TML

TDS-150

TDS-150

PORTABLE DATA LOGGER

- Strain Gauge
- Strain Gauge Transducers
- DC voltage
- Thermocouple
- Pt RTD
- Concrete Sensor Measurement
- Up to 50 channels in a channel unit
- Up to 100 CH by using TML-NET/ wireless together

Tokyo Measuring Instruments Laboratory Co., Ltd.

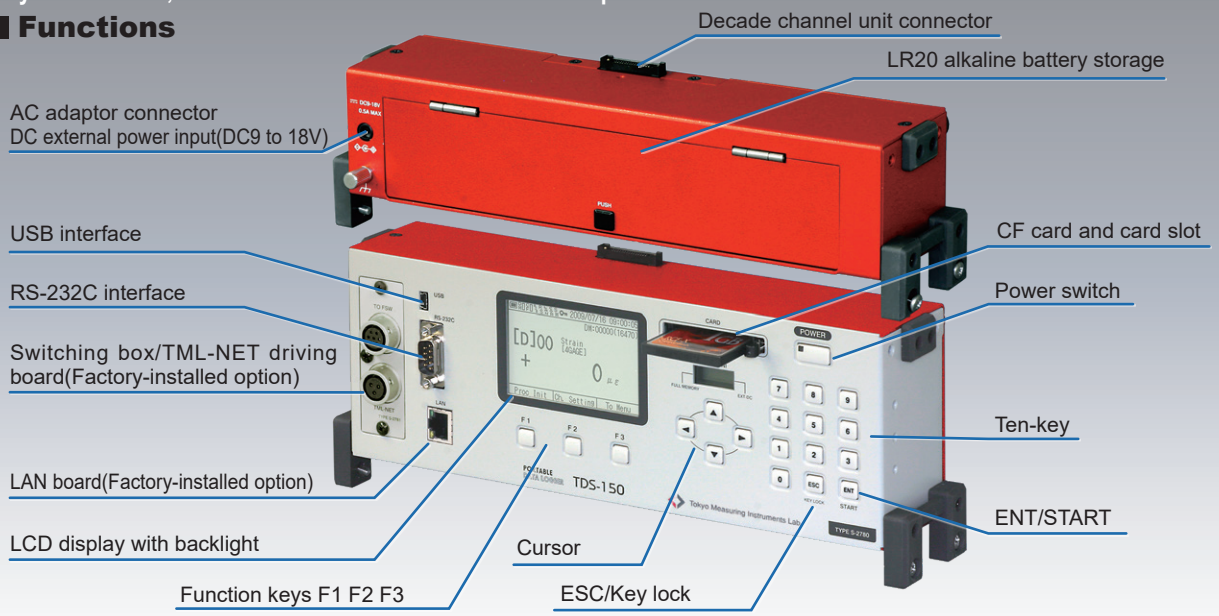
Field use, battery drive, plus alarm function

This portable data logger consists of a control unit (TDS-150) and exclusive decade channel units (FSW-10) and measures strain gauges, strain-gauge-based transducers, DC voltages, thermocouples and Pt RTD. The decade channel unit (FSW-10) can be cascaded up to 5 units to total 50 channels. In addition, by using a switching box/TML-NET driving board (option), up to 100 channels can be extended. TDS-150 operates on not only AC mains but alkaline D-cells or battery and has data memory and sleep interval timer functions for long term automatic measurement. It is possible to store measurement data and setup condition on compact flash memory card. Interfaces are USB and RS-232C, and reading of various setting conditions and measurement data can be conducted from a PC.

Wireless communication measurement is also possible by using the wireless controller ZT-150 and the wireless module ZT-014 (optional).

The new CONCRETE mode enables measurement of concrete filling sensor KZA and concrete moisture sensor KZW with only one channel, whereas two channels were used in the past.

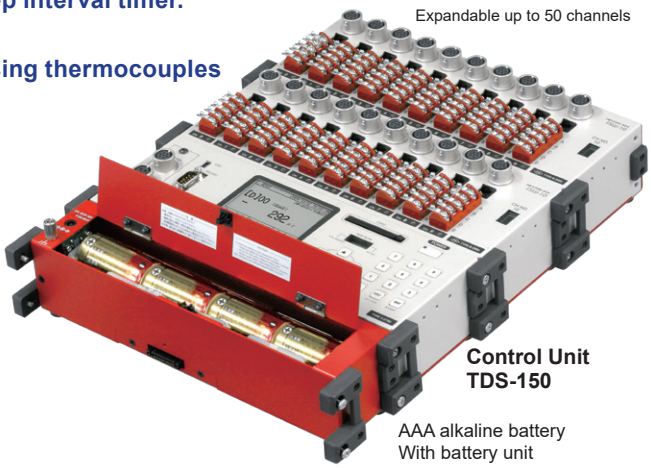
■ Functions



FEATURES

- -Connectable Five decade channel units (FSW-10)for 50 channels max
- -Possible long-term automatic measurement using sleep interval timer.
- -Low power consumption
- -Measurement of strain, DC voltage and temperature using thermocouples and Pt RTD.
- -Large capacity data memory available.
- -1-gauge 4-wire method available.
- -TEDS compatible
- -Strain complete compensation method available
- -Concrete sensor mode installed
- -Connectable network modules(Factory installed option)
- -Measurement by wireless communication using wireless controller ZT-150 and wireless module ZT-014 (optional)

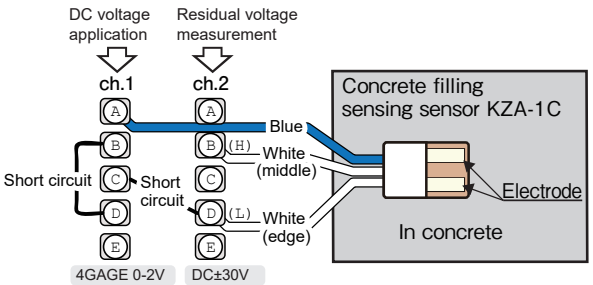
Channel unit
FSW-10/-10L (option)
Expandable up to 50 channels



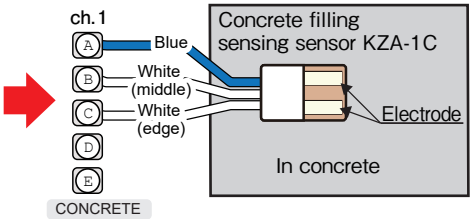
Control Unit
TDS-150

AAA alkaline battery
With battery unit

Concrete sensor mode

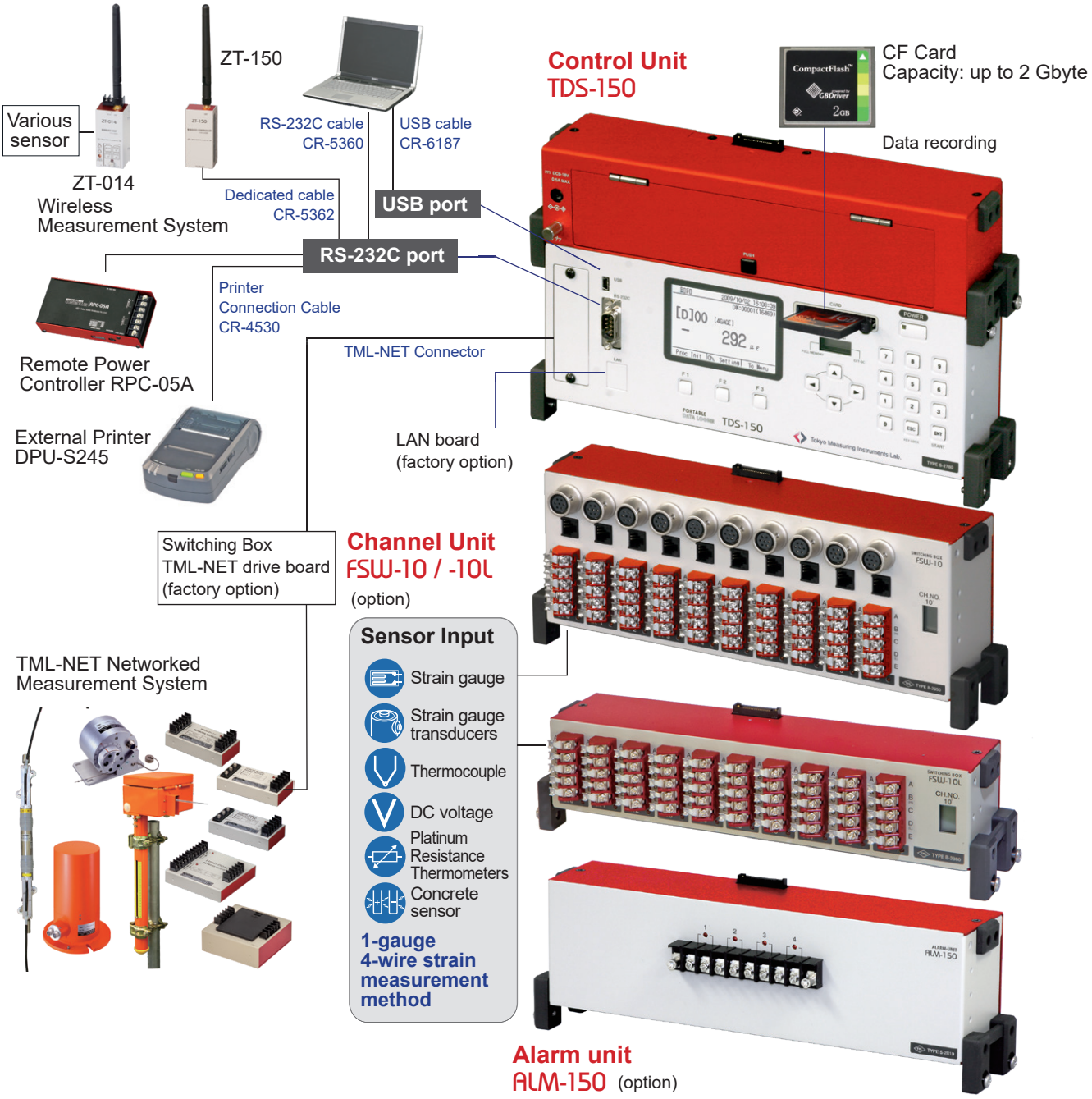


Conventional measuring instruments use two consecutive channels of a switch box with a single concrete sensor.



The “CONCRETE” sensor mode enables voltage application and residual voltage measurement on a single channel, making wiring work easier and increasing the number of measurement points.

System block diagram



Interface

RS-232C port

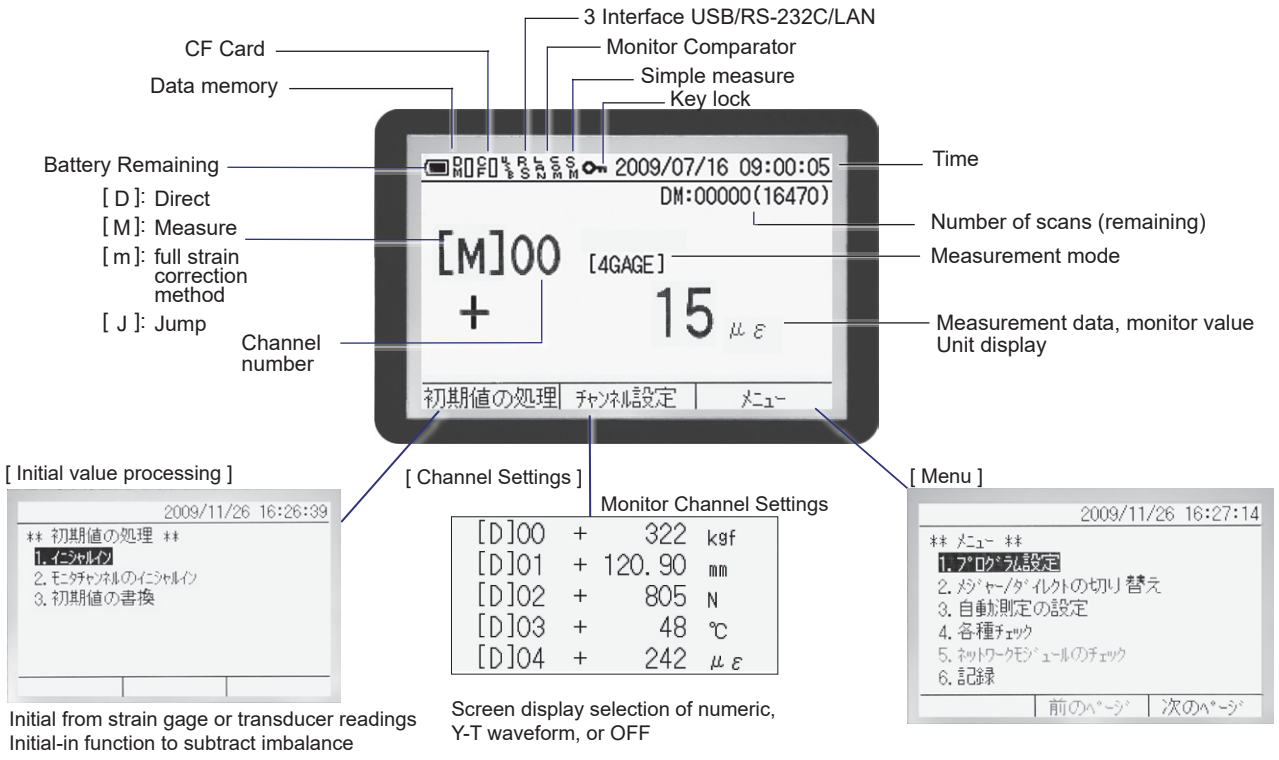
By connecting the RS-232C cable CR-5360 (optional), the TDS-150 can be controlled from a personal computer and data can be imported during online measurement. External connection devices can also be used with various dedicated cables.

- Measurement by wireless communication
  Wireless measurement is possible by connecting the wireless controller ZT-150 (optional) to the TDS-150 and communicating wirelessly with the wireless module ZT-014 (optional) to which a strain gage transducer is connected.
- Measurement by remote power controller RPC-05A
  The RPC-05A remote power controller (optional) can be incorporated between the TDS-150 and a PC or modem to control power ON/OFF by sending commands. The RPC-05A can also be easily connected to a solar cell for long-term unattended measurement.
- Data printout
  Prints out measurement data to an external printer DPU-S245 (optional).

USB port

The USB cable CR-6187 (optional) can be connected to a PC to control the TDS-150 or to import data during online measurement. (USB driver is available by installing Visual LOG TDS-7130v2 or Visual LOG Light TDS-700L).

Operation Screen



Initial from strain gage or transducer readings
Initial-in function to subtract imbalance

Screen display selection of numeric, Y-T waveform, or OFF

Various applications

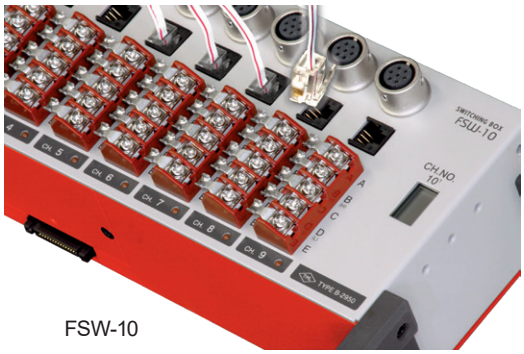
1-gauge 4-wire strain measurement method

Patent

No gage factor correction due to lead resistance or measurement error due to contact resistance.

One-touch connection

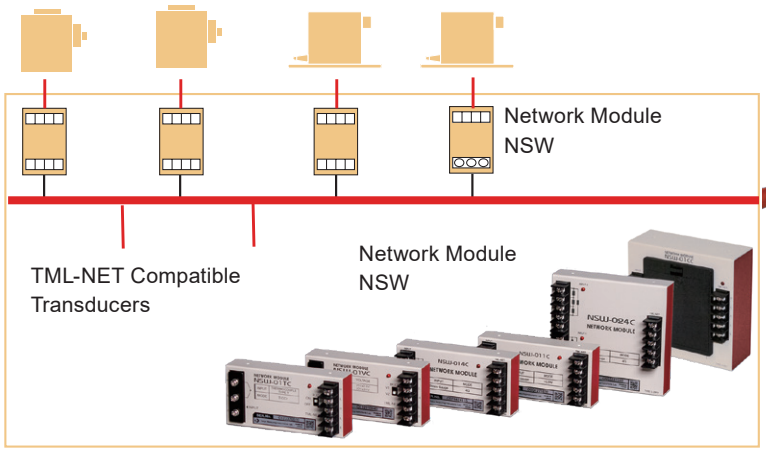
FSW-10, a 1-gauge 4-wire strain gage with modular plug connection using 4-wire lead wires developed by our company and modular plug input



FSW-10

TML-NET Networked Measurement System

Strain gauge transducers (load cells, displacement transducers, civil engineering transducers, etc.), DC voltage, temperature, pulse



Switching box TML-NET drive board

factory option

Supports network module drive
The network driver NDR-100 is not required.

Alarm unit ALM-150 for TDS-150 (option)

This is a dedicated alarm unit to be connected to the TDS-150. The alarm output function monitors a specified channel and closes the specified contact when the measured value changes by a certain amount (relative value setting) or exceeds a threshold value (upper/lower limit setting).

- **Any monitoring channel and any output contact (1 to 4) can be set**
- **Relative values and upper and lower limit conditions can be set**
- **Selectable monitored measurement value between monitor value and scan valu**

SPECIFICATION

Number of contacts	4	
point of contact	Semiconductor relay (a-contact: normally open)	
	Contact capacity	140V AC/DC200V MAX.
	Contact Rated current	0.5A MAX.
	Inrush current	1.5A MAX.
	ON resistance	3.2Ω MAX.
Indication	Status LED Lights up when each contact is closed	
Comparison Method	Relative value, upper and lower bounds	
Number of setting tables	100	
Other Functions	Alarm test	
Power Supply	Supplied through TDS-150	
Dimensions	280(W) x 60(H) x 80(D)mm (excluding protruding parts)	
Operating temperature and humidity range	-10 to +50°C, 85%RH or less (excluding condensation)	
Weight	Approx. 600g	
Standard Accessories	Operation Manual	1
	Warranty Card	1

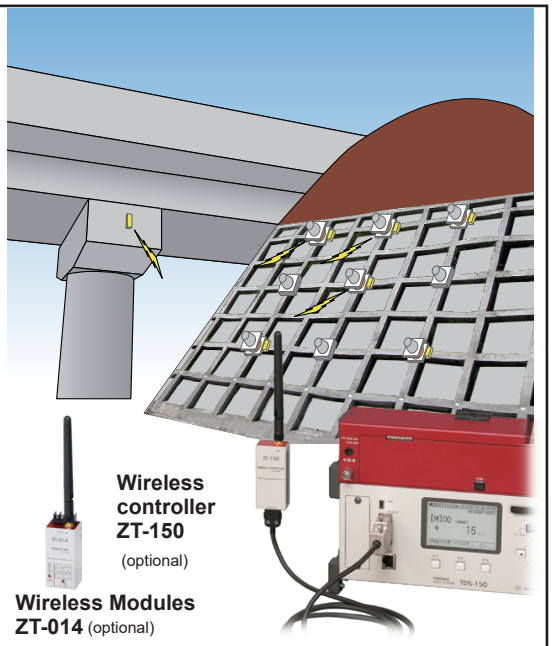
Wireless data recording system

Wireless controller ZT-150 (optional)

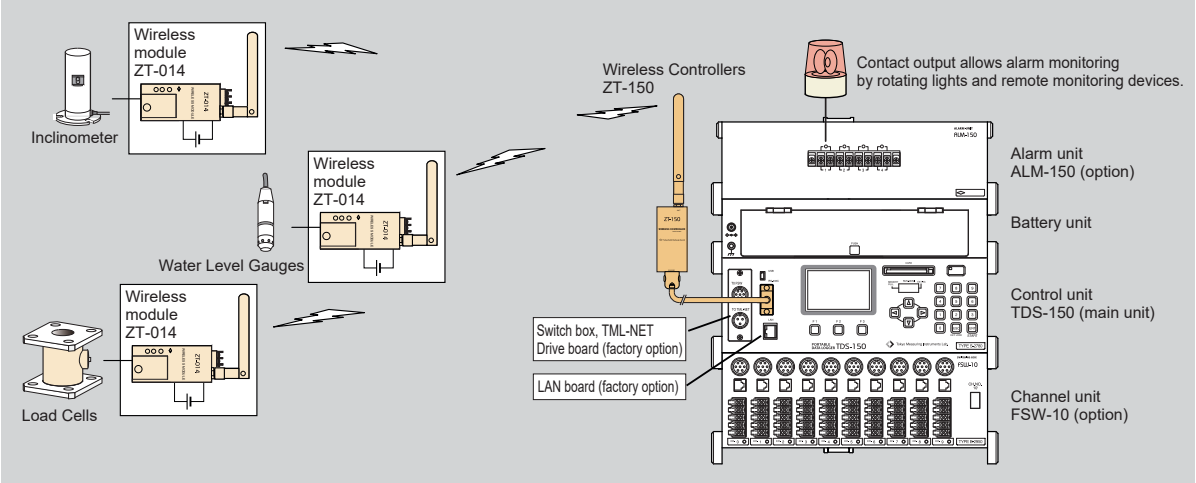
Wireless module ZT-014 (optional)

This system performs wireless interval measurement and data recording of measurement with strain gage transducers. The data measured by the wireless module ZT-014 is digitally processed and sent to the wireless controller ZT-150. Wiring from the sensor to the data logger can be made wireless, thus reducing wiring labor and costs.

- **Digital processing in the vicinity of the strain gage makes it highly resistant to noise**
- **Easy wiring due to wireless technology**
- **Communication distance is approx. 50m in line-of-sight**
- **Controls up to 20 wireless modules**
- **Can be used in combination with channel units and network modules (within 100 channels)**
- **Wireless controller ZT-150 is connected to TDS-150 via RS-232C**



System configuration image



Number of channels

Maximum 100 channels	In conjunction with external switching box NB: Switching box/TML-NET driving board (Factory-installed option) is required.
50 channels	In conjunction with 5 units of FSW-10

Applicable sensors (Sensor mode setting)

Strain	1-gauge 4-wire method 120Ω 240Ω 350Ω	Bridge excitation voltage DC1V 48ms (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)
Thermo-couple	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	Input impedance V 1/1 more than 500MΩ V 1/100 more than 1MΩ
Pt RTD	Pt RTD 3-wire	Linearization: Digital operation
TML-NET	Operating NSW series [Option]	Data reading from Network sensors

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	
Thermo-couple	—	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 in Full bridge 0-2V mode for TML LVDT is ±15000 x10^{-6} strain (x1) and 150000 x10^{-6} strain (x10).

Measuring accuracy

Sensor mode	Range	Resolution	Accuracy (23°C±5°C)	Tempera-ture effect (%rdg/°C)	Aging effect (%rdg/year)
Strain	×1 ×10	1x10^{-6} 10x10^{-6}	±(0.08%rdg+1digit) ±(0.08%rdg+1digit)	±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+3digit)	±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+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	Less than 100Ω
	240Ω	Less than 200Ω
	350Ω	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	0.1	0.38 + 0.6	0.38 + 3.9
	– 200 ~ – 100	0.1	0.15 + 0.2	0.15 + 1.4
	– 100 ~ + 400	0.1	0.10 + 0.2	0.10 + 0.8
K	– 210 ~ – 160	0.1	0.19 + 0.3	0.19 + 1.6
	– 160 ~ 0	0.1	0.12 + 0.2	0.12 + 1.0
	0 ~ + 960	0.1	0.08 + 0.1	0.08 + 0.5
	+ 960 ~ +1370	0.1	0.10 + 0.9	0.10 + 1.4
J	– 200 ~ – 160	0.1	0.16 + 0.2	0.16 + 1.2
	– 160 ~ 0	0.1	0.12 + 0.1	0.12 + 0.8
	0 ~ + 700	0.1	0.08 + 0.1	0.08 + 0.5
	+ 700 ~ +1200	0.1	0.08 + 0.6	0.08 + 0.9
B	+ 200 ~ + 280	0.5~0.4	0.04 + 4.0	0.04 + 4.0
	+ 280 ~ + 800	0.3~0.1	0.04 + 1.2	0.04 + 1.2
	+ 800 ~ +1760	0.1	0.05 + 0.4	0.05 + 0.4
S	– 10 ~ + 200	0.1	0.09 + 0.6	0.09 + 1.2
	+ 200 ~ +1760	0.1	0.07 + 0.4	0.07 + 0.7
R	– 10 ~ + 150	0.1	0.09 + 0.7	0.09 + 1.2
	+ 150 ~ +1760	0.1	0.07 + 0.4	0.07 + 0.7
E	– 210 ~ + 550	0.1	0.17 + 0.2	0.17 + 1.4
	+ 550 ~ +1000	0.1	0.09 + 0.4	0.09 + 0.8
N	– 200 ~ 0	0.1	0.18 + 0.4	0.18 + 1.6
	0 ~ +1090	0.1	0.08 + 0.2	0.08 + 0.6
	+1090 ~ +1300	0.1	0.08 + 0.9	0.08 + 1.2

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

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, LAN (Option)	
	Function	Control from PC and Data transfer
Measurement mode	INITIAL, DIRECT & MEASURE for each channel (DIRECT only for temperature)	
Channel switching	Scanning	Automatically from First to Last channel (Jump available)
	Monitor	Repetition of monitor channel Time-independent graphic monitor
Measurement start	Start key switch, Interval timer, Monitor comparator USB, RS-232C and LAN (Option)	
Program	Capable of setting for each channel	
	Coefficient	±(0.0001 to 99999)
	Unit	40 kinds such as με, mV, °C, kN 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
	Decimal point	As per sensor mode
Self-diagnosis	Insulation resistance, Dispersion, Sensitivity, Thermocouple wire burnout, Bridge output and coefficient setting	
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 59s for each step
	No. of starts	Programmable 99 times at max. or infinite per step
	No. of steps	Programmable 10 steps 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 5 sec. before measurement start and turns off automatically after measurement finish
Monitor comparator	Function	Automatic measurement based on a change amount set by monitor channel (1point)
	Comparative amount	Amount settable every step (±999999 at max.)

Monitor comparator	Comparative method	Available either amount of change or absolute
	Cycles of start	Max. 99 times/step or infinite
	Cycles of step	Max. 10 steps programmable
	GOTO step	Programmable loop to previous step
	GOTO interval	Move to step 1 of interval
Data memory	Function	Storing and reading of measurement data
	Contents	Measure mode, channel number, measurement data, time data and data number
	Capacity	Maximum 80000 data or 16,000 scans per 10 channels
	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 neither receiving any key operation nor interface commands for any set time. Switchable On/ Off.	
Operational time in continuous use	Using 4 LR20 alkaline battery Full bridge 120Ω about 40 hours at 23°C±5°C 1 hour sleep interval about 8 months for 10 channels scanning, Sleep ON at 23°C±5°C	

Operational environment	–10 ~ +50°C <85%RH without condensation
Storing temperature	–20 ~ +60°C
Power requirement	LR20 Alkaline cell 4 pieces Exclusive AC adaptor (CR-1861) External battery 9 ~ 18Vdc
Dimensions	TDS-150 Control unit including battery unit 280(W) x 60(H) x 162(D) mm FSW-10 Unit channel (Option) 280(W) x 60(H) x 100(D) mm excluging projecting parts
Weight	TDS-150 Control unit : 1.0 kg Battery unit : 0.6 kgs (No battery installed) FSW-10 Unit channel (Option) : 1.5 kgs.

Standard accessory

LR20 Alkaline cell	4 pieces
Philips driver	1 piece
Operation manual	1 copy
Carrying belt	1 piece

Wireless data recording system Specification

Wireless module ZT-014

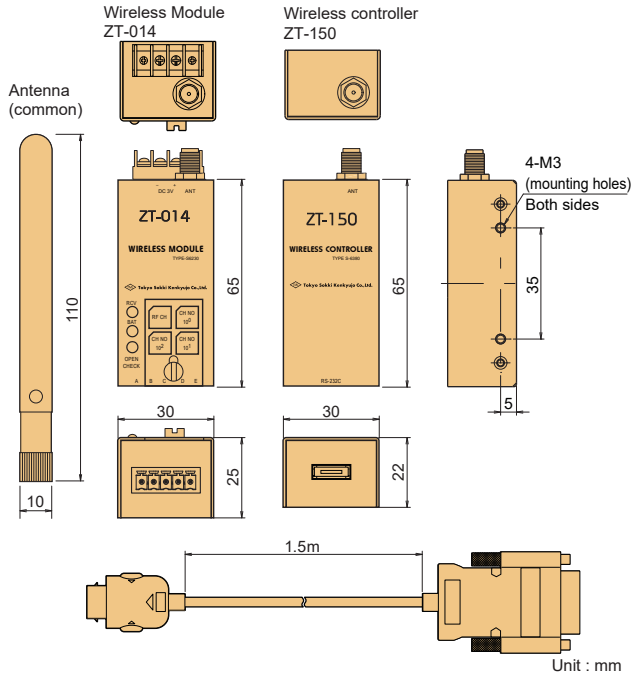
Strain measurement	
Number of points measured	1
Bridge power supply	DC2V
Input	4 gauge
Applicable Gauge Resistance	350 to 1000Ω
Input range	±30,000×10^{-6} Strain
Resolution	1×10^{-6} Strain
Accuracy	± (0.10% rdg + 3digit) (+23±5°C, not including sensitivity degradation due to lead wires)
Sensitivity Stability	±0.01%rdg/°C
Measurement Mode	Direct
Function	Interval measurement, sleep function (power-saving standby), measurement channel setting, radio channel setting, open check, remaining battery level check, wireless communication status check
Operation	
Measurement channel setting	10-position rotary switch x 3 digits
Radio channel setting	16-position rotary switch x 1
Display	LED to confirm open check LED to check remaining battery level LED for checking wireless communication status
Interval timer	Min. 1 minute, Max. 24 hours 00 minutes (1 minute steps)
Clock Accuracy	Daily difference ±3 seconds (+23±5°C)
Data Memory *Not used when wireless controller ZT-150 is connected.	
Recorded size	3500 data (recorded in nonvolatile memory)
Supply voltage	DC2.3V to 3.5V
Battery life	Approx. 1 year (CR-123A battery x 1 [external battery], +23±5℃, 350Ω bridge, 1-hour interval) Values are approximate and may vary depending on measurement conditions, temperature, etc.
Operating temperature and humidity range	-10 to +60°C, 85%RH or less (excluding condensation)
External dimensions	30(W)×25(H)×65(D)mm (excluding protruding parts)
Weight	approx. 60g (including antenna)
Vibration resistance	29.4m/s^2
Wireless Section	
Communication method	2.4GHz band IEEE802.15.4 protocol compliant (Number of channels: 15)
Communication distance	Approx. 50m at line-of-sight
Standard accessories	Operation manual ..... 1 Warranty card ..... 1 Terminal block for 4-gauge ..... 1 Antenna 1

Wireless controller ZT-150

Applicable measuring instrument	TDS-150 *Needs a version compatible with wireless modules
Wireless Section	
Communication method	2.4GHz band IEEE802.15.4 protocol compliant (Number of channels: 15)
Communication distance	Approx. 50m at line-of-sight
Number of wireless module connections	Up to 20 units (regardless of simultaneity between each channel)
External interface	RS-232C compliant (cable length: approx. 1.5 m)
Power supply voltage	DC 4.7V to 5.3V (supplied from TDS-150)
Power supply current	70mA MAX (0.5V DC)
Operating temperature and humidity range	-10 to +50°C, 85%RH or less (excluding condensation)
External dimensions	30(W)×22(H)×65(D)mm (excluding protruding parts)
Weight	Approx. 150g (including antenna and cable)
Vibration resistance	29.4m/s^2
Standard Accessories	Operation Manual ..... 1 Warranty Card ..... 1 Antenna ..... 1 TDS-150 dedicated cable CR-5362 1

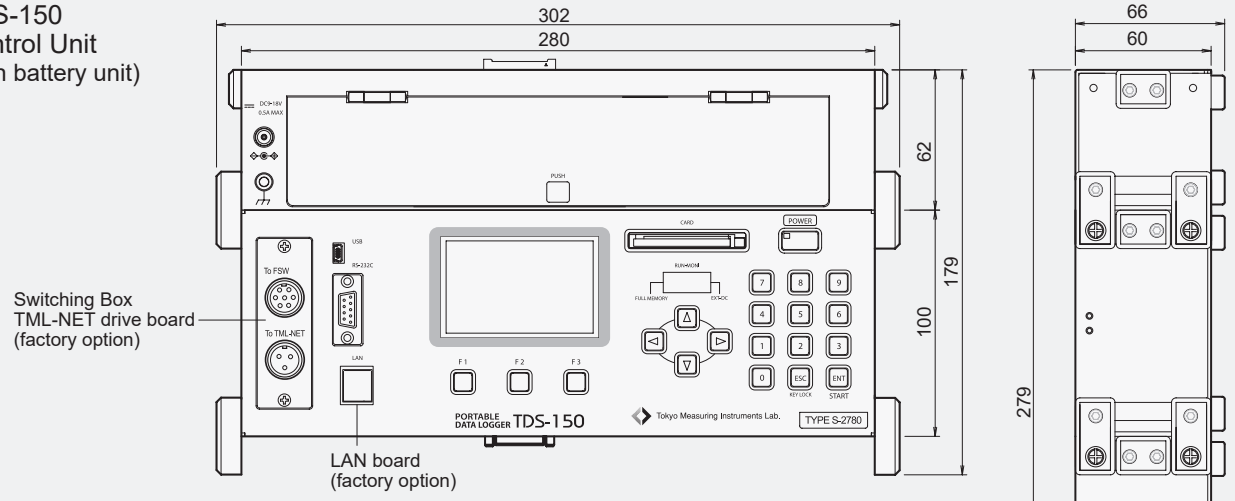
Related Products
Wireless Module Storage Case ZT-001 (Built-in battery case)
143 (W) x 120 (H) x 250 (D) mm (excluding protruding parts)

External Dimensions

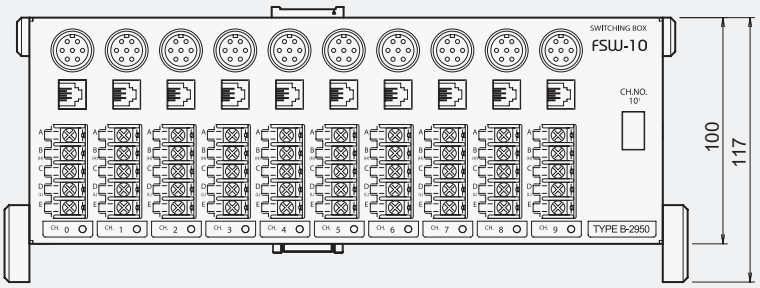


External Dimensions

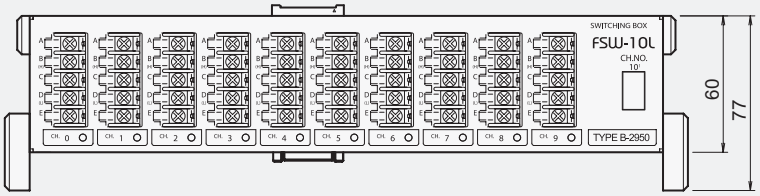
TDS-150
Control Unit
(with battery unit)

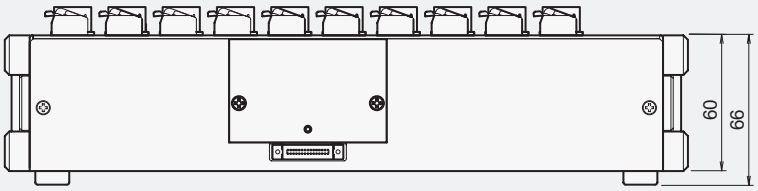


FSW-10
Channel Unit
(Option)



FSW-10L
Channel Unit
(Option)





Unit: mm

Related products

RS-232C cable CR-5360	Dsub9P-9P cross
USB cable CR-6187	
Data cable CR-3830	BNC-Dsub9P
External Printer DPU-S245	Seiko Electronics Inc.
Printer cable CR-4530	IFC-S01-1-E manufactured by Seiko Electronics Inc.
AC power adapter (set) CR-1867	
Remote power controller RPC-05A	
Channel unit FSW-10, FSW-10L	

CF card	128MB to 2GB (specified by us)
LAN board	Factory option
Switching Box TML-NET Drive Board	Factory option
Alarm unit ALM-150	
Wireless Controller ZT-150	
TDS-150 Upper lid	For both TDS-150 and FSW-10
For ALM-150 Upper lid	ALM-150
One-touch terminal	SB-OT1B

ISO 9001:2015 CERTIFICATION intertek UKAS MANAGEMENT SYSTEMS 014

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

The contents of this catalog are subject to change without prior notice.
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