TML

SMART DYNAMIC STRAIN RECORDER

Standard
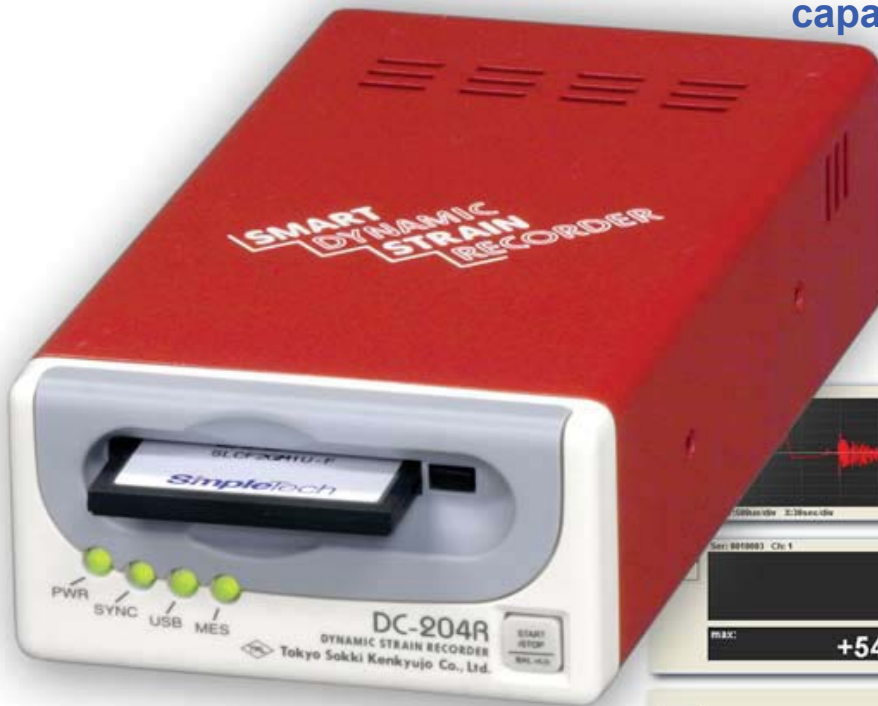# DC-204R

With analog output
DC-204Ra

Strain
DC voltage
Temperature

High speed sampling 200kHz

Large data recording 2GB capacity

Automatic data storing at power interruption **onboard UPS**

DC-204R
DYNAMIC STRAIN RECORDER
Tokyo Sokki Kenkyujo Co., Ltd.

PWR SYNC USB MES

START /STOP

CompactFlash
2GB
SLCF2GM1U
SimpleTech

-1027 ue
max: +5465   min: -4688

Tokyo Sokki Kenkyujo Co., Ltd.

200kHz sampling!
Large data storing with 2GB CF card!
All-in-one model with further upgraded functions!

The DC-204R/DC-204Ra is a compact flash recording type 4-channel dynamic strain recorder and measures strain, DC voltage and thermocouples. The DC-204Ra equips an analog output of ±5V to enable, waveform output to external recorders, display devices and automobile ECU. As compared with the previous model DC-104R/DC-104Ra, the frequency response is upgraded to 10kHz and sampling speed to 200kHz at the fastest. At the same time of measurement, measured data are automatically stored on a compact flash card up to 2GB. Using the controller DC-7204 as bundled software, the maximum 8 units (32 channels) including the DC-104 series can be used together. In addition to numerical monitor and waveform display, dynamically variable amount can be displayed in analog form and in real time. The battery-operating all-in-one model is optimum for measurement on a high speed moving body. AC operation needs a power adaptor as an option.

> The recorder is compatible with a compact flash card adapter of 32MB to 2GB. The formatted flash cards are available from TML.

Miniature
- Possible connection of 8 units (total 32 channels)

It is as small as 15.7x8.4cm like postcard and 4.2cm in height, suitable for vehicle onboard measurement. The 4-channel unit can be connected in parallel up to 8 units (total 32 channels).

Onboard Analog Output   DC-204Ra

Using the supplied analog output cable (CR-3610), the DC-204Ra can output 4-channel live waveform to external recorders and display devices.

Automatic Data Protection at Power Interruption (UPS)   *New Function*

In case of accidental power degradation during measurement, the built-in UPS circuit stops measurement and gets measured data automatically and safely stored on the CF card. Even if power supply is suddenly interrupted, the power switch is designed to turn off after recording the measured data on the CF card.

Memory Card of 2GB at the Maximum   *Upgraded*

It is compatible with a flash memory card of 32MB to 2GB in memory capacity. The formatted CF cards are available from TML. TML does not guarantee operation of commercial CF cards.

Recording Format

Measured data can be stored in not only CSV format but BIN format conforming to commercial software DADiSP for data analysis of dynamic phenomena. The bundled software CONTROLLER DC-7204 can get the data stored in CSV and BIN format.

High speed Sampling of 200kHz   *Upgraded*

The DC-204 series has a frequency response of DC to 10kHz. The maximum sampling speed is 200kHz with one channel. Reading of the stored data from the CF card during measurement and monitoring the measuring waveform data in real time are possible. (N.B. The sampling speed is restricted.)

Bar Graph Monitor and Circular Graph Monitor   *New Function*

The DC-204 series bundled software CONTROLLER DC-7204 can monitor dynamically variable amount in analog form and in real time with bar graph and circular graph as well as numeric values and waveform.

> DADiSP is available as a separate software package from DSP Development Corporation in the USA.
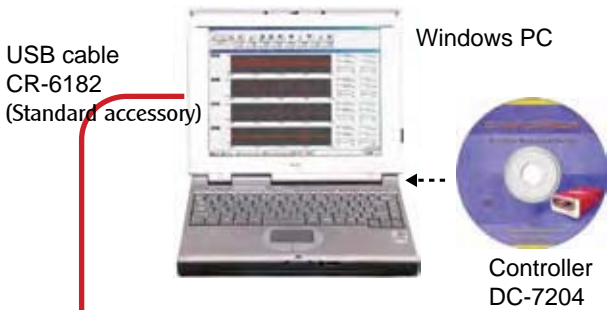
Sampling Speed and Recording Time

The highest sampling speed is 5μ sec.* with one channel and the measured data are recorded on a specified CF memory card at the same speed. The relationship of recording time (measuring time) with sampling speed is tabulated below. The measuring time depends on the data size.

* 1 channel use

Sampling frequency	Sampling speed	1 channel	2 channels	4 channels
200kHz	5μs	1.3 hours	—	—
100kHz	10μs	2.7 hours	1.3 hours	—
50kHz	20μs	5.5 hours	2.7 hours	1.3 hours
10kHz	100μs	27.4 hours	13.5 hours	6.7 hours
5kHz	200μs	55.4 hours	27.4 hours	13.5 hours
1kHz	1ms	11.4 days	5.6 days	67.5 hours
500Hz	2ms	23.1 days	11.4 days	5.6 days
50Hz	20ms	231 days	114 days	56.3 days
20Hz	50ms	572 days	281 days	140 days
10Hz	100ms	1155 days	572 days	281 days

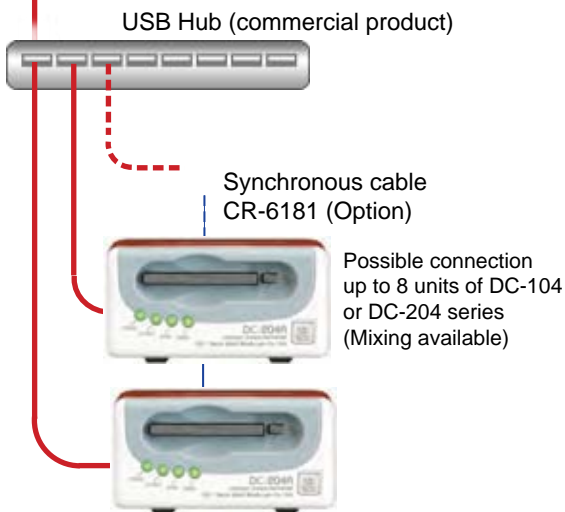In case of a 8M data size continuously recorded on a 2GB CF card

USB cable
CR-6182
(Standard accessory)

Windows PC

Controller
DC-7204

Measurement with 1 unit

Measurement with 2 or more units

USB Hub (commercial product)

Synchronous cable
CR-6181 (Option)

Possible connection
up to 8 units of DC-104
or DC-204 series
(Mixing available)

Analog output

DC-204Ra
(**DC-104Ra**)

Analog output to
external devices

Analog output
cable CR-3610

Recorders
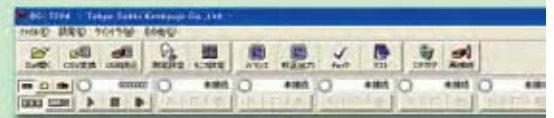
Oscillographs

Digital display
devices

Automobile
ECU, etc.

Measurement Software
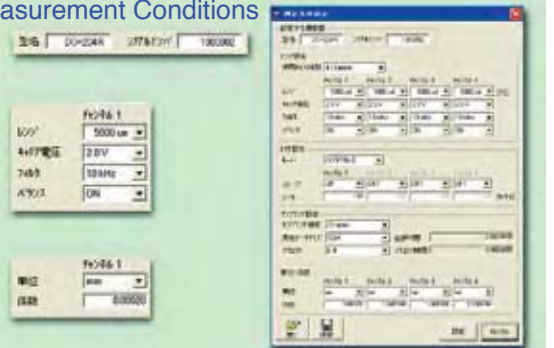## Controller DC-7204 (Standard accessory)

● **Main menu**
Main menu at the
time of start

● **Setting up Measurement Conditions**

Click the Measure
Setting to open dia-
log for measurement
conditions.

Set measuring capa-
city, unit, coefficient
etc.

● **Monitoring**

Click the Monitoring
Setting.
Dynamically variable
amount during mea-
surement can be
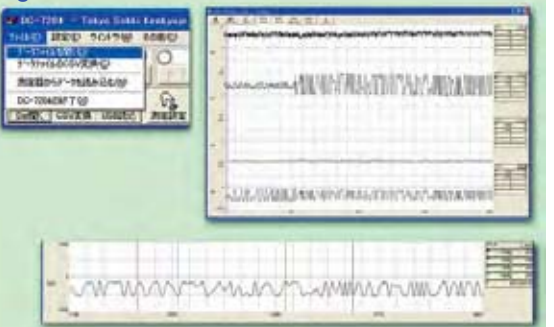viewed in numeric,
waveform, bar-graph,
cirular-graph, etc.

Measured data are
written directly on CF
card.
Data format is BIN
or CSV.

Circular-graph monitor   Bar-graph monitor

● **Data Processing**
The measured data
saved on CF card
are read. Processing
such as printout,
display of maximum,
minimum and mean
values and cutoput is
done.

Related Products
Measurement Software *Visual LOG*

● *DC-7630 Dynamic strain recorder measurement
and Data Processing Software*

In addition to operation extended
channel function, on-line or off-
line automatic measurement can
be made. An function of extract-
ing /omitting measured data is
provided. Graphic display in real
time during sampling is possible.

● *DFA-7610 FFT Analysis and Processing Software*

Various analysis processing for data file gotten by the supplied
software DC-7204 or optional software DC-7630 is done.

● *Carring Case CA-10A*

This is an aluminum carrying case to
store the recorder, strain connectors,
cables, etc.

Size: 400(W) x 260(D) x 100(H) mm

Input channel Section

Strain gauges

Strain Connectors `OPTION`

A stain gauge bridge configuration connector for the DC-104/DC-204 series recorders

SB-120DD-1R   120 ohms 3-wire quarter bridge
                 120/350 ohms half bridge
SB-350DD-1R   350 ohms 3-wire quarter bridge
                 120/350 ohms half bridge
SB-120DD-4R   120/350 ohms full bridge

Available is a remote sense cable (Option) to compensate for sensitivity degradation due to cable extension.

Strain gauge based transducers

Sensor input conversion cable CR-6180 (Standard accessory)

Used for connecting strain gauge based transducers (for force, displacement, pressure, acceleration, etc.) with a NDIS plug at the cable.

DC voltage

Attenuatioin cable CR-4010 `OPTION`

Used when inputting voltage signal. The measuring range of voltage signal is ±20V. The signal is attenuated to 1/1000 for input.

Thermocouple (temperature)
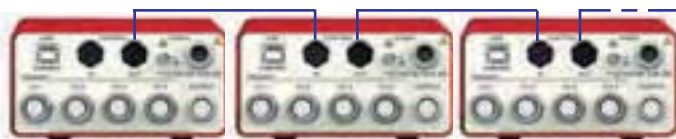
Thermocouple adapter TA-01KT `OPTION`

It enables temperature measurements using thermocouples type T or K. No external power supplies is needed. The adapter is connected through the supplied sensor input conversion cable CR-6180.

Control Section Max. 32 channels with 8 units

In case of connecting 2 or more units of the DC-104R/DC-204R series, the use of the synchronous cable CR-6181 (option) makes simultaneous sampling possible. In this case, power supply is necessary for all the connected recorders.

Synchronous cable CR-6181

External Start/Stop and External Trigger

External control signals for start, stop and trigger are input to the OONTROL IN connector.

Power Supply Section

DC Power Supply DC10～16V

The supplied cable CR-1310 is used.

Battery driving

Battery driving in combination with the battery pack BA-104 (option) is possible.

AC Power Supply

Using the AC adapter set CR-1860 (option), AC operation is possible.

USB Interface Section

Using the supplied USB cable CR-6182, the DC-104R/DC-204R recorders can be hooked up to a computer.

Analog Output Section [DC-204Aa/DC-104Aa]

By connecting the supplied output cable CR-3610 to the OUTPUT connector, a voltage output of 0 ~ Å}5V is obtained. Voltage signals for 4 channels from the one connector cable can be output to external recorders, etc.

Compact flash memory card

TML specified CF card is used. The memory capacity is up to 2GB.

Status LED

Each operational status is indicated.
MES /Measuring
USB /Communicating with USB cable
SYNC /Synchronizing with 2 or more
recorders.
PWR /Switching on

START/STOP

Gets started or stopped.

BAL/HLD

By depressing the key 3 seconds or more, Balancing functiions for the model itself.

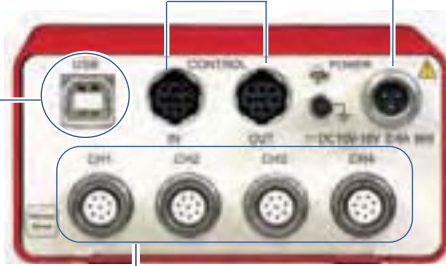DC-204R   DC-204Ra

USB Interface

The USB cable (CR-6182) is plugged in. Measurement setup and data are transferred to a PC.

Power supply

Operates on DC power supply. The battery and recorder are connected with the power cable (CR-1310). For AC operation, use the optional AC adapter set CR-1860.

Control

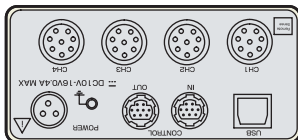For synchronization of 2 or more recorders. The optional synchronous cable (CR-6181) is needed.

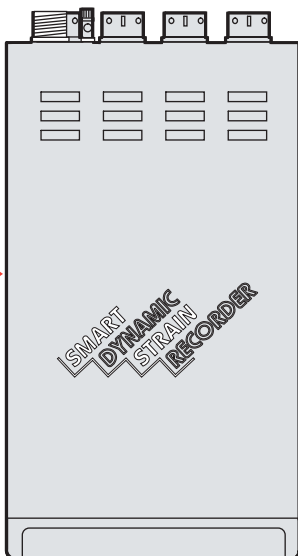**Power supply**

Input channel

Strain gauges and strain gauge based transducers are plugged in through the supplied sensor input conversion cable (CR-6180). The voltage input attenuation cable CR-4010 (option) and thermocouple adapter TA-01KT (option) can be also connected.
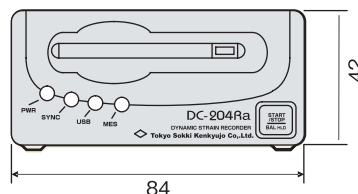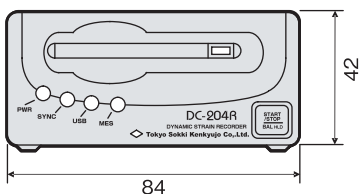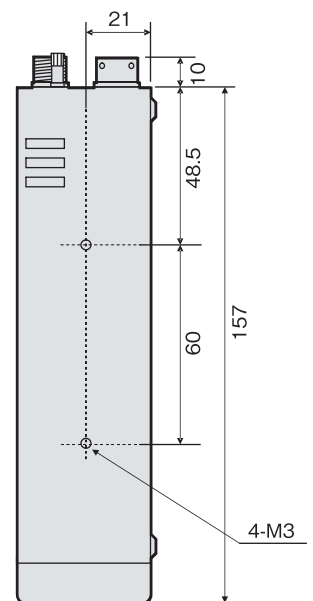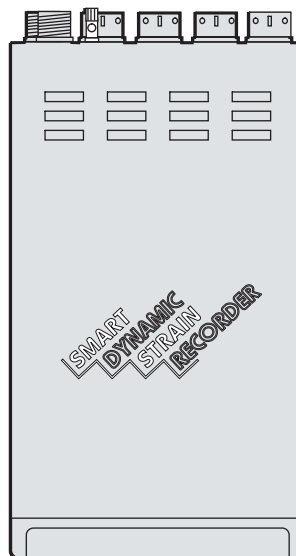
Analog output 〔DC-204Ra only〕

The DC-204Ra has an analog output. By connecting the supplied analog output cable (CR-3610), a live wave form is output to an external recording device.

DC-204R ▶

DC-204Ra ▶

21
10
48.5
157
60
4-M3

42

84

42

84

Unit in mm

Measurement

Measuring points	4
Inputs	Strain
	DC voltage with optional cable CR-4010

Strain measurement

Gauge resistance	120Ω、350Ω（Full bridge）
Bridge excitation	DC2V、0.5V、ON/OFF control
Measuring range	1000、2000、5000、10000、20000×10^{-6} strain in 5 ranges
Maximum range	±80000×10^{-6} strain
Accuracy	±0.2%FS

Voltage measurement 【using CR-4010 option】

Measuring range	1、2、5、10、20V in 5 ranges
Maximum range	±20V
Accuracy	±0.3%FS
Lowpass filter	10、30、100、300Hz、1k、3k、10kHz（Bessel type）
Frequency response	DC 〜 10kHz（−3dB±1dB）
Temperature coefficient	
Stability on zero	±1×10^{-6} strain/ºC with maximum sensitivity
Stability on span	±0.01%FS/ºC with maximum sensitivity
Balancing method	Electronics
Balancing range	±10000×10^{-6} strain
Balancing accuracy	±0.06%FS
Balancing speed	Approx. 1 sec. per channel
A/D converter	16-bit successive approximation
Resolution	1000×10^{-6} strain range : 1 or 0.1×10^{-6} strain
	2000×10^{-6} strain range : 1 or 0.1×10^{-6} strain
	5000×10^{-6} strain range : 1×10^{-6} strain
	10000×10^{-6} strain range : 1×10^{-6} strain
	20000×10^{-6} strain range : 1×10^{-6} strain
Sampling method	Simultaneous sampling
Sampling speed	5μs in 1 channel mode (200kHz)
	10μs in 2 channel mode (100kHz)
	20μs in 4 channel mode (50kHz)

Function

Start/Stop	Panel key operation, External signal
	Computer operation available
Manual trigger	External signal, Computer operation available
Balance/Open check	Panel key operation, Computer operation available
Synchronous measurement	
	Synchronous sampling available with 8 units 32 channels
	Combination use with DC-104R/DC-104Ra available

Display unit

LED status	Power、Synchronization、USB、Measurement

Setup

Procedure	By USB communication with bundled software
Channel	1、2、4 channel mode
Trigger	
Trigger mode	SINGLE、CONTINUE、FREERUN
Trigger level	±(0% 〜 100%) with 0.1% division for full scale

Data save

Saving media	Compact FLASH memory card
	32M〜2GB supplied from TML
	N.B.: High speed sampling use card is 128M〜2GB supplied from TML.
Format	Conforms to DADiSP/2000
Saving speed	5μs [1]、10μs [2]、20μs、50μs、100μs、200μs、500μs、1ms、2ms、5ms、10ms、20ms、50ms、
(Sampling intervals)	100ms、200ms、500ms、1s
	[1] : in 1-ch use only [2] : in 1-、or 2-ch use only
	Other with up to 4 channels
Data size	1k、2k、4k、8k、16k、32k、64k、128k、256k、512k 1M、2M、3M、4M、6M、8M、12M、16M、24M、32M、48M、60M、120M [3]、240M [4] ［Data］
	[3] : in 1-ch use only
	[4] : in 1-、or 2-ch use only
	Other with up to 4 channels
	For high speed sampling, the size is restricted to 64k data over in 1-ch use, 32k data over in 2-ch use, and 16k data over in 4-ch use.
Pre-area	Changeable by 10% division for 0〜100% while 256k data in 1-ch is at maximum.
File numbers	Maximum 255

Analog output 【DC-204Ra only available】

Voltage output	±5V（5kΩ load）or ±1mA
Output accuracy	±0.3%FS
Output balancing accuracy	±5mV or less（at 5000×10^{-6} strain）
Stability on zero	±2mV/ºC（at maximum sensitivity）
Calibration output	±1V
Lowpass filter	10、30、100、300Hz、1k、3k、10kHz (amplitude flat)
S/N ratio	46dBp-p or over (with filter of 1kHz or less, 1000×10^{-6} strain)

General Specifications

Power supply	10 〜 16V dc
	DC-204R 0.4A MAX.
	DC-204Ra 0.4A MAX.
Environment	0ºC〜＋50ºC 85%RH or less（no condensation）
Vibration tolerance	49m/s^2（5 〜 50Hz）in 3 directions
Dimensions	84（W）×42（H）×157（D）mm
Weight	500g

■ Product for CE marking is available on request.

Standard accessory

Operation manual …………………………………………1
DC Power cable CR-1310……………………………1
Sensor cable CR-6180 ………………………………4
USB cable CR-6182 …………………………………1
Output cable CR-3610 【DC-204Ra only】…………1
Compact Flash Memory card
　High speed type (512MB）………………………1
Measuring software Controller DC-7204
　（CD-ROM）………………………………………1

Specifications are subject to change without prior notice.