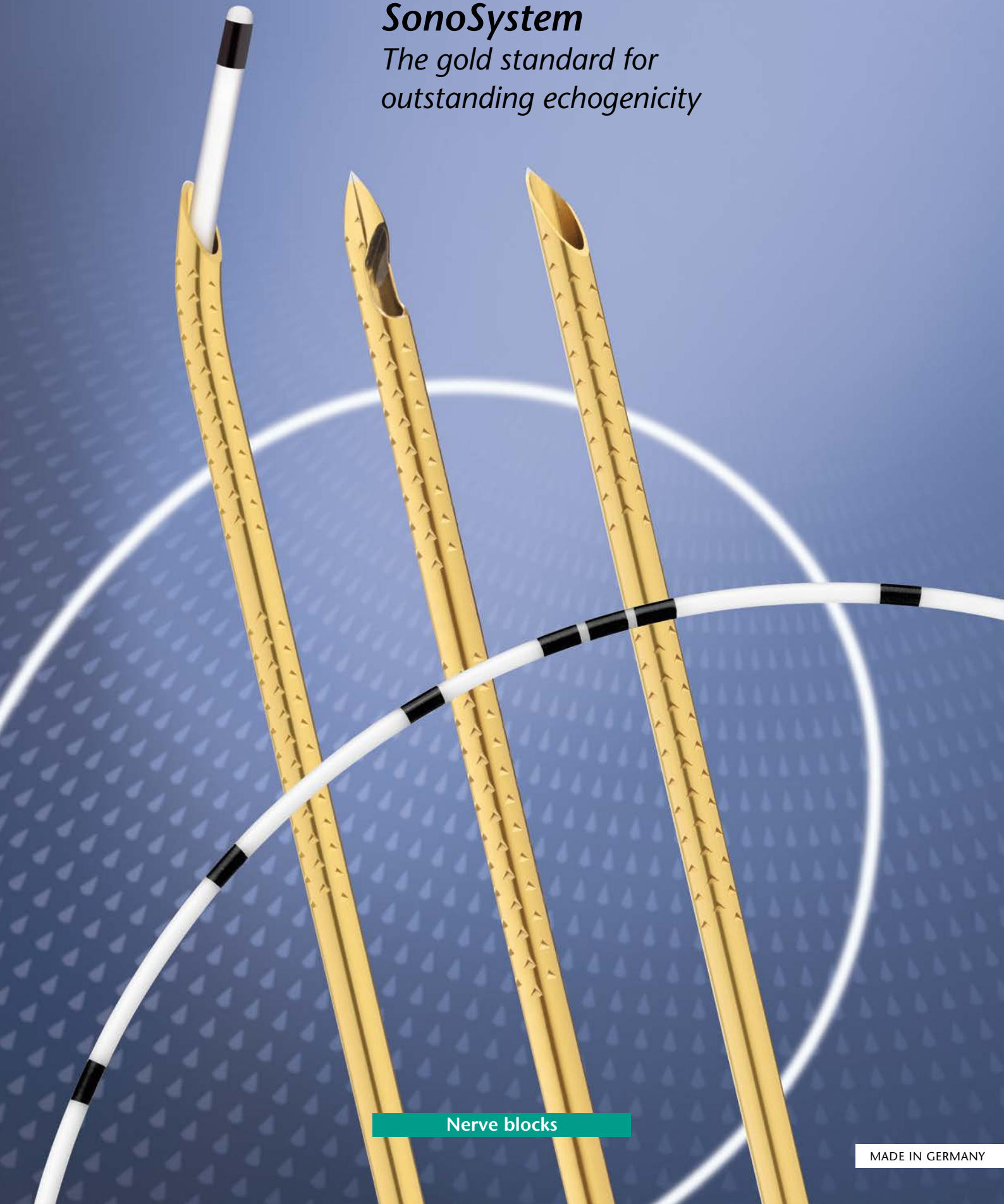
PAJUNK®

SonoSystem

The gold standard for outstanding echogenicity



Nerve blocks

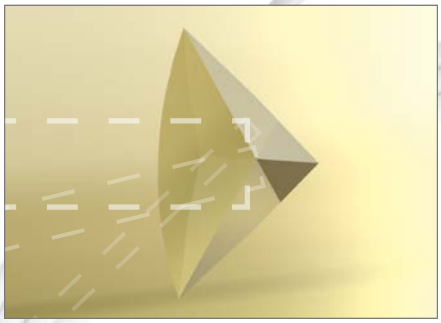
MADE IN GERMANY

Cornerstone Reflectors

Sono cannulas with maximum echogenicity

The visibility of cannula tips in ultrasound guided puncture is very important in preventing damage to neurons and blood vessels.[1] As even cannulas that are visible under ultrasound cannot always be identified at angles of 45° and above[2], this property has become a key decision-making criterion in the selection of cannulas in practice.[3]

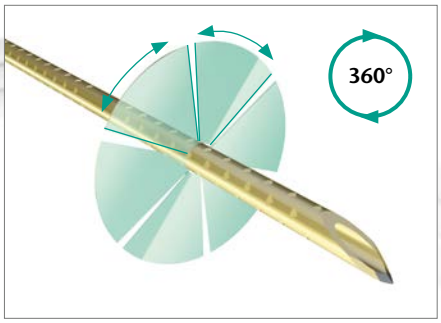
The patented Cornerstone Technology developed by PAJUNK® together with Dr. Chris Mitchell was designed specifically to solve this problem, and produces excellent visibility irrespective of the insertion angle.[4] Sono cannulas have a high degree of precision even at steep insertion angles. Both, the cannula shaft and -tip are very clearly visible.[5] In this way, Sono cannulas make an important contribution to the safety of the application.[6]



Echogenic Cornerstone Geometry

The embossed structures in the Cornerstone Reflectors form three surfaces which meet each other at a 90° angle.

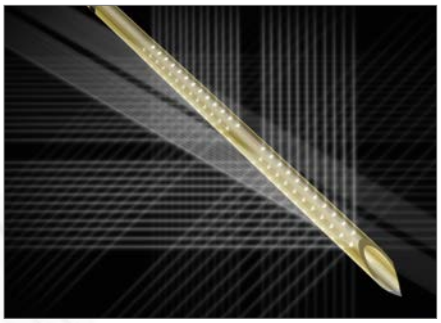
➡ **This guarantees direct or indirect reflection of the ultrasound waves even at very steep insertion angles.[2]**



Sophisticated 360° arrangement

Both cannula segments are graduated all-around with evenly offset Cornerstone Reflectors. The number and layout of these reflectors is matched precisely to the relevant cannula diameter.

➡ **Perfect cannula identification is guaranteed in every position.**

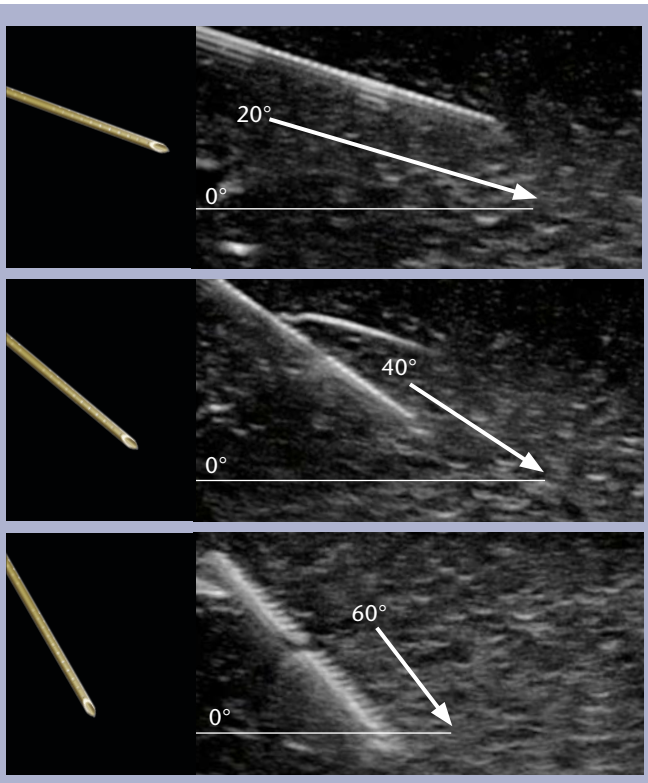


Visibility irrespective of the insertion angle

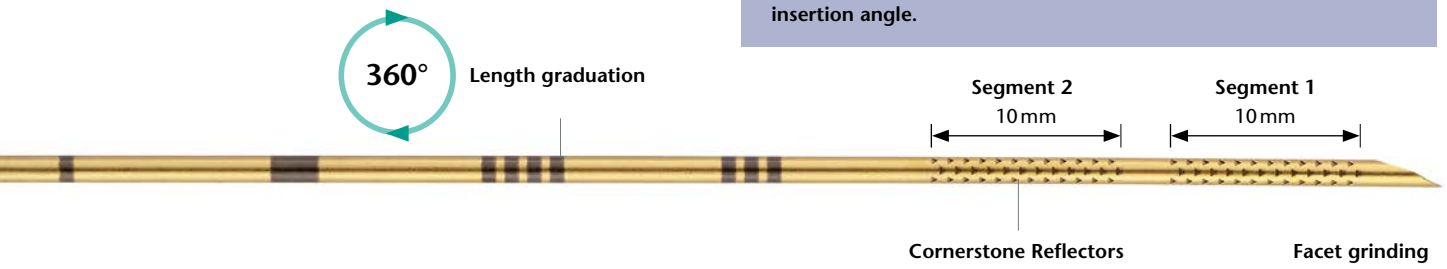
The Cornerstone Reflectors are designed that the ultrasound waves are very well reflected even with an insertion angle of 60° to 70°.[2]

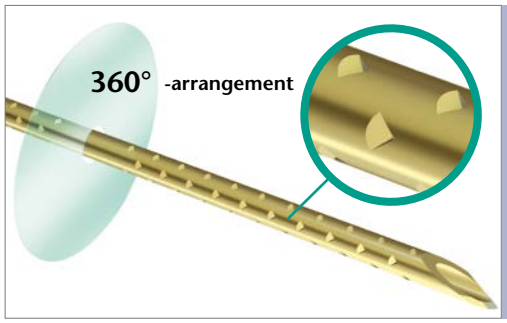
➡ **Ultrasound waves are reflected along a total length of 20 mm. Cannula shaft and cannula tip can be clearly identified.**

1 Wiesmann et al., Compound imaging technology and echogenic needle …, 2013; 38(5): 452–455
2 Uppal, Sondekoppam, Ganapathy, Effect of beam steering on …, 2014; 61(10): 909–915
3 Sviggum, Ahn, Dilger, Smith, Needle echogenicity in sonographically …, 2013; 32(1): 143–148
4 Hebard, Hocking, Echogenic technology can improve needle visibility …, 2011; 36(2): 185–189
5 Edgcombe, Hocking, Sonographic identification of needle tip …, 2010; 35(2): 207–211
6 Hocking, Mitchell, Optimizing the safety and practice …, 2012; 604



A test with various insertion angles, rising at 20° increments to 60°, confirms that Sono cannulas are highly visible irrespective of the insertion angle.





OptiView

- **Echogenic, three-dimensional Cornerstone Geometry**
- **360° configuration, arranged evenly around the cannula shaft**
- **Aligned to the cannula diameter**
- **Two 1 cm segments for positioning**
- **Cornerstone Reflectors are embossed as far as the tip of the cannula**

= Optimum cannula visibility from shaft to tip, irrespective of the insertion angle

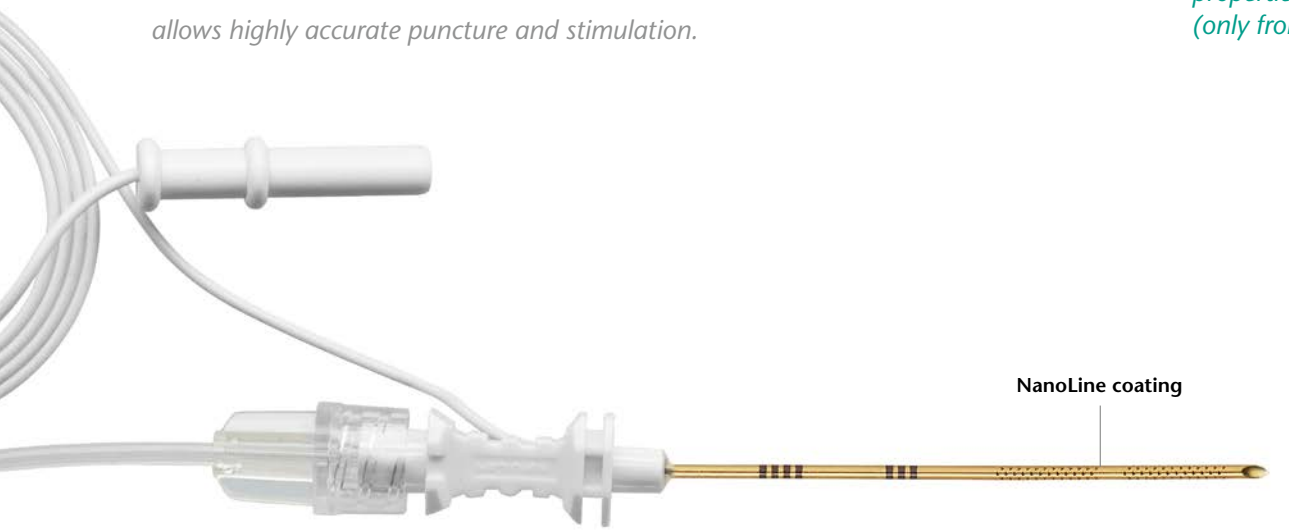
- *Special configuration of the Cornerstone Reflectors for optimum 360° sonographic visibility*
- *Ultrasound waves are reflected along a length of 20 mm*
- *Clear identification of cannula shaft and tip*
- *Reflexion especially at steep insertion angles*
- *360° length graduation for optimum positioning*

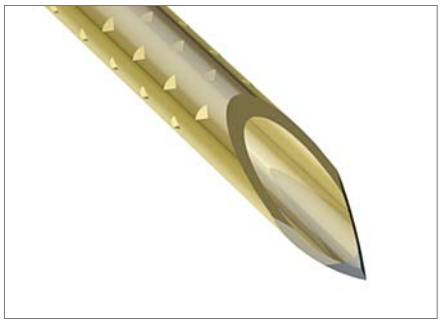
Dual guidance

Precise nerve stimulation with NanoLine

The echogenic Cornerstone Cannula is used to identify the relevant nerve under ultrasound, and in a second step the "dual guidance" procedure can be performed to check the accuracy of catheter placement by means of nerve stimulation. To this end, the distance from the nerve is deduced from the lowest current strength required for stimulation. The NanoLine NanoLine thin layer technology developed by PAJUNK® offers considerable benefits with regard to accuracy of stimulation, because it allows the insulating layer to be reduced to a minimum without affecting the functionality. This extremely thin polymer layer, which is applied to every internal and external part of the device except the bare tip, allows highly accurate puncture and stimulation.

- ➡ *Combination of ultrasound and stimulation technique*
- ➡ *Optimisation of puncture accuracy*
- ➡ *Better safety in use*
- ➡ *Nerve stimulator MultiStim ECO, designed specially for combination procedures*
- ➡ *Accurate stimulation and excellent gliding properties with NanoLine (only from PAJUNK®)*

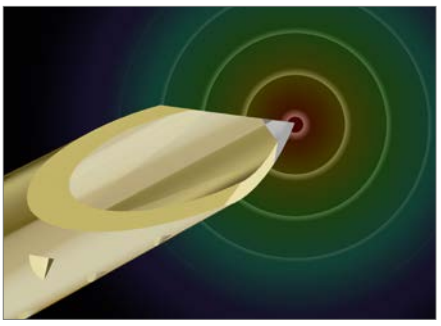




Echogenic cannula tip

The facet grinding has two inclination angles, and is coated with NanoLine technology, apart from the tip, which is bare.

➡ **Optimum conditions for outstanding cannula tip visibility.**

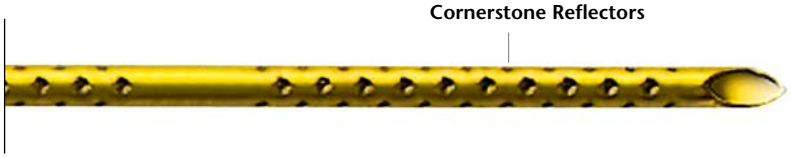


Precise stimulation

The very thin NanoLine coating guarantees a 100 % insulation. The contact point at the cannula tip remains bare.

➡ **Stimulation takes place only via the electroconductive puncture tip, generating a highly precise electrical field.**

MultiStim ECO is a compact nerve stimulator developed by PAJUNK®, an easy-to-use device that meets the demands of combinated procedures.



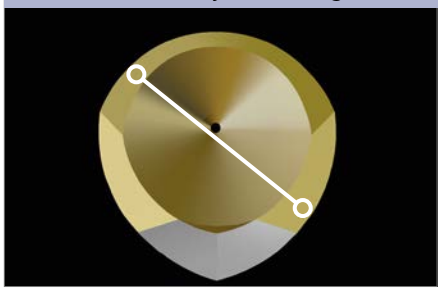
Longitudinal section through NanoLine cannula

Coated inner lumen

The thin-coating technology used, means that even the inner lumina of cannulas can be coated.

➡ This smooths out any unevenness and allows better flow of the anaesthetic.

Exact Ø thanks to very thin coating



Reduced puncture force – increased glide properties

The very thin coating means that the exterior diameter is no different from when conventional coating techniques are used. It also produces an extreme surface smoothness.

➡ NanoLine cannulas glide easily through tissue and do not require great puncture force.

The advantages of NanoLine:

- ➡ *Layer thickness is reduced to a minimum*
- ➡ *There is no change to the external diameter of the cannula*
- ➡ *The same excellent insulation properties as with conventional procedures*
- ➡ *A smooth surface to reduce the puncture force*
- ➡ *Extremely accurate stimulation via the contact point at the tip of the cannula*

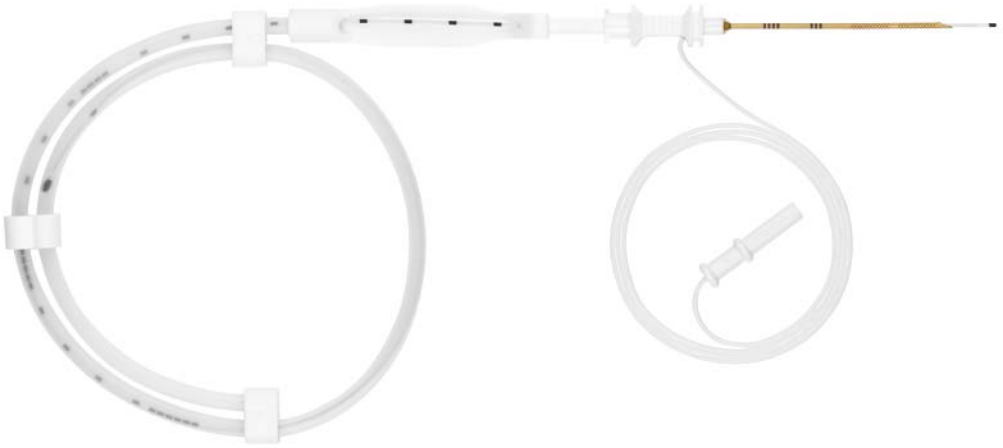
The kit variants

Continuous peripheral nerve block anaesthesia under ultrasound

Together with Dr Meier, PAJUNK® is the first manufacturer to have developed a technique by which the catheter is introduced in sterile condition directly from a container through the cannula, and the anaesthetic is injected through the catheter. This patented technique has established itself successfully on the market and has aroused a great response and recognition in the professional world. PAJUNK® differentiates between four SonoSystem kits depending on the catheter properties:

SonoLong Echo for convincing sonographic visibility

Kit consisting of SonoLong Echo catheter + SonoLong NanoLine cannula
optional with three different tip designs



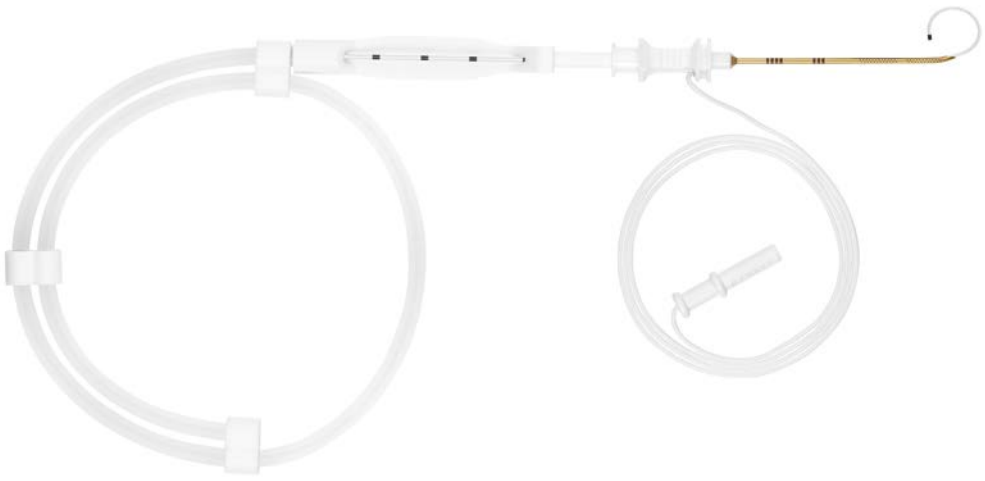
Facet grinding

SPROTTE® SPECIAL tip

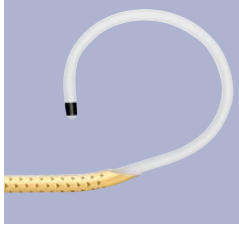
Tuohy tip

SonoLong Curl Echo for precise catheter placement

Kit consisting of SonoLong Curl Echo catheter with coiled tip + SonoLong NanoLine cannula
with Tuohy tip



Tuohy tip



You also have a choice between up to three different cannula types depending on the kit variant. While the facet grinding cannula exclusively places the catheter parallel to the nerve, the SPROTTE® SPECIAL cannula and the Tuohy cannula are suitable for those cases, where it is necessary to introduce the catheter at an angle to the nerve.

SonoLong Sono for maximum kink resistance

Kit consisting of SonoLong Sono catheter with integrated stainless steel helical coil + SonoLong NanoLine cannula optional with three different tip designs

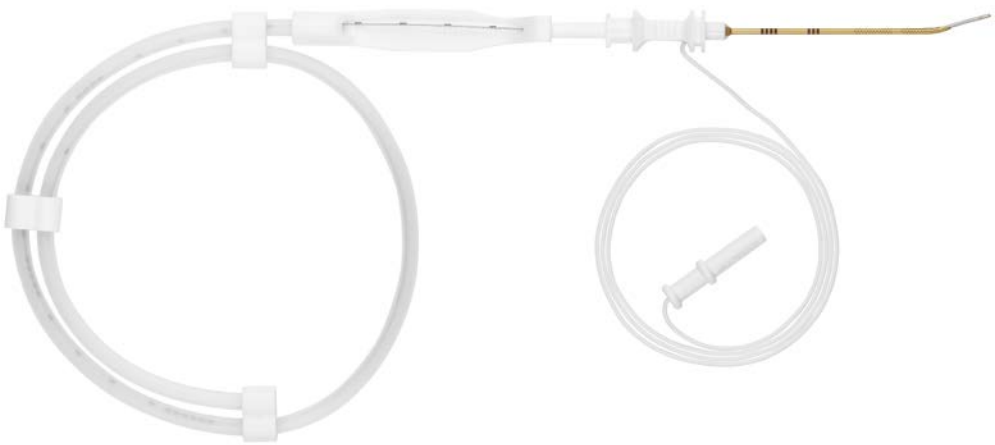
Facet grinding

SPROTTE® SPECIAL tip

Tuohy tip

StimuLong Sono II for additional nerve stimulation

Kit consisting of StimuLong Sono catheter with stimulateable tip + SonoLong NanoLine cannula with facet grinding or Tuohy tip



Facet grinding

Tuohy tip

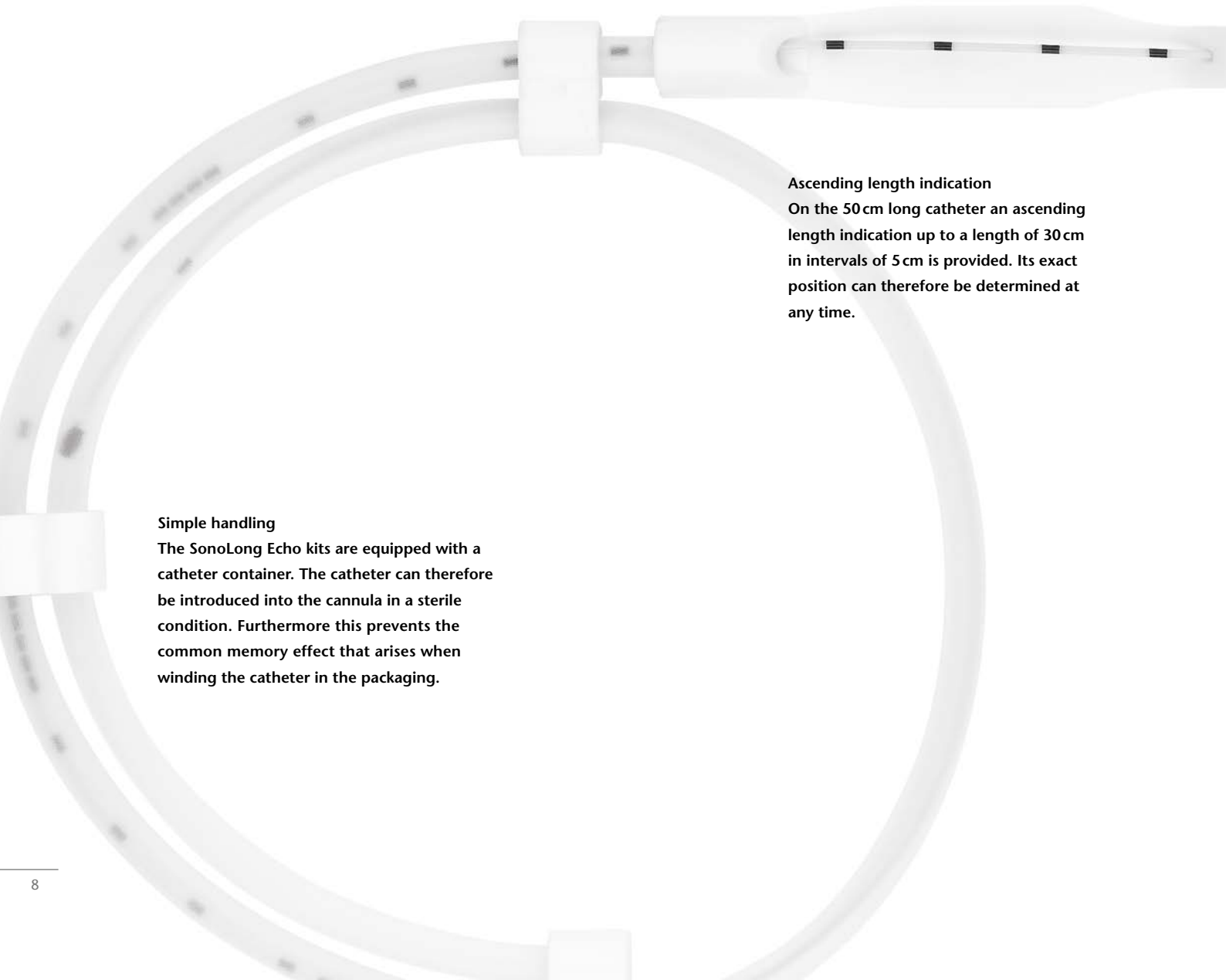
SonoLong Echo

Catheter placement directly through the cannula

The ultrasound procedure has radically changed processes in continuous regional anaesthesia. This has resulted in new requirements for the visibility of cannulas and catheters as well as their handling that our development department has been intensively working on for some time. Since PAJUNK® set a milestone in the industry in terms of the sonographic visibility of cannulas with Cornerstone Technology, we are pleased that with SonoLong Echo we succeeded in developing an ultrasound visible, MRT visible and radiopaque catheter.

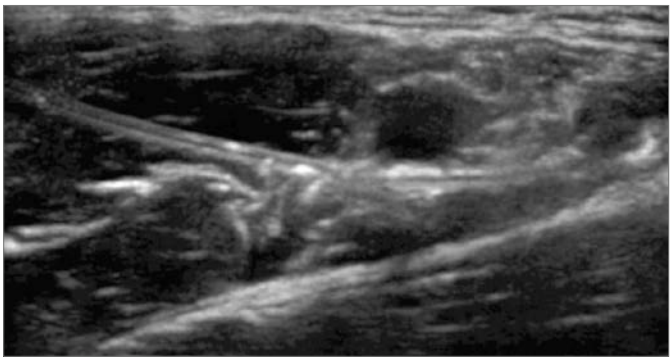
The kit consists of:

- *SonoLong NanoLine cannula with Cornerstone Reflectors optionally available with SPROTTE® SPECIAL tip, Tuohy tip or facet grinding*
- *SonoLong Echo catheter with catheter container*
- *FixoLong system*
- *Colour coded adapter*



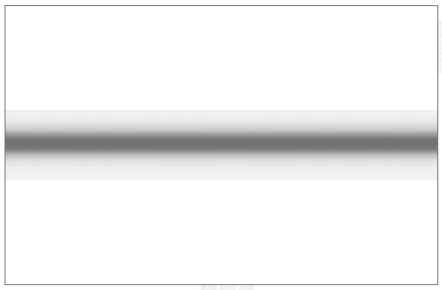
Ascending length indication
On the 50 cm long catheter an ascending length indication up to a length of 30 cm in intervals of 5 cm is provided. Its exact position can therefore be determined at any time.

Simple handling
The SonoLong Echo kits are equipped with a catheter container. The catheter can therefore be introduced into the cannula in a sterile condition. Furthermore this prevents the common memory effect that arises when winding the catheter in the packaging.



The special catheter material is extremely visible under ultrasound monitoring and in MRT and also radiopaque. – The best requirements for clear identification in all three procedures.

Facet grinding



Steel stylet

The catheter of the SonoLong Echo kit has a steel stylet, which is locked in place in the introductory aid at its end, and is removed together with the container after the application of the catheter.

➡ **This provides the catheter with outstanding stability.**

Catheter with central opening

The centre of the catheter is open.

➡ **This permits the free flow of the anaesthetic – particularly in connection with the post-operative injection pump.**

- ➡ *Under ultrasound monitoring and MRT clearly visible catheter material that is also radiopaque*
- ➡ *Is introduced into the cannula in a sterile condition*
- ➡ *Central opening enables a good and continuous flow of anaesthesia*

SonoLong Curl Echo

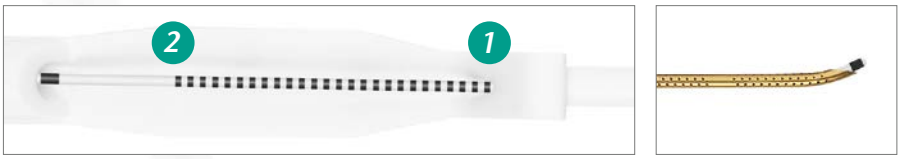
The "on-the-dot" anaesthesia, with a minimum of medication required

The provision of Cornerstone Reflectors eases precise positioning of the SonoLong NanoLine cannula in the direct proximity of the nerve under ultrasound monitoring. Since the catheter will follow the path with the least resistance, and this does not always coincide with the neural structures, it is also necessary to monitor the position of the catheter exactly. Against this background, the SonoLong Curl Echo kit was developed by PAJUNK® together with Dr. Cedric Luyet, which has a catheter that has been designed in a very special manner. The SonoLong Curl Echo catheter enables precise catheter positioning for a minimum of required medication. As soon as the catheter passes through the opening of the cannula, the soft tip of the Curl catheter tip will roll up and therefore access the point where the cannula tip is positioned. This permits an extremely precise anaesthesia, with a minimum of medication required. The SonoLong Curl Echo catheter is visible under ultrasound and is also radiopaque.

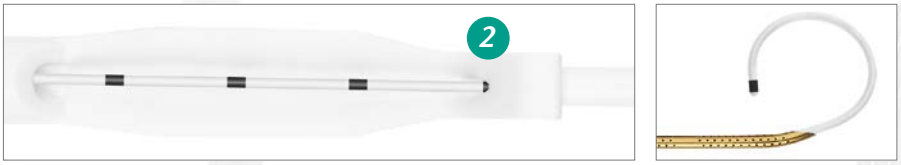
The kit consists of:

- *SonoLong NanoLine cannula with Cornerstone Reflectors and Tuohy tip*
- *SonoLong Curl Echo catheter in the catheter container*
- *FixoLong system*
- *Colour coded adapter*

Outlet marking



The SonoLong Curl Echo is pushed out of the cannula tip

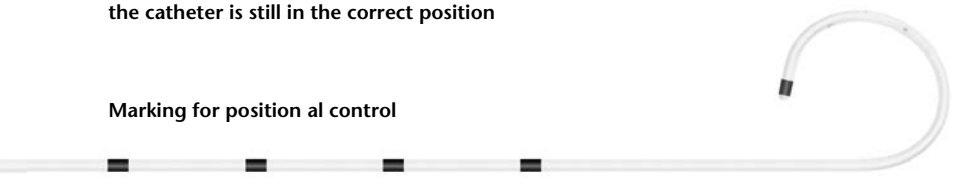


The soft Curl catheter tip is completely curled

The radiopaque SonoLong Curl Echo catheter is extremely visible under ultrasound. It has a curled end, a closed tip and six lateral openings. It can therefore be positioned extremely precisely and also provides an even distribution of anaesthetic.

For position control after catheter placement the catheter has been equipped with a 10 mm marking. Therefore it can be read off, whether the catheter is still in the correct position

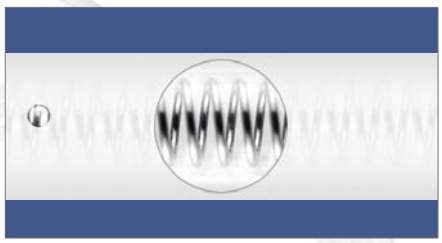
Marking for position al control



SonoLong Curl Echo catheter

SonoLong Curl Echo catheter with SonoLong NanoLine cannula with Tuohy tip

Exact catheter positioning
The SonoLong Curl Echo catheter curls in the direct proximity of the nerve. This permits a very precise administration of local anesthetic at the intended location.



Integrated stainless steel helical coil

The stainless steel helical coil confers kinking resistancy to the catheter.

➡ **This enables the unhindered flow of the anaesthetic, also and particularly over a longer period of time.**

- ➡ *Curled tip enables precise placement*
- ➡ *Six lateral eyes allow an even distribution of the anaesthesia*
- ➡ *Integrated stainless steel helical coil for maximum buckle protection and unhindered flow*
- ➡ *Cannula and catheter are extremely visible under ultrasound*

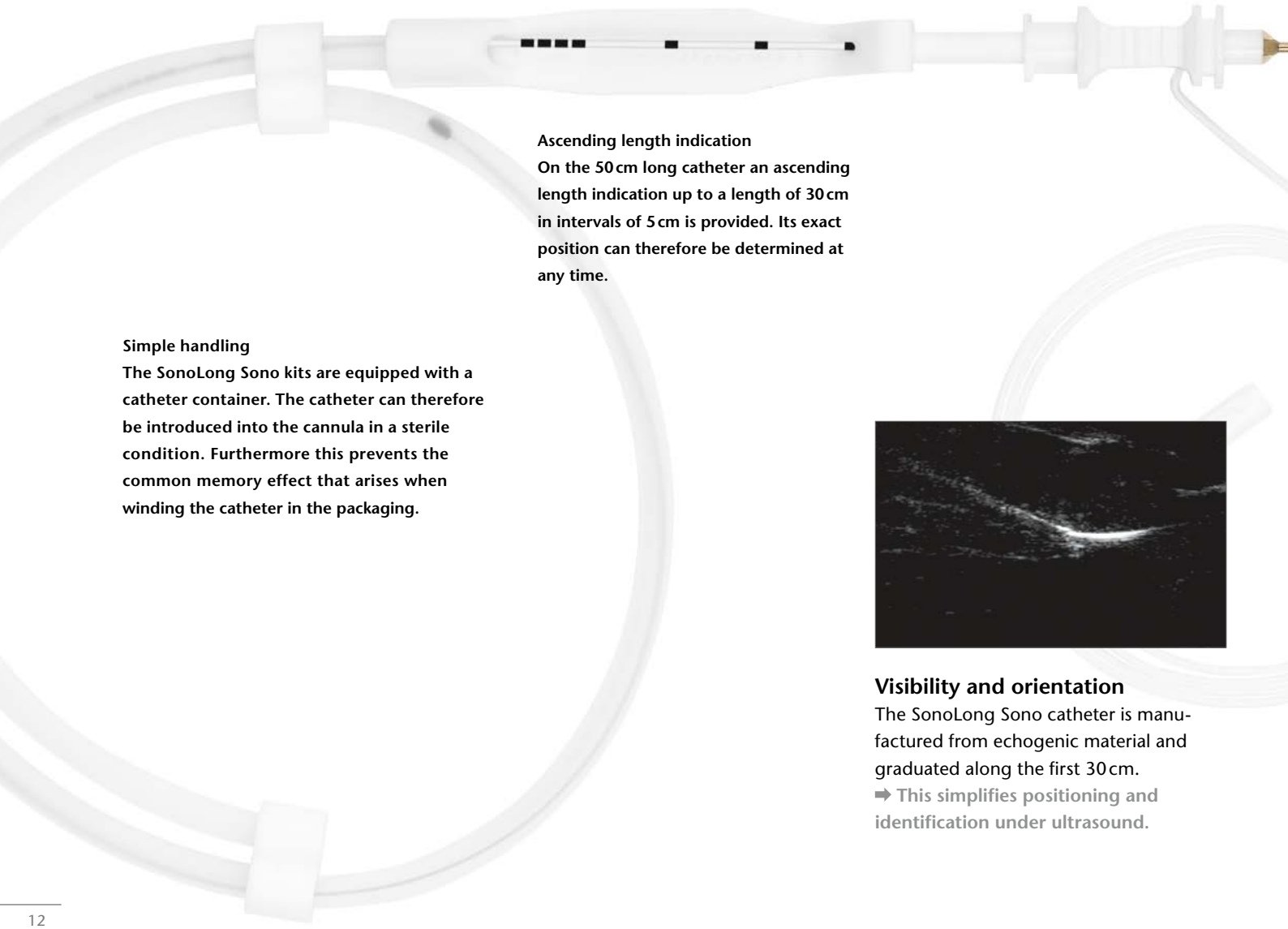
SonoLong Sono

The kink resistant catheter with stainless steel helical coil

The SonoLong Sono kit is a joint development of PAJUNK® and Dr Meier. It differs from the SonoLong NanoLine kit only in catheter design. It is equipped with an integrated stainless steel helical coil, and is suitable for long-term treatment in pain therapy and plexus anaesthesia. The SonoLong Sono kit is, just as the SonoLong Echo kit, available with three different types of cannulas: with a SPROTTE® SPECIAL tip, cannula with facet grinding or with a Tuohy tip. All three cannula variants are equipped with the proven Cornerstone Reflectors for improved visibility under ultrasound monitoring. The catheter material itself is characterized by its excellent echogenicity.

The kit consists of:

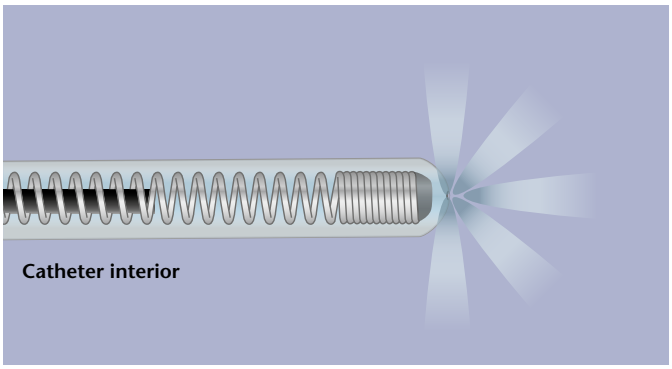
- *SonoLong NanoLine cannula with Cornerstone Reflectors optionally available with SPROTTE® SPECIAL tip, Tuohy tip or cannula with facet grinding*
- *SonoLong Sono catheter in catheter container*
- *FixoLong system*
- *Colour coded adapter*



Ascending length indication
On the 50 cm long catheter an ascending length indication up to a length of 30 cm in intervals of 5 cm is provided. Its exact position can therefore be determined at any time.

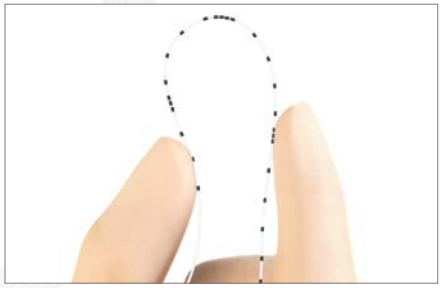
Simple handling
The SonoLong Sono kits are equipped with a catheter container. The catheter can therefore be introduced into the cannula in a sterile condition. Furthermore this prevents the common memory effect that arises when winding the catheter in the packaging.

Visibility and orientation
The SonoLong Sono catheter is manufactured from echogenic material and graduated along the first 30 cm.
➡ **This simplifies positioning and identification under ultrasound.**



Its integrated stainless steel helical coil provides the SonoLong Sono catheter with the highest degree of mobility and simultaneous kinking resistancy – an important aspect for continuous applications.

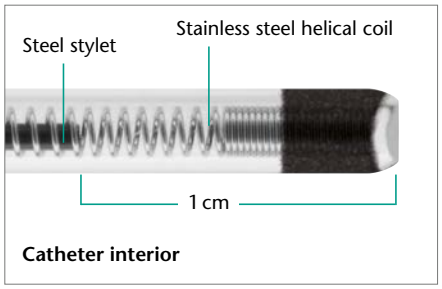
SPROTTE® SPECIAL tip



Unobstructed flow of the anaesthesia

The integrated stainless steel helical coil providesthe catheter with kinking resistancy.

➡ The best requirements for the unobstructed flow of anaesthesia for continuous applications and the safe connection of the catheter to the injection pump.



Soft, flexible catheter tip

The steel stylet ends 1 cm before reaching the catheter tip, which leaves the tip soft and flexible.

➡ This raises the flexibility during the insertion of the catheter and reduces the risk of unintentional injuries of vessels.

➡ *Maximum mobility and kinking resistancy thanks to the stainless steel helical coil*

➡ *Soft, flexible catheter tip prevents unintentional injuries*

➡ *Cannula and catheter are extremely visible under ultrasound monitoring*

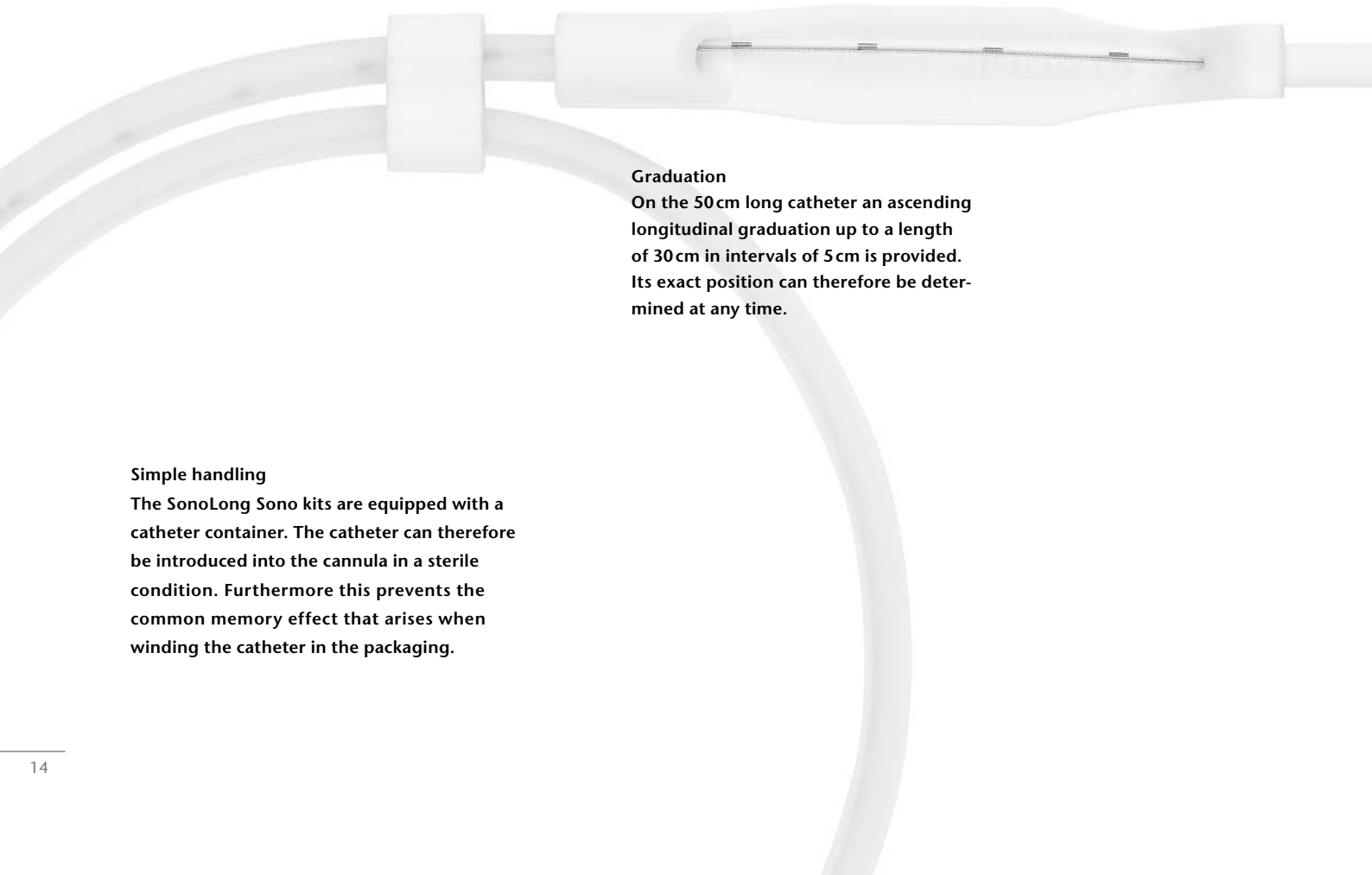
StimuLong Sono II

The combination of ultrasound and nerve stimulation provides double safety

The StimuLong Sono II combines the advantages of a stimulateable catheter with those of echogenic Cornerstone Cannulas in one kit. The StimuLongSono II catheter is characterised by its stimulateable tip. Stimulation is achieved here using an additional electric conductor that remains in the catheter over the entire application period and thus also enables subsequent position control. The relevant nerve is first identified by the echogenic Cornerstone Cannula. In a second stage, the accuracy of the catheter placement can then be checked using nerve stimulation. The distance to the nerve can be derived at the minimum current strength that is required for stimulation. As the inner lumen is completely NanoLine coated when compared with conventional cannulas, comprehensive insulation can be assumed. Stimulation takes place exactly when the catheter tip comes out of the cannula. A secondary position control of the catheter tip is also possible for intermittent post-operative pain therapy.

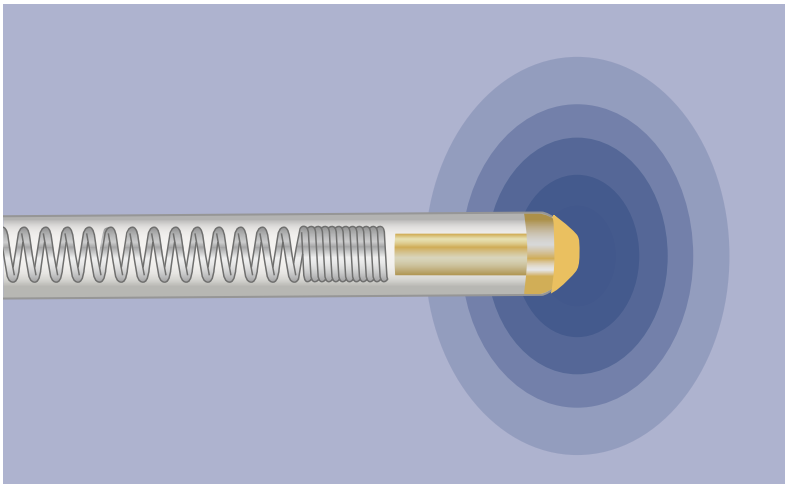
The kit consists of:

- *SonoLong NanoLine cannula with Cornerstone Reflectors optionally available with Tuohy tip or cannula with facet grinding*
- *StimuLong Sono catheter in catheter container*
- *FixoLong system*
- *Colour coded adapter*



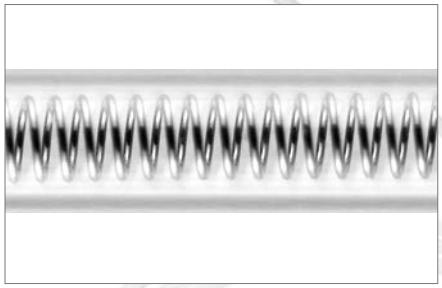
Graduation
On the 50 cm long catheter an ascending longitudinal graduation up to a length of 30 cm in intervals of 5 cm is provided. Its exact position can therefore be determined at any time.

Simple handling
The SonoLong Sono kits are equipped with a catheter container. The catheter can therefore be introduced into the cannula in a sterile condition. Furthermore this prevents the common memory effect that arises when winding the catheter in the packaging.



The atraumatically rounded tip of the StimuLong Sono catheter is gold-plated. As a result, the highest possible conductivity and an excellent stimulation capability are guaranteed.

Tuohy tip



Integrated stainless steel helical coil

The stainless steel helical coil provides the catheter with kinking resistancy.

➡ This ensures the unhindered flow of the anaesthetic, also and particularly over a longer period of time.

Stimulateable catheter

The catheter has a continuous electrical circuit.

➡ This establishes the electrical connection between the ClampingAdapter and stimulateable catheter tip.

- ➡ *Reliable flow of anaesthesia thanks to integrated stainless steel helical coil*
- ➡ *Stimulateable catheter ensures double safety during placement*
- ➡ *Excellent conductivity and stimulation capability due to gold-plated catheter tip*

Innovative catheter fixation

FixoLong / FixoLong Mini and FixoCath – ensure freedom of movement

PAJUNK® developed two different solutions for catheter fixation on patients; FixoLong / FixoLong Mini and FixoCath for catheter sizes 19 G and 20 G. Especially in continuous application, they prevent an accidental removal of the catheter if the patient moves or an obstruction of the anaesthetic flow by an unfavourable position.

FixoLong / FixoLong Mini

With FixoLong / FixoLong Mini, the catheter and Filter / MiniFilter are fixed close to the catheter exit, enabling greater freedom of movement in all continuous applications.

Art. No. 001151-40

FixoCath

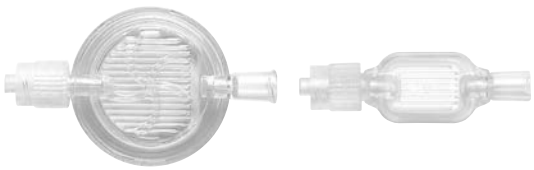
FixoCath is simultaneously a transparent adhesive and fixation and is placed directly on the exit point. This also ensures significant freedom of movement for the patient.

Art. No. 001151-37Z

Filter / MiniFilter 0.2 µm

The 0.2 µm bacterial filter prevents the passage of bacteria.

Art. No. 001151-37X



ClampingAdapter

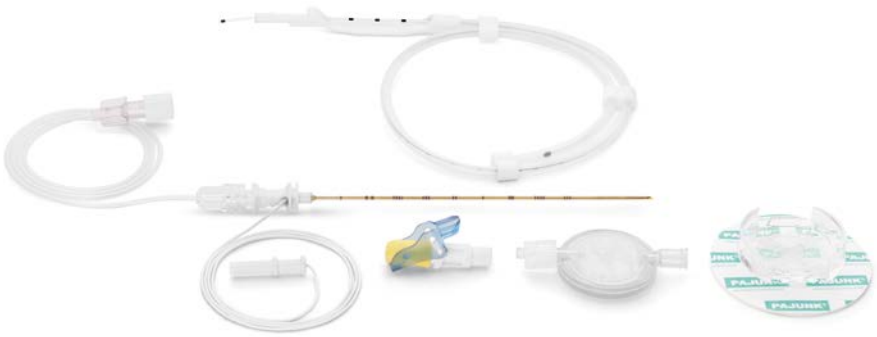
The PAJUNK® ClampingAdapter is a special anchoring device which prevents overstretching and ensures optimum anaesthetic flow.

Art. No. 001151-37V

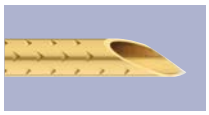
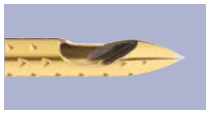
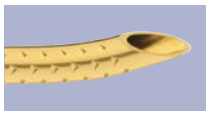
SonoSystem

All information at a glance

SonoLong Echo



Kit consisting of:
- SonoLong NanoLine cannula with Luer Lock connector and electrical connecting cable
- Adaptable injection tube
- SonoLong Echo catheter 20 G x 50 cm with central opening and steel stylet
- ClampingAdapter (yellow)
- Filter 0.2 µm
- FixoLong

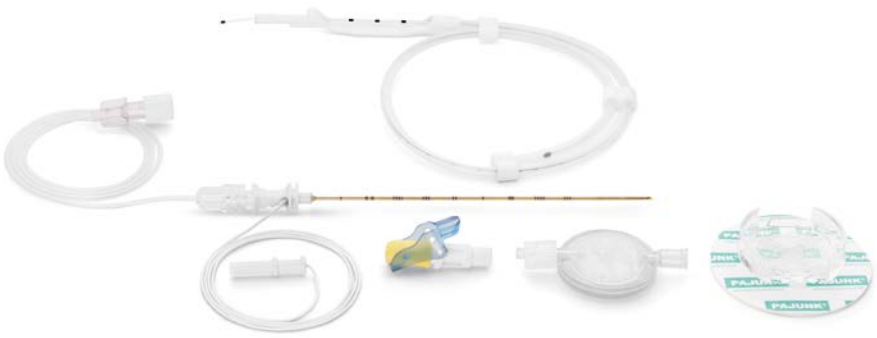
Product	Size	SonoLong Echo catheter	Item No.	PU
SonoLong NanoLine cannula				
 Facet grinding	19 G x 50 mm	20 G x 50 cm	531185-31A	10
	19 G x 75 mm	20 G x 50 cm	561185-31A	10
	19 G x 100 mm	20 G x 50 cm	521185-31A	10
	19 G x 150 mm	20 G x 50 cm	511185-31A	10
 SPROTTE® SPECIAL tip	19 G x 60 mm	20 G x 50 cm	531185-31B	10
	19 G x 120 mm	20 G x 50 cm	521185-31B	10
 Tuohy tip	18 G x 50 mm	20 G x 50 cm	531185-31C	10
	18 G x 75 mm	20 G x 50 cm	561185-31C	10
	18 G x 100 mm	20 G x 50 cm	521185-31C	10
	18 G x 150 mm	20 G x 50 cm	511185-31C	10

SonoLong Curl Echo

Kit consisting of:
- SonoLong NanoLine cannula with Luer Lock connector and electrical connecting cable
- Adaptable injection tube
- SonoLong Curl Echo catheter 20 G with integrated stainless steel helical coil, closed tip and 6 lateral openings
- ClampingAdapter (yellow)
- Filter 0.2 µm
- FixoLong

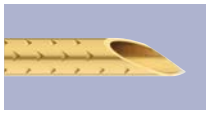
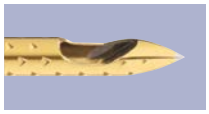
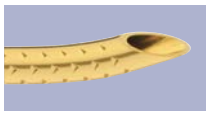
Product	Size	SonoLong Curl Echo catheter	Item No.	PU
SonoLong NanoLine cannula				
 Tuohy tip	18 G x 50 mm	20 G x 50 cm	531188-31C	10
		20 G x 90 cm	531188-34C	10
	18 G x 100 mm	20 G x 90 cm	521188-34C	10

SonoLong Sono



Kit consisting of:

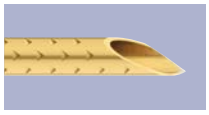
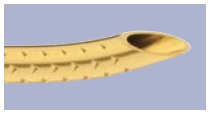
- SonoLong NanoLine cannula with Luer Lock connector and electrical connecting cable
- Adaptable injection tube
- SonoLong Sono catheter 20 G with integrated stainless steel helical coil, steel stylet and central opening
- ClampingAdapter (yellow)
- Filter 0.2 µm
- FixoLong

	Product	Size	SonoLong Sono catheter	Item No.	PU
	SonoLong NanoLine cannula				
	Facet grinding	19 G x 50 mm	20 G x 50 cm	531187-31A	10
		19 G x 75 mm	20 G x 50 cm	561187-31A	10
		19 G x 100 mm	20 G x 50 cm	521187-31A	10
		19 G x 150 mm	20 G x 50 cm	511187-31A	10
	SPROTTE® SPECIAL tip	19 G x 60 mm	20 G x 50 cm	531187-31B	10
		19 G x 120 mm	20 G x 50 cm	521187-31B	10
	Tuohy tip	18 G x 50 mm	20 G x 50 cm	531187-31C	10
		18 G x 75 mm	20 G x 50 cm	561187-31C	10
		18 G x 100 mm	20 G x 50 cm	521187-31C	10
		18 G x 150 mm	20 G x 50 cm	511187-31C	10

StimuLong Sono II

Kit consisting of:

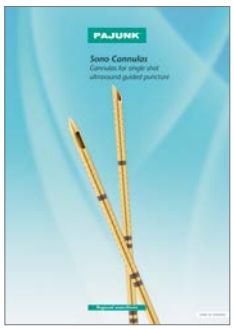
- SonoLong NanoLine cannula with Luer Lock connector and electrical connecting cable
- Adaptable injection tube
- StimuLong Sono catheter 20 G x 50 cm with central opening, electrically conductive stylet and integrated metal helical coil
- StimuLong ClampingAdapter (yellow) with integrated stimulation connection
- Connecting cable
- MiniFilter 0.2 µm
- FixoLong Mini

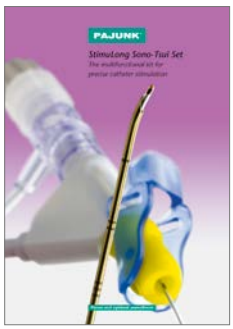
	Product	Size	StimuLong catheter	Item No.	PU
	SonoLong NanoLine cannula				
	Facet grinding	19 G x 50 mm	20 G x 50 cm	531187-32A	10
		19 G x 100 mm	20 G x 50 cm	521187-32A	10
	Tuohy tip	18 G x 50 mm	20 G x 50 cm	531187-32C	10
		18 G x 100 mm	20 G x 50 cm	521187-32C	10

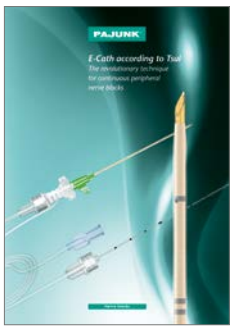
SonoCover

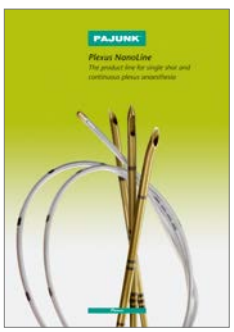
SonoCover

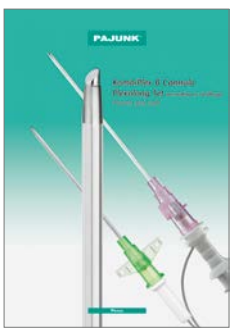
Product	Size	Item No.	with adhesive strips	with two elastic bands	with ultrasound gel	with 3D chamber	sterile
SonoCover	15 x 30 cm	021151-1530	•	•	•		•
SonoCover	15 x 60 cm	021151-1560	•	•	•		•
SonoCover	15 x 100 cm	021151-1501	•	•	•		•
SonoCover	15 x 30 cm	011151-1530	•	•		•	•
SonoCover	15 x 60 cm	011151-1560	•	•		•	•
SonoCover	15 x 100 cm	011151-1501	•	•		•	•
SonoCover	15 x 30 cm	031151-1530	•	•	•	•	•
SonoCover	15 x 60 cm	031151-1560	•	•	•	•	•
SonoCover	15 x 100 cm	031151-1501	•	•	•	•	•
SonoCover	15 x 30 cm	001151-1530	•	•			•
SonoCover	15 x 60 cm	001151-1560	•	•			•
SonoCover	15 x 100 cm	001151-1501	•	•			•

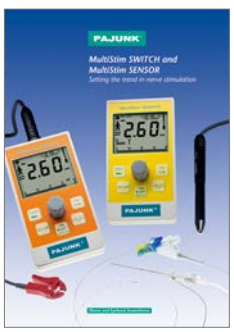


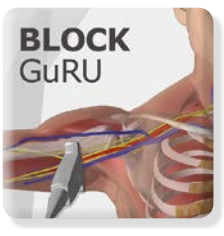












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Studies

- **Abbal B., Choquet O., Gourari A., Bouic N., Massone A., Biboulet P., Bringuier S., Capdevila X.** Enhanced visual acuity with echogenic needles in ultrasound-guided axillary brachial plexus block, Minerva Anestesiol. 2015 April; 81(4): 369–378

- **Bischoff J. M., Koscielniak-Nielsen Z. J., Kehlet H., Werner M. U.** Ultrasound-guided ilioinguinal/iliohypogastric nerve blocks for persistent inguinal postherniorrhaphy pain: a randomized, double-blind, placebo-controlled, crossover trial, Anesth. Analg. 2012 Jun; 114(6): 1323–1329

- **Fuzier R., Casalprim J., Bataille B., Harper I., Magues J. P.** The ecohogenicity of nerve blockade needles, Anesth. 2015; 70: 462–466

- **Edgcombe H., Hocking G.** Sonographic identification of needle tip by specialists and novices: a blinded comparison of 5 regional block needles in fresh human cadavers, Reg. Anesth. Pain Med. 2010 March–April; 35(2): 207–211

- **Hebard S., Hocking G.** Echogenic technology can improve needle visibility during ultrasound-guided regional anesthesia, Reg. Anesth. Pain Med. 2011 March–April; 36(2): 185–189

- **Hebard S., Hocking G., Murray K.** Two-dimensional mapping to assess direction and magnitude of needle tip error in ultrasound-guided regional anaesthesia, Anaesth. Intensive Care 2011; 39(6): 1076–1081

- **Hocking G. Mitchell C.** Optimizing the safety and practice of ultrasound-guided regional anesthesia: the role of echogenic technology, Curr. Opin. Anaesthesiol. 2012 Oct; 25(5): 603–609

- **Lurf M., Leixnering M.** Ultraschallgezielte Anlage eines Schmerzkatheters am N. medianus am Unterarm. Schmerzfreie Physiotherapie nach Arthrolyse und Tenolyse, Der Anaesthesist, Volume 57 Number 7, 2008; 686–688 [Plexolong]

- **Luyet C., Meyer C., Herrmann G., Hatch G. M., Ross S., Eichenberger U.** Placement of coiled catheters into the paravertebral space, Anaesth. 2012; 67: 250–255

- **Luyet C., Seiler R., Herrmann G., Hatch G. M., Ross S., Eichenberger U.** Newly Designed, Self-Coiling Catheters for Regional Anesthesia – An Imaging Study, Reg. Anesth. Pain. Med., Volume 36 Number 2, 2011; 171–176

- **Mahmoud K. M., Ammar A. S.** Ultrasound-guided continuous infraclavicular brachial plexus block using bupivacaine alone or combined with adenosine for pain control in upper limb surgery, Saudi Journal of Anaesth., Volume 5 Number 2, 2011; 132–137 [Plexolong]

- **Morath U., Luyet C., Spadavecchia C., Stoffel M. H., Hatch G. M.** Ultrasound-guided retrobulbar nerve block in horses: a cadaveric study, Vet. Anaesth. Analg. 2013; 40(2): 205–211

- **Schafhalter-Zoppoth I., McCulloch C. E., Gray A. T.** Ultrasound Visibility of Needles Used for Regional Nerve Block: An In Vitro Study, Reg. Anesth. Pain. Med., Volume 29 Number 5, 2004 Sept–Oct; 480–488

- **Schummer W., Sakka S.G., Hüttemann E., Reinhart K., Schummer C.,** Ultraschall und Lagekontrolle bei der Anlage zentraler Venenkatheter, Anaesthesist 2009; 58: 677–685 DOI 10.1007/s00101-009-1569-1

- **Sviggum H. P., Ahn K., Dilger J. A., Smith H. M.** Needle echogenicity in sonographically guided regional anesthesia: blinded comparison of 4 enhanced needles and validation of visual criteria for evaluation, J. Ultrasound Med. 2013 Jan; 32(1): 143–148

- **Taboada M., Rodríguez J., Amor M., Sabaté S., Alvarez J., Cortés J., Atanassoff P. G.** Is Ultrasound Guidance Superior to Conventional Nerve Stimulation for Coracoid Infraclavicular Brachial Plexus Block?, Reg. Anesth. Pain. Med., Volume 34 Number 4, 2009; 357–360 [short beveled needle]

- **Tsui B. C. H., Tsui J.** Reusable phantom with feedback signal for ultrasound needle tip control, Reg. Anesth. Pain Med. 2011; 36(6): 630–631

- **Uppal V., Sondekoppam R. V., Ganapathy S.** Effect of beam steering on the visibility of echogenic and non-echogenic needles: a laboratory study, Can. J. Anesth. 2014 Oct; 61(10): 909–915

- **Wiesmann T., Bornträger A., Zoremba M., Neff M., Wulf H., Steinfeldt T.** Compound imaging technology and echogenic needle design: effects on needle visibility and tissue imaging, Reg. Anesth. Pain Med. 2013 Sep–Oct; 38(5): 452–455

PAJUNK® GmbH
Medizintechnologie
Karl-Hall-Strasse 1
D-78187 Geisingen / Germany
Phone +49 (0) 77 04/92 91-0
Telefax +49 (0) 77 04/92 91-6 00
www.pajunk.com

PAJUNK® Medical Produkte GmbH
D.A.CH • BeNeLux
Karl-Hall-Strasse 1
D-78187 Geisingen / Germany
Phone +49 (0) 77 04/80 08-0
Telefax +49 (0) 77 04/80 08-150
www.pajunk.com

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