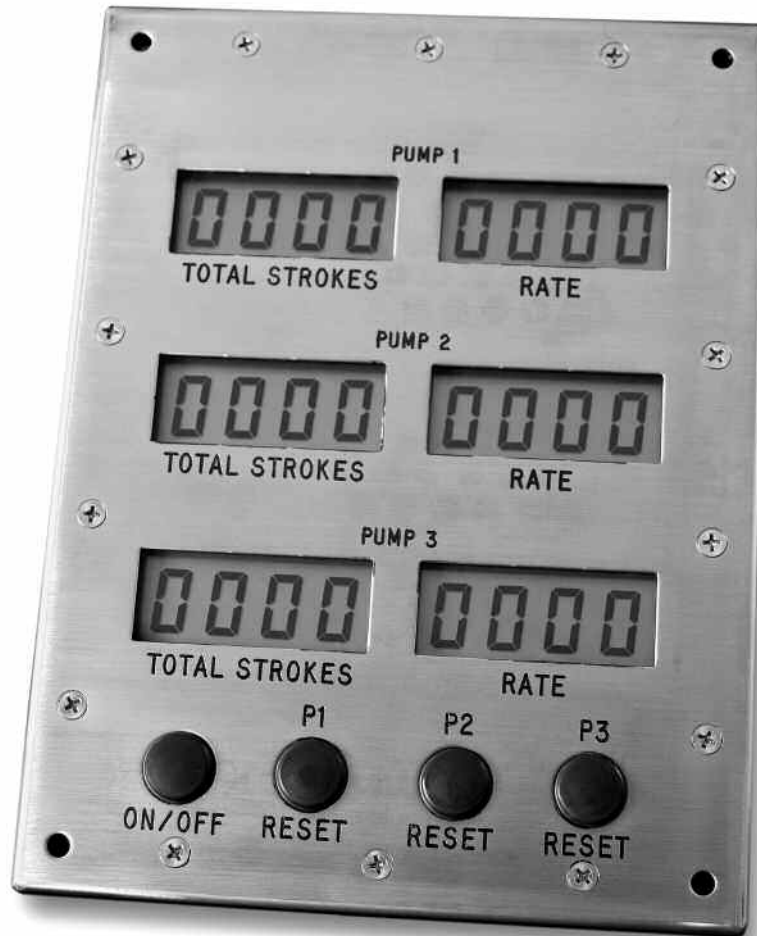


PSC-301 Pump Stroke Counter

3 PUMP MODEL



Operations and Maintenance Manual

Rev 1000



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OPERATIONS AND MAINTENANCE MANUAL

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SECTION 1

Systems General Information

1.A General Information

This manual describes the installation, operation and maintenance of the WGI Model PSC-301 Pump Stroke Counter System. This manual provides the user with information necessary to properly utilize the Pump Stroke Counter. Included here is all of the necessary information and procedures necessary to install and maintain this Pump Stroke Counter instrument.

1.B Unpacking and Inspection

Upon receipt of the equipment, assure all items are accounted for on the packing list. If any are missing, immediately inform the shipper. Inspect all items for damage. If any are damaged, immediately inform the freight forwarder and WG Industries, Inc.

1.C Precautionary Information

Assure all directions on the packages are followed during unpacking and handling.

1.D Personnel Qualifications

This equipment requires experienced personnel to handle, install and maintain it. WGI offers technical training if the Customer desires.

SECTION 2

System Description:

2.A Pump Stroke Counter

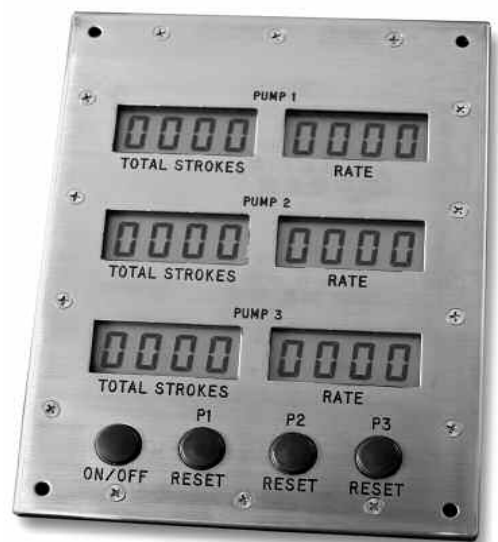
One Pump Stroke Counter with input capacity for three pumps.

2.B Pump Stroke Switches

Switches and cable assemblies are furnished by the customer, or the agent of WG Industries.

2.C Counter Capability

WGI Pump Stroke counters are capable of a minimum of 8 strokes per minute and a maximum of 240 strokes per minute for each pump.

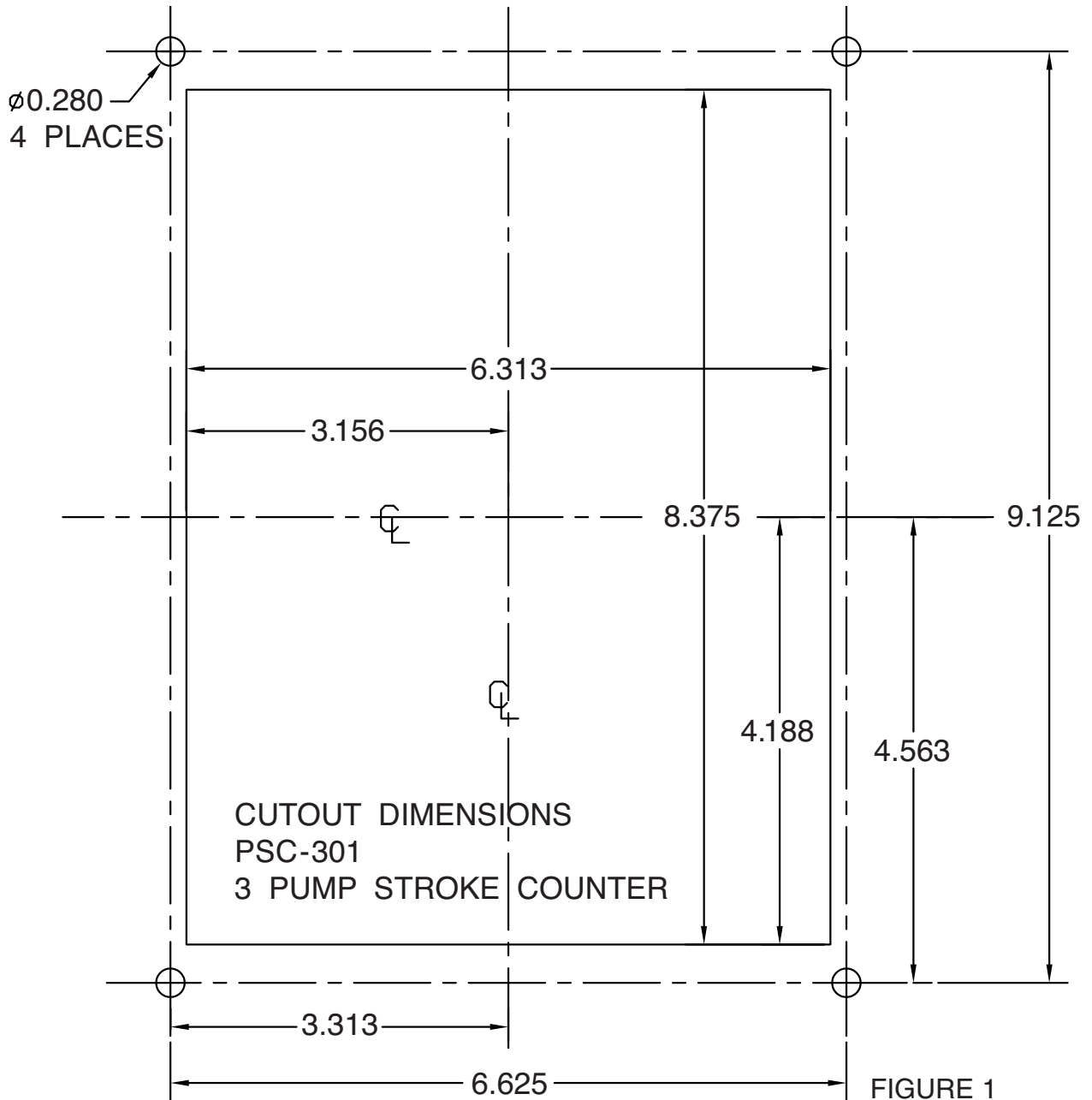


SECTION 3 Installation

3.A Pump Stroke Counter Installation

3.A.1 Pump Stroke Counter

The Pump Stroke Counter is mounted in a driller's or choke control panel in a rectangular opening, with dimensions as described in figure 1. Four bolts are used to fasten the Pump Stroke Counter to the panel, which are normally 1/4" stainless steel hex head bolts with flat washers under the head, and lock washers and nuts behind the panel. Care should be taken not to over-tighten these bolts, as the clear panel behind the front panel can fracture if torque sufficient to distort the stainless front panel is applied.



3.A.2 Pump Stroke Counter Cables

The cables are provided by either the customer or WGI Industries' agents, and should be wired according the diagram in figure 2. The connector for this cable is centered at the lower rear of the Pump Stroke Counter housing.

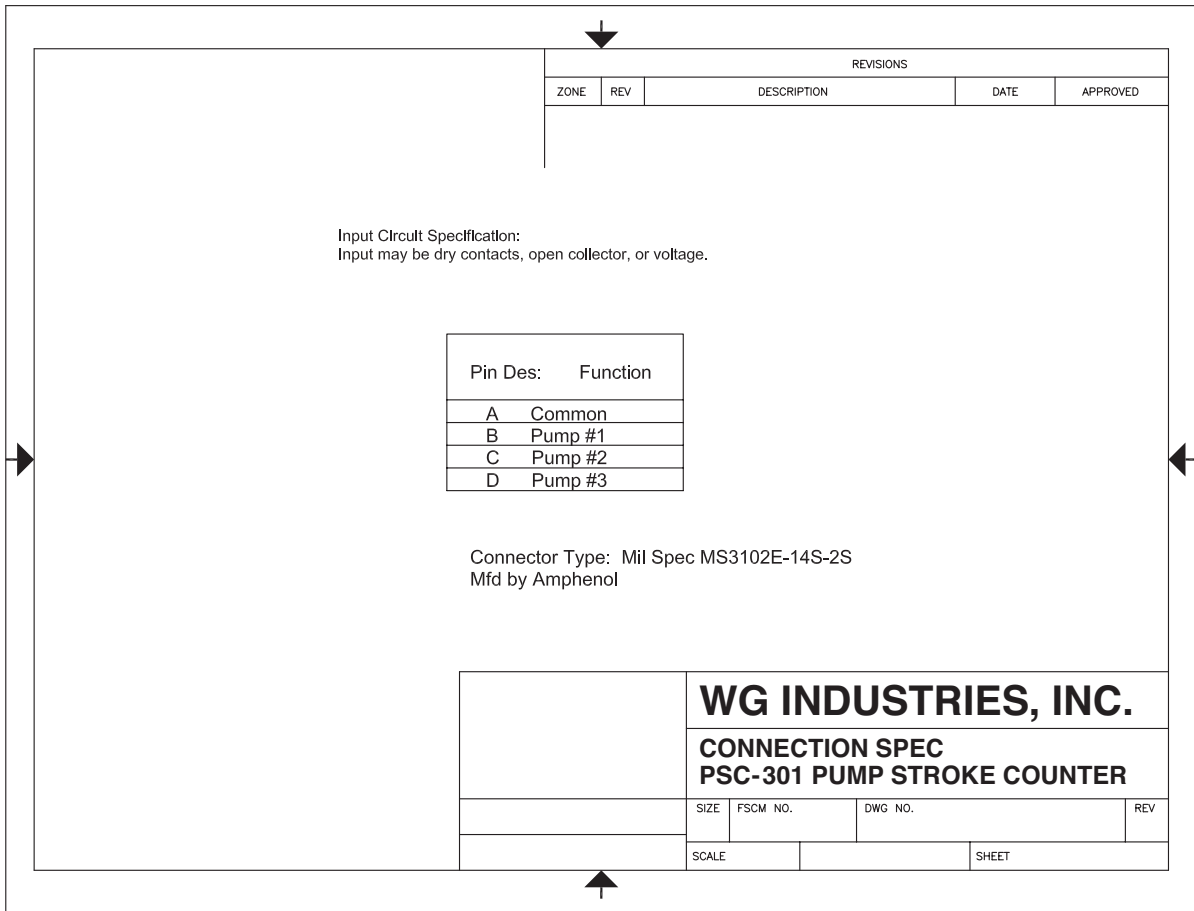


FIGURE 2

SECTION 4 Theory of Operation

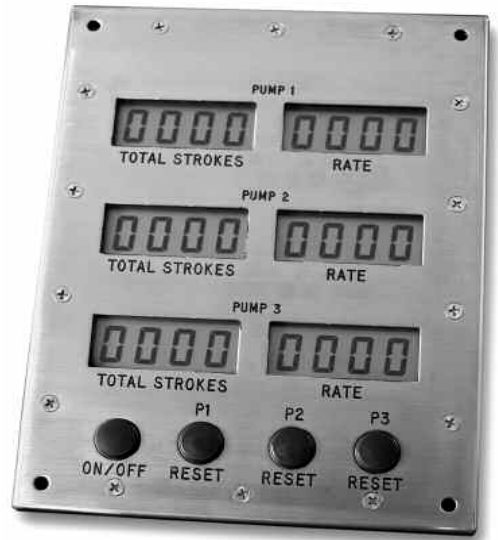
4.A Pump Stroke Counting System

This system is comprised of a Control Head containing the necessary batteries, displays, control and external connector. All power is supplied by a 3.6 Volt battery contained inside the instrument housing. Under normal use this battery should last approximately 5 years. The required input to the Pump Stroke Counter is either a simple switch closure to common, or an open collector driver circuit from external electronic detectors. The input is intrinsically safe, and can only provide a maximum of 52 microamperes under short circuit conditions at each pump connection. The Pump Stroke Counter detects signal closures and openings, and counts them with one increment, while determining the pump rate via an internal microprocessor. The Pump Stroke Counter contains a crystal-controlled real-time clock, with an accuracy of better than 100 parts per million.

Using the Pump Stroke Counter

There are 3 push-buttons (switches) on the front panel, one for power, and one each for clearing the count on each pump.

The power switch is an alternate action type; Pressing it will turn the device on, and pressing it again will turn the device off. When the unit is on, there will be a Total Strokes displayed, and when the Mud Pump is operating, the rate will be displayed in the Strokes/Minute window.



The other three push-buttons are for individually clearing the Total Strokes counters. Each time the switch is pressed, the count will be cleared on the corresponding display.

SECTION V Calibration

5.A No calibration is required for the Pump Stroke Counter.

No calibration is required for the Pump Stroke Counter. The device contains an internal crystal clock, which is used for determining the pump stroke rate.

SECTION VI Maintenance

6.A The internal battery will have to be replaced at the end of its life.

The internal battery will have to be replaced at the end of its life. This will normally be several years – a normal life is approximately 5 years – but the life can be shortened with extremes of temperature. When the display segments appear to no longer have a high contrast, it is time to replace the battery. Turning the unit off when not in use will extend the battery life.

SECTION VII

Warranty

WG Industries, Inc. (WGI) warrants the unit for a period of one year from the date of shipment. The warranty covers replacement of those parts having defects in material or workmanship when used for "Normal Oilfield Usage". For the purpose of this warranty, this is defined as normal oilfield monitoring applications.

WGI will not honor the warranty if any evidence of tampering, misuse or intrusion is indicated, except by a WGI authorized agent.

WGI will replace or repair – as it deems appropriate – any products covered by this warranty, after WGI's examination discloses to its satisfaction that the Pump Stroke Counter is defective and an adjustment is required. All products accepted under the provisions of this warranty shall be shipped prepaid to WGI or its agents, and returned to the customer prepaid by WGI.

WGI will not be responsible for repair or replacement of products resulting from improper handling, storage, installation, misuse, negligence or use in a manner contrary to the recommendations of WGI.

WGI warrants only the products that it sells – but manufactured by others – to the extent of the other manufacturer's warranties. All warranty claims shall be made in writing to the nearest WGI agent or factory representative. WGI makes no other warranty of any kind, expressed or implied, and all implied warranties of merchantability or fitness for a particular purpose which exceeds WGI's aforementioned obligation are hereby disclaimed by WGI and excluded from warranty.

This Warranty is non transferable, and WGI shall not be liable for any damage, or loss of property, or injury to persons, resulting from the use of any of WGI's products or equipment whether such damage, injury or loss results from, or is caused by manner of use, defects in materials, or workmanship or otherwise.

WGI

The WGI Pump Stroke Counter (Model PSC-301) simultaneously monitors and displays the total accumulated pump strokes and the stroke rate, of three individual mud pumps. The stroke rate and the total stroke count are independently displayed at all times, with the stroke count being updated at every stroke, as is the stroke rate. The WGI battery is designed to operate continuously for 5 years. No calibration is required. The quartz crystal oscillator provides high precision stroke rates with no appreciable drift. The WGI Pump Stroke Counter is designed to be intrinsically safe, and is built to operate in Class I Division II hazardous locations. The stainless steel enclosure is completely sealed. Labels are permanently engraved on the front panel. The entire package is constructed to operate in harsh environments and high vibration conditions encountered in normal drilling rig operations.

Specifications:

Dimensions:	10.125" L x 7.625" W x 3" D (20.3x20.3x10.2 cm)
Weight	8 lbs (3.63 Kg)
Case Material	Stainless Steel
Front Panel Control	Power on/off, pump count clear (3 pushbuttons)
Stroke Rate Range	8 to 240 strokes per minute (SPM)
Total Accumulated Strokes	9999 strokes (Counter will then roll over to 0)
Battery	3.6 Volt Lithium Cell
Battery Life	5 year's continuous operation under normal usage
External Power	None Required
Display	Liquid crystal display for total strokes & SPM
Time Base	Quartz Crystal oscillator
Pump Switch	Any "dry" contact, open collector or pulsed voltage inputs. For open collectors, the maximum permissive voltage presented at the connector is +3.6V. For pulsed voltages, the voltage range is ± 25 VDC. The input is ESD protected to ± 15 kv for harsh industrial environments.
Operating & Storage Temperatures	-40° to +75° C