



PIG-SIG[®] IV

Scraper Passage Indicator

Operating and Maintenance Instructions

Copyright

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 way 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.

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

Phone (918) 447-5100
Fax (918) 446-6327
E-mail: info@tdwilliamson.com
Explore the TDW Web site at www.tdwilliamson.com.

™ Trademark of T.D. Williamson in the United States and foreign countries.
® Registered trademark of T.D. Williamson in the United States and foreign country.

Document Version History

The list below shows the complete revision history of this document

Date	Version
06/2019	Remove T-101a, update measurements, update photos

Table of Contents

Section 1: Safety	
1.0 Safety	1
Section 2: Introduction & Installation	
1.0 Purpose.....	3
2.0 Description	3
Section 3: Installation	
1.0 Nipple Installation.....	9
2.0 Plug Installation.....	12
3.0 Indicator Installation	16
4.0 Extended Indicator Installation.....	22
5.0 Recovering the Plug	23
Section 4: Maintenance	
1.0 Preventative Maintenance	26

This page intentionally left blank.

Section I – Safety

1.0 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 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

This page intentionally left blank.

2.0 Introduction

2.1 Purpose

The purpose of this manual is to provide instructions for the installation, operation and preventative maintenance of the complete TDW PIG-SIG® IV Scraper Passage Indicator and installation of a PIG-SIG indicator assembly on a plug assembly already set in a pipeline.

2.2 Description

The TDW Scraper Passage Indicator (PIG-SIG IV) is a device that is installed on a pipeline to detect the passage of a pig or sphere.

The PIG-SIG IV 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, combination flag and electrical indicator, or rotary cap indicator. All indicators are compatible with all standard plug assemblies now in the field and are interchangeable.

This makes it possible to use these units as conversion kits as well as complete PIG-SIG Indicators.

The PIG-SIG IV is weatherproof and corrosion resistant. It features housings manufactured from space age plastic for durability and weather resistance. The flag indicator offers high visibility from the air or ground.

The carbon steel nipple is manufactured from easily weldable material. The PIG-SIG Plug Assembly can be installed on or removed from a pressured pipeline using a TDW T-101 or T-101b Drilling Machine and accessories.

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

- Flag Indicator with Manual Reset flag
- Rotary Cap Indicator with Manual Reset
- Electrical Indicator with Auto Reset
- Flag/Electrical Indicator with Auto Reset
- Indicator Extensions from 1 foot to 15 feet
- Unidirectional or Bidirectional Trigger Mechanisms
- Special Materials and O-Ring Seals
- Models for Environmentally Harsh Conditions

- Weld-on Nipple or Flanged Mounting
- Stainless or Brass Plug Assemblies
- "Build Your Own" PIG-SIG IV Assembly (See Appendix.)

Shown in Figure 1 is the manual reset with flag indicator model. Within the above four types, the PIG-SIG IV is available in several variations, including such options as bi-directional or unidirectional detection, O-ring material and material used in plug construction. Several extension lengths are available to elevate the indicator. The "Build your own PIG-SIG" charts at the end of this manual show all the variations available.

The PIG-SIG IV also can be installed on a line under pressure, without taking the line out of service, using the TDW T-101 or T-101b Drilling Machines. This manual includes installation procedures for each drilling machine.



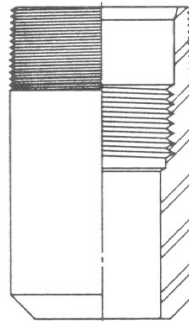
Figure 1. Manual Reset with Flag Indicator

2.2.1 Specifications

A. THREAD-O-RING Nipple Material



Nipple



THREAD-O-RING Nipple Material Specification:

Size & Grade:	2 NPS XXS, ASTM A 333 Grade 6 seamless steel pipe.
Tensile Requirements:	35,000 psi SMYS – 60,000 psi SMTS
Impact Requirements:	13 ft-lbf min Avg 3 Specimens 10 ft-lbf 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

2.2.2 Pressure-Temperature Ratings

PRESSURE-TEMPERATURE RATINGS FOR PIG-SIG IV SCRAPER PASSAGE INDICATOR THREAD O-RING NIPPLE

(Does not include allowance for corrosion.)

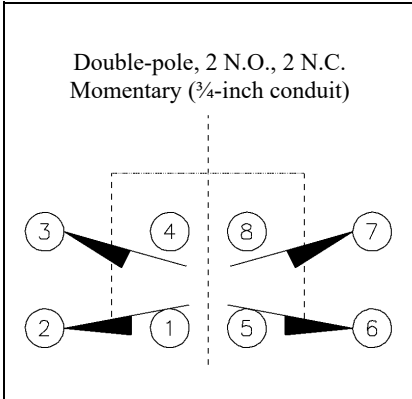
Pressures are in pounds per square inch, gauge (psig)

	Piping Code					
	B31.3	B31.4	B31.8			
Temp. °F		F=.72	F=.72	F=.60	F=.50	F=.40
-50	3159					
-20 to 250		3743	3743	3120	2600	2080
300			3620	3017	2514	2011
350			3493	2911	2425	1940
400			3369	2808	2340	1872
450			3246	2246	1872	1497
500	2985					

Note: O-Ring material selection must be suitable for service fluids and temperature requirements.

B. Electrical

Electrical Indicator Switch Specifications:



Electrical Ratings:

10 amps continuous carry. Circuits on any one pole must be the same polarity.

MICRO SWITCH¹ weather-sealed explosion-proof switch BXP4L is 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 and 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 Intended for Use in Potentially Explosive Atmospheres (94/9/EC) commonly referred to as the ATEX Directive. 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 Designation: 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 158°F (70°C). The switch housing is epoxy coated Aluminum and Zinc with Fluor silicone seals.

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

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

NEMA Types

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

C. Reference Standards

Non-Hazardous Locations

Type I 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 or 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.

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 Hack, coal dust or coke dust.
- Group G - Atmospheres containing flour, starch or grain dust.

**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	—

3.0 Installation

3.1 Nipple Installation

3.1.1 Pre-cut Hole vs. Tapping the Line

A THREAD-O-RING nipple may be installed over a pre-cut opening in the pipe, or 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. A pre-cut opening must be 1-7/16- to 1-1/2-inch diameter through the pipe wall, and the bore of the nipple must be coaxial with the hole cut in the pipe to within 1/32-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.

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

3.1.2 Welding Instructions

- A. Weld procedures and welders should be qualified to current API 1104, API 1107 or ASME Section IX.
- B. 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° F. 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.

C. Clean all weld edges thoroughly. Remove all paint, dirt, rust, oil, etc., from the weld areas.

D. Position the nipple so that it is on the centerline of the pipe and perpendicular to the surface of the pipe. A nipple, which is intended to receive a unidirectional trigger assembly, may be installed in any position around a pipe oriented in any direction relative to horizontal. A nipple, which is intended to receive a bidirectional trigger assembly, must be installed only on top of a horizontal pipeline.

E. 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 area.

F. Remove PIG-SIG plug from nipple. Be careful not to damage plug threads or trigger mechanism. Put some type of protective cover, such as a 2-inch plastic pipe cap, over the threaded end of the nipple.

G. For proper weld penetration a root gap should be introduced between the weld-end of the nipple and surface of the pipe. Do not exceed 1/8-inch root gap. 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 6-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 of values exceeds 4-1/2-inches, grind some off the weld-end of the nipple, obtain a shorter nipple, or decrease the amount of root gap.

WARNING: Follow established welding standards when welding the nipple onto the line. Improper welding can cause rupture of the pipeline during or after welding.

H. Upon completion of welding, remove the cap from the nipple.

I. Clean internal and external threads of the nipple.

J. Inspect the welded area inside the nipple. Remove any loose weld spatter or bead.

- K. The weld area should be allowed to cool before tapping the line. Normally, it will cool sufficiently while the tapping equipment is being prepared.

3.1.3 Tapping the Line

- A. Apply thread sealant to the external pipe thread of nipple and thread tapping valve onto nipple. The valve must be rated to at least line pressure and must have a minimum through bore of 2-1/16-inch to permit passage of the TDW PIG-SIG plug assembly.

CAUTION: Do not overtighten the valve. Overtightening can swage the nipple diameter too small to install the PIG-SIG plug assembly. Before making tap, check PIG-SIG plug clearance.

- B. Grasp trigger of plug and pass plug assembly upside down through tapping valve bore into nipple, as shown in Figure 2. If the top of the plug turns freely in the nipple, the nipple has not been distorted.

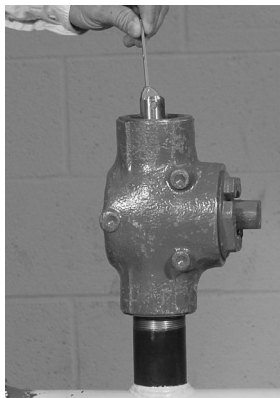


Figure 2. Check Nipple for Swaging

- C. When taking tapping measurements, as prescribed in the drilling machine manual, another measurement is required, which will be used in setting the plug. Measure from the top of the valve face to the top of tapping fitting as shown in Figures 3 and 10. Label this measurement “J” and retain for use when setting the plug.
- D. Prepare T-101 or T-101b drilling machine with a 1-7/16th inch drill, install and tap through pipe, following instructions in drilling machine manual.

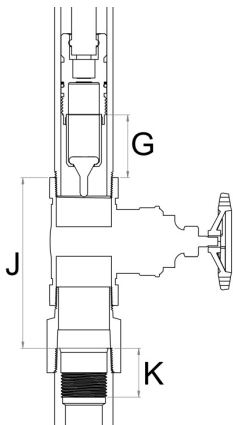


Figure 3. Measurement J

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

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

3.2 Installation of the Plug

Installation of the plug is the same for all four PIG-SIG types.

The nipple must be welded so that it is on the centerline of the pipe and perpendicular to it. The unidirectional assembly may be installed in any position around a pipe oriented in any direction relative to horizontal. The bi-directional assembly must be installed on top of a horizontal pipeline.

When installing an indicator

assembly on a plug assembly already installed in a line, begin with paragraph 4.3.

3.2.1 Preparation for Setting the Plug

- A. Extend drilling machine boring bar until retainer ring is exposed.
- B. Insert plug holder into boring bar and install retainer spring. See Figure 4.



Figure 4. Insert Plug Holder

- C. Install plug assembly on plug holder, aligning arrow on top of plug with arrow on hex drive of drilling machine. (Figure 5). Balls in plug holder must seat into plug well. Plug must not be positioned against plug holder shoulder. Refer to Figure 6.



Figure 5 Align Plug Assembly Arrow



Figure 6 Position Plug

- D. Lubricate Plug Assembly O-ring.

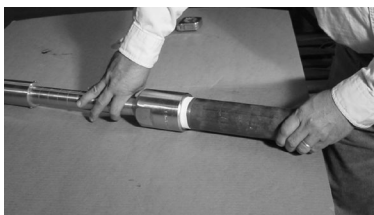


Figure 7. Install Valve Adapter

- E. Apply thread compound to the external threads of adapter and

install threaded valve adapter on drilling machine. See Figure 7.

- F. Fully retract plug assembly into the adapter. Make sure zero is visible on the body tube. See Figure 8.



Figure 8. Retract Plug Assembly

3.2.2 Compute Plug Setting Distance

It is important that the distance required to completely set the plug be known. Measurements are taken at this time to determine that distance.

- A. Measure from the end of the adapter to the bottom of the threads of the plug assembly and mark this measurement on the outside of the adapter, see Figure 9. Label this Measurement "G".
- B. Install drilling machine on tapping valve. Use thread compound on adapter threads.



Figure 9. Measurement G

- C. Measurement “J” (see Figure 3), the distance from the valve face to the top of the tapping fitting, was taken prior to making the tap.
- D. Measurement “K”, a constant 1-7/8-inches for all PIG-SIG models, is the distance from the top of the tapping fitting to the point where the plug is completely set in the fitting.
- E. The sum of Measurements “G,” “J,” and “K” should be the body tube reading when the plug is completely set. Mark this measurement on the drilling machine body tube. See Figure 10.

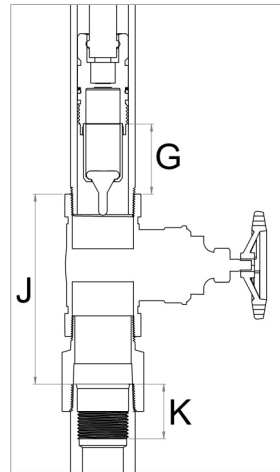


Figure 10. Plug Setting Measurements

CAUTION: Measurements must not exceed 18 inches, the maximum travel distance of the T-101b Drilling Machine. If setting distance exceeds 18 inches, a different tapping machine, such as the T-101 XXL, will be required.

3.2.4 Setting the Plug

- A. Install bleeder valve on drilling machine and open bleeder valve (Figure 11).
- B. Open the tapping valve slightly to purge air through bleeder valve on drilling machine and when air is purged, close bleeder valve.
- C. Check the adapter connections for leaks and then open tapping valve to full-open position.



Figure 11. Install Bleeder Valve

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

- D. Hold hex drive and rotate feed tube clockwise until feed tube is 2 in. from mark on body tube. Stop rotation.



Figure 12. Lock Boring Bar

- E. Install locking cap. This locks the feed tube and boring bar together permitting extension and rotation of the boring bar at the same time.



Figure 13. Lower the Plug

- F. Attach handle to $\frac{3}{4}$ in. hex drive. Do not use air motor for completion plug setting operations. See Figure 13.
- G. Rotate handle clockwise until mark is reached on body tube and plug is tight inside fitting. Do not over-tighten or the O-ring and threads may be damaged.
- H. Turn lower-in crank counterclockwise until arrow on hex drive aligns with flow in the pipeline. This aligns plug assembly in the nipple.
- I. If measurements correspond, check the seal on plug by removing the crank handle and locking cap.
- J. Retract boring bar 2 in. and open bleeder valve. If pressure bleeds off, plug is set.

NOTE: If pressure does not bleed off, plug is not properly set. Recheck measurements to make sure full travel distance has been reached. If full travel distance has been reached and pressure does not bleed off, pressure is probably leaking around O-ring. Close bleeder

valve and retract plug, following instructions in paragraph 4.5. Remove and check O-ring.

- K. Fully retract boring bar by turning feed tube counterclockwise. See Figure 14. Do not permit boring bar to turn, or plug will unthread.



Figure 14. Retract Boring Bar

- L. Remove drilling machine and tapping valve.
- M. Check plug to make sure it is aligned. If a unidirectional plug, arrow on top of plug should point in direction of flow. If a bi-directional plug, arrows should align with pipeline axis. See Figure 15.



Figure 15. Check Plug Alignment

Note: Make sure the top of the plug is below the top of the nipple.

- N. Advance set screw in plug into nipple wall to prevent plug from turning. See Figure 16.



Figure 16. Advance Plug Set Screw

3.3 Indicator Installation

3.3.1 Installing Flag and/or Electrical Switch Indicator

Note: See Section 4.3.2 for Rotary Cap Indicator Assembly.

- A. Install drive sleeve in plug. See Figure 17.



Figure 17. Install Drive Sleeve



Figure 18. Install Spring

- B. Install spring in drive sleeve. See Figure 18.
- C. If an extension is involved, proceed to paragraph 4.4. If not, go to step D below.
- D. Remove cover from housing/cap assembly.



Figure 19. Loosen Set Screws

- E. Loosen two set screws securing spring retainer and upper torsion spring to shaft. See Figure 19.
- F. Remove spring retainer and upper torsion spring from shaft. See Figure 20.



Figure 20. Remove Spring Retainer and Upper Torsion Spring

- G. Loosen two set screws in cam and remove it and lower torsion spring from shaft.
 - H. Thread housing/cap assembly onto nipple. Orient housing as desired.
- Caution: If wrench is used to turn indicator, do not over-tighten. Doing so may swage the nipple.*
- I. Install lower torsion spring and cock by placing spring legs on opposite sides of post. See Figure 21.

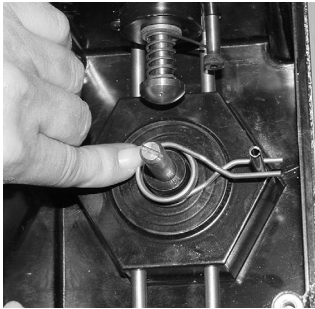


Figure 21. Cock Lower Torsion Spring



Figure 22. Install Cam

- J. Place cam on shaft, making sure post on cam is inserted between the legs of the spring. See Figure 22.



Figure 23. Position Trigger

- K. It's very important to position PIG-SIG trigger before tightening set screws by turning the shaft with a screwdriver (Figure 23)

as follows:

1. If unidirectional, turn shaft counterclockwise to a firm stop with a screwdriver. The trigger is positioned.
2. If bi-directional, turn the shaft fully counterclockwise. Mark this position of the slot in the shaft on the top of the cam. Turn shaft fully clockwise, again marking the position of the shaft on the cam. Turn the shaft counterclockwise, centering it between the two marks to place the trigger in the correct position. See Figure 24.



Figure 24. Mark Trigger Position



Figure 25. Adjust the Microswitch Lever

- L. If an electrical PIG-SIG is being set, adjust the microswitch lever up or down as necessary so that roller wheel fits into the cam groove, then tighten the set screws on the roller arm. See Figure 26.
- M. Install upper torsion spring and "cock" by placing spring legs on opposite sides of post, as in step C.
- N. Install spring retainer and tighten the two set screws, locking it in place on the shaft, as shown in Figure 27.



Figure 26. Install Upper Torsion Spring



Figure 27. Install Spring Retainer

Note: If pipeline pressure is less than 1,500 psi, only one (1) torsion spring on cam is necessary.

- O. Test trigger operation as follows:
 1. If a flag model, cock flag by placing in the down position. (Quarter turn to the right or the 3 o'clock position when facing flag.)
 2. Using a screwdriver, turn shaft clockwise. Flag will release, and microswitch click can be heard.

Note: Be aware that the flag will pop up as you maneuver the shaft.

3. Test bidirectional model by turning shaft to both directions.

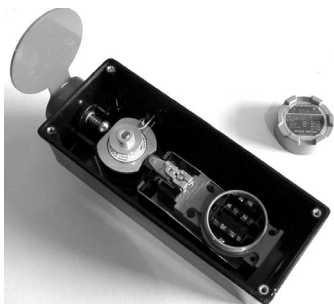


Figure 28 Electrical Connections

P. If an electrical model, remove cover to microswitch, and make electrical connections. See Figure 28.

1. Run three conductor cables into box. Connect ground wire to green post.
2. Connect wires following instructions on microswitch cover plate.

Q. Replace cover on microswitch.

R. Replace cover on PIG-SIG housing.

3.3.2 Installing Rotary Cap Indicator Assembly

Note: See Section 4.3.1 for Flag and/or Electrical Switch Indicator Assembly.

A. Install drive sleeve and spring in plug. See Figures 29 and 30.



Figure 29. Install Drive Sleeve



Figure 30. Install Spring



Figure 31. Thread Pipe Cap onto Nipple

B. Thread pipe cap unit onto nipple. Make sure to align hex head bolt into drive sleeve. See Figure 31. Make pipe cap unit wrench-tight. Do not over-tighten.

Caution: If wrench is used to turn indicator, do not over-tighten. Doing so may swage the nipple.

- C. For unidirectional trigger, turn threaded shaft and spacer counterclockwise until a firm stop is reached. The trigger will be in the down position.
- D. For bi-directional trigger, turn threaded shaft and spacer clockwise to a firm stop. Place a mark on the pipe cap where the spacer stopped. You can use the pin in the spacer for reference. Next, turn the spacer counterclockwise to a firm stop. Mark where the spacer stopped. Then, position spacer halfway between the two marks. The trigger will be in the down position.

- E. Place rotary cap on pipe cap. Position the rotary cap so that the two windows are perpendicular to the run of the pipe, as shown in Figure 32. Mark window position on the pipe cap and then remove rotary cap.



Figure 32. Align Rotary Cap



Figure 33. Install Decals

- E. Place two white decals at 180° positions to cover the areas marked on the pipe cap. See Figure 33.
- F. Replace rotary cap on pipe cap. Install flat washer, lock washer and cap nut. The completed installation is shown in Figure 34.



Figure 34. Rotary Cap Installation

CAUTION: Do not tighten the cap nut beyond 16 ft. lbs. Mechanical damage could result.

Note: A rotary cap indicator must be reset manually. When the rotary cap is turned counterclockwise until it stops, a unidirectional trigger is in the down or "reset" position. When it is turned clockwise until it stops, a unidirectional trigger is in the up, or "pig passed" position. When the rotary cap is turned clockwise or counterclockwise until it stops, a bi-directional trigger is in the up or "pig passed" position. The down or "reset" position is halfway between the two stops for a bi-directional trigger.

3.4 Extended Indicator Installation

Note: Special extensions are used in rotary cap applications – extension and rotary cap are made as one unit.

3.4.1 Install Extension

Thread extension onto nipple. Make sure hex fitting of shaft seats into drive sleeve. See Figure 35.



Figure 35. Install Extension

3.4.2 Install Indicator Assembly

- A. Remove cover from housing/cap assembly.
- B. Loosen set screws in spring retainer and cam (steps E-G, page 16 of this manual).
- C. Remove spring retainer, cam and torsion springs from shaft.
- D. Remove spacer and washer from shaft. See Figure 36.

Note: You may need to file shaft where set screws bite into shaft to make removal easier.

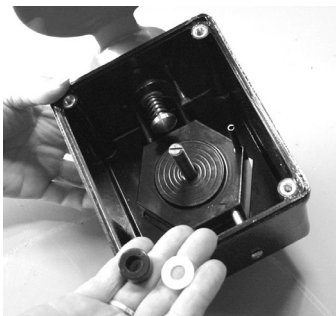


Figure 36. Remove Spacer and Washer

- E. Remove the shaft from the cap/housing assembly. Remove from the bottom. This shaft can be discarded. Retain white Teflon O-ring in bottom of hex cap.
- F. Place the cap/housing assembly over the extension shaft and thread onto extension (Figure 37). Orient housing as desired.



Figure 37. Install Cap/Housing Assembly

- G. Replace washer and spacer, in that order, on the extension shaft.
- H. Return to paragraph 4.3 steps I through O for completion of assembly.

3.5 Recovering the Plug

3.5.1 Preparations

- A. Remove cover from the box, or in the case of the Rotary

Cap Indicator, the pipe cap. If the latter, proceed to step G.

- B. Disconnect electrical wiring from microswitch if an electrical model.
- C. Loosen set screws on spring retainer and remove it as well as top torsion spring. Loosen set screws on cam. Make sure cam turns freely on the shaft. See Figure 38.



Figure 38. Loosen Set Screws

- D. Remove cam, lower torsion spring, spacer and washer, if installed on extension. May need to file shaft for easier removal.
- E. Unthread housing/cap assembly from PIG-SIG nipple or extension, as appropriate.
- F. Remove extension, if applicable.
- G. Remove spring and drive sleeve from plug.
- H. Loosen set screw which keeps PIG SIG plug aligned in nipple. See Figure 39.



Figure 39. Loosen Set Screw

- I. Install valve on nipple. Make sure valve has a minimum bore clearance of $2 \frac{1}{16}^{\text{th}}$ inch. Leave valve in open position.
- J. Install plug holder on drilling machine. Retract boring bar fully, making sure zero is visible on the body tube.
- K. Install valve adapter on drilling machine.

3.5.2 Take Required Measurements

- A. With boring bar fully retracted and feed tube at zero mark on body tube, calculate distance plug holder travels to contact bottom of recess in plug.
- B. Measure and record Measurement “N,” valve face to bottom of the recess in the completion plug. See Figures 40 and 42.



Figure 40. Measurement N

- B. Measure from the adapter face to the bottom of the completion plug holder. Mark this measurement on the outside of the adapter.
- C. Install drilling machine on tapping valve using thread compound on adapter threads.
- D. Measure from the face of the valve to the mark made on the adapter. This is Measurement “M.” See Figures 41 and 42.



Figure 41. Measurement M

E. The sum of Measurements “M” and “N” should be the body tube reading when the plug holder contacts the bottom of the recess in the plug. Mark this measurement on the drilling machine body.

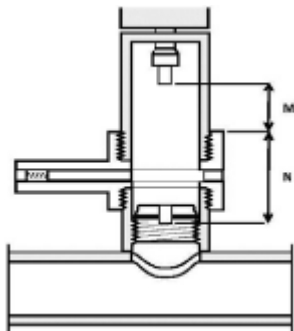


Figure 42. Plug Removal Measurements

3.5.3 Removing the Plug

- A. Install bleeder valve in open position.
- B. Test setup for pressure tightness by pressuring through bleeder valve on drilling machine. Slightly open bleeder valve after test. See Figure 43.
- C. Open tapping valve to full-open position.

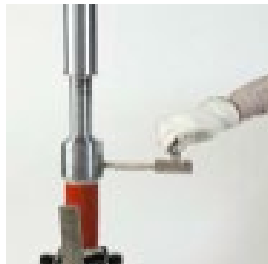


Figure 43. Open Bleeder Valve.

- D. With locking cap removed, rotate feed tube clockwise to extend boring bar until plug holder contacts bottom of hole in plug. The feed tube should be at mark on body tube. If feed tube is 1 inch above the mark on body tube, the plug holder did not align with square hole in plug:
 - To line up square plug holder with square hole in plug, rotate crank handle and feed tube clockwise slowly, but do not force.
 - When properly aligned, extend plug holder by rotating feed tube clockwise until stop is reached. The mark on the body tube should be reached.
- E. Rotate the feed tube $\frac{1}{2}$ revolution counterclockwise to align balls on plug holder in plug-retention groove.
- F. Install locking cap.
- G. Attach handle to $\frac{3}{4}$ in. hex drive.

- H. Rotate handle counter-clockwise until pressure starts to flow past plug. Purge air through bleeder valve. After air is completely purged, close bleeder valve. Continue retracting the plug to zero mark on body tube.

4.0 Preventive Maintenance

4.1 Preventive Maintenance Checklist

Maintenance of existing PIG-SIG IV Scraper Passage Indicators is important to continued proper operation. If your PIG-SIG is not working properly (indicating Pig passage) or has worked but is not working currently, refer to installation procedures in this instruction manual.

Below is a checklist of items to consider during regularly scheduled maintenance inspections.

1. **Is the flag positioned properly?** – When looking at the TDW flag, the flag should be turned down $\frac{1}{4}$ turn clockwise. This is the proper position before Pig passage. Once the Pig has passed, the flag should be standing up. The flag will need to be reset before the next Pig passage.
2. **If the PIG-SIG is electrical, is the indicator properly wired?** Are the wires still

connected to the terminals in the microswitch?

3. **Check the indicator to ensure it was installed properly.**

- A. Remove the cover on the indicator.
- B. Is the pin in the cam setting between the legs of the torsion spring? The legs of the spring should be crossed and on each side of the pin in the hex cap.
- C. Are the set screws in the spring retainer and cam tightened to the shaft?
- D. Loosen the two set screws in the spring retainer. Remove it and the top torsion spring. Loosen the two set screws in the cam.
- E. Using a screwdriver, turn the shaft in the center of the cam. The shaft should rotate freely at least 90 degrees.

4. **Is the plug trigger (flapper) positioned properly?**

- i. For uni-directional plugs, turn the shaft counterclockwise until it comes to a stop. Tighten the two set screws in the cam. This is the position the trigger should be in before the Pig passes. The springs will reset

the trigger after the Pig passes.

- ii. For a bi-directional plug, turn the shaft counter-clockwise until it comes to a stop. Make a mark on the cam in line with the slot on the shaft. Turn the shaft clockwise until it comes to a stop and make another mark in line with the slot on the shaft. Turn the slot in the shaft back to the middle of the marks. Tighten the two set screws in the cam.

- a. Replace the top torsion spring and the spring retainer and tighten the two set screws in the spring retainer.

Note: If pipeline pressure is less than 1,500 psi, the top torsion spring and spring retainer are not necessary. If pipeline pressure is greater than 1,500 psi, both upper and lower torsion springs must be installed. All PIG-SIGS are packaged with two torsion springs.

Note: Always remember to reposition the trigger if the cam and springs have been removed or replaced. If a PIG-SIG does not operate properly following correct indicator installation, then you will have to remove the indicator and confirm that the plug is positioned properly and working correctly.

5. Is the plug aligned with the pipeline axis?

- a. The arrows stamped on top of the plug should align with the pipeline.
- b. For a uni-directional plug the arrows should point in the direction of flow.

6. Is the drive sleeve installed in the plug?

- a. It looks like a 3/8 socket. You will need to remove this to check the rest of the plug. Be certain to replace it in the plug before putting the indicator back on.

7. Is the set screw in the top of the plug tightened into the nipple?

- a. There are two small holes inside the square hole of the plug. One of these has a set screw in it which needs to be tightened into the wall of the nipple, so the plug does not turn during installation or operation.

8. Does the shaft inside the plug turn ¼ turn?

- a. You can use a ½-inch hex key (Allen wrench) and the drive sleeve to check this.

Warning: Do not use excessive force.

9. Does the shaft turn freely and smoothly?

- a. The shaft should turn at least 90 degrees. If not, the trigger is probably damaged and must be replaced to work properly.

10. Refer to section 3.5.3 of this instruction manual section for the proper procedure for removing plug.

Hex Keys (Allen Wrenches) Reference List

Size	TDW Part Number	Where Used
3/32	00-0175-0002-00	Set screw in plug, cam and spring retainer.
1/8	00-0175-0003-00	Screws in flag pin guide.
5/32	00-0175-0004-00	Screws for attaching microswitch to bracket.
9/64	00-0175-0021-00	Screws for adjustable arm on microswitch.

T.D. Williamson Product Warranty

1. Products manufactured by T.D. Williamson, 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 T.D. Williamson, 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. **TDW 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.**



PIG-SIG V

Scraper Passage Indicator

Operating and Maintenance Instructions

tdwilliamson.com