

### Tubing Punch

Industry standard 19/16" OD tubing punch guns can be run using the Expro slickline trigger. The tool mechanism consists of three main components: electronic trigger, surface safety switches and explosives punch gun. Another application is the standard e-line operation with surface DC power for activation.

#### 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.

#### 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. These switches ensure that the device cannot fire on or near surface.

#### Explosive Punch Gun

The detonator has a safety shorting link which is removed during arming only after the surface safety switches have adopted the ground connection. Industry standard punches with 4 spf charge spacing can be used. Gun lengths can be from the standard 4ft (1.22m) upwards depending on the circulation area required. Orientation is achieved by use of an eccentric adapter which forces the gun to align with the tubing.

#### Applications

- Creating holes in production tubing above or below the packer to allow for squeezing, circulation or production from shut off zones

#### Benefits

- Cuts costs while providing a safe, effective and dependable solution for perforating the tubing
- Counts up after detonation to confirm firing time
- Records maximum pressure and temperature
- Uses standard explosive tubing punch assemblies as run on electric line
- No radio silence required
- No e-line rig up required
- Improved safety and reliability with explosive-free perforating
- Portable for rapid deployment
- Tool self-orientation
- Reduced personnel
- Easier slickline pressure control
- No special pressure testing procedures or electrical isolations

