

DFA SERIES

Digital Force Gauge

The CHATILLON® DFA Series is available with an integral loadcell, dedicated remote loadcell (DFA-R) or with an interchangeable remote loadcell (DFA-R-ND). All models feature RS232 serial data communications and an internal sampling rate of 10,000 Hz. The DFA Series is ideal for critical applications where capturing precise peak readings are required. Other features include the ability to store as many as 1000 test readings in as many as 99 batches. programmable high and low setpoints, pushbutton calibration and an analog output for graphing the force curve. All gauges feature user-selectable force units (oz, lbs, g, kg, N). A large, easy-to-read LCD display indicates current and peak values, gauge settings and gauge status. A selectable auto shutoff feature helps to preserve battery life. Gauges have an accuracy of $\pm 0.15\%$ of full scale \pm LSC. Gauges come with accessories, battery charger and carrying case.

FEATURES

- Three Versions
 - Integral Loadcell
 - Dedicated Remote Loadcell
 - Interchangeable Remote Loadcell
- Simple Pushbutton Operation
- Rugged All-Metal Housing
- 10,000Hz Sampling Rate
- Memory: 1000 Readings in 99 Batches
- RS232 Serial Data Communications
- Overload Capacity- 110% of Rated Capacity
- Hand-held or Test Stand Applications

SPECIFICATIONS

Accuracy:	$\pm 0.15\%$ of Full Scale ± 1 LSC
Selectable Units:	oz, g, lb, kg, N
Overload Capacity:	110% of rated capacity
Display:	LCD, 4-1/2 characters
Sampling:	10,000Hz
Outputs:	RS232. Mitutoyo
Power:	AC Adapter, NiCd Battery Pack
Accessories:	Carrying Case, Attachments Extension Rod, Battery Charger
Weight:	2 lbs (0.9 kg)
Warranty:	1 Years



DFA Series Handheld Digital Gauge

SPECIFICATION
SS-FM-3114-0101
December 2000



Pharmaceuticals



Electronics



Medical Device

INTERNET

www.ametek.com
www.chatillon.com
www.lloyd-instruments.co.uk

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PRODUCT FEATURES

Intelligent Displays

The DFA Series features a large, easy-to-read LCD display with a 32 x 122 pixel matrix. The display's contrast may be adjusted by the user to counter the effects of high ambient light conditions or viewing angle. Symbols are used to depict instrument status including battery levels and automatic shut-down feature enabled. The characters "C" or "+" are used to represent compression, while "T" or "-" represent tension. The upper left portion of the display shows the instrument's operational mode (Normal, Tension-Peak or Compression-Peak). The bottom right portion of the display indicates the units of measure (lb, Kg, N, oz, g). Force measurement is shown in large characters that are viewable from a distance. The display updates every 250ms when force is applied to the load cell.

The DFA Series also features a reversible housing that allows the user to change the instrument's display orientation, depending on the gauge's requirement application.

Digital Filtering

The DFA Series lets the user select the sampling rate for four different streams of data. For each stream, the user may filter the data rate to match the application requirements. The following table shows the data streams and sampling rates (Hz) that may be configured.

Digital Filter Sample Rates (Hz)	
Normal	0.5 / 1 / 2 / 5 / 10 / 20
Peak	1 / 2 / 5 / 10 / 20 / 50 / 100 / 200 / 500 / 1000 / 2000 / 5000 / 10000
Data Transmit	0.5 / 1 / 2 / 5 / 10 / 20 / 50 / 100 / 200
Analog	0.5 / 1 / 2 / 5 / 10 / 20 / 50 / 100 / 200

Remote Communications

All DFA Series gauges feature RS-232 serial data communications for transmitting data to remote equipment and for receiving commands. A special menu allows users to specify parity and bit length or to select baud rates up to 115K. The gauges also support transmission of data to MITUTOYO data collectors. An analog output lets users transmit data for graphing force curves on ancillary devices.

System Integration

The DFA Series can be mounted to the following CHATILLON Test Stands providing the user with an extremely powerful and precise measurement system.

- Models TCM 201
- Models TCD 200
- Models TCM 500
- Models LTS/LTC/HTC

The DFA Series, using its RS-232 serial data communications, can transmit data to a personal computer for analysis and sophisticated reporting. When used in cooperation with our NEXYGEN® and AUTOTEST Series Software, users can select from predefined tests and be provided with analysis reports in preformatted or customer layouts. Programmable HIGH and LOW setpoints allow the user to control test stand motion at predetermined capacities, or cycle between the setpoints.

Simplified Maintenance

The DFA Series includes services menus that allow the user to calibrate the gauge using standard weights. This same menu is used to take the user through a series of "self-tests" that verify load cell performance and instrument functionality.

Multiple Load Cell Configurations

The DFA Series may be specified with an integral load cell; with a dedicated remote load cell; or with a non-dedicated, interchangeable load cell. All models are equipped with RS-232 serial data communications and peripheral gauge control.

Data Archiving

The DFA Series allows the user to save up to 1,000 test readings organized into as many as 99 different batches. Each data set has:

- Batch Number
- Sample Number
- Tension Peak Value
- Compression Peak Value
- Indicated Normal Value with Engineering Unit
- Date
- Time

The user can organize data in up to 99 custom batches. A batch may hold up to 999 data sets. The total number of data sets is limited to 1000. Data is stored in non-volatile memory and is retained even if battery power is removed or the gauge is turned OFF.

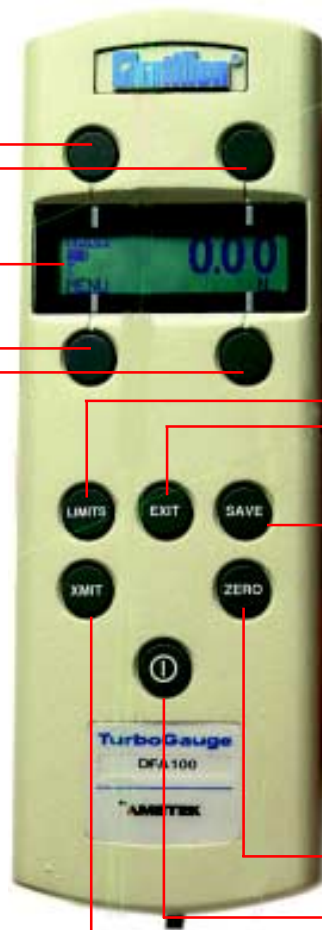
You can review and print data on demand. Data may be printed in 1-, 2- or 7-column format.

EASY-TO-USE INTERFACE

DFA Series Gauges put a powerful INTEL® microprocessor in your palm, allowing you to collect up to 1,000 reviewable data readings in memory, then download them via the gauge's RS-232 serial data communications. You follow a simple hierarchy of menu displays to filter data and configure gauge settings, including data transmission. You may even calibrate and test the gauge automatically. The gauges modular architecture allows you to evolve as technology evolves. Using a personal computer, you may download new features and functionality as they are introduced.

FUNCTION keys at each of the four corners of display work with menus to select options, as well as to go to "downstream" menus.

NORMAL DISPLAY starts up after the gauge is turned on. F1 key toggles between the standard force measurement setting or settings which capture peak tension or compression force. Indicators below shows portion of battery charge remaining, time remaining until auto shutdown, and whether the high or low force levels are being exceeded. F4 key allows you to toggle display reading between pounds, kilograms, and Newtons, or ounces, grams, and Newtons.



Function Key F1

Function Key F2

Function Key F3

Function Key F4

TRANSMIT... BUZZER...
HI LIM... LO LIM...

LIMITS button allows you to transmit signals to control test stand motion (F1). Key F2 allows you to activate or deactivate the limits buzzer, which sounds when the force exceeds the limits set. Both high and low limits may be set (F3, F4), allowing you to stop test stand motion at predetermined loads or to cycle between set points (CHATILLON® Model TCD test stands only). Limits guard against load cell damage.

EXIT button moves you back to prior screen in menu.

NORM... 0.1256
MENU... LB

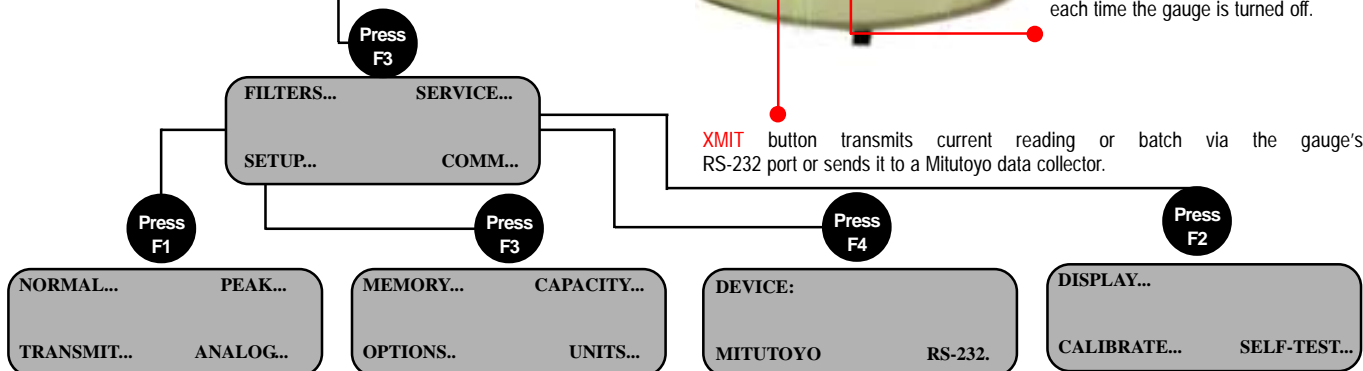
NORM... BATCH 01 #001 NB...
REVIEW... 00% LB

SAVE button takes you to "Data Save" mode, where you can save a reading to current batch or open a new batch (F2). Once data is saved, the F3 key allows you to review your saved data. The F4 key lets you change reading units to lb, Kg, N, oz and g. Up to 1,000 different time-stamped readings may be saved, in as many as 99 batches.

ZERO button returns current data reading in window to "0".

ON/OFF key saves all gauge setting each time the gauge is turned off.

XMIT button transmits current reading or batch via the gauge's RS-232 port or sends it to a Mitutoyo data collector.



FILTERS MENU lets you set the sampling rate for four different streams of data -- normal force reading, peak force reading, RS-232 transmission and analog output. (See table on opposite page.) With each stream, you can regulate and change the data rate to match your needs. The resulting data flow is averaged from all of the data points taken at the the gauge's inherent sampling rate of 10,000 samples per second. The result is a distillation of data that still reflects the extraordinarily high collection rate of the gauge.

EXAMPLE SUBSCREEN
(for peak filter rate)

PEAK: INCREASE
0.1256

SETUP MENU allows you to set the time and date under "Memory" (F1) and to activate various options (F3), such as auto shutdown, sign, and print options. The capacity menu (F2) is only available for the Remote Non-Dedicated Gauges and allows the gauge to be set for proper maximum load. The Units menu (F4) allows you to "lock in" the desired units of measurement, keeping them from being changed accidentally.

COMMUNICATIONS MENU is for selecting Mitutoyo or RS-232 output. This menu lets you quickly and easily set the parameters for RS-232 communications, such as from the gauge to a digital test stand or to a remote computer. Settings include stop bit length, baud rate, and parity, as well as whether units are to be included with the transmission.

EXAMPLE SUBSCREEN
(for baud rate):

BAUD INCREASE
0.1256
OK 19200 DECREASE

SERVICE MENU allows you to adjust the display contrast (F1) lighter or darker for display angle and light conditions. You can also calibrate the gauge (F3) using standard weights, as well as troubleshoot gauge problems with a self-test setting (F4). The latter is a highly useful tool for AMETEK service technicians, allowing them to work with you over the telephone to check out your gauge. It includes tests for proper keypad function and possible load cell damage.

SPECIFICATIONS

Accuracies

DFA 250g	±0.15% of Full Scale
DFA	±0.15% of Full Scale
DFA-R±0.15% of Full Scale	
DFA-R-ND	±0.3% of Full Scale

Data Storage

Stores up to 1000 data values in as many as 99 different user-defined batches

Sampling Rate

10,000 samples per second
User-adjustable Filters

Deflection

0.010-inch (0.254mm) maximum for full load

Safe Overload

Gauge will display "OVERLOAD" when the force applied exceeds 116% of the gauge capacity.

Maximum Overload

150% of gauge capacity. Load cell deformation may occur when overload exceeds 150%. Note: Gauge reading will not exceed 121%. If you feel the gauge may have exceeded the gauge capacity, contact your local AMETEK Representative.

Tare Capacity

10% in order to utilize full scale (in lb Mode); can tare more than 10%, however, user may not have the use of gauge's full scale capacity during testing

Analog Output

0 to ±2.0Vdc full scale, accurate to ±0.015V

Digital Input/Output

+5V signal when High or Low setpoint is reached

Display

32 x 122 pixel LCD dot matrix
Adjustable contrast

Display Refresh

250mS refresh in Normal and Peak modes

Keypad

Six dedicated function keys with labels: LIMITS, EXIT, SAVE, XMIT, ZERO and ON/OFF.

Four dynamic function keys which change based on display context.

Keys feature audible and tactile feedback.

Data Collect Mode

100 samples per second

Communications

Bi-directional RS-232 serial data communications, transmits up to 100 data points per second. User-selectable baud rates from 300 to 115,200. MITU-TOYO output.

Power

Rechargeable 8-hour NiCad battery, or continuous AC operation using battery charger supplied (110Vac or 220Vac)

Battery Life

8-10 hours of continuous operation between charges

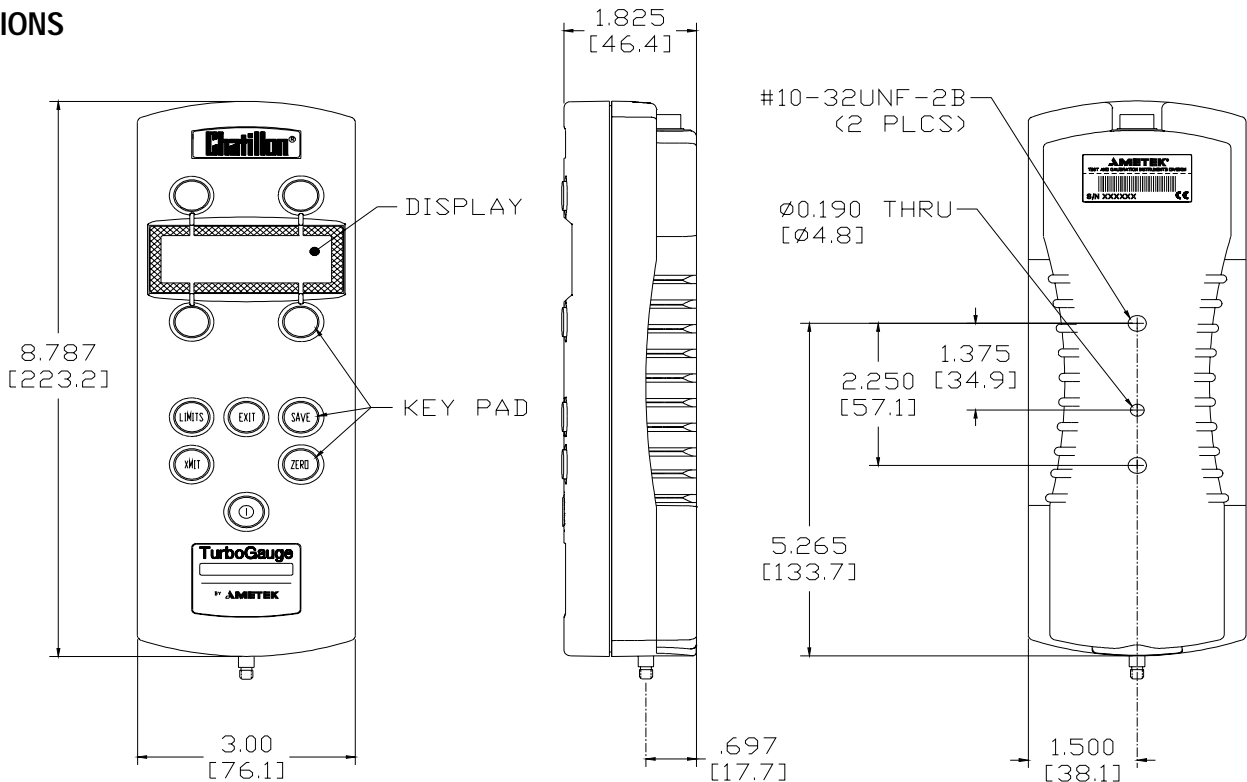
Temperature Range

40° to 110°F (5° to 45°C)

Temperature Stability

0.03% per °F

DIMENSIONS



ORDERING INFORMATION

Integral Loadcell Models

Model	Capacity
DFA250G	8 oz x 0.005 oz 250 g x 0.1 g 2.5 N x 0.001 N
DFA2	2 lb x 0.001 lb 1 kg x 0.001 kg 10 N x 0.01 N 32 oz x 0.004 oz 1000 g x 0.1 g
DFA10	10 lb x 0.005 lb 5 kg x 0.005 kg 50 N x 0.05 N 160 oz x 0.004 oz 5000 g x 0.5 g
DFA50	50 lb x 0.02 lb 25 kg x 0.01 kg 250 N x 0.1 N 800 oz x 0.1 oz 20000 g x 2 g
DFA100	100 lb x 0.05 lb 50 kg x 0.05 kg 500 N x 0.5 N 1600 oz x 0.2 oz 50000 g x 5 g

Dedicated Remote Loadcell Models

Model	Capacity
DFA-R-250G	8 oz x 0.004 oz 250 g x 0.1 g 2.5 N x 0.001 N
DFA-R-2	32 oz X 0.004 oz 2 lb x 0.001 lb 1000 g x 0.1 g 1 kg x 0.001 kg 10 N x 0.01 N
DFA-R-10	160 oz x 0.02 oz 10 lb x 0.005 lb 5000 g x 0.5 g 5 kg x 0.005 kg 50 N x 0.05 N
DFA-R-50	800 oz x 0.1 oz 50 lb x 0.02 lb 20000 g x 2 g 25 kg x 0.01 kg 250 N x 0.1 N
DFA-R-100	1600 oz x 0.2 oz 100 lb x 0.05 lb 50000 g x 5 g 50 kg x 0.05 kg 500 N x 0.5 N
DFA-R-200	3200 oz x 0.4 oz 200 lb x 0.1 lb 100 kg x 0.1 kg 1000 N x 1 N
DFA-R-500	500 lb x 0.2 lb 250 kg x 0.1 kg 2500 N x 1 N
DFA-R-1000	1000 lb x 0.5 lb 500 kg x 0.5 kg 5000 N x 5 N

Interchangeable Loadcell Models

Model	Capacity
DFA-R-ND	See Below

REMOTE Series Loadcell Models

Model	Capacity
Remote-2	2 lbs (1 kg, 10 N)
Remote-10	10 lbs (5 kg, 50 N)
Remote-50	50 lbs (20 kg, 200 N)
Remote-100	100 lbs (50 kg, 500 N)
Remote-200	200 lbs (100 kg, 1 kN)
Remote-500	500 lbs (200 kg, 2 kN)
Remote-1000	1000 lbs (500 kg, 5 kN)
Remote-2000	2000 lbs (1000 kg, 10 kN)
Remote-5000	5000 lbs (2000 kg, 20 kN)
Remote-10000	10000 lbs (5000 kg, 50 kN)

STANDARD ACCESSORIES

	Part No.
Operator's Manual	SPK-DFA-081
Carrying Case	SPK-FMG-073
Chisel Point	SPK-FMG-008A
Point Adapter	SPK-FMG-009A
Notch Adapter	SPK-FMG-010A
Flat Adapter	SPK-FMG-011A
Hook, 250g - 10 lbs	SPK-FMG-012A
Hook, 50 - 100 lbs	SPK-FMG-012B
Extension Rod	SPK-FMG-013A
Battery Charger 115V	SPK-FMG-069A
Battery Charger 220V	SPK-FMG-069B

TEST STAND MOUNTING KITS

	Part No.
LTS	NC000300
LTC	NC000300
HTC	NC000225
LTCM-6	NC000300
TCM201/TCM200	NC000300
TCM/TC500	NC000626
TCM/TC1000	NC000627

Request document PS-FM-3114 for a complete Parts List.

Add "-220V" after the model number if you require 220V operation, e.g. DFA2-220V.



TEST AND CALIBRATION INSTRUMENTS

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