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eFire-TCP Firing Head Enabled by Muzic Telemetry

Tubing-conveyed perforating electronic firing head enabled by Muzic wireless telemetry

APPLICATIONS

- Wells with little margin for applied pressure
- Deviated wells
- Wells with partial cushion
- Multizone perforating
- Selective perforating

BENEFITS

- Increases reliability with no moving parts
- Requires no applied pressure to activate firing head
- Operates with wireless telemetry or fluid pulse commands (for contingency scenarios)
- Provides confirmation when the firing command is received
- Runs with other mechanical and electronic firing heads

FEATURES

- Bidirectional communication for feedback from the reservoir and perforating string
- Safety features for explosives
- Underbalance control
- Facilitation of redundant firing configurations

Better understand and communicate with the reservoir

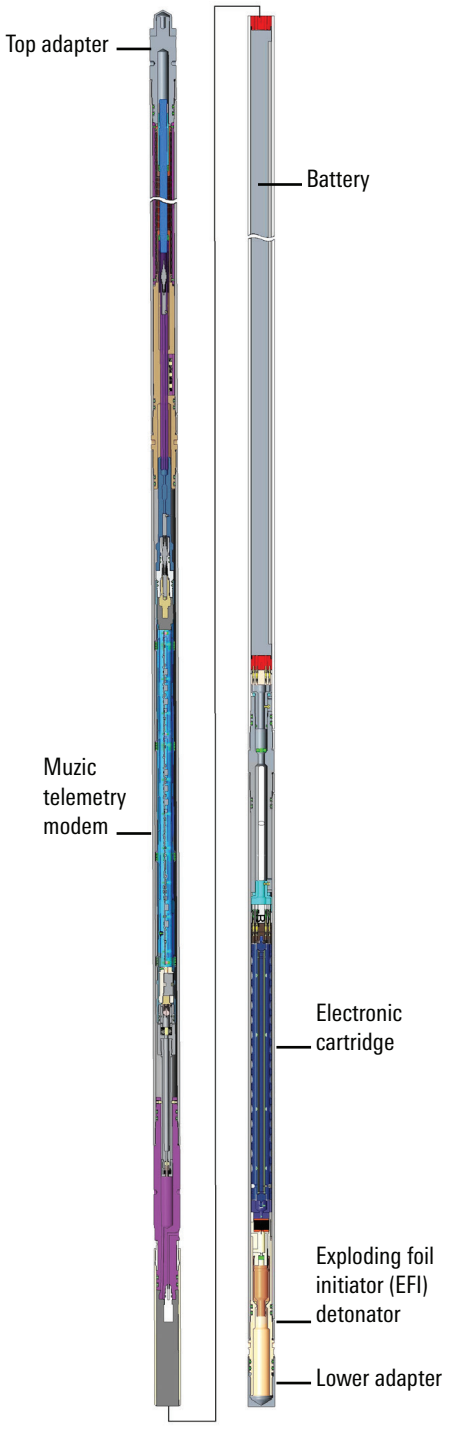
The eFire-TCP* tubing-conveyed perforating electronic firing head enabled by Muzic* wireless telemetry combines two field-proven technologies into a single firing head—IRIS* intelligent remote implementation system and Muzic telemetry. This combination of technology enables you to trigger the perforating guns using acoustic signals compared with conventional technology that requires pressure pulse commands. It does this by combining sensors, battery power, microprocessors, and control switches—replacing rupture discs, shear pins, and other mechanical activation devices, which require high overpressure or mechanical movement of the toolstring. This also ensures optimal underbalance conditions are achieved prior to firing the perforating guns.

Achieve wireless control, firing efficiency, and redundancy

This firing head consists of two sections. The upper Muzic telemetry section consists of a pressure transducer assembly mounted with a Muzic telemetry modem. The lower eFire-TCP head section consists of a firing head cartridge and battery rated at 330 degF and 20,000 psi for 100 h.

Once the wireless command is generated through the Muzic telemetry acquisition controller interface from surface, it is transmitted downhole through the repeater network to the firing head. After the command to fire reaches the eFire-TCP firing head enabled by Muzic telemetry, it returns to the surface to confirm gun initiation.

Standard fluid pulses can also be used to initiate the gun string. The pressure transducer provides measurements to the electronics cartridge. When a firing command is detected, the initiator module triggers the guns as described.



eFire-TCP tubing-conveyed perforating electronic firing head enabled by Muzic wireless telemetry.

eFire-TCP Firing Head Enabled by Muzic Telemetry

IFMZ-TDA Muzic Telemetry Firing Head Specifications	
	eFire-TCP Firing Head Enabled by Muzic Telemetry
OD, in [mm]	1.76 [44.7]
Makeup length, ft [m]	16.6 [5.1]
Pressure, psi [MPa]	20,000 [138]
Temperature rating, degF [degC]	330 [165] for 100 h 302 [150] for 500 h
Min. firing pressure, psi [MPa]	500 [3.5]
Battery duration	Lithium for 240 h or 500 h

4.5-in Muzic Telemetry Connect Fill Sub Assembly Specifications		
Firing System	**Muzic Telemetry Connect 3.000–6 SA**	**Muzic Telemetry Connect 5.062–6 SA**
Size, in	4.5	4.5
Tensile yield strength, lbf [N]	359,000 [1,596,900]	359,000 [1,596,900]
Fluid isolation	Yes	Yes
Max. OD, in [mm]	4.51 [114.6]	7.01 [178.1]
Makeup length, ft [m]	19.5 [5.94]	19.6 [5.97]
Weight, lbm [kg]	446 [202]	489 [222]
Gun type	HSD* high shot density system	HSD high shot density system
Gun size, in [mm]	2.88–5.00 [73.15–127]	6.62–7.00 [168.15–177.8]
Max. exposure	330 degF and 20,000 psi at 100 h 302 degF and 20,000 psi at 500 h	330 degF and 20,000 psi at 100 h 302 degF and 20,000 psi at 500 h
Max. operating pressure, psi [MPa]	20,000 [137.9]	20,000 [137.9]
Min. operating pressure, psi [MPa]	500 [3.4]	500 [3.4]
Max. working temperature, degF [degC]	330 [165.6]	330 [165.6]

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