

# PI-D Programmable Isolating DC Transmitter.

Programmable Isolating DC Voltage or DC Current Input to DC Current or DC Voltage Output Transmitter.

## Features.

- Field Programmable Input and Output Ranges.
- Bi-Polar Input and Output Ranges.
- Input to Output Isolation 1.6kV.
- High Accuracy 0.1%.
- Universal AC/DC Power Supply.
- Transmitter Power Supply Standard.
- Compact DIN Rail Mount Enclosure.
- Available Standard or Special Calibration.
- Low Cost Fixed Range PI-D-F Available.



Other PI- models include:  
 PI-B Bridge / Strain gauge;  
 PI-F Frequency;  
 PI-K Resistance;  
 PI-M Maths Computing;  
 PI-N RTD Differential Pt100;  
 PI-P Potentiometer;  
 PI-R RTD Pt100;  
 PI-S Dual Setpoint Controller;  
 PI-T Thermocouple.

## Ordering Information.

**PI-D-X** Standard Programmable Calibration: Input 4~20mA; Output 4~20mA;  
 High Voltage Power Supply.

**PI-D -**  -  -  - Special Programmable Calibration.  
 IR OR PS

**PI-D-F-X** Standard Fixed Calibration: Input 4~20mA; Output 4~20mA;  
 High Voltage Power Supply.

**PI-D-F -**  -  -  - Special Fixed Calibration.  
 IR OR PS PI-D-F only available with ranges marked with '#'.

INPUT RANGES				OUTPUT RANGES			
Voltage	IR	Current	IR	Voltage	OR	Current	OR
0~10mV	A	0~200µA	1	0~500mV	A	0~1mA	1
0~20mV	B	0~500µA	2	0~1V	B	0~2mA	2
0~50mV	C	0~1mA	3	0~2V	C	0~5mA	3
0~100mV	D	0~2mA	4	0~3V	D	0~10mA	4
0~200mV	E	0~5mA	5	0~4V	E	0~16mA	5
0~500mV	F	0~10mA	6	0~5V	F	0~20mA	6
0~1V	G	0~20mA #	7	0~6V	G	1~5mA	7
0~2V	H	0~50mA	8	0~8V	H	2~10mA	8
0~4V	I	0~100mA	9	0~10V #	I	4~20mA #	9
0~5V #	J	1~5mA	10	0~12V	J	-1~1mA	10
0~10V #	K	2~10mA	11	1~5V	K	-2~2mA	11
0~20V	L	4~20mA #	12	2~10V	L	-5~5mA	12
0~50V	M	10~50mA	13	-1~1V	M	-10~10mA	13
0~100V	N	-1~1mA	14	-2~2V	N	-20~20mA	14
0~150V	O	-10~10mA	15	-5~5V	O		
1~2V	P	-20~20mA	16	-10~10V	P		
1~5V #	Q	20~4mA *	17	-12~12V	Q		
2~10V #	R	50~10mA *	18				
-1~1V	S						
-5~5V	T						
-10~10V	U						
Special Input Range			Z	Special Output Range			Z

Ranges with '\*' beside them must have the polarity of their connections reversed.

PI-D-F only available with ranges marked with '#'.

POWER SUPPLY	PS
High Voltage Power Supply: 70~270Vac and 80~380Vdc	H
Mid Voltage Power Supply: 24~80Vac and 20~90Vdc	M
Low Voltage Power Supply: 8~30Vac and 8~30Vdc	L

Note: Power supply H is field selectable for M, and M for H. Power supply L must be ordered separately.

## Ordering Examples.

- 1/ PI-D-K-1-L 0~10V Input; 0~1mA Output; Low Voltage Power Supply.
- 2/ PI-D-Z-P-H-0/8V 0~8V Input; -10~10V Output; High Voltage Power Supply.

## Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument.

## PI-D Specifications.

Note: PI-D-F Input and Output Ranges Reduced. Refer to Ordering Information.

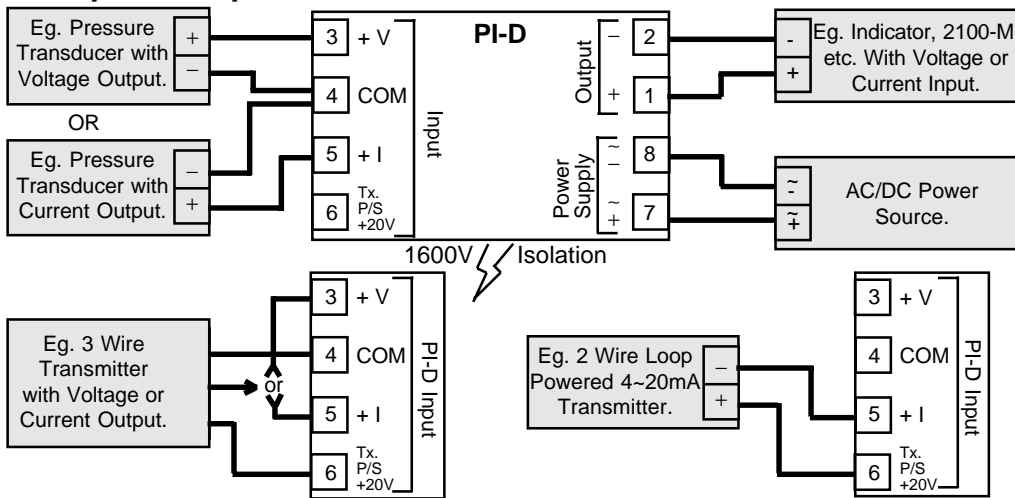
Input	-Voltage	Field Programmable From 10mV to 150Vdc and Bipolar. Minimum Input Resistance = 200kΩ. Maximum Over-range = 170Vdc Continuous.
	- Current	Field Programmable From 200μA to 100mAdc and Bipolar. Input Resistance = 25Ω. Maximum Over-range = 120mAdc Continuous.
	-Transmitter P/S	20Vdc±5% Common to Input Com. (Terminal 4.) Max Load = 30mA. Ripple < 20mV Typical at 30mA Load.
Output	-Voltage	Field Programmable From 500mV to ±12Vdc. Maximum Output Drive = 10mA.
	-Current	Field Programmable From 1mA to ±20mAdc. Maximum Output Drive = 10Vdc. (500Ω @ 20mA.)
Universal P/S	-Standard High (H)	70~270Vac and 80~380Vdc; 50/60Hz; 4VA.
	-Standard Mid (M)	24~80Vac and 20~90Vdc; 50/60Hz; 4VA.
	-Low Voltage (L)	8~30Vac and 8~30Vdc; 50/60Hz; 4VA.
	-Circuit Sensitivity	<±0.001%/V FSO Typical.
Accurate to		<±0.1% FSO Typical.
Linearity & Repeatability		<±0.1% FSO Typical.
Ambient Drift		<±0.01%/C FSO Typical.
Noise Immunity		125dB CMRR Average. (1.6kV Peak Limit.)
R.F. Immunity		<1% Effect FSO Typical.
Isolation Voltage		1.6kVac/dc Peak Input to Output for 60sec.
Response Time		200msec Typical. (From 10 to 90% 50msec Typical.)
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90%RH max. Non-Condensing.
Construction		Socket Plug-In Type with Barrier Terminals.

Note 1. Specifications based on Standard Calibration Unit, unless otherwise specified.

Note 2. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

No liability will be accepted for errors, omissions or amendments to this specification.

## Examples of Input Connection.

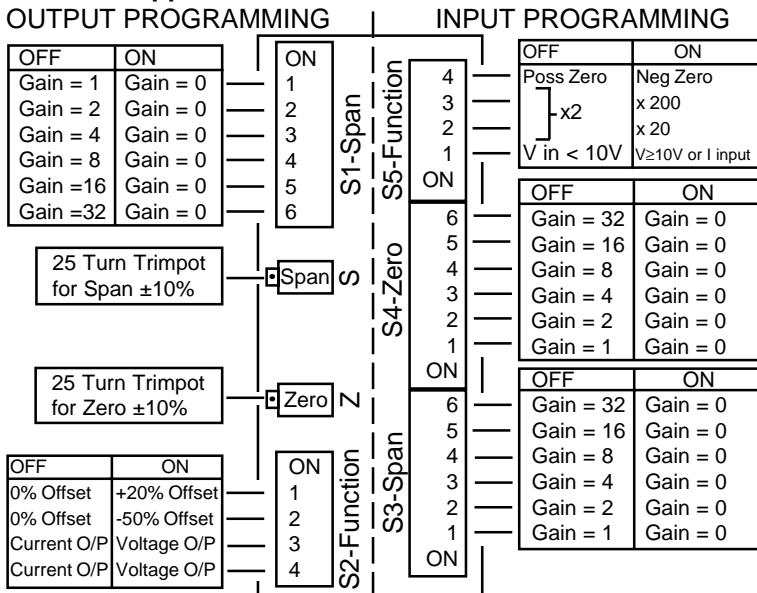


## Terminations.

Output	1	+Ve
	2	-Ve
Input	3	+V
	4	COM
	5	+I
	6	Tx. P/S 20V
P/S	7	~AC/+DC
	8	~AC/-DC

## Plan View of PI-D Adjustments.

Note: Not Applicable to PI-D-F.



## PI-D H1 Power Supply Link Settings.

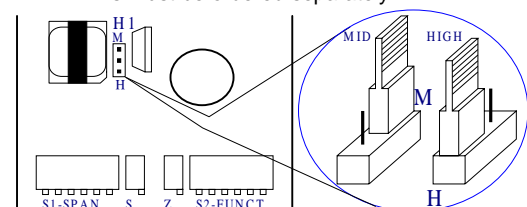


**WARNING: High Voltages Maybe Present.**  
Only adjust link with power disconnected.

Power Supply Link Settings	
H1	Power Supply Voltage Range
H	Link for High: 70~270Vac / 80~380Vdc
M	Link for Mid: 24~80Vac / 20~90Vdc

Notes:

- 1/ H1 is approx 4cm (1½") behind the 'S' trimpot.
- 2/ Exceeding voltage ranges may damage the unit.
- 3/ Ensure the enclosure label is correctly labelled for the link position.
- 4/ Adjust H1 jumper with a pair of needle nose pliers.
- 5/ Low Voltage Power Supply version is fixed, and has no link. This must be ordered separately.



### PI-D Input Programming.

Note: Not Applicable to PI-D-F.

Always set **OUTPUT range first**, then INPUT range. If the input range is not listed in the programming table, use the following formulae to work out the Zero and Span DIP switch settings for gain.

$$\text{Span Gain} = \frac{24}{\text{Pregain} \times (\text{Signal High} - \text{Signal Low})}$$

$$\text{Zero Gain} = 10 \times \text{Pregain} \times \text{Signal Low.}$$

If Zero is 1/ Positive, put S5-4 OFF.  
2/ Negative, put S5-4 ON.

		EFFECTIVE INPUT RANGE (ie Signal High - Signal Low)	S5-1	S5-2	S5-3	PREGAIN
VOLTAGE INPUT		10mV <= Range <= 20mV	0	0	0	200
		20mV < Range <= 200mV	0	0	1	20
		200mV < Range <= 2V	0	1	1	2
		2V < Range <= 20V	1	0	1	0.2
		20V < Range <= 150V	1	1	1	0.02
CURRENT INPUT		200µA <= Range <= 800µA	1	0	0	5000
		800µA < Range <= 8mA	1	0	1	500
		8mA < Range <= 50mA	1	1	1	50

So if a gain value of 28 is required, put DIP switch No's 3, 4, 5 (ie, gains of 4 + 8 + 16 = 28) OFF and all the other DIP switches ON.

DIP switches and trimpots are accessed by removing the small rectangular lid on the top of the PI-D enclosure.

Gain Value	1	2	4	8	16	32
DIP Switch No.	1	2	3	4	5	6

- Notes: (a) Enter ranges with their exponential value: Eg. Enter 20mA as 20 x 10<sup>-3</sup>; Enter 100mV as 100 x 10<sup>-3</sup>.  
 (b) Use the same pregain value in both the Span and Zero gain formulae.  
 (c) Enter the Zero or Span gain value into the appropriate Zero or Span DIP switch.  
 (d) If your GAIN ZERO exceeds 63, then your input range will need to be factory calibrated.

### PI-D Input Range Programming Table.

Note: Not Applicable to PI-D-F.

- Notes: 1/ Switch status 1 = ON, 0 = OFF, X = DON'T CARE.  
 2/ Input ranges with '\*' beside them reverse the polarity of the input connections.  
 3/ Input ranges with '#' beside them require more adjustment with the Zero and Span trimpots.

Input Range	S3-SPAN						S4-ZERO						S5-FUNCTION			
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4
0~10mV	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	x
0~20mV	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	x
0~50mV	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	x
0~100mV	1	1	0	0	1	1	1	1	1	1	1	1	0	0	1	x
0~200mV	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	x
0~500mV	1	1	1	0	0	1	1	1	1	1	1	1	0	1	1	x
0~1V	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	x
0~2V	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	x
0~4V	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	x
0~5V	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	x
0~10V	1	1	0	0	1	1	1	1	1	1	1	1	1	0	1	x
0~20V	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	x
0~50V	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	x
0~100V	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	x
0~150V	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	x
1~5V	1	0	0	0	0	1	1	0	1	1	1	1	1	0	1	0
2~10V	0	0	0	0	1	1	1	1	0	1	1	1	1	0	1	0
-1~1V	1	0	0	1	1	1	1	1	0	1	0	1	0	1	1	1
-5~5V	1	1	0	0	1	1	1	0	1	0	1	1	1	0	1	1
-10~10V	1	0	0	1	1	1	1	1	0	1	0	1	1	0	1	1
0~200µA	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	x
0~500µA#	1	0	1	0	1	1	1	1	1	1	1	1	1	0	0	x
0~1mA	1	1	1	1	0	0	1	1	1	1	1	1	1	0	1	x
0~2mA	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	x
0~5mA#	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1	x
0~10mA	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	x
0~20mA	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	x
0~40mA	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	x
0~50mA#	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	x
1~5mA	1	1	0	0	1	1	0	1	0	1	1	1	1	0	1	0
2~10mA	1	0	0	1	1	1	1	0	1	0	1	1	1	0	1	0
4~20mA	1	0	0	0	0	1	1	0	1	1	1	1	1	1	1	0
10~50mA	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	0
-1~1mA	1	1	1	0	0	1	0	1	0	1	1	1	1	0	1	1
-10~10mA	1	1	1	0	0	1	0	1	0	1	1	1	1	1	1	1
-20~20mA	1	1	0	0	1	1	1	0	1	0	1	1	1	1	1	1
* 20~4mA	1	0	0	0	0	1	1	0	1	0	1	1	1	1	1	1
* 50~10mA	1	1	0	0	1	1	0	1	1	0	0	1	1	1	1	1

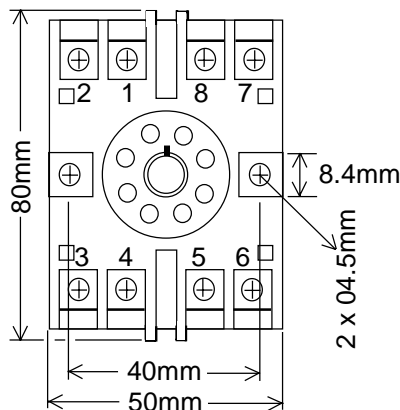
## PI-D Output Range Programming Table.

Note: Not Applicable to PI-D-F.

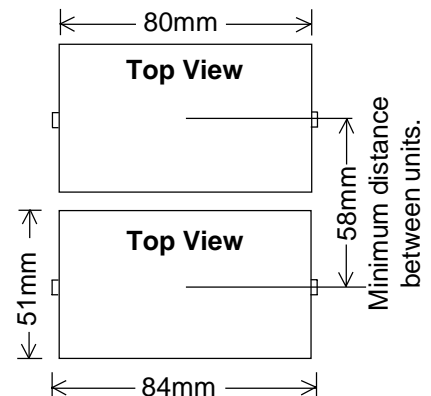
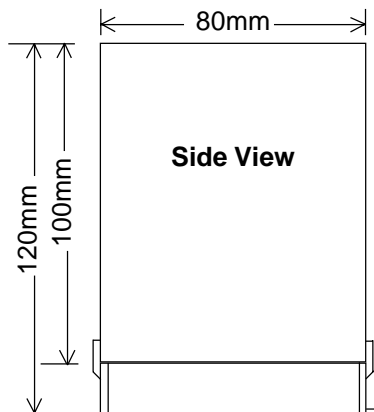
Notes: 1/ Switch status 1 = ON 0 = OFF  
2/ Output ranges with '\*' beside them reverse the polarity of the output connections.

Output Range (V)	S1-SPAN						S2-Function				Output Range (I)	S1-SPAN						S2-Function			
	1	2	3	4	5	6	1	2	3	4		1	2	3	4	5	6	1	2	3	4
0~500mV	0	1	1	1	1	1	0	0	1	1	0~1mA	0	1	1	1	1	1	0	0	0	0
0~1V	1	0	1	1	1	1	0	0	1	1	0~2mA	1	0	1	1	1	1	0	0	0	0
0~2V	1	1	0	1	1	1	0	0	1	1	0~5mA	0	1	0	1	1	1	0	0	0	0
0~3V	1	0	0	1	1	1	0	0	1	1	0~10mA	1	0	1	0	1	1	0	0	0	0
0~4V	1	1	1	0	1	1	0	0	1	1	0~16mA	1	1	1	1	0	1	0	0	0	0
0~5V	1	0	1	0	1	1	0	0	1	1	0~20mA	1	1	0	1	0	1	0	0	0	0
0~6V	1	1	0	0	1	1	0	0	1	1	1~5mA	1	1	0	1	1	1	1	0	0	0
0~8V	1	1	1	1	0	1	0	0	1	1	2~10mA	1	1	1	0	1	1	1	0	0	0
0~10V	1	1	0	1	0	1	0	0	1	1	4~20mA	1	1	1	1	0	1	1	0	0	0
0~12V	1	1	1	0	0	1	0	0	1	1	-1~1mA	1	0	1	1	1	1	0	1	0	0
1~5V	1	1	1	0	1	1	1	0	1	1	-2~2mA	1	1	0	1	1	1	0	1	0	0
2~10V	1	1	1	1	0	1	1	0	1	1	-5~5mA	1	0	1	0	1	1	0	1	0	0
-1~1V	1	1	0	1	1	1	0	1	1	1	-10~10mA	1	1	0	1	0	1	0	1	0	0
-2~2V	1	1	1	0	1	1	0	1	1	1	-20~20mA	1	1	1	0	1	0	0	1	0	0
-5~5V	1	1	0	1	0	1	0	1	1	1	0~-10mA *	1	0	1	0	1	1	0	0	0	0
-10~10V	1	1	1	0	1	0	0	1	1	1	0~-20mA *	1	1	0	1	0	1	0	0	0	0
-12~12V	1	1	1	1	0	0	0	1	1	1											
0~-5V *	1	0	1	0	1	1	0	0	1	1											
0~-10V *	1	1	0	1	0	1	0	0	1	1											

## Dimensions and Mounting.



8PFA Octal Termination Base



## The Proper Installation & Maintenance of PI-D.

### MOUNTING.

- (1) Mount in a clean environment in an electrical cabinet on 35mm, symmetrical, mounting rail.
- (2) Do not subject to vibration or excess temperature or humidity variations.
- (3) Avoid mounting in cabinets with power control equipment.
- (4) To maintain compliance with the EMC Directives the PI-D is to be mounted in a fully enclosed steel cabinet. The cabinet must be properly earthed, with appropriate input / output entry points, filtering and cabling.

### WIRING.

- (1) A readily accessible disconnect device and overcurrent device must be incorporated in the the power supply wiring.
- (2) All cables should be good quality overall screened INSTRUMENTATION CABLE with the screen earthed at one end only.
- (3) Signal cables should be laid a minimum distance of 300mm from any power cables.
- (4) For 2 wire current loops, 2 wire voltage signals or 2 wire current signals, Austral Standard Cables B5102ES is recommended. For 3 wire transmitters Austral Standard Cables B5103ES is recommended.
- (5) It is recommended that you do not ground current loops and use power supplies with ungrounded outputs.
- (6) Lightning arrestors should be used when there is a danger from this source.
- (7) Refer to diagrams for connection information.

### COMMISSIONING.

- (1) Once all the above conditions have been carried out and the wiring checked apply power to the PI-D loop and allow five minutes for it to stabilize.
- (2) Take a low (approx 10%) and high (approx 90%) reading of the variable being measured by the transducer supplying the signal to the PI-D, and ensure that this agrees with the level being indicated by the PLC or indicator, etc, that the PI-D is connected into. Adjust for any difference using the Zero and Span trimpots in the top of the PI-D enclosure with a small screw driver until the two levels agree. (Clockwise to increase the output reading and anti-clockwise to decrease the output reading.)

### MAINTENANCE.

- (1) Repeat (2) of Commissioning.
- (2) Do it regularly - at least once every 12 months.

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