# FS2000 DIGITAL INDICATOR WITH GRAPHIC DISPLAY / TOUCH PANEL (SD CARD SLOT & HIGH SAMPLING RATE)





## 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!!

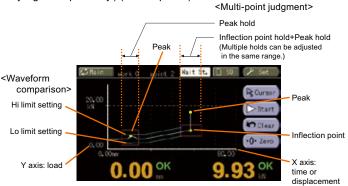
- Two-dimensional OK/NOK judgement can be performed with a load cell and displacement sensor.
- Analog monitor output Voltage output is proportionate to the input signal making the recording on recorder convenient. Approx. 2 V per 1 mV/V strain gauge input
- 25000 times/sec. high-speed processing
- Variety 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)

#### 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.







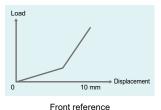
Enlarged numerical display

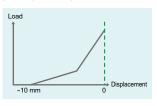


Enlarged waveform display

#### Selectable waveform reference

Judgement is possible based on press point of press machine





Back reference

#### 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



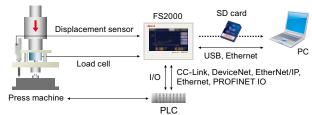
List display

#### 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.



## Example of use



#### FS2000-HYS Hysteresis specifications

Standard Can see going waveform

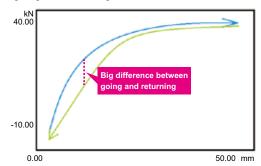


**Hysteresis specifications** 

# Can see outgoing and return waveform

#### Can choose comparison method!

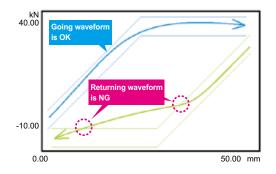
<Differential waveform comparison> Judgment of OK/NOK by the difference between going and returning



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 judgement up to 5 points



Multi hold point specifications

**OK/NOK** judment up to 15 points

		Оресп			
_	T				
Sensor		d (Fixed as strain gauge input) (6-wire)			
input	Excitation voltage				
(Standard)	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 μ V/°C RTI			
		Gain drift: Within 15 ppm/°C			
	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 disc	lacement (Pulse input: Line driver)			
	Max. input frequence				
		e Approx. 1,000,000			
	Adaptable encoder				
	Adaptable effcodel				
	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		d (Strain gauge) (6-wire) Same as standard			
input	Sensor input for displac	cement (Pulse input: open collector) Other than output circuit, spec is standard [MLT]			
Multisensor		Output stage circuit specification: Open collector			
input		lacement (Pulse input: line driver) Same as standard [MLT2]			
(Option:	Voltage input				
[MLT] or	Signal input range	-10 to +10 V			
[MLT2])	Absolute max. rating	g ±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/°C RTI			
		Gain drift: Within 0.01%/°C			
	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	Output level	Approx. 2 V per 1 mV/V input			
voltage output		Load resistance: 2 kΩ or more			
Display	4.3 inch TFT color LCD module, Display area: 95.0(W) × 53.9(H) mm, Dot configuration: 480 × 272 do				
	Display frequency Fixed at 3 times/sec.				
Comp.	Multi point comparis	son mode: 16 ch (set values)			
&	Capable	e of judging up to 5 hold points at the same time.			
judge.		, Peak, Bottom, P-P, Relative Maximum, Relative Minimum,			
function	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		son and waveform comparison are possible by measuring going/returning			
specifications		(Can choose go/return difference comparison)			
specifications					
Multi beld 1		points: 1000 points for going, 1000 points for returning			
Multi hold point					
Specifications Preventive	Sampling speed: 50				
	Trend display	Showing the trend of measurement data to help finding irregularities at early stage.			
maintenance	Statistics	Using the latest 10000 measured data			
support	_	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.			
	_	Login ID and Password			
External	Output signal (16)	Point judgment (load, displacement)/ Load overload/			
signal		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			

Rated voltage: 30 V, Rated current: 30 mA \* 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.

	Input signal (16) Load digital zero/ Displacement adjustment/ Measurement start/				
	Measurement end/ HOLD1 to 5/ Reset/				
		Forcibly light up the backlight/ Touch panel lock/ Work cha			
		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 cor			
Interface	USB: USB inte	rface	EIP:	EtherNet/IP interface (option)	
	CCL: CC-Link	interface (option)	ETN:	Ethernet interface (option)	
	ODN: DeviceNe	et 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	FS2000-HYS: Special option which records and judge a reverse waveform				
option	(Hysteresis specifications)				
	FS2000-MHP: Special opeton which enables to detect hold points up to 15			detect hold points up to 15	
	(Multi hold point specifications)				
General	Power supply voltage DC 24 V (±15%)				
specifications	Power consumption	, ,			
	Operating conditions Operation temperature: -10 to +40°C				
	Storage temperature: -20 to +60°C				
	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 conne	ctor	
	Analog connector	1	(when CC-Linl	coption is selected)1	
	Operating tool1		DeviceNet connector		
	SD card 1 GByte				
	Operation manual	1			
Optional	CN36: I/O conne	ctor (with cover)	TSU03:	DC lighting surge unit	
accessories	(Same as	the attachment)	SD1G:	SD card 1 GByte	
	CN71: CC-Link c	onnector		(Same as the attachment)	
	CN72: Double ro	w connector for CC-Lir	nk SD2G:	SD card 2 GByte	
	CN77: Analog co	nnector	SD16G:	SD card 16 GByte	
	(Same as	the attachment)	SD32G:	SD card 32 GByte	
	CND01: DeviceNe	connector	CA81-US	B: USB cable (A-miniB type) 1.8 m	
CE marking	EMC directive EN	61326-1			
certification					

### Structure of product code

	FS2000			
① Standard unit	1	2	3	4

#### 2 I/O output

Sign	Output type
Standard	Sink type (NPN output)
ISC	Source type (PNP output)
	<u> </u>

#### 3 Sensor input

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

#### 4 Interface

Sign	Interface
Standard	USB
	USB

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

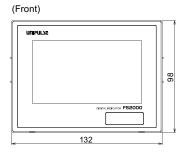
CCL	CC-Link		
ODN	DeviceNet		
EIP	EtherNet/IP		
ETN	Ethernet *2		
PRT	PROFINET IO		
*2 When shoos ETN ention			

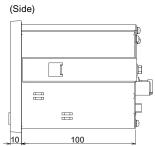
When choose ETN option, USB interface is not included.

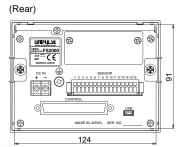
## Combination table

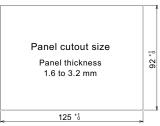
X axis	Y axis	Standard	MLT	MLT2
Time	Strain gauge	0	0	0
Line driver	Strain gauge	0	×	0
Line driver	Voltage (Load)	×	×	0
Time	Voltage (Load)	×	0	0
Open collector	Strain gauge	×	0	×
Open collector	Voltage (Load)	×	0	×
Voltage (Displacement)	Strain gauge	×	0	0

#### External dimension









Unit: mm

### 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  $\,\mu$  m



<sup>\*1</sup> When choose MLT option, ULE-50 is not available to use.

<sup>\*</sup> For specification & drawing of ULE-50, please refer to page 118 for more details.