System Description and Specifications

HI10000

HI10000 Fertilizer Injection System precisely monitors and controls fertilizer concentrations and pH for all types of hydroponics, greenhouse and field agricultural irrigation applications. Unlike flow-driven systems of the past, the Hanna Fertigation System continuously measures the actual EC and pH of the flow-through, and precisely adjusts the concentration of fertilizer into the system. The Hanna Fertigation System is a bypass system which will not interfere with main line flow and thus does not impede line flow or pressure. This unit will accurately inject fertilizer in flow rates ranging from 1GPM to 400GPM (depending on model).

HI8000 Series Controller included with the system has 10 programs that allow the user to set various EC and pH values for a variety of plants. Each system allows the injection of 4 fertilizers and 1 acid. If preferred, each fertilizer injector can be set to a specific percent, allowing customized fertilizer mixtures.

The HI10000 controls 32 irrigation valves (either sequentially or in groups of 2, 3, up to 4 at once) for complete automation of the Irrigation process. Programs can be triggered by time, external switching, and/or flow, (e.g. spot watering - timer adjustable). HI8000 is also capable of controlling an external agitator, handy for mixing fertilizer solutions. A backflow control allows the filtration system to be flushed and cleaned. Alarm controls and redundant monitoring help reduce error and unexpected events. This system can be synchronized with customized software which allows for remote monitoring and control from a PC.

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HI10000 Specification Summary

EC and pH driven functionality with advanced Auto Tuning PID control, 4 Independent, high speed injector assemblies, 10 Programmable recipes,

32 Zone Control Outputs, Time or Volume Control, PC interface software package. Custom systems can be produced with up to 7 independent injectors with dual controller assembly.

Specification

Range	EC: 0.0 to 10.0 mS/cm; pH: 0.0 to 14.0
Resolution	0.1 pH / 0.1 mS/cm
Accuracy	EC: ±0.078 mS/cm; pH: ±0.0546
Typical Inputs	3 EC (Conductivity Probes), 2 pH Electrodes, 4 Fertilizer Tank Level, 1 pH Tank Level, 5 External Tank Trigger, 1 Mix Tank Level, 2 Differential Pressure, 1 Irrigation
Typical Outputs	2 non-consent alarms, 32 zone valves, 2 filter flushing, 1 pump, 1 agitator, 4 Independent Fertilizer Injectors, 1 pH Injector
Control Type	Advanced Auto Tuning PID
Max. Injector Suction	Large Venturi = 780 l/h, Small Venturi= 280 l/h
Irrigation Capacity	32 Zones (24VAC 0.5 Amp Solenoid Valves)
Irrigation Control	Time/Volume Control, 1 to 6 selectable timetables per program,
Readout	20-digit, 4 level LCD with graphic symbols and messages
Program Method	With keypad or through a PC using proprietary software
Alarms	Dual Alarm Settings for redundant shut down capability plus third external independent EC safety system
Controller Power Requirements	115V/220V; 50Hz/60Hz, 5 Amp
Circulator Pump/Solenoid Array Power Requirements	208/240, 3 phase, 30 Amp Breaker
Circulator Pump	End Suction Centrifugal 208/240 VAC, 3Phase, 1 to 2.0 HP (exact size dependent on design specifications)
Transformer	400VA, 16AMP Capacity, 208/240 - 24 VAC
Electrical Panel Assembly	Equipped with high voltage breaker arrays, 24 amp, pump motor starter with thermal protection, 32 fused zone contacts, EC safety system, Electrically Latched, Thermal Safety Switch (@ 40 C)
Dimensions	L = 46.5, W = 30.75, H = 70.0 (inches)
Operating Temperature	40F to 95F Recommended

Electrical and Plumbing Requirements:

Electrical

Controller Power Requirements	115V/220V; 50Hz/60Hz, 10 Amp, 4 outlet box recommended
Circulator Pump/Solenoid Array Power Requirements	208/240, 3 phase, 30 Amp Breaker

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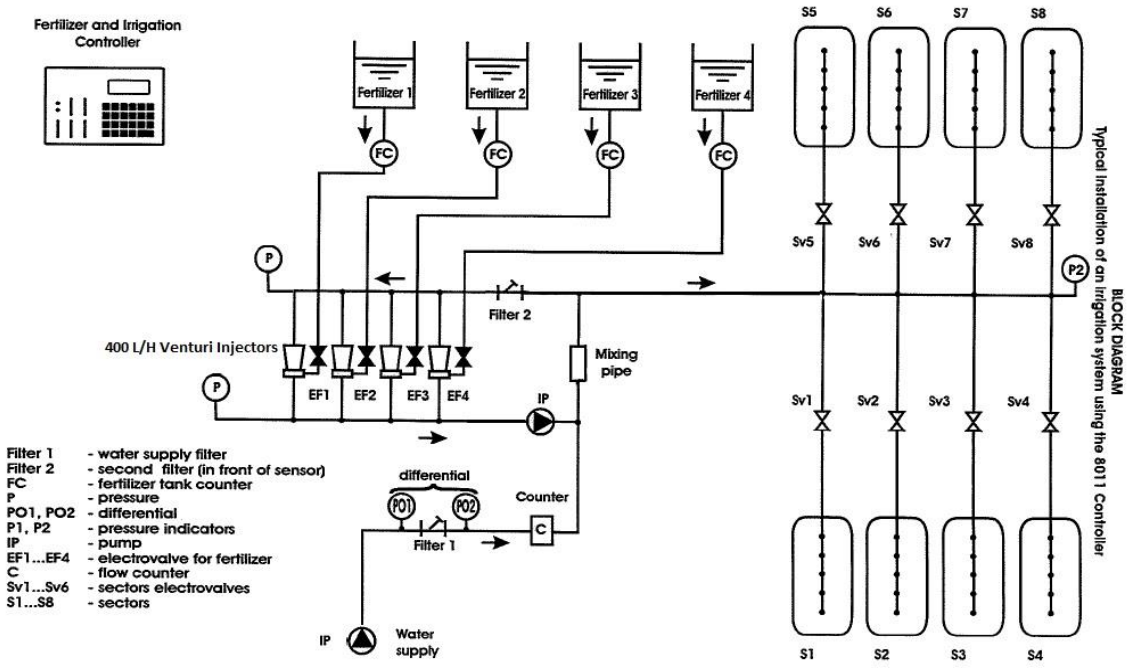
Plumbing

Pressure Requirement (PSI)	Maintained at fixed pressure between 50 to 65 PSI
Minimum Flow Rate	1.0 GPM
Maximum Flow Rate	350+ GPM (dependent on various factors)
Pipe Type Recommendations	Schedule 40 or 80 PVC
Min Pipe Diameter Recommendation	1.25 inch (1 inch for HI10000 (Low Flow))
Straight Run Requirement	10 diameters of straight run prior to system connection, 5 diameters after, (downstream).
Fertigator In/Out Connections	2 x 8 bolt, 4 inch flange fitting with gaskets

Site Prep Requirements

Housing	It is strongly suggested that the Fertigator be housed in an enclosure/structure that will protect the system from the direct effect of various weather conditions and allow the system to operate within the suggested Working Temperature Range (See Specifications)
Footing / Base	Concrete Slab of equivalent (see specifications for dimensions)

Direct Injection Configuration Diagram



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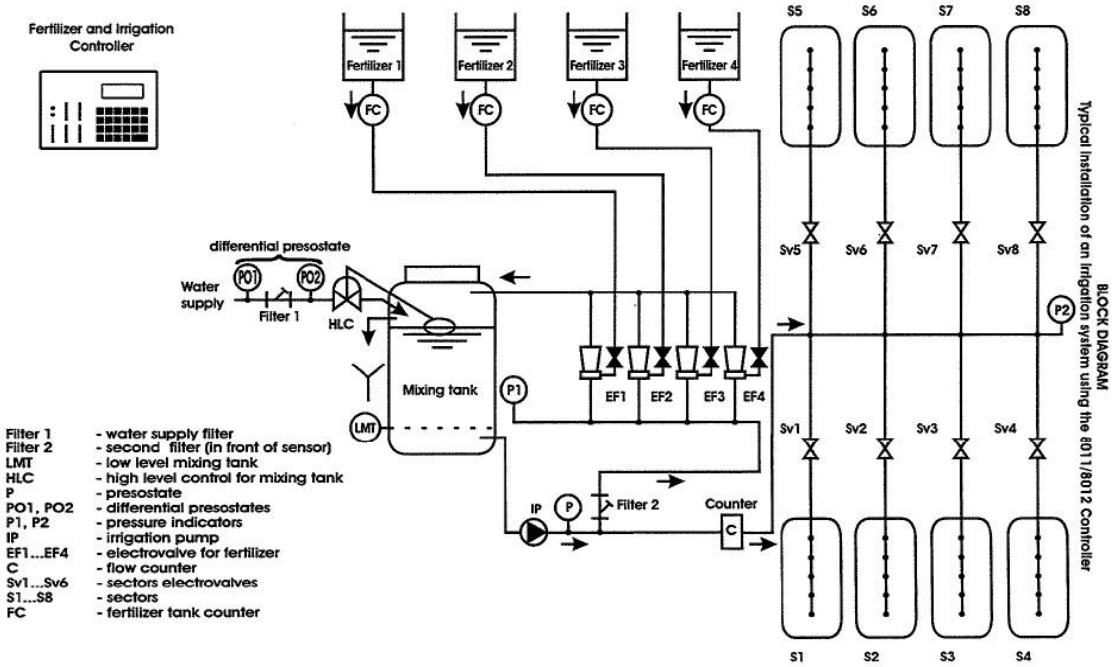
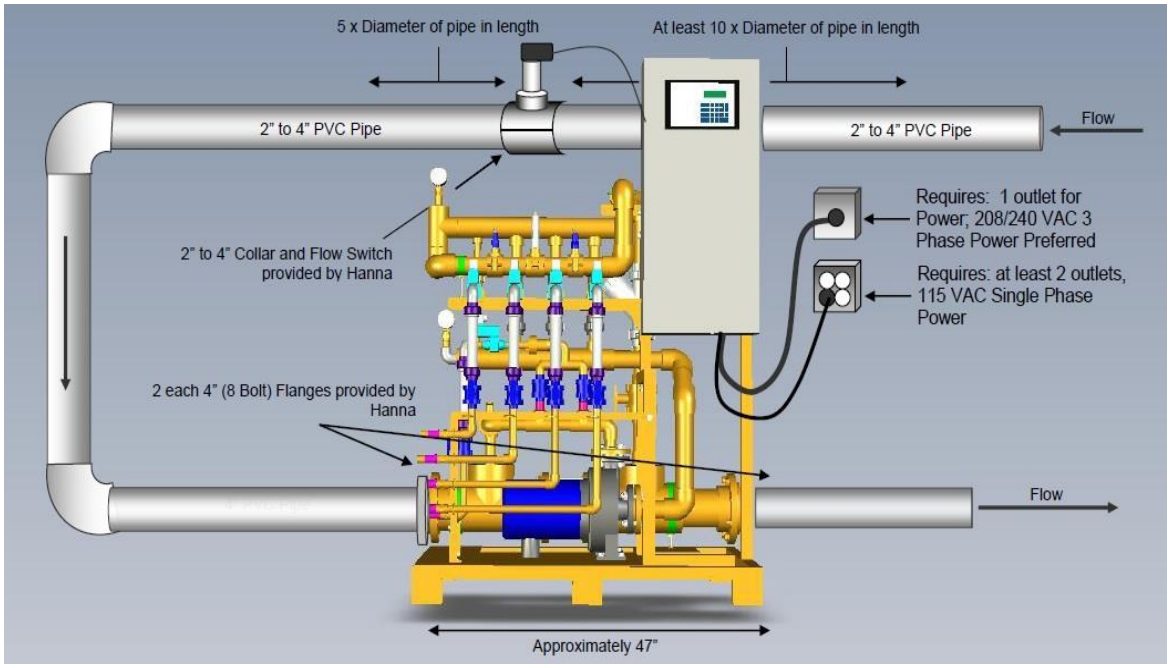
Circulation Tank Injection Configuration Diagram



Fertigator Installation Diagram



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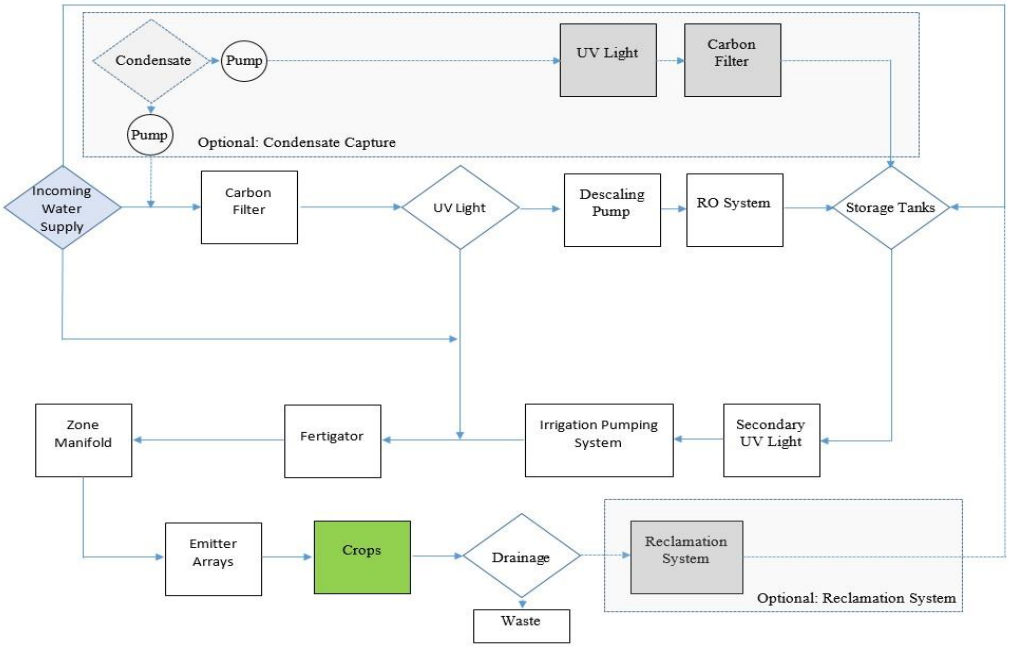
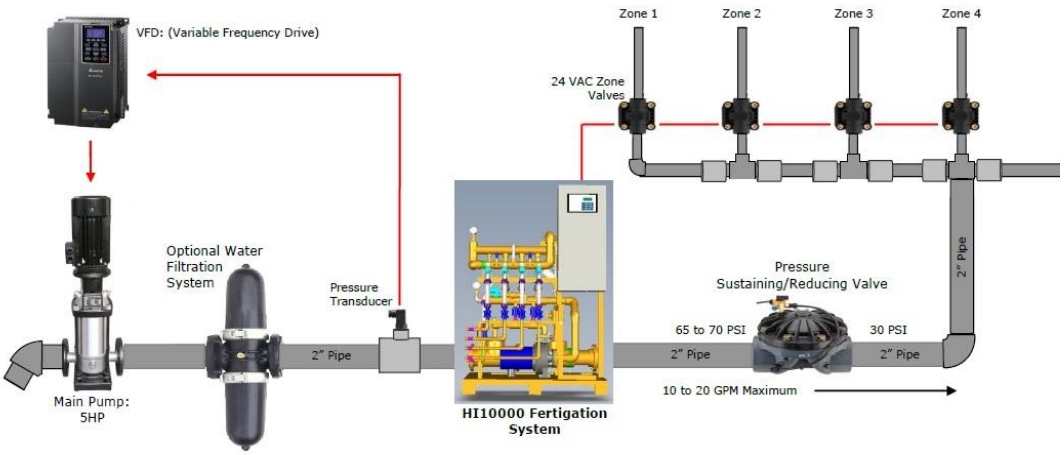
Client Responsibilities:

Electrical and Plumbing Requirements	All electrical and plumbing systems must be complete, in place and functional at the time of installation. (Factory installation optional). See Electrical and Plumbing Requirements
Flange Connections	Client supplies and installs 2 x 8 bolt, 4 inch flange fittings and gaskets
System Plumbing Connections to Fertigator	Client supplies and installs all Plumbing connections and fittings to and from the Fertigation system
Stock Tanks	Client supplies all stock tanks designated to contain fertilizers, acids, and/or reagents of any type.
Tubing and Connections	Client supplies all connectors, valves and tubing used to connect tanks and external containers to Fertigator
Filters	Client supplies external Filtration System(s) and/or stock tank filters
External Sensors	Client supplies external Sensors such as level, solar radiation, moisture, etc. that connect to Fertigator
Zone Valves	Client supplies and installs all 24 VAC zone valves and is required to run wiring to electrical cabinet for termination by installer (factory installation optional)

Typical Irrigation System Flow Chart



Fertigation/Irrigation System Installation



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Invoice Procedures: NET 30 Terms and Conditions

Requirement: Customers must complete the Hanna Instruments Customer Agreement and Credit Application for approval of Net 30 Terms.

- Ordering & Pricing: There is no minimum order requirement.
- Freight: All shipments are F.O.B. Destination. Shipments will be made by best service carrier or under special terms and specified by the customer, who assumes any additional costs.
- Terms & Payments The Customer must supply credit information satisfactory to the Manufacturer. Payment terms are 50% due upon shipment of the unit with the balance due Net 30 days from the date of Customer installation. Payment is contingent upon Customer acknowledgment, in writing, that the Hanna Fertigation System has met all expectations and functional requirements following installation. The Installation Site must meet functional and physical requirements in accordance with Hanna Installation Agreements and on-site inspection by Hanna Technician prior to the beginning of installation. Installation fee(s) are non-refundable. Non-credit approved customers may order COD at the discretion of the Manufacturer.

Invoice Procedures: Standard Terms and Conditions

- Ordering & Pricing: There is no minimum order requirement.
- Freight: Shipments will be made by best service carrier or under special terms and specified by the customer, who assumes any additional costs. Shipping costs are estimated and finalized prior to shipment. Customer is responsible for shipping and handling fees which must be paid prior to shipment of the product (HI10000)
- Terms & Payments HI1000: Payment terms are 50% of total sales order amount due upon placement of order. Deposit amount must be received, verified and deposited prior to initiation of production. Once initial deposit is received all costs associated with production and/or the purchase of raw materials are applied to the deposit amount and are non-refundable. Balance of Sales Order is due upon shipment of the unit. The Installation Site must meet functional and physical requirements in accordance with Hanna Installation Agreements and on-site inspection by Hanna Technician prior to the beginning of installation. Installation fee(s) are non-refundable.
- HI10000 Fertigation System Purchases require invoice paid in full prior to shipment of the system.

Warranty Terms and Conditions

Hanna products are manufactured in our ISO 9001:2008 facilities, meeting the highest quality standards in the industry. Hanna's high standards also apply should a product be returned due to defects in material or workmanship.
Limitations: Warranted products may be returned for repair or replacement only at the discretion of Hanna Instruments, USA.
The Warranty period commences from the original date of installation or a maximum of 30 days from date of shipment from factory; whichever comes first. This Warranty policy is non-transferable. Warranty is valid only when the product is used under normal conditions and in accordance with operating limitations and prescribed maintenance procedures.

NOTE: Special Custom Builds are covered under warranty for defects in material or workmanship only and will not be replaced or credited if it is determined by customer and/or Hanna Technical Staff, upon receipt of the product that the system will not or no longer fit (satisfy) customer prerequisites. Custom builds cannot be returned for credit or refund.

This warranty does not cover any form of abuse, lack of care for the equipment or negligence of any kind. Hanna Instruments Applications Engineer or Technical Staff will render judgment in cases where abuse or negligence are in question. Should Hanna Instruments incur any costs related to a warranty claim that is determined to be related to abuse, lack of care or negligence of any kind, all costs related to the determination of abuse, lack of care or negligence will be billed directly to the party/parties who placed the warranty claim. Should a warranty claim be placed after the warranty period has expired, all costs related to returning the equipment to like-new status such as but not limited to: travel, lodging, meals, rentals, parts, labor, shipping etc. will be invoiced directly to the party/parties. In the performance of non-warranty

work and the billing therefore, Hanna Instruments will make a reasonable effort to keep all non-product related costs i.e. travel etc. to a minimum. Work orders for all warranty and non-warranty jobs will be scheduled by Hanna Instruments on a priority basis. Hanna Instruments Application Engineers or technical Staff will make every effort to resolve the problem via phone. Should a visit to the customer's site be required, a $500.00 deposit by credit card or advanced payment is required. The deposit may be applied to any possible invoice for services or refunded if the problem is determined to be a legitimate warranty claim. The express warranty stated previously is the only express warranty given by Hanna Instruments to the end-user buyer. Hanna expressly disclaims any warranties implied by law, including but not limited to warranty of merchantability of fitness for a particular purpose. Hanna shall not be liable for any individual or consequential damages of any kind for breach of any warranty, negligence, on the basis of strict liability or otherwise.
Highlighted below is a general time frame of warranties for the Products and Components associated with this Warranty Policy. For any clarification or questions about a particular product then please contact your local Hanna representative for specific warranty information.

Length of Warranty	Coverage Description
2 years	HI8001-0400U Controller, HI98143-22 Isolated Transmitter(s)
2 years	All PVC related components and Venturi Injector Assemblies (5).
3 years	Electrical Components housed within Hanna manufactured Assemblies only; Including Solenoid Valves, Relays, Motor Starter Contactors, Transformers, Breakers, Fused Connections, Switches and electrical components associated with Hanna Control Panel operation.
6 Months	EC probes (HI3001) and pH Electrodes (HI1006-2005).
N/A	On-Site Service is NOT COVERED by standard warranty policy. Service visits are assessed and billed separately.
1 Year	Main Circulator Pump

Technical Support Services

Phone, email and Web Based Support is provided free of charge for the life of the Fertigation System.

Instrument Service

Warranty and non-warranty service, replacement, calibration and repairs are performed by factory trained service technicians at one of Hanna's Technical Service Centers worldwide. All items must have a Return Goods Authorization (RGA) number that can be obtained by contacting the Hanna Technical Service Department. The RGA number should be clearly marked on the outside of the box and the unit shipped prepaid and insured. Any product not bearing an RGA number will be refused. All products returned for warranty repair or replacement MUST be preceded or accompanied with proof of purchase, such as the original invoice or packing slip. Under special circumstances it may be deemed necessary by Hanna to issue a Return In Advance (RIA). In such cases, the defective materials must be returned to Hanna within 30 days. Materials not returned within 30 days become chargeable. Materials must be packed properly to avoid damage during transport, which would render the warranty null and void. The sender is responsible for expediting any damage claims placed against the carrier.

In most cases, a flat minimum service charge applies to non-warranty repairs or recalibration. Please contact your local Hanna Technical Service Department for current rates. Any materials returned for repair which are considered non-warranty may be serviced at hourly cost (excluding parts) following subsequent notification and approval of such.

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Returning Merchandise

Should an instance occur when a product may need to be returned for exchange or credit, or should a discrepancy occur in a packing slip; Hanna must be contacted to obtain a Return Goods Authorization (RGA) Number. Please follow these steps:

1. Within 30 days of receipt of merchandise call Hanna's Technical Service Department to obtain a RGA number.
2. Hanna will issue a Return Goods Authorization Number.
3. The number must be clearly marked on the outside of the package being returned. Shipments without a RGA Number will be refused.
4. Credit returns may be subject to a 25% restocking fee.

Terms and Conditions

Return shipments must meet the following requirements to be accepted for credit:

1. Products must be returned in the original packaging with labeling not defaced. All items returned will be inspected for credit worthiness.
   Credit will only be issued for product returned in like-new condition. No credit will be issued for product, which is not received in like-new condition.
2. All freight charges are the responsibility of the customer.
3. All chemicals and reagents being returned must be packaged in accordance with the laws and regulations of the governing country. Only unopened chemicals and reagents may be returned.

Hanna instruments® reserves the right to change or modify the design of its products at any time without advance notice.

Other Terms and Conditions

1. PARTS AND SHOP LABOR INCLUDED ON ESTIMATES. UNLESS OTHERWISE SPECIFIED, NO ON SITE LABOR, TRAVEL EXPENSES, OR SHIPPING COSTS INCLUDED.
2. INJECTION: Pending water sample; additional equipment may be required NOT included on estimates.
3. ALTERATION: Any alteration or deviation from estimate or specifications involving extra costs will become an extra charge over and above the estimate/sales order. All agreements are contingent upon delays beyond our control.
4. SHIPPING: Any applicable shipping charges will be included on the final invoice.
5. ENGINEERING: If an engineer's approval and/or any modifications are required by any federal or state agencies, all costs incurred will be the customer's responsibility and/or will be added to the final bill or invoiced separately.
6. SYSTEM COMPONENTS: Verification and approval via signature is required regarding all components including but not limited to pumps, VFD, filters, tanks, light, emitters, and special order (non-Hanna) parts listed on estimate and sales order. Custom items are made-to-order and cannot be returned.
7. PAYMENT TERMS: Payment terms are 50% of total (sales order) amount due upon placement of order. Deposit amount must be received, verified and deposited prior to initiation of production and/or ordering of materials. Once initial deposit is received, all costs associated with production and/or the purchase of raw materials are applied to the deposit amount and are NON-REFUNDABLE. Balance of Sales Order is due upon shipment of the unit. The Installation Site must meet functional and physical requirements in accordance with Hanna Installation Agreements and on-site inspection by Hanna Technician prior to the beginning of installation. Installation fee(s) are non-refundable.
8. WARRANTY: In the event that Hanna purchases Goods or Materials in its own name for incorporation into the Product delivered to Customer, and Hanna receives a warranty from the vendor of such Goods or Materials, Hanna shall ensure that such warranty is passed through to, and is enforceable by Customer. Hanna expressly disclaims any warranty liability on components that are not directly manufactured by Hanna.

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Service Plans

Executive Service Plan: HI10000 Fertigation System

- Direct visit(s) where air travel is required. Cost of the plan is $1895.00. 5% discount is applied when purchased with HI10000 Fertigation System. Additional cost and assessments may be applied for any special requirements for travel outside the US.
- Plan includes 1 factory visit per year, plus one emergency visit. An emergency visit is applicable if the cause of the Fertigation System failure is directly related to a manufacturer's defect. This will be determined by a qualified Hanna Technician prior to departure or on-site.
- Services performed include - Calibration and maintenance of all Hanna units, electrodes and accessory evaluation, and product training for all new staff member(s).
- Each visit is one day on-site.
- A minimum cost of $875.00 will be applied for each additional day of Training and/or Service requested. Additional fees must be paid for in advance of services being performed by a corporate credit card or an accepted and approved purchase order.
- The Plan is valid for up to 1 year upon date of execution.
- Plan does not include replacement parts.
- Plan also includes an additional 10% reduction on reagents, electrodes and related parts and accessories associated with the covered Hanna product(s).
- This plan DOES NOT extend the warranty of the stipulated instrument/system. However, if a new accessory is provided as port of the service then the applicable warranty applies to that accessory.

Coordination must be made at least 4 weeks in advance of the scheduled date of installation and or service. Coordination should include:

- Date and location of installation and or service
- Primary contact name, e-mail and phone number who will be working with the Hanna technician at the date of installation/service.
- Specific programs that will be conducted must be communicated in advance

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