

Type 557, 558, 571

EXTERNAL IMPEDANCE CONVERTERS AND RANGE CAPACITORS

The low impedance voltage mode piezoelectric sensor such as the Piezotron type, incorporates a miniature MOSFET electronic circuit inside the sensor housing. The internal circuitry converts the high impedance charge generated by the quartz crystals to a high level voltage signal with an output impedance of less than 100 ohms. The advantages of using a stand alone low impedance voltage mode sensor are now available in a hybrid system combining a high

impedance accelerometer, pressure or force transducer with an impedance converter. A distinct advantage of this system is that high temperature measurements can be made by separating both components and placing the quartz sensor in a considerably higher temperature environment than that of the impedance converter.

- Compatible with high impedance charge, mode sensors
- Miniature construction
- In-line or direct attachment to sensor
- Optional range capacitors to tailor output signal
- Two wire, constant current source operation



557

Photo Scale 1:1



558



571

| Technical Data | Units | 557/ 558 |
|--------------------------------------|-------------------|----------------------|
| Output Characteristics: | | |
| Voltage | V | ±5 |
| Impedance | Ω | 100 |
| Current | mA | 2 |
| Bias nom. | V | 11 |
| Input Characteristics: | | |
| Voltage FSO | V | ±5 |
| Resistance min. at R.T. | Ω | 5 x 10 ¹⁰ |
| Capacitance nom. | pF | 3 |
| Time Constant nom. | s | 5 |
| Transfer Characteristics | | |
| Non-linearity | % | 1 |
| Voltage Gain nom. | V | 0.97 |
| Noise 10 ... 300 Hz | μV _{rms} | 60 |
| Environmental Characteristics | | |
| Temperature Range | °F | -65 ... 250 |
| | °C | -54 ... 121 |
| Temperature Effect on Gain | % | 2 |
| Temperature Effect on Bias | V | ±2 |
| Shock 1 ms pulse width | g _{pk} | 2000 |
| Vibration Limit | g _{pk} | 500 |
| Power Supply Characteristics | | |
| Voltage | VDC | 20 ... 30 |
| Current | mA | 4 |
| Ripple | mV _{rms} | 1 |

1 g = 9.80665 m/s², 1 inch = 25.4 mm, 1 gram = 0.03527 oz, 1 lbf-in = 0.1129 Nm

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Applications

- Conversions of charge signals from piezoelectric sensors into proportional voltage signals
- High temperature installations requiring charge output sensors

Signal Polarities

Most high impedance sensors develop a negative-going signal with increasing measurand. This produces positive-going output signals from charge amplifiers which invert polarities. When these sensors are used with Piezotron Impedance Converters, increasing measurands yield negative-going output signals.

Low frequency response relates inversely to the Input Time Constant. The approximate frequency at which 5% attenuation occurs is: $f \text{ (Hz)} = 0.5 / \text{Input Time Constant}$

High frequency response depends upon output cable capacitance. Typical response -5% at ±1V with cable capacitance of 5000pF is 100000Hz. (Response with 50000pF is 10000Hz.)

Selecting a Range Capacitor

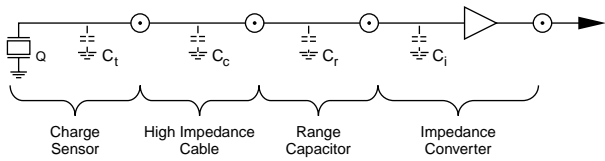
An impedance converter uses a MOSFET I.C. circuit, operating as a source follower with unity gain. For certain applications it may be necessary to use a range capacitor to reduce the voltage level from the sensor. A variety of range capacitors are offered:

- 1 Estimating max. pressure, force, or acceleration to be measured
- 2 Select sensor
- 3 Multiply sensor sensitivity (from data sheet) by estimated max. range as determined in step 1.
- 4 Select range capacitor
- 5 If possible, select one of four standard range capacitors which are stocked. Capacitance values below 100pF can be obtained by varying length of the sensor cable, Type 1631 series cable capacitance is 30pF/ft. Type 1601 series cable capacitance is 20pF/ft.
- 6 Compute exact system sensitivity ($V = Q/C_s$)

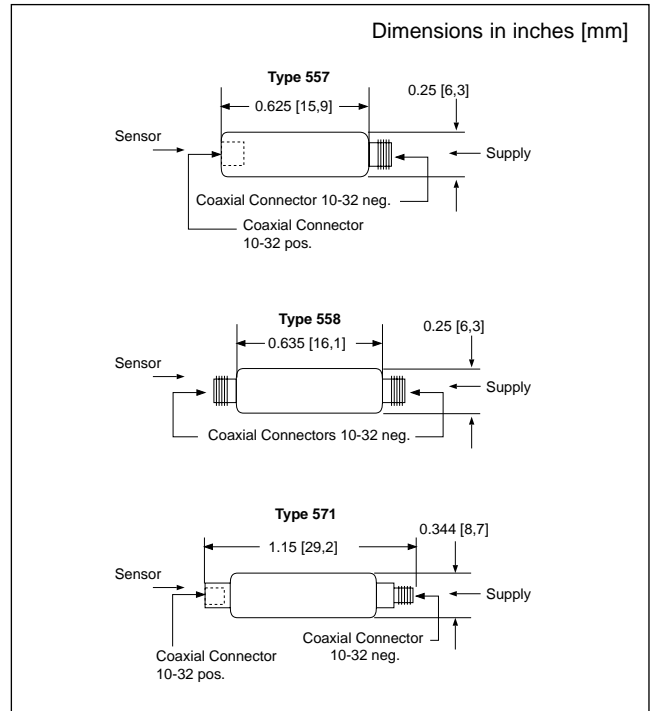
Range Capacitors

| 571... | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|--------|-----|-----|-----|------|------|------|-------|
| pF | 100 | 220 | 470 | 1000 | 2200 | 4700 | 10000 |

Nominal Sensitivity



- $V = Q/C_s$ where: $C_s = C_t + C_c + C_r + C_i$
- $Q =$ Sensor charge sensitivity (i.e. pC/psi, pC/g, pC/lbf etc.)
- $C_s =$ Total capacitance at input of impedance converter (pF)
- $C_t =$ Sensor capacitance
- $C_c =$ Input cable capacitance
- $C_r =$ Range capacitor
- $C_i =$ Impedance converter input capacitance

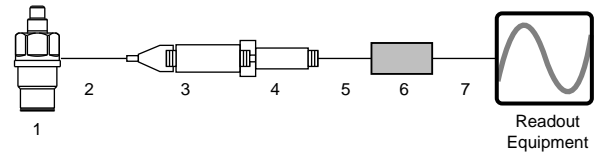


Mounting Options

Model 557: mounts directly on sensor for highest sensitivity, and lowest noise.

Model 558: mounts in-line with the same characteristics as Model 557, and features all welded construction and hermetic sealing.

Ordering Information



- Specify:
- 1 - charge sensor specify a high impedance sensor
 - 2 - 1631A... low noise cable, 10-32 pos. to BNC pos. or
 - 1631C... premium low noise cable, 10-32 pos. to BNC pos., specify length in meters
 - 3 - 571A... range capacitor
 - 4 - 557 impedance converter or
 - 558 In-line impedance converter
 - 5 - 1761B... general purpose 10-32 pos. to BNC pos., specify length in meters
 - 6 - 5100... coupler series
 - 7 - 1511... output cable, BNC pos. to BNC pos., specify length in meters

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