MICRO-EPSILON

Instruction Manual

Top-Line Video Endoscope

Video endoscope for machines, plants and cavities

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Certified acc. to DIN EN ISO 9001: 2008

Contents

1. Safety

Knowledge of the operating instructions is a prerequisite for equipment operation.

1.1 Symbols Used

The following symbols are used in this instruction manual:

⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a situation which, if not avoided, may lead to property damage.
➡	Indicates a user action.
i	Indicates a user tip.

1.2 Warnings

⚠ WARNING

The flexible probe is electrically conductive. Do not allow contact with electrically live objects.
> Death by electric shock

> Danger of injury

⚠ CAUTION

Do not look directly into the end of the flexible probe.
> Danger of injury, eye injury from bright light

NOTICE

Do not forcibly twist or elongate the flexible probe or bend it beyond its normal bend radius.
> Damage or destruction of the video endoscope

Avoid a heavy shock on the flexible probe.
> Damage or destruction of the video endoscope, break of the glass window or the video sensor at the probe tip

Keep the device away from acid or alkaline solutions, oil or gasoline, and do not use it in an atmosphere containing volatile / flammable vapors.
> Damage or destruction of the video endoscope

1.3 Notes on CE Identification

The following applies to Top-Line Video Endoscope:
- EU directive 2004/108/EC
- EU directive 2011/65/EC, “ROHS“, category 9

Products which carry the CE mark satisfy the requirements of the EMC regulation 2004/108/EC ‘Electromagnetic Compatibility’ and the European standards (EN) listed therein. The EC declaration of conformity is kept available according to EC regulation, article 10 by the authorities responsible at

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The systems satisfy the requirements if they comply with the regulations described in the instruction manual for installation and operation.

1.4 Proper Use

The Top-Line Video Endoscope is used for observation and examination of the inner life of machines, plants and cavities.
- The video endoscope is not suitable for medical use.
- The system may only be operated within the technical data, see Chap. 2.2.
- Use the Video endoscope in such a way that in case of malfunctions or failure personnel or machinery are not endangered.
- Take additional precautions for safety and damage prevention for safety-related applications.

1.5 Proper Environment

- Protection class: IP 53
- Operating temperature: -10 °C up to +60 °C (+14 up to +140 °F)
- Storage temperature:
  - Controller: -25 °C up to +45° C (-13 up to +113 °F)
  - Endoscope probe: -25 °C up tp +80 °C (-13 up to +176 °F)
- Humidity: At 40 °C (+104 °F) up to 95 % (no condensation)
- Ambient pressure: Up to 2 bar
- Fluid resistance: The endoscope probe can be immersed for a short time in following solutions: Water, salt solution (5 %), kerosene, gasoline, diesel, 70 % alcohol

2. Functional Principle, Technical Data

2.1 Short Description

The Top-Line Video Endoscope consists of a flexible probe with a built-in CMOS image sensor. The flexible probe is attached to the handle, where the probe tip is operated via bowden cables. The portable video display is on the handle.

The portable video display of the Top-line Video Endoscope is designed for high usability and simple operation.

2.2 Technical Data

Type	**Top-Line Video Endoscope**	
Outer diameter	4 mm	6 mm
Length	1.5 m / 3 m	1.5 m / 3 m / 6 m
Direction of view	0 °	
Field of view	70 °	
Focal range	15 mm - ∞	
Flexible probe tip	2 times 150° up/down; 4 times 150° up/down; right/left	4 times 150° up/down; right/left
Length of probe tip	14 mm	18,3 mm
Min. bending radius	32 mm	45 mm
Image sensor	CMOS	
Illumination	Mobile adjustable LED light source, Li-Ion battery, approx. 2.5 hours operating time	
Display	5" TFT/LCD display with rubber coat for shock absorption	
Interface	USB 1.1 / AV output	
Image storage	SD card (inclusive)	
Image resolution	300.000 pixels	
Image format	JPEG (640x480)	
Video format	ASF (640x480) playback with Windows Media Player	

Type	Top-Line Video Endoscope	
Firmware	Text generator; digital zoom: 2 times; image rotation; mirroring; possibility for connection to external monitor; date/time; language selection; automatic power-off	
Power supply	5 VDC (power supply included)	
Operating temperature	-25 °C to +80 °C (-13 °F up to +176 °F) in water +10 °C to +30 °C (50 °F up to 86 °F)	
Storage temperature	-30 °C to +60 °C (-22 °F up to 140 °F)	
Pressure resistance in air	up to 1 bar	
Humidity	5 - 95 % relative humidity	
Fluid resistance of the probe	Saline 5 % and most oils (excluding hydraulic fluid)	
Resistance to water	Probe IP 54 Handle/ Monitor IP 53	
Weight	Effective length 1.5 m = 0.9 kg Effective length 3.0 m = 1.0 kg	Effective length 1.5 m = 0.9 kg Effective length 3.0 m = 1.0 kg Effective length 6.0 m = 1.3 kg
Protective sheating	Protective tube from braided stainless steel with additional special plastic tube	

2.3 Endoscope Types

Outer diameter mm	Length mm	Articulation	Order no.
4	1500	2-times	20751776
4	1500	4-times	20752111
4	3000	4-times	20752112
6	1500	4-times	20751756
6	3000	4-times	20751757
6	6000	4-times	20751768

Video endoscope with 4 mm/6 mm diameter optional with 90° prism head, see Chap. A 1.

3. Delivery

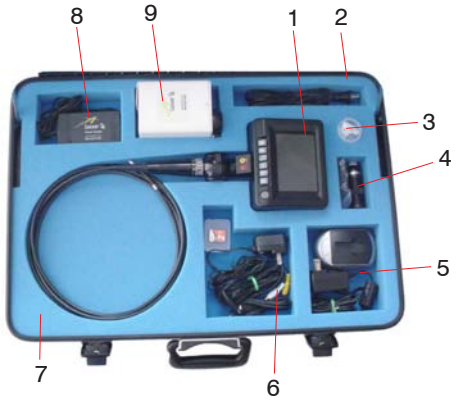
3.1 Unpacking

1 Top-Line Video Endoscope (1)
1 Top-Line LED light source and 2 batteries (4)
1 LED light source charger (5)
1 Endoscope charger with Li-Ion battery (6)
1 Battery for video display (6)
1 USB and video output cable (6)
1 2 GB SD memory card (6)
1 Aluminum protective case (7)
1 Instruction manual

3.2 Storage

- Storage temperature:
  - Controller:
    -25 °C up to +45° C (-13 up to +113 °F)
  - Endoscope probe:
    -25 °C up to +80 °C (-13 up to +176 °F)
- Humidity:
  40 °C up to 95 % (no condensation)

The Top-Line Video Endoscope is supplied in a metal case. The case has space for another ELTROTEC Endolight FOT Xenon 24 light source, see Chap. A 1



Optional accessories:

Eltrotec Endolight FOT Xenon ® 24 power supply (8)

Eltrotec Endolight FOT Xenon ® 24 light source (9)

Eltrotec Endolight FOT Xenon ® 24 power supply cable (2)

Prism head (3)

Further accessories are available, see Chap. A 1

Check for completeness and shipping damages immediately after unpacking.

In case of damage or missing parts, please contact the manufacturer or supplier.

Fig. 1 Aluminum protective case with contents

4. Description

The Top-Line Video Endoscope provides new views into the inner life of machines, plants and cavities without being dismounted before.

Due to the flexible guide, the articulation and the excellent optics breaking points and problem areas are very easy and early to identify and preventive tasks can be taken selectively.

The illumination is effected by means of a battery-operated controlled LED light source with high light intensity.

4.1 Setup of the Video Endoscope

Fig. 2 Setup of the video endoscope

Fig. 3 Control elements above the handle

4.2 Flexible Probe

All types have a stainless steel protective tube to avoid accidental crushing and they also have a coating to prevent damage while sliding over harsh surfaces.

⚠ WARNING

The flexible probe is electrically conductive. Do not allow contact with electrically living objects.
> Death by electric shock

> Danger of injury

⚠ CAUTION

Do not look directly into the end of the flexible probe.
> Danger of injury, eye injury from bright light

4.3 Probe Tip

There is a bending section in the probe tip. This is the most flexible and vulnerable part of the video endoscope. This probe must be handled more carefully than the flexible probe.

NOTICE

Do not squeeze or clamp the probe tip.
> Damage or destruction of the probe tip

4.4 Control Lever

Maximum bending of the probe tip will be possible when the flexible probe is fully extended.

Do not try to force the probe tip to bend with the flexible probe coiled for storage.
> Damage or destruction of the probe tip

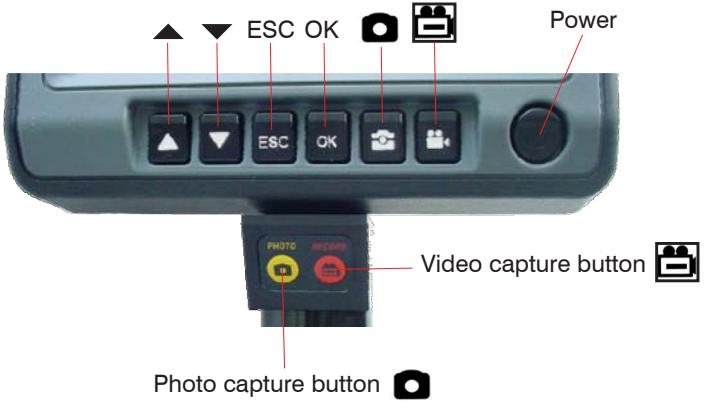
4.5 Locking

When engaged, the locking will prevent the probe tip from bending.

NOTICE

Do not attempt to withdraw the flexible probe from a cavity as long as the locking is activated.
> Damage or destruction of the articulation mechanism

4.6 Control Elements

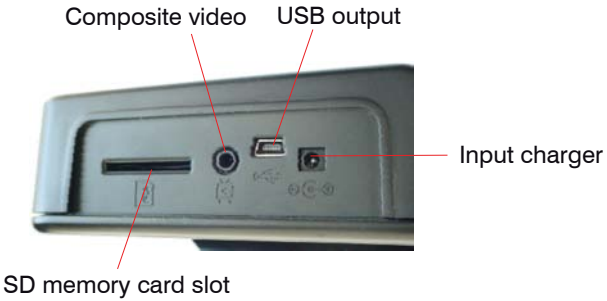


The control elements are described below, see Chap. 4.7.

4.7 Operating Menu

Button	Normal mode	Image Review mode	Menu mode
▲	Switches to Image Review mode and scrolls reverse through still images and videos.	Scrolls to previous still image or video.	Scrolls up through selections.
▼	Switches to Image Review mode and scrolls forward through still images and videos.	Scrolls to next still image or video.	Scrolls down through selections.
OK/	Enters main menu.	Deletes current image or video.	Confirms selection.
ESC	Displays battery charge level.	Returns to Normal mode and displays CAMERA and battery charge level.	Returns to Normal mode and displays CAMERA and battery charge level.
	Captures a still image (jpeg). While recording a video clip, pressing this button will stop the recording process (PHOTO button is duplicate of this).	The current video clip is played/ paused/ continued.	Returns to Normal mode.
	With this button, the video recording is started/ stopped (REC button has the same function)	Returns to Normal mode and displays CAMERA and battery charge level.	Returns to Normal mode.

4.8 Inputs /Outputs



The video display shows live video and captured images or videos. The device can output live video to an external display.

Stored images can be downloaded to a computer via the USB port and included USB cable (Mini USB 1.1 connector) or through the removable SD memory card.

5. Assembly

5.1 Screwing the 90 ° Prism Head

➡ Unscrew the threaded protective cap.

Shim ring

NOTICE

Tighten by hand only!
> Damage of the device

➡ Screw the knurled part of the prism head, but only on the first set of threads on the probe tip.

➡ Rotate the prism head tip until the inner level of the shim ring engages.

➡ Then continue threading the prism head, until there is no side play on the prism head. Stop threading at that point.

NOTICE

Always let the threaded protective cap or the adapter for protecting the thread of the probe tip.
> Damage of the device

No side play

A small gap will be present when the prism tip is fully tightened in place.

5.2 Mounting the Light Source

Installing the charged battery into the LED light source:

➡ Install batteries by rotating battery cover dial to position shown, and pulling cover off, see Fig. 4.

Fig. 4 View on light source from above before battery change

➡ Remove the cap of the light source.

➡ Insert batteries in the correct orientation according to the battery polarity labels on outside and inside of light source.

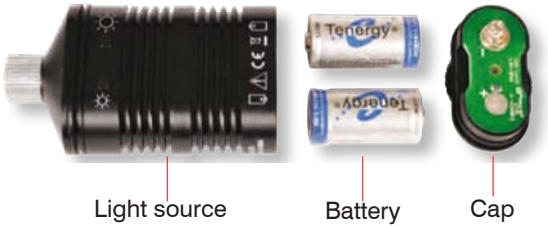


Fig. 5 Opened light source

➡ Replace the cap of the LED light source again.

Fig. 6 View on light source from above after battery change

Cover will only fit when oriented correctly.

- Rotate cover dial until index marks are aligned as shown, see Fig. 6, to lock the cover in place.
- Check the operation of the light source.
- Press the red power button to turn the light source on, see Fig. 7.
- Press again to turn the light source off, see Fig. 7.
- Press and hold one or the other of the intensity buttons to brighten or dim the light, see Fig. 8.

Fig. 7 Turn on/off the light source

Fig. 8 Brighten or dim the light

- Align the light source with the light source connection on the control handle and thread them together with the knurled ring, see Fig. 9.
- Tighten with fingers only.

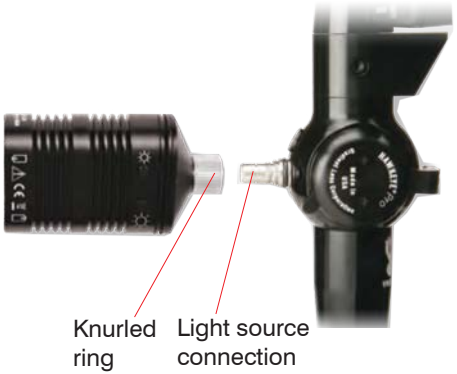


Fig. 9 Connect light source

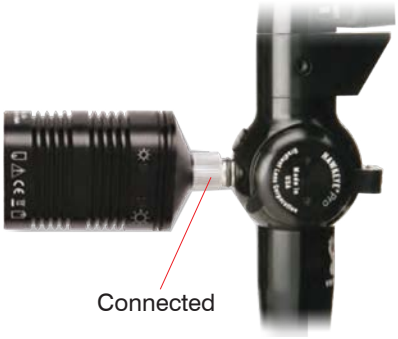


Fig. 10 Light source connected

6. Operation

6.1 Switching On

Turn the video display power on by pressing and holding the power button for 3-5 seconds.

Fig. 11 Switching on

The system will start up and go into normal mode, displaying a live image from the CMOS sensor.

6.2 Switching Off

Turn the video display power off by pressing and holding the power button for 1 - 2 seconds.

6.3 Holding the Video Endoscope

- Hold the handle in one hand in a way that is comfortable and allows you to both look at the LCD display and apply the control lever.
- Use the other hand to hold the flexible probe and guide it toward the inspection area.

6.4 Controlling the Probe Tip

A control lever controls the right/left movements and the other control lever the up/down movements at the 4-way configuration.

NOTICE

Do not angle the flexible probe or the probe tip with violence.
> Damage of the flexible probe and/or the probe tip

➡ Enable the locking if necessary, to hold the probe tip in the position as soon as the video-endoscope is in the viewing position.

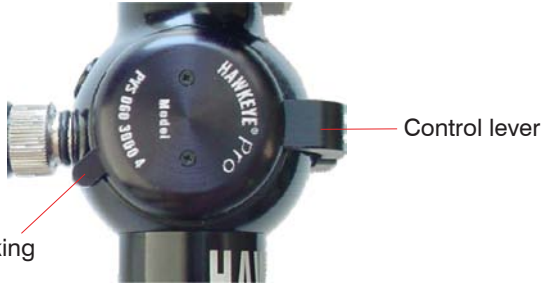


Fig. 12 Controlling the probe tip by control lever

6.5 Inserting the Video Endoscope

NOTICE

Before inserting the flexible probe into the cavity to be examined, ensure that the probe tip is straight and the locking is not engaged.
> Damage of the articulation mechanism

i Make sure that the probe tip can be moved freely with the control levers.

The more flexible probe is bent or coiled, the less the probe tip can be moved. Maximum articulation is possible when the flexible probe is relatively straight.

When the locking is not engaged, their control lever is loose and will move freely. Lock the control lever by pushing the lever to the resistance.

➡ Turn the light source on to maximum brightness.

➡ With the probe tip in the straight-ahead position, slowly begin to insert the video endoscope into the cavity to be examined.

Fig. 13 Inserting the flexible probe into the cavity

➡ Watch the image on the video display to see where the video endoscope is pointed and guide the probe tip in the inspection area.

If a bend must be negotiated, articulate the probe tip in the direction of the bend to keep the probe tip from bending. If the video endoscope is obstructed by objects or bending, rotate the flexible probe back and forth while moving it forward.

The rotations help to overcome disablements on the edges of the devices.

➡ Continue guiding the video endoscope forward until the target area is visible on the display.

6.6 Pulling out the Video Endoscope

When the inspection is completed or the video endoscope needs to be positioned, please note the following:

NOTICE

Do not angle the probe tip and solve the locking before you pull of the flexible probe.
> Damage of the articulation mechanism

- Move the control lever back and forth to ensure they are in a loose neutral position and the probe tip can be bent during the extraction as required.
- Pull out the video endoscope slowly and catch the probe tip when it exits to avoid damage to the probe tip.

i Move the flexible probe back and forth, if the video endoscope snags on device edges.

6.7 Operating Modes

The following operating modes are available:

Normal mode

Displays live camera images and date/time if so enabled.
In this mode, still photo and videos can be captured.

Image review mode

Displays captured still photos and videos.

Menu mode

File maintenance, system setting, etc.

6.7.1 Sequence

The device powers up in normal mode.

From normal mode:

- Enter image review mode by pressing ▲ or ▼ .
- Enter menu mode by pressing OK.
- Return to normal mode from any other mode by pressing ESC.

6.7.2 Normal Mode

6.7.2.1 Capture Still Photos

- In normal mode, press the button on the handle (or on video display).

Still photos are saved as .jpg file.

6.7.2.2 Capture Video Clips

- In normal mode, press the button on the handle (or on video display), to start recording.

The runtime display indicates that the recording is in progress.

- Press the button again to stop recording and save the clip.

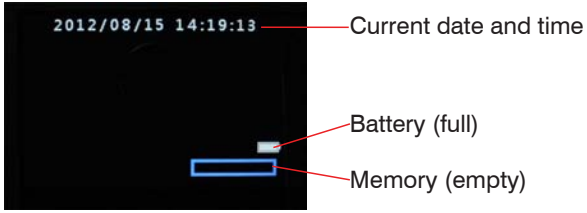
Pressing the button will capture and save still images during the video recording. Video files are saved as .ASF-file.

6.7.2.3 Memory & Battery Charge Display

In normal mode, press the ESC button, for calling both status displays.

Each is displayed as a bar. A fully charged battery is shown as a full bar.

A partial charge is shown as one to four segments inside the battery status display. The memory bar is filled in as the memory set up.



6.7.3 Image Review Mode

6.7.3.1 View of Captured Still Images or Video Clips

Stored images and videos are displayed in a grid, see Fig. 14. The selected image has a yellow outline around it.

Indicates a video clip.

Indicates a still image with added annotation.

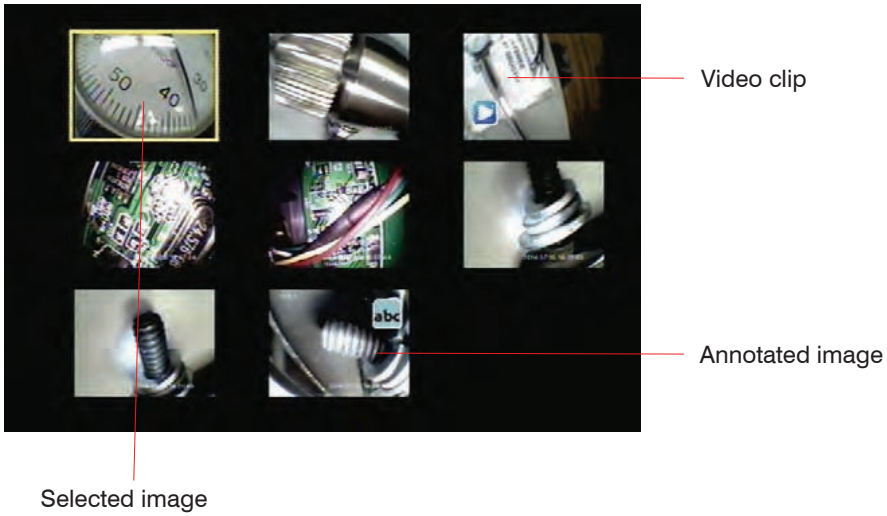


Fig. 14 Grid in image review mode

- Press the ▲ or ▼ buttons to change the selection.
- Upon reaching the last image on a page, another button press will display the next page, if any.
- To see a full-screen view of the selected image or video, press OK.

A full screen view of a still image will have this symbol:

A full screen video view of a video clip will have this symbol:

- Press the ▲ or ▼ buttons while viewing a full screen image to scroll to the next or previous image.

While in full screen view, a video clip in can be played, see Fig. 15, paused, see Fig. 16 and resumed by pressing the button. Pressing the button while a video is playing will capture and store the currently displayed frame from the video.

- To exit image review mode, press ESC.

Fig. 15 Video playing

Fig. 16 Video paused

6.7.3.2 Delete Single File

While in image review mode (either grid view or full screen view), the selected image or video clip can be deleted by pressing and holding OK for a few seconds.

A delete confirmation menu will appear as shown below, see Fig. 17, see Fig. 18.

Fig. 17 Grid view

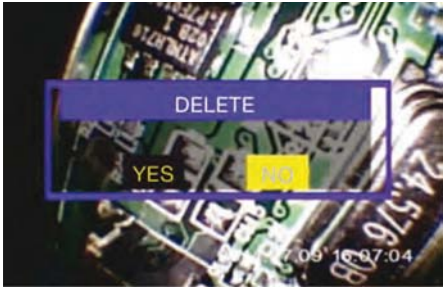


Fig. 18 Full screen view - NO

➡ Select YES with ▲ or ▼ and press the OK button, see Fig. 19.

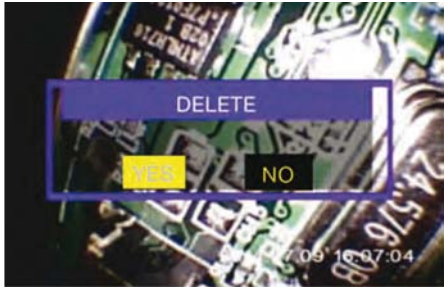


Fig. 19 Full screen view - YES

6.7.4 Menu Mode

6.7.4.1 Display Main Menu

➡ Press the OK button in normal mode to display the main menu.

➡ Use the ▲ and ▼ buttons to scroll through the menu and to reveal more functions.

➡ Select menu and submenu items using the ▲ and ▼ buttons to highlight the desired item and confirm with OK.

➡ Press the ESC button to exit a menu choice (exceptions will be noted).

6.7.4.2 Selection Main Menu

TEXT ANNOTATION	DATE/TIME
DIGITAL ZOOM	VIDEO FORMAT
ROTATION	LANGUAGE
MIRROR	DELETE ALL
VIDEO OUTPUT	AUTO POWER OFF

6.7.4.3 Text Annotation

A single line of text may be added to images as they are captured. The line is limited to about 30 - 50 characters in length, depending on the number of blank spaces in the text string.

➡ Select `TEXT ANNOTATION` from the main menu and confirm with `OK`.

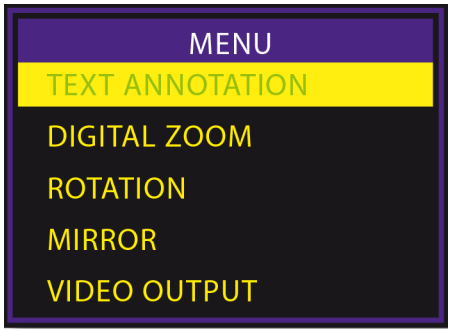


Fig. 20 Display `TEXT ANNOTATION`

The current default text is displayed `TEST` in this example, see Fig. 21.

➡ Select `EDIT TEXT` and press `OK` to edit the default text, see Fig. 21.

Fig. 21 Display `EDIT TEXT`

The text editing window will appear, with the current default text displayed, if any.

Fig. 22 Text editing window

The selected yellow key on the virtual keyboard is indicated by an orange outline.

The black function keys at the bottom of the virtual keyboard are activated by pressing by pressing the corresponding button on the real display, as indicated by the arrows in the adjacent photo, see Fig. 22 and as listed in the table, see Fig. 23:

Real keyboard		Virtual keyboard
▲	corresponds	▲
▼		▼
SPACE		ESC
ENTER		OK
◀		📷
▶		🖨

Fig. 23 Table to text editing window

- Use the ▲, ▼, ◀, ▶ virtual keys (◀, ▶, 📷, 🖨 real keys), to select the desired yellow key on the virtual keyboard.
- Then press ENTER (OK).
- Select ⟨X⟩ and confirm with OK to delete one character to the left of the cursor.
- Select ⟨X⟩ and confirm ESC to delete one character to the right of the cursor.

← moves the cursor one space to the left, → moves it one space to the right.

The abc key toggles between upper and lower case.

Pressing ESC will not exit this screen.

The SAVE key exits the keyboard screen and saves the edited default text.

The CANCEL key exits the screen without saving any edits.

Select TEXT COLOR and confirm with OK to change the color of the user-defined text.

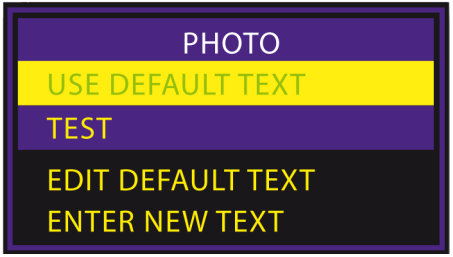
Select the desired text color from the list and confirm with OK:

Select ON/OFF to turn text annotation on or off:

➡ Choose ON or OFF and confirm with OK.

If DISPLAY has been set to ON, the PHOTO screen appears when the button is pressed to capture an image.

➡ Press OK to capture the image with the default text included on the image.

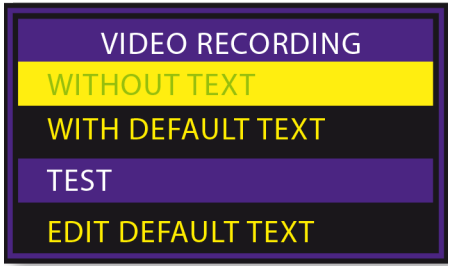


➡ Or, select EDIT DEFAULT TEXT or ENTER NEW TEXT to make the text editing screen appear and change the default text.

If DISPLAY has been set to ON, the VIDEO RECORDING screen appears when the button is pressed to capture a video clip.

With WITHOUT TEXT highlighted, press OK to begin capturing video with no annotation.

➡ Choose WITH DEFAULT TEXT to begin recording video with the default text included on the image.



Choose `EDIT DEFAULT TEXT` to display the text editing screen and edit the default text.

6.7.4.4 Digital Zoom

Select DIGITAL ZOOM, see Fig. 24 and confirm with OK.

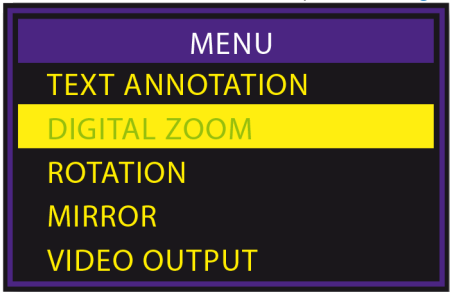


Fig. 24 View DIGITAL ZOOM

Use the ▲ and ▼ buttons to select the digital magnification of the live display image from 1.0 to 2.0 in increments of 0.1.

The selected magnification is shown on the display, see Fig. 25.

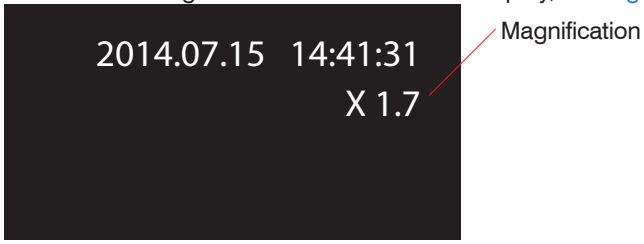


Fig. 25 View of magnification

6.7.4.5 Rotation

Rotate the live image by 180 degrees or returned it to normal by entering the `ROTATION` submenu, see Fig. 26, selecting the desired option (`NORMAL` or `180 DEGREE`), see Fig. 27 and pressing `OK`.

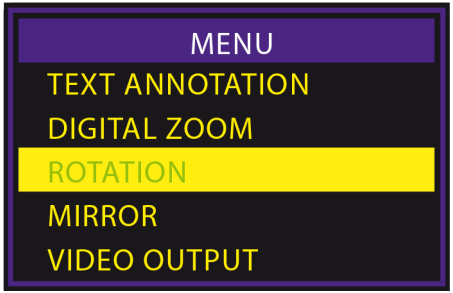


Fig. 26 View ROTATION

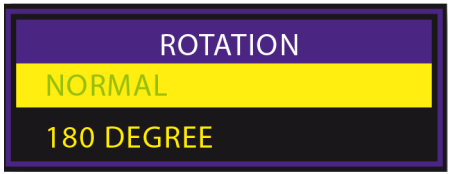


Fig. 27 View ROTATION - selection

6.7.4.6 Mirror

The image may be mirrored horizontally or vertically by opening the `MIRROR` submenu, see Fig. 28 and choosing from these options, see Fig. 29:

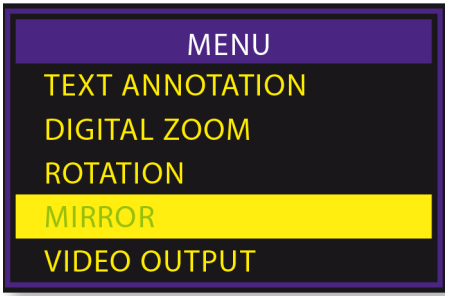


Fig. 28 View MIRROR

Fig. 29 View MIRROR - selection

i `FOLDING` gives the same result as rotating 180 degrees.

Fig. 30 Overview Mirror - options

6.7.4.7 Video Output

The VIDEO OUTPUT function, see Fig. 31, transfers the video signal to the composite input of an auxiliary display using the supplied cable. The unit will automatically revert to the built in display when the cable is disconnected. This function will allow you to toggle between displays if both are connected.

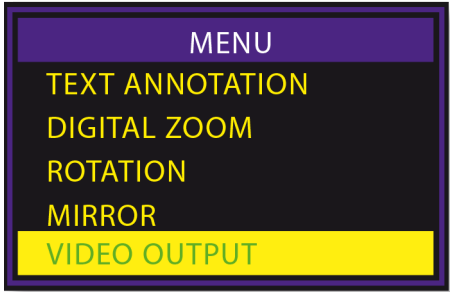


Fig. 31 View VIDEO OUTPUT

➡ Simply press OK, while this function is selected to toggle between displays.

6.7.4.8 Date/Time

Selecting the DATE/TIME menu item, see Fig. 32 and pressing OK brings up this submenu, see Fig. 33:

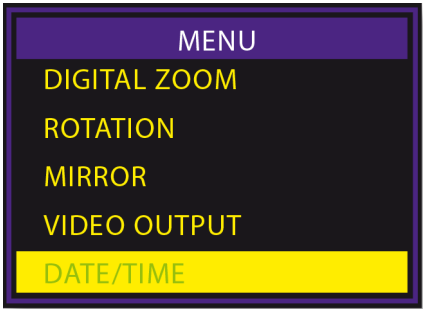


Fig. 32 View DATE/TIME

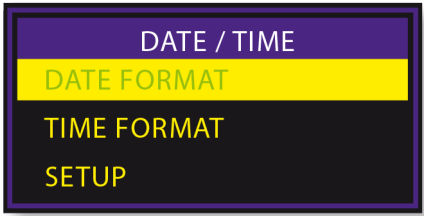


Fig. 33 VIEW DATE FORMAT

Selecting DATE FORMAT lets you choose the desired date display format from a list, see Fig. 34:

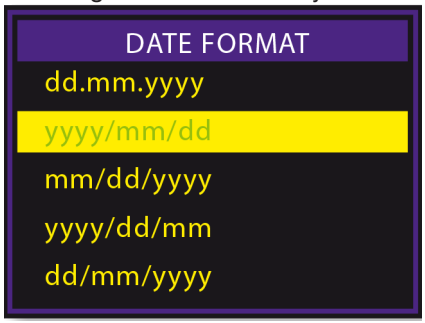


Fig. 34 View DATE FORMAT - selection

In TIME FORMAT submenu you can choose between the 12 or 24 hour format, ie. 24-HOUR CLOCK or 12-HOUR CLOCK (AM/PM), see Fig. 35.

Fig. 35 VIEW TIME FORMAT - selection

Fig. 36 View DATE/TIME - SETUP

Selecting SETUP from the DATE/TIME submenu, see Fig. 36 brings up this window, where the date and time can be set, and the date/time display turned on or off, see Fig. 37:

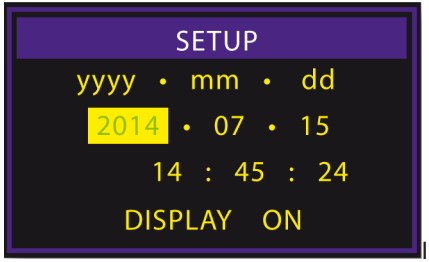


Fig. 37 View SETUP - selection

In this window, the selected field may be incremented or decremented with the ▲ and ▼ buttons.

The OK button will step to the next field until the ON/OFF field is selected.

The next press of the OK button will then return the display to Normal Mode. If DISPLAY indicates ON status, the date and time will be displayed on the screen in Normal Mode. Captured images and videos will always include a time/date stamp.

6.7.4.9 Instant Picture Review

INSTANT PICTURE REVIEW will automatically display an image after it is captured.

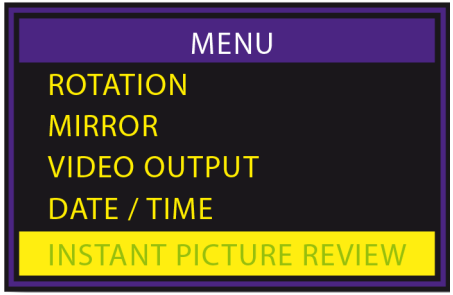


Fig. 38 View INSTANT PICTURE REVIEW

Select INSTANT PICTURE REVIEW, see Fig. 38, from the main menu and press OK.

Fig. 39 View INSTANT PICTURE REVIEW - selection

Choosing ENABLE, see Fig. 39, will cause captured still images to remain on the display screen. ESC must then be pressed to return the display to a live image.

Choosing 3 SECONDS will cause captured images to be displayed for three seconds before reverting back to a live image.

6.7.4.10 Video Format

This function allows you to select the format of the video output signal for an external display. The available options are NTSC and PAL, see Fig. 41.

Use the ▲ and ▼ to select VIDEO FORMAT, see Fig. 40, and press OK to confirm.

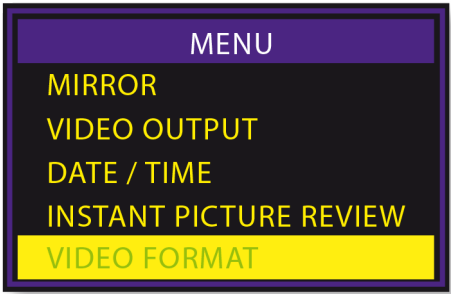


Fig. 40 View VIDEO FORMAT

Fig. 41 View TV FORMAT - selection

While the TV OUTPUT submenu is displayed, pressing the button will display the DISPLAY SETTING submenu, see Fig. 42.

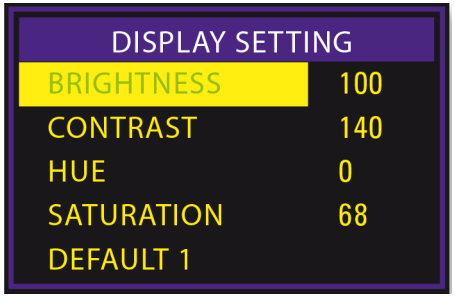


Fig. 42 View DISPLAY SETTING

Here the factory settings for the video display may be changed or reset.

➪ Use ▲ and ▼ buttons and press OK to select the characteristics to be changed.

➪ Then use ▲ and ▼ to change the setting and press OK to confirm.

Each unit is optimized from the default settings by MICRO-EPSILON Eltrotec prior to shipping. These optimized settings appear on a label on the rear side of the video display, should they need to be re-entered.

6.7.4.11 Language

➪ Choose the LANGUAGE item, see Fig. 43, in the main menu to scroll through the language choices , see Fig. 44.

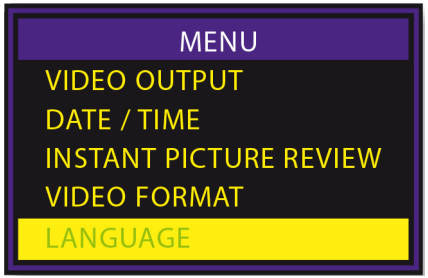


Fig. 43 View LANGUAGE

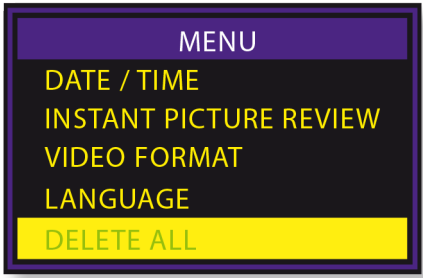
Fig. 44 View LANGUAGE - selection

There are 26 languages available, see also.

➪ Use ▲ and ▼ to select and press OK to confirm.

6.7.4.12 Delete All

Select this item to delete all saved still photo and video files.



Use ▲ and ▼ buttons to select Yes or No.

Confirm with OK.

6.7.4.13 Auto Power Off

Select AUTO POWER OFF, see Fig. 45.

Use the ▲ and ▼ buttons to select time for auto power off or to disable the auto power off function, see Fig. 46.

Press OK to confirm.

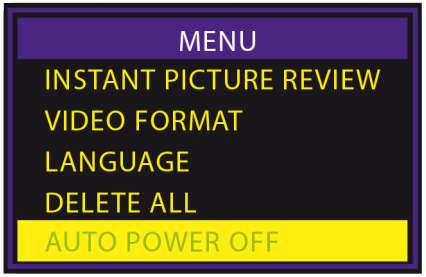


Fig. 45 View AUTO POWER OFF

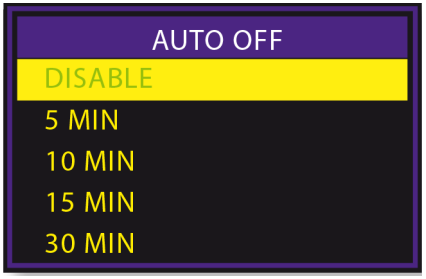


Fig. 46 VIEW AUTO OFF - selection

6.8 Charge Main Battery

- Connect the power supply cable to the DC/IN jack of the video display, see Fig. 47.
- Connect the power supply cable to a AC socket and allow the video display to charge its internal battery.

A full charge takes about 3 hours and will run for 2 - 3 hours.

Fig. 47 Charge main battery

6.9 Charge Light Source Battery

➡ Insert one of the light source battery into its charger.

i Make sure they are oriented correctly, as per the engraved symbols in the charger.

➡ Connect the charger to a 120/240 VAC 50/60 Hz outlet.

Fig. 48 Battery charger with batteries

The LED's on the charger will glow red while charging.

They will turn green when the batteries are fully charged. This will take 2.5 - 2.75 hours for fully discharged batteries.

6.10 Connecting to an Additional Display

➪ Use the included AV cable to connect the additional display to the jack of the video display.

i The additional display must accept a composite input.

The image on the video display will automatically switch to the additional display when the AV cable is connected.

Use the VIDEO OUTPUT function in the main menu to direct the output to the external display, or to switch between displays, see Chap. 6.7.4.7.

Fig. 49 AV cable

Fig. 50 Video output on video display

The output format for the additional display (NTCS or PAL) can be selected by using the VIDEO FORMAT function.

The video display and the external display cannot be viewed at the same time. The video display will automatically become active when the cable is disconnected.

6.11 Inserting SD Memory Card

➡ Insert the SD memory card into its slot, see Fig. 51.

Make sure the gold contacts are facing away from the video display.

➡ Push the card in gently, as far as possible and then release.

Fig. 51 Inserting the SD memory card

i Do not press the card with violence and with the contacts in wrong direction into the slot.

The card is in the slot now.

➡ To remove the card, push it in a little and release to take out the card again.

The card will spring out far enough to remove.

i Do not remove the SD memory card during image capture operations. This may result in a data loss and a damage of the memory card.

6.12 Transferring Image Files to a PC

Images stored on the SD memory card, can be downloaded via the USB port.

➡ Insert the Mini USB 1.1 connector to the USB port and open the appropriate drive on your PC.

The stored images are contained in: “X:\DCIM\100DSCIM”, where X is the drive letter. Jpegs can be viewed with Windows Picture Viewer; avi video files can be viewed via the Windows Media Player.

Fig. 52 USB cable

Fig. 53 USB output on video display

Alternatively, images from the SD memory card may be transferred to your computer by removing the card from the video display and inserting it into the card reader of your PC.

6.13 Changing Batteries

➡ To change batteries, remove the screw from the battery cover of the video display and remove the cover.

➡ Remove the battery cable and the connector carefully.

➡ Pull the connector apart and connect to a new battery.

➡ Change the battery, replace the cover and screw it in again.

7. Troubleshooting

The following troubleshooting hints should help you to solve some problems on site. If a problem is not solved using these suggestions, please contact the customer service and send the video endoscope back to the manufacturer, see Chap. 10.

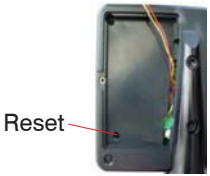
NOTICE

Do not try by no means, to disassemble the video endoscope.
> Damage or destruction of the video endoscope

7.1 Unclear and Diffuse Image

If using a detachable side-view tip adapter, the probe tip may not be properly attached.	➡ Detach adapter and reinstall.
Lenses or glass windows may be dirty.	➡ Clean the glass on probe tip of the flexible probe with alcohol and cotton swab. Also clean the side-view tip adapter if being used, see Chap. 8.2.
Light may be insufficient.	➡ Increase light source intensity or move probe tip closer to object to be viewed.

7.2 Video Display are not Working Properly

There is nothing to see on the LCD screen: The battery is almost empty.	➡ Recharge the battery.
Still images or videos cannot be recorded: There is no SD card in the device.	➡ Insert the SD card into the video endoscope.
Off: The battery is not charged enough.	➡ Charge the battery.
None of the functions work or hang.	➡ Switch off the video endoscope and restart the device.
If the functions cannot be restored:  	➡ Remove the cover from the battery compartment. Remove the battery to reveal the reset button. ➡ Insert a toothpick or another non-conducting tool into the reset hole and push the reset button to perform a system reset.

7.3 Articulation is Difficult

Locking may be fully or partially engaged.	➡ Release locking.
Articulation cables may be constricted by bends in the flexible probe.	➡ Keep the flexible probe as straight as possible during inspection.
The probe tip may be blocked because of their position within the device.	➡ Reposition the probe tip by rotating the flexible probe or moving the probe tip forwards and backwards.

NOTICE

Do not apply excessive force on control levers.
> Damage or destruction of the probe tip

7.4 Image not Bright Enough

Light source intensity is at a low setting.	➪ Turn to maximum intensity.
Probe tip may be too far from object.	➪ Move probe tip closer to object.
If using a detachable tip adapter, the probe tip may not be properly attached.	➪ Detach tip adapter and reinstall.
The lenses or glass windows may be dirty.	➪ Clean glass surfaces on probe tip, light guide connector and the eyepiece with alcohol and cotton swabs (or soft cloth), see Chap. 8.2.
	➪ Also clean detachable tips if being used, see Chap. 8.2.
Light source capacity may be insufficient for application.	

8. Instructions for Operation

8.1 SD Memory Card

Do not remove the SD memory card during image and video capture. This can cause data loss and damage to memory card.

i We recommend a 80x SD card for best video quality, see Chap. 3.1.

8.2 Cleaning

➪ Use cotton swabs and lens cleaning fluid or isopropanol (rubbing alcohol) for cleaning the optics.

➪ Clean the display with a clamp cloth only.

i Do not use chemical solvents, commercial glass cleaner or other cleansing agents.

9. Warranty

All components of the device have been checked and tested for perfect function in the factory. In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to MICRO-EPSILON Eltrotec.

The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced free of charge within this period if you return the device free of cost to MICRO-EPSILON Eltrotec. This warranty does not apply to damage resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties.

No other claims, except as warranted, are accepted. The terms of the purchasing contract apply in full. MICRO-EPSILON Eltrotec will specifically not be responsible for eventual consequential damages. MICRO-EPSILON Eltrotec always strives to supply the customers with the finest and most advanced equipment. Development and refinement is therefore performed continuously and the right to design changes without prior notice is accordingly reserved. For translations in other languages, the data and statements in the German language operation manual are to be taken as authoritative.

10. Service, Repair

In the event of a defect on the video endoscope please send the effected parts for repair or exchange. In the case of faults the cause of which is not clearly identified, the whole measuring system must be sent back to:

MICRO-EPSILON Eltrotec GmbH
Heinkelstraße 2
73066 Uhingen / Germany
Tel: +49 (0) 7161 / 98872-300
Fax: +49 (0) 7161 / 98872-303

eltrotec@micro-epsilon.de
www.micro-epsilon.com

11. Decommissioning, Disposal

The video endoscope is produced according to the directive 2002/95/EG, “RoHS“.

➡ Do the disposal according to the legal regulations (see directive 2002/96/EC).

Appendix

A 1 Accessories

Designation	Photo	Description	Order number
ELTROTEC Prism head 90 °		Outer diameter 4 mm; focus range 12 mm - ∞	20752113
ELTROTEC Prism head 90 °		Outer diameter 6 mm; focus range 12 mm - ∞	20752104
ELTROTEC Interchangeable lens for the close range		Outer diameter 4 mm; focus range 4 mm - 22 mm	20752170
ELTROTEC Interchangeable lens for the close range		Outer diameter 6 mm; focus range 4 mm - 22 mm	20752171
ELTROTEC Guideline		Outer diameter 4 mm; diameter 4.8 mm / length 432 mm	20752245
ELTROTEC Guideline		Outer diameter 4 mm; diameter 8 mm / length 432 mm	20752246

Designation	Photo	Description	Order number
Storage rack			20752241
LED hand lamp			20752242
Battery charger			20752243
Extra battery for für LED hand lamp			20752244
Extra battery for monitor			20752136

A 3 Factory Settings

The factory settings to optimize the video endoscope, see Chap. 6.7.4.10, are made by MICRO-EPSILON Eltrotec before each delivery. These optimized settings appear on a label on the rear side of the controller (video display) in case they need to be reentered.

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