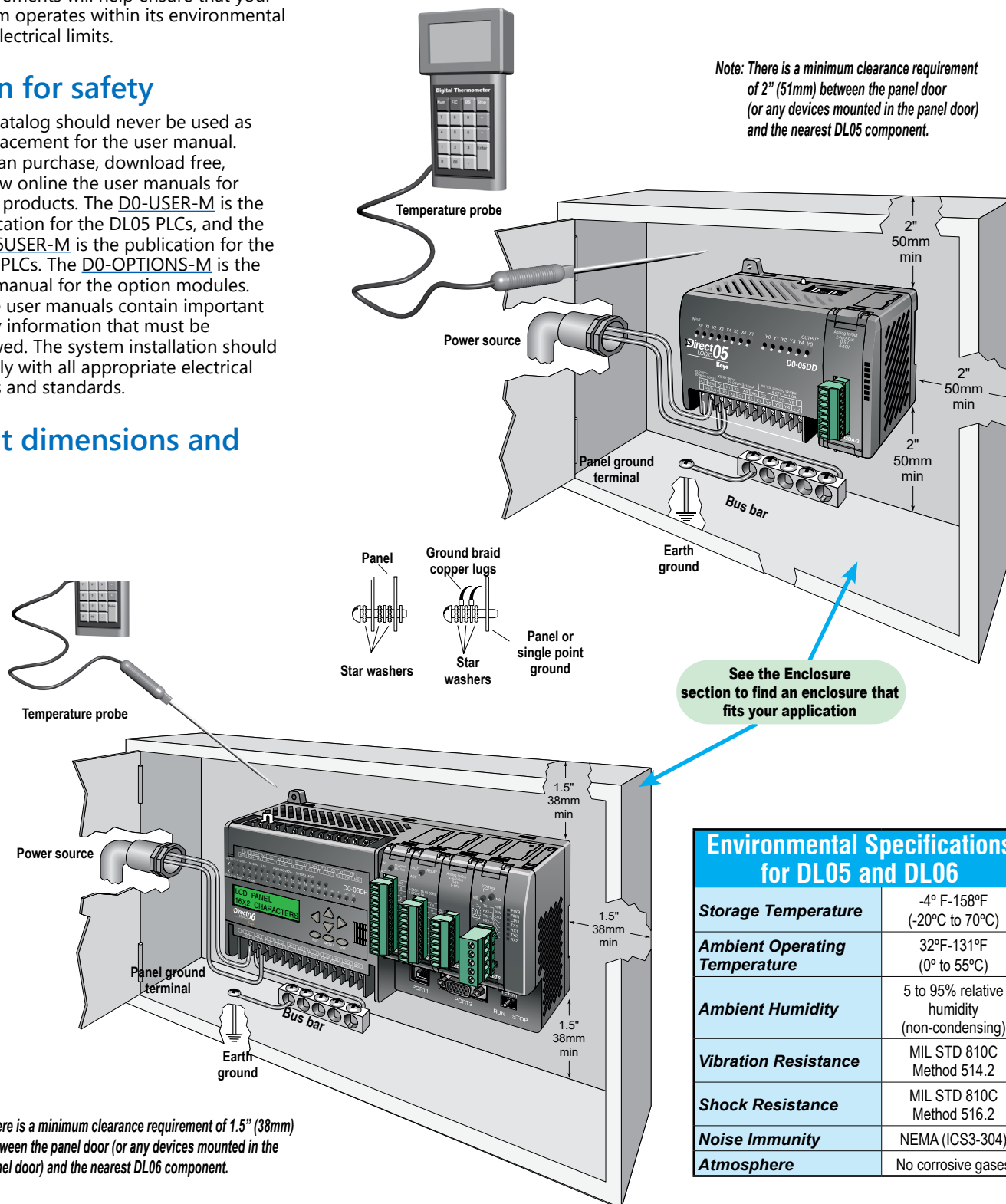

Features at a Glance

DirectSOFT software

The DL05 and DL06 PLCs use the same familiar DirectSOFT programming software that our larger PLCs use. A FREE version of DirectSOFT gives you all the great features of the full version, but with a 100-word PLC program download limitation. For programs larger than 100 words, the full package is required. The FREE PC-DS100 software may be sufficient to program the DL05 and DL06. If you are programming with a full package version prior to v6.0, you will need v2.4 or later for the DL05 PLCs and v4.0 or later for the DL06. We always recommend the latest version for the most robust features. See the DirectLOGIC Overview section DL in this catalog for a complete description of DirectSOFT including features, part numbers of programming packages and upgrades.

Programming
Handheld programmer....D2-HPP $679.00
DirectSOFT Programming for Windows
PC-DSOFT6 $462.00
PC-DS100   Free
PC-R60-U (upgrade) $291.00

Hardware features diagrams

Product Dimensions and Installation

It is important to understand the installation requirements for your DL05 or DL06 system. Your knowledge of these requirements will help ensure that your system operates within its environmental and electrical limits.

Plan for safety

This catalog should never be used as a replacement for the user manual. You can purchase, download free, or view online the user manuals for these products. The D0-USER-M is the publication for the DL05 PLCs, and the D0-06USER-M is the publication for the DL06 PLCs. The D0-OPTIONS-M is the user manual for the option modules. These user manuals contain important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

Unit dimensions and

Note: There is a minimum clearance requirement of 2" (51mm) between the panel door (or any devices mounted in the panel door) and the nearest DL05 component.

Temperature probe

Power source

Panel ground terminal

Bus bar

Earth ground

2"
50mm
min

2"
50mm
min

2"
50mm
min

Panel

Ground braid copper lugs

Star washers

Star washers

Panel or single point ground

See the Enclosure section to find an enclosure that fits your application

Temperature probe

Power source

Panel ground terminal

Bus bar

Earth ground

1.5"
38mm
min

1.5"
38mm
min

1.5"
38mm
min

Note: There is a minimum clearance requirement of 1.5" (38mm) between the panel door (or any devices mounted in the panel door) and the nearest DL06 component.

Environmental Specifications for DL05 and DL06	
Storage Temperature	-4º F-158ºF (-20ºC to 70ºC)
Ambient Operating Temperature	32ºF-131ºF (0º to 55ºC)
Ambient Humidity	5 to 95% relative humidity (non-condensing)
Vibration Resistance	MIL STD 810C Method 514.2
Shock Resistance	MIL STD 810C Method 516.2
Noise Immunity	NEMA (ICS3-304)
Atmosphere	No corrosive gases

Product Dimensions and Installation

Mounting Orientation

DL05 and DL06 PLCs must be mounted properly to ensure ample airflow for cooling purposes. It is important to follow the unit orientation requirements and to verify that the PLC's dimensions are compatible with your application. Notice particularly the grounding requirements and the recommended cabinet clearances.

Mounting orientation

Mounting orientation

Mounting orientation

Ports, Status Indicators, and Modes

Port 1

Port 1 is a 6-pin, fixed configuration port and has the same pin assignments on the DL05 and the DL06. Please refer to the table and diagrams on this page. This port can be used to connect to an HPP, DirectSOFT, an operator interface, or other external device. Features include:

- 9600 baud
- 8 data bits
- Odd parity
- 1 start bit, 1 stop bit
- Station address of 1
- Asynchronous, half-duplex, DTE

Protocols supported (as Server):

- K sequence, *Direct*NET, Modbus RTU

DL05 & DL06 Port 1 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232C)
4	TXD	Transmit data (RS-232C)
5	5V	Power (+) connection
6	0V	Power (-) connection (GND)

DL05

PORT 1   PORT 2
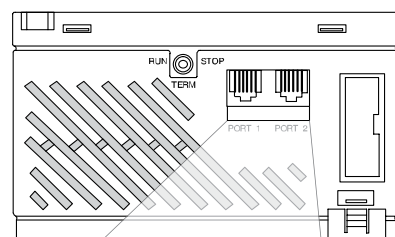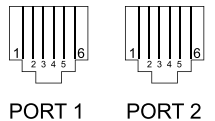
6-pin Female Modular Connector

DL06

PORT1
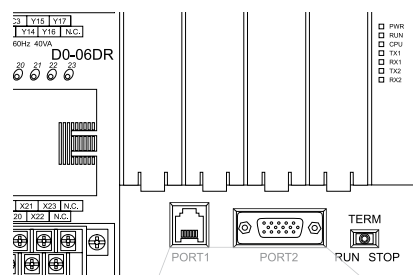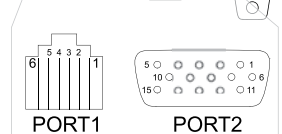
6-pin Female Modular Connector

PORT2

15-pin Female D-sub Connector

Port 2

Port 2 is a configurable port on both the DL05 and the DL06 PLCs. The DL05 PLC uses a 6-pin modular connector and offers RS-232 communications only. The DL06 PLC uses a 15-pin HD-sub connector and offers RS-232, RS-422, or RS-485 communications. Please refer to the table and diagrams on this page for more information. This port can be used to connect to an HPP, DirectSOFT, an operator interface, or other external device. Features of port 2 include:

- 300, 600, 1200, 2400, 4800, 9600 (default), 19,200, 38,400 baud
- 8 data bits
- Odd (default), even, or no parity
- 1 start bit, 1 stop bit
  - Station address:
    1 (default)
    1-90 DirectNET, K sequence
    1-247 Modbus RTU
- Asynchronous, half-duplex, DTE

Protocols supported:

- K sequence (Server), *Direct*NET (Client/Server), Modbus (Client/Server)

DL05 Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232C)
4	TXD	Transmit data (RS-232C)
5	RTS	Ready to send
6	0V	Power (-) connection (GND)

DL06 Port 2 Pin Descriptions		
1	5V	Power (+) connection
2	TXD	Transmit data (RS-232C)
3	RXD	Receive data (RS-232C)
4	RTS	Ready to send (RS232C)
5	CTS	Clear to send (RS232C)
6	RXD-	Receive data (-) (RS-422/485)
7	0V	Power (-) connection (GND)
8	0V	Power (-) connection (GND)
9	TXD+	Transmit data (+) (RS-422/485)
10	TXD-	Transmit data (-) (RS-422/485)
11	RTS+	Ready to send (+) (RS-422/485)
12	RTS-	Ready to send (-) (RS-422/485)
13	RXD+	Receive data (+) (RS-422/485)
14	CTS+	Clear to send (+) (RS-422/485)
15	CTS-	Clear to send (-) (RS-422/485)

DL05 and DL06 status indicators

Status Indicators		
Indicator	**Status**	**Meaning**
PWR	ON	Power good
	OFF	Power failure
RUN	ON	CPU is in Run Mode
	OFF	CPU is in Stop or Program Mode
CPU	ON	CPU self diagnostics error
	OFF	CPU self diagnostics good
TX1	ON	Data is being transmitted by the CPU-Port 1
	OFF	No data is being transmitted by the CPU-Port 1
RX1	ON	Data is being received by the CPU-Port 1
	OFF	No data is being received by the CPU-Port 1
TX2	ON	Data is being transmitted by the CPU-Port 2
	OFF	No data is being transmitted by the CPU-Port 2
RX2	ON	Data is being received by the CPU-Port 2
	OFF	No data is being received by the CPU-Port 2

DL05 and DL06 mode switches

Mode Switch Position	CPU Action
RUN (Run Program)	CPU is forced into the RUN mode if no errors are encountered. No program changes are allowed by the programming/monitoring device.
TERM (Terminal)	RUN PROGRAM and the TEST modes are available. Mode and program changes are allowed by the programming/monitoring device.
STOP	CPU is forced into the STOP mode. No changes are allowed by the programming/monitoring device.

Use the optional low profile 15-pin adapter to make option module wiring easier.

D0-06ADPTR