Series 1000
Installation Quotation Guide

(For Quotation Use Only - Do Not Install From This Guide)

This document is provided as a guide for quoting the installation of a Series 1000 System. Component location, power, wiring, and conduit requirements can be calculated from this guide. The Series 1000 Installation Manual (not this guide!) should be used for the actual installation of the system. GASBOY will not be responsible for installations performed from this guide.

HARDWARE DESCRIPTION

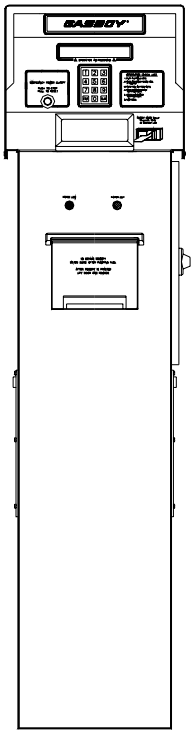
The GASBOY Series 1000 Fuel Management System is a microprocessor-based fuel control and data acquisition system. It is available in three types: card, cardless, or FleetKey. It is totally self-contained in an attractive, weatherized cabinet and pedestal assembly. The system is Underwriter's Laboratories listed and FCC-approved and is designed to be located on the fueling island convenient to the user.

The user-accessible part of the system consists of a 20-character liquid crystal display (LCD), which displays messages to guide the user through operating steps; and a 12-position keypad containing the keys 0-9, CLR, and ENT, which is used to enter data, (e.g., personal identification number (PIN), odometer readings, pump selections, etc.). All entries, except PIN, are displayed on the LCD for verification.

The card system is available with a magnetic stripe insertion reader or a static optical card reader; the FleetKey with one or two key receptacles. A red stop button on the cabinet face allows the dispensing equipment to be shut down quickly in case of emergency.

The rear of the cabinet is a hinged door secured with a lock to prohibit unauthorized access. The one-piece hood can be removed for total accessibility during servicing and interior LED indicators help diagnose system problems.

Solid state relays, and manual override switches, which control power to the fuel dispensing equipment, are located in the pedestal. The wiring for all equipment connected to the Series 1000 is terminated in the pedestal. An optional high speed, bidirectional, serial impact receipt printer can also be housed within the pedestal. The standard Series 1000 System controls two hose outlets and can be expanded in two hose increments to control a maximum of eight hoses. The unit can be expanded in the field. The system can handle pulsing rates of dollar (penny per pulse) or quantity (1, 10, 100, 250, 500, or 1000 pulses per unit of product). The pulse rate selection switch is located in an area sealable by Weights and Measures for retail applications.



UNIT SHOWN
WITH OPTIONAL
RECEIPT PRINTER

The standard Series 1000 System contains two asynchronous ports for terminal and/or computer communications. An optional auxiliary asynchronous port is available for tank monitor or receipt printer interfacing. All ports may be set to either RS-232 or RS-422 communications to meet individual requirements.

A CRT or data terminal with an ASCII character set, or a computer with the proper interface, is required to communicate with the Series 1000. The terminal is connected to the system through one of the two asynchronous communication ports located in the system cabinet. Communication is through direct wire, or by dial-up phone lines using an optional built-in modem. (See **Communication Wiring** for specific communication requirements and distance limitations.)

COMPONENT LOCATION

Careful planning for the layout of the site will help eliminate possible problems with the start-up of the Series 1000 system and will ensure continued, reliable system operation.

System:
Location: On the fuel island.
Environment: -30o to 50o C, 95% relative humidity, non-condensing.
Dimensions: Total height with post: 60"; Head: 15"W x 12"H x 20"D
Installation: Allow a clearance of 18 inches between the post and any of the pumps or dispensers. (Meets NFPA 30A and NFPA 70 requirements and allows room for wiring and maintenance of the system). Allow a minimum of 14 inches from the rear of the unit to allow the rear door to open for maintenance.

Data Terminal:
Location: Clean office; a dirty location may cause premature failure.
Environment: 0oC to 40oC, if supplied by GASBOY.
Installation: Do not install over a hazardous location.

External Modems:
Location: Office environment, or at minimum, within a protective enclosure.
Installation: Do not install over a hazardous location.
Environment: 0oC to 40oC, if supplied by GASBOY.

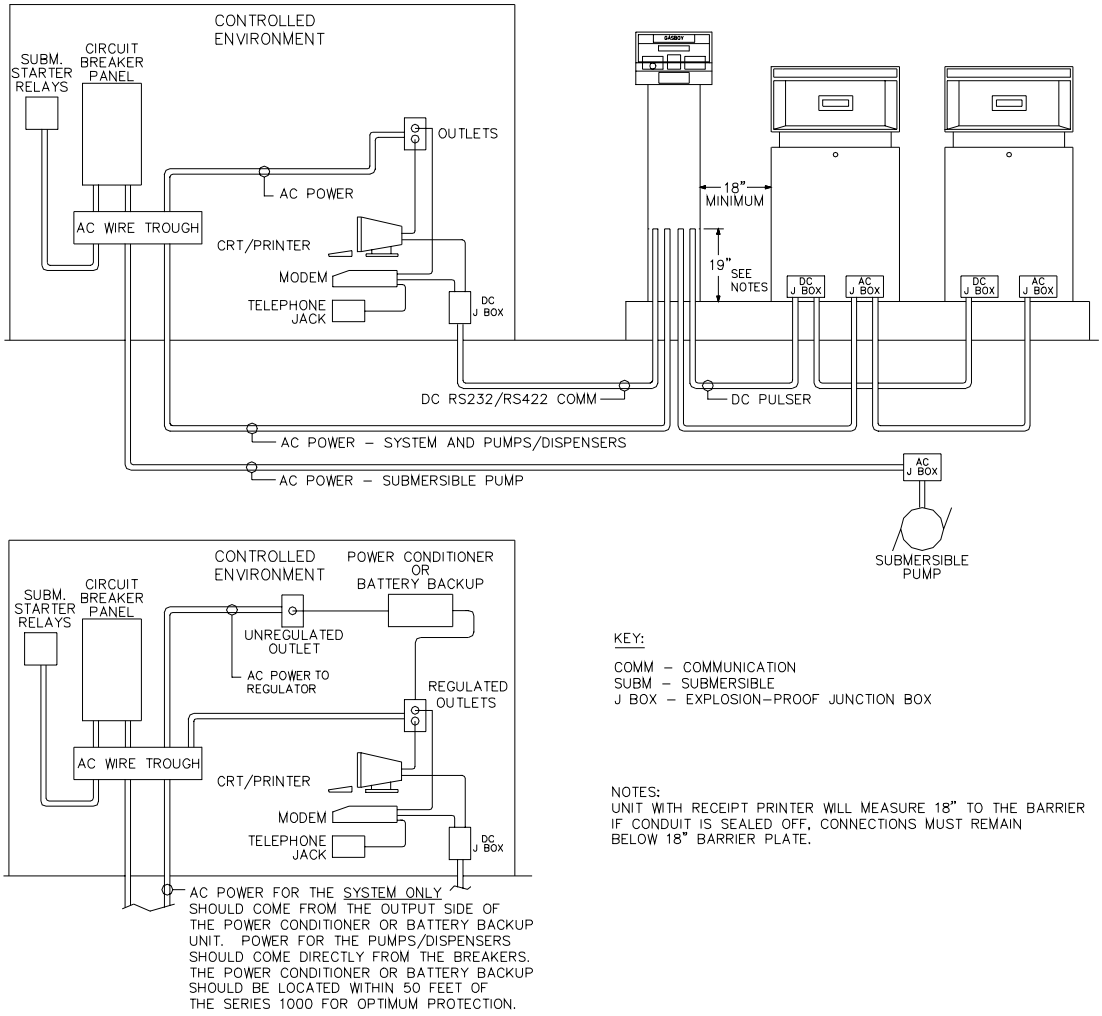
Power Conditioner: Provides clean power to the Series 1000 system.
Provides transient and common mode protection.
Location: In weather-protected area (typically near system circuit breakers); no more than 50 feet from the Series 1000 system.
Environment: -20oC to 48oC.

Voltage Regulator/Backup Power Supply: Required by Weights and Measures regulations for retail applications. Protects line-operated equipment from voltage spikes, low line voltage (brownout) and total line power failure by providing emergency power.
Location: In weather-protected area (typically near the system circuit breakers); no more than 50 feet from the Series 1000 system.
Environment: 0oC to 50oC.

CONDUIT INSTALLATION SPECIFICATIONS

1. All wiring is to be installed and used in accordance with local building/fire codes, all Federal, State, and Local codes, the National Electrical Code (NFPA 70), NFPA 30, and the Automotive and Marine Service Station Code (NFPA 30A) codes and regulations. Canadian users must also comply with the Canadian Electrical Code.
2. All peripheral equipment connected to the RS-232 ports should be UL-listed, have an Electronics Industry Association (EIA) standard RS-232 communications protocol, and not be installed over a hazardous location.
3. Power for the system, printer and modem must come from a separate circuit breaker rated at no less than 10 AMPS.
4. All wiring (AC and DC) connecting the different components of the Series 1000 System must be installed in threaded, rigid, metal conduit. DO NOT USE PVC.
5. Do not combine high voltage AC power wires and low voltage DC wires in a common conduit, junction box, or wire trough. AC and DC must be in separate metal conduits (except as noted in Communication Wiring and Pulser Wiring).
6. Wire gauge and conduit size should be determined through the use of the Wire Size and Conduit Size charts.
7. RS-232 communication must not exceed 100 feet. RS-232 communication wires must be in a separate metal conduit from any AC wires.
8. For communication distances exceeding 100 feet, use a GASBOY RS-422 Short Haul Modem. See Communication Wiring later in this document.
9. In submersible applications, starter relays are always recommended; however, the system can directly drive motors 3/4 HP or smaller.
10. Suction pumps over 3/4 HP at 115/230 VAC must use a starter relay. The starter relay should be wired in place of the motor in the applicable pump wiring diagram.
11. Disregard submersible pump in drawing if hose outlets are suction pumps.
12. A minimum of 18 inches must be maintained between the Series 1000 post and any of the pumps/dispensers.

CONDUIT LAYOUT



KEY:

COMM – COMMUNICATION
SUBM – SUBMERSIBLE
J BOX – EXPLOSION–PROOF JUNCTION BOX

NOTES:
UNIT WITH RECEIPT PRINTER WILL MEASURE 18" TO THE BARRIER IF CONDUIT IS SEALED OFF, CONNECTIONS MUST REMAIN BELOW 18" BARRIER PLATE.

CONDUIT SIZE CHART

Use these charts as a guideline to determine the necessary conduit sizes for the wiring of the GASBOY Series 1000 System. When actually determining the size of a conduit, you may need to increase conduit size because of a long run or large number of bends.

To determine conduit size needed, use the THHN/THWN Wire Areas table (left) to find the area for each wire gauge. Add up all wire areas. Use the Areas of Trade Size Conduit Table (right) to select the smallest number in the 25% fill area (based on NEC 501-1) that comes closest without exceeding the total wire area.

THHN/THWN Wire Areas				
Gauge	Diameter		Area (Sq units)	
	in	mm	in	mm
18	.090	2.29	.007	4.1
16	.104	2.64	.009	5.5
14	.118	2.95	.011	6.8
12	.135	3.43	.014	9.2
10	.169	4.29	.022	14.5
8	.216	5.49	.037	23.7
6	.259	6.60	.053	34.2
4	.331	8.41	.086	55.5
3	.359	9.14	.102	65.6
2	.394	10.01	.122	78.7
1063A	.417	10.59	.137	88.4

Areas of Trade Size Conduit						
Trade Size	Int. Diameter		Area (Sq units)		Fill Area (sq units) 25% Fill	
	in	mm	in	mm	in	mm
1/2	.629	16	.303	196	.076	49
3/4	.826	21	.532	343	.133	86
1	1.063	27	.862	556	.215	139
1–1/4	1.378	35	1.50	968	.375	242
1–1/2	1.614	41	2.04	1314	.509	329
2	2.087	53	3.36	2165	.839	541

SYSTEM AND PUMP/DISPENSER WIRING

System/Peripheral Equipment: AC Power for the system components must come from a separate, dedicated circuit breaker. No other equipment, including the system's pumps or dispensers, should be powered from this breaker. Whenever possible, one breaker should be used to supply the system, terminal, and modem. However, if necessary, the terminal or modem may be on a different separate, dedicated breaker. The power supplied from these breakers must be on the same phase of power.

Power: 115 VAC + 10% 47-63 HZ, 135 watts maximum.
Power conditioner: Required with unstable power sources.
Voltage regulator/back up power supply: Required for retail applications. The voltage regulator/backup power supply must be located within 50 feet of the Series 1000.

Pulsers: Reed (contact closure) type pulsers require two wires per pulser. Electronic pulsers require three wires per pulser. See **Pulser Wiring** later in this document for wire size and specifications.

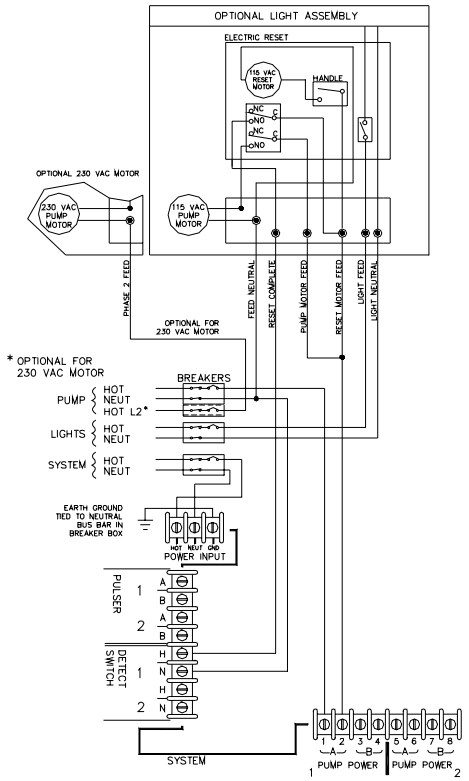
Wire Size: Use the chart below as a guide in selecting the proper size wire according to the specific installation requirements for motor wiring. Always use stranded wire.

115 VOLT WIRE GAUGE SIZES PER FEET OF RUN								
MOTOR H.P.	25'	50'	100'	150'	200'	250'	300'	OVER 300' USE RELAY AT MOTOR LOCATION
1/4	14	14	12	10	10	8	8	
1/3	14	14	12	10	8	8	8	
1/2	14	12	10	8	8	8	8	
3/4	14	12	10	8	6	6	4	
230 VOLT								
1/4	14	14	14	12	12	12	12	
1/3	14	14	12	12	12	12	12	
1/2	14	12	12	12	10	10	10	
3/4	14	12	12	10	10	10	8	
1-1/2	12	12	10	10	8	8	6	

SUCTION PUMPS

The Series 1000 System is capable of directly driving pump motors up to 3/4 HP at 115 VAC or 230 VAC. A starter relay must be used with pump motors over 3/4 HP. A separate circuit breaker should be supplied with each pump to meet the current requirements and to allow for isolated control with the circuit breaker in case of problems.

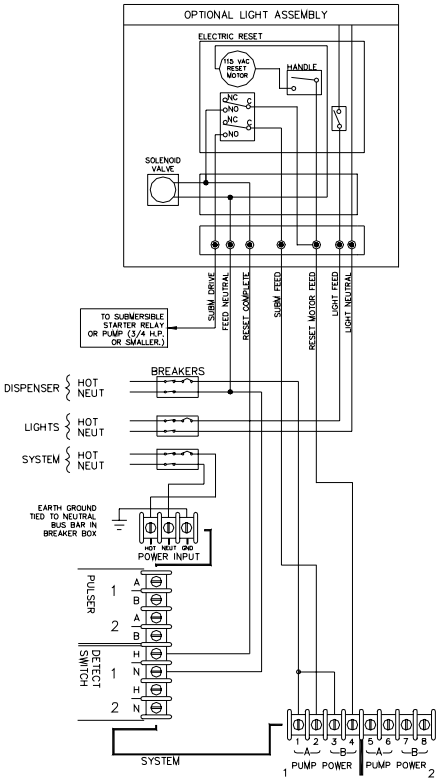
The AC wire size for a suction pump is dependent upon the HP rating of the pump motor, the voltage at which the pump will be operated (115/230), and the distance from the circuit breaker panel to the pump. The wire size for the switch detect from the pump should be 14 AWG.



DISPENSERS

The Series 1000 System can directly drive submersible pumps up to 3/4 HP at 115 VAC or 230 VAC. A separate circuit breaker is required for each dispenser directly driving a submersible pump. A dispenser with a submersible pump rated over 3/4 HP requires a submersible starter relay. Dispensers may be grouped together on a single breaker when the submersible pump has its own breaker. No more than two dispensers should be powered from one breaker. This allows you to maintain isolated control with the circuit breaker panel in case of problems.

The AC wire size for the control lines of a dispenser should be 12 AWG. These control lines supply power for the reset mechanism, solenoid valve, and submersible starter relay (when the submersible pump is not powered directly by the dispenser). The wire size for the submersible pump power depends on the HP rating of the pump motor, the voltage at which it will be operated (115/230), and the distance from the circuit breaker to the pump. The wire size for the switch detect from the dispenser should be 14 AWG.



PULSER WIRING

When installed in a separate DC conduit, 18 AWG wires are required for installation. Although it is recommended that DC pulser wires be run in a conduit separate from AC wires, they can be combined in the same conduit with AC wires providing UL-Listed cable with the following specifications is used:

Conductor: 18 AWG stranded wire. Number of conductors to be determined by pulser
Shield: Foil-wrapped 100% coverage and/or tinned copper braid 90% coverage
Drain Wire: Stranded, tinned copper, 20 AWG or larger/or braided shield
Voltage Rating: Maximum operating voltage of 600V
Environmental: Gas- and oil-resistant; suitable for wet or dry locations.

GASBOY can supply Belden 1063A (P/N C09655) which is a UL-Listed, 4-conductor cable that meets the requirements listed above. *NOTE: Belden 1063A is UL-Listed but not CSA listed.*

COMMUNICATION WIRING

Requirements

The Series 1000 System has two ports used for communication from the system to peripheral devices such as printer terminals and/or modems. These devices should be located in a controlled office type environment. Each port can be individually set up for use with a terminal or modem and for RS-232 or RS-422 communication. In cases where a Series 1000 internal modem is used, port two is not available for external communication wiring.

An optional auxiliary port provides communication from a tank monitor through the Series 1000 system to the peripheral device attached to port 1 or 2. The auxiliary port may be set for RS-232 or RS-422 communications.

RS-232 wiring can be used for direct connection to an EIA RS-232 compatible peripheral device. The distance of the RS-232 wiring is limited to 100 feet and must be in a metal conduit separate from any AC wires. The remote end of the wire can be terminated with either an RS-232D connector or a GASBOY RS-232 termination box.

RS-422 wiring requires the use of a GASBOY Short Haul Modem (P/N C05618) and the appropriate interconnect cable. The distance of the RS-422 wiring is limited to 1500 feet. Other advantages of RS-422 are its high noise immunity and the exceptions allowed to normal conduit requirements.

Conduit

RS-232 wires over 15 feet must be installed in a metal conduit separate from any AC wires. RS-422 wires should be installed in a metal conduit separate from any AC wires unless shielded cable as described below is used.

1. The cable can be run with AC wires in metal conduit. The shield drain wire must be connected to the system AC ground.
2. The cable can be run indoors without the use of metal conduit. The shield drain wire must be connected to the system AC ground. This cable must not be run outdoors without the use of metal conduit. Whenever possible the conduit should be run underground and not overhead.

Wire

All wire must be stranded.

RS-232

- 22 AWG for use with RS-232D connectors (5 wires per port).
- 18 AWG or 22 AWG for use with the GASBOY RS-232 termination box (5 wires per port).
- Distance is limited to 100 feet.

RS-422

Conductor: 18 AWG stranded wire. 2 twisted-pairs.
Shield: Foil-wrapped 100% coverage and/or tinned copper braid 90% coverage
Drain Wire: Stranded, tinned copper, 20 AWG or larger/or braided shield
Voltage Rating: Maximum operating voltage of 600V
Environmental: Gas- and oil-resistant; suitable for wet or dry locations.

GASBOY can supply Belden 1063A (P/N C09655) which is a UL-Listed, 4-conductor cable that meets the requirements listed above. *NOTE: Belden 1063A is UL-Listed but not CSA listed.*

Cables

RS-232 Termination Box: This unit can be purchased from GASBOY (P/N C05769) and provides the installer with an easy-to- wire terminal block connected to the proper pins on an RS-232D female connector. The terminal block will accept 18 or 22 AWG wire.

EIA 1:1 Cable: This cable can be purchased from GASBOY (P/N C04549) or made by the installer. This cable is generally used when communicating from a printer terminal to an RS-232 termination box or a modem.

Modem Cable: This cable can be purchased from GASBOY (P/N C04532) or made by the installer. This cable is generally used when an external modem is connecting with an RS-232 termination box or short haul modem.

Internal Modem

The Series 1000 System is available with an optional internal modem. When this modem is installed, port 2 communication is routed through the modem in place of being wired at the terminal block in the post. The phone line for the internal modem **must not** be installed in the DC conduit. Check with the local phone company for proper installation of the phone line.

Internal Modem (cont'd)

The UDS212A/D modem (P/N C05739) is a Bell 103J/212A compatible answer modem. It is designed for 0-300, 1200 baud, full duplex, asynchronous communication. The modem is mounted inside the Series 1000 at the factory. Power for the modem is supplied by the Series 1000.

The UDS212A/D modem is designed to meet or exceed the direct connect registration requirements of the FCC rules. This means that the modem will connect directly with a jack supplied by the phone company. The customer is required to order this phone jack and have it installed in the Series 1000 post.

Shared Printer Switch

A Shared Printer Switch (SPS) is used to allow two to four Series 1000/Fleetkey units to share a single printer as a transaction logger. Two wiring configurations are available: RS-232, when the distance from each unit to the SPS is less than 100 feet, or RS-422 whenever distances are between 101 to 1500 feet. RS-422 requires the use of a GASBOY Short Haul Modem (GASBOY P/N C05618). The Shared Printer Switch is available as a 2 port kit GASBOY P/N C09360 or a 4 port kit GASBOY P/N C09361 which includes the appropriate SPS and proper number of associated cables. See the *Series 1000 Installation Manual* for wiring diagrams.

FUEL POINT OPTION

The FleetKey system can be purchased or retrofitted with a Fuel Point option. With Fuel Point, each vehicle is equipped with a T-ring (tank ring). Each hose used with Fuel Point is equipped with an N-ring (nozzle ring). When fueling the vehicle, the antennas on the T-ring and N-ring automatically transmit vehicle information to the Fuel Point Reader (FPR), which in turn, transmits this information to the GASBOY FleetKey system which authorizes fueling and records vehicle and transaction information.

The hardware required for the Fuel Point option can be factory-installed on a new system, or retrofitted to an existing system. Refer to the following Fuel Point manuals for information on system installation and retrofitting:

- *Fuel Point Reader Installation, C35628*
- *Fuel Point Hose and Dispenser Retrofit Installation, C35593*
- *Vehicle Module Installation, C35699*
- *Vehicle Module Programming Manual, C35629*
- *Fuel Point Parts, C35709*

There are two variations on the Fuel Point option: the standard Fuel Point option or the Fuel Point Gate option. The standard option allows you to authorize up to 8 fueling positions. The gate option allows you to designate a fueling position (hose) as a gate controller The gate option requires a special vehicle module with gate antenna connectors on the vehicle and installation of a special ground loop antenna buried in the driveway.

GASBOY INTERNATIONAL LLC
P.O. Box 309, Lansdale, PA 19446 ● (215) 855-4631 ● FAX: (800) 444-5569