



Dynamic Underbalance System

TC-083-2750-200

TC-083-2875-200

TC-083-3125-200

TC-083-3375-200

TC-083-4000-200

TC-083-4500-200

MAN-TC-083-200 R1

Owen Oil Tools

5405 Blindman Crescent
Red Deer County Alberta Canada T4S 2M4
Phone: 1-403-340-1017
Fax: 1-403-340-1415
Toll Free: 1-888-345-1017
www.owentools.com

Warning: Use of Owen equipment contrary to manufacturer's specifications or operating instructions may result in property damage, serious injury or fatality. If you are not trained in the handling and use of explosive devices, do not attempt to use or assemble any Owen perforating systems or Owen firing devices.

Owen Oil Tools pre-assembles its tools as per the field operating manual. It is the responsibility of the purchaser to insure that this tool is assembled as required, prior to use.

This technology is regulated by and, if exported, was exported from the United States in accordance with the Export Administration Regulations (EAR). Diversion contrary to US Department of Commerce. Consult the BIS, the EAR and/or Owen Compliance Services, Inc. to determine licensing requirements for export or re-export of this technology.

This document contains Confidential information of Owen Oil Tools LP (Owen) and is furnished to the customer for information purposes only. This document must not be reproduced in any way whatsoever, in part or in whole, or distributed outside the customer organization, without first obtaining the express written authorization of Owen. This document is the property of Owen and returnable upon request by Owen.

©2009 Owen Oil Tools

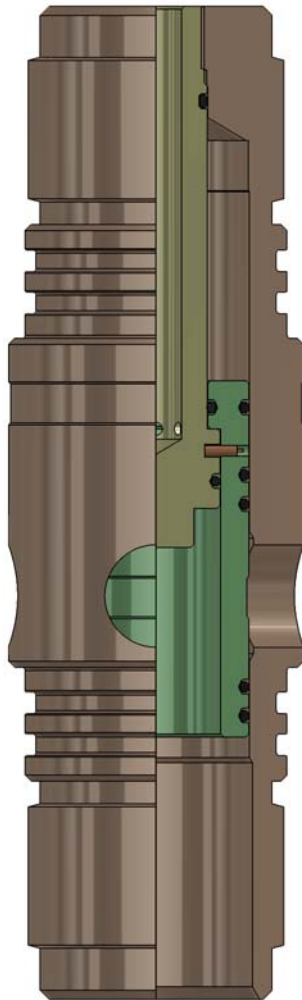


Blank Page

Description

The Underbalance Perforating System is used when an underbalance wellbore environment is desired after gun detonation and it is not possible to purge fluids from the wellbore.

The explosive pressure created by the gun detonation shears two pins and releases a piston which opens a ported sub. This allows borehole fluids to rush into empty carriers connected below the fired gun creating an underbalance situation in the wellbore which helps to clean out the perforation channels. The number of empty carriers required is determined by the well and operator requirements.



Features and Benefits

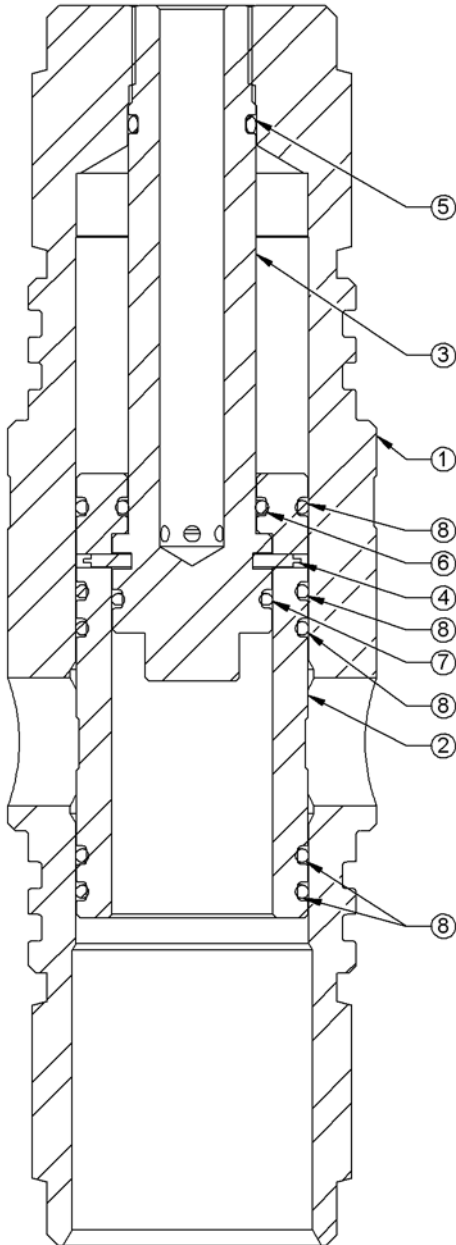
- Comes in 2-3/4", 2-7/8", 3-1/8", 3-3/8", 4" and 4-1/2" sizes.
- Upward moving piston to prevent accidental opening.
- The piston locks into place making this a one-time use only tool.
- Multiple empty carriers can be attached to create a larger cavity using specially designed thru subs.
- Large bore thru subs decrease restriction between the empty carriers.

Specifications

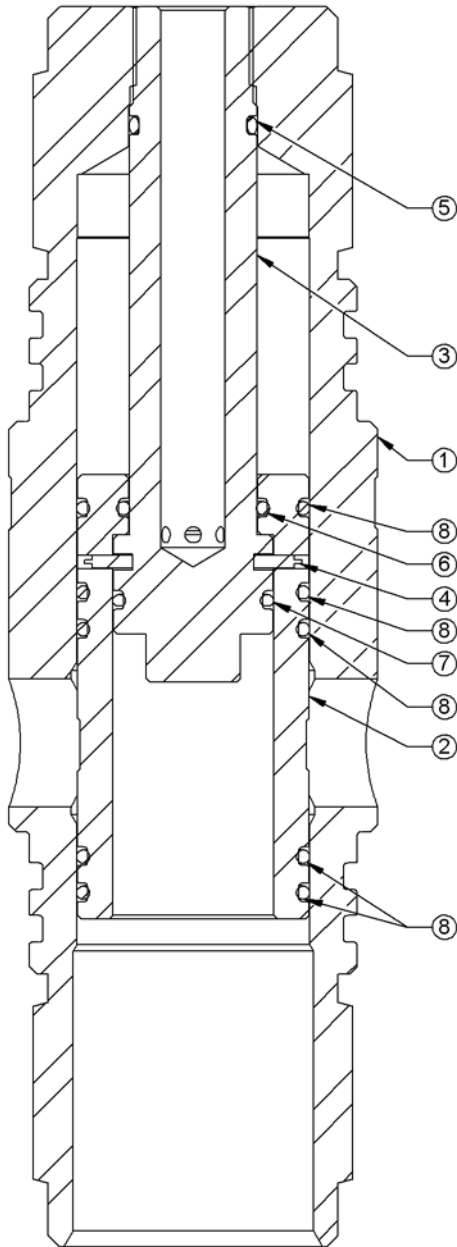
O.D.	2-3/4" (70 mm)	2-7/8" (73 mm)	3-1/8" (79 mm)
Make-Up Length	3.20" (81.3 mm)	3.20" (81.3 mm)	3.58" (90.9 mm)
Max. Temperature ¹	250°F (121°C)		
Max. Hydrostatic	22,500 psi (155.1 MPa)	18,890 psi (130.2 MPa)	19,385 psi (133.7 MPa)
Tensile Strength	119,900 lbf. (53,330 daN)	113,100 lbf. (50,309 daN)	159,279 lbf. (70,851 daN)
Flow Area After	3.14 in ² (20.3 cm ²)	3.14 in ² (20.3 cm ²)	3.14 in ² (20.3 cm ²)
Top Connection	2.355" - 6 TPI Acme	2.495" - 6 TPI Acme	2.745" - 6 TPI Acme
Bottom Connection	2.355" - 6 TPI Acme	2.495" - 6 TPI Acme	2.745" - 6 TPI Acme
Product Number	TC-083-2750-200	TC-083-2875-200	TC-083-3125-200

O.D.	3-3/8" (86 mm)	4" (101 mm)	4-1/2" (114 mm)
Make-Up Length	3.58" (90.9 mm)	3.20" (81.3 mm)	2.95" (74.9 mm)
Max. Temperature ¹	250°F (121°C)		
Max. Hydrostatic	20,465 psi (141.1 MPa)	18,315 psi (126.3 MPa)	18,960 psi (130.7 MPa)
Tensile Strength	157,525 lbf. (70,071 daN)	216,225 lbf. (96,182 daN)	375,875 lbf. (167,198 daN)
Flow Area After	3.14 in ² (20.3 cm ²)	4.71 in ² (30.4 cm ²)	4.71 in ² (30.4 cm ²)
Top Connection	2.808" - 6 TPI Acme	3.435" - 6 TPI Acme	3.933" - 6 TPI Acme
Bottom Connection	2.808" - 6 TPI Acme	3.435" - 6 TPI Acme	3.933" - 6 TPI Acme
Product Number	TC-083-3375-200	TC-083-4000-200	TC-083-4500-200

¹The maximum temperature can be increased to 450° (230°C) by substituting the 90 durometer Nitrile O-rings with 90 durometer Viton O-rings. Refer to the Time vs Temperature chart for Explosives to confirm any explosives requirements



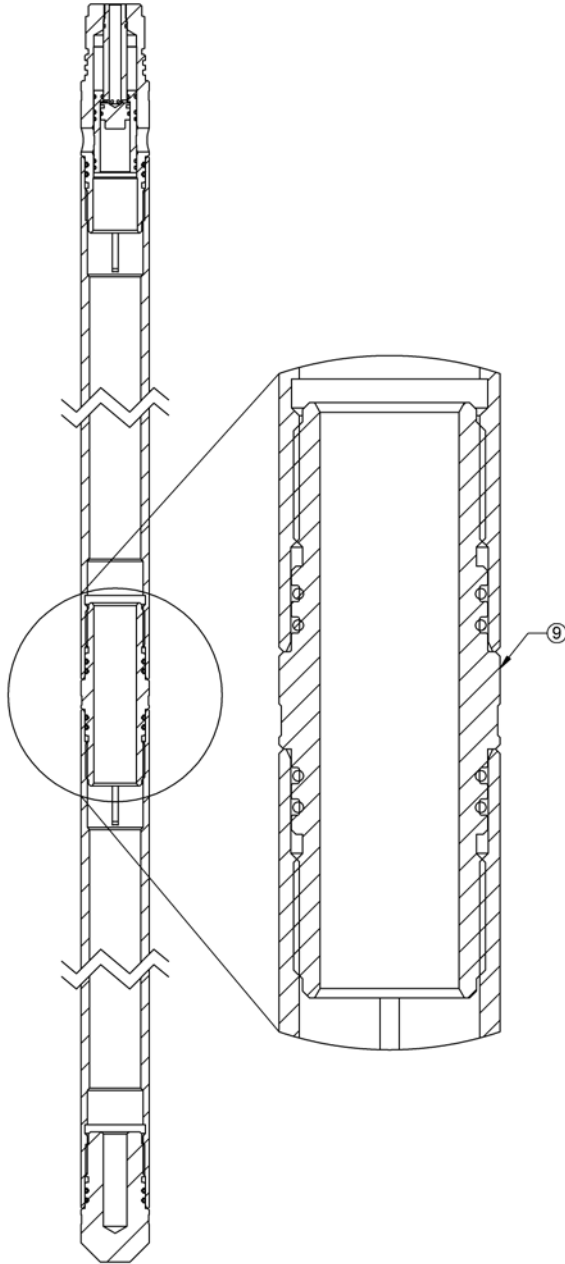
Item	Part Number	Qty	Description
--	TC-083-2750-200	--	2.750" Underbalance Perforating System
1	TC-083-0214-000	1	2-3/4" Underbalance Sub
2	TC-083-0215-000	1	2-3/4" Venting Piston
3	TC-083-0216-000	1	2-3/4" Mandrel
4	SF-010-0100-038	2	Shear Pin, 0.100" OD X 0.380" LG
5	OOO-N569-115	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-118	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-119	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-128	5	O-Ring 90 Durometer Nitrile (Piston)
Item	Part Number	Qty	Description
--	TC-083-2875-200	--	2.875" Underbalance Perforating System
1	TC-083-0201-000	1	2-7/8" Underbalance Sub
2	TC-083-0202-000	1	2-7/8" Venting Piston
3	TC-083-0203-000	1	2-7/8" Mandrel
4	SF-010-0100-038	2	Shear Pin, 0.100" OD X 0.380" LG
5	OOO-N569-117	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-120	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-121	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-130	5	O-Ring 90 Durometer Nitrile (Piston)
Item	Part Number	Qty	Description
--	TC-083-3125-200	--	3.125" Underbalance Perforating System
1	TC-083-0204-000	1	3-1/8" Underbalance Sub
2	TC-083-0205-000	1	3-1/8" Venting Piston
3	TC-083-0206-000	1	3-1/8" Mandrel
4	SF-010-0100-038	2	Shear Pin, 0.100" OD X 0.380" LG
5	OOO-N569-120	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-123	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-124	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-133	5	O-Ring 90 Durometer Nitrile (Piston)



Item	Part Number	Qty	Description
--	TC-083-3375-200	--	3.375" Underbalance Perforating System
1	TC-083-0207-000	1	3-3/8" Underbalance Sub
2	TC-083-0205-000	1	3-1/8" Venting Piston
3	TC-083-0206-000	1	3-1/8" Mandrel
4	SF-010-0100-038	2	Shear Pin, 0.100" OD X 0.380" LG
5	OOO-N569-120	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-123	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-124	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-133	5	O-Ring 90 Durometer Nitrile (Piston)

Item	Part Number	Qty	Description
--	TC-083-4000-200	--	4.000" Underbalance Perforating System
1	TC-083-0208-000	1	4" Underbalance Sub
2	TC-083-0209-000	1	4" Venting Piston
3	TC-083-0210-000	1	4" Mandrel
4	SF-010-0130-045	2	Shear Pin, 0.130" OD X 0.450" LG
5	OOO-N569-128	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-131	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-133	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-144	5	O-Ring 90 Durometer Nitrile (Piston)

Item	Part Number	Qty	Description
--	TC-083-4500-200	--	4.500" Underbalance Perforating System
1	TC-083-0211-000	1	4-1/2" Underbalance Sub
2	TC-083-0212-000	1	4-1/2" Venting Piston
3	TC-083-0213-000	1	4-1/2" Mandrel
4	SF-010-0130-045	2	Shear Pin, 0.130" OD X 0.450" LG
5	OOO-N569-133	1	O-Ring 90 Durometer Nitrile (Mandrel)
6	OOO-N569-136	1	O-Ring 90 Durometer Nitrile (Piston)
7	OOO-N569-137	1	O-Ring 90 Durometer Nitrile (Mandrel)
8	OOO-N569-148	5	O-Ring 90 Durometer Nitrile (Piston)



Item	Part Number	Qty	Description
--	--	--	Underbalance Perforating System Thru Subs
9	TC-083-0034-000	Opt. *	2-3/4" Underbalance Thru Sub
	TC-083-0022-000		2-7/8" Underbalance Thru Sub
	TC-083-0025-000		3-1/8" Underbalance Thru Sub
	TC-083-0027-000		3-3/8" Underbalance Thru Sub
	TC-083-0029-000		4" Underbalance Thru Sub
	TC-083-0032-000		4-1/2" Underbalance Thru Sub

NOTE: Each Sub must be purchased separately

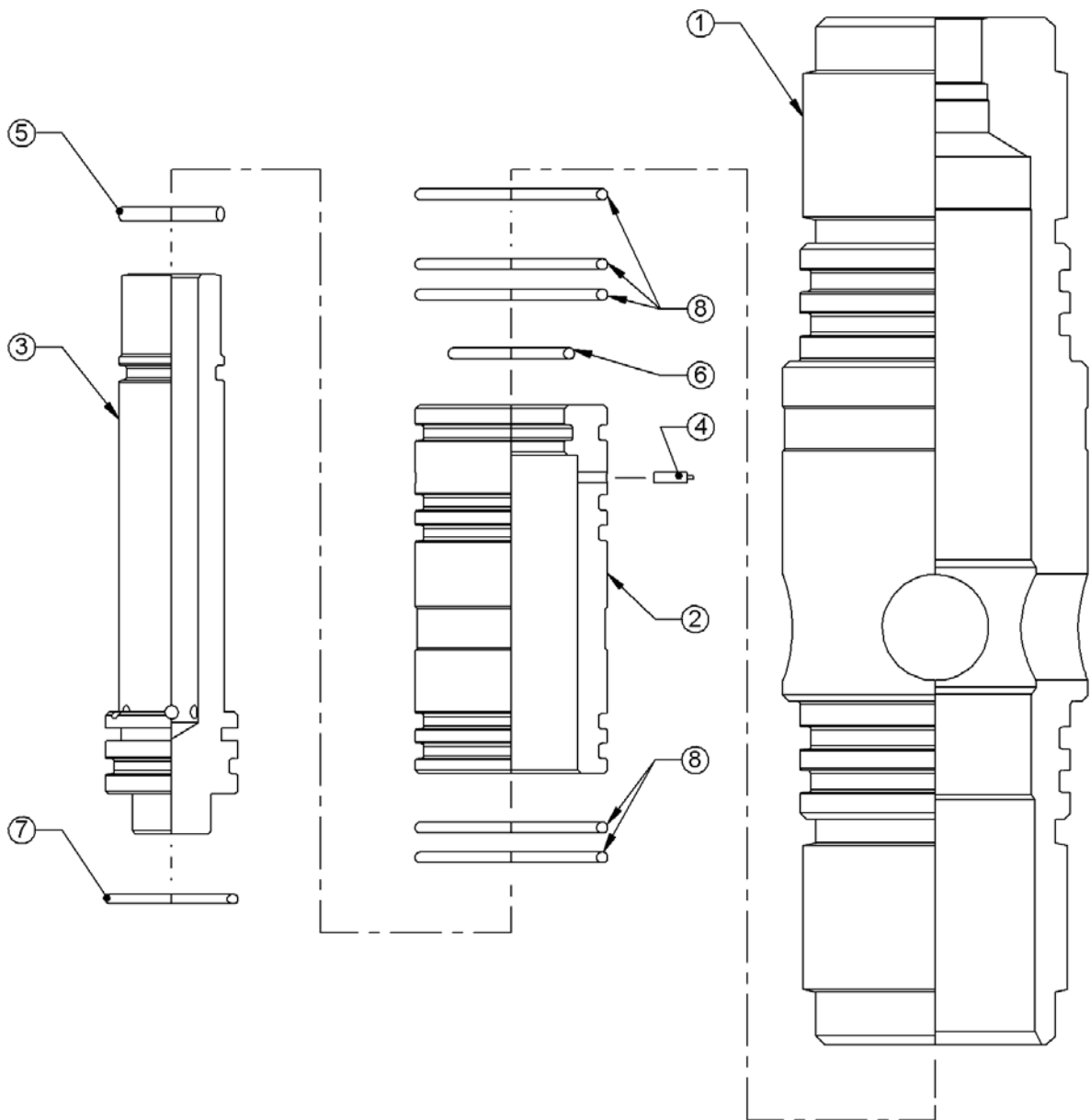
*Number of thru subs required depends on number of empty carriers run to achieve required underbalance. Total needed is one less than the number of empty carriers



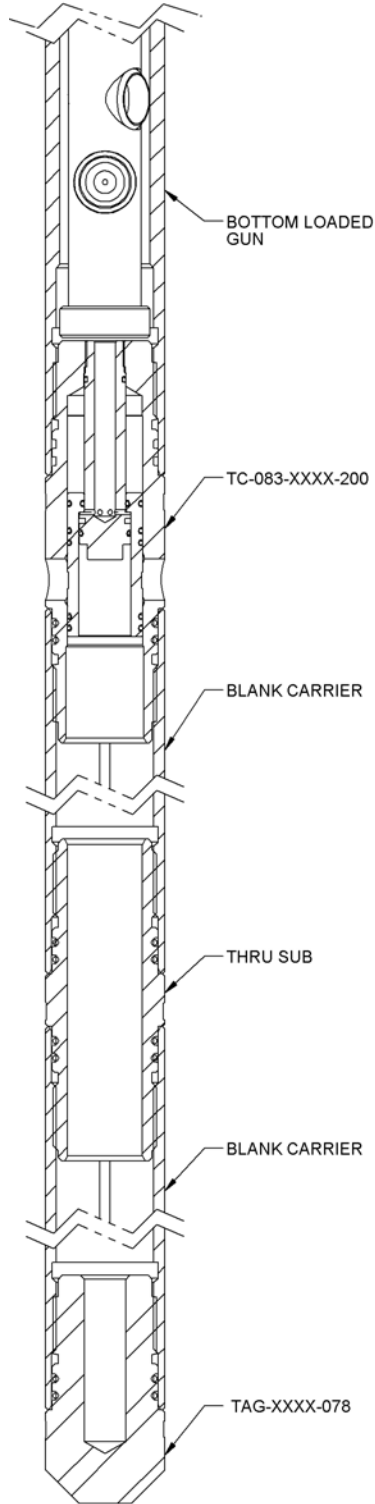
Assembly Instructions

*NOTE: Tool comes pre-assembled and is a "one time use", instructions for information only

- Step 1:** Install lightly greased O-rings (items 6 and 8) onto venting piston (item 2). Install lightly greased O-ring (item 7) onto Mandrel (item 3).
- Step 2:** Push mandrel into venting piston until mandrel shoulders out. Install shear pins (item 4) into venting piston and mandrel. Install lightly greased O-ring (item 5) onto Mandrel.
- Step 3:** Install venting piston and mandrel into underbalance sub (item 1). Using a 3/4" socket drive, thread mandrel into venting piston sub until mandrel locks.



System Assembly



Step 1: Install standard gun O-rings onto Dynamic Underbalance Sub and any Thru Subs being used.

Step 2: Connect Dynamic Underbalance Sub (TC-083-XXXX-200) on bottom of last loaded perforation gun in place of a bottom sub. Ensure the end with the smaller bore is pointing into the loaded gun.

Step 3: If multiple carriers are being used, install a Thru Sub to bottom of blank carrier.

Step 4: Attach another blank carrier to bottom of Underbalance Thru Sub.

Step 5: Repeat Steps 3 and 4 for multiple sets of blank carriers.

Step 6: On the last blank carrier, install bottom sub (TAG-XXXX-078) making sure correct O-rings are installed.