DMS 2100

DEMAND MONITOR

INSTALLATION GUIDE

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UNPACKING

The shipping carton should contain the following items:

- DMS-2100 Demand Monitor
- DemandLink Pro Software
- DemandLink User Manual
- Serial Cable
- Sync Input Cable
- Open Collector Output Cable

Be sure to inspect the DMS-2100 for any shipping damage. If damage is evident, notify the carrier accordingly, and contact the factory.

INSTALLATION INSTRUCTIONS

1. Identify a suitable mounting location. The mounting surface should be a suitable flat vertical wall, which will accept the mounting hardware and provide the necessary rigidity for supporting the unit and the associated wiring.

   The demand monitor communicates with the computer via RS-232. The maximum distance for RS-232 is 50 feet. This should be taken into consideration when selecting the mounting location. The demand monitor can be mounted near the computer or the meter. If the mounting location is more than 50 feet from the computer, line-driving hardware (such as a short haul modem) should be used for communication.

   NOTE

   Consider ease of access by personnel to service the unit, as well as proximity to metering equipment and the cost to run wiring, prior to mounting the unit.

2. Mount the enclosure with suitable #10 hardware, using the top and bottom mounting brackets. Each bracket has two holes to accommodate the mounting hardware. In addition, the top bracket has a keyhole opening in the center to facilitate temporary mounting for ease in installation, testing, etc.
3. Select appropriate fuse ratings, depending on type of loads, and install output fuses at F3 and F4 on the control board. Reference Figure 1: Control Board.
4. Punch out the appropriate knockout(s). Connect the I/O wiring, making sure that the pulse initiator inputs are connected to the designated terminal on the I/O terminal block. Reference Table 1: Terminal Block Designations.

   The demand monitor is capable of operating with wire lengths of 2500 feet or less, when using 18 AWG Al twisted pair wire or better, or with a maximum line impedance

of 1.5 kΩ if other wire is used. Twisted pair is recommended for runs over 25 feet.

5. Before AC power connections are made, verify that SW4 on the control board is set to the correct input voltage setting. Follow all Local, State, and Federal Electrical Wiring Codes. For safety, convenience, and ease of installation, it is recommended that the unit be powered from 120VAC.

   Disable AC power source. Connect the AC power source to the unit using 16-18 gauge stranded wire with an insulation rating of at least 300 volts. If 240VAC power input is used, then the wire insulation rating should be at least 600 volts.

6. When all power and input connections are made, cold starting the unit is required. Cold start the demand monitor by performing the following:

   1. Turn the power OFF.
   2. Install a shorting jumper on J1 header. Reference Figure 1: Control Board
   3. Turn the power ON.
   4. After COLD START is displayed, turn power OFF.
   5. Remove shorting jumper J1.
   6. Turn power ON. The unit is now ready to program and put into operation.

WARNING!

Failure to remove the jumper on J1 will cause all data to be erased each time power is turned on after a power fail.

WIRING CONNECTIONS

Reference Figure 2: Control Board for this section:

Table 1: Terminal Block Designations

Terminal Block 1	TB1-1	AC Input (HOT)
	TB1-2	Meter Input (Y1)
	TB1-3	Meter Input (Z1)
	TB1-4	Meter Input (Y2)
	TB1-5	Meter Input (Z2)
	TB1-6	Meter Input Common (K)
	TB1-7	Automatic Curtailment Relay 1 "Y" (Normally Open)
	TB1-8	Automatic Curtailment Relay 1 "K"
	TB1-9	Automatic Curtailment Relay 1 "Z" (Normally Closed)
	TB1-10	AC Input (Neutral)
Terminal Block 2	TB2-1	Automatic Curtailment Relay 2 "Y" (Normally Open)
	TB2-2	Automatic Curtailment Relay 2 "K"
	TB2-3	Automatic Curtailment Relay 2 "Z" (Normally Closed)

Sync Input (HB1)

When the synchronizing end of interval input is necessary, use the sync input cable provided and connect it to HB1 located on the control board. Contact closure between pins 1 and 2 causes an End of Interval (EOI). For additional information, refer to Sync Input, page 8.

Open Collector Output (OC)

When the open collector output is necessary, use the open collector output cable provided and connect it to HB6 located on the control board. HB6 pin 1 is the collector and pin 2 is the emitter.

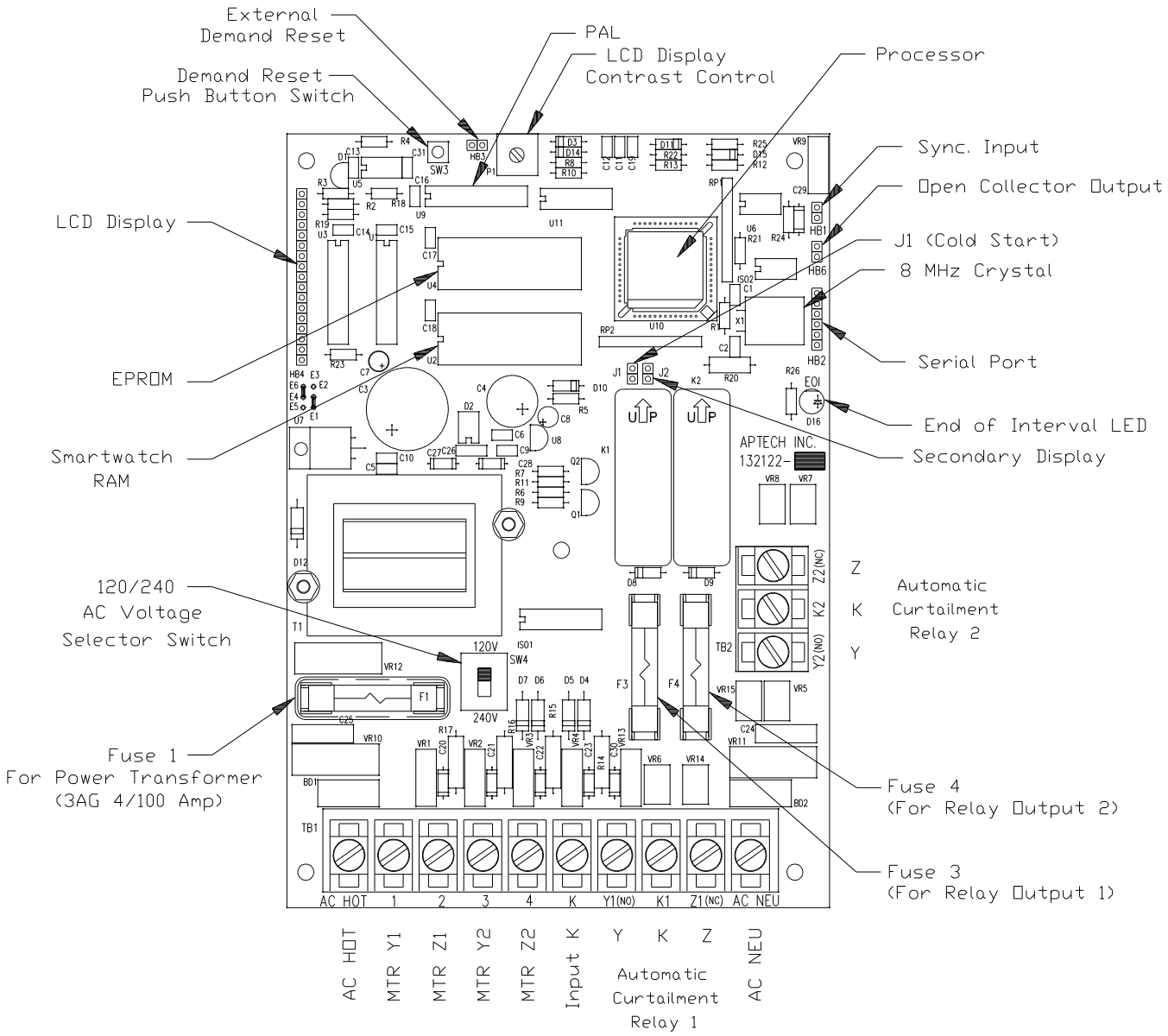
RS-232

Connect the RS-232 cable provided, from the DB-9 connector, located on the bottom of the enclosure, to the computer serial port.

Voltage Selection Switch

The DMS-2100 can operate at 120 or 240 volts by setting SW4 on the circuit board to the appropriate position. The factory default setting is 240 volts.

OPERATION



FORM "A" INPUTS

Figure 4: Control Board

Power Up Display

When power is applied to the DMS-2100, the following items are displayed:

- Product Name
- Software Version
- Copyright Statement

Display Modes

There are two display modes featured in the Demand Monitor: Primary Mode and Secondary Mode. Normally, the Demand Monitor is in the Primary Display Mode. It cycles through the programmed display items changing at the selected intervals. Display items are programmed using DemandLink Pro Software.

When the Secondary Display button, located inside the enclosure at the top right corner, is pressed, the Demand Monitor enters the Secondary Display Mode and displays the items selected for Secondary Display. When the Secondary Display button is pressed again, the Demand Monitor exits the Secondary Display Mode and returns to the Primary Display Mode. The Secondary Display Mode automatically returns to the Primary Display Mode after 5 minutes.

The following items are available for display:

Table 2: Displayable Items

NOMENCLATURE	DESCRIPTION
P1	Input Pulse Count 1
P2	Input Pulse Count 2
P3	Input Pulse Count 3
P4	Input Pulse Count 4
PO	Output Pulse Count
PkDt	Date of Peak Demand
PkTm	Time of Peak Demand
Date	Current Date
Time	Current Time
TL	Time Left in Intervals
Engy	Energy
PDmd	Peak Demand
CDmd	Cumulative Demand
Dmd	Last Interval Demand
PjD	Projected Demand
InD	Instantaneous Demand

Meter Input and Automatic Curtailment Relay Display Status

The right most character position of the display is reserved for meter input and automatic

curtailment relay status. It is important to note that the meter input status represents the debounced condition of each of the inputs. Therefore, if a closure from K to Y on meter input 1 is present for the required debounce time, the indicator for meter input 1 would be turned "on". When K to Y is opened on meter input 1 for the required debounce time the indicator for meter input 1 will be turned "off". The following diagram shows the positions on the display for the meter input indicators as well as the automatic curtailment relay indicator.

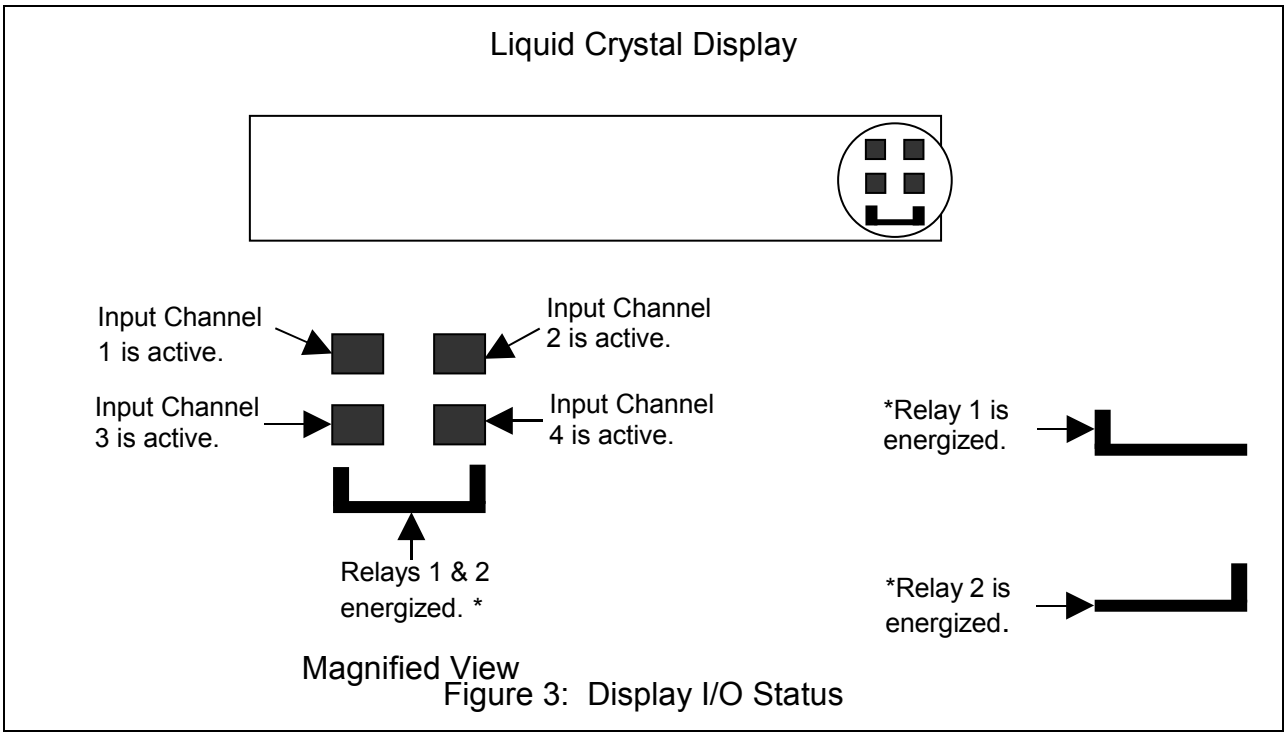


Figure 3: Display I/O Status

Demand Reset

This command resets the stored demand intervals and peak demand readings to zero, and also resets the date and time of peaks. New peaks can then be captured. This is normally performed to coincide with the reset of the billing meter. Energy values are not reset when demand reset is performed. Energy values can only be changed using the pre-load function. Reference Preload Energy Readings, page 7.

To activate a Demand Reset, press the Demand Reset Push Button Switch on the control board (reference Figure 1: Control Board). If the demand reset lockout period has past, or there is no demand reset lockout period, pressing the demand reset switch activates a demand reset. DEMAND RESET displays for seven seconds and then the unit returns to Primary Display Mode.

If a second demand reset is attempted and the demand reset lockout variable has not decreased to zero, the display indicates the number of demand reset lockout intervals remaining. DEMAND RESET displays for seven seconds and then the unit returns to Primary Display Mode.

Preload Energy Readings

This command allows the user to set the energy (kilowatt-hours for example) in the Demand Monitor. This allows the Demand Monitor and billing meter to have synchronized energy

readings.

Sync Input

The demand monitor clock can be synchronized to an external device with a contact closure between HB-1 pins 1 and 2. When the closure occurs, the demand monitor ends the interval and changes the time to the closest interval start or interval ending time.

> Example:
>
> If a demand monitor had an interval length of 15 minutes, and an external sync input was received at 09:05, the time would be set back to 09:00. If more than half of the interval time has passed when an external sync input is received, the time will be set forward. For example, using the same demand monitor as above, if an external sync input was received at 09:12, the clock would be set forward to 09:15.

EPROM Replacement

To install a new software version in the demand monitor, the following procedure must be performed for the "First Time Power On" after the new EPROM is installed.

1. Turn the power OFF.
2. Remove EPROM from U4. Reference Figure 1: Control Board
3. Install new EPROM at U4. Align the notch located at the end of the EPROM to the notch on U4 socket to ensure correct orientation.
4. Install a shorting jumper on J1 header. Reference Figure 1: Control Board.
5. Turn the power ON.
6. After COLD START is displayed, turn power OFF.
7. Remove shorting jumper J1.
8. Turn power ON. The unit is now ready to program and put into operation.

WARNING!

Failure to remove the jumper on J1 will cause all data to be erased each time power is turned on after a power fail.

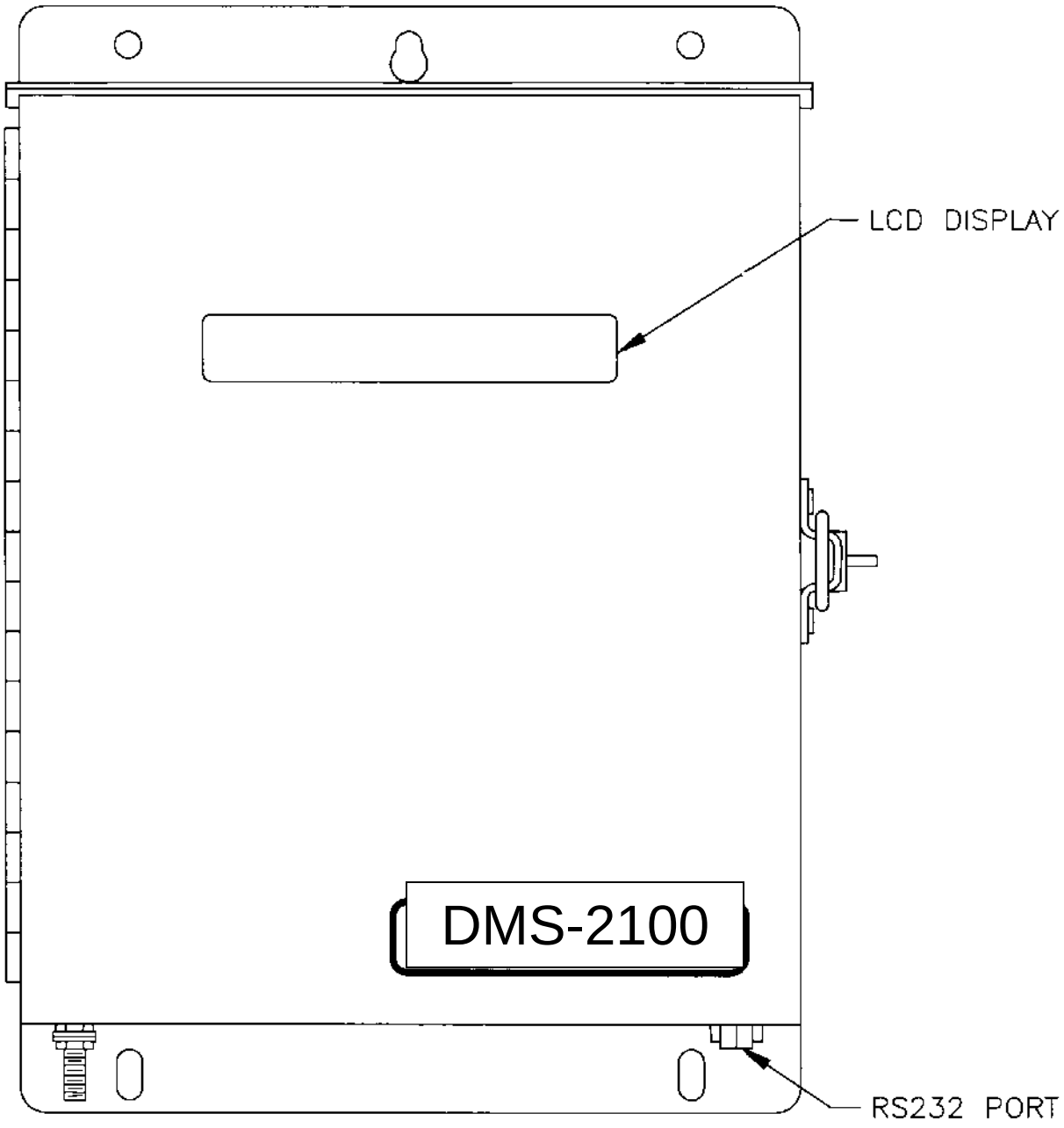


Figure 4: DMS-2100

APPENDIX A - SPECIFICATIONS

POWER REQUIREMENTS

AC Input	*120/240 VAC +/- 20%*
Burden	*Less than 4.5 Watts at 240 VAC* *Less than 2.5 Watts at 120 VAC*

METER INPUTS

Number of Inputs	*Four Form A or Two Form C*
Input Scale Factor	*+/- .01 watt hours to 99.99999 kWh/ pulse per channel. Each channel may have its own scale factor.*
Input Debounce	*32.333 ms to 399.984 ms in 16.666 ms increments*
Pulse Rate	*10 per second maximum*
Maximum Interface Distance	*2500 feet when using 18 AWG Al twisted pair wire or better.*

OUTPUTS

Number of Outputs	*Two Form C mercury wetted relays for alarm or load curtailment. One Form A open collector provides End of Interval/ energy pulses.*
Voltage	*Maximum 500 VAC*
Current	*Maximum of 2 Amps*
Capacity	*Maximum 100VA*
Output Pulse Spacing	*100 ms through 1000 ms in 100 ms increments*

INTERVAL LENGTHS

Programmable	*1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60 minutes*
Sub-intervals	*Up to six sub-intervals*

ENVIRONMENTAL

Temperature Range	*-40° to + 85° Celsius*
Humidity Range	*5% to 95% non-condensing*

MECHANICAL

Enclosure	*Nema 3R Aluminum*
Dimensions	*7.38" W x 9.25" H x 3.25" D*

APPENDIX B - DEMAND CALCULATION

The following describes the calculations to obtain interval demand for one channel:

$$\textit{Demand} = \frac{60 * \text{Input } K_e * \text{No. of pulses}}{(\text{interval length in minutes})}$$

Example:

Interval length	=	5 minutes
Input K_e	=	1.8 kWh/Pulse
Pulses per interval	=	4 pulses

$$\text{Demand} = \frac{60 * 1.8 * 4}{5} = 86.4 \text{ kW}$$

$$\textit{Rolling Demand} = \frac{60 * \text{input } K_e * \text{sum of all rolling register pulses}}{(\text{demand interval length in minutes})}$$

Example:

Interval Length	=	5 minutes
Rolling Intervals	=	3
Demand Int. Length	=	5 * 3 = 15 minutes
Input K_e	=	1.8 kWh/Pulse
Pulses/Interval	=	4

$$\text{Demand} = \frac{60 * 1.8 * (4 + 4 + 4)}{15} = 86.4 \text{ kW}$$

APPENDIX C - TROUBLESHOOTING GUIDE