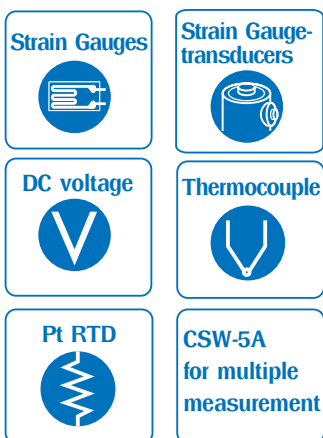


TML

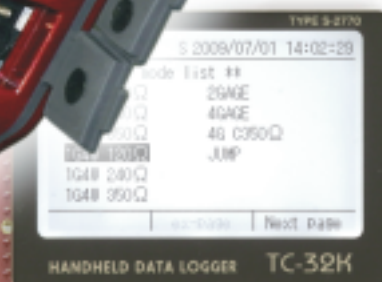
TML Pam E-3000A

HANDHELD DATA LOGGER **TC-32K**



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



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



Thermocouples



DC voltage



Load cell, Displacement transducers, etc.

Pt RTD



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



One-touch connection with TEDS compatible 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)

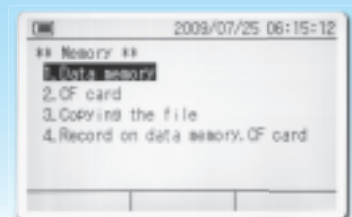
1-Gauge 4-Wire method strain gauges with modular plug

Compact flash memory card

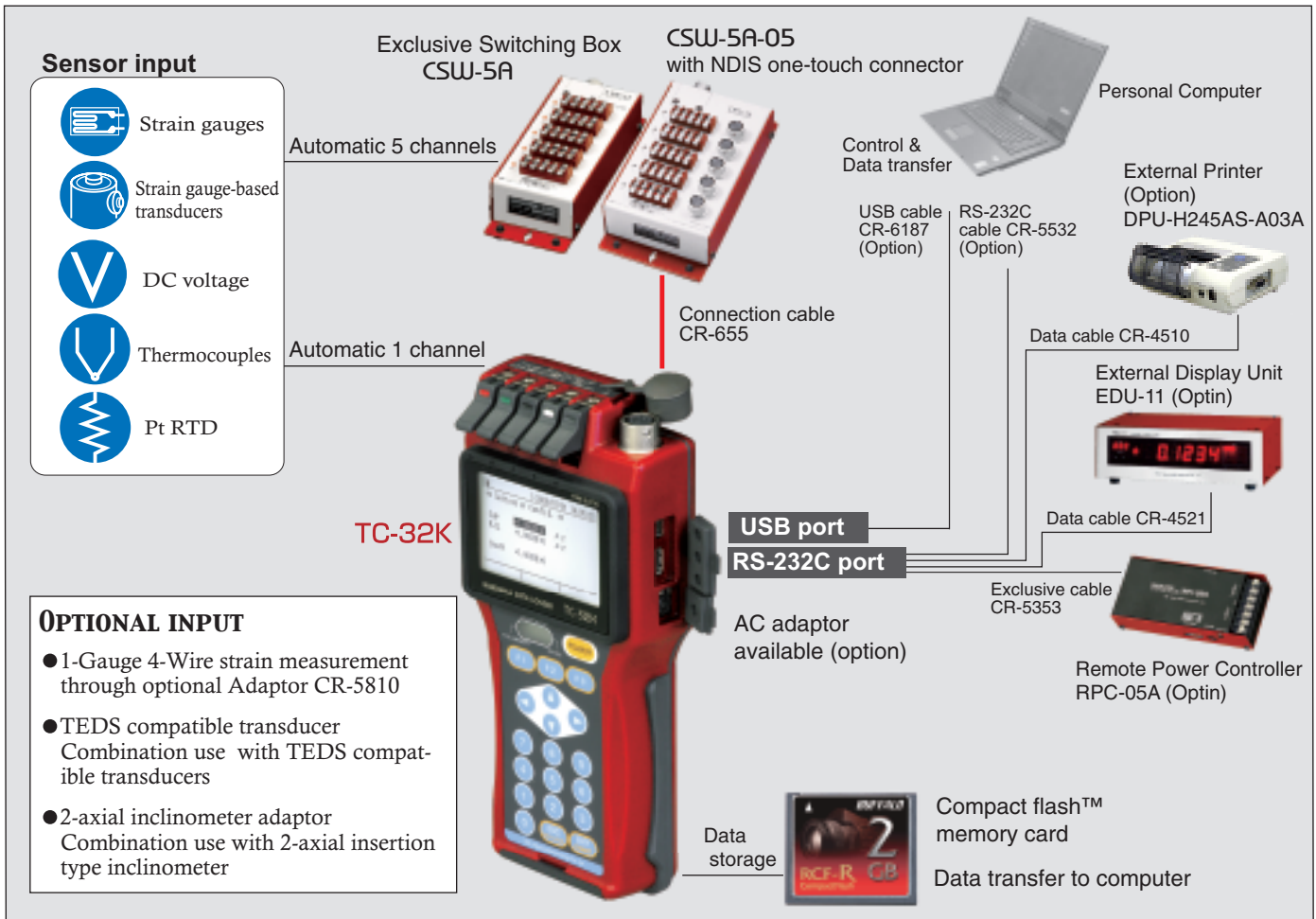


Applicable card memory capacity
32MB~2GB (FAT16)

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



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.

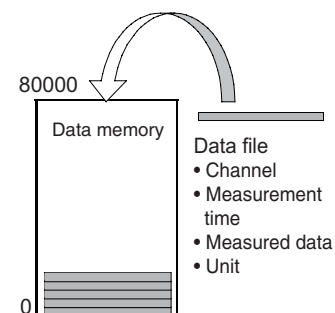
● Printout of data

The online measurement data is printed on the external printer DPU-H245AS-A03A (option).



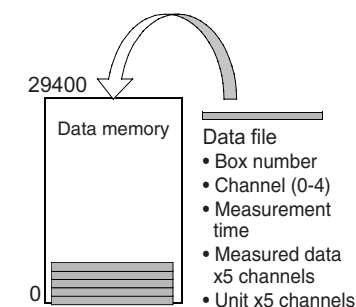
DATA MEMORY

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.



- The number of recordable data is 80,000 maximum.
 - 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.
 - Even if the channel is changed the storing destination of the data is not changed.
 - 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.



- Measurements of about 29,400 times are possible.
- Even if the switching box is changed over, the data storing destination is not changed.
- 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.
- The data after recorded in a PC should be sorted out by box number and channel.

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	
Thermo-couple	Thermocouple T	Linearization: Digital operation	* Bridge excitation voltage DC2V 24ms (50Hz)
	Thermocouple K		
	Thermocouple J		
	Thermocouple B		
	Thermocouple S		
	Thermocouple R		
	Thermocouple E		
Thermocouple N			
DC voltage	Voltage V 1/1	±300mV	Input impedance V 1/1 more than 500MΩ V 1/100 more than 1MΩ
	Voltage V 1/100	±30V	
	Voltage V Auto	±30V *	
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	
	—	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	x1 x10	1x10 ⁻⁶ 10x10 ⁻⁶	±(0.08%rdg+1digit) ±(0.08%rdg+1digit)	±0.002 ±0.002	±0.02 ±0.02
DC voltage V1/1	x1 x10	0.001mV 0.010mV	±(0.08%rdg+3digit) ±(0.08%rdg+3digit)	±0.0024 ±0.0024	±0.02 ±0.02
DC voltage V 1/100	x1 x10	0.0001V 0.0010V	±(0.08%rdg+2digit) ±(0.08%rdg+2digit)	±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 240Ω 350Ω	Less than 100Ω Less than 200Ω Less than 300Ω

Thermocouple temperature measurement

Thermo-couple	Measuring range (°C)	Resolution (°C)	Accuracy ±(%rdg+°C) (23°C±5°C)	
			External RJC	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	Coefficient	1.0000
	Unit	As per sensor mode
Self-diagnosis	Decimal point	As per sensor mode
	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
Memory card	Storage period	About 20 days (with full charge)
	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.	

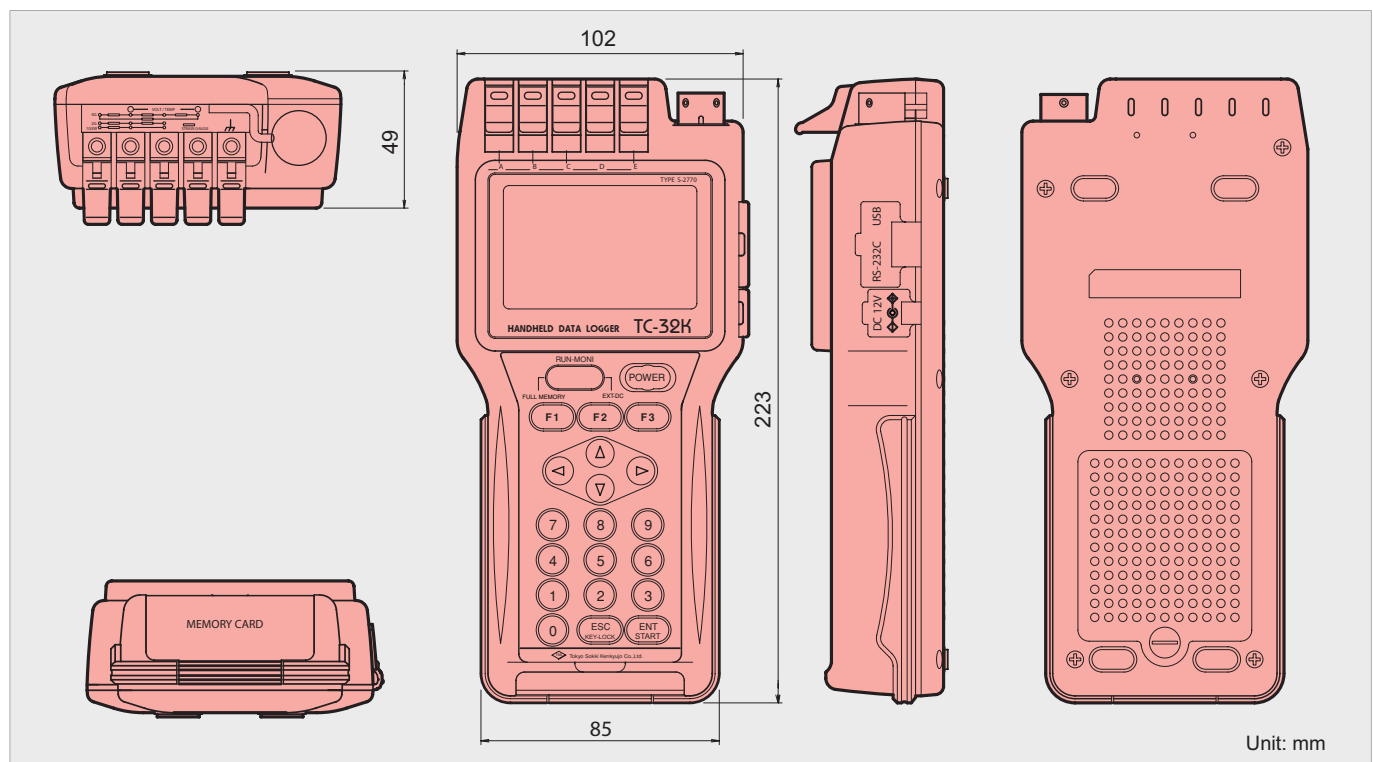
Vibration resistance	29.4m/s ² (50Hz 0.5mmp-p)
Shock resistance	49m/s ²
Protection	IP-54 (with connector cap)

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

2009/07/25 06:08:35
** menu **
1. Program setting
2. Direct meas/switch
3. Auto measurement setting
4. Various checks
5. Setting concerning measurement
6. Memory
ex-Page Next page

[Automatic measurement]

2009/07/25 06:12:01
** Auto measurement setting **
1. Setting of interval measurement
2. Start and stop of interval

[RS-232C parameter]

S 2009/07/01 13:58:07
** RS-232C setting **
1. Baud rate 9600
2. Data bit 8bit
3. Parity Non
4. Stop bit 1bit
5. Flow control Off
6. Time out 05Sec

[Sensor mode]

S 2009/07/01 14:02:29
** Sensor mode list **
163Ω 120Ω 2GAGE
163Ω 240Ω 4GAGE
163Ω 350Ω 4G C350Ω
164Ω 120Ω JUMP
164Ω 240Ω
164Ω 350Ω
ex-Page Next page

[Measurement mode]

2009/07/25 06:18:47
** Measurement mode switch **
Single channel mode
Multi channel mode
Clinometer 1 axis mode
Clinometer 2 axis mode

[Recognition of TEDS sensor]

2009/07/25 06:17:58
** TEDS sensor Info reading **
Ch Cap Ro Unit
00 +1.0000E+2 N 3000μ ε
01 +0.0000E+0 0μ ε
02 +0.0000E+0 0μ ε
03 +0.0000E+0 0μ ε
04 +0.0000E+0 0μ ε
Read Set

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



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.

■ Combination with TC-32K



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

- 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

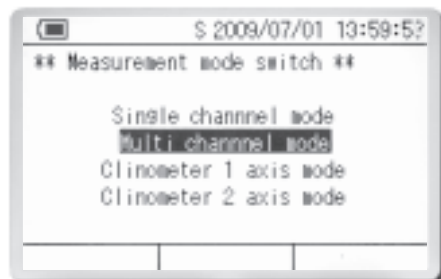
■ SPECIFICATIONS

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]

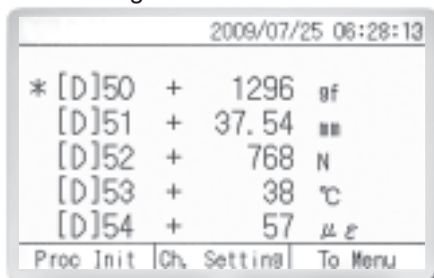
Simple waterproof case

■ Multi-channel mode



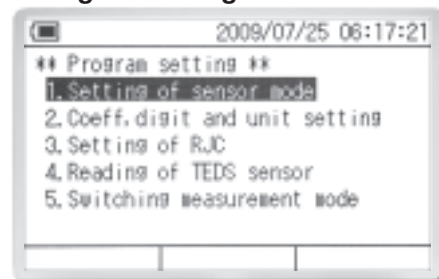
By selecting the Multi-channel mode, 5-channel scanning, monitoring and automatic measurement become possible.

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 supplied
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-brightness 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 function 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.

Visual LOG Light is a registered trade mark of Tokyo Sokki Kenkyujo Co., Ltd.

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 connector of the TC-32K

Option

- TC-32K exclusive cable
- USB cable CR-6187
- RS-232C cable CR-5532
- AC adapter CR-1861

Specifications subject to change without prior notice



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



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