

# DFS-Digital Force Gauge

# Instruction Manual



Congratulations on your purchase of a Shimpo DFS (Digital Force Gauge). We trust you will enjoy many years of professional results from your DFS for force measurement applications.

Please read the entire instruction manual thoroughly before initial set-up and operation; the information contained herein will aid you in operating your Shimpo DFS safely and with excellent results.

If you have any questions regarding our product(s), call your local Shimpo representative or contact Shimpo directly for assistance.

## Contents

Inspection / Standard Accessories	2
Features and Benefits	2
Important Safety Instructions	2
Set-Up	3
Power	3
Display and Keypad	4
Factory Settings	5
Operation	5-8
How to Tare and Zero the Display	5
Changing the Measuring Mode	5
Changing Units of Measure	6
Setting High and Low Limits	6
Changing Display Update Time	6
Changing Memory Modes	7
Recalling Statistics	8
Setting of Filter	8
Communication with External Devices	9-16
Output Selection	9-13
RS232	10-12
Digimatic	13
Analog	13
Comparator	13
External Control Input	14-15
Overload Output	16
Parameter Settings	17
Low Battery Indication	18
Auto Power Off	18
Calibration	18-19
Troubleshooting	19
Dimensions and Specifications	20
Warranty	20

# SHIMPO

A **Nidec** Group Company

## Inspection/Standard Accessories

If any damage is apparent, do not unpack the DFS. Notify the shipping carrier immediately for damage claim instructions. Refer to the nameplate to confirm model number ordered and record serial number for future reference.

Items included with the DFS are:

- AC adapter
- (4) AA batteries
- DFS output connector
- Overload protection cable
- Plastic carrying case

## Features and Benefits

The DFS offers many features and benefits, including:

- Large memory capacity (100 samples plus statistics) enables portable data collection for multi-location usage
- High sampling rate (1000 hz) allows peak force and torque points to be easily captured
- Handheld and test stand mountable - allows flexibility in multiple test set-ups, applications and fixturing
- High and low set points permit measurement of breakaway torque in applications such as child safety cap testing
- External tare and hold control allows hands-free zeroing using a keyboard or foot switch

## Important Safety Instructions



Always wear eye protection when testing materials.



Attachments must be properly installed to the force gauges (hand-tighten only! Do not use wrenches or other tools!).

Never exceed force capacity; if "OVR 1234"



appears on the display, STOP the test immediately to avoid permanent sensor damage.



Never apply a force or load at an angle to the force sensor.



When installing the DFS on a test stand, confirm that the indicator unit is thoroughly secured.



When not in use over an extended period of time, remove batteries to avoid battery terminal corrosion.



Only use the provided AC adapter; usage of any other adapter may damage circuitry.



Check the batteries periodically for corrosion when using the unit under AC power; this will avoid damage and ensure memory backup (refer to "Low Battery Indication" section).



Do not use or store unit in extreme temperatures; normal operating temperature is 32-113°F (0-45°C).



Do not use or store unit in oily, dusty, or excessively wet areas.



Do not use any chemicals to clean the case; use a wet, soapy cloth.

## Set-Up

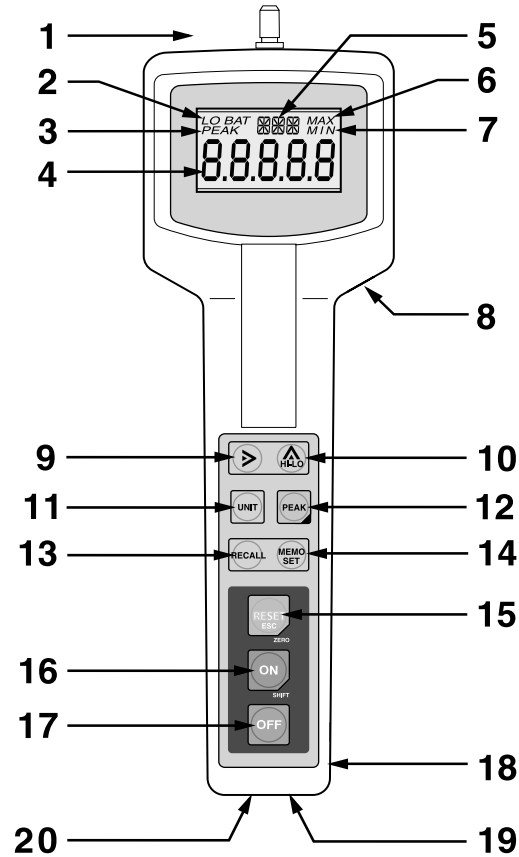
### Power

Every DFS unit is shipped from the factory without the batteries (provided) installed. To install the batteries:

1. Remove the battery plate located at the bottom of the handle using a coin or appropriate screwdriver.
2. Install the (4) AA batteries, observing the proper polarity.
3. Reinsert the battery plate cover, making sure the lip engages properly before tightening.

**NOTE:** If AC adapter operation is preferred, refer to the "Display & Keypad" section of this manual for AC outlet location.

# Display & Keypad



1. Sensor Shaft
2. Low Battery Indicator
3. Peak Indicator (**NOTE:** Refer to "Changing the Measuring Mode" section for explanation)
4. Main Display
5. Small Display
6. Maximum Reading Indicator
7. Minimum Reading Indicator
8. AC Adapter Port
9. > Button
10. HI-LO Button
11. Unit Button
12. Peak Button (**NOTE:** Refer to "Changing the Measuring Mode" section for explanation)
13. Recall Button
14. Memo Set Button
15. Reset Button
16. On Button
17. Off Button
18. Overload Output Port
19. Data Output Port
20. Battery Compartment

## Factory Settings

Each time the power is turned OFF and ON there are some parameters that the DFS will default to. Consult the section on "Parameter Settings" to customize these default settings. The following chart reflects the default settings as programmed by the factory:

PARAMETER	DEFAULT FACTORY SETTING
Display Update	0.125 seconds
Measuring Mode	True Peak
Auto Power Off	3 Minutes
Measurement Unit	English (Lb, Lb-l or oz-l)
Output	RS232 Baud Rate - 4800 Data Length - 8 bits Stop Pulse - 2 bits Data End Code - CrLF Software Flow Control - off
External Trigger	Tare
Memory Mode	Single
Analog Output Mode	On
Filter	Off

## Operation

### How to Tare and Zero the Display

After installing an attachment, it will be necessary to tare the DFS:

1. Press the RESET button while holding down the ON button to tare the display.
2. Press the RESET button by itself when the peak indicator is showing to zero the display. Repeat step 1 if the display does not return to zero.

**NOTE:** The DFS can tare up to 50% of the remote sensor's rated capacity.

### Changing the Measuring Mode: True Peak Mode/Standard Mode

**CAUTION:** Depending on which of these two measuring modes is selected, the PEAK button performs two different functions! The DFS will always display an average force when PEAK is not showing on the display. The average measurement is based upon the display update rate chosen (see "Changing Display Update Time" section). When in the True Peak mode, pressing the PEAK button will allow the display to scroll from average to peak "+" (compression or clockwise torque) to peak "-" (tension or counterclockwise torque). When in the Standard mode, pressing the PEAK button will allow the display to scroll from average to maximum display reading "+" to maximum display reading "-". **Despite showing PEAK on the display, these are not true peak readings; they are the highest average displayed readings since the DFS was last "tared".**

Instructions to change the Measuring Mode are as follows:

1. Press the PEAK button while holding down the ON button. The small display will exhibit "dSP".
3. Press the PEAK button; the small display will read "PfS" and the main display will show "on" (True Peak) or "oFF" (Standard).
3. Press the > button to toggle between "on" and "oFF".

## Operation (continued)

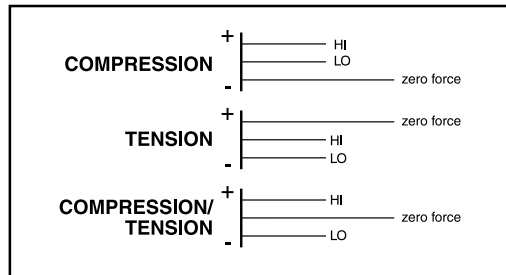
4. Press MEMO SET button to store the measuring mode and exit.

**NOTE:** By keeping the true peak mode "ON", the DFS will always display the peak samples and not a maximum average.

### Changing Units of Measure

By pressing the UNIT button, the DFS will scroll between English, Metric, and Newton units; once the DFS is turned OFF the unit will default to the factory setting. Instructions to change the default unit of measure setting are as follows:

1. Press the PEAK button while holding down the ON button; the small display will indicate "dSP".
2. Press the PEAK button three times; the main display will indicate "init" and the small display will reflect the current default setting.
3. Each time the UNIT button is pressed, the small display will scroll between English, Metric, and Newton units.
4. Press the MEMO SET button to store the default unit setting and exit.



### Setting High and Low Limits

It is possible to program high and low limits for applications requiring tolerances. Use the diagram below as a guide for setting the limits.

Instructions to set the high and low limits are as follows:

1. Press the HI-LO button; "ΔHI" will be flashing on the small display and whatever limit is already programmed will be displayed.
2. Press the > button; the entire display will be flashing.
3. Press the HI-LO button to toggle between "+" (compression or clockwise torque) and "-" (tension or counter-clockwise torque).
4. Press the > button to scroll across each digit position.
5. Press the HI-LO button to select the numerical value of each digit position.
6. Once the high limit has been programmed, press the MEMO SET button; "▽LO" will be flashing on the small display and whatever limit is already programmed will appear on the main display.
7. To program the low limit, repeat steps 2-5.
8. Once the low limit has been programmed, press the MEMO SET button to store the set points and exit from this function.

The unit of measure will be displayed when the measurement is within the set points. Small "arrows" (Δ or ▽) will appear on the small display when the measurement is above or below the set points.

The unit of measure will never be displayed if the low limit is set higher than the high limit. This is because it is impossible for the measurement to fall between the setpoints.

Set points can be referenced by pressing the HI-LO button: the first time the button is pressed the display will show the high limit, the second time will show the low limit, and the third time will exit.

To cancel the high and low limits, both settings must be set to zero.

**NOTE:** A comparator output is available for "go – no go" testing (refer to "Comparator Output" section).

## Operation (continued)

### Changing Display Update Time

The display update time works with the sampling rate (1000 hz) to provide an average reading. All samples taken within the selected update time are averaged (based on 1000 samples/sec) and displayed.

To change display update time:

1. Press the PEAK button while holding down the ON button. The small display will exhibit "dSP" and the main display will reflect the current setting.
2. Each time the > button is pressed, the main display will scroll through "0.125", "0.25", "0.5", "1.0" and "2.0" (these correspond with the amount of time in seconds that the display will update).
3. Press the MEMO SET button to store the desired display update time and exit.

### Changing Memory Modes

The DFS operates in three distinct memory modes:

- *Single (on-demand memory)*
- *Continuous*
- *Standard (NOTE: Main display reflects "nonE" in this mode)*

To change the memory mode:

1. Press the PEAK button while holding down the ON button; the small display will reflect "dSP".
2. Press the PEAK button six times; "Log" will appear on the small display and the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will scroll through "SinG", "Cont" and "nonE".
4. Press the MEMO SET button to store the desired memory mode and exit.

**NOTE:** Data stored in memory can be output to an external device (see "Communication with External Devices" section).

### Single and Continuous Memory Modes

The three functions performed when using either the Single or Continuous mode are:

- *Storing data*
- *Recalling data*
- *Deleting data*

#### *Storing Data (Single Memory Mode)*

After selecting the "SinG" mode it is possible to send one data reading into memory each time the MEMO SET button is pressed; the small display will briefly change to an "M". The "M" indicates that the data reading displayed has been stored in memory. Up to one hundred data readings can be stored. "FULL" will appear on the main display if memory is full.

#### *Storing Data (Continuous Memory Mode)*

After selecting the "Cont" mode it is possible to enter data readings continuously into memory by pressing the MEMO SET button once. The small display will reflect a flashing "M" and data readings will be stored in memory as quickly as the display update rate chosen (reference "Changing Display Update Time" section). Data readings will continually be entered into memory until the MEMO SET button is pressed a second time or 100 samples have already been entered ("FULL" will appear briefly on the main display).

#### *Recalling Data (Single and Continuous Memory Mode)*

To recall data in the memory press the RECALL button; the last data reading entered and corresponding memory position will be flashing opposite each other on the main display. Each subsequent push of the RECALL button will scroll through the data readings in the opposite order as they were entered. Press the RESET button to exit from memory recall.

**NOTE:** No data readings have been entered if "nonE" shows on the main display after pressing the RECALL button.

## Operation (continued)

### *Deleting Data (Single and Continuous Memory Mode)*

While recalling data (see above) it is possible to delete one data reading at a time or delete the entire memory.

To cancel one reading at a time:

Press the RECALL button to scroll through the data in memory until the undesired reading is appears on the display. Push the > button to delete that data reading. All higher memory positions will decrement one to fill the deleted position. If the reading being deleted is the last one in memory, then the memory position will decrement one as there is no higher memory position to take its place.

To delete the entire memory:

After recalling the memory using the RECALL button, press the RESET button while holding down the ON button; "CLr" will briefly appear on the main display. This indicates that all data readings have been deleted and will automatically exit from memory recall.

### Standard Memory Mode

After selecting the "nonE" mode it is possible to store the maximum "+", maximum "-", minimum "+", minimum "-", and last reading during a sampling period. After pressing the MEMO SET button, a flashing "M" will appear on the small display; push the MEMO SET button again to end the sampling period.

Each time the RECALL button is pressed the DFS will scroll through the readings mentioned above. It is not necessary to clear the memory before performing the next test as they will be cancelled when the MEMO SET button is pressed.

## Recalling Statistics

While recalling data from memory in either the Single or Continuous Mode it is possible to also recall statistics. To recall statistics:

1. Press the RECALL button. The last data reading entered and memory position will be flashing opposite each other on the main display.
2. Press the PEAK button. The maximum reading will appear on the main display.
3. Each subsequent push of the Peak button will scroll to minimum, peak "+", peak "-", average, standard deviation and return to maximum.
4. Press the RESET button to exit.

**NOTE:** Peak "+" and peak "-" will not be displayed if the data was stored in the Single Memory Mode.

## Setting of Filter

Subtle vibrations are common in many testing environments. The DFS incorporates a filtering feature that "smoothes" the force curve by eliminating extraneous measurements caused by these outside influences. Depending on how severely these impact the sampling, a large or small filter is available. Set a filter as follows:

1. Press the PEAK button while holding down the ON button. The small display will show "dSP".
2. Press the PEAK button eight times. The small display will indicate "Adf" and the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will scroll through "0" (no filter), "1" (small filter) and "2" (large filter).
4. Press the MEMO SET button to store the selection and exit.

**NOTE:** To determine which filter (if necessary) is needed, first attempt to test without a filter, then proceed to filter 1 and possibly to filter 2.



# Communication with External Devices

When operated with the proper cable, the DFS offers a variety of output and input abilities for bi-directional communication with external devices such as computers and data loggers.

## Output Selection

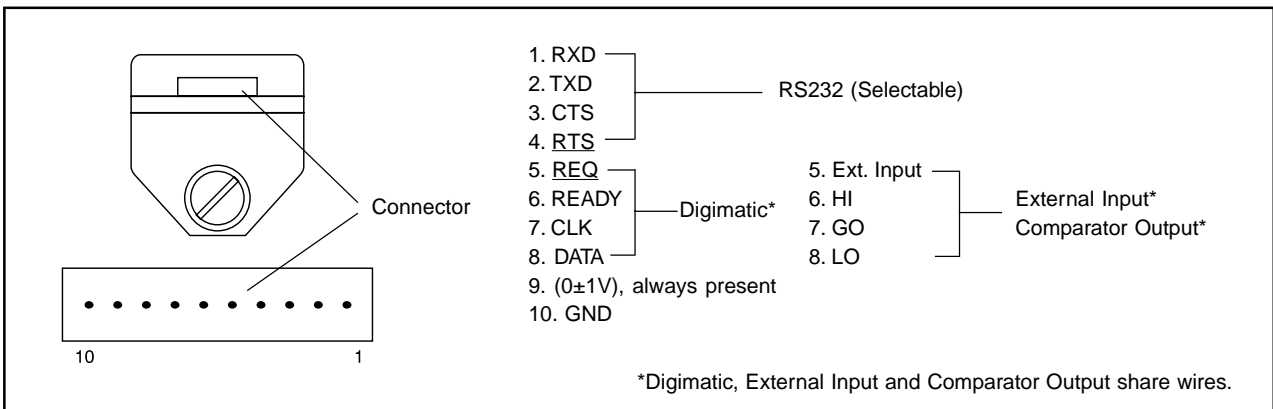
There are three output selections:

- RS232
- Digimatic
- None

Although there are only three output options, there are actually four outputs available; consult the chart below to determine the proper selection for the cabling and output desired:

DESIRED OUTPUT	CABLE PART #	MAIN DISPLAY
RS232	DFS-RS232	232
Digimatic	DFS-Digimatic	dG
Comparator	DFS-Comparator	232 or nonE
Analog	DFS-Analog	232, dG, or nonE

The following chart indicates the pin outs of the DFS connector:



Instructions to select the type of output are as follows:

1. Press the PEAK button while holding down the ON button. The small display will indicate "dSP".
2. Press the PEAK button four times. The small display will indicate "OUT" and the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will scroll through "nonE", "dG", "232". **NOTE:** If "RS232" is selected, please review the following section to set these specific output characteristics.
4. Press the MEMO SET button to store the selection and exit.

# Communication With External Devices (continued)

## RS232

Depending upon the type of data collection device that is being used with the DFS, it may be necessary to adjust the factory settings mentioned at the beginning of this manual. To adjust the RS232 output characteristics:

1. Select the RS232 output (following the above instructions) but do NOT press the MEMO SET button.
2. To set the baud rate, press the HI-LO button. The small display will indicate "bPS" and the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will scroll through "9600", "4800", "2400" and "1200".
4. To set the data length, press the HI-LO button; "dAT" will appear on the small display while the main display will indicate the current setting.
5. Each time the > button is pressed the main display will toggle between "8" and "7".
6. To set the stop pulse, press the HI-LO button. The small display will indicate "STP" and the main display will reflect the current setting.
7. Each time the > button is pressed, the main display will toggle between "1" and "2".
8. To set the parity, press the HI-LO button; "PRT" will appear on the small display and the main display will reflect the current setting.
9. Each time the > button is pressed, the main display will scroll through "nonE", "Eun" (even), "odd" (odd).
10. To set the data end code, press the HI-LO button; the small display will indicate "dEL" and the main display will reflect the current setting.
11. Each time the > button is pressed, the main display will toggle between "Cr" and "CrLF".
12. To set the software flow control, press the HI-LO button. The small display will indicate "fLO" and the main display will reflect the current setting.
13. Each time the > button is pressed, the main display will toggle between "on" and "oFF".
14. After selecting the software flow control, press the MEMO SET button to store the RS232 characteristics and exit.

### Output Data Format

The following chart demonstrates the format of the data as it is output through RS232:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
CR	S	T	A	T	I	S	T	I	C	S		CR	LF
U	N	I	T	S		k	g					CR	LF
D	A	T	A					1	0	0		CR	LF
M	A	X			—			1	0	0	0	CR	LF
M	I	N			—					1	0	CR	LF
P	K	C									0	CR	LF
P	K	T			—			1	1	0	0	CR	LF
A	V	G			—				9	1	2	CR	LF
D	E	V							8	.	2	CR	LF
H	L	M	T		—			1	0	0	0	CR	LF
L	L	M	T		—				9	0	0	CR	LF
CR	LF												
	D	A	T	A	—				9	1	5	CR	LF
		1											
		2		L	—				8	9	5	CR	LF
	9	9		H	—			1	0	0	5	CR	LF
1	0	0							9	9	0	CR	LF
	*	*		E	N	D		*	*				

### Memory Data Output

Data may be output from memory by first pressing the RECALL button and then pressing the MEMO SET button. The main display will briefly indicate "oUt" to confirm that the data has been sent. The following chart indicates the order of the data output depending upon which memory mode was used:

ON-DEMAND	CONTINUOUS	STANDARD
STATISTICS	STATISTICS	Units
Units	Units	Max
DATA	DATA	Max
MAX	MAX	MIN
MIN	MIN	MIN
AVG.	PKC	LAST
DEV	PKT	**END**
HLMT	AVG	
LLMT	DEV	
	HLMT	
	LLMT	
DATA		
1 XXX		
2 XXXX	DATA	
3 XXXX	1 XXXX	
	2 XXXX	

# Communication With External Devices (continued)

## External Control Commands

The chart below lists the ASCII Capital Characters and their functions for controlling the DFS from a computer or other external device:

COMMAND	FUNCTION	DATA
UNTG	Change units to g or kg	
UNTN	Change units to N	
UNTL	Change units to lb or oz	
DSPN	Change mode to average	
DSPT	Change mode to peak tension	
DSPC	Change mode to peak compression	
PKCL	Peak clear reset	
MEMS	Display value stored in memory	
MEMC	Last data in memory clear	
MEMD	Memory data output	
MEMZ	Clear all data in memory	
MEMN	Memory location recall	
CPST	Upper and lower limit set	
Z	Tare	
UPD	Display update	1,2,3,4,5
APF	Auto – power – off	0,3
EXS	External input setting	Z,H,N
HLD	Hold trigger mode	E,L,O,C
LOG	Memory mode setting	S,C,N
PKF	Peak fast mode	0,1
DAF	Analog output setting	0,1
ADF	Filter setting	0,1,2
D	Output display data	
DATN	Output average mode data	
DATT	Output tension peak data	
DATC	Output compression peak data	
LIST	Gauge's present state	
AB	Stop continuous data output	
BB	Continuous data output request	
BC	Model name confirmation request	
BD	Units confirmation request	

## External Control Command Descriptions

### ASCII capital characters

- UNTG, UNTN, UNTL - Change UNITS to Kg, N, lb

UNTG CR... Kg(g)

UNTN CR... N

UNTL CR... lb (oz)

- DSPN, DSPT, DSPC - Change to average, peak tension, peak compression mode

DSPN CR... Change to average mode

DSPT CR... Change to peak tension mode

DSPC CR... Change to peak compression

- PKCL \_\_\_\_\_ Peak Clear

PKCL CR.... Peak reset. Same as reset from the gauge. If edge trigger is selected for HOLD, the PC can release the HOLD using this particular command.

- MEMS, MEMC, MEMD, MEMZ, MEMN (five control memory commands)

MEMS CR.... with this command if gauge is set in the ON-DEMAND (single) mode, it sends back to the computer the word SING. If gauge is set in the continuous or standard mode then when this command is sent and the gauge's memory starts, it sends back to PC the word STA. If memory stops, the word STP is sent back to the PC.

MEMC CR.... Last DATA in memory to clear

MEMD CR ....Memory DATA recall

MEMZ CR ... Clear all DATA in memory

MEMN CR ....Memory location recall

- CPST \_\_\_\_\_ Comparator Setting

CPST 0 0000 0 0000 CR  
SIGN    UPPER    SIGN    LOWER  
          LIMIT    LIMIT

Example: CPST  1234-0123 CR

SPACE                          need 4-digit # (fill with zeros)

- Z \_\_\_\_\_ TARE

Z CR .... To TARE. Works the same way as if it were done thru the gauge i.e SHIFT + ZERO.

- UPD \_\_\_\_\_ Display Update Time

UPD  CR     = 1: 0.125 sec.

2: 0.25 sec.

3: 0.5 sec.

4: 1 sec.

5: 2 sec.

# Communication With External Devices (continued)

## External Control Command Descriptions (continued)

- APF \_\_\_\_\_ Auto-Power-Off  
APF  CR  = 0: none  
                                  3: 3 minutes
  
- EXS \_\_\_\_\_ External Input Setting  
EXS  CR  = Z: TARE  
                                  H: HOLD  
                                  N: NONE
  
- HLD \_\_\_\_\_ HOLD Trigger Mode  
HLD  CR  = E: EDGE  
                                  L: LEVEL  
                                  O: Open Contact  
                                  C: Closed Contact
  
- LoG \_\_\_\_\_ Memory Mode Setting  
LoG  CR  = S: Continuous  
                                  N: Standard
  
- PKF \_\_\_\_\_ PEAK Fast Mode  
PKF  CR  = 0: OFF  
                                  1: ON
  
- DAF \_\_\_\_\_ Analog Output Setting  
DAF  CR  = 0: 1 msec  
                                  1: Display update
  
- ADF \_\_\_\_\_ Filter Setting  
ADF  CR  = 0: None filter  
                                  1: Normal filter  
                                  2: High filter
  
- D, DATN, DATT, DATC, AB, BB, BC, BD \_\_\_\_\_ Data  
output request (8 commands)  
D           CR ....Output displayed DATA  
DATN       CR ....Output average mode DATA  
DATT       CR ....Output tension PEAK DATA  
DATC       CR ....Output compression PEAK DATA  
AB          CR ....Stop continuous data output  
BB          CR ....Continuous data output  
BC          CR ....Model name confirmation request  
BD          CR ....Unit's confirmation request

## ■ LIST \_\_\_\_\_ Gauge's present state

LIST	CR (Command from PC)		
MDL	DFS-100	---	---
UNITS	lb		
DSPM	NORMAL		
DSPT	0.125		
PKFST	ON		
DAFST	ON		
ADFIL	NONE		
OFFT	NONE		
232C	4800	B8	S2
232C	PN	CR LF	X OFF
CP	ON		
HLMT	50.00		
LLMT	- 10.00		
ET	HOLD		
ET	LEVEL OPEN		
LOG	CONTINUE	---	---

Typical gauge response

## Gauge Response

- OK           ....Command accepted
- ERRO       ....Did not recognize command\*
- ERR1       ....Command cannot be processed\*
- ERR2       ....Wrong nomenclature, i.e N,S,C\*
- ERR3       ....Communications error\*
- ERR7       ....Memory unit error\*\*
- IN HOLD     ....When in HOLD, certain commands cannot be processed.
- IN MEMORY   ....When in continuous memory mode or standard mode (active), certain commands can be processed.

\* Check command and resend  
\*\* See troubleshooting section

UNITS CHANGE DISABLE .... This output is transmitted to PC when someone is trying to change UNITS while memory is accepting DATA.

## Communication With External Devices (continued)

### Digimatic

Digimatic output is used for Mitutoyo data collectors and printers (refer to RS232 memory data output instructions).

### Analog

Analog output is very linear and can have a high response time (1mS). This voltage is directly related to the unit of measurement.

Specifications:

Voltage: -1VDC~0~+1VDC

Load Impedance: 2K or higher

Response Time:

1mS - with analog output mode "on"

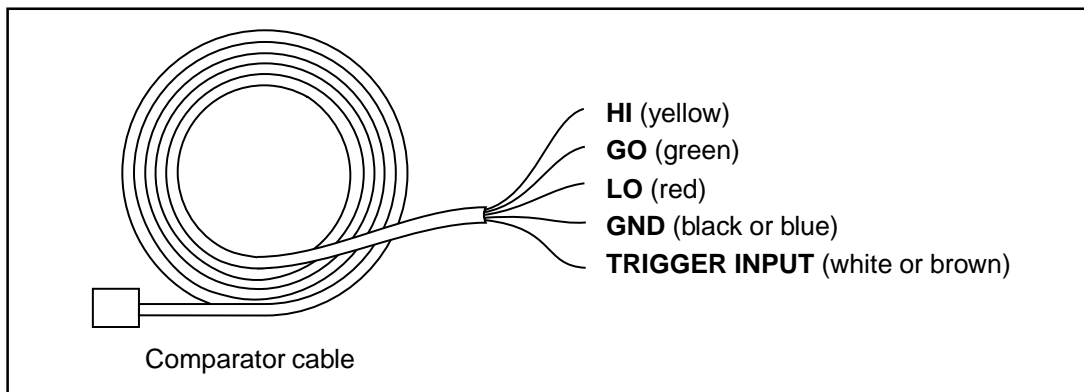
display update time - with analog output mode "off"

To change analog output mode:

1. Press the PEAK button while holding down the ON button; "dSP" will appear on the small display.
2. Press the PEAK button seven times. The small display will indicate "dAf" and the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will toggle between "on" and "off".
4. Press the MEMO SET button to store analog output mode and exit.

### Comparator

Once high and low limits have been set (refer to "Setting High and Low Limits" section), the comparator output may be used to turn on a light or sound an alarm for "go - no go" testing.



HI point is defined as:  $HI < Data$  (display)

OK or GO is defined as:  $LO < Data < HI$

LO point is defined as:  $LO > Data$

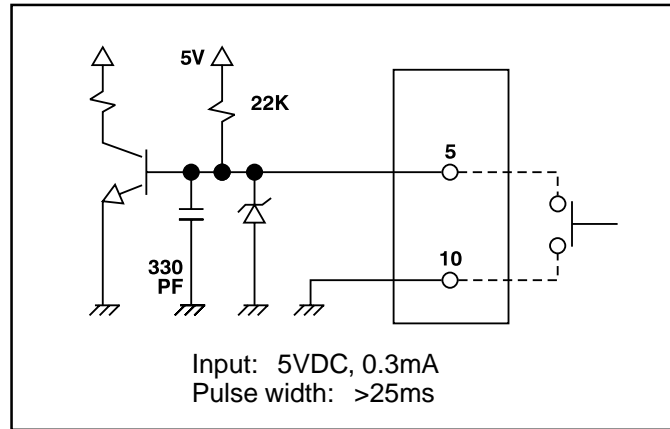
**NOTE:** The comparator cable is also used for external control input (see following section).

# Communication With External Devices (continued)

## External Control Input

**NOTE:** To activate the comparator cable, either "RS232" or "nonE" needs to be selected under outputs.

Using external control input makes it possible to remotely tare or hold the display. The following diagram indicates the pin outs of the DFS:



To select external input:

1. Press the PEAK button while holding down the ON button. The small display will indicate "dSP".
2. Press the PEAK button five times; "ET" will appear on the small display while the main display will reflect the current setting.
3. Each time the > button is pressed, the main display will scroll through "tArE", "HoLd", "nonE".
4. A) If "nonE" or "tArE" is desired, push the MEMO SET button to store the selection and exit.  
B) If the "HoLd" feature is desired, push the HI-LO button to set additional characteristics; the small display will indicate "EL" and the main display will reflect the current setting.
5. Each time the > button is pressed, the main display will toggle between "EdG"(edge trigger) and "LEu"(level trigger).
6. Push the HI-LO button after selecting the type of trigger; the small display will indicate "OPC" and the main display will reflect the current setting.
7. Each time the > button is pressed, the main display will toggle between "oPn"(open) and "CLS" (closed).
8. Push the MEMO SET button to store the type of trigger and exit.

# Communication With External Devices (continued)

## External Tare

To tare, short pins 5 and 10 for at least 25mS.

## External Hold

Choose edge or level trigger and also OPEN or CLOSED condition.

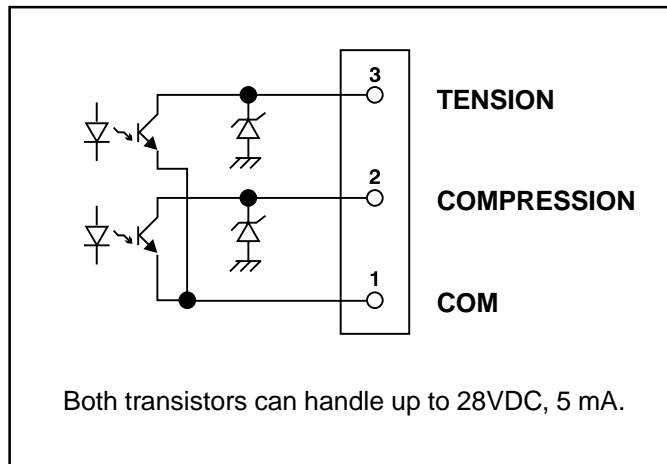
<p>Level trigger: OPEN Display holds present value when switch opens.</p>	
<p>Level trigger: CLOSED Display holds present value when switch closes.</p>	
<p>Edge trigger: OPEN Display holds present value after switch opens until it is reset.</p>	
<p>Edge trigger: CLOSED Display holds present value after switch closes until it is reset.</p>	

HOLD cannot be released from an external source in the edge trigger mode. To release it press RESET. Level mode can be released externally.

## Communication With External Devices (continued)

### Overload Output

The DFS possesses an overload output feature (DFS-CTRLCABLE) to protect the load cell or torque sensor. When the load exceeds 150% of its capacity, an open collector transistor turns ON (there are two OC NPN transistors, one for tension and one for compression). The output of these transistors can be used as an alarm or to stop a process, thus protecting the remote sensor or the sample under test. See "Display and Keypad" section for the location of the overload output port.



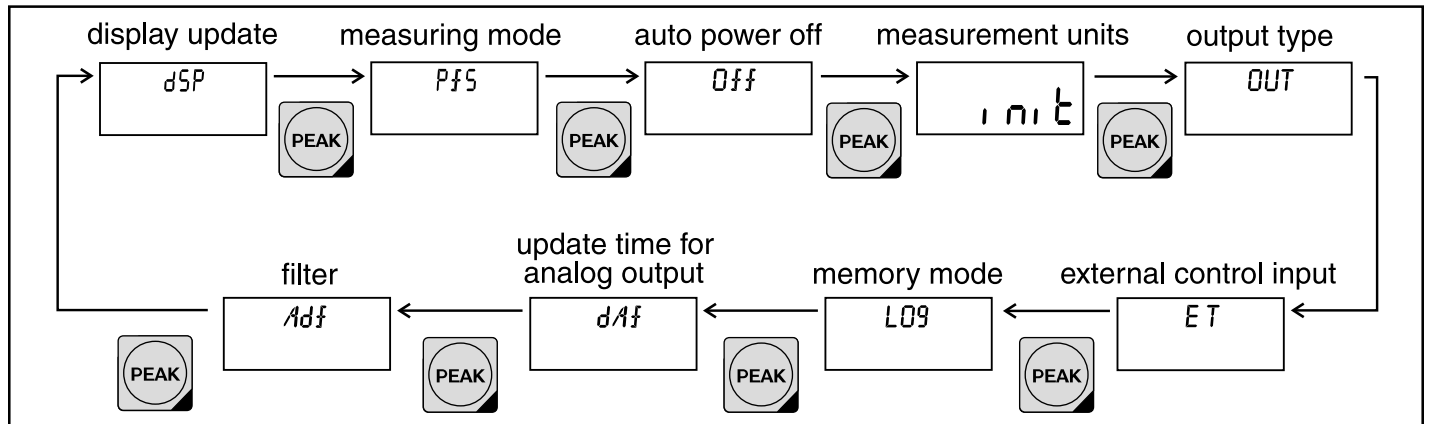
**NOTE:** This output is always active, therefore no parameter selection is necessary.



# Parameter Settings

The DFS will default to certain parameters when power is turned OFF and ON. To access the parameter settings:

1. Press the PEAK button while holding down the ON button; the small display will indicate "dSP".
2. Each time the PEAK button is pressed, the DFS will scroll through each of the parameters.



3. Press the RESET button to exit.

See the chart below for the location of descriptions of the options within each parameter.

DESCRIPTION	DISPLAY	OPTIONS
Display Update Time (see page 6)		(in seconds) 0.125, 0.25, 0.5, 1, 2
Measuring Mode (see page 5)		on, oFF
Auto Power Off (see page 18)		nonE, 3
Measurement Units (see page 5)		English, Metric, or Newton Lb(oz), Kg(g), N
Output Type (see page 9-13)		nonE, dG, 232C
External Control Input (see page 14-15)		nonE, tArE, HoLd
Memory Mode (see page 7)		nonE, SinG, Cont
Update time for Analog Output (see page 13)		on(1ms), oFF(display update time)
Filter (see page 8)		0, 1, 2

## Low Battery Indication

The batteries should be changed when “LO BAT” appears on the display.

**NOTE:** Parameters and data in memory can be saved if the AC adapter is plugged in and the DFS is left ON before removing the batteries.

## Auto Power Off

The DFS incorporates a selectable auto power off feature to protect the life of the batteries. If no buttons are pressed or the display has not changed for a period of three minutes, the DFS will automatically shut off. This feature is inactive if the DFS is being used with the AC adapter or if it is in calibration mode. To engage or disengage the auto power off feature:

1. Press the PEAK button while holding down the ON button; the small display will indicate “dSP”.
2. Press the PEAK button two times. The small display will indicate “Off” and the main display will reflect the current setting.
3. Each time the > button is pressed the main display will toggle between “3” and “nonE”.
4. Press the MEMO SET button to store the auto power off selection and exit.

## Calibration

Any DFS can be calibrated in the field. The DFS are very easy to calibrate with metric weights, but the torque sensors require a “calibration wheel”.

Required items for DFS calibration:

- *Appropriate calibration weight (see following table)*
- *Proper attachment for applying the weight to the DFS (either tension or compression)*
- *Secure mounting stand that will not introduce vibration*

Instructions to calibrate a remote load cell are as follows:

1. Mount the DFS to the stand.
2. Secure the attachment to the DFS.
3. Make sure the power on the DFS is turned OFF.
4. While holding down the MEMO SET button, press the ON button and hold until the main display shows “CAL”. The small display will reflect the two-digit code that corresponds with the capacity (see following calibration table).
5. Press the MEMO SET button. The capacity of the DFS will appear on the main display; please move on to step 6. If the DFS did not show the correct model (code), use the > button to select the proper code for the remote sensor (see the following table).
6. Press the MEMO SET button. The small display will show “PLS”. Pressing the > button will toggle the small display “MNS” and “PLS”. If calibrating under a compression load choose “PLS”. If calibrating under a tension load choose “MNS”.

**NOTE:** Default setting is one direction calibration.

7. Press the MEMO SET button. The minimum indicator will appear and the main display will reflect a hexadecimal number that has no relevance to the user.
8. Confirm that there is no load (except for the attachment) since the DFS is ready for zero point calibration. Press the MEMO SET button. The small display will exhibit “SCN” and blink for about 12 seconds until the maximum indicator appears.
9. Gently place the proper calibration weight (see the following table) on the load cell and confirm that it is steady. Press the MEMO SET button to begin full scale calibration. The “SCN” will flash for about 18 seconds until the small display shows “END”.
10. “ERR” will appear on the display if the calibration failed. Turn the power off and repeat the entire procedure.
11. After “END” appears, press the OFF button to end the calibration process.

## Calibration (continued)

MODEL	SELECT NUMBER	DISPLAY	CALIBRATION WEIGHT
DFS-0.5 (R)	00	0.2	200g
DFS-1 (R)	01	0.5	500g
DFS-2 (R)	02	1.0	1000g
DFS-5 (R)	03	2.0	2.0kg
DFS-10 (R)	04	5.0	5.0kg
DFS-20 (R)	05	10.0	10.0kg
DFS-50 (R)	06	20.0	20.0kg
DFS-100 (R)	07	50.0	50.0kg

Please call Shimpo for information on additional sensors.

## Troubleshooting

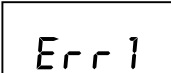



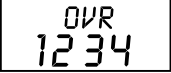
The following are general checkpoints; please call your local Shimpo representative or contact Shimpo Instruments directly for further assistance.

The DFS does not turn on:

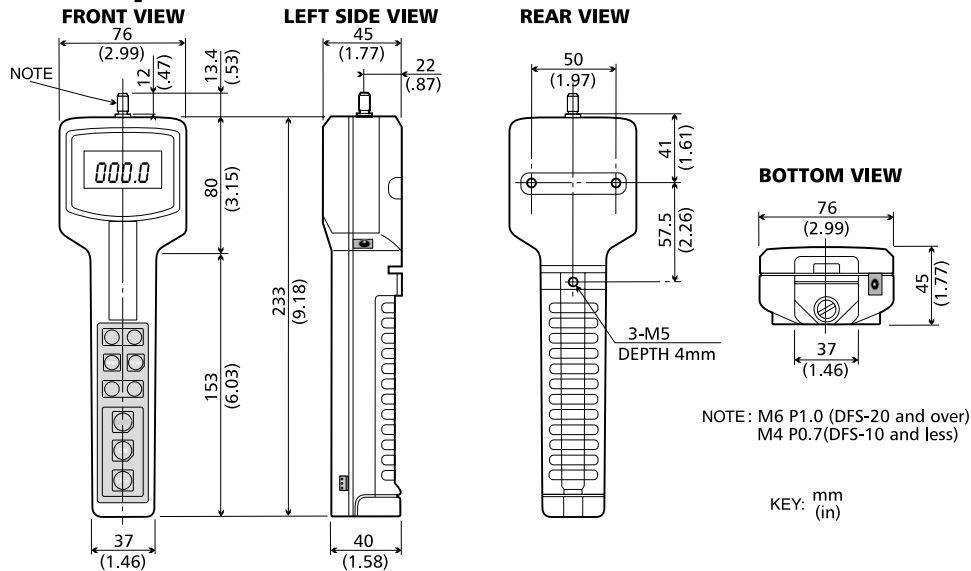
- *Check all electrical components (power source ... battery or power cord)*

Error Codes are displayed:

- *If any error codes appear on the display, turn power OFF and then ON*
- *If error code remains, see table below:*

DISPLAY	CONDITION	ACTION
	EE PROM reading error	Press RESET; unit will default to factory settings
	Memory data error	Press RESET to clear memory
	Calibration error	Press RESET and repeat calibration procedure
	Memory unit error; occurs if the measurement unit (lb, Kg, N) is changed while entering data into memory	Change measurement units or clear memory
	Overload condition –possible load cell damage	Remove excessive load; if the display does not return to normal operation, send unit in for repair

# Dimensions and Specifications



MODELS	DFS-0.5 DFS-0.5R	DFS-1 DFS-1R	DFS-2 DFS-2R	DFS-5 DFS-5R	DFS-10 DFS-10R	DFS-20 DFS-20R	DFS-50 DFS-50R	DFS-100 DFS-100R
<b>CAPACITY</b>	8 oz 200 g 2 N	16 oz 500 g 5 N	2 lb 1000 g 10 N	5 lb 2 Kg 20 N	10 lb 5 Kg 50 N	20 lb 10 Kg 100 N	50 lb 20 Kg 200 N	100 lb 50 Kg 500 N
<b>RESOLUTION</b>	0.01 oz		0.001 lb		0.01 lb		0.1 lb	
	0.1 g		1 g		0.001 Kg		0.01 Kg	
	0.001 N		0.01 N				0.1 N	
<b>ACCURACY</b>	±0.2% FS + 1/2 digit at 23°C							
<b>DISPLAY</b>	4-Digit LCD, 11.5 mm High with various indicators including Low Battery Indication and minus sign for Tension.							
<b>MEASURING MODE</b>	Average, Peak Compression, Peak Tension (selectable)							
<b>DISPLAY UPDATE</b>	125 ms, 250 ms, 1 sec, 2 sec (selectable)							
<b>SAMPLING RATE</b>	Average Mode: 125 ms, 250 ms, 1 sec, 2 sec Peak Mode: 1 ms, 125 ms, 250 ms, 1 sec, 2 sec							
<b>TEMPERATURE COEFFICIENT</b>	Zero: ±0.02% FS/°C (max.), Span: ±0.015% of reading/°C (max.)							
<b>OUTPUTS</b>	1. RS232C 2. Digimatic: (works with Mitutoyo's printer model DP-1HS) 3. Analog: (±1VDC with load impedance of 2K or higher and tare function capability.)							
<b>OVERLOAD CAPACITY</b>	200% of FS							
<b>COMPARATOR OUTPUT (Set Points)</b>	Three open collector NPN transistors for HI, GO, and LO (28VDC, 7 ma max.)							
<b>OVERLOAD OUTPUT</b>	Two open collector NPN transistors one for Tension and one for Compression (28VDC, 5 ma max.)							
<b>TARE &amp; HOLD CONTROL</b>	Relay contact (selectable)							
<b>MEMORY</b>	Holds 100 samples plus statistics (MAX, MIN, AVG, and Standard Deviation)							
<b>POWER</b>	4 - AA Alkaline batteries. Last approx. 20hrs. in continuous operation or AC Adapter for continuous use (6VDC, 200 ma)							
<b>AUTO POWER SHUT-OFF</b>	Selectable (3 minutes if there is no activity)							
<b>OPERATING TEMP RANGE</b>	32 - 113°F (0 - 45°C)							
<b>DIMENSIONS/WEIGHT</b>	3"W x 1.77"H x 9.72"L (76 x 45 x 247)mm /1.2 lbs. (550 g)							
<b>ACCESSORIES (Included)</b>	Batteries, carrying case, overload output cable, AC adapter, 6 adapters (flat head, hook, chisel, notched head, cone & extension rod)							
<b>ACCESSORIES (Available)</b>	Test stands, RS232C cable, Digimatic, analog and comparator output cables.							

## Warranty

**LIMITED EXPRESS WARRANTY:** Shimpo Instruments warrants, to the original purchaser of new products only, that this product shall be free from defects in workmanship and materials under normal use and proper maintenance for one year from the date of original purchase. This warranty shall not be effective if the product has been subject to overload, misuse, negligence, or accident, or if the product has been repaired or altered outside of Shimpo Instruments's authorized control in any respect which in Shimpo Instruments's judgment, adversely affects its condition or operation.

**DISCLAIMER OF ALL OTHER WARRANTIES:** The foregoing warranty constitutes the SOLE AND EXCLUSIVE WARRANTY, and Shimpo Instruments hereby disclaims all other warranties, expressed, statutory or implied, applicable to the product, including, but not limited to all implied warranties of merchantability and fitness.

**LIMITATION OF REMEDY:** Under this warranty, Shimpo Instruments' SOLE OBLIGATION SHALL BE TO REPAIR OR REPLACE the defective product or part, at Shimpo Instruments' option. Shimpo Instruments reserves the right to satisfy warranty obligation in full by reimbursing Buyer for all payments made to Shimpo Instruments, whereupon, title shall pass to Shimpo Instruments upon acceptance of return goods. To obtain warranty service, Purchaser must obtain Shimpo Instruments's authorization before returning the product, properly repackaged, freight pre-paid to Shimpo Instruments.

**INDEMNIFICATION & LIMITATION OF DAMAGES:** Buyer agrees to indemnify and hold Shimpo Instruments harmless from and against all claims and damages imposed upon or incurred arising, directly or indirectly, from Buyer's failure to perform or satisfy any of the terms described herein. In no event shall Shimpo Instruments be liable for injuries of any nature involving the product, including incidental or consequential damages to person or property, any economic loss or loss of use.

**MERGER CLAUSE:** Any statements made by the Seller's representative do not constitute warranties except to the extent that they also appear in writing. This writing constitutes the entire and final expression of the parties' agreement.

Copyright® Nidec-Shimpo America Corporation 2001. All rights reserved. Product specifications are subject to change without notice.

**NIDEC-SHIMPO AMERICA CORPORATION** • 1701 Glenlake Avenue Itasca, IL 60143 USA • Phone: (800) 237-7079 • Fax: (630) 924-0342  
 www.shimpoint.com • info@shimpoint.com