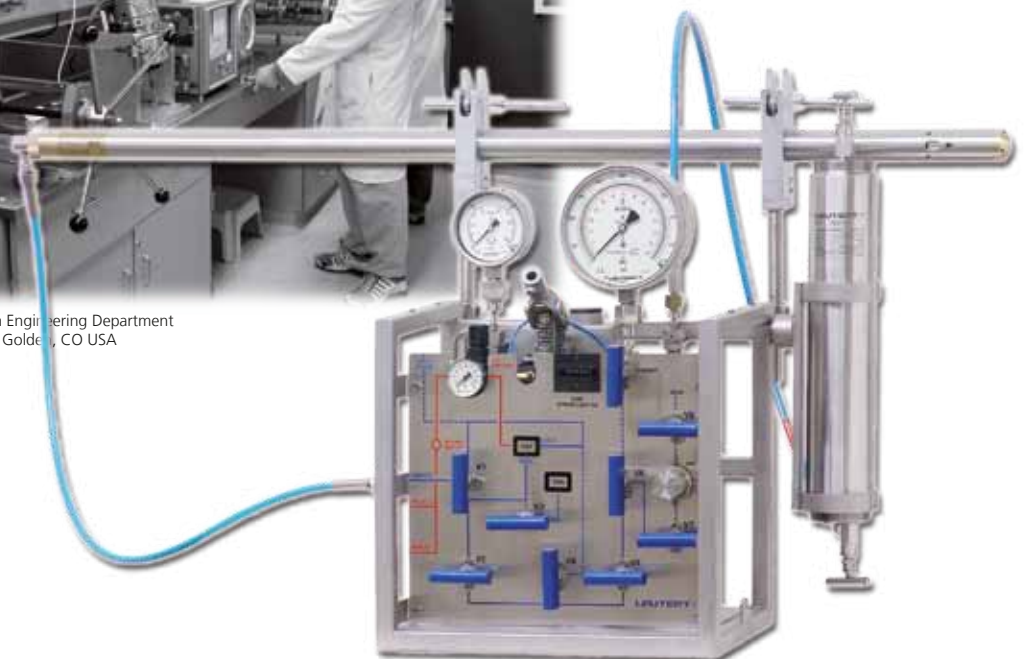


## One Phase Sampler OPS<sup>\*)</sup>



Picture Courtesy of the Petroleum Engineering Department  
at the Colorado School of Mines, Golden, CO USA



### Sampling

The OPS One Phase Sampler provides representative sample of well fluid which can be transferred to sample bottle without using mercury. The Samples are maintained in single phase when brought to surface.

<sup>\*)</sup> Product cannot be sold to customers within the United Kingdom

## The Design

The LEUTERT Positive Displacement Sampler provides clients with representative samples of well fluids all over the world. The collected fluid can be transferred on location to the sample bottle without the use of mercury. The below described modified version of the PDS<sup>short</sup>, the One Phase Sampler OPS\*, allows the sample to be pressurized above reservoir pressure after it has been taken from the reservoir. This compensates any temperature induced pressure drop (e.g. as the sample is returned to surface) and maintains the sample in single phase.

The main features of the LEUTERT One Phase Sampling system are:

- Shortest sampler of its kind available in the market
- Confirmed sample volume (600 cc)
- Maintaining the sample in single phase
- Less seals due to reduction of nipples
- Positive displacement operation
- Adjustable sampling duration
- Mercury-free transfer to shipping bottle
- Positive locking after tool closure
- Ability to validate sample in sample chamber
- Rugged design with minimal components

## The Bottom Hole Sampler

While using the standard PDS<sup>short</sup> sampler the sample will efficiently be restored to original sub surface conditions by heating if the fluid has a low heavy-component content. However, when the fluid contains asphaltenes and paraffins in a colloidal dispersion state, and when these products have been segregated, it is no longer possible to reintegrate them into the fluid. In such a case, the properties of the fluid on which the thermodynamic measures are taken in the laboratory do not any longer exactly correspond to those of the fluid in the deposit. Therefore, in such cases the sample must remain in monophasic condition during the complete sampling process.

The OPS section may be attached to the LEUTERT PDS<sup>short</sup> sampler in order to keep a fluid in a monophasic state. The OPS section is filled with compressed nitrogen gas prior to sampling. This pressurized gas is allowed to act on the sample via a floating piston, thus, compensating the volume changes, and keeping the sample pressure well above the dew point or bubble point at all times.

Volume	:	600 ccm	
Max. operating pressure	:	15,000 psi	1034 bar
Max. operating temperature	:	360 °F	180 °C
Test pressure	:	22,500 psi	1551 bar
Diameter	:	1 - 11/16 inches	43 mm
Length	:	15.25 Ft	4648 mm
Weight	:	68 lbs	31 kg
Material	:	Seamless stainless steel to NACE, bronze alloy	

\*) Please note that the OPS section can not be sold to customers within the United Kingdom.

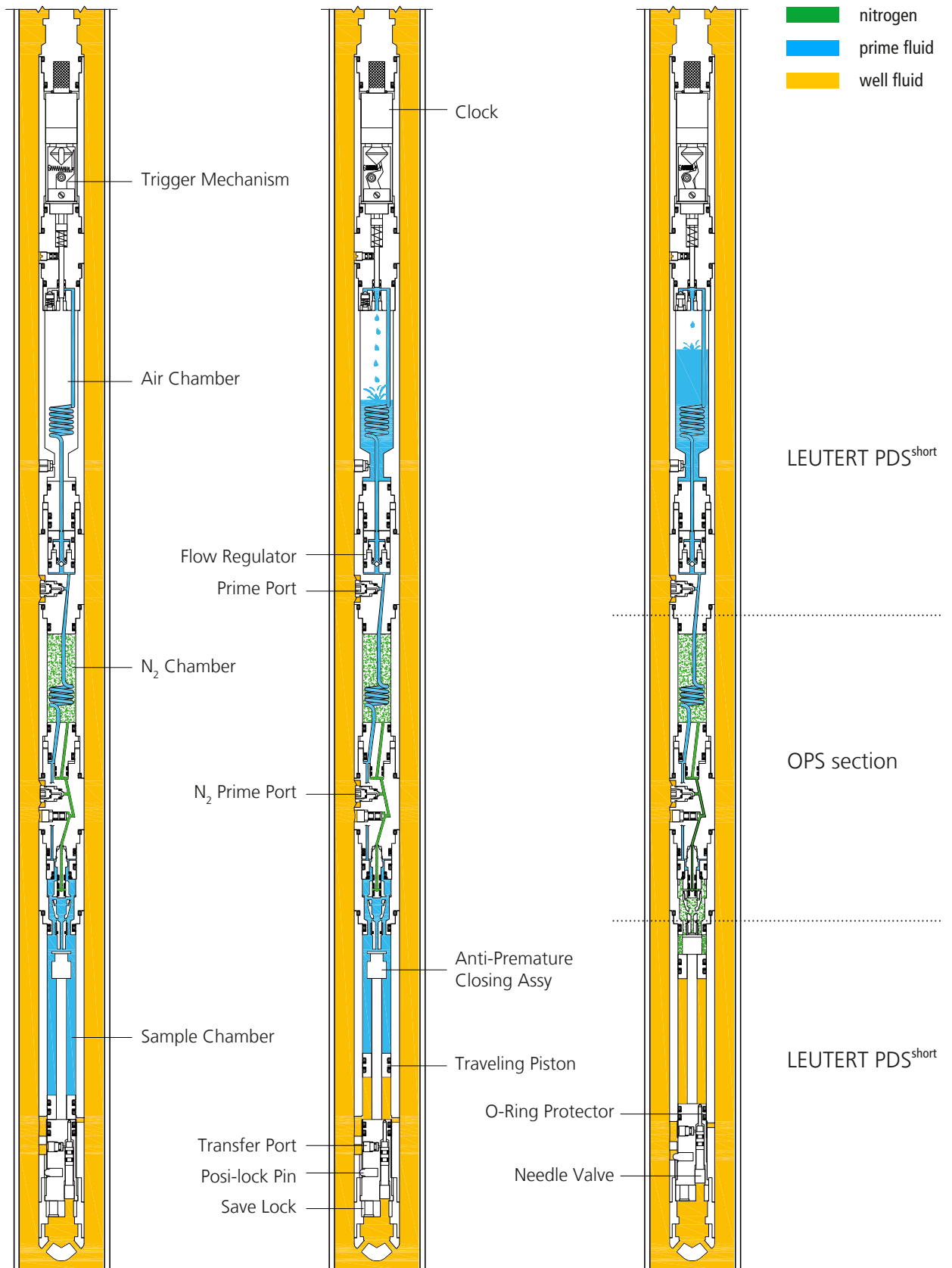


Fig. A  
primed-ready to take  
sample

Fig. B  
triggered-taking  
sample

Fig. C  
sample chamber filled and  
locked closed

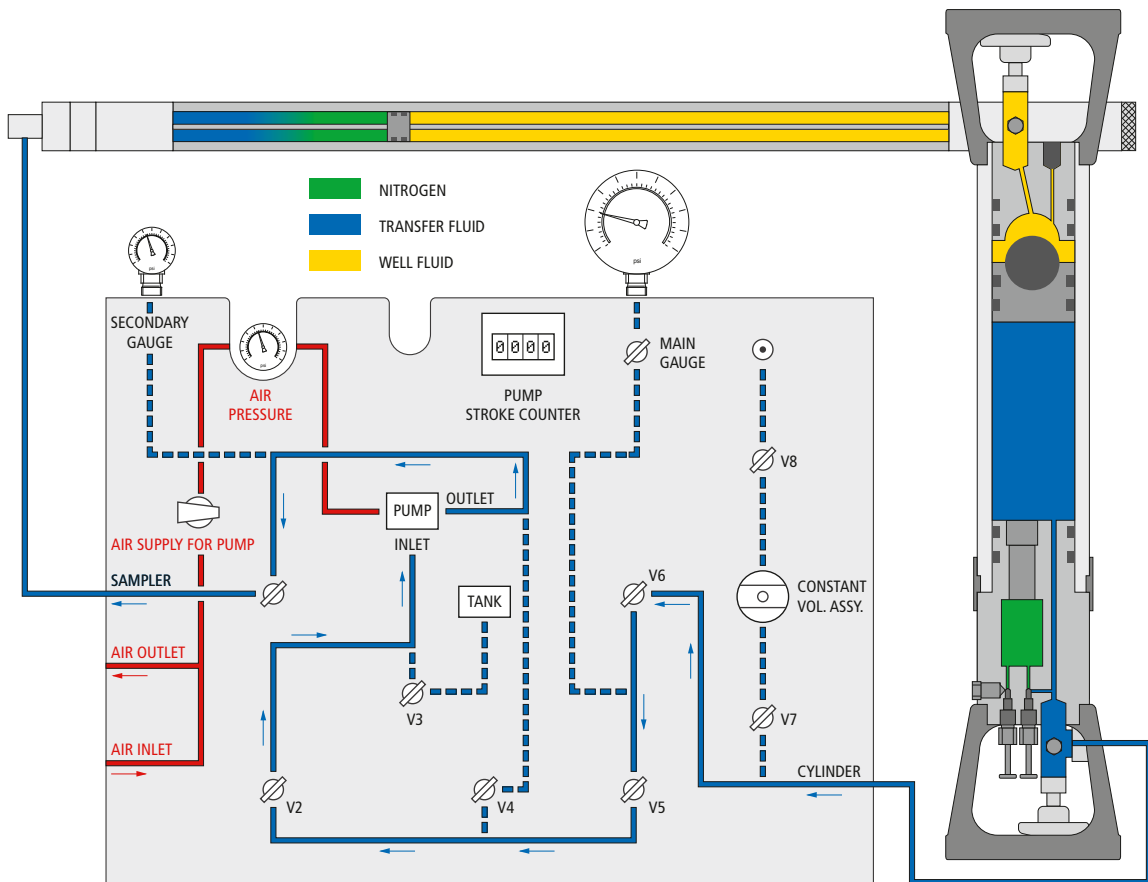
## The Transfer

After the sample is trapped, the tool is pulled back to surface. The sample chamber may be removed from the tool assembly and installed into the transfer unit. The sample may now be transferred to a piston sample bottle. The bottle has a capacity of 700 cc and is available with 10,000 psi or 15,000 psi working pressure.

The transfer unit is built to the same high quality as the sampler. Its rugged design of stainless steel is equipped with the necessary high pressure hydraulics. The transfer pump is pneumatically operated to enable a controlled transfer to be effected both automatically and quickly.

The sampling system operates with a complete range of sample bottles, available for surface or sub-surface samples in various working pressures, such as the LEUTERT Type 600 Cylinder.

Max. operating pressure	: 15,000 psi	1034 bar
Test pressure	: 22,500 psi	1551 bar
Max. operating temperature	: 302 °F	150 °C
Dimensions	: 18.5" x 17" x 13"	470 mm x 430 mm x 330 mm
Weight	: 77 lbs	35 kg
Material	: Stainless steel according to NACE MR-01-75	



*Schematic of Field Transfer Unit Showing Sample Transfer into Sample Cylinder*

## The Heating Jackets

During the retrieval of the OPS Sampler from the well, the sample will remain in Single Phase owing to the Nitrogen over pressure within the sample chamber. Therefore the drop in temperature during PULL OUT OF HOLE has no effect on the phase status of the sample.

However it may be desired to transfer the sample on surface at reservoir temperature. This can be achieved by utilizing LEUTERT Heating Jackets for Sample Chamber and Sample Cylinder.

In addition, if the reservoir sample is very viscous or contains paraffins / asphaltines, surface transfer may be difficult. For the purpose of facilitating easy Transfer into the Sample Cylinder, LEUTERT Heating Jackets may be used.

Temperature range : 68 °F to 350 °F | 20 °C to 177 °C

Dimensions without Controller

Heating Jacket for Sampler : 3.9" x 3.9" x 51.2" | 100 mm x 100 mm x 1300 mm

Heating Jacket for Cylinder : 5.9" x 5.9" x 15.7" | 150 mm x 150 mm x 400 mm

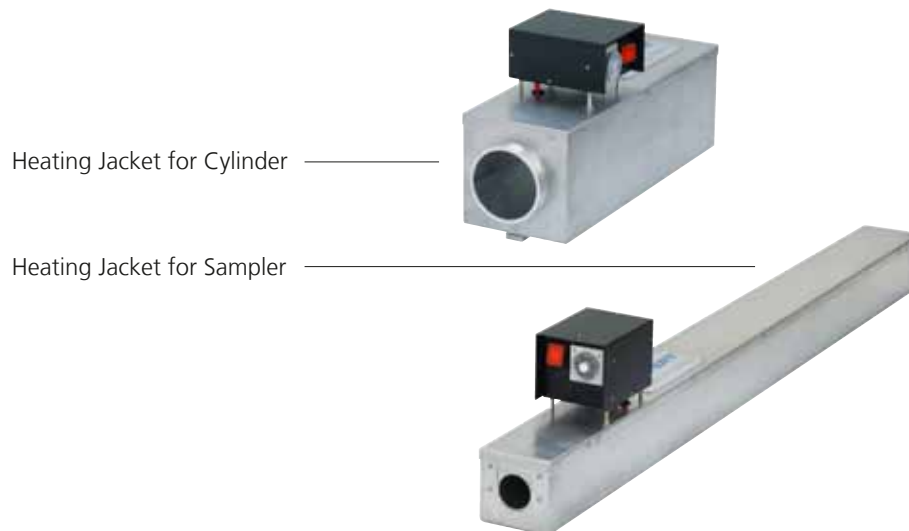
Weight

Heating Jacket for Sampler : 15.4 lbs | 7 kg

Heating Jacket for Cylinder : 25.3 lbs | 11 kg

Material : Stainless steel according to NACE MR-01-75

Power supply : 110 V AC to 240 V AC



## The Maximum Thermometer

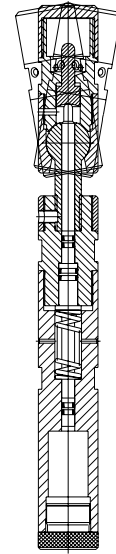
In addition to the Heating Jackets, LEUTERT provides Maximum Temperature Thermometers to determine the temperature attained at the location where the sample was taken.

Knowing the maximum temperature and the pressure of the samples taken allows the operator to verify the quality of the trapped sample on site.

## The Tandem Firing Mechanism

A Tandem Firing Mechanism allows the operation of two samplers at the same time. In this case, the lower sampler will be triggered immediately after the upper sampler has taken its sample. Due to its function as a knuckle joint in diverted wells, two samplers of 300 cc can be flexibly combined to collect a total volume of 600 cc.

Max. operating pressure	: 15,000 psi	1034 bar
Test pressure	: 22,500 psi	1551 bar
Max. operating temperature	: 360 °F	180 °C
Length	: 15.5"	394 mm
Diameter	: 1-11/16"	43 mm
Weight	: 15.4 lbs	7 kg
Material	: Seamless stainless steel according to NACE MR-01-75	



## The Nitrogen Booster Station

The LEUTERT One Phase Samplers and Cylinders allows over pressuring the samples after they're removed from the reservoir. The Sample chambers are pressurized across a piston with a nitrogen gas chamber. This compensates any temperature induced pressure drop (e.g. as the sample is returned to surface).

The LEUTERT Nitrogen Booster Station is used to compress nitrogen into the sample chambers of the One Phase Samplers and Cylinders to a pressure rate above the well pressure.

Max. operating pressure	: 15,000 psi	1,034 bar
Test pressure	: 22,500 psi	1,551 bar
Max. operating temperature	: 212 °F	100 °C
Dimensions	: 25.6" x 11.8" x 9.8"	650 mm x 300 mm x 250 mm
Weight	: 50.7 lbs	23 kg
Material	: Stainless steel according to NACE MR-01-75	

