Starrett®

PKG08812- QRGDFC

TRUST IS IN THE NAME

Quick Reference Guide

READ THIS MANUAL BEFORE USING THE INSTRUMENT

**ANTES DE UTILIZAR EL INSTRUMENTO,
LEA ATENTAMENTE ESTE MANUAL**

LIRE CE MANUEL AVANT D'UTILISER L'INSTRUMENT

**LEIA ATENTAMENTE ESTE MANUAL ANTES
DE UTILIZAR O INSTRUMENTO**

使用仪器前请阅读本操作手册

**DIESES HANDBUCH VOR DER VERWENDUNG
DES MESSGERÄTS LESEN**

**LEGGERE ATTENTAMENTE QUESTO MANUALE PRIMA
DI UTILIZZARE QUESTO STRUMENTO**

Starrett®

DFC DIGITAL FORCE CONTROLLER

QUICK REFERENCE GUIDE

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DFC DIGITAL FORCE CONTROLLER

THIS IS A STARRETT QUICK REFERENCE GUIDE FOR THE DFG DIGITAL FORCE CONTROLLER.

ALL SPECIFICATIONS IN THIS DOCUMENT ARE CORRECT AT TIME OF PRODUCTION AND ARE SUBJECT TO CHANGE. PLEASE CONTACT STARRETT FOR FURTHER INFORMATION.

Thank you for choosing the DFC Force Controller.

This Quick Reference Guide is an overview of the basic functions available with your instrument. For detailed instructions on instrument setup and operation, please refer to the electronic user manual. You may download a copy of the user manual at http://www.Starrett.com/u?dfc-um.

INTRODUCTION

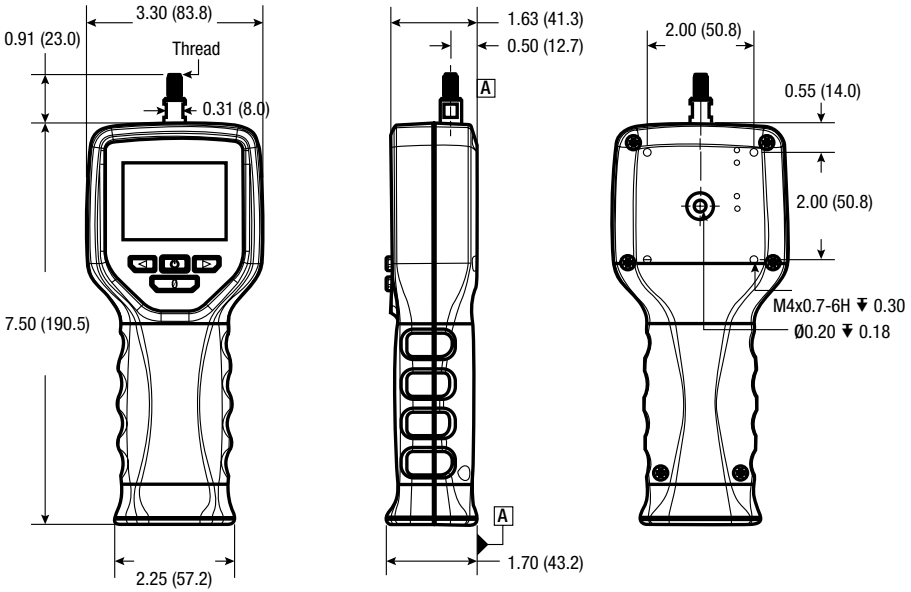
The DFC may be used as a classic digital force gage. It may also be used as a digital controller when connected to the FMM Digital Force Tester.

The DFC, as a controller, is the only gage available that lets you setup an automated test, including the operating parameters of the force tester. Configure speed and distance limits through the DFC.

STARRETT DFC ADVANCED FORCE GAGE	
SPECIFICATION	**DFC**
Accuracy, Full Scale	0.1%
Data Sampling (Hz)	25,000
Display Resolution	10,000:1
Safe Overload, Full Scale	200%
Maximum Tare	10%
COMMUNICATIONS	
Bluetooth®	Yes
USB 2.0	Yes
RS-232	Yes
Digital I/O	2 channels
Memory, saved results max.	99
OPERATING MODE	
Machine Control[1]	Yes
Real Time	Yes
Peak Compression	Yes
Peak Tension	Yes
Load Limit	Yes
Break Limit	Yes
Load Average	Yes
Load-Time Average	Yes
Cyclic Count, Max.	99,999
Cyclic Duration, Max.	27 Hrs.
Hold Duration, Max.	27 Hrs.
Coefficient of Friction	Yes
POWER, ENVIRONMENTAL	
Battery Type	Lithium Ion
Battery Life, @ 20% brightness	>30 hours
Charge Time, using 110/240V Mains	<3 hours
Display (OLED)	320 x 240
Operating Temperature	40°F to 110°F (4°C to 43°C)
Thread, for adapters (Metric)	M6, M10
Instrument Weight (approx.)	3 lbs (1.36 kgs)
CE COMPLIANCE	
EN61010-1 Safety for Electrical Equipment	Yes
EN61000-6-3 EMC Generic Emissions	Yes
EN61000-6-1 EMC Generic Immunity	Yes

NOTES

1. Machine control is exclusive to the DFC. When connected to the FMM digital force tester, configuration of force gage and tester is performed through the gage.



DFC - ADVANCED FORCE CONTROLLER									
	LOAD CAPACITY					FULL SCALE DEFLECTION		THREAD	ACCESSORY
MODEL	N	KGF	LBF	OZF	GF	IN	MM	MM	KIT
DFC-2	10	1	2	32	900	0.013	0.33	M6 x 1-6H	SPK-FG-A
DFC-5	25	2	5	80	2,200	0.007	0.18	M6 x 1-6H	SPK-FG-A
DFC-10	50	5	10	160	5,000	0.006	0.15	M6 x 1-6H	SPK-FG-S
DFC-20	100	10	20	320	9,000	0.008	0.20	M6 x 1-6H	SPK-FG-S
DFC-50	250	25	50	800	23,000	0.015	0.39	M6 x 1-6H	SPK-FG-S
DFC-100	500	50	110	1,600	45,000	0.024	0.60	M6 x 1-6H	SPK-FG-S
DFC-200	1,000	100	225	-	-	0.021	0.54	M6 x 1-6H	SPK-FG-M
DFC-500	2,500	250	550	-	-	0.028	0.70	M10 x 1.5-5H	SPK-FG-L

NOTES

Load measurement accuracy is ±0.1% of load cell capacity. Display resolution is 10,000:1.

KEYPAD AND NAVIGATION

The DFC keypad is multi-functional. There are four keys.

ON/OFF/MENU KEY

This key is used to power the gage on/off. Press to power the gage on. Press and hold for 3 seconds to power the gage off.

This key is also used to access the Setup Menu. When the gage is powered ON, press to access the Setup Menu.

This key is also used to navigate UP when in the Setup Menu. ▲

ZERO KEY

This key is used to zero the displayed values. Press to zero load and if connected to the FMM digital force tester, zero distance.

This key is also used to navigate DOWN when in the Setup Menu. ▼

SOFTKEY 1

This is the left arrow key. It is used to move out of a setup when in the Setup Menu. ◀

This key may also be mapped to a specific function.

The Setup Menu has a Key setup function where you may assign how Softkey 1 performs. For example, you can assign a SAVE function to the key. When pressed, the measured values are "saved" to memory.

SOFTKEY 2

This is the right arrow key. It is used to move in to a setup when in the Setup Menu. ▶

Like the Softkey 1, it also may be mapped to a specific function. For example, you can assign a MODE function to the key. Pressing the key can change the operating modes of the gage. You can switch from Real Time to Peak Tension by pressing Softkey 2.

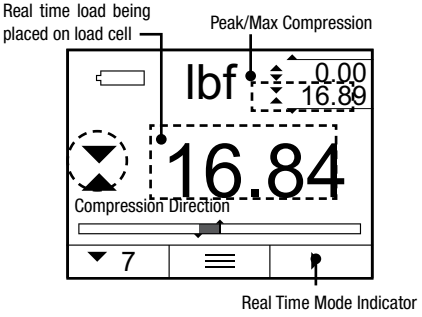
DISPLAY LAYOUT

The force gage features a high-resolution OLED color display with adjustable backlight. The backlight may be adjusted from a setting in the Main Menu.

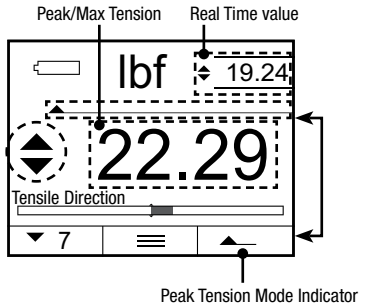
The DFC features a primary and secondary display window.

DISPLAY TYPES

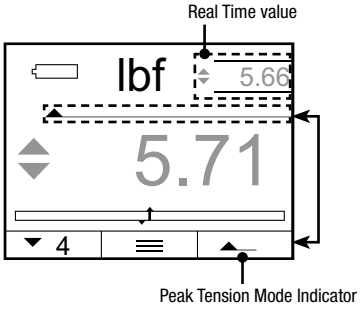
PRIMARY DISPLAY	SECONDARY DISPLAY
Real Time	Peak Measurement
Peak Tension	Real Time Measurement
Peak Compression	Real Time Measurement
Average	Peak Measurement Preload to Start Average
Average (Functional Capacity)	Peak Measurement Time Duration
Static COF	Kinetic COF
Kinetic COF	Static COF



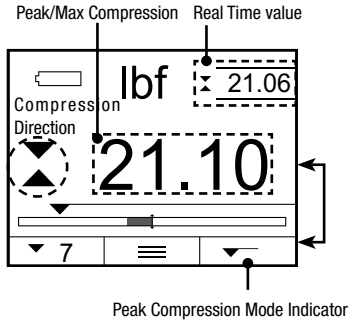
Shown: Real Time view showing Peak Compression



Shown: Peak Tension view



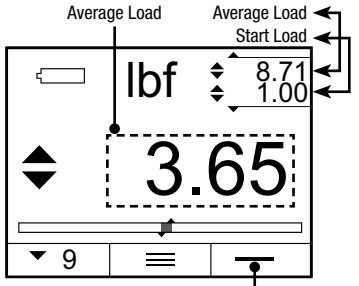
Shown: Peak Tension view with Tolerance result



Shown: Peak Compression view

Shown: Display in Classic mode

Shown: Display in Controller mode used with FMM Test Frame



Shown: Average view

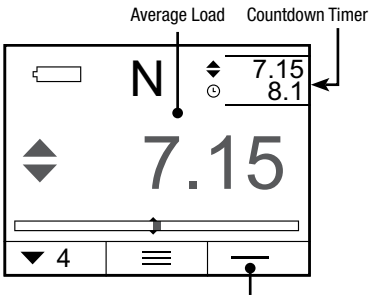
Average Mode Indicator

CONTROLLER DISPLAY FORMATS

As a Controller, the DFC will display both load and distance information and results. The gage will serve is the universal interface for the "system" and will be used to setup the force gage and the tester.

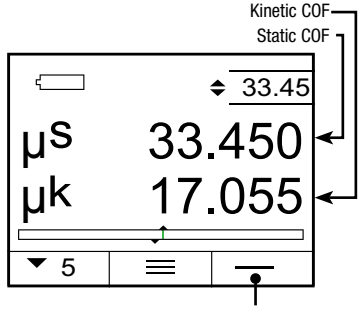
The DFC force gage will display load information, as measured by the load cell.

The DFC force gage will display distance information, as measured by the FMM digital force tester.



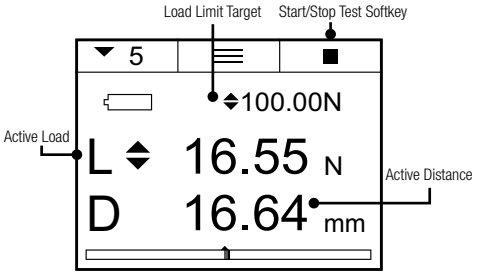
Shown: Functional Capacity result

Average Mode Indicator

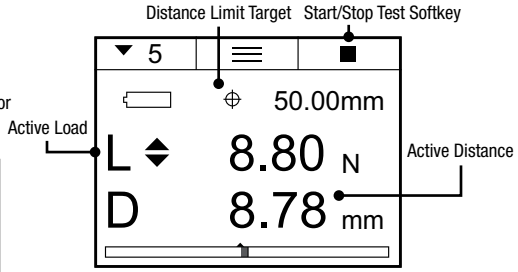


Shown: COF result

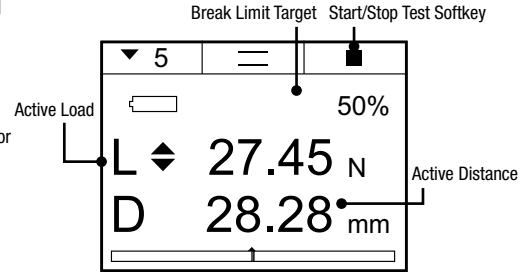
Average Mode Indicator



Shown: Load Limit Test results



Shown: Distance Limit Test results

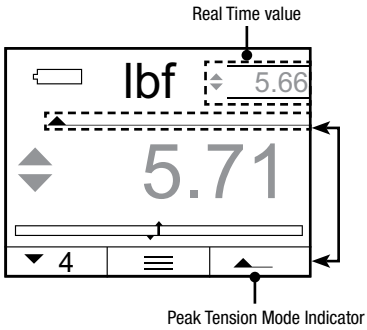


Shown: Break Limit Test results

USING TOLERANCE LIMITS

Use tolerances to setup "pass" and "fail" measurements. You may specify a Limit 1 and a Limit 2 to create a tolerance band. Measured results that equal or fall within the range created by the two limits are considered "pass" results. If the measured result falls outside the band created by the two Limits, the result is considered a "fail" result. A "fail" results displays in RED.

Press ▼ Move to TOLERANCE
Press ▶ Select ENABLE
Press ▼ Move down to LIMITS
Press ▼ Move down to LIMIT 1
Press ▶ Select Limit 1 value using ▼▲
Press ◀ Move out of Limit 1
Press ▼ Move down to LIMIT 1
Press ▶ Select Limit 2 value using ▼▲
Press ◀ Move out of LIMIT 2
Press ◀ Move out of TOLERANCE



Shown: Peak Tension view with Tolerance result

SAVING RESULTS

The DFC feature an internal memory for saving results for the purpose of calculating and displaying statistics. You may save up to 99 individual results in memory.

To save results to memory, you must configure a softkey with the SAVE function. Press the SAVE softkey to save the displayed results to memory.

Results saved to memory MUST be of the same type. You cannot have mixed type results. For example, you cannot save tension results with COF results. Results MUST be of the same type.

Results obtained using the TESTS feature are saved in pairs. For each test, there is a Load and Distance result (L-D). You cannot save results from different types of tests. For example, you cannot save results from a Load Limit test with results from a Break Limit test. Each load-distance pair of results must have come from the same test type: Load, Distance or Break.

RESULT TYPE	MEMORY TYPE
MODES	
Real Time	Real Time
Tension Peak	Tension Peak
Compression Peak	Compression Peak
Average	Average
Static COF	Static COF
Kinetic COF	Kinetic COF
TESTS	
LOAD LIMIT TEST	
Distance @ Limit	Distance @ Limit
Load Limit	Load Limit
DISTANCE LIMIT TEST	
Load @ Limit	Load @ Limit
Distance Limit	Distance Limit
BREAK LIMIT TEST	
Load Max (Peak Load)	Load Max (Peak Load)
Distance @ Load Max	Distance @ Load Max

Management of the DFC memory is important to ensure correct statistical analysis. Always clear old results that are from a different test method.

CLEAR RESULTS FROM MEMORY

Results in memory may be cleared individually or collectively. To clear an individual result from memory, go to the STATS view. Select the results you want to clear. Select the "X" (delete) key.

To clear all results from memory, go to the Memory setup and select CLEAR. This will erase all results for the gage's memory.

VIEW STATISTICS

You must configure a softkey with STATS to view statistics. When results are saved to memory, you press the STATS softkey to view results in memory and the statistics for those results.

EXPORT RESULTS

You must configure a softkey with SEND to export to an external device via Bluetooth, RS232 or USB. Press the SEND softkey to export the displayed result.

GAGE SETUP

MODES

Press ▲ for Menu
Press ▶ for Modes
Select your Mode, press ◀ to exit setup

UNITS

Press ▲ for Menu
Press ▼ for Units
Select your Units, press ◀ to exit setup

MEMORY

Press ▲ for Menu
Press ▼ for Memory
Press ▶ to Display results from memory
Press ▶ to Clear results from memory
Press ▶ to Export results from memory
Select your Units, press ◀ to exit setup
*You must configure a softkey to display memory and statistics.

TESTS

Press ▲ for Menu
Press ▼ for Tests
Press ▶ to Enable Tests
Press ▼ to your Test Method
Press ▶ to enter specific Test Method options
*Refer to the User Manual for detailed instructions on using the TESTS feature in your DFC.

TOLERANCE

Press ▲ for Menu
Press ▼ for Tolerance
Press ▶ to Enable Tolerance
Press ▶ to setup Limit 1, select Limit 1 value ▲▼
Press ▶ to setup Limit 2, select Limit 2 value ▲▼
Press ◀ to exit setup

KEYS

Press ▲ for Menu
Press ▼ for Keys
Press ▼ to specify a Sound for key presses
Press ▼ to specify Softkey 1 function
Press ▼ to specify Softkey 2 function
Press ◀ to exit setup
*Certain gage functions require a softkey to be setup in order to use the function- Memory, Statistics, Tests, Export (Send)

SETTINGS

Press ▲ for Menu
Press ▼ for Settings, select Settings Type

COMMUNICATIONS

Press ▼ for Communications (Comms)
Press ▶ to specify the Data Channel method for exporting results: USB, RS-232, or BT (Bluetooth®)
Press ▼ to select RS-232
Press ▼ to select RS-232 Baud Rate
Press ▼ to setup direction sign (- default for Compression)
Press ▼ to transmit Units
Press ▼ to transmit Tolerance Limits
Press ◀ to exit Comms setup

DISPLAY

Press ▼ for Display
Press ▶ to setup Auto Off
Press ▶ to setup Backlight Brightness
Press ▶ to setup Flip orientation (required for TESTS feature)
Press ▶ to setup Radix
Press ◀ to exit Display setup

FILTERS

Press ▼ for Filters
Press ▶ to specify filter rate
Press ◀ to exit Filter setup

ABOUT

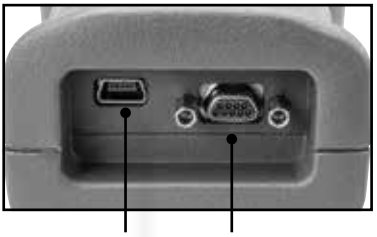
Press ▼ for About
Press ▶ to view the gage's characteristics, serial number, overload history and more.
Press ◀ to exit setup
*The About setup is read-only.

MEMORY

Press ▼ for Password
Press ► to Enable a Password
Press ▲▼ to select the Passcode
Press ◄ to exit setup

LANGUAGE

Press ▼ for Language
Press ▼ to your preferred display language
Press ◄ to exit setup



Gage Setup Menu Structure

CHARGING BATTERY

Connect the USB cable supplied with your DFC to the USB connector at the base of the gage. Connect the opposite end of the cable to the USB connector on a source device, i.e., personal computer, USB adapter.

If the DFC is connected to an FMM test frame and power to the frame is ON, the DFC battery is continuously charged.

Communicating with External Devices

The DFC can communicate using Bluetooth, USB 2.0 and RS-232. Select the Data Channel type to be used.

PROTOCOL	WHERE TO USE
Bluetooth®	Print via Bluetooth printer Export data to an external device
USB 2.0	Charge DFC Battery Upload firmware and new features to DFC from a PC Export data to a printer Export data to a PC
RS-232	Communicate with a serial printer Communicate with a serial external computer or hard drive
Control	Controls the crosshead direction and velocity the FMM from the DFC gage

MODES	UNITS	MEMORY	TESTS	TOLERANCE	KEYS	SETTINGS
Real Time	ozf	Display	Enable	Enable	Enable	Comms
Peak Tension	lbf	Clear	Load Limit	Limit 1	Softkey 1	Data Channel
Peak Compression	gf	Export	Type	Limit 2	Send	RS-232
Averaging	kgf		Target	Sound	Units	Xmit Comp -
Time Avg	N		Speed		Save	Xmit Units
COF	User		Distance Limit		Mode	Xmit TOL
			Type		Stats	Display
			Target		Start/Stop	Auto Off
			Speed		Return 0	Backlight
			Break Limit		Softkey 2	Flip
			Type		Send	Radix
			Minimum Break		Units	Filter
			% Drop		Save	About
			Auto 0		Mode	Password
			Auto Return		Stats	Language
			Auto Save		Start/Stop	English
					Return 0	Deutsch
						Espanol
						Portugues
						Francais
						Italiano
						Chinese
						Russian
						Polski
						Czech

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