Vaporless Manufacturing, Inc.

Quality Petroleum Equipment

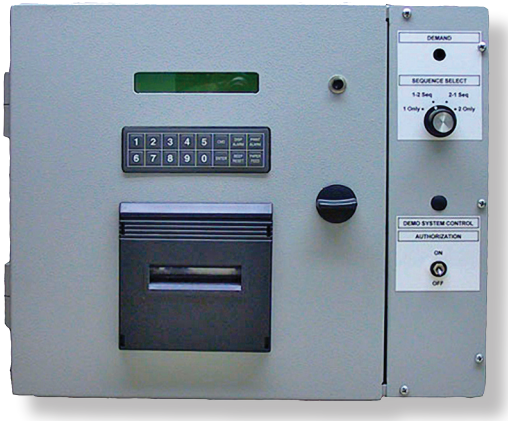
Solutions For Over 20 Years

PLC-5000

Electronic Line Monitoring System

The PLC-5000 System consists of two primary components, a Central Control Node (CCN) and a Leak Detector Node (LDN).

- Tests **Volumetrically,** *not by Pressure Decay,* 0.1 and 0.2 gallon per hour annual and monthly testing.
- The 3 GPH (Catastrophic) test can be performed volumetrically or through pressure decay.
- Higher precision, less false alarms!
- Line isolation and control through solenoid valves possible.
- High head pressure and high bleed-back, **No Problem.**

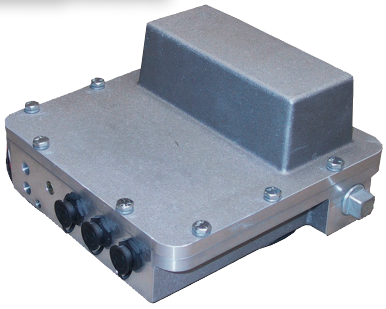


Central Control Node

PLC-5011
PLC-5012
PLC-5013

Central Control Node:

- Sends authorization requests to the appropriate LDN for submersible control.
- Monitors and directs up to four LDN's.
- Performs Volumetric leak detection calculations.
- In the event of a detected leak or other reportable alarm (reporting off-line or disabled submersibles, sump sensor alarms, etc.), issues appropriate alarm.



Leak Detector Node

PLC-5021 Single Phase
PLC-5031 Three Phase

Leak Detector Node:

- Monitors and transmits equipment status and line pressure management information.
  Line pressure management includes establishing specific preset line pressure after authorizations end. This is accomplished using a Precision Solenoid Valve and pressure sensor(s).
- Thermal expansion/contraction detection and compensation.

The **PLC-5011 CCN** and **PLC-5012 CCN** utilize LonWorks Power-Line Transceivers, *communicating with their LDN's over existing electrical wires powering the submersible*. Network Communications using International Forecourt Standards Forum (IFSF) communications, Oil Company backed development standards. Meets FCC (US), Industry Canada (Canada), and CENELEC (European) mains signaling regulations.

PLC-5011 CCN — Control Valve Type — Site Controller with Printer

In addition to the normal submersible control functions, the **PLC-5011 CCN** is designed to provide for operation of control valves such as those used in the transition sumps of marinas, between the underground portion of the line and the exposed dock line. This eliminates thermal effects on the underground portion of the fuel line.

Loading racks and other high head pressure situations are applications where a control valve, installed after the delivery line leaves the ground, may be used to isolate the underground pipe. This allows testing of the underground pipe and the ability to isolate head pressure from the leak detection system. By controlling the opening of such valves, the system can monitor for proper line pressure and accurately perform line leak detection on the underground portion of piping systems. Contacts are provided to manage control valves, allowing the underground piping to be tested independently of the line downstream from the control valve. The provided contacts are used to control voltage to the valves.

Line leak detection between the main tank and day tanks used in conjunction with generators, heating oil burners and associated polishers may be similarly protected. Contact the factory to discuss these applications.

The **PLC-5011 CCN** can control the sequential starting of multiple submersibles. When the "lead" LDN has determined the line has passed a catastrophic line test, subsequent submersibles are brought on-line. If the lead LDN does not detect a tight line, the lead channel will be de-authorized and the operation of additional submersibles will be prevented.

Options B and C may be ordered with this hardware conýguration. See Options on back.

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Designed and Manufactured in U.S.A.

PLC-5012 CCN — Staged Turbine Type ð Site Controller with Printer

In addition to the normal submersible control functions, the **PLC-5012 CCN** is designed to provide true on-demand starting of multiple turbines manifolded to a single fuel distribution line. The “lead” submersible will be activated upon authorization and will serve as the sole delivery source as long as line pressure is maintained above 24 psi. If line pressure falls below this level, a contact closure is provided to authorize the next submersible in the sequence. Additional submersibles may be added to the sequence as needed.

Options B and C may be ordered with this hardware conýguration. See Options below.

PLC-5013 CCN — Variable Speed Type — Site Controller with Printer

In addition to the normal submersible control functions, the **PLC-5013 CCN** is designed to provide signaling to the control modules of variable speed turbines. Upon authorization, a contact closure is provided to signal the start / run input of the control module. Remote Leak Detector Nodes are still required in this application to provide the normal function of line pressure and sensor monitoring.

Normal power line communication between the **PLC-5013 CCN** and the remote Leak Detector Node is prevented due to the nature of the technology used by variable speed electronics. In this case, two additional wires must be provided in the conduit between the equipment room and the Leak Detector Node to provide both power and a communication path.

Because variable speed turbine controllers incorporate a method of providing on-demand pressure regulation, **in most situations the inclusion of Option B is not necessary or recommended with this particular application.**

Options B and C may be ordered with this hardware conýguration. See Options below.

Options

Option B - MASTER SLAVE SELECT

This option, included with the Central Control Node, provides switching and wiring for lead turbine selection and sequence ordering. It is incorporated into the Central Control Nodes as described above. Option B provides a rotary switch(es) to allow the user to select the proper lead turbine and the sequence order of additional turbines. Using Option B, the user has more control over individual turbines, including the ability to shut-down for uninterrupted tank tightness testing or submersible maintenance while maintaining fueling operations. No field wiring changes need to be made to change the operating sequence. This selection provides the operator more control and line pressure management choices.

The configuration of this option is application specific. Many combinations of independent and sequenced channels are possible. Consult the factory regarding your specific requirements.

Option C - MOUNTED ALARM CONTACTS

Contact factory for options and pricing.

Leak Detector Node

An LDN (Leak Detector Node) monitors pressure in the product line, vents excess pressure from the product line, directly controls the submersible via the motor starter in the LDN, and communicates the status of line pressure and pump information to the CCN (Central Control Node). Communication with the CCN is through the existing power mains. Variable speed turbines interrupt communication, hence the need for an additional pair of wires run to the LDN and the need to order the **PLC-5013 CCN** for communication where variable speed turbines are used.

The LDN is packaged in an explosion proof and water-tight enclosure designed to function in a Class I, Division 1, Group D hazardous environment. Installation kits are available to maintain this integrity for various fractional horsepower through five horsepower submersibles. To allow continuous fueling in the event of an electronic or mechanical failure, a manual override is provided for the LDN.

PLC-5021 LDN

For Nominal 230 VAC (208 – 240 VAC) up to 2 horsepower, single phase motors

PLC-5031 LDN

For Nominal 230 VAC (208 – 240 VAC) up to 5 horsepower, three phase motors

Please contact the factory for more information and specific applications.

Vmi

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