CE

User's Guide

omega.com™

OMEGA®

www.omega.com
e-mail: info@omega.com

DFG70 SERIES
Digital Force Gauge with Memory

omega.com™

OMEGA®

OMEGAnet℠ On-Line Service http://www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA:
ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1
TEL: (514) 856-6928 FAX: (514) 856-6886
e-mail: canada@omega.com

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico:
TEL: (001) 800-826-6342 FAX: (001) 203-359-7807
En Español: (001) 203-359-7803 e-mail: espanol@omega.com
info@omega.com.mx

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 6418405 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: nl@omega.com

Czech Republic:
Rudé armády 1868, 733 01 Karviná 8
TEL: +420 (0)69 6311899 FAX: +420 (0)69 6311114
Toll Free in Czech Republic: 0800-1-66342 e-mail: czech@omega.com

France:
9, rue Denis Papin, 78190 Trappes
TEL: +33 (0)130 621 400 FAX: +33 (0)130 699 120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 3017 FAX: +49 (0)7056 8540
Toll Free in Germany: 0800 TC-OMEGA℠
e-mail: germany@omega.com

United Kingdom:
ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5EX, England
TEL: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in England: 0800 488 488
e-mail: sales@omega.co.uk

INTRODUCTION

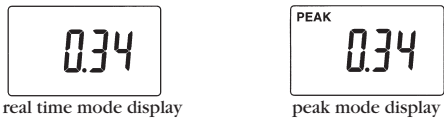
The DFG70 is a highly sophisticated, laboratory grade digital force gauges which offer programmable high/low setpoints for go/no go testing. Store up to 256 values into memory, which can be displayed or transmitted using digimatic or serial output ports. Use the real mode to display load transients, or the peak mode to capture the peak force achieved during a test. Select measuring units between Pounds (ounces), Kilograms (grams) and Newtons.

GENERAL OPERATION

1 Press ON/OFF. After a beep, the capacity of the gauge is displayed and the gauge will automatically enter into the measuring mode. Press and hold RECALL UNITS for at least four (4) seconds each time you wish to select between pounds (ounces), kilograms (grams) and Newtons.

2 HAND TIGHTEN (no tool!) selected attachment to the measuring shaft.

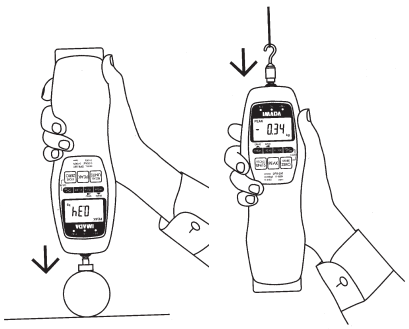
3 When the gauge is turned on, it will go directly to its real time measuring mode. Press PEAK to measure peak forces. "Peak icon" on the display indicates peak measuring mode, whereas the peak reading will not change until a higher value is measured. To delete the last peak reading, press STORE ZERO. To end peak reading mode and go to real time measuring mode, press PEAK again.



real time mode display peak mode display

4 If necessary, press STORE ZERO to tare the weight of the attachment and shaft orientation. Pressing STORE ZERO will also clear the peak reading.

5 Make sure to apply tension and compression (-) forces to the gauge in line with the measuring shaft. *DO NOT* attempt to measure forces perpendicular to the measuring shaft - damage to load cell and/or shaft may result.



PRECAUTIONS

1 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 gauge beeps to warn. NEVER exceed 200% of the rated capacity, or the load cell will be damaged.

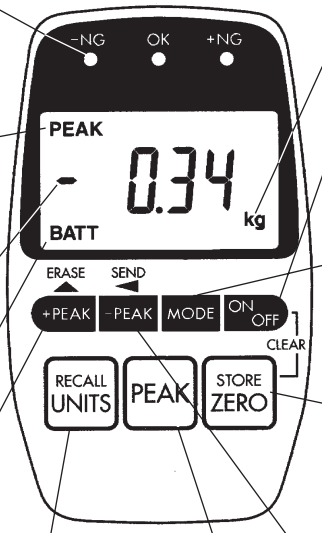
2 When mounting DFG70, use M4 mounting screws with a maximum insertion depth of 5 mm into the gauge.

3 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.

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

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

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



LED's
When high-low set points are set, LED indicates below (-NG), within (OK), or above set point value (+NG).

PEAK icon
When continuously displayed, peak hold function is activated. When flashing, indicates peak memory mode is activated.

TENSION icon
Displayed for tensile measurements.

BATTERY icon
Flashes when the Ni-Cad cells need to be charged.

+PEAK
Recalls +Peak value. Also, selects value of digit. When programming set points in memory mode, deletes the last value stored.

FORCE UNITS
Displays selected measuring units.

POWER
Press and release for ON/OFF. When pressed and released in conjunction with the ZERO key, all values stored in memory will be deleted.

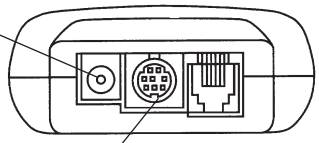
MODE
Allows operator to scroll through measuring mode, programming set points mode and peak memory mode.

STORE/ZERO
Tares weight of attachment. Clears Peak reading. When pressed while turning on gauge, deletes all readings stored in memory. In Peak memory mode, enters each value into stored memory.

-PEAK
Recalls -Peak value in peak mode. Also, used for shifting digits when programming set points. In peak memory mode, displays memory space left available or when connected downloads digimatic data.

RECALL/UNITS
Press and hold for 4 seconds to select oz/lbs, g/kg, Newtons. Also selects tension or compression when setting High/Low set points. When in peak memory mode, recalls each reading stored in memory.

PEAK
Activates peak readings.



AC ADAPTER/ CHARGER PORT

FULL DUPLEX COMMUNICATIONS PORT

PROGRAMMING SETPOINTS MODE

1 Press MODE until all numeric digits flash.

2 As High or Low points will be recognized automatically by gauge CPU, either High or Low may be set first. To set the 1st point (High or Low), press SEND -PEAK to select desired digit.
Press ERASE +PEAK to select the value of each selected digit.
Scroll through each digit until the value desired has been defined. Once the 1st setpoint is selected, press SEND -PEAK so that all digits will be flashing. Then press ERASE +PEAK in order to set 2nd point (High or Low). While all numbers are continuously flashing, press SEND -PEAK and repeat the above sequence to select the 2nd sepoint. Again all numbers will be flashing after the 2nd setpoint is set. While setting 1st and 2nd setpoints, tension (-) or compression (+) can be selected by pressing RECALL UNITS .

3 After 2nd setpoints are set and all numbers are flashing, press ERASE +PEAK to review and scroll High or Low setpoint values.

4 Press MODE twice and return to measuring mode. With High and Low setpoints set, whether on real time measuring mode or peak measuring mode, three LED's above the display will light:

-NG (Yellow LED) : for below Low setpoint
OK (Green LED) : for between setpoints
+NG (Red LED) : for above high setpoint

MEMORY MODE

1 Press MODE until "PEAK icon" flashes on the display.

2 Apply tension (-) or compression (+) forces, the display will hold the peak force measurement (peak reading will not change until a higher value is measured).

3 To store this value into memory, press STORE ZERO . The value will be stored by a confirming beep and display will automatically reset to zero and is ready for the next measurement.

4 Repeat this sequence for each measurement to be stored up to 256 data. Note: to redo the last stored data, press ERASE +PEAK .

5 To review the data stored in memory, press RECALL UNITS .

Each stored data will be displayed, starting with the first value stored, each time RECALL UNITS is pressed.

When all stored data have been displayed, "END" will be appear on the display. To continue storing or recalling data again, press STORE ZERO .

Note: When SEND -PEAK is pressed after STORE ZERO is pressed, the gauge will display remaining memory space.

6 To download data stored in memory, choose between the following methods:

RS-232: Connect the gauge to the device receiving data by using CB-202 or CB-203 cable. Use the R [CR] uppercase ASCII command to transmit data. (See page 8).

7 To delete all data stored in memory, press and release ON/OFF while holding STORE ZERO . Two beeps will confirm the memory reset.

(1) Beyond 256 data, "Full" will appear.
(2) Stored data will be lost if battery voltage drops lower than normal.

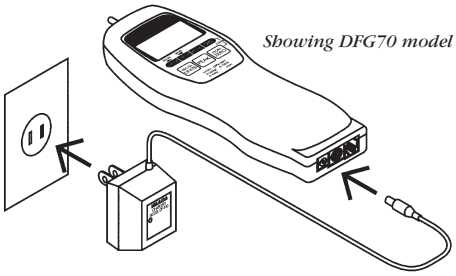
RECHARGING NI-CAD BATTERY

1 To maximize the life of the battery, power will automatically shut off after 10 minutes of non-use. This automatic shut off feature can be bypassed and the gauge may be used continuously when the AC adapter/charger is used.

2 "BATT" icon will flash when gauge needs to be recharged. To maximize battery life, do not recharge until "BATT" icon flashes. With proper recharging, the battery can be recharged 500 times.

3 Push ON/OFF to turn off power. Then use the provided adapter/charger and plug into the correct AC output. It takes 8 hours to charge fully. **DO NOT** recharge for more than 12 hours.

4 When the gauge is turned off, make sure the AC adapter/charger is disconnected.

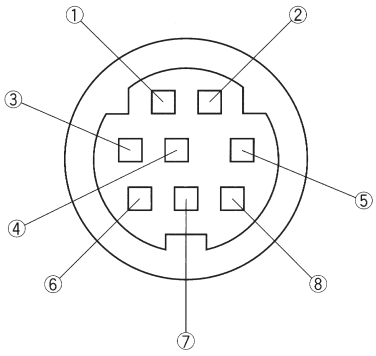

Showing DFG70 model

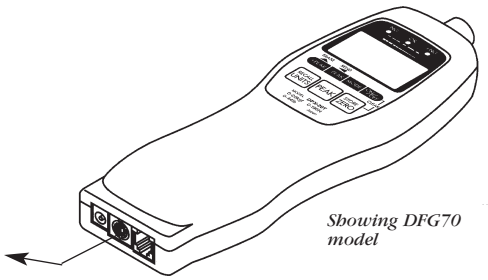
COMMUNICATIONS PORT

The communications port is divided into three separate data formats. Pins one, two and five are assigned to the full duplex, RS-232C serial interface. Pins three and six represent the ±2VDC analog output and pins four, seven and eight provide cold-contact switching circuits to remotely hold and clear the display.

PORT PIN DEFINITIONS

1 RS-232C Ground
2 RS-232C Signal Output
3 Analog Output ±2VDC
4 External Switch Display Freeze
5 RS-232C Receive Signal
6 Analog Ground
7 External Switch Zero/clear
8 External Switch Common




Showing DFG70 model

RS232 INTERFACE FUNCTIONS

1 RS-232C bi-directional interface functions

All gauge functions can be duplicated from a remote location by utilizing RS-232C interface. All commands must be sent in upper-case ASCII character format followed by a carriage return (CR).

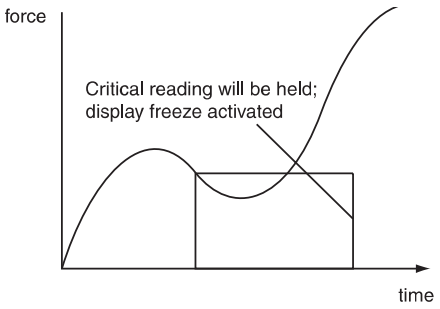
Signal level:	RS-232C
Data bits:	8 bits
Stop bits:	1 bit
Parity bits:	No
Baud Rate:	2400 bps

2 ±2 VDC Analog Signal

Connect the CB-101 analog cable to the full duplex port and the device receiving the data.

3 External Switch Display Freeze

By connecting (use contact closure and **DO NOT** apply voltage across) #4 and #8 of the communications port, the gauge instantaneously captures the critical reading and holds the display from remote locations.



(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 #4 and #8 port pins.

5 External Switch Display Clear

By connecting (use contact closure and **DO NOT** apply voltage across) #7 and #8 of the communications port, display may be cleared from remote locations.

Use contact closure only and **DO NOT** apply voltage across #7 and #8 port pins.

COMMAND	FUNCTION	RESPONSE
B [CR]	Delete last data stored in memory	R [CR] executed E [CR] error
C [CR]	High/Low setpoint comparison	R [CR] OK U [CR] +NG L [CR] -NG E [CR] error
F±____[CR]*	Select high setpoint	R [CR] executed
S±____[CR]*	Select low setpoint	E [CR] error
H [CR]	Recall +peak (compression)	[value] [unit] P [CR] executed E [CR] error
U [CR]	Recall -peak (tension)	[value] [unit] P [CR] executed E [CR] error
I [CR]	Clear Memory	R [CR] executed E [CR] error
R [CR]	Recall all memory data	[value] [unit] M [CR] [value] [unit] M [CR] R [CR] executed
		E [CR] error
W [CR]	store data in memory	R [CR] executed E [CR] error
D [CR]	transmit display data	[value][unit][mode][CR] executed E [CR] error
K [CR]	select “Kg” units	R [CR] executed E [CR] error
N [CR]	select “N” units	
L [CR]	select “lb” units	
O [CR]	select “oz” units (only oz model)	
P [CR]	select peak mode	
T [CR]	select real time mode	
Z [CR]	tare display	
Q [CR]	turn off power	

[mode] = T: Real time, P: Peak [units] = K: Kg, N: Newtons, L: Pounds, O: Ounces

** For example: to set 1000 (compression) as high: F1000[CR]*
to set 0500 (tension) as low: S-0500[CR]

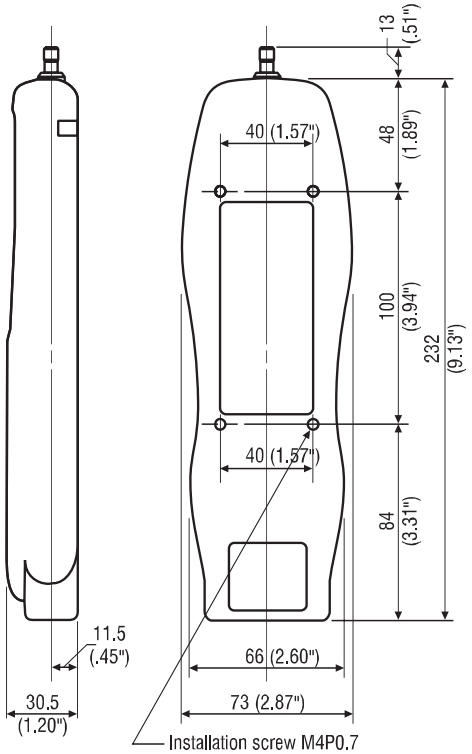
DFG70 RANGES (Resolution)

MODEL	CAPACITY		
	Pounds Ounces	Grams Kilograms	Newtons
DFG70-0.5	8.818 oz (0.001 oz)	250.0 g (0.1 g)	2.450 N (0.001 N)
DFG70-1	17.63 oz (0.01 oz)	500.0 g (0.1 g)	4.900 N (0.001 N)
DFG70-4	4.410 lb (0.001 lb)	2.000 kg (0.001 kg)	19.60 N (0.01 N)
DFG70-11	11.02 lb (0.01 lb)	5.000 kg (0.001 kg)	49.00 N (0.01 N)
DFG70-44	44.10 lb (0.01 lb)	20.00 kg (0.01 kg)	196.0 (0.1 N)
DFG70-110	110.2 lb (0.1 lb)	50.00 kg (0.01 kg)	490.0 N (0.1 N)
DFG70-220	220.4 lb (0.1 lb)	100.0 kg (0.1 kg)	979.0 N (0.1 N)

SPECIFICATIONS

Accuracy	± 0.1% ± 1 LSD
Display Update	20 updates/second
Selectable Units	Displays values in grams/kilograms, ounces/pounds or newtons
Overload Capacity	200% full scale
Power	Four internal AA Ni-Cad cells, eight hour capacity when fully charged with AC adapter
Low Battery Indicator	Display flashes BATT when battery is low
CPU	8-bit CMOS
A/D Converter	16-bit Delta Sigma System
Memory	Nonvolatile, recall up to 256 measurements
Peak Memory	Recalls peak tension and compression
Setpoints	Programmable high/low setpoints with color coded indicator.
Dimensions	9.6 x 2.9 x 1.2 in (245 x 73 x 30.5 mm)
Ambient Temperature	32° to 100°F; 0 to 40°C
Weight	18 ounces
Shipping Weight	4 pounds
Output Ports	RS232C: Full duplex, 2400 baud, 8 data bits, no parity bit, 1 stop bit Analog: ±2VDC full scale
Included Accessories	AC adapter/charger; eight attachments: (3 hooks, flat tip, chisel tip, notched tip, conical tip, extension shaft) and hard-plastic carrying case

DIMENSIONS



MADE IN USA

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 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 should malfunction, 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 being 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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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. P.O. 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. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M3514/1099