

Specification Comparison for Models 7210 & 9210 Lock-in Amplifiers

This table shows a comparison between the specifications for the **SIGNAL RECOVERY** models 7210 and 9210 multi-channel lock-in amplifiers. Please note that the instruments use very different designs so please consult AMETEK technical support for more guidance as to which is the better choice for the intended application.

| MODEL NUMBER Feature | 7210 | 9210 |
|---------------------------|--|--|
| No. of Channels | 4, 8, 12, 16, 20, 24, 28 or 32 depending on configuration ordered | Chassis 9210-CHS supports up to 5 signal processing boards, each with one signal generator output and two differential voltage mode signal inputs, giving up to 10 measuring channels |
| User Upgradeable | No, unit must be returned to factory for fitting additional signal channels and recalibration | Yes, additional signal processing boards can be installed in existing chassis and corresponding calibration files loaded |
| Input Mode | Single ended voltage inputs. Each optional model 7210DIF converts four channels to differential voltage inputs | Differential voltage inputs |
| Connector | BNC | RJ45; optional model BB-BNC breakout box allows convenient conversion to BNC connectors |
| Input Noise and Impedance | < 10 nV/√Hz at 1 kHz; 10 kΩ | Depends on signal processing board: 9210-LO: 1.8 nV/√Hz at 1 GΩ amplifier impedance (typical 15/0.5 nA input bias/offset current) 9210-MED: 3.7 nV/√Hz at 30 GΩ amplifier impedance (typical 0.5/0.1 nA input bias/offset current) 9210-HI: 18 nV/√Hz at ~TΩ amplifier impedance (typical 10 – 5 pA input bias current) |
| Input Coupling | AC only | AC or DC |

| MODEL NUMBER | 7210 | 9210 |
|-------------------------------------|---|--|
| Feature | | |
| Frequency Range | 20 Hz – 51 kHz | DC – 100 kHz recommended; DC – 500 kHz maximum |
| Sensitivity | 1 V to 100 μ V rms with 9 gain settings | \pm 10 V to \pm 2 mV with 12 gain settings |
| Reference | External reference only, 20 Hz to 50.5 kHz | Internal or external reference |
| External Reference Processing | True PLL design locks to external reference which gives measurement phase jitter independent of frequency | External reference frequency is sampled by FPGA which gives measurement phase jitter that increases with frequency |
| Generator (Oscillator Output) | Not available | One output per signal processing board; max 5 per chassis; DDS generator using a 20-bit DAC running at 1.33 MSa/s |
| Output voltage | — | \pm 10 V, \pm 1 V and \pm 0.1 V full range |
| Output current | — | 50 mA max |
| Output type | — | Two outputs, one with and one without current measurement, Floating or Grounded |
| Output waveform | — | Sinewave, square-wave, triangle, sawtooth, noise, and their sum, difference and product. |
| Output frequency | — | DC to 100 kHz recommended; DC – 500 kHz maximum |
| Output current measurement | — | Integrated dual phase lock-in current measurement of floating output (50 mA to 25 nA full scale in 20 steps) |
| Demodulation | Each channel has dual phase lock-in detection of in-phase and quadrature (X & Y) outputs | Each signal channel and the output current measurement has dual phase lock-in detection of in-phase and quadrature (X & Y) outputs and resulting magnitude and phase |
| Tandem Demodulation ¹ | X output of first demodulation is passed to second dual phase lock-in detection of in-phase and quadrature (X & Y) outputs at a tandem reference frequency f_2 , where f_2 is generated by the instrument | Using one signal processing board, requires an analog output to be connected to an analog input. If using two boards then this connection is not needed. |
| Tandem Demodulator Frequency Output | 0.1 Hz to 100 Hz; TTL signal from front panel BNC | |
| Output Time Constants | 4 ms (main demodulators) or 30 ms (tandem demodulators) to 1 ks in 1-3-10 sequence (12 steps) at 12 dB/octave | 1 ms to 100 s |
| Harmonic Measurements | \times 1F or \times 2F if not using tandem mode | \times 1F to \times 65535F |

1) Tandem Demodulation Mode: Detect a signal using dual phase demodulation at one reference frequency and take the X-channel demodulator output after filtering and apply this to a second dual phase demodulator running at a second, lower, reference frequency. This mode allows measurement of the modulation amplitude of an amplitude-modulated carrier frequency, and is equivalent to connecting two lock-in amplifiers together with the analog output of the first feeding the signal input of the second

| MODEL NUMBER Feature | 7210 | 9210 |
|-------------------------|---|--|
| Computer Interfaces | GPIB & RS232 | Ethernet & USB |
| Software Support | Multilock operating software – supports up to four model 7210's (128 channels) SR7210Comms ActiveX Control and SDK LabVIEW Driver | MCL User Software – supports one model 9210 (10 signal channels) LabVIEW Driver |
| Dimensions | 3U (133.5 mm) high rack mounted unit, 435 mm deep | 1U (44.5 mm) high rack mounted unit, 255 mm deep |
| Weight | 12.5 kg | Chassis: 2.3 kg; modules 85g each |
| Power | 100 V to 240 V AC 50/60 Hz, 200 W max | 100/120/220/240 V AC 50/60 Hz, 40 W max |



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