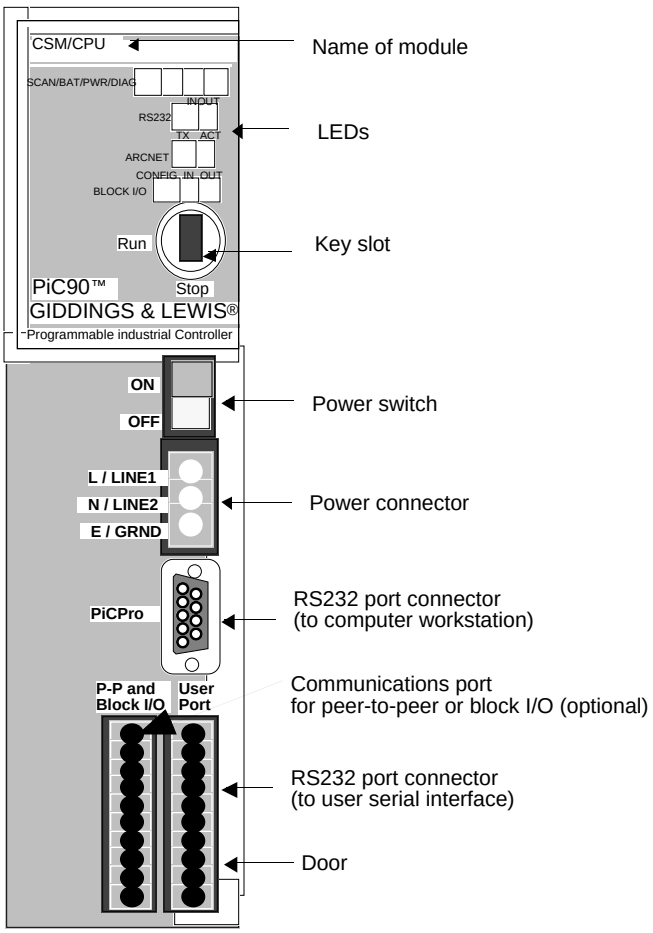
A.7 - PiC9011/9012 - CSM/CPU Central Service Module/Central Processing Unit

Introduction

The CSM/CPU module for the PiC9011/9012 occupies the 1/2 slot in the rack.

The CSM/CPU converts AC or DC power to regulated DC power. It supplies this power to the modules in the rack through the bus. The CSM/CPU controls the PiC9011/9012 system and executes the application program.

Figure A7-1. PiC9011/9012 CSM/CPU Module

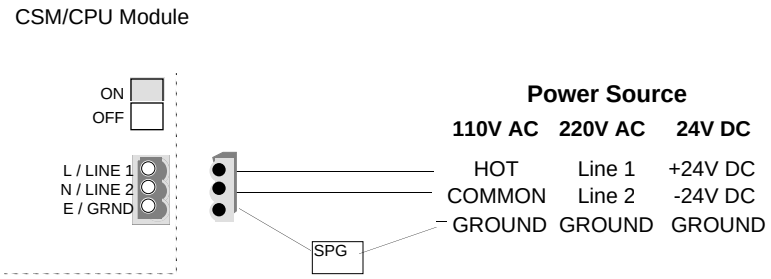


Connections

The CSM/CPU module receives power through a 3-pin power connector. Figure A7-2 illustrates the connections as listed below.

Module	AC Power Source 110VAC	AC Power Source 220VAC	DC Power Source 24VDC
L / LINE 1 to	Hot	Line1	+24V
N / LINE 2 to	Common	Line2	-24V
E / GRND to	Single Point Ground	Single Point Ground	Single Point Ground

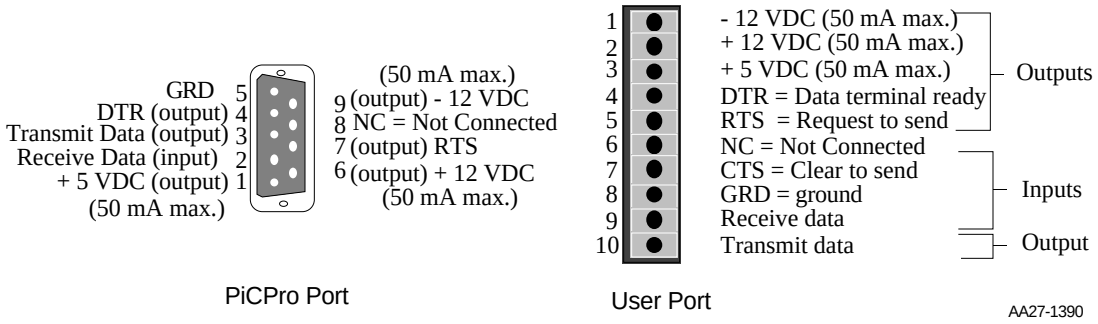
Figure A7-2. Power to the System



Serial Ports

The PiCPro Port (9-pin D connector) communicates with the workstation serial port and the User Port (10-pin screw terminal connector) communicates with an optional serial interface device.

Figure A7-3. Pinouts for the Two RS232 Communications Ports



The PiCPro Port allows the PiC9011/9012 to communicate with the workstation. This port is used when downloading an application program from the workstation into RAM memory. It may also be used to exchange data between the workstation and the PiC9011/9012 system while the PiC9011/9012 system is running.

The pinout for the PiCPro Port cable is shown below.

PiCPro Cable Pinout

9-pin female (to PC)		**9-pin female** (to PiCPro Port)
3	to RD	2
2	to TD	3
5	to GND	5

NOTE: Other pins may be connected in the cable recieved from Giddings & Lewis, but only pins 2, 3, and 5 are used.

The User Port is used to communicate with a touch-screen, a hand-held controller, or other serial interface device.

Peer-to-Peer (ARCNET) and Block I/O Expansion (Optional)

Peer-to-peer and block I/O expansion are optional on the PiC9011/9012. The PiC90s with this communication capability have a communications port with a 10-pin screw terminal connector to the left of the user port. (See Figure 7-1.)

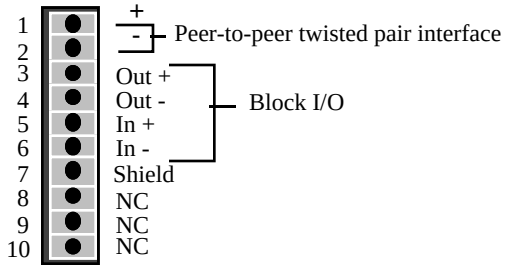
The top two pins are used for peer-to-peer communication connections using twisted pair wire*.

The next four pins are used for block I/O expansion (up to 77 block modules) where the maximum distance between block modules is 200 feet using shielded twisted pair wire*.

The 7th pin is a shield connection. When using shielded wire, connect the shields to it.

*Use shielded cables when it is necessary to meet EMC standards. The recommended wire has 100Ω characteristic impedance.

Figure A7-4. Pinout for ARCNET and Block I/O Expansion Port



Peer-to-Peer(ARCNET)/
Block I/O communications port

CAUTION

The network is polarity dependent.

In peer-to-peer communications, always connect the positive (+) of the twisted pair interface of the first PiC to the positive (+) of the twisted pair interface of the second PiC and the negative (-) to the negative (-), etc.

In block I/O expansion systems, connect the positive (+) of the twisted pair out of the CPU module to the positive (+) of the twisted pair in on the next block I/O module and the negative (-) to the negative (-), etc. Connect the positive (+) of the twisted pair in of the CPU module to the positive (+) of the twisted pair out on the next block I/O module and the negative (-) to the negative (-), etc.

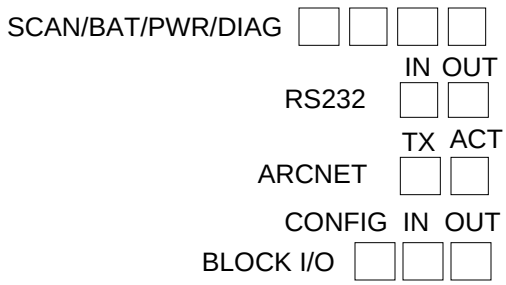
See Appendix N1 Peer-to-Peer Communication Connections for information on connecting PiCs on a network.

See Appendix N2 I/O Expansion Connections for more information on block I/O expansion.

LEDs

There are 11 LEDs on the PiC9011/9012 CSM/CPU as shown in Figure A7-5 below. This section describes these LEDs.

Figure A7-5. LEDs



Status LEDs

The CSM/CPU module has four LEDs to indicate status as shown in the top row in Figure A7-5 above. They are described below.

NOTE: During normal operation the DIAG and BATT LEDs should be off, and the PWR and SCAN LEDs should be on.

Scan (SCAN)	
ON	The processor is executing the application program.
OFF	Scan is lost and there is an orderly shut down procedure followed.
Battery (BAT)	
ON	Goes on briefly while the battery is checked at power-on.
OFF	Battery passed power up test.
Flashing	Replace lithium battery. See replacement procedure that follows.
Power (PWR)	
ON	Power is on to the system. It indicates that the +5V supply is within tolerance. See the specification sheet.
OFF	No power to the system
Diagnostic (DIAG)	
ON	On briefly during startup diagnostics. If it remains ON, module has failed startup diagnostics.
OFF	Normal operation
Flashing	Flashes error codes under certain conditions. These codes are listed in Appendix M.

Communication LEDs

There are seven communication LEDs shown in Figure A7-5: two for RS232 communication, two for ARCNET communication, and three for Block I/O communication. They are described below.

RS232 User Port Data In (IN)	
ON	Data being received at user port
OFF	No data being received at user port
RS232 User Port Data Out (OUT)	
ON	Data being transmitted from user port
OFF	No data being transmitted from user port
ARCNET Transmit Status (TX)	
ON	Normal network activity
OFF	Not active part of network
Blinking	Network reconfiguration
ARCNET Active Status (ACT)	
Flash/ON	Data being transferred to/from ARCNET interface
OFF	No data transfer
BLOCK I/O Module Configuration (CONFIG)	
ON	Communication established with block I/O modules
OFF	Communication not established with block I/O modules
BLOCK I/O Data In (IN)	
ON	Indicates the CPU is receiving data from block I/O modules
OFF	Indicates the CPU is not receiving data from block I/O modules
BLOCK I/O Data Out (OUT)	
ON	Indicates the CPU is transmitting data to block I/O modules
OFF	Indicates the CPU is not transmitting data to block I/O modules

CSM/CPU Time-of-Day Clock

An internal clock IC maintains the current date and time. If power is off to the system, the battery maintains the clock. The application program and PiCPro can access this clock. Details are given in the Software manual.

Theory of Operation

The CSM/CPU module converts input power into DC power at voltages of + 5V, + 15 V, and - 15 V and supplies them to the logic side of the modules in the rack. External power supplies are used for the field side of the I/O modules. Such supplies are not routed through the CSM/CPU, but they should all have the same power cut-off switch as the PiC9011/9012. See the power distribution diagrams in the Hardware chapter.

CAUTION

The on/off rocker switch on the face of the CSM/CPU does not control the I/O power supplies.

Always shut off power at the main disconnect switch before you replace a module in the system rack.

With the CSM/CPU module, a key is supplied to protect the system from unauthorized start-ups. You can set up the PiC9011/9012 hardware, power up and run the diagnostic tests, and even load a software application program without the system key. However, the application program will not be scanned until you turn the Run/Stop key on the CSM/CPU to the Run position.

The CSM/CPU module does the following:

- Performs diagnostic tests.
- Checks the battery.
- Performs routine maintenance tasks.
- Executes the application program.
- Communicates with the I/O modules.
- Maintains communication with the workstation through the PiCPro port.
- Maintains communication with the user interface device through the user port. (Details for this communication depend partly on the type of interface device. Refer to the manual that comes with the device.)
- Provides peer-to-peer (ARCNET) communication and block I/O expansion capability (optional)

Replacing the Battery on the CSM/CPU

Follow the procedure below to replace a battery.

1. After power has been applied to the CSM/CPU for at least five minutes, turn off power at the control cabinet main disconnect switch and at the CSM/CPU power switch. Unplug all connectors from the CSM/CPU.
2. Remove the CSM/CPU module from the rack by pressing down the latch at the top and pulling it out.
3. Use a static-free work surface if possible. Ground yourself using a properly grounded wrist strap before you open the case. These are standard precautions before handling any electronics component.
4. Lay the CSM/CPU on the work surface with its label side up. Press the plastic tabs at the top and bottom of the module case toward each other and lift the side cover off

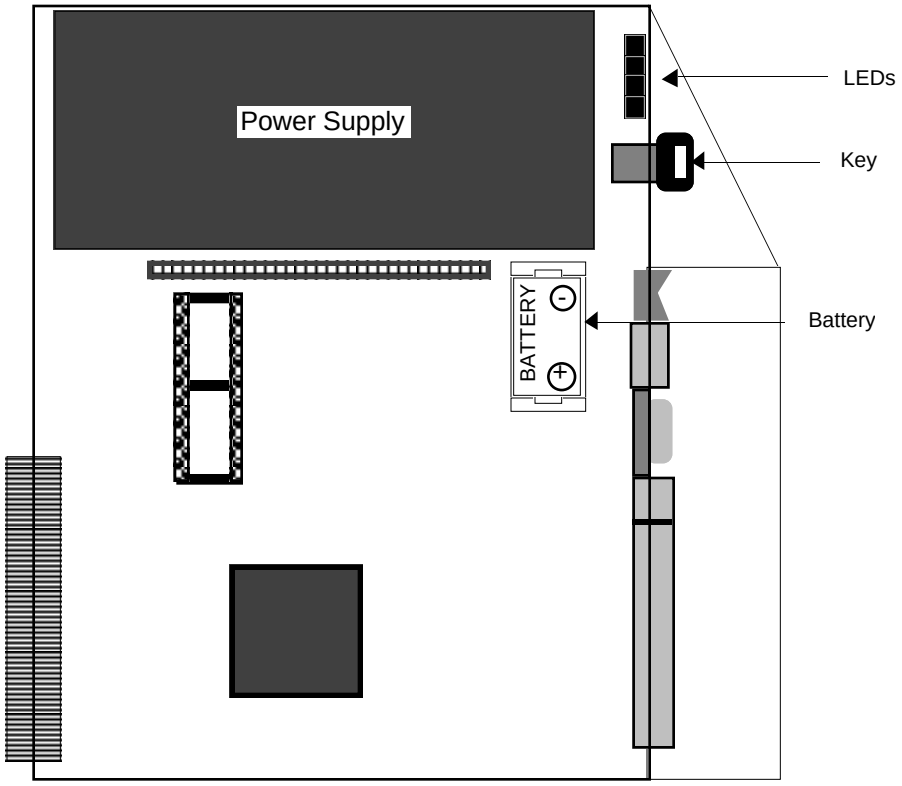
WARNING

Do not touch any of the capacitors.

Do not touch the pins on any of the ICs; even with precautions against static you may destroy the circuitry.

5. Use Figure A7-6 to locate the battery. Note how it is oriented.

Figure A7-6. Inside the CSM/CPU Module: Position of Battery



6. Use an insulated screwdriver to pry the battery up at one end, then lift it out. Replace it with a 3V, 2/3A lithium battery. See the specification sheet at the end of this section.
7. Close the case and insert the CSM/CPU in the rack. Reconnect all the cables. Turn on power and check the LEDs.

Specification Table

Characteristic	CSM/CPU specifications
Functions	Supplies regulated DC power to the hardware modules installed in the rack. Executes the application program. Executes Diagnostics on the system and its modules. Communicates through the RS232 ports to external devices. Peer-to-peer communication with PiC900 family of controls (optional)

Models available						Number of servo axes available at six update rates*					
PiC90 Model (with AC Power Source)	**Part Number**	**Speed**	**App Mem**	**RAM Mem**	**User Mem**	**8 ms**	**4 ms**	**2 ms**	**1 ms**	**.5 ms**	**.25 ms**
9011 Standard w/o comm	502-04071-00	10 MHz	256K	128K	32K	6	4	2	1	0	0
9011 Standard w comm	502-04071-20	10 MHz	256K	128K	32K	6	4	2	1	0	0
9012 Turbo w/o comm	502-04073-00	20 MHz	256K	128K	32K	6	6	4	2	1	0
9012 Turbo w comm	502-04073-20	20 MHz	256K	128K	32K	6	6	4	2	1	0
PiC90 Model (with DC Power Source)											
9011 Standard w/o comm	502-04080-00	10 MHz	256K	128K	32K	6	4	2	1	0	0
9011 Standard w comm	502-04080-20	10 MHz	256K	128K	32K	6	4	2	1	0	0
9012 Turbo w/o comm	502-04081-00	20 MHz	256K	128K	32K	6	6	4	2	1	0
9012 Turbo w comm	502-04081-20	20 MHz	256K	128K	32K	6	6	4	2	1	0

*The number of axes listed is typical for RATIO_GR, RATIOCAM, VEL_STRT, POSITION and DISTANCE move types. Applications which use time axes, servo tasks, RATIO_RL, M_LINCIR , or M_SCRVLC moves require more CPU time. Consult Giddings & Lewis for assistance if you want to exceed the number of axes in this chart.

AC power source	90-250 VAC, 47-440 Hz, 1A
DC power source	20 -30V DC, 3 A
Input connector	3-terminal plug connector, meets all specifications for touch safety in accordance with IEC 529 and DIN VDE 0470 part 1
Power output, total	CSM/CPU 40 W

Individual outputs	**AC Power Source** **DC Power Source** + 5 V @ 5.0 A 3A + 15 V @ 2.0 A 1A -15 V @ .5 A .5A
Battery	1.2 Ah 3V, 2/3A lithium battery
+ 5 V supply monitor	Low trip point 4.50V min 4.75V max High trip point 5.50V min 5.94V max PWR LED goes off and PiC9011/9012 shuts down
Flash memory system board (optional)	4 Megabyte FMS Board 502-03882-00 8 Megabyte FMS Board 502-03882-20
PiCPro port	Used to connect to the work station RS232 serial port, secured protocol Software selectable baud rate (300 to 57600 baud)
User port	Used to connect to a serial interface device RS232 serial port Supports RTS/CTS hardware handshaking Baud rates to 19.2 K
Peer-to-peer communi-cations (optional)	Allows for communication between PiC90s and/or PiC900s (up to 255) A dedicated network controller supports peer-to-peer communi-cations. Provides a twisted pair wire interface that is transformer isolated. Data is transferred serially at a rate of 2.5 megabits per second.
Block I/O expansion (optional)	Allows for communication between the PiC90 and block I/O modules (up to 77) The maximum distance between modules is 200 feet using shielded twisted pair wire
Time-of-day clock	Access via PiCPro or application program.
Clock tolerance	At 25° C, ±1 second per day Over temperature, voltage and aging variation, +2/-12 seconds per day
Logic side power requirements (typical)	TBD
Operating temperature range	7° C to 55° C (45° F to 131° F)
Storage temperature range	-40° C to 85° C (-40° F to 185° F)
Humidity	0 to 95%, non-condensing
EMC Compliant	In progress

UL and C/UL Listed	In progress
Physical size	2.4" wide x 12" high x 8.4" deep (including latch) 61 mm x 305 mm x 213 mm