Permanent Pressure Gauges

DataCan User Manual – V1.4

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History of Changes

Rev. No.	Date	Pages	Description of Changes
1.0	Nov -2021	7	Initial Draft
1.1	Jan -2022	14	Updated Format, Added Pressure Testable Gauges, Updated Spare Parts, Added Installation Equipment
1.2	May -2022	9,13,14	Added Assembly Notes
1.3	May -2022	26	Combined Bottom and Passthru instructions, added Testing and Appendix, Added specifications and part numbers, Updated Formatting
1.4	Sept -2022	19,20	Added Ferrule Setting Tool Instructions

1 About This Guide

This document is intended as a supplement to formal training. DataCan is constantly working to improve its products. We must therefore reserve the right to change designs, materials, specifications, and prices without notice. DataCan declines any liability that may arise out of the potential inaccuracies in this guide.

This guide assumes that you have some computing and tool knowledge. For more information, contact your local service representative.

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We thank you for any feedback or comments that will help us to continue to improve our products and service.

2 Introduction

DataCan Services Corp. provides technology-driven downhole measurement solutions that deliver productivity, quality, and safety. We design, manufacture and service 200°C plus hybrid platform instruments, patented multi-cycle instant close shut-in tools, reservoir management systems and a suite of quartz and piezo-resistive pressure measurement instruments. We offer specialized solutions that will help you improve productivity in your applications.

We are the leader in ultra-high temperature circuit design, manufacturing, and packaging.

- Our part selection process ensures the best long-term reliability is provided.
- Our fully automated surface mount assembly procedures ensure the highest quality circuit is constructed every time with minimal heat impact.
- Our Hybrid design and construction techniques will enable DataCan and its customers to reliably enter the 177ºC to 225ºC market.
- Our metal-to-metal seal and fully welded designs prevent potential leaks.

3 Product Overview

3.1 Product Description

DataCan's Multi-Gauge Piezo or Quartz Bottom Pressure Gauge can be used on its own or at the bottom of a multi-gauge pressure system. The Multi-Gauge Piezo or Quartz Passthru Gauge can be used to connect up to 8 permanent gauges on a single conductor. All the Bottom and Passthru tools come in a standard version as well as a pressure testable version for quality assurance.

These assembly instructions are to be used when assembling any of DataCan's Piezo or Quartz permanent downhole gauges. A full list of permanent gauge part numbers can be found below.

3.2 Product Specifications

WARNING: If your product does not have a part number that matches the part number(s) below, please contact a DataCan representative to ensure this manual applies to your needs.

3.2.1 Piezo Gauges

0.75" Piezo Perm

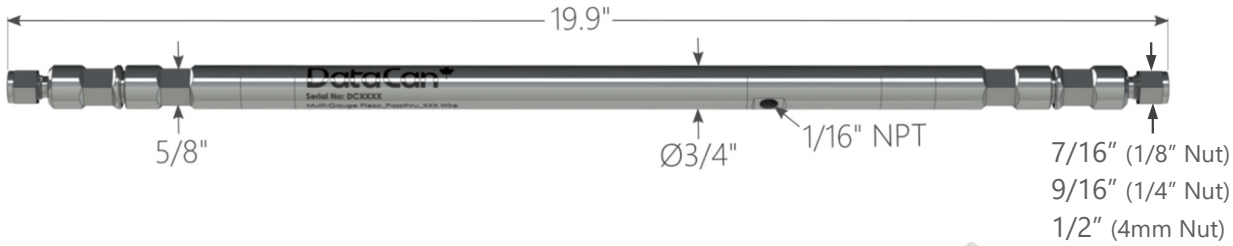
0.75" Piezo Perm - Standard

Pressure	Temperature	Part No.					
		1/8" Wire		¼" Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
750 psi	150°C	111542	111548	111530	111536	111554	111560
1,500 psi		111543	111549	111531	111537	111555	111561
3,000 psi		111544	111550	111532	111538	111556	111562
6,000 psi		111545	111551	111533	111539	111557	111563
10,000 psi		111546	111552	111534	111540	111558	111564
15,000 psi		111547	111553	111535	111541	111559	111565

0.75" Piezo Perm - Pressure Testable

Pressure	Temperature	Part No.					
		1/8" Wire		¼" Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
750 psi	150°C	112166	112172	112154	112160	112178	112184
1,500 psi		112167	112173	112155	112161	112179	112185
3,000 psi		112168	112174	112156	112162	112180	112186
6,000 psi		112169	112175	112157	112163	112181	112187
10,000 psi		112170	112176	112158	112164	112182	112188
15,000 psi		112171	112177	112159	112165	112183	112189

0.75” Piezo Passthru



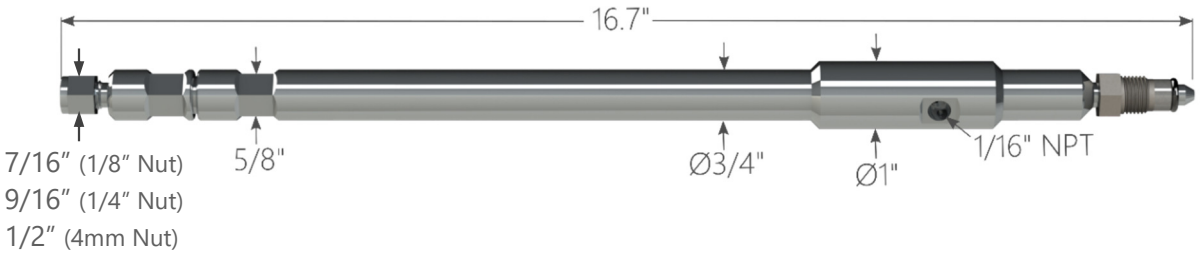
0.75” Piezo Passthru - Standard

Pressure	Temperature	Part No.					
		1/8” Wire		¼” Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
1,500 psi	150ºC	112425	112426	112423	112424	112427	112428
3,000 psi		111574	111578	111566	111570	111582	111586
6,000 psi		111575	111579	111567	111571	111583	111587
10,000 psi		111576	111580	111568	111572	111584	111588
15,000 psi		111577	111581	111569	111573	111585	111589

0.75” Piezo Passthru - Pressure Testable

Pressure	Temperature	Part No.					
		1/8” Wire		¼” Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
1,500 psi	150ºC	112431	112432	112429	112430	112433	112434
3,000 psi		112198	112202	112190	112194	112206	112210
6,000 psi		112199	112203	112191	112195	112207	112211
10,000 psi		112200	112204	112192	112196	112208	112212
15,000 psi		112201	112205	112193	112197	112209	112213

1.00” Dual Piezo



1.00” Dual Piezo - Standard

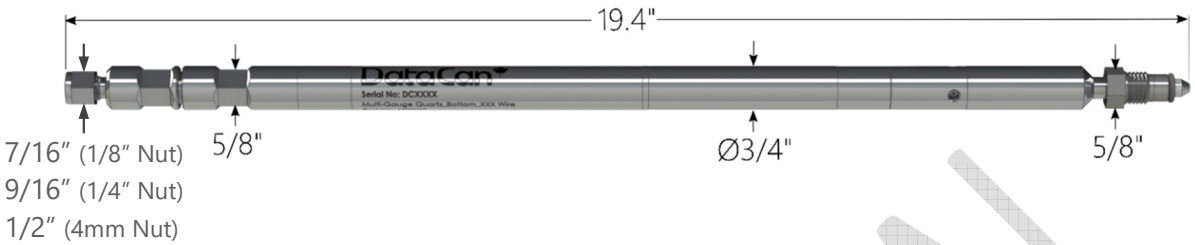
Pressure	Temperature	Part No.					
		1/8” Wire		¼” Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
1,500 psi	125°C	112616	112621	112606	112611	112626	112631
3,000 psi		112617	112622	112607	112612	112627	112632
6,000 psi		112618	112623	112608	112613	112628	112633
10,000 psi		112619	112624	112609	112614	112629	112634
15,000 psi		112620	112625	112610	112615	112630	112635

1.00” Dual Piezo – Pressure Testable

Pressure	Temperature	Part No.					
		1/8” Wire		¼” Wire		4mm Wire	
		Stainless	Inconel	Stainless	Inconel	Stainless	Inconel
1,500 psi	125°C	112733	112738	112723	112728	112743	112748
3,000 psi		112734	112739	112724	112729	112744	112749
6,000 psi		112735	112740	112725	112730	112745	112750
10,000 psi		112736	112741	112726	112731	112746	112751
15,000 psi		112737	112742	112727	112732	112747	112752

3.2.2 Quartz Gauges

0.75” Quartz Perm



0.75” Quartz Perm - Standard

Pressure	Temperature	Material	Part No.		
			1/8” Wire	¼” Wire	4mm Wire
5,000 psi	150°C	Inconel	111595	111590	111600
10,000 psi			111596	111591	111601
16,000 psi			111597	111592	111602
20,000 psi			111598	111593	111603
25,000 psi			111599	111594	111604

0.75” Quartz Perm - Pressure Testable

Pressure	Temperature	Material	Part No.		
			1/8” Wire	¼” Wire	4mm Wire
5,000 psi	150°C	Inconel	112219	112214	112224
10,000 psi			112220	112215	112225
16,000 psi			112221	112216	112226
20,000 psi			112222	112217	112227
25,000 psi			112223	112218	112228

1.25" Quartz Passthru

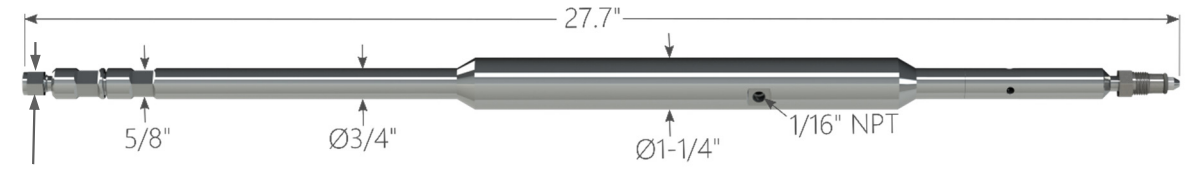
1.25" Quartz Passthru - Standard

Pressure	Temperature	Material	Part No.		
			1/8" Wire	¼" Wire	4mm Wire
10,000 psi	150°C	Inconel	111608	111605	111611
16,000 psi			111609	111606	111612
20,000 psi			111610	111607	111613

1.25" Quartz Passthru - Pressure Testable

Pressure	Temperature	Material	Part No.		
			1/8" Wire	¼" Wire	4mm Wire
10,000 psi	150°C	Inconel	112232	112229	112235
16,000 psi			112233	112230	112236
20,000 psi			112234	112231	112237

1.25” Dual Quartz



7/16” (1/8” Nut)
9/16” (1/4” Nut)
1/2” (4mm Nut)

1.25” Dual Quartz - Standard

Pressure	Temperature	Material	Part No.		
			1/8” Wire	¼” Wire	4mm Wire
5,000 psi	150°C	Inconel	112700	112696	112704
10,000 psi			112701	112697	112705
16,000 psi			112702	112698	112706
20,000 psi			112703	112699	112707

1.25” Dual Quartz – Pressure Testable

Pressure	Temperature	Material	Part No.		
			1/8” Wire	¼” Wire	4mm Wire
5,000 psi	150°C	Inconel	112712	112708	112716
10,000 psi			112713	112709	112717
16,000 psi			112714	112710	112718
20,000 psi			112715	112711	112719

4 Permanent Pressure Gauge Assembly

Proper assembly of DataCan products ensures high-quality performance and long-lasting results. The following section highlights the steps required for proper assembly. Please note that these instructions apply to all variations of permanent gauges. However, some steps specify different instructions for specific models.

4.1 Preparation

Prior to gauge assembly, it is recommended that you connect the gauge to the surface box you will use in your system and confirm communication. If the surface box has not already been configured to log the gauge being assembled, see the surface box manual for connection and configuration instructions.

4.2 Tools Required

Description	Part No.
Gauge Assembly Checklist. Printed for file	Section 7
Surface Box configured to sample gauge	103648, 108768, 110797, 109684, or 109137
Swagelok Silver Goop	105031
5/8" Combination Wrench (x2)	102206
Grease, O-Ring Lubrication, High Temp	101184
Small Tubing Cutter, 1/8"-5/8"	100601
Closed Jaw Crimping Tool	100241
USB cable (connect surface box to PC)	PE171UU0012
Test connection wires with alligator clips	N/A (provided with surface box)
7/16" Combination Wrench (for 1/8" wire)	N/A
9/16" Combination Wrench (for 1/4" wire)	N/A
1/2" Combination Wrench (for 4mm wire)	N/A
Ferrule Setting Tool (Optional – for 1/4" and 4mm wire only)	112763
Tape Measure or Ruler	N/A
Marker	N/A
Multimeter	N/A
PC with DataCan Download Software installed (Recommended for diagnostics)	N/A

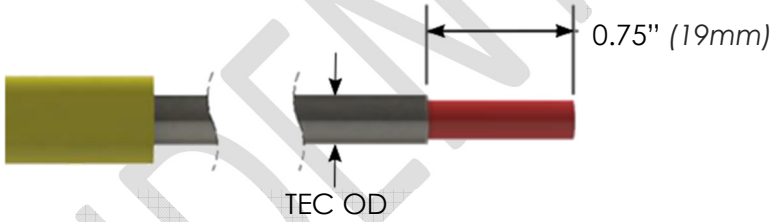
4.3 Assembly Instructions

1. Perform continuity test on TEC Cable. See Section 6.1 – *TEC Cable Continuity Test.*

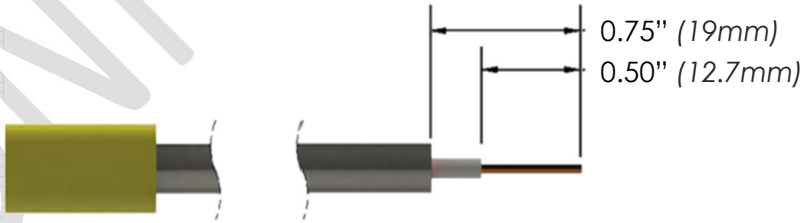
2. Perform cable resistance test on TEC Cable. See Section 6.2 – *Cable Resistance Test.*
   Note: The gauge should not be connected at this point and resistance is expected to be greater than 1MΩ.

3. Remove approximately 5ft of encapsulation.

4. Remove 0.75" of armour from the connection end of the TEC. The preferred method is to score armour with a small pipe cutter. Carefully flex TEC at the scored point and the armour should crack easily. Remove armour and inspect insulation and wire for damage. Be careful not to cut too deep as this could cause the cut point to flare inward and short to the wire.



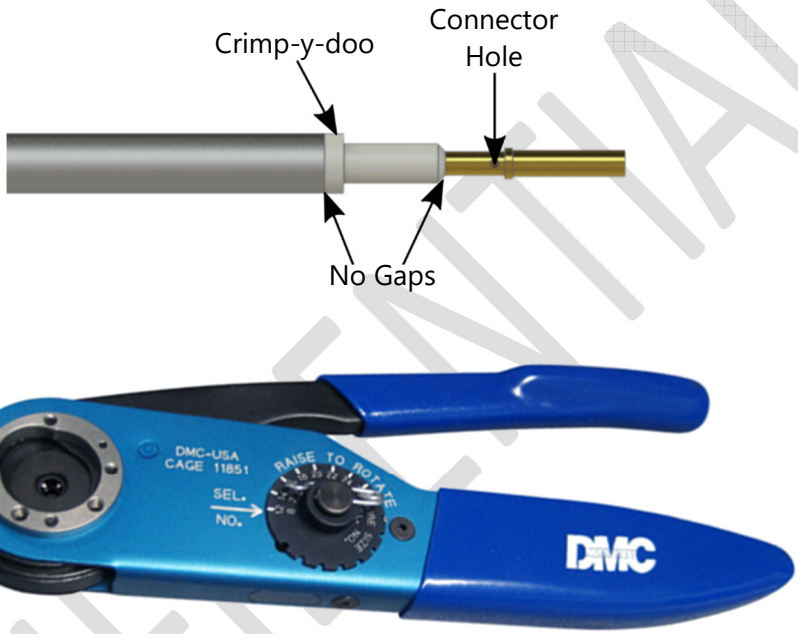
5. Strip 0.75" of filler from the insulation **(1/4" TEC only).** Strip 0.5" of insulation from the conductor. Ensure no damage is done to the conductor.



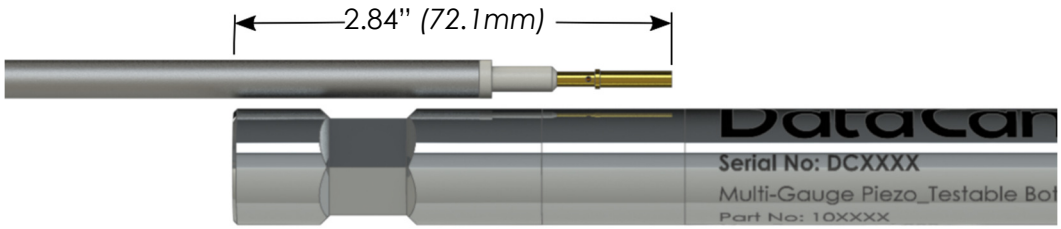
6. Slide the Crimp-y-doo (PEEK insulator) over the conductor. About 0.25" of conductor should still be visible.

7. Crimp the connector onto the end of the wire using a closed jaw crimping tool set to the conductor wire size (18 AWG). The small hole in the connector should be closest to the wire. Ensure there are no gaps between the TEC, Crimp-y-doo and socket connector. The ¼" TEC size is shown below.

   Note: The Crimp-y-doo ensures correct cable prep, keeps the socket connector centered during Gauge insertion and prevents conductor contraction during Gauge deployment.

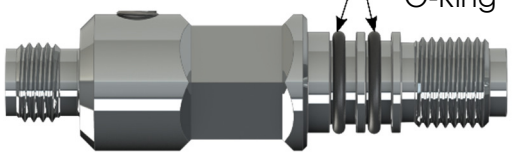


8. Test fit the connection in the Gauge. The connector should gently slide onto the pin connection within the Gauge with little friction. The PEEK insulator should shoulder out inside the Gauge **(1/4" TEC only).** To ensure the TEC is pushed in far enough, mark and measure the cable 2.84" *(72.1mm)* from the connector end. Once inserted, this line should line up with the Gauge opening. Remove the wire from Gauge and inspect for wire compression.

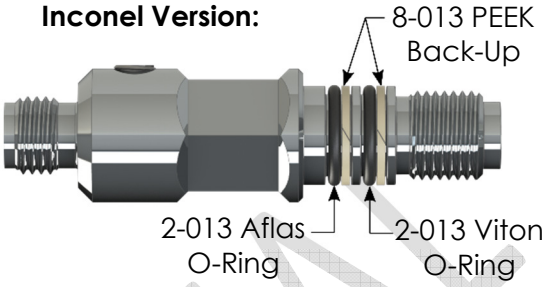


9. Install the O-rings and Back-ups on the strain relief housing as shown below. For the Passthru Pressure Gauges, there are two strain relief housings: one at the top of the gauge, and one at the bottom.

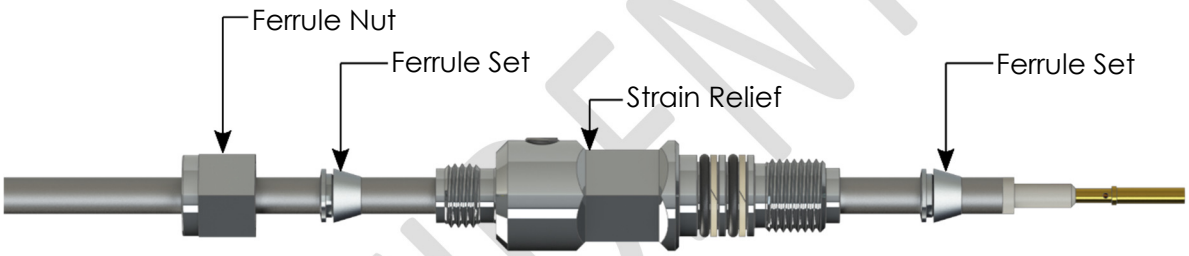
SS Version:



Inconel Version:

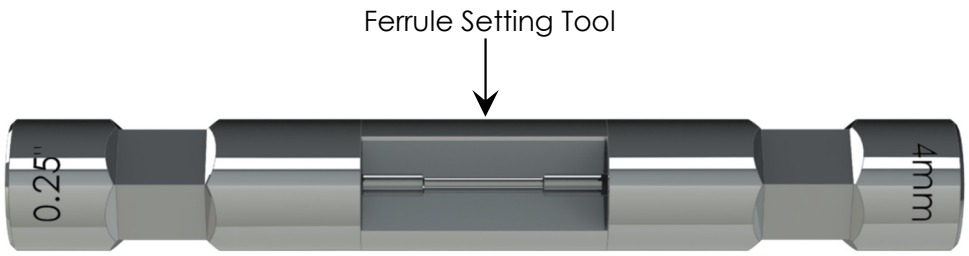


10. Slide all the Gauge parts onto the TEC in the order shown below without threading them together.

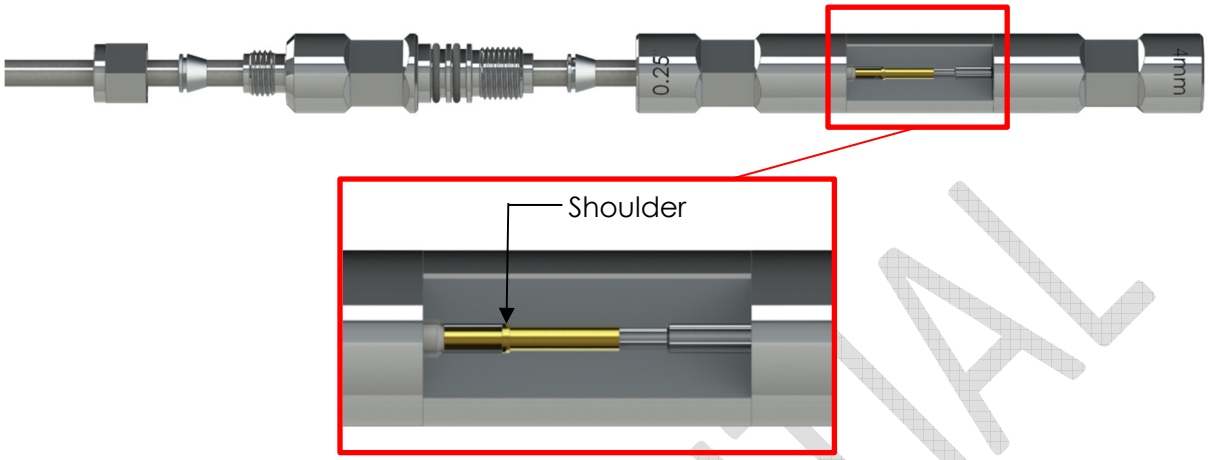


Note: Make sure all ferrule sets are oriented correctly as shown.

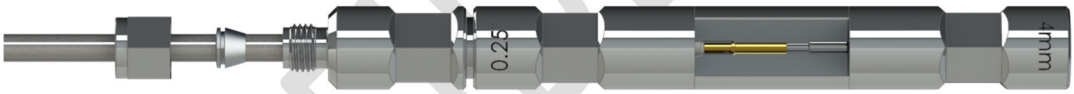
11. Optional: Preset Ferrules using the Ferrule Setting Tool (1/4" and 4mm TEC only). If not presetting Ferrules, skip to step 16.



12. Slide the wire into the end of the Ferrule Setting Tool marked with the correct size of TEC (1/4" or 4mm) until the socket connector shoulders out inside. The previously marked line on the TEC cable should line up with the Ferrule Setting Tool opening.

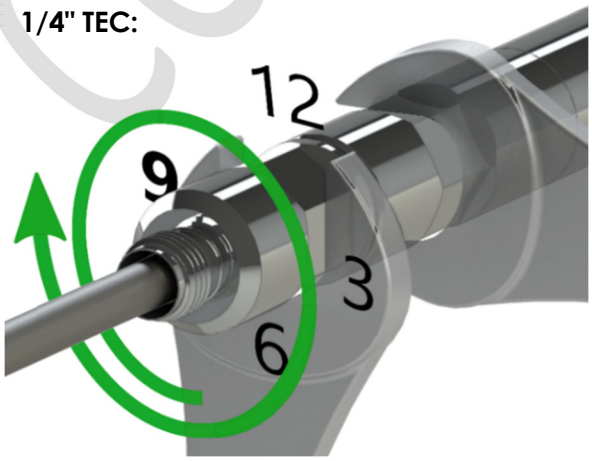


13. Grease Strain Relief thread and back of Ferrule with Swagelok Silver Goop. Grease the O-rings with O-ring lubricant. Slide the Ferrule Set and Strain Relief into the end of the Ferrule Setting Tool and tighten by hand.

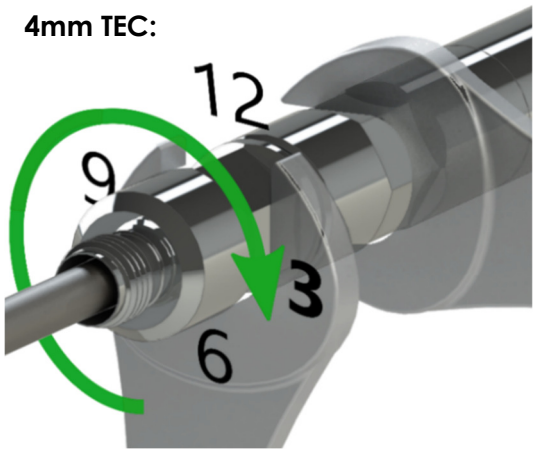


14. Mark the Strain Relief at the 6 o'clock position. **For ¼" TEC**, tighten the Strain Relief 1.25 turns to the 9 o'clock position. **For 4mm TEC**, tighten the Strain Relief 0.75 turns to the 3 o'clock position. Do not exceed 55 ft*lb (75 N*m).

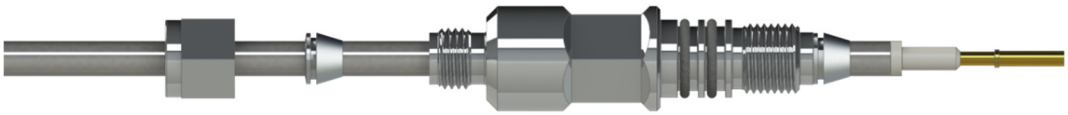
1/4" TEC:



4mm TEC:



15. Unthread the Strain Relief and remove the TEC from the Ferrule Setting Tool. Inspect Ferrule for proper tightening.



16. **If the Ferrules were preset:** skip to the next step.

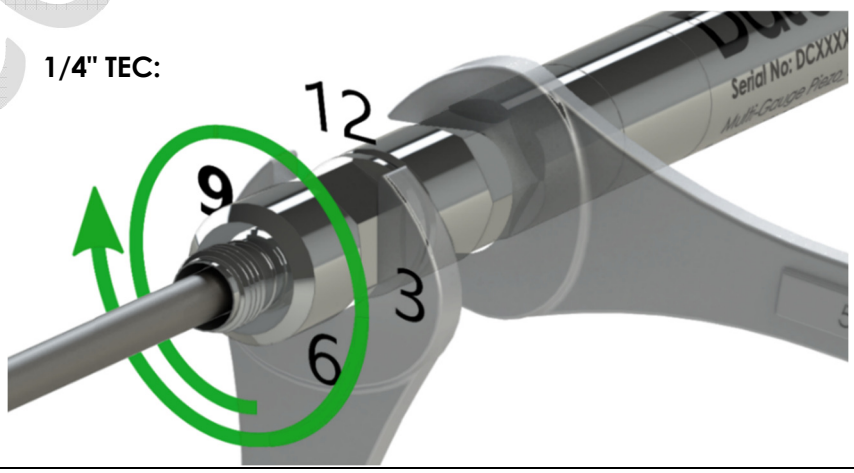
    If the Ferrules were not preset: Slide the wire into the Pressure Gauge until it connects with the glass feedthru inside. The previously marked line on the TEC cable should line up with the Gauge opening.

17. Grease Strain Relief thread and back of Ferrule with Swagelok Silver Goop. Grease the O-rings with O-ring lubricant. Slide the Ferrule Set and Strain Relief into the end of the Pressure Gauge and tighten by hand. Test the continuity and Gauge function. See Section 6.3 – *Continuity and Gauge Function Test.*

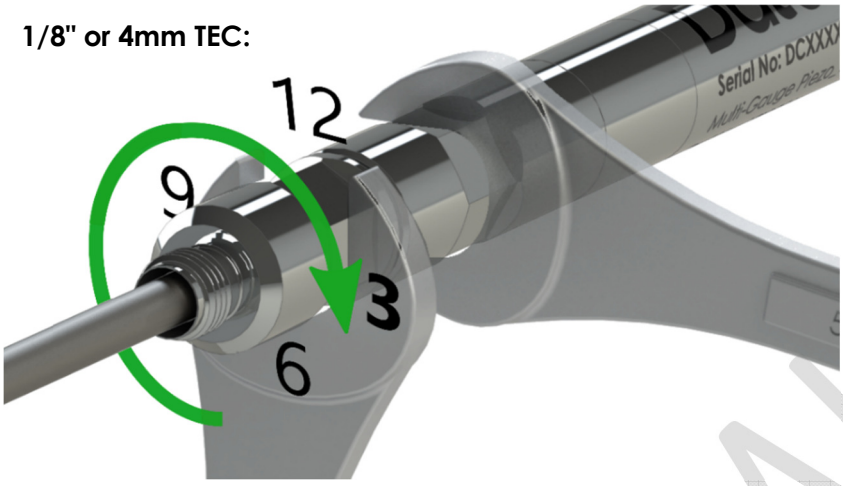
18. **If the Ferrules were preset:** Tighten the Strain Relief with a wrench to the previously pulled-up position. You will feel a significant increase in resistance. Tighten the Strain Relief slightly.

    If the Ferrules were not preset: Mark the Strain Relief at the 6 o'clock position. **For ¼" TEC**, tighten the Strain Relief 1.25 turns to the 9 o'clock position. **For 1/8" and 4mm TEC**, tighten the Strain Relief 0.75 turns to the 3 o'clock position. Do not exceed 55 ft*lb (75 N*m).

1/4" TEC:



1/8" or 4mm TEC:



19. Grease back of Ferrule with Swagelok Silver Goop. Slide Ferrules into place and thread Ferrule Nut onto Strain Relief. Tighten Ferrule Nut to the same degree as the first Ferrule connection. Do not exceed 55 ft*lb (75 N*m).

20. For Passthru Gauges, repeat steps 1 – 19 on the other end of the tool.

21. Perform a continuity and Gauge function test. See Section 6.3 – *Continuity and Gauge Function Test.*

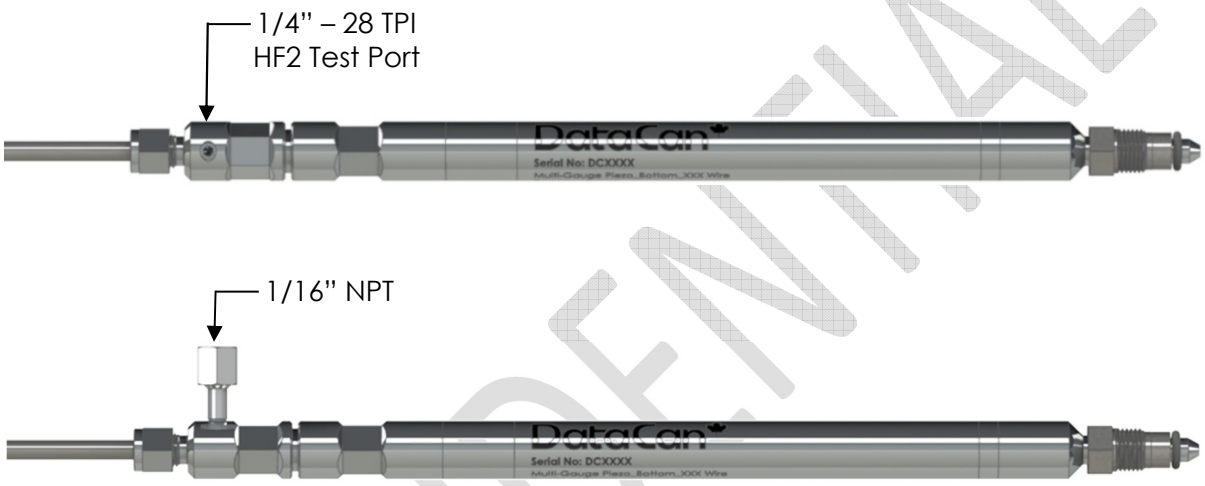
22. Perform a cable resistance test. See Section 6.2 – *Cable Resistance Test.*

    Note: The gauge should be connected, and resistance is expected to be:

    - 100kΩ for a single gauge system
    - 100kΩ / # of gauges for a multi-gauge system. For example, if two gauges are used, the expected resistance for each gauge should be 50kΩ.

5 Pressure Test Connection – Testable Version Only

1. Remove the plug from the strain relief body shown below and attach the pressure source that will be used to test the connection.



2. Run the pressure up to expected well pressure, but not above the rating of the gauge or pressure test equipment. Ensure there is no continuous loss in pressure.
   Note: The process of compressing the oil will cause the oil to heat up and expand. As a result, a small initial drop in pressure may be observed as the oil cools again. Once pressure stabilizes, pump back up to target pressure.

3. Once the pressure test is complete, remove the adapter and re-insert the test port plug into the testable body. Tighten to 60 to 80 in·lbs (6.8 to 9 N·m).

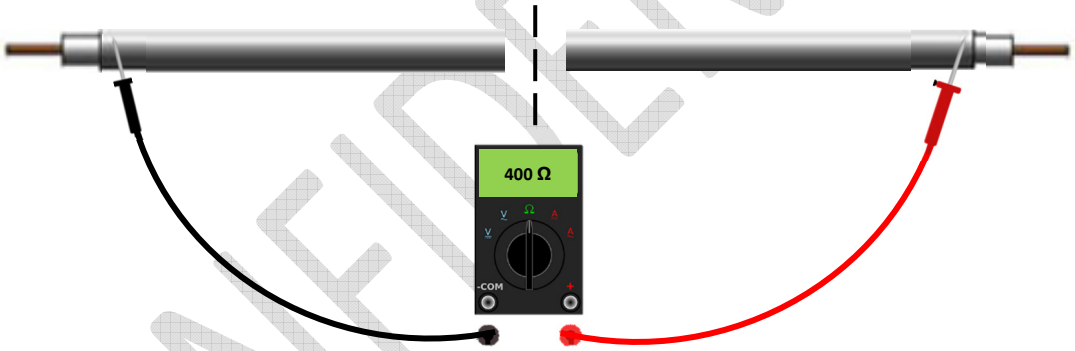
4. For Pressure Testable Passthru Gauges, repeat steps 1-3 on the other end of the tool.

6 Testing

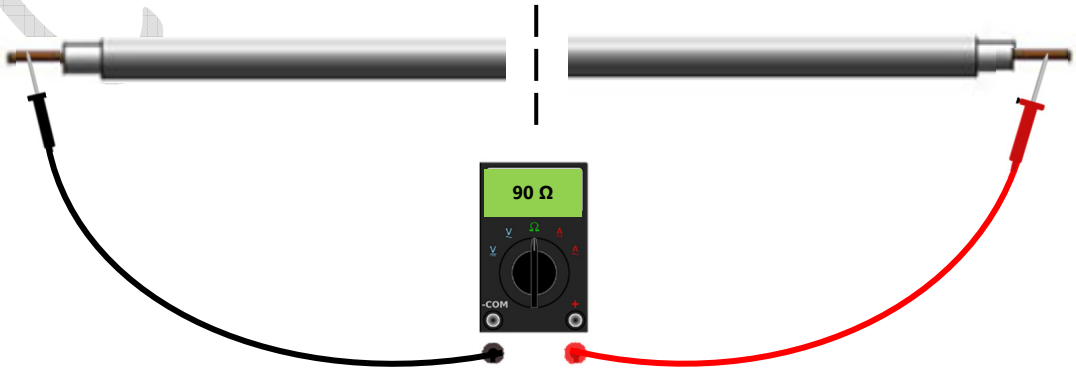
DataCan suggests periodic testing of the cable throughout the assembly process. This ensures functionality is maintained before changes are made permanent. Please refer to the following sections when prompted in the instructions before moving on to the next step.

6.1 TEC Cable Continuity Test

1. Using a multimeter, set the multimeter to the resistance setting.
2. Connect the positive probe (Red) to the Armour of the TEC cable at one end. Connect the negative probe (Black) to the Armour of the other end. The expected reading depends on length, encapsulation, and armour type, but generally should be less than 600 Ω.



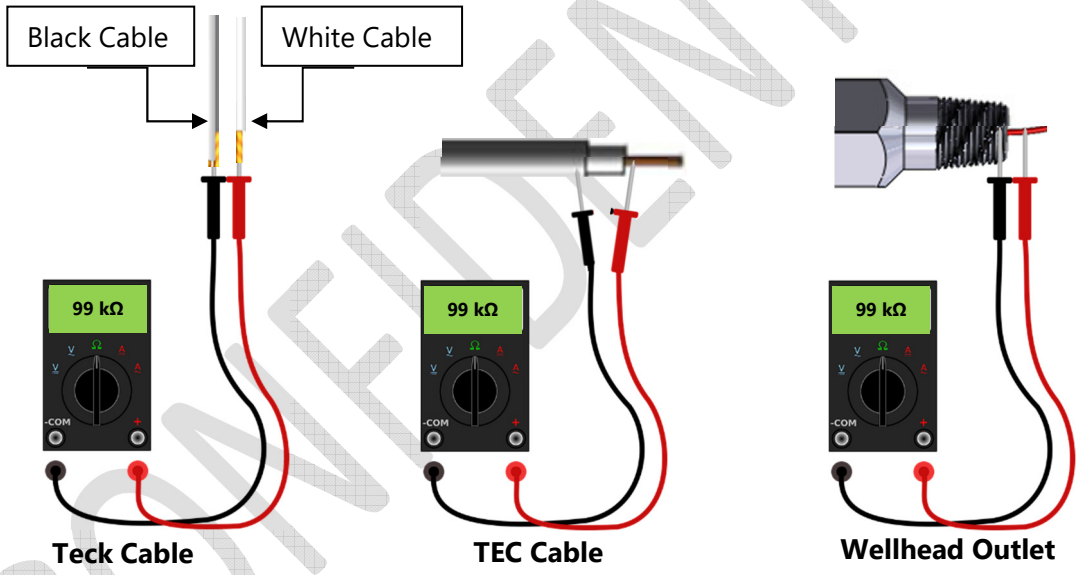
3. Connect the positive probe (Red) to the center conductor of the TEC cable at one end. Connect the negative probe (Black) center conductor of the other end. The expected reading depends on length and type of cable, but generally should be less than 210 Ω.



6.2 Cable Resistance Test

1. Using a multimeter, set the multimeter to the resistance testing.
2. Connect positive to the center conductor of TEC cable or positive wire of surface cable (white of Teck cable). Connect negative to the armour of TEC cable or negative wire of surface cable (black of Teck cable).

   Note: Resistance should be greater than 1MΩ if Gauge is not connected. Resistance should be 95 – 101 kΩ if the Gauge is connected.



6.3 Continuity and Gauge Function Test

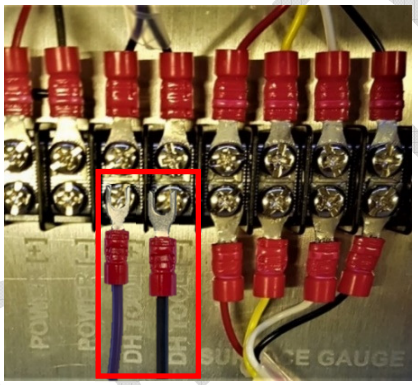
Note: This test assumes that the surface box you are using has already been configured to read the gauge you are testing. If your surface box is not configured, please refer to the surface box manual for configuration instructions.

Note: If your gauge is already connected to your Surface Box / Telemetry Card and is powered on, skip to Step 6.

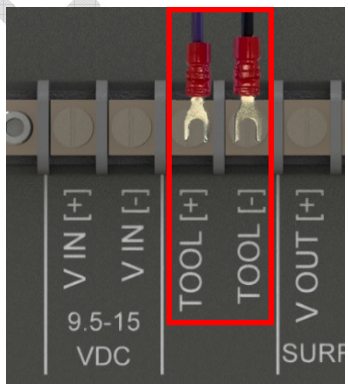
WARNING: Power should be disconnected or the power switch in the OFF position before any electrical connections are made or broken.

1. If using a Standard Surface Box, Rackmount unit, or Telemetry Card: Attach positive (purple) and negative (black) test wires to positive and negative tool inputs on the Surface Box / Telemetry Card.

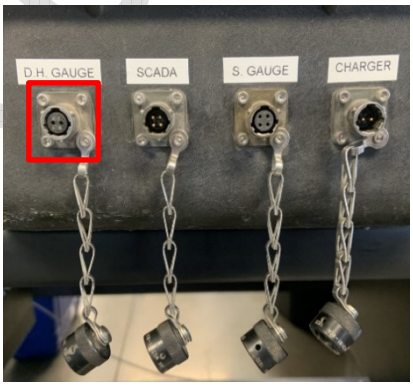
   If using a Portable Surface Box: Connect Gauge to Box using an Amphenol cable.



Surface Box



Rackmount Unit



Portable Box

Telemetry Card

2. Attach test wires to the cable.

   For Teck Cable

   - Attach negative to the black wire.
   - Attach positive to the white wire.

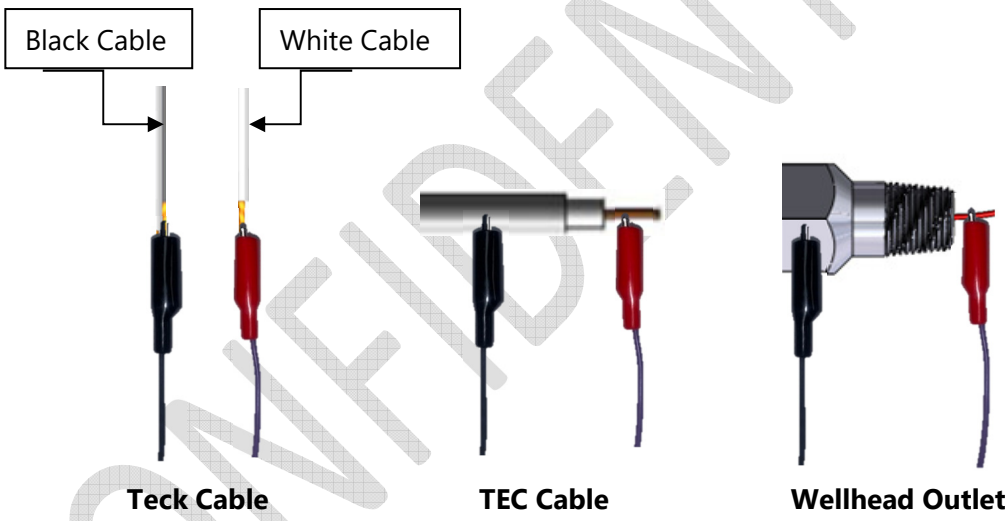
   For TEC Cable

   - Attach negative test wire to the cable armour.
   - Attach the positive test wire to the cable wire.

   For Wellhead outlet

   - Attach positive to the red wire.
   - Attach negative to the body.

   DO NOT PUT REVERSE POLARITY ON THE GAUGE – SEVERE DAMAGE MAY OCCUR



Teck Cable **TEC Cable** **Wellhead Outlet**

3. Attach the power supply to the Surface Box / Telemetry card.

   DO NOT PUT REVERSE POLARITY ON THE SURFACE BOX – SEVERE DAMAGE MAY OCCUR

4. Turn the Surface Box / Telemetry Card on.

5. Check indicators to confirm power is on.

   - Surface Box Screen turns on
   - Telemetry Card POWER – Solid Orange

6. Confirm communication with gauge. NOTE: it can take up to 15 seconds after power-up or connection for a gauge to respond.
    - For a surface box with a screen: Confirm a new reading for each connected gauge. NOTE: gauge data and warnings update at the sample rate.
    - For Telemetry card: Confirm a blue TOOL flash for each gauge connected, each sample period, or confirm a new sample in the diagnostics screen of the connected PC.

7 Gauge Assembly Checklist

Gauge SN: _____

Notes: _____

- ☐ Prepare TEC cable as required.
- ☐ Inspect connector crimps are correct and good crimps.
- ☐ Ensure o-rings and back-ups are installed correctly.
- ☐ Examine all parts & ferrules are positioned correctly on the TEC cable.
- ☐ Optional: Preset Ferrules (1/4" and 4mm TEC). Tighten 1.25 turns for past finger tight for ¼" TEC or 0.75 turns for 4mm TEC. Do not exceed 55 ft*lb (75 N·m).
- ☐ Insert the connection into the gauge main housing.
- ☐ Grease all threads and back of ferrules with Swagelok Silver Goop.
- ☐ Thread the strain relief housing into pressure gauge housing.
  If Ferrules were not preset: Tighten 1.25 turns for past finger tight for ¼" TEC or 0.75 turns for 1/8" and 4mm TEC. Do not exceed 55 ft*lb (75 N·m).
  If Ferrules were preset: Tighten slightly passed seated position.
- ☐ Check continuity and isolation from gauge body.
- ☐ Thread the ferrule nut onto the strain relief housing.
  Tighten 1.25 turns for past finger tight for ¼" TEC or 0.75 turns for 1/8" and 4mm TEC. Do not exceed 55 ft·lb (75 N·m).
- ☐ Check continuity and gauge function.

Testable Version Only:

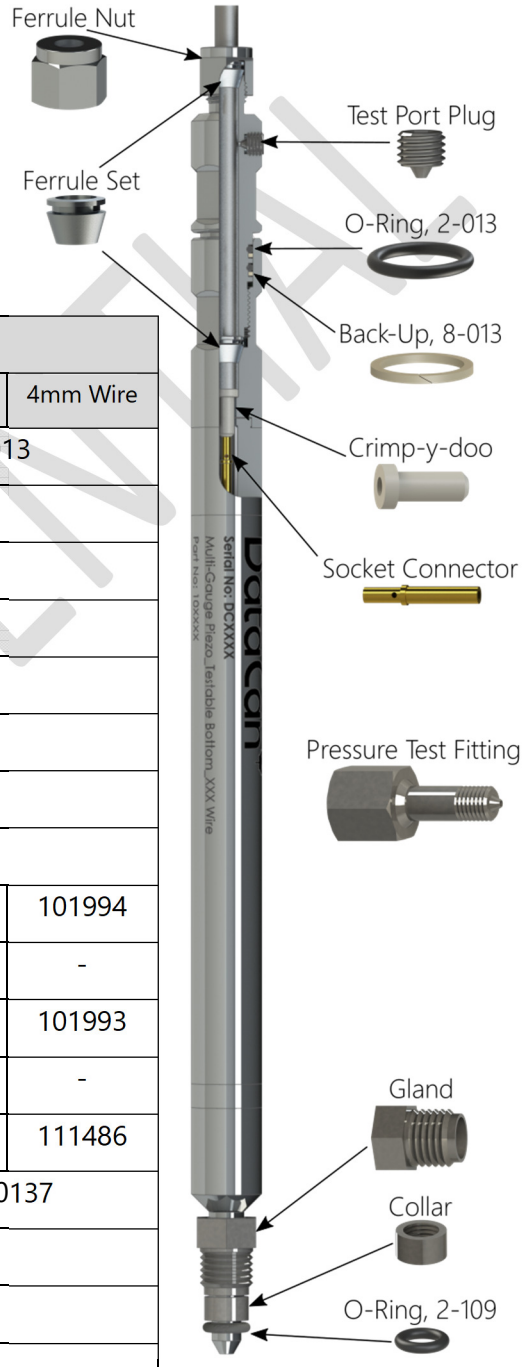
- ☐ Apply pressure to the assembly via the test port. It is recommended to test well pressure.
  DO NOT EXCEED THE PRESSURE RATING OF GAUGE OR PRESSURE TEST EQUIPMENT
  - Port Pressure _____ Duration _____
- ☐ Re-insert test port plug.

Completed By: _____ Date: _____

Appendix

Spare Parts

Some small parts may become lost, dropped, or damaged. For every installation, DataCan recommends bringing spare parts.



Description	Part No.		
	1/8" Wire	¼" Wire	4mm Wire
O-Ring_2-013_Viton 90	PM933RC2013		
O-Ring_2-013_Aflas 718 2B	106981		
Back-Up_8-013_PEEK Split	111484		
O-Ring_2-109_Viton 90	101815		
Collar_L Series_0.375"_SS316	100930		
Collar_L Series_0.375"_CRA	103469		
Gland_L Series_0.375"_SS316	100929		
Gland_L Series_0.375"_CRA	103470		
Ferrule Set_SS 316	100555	100060	101994
Ferrule Set_Inconel	101842	101841	-
Ferrule Nut_SS 316	100556	100557	101993
Ferrule Nut_Inconel	101910	103571	-
Crimp-y-doo	111483	111479	111486
Connector_0.060" Socket	102151	10137	
Test Port Plug_SS 316	100072		
Test Port Plug_CRA	102777		
Pressure Test Fitting	101145		
Perm Connection x ½" NPTM Adapter	102250		