

# MCD-A

## Multi Conditioner System

● 8 or 16 Channels, High Vibration Resistance



MCD-16A Unit Base (With a Monitor Card, and 16 pc of DPM-71B Conditioner Cards installed)



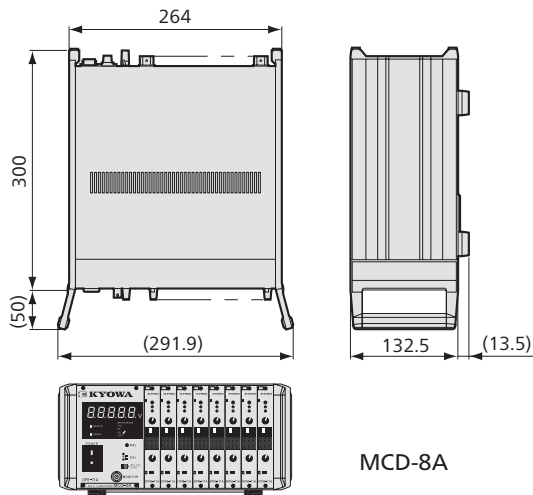
### Outstanding vibration resistance enables on-vehicle application Monitor card equipped with a large digital indicator

- The unit base is available in 2 types of 8 or 16 channels.
- 6 different types of conditioner cards are available.
- Each conditioner card applies a plug-in system for easy exchange.
- Each conditioner card features I/O isolated.
- A digital strain generator is provided both for strain amplifier card and signal conditioner card, can be set in 10 micro strain step.
- Certified for CE marking

The Multi Conditioner MCD-A is a portable and moderate price system capable of accommodating 8 or 16 conditioner cards. Selection of optimum cards from among 6 different kinds enables economical system configuration to the exact requirements for each individual application.

Easy operation and excellent vibration resistance make it usable conveniently outdoors for up to 16-channel simultaneous measurement of various physical quantities.

#### ■ Dimensions



MCD-8A

#### System Components

- **Unit Base** (Please select either of them when ordering)
  - MCD-8A for measurement of up to 8 channels
  - MCD-16A for measurement of up to 16 channels
- **Monitor Cards** (Required for each unit base)
  - DPE-71A
- **Conditioner Cards\***
  - DPM-71B/71B-I Strain Amplifier Card
  - DPM-72B/72B-I Strain Amplifier Card
  - CDV-71A Signal Conditioner Card
  - CFV-71A F/V Converter Card
  - CTA-71A Thermocouple card
  - CCA-71A Charge Amplifier Card
- **Battery Units**
  - MDB-21A for MCD-8A
  - MDS-22A for MCD-16A

\* When ordering the system, up to 8 or 16 cards can be selected. Please be sure DPM-71B and DPM-72B cannot be mounted simultaneously.

#### Specifications

<b>■ Unit Base MCD-A</b>	
A monitor card and various conditioner cards can be mounted in a base unit.	
<b>Types</b>	MCD-8A to accommodate 8 conditioner cards MCD-16A to accommodate 16 conditioner cards
<b>Vibration Resistance</b>	49.03 m/s <sup>2</sup> (5G), 5 to 55 Hz 15 cycles each in 3 directions, 1 min/cycle
<b>Operating Temperature Range</b>	- 10 to 50°C
<b>Operating Humidity Range</b>	20 to 85%RH (Non-condensing)
<b>Storage Temperature Range</b>	-20 to 60°C
<b>Power Supply</b>	100 to 240 VAC 9 to 18 VDC
<b>Current Consumption</b>	MCD-8A 1 A or less (100 VAC), 3.3 A or less (12 VDC) MCD-16A 2 A or less (100 VAC), 6.5 A or less (12 VDC)
<b>Dimensions</b>	MCD-8A 264(W) x 132.5(H) x 300(D) mm (Excluding protrusions) MCD-16A 426(W) x 132.5(H) x 300(D) mm (Excluding protrusions)
<b>Weight</b>	MCD-8A Approx. 7 kg (With 8 DPM-71B cards mounted) MCD-16A Approx. 10 kg (With 16 DPM-71B cards mounted)
<b>EMC Directive</b>	EN61326-1 (Class A)

#### Standard Accessories

- AC power cable P-18 (With a 2-pin conversion adapter CM-39)
- DC power cable P-76
- Output cable U-59 (1.5 m) (BNC-BNC)
- Synchronous cable N-93 (90 cm)
- Connector for Integrated output cable
- Short-circuit fixture
- Spare fuse (1 each for AC and DC)
- Miniature screwdriver
- Instruction manual

#### Optional Accessories

- Extension cables N-81 (5 m) to N-85 (50 m)
- Bridge boxes DB, DBB, and DBS
- Noise filter F
- Plug for input P12-7
- Battery unit MDB-21A/22A
- 1-channel dummy panel MCC-DUMMY-N
- Fixture for JIS rack H-1227



### ■ Monitor Card DPE-71A

The monitor card provides an output voltage monitor indicator and a carrier oscillator circuit used for the strain amplifier card. It should be mounted to each unit base. The output voltage monitor indicator uses high-luminosity LEDs and consumes minimal power. It also allows selection of a monitor mode from DC (DC to 1 Hz, approx.), PH (peak hold at 10 to 50 Hz, approx., no reset) or AC (rms value at 50 Hz or higher), and thus enables monitoring of signals in any bandwidth. The carrier oscillator circuit switches automatically according to the strain amplifier card mounted.

**Monitor Indicator** 4-digit indication of the output voltage of a selected channel. DC, AC, P.H. or OFF switchable

**Control Switches** BAL (automatic zero balance adjustment)  
±CAL (simultaneous calibration of all channels in plus and minus directions)

**Synchronized LEDs** MASTER lights up when the strain amplifier card is used and the INT/EXT switch is set to INT.  
ERROR lights up when the synchronized signal is incompatible.

### ■ Conditioner Cards (Common specifications)

6 different types of conditioner cards are available. By installing the desired types in the unit base, various physical phenomena can be measured simultaneously. All conditioner cards have the specifications stated below.

**Number of Measuring Channels** 1

**Output** Dual output (The same voltage is output to BNC connector and Integrated output connector.)

**Output Voltage** ±5 V (Load 5 k or more)

**Zero Adjustment Range** ±0.1 V (Except for CTA-71A)

**Output Impedance** 2Ω or less

**Withstand Voltage** 250 VAC for one minute between input and output, input and case, and output and case

**Over-input Indication** OVER lamp lights up.

**Dimensions** 20 x 128.5 x 233 mm

### ■ Strain Amplifier Cards DPM-71B, DPM-72B, DPM-71B-I\*, DPM-72B-I

Are carrier-based conditioners for strain measurement. They differ from each other in frequency response range. Both feature an excellent SN ratio and the CST method to automatically eliminate unbalanced bridge capacitance for stable measurement.

\*The suffix I means with feature of strong against invert noise

#### Frequency Response Range and Carrier Frequencies

Models	Frequency Response Range	Carrier Frequencies
DPM-71B (-I)	DC to 2.5 kHz (Deviation ±10%)	5 kHz
DPM-72B (-I)	DC to 5 kHz (Deviation ±10%)	12 kHz

The carrier oscillator is provided by the monitor card.

**Applicable Bridge Resistance** 60 to 1000 Ω

**Gage Factor** 2.00 fixed

**Bridge Excitation** 2 V<sub>rms</sub>

**Balance Adjustment Range**

**Resistance** Within ±2% (±10 k μm/m)

**Capacitance** 2000 pF

**Balance Adjustment Method**

**Resistance** True electron auto balance

**Accuracy** Within ±0.5 μm/m (With RANGE set at 1 [x100 μm/m])

**Capacitance** CST (capacitance self-tracking)

**Sensitivity** ±0.5 V per 10 μm/m input

**Nonlinearity** Within ±0.2% FS

**Calibration (CAL)** (±10 to 9990 μm/m), switchable by the 3-digit switch in 10 μm/m steps

Accuracy Within ± (0.5% + 0.5 μm/m)

**Sensitivity Switch (RANGE)** 8 steps of 100, 200, 500, 1k, 2k, 5k, 10k μm/m and OFF

**Fine Sensitivity Adjustment (VERN)** 1 to 1/2.5

**LPF** Transfer characteristic: 2nd order Butterworth

Cutoff frequencies: 10, 30, 100, 300, 1 k Hz and FLAT (6 steps)

Amplitude ratio: -3 ±1 dB (At cutoff point)

Attenuation: (-12 ±1) dB/oct.

(Except when DPM-71B/B-1 is set at 1 kHz)

**SN Ratio** DPM-71B: 49 dB p-p (At 200 μm/m range)

DPM-71B-1: 44 dB p-p (At 200 μm/m range)

DPM-72B: 45 dB p-p (At 200 μm/m range)

DPM-72B-1: 40 dB p-p (At 200 μm/m range)

**Stability** Zero: ±0.1 μm/m per °C, ±1 μm/m/8 h

Sensitivity: ±0.05%/°C, ±0.3%/8 h

### ■ Signal Conditioner Card CDV-71A

CDV-71A is an isolated signal conditioner adopting DC bridge excitation. High frequency response at up to 50 kHz enables it to measure fast physical phenomena. CDV-71A can be connected to a strain gage or strain gage transducer.

**Frequency Response Range** DC to 50 kHz (Deviation +0.5/-3 dB)

**Applicable Bridge Resistance** 60 Ω to 10 kΩ (With bridge excitation 2 V)  
300 Ω to 10 kΩ (With bridge excitation 10 V)

**Gage Factor** 2.00 fixed

**Bridge Excitation** 2 or 10 VDC, switchable

**Balance Adjustment Range**

**Resistance** Within ±2% (±10 k μm/m)

**Balance Adjustment Methods** True electron auto balance method (compensated value stored in nonvolatile memory)

**Accuracy** Within ±5 μm/m (With RANGE set at 200 μm/m)

**Sensitivity** 0.05 V per 10 μm/m input (With bridge excitation 2 V)  
0.25 V per 10 μm/m input (With bridge excitation 10 V)

**Nonlinearity** Within ±0.05% FS

**Calibration (CAL)** ±(10 to 9990 μm/m),  
switchable by the 3-digit switch in 10 μm/m steps

**Accuracy** ±(0.3% + 1 μm/m)

**Sensitivity Switch (RANGE)** 7 steps of 200, 500, 1 k, 2 k, 5 k,  
and 10 k μm/m, and OFF

**Fine Sensitivity Adjustment (VERN)** 1 to 1/2.5

**LPF** Transfer characteristic: 2nd order Butterworth

Cutoff frequencies: 10, 30, 100, 300, 1 k, 3 k, 10 k Hz and FLAT (8 steps)

Amplitude ratio: -3 ±1 dB (At cutoff point)

Attenuation: (-12 ±1) dB/oct.

**Noise** 20 μm/m p-p (With 200 μm/m range)

**Stability** Zero: ±1 μm/m per °C, ±10 μm/m per 8 h

Sensitivity: ±0.02%/°C, ±0.1%/8 h

### ■ Thermocouple Card CTA-71A

Compatible with 2 types of thermocouples, K (CA) and T(CC), the CTA-71A comes with a temperature measuring adapter CT-2A.

**Applicable Thermocouples** K (CA), T (CC)

**Measuring Range** K1: -200 to 1230°C

K2: -200 to 480°C

K3: -200 to 240°C

T1: -200 to 400°C

T2: -200 to 210°C

**Fine Sensitivity Adjustment (VERN)** 1 to 1/2.5

**Reference Junction Compensation** ±2.5°C (At -10 to 50°C)  
±1°C (At approx. 20°C; 2°C with K1)

**Linearizer Accuracy** Within ±0.5% FS (±1% FS with T type)

**Zero Stability** ±0.05% FS/°C, 0.05% FS/8 h

**Calibration** 100% and 50% the full scale in each measuring range and 0°C

**Accuracy** Within ±0.5%

**Frequency Response Range** DC to 10 Hz (Deviation +0.5/-1 dB)

**Standard Accessories**

Temperature measuring adapter CT-2A (With built-in terminal temperature sensor to connect the thermocouple to the unit base)

### ■ F/V Converter Card CFV-71A

CFV-71A can convert frequency of up to 10kHz to corresponding voltage. As CFV-71A supply power to the connected sensors, it can be used as a revolution counter.

**Input Signal** Frequencies: 0.2 Hz to 10 k Hz AC (Zero-cross),  
TTL level (Including open collector signals)

Voltage: ±0.5 to ±50 V

**Input Impedance** Approx. 20 kΩ

**Nonlinearity** Within ±0.1% FS

**Sensitivity Switch (RANGE)** 6 steps of 500, 1 k, 2 k, 5 k, 10 k [Hz] and OFF

**Fine Sensitivity Adjustment (VERN)** 1 to 1/2.5

**Calibration** 100% and 50% each measuring range

**Accuracy** Within ±0.5%

**Response Time** 1 ms or less (With 10 kHz input)

**Stability** Zero: ±0.01% FS/°C, ±0.05% FS/8 h  
Sensitivity: ±0.01%/°C, ±0.05% FS/8 h

**Sensor Power Supply** Approx. 12 VDC, within 50 mA

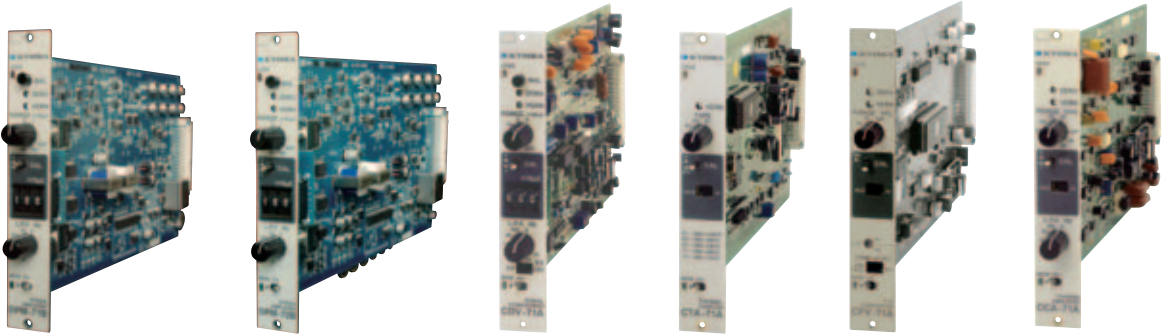
**Standard Accessories** Input connector P12-7

**Optional Accessories** Input cable U-12 (1.5 m)  
Conversion adapter FV-1A

Note: The unit base MCD-16A accepts up to 10 pc. of CFV-71A in case other conditioner cards are not installed.  
In case mounted with other conditioner cards, 6 pc. of CFV-71A is the maximum can be mounted.

<b>Charge Amplifier Card CCA-71A</b>	
It can be used in all with built-in amplifier type or electric charge type accelerometer. When connect a electric charge amplifier, optional CCA-10A, 11A, or 12A is needed.	
<b>Applicable Piezoelectric Accelerometer</b>	
<b>Built-in amplifier type</b> ±5000 mV	
<b>Input</b>	
<b>Built-in amplifier type</b> Unbalanced input, constant-current supply built in (constant current 4 mA, excitation voltage 24 V, load 1kΩ or less) (Conversion adapter CCA-1B for NDIS connector provided as a standard accessory)	
<b>Charge type</b> Optional charge converter CCA-10A, 11A or 12A required	
<b>Sensitivity Switch (RANGE)</b> 9 steps of 20, 50, 100, 200, 500, 1 k, 2 k, 5 k [mV] and OFF	
<b>Fine Sensitivity Adjustment (VERN)</b> 1 to 1/2.5	
<b>Internal Calibration</b> 100% and 50% of each measuring range	
<b>Accuracy</b> Within ±0.5% FS	
<b>Frequency Response Range</b> 1 Hz to 50 kHz (Deviation +1/-3 dB)	
<b>LPF</b> Transfer characteristic: 2nd order Butterworth Cutoff frequencies: 300, 1 k, 3 k, 10 k Hz and FLAT (5 steps) Amplitude ratio: -3 ±1 dB (At cutoff point) Attenuation: (-12 ±1) dB/oct.	
<b>Distortion</b> 1% (±5 V)	
<b>SN Ratio</b> 45 dB (With 20 mV range)	
<b>Stability</b> Zero: ±0.5 mV/°C, ±5 mV/8 h Sensitivity: ±0.1%/°C, ±1%/8 h	
<b>Standard Accessories</b>	Conversion adapter CCA-1B for NDIS connector
<b>Optional Accessories</b>	Charge converters CCA-10A, 11A and 12A

<b>Charge Converters CCA-10A/11A/12A</b>	
<b>Output</b>	±5000 mV
<b>Input Electric Charge*1</b>	
CCA-10A	1000 pC to 500 nC
CCA-11A	100 pC to 50 nC
CCA-12A	10 pC to 5 nC
<b>Gain Accuracy</b>	Within ±0.6% (In combination with CCA-71A, ±1.6%)
<b>Frequency Response Range</b>	
CCA-10A	1 Hz to 10 kHz (Deviation +1/-3 dB)
CCA-11A	1 Hz to 50 kHz (Deviation +1/-3 dB)
CCA-12A	1 Hz to 50 kHz (Deviation +1/-3 dB)
<b>SN Ratio</b> 43 dB or more*2	
CCA-10A	28 pF p-p or less
CCA-11A	2.8 pF p-p or less
CCA-12A	0.28 pF p-p or less
*1. Adjustable range by RANGE and VERN controls of CCA-71A set to 5 V output	
*2. With RANGE set to 20 mV and VERN to x1 on CCA-71A	
<b>Battery Unit MDB-21A/22A</b>	
MDB-21A	For MCD-8A
MDB-22A	For MCD-16A
<b>Continuous Operating Time</b> Approx. 3 h (Fully recharged with strain amplifier cards mounted)	
Since the battery should be incorporated into the unit base, it is required to remodel the unit base. Please contact us for the service.	



DPM-71B      DPM-72B      CDV-71A      CTA-71A      CFV-71A      CCA-71A

**Block Diagram**

