

Introduced in this catalog are KYOWA's flexible multi conditioner systems and dynamic strain amplifiers to measure signals sent from sensors such as strain gages and strain gage transducers. These sensors and the equipment for recording and processing related data are also available from KYOWA. Refer to separate catalogs for these products.

Dynamic Strain Amplifiers

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Multi Conditioner MCD-A

The Multi Conditioner MCD-A is a portable, flexible system capable of accommodating 8 or 16 conditioner cards available in 6 different types. The system can be economically configured to the exact requirements for each individual application. Easy operation and excellent vibration resistance make it usable conveniently outdoors too.

- The unit base, the cabinet, is available in two types of 8 or 16 channels.
- 6 different kinds of conditioner cards are available for selection as needed.
- Each conditioner card applies a plug-in system for easy exchange.
- Each conditioner card features isolated input/output.
- Outstanding vibration resistance enables vehicle-borne applications.
- The monitor card is equipped with a large digital indicator for easy observation of output.
- A digital, reference equivalent strain generator provided for the dynamic strain amplifier card and signal conditioner card, can be set in 10 μ m/m units.
- Certified for CE marking



Selectable Components Unit Bases

MCD-8A for measurement of up to 8 channels MCD-16A for measurement of up to 16 channels

Monitor Card

DPE-71A (required for each unit base) **Conditioner Cards**

DPM-71A dynamic strain amplifier card DPM-72A dynamic strain amplifier card CDV-71A siginal conditioner card CFV-71A F/V converter card CTA-71A thermocouple card

CCA-71A charge amplifier card (8 or 16 desired conditioner cards can be installed in the unit base. However, DPM-71A and DPM-72A cannot be installed simultaneously in one unit base.)

Unit Bases MCD-8A/MCD-16A

MCD-8A: 8-channel housing MCD-16A: 16-channel housing Each unit base involves a mother board connected to each conditioner card, input/output connectors, AC-DC power circuit, and DC-DC converter. It accommodates a monitor card and up to 8 or 16 conditioner cards.

Vibration Resistance 49.03 m/s² (5 G) (5 to 55 Hz) 15 cycles each in 3 directions, 1 minute/ cycle **Operating Temperature/Humidity** -10 to 50°C, 85% RH max. Storage Temperature –20 to 60°C Power Requirements Rated 100 to 240 VAC. 47 to 440 Hz Allowable 85 to 264 VAC; 47 to 440 Hz 9 to 18 VDC Dimensions MCD-8A: 264 x 132.5 x 300 mm (excluding protrusions) MCD-16A: 426 x 132.5 x 300 mm (excluding protrusions) Mass MCD-8A: Approx. 7 kg (with 8 units of DPM-71A installed) MCD-16A: Approx. 10 kg (with 16 units of DPM-71A installed) EMC Standard EN61326-1 (common to all ards) Safety Standard EN61010-1 (installation category II, degree of contamination 2) **Standard Accessories** AC power cable P-18 (with conversion adaptor CM-33) DC power cable P-57 Output cable U-59 (BNC-BNC) Synchronous cable N-93 Connector for concentrated output cable

- Short-circuit board
- Spare fuse (one each for AC and DC),
- Miniature screwdriver
- Instruction manual

Optional Accessories

Centralized analog output cable MC-21A 1-channel dummy panel MCC-DUMMY-N

Monitor Card DPE-71A

The monitor card consists of an output voltage indicator and a carrier oscillating circuit used for the dynamic strain amplifier card. It should be installed in each unit base. The output voltage indicator uses highly luminant LEDs and consumes minimal power. It also allows selection of DC (0 to 1 Hz, approx.), PH (peak hold at 10 to 50 Hz, approx.; no reset) or AC (r.m.s. value at 50 Hz or higher) and thus enables monitoring of signals in any bandwidth. The carrier oscillating circuit switches automatically according to the dynamic strain amplifier card installed.

Monitor Meter

- Gives 4-digit indication of the output voltage of a selected channel.
- DC, AC, PH or OFF mode selectable by the switch
- **Control Switches**
- BAL (automatic balance adjustment) and CAL (simultaneous calibration of all channels in plus and minus directions)
- Synchronized LEDs
- MASTER lights up when the dynamic 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

By installing the desired types of conditioner cards in the unit base, different types of physical phenomenon can be measured simultaneously. All conditioner cards share the specifications stated below.

NOTE: Dynamic strain amplifier cards DPM-71A and DPM-72A cannot be installed simultaneously in one unit base.

COMMON SPECIFICATIONS Number of Meaauring Channels: 1

Output

Dual output (the same voltage is output to BNC connector and integrated output connector.)

Output voltage: $\pm 5 \text{ V}$ (load 5 k Ω 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 casing, and output and casing

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

Dimensions

20 x 128.5 x 233 mm

Strain Amplifier Cards DPM-71A/DPM-72A

The DPM-71A and DPM-72A are carrierbased conditioners for strain measurement. They differ from each other in their frequency response range. Both feature an excellent SN ratio and the CST method to automatically eliminate unbalanced bridge capacitance for stable measurement.

Frequency Response Range

- DPM-71A: DC to 2.5 kHz (deviation ±10%) DPM-72A: DC to 5 kHz (deviation ±10%)
- **Carrier Frequency**
- DPM-71A: 5 kHz
- DPM-72A: 12 kHz
- (Carrier oscillator is provided on the monitor card.)
- Applicable Bridge Resistance
- 60 to 1000 Ω
- Gage Factor
- 2.00 fixed
- Bridge Voltage
- Sine wave 2 V rms
- Balance Adjustment Range Resistance: Within $\pm 2\%$ ($\pm 10000 \ \mu m/m$) Capacitance: 2000 pF
- **Balance Adjustment Method**
- Resistance: True electron auto balance Accuracy: Within ±0.5 µm/m (with RANGE set at 100 µE)
- Capacitance: CST (capacitance self-tracking) Sensitivity
- 0.5 V/10 µm/m input
- Nonlinearity
- Within ±0.2% FS
- Reference Equivalent Strain (CAL) $\pm (10 \text{ to } 9990 \ \mu\text{m/m}),$ selectable by the 3-digit switch in 10 µm/m steps
- Accuracy: Within $\pm (0.5\% + 0.5 \mu m/m)$ Sensitivity Switch (RANGE)
- 8 steps of 1, 2, 5, 10, 20, 50, 100 x100 με and OFF
- Fine Sensitivity Control (VERN)
- 1 to 1/2.5
- Low-Pass Filter
- Second-order Butterworth Cutoff frequency: 6 steps of 10, 30, 100, 300, 1k Hz and F (flat)
- Amplitude ratio at cutoff point: -3 dB ±1 dB Attenuation: -12 dB ±1 dB/oct
- SN Ratio
- DPM-71A: 43 dBp-p (with 100 µE range) DPM-72A: 40 dBp-p (with 100 µE range) Stability
- Zero: ±0.1 μm/m/°C, ±1 μm/m/8 h Sensitivity: ±0.05%/°C, ±0.3%/8 h



Signal Conditioner Card **CDV-71A**

The CDV-71A is an isolated signal conditioner adopting DC bridge voltage. High frequency response at up to 50 kHz enables it to measure fast physical phenomenon. The card can connect to a strain gage or strain gage transducer.

- Frequency Response Range
- DC to 50 kHz (deviation +0.5/-3 dB) Applicable Bridge Resistance 60Ω to 10 k Ω (with 2 V bridge voltage) 300 Ω to 10 k Ω (with 10 V bridge voltage)
- Gage Factor
- 2.00 fixed
- Bridge Voltage 2 or 10 VDC, selectable by the switch
- Balance Adjustment Range
- Resistance: Within $\pm 2\%$ ($\pm 10000 \ \mu m/m$) **Balance Adjustment Method**
- True electron auto balance method
- (compensated value stored in nonvolatile memory)
- Accuracy: Within ±5 µm/m (with 200 xµE range)
- Sensitivity
- 0.05 V/10 µm/m input (with 2 V bridge voltage) 0.25 V/10 µm/m input (with 10 V bridge voltage)
- Nonlinearity
 - Within ±0.05% FS
- Reference Equivalent Strain (CAL)
 - \pm (10 to 9990 μ m/m), selectable by the 3-digit switch in 10 µm/m steps
- Accuracy: $\pm (0.3\% + 1 \,\mu m/m)$
- Sensitivity Switch (RANGE)
- 7 steps of 2, 5, 10, 20, 50, 100 x100 µE and OFF (each strain value stands for the input which initiates 5 V with 10 V bridge voltage and vernier control set to max.)
- Fine Sensitivity Control (VERN)
- 1 to 1/2.5
 - Low-Pass Filter
 - Second-order Butterworth
 - Cutoff frequency: 8 steps of 10, 30, 100, 300, 1k, 3k, 10k Hz and F (flat)
 - Amplitude ratio at cutoff point: -3 dB ±1 dB
 - Attenuation: -12 dB ±1 dB/oct
- Noise
- 20 μm/mp-p (with 200 με range) Stability
 - Zero: $\pm 1 \text{ um/m/}^{\circ}\text{C}$. $\pm 10 \text{ um/m/8 h}$ Sensitivity: ±0.02%/°C, ±0.1%/8 h



Thermocouple Card CTA-71A

Compatible with two types of thermocouples, K (CA) and T (CC), the CTA-71A comes with a temperature measuring adaptor 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 Control (VERN) 1 to 1/2.5 **Reference Junction Compensation** ±2.5°C (at -10 to 50°C) \pm 1°C (at approx. 20°C; \pm 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% of 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 Accessory Temperature measuring adaptor CT-2A (with built-in terminal temperature sensor to connect the thermocouple to the unit base)

F/V Converter Card CFV-71A

The CFV-71A can convert frequencies of up to 10 kHz to corresponding voltages and can supply power to the connected sensor. It can be used as a revolution counter as desired.

Input Signals

- Frequency: 0.2 Hz to 10 kHz AC (zero-cross), TTL level (including open collector signals) Voltage: ±0.5 to ±50 V
- Input impedance: Approx. 20 k Ω
- Nonlinearity
- Within ±0.1% FS
- Sensitivity Switch (RANGE)
- 6 steps of 500, 1k, 2k, 5k, 10k Hz and OFF
- Fine Sensitivity Control (VERN)
- 1 to 1/2.5
- Calibration
 - 100% and 50% of each measuring range Accuracy: Within $\pm 0.5\%$
- 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
- **Optional Accessories**
- Input cable U-12, conversion connector FV-1A
- NOTE: The unit base MCD-16A accepts up to 10 F/V converter cards if it has not any other type of conditioner card mounted in combination. If mounted in combination with other types of conditioner cards, the number of F/V converter cards is limited to 6.



TOTAL SYSTEM BLOCK DIAGRAM

CTA-71A

MONI ON

CTA-71A



Charge Amplifier Card CCA-71A

The CCA-71A is a conditioner intended for piezoelectric accelerometers. While it can connect to either built-in amplifier type or electric charge type acccelerometer, an optional charge converter, CCA-10A, 11A or 12A, is required for use with the electric charge type.

- Applicable Piezoelectric Accelerometer Built-in amplifier type, ±5000 mV
- Input
 - Built-in amplifier type: Unbalanced input, constant-current supply built in (constant current 4 mA, excitation voltage 24 V, load 1 k Ω or less) (Conversion adaptor CCA-1B for NDIS connector provided as a standard accessory)
 - Charge type: Optional charge converter CCA-10A, 11A or 12A required
- Sensitivity Switch (RANGE)
- 9 steps of 20, 50, 100, 200, 500, 1k, 2k, 5k mV and OFF
- Fine Sensitivity Control (VERN): 1 to 2.5 Internal Calibration
- 100% and 50% of each measuring range Accuracy: Within $\pm 0.5\%$ FS
- Frequency Response Range 1 Hz to 50 kHz (deviation +1/-3 dB)
- Low-Pass Filter
- Second-order Butterworth Cutoff frequency: 5 steps of 300, 1k, 3k, 10k Hz and F (flat)
- Accuracy of cutoff frequency: $-3 \text{ dB} \pm 1 \text{ dB}$ Attenuation: $-12 \text{ dB} \pm 1 \text{ dB/oct}$
- Distortion: 1% (±5 V)
- SN Ratio: 45 dB (with 20 mV range)
- Stability
- Zero: ±0.5 mV/°C, ±5 mV/8 h Sensitivity: ±0.1%/°C, ±1%/8 h
- Standard Accessory
- Conversion adaptor CCA-1B for NDIS connector

Optional Charge Converters

- CCA-10A, CCA-11A, CCA-12A
- Output: ±5000 mV
- Input Electric Charge
- CCA-10A: 500000 pC CCA-11A: 50000 pC
- CCA-12A: 50000 pC
- Gain Accuracy
- Within $\pm 1\%$ (in combination with CCA-71A)
- Frequency Response Range
- 1 Hz to 50 kHz (deviation +1/-3 dB) SN Ratio: 43 dB (in combination with CC-
- 71A and wth 20 mV range)



Bridge Boxes (for connection of strain gages to strain amplifiers and signal conditioners)



Multi Conditioner Cluster System MCC-A

The MCC-A is a unique system capable of clustering different kinds of conditioner cards to configure the most suitable package for measurement of desired physical values. All conditioner cards have the same output level, ensure excellent operational efficiency and can be controlled by personal computer.

- Varieties of conditioner cards are available for various measurement purposes.
- The unit base, the cabinet, to accommodate conditioner cards is available in three types of 6, 8 and 16 channels.
- Conditioner status including types, input identification signals, setting sensitivities, and calibration signals of all installed conditioner cards can be output to a personal computer via an optional interface.
- A personal computer can control conditioner cards via an optional interface.
- Each conditioner card features isolated input/output and ensures easy upgrade of the system (except for LFU-21A, 22A, HFU-21A, and CSL-21A).
- The unit base can have an address code designated to facilitate data processing if multiple unit bases are used.



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Model	A (mm)	B (mm)
MCC-6A	223.5	246
MCC-8A	264	286
MCC-16A	427	449

Selectable Components

Unit Bases MCC-6A (6-channel housing) MCC-8A (8-channel housing) MCC-16A (16-channel housing) Monitor Card DPE-16A (required for each unit base) **Conditioner Cards** DPM-11A/12A/13A dynamic strain amplifier cards CDV-21A/CDA-21A signal conditioner cards CZA-21A/22A isolation amplifier cards LFU-21A/22A low-pass filter cards HFU-21A high-pass filter card CFV-21A F-V converter card CPT-21A potentiometer card CTA-21A thermocouple card CCA-21A charge amplifier card **Optional Units** MCG-21A GPIB interface unit MCB-21A battery unit MCR-21A remote-control unit MCR-23A backup module

CCA-1A remote charge converter

Unit Bases MCC-6A/MCC-8A/MCC-16A

MCC-6A: 6-channel housing MCC-8A: 8-channel housing MCC-16A: 16-channel housing

- Power Requirements 90 to 250 VAC, 48 to 440 Hz, approx. 100 VA with 16 channels of dynamic strain amplifiers installed
- 11 to 30 VDC (11 to 15 VDC for MCC-16A), approx. 3.3 A with 16 channels of dynamic strain amplifier cards operated on 12 V,
- approx. 1.5A with 6 or 8 channels of dynamic strain amplifier cards operated on 12 V
- Dimensions & Mass
- MCC-6A: 223.5 x 132.5 x 354 mm, approx. 5 kg (including monitor card)
- MCC-8A: 264 x 132.5 x 354 mm,
- approx. 5.5 kg (including monitor card) MCC-16A: 427 x 132.5 x 354 mm,
- approx. 7 kg (including monitor card) Standard Accessories
- AC power cable P-18 (with conversion
- adaptor CM-33)
- DC power cable P-57
- Output cable U-59 Card pullout tool
- Miniature screwdriver
- Connectors for status information
- centralized output and synchronization Spare fuse
- Spare fuse
- Hexagonal wrench (1.5 mm) Instruction manual



Monitor Card DPE-16A

The monitor card consists of an output voltage indicator and carrier oscillators used for the dynamic strain amplifier card. The DPE-16A should be installed in each unit base.

- Monitor Indicator
 - 4-digit indication in red.
 - BRIGHT/UNBRIGHT switchable
 - Can monitor signals in a range of DC to the full frequency response range
 - Indication updated at a rate of approx. 3 times per second
- Linearity: 1/2 LSB max. in the case of DC 3 switchable types of carrier oscillators
- built in **Operating Temperature & Humidity:**
- -10 to 50°C, 85% RH or less

(noncondensing)

Storage Temperature: -30 to 70°C



Conditioner Cards

COMMON SPECIFICATIONS

Output Triple output

- (1) OUTPUT-V: ± 5 V or more (load 5 k Ω or more)
- (2) Parallel output of OUTPUT-V
- (depends on centralized connector) (3) OUTPUT-I: ± 5 V or more (load 5 k Ω or more.); ± 30 mA or more. (load 30 Ω)
- Vernier control: Continuously variable between 1 to 1/2.5 (for cards equipped with VERN control)

OUTPUT-I control: Continuously variable between 1 to 1/100

Output Impedance

OUTPUT-V approx. 2 Ω,

OUTPUT-I approx. 10 Ω

- Over-input Indication: OVER lamp lights up. KIND Output
- Signals to identify 10 kinds of conditioner cards can be output.
- **Channel Identification**

Plus calibration signal is superimposed in time series on each output voltage of channels 1 to 6, 8 or 16 (this helps to prevent erronous connection with channels of recorder) Withstand Voltage

250 VDC for one minute between input and

output, input and unit common, and output and unit common (DPM, CDV, CDA, CFV, CPT, CTA cards)

Dimensions: 20 x 128.5 x 233.2,

DIN41612-64 poles, IEC 603-2 64 poles (compatible with Eurocard)

Operating Temperature & Humidity

-10 to 50 °C, 85% RH or less (noncondensing) Storage Temperature: -30 to 70 °C

Strain Amplifier Cards DPM-11A/DPM-12A/DPM-13A

These models are carrier amplifiers for strain measurement. They differ with each other in their frequency response range. All feature an excellent SN ratio and the CST method to automatically eliminate unbalanced bridge capacitance, for stable measurement.

Frequency Response Range (Deviation ±10 %)/ Carrier Frequency DPM-11A: DC to 2.5 kHz/5 kHz DPM-12A: DC to 5 kHz/12 kHz DPM-13A: DC to 10 kHz/28 kHz Number of Measuring Channels: 1

Applicable Bridge Resistance: 60 to 1000 Ω

- Gage Factor: 2.00 fixed
- Bridge Voltage: Sine wave 2 V rms
- **Balance Adjustment Range**
- Resistance: ±1% (±5000 µm/m) Capacitance: 2000 pF
- Balance Adjustment Method
- Resistance: True electron auto balance Accuracy: ±1 µm/m

Capacitance: CST (capacitance self-tracking) Sensitivity (with 10 µm/m input)

- 0.5 V or more (load 5 kΩ or more) (0.2 V or more with DPM-13A) 3 mA or more (load 30 Ω)
- Nonlinearity: Within ±0.2% FS
- (within $\pm 0.3\%$ FS with DPM-13A)
- Calibration (Reference Equivalent Strain) ±50, ±100, ±200, ±500, ±1k, ±2k, ±5k με Accuracy: Within $\pm 0.5\%$ ($\pm 1 \mu$ m/m with
- calibration of $\pm 50 \ \mu$ E) Sensitivity Switch (RANGE)
- 7 steps of 100, 200, 500, 1k, 2k, 5k µ£ and 0 Accuracy: Within ±0.5% OUTPUT-I Control
- Continuously variable between 1 to 1/100 Low-Pass Filter
- Cutoff frequency: 6 steps of 10, 30, 100, 300, 1k Hz and F (flat)
- Amplitude ratio at cutoff point: -3 dB ±1 dB Attenuation: -12 dB/oct
- Noise with Max. Sensitivity
- 2 µm/mp-p or less with low-pass filter set at F 1 μ m/m_{p-p} or less with low-pass filter set at 300 Hz (with bridge resistance 120 Ω)
- Stability

Zero: ±0.1 μm/m/°C, ±1 μm/m/8 h $\pm 0.05\%$ FS/±10% power fluctuation

Sensitivity: ±0.05%/°C, ±0.3%/8 h ±0.05% FS/±10% power fluctuation

Remote Function: Provided



Signal Conditioner Cards **CDV-21A/CDA-21A**

CDV-21A: Constant-voltage type CDA-21A: Constant-current type These signal conditioners use DC bridge voltage and are intended to connect with strain gage transducers. The constant-current type CDA-21A is suitable for measurement of signals sent from a transducer connected through longer cable.

Number of Measuring Channels: 1 Applicable Bridge Resistance CDV-21A: 120 to 1000Ω CDA-21A: 999 Ω Gage Factor: 2.00 fixed Bridge Voltage				
CDV-21A: 2 VDC and 10 VDC (±0.2%),				
CDA-21A: 10 mA. constant current				
Input Impedance: 10 M Ω +10 M Ω				
Balance Adjustment Range				
Resistance: Within ±1%				
Balance Adjustment Method				
True electron auto balance				
Accuracy: Within 5 µm/m				
CDV 214: 0.1 V or more/10 um/m input				
(with bridge resistance 120 O and bridge				
voltage 2 V)				
CDA-21A: 0.175 V or more/10 µm/m input				
(with bridge resistance 350 Ω)				
Nonlinearity: Within ±0.05% FS				
Sensitivity Switch (RANGE)				
7 steps of 100, 200, 500, 1k, 2k, 5k με and 0				
Calibration (Reference Equivalent Strain)				
$\pm 50, \pm 100, \pm 200, \pm 500, \pm 1k, \pm 2k, \pm 5k \mu \epsilon$				
Accuracy: Within ±0.3% ±0.5 μm/m				
$(\pm 1 \ \mu m/m \text{ with calibration of } \pm 50 \ \mu \epsilon)$				
Frequency Response Range				
DC to 50 KHZ (+0.5/-3 dB)				
Low-Pass Filter				
Hz and E (flat)				
Δ mplitude ratio at cutoff point: -3 dB +1 dB				
Attenuation: $-12 \text{ dB} \pm 1 \text{ dB/oct}$				
Noise (with bridge resistance 350 Ω)				
CDV-21A				
Low-Pass Bridge Voltage CDA 21A				
Filter 2 V 10 V				
E (Elat) 50 µm/m 10 µm/m 29 µm/m				
$\frac{10 \text{ kHz}}{10 \text{ kHz}}$ 12 µm/m 2.4 µm/m 6.9 µm/m				
1 kHz 6 µm/m 1 2 µm/m 3 4 µm/m				
100 Hz 4 µm/m 0.8 µm/m 2.3 µm/m				
10 Hz 3 µm/m 0.6 µm/m 1.7 µm/m				
With BANGE switch set at 100 xue				

Stability

CDV-21A

Zero: $\pm 1 \ \mu m/m/^{\circ}C, \pm 10 \ \mu m/m/8 \ h$ Sensitivity: ±0.02%/°C, ±0.1%/8 h (with bridge resistance 350 Ω, bridge voltage 2 V and after one hour from power-on)

CDA-21A

Same as above with bridge resistance 350 Ω (equivalent to bridge voltage 3.5 V). Remote Function: Provided

CDV-21A

Isolation Amplifier Cards CZA-21A/CZA-22A

The CZA-21A and CZA-22A are amplifier cards featuring isolated input/ output, a high withstand voltage of 1000 VDC and high common mode rejection ratio. The CZA-21A provides a maximum gain of 100 times and a frequency response range of DC to 50 kHz, while the CZA-22A provides a maximum gain of 10000 times and a frequency response range of DC to 100 kHz.

High-Pass Filter Card HFU-21A

The HFU-21A is a high-pass filter card which eliminates unnecessary DC and low-frequency components contained in measured waveforms. The HFU-21A permits selection of a cutoff frequency in the same 64 steps as the low-pass filter card LFU-21A or LFU-22A, thereby enabling formation of a convenient band-pass filter together with the lowpass filter. (Input/output of the HFU-21A are not isolated.)







automatically.



Low-Pass Filter Cards

The LFU-21A and LFU-22A are highly-

eliminate unnecessary high-frequency

components contained in measured

amplitude type and the LFU-22A is a

of -48 dB/oct. (Input/output are not

linear phase type. Both permit selection of a cutoff frequency in 64 steps and

feature en excellent cutoff characteristic

F/V Converter Card CFV-21A

This frequency-to-voltage converter can

convert a frequency as high as 10 kHz to

Potentiometer Card CPT-21A

a corresponding voltage. It can supply

power to a connected sensor and be

The CPT-21A is a conditioner card

connectable to a potentiometer for

 $k\Omega$. Zero balancing is performed

angle or displacement measurement.

The applicable resistance is 1 k Ω to 10

used as a revolution counter.

waveforms. The LFU-21A is a flat

precise low-pass filter cards which

LFU-21A/LFU-22A

isolated.)





CTA-21A



Options to Enhance the Performance of the MCC-A System

GPIB Interface MCG-21A

This interface makes the MCC-A system controllable by personal computer together with other GPIB equipped instruments such as A-D converter and recorder. This realizes labor- and timesaving measurement, recording and processing/analysis.

Conforming to the IEEE Standard, data transfer is performed in ASCII.

Battery Unit MCB-21A

Where no AC wall outlet is available, the MCB-21A enables the MCC-A system to operate continuously for the following time length:

Approx. 3.5 hours with MCC-6A Approx. 3.0 hours with MCC-8A Approx. 1.0 hours with MCC-16A (from fully charged status and with dynamic strain amplifier cards installed)

Remote Control Unit MCR-21A

The MCR-21A can control the following from a distant location:

- Individual calibration by the unit or by the channel
- · Individual adjustment of initial unbalance by the unit or by the channel
- Function setting and reading of each channel · Initial setting at
- power-up
- Remote function test of MCC-A

Backup Module MCR-23A

This backup module stores the function settings of standard cards to set up the system in the previous conditions immediately upon power-on. It is connected to the amplifier status connector of the unit base MCC-A. Memory backup time: approx. 5 years (at 20°Č)

Rack-Mounting Kits MCY-15A/MCY-13A



	MCY-15A for JIS rack	MCY-13A for DIN EIA rack	
Α	150	132.5	
В	100	89	
Illustrated above is the MCV 15A for JIS rack			

Dummy Panels in MCY Series

	6 channels accommodated	8 channels accommodated		
Cards only	MCY-13A-6	MCY-13A-8		
+ GPIB Interface	MCY-13A-6-G	MCY-13A-8-G		
+ GPIB + Battery	MCY-13A-6-G.B	MCY-13A-8-G.B		
1-channel dummy panel is MCC-DUMMY-N.				

Thermocouple Card CTA-21A

The CTA-21A is a thermocouple card compatible with the K (CA) and T (CC) types. It is provided standard with the temperature measuring adaptor CT-1A for connection of a thermocouple to the unit base.

Charge Amplifier Card CCA-21A

The CCA-21A is a charge amplifier card compatible with all types of piezoelectric accelerometers, including amplifier builtin type and electric charge type. For the electric charge type accelerometers, the remote charge converter CCA-1A is used in combination. In this case, calibration values can be input for checking the input through to output.

DPM-600 Series Strain Amplifiers

The DPM-600 series are 1-channel dynamic strain amplifiers adopting a manual balancing method. While these instruments are of the carrier type, the CST method electrically cancels unbalanced capacitive components, which are automatically tracked even during measurement. Therefore, capacitance changes due to change in measurement environments or external disturbance cause virtually no errors in measurement.

- The CST method cancels unbalanced capacitive components by constantly tracking them to enable stable and precise measurement.
- An outstanding SN ratio enables safe measurement of micro strains.
- Calibration values can be set with the 4-digit switch.
- Over-input indication is provided.
- Wide frequency response range: DC to 10 kHz (DPM-603)
- High vibration resistance ensures stable operation under vibration of 29.42 m/s² (3 G).
- DPM-600B models are available which feature a withstand voltage of 1500 VAC for one minute.

Models Available

Madal	Frequency Response (Deviation ±10%)			Withstand Voltage	
Model	DC to 10 kHz	DC to 5 kHz	DC to 2.5 kHz	250 VAC	1500 VAC
DPM-603A	Yes			Yes	
DPM-602A		Yes		Yes	
DPM-601A			Yes	Yes	
DPM-603B	Yes				Yes
DPM-602B		Yes			Yes
DPM-601B			Yes		Yes

Auto balancing type DPM-613B, DPM-612B and DPM-611B are also available.

Number of Measuring Channels

- 1 (multiple units can be combined for multichannel configuration)
- Applicable Bridge Resistance: 60 to 1000 Ω
- Gage Factor: 2.00 fixed Bridge Voltage: 2 VAC/0.5 VAC rms, switchable
- Carrier Frequency
- DPM-601A/601B: 5 kHz
- DPM-602A/602B: 12 kHz
- DPM-603A/603B: 28 kHz
- Balance Adjustment Range (BAL)
- Resistance: Within $\pm 1\%$ ($\pm 5000 \ \mu$ m/m) Capacitance: 2000 pF
- Balance Adjustment Method
 - Resistance:
 - Manual balancing (10-turn potentiometer) Capacitance:
- CST (capacitance self-tracking)
- Sensitivity: 0.2 V or more.(load over 5 k Ω) or 3 mA or more (load 30 Ω) /10 µm/m input (with bridge voltage 2 V rpm)
- Output (Dual output)
- $\begin{array}{l} \text{OUTPUT I: } \pm 5 \text{ V or more (load 5 k}\Omega \text{ or more)} \\ \pm 30 \text{ mA or more (load 30 }\Omega) \\ \text{OUTPUT V: } \pm 5 \text{ V or more (load 5 k}\Omega \text{ or more)} \end{array}$
- ± 5 mA or more (load 3 Ω) (Models of ± 10 V output are optionally available).
- Nonlinearity Within $\pm 0.1\%$ FS ($\pm 0.2\%$ FS with DPM-603)
- Reference Equivalent Strain (CAL)
- ±(1 to 9999 μm/m) Setting: 4-digit switch Accuracy: Within ±(0.5% + 0.5 μm/m), within ±(0.5% + 1.0 μm/m) with DPM-603
- Sensitivity Switch (RANGE) 8 steps of 1, 2, 5, 10, 20, 50, 100 x100 με and
- 8 steps of 1, 2, 5, 10, 20, 50, 100 x100 με and OFF

Fine Sensivity Control (VERN): 1 to 1/2.5 OUTPUT I Adjustment

- Sensitivity: 1 to 1/100
- Zero: Approx. ±30 mV
- Low-Pass Filter
- Cutoff frequency: 6 steps of 10, 30, 100, 300, 1k Hz and F (flat)
- Amplitude ratio at cutoff point: -3 dB ±1 dB Attenuation: -12 dB/oct (except for DPM-601/611 set at 1 kHz)
- SN Ratio
- 46 dB_{p-p} (approx. 1/200) or more with RANGE set at 100 μ E (40 dB_{p-p} or more with DPM-603)
- 52 dB_{p-p} (approx. 1/400) or more with RANGE set at other than 100 μ E (46 dB_{p-p} or more with DPM-603)
- Zero Stability
- ±0.1 μm/m⁷°C (±0.2 μm/m with DPM-603) ±0.5 μm/m/24 h (±1 μm/m/24 h with DPM-603)
- ±0.05% FS/±10% power fluctuation
- Sensitivity Stability
- $\pm 0.0 \%/^{\circ}C, \pm 0.3\%/24 h$
- ±0.05%/±10% power fluctuation Withstand Voltage
- 250 VAC for one minute between measuring bridge and chassis
- 1000 VAC for one minite between AC power supply and chassis
- 1500 VAC for one minute between each of measuring bridge, output, AC power supply, DC power supply and chassis under a relative humidity of 70% or less (DPM-601B/602B/603B)
- Over-input Indication: OVER lamp flickers.



DPM-603A

Remote Function

Simultaneous calibration of all channels Vibration Resistance Conforms to MIL-STD-810C 10 to 500 Hz 19.61 m/s2 (2 G) 5 to 55 Hz 29.42 m/s² (3 G) 12 cycles each in X, Y and Z directions, 15 minutes/cycle **Operating Temperature & Humidity** -10 to 50°C, 85% RH (noncondensing) Storage Temperature: -30 to 70 °C Power Requirements AC line 10.5 to 15 VDC, 0.35 A **Dimensions & Mass** 49 x 142 x 264 mm (excluding protrusions), approx. 1.5 kg Standard Accessories AC power cable P-16 (with conversion adaptor CM-33) Output cable U-58 for DPM-600A series U-60 for DPM-600B series Spare fuses (midget type 0.5A, 1A) Miniature screwdriver for DPM-600A series Insulation screwdriver for DPM-600B series Instruction manual Optional Accessories . Bridge boxes in DB/DBB series (See page 5.) Housing case YA-B Noise filters F-7B/F-BNC (See last page.) Amplifier stand FA-1B (See last page.) Extension cables in N series (See last page.)



DPM-700B Series Strain Amplifiers

Dynamic strain amplifiers in the DPM-700B series are upgraded versions of the forerunners which have enjoyed an established reputation. Making full use of the leading-edge technology, the DPM-700B series are developed to have all functions controlled under the built-in microprocessor and thereby ensure strain measurement with higher accuracy and stability. In addition to new functions such as automatic carrier discrimination, comparator and saving of setting conditions in nonvolatile memory, the DPM-700B models offer versions of the functions of the forerunners.

- Excellent SN ratio enables highly precise measurement of micro strains.
- Carrier-based operation ensures outstanding stability and makes these amplifiers highly resistant to adverse influence from noise and thermoelectromotive force.
- Unbalanced capacitive components are canceled constantly by self-tracking with the CST method, thereby enabling stable and precise measurement.
- An automatic carrier discrimination circuit prevents erroneous operation due to switchover between INT and EXT.
- A bridge check function allows checking of connections between the strain gage and input connector.
- A panel meter provides three modes: AC, DC and PH. In the PH mode, the peak value is held until starting the next operation.
- Initial unbalance, RANGE, VERN, L.P.F. and COMP settings are all stored in nonvolatile memory and kept for a long period of time after the power is turned off.
- A built-in comparator makes the amplifiers usable in control applications.
- Isolated input/output ensures excellent noise resistance and stability to enable the amplifiers to configure a flexible measuring system.
- Balance adjustment range is twise as wide as the forerunners and accuracy is increased to a great extent.
- Excellent vibration resistance allows onboard applications.
- A key lock function helps to prevent erroneous operation.
- ullet Besides those stated in the specifications, output of 4 to 20 mA or ± 10 V may be specified as options.



Multiple DPM-700B Units Installed in Portable Case YB-506A



DPM-712B

Models Available

Models	Frequency Response (Dev. ±10%)	Carrier Frequency
DPM-711B	DC to 2.5 kHz	5kHz
DPM-712B	DC to 5 kHz	12 kHz
DPM-713B	DC to 10 kHz	28 kHz

Number of Measuring Channels

1 (multiple units can be combined for multichannel configuration)

- Applicable Bridge Resistance
- 60 to 1000 Ω

Gage Factor 2.00 fixed

Bridge Voltage

2 VAC/0.5 VAC rms, switchable

Balance Adjustment Range (BAL)

Resistance: Within $\pm 2\%$ ($\pm 10000 \ \mu$ m/m) Capacitance: 2000 pF

Balance Adjustment Method

Resistance: True electron auto balance Accuracy: ±0.5 μm/m (with RANGE set at 100 με and bridge voltage 2 V rms) Storage: Nonvolatile memory

Capacitance: CST (capacitance self-tracking) Sensitivity

0.2 V or more (load 5 k Ω or more) or 3 mA or more (load 30 Ω) to 10 μ m/m input with

bridge voltage 2 V rms Output (Dual output)

OUTPUT A: ± 5 V or more (load 5 k Ω or more) ± 10 mA or more (load 30 Ω)

Zero adjustment range: ± 0.1 V or more OUTPUT B: ± 5 V or more (load 5 k Ω or more)

 \pm 10mA or more (load 30 Ω) Sensitivity adjustment range: 1 to 1/100 Zero adjustment range: \pm 30 mV or more

to OUTPUT A

Note, however, current output cannot be selected simultaneouly for OUTPUTs A and B. Models providing 4 to 20mA output or \pm 10V output are optionally available. The model numbers and specifications are as follows:

DPM-711B M6/712B M6/713B M6 OUTPUT A: \pm 5 V or more (load 5 k Ω or more)

Zero adjustment range: ± 0.1 V or more OUTPUT B: 4 to 20 mA (250 Ω or less) to 0 to 5 V of OUTPUT A

DPM-711B M10/712B M10/713B M10 OUTPUT A: ± 10 V or more (load 5 k Ω or more) ± 10 mA or more (load 30Ω) Zero adjustment range: ±0.1 V or more OUTPUT B: ±10 V or more (load 5 kΩ or more) ±10 mA (load 30 Ω) Sensitivity adjustment range: 1 to 1/100 Zero adjustment range: ±30 mA or more to OUTPUT A Nonlinearity Within ±0.1% FS (±0.2% FS with DPM-713B) **Output Impedance** Approx. 2 Ω Reference Equivalent Strain (CAL) ±(1 to 9999 μm/m) Setting: 4-digit switch Accuracy: Within $\pm(0.5\% + 0.5 \mu m/m)$ $\pm (0.5\% + 1.0 \,\mu\text{m/m})$ with DPM-713B Sensitivity Switch (RANGE) 8 steps of 1, 2, 5, 10, 20, 50, 100 x100 $\mu\epsilon$ and OFF Accuracy: Within ±0.5% Storage: Nonvoltatile memory Fine Sensitivity Control (VERN) 1 to 1/2.5 Storage: Nonvolatile memory Low-Pass Filter (L.P.F.) Transfer characteristic: 2-pole second-order Butterworth Cutoff frequency: 6 steps of 10, 30, 100, 300. 1k Hz and F (flat) Amplitude ratio at cutoff point: -3 dB ±1 dB Attenuation: –12 dB \pm 1 dB/oct Storage: Nonvolatile memory SN Ratio 46 dB_{p-p} or more with RANGE set at 1 x 100 μ E (40 dBp-p or more with DPM-713B) 52 dB_{p-p} or more with RANGE set at other than 1 x 100 μ E (46 dB_{p-p} or more with DPM-713B) Zero Stability ±0.1 μm/m/°C (±0.2 μm/m/°C with DPM-713B) ±0.5 μm/m/24 h (±1 µm/m/24 h with DPM-713B) $\pm 0.05\%$ FS/ $\pm 10\%$ power fluctuation Sensitivity Stability ±0.05%/°C, ±0.3%/24 h ±0.05%/±10% power fluctuation Withstand Voltage 250 VAC for one minute between measuring bridge and chassis 1000 VAC for one minite between AC power supply and chassis **Over-input Indication** Panel meter flickers. **Output Voltage Indications** 4-digit indication of OUTPUT A value Update: Approx. 5 times/second 10-segment LED bar graph **Checking Function** Bridge check **Key Lock Function** RANGE, BAL, CAL, L.P.F., and METER MODE switches can be locked. **Remote Function** Balance adjustment, calibration and key lock can be executed remotely. Synchronization Internal (INT) and external (EXT) are discrimated automatically. Comparator High and low limits can be set in 1 mV steps between ±(0 to 9999 mV) Output: Signal exceeding high or low limit turns open collector ON. Accuracy: ±5 mV to panel meter reading

Number of comparison times: 15 times/sec

10 to 500 Hz 19.61 m/s² (2 G) 5 to 55 Hz 29.42 m/s² (3 G) 12 cycles each in X, Y and Z directions, 15 minutes/cvcle **Operating Temperature & Humidity** -10 to 50°C, 85% RH (noncondensing) Storage Temperature –30 to 70°C **Power Requirements** AC line, approx. 8 VA (100 VAC) 10.5 to 15 VDC, approx. 0.5 A (12 VDC) **Dimensions & Mass** 49 x 128.5 x 262.5 mm (excluding protrusions), approx. 1.4 kg Panel cut dimensions: 50 x 113 mm Standard Accessories AC power cable P-16 (with conversion adaptor CM-33) Output cable U-58 Short-circuit board Spare fuses (midget 0.5A, 1A) Adjustment screwdriver Instruction manual

Vibration Resistance

Conforms to MIL-STD-810C

Optional Accessories

Bridge boxes DB/DBB (See page 5.) Housing case YB-A Noise filters F7B/F-BNC (See last page.) Amplifier stand FA-1B (See last page.) Extension cables, N series (See last page.)



Unit: mm





Rear Panel

YA-B Series Portable Housing Cases for DPM-600



Model	Number of Mountable Amplifiers	A (mm)	B (mm)	C (mm)
YA-503B	3	165	205	185
YA-504B	4	215	255	235
YA-506B	6	315	355	335
YA-508B	8	415	455	435

Standard Accessory:

AC power cable P-17 (with conversion adaptor CM-33) **Optional Accessories:** Rack-mounting blackets Y-15A-N

1-channel dummy panel YA-DUMMY

YB-A Series Portable Housing Cases for DPM-700B



Model	Number of Mountable Amplifiers	A (mm)	B (mm)	C (mm)
YB-503A	3	163	208	179
YB-504A	4	213	257	229
YB-506A	6	312	356	328
YB-508A	8	411	455	427

Standard Accessories:

AC power cable P-17 (with conversion adaptor CM-33) DC power cable P-57

- 2 types of status output plugs, instruction manual **Optional Accessories:**
- JIS rack-mounting blacket H-1783 for YB-508A
- DIN rack-mounting bracket H-9429

1-channel dummy panel YB-DUMMY

Amplifier Stand FA-1B



This rubber-made stand is usable for: DPM-600 and 700B series

Noise Filters

(To eliminate noise containing high-frequency components)



Usable for the input of all strain amplifier cards and modules



F-BNC

JQA-QMA0821

Reliability through integration **KYOWA**

KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

Overseas Department:

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C 9 353 205 406 В 149 10 10 Δ



Extension Cables, N Series

Length

5m

10m

20m

30m

50m

100m



Model

N-81

N-82

N-83

N-84

N-85

N-100

An extension cable is used to extend a bridge box cable or transducer cable. Each cable in the N series is terminated with an NDIS connector plug at one end and a relay jack of the same specification at the other end.

Specifications are subject to change without notice for improvement.



Safety precautions Be sure to observe the safety precautions given in the instruction manual, in order to ensure correct and safe operation.

Manufacturer's Representative



Cat. No. 401B-U21