

Slickline Explosives Services



# Delivering Excellence in Operations worldwide



We are positioned to service all major and developing markets

With maturing assets, the drive towards efficiently maintaining production levels with minimum operating expense is of utmost importance.

The ability to perform cost-effective intervention programmes is critical to ensure that well performance is optimised throughout the life of the well.

Expro provides a range of slickline-deployed explosive services which target production optimisation and enhancement projects, as well as work-over and abandonment campaigns.

These services can be deployed on slickline using Expro's Intelligent Trigger and Depth Correlation.

Services include:

- Through tubing perforating
- Explosive punch guns
- Setting permanent and retrievable bridge plugs
- Jet pipe cutters and non-explosive Radial Cutting Torch
- Power perforator

Expro also provides a full range of Production Monitoring equipment to identify production issues, and Well Integrity investigation tools either on slickline or on a standard e-line mono-conductor cable.

# Combined Trigger Unit



Expro's combined trigger unit (CTU) is a memory-programmable device for applying electrical power remotely down hole to initiate explosive devices.

The CTU consists of a lithium battery pack and a control cartridge incorporating five programmable safety parameters and two mechanical safety switches, all contained within the tool and is an independently Qualified Radio Safe device, with a field proven track record since 1997.

The CTU has been used to initiate an extensive range of explosive devices used throughout the oil industry, including tubing punchers, tubing cutters, bridge plugs, radial cutting torch/punches, perforating guns and power tools.

## Applications & benefits

**Initial Delay** The CTU will count down the programmed duration, before commencing firing sequence.

**Temperature and Pressure Thresholds** The CTU requires three consecutive readings above the programmed pressure and temperature thresholds before advancing to the next sequence in the initiation process.

**Pressure Stability** The CTU compares six consecutive pressure readings over a three minute period. If the pressure changes by more than the specified pressure stability band then the CTU will wait another 30 seconds and repeat the pressure stability check. This process will continue until the programmed pressure stability criteria is met.

**Pressure Control Pulse** Optional pressure control pulse.

**Accelerometer** Optional accelerometer function provides an additional control over the firing sequence.

**Timeout** CTU timeout feature ensures that tool will abort after a specified duration, if one of the required steps in firing sequence is not met.

**Once all the programmed steps have been met the CTU will advance to the:**

**Final Pressure Threshold** The CTU checks that the pressure applied to it is still above the specified pressure threshold, prior to advancing the firing sequence to the final stage. If this criteria is not met, the sequence will abort.

**Final Delay** The trigger will countdown the specified duration before initiating the firing process.

The trigger is programmed using Windows-based software and can initiate the following explosive devices

- 56 ohm detonators
- 5 ohm igniters
- 20 ohm igniters
- Thermal Generator of an RCT / PTS tool
- 50 ohm top fire single resistor detonators

# Slickline perforating



Utilising Expro's CTU and Slickline Depth Control System, slickline perforating has resulted in production perforating being performed using slickline with no compromise on safety or depth accuracy.

Expro's slickline perforating has the ability to use perforating guns from all the leading suppliers in the oil industry. Our detailed perforating well planning service incorporates specific performance modelling with regards to well conditions, completion details, guns used and required perforating performance. Enhancements to the perforating service include development of a high temperature trigger enabling HPHT wells to be accurately perforated utilising slickline and the associated cost savings of this conveyance method.

## Slickline Depth Control System

Expro's Slickline Depth Control System is used where accurate depth correlation is required for slickline deployed tools.

The system consists of a PC based depth correlation computer incorporated into a Zone II IS rated enclosure. The system records depth, speed, tension, magnetic marks against time or depth, with configurable tension and logging alarms.

Utilising a standard memory correlation toolstring during the drift run, Expro's depth control procedures and propriety software has resulted in a field proven measured depth accuracy of +/- 2 feet, with each run being individually corrected to compensate for the varying factors that affect depth control.

This accuracy has resulted in many more applications where depth control is required now being deployed on slickline rather than e-line, resulting in significant cost savings to our customers.

## Punch guns

Expro use both industry standard punch guns, using an eccentric sub to orientate the gun against the tubing wall, where the specially designed chargers are designed to punch holes in adjacent pipe only, causing no damage to outer casings. A standard gun consists of 10 shots with various sizes of charges depending on the application.



Slickline depth control system



Punch gun

## Plug setting

Expro's CTU can be configured to initiate a range of industry standard setting tools, enabling the setting of various sizes of permanent, high expansion and retrievable plugs for casing sizes up to 9 5/8".



Bridge plug setting

## Explosive Jet Cutter

The CTU can utilise the industry standard jet cutter which provides a field-proven, reliable pipe recovery solution. This device continues to be the preferred method for running explosive tubing and casing cutters in the oil industry.



Explosive-cut tubing

## Power Perforator

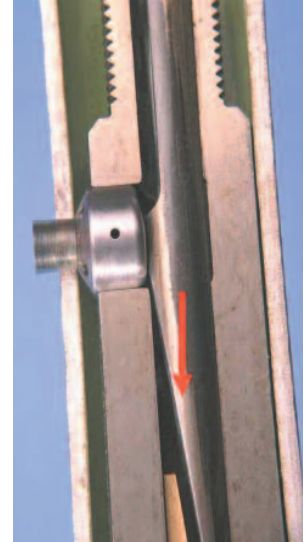
The Power Perforator is Expro's convenient low cost solution to a variety of production problems where a communication port is required between the production tubing and the annulus. The Expro CTU is used to safely activate the tool, which punches a hole in the tubing enabling various styles of inserts to be set.

- Punches holes for communication
- Inserts calibrated orifices for maintenance circulation, chemical injection
- Inserts check valves for temporary gas lift

The Power perforator can be used without damaging the casing, in a range of tubing up to 7" O.D.



Power perforator insert



Power perforator mechanism

## Radial Cutting Torch

Expro's Radial Cutting Torch (RCT) is a patented cutting device used to sever tubing, casing, drill pipe and coil tubing. The RCT performs this task without the use of high explosives or dangerous chemicals.

The RCT utilises a proven technology which consists of a proprietary mixture of powdered metal oxides, a torch body and a nozzle section to generate a highly energised plasma stream that has the consistency and cutting action of a 6,000 degree sand blaster. This enables the RCT to cut effectively even under high stand-off conditions.



RCT-cut tubing

## Power Jar

The Power Jar delivers up to 40 times more impact compared to a conventional slick-line jar. It provides a downward high peak energy, short duration impact and can be used to:

- Knock-out flapper valves, bridge plugs, and packer ball seats
- Shift sliding sleeves
- Knock loose tool strings and chokes
- Cut tubing bull plugs
- Jar loose stuck tool strings
- Drive a spear into wire

The customised attachments allow for maximum flexibility.



Power Jar attachments

Expro's business is well flow technologies and specialised services, and our mission is to:

- **measure**
- **improve**
- **control** and
- **process**

flow from high-value oil and gas wells.

Our expertise is marketed through five segments:

**Well Testing & Commissioning, Production Systems, Wireline Intervention, Connectors & Measurements and Deepwater Intervention.**





**EXPRO**

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