DUCT (Downhole Universal Combined Tool)

Purpose.

DUCT- new combined multi-purpose tool that allows you to work in both the cable and self-contained modes. Also self-contained mode is available, when tool works in cable mode. The information is recording into the internal memory of the tool. Thus, increasing reliability of operation – it is always possible to get the recorded information from the internal memory if a logging panel fails. In addition it should be kept in mind that the information at the logging panel records in depth format, but the information at the internal memory of the tool records in time format, So, you can get a full data of the work (in time or on the depth) with DUCT tool on the well.

The main channels of the DUCT are similar to a DSCCT tool. Additionally in the cable mode, you can control the settings of the tool: power supply voltage, voltage into the tool, the tool's inner temperature. Connection with PC is via USB.

New DUCT has a flexible architecture that can to solve a very wide range of tasks in geophysical exploration. The tool consists of a base module, which concentrated the main measurement channels, and the additional module, which can have up to 8 measurement channels. An additional module can serve:

- Resistivity meter and capacitance water holdup;
- Multichannel capacitance water holdup with distributed sensors for the study of
- horizontal wells; Sound level meter;
- Highly sensitive thermometer;
- Any set of channels on demand of the customer.

Standard single-contact flow-meter shall be connected to an additional module or it can be connected directly to the main module (instead of the additional module). It is possible to connect an additional second inline flow-meter.

The tool has an adapter to work on a cable, which allows you to use it as a cable tool. Data format is the same as the cable tool DCRT.

Technical characteristics

Parameter	Value
The number of recording channels (parameters)	from 1 to 9
Measuring range, kgf/sq.cm	0-400, 0-600, 0-800, 0-1000
Number of bits of ADC	16
The relative error, %	± 0.15
Absolute error, kgf/sq.cm	0.6¥ 0.9¥ 1.2¥ 1.5
Pressure resolution, %	0.0015
Pressure resolution,* kgf/sq.cm	0.008

Parameter	Value
Measuring range, ° C	0...+100, 0...+120, 0...+150
Number of bits of ADC	16
Absolute error, ° C	0.5
Temperature sensitivity, ° C	0.003
Time constant, sec	1.2
Measuring range, microR/hour	
	0...25
0 Sensitivity, imp/min on 1 microR/hour, not less than	150
Relative error, %	± 15
Signal/noise ratio, not less than	5
Design options of flowmeters:	
Flow-meter diameter 30(32) mm, 20 mm diameter polyamide spinner, range, m3/hour	3-250
Flow-meter diameter 38(42) mm, 27 mm diameter polyamide spinner, range, m3/hour	2-200
Open/close flow-meter diameter 38/110 mm (opened/closed), rubber spinner diameter 60 mm, range, m3/hour	0.5-50
Overheating sensor in still water, ° C, not less than	in self-contained mode 4° , in cable
mode 15° Time constant, sec	3
Conductivity measuring range, Sm/m	from 1 to 50
Absolute error, Sm/m, not more than	1
Thermal care zero, Sm/m, not more than	0.1
Measuring range, % ¥ units.	0...60 ¥ 0...1
Absolute error, % ¥ units	10 ¥ 0.1
Power source	2 batteries CR123 1-1.5 Ah capacity (for work up to 120° C) or Accumulator 18650 2.2 Ah capacity (for work up to 95° C) or 1 battery 10 Ah capacity (for work up to 150° C)
Current consumption (depends on cycle), mA, not more than Work mode – 0.1...4; standby mode (delay) – 0.1	
Amount of memory of the tool	8 Mbytes or 432 537 points (with all channels)
The time of storage of information	10 years
Filling time memory (9 channels on), h	30
Number of write cycles in the internal memory	100 000

Sample Rate (measurement period), sec	0.125-125
Delay time of writing of the tool, h	Up to 255
Work time with cycle 0.25 sec and 9 channels (T, P, LM, GR, STI, Q, Q2, VL, REZ)	1 802 minutes or over 30 hours
All memory reading time, min	About 2
Range of starting programs by pressure, kgf/sq.cm	from 0 to 600 with
step 1 Interface	USB
Inner power source current consumption (accumulator or batteries):	
- Sleep mode, mA	not more than 0.1
- Cable mode with core cable wire current over 10 V, mA	not more than 0.02
- connection via USB, mA	not more than 0.02
- Main module without GR and without STI heater, mA	8
- GR channel, mA	additional 25

Parameter	Value
- STI heater channel, mA	additional 130
- Flow-meter module, mA	additional 3.5
- Additional module, mA	additional 5
Length (with one flow-meter, without centralizer), mm	1600
Diameter, mm	28-42
Weight, kg, not more than	8-18

Modifications

Model	Description
DUCT -30 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW Power source - Accumulator
DUCT -30 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW. Power source - Battery
DUCT -32 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW. Power source - Accumulator
DUCT -32 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW. Power source - Battery
DUCT -38 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Accumulator
DUCT -38 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Battery
DUCT -42 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Accumulator
DUCT -42 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Battery
DUCT -38 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Accumulator (2 Blocks)
DUCT -38 MPa/° C	Channels: TEMP,PRES,GR,CCL,STI,CWH,REZ,FLOW,FLO2. Power source - Battery (2 Blocks)