

Dynamic Strain
Measuring Instruments

Outline

1-channel

Multi-channel

DC Amplifier

Other

MCF-B

Multi Signal Conditioner

●8 or 16 channels



*RoHS compliant models except CFV-90A.
CFV-90A: RoHS compliant models are available. Inquires are welcome.

Simple-operation amplifier for various fields.

- Easy operation greatly reduces the working hours.
- 4-digit CAL switch.
- Hardly affected by noise.
- Various fixing fixtures and handles.
- You can set and control the MCF-B from your PC.
- Input Open Detection Function (DPM-91A/92A)

The MCF-B is a portable amplifier and builds a high-performance system by using conditioner cards. The CAL LOCK function keeps outputting the calibration values.

System Content

■ Unit Base

- MCF-8B (For measurement of up to 8 conditioner cards)
- MCF-16B (For measurement of up to 16 conditioner cards)

■ Conditioner Cards*

- DPM-91A/91A-I (Strain Amplifier Card, carrier frequency 5 kHz)
- DPM-92A/92A-I (Strain Amplifier Card, carrier frequency 12 kHz)
- (The suffix "-I" means with feature of robustness against inverter noise.)
- CDV-90A (Signal Conditioner Card)
- CTA-90A (Thermocouple Card)
- CCA-90A (Charge Amplifier Card)
- CFV-90A (F/V Converter Card)

*The carrier frequencies are different. Please be sure DPM-91A and DPM-92A are not mounted in the same unit base.

*When using strain gages, use bridge boxes.

*When mounting the CTA-90A and an empty channel exists, be sure to mount the dummy card.

*The software for the command control functions should be prepared by yourself. We have released the control commands.

*To use the command control functions, you may require to update the firmware of conditioner cards.

Note that the update should be handled by Kyowa (with charge).

Specifications

■ Multi Signal Conditioner MCF-B

Number of Conditioner Cards 8 (MCF-8B)
16 (MCF-16B)

Applicable Conditioner Cards

Card Model	Compatible Firmware
DPM-91A, DPM-91A-I DPM-92A, DPM-92A-I	Ver.03.00 or later
CDV-90A	Ver.03.00 or later
CTA-90A	Ver.01.02 or later
CFV-90A	Ver.03.01 or later
CCA-90A	Ver.03.00 or later

Monitor Meter Indicate output voltage of selected any channel by 1-digit sign and 4-digit value.
When error occurs, error No. and message are indicated.

Control Switch (Front)
CH select: Switching channels that indicate on the monitor meter.
BAL: Balance adjustment is executed all channels simultaneously.
+CAL, -CAL: Calibration output is executed all channels simultaneously.
KEY LOCK: When set to ON, no operation switches are available.

(Rear)
OSC select: To select the oscillator signal internal or external.
COM change-over: To change open or short between COM terminal and GND terminal.

Channel Indication CH LED lights up when the channel is monitored.

Key-lock Indication KEYLOCK LED lights up when Key-lock set to ON.

PHYSICAL QUANTITY Indication

PHYSICAL QUANTITY LED lights up when the conditioner card in TEDS mode.

Master Indication OSC INT LED lights up when use DPM card and when OSC select switch sets to INT as internal oscillator.

Other Function Automatically select carrier frequency according to the types of the connected DPM card.

Command Control Function

Signaling System RS-485 half duplex system
Communication Speed 9600 bps
Character Length 8 bits
Parity None
Stop Bit 1 bit
Delimiter CR: Command transmission to the MCF-B.
CR+LF: Data transmission from the MCF-B.
Device ID 0 to F (up to 16 units can be controlled by one computer)

*Device IDs are set using the DIP switches in the monitor display section.

Communication Range Up to 200 m

Command Start command control
End command control
Select monitor display channel
Get card type
Get connected models
Get version
Get error number
Get voltage
Execute balance adjustment (DPM-90A series, CDV-90A)
Set calibration output (DPM-90A series, CDV-90A, CTA-90A, CFV-90A, CCA-90A)
Set internal gain (DPM-90A series, CDV-90A, CTA-90A, CFV-90A, CCA-90A)

	Perform zero-point adjustment (DPM-90A series, CDV-90A, CFV-90A, CCA-90A)
	Perform internal gain adjustment (DPM-90A series, CDV-90A, CTA-90A, CCA-90)
	Set bridge voltage (CDV-90A)
	Switch TEDS mode on/off (DPM-90A series, CDV-90A, CCA-90A)
	Load TEDS information (DPM-90A series, CDV-90A, CCA-90A)
	Set low-pass filter cutoff frequency (DPM-90A series, CDV-90A, CCA-90A)
	Set high-pass filter cutoff frequency (DPM-90A series, CDV-90A)
	Select thermocouple type (CTA-90A)
	Switch measurement range (CFV-90A)
	Set input coupling (CFV-90A)
	Set trigger level (CFV-90A)
Switch Status in Command Control Mode	Switch operations are locked (except for [CH SELECT] switches).
Notification in Command Control Mode	[KEY LOCK] LED flashes.
Exiting Command Control Mode	Canceled by command or using switch.
Settings After Exiting Command Control Mode	Retains most recent settings.
Vibration Resistance	49.03 m/s ² (5 G) 5 to 55 Hz 15 cycles each in X, Y, Z directions, 1 min/cycle
Operating Temperature	-10 to 50°C
Operating Humidity	20 to 85% (Non-condensing)
Storage Temperature	-20 to 60°C
Power Supply	10 to 30 VDC
Current Consumption	1.5 A or less (MCF-8B) 3 A or less (MCF-16B) (Fully equipped with CDV-90A cards, bridge excitation = 2 V, bridge resistance 60 Ω, power supply 15 VDC.)
Connector	Centralized output connector (MDR connector, pincount 26, female) BNC connector
Dimensions	246.4 W × 101 H × 170 D mm (Excluding protrusions, MCF-8B) 440 W × 101 H × 170 D mm (Excluding protrusions, MCF-16B)
Weight	Approx. 3.5 kg, unit base only (MCF-8B) Approx. 5 kg (With 8 DPM-91A cards mounted, MCF-8B) Approx. 5 kg, unit base only (MCF-16B) Approx. 8 kg (With 16 DPM-91A cards mounted, MCF-16B)
Compliance	Directive 2014/30/EU (EMC) Directive 2011/65/EU, (EU) 2015/863 (10 restricted substances) (RoHS)
Standard Accessories	DC power cable P-76 (Approx. 1.8 m) Ground wire P-72 (Approx. 5 m) Synchronous cable U-59 (Approx. 1.5 m) Connector for centralized output cable Spare fuse Instruction manual (CD-R)
Optional Accessories	AC adapter UEA360-1540 1 channel dummy card MCF-DUMMY2 RS-485 extension cable for MCF N-136 (Approx. 1 m) RS-485 communication Y cable for MCF N-137 (Approx. 0.3 m) Independent left/right rack fixture MCF-BKT MCF handle fixture MCF-HANDLE Fixture for JIS rack for MCF-16B MCF-JIS Fixture for DIN rack for MCF-16B MCF-DIN

■ Strain Amplifier Card DPM-91A, 92A

Frequency Response and Carrier Frequencies

Models	Frequency Response	Carrier Frequencies
DPM-91A (-I)	DC to 2.5 kHz (Deviation ±10%)	5 kHz
DPM-92A (-I)	DC to 5 kHz (Deviation ±10%)	12 kHz

Measuring Targets Strain gages (A separate bridge box is necessary.)

Strain-gage transducers

Channels 1

Compatible Bridge Resistance 60 to 1000 Ω

Gage Factor 2.00 fixed

Bridge Excitation 2 V_{rms}

Balance Adjustment

Resistance: Within ±2% (±10 k × 10⁻⁶ strain)

Capacitance: 2000 pF or less

(Bridge resistance 120 Ω)

Balance Adjustment Methods

Resistance: Auto balance

(Stored in nonvolatile memory)

Accuracy: Within ±0.5 × 10⁻⁶ strain

(When 5 V output to 100 × 10⁻⁶
strain input)

Capacitance: CST (Capacitance self-tracking)

Nonlinearity Within ±0.2% FS

Calibration (CAL) ±(1 to 9999 × 10⁻⁶ strain)

Accuracy: Within ±(0.5% + 0.5 × 10⁻⁶ strain)

Sensitivity Adjustment

Sensitivity is set in combination with a 4-digit INPUT switch and
a 3-digit OUTPUT switch.

OUTPUT switch range: 1.00 to 5.00 V in 0.01-V step

INPUT switch range: 100 to 9999 × 10⁻⁶ strain in 1 × 10⁻⁶ strain step

Accuracy: Within ±(0.5%+5 mV)

Range: ×200 to ×50000

Fine Sensitivity Adjustment ×0.4 to ×1

LPF Transfer characteristic: 2nd order Butterworth

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

Amplitude ratio at cutoff point: -3 ±1 dB

Attenuation: (-12 ±1) dB/oct.

(Except set at 1 kHz.)

HPF Cutoff frequencies: 0.2 Hz, OFF (2 steps)

SN Ratio Conditions: When 200 × 10⁻⁶ strain input and 5V output,
120 Ω short.

DPM-91A: ≥49 dB_{PP}

DPM-91A-I: ≥44 dB_{PP}

DPM-92A: ≥45 dB_{PP}

DPM-92A-I: ≥40 dB_{PP}

Stability Temperature Zero point: Within ±0.1 × 10⁻⁶ strain per °C
Sensitivity: Within ±0.05%/°C

Time Zero point: Within ±1 × 10⁻⁶ strain per 8 h

Sensitivity: Within ±0.3%/8 h

(When 100 × 10⁻⁶ strain input and 5 V output, zero point is
measured by 120 Ω short, sensitivity is measured by
120 Ω bridge.)

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

Output voltage: Within ±5 V or over (Load 5k Ω or more)

Zero adjustment: Within ±0.1 V or over

Output Off Function Available

Output Impedance 2 Ω or less

Withstand Voltage 500 VAC within 1 min in:

Between input and output.

Between input and case.

Between output and case.

Over Input Indication LED lights up.

TEDS Reads the sensor's TEDS information then
sets the rated output to OUTPUT switch as
output voltage.

Input Open Detection Function Saturates output in the negative direction
when input is open.

Connector Shape Input connector: NDIS4102 (7 pins) connector
Output connector: BNC connector

Dimensions 24 W × 96 H × 170 D mm (Excluding protrusions)

Weight Approx. 190 g

Compliance Directive 2011/65/EU, (EU)2015/863
(10 restricted substances) (RoHS)

Standard Accessories Output cable U-59



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■ Signal Conditioner Card CDV-90A

Measuring Targets	Strain gages (A separate bridge box is necessary.) Strain-gage transducers
Channels	1
Gage Factor	2.00 fixed
Balance Adjustment	Within $\pm 2\%$ ($\pm 10 \times 10^{-6}$ strain)
Balance Adjustment Methods	Resistance: Auto balance (Compensated value stored in nonvolatile memory) Accuracy: Within $\pm 1 \times 10^{-6}$ strain (With excitation 10 V, 5 V output to 200×10^{-6} strain input)
Nonlinearity	Within $\pm 0.05\%$ FS
Input Impedance	20 M Ω or more
Output Impedance	2 Ω or less
Calibration Strain	$\pm (1 \text{ to } 9999 \times 10^{-6} \text{ strain})$ Accuracy: Within $\pm (0.3\% + 1 \times 10^{-6} \text{ strain})$
Sensitivity Adjustment	Sensitivity is set in combination with a 4-digit INPUT switch and a 3-digit OUTPUT switch. OUTPUT switch range: 1.00 to 5.00 V in 0.01-V step INPUT switch range: 200 to 9999×10^{-6} strain in 1×10^{-6} strain step Accuracy: Within $\pm (0.5\% + 5 \text{ mV})$ Range: $\times 200$ to $\times 5000$
Fine Sensitivity Adjustment	$\times 0.4$ to $\times 1$
Compatible Bridge Resistance	300 Ω to 1 k Ω (With excitation 10 V) 60 Ω to 1 k Ω (With excitation 2 V)
Bridge Excitation	2 or 10 VDC, switchable
Frequency Response	DC to 50 kHz (Deviation $+0.5$, -3 dB)
Output	Dual output (The same voltage is output to BNC connector and centralized output connector.) Output voltage: Within ± 5 V or over (Load 5k Ω or more) Zero adjustment: Within ± 0.1 V or over
Low-pass Filter	Transfer characteristic: 2nd order Butterworth Cutoff frequencies: 10, 30, 100, 300, 1 k, 3 k, 10k Hz and FLAT (8 steps) Amplitude ratio at cutoff point: -3 ± 1 dB Attenuation: (-12 ± 1) dB/oct.
High-pass Filter	Cutoff frequencies: 0.2 Hz, OFF (2 steps)
Noise	10×10^{-6} strain $_{pp}$ (When 10 V bridge excitation voltage, 200×10^{-6} strain input, 5 V output and 350 Ω short)
Stability	Temperature Zero point: Within $\pm 1 \times 10^{-6}$ strain per $^{\circ}\text{C}$ Sensitivity: Within $\pm 0.02\%/^{\circ}\text{C}$ Time Zero point: Within $\pm 10 \times 10^{-6}$ strain per 8 h Sensitivity: Within $\pm 0.1\%/8 \text{ h}$ (When 2 V bridge excitation voltage, 1000×10^{-6} strain input and 5 V output. Zero point is measured by 350 Ω short, sensitivity is measured by 350 Ω bridge.)
Output Off Function	Available
Withstand Voltage	500 VAC for 1 min, between the following two positions respectively. (Input and output, input and case, output and case)
Over Input Indication	LED lights up.
TEDS	Reads the sensor's TEDS information then sets the rated output to OUTPUT switch as output voltage.
Input Open Detection Function	Saturates output in the negative direction when input is open.
Connector Shape	Input connector: NDIS4102 (7 pins) connector Output connector: BNC connector
Dimensions	24 W $\times$ 96 H $\times$ 170 D mm (Excluding protrusions)
Weight	Approx. 150 g
Compliance	Directive 2011/65/EU, (EU)2015/863 (10 restricted substances) (RoHS)

Standard Accessories Output cable U-59

■ Thermocouple Card CTA-90A

Applicable Thermocouples	K, T, J, N, E, and R (Thermocouple resistance is 1 k Ω or less)
Measuring Range	K: -200 to 1300 $^{\circ}\text{C}$, T: -200 to 400 $^{\circ}\text{C}$ J: -200 to 1200 $^{\circ}\text{C}$, N: -200 to 1300 $^{\circ}\text{C}$ E: -200 to 1000 $^{\circ}\text{C}$, R: 0 to 1700 $^{\circ}\text{C}$
Channels	1
Reference Junction Compensation	± 2.5 $^{\circ}\text{C}$ (-10 to 50 $^{\circ}\text{C}$) ± 1 $^{\circ}\text{C}$ (20 ± 3 $^{\circ}\text{C}$)
Frequency Response	DC to 10 Hz (Deviation: $+0.5$, -1 dB)
Linearizer Accuracy	Within $\pm 0.5\%$ FS (With type K, J, N, E, R) Within $\pm 1\%$ FS (With type T)
Calibration	100 to 1700 $^{\circ}\text{C}$ from step up of 100 $^{\circ}\text{C}$ (Full scale depends on the type of thermocouple.) Accuracy: Within $\pm 0.5\%$ FS
Sensitivity Adjustment	Sensitivity is set in combination with a 2-digit INPUT switch and a 3-digit OUTPUT switch. OUTPUT switch range: 1.00 to 5.00 V in 0.01-V step INPUT switch range: 100 to 1700 $^{\circ}\text{C}$ in 100 $^{\circ}\text{C}$ step
Fine Sensitivity Adjustment	$\times 0.4$ to $\times 1$
Frequency Response	DC to 10 Hz (Deviation $+0.5$, -1 dB)
Noise	30 mV $_{pp}$ or less (Input short)
Stability	Temperature Zero point: Within $\pm 0.05\%$ FS/ $^{\circ}\text{C}$ Sensitivity: Within $\pm 0.05\%/^{\circ}\text{C}$ Time Zero point: Within $\pm 0.5\%$ FS/8 h Sensitivity: Within $\pm 0.5\%/8 \text{ h}$ (Using K type, 5 V output to 1300 $^{\circ}\text{C}$)
Withstand Voltage	500 VAC for 1 min, between the following two positions respectively: Input and output, input and case, output and case
Over Input Indication	LED lights up.
Connector Shape	Input connector: One-touch type terminal block Output connector: BNC connector Applicable wire Solid wire: $\phi 0.4$ mm to $\phi 1.3$ mm (UL AWG16 to 26) Twisted wire: $\phi 0.2$ mm ² to $\phi 1.3$ mm ² (UL AWG16 to 24)
Dimensions	24 W $\times$ 96 H $\times$ 170 D mm (Excluding protrusions)
Weight	Approx. 140 g
Compliance	Directive 2011/65/EU, (EU)2015/863 (10 restricted substances) (RoHS)
Standard Accessories	Output cable U-59

■ Charge Amplifier Card CCA-90A

Channels	1
Measuring Targets	IEPE accelerometer, Max. ± 5000 mV (built-in amplifier type) *Charge converter is necessary when using a charge output accelerometer. Recommended item: Fuji ceramics corporation, "CAC1R0"
Input	Input format: Unbalanced input Sensor supply: Built-in constant-current supply Constant current 4 mA Excitation voltage: Approx. 24 V
Frequency Response	0.2 Hz to 50 kHz (Deviation $+1$, -3 dB)
Sensitivity Adjustment	Sensitivity is set in combination with a 4-digit INPUT switch and a 3-digit OUTPUT switch. INPUT switch range: 20 to 5000 mV in 1-mV step OUTPUT switch range: 1.00 to 5.00 V in 0.01-V step Accuracy: Within $\pm (0.5\% + 5 \text{ mV})$ Range: $\times 1$ to $\times 250$
Fine Sensitivity Adjustment	$\times 0.4$ to $\times 1$
Calibration (DC CAL)	$\pm (1 \text{ to } 5000 \text{ mV})$ Accuracy: Within $\pm 0.3\%$ FS

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Low-pass Filter	Transfer characteristic: 2nd order Butterworth Cutoff frequencies: 300, 1k, 3k, 10k Hz and FLAT (5 steps) Amplitude ratio at cutoff point: -3 ± 1 dB Attenuation: (-12 ± 1) dB/oct.
Distortion Rate	Within 1% (When ± 5 V output)
SN Ratio	48 dB _{PP} or more (When 20 mV input and 5 V output)
Stability	Temperature Zero point: Within ± 0.5 mV per °C Sensitivity: Within ± 0.05 %/ °C Time Zero point: Within ± 5 mV per 8h Sensitivity: Within ± 0.5 %/8h
TEDS	Reads the sensor's TEDS information then displays it on the monitor meter to the value that converted the output voltage into the physical quantity.
Output	Dual output, both BNC connector and integrated connector output the same signal. Voltage output: ± 5 V or more, when load resistance 5 k Ω or more Zero adjustment: -0.1 to 0.1 V or wider
Output Off Function	Available
Output Impedance	2 Ω or less
Withstand Voltage	500 VAC for 1 min, between the following two positions respectively: Input and output, input and case, output and case
Over Input Indication	LED lights up.
Connector Shape	Input connector: BNC Output connector: BNC
Dimensions	24 W $\times$ 96 H $\times$ 170 D mm (Excluding protrusions)
Weight	Approx. 140 g
Compliance	Directive 2011/65/EU, (EU)2015/863 (10 restricted substances) (RoHS)
(Note) The specifications does not include the accuracy of the optional charge converter.	
Standard Accessories	Output cable U-59

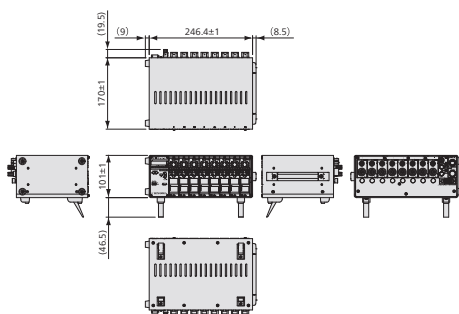
■ F/V Converter Card CFV-90A

Channels	1
Measuring Targets	AC signal Pulse signal (including open collector signal)
Frequency Range	0.2 Hz to 100 kHz *When set to 1.0 V output and 20 kHz range, 100 kHz input can measure as 5 V.
Input Voltage	± 0.5 to ± 50 V
Input Coupling	AC or DC Select by switch operation.
Trigger Level (Input Detection Level)	0.0 to 5.0 V in 0.1-V step Trigger level is set from the 2-digit thumbwheel switch. (When trigger level set to 5.1 V or more, trigger level saturates at 5.0 V)

Nonlinearity	Within $\pm 0.1\%$ FS
Sensitivity Adjustment (RANGE)	500, 1k, 2k, 5k, 10k, 20 kHz (6 steps) Full scale of the range is output with the voltage set with the OUTPUT switch (3-digit thumbwheel switch). Accuracy: Within $\pm (0.1\% + 5$ mV) (Setting Example) When "SET" is executed with RANGE set to 20 kHz and OUTPUT switch set to 1.0 V, 1.0 V output at 20 kHz input, 5.0 V output at 100 kHz input.
Calibration (CAL)	100% or 50% of each RANGE Accuracy: Within $\pm 0.5\%$
Response Time	When frequency continuous: Less than one cycle of the input signal + 25 μ s or less (At the start of output voltage rising) When frequency cutoff: Less than two cycle of the input signal + 25 μ s or less (At the start of output voltage falling)
Power Supply to Sensors	12 VDC $\pm 10\%$ (At load current is 50 mA or less.)
Noise	30 mVp-p or less (When input the signal: Square, frequency 100 kHz, amplitude: ± 0.5 V)
Stability	Temperature Zero point: Within $\pm 0.01\%$ FS per °C Sensitivity: Within $\pm 0.01\%$ / °C Time Zero point: Within $\pm 0.05\%$ FS per 8h Sensitivity: Within $\pm 0.05\%$ /8h
Output	Dual output (The same voltage is output to BNC connector and centralized output connector.) Output voltage: Within 0 to 5 V (Load 5 k Ω or more) Zero adjustment: Within ± 0.1 V
Output Off Function	Available
Output Impedance	2 Ω or less
Withstand Voltage	500 VAC for 1 min, between the following two positions respectively: Input and output, input and case, output and case
Over Input Indication	LED lights up.
Connector Shape	Input connector: NDIS4109 (Small round 9 pins) Output connector: BNC
Dimensions	24 W $\times$ 96 H $\times$ 170 D mm (Excluding protrusions)
Weight	Approx. 140 g
(Note) When using MCF-16B, CFV-90A maximum installed amount are 12 units. (When CFV-90A only installed.) When using mixed the other conditioner card, CFV-90A maximum installed amount are 8 units. When using MCF-8B, no restriction on the number of units to be installed.	
Standard Accessories	Output cable U-59 Input connector plug 4109P

■ Dimensions

● MCF-8B



● MCF-16B

