

Mecmesin

Advanced Force Gage Mk4

Operating Manual



Contents

Powering the Gage	2
Using the Gage	3
Basic Functions	5
Optional Settings	9
Additional Force & Torque Sensors	10
Advanced Menu Options	11
AFG Specifications	26

Introduction

Thank you for choosing the Mecmesin Corporation Advanced Force Gage (AFG) instrument. With correct use and regular re-calibration it will give many years of accurate and reliable service.

The Mecmesin Corporation AFG is the flagship member of a series of highly versatile display units. By using the latest integrated circuit technology it has been possible to produce an instrument which can be used to measure tensile and compressive forces accurately, whilst being simple to use by the operator. Information contained in this operating manual also applies to the AFTI display when used with external 'Smart' sensors.

Before Use

Upon receiving the unit please check that no physical damage has occurred to the packaging material, plastic case or the instrument itself. If any damage is evident please notify Mecmesin Corporation immediately.

Operation

The most commonly used features (such as displaying force, peak hold, zero and changing of displayed units) can all be done by pressing a single dedicated key identified on the front panel with grey text – see page 5, Basic Functions.

For less frequently used features, a number of menu "hot keys" are provided, whereby the operator simply presses and holds a menu key to access the gage configuration – see page 9, Optional Settings.

To configure the advanced features of the gage a full menu-driven system is available by using the keys identified on the front panel with red text – see page 11, Advanced Menu Options.

POWERING THE GAGE

Fitting and charging of rechargeable batteries

The AFG is supplied with a set of 5 Nickel Metal Hydride AAA rechargeable batteries. For safety reasons during transportation the batteries are shipped discharged. To obtain maximum battery life we recommend that you charge them with the charger/adaptor supplied for at least 14 - 16 hours when you first receive the AFG. Do not use any other battery charger other than that supplied with the force gage.

To insert the batteries you must first remove the battery cover on the upper part of the rear of the gage by removing the 2 retaining screws. Fit the 5 batteries in the battery holder ensuring that you observe polarity and the batteries are placed on top of the 'release tag'. To remove the batteries simply pull the 'release tag' and they will be freed from the spring-loaded contacts.

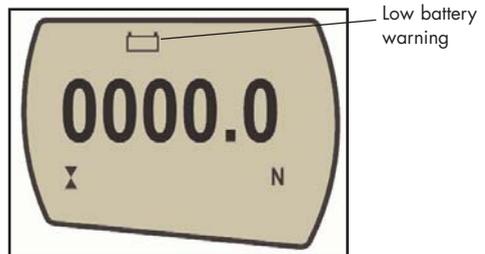
Refit the battery cover and tighten the 2 retaining screws.

Connect the AC adaptor/charger to the AFG charger socket located at the right-hand side of the gage next to the display and charge the batteries for 14 - 16 hours. Only use the adaptor/charger supplied. A fully charged battery pack will provide approximately 20 hours constant use between charges.

Low Battery Warning

A low battery symbol will appear in the display approximately 2 minutes before the gage powers down automatically. See Figure 1a.

Fig. 1a



AC operation

The AFG can also be powered directly from the AC. This can be achieved with or without the rechargeable batteries being fitted. Connect the AC adaptor/charger to your AC supply. Only use the adaptor/charger supplied.

Fitting of alkaline batteries

If rechargeable batteries are fitted, a trickle charge will be applied to the batteries with the display switched on.

The AFG can also be powered by AAA 1.5V alkaline batteries (not supplied). For the fitting of alkaline batteries, follow fitting instructions as per rechargeable batteries above.

Warning: When alkaline batteries are fitted, the AC adaptor/charger must **NEVER** be connected to the AFG due to the risk of acid leakage which could damage the instrument.

Battery safety information

NEVER:

Short circuit

Disassemble or deform cells

Heat or incinerate

Immerse in water

Solder anything to the battery terminals

Reverse individual cell polarity

Use alternative chargers other than those supplied by Mecmesin Corporation. Use replacement parts other than those supplied by Mecmesin Corporation.

Never dispose of batteries with 'normal' garbage. Contact your local Environmental Authority to determine the location of your appropriate disposal facility.

USING THE GAGE

Fitting accessories

All AFG instruments are supplied with a short extension rod (30mm long). This fits directly onto the loadcell mounted in the bottom of the AFG. When attaching accessories to the gage always use the extension rod. It comes supplied with a thumb wheel to control the orientation of any accessory fitted.

When fitting the extension rod ensure that it is screwed finger-tight only. Excessive torque can damage the loadcell. Your chosen grip can now be fitted to the extension rod which has an M6 male thread.

Mounting to a test stand

On the rear of the gage there are two M5 threaded holes, which can be used for mounting the gage to a Mecmesin Corporation test stand.

Each Mecmesin Corporation test stand is supplied with a dedicated 'dovetailed mounting bracket' and screws for this purpose.

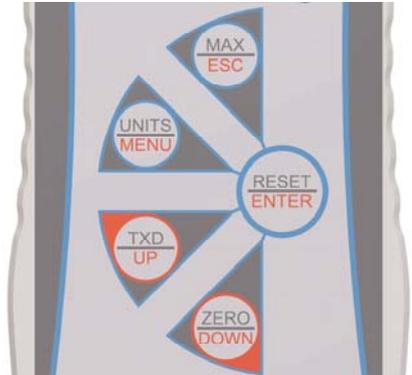
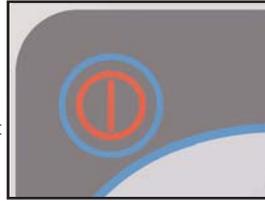
If you wish to mount to another type of stand, ensure that the screws used are threaded into the gage to a **maximum depth of 12mm**. If screws are fitted beyond this depth, damage to the internal PCB or loadcell may occur.

Powering up

As shown in Figure 1b the control panel has 5 Function keys plus an On/Off key:-

Fig.1b

To power up the gage press the red key. ① A short self test runs during which the display will show the model and capacity in newtons.



Please note that an AFG measuring very low forces may not show zero if it is moved during the self test routine. Once it is properly mounted and zeroed the reading will be stable

After the self test, providing no load has been applied to the instrument, the display will show all zeros. This is because the gage re-zeros itself during the self test routine.

If a force is applied perpendicularly via the sensor probe (bottom of AFG), the reading on the display will register the applied force.

Forces greater than 120% of full-scale will produce an audible beep until load is released and an OL symbol will appear on the display **for 30 seconds**.

NB: All the current settings are saved when the gage is turned off and the gage will function in the same mode when powered up again.

Forces greater than 150% of full-scale will produce an audible beep until load is released and an OL symbol will appear **permanently** on the display. If this should occur consult your supplier to arrange inspection and repair, if necessary.

Should the instrument have sustained a catastrophic overload, the symbol **OL** will be permanently displayed and the instrument must be returned to Mecmesin Corporation or an approved Mecmesin Corporation distributor for repair.

To power down the gage press the red ① key.

Basic Functions

Display of Tension/ Compression

If the AFG has suffered a serious overload condition, the load indicator bar will be partially displayed even when no load is present. This is a warning that the loadcell is damaged and you should immediately contact your supplier to arrange repair.

Tensile forces are displayed on the AFG and recognized by the symbol \blacklozenge (See Fig. 2a)

Compressive forces are displayed on the AFG and recognized by the symbol \blacktriangledown (See Fig. 2b)

Fig. 2a



A load indicator bar alerts the operator to how much load has been applied to the transducer. As the load approaches the maximum rating of the transducer, the indicator bar changes appearance when above approximately 80% of the rated capacity. This warns the operator that steps should be taken to prevent excessive load being applied.

For tensile forces the indicator bar is solid then dotted. For compressive forces the indicator bar is dotted then solid – see Figure 2b.

Fig. 2b



Zeroing the Gage

During the operation of the gage it is often necessary to zero the display – e.g. when you wish to tare out the weight of a grip, so it does not become part of the measured reading. Press and release the **ZERO** key. The display will blink momentarily as the zero operation is carried out.

Changing the unit of measurement

You can choose from the following units of measurement depending on the capacity of your gage: millinewtons, kilonewtons, newtons, gram-force, kilogram-force, ounce-force or pound-force.

To change the display units press and release the **UNITS** key. Each successive key press will select the next available units until the gage returns to its original setting. The AFG automatically converts readings as new units of measure are selected.

Max (peak) readings

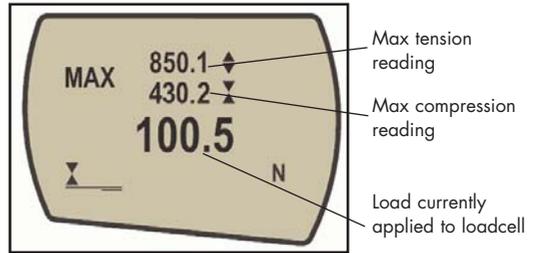
The gage detects and stores maximum (peak) force in both compressive and tensile directions.

"Max" mode

Press the **MAX** key. The display will show the word MAX together with the highest tensile \blacklozenge force and the highest compressive \blacktriangledown force detected during the test. The current load being applied to the transducer is also displayed - see Figure 3a overleaf.

Dual Max

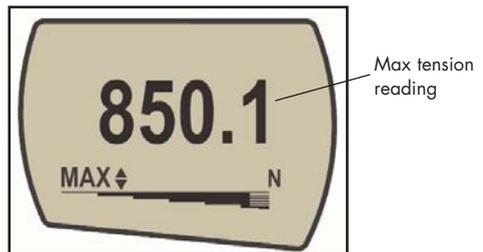
Fig. 3a



Max Tension

Press the **MAX** key again and the display will show the maximum tensile force identified by the ◀▶ symbol. (See Fig. 3b)

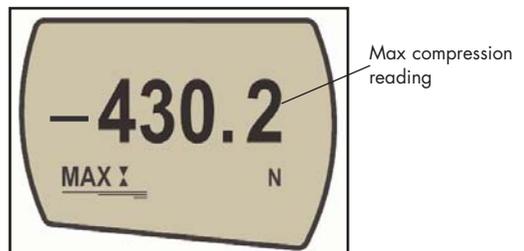
Fig. 3b



Max Compression

Press the **MAX** key again and the display will show the maximum compressive force identified by the ⊗ symbol. (See Fig. 3c)

Fig. 3c



"Normal" mode

Data Output

Analog output

RS232 and Mitutoyo
output signals

PC Communication

*AFG uses 9600, 19200,
57600 or 115200 Baud, 8
data bits, 1 start bit, 1 stop bit
and no parity. (See Advanced
Menu Options for setup details)*

*A full range of data cables are
available to connect your gage
to peripheral devices – contact
your supplier.*

Press the **MAX** key again and the word MAX has now disappeared from the display. The display will now indicate forces applied in both directions as they are applied to the transducer and maintain a "running" display.

Press the **RESET** key to clear both maximum registers and prepare for detecting the next maximum readings.

(See also COMMS section of Advanced Menu Options on page 25)

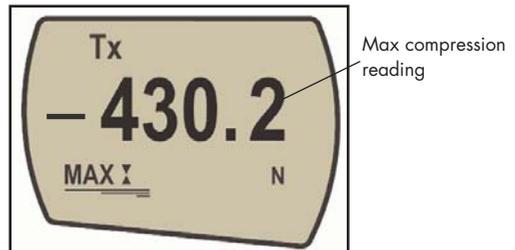
A calibrated analog output is available from the top 'D type' connector marked 'coms' for use with chart recorders, oscilloscopes or any other devices requiring analog inputs. See technical specifications on page 26 and 30 for details.

It is possible to transmit the displayed reading to peripheral devices (e.g. PC, printer) by pressing and releasing the **TXD** key.

Displayed readings can also be requested individually from a PC via the RS232 interface by sending a "?" (ascii D63 [3fh] character).

For sending a continuous data stream to a PC, press and hold the **TXD** key for 2 seconds then release. TX will now appear in the display to indicate that data is being sent, (see figure 4). To stop sending data, simply press and release the **TXD** key, at which point TX will disappear from the display.

Fig. 4



Please note that the continuous data stream only starts when approximately 2% of the rated capacity of the gage is reached. This default threshold can be set from 1-100% (see advanced menu options).

Remote key press from PC

Hold down the **Ctrl** key on the PC keyboard and press;

- a* to simulate pressing the **TXD** key *
- b* to simulate pressing the **UNITS** key
- c* to simulate pressing the **MAX** key
- d* to simulate pressing the **RESET** key
- e* to simulate pressing the **ZERO** key

* Note that the continuous transmission mode cannot be entered via these methods.

- '1' (ascii 001 [01h]): "TXD"
- '2' (ascii 002 [02h]): "UNITS"
- '3' (ascii 003 [03h]): "MAX"
- '4' (ascii 004 [04h]): "RESET"
- '5' (ascii 005 [05h]): "ZERO"
- '?' (ascii 063 [3Fh]): Single reading request

Optional Settings

Backlit Display

It is possible to activate a backlight on the AFG display. Press and hold **UNITS** key whilst powering up the AFG with the **ⓘ** key. The backlight is now operating.

Please note that power consumption is doubled when using the backlight. For this reason the backlight setting is not remembered after power down.

Auto-off

To conserve battery power, it is possible to activate an Auto-off function so that the gage powers down after either 2 or 10 minutes since the last key press, OR since a load change of more than 2% of full-scale.

Press and hold **ZERO** key whilst powering up the AFG with the **ⓘ** key. A menu will appear with options OFF, 2 MINS, 10 MINS. Move the **UP** or **DOWN** key to desired setting and press the **ENTER** key. The symbol **Ao** will appear in the display to indicate if Auto-off is active. This feature is remembered after power down.

Invert Display

For hand-held tension applications it is often desirable to reverse the display, so that the operator can read it more comfortably. Press and hold the **MAX** key whilst powering up the AFG with the **ⓘ** key to invert the display. This feature is remembered after power down.

Factory Default

The AFG may be returned to its original factory default settings, indicated on pages 28 and 29 of the Advanced Menu Options section of this manual.

Press and hold the **RESET** key whilst powering up the AFG with the **ⓘ** key

Smart Force & Torque Sensors

'Smart' sensors

Warning! The AFG must be powered down when connecting or disconnecting smart transducers.

Note: Connecting a new 'Smart' transducer causes the default settings within Advanced Menu Options to be installed

Loadcell Diagnostic test

An instrument showing an overload condition cannot be relied upon to provide accurate, repeatable measurement – consult your supplier.

All Advanced Force Gages have a 15-pin 'Smart' connector port on the left-hand side for interface with Mecmesin Corporation external 'Smart' force and torque sensors. This allows you to use your existing AFG to perform additional tests without the need for a dedicated instrument.

To connect a 'Smart' sensor, power down the gage and plug in the 'Smart' force or torque sensor to the 15-pin 'Smart' port. Power on the AFG. The 'Smart' transducer will be automatically recognized and the capacity displayed.

If you suspect that your AFG loadcell or 'Smart' sensor has sustained an overload it is possible to check the status of the sensor immediately.

Symptoms of overload may be (a) OL in display (b) buzzer sound (c) probe not aligned perpendicularly to gage (d) load indicator bar present even under zero load.

See CALIBRATION section of Advanced Menu Options on page 28 to check loadcell status.

Advanced Menu Options

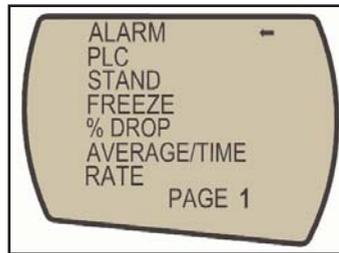
Navigating the menus

All the features and advanced menu options of the AFG are also applicable whilst using the 'Smart' range of peripheral devices. (Except for the footswitch 2 option which has the same pin requirement)

The AFG Advanced Menus are accessed using the red text on the keys.

Press and hold the **MENU** key for approximately 2 seconds to access page 1 of the main-menu, (see figure 5). Pressing the **MENU** key again takes you to page 2 of the main menu. To move between the options listed on the 2 main-menu pages, press **UP** and **DOWN** keys to move the cursor. Press the **ENTER** key to select sub-menus, activate features and enter values. Within sub-menus the **UP** and **DOWN** keys will also change numerical values. Press the **ESC** key to return to the main-menu page and **ESC** again to return to the main display.

Fig. 5



MAIN MENU
PAGE 1

ALARM

Alarms will not trigger in the first 1% of full-scale use

The AFG has an audible and visual alarm feature which can be set to trigger on pass, fail or sample break criteria.

To set an alarm, press and hold the **MENU** key until page 1 of the main-menu appears.

The cursor arrow will point to ALARM. Press the **ENTER** key.

ALARM sub-menu 1

The display will show ALARM OFF and SET.
Press the **ENTER** key to change ALARM OFF to ALARM ON.
Press the **DOWN** key to move the arrow cursor to SET and press the **ENTER** key.

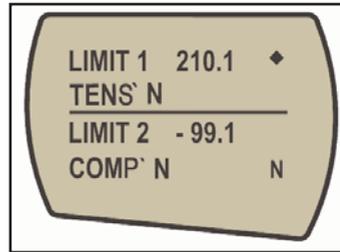
ALARM sub-menu 2

*Torque sensors will show
CW for clockwise and
CCW for counter-
clockwise*

The display will now show the two limits LIMIT 1 (lower limit) and LIMIT 2 (upper limit) plus the value they are set to and whether they are in tension (TENS'N) or compression (COMP'N). A diamond cursor will indicate which value is selected. Use **UP** and **DOWN** keys to change the value, press and hold to scroll values. When the correct value is reached press the **ENTER** key to set LIMIT 1. Repeat procedure for LIMIT 2 (see figure 6).

Note: The alarm limits are not active below 1% of the capacity of the gage.

Fig. 6



ALARM sub-menu 3

The display shows AUDIBLE, LED and BOTH with the arrow cursor indicating which feature is selected. This menu selects how the PASS/FAIL status of a value will be indicated.

AUDIBLE - Only the audible alarm will be activated when the value is a PASS/FAIL.

LED - The green and red LED's will indicate the PASS /FAIL status.

BOTH - Both the LED and the audible alarm will be activated above.

Use the **UP** and **DOWN** keys to move the cursor and press the **ENTER** key to select the desired feature.

ALARM sub-menu 4

The display shows OUT BAND and IN BAND. This menu selects which values are to be considered.

OUT BAND - Any value falling outside the set limits
LIMIT 1 and LIMIT 2

IN BAND - Any value falling between the set limits LIMIT 1
and LIMIT 2

Use the **UP** and **DOWN** keys to move the cursor and press
ENTER key to select the desired feature.

ALARM sub-menu 5

The display shows PASS or FAIL. This menu sets the OUT
BAND criteria.

PASS - Values, which fall either OUT BAND (or IN BAND,
if selected), are a PASS and will cause an audible
beep, illuminate an LED or both.

FAIL - Values, which fall either OUT BAND (or IN BAND,
if selected), are a FAIL and will cause an audible
beep, illuminate an LED or both.

Use **UP** and **DOWN** keys to move the cursor and press
ENTER key to select the desired feature.

Alarm sub-menu 6

The display shows BUZZER ON CONTINUOUS PULSE. This
menu selects length of time that the buzzer will sound, if
AUDIBLE or BOTH has been selected in sub-menu 3.

CONTINUOUS - The buzzer sounds at a pre-set alarm value
and stays on until load falls below that pre-set.

PULSE - The buzzer pulses for fixed time of one second every
time the load crosses over each of the presets.

Use **UP** and **DOWN** keys to move the cursor and press
ENTER key to select the desired feature.

Fig. 7



ALARM on break

Display is showing sub-menu 1 again (= ALARM ON and SET). Press **ESC** key to return to main-menu and again to return to main display. The main display will now show an alarm 'bell' symbol indicating the alarm is turned on - See Figure 7.

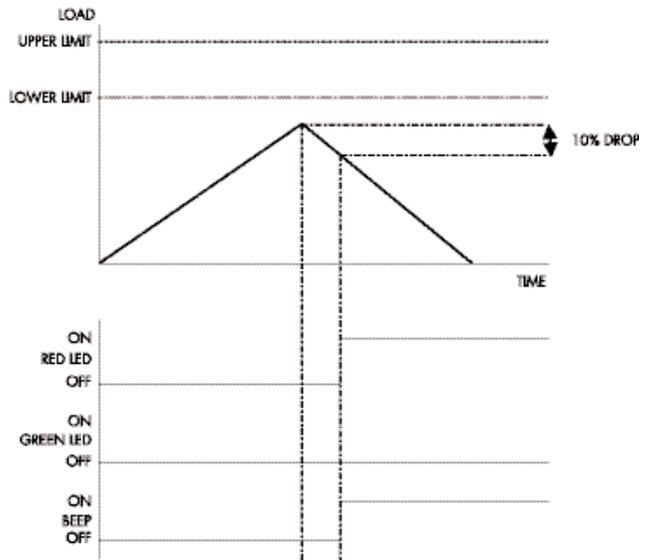
This feature is only activated when the % DROP feature is used in conjunction with the ALARM function. The AFG looks for a percentage (of full-scale) drop from peak load value, set in the % DROP menu (see page 19). The alarm can be used to indicate if the break point falls inside or outside the limits LIMIT 1 and LIMIT 2 set in the alarm menu - see Examples 1 to 5 overleaf.

Example 1

Settings: -

- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % DROP is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
- Main display is set to 1st peak tension screen

Example 1

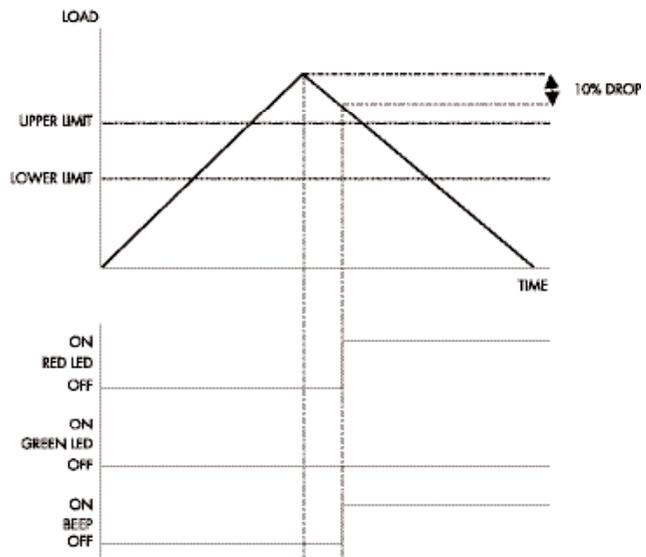


Example 2

Settings: -

- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % DROP is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
- Main display is set to 1st peak tension screen

Example 2

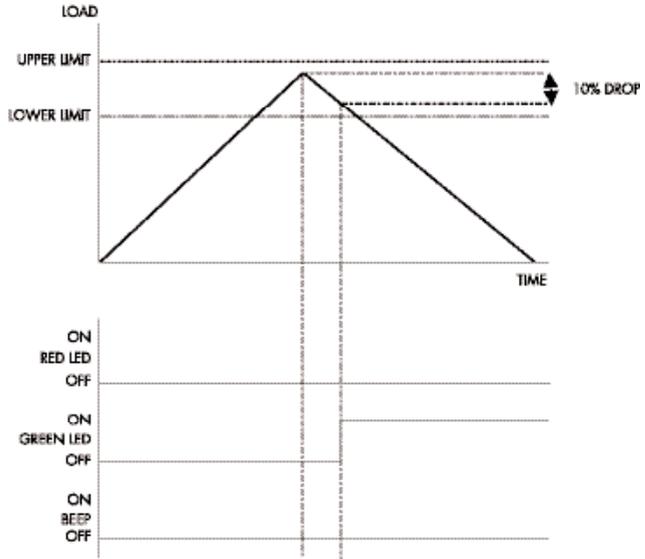


Example 3

Settings: -

- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % DROP is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
- Main display is set to 1st peak tension screen

Example 3

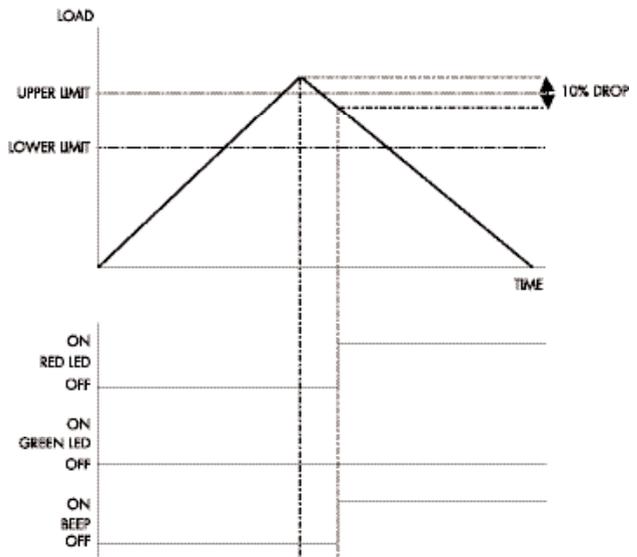


Example 4

Settings: -

- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % DROP is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
- Main display is set to 1st peak tension screen

Example 4



Example 5

Settings: -

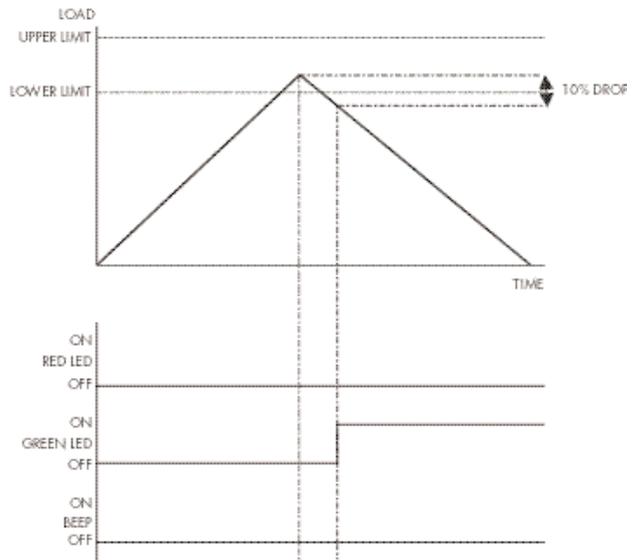
- BOTH LED and audio alarms are active
 - Alarm triggers on OUT BAND
 - Alarm is set to FAIL
 - % DROP is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
- Main display is set to 1st peak tension screen

PLC

(Programmable Limit Controller)

PLC sub-menu 1

Example 5



For PLC applications, this function requires an external cable with a built-in solid-state relay - see Specifications on page 26 for details of the signal.

To configure the signal output of the AFG, press and hold the **MENU** key until page 1 of the main-menu appears. Press the **DOWN** key to move the arrow cursor to PLC and press the **ENTER** key.

The cursor arrow points to PLC OFF.

The display will show:

PLC OFF -	Indicates PLC function status
AT LIMITS -	Will set PLC signal at specified load limits
AT ALARM -	Will tie in PLC signal with the AFG alarm settings

Select the desired function and press **ENTER** key.

AT LIMITS sub-menu 1

The display will show:

RESET - When the load limit is reached, the output signal triggers the relay and the **RESET** key must be pressed to clear the line before starting the next test.

CONTINUOUS - The relay will be activated every time the load limit is reached and the output signal will remain on.

PULSE - The relay will be activated momentarily when the load limit is reached.

Select the desired function and press the **ENTER** key.

AT LIMITS sub-menu 2

The display will show SET and a default load limit at which output signal will trigger the relay. To set the required load limit use **UP** and **DOWN** keys to adjust the value and the **ENTER** key to confirm the selection.

AT ALARM sub-menu 1

The display will show:

STATE

HIGH - Will set PLC signal at AFG's high alarm setting

LOW - Will set PLC signal at AFG's low alarm setting

Select the desired function and press the **ENTER** key.

The display will revert back to PLC sub-menu 1 and PLC ON will now be displayed.

Press **ESC** key to return to main-menu page 1.

STAND

The AFG may be used to send a signal to control the Mecmesin Corporation range of motorized test stands via a dedicated cable.

Contact your supplier for stand interface cable

To configure the signal output from the AFG, press and hold the **MENU** key until page 1 of the main-menu appears. Press the **DOWN** key to move the arrow cursor to STAND and press the **ENTER** key.

STAND sub-menu 1

The display will show:-

STAND OFF/ON -Indicates status of stand control function.

REVERSE - Reverses the stand direction of travel at sample break (BREAK) or load-limit value (LIMIT). The test stand will reverse back to the start position as defined by the physical Microswitch.

STOP - Stops the stand at sample break (BREAK) or load-limit value (LIMIT). The test stand does not return to the start position.

CYCLE - Cycles a suitable test stand between load limits (UPPER, LOWER) for a set number of times (CYCLE).

The cycle function only refers to the VersaTest (Quantrol TC2) motorized test stand

REVERSE sub-menu 1

Select the desired function using **UP** and **DOWN** keys and press the **ENTER** key to select.

REVERSE sub-menu 2

Select UP or DOWN to tell the gage which direction the stand will begin to move before the load-limit is reached.

Break sub-menu 1

BREAK - Sets the gage to reverse at sample break. Set % break using **UP/DOWN** arrow keys. Press **ENTER** to select.

SET % of loadcell capacity to indicate the value by which the load must fall to determine a break. Use a higher percentage for 'noisy' samples where the load may fluctuate before the sample finally breaks.

Press the **ENTER** key to confirm selection and return to stand sub-menu 1.

Limit sub-menu 1

LIMIT - Sets the load-limit value to trigger the stand reverse function. Press **ENTER** key to select.

SET load-limit using **UP** and **DOWN** keys. (**UNITS** key changes the units of measurement for load-limit value). Press **ENTER** key to confirm selection and return to stand sub-menu. Negative load limits indicate compression.

STOP sub-menu 1

Select **BREAK** or **LIMIT** as per Reverse sub-menu 2 (above) and **SET** the appropriate value at which you require the test stand to stop.

CYCLE sub-menu 1

Only used in conjunction with VersaTest motorized test stand

Select and **SET** **UPPER** load-limit, **LOWER** load-limit and the number of **CYCLES** you wish to perform (range = 2 - 9999). Start the test by pushing the **UP** or **DOWN** switch on your test stand. The test stand will move to the **UPPER** load-limit and then travel back to the **LOWER** load-limit to perform the first cycle. Subsequent cycles will be performed and a cycle-counter is shown on the main display.

Note: a) It is assumed that starting a test in the **UP** direction applies a tension force, and in the **DOWN** direction a compression force is applied.

b) The total number of cycles must be completed .. e.g. if a sample breaks during the test, the AFG will try to continue applying load for the set number of cycles.

c) **WARNING:** At the end of your cycle test, the test sample could still be under load.

*Note: It is recommended to press **RESET** key after each STAND operation*

When one of the stand control options (**REVERSE**, **STOP** or **CYCLE**) have been set press **ENTER** key. The display will revert back to **STAND** sub-menu 1 and **STAND ON** will now be displayed. Press **ESC** key to return to main-menu page 1.

FREEZE

Contact your supplier for interface cable.

This feature is used to 'freeze' the main-display when an external signal is received. The AFG can be configured to freeze when going either low 1-0 (**LO**) or high 0-1 (**HI**). This is particularly useful for applications where an event occurs (e.g. switch testing). To clear the main-menu display press the **RESET** key.

To configure this function, press and hold the **MENU** key until page 1 of the main-menu appears. Press the **DOWN** key to move the arrow cursor to **FREEZE** and press the **ENTER** key.

FREEZE sub-menu 1

Select the desired **LO** or **HI** function using **UP** or **DOWN** arrow key and press **ENTER** key to select. When set the sub-menu will display **FREEZE ON**. To disable the **FREEZE** function, press the **ENTER** key. **FREEZE OFF** will now be displayed. Press **ESC** key to return to main-menu page 1.

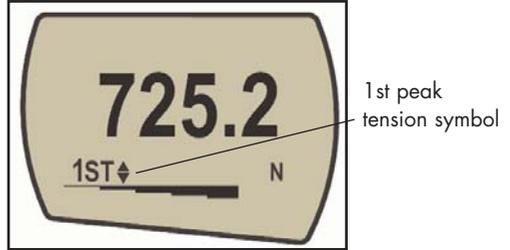
% DROP

1st Peak facility – this is used to detect the force at which a sample breaks but is not necessarily the maximum force (e.g. detecting the force at which a tablet first begins to crack.)

When this feature is set to ON, two additional functions can be selected using the **MAX** key from the main display.

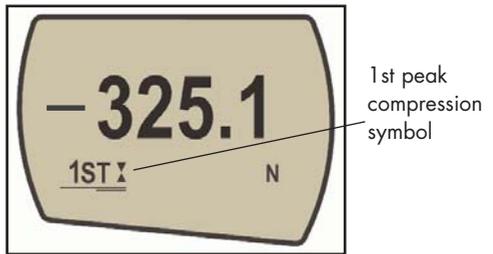
1st Peak Tension

Fig. 8



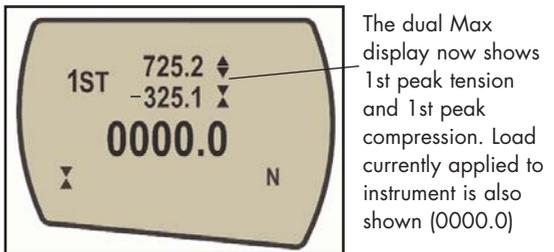
1st Peak Compression

Fig. 9



1st Peak Tension/Compression

Fig. 10



% DROP sub-menu 1

% DROP sub-menu 2

EXAMPLE

The display will show % DROP OFF and SET. Press the **ENTER** key to change % DROP OFF to % DROP ON. Press **DOWN** key to move the arrow cursor to SET % and press **ENTER** key.

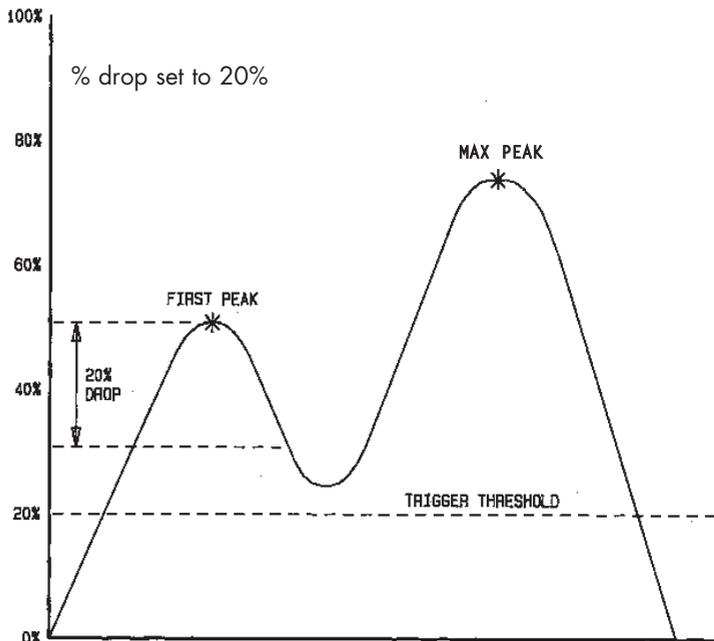
To determine what precisely is considered a break, you must define the % drop of full-scale value from the peak load observed prior to the break occurring.

To set the required % drop use **UP** and **DOWN** keys to adjust the value and press **ENTER** key to confirm the selection. The % drop value selected also acts as a threshold, below which the % drop function will not be active.

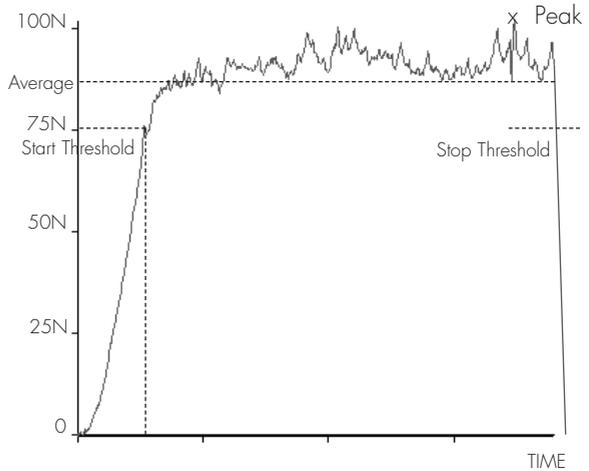
To disable the % DROP function, press the **ENTER** key. % DROP OFF will now be displayed.

Example: AFG 100N has % drop of 20 (= 20N). If the peak load before sample break is 50N, the load must drop to 30N in order for the AFG to detect a 1st peak of 50N. If load continues to be applied above 50N (e.g. to 75N), the AFG will return 75N as MAX and 50N as 1st peak.

This test would produce a first peak result



AVERAGE/TIME



This function allows the average load reading to be displayed. The average starts being calculated when the START threshold (% of full-scale) is reached and stops being calculated when the load passes through the STOP threshold.

To set AVERAGE over TIME, press and hold the **MENU** key until page 1 of the main-menu appears. Using **UP** and **DOWN** keys move the cursor key to AVERAGE/TIME. Press the **ENTER** key.

Avg/Time sub-menu 1

The display will show AV/TIME OFF and SET. Press **ENTER** key to change AV/TIME OFF to AV/TIME ON. Press the **DOWN** key to move the arrow cursor to SET and press **ENTER** key.

Avg/Time sub-menu 2

The display will now show the START % and STOP % and the values to which they are set. Define a value of full-scale as the threshold value for each. Any load reading above the START threshold will be averaged over time with all the previous readings occurring since the threshold value was exceeded.

Averaging stops when the load readings cross through the STOP threshold.

A diamond cursor will indicate which value is selected.

Use **UP** and **DOWN** keys to change the value, press and hold to scroll values. When the correct value is reached press **ENTER** key to set START.

Repeat procedure for STOP.

The display will revert back to AVERAGE/TIME sub-menu 1 and AV/TIME ON will now be displayed.

To disable the AVERAGE/TIME function, press the **ENTER** key. AV/TIME OFF will now be displayed.

Press **ESC** key to return to main-menu page 1.

RATE

This function allows the selection of the gage throughput rate, i.e. the amount of averaging performed by the internal electronics before the load reading is displayed. There are three levels:

- MED - Gage default.
- HI - Display updates quickly with little data averaging
- LO - Maximum data averaging before values are displayed. (Smooths 'noisy' data)

Rate sub-menu 1

To set RATE, press and hold the **MENU** key until page 1 of the main-menu appears. Using **UP** and **DOWN** keys move the arrow key to RATE. Press **ENTER** key to access.

Using **UP** and **DOWN** keys select the relevant level (MED, HI or LO) and press the **ENTER** key.

Press **ESC** key to return to page 1 of the main-menu.

MAIN-MENU PAGE 2

Fig. 11



From page 1 of main-menu press **MENU** key to scroll to page 2 of the main-menu.

FOOTSWITCH 1

Footswitch 1 sub-menu 1

FOOTSWITCH 2

Footswitch 2 sub-menu 1

COMMS

COMMS sub-menu 1

The AFG has two footswitch input pins on the 15-way D connector. This allows the footswitch to be assigned to replicate one of each of the six main key functions, **ON/OFF**, **MAX**, **UNITS**, **TXD**, **ZERO** and **RESET**.

This feature is useful when integrating the AFG into test or production systems.

Note: A footswitch assigned to the **UNITS** key can allow entry into the menu, but the gage will not respond to further footswitch operations from either footswitch 1 or 2 once in the menu.

To assign the function of a key to FOOTSWITCH 1 use **UP** and **DOWN** keys to move the arrow key to FOOTSWITCH 1. Press **ENTER** key to access.

Using **UP** and **DOWN** keys select the relevant key (OFF, MAX, UNITS, TXD, ZERO or RESET) and press the **ENTER** key.

Press **ESC** key to return to page 2 of the main-menu.

To assign the function of a key to FOOTSWITCH 2 use **UP** and **DOWN** keys to move the arrow key to FOOTSWITCH 2.

Using **UP** and **DOWN** keys select the relevant key (MAX, UNITS, TXD, ZERO or RESET) and press the **ENTER** key.

Press **ESC** keys to return to page 2 of the main-menu.

Note: Footswitch 2 is multiplexed with the Smart Sensor analog voltage out. If a 'Smart' Sensor is attached, Footswitch 2 functions are disabled.

Communications settings are selected to configure interfacing of the AFG with peripheral devices. Also used to configure the AFG to store up to a maximum of 100 readings in the internal memory.

To set communications first use **UP** and **DOWN** keys to move the cursor arrow to COMMS on page 2 of the main-menu.

Using **UP** and **DOWN** keys select the relevant option (see below) and press the **ENTER** key.

- PORT - Communicates with peripheral device. Transmission of the displayed load reading can be set to include unit of measurement (UNITS ON or OFF) and BAUD rate can also be set.
- STORE MEM - Stores a single load reading to the internal memory. With this option selected, pressing the **TXD** key when in the MAX modes of the main display will send the displayed value to memory. Up to 100 readings may be stored in the memory. As each reading is stored, a 'REC' symbol appears on the main display to indicate a reading has been stored in the memory.
- SEND MEM - Sends all load readings stored in the internal memory to a peripheral device (e.g PC or data logger).
- CLEAR MEM – Erases all load readings stored in memory.

When setting PORT you will now access sub-menu 1.

Port sub-menu 1

Transmission of the displayed load reading can be set to include the unit of measurement (UNITS ON or OFF). Use the **UP** or **DOWN** key to position the arrow cursor at either UNITS OFF or ON. Press **ENTER** key to select.

Port sub-menu 2

Sign off or on can now be set. This will transmit a negative sign for compression readings if set to ON. Use the **UP** or **DOWN** key to position the arrow cursor at either SIGN OFF or ON. Press **ENTER** key to select.

Port sub-menu 3

The transmission (or Baud) rate can now be set. Use the **UP** or **DOWN** key to position the arrow cursor at the relevant speed (9600, 19200, 57600 or 115200). Press **ENTER** key to select.

Port sub-menu 4
Transmission of the displayed load reading can now be set to include NULL (nothing), CR, LF or CR LF.
Use the **UP** or **DOWN** key to position the arrow cursor at the desired setting.
Press **ENTER** to select.

Port sub-menu 5
A LINE DELAY, if any, to be executed after each reading is sent, can now be set.
Use the **UP** or **DOWN** key to set this value from 0 to 5 seconds in one second intervals.
Press **ENTER** key to select.

Port sub-menu 6
For use with continuous readings only, a % threshold for the start of transmission can now be set.
Use the **UP** or **DOWN** key to set this value from 1% to 100%.
Press **ENTER** key to select.

Port sub-menu 7
Method of transmission, RS232, MITUTOYO or BOTH, can now be set.
Use the **UP** or **DOWN** key to position the arrow cursor at the desired setting.
Press **ENTER** to select.

Now return to COMMS sub-menu 1

To set STORE MEM press **ENTER** key from *Comms sub-menu 7*. This will cause a memory counter to appear in the main display. You will now return to COMMS sub-menu 1.
Note: The CYCLE counter and memory counters cannot appear on the main display simultaneously. The last selected is the one which will appear.

To set SEND MEM press **ENTER** key from *Comms sub-menu 7*. This will cause a TX symbol to flash in the main display as the memory data is now transmitted to a peripheral device. The data is transmitted at the settings defined by PORT. After transmission of data you will now return to COMMS sub-menu 1.

To set CLEAR MEM press **ENTER** key from *Comms sub-menu 7*. This now erases all the data stored in the memory. The memory counter is now reset to zero. After clearing the memory you will now return to COMMS sub-menu 1.
Press **ESC** key to return to page 2 of the main-menu.

x/CONSTANT

X Constant sub-menu 1

A constant multiplier of from 0.001 to 10.000 can be set for a selectable base unit. Units will be replaced with an X on the main display, and the **UNITS** key will have no effect on the displayed units.

To set X CONSTANT, first use **UP** and **DOWN** keys to move the cursor arrow to X CONSTANT on page 2 of the main-menu and press the **ENTER** key.

The display will show X CONSTANT OFF and SET. Press **ENTER** key to change X CONSTANT OFF to X CONSTANT ON.

Press the **DOWN** key to move the arrow cursor to SET and press **ENTER** key.

Using the **UP** and **DOWN** keys set the X CONSTANT multiplier to the desired value. The unit this will apply to is shown in the lower right corner of the screen and can be adjusted with the **UNITS** key.

Press **ESC** key to return to page 2 of the main-menu.

INFORMATION

Displays calibration information.

T - Tension span
C - Compression span
I - Initial Zero
G - Gravitational constant
Z - Current zero

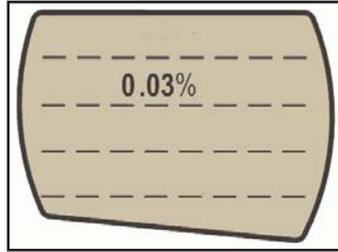
This is for information only and may be required for diagnostic purposes by your distributor.

CALIBRATION

Calibration menu - displays a password menu and allows the user to check for loadcell offset if overload is suspected.

Place the gage (or your external SMART sensor) horizontally on a flat level surface. By using **UP** or **DOWN** keys Select the CAL option and the display will show 0000. Press the **ENTER** key four times (to enter 0000 as the password), a screen showing the % difference between the critical zero and current reading will appear.(See Fig 1.2 overleaf). This can be used as an indication of overload and the current condition of the loadcell.

Fig. 12



Press and hold the **ESC** key until you return to page 2 of main-menu.

CONTRAST

The contrast of the display may be increased and decreased in this menu.

From page 2 of main-menu press **UP** or **DOWN** keys to position the arrow key on **CONTRAST**. Press **ENTER** key to select **CONTRAST** menu and 1.234 will be displayed. Press **UP** or **DOWN** key to adjust the contrast of the display and **ENTER** key to confirm the setting. You will now return to page 2 of the main-menu.

AFG SPECIFICATIONS

RANGE & RESOLUTION

Model no:	mN	N	kN	gf	kgf	ozf	lbf
AFG2.5	2,500 x 0.5	2.5 x 0.0005	-	250 x 0.05	-	9 x 0.002	0.55 x 0.0001
AFG 5	5,000 x 1	5 x 0.001	-	500 x 0.1	0.5 x 0.0001	18 x 0.005	1.1 x 0.0002
AFG 10	10,000 x 2	10 x 0.002	-	1,000 x 0.2	1 x 0.0002	35 x 0.01	2.2 x 0.0005
AFG 25	25,000 x 5	25 x 0.005	-	2,500 x 0.5	2.5 x 0.0005	90 x 0.02	5.5 x 0.001
AFG 50	50,000 x 10	50 x 0.01	-	5,000 x 1	5 x 0.001	180 x 0.05	11 x 0.002
AFG 100	-	100 x 0.02	-	10,000 x 2	10 x 0.002	350 x 0.1	22 x 0.005
AFG 250	-	250 x 0.05	-	25,000 x 5	25 x 0.005	900 x 0.2	55 x 0.01
AFG 500	-	500 x 0.1	-	50,000 x 10	50 x 0.01	1,800 x 5	110 x 0.02
AFG 1000	-	1,000 x 0.2	1 x 0.0002	-	100 x 0.02	3,500 x 1	220 x 0.05
AFG 2500	-	2,500 x 0.5	2.5 x 0.0005	-	250 x 0.05	9,000 x 2	550 x 0.1

ACCURACY

± 0.1% of full-scale

Calibration temperature: 20°C ± 2°C

Operating temperature: 10°C - 35°C

Temperature shift at zero load: ± 0.01% of full-scale/°C

OUTPUT

RS232-C:

Digimatic (Mitutoyo) format

Analog:

8 data bits, 1 Start bit, 1 Stop bit, no parity

BCD output

0 to +4V full scale for tension (or clockwise)

0 to -4V full scale for compression (or counter-clockwise)
(calibrated to order at factory)

PLC Signals:

Relay description

The solid-state relay is mounted on a PCB, which is housed in a 15 pin D-type connector.

Connection to the relay output is via a 5 metre length screened cable. The end of the cable is left with bare wires to allow appropriate termination to the peripheral PLC device.

AFG SPECIFICATIONS

PLC Signals *(continued)*

Electrical

Supply voltage: The relay is powered from a 5 volt regulator inside the AFG.

Input control: The relay state is controlled via a TTL signal from the AFG and is in a "closed position" when a logic '1' input is applied.

Output characteristics

Peak relay ac voltage: 350 volts

Continuous relay load current or peak ac voltage: 120 mA

Maximum relay peak load current: 300 mA

Typical relay contact resistance at 100 mA: 17 ohms

Isolation voltage between AFG and relay output: 1500 volts ac

ADAPTOR/CHARGER UNIT

The AC adaptor/charger supplied with the AFG is a constant-current type.

Primary: 230V – 50Hz (110V – 60Hz version also available)

Secondary: 100mA constant current at 9V

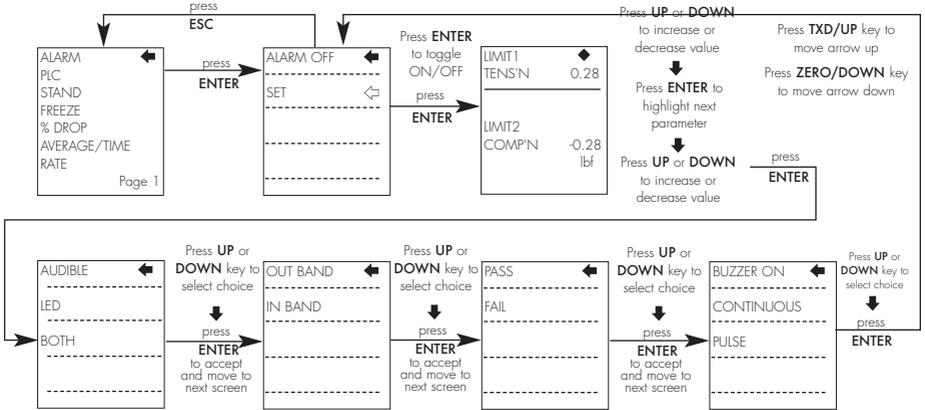
Charger output plug: Centre = positive Outer = negative

If you have any feedback regarding Mecmesin Corporation, its products and services, which you would like to share with us, please contact us at feedback@mecmesin.com

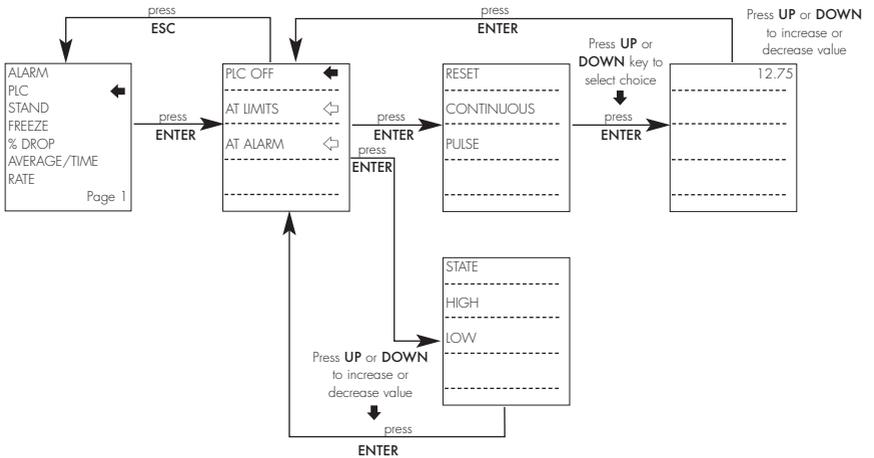
Advanced Menu Options Flow Chart Page 1

On the following pages are flowcharts to help you navigate the menus found in the AFG. They appear in the order they appear on the two pages of the main menu on the Gate.

Alarm

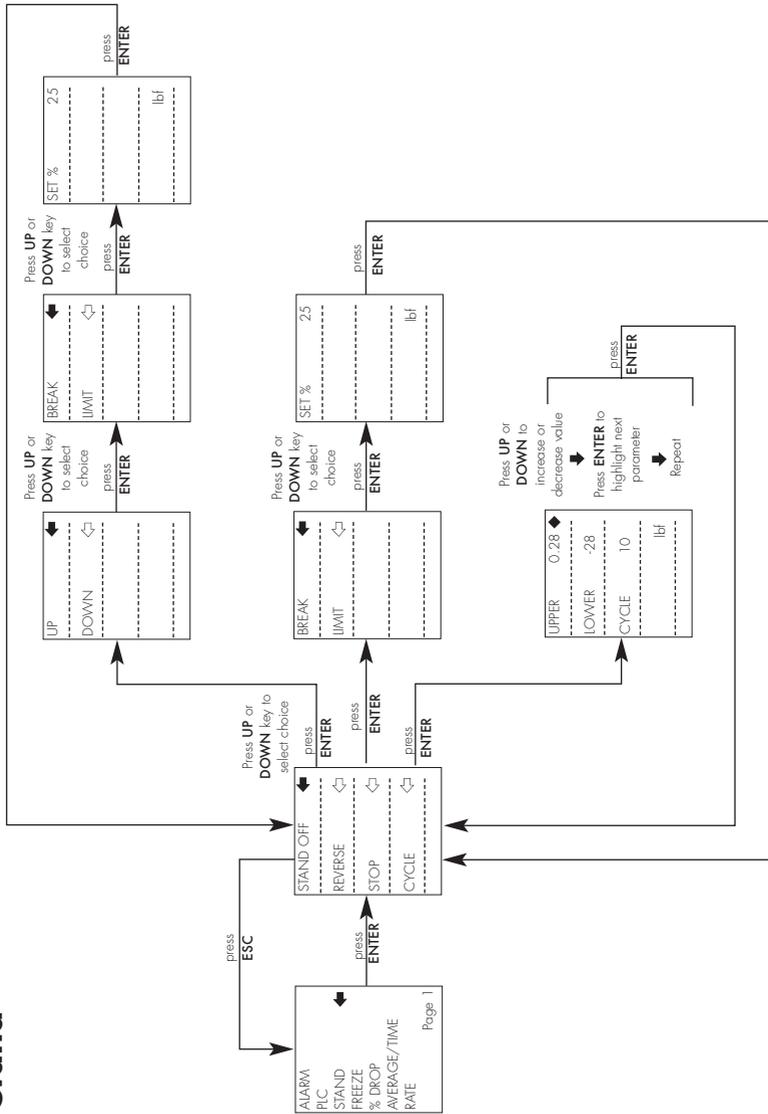


PLC



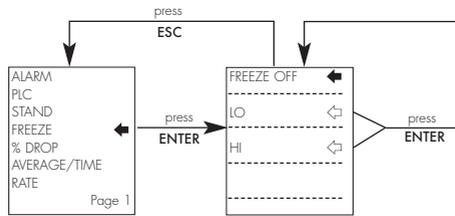
Advanced Menu Options Flow Chart Page 1

Stand

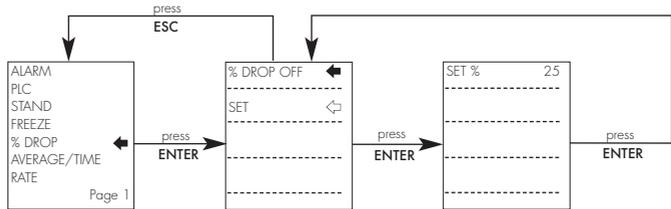


Advanced Menu Options Flow Chart Page 1

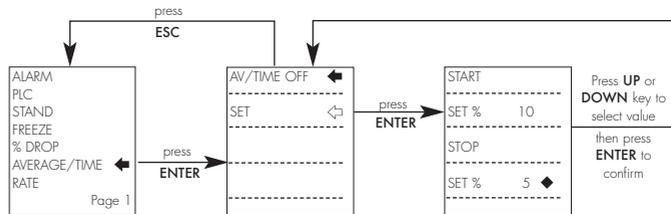
Freeze



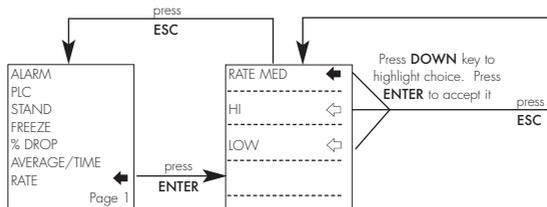
% Drop



Average/Time

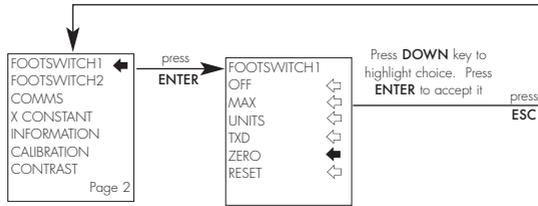


Rate

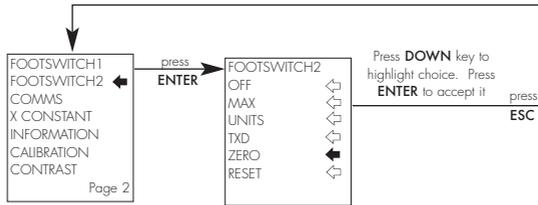


Advanced Menu Options Flow Chart Page 2

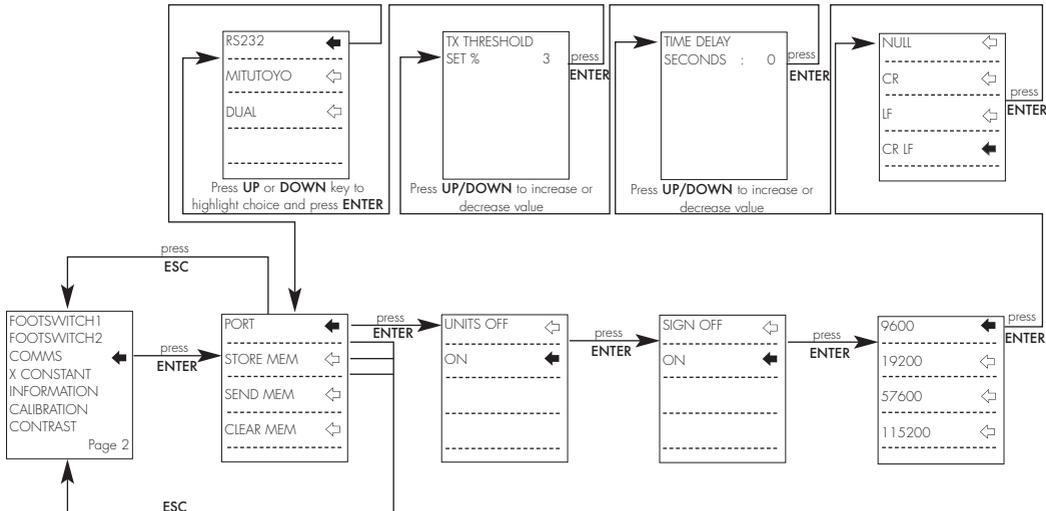
Footswitch 1



Footswitch 2

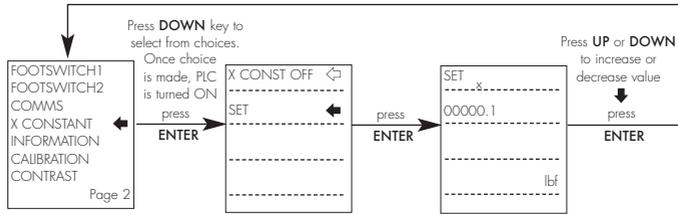


Comms

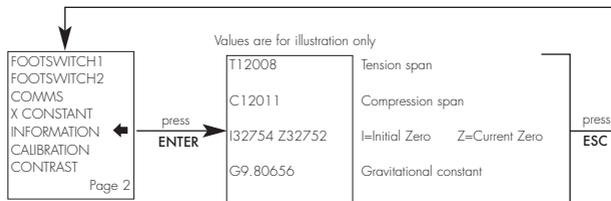


Advanced Menu Options Flow Chart Page 2

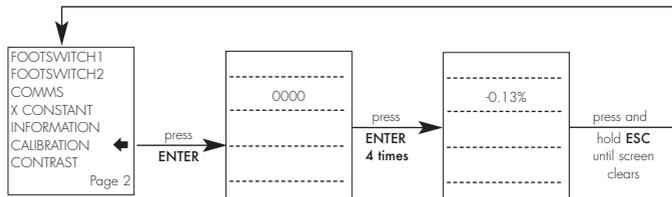
Constant



Information



Calibration

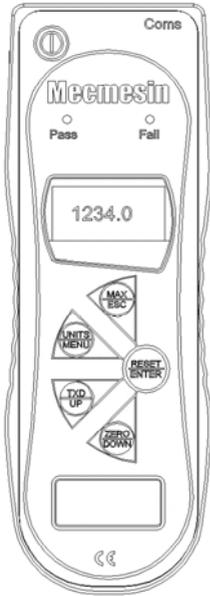


Contrast

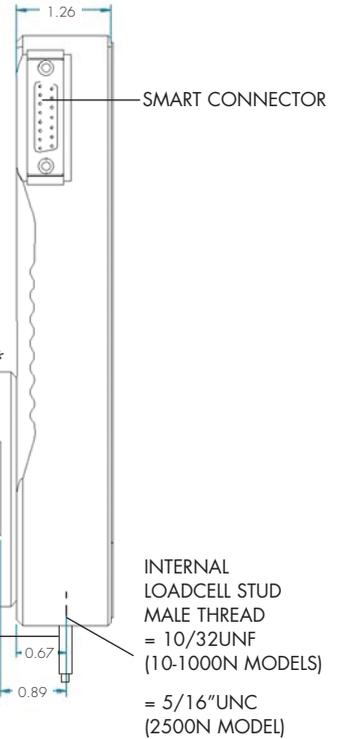


Dimensions (incl. Pin-out details) (in inches)

Front View



Side View

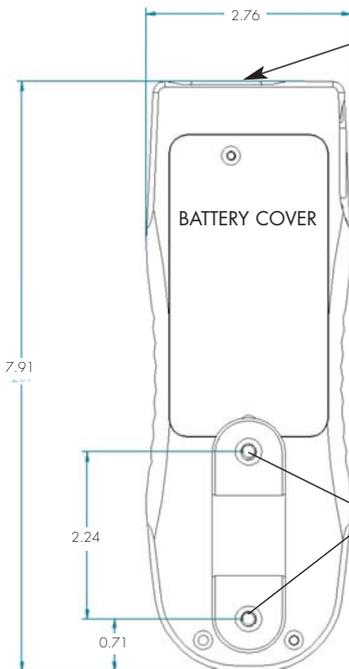


EXTENSION ROD MALE THREAD
= M6 (10N - 1000N)
= 5/16"UNC (2500N)

15 WAY D-TYPE
COMMUNICATION
CONNECTOR

* Shown with Dovetail Mounting Bracket
(supplied with Mecmesin Corporation Test Stands)

Rear View



TAPPED HOLE:
THREAD M5 x 0.8 x
5.5mm DEEP

AFG Mk 4 D Connector Pin Out:	
1	Analog Output
2	RS232 Transmit
3	RS232 Receive
4	Mitutoyo Clock Output
5	Mitutoyo Ready Output
6	+ 5 Volts
7	FREEZE Reading Input
8	Stand Reverse UP
9	Footswitch 2 Input/SMART -ve out
10	Ground
11	Mitutoyo Request Input
12	Mitutoyo DATA Output
13	Footswitch 1 input
14	PLC Output
15	Stand reverse DOWN

Allocation for the pins on the
Male 15 way 'D Type'
Communication Connector

Optional Extras



Universal Expansion Module shown for connecting up to a maximum of 5 cables simultaneously.

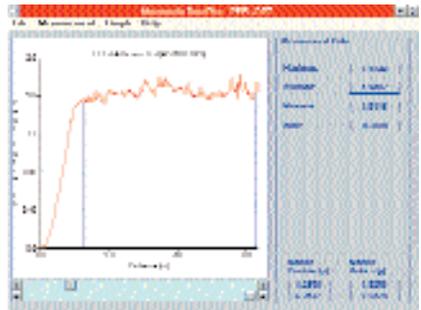
CABLES	PART NO.
Cable AFG to Mitutoyo Printer/DigiCon-X Interface	351 - 058
Cable AFG to RS 232 - 9 way	351 - 059
Cable AFG Analog cable	351 - 060
Footswitch for AFG	351 - 061/V01/V02
Universal Expansion Module for AFG	432 - 185
Cable AFG to Versatest/UltraTest/M5KNE/MultiTest	351 - 062
Cable AFG to PLC	351 - 063

DataPlot

WINDOWS SOFTWARE FOR LOGGING, PLOTTING AND ANALYSING FORCE/TORQUE DATA

DataPlot enables a PC to communicate with Mecmesin Corporation digital force gages, torque gages and display units, by means of the bi-directional RS232 interface which is a standard feature of all instruments. The PC functions as a virtual chart recorder with the following features:

- Auto-ranging
- Zooming/re-scaling
- Overlaying of test traces
- Printout of tabular data
- 'Smart-linked' preference settings
- Start/stop triggers
- Data export to spreadsheets



MultiTest



The MultiTest 1 is a budget-priced, potentiometer-controlled test stand with 1000 newton capacity. When used with a Mecmesin Corporation force gage and appropriate fixtures this system is ideal for relatively straightforward testing applications; the force gage captures maximum tensile and compressive loads. (Also available in a 2500 newton capacity)

MultiTest-*x*



The MultiTest 2.5-*x* is a console-controlled 2500 newton stand, which can carry out simple test procedures and data analyses. Features include: cycling, load-holding, remote and running to a precise load, displacement, time or break. (Also available in a 1000 and 5000 newton capacity)

MultiTest-*i*



The MultiTest 5-*i* is a fully computer-controlled 5000 newton testing machine. Mecmesin Corporation's Emperor software enables users to develop sophisticated program routines and analyses to meet precise requirements for testing particular products. (Also available in a 1000 and 2500 newton capacity)

Vortex-*i*



The Vortex-*i* is a fully computer-controlled motorized torque testing system. A Vortex improves reproducibility by allowing constant speed testing. However, a Vortex-*i* will enable complete control of the test procedure, analysis and reporting by using a new torque version of Mecmesin Corporation's powerful, flexible and user-friendly Emperor software.

procedure, analysis and reporting by using a new torque version of Mecmesin Corporation's powerful, flexible and user-friendly Emperor software.

Interface Cables

BFG to RS232 9-way for PC, dataloggers - part no: 351-054

BFG to digimatic 10-way for Mitutoyo printer - part no: 351-055

BFG to analog - part no: 351-057



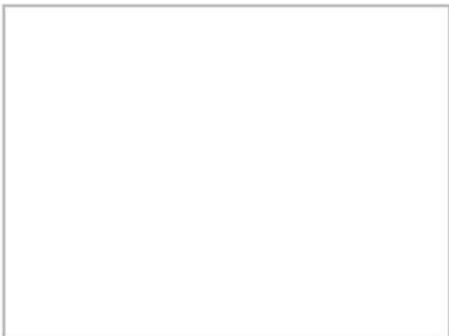
BFG to RS232 9-way for PC, dataloggers

BFG to digimatic 10-way for Mitutoyo printer



BFG to analog

To view our range of accessories please request our brochure by calling 703-433-9247 or visit our website and download the brochure under 'Products', 'Accessories'.



DEALER STAMP

431-213-V10

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