

A wide range of videoscopes for specialist inspection



SERIES 6 VIDEOSCOPIES

INDUSTRIAL VIDEOSCOPE IV6C6-13/20/35/50/75

IV8C6-20/35/50/75

IV7D6X1-26 (NTSC type, LCD monitor mountable)

IV7D6X2-26 (PAL type)

IV5C6X1-15

Series 6 videoscopes can be used in a wide variety of specialist inspections, including F100 (IV7D6X1-26) and T700/CT-7 (IV5C6X1-15) inspections.

- Full screen display.
- Four way angulation
- Tapered Flex (TF) Tube for enhanced insertion.
- Five button remote operation.
- Diameters of 5.1mm, 6mm, 7.3mm (with Channel) and 8.4mm.

■ IV5C6, IV6C6 and IV8C6 Scope Specifications

	Distal end	Diameter	IV5C6X1-15	IV6C6-13	IV6C6-20	IV6C6-35	IV6C6-50	IV6C6-75	IV8C6-20	IV8C6-35	IV8C6-50	IV8C6-75
			ø5.1mm	ø6.0mm						ø8.4mm		
Insertion tube	Bending section	Angulation range	150° up/down direction			150° in up/down and right/left directions						
	Flexibility		Tapered flex tube									
	Minimum bending radius		30mm					50mm				
	Working length		1,500mm	1,340mm	2,040mm	3,540mm	5,030mm	7,530mm	2,010mm	3,510mm	5,000mm	7,500mm

■ IV5C6 Optical Adaptor Specifications

	Optical system				Distal end	
	Field of view	Direction of view	Depth of field	F No	Outer diameter	Rigid distal end length
AT120D-IV5C6X1	120°	Forward	14-100mm	5.2	5.1mm	17.5mm
AT90S-IV5C6X1	90°	Slide	12-100mm	5.2		22.8mm

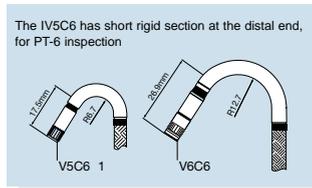
■ IV6C6 Optical Adaptor Specifications

	Optical system				Distal end		
	Field of view	Direction of view	Depth of field	F No	Outer diameter	Rigid distal end length*1	
AT40D-IV6C6	40°	Forward	330-∞mm	3.0	ø6.0mm	26.9mm	
AT80D/NF-IV6C6	80°		10-∞mm	13.0		27.5mm	
AT80D/NF-IV6C6	80°		34-∞mm	4.5		27.4mm	
AT120D/NF-IV6C6	120°		5-∞mm	12.5		27.0mm	
AT120D/FF-IV6C6	120°		20-∞mm	5.5		26.9mm	
AT80S-IV6C6	80°	Side	23-200mm	5.0	ø6.0mm	32.3mm	
AT120S/NF-IV6C6	120°		1-9mm	15.5		32.3mm	
AT120S/FF-IV6C6	120°		7-90mm	8.0		32.3mm	
AT60D/60D-IV6C6*2	60°/60°		Direct/Direct	7-30mm		9.3	38mm
AT60S/60S-IV6C6*2	60°/60°		Side/Side	6-30mm		9.3	44mm

■ IV8C6 Optical Adaptor Specifications

	Optical system				Distal end		
	Field of view	Direction of view	Depth of field	F No	Outer diameter	Rigid distal end length*1	
AT40D-IV8C6	40°	Forward	200-∞mm	2.5	ø8.4mm	26.2mm	
AT80D-IV8C6	80°		40-∞mm	5.5		29.4mm	
AT120D/NF-IV8C6	120°		5-∞mm	14.0		29.6mm	
AT120D/FF-IV8C6	120°		45-∞mm	3.0		29.3mm	
AT80S-IV8C6	80°		Side	22-∞mm		6.0	ø8.4mm
AT120S-IV8C6	120°	3-55mm		16.0	35.8mm		
AT120D/120S-IV8C6	120°/120°	Forward/Side		5-∞mm/3-∞mm	5/9	28.0mm	
AT60D/60D-IV8C6*2	60°/60°	Forward/Forward		5-50mm/5-50mm	11/11	24.0mm	

*1 When the Adaptor is attached to the scope.
 *2 For 3D measurement.



■ IV7D6X1/IV7D6X2 Scope Specifications

Optical system	Field of view	120°	
	Direction of view	Forward viewing	
	Depth of field	9 to 80mm	
Insertion tube	Distal end	Outer diameter	ø7.3mm
		Rigid distal end length	19.8mm
	Bending section	Angulation range 130° in up/down and right/left directions	
	Flexible portion (tube)	Flexibility Tapered Flex Tube	
	Outer diameter	Working length 2,610mm	
Channel	Inner diameter	ø1.7mm	
Universal cord length	2,000mm		

■ MAJ-456 Rigid Sleeve Specifications

Optical system	Field of view	120°
	Direction of view	Side view
	Depth of field	7-80mm
Insertion tube	Outer diameter	ø8mm
	Working length	338mm
Total length	420mm	

■ Operating Environment for Series 6 Videoscopes

- **Operating temperature:** Insertion tube: In air: -10-80°C (14-176°F)*
 In water: 10-30°C (50-86°F)**
 All portions except insertion tube: In air: 0-40°C (32-104°F)
- **Operating pressure:** Insertion tube:
 In air: 1013hPa (normal pressure) (IV6C6/8C6)
 In water: 1013 (normal pressure)-1360hPa (1-1.35atm) (IV6C6/8C6-13,20,35)
 1013 (normal pressure)-1773hPa (1-1.75atm) (IV6C6/8C6-50,75)
 All portions except insertion tube: In air: 1013hPa (1atm normal pressure)
- **Liquid resistance:** Insertion tube: Withstands machine oil, light oil and 5% salt water (10-30°C or 50-86°F) (normal temperature).

* At 50-80°C atmosphere, use the instrument at a relative humidity of 40% or below. Using the instrument at a higher humidity may cause equipment damage.
 ** Insertion tube of IV7D6 and IV5C6X1 scopes is splashproof, except for the channel of IV7D6, which is not fluid-proof.



Series 6 systems can be conveniently packaged (see page 18 for details). All systems require a control unit and can be used with digital image storage devices (see page 8).

SERIES 5 VIDEOSCOPIES

INDUSTRIAL VIDEOSCOPE IV6C5-110/160

The IV6C5 Series offers working lengths of up to 16 metres.

RADIATION RESISTANT VIDEOSCOPIES IV6C5X1-75/110

The IV6C5X1 Series scopes are radiation-resistant up to 50Gy (5000 Rad).



■ IV6C5 Scope Specifications

	IV6C5-110	IV6C5-160	IV6C5X1-75	IV6C5X1-110
Optical system	Field of view			
	60°/100° (convertible using optical adaptor)			
	Direction of view			
Direct/side viewing (convertible using optical adaptor)				
Depth of field*1				
3~44mm/9~127mm/4~∞mm/6~∞mm/17~∞mm/32~∞mm (convertible using optical adaptor)				
Illumination system		Light guide system		Quartz light guide system
Distal end	Outer diameter			
	ø6.0mm			
Bending section	Angulation range*2		Up 120°/Down 120°	
Insertion tube	Outer diameter		ø6.0mm (TF tube)	
	Working length		11000mm	16000mm
Total length		11230mm	16230mm	7780mm
Universal cord length		2000mm		
Carrying case		Drum type case		Attache type case

*1 Depth of field refers to the scope-tip-to-object distance range within which the image is clearly focused.
*2 As the insertion tube is bent or looped, the range of angulation decreases.

■ Guide Tube Specification

		MH-905		MH-906	
Insertion tube	Flexible portion	Rigid distal length			
		10mm (distal end port length)			
		Inner diameter			
	ø6.8mm				
		Outer diameter			
		ø9.9mm			
		Tapered flex tube			
Working length		10845mm		15845mm	
Total length		15845mm		16000mm	

- **Operating temperature:** Insertion tube: In air: 0~50°C (32~122°F)
In water: 10~30°C (50~86°F)
All portions except insertion tube: In air: 0~40°C (32~104°F)
- **Operating pressure:** Insertion tube: In air: 1013hPa (normal pressure) (IV6C5-110/IV6C5-160)
In water: 1013 (normal pressure)~1773hPa (1~1.75atm) (IV6C5X1-75)
1013 (normal pressure)~2127hPa (1~2.1atm) (IV6C5-110) (IV6C5X1-110)
1013 (normal pressure)~2634hPa (1~2.6atm) (IV6C5-160)
All portions except insertion tube: In air: 1013hPa (1atm normal pressure)
- **Liquid resistance:** Insertion tube: Withstands machine oil, light oil and 5% salt water. (10~30°C or 50~86°F) (normal temperature).
- **Radioactivity resistance target value:** 50Gy (5000Rad) (IV6C5X1-75/110)

Series 5 videoscopes require an IV-6A control unit and MAJ-565 adaptor for operation.

CONTROL UNIT FOR SERIES 6 & SERIES 5 VIDEOSCOPIES

INDUSTRIAL VIDEOSCOPE CONTROL UNIT IV-6A

Loaded with every imaginable leading edge RVI function, the IV-6A is designed to make your inspections as efficient and effective as possible.

- Remote control operation using the Series 6 scope's "Five Button" control pad.
- Extended exposure time for darker areas.
- Automatic brightness adjustment.
- Zooming and virtual scrolling (panning) with moving images.
- Built-in image enhancement function.
- Compatible with Series 5 scopes when MAJ-565 adaptor is used.
- Compatible with fiberscopes and borescopes when OTC-6 C-Mount CCD Camera is used (see below).



SPECIFICATIONS

Voltage: 12V DC
Power Consumption: 24W maximum
Dimensions: 174(W) x 259(H) x 2241(D) mm
Weight: 1.5Kg

CONTROL UNIT FOR SERIES 6

INDUSTRIAL VIDEOSCOPE CONTROL UNIT IV-6

This camera control unit (CCU) can display full screen, high-resolution images captured by the scope on the monitor.

- Retainable white balance setting.
- Auto gain control function increases brightness in dark areas.
- Electric shutter automatically adjusts brightness on a monitor.



SPECIFICATIONS

Voltage: 12V DC
Power Consumption: 8W
Dimensions: 149(W) x 250(H) x 2240(D) mm
Weight: 1.1Kg

ACCESSORIES FOR SERIES 6 & SERIES 5 VIDEOSCOPIES

DIGITAL STORAGE AND MEASUREMENT SYSTEM

DSM-2

Compact, lightweight and easy to use, this state of the art system offers an impressive array of versatile functions to meet the most advanced RVI requirements.

- Easy to use, menu driven software for quick capture and storage of still video images - up to 20 images along with accompanying audio annotations can be stored in the internal memory.
- Images and data can be down loaded to floppy disk or Smart-Media card for later review of inspection results on a PC.
- A wide selection of image management functions include measure, recall, delete, export and import.
- All functions controllable from the DSM-2's front panel or the control pad on the control section of an Olympus Series 6 Videoscope.
- Capable of controlling the Digital Measuring Borescope (see page 15).



SPECIFICATIONS

Voltage: 12V DC
Power Consumption: 24W maximum
Dimensions: 2174(W) x 40(H) x 2210(L) mm
Weight: 900g (2lb)

INDUSTRIAL DIGITAL IMAGE RECORDER

IW-R1

Compact digital image recorder.

- Freeze, store and play modes available.
- Picture quality selectable from three settings - HIGH, MIDDLE or LOW; a maximum of 99 still image frames can be recorded in LOW mode.
- Images stored on a PCMCIA memory card can be down loaded to a PC.
- Remote control operation using either the Series 6 scope's "Five Button" control pad or the MAJ-539 wired remote controller.



SPECIFICATIONS

Voltage: 12V DC
Power Consumption: 9W
Dimensions: 178(W) x 49(H) x 296(D) mm
Weight: 1.7Kg (3.8lb)

C-MOUNT CCD CAMERA

OTC-6

Monitor observation with a fiberscope or borescope.



Zooming and other advanced functions of the IV-6A are available for fiberscopes and borescopes when the OTC-6 C-Mount CCD Camera is used. (Note: the OTC-6 camera can be used with IV-6A only)

HIGH INTENSITY LIGHT SOURCES

Model	Lamp	Weight (kg)	Dimensions (mm)	Power supply	Power consumption	Light guide fitting
ILH-2A	50W metal halide	3.0	173x235x85	100-230V 50-60Hz 115V 400Hz	100W	1) Olympus 2) 16mm diameter borescopes (with additional lamp tray)
ILH-2B	50W metal halide	3.0	173x235x85	100-230V 50-60Hz (with mains adaptor) 12V DC	100W	1) Olympus 2) 16mm diameter borescopes (with additional lamp tray)
KLS-4250S	250W metal halide arc lamp	26	250x320x450	100-120V 50-400Hz/ 220-240V 50-60Hz and clean, compressed air 4 bar, 190lit/m minimum	550VA	Olympus
UV	200W	7.5	265x150x256	220-240V AC 50Hz	700VA	Olympus

Note: All the above have constant colour temperature mechanical shutters to control light output, except for the ILK-D1 and ILK-D2 which have a four-position light guide sockets. The ILK-D2 is fitted with an automatic light cutout, which operates when the light guide is removed.

LIGHT SOURCE TECHNICAL INFORMATION

When selecting a light source for a particular application, consideration should be given to its specification, but perhaps the area that causes most confusion is the lamp itself.

A number of details on light source lamps will benefit from some technical explanation, to ease the task of comparing one light source with another.

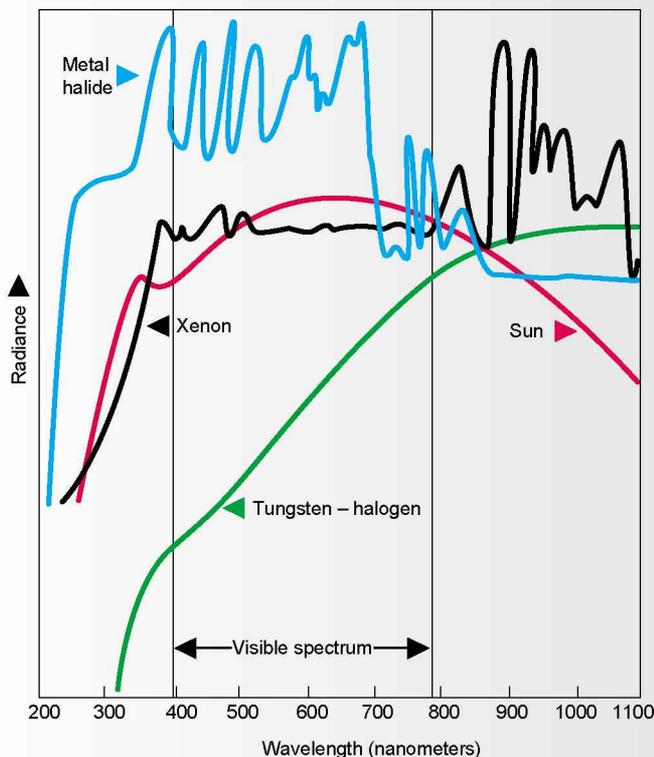
SPECTRAL OUTPUT

The spectral output of a lamp details the amount of electro-magnetic radiation produced across a range of wavelengths, from ultra-violet (UV), through the visible spectrum, to infra-red (IR). Radiation wavelengths are expressed in nanometres (nm), one nanometre being 10^{-9} metres.

The visible spectrum is between approximately 390 and 770nm, with ultra-violet being below and infra-red being above this range. In order to give true colour images, the light source should have a relatively even output across the visible spectrum. Ideally, the amount of IR radiation produced should be minimised, as IR radiation is converted to heat, which may then require a dissipation system, adding cost, volume and weight to the light source.

The spectral outputs of the three most frequently used lamp types are shown in Figure 1 and compared with that of the sun.

FIGURE 1 SPECTRAL OUTPUT OF TYPICAL LAMPS



COLOUR TEMPERATURE

The colour temperature of a lamp is an indication of its radiance and is measured in degrees absolute ($^{\circ}\text{K}$ in SI units).

Typically, tungsten-halogen lamps have a colour temperature of $3,200^{\circ}\text{K}$, whilst metal-halide and xenon arc lamps are around $5,600^{\circ}\text{K}$. The colour temperature of the sun is $5,900^{\circ}\text{K}$.

With tungsten-halogen lamps, the colour temperature can be reduced by decreasing the voltage across the lamp filament. Some light sources use this method to adjust the 'intensity' of the light output. Unfortunately, this 'rheostat' type control increases the 'yellowing' of the resultant illumination.

For this reason, most Olympus light sources use a mechanical shutter to control light output, as the full colour temperature of the lamp is preserved.

POWER

A lamp's power rating refers to the power required to operate it – it is not a direct indication of a lamp's illumination power. For instance, a 500W tungsten-halogen lamp will not produce a higher illumination output per unit area than a 50W metal-halide or xenon lamp.

OUTPUT

The way in which a lamp's output is quoted can be confusing. Generally speaking, for RVI applications, it is only relevant to consider the amount of electro-magnetic radiation within the visible spectrum being concentrated onto the light guide, known as the lamp's luminance, normally expressed in candela per square millimetre (cd/mm^2).

However, the light source is only one part of an RVI system. Other important factors to consider include the size of fibre bundle in the endoscope, the type of light guide used, whether it is integral to the scope or separate, and whether CCTV or photography is required.

Different types of light guide have different spectral transmissions and in general liquid light guides offer a better transmission at the higher end of the visible spectrum and in the UV than fibre light guides, leading to a whiter illumination.

SUMMARY

In summary, the best answer is to try the complete RVI system on a typical application. This will show whether a more powerful light source is required, or if a simple tungsten-halogen unit produces sufficient illumination.