

SES

Stainless Single-Jet Meter Instructions



The logo for Seametrics, featuring a blue swoosh above the word "Seametrics" in a bold, italicized font.



General Information

General Information Page 3
Features Page 3
Specifications Page 4
Dimensions Page 4
Flow Range..... Page 4
Pressure Drop Curve..... Page 5

Installation & Connections

Piping Requirements Page 5
K-Factor Page 5
Connections to Non-Seametrics Control Devices Page 5

Repair

Rotor Replacement Page 6
Sensor Replacement..... Page 6
Parts List..... Page 6

Troubleshooting

Problem Page 7
Probably Causes..... Page 7
Things to Try..... Page 7

The **SES** single-jet meter provides accurate, wide range flow metering in an extremely rugged stainless steel package. Single-jet simplicity combined with high quality jewel bearings results in long life and relatively high tolerance for problem fluids. Typical applications are chemical batching, proportional chemical injection, fertilizer injection, proportioning of spray chemicals, and general flow rate monitoring.

The sensor is easily replaced from outside the meter, and is compatible with most of the Seametrics indicators and transmitters, as well as most controls and PLC's that accept DC inputs. The standard rotor is PVDF (Kynar®) and the shaft is a special nickel-bonded tungsten carbide.

The optional ceramic shaft increases resistance to some concentrated chemicals. The standard O-ring is Teflon®-coated Viton®.

Features

18' (5.5m) Sensor Cable
 Low power- Dark blue (powered units)
 Micropower- Grey (battery units)

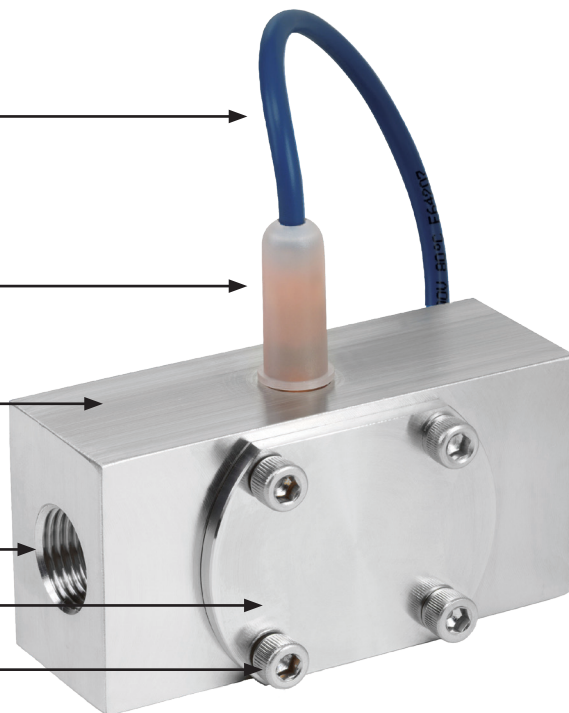
Thread-in Sensor, Field Replaceable,
 6–24 Vdc Pulse

316 Stainless Steel Body

Female NPT Thread

Removeable 316SS Cover

Hex Screws



Internal

- Jewel Bearings—Ruby Ring and Ball
- Kynar®/Tungsten Carbide Rotor Assembly (*Kynar®/Ceramic or Kynar®/Silicon Carbide optional*)
- Teflon®-coated Viton® O-ring (*Viton® or EPDM optional*)



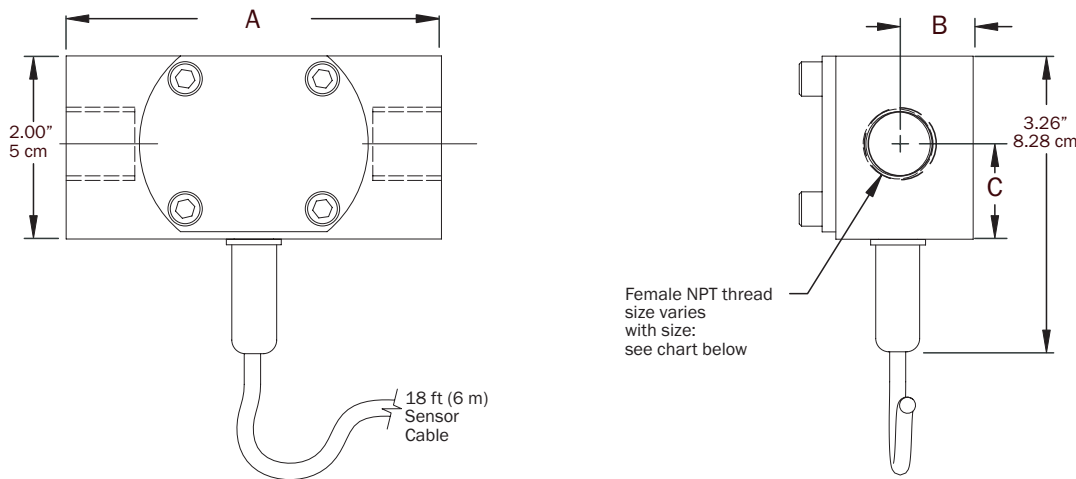
Field Replacement of Sensor

Specifications*

Connection Ports	1/2", 3/4", 1" —Female NPT thread	
Sensor Cable	18 ft (6 m) standard—maximum cable run 2000 ft (607 m)	
Materials	Body	316 stainless steel
	Rotor	PVDF (Kynar®)—2 magnet (6 magnet high resolution optional)
	Shaft	Nickel-bonded tungsten carbide (ceramic or silicon carbide optional)
	O-Ring	Teflon®-coated Viton® (Viton® or EDPM optional)
	Bearings	Ruby ring and ball
	Cover	316 stainless steel
Maximum Temperature	200° F (93° C)	
Maximum Pressure	500 psi (35 bar)	
Accuracy	±1% of full scale	
Power	Standard	6–36 Vdc, < 2 mA
	Micropower	3.1–16 Vdc, 60 µA @ 3.6 Vdc (for FT450 and DL76 only)
Outputs	Current sinking pulse, 6–24 Vdc	

* Specifications subject to change. Please consult our website for current data (seametrics.com)
 Kynar is a registered trademark of Arkema, Inc., Teflon and Viton are registered trademarks for DuPont Corporation

Dimensions



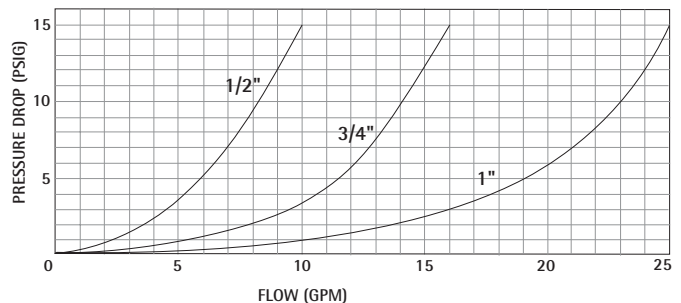
Model	NPT Thread Size	A	B	C
-050	1/2 inch	4.10	0.82	1.04
-075	3/4 inch	4.10	0.82	1.04
-100	1 inch	5.00	0.75	1.00

Flow Range

Model #	K-Factor* (pulses/gal)	Gal/Min	Liter/Min
-050	535	0.1–10	0.38–38
-075	390	0.2–15	0.75–57
-100	220	0.5–25	1.9–95

*Nominal K-factors (based on averages) for standard 2-magnet version. High resolution (6-magnet) K-factors are approximately tripled.

Pressure Drop Curves



INSTALLATION

Piping Requirements

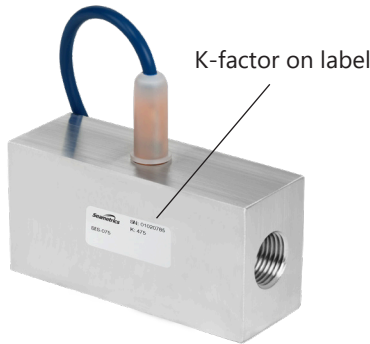
Standard fittings are female NPT. Straight pipe of at least five diameters upstream of the meter is recommended. Vertical or horizontal installations are acceptable.



WARNING:
This meter has low-friction bearings. DO NOT AT ANY TIME test operation of the meter with compressed air. Doing so will subject it to rotational speeds many times those for which it was designed, and will certainly damage the rotor, shaft, and/or bearings.

K-Factor

The meter is factory calibrated. The K-factor is found on the label on the meter body and must be input into the control/display for accurate reading.

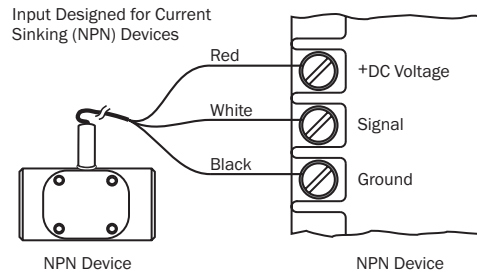


CONNECTIONS

Connecting to Non-Seametrics Control Devices

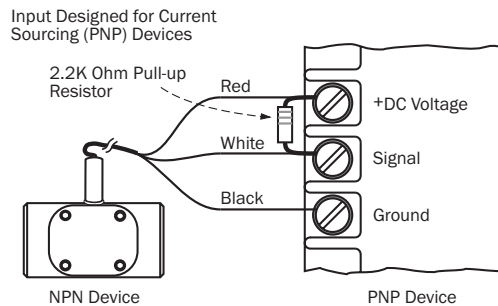
It is often desirable to connect an SES flow sensor to a PLC or industrial computer board, and the sensors are well suited for this. Typically it can be connected directly, or with a single resistor added. The pickup sensors are current sinking (NPN) GMR devices that require 6–36 Volts DC and 2 mA current. They can connect directly to a PLC or computer board if:

1. The sensor power supply on the PLC is 6–36 Vdc (24 Vdc is typical).
2. The sensor power supply can provide at least 2 mA (100 mA is typical).
3. The sensor input on the PLC can accept a current sinking device.
4. The PLC frequency response > flow meter output frequency.



Input designed for current sinking devices (NPN)

If the PLC input only accepts current sourcing devices, a pull-up resistor must be added. Typically, on a 24 Vdc input a 2.2 K Ohm resistor will be effective.



Input designed for current sourcing (PNP) devices

Since the three-wire pickup sensors are solid state, they do not exhibit switch bounce and can be used at relatively high frequencies.

If the PLC is equipped with a 4-20 mA analog input module, it is necessary to order the SES flow sensor with some form of 4-20 mA transmitter. Seametrics offers the FT440 indicating transmitter. Follow the connection diagrams for these products to connect to the analog input.

Rotor Replacement

There is only one moving part to this meter. The bearings are made of ruby, which rarely wears out or needs replacement unless they have been physically damaged by severe shock. The shaft is integrally molded into the rotor, and shaft and rotor are replaced as one part. (You may wish to replace the bearings, using the bearing removal tool, while the meter is disassembled for rotor replacement). To replace the rotor, disconnect the meter and remove the four screws that hold the cover in place. Lift the cover and remove the rotor (see parts diagram below).

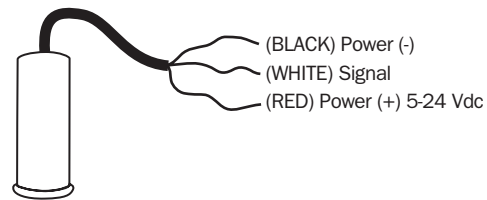
When putting in the new rotor, be sure that the ends of the shaft are in both bearings before tightening the cover. The rotor can be easily dropped into the bottom bearing. Starting the shaft into the upper bearing requires a bit of care. It is easier if the rotor is spinning, which can be done by lightly blowing into a port. When the upper bearing plate drops into place, hold it down and check for free spinning (by blowing lightly) before replacing the cover. Check that the O-ring is in its seat on the bearing plate before replacing the cover. Replace the cover, insert the four cap screws and tighten.

Sensor Replacement

The sensor ordinarily does not need replacement unless it is electrically damaged. If replacement is necessary, unscrew the sensor by hand. Screw the replacement sensor in and tighten by hand.



Reconnect the sensor according to the diagram below.

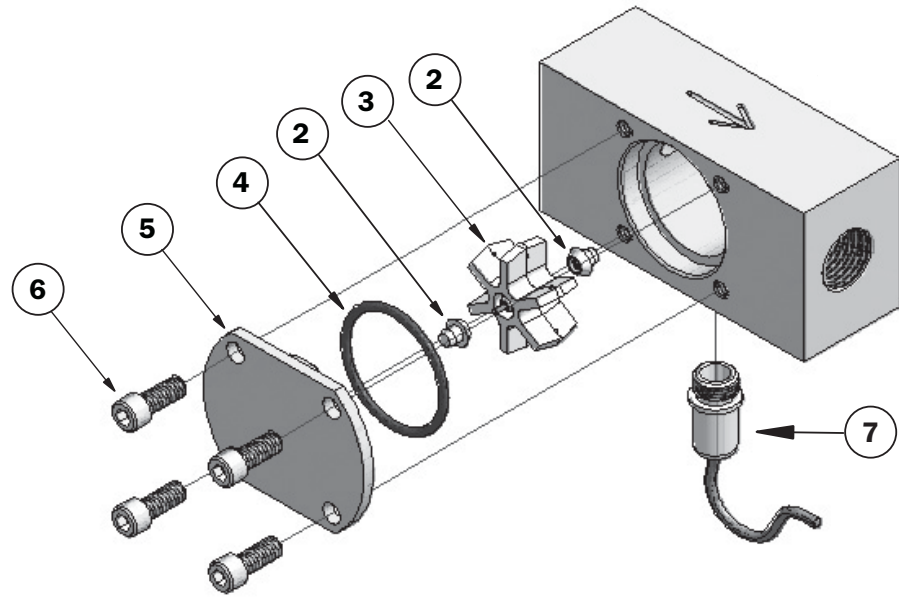


SES Parts List

Corresponding diagram can be found on the next page, 7.

2	Bearing Assembly <i>(Includes 2)</i>	103313
	Bearing Removal Tool <i>(not shown)</i>	100372
3	Rotor Repair Kit	
	Kynar®/Ceramic <i>(2 magnet)</i>	103930
	Kynar®/Carbide <i>(2 magnet)</i>	103931
	Kynar®/Silicon Carbide <i>(2 magnet)</i>	103933
	Kynar®/Ceramic <i>(6 magnet, high res)</i>	100453
	Kynar®/Carbide <i>(6 magnet, high res)</i>	103932
4	O-Ring* EPDM	100264 (optional)
	Viton®	100219 (optional)
	Teflon®-coated Viton®	100973 (standard)
5	Cover Stainless Steel <i>(SES-050/-075)</i>	100682
	Stainless Steel <i>(SES-100)</i>	100800
6	Hexscrew <i>(4 required)</i>	100693
7	Sensor Standard	100419
	Micropower	100508

Kynar is a registered trademark of Arkema, Inc., Teflon and Viton are registered trademarks for DuPont Corporation



Troubleshooting

Problem	Probable Cause	Things to Try...
No signal after installation	Insufficient flow Bad connections to control electronics Incompatible control Damaged or missing rotor Failed magnetic sensor	Consult Flow Rate Chart Reduce pipe size or use different sensor Check connections at control: Red (+), Black (-), White (signal) Use 6–36 Vdc power supply - for low power Use 3.1–16 Vdc power supply - for micropowered Add pull up resistor, if using current-sourcing device Remove flow sensor from fitting and check for free spinning; replace rotor Replace magnetic sensor
Inaccurate metering	Not enough straight pipe between meter and severe flow disturbance Wrong K-Factor entered Magnetic sensor failing to pick up each blade Wrong time units on flow indicator	Move meter away from flow disturbance or field calibrate Check fitting for K-Factor, check indicator to see if it is entered properly ("Set K" on FT430, FT440, FT450, or FT520) Remove flow sensor from pipe. If indicator is FT430, FT440, FT450, or FT520, set K to 1.00, turn rotor slowly by hand, indicator should count each blade; replace sensor If using FT430, FT440, or FT520, check left side of display (sec, min, hr, day); change to desired unit

The limited warranty set forth below is given by Seametrics, with respect to Seametrics brand products purchased in the United States of America.

Seametrics warrants that products manufactured by Seametrics, when delivered to you in new condition in their original containers and properly installed, shall be free from defects in material and workmanship. **Seametrics products are warranted against defects for a minimum period of two (2) years from date of installation, unless otherwise specified, with proof of install date. If no proof of install date can be provided, warranty period will be two (2) years from date of shipment from Seametrics, as defined on Seametrics' invoice.** Seametrics' obligation under this warranty shall be limited to replacing or repairing the part or parts, or, at Seametrics' option, the products, which prove defective in material or workmanship. The following are the terms of Seametrics' limited warranty:

- a. Buyer must give Seametrics prompt notice of any defect or failure and satisfactory proof thereof.
- b. Any defective part or parts must be returned to Seametrics' factory or to an authorized service center for inspection.
- c. Buyer will prepay all freight charges to return any products to Seametrics' factory, or another repair facility, as designated by Seametrics.
- d. Defective products, or parts thereof, which are returned to Seametrics and proved to be defective upon inspection, will be repaired to factory specifications.
- e. Seametrics will deliver repaired products or replacements for defective products to the buyer (ground freight prepaid) to the destination provided in the original order.
- f. Products returned to Seametrics for which Seametrics provides replacement under this warranty shall become the property of Seametrics.
- g. This limited warranty covers all defects encountered in normal use of Seametrics products, and does not apply to the following cases:
 - i. Loss of or damage to Seametrics product due to abuse, mishandling, or improper packaging by buyer
 - ii. Failure to follow operating, maintenance, or environmental instructions prescribed in Seametrics' instruction manual
 - iii. Products not used for their intended purpose
 - iv. Alterations to the product, purposeful or accidental
 - v. Electrical current fluctuations
 - vi. Corrosion due to aggressive materials not approved for your specific product
 - vii. Mishandling, or misapplication of Seametrics products
 - viii. Products or parts that are typically consumed during normal operation
 - ix. Use of parts or supplies (other than those sold by Seametrics) which cause damage to the products, or cause abnormally frequent service calls or service problems
- h. A new warranty period will be established for repaired products, or products replaced during the original warranty period.
- i. In the event that equipment is altered or repaired by the buyer without prior written approval by Seametrics, all warranties are void. Damage caused by equipment or accessories not manufactured by Seametrics may void the product's warranty.
- j. SOFTWARE: The Seller grants the user a non-exclusive license to use Seametrics' software, according to the following limitations and conditions:
 - i. The user may install the software on one or more desktop or laptop computers.
 - ii. All title and intellectual rights to the software are owned by Seametrics.
 - iii. No copies may be made or distributed except as described above.
 - iv. The user may not modify or reverse-engineer the software.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY. NO IMPLIED WARRANTY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, APPLIED TO THE PRODUCTS AFTER THE APPLICABLE PERIOD OF THE EXPRESS LIMITED WARRANTY STATED ABOVE, AND NO OTHER EXPRESS WARRANTY OR GUARANTY, EXCEPT AS MENTIONED ABOVE, GIVEN BY ANY PERSON OR ENTITY WITH RESPECT TO THE PRODUCTS, SHALL BIND SEAMETRICS. SEAMETRICS SHALL NOT BE LIABLE FOR LOSS OF REVENUES, OR PROFITS, OR INCONVENIENCES, EXPENSE FOR SUBSTITUTE EQUIPMENT OR SERVICE, STORAGE CHARGES, LOSS OF DATA, OR ANY OTHER SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGE CAUSED BY THE USE OR MISUSE OF, OR INABILITY TO USE THE PRODUCTS, REGARDLESS OF THE LEGAL THEORY ON WHICH THE CLAIM IS BASED, AND EVEN IF SEAMETRICS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL RECOVERY OF ANY KIND AGAINST SEAMETRICS BE GREATER IN AMOUNT THAN THE PURCHASE PRICE OF THE PRODUCT SOLD BY SEAMETRICS AND CAUSING THE ALLEGED DAMAGE. WITHOUT LIMITING THE FOREGOING, YOU ASSUME ALL RISK OF LIABILITY FOR LOSS, DAMAGE, OR INJURY TO YOU AND YOUR PROPERTY AND TO OTHERS AND THEIR PROPERTY ARISING OUT OF USE OR MISUSE OF, OR INABILITY TO USE THE PRODUCTS NOT CAUSED DIRECTLY BY THE NEGLIGENCE OF SEAMETRICS.

SOME STATES DO NOT ALLOW LIMITATIONS ON THE DURATION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. SIMILARLY, SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATIONS OF CONSEQUENTIAL DAMAGE, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS; HOWEVER, YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

