



**Solartron
Metrology**

**SCIENCE
GATE**
Your Automation Partner



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MACH 1 Series



User Leaflet

AMETEK®
ULTRA PRECISION TECHNOLOGIES

1.0: General

The Mach 1 Series range of Transducer coil assemblies are designed for protection against dust and water, making them suitable for use in harsh environments. Designed to be rugged and yet still cost effective, these devices offer the Customer all the attributes associated with L.V.D.T.'s. A variety of combinations and accessories are available as options.

1.1 Introduction

The Mach 1 range of transducers operate on the L.V.D.T. principal, where movement of a core inside the transducer body is detected by a differential change in output on two secondary coils, the primary coil(s) being energised by an appropriate AC signal. With the core in a central position, the coupling from the primary to each secondary is equal and opposite and therefore cancel out, thus the resultant output voltage is zero. As the core is displaced further into one secondary, its voltage increases proportionally and the other secondary voltage decreases hence the output changes in magnitude and phase in proportion to movement in either direction from null.

The red and white connections are in phase for inward movement (ie. towards the cable end). The output signal depends on both core movement and energisation voltage and is expressed as a

sensitivity in mV output / V energising / mm travel.

1.2 Installation

L.V.D.T. transducers generally are a reliable and proven technology that is well established in all areas of manufacturing and control industries. The majority of the associated problems experienced with their application and use are totally avoidable, particularly if sufficient thought is given during the initial design stages of equipment, to the positioning and clamping methods employed for these feedback elements.

L.V.D.T.'s being of inductive nature are susceptible to some degree to the influence of magnetic fields and therefore should be positioned well away from electric motors, relays and permanent magnets, where this is not possible then magnetic shielding should be considered as an alternative.

Clamping of the coil assembly should be carefully considered, some example methods are shown in figure 1. Ideally the body of the transducers should be clamped centrally in a pinch or yoke type clamp, manufactured from a low conductivity, non-magnetic material, if this is not possible then the introduction of a non-metallic bush between body and clamp is a preferred alternative.

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Irrespective of clamping method care must be taken not to over tighten retaining screws as distortion of the body may prove damaging to the integrity of the transducer and adversely affect the geometry of the installation.

If the L.V.D.T. is to be mounted on equipment subject to high "g" then dependent on the direction of these forces, it may be advantageous to consider end to end clamping in preference to over body clamping.

The magnetic core supplied with each transducer has been manufactured and heat treated to achieve the optimum magnetic performance, any subsequent handling of the core which results in stress being imparted will render the calibration void, this includes over tightening of the core during installation onto its carrier. Hand tightening and retention by means of a suitable thread locking anaerobic retainer is the recommended procedure.

1.3. Cores

The standard core supplied with each transducer incorporates an M4 x 0.7 x 12 mm deep female thread at both ends for mounting onto a carrier, an alternative 6-40 UNF female thread is available as a standard option upon request.

1.4. Carriers

A standard length carrier is available for each model of transducer, manufactured from 316 stainless steel and incorporating an M4 x 0.7 x 10 mm long male thread for attachment to the standard core and an M4 x 0.7 x 20 mm male thread for attachment to the fixture.

A 6-40 UNF thread option is also available.

1.5. Guided Carrier

1.5.1. MOUNTING Normal mounting methods apply (see section 1.2. on Installation). Careful consideration should be given to alignment, the carrier must be able to move freely within the transducer core. Side force should be kept to a minimal level.

1.5.2. MAINTENANCE: Check for free movement of the carrier when in the vertical plane. Lubrication is provided via an oilite bush which is impregnated with molybdenum disulphide and in normal usage is maintenance free.

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1.6. Ball Tip

This option is for use with the Guided Carrier and is attached via an adapter fitted to the threaded end of the core carrier. Side forces which may exert undue pressure and flex the carrier must be avoided.

1.7. Rod End Bearings

1.7.1. MOUNTING: With the exception of the B100 the Transducer may be mounted in any axis; it is recommended that the rear rod end bearing (near cable exit) is mounted on the static component. The B100, because of the increase in weight, may exhibit bowing of the carrier and therefore mounting in the horizontal plane should either be avoided or additional support given to the body. This option is used with the guided core.

1.7.2. MAINTENANCE: Rod end bearings are supplied pre-lubricated with mineral oil; for higher temperature applications the use of a molybdenum disulphide impregnated oil is recommended and your representative should be consulted about the maximum temperature.

Periodic inspection of locking screws and nuts etc. is advisable depending upon the Customer's application. Rod end bearings should be able to move freely and have minimal side play.

1.8. Cable

5 kHz Version: Solartron Metrology cable is specially manufactured to optimise performance with respect to temperature, chemical resistance, flex life, abrasion resistance and electrical performance. However, no single cable design can fulfil every known requirement and by taking a few simple precautions cable failure can be avoided. In flexure conditions then a minimum bend radius of 150 mm should be maintained. Avoid contact with sharp edges and rough surfaces and inspect at periodic intervals.

Excessive cable runs may alter the output characteristics; if in doubt consult your representative.

2.5 kHz Version: The standard termination is by 7/0.125 P.T.F.E. insulated flying leads, capable of withstanding the operating temperature of the L.V.D.T. Routing of cables should be kept as smooth as possible avoiding burrs, sharp edges and excessive cable loads.

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1.9 Environmental

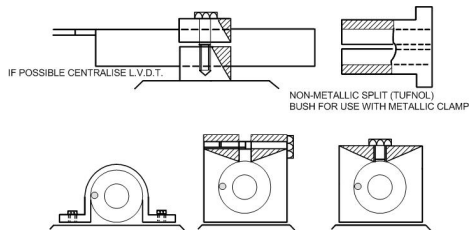
Operating Temperature Range A,B,K,L (types) *
-55 °C / +150 °C
Operating Temperature Range C,D,M,N (types) *
-55 °C / +200 °C
Storage Temperature Range A,B,K,L (types) *
-55 °C / +150 °C
Storage Temperature Range C,D,M,N (types) *
-55 °C / +200 °C
Conditions of high humidity and vibration should be avoided.

1.10. Connectors

1.10.1. INTEGRAL: Transducers can be fitted with a six pin connector, or a connector kit can be supplied for fitting by the Customer. This option is not available for Transducers fitted with rod end bearings, or radial lead outlet. It is recommended to ensure satisfactory operation that this option is Factory fitted.

1.10.2. IN-LINE: A five pin Din type connector can be fitted to the lead, supplied loose or ordered separately. If fitted to non-Solartron Metrology equipment, careful observation of connections must be adhered to as Solartron Metrology cannot be held responsible for any damage which may result.

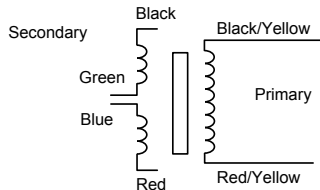
Figure 1 Examples of Clamping Methods



* An explanation of codes can be found on our ordering guide 502103 available from sales.solartronmetrology@ametek.com or www.solartronmetrology.com

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Figure 2 Plug Connections



Connect Blue to Green or Black to Red for differential output.

Calibrated frequency,	voltage	load
2.5 kHz	3 volts rms	100 k Ω

Yellow/Red and Red are in phase for forward displacement (toward cable end).

Note: Fit "Quad Balance" resistor if supplied, between Red/Blue or Black/Green, as directed, in order to optimise linearity around null.

2.5kHz

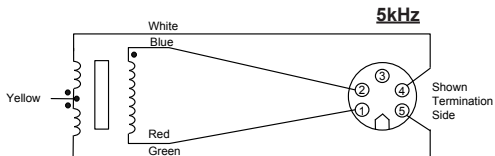
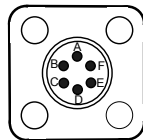


Figure 3 Connector Terminations - 5kHz

Transducer	Pin
Yellow	A
Green	B
Blue	C
N/C	D
Red	E
White	F



Shown Termination Side

Note: Fit "Quad Balance" resistor if supplied, between Yellow/White or Yellow/Green, as directed, in order to optimise linearity around null.

Solartron Metrology, Bognor Regis, accepts no responsibility for damage when accessories are fitted by the Customer. In the event further information being required please contact your representative.