+/-10V (Dual 10V) to Single-Supply Signal Converter for ADC

This board will make your work easy if you want to interface +/- 10V (Dual 10V) device or sensor to single-supply signal ADC. This tiny project has been made for industrial and process control applications and provides an easy interface between +/-10V (Dual 10V) sensor or device to single-supply ADC. Connect +/-10V sensor/device to pin 3 of connector CN1, and circuit outputs 0.5V to 4.5V at pin 3 of connector CN2. The operating supply of the circuit is 5V and it draws few milliamps of current. The project is also provided with optional precision Ref voltage for accurate output.

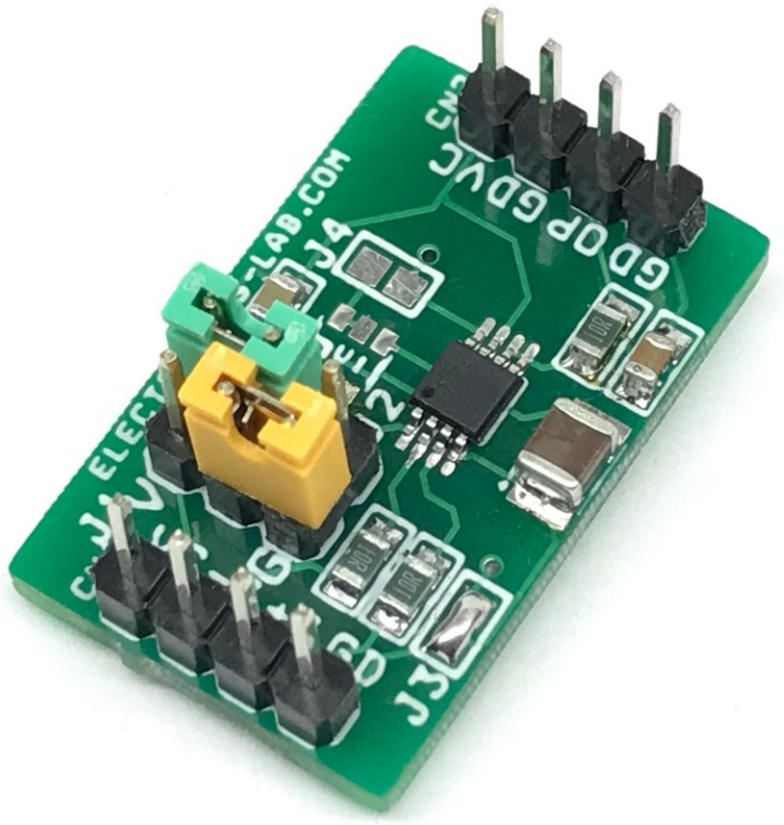
Testing this project is easy, close jumper J1 to VCC, J2 to GND, close the solder jumper J3, keep jumper J4 open, apply 5V DC to pin 1 and 2 of CN2, connect +/-10V source to pin 3 (+I) and GND. Measure the output at pin 3 (OP) of Cn2.

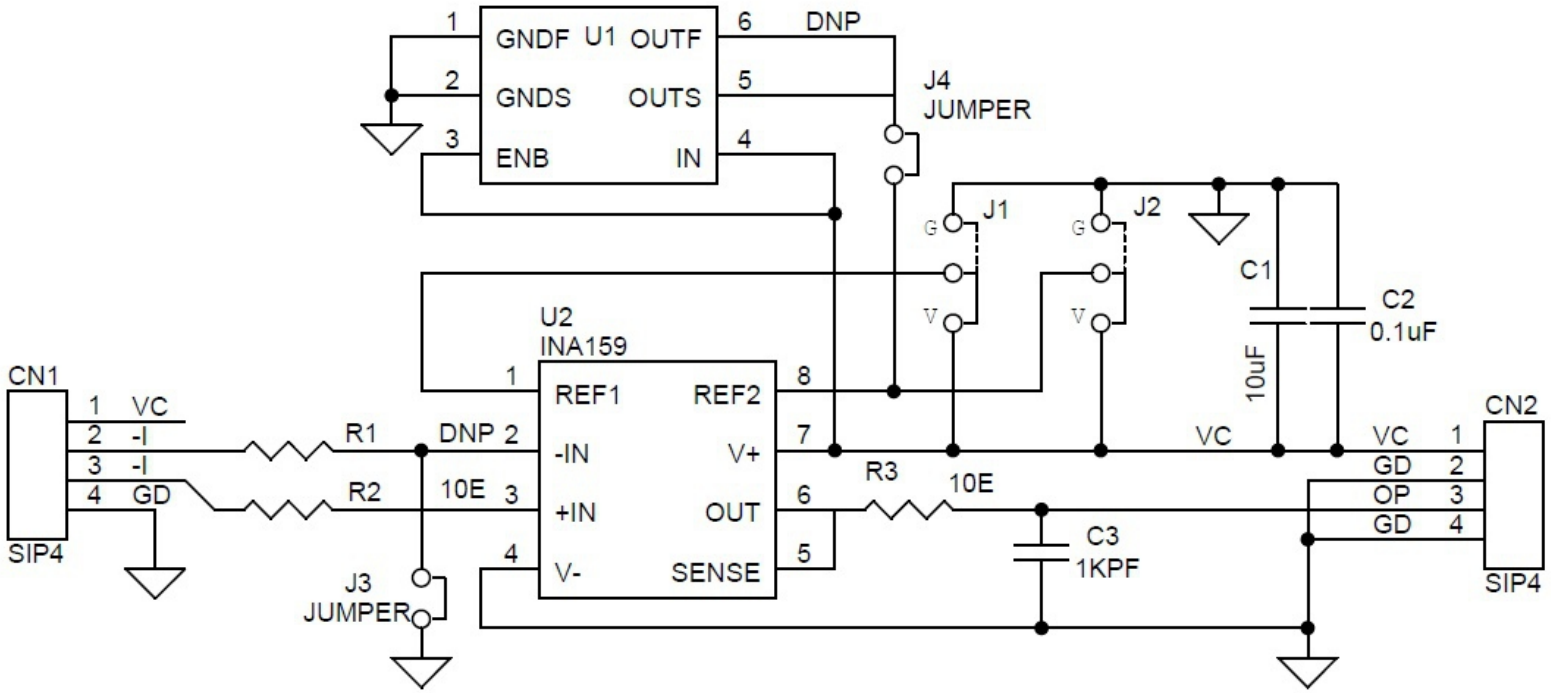
Optional Reference Voltage: for precision output, use reference voltage chip U1 REF3425 or REF3225 from Texas, close Jumper J3, J4, and J1 to GND.

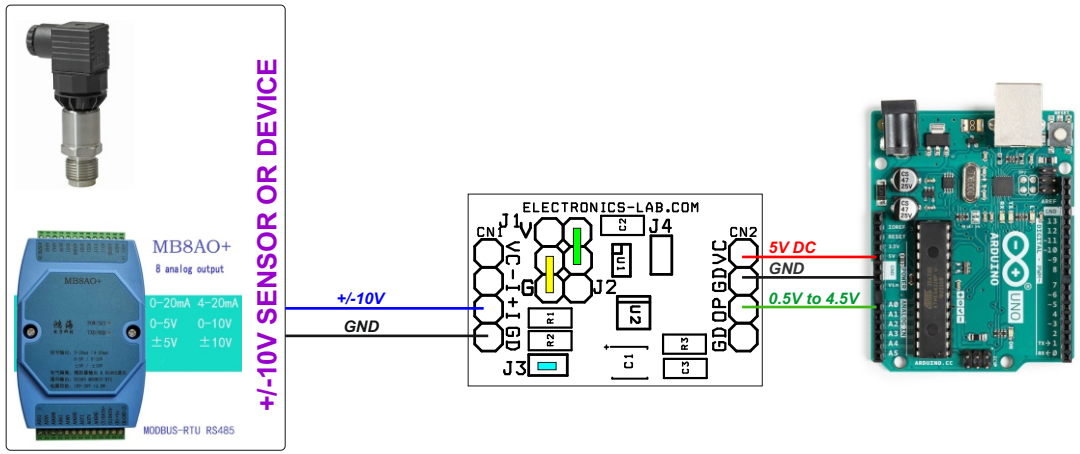
The INA159 is a high slew rate, G = 1/5 difference amplifier consisting of a precision op amp with a precision resistor network. The gain of 1/5 makes the INA159 useful to couple ±10V signals to single-supply analog-to-digital converters (ADCs), particularly those operating on a single +5V supply. The on-chip resistors are laser-trimmed for accurate gain and high common-mode rejection. Excellent temperature coefficient of resistance (TCR) tracking of the resistors maintains gain accuracy and common-mode rejection over temperature. The input common-mode voltage range extends beyond the positive and negative supply rails. It operates on +1.8V to +5.5V single or split supplies. The INA159 reference input uses two resistors n of many commonly-used circuits. The INA159 provides this circuit function withou

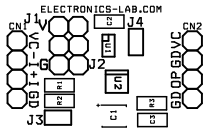
Feature

- Operating Supply 5V DC
- Input +/-10V (Dual 10V) Sensor or Industrial Device
- Output 0.5V to 4.5V DC (ADC)

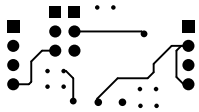


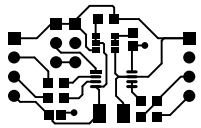

1
GNDF
U1
OUTF
6
DNP
2
GNDS
OUTS
5
J4
JUMPER
3
ENB
IN
4
G
J1
G
J2
C1
C2
0.1uF
V
V
10uF
U2
INA159
CN1
1
REF1
REF2
8
1 VC
2 -I
R1
DNP
2
-IN
V+
7
VC
VC
1
CN2
3 -I
R3
10E
GD
2
4 GD
R2
10E
3
+IN
OUT
6
OP
3
GD
4
4
V-
SENSE
5
C3
1KPF
SIP4
J3
JUMPER
SIP4


+/-10V SENSOR OR DEVICE
MB8AO+
8 analog output
0-20mA 4-20mA
0-5V 0-10V
±5V ±10V
MODBUS-RTU RS485
+/-10V
GND
ELECTRONICS-LAB.COM
CN1
J1
VCC
I+
I-
GND
J3
J4
J2
CN2
5V DC
GND
0.5V to 4.5V



SILK SCREEN TOP


BOTTOM LAYER


TOP LAYER

PCB DIMENSIONS 26.51MM X 16.51MM

BOM						
NO	***QNTY.***	***REF.***	***DESC***	***MANUFACTURER***	***SUPPLIER***	***SUPPLIER PART NO***
1	2	CN1,CN2	4 PIN MALE HEADER 2.54MM PITCH	WURTH	DIGIKEY	732-5317-ND
2	1	C1	10uF/16V SMD SIZE 1210 OR 1206	MURATA/YAGEO	DIGIKEY	
3	1	C2	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	1	C3	1KPF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
5	2	J1,J2	JUMPER3PIN/SHUNT	WURTH	DIGIKEY	732-5316-ND
6	2	J3,J4	PCB JUMPER/SOLDER JUMPER			
7	2	U1,R1	DNP			
8	2	R2,R3	10E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
9	1	U2	INA159AIDGKT	TEXAS	DIGIKEY	296-18688-1-ND
10	2	SHUNT	2.54MM PITCH FEMALE	SULINS	DIGIKEY	S9001-ND