FS2000

DIGITAL INDICATOR WITH GRAPHIC DISPLAY / TOUCH PANEL (SD CARD SLOT & HIGH SAMPLING RATE)

CC-Link
DeviceNet
EtherNet/IP
PROFINET
RoHS2



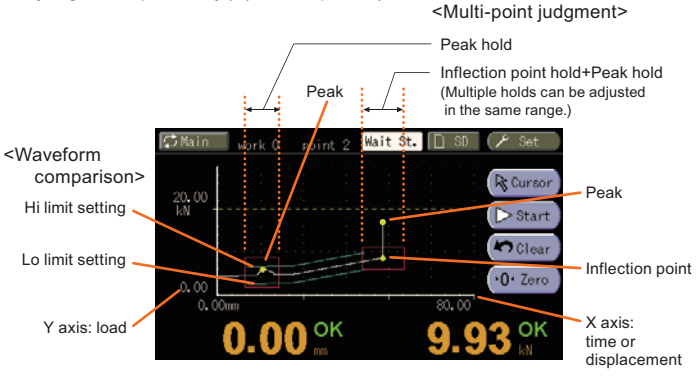
The best solution for OK/NOK judgment of press fitting and caulking application !!
High responsiveness of 5 kHz to fully utilize the performance of Super Cell !!
A fluctuation of force is shown as a waveform!!

- Two-dimensional OK/NOK judgment can be performed with a load cell and displacement sensor.
- Analog monitor output
  Voltage output is proportionate to the input signal making the recording on recorder convenient.
  Approx. 2 V per 1 mV/V strain gauge input
- 25000 times/sec. high-speed processing
- Variety of interfaces
  USB / CC-Link / DeviceNet / EtherNet/IP / Ethernet / PROFINET IO
- 4.3-inch color LCD module & touch panel
  Operation can be effortlessly performed by a direct touch on the touch panel.

Comparison & hold function by waveform display

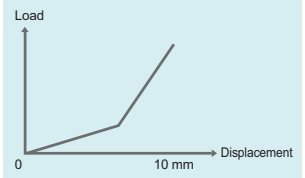
■ Waveform comparison
This function compares the actual measurement waveform against the setup High/Low limit waveforms and will give out an NOK judgment when any of the point exceeded the preset High/Low limit waveforms.

■ Multi-point judgment
OK/NOK judgment can be performed on multi points in one process. (e.g. The start point and end point of press fitting can be judged respectively.) (Max. 5 points)

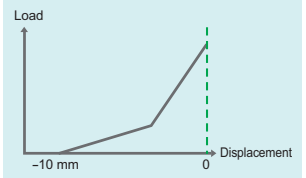


Selectable waveform reference

Judgment is possible based on press point of press machine



Front reference
Measurement point starts from left



Back reference
Measurement point starts from right

Improved usability

4.3 inch wide display provides excellent visibility.
Main display configuration can be selected to keep it as simple as possible by eliminating unnecessary information.



OK judgment



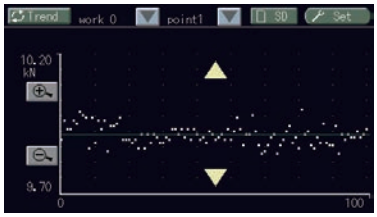
Enlarged numerical display



Enlarged waveform display

Trend display is helpful for preventive maintenance

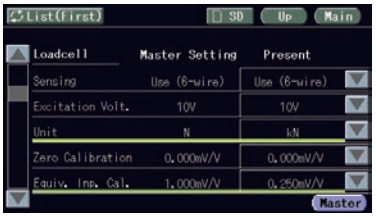
Trend of the zero-point shift and hold values can be monitored to find any irregularities for preventing breakdown of machines.



Trend display

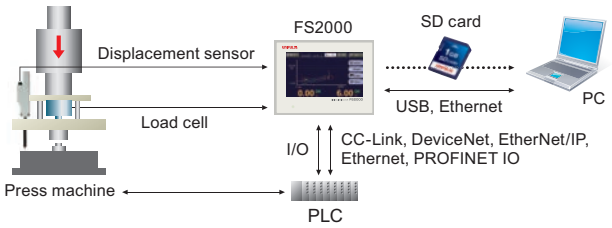
Changed setting items are highlighted!

Master and current set values are listed up for checking the changed setting items easily.
Set values can be edited directly on the list without going into each setting menu.
* Except for waveform comparison settings



List display

Example of use



Saved measured data (waveform) on SD card can be displayed afterwards

Measured data and set values can be saved in the SD card. Data can be converted to CSV format easily for editing with Microsoft Excel.

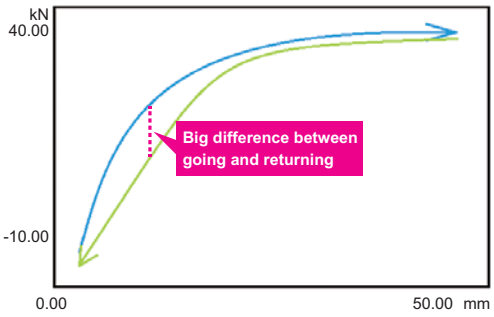


FS2000-HYS Hysteresis specifications

Standard Can see going waveform ▶▶▶ **Hysteresis specifications** **Can see outgoing and return waveform**

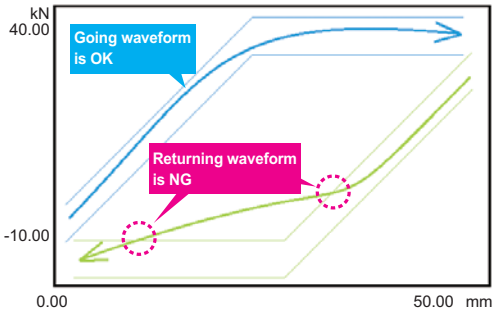
● Can choose comparison method!

<Differential waveform comparison>
Judgment of OK/NOK by the difference between going and returning



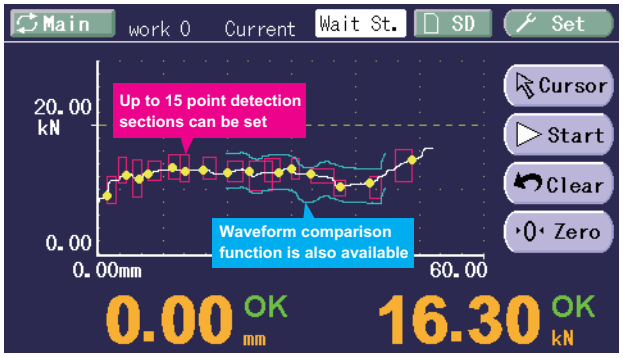
Recommended for below usage:
- Expansion and contraction of the spring
- Rotating the steering wheel clockwise, counterclockwise, etc.

<Standard waveform comparison>
OK/NOK judgment for going and returning waveform.



Recommended for below usage:
- Torque hinges used to open and close doors
- Shock absorbers that absorb the impact of tires, etc.

FS2000-MHP Multi hold point specifications



Standard
OK/NOK judgment up to 5 points

▼▼▼

Multi hold point specifications

OK/NOK judgment up to 15 points

Specifications

Sensor input (Standard)	Sensor input for load (Fixed as strain gauge input) (6-wire)	
	Excitation voltage	DC 2.5, 5, 10 V±10% (depending on settings) Output current: Within 30 mA
	Signal input range	−2.0 to +2.0 mV/V
	Accuracy	Non-linearity: Within 0.02% FS±1 digit (at 2.0 mV/V input)
		Zero drift: Within 0.1 μV/℃ RTI
		Gain drift: Within 15 ppm/℃
	Low-pass filter	Selectable from 10 Hz to 10 kHz (-6 dB/oct.) (at A/D converter speed 25000 times/sec.)
		Selectable from 2 Hz to 2 kHz (-6 dB/oct.) (at A/D converter speed 5000 times/sec.)
	A/D converter	Speed: Selectable from 25000 times/sec., 5000 times/sec.
		Resolution: 24 bit (binary) Effective resolution: Approx. 1/20000 against 2.0 mV/V
	Sensor input for displacement (Pulse input: Line driver)	
	Max. input frequency	1 MHz
	Internal count range	Approx. 1,000,000
	Adaptable encoder	Output: Incremental type 2-phase output (A/B-phase signal output)
		Also capable of single-phase output
		(A-phase input used. All pulses are counted as in the plus direction.)
		Output stage circuit specification: Line driver (Based on RS-422)
Sensor input Multisensor input (Option: [MLT] or [MLT2])	Sensor input for load (Strain gauge) (6-wire) … Same as standard	
	Sensor input for displacement (Pulse input: open collector) ... Other than output circuit, spec is standard [MLT]	
	Output stage circuit specification: Open collector	
	Sensor input for displacement (Pulse input: line driver) … Same as standard [MLT2]	
	Voltage input	
	Signal input range	−10 to +10 V
	Absolute max. rating	±15 V
	Input impedance	Approx. 1 MΩ or more
	Accuracy	Non-linearity: Within 0.02% FS±1 digit (at 10 V input)
		Zero drift: Within 0.2 mV/℃ RTI
		Gain drift: Within 0.01%/℃
	Low-pass filter	Selectable from 10 Hz to 10 kHz (-6 dB/oct.) (at A/D converter speed 25000 times/sec.)
		Selectable from 2 Hz to 2 kHz (-6 dB/oct.) (at A/D converter speed 5000 times/sec.)
	A/D converter	Speed: Selectable from 25000 times/sec., 5000 times/sec.
		Resolution: 24 bit (binary) Effective resolution: Approx. 1/20000 against 10 V
Analog voltage output	Output level	Approx. 2 V per 1 mV/V input
		Load resistance: 2 kΩ or more
Display	4.3 inch TFT color LCD module, Display area: 95(W) × 54(H) mm, Dot configuration: 480 × 272 dot	
	Display frequency	Fixed at 3 times/sec.
Comp. & judge. function	Multi point comparison mode: 16 ch (setting values can be stored)	
	Capable of judging up to 5 hold points at the same time.	
	Sample, Peak, Bottom, P-P, Relative Maximum, Relative Minimum,	
	Inflection Point (A,B,C,D), Average, End displacement	
	Waveform comparison mode: 16 ch (setting values can be stored)	
	Compares the actually measured waveform against the preset HI/LO waveforms.	
	The overall measured waveform will be compared against the preset HI/LO and if any of its points exceeds the preset waveform, then the measured waveform will be NOK.	
Hysteresis specifications	Multi-point comparison and waveform comparison are possible by measuring going/returning with one waveform. (Can choose go/return difference comparison)	
	Number of drawing points: 1000 points for going, 1000 points for returning	
Multi hold point specifications	Multi hold: 15 points	
	Sampling speed: 5000 Hz	
Preventive maintenance support	Trend display	Showing the trend of measurement data to help finding irregularities at early stage.
	Statistics	Using the latest 10000 measured data
		Displaying number of measurement, OK, NOK
	Screen capture	Saves screen capture data as bmp data.
	Work name edit	Work name can be edited and displayed for each Work No.
	Setting list display	Changed setting items comparing to master set values are highlighted.
	User management	Login ID and Password
External signal	Output signal (16 points)	Point judgment (load, displacement)/ Load overload/ Measurement complete/ Waveform comparison judgment/ Load & displacement OK/ CPU OK/ SD card OK/ Timing output 1,2 Output Type: Sink type/ source type selectable. (Source Type is option: [ISC]) Output transistor ON at signal ON. To connect an input unit like a PLC, connect plus common for sink type, and minus common for source type. Rated voltage: 30 V, Rated current: 30 mA
	Input signal (16 points)	Load digital zero/ Displacement adjustment/ Measurement start/ Measurement end/ HOLD1 to 5/ Reset/ Forcibly light up the backlight/ Touch panel lock/ Work change Input type: Plus common/ Minus common selectable. (Minus common is option: [ISC]) To connect a transistor, connect NPN output type (sink type) for plus common and PNP output type (source type) for minus common.
Interface	USB: USB interface EIP: EtherNet/IP interface (option) CCL: CC-Link interface (option) ETN: Ethernet interface (option) ODN: DeviceNet interface (option) PRT: PROFINET IO interface (option) *Only one option can be installed	
Option	ISC: I/O Source board, MLT: Multi sensor input, MLT2: Multi sensor input 2	
Special option	FS2000-HYS:	Special option which records and judge a reverse waveform (Hysteresis specifications)
	FS2000-MHP:	Special opeton which enables to detect hold points up to 15 (Multi hold point specifications)
General specifications	Power supply voltage	DC 24 V (±15%)
	Power consumption	6 W typ.
	Operating conditions	Operation temperature: −10 to +40℃ Storage temperature: −20 to +60℃ Humidity: 85% RH or less (non-condensing)
	Dimension	132(W) × 98(H) × 110(D) mm (Not including projections)
	Weight	Approx. 1.0 kg
Attachments	I/O connector (with cover) ...1 CC-Link connector Analog connector.....1 (when CC-Link option is selected) .....1 Operating tool .....1 DeviceNet connector SD card 1 GByte .....1 (when DeviceNet option is selected) .....1 Operation manual.....1	
Optional accessories	CN36: I/O connector (with cover) (Same as the attachment)	CND01: DeviceNet connector SD1G: SD card 1 GByte (Same as the attachment)
	CN71: CC-Link connector CN72: Double row connector for CC-Link CN77: Analog connector (Same as the attachment)	SD16G: SD card 16 GByte SD32G: SD card 32 GByte CA81-USB: USB cable (TypeA-Bmini) 1.8 m

* Please note that there are possibilities of individual differences in a color tone on display devices such as LEDs, fluorescent display tubes and LCDs due to manufacturing process or production lots.

Structure of product code

FS2000 □ ① □ ② □ ③ □ ④

① Standard unit

② I/O output

Sign	Output type
Standard	Sink type (NPN output)
ISC	Source type (PNP output)

③ Sensor input

Sign	Output type
Standard	Strain gauge, Line driver
MLT or MLT2 *1	Strain gauge Open collector (MLT only) Line driver (MLT2 only) Voltage (Load or displacement)

*1 When choose MLT option, ULE-50 is not available to use.

④ Interface

Sign	Interface
Standard	USB

↓ One optional interface can be added in addition to the standard interface.

CCL	CC-Link
ODN	DeviceNet
EIP	EtherNet/IP
ETN	Ethernet *2
PRT	PROFINET IO

*2 When choose ETN option, USB interface is not included.

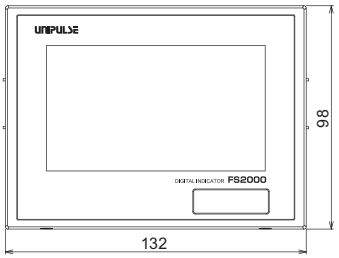
Combination table

X axis	Y axis	Standard	MLT	MLT2
Time	Strain gauge	○	○	○
Line driver	Strain gauge	○	×	○
Line driver	Voltage (Load)	×	×	○
Time	Voltage (Load)	×	○	○
Open collector	Strain gauge	×	○	×
Open collector	Voltage (Load)	×	○	×
Voltage (Displacement)	Strain gauge	×	○	○

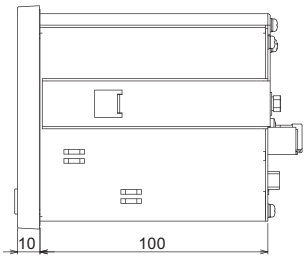
External dimension

Unit: mm

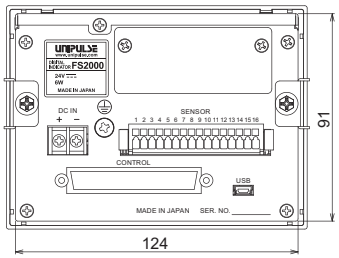
(Front)

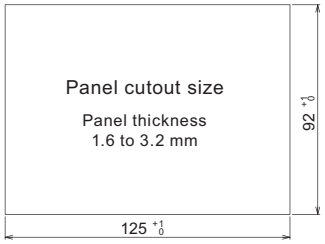


(Side)



(Rear)





A digital contact sensor designed for FS2000

Digital contact sensor

ULE-50

You can perform OK/NOK judgment with a Force vs Displacement curve.



- Wide measuring range & high-accuracy
  Measuring range: 50 mm
  Resolution: 2.5 μm

* For specification & drawing of ULE-50, please refer to page 117 for more details.