DirectLogic® DL105 Programmable Logic Controller (PLC)

DL105 PLCs

For the latest prices, please check AutomationDirect.com.
What is it?
The DL105 series is a fixed-I/O micro PLC with 10 inputs and 8 outputs. Eight configurations are available in combinations of AC, DC and relay I/O, as well as AC or DC powered models.

What’s it got?
- 10 inputs and 8 outputs
- 2K program memory
- 384 words data memory
- 110/220 VAC or 24 VDC powered models
- Built-in 24 VDC auxiliary power supply for field devices included with AC powered models
- 91-instruction programming, includes time or event-based drum sequencer, timed interrupt, immediate I/O, etc.
- One RS-232C communication port

What can I do with it?
- Build an electronic drum sequencer with 18 I/O points and connect an operator interface
- Drive high-current (up to seven amps) loads with the AC/relay model
- Use the high-speed I/O modes of a DC input or output model to perform counting or positioning tasks

Visit our Web page at http://www.automationdirect.com/dl105 for more information
It’s not the smallest micro, but it will put a big smile on your face!

The DL105 has 18 I/O points, high current capability, and removable I/O connectors. These features, plus heavy-duty power supply design and built-in surge suppression on the relay outputs, still make the DL105 one of the most versatile fixed-I/O units in the market.

AC inputs and high current AC outputs

Great for higher current applications, our AC outputs are rated at 1.6 A per point.

Seven amp relays

We used powerful 7A relays and combined them with a design that sheds heat! The DL105 offers eight relay outputs that can support up to seven amps per point. (You can drive all eight outputs at six amps per point up to 60°C.) Compare this to the 2.5 A of other micro PLCs.

Removable connectors

The DL05 was one of the first micro PLCs to offer removable terminal blocks. This feature makes wiring and installation a lot easier and less time consuming.
Features and Specifications

The DL105 micro PLCs contain the CPU, power supply and I/O all in the same housing. If you examine the CPU Specifications table, you’ll see that we included many features found in our modular CPUs.

Review the specs
Make sure these features can satisfy the requirements of your application. Since these units are completely self-contained, you cannot expand the system or replace the CPU as you would in a modular system.

System capacity
System capacity is the ability to accommodate a variety of applications. 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 words are useful for data storage, etc.

Performance
The performance is simply the scan time, which is the amount of time required to read the inputs, solve the RLL program and update the outputs.

Instructions and diagnostics
Make sure the unit offers the instructions you need.

Communications
All DL105 units offer one RS-232 port, capable of 9600 baud.

Specialty features
With the DC input and/or DC output versions, we also offer several high-speed I/O features.

Programming

<table>
<thead>
<tr>
<th>Instruction</th>
<th>OMRON PLUS/flowchart style (Stages)</th>
<th>RLL ladder style</th>
<th>Frequency (kHz)</th>
<th>Instructions</th>
<th>Support</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC-powered units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1-130DA</td>
<td>10-20 points</td>
<td>8 AC outputs</td>
<td>7A/point</td>
<td>100</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>F1-130AR</td>
<td>10-20 points</td>
<td>8 AC outputs</td>
<td>7A/point</td>
<td>100</td>
<td>0.1</td>
<td></td>
</tr>
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<td></td>
</tr>
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<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1-130DD-D</td>
<td>10-20 points</td>
<td>8 AC outputs</td>
<td>7A/point</td>
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<td>8 AC outputs</td>
<td>7A/point</td>
<td>100</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

Note: Either high-speed input or pulse output can be used, but not in the same configuration.

For the latest prices, please check AutomationDirect.com.

www.automationdirect.com/dl105
DL105 Hardware Features

CPU status indicators
RUN…………ON………………CPU is in RUN mode
………………OFF………………CPU is in PROGRAM mode
PWR…………ON………………CPU power good
………………OFF………………CPU power failure
CPU…………ON………………CPU internal diagnostics
…………………………………has detected an error
………………OFF………………CPU is OK

Mode control
The DL105 units do not have mode switches like many of our modular CPUs. You can set the unit (using special V-memory locations) so that it will power up in RUN mode.

Communications port
Protocol……………………………K-sequence slave
Devices……………………………Can connect with HPP, DirectSOFT, DV-1000, C-More Panels
Specs……………………………..6P6C RJ12 connector
……………………………………RS-232-C, 9,600 baud,
……………………………………Odd parity,
……………………………………8 data bits (one start,
………………………………………………one stop bit),
………………………………………………Asynchronous, half-duplex, DTE

RJ12 Connector Port 1 Pinout
Pin…………………………………..Signal
1………………………………………0V
2………………………………………5V
3………………………………………RS-232 Data in
4………………………………………RS-232 Data out
5………………………………………5V
6………………………………………0V

Fixed EEPROM memory
The DL105 units offer built-in EEPROM memory.

NOTE: Terminals accept 16–24 AWG. For 16 AWG, use type TFFN or Type MTW. Other types of 16 AWG may be acceptable, but it really depends on the thickness of the wire insulation.
It is important to understand the installation requirements for your DL105 system. This will help ensure that the DL105 products operate within their environmental and electrical limits.

Plan for safety
This catalog should never be used as a replacement for the user manual. The user manual, D1-USER-M, contains important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

Unit dimensions and mounting orientation
Use the following diagrams to make sure the DL105 system can be installed in your application. DL105 units must be mounted horizontally to ensure proper airflow for cooling purposes. It is important to check these dimensions against the conditions required for your application. For example, we recommend that you leave 2" depth for ease of access and cable clearance; however, your distance may be greater or less. Also, check the installation guidelines for the recommended cabinet clearances.

Note: There is a minimum of 2" (50mm) clearance required between the panel door or any devices mounted in the panel door and the nearest DL105 component.

Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-4°F to 158°F (-20°C to 70°C)</td>
</tr>
<tr>
<td>Ambient Operating</td>
<td>32°F to 131°F (0°F to 55°C)</td>
</tr>
<tr>
<td>Humidity</td>
<td>30% to 95% relative humidity (non-condensing)</td>
</tr>
<tr>
<td>Vibration Resistance</td>
<td>MIL STD 810C, Method 514.2</td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>MIL STD810, Method 516.2</td>
</tr>
<tr>
<td>Noise Immunity</td>
<td>NEMA(ICS3-304)</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>No corrosive gases</td>
</tr>
</tbody>
</table>

Dimensions and mounting
Power Supply Options

This product family offers units that operate on 110/220 VAC and 12/24 VDC. Choosing the power supply is probably the most important consideration when specifying a DL105 system, since not all I/O combinations are offered with each power supply option. The table to the right provides the I/O choices and power supply specifications for each type unit.

Choosing the I/O

The DL105 product family offers several different combinations of I/O points. Once you have chosen the power supply option, you need to choose the unit that offers the type of I/O points needed in your application.

Fixed I/O

All DL105 Micro PLCs have “fixed” I/O that is updated on every scan. This means that all units have 10 inputs and 8 outputs, regardless of the actual type of points on the units (DC in/Relay out, DC in/DC out, etc.) The DL105 micro PLC is non-expandable, so you cannot add I/O points. If you are concerned about future system expansion, check our DL06 (36 base I/O expandable to 100 total I/O), or the DL205 micro-modular product family. The DL205 also offers a wide array of features and flexible I/O arrangements with several different base sizes.

Addresses automatically assigned

The DL105 uses automatic addressing, so for the vast majority of applications, there is no setup required. We use octal addressing for many of our products, which means there are no 8s or 9s. The first eight input points use addresses X0-X7, and the last two input points use X10 and X11. If you plan on using the high-speed counting features, there is some very minimal setup required in special V-memory locations.
DL105 I/O Specifications

F1-130AA $247.00

Wiring diagram and specifications

Power requirements
Voltage range: 94–240 VAC (30VA)
100–240 VDC (30W)

AC input specifications
Number of input points: 10
Number of commons: 3 (isolated)
Input voltage range: 80–132 VAC
90–150 VDC
Input current: 6mA @ 132VAC
6.8 mA @ 150VDC
ON current/voltage level: > 4mA / 80VAC
> 4mA / 90VDC
OFF current/voltage level: < 2mA / 45VAC
< 2mA / 60VDC
OFF to ON response: < 8ms
ON to OFF response: < 15ms
Fuses: None

AC output specifications
Number of output points: 8
Number of commons: 4 (isolated)
Output circuitry: Triac
Output voltage range: 20–140 VAC
47–63 Hz
Peak voltage: 400VAC
ON voltage drop: 1.3 VAC at 2A
Maximum current: 1.7 A/point
(Maximum leakage current: 1mA at 400VAC
Maximum inrush current: 30A for 10ms
Minimum load: 15A for 100ms
Minimum load: 10mA
OFF to ON response: 8.33 ms @ 60Hz
10ms @ 50Hz
On to OFF response: 8.33 ms @ 60Hz
10ms @ 50Hz
Fuses: None (external recommended)

Auxiliary 24 VDC Output
Voltage range: 21.6–26.4 VDC
Output: 500mA max., isolated
Ripple: less than 200mV p–p

For the latest prices, please check AutomationDirect.com.
DL105 I/O Specifications

F1-130AR  $217.00

Wiring diagram and specifications

Power requirements
Voltage range: 94–240 VAC (30VA) 100–240 VDC (30W)

AC input specifications
Number of input points: 10
Number of commons: 3 (isolated)
Input voltage range: 80–132 VAC 90–150 VDC
Input current: 6mA @ 132VAC 6.8 mA @ 150VDC
ON current/voltage level: > 4mA / 80VAC > 4mA / 90VDC
OFF current/voltage level: < 2mA / 45VAC < 2mA / 60VDC
OFF to ON response: < 8ms
ON to OFF response: < 15ms
Fuses: None

Relay output specifications
Number of output points: 8
Number of commons: 4 (isolated)
Output circuitry: Relay
Output voltage range: 12–250 VAC 12–30 VDC
Maximum voltage: 265VAC, 150VDC
Maximum current: 7A/point (see derating)
Maximum inrush current: 12A
Minimum load: 10mA
Minimum OFF resistance: 100 MΩ @ 500 VDC
OFF to ON response: 15ms
ON to OFF response: 5ms
Fuses: None (external recommended)

Auxiliary 24 VDC Output
Voltage range: 21.6–26.4 VDC
Output: 500mA max., isolated
Ripple: Less than 200mV p–p

Typical Relay Life (Operations)
at Room Temperature

<table>
<thead>
<tr>
<th>Voltage and Type of Load</th>
<th>Load Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 mA</td>
</tr>
<tr>
<td>24 VDC Resistive</td>
<td>10M</td>
</tr>
<tr>
<td>24 VDC Solenoid</td>
<td></td>
</tr>
<tr>
<td>110 VAC Resistive</td>
<td></td>
</tr>
<tr>
<td>110 VAC Solenoid</td>
<td></td>
</tr>
<tr>
<td>220 VAC Resistive</td>
<td></td>
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<tr>
<td>220 VAC Solenoid</td>
<td></td>
</tr>
</tbody>
</table>

For the latest prices, please check AutomationDirect.com.
DL105 I/O Specifications

F1-130DA $247.00

Wiring diagram and specifications

**Power requirements**
- Voltage range: 94–240 VAC (30VA) / 100–240 VDC (30W)

**DC input specifications**
- Number of input points: 10 (sink/source)
- Number of commons: 3 (isolated)
- Input voltage range:
  - (X0–X3): 10–26.4 VDC or 21.6–26.4 VAC
  - (X4–X11): 10–26.4 VDC or 21.6–26.4 VAC
- Input impedance:
  - 2.8 kΩ @ 12VDC
  - 2.8 kΩ @ 24VDC
- ON current/voltage level: > 3mA / > 9VDC
- OFF current/voltage level: < 0.5 mA / < 2VDC
- Response:
  - X0-X3: 50µs
  - X4-X11: 2-8 ms
- Fuses: None

**AC output specifications**
- Number of output points: 8
- Number of commons: 4 (isolated)
- Output circuitry: Triac
- Output voltage range: 20–140 VAC / 47–63 Hz
- Peak voltage: 400VAC
- ON voltage drop: 1.3 VAC @ 2A
- Maximum current:
  - 1.7 A @ point (Subject to derating)
- Maximum leakage current: 1mA at 400VAC
- Maximum inrush current: 30A for 10ms
  - 15A for 100ms
- Minimum load: 10mA
- OFF to ON response:
  - Y0-Y7: 8.33 ms @ 60Hz
  - Y2-Y7: 10ms @ 50Hz
- ON to OFF response:
  - Y0-Y7: 8.33 ms @ 60Hz
  - Y2-Y7: 10ms @ 50Hz
- Fuses: None (external recommended)

**Auxiliary 24 VDC Output**
- Voltage range: 21.6–26.4 VDC
- Output: 500mA max., isolated
- Ripple: less than 200mV p–p

**Derating Chart for DC Inputs**

<table>
<thead>
<tr>
<th>Points</th>
<th>Derating Chart for DC Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Derating Chart for AC Outputs**

<table>
<thead>
<tr>
<th>Points</th>
<th>Derating Chart for AC Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2A</td>
<td></td>
</tr>
<tr>
<td>1.3A</td>
<td></td>
</tr>
<tr>
<td>1.4A</td>
<td></td>
</tr>
<tr>
<td>1.5A</td>
<td></td>
</tr>
<tr>
<td>1.6A</td>
<td></td>
</tr>
<tr>
<td>1.7A</td>
<td></td>
</tr>
</tbody>
</table>

For the latest prices, please check AutomationDirect.com.

www.automationdirect.com/dl105

DL105 PLCs  tDL1-7
DL105 I/O Specifications

F1-130DD  $247.00

Wiring diagram and specifications

**Power requirements**
- Voltage range: 94–240 VAC (30 VA), 100–240 VDC (30 W)

**DC input specifications**
- Number of input points: 10 (sink/source)
- Number of commons: 3 (isolated)
- Input voltage range: (X0–X3) 10–26.4 VDC, (X4–X11) 10–26.4 VDC or 21.6–26.4 VAC
- Input impedance: 2.8 kΩ @ 12-24 VDC
- ON current/voltage level: > 3mA / > 9 VDC
- OFF current/voltage level: < 0.5 mA / < 2 VDC
- OFF to ON response: X0–X3: 50 µs, X4–X11: 2–8 ms
- ON to OFF response: X0–X3: 50 µs, X4–X11: 2–8 ms
- Fuses: None

**DC output specification**
- Number of output points: 8 (sinking)
- Number of commons: 3 (internally connected)
- Output circuitry: MOSFET
- Output voltage range: 5–30 VDC
- Peak voltage: 60 VDC
- ON voltage drop: 0.4 VDC @ 0.5 A
- Maximum current: 1.0 A / point (Y0–Y1)
- Maximum leakage current: 15µA at 30VDC
- Maximum inrush current: Y0–Y1: 1.5 A for 10ms, Y2–Y7: 3 A for 10ms
- Minimum load: None
- OFF to ON response: Y0–Y1: 10µs, Y2–Y7: 3.5 µs
- ON to OFF response: Y0–Y1: 70 µs, Y2–Y7: 110 µs
- External DC power required: 10–30 VDC, @ 30mA + load current
- Fuses: None (external recommended)

For the latest prices, please check AutomationDirect.com.
DL105 I/O Specifications

F1-130DR $206.00

Wiring diagram and specifications

Power requirements

Voltage range:
- 94–240 VAC (30VA)
- 100–240 VDC (30W)

DC input specifications

Number of input points: 10 (sink/source)
Number of commons: 3 (isolated)
Input voltage range:
- (X0–X3): 10–26.4 VDC
- (X4–X11): 10–26.4 VDC or 21.6–26.4 VAC
Input impedance: 2.8 kΩ @ 12–24 VDC
ON current/voltage level: > 3mA / > 9VDC
OFF current/voltage level: < 0.5 mA / < 2VDC
OFF to ON response:
- X0–X3: 50µs
- X4–X11: 2–8 ms
ON to OFF response:
- X0–X3: 50µs
- X4–X11: 2–8 ms
Fuses: None

Relay output specifications

Number of output points: 8
Number of commons: 4 (isolated)
Output circuitry: Relay
Output voltage range:
- 12–250 VAC
- 12–30 VDC
Maximum voltage: 265VAC, 150VDC
Maximum current: 7A/point (see derating)
Maximum inrush current: 12A
Minimum load: 10mA
Minimum OFF resistance: 100MΩ @ 500VDC
OFF to ON response: 15ms
ON to OFF response: 3ms
Fuses: None (external recommended)

Auxiliary 24 VDC Output

Voltage range: 21.6–26.4 VDC
Output: 500mA max., isolated
Ripple: less than 200mV p–p

Typical Relay Life (Operations) at Room Temperature

<table>
<thead>
<tr>
<th>Voltage and Type of Load</th>
<th>Load Current (50mA, 5A, 7A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC Resistive</td>
<td>10M 600K 300K</td>
</tr>
<tr>
<td>24VDC Solenoid</td>
<td>— 150K 75K</td>
</tr>
<tr>
<td>110VAC Resistive</td>
<td>— 600K 300K</td>
</tr>
<tr>
<td>110VAC Solenoid</td>
<td>— 500K 200K</td>
</tr>
<tr>
<td>220VAC Resistive</td>
<td>— 300K 150K</td>
</tr>
<tr>
<td>220VAC Solenoid</td>
<td>— 250K 100K</td>
</tr>
</tbody>
</table>

For the latest prices, please check AutomationDirect.com.
DL105 I/O Specifications

F1-130DD-D  $247.00

Wiring diagram and specifications

**Power requirements**
- Voltage range: 10–30 VDC
- Power requirements: 10W max.

**DC input specifications**
- Number of input points: 10 (sink/source)
- Number of commons: 3 (isolated)
- Input voltage range:
  - (X0–X3): 10–26.4 VDC
  - (X4–X11): 10–26.4 VDC or 21.6–26.4 VAC
- Input impedance: 2.8 kΩ @ 12–24 VDC
- ON current/voltage level: > 3mA / > 9 VDC
- OFF current/voltage level: < 0.5 mA / < 2 VDC
- OFF to ON response:
  - X0–X3: 50µs
  - X4–X11: 2–8 ms
- ON to OFF response:
  - X0–X3: 50µs
  - X4–X11: 2–8 ms
- Fuses: None

**DC output specifications**
- Number of output points: 8 (sinking)
- Number of commons: 3 (internally connected)
- Output circuitry: MOSFET
- Output voltage range: 5–30 VDC
- Peak voltage: 60VDC
- ON voltage drop: 0.4 VDC @ 0.5 A
- Maximum current:
  - Y0–Y1: 0.5 A/point
  - Y2–Y7: 1.0 A/point
- Maximum leakage current: 15µA at 30 VDC
- Maximum inrush current:
  - Y0–Y1: 1.5 A for 10ms
  - Y2–Y7: 3A for 10ms
- Minimum load: None
- OFF to ON response:
  - Y0–Y1: 10µs
  - Y2–Y7: 3.5 µs
- ON to OFF response:
  - Y0–Y1: 70µs
  - Y2–Y7: 110µs
- Fuses: None (external recommended)

**Derating Chart for DC Inputs**
- Graph showing derating based on ambient temperature.

**Derating Chart for DC Outputs**
- Graph showing derating based on ambient temperature.

**Output Point Wiring**

**Input Point Wiring**

**Equivalent Circuit**
- High-Speed Inputs (X0–X3)
- Standard Inputs (X4–X11)
- Output Circuit

**Note:** Same supply can be used to power both input and output circuits because all circuits are isolated from the internal logic.

For the latest prices, please check AutomationDirect.com.
DL105 I/O Specifications

F1-130DR-D  $216.00

Wiring diagram and specifications

**DC power supply specifications**
- Voltage range: 10–30 VDC
- 10W max.

**DC input specifications**
- Number of input points: 10 (sink/source)
- Number of commons: 3 (isolated)
- Input voltage range:
  - X0–X3: 10–26.4 VDC
  - X4–X11: 10–26.4 VDC or 21.6–26.4 VAC
- Input impedance: 2.8 kΩ @ 12–24 VDC
- ON current/voltage level: > 3mA / > 9VDC
- OFF current/voltage level: < 0.5 mA / < 2VDC
- Off to ON response:
  - X0–X3: 50µs
  - X4–X11: 2–8 ms
- On to OFF response:
  - X0–X3: 50µs
  - X4–X11: 2–8 ms
- Fuses: None

**Relay output specifications**
- Number of output points: 8
- Number of commons: 4 (isolated)
- Output circuitry: Relay
- Output voltage range:
  - 12–250 VAC
  - 2–30 VDC
- Maximum voltage: 285VAC, 160 VDC
- Maximum current: 7A/point (See derating)
- Maximum inrush current: 12A
- Minimum load: 10mA
- Minimum OFF resistance: 100MΩ @ 500VDC
- OFF to ON response: 15ms
- ON to OFF response: 5ms
- Fuses: None (external recommended)

**Note:** Same supply can be used to power both input and output circuits because all circuits are isolated from the internal logic.

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**Typical Relay Life (Operations) at Room Temperature**

<table>
<thead>
<tr>
<th>Voltage and Type of Load</th>
<th>Load Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50mA</td>
</tr>
<tr>
<td>24VDC Resistive</td>
<td>10M</td>
</tr>
<tr>
<td>24VDC Solenoid</td>
<td>—</td>
</tr>
<tr>
<td>110VAC Resistive</td>
<td>—</td>
</tr>
<tr>
<td>110VAC Solenoid</td>
<td>—</td>
</tr>
<tr>
<td>220VAC Resistive</td>
<td>—</td>
</tr>
<tr>
<td>220VAC Solenoid</td>
<td>—</td>
</tr>
</tbody>
</table>

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For the latest prices, please check AutomationDirect.com.
Built-in High-Speed I/O Features

Selected DL105 micro PLCs offer special high-speed input features (on units with DC inputs) and pulse output features (on units with DC outputs). These features are available on the first four input points (X0-X3) and the first two output points (Y0-Y1). This allows you to use the economical DL105 micro PLC to solve a diverse range of high-speed machine control applications.

There are several modes of operation from which to choose. Here’s a brief description of the modes provided.

- Single 5kHz high-speed counter with 24 presets. When the preset is reached, an interrupt routine is executed.
- Single quadrature encoder input (up/down counter) for clockwise and counterclockwise position control.
- Single-channel programmable 7kHz pulse output with an external interrupt and separate acceleration/deceleration profiles for positioning and velocity control.
- A single external interrupt input for an immediate response to time-critical tasks.
- Single pulse catch input allows the CPU to read an input with a pulse width as small as 0.1 ms.
- Four inputs with selectable filters (0-99 ms) to ensure input signal integrity. This is the default mode, which is set at 10ms filter.

You can easily select the mode of operation just by entering an appropriate “code” in a special CPU V-memory location. These features are explained in more detail later in this section. Remember, not all features can be used at the same time. The Counter Mode Options table provides point-by-point usage for each mode of operation.

### Counter Mode Options

<table>
<thead>
<tr>
<th>Mode</th>
<th>DC Input Points</th>
<th>DC Output Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X0</td>
<td>X1</td>
</tr>
<tr>
<td>Filtered Input</td>
<td>Filtered Input</td>
<td>Filtered Input</td>
</tr>
<tr>
<td>Up Counter</td>
<td>Count Input</td>
<td>Filtered Input</td>
</tr>
<tr>
<td>Up/Down Counter</td>
<td>Phase A Input</td>
<td>Phase B Input</td>
</tr>
<tr>
<td>Interrupt Input</td>
<td>Interrupt Input</td>
<td>Filtered Input</td>
</tr>
<tr>
<td>Pulse Catch</td>
<td>Pulse Catch</td>
<td>Filtered Input</td>
</tr>
<tr>
<td>Pulse Output</td>
<td>Not available for use</td>
<td>Filtered Input, or Interrupt to Trigger Pulse Output</td>
</tr>
<tr>
<td>Timed Interrupt</td>
<td>Filtered Input</td>
<td>Filtered Input</td>
</tr>
</tbody>
</table>

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Built-in High-Speed I/O Specifications

<table>
<thead>
<tr>
<th><strong>High-Speed Input Specifications</strong></th>
<th><strong>High-Speed Output Specifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs</strong></td>
<td><strong>Outputs</strong></td>
</tr>
<tr>
<td>4 pts. max., X0-X3, sink or source</td>
<td>2 pts. max., Y0&amp;Y1 current sinking, 7kHz Max.</td>
</tr>
<tr>
<td><strong>Minimum Pulse Width</strong></td>
<td><strong>Voltage Range</strong></td>
</tr>
<tr>
<td>100µs</td>
<td>5–30 VDC</td>
</tr>
<tr>
<td><strong>Input Voltage Range</strong></td>
<td><strong>Maximum Load Current</strong></td>
</tr>
<tr>
<td>10–26.4 VDC</td>
<td>0.5 A point</td>
</tr>
<tr>
<td><strong>Input Impedance</strong></td>
<td><strong>ON Voltage Drop</strong></td>
</tr>
<tr>
<td>3.0 kΩ @ 12VDC</td>
<td>0.45 VDC @ 0.5 A</td>
</tr>
<tr>
<td>2.8 kΩ @ 24VDC</td>
<td><strong>Leakage Current</strong></td>
</tr>
<tr>
<td><strong>ON Current/Voltage Level</strong></td>
<td>15µA @ 30VDC</td>
</tr>
<tr>
<td>&gt; 3mA / &gt; 9VDC</td>
<td><strong>Inrush Current</strong></td>
</tr>
<tr>
<td><strong>OFF Current/Voltage Level</strong></td>
<td>1.5 A (10ms)</td>
</tr>
<tr>
<td>&lt; 0.5 mA / &lt; 2VDC</td>
<td>0.5 A (100ms)</td>
</tr>
<tr>
<td><strong>OFF to ON Response</strong></td>
<td><strong>OFF to ON Response</strong></td>
</tr>
<tr>
<td>&lt; 50µs</td>
<td>&lt; 50µs</td>
</tr>
<tr>
<td><strong>ON to OFF Response</strong></td>
<td><strong>ON to OFF Response</strong></td>
</tr>
<tr>
<td>&lt; 50µs</td>
<td>&lt; 50µs</td>
</tr>
</tbody>
</table>

Wiring Diagram

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Understanding the Timed Interrupt

Overview

There is a timed interrupt feature available in the DL105 micro PLCs. This cyclical interrupt allows you to easily program a time-based interrupt that occurs on a scheduled basis. This feature is available in all units, regardless of input type. The CPU’s timed interrupt operates in a manner similar to the external interrupt input, but instead of the interrupt subroutine being triggered by an external event tied to X0, it is now triggered by a cyclical interval of time. This interval can be programmed from 5ms to 999ms. Whenever the programmed time elapses, the CPU immediately suspends its routine scan cycle and jumps to interrupt subroutine INT0. When the subroutine execution is complete, the CPU automatically resumes its routine scan cycle starting from the exact location where it was interrupted. Since the CPU scan time and the interrupted time interval are different, the RLL program gets interrupted at various points in the execution over time. This does not present a problem. The CPU always returns to the point where it left to resume the program execution.

Input assignments for timed interrupt mode
X0:…………………Filtered input (uses filter time set for X1)
X1:…………………… Filtered input
X2:…………………… Filtered input
X3:…………………… Filtered input

Timed interrupt specification
Timed interrupts……………………… 1 (internal to CPU)
Time interval……………… 5 to 999 ms (1ms increments)
Interrupt subroutine……………………………… INT0
**Boolea Instructions**

**Store (ST)**
Begin a new rung or an additional branch in a rung with a normally open contact.

**Store Not (SNT)**
Begin a new rung or an additional branch in a rung with a normally closed contact.

**Or (OR)**
Logically ORs a normally open contact in parallel with another contact in a rung.

**Or Not (ORN)**
Logically ORs a normally closed contact in parallel with another contact in a rung.

**And (AND)**
Logically ANDs a normally open contact in series with another contact in a rung.

**And Not (ANDN)**
Logically ANDs a normally closed contact in series with another contact in a rung.

**And Store (STR)**
Logically ANDs two branches of a rung in series.

**Or Store (ORST)**
Logically ORs two branches of a rung in parallel.

**Out (OUT)**
Reflects the status of the rung (on/off) and outputs the discrete (on/off) state to the specified image register or memory location.

**Out (OUT)**
Reflects the status of the rung and outputs the discrete (ON/OFF) state to the image register. Multiple OR OUT instructions referencing the same discrete point can be used in the program.

**Positive Differential (PD)**
Is typically known as a one shot. When the input logic produces an off to on transition, the output will energize for one CPU scan.

**Set (SET)**
An output that turns on a point or a range of points. The reset instruction is used to turn the points OFF that were set ON with the set instruction.

**Reset (RES)**
An output that resets a point or a range of points.

**Pause Outputs (PAUSE)**
Disable the updating of specified output points.

**Clear Outputs (CLR)**
Clears the discrete output points.

**Accumulator/Stack Load and Output Data**

**Load (LD)**
Loads a 16-bit word into the lower 16 bits of the accumulator/stack.

**Load Double (LDD)**
Loads a 32-bit word into the accumulator/stack.

**Load Formatted (LDF)**
Loads a value with a specified number of consecutive discrete memory bits.

**Load Address (LDA)**
Loads the accumulator with the HEX value for an octal constant instruction.

**Out (OUT)**
Copies the values in the lower 16 bits of the accumulator to a specified discrete memory location.

**Out Double (OUTD)**
Copies the value to the accumulator to two consecutive V-memory locations.

**Out Formatted (OUTF)**
Outputs a specified number of bits (1–32) from the accumulator to the specified discrete memory locations.

**Pop (POP)**
Moves the value from the first level of the accumulator stack to the accumulator and shifts each value in the stack up one level.

**Immediate Instructions**

**Store Immediate (SIEL)**
Begin a new branch of logic with a normally open contact. The contact will be updated with the current input field status when processed in the program scan.

**Store not Immediate (SINIL)**
Begin a new branch of logic with a normally closed contact. The contact will be updated with the current input field status when processed in the program scan.

**Or Immediate (ORI)**
Connects a normally open contact in parallel with another contact. The contact will be updated with the current input field status when processed in the program scan.

**And Immediate (ANDI)**
Connects a normally closed contact in parallel with another contact. The contact will be updated with the current input field status when processed in the program scan.

**Or Not Immediate (ORNI)**
Connects a normally closed contact in series with another contact. The contact will be updated with the current input field status when processed in the program scan.

**And Not Immediate (ANDNI)**
Connects a normally open contact in series with another contact. The contact will be updated with the current input field status when processed in the program scan.

**Register (REG)**
A contact that turns on a point or a range of points. The reset instruction is used to turn the points OFF that were set ON with the set instruction.

**Reset Immediate (RESIL)**
Set the status of the rung to 0. The output field status is updated when the instruction is processed in the program scan.

**Immediate Outputs**

**Add Immediate (ADDI)**
Adds a BCD value in the lower 16 bits to the accumulator with a V-memory location. The result resides in the accumulator.

**Add Double Immediate (ADDI)**
Adds a BCD value in the accumulator with a V-memory location. The result resides in the accumulator.

**Subtract Immediate (SUBI)**
Subtracts a BCD value, in a V-memory location from the lower 16 bits in the accumulator. The result resides in the accumulator.

**Subtract Double Immediate (SBDI)**
Subtracts a BCD value, which is either two consecutive V-memory locations or an 8-bit constant, from a value in the accumulator. The result resides in the accumulator (continued below).

**Logical Instructions (Accumulator)**

**And (AND)**
Logically ANDs the lower 16 bits in the accumulator with a V-memory location.

**And Double (ANDD)**
Logically ANDs the value in the accumulator with two consecutive V-memory locations or an 8-bit constant.

**Or (OR)**
Logically ORs the lower 16 bits in the accumulator with a V-memory location.

**Or Double (ORD)**
Logically ORs the value in the accumulator with two consecutive V-memory locations or an 8-bit constant.

**Exclusive Or (XOR)**
Performs an Exclusive Or of the lower 16 bits of the accumulator with a V-memory location.

**Exclusive Or Double (XORD)**
Performs an Exclusive Or of the value in the accumulator with two consecutive V-memory locations or an 8-bit constant.

**Compare (CMP)**
Compares the lower 16 bits value (that is, the value in the accumulator) with a V-memory location.

**Compare Double (CMPD)**
Compares the value in the accumulator with two consecutive V-memory locations or an 8-bit constant.

**Math Instructions (Accumulator)**

**Add (ADD)**
Add a BCD value in the lower 16 bits in the accumulator with a V-memory location. The result resides in the accumulator.

**Add Double (ADDD)**
Add a BCD value in the accumulator with two consecutive V-memory locations or an 8-bit constant. The result resides in the accumulator.

**Subtract (SUB)**
Subtract a BCD value, in a V-memory location from the lower 16 bits in the accumulator. The result resides in the accumulator.

**Subtract Double (SUBD)**
Subtract a BCD value, which is either two consecutive V-memory locations or an 8-bit constant, from a value in the accumulator. The result resides in the accumulator.

**Timer, Counter, and Shift Register Instructions**

**Timer (TMR)**
Single input incremental timer with 0.1 second resolution (0-9999.9 seconds).

**Fast Timer (TFMR)**
Single input incremental timer with 0.01 second resolution (0-99999.9 seconds).

**Accumulating Timer (TARA)**
Two input incremental timer with 0.1 second resolution (0-99999.9 seconds). Timer values and enabled/disabled inputs control the timer.

**Accumulating Fast Timer (TRAF)**
Two input incremental timer with 0.01 second resolution (0-999999.9 seconds). Time and enable/reset inputs control timer.

**Counter (CNT)**
Two input incremental counter (0-9999). Count and reset inputs control the counter.

**Up Down Counter (UDC)**
Up down counter (0-99999999). Up, down, and reset inputs control the counter.

**Shift Register (SR)**
Shift data through a range of control registers with each clock pulse. The data, clock, and reset inputs control the shift register.

**Increment Binary (INCB)**
Increments a binary value in a specified V-memory location by 1 each time the instruction is executed. The result resides in the accumulator.

**Decrement Binary (DECIB)**
Decrements a specified binary value in a V-memory location by 1 each time the instruction is executed.

**Table Instructions**

**Move (MOV)**
Moves the values from one V-memory table to another V-memory table.

**Move Memory Cartridge/Load Label (MOVMC/LDLBL)**
Copies data from data label area in program ladder memory to V-memory.

**Paragraph Instructions**

**Shift Left (SHL)**
Shifts the bits in the accumulator a specified number of places to the left.

**Shift Right (SHR)**
Shifts the bits in the accumulator a specified number of places to the right.

**Encode (ENCOD)**
Encodes the bit position set to 1 in the accumulator, and returns the appropriate binary representation in the accumulator.

**Decode (DECOD)**
Decodes the 8-bit binary value (0-31) in the accumulator by setting the appropriate bit position 1 to 1 in the accumulator.

**Interrupt Instructions**

**Interrupt Routine / Return (INT / IRT)**
When a hardware or software interrupt occurs the interrupt routine will be initiated. The INT instruction is the beginning of the interrupt routine. The interrupt routine is terminated with an IRT instruction (time the interrupt interrupt return). When a interrupt return is reached the execution of the program continues from the instruction where the program execution was suspended.

**Enable Interrupt (EN)**
Enable hardware and software interrupt to be acknowledged.

**Disable Interrupt (DISI)**
Disable hardware and software interrupt from being acknowledged.

**CPU Control Instructions**

**No Operation (NOP)**
Inserts a 0-octet operation cell at specified program address.

**End (END)**
Marks the termination point for the normal program scan. An End instruction is required at the end of the main program body.

**Step (STEP)**
Changes the mode of the CPU from Run to Program (Stop).

**Number Conversion Instructions (Accumulator)**

**Binary (BIN)**
Converts the BCD value in the accumulator to the equivalent binary value.

**Binary Coded Decimal (BCD)**
Converts the binary value in the accumulator to the equivalent BCD value. The result resides in the accumulator.

**Import (IN)**
Takes the one’s complement of the 32-bit value in the accumulator.

**The result resides in the accumulator.

**RLLPLUS Stage / Drum Programming**

**Initial Stage (ISG)**
The initial stage instruction is used for a starting point for user application program. The ISG instruction will be active on power up and PROGRAM transition. Transitions.

**Stage (STG)**
Stage instructions are used to create structured programs. They are program segments which can be activated or deactivated with control logic.

**Jump (JMP)**
A N.O. coil that deactivated the active stage and activates a specified stage when there is power flow to the coil.

**Master (MST)**
The Master Reset (MST/MLR) allows the program to control sections of logic by forming a new power rail. The M3 marks the beginning of a power rail and the MRP marks the end of the power rail control.

**Drum Instructions: Time and Event Drum with Discrete Outputs (EDR)**
Time and/or event driven drum with up to 16 steps and 16 discrete output points. Output status is written to the specified output during each clock pulse. A specified time base per count (in ms). Each step can have a different number of counts and an event to trigger the counting. Once the time has expired, the next step occurs. Also define prestep as destination when reset occurs.

**Message Instructions**

**Fault/Data Label (FAULT/DBL)**
Displays a V-memory location, another V-memory location or a Data label constant to the handheld programmer or personal computer using Direct Sof.

**Numerical Constant/ASCII Constant (NCON/ACON)**
Stores constants in numerical or ASCII form for use with other instructions.

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