



Owen Oil Tools

Technical Manual
Coil Tubing
Pressure Activated
Firing Head with Auto Vent
TC-032-1688-000

MAN-TC-032

Caution

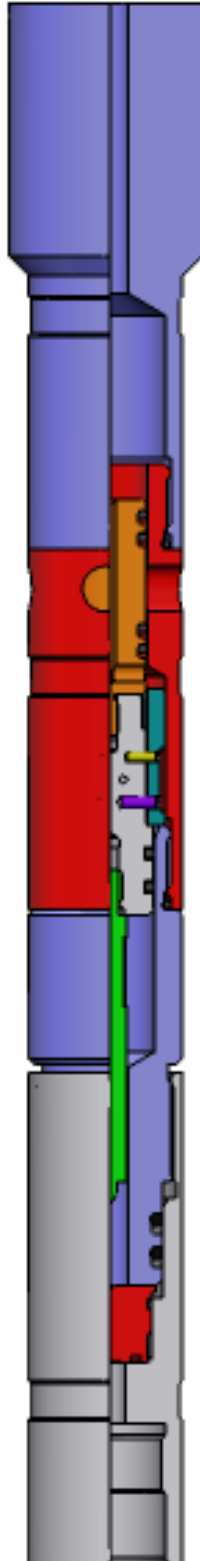
Safety Information

If you are not properly trained in the handling, and use of explosives devices, do not attempt the assembly of any Owen Oil Tools Perforating Systems or Firing Devices. The use of this tool or assembly other than the intended or designed use, is solely the responsibility, and liability of the customer.

Technical Assistance

For technical assistance, please call or contact, Owen Oil Tools LP, warehouse or representative.

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Description

The Coil Tubing Pressure Activated Firing Head with Auto Vent was developed for use where pressure firing is required such as horizontal wells or well stimulation. The Auto Vent provides a method for venting the tubing prior to pulling out. It also provides the ability to see a pressure drop upon tool activation.

Features and Benefits

- Many parts are common with the standard TC-030 Firing Head.
- Can be placed on top or bottom of all Owen Small Scalloped Gun Systems (1-11/16", 2-1/8", 2-1/2").
- Well suited for highly deviated wells.
- **Operating range 2000 psi (14 MPa) to 12,000 psi (84 MPa).
- The top thread is specified when ordering (custom machining release form required).
- An optional cap with a 1.25" OD 10 TPI Stub Acme box thread is available upon request.

****it is not recommended this tool be run above 12,000 psi (84 MPa) as damage may occur**

Specifications

O.D.	1.69 in	43 mm
Max. Temperature ¹	250°F (121°C)	
Max. Hydrostatic ²	12,000 psi	83 MPa
Min. Hydrostatic	2,000 psi	13.8 MPa
Max. Tensile Strength	33,000 lbs.	14 680 daN

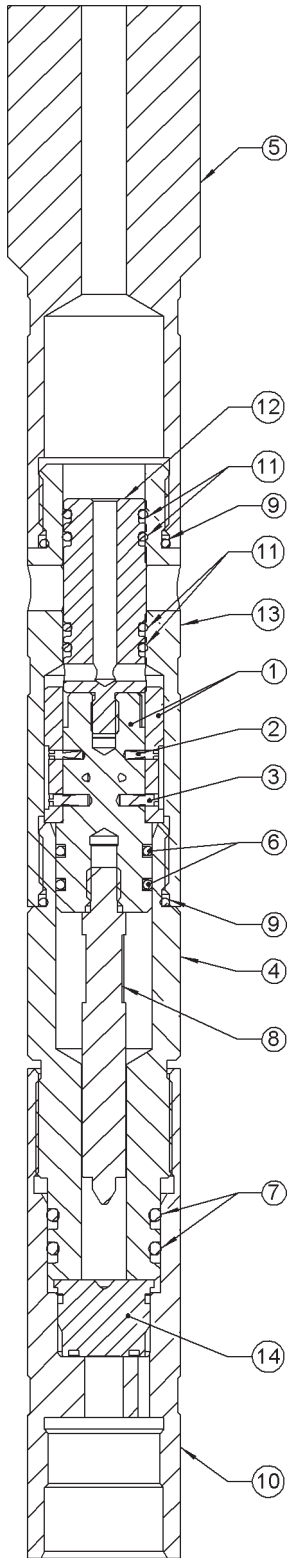
¹ The maximum temperature can be increased to 450° (230°C) by substituting the 90 durometer Nitrile O-rings with 90 durometer Viton O-rings. Refer to the Time vs Temperature chart for Explosives to confirm any explosives requirements.

²Can be run only once successfully at set pressures between 12,000 and 18,000 psi, as the firing head will be damaged making subsequent runs impossible.

Coil Tubing Pressure Activated Firing Head with Auto Vent

TC-032-1688-000

Owen Oil Tools



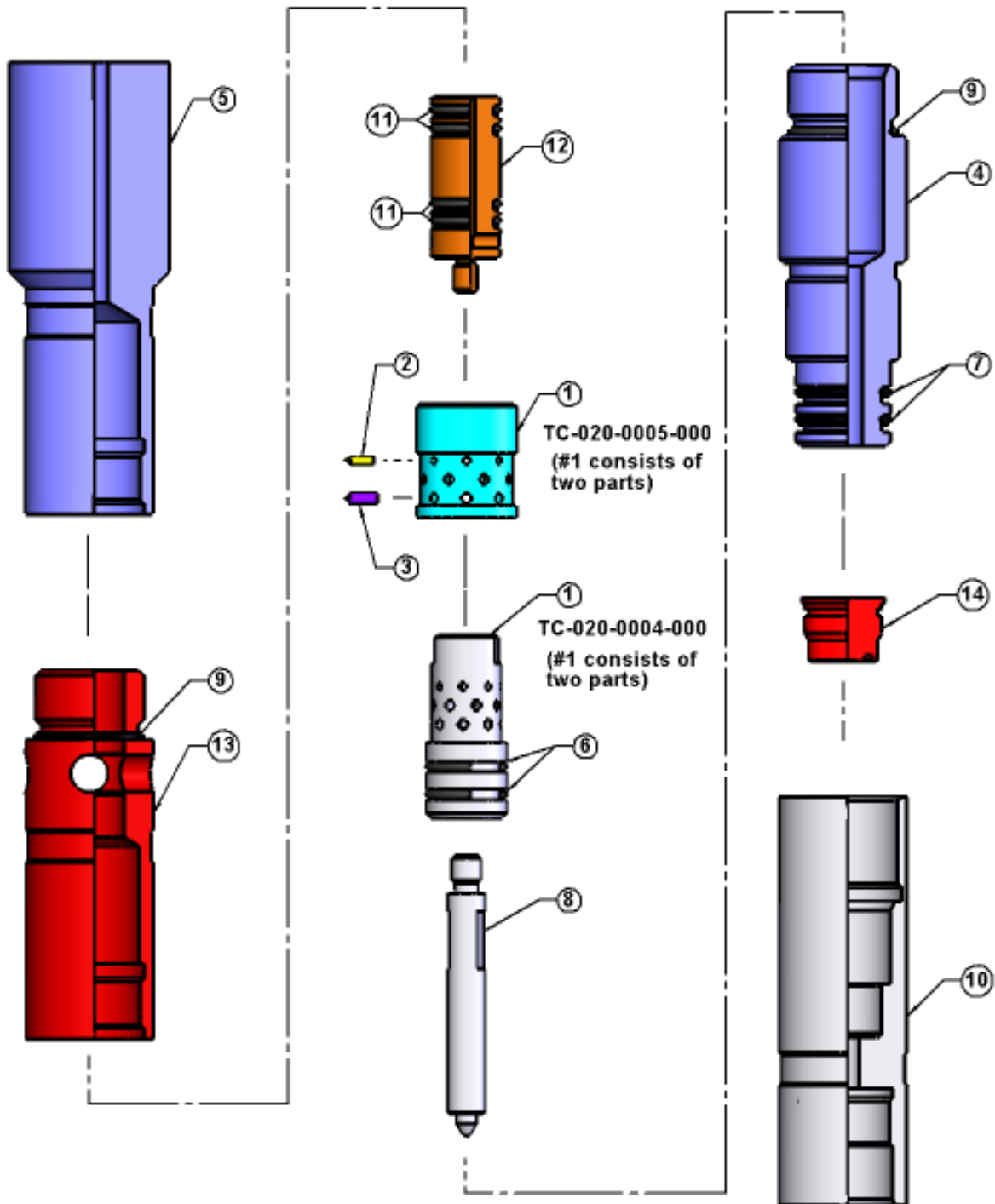
Item	Part Number	Qty	Description
--	TC-032-1688-000	--	Coil Tubing Pressure Activated Firing Head with Auto Vent
1	TC-020-0003-000	1	Piston/Shear Ring Set (matched Set)
	TC-020-0004-000		Shear Piston
	TC-020-0005-000		Outer Shear Ring
*2	SF-010-0100-038	8	Shear Pin - small diameter
*3	SF-010-0130-045	16	Shear Pin - large diameter
4	TC-020-0001-000	1	Piston Housing
5	TC-031-0008-000	1	Retainer Cap (Special Application)
*6	OOO-N569-118	2	O-Ring, 90 Durometer
*7	OOO-N569-214	2	O-Ring, 90 Durometer
8	TC-020-0007-000	1	Firing Pin with Flats
*9	OOO-N569-124	2	O-Ring, 90 Durometer
10	TC-040-0001-400	1	Detonator Housing
11	OOO-N569-116	4	O-Ring, 90 Durometer
12	TC-032-0011-000	1	Venting Piston
13	TC-032-0010-000	1	Venting Sub Body
14	Reference	--	Percussion Detonator
--	TC-032-1688-099	--	Redress Kit, PAFH
--	TC-031-0008-400	--	Optional Retainer Cap (1.25" - 10 TPI SA)
--	MAN-TC-032	--	Assembly Manual

For information concerning the different adapters and crossovers for the downhole devices which might be run with this firing head, please contact our Sales or Technical Department.

***indicates parts in TC-020-1688-099 Kit**

Item	Part Number	Qty	Description
--	TC-032-1688-099	--	Re-Dress Kit, PAFH
	TC-020-1688-099	1	Redress Kit, CT Pressure Activated FH
8	TC-020-0007-000	1	Firing Pin with Flats
9	OOO-N569-124	1	O-Ring 90 Durometer
11	OOO-N569-116	4	O-Ring 90 Durometer

Note: requires 7 pins to comply with API RP 67 4.43 drop test. This is dropping the Firing Head alone



Assembly Instructions

1. Install O-rings (Item 6) on Shear Piston (item 1). Apply loctite (use appropriate temperature rating) to threads of firing pin (item 8), thread it into Shear Piston and tighten.
2. Slide the Shear Ring (TC-020-0005-000), over the Shear Piston. Make sure the alignment marks on the top of the piston and the top of the Shear Ring are lined up. This will ensure the the Shear Pins go in. Now you can install the Shear Pins (Items 2 and 3) as required.
3. Install the O-rings (Item 11) on the Venting Piston (item 12), thread and tighten venting Piston into the top of the Shear Piston (Item 1).
4. Install O-rings (items 7 and 9) on Piston Housing (item 4) and thread housing into the Detonator Housing (Item 10). Do Not install detonator at this time (see Step 8).
5. Take the Piston Assembly (item 1) and push pin first into Piston Housing (item 4). Push until the outer Shear Ring (item 1) bottoms out on the top of the Piston Housing shoulder
6. Now install the Venting Sub Body (item 13) over the Venting Piston (item 12) and Shear Ring. Thread the venting sub body to the Piston Housing (item 4) and tighten.
7. Install O-ring (item 9) on venting sub body (item 13) and thread the retaining cap (item 5) to the venting sub and tighten.
8. Last step done on location just prior to well operation. Remove detonator housing (item 10) and carefully push CP Initiator (item 14) into place in the Detonator Housing (item 10). Thread detonator housing (item 10) back onto Piston Housing (item 4) and tighten.

Caution: do not use any sharp object to push the CP Initiator into place





Pinning Procedures
Imperial Units

Step 1 (Data)

- A. Well Temperature (BHT) at perforating depth _____ °F
- B. True Vertical Depth (TVD) _____ ft
- C. Maximum fluid weight in well when tripping _____ ppg (lb/gal) (Annulus)
- D. Fluid Weight in tubing when ready to fire _____ ppg (lb/gal)

Step 2 (Calculate Pressures)

- E. Maximum Hydrostatic at depth
($0.05195 * B * C$) = _____ psi
- F. Tubing hydrostatic when ready to fire
($0.05195 * B * D$) = _____ psi
- G. Greater of E or F _____ psi
- H. Absolute Firing Pressure
($G + 2000$ psi (minimum safety factor) = _____ psi

Step 3 (Calculate number of pins)

- I. Reduction Factor
(Ref. Temp. Reduction Chart with temp from A) = _____
- J. Adjusted Large Pin rating (.130" diameter)
(_____ psi * I) = _____ psi / pin @ BHT
Reference: pin shipping bag for listed pin value to use
- K. Adjusted Small Pin rating (.100" diameter)
(_____ psi * I) = _____ psi / pin @ BHT
Reference: pin shipping bag for listed pin value to use
- L. Number of Large Pins
(H / J) = _____
- M. Round Down L = _____
- N. Number of Small Pins
{($L - M$) * J} / K = _____
- O. Round Up N = _____

Pinning Procedures
Imperial Units

Step 4 (Calculate Nominal Absolute Firing Pressure)

- P. Large Pin Psi @ BHT
(M * J) = _____ psi
- Q. Small Pin Psi @ BHT
(O * K) = _____ psi
- R. Total Absolute Pressure @ BHT
(P + Q) = _____ psi

Step 5 (Calculate pressure tolerance)

- S. Tolerance (R * 0.05) = _____ psi

Step 6 (Calculate surface pressure) - Pressure applied on tubing

- T. Nominal pressure (R - F) = _____ psi
- U. Maximum pressure (T + S) = _____ psi
- V. Minimum pressure (T - S) = _____ psi

Shear Pin Temperature Correction Chart

Degrees Farenheit	Correction Factor	Degrees Farenheit	Correction Factor	Degrees Farenheit	Correction Factor	Degrees Farenheit	Correction Factor
70	1	180	0.944	290	0.9025	400	0.882
80	0.995	190	0.9395	300	0.898	410	0.884
90	0.988	200	0.935	310	0.897	420	0.885
100	0.9825	210	0.9315	320	0.8945	430	0.886
110	0.9775	220	0.9275	330	0.8925	440	0.888
120	0.9725	230	0.9235	340	0.89	450	0.89
130	0.9675	240	0.9195	350	0.888	460	0.894
140	0.962	250	0.9165	360	0.887	470	0.9
150	0.957	260	0.9125	370	0.886		
160	0.953	270	0.909	380	0.8845		
170	0.9485	280	0.906	390	0.8835		



Pinning Procedures
Metric Calculations

Step 1 (Data)

- A. Well Temperature (BHT) at perforating depth _____ °C
- B. True Vertical Depth (TVD) _____ m
- C. Maximum fluid weight in well when tripping _____ kg/m³
- D. Fluid Weight in tubing when ready to fire _____ kg/m³

Step 2 (Calculate Pressures)

- E. Maximum Hydrostatic at depth
(0.00981 * B * C) = _____ kPa
- F. Tubing hydrostatic when ready to fire
(0.00981 * B * D) = _____ kPa
- G. Greater of E or F _____ kPa
- H. Absolute Firing Pressure
(G + 14000 kPa) {minimum safety factor} = _____ kPa

Step 3 (Calculate number of pins)

- I. Reduction Factor
(Ref. Temp. Reduction Chart with temp from A) = _____
- J. Adjusted Large Pin rating (.130" dia.)
(_____ kPa * I) = _____ kPa / pin @ BHT
Reference: pin shipping bag for listed pin value to use
- K. Adjusted Small Pin rating (.100" dia.)
(_____ kPa * I) = _____ kPa / pin @ BHT
Reference: pin shipping bag for listed pin value to use
- L. Number of Large Pins
(H / J) = _____
- M. Round Down L = _____
- N. Number of Small Pins
{ (L - M) * J } / K = _____
- O. Round Up N = _____

Pinning Procedures
Metric Calculations

Step 4 (Calculate Nominal Absolute Firing Pressure)

- P. Large Pin Psi @ BHT
(M * J) = _____ psi
- Q. Small Pin Psi @ BHT
(O * K) = _____ psi
- R. Total Absolute Pressure @ BHT
(P + Q) = _____ psi

Step 5 (Calculate pressure tolerance)

- S. Tolerance (R * 0.05) = _____ psi

Step 6 (Calculate surface pressure) - Pressure applied on tubing

- T. Nominal pressure (R - F) = _____ psi
- U. Maximum pressure (T + S) = _____ psi
- V. Minimum pressure (T - S) = _____ psi

Shear Pin Temperature Correstion Chart

Degrees Celcius	Correction Factor	Degrees Celcius	Correction Factor	Degrees Celcius	Correction Factor	Degrees Celcius	Correction Factor
21	1	82	0.944	143	0.9025	204	0.882
27	0.995	88	0.9395	149	0.898	210	0.884
32	0.988	93	0.935	154	0.897	216	0.885
38	0.9825	99	0.9315	160	0.8945	221	0.886
43	0.9775	104	0.9275	166	0.8925	227	0.888
49	0.9725	110	0.9235	171	0.89	232	0.89
54	0.9675	116	0.9195	177	0.888	237	0.894
60	0.962	121	0.9165	182	0.887	243	0.9
66	0.957	127	0.9125	188	0.886		
71	0.953	132	0.909	193	0.8845		
77	0.9485	138	0.906	199	0.8835		