PIG-SIG® V
Scraper Passage Indicator

Operating and Maintenance Instructions

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Notice

Any operation involving work on pipe containing liquids or gases under pressure is potentially hazardous. It is necessary, therefore, that correct procedures be followed in the use of this equipment to maintain a safe working environment.

No person should use this equipment who is not fully trained in the procedures stated in this manual, and who is not fully aware of the potential hazards connected with work on pipe containing liquids or gases under pressure.

The purchaser of this equipment is responsible for the manner in which this equipment is used and the training and competence of the operators.

Should any difficulty arise at any time in the use of this equipment, please contact T.D. Williamson immediately. Failure by any person to follow the procedures and instructions, including all warnings and cautions, provided in this manual shall void any T.D. Williamson Product Warranty provided herein.

For Parts and Service:
P.O. Box 3409, Tulsa, OK 74101- 3409 USA

In the U.S. toll free 1-888-TDWmSon (839-6766)
Phone (918) 447-5100
Fax (918) 446-6327
E-mail: contact@tdwilliamson.com
Explore the TDW Web site at www.tdwilliamson.com.

Document Version History

The list below shows the complete revision history of this document

Date	Version
02/2013	Document Release
12/2014	E005298
01/2018	Revision to Pg 62 Language

Table of Contents

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Section I – Safety

1.0 SAFETY

Throughout this publication, “Dangers,” “Warnings” and “Cautions” (accompanied by the International ⚠) are used to alert the customer to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. **OBSERVE THEM CAREFULLY!**

⚠ DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death.

⚠ WARNING

WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death and damage to the equipment.

⚠ CAUTION

CAUTION – Hazards or unsafe practices which could result in minor personal injury or product or property damage.

1.1 General

Ensure the safety features and operating procedures of the drilling machine are understood. Do not attempt to make a tap or set a PIG-SIG® V plug assembly without having a complete understanding of the drilling machine and of the precautions of working on pressurized lines.

1.2 Personal Protective Equipment and Protective Clothing

Protective clothing is recommended whenever working around machinery. Suggestions are: hard hat, gloves, safety goggles, safety shoes, garments to cover exposed areas of skin, hearing protection, and the appropriate breathing apparatus when the potential for toxic atmosphere exists.

Section I – Safety

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Section II – Introduction

1.0 Purpose

1.0 PURPOSE

This manual is designed to provide the operator with factory recommended operation and maintenance instructions for safe and effective use of the TDW PIG-SIG V Scraper Passage Indicator.

Read the entire manual for instructions on installation, operation, and preventative maintenance for the PIG-SIG V:

- On a plug assembly already set in a pipeline.
- On a line under pressure.
- On a line not under pressure.

2.0 Description

2.0 DESCRIPTION

The TDW Scraper Passage Indicator is a device that is installed on a pipeline to detect the passage of a pig or sphere.

The PIG-SIG V indicator has a trigger that extends into the pipeline through a welded fitting that has been tapped. When a pig passes, the trigger is tripped, activating the signaling mechanism. Signaling mechanisms available include a flag indicator, electrical indicator, and a combination flag and electrical indicator. PIG-SIG V indicators are interchangeable with all PIG-SIG indicators now in the field. This makes it possible to use these units as conversion kits as well as complete PIG-SIG indicators. The PIG-SIG V indicator is weather-proof, corrosion-resistant and the flag indicator offers high visibility. All parts of the standard PIG-SIG V construction are manufactured from stainless steel.

Section II – Introduction

2.0 Continued

The PIG-SIG V Plug Assembly can be installed on or removed from a pressure pipeline using a TDW T-101 series Drilling Machine and accessories. In some cases, a T-101 XL drilling machine may be required. This manual addresses the T-101b and T-101b XL.

The PIG-SIG V indicator is available in various combinations of operation, indication and materials of construction, depending on piping requirements including:

- All PIG-SIG V units are omni-dimensional.
- Flag indicator with manual reset flag (see Table 1).
- Electrical indicator with auto reset (see Table 2).
- Combination electrical auto reset with manual reset flag indicator (see Table 3).
- Indicator extensions from one to ten feet.
- Flanged mounting.
- Because of stainless steel construction, any model is suitable for environmentally harsh conditions.

Table 1 shows the components of the manual reset flag indicator model. Table 2 shows the components of the electrical indicator with auto reset. Table 3 shows the components of the combination model featuring electrical auto reset with manual reset flag indicator.

Section II – Introduction

Table 1. PIG-SIG V Flag Indicator With Manual-Reset Flag		
Flag Indicator Assembly Cap	Plug Assembly	THREAD-O-RING Nipple
		
Set Screws and Allen Wrench	PTFE Grease Lubricant (Anti-Seize)	Silicon Grease Lubricant
		

Table 2. PIG-SIG V Electrical Indicator With Auto Reset

Electrical Indicator Assembly Cap	Plug Assembly	THREAD-O-RING Nipple
		
Set Screws and Allen Wrench	**PTFE Grease Lubricant (Anti-Seize)**	**Silicon Grease Lubricant**
		

Table 3. PIG-SIG V Combination Electrical Auto Reset with Manual Reset Flag Indicator		
Electrical Indicator Assembly Cap	Plug Assembly	THREAD-O-RING Nipple
		
Set Screws and Allen Wrench	PTFE Grease Lubricant (Anti-Seize)	Silicon Grease Lubricant
		

2.0 Continued

Within each type, the PIG-SIG V indicator is available in a number of variations, including such options as O-ring material and material used in plug construction. A number of extension lengths up to 10 feet are available to elevate the indicator.

The PIG-SIG V indicator can be installed on a line under pressure, without taking the line out of service, using the TDW T-101, T-101a or T-101b (or XL versions) drilling machine.

2.1 Specifications

A. THREAD-O-RING Nipple (Figure 2.1). For material specifications and pressure-temperature ratings, refer to Table 4 and Table 5.

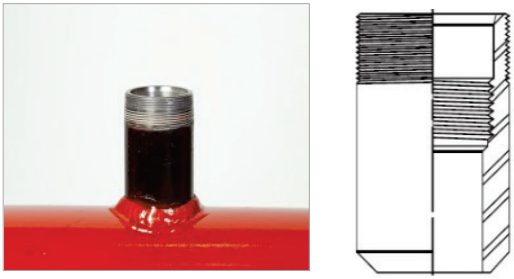

Figure 2.1 THREAD-O-RING Nipple

B. THREAD-O-RING-Nipple Material. (Refer to Table 4.)

Table 4. THREAD-O-RING Material Specifications	
Size and Grade	2 NPS XXS, ASTM A 333 Grade 6 seamless steel pipe
Tensile Requirements	35,000 psi SMYS – 60,000 psi SMYS
Impact Requirements	13 ft.-lb. min. Avg. 3 Specimens 10 ft.-lb. min. One Specimen Only Impact Temperature: 50° F
Chemical Requirements	Composition Percentage: Carbon: 0.30 max Manganese: 0.29–1.06 Phosphorus: 0.025 max Sulfur: 0.025 max Silicon: 0.10 min
Test Report	Certified test reports furnished per ASTM A 530

C. Pressure-Temperature Ratings (for Design Factor F). (Refer to Table 5.)

Table 5. Pressure-Temperature Ratings for PIG-SIG V THREAD-O-RING Nipple*†

Temp (° F)	Temp (° C)	Piping Code					
		B31.3	B31.4	B31.8			
		–	F=.72	F=.72	F=.60	F=.50	F=.40
-50	-46	3159					
-20 to 250†	-29 to 121		3743	3743	3120	2600	2080
300†	149			3620	3017	2514	2011
350†	177			3493	2911	2425	1940
400†	204			3369	2808	2340	1872
450†	232	3072		3246	2246	1872	1497
500†	260	2985					

* Pressures are in pounds per square inch, gauge (psig). Ratings do not include allowance for corrosion.
† Due to magnet degradation, the temperature for the plug assembly is limited to 200° F (93° C).
NOTE:
O-ring material selection must be suitable for service fluids and temperature requirements.

Section II – Introduction

D. Electrical Specifications and Ratings. (Refer to Figure 2.2.)

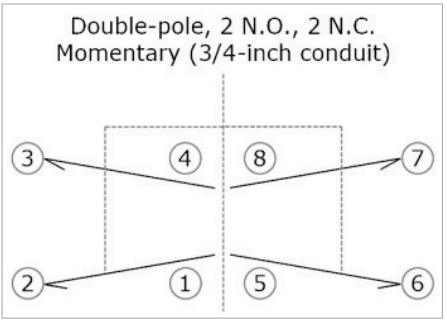

Figure 2.2. Electrical Indicator Switch Specifications

NOTE:
When a flag indicator is used in combination with an electrical switch; the switch will open or close momentarily when the flag is reset.

Electrical ratings (refer to Tables 6-8):
10 amps continuous carry. Circuits on any one pole must be the same polarity. The BX4CL switch is weather-sealed, explosion proof and designed specifically for use in hazardous location applications. The switch enclosure is sealed for protection against corrosion, water, dust, and oil as defined in NEMA 1, 3, 4, 4X, 6, 7, 9, 13, and IP67 as defined in IEC 529. The switch enclosure meets the European Hazardous Locations Designation: EExd IIC T6 category II 2 GD, SIRA 00ATEX 1037X. The switch complies with the European Directive on Equipment and Protective Systems Indented for us in Potentially Explosive Atmospheres (94/9/EC) commonly referred to as ATEX Directive.

Section II – Introduction

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN50014 1997 and EN50018 1994. The switch meets the North American Hazardous Locations Designations: Class I, Groups B, C, and D; Class II, Groups E, F, and G. The switch complies with UL (File No. E61730) and CSA (File No. LR57327). The switch operating temperature range is -40° F (-40° C) to 185° F (85° C). The switch housing is epoxy-coated aluminum and zinc with fluorosilicone seals. (IEC Standards: Ex dIICT6, IP67)

Table 6. AC Volts – Pilot Duty: 600 VAC, 720 VA Amps at 0.35 Power Factor

Circuitry	VAC	Make	Break
Double-Pole Double-Throw	240	15	1.5
	480	7.5	0.75
	600	6	0.60

Table 7. DC Volts – Pilot Duty: 240 VDC, 30 Watts Make and Break Amps

Circuitry	VDC	Inductive	Resistive
Double-Pole Double-Throw	24	10	10
	120	0.25	0.8
	240	0.15	0.4

Table 8. NEMA Types

Non-Hazardous Locations							Hazardous Locations						
1	3	4	4X	6	6P	12	13	7B	7C	7D	9E	9F	9G
•	•	•	•	•			•	•	•	•	•	•	•

E. Reference Standards. (Refer to Table 9.)

Non-Hazardous Locations
Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment.

Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, and external ice formation.

Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water and hose-directed water.

Type 4X enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water and hose-directed water.

Type 6 enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against the entry of water during occasional temporary submersion at a limited depth.

Type 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant.

Hazardous Locations
Type 7 enclosures are for use indoors in locations classified as Class I, Groups B, C, or D as defined in the National Electrical Code.

- Group B – Atmospheres containing hydrogen manufactured gas.
- Group C – Atmospheres containing diethyl ether, ethylene, or cyclopropane.
- Group D – Atmospheres containing gasoline, hexane, butane, naphtha, propane, acetone, toluene, or isoprene.

Section II – Introduction

Type 9 enclosures are for use indoors in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code.

- Group E – Atmospheres containing metal dust.
- Group F – Atmospheres containing carbon back, coal dust, or coke dust.
- Group G – Atmospheres containing flour, starch, or grain dust.

Table 9. Conforming International Standard

Type of Protection	NEMA	IEC
Rain Tight	Type 3	IP-63
Water Tight	Type 4	IP-65
Submersible	–	IP-67
Oil Tight/Dust Tight	Type 13	–

Section III – Pipeline Not Under Pressure

Section III Overview

This section provides instructions for the installation of the TDW PIG-SIG V Scraper Passage Indicator in pipelines or pig traps not under pressure and where there is no product flow.

A THREAD-O-RING nipple may be installed over a pre-cut opening in the pipe. As an option to installing the nipple over a pre-cut opening, the opening may be cut using a drilling machine with a 1-7/16-inch drill after the nipple has been welded to the pipe. Once a nipple has been welded to the pipe, it is recommended that a drilling machine be used to cut the opening in the pipe wall so that the nipple will act as a guide and ensure proper alignment. The opening through the pipe wall must be 1-7/16- to 1-1/2-inch diameter, and the bore of the nipple must be coaxial with the hole cut in the pipe to within 1/64-inch. No part of a THREAD-O-RING nipple may extend inside the pipe for reinforcement or for any other purpose. If additional reinforcement is required, THREAD-O-RING nipples can be provided for attachment to various types of integrally-reinforced connections.

If the PIG-SIG V indicator is replacing a PIG-SIG IV assembly, remove all PIG-SIG IV components.

Section III – Pipeline Not Under Pressure

1.0 Installation Overview and Preparation

1.0 INSTALLATION OVERVIEW AND PREPARATION

1.1 Initial Test

NOTE:
The PIG-SIG V will be shipped partially assembled, as shown in Figure 3.1.

Figure 3.1. Verify PIG-SIG V Operation

A. Before installation, assemble the flag indicator assembly cap onto the plug assembly. Push the cap downward until fully seated.
B. Install the three set screws and tighten to 1.5 ft.-lb.

⚠ CAUTION	Ensure hands and fingers are clear of potential pinch points around the flag when tripping or resetting the unit.

C. Set the flag and operate the trigger a couple of times to ensure the unit functions correctly (Figure 3.1).
D. After the test, remove the set screws and pull the cap off the plug assembly.

1.0 Continued

1.2 Preparation

NOTE:
Since the PIG-SIG V indicator operates using magnets, it is vitally important that the internal threads of the fitting be free from all chips left from the tap.

A. Using a “bottle” brush, clean the internal wall and threads of the fitting thoroughly (Figure 3.2).
B. Spray the internal threads with a cleaning solvent or light lubricant.
C. Apply a light coating of PTFE Grease Lubricant (anti-seize) to the plug body O-ring and threads (Figure 3.3).

NOTE:
O-ring material selection must be suitable for service fluids and temperature requirements.

Figure 3.2. Clean Internal Threads Ring

Figure 3.3 Lubricate O-Ring

1.3 Installing the PIG-SIG V Plug Assembly

A. Insert the plug body into the fitting and start threads. Be careful not to cross thread.
B. Use a one-inch hex wrench or the PIG-SIG V plug holder and crescent wrench to tighten (Figure 3.4). The plug will become more difficult to thread when the O-ring enters the fitting. Tighten until the plug bottoms out.

Section III – Pipeline Not Under Pressure

1.0 Continued

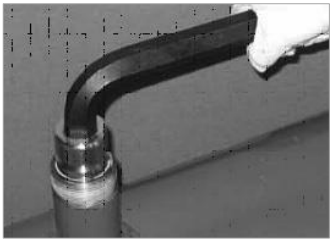

Figure 3.4. Tighten Plug Body

C. Note that the top of the plug assembly extends 1.38 inches above the nipple when set. This is normal.

2.0 Plug Installation: Flange- or Valve-Mounted

2.0 PLUG INSTALLATION: FLANGE- OR VALVE-MOUNTED

The following points relate to the installation, operation, and maintenance of all signaling mechanism offered; flange mounting does not affect the interchangeability between a PIG-SIG V and a PIG-SIG IV, but should be verified on a case basis. Extensions are offered for both wetted parts and signaling units. Customers should provide accurate pipeline dimensions when specifying extended wetted parts to ensure operation. Wetted extensions are not interchangeable due to specific sizing for location.

IMPORTANT	Safety guidelines should always be followed. Additionally, adhere to any operator requirements and instructions for storing and installation of flanges.

Before installing the TDW THREAD-O-RING flange, the sealing faces of both flanges and gasket should be inspected for signs of damage or debris. Should any damage be found, equipment should NOT be installed. An initial test should be performed to ensure all parts assemble correctly.

Operators guidelines for flange installation should be followed to ensure correct procedure to torque flange bolts. Once the TDW THREAD-O-RING flange is correctly installed on the line (Figure 3.5), follow the standard installation.

Figure 3.5. Flange-Mounted Assembly

Section III – Pipeline Not Under Pressure

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Section IV – Pipeline Under Pressure

Section IV Overview

This section provides instructions for the installation of the TDW PIG-SIG V Scraper Passage Indicator in pipelines or pig traps while under pressure and where there is product flow.

A THREAD-O-RING nipple may be installed over a pre-cut opening in the pipe. As an option to installing the nipple over a pre-cut opening, the opening may be cut using a drilling machine with a 1-7/16-inch drill after the nipple has been welded to the pipe. Once a nipple has been welded to the pipe, it is recommended that a drilling machine be used to cut the opening in the pipe wall so that the nipple will act as a guide and ensure proper alignment. The opening through the pipe wall must be 1-7/16- to 1-1/2-inch diameter, and the bore of the nipple must be coaxial with the hole cut in the pipe to within 1/64-inch. No part of a THREAD-O-RING nipple may extend inside the pipe for reinforcement or for any other purpose. If additional reinforcement is required, THREAD-O-RING nipples can be provided for attachment to various types of integrally-reinforced connections.

If the PIG-SIG V indicator is replacing a PIG-SIG IV assembly, remove all PIG-SIG IV components.

Section IV – Pipeline Under Pressure

1.0 THREAD-O-RING Nipple Installation

1.0 THREAD-O-RING NIPPLE INSTALLATION

1. 1 Tapping Requirements

⚠ CAUTION	The PIG-SIG V plug assembly can be damaged and may not operate properly if the THREAD-O-RING nipple is not installed correctly or if the opening in the pipe is too small.

⚠ CAUTION	Clean the threads of the THREAD-O-RING nipple before installing the PIG-SIG V plug. The plug threads may gall and/or be damaged if debris is not removed prior to installation (Figure 4.1).

Figure 4.1.
Brush Threads

A. A THREAD-O-RING nipple can be welded to the pipeline then tapped through, using a T-101 drilling machine and a 1-7/16-inch drill.
B. The nipple must be welded so that it is on the top centerline of the pipe and perpendicular to it.

1.0 Continued

1.2 Welding Instructions

NOTE:
Weld procedures and welders should be qualified to current API 1104, API 1107, or ASME Section IX.

Low hydrogen electrode AWS-E-XX18 is recommended for use with TDW fittings. The use of low hydrogen electrodes is specifically recommended by certain welding specialists when the nipple is to be welded to pipelines operating in a high moisture area and/or a temperature below 50-degrees Fahrenheit. Use of AWS-E-XX18 electrodes helps avoid cracks that can result from stress produced during solidification of weld metal and help avoid hydrogen-induced cracking. Consult the manufacturers of such electrodes for proper care and use.

A. Clean all weld edges thoroughly. Remove all paint, dirt, rust, oil, etc., from the weld areas.
B. Position the nipple so that it is on the top centerline of the pipe and perpendicular to the surface of the pipe.
C. If moisture is on the line, dry the area where the nipple will be located to remove the moisture before installation is started. This is important in a high-moisture atmosphere.

Section IV – Pipeline Under Pressure

1.0 Continued

⚠ **WARNING**	Follow established welding standard when welding the nipple onto the line. Improper welding can cause rupture of the pipeline during or after welding.

D. For proper weld penetration, a root gap should be introduced between the weld-end of the nipple and the surface of the pipe. A 3/32-inch (0.094) root gap is recommended. Do not weld inside of the nipple and be careful to prevent excessive weld penetration inside the nipple to help avoid tapping problems. The length of the nipple varies according to pipe wall thickness. For installation on six-inch and larger pipe, the sum of the nipple length, root gap, and pipe wall thickness should be 4-1/4 to 4-1/2 inches. If that combination would exceed 4-1/2 inches, grind some off the weld-end of the nipple to obtain a shorter nipple or decrease the amount of the root gap.
E. Upon completion of the welding, remove the cap from the nipple.
F. Clean internal and external threads of the nipple.
G. Inspect the welded area inside the nipple. Remove any loose weld spatter or bread.
H. Before tapping the line, allow the weld area to cool. Normally, it will cool sufficiently while the tapping equipment is being prepared.

1.0 Continued

1.3 Tapping the Line

⚠ CAUTION	If utilizing a threaded valve, do not over-tighten the valve during installation. Over-tightening can swage the nipple diameter too small to install the PIG-SIG V plug assembly.

A. ***Threaded Valves***: Apply thread sealant to the external pipe thread of the nipple and thread tapping valve onto the nipple. The valve must be rated to at least line pressure, and must have a minimum through-bore of 2-1/16 inches to permit passage of the TDW PIG-SIG V plug assembly. ***Flanged Valves***: Utilizing a new gasket, install the valve on the flanged fitting; consider the orientation of the valve. Keep the fitting-face and Valve-face parallel. Make sure not to damage the gasket and that the gasket does not extend into the bore of the valve.

NOTE:
On all flanges above 500-psi working pressure, use a new Flex Type, Elastograph, or equal gasket on all connections. On Ring-Type Joint (RTJ) Flanges, use a new RTJ gasket.

B. ***For All Valves***: After the valve has been installed, check the nipple for swaging (distortion) caused by possible over-tightening of the valve. This can be done using a THREAD-O-RING gauging tool if available. Otherwise, insert a dummy plug without an O-ring through the valve and into the fitting. If the plug threads into the fitting, the nipple has not been distorted. If it does not turn, the fitting is distorted and will not accept the threads of the PIG-SIG V plug.

Section IV – Pipeline Under Pressure

1.0 Continued

C. Measure from the top of the valve to the top of the PIG-SIG V nipple (Figure 4.2). Label this Measurement “J” and retain for use when setting the PIG-SIG V plug.

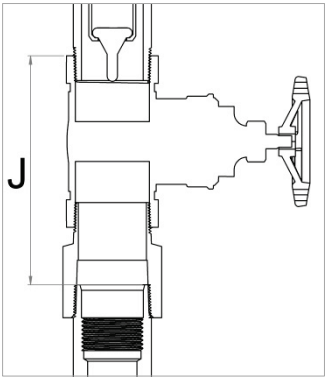


Figure 4.2. Measurement “J”

D. Prepare the T-101b drilling machine with a 1-7/16-inch drill. Install and tap through the pipe following instructions in the drilling machine manual.

⚠ WARNING

Vent pressure bleeder valve away from work area and personnel. Stand clear of the vent when the bleeder valve is opened. Otherwise, personal injury may result from blowing material.

E. Close the tapping valve, bleed the pressure, and remove the drilling machine.

2.0 Indicator Installation

2.0 INDICATOR INSTALLATION
2.1 Initial Test

NOTE:
Installation of the plug is the same for all PIG-SIG V types. When installing an indicator assembly already installed in a line, begin with Section IV, paragraph 2.3.

A. Before installation, assemble the flag indicator assembly cap onto the plug assembly. Push the cap downward until fully seated.

⚙ SPECIFICATIONS

The cap will travel approximately 1-7/16 inches after contacting the plug body.

B. Install the three set screws and tighten to 1.5 ft.-lb.

⚠ CAUTION	Ensure hands and fingers are clear of potential pinch points around the flag when tripping or resetting the unit.

C. Set the flag and operate the trigger a couple of times to ensure the unit functions correctly (Figure 4.3).

Figure 4.3. Verify PIG-SIG V Operation

D. After the test, remove the set screws and pull the cap off the plug assembly.

2.0 Continued

2.2 Prepare Drilling Machine

A. Apply thread sealant to the adapter threads and then thread the adapter on to the drilling machine.
B. Extend the boring bar by rotating the feed tube clockwise until the retainer spring can be removed (Figure 4.4).
C. Remove the retainer spring.
D. Remove the cutting assembly (Figure 4.5).

Figure 4.4. Extend the Boring Bar

Figure 4.5. Remove the Cutting Assembly

E. Ensure that the drilling machine is set up with the drilling machine adapter for PIG-SIG V installation (no. 00-0706-0016-00).
F. Inspect the PIG-SIG V Plug holder (no. 00-8138-0000-00) for damage. Ensure that the retainer balls are firm and will not allow the PIG-SIG V to fall off the plug holder.
G. Insert the plug holder into the end of the boring bar (Figure 4.6).
H. Attach the retainer spring (Figure 4.7).

Figure 4.6. Insert Plug Holder

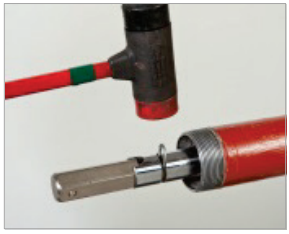


Figure 4.7.Attach Retainer Spring

2.0 Continued

⚠ CAUTION	Clean the threads of the THREAD-O-RING nipple before installing the PIG-SIG V plug. The plug threads may gall and/or be damaged if debris is not removed prior to installation (Figure 4.8).

Figure 4.8. Brush Threads

⚠ CAUTION	Do not allow the PIG-SIG holder to bottom out in the PIG-SIG. The PIG-SIG should have slight movement when installed on the plug holder.

I. Attach the PIG-SIG V to the plug holder (Figure 4.9). The retainer balls in the holder should snap into groove in the PIG-SIG V. Do not let the plug holder bottom out in the PIG-SIG V. When properly positioned, there will be end play between the plug holder and plug (Figure 4.10).

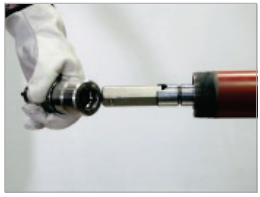


Figure 4.9. Attach PIG-SIG to Plug Holder

Figure 4.10. PIG-SIG on Plug

2.0 Continued

J. Check the O-ring on the PIG-SIG V for any damage. Replace if necessary.

⚠ CAUTION	A damaged O-ring can create a hazardous environment from leaking fluids and result in personal injury and/or property damage.

K. Ensure the O-ring is not twisted. Lubricate the O-ring with silicone grease and the threads with PTFE grease (anti-seize) (Figure 4.11).

L. While holding the body tube, slowly rotate the feed tube counterclockwise (Figure 4.12) until the last thread of the PIG-SIG V is flush with the bottom of the threaded adapter (Figure 4.13).

M. Using a marker pen, place a mark on the body tube at the base of the feed tube.

N. Slowly rotate the feed tube counterclockwise (Figure 4.14) until the feed tube is at zero. With the PIG-SIG V fully retracted, ensure that the trigger does not extend past the end of the drilling machine adapter threads.

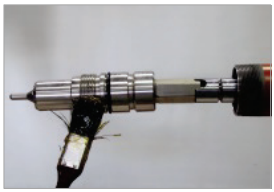


Figure 4.11. Lubricate Threads

Figure 4.12. Rotate Feed Tube

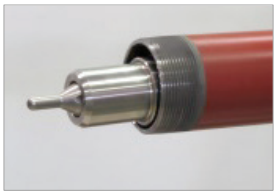


Figure 4.13. PIG-SIG V Flush with Bottom of Thread Adapter

Figure 4.14. Feed Tube at Zero

2.0 Continued

2.3 Calculating the Travel Distance

Determine the distance the PIG-SIG V needs to travel to be completely set in the tapping fitting. With the boring bar fully retracted and the feed tube at the zero mark on the body tube (Figure 4.14), measure the following:

A. Measurement “J” is the distance from the top of the plug assembly fitting to the top of the valve face (Figure 4.15). This distance was measured and recorded before the tap was made.

B. ***Threaded Valves***: With the PIG-SIG fully retracted, measure from the bottom of the feed tube to the mark made on the body tube (Figure 4.16).
Flanged Valves: With the PIG-SIG fully retracted, measure from the bottom of the feed tube to the mark made on the body tube (Figure 4.16). This is Measurement “G.”

C. ***Threaded Valves***: Transfer the measurement of the bottom of the feed tube to the mark on the body tube. Measure from the end of the adapter threads and mark this on the outside (Figure 4.17).

Figure 4.15. Measurement “J”

Figure 4.16. Take Measurement

Figure 4.17. Measure the Adapter

2.0 Continued

2.4 Installing the Drilling Machine

A. Apply thread paste (pipe dope) on the threaded drilling machine adapter (Figure 4.18).
B. Install the drilling machine on the valve.
Flanged Valves: Install a new gasket.

NOTE:
On all flanges above 500-psi working pressure, use a new Flex-Type, Elastograph or equal gasket on all connections. On RTJ Flanges, use a new RTJ gasket.

⚠ CAUTION	Do not over-tighten the drilling machine. Do not let the tapping valve rotate during tightening.

C. ***Threaded Valves***: Tighten the drilling machine assembly wrench-tight. Apply the pipe wrench to the adapter only (Figure 4.19). Do not apply the wrench to the drilling machine.
D. ***Threaded Valves***: Measure from the face of the valve to the mark made on the adapter (Figure 4.20). Record this as Measurement “G.”
E. Measurement “K” for the PIG-SIG V is always equal to 1-7/8 inches.

Figure 4.18. Apply Thread Paste

Figure 4.19. Tighten Drilling Machine

Figure 4.20. Measurement “G”

2.0 Continued

NOTE:
An optional spacer may be installed to provide clearance to reduce the risk of valve contact with the plug body (Figures 4.21 and 4.22).

Figure 4.21. Optional Adapter

Figure 4.22. Installed Plug

⚠ CAUTION	The combination of Measurements “G”, “J,” and “K” must not exceed 18-inches, the maximum travel distance of the T-101b Drilling Machine, or 28-inches if using the T-101XL. If the setting distance exceeds these measurements, please consult the factory for alternatives.

F. Add dimensions “G”+”J”+”K” to give you the total set dimension. The sum of measurements “G”+”J”+”K” should be the body tube of the T-101b reading when the PIG-SIG V is completely set. Measure from the bottom of the feed tube and mark this measurement on the body tube (Figure 4.23). See EXAMPLE on following page.

2.0 Continued

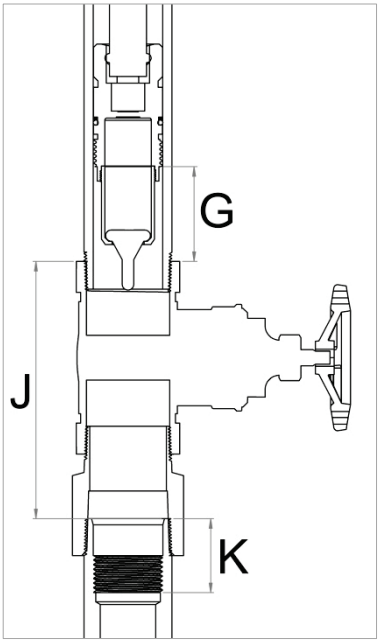


Figure 4.23. Measurements "G", "J", and "K"

EXAMPLE

Setting a two-inch PIG-SIG V using a threaded adapter and assuming Measurement "G" to be 2-5/8-inch. The Measurement "J" is 4-1/2-inch:

Measurement "G" = 2-5/8"
Measurement "J" = 4-1/2"
Measurement "K" = 1-7/8"
TOTAL = 9"

2.0 Continued

2.5 Aligning the Plug

A. Install the bleeder valve (Figure 4.24) into the 3/8 x ¼-inch bushing on the base of the T-101 DM (Figure 4.25). Leave the bleeder valve in the open position.

NOTE:
Depending on the product, the bleeder valve may be left in the closed position. Refer to the appropriate Commodities Procedure.

Figure 4.24. Bleeder Valve.

Figure 4.25.Installed Bleeder Valve

⚠ WARNING

Vent pressure bleeder valve away from work area and personnel. Stand clear of the vent when the bleeder valve is opened. Otherwise, personal injury may result from blowing material.

Consider the dangers of product when purging from the drilling machine adapter.

B. Open the tapping valve slightly to purge air through the bleeder valve on the drilling machine. When air is completely purged, close the bleeder valve. Check the adapter connections for leaks.
C. Open the tapping valve to fully open position.
D. Rotate the feed tube clockwise, and extend the boring bar until the bottom of the feed tube is two inches from the mark on the body tube.

2.0 Continued

E. Lock the boring bar and feed tube by the following:
Model T-101a: Tighten the 1/8-inch Allen socket head screw on the bearing retainer nut (Figure 4.26).
Model T-101b: Install the locking cap (Figure 4.27).

Figure 4.26. T-101a.

Figure 4.27. T-101b

Both of these methods lock the feed tube and boring bar together permitting extension and rotation of the boring bar at the same time.

F. Attach the crank handle to the ¾-inch hex drive (Figure 4.28). Do not use an air motor for PIG-SIG V setting operation.
G. Rotate the crank handle clockwise until the mark is reached on the body tube (Figure 4.29) and the PIG-SIG V is tight inside the fitting. To prevent damage to the O-ring and threads, do not over-tighten.

2.0 Installation

Figure 4.28. Crank Handle.

Figure 4.29. Mark on Body Tube

IMPORTANT

If the TOTAL SET distance cannot be attained, the PIG-SIG V may not be completely set. DO NOT REMOVE VALVE. Check all measurements. If the plug needs to be removed, follow the removal instructions, check all work including measurements, and reset.

If the chips are stopping the plug from being set, remove the machine and remove the THREAD-O-RING plug holder.

2.6 Setting The Plug

A. Remove the crank handle from the hex drive.
B. Unlock the boring bar and feed tube by the following:
Model T-101a: Loosen the 1/8-inch Allen socket head screw on the bearing retainer nut (Figure 4.30).
Model T-101b: Remove the locking cap (Figure 4.31).

Figure 4.30. T-101a.

Figure 4.31. T-101b

⚠ CAUTION	Do not turn the crank handle counterclockwise with the 1/8-inch Allen socket head screw tightened or the locking cap on the machine. This will unthread the PIG-SIG V.

C. Rotate the feed tube counterclockwise approximately 24 turns, retracting the plug holder two inches above the PIG-SIG V. Ensure the hex drive does not rotate, otherwise the PIG-SIG V will unthread from the fitting.
D. Check the seal on the PIG-SIG V by opening the bleeder valve on the drilling machine for several minutes (Figure 4.32). Leave the bleeder valve open after pressure is completely relieved.

2.0 Installation

Figure 4.32. Bleeder Valve

NOTE:
Should leakage occur, it indicates the following possibilities:

- PIG-SIG V is not completely set.
- O-ring on the PIG-SIG V is damaged.

To correct the leak, close the bleeder valve and remove the PIG-SIG V. Inspect the PIG-SIG V and O-ring and then reinstall.

2.7 Removing the Drilling Machine

⚠ CAUTION	Do not turn the crank handle counterclockwise with the 1/8-inch Allen socket head screw tightened or the locking cap on the machine. This will unthread the PIG-SIG V.

A. Once the pressure has been relieved and the seal of the plug has been confirmed, rotate the feed tube counterclockwise (Figure 4.33) to the zero mark on the body tube (Figure 4.34).
B. Remove the bleeder valve from the 3/8 x ¼-inch bushing (Figure 4.35).

Figure 4.33. Feed Tube

Figure 4.34. Body Tube

Figure 4.35. Bleeder Valve

C. If applicable, secure the drilling machine to lifting equipment.
D. Unscrew the drilling machine from the tapping valve (Figure 4.36).
E. Remove the tapping valve.
F. Install the PIG-SIG V indicator on the THREAD-O-RING fitting. The top of the PIG-SIG V assembly is designed to extend 1.38-inches above the THREAD-O-RING fitting (Figure 4.37).

Figure 4.38 shows a completed Threaded Valve-Mounted assembly. Figure 4.39 shows a completed Valve-Mounted assembly.

2.0 Installation

Figure 4.36. Unscrew the Drilling Machine.

Figure 4.37. Installed Plug

Figure 4.38. Threaded Valve-Mounted Assembly - Assembled.

Figure 4.39. Valve-Mounted Assembly - Assembled.

NOTE:
Refer to Section V for Indicator Installation instructions.

3.0 Plug Recovery

3.0 PLUG RECOVERY

3.1 Preparations

A. Remove the three set screws (Figure 4.40) and remove the flag indicator from the plug by pulling straight up. Do not turn the cap during the removal process.

B. Clean the external threads and check for any damage.

C. ***Threaded Valves***: Apply thread paste (pipe dope) to the external threads (Figure 4.41).

Figure 4.40. Remove Set Screws.

Figure 4.41. Apply Thread Paste

D. Select the appropriate tapping valve, whether flanged or threaded, and install the tapping valve onto the THREAD-O-RING fitting. Ensure the valve has a minimum bore clearance of 2-1/16-inches.

⚠ WARNING

Select a tapping valve which will allow the PIG-SIG to pass through the bore. The bore should be unobstructed by seat rings, lugs, etc. The bore of the valve must be round and have a minimum inside diameter of 2-1/16-inches.

E. Leave the valve in the open position.

3.0 Continued

3.2 Checking Operation of Tapping Valve

A. Ensure the valve will open and close properly. Operate and visually check that the valve completely opens and closes (Figure 4.42). Depending on type of valve:
Ball Valves: ensure stops and indicators are correctly set, or
Gate Valves: Count the number of turns required to open and close the valve completely. Record the number of turns on the Measurement Card and measure the length of the stem above the operating handle in the open (Figure 4.43) and closed position (Figure 4.44). Take note of these measurements.

Figure 4.42. Open and Close Valve

Figure 4.43. Open Position

Figure 4.44. Closed Position

⚠ CAUTION	Do not use force when opening and closing the valve. Use of force will not improve the seal and can damage the valve.

B. Leave the valve in the open position.

3.0 Continued

3.3 Calculating the Travel Distance

With the boring bar fully retracted and the feed tube at the zero mark on the body tube, calculate the distance the plug holder travels to contact the bottom recess in the PIG-SIG V.

A. Measure from the bottom of the one-inch hex drive recess in the PIG-SIG V to the face of the valve (Figure 4.45). Record this as Measurement "N."

B. Close the tapping valve (Figure 4.46).

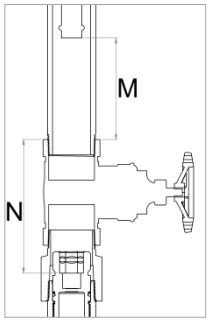


Figure 4.45. Measurement "N"

Figure 4.46. Close Tapping Valve

C. Measurement "M" is the distance from the valve face to the bottom of the plug holder, when fully retracted.

Threaded Valves: Measure from the face of the adapter to the bottom of the plug holder. Mark this measurement on the outside of the adapter.

Flanged Valves: Measure from the flange face of the drilling machine adapter to the bottom of the plug holder. Record this as Measurement "M."

3.0 Continued

NOTE:
An optional spacer may be installed to provide clearance to reduce the risk of valve contact with the plug body (Figures 4.47 and 4.48).

Figure 4.47. Optional Adapter

Figure 4.48. Installed Plug

3.4 Installing the Drilling Machine

A. Apply thread paste (pipe dope) on the threaded drilling machine adapter (Figure 4.49).
B. Install the drilling machine on the valve. ***Flanged Valves***: Install a new gasket.

NOTE:
On all flanges above 500-psi working pressure, use a new Flex Type, Elastograph or equal gasket on all connections. RTJ Flanges, use a new RTJ gasket.

⚠ CAUTION	Do not over-tighten the drilling machine. Do not let the tapping valve rotate during tightening.

C. ***Threaded Valves***: Tighten the drilling machine assembly wrench-tight. Apply the pipe wrench to the adapter only (Figure 4.50). Do not apply the wrench to the drilling machine.
D. ***Threaded Valves***: Measure from the face of the valve to the mark made on the adapter (Figure 4.51) Record this as Measurement “M”.

3.0 Continued

E. Open the tapping valve.
F. Measure from the face of the valve to the mark made on the adapter. Record this as Measurement “M” (Figure 4.51).

Figure 4.49. Apply Thread Paste

Figure 4.50. Tighten Drilling Machine

Figure 4.51. Measurement “M”

G. Add Measurements “M” + “N.” The sum of Measurements “M” + “N” should be the body tube reading when the plug holder contacts the bottom of the recess in the PIG-SIG V.
H. Measure from the bottom of the feed tube and mark this measurement (the sum of “M” and “N”) on the body tube (Figure 4.52).

Figure 4.52. Mark Measurement.

See Measurement EXAMPLE on next page.

3.0 Continued

EXAMPLE

Removing a two-inch PIG-SIG V using a threaded adapter and assuming Measurement “M” to be 3 inches and Measurement “N” is 10 inches:
Measurement “M” = 3”
Measurement “N” = 10”
TOTAL = 13”

The feed tube should be at 13 inches on the body tube when the bottom of the plug holder contacts the bottom of the one-inch hex drive recess in the PIG-SIG V plug.

3.5 Aligning The Plug

A. Install the bleeder valve (Figure 4.53) into the 3/8 x ¼-inch bushing on the base of the T-101 DM (Figure 4.54). Ensure the tapping valve is in the open position.

Figure 4.53. Bleeder Valve.

Figure 4.54.Installed Bleeder Valve

IMPORTANT

If the feed tube is at the mark on the body tube, continue on to Section 3.7.

3.0 Continued

B. Rotate the feed tube clockwise to extend the boring bar until the plug holder contacts bottom of the one-inch hex drive recess in the PIG-SIG V. The feed tube should be at the mark on the body tube.

C. If the feed tube is approximately one inch above the mark on the body tube (Figure 4.55), the plug holder did not align with the hex drive hole in the PIG-SIG V.

IMPORTANT	If the feed tube is approximately one inch above the mark on the body tube, continue on to Section 3.6.

Figure 4.55. Feed Tube One Inch Above Mark On Body Tube

3.0 Continued

3.6 Aligning the PIG-SIG V

A. Install the crank handle onto the hex drive of the T-101 drilling machine.

⚠ CAUTION	Do not use force when aligning the plug holder and PIG-SIG V. Damage may occur to the PIG-SIG V.

B. Apply slight pressure to the feed tube while slowly rotating the hex drive (Figure 4.56) until the plug holder aligns with the plug.
C. When properly aligned, the feed tube will rotate freely. Extend the plug holder by rotating the feed tube clockwise until the stop is reached.
D. The feed tube should be at the mark on the body tube (Figure 4.57).

Figure 4.56. Crank Handle.

Figure 4.57. Mark on Body Tube

3.7 Removing the PIG-SIG V

A. Lock the boring bar and feed tube by the following:
Model T-101a: tighten the 1/8-inch Allen socket head screw on the bearing retainer nut (Figure 4.58).
Model T-101b: tighten the locking cap (Figure 4.59).

3.0 Continued

Figure 4.58. T-101a.

Figure 4.59. T-101b

Both of these methods lock the feed tube and boring bar together permitting extension and rotation of the boring bar at the same time.

B. Attach the crank handle to the ¾-inch hex drive.

⚠ WARNING

If the PIG-SIG V cannot be removed, do not force the drilling machine as damage may occur. Do not proceed; call your Service Center. The fitting may need to be abandoned.

Consider the dangers of product when purging from the drilling machine adapter.

C. Slowly rotate the crank handle counterclockwise until the pressure starts to flow past the PIG-SIG V (Figure 4.60).
D. Purge air through the bleeder valve.
E. After air is completely purged, close the bleeder valve (Figure 4.61).

3.0 Continued

Figure 4.60. Crank Handle.

Figure 4.61. Close Bleeder Valve

F. Continue rotating the hex drive counterclockwise until the zero mark on the body tube is reached.
G. Close the tapping valve (Figure 4.62).
H. Open the bleeder valve and bleed off the trapped pressure from the drilling machine (Figure 4.63).
I. Remove the bleeder valve from the 3/8 x ¼-inch bushing (Figure 4.64).
J. If applicable, secure the drilling machine to lifting equipment.
K. Unscrew the drilling machine from the tapping valve (Figure 4.65).

Figure 4.62. Close Tapping Valve

Figure 4.63.Open Bleeder Valve

Figure 4.64. Remove Bleeder Valve

Figure 4.65.Unscrew Drilling Machine

3.0 Continued

3.8 Recovering the PIG-SIG V

A. Hold the body tube and rotate the feed tube clockwise (Figure 4.66). Extend the boring bar until the PIG-SIG V can be removed from the plug holder (Figure 4.67).
B. Remove and clean the PIG-SIG V (Figure 4.68).
C. Remove the O-ring (Figure 4.69).
D. Replace the O-ring.
E. If required, prepare the machine for re-installation of the PIG-SIG V.

Figure 4.66. Rotate Feed Tube

Figure 4.67. Extend Boring Bar.

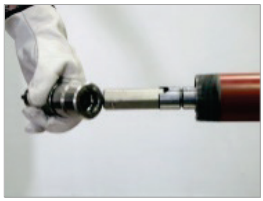


Figure 4.68. Remove PIG-SIG V

Figure 4.69. Remove O-Ring

IMPORTANT	If required, clean the equipment at the site prior to shipping. Repackage all equipment properly and securely for return shipment.

Section V – Indicator Installation

1.0 Indicator Installation

1.0 INDICATOR INSTALLATION

1.1 Installing the Indicator

A. Locate the three set screws used in the flag indicator body (Figure 5.1).

B. Apply a bead of silicone grease lubricant around the housing O-ring (Figure 5.2).

Figure 5.1.Set Screws

Figure 5.2. Apply Lubricant

C. Place the indicator over the top of the plug and push down until it is fully-seated. The indicator cap will completely cover the external threads on the nipple. Check set screw holes to see set screw groove. Turn the indicator to desired flag orientation (Figure 5.3). Add glycol to plug cavity.

SPECIFICATIONS

The cap will travel approximately 1-7/16 inches after contacting the plug body.

D. Install the three nylon-tipped set screws to secure the flag indicator in place. Tighten to 1.5 ft.-lb. (Figure 5.4).

Figure 5.3 Indicator

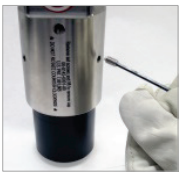


Figure 5.4. Install Set Screws

Section V – Indicator Installation

1.0 Continued

E. Push the flag down until it locks in the horizontal position (Figure 5.5). The PIG-SIG V is ready for operation.

Follow these instructions for installation of all indicator types (Figure 5.6 and 5.7).

Figure 5.5 Flag In Horizontal Position

Figure 5.6.Electrical-Only Indicator

Figure 5.7. Flag/Electrical Combination Indicator

1.2 Extension Installation

If the indicator is installed on a 1 to 10 foot extension, it is installed exactly the same as the indicator itself (Figure 5.8).

A. If using an indicator on an extension, position the strip of EPDM rubber gasket (provided) over the three set screws (Figure 5.9).
B. Before burial, secure the rubber gasket with the 316 stainless-steel hose clamp (provided).

Figure 5.8. Extension

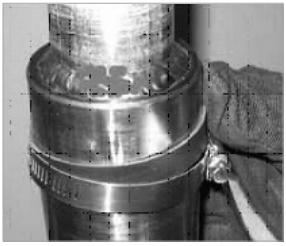


Figure 5.9. Secure Extension Base

Section VI – Optional Features

Section VI Overview

1.0 OPTIONAL FEATURES

1.1 Transparent Cover

Transparent Cover
no. 04-3993-0000

The optional transparent cover provides protection for the PIG-SIG V in high-snow load and heavy dust environments as well as general protection for the PIG-SIG V unit.

The transparent cover is placed over the PIG-SIG V unit and secured by inserting the provided pin through both holes on the bottom of the cover.

1.2 Spacer

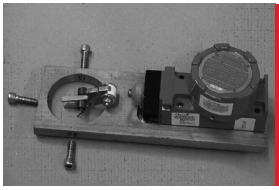
Spacer
no. 00-8383-0000 (hex)
no. 00-8383-0001 (round)

An optional spacer may be installed to provide clearance to reduce the risk of valve contact with the plug body. The spacer is available in hex and round.

Section VI – Optional Features

1.0 Continued

1.3 Indicator Conversion Kit



Indicator Conversion Kit
no. 04-3968-0000 (combo)
no. 04-3968-0001
(electrical)

Conversion kits are available for converting the PIG-SIG V from flag-only operation to either electrical-only or flag/electrical combination.

Flag to Electrical. Conversion to electrical-only indicator will allow for a signal to be sent through the SCADA system electronically, without the use of a visual-flag indicator.

Flag to Combination. Conversion to combination indicator will allow for a signal to be sent through the SCADA system electronically, in addition to a visual flag indicator.

Section VII – Maintenance

1.0 Preventative Maintenance

1.0 PREVENTATIVE MAINTENANCE

Once properly set in the line, the PIG-SIG V indicator is relatively maintenance-free. Routine inspection of existing PIG-SIG V Scraper Passage Indicators is important to continued proper operation. If your PIG-SIG V unit is not working properly (indicating pig passage) or has worked but is not working currently, refer to troubleshooting guide in this section.

The flanged PIG-SIG V does not require any further maintenance beyond that of a standard PIG-SIG V. Refer to operator maintenance schedules for the flange bolt torque values.

1.1 Flag Operation

Ensure the flag is properly positioned. When looking at the TDW flag, the flag should be in the horizontal position (Figure 7.1). This is the proper position before pig passage. Once the pig has passed, the flag should raise. The flag will need to be reset before the next pig passage.

Figure 7.1. Horizontal Flag

1.2 Product Leakage

If there is product seepage around the flag indicator, there is a leak around the plug O-ring. The PIG-SIG V plug should be removed and the O-ring replaced. For plug removal procedures, refer to *Section III Pipeline Under Pressure.* If there is potential for product contamination (wax, sand, etc.) in the trigger housing, the plug should be removed and the trigger cavity cleaned in warm, soapy water of a mild solvent that is compatible with the PTFE component inside the housing.

1.0 Continued

1.3 Indicator Shaft Seal Replacement

1.3.1 To remove the existing seal:

A. Place the indicator upside down so that you can see the magnet located inside the cap.

⚠ WARNING	This is a strong magnet. To avoid personal injury, take care to keep flesh from between magnet and metallic items.

B. Remove the magnet by removing the bolt.
C. ***Flagless Indicators***: remove the stainless-steel cover.
D. Remove the spring that is located behind the magnet.
E. Turn the indicator right-side up and place the flag in the upward position or remove the stainless-steel cover to access the mounting hardware.
F. Remove the four screws that are located around the shaft.
G. Remove the assembly off the cap and remove the old seal.

1.3.2 New seal installation:

A. Place the new seal (Figure 7.2) on the plunger rod.
B. Slide it up the push rod until the seal is located in the existing groove. Do not stretch the seal more than necessary (Figure 7.3).

Figure 7.2. Seal

Figure 7.3. Push Rod and Screws Installed

1.0 Continued

C. Place the assembly back onto the cap and align the holes in the new seal with the holes in the cap.
D. Install the four screws evenly back in to the assembly. Before tightening the screws, ensure that the assembly is square to the cap (Figure 7.3).
E. Install the short rod through the push rod. Install one snap ring on one side of the short rod.
F. Install the latch. Slide the large pin through the back of the latch (Figure 7.4) with one snap ring affixed to one end (Figure 7.5).

Figure 7.4. Install the Latch

Figure 7.5. Snap Ring

G. Install one washer between the flag and flag assembly housing (Figure 7.6).

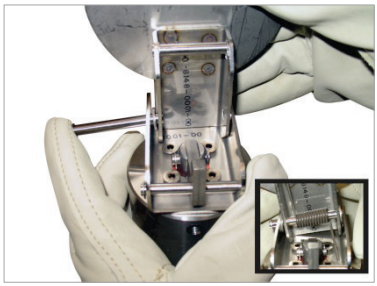


Figure 7.6. Attaching Flag Assembly to Housing Assembly

H. Install the spring on to the push rod and then install the second washer (Figure 7.6).
I. Install another snap ring to lock the large pin in place. Refer to Figure 7.5.

1.0 Continued

J. Insert the bolt into the magnet and place it onto the spring. Slightly compress the spring to allow the threads of the bolt to engage the push rod. Tighten the bolt with a hex wrench 5 ft.-lb.

K. Verify functionality of the unit and the seal. Ensure the seal did not tear.

1.4 Filter Pack

In the event that the filter pack or magnet needs replacement, a new magnet assembly holder with filter pack can be purchased.

A filter pack magnet holder assembly can be replaced by unscrewing the lower plug body and replacing the old magnet holder assembly with filter pack. Once replaced, reinstall the lower plug body with low-strength thread locker.

Magnet Holder Assembly with Filter Pack no. 04-4133-0000

1.0 Continued

1.5 Magnet Replacement

The magnet in the cap assembly is coated to protect the magnet from moisture. If the coating becomes chipped or damaged, the magnet may swell or come apart. If the magnet is damaged, it can be replaced by unscrewing one hex screw, removing the old magnet and replacing it with a new magnet (Figures 7.8 and Figure 7.9).

⚠ WARNING	This is a strong magnet. To avoid personal injury, take care to keep flesh from between magnet and metallic items.

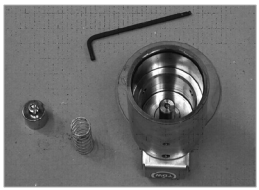


Figure 7.8. Magnet Disassembled

Figure 7.9. Magnet Assembled

1.6 Proper Electrical Switch Adjustment

The gap between the electrical switch and the rocker arm on the flag assembly used with the electrical indicator comes pre-set from the factory. However, on occasion the gap may move out of adjustment and need to be re-adjusted to function properly.

1.0 Continued

The PTFE nose of the rocker arm should be slightly touching the switch. If there is a gap between the nose of the rocker arm and the switch then loosen the two nuts on the bottom of the electrical switch and slide the unit until it just begins to touch the rocker arm. Once set, re-tighten the two nuts and re-install the unit (Figure 7.10). Note that the distance can only be adjusted while the unit is installed on a plug. If the plug is removed from the assembly, the gap will be greater than when the plug is installed (Figures 7.11 and 7.12).

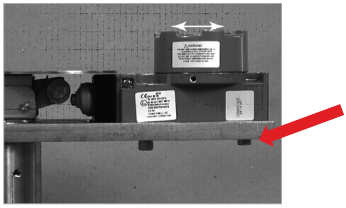


Figure 7.10. Adjust Electrical Switch.

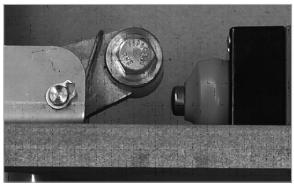


Figure 7.11 Gap (Plug Not Installed)

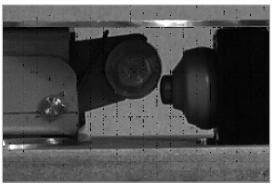


Figure 7.12 Gap (Plug Installed)

Section VII – Maintenance

2.0 TROUBLESHOOTING

Table 10. PIG-SIG V Troubleshooting Guide

Indicator	Issue	Possible Solution
All Types	Flag doesn't raise after assumed pig passage.	Verify indicator is properly installed: check indicator installation by removing a set screw and looking for the groove on the plug.
		Verify that the plug is fully installed: Measure the distance the plug extends above the THREAD-O-RING nipple (should be 1-3/8 inches).
		In the event of freezing weather: the seal on the indicator may have been compromised allowing water to enter the upper portion of the plug. This water can freeze and not allow the magnet to move. Remove indicator and check for moisture.
	Plug assembly won't thread on to the THREAD-O-RING Nipple.	Verify that it is indeed a TDW THREAD-O-RING.
		The hole in the pipe may be too small or not centered.
		THREAD-O-RING may be swedged due to over-tightening of a valve or cap. Measure the inside dimension (ID) to ensure it is not swedged or egged.
	PIG-SIG V has never worked correctly.	Verify proper THREAD-O-RING was used for corresponding wall thickness of pipe. Measure the height of the THREAD-O-RING as it is mounted to the pipe and then add that measurement to the wall thickness of the pipe. This measurement should not exceed 4.50 inches but needs to be greater than 4.25 inches.

All Types (Cont.)	Plug stopped working correctly.	Contaminated plug: install a new filter pack version.
		Wax build up in plug: consult with factory on other plug option.
	Trigger is damaged.	Verify proper THREAD-O-RING was used for corresponding wall thickness of pipe. Measure the height of the THREAD-O-RING as it is mounted to the pipe and then add that measurement to the wall thickness of the pipe. This measurement should not exceed 4.50 inches but needs to be greater than 4.25 inches.
		Plug may have wax or other buildup preventing the trigger from moving, resulting in damage.
Electrical or Combo	Electrical switch is not sending electrical signal.	Proper switch adjustment: refer to electrical switch instruction in the manual and ensure the switch is adjusted properly.
		Ensure that the double torsion spring is still installed correctly.
		Verify indicator is properly installed: check indicator installation by removing a set screw and looking for the groove on the plug.
		Verify that the plug is fully installed: measure the distance the plug extends above the THREAD-O-RING Nipple; the distance should be 1-3/8 inches.
		In the event of freezing weather: the seal on the indicator may have been compromised allowing water to enter the upper position of the plug. This water can freeze and not allow the magnet to move. Remove indicator to check for moisture.

Electrical or Combo (Cont.)	Flag does not raise after assumed pig passage/switch does not actuate or release (reset).	Proper switch adjustment: refer to electrical switch instruction in the manual and ensure the switch is adjusted properly. Gap between polymer slider and switch plunger should be between 0.005 and 0.02 inches (0.1 to 0.6 mm).

Table 11. PIG-SIG V Maintenance Intervals

Item	Interval
Seal	Inspect every six months for tears or cracks. Replace annually (order seal kit).
Magnet	Inspect annually. Replace if cracks or chips are present.
Indicator O-ring	Replace annually.
Plug O-ring	Inspect any time plug is removed. Replace annually.
Plug Backup Ring	Replace each time the plug is removed.

NOTE:
These time frames are suggestions from TDW. Times may vary depending on the pipeline product and the environment that the unit is exposed to.

Section VII – Maintenance

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Section VIII – Application Guide

1.0 RECOMMENDED APPLICATIONS

The PIG-SIG V uses opposing magnets across a solid plug body web instead of a rotating shaft with (dynamic) O-ring seal. The static O-ring on the outside diameter of the plug body is the only seal needed to prevent pipeline product leakage. In the standard PIG-SIG V model, the magnet in the lower plug body (trigger) housing is exposed to pipeline fluids which can result in attraction of magnetic debris (hot tapping filings and corrosion scale or powders). While the trigger cavity is “self-flushing,” build-up of a significant amount of magnetic debris can limit the stroke of the trigger and/or reduce the effectiveness of the magnet. Liquid or relatively high pressure gas, combined with turbulence due to high flow rate can kick up heavy amounts of magnetic particulates. Heavy wax pushed into the PIG-SIG V trigger cavity due to infrequent pigging may also create more debris volume than can be effectively flushed out, resulting in reduced trigger stroke (failure to trip) and/or resistance to returning to the normal state (which may prevent an electrical switch from releasing).

1.1 Standard PIG-SIG V

Standard PIG-SIG V models are recommended for pipelines with minimal amounts of heavy wax present (especially from infrequent pigging). These include pipelines with relatively low density, low viscosity fluids (gas or refined products), and relatively low velocity, with any concentration of ferrous and non-ferrous particulates (corrosion products, filings, chips). Not recommended for high-viscosity oil with heavy wax.

1.0 Continued

The following are recommended applications:

- Gas
- Clean crude
- Clean water
- Refined products
- New lines
- Launchers
- Side mounts (non-extended units)
- Black powder: gas or low-viscosity fluids
- Iron contaminants: gas or other low-viscosity liquids pipelines (produced water, sea water)
- Highly-corroded pipes where iron shaving/fillings/debris is known to be present (low viscosity)
- Refined products with corrosion or other ferrous debris

1.2 Applications Requiring Special Versions of PIG-SIG V

- Known heavy wax crude lines
- Ammonia: no copper-based (brass) components (standard stainless PIG-SIG V okay)
- Acids
- Caustics
- High-temperature: consider magnet, spring, and PTFE (PIG-SIG V trigger housing), and O-ring limitation
- Low Temperature: Consider material and possible O-ring limitation

TDW Product Warranty

1. Products manufactured by T.D. Williamson, Inc. (TDW), are warranted free from defects in material and workmanship for a period of **three (3) years from the date of shipment from the factory. Elastomer products are warranted for one (1) year under proper storage to be free from defects in material and workmanship. The foregoing warranty does not apply to any items not manufactured by TDW, including, but not limited to, electronic devices, switch components, pumps, O-rings, purchase cylinders, etc. These third-party parts will revert back to suppliers warranty. TDW assumes no liability under this or any other warranty for components not manufactured by TDW. This Warranty applies only to products shipped after June 30, 2000.**

2. If TDW accepts any claim made under this Warranty, TDW's liability, if any, shall be limited to, at TDW's sole option, repair or replacement of the failed part or product, or a refund of the purchase price, less an allowance for services rendered for the product prior to the Warranty claim. T**DW disclaims any and all responsibility for special, consequential or incidental damages arising out of or related to the sale, use, or inability to use any products covered by this Warranty.**

3. Buyer agrees not to return goods for any reason except with the prior written consent of TDW, which consent, if given, shall specify the terms, conditions and charges upon which any returns may be made. Materials returned to TDW for Warranty work must have a Return Material Authorization (RMA) number, and such number must be noted on the package at the time of shipment. Claims under this Warranty must be made in writing within ten (10) days of any failure and sent by registered mail to: P.O. Box 3409, Tulsa, Oklahoma 74101. Any failed products or parts must be held for inspection by TDW or, at TDW's option, returned to TDW's factory. Customer shall prepay shipping charges, and shall pay all duties and taxes, as applicable, for products or parts returned to TDW for warranty service.

4. This Warranty shall not apply to any product or component which has been repaired or altered by anyone other than TDW, or has become damaged due to misuse, negligence or casualty, or has been operated or maintained contrary to TDW's printed instructions and warnings.

5. This Warranty does not cover any defect, malfunction, or failure caused by circumstances beyond the control of TDW, including but not limited to unreasonable or negligent installation, operation, maintenance, abuse, accident, failure to follow instructions in this manual and/or other printed instructions, warnings and cautions provided by TDW, defective or improper associated equipment, attempts at modification and/or repair not authorized by TDW, inbound shipping, and shipping damage

6. All rights, duties, and obligations arising under this limited Warranty shall be governed by the laws of the State of Oklahoma, U.S.A., regardless of conflict of laws provisions. In the event Buyer initiates litigation under this Warranty, Buyer hereby agrees that jurisdiction for such litigation shall be brought only in the District Court for the County of Tulsa, Oklahoma.

7. TDW reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold product and/or the accessories thereto.

8. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED. TDW NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO MODIFY THESE TERMS AND CONDITIONS, WARRANT SPECIFIC APPLICATIONS, OR ASSUME FOR TDW ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ANY TDW PRODUCT OTHER THAN AS PROVIDED IN THIS WARRANTY.**

08-09-2015

PIG-SIG® V
Scraper Passage Indicator

Operating and Maintenance Instructions

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