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Optis™ Electric Line HD

Optis™ Electric Line HD is a step change in downhole video technology providing colour, 25 frames per second video, on mono-conductor cables. Colour images provide a new level of detail particularly when inspecting corrosion or mechanical damage.

EV's proprietary telemetry, which runs at over 200 kbps, is combined with video compression technology and error correction to deliver industry leading video quality. The system tunes itself to a wide range of cables so that Optis™ Electric Line HD works on virtually any cable length or cable type.

Optis™ Electric Line HD's modular design means it can be run with downview, sideview or both. Deviation, high side indicator and internal temperature are digitally transmitted to the surface laptop providing essential information when viewing images.

EV's colour downview lighthead uses the latest in LED technology combined with an optimised lens to give colour pictures of unrivalled quality even in marginal fluid conditions. The LED light intensity can be adjusted to maximise image quality in a wide range of wellbore scenarios. The LED technology is rugged, minimizing susceptibility to shock loading.

The colour sideview camera has its own LED lights and a lens with a focal length from 1" to 8" providing excellent pictures in 2 3/8" tubing and up to 21" marine risers. Rotation of the sideview camera is controlled from the surface with a high side indicator to show where the camera is looking in deviated wells.

- Inspection and monitoring of corrosion and erosion
- Monitoring fluid movements and entry
- Imaging dropped objects and wellbore fish
- Open hole imaging
- Inspection of wellbore hardware including safety valves



Specifications

Diameter	1 11/16"	43mm
Length	11.8 feet	3.60m
Pressure Rating	15000 psi	1034 bar
Max operating temperature	257°F	125°C
Camera	Colour downview & sideview	
Connection	Go	



Optis™ Fibre Coil

Optis Fibre Coil offers a seamless Fibre Optic interface for EV's field proven camera and communication technology on Schlumberger's ACTIVE Coil Tubing services platform.

Optis Fibre Coil is a unique downhole camera and conveyance solution that enables increased operating efficiencies. By combining the benefits of ACTIVE CT conveyance with full bi-directional transmission, Optis Fibre Coil retains surface control of EV's state of the art video camera technology and latest high intensity LED lighting to optimise picture resolution and clarity. The ability to flush up to 2 barrels/min with clear fluids also increases the potential to acquire high-quality images in environments that would normally not be suited to visual spectrum devices.

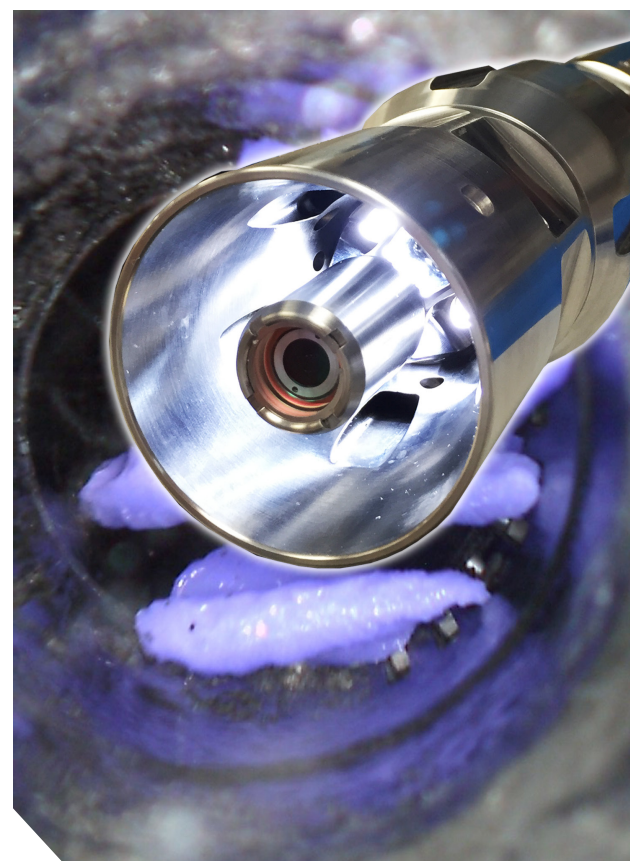
Optis Fibre Coil is battery powered and is designed to run on Schlumberger's ACTIVE CT for up to 24 hours. Real time images are displayed in the coil tubing control unit.

Optis Fibre Coil Features

- Up to 24 hours of full-colour, 25 frames per second, live streaming video
- Flushing sleeve protects camera from mechanical impact
- Up to 2 barrels/minute of clear fluid can be flushed through ports in front of camera lens to optimise image clarity
- Modular design includes optional centralization to minimise risk of mechanical hang-up

Optis Fibre Coil Applications

- Obstruction diagnosis
- Fishing evaluation
- Mechanical inspection
- Pre and post milling runs
- Pre and post scale clean-up
- Production Logging
- Water, gas, oil or sand entry
- Scale, salt or hydrate identification



Specifications

Device Maximum OD	2.9 in	73.0 mm
Device Length	8.6 ft	2.6 m
Pressure Rating	15,000 psi	1,034 bar
Max Operating Temperature	257°F	125°C
Camera	Colour downview	
Video Refresh Rate	Up to 25 frames per second	
Power Source	Lithium or Alkaline Batteries	
Power Time	24 hrs	
Flushing Rate	2 barrels per minute	
Optical Fibre Length	25,000 ft	7,620 m
Connection	Schlumberger ACTIVE Optical Bulk Head	



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Optis™ Televiewer

Optis™ Televiewer combines EV's industry leading electric line cameras with Baker Hughes Telecoil to provide live video on coil tubing while maintaining the ability to drop balls and pump fluids.

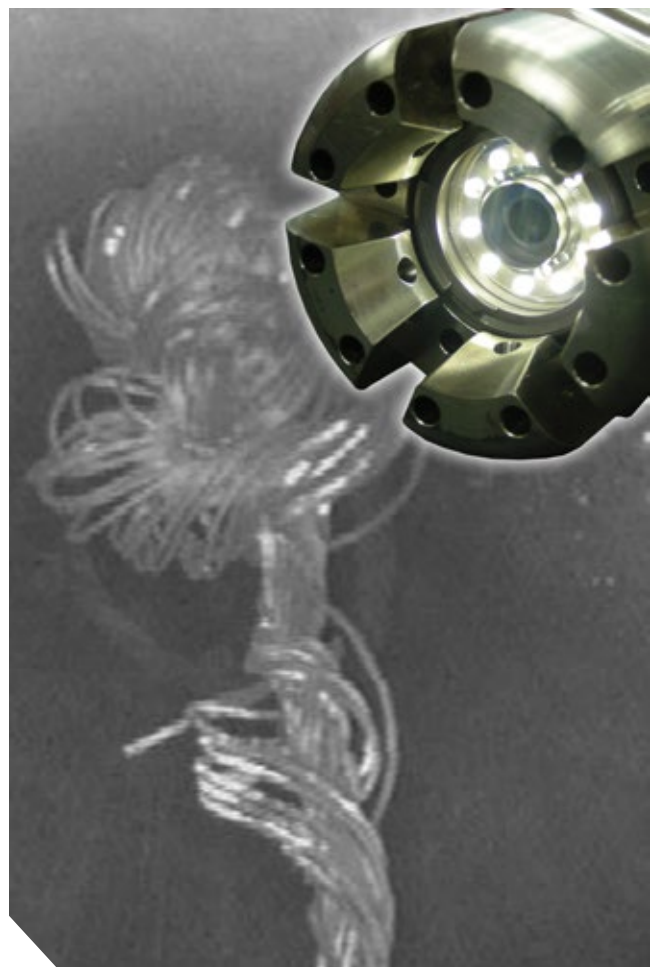
EV's downview electric line camera is housed within a coil tubing running tool. The front end of the running tool has 10 downward and 5 sideways ports through which fluid can be pumped at up to 5 barrels per minute. The 5 sideways ports ensure that the camera lens is always clean and the 10 downwards ports displace the wellbore fluid to ensure that there is a clear fluid in the zone of interest.

In addition to live video the tool deviation and high-side indicator are transmitted to surface to assist in problem diagnosis. The real time images are displayed in the coil tubing control unit and can be streamed to the customer's office via internet links.

The running tool is rugged with a compressive load capability of over 120,000 lbs. A variety of front end nozzles can be designed if the customer has specific requirements such as salt washing.

Applications for Optis™ Televiewer include:

- Inspection of mechanical problems or inability to get down
- Fishing
- Pre & post milling
- Evaluating the status of frac or sliding sleeves
- Pre and post scale or salt clean-up
- Identifying fluid entries



Specifications

Diameter	2 7/8"	73mm
Length	61.5"	1561mm
Pressure Rating	15000 psi	1034 bar
Max Operating Temperature	257°F	125°C
Camera	Downview	
Flushing rate	Up to 5 barrels per minute	



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Optis™ IVC

Optis™ IVC provides a unique well integrity diagnostic tool. Combining EV's HD electric line video with an industry leading 24 arm caliper, Optis™ IVC provides real time answers to well integrity issues. The qualitative colour images combined with the qualitative caliper measurements give definitive results.

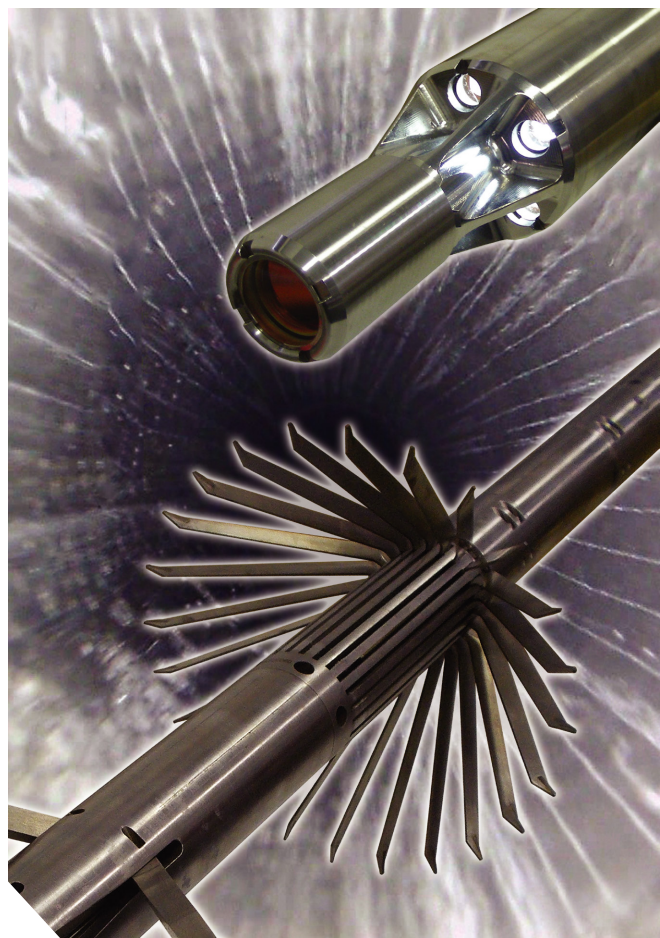
The integrated video caliper string uses EV's proprietary telemetry which runs at up to 300 kbps to provide both streaming colour video and high resolution multi-finger caliper data in real time.

Optis™ HD e-line has both downview and sideview cameras in a 43mm OD toolstring and streams colour video at up to 25 frames per second via mono or multi-line cable. When running in the well the full colour video gives an instant view of any well integrity issues.

When logging up the well the 24 arm caliper provides a quantitative assessment in tubulars from 2 3/8" to 7". Extended arms can increase this to 9 5/8". At a logging speed of 10 meters per minute the IVC caliper has an industry leading consistent vertical resolution of 3mm. Tool eccentricization is corrected in real time and 3D imaging is displayed enabling real time interpretation. Should any anomalies be seen, the IVC tool provides the unique capability of instantly switching to the sideview colour video - to inspect the anomaly in detail.

Applications Include:

- Tubing & casing integrity
- Inspection and monitoring of corrosion
- Scale or salt build up
- Frac sleeve status
- Safety valve inspection
- Seal bore inspection



Specifications

Diameter	1 11/16	43mm
Length	4.38m	14.4 feet
Pressure Rating	15000 psi	1034 bar
Temperature Rating	257°F	125°C
Camera	Colour downview & sideview	
Video Refresh rate	Up to 25 frames per second	
Caliper measuring range	50mm - 180mm	1.97" - 7.09"
Caliper radial accuracy	+/- 0.0197"	+/- 0.5mm
Caliper radial resolution	+/- 0.004"	+/- 0.1mm
Caliper vertical resolution at 30ft/min	0.12"	3mm



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Optis™ RT120

The Optis™ RT120 real time camera is a continuous rotate and tilt camera with an unrivalled track record in wellbore operations. It provides full hemispherical viewing via continuous 360° variable speed rotate and tilt with on-screen display of the camera position. Twin cameras provide low light monochrome and high definition colour images. Infinitely variable LED lighting allows enhanced imaging capability in low visibility fluids.

The Optis™ RT120 is typically deployed on drill pipe in order to provide flushing capability but it can also be deployed on a tugger line or umbilical.

The Optis™ RT120 drill pipe running tool allows the flushing of a clear fluid in the zone of interest thus ensuring a quality picture whatever the wellbore fluid. The running tool has an integral dome protector which also acts as a delivery method for controlled flushing operations. The protection frame offers maximum protection while minimising the reduction in viewing area. Up to 10 barrels per minute of clear flushing fluid can be pumped through the running tool.

Connection from the camera to the surface control unit is via an umbilical which is typically strapped to the outside of the pipe. The surface master control unit provides the operator with full control of the camera including 3-axis movement, auxiliary camera switching and lighting control.

The Optis™ RT120 system including drill pipe running tool can be mobilised by helicopter or any other means.

The range of applications for the Optis™ RT120 includes the inspection of:

- Subsea wellhead profiling
- Subsea horizontal tree crown plug seal faces
- BOP internals
- Thread and seals
- Dropped objects and fishes
- Milled or cut pipe faces



Specifications

Diameter	120 mm
Length	280 mm
Pressure rating	3000 psi
Max operating temperature	50°C
Hazardous operating zone	Zone 2

Drill Pipe Running tool

Length	670 mm
Diameter	170 mm
Connection	4 ½" API IF box-up
Flushing rate	10 barrels per minute



Optis™ VMPL

The Optis™ VMPL combines EV's memory camera with production logging sensors in a compact and rugged logging string that offers a cost effective and innovative alternative to traditional production logging strings. Qualitative evaluation of fluid entry from the colour HD video camera is complimented with quantitative measurements of temperature, pressure, gamma ray and flow rate. The memory camera can record up to 5 hours of HD colour video at 30 frames per second. The five hours can be split into segments with delays as required for stations or flowing passes. Oil entry into high water cut environments can be identified with flow from individual perforations as can water entry into gas wells. The colour video also gives a qualitative indication of corrosion or scale build-up.

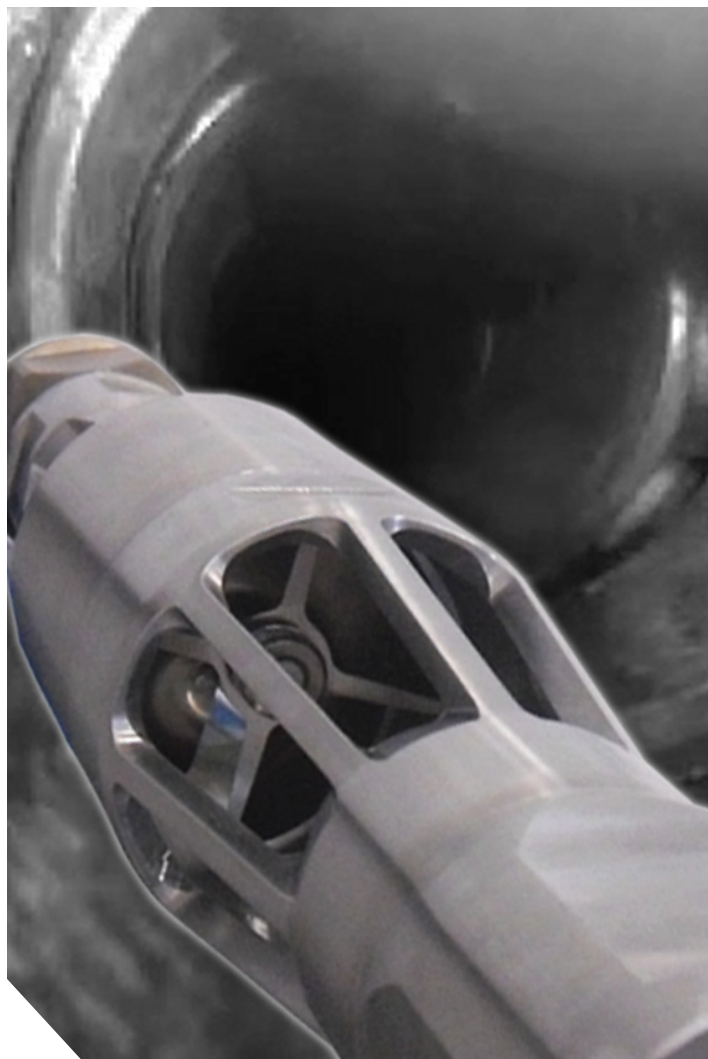
The memory production logging sensors can be sampled at up to 32 times per second and include:

- Fast response temperature
- Pressure - Piezo
- In-line flowmeter
- Gamma ray
- CCL

Normally a 2 1/8" OD flowmeter is run to improve spinner response in a 1 11/16" string. However a 1 11/16" OD flowmeter is available where restrictions require it.

Applications for Optis™ VMPL include:

- Oil and gas entry into high water cut wells
- Water entry into gas wells
- Flow regimes and fluid entries in horizontal wells
- Leak detection
- Scale build-up in water injectors



Specifications

Diameter	1 11/16"	43mm
Length	167"	4240mm
Pressure Rating	15000 psi	1034 bar
Max Operating Temperature	257°F	125°C
Camera	Colour Downview	
Recording Time	Up to 5 hours	
Pressure	0.01 psi resolution	7.5 psi resolution
Temperature	0.01°C resolution	0.5°C resolution
In-line flowmeter	1 11/16" or 2 1/8" OD	
Gamma ray	1 cps resolution	



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Optis™ Slickline HD

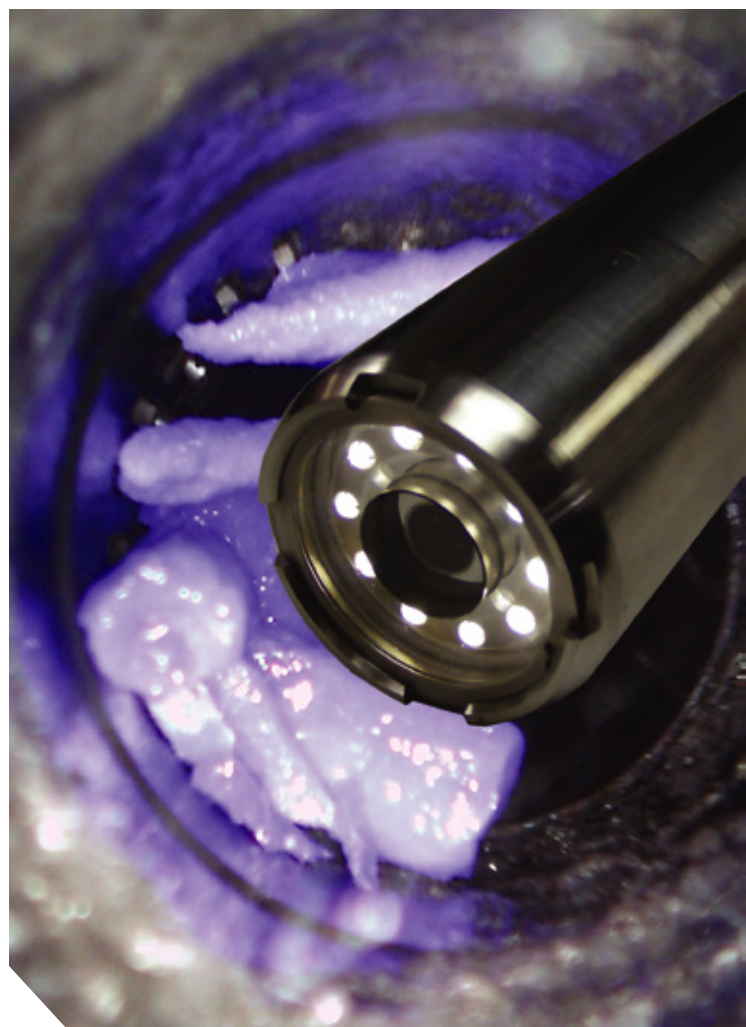
The Optis™ Slickline memory camera provides up to 5 hours of full colour video. Reliable and simple to use, the Optis™ Slickline camera opens new markets for wellbore imaging. With the latest image sensing technology combined with digital compression and encoding, Optis™ Slickline sets the new industry standard. High efficiency LED's and a 51° field of view ensure the highest probability of a quality picture.

The modular design is lightweight and easily transportable. For low temperature applications NiMh rechargeable batteries can be used allowing the tools to be flown in helicopters.

As long as it is at the bottom of the string Optis™ Slickline can be combined with a range of other services, either electric line or memory, such as calipers, well tractors, temperature and pressure sensors or noise tools. The 5 hour recording time eliminates the need for precise planning and allows for the variables in wireline intervention.

Applications for Optis™ Slickline include:

- Imaging dropped objects and wellbore fish
- Mechanical inspection of wellbore hardware
- Inspection and monitoring of corrosion and erosion
- Detecting water entry in gas wells and oil entry in high cut water wells
- Gas storage inspection
- Coal bed methane wells



Specifications

Diameter	1 11/16"	43mm
Length	8.5 feet	2.6m
Pressure Rating	15000 psi	1034 bar
Max Operating Temperature	257°F	125°C
Camera	Colour Downview	
Recording Time	Up to 5 hours	
Power	Lithium battery or rechargeable NiMh battery	
Connection	Standard 15/16" SR pin-up	



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Optis™ Electric Line - HT

EV's patented high temperature lens technology delivers a camera capable of operating at temperatures up to 350°F and pressures up to 1034 bar within a 1 $\frac{11}{16}$ " diameter tool.

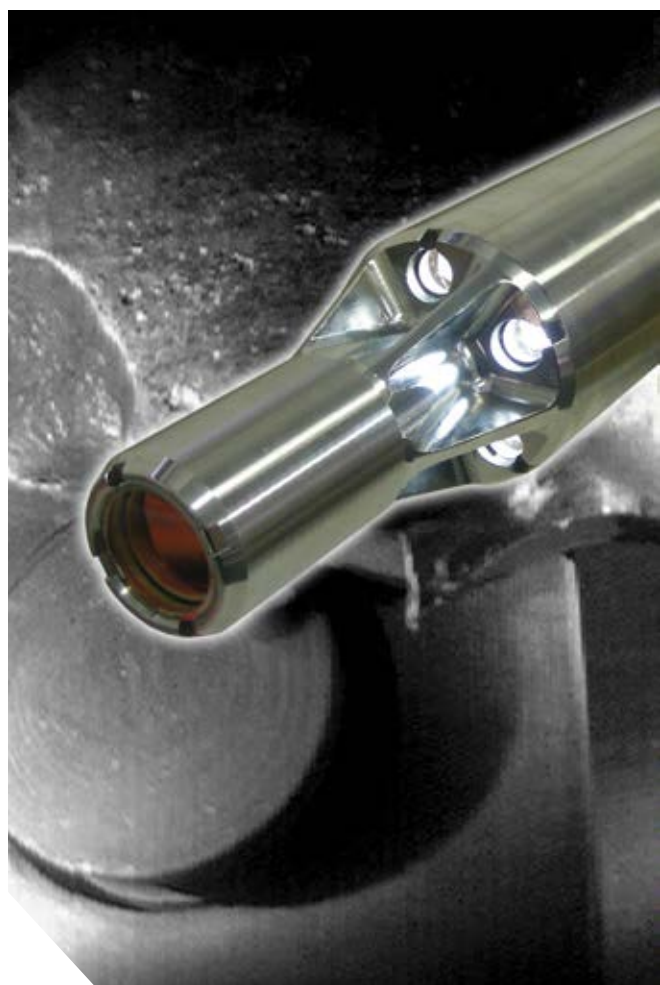
The downview only camera is based around EV's field proven camera and communications technology combined with the latest high intensity LED lighting. The fully bidirectional transmission allows control of lighting levels and picture resolution from surface. When running in the well the camera can be set to low or medium resolution with frame rates of up to 4 frames per second. When viewing a stationary object the picture resolution can be set to high with a frame rate of 0.2 frames per second providing the best quality image of the area of interest.

Deviation, high side indicator and internal temperature are digitally transmitted to the surface laptop showing the orientation of the image in the wellbore.

Optis™ technology can be run on a wide range of mono and multiline cables with lengths of up to 33,000 ft via a GO pin connection. Integration into the logging unit's depth system is both quick and simple.

Using the latest flasking and electronics technology the high temperature camera is rated to 350°F for one hour at bottom hole temperature. At lower bottom hole temperatures extended periods can be spent in the well.

- Imaging dropped objects and wellbore fish
- Mechanical inspection of wellbore hardware
- Inspection and monitoring of corrosion and erosion
- Detecting water entry in gas wells and oil entry in high cut water wells
- Gas storage inspection
- Scale, salt & hydrate identification
- Safety valve inspection
- Pre & post milling



Specifications

Diameter	1 $\frac{11}{16}$ "	43mm
Length	7.5 feet	2.28m
Pressure Rating	15000 psi	1034 bar
Max operating temperature	350°F	175°C
Camera	Monochrome downview	
Connection	Go	