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Mecmesin

testing to perfection

Advanced Force Gauge

Operating Manual



(Includes AFTI display)

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The Advanced Force Gauge (AFG)

Introduction

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

The Mecmesin 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 AFG or Advanced Force & Torque Indicator (AFTI) display when used with '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 immediately.

Operation

The most commonly used features, such as displaying force, peak hold, zero and changing of displayed units of measurement can all be done by pressing a single dedicated key on the front panel with grey text - see page 6, Basic Functions.

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

Maintenance

When cleaning the keypad care must be taken to avoid liquids, especially alcohols, seeping around the edge of the membrane. Therefore, we recommend the use of a lightly dampened cloth to avoid liquid spillage onto the membrane.

Powering the Gauge

The AFG is supplied with a set of 5 Nickel Metal Hydride AAA rechargeable batteries, which are supplied fully charged to allow use straight from the box. Do not use any other battery charger other than that supplied with the force gauge.

Replacing batteries

To replace the batteries you must first remove the battery cover on the upper part of the rear of the gauge by removing the 2 retaining screws. Remove the fitted batteries and fit the 5 new batteries in the battery holder ensuring that you observe polarity and the batteries are placed on top of the 'release tag' and they will be freed from the spring-loaded contacts.

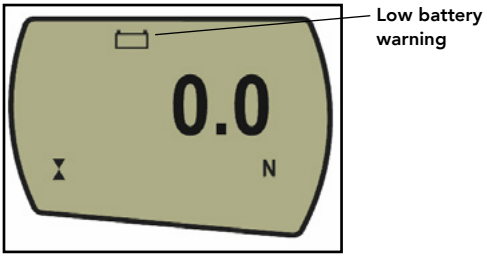
Refit the battery cover and tighten the 2 retaining screws.

Connect the mains adaptor/charger to the AFG charger socket located at the right hand side of the gauge 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 gauge powers down automatically. See Fig 1.

Fig. 1



Mains operation

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

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

Fitting of alkaline batteries

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 mains 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
Use replacement parts other than those supplied by Mecmesin

Using the Gauge

Fitting accessories

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

Mounting to a test stand

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 gauge 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 a 10-32UNF male thread (10-500N), 5/16"UNC (1000-2500N).

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

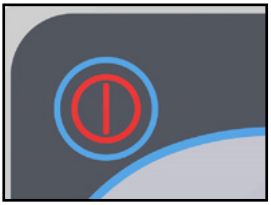
Each Mecmesin test stand is supplied with a dedicated 'dovetailed mounting bracket' and screws for this purpose.

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

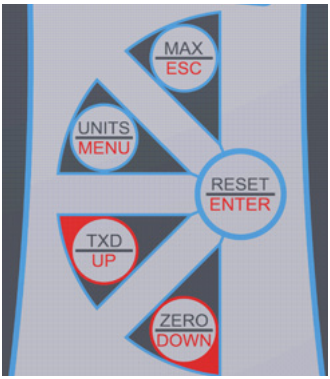
Powering up

As shown in Fig 2 the control panel has 5 Function keys plus an On/Off key:

Fig. 2



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



Note: The current version of the gauge's operating software appears in the bottom left corner of the start-up screen. This may have been updated, however the manual supplied with your AFG remains valid.



After the self test (if the 'X CONSTANT' is used, its value will be displayed at this point) providing no load has been applied to the instrument, the display will show all zeros. This is because the gauge re-zeros itself during the self test routine.

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.

If a compressive or tensile force is applied to the sensor probe (bottom of AFG), the reading on the display will register the applied force.

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

Do not overload the loadcell, as this could cause irreparable damage.

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**.

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.

To power down the gauge press the ⏻ key.

Basic Functions

Display of Tension/ Compression

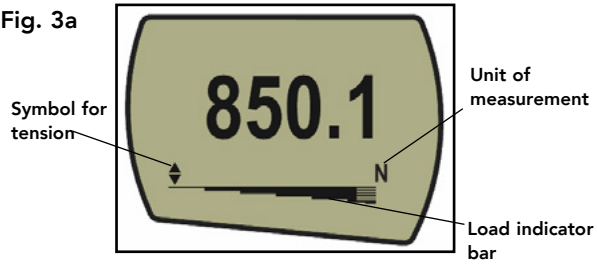
Tensile forces are displayed on the AFG and recognised by the symbol ▲▼ (See Fig. 3a)

Compressive forces are displayed on the AFG and recognised by the symbol ▼▲ (see Fig. 3b)

When connected with an external 'Smart' torque sensor clockwise torque and anticlockwise torque are represented by ↻↺

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 load cell is damaged and you should immediately contact your supplier to arrange repair.

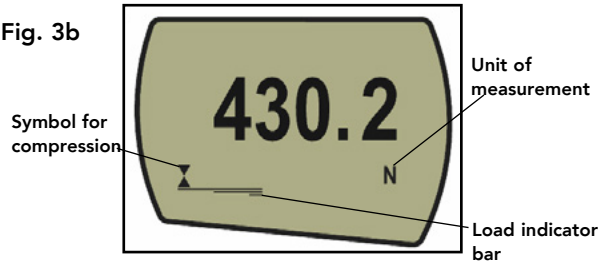
Fig. 3a



A load indicator bar alerts the operator to how much load has been applied to the loadcell. As the load approaches the maximum rating of the loadcell, 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.

When applying tensile force, the indicator bar begins solid in appearance, then becomes striped when the capacity is approached. When applying compressive force, the indicator bar begins striped and then becomes solid
(see Fig 3a & 3b).

Fig. 3b



Zeroing the gauge

During the operation of the gauge it is often necessary to zero the display - e.g. when you wish it to tare out the weight of a grip, so it does not become part of the measured reading. Press and release the **ZERO** key.

Changing the unit of measurement

You can choose from the following units of measurement depending on the capacity of your gauge: newtons (N), millinewtons (mN), kilonewtons (kN), kilogram-force (kgf), ounce-force (ozf), pound-force (lbf) or gram-force (gf).

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

Max (peak) readings

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

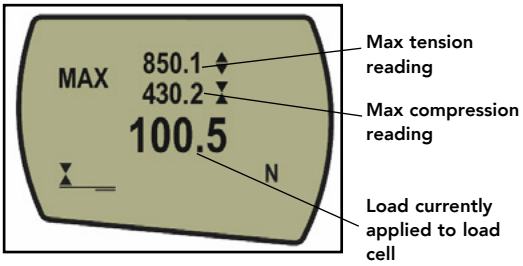
Note: the following max display modes do not apply when the % 1st PEAK function is enabled. See page 23 for alternative modes

"Max" mode

Press the **MAX** key. The display will show the word **MAX** together with the highest tensile ▲ force and the highest compressive ▼ force detected during the test. The current load being applied to the loadcell is also displayed - see Fig 4a overleaf.

Dual Max

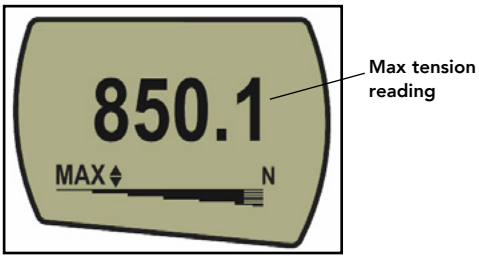
Fig. 4a



Max Tension

Press the **MAX** key again and the display will show the maximum tensile force identified by the ▲ symbol. (see Fig. 4b)

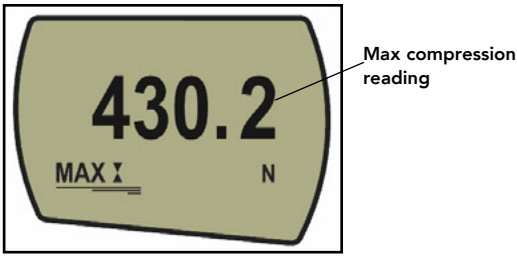
Fig. 4b



Max Compression

Press the **MAX** key again and the display will show the maximum compressive force identified by the ▼ symbol. (See Fig. 4c)

Fig. 4c



Note: When % 1st PEAK function is enabled, different max modes are shown, see page 23

"Normal" mode

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 loadcell and maintain a "running" display.

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

Data Output

(See also COMMS section of Advanced Menu Options on page 28)

Analogue output

An uncalibrated analogue output is available from the top 'D type connector marked 'coms' for use with chart recorders, oscilloscopes or any other devices requiring analogue inputs. A calibrated analogue output can also be supplied as an option (calibrated to order at factory). See technical specifications on page 54 and 55 for details.

RS232 and Digimatic output signals

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

A full range of interface cables are available to connect your AFG to peripheral devices – see page 56 for details.

Displayed readings can also be requested individually from a PC via the RS232 interface by sending a "?" character.
See page 37.

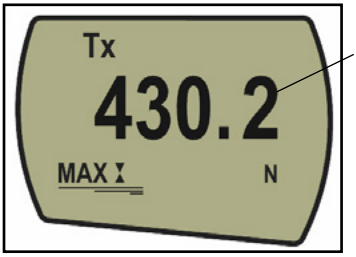
Continuous data transmission

For sending a continuous data stream to a PC, printer, etc 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 5). To stop sending data, simply press and release the **TXD** key, at which point TX will disappear from the display.

The continuous data stream rate is 25Hz, unless 115200 Baud is selected, when it is 50Hz.

When using continuous transmission over RS232 only, select the TX METHOD as RS232 (see page 29). If DIGIMATIC or DUAL is selected, and no digimatic device is connected, the display will periodically freeze.

Fig. 5



Please note that the continuous data output only starts when the load threshold default of 2% of the rated capacity of the gauge is reached.
This threshold can be set from 0-100% (see page 29).

PC Communication or other RS232 input device, eg. PLC.

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

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

See page 37 for full table.

* **Note** that the continuous transmission mode cannot be entered via this method.

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 scales the settings limit of the Advanced Menu Options relative to the new transducer capacity.

All Advanced Force Gauges have a 15-pin 'Smart' connector port on the left-hand side for interface with Mecmesin 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 gauge 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 recognised and the capacity displayed.

Loadcell Diagnostic Test

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

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 gauge (d) load indicator bar present even under zero load.

See CALIBRATION section of Advanced Menu Options on page 31 to check load cell status.

Advanced Menu Options

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).

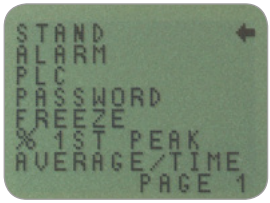
Navigating the menus

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

Press and hold the **MENU** key for approximately 3 seconds to access page 1 of the main-menu, (see Fig. 6). Pressing the **MENU** key again takes you to pages 2 and 3 of the main menu in turn. To move between the options listed on the 3 main-menu pages, press the **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 relevant main-menu page and **ESC** again to return to the main display.

MAIN MENU PAGE 1

Fig. 6



Main menu page 1

Stand

The AFG may be used to send a signal to control the Mecmesin range of motorised 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. The cursor arrow will point to STAND. 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 (BREAK)	Stops the stand at sample 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 and MultiTest-d motorized test stands.

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

REVERSE sub-menu 1

Select **UP** or **DOWN** to tell the gauge which direction the stand will begin to move before the load-limit is reached. Press **ENTER** to select.

REVERSE sub-menu 2

The display will show:

BREAK	Sets the gauge to reverse at sample break. Press **ENTER** to select.
LIMIT	Sets the load-limit value to trigger the stand reverse function. Press **ENTER** to select.

BREAK sub-menu 1

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.

Set % BREAK using **UP** and **DOWN** keys and press the ENTER key to select and return to stand sub-menu 1.

LIMIT sub-menu 1

Set load-limit using **UP** and **DOWN** keys. (**UNITS** key changes the units of measurement for load-limit value). Press the **ENTER** key to select and return to stand sub-menu 1. Negative load-limits indicate compression.

STOP sub-menu 2

The display will show:

BREAK Sets the gauge to stop at sample break. Press **ENTER** to select.

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

BREAK sub-menu 1

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.

Set % BREAK using **UP** and **DOWN** keys and press the ENTER key to select and return to stand sub-menu 1.

LIMIT sub-menu 1

Set load-limit using **UP** and **DOWN** keys. (**UNITS** key changes the units of measurement for load-limit value). Press the **ENTER** key to select and return to stand sub-menu 1. Negative load-limits indicate compression.

Cycle

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

Cycle sub-menu 1

Only used in conjunction with VersaTest and MultiTest-d motorised test stands.

The display will now show the UPPER load-limit, the LOWER load-limit and the number of CYCLES you wish to perform (range = 1 - 999). A diamond curser indicates which value is selected. Use the **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 select.

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 the **ENTER** key. The display will revert back to STAND sub-menu 1 and STAND ON will now be displayed. Press the ESC key to return to
main-menu page 1.

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.

ALARM

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

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

Up to 5 alarm settings may be stored, but only one setting may be used at any one time.

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
(SETTING SELECTION)

The display will show ALARM OFF, and 5 separate alarms, which may each be set up independently and stored by the user for easy access when changing test routines.
The cursor will be positioned against the current alarm in use, or against ALARM OFF if no alarm is selected.

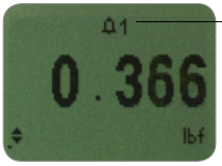
To activate an alarm, move the curser to the desired alarm and press **ENTER**.

ALARM sub-menu 2
(ALARM SET)

This will access the ALARM sub-menu 2, however this alarm has now been activated, and you can return to the main display by pressing the **ESC** key twice.
The main display will now show an alarm 'bell' symbol accompanied by the number of the alarm selected, indicating that that alarm is activated (see Fig. 7).

If, however, you wish to change the settings of the selected alarm, choose SET by pressing the **ENTER** key in ALARM sub-menu 2.

Fig. 7



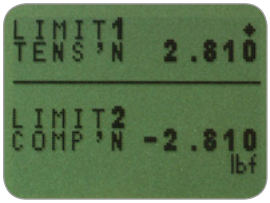
Alarm symbol with setting number in use

ALARM sub-menu 3
(ALARM LIMITS)

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 indicates which value is selected. Use the **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 Fig. 8).

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

Fig. 8



ALARM sub-menu 4
(ALARM INDICATOR)

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 PASS LED will illuminate green to indicate a pass status, the FAIL LED will illuminate orange or red to indicate low or high failures respectively.
BOTH	Both the LED and the audible alarm will be activated.

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

ALARM sub-menu 5
(ALARM BAND)

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 6
(ALARM PASS/FAIL)

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 7
(ALARM BUZZER MODE)

The display shows BUZZER ON, CONTINUOUS and PULSE. This menu selects the length of time that the buzzer will sound, if AUDIBLE or BOTH has been selected in
sub-menu 5.

CONTINUOUS	The buzzer sounds at a pre-set alarm value and stays on until the load falls below that pre-set.
PULSE	The buzzer pulses for a fixed time of
one	second every time the load crosses
over	each of the presets.

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

The display will now return to the main menu page 1, press **ESC** to return the main display.

Alarm on break

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 % 1st PEAK menu (see page 23). 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 below.

Fast Selection of Alarms

In order to quickly and easily switch between pre-set alarms, it is possible to instantly access an ALARM SELECT page by holding down the **RESET** key for 3 seconds whilst in the main display.

The ALARM SELECT page is similar to the ALARM sub-menu 1- the display will show ALARM SELECT; OFF, and the 5 separate alarms.

The cursor will be positioned against the current alarm in use, or against ALARM OFF if no alarm is selected.

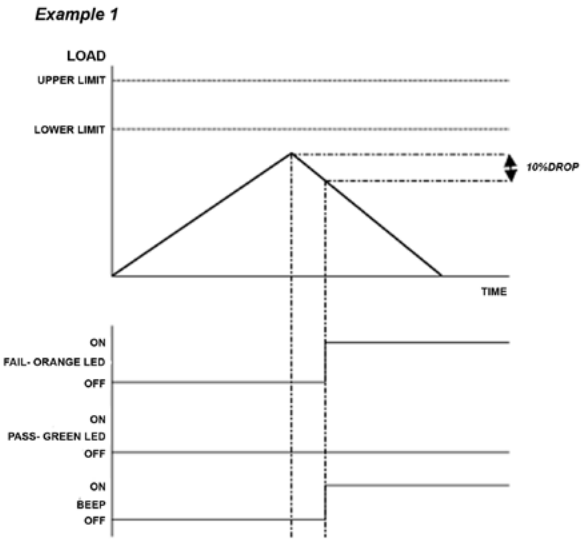
To activate an alarm, move the cursor to the desired alarm (or to OFF to deactivate alarms) and press **ENTER**. Alternatively, to cancel the command, press **ESC.**

The screen will return to the main display.

Example 1

Settings:

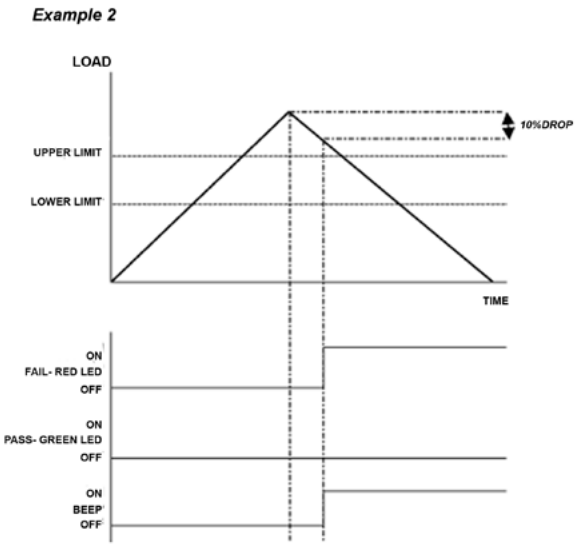
- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % 1st PEAK is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
  Main display is set to 1st peak tension screen



Example 2

Settings:

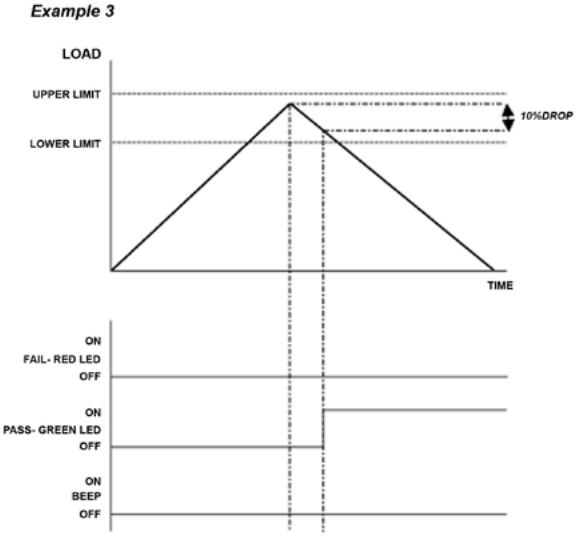
- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % 1st PEAK is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
  Main display is set to 1st peak tension screen



Example 3

Settings:

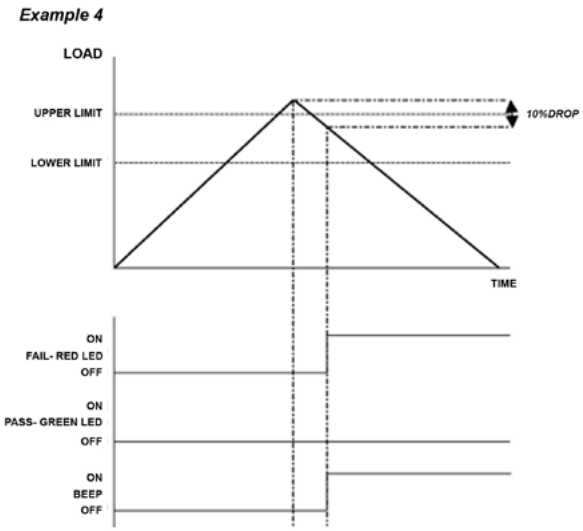
- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % 1st PEAK is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
  Main display is set to 1st peak tension screen



Example 4

Settings:

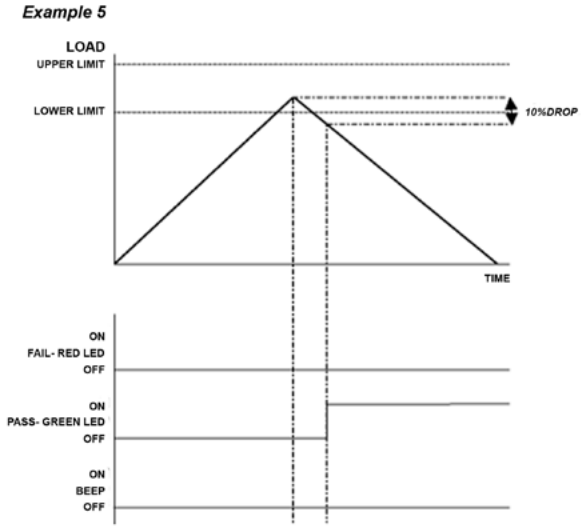
- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % 1st PEAK is 10% of full-scale (e.g. AFG 100N must register drop of 10N)
  Main display is set to 1st peak tension screen



Example 5

Settings:

- BOTH LED and audio alarms are active
- Alarm triggers on OUT BAND
- Alarm is set to FAIL
- % 1st PEAK 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 Logic Controller)

For PLC applications, this function requires an external cable with a built-in solid-state relay - see Specifications on pages 54-56 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 **ENTER**.

PLC sub-menu 1

The display will show PLC OUTPUT:

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 the **ENTER** key.

AT LIMITS sub-menu 1

The display will show:

RESET	When the load limit is reached, the output signal triggers and the **RESET** key must be pressed to clear the line before starting the next test.
CONTINUOUS	The output signal will be activated every time the load limit is reached and will remain on whilst the load exceeds the set limit.
PULSE	The output signal will be activated momentarily when the load limit is reached. The **RESET** key must be pressed before starting the next test.

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 the output signal will trigger. 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 high at AFG's alarm.
LOW Will set PLC signal low at AFG's alarm.

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 the main menu page 1.

PASSWORD

Once the desired settings for the AFG have been established, it is possible to password protect the menu pages, so that no further changes may be made without authorised access.

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

PASSWORD sub-menu 1

The display shows MENU PASSWORD:

OFF Enables access to menu pages.
ON Requires a password be entered to access the menu pages.

Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**, then press the **ESC** key twice to return to the main display.

If the PASSWORD function has been enabled, and the **MENU** key is held down to access the menu pages from the main display, a screen showing 0000 will appear, and the menu password '6284' must be entered to proceed. Use the **UP** and **DOWN** keys to select the first number, followed by **ENTER** to move on to the next number, and so on. If the password is entered incorrectly, the display will return to the main display.

FREEZE

Use pins 7 & 10 for this function - page 54 for details. When unconnected, pin 7 is pulled high internally.

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, falling edge (LO) or high 0-1, rising edge (HI). This is particularly useful for applications where an event occurs (e.g. switch testing). To clear the display press the **RESET** key.

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

FREEZE sub-menu 1

Select the setting desired LOW, HIGH or OFF for the FREEZE Display function using **UP** or **DOWN** arrow keys and press **ENTER** to select. Press **ESC** to return to the main menu page 1.

% 1st PEAK

When testing samples, the AFG enables the value at both the first peak and second peak to be measured and displayed. Once calculated, either result or both can be transmitted to a peripheral device (see Comms on page 28).

The % drop feature is based on the capacity of the AFG, and refers to the amount the 1st peak must drop before the software starts to look for the 2nd peak.

EXAMPLE

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 the 2nd peak and 50N as the 1st peak. (see Fig . 9)

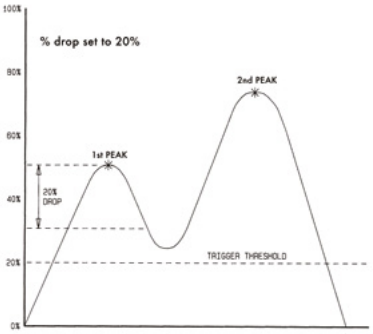


Fig. 9

For illustration only

To enable the % 1st PEAK function, press and hold the **MENU** key until page 1 of the main menu appears. Press the **DOWN** key to move the cursor to % 1ST PEAK and press the **ENTER** key.

% 1st PEAK sub-menu 1
(SET)

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

% 1st PEAK sub-menu 2
(PERCENTAGE)

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.
Use the **UP** and **DOWN** keys to set the percentage to the desired value and press the **ENTER** key. The % drop value selected also acts as a threshold, below which the % drop function will not be active.

% 1st PEAK sub-menu 3
(TX PEAKS)

The values which are to be transmitted to a peripheral device when using the **TXD** key on a dual max screen must now be selected. The following display will appear.

TX 1st PEAK	Sets the AFG 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).
TX 2nd PEAK	Sets the AFG to transmit the 2nd peak only.
TX BOTH	Sets the AFG to transmit both the 1st peak and the 2nd peak.

Use the **UP** and **DOWN** keys to move the arrow cursor to the desired selection and press **ENTER**.

The display will return to the % 1st PEAK sub-menu 1. Press **ESC** to return to the main menu page 1, and again to return to the main display.

Max Modes with % 1st PEAK function enabled

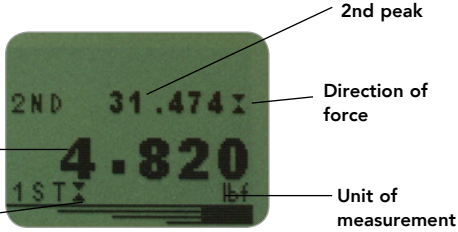
When the % 1st PEAK function has been enabled, pressing the **MAX** key will scroll through the following max display modes, in order;

1) 1st and 2nd tension peaks
2) 1st tension peak only
3) 1st and 2nd compression peaks (see Fig. 10).
4) 1st compression peak only
5) Current 'live' reading

When setting up the AFG, a graphical representation of the test provides a clear insight into the % drop factor required. Please contact Mecmesin or your approved supplier for details on Dataplot graphical charting software.

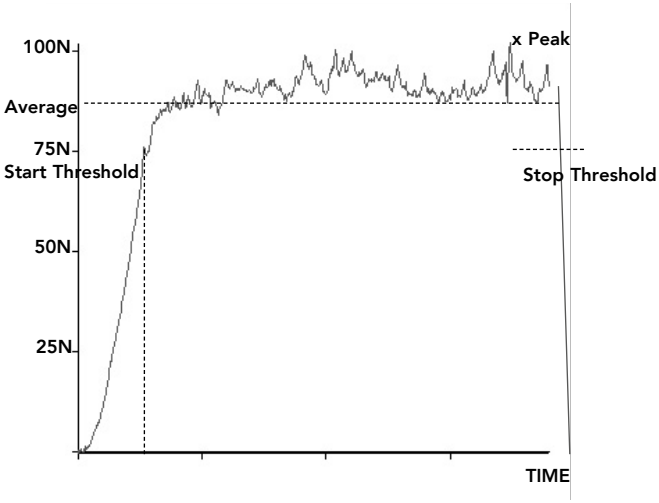
Screen of 1st and 2nd peaks

Fig. 10



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.

AV/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.

The maximum duration of AV/TIME calculation is approx. 22 minutes.

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

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

AV/TIME sub-menu 1
(SET)

The display will now show the START and STOP thresholds and the values to which they are set (as a % of full-scale).

AV/TIME sub-menu 2
(PERCENTAGE START/STOP)

Any load reading above the START threshold will be averaged over time. Averaging stops when the load reading passes through the STOP threshold.

A diamond cursor will indicate which value is selected.

Use the **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 START.
Repeat procedure for setting STOP.
The display will revert back to AV/TIME sub-menu 1.

To disable the AV/TIME function, press the **ENTER** key when the cursor arrow is aligned with ON in AV/TIME sub-menu 1. It will now display OFF.

Press the **ESC** key to return to the main menu page 1, and again to return to the main display.

The maximum duration of AV/TIME calculation is approx. 22 minutes. When the time limit expires, 'AT' is displayed in the main display, and the **MAX** key must be pressed in order to clear 'AT' and continue use of the AFG.

MAIN MENU PAGE 2

Fig. 11



Main menu page 2

RATE

This function allows the selection of the gauge data capture rate, i.e. the amount of averaging performed by the internal electronics before the load reading is displayed. Data are sampled at 5000Hz and averaged to 2 levels.

MEDIUM	80Hz (Default)
HIGH	2000Hz

To set RATE, press and hold the **MENU** key until the main menu page 1 appears. Press and release the **MENU** key to access the main menu page 2. Using the **UP** and **DOWN** keys move the arrow cursor to RATE, and press **ENTER**.

RATE sub-menu 1

Using the **UP** and **DOWN** keys select the relevant level (MEDIUM or HIGH) and press the **ENTER** key.

Press the **ESC** key to return to the main menu page 2, and again to return to the main display.

FOOTSWITCH 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 five main key functions, **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 page, but the gauge 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, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key to access the main menu page 2. Using the **UP** and **DOWN** keys, move the arrow cursor to FOOTSWITCH 1 and press **ENTER**.

FOOTSWITCH 1
sub-menu 1

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

Press the **ESC** key to return to page 2 of the main-menu, and again to return to the main display.

FOOTSWITCH 2

To assign the function of a key to FOOTSWITCH 2, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key to access the main menu page 2. Using the **UP** and **DOWN** keys move the arrow cursor to FOOTSWITCH 2, and press **ENTER**.

FOOTSWITCH 2
sub-menu 1

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

Press the **ESC** key to return to page 2 of the main-menu, and again to return to the main display.

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

COMMS

Communications settings are selected to configure interfacing of the AFG with peripheral devices. The menu is also used to configure the storage settings of the AFG, which may store up to 500 readings in its on-board memory.

To access the COMMS settings, press and hold the **MENU** key until page 1 of the main menu appears. Press and release the **MENU** to access page 2 of the main menu, use the **DOWN** key to move the arrow cursor to **COMMS** and press **ENTER**.
The display shows:

COMMS sub-menu 1

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 500 readings may be 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.

Using **UP** and **DOWN** keys select the relevant option. When setting PORT, you will access PORT sub-menu 1.

PORT sub-menu 1
(TX UNITS)

Transmission of the displayed load reading can be set to include the unit of measurement, the display shows TX UNITS OFF or ON.
Use the **UP** or **DOWN** key to position the arrow cursor against the desired selection and press the **ENTER** key.

PORT sub-menu 2
(TX SIGN)

The display will show TX SIGN OFF and ON. This will transmit a negative sign for compression readings if set to ON. Use the **UP** or **DOWN** key to position the arrow cursor against the desired selection and press the **ENTER** key.

PORT sub-menu 3
(BAUD RATE)

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** to select.

PORT sub-menu 4
(TERMINAL)

Additional characters can be appended to the transmitted load (RS232 only). These can be set to NULL (nothing), CR (carriage return), LF (line feed) 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
(LINE DELAY)

If required, a LINE DELAY, 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** to select.

PORT sub-menu 6
(TX THRESHOLD)

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 0% to 100%.
Press **ENTER** to select.

PORT sub-menu 7
(TX METHOD)

Method of transmission, RS232, DIGIMATIC or DUAL (both), can now be set.
Use the **UP** or **DOWN** key to position the arrow cursor at the desired setting.
Press **ENTER** to select.

The display will return to the COMMS sub-menu 1.

COMMS sub-menu 1 (further options)

STORE TO MEMORY

To set STORE MEM, move the arrow cursor against it in COMMS sub-menu 1 and press the **ENTER** key.
This will cause a memory counter to appear in the main display, that is incremented each time a reading is stored, by pressing the **TXD** key.
Note: The CYCLE counter and memory counter cannot appear on the main display simultaneously. If both are selected, the cycle counter is displayed. When pressing **TXD** to store a reading, the memory counter is displayed momentarily to show the number of readings stored.
You will now return to COMMS sub-menu 1.

SEND FROM MEMORY

To set SEND MEM, move the arrow cursor against it in COMMS sub-menu 1 and press the **ENTER** key. 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.

CLEAR THE MEMORY

To set CLEAR MEM, move the arrow cursor against it in COMMS sub-menu 1 and press the **ENTER** key. 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 the **ESC** key to return to page 2 of the main-menu, and again to return to the main display.

INFORMATION

Displays calibration information.

▲▼ Tension span
▲▼ 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

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

If you suspect that your AFG has sustained an overload, it is possible to check the status of the AFG immediately.

Symptoms of overload may be (a) OL in display (b) buzzer sound (c) load indicator bar present even under zero load.

Place the AFG (or your external SMART sensor) on a flat level surface. Press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key to access the main menu page 2. Using the **UP** and **DOWN** keys move the arrow cursor to CALIBRATION, and press **ENTER**.

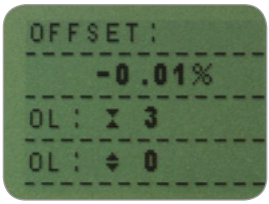
CALIBRATION sub-menu 1

The display will show 0000. Press the **ENTER** key four times (to enter 0000 as the password).

CALIBRATION sub-menu 2

CALIBRATION sub-menu 2 (the sensor diagnostic test screen) will appear on the display, as shown in Fig. 12.

Fig. 12



The offset value provides an indication of the condition of the loadcell, and is defined as the % difference between the initial zero and the current zero reading.

If the offset is between 5 - 10 %, please contact your supplier to arrange a re-calibration of your AFG.
If the offset is greater than 10 %, please contact your supplier to arrange for a possible sensor replacement.

These values are given as an indicator only - the need for calibration/repair may vary according to the individual characteristics of the sensor.

In addition to the offset, the number of overloads (OL) experienced by the loadcell in both compression and tension directions are displayed. An overload is registered when a load exceeding 150% of the rated capacity of the loadcell is applied in either direction.

Press the **ESC** key to return to the main menu page 2, and again to return to the main display.

x CONSTANT

A constant multiplier 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 press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key to access the main menu page 2. Using the **UP** and **DOWN** keys move the arrow cursor to x CONSTANT, and press **ENTER**.

x CONSTANT sub-menu 1

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

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

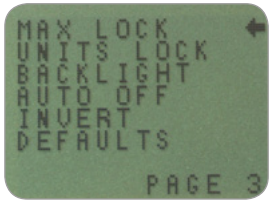
x CONSTANT sub-menu 2

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 the **ESC** key to return to main menu page 2 and press the **ESC** key again to return to the main display.

MAIN MENU PAGE 3

Fig. 13



Main menu page 3

MAX LOCK

Once the desired Max display mode has been selected, it is possible to lock the mode, so that further pressing the **MAX** key results in no change.

To access the MAX LOCK function, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to MAX LOCK, and press **ENTER**.

MAX LOCK sub-menu 1

The display shows MAX LOCK:
OFF Unlocks the max display mode.
ON Locks the current max display mode.

Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

UNITS LOCK

Once the desired unit of measurement has been selected, it is possible to lock the units, so that further pressing the **UNITS** key results in no change.

To access the UNITS LOCK function, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to UNITS LOCK, and press **ENTER**.

UNITS LOCK sub-menu 1

The display shows UNITS LOCK:
OFF Unlocks the units.
ON Locks the units to the current setting.

Note: The UNITS/MENU key can still be used to enter the menu pages when the UNITS LOCK function is enabled.

Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

BACKLIGHT

It is possible to activate a backlight on the AFG display.

To access the BACKLIGHT function, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to BACKLIGHT, and press **ENTER**.

BACKLIGHT sub-menu 1

The display shows BACKLIGHT OFF and ON:
Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**.

Note: Battery consumption is doubled when using the backlight.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

When activated, the backlight will remain on for 30 seconds since the last key press or last load applied registering over 2% of full scale.

AUTO OFF

To conserve battery power, it is possible to activate an auto-off function so that the AFG powers down 5 or 10 minutes after either the last key press, or the last load applied greater than 2% of full scale.

To access the AUTO OFF function, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to AUTO OFF, and press **ENTER**.

The display shows AUTO OFF:

AUTO OFF sub-menu 1

OFF	Disables auto-off function.
5 MINUTES	AFG will automatically power down after 5 mins.
10 MINUTES	AFG will automatically power down after 10 mins.

Note: The AUTO OFF function is disabled whilst accessing the menu pages, regardless of setting.

Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

INVERT

Note: The menu pages are not inverted when the INVERT function is enabled.

For hand-held tension applications it is often desirable to reverse the display, so the operator can read it more comfortably.

To access the INVERT function, press and hold the MENU key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to INVERT, and press **ENTER**.

INVERT sub-menu 1

The display shows INVERT OFF and ON:
Use the **UP** and **DOWN** keys to move the arrow cursor against the desired selection and press **ENTER**.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

DEFAULTS

To restore the factory default settings of your AFG, press and hold the **MENU** key until page 1 of the main-menu appears. Press and release the **MENU** key twice to access the main menu page 3. Using the **UP** and **DOWN** keys, move the arrow cursor to DEFAULTS, and press **ENTER**.

DEFAULTS sub-menu 1

The display shows DEFAULTS SET, press the **ENTER** key.

DEFAULTS sub-menu 2

The display shows RESTORE DEFAULTS YES and NO. Align the arrow cursor with YES to restore default settings, or with NO to cancel the action, and press the **ENTER** key.

The display will return to the main menu page 3, press the **ESC** key to return to the main display.

Factory Default Settings

Menu Function	Default Setting
STAND	OFF
ALARM	OFF
PLC	OFF
PASSWORD	OFF
FREEZE	OFF
% 1st PEAK	OFF
AV TIME	OFF
RATE	MEDIUM
FOOTSWITCH1	OFF
FOOTSWITCH2	OFF
COMMS	
PORT	SELECTED
UNITS	OFF
SIGN	ON
BAUD	9600
TERMINAL	CR AND LF
LINE DELAY	0 SECONDS
TX THRESHOLD	2%
TX METHOD	RS232
x CONSTANT	OFF
MAX LOCK	OFF
UNITS LOCK	OFF
BACKLIGHT	OFF
AUTO OFF	OFF
INVERT	OFF

RS232 Commands Table: Configuration

It is possible to remotely read/configure the settings of your AFG by sending the following RS232 command characters:

Character in ASCII	Decimal	Hexadecimal	Function	
M	77	0x4D	Current mode	
U	85	0x55	Current units	
C	67	0x43	Loadcell capacity	
@	64	0x40	Configuration status request	
*	42	0x2A	Continuous transmit	
r	114	0x72	Normal screen	
s	115	0x73	Dual Max*	
t	116	0x74	Max Tension (or Clockwise)*	
u	117	0x75	Max Compression (or Counter-clockwise)*	
v	118	0x76	Dual Peak Tension (or Clockwise)**	
w	119	0x77	1st Peak Tension (or Clockwise)**	
x	120	0x78	Dual Peak Compression (or Counter-clockwise)**	
y	121	0x79	1st Peak Compression (or Counter-clockwise)**	
a	97	0x61	mN	N.m
b	98	0x62	N	N.cm
c	99	0x63	kN	mN.m
d	100	0x64	gf	gf.cm
e	101	0x65	kgf	kgf.cm
f	102	0x66	ozf	kgf.m
g	103	0x67	lbf	ozf.in
h	104	0x68	-	lbf.ft
i	105	0x69	-	lbf.in
?	63	0x3F	Transmit the current reading	
CTRL a	1	0x01	**TXD** key	
CTRL b	2	0x02	**UNITS** key	
CTRL c	3	0x03	**MAX** key	
CTRL d	4	0x04	**RESET** key	
CTRL e	5	0x05	**ZERO** key	

Note: Displayed units will only change if it is applicable to the loadcell capacity of the gauge.

*Only if % 1st Peak function is disabled

**Only if % 1st Peak function is enabled

RS232 Command Responses: Information

It is possible to remotely interrogate your AFG by sending the following RS232 commands. This will inform you which settings are currently configured.

Command: M

Response	AFG Display Mode
Normal	Normal Mode
MaxC	Max Compression (or Counter-clockwise)
MaxT	Max Tension (or Clockwise)
MaxDual	Dual Max Screen
1stC	1st Peak Compression (or Counter-clockwise)
1stC Dual	Dual 1st Compression Screen (or Counter-clockwise)
1stT	1st Peak Tension (or Clockwise)
1stT Dual	Dual 1st Tension Screen (or Clockwise)

Command: U

Response for Force Loadcell	Response for Torque Loadcell
N	N.m
mN	N.cm
kN	mN.m
gf	gf.cm
kgf	kgf.cm
ozf	kgf.m
lbf	lbf.ft
	lbf.in
	ozf.in

Command: C

The loadcell size in N (or N.m for torque).

Note: 'xxxx' will be transmitted if the loadcell is not calibrated, or has a serious fault. Contact Mecmesin or your supplier.

Command: @
When all options are OFF, and the AFG is set at defaults, you will receive the following information listing:

RESPONSE	EXPLANATION OF RESPONSE
AFG	Gauge type
10.000	Loadcell size in N as per transmitting 'C'
V01	Version number
Normal	Mode of operation as per transmitting 'M'
N	Units of operation as per transmitting 'U'

Menu Function	Default Setting
STAND	OFF
ALARM	OFF
PLC	OFF
PASSWORD	OFF
FREEZE	OFF
% 1ST PEAK	OFF
AV TIME	OFF
RATE	MED
FOOTSWITCH1	OFF
FOOTSWITCH2	OFF
COMMS	P,OFF,ON,9600,CL,0,2,S
x CONSTANT	OFF
MAX LOCK	OFF
UNITS LOCK	OFF
BACKLIGHT	OFF
AUTO OFF	OFF
INVERT	OFF

When all options are ON, you will receive the following information listing for each option:

STAND ON options explained below:

STAND ON, R, 1, 2, 3	
R	Reverse
1	U = Up, D = Down
2	B = Break, L = Limit
3	Break percent or Limit Value
STAND ON, S, 1, 2	
S	Stop
1	B = Break, L = Limit
2	Break percent or Limit Value
STAND ON, C, 1, 2, 3	
C	Cycle
1	Upper cycle value
2	Lower cycle value
3	Cycles

ALARM ON options explained below:

ALARM ON, 1, 2, 3, 4, 5, 6, 7	
1	Alarm Number Selected; 1, 2, 3, 4 or 5
2	x Limit1 value
3	x Limit2 value
4	B = Buzzer, L = LED, BL = Buzzer & LED
5	O = Out of Band, I = In Band
6	P=Pass, F=Fail
7	C = Continuous, P = Pulse, or blank

PLC OUTPUT ON options explained below:

PLC OUTPUT ON, L, 1, 2	
L	At limits
1	R = Reset, C = Continuous, P = Pulse
2	Limit value
PLC OUTPUT ON, A, 1	
A	At alarm
1	H = High, L = Low

PASSWORD 1 options explained below:

PASSWORD 1	
1	Menu Password ON or OFF

FREEZE ON options explained below:

FREEZE ON, 1	
1	L = Low, H = High

% 1st Peak options explained below;

% 1st Peak ON,1,2	
1	Drop in percent
2	Load Transmitted, 1st for 1st peak, 2nd for 2nd peak, 1st&2nd for both

AV TIME ON options explained below:

AV TIME ON, 1, 2	
1	Start Threshold value
2	Stop Threshold value

RATE 1 ON options explained below:

RATE 1	
1	M = Medium, H = High

FOOTSWITCH1 ON options explained below:

FOOTSWITCH1 ON, 1	
1	Footswitch 1 - M = Max, U = Units, T = Txd, Z = Zero, R = Reset

FOOTSWITCH2 ON options explained below:

FOOTSWITCH2 ON, 1	
1	Footswitch 2 - M = Max, U = Units, T = Txd, Z = Zero, R = Reset

COMMS settings are explained below:

COMMS 1, 2, 3, 4, 5, 6, 7, 8	
1	P = Port, M = Store in memory
2	Units being transmitted, ON or OFF
3	Sign being transmitted, ON or OFF
4	Baud rate value
5	C = Carriage return, L = Line feed, CL = both
6	Line delay in seconds
7	Constant transmit threshold in percent
8	S = Serial RS232, D = Digimatic, B = Both

X CONST ON options explained below:

X CONST 1	
1	X CONST value with units

MAX LOCK 1 options explained below:

MAX LOCK 1	
1	Max key locked, ON or OFF

UNIT LOCK 1 options explained below:

UNITS LOCK 1	
1	Units key locked, ON or OFF

BACKLIGHT 1 options explained below:

BACKLIGHT 1	
1	Backlight enabled, ON or OFF

AUTO-OFF 1 options explained below:

AUTO-OFF 1	
1	Auto-off time, OFF, 5 mins or 10 mins

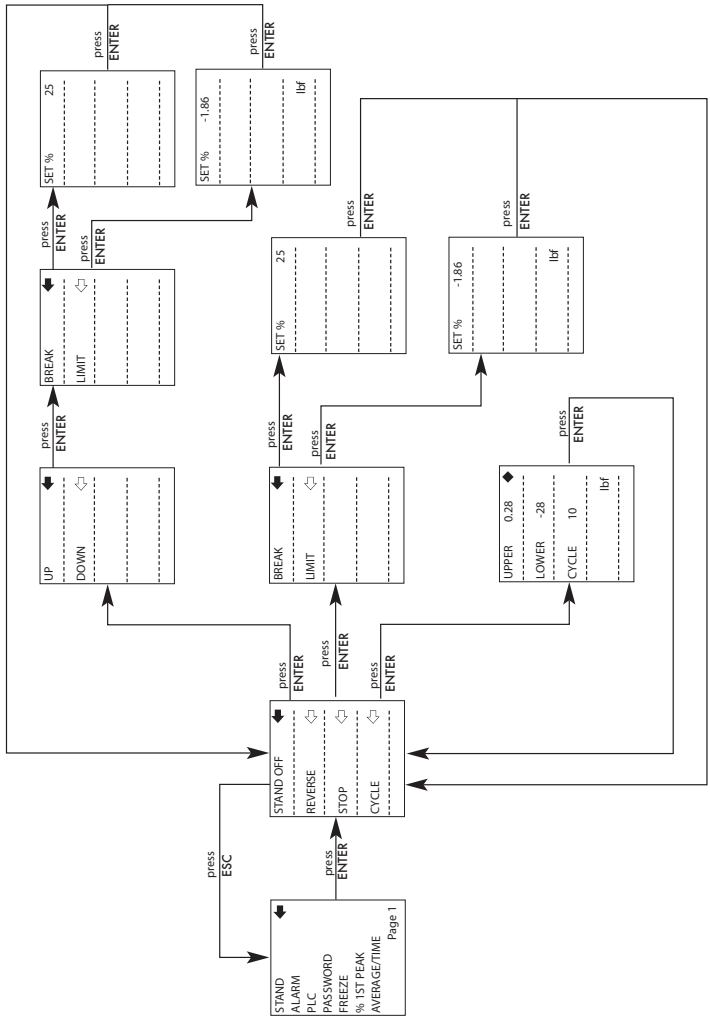
INVERT 1 options explained below:

INVERT 1	
1	Display inverted, ON or OFF

Advanced Menu Options Flow Chart Menu Page 1

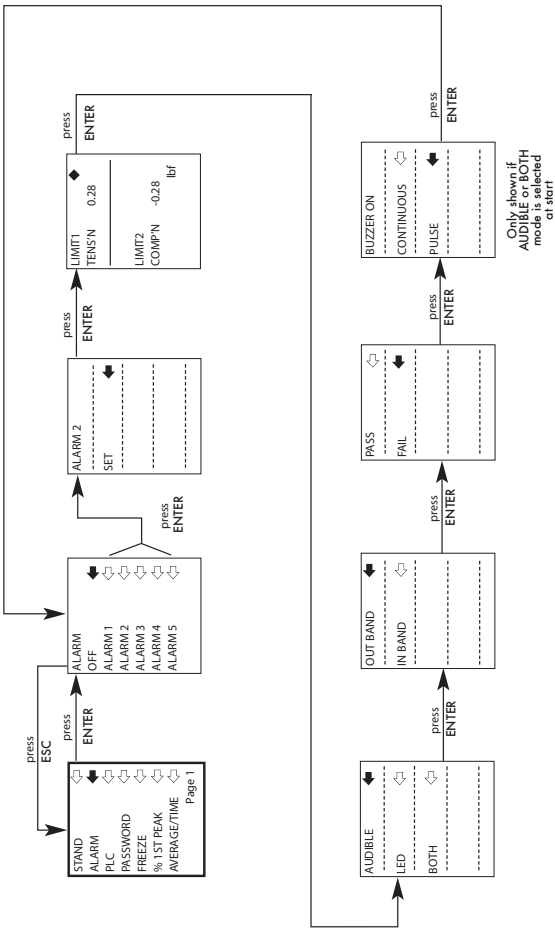
On the following pages are flowcharts to help you navigate the menus found in the AFG.
They appear in the order they appear on the three pages of the main menu on the instrument.

STAND



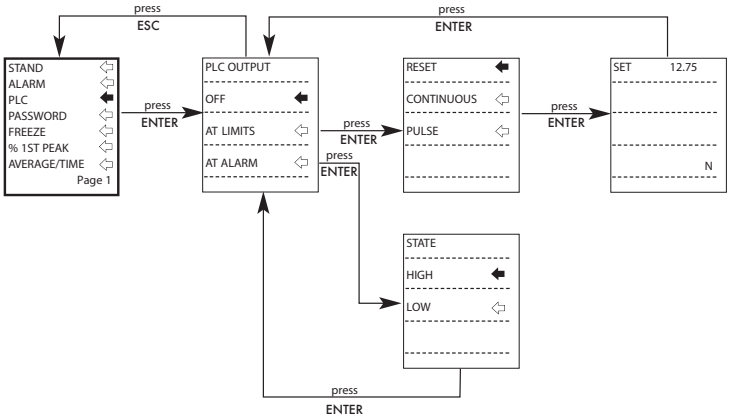
Advanced Menu Options Flow Chart Menu Page 1

ALARM

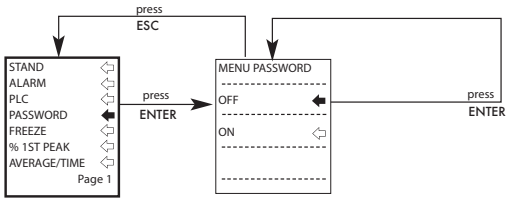


Advanced Menu Options Flow Chart Menu Page 1

PLC

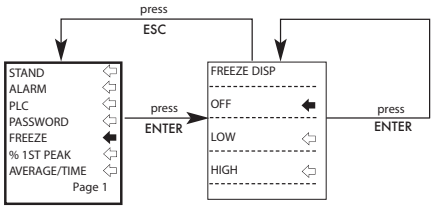


PASSWORD

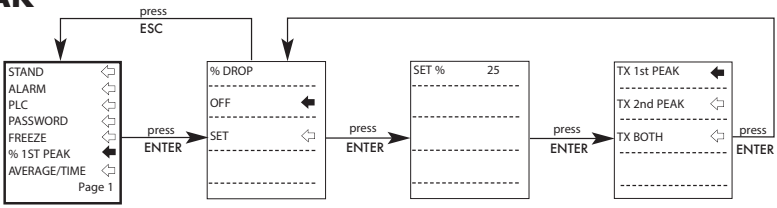


Advanced Menu Options Flow Chart Menu Page 1

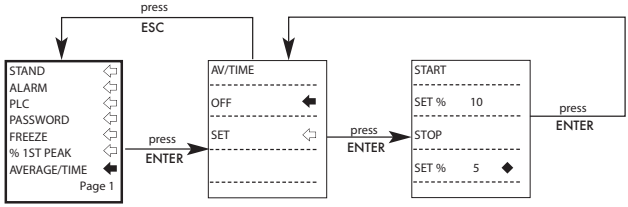
FREEZE



% 1ST PEAK

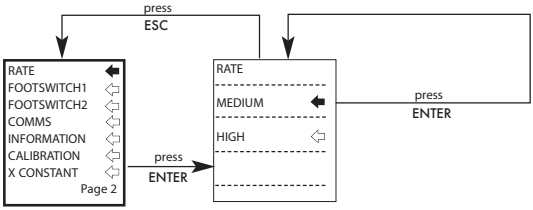


AVERAGE/TIME

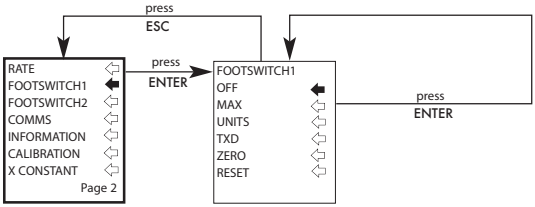


Advanced Menu Options Flow Chart Menu Page 2

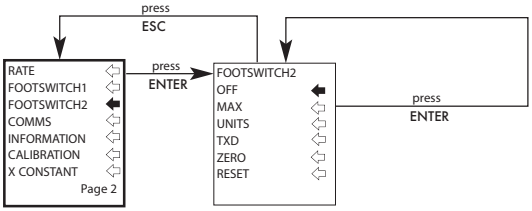
RATE



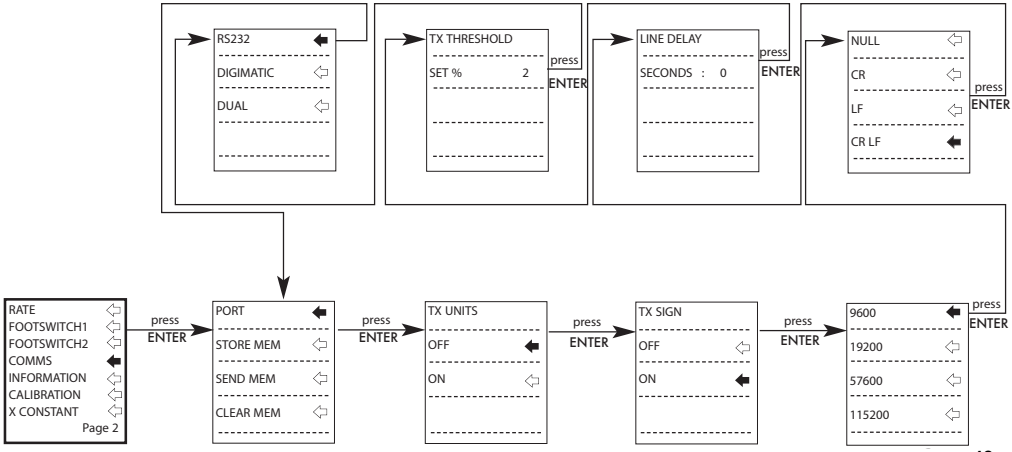
FOOTSWITCH1



FOOTSWITCH2

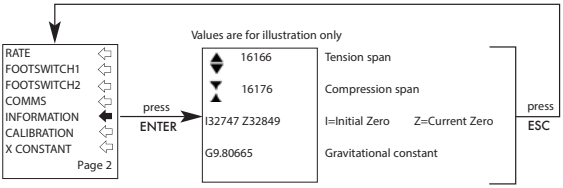


COMMS

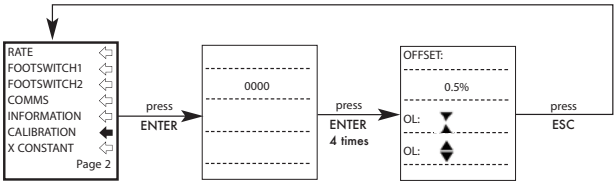


Advanced Menu Options Flow Chart Menu Page 2

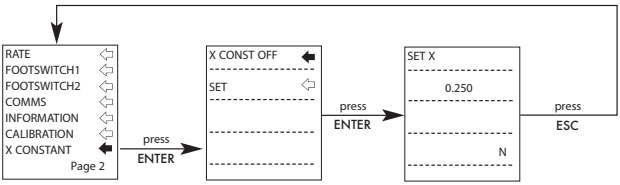
INFORMATION



CALIBRATION

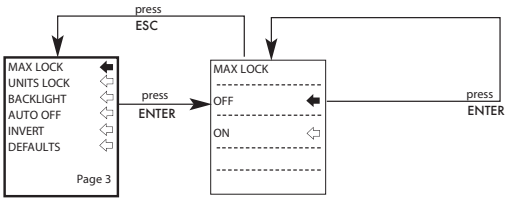


X CONSTANT

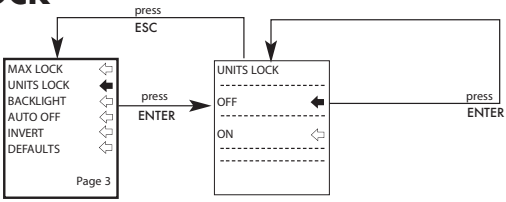


Advanced Menu Options Flow Chart Menu Page 3

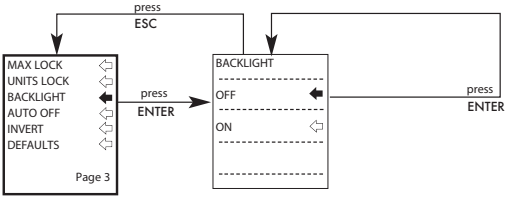
MAX LOCK



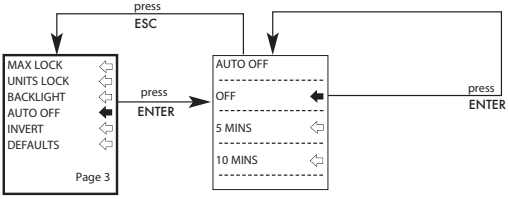
UNITS LOCK



BACKLIGHT

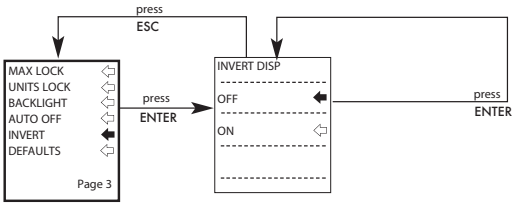


AUTO OFF

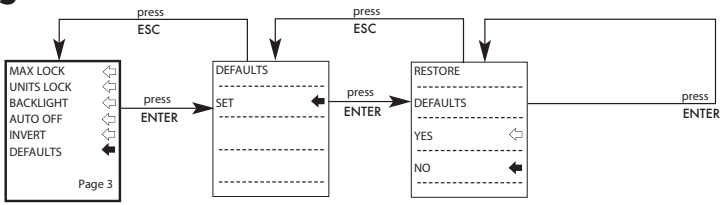


Advanced Menu Options Flow Chart Menu Page 3

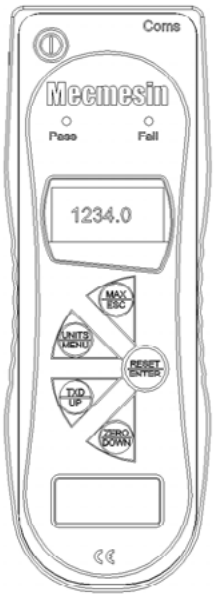
INVERT



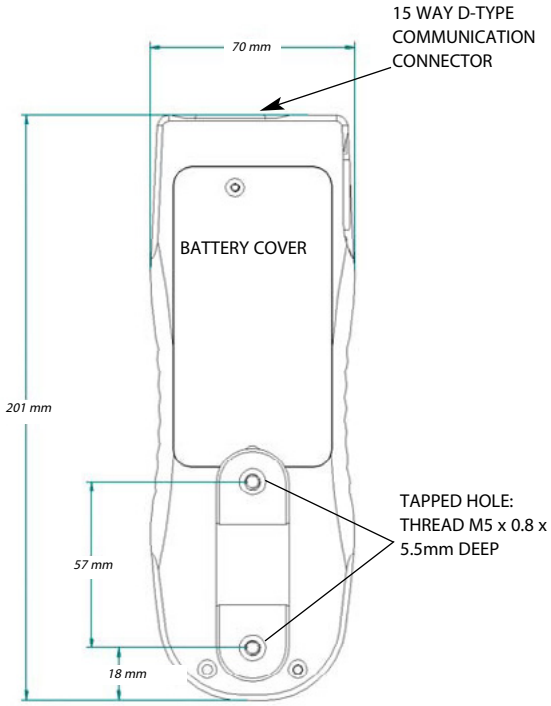
DEFAULTS



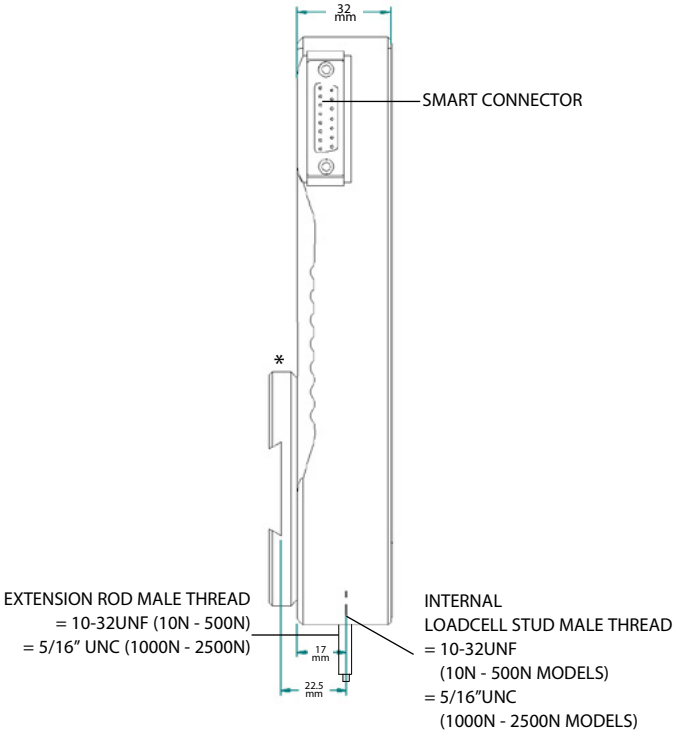
Front view



Rear view



Side view



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

AFG SPECIFICATIONS

Range & Resolution Accuracy

Model no:	mN	N	kN	gf	kgf	ozf	lbf
AFG 2.5	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

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

Digimatic (BCD) Output:

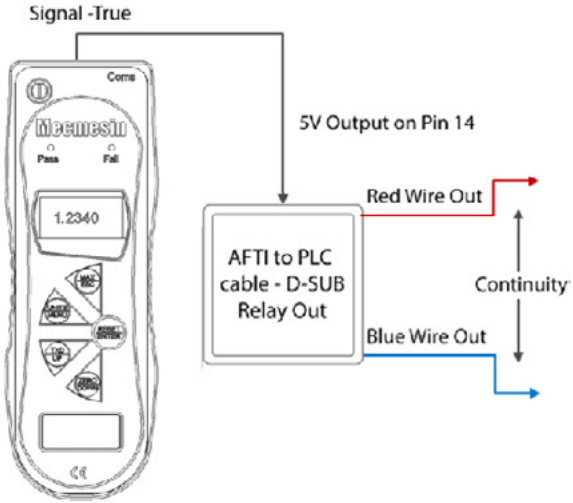
Analogue: Approx. ±2-5V uncalibrated for full scale tension/ compression (or clockwise/counter-clockwise)
If calibrated:
0 to +4V full scale for tension (or clockwise)
0 to -4V full scale for compression (or counter-clockwise)
(Calibrated to order at factory)

PLC Signals: The output of the pin is high 5V, low 0V

AFG SPECIFICATIONS

Female 15 way 'D Type' Communication Connector Pin Out and Relay Diagram

Pin Out:	
1	Analogue Output
2	RS232 Transmit
3	RS232 Receive
4	Digimatic Clock Output
5	Digimatic Ready Output
6	+5 volts
7	FREEZE Reading Input
8	Stand Reverse UP
9 out	Footswitch 2 Input/SMART -ve
10	Ground
11	Digimatic Request Input
12	Digimatic Data Output
13	Footswitch 1 Input
14	PLC Output
15	Stand reverse DOWN



Relay Electrical

Supply voltage: The relay is powered from a 5V 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 (Signal from the AFG is true).

Relay Output Characteristics (351-063)

Output Function:	Continuity between Red and Blue wire when AFG output logic is 1 (Signal True).
Peak relay ac voltage:	350 V
Continuous relay load current (PEAK AC):	120 mA
Maximum relay peak load current:	300 mA
Typical relay contact resistance at 100 mA:	17 Ω (Ohm)
Isolation voltage between AFG and relay output:	1500 V ac

Relay Description

Using AFG-PLC cable
Part number 351-063 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.

Communications Cables

Interface cables for connecting your AFG to peripheral devices:

Cable	Mecmesin Part Number
AFG to RS232 (9-pin D-type)	351-059
RS232 (9-pin D-type) to USB converter kit	432-228
AFG to Digimatic (Mitutoyo 10-way IDC)	351-058
AFG to Analogue	351-060
AFG to PLC	351-063
AFG to Footswitch 1	351-061-vo1
AFG to Footswitch 2	351-061-vo2
MultiTest-*d* Stand Reverse and RS232 to AFG Cable	351-074
Universal Expansion Module (for connecting up to 5 cables simultaneously)	432-127

Adaptor/Charger Unit

The mains 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

External 'Smart' Sensors - Calibration Principle

Mecmesin use standard mV/V sensors in all instruments. These sensors are subjected to an excitation voltage from the host display (either AFTI or AFG) and the signal is amplified. Due to the ratiometric principle, when the amplified signal is converted from analogue to digital, the excitation voltage (also known as reference voltage) appears on both sides of the conversion equation and therefore cancels itself out. In real terms, the absolute value of the excitation voltage is unimportant to the conversion! Any components that are not subject to the ratiometric principle have been specified within the product design to be high-precision and their allowable deviation falls well within the accuracy tolerance of the instrument. As a consequence of using this technique, it is not necessary to match-calibrate the 'Smart' sensor to a specific display. You may only return the 'Smart' sensor to Mecmesin or an authorised distributor for calibration.

Also Available from Mecmesin...

Tornado

The Tornado is a sophisticated digital torque tester with a broad array of useful advanced capabilities, including:

- Tamper-evident closure testing facility; capture both 'slip' & 'bridge' peak torques
- Choice of 4 models: 1.5N.m, 3N.m, 6N.m & 10N.m capacity
- Tolerance alerting with audible & LED pass/fail alarms
- On board memory of up to 500 readings





Orbis

The Orbis digital torque tester offers a simple, cost effective alternative to the Tornado. Featuring the same highly accurate digital torque capture, but without the Tornado's advanced programming functions, the Orbis is suitable for a broad range of basic torque applications.

6N.m •
Clear, intuitive controls •
Compact, portable & affordable •
Mains or battery powered •

Also Available from Mecmesin...

MultiTest-*xt*



The MultiTest-*xt* range of force testing systems are ideal for quality control applications in production environments.

Using touch screen technology the MultiTest-*xt* is specifically designed for environments where throughput, productivity and minimal training are vital and where the use of a computer is not always suitable.

Features Include:

- **Large easy-to-read touch screen display:** clearly shows test results and graphs
- **Easy-to-use with minimal training:** "Simplicity itself" one button launches the test
- **Instant access to 5 pre-stored tests:** instant selection of favourite tests
- **Choice of 3 program modes:** Quick Test, Program Test and Advanced Test
- **Colour-coded indication of "Pass" or "Fail" -** immediately alerts the operator
- **Wide range of test stands:** capacities from 1kN to 50kN



MultiTest-*i*

The MultiTest-*i* is a fully computer-controlled tension and compression testing system. Mecmesin's Emperor™ software enables users to develop sophisticated routines and analyses to meet precise requirements for advanced testing applications. 5 models are available with 1kN, 2.5kN, 5kN, 10kN, 25kN or 50kN capacity.

To find out about our broad range of grips and accessories, please call us on **+44 (0) 1403 799979,** or visit us at **www.mecmesin.com**

Mecmesin

testing to perfection

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Formed in 1977, Mecmesin Ltd is today widely regarded as a leader in force and torque technology for quality control testing in design and production. The Mecmesin brand stands for excellent levels of performance and reliability, guaranteeing high quality results. Quality control managers, designers and engineers working on production lines and in research laboratories worldwide rely upon Mecmesin force & torque measurement systems for a range of quality control testing applications, which is almost limitless.

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