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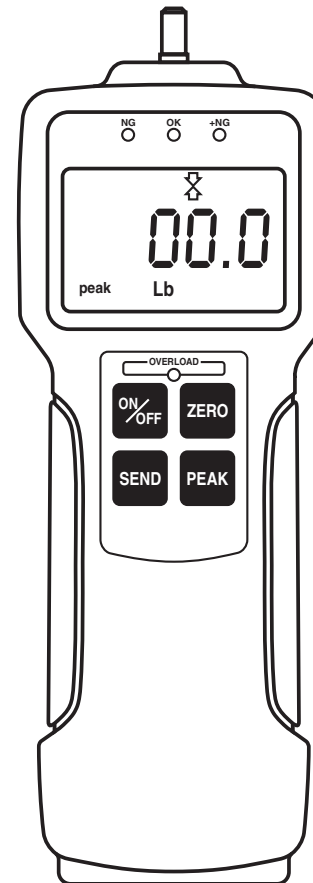
M-4175/0305

User's Guide

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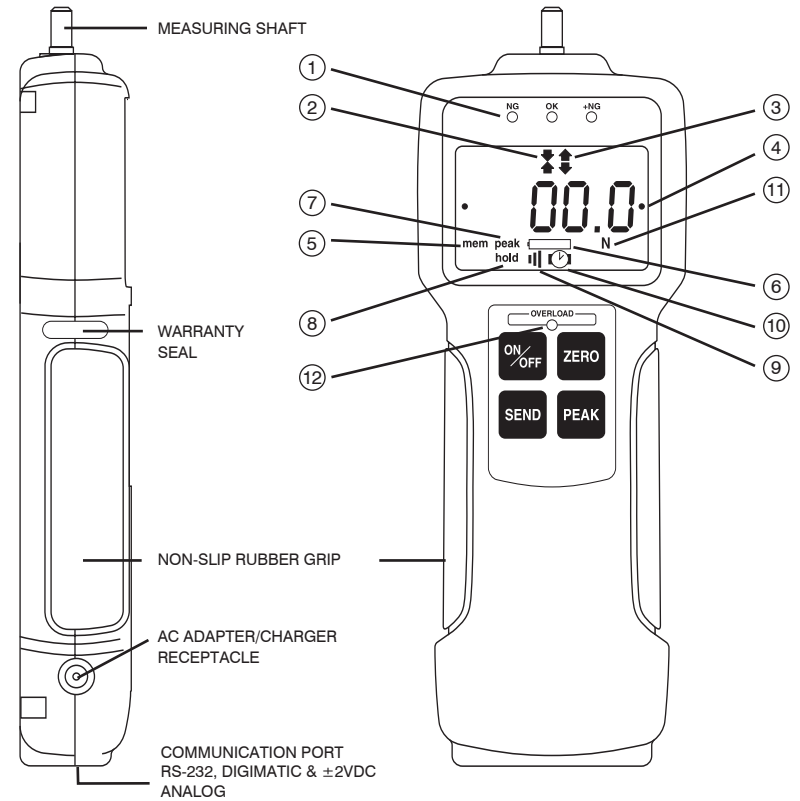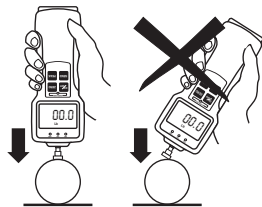| ISO 9001	ISO 9002
CERTIFIED CORPORATE QUALITY	CERTIFIED CORPORATE QUALITY
STAMFORD, CT	MANCHESTER, UK

DFG 71 Series
Digital Force Gauge

INTRODUCTION

Model DFG 71 is a state-of-the-art high performance, digital force gauge which offers a giant, easy-to-read LCD display and high/low setpoints with color-coded LED indicators for go/no go testing. These force gauges store up to 1000 data values in memory, which can be transmitted using RS-232 or Digimatic output formats. The real time measuring mode is used to display force transients. Peak measuring mode captures the peak force achieved during a test. Select measuring units from lbf(ozf), kgf(gf), and N.

IMPORTANT

1. **WARNING!!** Test samples and fixtures can break or shatter, wear eye and body protection to avoid injury.

2. **WARNING!** REGARDLESS of whether the unit is ON or OFF, **DO NOT** exceed the capacity of the gauge. At 110% of the rated capacity, the overload LED indicator flashes to warn. NEVER exceed 200% of the rated capacity, or the load cell will be damaged. Avoid shock load.

3. When mounting DFG-71, use M4 mounting screws with a maximum insertion depth of 5 mm into the gauge.

4. Measure in line tension and compression forces only. **DO NOT** attempt to measure forces perpendicular to the measuring shaft – damage to load cell and/or shaft may result.

5. Hand tighten attachments only. **DO NOT** use tools.

6. Make sure this gauge and all peripherals are powered down before attaching any cables.

7. **DO NOT** disassemble the gauge. Disassembly voids warranty.

8. Recommended recalibration cycle is one year.

Labels: MEASURING SHAFT, WARRANTY SEAL, NON-SLIP RUBBER GRIP, AC ADAPTER/CHARGER RECEPTACLE, COMMUNICATION PORT RS-232, DIGIMATIC & ±2VDC ANALOG

① **Programmable Setpoint LED's**
When high-low setpoints are set, LED indicates below (-NG), within (OK), or above set point value (+NG).

② **Compression icon**
Indicates compression measurement.

③ **Tension icon**
Indicates tension measurement.

④ **Reverse +/– values**

⑤ **Auto Memory - Peak Reset icon**

⑥ **Battery icon**
Flashes when Ni-MH cells need charging.

⑦ **PEAK icon**
Displays continuously when peak function is active.

⑧ **HOLD icon**
Displays when external hold signal is active or SEND button is pressed.

⑨ **Alarm Icon**

⑩ **Auto Power Off icon**

⑪ **Units icon**
Displays selected measuring units. (ozf, Lbf, gf, kgf, or N)

⑫ **Overload Indicator**
Flashes at 110% of rated capacity.

OPERATION

Selecting Units

Press ⏻ to turn on the gauge. The LCD display briefly shows the capacity of the gauge and then zero with a measuring unit (factory setup is lbf). If you want to change to other units:

1. Turn off the gauge.
2. Press ⏻ again while holding ZERO to enter Power-Off programming mode (CF9 flashes with solid nn0).
3. Press SEND to display U-03 with a unit, then press PEAK or ZERO to cycle desired units (ozf or lbf, gf or kgf, and N), and press SEND to select (CF9 flashes with solid End).
4. Press ⏻ to exit 1st. programming mode.

Once units are selected, the gauge retains them as a default.

Reversing the Display

The factory default is standard display.
To reverse the display:

1. Turn on the gauge
2. Press PEAK and ZERO for 3 seconds to enter Power-On programming mode (CF9 flashes with solid F0).
3. Press PEAK 5 times to display flashing CF9 with solid F5, then press SEND to display -12345. Press PEAK or ZERO, to cycle between standard and reverse ⚑-12345 .
4. Press SEND to select, the display flashes CF9 with solid End.
5 Press SEND again to exit Power-On programming mode.

Once desired display is selected, the gauge retains it as a default.

STANDARD DISPLAY   REVERSE DISPLAY
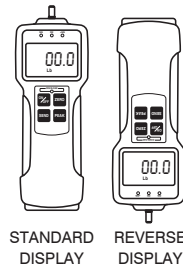
Programming Setpoints (optional)

Program High and Low setpoints for easy GO/NO GO testing.

1. Turn on the gauge
2. Press PEAK and ZERO for 3 seconds to enter Power-On programming mode (CF9 flashes with solid F0).
3. Press PEAK to display flashing CF9 with solid F1, then press SEND to display –HI– and then the high set value (i.e. H 10.0).
4. Press PEAK to increase and ZERO to decrease the High set value, then press SEND to display –LO– and then low set value (i.e. L 5.0). Press PEAK to increase and ZERO to decrease the Low set value and press SEND to display flashing CF9 with solid End.
5. Press SEND again to exit Power-On programming mode.

HI 10.0 Lbf
HIGH SETPOINT

L 5.0 Lbf
LOW SETPOINT
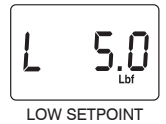
Hand Tighten the selected attachment (No tools!) to the measuring shaft.

Peak or Real time Measuring Mode

Press ⏻ to turn on and the gauge automatically enters real time measuring mode. For peak measurement press PEAK. The "Peak icon" appears on the display. Peak readings will not change until a higher value is measured. Press PEAK again to return to real time mode.

"Or PEAK" is the factory default which measures peak compression or peak tension. "And PEAK" measures both peak compression and peak tension during a test. Refer to the F2 function of the Power-On programming table for the "And PEAK" function.

0.0 Lbf
REAL TIME MODE DISPLAY

0.0 peak Lbf
PEAK MODE DISPLAY
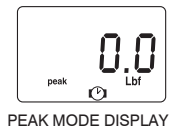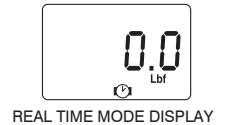
Tare

If necessary, press [ZERO] to tare the weight of the attachment and shaft orientation. Pressing [ZERO] also clears the peak reading.

Caution

Make sure to apply tension or compression forces in line with the measuring shaft.

If High and Low setpoints have been programmed (see page 5), for example, 5 lbf is set as Low and 10 lbf as High, the ORANGE LED light for measurements less than 5 lbf (Low setpoint). GREEN lights between 5–10 lbf and RED lights over 10 lbf (High setpoint). Setpoint output is available through the Communications port (see page 7).
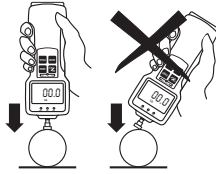
After measuring, press the [SEND] button to transmit data to:
    RS-232C or Digimatic devices

Storing Data into Memory

During measurement whether Peak or Real Time, press [SEND] to store and display up to 1000 force value into memory. (If no data is stored − − − − − is displayed then flashing CF9 with solid End).

Recalling Data from Memory

1. Turn on the gauge.
2. Press [PEAK] and [ZERO] for 3 seconds to enter Power-On programming (CF9 flashes with solid F0). Press [SEND] and the display cycles memory location and value. Press [PEAK] to increase location and [ZERO] to decrease. Press [SEND] to exit.

Clearing Data from Memory

1. Turn off the gauge.
2. Press [ON/OFF] again while holding [SEND] to enter memory mode.

Single Memory Clear

A memory location with a dot at both ends is the last stored value and the only one that can be erased. Press [SEND] to erase and ErASEd is displayed. If you erase any other location Error is displayed.

All Memory Clear

While a memory location or value is displayed, press [SEND] for 3 seconds, all data is erased, ErASEd is displayed, then − − − − − and flashing CF9 with solid End. Press [ON/OFF] to exit. (See page 14-15).

Downloading Data from Memory

Choose between the following download methods.

Digimatic Data Download from Memory

1. Connect the gauge and device receiving data with CB-304 cable.
2. Turn on the gauge. Press [PEAK] and [ZERO] for 3 seconds to enter Power-On programming (CF9 flashes with solid F0).
3. Press [SEND] to transmit all data.
4. Press [SEND] again to exit.

RS-232C Data Download from Memory

Connect the gauge and device receiving data with a CB-204 cable. Use the I[CR] ASCII command to transmit data (uppercase ASCII character format).

COMMUNICATIONS PORT

26 PIN CONNECTOR
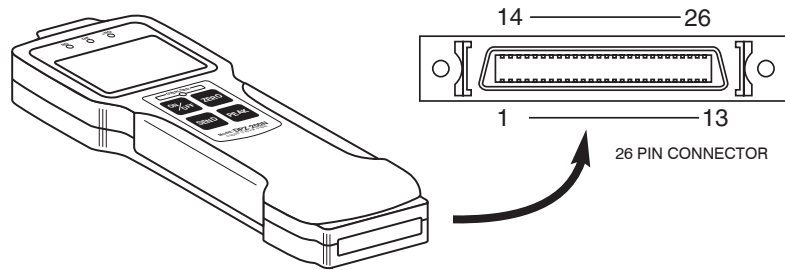
COMMUNICATIONS PORT PIN DEFINITIONS

PIN#	DEFINITION	
1	RS-232C Signal Output	
2	RS-232C Receive Signal	RS-232C Output
3	RS-232C Ground	
4	Analog Output ±2VDC	Analog Output
5	Analog Ground	
6		
7		
8	External Switch Display Clear	
9		
10	External Switch Display Freeze	External Inputs
11		
12	Ground	
13	Ground	
14		
15		
16	Digimatic Data Request	
17	Digimatic Data Ready	
18	Digimatic Data Clock	Digimatic Output
19	Digimatic Data Signal Out	
20	Digimatic Data Ground	
21	+NG Output	
22	OK Output	
23	-NG Output	
24	Overload Output	
25	Common	
26	Common	

High/Low Setpoint and Overload Output (open collector= 30V, 10mA max)

1. RS-232C bi-directional interface functions

All functions can be duplicated remotely by using the RS-232C interface. Commands must be sent in uppercase ASCII character format followed by a carriage return [CR].

RS-232C Signal: 8 data, 1 stop, no parity. Baud Rate: 19200 bps

RS-232C INTERFACE FUNCTIONS (Upper case ASCII format)

COMMAND	FUNCTION	RESPONSE*
T[CR]	Select real time mode	R[CR]
P[CR]	Select peak mode If OR peak is programmed **P[CR]** = peak If AND peak is programmed **P[CR]** (1st time)= +peak **P[CR]** (2nd time)= − peak	R[CR]
Z[CR]	Tare Display	R[CR]

D[CR]	Transmit display data	[direction][value][units][mode]
		[go/nogo/overload][CR]
		[direction] +=compression
		   −=tension
		[value] 4 digits w/decimal
		[units] K, N, or O
		[mode] T=real time value
		   P=peak value
		   H=Hold value
		   M=Memory value
		[go/nogo] H=+NG
		   O=OK
		   L=-NG
		   E=Overload

V[CR]	Transmit Peak data	P+[value][units][CR] P− [value][units][CR]
g[CR]	Continuous data output (10 data/sec)	
Y[CR]	Stop continuous data output	
K[CR]	Select "kgf" units	R[CR]
N[CR]	Select "N" units	R[CR]
O[CR]	Select "lbf" units	R[CR]
B[CR]	Delete last data stored in memory	R[CR]
M[CR]	Store data	R[CR]
I[CR]	Recall memory data	Data format is the same as **D** command response. It will output END[CR] at the end of data
C[CR]	Clear memory	R[CR]
EXXXXYYYY [CR]	Set high/low setpoints(4 digit) XXXX=High, YYYY=Low	R[CR]
E[CR]	Read high/low	EXXXXYYYY[CR] setpoint values (4 digit) XXXX=High, YYYY=Low

*Note: E[CR] response if the command is not accepted.

2. **Mitutoyo Digimatic Signal**
   Connect the CB-304 cable to the communications port and the device receiving the data. Set up parameters as instructed from the Mitutoyo processor manual.

3. **±2 VDC Analog Signal**
   Connect the CB-104 analog cable to the communications port and the device receiving the data.

4. **External Switch Display Freeze**
   By connecting #10 and #12 of the communications port, the gauge instantaneously captures the critical reading and holds the display from remote locations (use contact closure and **DO NOT** apply voltage across #10 and #12).

force

Critical reading will be held; display freeze activated

time
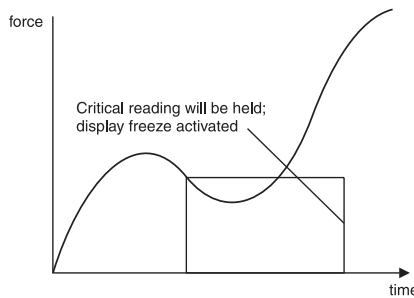
⚠ (1) Pay extra attention to avoid overload as display value will not change during display hold.
(2) Use contact closure only and **DO NOT** apply voltage across #10 and #12 port pins.

5. **External Switch Display Clear**
   By connecting #8 and #12 of the communications port, display can be cleared from remote locations (use contact closure and **DO NOT** apply voltage across).


⚠ Use contact closure only and **DO NOT** apply voltage across #8 and #12 port pins.


RECHARGING NI-MH BATTERY

1. To maximize the life of the battery, power is automatically shut off after 10 minutes of non-use or user-defined interval. Automatic shut off is bypassed when used with the AC adapter/charger.

2. Battery icon will flash when the gauge needs to be recharged.

   0.0 Lbf

3. Push ⏻ to turn off power. Only use the OMEGA AC adapter/charger provided, AD120 for 115VAC, AD230 for 230VAC. Plug into the correct AC output. It takes 10 hours to charge fully.

4. When the gauge is turned off, make sure the AC adapter/charger is disconnected to avoid overcharging.
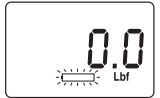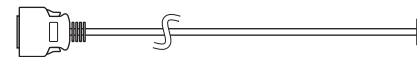
OPTIONAL CABLES
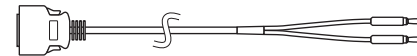
10' Analog cable
CB-104
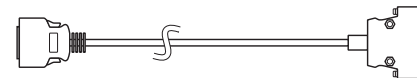
10' RS-232C cable, 9 pin female
CB-204

10' Digimatic Cable
**CB-304**

OPTIONAL ADAPTER PLATE

AP-001 Adapter Plate mounts OMEGA low capacity gauges to most other brands of test stands.

Use the 4 screws (supplied) to mount the OMEGA gauge to the AP-001 adapter plate.

Then use the 2 PEM nuts on the AP-001 adapter plate to mount to other brands of test stand.

AP-001

OMEGA GAUGE

GAUGE MOUNTING SCREWS (4)

PEM NUTS
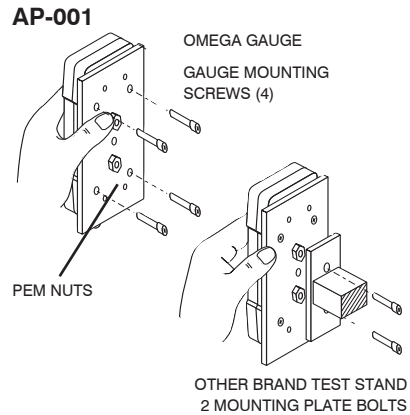
OTHER BRAND TEST STAND
2 MOUNTING PLATE BOLTS
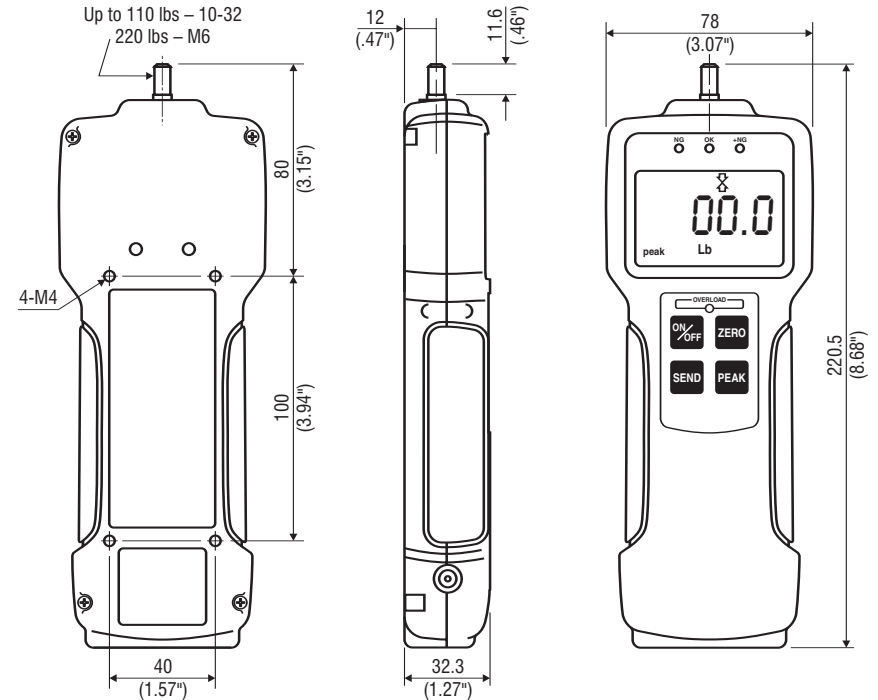
DFG-71 Specifications

Accuracy	± 0.2% F.S. ± 1 LSD
Selectable Units	ozf or lbf, gf or kgf, and Newtons
Overload Capacity	200% of F.S. Overload indicator flashes beyond 110% of F.S.
Power	Rechargeable Ni-MH battery pack or Imada AD120/230 adapter
Battery Indicator	Icon flashes when battery is low
Battery Life	approx. 8 hours (recharge time approx. 10 hours)
Memory	Non-volatile, recall up to 1000 data
Setpoints	Programmable high/low setpoints with color-coded LED indicators and output signal
Outputs	RS-232C, Digimatic and ± 2 VDC analog output
Auto Zero Reset	1.0 to 25.5 sec (selectable)
Electronic Dampening	7 levels (selectable)
Auto Power Off	5, 10, 30, 60 minutes or OFF (selectable)
Operating Temp.	32° to 100°F (0° to 40°C)

DFG-71 DIMENSIONS

Up to 110 lbs – 10-32
220 lbs – M6

12 (.47")
11.6 (.46")
78 (3.07")
80 (3.15")
100 (3.94")
4-M4
40 (1.57")
32.3 (1.27")
220.5 (8.68")

NG   OK   +NG

00.0

peak   Lb

OVERLOAD

ON/OFF   ZERO
SEND   PEAK

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WARNING: These products are not designed for use in, and should not be used for, human applications.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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