

## 규격서

품명 및 규격 Description	단위 Unit	수량 Quantity
Charge Accelerometer & Conditioning Amp. Set (Vibration Exciter & Vibration Controller Set)	set	1

### 1. 일반 사양

- 1.1 본 장비는 전자식 진동시험기를 주어진 시험 스펙에 맞게 제어 및 모니터링하기 위한 장비로, 전자식 진동시험기에서 발생하는 신호를 시간, 주파수 영역에서 관찰하고 평가하기 위한 장비이다.

### 2. 장비구성

- 2.1 진동 센서 및 진동센서 컨디셔닝 앰프 : 1 set
- 2.1.1 Four Channel Charge Conditioning Amplifier : 2 ea
  - 2.1.2 Charge Accelerometer, 10.2 pC/ms<sup>-2</sup> Unigain : 20 ea
  - 2.1.3 Cable super low-noise, 10-32 UNF (M) : 30 ea
  - 2.1.4 Piezoelectric Charge Accelerometer 4,5pC/g : 10ea
  - 2.1.5 Piezoelectric Charge Accelerometer 0,45pC/ms<sup>-2</sup>: 10ea
  - 2.1.6 Freight - Standard, above 20 kg : 1ea

### 3. 상세 규격

- 3.1 본 장비는 아래의 기술사양을 만족하여야 한다.

### 3.1.1 기본사양

- 기존 운영 장비와 호환 가능할 것
- 추후 채널 확장이 가능 할 것

### 3.1.2 Four Channel Charge Conditioning Amplifier Input

- CONNECTOR: TNC(TNC to 10 $\pi$  32UNF adaptor JP-0162 included)
- GROUNDING: Single-ended or floating
- MAX. INPUT:
  - Differential Charge: 10 nC (peak); Type 2692-C/D: 100 nC (peak)
  - Common Mode Voltage: 4.2V (peak) At gain  $\geq 0.316$  mV/pC ( $\approx 10$  dB gain with 1 nF transducer capacitance)
- INPUT PROTECTION:
  - Differential Charge:  $\leq 300$  nC (peak)
  - Common Mode Voltage:  $\leq 15$ V (peak)
  - COMMON MODE REJECTION RATIO:  $>50$  dB (typical) (50 to 60Hz with 1 nF transducer capacitance)
- AMPLIFIER GAIN:
  - 0.1mV/pC to 10 V/pC ( $\approx 20$  to  $+80$  dB gain with 1 nF transducer capacity); Type 2692-C/D: 0.01 mV/pC to 10 V/pC ( $\approx 40$  to  $+80$  dB gain with 1 nF transducer capacity)
- TRANSDUCER SENSITIVITY RANGE:
  - $10^{-19}$  to  $10^{-6}$  C/MU (MU = mechanical units: m/s<sup>2</sup>; g, N, lb., Pa)
- CALIBRATED OUTPUT:
  - Selectable in 10 dB steps. 100 dB attenuator range, 10 $\pi$  15 to 107 V/MU(Type 2692-C/D: Selectable in 10 dB steps. 120 dB attenuator range,  $10^{-16}$  to 107 V/MU)  $\pm 1\%$  for  $0^{\circ}\text{C} \leq T_a \leq +40^{\circ}\text{C}$  and  $\pm 2\%$  for  $-10^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$
  - Frequency range from  $5 \times f_l$  to  $0.2 \times f_u$
  - $f_l$  = lower freq. limit: 0.1, 1.0 or 10 Hz
  - $f_u$  = upper freq. limit: 0.1, 1, 3, 10, 30 or 100 kHz
- FREQUENCY RANGE (-10%):
  - Acceleration: 0.1Hz to 100 kHz (transducer cable length  $<10\text{m}$ );
  - Velocity (optional): 1.0Hz to 10 kHz
  - Displacement (optional): 1.0Hz to 1 kHz
- LOW-PASS FILTER (-10%):
  - 0.1, 1, 3, 10, 22.4, 30 or 100 kHz, attenuation slope 40 dB/decade
- HIGH-PASS FILTER ( $\approx 10\%$ ):

Acceleration: 0.1, 1.0 or 10 Hz; Type 2692-C/D: 0.1, 1 or 20 Hz

Velocity (optional): 1.0 or 10 Hz

Displacement (optional): 1.0 or 10 Hz

-INHERENT NOISE (2 Hz to 22.4 kHz):

<5 fC referred to input,  $10^{\circ}\text{C} \leq T_a \leq +40^{\circ}\text{C}$

<10 fC referred to input,  $40^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$

(amplifier sensitivity (>20 dB) with 1 nF transducer capacitance)

-HARMONIC DISTORTION AND NOISE (2 Hz to 22.4 kHz,  $Q_{in}$

$\leq 2 \text{ nC}_{peak}$ ,  $V_{out} \leq 3.16 \text{ V peak}$ ): <0.003% for amplifier gain  $\leq 0.1 \text{ V/pC}$

(<40 dB gain with 1 nF transducer

capacitance)

-ENVIRONMENTAL SUSCEPTIBILITY (referred to input):

Magnetic Field: <0.2 fC/(A/m)

Electromagnetic Field: <20 fC/(V/m) or <4 fC/V

Vibration (10 to 500Hz): <30 fC/(m/s<sup>2</sup>)

-MOUNTED RESONANCE TESTING1: EP Patent 715.722, US

Patent 5.753.793

Mounted resonance testing of the accelerometer and cable

interconnection, controllable from front panel and RS-232 interface

-TEST TONE OSCILLATOR:

$\omega = 1000 \text{ rad/s}$  (159.2Hz), sinusoidal

Test Level: 1mV to 10 V ( $\pm 1\%$ ). Controllable from front panel and RS-232 interface

Reference Tone: 1V (RMS), ( $\pm 1\%$ ), 159.2Hz

-RISE TIME: >7.5V/ $\mu\text{s}$  (100 kHz bandwidth)

-CHANNEL TO CHANNEL PHASE-MATCH:

$2.1^{\circ} \pm 0.1^{\circ} \times (f/f_l)$  from  $f_l$  to  $20 \times f_l$

$0.1^{\circ}$  from  $20 \times f_l$  to  $0.1 \times f_u$

$(f/f_u)^{\circ}$  from  $0.1(f_u)$  to  $f_u$

$f_l$ : lower freq. limit: 10 Hz

$f_u$ : upper freq. limit: 0.1, 1, 3, 10, 30 or 100 kHz

-OPTIONAL FILTERS: Integration: Single and double

-INTERNAL BATTERY (not included):

Nickel-Metal Hydride rechargeable battery supporting SMBus and

on-battery charge level meter. Provides typically 15 hours of

continuous use with a single channel and 4 hours with four channels

without backlighting and without optional filters. With backlighting on,

and with optional filters, battery provides typically 3 hours of

continuous use. If NEXUS is not used for more than a month, please

remove the battery to prevent discharging. Charging time is

approximately 4 hours



-EXTERNAL DC POWER INPUT:

Complies with ISO 7637.1 (12 V) and 7637.2 (24V)

-Input Range: 10 to 33VDC

-MAINS SUPPLY:

Supported via supplied Mains Adaptor ZG-0426 (included), 90 .264VAC, 40 .

65Hz

3.1.3 Four Channel Charge Conditioning Amplifier Output

-CONNECTOR: BNC

-GROUNDING: Single-ended or floating

-OUTPUT IMPEDANCE: = 50Ω//500 pF

-MAX. OUTPUT (differential voltage):

3.16V peak (6.32 V peak to peak); Type 2692-C/D: 10 V peak (20Vpeak to peak)

-MAX. DC OFFSET:  $\pm 25\text{mV}$ , typically  $< 2\text{mV}$

-OUTPUT PROTECTION:

Differential Voltage:  $\leq 50\text{V}(\text{peak})$

Common Mode Voltage:  $\leq 15$  (peak)

Common Mode Rejection:  $>50$  dB (50 to 60 Hz) for Common Mode Voltage  $\leq 2\text{V}$  peak (voltage injected into instrument)

-OUTPUT DRIVE CAPACITY:

100m of cable length (100 pF/m) to 20 kHz

1000 m of cable length (100 pF/m) to 2 kHz

-CHANNEL SEPARATION: better than  $\approx 100$  dB at 1 kHz

3.1.4 Charge Accelerometer,  $10.2 \text{ pC/ms}^{-2}$  Unigain

-Dynamic Characteristics

Charge Sensitivity (@ 159.2Hz):  $98 \pm 12\%$  pC/g

Frequency Response: See typical Amplitude Response

Mounted Resonance Frequency: 16kHz

Amplitude Response  $\pm 0\%$  [1]: 0.1 to 4800Hz

Transverse Sensitivity:  $< 4\%$

Transverse Resonance Frequency: 10 kHz

-Electrical Characteristics

Min. Leakage Resistance @ 20C:  $\geq 20 \text{ G}\Omega$

Capacitance: 1200pF

Grounding: Signal ground connected to case

-Environmental Characteristics

Temperature Range:  $-74$  to  $250 \text{ C}$  ( $-101$  to  $482 \text{ F}$ )

Humidity: Welded

Max. Operational Sinusoidal Vibration (peak): 2000 g pk

Max. Operational Shock (+/-peak): 2000 g pk  
Base Strain Sensitivity: strain 0.003 Equiv. g/ $\mu$   
Thermal Transient Sensitivity: 0.002 (0.011) Equiv. g/C (g/F)  
Magnetic Sensitivity (50Hz-0.03 Tesla): 0.1g/T

-Physical Characteristics

Dimensions

Weight: 54 (1.89) gram (oz.)

Case Material: Stainless steel

Connector: 10-32UNF

Mounting: 10-32UNF  $\times$  5 mm threaded hole

3.1.5 Piezoelectric Charge Accelerometer 4,5pC/g

- Charge Sensitivity: 0.45pc/ms<sup>-2</sup>
- Sensitivity Tolerance: +/-15
- Measuring Range: 2mms<sup>-2</sup> to 20Kms<sup>-2</sup>
- Frequency Range, +10%: 0.1 to 8KHz
- Mounted Resonance Frequency: 25KHz
- Transverse Sensitivity: <5%
- Transverse Resonance: 18KHz
- Min. Leakage Resistance at 20C: 20G $\Omega$
- Capacitance: 360pF
- Sensing Element: PZ23
- Base Strain Sensitivity (In base plane at 250  $\mu$ ε): 0.005ms<sup>-2</sup>/ $\mu$ ε
- Temperature Transient Sensitivity (3 Hz LLF, 20dB/decade): 0.2ms<sup>-2</sup>/c
- Magnetic Sensitivity (50Hz . 0.03 T): 1ms<sup>-2</sup>/T
- Ambient Temperature Range: -74 to 250C
- Max. Operational Shock (+/-Peak): 5 0 Kms<sup>-2</sup>
- Max. Operational Continuous sinusoidal acceleration (Peak) : 20Kms<sup>-2</sup>
- Sealing : Welded
- Humidity: 9 0 %
- Mounting Slots (pairs): 1
- Weight: 4.5gram

3.2.1 Piezoelectric Charge Accelerometer 0,45pC/ms<sup>-2</sup>

- Charge Sensitivity: 0.45pc/ms<sup>-2</sup>
- Sensitivity Tolerance: +/-15
- Measuring Range: 2mms<sup>-2</sup> to 20Kms<sup>-2</sup>
- Frequency Range, +10%: 0.1 to 8KHz
- Mounted Resonance Frequency: 25KHz
- Transverse Sensitivity: <5%
- Transverse Resonance: 25KHz

- Min. Leakage Resistance at 20C: 20GΩ
- Capacitance: 360pF
- Sensing Element: PZ23
- Base Strain Sensitivity (In base plane at 250 με): 0.005ms<sup>-2</sup>/με
- Temperature Transient Sensitivity (3 Hz LLF, 20dB/decade):0.2ms<sup>-2</sup>/c
- Magnetic Sensitivity (50Hz . 0.03 T):1ms<sup>-2</sup>/T
- Ambient Temperature Range: -74 to 250C
- Max. Operational Shock (+/-Peak): 5 0 Kms<sup>-2</sup>
- Max. Operational Continuous sinusoidal acceleration (Peak) : 20Kms<sup>-2</sup>
- Sealing : Welded
- Humidity: 9 0 %
- Mounting Slots (pairs):3
- Weight:4.5gram

### 3.2.2 Cable super low-noise,10-32 UNF (M)

- CONNECTOR: 10-32UNF male to 10-32UNF male
- Temperature range: -75 to +250켈 (-103 to +482켈)

## 4. 기타

4.1 납기 : 발주 후 8주 이내

4.2 보증 기간 : 1년