

Medical System solutions

Edition 2015



Reliable innovations





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Your partner for reliable connections

The HUBER+SUHNER Group is a leading international manufacturer and supplier of components and systems for electrical and optical connectivity. The company unites technical expertise in radio frequency technology, fiber optics and cable and polymer technology under one roof.

HUBER+SUHNER has worked in the medical market for many years with a wide range of leading manufacturers of medical devices. Within this wide market, HUBER+SUHNER concentrates on the development and production of innovative, passive connection solutions in the following fields:

- Microwave ablation
- Diagnostics
- Radiation therapy
- Radio frequency applications



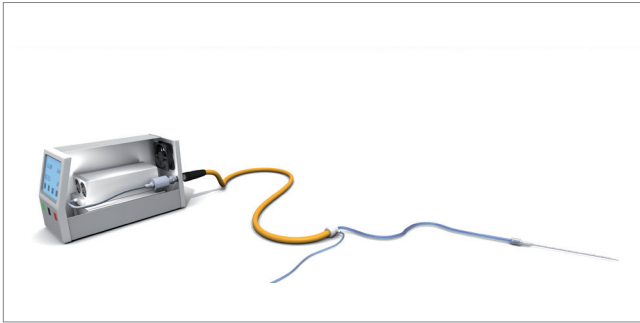
Safely connected with HUBER+SUHNER

HUBER+SUHNER supplies the medical market with cables, connectors, assemblies and cable systems. The wide range of radio frequency and fiber optic products and data cables is characterised by its reliable compliance with high quality standards. Broad support in the radio frequency, microwave and fiber optic market means that HUBER+SUHNER supplies a very wide range of standard products. Based on their long-standing experience in data and energy transmission, our engineers develop special and bespoke products which are precisely tailored to the required functions.

HUBER+SUHNER supplies solutions in the following fields listed in this brochure:

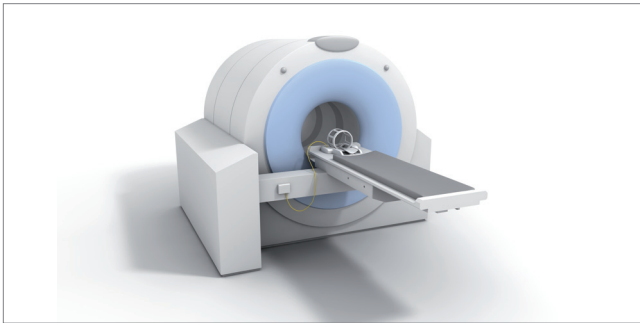
- Microwave ablation
- Diagnostics
- Radiation therapy
- Radio frequency applications

Microwave ablation



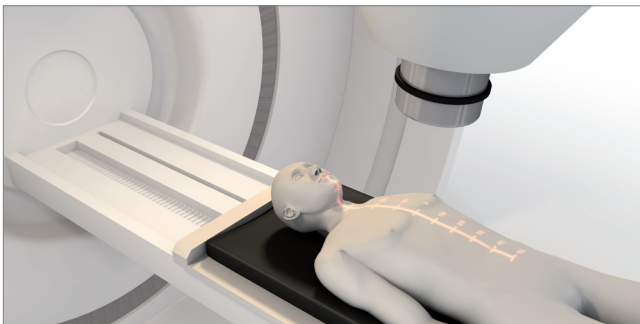
Microwave ablation is an innovative and highly promising method for treatment cancerous tissue. Thanks to its many years of experience in microwave technology, HUBER+SUHNER can supply a large portfolio of cables, connectors and cable solutions which meet the very high requirements in the medical market.

Diagnostics



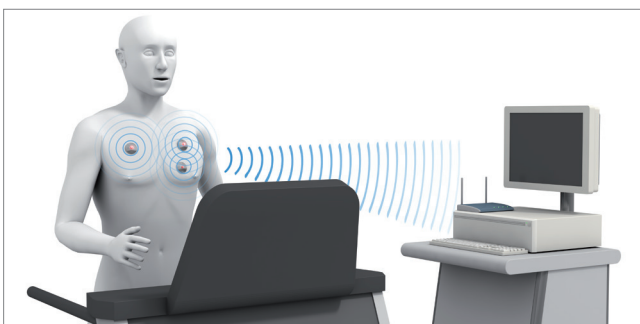
With the three technologies of radio frequency, low frequency and fiber optics under one roof, HUBER+SUHNER can supply both standard products and bespoke solutions. Decades of experience working with leading manufacturers of imaging diagnostic equipment have seen ongoing development of products and materials. This means that the portfolio includes many products which have been enhanced for these specific requirements.

Radiation therapy

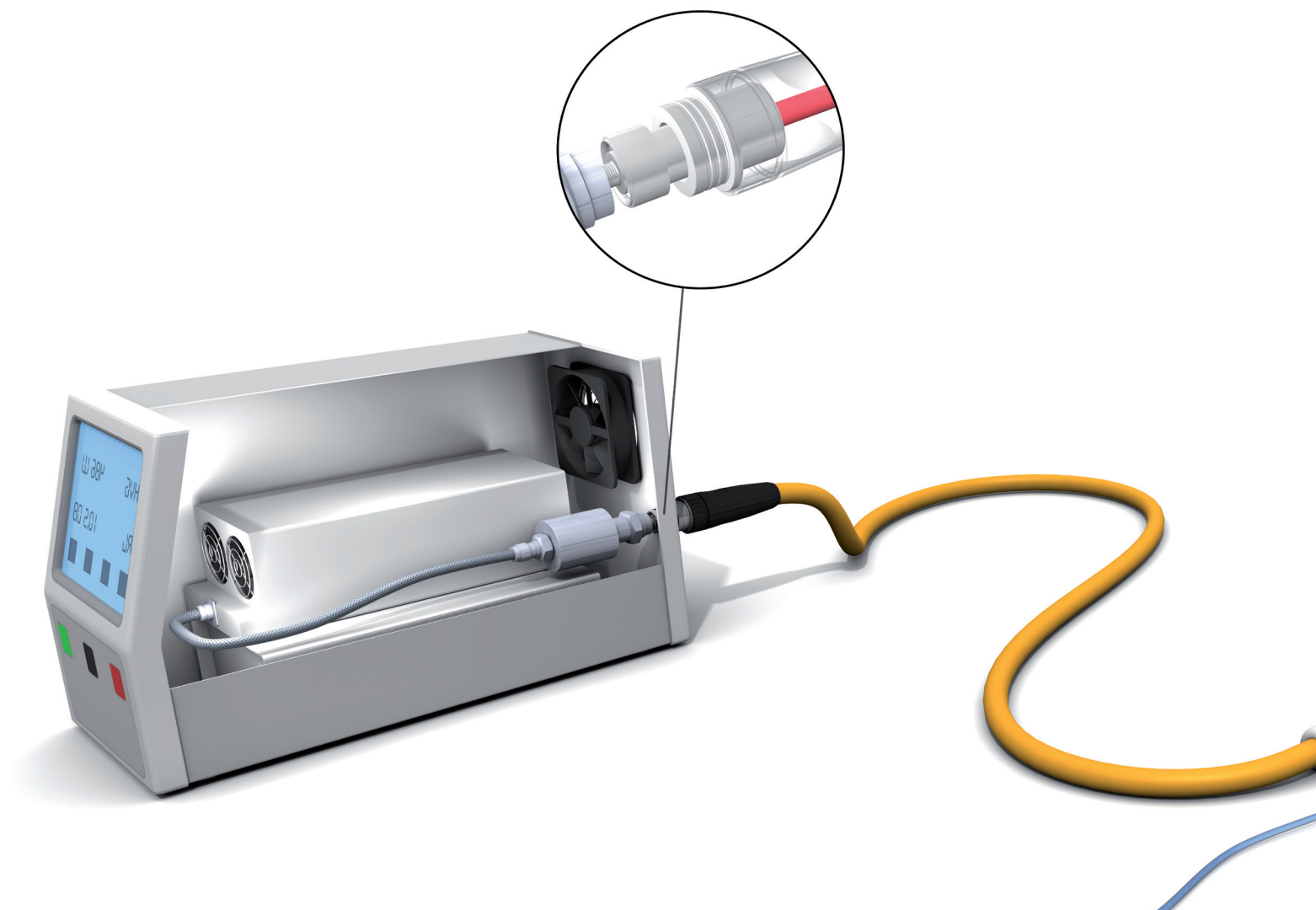


Significant investment has been made in research into particle therapy systems over the last 20 years. Organisations equipped with this new technology have a wide range of applications and often combine therapy and research. With the support of international institutions, HUBER+SUHNER has developed a wide range of special connection solutions. Experience from these projects is then used to develop bespoke solutions.

Radio frequency applications



The use of radio frequency and microwave technology in a wide range of medical treatments and diagnostic and communication applications is growing rapidly. As a specialist component manufacturer, HUBER+SUHNER supports the developers of applications and treatment methods from design through to production phase with innovative, bespoke solutions.

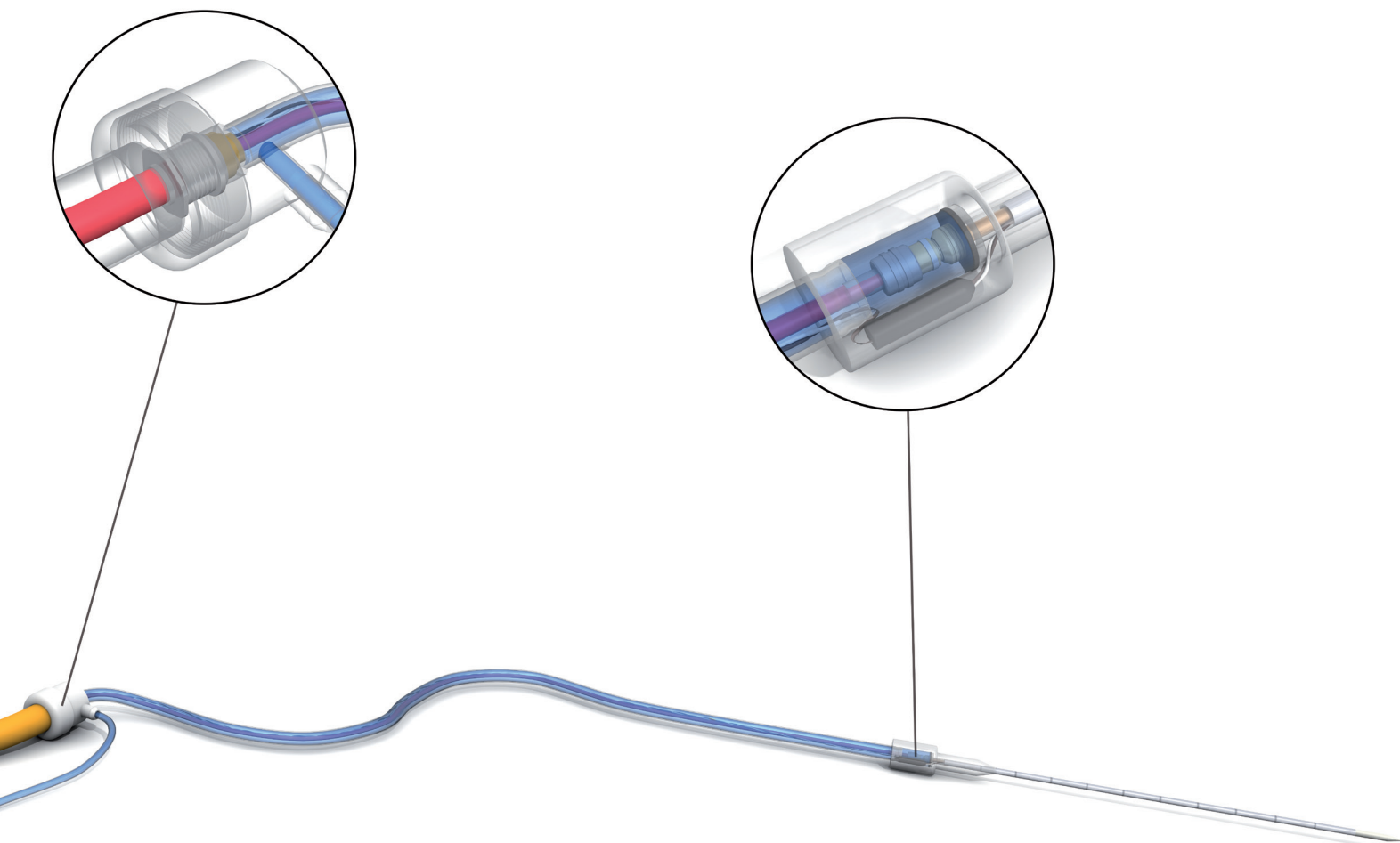


Microwave ablation

One promising new method for treating cancer tumours and metastases is microwave (MW) or radio frequency (RF) ablation. These minimally or non-invasive procedures enable work to be carried out in areas which are difficult to access, where treatment with conventional methods is only possible with serious side-effects. The savings resulting from shorter recovery times are resulting in rising acceptance of these treatment methods in healthcare circles.

Generator

The generator supplies the microwave energy. An integral controller allows the power, treatment time and temperature to be controlled. The device is used in the vicinity of the patient and must therefore meet high the safety requirements that apply in human medicine. An integral DC/DC block provides protection from high voltage. At the same time, sensors monitor the temperature and radio frequency power level. The robust radio frequency connectors on the device are designed for frequent connection cycles and ensure that the generator has a long service life.



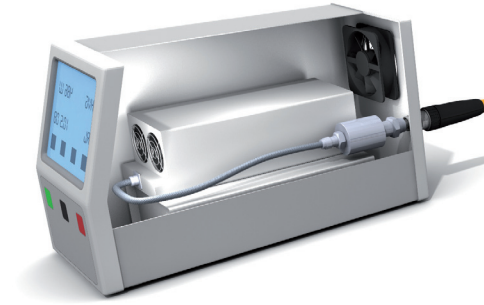
Transmission cable

The transmission cable must be robust and mobile and is therefore strengthened with specially developed reinforcements. At the same time, the microwaves must be transferred from the generator to the antenna in the applicator with minimal energy losses. The cables are therefore strengthened with special reinforcements to make them crush-resistant. The materials used in the cable are also selected to meet the requirements for medical use, above all for sterilisation. Properties such as coolability and the diameter of the transmission cable likewise play a major role in the cable selection process.

Applicator

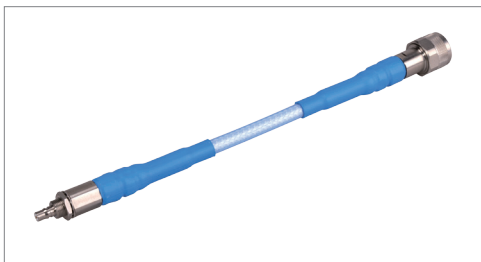
HUBER+SUHNER develops all equipment together with the customer or supplies individual components for the applicator (also known as the probe or disposable element). Thanks to its long experience in microwave technology, HUBER+SUHNER is capable of manufacturing thin cables which result in extremely low losses while also allowing cooling in or around the cable using a variety of media. The use of special connector solutions can also satisfy the demand for flexibility while maintaining the form stability of the supply cable to the antenna. This makes the applicator simple and highly ergonomic to handle.

Generator



The generator supplies the microwave energy and the power, treatment time and temperature of the application are regulated using an integral controller. Since the generator is used in the close vicinity of the patient, it must meet the safety requirements for use in human medicine.

At the same time, properties such as electrical attenuation, frequent connection cycles with simple connector mechanisms, safe function and reliability are also important.



Low-attenuation microwave cables

This cable assembly has been tuned for minimal losses, high power and combines the microwave source with the output connector. Flexibility, relatively tight bending radii and the easy installation of the snap-lock connectors help with the miniaturisation of the generator and ensure efficient assembly. In addition, shielding properties are an important criterion to ensure that all EMC requirements can be satisfied.



Housing connection

The radio frequency connector on the generator output must ensure that the power can be transferred and must also be designed to withstand the high number of connection cycles of the transmission cable. The connector must be easy to use while also ensuring a high level of connection reliability. At the request of the customer, it is also possible to manufacture and use modified radio frequency connectors for this application.



Amplifier output

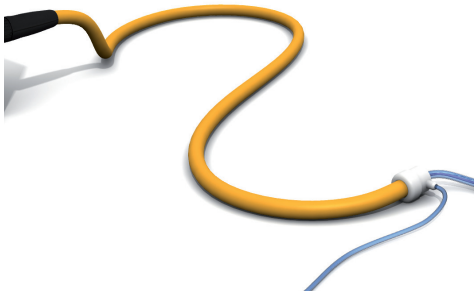
The high-performance connector is installed directly on the microwave amplifier housing and connects the power output directly to the printed circuit board inside. Quick-lock connectors, such as QN connectors are often used to make the connections easier.



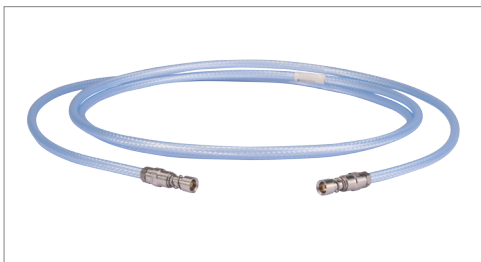
DC/DC block

The use of a DC/DC block to insulate the generator from the applicator on the internal and external conductors of the coaxial cable creates a galvanic separation from the generator. This protects the patient and the medical staff in the event of an electrical fault.

Transmission cable



The energy is fed through the transmission cable from the generator to the applicator with minimal energy losses. Specially developed reinforcements make the cable robust and crush-resistant. The materials used for the cable meet the requirements for a medical environment, particularly for sterilisation. In addition these cables can be finished to satisfy special requirements such as coolability and coding.



Low-attenuation microwave cables

A low-loss microwave cable is the key component in a transmission cable. In addition to minimal losses in the cable, flexibility, haptics and weight are other important factors. Since the cables also come into contact with the patient, they should also not become hot if possible. HUBER+SUHNER Sucoflex cables are used for this application.



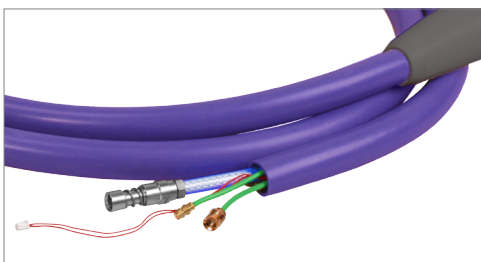
Cable connectors

The connection of the transmission cable to the generator must ensure that power can be transmitted while also withstanding a high number of connection cycles with the generator. The connector must be easy to use while also ensuring a high level of connection reliability.



Interface connectors

The connection between the transmission cable and applicator is often located in a special unit mounted on the operating table. Easy, fast handling, even when using the applicator with medical gloves, is a central requirement for the ergonomic properties of this radio frequency connector, in addition to its electrical properties.



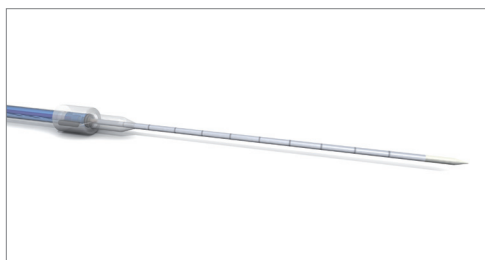
Hybrid cable assemblies

In addition to microwave transmission, other connections may be integrated in the transmission cable, such as signal cables for a wide range of sensors. HUBER+SUHNER works with customers to develop complete cable assemblies with hybrid connectors which are both compact and can also withstand high mechanical forces .

Applicator

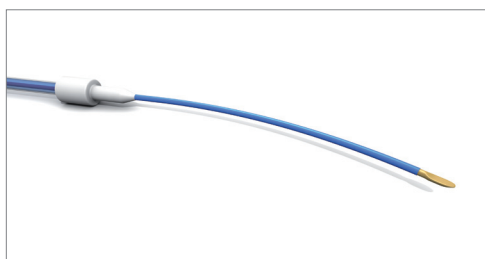


HUBER+SUHNER works with customers to develop the applicator or supply individual components. Thanks to its long experience in microwave technology, HUBER+SUHNER is capable of manufacturing space-saving cables which result in extremely low losses whilst also promoting cooling in or around the cable using a variety of media. The use of special cables and connectors can also satisfy the demand for flexibility whilst maintaining the form stability of the supply cable to the antenna.



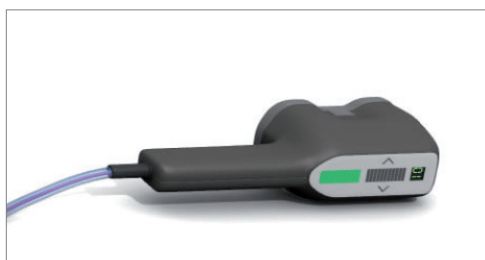
Rigid probe

This probe consists of a rigid needle with integral microwave antenna which is inserted into the the body up to the diseased tissue. The critical requirements for the design of this applicator are a small diameter, mechanical strength and excellent cooling.



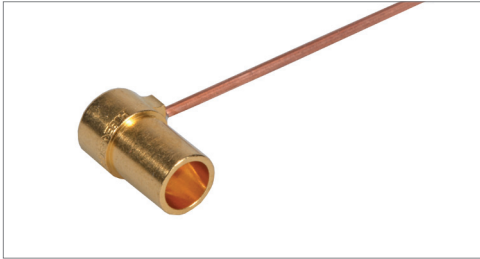
Flexible probe

A flexible cable on this applicator leads to the integral microwave antenna tip which allows the antenna to be inserted through a catheter to the required area of the body. In addition to a small diameter and the correct balance between flexibility and rigidity, excellent cooling is also required. The disposable is designed for single use.



Applicator for the body surface

These applicators are used for medical treatments on the surface of the body (for example for treating hyperhidrosis). Each applicator is used multiple times and includes an antenna which is connected directly to the generator using flexible, low-attenuation cables.



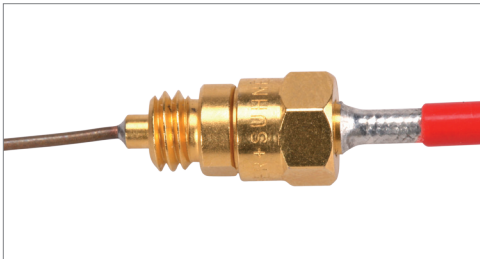
Semi-rigid cables

Low-attenuation semi-rigid cables are used inside the steel needle of a rigid probe. In addition to the production of these cables, HUBER+SUHNER can also deliver the required assembly techniques used to produce these probes, such as laser cutting and welding.



Flexible probe cables

A flexible, low-attenuation cable ends in the antenna tip. HUBER+SUHNER produces these assemblies including the assembly of the antenna tip itself. Their high power consumption means that additional cooling may be required. HUBER+SUHNER installs integral cooling systems with liquids or gases without noticeably reducing flexibility.



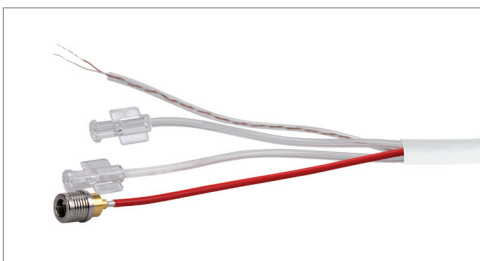
Connector between flexible and rigid parts

Special connector solutions are required for the transitions between the flexible and the rigid part of the applicator. MCV connectors and modified versions of these connectors are ideal for this purpose. They can be used as straight or right-angled connectors within the handle of the probe.



Antenna tip

The antenna tip is a key component for a stationary or mobile probe. It emits microwave energy to destroy the diseased tissue. HUBER+SUHNER assembles antenna tips using precision assembly processes.



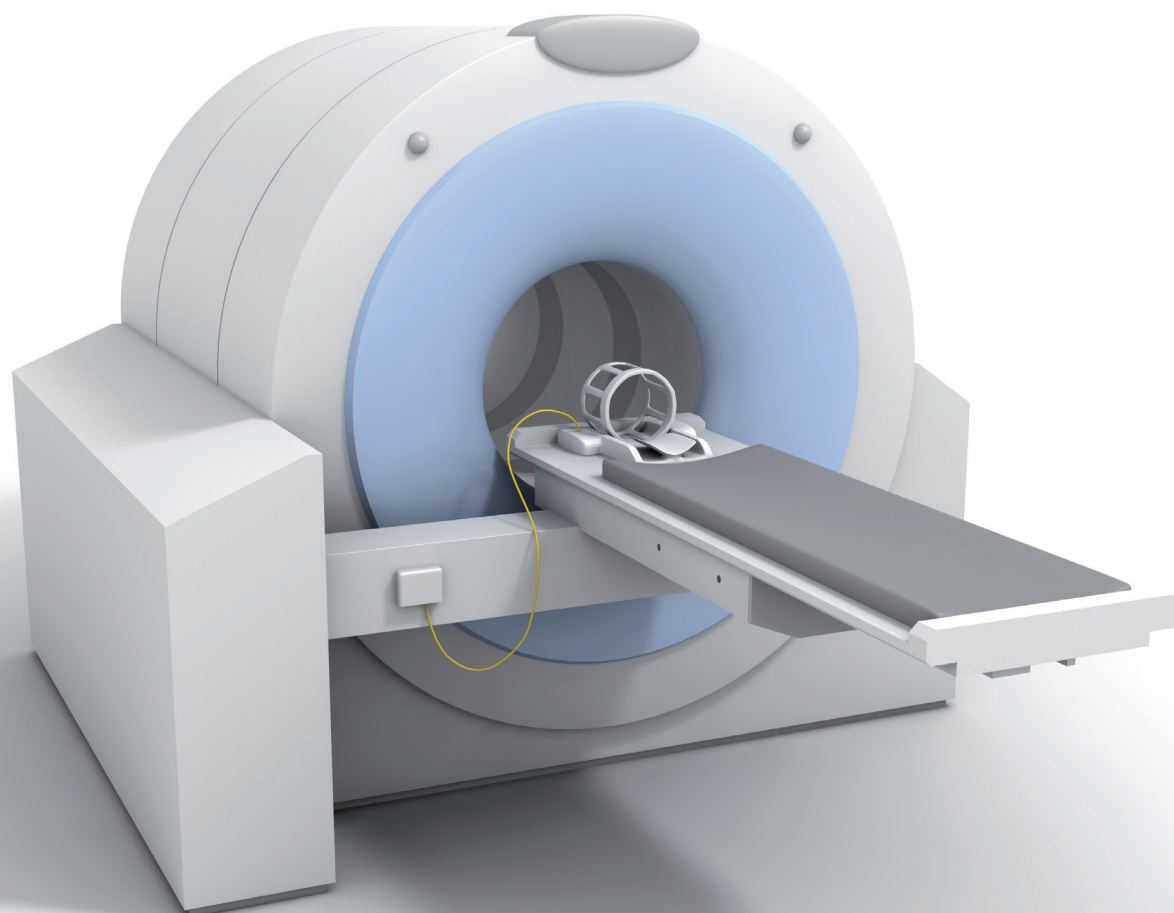
Hybrid cables

In its hybrid cables, HUBER+SUHNER combines flexible microwave cables with various data and cooling cables. These solutions are generally designed and enhanced for specific customer applications.



Probes assembly

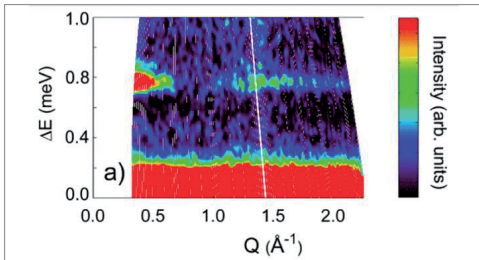
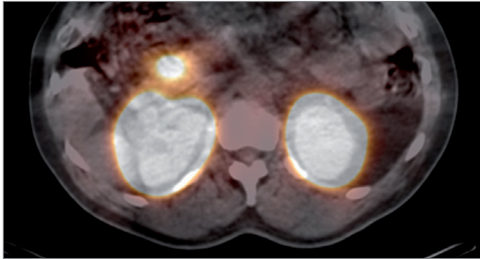
In addition to producing the various components, HUBER+SUHNER has the expertise required to manufacture the entire applicator and can provide the customer with support in the development process from the prototype phase to mass production.



Diagnostics

With the three technologies of radio frequency, low frequency and fiber optics under one roof, HUBER+SUHNER can supply bespoke solutions in addition to a wide range of standard products. Decades of experience working with leading manufacturers of imaging diagnostic equipment have resulted in the ongoing development of products and materials. This means that the portfolio includes many products which have been enhanced for these specific requirements.

- Non-magnetic cables and connectors
- Hermetically sealed components
- Semi-rigid cable assemblies
- Bespoke special solutions



MRI/NMR

MRI is a frequently used imaging method in medicine and research. In contrast to CT and other methods, MRI does not generate any ionising radiation, which is regarded as a benefit due to the negative effects of ionising radiation on the human body. However, the powerful magnetic field and low amplitudes of the signals which have to be detected make special demands on the components used, particularly in respect of non-magnetic materials.

In contrast to MRI, NMR is not an imaging method but is used to analyse molecular structures. MRI and NMR are based on the same physical principle. The required spectral evaluation of the measurement signal normally places even higher demands on the system and its components. To reduce the associated noise, solutions such as cryogenic systems are used.

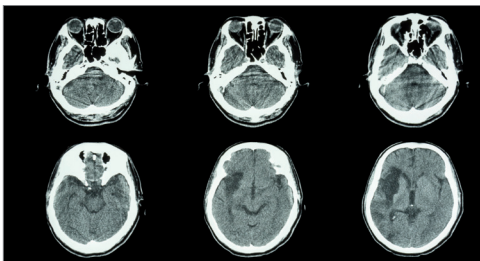
HUBER+SUHNER supplies a wide range of non-magnetic connectors and cables for these applications. This includes the BNC, SMA, N, 7/16 and 4.3-10 connector families. In addition, hermetically sealed, coaxial bushings are used for cryogenic systems and may also be made of non-magnetic material. The cable and connector portfolio satisfies a very wide range of customer wishes in terms of materials, losses, and electrical and thermal conductivity.



X-ray, computed tomography (CT), PET scanners and PET-CT/PET-MRI

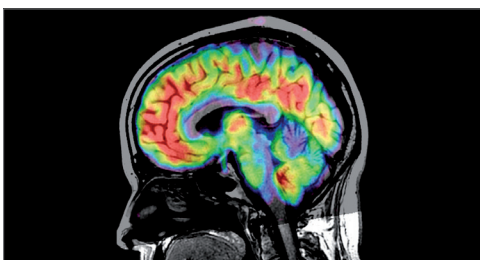
X-rays are an established imaging method in medicine. Modern devices attempt to reduce the intensity of the X-ray radiation and therefore the effects on the human body. Film material has been replaced by digital methods.

In computed tomography, the various images are used to generate a 3-D model. This allows medical staff to provide a much more precise diagnosis than a 2-D X-ray image.

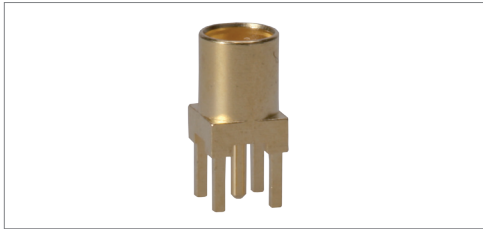


PET scanners generate a 3-D image using gamma radiation. The image allows a functional dissection of the living organism. Devices which combine PET and CT (PET-CT) or PET and MRI (PET-MRI) use both these imaging methods.

HUBER+SUHNER is the right partner for all RF connectors for these applications. The company can satisfy special requirements such as the radiation stability of materials, good shielding and high power. Our extensive product portfolio also includes coaxial bushings for housings and connection technology for cameras.



Radio frequency coils



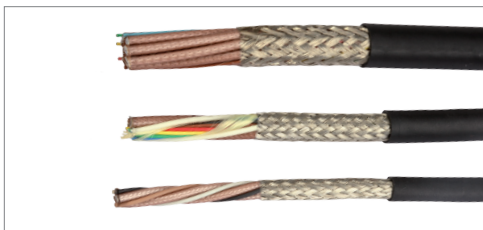
Non-magnetic connectors

HUBER+SUHNER supplies cable connectors, adaptors and other coaxial components for radio frequency coils. Various connector series are also available in non-magnetic versions.



Non-magnetic cables

The cables can also be made of non-magnetic materials. The combination of connector and cable results in non-magnetic assemblies which are assembled to suit specific customer requirements.



Hybrid cables

Multiple cables can be combined to form hybrid cables that suit the specific requirements in the devices and thus make handling easier. Combinations of radio frequency, fiber optic, data and energy supply cables are possible.

Magnetic field generators



High-voltage connectors

High power and good radio frequency performance demand appropriate connectors, such as products from the 7/16 series and the more compact 4.3/10 series.



Radio frequency cables

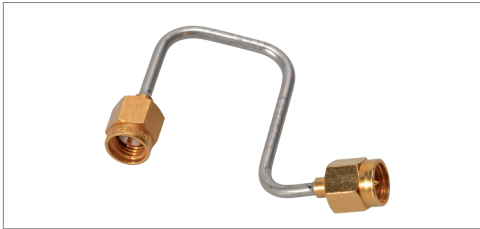
Coaxial cables with high RF ratings and high voltage strength are used to generate magnetic fields. HUBER+SUHNER Sucoform cables are ideal for this application.



Signal cabling

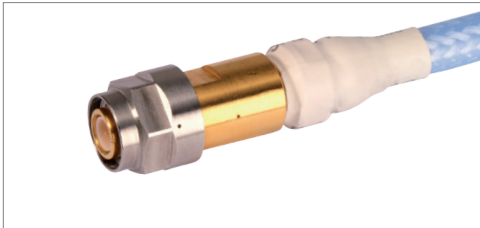
A wide range of signal cables for sensors come together in the control cabinet for the diagnostic device where they are connected using snap connectors. QLA and QMA connectors and Enviroflex cables from HUBER+SUHNER are typical components for this application.

Cryogenic systems



Cable assemblies

The various thermal expansion coefficients of metal and dielectrics are a special challenge to assemblies in a cryogenic environment. This is the area of use for semi-rigid cable assemblies or the Cobraflex cable specially developed for this application.



Ventilated connectors and adapters

Special ventilated connectors from HUBER+SUHNER reduce the negative effects of outgassing during cooling cycles. Most standard components can be supplied in a ventilated version.

Hermetically sealed connectors



Coaxial adapters

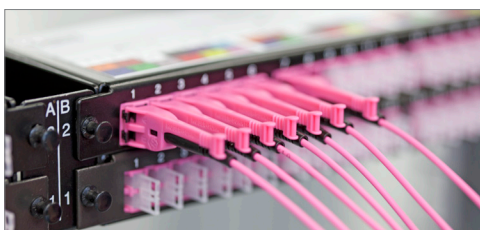
Hermetically sealed adapters allow a radio frequency signal to be transmitted into or out of a hermetically sealed chamber using standard cable assemblies. HUBER+SUHNER offers sealed adapters and connectors in its portfolio.



Hermetically sealed multiport connectors

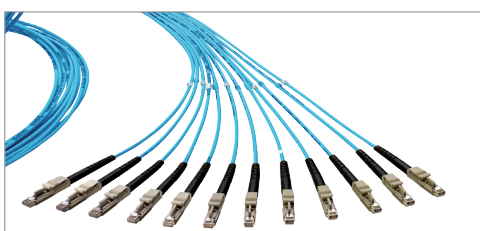
Hermetically sealed multiport solutions are used to combine multiple radio frequency cables or as sealed bushings to combine radio frequency and other electrical connectors.

Fiber-optic-based data transmission



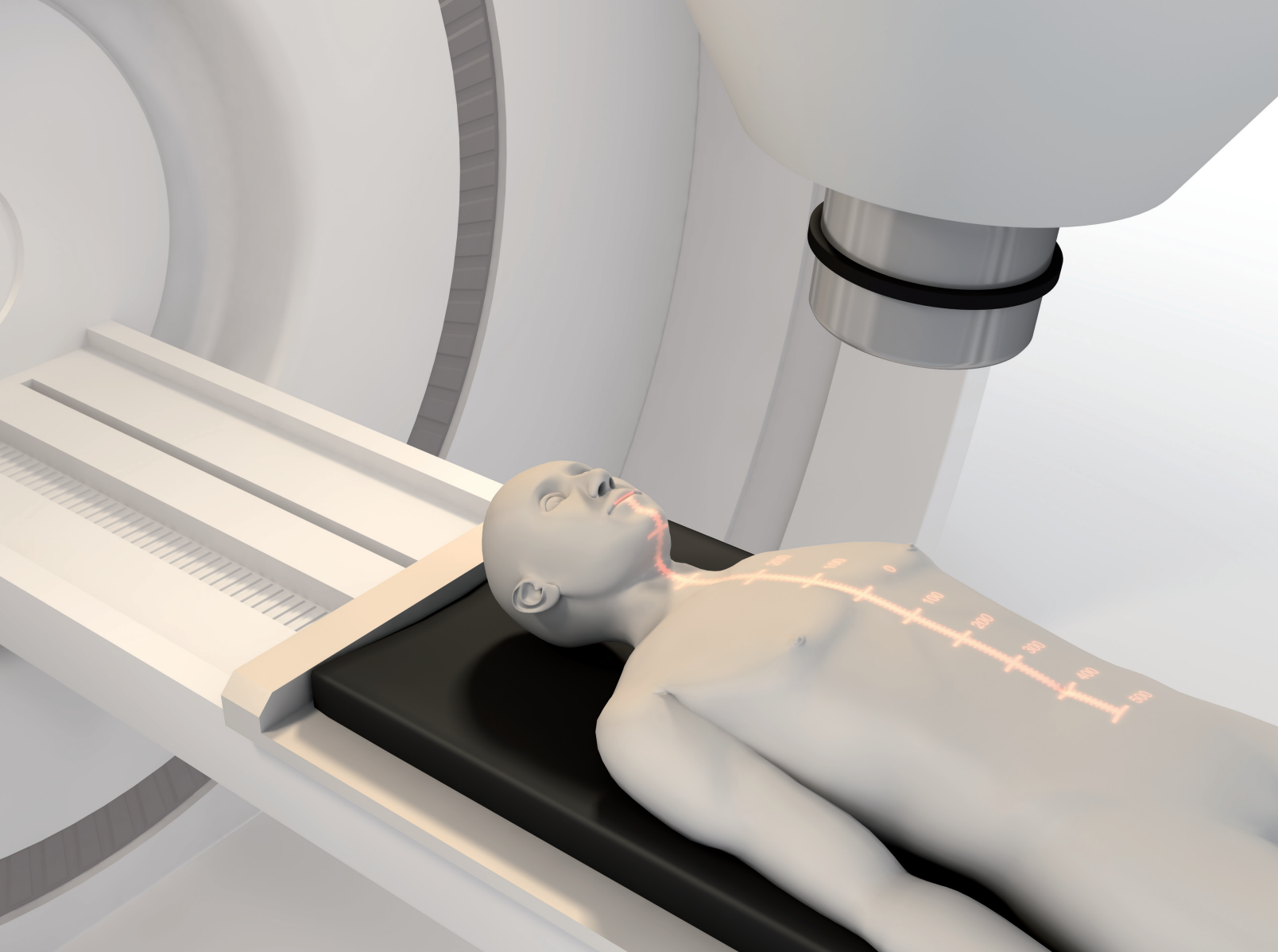
Fiber optic connections

Large volumes of digital data are generated in imaging diagnostic devices. This data is transferred to the hospital's data center using fiber optic connections. HUBER+SUHNER fiber optic distributor boxes provide simple fiber management combined with maximum packaging density.



Fiber optic cable systems

Fully assembled and tested fiber optic system cables allow connections featuring fiber optic cables to be installed safely in hospital environments. As a result, devices can be connected in these environments without splicing.



Radiation therapy

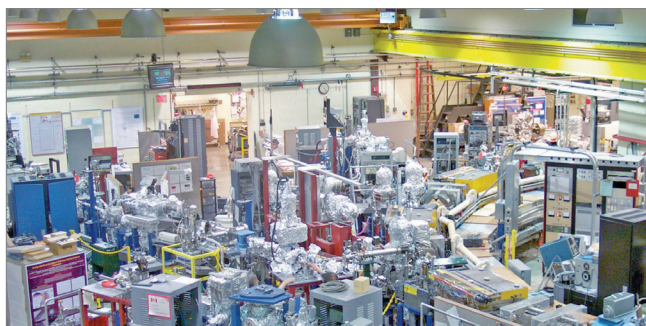
Significant investment has been made in research into particle therapy systems over the last 20 years. Organisations equipped with this new technology have a wide range of applications and often combine therapy and research. A number of international institutes for which HUBER+SUHNER has developed a variety of special connection solutions are working at the cutting edge in this field. Examples of such products include radiation-resistant, low-noise cables and special radio frequency coaxial connectors which are located directly on and in the systems, as well as all the fiber optic cable systems (ODFs) for neighbouring computer centers in research institutions.

Synchrotron



To radiate patients with particles (protons), the particles are accelerated in a synchrotron using a magnetic field. HUBER+SUHNER supplies major components, cables and connectors for the construction of particle accelerators. These components are mainly used to control the magnetic fields and perform a wide range of measuring tasks.

Beam guidance

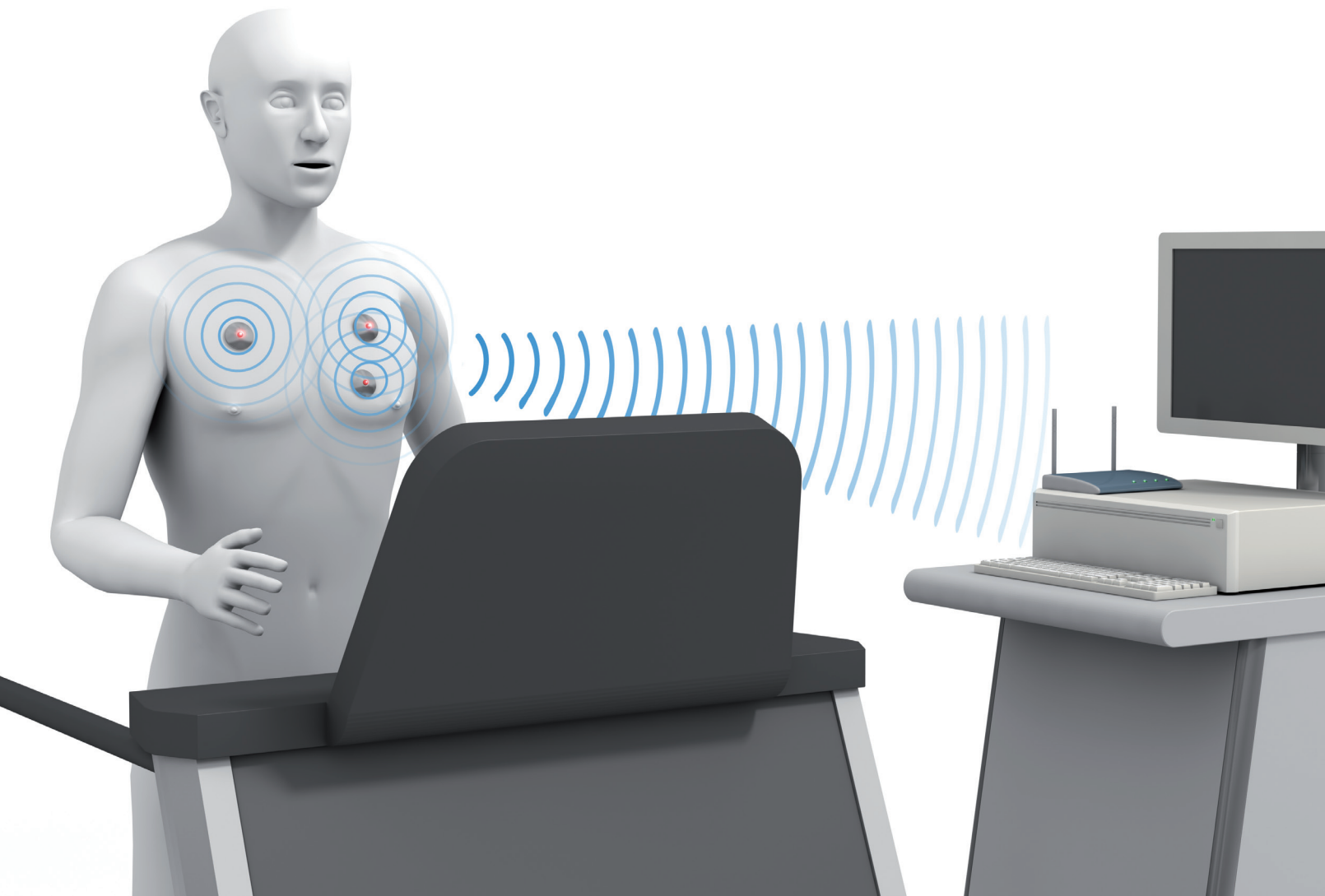


The accelerated particles (protons) are bundled and guided by a complex network of magnetic fields. The radio frequency components employed in the synchrotron can also be used in this part of a radiation therapy device. The radio frequency cables and connectors which HUBER+SUHNER assembles for this demanding application are manufactured on a customer-specific basis.

Gantry



The gantry rotates around the patient's bed and is responsible for beam guidance. Central factors in this respect are the splitting and control of the particle beam to ensure that it can be focused on the treatment target in the body as precisely as possible. The mobility of the installation increases the requirements placed on the radio frequency connectors since they must also provide a high level of flexibility to withstand repeated bending without any adverse effect on performance.



Radio frequency applications

Radio frequency and microwave signals are increasingly being used in medical applications.

As a specialist manufacturer, HUBER+SUHNER supports the development of new applications and treatment methods from design through to production with innovative, bespoke radio frequency and fiber optic solutions. The main focus areas for radio frequency and microwave solutions are:

- Microwave-based diagnostics
- Microwave therapy
- Increasing the tissue temperature
- Tissue characterisation
- Video and image processing systems
- Wireless monitoring

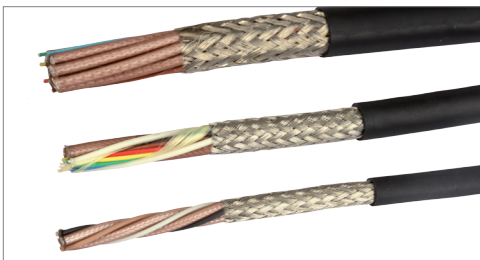
Microwave-based diagnostics

Microwave technology is used, among other things, for rapid diagnosis after a stroke as an alternative to a CT or MRI scan. This diagnosis can be made while the patient is still in the ambulance. Depending on the type of stroke (ischemic clots or hemorrhagic bleeds), the correct treatment can then be initiated to minimise the damage suffered by the brain itself. For this application, several radio frequency antennas are used to generate an image of the patient's head.



minibend

Minibend cable assemblies are the perfect cabling solutions for microwave tomography. Thanks to the special cable design with steel braiding, the cable can be routed perfectly in very small spaces inside the devices with very small bending radii. HUBER+SUHNER can supply minibend solutions for frequencies up to 67 GHz.



Multicoax

In microwave tomography, a special solution featuring multicoax cables is used that features multiple microwave cables and signal cables bundled together. High flexibility and a large number of bending cycles are the main requirements for these cables.

Microwave therapy

As it penetrates the fatty tissue easily, the muscle tissue below is warmed. The subjective feeling of warmth also prevents an overdose. Acute diseases require a low dose with a short treatment time. These diseases include inflammatory and traumatic clinical pictures. By contrast, a higher dose and longer treatment time is required for chronic diseases.



Connectors

Easy-connect connectors such as QN, BNC or C are used to support the relatively high rating of over 1000 W pulse and 200 W permanent power at 2.5 GHz. At the same time these connectors are easy to handle by the medical staff.

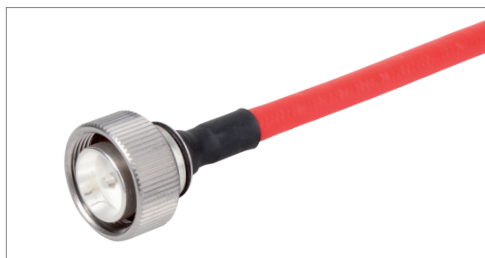


cables

Low-attenuation cables are required to minimise the losses in the cables. Although these cables have a relatively large diameter, they must be flexible. GX cables from HUBER+SUHNER are typically used for this application as they can be assembled in accordance with customer requirements to produce a tested assembly that is immediately ready for use.

Increasing the tissue temperature

In hyperthermia therapy, the temperature of tissue is increased locally to make cancerous cells susceptible to radiation and cancer medication. There are a large number of ways to increase the temperature of the tissue, and warming it using microwaves is one of the most common methods.



Radio frequency connectors

HUBER+SUHNER manufactures a wide range of different standard connector series which can be used for special applications. These standard connectors can also be adapted to meet specific customer demands.

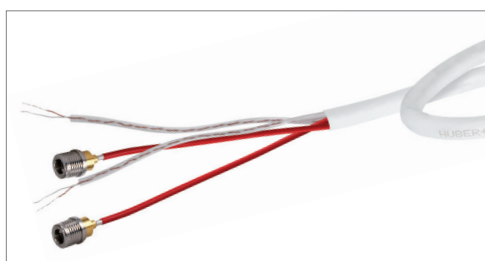


Radio frequency cables

From the wide range of radio frequency cables available, customers can select the best possible compromise between flexibility, load capacity and attenuation to meet the requirements imposed by a high microwave rating in a mobile applicator in a hand-held device.

Tissue characterisation

Radio frequency spectroscopy is used to analyse tissue and distinguish between healthy and tumour tissue. The system works like a radar by emitting a radio frequency signal and measuring the resonance. The resulting image is used to identify cancerous tissue.



Hybrid solutions

In addition to the radio frequency signals that pass to and from the analysis device, other connectors are often required to monitor the applicator during the treatment. HUBER+SUHNER manufactures both hybrid cables, consisting of frequency and signal connectors, and also complete bespoke cabling systems.



Radio frequency connectors

Since the connectors in medical applications often need to be connected and disconnected, the main demand in this sector is for connectors which are blind-mateable or which can be locked with a snap mechanism, such as BMA, QMA or QLA.

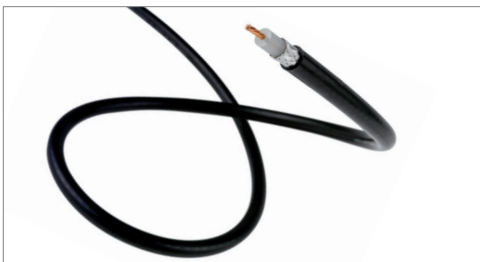
Video and image processing systems

Multiple video cameras, microscopes and monitors are used in a modern operating theatre environment. The required images and data are displayed on monitors and saved to data media. 75 ohm cable assemblies are used for this purpose, which are routed in a bearing system above the theatre table inside the sterile zone.



75 ohm Connectors

Typical 75 ohm connectors are BNC models or the smaller MCX-75 connectors.



75 ohm cables

Flexible, relatively thin but low-loss 75 ohm cables, such as the SX_02173_D-03, are used in this application.

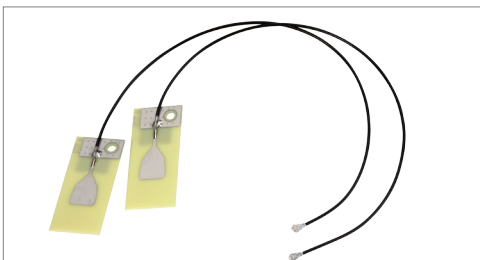
Wireless monitoring

Mobile communication delivers a number of benefits in a medical environment. For example, data from probes, analysis devices and monitoring instruments can be transmitted wirelessly. Both Wi-Fi and mobile communication technologies can be used.



Indoor antennas

HUBER+SUHNER broadband antennas, which cover all mobile phone frequencies (GSM to LTE) and all Wi-Fi bands, can be used to provide wireless coverage in hospitals.



Portable antennas

Integral or portable antenna elements from HUBER+SUHNER are developed to meet specific customer requirements and optimised for installation in medical devices for applications such as wireless patient monitoring.

Radio frequency cables and cable assemblies

MW ablation generator	MW ablation transmission cable	MW ablation applicator	Diagnostic radio-frequency coils	Diagnostic magnetic field generators	Diagnostic cryogenic systems	Radiation therapy	MW-based diagnostics	MW therapy	Hyperthermia therapy	Tissue characterisation	Video and visualisation systems	Cable type	Non-magnetic	External diameter (mm)	Frequency (GHz)	VOP (%)	MAX IL @ 1 GHz	MAX IL @ 2.45 GHz	MAX IL @ 5.8 GHz	CW rating (W) @ 1.00 GHz	CW rating (W) @ 2.45 GHz	CW rating (W) @ 5.8 GHz	Min. temperature (°C)	Max. temperature (°C)	Min bending radius (static) (mm)	Impedance
							x					minibend		2.49	65	70	1.00	1.30	2.10	170	110	65	-65	150	5.1	50
							x					minibend L		2.69	50	76	0.66	1.05	1.64	290	175	110	-65	150	5.1	50
							x					microbend		1.96	90	70	1.00	1.64	2.62	170	110	65	-65	150	1.5	50
x												mini 141		3.66	40	76	0.50	0.66	1.00	590	350	220	-65	150	8.4	50
x	x											SUCOFLEX 102		4.00	46	77	0.42	0.66	1.03	448	286	186	-55	125	12	50
x	x								x			SUCOFLEX 104		5.50	26.5	77	0.26	0.41	0.65	1032	659	429	-55	125	16	50
x	x								x			SUCOFLEX 106		7.90	18	77	0.17	0.28	0.44	1812	1158	752	-55	125	24	50
		x	x				x					SUCOFORM 47	x	1.20	40	71	1.27	2.03	3.12	36	23	15	-65	165	3.18	50
		x								x		SUCOFORM 86		2.10	40	71	0.74	1.19	1.92	184	118	76	-65	165	2.1	50
		x								x		SUCOFORM 141	x	3.80	33	71	0.43	0.72	1.19	484	309	201	-65	165	8	50
x			x	x								SUCOFORM 250	x	6.35	18	71	0.27	0.45	0.75	1047	669	435	-65	165	30	50
		x										Multiflex 86		2.65	40	71	0.78	1.25	1.99	159	102	66	-65	165	6	50
		x										Multiflex 141		4.14	33	71	0.44	0.72	1.17	424	271	176	-65	165	10	50
		x										K_01152-16		1.00	3	69	2.00	3.25	-	15	10	-	-55	165	12	50
									x			S_02132_B		3.20	6	82	0.57	0.95	1.60	125	80	52	-25	85	16	50
									x			S_06132_D-10		8.95	4	82	0.32	0.54	-	174	111	-	-25	85	45	50
										x		S_02223		2.55	1	1	0.68	-	-	33	-	-	-25	85	15	75
			x						x			ENVIROFLEX_178		1.84	3	70.7	1.79	3.02	-	76	49	-	-40	105	5	50
			x							x		ENVIROFLEX_179		2.54	3	70	0.92	1.63	-	57	36	-	-40	105	7	75
			x							x		ENVIROFLEX_316		2.54	3	70.7	1.06	1.80	-	114	73	-	-40	105	5	50
		x		x					x			EZ_47 (semi-rigid)		1.19	40	69.5	1.30	2.07	3.29	36	23	15	-40	100	3.18	50
								x				GX_07272_D		10.80	6	66	0.34	0.62	1.14	710	454	295	-40	105	60	50
			x									K_02252_D-60	x	3.00	6	69	1.11	1.94	3.45	175	112	73	-65	165	18	50
			x									K_01152-07	x	1.25	1	69	2.60	4.34	-	31	20	-	-80	205	6	50
							x					G_02330_HT (triaxial)		5.3	1	-	1.00	-	-	38	-	-	-25	85	30	50
							x					G_03332 (triaxial)		7.3	2	66	0.53	-	-	104	-	-	-25	85	36	50

Radio frequency connectors and adapters

MW ablation generator	MW ablation transmission cable	MW ablation applicator	Diagnostic radio-frequency coils	Diagnostic magnetic field generators	Diagnostic cryogenic systems	Diagnostic hermetically sealed connectors	Radiation therapy	MW-based diagnostics	MW therapy	Hyperthermia therapy	Tissue characterisation	Video and visualisation systems	Connector interface	Non-magnetic	Impedance	Frequency (GHz)	Mating cycles	Coupling mechanism	Interface external diameter (mm)
				x									4.3-10		50	6.0	100	Screw/snap	25
													7/16		50	7.5	500	Screw-on	36
	x										x		BMA		50	26.5	1000	Slide-on	9
													BNC		50/75	4.0	500	Bayonet	14
				x								x	MCX	x	50/75	6.0	500	Snap-on	5
									x				N		50	11.0	500	Screw-on	19
				x									QLA		50	1.4	10000	Quick latch	7
	x	x						x					QMA		50	18.0	100	Quick-lock	10
x	x									x			QN		50	6.0	100	Quick-lock	19
							x						SHV		50	0.3	500	Bayonet	14
											x		SMA	x	50	26.5	500	Screw-on	8
x				x	x								Adapter		50	18.0	500	Various	-
x													DC/DC block		50	6.0	500	Various	-

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HUBER+SUHNER is certified in accordance with EN 9100, ISO 9001, ISO 14001, ISO/TS 16949 and IRIS.

Note

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