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Chapter 7

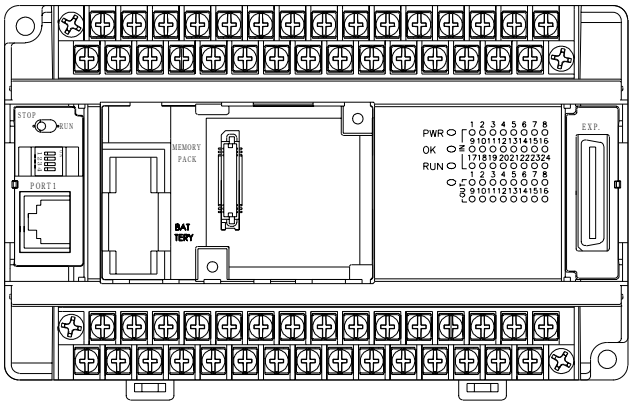
VersaMax 40-Point Micro PLCs

This chapter describes the features, specifications, and field wiring for 40-Point VersaMax Micro PLCs.

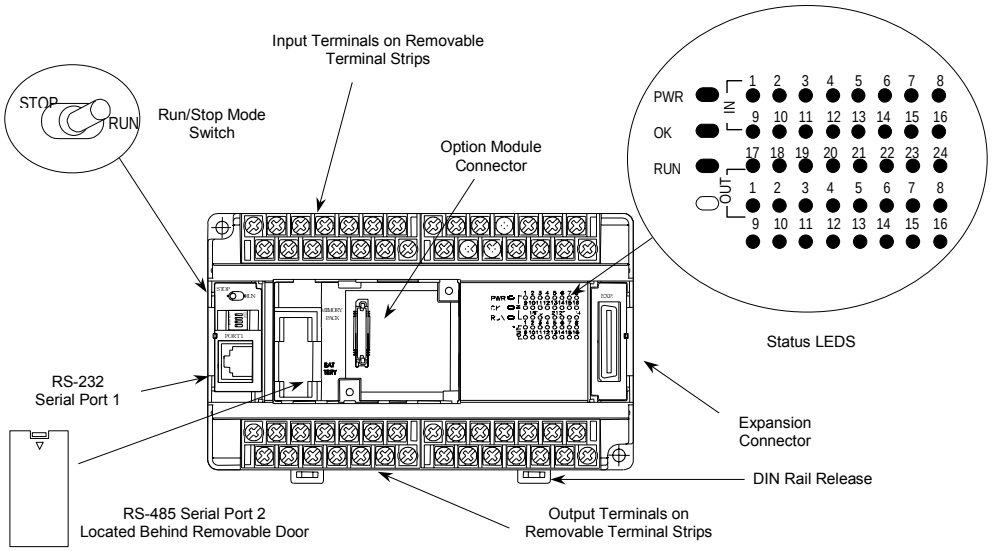
- IC200UDD040 40 Point Micro PLC, (24) 24VDC In, (16) 24VDC Out (Source), 24VDC Power Supply
- IC200UDD240 40 Point Micro PLC, (24) 24VDC In, (12) 24VDC Out with ESCP, (4) 24V LCDC Out, 24VDC Power Supply
- IC200UDR040 40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 24VDC Power Supply
- IC200UDR140 40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 120/240VAC Power Supply
- IC200UDR440 40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 12/24VDC Power Supply

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Features of VersaMax 40-Point Micro PLCs



- Supports up to four Expansion Units in any combination.
- Removable screw-down “barrier-style” terminal strips with protective covers.
- Built-in serial communications port supports SNP/ SNPX master and slave, Modbus RTU master and slave, and Serial I/O.
- Removable Memory Pack Module available.
- Optional Port 2.
- Run/Stop mode switch that can be configured as a run/stop switch, a memory protect switch, and also used for clearing faults when a fatal fault exists.
- Resettable calendar clock.
- Full-featured programming Instruction Set with floating point math. The application program can be either Ladder Diagram (LD) or Instruction List (IL) format.
- 24K words of program memory, 32K words of registers.
- Flash memory (ROM) for non-volatile program storage and for system firmware.
- Configurable to read configuration and application program at powerup from either RAM or flash memory (ROM).
- Capacitor backs up RAM and the Time-of-Day clock for at least 30 minutes at 25 degrees C
- Optional lithium battery backup for RAM and real-time clock.
- Enhanced High-speed Counter / Pulse Train commands for Jogging, Blending, and Homing, plus configurable 32-bit Counters /PTO/ and 32-bit function blocks.



Run/Stop Switch

The Run/Stop switch can be configured as a run/stop switch or a memory protect switch, and used for clearing faults when a fatal fault exists.

Ports

Port 1 is a built-in RS-232 serial port with an RJ-45 connector.
A second port can be added to a 40-Point Micro PLC using one of the port Option Modules described in chapter 13. If a second port is installed, both ports can be used for programming. Only one port can be used at a time for programming, but both ports can be used for monitoring at the same time.

Port 1 and the optional Port 2 are individually-configurable for SNP master/slave, RTU master/slave, and Serial I/O protocols. Both 4-wire and 2-wire RTU are supported when the RS-485 Port Option module is installed as port 2. Port 2 does not support hardware flow control. When either port is being used for RTU slave, it automatically switches to SNP slave mode when that port is being used by the programmer. If a port is configured for Serial I/O, RTU Master, or SNP Master operation, that port defaults to SNP slave and automatically reverts to SNP slave when the CPU is in Stop mode.

Either port can be software-configured to set up communications between the CPU and various serial devices. An external device can obtain power from the port if it requires 200mA or less at 5VDC.

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Analog Inputs

The RS232 Option Module (IC200USB001) or the RS485 Option Module (IC200USB002) can provide two 0-10V analog inputs. See chapter 13 for more information about option modules. The two inputs can be used to adjust the values in analog registers %AI016 (input 1) and %AI017 (input 2). An example use for the analog inputs would be to set threshold values for use in logical relationships with other inputs/outputs.

Removable Terminal Strips

The removable terminal assemblies are protected by hinged covers. After turning off power to the Micro PLC, a terminal assembly and attached field wiring can be separated from the Micro PLC by removing two screws.

Status LEDs

LEDs on the Micro PLC provide quick visual verification of operating status. In addition to LEDs for Power, OK, and Run mode, there is an LED for each I/O point.

Backup Battery

The Micro PLC uses a large value capacitor to provide memory retention current to the System/User RAM and the Time-of-Day clock when the power supply is either not present or not powered up. The capacitor retains memory contents for at least 30 minutes.

To maintain memory for longer than this, a replaceable battery assembly can be installed in the battery holder, as described in chapter 14. The Micro PLC reports the battery state to the PLC Fault Table and also uses Status Bits %SA011 and %S0014 to indicate the battery state.

General Specifications of 40-Point VersaMax Micro PLCs

Module Dimensions	Height: 90mm (3.6 inches), Depth: 76mm (3.0 inches) Width: 150mm (6.0 inches)
Typical Scan Rate	1.7 ms/K for Boolean logic (see appendix A)
Real Time Clock accuracy (for Timer contacts and Timer function blocks)	+/-0.5%
Time-of-Day Clock accuracy	+/-5 sec/day @10degC, +/-5 sec/day @25degC, and +/-11 sec/day @ 55°C or across full temperature range
Maximum number of slave devices per RS-485 network	8 (can be increased with a repeater)
+24 VDC Output Power Supply (for input circuits and user devices)	435mA maximum
+5 VDC output of Serial Ports	200mA per port, 400mA total for both ports, maximum

High-Speed Counters

VersaMax 40-Point Micro PLCs can be configured to provide built-in High-Speed Counter and pulse operation. When configured for High-Speed Counter operation, inputs I1 to I8 can be set up as:

- Up to four Type A Counters or
- One Type A and one Type B Counter or
- Up to four Type A_32 Counters or
- One Type A and one Type B_32 Counter

Each counter provides direct processing of rapid pulse signals up to 100kHz for industrial control applications such as meter proving, turbine flow meter, velocity measurement, material handling, motion control, and process control.

Each counter can be enabled independently. Type A counters can be configured for up or down counting (default is up) and for positive or negative edge detection (default is positive). The type B counter provides an A Quad B counting function.

See Chapter 17 for information about High-Speed Counter operation.

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IC200UDD040
40 Point Micro PLC, (24) 24VDC In, (12) 24VDC Out with ESCP, (4) LCDC Out, 24VDC Power Supply

VersaMax Micro PLC IC200UDD040 accepts twenty-four DC inputs and provides twelve 24V ESCP outputs and four 24VDC low current outputs. It uses +24VDC nominal input power for PLC operation.

DC Power

If configured to disable power-up diagnostics, the PLC begins logic solution 100ms after the voltage level of the power supply input reaches and maintains 24VDC. The 24VDC power source for the PLC must have enough transient current capability to support the inrush current of the power supply and to maintain a 24VDC voltage level (see power supply specifications for inrush requirements).

DC Inputs

The twenty-four configurable DC inputs can be used as positive or negative logic standard inputs. Eight of these inputs can be used for High-speed Counter inputs. When used as standard inputs, they are compatible with a wide range of input devices, such as pushbuttons, limit switches, and electronic proximity switches.

The Micro PLC's +24 VDC supply can be used for input devices and to power the DC input circuits at about 8mA per input. The combination of input circuit current and external device current must not exceed 435 mA.

DC Outputs

Outputs 1 – 4 can be used as standard, High-speed Counter, Pulse-Width Modulated, Pulse Train Outputs, or Pulse Train Outputs with Ramping. All standard outputs are all source-type. Outputs can be used to switch devices like valves, lamps or contactors.

Outputs 5 – 16 provide Electronic Short-Circuit Protection.

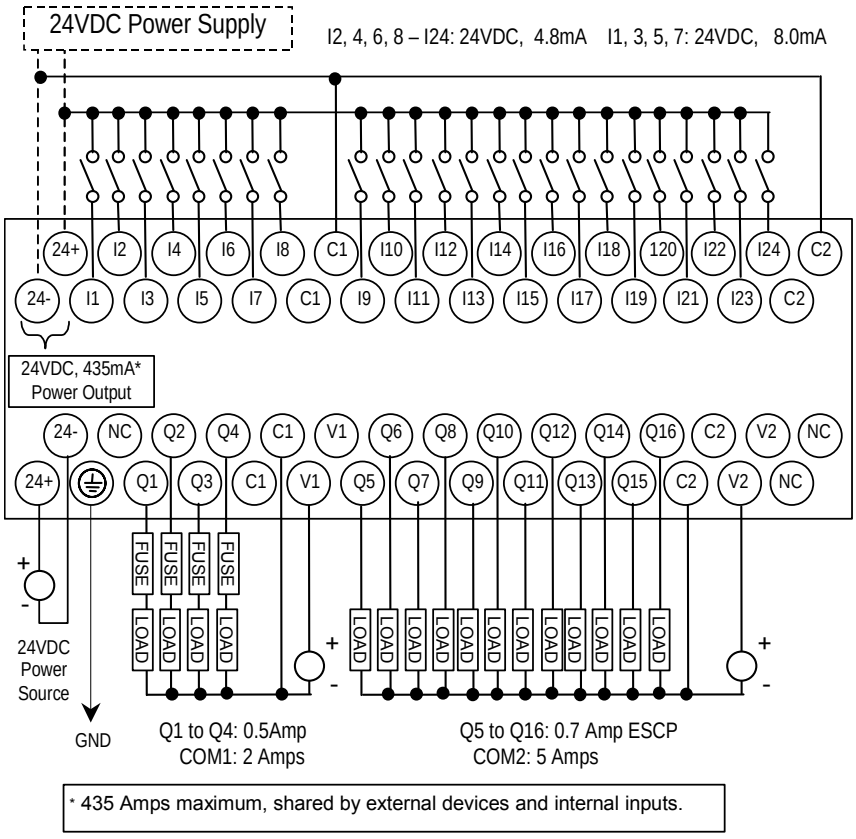
Micro PLC IC200UDD040 Specifications

Inputs	Twenty-four 24 VDC positive logic inputs
Outputs	Sixteen 24VDC outputs. Outputs 5-16 with ESCP
High-speed Counters	Up to four Type A or one Type A and one Type B, or four Type A_32, or one Type A_32 and one Type B_32
DC Power Specifications	
Range	19.2VDC to 30VDC
Hold-up	10mS at 19.2 VDC
Inrush Current	1 Amp maximum at 30VDC
Inrush Time	10mS for 1 Amp
Input Current	0.20 Amp typical at 24VDC
Input Power Supply Rating	5W
DC Input Specifications	
Rated Input Voltage	24 volts DC
Input Voltage Range	0 to 30 volts DC
Input Current at 24VDC	I1, I3, I5, I7: 8mA typical; other inputs 4.8mA typical
Input Impedance	I1, I3, I5, I7: 2.7 kOhms; other inputs: 4.7kOhms
Input Threshold Voltage	ON: 18VDC minimum, OFF: 5VDC maximum
Input Threshold Current	I1, I3, I5, I7: ON 4.5mA maximum, OFF: 1.8mA minimum Other inputs: ON 3.3mA maximum, OFF: 1.6mA maximum
Response Time	1ms to 20ms configurable as regular input; 100µs as HSC input
Isolation Voltage	1500V RMS field side to logic side, 500V RMS between groups
Output Specifications	
Voltage Range	12VDC / 24VDC
External Power Supply	12/24VDC –10%, +20%
Maximum Load Current	0.5A per point (Q1 – Q4) at 24VDC at 100 % ON duration 0.7A per point (Q5 – Q16) at 24VDC at 100 % ON duration
Minimum Switching Current	10mA
Maximum Inrush Current	Q1,Q2,Q11,Q12: 8A for 20ms, 1 pulse Q3-Q10: 4A for 20ms, 1 pulse
Output Voltage Drop	0.3V maximum
OFF state leakage current	0.1mA maximum
Response Time	OFF to ON, ON to OFF: 0.1ms maximum (24 VDC)
Isolation Voltage	1500V RMS between field side and logic side, 500V RMS between groups
Fuse	None, outputs 5-12 are ESCP protected
Undervoltage shutdown	Q5 – Q16: 5V minimum, 8V maximum
DC short circuit current	Q1 – Q4: 5A maximum Q5 - Q16: 0.7A maximum ESCP
Peak short circuit current	Q5 - Q16:4A maximum
Delay time of peak short circuit current	100 microseconds
Delay time of current limit	100 microseconds

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High-speed Counter Input and Output Specifications	
Maximum Counter Frequency	100kHz
Input Voltage	ON : 18V, OFF: 5V
Count Pulse Width	500 microseconds
Count Registers	16bits
Outputs	
Load Voltage	12/24VDC
Maximum Pulse/Pulse Train with Ramping/PWM Frequency	Type A: 100kHz Type B: 60kHz PWM and PTO: 65kHz Pulse Train with Ramping: 65kHz
Types available	Up to four HSC, PT,PT with Ramping and/or PWM outputs

Wiring Diagram, IC200UDD040



IC200UDD240
40 Point Micro PLC, (24) 24VDC In, (16) 24VDC Out (Sink), 24VDC Power Supply

VersaMax Micro PLC IC200UDD240 accepts twenty-four DC inputs and provides sixteen DC outputs. It uses +24VDC nominal input power for PLC operation.

DC Power

If configured to disable power-up diagnostics, the PLC begins logic solution 100ms after the voltage level of the power supply input reaches and maintains 24VDC. The 24VDC power source for the PLC must have enough transient current capability to support the inrush current of the power supply and to maintain a 24VDC voltage level (see power supply specifications for inrush requirements).

DC Inputs

Twenty-four configurable DC inputs can be used as positive or negative logic standard inputs. Eight of these inputs can be used for High-speed Counter inputs. When used as standard inputs, they are compatible with a wide range of input devices, such as pushbuttons, limit switches, and electronic proximity switches.

The Micro PLC's +24 VDC supply can be used for input devices and to power the DC input circuits at about 8mA per input. The combination of input circuit current and external device current must not exceed 435mA.

DC Outputs

Micro PLC IC200UDD240 has 16 Sink-type DC outputs. All outputs are isolated between field and logic and are switching positive voltage. The outputs have one common incoming supply (VC) and one common ground (COM). The outputs are able to drive high inrush currents (8 times the rated current) and are protected against negative voltage pulses. This makes it possible to switch lamps and inductive loads.

DC outputs can be used as standard, High-speed Counter, Pulse-Width Modulated, Pulse Train Outputs, or Pulse Train Outputs with Ramping.

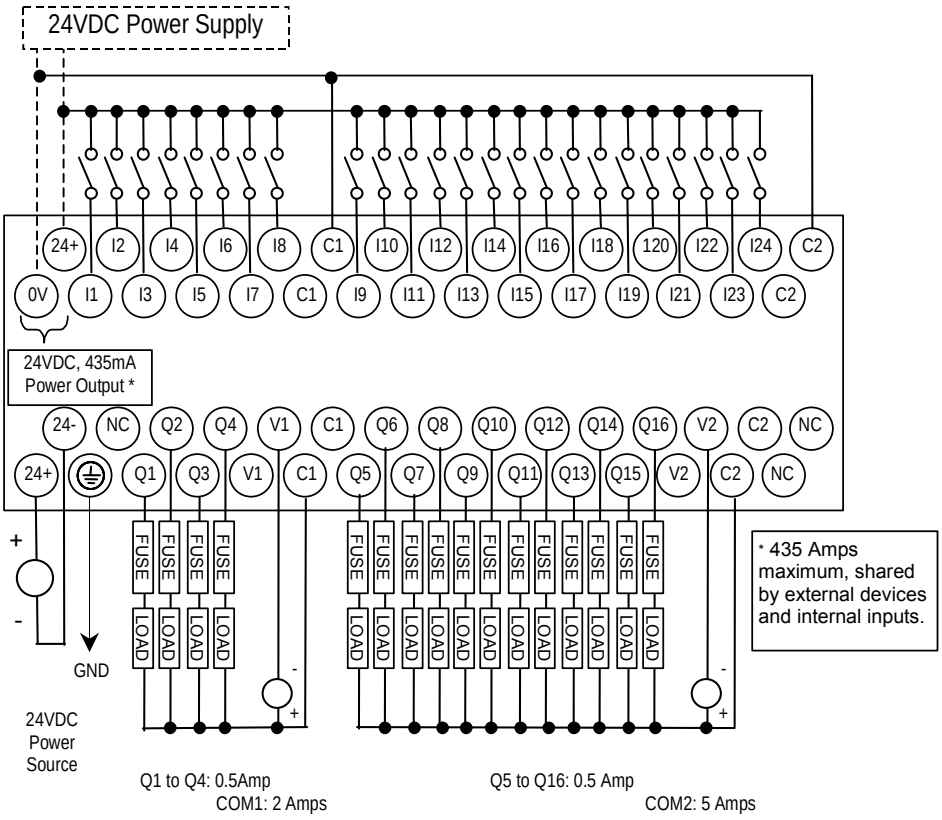
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Micro PLC IC200UDD240 Specifications

Inputs	Twenty-four 24 VDC positive logic inputs
Outputs	Sixteen transistor outputs, 24 VDC.
High-speed Counters	Up to four Type A or one Type A and one Type B
DC Power Specifications	
Range	19.2VDC to 30VDC
Hold-up	10mS at 19.2 VDC
Inrush Current	1 Amp maximum at 30VDC
Inrush Time	10mS for 1 Amp
Input Current	0.20 Amp typical at 24VDC
Input Power Supply Rating	5W
DC Input Specifications	
Rated Input Voltage	24 volts DC
Input Voltage Range	0 to 30 volts DC
Input Current at 24VDC	I1, I3, I5, I7: 8mA typical; other inputs 4.8mA typical
Input Impedance	I1, I3, I5, I7: 2.7 kOhms; other inputs: 4.7kOhms
Input Threshold Voltage	ON: 18VDC minimum, OFF: 5VDC maximum
Input Threshold Current	I1, I3, I5, I7: ON 4.5mA maximum, OFF: 1.8mA minimum Other inputs: ON 3.3mA maximum, OFF: 1.6mA maximum
Response Time	1ms to 20ms configurable as regular input; 100µs as HSC input
Isolation Voltage	1500V RMS field side to logic side, 500V RMS between groups
Output Specifications	
Voltage Range	12VDC/24VDC
External Power Supply	12/24VDC –10%, +20%
Maximum Load Current	0.5A per point (Q1 – Q24) at 24VDC
Minimum Switching Current	10mA
Maximum Inrush Current	Q1,Q2,Q11,Q12: 8A for 20ms, 1 pulse, Q3-Q10: 4A for 20ms, 1 pulse
Output Voltage Drop	Q1– Q12: 12V
OFF state leakage current	0.1mA
Response Time	OFF to ON, ON to OFF: 0.05mS maximum @ 24VDC
Isolation Voltage	1500V RMS between field side and logic side, 500V RMS between groups
Fuses	Not required
Under-voltage shutdown	Q1 - Q12: 5V minimum, 8V maximum
DC short circuit current	Q1 – Q12: 0.7A minimum, 2A maximum

High-speed Counter Input and Output Specifications	
Maximum Counter Frequency	100kHz
Input Voltage	ON : 18V, OFF: 5V
Count Pulse Width	500 microseconds
Count Registers	16bits
Outputs	
Load Voltage	12/24VDC
Maximum Pulse/PWM Frequency	Type A: 100kHz Type B: 60kHz PWM and PTO: 65kHz
Types available	Up to four HSC, PT, and/or PWM outputs

Wiring Diagram, IC200UDD240



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IC200UDR040
40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 24VDC Power Supply
IC200UDR140
40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 120/240VAC Power Supply
IC200UDR440
40 Point Micro PLC, (24) 24VDC In, (16) Relay Out, 12/24VDC Power Supply

VersaMax Micro PLCs IC200UDR040, IC200UDR140, and IC200UDR440 each accept twenty-four DC inputs and provide sixteen normally-open 2 Amp relay outputs.

- IC200UDR040 uses +24VDC nominal input power for PLC operation.
- IC200UDR140 uses 100VAC to 240VAC nominal input power for PLC operation.
- IC200UDR440 uses +12/24VDC nominal input power for PLC operation.

DC Inputs

Twenty-four configurable DC inputs can be used as positive or negative logic standard inputs. Eight of these inputs can be used for High-speed Counter inputs. When used as standard inputs, they are compatible with a wide range of input devices, such as pushbuttons, limit switches, and electronic proximity switches.

The Micro PLC's +24 VDC supply can be used for input devices and to power the DC input circuits at about 8mA per input. The combination of input circuit current and external device current must not exceed 435mA.

Relay Outputs

The sixteen normally-open Form A relay outputs (SPST-single pole single throw) can control many types of load devices such as motor starters, solenoids, and indicators. The switching capacity of each of these circuits is 2 amps. An external source of AC or DC power must be supplied to operate field devices.

The relay outputs can be configured as up to three HSC outputs. Relay outputs cannot be used as Pulse Train or PWM outputs.

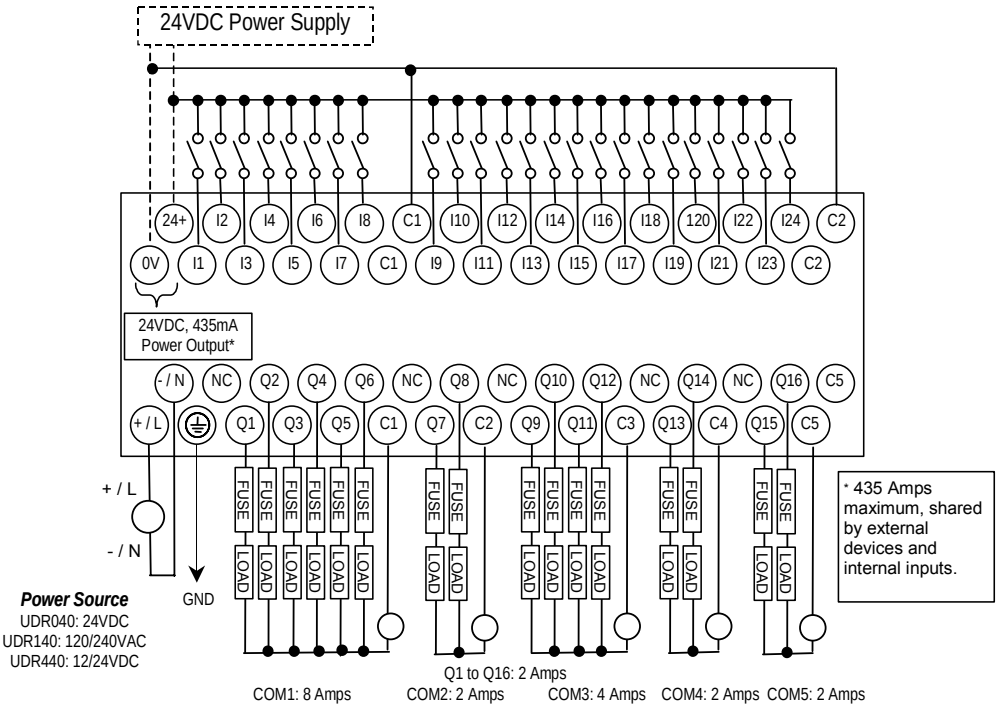
Micro PLC IC200UDR040, IC200UDR140, IC200UDR440 Specifications

Inputs	Twenty-four 24 VDC positive/negative logic input circuits
Outputs	Sixteen normally open 2 amp relay circuits
High-speed Counters	Up to four Type A or one Type A and one Type B
+24 VDC Output Power Supply	435mA maximum (for input circuits and user devices)
+5 VDC output of Serial Port	Serial Port 1, pin 7: 100mA maximum
Power Supply Specifications	
Range	IC200UDR040, IC200UDR440: 19.2VDC to 30VDC IC200UDR140: 100 -15% to 240 +10% VAC
Frequency	IC200UDR140: 50 -5% to 60 +5% Hz
Hold-up	IC200UDR040, IC200UDR440:10mS at 19.2 VDC IC200UDR140: 10mS at 85 to 100VAC, 20mS at 100 to 265VAC
Inrush Current	IC200UDR040, IC200UDR440:1 Amp maximum at 30VDC IC200UDR140: 30 Amp maximum at 200 VAC, 40 Amp maximum at 265 VAC
Inrush Time	IC200UDR040, IC200UDR440:10mS for 1 Amp IC200UDR140: 2 ms for 40Amp
Input Current	IC200UDR040, IC200UDR440:0.20 Amp typical at 24VDC IC200UDR140: 0.20 Amp typical at 200 VAC 0.10 Amp typical at 100 VAC
Input Power Supply Rating	IC200UDR040, IC200UDR440: 5W IC200UDR140: 26 VA
DC Input Specifications	
Rated Input Voltage	24 volts DC
Input Voltage Range	0 to 30 volts DC
Input Current at 24VDC	I1, I3, I5, I7: 8mA typical; other inputs 4.8mA typical
Input Impedance	I1, I3, I5, I7: 2.7 kOhms; other inputs: 4.7kOhms
Input Threshold Voltage	ON: 18VDC minimum, OFF: 5VDC maximum
Input Threshold Current	I1, I3, I5, I7: ON 4.5mA maximum, OFF: 1.8mA minimum Other inputs: ON 3.3mA maximum, OFF: 1.6mA maximum
Response Time	1ms to 20ms configurable as regular input; 100µs as HSC input
Isolation Voltage	1500V RMS field side to logic side, 500V RMS between groups
High-speed Counter Input and Output Specifications	
Maximum Counter Frequency	100kHz
Input Voltage	ON: 15V, OFF: 5V
Count Pulse Width	20% to 80% duty cycle at 10kHz
Count Registers	16bits
Outputs	
Load Voltage	Q1: 5/12/24V, Q2-Q4: See relay output specifications
Type available	Up to three HSC outputs

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Relay Output Specifications			
Operating Voltage	5 to 30 VDC or 5 to 250 VAC		
Isolation	1500 V RMS between field side and logic side, 500 V RMS between groups		
Leakage Current	15 mA at 240 VAC maximum		
Maximum UL Pilot Duty Rating	2 amps at 24 VDC and 240 VAC		
Maximum Resistive Load Rating	2 amps at 24 VDC and 240 VAC		
Minimum Load	10 mA		
Maximum Inrush	IC200UDR040: 1.5A, 10ms IC200UDR140: 9.4A, 20ms		
Response Time	ON: 15 ms maximum, OFF: 15 ms maximum		
Contact Life: Mechanical	20 x 10^6 mechanical operations		
Contact Life: Electrical Voltage 240VAC, 120VAC, 24VDC	Current: Resistive 2.0A	Current: Lamp and Solenoid 0.6A	Typical Operations 200,000

Wiring Diagram, IC200UDR040, IC200UDR140, IC200UDR440



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