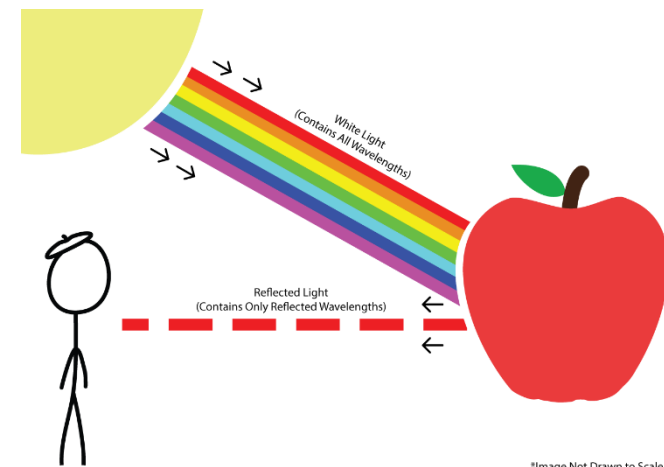
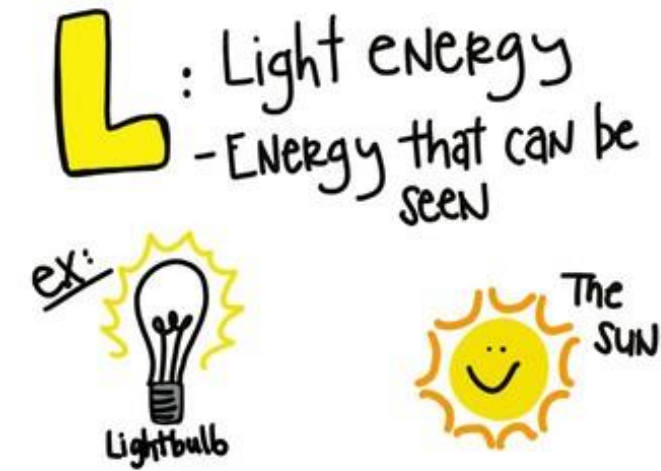


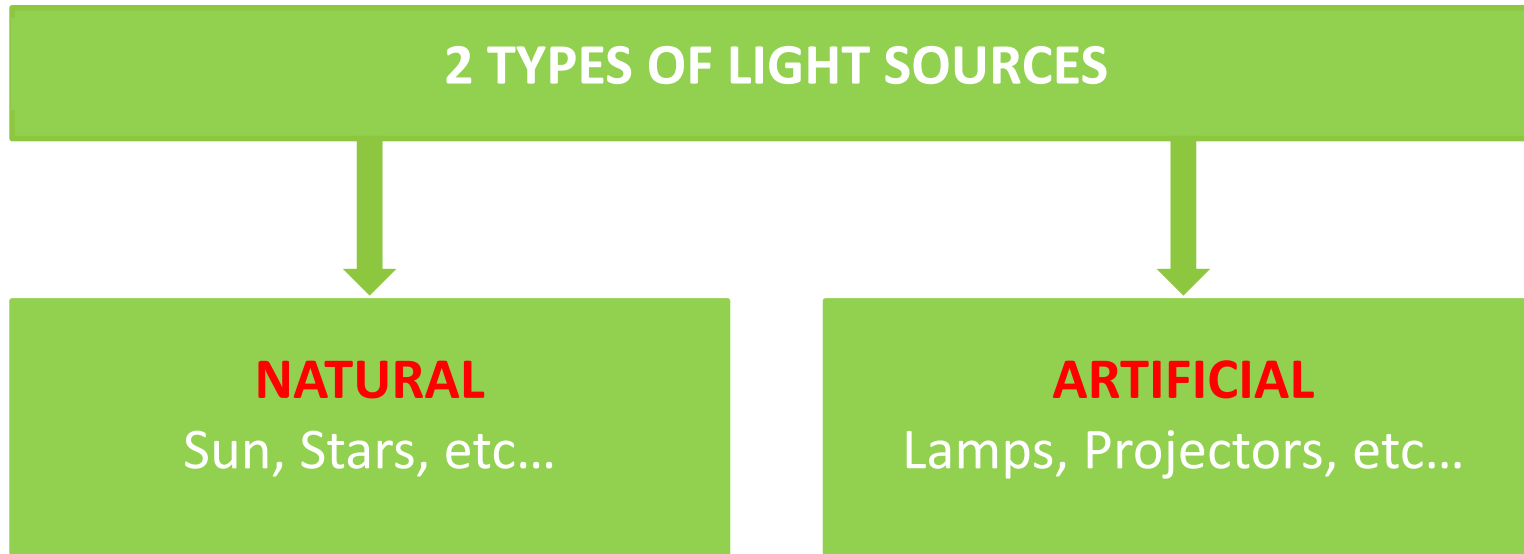
LIGHT SOURCES

INGENIOUS

1. LIGHT DISPLAY – COLOR REFLECTION
2. LIGHT SOURCE – DEFINITION & TYPES
3. COMMON LIGHTING METHODS TO THE OPERATING ROOM
4. PARAMETERS OF LIGHT SOURCE
5. LED VS XENON
6. MODELS OF LIGHT SOURCES
7. LIGHT GUIDES
8. COMPARISON

- Light is **an** electromagnetic radiation called photon ,it can be detected by the human eye
- The '**color**' of an **object** is the wavelengths of light that it reflects
- An Apple is RED because it absorbs **s** photons of all energies except those corresponding to red wavelengths of light

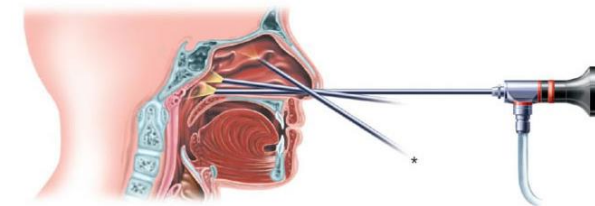
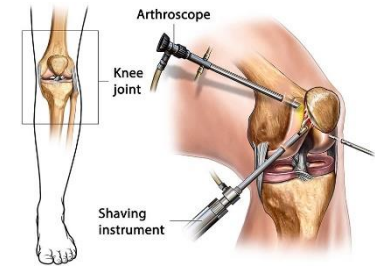
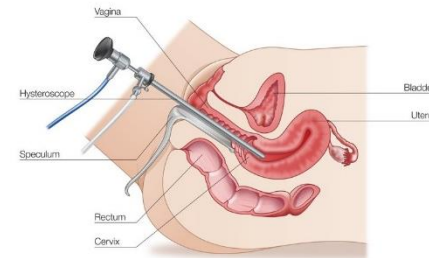
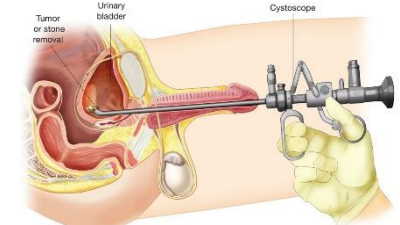
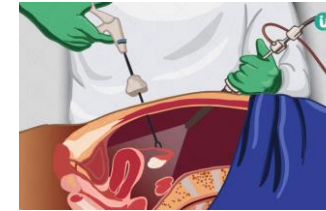




- **In MIS in-cavity lighting is essential for surgical image display**
- Lamps include Halogen, Xenon, and LED

IN-CAVITY LIGHTING

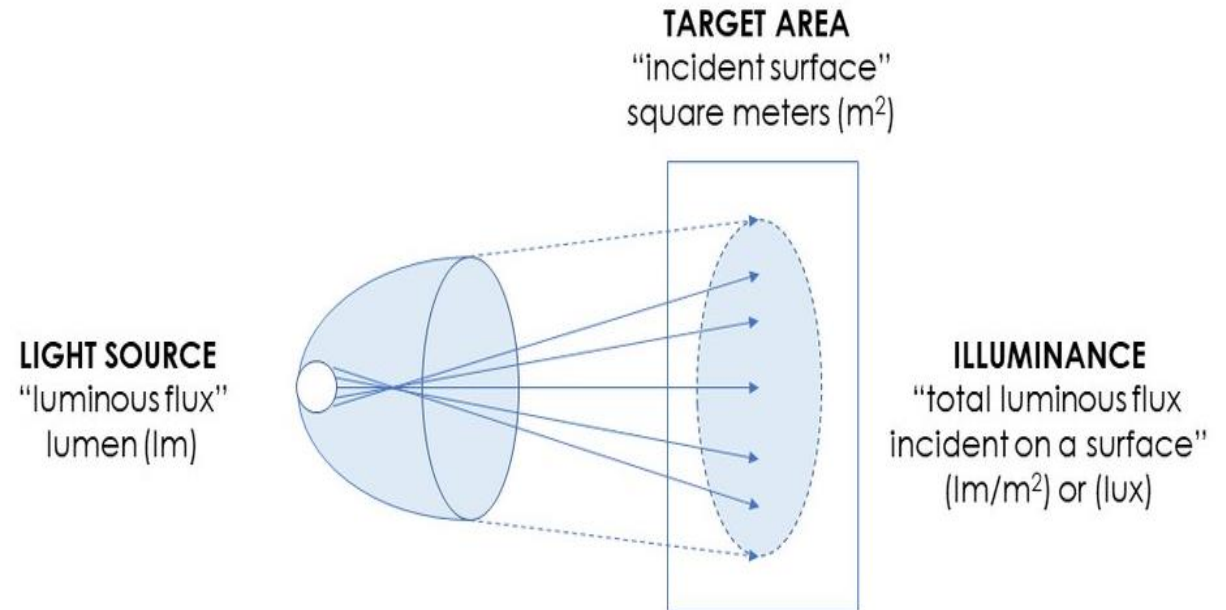
- Minimal invasive surgeries are performed in **dark** cavities
- Cavities are devoid of natural illumination
- An external source of light is needed to illuminate the area that needs to be examined



- **HALOGEN** (tungsten filament sealed into a compact transparent envelope that is filled with a mixture of an inert gas)
- **XENON (HID)** (electric light produces light by passing electricity through ionized xenon)
- **LED** (Light Emitting Diode / semiconductor device that emits light when an electric current flows through it)



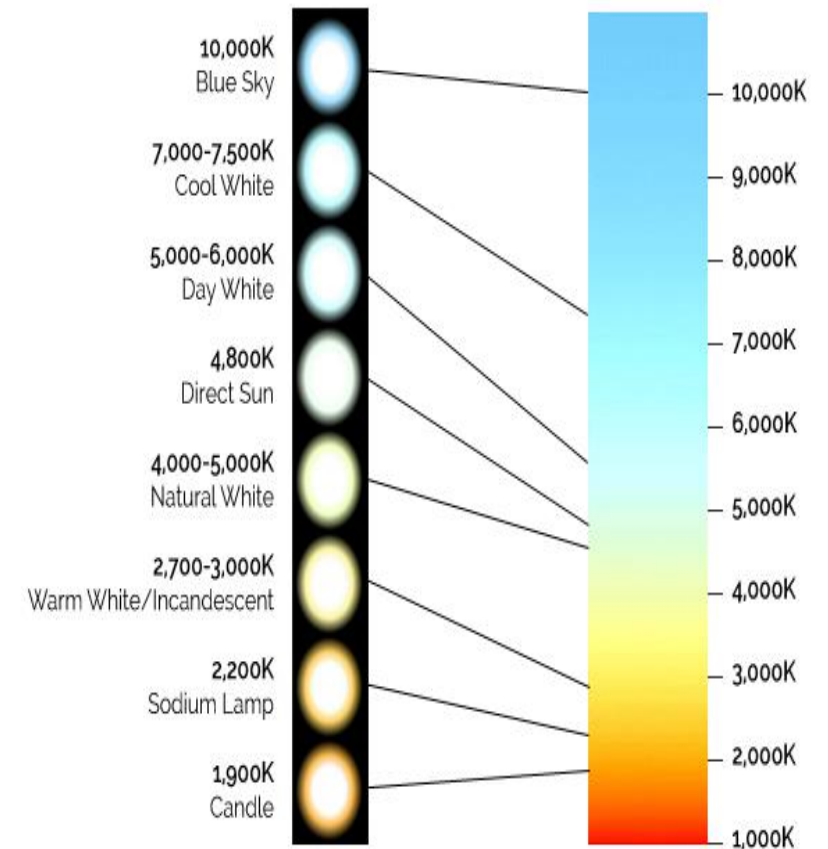
- Illuminance is the amount of light measured on a plane surface or the total luminous flux incident on a surface per unit area.
- Lighting level is measured in:
 - Lux (Lumens /sq. meter)
 - Footcandle (Lumens /sq. ft.)

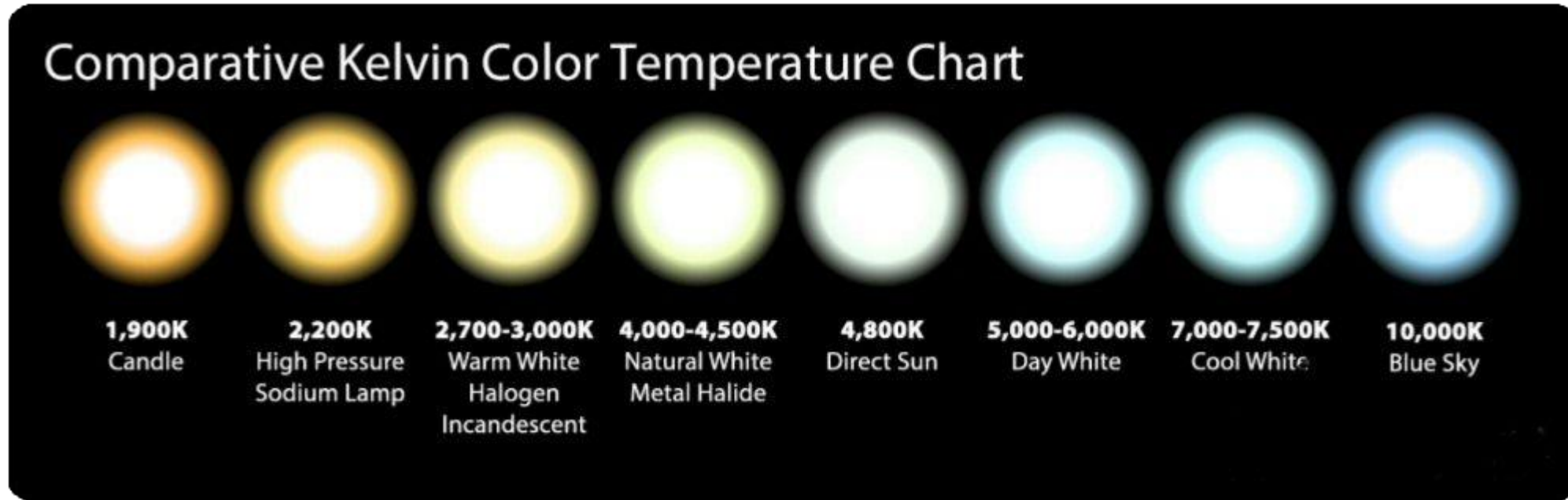


- Color temperature is a way to describe the light appearance provided by a light bulb.
- It is measured in degrees of Kelvin (K) on a scale from 1,000 to 10,000.

TEMPERATURE (K)	COLOR	DESCRIPTION
2000 – 3500	Orange/Yellow	Warm White
3500 – 5000	Paper White	Natural/ Neutral White
5100 – 6500	Bluish White	Cool White

Kelvin Color Temperature Chart





White/yellow glow
(candlelight)

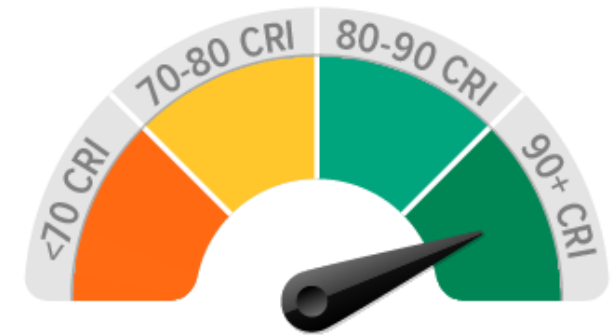


Direct Sun/Day
white



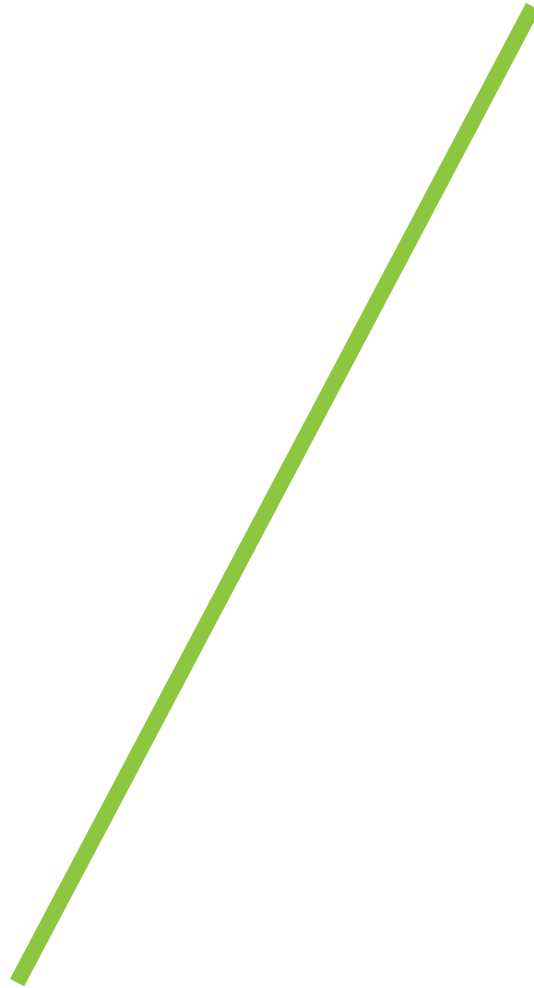
Cool white
glow, Blue Sky

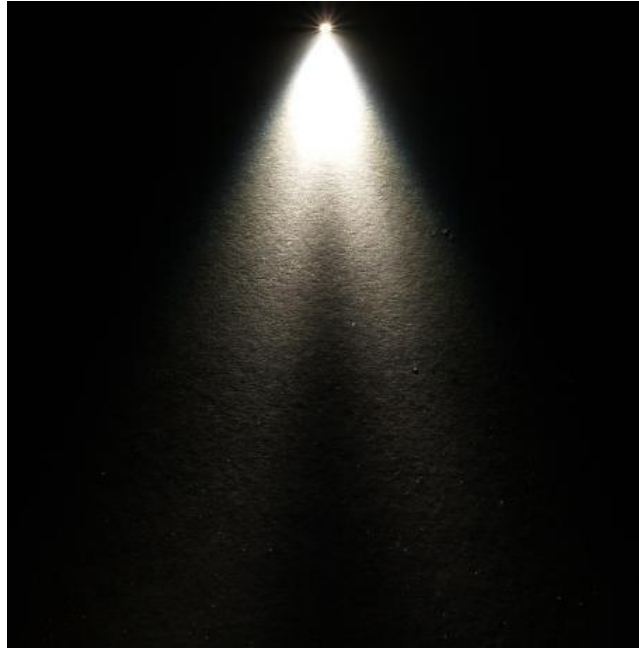
- The apple appears red because it absorbs all colors of the spectrum except red, **which it reflects.**
- When we use an artificial light source such as an LED light source, we are attempting to "reproduce" the colors of natural daylight such that objects appear the same as they do under natural daylight.



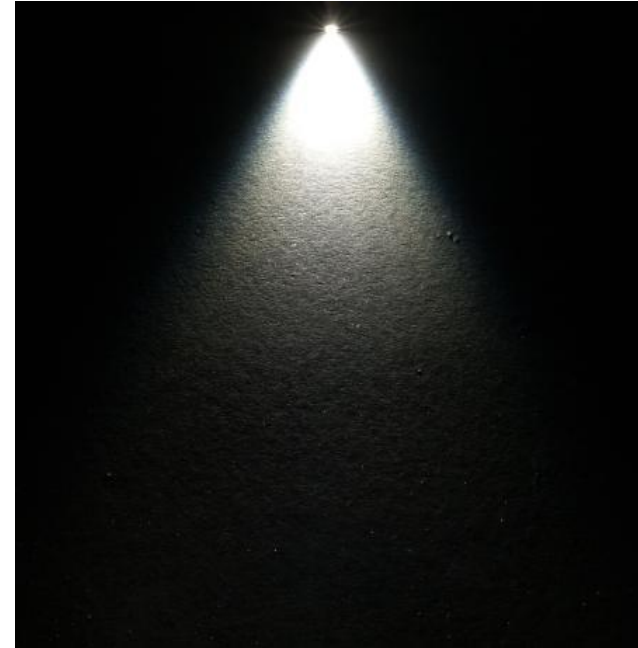
- LAMP LIFE is the time in hours, a lamp will last before a percentage of lamps will burn out.
- Depends on the type of lamp used
- Depends on lamp intensity







XENON LIGHT



LED LIGHT

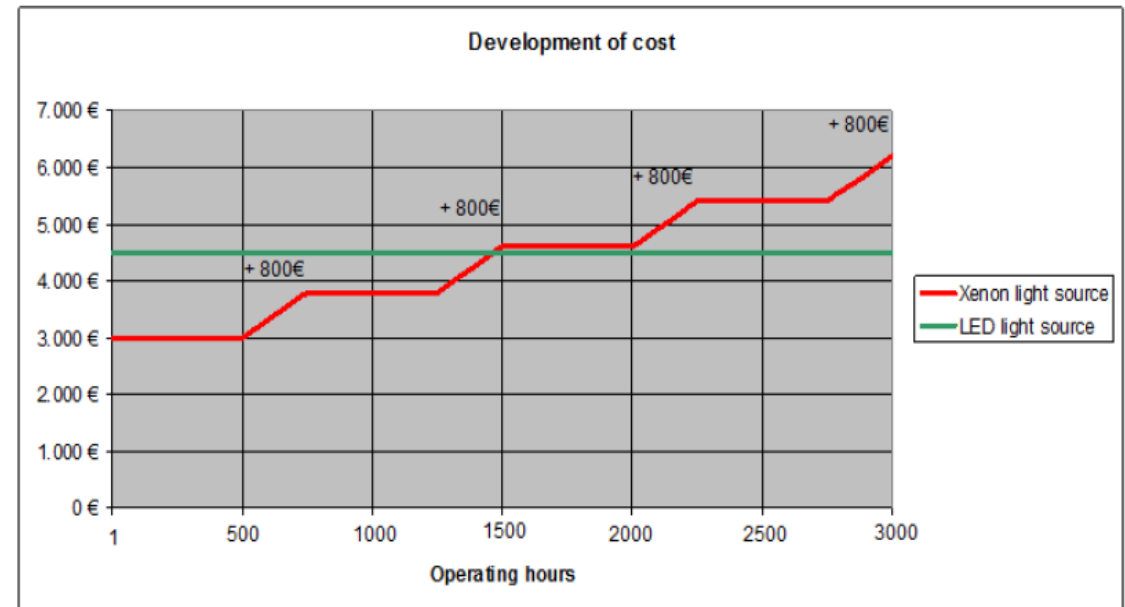
- LED light is homogenous and intensive
- LED provides whiter and brighter light

- LED offers wide range of color temperature compared to Xenon
- It is more convenient for day light colors

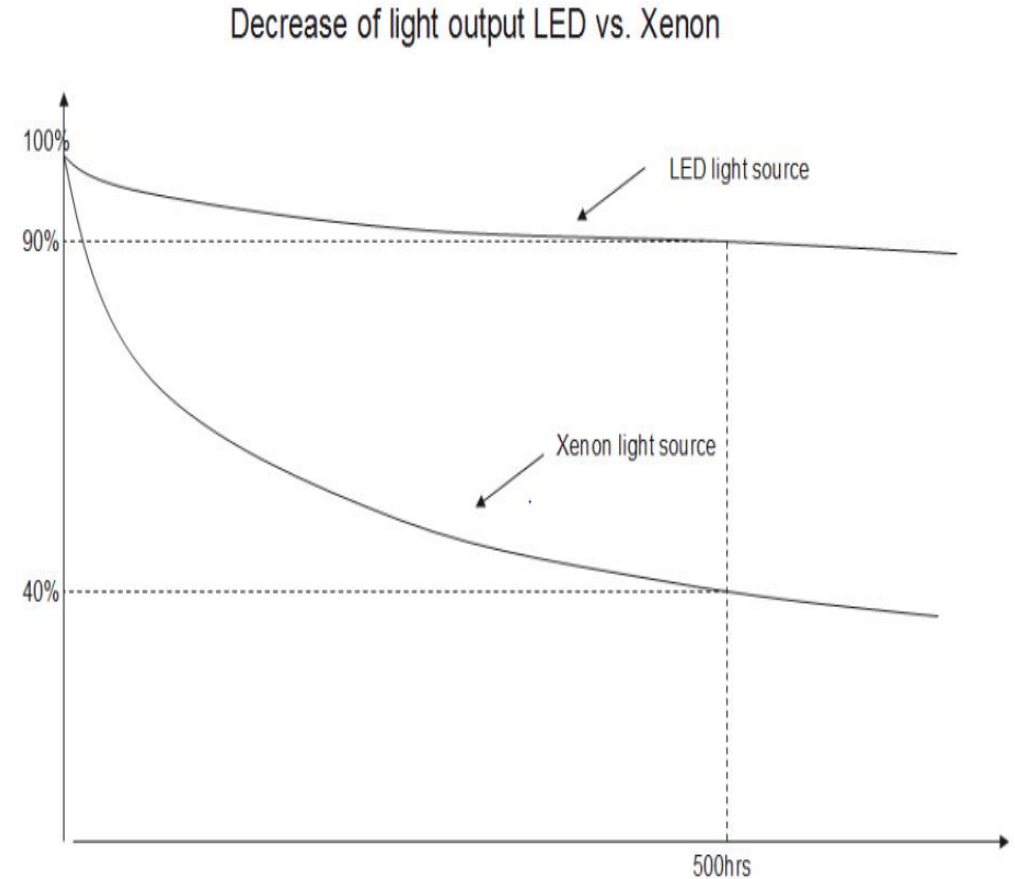


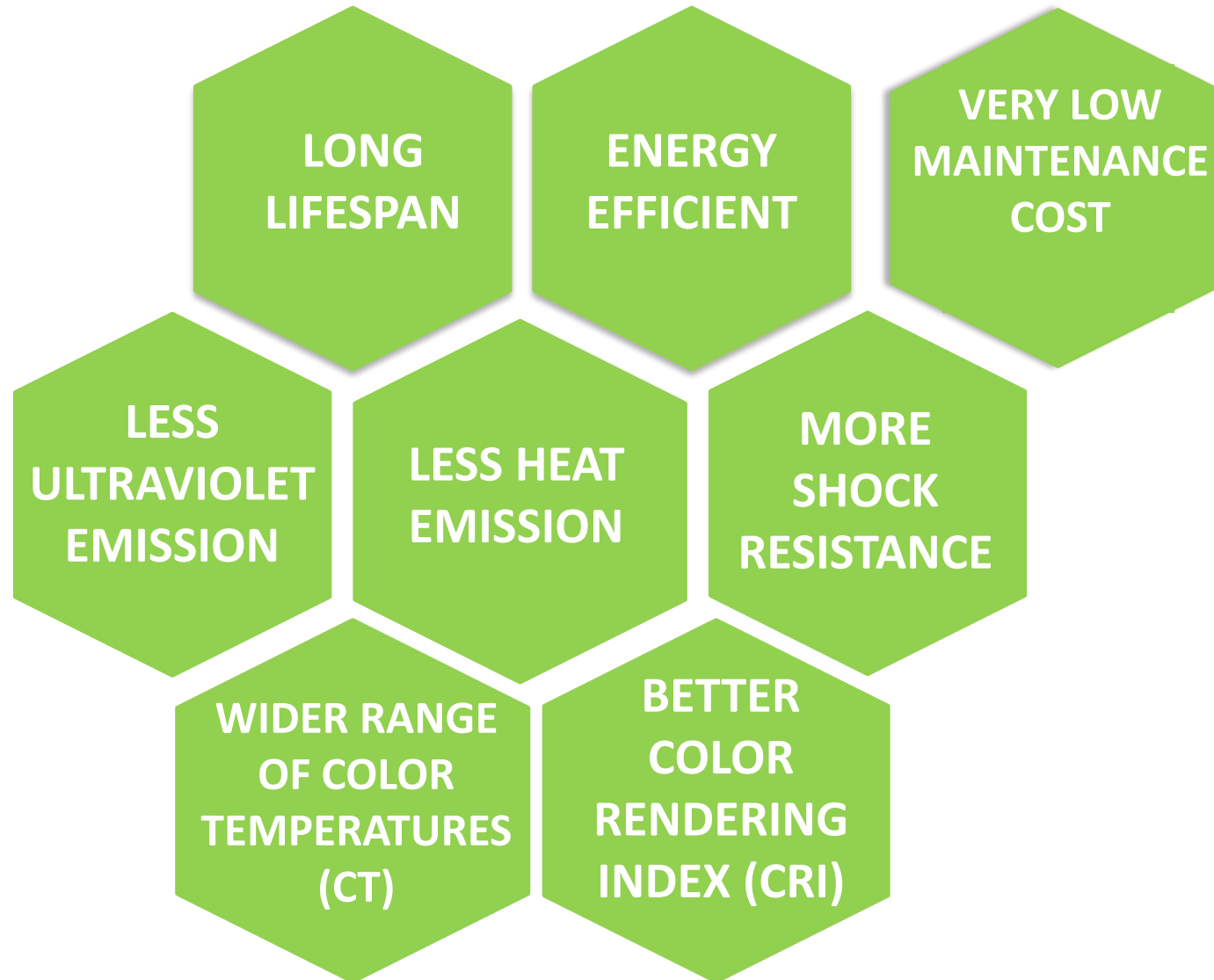
- **LED** lighting has relatively high initial costs and low lifetime costs.
- **XENON** is cheaper to purchase but it is relatively expensive to maintain.
- Xenon bulbs will likely need to be purchased several times in order to attain the equivalent lifespan of a single LED light.

Development of cost for LED and Xenon bulb exchange for 5 years/3000h



- **LED** lamp last longer than Xenon lamp
- **LED** light output ensures sustainability over activated time
- **XENON** lights need to be changed out before the end of their useful life because of degradation effects







SPECTRA LED 300



EPSILON LED 300

SPECTRA LED light source produces a light which surpasses almost all LED light sources and 300W xenon light sources, but it is less expensive than xenon.

The **SPECTRA LED** light source offers:

1. High color rendering index
2. Low noise level
3. Multi light guide adapter
4. Automatic light control
5. High performance - Durability



HIGH COLOR RENDERING INDEX (CRI)

- The extremely high CRI_{Ra} >90 compared to other light sources permits optimum color rendering of an endoscopic image
- The on-screen color reproduction is very natural, unlike models with lower CRI values (~ 70), whose color reproduction tends to be less saturated
- A lower CRI value cannot be compensated by camera algorithms such as the automatic white balance



LOW NOISE LEVEL



- Due to its sophisticated cooling design, the light source generates a noise level of just 25 dB, which is virtually inaudible.
- As the noise levels decrease in the OR, the stress levels decrease, which helps to ensure a more pleasant work environment.

MULTI LIGHT GUIDE ADAPTER



- Thanks to its included multi-light-guide adapter, the light source is compatible, without modification, with light guides of Storz, Wolf, and Olympus
- If a light guide is connected to the light source incorrectly, a message appears on the display, informing the user of this

MIS CONNECTIVITY

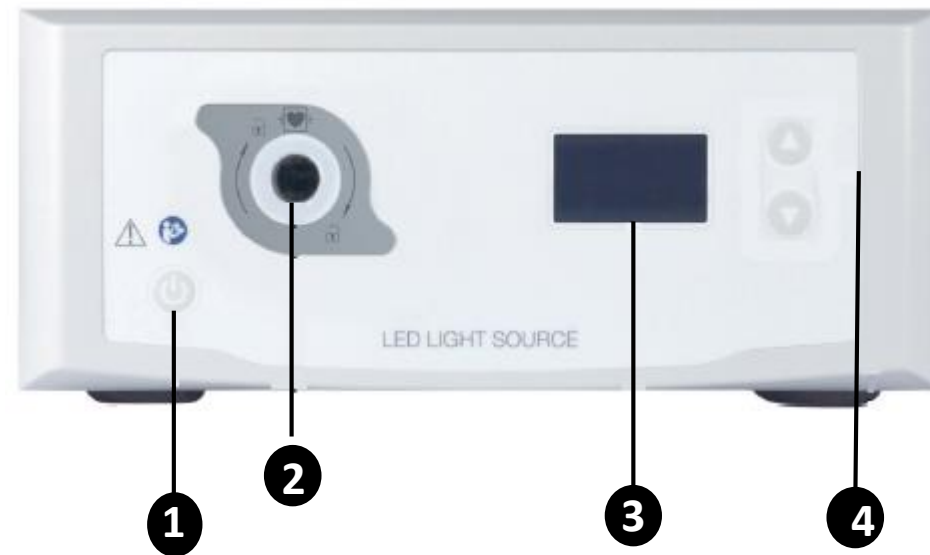
- MANUAL LIGHT CONTROL by CCH via MIS-Bus interface .
- The LED light source can be adjusted remotely by the user via the buttons on the camera head.
- PATENTED FULLY AUTOMATIC LIGHT CONTROL via the MIS bus interface with the **SPECTRA CAMERA**.



HIGH PERFORMANCE - DURABILITY

- Lifespan of the illuminant > 30.000 h
- Low power consumption
- LCD display showing luminance level and status information





1 ON/ standby button

2 Multi-light-guide adapter

3 Display

4 Light intensity adjustment



- 1 Fuse holder
- 2 Connection for power cord
- 3 Main power switch
- 4 Potential equalization terminal
- 5 MIS-Bus ports
- 6 Port for service (covered)

ILLUMINATION TYPE	HIGH POWER WHITE LED
Color rendering index	CRI > 90
Color temperature	5600 K
Luminous flux	1420 lm
Lifetime of illuminant	>30000 h
Dimension (W*H*D)	295*130*355 mm
Weight	8 kg
Power consumption	0.6A-1.6A

EPSILON LED light source produces a light which surpasses almost all LED light sources and 300W xenon light sources.

The **EPSILON LED** light source offers:

1. High color rendering index
2. Low noise level
3. Automatic light control
4. High performance - Durability



A HIGH COLOR RENDERING INDEX

The color rendering index is higher than 80

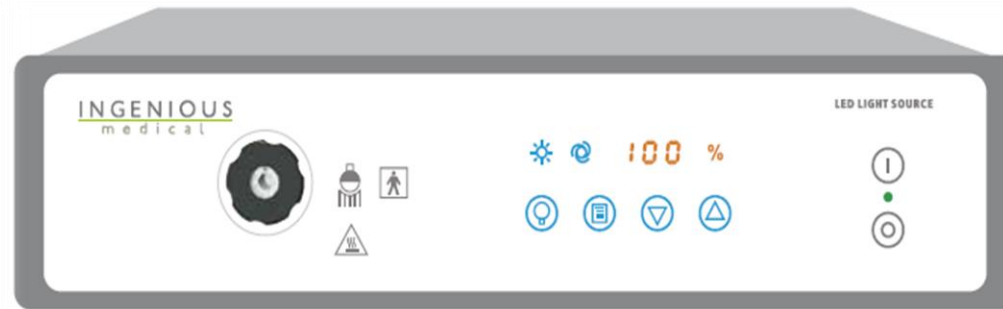
LIFESPAN OF THE ILLUMINANT

> 50.000 H

LOW NOISE LEVEL

Fan speed is controlled according to the temperature of the lamp module to minimize the fan airborne noise

HIGH PERFORMANCE DURABILITY

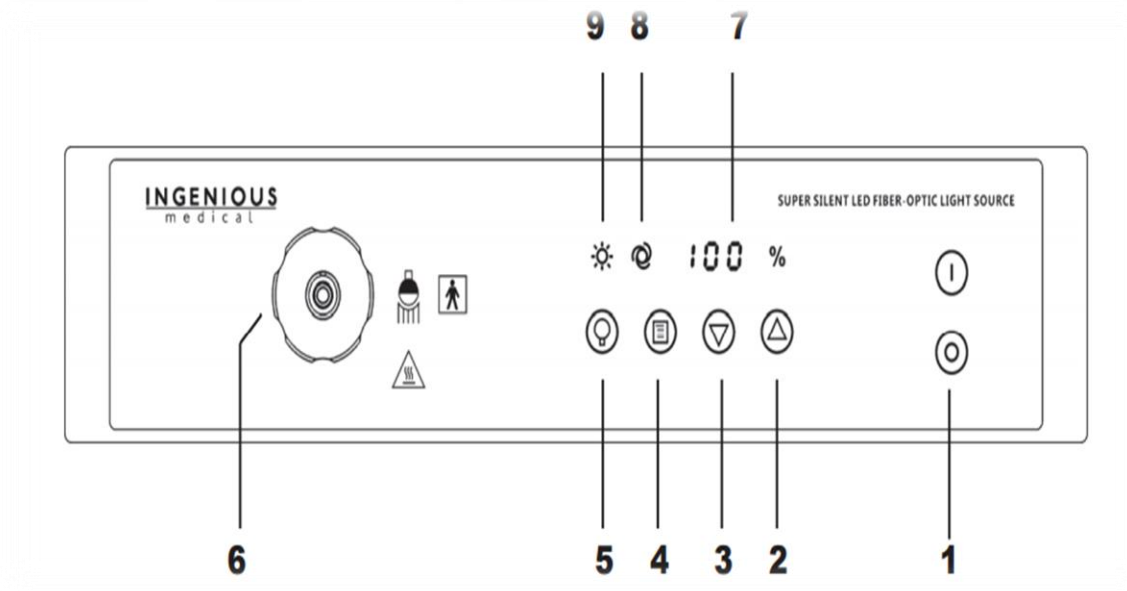


AUTOMATIC LIGHT CONTROL

Done by mean of a coaxial cable with a BNC plug connected to the video signal on the BNC connector.

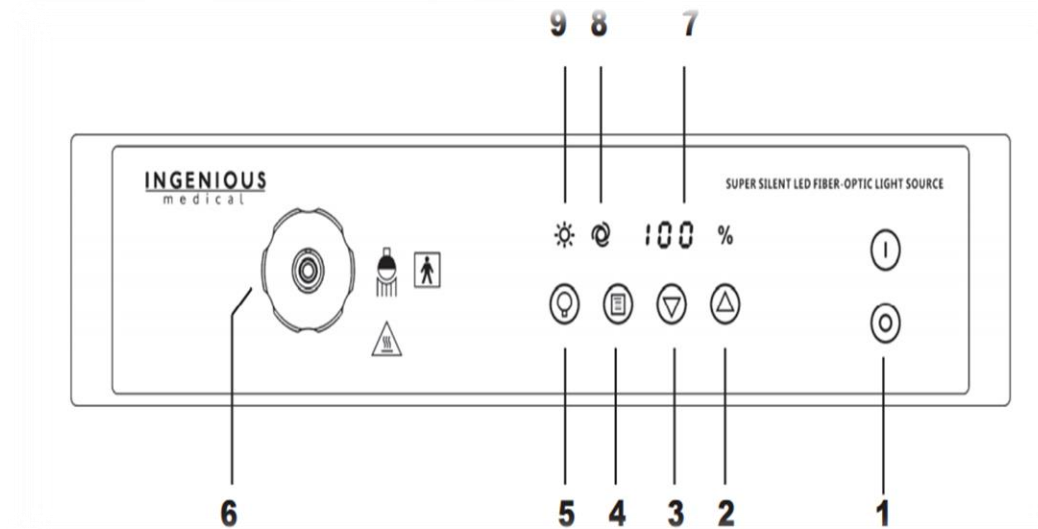
LOW POWER CONSUMPTION

≤ 0.6 A



- 1 Power ON/OFF switch “ I ” is on and “ O ” is off
- 2 Control button : Increase light level

- 3 Control button : Decrease light level
- 4 Control button : Automatic brightness control on or off



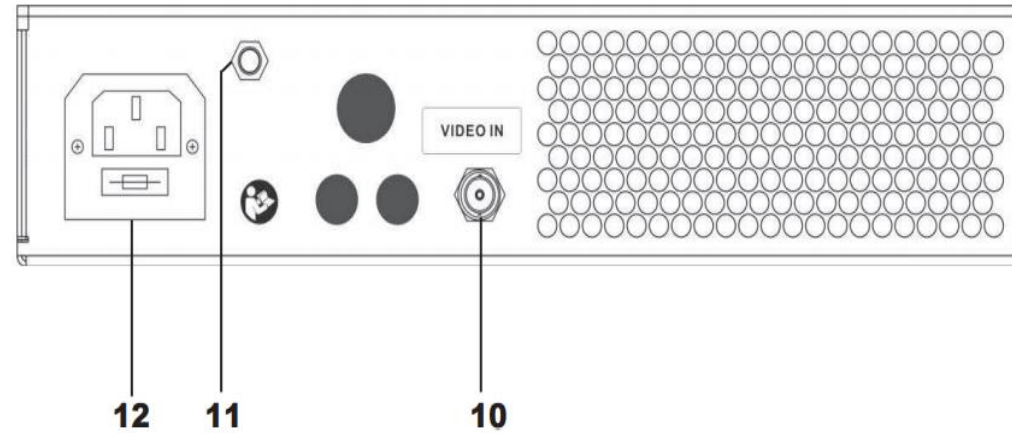
5 Control button : Lamp on or off

6 Light output with light cable interface connector

7 Digit displays for indicating the brightness in 10 % increments

8 Indicator : lit when the automatic brightness control is selected

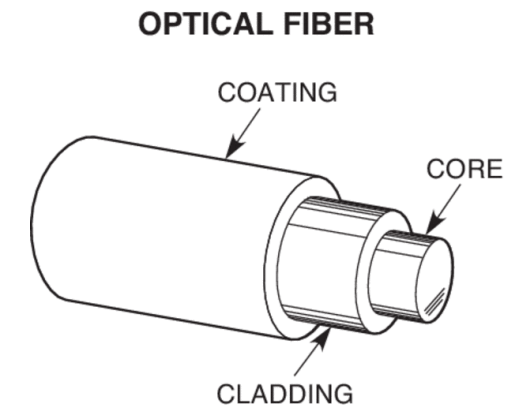
9 Indicator : lit when lamp is on

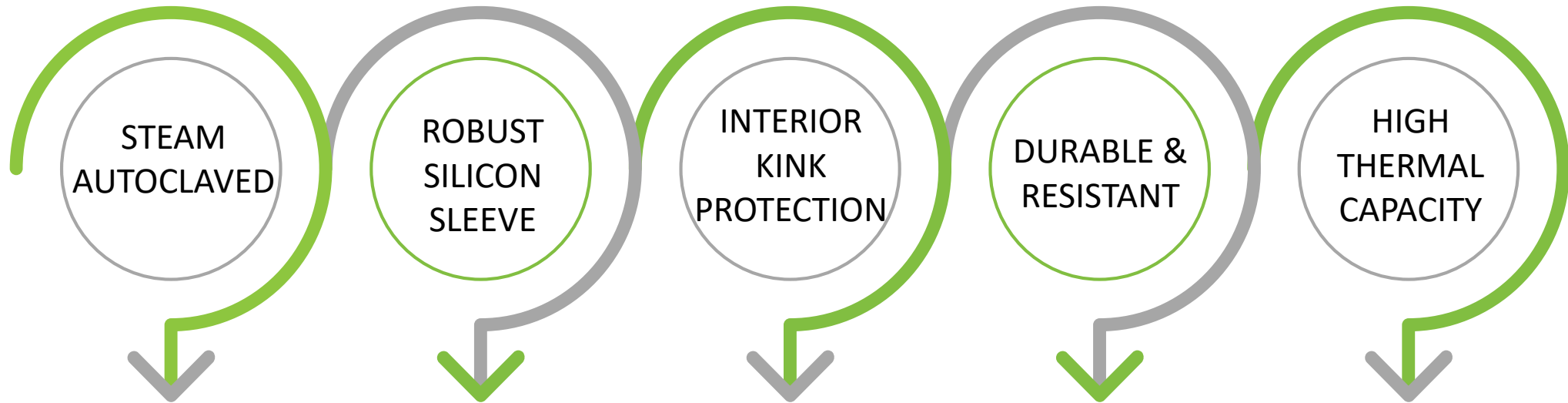


- 10** Video input
- 11** Potential equalization stud
- 12** Main power input connector (with double fuse holder)

ILLUMINATION TYPE	HIGH POWER WHITE LED
Color rendering index	CRI > 80
Color temperature	6000 K
Luminous flux	1420 lm
Lifetime of illuminant	>50000 h
Dimension (W*H*D)	325 × 74 × 365 mm
Weight	6.5 kg
Power consumption	0.7A-1.4A

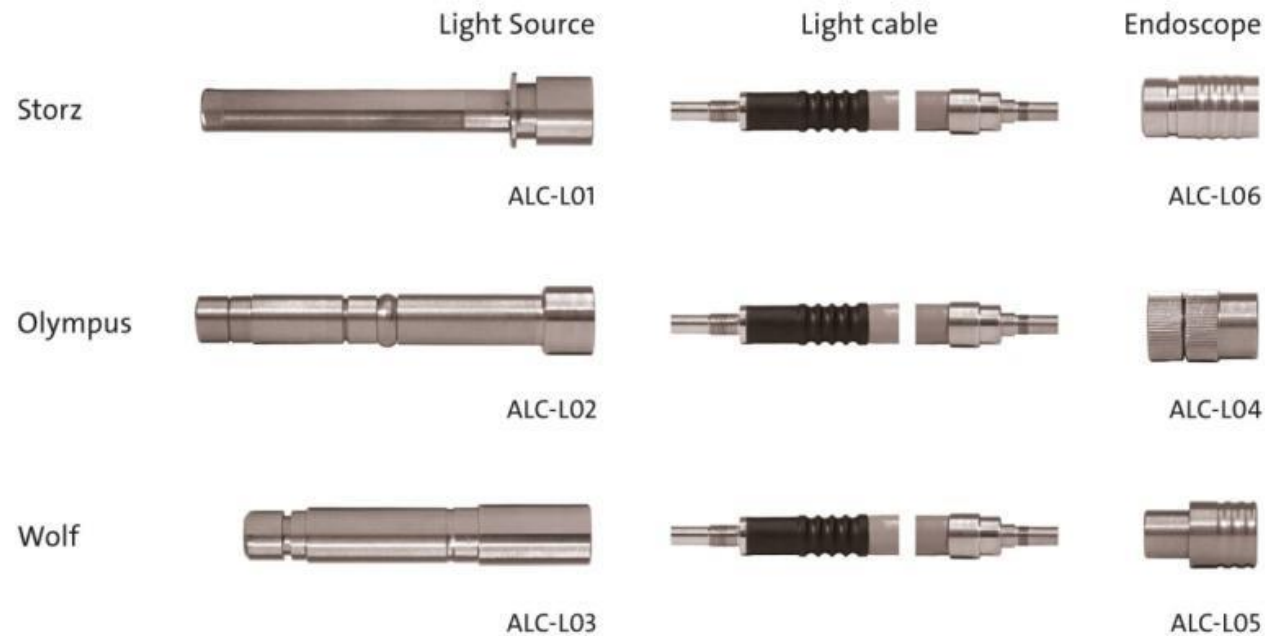
- Dedicated for light endoscopy devices
- Made from special fiber bundle
- Provide efficient transmission of light and the highest number of lumens reaching an endoscope.
- Flexible connectors making it easy to connect a light source and an endoscope





They are specially suited to be used with light sources that generate high temperatures, such as xenon light source

- Multi light guide adapter compatible to Storz, Wolf and Olympus light guides
- Multi telescope adapter **compatible with ...**

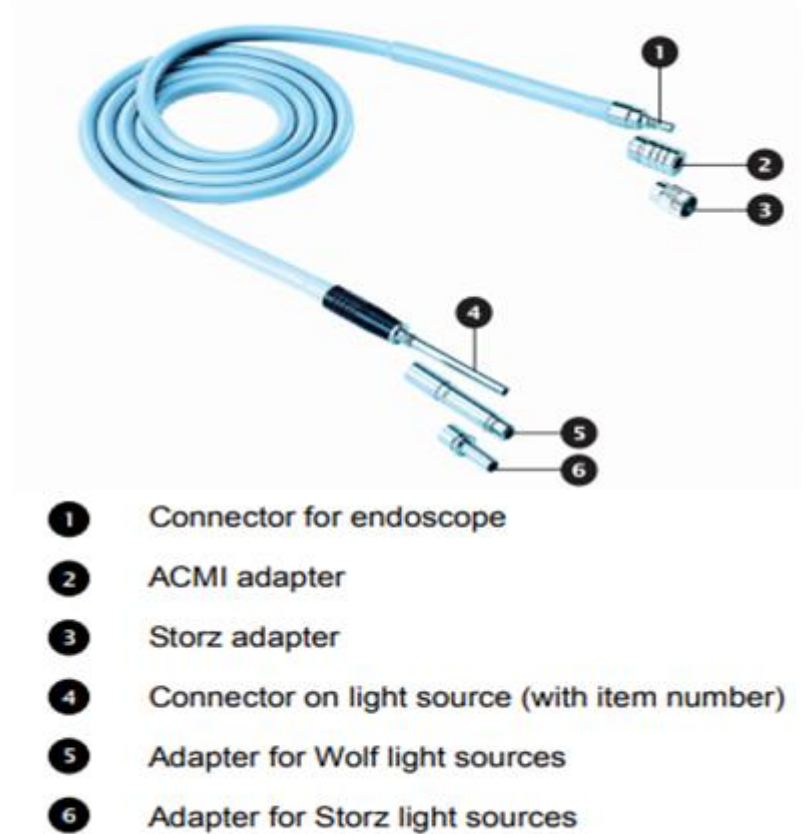


ADAPTERS FOR
LIGHT SOURCE

LIGHT GUIDE

ADAPTERS FOR
TELESCOPE

- The use of different adapters allows the light guides to be used with light sources and endoscopes manufactured by all standard manufacturers.
- Ensures flexibility in combining telescopes to several light sources
- Perfect combination to offer the client a hybrid solution

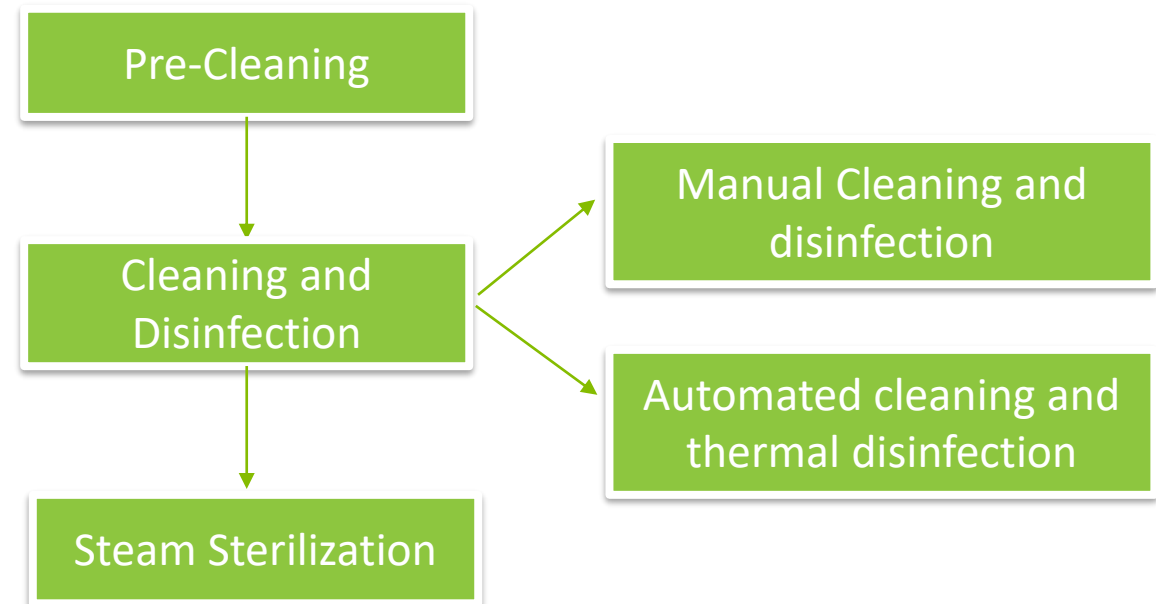




Length	180 cm / 230 cm / 300 cm
Active diameter	3.5 mm / 4.8 mm
Smallest bending radius	5 cm

The reprocessing procedure consists of the following steps:

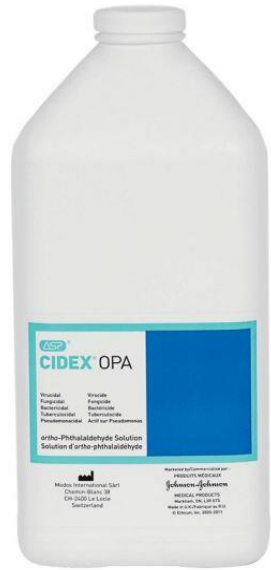
1. Pre-cleaning immediately after use
2. Cleaning and disinfection (manual or automated)
3. Steam / Cold Sterilization



Proceed as follows:

1. Disassemble the adapters used if applicable on both sides
2. Remove visible surgical residue as completely as possible using a moist, lint-free wipe
3. Dry the device using a soft, lint-free wipe
4. Place the device into a container for dry removal and seal
5. Arrange for reprocessing, ensuring that the device is reprocessed within 6 hours

❖ **Complete the pre-cleaning process immediately after use.**



MANUAL CLEANING

Cidex® OPA
(Johnson & Johnson)



MANUAL DISINFECTION

Cidezyme®/Enzol®
(Johnson & Johnson)

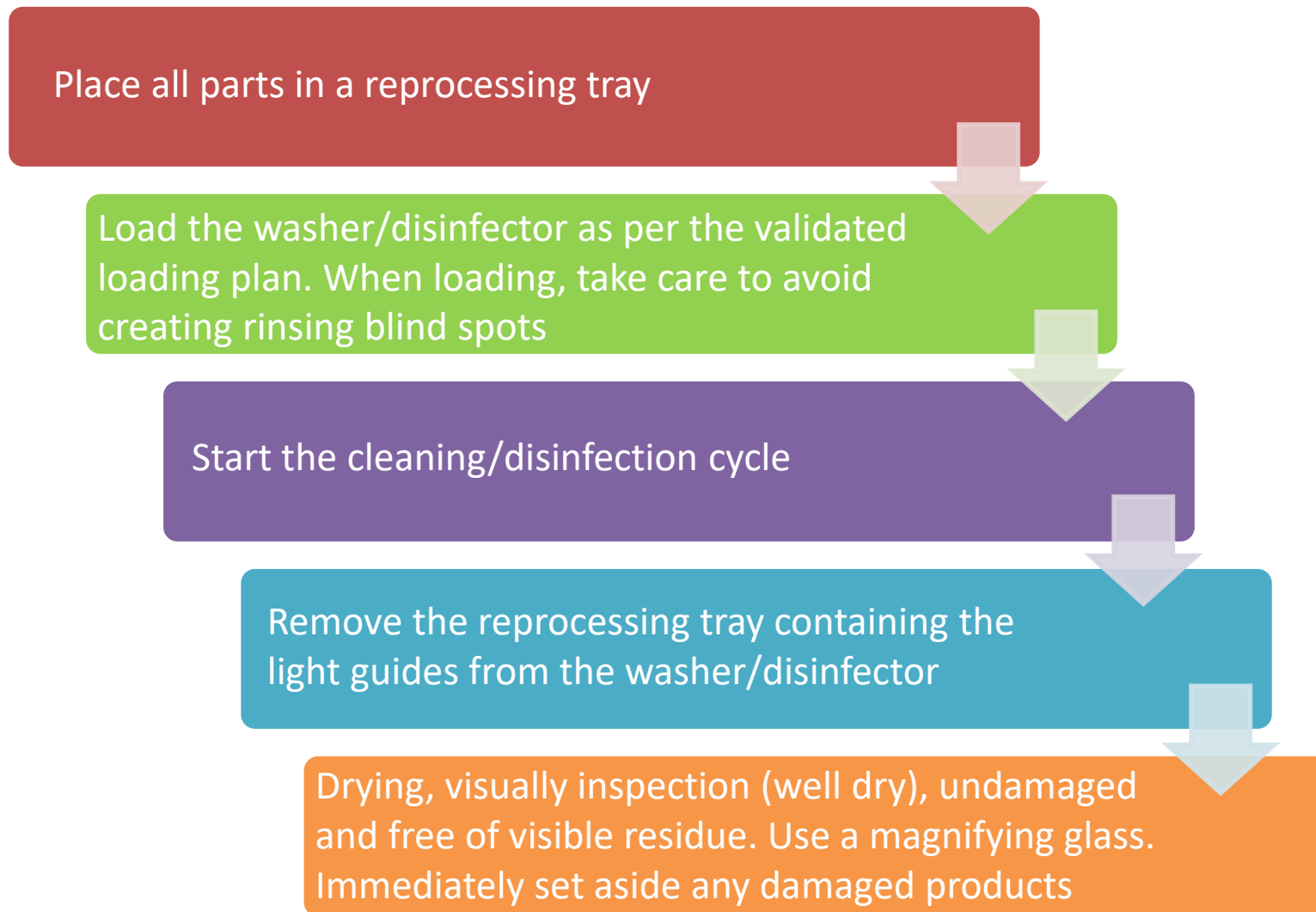


PRODUCTS FOR AUTOMATED CLEANING:

Neodisher® MediClean forte 0.5 %
Neodisher® MediZym

STAGE	WORK STEP	TEMP (°C/°F)	TIME	WATER QUALITY	CLEANING/DISINFECTANT SOLUTION
I	Cleaning	35-45/95-113	5	Drinking water	Cidezyme/Enzol (Johnson & Johnson) concentration 0.8%
II	Rinse	< 45/113	3x ≥1	Drinking water	---
III	Disinfection	20-25/68-77	12	---	Disinfectant solution (undiluted)
IV	Final Rinse	Room Temperature (cold)	3 x 1	Deionized water	---
V	Dry	Room Temperature	---	---	---

STAGE	WORK STEP	TEMPERATURE (°C/°F)	TIME (MIN)	WATER QUALITY	CLEANING/DISINFECTANT SOLUTION
I	Prerinsing	<25/77	2	Drinking water	---
II	Cleaning	55/131	10	Drinking water	Alkaline detergent, e.g. 0.5 % neodisher MediClean forte (5 ml/L), ph > 10
III	Rinse 1	>10/50	1	Drinking water	---
IV	Rinse 2	>10/50	1	Deionized water	---
V	Thermal disinfection	>90/194	5	Deionized water	A0 value>3000
VI	Drying				



Make sure that manual or automated cleaning and disinfection is complete

Place all parts in a reprocessing tray

Double-wrap the tray with two single layers of legally marketed sterilization wrap

Load the sterilizer as per the validated loading plan

Start the sterilization cycle in accordance with the manufacturer's instructions and instructions for use for the sterilizer


Use the following validated parameters for the sterilization process:

Temperature 134 °C (273.2 °F)
Holding time 5 min (effective sterilization time)


HIGH COLOR INDEX
92 – 95 / REAL COLOR DETECTION




AUTOMATIC LIGHT CONTROL
VIA MIS BUS

 **AUTO**


LOW POWER CONSUMPTION
0.6 – 1.6 A



LOW NOISE LEVEL
25 DB WHICH IS VIRTUALLY
INAUDIBLE



LONG LAMP LIFE
LIFE TIME > 30,000 HRS




SMART CONTROL VIA CHU
INTEGRATION WITH SPECTRA CHU



MULTI CONNECTIVITY
COMPATIBLE WITH ALL LIGHT GUIDES



PERFECT COLOR TEMPERATURE
5,600 KELVIN



CONNECTIVITY DISPLAY
ALERTS FOR NON CONNECTED
LIGHT GUIDES





INGENIOUS

THANK YOU

INGENIOUS