

Operating instructions



:: INVIZ big



Preface

The device identification "INVIZ" stands for a series of latest inspection cameras, which are constructed strictly according to the instructions of the users.

The video endoscope at hand, "INVIZ BIG", is currently the simplest and at the same time most hard wearing camera technology for the inspection and documentation of weld seams and pipe inner walls in the 30 mm – 300 mm category. Expect high resolution, impressive colours, highest light sensitivity, full image, digital image and video memory as well as a smart text generator option.

First models of the INVIZ BIG series and previous are in the market since about 10 years and have been proved to be one of the most 'ruggedized' inspection cameras in the world. The percentage rate of failure during the first two years of operation is less than 5% - not reached through any other RVI video - equipment in today's market place.

By continually and consistently not including the electrical conductors of the KEVLAR – reinforced main cable inside one epoxy-glass fibre pushing pole, the system keeps difficult flexibility of turning multiple corners and bends without breaking the main camera supply. The immense amount of options and custom made accessories will allow the operator to reach any point of the application:

- :: Simple rotating and maneuvering of the probe with attached NEW side view optics.
- :: Waterproofness up to 50 meter.
- :: Longterm-tested durability of the entire probe through high wall thickness of the probe.
- :: Extremely light sensitive 40mm camera head, interchangeable with 29mm standard head.
- :: Manoeuverability through many pipe bends. A widest range of pushing- and centering tools are supporting the operator to accomplish his task.
- :: Easy focusing of the optics within a wide range of applications.
- :: New several hours lasting battery-operation option.

In order to obtain the economic advantages of your endoscope even in the long run, you ought to read and follow the following advice, tips and warnings carefully. The observance of these instructions serve the purpose of your own safety as well as the safety of those in the work field of the endoscope as well as that of the corresponding control device.

All tips, code of behaviour, suggestions for measures to be undertaken, advice, warnings and instructions are exclusively valid for the operation of "INVIZ" BIG videoscopes and not for devices by other manufacturers.

For questions, which have not been answered by this instruction manual, your dealer and/or the manufacturer are gladly available for advice. Kindly contact us even if you have suggestions for the improvement of this manual or the product.

We wish you success during your inspections!

Operating precautions

**Compulsory instructions
for a safe start-up in
accordance with regulations.
Reading before the initial
operation is an absolute must!**

Before the initial operation, this instructions manual must be completely read and understood by the user in order to exclude damage to life and property through the operation of the video camera system (the device) with the greatest degree of safety. The operation of the device without the understanding of the instructions manual is not allowed under any circumstances. The device has been conceived exclusively for industrial application exclusively through personnel trained in all technical questions and must never be operated by private users.

For a generally non-destructive operation of the device, beside the safety of the personnel and environment, an extensive knowledge of the device, the inspection technology, the safety instructions as well as the industrial field of application are absolutely necessary!

The device must never be connected to electric mains, if you have not understood this instruction including safety warnings or even if you have not understood individual sections or if you cannot or do not wish to use the device in accordance with the regulations.

viZaar is not liable under any circumstances for the consequences of faulty inspection results, which were achieved with the device.

viZaar shall not be liable under any circumstances for the loss of inspection data.

viZaar shall not be liable under any circumstances if device parts are left behind in the inspected plant inadvertently.

For compulsory attention:



Warning against risk of injury or loss of life to humans



Warning against significant risk of damage to device and plant



Warning against fatal electric shock



Warning against life-threatening explosion risk



Warning against life-threatening fire risk



The device or parts thereof must never be inserted into human body openings and / or used for (veterinary) medical analyses.



The device must never be opened by the user at any place other than the camera housing. Life-threatening electric voltage are used or generated in the device; in particular, the device must never be used with the

housing open. The device must never be used when there are audibly loose parts inside the device.



The video probe of the device must never be used in or in the vicinity of apparatus or equipment, which are partly or fully energized by electric current of any type (e.g. transformers, motors, generators, switchboards etc.). The metallic housing of

the camera conducts electricity and dangerous currents are transmitted during every contact or even short-circuits can be triggered in the plant.



In case an exchange of the lamp becomes necessary, one must proceed according to the procedure in the instructions!



The device must never be operated in moist environment (e.g. during precipitation) nor must the control device

or the operating pendant be submerged in water – there is a risk to life due to electric currents!



Before start-up, the device must be acclimatized according to the ambient temperature. This is valid in particular for cooled devices, wherein condensate

accumulation during warm-up can lead to destruction and damage due to electric sparkover.



The device must never be operated with damaged video probe. There is a risk of damage to hand due to the metallic protective mesh (Suggestion: Always wear work gloves for protection). At the same time, there is a danger that liquids might penetrate the probe and thereby impair the functioning permanently or might cause a life-threatening electric shock to the operator! Even the use of a

slightly damaged probe can quickly lead to the total destruction of the probe due to the electric conductors lying inside. The operation of a damaged probe is impermissible within the area of jurisdiction of the European Union, since the regulations on emission of electromagnetic radiation can no longer be adhered to with safety.



Never operate the probe without working gloves! Considerable risk of getting adjusted!

At the same time, protective glasses must always be worn while operating the probe.



Never operate the device under conditions which do not comply with the operating conditions or storage conditions described in the instructions manual!



The device must never be operated in operating environments which are vulnerable to explosion or fire risk. The device is not equipped with safety devices or acceptance for operation in environments vulnerable to explosion or fire risk. An impermissible employment in

environments susceptible to explosion or fire leads unavoidably to a device-induced life-threatening explosion and to a fire in the plant. The operator is obliged to check the plant for substances vulnerable to explosion or fire before every new start-up of the device.



The device must be checked annually by the manufacturer or an authorized third party for compliance with the electrical safety instructions obligatory at the usage site and conformance with the as-delivered condition of the device. The device must not be connected to the electric supply

mains or otherwise operated after the ascertainment of a defect or any deviation from the as-delivered condition. This is valid, in particular, if the device has tumbled or fallen down or was exposed to a liquid.



Never allow the device to be operated without supervision. For safety reasons, it is necessary to switch-off the machine during pauses.



Never operate the device in radio-actively contaminated environment! Never expose the probe to ionizing radiation of any type!



Never bring the probe in contact with corrosive substances of any kind (acid or alkali). Risk of damage and injury while manipulating the probe.

Never bring the probe in contact with solvent containing liquids! Risk of Damage!



Never insert the probe in plant parts the contents of which are unknown!



For increasing your own safety against electric shocks with risk of injury or loss of life, the device must always be connected and operated via a residual current circuit breaker system or an isolating transformer. This can in any case be a compulsory

condition depending upon the operating environment. For this, consult your responsible safety in-charge or the accident protection measures in force in your respective country.



The device must be transported exclusively in the transport case conceived for it by the manufacturer. The device and the corresponding accessories must be

packed in the transport case only according to the instructions at hand.



The use of too long power extension cords is life-threatening and forbidden (max. 25 m in case of a supply line made of copper 3 x 1.5 mm²). Hereby, a life-threatening loss of the protective function of the upstream safety element is possible. At the same time, voltage differences of the earth potential as

compared to the displaced reference point of electric output (bridged by a too long extension cord) could cause dangerous electric currents on contact with the device housing or impermissibly high equalizing currents at the probe. In case of uncertainties, consult your on-site electrical expert.



Always ensure that the respectively inspected metallic pipeline systems conform exclusively to a homogenous earthing potential; electrically insulated transition points (e.g. sealings, plastic line sections) can exhibit different electric earth voltage potentials depending upon

the plant, which could build up very high electric currents with sparking and substance burn-out in case of bridging through the metallic, electrically conducting probe. Kindly consult your on-site expert in advance.



The endoscope system can be connected to the public electric supply mains through a 'IEC-plug lead' included in the delivery or a 'IEC-plug lead' which complies with the local socket standards. The system accepts faultlessly all power supplies known worldwide with alternate currents of 96 VAC to 246 VAC at 46 to 60 Hz.

For safe operation, the device needs a reliable potential earth (PE) connection. In case of doubt, an expert or the manufacturer must be consulted. The minimum output supplied by the power connection can be derived from the device specifications contained in the instructions.



Never insert the probe in plant parts, if weld or cutting work is being undertaken simultaneously or soon. Likewise, the probe must never be inserted if further inspection procedures like eddy current or radiography tests are being undertaken

on the same plant part. Never insert the probe in plant parts, which are not fully switched-off (e.g. danger from rotating plant components) or cooled down.



Exclusively the viZaar accessory articles or spare parts described in this instructions manual may be used in connection with the device.



Never look directly at the light emission in the camera head. There is danger of lasting eye injury or at least a long-lasting eye irritation with accidental consequences through a temporarily restricted power of vision.



When operating the device outside the permissible operating conditions or with destruction caused by usage which deviates from the instructions, non-compliance with the operating conditions or through the usage

of non-original spare parts or accessories as well as through impermissible opening of the device, the guarantee obligation or the guarantee commitment by the supplier or manufacturer lapses, in principle.



The different options / accessoires require handling which is different each time and deviate from each other significantly even in the technical specifications.

The enclosed operating and application instructions of the respective option must be compulsorily adhered to.



Never insert the probe in pressurized containers or pipelines via sluices! The entire probe is watertight up to the length of the probe in most devices but is not designed for fluid or general gas pressure higher up. Beside the danger of destruction through pressure forces,

there is the danger of uncontrolled exit of pressure medium into the control device via a leaky probe. Depending on the properties of the pressure medium, there is significant risk of injury or accident.



Using the optional pushing poles and / or pushing reel causes additional endangerment of the operator: Glass-fibre epoxy poles may have splices on the surface and can cause heavy injury of your hand during handling. Always use rugged working gloves when operating with epoxy – glass fibre pushing poles



Using the optional pushing poles and / or pushing reel causes additional endangerment of the operator and facility: Endless push poles on a reel are wound under a enormous spring force – in the case you open the reel break without keeping the

open end of the push pole under control, the reel will unwind very fast and can cause heavy injury to the operator and persons nearby. Also any neighboring material can be destroyed through a push pole moving uncontrolled and fast.



Using the optional pushing poles and / or pushing reel causes additional endangerment of the facility: Defective or false operated push poles may get stuck inside the application without a chance of easy retrieval. Never push the poles too strongly, always inspect poles before starting the inspection.



Using the optional pushing poles cause additional endangerment of the facility: Always approve 100% push poles are connected properly to each other (extension) or to the camera before inserting the probe. Not correctly linked pole-con-

nectors / locks will cause the fatal situation to open immediately when starting to retrieve the probe after inspection (during pulling). This will disable the operator to retrieve the probe if one or more bends have been inspected (getting stuck).



Be careful employing centering tools to the probe. Faulty operated or wrong chosen centering trollies or rings can cause the probe getting stuck inside tubes and affiliated bends behind obstacles, bends and weldings etc.

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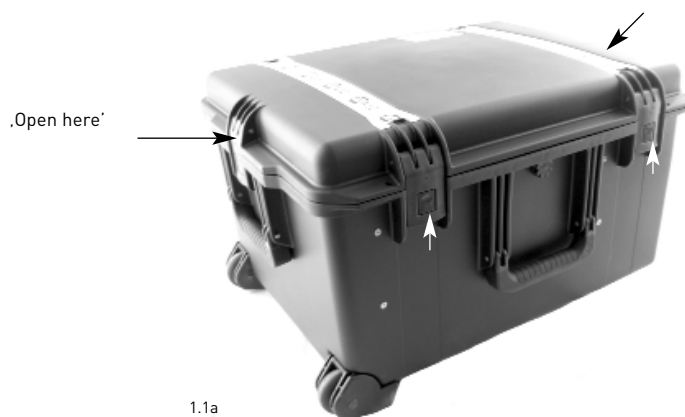
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1 Structure and start-up

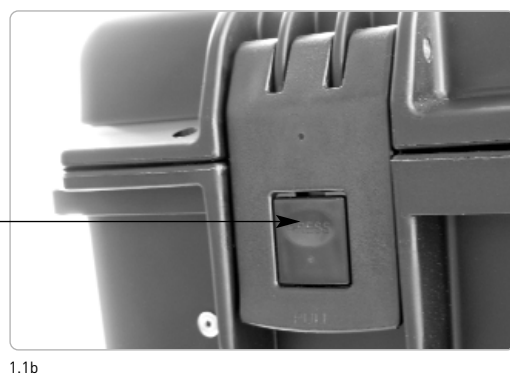
1.1 Removal from the transport case

Before opening the optional transport case, check the container for possible transport damages.

DIM:
H 635 x W 510 x D 365; PE;
Weight empty 12,25 kg



.Push center and lift to unlock'



Press the tab for sliding the lever



Pull the device on both sides of the reel and remove. It appears to be sensible to note the location of each accessory part during removal and to proceed later in reverse sequence while packing.

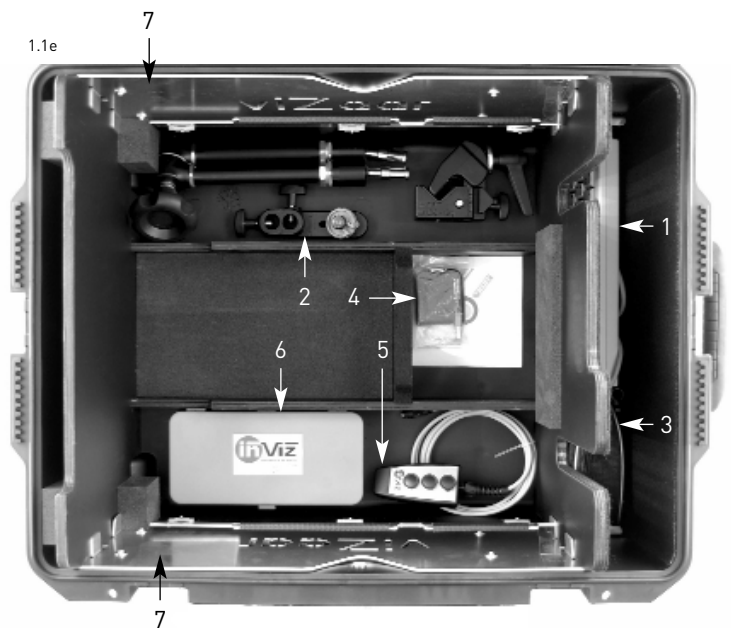
- 1 .Lift here'
- 2 .LCD Control Pendant'
- 3 .Watch alignment when packing'
- 4 .Umbilical cord for LCD'

1.1d

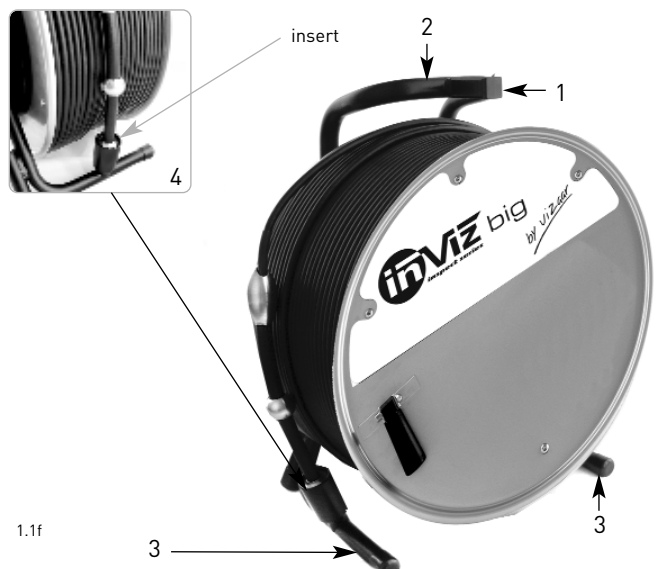


- 1 .Mini-keyboard under holding plate
- 2 .Magic arm' dismembered
- 3 .Accessory pouch'
- 4 .Card Reader'
- 5 .Remote control'
- 6 .Accessory box'
- 7 .Packing drawers opened for removal

1.1e

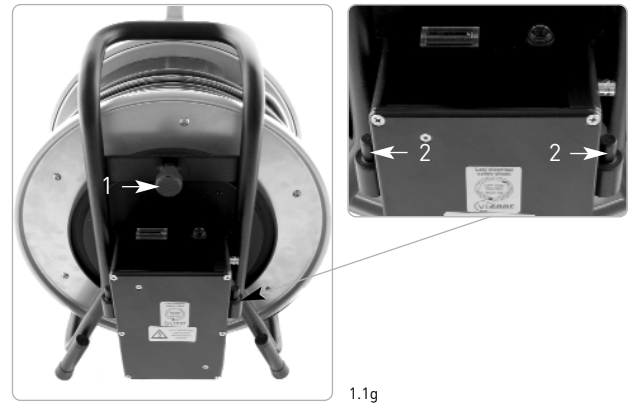


- 1 .Fix magic arm here''
- 2 .Handle for carrying'
- 3 .Feet'
- 4 .Transport position for scope camera'



1.1f

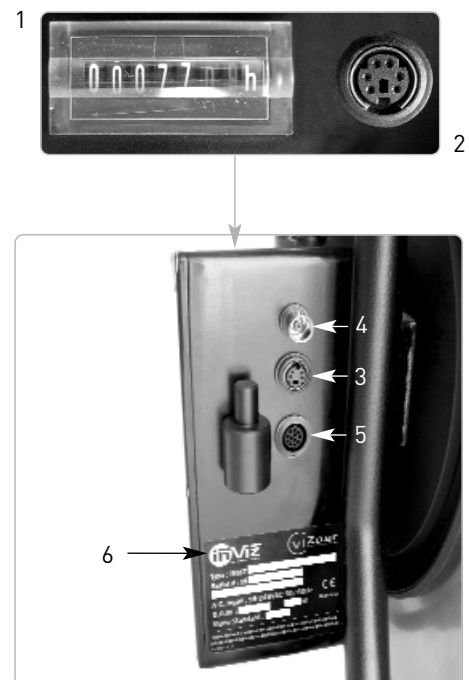
- 1 ,Reel brake'
- 2 ,Mount for accessory pouch'
or battery



- 1 ,Power cord'
- 2 ,On / off main switch'



- 1 ,Counter operation hrs'
- 2 ,PS2 keyboard for option text generator'
- 3 ,S-Video video out (only in combination with
option data display modul'
- 4 ,BNC composite video out'
- 5 ,Connector umbilical to LCD'
- 6 ,Date of manufacturing, SN'



1.2 Accessories

Scope of delivery version basic device in optional transport:

- 1 INVIZ big
- 2 Umbilical cord for LCD or of the simple operation pendant
- 3 Accessory pouch with
 - 3.1 Power cord D, UK or US
 - 3.2 BNC Video cord
 - 3.3 BNC to RCA video adapter
- 4 Accessory box
 - 4.1 Screwdriver
 - 4.2 Protection ring (Ø 40mm)
 - 4.3 Centering brush (Ø 65mm)
- 5 Light control



Scope of delivery optional accessory packed in optional transport case:

- 1 LCD operating pendant with digital image video recorder and actual high speed "Flash Card" Memory Card
- 2 Flash Card reader with USB connector
- 3 Mini PS2 keyboard US or D
- 4 Magic Arm
- 5 Remote control for recording of picture and video



Optional pushing aid tools cannot be accommodated in the transport case. The usage is explained separately.

Connection and operation of the text generator is represented in the following chapters.

Connection and operation of the optional LCD imaging recorder represented separately.

1.3 Initial operation

After connecting the power cord, the device can be started with the red main switch. The camera LED will be started. For visualization of the camera image, at least a conventional monitor or the imaging recorder must be connected to the video output of the device.

The device must be operated exclusively in environments, which guarantee that the in-built ventilator supplies the lamp with sufficient fresh air for cooling. In case of insufficient cooling, there can be damage to the LED.

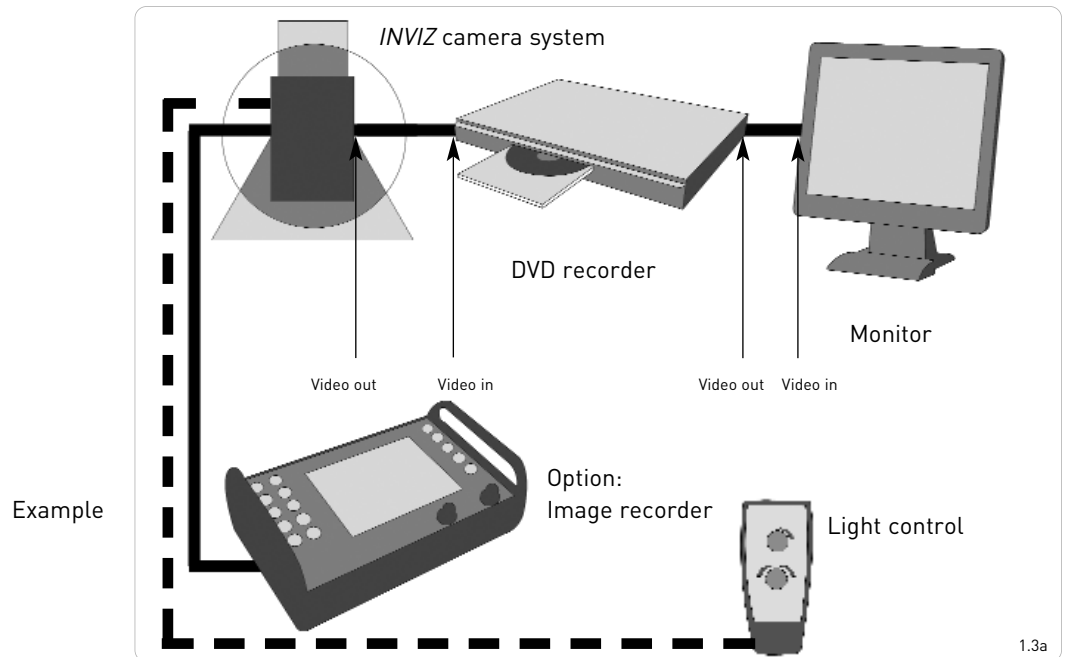
The following is recommended for visualization:

- :: Standard studio monitor, type CRT (best results) 10" to 21"
- :: *INVIZ* image recorder
- :: LCD monitors
- :: Fast laptop / Notebook via high-value framegrabber (Status 2006 USB framegrabber cannot be recommended)
- :: Head up display

For storage of image and video, the following are recommended given the current state of technology:

- :: VHS recorder (adequate quality only in S-VHS operation)
- :: DVD / hard disc recorder
- :: Mini DV Camcorder with AV input
- :: Fast laptop / notebook via high value framegrabber (s per status 2006, USB 2.0 framegrabber cannot be recommended), e.g. Fire Wire / PCMCIA
- :: *INVIZ* image recorder

Please contact your *viZaar* representant for any further question to this important issue.



For avoiding possible damages to the monitor, it is recommended to operate the inspection camera or external peripheral devices like monitor or video recorder via the same main power potential. This is ensured for all participating users through the use of a multiplug. In case very long video cords are used, there can be disturbing equalizing current via the shielding of the cable.

The video image of the camera head can now be captured as so-called Composite Signal ("video signal" in common parlance) via the lateral BNC video output through every conventional television with Scart/AV input. The S-VHS (Y/C) output lying thereunder offers a visibly improved quality

in the detail of the image signal and can be used with accordingly higher value devices.

In order to use the full image quality of the high-resolution camera quality, we recommend that accordingly high resolution special monitors from a screen size of 10" onwards be used exclusively for inspection tasks in the material test, which, also possess an S-VHS input.

All video connection cords to peripheral devices must exhibit a resistance of 75 Ohm and are characterized by the identification RG 59. Beside the industrial BNC connector, the so-called CGA / RCA / Cinch connectors are widely popular; corre-

sponding adapter and/or adapter cable can be ordered in the trade.

As a rule, recording device and monitor are switched in series, for being able to control the recording results easily. Older video devices do not terminate the video line automatically with a 75 Ohm terminating resistance. This must be placed in the correct position manually by means of a switch. You may refer to the instructions of the respective devices. A wrongly set or missing terminating resistor and/or the parallel operation of several terminated users at one output can lead to significantly dark or overexposed pictures, it can lead to colour distortions and can lead to so-called ghost images in extre-

me cases.

However, the S-VHS output (if available), the composite output and the LCD tableau can be operated simultaneously.

The result and the correct interpretation of an inspection are dependent to a high degree on the selection of adequate sighting and documentation medium a too low resolution, like in case of normal TV sets, cheap LCD head-up displays or standard VHS recorders as well as a faulty colour settings as a rule lead to the missing of small material errors like e.g. tears. The same can occur with so-called digital systems, which partly exhibit significant detail errors through data compression or falsify the finest pixels of the camera during digitalization. The manufacturer or your dealer will gladly advise you.

Avoid visual inspections under the influence of sunlight on the screen.

The connection of any kind of power supply units at the video outputs can destroy your video endoscope. BNC connectors and cables are widely popular in all industrialized countries with the most diverse signals and voltage ranges – before start-up, confirm the compatibility with your device by consulting an expert.

Always consider the videosignal-norm of your *INVIZ* system (PAL or NTSC), which should comply to the video standard of your country. Only NTSC or PAL monitors / VCR's will allow to correctly operate with your *INVIZ* scope. The *INVIZ* LCD image recorder will allow to run on NTSC and PAL through it's integrated auto-detect function.

1.4 Further functions of the basic device

With the delivery of an *INVIZ* system without imaging recorder, there is a remote control serially delivered for the manual control of light emission strength, or the revolving speed of the motorized side view mirrors. The remote control is connected to the basic device by means of the enclosed cord, while the device is in off mode.

Manual light intensity adjustment

In most of the cases, it is sufficient to leave the light emission at maximum setting, since the automatic exposure time control of the camera ("shutter") ensures an optimally exposed picture. In case of special applications, like e.g. polished metal surfaces, a manual intervention and/or reduction of the light emission output becomes necessary.

Motorised regulator "Speed"

All necessary information pertaining to this can be found in the special section of instructions manual option '+motorized head'.

Operating hours counter

The operating hours counter cannot be reseted to zero. Its gives you an indication of the progressive ageing of the probe. Through the operating hours counter, you shall obtain objective values for a realistic estimate of the economic success of your inspection work with the system.

PS2 connection socket in the control device

To the extent that the optional text generator is integrated, the mini keyboard included with the delivery or another keyboard can be connected here with PS2 interface. Alternatively, there is another interface available in the optional imaging recorder; but only one of the two connection points can be occupied for trouble-free operation.



Reel brake

For transport, the reel brake ought to be pulled carefully, in order to prevent an unintentional rolling away of the endoscope. Pulling it too hard can damage the reel axis or the brake itself. For optimum work, the brake can be pulled slightly or completely during operation.

Mount for the accessory pouch

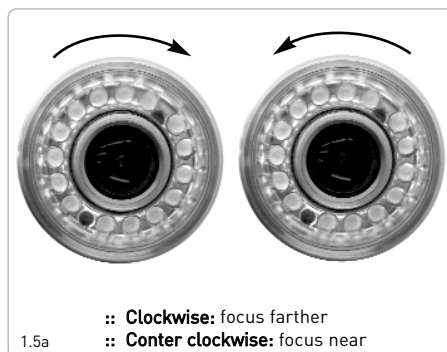
The accessory pouch can be simply hung from the two mounting points and for local transport, it ought to be fitted with everything which would be needed for the next inspection (centering tools, side view optics, cable etc.). Remove the pouch before storage in the case and pack separately.

Fastening axis for the variable mounting arm

At this point, the "magic arm" for fastening the LCD imaging recorder can ideally be fastened securely. Watch out, since during a too great deviation of the adjustable centre of gravity, it is possible that the entire unit topples and the device is damaged.

1.5 Focusing

- :: Rotate front housing until desired focus is set.
- :: Hold back section, while rotating front housing.
- :: Do not remove front housing unnecessarily. LED will shut-off at nearest focal point.



2 Product specifications

INVIZ big

- :: CCD push camera for visual inspections of tube, pipes and other cavities.
- :: PAL or NTSC composite video out (see product label).
- :: Probe length 30 meter, 50 meter, 80 meter (see product label).
- :: Camera head diameter 29,0 mm.
- :: Weight incl. 30 meter probe 15,7kg (incl. monitor 1,4kg).
- :: Recommended area of application: 40mm tubing up to 400mm pipes.
- :: CCD image resolution:
NTSC: vertical 512 / horizontal 492 Pixel,
PAL: vertical 500 / horizontal 582 Pixel,
380 TV lines.
- :: Min. illumination requirement: 1,5 lux.
- :: Automatic white balance modus.
- :: Ambient operation temperature:
-25°C – 55°C / -13°F – 131°F.
- :: Ambient storage temperature:
-25°C – 55°C / -13°F – 131°F.
- :: Max. operation temperature range of the probe in air:
-10°C – 65°C / 14°F – 145°F.
- :: Adjustable focus range:
Straight view 18mm to infinity.
- :: Field of view FOV:
Diagonal 72°.
- :: Watertight up to 50 meter
(**CAUTION:** When using 80 meter probe!)

3 Supplementary equipment

3.1 Option push poles and pushing rods

The inspection push camera INVIZ big usually can't be operated within tubes and pipes when not employing 1,5 meter push poles with connector or endless push rods stored on a reel.

The epoxy – fibre poles will allow the operator to push the camera head to most of the regions of interest of an industrial device without opening it.

Even the poles and rods will provide excellent handling advantage during the inspection, a few precautions must be observed to guarantee working safety and keep the device / facility undamaged.



Push poles and rods are hard-wearing, however will not withstand any pushing or pulling force. The epoxy fibre material will break when bended too much. The allowed maximum bending depends on the design (stiff, medium, soft). Epoxy fibre poles are aging rapidly through high temperatures, chemicals, sol-

vents and frequent usage. The older they are, the more they have to be exchanged by new material. viZaar rejects any damage compensation in the described case of damage. In case of doubt, please send in the pushing-aid material for evaluation to the viZaar service.



10mm stainless steel pole connecting clutches are especially glued onto the fibre epoxy material, and can be pulled-off when mistreated or worn out. Pulled off / damaged connectors or clutches will cause tremendous trouble to the facility, when camera head and other poles may left in a pipe after a 90° bend.

Always check the pole connectors before employing them to the camera. viZaar rejects any damage compensation in the described case of damage. In case of doubt, please send in the pushing-aid material for evaluation to the viZaar service.



Always confirm when using the 10mm stainless steel pole connectors, that the clutches are truly locked, liked described in the below pictures. Open connectors will cause the same impact as broken / defective

connectors to the object of inspection.



Damaged epoxy – fibre material can cause heavy injury to your hand, when the PE- outside coating is worn or damaged!



When using endless push poles stored on a reel be aware of unexpected force trying to unwind the reel itself when just opening the reel-break. The rod will

unwind itself in a fast and powerful way, causing injury to people or damage to the facility!



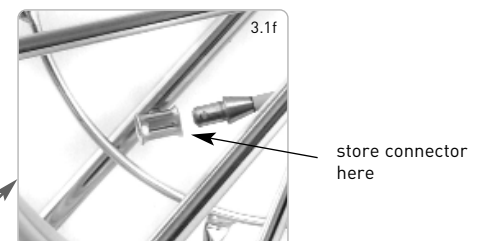
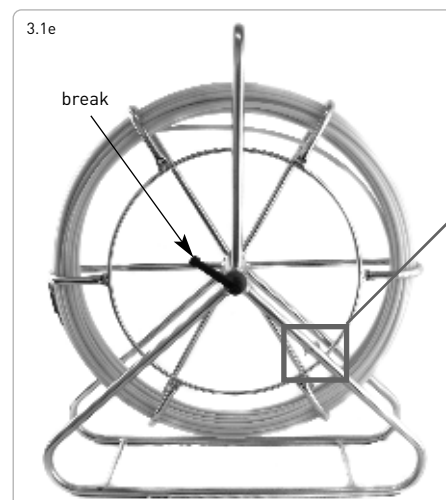
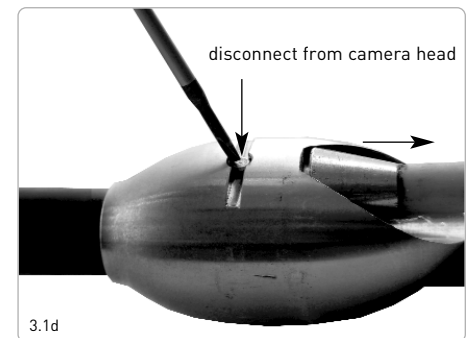
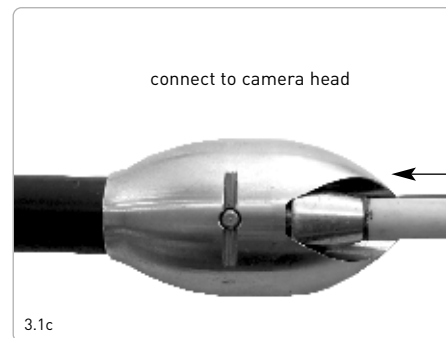
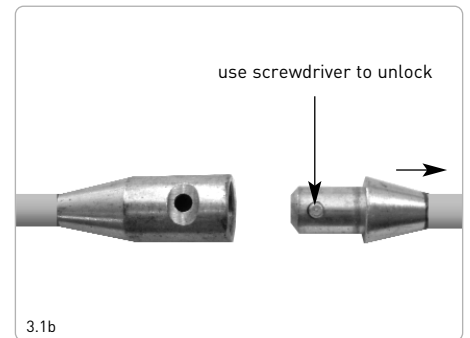
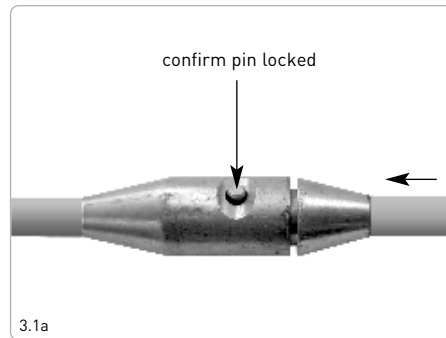
Even without breaking, the employment of push poles can disable you to retrieve the camera – head with the poles from the inspected piping. viZaar rejects any damage compensation in this case. Employing epoxy fibre poles and rods is an issue of experience and

training. In case of doubt, please ask viZaar for further training or technical assistance. Never push the probe / fibre epoxy pole into the pipe applying high force, especially through 90° bends!

3 Supplementary equipment

Employing the poles or rods extremely depends on the experience of the operator. The different flexibility of the rods / poles may be used depending on the application length and number of bends. Rods and poles can be combined, also poles of different flexibility may be combined to reach the area of interest. If the probe or camera head needs to be rotated, 1,5 meter poles need to be used instead of the reel.

The poles / rod can be connected to the camera head or to the centering tool.



3 Supplementary equipment

3.2 Option centering tools and trollies

Centering tools are necessary to perform inspections with the INVIZ big in larger tubes and pipes, nevertheless, a side view or a straight view is employed. Centering tools prevent the probe from lying on the tube/pipe-sole, creating difficulties because of unacceptable illumination and focusing situations. Also centering tools prevent the probe optics to get dirty through debris in the empty pipe.

For good inspection results, always try to attach a corresponding centering tool to each tube diameter.

Two different centering tools technics are available: 'Sliding' centering discs and brushes for small diameters and larger centering trollies with wheels reducing friction. Pushing aids like epoxy fibre rods or poles are attached to the bigger trollies or directly to the probe when using smaller discs only.



When choosing a centering tool always consider obstacles, big weldings, damaged (oval) pipes, dirt etc. which decreases the nominal inner pipe diameter. Ignoring the rule to choose centering tools at a maximum of 75% - 85% of the inner tube diameter may end into the impact of the probe get stuck inside the inspection application.

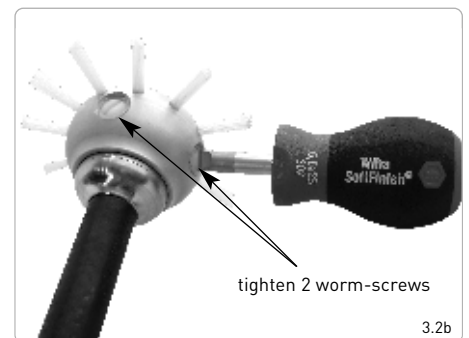
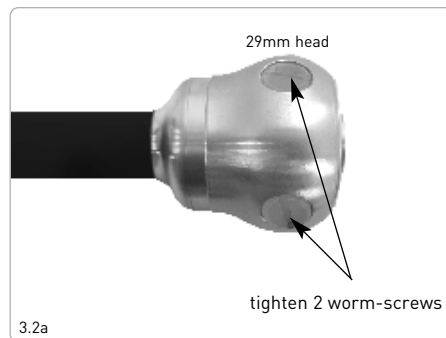


Always assure all components screws of the centering tools are perfectly tightened to not get lost inside the application.

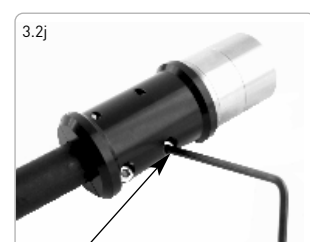
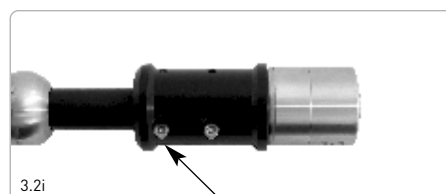
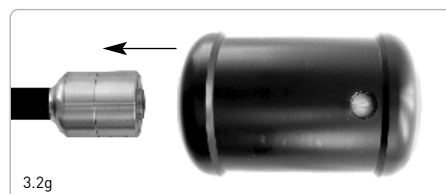


Heavy centering tools can cause damage to delicate tube surfaces.

Standard centering tools

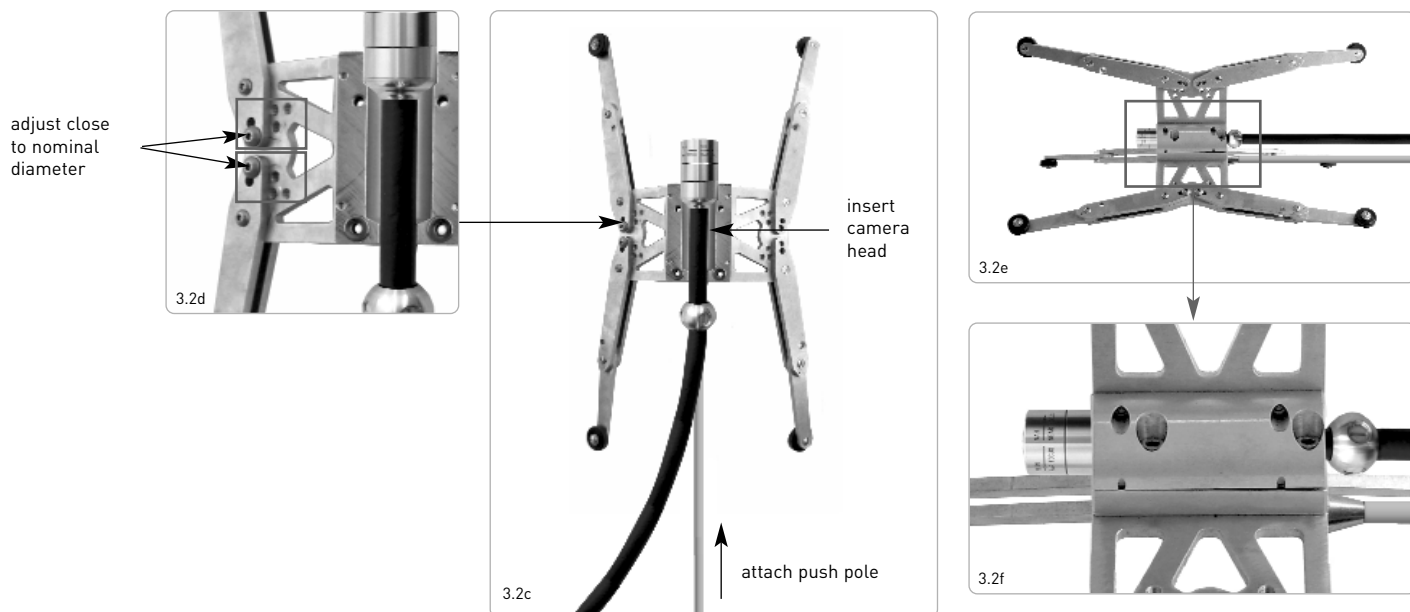


Custom made centering tools



3 Supplementary equipment

Option centering trolley



3 Supplementary equipment

3.3 Option side view prism

The below shown side view prism may be employed for direct tube wall inspection. To attach the side view prism, the straight view optics need to be screwed-off. Be careful to not unscrew the distance ring. When screwing the side view optics onto the head and vice versa, be careful to find the exact beginning of the thread and not to damage the o-ring.



Always be extremely careful to not let dirt and dust enter the electronics of the camera head.



Never fix centering rings to the sideview mirror.



Only open and close the camera head if the complete system is switched off.

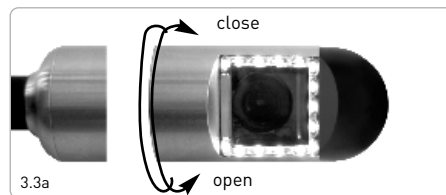


The sideview optical adapter is only splash water-proof!

The focus range can be adjusted easily as follows to achieve 'sharp images':

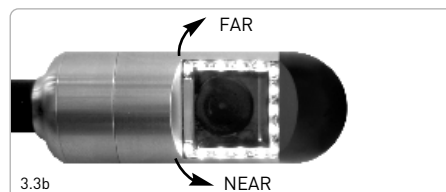
NEAR FOCUS:

Upon the position the LED's start / stop illuminating (the camera needs to be switched on after closing the camera head) this is the most closest view possible. Near view = move lens away from camera housing.



FAR VIEW:

The end position of the side view optics to the distance ring is the farthest focus point within the illumination capability of the camera head. Do not tighten the thread onto the distance ring! Far view = move lens towards camera housing.



Softly clean prism surface with a cotton-tip (Q-tip) dipped into 80% alcohol.



3 Supplementary equipment

3.4 Option motorized side view mirror

The below shown motorized side view mirror may be employed for convenient direct tube wall inspection without rotating the instrument itself. The mirror speed can be controlled and even the rotation can be stopped easily from the control pendant. To attach the side view mirror, the straight view optics need to be screwed –off. Be careful to not unscrew the distance ring. When screwing the side view optics onto the head and vice versa, be careful to find the exact beginning of the thread and not to damage the o-ring.



Always be extremely careful to not let dirt and dust enter the electronics of the camera head.



Never fix centering rings to the motorized sideview mirror.



Only open and close the camera head if the complete system is switched off.

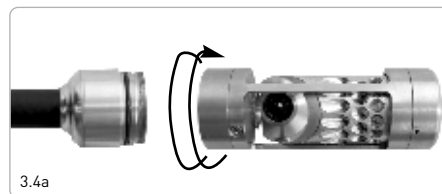


The motorized sideview adapter is NOT waterproof at all!

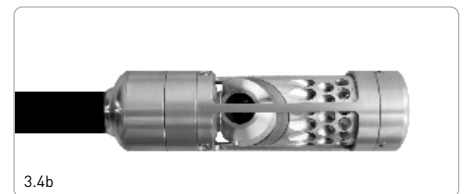
The focus range can be adjusted easily as follows to achieve 'sharp images':

NEAR FOCUS:

Upon the position the LED's start / stop illuminating (the camera needs to be switched on after closing the camera head) this is the most closest view possible. Near view = move lens away from camera housing.



3.4a



3.4b

FAR VIEW:

The end position of the side view optics to the distance ring is the farthest focus point within the illumination capability of the camera head. Do not tighten the thread onto the distance ring! Far view= move lens towards camera housing.



3.4c



3.4d



3.4e

Rotation speed:

Mid-position = stop

The speed or direction of rotation of the mirror-motor can be controlled by the LCD image recorder or standard control device. The operator must be aware that the interrupted side view image does only allow a 96% inspection of the inner wall surface due to general design.

Softly clean prism surface with a cotton-tip (Q-tip) dipped into 80% alcohol.

Remark: A standard INVIZ BIG must be prepared at viZaar / Albstadt to be able operating a motorized side view!



3.4f

3 Supplementary equipment

3.5 Option rechargeable battery

The INVIZ Big can be equipped with a rechargeable NiMH battery. The system must be ordered to be prepared for battery operation. The battery option can not be combined with the option digital cable-counter.



Never use other charging equipment than the supplied viZaar VE-100129-AE.



Opening the battery unit will discard any warranty.



When battery capacity seems to be reduced, NiMH cells need to be replaced at the viZaar product service by new batteries. Never replace cells by unproved batteries types – this may cause fire or explosion during any operation and void warranty for the complete system!

Charging time when battery completely empty:
approx. 4 h.

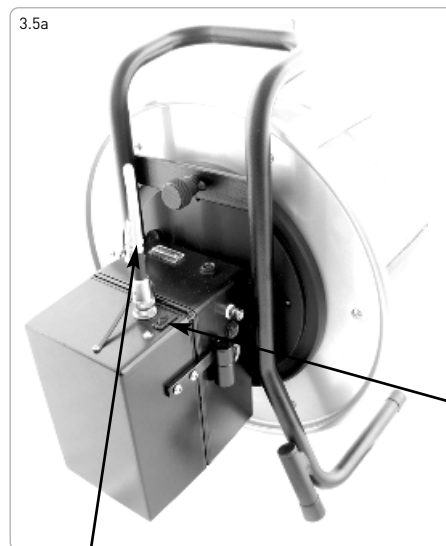
The charging unit can be used for 100 VAC to 240 VAC 50 / 60 Hz.

The charger will automatically stop charging when the battery is full.

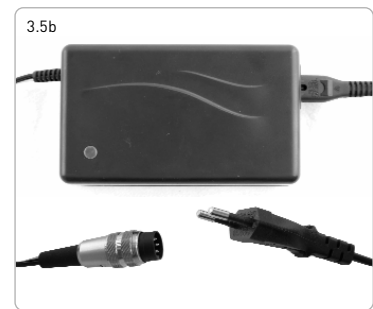
Use switch 'A' to turn the battery on or off.

To switch from recharching mode to operation mode you have to disconnect the charging equipment and connect the connection cable (VE-100130-AE).

The battery must be disconnected from the camera before charging.



Connection cable VE-100130-AE for battery operation



switch 'A'

3 Supplementary equipment

3.6 Option digital probe meter counter

The INVIZ BIG inspection system can be equipped with an optional special digital on-screen counter, exactly measuring the 'in fact' length of the inserted probe cable.

This option can not be installed in systems with battery operation.

Compared with other counting equipment, the viZaar counter option has to be installed in front of the inspection application, to guarantee most exact results. The unit is calibrated to an accuracy of $\pm 10\text{mm}$ per 1000mm (1 meter $\pm 1\text{cm}$).

Depending on the environment, the counter can be mounted with a clamping device or strong magnet close to the tube/pipe entry like shown in the below pictures. It is recommended to first install the cable into the counter, before fixing the arm onto the tube like shown.



When the counter is employed only careful pushing and pulling of the epoxy fibre poles is allowed.



Only connect the counter to the system when it is shut-off.

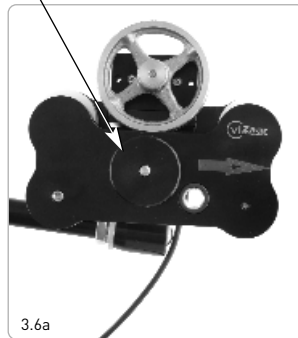


Any liquids from the application (tube or pipe) shall never penetrate the counter when retrieving the probe.



All values will be set to zero, if the unit is switched off during inspection.

open screw

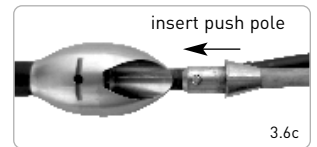


3.6a



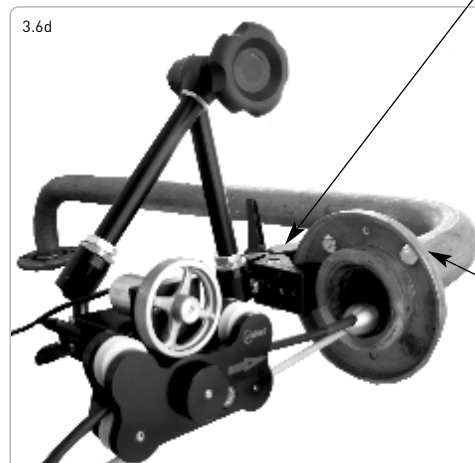
3.6b

insert probe

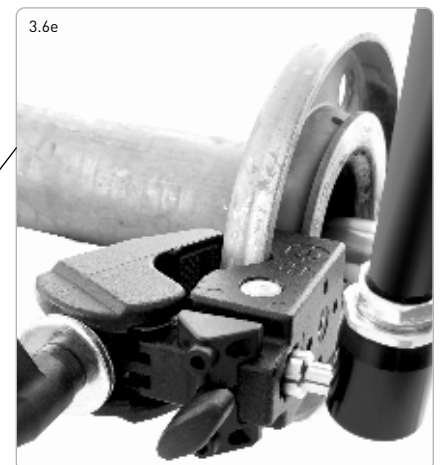


insert push pole

3.6c



3.6d



3.6e



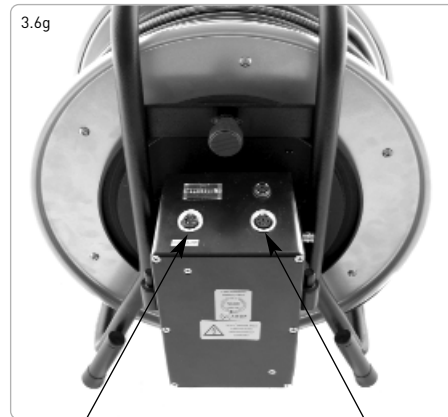
3.6f

alternatively

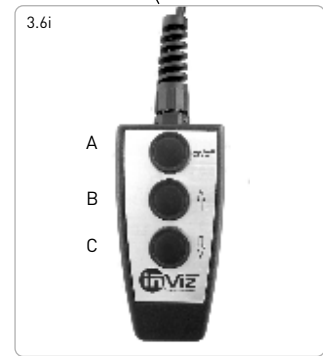
3 Supplementary equipment

When the counter is not connected, '0' will be indicated on the OSD all the time. If you wish the counter display to disappear, the counterpendant has to be connected. The usage of the counterpendant – once the hardware is setup – is kept easy to us:

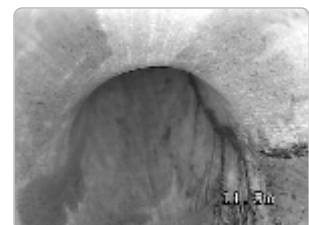
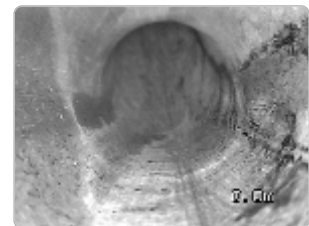
- :: button 'A' toggles the counter OSD on / off.
- :: press button for seconds to reset counter to zero – usually at the beginning of the tube.
- :: button up 'B' or down 'C' will preset the counter to the wished value before starting the inspectin when not zero. Press button B and C for 3 seconds to reset counter to zero – usually at the beginning of the tube.



metercounter



metercounter pendant



3 Supplementary equipment

3.7 Option 40mm head adapter

In case more light is necessary than the standard 29mm head, viZaar is providing a 40mm diameter optical head with more LED – illumination power.

After switching-off the system, the head can be replaced very simply by unscrewing the 29mm head incl. the behind located distance ring. It is important no dirt can enter the open camera! Be careful when starting winding the new optics onto the head – do not damage the thread by rotating with force into a wrong position.

The 40mm optic is manufacturer pre-adjusted for the best possible range of focus, and can be set to the wished focus point like the 29mm optic.



mount 40mm head



4.1 Image recorder

Overview

The INVIZ imaging recorder fulfils the following additional functions beside the visualization of the inspection image:

- :: Adjustment of the light intensity of *INVIZ* endoscopes and pushing cameras
 - Mostly endoscopy is done with full light intensity, since all *INVIZ* cameras control the brightness of the picture via the exposure time of the camera itself. Only under few circumstances, it can be advisable to control the light intensity manually (e.g. strongly reflecting surface).
- :: Adjustment of the rotational speed of the option motorized side view.
- :: Recording and showing of individual images on conventional CF card.
- :: Recording and showing of video scenes on conventional high speed CF card with up to 25/30 images per second.
- :: Administration of the image and video data (saving, copying, renaming and deletion).

The *INVIZ* imaging recorder can be operated with all *INVIZ* camera systems, irrespective of the video standard (PAL or NTSC). As a rule, the video signal made available is detected automatically and reliably. With further accessories, the imaging system can be used even for the camera technology of other manufacturers.

The control pendant can be operated easily through the intuitive menu guidance on the display screen and the keys can be operated even with gloves or protective gear.

The CF card shaft is hidden, in order to protect it from mechanical influences or inadvertent removal of the card. At the same time, the imaging recorder ought to be protected from collisions or falls, in order to prevent damage.

The imaging recorder ought to be regularly cleaned with a soft cloth, cotton bud and 70% isopropanol. Never use aggressive solvent (Acetone)!

The technical specifications of the image recorder:

Screen	
Type	6.5" TFT LCD
Resolution	640 x 480 pixels
Brightness	300cd/m ²
Colour depth	262,144 colours (18-bit)
Media recording	
Flash memory	CompactFlash™ Type I & II cards
Hard disk memory	IBM MicroDrive™ Type II
Size (max.)	CompactFlash™ 2 GB, IBM MicroDrive™ 1GB
Image / video resolution	640 x 480 NTSC / 768 x 512 PAL, JPEG or MJPEG
Recording time video	SP Modus 2 GB, 40 min LP Modus 2 GB / 80 min
Fily system and file format	
Capacity	Main index - 256 folders per 1296 files Size picture file 256 KB
File format	FAT-16 8:3, long file names
Freeze image	JPEG
Video sequence	Motion-JPEG (MJPEG), 25 /12,5 fps
Recommended compact flash cards are:	
Type I	Dane-elec, Lexar
Type II	IBM MicroDrive™
Housing	
Not splash water-tight	
Dimensions	Width 264 x height 95 x depth 172 mm 1,7 kg,

In the menu guidance, there are functions which may not be relevant for your *INVIZ* system. In order to ensure that the image recorder possesses the greatest possible compatibility with many devices, these sub-functions were, however, not removed.

viZaar is always improving or extending the existing software of the image recorder. This can, however, have the result that sub-areas of the function description of the imaging recorder do not immediately correspond to the instructions.

General remarks on digital image and video recording

Although digital conversion takes place in a very high-value procedure, minor conversion losses and picture distortions cannot be excluded given the state of technology; all memory saving jpg image saving procedures, are liable for the defect of edge deformation, i.e. sharp colour transitions appear washed out under slight enlargement. At the same time, metallically reflecting scenes are often provided with the smallest pixels, which were not visible in the original, through the compression procedure.

Besides, there are basic losses during the initial conversion of the analogous video signal into a digital value. Depending upon the bit depth of the converter, important details can disappear: out of dark, "marginal" scenes of the original on the monitor during inspection, possibly only a dark black without statement is saved in principle according to a specified "1 or 0" pattern.

Note carefully:

- :: Digital image data are not secure against illegal manipulation
- :: Make sure that you are able to reliably retrieve the obtained image data 10 years after the inspection and you are able to reproduce it faultlessly!
- :: Adhere to the technical data sheets for lasting care and safekeeping of the storage media.

A



The gallery key shows a selection of the images stored on the memory card., starting with the last recording.



By pressing the key, the last stored image is represented on the screen. By pressing the keys arbitrarily, one can switch to and for between the individual images of the memory. After the last image, the device switches automatically to the first image



By pressing this key, you can retrieve individual sub-menus and options under the main menu. At the same time, the cursor can be moved during text entry (file names).



If you have checked images in the memory archive, you can revert to the live image with this key.



The menu key opens the main menu.



The enter key serves the purpose of confirming the entries made.

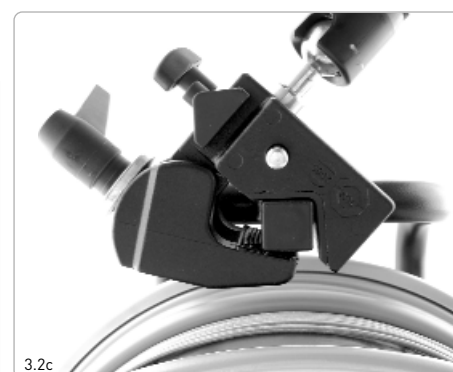


The enter key serves the purpose of confirming the entries made.

3.2a



3.2b



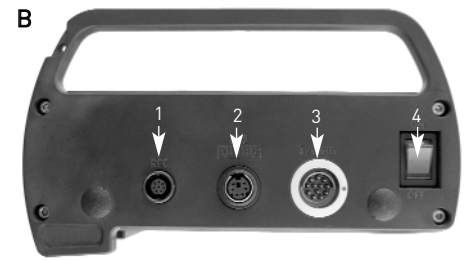
3.2c

Start-up

The operating pendant is connected to the endoscope in off mode at position 3 by means of the 2.5 m long system cord included in the delivery. Now the inspection system can be switched on and can be activated with the main switch 4 of the LCD. The system registers during the start phase with a blue screen and checks the video standard, whereupon the live image of the camera appears after 5 seconds. A manual intervention in the selection of the video standard is activated via the setup menu.

The operating pendant can be held freely, hung around the neck or fastened in the plant or to the system with the optional fastening arm.

- 1 „REC-connection for REC-remote control“
- 2 „Connection for Mini PS2 keyboard“
- 3 „Connection to the system“
- 4 „On-Off-switch“
- 5 „Slot for inserting the flash card“



For fastening the image recorder, tighten the ¼" screw of the mobile supporting arm onto the thread provided for the purpose on the reverse side by turning it a few times and counter it tightly with the ring.

There is a sling belt in the scope of delivery of the imaging recorder, a CF card with minimum 512 MB, a freely available Apple® Quicktime Software (for playing the video sequences on PC under Win XP), a conventional USB card reading device as well as a keypad remote control with 2.5 m cable for comfortable shooting.

For hassle-free handling and viewing of the recorded files, viZaar recommends that you work exclusively with a PC which possesses the operating system Microsoft Windows XP and USB 2.0 interfaces. Documentation and dubbing of the data is possible with this constellation even without intensive PC know-how. This instruction presupposes simple know-how in the handling of files and is not intended to communicate know-how on the handling of image and video files on a computer under any circumstances. Under Windows XP, the card reading device will register itself on its own as a plug & play drive.

viZaar is not liable for the loss of image or video data under any circumstances. Backup image and video files yourself regularly at short intervals on a stationary computer and create backup data media (e.g. CD Rom).

The following points ought to be adhered during the secure handling of image recorders:

- :: Never format the CF card in the PC! Formatting in the PC does not consider the necessity of quick writing access of the imaging recorder. A PC formatting is irreversible, kindly use a new card, otherwise, there is an error message.
- :: Never remove or insert the card in the image recorder when in operation. It is possible that all data or the formatting might be lost.
- :: Incorrect insertion is prevented through a coding of the CF card. Never attempt to push in the card with force. The card is

detached from the insertion contacts and ejected when the push button next to the shaft is pressed.

- :: Never continue to conduct the inspection with apparently defective imaging recorder or defective CF-card. There is risk of data loss!
- :: Ensure that the AC-voltage supply is secure. A failure of the power supply during the saving procedure can lead to irreversible data loss.

Check date / clock time

viZaar sets the date and clock time before the delivery at MST + 1 h. At times, it is necessary to correct the date and clock time at the site of application. The time displayed on the screen is not used by the image recorder and must be separately set by means of a PS2 keypad! The time setting on the imaging recorder is urgently needed for the creation of the file name and description. If the clock time does not remain stored, the back-up battery must be exchanged ex-works.

Subsequently, the key remote control

Das Gerät ist jetzt einsatzbereit.

Working with the image recorder

The following chapter describes the recording and storing of video and freeze images as well as the determination of file names for storing many images and video clips.

In general: Use of the menus

The operating pendant is operated through 8 buttons to the right and left of the screen in connection with a number of screen menus.

In order to recall the main menu, you need to press



(the main menu is superimposed semi-transparently over the video image.)

In order to alternate between different menu points, you need to press



or



In order to select an option, you need to press



In order to quit a menu, you need to press



Pressing the



at any point of time results in the quitting of the respective function and reverting to the previous menu point.

Making a freeze image

In order to freeze an image, you need to press



If an image is frozen, "freeze image" is displayed on the screen.

In order to return to live video display, press once again.



JPG images / selection of image mode

In case the representation of the frozen image flickers due to movement-induced blurred focus, the operating pendant enables half resolution recorded image, wherein the lines of a semi-image are doubled, in order to achieve full PAL or NTSC resolution.

Press



The screen alternates between full image and half-image mode.

while the image is frozen.

In full image mode, one image is generated from two consecutive half-images, whereas in half-image mode, all lines of a half-image are (interpolated) doubled. A full image mode offers a higher, "more real" resolution, whereas a half-image mode is better for representation of faster movements. If representation is in full image a "D" is displayed in the upper right corner of the file name editor.

Press



in order to save the frozen image. The first 6 characters of the file name are the source file name and represent the standardized date in the following format:

JJMMTT (US-date format)

Alternatively another arbitrary source file name can be entered in the menu point source file menu.

The last two alphabets of the file name are automatically assigned consecutive numbers in the sequence 0-9;A-Z. It is, thereby, ensured that every image is assigned a unique file name.

The first numbers are, for example: 00, 01, 02, 03, ..., 09, 0A, 0B, ..., 0Z, 10, 11, ...

Shooting video clips

In order to shoot a video clip, press



(The screen shows the maximum length of the film in the format minutes-seconds, respective of the freely available storage space on the Compact Flash Card.)

In order to start the sequence, press



Or to abort the recording process, press



until the display "Cancel" appears or press



in order to select "Cancel" or press



in order to quit the recording menu.

Viewing of stored images

This section describes how stored images and video clips can be represented, processed and reproduced by means of the preview in the imaging recorder.

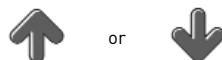
Use of the image gallery, preview

The image preview offers an overview of all the shot images and offers commands which simplify the file management. In order to display the image preview, press



Thereafter, the last 12 images shot in the current image folder are displayed in a miniature preview.

A flashing file name displays the last saved file. Video sequences are displayed with the start image and a recall symbol can be recognized in the lower left corner. For the selection of a miniature picture, move the selection indicator with



In order to jump over several images, keep a key pressed.

(In the image preview, you can run through 12 images at a time and the file name is displayed when you emphasise one image.)

move the indicator on the topmost miniature image on the left side and press



(The preceding 12 miniature images are displayed. In case the previous side contained less than 12 images, the upper left corner of the preview is empty.)

For the display of the following page, move the indicator to the lowest miniature image to the right and press



(The next 12 images are displayed. In case there are no new images, no miniature images are displayed starting from the lower right corner.)

For display of an image in large format or recall of a video clip, identify the miniature image of the respective file in the preview and press



(The freeze image or the film sequence is reproduced. In order to return to the gallery, press



While an image is displayed in large format, the following keys can be used.



Jump to the next image



Cut to the previous image



Display of the selection menu, in order to rename or delete the displayed image.

While a film sequence is being replayed, the following keys can be used:



Pause / rendition



Rewind



Fast forward

In order to quit the selection menu, press



Use of the gallery menu

You can process the indicated files in the gallery with the following options:

Option	Description
Mark	Enables the simultaneous selection of several files
Delete	Deletes the selected files
Move	Moves the selected file to another directory
Copy	Copies the selected file to another directory
Rename	Changes the file name
Change folder	Change directories
New folder	Create a new directory

In order to use the gallery functions, press



The first option in the menu is highlighted

while the gallery is recalled.

Marking of files in the gallery

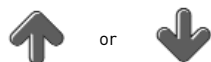
Select the command **MARK** in the gallery menu and press



In order to execute it.

(The **MARK** menu will display through flashing that the selection mode is active.)

In order to select the first image to be marked, use the



keys, in order to highlight the image. Press



in order to mark the image.

(A marking will appear on the miniature image, in order to display that the respective file was marked.)

Through double marking, the files are reverted to their previous state and / or the marking is erased. Mark the other files in the same manner.

If you have selected all the desired files:

Press



in order to return to the gallery menu. Select the function, which you want to use: **Delete**, **Move** or **Copy**.

Press



in order to select the function. Proceed as follows, in order to execute the desired functions:

Deletion of one or several files

Select **Delete** in gallery menu.

Press



in order to select the function.

(A delete menu will appear, in which the deletion must once again be confirmed. Alternatively, one can also abort.)

Press



in order to highlight OK. Press



in order to execute the order. In order to abort the deletion, select

Abort and press



Moving or copying of files

Highlight **MOVE** or **COPY** in the gallery menu. Press



in order to select the function.

(A menu will appear, wherein the further procedure must be confirmed.)

Press



in order to highlight the desired folder.

Press



in order to select the folder. Alternatively you must select



in order to abort the action.

(A folder selection menu is displayed, wherein a list of all folders in the Compact Flash Card is contained.)

Select the desired folder.

Press



(The files are copied or moved to the respective folder.)

In order to rename a file, select **RENAME** from the gallery menu.

Press



(A file name dialogue appears, wherein the further procedure must be confirmed.)

Enter the first 6 alphabets of the file name as follows:

Press



or



in order to alternate between the alphabets A-Z and 0-9. Press



in order to alternate between the 6 symbols. After the entry of the 6. symbol, press



in order to return to the preview menu. (The last two alphabets cannot be changed.)

In order to change the current folder, select **FOLDER** in the preview menu. Press



(A folder selection menu will display a list of all available folders, which are present on the Compact Flash Card.)

Select the desired folder. Press



(The miniature images of the last saved images in the current folder are displayed in the gallery.)

Creation of a new folder

Highlight **+Folder** in the gallery menu. Press



(The +Folder menu is displayed.)

Press



in order to select the standard and create a folder with the standard name "FOLDER" followed by a 2-symbol suffix. Alternatively, press



in order to select arbitrarily and proceed as during the renaming of the files.

Configuration of the main functions

This chapter describes the adjustments which can be made in the main menu, in order to make the control pendant adequate for your application.

Use of the main menu

In order to display the main menu, press



In live video operation.

Video settings

Image resolution – Determination of the Freeze Image Mode:

The ex-works setting is full image, wherein a complete full image is generated from 2 consecutive half-images. The resolution of the recorded image corresponds to the nominal resolution of the NTSC/PAL resolution

The full-image mode is recommended when particularly detail-rich and slowly moving objects are being recorded.

If the function half-image is activated, all images are saved in half-resolution mode. Images of this function possess half the resolution of the corresponding video standard. Through doubling of each line of the recorded half-image, the recorded image is once again blown up to the resolution of the corresponding video standard (PAL or NTSC). The half-image mode is recommended when fast moving objects are being recorded.

Determination of the Shooting Time:

Allows the determination of the length of the video clips.

:: **Long** enables a maximum clip length, but the film sequences can be reproduced

only in half-time resolution on the PC under quick time.

:: **Short** shortens the available shooting time to half of **Long**, but video clips are reproduced in full time resolution on the PC under quick time.

Other settings

Changing the source file name:

Enables the entry of the 6 alphabets of the file name prefix.

:: If the setting is on standard, then each file is preceded by a 6-place name prefix,

which represents the current date in US American format. (MMTTJJ)

:: If arbitrary is selected, the following file name editor is displayed, wherein the 6 alphabets can be determined

Display direction:

In difficult working conditions, the image can be turned upside down if need be at this point, i.e. the operating pendant can be operated in reverse.

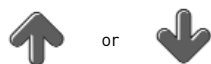
Language:

Enables the setting of the language of the screen menu.

Setup

Sub-menu date and time settings:

In order to change date or time, press

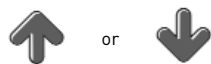


In order to highlight date or time, press



(The first character of the date is highlighted through a flashing cursor.)

Use



in order to change the represented number.

Press



in order to reach the next digit.

If you have changed all values of date and time:

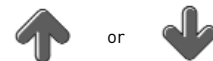


in order to quit the editor mode.

Sub-menu video parameters

Changing the video parameters:

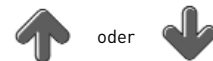
The video settings colour, brightness, saturation and colour shade enable the equalization of deficits of the video source and the adjustment of the video image, e.g., to the light source and the environment. Press



Or until the parameter to be changed is selected and press



in order to change it. Press



in order to change the setting.

(Each of the values can be freely selected between 0 and 9, whereby the ex-works setting is 5.)

Press



in order to quit the editing mode.

Kindly note that these values are saved permanently and the image is likewise stored as changed.

Other settings / file administration

Formatting of a compact flash card:

Select in the main menu **Format Card**. Press **OK** in the sub-menu.

(After the formatting, the Compact Flash Card is assigned to a folder with the name folder AA.)

Formatting deletes irreversibly all data contained on the inserted data carrier!

Changing the folder:

Quick access to the data system without long-winding opening of the gallery. Enables quick changing of the structure of the inserted card. The folder names can be easily adjusted to the inspection conditions on-site.

Press **Change Folder** in the main menu.

(The folder selection sub-menu shows a list of all available folders on the Compact Flash Card.)

Use



or



in order to reach the desired folder.

Press



in order to determine this folder as storage folder.

Creating a folder:

Select **CREATE FOLDER** in the main menu. Proceed as described in the section "Creating a new folder".

Renaming the folder:

Select **RENAME FOLDER** in the main menu. Proceed as described under the section "Renaming a file".

OSD:

Under preparation.

Voltage saving mode:

Leave the setting on "OFF" as long as no battery-supported *INVIZ* system is in use. The display is switched-off after the adjusted time setting. For a restart, the system must be switched-off and then switched-on once again.

3.3 Integrated text generator

Overview

With the INVIZ text generator, you have access to the latest on screen text superimposing technology. It combines splendid image and writing technology with practically unlimited possibilities for individual adjustments. The text generator function is, e.g., used to display different parameters on the screen, like date, clock time etc. or to write-in text to video image. Both the text and the text background can be represented in colour. A speciality in the background is the setting "reduced contrast". Hereby, the background of the characters is represented selectively as transparent through grey to black. In the recommended grey setting, the text background is somewhat darkened. Thereby, the legibility of the text is increased immensely without hiding the image. For further highlighting, a flashing mode is available. Frequently used text can be saved as a fixed word or fixed text and can be retrieved later with a command. Any PS-2 keyboard compatible with the industrial standard can be connected to the operating pendant or the device itself. The instruction at hand refers to a German-language or US keypad with its representations and examples, but minor deviations can occur in the keypad script. A few entries (e.g. date, clock time) are executed via window dialogues. After the conclusion of a window dialogue, the screen is automatically restored, so that you can continue your work at the place you were interrupted earlier. As long as a window is open, only actions which concern this window can be triggered. All other keys are blocked.

The operation of date and clock time is not coupled with the INVIZ imaging recorder, and must be separately adjusted!

A few existing functions like photo counter, positioning are no longer used when the INVIZ inspection systems are in use, and are, thus, no longer described in detail.

Beside the standard settings, the INVIZ text generator can be multifunctionally programmed textually with additional superimpositions from viZaar engineers. Wouldn't the continued superimposition of your company logo be attractive for your customers?

Cursor functions

The cursor can be arbitrarily positioned on the screen. You can use the field with the cursor and the additional keys or steer the cursor movement over the Num block. In doing so, the NUM lock display must be switched-off (switching by means of the Num-key).

Furthermore, for cursor control, the keys **Back, Tab, Shift** as well as **Ctrl, Alt, Delete** are used. The key functions for cursor control are listed in detail in the table at the end of the chapter.

Function recall

The text generator offers you a series of functions. You can, for example, influence the colours for script and background and the text attributes, fixed texts can be used for long text sequences or even entire screen pages can be saved. In the following table, all keypad command are listed. Kindly note that in some cases, the commands can be different from the description in the table. The reason for this is that the commands are programmable and can therefore be distinguished on the basis of different country variants. In this case, you can use the help menu in the data write-in, wherein all functions are likewise present:

Use **F1** in order to open the help menu. With **Page up / Page down** you can scroll. Select the desired command with the arrow keys (**↓, ↑**) and activate Return (**↵**).

*This is programmable and could be changed if desired ** ONLY Panasonic AG 5700 / JVC SR 388 *** Panasonic AG5700/JVC SR 388

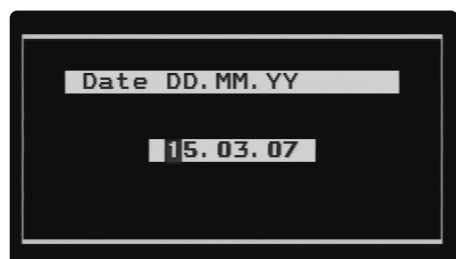
Cursor up	Move cursor up by one line	Ctrl + D	Date on / off
Cursor down	Move cursor down by one line	Ctrl + T	On screen displaying on / off
Cursor right	Move cursor one column to the right	Ctrl + M	Meter counter on / off
Cursor left	Move cursor one column to the left	Ctrl + P	Photo counter on / off
Home	Move cursor to the start of the line	Ctrl + U	Clocktime on / off
End	Move cursor to the end of the line	Alt + F1	Status line 1 on / off
Page up	Move cursor to the start of the page	Alt + F2	Status line 2 on / off
Page down	Move cursor to the end of the page	Alt + F3	Status line 3 on / off
Back	Delete the previous character	Alt + F4	Status line 4 on / off
Delete	Delete current character	Ctrl + Alt + S	Pan position on / off
Alt + Delete	Delete line from cursor onwards	Ctrl + Alt + N	Tit position on / off
Shift + Delete	Delete current line	F2 ... F11	Load fixed page 1 ... 10
Ctrl + Delete	Delete current page	Ctrl + Alt + F2 ... F11	Save fixed page 1 10
Tab	Move cursor to the right by n (8) characters*	Ctrl + F1	Video recorder stop**
Shift + Tab	Move cursor to the left by n (8) characters*	Ctrl + F3	Rewind video recorder**
ESC	Quitting a window without changes	Ctrl + F4	Video recorder rendition rewind***
Enter	Return / confirm entry or change	Ctrl + F5	Video recorder rendition **
Ctrl + M	Set the meter counter on 0	Ctrl + F6	Fast forward video recorder**
Ctrl + P	Increase photo counter by 1	Ctrl + F7	Position video recorder**
Alt + W + nn + F12	Print memorized word # nn	Ctrl + F8	Pause video recorder**
Help Menu F1	Set date	Ctrl + F9	Shoot video recorder **
Ctrl + F	Select character colour	Ctrl + F10	Pre-set video-time**
Ctrl + H	Select background colour	Ctrl + F11	Set the video time on 0**
Alt + M	Set position meter	Ctrl + F12	Video recorder eject**
Help Menu F1	Set photo counter	Ctrl + Alt + +	Increase background contrast
Ctrl + S	Selection memory window page	Ctrl + Alt + -	Reduce background contrast
Ctrl + W	Selection memory window word	Ctrl + +	Increase character colour (see colour selection)
Help Menu F1	Set clocktime	Ctrl + -	Reduce character colour (see colour selection)
Ctrl + B	Flashing mode text on / off	Alt + +	Increase background colour (see colour selection)
Ctrl + C	Cursor on / off	Alt + -	Reduce background colour (see colour selection)
Ctrl + Alt + Delete	Triggers a warm start	Ctrl + I	System information
Ctrl + L	Switches the superimposed logo on / off		

Date and clocktime

Date and clocktime are setted through the help menu. Use **F1** key and go to page 4 with **Page down**. Choose the desired command with (**↓**, **↑**) and press (**↵**).

An entry window appears wherein the respective value is entered in six digits. Implausible entries, like e.g. hours above 24 and dates beyond 31, are ignored. The window is shut and the entry value is accepted as soon as you activate **ENTER** with **ESC**.

The display of date and clocktime can be switched-on and off via the commands **Ctrl + D** and / or **Ctrl + U**.



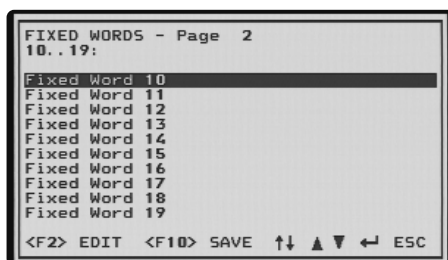
3.3a

Fixed words

The INVIZ text generator possesses a memory for individual text entries, which are retained even after switching-off. In all, 100 fixed words (fixed word 00 up to fixed word 99) with 36 characters each can be accommodated.

The entry window for fixed words is opened with the command **Ctrl + W**. If you wish to enter or change a fixed word, use the cursor keys (**↓**, **↑**) in order to reach the desired line. With **F2** you shall reach the entry mode. End the entry with (**↵**) and save the entered word macro with **F10**. If you quit the line with **ESC** the change is not saved.

If you wish to display an existing fixed word on the screen, select the corresponding line and activate (**↵**). You can reach the next and / or the previous page in the selection window via **Page up** or **Page down**. If you wish to display a fixed word on the monitor and know its number, it is not necessary to recall the entry window. Use **Alt + W**, then enter the word macro number (e.g. 09) and subsequently activate the key **F12**.



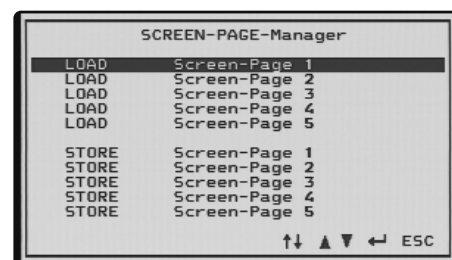
3.3b

Page macros / Memory

You can save up to 10 screen pages. Thereby, only the data written-in but not the background video image and status lines are displayed. Take note of the following: The space vacated by switched-off status lines, is available to you for the entry. If a saved fixed page is recalled, wherein status lines were switched-off and their place was described, this text is no more visible, if the respective status line is now switched-on. You can e.g. use the fixed pages to create forms which are needed repeatedly. If you retrieve a fixed page, the current screen content is overwritten. Should you still need it, save it as fixed page in advance.

In this case, use the commands **Ctrl + Alt + F2 ... F11** for saving. The window for loading or saving the fixed pages is opened with the command **Ctrl + S**. Use the cursor keys (**↓**, **↑**) in order to reach the desired line and load or save with (**↵**).

If you quit the window with **ESC** no change is undertaken. The next and / or previous selection window can be reached via **Page up** and / or **Page down**. To load a fixed page on the screen, it's not necessary to recall the entry window. Use **F2 ... F11** (pages 1 to 10) to load.

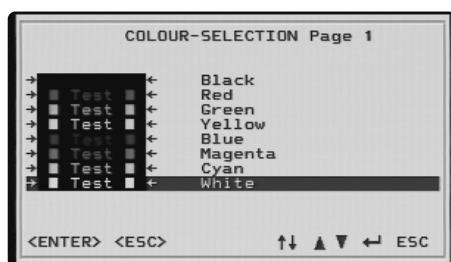


3.3c

Characters and background colour

In the data superimposition, both the characters as well as the background can be represented in colour. The setting is valid from the current cursor position onwards, and is retained until a new colour selection is made.

The advantage of the colour rendition is that, e.g., you have the possibility of especially highlighting important text passages. Through the setting of the background, one succeeds in highlighting the text from the video image under any circumstances. In addition to the different colour renditions, the background can even be selected in transparent or reduced mode. Transparent means that the video image can be directly seen behind the text. Reduced is a semi-transparent background. If you have selected the reduced background for a text, there is the further possibility of adjusting the background contrast. Via the commands **Alt + +** and / or **Alt + -** you can select different gradations from transparent to black.



3.3d

Flash mode

The colour selection window for the script is recalled via the command **Ctrl + F** and **Ctrl + H** for the background. With the cursor keys (↓, ↑) and the enter key (↵) you can select the desired colour. With Page up and Page down you can scroll between the pages of the colour selection window but also via key combinations. By using **Ctrl + Alt + +** and / or **Ctrl + Alt + -** the background colour is enhanced and / or reduced. Important data entries, which you wish to mark especially, can be highlighted with the flash attribute. For alternating between continuous and flashing display, select the key combination **Ctrl + B**. The flashing mode remains active until it is switched-off or the data write-in is switched-off.

Cursor

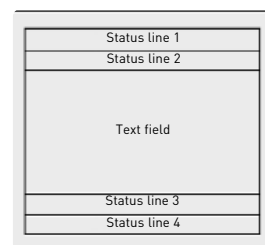
The cursor is recognizable as a white rectangle in the monitor. For some applications, it is desirable to make the cursor invisible. For this, use the key combination **Ctrl + C**. The cursor can no longer be seen, yet it retains its full function and can be switched-on again through renewed activation of the said keys.

Fade-in

If you wish to observe the video image without text superimposition and status lines, you can completely shadow the data superimposition through the command **Ctrl + T**. The image content is, however, preserved, and is displayed once again upon reuse of this command. Please note, that all entries like text data or control commands are processed even without visible data superimposition.

Status lines

On the screen, 40 columns and 25 lines (image standard PAL) and / or 21 cells (image standard NTSC) are available for the data write-in. The first and the last two lines are the so-called status lines. As a rule, they are reserved for the measured value and / or parameter superimposition and are not overwritten by text. In case you need less than 4 status lines for the measured value superimposition, the remaining lines are automatically used as normal text lines by means of switching-off the status lines. There is a possibility of positioning status fields even in the text area. This is however not recommendable, since they can be overwritten there by text entries. Via the key combination **Alt + F1 ... Alt + F4** you can switch-on and off individual status lines. Further adjustment possibilities for status lines and fields are contained in user setup.



3.3e

Warm start

With the key combination **Ctrl + Alt + Del** you can trigger a restart of the system without switching-off the endoscope. A warm start is not necessary in normal operation.

5 Getting started

After the initial startup of the INVIZ system, the following points may be noticed by you:

- :: The image is out of focus. The manually adjustable optic was adjusted ex-works to a focal distance of approx. 100 mm. The focal range was not conceived for the observation of the environment.
- :: The image inside the application appears dark or too bright. Reduce or increase the light as described under initial operation. If the light output is still too low, check all LED's illuminating or consider the light output not being enough for this particular cavity / pipe – usage of optional 40mm head is recommended.

In the following, we have collected a few general empirical values, which can help you to economically achieve utilizable inspection results quicker and lastingly. The points do not concern your work safety, but exclusively serve the purpose of communicating general technical knowledge.

Before introducing the probe into a cavity or a pipeline, it must always be ensured:

- :: That the highest permissible operating temperature (e.g. 65° C) of the probe is not exceeded. A sure sign for too high a temperature is the appearance of white pixels; the device must be immediately switched-off and the probe must be removed from the application urgently. One-time temperatures above 84° C destroy the camera head irreversibly. Fresh weld seams in pipelines have high local temperatures, which quickly lead to the destruction of the instrument!
- :: That the application is free of acids, alkali, oils and solvents. All non ph-neutral liquid media may destroy different parts of the probe.
- :: That the application is not impurified with liquids, the viscosity of which lies below that of water (e.g. glysantine).
- :: That the entry point is deburred; sharp edges damage the braiding of the insertion tube.
- :: That the sheathing of the distal probe end is not visibly damaged and leaky right from the beginning.

- :: That no elements in the application can be activated, e.g. remote control valves, turbine rotors, agitators etc.
- :: For achieving meaningful inspection results, the application ought to be cleaned in advance, as long as depositions need not be documented. In case of unclean plants, the optic or the light out of the camera is dirtied fast.
- :: The probe must be inserted inside plants only when it is clean, in order to prevent so-called "cross contamination". This is in particular true for the food and pharmaceuticals field.
- :: Therefore, the probe shall never be inserted in the sewerage.
- :: Autoclaving is not possible.
- :: The farther you insert a probe, the greater is the danger that it might get stuck. In principle, an endoscopic probe can be more easily inserted than extracted, as far as straight, narrow and steep pipelines are not being inspected. In perimeters (e.g. heating pipes at apparatus and reactors) this can lead to self-obstruction – similar to a lasso. Do not lose your nerves in such a case- there are often different methods of disengaging the probe without opening the plant or destroying the probe. The risk of getting stuck on steps is increased with the employment of centering tools. In principle, never use force while releasing! The manufacturer offers a foreign parts retrieving service.
- :: In order to limit the long-time action of unknown substances, the probe ought to be cleaned after use.
- :: Mount your equipment basically in such a manner, that it stands absolutely securely. Fundamentally, the probe does not possess the constructive characteristics of stopping a free fall of the control device without breaking. Through an insecure mounting, you are principally seriously endangering persons, who are working on levels beneath you. At the same time, strong jolts are resented by a rotating arc lamp, besides shortening its lifetime, possibly accompanied by total failure.
- :: Ensure that no one can tread on the probe. Wind up superfluous probe lengths immediately. This is all the more valid, if vehicles are moving in the vicinity or your inspection takes place on a steel grating.

Further advice from practice:

- :: If the illumination of your endoscope is not sufficient in an axial inspection (view angle 0°), the environment can be brightened with a white styrofoam piece or a paper ball, which are moved in front of the endoscope. Attention, connect styrofoam or paper well with a fishing line, in order to ensure a simple retrieval.
- :: You can mark the probe with coloured insulation tape at regular intervals, in order to localize the inspection spot more easily. Kindly take a zig-zag position of the probe into calculation.
- :: A stuck probe can be released with deliberate rotation and simultaneous pulling or even pushing. In connection with centering tools, steps or down-coming, T-outlets with downward incline, can be jumped over a "swing"; heavy centering tools ought to be manoeuvred around the T-piece laterally on the wall (simultaneous highrolling).
- :: The friction while the probe is stuck through self-obstruction can be strongly reduced through a streaming liquid (in the simplest case, water). Furthermore, there's the possibility of releasing the stuck probe by means of remote controlled motorized tongs, slings and additional endoscope technology. In extreme urgency, it can be considered whether a retrieval of the probe by accessing it from the opposite end of the pipe is possible. For this, you ought to contact the manufacturer, who can give you technically correct instructions for releasing the probe from the control device. viZaar even makes service technicians available for this difficult task, which will support you on-site.

Further questions in respect of the selection of the device technology or settings, all viZaar co-workers and dealers are gladly available to you for help.

6 Care, maintenance and repair

6.1 Cleaning of the system

Endoscope reel, LCD panel, light out and camera ought to be regularly cleaned with a soft cloth, cotton bud and 70% isopropanol. Never clean the light emission with a solvent (e.g. acetone)!

A dirty probe, as far as watertight, can be cleaned with soap water.

6.2 Maintaining of the O-ring

To keep Viton O-ring watertight kindly attach some silicon-grease to the head O-ring from time to time again.

6.3 Maintenance by the manufacturer

Even if your device apparently still functions, the manufacturer can noticeably improve the functional safety during a maintenance by his trained personnel, and prevent possibly greater defects in advance.

- :: Check of the probe, of the extra-flexible articulating section and of the camera for water-tightness.
- :: Care / exchange of the sealings at the camera optic, check of the optical qualities and that of the camera.
- :: Check of the probe for dangerous squeezes, documentation of the destroyed probe sheathing braid, removal of freight wires.
- :: Check of the LED's.
- :: Safety check according to accident protection regulations and VDE.
- :: Concluding report.

Use the standstill time between the inspections in order to prevent an unexpected breakdown. We recommend annual maintenance intervals and/or after 500 operating hours each time.

A damage to the miniature camera head means repair costs to the extent of up to 40% of the acquisition costs! Therefore, handle the device with care in principle. You can, by the way, insure your video endoscope through many industrial insurance schemes with an electronic insurance, e.g. insure against operating impacts and loss.



Ask up to seven days after delivery for the cost of a guarantee extension or generally for a maintenance contract!

IMPORTANT:

viZaar is not liable for accidents or damage to devices, which are caused by repair attempts by unauthorized persons. viZaar does not repair systems in its own workshop systems, which are contaminated with dangerous substances.

6.4 Transport

The probe system can be shipped with optional case without repacking through a courier service or it can be transported personally. The case must be secured against inadvertent opening through strap-ping.

- :: Due to the strict demands of courier services in terms of packing, we recommend that you pack all fragile accessories well with air bubble foil.
- :: Video cable and network cable can be packed in the accessory bag. The tableau cable can be wound around the handle.
- :: The reel brake ought to be hand tightened.
- :: It is recommended that you fix the coiled layers of the probe with an adhesive tape or cable binder temporarily before a courier transportation or flight travel.

6.5 Customer service

Should there be problems or disturbances in the device, kindly contact your local dealer or factory customer service:

viZaar industrial imaging AG
VT repair service
Hechinger Straße 152
72461 Albstadt

Germany

Tel: +49 (0) 7432 98375-0
Fax +49 (0) 7432 98375-50

Do not send the device without establishing contact previously via fax / telephone.

viZaar also offers an on-site repair service of contaminated *INVIZ* – devices in nuclear installations. Kindly establish telephonic contact with us in case of need!

7 Guarantee, technical data and conformity

7.1 Guarantee

viZaar guarantees, that all video endoscope system components are faultless in respect of material and fabrication. The obligation from this guarantee is restricted to the repair and the exchange of all parts, wherein an error occurred proper use. The guarantee starts with the delivery of the device to the end consumer by an authorised viZaar dealer or directly from viZaar.

The guarantee period is restricted to one year. The guarantee is valid for the buyer, and/or end consumer, and cannot be transferred to third parties. The guarantee expires for products, which are damaged through accident, transport, alteration, improper storage or non-purposive application, or are opened and/or repaired by unauthorized persons.

Excluded from this guarantee regulation are:

- :: Wear and tear parts like lamps, steering cables, braid work and light fibres.
- :: Assembly groups exposed to risks like: Water damage in the motor drive unit, heat damage to the probe head etc.
- :: Merchandise like video recorder, monitor, etc., which have a separate manufacturer guarantee.

Special fabrications are subject to a special guarantee agreement

viZaar does not undertake any guarantee for damages to the device, which have occurred through the insertion in plants with electrical potential error.

During application in the hot zone of nuclear plants the guarantee claim expires in principle for the function of the camera head. This is valid, in particular, for the CCD image, the optic sensor, sealing plastics and the light fibres. For all further guarantee claims of contaminated devices, viZaar offers an on-site service against travel payment.

7.2 General device specifications

Device dimensions

All individual device dimensions are listed in the individual sub-chapters of the different systems.

Operating conditions

All individual operating conditions are listed in the individual sub-chapters of the different systems

General system data

- :: 96VAC - 246VAC / 30W continuous / 2A starting current
- :: 45Hz - 60Hz
- :: Composite/ F-BAS video out (Y1,0Vpp/C0,3Vpp), impedance 750hm
- :: PAL or NTSC video standard deliverable
- :: Probe and camera materials: polyurethane, polyolefin, VA-steel, viton, epoxy resin, acrylic, glass, Lexan
- :: White LED illumination

Camera / camera head

All individual camera parameters are listed in the individual chapter of the different systems.

viZaar reserves the right to errors and changes attributable to technical progress.

7.3 Disposal of the device after end of life-expectancy

All the devices of viZaar described in this instructions manual shall be taken back for disposal by viZaar without any time-limit and free of cost if desired by the legitimate possessor. viZaar shall not pay for the costs of delivery. Prerequisite is a largely clean condition without adhering product residues or other toxic contaminations. The device must never be left next to household or bulky waste, but must be disintegrated in component types and must be introduced in the commercial recycling system. The device contains electro-chemical (storage) support batteries and minor parts of heavy metals, which must be properly disposed of and recycled in accordance with the valid guidelines within the EC.



6.4 Confirmation of CE conformity

This device possesses CE- identification and fulfills the conformity with standardisation EN 50081-2. The fulfillment of this standard presupposes the application in industrial area.

The device is designed for an application under the following electro-magnetic conditions:

“commercial and, to a limited extent, industrial segment (E2)”.

Manufacturer:

viZaar industrial imaging AG
Hechinger Straße 152
72461 Albstadt

Germany

