

Brodie AddPak
Additive Injection Block

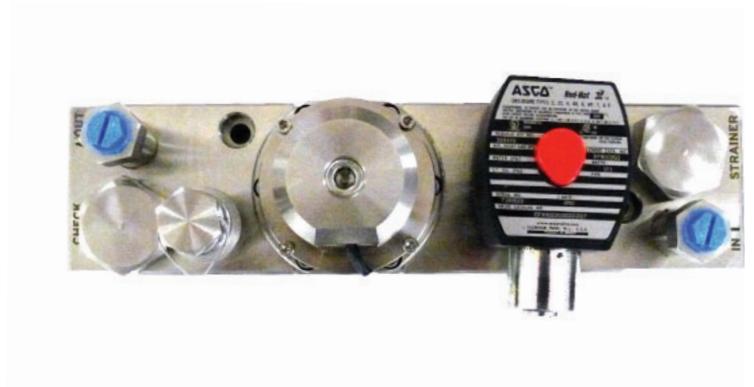


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1 Read Me First

Notice

Brodie International, a Brodie Meter Co., LLC Company ("Brodie") shall not be liable for technical or editorial errors in this manual or omissions from this manual.

Brodie makes no warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose with respect to this manual and, in no event, shall Brodie be liable for any special or consequential damages including, but not limited to, loss of production, loss of profits, etc.

Product names used herein are for manufacturer or supplier identification only and may be trademarks/registered trademarks of these companies. The contents of this publication are presented for informational purposes only, and while every effort

has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time.

Brodie does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Brodie product remains solely with the purchaser and end-user.

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2 Essential Instructions

General

Brodie International designs, manufactures and tests its products to meet many international standards. As the instruments are sophisticated technical products they must be installed, used and maintained properly to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and incorporated into onsite safety programs where possible.

Read all instructions prior to installing, operating, and servicing the product. If this instruction manual is not the correct manual, telephone +1 912 489 0200 and the requested manual will be provided.

Save this instruction manual for future reference. If you do not understand any of the instructions, contact your Brodie representative for clarification.

Follow all warnings, cautions, and instructions marked on and supplied with the product. Inform and educate your personnel in the proper installation, operation, and maintenance of the product. Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.

To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product. When replacement parts are required, ensure that qualified personnel use replacement parts specified by the manufacturer.

Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards, or improper operation.

Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified personnel, to prevent electrical shock and personal injury.

It is the customer's responsibility to provide fire prevention measures and equipment per local regulations.

The injection block has been designed without allowance for corrosion. The customer should implement a periodic inspection and maintenance program to ensure that no part of the block's pressure retaining components has been subjected to corrosion.

Use of this equipment for any purpose other than its intended purpose may result in property damage and/or serious personal injury or death.

Essential Instructions for Pressure Containing Equipment, Including the European Union (Directive 97/23/EC)

Although it is not expected for the device to be used in a service where it would come in to contact with unstable fluids, it is the end user's responsibility to assess any risks and take any precautions necessary.

It is the end user's responsibility to ensure that piping and other attachments connected to the Brodie instrument do not place adverse stresses upon it, the design of the instrument has not been assessed for the effects of traffic, wind or earthquake loadings.

It is the end user's responsibility to ensure that the instrument is mounted when required on suitable supporting foundations.

It is the end user's responsibility to install the device in a well-designed system to avoid potential hazards such as water hammer, vacuum collapse or uncontrolled chemical reactions.

It is the end user's responsibility to provide fire protection measures and equipment in accordance with the local regulations.

When the ambient temperature is below the minimum operating temperature specified on the device it is the end user's responsibility to ensure that the device is warmed to an appropriated temperature before being pressurized.

Do not exceed the operating pressure and temperature limits of the instrument as stamped on the nameplates.

It is the customer's responsibility to install this equipment in a system that provides adequate over-pressure protection and that limit pressure surges to 10% of the maximum allowable working pressure of the instrument.

It is the end user's responsibility to provide fire protection measures and equipment in accordance with the local regulations.

Essential Instructions for Electrical Equipment, Including the European Union (Directive 2004/108/EC and 2004/22/EC)

This unit contains Electrostatic sensitive circuit boards. Electrostatic safety precautions should be taken to prevent damage.

When connecting wiring it is good practice to use shielded cable. The shield should be connected to earth at the read out or control systems end of the cable; the other end of the shield should not be connected.

This wiring practice is mandatory in order to comply with the requirements for electromagnetic compatibility as per the EMC directive 2004/108/EC and MID 2004/22/EC of the council of the European Union.

It is the end user's responsibility to ensure that all protective covers are in place to prevent electrical shock and/or personnel injury.

3 Warranty Claim Procedures

3.1 - Limited Warranty

Subject to the limitations contained in Section 2 herein and except as otherwise expressly provided herein, Brodie Meter Co., LLC ("Brodie") warrants the Goods-manufactured by Brodie will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period.

Goods are warranted for twelve (12) months from the date of installation and 18 months from date of shipment, whichever occurs first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services.

Products purchased by Brodie from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

Buyer agrees that Brodie has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products.

If Buyer discovers any warranty defects and notifies Brodie thereof in writing during the applicable warranty period, Brodie shall, at its option, repair or replace, that portion of the Goods found by Brodie to be defective or refund the purchase price of the defective portion of the Goods/Services.

All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Brodie, are not covered by this limited warranty, and shall be at Buyer's expense.

Brodie shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized Brodie representative.

All costs of dismantling, reinstallation and freight and the time and expenses of Brodie's personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Brodie.

Brodie is not responsible for damages that incur during shipment to Buyer for shipments that are F.O.B. Brodie Factory, FCA Brodie Factory, or EXWORKS Brodie Factory. Shipping charges for goods returned to Brodie under warranty will be at Buyer's expense.

Products found not to be warranted can be repaired and returned at Buyer's expense and return charges born by Brodie will be added to the cost of repair or returned to Buyer "as received" at Buyer's expense. Insurance for returned products will be at Buyer's expense.

For all returned products please package to prevent damage, or future damage during shipment.

Make sure the products are cleaned, free from grease oil, chemicals and other materials that may hamper defect detection and impede repair.

All returned items must be accompanied with a MSDS for the products that have been in contact with the equipment, including cleaning agents.

3.1 - Limited Warranty Continued

A decontamination statement, RMA, and Customer Problem Report must also accompany equipment returned. Product received in an unsuitable condition will be returned at Buyer's expense without being examined.

Goods repaired, and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer.

This limited warranty is the only warranty made by Brodie and can be amended only in a writing signed by an authorized representative of Brodie.

Except as otherwise expressly provided in the Agreement, there are no representations or warranties of any kind, expressed or implied, as to merchantability, fitness for a particular purpose, or any other matter with respect to any of the goods or services.

It is understood that corrosion or erosion of materials is not covered by our guarantee unless the Buyer has notified the Seller the product will be used in an environment conducive to corrosion and/or erosion and the product has been coated with Brodie's recommended method of protection against corrosion / erosion.

3.2 - Limitation of Remedy and Liability

Brodie International, a Brodie Meter Co., LLC Company ("Brodie") shall not be liable for damages caused by delay in performance.

The sole and exclusive remedy for breach of warranty hereunder shall be limited to repair, correction, replacement or refund of purchase price under the limited warranty clause in Section 1 herein.

In no event, regardless of the form of the claim or cause of action (whether based in contract, infringement, negligence, strict liability, other tort or otherwise), shall "Brodie's" liability to buyer and/or its customers exceed the price to buyer of the specific goods manufactured or services provided by Brodie giving rise to the claim or cause of action.

Buyer agrees that in no event shall Brodie's liability to buyer and/or its customers extend to include incidental, consequential or punitive damages.

The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, loss of use, loss of revenue and cost of capital.

Brodie International
P.O. Box 450 (30459-0450)
19267 Highway 301 North
Statesboro, GA 30461, USA

www.brodieintl.com
Phone: +1 (912) 489-0200

4 Receipt of Shipment

When you receive your equipment inspect the outside of the packing case for damage which may have incurred during shipping. Damage incurred during shipment is the responsibility of the carrier and is not part of the factory warranty. If the packing case is damaged, notify the local carrier immediately.

If the package is in good condition remove the en-

velope containing the packing list and carefully remove the equipment and all components included in the shipment from the packing case. Inspect for damaged or missing parts, referring to the packing list, and prior to discarding the packing material.

If Items are missing from your shipment, contact your sales representative. Your sales order number will be required.

5 Return of Equipment

If the equipment must be returned to the factory for repair or replacement, a Returned Materials Authorization (RMA) must be included with the components.

RMA forms may be obtained from your sales representative or from the Product Service Department. In addition to the RMA, a Material Safety Data Sheet and a Decontamination Statement must be included with Items being returned to the factory. A Decontamination Statement is included in the back of this manual.

If the equipment is removed from service it must be thoroughly drained and neutralized before it is packed for shipment. Care must be taken to ensure that product removed from the equipment is disposed of in accordance with all applicable local, state and federal regulations.

The connections should be sealed to keep residual fluid from leaking out of the meter during transport. The type of flange seal required will vary with the form of transportation used. Contact the carrier for specific instructions.

The equipment should be securely mounted on a wooden skid for shipment. The original container or a solid wooden box should be used to protect the exterior of the components.

When packing the components for return to the factory, place the RMA and a copy of the packing list that was delivered with the equipment inside an envelope. Place the envelope inside the shipping container with the Item being returned and reference the RMA number on the outside of the shipping container.

Equipment returned to the factory without the proper documentation will be returned to sender at their expense.

Ship the container to:
Brodie Meter Co., LLC
Product Service Department
19267 Highway 301 North
Statesboro, GA 30461, USA

Phone: +1 (912) 489-0200
Fax: +1 (912) 489-0294
service@brodieintl.com

6 Storage

Brodie International instruments are precision devices and should be handled and stored with care. They should not be subjected to rough or improper handling or stored in an environment where moisture, extreme temperatures, or foreign material can damage the meter.

The inlet and outlet connection covers should remain on the instrument until the unit is ready for installation.

If extended storage is required it is recommended that the instrument be placed in an environmentally controlled warehouse. If this is not possible the

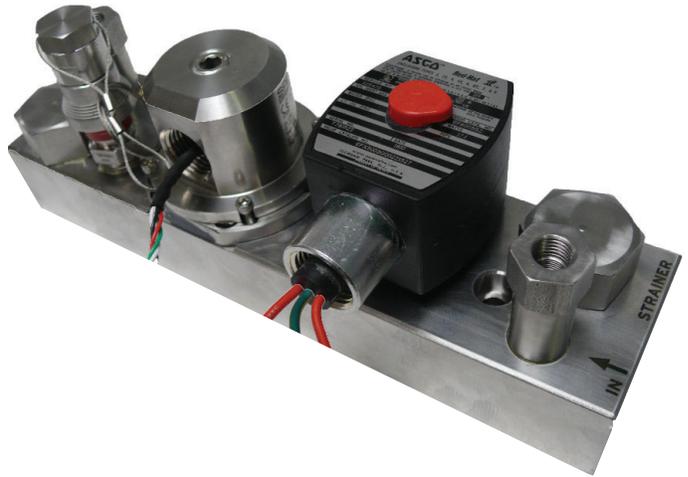
instrument should be stored in a waterproof lined wooden box. Desiccant packs should be taped to the inside of the instrument end connections before they are sealed to reduce the effect of humidity on the equipment and accessories. Caution must be used to ensure desiccant packs are removed prior to installation.

Depending on the storage time it may also be preferable to use a compatible corrosion inhibitor.

If the injection block is removed from service for an extended period of time it should be flushed with a light oil before being placed into storage.

7 Standard Features

Brodie AddPak Injection Block



General

Brodie's AddPak Chemical Injector offers a wide variety of service options. A complete stainless steel construction and extensive elastomer selection prove to be suitable for use in numerous chemical and industrial applications. The Injector is machined out of a solid piece of stainless steel bar stock which minimizes external leak points. The injector also incorporates an inlet machined basket strainer and an outlet check valve.

Installation

The Injector's slim footprint allows for easy installation with minimal space requirements. As a slave injector, the versatile AddPak Chemical Injector easily incorporates into numerous applications from PLC to TAS Systems.

Oval Gear Meter

The Injector's oval gear meter allows a broad range of chemical use in additive and marker applications. The Brodie oval gear design produces a highly accurate measurement in single c/c units.

Mechanical

- Available in 1-6 Pack Configuration
- 304 Stainless Steel Machined Block
- Inlet & Outlet Isolation Valves
- Inlet & Outlet Connections 3/8" FNPT
- Calibration Port Valved with Dust Cap
- Strainer (100 Mesh)
- Check Valve
- Elastomers Wetted are all Teflon or Teflon Encapsulated Material
- Optional Elastomer Material: Kalrez or Chemrez Seals per Request
- Standard: Ryton Oval Gears
Stainless Steel Gears Available per Request
- Flow Range: 0.1 - 3 GPM
- Accuracy: 0.5%
- Repeatability: 0.25%
- Oval Gear Meter K Factor: 5400 PPG
- Process Connections 3/8" FNPT
- Max Viscosity 300 Centistokes
- Max Working Pressure 400 PSI

Electrical

- ASCO Explosion Proof Solenoid
- 120VAC 60HZ Standard, Other Voltage/(options?) Available per Request
- Oval Gear Meter Sensor 5 - 27 VDC, Supply Open Collector High Speed Pulses
- 4 wire sensor type
- Common Pulse Signal and Earth Ground Connections
- Suitable for Hazardous Area
- FM Approvals for use in Class I, DIV I Areas
- ATEX/CE Approval Optional

Optional Accesories

- Calibration Kit, including quick-coupler (female), cylinder, back pressure check valve, and spout.
- 6 (maximum) slave injection blocks can be mounted, pumped, and wired for A/C + D/C on mounting back board

8 Functional Operation

The Brodie Addpak injector block consists of a 304 stainless steel block machined and assembled with a positive displacement oval gear meter, Asco solenoid, isolation and control needle valves on the inlet and outlet, a strainer, and check valve. Additionally, a quick coupler is included for calibration. Compact design and low cost provide the ideal solution for chemical additive injection regarding petroleum terminals and pipelines. Compared to other types of injectors, Brodie's AddPak Injector

Controller

The controller as referenced above will send an AC voltage to the solenoid. This will energize the coil and allow flow through the block. As flow passes thru the block, the oval meter will send pulses proportional to flow volume back to the controller. When the preset volume is met, the controller will terminate the AC power to the solenoid, the valve will close, and flow will cease. This cycle is repeated every time the controller sends

Block minimizes leak points; All components are built and assembled into the block.

The AddPak injector block is a slave injector, typically controlled from a PLC, Terminal Automation System or Electronic Preset. If the application requires a smart controller, please consult the factory. The AddPak as standard does not include the necessary electronics to pace the injector, accumulate totals, or provide alarms.

AC voltage to the solenoid. Standard AC voltage is 115 VAC with options for 230 VAC or 24VDC solenoids available. The User should select a controller with alarms for conditions with excess additive or no additive flow. The controller should discontinue loading until the problem is resolved and the alarm has been reset. The user can consult Brodie for assistance in selecting the appropriate controller.

9 Mounting

The AddPak Injection block can be mounted in any orientation provided the oval gears remain in a horizontal position. The inlet and outlet connections can be vertical, horizontal, or inclined. To ensure the gears are in a horizontal position, the sensor and solenoid should be facing the installer, rather than facing up or down.

10 Specifications

Manifold Block	
Fluid Port Sizes:	3/8" FNPT
Body Material	Stainless Steel
Elastomer Material	Teflon, Viton, Chemraz
Max Working Pressure	400PSI

Solenoid	
Fluid Orifice Size	5/32"
Max Working Pressure	400 PSI
Max Operating Pressure	150 PSI (differential)
Certifications:	FM, ATEX

Sensor: Electrical	
Sensor Power	5vdc to 27vdc, 20mA maximum
Open Collector Output	5vdc to 27 vdc 100 mA maximum (unsourced)
4 Wire Connection	Function:
Red Wire	Sensor Power
Black Wire	Sensor Power Common & Emitter (signal common)
White Wire	Sensor Signal, Open Collector (un-sourced)
Green Wire	Earth Ground

Meter Pickup Sensor	
4 Wire	
Red Wire	Sensor Power
Black Wire	Power & Signal Common
White Wire	Pulse Signal
Green Wire	Earth Ground
Certifications:	FM, ATEX

Solenoid Connections	
Mechanical	1/2" FNPT
Two Red Wires	Actuator Coil
Green Wire w/ Yellow Stripe	Earth Ground

Coil Data	
Power Requirements:	17.1 Watts @ 120 VAC, 8.6 Watts @ 240 VAC
Certifications:	NEMA Type 3, 35, 4, 4X, 6, 6P, 7, & 9 Explosion Proof

Sensor: Mechanical	
Sensor Thread	1/2" FNPT
Material	Aluminum

Environmental	
Ambient Operating Range:	-40 to 140 °F

Fluid	
Inlet	3/8" Female NPT
Outlet	3/8" Female NPT

Fluid Metering Gears:	
Nominal Pulse Resolution	5400 PPG in Mineral Spirits
Material (Gears)	Standard: Ryton Stainless Steel Available
Black Wire	Power & Signal Common
White Wire	Pulse Signal
Green Wire	Earth Ground
Certifications:	FM, ATEX

10.1 - Parts List

Item	Description	Model	Qty
1	Additive Injection Block	AB1001	1
2	Needle Valve Assembly	AB1002	2
3	Retainer Cap 15/16 - 28 UN Threads	AB1003	2
4	O-Ring Encapsulated Teflon	AB1004	2
5	Strainer Basket	AB1006	1
6	Solenoid 240/60, 220/50 Voltage	AB1027	1
	Housing - Needle Valve	AB1016	1
	Poppet - Needle Valve	AB1017	
7	Gear Post*	AB10**	2
9	Gear Set*	AB10**	1
10	O-Ring - Teflon - Sensor	AB1010	1
11	Mounting Plate - Sensor	AB1011	1
12	Screws - Socket Head Cap 10 - 32 x 3/8" Long 316 SS	151098-419	6
13	Sensor	AB1012	1
14	Screws- Socket Head Cap 6-32 x 7/16"	151086	4
15	Quick Connect - Stem Protector - Swagelok P/N: SS-QC6-D-6PM	1501146	1
16	Quick Connect Stem Protector Swagelok P/N: SS-QC6-SP	1501145	1
17	Poppet - Check Valve	AB 1014	1
1	Spring - Check Valve - Century Spring Corp. P/N: 72017S	1501147	1

**Standard: Ryton Oval Gears, Consult Factory for Stainless Steel Options

Elastomers	
Needle Valve	FKM Viton
Calibration Port	FKM Viton
Solenoid	Chemraz
All Other Elastomers	Teflon or Encapsulated Teflon

11 Solenoid Input

The Add Pak Injection Block has a single control input. The single input is connected to the coil of the solenoid valve. The solenoid valve is normally closed and when powered the coil is energized and the valve opens and remains opened until power is

removed. The standard voltage for solenoid coil is 115VAC. Optionally the solenoid coils with 230VAC or 24VDC can be supplied.

12 Sensor Output

The AddPak Injection Block is equipped with a Hall-Effect pickoff. It is mounted in close proximity to the oval gears. Each oval gear has two rare earth magnets embedded and sealed on the face of the gear. As flow passes through the block, the oval gears rotate in direct proportion to the volume, and the sensor changes state as each magnet passes the sensor. When the gear and magnet are directly in line, the pickoff changes from off, to on, momentarily, then back off. This operation occurs as each

magnet passes the sensor. The K Factor for the meter is approximately 5400 pulses per gallon. This K factor is the starting point in the field. Field calibration is necessary to calculate the true K factor under specific process conditions which depend on required flow rate and chemical in use. K factor data is transmitted into the control device. Brodie offers a calibration kit with dry break quick connections and a graduated cylinder. The customer is responsible for performing calibration.

13 Wiring

Solenoid

The solenoid wiring from the controller to the coil should be a minimum of #18AWG. The AC and DC wiring should run in separate conduit. It is highly recommended that the user contract a local certified electrician to run and terminate the wir-

ing in accordance with all governmental codes for the area. The solenoid coil produces an inductive load to the controlling device. Please consult with the manufacture of the controller regarding this.

Meter Sensor

The sensor wiring can be either a three or four conductor, #18-22 AWG shielded instrument cable. Use the Belden number 6502FE or similar. Shield should terminate at the controller to a DC common or a specifically assigned termination. Do not

terminate shield wires to an AC earth ground. Do not terminate shield at sensor. Isolate the shield at Meter Sensor and tape off.

Meter Sensor: Pulse Signal Output

The AddPak Injection Block meter sensor output is an un-sourced, open collector, transistor output. The white sensor wire is connected to the transistor collector. The emitter of the transistor is connected to the black wire, or DC COMMON connection; The term "un-sourced" means that no voltage is applied to the output from within the sensor. It must be pulled to a "high" or "on" or "true" state by voltage supplied from an external source. The sensor electronics then drives

the collector "low" or "off" or "false" with each pulse transmitted. The output is NOT driven high internally with the sensor. The industry common scheme allows the sensor to drive external equipment supplied by its own internal transmitter power. There must be a common connection between the DC negative of the sensor supply and the DC COMMON of the signal pulse counter. Refer to the wiring diagram at the end of this manual for specific connection details.

14 Process Fluid Connections

General

The process fluid inlet and outlet connections are 3/8" FNPT. The inlet and outlet are marked in the front of the AddPak. The inlet pressure must be

higher than the outlet to ensure proper injection.

Fluid Inlet and Outlet Piping

The piping from the additive pump to the AddPak must be sized to ensure adequate flow to meet the demand for injection. Remember to consider how many injectors will be operating and the total flow required to meet that demand. Distance from the additive pump and the injectors is another thing to consider when determining the pipe size. The minimum tubing size to reach the maximum flow of 3 GPM is typical 1/2". Larger tubing or pipe may be required based on the viscosity of the additive.

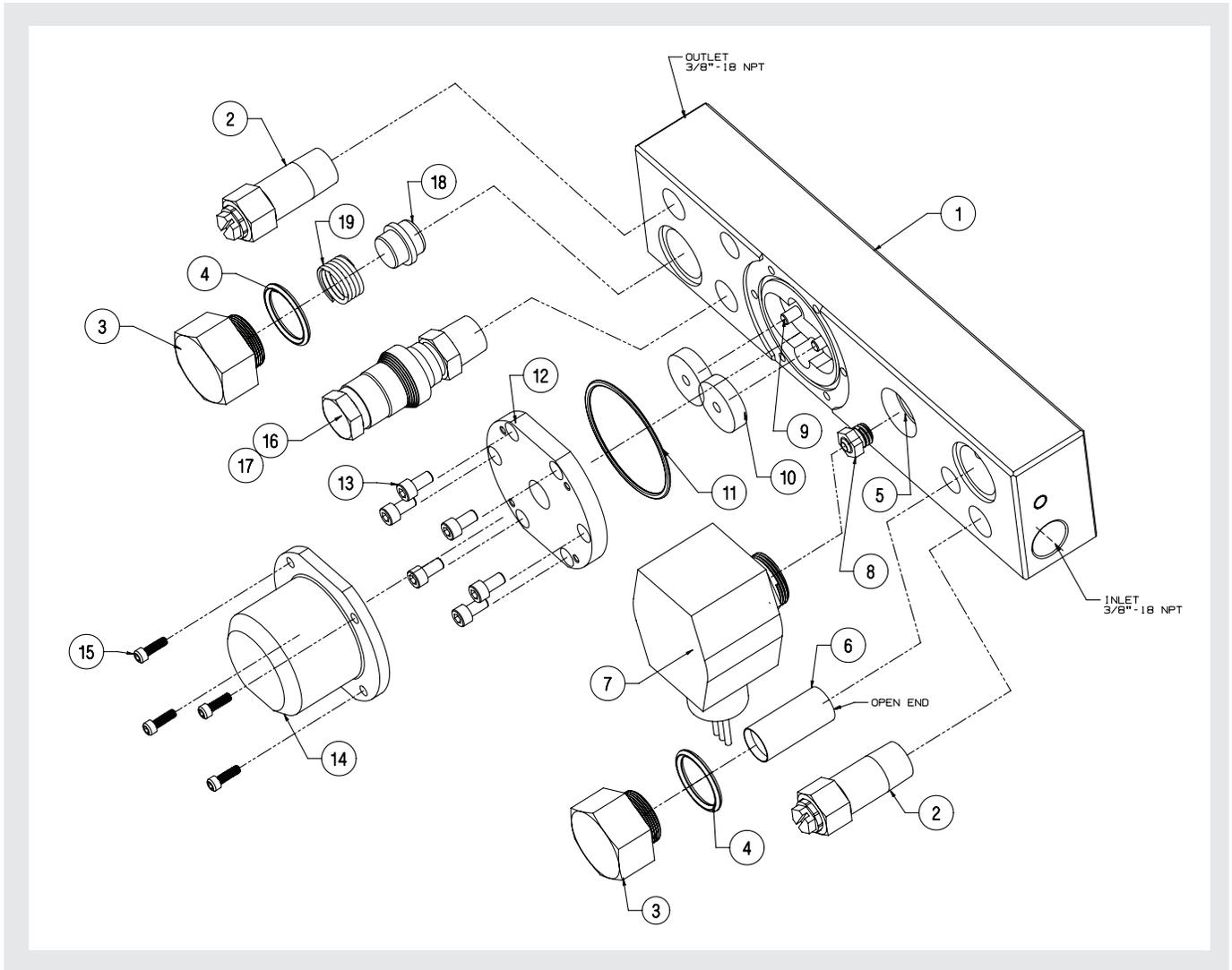
The outlet tubing from the AddPak to the point of injection is 1/2". We recommend using stainless steel tubing. A check valve and isolation valve is recommended at the point of injection into the process line. This will prevent product flow from contaminating the additive when the injector is in the idle state. The check valve should be a positive shutoff spring close check. The check valve should be selected to open with positive pressure of 1 to 10 PSI. If you have multiple injectors piped to one injection point then a check valve and isolation valve should be installed for each injector.

15 Thermal Relief

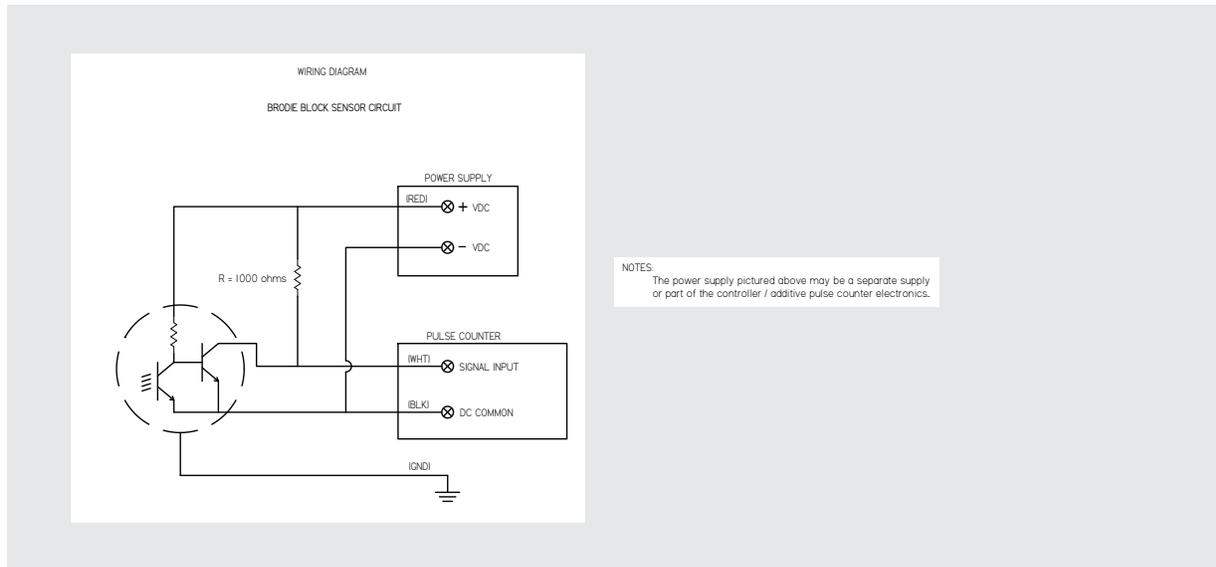
Brodie offers both an injection point kit with a blocking solenoid and thermal relief kit for application where no contamination is required. This is normally used for dyes and markers. Since the injector block has a blocking solenoid and the injection point kit has a blocking solenoid it is necessary to relieve any thermal pressure build up

between them. The thermal relief kit is installed on the inlet and outlet of the injector block. The injection point kit is installed in the field by the user or their contractor.

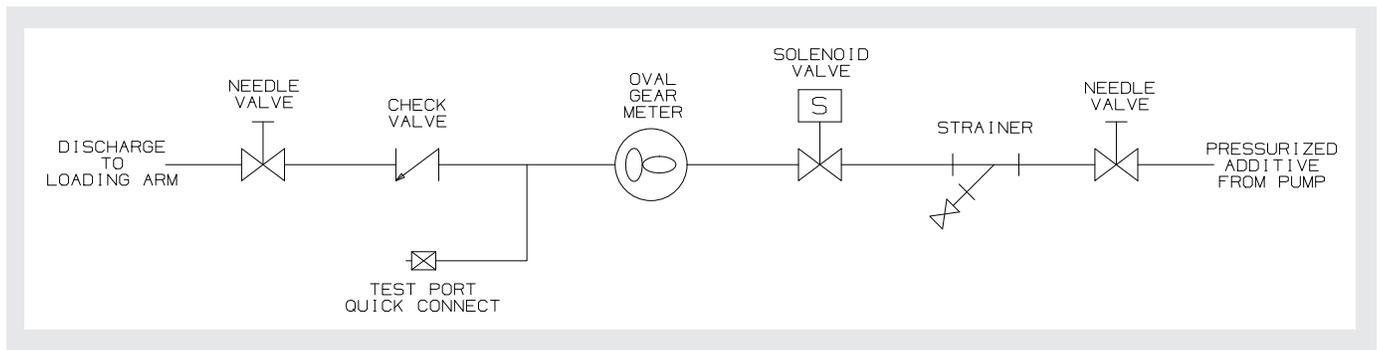
15.1 AddPak Unit Assembly



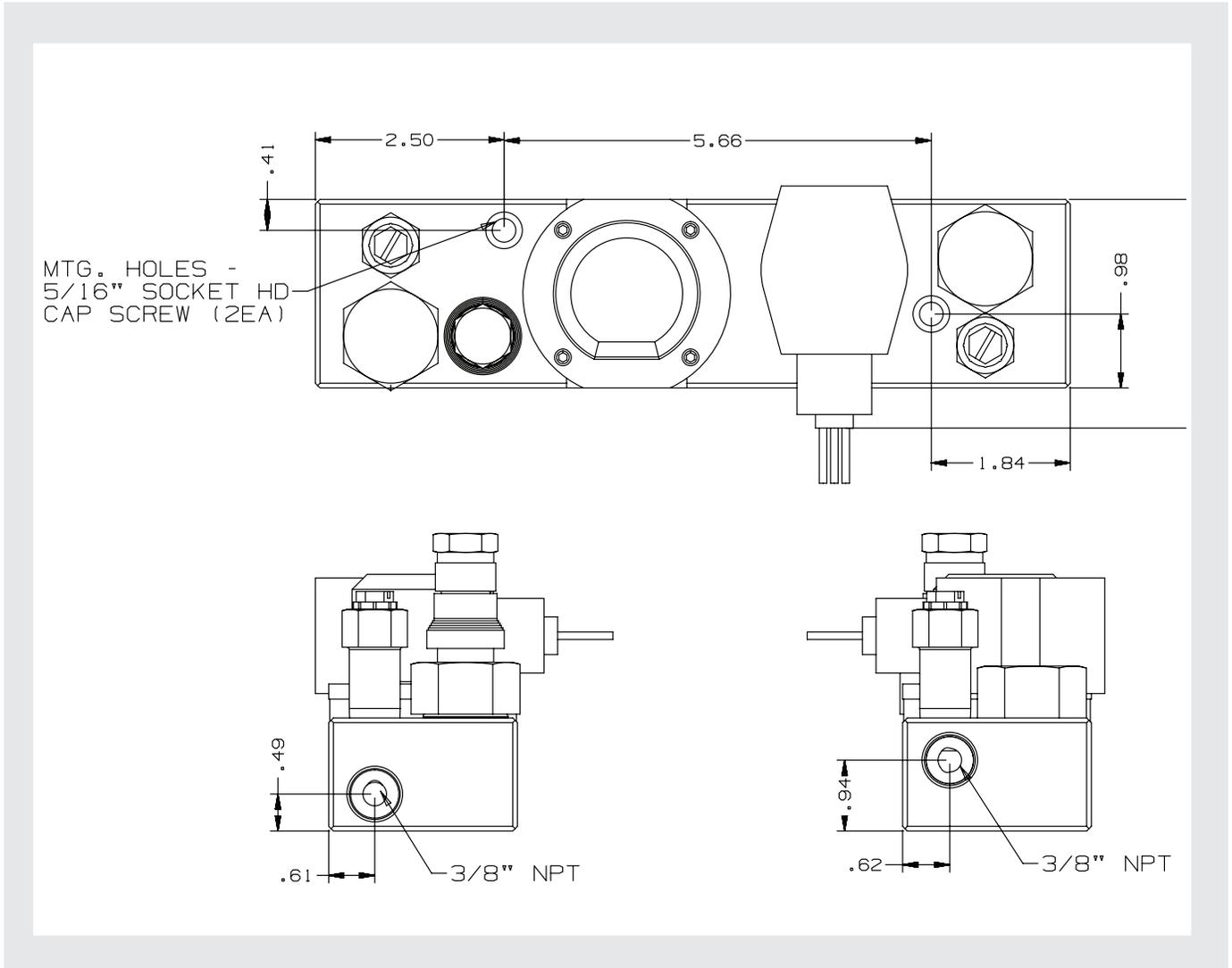
15.2 AddPak Wiring Diagram



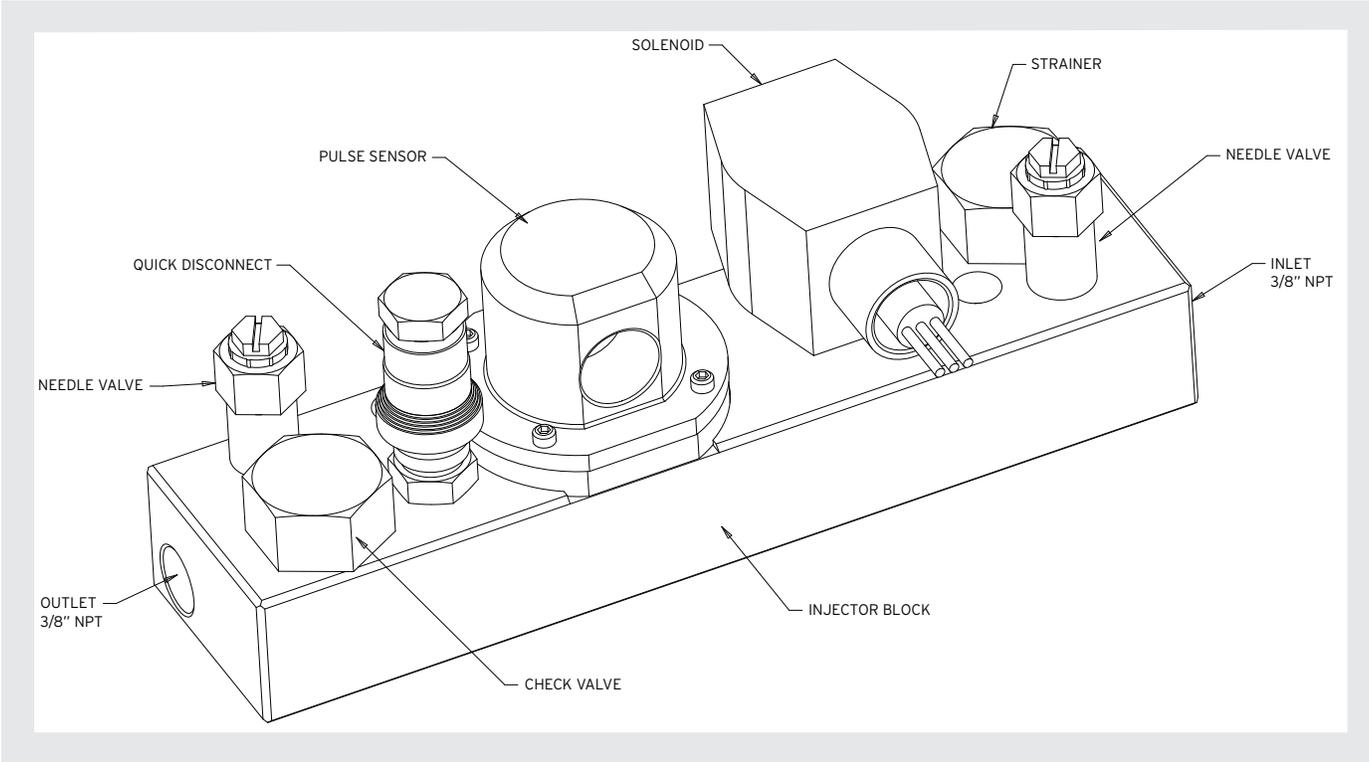
15.3 Process and Instrumentation Diagram (P&ID)



15.4 AddPak Illustration



Technical Configuration



Decontamination Statement

RMA Number: _____

Item Being Returned: _____

List all chemicals, process fluids and gases that have come in contact with the equipment, including cleaning agents. Attach additional pages of information if necessary. A Material Safety Data Sheet (MSDS) is required if non-food grade products have been used with the item being returned.

Information Required	Product 1	Product 2
Chemical Name		
Health and Safety Hazards		
Precautions, First Aid		

I hereby certify the equipment being returned has been cleaned and decontaminated in accordance with good industrial practices and in compliance with OSHA and DOT regulations. This equipment poses no health or safety risks due to contamination.

Signature: _____

Name (Please Print): _____

Title: _____

Company Name: _____

Phone Number: _____

Fax: _____

E-mail: _____

Reason for Return: _____

REMINDER

All items being returned must be packaged separately. This decontamination statement and the MSDS sheet(s) must be placed on the outside of the shipping container.

Appendix B

Customer Problem Report

For faster service, complete this form and return it along with the affected equipment to customer service at the address indicated below. If you require technical assistance, please contact the Product Service Department at the phone number listed below.

Company Name: _____ Phone: _____

Technical Contact: _____

Repair PO#: _____

Invoice Address: _____

Shipping Address: _____

Return Shipping Method: _____ S/N: _____

Equipment Model #: _____ Failure Date: _____

Description of Problem: _____

What was happening at time of failure: _____

Additional Comments: _____

Report Prepared by: _____ Title: _____

Brodie International

P.O. Box 450 (30459-0450)
19267 Highway 301 North
Statesboro, GA, 30461
USA

Email: sales@brodieintl.com
Phone: +1 (912) 489-0200
Fax: +1 (912) 489-0294
