Product Guide
Things to note

**Sterilisation:**
In general, cleaning and sterilisation can be achieved by those methods approved for endoscopes and similar devices. See information supplied with each Gaeltec product.

**Specifications:**
All specifications are current at time of printing but are subject to modification without notice. (08/2011)

**Markings:**
All the catheters can be supplied to order with centimeter markings.

**Bespoke / Custom Products:**
Gaeltec are always willing to work with clients on customised products, as well as designing and manufacturing bespoke items... Just ask!
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About Gaeltec

Gaeltec was formed in July 1971 by Donald MacLachlan who lived in Edinbane, about 8 miles from Dunvegan. Shortly after this he moved to the old fishing village of Stein, on the Waternish peninsula, and the company began trading from an old stone-built workshop which had in years past been the premises of a village merchant.

Increasing production and staff numbers soon made this workshop inadequate and, in 1976, it was decided to approach the Highlands and Islands Development Board for assistance in acquiring new premises. Following discussions the Board offered to build, on the present site at Dunvegan, a bespoke workshop designed with the particular needs of Gaeltec in mind. The building was completed in 1977 and handed over in November of that year. Eight years later an administration block was built adjacent to the workshop and staff gradually increased to 27.

Gaeltec manufactures a comprehensive range of miniature pressure transducers. During earlier years, design and production was concentrated on supplying the needs of engineering researchers, most customers being universities and research establishments. More recently, however, the main effort has been towards the manufacture of medical instruments for both research and clinical applications and 95% of present output is medically orientated.

About 60% of output is exported, Europe and the USA being the main markets, but devices are sold directly to Japan, India, Hong Kong, China, Australia, New Zealand, South Africa, Uruguay, Canada and to several other countries through UK distributors. In 1983 Gaeltec received The Queen’s Award For Export Achievement.

Over the past few years Gaeltec has developed a range of ambulatory recorders. These are computerised devices that monitor patients going about their normal daily routines to eliminate the changes which occur in patients by being in a strange or controlled environment. The recorded data is then analysed by software packages written by Gaeltec. In 1991 Gaeltec won a SMART award (Small Firms Merit Award for Research and Technology) for techniques developed for its ambulatory recorders.

There have been no major difficulties in manufacturing a high technology product in this remote area. Communications through email, post, telephone and fax have proved reliable and enable Gaeltec to maintain worldwide contact with clients. Personal travel to visit customers is, however, time consuming and is kept to a minimum, although an increasing number of contacts visit Gaeltec here on Skye.
The Gaeltec Products

Gaeltec has been developing and manufacturing miniature pressure transducers and associated equipment for over thirty years.

The company designs and manufactures the thin film resistive strain gauge sensors as well as the housings and catheters at the Dunvegan premises. Close involvement with research groups in many fields has led to successful products in current use in engineering research, clinical neurology, urology, gastroenterology etc.

Many other specialised projects have been completed with veterinarians, cardiologists, linguists, diving physiologists, anatomists and even a formula one racing team. We have developed from these projects a wide range of sensors and techniques that can be used in different combinations. This allows flexibility in many fields, for example, the measurement of pressure, force, EMG, temperature, conductivity, flow, etc.

Alongside the main products, catheter tip pressure transducers, we have developed interface units and strain gauge amplifiers to complement them.

To make full use of the advantages of catheter tip pressure transducers in physiological measurements, we have developed an ambulatory recorder with up to 8 input channels and an event marker. There can be up to 10 traces on the screen to display the input channels and signals derived from them.

Products Include:

- Single and multisensor flexible catheters with, or without, lumens
- Sensors mounted on needles
- Intracranial transducers
- Sensors mounted in customised housings
- Ambulatory recorders
- Transducer control units
- Bespoke & customised items
The Gaeltec Devices ‘CTU’ range feature robust metal sensing diaphragms mounted within soft flexible silicone rubber catheters. They have excellent frequency response and are simple to use in all urological applications including ambulatory recording. - See also ‘CTR-1b’

The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5μV/V/mmHg, using the extension lead, type EL-1 for single and EL-2 for dual sensor catheters, with the appropriate connector which can be fitted by the customer or by Gaeltec Devices.

‘Gaeltec Devices is able to supply variations on these standard items to suit the particular needs of the customer.’

CTU-1 Single sensor

CTU-2 Dual sensor
Specifications

Sensor: Metal diaphragm with directly deposited resistive strain gauges

Excitation: 5V AC r.m.s. maximum or 1V DC maximum

Bridge resistance: 1.5kΩ nominal

Sensitivity: 5µV/V/mmHg

Linear pressure range: 0 - 150mmHg

Compensated temperature range: 15 - 40°C

Temperature coefficient of zero: < 0.05%FS/°C

Temperature coefficient of sensitivity: < 0.2%/°C

Linearity and hysteresis error: < ±1%FS BSL

Overpressure: 600mmHg

Connector: 6 pin Lemo 2 series for single sensor, 14 pin Lemo 4 series for dual sensors
The P-CTU range feature robust metal sensing diaphragms mounted within flexible blue polyurethane catheters. They have excellent frequency response and are simple to use in all urological applications including ambulatory recording.

The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5μV/V/mmHg, using the extension lead, type EL-1 for single and EL-2 for dual sensor catheters, with the appropriate connector which can be fitted by the customer or by Gaeltec Devices.

‘Gaeltec Devices is able to supply variations on these standard items to suit the particular needs of the customer.’

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5μV/V/mmHg
- **Linear pressure range:** 0 - 150mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/C°
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Overpressure:** 600mmHg
- **Connector:** 6 pin Lemo 2 series for single sensor, 14 pin Lemo 4 series for dual sensors
Urology
Polyurethane Catheter Tip Pressure Transducers - P-CTU

P-CTU-1

LENGTH 100 cm (or as specified)

D = 5 cm or 6 cm

2.35 mm at sensor

5 cm 5 cm 15 cm

MARKING DOTS

2.0 mm approx.

P-CTU-2

LENGTH 100 cm (or as specified)

D = 5 cm or 6 cm

2.35 cm at sensor

10 cm 15 cm

MARKING DOTS

2.0 mm approx.

P-CTU-L1

LENGTH 50 cm

1 mm BORE LUMEN

2.6 mm at sensor

5 cm 5 cm 15 cm

MARKING DOTS

P-CTU-L2

LENGTH 50 cm

1 mm BORE LUMEN

3.0 mm at sensor

10 cm 15 cm

MARKING DOTS

2.6 mm approx.
This Gaeltec Devices ‘CCT’ pressure transducer features a robust metal sensing diaphragm mounted within an oil filled silicone rubber tube.

This construction allows the diaphragm to react to pressure from all sides unlike the standard side mounted sensor. There are measurements where this may be an advantage. The extra thickness of silicone over the diaphragm reduces the frequency response (but this is still very fast compared to perfusion) and introduces a positive drift of zero due to water absorption. For short term studies this will not be a problem and can be minimised by pre-soaking for 3 hours before use.

The transducer is compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5µV/V/mmHg.

Specifications
- **Catheter material**: soft flexible silicone rubber
- **Sensor outside dimensions**: 2.4mm Ø, sensitive over 3mm length (or 3.2mm Ø, sensitive over 4mm length)
- **Sensor**: Metal diaphragm with directly deposited resistive strain gauges
- **Excitation**: 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance**: 1.5kΩ nominal
- **Sensitivity**: 5µV/V/mmHg
- **Linear pressure range**: 0 - 100mmHg
- **Compensated temperature range**: 15 - 40°C
- **Temperature coefficient of zero**: < 0.05%/°C
- **Temperature coefficient of sensitivity**: < 0.2%/°C
- **Linearity and hysteresis error**: < ±1%FS BSL
- **Overpressure**: 600mmHg
- **Connector**: 6 pin Lemo 2 series

CCT-1 Single sensor
The Gaeltec Devices voiding sensor is a simple and robust strain gauge device for use in flow rate studies.

It is made of white PVC and ABS plastic and contains an amplifier which can be adjusted for gain and sensitivity to match any system. The very flexible cable has a white pvc jacket and measures 3m long.

The device is protected from overloads and can measure up to 2kg.

It can interface directly with all Gaeltec’s recorders and amplifiers.

**Specifications**

- **Cable**: 3 metres white PVC jacket
- **Connector**: 6 pin plastic REDEL type
- **Diameter of sensor**: 110mm
- **Sensitivity**: adjustable 0.8 to 40mV/kg
- **Power requirement**: ±2 to ±20volt DC supply
The Gaeltec Devices ‘CTO’ range feature robust metal sensing diaphragms mounted within soft flexible silicone rubber catheters.

They have excellent frequency response and are simple to use for standard manometry as well as ambulatory recording.

The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5µV/V/mmHg.

Gaeltec Devices is able to supply variations in the sensor spacing on these standard items to suit the particular requirements of the customer usually at no extra cost.

‘Over the years we have made a wide variety of devices using our proven technology. If you have a special need, ask us.’

‘All the catheters can be supplied with centimeter markings and/or a soft tip extension.’

**Specifications**
- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg
- **Linear pressure range:** 0 - 150mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/°C
- **Temperature coefficient of sensitivity:** < 0.2%/°C
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Overpressure:** 1200mmHg
- **Connector:** 6 pin Lemo 2 series for single sensor, 14/14/16/20/24 pin Lemo 4 series for 2/3/4/5/6 sensor catheters. As supplied on the appropriate extension lead type EL-1/2/3/4/5/6
CTO-2

LENGTH 100cm (or as specified)

30cm

D= 5cm or 6cm

Centimetre marking dots

2.7mm approx.

2.0mm approx.

D= 5cm

5cm

CTO-3

LENGTH 100cm (or as specified)

30cm

D= 5cm

Sensors in line or rotated 120˚

2.7mm approx.

2.0mm approx.

D= 5cm

5cm

CTO-4

LENGTH 100cm (or as specified)

30cm

D= 5cm

Centimetre marking dots

2.7mm approx.

2.0mm approx.

D= 5cm

5cm

CTO-5

LENGTH 100cm (or as specified)

30cm

Centimetre marking dots, 30-70cm from tip sensor rings at 10cm and 5cm, as on CTO-1/2/3/4

D= 5cm

CTO-6

LENGTH 100cm (or as specified)

30cm

Centimetre marking dots, 30-70cm from tip sensor rings at 10cm and 5cm, as on CTO-1/2/3/4

D= 5cm

Tip Extension

Length is measured from the centre of the sensor
This device has been developed to measure sphincter activity where it is felt that a point sensor will not be adequate; for instance, in oesophageal ambulatory recording when the catheter cannot be kept exactly in place over time.

The sensor is an oil filled thin wall silicone rubber tube with a standard Gaeltec Devices miniature pressure transducer within it. This has the property of integrating the pressure and the length that is pressurised, which gives an output in proportion to the sphincter competence.

Due to the construction using silicone rubber there are additional limitations to the performance compared to the standard point sensor. Primarily a positive baseline shift during soaking in water has to be allowed for. Pre-soaking for six hours before measurement will reduce this effect to a minimum. The sensor is also sensitive to acute bending which in normal use should be at an acceptable scale of error.

The sphinctometer sensor can be supplied as a single sensor catheter or as the tip of a multisensor catheter up to five sensors in total.

**Specifications**

- **Diameter of oil cell:** 3.2mm Ø or 2.4mm Ø (very flexible)
- **Length of oil cell:** typically 4-6cm or as specified
- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg when pressurised over the full length. Output is proportional to the pressure and length pressurised and should be referred to in units that reflect this, e.g. mmHg.cm
- **Pressure range:** 0 - 150mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/C°
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL

![Output v pressure and length pressurised for a 5cm device]
The Gaeltec Devices ‘CTG’ range feature robust metal sensing diaphragms mounted within soft flexible silicone rubber catheters. They have excellent frequency response and are simple to use for standard manometry as well as ambulatory recording.

The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5µV/V/mmHg.

We can make special units with many configurations of lumens and balloon ties in this range of extra long catheters.

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg
- **Linear pressure range:** 0 - 300mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/C°
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Overpressure:** 1200mmHg
- **Connector:** 6 pin Lemo 2 series for single sensor, 14 pin Lemo 4 series for 2/3 sensor catheters.

As supplied on the appropriate extension lead type EL-1/2/3
The Gaeltec Devices ‘CTR’ range feature robust metal sensing diaphragms mounted within soft flexible silicone rubber catheters. They have excellent frequency response and are simple to use for standard manometry as well as ambulatory recording.

The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of $5\mu V/V/mmHg$.

Over the years we have made a wide variety of devices using our proven technology. We can make special units with lumens, balloon ties, EMG electrodes and multiple sensors at one location.

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** $5V$ AC r.m.s. maximum or $1V$ DC maximum
- **Bridge resistance:** $1.5k\Omega$ nominal
- **Sensitivity:** $5\mu V/V/mmHg$
- **Linear pressure range:** 0 - 300mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** $< 0.05\%FS/C$°
- **Temperature coefficient of sensitivity:** $< 0.2\%/C$°
- **Linearity and hysteresis error:** $< \pm 1\%FS$ BSL
- **Overpressure:** 1200mmHg
- **Connector:** 6 pin Lemo 2 series for single sensor, 14/14/16 pin Lemo 4 series for 2/3/4 sensor catheters.
  As supplied on the appropriate extension lead type EL-1/2/3/4

‘Gaeltec Devices is able to supply variations in the sensor spacing on these standard items to suit the particular requirements of the customer usually at no extra cost.’
This Gaeltec Devices transducer has been developed to make non-invasive measurements of “Intracranial Pressure” in neonates/newborns, using the well known principle of applanation of the fontanelle. It has been in clinical use for many years.

The high frequency response gives a good display of respiratory and pulse pressure waves. The balloon over the sensor enables the baseline to be checked by equalising pressure above and below the sensor in situ, as in the Gaeltec Devices ICT/B transducer.

A major advantage of this system over pneumatic devices is the compatibility with most strain gauge pressure monitors using the extension lead type EL-1, with the appropriate connector, fitted by the customer or by Gaeltec Devices.

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5 or 10µV/V/mmHg
- **Linear pressure range:** 0 - 100mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/°C
- **Temperature coefficient of sensitivity:** < 0.2%/°C
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Overpressure:** 600mmHg
- **Catheter:** 50cm of flexible silicone rubber
- **Connector:** Standard Gaeltec Devices 6 pin Lemo 2 series

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**FONTANOMETER**

12.6mm Ø, 3mm thick

Balloon inflation and reference pressure vent

LENGTH 50cm

2.7mm approx.

18
The ICT/B is one of a range of catheter tip transducers manufactured by Gaeltec Devices. It is designed for measuring intracranial pressure by the epidural method.

A significant feature of the ICT/B is the ability to check the zero drift of the ICT/B and pressure monitor in-vivo. Not only does this allow for accurate measurements, but also allows moving the patient with the ICT/B in the epidural space and reconnection to another monitor quickly.

There is a flat silicone rubber membrane, or balloon, covering the pressure sensing diaphragm. Two internal tubes connect the two sides of the diaphragm to a female luer fitting on the connector shell. By introducing approximately 0.2 to 0.3ml of air, the pressure in these tubes will be greater than the ICP being measured.

The exact amount of air is not critical, subject to the permitted maximum. When this air is injected, the pressure will cause the balloon to be lifted from the surface of the sensor and the same pressure will be applied to the back of the sensor. The strain gauge senses equal pressure above and below which is equivalent to having zero pressure applied. Thus by injecting a small volume of air, one undeflects the pressure sensor and checks the zero of the transducer and amplifier.

**Specifications**

- **Sensor housing:** Titanium 2.3mm thick 6mm wide
- **Catheter:** 50cm silicone rubber 2.4mm Ø
- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg
- **Linear pressure range:** 0 - 100mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/C°
- **Zero drift:** < 1mmHg in 24 hours
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Maximum balloon inflation volume:** 0.4ml of air
- **Overpressure:** 1200mmHg
- **Connector:** 6 pin Lemo 2 series
This transducer, for measuring physiological pressures externally, has an end-mounted sensor within an electrically isolated titanium shell which is tapered to match standard female luer locking fittings. It is supplied with a captive luer lock nut.

The sensing area is extremely small and so also is the volume displacement allowing a very good frequency response in the measuring system.

The transducer weighs less than 4gm and can be operated with a wide range of pressure amplifiers.

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg
- **Linear pressure range:** 0 - 300mmHg
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%/FS/C°
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Overpressure:** 1200mmHg
- **Cable:** 60cm of 3mm Ø with silicone rubber jacket
- **Connector:** 6 pin Lemo 2 series
General Purpose Catheter Tip Pressure Transducers - CTC

The Gaeltec Devices ‘CTC’ range feature robust metal sensing diaphragms within polished surgical steel (AISI type 304) bodies which can be mounted on a variety of catheter types. They have excellent frequency response and are simple to use. The units are compatible with a wide range of monitors, which have been set for use with conventional transducers having a sensitivity of 5µV/V/mmHg.

USCI Woven Dacron catheter 110cm long
5F/L 0.5mm Ø bore lumen, at tip or beside the sensor
6F/L 0.5mm Ø bore lumen, at tip or beside the sensor
7F/L 0.75mm Ø bore lumen, at tip or beside the sensor
8F/L 1mm Ø bore lumen, at tip.

This list is intended as a guide to our normal range of devices. We always try to provide the exact requirements of our customers and can usually combine elements from any of our catheter designs into one unit in a modular fashion.

Specifications
Sensor: Metal diaphragm with directly deposited resistive strain gauges
Excitation: 5V AC r.m.s. maximum or 1V DC maximum
Bridge resistance : 1.5kΩ nominal
Sensitivity: 5µV/V/mmHg
Linear pressure range: 0 - 300mmHg
Compensated temperature range: 15 - 40°C
Temperature coefficient of zero: < 0.05%/°C
Temperature coefficient of sensitivity: < 0.2%/°C
Linearity and hysteresis error: < ±1%FS BSL
Overpressure: 1200mmHg
Connector: 6 pin Lemo 2 series for single sensor, 14 pin Lemo 4 series for 2/3 sensor catheters.
As supplied on the appropriate extension lead type EL-1/2/3

Most types are available made with reinforced polyurethane catheter material. 3,4 and 5F PTFE catheters are available up to 250cm long.

USCI Woven Dacron © Catheter

USCI Woven Dacron © Catheter (High speed injection)
These Gaeltec Devices transducers feature robust metal sensing diaphragms within polished surgical steel (AISI type 304) needles. The sensors are side mounted and the tip can be sharpened or domed.

They have been used in a variety of applications, both in experimental equipment and in clinical use for physiological measurements such as compartment pressure and intradiscal pressure. They have excellent frequency response and are compatible with a wide range of monitors.

This is intended as a guide to our normal range of needle devices. Over the years we have made a wide variety of devices using our proven technology. If you have a special need, ask us.

**Specifications**

**Sensor:** Metal diaphragm with directly deposited resistive strain gauges  
**Excitation:** 5V AC r.m.s. maximum or 1V DC maximum  
**Bridge resistance:** 1.5kΩ nominal  
**Sensitivity:** 5µV/V/mmHg or as appropriate to range  
**Linear pressure range:** 0 - 150mmHg or as specified up to several atmospheres  
**Compensated temperature range:** 15 - 40°C  
**Temperature coefficient of zero:** < 0.05%FS/C°  
**Temperature coefficient of sensitivity:** < 0.2%/C°  
**Linearity and hysteresis error:** < ±1%FS BSL  
**Overpressure:** 1000mmHg  
**Cable:** Reinforced flexible silicone rubber  
**Connector:** 6 pin Lemo 2 series as on the appropriate extension lead type EL-1
The Gaeltec Devices ‘8T’ low differential pressure transducers offer small size, low weight and dead volume with high frequency response.

There are units to cover the ranges ±2, ±10, ±20 cm H₂O and in a smaller case ±50 cm H₂O.

**Type 8T-2,-10,-20**
Anodised aluminium case with 3.3mm Ø stainless steel ports.

**Specifications**
- **Linear pressure range 8T-2:** ±2 cm H₂O FS
- **Sensitivity:** > 125 mV/V/At
- **Linear pressure range 8T-10:** ±10 cm H₂O FS
- **Sensitivity:** > 100 mV/V/At
- **Linear pressure range 8T-20:** ±20 cm H₂O FS
- **Sensitivity:** > 80 mV/V/At
- **Excitation:** 10V AC r.m.s. or DC maximum
- **Natural frequency:** 400Hz approx.
  ( usable frequency range up to 200Hz)
- **Overpressure:** 40cm H₂O
- **Line pressure:** 1At maximum
- **Cable:** 2 metres PVC
- **Connector:** Specified by customer

**Type 8T-50**
Stainless steel case with 1.65mm ports.

**Specifications**
- **Linear pressure range 8T-50:** ±50 cm H₂O FS
- **Sensitivity:** 15 mV/V/At nominal
- **Excitation:** 5V AC r.m.s. or 5V DC maximum
- **Overpressure:** 200cm H₂O
- **Line pressure:** 1At maximum
- **Cable:** 50cm stainless steel braid covered nylon 1.6mm
- **Connector:** Gaeltec Devices standard 6 pin Lemo series 2.
  (Use with extension lead type EL-1.)

**Specifications (All Models)**
- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Bridge resistance:** 1.5 kΩ nominal
- **Compensated temperature range:** 10 - 40°C
- **Temperature coefficient of zero:** < 0.05%/FS/°C
- **Temperature coefficient of sensitivity:** < 0.2%/°C
- **Linearity and hysteresis error:** < ±1%/FS BSL

8T is a differential pressure transducer with equal volume ports originally designed to be directly mounted onto a split face mask fitted with a pair of pneumotach heads thereby enabling the highest possible frequency measurements for oral and nasal airflow during speech waveform analysis.
These Gaeltec Devices pressure transducers feature a robust metal sensing diaphragm within a small stainless steel disc shaped housing.

They can be used in a variety of applications including physiological measurements as the sensor is electrically isolated from the housing. They have excellent frequency response and are compatible with a wide range of monitors.

**Specifications**

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Bridge resistance:** 1.5kΩ nominal
- **Sensitivity:** 5µV/V/mmHg or as appropriate to range
- **Linear pressure range:** 0 - 150mmHg or as specified (up to 5 atmospheres nominally)
- **Compensated temperature range:** 15 - 40°C
- **Temperature coefficient of zero:** < 0.05%FS/C°
- **Temperature coefficient of sensitivity:** < 0.2%/C°
- **Linearity and hysteresis error:** < ±1%FS BSL
- **Cable:** Reinforced flexible silicone rubber
- **Connector:** 6 pin Lemo 2 series as on the appropriate extension lead type EL-1

**MT-12**

![Diagram of MT-12](image)
This transducer has been produced specifically for situations where both sides of the sensing diaphragm are to be exposed to a liquid.

In order to obtain good measurements it is necessary to clear the system of air bubbles. The transparent perspex housing allows a view of all the pathways within the transducer housing.

The sensitivity can be higher than the normal Gaeltec Devices transducers as the relatively large metal diaphragm is an active full bridge network - as opposed to the usual half bridge device with the reference half of the bridge being passive resistors in the connector.

The Perspex Differential Pressure Transducer (PSPX) was originally designed for use in an artificial heart valve testing machine but can be adapted for other wet/wet situations. The transparent housing allows the user to visibly flush the pressure ports thereby eliminating artefact caused by any bubbles in the system.

Specifications

- **Sensor:** Metal diaphragm with directly deposited resistive strain gauges
- **Excitation:** 5V AC r.m.s. maximum or 1V DC maximum
- **Sensitivity:** According to pressure range up to 20µV/V/mmHg or 5µV/V/mmHg
- **Normal pressure range:** ±300mmHg, or as specified
- **Maximum overpressure:** 1 At
- **Compensated temperature range:** 10 - 40°C or as specified
- **Temperature coefficient of zero:** 0.05%FS/C⁰ maximum
- **Temperature coefficient of sensitivity:** 0.2%/C⁰ maximum
- **Linearity and hysteresis error:** ±1%FS maximum
- **Pressure ports:** One male and one female luer fitting on each side of the sensor, or as specified
- **Connector:** 50cm of silicone cable terminated with a Gaeltec standard 6 pin Lemo

**Note:** Liquids used in the transducer must be compatible with silicone rubber and perspex.
Gaeltec now manufactures a wide range of intralumenal, flexible, multi-use, silicone rubber catheters, with platinum ring electrodes mounted alone or in combination with Gaeltec pressure sensors. Whilst standard catheters are available we also manufacture catheters to individual customer’s specifications with regards to length, diameter and electrode location.

If required, the catheter may be specified in single or multi lumen variants (not twin lumen which we use to describe some of our urological transducers) which will impose constraints on its overall diameter.

By appropriate choice of specification, these catheters have applications in upper and lower GI tracts and for urine leakage detection in ambulatory urological studies.

Previously, this range of catheters were marked with generic part numbers which identified only the number of electrodes and pressure sensors. For re-ordering purposes the unique Serial Number which is shown on the connector label should be used. This identifies the various parameters mentioned above. Newer catheters are marked with a specific product code.

When seeking the availability of a Gaeltec device mentioned in any Scientific Paper, as much detail as possible should be supplied in order to assist in identification of the correct specification.
The S13 interface is designed for use with DC strain gauge amplifiers with excitation of 3V DC or more.

It supplies the Gaeltec Devices miniature pressure sensor with a drive voltage of 0.9V which protects the sensor from electrolytic damage while it is implanted. The unit has trimpot controls for adjustment of gain and zero.

Up to three S13 circuits can be fitted into one case. The case dimensions are 100 x 50 x 25mm. The transducer connection is via a high quality Lemo insert in a lightweight nylon plugshell on 2 metres of PVC cable.

The monitor connecting lead can be bare ended or fitted, at additional cost with a customer specified connector. The S13 does not provide patient isolation. The monitor must be patient isolated.
Available with 2, 4 or 8 channels.

**Power:** One AA Alkaline cell. Remaining capacity can be viewed on host computer.

**Current consumption:** 70mA maximum. (105mW maximum).

**Real Time Clock:** Independent of recorder battery.

**Sampling rate:** 10Hz to 4kHz programmable.

**Memory:** 1GB MultiMediaCard. Remaining capacity can be viewed on host computer.

**Inputs:** Pressure, pH, Temperature, Respiration, Swallow, Urine Loss, Flow.

**Connection to PC:** Optically isolated USB lead. Data download via internal or external MultiMediaCard reader.

**Software:** Windows 95/98/XP/Vista/7. Fast zoom and analysis on replay. Real-time display.

**Recorder size:** 72 x 55 x 18mm.

**Recorder weight:** 85gm with battery.

**Host computer:** Pentium 133 or faster CPU. Microsoft Windows 95 with full USB support or Windows 98/XP/Vista/7, USB port, Serial Port, SVGA monitor.

**Supplied with:** Belt and pocket clip, patient isolated serial lead, serial/USB adaptor, recording and playback software, one 1GB MultiMediaCard, carrying case and USB card reader with software.
The Gaeltec S7d Mk.II is a general purpose amplifier for interfacing Gaeltec Medical Pressure Transducers to host analogue devices.

S7d MkII is designed specifically as a low cost device meeting the appropriate medical regulatory requirements, allowing Gaeltec Pressure Transducers to be connected to other Medical Devices which require an analogue input signal. It is also suitable for use as an interface between Gaeltec Pressure Transducers and suitable personal computers for medical or non-medical use where the user wishes to use third party application software. This requires the use of an Analogue to Digital converter (not supplied).

The S7d is available in configurations of 4 or 8 channels according to customer requirement.

- A single, multi-pin, Input connector provides for Pressure Transducer connection.
- A single, multi-pin, Output connector provides for connection to the Host Device.
- A backlit LCD bar graph display is provided for use during setup, configuration & recording.
- The S7d is powered by a medically approved Low Voltage mains adaptor (supplied).

### Supplied components
- The S7d Mk.II amplifier unit.
- A 9 volt DC medical mains Power Supply specific to the country of use.
- An Output Cable\(^1\) with free end for connection to the Host Analogue Recording Device\(^2\).

### Available accessories
- An Input Cable\(^1\) for connection to the required Gaeltec Pressure Transducer(s).
- Appropriate pressure transducer(s).
- Calibration tube(s) for the specified pressure transducer(s).
- A manometer for use during transducer calibration.

### Additional accessories (Not supplied by Gaeltec)
- A host analogue device.
- Suitable software for displaying, recording and analysing the pressure outputs.
- A to D converter board for computer.

\(^1\) 2m length supplied unless otherwise specified.
\(^2\) Additional connector for host device may be supplied at additional cost, if required.
Various

**Transducer Simulator (CA-2)**

This device enables the user to do a simple check on the extension cable (with or without an S13) and the monitor. If a system is not functioning it is not always clear which part of it needs attention. By exchanging the transducer for this unit, simulated zero pressure and approximate calibrated pressure steps can be presented to the system and the display checked for any errors. This will identify the problem as either in the recording apparatus and cables or the transducer. The unit can also be used to roughly set up the amplifier gain before calibrating the complete system with a known pressure using the calibration tube.

**CA-2 Adaptors**

These are for checking multisensor extension leads and amplifiers. The appropriate adaptor will interconnect the extension lead to the simulator.

- **EL-3/CA-2**: Connects 2 or 3 sensor leads 14 pin Lemo
- **EL-4/CA-2**: Connects 4 sensor leads 16 pin Lemo
- **EL-5/CA-2**: Connects 5 sensor leads 20 pin Lemo
- **EL-6/CA-2**: Connects 6 sensor leads 24 pin Lemo
Sterilisation Caps

The two part, screw-on, sterilising caps have been designed to provide complete protection of the transducer connector and the reference pressure line when the transducer is being cleaned and disinfected in an enclosed washing machine or submerged in a bath.

There are two sizes of cap, one for all Gaeltec transducers with multiple sensors and a smaller version suitable for single sensor transducers. Both are backward compatible with Gaeltec transducers manufactured since the year 2000.

The screw-on caps are used in conjunction with a red silicone rubber “O” ring. In the case of multi sensor transducers, the ring is fitted onto the transducer plug and for single sensor transducers, the ring is fitted into the cap itself.

With both types it is important to ensure that the red ring is properly in place prior to immersion. Replacement “O” rings can be obtained from Gaeltec if required.

Calibration Tube (CA-1)

Tightening the collet on this device will seal around the Gaeltec pressure catheter and using the male luer fitting a connection can be made to a reference pressure, such as a mercury manometer.

The output of the transducer and amplifier system can be reliably and quickly confirmed.
The termination can be a single multi-core cable or split into groups of four conductors corresponding to each sensor (type s).

We offer a range of leads to match the connectors on Gaeltec Devices catheter tip pressure transducers. They can be supplied with a connector to suit the customer’s amplifier at cost, or as bare ended cables. They feature a high quality gold plated Lemo insert in a light weight machined nylon shell.

**Specifications**
- **Length:** 2 metres
- **Material:** PVC sheath multi-core screened cable
- **Connector shell:** Machined nylon
- **Connector:** Lemo insert (gold plated pins and sockets)

Special leads not listed here can be supplied to order.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Lemo insert type</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL-1</td>
<td>Single sensor</td>
<td>2306 06 pin</td>
</tr>
<tr>
<td>EL-2</td>
<td>Two sensor</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>EL-2s</td>
<td>Two sensor with split termination</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>EL-3</td>
<td>Three sensor</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>EL-3s</td>
<td>Three sensor with split termination</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>EL-4</td>
<td>Four sensor</td>
<td>4316 16 pin</td>
</tr>
<tr>
<td>EL-4s</td>
<td>Four sensor with split termination</td>
<td>4316 16 pin</td>
</tr>
<tr>
<td>EL-5</td>
<td>Five sensor</td>
<td>4320 20 pin</td>
</tr>
<tr>
<td>EL-5s</td>
<td>Five sensor with split termination</td>
<td>4320 20 pin</td>
</tr>
<tr>
<td>EL-6</td>
<td>Six sensor</td>
<td>4324 24 pin</td>
</tr>
<tr>
<td>EL-6s</td>
<td>Six sensor with split termination</td>
<td>4324 24 pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor no.</th>
<th>Pos. supply</th>
<th>Neg. supply</th>
<th>Pos. output</th>
<th>Passive output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Blue</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>2</td>
<td>Orange</td>
<td>Violet</td>
<td>White</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>Pink</td>
<td>Turquoise</td>
<td>Grey</td>
<td>Brown</td>
</tr>
<tr>
<td>4</td>
<td>Red/white</td>
<td>Blue/white</td>
<td>Yellow/red</td>
<td>Green/white</td>
</tr>
<tr>
<td>5</td>
<td>Red/black</td>
<td>Blue/black</td>
<td>Yellow/blue</td>
<td>Green/red</td>
</tr>
<tr>
<td>6</td>
<td>Red/brown</td>
<td>Blue/red</td>
<td>Orange/blue</td>
<td>Green/yellow</td>
</tr>
</tbody>
</table>
Cables
Extra-Flexible Extension Leads

The ELF series of extension cables was introduced initially for use with Gaeltec Devices ambulatory recorders. Due to customer demand these are now available for all applications and cover transducers from one to six pressure sensors.

The leads with split terminations now feature a moulded cable transition for greater strength and durability. Contra connectors to suit customers’ amplifiers can be fitted at extra cost, if required.

Specifications
Length: 2 metres
Material: Extra flexible multi-core screened cable
Connector shell: Machined nylon
Connector: Lemo insert (gold plated pins and sockets)

We can quote for the supply of special leads not listed on this data sheet.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Lemo insert type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELF-1</td>
<td>Single sensor</td>
<td>2306 06 pin</td>
</tr>
<tr>
<td>ELF-2 / ELF-2s</td>
<td>Two sensor / Two sensor with split termination</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>ELF-3 / ELF-3s</td>
<td>Three sensor / Three sensor with split termination</td>
<td>4314 14 pin</td>
</tr>
<tr>
<td>ELF-4 / ELF-4s</td>
<td>Four sensor / Four sensor with split termination</td>
<td>4316 16 pin</td>
</tr>
<tr>
<td>ELF-5 / ELF-5s</td>
<td>Five sensor / Five sensor with split termination</td>
<td>4320 20 pin</td>
</tr>
<tr>
<td>ELF-6 / ELF-6s</td>
<td>Six sensor / Six sensor with split termination</td>
<td>4324 24 pin</td>
</tr>
</tbody>
</table>

1, 2 and 3 sensor leads. 14-core white PVC jacket, 0.133” O/D.

<table>
<thead>
<tr>
<th>Connection</th>
<th>Sensor 1</th>
<th>Sensor 2</th>
<th>Sensor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Supply</td>
<td>Red</td>
<td>Orange</td>
<td>Pink</td>
</tr>
<tr>
<td>- Supply</td>
<td>Blue</td>
<td>Violet</td>
<td>Turquoise</td>
</tr>
<tr>
<td>+ Output</td>
<td>Yellow</td>
<td>White</td>
<td>Grey</td>
</tr>
<tr>
<td>- Output</td>
<td>Green</td>
<td>Black</td>
<td>Brown</td>
</tr>
</tbody>
</table>

4, 5 and 6 sensor leads. 24-core white PVC jacket, 0.173” O/D.

<table>
<thead>
<tr>
<th>Connection</th>
<th>Sensor 1</th>
<th>Sensor 2</th>
<th>Sensor 3</th>
<th>Sensor 4</th>
<th>Sensor 5</th>
<th>Sensor 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Supply</td>
<td>Red</td>
<td>Orange</td>
<td>Red</td>
<td>Orange</td>
<td>Pink</td>
<td>Light Brown</td>
</tr>
<tr>
<td>- Supply</td>
<td>Turquoise</td>
<td>Violet</td>
<td>Deep Blue</td>
<td>Purple</td>
<td>Clear</td>
<td>Dark Green</td>
</tr>
<tr>
<td>+ Output</td>
<td>Yellow</td>
<td>White</td>
<td>Dark Grey</td>
<td>White</td>
<td>Grey</td>
<td>Yellow</td>
</tr>
<tr>
<td>- Output</td>
<td>Clear</td>
<td>Black</td>
<td>Brown</td>
<td>Black</td>
<td>Brown</td>
<td>Green</td>
</tr>
</tbody>
</table>

Inner core | Outer wires
All Quotations and Offers given, Contracts or Orders accepted and Supplies made by us are subject to the following conditions:

(1) All Price lists are subject to alteration without notice.

(2) All Quotations, unless previously withdrawn, are open for acceptance for a period not exceeding 30 days.

(3) All Quotations may be withdrawn without notice at any time prior to acceptance of Order.

(4) All offers are made without engagement and no liability is accepted for loss, damage or delays caused by Government order, war, civil commotion, accidents, fires, strikes, or delay in obtaining materials or any other cause beyond our reasonable control.

(5) All Orders are accepted on condition that any fluctuation in the cost of the materials and/or wages beyond our control may entail an adjustment in the selling price of such Orders as remains to be completed.

(6) While all reasonable steps are taken to deliver goods within the delivery period no responsibility is accepted by us for failure to do so. We reserve the right to deliver in more than one shipment at our discretion.

(7) Goods of our manufacture are covered under the terms of our standard Warranty, copies of which are available upon request. Save as expressly stated therein no liability shall be accepted by us for any loss or damage or injury arising directly or indirectly in connection with goods supplied by us or their use. However, nothing in these Conditions shall be deemed to exclude liability for death or personal injury caused by our negligence, nor, to the extent of any mandatory requirement of Scots Law, for damage to tangible personal property of customer or its employees caused by our negligence. No warranty attaches to any goods supplied by us to which repairs, modifications or attachments have been made other than by our Engineers or Service Personnel.

(8) In respect of goods supplied by us which are (a) not of our manufacture or (b) non-standard, i.e. specially developed, produced or constructed, we do not warrant that their design or use will not infringe existing patent or other protective rights anywhere in the world and shall be under no liability in respect of such infringement.

(9) We do not accept liability in respect of failure to deliver or perform or delay in delivering or performing under an Order or Contract due to any cause outside our reasonable control including but not limited to causes arising from the acts or omissions of the Customer.

(10) Customer’s goods and materials are accepted for processing by us at Customer’s own risk. Every reasonable care and precaution will be taken with such goods or materials.

(11) Recommendations, technical data or advice relating to goods supplied by us or to their use are given in good faith, but without liability for any loss, damage or injury arising directly or indirectly from any errors or omissions therein.

(12) Risk in the goods ordered shall pass to Customer upon despatch ex works, but title to the goods shall remain with us until payment in full is received by us. Customer agrees to allow access to his premises during business hours should we require to collect our property from him in this respect.

(13) In the event of a delay in payment beyond any agreed credit term we reserve the right to levy an additional interest charge on the outstanding sum owing of 8% above The Bank of England base rate, without prejudice however to our legal rights in respect of any such breach of the agreed terms.

(14) To the extent that any provision herein may be rendered void by prevailing mandatory National or Regional Legislation or Treaty, such provision shall be deemed deleted and these Conditions of Sale shall remain effective to the extent permitted. In the event of any conflict between these Conditions of Sale and any conditions stated by others, these Conditions of Sale shall prevail.

(15) Any changes in these Conditions of Sale may only be made with the express, written authority of our Managing Director.

(16) All Orders accepted, Contracts undertaken and Supplies made shall be governed by and construed in accordance with the Laws of Scotland.

The most up-to-date conditions of sale are always available on our website.
We warrant to the original purchaser of products manufactured by us that we will make good, by repair or at our option by the supply of replacements, defects which under proper installation and use arise in the equipment within a period of twelve calendar months after the equipment has been supplied by us and which arise solely from faulty design, materials or workmanship, provided always that defective parts are returned to our Works promptly and carriage paid unless otherwise agreed.

In the case of transducers where the cause of failure in our opinion cannot be clearly attributed either to misuse or faulty design, workmanship or materials, the repaired or new parts will be charged for at a cost not greater than one twelfth of the current replacement value for each calendar month elapsed since the original date of supply.

Provided further that in respect of parts or components not of our manufacture we will give a warranty equivalent to the warranty (if any) received from the suppliers thereof, but not so as to impose on us in respect of such parts or components a liability greater than that imposed on us by the preceding paragraphs.

Save as stated above, no liability shall be accepted by us for any loss, damage or injury arising directly or indirectly in connection with the goods supplied by us or their use, provided however, that nothing herein shall be deemed to exclude liability for death or personal injury caused by our negligence, nor, to the extent of any mandatory requirement of Scots Law, for damage to tangible personal property of purchaser or its employees caused by our negligence. No warranty attaches to any goods supplied by us to which repairs, modifications or attachments have been made other than by our Engineers or authorised Service Personnel.

Recommendations, technical data or advice relating to goods supplied by us or their use are given in good faith, but without liability for any loss, damage or injury arising directly or indirectly from any errors or omissions therein, other than liability for death or personal injury caused by our negligence.

Goods returned ‘under warranty’ and found not to be defective will be returned to the purchaser at the purchaser’s expense and subject to a charge covering testing and handling.