WARRANTY

Intek, Inc. warrants each Rheotherm product to be free from defects in material and workmanship under normal use and service, Intek's obligation under this warranty being limited to making good any part or parts thereof which shall, within one (1) year after delivery of such product to the original purchaser, be returned to Intek with transportation charges prepaid and which Intek's examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties, express or implied and all other obligation or liabilities on Intek's part. The purchaser will assume all responsibility and expense for removal, decontamination and reinstallation of equipment.

Rheotherm flow meters are manufactured under United States patent numbers 4,255,968, 4,942,763, 4,949,578, 5,485,754 and. 5,752,411
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SECTION 1 – GENERAL INFORMATION

1.1 INTRODUCTION

Rheotherm® precision flow meters are designed to provide accurate linear or non-linear (depending on the model) representation of fluid flow rate. This model 100 has a non-linear output. They are manufactured exclusively by Intek, Inc. and employ a patented thermal technique used by industry since 1978. The unique transducer designs have protected sensors, are easy to install and require little or no maintenance.

Each Rheotherm flow meter consists of two elements — a transducer and an electronics unit. The transducers come in two basic designs, intrusive and nonintrusive (SECTION 2.1). Design selection is based on application constraints or customer preference. The electronics, for signal processing, are housed in one of four basic enclosure styles (SECTION 2.2). Again, selection is based on application requirement.

Key features of Rheotherm instruments are:

- Nonintrusive flow measurement — For pipe sizes from 0.030 to 2 inches, flow sensing can be done from outside the flow tube.

- No moving parts — There are no rotating, translating, undulating or oscillating parts to wear, stick, break or fatigue.

- Chemical compatibility — The wetted surface(s) can be any of a number of corrosion resistant metals or alloys. There are no internal joints or seals in most TU type transducers.

- Flexibility — Rheotherm meters can be ordered calibrated for mass or volumetric units or in average velocity. Flow rate, totalization and fluid temperature displays or output signals are available as well as rangeability up to 100:1 or more.

- Fluid pressure options to 10,000 psi (check transducer tag for rating on your unit).

- Withstands over ranging — No damage or change in calibration will occur due to excessive flow rates many times higher than calibration range.

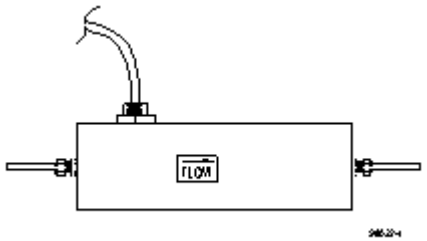
- Immunity to shock and vibration.

- Optional nuclear radiation hardening.

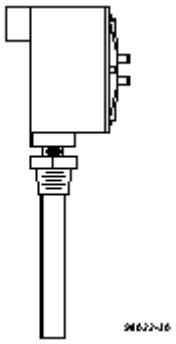
- Range of application includes measurements in capillary tubes to large diameter pipes or ducts.

1.2 DESCRIPTION OF OPERATION

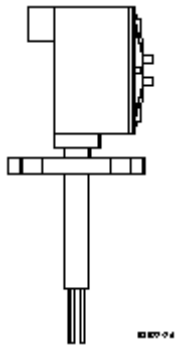
Rheotherm flow meters are available with various nonintrusive and intrusive transducer designs, but they all use the same thermal sensing technique. Two temperature sensors are used — one is in thermal equilibrium with the fluid and provides a fluid temperature reference, while the second temperature sensor is located near a heater so that its temperature is slightly above that of the fluid. In a TU transducer, the temperature sensors and heater are attached to the outside of the flow tube, whereas the probe transducers have the sensors and heater located in the probe(s) that are inserted into the stream. The amount of heat removed from the heated sensor by the stream is related to fluid velocity. Hence, the measured temperature differential between the reference sensor and heated sensor is a function of flow rate. For the Model 100 the non-linear output is approximately proportional to the logarithm of flow. Intek, Inc. is licensed to use this patented and trademarked flow measurement technique.



Nonintrusive transducer (TU)



Example of single probe with NPT fitting



Example of dual probe with flange fitting

1.3 PRECAUTIONS

1. Use proper input power — Check the label on the electronics for the input power requirements.

2. Use reasonable care in handling the transducer. Do not try to disassemble the transducers; there are no removable parts.

   TU — excessive twisting or bending can damage the sensor. The flow tubes are thin-walled tubing.
   Probes (NPT/2I, NPT/I, BF/2I, BF/I, etc.) — take care not to bend the probes or damage the tips. Do not try to remove or turn the conduit junction box.

3. All TU sensors under TU¼ should be supported by the sensor shell, not the tube stubs. TU sensors using GALB junction boxes or sensors without junction boxes can be supported with pipe clamps or some other appropriate means. TU s with ____ can be supported using the brackets machined into the junction box. Additionally, Intek sells separate support brackets.

4. Check the transducer maximum temperature rating — do not operate a transducer at or subject it to a temperature above its specified limit.

5. Keep moisture out of the electronic enclosure and sensor junction box. Once cable connections are made in the junction box, make sure the lid is tightly closed. Seal conduit lines if they can become wet inside.

6. Keep transducer wetted surfaces clean and free of permanent layer build-up.

7. Do not exceed pressure limits of the tube or fittings.

8. Maintain a thermally stable environment (short-term) for the transducer and adjacent line. (See SECTION 2 — INSTALLATION.)

These instructions cover installation, calibration and maintenance of Rheotherm meters in standard configurations. Any special information pertaining to your unit is covered under CUSTOM INFORMATION (SECTION 6). Time should be taken to carefully read these instructions prior to installation of the equipment. Should any questions arise or problems occur, call Intek for immediate assistance.

SECTION 2 – INSTALLATION

2.1 TRANSDUCER

> !! **IMPORTANT:** All transducers have a directional arrow on the tag and/or etched into a metal part. Before installing a sensor, please note proper flow direction. This is critical to sensor operation.

> !! **IMPORTANT:** If you have more than one Rheotherm unit, make sure the complete serial number of the transducer matches the complete serial number of the electronics. The transducer and electronics are a matched set. Components with different serial numbers should not be interchanged. The transducers have no user serviceable parts, so do not try to disassemble, as permanent damage may result.

The transducer style supplied with your meter is listed in the model code number in SECTION 6. Proper installation of the sensor is necessary for achieving accuracy and repeatability. Installation suggestions for each type of standard transducer are given here. For custom transducer installations, refer to CUSTOM INFORMATION — SECTION 6.

Be sure wetted surfaces are clean before installing. If cleaning is needed, use non-residue solvent and wipe dry. If the sensor has a connector box, keep moisture out. Make sure the lid is tightly sealed and, if supplied, the gasket is in place. Seal conduit lines at the connector box if conduit lines can become wet.

1. TU (nonintrusive) — TU $^{1}/_{16}$ and TU⅛ transducers, unless they have optional ¼" O.D. ends, particularly require special care in handling and installing to avoid damage to sensor tube stubs.

   > !! **CAUTION:** TU transducers are made with thin-walled tubing — use care when installing.

   All TU transducers (other than $^{1}/_{16}$ and ⅛ inch) should have straight line input and output sections, typically 20 pipe diameters on the inlet and 6 to 10 diameters on the outlet. If installed vertically, the flow should be going up through the sensor. Connection in the line is via compression fittings, hose with clamp, threaded fittings or flanges, whichever is appropriate. Care must be taken not to transmit a twisting force through the transducer's midsection. The TU transducer, whether flanged or not, must not be used to pull other piping together or to make up angular mismatch of fittings. The transducer junction box (if supplied) should never be rotated for any reason.

   TU$^{1}/_{16}$ transducers may be sleeved with a ⅛" tube for added support. Connection should always be made to the $^{1}/_{16}$" tube, as there is no assured seal between the $^{1}/_{16}$" tube and the sleeve.

   Some TU transducers have an integrally mounted cable; do not pull on this cable, or attempt to remove the fitting where the cable enters the sensor shell.

Fluid temperatures other than ambient require special attention. Thermal gradients from one end of the transducer to the other, as well as along the radius of the connection pipe, are undesirable. Therefore, effective insulation should be installed around the inlet and outlet straight line runs. Gradients which may exist in the line further up stream can be removed if an insulated elbow is installed in the line prior to entering the straight line portion of the plumbing. Metallic support braces for the sensor or adjoining plumbing can act as a heat sink and cause operational problems in high temperature applications. The support braces should be thermally isolated from the line to avoid large heat conduction effects.

If the transducer is for use above 212°F, it will have a side arm and connector box, where the internal high temperature wiring is connected to the lower temperature transducer cable. Free air should be allowed to flow around the side arm and connector box to keep the box cool. The side arm can be insulated up to one third of its length from the transducer body.

In these applications, proper thermal control is vital to accurate meter performance. Non-uniform heat tracing, relay on/off temperature controllers and oscillating proportional type control should always be avoided. Steam trace lines with good pressure regulation or properly tuned proportional temperature control systems are effective in maintaining uniform fluid temperature. ***A box around the sensor and inlet tubing is highly recommend for operating temperatures higher than room ambient. Allow enough inlet tubing inside the box to allow the fluid temperature to become the same temperature as the surrounding air. Separately control the box air temperature at the same temperature as the incoming fluid temperature to minimize thermally induced indication errors.***

Flow stream conditioning must also be considered to maximize meter performance. Avoid upstream protrusions and short distance straight runs. Flow pulsations, such as those created by metering pumps, may cause the instrument to differ from the factory calibration. Furthermore, if the flow is varied by stroke and by pump speed adjustment, the indication will most likely be non-repeatable. If you are using a pump of this type, it is recommended that a pulsation dampening device be used to provide smooth continuous flow. A second choice would require readjustment of the instrument calibration (cal) potentiometer after installation (See SECTION 4.2).

For liquid measurement systems using high pressure gas to force flow, the effects of the absorbed gas must be considered. In these cases, sudden pressure drops up stream of the sensor such as line size expansions, control valves, and pressure dropping regulators must be avoided. Sudden pressure drops can cause the absorbed gas to release into the liquid, making the flow sporadic and difficult to measure. Control valves should be placed down stream of the sensor.

The ideal installation will provide the sensor with well established smooth flow, uniform system temperature and consistent fluid media.

2. Intrusive Probes —

   !! **IMPORTANT:** Recommended straight run for best accuracy is 20 diameters up stream and 10 diameters down stream.

   The various probe transducers are mounted through a threaded collar (NPT/2I and NPT/I) or flanged tee (BF/2I or BF/I). Other fittings and sensor designs are also available and are discussed on the Custom Information page. Generally the probes are sized so the tips extend ½ to 1 inch beyond the pipe center line when properly installed. There are exceptions to this in certain applications; see CUSTOM INFORMATION (SECTION 6) as it applies.

   Proper alignment of the sensor with flow is important; the flow direction is indicated on the transducer tag and/or etched into the transducer. All dual probe transducers (NPT/2I, BF/2I) are installed so that the two probes are side-by-side across the fluid stream. Never rotate the junction box that houses the terminal cable connection. If this occurs the transducer could be damaged and/or installed misaligned with the flow direction.

   For high temperature applications, the sensor and surrounding line should be well insulated. Leave a portion of the transducer neck un-insulated to allow heat dissipation before reaching the junction box.

2.2 ELECTRONICS

Various types of electronics housings are available. These include NEMA 4, laboratory bench type, explosion proof, and panel mount enclosures as well as special models to meet customer requirements. These come in different sizes to accommodate options and special features.

1. NEMA 4 — The standard industrial housing, this enclosure is watertight (non-submersible) when the door is properly clamped shut. The housing should be mounted such that wire/cable ports are located at the bottom of the housing, to reduce problems associated with water spray, condensation and settling of dust and dirt. An all stainless steel version for corrosive environments is also available.

2. NEMA 7 — For use in hazardous (class I) environments. The lid should be closed and all bolts tightened before the unit is powered up. If a NEMA 7/NEMA 4 enclosure was ordered, the unit will have a rubber gasket in a groove in the top of the enclosure base. Conduit seals are frequently required, so applicable code requirements should be met when installing the conduit into the box.

3. Laboratory — This table-top unit is NEMA 1 only; do not spill liquid on it or use in a wet environment. This unit typically has a grounded power cord, and all transducer and output connections are located on the back of the enclosure.

4. Panel Mount — For use in a control panel, mounted so the enclosure face is flush with the panel surface. Most or all connections are made on the back of the enclosure. NEMA 1 only; do not use in a wet environment.

The electronics housing should be installed keeping in mind the length and routing of the transducer cable. Standard cable length is six feet but it can be specified up to 200 feet. If, after calibration of the unit, the cable length is changed (a portion cut off or additional cable spliced on), there may be a shift in the calibration due to the change in cable resistance. The size of this effect depends on the amount of change. If a noticeable shift occurs, it may be calibrated out following the single point calibration instructions in SECTION 4.2.

Unless otherwise specified, normal ambient environment for the electronics is 0-120°F. Recommended maximum temperature is 135°F.

2.3 ELECTRICAL CONNECTIONS

1. Transducer Cable — The standard transducer cable is 22 or 24 gauge, multi-conductor (5 or 6), shielded cable with a PVC jacket. Connect the transducer cable to the electronics (and transducer junction box if supplied) following the wire color codes shown on the wiring diagram (Figure 1). Make sure all connections are tight. If the unit does not operate properly after installation is completed, check these connections again.

   In general the laboratory unit will have a plug-in connector for the transducer cable.

2. Power — The input power requirement is listed on the tag on the electronics enclosure and is shown on the input power connector; make sure the input power source is compatible. The standard power requirement is 120 Vac, 60 Hz, ½ A, single phase. (For units going to Europe, the standard is 220 Vac, 50 Hz, ¼ A, single phase.) Power connections are as shown in Figure 1. Laboratory units sold in the U.S. have a power cord with grounded plug.

   !! **CAUTION:** Never make or break transducer cable connections with the electronics powered up (unless instructed by factory to do so).

   As a general rule, if the flow is to be shut off or the flow line empty for long periods of time, power to the unit should also be turned off. An on/off switch, provided by the customer, is recommended for all industrial installations.

3. Output — Output connections are made to the output terminal as shown in Figure 1. If the unit has a 4-20mA output, the standard is an isolated 4-wire transmitter with the current loop powered by the Rheotherm electronics. Do not attempt to use with a system that also sources the current unless the instrument was specifically order that way.

SECTION 3 – OPERATION

3.1 START UP

Typically, the instruments come from the factory set up for the flow range of interest to the customer. Following installation all that is required is to switch on power and initiate flow in the measurable flow rate range. Liquid meters that are not calibrated directly on the liquid to be measured are so indicated in this manual (SECTION 6) and require an in-line field calibration.

When power is first turned on, the output reading or signal will indicate full scale. After ten to forty-five seconds (depending on flow range adjustment) the reading will stabilize. The instrument time constant is generally between 4 to 12 seconds. Higher average flow rates will result in an observed faster response time for a given unit.

3.2 GENERAL INFORMATION

The Rheotherm instrument is compensated for a wide range of both ambient and flowing media temperatures. However, abrupt changes in the temperature of the flowing material can cause the instrument output to deviate from the true representation of flow rate. A proper reading is obtained only when the transducer is in thermal equilibrium with the material. Typically, a 20°F abrupt change in temperature may require 40 seconds to stabilize. Temperature ramps should be kept below 1°C/minute.

Rheotherm instruments are calibrated for a particular fluid, either at the factory or in the field. If the fluid changes properties, the calibration changes. Therefore, once calibrated, do not allow fluid properties such as density and viscosity to change (other than the intrinsic changes which occur with temperature variation). If the fluid is changed, a recalibration may be attempted following the procedure in SECTION 4.2. If this procedure does not provide a good calibration for the range of interest on the new fluid, contact the factory.

3.3 OPTIONS (Refer to those Sections that apply to the instrument you have purchased).

1. Analog Outputs — The unit will have a non-linear 4-20 mA, 0-5Vdc or 0-10Vdc output. See SECTION 2.3.3 for a discussion of the 4-20 mA output.

2. Flow rate display — The optional analog panel meter has a log scale so it is direct reading, showing % of full scale flow rate.

3. Flow switch relay — Flow switches may initially indicate a high flow rate even for zero flow when power is first applied to the unit. Correct indication of flow will result after an initial period which can extend to forty seconds depending on where the trip value is set. The relay in standard flow switches is picked up (energized) when the flow rate is above a set point. A loss of flow is therefore indicated in the event of loss of power to the sensor when connected to N.C. contacts. If the switch option has been ordered for high flow indication, the relay will be energized with flow below the trip value. See CUSTOM INFORMATION, SECTION 6 for details on operation of the relay.

4. Flow straightener — TU sensors of $^{3}/_{16}$" or larger size may require a flow straightener in certain low viscosity liquids. The straightener is used to keep the flow regime out of the transition region (from laminar to turbulent). The straightener is shipped installed in the flow tube. It may be removed for cleaning and must be correctly reinserted for accurate operation of the meter. It always installs from the inlet side of the sensor, and one end of the straightener has one or two hooks on the end which should end up nestled in the notch(es) at the inlet end of the flow tube. It should not take too much force to remove or install the straightener. Take care not to bend it while it is out of the sensor.

3.4 OUTPUT CURVE

Figure 2 is the final nonlinear output curve for your unit. The instrument has been calibrated over the actual flow rate range indicated on the ordinate (Y axis).

3.5 TRANSDUCER & ELECTRONICS FUNCTIONAL TESTS

A test of the Rheotherm instrument functional operation can be performed in three phases as outlined below:

1. Transducer continuity check, Figure A p. 11.
2. Transducer isolation check, Figure B, p.11.
3. Electronic circuit board check, Figure C, p.11.

1. The transducer continuity check is performed as follows (see Figure A, p. 11):

   A. Disconnect the transducer cable from the electronics.
   B. Make resistance measurements between the cable pairs as shown in Figure A. The readings should be as indicated; if not, consult factory for repair.

2. The transducer isolation check is performed as follows (see Figure B, p. 11):

   A. Disconnect the transducer cable from the electronics.
   B. Make the circuit connections illustrated in Figure B.
   C. Probe all the conductors and note the voltage with respect to the shield. All readings should be less than 0.5 Vdc. The yellow (Y) wire should also be isolated from the blue (Blu) and the green (G) wires. Connect the "low" test lead to Y and probe the Blu and G terminals with the "high" lead. Again, the meter should read less than 0.5 Vdc in both cases; if not, consult factory for service. Also, check for isolation between the blue (Blu) and green (G) wires.

3. The sensor input to flow output of the electrical circuit is checked as follows (see Figure C, p. 11):

   A. Construct the dummy transducer as illustrated in Figure C.
   B. Turn off power to the unit.
   C. Disconnect the transducer cable from the instrument.
   D. Connect the dummy transducer to the instrument input.

E. Restore power.
F. Connect a DC voltmeter across the TEMP (+) and the GND (–) test point jumpers. Select R3* for proper TEMP value. Select R2* (coarse) and adjust R1* (fine) for ΔT value.
G. Compare the measured flow rate and the indicated flow rate to original calibration data of Table II. Recheck TEMP and ΔT.

*resistors of dummy transducer

TRANSDUCER CONTINUITY CHECK

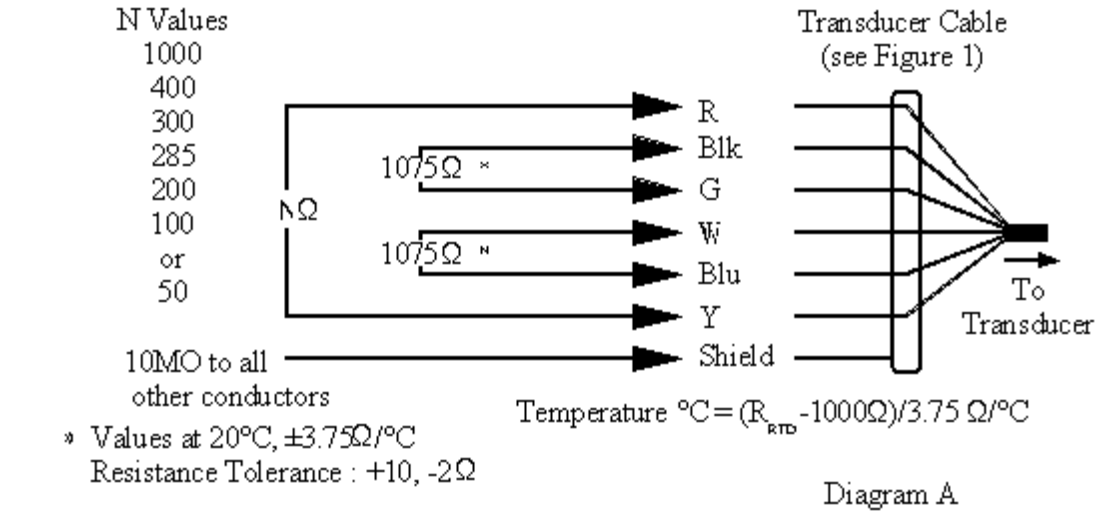


Diagram A

TRANSDUCER ISOLATION CHECK

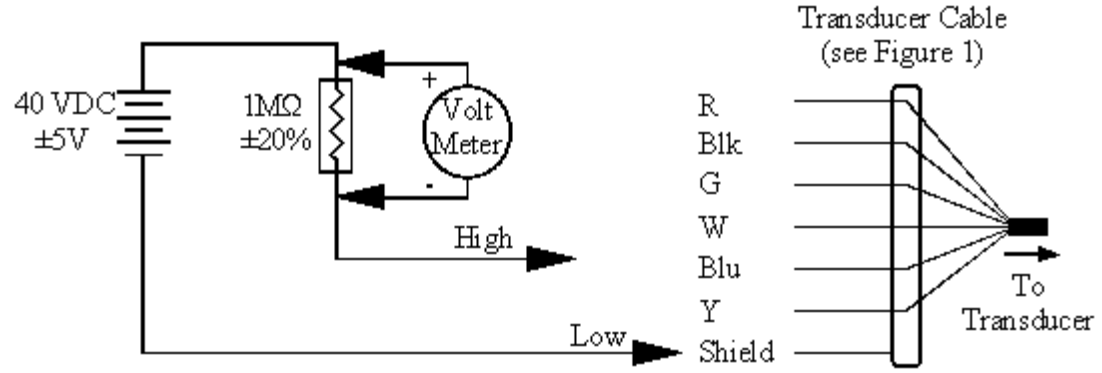


Diagram B

DUMMY TRANSDUCER FOR ELECTRONICS FUNCTIONAL CHECK

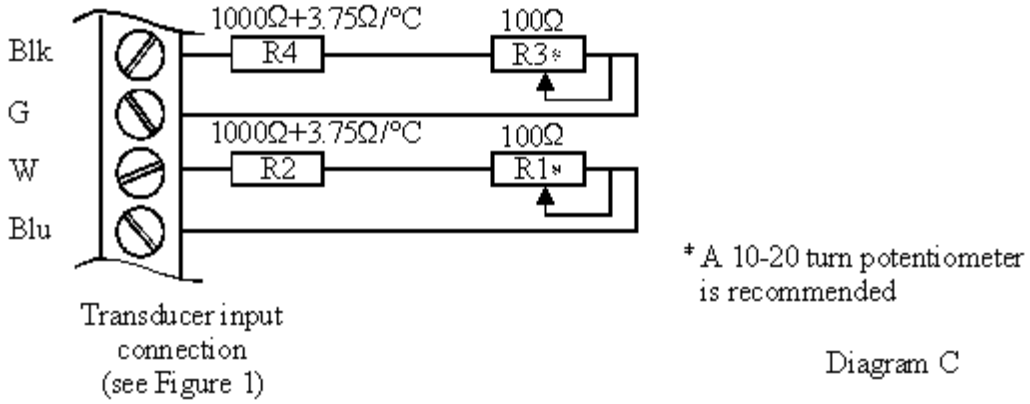


Diagram C

(dwg. #II-92147-1)

SECTION 4 – MAINTENANCE

4.1 GENERAL MAINTENANCE

Certain precautions should be taken to insure proper performance of all models of flow instruments. Since the measurement technique involves a signal resulting from heat transfer to the flowing medium, care should be exercised to prevent build-up of varying layers on the walls of the transducer. Layers such as bacterial growth, dried paints, gas bubbles and non-solubles can result in measurement below actual flow rates. Periodic checks and cleaning should be performed to insure a clean pipe or probe surface.

It should be part of normal maintenance procedure to check the system for proper functioning. Experience and other observable conditions should be utilized to determine the frequency of inspection. Long term drift in the unit calibrations is not expected, but if a single point recalibration is required, refer to SECTION 4.2. To test the flow switch action (if that option was ordered), the flow rate should be reduced below (for low flow switch) or raised above (for high flow switch) the switching level. Then check and insure relay action and continuity of the shut down or warning circuits which it operates.

The joints of all intrusive probes tips should be inspected for wear and corrosion.

4.2 SINGLE POINT FIELD CALIBRATION

When field calibration is required, for any reason, the simplest adjustment is a single point linear offset, and this should usually be tried first. All calibrations should be done at normal operating temperature. When a single point calibration (or recalibration) is required, it is performed as follows:

> Establish a known flow rate in the upper third of the calibrated range that is shown on the output curve (Figure 2). Adjust calibration potentiometer P2 (cal), Figure1, for a correct output reading or signal.

If P2 runs out of adjustment before the meter is reading correctly, P1 (see Board Layout P.17) can be used to further offset the signal. Turning P1 clockwise decreases the signal. (Note: P1 has no effect on some meters.)

Sometimes you may find the single point calibration is not sufficient to align the output over a wide flow rate range. If so, a two-point offset/gain calibration can be performed as described below.

A. Establish a known flow rate at the low end (10-15% of full scale) of the factory calibrated range (Figure 2, page 18).[1] Adjust P2 potentiometer, Figure 1, for an accurate output signal.

B. Establish a flow rate near 90-95% of full scale.[1] Adjust "Flow Span" potentiometer, P3 (Figure 1) for an accurate output signal.

C. Repeat steps A and B until desired accuracy is achieved. Record flow vs. output relationships for various flows and compare with output curve. Construct a new calibration curve if needed.

[1]The flow meter output must have stabilized before any adjustment is made. A strip chart or data logger monitoring of the output can be very helpful in determining when the flow has entered steady-state conditions, especially at low or noisy flows.

4.3 SPARE PARTS

There are no normally recommended spare parts to stock. The transducer and electronics are a matched set and therefore are not interchangeable with others. Should a spare be needed, a complete unit should be ordered and stocked. For AC powered units, the spare fuse is a ½A, fast acting fuse. Replace fuse with Wickmann part number 3730500041 or equivalent. For units powered by 24 Vdc, the fuse is a 1A slow blow fuse. Replace with Wickmann part number 3741100041.

4.4 TROUBLE SHOOTING

TABLE I. TROUBLE SHOOTING GUIDE

OBSERVATION	PROBABLE CAUSE	REMEDY
Output continually drifting downward with constant flow.	1. Coating forming on wetted surface of transducer.	1. Clean transducer periodically or adjust calibration (cal) potentiometer until layer build-up stabilizes.
Output saturates high or low — will not respond to flow change.	1. Loose transducer cable connections. 2. Flow rate not yet within range of meter. 3. Meter/Calib switch in wrong position. 4. Transducer cable damaged. 5. Bad electronic component. 6. Blown fuse.	1. Securely connect transducer cable. 2. Check flow. 3. Check Meter/Calib switch is in "meter" position. 4. Check cable continuity. 5. Perform transducer and electronics functional test (see SECTION 3.5). Write results down and consult factory. 6. Replace fuse as needed.
Output varies with flow but not stable.	1. Fluid temperature not stable. 2. Fluid mixture not properly blended. 3. Gas mixed with liquid. 4. Flow not fully developed.	1. Tune temperature controller, add insulation and/or add static mixer in front of transducer. 2. Add static mixer in front of transducer. 3. Reduce gas pressure or check for air ingress on suction side of pump. Refer to Installation Section. 4. Check inlet and outlet for proper straight line length & freedom from obstructions.

SECTION 5 – CUSTOMER SERVICE

Intek's corporate philosophy is to solve our customer's difficult flow measurement problems. This means that each instrument is custom configured and calibrated for the application. When you purchase a Rheotherm instrument you also receive Intek's outstanding customer service. For sales or product service, call your local representative or Intek directly at (614) 895-0301, 8AM to 5PM EST/EDT weekdays or fax us anytime at (614) 895-0319. E-mail inquiries should be sent to *sales@Intekflow.com* or *techsupport@Intekflow.com*. Our customer service staff will provide assistance promptly.

5.1 QUESTION ON EXISTING HARDWARE

To allow us to help you more quickly, please have the serial number of the equipment available before you call.

5.2 TROUBLE SHOOTING

If you have reviewed SECTION 4.4 TROUBLE SHOOTING and have questions, please call our experienced engineers for assistance. In many cases we can solve a problem over the phone. Please provide as complete a description as possible of the problems encountered.

5.3 FACTORY AND FIELD SERVICE

If you request field service, Intek has experienced engineers available to meet your needs. Many of the repairs or recalibrations will require returning the instrument to the factory. If a problem cannot be solved over the phone, with your help, we will determine if factory service or field service will be the best solution.

To request factory service, a Return Material Authorization (RMA) and purchase order is required. Our customer service staff will assist you with the required information to return instruments for service.

5.4 DECONTAMINATION OF EQUIPMENT

For the safety of your personnel and ours, any hardware that has been in contact with potentially hazardous liquids or gases must be properly decontaminated before shipment to Intek.

5.5 QUESTIONS ON NEW EQUIPMENT

For a new Rheotherm application or any liquid or gas flow measurement need, contact your local Rheotherm representative or the Intek technical sales department at the above phone/fax numbers. Our staff will be pleased to answer all questions and provide quotations.

SECTION 6 – CUSTOM INFORMATION

6.1 UNIT IDENTIFICATION

Model no.: _____

Serial no.: _____

Customer identification: _____

6.2 CONFIGURATION

The configuration of this unit, as originally shipped from the factory:

Input Power:
☒ 115 Vac, 50/60 Hz ☐ 230 Vac, 50/60 Hz ☐ 24 Vdc
Output:
☒ 4-20 mA ☐ 0-5 Vdc ☐ 0-10 Vdc
Pressure Rating: _____ Temperature Rating: _____
Calibrated Range: _____
Wetted Material:
☒ 316 stainless steel ☐ other _____
Enclosure Type:
☒ NEMA 4 ☐ NEMA 4X ☐ NEMA 7 (CL I, Grp BCD) ☐ Other _____Process Connection: _____

6.3 SPECIAL INSTRUCTIONS

The 0-5 Vdc signal is approximately proportional to the logarithm of flow. To linearize the output, use this equation:

$$Flow\ (cc\ /\ \mathbf{min}) = \frac{e^{e^{(mx+b)}}}{f}$$

where
x = Vdc
m = 0.044354
b = 2.2268
f = 106.0852

TABLE II. ORIGINAL CALIBRATION DATA FOR FUNCTIONAL TEST

Unit Serial Number - _____

I	II	III	IV	V	VI
TEMP	ΔT	TP4	Linear Output _____	Instrument Display _____	Flow Rate _____

Note: An offset of data in Column III and IV (with respect to Column II) may appear if the instrument has been field adjusted.

Figure 1. Rheotherm® 100 Rev. B Signal Conditioner PCB Layout

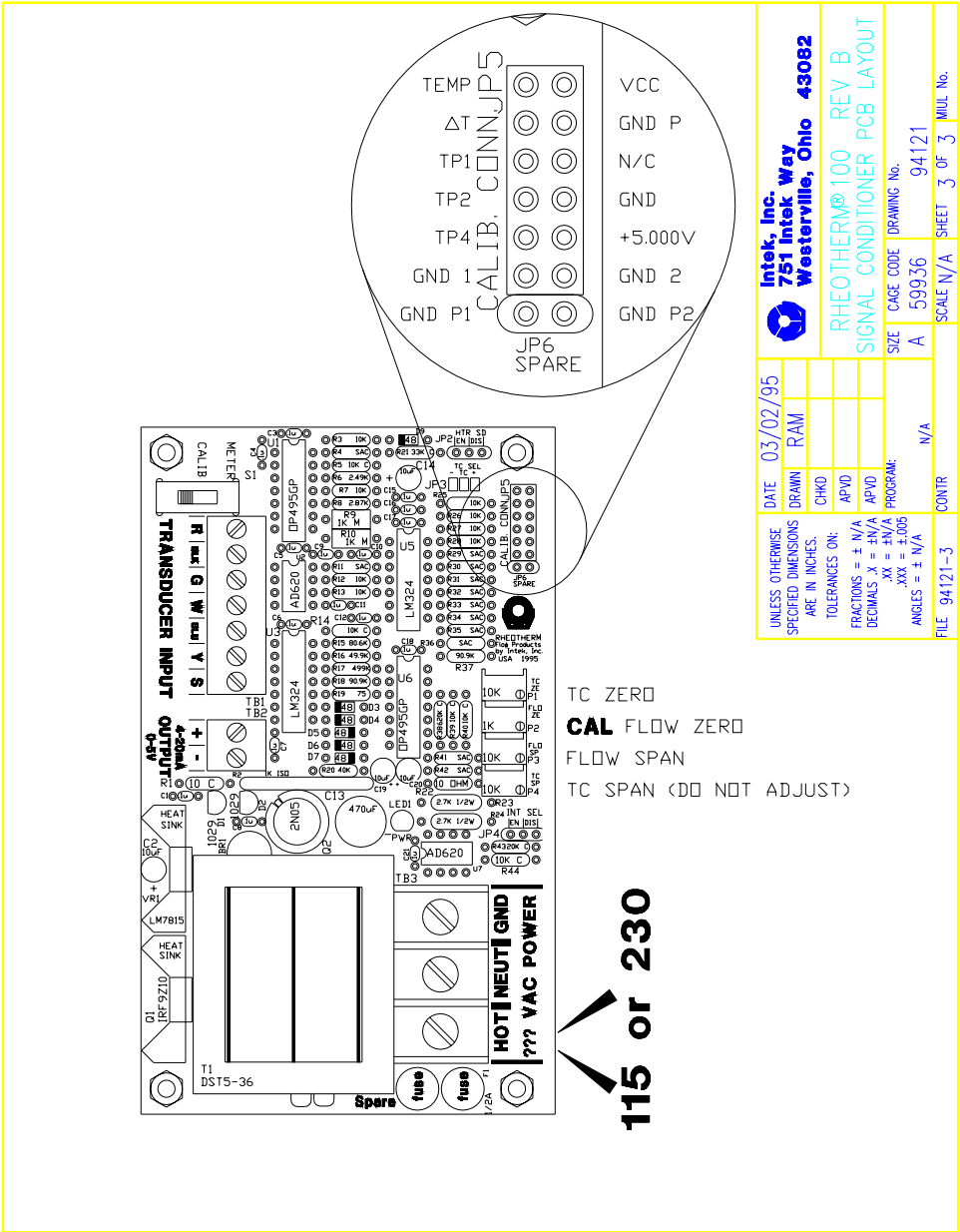


Figure 2. Flow Rate vs. Output Curve