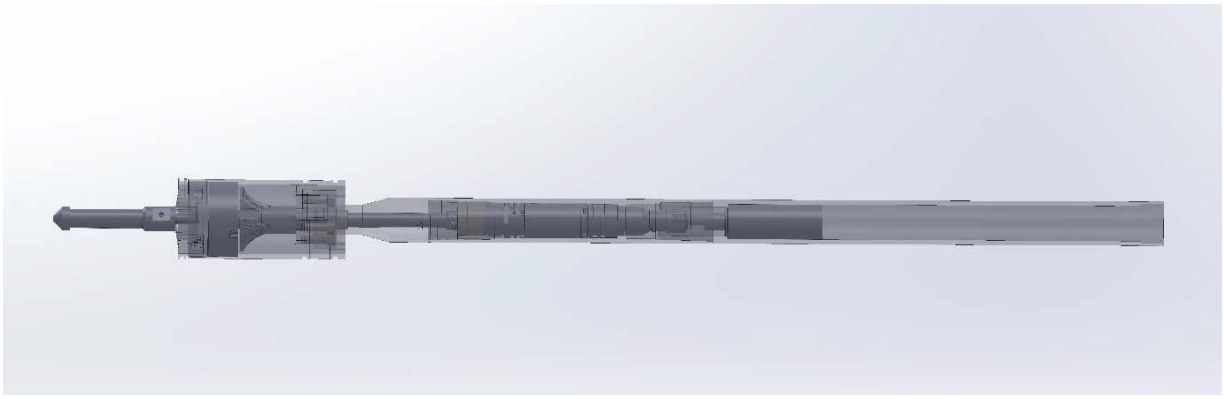
Product Introduction

Scissorhands-LWD150®,Wireless drilling electromagnetic wave resistivity logging instrument system, dual frequency, dual transmitter, and dual receiver.

The system is equipped with APS pulsers widely used in the industry, which have high reliability, erosion resistance, and other characteristics. The data transmission efficiency is superior, and the comprehensive data transmission rate can reach 1.0bps.



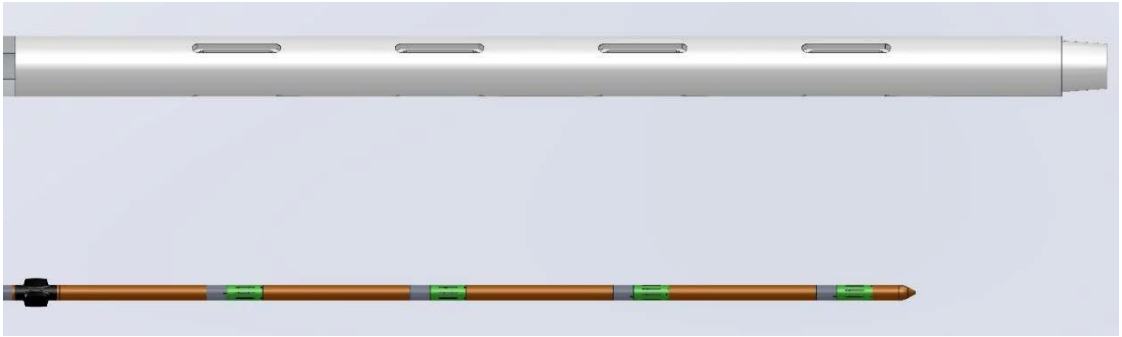
Different from the conventional drill collar type resistivity instrument structure, the entire set of tools is designed with a probe tube approach, with an outer diameter of 44.5mm, streamlined and optimized length, easy installation, maintenance, and transportation, and a significant cost advantage. According to the construction requirements of different wellbore sizes, drill collars and adaptive pulsers can be replaced at any time on site, theoretically increasing tool utilization efficiency by three times.

The system is equipped with a near drill bit inclination module installed at the lower end of the resistivity system, which can shorten the measurement point by 9 meters compared to the conventional inclination module, providing strong data support for precise trajectory control.

CNPS® high-temperature MWD system can intelligently identify the downhole working mode and make real-time judgment according to the rotational speed of downhole drilling tools, thus sending different data sequences during composite drilling and directional drilling, greatly improving the effectiveness of data transmission.

Optional dual battery power supply mode, the power management module can intelligently control dual battery discharge while ensuring battery discharge safety, effectively extending downhole working time.

The system is equipped with portable probe tube type azimuth gamma as standard, which can meet the needs of different customers, especially suitable for shale gas development stratum detection. It can be imaged, and data can be packaged and uploaded.



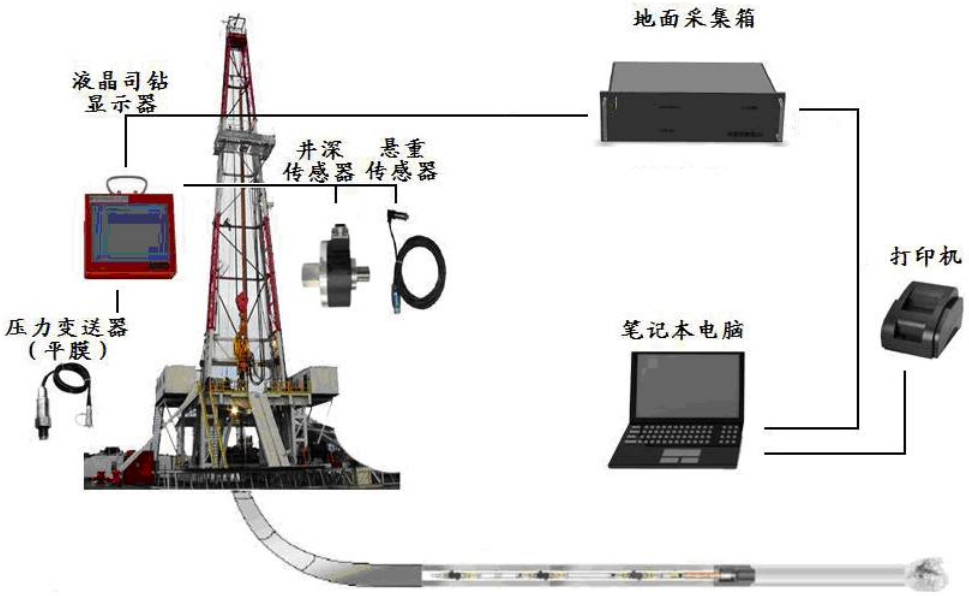
The design of the resistivity probe has been independently developed based on excellent concepts in the integrated industry, with complete technical features, complete intellectual property rights, tool design working temperature of 150 ℃, and reliable technical performance.

1.Tools Overview

Scissorhands-LWD150®wireless drilling electromagnetic wave resistivity instrument system consists of two parts: surface equipment and downhole measurement instruments.

1.1Surface Equipment

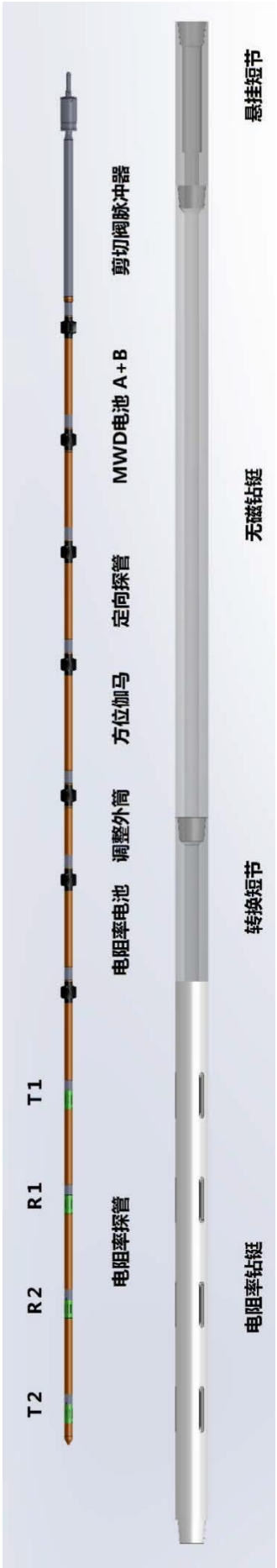
Surface equipment mainly includes: laptop (upper computer), surface acquisition box, driller's display, thermal printer (optional), pressure transmitter (flat film), suspended load sensor, well depth sensor, and related connecting cables, as shown in Figure 1-1.



1.2 Downhole measuring tools

The downhole measurement tools mainly consist of pulsers, driving nipples, directional probe tubes, azimuth gamma probe tubes, probe tube type electromagnetic wave resistivity, coupling components, etc. The resistivity system is equipped with dedicated drill collars.

As shown in Figure 1-2, the connection sequence of the instrument string from top to bottom is: APS pulser+MWD main battery+MWD secondary battery+directional probe tube+directional gamma+extension rod+resistivity battery+resistivity probe tube (installed near wellbore inclination).



2. Tool's performance index

Figure 1-1 Basic performance index of tools

Parameter	Index
Sitting mode	Upper hanging
Can fishing or not	Not
Comprehensive Baud Rate	1bps
OD	44.5mm
Temperature	150℃
Pressure	20000psi
Flow rate	6～75L/S
Sand content	Suggested 1%, max. 3%
Mud density	≤2.17g/cm^3
Lost circulation material	50lb/bbl medium size bridge plugging agent
Drill collar OD	3 1/2～9 1/2in
Max. dog leg degree	30°/100ft
Impact	1000g 0.5ms 1/2 sine
Vibration	20g RMS 30～500 Hz random 25g 50～300Hz sine

Figure 1-2 MWD battery performance index

Parameter	Index
Length	1950mm
Weight	11kg
Temperature	150℃
Pressure	20000psi
Voltage	DC 28V
Battery capacity	28Ah

Figure 1-3 Resistivity battery performance index

Parameter	Index
Length	1950mm
Weight	11kg
Temperature	150℃
Pressure	20000psi
Voltage	DC 29V
Battery capacity	28Ah

Figure 1-4 Performance index of directional probe tube

Parameter	Index
Length	1135mm
Weight	9kg
Temperature	150℃
Pressure	20000psi
Working Voltage	DC 20-38V
Rated Current	30mA
Deflection measurement range	0～180°
Well deflection accuracy	±0.1°(static)，±0.2°(dynamic)
Direction measurement range	0～360°
Direction measurement accuracy	±1°(well deflection＞5° static) ±2°(well deflection＞5° dynamic)
Tool face measurement range	0～360°
Tool face measurement accuracy	±2°
Tool face update time	40s(average)
Magnetic tool face conversion well deflection	5°
Temperature measurement range	0～150℃
Temperature measurement accuracy	±1℃

Figure 1-5 Performance index of directional gamma probe

Parameter	Index
Length	1290mm
Weight	10kg
Temperature	150℃
Pressure	20000psi
Working Voltage	DC 20-38V
Rated Current	20mA
Gamma measurement range	0～250API
Gamma probe sensitivity	＞0.5cps/API
Gamma value	Up, down, left, right, and average gamma
sampling period	10s

Figure 1-6 Performance index of resistivity probe tubes

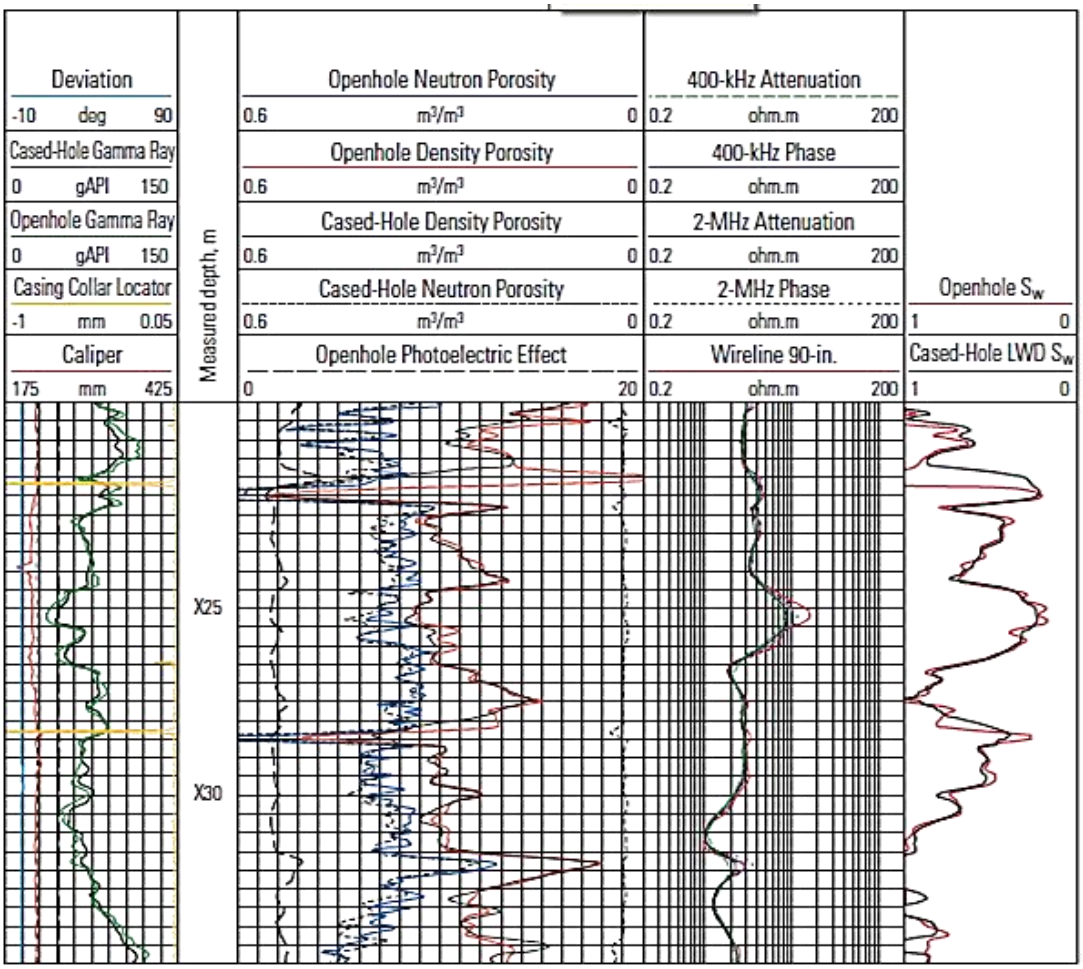
Parameter	Index
Length	3632mm, with a resistivity control length of 1080mm
Weight	20kg
Temperature	150℃
Pressure	20000psi

Parameter	Index
Voltage	DC 28V
2M phase resistivity	0.5-60Ω.m，精度±3% 60-2000Ω.m，精度±10Ω.m
400K phase resistivity	0.1-15Ω.m，精度±3% 15-500Ω.m，精度±5Ω.m
2M attenuation resistivity	0.5-25Ω.m，精度±5% 25-60Ω.m，精度±5Ω.m
400K attenuation resistivity	0.1-6Ω.m，精度±5% 6-20Ω.m，精度±1.25Ω.m
2M phase resistivity 1Ω.m strata vertical resolution	0.33m
400Kphase resistivity 1Ω.m strata vertical resolution	0.45m
2M attenuation resistivity 1Ω.m strata vertical resolution	0.55m
400K attenuation resistivity 1Ω.m strata vertical resolution	0.84m
2M phase resistivity 10Ω.m strata vertical resolution	0.53m
400K phase resistivity 10Ω.m strata vertical resolution	0.74m
2M attenuation resistivity 10Ω.m strata vertical resolution	1.02m
400K attenuation resistivity 10Ω.m strata vertical resolution	1.50m
2M phase resistivity 1Ω.m strata detection depth	0.43m
400K phase resistivity 1Ω.m strata detection depth	0.58m
2M attenuation resistivity 1Ω.m strata detection depth	0.69m
400K attenuation resistivity 1Ω.m strata detection depth	0.99m
2M phase resistivity 10Ω.m strata detection depth	0.69m
400K phase resistivity	0.91m

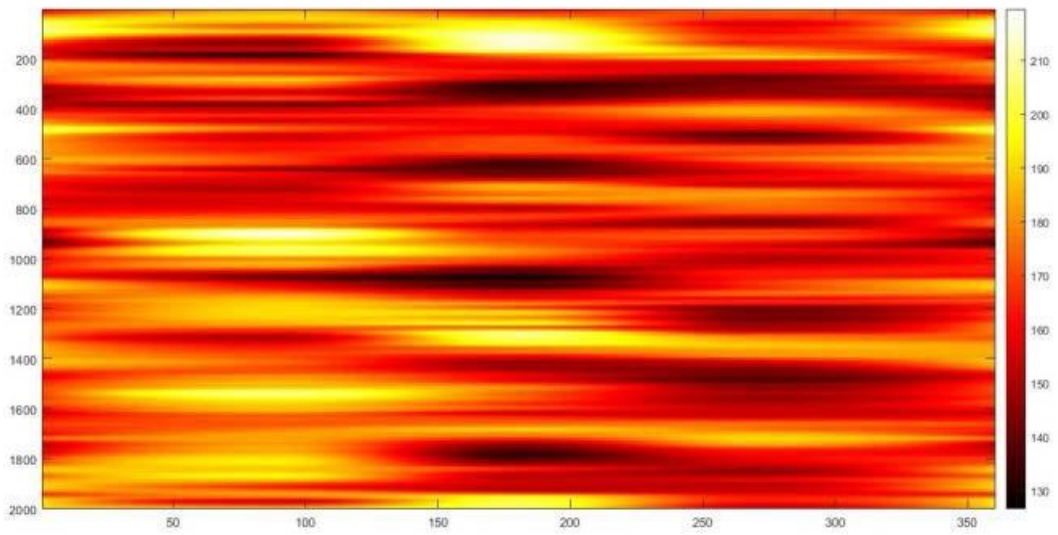
Parameter	Index
10Ω.m strata detection depth	
2M attenuation resistivity 10Ω.m strata detection depth	1.22m
400K attenuation resistivity 10Ω.m strata detection depth	1.91m

3. **Attached figure**

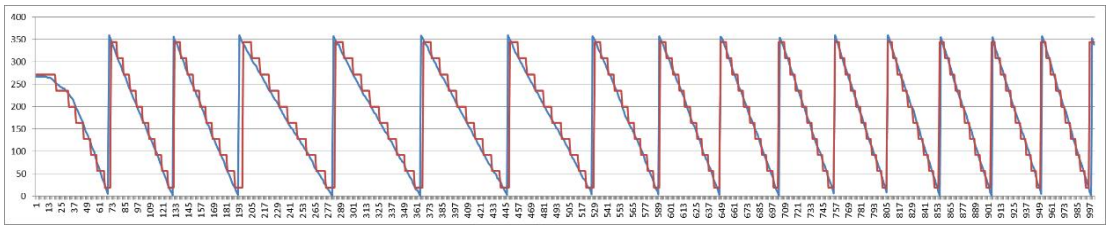
Attachment-1：Comparison of Resistivity Measurement Curves



Attachment-2：Gamma imaging rendering



Attachment-3：Identification of sectors under azimuth gamma rotation state (dynamic changes in speed)



Attachment-4：Finished product picture

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