

**MB** MARSH BELLOFRAM®

MB T-1500 Electro-Pneumatic I/P & E/P Transducers

Electro-Pneumatic I/P & E/P Transducers

# Type-1500

Precision  
Control  
Devices

ISO 9002  
certified



# T-1500

The T-1500 is a new series of electro-pneumatic transducers that convert an electrical signal to a proportional pressure output. It provides precision electro-pneumatic control to actuators, valves, positioners, final control elements and is ideally used for high-flow control devices. The T-1500's compact size and accessibility to ports and adjustments allow the unit to be installed in space-constrained locations or in a manifold for multi-device control.

DIN rail and manifold assemblies are available in kits that provide three, five or ten mounting points.

An integral pneumatic volume booster is included in the T-1500 design to provide high flow capacity. (See specifications for flow data.)

## STANDARD FEATURES

- Small footprint, compact size
- Manifold mounting configurations
- Built-in volume booster
- Electrical Connections: Conduit ½" NPT or BSPT, Terminal Block, Hirschmann® Connectors (DIN 43 650-A)
- Supply and output ports on front and back of unit
- Low air consumption
- External zero and span adjustments
- Low cost
- Field accessible orifice
- Electrical conduit connection meets CE requirements

## OPTIONS AVAILABLE

- Intrinsically Safe (FM, CSA, CENELEC)
- NEMA 4X (FM, CSA) Excludes Terminal Block

## T-1500 I/P TRANSDUCER PRINCIPLE OF OPERATION

(see Fig. 2 & 6)

The T-1500 Transducer is a force balance device in which a coil is suspended in the field of a magnet by a flexure. Current flowing through the coil generates axial move-

ment of the coil and flexure. The flexure moves against the end of a nozzle and creates a back pressure in the nozzle by restricting air flow. This back pressure acts as a pilot pressure to an integral booster relay. Consequently, as the input signal increases (or decreases for reverse acting), output pressure increases proportionally.

In the zero based T-1500, the output of the transducer section is routed to an integral negative bias booster relay.

The bias relay allows the complete unit to regulate output pressure down to 0 psig/BAR. The bias relay also amplifies the output of the transducer which

allows the zero based units to regulate higher output pressures than the standard T-1500.

Zero and Span are calibrated by turning easily accessible adjusting screws on the front face of the unit (see Figures 3, 4, 5, 7, 8 & 9). The zero adjustment causes the nozzle to move relative to the flexure. The span adjustment is a potentiometer that limits the flow of current through the coil. A thermistor circuit in series with the coil provides temperature compensation.

## APPLICATIONS

The T-1500 transducer can be used as an electro-pneumatic control device to operate:

- Valve actuators
- Valve positioners
- HVAC systems
- Material handling systems
- Paper handling controls
- Automation systems
- Liquid and gas processing systems

## MOUNTING

The T-1500 can be mounted at any angle but should be calibrated after mounting. For maximum output pressure stability, the T-1500 should be mounted vertically in a vibration free location or such that the vibration is isolated to the X and Z axis. The T-1500 can be in-line, panel, pipe, DIN rail or manifold mounted.

## AIR CONNECTIONS

1. Supply Air must be instrument quality air regulated between 5 psi above maximum output pressure up to 120 psig / 8.3 BAR (See table: Supply Pressure Range).
2. Instrument-quality air consists of:
  - a. A dew point less than 35° F
  - b. No particles larger than three microns
  - c. Maximum oil content of 1 ppm
3. All unused ports must be plugged.

## SUPPLY

Connect supply to either of two ports marked "IN" on the base of the transducer. Avoid getting pipe sealant inside the piping or transducer.

## OUTPUT

Connect output to either of two ports marked "OUT" on the base of the transducer. The second "OUT" port may be used for a pressure gauge.



	Standard Range	Zero Based
Hysteresis	<0.75% of span	<1.0% of span
Repeatability	<0.5% of span	<0.5% of span
Linearity (Independent)	<0.75% of span <1.0% of span for fluorocarbon units	<1.0% of span
Flow @ Mid Range	6.5 SCFM (Minimum) @ 15.0 psig / 1.0 BAR output pressure, 120 psig / 8.3 BAR supply pressure	9.0 SCFM (Minimum) @ 15.0 psig / 1.0 BAR output pressure, 150 psig / 10.3 BAR supply pressure
Maximum Air Consumption	3 SCFH @ 15 psi / 1.0 BAR output pressure	18 SCFH @ Maximum output pressure
Exhaust Capacity	>1.0 SCFM @ 5 psi / 0.4 BAR above set point	>1.0 SCFM @ 5 psi / 0.4 BAR above set point
Supply Pressure Range	5 psi above maximum output up to 120 psig / 8.3 BAR maximum	0-15 units: 25-150 psig / 1.7-10.3 BAR 0-30 units: 40-150 psig / 2.8-10.3 BAR 0-60 units: 70-150 psig / 4.8-10.3 BAR 0-120 units: 125-150 psig / 8.6-10.3 BAR
Weight	1.3 lbs	1.63 lbs
Port Size	1/4" NPT, BSPT, BSPP	1/4" NPT, BSPT, BSPP
Supply Pressure Sensitivity	<2.5% of span for a supply pressure change of 15 psig / 1.0 BAR	<1.7% of span change in output pressure over full supply pressure range (0-120 units)
Temperature Range	-20°F to +150°F	-20°F to +150°F
Input Signal	4-20 mA DC, 0-5 VDC, 1-5 VDC, 1-9 VDC, 0-10 VDC, 1-10 VDC	4-20 mA DC, 0-5 VDC, 1-5 VDC, 1-9 VDC, 0-10 VDC, 1-10 VDC
Output Range	3-15, 3-27, 6-30 psig 0.2-1.0, 0.2-1.9, 0.4-2.1 BAR	0-15, 0-30, 0-60, 0-120 psig 0-1.0, 0-2.1, 0-4.1, 0-8.3 BAR

**Electrical Connections:** Both the I/P & E/P versions are two-wire devices, plus a safety ground. The E/P requires a DC voltage input signal; example: 1 to 9 VDC. The I/P models require an input current of 4 to 20 mA.

### T1500 Ordering Information

9	6	A	-	B	C	D	-	E	F	G
9	6	-	-	-	-	-	-	-	-	-
		A								
		6							0	ENCLOSURE RATING NEMA 4X (INCLUDES APPROVALS) INDOOR USE / GENERAL PURPOSE
		9								
				B						"IN & OUT" PNEUMATIC PORT CONNECTIONS
				7						1/4" NPT
				8						1/4" BSPT
				9						1/4" BSPP
					C					INPUT (SIGNAL)
					1					4-20 mA DC
					2					0-5 VDC
					3					1-9 VDC
					4					1-10 VDC
					5					0-10 VDC
					6					1-5 VDC
						D				OUTPUT (PRESSURE)
						0				3-15 psig / 0.2-1.0 BAR
						1				3-27 psig / 0.2-1.9 BAR
						2				6-30 psig / 0.4-2.1 BAR
						3				0-15 psig / 0-1.0 BAR
						4				0-30 psig / 0-2.1 BAR
						5				0-60 psig / 0-4.1 BAR
						6				0-120 psig / 0-8.3 BAR
							E			ELECTRICAL CONNECTION
							0			1/2" NPT (1/4" NPT PORTS ONLY)
							1			Terminal Block (Indoor Use / General Purpose Only)
							2			Hirschmann Connection (DIN 43 650-A)
							3			1/2" BSPT Conduit (1/4" BSPT or BSPP Ports Only)
								F		ELASTOMER
								0		Nitrile
								1		Fluorocarbon
									G	AGENCY APPROVALS and CERTIFICATIONS
									0	FM, CSA and CENELEC Intrinsically Safe
									1	None - General Purpose Only



NOTE: Intrinsic safety rating requires that installation must conform to the system diagram drawing for the effected agency.

## T-1500 MANIFOLD & ADAPTER KIT PRINCIPLE OF OPERATION

The T-1500 manifold assembly allows multiple T-1500 Transducers to be mounted in parallel. This minimizes the number of individual supply air lines required. Manifolds are available to hold three, five, or ten units. Each manifold comes with check valves so that a unit can be pulled off of the manifold for service or replacement without affecting the whole manifold. (See Figure 1.)

## MOUNTING

The manifolds may be mounted flush with a wall or cabinet or may be mounted away from the wall. Both mounting options are

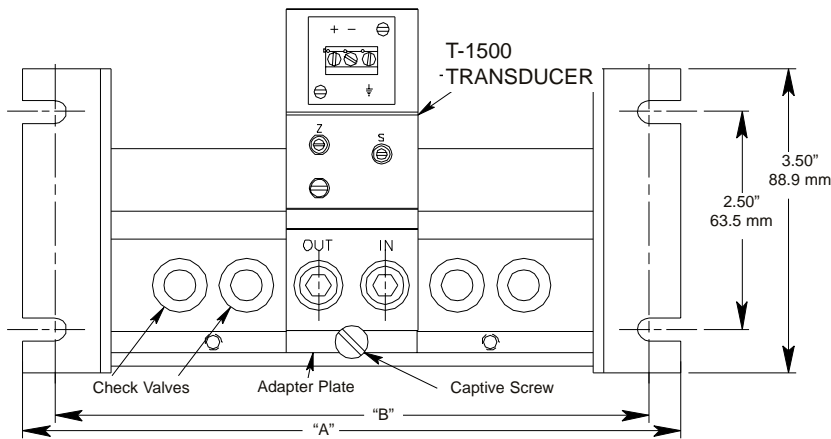


Figure 1 - Manifold Front View

included in the basic manifold kit. In addition, all fittings required to mount the full number of units in each manifold are included in the basic kit. An additional adapter kit may be purchased which contains all of the hardware required to manifold mount a single T-1500 Transducer should the need arise.

## AIR SUPPLY ATTACHMENT

The air supply can be attached to either side of the manifold via a 3/4" NPT connection or to the back of the manifold via a 3/8" NPT connection. After an air supply port is selected, the open ports should be plugged using the plugs provided with the manifold kit and a pneumatic sealant.

## OUTPUT AIR ATTACHMENT

Connect the output ports from each of the T-1500 Transducers to the bottom or back of the manifold. After connecting the transducers, plug the other 1/8" NPT ports using the plugs provided and a pneumatic sealant.

## T-1500 MANIFOLD ADAPTER KIT

The T-1500 manifold kit includes the adapter kits required for each transducer.

## ELECTRICAL CONNECTIONS

Two brackets supplied with the manifold kit allow an electrical conduit to be attached to the manifold. Mounting screws and nuts are provided, and the brackets have an 11/64" diameter hole which will fit standard 8-36 UNF or 8-32 UNC screws (not supplied).

Number of Transducers	Length "A"	Length "B"
3	7.57" 192.3 mm	6.83" 173.5 mm
5	10.75" 273.1 mm	10.01" 254.3 mm
10	18.70" 475.0 mm	17.96" 456.2 mm

## T-1500 MANIFOLD ORDERING INFORMATION

T-1500 Wall Mount Kit, 3 unit	010-606-000
T-1500 Wall Mount Kit, 5 unit	010-606-001
T-1500 Wall Mount Kit, 10 unit	010-606-002
T-1500 Manifold Adapter Kit (Replacement)	010-602-000

## T-1500 KITS

DIN Rail Mounting Kit	971-140-000
Pneumatic Repair Kit (3-15, 3-27 psi / 0.2-1.0, 0.2-1.9 BAR)	971-141-000
Pneumatic Repair Kit (6-30 psig / 0.4-2.1 BAR)	971-141-002
Pneumatic Repair Kit, Fluorocarbon (3-15, 3-27 psig / 0.2-1.0, 0.2-1.9 BAR)	971-141-003
Pneumatic Repair Kit, Fluorocarbon (6-30 psig / 0.4-2.1 BAR)	971-141-004
Pneumatic Repair Kit (0-120 psig / 0-8.3 BAR)	971-145-000
Pneumatic Repair Kit Fluorocarbon, (0-120 psi / 0-8.3 BAR)	971-145-001
Electronic Repair Kit (4-20 mA)	971-142-000
Electronic Repair Kit (0-5 VDC or 1-5 VDC)	971-142-001
Electronic Repair Kit (1-9, 1-10 VDC, or 0-10 VDC)	971-142-002
2" Pipe Mounting Kit	971-159-000



### IMPORTANT NOTICE

Marsh Bellofram does not warrant products which have been subject to misuse, abuse, negligence, accidents, misapplication, improper installation, or tampering in any way. Marsh Bellofram, in all circumstances, shall not be liable for special, indirect, or consequential damages. MARSH BELLOFRAM GIVES NO WARRANTY, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER BEYOND THAT SPECIFIED IN MARSH BELLOFRAM'S CATALOG. (Please refer to Marsh Bellofram's catalog for warranties and remedies.)

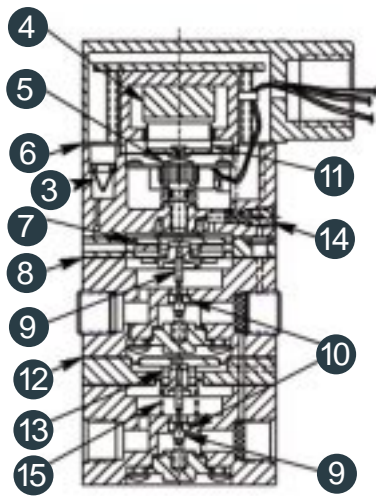
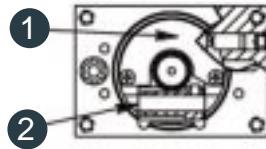
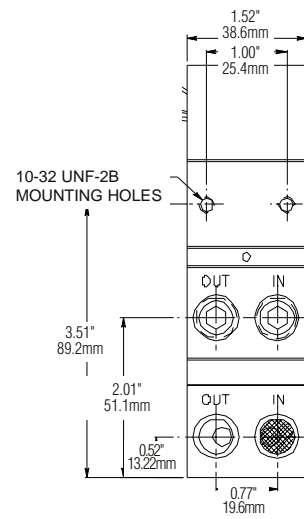


FIGURE 2



NUMBER	DESCRIPTION
1	Circuit Board
2	Worm Gear
3	Duckbill Valve (NEMA 4X Only)
4	Magnet Assembly
5	Nozzle Assembly
6	Bonnet Gasket (NEMA 4X Only)
7	Servo Diaphragm (I/P Section)
8	Control Diaphragm (I/P Section)
9	Pintle
10	Supply Seat
11	Coil/Flexure Assembly
12	Servo Diaphragm (Bias Relay)
13	Control Diaphragm (Bias Relay)
14	Orifice Screw
15	Bias Spring



BACK DIMENSIONS

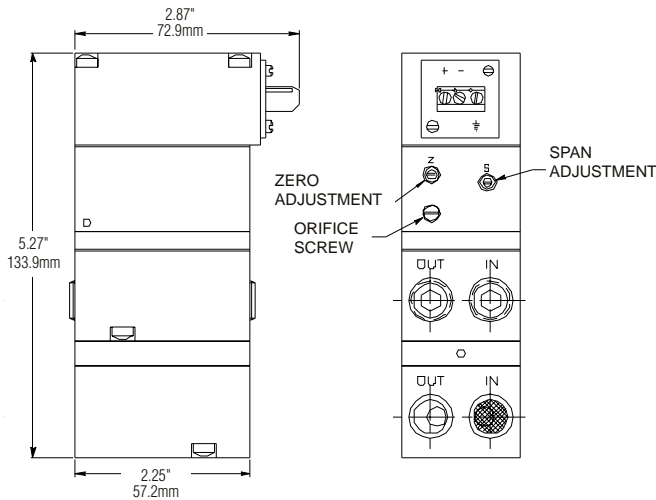


FIGURE 3 - TERMINAL BLOCK

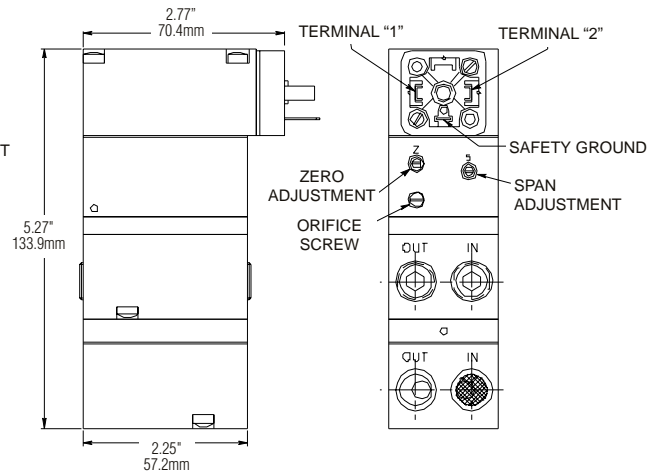


FIGURE 4 - Hirschmann® (DIN 43 650-A)

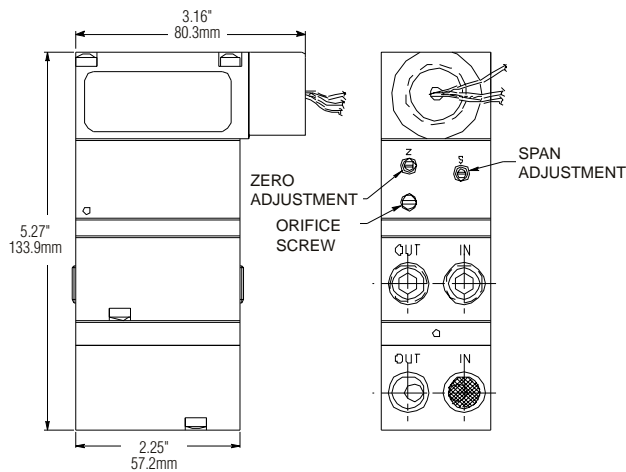


FIGURE 5 - 1/2" NPT / BSPT



T-1500 EXTENDED RANGE DIMENSIONS

Drawings and dimensions are for reference only.

NUMBER	DESCRIPTION
1	Circuit Board
2	Worm Gear
3	Duckbill Valve (NEMA 4X Only)
4	Magnet Assembly
5	Nozzle Assembly
6	Bonnet Gasket (NEMA 4X Only)
7	Servo Diaphragm (I/P Section)
8	Control Diaphragm (I/P Section)
9	Pintle
10	Supply Seat
11	Coil/Flexure Assembly

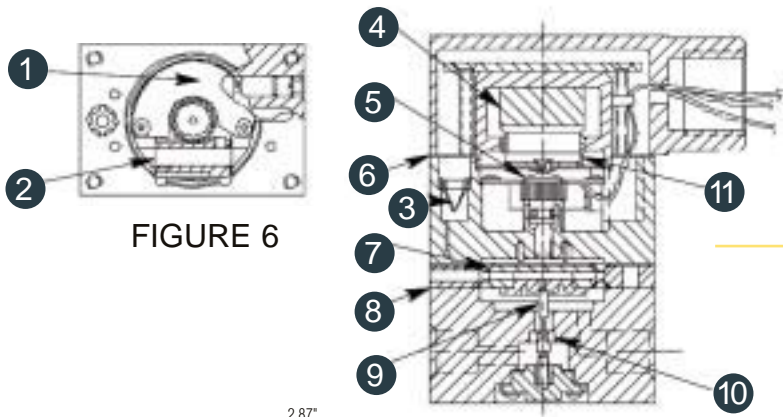
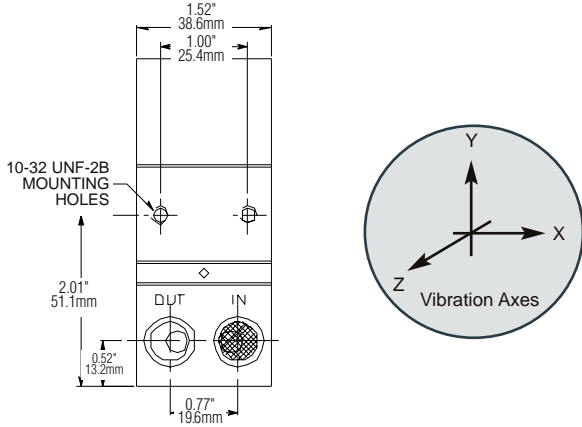


FIGURE 6



BACK DIMENSIONS

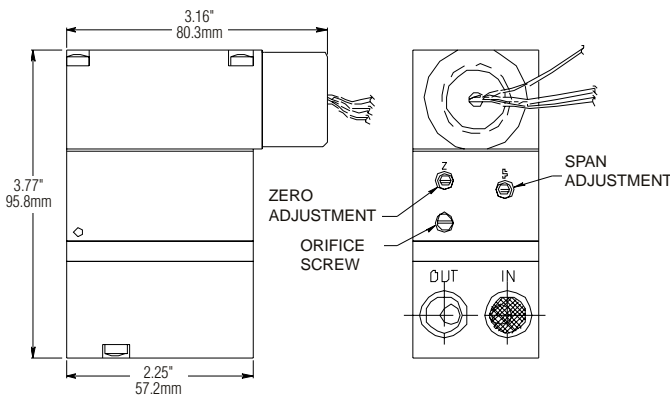


FIGURE 8 - 1/2" NPT / BSPT

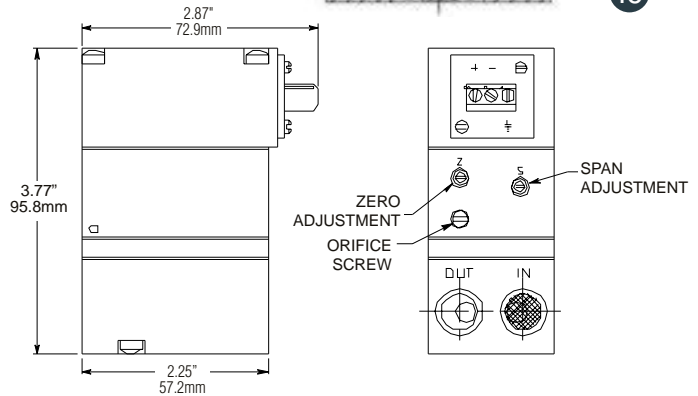


FIGURE 7 - TERMINAL BLOCK

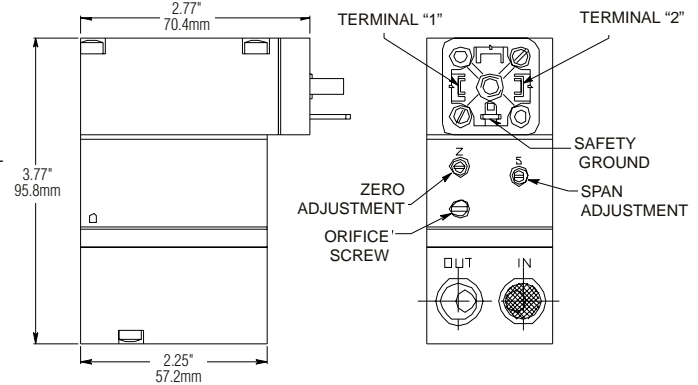


FIGURE 9 - Hirschmann® (DIN 43 650-A)

Drawings and dimensions are for reference only.



**AGENCY APPROVALS - APPLIES ONLY TO UNITS ORDERED WITH APPROVALS**  
 FACTORY MUTUAL & CSA

NEMA/TYPE 4X : The T-1500 Transducers, NPT, BSPT, Hirschmann models are rated intrinsically safe by FM & CSA for:

- DUST-PROOF FOR CLASS II, DIV 1, GROUP E,F,G.
- SUITABLE FOR CLASS III LOCATIONS.

Warning - These ratings are valid ONLY WHEN the cover is fully installed, and the electrical connections conform to required standards.

**INDOOR USE / GENERAL PURPOSE:**

T-1500 model transducers are rated intrinsically safe by FM & CSA for:

- CLASS I, DIVISION 1, GROUPS A, B, C, D HAZARDOUS LOCATIONS.

**ENTITY PARAMETERS**

V<sub>max</sub> = 30 VDC, I<sub>max</sub> = 100 mA C<sub>i</sub> = 0 uF, L<sub>i</sub> = 0 mH T4 Max. Ambient 70°C.

V<sub>oc</sub> and I<sub>sc</sub> of a barrier shall not exceed V<sub>max</sub> and I<sub>max</sub> of the transducer.

(L<sub>i</sub> + Wiring) and (C<sub>i</sub> + C<sub>wiring</sub>) shall not exceed L<sub>a</sub> and C<sub>a</sub> of a barrier.

**NON-INCENDIVE:** The T1500 Transducer is approved as non-incendive by FM & CSA for :

- CLASS I, DIVISION 2, GROUP A, B, C, D HAZARDOUS LOCATIONS.

A barrier is not necessary when the T-1500 Transducer is in any of these locations.

**CENELEC**

Intrinsically safe for EExia IIBT4

Input parameters: V<sub>max</sub> = 30V, W<sub>max</sub> = 1W, Req = 150 OHMS, Leq = 20mH

Models are CE marked for use in the European Union, and meet the EMC heavy machinery directives.



T-1500 STANDARD RANGE DIMENSIONS