

# POWER LINE TRANSDUCERS AND MULTIFUNCTION METER



Power line transducers are suitable for measuring electrical parameters like AC voltage, current, frequency, PF, KW, KVAR and also for DC signal isolation. They are best suited for MCC and PCC panels, AMF panels, SCADA systems, PLCs for data acquisition and metering.



## MODELS

**D2 PTV1, D2 PTC1, D3 PTF1, D5 PTA1, D5 PTW1, D5 PTW2, D5 PTW3, D1 IST1, D3 IST1, D5 IST1, D5 IST2, F3 MFM1, D3 TTT1, D3 RET1, D3 TET1, D5 PTC1, D5 PTV1, D1 PTC3, D1 PTV3, D5 MFT1, D5 PAT1, D5 BCT1**

## FEATURES

- Fully solidstate electronic design.
- Rugged to withstand harsh environments
- Load independent outputs
- Galvanically isolated signals
- Accuracy class : 0.5% (Optional 0.2%)
- Self or auxiliary powered.
- CT burden : less than 0.5 VA

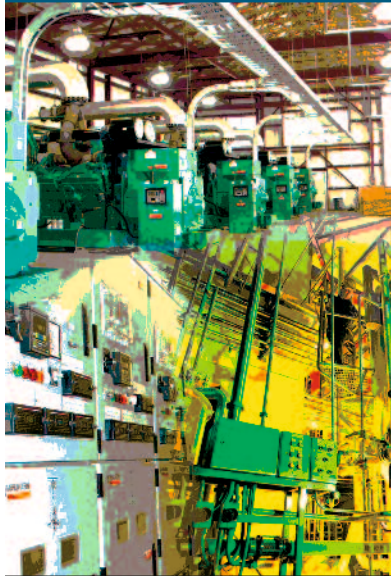



## FUNCTIONS

- Convert high value AC signal to low value DC signals
- Inputs voltage, current, frequency, power factor, power
- Outputs DC signals single or dual (optionally 3 or 4 for Isolation transducers)

## Ordering Instructions

- Product Family Name
- Model Name
- System Supply Voltage
- Aux. Supply/Control supply voltage
- CT/PT Ration
- Primary range
- Output required

# VOLTAGE, CURRENT, FREQUENCY TRANSDUCERS

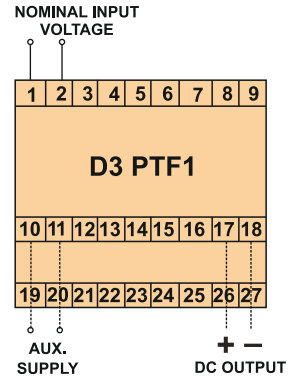
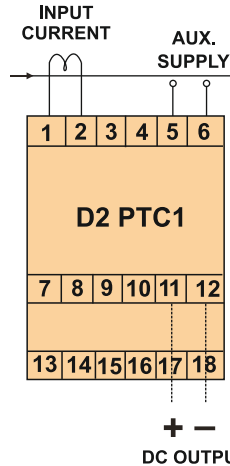
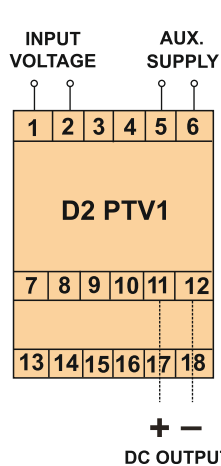
	D2 PTV1 AC Voltage Transducer	D2 PTC1 AC Current Transducer	D3 PTF1 Line Frequency Transducer
			
	<p>Voltage transducer, Input AC voltage, Output (DC) single or dual, accuracy 0.5%</p>	<p>Current transducer, Input AC Current, Output (DC) single or dual, accuracy 0.5%</p>	<p>Frequency transducer, Output (DC) single or dual, accuracy 0.5%</p>

<small>Note: Mention specific voltage ( Fixed/wide range ) in order</small> <b>Auxiliary Supply</b>	18 - 60 / 24/48 VDC +/- 20%, 80-300 VAC / DC, 50 Hz		24/48 VDC +/- 20%, Self Powered, 80-300 VAC/DC, 50 Hz
<b>Power Consumption</b>	3.5 VA - AC, 4 VA - DC 24/48 VDC +/- 20%	3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC
<b>Input Value</b> I in	N.A.	0 -1 A AC / 0 - 5 A AC	Freq. Range 45 to 55 Hz/40-60 Hz/55-65 Hz/48-52Hz
V in	63.5 / 110 / 240 / 415 V	N.A.	63.5 / 110 / 240 / 415 V
<b>DC Output (Single / Dual)</b>	0-1, 0- 10, 0-20, 4-20mA DC, 0-5, 0-10V DC Other optional on request		
<b>No of Signal Output</b>	Single (Optional Dual Output)	Single (Optional Dual Output)	Single (Optional Dual Output)
<b>Response Time</b>	Less than 500 milliseconds		
<b>Input / Output isolation</b>	Galvanic		
<b>Temperature</b>	0°C to + 55°C		
<b>Humidity</b>	Up to 95% Rh non condensing		
<b>Dimensions (L x W x D) (mm)</b>	75 x 56.5 x 117.5	75 x 56.5 x 117.5	75 x 83.5 x 117.5
<b>Weight</b>	440 gms	440 gms	575 gms

<b>Operations</b>	<p>The input Voltage signal is scaled down through Interposing potential transformer. The scaled down signal is fed to a precision rectifier stage, its output is processed to provide DC Voltage/ Current output proportional to input AC voltage. The output signal is calibrated for RMS value.</p>	<p>The input current signal is scaled down through Interposing current transformer. The scaled down signal is fed to a precision rectifier stage, its output is processed to provide DC Voltage/ Current output proportional to input AC Current. The output signal is calibrated for RMS value.</p>	<p>The input frequency signal is scaled down through Interposing potential transformer. The scaled down signal is fed to a precision frequency to voltage Converter stage, its output is processed to provide DC Voltage/ Current output proportional to Line Frequency.</p>
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### Common Specifications

<b>Output Load Resistance (Rout)</b> For Current Output	Max. 10V/I out (Optional Max. 15V/Iout)
For Voltage Output	10 Kohm (min.)
<b>Output Ripple</b>	Less than 0.5% of span (peak to peak)
<b>Auxiliary Supply Burden</b>	Less than 4 VA
<b>Insulation Resistance</b>	More than 100 Mohms at 500 V DC
<b>Zero Span Adjustment</b>	Optionally provided
<b>Terminals</b>	Suitable for 2.5 sq.mm wires
<b>Enclosure Type</b>	ABS Plastic, Ingress Protection IP40



# POWER TRANSDUCERS



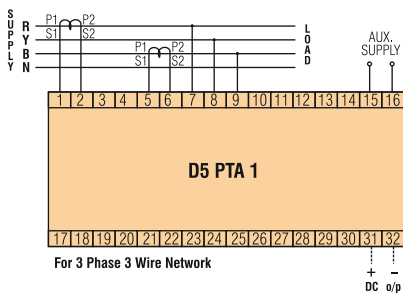
D5 PTA1 Power Factor Transducer	D5 PTW1 Active Power Transducer	D5 PTW2 Reactive Power Transducer	D5 PTW3 Apparent Power Transducer
Power Factor Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%	Active Power Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%	Reactive Power Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%	Apparent Power Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%

24/48 VDC +/- 20%, Self Powered, 80 - 300 VAC / DC 110 V AC/DC, 220 V AC/DC, 50 Hz

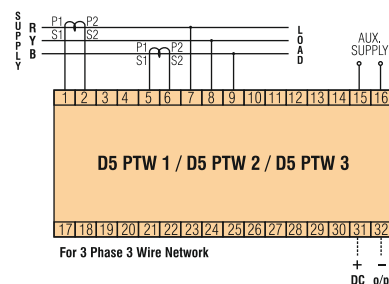
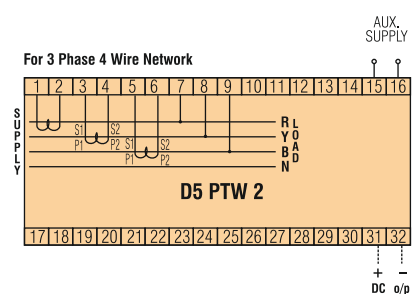
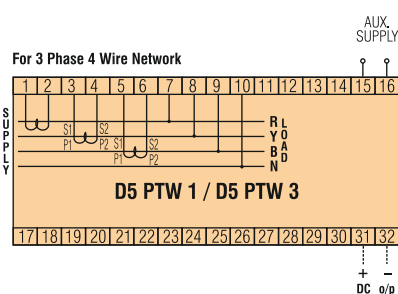
3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC
1 A / 5 A	1 A / 5 A	1 A / 5 A	1 A / 5 A
110 / 415 V	110 / 415 V	110 / 415 V	110 / 415 V
Single (Optional Dual Output)	0-1, 0-5, 0-10, 0-20mA DC, 4-20 mA DC, 0-(±)5, 0-(±)10, 0-(±)20 mA DC, 0-5, 0-10V DC	Single (Optional Dual Output)	Single (Optional Dual Output)
	Less than 500 milliseconds		
Galvanic	Galvanic	Galvanic	Galvanic
0°C to + 55°C	0°C to + 55°C	0°C to + 55°C	0°C to + 55°C
Up to 95% Rh non condensing	Up to 95% Rh non condensing	Up to 95% Rh non condensing	Up to 95% Rh non condensing
150 x 70 x 114	150 x 70 x 114	150 x 70 x 114	150 x 70 x 114
1200 gms.	1200 gms.	1200 gms.	1200 gms.

The input Voltage and current signals are scaled down through interposing and current transformers. The scaled down voltage signal proportional to  $v \cos \phi$ . This signal is divided by the voltage signal to get DC Voltage linearly proportional to Power Factor. This output is further processed to provide DC Voltage / Current output signal.

The Transducer is suitable for balanced load conditions only, when used on 3 Phase 3 Wire, 3 Phase 4 Wire electrical networks.



The input Voltage and current signals are scaled down through interposing potential and current transformer. In case of reactive transducers the voltage signals are 90° phase shifted. The scaled down signals are fed to precision multipliers working on time division multiplication principle. The multiplier output is processed to provide DC Voltage / Current output signal proportional to input active / reactive power. For Signal Phase network, only Active Power Transducer is offered. For 3 Phase 3 Wire or 3 Phase 4 Wire electrical networks both Active and Reactive Power Transducers are offered for balanced as well as unbalanced load conditions.



# ISOLATION TRANSDUCERS

	D1 IST1 DC Signal Isolation Transducer	D3 IST1 DC Signal Isolation Transducer	D5 IST1 DC Signal Isolation Transducer
			
	Loop Powered DC Signal Isolator input & output DC signal. Single Output. Accuracy 0.2%	Signal Isolation transducer, Input & output DC signals, Single or dual outputs, accuracy 0.5%	Signal Isolation transducer, Input & output DC signals, upto 4 outputs, accuracy 0.5%

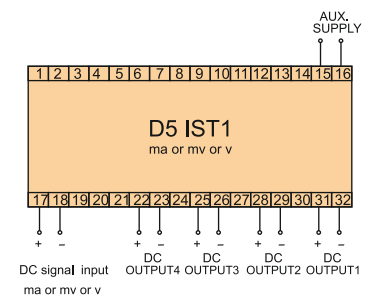
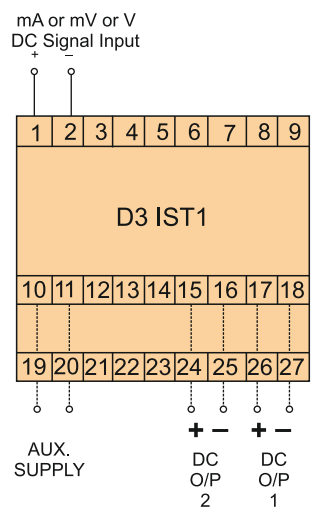
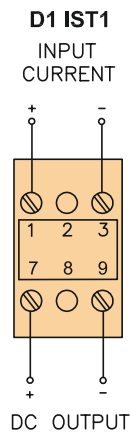
<b>Auxiliary Supply</b> <small>Note: Mention specific voltage ( Fixed/wide range ) in order</small>	Loop Powered	24/48 VDC $\pm$ 20%, 80-300 VAC / DC, 50Hz	
<b>Power Consumption</b>		3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC
<b>Input Value</b> I in	4 - 20 mA DC Signal.	0-1, 0-5, 0-10, 0-20, 4-20mA DC Signals	
V in		0-50, 0-60, 0-75, 0-100 mV DC / 0-1, 0-5, 0-10, 0-150, 0-300, 0-600 V DC	
<b>Resistance Type</b>	N.A.	N.A.	N.A.
<b>DC Output (Single / Dual)</b>	4- 20 mA DC	0 - 1 mA, 0 - 10 mA, 0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V	
<b>No of Signal Output</b>	Single	Single (Optional Dual Output)	Single (Optional Dual or 3 or 4)
<b>Response Time</b>	Less than 100 mSec.		
<b>Input / Output isolation</b>	Galvanic	Galvanic	Galvanic
<b>Temperature</b>	0 <sup>0</sup> C to + 55 C <sup>0</sup>	0 <sup>0</sup> C to + 55 <sup>0</sup> C	0 <sup>0</sup> C to + 55 C <sup>0</sup>
<b>Humidity</b>	Up to 95% Rh non condensing	Up to 95% Rh non condensing	Up to 95% Rh non condensing
<b>Dimensions (L x W x D) (mm)</b>	30 x 80 x 120	73 x 83.5 x 117.5	150 x 70 x 114
<b>Weight</b>	150 gms.	350 gms.	1200 gms.




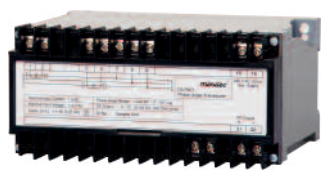
**Operations**

The input signal is filtered and processed to convert into a standard dc voltage. This voltage is fed to a linear opto coupler which provides the required galvanic isolation. An optical feedback is used for improved linearity, response time and temperature effects. The output from the linear opto coupler is further processed to provide dc voltage / current output.

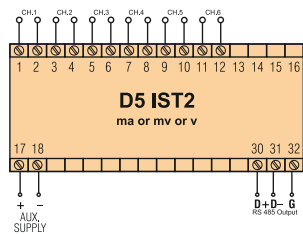
The isolator with fast response time (10 mSec) are typically used in feedback control system.

In input dc current is chopped by the chopper to convert it into high frequency ac signal. This signal is fed to an isolating high frequency transformer. The ac output current from the transformer is rectified and filtered to obtain load independent dc output current. As the transformation ratio is 1:1 the output current is identical in value to the dc input current.

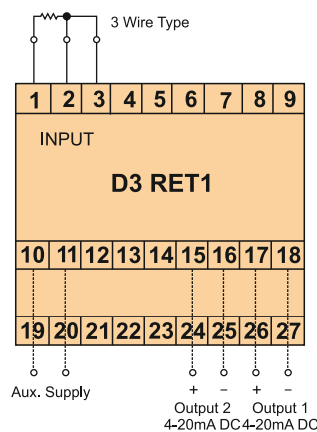
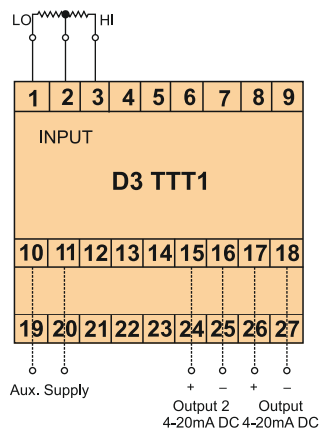


<b>D5 IST2</b> DC Signal Isolation Transducer	<b>D3 TTT1</b> Transformer Tap Position Transducer	<b>D3 RET1</b> Resistance Transducer	<b>D5 PAT1</b> Phase Angle Transducer
 <p>Analog DC Signal Isolation transducer, 6 programmable Input &amp; RS 232/485 output, accuracy 0.2%,</p>	 <p>Transformer Tap Position transducer, Input Resistance output (DC) single or dual, accuracy 0.5%</p>	 <p>Resistance transducer, Input 2 Wire or 3 Wire Resistance output (DC) single or dual, accuracy 0.5%</p>	 <p>Precision grade transducer used for measurement of Phase Angle between Voltage and Current Waveforms of a 3 Phase 3 Wire or 3 Phase 4 Wire Electrical Network System.</p>
18 - 60 V DC, 80 - 300 VAC/DC, 50Hz	24/48 VDC ± 20%, 80 - 300 VAC/DC, 50Hz	24/48 VDC ± 20%, 80 - 300 VAC/DC, 50Hz	110/240 V AC ± 15%, 24/48/110/220 VDC ± 10%, 18 - 60 V DC, 80 - 300 VAC/DC, 50Hz Self Powered
Less than 4 VA	Less than 4 VA	Less than 4 VA	Less than 4 VA
0-1,0-10,0-20,4-20 mA DC,	0 - 1.6 Kohm, 0 - 16 Kohm, 0 - 1.7 Kohm, 0 - 17 Kohm	0-100, 0-200 Ohm, 0-1KOhm	1 or 5 A AC
0-5,0-10V DC	-	-	110 V AC (HT Supply), 415 VAC (LT Supply)
-	3 Terminal Input	2 Wire, 3 Wire	3 Wire, 4 Wire
Single (Optional Dual Output)	0-1mA DC, 0-5mA DC, 0-10mA DC, 0-20mA DC, 4-20mA DC, (-)20-0 - (+)20 mA DC, 4-20mA DC, 500 Ohm (max), 0-5 V DC, 0-(+)10 V DC, (-)10-0 - (+)10 V DC	Single (Optional Dual Output)	4-20 mA DC, 0-1,0-5,0-10,0-20 mA DC, 0-(±)5 0-(±)10, 0-(±)20 mA DC, 0-5,0-10 VDC
Less than 500 mSec.	Less than 500 mSec.	Less than 500 mSec.	Less than 500 mSec.
2 KV 50 Hz for 1 min	2 KV 50 Hz for 1 min	2 KV 50 Hz for 1 min	2 KV 50 Hz for 1 min
0 - 55 Deg. C.	0 - 55 Deg. C.	0 - 55 Deg. C.	0 - 55 Deg. C.
95% RH Non-condensing	95% RH Non-condensing	95% RH Non-condensing	95% RH Non-condensing
150 x 70 x 114	85 X 80 X 120	85 X 80 X 120	150 x 70 x 114
1000 gms.	350 gms.	350 gms.	1200 gms.

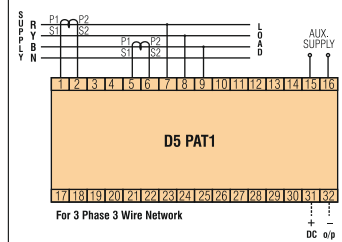
D5 IST2 replaces multiple analog DC Signal Transducers and combines 6 Programmable Channels in to a single Product. The Product features user selectable Inputs such as mV DC, V DC. The Inputs can be changed from Jumper Settings. The parameters are available through a galvanically isolated 485 Half Duplex or 232 Communication Port over Modbus RTU Protocol.



It is a precision grade transducer is used for galvanically isolated measurement of Transformer Tap or Resistance (2 Wire or 3 Wire). It measures the value of resistance on tap position changers, typically used on high voltage transformers. Each position on the selector has an equal value of resistance so that as the tap position is increased or decreased the value of resistance increases or decrease respectively. The input is in the form of Resistance and provides a Stable, Ripple-Free and Optically Isolated DC load independent output in the form of current or voltage. The transducer is fully solid state. Use of latest circuit techniques and quality components ensure reliable operation over long period.



The Transducer is fully solid state. Use of latest circuit techniques and quality components ensure reliable operation over long period. The Transducer measures both Inductive (Lag) and Capacitive (Lead) Phase Angle conditions. It is suitable for balanced as well as unbalanced load conditions



# TEMP./3PHASE COMBINED TRANCDUCERS

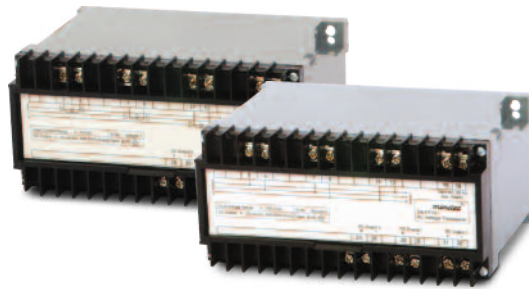


## D3 TET1 Temperature Transducer



Temperature transducer, Input PT 100, Output (DC) single or dual, accuracy 0.5%

## D5 PTC1 / D5 PTV1 3 Phase Combined AC Current or Voltage Transducer

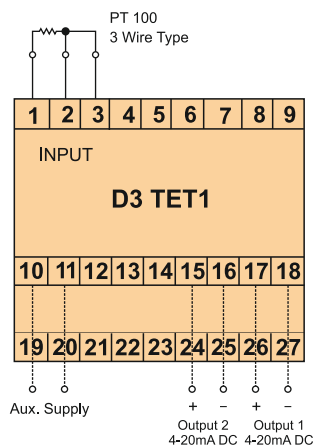


3 Phase Combined Current transducer, Input AC Current, Output (DC) 3 Nos., accuracy 0.5%

3 Phase Combined Voltage transducer, Input AC Voltage, Output (DC) 3 Nos., accuracy 0.5%

<b>Auxiliary Supply</b> <small>Note: Mention specific voltage (Fixed/wide range) in order</small>	24/48 VDC ± 20%, 80 – 300 VAC / DC, 50Hz	24/48 VDC ± 20%, Universal Supply 80 – 300 VAC / DC, 50Hz
<b>Power Consumption</b>	Less than 4 VA	Less than 12 VA
<b>Sensor</b>	P T– 100, 3 Wire Connection	N.A.
<b>Input Value</b> I in	N.A.	0 – 1 A / 0 – 5 A AC for D5 PTC1
V in	N.A.	0 – 150 V, 0 – 300 V, 0 – 500 V AC or any user range for D5 PTV1
<b>Resistance Type</b>	N.A.	N.A.
<b>DC Output (Single / Dual)</b>	0 – 1 mA DC, 0 – 5 mA DC, 0 – 10 mA DC, 0 – 20 mA DC, 4 – 20 mA DC, (-)20 – 0 – (+)20 mA DC, 4 – 20 mA DC, 500 Ohm (max), 0 – 5 V DC, 0 – (+)10 V DC, (-)10 – 0 – (+)10 V DC	
<b>No of Signal Output</b>	Single (Optional Dual Output)	Three Nos.
<b>Response Time</b>	Less than 500 mSec.	Less than 500 mSec.
<b>Input / Output Isolation</b>	2 KV 50 Hz for 1 min	2 KV 50 Hz for 1 min
<b>Temperature</b>	0 – 55 Deg.C.	0 – 55 Deg.C.
<b>Humidity</b>	95% RH Non-condensing	95% RH Non-condensing
<b>Accuracy</b>	(±)0.5% of Span	(±)0.5% of Span
<b>Enclosure</b>	D3	D5
<b>Dimensions (L x W x D) (mm)</b>	85 X 80 X 120	150 X 70 X 114
<b>Weight</b>	350 gms.	750 gms.

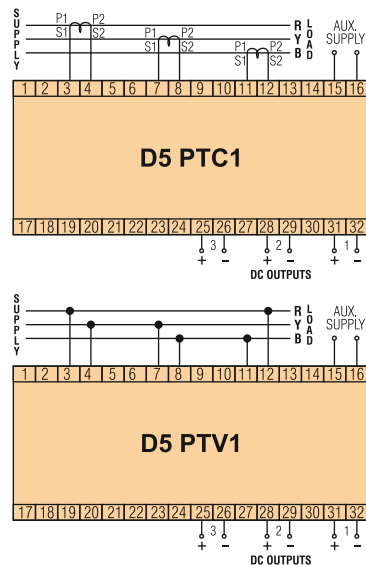
It is a precision grade transducer is used for galvanically isolated measurement of Temperature using external PT100 (RTD) Sensor 3 Wire Type. It measures temperature by measuring resistance of the PT100 Sensor. The input is in the form of Resistance and provides a Stable, Ripple-Free and Optically Isolated DC load independent output in the form of current or voltage. The transducer is fully solid state. Use of latest circuit techniques and quality components ensure reliable operation over long period.



In this type of Transducer, 3 Separate Current/Voltage Transducers are combined in one enclosure. This Type of Transducer can be used to measure Voltages or Current in a 3 Phase 3 Wire or 4 Wire Electrical Network.

**Advantages:**

- a) Reduces Wiring cost
- b) Compact compared to 3 separate Transducers
- c) Economical



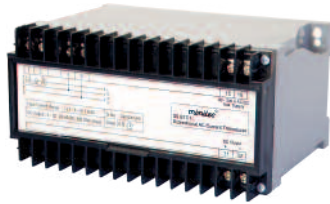
# 2 WIRE / BIDIRECTIONAL / MULTIFUNCTION TRANSDUCER

<b>D1 PTC3 / D1 PTV3</b> 2 Wire Type AC Current or Voltage Transducer	<b>D 5 BCT1</b> Bidirectional Current Transducer	<b>D5 MFT1</b> Multifunction Transducer (Analog Outputs)
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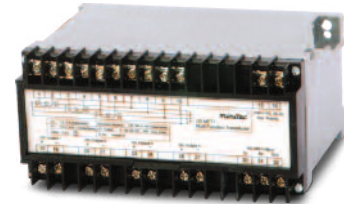


**2 Wire Current transducer, Input AC Current, Output (DC) single, accuracy 0.5%**

**2 Wire Voltage transducer, Input AC Voltage, Output (DC) single, accuracy 0.5%**



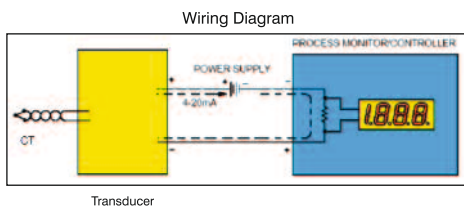
Bidirectional Current Transducer is a precision grade Transducer used for measurement of Bidirectional load current in a 3 Phase Electrical Network System. The current flow direction is sensed by measuring phase angle between voltage and current signals.



D5MFT1 is a Multifunction Power Line Transducer for simultaneous measurement of various electrical parameters of 3 Phase 3 Wire or 4 Wire electric power system. The information is available through 4 Nos. of galvanically isolated Analog Outputs and RS 485, Half Duplex Serial Communication Port over MODBUS RTU Protocol. Use of latest circuit techniques and quality components ensures reliable operation over long periods. The Transducer are widely used in application areas where accurate and reliable monitoring of power line parameters is essential.

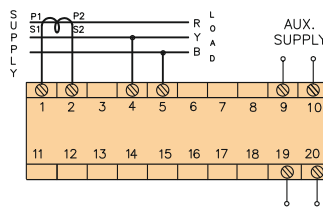
7.5 - 36 V DC, 2 Wire Type (Mostly 24 V DC)	110/240 V AC $\pm 15\%$ , 50 HZ 24/48/110/220 V DC $\pm 10\%$ 18-60 V DC / 80-300 V AC/DC, 50Hz	18-60 V DC, 80 - 300 V AC/DC, 50Hz
Less than 1 VA	4 VA	Less than 6 VA
N.A.	N.A.	N.A.
0 – 1 A / 0 – 5 A AC for D1 PTC3	1 or 5 A AC	1A, 5A (User Selectable)
0 – 150 V, 0 – 300 V, 0 – 500 V AC or any user range for D1 PTV3	110/415 V AC	110 V, 415 V (User Selectable)
N.A.	N.A.	N.A.
4 - 20 mA DC	0-1/0-5/0-10/0-20/4-20 mA DC, 0-5, 0-10 VDC	4 Nos. of Galvanically Isolated 4 – 20 mA DC, 500 or 750 Ohm
Single	One or Two	N.A.
Less than 500 mSec.	Less than 500 mSec.	Less than 500 mSec.
2 KV 50 Hz for 1 min.	Galvanic (2 KV AC, 50 Hz for 1 min.)	2 KV AC, 50 Hz for 1 min.
0 – 55 Deg.C.	0 to +55 Deg.C.	0 – 55 Deg.C.
95% RH Non-condensing	95% RH Non-condensing	95% RH Non – Condensing
( $\pm$ )0.5% of Span	( $\pm$ )0.5% of Span	$\pm$ 0.5% of Span
D1	D5	ABS Plastic Enclosure, Ingress Protection IP40
30 X 80 X 120	150 X 70 X 114	150 x 70 x 114
100 gms.	750 gms.	750 gms.

The Transducer converts the A.C. Input current or Voltage signal to a 4-20mA D.C. Output. The output is directly proportional to the input signal. 2 Wire Transducer obtain the power to operate from the 4-20mA output circuit to which they are connected, and therefore require no separate auxiliary supply. It is average sensing RMS calibrated current Transducer. 2 Wire Transducers have an advantage over conventional auxiliary powered transducer, because no separate auxiliary is required, savings in the cost of providing a separate auxiliary supply and wiring are made. The above Transducer can be used to measure current or voltage in energy management systems, switchboards, generator and telemetry controls. Isolation of 2 KV is provided between the input and output signal, allowing the output to be fed to conventional analogue meters, digital meters, PLC, and computer systems.



### Applications

- Measuring AC current flow in a factory having private power plants
- Electrical Utilities

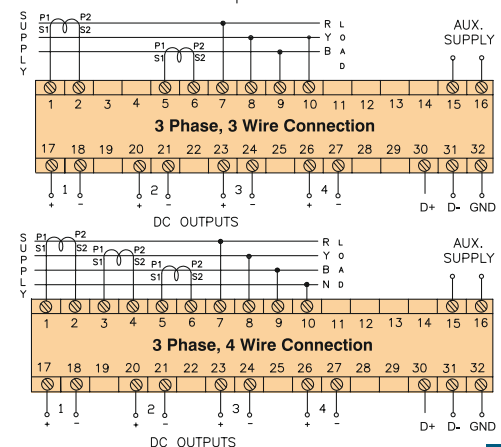


### Salient Feature

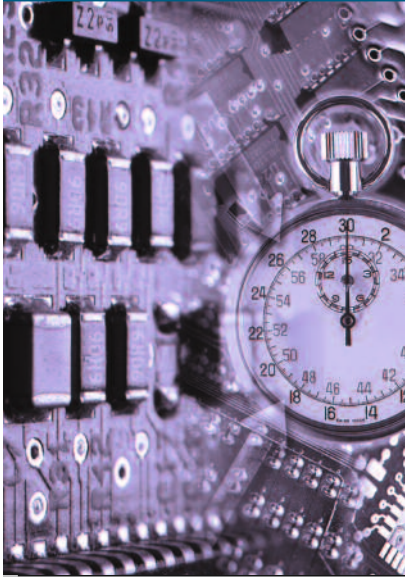
- Monitoring of various electrical parameters from a Single Transducer Replaces Multiple Analog Transducers.
- Programmable CT and PT Ratio.
- Modbus RTU Communication Protocol.
- Complete galvanic isolation between Input, Output, Auxiliary Supply.
- High long term stability.
- DIN Rail, Panel Wall Mounting.

### Applications

- Electrical Utility
- Motor and Power Control Circuits
- Process Monitoring and Control
- Energy Management
- Substation Monitoring
- Building Management Systems
- Standalone Or SCADA, RTU Integration
- Telemetry
- Power Generation, Transmission & Distribution
- Captive Power Plants



# MULTIFUNCTION METER



Minilec offers multifunction meter F3MFM1 to 4 for simultaneous measurement of various Electrical Parameters of 3 Phase 3 Wire or 4 Wire electric power system. The Meters are widely used in application areas where accurate and reliable monitoring of Power Line parameters is essential.



Measurement	3 Phase 3 Wire or 4 Wire (User Selectable)
Input Current	0 - 120% of the selected range (1A, 5A AC User Selectable)
Input Voltage	0 - 120% of the selected range (110 or 415 V User Selectable)
Frequency	40 - 60 Hz
Power Factor	(Lag) 0.5 -1- 0.5 (Lead)
Power	$0 - \sqrt{3} \times V \times I \times PF$
Continuous	2 times for Current,
Overload	1.2 times for Voltage
Momentary	40 times for Current (1 Second)
Overload	2 times for Voltage (1 Second)
Power Supply	80 - 300 V AC/DC, 18- 60 V DC Self Powered (Pl. Specify)
Burden	Less than 5 VA for Auxiliary Supply 0.5 VA for Voltage & Current
Response Time	Less than 500 mSec.
Display	3 Lines of 7 Segment 4 Digits
Keys	3 Tactile keys
Comm. Port	RS 232 or RS 485 (Optional)
Isolation	2 KV, 50 Hz for 1 min between Input, Supply & Communication Port
Insulation	100 Mohms at 500 V DC for 1 min
Environmental	0-55C, 95% RH Non-Condensing
Weight	370 gms.

## Applications

- Electrical Utility
- Control Panels
- Motor and Power Control Circuits
- Process Monitoring and Control
- Energy Management
- Substation Monitoring
- Building Management Systems
- Telemetry
- Power Generation, Transmission and Distribution
- Captive Power Plants

Parameters	Class 0.5	Class 0.2
Voltage Current	0.5% of Span	0.2% of Span
Frequency	0.5% of Reading	0.2% of Reading
Power Factor	0.5% of Reading	0.2% of Reading
Active Power Reactive Power Apparent Power	0.5% of Span	0.2% of Span
Active Energy Reactive Energy Apparent Energy	0.5% of Reading	0.2% of Reading

## Features

- Accuracy Class 0.5 and 0.2%
- Compact and Easy Installation
- Programmable CT, PT Ratio
- Wide range of Auxiliary Power Supply 45 to 300 V (Self Powered also available)
- True RMS Measurement
- Conformity to EM/EMC
- 4 Quadrant Measurement
- Communication with PC, DCS, PLC through RS 232 or RS 485 Port
- Demand, Energy Parameters
- Password Protection

Parameters	F3 MFM2	F3 MFM3	F3 MFM4
Vpn, V1, V2, V3	✓	✓	✓
Vpp, Vry, Vyb, Vbr	✓	✓	✓
A, AI, A2, A3	✓	✓	✓
W, WI, W2, W3	✓	✓	✓
VAR, VAR1, VAR2, VAR3	✓	✓	✓
VA, VA1, VA2, VA3	✓	✓	✓
Frequency	✓	✓	✓
PF, PF1, PF2, PF3	✓	✓	✓
Wh, Import Wh, Export Wh		✓	✓
VARh, Import VARh, Export VARh		✓	✓
Vah		✓	✓
Demand Parameters (W/VA/A)			✓
Run, On Hours, Interruptions	✓	✓	✓
<b>User Selectable any 10 Parameters At your End (Except Demand)</b>		<b>F3 MFM1</b>	

