Model 7716 Process Control Unit

CSI's Model 7716 Process Control Unit (PCU), part of the I/NET 7700™ family of products, provides direct control and monitoring of process functions from a "Peer-to-Peer" LAN based controller. These process functions include environmental control, trending, energy management, and process control which may be executed locally in a standalone mode or "globalized" across the Token Passing LAN. The 7716 PCU is appropriate for commercial, institutial, and industrial applications.

PCU Features

- Direct Digital Control (DDC)
- Both Adaptive and Self-Tuning PID Algorithms
- Universal Inputs
  - Pulse
  - Analog
  - Discrete
- Configurable Outputs
  - Pulse Width Modulation (PWM) Analog Control
  - Form C Relay Discrete Control
  - Floating Control
- Peer-to-Peer Token Passing LAN Port — Built-in
- Automatic LAN reconfiguration upon any fault detection
- Automatic Restart Procedure Upon Power Loss/Restoration
- On-Off-Auto Switches On All Outputs
  - Prewired for Status Feedback
  - LED Indicators for Output Status
- Look-Up Tables for Each Input
  - 20 Segment Curve Fitting
- Analog Transducer Power Supply Built-in
- Local Port for PC
- Local Port for Auto Dial/Auto Answer Modem
- On-board Trending of All I/O Points
- Modular, Object Oriented Programming
- Extensive Math/Logic Package
- Resident Programs for:
  - Environmental Control with DDC
  - Energy Management
  - Historical Data Collection
- CSI Baseplate Mounting
- Downloadable Firmware

Controller Design

The 7716 PCU hardware is based on a monolithic board design, combining processing, memory, communications and field Input/Output (I/O) functions on a single printed circuit board. The controller features quick disconnect terminals, downloadable firmware, an RS-485 LAN port, one or two RS-232 ports, a TTL port for a hand held console, and optional on-board modem drivers. The inherent reliability of this monolithic design is further enhanced with extensive transient protection, automatic self-test features, and a fiber optics communications option.

Control Functions

Direct Digital Control is provided by "Object Modules" which are used to develop global logic sequences. These Object Modules emulate pneumatic/electronic components and may be "linked" to create a wide variety of custom control sequences. Object Modules

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are available for: PID, Floating, High/Low Selector, 2 Position, Relay (with timer), and Reset (dual input).

Automatic Time Scheduling provides a full year's schedule, including multiple start/stop times, special days and temporary inputs for each load.

Automatic Temperature Control, working in conjunction with Automatic Time Scheduling, self adjusts the heating or cooling set-point providing normal temperature control, as well as setup/set back control, including user specified deadbands.

Predictive Central Plant Start allows plant startup based on inputs from one or more space sensors.

Demand Limiting continuously monitors the rate of electrical power consumption and predicts the demand during each demand interval. If the predicted demand exceeds a preset level, controlled loads are shed or control set points changed in a user defined priority sequence. As peak demand passes and electrical power consumption decreases, the controller restores the loads or set points to their normal routines. Multiple power meters are supported in each PCU, with multiple loads specified for each meter. Maximum Off, Minimum On-Off, and seven levels of shed priority ensure efficient Demand Limiting, while protecting environmental control objectives.

Calculated Points are used to perform special calculations required by the system. Calculated points allow development of "equations" using math, logic, Boolean, time, and other operators.

Event Initiated Control provides "IF-THEN-ELSE" control sequences, with time delay options, based on a state change or specified state of a point.

Additional Functions include **Runtime, Consumption and Alarm Inhibit.**

High Resolution Look-up Tables

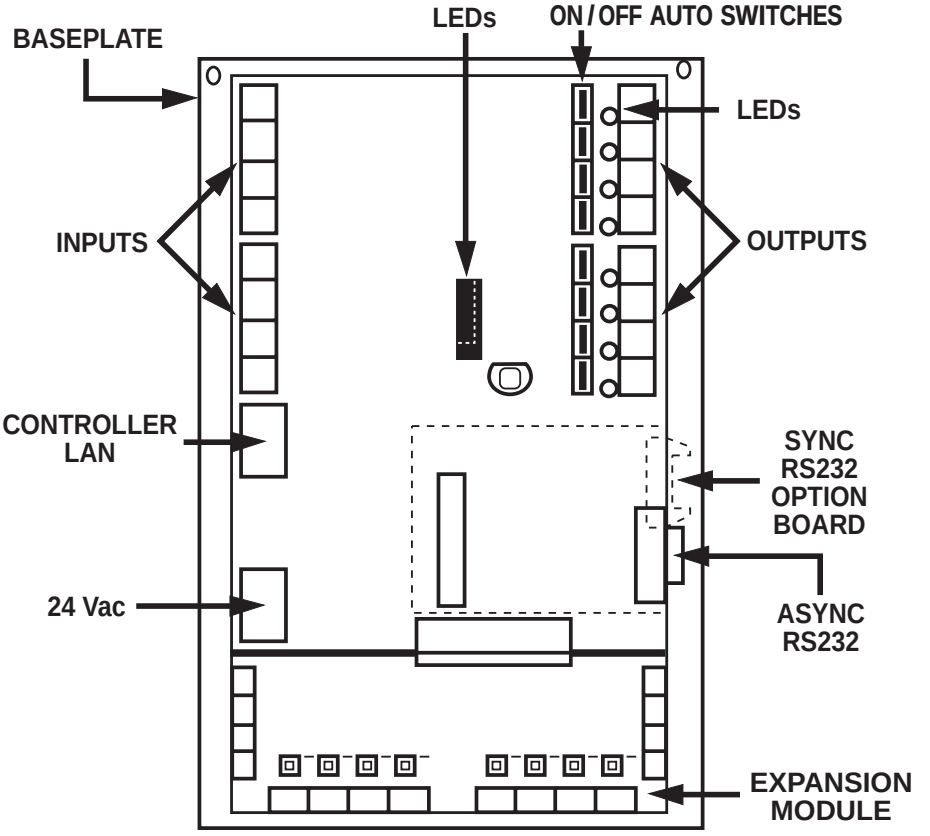
Non-linear points may use a look up table for linearization. The table contains as few as 2 or as many as 21 entries. Separation between entries is user definable, allowing higher accuracy around the primary area of interest. Look up tables may be used with linear or non-linear signals to clamp the end points to a specific value.

Downloadable Firmware

Complete executable software is downloaded through a locally connected PC, the LAN, or a modem.

On-Line Editing Capability

The 7716 provides direct on-line edit capability via a local, remote, or portable PC for instant modification of all parameters. An operator with the appropriate password authorization may make changes "on-line" that are as simple as time schedule changes or as comprehensive as chiller optimization strategies. There is no need to



7716 PCU

MODEL NUMBER	DESCRIPTION	COMMENTS
7716	*Process Control Unit, 8 UI, 8 DO (Relay), 24Vac*	*Baseplate Mounted, accommodates the RS232 Communications Expansion Board, and/or one of the Point I/O modules listed below.*
RS232 EXP	*RS232 Communication Expansion Board*	*Allows Synchronous communications.*
P8UI	*PCU Expansion Board – 8UI*	*8.5" x 3.2" (21x 8.1 cm)*
P8UI4AOC	*PCU Expansion Board – 8UI & 4 AO (4 – 20mA)*	*8.5" x 3.2" (21x 8.1 cm)*
P8UI4AOV	*PCU Expansion Board – 8UI & 4 AO (0 – 10Vdc)*	*8.5" x 3.2" (21x 8.1 cm)*
P8UI8DO	*PCU Expansion Board – 8UI & 8DO (Relay)*	*8.5" x 3.2" (21x 8.1 cm)*
P8RTD	*PCU Expansion Board – inputs (for 1000 ohm, 3 wire RTDs)*	*8.5" x 3.2" (21x 8.1 cm)*
CBL072	*Cable, Controller DE9 to PC DE9, 6ft. (2m)*	
CBL073	*Cable, Controller DE9 to PC DB25, 6ft. (2m)*	
CBL074	*Cable, Controller DE9 to Modem DB25, 6ft. (2m)*	
TCON096	*Model 7716 PCU Installation Guide*	

use archaic techniques that require compiling, debugging or reloading the software. The operator may observe the results of the changes instantly. All operator entries on I/NET 7700 PCs use menus with self prompting, fill-in-the-blank editors. Context sensitive help screens are available on the PC with the touch of the "F1" key. There is no need to learn a custom computer language or generate programming statements.

Trend Sampling

Trend Sampling is accomplished within the controller independent of any PC workstation. Each PCU can trend all connected points and can store up to 1440 samples of critical points within the PCU. These samples can be archived to multiple local or remote PC workstations and used to generate custom reports.

Specifications:

COMMUNICATION PORTS
CONTROLLER LAN: RS-485; 19,200 or 9600 baud, SDLC, token-passing.
HAND HELD CONSOLE PORT: RJ11 Modular, 1200 baud, TTL
RS-232 PORT: PC @ 9600 baud (7801 TAP function), or Hayes direct-dial asynchronous modem @ 1,200, 2,400 baud or 9,600 baud
RS-232 EXPANSION BOARD PORT: Supports synchronous modem, direct or two-way dial SDLC (78061 or 78035 TAP functions) @ baud rates of 1,200 to 9,600 baud. Requires optional plug on module.

NETWORK WIRING REQUIREMENTS
CONTROLLER LAN LENGTH: 5000 ft. (1500 m) per segment. 25,000 ft (7600 m) with repeaters
CABLE SUPPORTED: Twisted pair, shielded. 22 AWG (0.324 mm2) or larger, 30 pF/ft. or less between conductors, 55 pF/ft. or less conductor to shield, 85 to 150 Ohm impedance. Belden 9841 or equivalent

PROCESSOR
PROCESSOR: Zilog Z181
CLOCK/CALENDAR: Battery backed, includes seconds, minutes, hours, day, month, year, leap year

MEMORY
EPROM: 32KB
STATIC RAM: 256KBytes
NOVRAM: 512 Bytes
RAM BATTERY BACKUP: On-board Ni-cad, rechargeable. Maintains RAM for 300 hours

FIRMWARE
BINARY FILES: Downloadable to battery backed RAM

AUTO DIAL SUPPORT
TELEPHONE NUMBERS: 8, stored in NOVRAM
NUMBER OF DIGITS: 31 per phone number
SUPPORTED: Phone, Beeper, Pager

PHYSICAL DESCRIPTION
PCB DIMENSIONS: 9"L x 8.5"W x 1.8"D (22.9 cm x 21.5 cm x 4.5 cm)
BASEPLATE DIMENSIONS: 13.75"L x 9.6" (34.9 cm x 24.4 cm)
RS232 EXPANSION BOARD DIMENSIONS: 4.3"L x 3.4"W (10 cm x 8.8 cm)
WEIGHT: 3 lbs.
POWER REQUIREMENTS: 24Vac, +10%, 50/60 Hz, 40 VA (max)

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OPERATING TEMPERATURE: 32° to 122°F (0°C to 50°C)
OPERATING HUMIDITY: 0 – 90% RH, non-condensing

Specifications *(continued from page 3)*

INPUT/OUTPUT

LOOKUP TABLES FOR NON-LINEAR INPUT POINTS:
- Quantity: 32
- Points on curve: 21
- Curve point spacing: User defined
- Interpolation algorithm

UNIVERSAL INPUTS: May be either Analog, Lini-Temp, Pulsed, or Digital per the following specifications.

ANALOG INPUTS:
- 0 – 5Vdc (default)
- 0 – 10Vdc
- 0 – 20mA
- LTS80 LiniTemp
- 3 Wire 1000Ω RTD available via expansion board
- Accuracy: +/– 0.1% (0 – 5 volt input) 0.5% (0 – 20mA input) @ 25°C
- Resolution: 12 bit (0.024%)

A/D DIGITAL FILTERING: Averaging (Notch) and glitch filters

ANALOG TRANSDUCER POWER SUPPLY: 24Vdc, 160mA max. load.

DISCRETE INPUTS: Dry contact input
- Contact Excitation: 5V @ 5 mA
- Pulse Input Rate: 4 Hz
- Input Duration: 120 msec minmum

DISCRETE OUTPUTS: Form C (SPDT) relay, 3A resistive @ 24Vac/dc
- On/Off/Auto switches: On board, with tri-state feedback
- Modes: Latched, Momentary, or PWM proportional

ANALOG OUTPUTS: Available via expansion board.
- 0 – 10 Vdc @ 10mA
- 4 – 20 mA @ up to 13 Vdc
- Accuracy: 1% typical, 3% minimum
- Resolution: 8 bit.

POINT SCAN INTERVAL: 1 – 255 seconds

DDC SAMPLE INTERVAL: 1 – 255 seconds

TERMINATIONS

TERMINAL BLOCKS: Removable screw terminal connectors

INDICATION

LEDS: Each discrete output and On/Off/Auto switch position
- LAN TX
- LAN RX
- 232 TX
- 232 RX
- HHC TX
- HHC RX
- LAN Reconfiguration
- Alarm
- Low Power
- Outputs Diaabled

LISTINGS

UL Listed

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