

DFS Series Digital Force Gauge With Integral Loadcell

Specification Sheet
SS-FM-3004-0904
September 2004

The CHATILLON® DFS Series offers the best price performance of any digital force gauge available today. This compact, easy-to-use force gauge is designed for basic and complex applications. Ideal for handheld or test stand applications, the DFS may be equipped with integral loadcells or smart remote sensors for load measurement or torque measurement. Measurement accuracy is better than 0.1% full scale. A large, easy-to-read, high resolution dot matrix LCD display supports a variety of standard gauge

functions including normal and peak readings, high/low limits, setpoints, pass/fail results, statistical results, load averaging, load comparisons, % and sharp break detection, loadcell actuation and direction. Loads are displayed in ozf, gf, lbf, kgf and N units. The display can be inverted and displayed results may be "hidden" from the operator. The DFS gauge comes standard with an RS-232 cable, carrying case, battery adapter/charger, testing accessories and NIST Certificate of Calibration with data.

Features

- ① Eight Models and Capacities
- ① Advanced Operating Modes
 - Normal
 - Peak Tension and Compression
 - % or Sharp Break Detection
 - Load Comparisons & Load Averaging
 - Contact Closure
 - Load Limits
 - Pass-Fail Limits
- ① Statistical Calculations
 - Mean with Maximum and Minimum Values
 - Coefficient of Variation with Mean and Standard Deviation
 - Standard Deviation with Variance and Mean
 - % Differentiation
- ① Integral Loadcells
 - Accuracy $\pm 0.1\%$ Full Scale
 - Mechanical Overload Protection to 150% Full Scale
- ① Simple Operator Interface
 - High Resolution Display
 - Menus, Prompts and Function Keys for Easy Use
- ① Standard Outputs
 - RS232 Serial Data, Mitutoyo Digimatic, $\pm 2Vdc$ Analog
- ① NIST Calibration with Data
 - Available IEC/ISO17025 Cert with Uncertainty
- ① 2 Year Warranty



You Get More with Your CHATILLON Gauge.

Because You Expect More from a Chatillon® Gauge...

Do More... Pay Less!

The new CHATILLON DF Series deliver more features without compromising ease of use, accuracy and very importantly costs to you. You'll do more with a DF Series and you'll get the reliability and quality that you come to expect from Chatillon force measurement instruments.

Easy-to-Read Display.

A large, easy-to-read 128 x 64 dot matrix display can display up to 8 lines of information. The high resolution display features contrast adjustments and can be inverted when required. The display can even be "hidden" at the press of a button. A load bargraph indicated load direction, measured load and safe load and helps prevent overloads. The integral loadcells feature mechanical overload protection at 150% Full Scale.

Single Touch Operation.

The rubber keypad features dedicated and dynamic function keys. The function keys correspond to displayed options and guide the user during operation. A navigation pod lets you navigate through the menus and to scroll and change values quickly. The innovative "i" key can be used to display critical information on the gauge such as gauge capacity and resolution, battery life remaining, loadcell overload history, even service information including last calibration date, or the location of service centers.

Dependable Measurements.

The DF Series features an integral loadcell sensor that delivers repeatable, accurate results. The innovative load bargraph shows dynamic load, direction of load and warns you of pending overload conditions. Smart technology in the gauge even keeps track of overload history to aide in maintenance and troubleshooting.

Comprehensive Results.

The DF Series supplies you with comprehensive results that are easy to view and understand. The gauge displays:

- Measured Result with Units
- Operating Mode
- Pass-Fail Result
- High and Low Load Results
- Break Detection
 - Sharp Break
 - Percentage Break
- Contact Closure
- Load Averaging
 - Time Based
 - Load Based
- Saved Results
- Statistical Calculations
 - Average with MIN and MAX Results
 - Cv with Average and Standard Deviation
 - % Differentiation between Successive Results
 - Standard Deviation based on Total Population or (n-1)

Outputs

The DFS Series comes standard with digital and analog outputs. RS232 outputs are supported with baud rates from 4800 to 115,600. Simply select the baud rate and whether or not you want to gauge to transmit with or without units. You may select the Mitutoyo output when communicating with a Mitutoyo device. Or, you may use the $\pm 2V$ analog output to drive alarms or other ancillary devices.

We Validate It.

Frankly, a Certificate of Conformance isn't worth much! The DF Series comes standard with a Certificate of Calibration with data certified to NIST. And we offer Calibration Certificates with uncertainty calculations since AMETEK is an ISO17025



Calibrate and Verify Status.

The DF Series incorporates flash memory and hosts a set of self-diagnostic functions for monitoring the display, keypad and electronics. Using the "i" key, you have immediate access to battery conditions, including estimated battery life remaining. You can also view loadcell status, including the number of overloads that have been applied to the gauge. Zero offset verification is standard and a step-by-step calibration procedure is built-in allowing you to calibrate your DF gauge with certified standards.

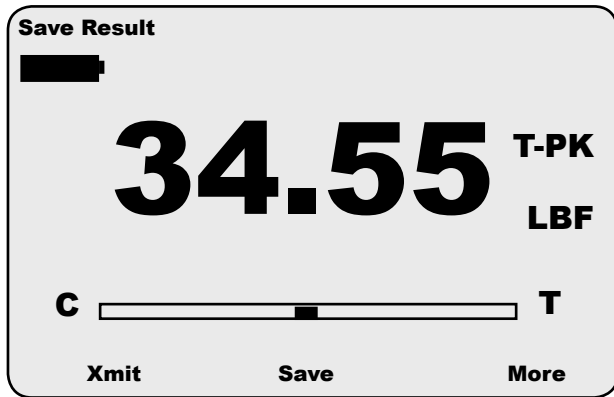
Test Stand Compatibility.

The DF Series has a universal mounting backplate that enables you to fit the gauge to commonly used Chatillon force testers including the MT Series, LTCM Series, TCM Series and TCD Series.

... You Get More from a Chatillon® Gauge.

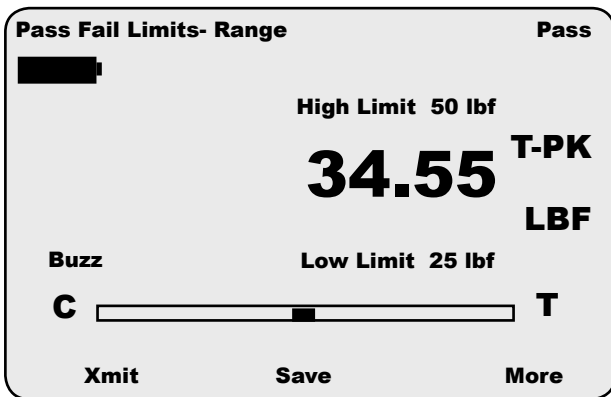
Normal and Peak Modes

The DF digital gauge will display Normal and Peak tension and compression loads. Results may be displayed in ozf, gf, lbf, kgf or N units. Use the UNITS key to sequence through the available units. You may define and establish your Default Units during instruments setup. You can increase the size of the displayed information using the keypad.



High & Low Load or Pass-Fail Limits

The DF Series may be configured with High and Low Load Limits or Pass-Fail Limits. Load limits allow you to establish setpoints for your testing. If the gauge exceeds a setpoint value, the gauge can provide a visual and audible alarm. You can also setup the gauge to operate as a pass-fail system. You can setup a pass-fail limit based on a limit range or on a nominal value with a % bandwidth. Based on your setup, the gauge will provide you with a Pass-Fail indication.



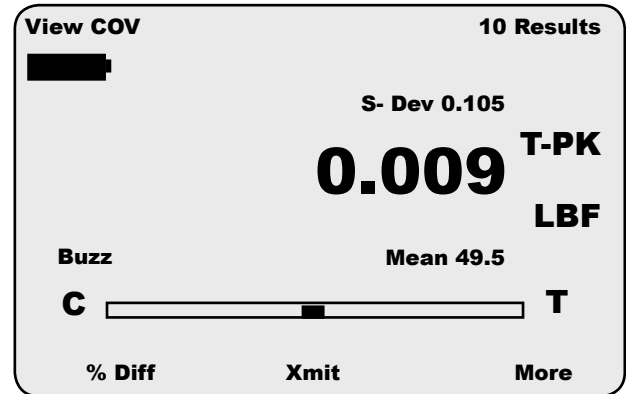
Contact Closure

The contact closure feature can be used to freeze the display at a load value equal to the "make" or "break" on an electrical contact.

Statistical Results

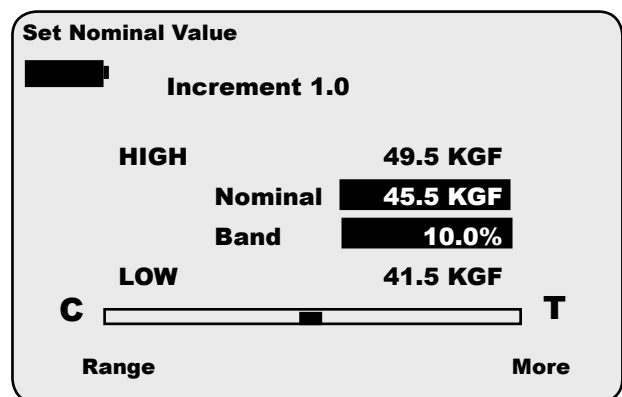
You may save and store up to 10 results in instrument memory for later recall or to calculate statistical results. The gauge labels each results and indicates memory capacity. The gauge will alert you when memory is full. Statistical results include:

- Calculate Mean and also show you the MAX and MIN values for your calculation
- Coefficient of Variation is calculated and displayed with the Mean and Standard Deviation value
- Standard Deviation is calculated and displayed with the Mean and the Variance value. Total Population and Sample (n-1) methods are supported



Simplified Setup

Menus and intelligent prompts make gauge setup fast and easy. Gauge options are presented in a "List Format". Using the navigation pod and function keys, you simply select the functions and parameters required. The gauge will guide you through the setup process. Default settings are provided and a "Quick Reset" allows you to re-establish defaults with a single key press. Using the standard RS232 output, you can print your gauge setup parameters for record archiving or to use as a setup template for other DFS force gauges in your plant.



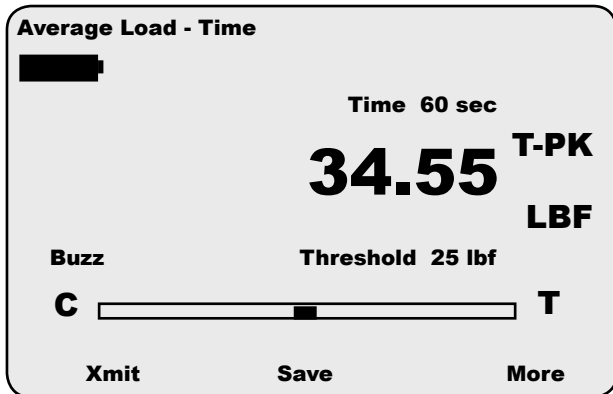
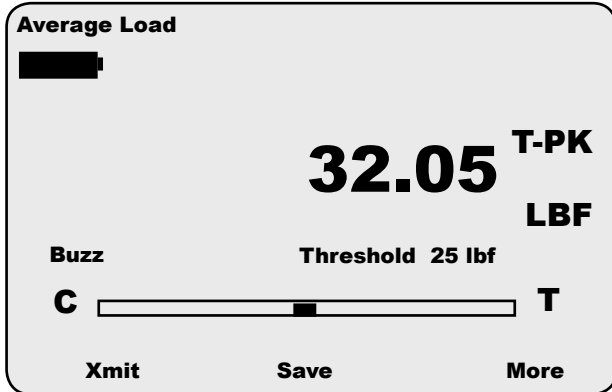
Advanced Measurement Functions.

Load Averaging

Two methods of load averaging are standard with your DFS. Load averaging is useful to determining load characteristics of long test periods or for samples with characteristically noisy load readings.

Load Method

This method allows you to define a load threshold. The gauge will begin taking readings once the load threshold has been reached and will continue to take and average readings until the measured load falls below the threshold value.



Time Method

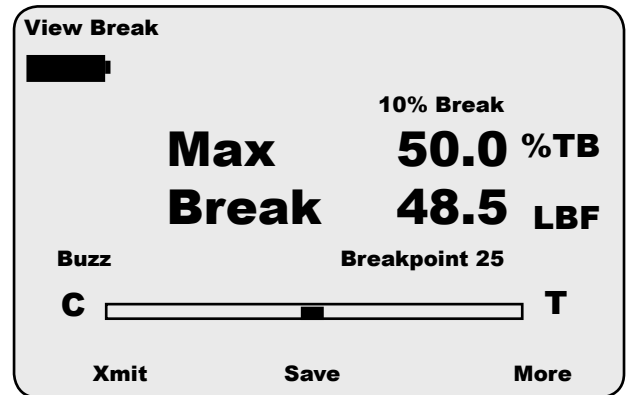
The Time method allows you to establish your load averaging based on a load threshold and time duration. The load threshold determines the start of the averaging, while the time duration defines the length of the test period. The gauge will begin taking readings when the threshold is reached and will continue to take and average readings until the time duration has expired.

Automate with Nexygen Software

Your DFS can make use of our Nexygen software for gauge applications. With Nexygen software, you can perform tests and graph results automatically using a personal computer. Load results may be shown graphically versus time. Tabular results are displayed and can be used to create relationships, queries or used to produce reports. You can format the display to match your requirements and establish pre- and post-test questions that require the operator to answer questions based on the test setup. Setup is easy too. Menus, radio buttons and prompts guide you through instrument and test setup. Since Nexygen software is OLE2 compatible, information can be exchanged transparently with Microsoft Word, Excel, Access, PowerPoint and Outlook. You won't find a more comprehensive gauge software package!

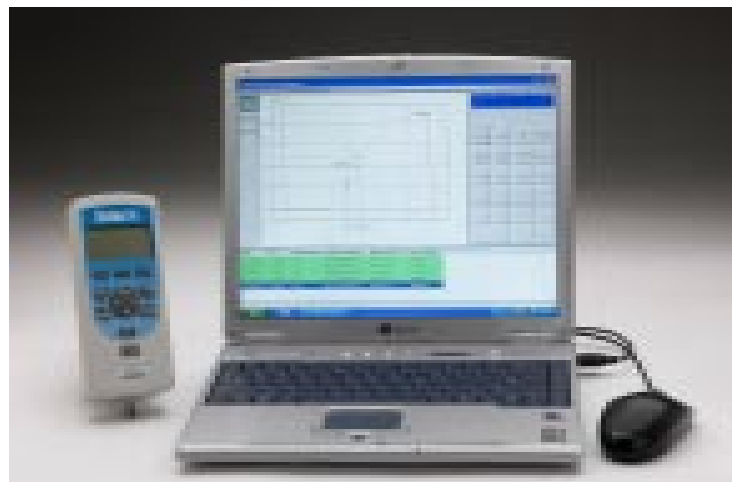
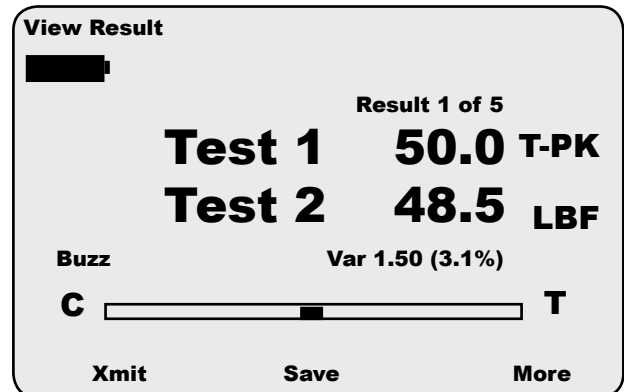
Percentage and Sharp Break Detection

Break detection is provided and two types of breaks are supported. A sharp break can be used to detect whenever the load measurement drops 5% from a peak load. Alternatively, you may override the sharp break and setup the gauge with a % break detector. The % break detector allows you to set the drop percentage that is used to define a break. This type of break is useful on samples with high



Load Comparison

Load comparisons of up to two sets of 5 results may be measured using the DFS. The gauge will measure and store up to 5 results for each of two tests (10 results). The gauge will then display the first set of results with the second set of results and calculate statistical relationships such as % difference, COV, variance and standard deviation. This feature is ideal for functional capacity testing.



Ordering

DFS Series with Integral Load Sensor

Model	ozf	gf	lbf	kgf	N
DFS-250G	9 x 0.002	250 x 0.05	0.5 x 0.0001	-	2.5 x 0.0005
DFS-002	36 x 0.007	1000 x 0.2	2.2 x 0.0004	1 x 0.0002	10 x 0.002
DFS-010	180 x 0.04	5000 x 1	11 x 0.002	5 x 0.001	50 x 0.01
DFS-025	400 x 0.08	11,000 x 2	25 x 0.005	11 x 0.002	110 x 0.02
DFS-050	900 x 0.2	25,500 x 5	55 x 0.01	25 x 0.005	250 x 0.05
DFS-100	1800 x 0.4	50,000 x 10	110 x 0.02	50 x 0.01	500 x 0.1
DFS-200	-	-	225 x 0.05	100 x 0.02	1000 x 0.2
DFS-500	-	-	550 x 0.1	250 x 0.05	2500 x 0.5

Note: Gauge is supplied with a 120V Charger/Adapter and US Mains Plug.

Use the following prefixes if you require a UK or EU Mains Plug.

-UK 230V UK Style Mains Plug (Example: DFS-100-UK)

-EU 230V EU Style Mains Plug (Example: DFS-050-EU)

DFS Series Accessories

Item	Capacity	Part No.	Included
Carrying Case	SPK-DF-118	SPK-FMG-118	Standard
Chisel	100 lbf (500 N)	SPK-FMG-008A	Standard ¹
Chisel	500 lbf (2500 N)	SPK-FMG-008B	Standard ¹
Point	100 lbf (500 N)	SPK-FMG-009A	Standard ¹
Point	500 lbf (2500 N)	SPK-FMG-009B	Standard ¹
Notch	100 lbf (500 N)	SPK-FMG-010A	Standard ¹
Notch	500 lbf (2500 N)	SPK-FMG-010B	Standard ¹
Flat	100 lbf (500 N)	SPK-FMG-011A	Standard ¹
Flat	500 lbf (2.5 kN)	SPK-FMG-011B	Standard ¹
Hook, Stationary	50 lbf (225 N)	SPK-FMG-012A	Standard ¹
Hook, Stationary	100 lbf (500 N)	SPK-FMG-012B	Standard ¹
Hook, Stationary	500 lbf (2.5 kN)	SPK-FMG-012C	Standard ¹
Extension Rod, 6-inch	100 lbf (500 N)	SPK-FMG-013A	Standard ¹
Extension Rod, 6-inch	500 lbf (2.5 kN)	SPK-FMG-013B	Standard ¹
Battery Charger, 120V, US Mains Plug		SPK-DF-US120	Standard ¹
Battery Charger, 230V, EU Mains Plug		SPK-DF-EU230	Standard ¹
Battery Charger, 230V UK Mains Plug		SPK-DF-UK230	Standard ¹
Handle Assembly		SPK-DF-HANDLE	Optional

Note: ¹ Accessories are Model dependent.

100 lbf (500 N) capacities and below use a #10-32 fitting

200 and 500 lbf (1 kN and 2.5 kN) capacities use a 5/16-18 fitting



DFS Series force gauge shown with a TCD200 digital tester.

TCM-TCO Compatibility

The DFS gauge is compatible with Chatillon TCM motorized testers and TCD digital testers. The universal backplate design is compatible with Chatillon testers and helps ensure proper sample alignment.

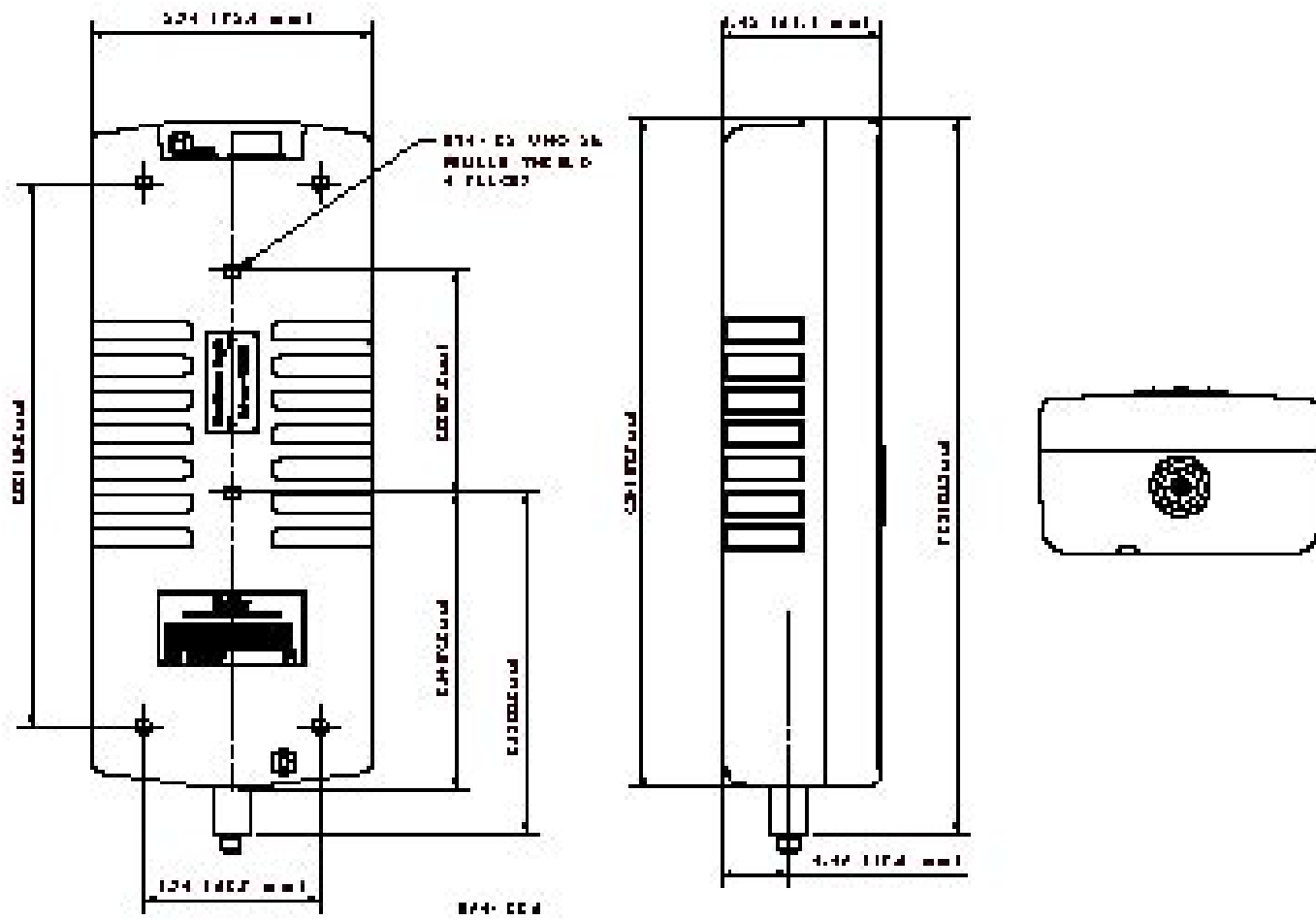
Test Stand Adapters

Item	Capacity	Part No.	Included
MT150 Series	150 lbf (660 N)	SPK-MT-0001	Optional
MT500 Series	500 lbf (2500 N)	SPK-MT-0004	Optional
LTCM-100 Series	100 lbf (500 N)	SPK-DF-LTCM	Optional
TT Tester	500 lbf (2500 N)	NC002582	Optional
TCM201 Series	225 lbf (1000 N)	SPK-FM200-019	Optional
TCD200 Series	225 lbf (1000 N)	SPK-FM200-019	Optional

Interface Cables, Adapters and Software

Item	Part No.	Included
RS232 Cable (6 ft, 2m)	NC000850-1	Standard
RS232 Cable (10 ft, 3m)	NC000850-2	Optional
Mitutoyo Cable, 10-Pin	NC000654	Optional
Mitutoyo Cable, RS232	NC000697	Optional
TCM201 Interface Cable	ENC0125	Optional
TCD200 Interface Cable	NC000647	Optional
RS232-USB Adapter	SPK-DF-USB	Optional
NEXYGEN Gauge Software	40/0739	Optional

Dimensions



Specifications

Accuracy: $\pm 0.1\%$ of full scale

Certification: Calibration with NIST Data, IEC/ISO17025 optional

Data Sampling Rate: 5000 Hz

Peak Capture Rate: 5000 Hz

Display Update Rate: 10 Hz

Tare Capacity: 10% full scale

Overload Protection: 150% full scale

Display Characteristics: High resolution, dot-matrix LCD, 8 lines, 40 characters, adjustable contrast, invert and "hide" capability

Automatic Shut Down: Configurable time. May be disabled.

Data Storage: 10 results, Optional NEXYGEN™ software for unlimited storage and automated testing and analysis

Test Stand Control: Compatible with TCD Series testers.

Outputs: RS-232, Mitutoyo (Digimatic) and $\pm 2Vdc$ analog

Power: Battery or direct AC operation. Universal Power 120V/230V, Rechargeable Nickel Metal Hydride (supplied)

Battery Life: Approximately 30 hours, continuous use
Gauge may be operated with direct AC Power Source

Instrument Weight: 1.5 lbs (0.7 kg)

Operating Temperature: 40° to $100^{\circ}F$ (4° to $38^{\circ}C$)

Warranty: 2 year

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