HANHLED DATA LOGGER TC-32K

Strain Gauges
Strain Gauge-transducers
DC voltage
Thermocouple
Pt RTD
CSW-5A for multiple measurement

Strain measurement

Compact Flash card saving
1-Gauge 4-Wire method

Pop-up menu
Alkaline battery drive supported

LCD screen with backlight

Interface
USB
RS-232C

1-Gauge 4-Wire method
Strain measurement
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
- DC voltage
- Load cell, Displacement transducers, etc.
- Thermocouples
- 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

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**

**Sensor input**
- Strain gauges
- Strain gauge-based transducers
- DC voltage
- Thermocouples
- Pt RTD

**OPTIONAL INPUT**
- 1-Gauge 4-Wire strain measurement through optional Adaptor CR-5810
- TEDS compatible transducer
  Combination use with TEDS compatible transducers
- 2-axial inclinometer adaptor
  Combination use with 2-axial insertion type inclinometer

**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.

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.
## Measuring accuracy

<table>
<thead>
<tr>
<th>Leadwire resistance correction range</th>
<th>Comet B (3-wire quarter bridge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120Ω</td>
<td>Less than 100Ω</td>
</tr>
<tr>
<td>240Ω</td>
<td>Less than 200Ω</td>
</tr>
<tr>
<td>350Ω</td>
<td>Less than 300Ω</td>
</tr>
</tbody>
</table>

## Thermocouple temperature measurement

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Measuring range (°C)</th>
<th>Resolution (°C)</th>
<th>Accuracy z°/(deg+ °C) (23 °C±5°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>-200 to 200</td>
<td>0.1</td>
<td>0.38 ± 0.6, 0.6 ± 0.3, 3.0 ± 3.9</td>
</tr>
<tr>
<td>K</td>
<td>-100 to 990</td>
<td>0.1</td>
<td>0.15 ± 0.2, 0.5 ± 1.4</td>
</tr>
<tr>
<td>J</td>
<td>-200 to 400</td>
<td>0.1</td>
<td>0.10 ± 0.2, 0.4 ± 0.8</td>
</tr>
<tr>
<td>B</td>
<td>+200 to +700</td>
<td>0.5 ~ 1.0</td>
<td>0.08 ± 1.1</td>
</tr>
</tbody>
</table>

## Thermocouple temperature measurement

### Applicable sensors

- **Strain**
  - 1-gauge 4-wire method
  - 3-wire quarter bridge
  - Half bridge
  - Full bridge

### Thermocouple

- Measurement and Conversion
  - Bridge excitation voltage
    - DC1V 44ms (50Hz)
    - DC2V 2.5V 10μA constant current method

### DC voltage

- Voltage
  - ±1000V
  - ±300V
  - ±300mV

### Pt RTD

- Measurement and Conversion
  - Linearity:
    - Digital operation

### Measuring Range

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
<th>Measuring range</th>
<th>Initial memory</th>
<th>Sampling speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain</td>
<td>x1</td>
<td>±10000</td>
<td>±10000</td>
<td>80ms (50Hz area)</td>
</tr>
<tr>
<td>DC voltage</td>
<td>x1</td>
<td>±300mV</td>
<td>±300mV</td>
<td>67ms (60Hz area)</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>T(0): -250 to +400°C</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt RTD</td>
<td>—</td>
<td>±200 to ±850°C</td>
<td>—</td>
<td></td>
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### Display

- LCD with backlight

### Interface

- USB, RS-232C

### Measurement start

- Start key switch, Interval timer, USB and RS-232C

### SIMPLEX measure

- Unit: 1.0000
- 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: Hour, min, and sec. up to 99h 59m 59s for each step
- No. of steps: Programmable 99 times at max. or infinite per step
- No. of steps: Programmable 5 step at max.
- GOTO step: Looping previous step
- Sleep On/Off: Switches on 10 sec. before measurement time and turns off automatically after measurement finish

### Remarks

- Measuring range of Full bridge 0-2V such as our LVDT is ±1500 x 10⁻⁶ strain (x1) and 150000 x 10⁻⁶ strain (x10).
- The accuracy of thermocouples is not included. Thermocouple B does not use RJC.
### SPECIFICATIONS

**TC-32K**

#### 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
- **Temperature**: –10~+60°C <85%RH without condensation
- **Humidity**: –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

![Outer View and Dimensional Diagram](image)

Unit: mm

### Pop-up operation guide

**[Menu]**
- Program setting
- Direct meas/sch
- Auto measurement setting
- Various checks
- Setting concerning measurement

**[Automatic measurement]**
- Auto measurement setting
- Setting of interval measurement
- Start and stop of interval

**[RS-232C parameter]**
- RS-232C setting
- Data bit
- Parity
- Stop bit
- Flow control
- Time out

**[Sensor mode]**
- Sensor mode list
- Climb channel mode
- Multi channel mode

**[Measurement mode]**
- Measurement mode switch

**[Recognition of TEDS sensor]**
- TEDS sensor Info reading
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)

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Applicable instrument</th>
<th>TC-32K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels</td>
<td>5</td>
</tr>
<tr>
<td>Strain measurement</td>
<td>3-wire quarter bridge 120, 240 &amp; 350Ω, Half bridge 120<del>1000Ω, Full bridge 120</del>1000Ω, Full bridge constant current 350Ω</td>
</tr>
<tr>
<td>Measurement range</td>
<td>Conforms to TC-32K</td>
</tr>
<tr>
<td>Sensor cable extension range</td>
<td>Total length of cable : within 200Ω</td>
</tr>
</tbody>
</table>

**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

**Operational environment**

- –10~+50˚C <85% RH (without condensation)
- Power requirement Supplied from TC-32K

**Dimension**

- CSW-5A 75W x 41.5H x 204D mm except projecting 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
- Connection cable CR-655 1 pc.

**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.

**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.

**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

**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

1-Gauge 4-Wire Adaptor CR-5810

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

**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

1-Gauge 4-Wire Adaptor CR-5810

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

**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**

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<td>No. of channels</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Environment</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Outer dimension</td>
</tr>
<tr>
<td>Weight</td>
</tr>
</tbody>
</table>
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.

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

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

Specifications subject to change without prior notice.