

INSTRUCTIONS FOR USE

ARTip solo

Status: 2025-08

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1 Introduction

Please read this instructions for use to learn about the correct use of the ARTip solo before using it for the first time.

Keep the instructions for use close to the site of operation and ensure that the user can access it at all times.

	Never use the ARTip solo in the OR without having been instructed by an authorised person in its safe use.
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1.1 Purpose of the document

This document tells you how to handle the ARTip solo. In conjunction with the instructions by our trained specialists, it allows you to safely handle the ARTip solo.


This document has been created for anyone put in charge with the setup, operation and cleaning of the device.

1.2 Notes on this document

Notes to avoid damage to property:

	This symbol is found in front of notes to assist the user, to facilitate the use of the device or to prevent faults.
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Safety information to avoid risk of injury:





	This symbol indicates safety information. Non-compliance with the corresponding information may lead to damage or even injuries for the patients and / or the user.
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






Words written in CAPITAL LETTERS indicate parts or accessories of the system as well as important terms regarding their use.








1.3 Important notes on the safe handling (summary)

The incorrect operation or non-compliance with precautionary measures may cause serious incidents, injuries of patients or damage to persons or material.

Therefore, use this instruction manual to fully inform yourself about the correct operation and handling of the ARTip solo.

	Never use the ARTip solo in the OR without having been instructed by an authorised person in its safe use.
	Make sure that the rail of the operating table is secured and locked before using the device.
	Continuously monitor the patient and the ARTip solo while you control one of the powered movements.
	Never open the ARTip solo or the POWER SUPPLY. Risk of an electric shock!

	Always steady the endoscope before you unlock the quick fastener between endoscope and ENDOSCOPE CLAMP, as well as between ENDOSCOPE CLAMP and UNIVERSAL JOINT.
	The device is not intended for the operation in explosive areas. Ensure a sufficient distance to highly flammable gases (e.g. O ₂ , anaesthetic gases).
	Do not reach into the system's range of motion during the movement.
	The TROLLEY is intended for the storage and transport of the ARTip solo when not in use. Never use the TROLLEY to place the ARTip solo next to the operating table during the application.
	Devices that are connected to the analogue and digital interfaces of the ARTip solo must comply with the standards for electromedical devices. All configurations must meet the requirements of the system standard EN 60601-1. The person connecting additional devices is responsible for the compliance with this standard!
	Warning: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
	Warning: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ARTip solo, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.
	All serious incidents related to the product must be reported to the manufacturer and the competent authority in the country concerned.
	Do not use a STERILE COVER if you can detect damage to the packaging or the STERILE COVER itself!
	Modifications to the device are not permitted.
	Check the configuration for any possible collision with parts of the operating table before using the device. The maximum transverse tilt depends on the respective operating table.
	Operate the ARTip solo only when it has reached room temperature again after a previous storage at high or low temperatures.
	Avoid tripping hazards when connecting the cables.
	Never place the UNIVERSAL JOINT, ENDOSCOPE CLAMP, TENSION SLEEVE, MOUNT-1A and JOYSTICK together with dirty surgical instruments into a disinfection bath.
	After use, do not store the UNIVERSAL JOINT, ENDOSCOPE CLAMP, TENSION SLEEVE, MOUNT-1A and JOYSTICK together with dirty surgical instruments in a container.

	<p>All components to be used in a sterile condition - except the STERILE COVER - are delivered in a non-sterile condition.</p> <p>Prior to their first application, you must carry out the <i>complete</i> treatment of the sterilisable components in accordance with the "Processing instructions IIA – EN 2039-210049"!</p>
	<p>Except for the UNIVERSAL JOINT, the JOYSTICK, the TENSION SLEEVE, the MOUNT-1A and the ENDOSCOPE CLAMP - the ARTip solo as well as the POWER SUPPLY are not suited for the mechanical/ automated cleaning or disinfection process!</p>
	<p>The quick clamping for the docking to the operating table is designed for a maximum Trendelenburg position of 30°. Never exceed that range.</p>
	<p>Should there be a power failure while using the device, check its safe operation prior to the next use!</p>
	<p>Pull the power plug of the POWER SUPPLY in order to completely disconnect this device from the mains. Make sure that the POWER SUPPLY can be accessed at any time.</p>
	<p>Should there be a power failure or should the POWER SUPPLY be accidentally disconnected during use, the TROCAR POINT will be lost and must be reset.</p>
	<p>Positions outside the shown range of motion cannot be reached!</p> <p>Should one or several axes have reached their maximum joint angle, the movement of the ARTip solo will stop! In order to prevent this, place the arm preferably in a central location in the operating field.</p>

1.4 Modifications

Subject to technical modifications!

Both the device and the instructions for use are developed and improved on a continuous basis. Some illustrations may therefore slightly differ from the actual delivery condition.

These instructions for use have been prepared with the utmost care. We are not liable for mistakes and printing errors!

Your improvement suggestions in regard to our products or these instructions for use are always welcome. Please contact the address provided in this instructions for use or your competent sales partner.

1.5 General product description

The ARTip solo simulates an arm working in several degrees of freedom. The endoscopic camera is registered in the TROCAR POINT which serves as a pivot point. Based on this zero point, the device calculates the required individual movements of the axes in order to achieve the desired total movement.

The ARTip solo is equipped with an electromechanical drive in order to perform the arm movements. An integrated activation function allows you to manually move the ARTip solo at the push of a button.

The system provides for a large range of motion that allows for an all-round view of 360 ° and this with an inclination of the endoscope of up to 90 ° to the perpendicular.

An ergonomic JOYSTICK is used as an input device for the non-dominant hand of the surgeon. It can be mounted to all common MIC tools using the appropriate adaptors.

The ARTip solo is lightweight and compact despite its large range of motion and is fastened directly to the Operating table using a quick-clamping system. A repositioning and registration to the patient is not necessary even if the Operating table has been moved in the meantime. To allow the surgeon to convert to an open surgery in case of an emergency, the ARTip solo can be completely removed in the shortest possible time.

During the development of the ARTip solo, we attached importance to a constant availability and extensive reusability. For this reason, you will need only one STERILE COVER per operation for a safe application.

The sterilisation inside a fractional vacuum at 134°C puts a lot of strain on the material. That is why all components that are treated will have only a limited life despite the use of selected materials. For more information on this, please refer to "Processing instructions IIA – EN 2039-210049".

The product works with software. You can find out more in document 1515-240319 (Cybersecurity label – Soloassist), which is available on request.

1.6 Intended use / Notes on product liability

Essential Performance:

Stable fixation of an endoscope

The system holds an endoscope in a fixed position, which was adjusted by the user. This will also be assured when power is lost.

Enabling the repositioning of an endoscope



The system enables the user to reposition the endoscope by use of the JOYSTICK or the ARTip solo VOICE. In case of power loss or other failures this function is not available or may be degraded.

Manual repositioning of the endoscope

The system enables the user to reposition the endoscope by hand by pushing a button. In case of power loss this function is not available.

Environment:

Operating room. The ARTip solo must be firmly connected to the operating table during its use. It is not permitted to place it on an equipment trolley, a side table or similar.

	The TROLLEY is intended for the storage and transport of the ARTip solo when not in use. Never use the TROLLEY to place the ARTip solo next to the operating table during the application.
	The device is not intended for the operation in explosive areas. Ensure a sufficient distance to highly flammable gases (e.g. O ₂ , anaesthetic gases).

During HF Surgery, the ARTip solo is only compatible with following HF SURGICAL EQUIPMENT:

Power Cut mode capability of 300 W, working frequencies to include at least 400 kHz \pm 100 kHz;

Coagulation mode capability of 100 W, working frequencies to include at least 400 kHz \pm 100 kHz;

The ARTip solo can not be used for argon plasma coagulation mode.

User Group:

A mandatory requirement for using the ARTip solo is the proper assembly and maintenance of the device as well the compliance with this instruction manual.

The ARTip solo is used primarily by the surgeon performing the operation. He must have sufficient experience in the use of minimally invasive operating techniques and received instructions in the handling of the ARTip solo. The device may be operated exclusively by instructed personnel. The instruction is to be documented.

Application:

Holding and guiding the endoscopic camera for the minimally invasive intervention in abdominal surgery, thoracic surgery, urology or gynaecology.

The intended use of the ARTip solo is a robotic computer driven system whose function is to hold and position a rigid laparoscope / endoscope.

Contraindications:

The ARTip solo is controlled by the surgeon performing the operation. In case of intraoperative complications that can not be managed laparoscopically and the surgeon must convert to an open surgery, it has to be ensured that the required medical personnel is available.

The ARTip solo may not be used for fields other than the application fields named above. The ARTip solo may be used exclusively for holding and moving an endoscope.

The manufacturer will only consider himself liable for the safety-related characteristics, reliability and performance if

- the user has been fully instructed in the proper use of the device.
- the readjustments, modifications or repairs are performed exclusively by the manufacturer or an institution expressly authorised by the manufacturer.
- the device is used under the specified environmental conditions in rooms used for medical purposes in which the electrical installation meets the requirements of the VDE 0100-710 or IEC 60364-7-10 standard.
- the device is used entirely in accordance with this instruction manual.

Clinical Benefit:

The ARTip solo has indirect clinical benefit for the patient. The benefits of the device lie primarily with the user. The positioning or fixation of the endoscope during minimally invasive interventions using robotic systems relieves the assistant from a long-lasting static holding task while allowing for solo procedures with a stable endoscope image.

Warranty:

The manufacturer issues a 12 month warranty on the performance of the product. The period of validity of this warranty is limited to claims that have been immediately asserted in writing within the named period after the invoice date - if applicable, with a reference to repairs stating the invoice number. Legal warranty claims are not restricted by this warranty.

If you did not purchase the product directly from the manufacturer, please contact your sales partner for the processing of the warranty.

This warranty covers only defects that have not been caused by normal wear, misuse, improper handling, external influences, deficient or incorrect preparations, or force majeure.

All warranty claims will be lost if the user itself or a non-authorized repair shop has carried out repairs or modifications on the product.

Liability claims arising from the improper use or from a combination with other devices or accessories can not be asserted.



All serious incidents related to the product must be reported to the manufacturer and the competent authority in the country concerned.

1.7 Receiving inspection

Please check the ARTip solo and the enclosed accessories immediately upon receipt for possible transport damage and defects.



Claims for damages can be asserted only if the seller or the freight forwarder is immediately informed. A damage report has to be prepared immediately. The damage report must be submitted directly to the manufacturer or the representative of the manufacturer so that the claims for damages can be reported to the insurance company.

When a device is returned to the manufacturer, use, if possible, the original packaging. The following accompanying documents are to be enclosed: Name and address of the owner, ID and serial number (see name plate) as well as a description of the defect.

1.8 Initial operation

The operator may operate the ARTip solo only after the manufacturer or the supplier:

- has performed a functional test of the devices at the place of operation and
- has instructed the persons responsible for the operation in the proper handling of the ARTip solo based on this instruction manual.

	All components to be used in a sterile condition - except the STERILE COVER - are delivered in a non-sterile condition. Prior to their first application, you must carry out the <i>complete</i> treatment of the sterilisable components in accordance with the "Processing instructions IIA – EN 2039-210049“!
	Operate the ARTip solo only when it has reached room temperature again after a previous storage at high or low temperatures.

2 System Description

2.1 Overview

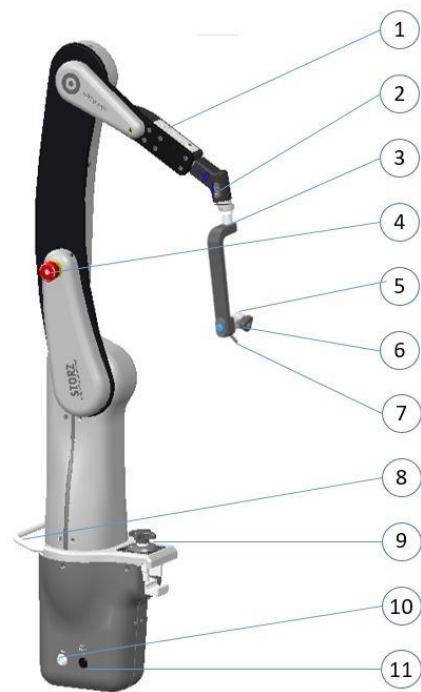


fig. 1: System overview

Number	Description
1	Control panel
2	Releasing slider
3	UNIVERSAL JOINT
4	Emergency stop
5	ENDOSCOPE CLAMP
6	TENSION SLEEVE
7	TRACER PIN
8	Handle
9	Quick-fastener for fastening to the operating table
10	Control connection (JOYSTICK / ARTip solo VOICE)
11	Power Supply connection

Table 1: System overview

2.2 System components

Component	Picture	Description
ARTip solo Arm (multiple patient multiple use)		The ARTip solo arm is the executing component and is fastened via a quick-fastener to the operating table.
POWER SUPPLY (multiple patient multiple use)		The POWER SUPPLY supplies the ARTip solo with the required operating voltage and is designed for a wide input voltage range. Use only the original POWER SUPPLY with the supplied cables.
POWER CORD (multiple patient multiple use)		The POWER CORD supplies the POWER SUPPLY with AC current. Use exclusively the POWER CORD supplied with the equipment or country specific POWER CORDS.
SUPPLY CABLE (multiple patient multiple use)		The SUPPLY CABLE is used to establish the electrical connection between the ARTip solo and the POWER SUPPLY. The SUPPLY CABLE is 3.5m long. Use exclusively the SUPPLY CABLE supplied with the equipment.

Component	Picture	Description
UNIVERSAL JOINT (multiple patient multiple use)		<p>The UNIVERSAL JOINT is a pivoting connection between the ARTip solo and the ENDOSCOPE CLAMP.</p> <p>The UNIVERSAL JOINT is autoclavable; the useful life is at least 500 cycles</p>
TENSION SLEEVE (multiple patient multiple use)		<p>The TENSION SLEEVE accepts the endoscope in a secure and gentle way. They are available for endoscopes with 4 mm, 5 mm and 10 mm as well as for endoscopes measuring up to 12.7 mm.</p> <p>The TENSION SLEEVES are marked with different colors.</p> <p>The TENSION SLEEVE is autoclavable; the useful life is at least 100 cycles</p>
ENDOSCOPE CLAMP (multiple patient multiple use)		<p>In combination with the TENSION SLEEVE, the ENDOSCOPE CLAMP is a pivoting connection between UNIVERSAL JOINT and endoscope.</p> <p>The ENDOSCOPE CLAMP is autoclavable; the useful life is at least 500 cycles.</p>
JOYSTICK (multiple patient multiple use)		<p>The JOYSTICK is used to move the ARTip solo.</p> <p>The JOYSTICK is autoclavable; the useful life is up to 150 cycles.</p> <p>Since the JOYSTICK is safety-relevant for the operation of the ARTip solo, its use is electronically limited to 150 operations.</p> <p>There is a left and a right variant of the JOYSTICK. For more details, refer to the instructions for use for the JOYSTICK-IIA: 2039-210048.</p>
MOUNT-1A (multiple patient multiple use)		<p>The MOUNT-1A fits most surgical handles and is the standard attachment for the JOYSTICK.</p> <p>The MOUNT-1A can be reconditioned for at least 500 cycles.</p> <p>There are further mounting options for the handles that deviate from the standard. For more details, refer to the instructions for use for the JOYSTICK-IIA: 2039-210048.</p>

Component	Picture	Description
STERILISATION TRAY (multiple patient multiple use)		<p>The STERILISATION TRAY with fixture for the UNIVERSAL JOINT is intended for the mechanical cleaning.</p> <p>It also provides space for the JOYSTICK, the MOUNT-1A, the ENDOSCOPE CLAMP and for two TENSION SLEEVE.</p>
STERILE COVER (single use)		For the sterile single-use covering of the ARTip solo.
ARTip solo VOICE (multiple patient multiple use)		<p>The ARTip solo VOICE is an alternative for the JOYSTICK to reposition the ARTip solo.</p> <p>The ARTip solo VOICE evaluates the spoken commands of the user and transmits them to the ARTip solo.</p> <p>For more details, refer to the instruction manual for the ARTip solo VOICE: 2039-210047.</p>
TROLLEY (multiple patient multiple use)		The TROLLEY is intended for the storage as well as transport of the ARTip solo when not in use.

Table 2: Components and accessories

Overview accessories and spare parts:

When ordering the parts, please contact the manufacturer or the corresponding representative directly.

Please use only original accessories. The use of accessories not approved by the manufacturer may pose a risk to the patient and lead to damage on the device.

Article number	Article name	Name
202426	ARTip solo	ARTip solo
172035	POWER SUPPLY	POWER SUPPLY
182205	POWER CORD	POWER CORD
172054	SUPPLY CABLE	SUPPLY CABLE
141362	UNIVERSAL JOINT	UNIVERSAL JOINT
141363	ENDOSCOPE CLAMP	ENDOSCOPE CLAMP
161774	TENSION SLEEVE D4	TENSION SLEEVE 4 mm
141365	TENSION SLEEVE D5	TENSION SLEEVE 5 mm
141339	TENSION SLEEVE D10	TENSION SLEEVE 10 mm
161773	TENSION SLEEVE D12.7	TENSION SLEEVE 12.7 mm
110084 *	STERILE COVER PU/ 50 ea.	STERILE COVER for ARTip solo, PU with 50 pieces REF 6001-40001
242702 *	STERILE COVER PU/ 50 ea.	STERILE COVER for ARTip solo, PU with 50 pieces REF E6785
202428	JOYSTICK-LH-IIA	JOYSTICK for the left non-dominant instrument
172066	MOUNT-1A	MOUNT-1A suitable for most instruments
202429	Set ARTip solo voice	Set ARTip solo VOICE
172099	STERILISATION TRAY	STERILISATION TRAY for sterilisable parts
120874	TROLLEY	TROLLEY
2039-210046	Manual ARTip solo - EN	-
2039-210049	Processing instructions IIA - EN	-
2039-210048	Manual JOYSTICK-IIA - EN	-

Table 3: Accessories and spare parts

* The two STERILE COVERS REF 6001-40001 and REF E6785 are matched to the device in terms of fit and function; due to country-specific approvals, only one STERILE COVER may be available in each case.

2.3 Mechanical data

Weight	11,5 kg
Dimensions (W x H x D)	167 x 1059 x 291 mm
Safe working load	1 kg

Connection to the operating table Quick-fastener, suitable for European and US standard rails

Range of motion:

The positions reached by the ARTip solo depend on the select cantilever position (see 3.1 / step 3) as well as the positioning at the operating table. The following figure illustrates the range of motion. The area that can be reached by the tip of the arm is highlighted in yellow.

The range of motion is to be measured in such a way that the endoscope can be moved at least within a 300 mm semi-sphere radius around the TROCAR POINT. There are sufficient reserves available for an application-oriented positioning of the arm at the operating table.

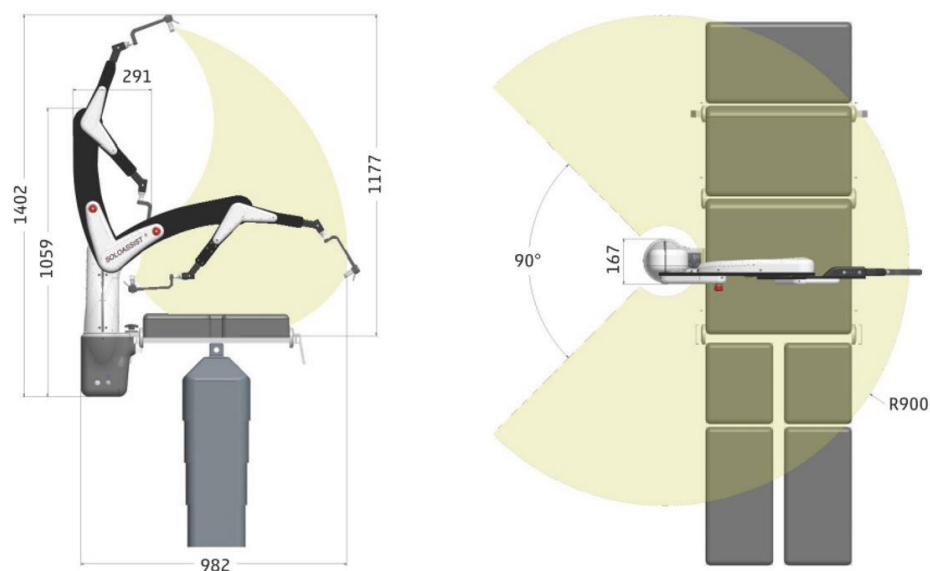







fig. 2: Range of motion

	<p>Positions outside the shown range of motion cannot be reached!</p> <p>Should one or several axes have reached their maximum joint angle, the movement of the ARTip solo will stop! In order to prevent this, place the arm preferably in a central location in the operating field.</p>
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2.4 Electrical data

POWER SUPPLY	Type BET-0624M, Bicker Elektronik GmbH
Input voltage	100 - 240V~; 50-60Hz
Max. power input	60W
Output voltage	24 V DC
Protection class	II
Operating mode	continuous
Mains fuses	none

	Devices that are connected to the analogue and digital interfaces of the ARTip solo must comply with the standards for electromedical devices. All configurations must meet the requirements of the system standard EN 60601-1. The person connecting additional devices is responsible for the compliance with this standard!
	Warning: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
	Warning: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ARTip solo, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.
	Pull the power plug of the POWER SUPPLY in order to completely disconnect this device from the mains. Make sure that the POWER SUPPLY can be accessed at any time.

2.5 Important performance characteristics

Important performance characteristics of the ARTip solo:

- No movement in case of faults
- Constant availability without a dangerous failure of the system

2.6 Environmental conditions

for transport and storage

Temperature	-20°C to +70°C
Relative air humidity	10% to 90%, non-condensing
Air pressure	700 hPa to 1060 hPa


for the operation

Temperature	+15°C to +37°C
Relative air humidity	10% to 85%, non-condensing
Air pressure	700 hPa to 1060 hPa

2.7 Storage and transport

The ARTip solo should always be transported in suitable packaging. Any position is possible during transportation.

For storage between the applications, we recommend the optional TROLLEY.

	Operate the ARTip solo only when it has reached room temperature again after a previous storage at high or low temperatures.
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2.8 Symbols used on the name plates / labels











Symbol	Description
	Observe the instructions for use
	Follow the instructions for use
Control	Connection for the input devices
Supply	Power supply
Type	Construction type
	Device conforms to the regulation MDR - 2017/745 (Medical Device Regulation)
	Date of manufacture
	Manufacturer
	Serial number
	Reference number
Rx only	Sale only on instruction of a physician (US federal law)
	Authorised representative in Switzerland
	Medical Device
	Dispose products marked with this symbol separately with electric and electronic devices. The disposal is carried out by the manufacturer within the EU for free.

Table 4: Symbols on nameplate and label

2.9 Application parts

In accordance with the standard, the ARTip solo does not feature any application parts that are in contact with the patient when used properly. However, the following parts can be touched by the patient.

- UNIVERSAL JOINT
- JOYSTICK
- Base plate with connection to the operating table

2.10 Name plate

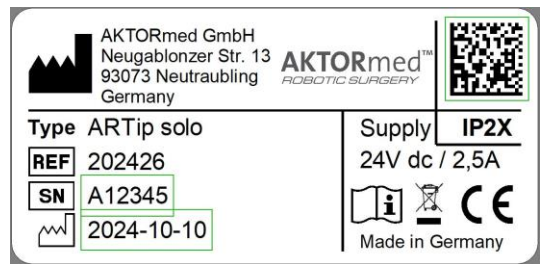


fig. 3: Name plate

2.11 Identification according to MDR (Medical Device Regulation)

The ARTip solo including accessories is a class I medical product. Sterile disposables are class Is medical devices.

2.12 Symbols on STERILE COVER

Symbol	Description
	Reference number
	Lot number
	Can be used until
	Sterilised with ethylene oxide
	Authorised representative in the European Community
	Authorised representative in Switzerland
	Do not use if packaging is damaged
	Do not re-sterilise
	Do not reuse



Symbol	Description
	Free of latex
	Manufacturer

Table 5: Symbols on STERILE COVER

2.13 Contact

If you have any further questions in connection with the product, please contact:

Karl Storz SE & Co. KG
Dr.-Karl-Storz-Straße 34
78532 Tuttlingen
GERMANY

Web: www.karlstorz.com eMail: info@karlstorz.com
Phone: +49 7461 708-0 Fax: +49 7461 708-105

3 Setup / Commissioning

3.1 ARTip solo

Follow the following work steps to mount the ARTip solo to the operating table and to put it into operation for the following application. This is usually done **before** the patient is washed and covered with sterile drapes.

Step 1: Mount it to the operating table






Step	Description
	The device is lifted to the standard rail and mounted.
	Once the device is placed on the standard rail of the Operating table, align it perpendicular to the Operating table and tighten the clamp screw by hand.




Table 6: Mounting on OR table

	Make sure that the ARTip solo is firmly locked on the rail of the operating table before using the device.
	For more information on the positioning, refer to the SETUP cards for the individual procedures (e.g. CHE, fundoplication, sigma resection...).

	<p>In order to utilise the ARTip solo's range of motion as best as possible, the device should be positioned at the height of the optical trocar.</p> <p>Further information's on the positioning could be found in the POSITIONING GUIDE.</p>
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Step 2: Establish the electrical connection

Connect the POWER CORD to the POWER SUPPLY and then plug the POWER CORD into a suitable wall outlet. Connect the SUPPLY CABLE to the POWER SUPPLY and then connect the SUPPLY CABLE to the input jack of the ARTip solo.

	<p>Pull the power plug of the POWER SUPPLY in order to completely disconnect this device from the mains. Make sure that the POWER SUPPLY can be accessed at any time.</p>
	<p>Use only the original POWER SUPPLY, POWER CORD and SUPPLY CABLE.</p>
	<p>Avoid tripping hazards when connecting the cables.</p>

Step 3: Select cantilever position

The cantilever features an additional pivot joint at its distal end. This adjustment option allows you to largely avoid collisions with the surgeon's instruments.

In the standard position, the UNIVERSAL JOINT points downward. Select a joint position that seems suitable for the planned intervention.

Change the joint position as follows:





Picture	Description
	This joint allows you to change the angle position of the UNIVERSAL JOINT in 45° increments.
	<ol style="list-style-type: none">1. Pull the joint head forward.2. Turn the pivot joint into the desired position.3. Let the joint head lock in again.

Table 7: Changing joint position

	If applicable, disconnect a connected endoscope from the UNIVERSAL JOINT if you change the joint position.
	The joint position can be changed at any time while the ARTip solo is in use. A new adjustment of the TROCAR POINT is not necessary.

Step 4: Prepare the STERILE COVER







<div></div> <div>Do not use a STERILE COVER if you can detect damage to the packaging or the STERILE COVER itself!</div>	
Step	Description
	Remove a STERILE COVER from the package and lay it out ready.
	Open the folded STERILE COVER in the center (sticker with green arrow).
	Reach with one hand into the STERILE COVER and insert the pin of the UNIVERSAL JOINT through the opening in the elastic part of the STERILE COVER.
	Pull the UNIVERSAL JOINT through.
	Pull the elastic front end of the STERILE COVER over the conical collar of the connector.

Table 8: Preparation of STERILE COVER

Step 5: Connect the UNIVERSAL JOINT and cover the arm with the STERILE COVER

	The ARTip solo is usually covered with the STERILE COVER after the skin disinfection has been carried out but before the patient is covered with a sterile drape.
Step	Description
	Guide the UNIVERSAL JOINT with the STERILE COVER from below to the cantilever.
	Insert the pin of the UNIVERSAL JOINT into the fixture of the cantilever until the UNIVERSAL JOINT will audibly snap in.
	Check if it correctly locked in place by pulling at the UNIVERSAL JOINT.
	Grab the STERILE COVER and pull it over the arm.
	Gather any excess length of the STERILE COVER downward.

Table 9: Sterile Cover

Proceed with the sterile covering of the patient at this point according to the usual procedure in your place.



Only use the original STERILE COVER - REF 6001-40001, or REF E6785 - that you have purchased from the manufacturer or an authorised partner.




3.2 Mounting the JOYSTICK to the surgical instrument

The JOYSTICK is designed so that it is preferably connected to the left hand while used with the surgical instrument. A JOYSTICK version for the right hand as well as different instrument adapters are available. Please refer to the JOYSTICK instructions for use for details (Manual JOYSTICK-IIA – EN 2039-210048).



fig. 4: JOYSTICK on the instrument

Fasten the JOYSTICK to the instrument as follows:

Step	Description
	Slide the JOYSTICK onto the MOUNT-1A. The cable of the JOYSTICK points in the same direction as the screw.
	Slide the JOYSTICK from the front over the handle of the instrument.
	Fix the JOYSTICK by tightening the screw on the instrument.



Step	Description
	Connect the JOYSTICK with the input jack on the ARTip solo.

Table 10: JOYSTICK attachment

	There are different versions of the JOYSTICK MOUNT available, suitable for most common instruments.
---	---

3.3 Mounting the ENDOSCOPE CLAMP to the endoscope

Select the TENSION SLEEVE suitable for the endoscope. There are types available for 4, 5, 10 and 12.7 mm endoscopes. If you want to use an endoscope with a different outer diameter, our field service will gladly give you advice on which TENSION SLEEVE to use.



Picture	Description
	Loosely screw the TENSION SLEEVE into the ENDOSCOPE CLAMP.
	Slide the ENDOSCOPE CLAMP over the endoscope and tighten the TENSION SLEEVE by hand.

Table 11: ENDOSCOPE CLAMP attachment

	Tighten the ENDOSCOPE CLAMP only enough so that you can still turn the endoscope easily.
---	--

4 Operation

The ARTip solo is operated either by unlocking the axes and the subsequent manual positioning or via motor using a JOYSTICK as a control element.

For the motor-driven adjustment, you must register the position of the patient to the ARTip solo. This registration is the basis for the calculation of movements.

4.1 Controls and status displays

The ARTip solo features two illuminated controls (1/5) as well as three more status displays (2-4).

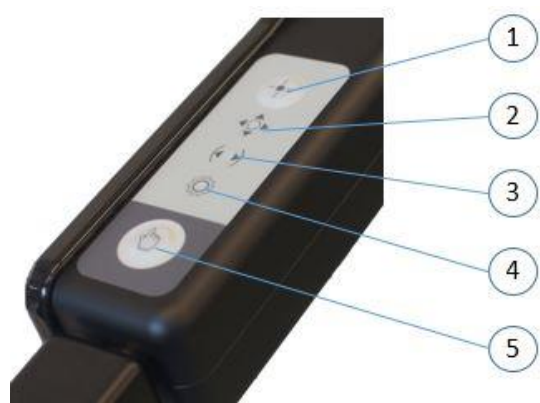


fig. 5: Control Panel

Controls




Button	Symbol	Function
1		Sets the TROCAR POINT
5		Unlocks the ARTip solo for the manual positioning

Table 12: Control elements

Status displays

Display	Symbol	Colour	Meaning
1		White	OFF: No JOYSTICK connected PULSATING*: Device is ready, no TROCAR POINT is set





			ON: Device is ready, TROCAR POINT is set
2		Yellow	ON: The connected JOYSTICK is defective FLASHING**: Life warning first stage, the JOYSTICK had more than 140 applications BLINKING***: Life warning second stage. The connected JOYSTICK had more than 145 applications. We recommend an immediate replacement.
3		Yellow	ON: One or more axes of the ARTip solo has/have reached the maximum angle. A further movement in this direction is no longer possible.
4		Yellow	ON: Service, an internal error has been detected.
5		Green	OFF: No power supply ON: Operational BLINKING***, if the button 1 (set TP) is pressed: The TROCAR POINT has been successfully set. BLINKING***, if no button is pressed: The pivot joint at the distal end of the cantilever arm has not correctly locked into place.

Table 13: Status displays


* PULSATING: The corresponding display slowly becomes brighter and darker again.

** FLASHING: approx. 0.3 s on and then 3 s off.

*** BLINKING: approx. 1 s on and then 1 s off.



Should the yellow display 4 "Service" light up, an error has occurred in the ARTip solo. In this case, the device must be immediately checked. However, the device can still be operated.

	<p>Should the yellow display 2 "Joystick" flash, then the useful life of the JOYSTICK has almost been reached. Replace the JOYSTICK immediately.</p> <p>Once the display has started to blink, you can use the JOYSTICK no more than 5 x!</p>
---	---

EMERGENCY STOP

The ARTip solo features an EMERGENCY STOP button. Once pressed, the EMERGENCY STOP button will light red and be locked.



Picture	Description
	<p>Press this button if you think that the device performs a movement even though you have not pressed a button on the JOYSTICK.</p>
	<p>In order to release the EMERGENCY STOP again, turn the switch clockwise.</p>

Table 14: Emergancy Stop

4.2 Manual positioning

The ARTip solo features unlockable brakes that allow you to manually move the arm quickly and accurately at any time. The weight of the endoscope will be largely compensated in the process.



Picture	Description
	<p>In order to reposition the arm, hold the arm at the pivot joint and press the button (5) "Unlock". The arm can now move freely.</p> <p>As soon as you have reached the desired position, release the button (5). The arm is immediately locked again and the image detail is stable.</p>

Table 15: Manual positioning

4.3 Motor-driven adjustment

If the ARTip solo is adjusted via a motor, the **tip of the endoscope** moves along the surface of an imagined sphere in space. The image detail can therefore be intuitively changed during the operation. The motor-driven adjustment takes place via a JOYSTICK.

	The motor-driven adjustment is available only after a TROCAR POINT (see 4.4.1) has been saved.
---	--

Assignment of the control buttons on the JOYSTICK

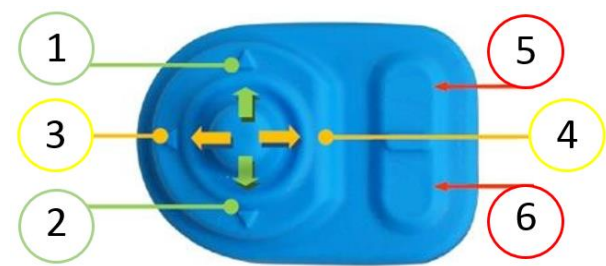


fig. 6: Buttons on the Joystick

Button	Description
1	Move image up
2	Move image down
3	Move image to the right
4	Move image to the left
5	Zoom out
6	Zoom in

Table 16: Movements

All movement directions are based on the monitor image. Ensure the anatomically correct setting of the image horizon.

Corresponding movements of the endoscope within the trocar

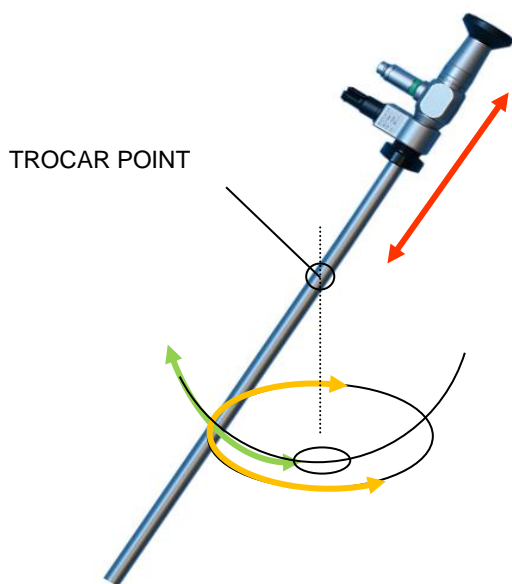


fig. 7: Endoscope movement

4.4 Operating procedure

In the following, it is assumed that point 3 (assembly and commissioning) has been completed and the ARTip solo is ready for use.

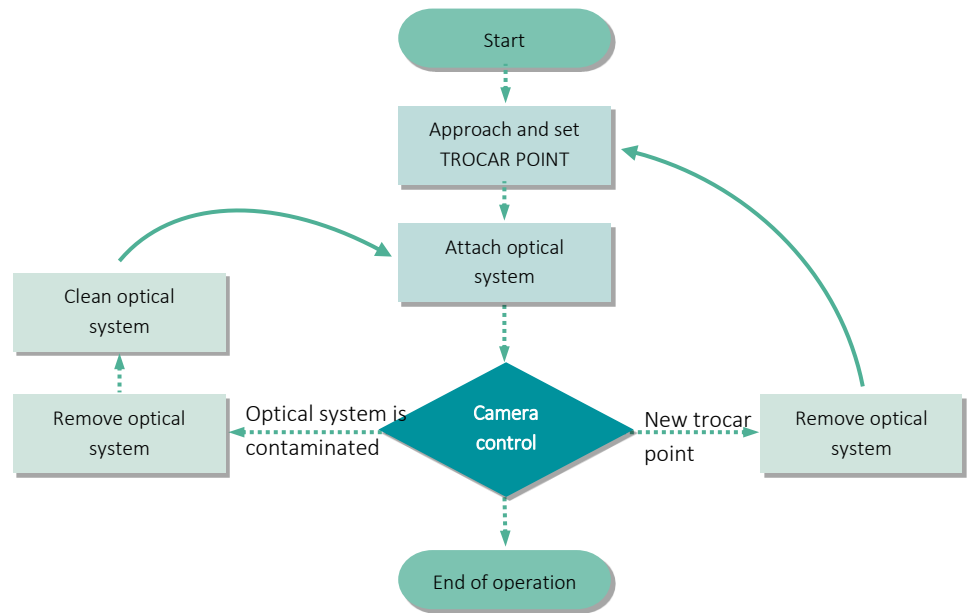



fig. 8: Workflow

	Continuously monitor the patient and the ARTip solo while you control one of the powered movements.
---	---

4.4.1 Approaching and saving the TROCAR POINT (patient registration)

In order to establish a relation between patient and ARTip solo, it is necessary to know the position of the patient on the operating table. This is done by the following procedure, which is also called registration.

After switching on, the ARTip solo can immediately be moved manually by pressing the "Unlock" key (5).





Step	Description
	Press the button (5) "Unlock" and move the TRACER PIN of the UNIVERSAL JOINT to the entrance point of the trocar into the abdominal wall..
	<p>Press the button (1) "TP" on the control panel of the ARTip solo.</p> <p>You will receive a visual feedback when pressing the button. The "Ready" display (5) begins to blink green..</p>

Table 17: Saving trocar point

	PLEASE NOTE! The endoscope may not be connected to the UNIVERSAL JOINT during the probing of the TROCAR POINT.
	Should there be a power failure or should the device be accidentally turned off during its use, the TROCAR POINT will be lost and must be newly fixed.

4.4.2 Mounting the endoscope


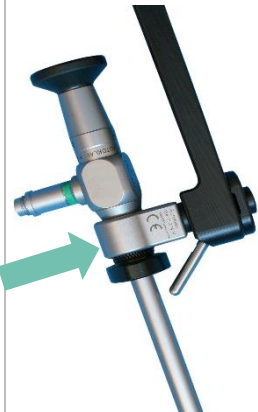
Step	Description
	Move the ARTip solo so that the UNIVERSAL JOINT gets close to the roughly positioned endoscope (optical system) already introduced into the trocar.
	Fasten the endoscope (optical system) by mounting the ENDOSCOPE CLAMP to the UNIVERSAL JOINT. The ENDOSCOPE CLAMP will lock into place with a "click".

Table 18: Endoscope attachment


4.4.3 Camera control

The endoscope position can be changed at any time either manually (see 4.2) or via motor (see 4.3).

The motor driven adjustment of the ARTip solo makes the right/left, up/down movement in relation to the monitor image intuitive and it can be accurately zoomed.

Desired image change	Required action
Image to the right	Push JOYSTICK to the right
Image to the left	Push JOYSTICK to the left
Image up	Push JOYSTICK up
Image down	Push JOYSTICK down
Overview	Press "Zoom out" button on the JOYSTICK
Detailed view	Press "Zoom in" button on the JOYSTICK

Table 19: Image adjustment

	It is also possible to move the image diagonally, for example, to the top right. Press the JOYSTICK also diagonally into the desired direction.
---	---

4.4.4 Cleaning the endoscope (optical system)

Press the unlocking button on the UNIVERSAL JOINT and pull the ENDOSCOPE CLAMP out of the UNIVERSAL JOINT.

Once the endoscope (optical system) is cleaned, you can mount it again. The ENDOSCOPE CLAMP will automatically lock into place. The unlocking button does not have to be pressed for the mounting.

The viewing angle set before the cleaning will be available again.

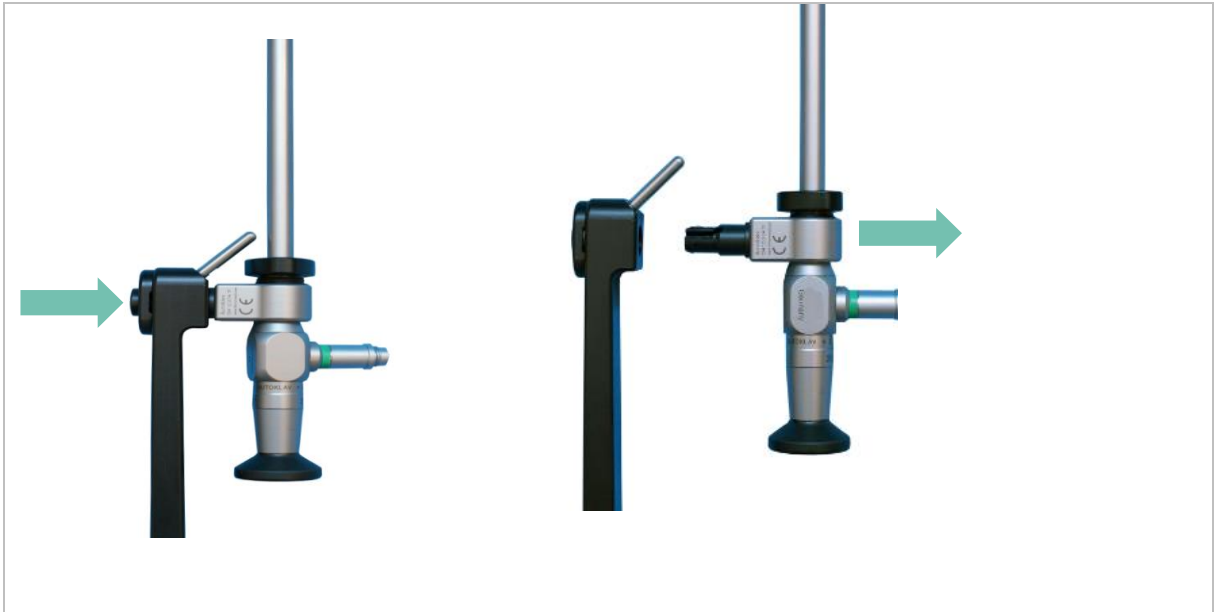


fig. 9: Endoscope cleaning

4.4.5 Setting a new TROCAR POINT

If applicable, uncouple a connected endoscope.

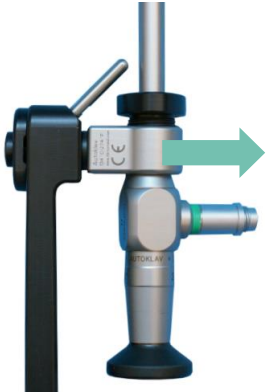



Approach the new TROCAR POINT as described under 4.4.1.

Press "TP" the button (1). The display on the "Ready" button (5) will begin to blink.



PLEASE NOTE! The endoscope may not be connected to the UNIVERSAL JOINT during the probing of the TROCAR POINT.

4.4.6 Ending the application

Step	Description
	Remove the endoscope (optical system) by pressing the unlocking button on the UNIVERSAL JOINT.
	Remove the UNIVERSAL JOINT from the cantilever arm by sliding down the unlocking sliders on the sides.
	Dispose the used STERILE COVER of the ARTip solo. Bring the ARTip solo into an upright position for the subsequent storage on the TROLLEY.
	Disconnect all cable connections and unplug the POWER SUPPLY.





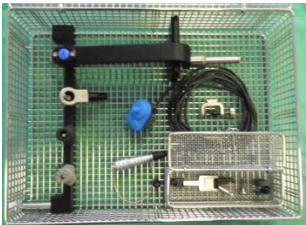

Step	Description
	Remove the JOYSTICK from the instrument handle.
	Attach the protective cap to the JOYSTICK connector.
	Slide the MOUNT-1A off the JOYSTICK.
	Loosen the TENSION SLEEVE and detach the ENDOSCOPE CLAMP from the endoscope.
	Place the UNIVERSAL JOINT, the ENDOSCOPE CLAMP, the TENSION SLEEVE, the MOUNT-1A and the JOYSTICK into the STERILISATION TRAY.
	The ARTip solo can now be taken from the operating table and placed on the TROLLEY.

Table 20: End of operation

4.5 Wipe disinfection

The ARTip solo has been successfully tested with the following disinfectants for wipe disinfection with regard to the material compatibility of the surfaces.

You can perform wipe disinfection with the disinfectants mentioned here and similar disinfectants with regard to the active substances contained.

Use a soft cloth to apply the disinfectant and follow the manufacturer's instructions regarding the exposure time of the disinfectant used.

disinfectant	agent	mass concentration in 100 g solution:
Microbac (cloths)	Benzyl-C12-18-Alkyldimethylammoniumchlorid	0,4 g
	Didecyldimethylammoniumchlorid	0,4 g
Meliseptol HBV (cloths)	1-Propanol	50 g
	Didecyldimethylammoniumchlorid	0,075 g
Incidin Liquid	2-Propanol	35 g
	1-Propanol	25 g
Isopropanol	2-Propanol	63,1 g

Table 21: Disinfecting agents

4.6 Reprocessing

The STERILISABLE ARM COMPONENTS must be cleaned, disinfected and sterilised prior to each use; this also applies in particular for the first time use after the delivery as all STERILISABLE ARM COMPONENTS are not delivered in a sterilised condition (clean and disinfect the components after the removal of the protective transport packaging; sterilise the components according to the corresponding packaging).

"STERILISABLE ARM COMPONENTS" include the UNIVERSAL JOINT, the JOYSTICK, the MOUNT-1A, the ENDOSCOPE CLAMP and the TENSION SLEEVE(s). An effective cleaning and disinfection is absolutely necessary for an effective sterilisation.

As part of your responsibility, please observe the sterility of the application. For details on the reprocessing of STERILISABLE ARM COMPONENTS, please refer to the separately available reprocessing instructions "Processing instructions IIA – EN 2039-210049".

5 Emergency procedures

There are basically two emergency scenarios:

5.1 Intraoperative complications

In case of intraoperative complications not due to the use of the ARTip solo, it may still be in order to remove the device as fast as possible from the OR surroundings in order to have better access to the patient.

Proceed as follows:

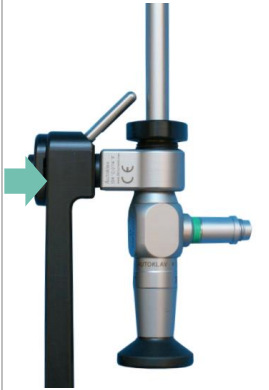

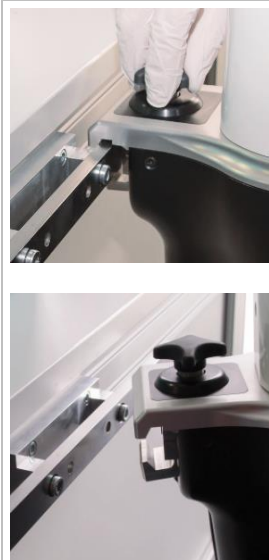
Step	Description
	Detach the endoscope (optical system) by pressing the unlocking button on the UNIVERSAL JOINT.
	Bring the ARTip solo into an upright position and turn it away to the side.
	If you still have not sufficient access to the surgery site, remove the entire arm from the operating table. Open the mount and detach the device from the operating table rail.


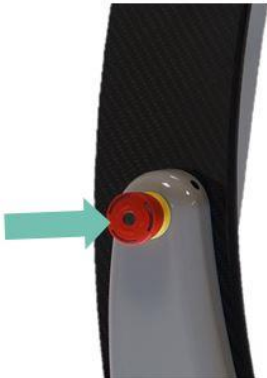



Table 22: Emergency procedure

5.2 Technical problems

The technical device may still malfunction despite all the diligence during the development, testing and production.



The pressing of the emergency button will interrupt the power supply of the drives and a movement can no longer be performed.

Remove the ARTip solo from the surgery surroundings as described under 5.1 and call, if necessary, an assistant for the camera movement in order to end the intervention.

	<p>A critical situation may occur if an unintended movement is performed. Unintended means that no button has been pressed on the JOYSTICK and the device moves anyway.</p> <p>In this case IMMEDIATELY press the red EMERGENCY STOP button.</p> 
	<p>Do not use the device for further interventions even if you think that the error no longer exists!</p>
	<p>All serious incidents related to the product must be reported to the manufacturer and the competent authority in the country concerned.</p>
	<p>Contact the manufacturer's service or another authorised person immediately. Do not change any of the device configurations.</p>

6 Troubleshooting

In case the ARTip solo does not behave as expected, the following hints should enable you to solve simple problems yourself.

	Never open the ARTip solo or the POWER SUPPLY. Risk of an electric shock!
	<p>Always contact the manufacturer's service or a representative expressly authorised by the manufacturer:</p> <ul style="list-style-type: none"> • if you are not able to solve the problem with the help of the following information or • if safe work is no longer ensured.

Symptom	Solutions
Status display "Ready" does not light	<p>Check the POWER SUPPLY:</p> <ul style="list-style-type: none"> • Tight fit of the SUPPLY CABLE on the arm • Connection to the outlet • Switch to a different outlet
Status display "Ready" constantly blinks	<p>The pivot joint at the distal end of the cantilever arm has not correctly locked into place.</p> <p>➔ Check the pivot joint.</p>
Status display light "JOYSTICK" is on	<p>The JOYSTICK is defective.</p> <p>➔ Replace the JOYSTICK with a new one.</p>
Status display "JOYSTICK" flashes	<p>The JOYSTICK has been used more than 140x and is near the end of its useful life.</p> <p>The Joystick can be used no more than 150x and will then automatically be deactivated.</p> <p>➔ Replace the JOYSTICK.</p>
Status display "JOYSTICK" blinks	<p>The JOYSTICK has been used more than 145x and is near the end of its useful life.</p> <p>The Joystick can be used no more than 150x and will then automatically be deactivated.</p> <p>➔ Replace the JOYSTICK.</p>
"Emergency stop" button lights red	<p>Check whether the emergency stop button on the ARTip solo is pressed and unlock it, if applicable, by turning it clockwise.</p>
Status display light "Service" is on	<p>An internal error has occurred.</p> <p>➔ Call the service.</p>
Movement does not follow the expected path. Image does not move in the expected direction.	<p>The TROCAR POINT is possibly not set correctly.</p> <p>➔ Reset the TROCAR POINT. (See chapter 4.4.1)</p>

Table 23: Trouble shooting

7 Service

The ARTip solo is basically maintenance-free. However, regular inspections and safety tests are imperative in order to ensure a reliable operation over its lifetime.

7.1 Handover certificate

The manufacturer or a representative expressly authorized by the manufacturer will commission the device upon delivery.

7.2 Regular inspections

Perform the following checks before each use of the device:

- Check POWER CORD for damage.
- ARTip solo and accessories for external damage.



Never use the ARTip solo if you detected any damage. Contact the corresponding service.

7.3 Annual safety-related inspection

A regular maintenance is not required. However, the manufacturer requires a specialist or a hospital technician to carry out a precautionary safety inspection on a regular basis in order to ensure a reliable operation over its lifetime. This inspection must be carried out at least once a year.

No special requirements or precautions have to be considered for a precautionary inspection. During the inspection, the following tests have to be performed in accordance with section 5 of the DIN EN 62353:

- 5.2 Inspection
- 5.3.2 Measurement of the protective conductor resistance, where applicable
- 5.3.3 Measurement of the leakage currents
- 5.3.4 Measurement of the insulation resistance

The test results are to be fully documented in a test report according to section 6 of the DIN EN 62353. The test report can be taken from section F of the standard.

In case of a malfunction, please contact the Karl Storz Service or the respective service partner. In addition to an accurate description of the error, please also always indicate the product identification number and serial number as shown on the name plate of the device.

7.4 Disposal / Recycling




The manufacturer confirms that the product

ARTip solo




meets the following guidelines:

- Waste electrical and electronic equipment (WEEE) 2012/19/EC,
- Electrical and Electronic Equipment Act - ElektroG,
- as well as the legal requirements of the member states of the ECC

Further information can be found in document no. 1206-140095 (Recycling pass).

	Due to the risk of an infection through contaminated products, they have to be treated prior to the disposal.
	Make sure that contaminated disposable products are disposed separately.
	The national regulations are to be complied when the product or its components are disposed of or recycled.

8 EMC

	Portable and mobile HF communication devices such as cell phones can interfere with MEDICAL ELECTRICAL DEVICES. Do not operate such devices in the direct vicinity of the ARTip solo.
	MEDICAL ELECTRICAL DEVICES are subject to special precautionary measures in regard to EMC. The ARTip solo may be installed and operated only in accordance with the EMC information contained in this manual.
	The ARTip solo or the associated POWER SUPPLY may not be placed directly adjacent to other equipment or stacked with other equipment. If it is necessary to operate the device close to other equipment and stacked with other equipment, the ARTip solo should be monitored in order to check the proper operation with this arrangement.

Guidelines and manufacturer's declaration - Electromagnetic emissions

Emission

Test	Limit	Electromagnetic environment - guidance
Conducted emission	CISPR 11, Group 1, Class B	Device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Radiated emission	CISPR 11, Group 1, Class B	
Voltage fluctuations and flicker	IEC 61000-3-3	Device is directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. Only for Home healthcare environment.

Table 24: Emission

Immunity test levels

Test	Limit	Electromagnetic environment - guidance
Electrostatic Discharge (IEC 61000-4-2)	Contact Discharge: ± 8 kV Air Discharge: ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Radiated RF EM field (IEC 61000-4-3)	80-2700 MHz; 1kHz AM 80 %; 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = 1.2\sqrt{P}$ for 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ for 800 MHz to 2,7 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter

Test	Limit	Electromagnetic environment - guidance
		manufacturer and d is the recommended separation distance in meters (m).
Proximity fields from RF wireless communications equipment (IEC 61000-4-3)	385 MHz; Pulse Modulation: 18 Hz; 27 V/m 450 MHz, Pulse Modulation: 18 Hz; 1 kHz sine; 28 V/m 710, 745, 780 MHz; Pulse Modulation: 217 Hz; 9 V/m 810, 870, 930 MHz; Pulse Modulation: 18 Hz; 28 V/m 1720, 1845, 1970 MHz; Pulse Modulation: 217 Hz; 28 V/m 2450 MHz; Pulse Modulation: 217 Hz; 28 V/m; 5240, 5500, 5785 MHz; Pulse Modulation: 217 Hz; 9 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance 30 cm.
Electrical fast transients / bursts (IEC 61000-4-4)	Power lines: 2 kV; 100 kHz repetition frequency Signal lines: 1 kV; 100 kHz repetition frequency	Mains power quality should be that of a typical environment.
Surges (IEC 61000-4-5)	L-N: 1kV at 0°, 90°, 180°, 270°	Mains power quality should be that of a typical environment.
Conducted disturbances induced by RF fields (IEC 61000-4-6)	0.15-80 MHz; 1kHz AM 80 %; 3 Vrms , 6 Vrms in ISM band	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = 1.2\sqrt{P}$ for 150 kHz to 80MHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
Rated power frequency magnetic fields (IEC 61000-4-8)	30 A/m, 50 Hz and 60 Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips / Voltage interruptions (IEC 61000-4-11)	0 % UT for 0.5 cycle at 8 phase angles 0 % UT for 1 cycle at 0° 70 % UT for 25/30 cycles at 0° 0 % UT for 250/300 cycles 0°	Mains power quality should be that of a typical environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the device is powered from an uninterruptible power supply or battery.

Table 25: Immunity test level



	Warning: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
	Warning: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ARTip solo, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

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