

# Intelli-Pulse

**Intelli-Pulse is a revolutionary decoding system that applies new modulation scheme called PPWM – Pulse Position and Width Modulation for Measurement While Drilling (MWD) using mud pulse. This system is 3 times faster than all conventional pulse systems\***

PPWM is a modulation scheme that has a better spectral efficiency than PPM for the same noise margin. It combines PPM and PWM. So the information is encoded in both the pulse position and the pulse width. As we will show below – the spectral efficiency and the bit-rate is higher than pure PPM for the same noise margin.

*Shown below is the amount of data transmitted to surface in two formats, M-ary (conventional) and PPWM.*

PW (sec.)	M-ary	PPWM, CPP=2	PPWM, CPP=3	PPWM, CPP=4
1.0	0.5455	0.667	0.828	0.923
0.8	0.682	0.833	1.02	1.15
0.6	0.91	1.11	1.36	1.54
0.5	1.09	1.33	1.64	1.84
0.4	1.36	1.67	2.05	2.31
0.3	1.82	2.22	2.72	3.08

## Applications

- Areas where EM does not work
- Cost savings with 80% less batteries used than EM systems
- Long range extended laterals, 500 hours on a single battery.

## Benefits

- Over 3 times faster than conventional pulse systems
- 3 times more data than conventional pulse systems
- No need to cycle pumps on connections
- Start sliding from 1 minute from pumps on
- Close range inclination
- Raw Data for MSA
- Vibration and voltage logs
- Realtime inclination while rotating
- Real time RPM
- Stick slip index
- Provides real-time 6-axis surveys



# Intelli-Pulse **Technical Specifications**

## GENERAL

Pressure drop: 100 PSI  
Power Source: 28 to 36 volt lithium batteries  
Operating Hours: Configurable up to 500 hours  
Retrievability: Configurable  
Toolface Updates: 3 Seconds

## DIRECTIONAL SPECIFICATIONS

### Electrical

Operating voltage range: 12 Volt to 36 Volt

### Environment

Operating temperature: 32°F to 302°F (0°C to 150°C)  
Survival temperature: -40°F to 365°F (-40°C to 185°C)  
Operating Pressure: 20,000 psi (138 MPa)

### Performance

Inclination: Absolute +/- 0.1° Spread 0.2°  
Azimuth: Absolute +/- 0.2° Spread 0.4°  
Gravity Toolface: Accuracy: +/- 0.1°  
Magnetic Toolface: Accuracy: +/- 0.1°  
Total G field accuracy: +/- 0.0015 g  
Total H field accuracy: +/- 75 nTeslas

## GAMMA MODULE SPECIFICATIONS

### Environment

Operating Pressure: 20,000 PSI (138 MPa)  
Operating temperature: -20°F to 350°F (-29°C to 177°C)  
Maximum heat/cool rate: 3°C/minute  
Vibration; 20 gRMS (15-1000 Hz)

### Performance

Maximum API range @ 5% PPU error 8000 API  
Accuracy: +/- 2% @ 302°F (150°C)  
Thin Bed Resolution: 6.8" (17.3 cm)

## PULSER SPECIFICATIONS

Motorized Pulser Driver  
Integrated Gamma Pulse Width: 0.8 to 1.0 sec

### Physical

Length: 43.5" (1.105m)  
Outside diameter: 1.875" (47mm)

### Environment

Operating Pressure: 20,000 psi (138 MPa)  
Operating Temperature: 32°F to 347°F (0°C to 175°C)  
Survival Temperature: -40°F to 365°F (-40°C to 185°C)  
Mud Flow Rate: up to 1200 gpm max (8"OD collar)  
LCM medium nut plug, 40 lb/bbl max recommended  
Vibration: 20 gRMS (15-1000 Hz)  
Shock: 1000 g, .5 ms, 1/2 Sine

