TML

HANDHELD DATA LOGGER TC-32K

Strain Gauges

Strain Gauge-transducers

DC voltage

Thermocouple

Pt RTD

CSW-5A for multiple measurement

LCD screen with backlight

Interface
USB
RS-232C

Pop-up menu

Alkaline battery drive supported

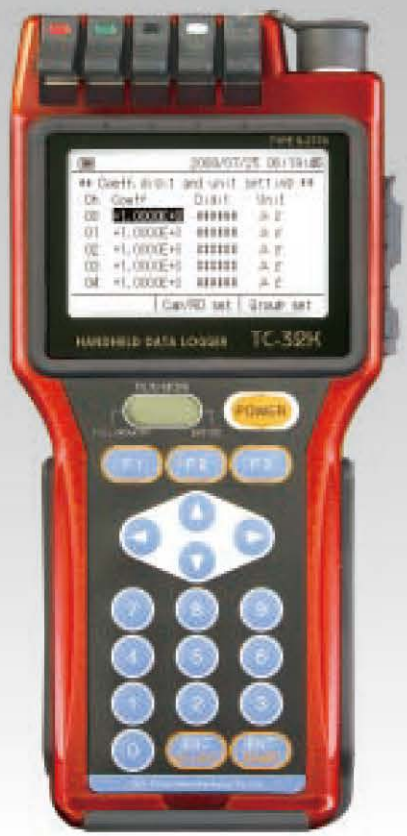
Compact Flash card saving

1-Gauge 4-Wire method Strain measurement

TML Tokyo Sokki Kenkyujo Co., Ltd.

HANDHELD DATA LOGGER

TC-32K



TC-32K is a compact and handheld digital data logger. The splash-waterproof construction enables outdoor use. The sensor connection terminal board is a patented one-touch type to facilitate connection with leadwires and banana plug and speedy preparation for measurement. Sensor mode, coefficient and initial values can be set and measurement values recorded for the maximum 20 channels, so you can collect measurement data at several field sites for later data processing. The use of the exclusive switching box CSW-5A makes 5-channel automatic measurement possible. TC-32K has an interval timer, data memory, compact flash memory card slot and interfaces for computer control and data transfer. Gauge resistance and insulation resistance measurement functions are also provided to easily check strain gauges and transducers.

High brightness LCD and Display in selectable Measurement mode switch

LCD with backlight
Resolution: 255×160 dots

Easy operability and high reliability

Keeping in touch with multi-measurement of strain, DC voltage, thermocouple, Pt RTD, etc.

- Strain gauges
- Strain gauge-based transducers — Load cell, Displacement transducers, etc.
- Thermocouples
- DC voltage
- Pt RTD

Through TEDS compatible sensor, automatically recognizes measuring range, rated output, etc.

One-touch connection with TEDS ompatible load cell.

To use TEDS function, a transducer supporting TEDS is required.

1-Gauge 4-Wire measurement available

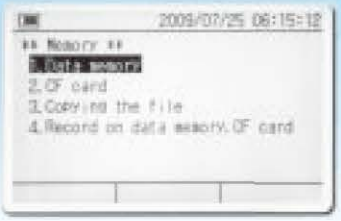
Optional adaptor CR-5810 offers 1-Gauge 4-Wire measurement (patent) with connection by modular plug, enabling ideal measurement without sensitivity drop and temperature effect due to leadwires.

1-Gauge 4-Wire adaptor CR-5810 (option)

1-Gauge 4-Wire method strain gauges with modular plug

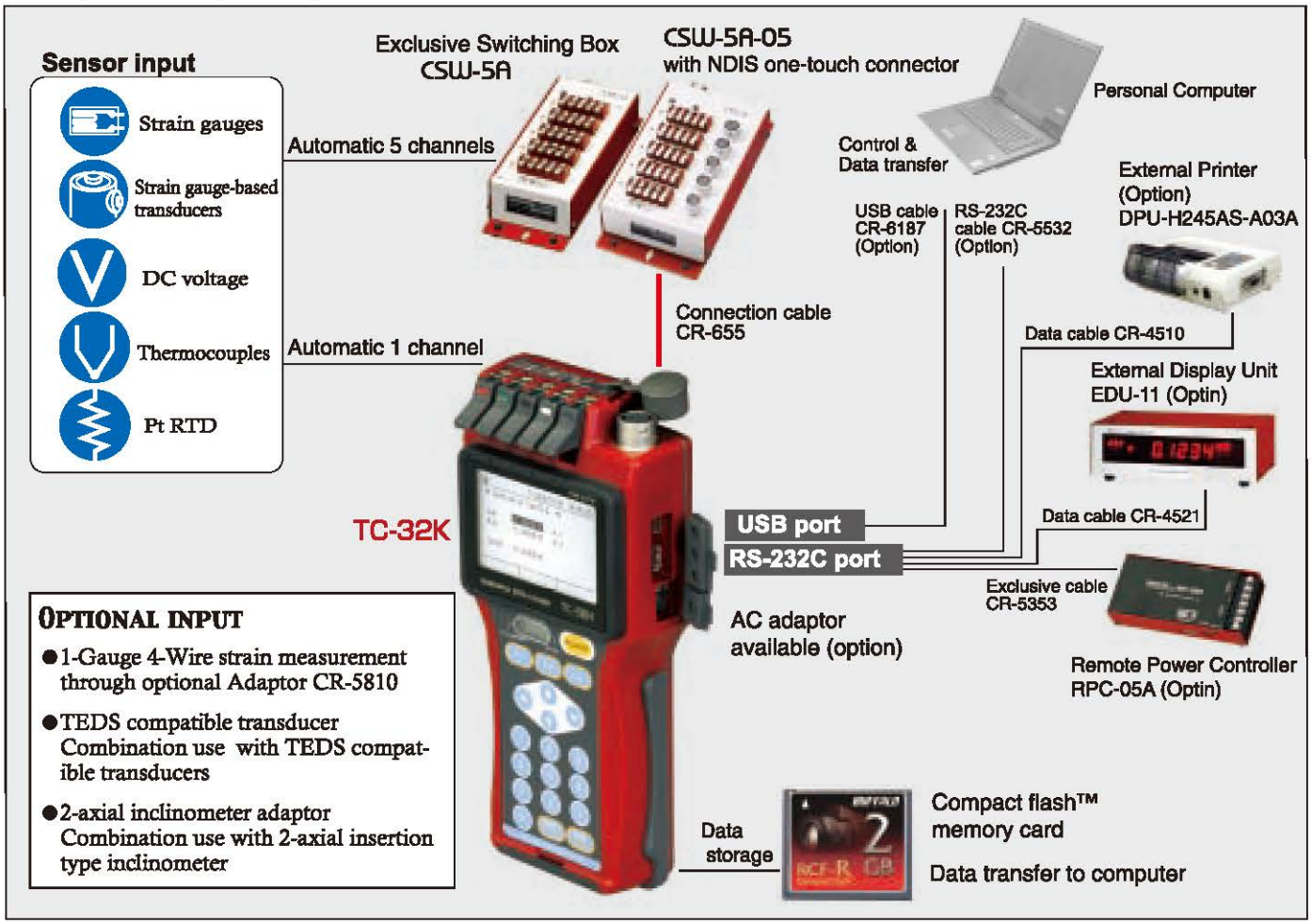
Compact flash memory card

Measurement data and the contents of setting are recorded on compact flash card. Firmware upgrade through the card is possible.



Applicable card memory capacity 32MB~2GB (FAT16)

■ SYSTEM BLOCK DIAGRAM



■ INTERFACE

Two types of interfaces, USB and RS-232C are equipped.

USB port

Using the USB cable CR-6187 (option), control of TC-32K from a computer and data read of online measurement are possible. The USB driver is contained in TML measurement software Visual LOG Light (option).

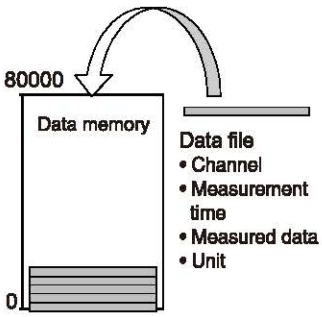
RS-232C port

By connecting the RS-232C cable CR-5532 (option), control of TC-32K from a computer and data read of online measurement can be done. Also, connection with external devices using the external cable is possible.

- ●Monitoring on TML External Display EDU-11
  The use of EDU-11 enables monitoring at a place away from TC-32K.
- ●Measurement with TML Remote Power Controller RPC-05A
  By setting up RPC-05A between TC-32K and a computer or modems, power on/off, control for solar power charge, etc. in long- term measurement are possible.
- ●Printout of data
  The online measurement data is printed on the external printer DPU-H245AS-A03A (option).

■ DATA MEMORY

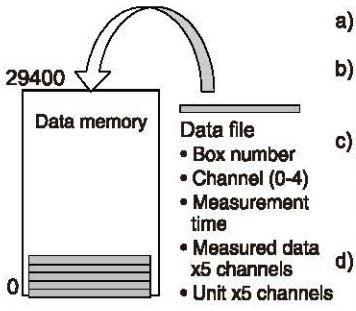
The maximum 80,000 data in single channel mode can be recorded. The data memory is one area only and the data stored in the area in order of measurement. One data are composed of channel, measurement time, measured data and physical unit.



a)The number of recordable data is 80,000 maximum.
b) When the ring buffer is set to off if the number of data reaches 80,000, M is indicated on the Sub-LCD and no more data recorded.
c) Even if the channel is changed the storing destination of the data is not changed.
d) The data after storing in a PC should be sorted out by channel.

If the number of data reaches 80000 at ON of the ring buffer, the oldest data are removed and the latest data continue to be recorded.

In the multi-channel mode with the external switching box CSW-5A, measurements of about 29,400 times are possible. One data are composed of box number, measurement time, and measured data and physical units for 5 channels.



a) Measurements of about 29,400 times are possible.
b) Even if the switching box is changed over, the data storing destination is not changed.
c) If the data memory reaches the limit of the memory capacity at ON off the ring buffer, the oldest data are removed and the latest data continues to be recorded.
d) The data after recorded in a PC should be sorted out by box number and channel.

TC-32K SPECIFICATIONS

Number of channels

1-ch	TC-32K	NDIS connector or one-touch sensor terminal
5-ch	Combined with CSW-5A	CSW-5A, CSW-5A-05

Applicable sensors

Strain	1-gauge 4-wire method	120Ω 240Ω 350Ω	* For 1-gauge 4-wire method optional exclusive adaptor must be used. Bridge excitation voltage DC1V 44ms (50Hz)
	3-wire quarter bridge	120Ω 240Ω 350Ω	
	Half bridge	120~1000Ω	
	Full bridge	120~1000Ω	
	Full bridge constant current	350Ω	
	Full bridge 0-2V	120~1000Ω	* Bridge excitation voltage DC2V 24ms (50Hz)
Thermocouple	Thermocouple T Thermocouple K Thermocouple J Thermocouple B Thermocouple S Thermocouple R Thermocouple E Thermocouple N		Linearization: Digital operation
DC voltage	Voltage V 1/1 ±300mV Voltage V 1/100 ±30V Voltage V Auto ±30V *		Input impedance V 1/1 more than 500MΩ V 1/100 more than 1MΩ
Pt RTD	Pt RTD 3-wire		Linearization: Digital operation

Note : * Only for one channel measurement with TC-32K

Measuring Range

Item	Range	Measuring range	Initial memory	Sampling speed
Strain	x1 x10	±30000 x10^{-6} strain ±300000 x10^{-6} strain	±160000 x10^{-6} strain	80ms (50Hz area) 67ms (60Hz area)
DC voltage	x1 x10	V 1/1 ± 30.000mV ±300.000mV	V 1/1 ±160.000mV	
	x1 x10	V 1/100 ± 3.0000 V ±30.0000 V	V 1/100 ± 16.0000V	
Thermocouple	—	T: - 250 ~ + 400°C K: - 210 ~ +1370°C J: - 200 ~ +1200°C B: +200 ~ +1760°C S: - 10 ~ +1760°C R: - 10 ~ +1760°C E: - 210 ~ +1000°C N: - 200 ~ +1300°C	—	
Pt RTD	—	- 200 ~ +850°C	—	

Note : Measuring range of Full bridge 0-2V such as our LVDT is ±15000 x10^{-6} strain (x1) and 150000 x10^{-6} strain (x10).

Measuring accuracy

Sensor mode	Range	Resolution	Accuracy (23°C±5°C)	Temperature effect (%rdg/°C)	Aging effect (%rdg/year)
Strain	×1 ×10	1x10^{-6} 10x10^{-6}	±(0.08%rdg+1dlglt) ±(0.08%rdg+1dlglt)	±0.002 ±0.002	±0.02 ±0.02
DC voltage V1/1	×1 ×10	0.001mV 0.010mV	±(0.08%rdg+3digit) ±(0.08%rdg+3dlglt)	±0.0024 ±0.0024	±0.02 ±0.02
DC voltage V 1/100	×1 ×10	0.0001V 0.0010V	±(0.08%rdg+2digit) ±(0.08%rdg+2dlglt)	±0.002 ±0.002	±0.02 ±0.02
Pt RTD Pt100 3W	—	0.1°C	±(0.08%rdg+3°C)	±0.0020	±0.05

Range : in auto-ranging

Leadwire resistance correction

Comet B (3-wire quarter bridge)	Gauge resistance	Leadwire resistance correction range
	120Ω	Less than 100Ω
	240Ω	Less than 200Ω
	350Ω	Less than 300Ω

Thermocouple temperature measurement

Thermocouple	Measuring range (°C)	Resolution (°C)	Accuracy ±(%rdg+°C) (23°C±5°C) External RJC	Accuracy ±(%rdg+°C) (23°C±5°C) Internal RJC
T	– 250 ~ – 200 – 200 ~ – 100 – 100 ~ + 400	0.1 0.1 0.1	0.38 + 0.6 0.15 + 0.2 0.10 + 0.2	0.38 + 3.9 0.15 + 1.4 0.10 + 0.8
K	– 210 ~ – 160 – 160 ~ 0 0 ~ + 960 + 960 ~ +1370	0.1 0.1 0.1 0.1	0.19 + 0.3 0.12 + 0.2 0.08 + 0.1 0.10 + 0.9	0.19 + 1.6 0.12 + 1.0 0.08 + 0.5 0.10 + 1.4
J	– 200 ~ – 160 – 160 ~ 0 0 ~ + 700 + 700 ~ +1200	0.1 0.1 0.1 0.1	0.16 + 0.2 0.12 + 0.1 0.08 + 0.1 0.08 + 0.6	0.16 + 1.2 0.12 + 0.8 0.08 + 0.5 0.08 + 0.9
B	+ 200 ~ + 280 + 280 ~ + 800 + 800 ~ +1760	0.5~0.4 0.3~0.1 0.1	0.04 + 4.0 0.04 + 1.2 0.05 + 0.4	0.04 + 4.0 0.04 + 1.2 0.05 + 0.4
S	– 10 ~ + 200 + 200 ~ +1760	0.1 0.1	0.09 + 0.6 0.07 + 0.4	0.09 + 1.2 0.07 + 0.7
R	– 10 ~ + 150 + 150 ~ +1760	0.1 0.1	0.09 + 0.7 0.07 + 0.4	0.09 + 1.2 0.07 + 0.7
E	– 210 ~ + 550 + 550 ~ +1000	0.1 0.1	0.17 + 0.2 0.09 + 0.4	0.17 + 1.4 0.09 + 0.8
N	– 200 ~ 0 0 ~ +1090 +1090 ~ +1300	0.1 0.1 0.1	0.18 + 0.4 0.08 + 0.2 0.08 + 0.9	0.18 + 1.6 0.08 + 0.6 0.08 + 1.2

The accuracy of thermocouples is not included. Thermocouple B does not use RJC.
RJC: Reference junction compensation

Check function

Item	Insulation resistance	Resistance measurement
Accuracy	±20%rdg on battery working	±(0.5%rdg+0.2Ω) ±(0.5%rdg+2Ω)
Resolution	0.1MΩ	0.1Ω(0~3kΩ) 1Ω(3k~30kΩ)
Range	0~500MΩ	0~30kΩ
Sampling speed	1s	0.5s
Remarks	Excitation 2.5V	10μA constant current method

Display	Display unit	LCD with backlight
	Resolution	255x160 dot
	Contents	Measuring data, Setting list, Y-T monitor
Clock	Setting	Year, Month, Day, Hour, Min. and Sec.
	Accuracy	±1 sec./day (23°C±5°C)
Interface	USB, RS-232C	
	Function	Control from PC and Data transfer
Measurement mode	INITIAL, DIRECT & MEASURE for each channel (DIRECT only for temperature)	
Channel switching	Scanning	Automatically from *0 First to *4 Last channel when combined with CSW-5A (Jump available)
	Monitor	Repetition of monitor channel Time-independent graphic monitor
Measurement start	Start key switch, Interval timer, USB and RS-232C	
Program	Capable of setting for each channel	
	Coefficient	±(0.0001 to 99999)
	Unit	40 kinds such as μ, ε, mV, °C, kgf and mm
	Decimal point	Any 0~6 decimal places
	Initial value	Writing for every channel
	Sesor mode	Setting for every sensor
SIMPLE measure	Coefficent	1.0000
	Unit	As per sensor mode
	Decimal point	As per sensor mode
Self-diagnosis	Upgrade indication, battery, dispersion, and burnout check	
TEDS	Standard	IEEE1451.4 Class 2
	Function	Readout of TEDS sensor parameter
Interval timer	Function	Automatic start according to the set time interval and time
	Interval	Hour, min. and sec. up to 99h 59m 50s for each step
	No. of starts	Programmable 99 times at max. or infinite per step
	No. of steps	Programmable 5 step at max.
	Real time start	Sets a start time (day: hour: minute: second) for each step
	GOTO step	Looping previous step
	Sleep ON/OFF	Switches on 10 sec. before measurement time and turns off automatically after measurement finish

Data memory	Function	Storing and reading of measurement data
	Contents	Measure mode, channel number, measurement data, time data and data number
	Capacity	80000 data
	Storage period	About 20 days (with full charge)
Memory card	Standard	Compact Flash™ card
	Capacity	32MB~2GB (FAT 16)
Auto-power OFF	Automatically turns off when not receiving any key operation and RS-232C commands for any set time. Switchable On/Off.	

Vibration resistance	29.4m/s² (50Hz 0.5mmp-p)
Shock resistance	49m/s²
Protection	IP-54 (with connector cap)

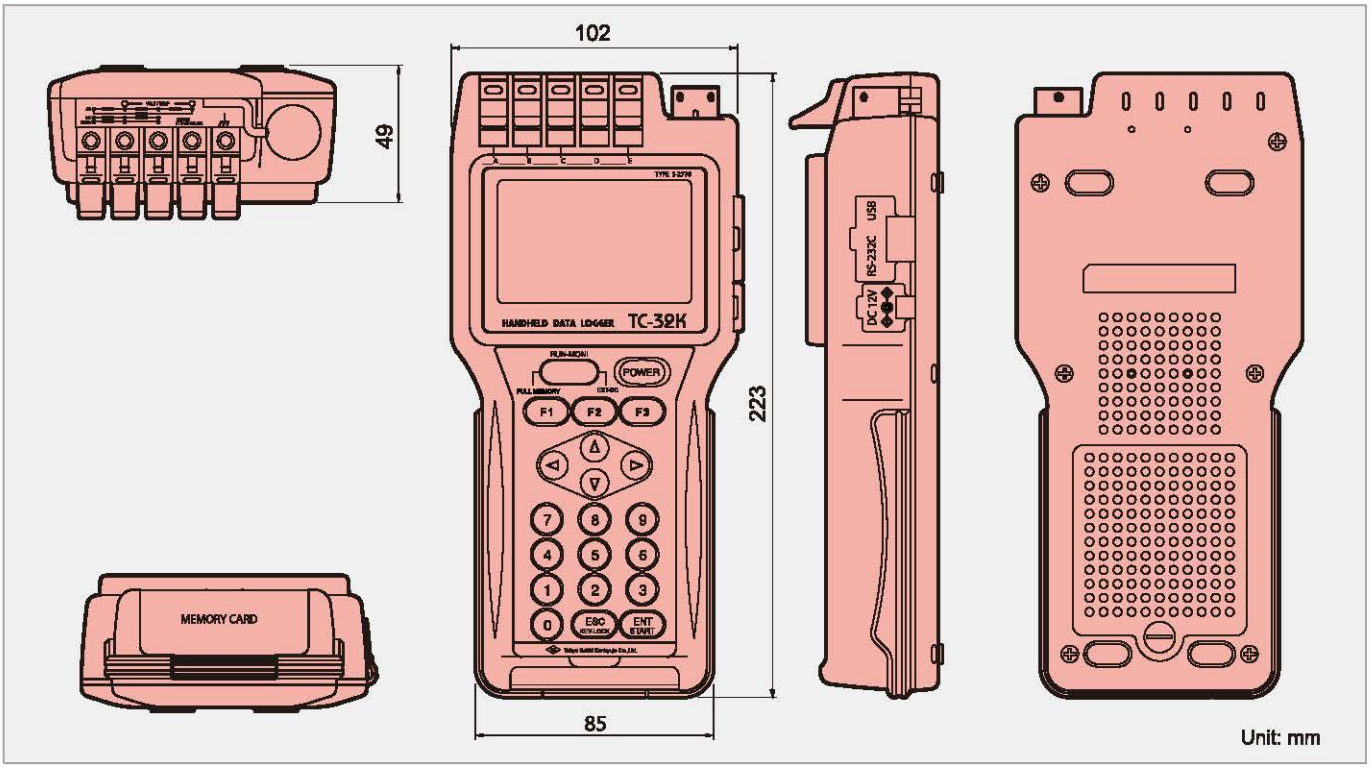
Operational time in continuous use	Alkaline battery : Approx. 10 hours (Strain measurement in 350Ω full bridge)

Operational environment	–10~+50°C <85%RH without condensation
Storing temperature	–20~+60°C
Power requirement	LR6 Alkaline cell 4 pieces Exclusive AC adaptor External battery 9~18Vdc
Dimensions	102(W) x 49(H) x 223(D) mm
Weight	0.8 kg.

Standard accessory

LR6 Alkaline cell	4 pieces
Carrying belt	1 piece
Operation manual	1 copy
Accessory box	1 piece

Outer View and Dimensional Diagram

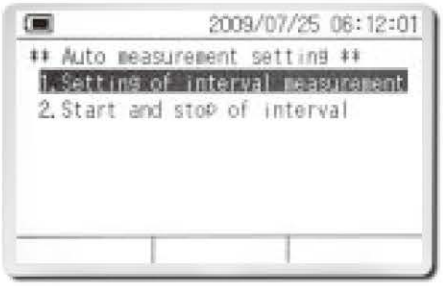


Unit: mm

Pop-up operation guide

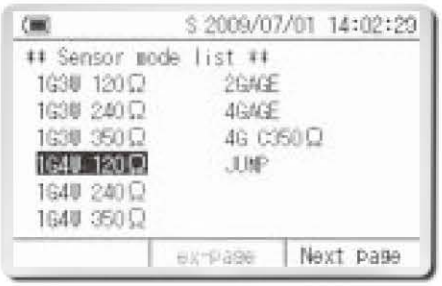
【Menu】

【Automatic measurement】

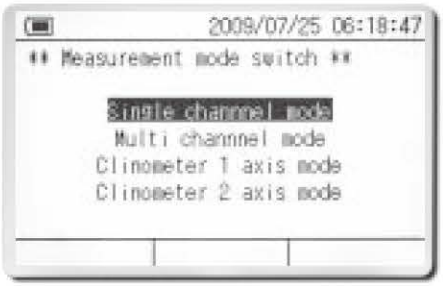


【RS-232C parameter】

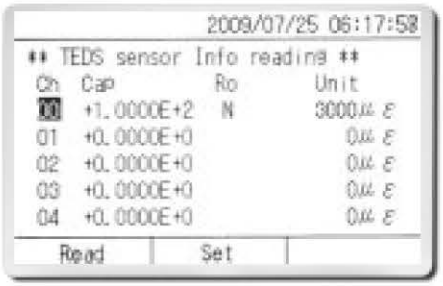
【Sensor mode】



【Measurement mode】



【Recognition of TEDS sensor】



CSW-5A / CSW-5A-05 Switching Box

- Capable of measuring strain, DC voltage, thermocouples and Pt RTD
- Sensor mode setting by TC-32K
- Sensor connection by terminal screwing and soldering
- Small and light

The CSW-5A switching box is combined with TC-32K when 5 channel extension is needed. CSW-5A can receive strain gauges, DC voltage, thermocouples and Pt RTD. CSW-5A-05 has connector receptacles for NDIS one-touch connector as well as connection terminal board.

■ SPECIFICATIONS

Applicable instrument		TC-32K
Number of channels		5
Strain measurement		
3-wire quarter bridge		120, 240 & 350Ω
Half bridge		120~1000Ω
Full bridge		120~1000Ω
Full bridge constant current		350Ω
Measurement range		Conforms to TC-32K
Sensor cable extension range (Full bridge constant current)		Total length of cable : within 200Ω
DC voltage measurement		
Measurement range		Conforms to TC-32K
Input impedance		More than 1MΩ
Thermocouple measurement		
Measurement range		Conforms to TC-32K
Pt RTD measurement		
Measurement range		Conforms to TC-32K
Measurement method		3-wire
Measurement number		Fixed (CH0 ~ CH4)
Channel indicator		Red LED for each channel
Switching relay		Hermetically sealed special relay
Operatiional environment		–10~+50˚C <85% RH (without condensatiion
Power requirement		Supplied from TC-32K
Dimension	CSW-5A	75W x 41.5H x 204D mm except projeting parts
	CSW-5A-05	105W x 41.5H x 204D mm except projecting parts
Weight	CSW-5A	650 gr.
	CSW-5A-05	800 gr.
Standard accessories		Operation manual 1 copy Conneciton cable CR-655 1 pc.

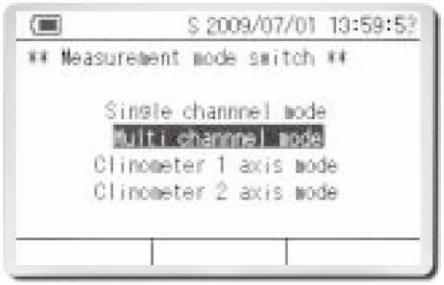
[Option]

Simple waterproof case

■ Combination with TC-32K

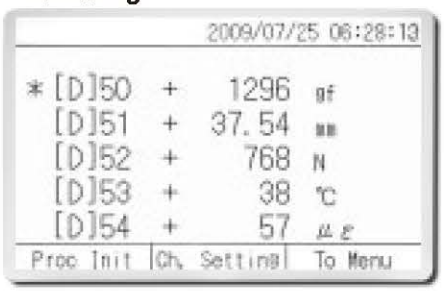
Connection cable
CR-655
(with CSW-5A
supplied)

■ Multi-channel mode



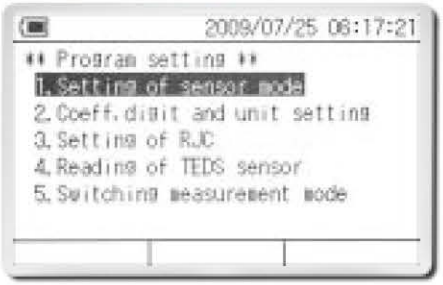
By selecting the Multi-channel mode, 5-channel scanning, monitoring and automatic measurement become possible.

Monitoring



Real time monitoring is available for one channel and marked with blinking. The monitoring channel is manually changed over. Channel is displayed in 2 digits, consisting of switching box number in upper digit and channel number in lower digit. The above display shows monitoring of the channels of CSW-5A set at box No.5

■ Program setting



The setting of sensor mode, coefficient, digits, unit, RJC, etc. are the same as single channel mode, but TEDS sensor is not applicable.

RELATED PRODUCTS

External Switching Box CSW-5A/-5A-05

Combination with the exclusive switching box makes 5-channel automatic and interval measurement possible.

CSW-5A-05 has connector receptacles for NDIS one-touch connector as well as connection terminal board.

External Printer DPU-H245AS-A03A

The measurement data of TC-32K is printed out.

Printer cable CR-4510 optional
Dsub9P-10P (mini) thru 0.5m
Exclusive cable

Remote Power Controller RPC-05A

In combination with RPC-05A and an external battery, long-term measurement with TC-32K using sleeping function becomes possible.

Exclusive RS-232C cable
CR-5353

1-Gauge 4-Wire Adaptor CR-5810

1-Gauge 4-Wire method
strain gauges with modular plug

External Display Unit EDU-11

The monitor value of TC-32K can be displayed at a remote place. Features high visibility with high-brightneess LED.

Data cable CR-4521
BNC output cable CR-31 belonging to EDU-11

RS-232C cable CR-5532

Dsub9P-10P(mini) Cross 1.5m
Exclusive cable for connection with personal computer

USB cable CR-6187

Mini B-A with ferrite core 1.5m
Exclusive cable for connection with personal computer

AC adaptor CR-1861

Compact Flash™ card

Capacity : 32MB~2GB

TEDS compatible sensor

To use TEDS functioin of the TC-32K, TEDS compatible sensor is required to recognize its own parameters such as measuring capacity, rated output, etc. registered in the built-in IC chip.

TEDS compatible load cell TCLZ with the built-in IC chip

2-axial inclinometer adaptor IA-33/IA-32

SPECIFICATIONS

Applicable instrument	TC-32K
No. of channels	2
Accuracy	Conforms to TC-32K
Power requirement	Supplied for TC-32K 5Vdc
Environment	-10~+50°C <80%RH (without condensation)
Outer dimension	95W x 42H x 85D mm
Weight	300gr.

TML Measurement Software *Visual LOG® Light* (for monitoring)

The Visual LOG Light is measurement software designed for TML digital strainmeters and data loggers. The online measurement supports 3 setups of interval timer and manual measurement. Three types of applications: direct connection with a computer via RS-232C, GP-IB, LAN and USB, Modem via phone line and transfer of data memory are prepared according to interface and combination of instrumentation.

Compatible with USB driver and application

Visual LOG Light newly supports USB driver and application software, enabling you to measure online with the built-in USB interface of TC-32K. Online measurement data read-in and command control are available. Exclusive USB cable CR-6187 option is required to create such online measurement. TC-32K also incorporates RS-232C interface to create such online system as USB by connecting exclusive RS-232C cable CR-5532 option. Moreover, data output to an external display unit or printer is available through the built-in RS-232C port in TC-32K.

Standard interface ports and AC adapter connecter of the TC-32K

Option

TC-32K exclusive cable

USB cable CR-6187

RS-232C cable CR-5532

AC adapter CR-1869

Specifications subject to change without prior notice

Approval Certificate **ISO9001**
Design and manufacture of strain gauges, strain measuring equipment and transducers

Tokyo Sokki Kenkyujo Co., Ltd.
www.tml.jp/e
8-2, Minami-Ohi 6-Chome, Shinagawa-Ku, TOKYO 140-8560, JAPAN
TEL: TOKYO 03-3763-5611 FAX: TOKYO 03-3763-5617