

Series 1000 Fuel Management System

Installation Manual

Computer Programs and Documentation

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Federal Communications Commission (FCC) Warning This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Approvals

Gasboy, Greensboro, is an ISO 9001:2000 registered facility. Underwriters Laboratories (UL): New York City Fire Department (NYFD): California Air Resources Board (CARB): UL File# Products listed with UL NYFD C of A # Executive Order # Product Product All dispensers and self-contained pumping 4823 9100A, 9140A, 9152A, 9153A, G-70-52-AM Balance Vapor Recovery MH4314 9800A, 9840A, 9850A, 9852A, units G-70-150-AE VaporVac 9853A, 9140 Power operated Transfer Pump Models 25, MH6418 25C, 26, 27, 28, 72, 72S, 72SP, 72X, 73 and 4997 9822A, 9823A 1820 5046 91000, 91400, 91520, 91530, Hand operated Transfer Pump Models 1230 9800Q, 9840Q, 9852Q, 9853Q MH7404 Series, 1243 Series, 1520 and 1720 Series 8753K, 8853K, 9153K, 9853K 5087 MH10581 Key control unit, Model GKE-B Series (restricted to diesel and nonretail gasoline sales) Card reader terminals, Models 1000, 1000P 5091 8752K, 9152K Site controller, Model 2000S CFN Series 9122K, 9123K, 9822K, 9823K 5129 Data entry terminals, Model TPK-900 Series Fuel Point Reader System

National Conference of Weights and Measures (NCWM) - Certificate of Compliance (CoC):

Gasboy pumps and dispensers are evaluated by NCWM under the National Type Evaluation Program (NTEP). NCWM has issued the following CoC:

CoC#	Product	Model #	CoC#	Product	Model #	CoC#	Product	Model #
95-179	Dispenser	9100 Retail Series, 8700 Series, 9700 Series	91-019	Dispenser	9100 Commercial Series	05-002	Atlas	8700K, 8800K, 9100K, 9200K, 9800K
95-136	Dispenser	9800 Series	91-057	Controller	1000 Series FMS, 2000S-CFN Series			

Patents

Gasboy products are manufactured or sold under one or more of the following US patents:

Dispensers

5,257,720

Point of Sale/Back Office Equipment

D335,673

Additional US and foreign patents pending.

Trademarks

Non-registered trademarks	Registered trademarks	
Atlas TM	ASTRA®	
Consola TM	Fuel Point®	
Infinity TM	Gasboy®	Additional US
	Keytrol®	Other brand or
	Slimline®	trademarks or

and foreign trademarks pending.

r product names shown may be registered trademarks of their respective holders



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1 – Introduction

Purpose

The Gasboy[®] Series 1000 Installation Manual is provided to assist you in installing your Series 1000 System. This manual should be supplied to the electrician prior to the installation of conduit and wiring to ensure your Series 1000 System is installed properly. Faulty installations are the major cause of system malfunctions. The Series 1000 system must be installed exactly as described in this manual to ensure its reliability and proper operation.

Abbreviations and Acronyms

Term	Description
CFN	Cash Flow Network
CRT	Cathode Ray Tube
EIA	Electronics Industrial Association
LCD	Liquid Crystal Display
РСВ	Printer Circuit Board
PIN	Personal Identification Number
SPS	Shared Printer Switch
UL®	Underwriters Laboratories

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 where access to the system is controlled by magnetic or optical cards.
- Cardless where access to the system is attained by entering a valid vehicle number.
- FleetKey where access to the system is controlled by encoded data keys.

The system is totally self-contained in an attractive, weatherized cabinet and pedestal assembly. The system is Underwriter's Laboratories (UL) and FCC-Listed, and is designed to be located on the fueling island convenient to the user.

Note: Gasboy provides a toll-free number for customers and installers having questions pertaining to the installation: 1-800-444-5529.

The cabinet head measures approximately 15" W x 12" H x 20" D and is mounted on top of the 48" high pedestal. The cabinet face is protected by a clear acrylic shield for weather protection. A combination of side extensions and top overhang reduces sun glare, and a fluorescent light provides lighting for around-the-clock user operation. Visual prompting messages, displayed on an eye-level 20-character Liquid Crystal Display (LCD), guide the user through the steps required to operate the system. A list of operating instructions is also printed on the cabinet face for reference.

A 12-position membrane keypad, containing the keys 0-9, CLEAR and ENTER, is provided on the center of the face for entering data (for example, personal identification number (PIN), odometer readings, pump selections, and so on). All entries, except PIN, are displayed on the LCD for verification. The card-activated system is equipped with a mag stripe insertion reader. The FleetKey system is equipped 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. Servicing is facilitated by interior LED indicators which help diagnose system problems.

Solid state relays and manual override switches, which control power to the fuel dispensing equipment, are located in the pedestal. If ordered, an optional, high-speed bi-directional serial impact receipt printer is also housed within the pedestal. The wiring for all equipment connected to the Series 1000 is terminated in 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.

The Series 1000 System contains two asynchronous ports for terminal and/or computer communications. An optional auxiliary port PCB (two ports) is available for tank monitor interfacing. The ports can be set for 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 data terminal (or computer) is connected to the system through one of the two asynchronous communication ports located in the system cabinet. A tank monitor may be connected to the system through the optional auxiliary asynchronous communication port which would also be located in the system cabinet. Communication is through direct wire, or by dial-up phone lines using an optional built-in modem. Refer to "Communication Wiring" on page 51 for specific communications requirements and distance limitations.

Rules for Proper Installation

For proper installation, proceed as follows:

- Please read this entire manual before starting installation.
- 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.
- All wiring must be in threaded, rigid, metal conduit to provide the necessary shielding. Do not use PVC conduit.
- High-voltage (AC) and low-voltage (DC) must not be combined in a common conduit, junction box, or wire trough unless cable is used as specified in "System and Pump/ Dispenser Wiring" on page 17 or "Communication Wiring" on page 51.
- Power for the Series 1000 System, data terminal, and external modem must come from a separate, dedicated, circuit breaker.
- Properly ground the Series 1000 System and peripheral equipment.
- Use terminal connectors on stranded wire.
- Test pumps in the manual override position prior to system start-up.
- Do not turn on the system power switch located in the head assembly. Power will be applied to the system by the person performing the system start-up.

\land WARNING

Turning on this switch prematurely may result in damage to the system and may void your warranty.

• Check through all boxes and cartons before disposing of them for manuals, cables, connectors, and so on.

Warranty

For information on warranty, refer to MDE-4255 Gasboy's Warranty Policy Statement. If you have any warranty-related questions, contact Gasboy's Warranty Department at its Greensboro location.

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2 – Important Safety Information

This section introduces the hazards and safety precautions associated with installing, inspecting, maintaining or servicing this product. Before performing any task on this product, read this safety information and the applicable sections in this manual, where additional hazards and safety precautions for your task will be found. Fire, explosion, electrical shock or pressure release could occur and cause death or serious injury, if these safe service procedures are not followed.

Preliminary Precautions

You are working in a potentially dangerous environment of flammable fuels, vapors, and high voltage or pressures. Only trained or authorized individuals knowledgeable in the related procedures should install, inspect, maintain or service this equipment.

Emergency Total Electrical Shut-Off

The first and most important information you must know is how to stop all fuel flow to the pump/dispenser and island. Locate the switch or circuit breakers that shut off all power to all fueling equipment, dispensing devices, and Submerged Turbine Pumps (STPs).

A WARNING

The EMERGENCY STOP, ALL STOP, and PUMP STOP buttons at the cashier's station WILL NOT shut off electrical power to the pump/ dispenser. This means that even if you activate these stops, fuel may continue to flow uncontrolled.

You must use the TOTAL ELECTRICAL SHUT-OFF in the case of an emergency and not the console's ALL STOP and PUMP STOP or similar keys.

Total Electrical Shut-Off Before Access

Any procedure that requires access to electrical components or the electronics of the dispenser requires total electrical shut off of that unit. Understand the function and location of this switch or circuit breaker before inspecting, installing, maintaining, or servicing Gasboy equipment.

Evacuating, Barricading and Shutting Off

Any procedure that requires access to the pump/dispenser or STPs requires the following actions:



- An evacuation of all unauthorized persons and vehicles from the work area
- Use of safety tape, cones or barricades at the affected unit (s)
- A total electrical shut-off of the affected unit (s)

Read the Manual

Read, understand and follow this manual and any other labels or related materials supplied with this equipment. If you do not understand a procedure, call a Gasboy Authorized Service Contractor or call the Gasboy Service Center at 1-800-444-5529. It is imperative to your safety and the safety of others to understand the procedures before beginning work.

Follow the Regulations

Applicable information is available in National Fire Protection Association (NFPA) 30A; *Code for Motor Fuel Dispensing Facilities and Repair Garages*, NFPA 70; *National Electrical Code (NEC)*, Occupational Safety and Hazard Association (OSHA) regulations and federal, state, and local codes. All these regulations must be followed. Failure to install, inspect, maintain or service this equipment in accordance with these codes, regulations and standards may lead to legal citations with penalties or affect the safe use and operation of the equipment.

Replacement Parts

Use only genuine Gasboy replacement parts and retrofit kits on your pump/dispenser. Using parts other than genuine Gasboy replacement parts could create a safety hazard and violate local regulations.

Safety Symbols and Warning Words

This section provides important information about warning symbols and boxes. Alert Symbol

This safety alert symbol is used in this manual and on warning labels to alert you to a precaution which must be followed to prevent potential personal safety hazards. Obey safety directives that follow this symbol to avoid possible injury or death.

Signal Words

These signal words used in this manual and on warning labels tell you the seriousness of particular safety hazards. The precautions below must be followed to prevent death, injury or damage to the equipment:



DANGER: Alerts you to a hazard or unsafe practice which will result in death or serious injury.



• **CAUTION** with Alert symbol: Designates a hazard or unsafe practice which may result in minor injury.



CAUTION without Alert symbol: Designates a hazard or unsafe practice which may result in property or equipment damage

Working With Fuels and Electrical Energy

Prevent Explosions and Fires

Fuels and their vapors will explode or burn, if ignited. Spilled or leaking fuels cause vapors. Even filling customer tanks will cause potentially dangerous vapors in the vicinity of the dispenser or island.

No Open Fire

Open flames from matches, lighters, welding torches or other sources can ignite fuels and their vapors. **No Sparks - No Smoking**



Sparks from starting vehicles, starting or using power tools, burning cigarettes, cigars or pipes can also ignite fuels and their vapors. Static electricity, including an electrostatic charge on your body, can cause a spark sufficient to ignite fuel vapors. Every time you get out of a vehicle, touch the metal of your vehicle, to discharge any electrostatic charge before you approach the dispenser island.

Working Alone

It is highly recommended that someone who is capable of rendering first aid be present during servicing. Familiarize yourself with Cardiopulmonary Resuscitation (CPR) methods, if you work with or around high voltages. This information is available from the American Red Cross. Always advise the station personnel about where you will be working, and caution them not to activate power while you are working on the equipment. Use the OSHA Lockout/ Tagout procedures. If you are not familiar with this requirement, refer to this information in the service manual and OSHA documentation.

Working With Electricity Safely

Ensure that you use safe and established practices in working with electrical devices. Poorly wired devices may cause a fire, explosion or electrical shock. Ensure that grounding connections are properly made. Take care that sealing devices and compounds are in place. Ensure that you do not pinch wires when replacing covers. Follow OSHA Lockout/ Tagout requirements. Station employees and service contractors need to understand and comply with this program completely to ensure safety while the equipment is down.

Hazardous Materials

Some materials present inside electronic enclosures may present a health hazard if not handled correctly. Ensure that you clean hands after handling equipment. Do not place any equipment in the mouth.

\Lambda WARNING

The pump/dispenser contains a chemical known to the State of California to cause cancer.

The pump/dispenser contains a chemical known to the State of California to cause birth defects or other reproductive harm.

In an Emergency

Inform Emergency Personnel

Compile the following information and inform emergency personnel:

- Location of accident (for example, address, front/back of building, and so on)
- Nature of accident (for example, possible heart attack, run over by car, burns, and so on)
- Age of victim (for example, baby, teenager, middle-age, elderly)
- Whether or not victim has received first aid (for example, stopped bleeding by pressure, and so on)
- Whether or not a victim has vomited (for example, if swallowed or inhaled something, and so on)

Gasoline ingested may cause unconsciousness

- and burns to internal organs. Do not induce vomiting. Keep airway open.
 - Oxygen may be needed at scene. Seek medical advice immediately.

WARNING



Gasoline inhaled may cause unconsciousness and burns to lips, mouth and lungs. Keep airway open. Seek medical advice immediately.

WARNING

Gasoline spilled in eyes may cause burns to eye tissue.

Irrigate eyes with water for approximately 15 minutes.

Seek medical advice immediately.



Gasoline spilled on skin may cause burns. Wash area thoroughly with clear water.

Seek medical advice immediately.

IMPORTANT: Oxygen may be needed at scene if gasoline has been ingested or inhaled. Seek medical advice immediately.

Lockout/Tagout

Lockout/Tagout covers servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machine(s) or equipment or release of stored energy could cause injury to employees or personnel. Lockout/Tagout applies to all mechanical, hydraulic, chemical or other energy, but does not cover electrical hazards. Subpart S of 29 CFR Part 1910 - Electrical Hazards, 29 CFR Part 1910.333 contains specific Lockout/ Tagout provision for electrical hazards.

Hazards and Actions



WARNING

Spilled fuels, accidents involving pumps/dispensers, or uncontrolled fuel flow create a serious hazard.

- Fire or explosion may result, causing serious injury or death.
- Follow established emergency procedures.

The following actions are recommended regarding these hazards:



- Do not go near a fuel spill or allow anyone else in the area.
- Use station EMERGENCY CUTOFF immediately. Turn off all system circuit breakers to the island(s).
- Do not use console E-STOP, ALL STOP and PUMP STOP to shut off power. These keys do not remove AC power and do not always stop product flow.
- Take precautions to avoid igniting fuel. Do not allow starting of vehicles in the area. Do not allow
 open flames, smoking or power tools in the area.
- Do not expose yourself to hazardous conditions such as fire, spilled fuel or exposed wiring.
- Call emergency numbers.

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3 – System Layout

Component Location

Careful planning for the layout of the site will help eliminate possible problems with the startup of your system and will ensure continued, reliable system operation.

System

The Series 1000 System should be located on the fuel island. The unit has been designed to withstand an environment of -30° C to 40° C, 95% relative humidity, non-condensing. When mounting the unit, a minimum clearance of 18 inches must be maintained between the post and any of the pumps or dispensers. This clearance meets the NFPA 30A and NFPA 70 requirements and allows room for wiring and maintenance of the system. Adequate clearance around the head of the unit is important to provide room for maintenance of the system. A minimum of 14 inches of clearance from the rear of the unit must be provided to allow the rear door to open.

Data Terminal

When a data terminal is used with the system it should be located in a clean, office-type environment. Do not install over a hazardous location. Data terminals supplied by Gasboy have an operative temperature range of 0° C to 40° C. Locating the terminal in a dirty environment may cause premature failure.

External Modems

When an external modem is used with the system it is recommended the modem be located in an office type environment. However, if this is not possible, it should be housed in a protective enclosure. Do not install over a hazardous location. External modems supplied by Gasboy have an operative temperature range of 0° C to 40° C.

Power Conditioner

When used, a power conditioner helps provide clean power to the Series 1000 System. Poor power conditions are a key cause to system malfunction or failure. The power conditioner provides transient and common mode protection for the Series 1000, although it cannot totally compensate for extremely poor power conditions. The power conditioner must be located in an area protected from direct contact with weather (typically near the system circuit breakers) and should be no further than 50 feet from the Series 1000 for optimum protection. The unit is designed for an operating temperature range of -20° C to 40° C.

Voltage Regulator/Backup Power Supply

When the Series 1000 is being used for the resale of fuel, Weights and Measures regulations require a backup power supply. The voltage regulator/backup power supply protects line-operated equipment from low line voltage (brownout) and total line power failure by providing virtually instant emergency power. The voltage regulator/backup power supply also protects line-operated equipment from potentially dangerous voltage spikes coming in on the commercial AC power. Although it does help to condition the power to the Series 1000, it cannot totally compensate for extremely poor power conditions. The voltage regulator/backup power supply must be located in an area protected from direct contact with weather (typically near the system circuit breakers) and should be no further than 50 feet from the Series 1000 System for optimum protection. The unit is designed for an operating temperature range of 0° C to 40° C.

System Dimensions - Standard Unit





System Dimensions - Unit with Receipt Printer





Conduit Layout



Figure 3-3: Conduit Layout

Conduit Layout/Installation Specifications

- 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.
- All peripheral equipment connected to the RS-232 ports must be UL-listed, have an Electronics Industrial Association (EIA) standard RS-232 communications protocol and not be installed over a hazardous location.
- Power for the system, printer and modem must come from a separate circuit breaker rated at no less than 10 AMPS.
- All conduit must be metal to provide the necessary shielding.
- High-voltage (AC) and low-voltage (DC) must not be combined in a common conduit, junction box, or wire trough unless cable is used as specified in "System and Pump/ Dispenser Wiring" on page 17 or "Communication Wiring" on page 51.
- Use the Wire Size chart (see Figure 4-2 on page 21) to determine the proper wire gauge.
- Use the Conduit Size chart (see Figure 3-3 on page 13) to determine the proper conduit size.
- RS-232 communication must not exceed 100 feet. RS-232 communication wires must be in a separate metal conduit from any AC wires.
- For communication distances exceeding 100 feet, you must use a Gasboy RS-422 Short Haul Modem.
- DC pulser and DC RS-422 communication wires can be combined in the same conduit.
- Suction pumps over 3/4 HP at 115/230 VAC must use a starter relay. Wire the starter relay in place of the motor in the applicable pump wiring drawing.
- A minimum of 18 inches must be maintained between the Series 1000 post and any of the pumps/dispensers.
- Disregard submersible pump in drawing if hose outlets are suction pumps.

Conduit Requirements

All wiring (AC and DC) connecting the different components of the Gasboy Fuel Management System must be installed in threaded, rigid, metal conduit except as noted in "Installation Notes" on page 51 and "Short Haul Modem - RS-422" on page 58. PVC IS NOT ACCEPTABLE. Components of the system include pumps, dispensers, submersible pumps, submersible starter relays, the circuit breaker panels and the Series 1000 system. Communications equipment signal wires must also be run in metal conduit, except for RS-422 wiring as noted in "Communication Wiring" on page 51.

Communication equipment signal wires must also be run in metal conduit. High-voltage (AC) and low-voltage (DC) must not be combined in a common conduit, junction box, or wire trough unless cable is used as specified in "System and Pump/Dispenser Wiring" on page 17 or "Communication Wiring" on page 51.

All conduits must be connected to the Series 1000 pedestal through the holes and knockouts provided by the factory. Do not make any other holes in this unit. If you must make holes at locations other than those provided, contact Gasboy for approval first.

All wiring and conduit runs must conform with all building/fire codes, all Federal, State, and Local codes, the National Electrical Code (NFPA 70), NFPA30, and the Automotive and Marine Service Stations Code (NFPA 30A). Canadian users must also comply with the Canadian Electrical Code.

Use the charts in Figure 3-4 as a guideline to determine the proper conduit sizes for the Gasboy Series 1000 fuel management system. When planning the orientation of the wiring runs, follow the applicable Gasboy wiring diagram and consider the layout of the components at the site. Long runs or a large number of bends may require you to increase conduit size over what is listed.

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	Diam	neter	Area (S	q 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. Die	ameter	Area (S	iq units)	Fill Ar- units) :	ea (sq 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		

Figure 3-4: Conduit Size

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4 – System and Pump/Dispenser Wiring

Wiring Precautions

The quality of the electrical installation is a major factor in maintaining proper safety levels and providing trouble-free operation of your Gasboy pump/dispenser. To assure a quality installation, follow these rules:

- 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.
- Use approved conduit and insulated gasoline and oil resistant copper wiring of the proper size.
- Wire connections must be tightly spliced and secured with a wire nut; close off the open end of the wire nut with electrical tape.
- Install an emergency power cutoff. In addition to circuit breaker requirements of NFPA 70, NFPA 30, NFPA 30A and the Canadian Electrical Code (Canadian users only), a single control which simultaneously removes AC power from all site dispensing equipment is recommended. This control must be readily accessible, clearly labeled, and in accordance with local codes.

The Disable Pumps button on the Series 1000 will cut all control power to the solid-state relays of the pump control unit, which should stop product flow. However, AC power will still be present at the Series 1000 and may be present at some site dispensing equipment.

In order to provide the highest level of safety to you, your employees, and customers, we recommend that all employees be trained as to the location and procedure for turning off power to the entire system.

\land WARNING

To reduce the risk of electrical shock when servicing, turn off all power to the pump/ dispenser. In submersible pump applications, turn off all power to the submersible pump and any other dispensers which use that submersible pump. AC power can feed back into a shut off dispenser when dispensers share a common submersible pump or starter relay.

Power Requirements

System/Peripheral Equipment

AC power for the Series 1000 system, data terminal, and external modem must come from a separate, dedicated circuit breaker. No other equipment, including the system's pumps or dispensers, may 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 separate, dedicated breaker within the same breaker panel and on the same phase of power.

The system requires 115 VAC + 10% 47-63 HZ for power. The system draws 135 watts maximum. An unstable power source may require the use of a power conditioner. If the Series 1000 is going to be used for the resale of fuel, Weights and Measures regulations require a voltage regulator/backup power supply (Gasboy Part Number C04395). Information pertaining to the installation of a power conditioner or voltage regulator/backup power supply may be found in "System Layout" on page 9.

Proper system grounding is an extremely important part of the system installation. Grounds for all system devices should be wired to the breaker panel ground bus bar which, in turn, should be grounded to a ground rod. A conduit ground does not provide a sufficient ground. It is recommended that the neutral and ground bus bars be bonded together when it is not prohibited by local codes.

Suction Pumps

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

Dispensers

The Series 1000 System is capable of directly driving submersible pumps up to 3/4 HP at 115/230 VAC. A dispenser with a submersible pump exceeding this limitation requires the use of a submersible starter relay. A separate circuit breaker should be supplied for each dispenser in cases where it will directly drive the submersible pump. Dispensers may be grouped together on a single breaker when the submersible pump has its own breaker. It is recommended that no more than two dispensers be powered from one breaker to maintain isolated control with the circuit breaker panel in case of problems.

Terminal Block ID

All wiring for the Series 1000 is terminated to the chassis assembly in the pedestal of the system. Terminal connectors should be used on stranded wire when connecting to the system's terminal blocks. The orientation of the chassis assembly is shown Figure 4-1 on page 19.

Terminal Block ID Diagram



Figure 4-1: Terminal Block ID Diagram

Notes: 1) The terminal blocks shown above are located in the post.

- 2) Red decals indicate AC wiring, black decals indicate DC wiring.
- 3) Standard terminal block configuration is shown above. In pedestals with receipt printers, the upper terminal block plate is mounted back-to-back with the relay modules.

Wire Size

The AC wire size for power of the system must be 14 AWG or larger. This gauge of wire will be sufficient for runs of up to 300 feet from the breaker panel to the system. Sites with distances over 300 feet must use 12 AWG wire or larger.

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 chart below may be used as a guide in selecting the proper size wire according to the specific installation requirements. The wire size for the reset complete from the pump should be 14 AWG.

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 directly powered by the dispenser). The wire size for the submersible pump power depends upon 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. Use Figure 4-2 on page 21 as a guide in selecting the proper size wire according to the specific installation requirements. The wire size for the reset complete from the dispenser should be 14 AWG.

The DC wire size for the pulser must be 18 AWG (when they are used). Shielded cable, as described in "Pulser Wiring Diagrams" on page 28 allows pulser lines to run with the AC wires.

The DC wire size for the RS-422 lines should be 18 AWG and meet the specifications outlined in "Communication Wiring" on page 51.

All wire should be stranded.

Refer to "Communication Wiring" on page 51 to determine the wire size and type for the communication wiring for your specific application.

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	

Figure 4-2: Wire Size

Control Lines for Mechanical Pumps/Dispensers

Descriptions of the control lines are provided to familiarize the installer with the control inputs and outputs that are used to control a mechanical pump/dispenser. Reading these descriptions will give the installer a better working knowledge of the system and aid in planning the site wiring.

Grounding

To ensure proper operation of the equipment and provide the necessary safety factors, this unit must be grounded. A ground wire (preferably green) must be connected between the ground wire of the system and the main electrical service panel. One (1) earth ground connection is required per unit. A ground rod must be installed at the main electrical panel in accordance with the National Electrical Code. This ground rod is to be a solid, corrosion-resistant conductor. It should be properly tied into the ground bus strip of the panel. We recommend the neutral and ground bus strips be bonded together (unless prohibited by local codes).

Reset Motor Feed

This is a 115 VAC input which is supplied through the pump handle switch to activate the reset motor. This line should be switched through the Series 1000 system and should only be on when the pump/dispenser is authorized or in manual mode. Without power supplied to this line, the pump/dispenser will not reset when the pump handle is turned on. Two feed lines are provided for twins. This feed is also connected to the input of one of the internal switches of the electric reset. When the reset finishes its cycle, the 115 VAC input to the switch will be passed through as an output causing the solenoid valve (optional in some models) to open and the reset complete line to indicate 115 VAC.

Pump Motor Feed

This is a 115 VAC input which is supplied to the input side of one of the internal switches of the electric reset. This line should be switched through the Series 1000 system and should only be on when the pump/dispenser is authorized or in manual mode. When the reset finishes its cycle, the 115 VAC input to the switch is passed through as an output causing the pump motor to receive power and begin fueling. Without power to this line, the unit would reset, but be unable to fuel. Two feed lines are provided in twins which contain two motors. The gauge of this wire (and its neutral wire) should be determined according to the size of the motor, the voltage at which the motor will be powered (115 VAC or 230 VAC), and the distance from the breaker panel to the pump. It is possible to combine the pump motor feeds for twins and supply them from one breaker; however, the gauge of the wire needs to be adjusted to handle the load of two motors.

Note: 230 VAC is developed across a motor when the other leg of the motor is connected to a *Phase 2 Feed.*

Neutral Feed

This is the AC current return line back to the breaker panel for all attached devices (pump motor, reset motor, solenoid valves). The gauge of this wire must be equal to that of the pump motor feed (suction pumps) or submersible feed (dispensers).

Submersible Feed, Submersible Drive

This is a 115 VAC input which is supplied to the input side of one of the internal switches of the electric reset. This line should be switched through the Series 1000 system and only be on when the pump/dispenser is authorized or in manual mode. When the reset finishes its cycle, the 115 VAC input to the switch is passed through as an output (submersible drive) to drive a starter relay or to directly drive a submersible motor up to 3/4 HP at 115/230 VAC. Any submersible motor exceeding this limitation must use a starter relay.

Note: 230 VAC is developed across a motor when the other leg of the motor is connected to a *Phase 2 Feed.*

Reset Complete (Switch Detect)

This is a 115 VAC output which is used to indicate the reset is complete and the pump/ dispenser is ready to dispense product. Two lines are provided for twins. This line should only be used when monitoring of the pump/dispenser is desired (such as when used with a fuel management system). This line must be capped when not in use.

Light Feed

This is a 115 VAC input required to power optional fluorescent lights that may be available in a pump/dispenser. In a site configuration using multiple dispensers (or pumps), the power for the lights of up to eight units can be supplied by one breaker. The light feed is not controlled by the Series 1000 system.

Light Neutral

This is a return line for AC current from the lights to the breaker panel.

Phase 2 Feed

This is a hot feed which is the opposite phase of the pump motor feed. This line and the pump motor feed are used for 230 VAC motor applications.

Pulser

This supplies a DC output which is provided to indicate the quantity dispensed.

Control Lines for Gasboy 9800 or 9820 Electronic Pumps/ Dispensers

Descriptions of the control lines are provided to familiarize the installer with the control inputs and outputs that are used to control the Series 9800 and 9820 dispensing units. Reading these descriptions will give the installer a better working knowledge of the system and aid in planning the site wiring.

The Series 9800 may be provided for use with 230 VAC power for international applications. The operating voltage for control lines to these units is shown in parentheses as (230 VAC International).

Ground

To ensure proper operation of the equipment and provide the necessary safety factors, a good ground line must be provided. A ground wire (preferably green) must be connected between the ground wire of the system and the main electrical service panel. One (1) earth ground connection is required per unit. The ground rod is to be a solid, corrosion-resistant conductor and must be installed at the main electrical panel in accordance with the National Electrical Code. It should be properly tied into the ground bus strip of the panel. We recommend the neutral and ground bus strips be bonded together (unless prohibited by local codes).

Micro Feed

The Micro Feed is a 115 VAC (230 VAC International) input required to power the microprocessor of the register's electronics. This power must always remain on and must be on a separate breaker from the control lines (Control/Pump Motor Feed or Control/Subm Feed - Side 1, Side 2). This must also be on a separate breaker from the fluorescent lights to reduce electrical noise and allow for separate control of the lights. In a site configuration using multiple dispensing units, the power for the microprocessors of up to 8 units can be supplied by one breaker.

Micro Neutral

The Micro Neutral is a return line for AC current from the microprocessor of the dispensing unit to the breaker panel.

External Valve

The External Valve line is used to directly power an anti-siphon valve mounted on top of an aboveground tank. The valve must operate at the same voltage as the pump motor and the current draw must not exceed one Amp, or the valve must be switched through an external relay controlled by the External Valve line. Do not connect two or more External Valve lines together. If more than one pump is drawing from the tank, separate anti-siphon valves must be installed, or each External Valve line must operate an external relay which then operates the valve.

Control/Pump Motor Feed

The Control/Pump Motor Feed is a 115 VAC (230 VAC International) input which is required to power and authorize the control line. This line is used to provide authorization for the dispensing unit (when enabled through the DIP switches). A resistor assembly must be installed between the Control Feed line and Feed Neutral to prevent false triggering of the authorization input. The resistor assembly is 8.2K OHM, 10 Watt (Part Number C05818) for 115/230 VAC domestic and 30K OHM, 10 Watt (Part Number C06683) for 230 VAC international wiring. Two Control/Pump Motor Feed lines are provided for twins.

The Control/Pump Motor Feed line is used to power the slow flow and fast flow valves (when installed). The power used to control the pump is also provided by this line. It is possible to combine the control lines for twins and supply them from one breaker; however, the gauge of the wire needs to be adjusted to handle the load of two motors. The Reset Complete signal used for external monitoring of the pump also originates from the Control/Pump Motor Feed line.

Neutral Feed

The Neutral Feed is the AC current return line back to the breaker panel for all attached devices (pump motor, solenoid valves).

Control/Submersible Feed (Control/Subm Feed)

The Control/Subm Feed is a 115 VAC (230 VAC International) input which is required to power and authorize the control line. This line is used to provide authorization for the dispensing unit (when enabled through the DIP switches). If this line is controlled by a fuel management system using solid state relays, a resistor assembly must be installed between the Control Feed line and Feed Neutral to prevent false triggering of the authorization input. The resistor assembly is 8.2K OHM, 10 Watt (Part Number C05818) for 115/230 VAC domestic and 30K OHM, 10 Watt (Part Number C06683) for 230 VAC international wiring. The TopKAT[™] and CFN systems require the resistor assembly only when they are used with the 9800 pump/dispenser operating in standalone mode. Operating the 9800 in standalone mode with a TopKAT requires the TopKAT mechanical interface option; with a CFN system, requires an optional mechanical pump control unit. This line also supplies the power which is switched to the slow flow and fast flow valves along with the switch detect signal. Two lines are provided for twins.

If the 9800 is to be controlled through authorization of this line, special care must be taken in the wiring of the submersible control lines when a common submersible is used for more than one hose outlet. Refer to "Submersible Starter Drive (Subm Starter Drive)" on page 25 for more information.

Units with Standard Submersible Drive (Subm Drive)

Power for the Subm Drive line originates from this input. The submersible starter relay line, in standard dispensers, is not capable of directly powering a submersible pump. A starter relay must be used. The control lines for twin dispensers can be combined together and powered by one breaker if individual control of each side is not desired. In a site configuration using multiple dispensers, the power for the control lines of up to 8 hose outlets (8 singles or 4 twins) can be supplied from one breaker.

Units with Optional Direct Submersible Drive

Power for the Subm Drive line originates from this input. 9800's equipped with the optional relays for direct submersible pump drive can be connected directly to submersible pumps up to 3/4 HP at 115/230 VAC. This line is limited to 3/4 HP because of the control circuit in the Series 1000. The gauge of this wire should be determined according to the size of the motor, the voltage at which the motor will be powered, and the distance from the breaker panel to the pump.

Submersible Starter Drive (Subm Starter Drive)

The Subm Starter Drive is a 115 VAC (230 VAC International) output used to control a submersible starter relay. Two lines are provided for twins. This line is capable of supplying 300mA of AC current to control the coil of the submersible motor contactor (starter relay). This is sufficient for directly connecting to the popular models, but if in doubt, check the contactor (relay) manufacturer's data sheet for the sealed VA rating. Divide the sealed VA by the coil voltage to determine the current. This line must not be connected directly to the submersible pump, shorted to any conduit or chassis metal, or mis-wired, or the CPU PC board will be instantly damaged. This line must be left capped when not in use.

IMPORTANT INFORMATION

When multiple dispensers are used to control a common submersible starter relay or pump, and the 9800 is controlled (authorized) through the Control/Pump Motor Feed line (as in the case of some fuel management systems), it is important that the lines from the 9800 to the submersible equipment be isolated from each other. This can be accomplished by running the submersible control lines through a secondary set of relay contacts in the fuel management system. If a secondary set of contacts is not available, external control relays must be used between the 9800 and the submersible starter relay or pump. Another option is to provide a separate submersible starter relay for each hose outlet. In no case can the submersible drive lines from the 9800 be tied together.

Submersible Drive (Subm Drive)

This line is always present for dispensers, but is active only when Subm Drive relays are supplied. The Subm Drive is a 115/230 VAC (230 VAC International) output used to control the submersible starter relay or submersible pump. When connected directly to the submersible pump, the motor size cannot exceed 3/4 HP at 115/230 VAC. This line is limited to 3/4 HP because of the control circuit in the Series 1000. Two lines are provided for twins. In cases where both lines will be controlling the same starter relay or pump, they can be combined.

Reset Complete (Switch Detect)/Slow Flow

The Reset Complete/Slow Flow is a 115 VAC (230 VAC International) output which is used to indicate that the reset process is complete and the dispensing unit is ready to dispense product. It may also be used in applications where control of a remote slow flow valve (satellite) is required. Two lines are provided for twins. This line must be capped when not in use.

Fast Flow

This is a 115 VAC (230 VAC International) line that can be used to control a remote fast flow valve (satellite). It is present only in units with two stage solenoid valves. This line is not normally used and is not connected at the factory. Two lines are provided for twins.

Phase 2 Feed

The phase 2 feed is a hot feed which is the opposite phase of the pump motor feed. This line and the pump motor feed are used for 230 VAC motor applications. The Phase 2 Feed should be switched through a separate relay to prevent false triggering of the authorization signal.

Slow/Fast Satellite Returns

These lines are used only in units that come equipped with satellite piping. They are used in applications where the dispenser and satellite may not dispense product at the same time. These lines are not connected internally as they leave the factory. Four lines are provided for twins.

Light Feed

The Light Feed is a 115 VAC input required to power the fluorescent lights. In a site configuration using multiple dispensers (or pumps), the power for the lights of up to 8 units can be supplied by one breaker. It is recommended that this be on a separate breaker from the Micro/Heater Feed to reduce electrical noise and allow for separate control of the lights.

Light Neutral

The Light Neutral is a return line for AC current from the lights to the breaker panel. When a separate breaker is not used to control the lights, the light neutral is attached to the Micro Neutral.

Pulser

When the dispensing unit includes the optional pulser interface, a pulser output is provided. This pulser output provides a DC output to indicate the quantity dispensed. This is an open collector output. This output can sink up to 100 milliamps DC at voltages up to 24 VDC. The pulse rate can be configured by a sealable DIP switch. For possible pulse output rates, refer to MDE-4334 Atlas Start-up/Service Manual. An additional output is provided for a twin. A DC ground line from the Series 1000 should be connected to the DC ground line provided from the electronic register. These lines must be capped when not in use.

🕂 WARNING

The Series 1000 Pump Control PCB must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to set the Pump Control PCB jumpers properly will damage the Series 1000 system.

Pulser Wiring Diagrams



Figure 4-3: V-R Reed Switch Pulser, 1871 Series 10:1





Pulser Wiring Notes

- All pulsers above are shown connected to hose 1.
- Jumpers on the Pump Control PCB must be properly jumpered according to the pulser type. This should be done by the person performing the start-up. Power to the system must not be turned on prior to this set-up.
- Refer to "Conduit Layout" on page 13 for detailed system installation specifications.
- 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:

Specification	Description
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 (Part Number 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.

Single Suction Pump 115 VAC/230 VAC, V-R Reset



Figure 4-5: Single Suction Pump 115 VAC/230 VAC, V-R Reset

Twin Suction Pump 115 VAC/230 VAC, V-R Reset



Figure 4-6: Twin Suction Pump 115 VAC/230 VAC, V-R Reset

Twin Suction Pump, Single Motor 115 VAC/230 VAC, V-R Reset



Figure 4-7: Twin Suction Pump, Single Motor 115 VAC/230 VAC, V-R Reset

Single Dispenser, V-R Reset





Twin Dispenser, V-R Reset





Single Suction Pump 115 VAC/230 VAC, Gasboy Reset



Figure 4-10: Single Suction Pump 115 VAC/230 VAC, Gasboy Reset

Note: Units with two motors may require pump to be operated at 240 VAC to limit the AC current required.

Twin Suction Pump 115 VAC/230 VAC, Gasboy Reset



Figure 4-11: Twin Suction Pump 115 VAC/230 VAC, Gasboy Reset

Twin Suction Pump, Single Motor 115 VAC/230 VAC, Gasboy Reset



Figure 4-12: Twin Suction Pump, Single Motor 115 VAC/230 VAC, Gasboy Reset

Single Dispenser, Gasboy Reset





Twin Dispenser, Gasboy Reset



Figure 4-14: Twin Dispenser, Gasboy Reset

9850A, 9852Q, 9853Q Pumps



Figure 4-15: 9850A, 9852Q, 9853Q Pumps

- Notes: 1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) Model 9850 must be wired for 240 VAC pump motor.
 - 4) The wire colors may vary. Refer to current pump wiring diagrams.
 - 5) When used with an aboveground tank, the anti-siphon valve mounted on the tank must be driven from the EXTERNAL VALVE line, have the same operating voltage as the pump motor, and the current draw must not exceed 1 Amp. If these conditions are not met, it must be controlled by an external relay driven from the EXTERNAL VALVE line. Do not connect the anti-siphon valve or external relay to the RESET COMPLETE line. Do not connect two or more EXTERNAL VALVE lines together. If more than one pump is drawing from the tank, separate anti-siphon valves must be installed, or each EXTERNAL VALVE line must operate an external relay which then operates the valve.

9852QTW2, 9853QTW2, 9853QTW1M Pumps



Figure 4-16: 9852QTW2, 9853QTW2, 9853QTW1M Pumps

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) The wire colors may vary. Refer to current pump wiring diagrams.
 - 4) When used with an aboveground tank, the anti-siphon valve mounted on the tank must be driven from the EXTERNAL VALVE line, have the same operating voltage as the pump motor, and the current draw must not exceed 1 Amp. If these conditions are not met, it must be controlled by an external relay driven from the EXTERNAL VALVE line. Do not connect the anti-siphon valve or external relay to the RESET COMPLETE line. Do not connect two or more EXTERNAL VALVE lines together. If more than one pump is drawing from the tank, separate anti-siphon valves must be installed, or each EXTERNAL VALVE line must operate an external relay which then operates the valve.

9853AHC, 9840Q Pumps





- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) The wire colors may vary. Refer to current pump wiring diagrams.

9852QTW1 Pump



Figure 4-18: 9852QTW1 Pump

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units. Two assemblies required for twins.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) The wire colors may vary. Refer to current pump wiring diagrams.
 - 4) When used with an aboveground tank, the anti-siphon valve mounted on the tank must be driven from the EXTERNAL VALVE line, have the same operating voltage as the pump motor, and the current draw must not exceed 1 Amp. If these conditions are not met, it must be controlled by an external relay driven from the EXTERNAL VALVE line. Do not connect the anti-siphon valve or external relay to the RESET COMPLETE line. Do not connect two or more EXTERNAL VALVE lines together. If more than one pump is drawing from the tank, separate anti-siphon valves must be installed, or each EXTERNAL VALVE line must operate an external relay which then operates the valve.

9852QX, 9853QX, 9840QX, 9850AX, 9850AXS Dispensers



Figure 4-19: 9852QX, 9853QX, 9840QX, 9850AX, 9850AXS Dispensers

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) If using the SUBM PUMP DRIVE in place of the SUBM STARTER DRIVE to control the submersible for this unit, connect the SUBM PUMP DRIVE lines through the "B" contacts of the Series 1000 in place of the SUBM STARTER DRIVE lines. Be sure to leave the SUBM STARTER DRIVE lines capped.
 - 4) The wire colors may vary. Refer to current pump wiring diagrams.

5) When multiple dispensers are used to control a common submersible starter relay or pump, and the 9800 is controlled (authorized) through the Control/Subm Feed line (as in the case of some fuel management systems), it is important that the lines from the 9800 to the submersible equipment be isolated from each other. This can be accomplished by running the submersible control lines through a secondary set of relay contacts in the fuel management system. If a secondary set of contacts is not available, external control relays must be used between the 9800 and the submersible starter relay or pump. Another option is to provide a separate submersible starter relay for each hose outlet. In no case can the submersible drive lines from the 9800 be tied together.

9850AXTW1, 9850AXTW2, 9852QXTW1, 9852QXTW2, 9853QXTW1, 9853QXTW2 Dispensers



Figure 4-20: 9850AXTW1, 9850AXTW2, 9852QXTW1, 9852QXTW2, 9853QXTW1, 9853QXTW2 Dispensers

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units. Two assemblies required for twins.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.
 - 3) If using the SUBM PUMP DRIVE in place of the SUBM STARTER DRIVE to control the submersible(s) for this unit, connect the SUBM PUMP DRIVE lines through the "B" contacts of the Series 1000 in place of the SUBM STARTER DRIVE lines. Be sure to leave the SUBM STARTER DRIVE lines capped.
 - 4) The wire colors may vary. Refer to current pump wiring diagrams.
 - 5) When multiple dispensers are used to control a common submersible starter relay or pump, and the 9800 is controlled (authorized) through the Control/Subm Feed line (as in the case of some fuel management systems), it is important that the lines from the 9800 to the submersible equipment be isolated from each other. This can be accomplished by running the submersible control lines through a secondary set of relay contacts in the fuel management system. If a secondary set of contacts is not available, external control relays must be used between the 9800 and the submersible starter relay or pump. Another option is to provide a separate submersible starter relay for each hose outlet. In no case can the submersible drive lines from the 9800 be tied together.

9820, 115/230 VAC Domestic Dispensers



Figure 4-21: 9820, 115/230 VAC Domestic Dispensers

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.

9820, 230 VAC International Dispensers



Figure 4-22: 9820, 230 VAC International Dispensers

- Notes:1) The power resistor assembly is 8.2K OHM, 10 W (Part Number C05818) for 115/230 VAC domestic units and 30K OHM, 10 W (Part Number C06683) for 230 VAC international units.
 - 2) Before applying power, the Series 1000 Pump Control PCB jumpers must be set for Series 9800/9820 as described in C08921 Series 1000 Start-up Manual. Failure to properly set the jumpers will damage the Series 1000 system.

Gasboy Gate System Control Wiring



Figure 4-23: Gasboy Gate System Control Wiring

- Notes:1) The Series 1000 Gate System will only directly switch 115 VAC (3/4 HP max.). If your gate uses a different control voltage (12 V, 24 V, and so on) or exceeds 3/4 HP max. rating, an auxiliary mechanical relay with a 115 VAC solenoid coil must be used to switch the control voltage to the gate.
 - 2) There are no connections made to the Pulser/Reset complete terminal block.
 - 3) The Series 1000 allows a loadable timeout value (1-255 seconds) during which it keeps the gate relay energized. The selected time depends on the gate manufacturer's specification.
 - 4) After the initial relay closure, the remainder of the gate opening and closing is dependent upon the gate electrical system.
 - 5) As shown, the first pump power position is used for gate control.

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5 – Communication Wiring

Requirements

The Series 1000 System has two ports 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.

The Series 1000 offers an optional auxiliary port PCB (2 ports) used for communication from a tank monitor through the Series 1000 System to the peripheral device attached to Port 1 or Port 2. The auxiliary ports may be set up for RS-232 or RS-422 communication.

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 and the appropriate interconnect cable. RS-422 wiring is capable of running up to 1500 feet. It can be used for distances under 100 feet in place of RS-232 wiring. Other advantages of RS-422 are its high noise immunity and the exceptions allowed to normal conduit requirements. Refer to "Short Haul Modem - RS-422" on page 58.

Installation Notes

- 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.
- All peripheral equipment connected to the RS-232 ports must be UL-listed, have an Electronics Industry Association (EIA) standard RS-232 communications protocol and not be installed over a hazardous location.

- Power The AC power for the peripheral equipment must be on a separate circuit breaker (which can be the same breaker used to supply the system power).
- Distance

1-100 Feet	RS-232 Direct-connect
101-1500 Feet	RS-422 and Gasboy Short Haul Modem required. Refer to "Short Haul Modem - RS-422" on page 58.

• RS-232

Conduit

RS-232 wires over 15 feet must be installed in a metal conduit separate from any AC wires.

Wire

Cables can be purchased from Gasboy or made by the installer. When making cables, wire used must be stranded, not solid core.

- RS-232
 - 22-gauge for use with RS-232D connectors
- 18-gauge for use with the Gasboy RS-232 termination box
- For RS-422 requirements, refer to "Short Haul Modem RS-422" on page 58.
- Setup Instructions for the proper setup of the communication ports can be found in the Start-up Manual. This setup should be done by the person doing the start-up of the system. The system power switch must not be turned on prior to the proper setup of these ports.

Cables

The drawings on the opposite page show the pin-to-pin layout of the RS-232 termination box, the EIA 1:1 cable, and the modem cable.

RS-232 Termination Box

This unit can be purchased from Gasboy 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-gauge wire.

Figure 5-1: Termination Box - Gasboy Part Number C05769

1	3
2	5,6
3	2
4	2
5	
TERMINAL BLOCK	RS232 FEMAL CONNECTO

EIA 1:1 Cable

This cable can be purchased from Gasboy or made by the installer. It is generally used when communicating from a printer terminal to an RS-232 termination box or a modem.

Figure 5-2: EIA 1:1 Cable - Gasboy Part Number C04549



Modem Cable

This cable can be purchased from Gasboy or made by the installer. It is generally used when an external modem is connecting with an RS-232 termination box or a short haul modem.

Note: Cables supplied by Gasboy for these part numbers are eight feet long.

Figure 5-3: Modem Cable - Gasboy Part Number C04532



RS-232 Cable Assembly





Field Wiring Schemes for Ports 1 and 2

The wiring diagrams on the next few pages show the various wiring schemes that are available on the Series 1000. Each port may be wired for any of the wiring schemes provided that the installation requirements are met as outlined in "Requirements" on page 51. The diagrams on this page show Port 1 connected to a printer or printer/CRT combination while Port 2 is connected to an external modem or PC. For specific information on connecting a Link CRT terminal and an Okidata[®] printer, refer to "Wiring for Link CRT Terminal and Okidata Printer" on page 57. The diagrams on the next page show auxiliary port wiring for a Veeder-Root TLS Tank Monitoring System.









Figure 5-7: RS-422 - Gasboy Short Haul Modem



Figure 5-8: RS-422 - Gasboy Short Haul Modem with C08159 Surge Protector



Auxiliary Port Wiring





Figure 5-10: RS-422 - Gasboy Short Haul Modem to Veeder-Root TLS



Wiring for Link CRT Terminal and Okidata Printer

The following diagram shows the connections between the Series 1000 port and the Link CRT terminal and Okidata printer.





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.

The Gasboy internal modem (Part Number C05739) is a Bell 103J/212A compatible answer modem. It is designed for 0-300 or 1200 baud, full duplex, asynchronous communication. The modem is mounted inside the Gasboy system at the factory. Power for the modem is supplied by the Gasboy system.

When using Gasboy PC1000 for Windows®, a 9600 baud modem (Part Number C07530) is available.

The Gasboy internal 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 a phone company. The customer is required to order this phone jack and have it installed in the Gasboy system's post.

To order this equipment from a phone company, specify:

- Any one of the following jacks RJ11C or RJ41S or RJ45S.
- The registration number of 6BHUSA-24793-DT-E.
- The data transmission rate of 0 300 or 1200 baud.
- The Bell equivalent of 103J/212A.

Short Haul Modem - RS-422

A Gasboy Short Haul Modem and the appropriate interconnect cable must be used when the RS-422 communication mode is being used. It should be used for distances between 100 and 1500 feet. It can be used for distances under 100 feet in place of RS-232 wiring. One Short Haul Modem is required at the remote end of the communication wiring. Refer to "Field Wiring Schemes for Ports 1 and 2" on page 54 for wiring diagrams.

Installation Requirements

- All wiring is to be installed and used in accordance with all building/fire codes, all Federal, State, and Local codes, National Electrical Code (NFPA 70), NFPA 30, and Automotive and Marine Service Station Code (NFPA 30A) codes and regulations. Wiring must also conform to the wiring diagram supplied with the pump/dispenser. Canadian users must also comply with the Canadian Electrical Code.
- Power: The AC power for the short haul modem should come from the same breaker that supplies the peripheral device or the system.
- Cable: Twisted pair shielded cable is highly recommended for RS-422 wiring. Although it is recommended that 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:

Specification	Description
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 600 V
Environmental	Gas- and oil-resistant; suitable for wet or dry locations.

Gasboy can supply Belden 1063A (Part Number C09655) which is a UL-listed, 4conductor cable that meets the requirements listed above.

Note: Belden 1063A is UL-listed but not CSA-listed.

Cable with a voltage rating of less than 600V must be installed in a conduit separate from all AC wires. These modems must be connected with private lines and will not work if connected into a telephone network.

- Conduit: When using the recommended shielded twisted-pair cable described above, RS-422 wires can be run with AC wires in metal conduit. The shield drain wire must be connected to the system AC ground. Only AC wires for the system and pumps can be installed in the AC conduit. Do not run the cable outdoors without the use of metal conduit. Do not run this cable overhead, outdoors. The cable can be run indoors without the use of metal conduit. The shield drain wire must be connected to the system AC ground. If using cable other than that recommended above, the RS-422 field wires must be installed in a metal conduit separate from any AC wires.
- Distance: The maximum field wiring cable length is not to exceed 1500 feet.

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. The RS-232 wiring configuration may be used whenever the distance from each unit to the SPS is less than 100 feet. The RS-422 wiring configuration must be used whenever distances are between 101 to 1500 feet, and requires the use of a Gasboy Short Haul Modem (Gasboy Part Number C05618). Follow all wiring requirements and installation notes listed in the beginning of this chapter. The SPS must be connected to Port 1 of the FleetKey/Series 1000 because it is the only port that supports direct printout or logger functions. The SPS is available as a 2 port kit Gasboy Part Number C09360 or a 4 port kit Gasboy Part Number C09361 which includes the appropriate SPS and proper number of associated cables. The cables have an identifying tag at one end, which is also the end that must be connected to the SPS. If the cable is reversed, communication will be blocked. The SPS is used with the standard factory jumper selections. JP1 and JP3 are jumpered, JP2 and JP4 are not jumpered. Connection and cabling diagrams are shown below and on the following page.

SPS Connections





Figure 5-13: RS-232 Wiring



Note: The SPS TS-201 is being used with factory default settings: JP1 and JP3 jumpered, JP2 and JP4 not jumpered. The SPS must be connected to Port 1 of the FleetKey/Series 1000 because it is the only port that supports direct printout or logger functions.

SPS Cabling

Note: All Gasboy-supplied cables are eight feet long.

Figure 5-14: SPS Printer Cable - C05166



Figure 5-15: SPS Port Cable - C05165







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6 – Testing

Completion Checklist

The information below will help verify proper installation of the Series 1000 System. Review it before testing the pumps and/or dispensers in the manual, override position.

- 1 Is there adequate clearance around the Series 1000? (Refer to "Component Location" on page 9).
- 2 Is the optional data terminal located in a clean, office-type environment? (Refer to "Component Location" on page 9).
- **3** Is the optional external modem located in an office-type environment or a protective enclosure? (Refer to "Component Location" on page 9).
- 4 Is all the wiring in metal conduit? (Refer to "Conduit Requirements" on page 14). The only exception to the metal conduit rule is RS-422 as noted in "Communication Wiring" on page 51.
- 5 Is the AC and DC wiring in separate conduits, troughs, and so on (except as noted in "Pulser Wiring Notes" on page 29 and "Installation Requirements" on page 58).
- 6 Is the system/peripheral equipment on a separate dedicated breaker? (Refer to "Power Requirements" on page 18).
- 7 Is the system grounded properly? (Refer to "Power Requirements" on page 18).
- 8 Are pumps over 3/4 HP at 115/230 VAC equipped with a starter relay? (Refer to "Power Requirements" on page 18).
- 9 Is the correct gauge wire installed for the:
 - System? ("Wire Size" on page 20)
 - Pumps? ("Wire Size" on page 20)
 - Dispensers? ("Wire Size" on page 20)
 - Pulsers? ("Wire Size" on page 20)
 - Communication lines? ("Requirements" on page 51)
- Are the communication lines under the maximum allowable distance. RS-232: 100 feet, RS-422: 1500 feet except as noted in "Installation Notes" on page 51 and "Short Haul Modem - RS-422" on page 58.
- 11 If the system has an external modem, is the phone line installed? ("Internal Modem" on page 57)
- **12** Is there fuel in the tanks?

Manual Override Test

Upon completion of the system wiring, the pumps and/or dispensers should be tested to verify that the AC wiring is correct. Do not turn on the system power during these tests. The appropriate procedure for testing and the expected results is provided below. Should any of these tests fail, the wiring should be corrected and the test must be performed again.

To perform the Manual Override Test, proceed as follows:

- 1 Turn off all the system override switches.
- 2 Turn on the breakers for all the pumps/dispensers.
- 3 Place the system override switch, located in the pedestal, for hose 1 in the MANUAL position.
- **4** Turn on hose 1. After completing the reset procedure, the hose should be able to dispense the product.
- 5 Turn on all other hoses. No other hose besides 1 should be active.
- 6 Turn off all hoses.
- 7 Place the system override switch, located in the pedestal, for hose 1 in the OFF position.
- 8 Repeat steps 3 to 7 for all remaining hoses. Substitute the hose under test for hose 1.

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