

Monitran - Our concept



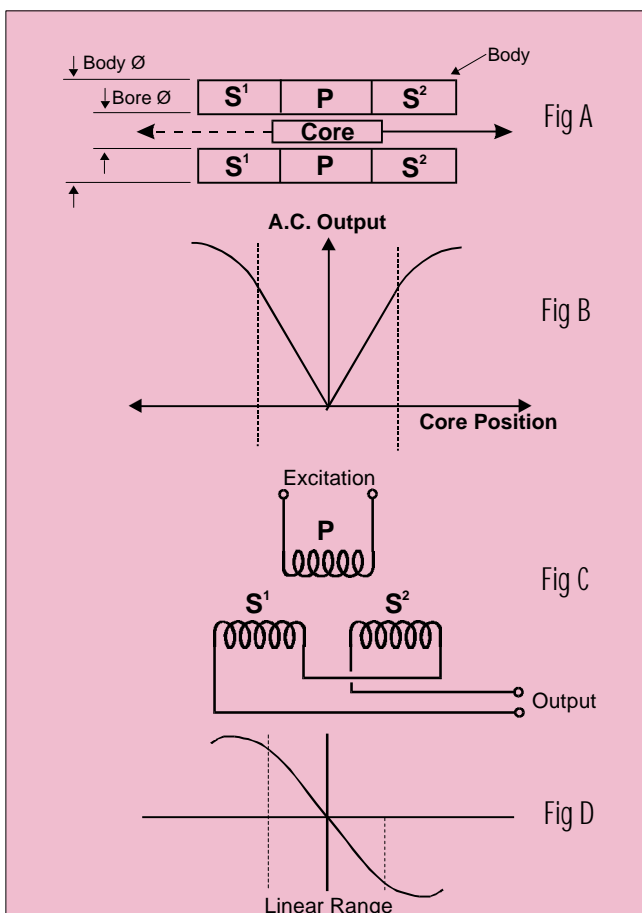
Monitran is a well established UK company. Our expertise lies in the design and manufacture of sensors and instrumentation for the measurement of vibration and displacement.

We believe that customer service is paramount. To ensure this, our experienced engineers offer assistance in the purchase of the correct sensor to suit the application and are available for future backup service.

Our policies include supplying sensors at a realistic and economical price and delivering from stock or within the fastest time.

For special applications, we also offer a custom-design service where the standard models do not quite fit the bill.

Position Sensors - How they operate



The primary windings (P) are energised with a constant amplitude A.C. supply at a frequency of 1 to 10 kHz. This produces an alternating magnetic field in the centre of the transducer which induces a signal into the secondary windings (S^1 & S^2) depending on the position of the core.

Movement of the core within this area causes the secondary signal to change (Fig B). As the two secondary windings are positioned and connected in a set arrangement (push-pull mode), when the core is positioned at the centre, a zero signal is derived.

Movement of the core from this point in either direction causes the signal to increase (Fig C). As the windings are wound in a particular precise manner, the signal output has a linear relationship with the actual mechanical movement of the core.

The secondary output signal is then processed by a phase-sensitive demodulator which is switched at the same frequency as the primary energising supply. This results in a final output which after rectification and filtering gives D.C. or 4-20mA proportional to the core movement and also indicates its direction, positive or negative from the central zero point (Fig D).

The distinct advantage of using an LVDT displacement transducer is that the moving core does not make contact with other electrical components of the assembly, as with resistive types, as so offers high reliability and long life. Further, the core can be so aligned that an air gap exists around it, ideal for applications where minimum mechanical friction is required.

The LVDT design lends itself for easy modification to fulfill a whole range of different applications in both research and industry.

Some typical variations include :- Complete sealing for part or full submersion in liquids and gases, Heavy construction build for tough industrial areas, Miniature and low cost models for price-conscious OEM usage, Internal electronic circuitry eliminating the need for additional instrumentation equipment.

The LVDT, Linear Variable Differential Transformer is a well established transducer design which has been used throughout many decades for the accurate measurement of displacement and within closed loops for the control of positioning.

In its simplest form, the design consists of a cylindrical array of a primary and secondary windings with a separate cylindrical core which passes through the centre. (Fig A)

To help you choose the right sensor

1 Ease of installation

Monitran's range of LVDT displacement transducers are available with a variety of body fittings and core assemblies. These include:-

- a). Axial or radial cable exit
- b). Core only
- c). Plain core with extension rod
- d). Guided core with extension rod
- e). Sprung loaded core with extension rod
- f). Guided core with extension and rod end bearings

2 Material

Most of Monitran's LVDT displacement transducers are constructed in stainless steel. For special applications, other materials can be used on request.

3 Sealing

Some models offer standard sealing to IP65, but other ratings are available up to IP68 for full submersible use. Our custom-design service allows variations in the sealing of all models. Please consult our Sales Office.

4 Robust Construction

We offer different levels of construction to suit the application. The industrial series give a high level of protection for harsh industrial conditions, however, for projects which involve possible extreme mistreatment, we recommend use of the heavy industrial series.

5 Electrical Connection

The choice of standard connections include:-

Flying cable (standard length is 2 metres - longer lengths to order.) Types available - PVC, PTFE, Polyurethane and armoured cables.

Connectors. Types available - Hirschmann, Military.

6 Measuring Range

Each series of model types offers a wide choice of measuring ranges. The range can be applied as a bi-directional measurement about the zero point i.e. $\pm 5.0\text{mm}$, as a unidirectional measurement i.e. a $\pm 5.0\text{mm}$ becomes 0-10mm, or for improved linearity performance part of the full range may be used.

7 Linearity

Our definition of linearity is that the output curve over the quoted linear range will not deviate from a theoretical straight line drawn through zero by more than 0.5% of full stroke. Linearity can be improved by using a smaller part of the total measuring range. (Tech Sheet SS0130)

8 Outputs

The standard LVDT displacement transducer provides an A.C. output and need a supporting electronic unit to energise and condition the signal. (Request Tech Sheet SS0398)

Some models are available with internal electronic circuitry to give a D.C.in-D.C.out performance. A suitable D.C. supply is needed and the choice of outputs available are D.C. bipolar (Tech Sheet SS0393), 0-5V, 0-10V (Tech Sheet SS0394) and 4-20mA (Tech Sheet SS0192).

9 Other specifications to be considered:-

- a). Temperature range. Standards are -30°C to $+85^{\circ}\text{C}$ and -30°C to 150°C For higher temperature ranges, please consult our Sales Office.
- b). Frequency response. This is determined by the mechanical arrangement used, the frequency of the energising supply and the filtering characteristics of the conditioning system.
- c). Weight. The mass of transducer, in particular the core assembly, can be important.

Typical Applications

LVDT displacement transducers are used extensively in a variety of applications in scientific and industrial projects. Their use tends to fall into two categories.

- 1). Absolute measurement of displacement, position, movement, dimensional gauging and velocity.

This use applies to many areas such as in weighing platforms, structure movement in civil engineering, research test rigs, quality control product dimension checking, level monitoring etc.

- 2). As a feedback sensing element in closed loop systems. For instance, in hydraulic, pneumatic and robotic systems the LVDT is fitted in tandem with the actuator or robotic arm and produces a signal relating to the movement. When the required movement has occurred, the LVDT signal is used as a control to stop further movement.

This applies to servo-hydraulic systems, automotive engine management, aircraft engine reverse thrust control, tunnel boring equipment etc.

The following pages will help you select the right displacement transducer to suit your application. If you find these standard units are not quite suitable, we offer a custom-build service. Contact us for more details...

MINIATURE DISPLACEMENT TRANSDUCERS

MINIATURE Series



The range of miniature LVDT displacement transducers are ideal where space is limited. Measuring ranges cover from $\pm 0.25\text{mm}$ to $\pm 75\text{mm}$ and a series of options are available as shown in the selection chart below.

Their small size make them suitable for OEM applications in load cells, pressure transducers, weighing systems and closed-loop control. The low mass of the core can also be advantageous in projects having minimal weight restrictions.

The selection chart below shows the standard model options available, but we also offer a CUSTOM-DESIGN service.

For a model to exactly fit your special requirements, please call our Sales Office on 01494 816569

SELECTION CHART - Miniature Series

How to choose the measuring range...

All Monitran's LVDT Displacement Transducers start with the series letters MTN.

This is followed by letters which signify the general specification e.g. MTN/MXC.

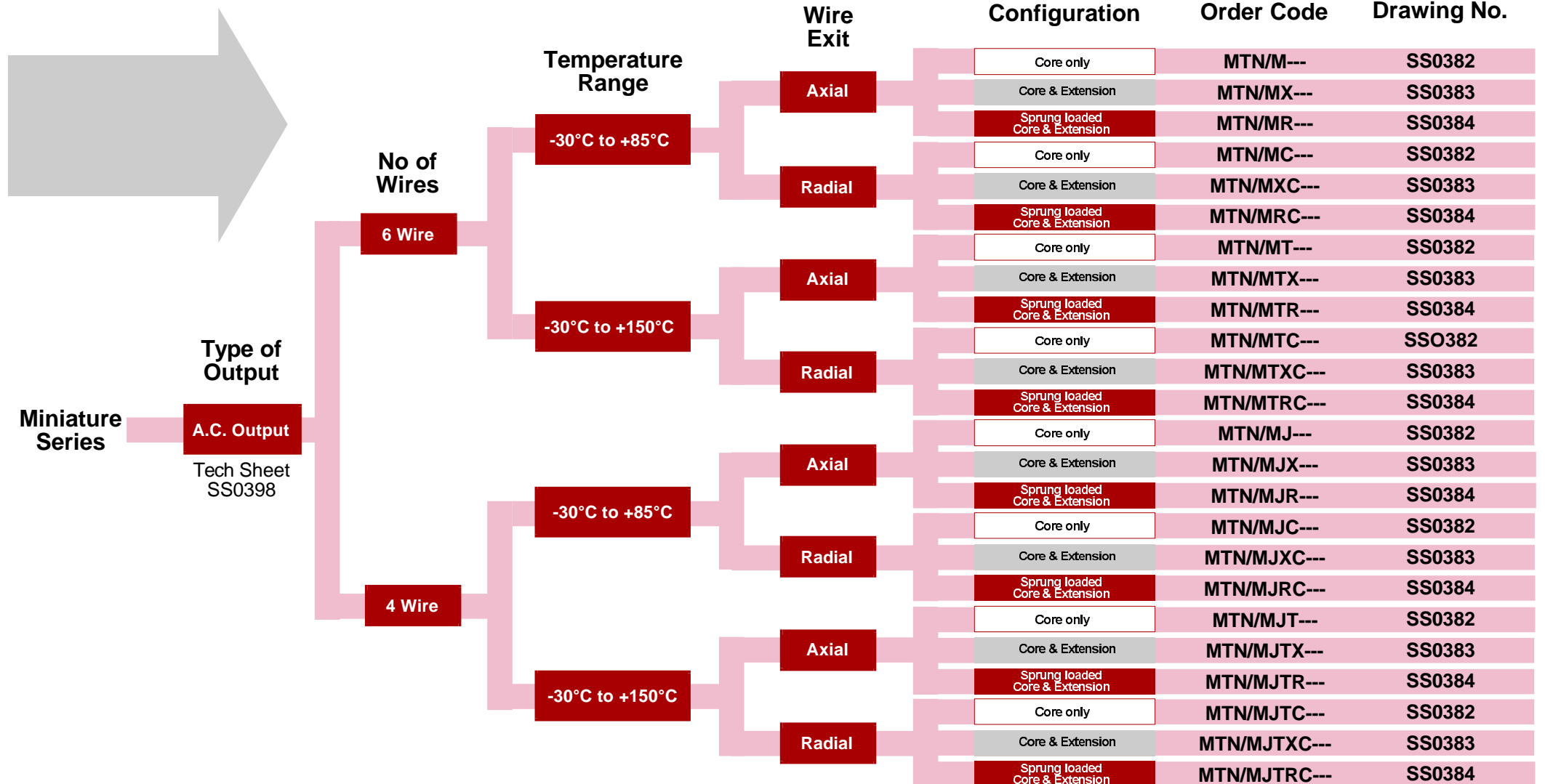
The measuring range is defined by the numbers following this model designation.

e.g. MTN/MXC50.

The numbers relate to half of the full measuring range, so 50 represents a range of $\pm 50\text{mm}$.

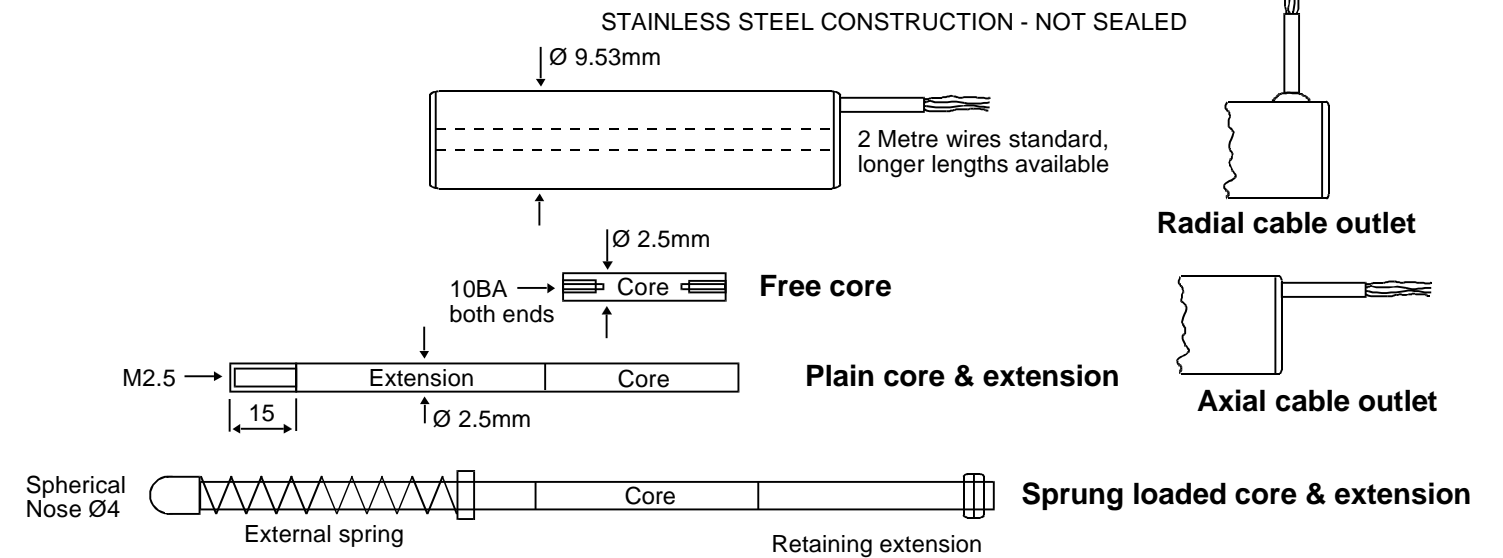
(Note: A $\pm 50\text{mm}$ transducer can be operated in a unidirectional mode i.e. as a 0-100mm device.)

If you need assistance in choosing the right measuring range and overall specification, please consult our Application Engineers.



MINIATURE DISPLACEMENT TRANSDUCERS

DIMENSIONAL DRAWINGS - Miniature Series



INDUSTRIAL DISPLACEMENT TRANSDUCERS

INDUSTRIAL Series



The Industrial Series has been specifically designed to meet the tough conditions that are experienced in industrial plant areas. The robust construction includes as standard, a stainless steel housing, sealing to IP65 (IP68 optional), armoured cable and a waterproof option.

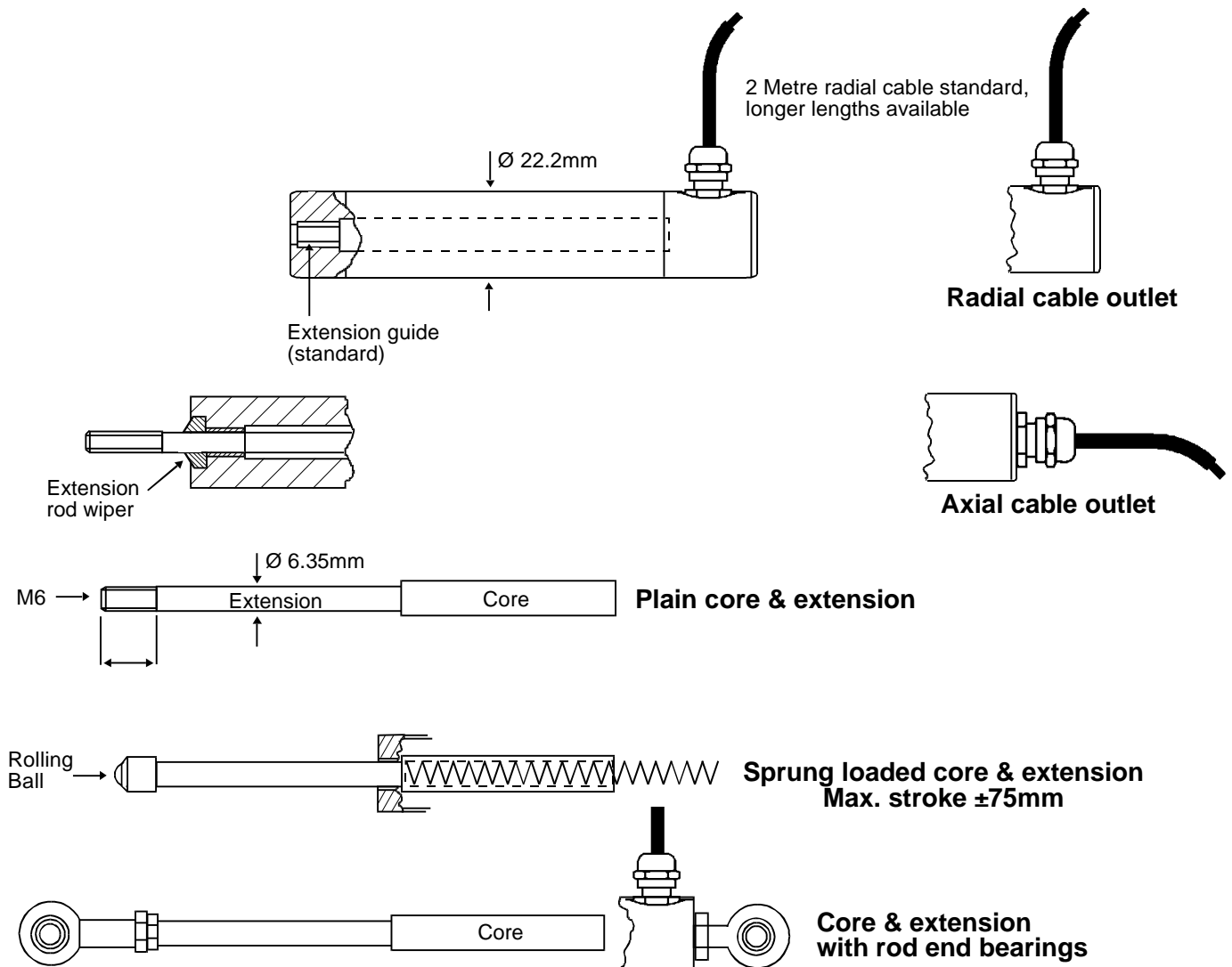
To aid the engineer in fitting and replacement, the transducers come with a choice of spherical bearings, double rod ends and a spring-return core. Measuring ranges extend from $\pm 0.5\text{mm}$ to $\pm 550\text{mm}$.

The selection chart opposite shows the standard model options available, but we also offer a CUSTOM-DESIGN service.

For a model to exactly fit your special requirements, please call our Sales Office on 01494 816569

DIMENSIONAL DRAWINGS - Industrial Series

STAINLESS STEEL CONSTRUCTION - SEALED TO IP65 (IP68 also available)



INDUSTRIAL DISPLACEMENT TRANSDUCERS

SELECTION CHART - Industrial Series

How to choose the measuring range...

All Monitran's LVDT Displacement Transducers start with the series letters MTN.

This is followed by letters which signify the general specification e.g. MTN/IEJR.

The measuring range is defined by the numbers following this model designation.

e.g. MTN/IEJR50.

The numbers relate to half of the full measuring range, so 50 represents a range of ± 50 mm.

(Note: A ± 50 mm transducer can be operated in a unidirectional mode i.e. as a 0-100mm device.)

If you need assistance in choosing the right measuring range and overall specification, please consult our Application Engineers.

Temperature Range

Temperature Range -30°C to +85°C

Temperature Range -30°C to +150°C

Level of Sealing

Standard Sealing (IP65)

Waterproof Sealing (IP68)

Standard Sealing (IP65)

Type of Output

A.C. Output

Tech Sheet SS0398

D.C. Bi-polar Output

Tech Sheet SS0393

D.C. 0-5V Output

Tech Sheet SS0394

D.C. 0-10V Output

Tech Sheet SS0394

D.C. 4-20mA Output

Tech Sheet SS0192

A.C. Output

D.C. Bi-polar Output

D.C. 0-5V Output

D.C. 0-10V Output

D.C. 4-20mA Output

A.C. Output

No of Wires

4 Wire

6 Wire

4 Wire

3 Wire

3 Wire

3 Wire

4 Wire

4 Wire

3 Wire

3 Wire

3 Wire

4 Wire

6 Wire

Cable Exit

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Radial

Axial

Front Nose Configuration

Standard Guided Core & Extension

Guided Core & Extension with Rod Wiper

Core / Extension Configuration

Plain Core & Extension

Sprung Loaded Core & Extension

Core & Extension with Rod End Bearings

Order Code

Drawing No.

MTN/IEJ---	SS0343
MTN/IEJS---	SS0344
MTN/IEJR---	SS0345
MTN/IEJG---	SS0343
MTN/IEJSG---	SS0344
MTN/IEJRG---	SS0345
MTN/IEJA---	SS0343
MTN/IEJSA---	SS0344
MTN/IEJGA---	SS0343
MTN/IEJSGA---	SS0344
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MTN/IEUGAW--- -10	SS0346
MTN/IEIW---	SS0346
MTN/IEIGW---	SS0346
MTN/IEIAW---	SS0346
MTN/IEIGAW---	SS0346
MTN.IEHJ---	SS0343
MTN/IEHJA---	SS0343
MTN/IEH---	SS0343
MTN/IEHA---	SS0343

Industrial Series

HEAVY INDUSTRIAL Series



The Heavy Industrial Series offer the same performance accuracy but have an extra rugged construction to withstand harsh conditions several orders higher, as typically experienced in heavy plant applications.

The rugged construction consists of a strong stainless steel body, internal bearings, armoured cable and sealing up to fully waterproof. Measuring ranges are from $\pm 25\text{mm}$ to $\pm 200\text{mm}$ with optional internal electronics available for a DC or 4-20mA output.

The selection chart below shows the standard model options available, but we also offer a CUSTOM-DESIGN service.

For a model to exactly fit your special requirements, please call our Sales Office on 01491 816569

SELECTION CHART - Heavy Industrial Series

How to choose the measuring range...

All Monitran's LVDT Displacement Transducers start with the series letters MTN.

This is followed by letters which signify the general specification e.g. MTN/HIEJ.

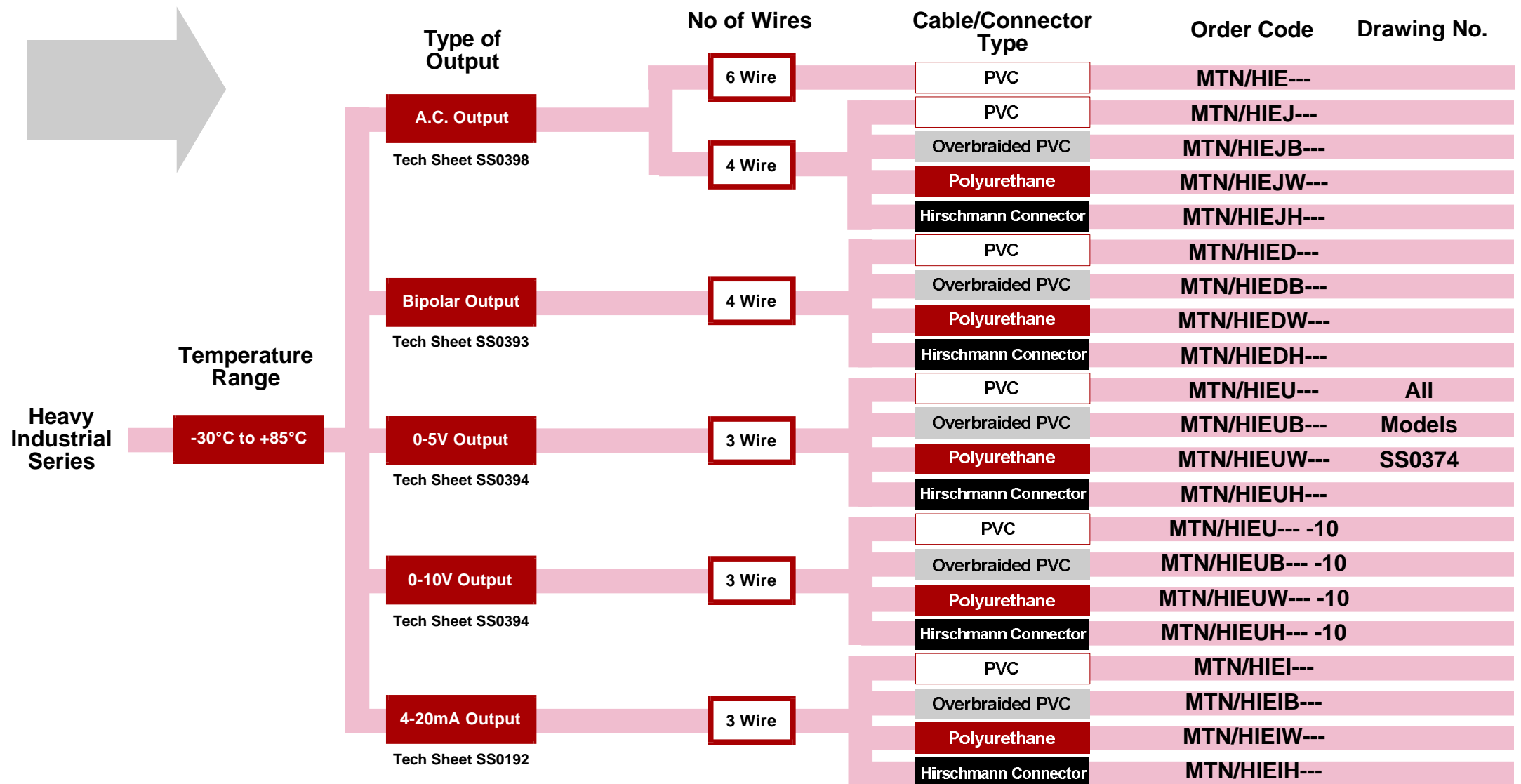
The measuring range is defined by the numbers following this model designation.

e.g. MTN/HIEJ50.

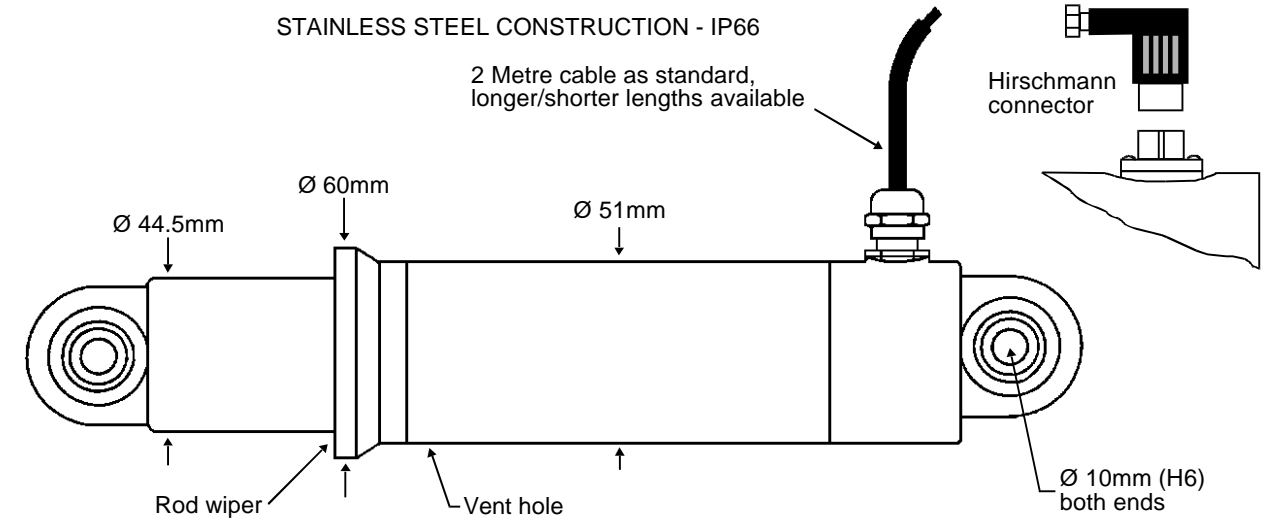
The numbers relate to half of the full measuring range, so 50 represents a range of $\pm 50\text{mm}$.

(Note: A $\pm 50\text{mm}$ transducer can be operated in a unidirectional mode i.e. as a 0-100mm device.)

If you need assistance in choosing the right measuring range and overall specification, please consult our Application Engineers.



DIMENSIONAL DRAWINGS - Heavy Industrial Series



DC LABORATORY Series



The D.C. Laboratory Series offer a range of models for research applications where accuracy and ease-of-use are important. All models have internal electronics to give a D.C. or 4-20mA output as requested, eliminating the need for external instrumentation.

Measuring ranges extend from $\pm 2.5\text{mm}$ to $\pm 100\text{mm}$ with a choice of core types and cable exits.

The selection chart below shows the standard model options available, but we also offer a CUSTOM-DESIGN service.

For a model to exactly fit your special requirements, please call our Sales Office on 01494 816569

SELECTION CHART - DC Laboratory Series

How to choose the measuring range...

All Monitran's LVDT Displacement Transducers start with the series letters MTN.

This is followed by letters which signify the general specification e.g. MTN/DLS.

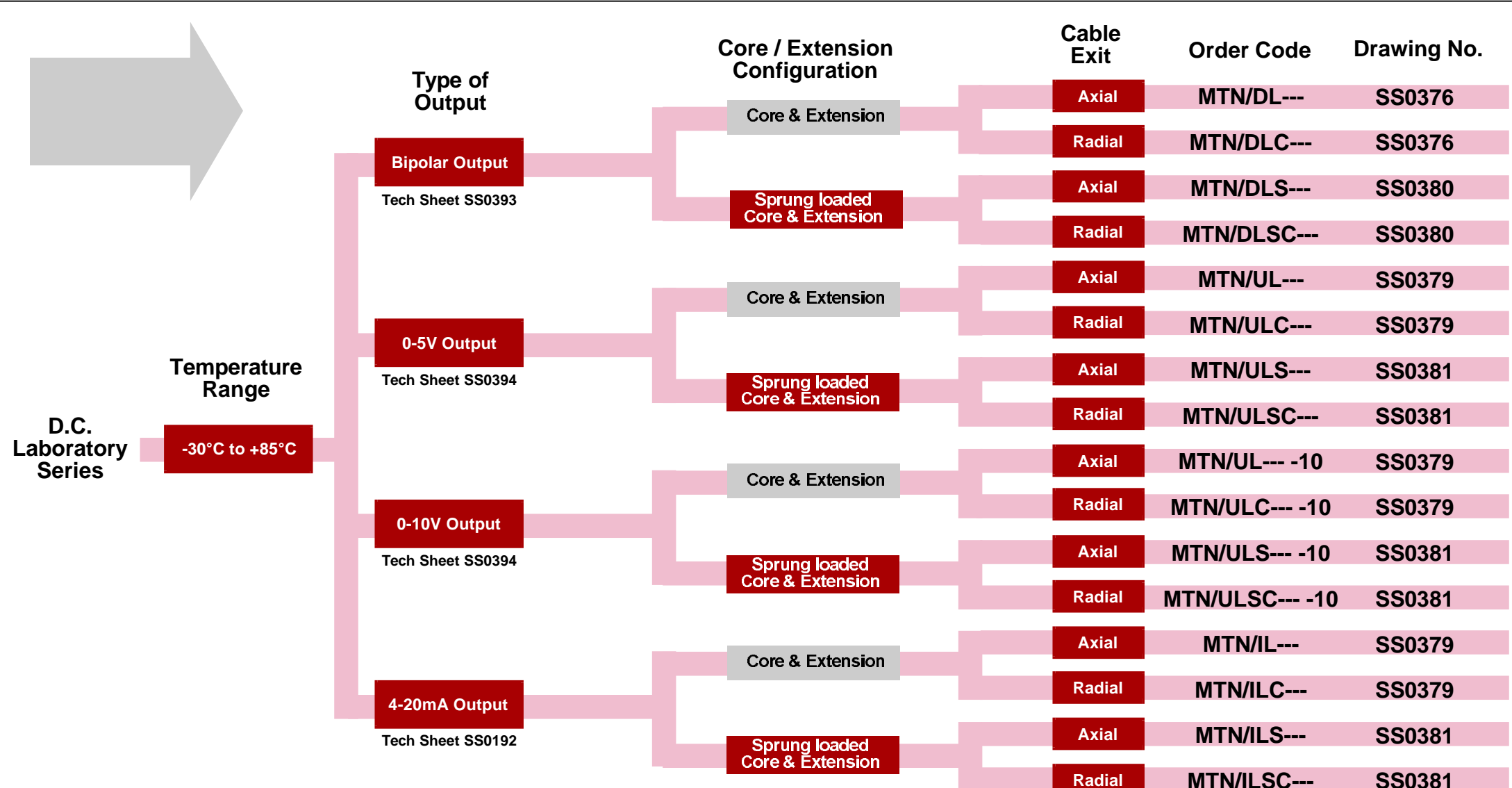
The measuring range is defined by the numbers following this model designation.

e.g. MTN/DLS50.

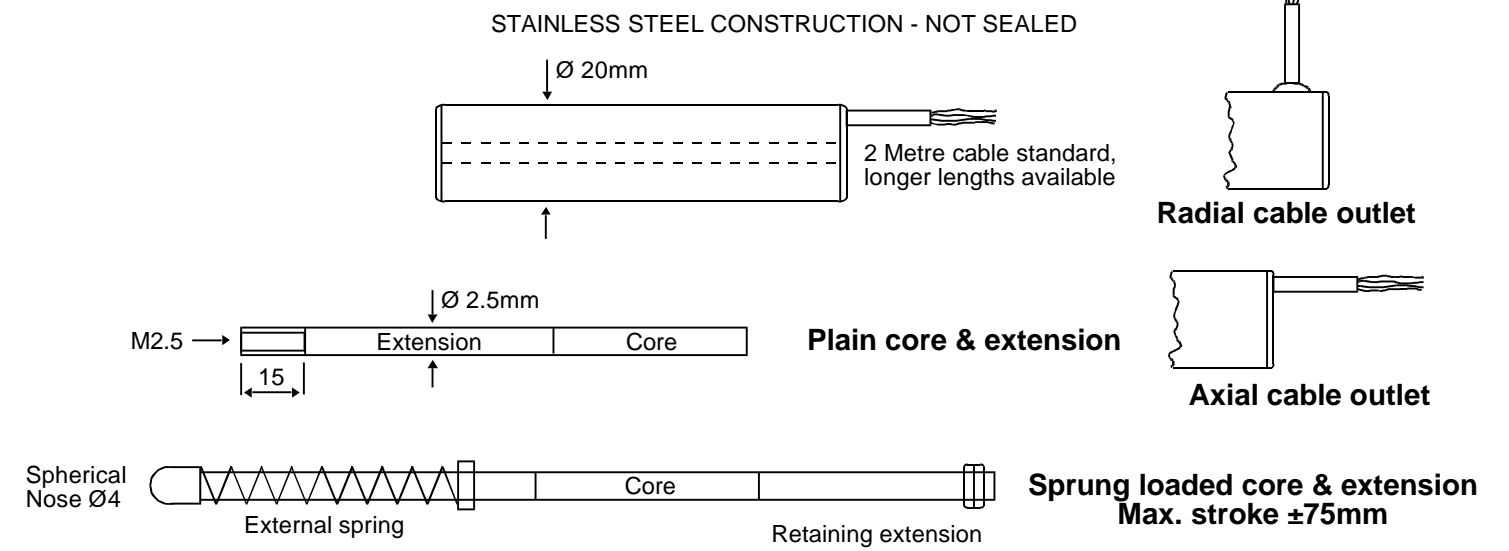
The numbers relate to half of the full measuring range, so 50 represents a range of $\pm 50\text{mm}$.

(Note: A $\pm 50\text{mm}$ transducer can be operated in a unidirectional mode i.e. as a 0-100mm device.)

If you need assistance in choosing the right measuring range and overall specification, please consult our Application Engineers.



DIMENSIONAL DRAWINGS - DC Laboratory Series



PRESSURISED DISPLACEMENT TRANSDUCERS

PRESSURISED Series



The Pressurised Series has been designed to allow a pressure of up to 6000 psi (400 bar) to exist between the core and internal assembly. They have been widely used in hydraulic applications where the LVDT is acting as a feedback loop signal source within a cylinder.

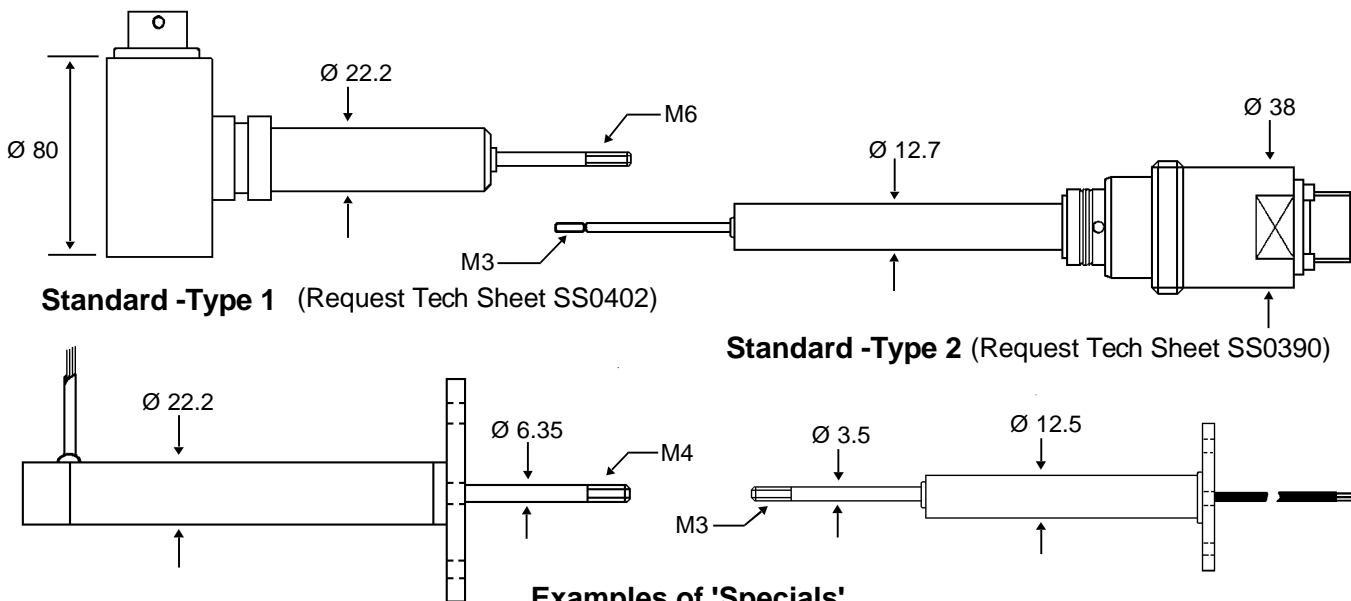
Measuring ranges exist from $\pm 25\text{mm}$ to $\pm 500\text{mm}$ with optional internal electronics giving either a D.C. or 4-20mA output.

The selection chart below shows some of the existing special designs, but we also offer a CUSTOM-DESIGN service.

For a model to exactly fit your special requirements, please call our Sales Office on 01494 816569

DIMENSIONAL DRAWING - Pressurised Series

STAINLESS STEEL & MILD STEEL CONSTRUCTION - WITHSTANDS PRESSURE UP TO 6000 PSI



Please discuss your requirements with our Sales Office



Pressurised Series	Body Type	Temperature Range	Type of Output	Tech Sheet	Order Code
			A.C. Output	SS0398	MTN/PE---
Standard Body	-30°C to +150°C excl. connector	D.C. Bipolar Output	SS0393	MTN/PED---	
		D.C. 0-5V Output	SS0394	MTN/PEU---	
		D.C. 0-10V Output	SS0394	MTN/PEU--- -10	
		D.C. 4-20mA Output	SS0192	MTN/PEI---	
Slimline Body	-30°C to +150°C excl. connector	A.C. Output	SS0398	MTN/PES---	
		D.C. Bipolar Output	SS0393	MTN/PESD---	
		D.C. 0-5V Output	SS0394	MTN/PESU---	
		D.C. 0-10V Output	SS0394	MTN/PESU--- -10	
		D.C. 4-20mA Output	SS0192	MTN/PESI---	

INSTRUMENTATION for Displacement Transducers



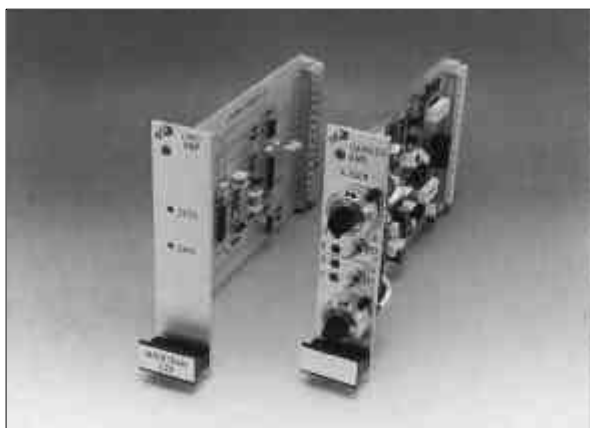
Single Channel LVDT Signal Conditioning

To fully support a single LVDT displacement transducer, we offer the MTN/8100 series. This unit is housed in a robust die cast box with industrial glands for all input and output cabling.

The MTN/8100 provides all the necessary circuitry to energise and condition the transducer signal. This includes operation from either mains or various D.C. supplies, together with controls for the adjustment of both zero and gain.

Request Specification Sheet SS0076 for full operating details.

Custom design service also available, please call us with your specific requirements.



Multichannel Modular System

For the support of several LVDT displacement transducers, we offer the multichannel modular series. The Eurocard modules can be supplied separately or built into a free-standing or rack-mounting cabinet.

For flexibility, a choice of modules is available for LVDT conditioning, Strain gauge transducer conditioning, Trip level alarms, Digital monitoring etc.

The system is mains operated and individual channel outputs are provided.

Request Tech Sheets SS0125, SS0153 & SS0123 for full technical details.

Custom design service also available, please call us with your specific requirements



Custom Design Service & System Engineering

Our standard range of measurement products is extensive and continues to expand as we adapt to fulfil our customer's needs.

With our specialised experience, we offer a Custom Design Service where we can design and manufacture products to exactly fit your particular application.

Should you have a project requiring system engineering, we can also take full responsibility for a complete measuring and control system.

For the complete measurement solution, call our Sales Office on 01494 816569 to discuss all your requirements with our experienced Applications Engineers.