

Expro Slickline Trigger

Expro slickline trigger can be used to fire any perforating gun, tubing punch, tubing cutter or setting tool on slickline without the need for radio silence.

The tool mechanism consists of three main components: lithium battery pack, electronic trigger and surface safety switches.

Lithium Battery Pack

This pack comprises standard lithium C-cells which provide firing power when the tool initiates.

Electronic Trigger

The electronics package controls the output from a battery pack. This initiates the detonator only when all safety barriers are overcome and downhole parameters are such that they satisfy the pre-programmed firing sequence (see overleaf).

Surface Safety Switches

Individual mechanical pressure and temperature switches form short circuits across the detonator to ensure surface safety. Well pressure and temperature 'open' the switches at a pre-determined depth and 'close' them on retrieval.



Applications

Deployment on slickline of:

- Perforating guns
- Tubing punchers
- Tubing cutters
- Bridge plugs

Benefits

- No E-line rig-up required
- Reduced personnel
- Reduced cost and increased efficiencies
- Easier pressure control

Features

- Micro processor controlled firing sequence
- Hardcoded interlocks for increased safety
- Electronic pressure sensor
- Electronic temperature sensor
- Accelerometer for movement detection
- Mechanical pressure and temperature switches for surface safety



Functionality

Start-up delay is an initial period where pressure and temperature must be within acceptable parameters. This ensures the trigger will only accept a valid start at power on with sensible pressure and temperature values.

Initial delay is the simplest and most robust user configurable safety feature. It is recommended that the trigger should be on depth at the desired activation position before the initial delay elapses.

Pressure, temperature and accelerometer interlocks are programmed so the trigger is incapable of activating if its inputs do not comply leads with safe shut-down. Failure to comply with the PTA parameters' at any future stage will also lead to shut-down.

Baseline parameters sets the baseline pressure, the true measure of well pressure from which pulse processing operates on a relative basis. When pulse processing used the trigger will acquire the baseline pressure and wait until a valid pulse sequence is identified.

Pressure pulses provides for the use of pressure pulses to activate the trigger. This provides a user with a measure of control from surface based on a programmed pattern of accelerometer signals to activate the trigger.

Accelerometer pulses provides for the use of acceleration pulses to activate the trigger. This provides a user with a measure of control from surface based on a programmed pattern of accelerometer signals to activate the trigger.

Final delay is a user defined duration from when the trigger determines that the configured activation conditions are met until the trigger activates its output. At the end of the final delay the trigger output is activated for the configured activation time. When the activation time has expired, the trigger shuts down.

Maximum run time is a user defined period that regardless of configuration the trigger will shut down if total time (since battery/power on) ever exceeds this value.

Technical specifications

Maximum tool ratings	LPLT	Standard	HPHT
Pressure	10,000 psi (69MPa)	15,000 psi (1034 bar)	25,000 psi (1724 bar)
Temperature	150°C	165°C	240°C
Diameter	1.69 " (42.9mm)	1-11/16" (43mm)	2-1/8" (54mm)
Length (excluding explosives attachments)	47" (1.19m)	63.9" (1.623m)	103.1 " (2.619m)
Dual mechanical temperature safety switches	Selectable values	Selectable values	Selectable values
Electronic system parameters			
Initial time safety interlock	1 min – 22 days	1 min – 30 days	1 min – 30 days
Pressure safety interlock	150 – 10,000 psi	100 – 16,000 psi	100 – 26,000 psi
Temperature safety interlock	0 - 145°C	5 - 165°C	5 - 240°C
Final trigger delay	1 min to 14 days	1 min to 30 days	1 min to 30 days
Memory	5 x post activation points	524,288 datasets	838,860 datasets