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DFS-R Series Digital Indicator For Smart Load and Torque Sensors

Specification Sheet
SS-FM-3005-0305
March 2005

The CHATILLON® DFS-R-ND Series supplies accurate load and torque measurement in a common gauge. Ideal for handheld or test stand applications, the DFS-R-ND may be equipped with smart loadcells or torque sensors. The auto-recognition feature knows whether a load or torque measurement is required. Measurement accuracy is better than 0.25% full scale when used with interchangeable sensors. Accuracy is better than 0.1% full scale when specified with a dedicated SCL load sensor. 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, sensor actuation and direction. Measurements are displayed in ozf, gf, lbf, kgf and N units or oz-in, g-cm, lb-in, N-cm and N-m units. The DFS-R-ND gauge comes standard with an RS-232 cable, carrying case, battery adapter/charger, and NIST Certificate of Calibration with data.

Features

- ❑ Dedicated or Interchangeable Sensors
 - Load and Torque Sensors
 - Accuracies to better than 0.1% Full Scale
- ❑ Advanced Operating Modes
 - Normal
 - Peak Tension, Compression and Torque
 - % or Sharp Break Detection
 - Load Comparisons
 - Load Averaging
 - Contact Closure
 - Load Limits
 - Pass-Fail Limits
- ❑ Statistical Calculations
 - Mean with Maximum and Minimum Values
 - Coefficient of Variation with Mean and Standard Deviation
 - Standard Deviation with Variance and Mean
 - % Differentiation
- ❑ Simple Operator Interface
 - High Resolution Dot-Matrix
 - Menus with Prompts for Easy Use
 - Dedicated and Function Keys with Navigation Pod
- ❑ Standard Outputs
 - RS232 Serial Data, Mitutoyo Digimatic, ±2Vdc Analog
- ❑ NIST Calibration with Data
 - Available IEC/ISO17025 with Uncertainty
- ❑ 2 Year Warranty



You Get More with Your CHATILLON Gauge.

Chatillon >K
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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 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.

Intelligent Sensor Technology.

The DFS-R-ND makes use of intelligent sensor technology allowing the gauge to operate with loadcells or torque sensors. Sensors plug into the side connector on the gauge. The gauge will auto-configure itself based on the sensor type. If a loadcell is installed, the gauge will automatically scale itself and install operations for a force gauge. Conversely, if a torque sensor is installed, the gauge will install operations for a torque gauge.

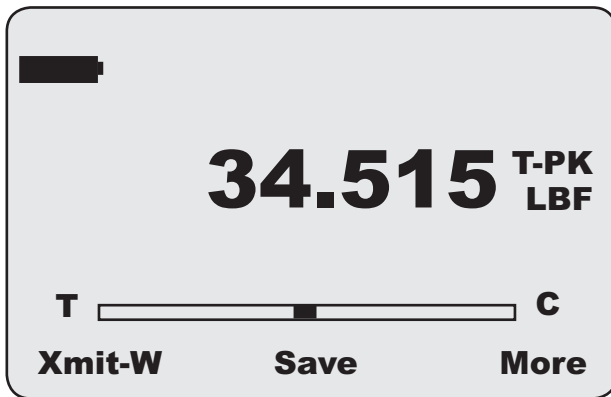
Test Stand Compatibility.

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

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

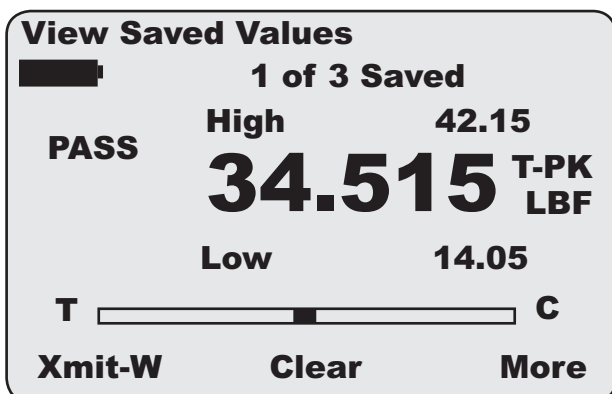
Normal and Peak Modes

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.



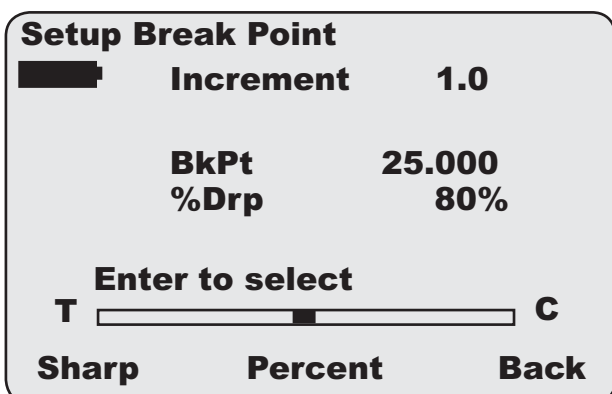
High & Low Load or Pass-Fail Limits

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.



Percentage and Sharp Break Detection

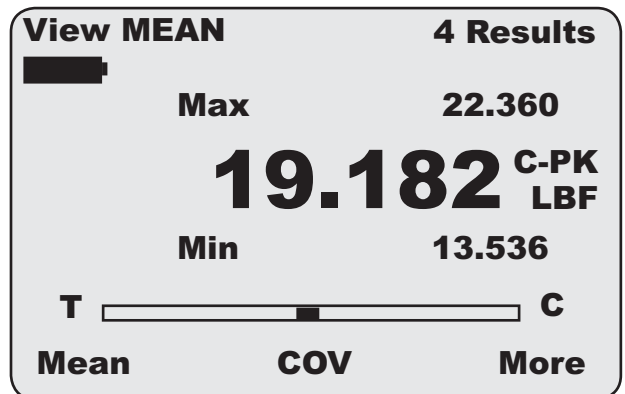
Break detection is provided and two types of breaks are supported. A sharp break can be used to detect whenever the load measurement drops 5% from a peak load. Alternatively, you may override the sharp break and setup the gauge with a % break detector. The % break detector allows you to set the drop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



Statistical Results

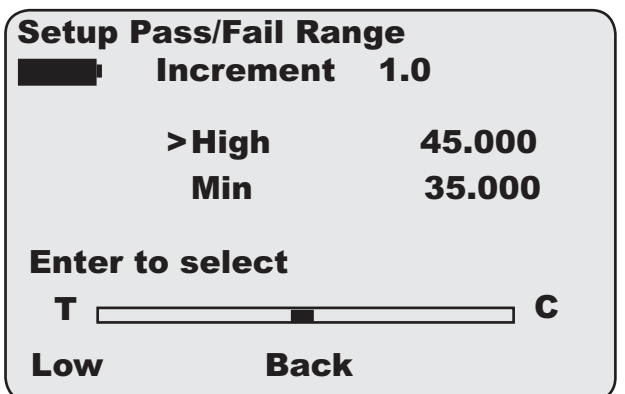
You may save and store up to 10 results in instrument memory for later recall or to calculate statistical results. The gauge labels each results and indicates memory capacity. The gauge will alert you when memory is full. Statistical results include:

- 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
- Calculate and display % Difference between consecutive test results



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.



Contact Closure

The DFS Series may be used to detect a contact break. Using a jumper on Pins 8 and 10, the gauge will detect when a contact is "opened" and freeze the display reading showing the force required to break the contact.

Auto Scaling

The DFS-R-ND, when equipped with a load sensor, will display loads in the following units: ozf, gf, lbf, kgf or N values. If equipped with a torque sensor, selecting the Units key will display torque in in-oz, g-cm, in-lb, kg-cm and N-m.

You may define and establish your Default Units during instrument setup.

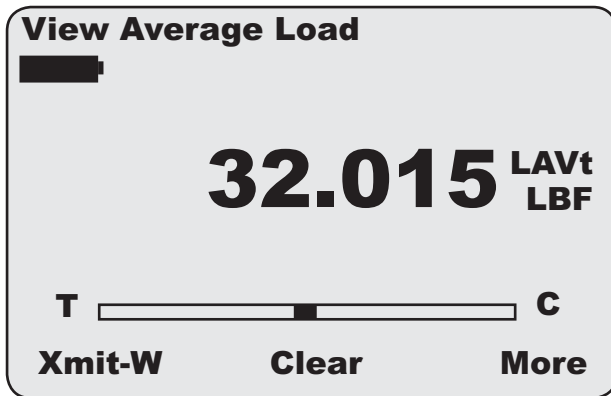
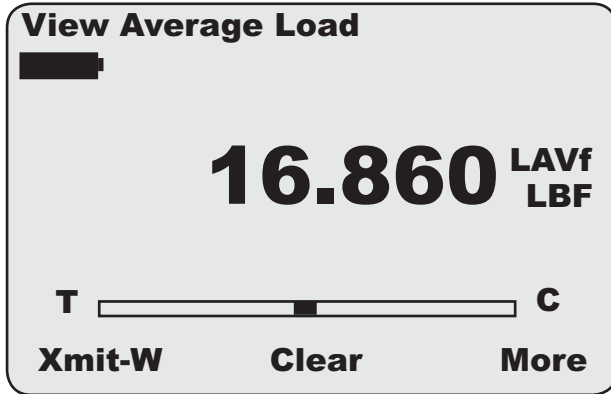
Advanced Measurement Functions.

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.

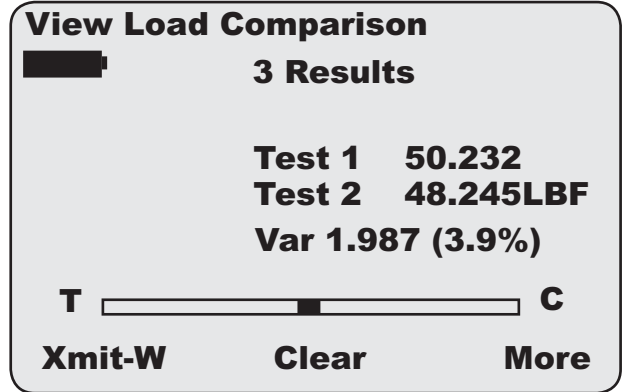
Automate with Nexygen Software

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!



Load Comparison

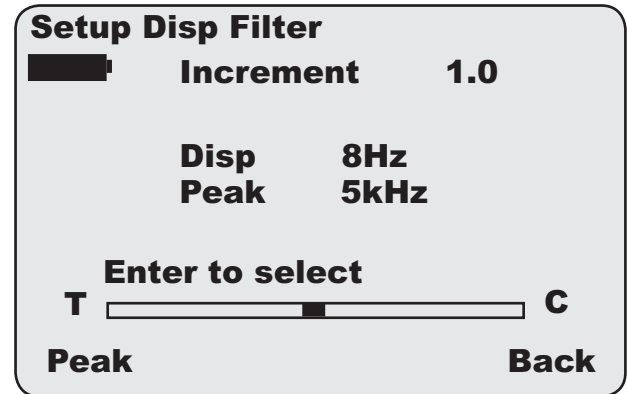
Load comparisons of up to two sets of 5 results may be measured using the DFS. The gauge will measure and store up to 5 results for each of two tests (10 results). The gauge will then display the first set of results with the second set of results and calculate statistical relationships such as % difference,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



Filtering

You may filter the display and peak readings with the DFS Series. The default display rate is 8Hz, however, this may be lowered to 2 Hz to accommodate noisy signals.

The peak sample rate may be specified as 5000Hz, 200Hz or 8Hz to suit specific application needs. A simple menu structure is used to specify filter rates.



Specifications

Accuracy: $\pm 0.1\%$ of full scale (Dedicated SLC Sensor)
 $\pm 0.25\%$ of full scale (Interchangeable SLC or STS Sensors)

Certification: Calibration with NIST Data, IEC/ISO17025 optional

Data Sampling Rate: 5000 Hz

Peak Capture Rate: 5000 Hz

Display Update Rate: Configurable 8Hz or 2Hz

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.

Ordering

DFS-R Series with Dedicated SLC Load Sensor

| Model | ozf | gf | lbf | kgf | N |
|------------|------------|------------|--------------|---------------|--------------|
| DFS-R-250G | 8 x 0.002 | 250 x 0.05 | 0.5 x 0.0001 | 0.25 x 0.0001 | 2.5 x 0.0005 |
| DFS-R-0002 | 32 x 0.005 | 1000 x 0.1 | 2 x 0.0002 | 1 x 0.0001 | 10 x 0.001 |
| DFS-R-0010 | 160 x 0.02 | 5000 x 0.5 | 10 x 0.001 | 5 x 0.0005 | 50 x 0.005 |
| DFS-R-0025 | 400 x 0.05 | 10,000 x 1 | 25 x 0.002 | 10 x 0.001 | 100 x 0.01 |
| DFS-R-0050 | 800 x 0.1 | 25,000 x 2 | 50 x 0.005 | 25 x 0.002 | 250 x 0.02 |
| DFS-R-0100 | 1600 x 0.2 | 50,000 x 5 | 100 x 0.01 | 50 x 0.005 | 500 x 0.05 |
| DFS-R-0200 | - | - | 200 x 0.02 | 100 x 0.01 | 1000 x 0.1 |
| DFS-R-0500 | - | - | 500 x 0.05 | 250 x 0.02 | 2500 x 0.2 |
| DFS-R-1000 | - | - | 1000 x 0.1 | 500 x 0.05 | 5000 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-R-0100-UK)

-EU 230V EU Style Mains Plug (Example: DFS-R-0100-EU)

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 +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°F (4° to 38°C)

Warranty: 2 year



Ordering

Digital Gauge - No Measurement Sensor

| Model | Order Sensor Separately |
|----------|--|
| DFS-R-ND | Order Load or Torque Sensors separately. |

Note: Gauge is supplied with 120V Charger and US Mains Plug standard.
 Use the following prefixes if you require a UK or EU Mains Plug.
 -UK 230V UK Style Mains Plug (Example: DFS-R-ND-UK)
 -EU 220V EU Style Mains Plug (Example: DFS-R-ND-EU)

Remote Sensors- Load Measurement

| Model | ozf | gf | lbf | kgf | N |
|----------|------------|------------|--------------|---------------|--------------|
| SLC-250G | 8 x 0.002 | 250 x 0.05 | 0.5 x 0.0001 | 0.25 x 0.0001 | 2.5 x 0.0005 |
| SLC-0002 | 32 x 0.005 | 1000 x 0.1 | 2 x 0.0002 | 1 x 0.0001 | 10 x 0.001 |
| SLC-0010 | 160 x 0.02 | 5000 x 0.5 | 10 x 0.001 | 5 x 0.0005 | 50 x 0.005 |
| SLC-0025 | 400 x 0.05 | 10,000 x 1 | 25 x 0.002 | 10 x 0.001 | 100 x 0.01 |
| SLC-0050 | 800 x 0.1 | 25,000 x 2 | 50 x 0.005 | 25 x 0.002 | 250 x 0.02 |
| SLC-0100 | 1600 x 0.2 | 50,000 x 5 | 100 x 0.01 | 50 x 0.005 | 500 x 0.05 |
| SLC-0200 | - | - | 200 x 0.02 | 100 x 0.01 | 1000 x 0.1 |
| SLC-0500 | - | - | 500 x 0.05 | 250 x 0.02 | 2500 x 0.2 |
| SLC-1000 | - | - | 1000 x 0.1 | 500 x 0.05 | 5000 x 0.5 |

“Plug & Play” Sensors

The DFS-R-ND has an auto-recognition feature that detects whether or not the gauge is using a load measurement sensor or torque sensor. Plug the sensor into the gauge and the gauge will automatically provide you with options associated with force or torque measurement. The gauge automatically scales itself based on the sensor capacity- there is no need to instruct the gauge on sensor capacity or sensitivity. Standard sensor accuracy is better than 0.25% FS, however, a sensor may be calibrated to better than 0.1% FS when used as a dedicated device.

Remote Sensors- Torque Measurement

| Model | in-oz | N-cm | in-lb | kg-cm | N-m |
|----------|------------|------------|------------|--------------|---------------|
| STS-0003 | 50 x 0.005 | 35 x 0.005 | 3 x 0.0005 | 3.5 x 0.0005 | 0.35 x 0.0001 |
| STS-0012 | 192 x 0.02 | 125 x 0.02 | 12 x 0.002 | 12.5 x 0.002 | 1.25 x 0.0002 |
| STS-0050 | 800 x 0.1 | 500 x 0.05 | 50 x 0.005 | 55 x 0.005 | 5 x 0.0005 |
| STS-0100 | - | 1000 x 0.1 | 100 x 0.01 | 100 x 0.01 | 10 x 0.001 |
| STS-0200 | - | 2000 x 0.2 | 200 x 0.02 | 200 x 0.02 | 20 x 0.002 |



Ordering

DFS-R Series Accessories

| Item | Capacity | Part No. | Included |
|--------------------------------------|------------------|---------------|-----------------------|
| Carrying Case | | SPK-DF-118 | Standard |
| Battery Charger, 120V, US Mains Plug | | SPK-DF-US | Standard ¹ |
| Battery Charger, 230V, EU Mains Plug | | SPK-DF-EU | Standard ¹ |
| Battery Charger, 230V UK Mains Plug | | SPK-DF-UK | Standard ¹ |
| Chisel | 100 lbf (500 N) | SPK-FMG-008A | Optional |
| Chisel | 500 lbf (2500 N) | SPK-FMG-008B | Optional |
| Point | 100 lbf (500 N) | SPK-FMG-009A | Optional |
| Point | 500 lbf (2500 N) | SPK-FMG-009B | Optional |
| Notch | 100 lbf (500 N) | SPK-FMG-010A | Optional |
| Notch | 500 lbf (2500 N) | SPK-FMG-010B | Optional |
| Flat | 100 lbf (500 N) | SPK-FMG-011A | Optional |
| Flat | 500 lbf (2.5 kN) | SPK-FMG-011B | Optional |
| Hook, Stationary | 50 lbf (225 N) | SPK-FMG-012A | Optional |
| Hook, Stationary | 100 lbf (500 N) | SPK-FMG-012B | Optional |
| Hook, Stationary | 500 lbf (2.5 kN) | SPK-FMG-012C | Optional |
| Extension Rod, 6-inch | 100 lbf (500 N) | SPK-FMG-013A | Optional |
| Extension Rod, 6-inch | 500 lbf (2.5 kN) | SPK-FMG-013B | Optional |
| 1/4-inch Hex Drive Socket | | SPK-DTG-037 | Optional |
| 3/8-inch Hex Drive Socket | | SPK-DTG-038 | Optional |
| 1/2-inch Hex Drive Socket | | SPK-DTG-039 | Optional |
| Hex Blade | | SPK-DTG-040 | Optional |
| 7/64-inch Hex Key | | SPK-FMG-015 | Optional |
| 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

Test Stand Adapters

| Item | Capacity | Part No. | Included |
|-----------------|------------------|---------------|----------|
| MT150 Series | 150 lbf (660 N) | SPK-MT-REMOTE | Optional |
| MT500 Series | 500 lbf (2500 N) | SPK-MT-REMOTE | Optional |
| LTCM-100 Series | 100 lbf (500 N) | NC000300 | Optional |
| TT Tester | Not Compatible | | |
| TCM201 Series | 225 lbf (1000 N) | NC000300 | Optional |
| TCD200 Series | 225 lbf (1000 N) | NC000300 | Optional |

Interface Cables, Adapters and Software

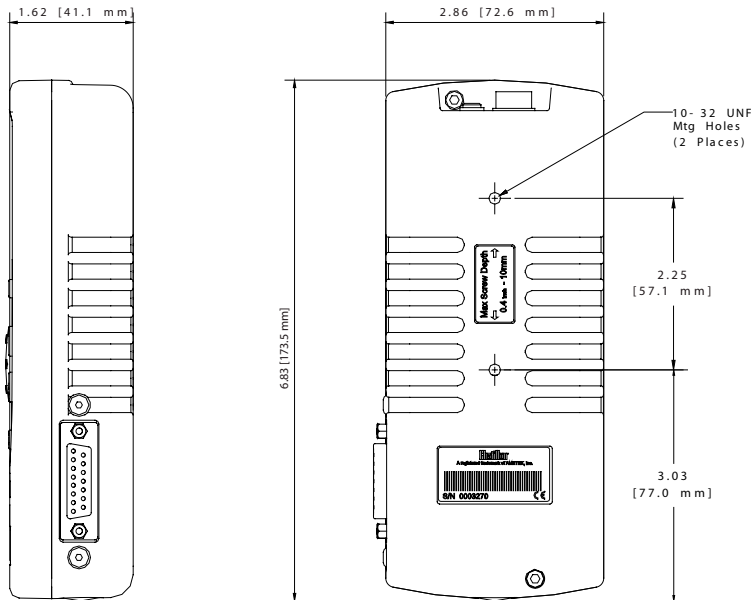
| Item | Capacity | Part No. | Included |
|-------------------------|----------|--------------|----------|
| RS232 Cable (6 ft, 2m) | | SPK-DF-RS232 | Standard |
| RS232 Cable (10 ft, 3m) | | NC000850-2 | Optional |
| Mitutoyo Cable, 10-Pin | | NC000654 | Optional |
| Mitutoyo Cable, RS232 | | NC000697 | Optional |
| TCM201 Interface Cable | | ENC0125 | Optional |
| TCD200 Interface Cable | | NC000647 | Optional |
| RS232-USB Adapter | | SPK-DF-USB | Optional |



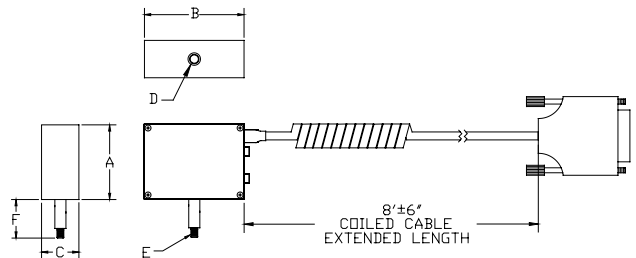
TCM-TCD Compatibility

The DFS-R-ND 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 alignment with your sample under test.

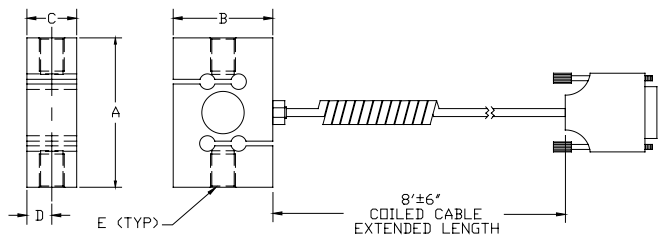
Dimensions - DFS Series



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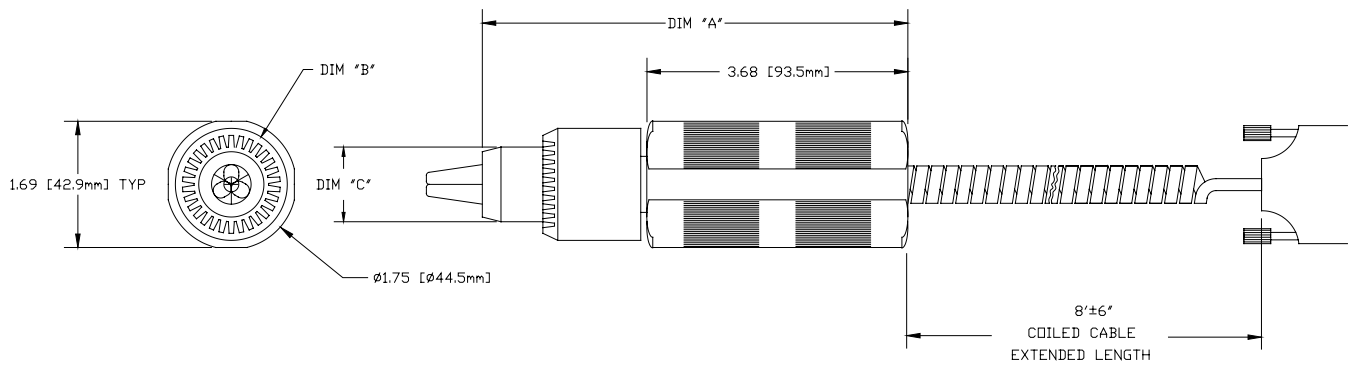


| | | | | | | |
|----------|-------------|-------------|------------|-----------------------|---------------------|-----|
| 25 LBF | 1.50 [38.1] | 2.00 [50.8] | .75 [19.0] | #10-32 | #10-32 | .75 |
| 10 LBF | 1.50 [38.1] | 2.00 [50.8] | .75 [19.0] | #10-32 | #10-32 | .75 |
| 2 LBF | 1.50 [38.1] | 2.00 [50.8] | .75 [19.0] | #10-32 | #10-32 | .75 |
| 250 G | 1.50 [38.1] | 2.00 [50.8] | .75 [19.0] | #10-32 | #10-32 | .75 |
| CAPACITY | A | B | C | D FEMALE THREAD | E MALE THREAD | F |



| | | | | | |
|----------|-------------|-------------|------------|------------|-------------|
| 1000 LBF | 2.98 [75.7] | 2.50 [63.5] | .98 [24.9] | .49 [12.4] | 1/2-20 |
| 500 LBF | 2.98 [75.7] | 2.00 [50.8] | .98 [24.9] | .49 [12.4] | 1/2-20 |
| 200 LBF | 2.48 [63.0] | 2.00 [50.8] | .61 [15.5] | .31 [7.9] | 1/4-28 |
| 100 LBF | 2.48 [63.0] | 2.00 [50.8] | .61 [15.5] | .31 [7.9] | 1/4-28 |
| 50 LBF | 2.48 [63.0] | 2.00 [50.8] | .61 [15.5] | .31 [7.9] | 1/4-28 |
| CAP. | A | B | C | D | E THREAD |

E96-355



| | | | | | |
|-----------|----------------|---------------|---------------|-------------|---------------|
| 200 IN-LB | 6.00 [152.4mm] | 1.62 [41.1mm] | 1.20 [30.5mm] | 5/64 TO 1/2 | NO |
| 100 IN-LB | 6.00 [152.4mm] | 1.62 [41.1mm] | 1.20 [30.5mm] | 5/64 TO 1/2 | NO |
| 50 IN-LB | 6.00 [152.4mm] | 1.62 [41.1mm] | 1.20 [30.5mm] | 5/64 TO 1/2 | NO |
| 12 IN-LB | 6.00 [152.4mm] | 1.62 [41.1mm] | 1.20 [30.5mm] | 5/64 TO 1/2 | YES |
| 50 OZ-IN | 5.62 [142.7mm] | 1.25 [31.8mm] | 1.00 [25.4mm] | 1/16 TO 3/8 | YES |
| CAPACITY | DIM 'A' | DIM 'B' | DIM 'C' | SAMPLE SIZE | OVERLOAD STOP |

E96-356

AMETEK TEST AND CALIBRATION INSTRUMENTS

For the authorized Chatillon Distributor or Manufacturer's Representative near you, go to www.chatillon.com

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