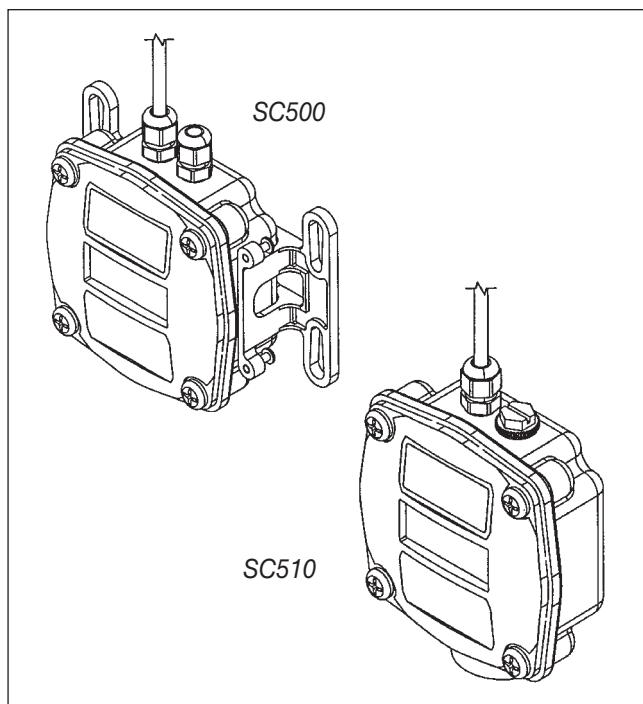


GPI Scaled Pulse Module

Owner's Manual



To the owner...

Congratulations on receiving your GPI Scaled Pulse Module. We are pleased to provide you with a product designed to give you maximum reliability and efficiency.

Our business is the design, manufacture, and marketing of liquid handling, agricultural, and recreational products. We succeed because we provide customers with innovative, reliable, safe, timely, and competitively-priced products. We pride ourselves in conducting our business with integrity and professionalism.

We are proud to provide you with a quality product and the support you need to obtain years of safe, dependable service.

President
Great Plains Industries, Inc.

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GENERAL INFORMATION

This manual will assist you in operating and maintaining the GPI electronics supplied with your GPI meter or as an accessory unit on both local and remote models. The GPI Electronics can be used in indoor or outdoor applications where occasional exposure to moisture is common.

The Scaled Pulse Module can be used on all GPI models, including the Precision G series, IM or the Industrial Grade G2 series, the Commercial Grade A1 series, and the positive displacement GM series oval gear meters.

Product differences in this manual are identified by either, **Local** or **Remote** as necessary.

The new GPI Scaled Pulse Module is a switch-programmable multi-stage counter/divider with multiple inputs. Its function is to provide a pulse output for each number of input pulses. Input pulses are assumed to come from a frequency-output flowmeter mechanism.

Display information in this manual supersedes display information provided with your meter.

GPI flowmeters have a “K-factor” which is the pulse output per unit volume measured stated as “Pulses Per Gallon” (PPG). Other flowmeters also have a “K-factor” as determined by their manufacturer. Verify the “K-factor” unit of measurement before programming this equipment. In a flowrate-measuring system, it’s desirable to have an output signal that has been converted to a standard unit of measure, such as gallons. Such an output can then be used to drive “off-the-shelf” display units and/or relays.

An electronic circuit, including GPI Scaled Pulse Modules, perform this conversion by counting and accumulating input pulses until the count reaches the known K-factor. It then generates an output pulse. At that time the counter/accumulator “starts over” with a new count, and this process repeats continuously as long as input pulses are present.

The GPI Scaled Pulse Module presents a series of 10-position switches by which the user can set the desired K-factor.

All user connections to the GPI Scaled Pulse Module are made through rugged, convenient screw-terminal blocks, so that in typical setups no soldering, “wire nuts” or electrical tape is required.

⚠ CAUTION
This unit is not FM Approved. Therefore, use of this transmitter with an approved metering system voids FM Approval.

NOTE: This unit is DC powered, requiring an input power supply of 5 to 30 volts.

SAFETY INSTRUCTIONS

- When measuring flammable liquids, observe precautions against fire or explosion.
- When working in hazardous environments, always exercise appropriate safety precautions.
- When applying external power to the transmitter, use DC power only.
- Disconnect external power to the transmitter before detaching or attaching input or output wires.
- Ground loops between sensor and user equipment can damage the module and can be dangerous.
- Be sure O-rings and seals are kept in good repair.

INSTALLATION

⚠ CAUTION
Installation should be performed only by qualified personnel, and in accordance with local governing regulations.

The following installation guidelines are separated by meter series and mounting type.

Precision G Series or IM Series:

- **Local** – The SC510 Scaled Pulse Module mounts directly to the 1 inch MNPT conduit connector or Reducer Bushing. (IM Series)
- **Remote** – The SC500 Scaled Pulse Module connects via an output cable as shown in the Wiring Diagram.

Industrial Grade G2 Series:

- **Local** – The SC510 Scaled Pulse Module requires the GPI 510 Conversion Kit (#11344001) for local mounting to the G2 Series meter.
- **Remote** – The SC500 Scaled Pulse Module connects via an output cable as shown in the Wiring Diagram.

GM Oval Gear Series:

- **Remote** – The SC500 Scaled Pulse Module connects via an output cable as shown in the Wiring Diagram.

Mount the GPI Scaled Pulse Module using bolts, screws or standard U-bolts for pipes. Mounting options include:

- Wall
- Pipe
- Meter (1 inch FNPT conduit connection required)

Environmental

Choose a mounting location suitable for the Scaled Pulse Module. The ideal mounting location is where the:

- flowmeter is as close as possible.
- mounting surface has minimal vibration.
- ambient temperature is -40° F to +185° F (-40° C to +85° C).
- cable lengths are minimal.

Avoid mounting locations where the Scaled Pulse Module is:

- subject to constant exposure to water or other liquids (occasional low-pressure splashing will not harm unit if cable entry points are well-sealed).
- close to high voltage/current runs, DC motors, internal combustion engines, or frequency inverters.

Cable Guidelines

The open collector signal itself is very resistant to electrical noise pickup and shielded cable is seldom needed except in very “noisy” (electrical) locations and/or when very long runs (thousands of feet) are used.

Sensor Cabling

- Some products come with 20 ft. of shielded cable.
- If you require a longer cable, a 100 ft. cable kit is available from GPI, or use Belden 9363 cable. When wiring longer lengths of cable, be sure to connect the shield to Module COM ONLY! (Multiple shield connections may cause ground-loop problems).
- Some trial and error may be needed because of the wide variety of user conditions. Try to keep cable lengths short!

WIRING

This manual refers to various models of GPI flowmeters. Determine what type of input the electronics will receive and what type of output, if any, you require. Use the diagrams found in the wiring diagrams section, if the unit is not already wired, to correctly wire the system.

CAUTION

Determine maximum power supply voltage after determining maximum allowable voltage of all electronic devices in the system.

The Scaled Pulse Module may come with 20 ft. of cable to connect to the meter. The customer must supply the power and output wiring.

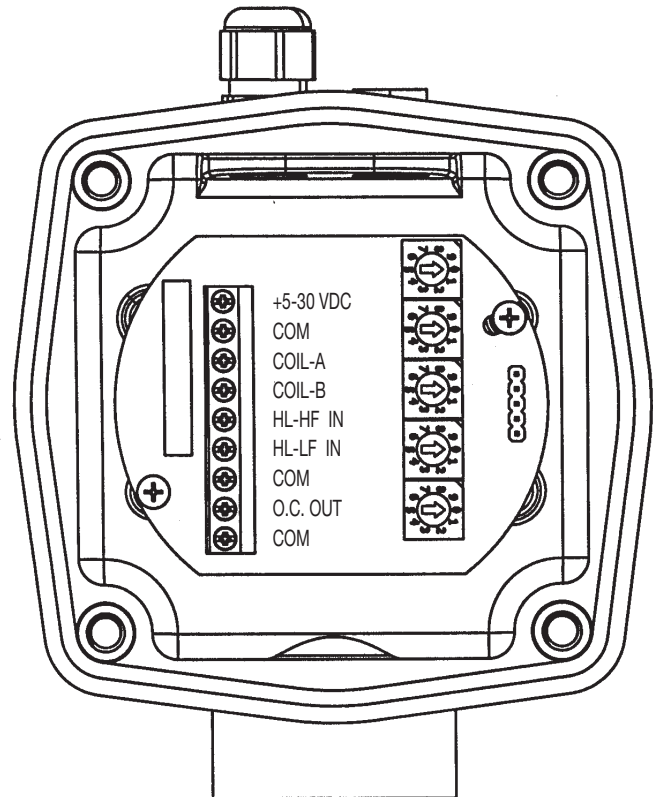
Connecting the Equipment:

- Remove the faceplate by removing the four (4) corner screws.
- Attach wiring from your equipment according to the following terminal connections and wiring diagrams, depending on your circumstances.

TERMINAL CONNECTIONS

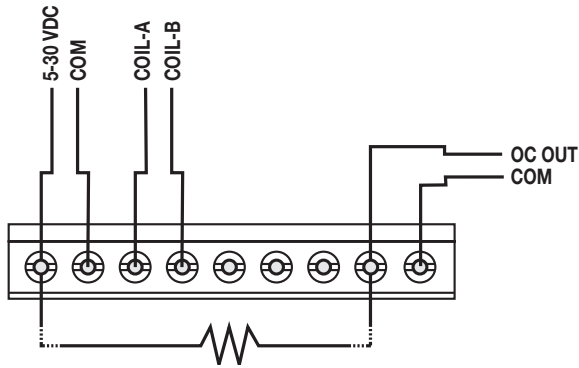
Remote Transmitter INPUTS / OUTPUTS

- COIL-A:** Low-level Sine Wave Input
- COIL-B:** Low-level Sine Wave Input
- HL-HF IN:** High-level High-frequency Input
- HL-LF IN:** High-level Low-frequency Input. 150 Hz maximum
- COM:** Local Common (3 terminals are equivalent)
- O.C. OUT:** Pulse-Out Frequency Output Signal.
It is an "open-collector" output (also known as "n-p-n" or "current-sinking"), referenced to transmitter Local-Common
- +5-30 VDC:** Power supply of 5 to 30 VDC, 25 mA maximum current



WIRING DIAGRAM 1

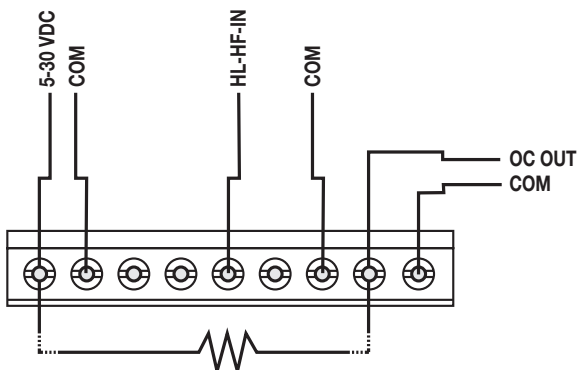
Sine Wave Input from A1, G2 or G Series



Note: Pull-up resistor only required if not supplied by receiving equipment.

WIRING DIAGRAM 2

Open-Collector, Hall Effect, RF, Active Drive From G2, GM, IM or G Series High Level, High Frequency Input

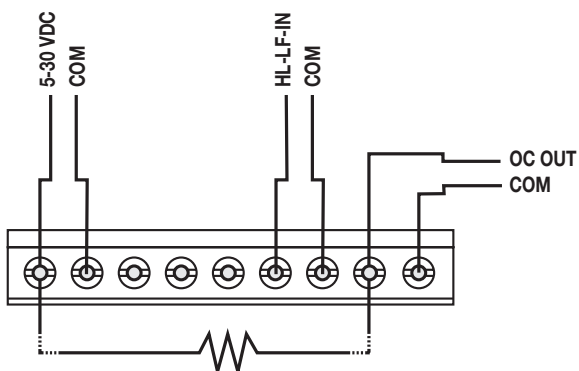


Note: Pull-up resistor only required if not supplied by receiving equipment.

WIRING DIAGRAM 3

High Level, Low Frequency Input

Contact Closure or Reed Switch from GM and IM Series



Note: Pull-up resistor only required if not supplied by receiving equipment.

INPUT(S)

The GPI Scaled-Pulse circuit contains input conditioning, with circuit protection, for the three most commonly found flowmeter signal-output types:

Coil Input:

- This input accepts a low level or “sine wave” signal from almost any magnetic pickup coil.
- Signal amplitude must be greater than 25 mV p-p (peak-to-peak), and have only a single “rising edge” and a single “falling-edge” per cycle.
- The Coil Signal Input should not exceed 1V p-p in amplitude.
- **Do not** connect either of the Coil Input lines to any ground point.

NOTE: In applications with very low p-p voltage, shielded cable may be required (to reduce electrical “noise” pickup) between the pickup coil and the input terminal. If a cable shield is used, connect **only** the circuit end to any of the COM terminals. **Do not** connect the shield to anything at the pickup coil end.

High Level, High Frequency:

- This input accepts a signal from either an open-collector device (there is a built-in “pull-up” resistor at this input), or an active-drive device (sometimes called a “square wave”). Such signals usually come from either a “pre-amp” or some type of “active” pickup device (such as a Hall Effect or RF Sensor).
- If open-collector, the correct signal amplitude will automatically be applied by the GPI circuit.
- If active-drive, the minimum required signal amplitude is 2V p-p. The maximum active-drive signal amplitude should be restricted to no more than about 25V p-p.

NOTE: The High Level, High Frequency input is not “debounced.” **Do not** connect a switching device (such as a Reed Switch) to this input.

High Level, Low Frequency:

- This input accepts a contact closure type pickup device, such as a Reed Switch.
- Maximum upper frequency is restricted to about 150 Hz.
- The input is internally “debounced” so that it will correctly process a contact-closure type pickup device, such as a Reed Switch.
- Otherwise, the input generally has the same form and specifications as the High Level, High Frequency input described above.

NOTE: No additional components are usually required, since the GPI circuit contains a built-in “pull up” resistor at this input.

OUTPUT

The GPI Scaled-Pulse circuit has a single output. It is a true open-collector type, referenced to any of the COM terminals. This output is rated for a maximum sink current of 200 mA, and a maximum open circuit voltage of 60V. Be sure that you never exceed these limits.

NOTE: Do not apply any AC voltage to this output, as the internal device may be damaged.

The output produces a single fixed-duration pulse (pulls “low” briefly) once per “n” input pulses, where “n” is the number set by the K-factor switches (see operational description). A relay is **not** supplied; however, the user may drive a relay by connecting the coil from the positive DC voltage supply to the open collector output. If so, a DC coil relay should be chosen, with its coil voltage equal to the supply voltage and resistance chosen to limit current to less than 200 mA.

The duration of the output pulse is fixed at 25 milliseconds. This duration is long enough to operate a typical relay or mechanical counter. However, a very low K-factor may result in an output that appears to be “ON” all the time. Shorter (or longer) output pulse durations can be supplied, and may be available on special order from the factory.

POWER SUPPLY

The GPI Scaled Pulse circuit is designed to operate correctly when supplied with any DC voltage between about 5-30 volts, referenced to any of the COM terminals. The supply voltage need **not** be regulated, as long as it falls within these limits. Reverse polarity protection is included.

Normal operating current is about 10-15 mA, and will never exceed 25 mA.

⚠ WARNING

Do not apply AC voltage to the unit. Low voltage AC will not damage the unit, but may cause erratic operation.

ENVIRONMENTAL

All electronic components in the GPI Scaled Pulse circuit are rated for an operating temperature range of -40° F to +185° F (-40° C to +85° C).

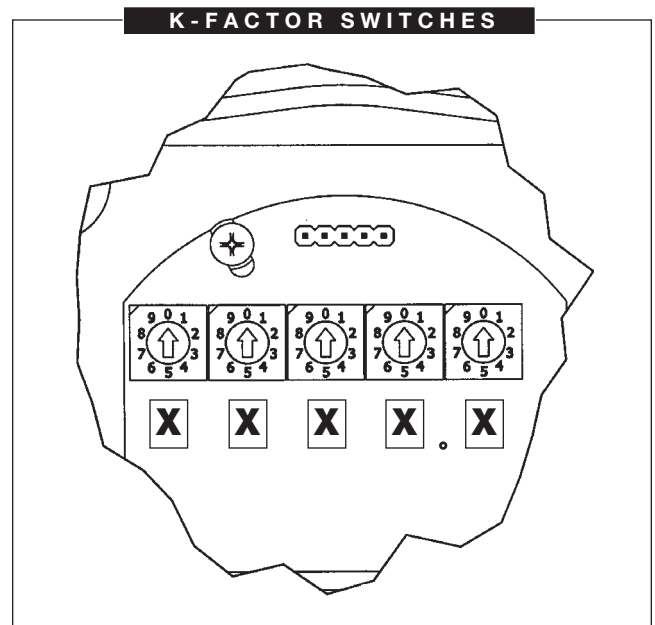
The circuit will operate correctly in humidity conditions up to about 95% non-condensing. As with most electronic circuits, exposed circuitry should not be subjected to liquid moisture.

No Components of the Scaled Pulse circuit are especially sensitive to shock or vibration. Ordinary back-of-truck vibration will not damage the unit.

OPERATIONS

When installing the GPI Scaled Pulse Module, make sure that all electrical connections are tight and secure.

The only user-adjustable settings are to the K-factor switches. On a typical flowmeter, the K-factor is usually available, either stamped on the unit itself or printed in the accompanying documentation (if you cannot find it, please contact the meter’s manufacturer). Using a small straight blade screwdriver or similar tool, simply set the module’s K-factor switches to this number.



The “X” markers represent the digits of the K-factor. This allows a K-factor range of 0000.1 to 9999.9. The switches are arranged and labeled as follows:



Each switch may be set to any of 10 positions (0-9). Set each so that the whole string of switches represents the meter’s K-factor. The switches do not have any mechanical stops and may be turned all the way around.

If the meter’s K-factor does not contain a decimal point, set the right-most switch to “0”.

Example: Meter K-factor is 3555 PPG



If the meter’s K-factor has more than one decimal position, you must round the number so that you can set the switches with only one decimal position.

Example: Meter K-factor is 5252.38 PPG



If the meter's K-factor is less than 1000.0 PPG, you must set the left-most switches to "0".

Example: Meter K-factor is 75 PPG

0 0 7 5 . 0

645 PPG x 1.0 = Gallon 645
 645 PPG x 0.1 = 1/10th Gallon 64.5
 645 PPG x 10.0 = 10 Gallons 6450

If you need one output pulse for every 1/10th unit instead of every whole unit, multiply the meter's K-factor by 0.1 and then setting the result on the switches.

If you need one output pulse for every 10 units, multiply the meter's K-factor by 10.

Example: Meter K-factor is 645 PPG

645 PPG x 1.0 = Gallon, set 645

0 6 4 5 . 0

(1 Pulse Out = 1 Gallon)

645 PPG x 0.1 = 1/10th Gallon, set 64.5

0 0 6 4 . 5

(10 Pulses Out = 1 Gallon)

645 PPG x 10.0 = 10 Gallons, set 6450

6 4 5 0 . 0

(1 Pulse Out = 10 Gallons)

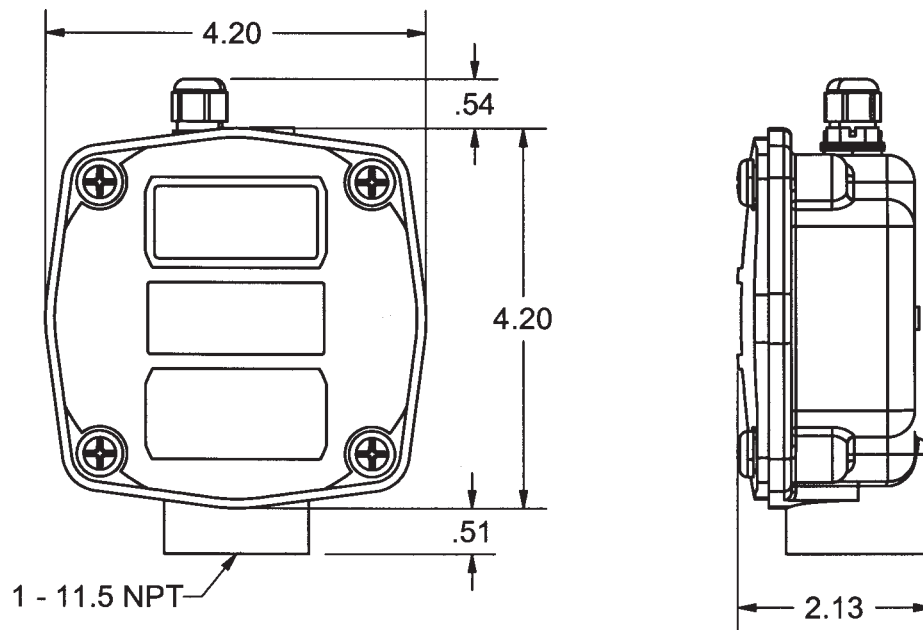
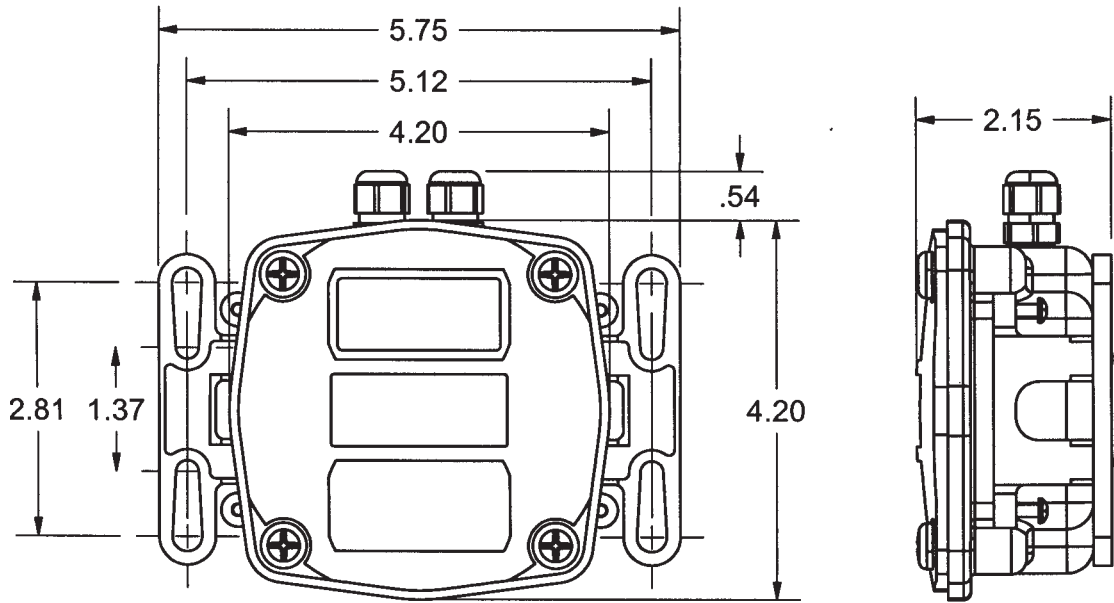
If you need to set a very large K-factor (larger than 9999.9), with a standard unit, you will have to follow the instructions for getting an output pulse every 1/10th unit. That is, multiply the meter's K-factor by 0.1, and then enter the result on the switches. Remember that you will get an output pulse every 1/10th unit instead of every whole unit.

If you need to set a very large K-factor (greater than 9999.9), and still need an output pulse for every whole unit, please contact the factory. It is possible to supply, on special order, units with a K-factor range of 00000 to 9999-9 (i.e., no decimal place).

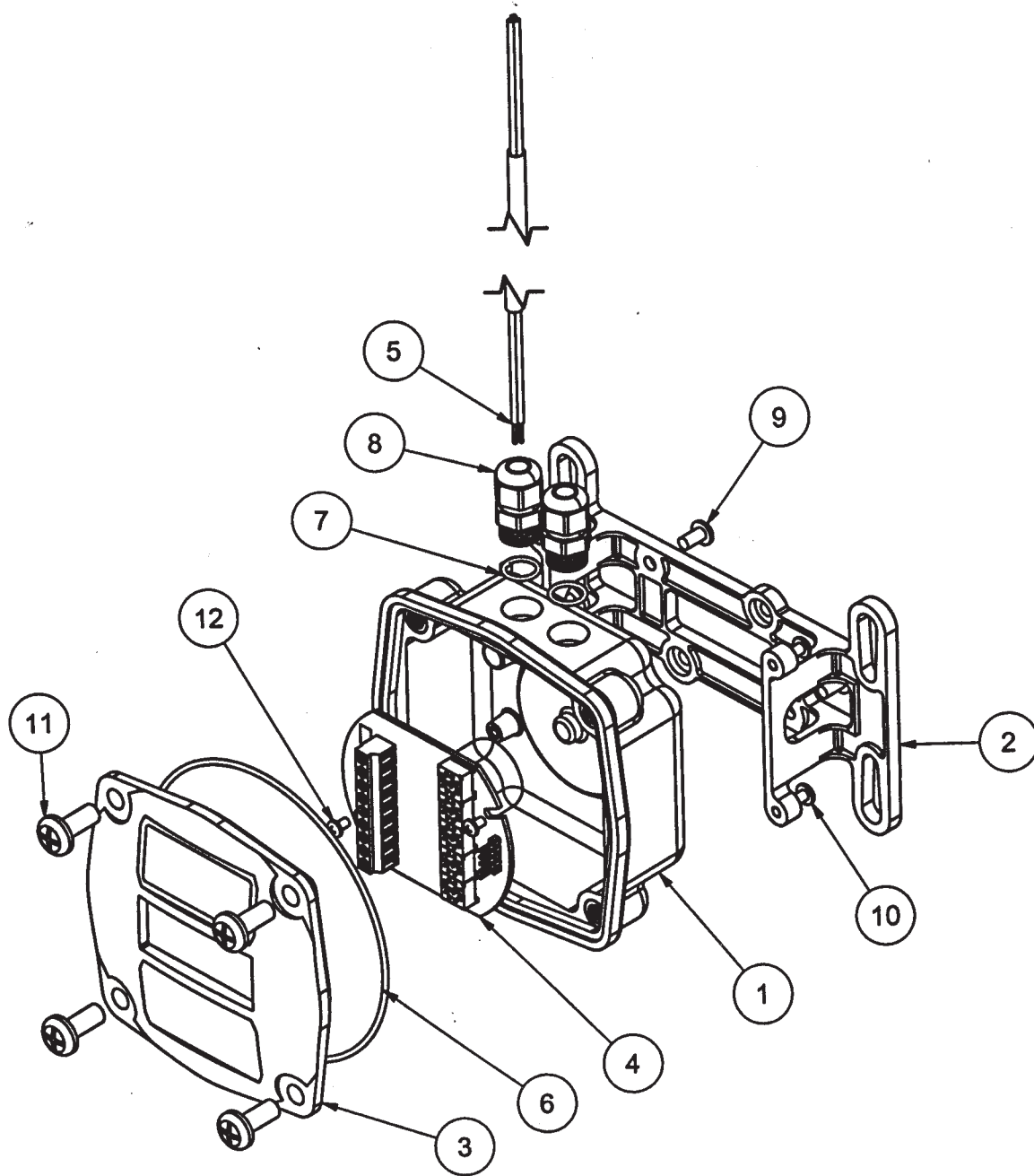
TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
A. NO OUTPUT ACTIVITY WHEN USING "COIL" OR "HL-HF-INPUT"	1. Signal too weak 2. Frequency above 1500 Hz 3. Electronic failure	Supply stronger signal. Supply lower frequency. Contact factory.
B. NO OUTPUT ACTIVITY WHEN USING "HL-LF-INPUT"	1. Signal too weak 2. Frequency above 150 Hz 3. Electronic failure	Supply stronger signal. Supply lower frequency. Contact factory.
C. EXTRA OR ERRATIC OUTPUT PULSES WHEN USING ANY INPUT	1. Signal picking up electronic "noise" 2. Electronic failure	Use shielded (or shorter sensor) cable. Contact factory.
D. EXTRA OR ERRATIC OUTPUT PULSES WHEN USING REED SWITCH	1. Using incorrect input	Use HL-LF input for Reed Switch.
E. OUTPUT "FLUTTERING" RAPIDLY OR "ON" CONTINUOUSLY	1. Very low K-factor plus very high frequency	Use "10x" K-factor, output will be one pulse per 10 units (see above).
F. OUTPUT PULSE PRESENT, BUT WILL NOT OPERATE RELAY OR COUNTER	1. Relay or counter needs longer-duration pulse	Contact factory.

DIMENSION DRAWINGS

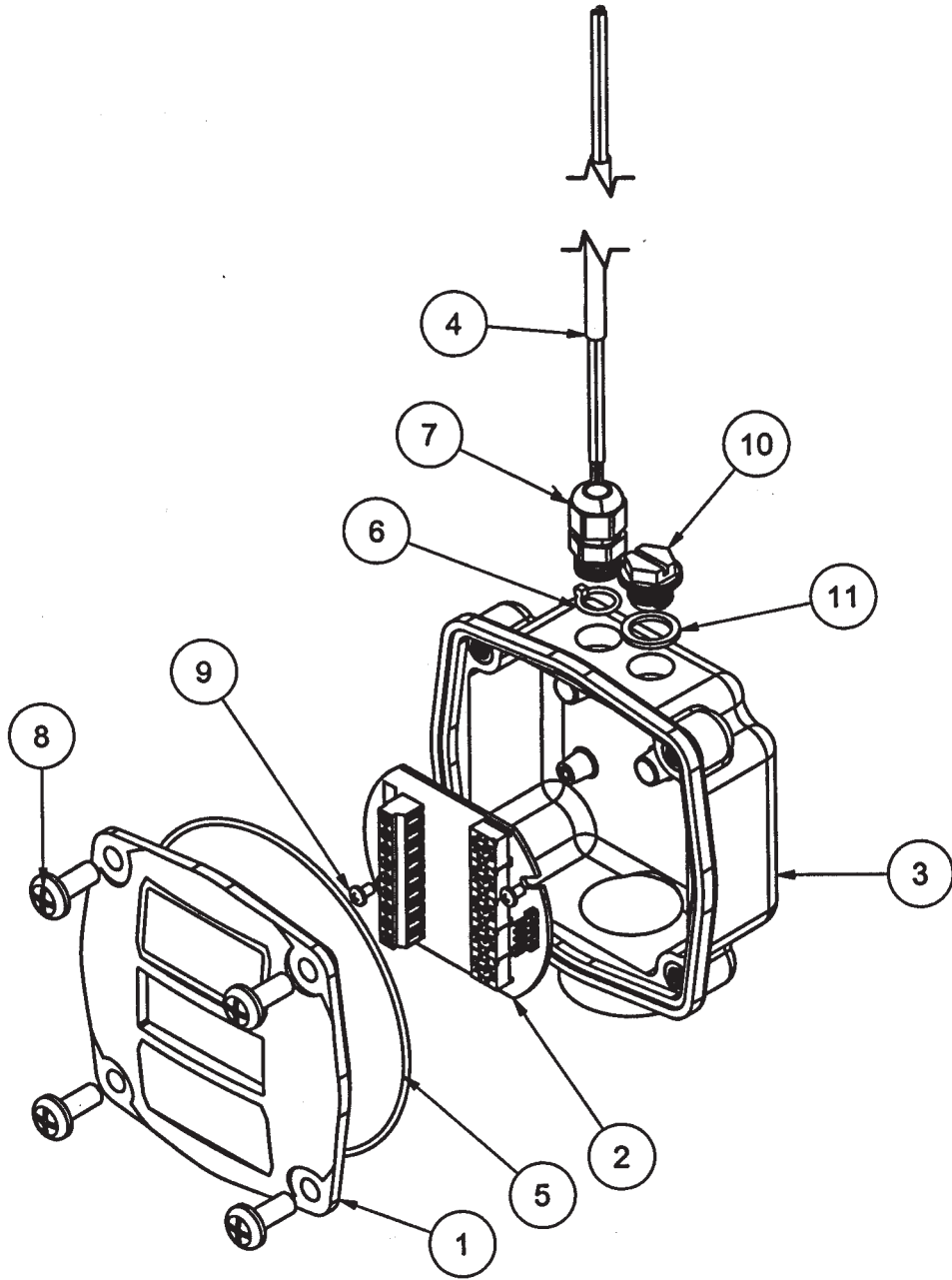


ILLUSTRATED PARTS DRAWING - SC500



Item No.	Part No.	Description	No. Req'd.
1	120509-01	Adapter Kit.....	1
2	120058-01	Bracket	1
3	12052001	Blank Coverplate Kit.....	1
4	12052101	Circuit Assembly Kit	1
5	125066-20	Cable, 20 ft.	1
6	901002-82	O-Ring	1
7	901002-87	Seal.....	2
8	902005-9	Strain Relief	2
9	904002-44	Screw, 8-32 x 5/16"	2
10	904005-13	Screw, 6-32 x 1/2"	4
11	904005-28	Sealing Screw, 1/4 - 20 x 5/8"	4
12	904005-63	Screw, 4-40 x 3/16"	2

ILLUSTRATED PARTS DRAWING - SC510



Item No.	Part No.	Description	No. Req'd.
1	120059-01	Blank Coverplate Kit.....	1
2	12052101	Circuit Assembly Kit	1
3	12051701	Enclosure Kit.....	1
4	125066-20	Cable, 20 ft.	1
5	901002-82	O-Ring	1
6	901002-87	Seal.....	2
7	902005-9	Strain Relief	2
8	904002-44	Sealing Screw, 1/4 - 20 x 5/8"	4
9	904005-63	Screw, 4-40 x 3/16"	2
10	906005-47	Threaded Plug	1
11	906005-48	Seal.....	1

SPECIFICATIONS – LOCAL MODEL

Applications:

Use for indoor or outdoor applications where occasional moisture is common.

Materials:

Acetal, Polyester (decals), FKM (gasket & seals), Stainless Steel (fasteners)

Power Source:

5 to 30 VDC loop voltage required for correct operation.
Maximum current (exclusive of output current) = 25 mA

Input Signal:

Hall Effect, Reed Switch, NPN, Open Collector or Sine Wave

Accuracy/Performance:

Accurate to ± 1 count

Frequency Range:

Coil, HF = 0-1500 Hz
LF = 0-150 Hz

Operating Temperature:

-40° F to +185° F (-40° C to +85° C)

Cable:

No cable provided

Mechanical Connections:

Unit is mounted directly to flow meter body.

Electrical Connections:

SC500 - Two strain relief ports
SC510 - One strain relief port: one threaded plug

Shipping Weight:

1.1 lb. (.5 kg)

SPECIFICATIONS – REMOTE MODEL

Applications:

Use for indoor or outdoor applications where occasional moisture is common.

Materials:

Acetal, Polyester (decals), FKM (gasket & seals), Stainless Steel (fasteners), PVC (cable jacket)

Power Source:

5 to 30 VDC loop voltage required for correct operation.

Frequency Range:

Coil = 0-1500 Hz
HLLF = 0-150 Hz
HLHF = 0-1500 Hz

Operating Temperature:

-40° F to +185° F (-40° C to +85° C)

Cable:

20 feet, 3-conductor (red, black & white), tinned drain wire, 22 AWG, PVC jacket .212 dia., (Reference Belden 9363 or equivalent cable)

Mechanical Connections:

Wall or pipe mountable with standard U-bolts

Electrical Connections:

SC500 - Two strain relief ports
SC510 - One strain relief port: one threaded plug

Shipping Weight:

1.1 lb. (.5 kg)

SERVICE

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, contact the GPI Customer Service Department in Wichita, Kansas, Monday-Friday, 8:00 a.m. to 5:00 p.m. Central time.

Tel: 316-686-7361

Fax: 316-686-6746

Toll free: 1-888-996-3837

To obtain prompt, efficient service, always be prepared with the manufacturing date code, found behind the coverplate.

For warranty work, always be prepared with your original sales slip or other evidence of purchase date.

Please contact GPI before returning any part. It may be possible to diagnose the trouble and find a solution with a telephone call. GPI can also inform you of any special requirements you will need to follow for shipping.

Limited Warranty Policy

Great Plains Industries, Inc. 5252 E. 36th Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 1 year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. The warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of manufacture or on the date of purchase with an original sales receipt. This warranty shall not apply if:

- A. the product has been altered or modified outside the warrantor's duly appointed representative;
- B. the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, contact the GPI Customer Service Department at 316-686-7361 or 888-996-3837. Or by mail at:
Great Plains Industries, Inc.
5252 E. 36th St. North
Wichita, KS, USA 67220-3205

The company shall, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC., EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

Note: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT – Part 702 (governs the resale availability of the warranty terms).

GPI *meters.com*

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