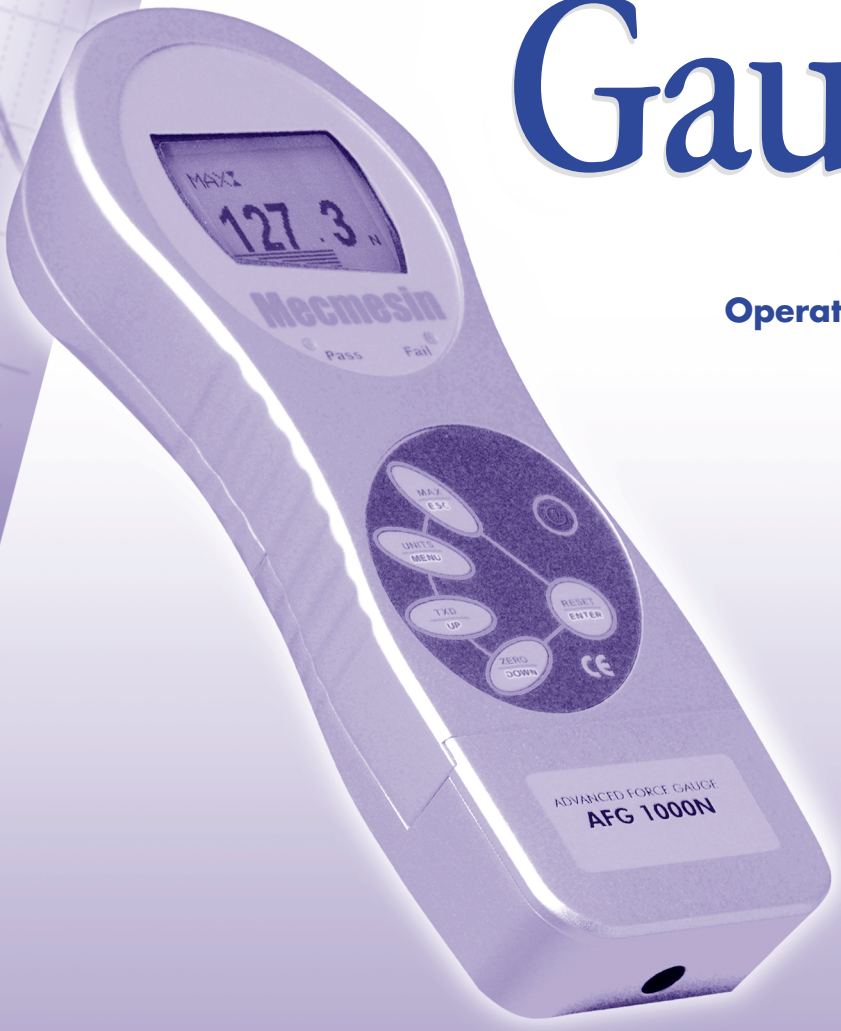
Mecmesin

Advanced Force Gauge

Operating Manual



Contents

Introduction

Thank you for choosing the Mecmesin Advanced Force Gauge (AFG) instrument. 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 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 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 gauge configuration – see page 9, Optional Settings.

To configure the advanced features of the gauge 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 GAUGE

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.

Fitting and charging of rechargeable batteries

To insert the batteries you must first remove the battery cover on the upper part of the rear of the gauge by undoing the 3 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.

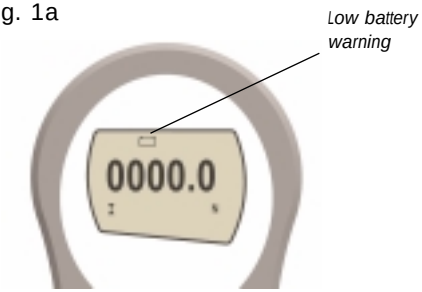
Refit the battery cover and tighten the 3 retaining screws.

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 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. 1a

Fig.1a



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.

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.

USING THE GAUGE

The Rotary Coupling is supplied with AFG instruments between capacities of 10N to 1000N. It allows operators to orientate the gripping accessory without the need for a locking wheel (as on the extension rod).

We do not recommend it to be used for AFG 2.5N and 5N due to its weight, which would need to be tared from the measuring range.

Fitting accessories

Affix the Rotary Coupling to the male thread of either the short extension rod (30mm long) or the long extension rod (130mm long). Affix the extension rod to the load cell probe in the hole at the bottom of the gauge by tightening it gently with the fingers.

Note: When fitting a grip ensure that it is screwed finger-tight only. Excessive torque can damage the load cell.

Your chosen grip or accessory may now be connected to the rotary coupling.

Mounting to a test stand

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.

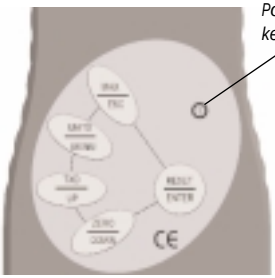
Each Mecmesin test stand is supplied with a dedicated 'dovetailed mounting bracket' and screws for this purpose.

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 5.5mm. The final thread is peaned but if screws are fitted beyond this depth, damage to the internal PCB may occur.

Powering up

As shown in Figure 1b the control panel has 6 keys:-

Fig.1b



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 Newton's.

After the self test, providing no load has been applied to the instrument, the display will show all zeroes. This is because the gauge re-zeroes 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 force is applied perpendicularly via the sensor probe (hole at bottom of AFG), the reading on the display will register the applied force.

* Do not overload the transducer, as this will 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. Consult your supplier to arrange repair.

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.

To power down the gauge press the red ⏻ key.

Basic Functions

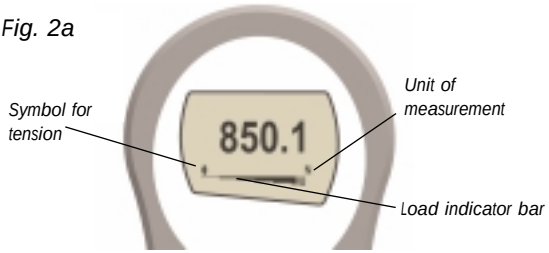
Display of Tension / Compression

Tensile forces are displayed on the AFG and recognised by the symbol ⬍

Compressive forces are displayed on the AFG and recognised by the symbol ⧗

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. 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 approx. 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 Gauge

During the operation of the gauge 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 gauge: 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 gauge returns to its original setting. The AFG automatically converts readings as new units of measure are selected.

Max (peak) readings

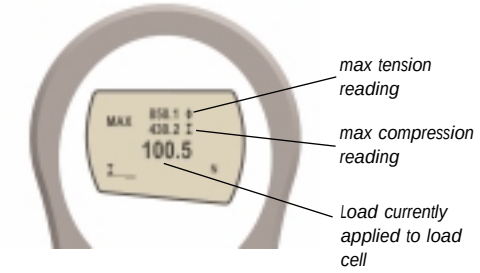
The gauge detects and stores maximum (peak) force in both compressive and tensile directions.

"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 transducer is also displayed - *see Figure 3a overleaf.*

Dual Max

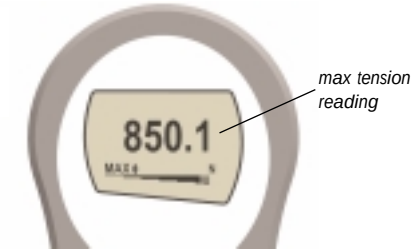
Fig. 3a



Max Tension

Press the MAX key again and the display will show the maximum tensile force identified by the ▲▼ symbol.

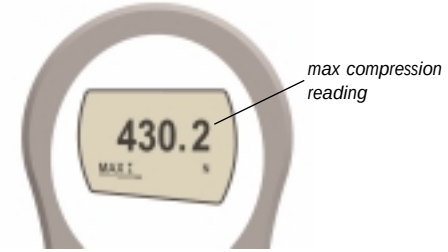
Fig. 3b



Max Compression

Press the MAX key again and the display will show the maximum compressive force identified by the ⧗ symbol.

Fig. 3c



"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 transducer 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 23)

Analogue output

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

RS232 and Mitutoyo output signals

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.

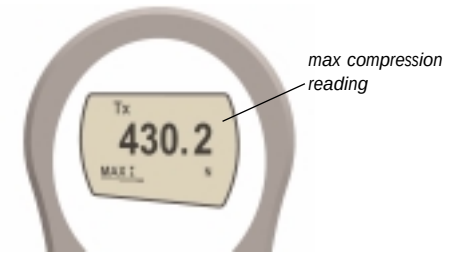
PC Communication

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. To stop sending data, simply press and release the TXD key, at which point TX will disappear from the display.

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 gauge to peripheral devices – contact your supplier.

Fig. 4



Please note that the continuous data stream only starts when approx. 2% of the rated capacity of the gauge is reached.

Optional Settings

Backlit Display

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

Please note that battery 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 gauge powers down after 2 minutes since the last key press.

Press and hold ZERO whilst powering up the AFG with the ⏻ key. The symbol 'Ao' will appear in the display to indicate Auto-off is active. This feature is remembered after power down.

Invert Display

For 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

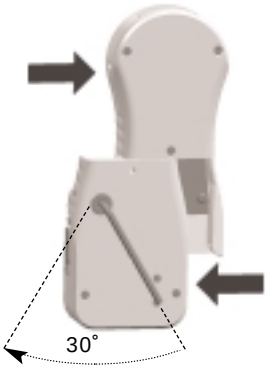
Additional Force & Torque Sensors

Interchangeable Advanced Loadcell Cartridges (ALC)'s

The AFG has an interchangeable loadcell cartridge, which allows selection of different capacity load cells to be fitted to the AFG console.

To exchange the cartridge, power down the gauge and remove it from the test stand if it is fitted to one.
Turn the gauge face down and insert a 4mm Allen key (supplied) into the boss on the back of the ALC.
To unlock the ALC rotate the boss anti-clockwise with the Allen key through approximately 30° to release the spring loaded locking cam. Whilst still holding the Allen key in position slide the ALC away from the AFG console to the left. See Figure 5.

Fig. 5



Warning! Incorrect alignment of the ALC may lead to damage to the ALC interface pins.

To fit the new ALC, first insert the Allen key into its boss and rotate the locking cam as above. Slide the ALC into the AFG console, ensuring that the mating surfaces are correctly aligned.

Push the ALC firmly home into the AFG console and, to lock it, tighten the locking cam by rotating the Allen key clockwise until slight pressure is felt. Take care not to over tighten the locking cam.

'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

All Advanced Loadcell Cartridges have a 15-pin 'Smart' connector port on the right hand side for interface with Mecmesin external 'Smart' force and torque sensors. This allows you to use your existing AFG console 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 ALC 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 24 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.

Navigating the menus

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. To move between the options listed on the 2 main-menu pages, press UP and DOWN to move the cursor. Press ENTER to select sub-menus, activate features and enter values. Within sub-menus UP and DOWN will also change numerical values. Press ESC to return to page 1 of the main-menu page.

If ALARM is selected in page 1, by pressing ENTER the status of all the other functions can be seen by consecutively pressing the MENU key to scroll through the functions one at a time. Press ESC once to return to the main menu page and twice to return to the main display.

Fig. 6

MAIN MENU PAGE 1

ALARM

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 ENTER to change ALARM OFF to ALARM ON.
Press DOWN to move the arrow cursor to SET and press ENTER.

ALARM sub-menu 2

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 ENTER to set LIMIT 1. Repeat procedure for LIMIT 2.

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

Fig. 7

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

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 UP and DOWN to move the cursor and press ENTER 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

ALARM sub-menu 5

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

The display shows PASS, FAIL and PULSE. This menu sets the OUT BAND and IN BAND mode.

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

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

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

Display is showing sub-menu 1 again (= ALARM ON and SET). Press ESC to return to main-menu and again to return to main display. The main display will now show an alarm

Fig. 8

'bell' symbol indicating the alarm is turned on. See Figure 8.

ALARM on break

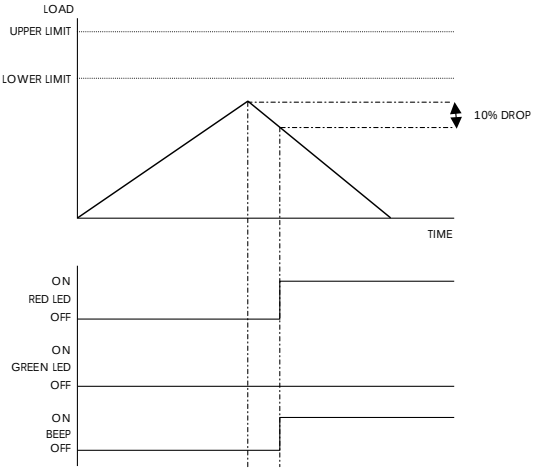
This feature is only activated when the % DROP feature is used in conjunction with the ALARM function. The AFG looks for a percentage (of full-scale) drop from peak load value, set in the % DROP menu (see page 19). The alarm can be used to indicate if the break point falls inside or outside the limits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

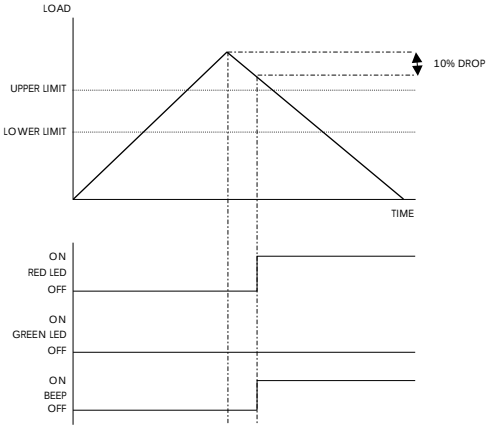


Example 2

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

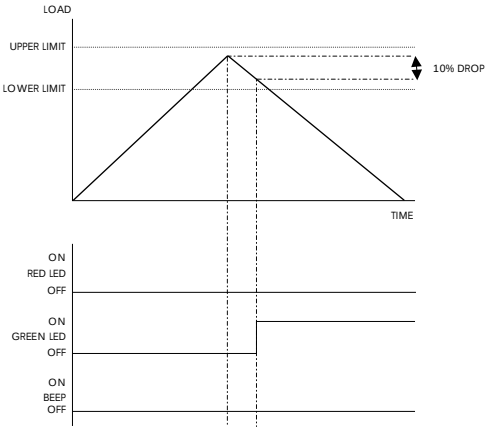


Example 3

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

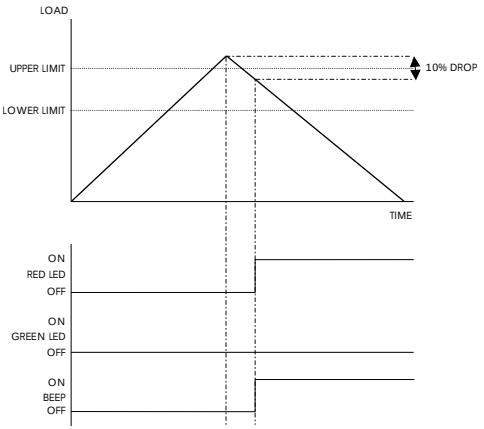


Example 4

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

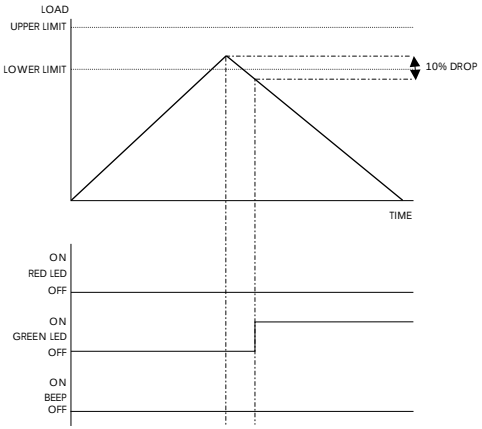


Example 5

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*

Example 5



PLC

(Programmable Limit Controller)

The AFG has a load output signal which may be used for PLC applications. This function requires an external cable with a built-in solid-state relay – see Specifications on pages 26 and 27 for details of the signal.

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

PLC sub-menu 1

The display will show:-

PLC OFF - Indicates PLC function status.

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.

PLC sub-menu 2

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

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

Press ESC to return to 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. Press DOWN to move the arrow cursor to STAND and press the ENTER key.

STAND sub-menu 1

The display will show:-

STAND OFF - 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).

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

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.

REVERSE sub-menu 2

BREAK - Sets the gauge to reverse at sample break. Press ENTER to select.

Break sub-menu 1

SET % of load cell 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 ENTER 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 to select.

SET load-limit using UP and DOWN keys. (UNITS key changes the units of measurement for load-limit value). Press ENTER 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

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) At the end of your cycle test, the test sample will still be under load.

When one of the stand control options (REVERSE, STOP or CYCLE) have been set press ENTER. The display will revert

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

back to STAND sub-menu 1 and STAND ON will now be displayed. Press ESC to return to main-menu page 1.

FREEZE

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 RESET.

Contact your supplier for interface cable.

To configure this function, press and hold the MENU key until page 1 of the main-menu appears. Press DOWN 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 keys and press ENTER to select. When set the sub-menu will display FREEZE ON. To disable the FREEZE function, press ENTER. FREEZE OFF will now be displayed. Press ESC 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

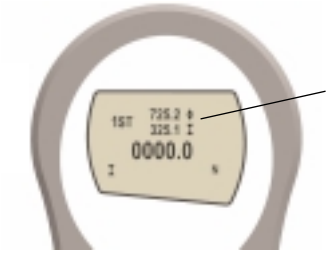
Fig. 9

1st Peak Compression

Fig. 10

1st Peak
Tension / Compression

Fig. 11



The dual Max display now shows 1st peak tension and 1st peak compression. Load currently applied to instrument is also shown (0000.0)

% DROP sub-menu 1

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

% DROP sub-menu 2

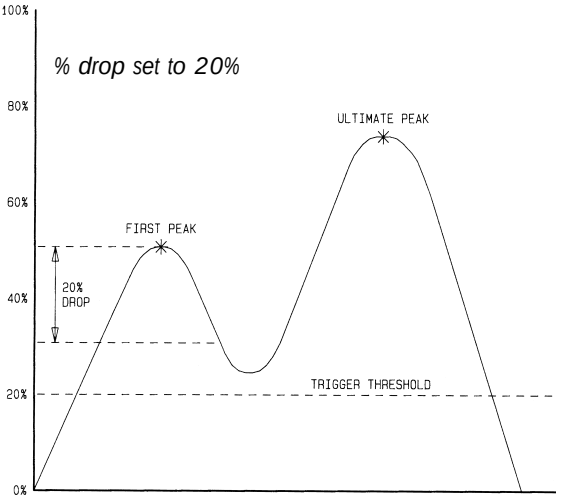
To determine what precisely is considered a break, you must define the % drop of full-scale value from the peak load observed prior to the break occurring.

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

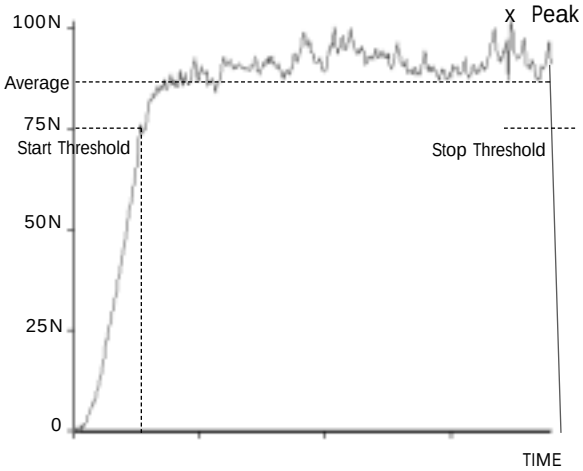
EXAMPLE

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 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 threshold (% of full-scale) is reached and stops being calculated when the load falls back below this threshold.

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

Avg / Time sub-menu 1

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

Avg / Time sub-menu 2

Define a % value of full-scale as the threshold value in the SET T menu. Any load reading above this threshold will be averaged over time with all the previous readings occurring since the threshold value was exceeded. Averaging stops when load readings fall back below the threshold.

Press ESC to return to main-menu page 1.

RATE

This function allows the selection of the gauge throughput rate, i.e. the amount of averaging performed by the internal electronics before the load reading is displayed. There are three levels HI, MED and LO.

HI - Display updates quickly with little data averaging
MED - Gauge default.
LO - Maximum data averaging before values are displayed. Smoothes 'noisy' data.

To set RATE, press and hold the MENU key until page 1 of the main-menu appears. Using UP and DOWN move the arrow key to RATE.
Using UP and DOWN select the relevant level (HI, MED or LO) and press the ENTER key.
Press ESC to return to page 1 of the main-menu.

MAIN-MENU PAGE 2

Fig. 12

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

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.

To assign the function of a key to FOOTSWITCH 1 use UP and DOWN to move the arrow key to FOOTSWITCH 1.
Using UP and DOWN select the relevant key (MAX, UNITS, TXD, ZERO or RESET) and press the ENTER key.
Press ESC to return to page 2 of the main-menu.

FOOTSWITCH 2

To assign the function of a key to FOOTSWITCH 2 use UP and DOWN to move the arrow key to FOOTSWITCH 2. Using UP and DOWN select the relevant key (MAX, UNITS, TXD, ZERO or RESET) and press the ENTER key.
Press ESC to return to page 2 of the main-menu.

COMMS

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.

COMMS sub-menu 1

Using UP and DOWN 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 to select.

Port sub-menu 2

The transmission (or Baud) rate can now be set.
Use the UP or DOWN key to position the arrow cursor at the relevant speed (2400, 9600, 57600 or 115200). Press ENTER to select.

You will now return to page 2 of the main-menu.

To set STORE MEM press ENTER from Comms sub-menu 1. This will cause a memory counter to appear in the main display. You will now return to page 2 of the main-menu.

To set SEND MEM press ENTER from Comms sub-menu 1. 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 page 2 of the main-menu.

To set CLEAR MEM press ENTER from Comms sub-menu 1. 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 page 2 of the main-menu.

x/CONSTANT

A constant of multiplication can be applied to the load values in the main display. This is useful for applications where you wish to convert the load reading into a non-standard unit of measurement e.g. for co-efficient of friction tests.

Press ENTER to select xCONSTANT. Press UP or DOWN to adjust the constant of multiplication. Press ENTER to confirm.

INFORMATION

Displays calibration information.

- T - Tension span
- C - Compression span
- Z - Current zero
- G - Gravitational constant
- I - True zero at time of calibration

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 load cell offset if overload is suspected.

Place the gauge (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 ENTER four times (to enter 0000 as the password), a screen showing initial (at calibration) load cell offsets and current offset in % is displayed.

The upper value shows the % offset when the gauge was last successfully calibrated. The lower value shows the % offset currently present on the gauge. See Figure 13.

Fig. 13

If the current % offset is between 5 and 10% please contact your supplier to arrange a recalibration of your AFG.
If the current % offset is greater than 10% please contact your supplier to arrange for a load cell replacement. These values are given as an indicator only – the need for calibration / repair may vary according to the individual characteristics of the load cell.

Press and hold ESC 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 to select CONTRAST menu and 1.234 will be displayed. Press UP or DOWN to adjust the contrast of the display and ENTER 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

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: 8 data bits, 1 Start bit, 1 Stop bit, no parity
Digimatic (Mitutoyo) format BCD output
Analogue: 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 hosed in a 15 pin D-type connector. Connection to the relay output is via a 5metre length screened cable. The end of the cable is left with bare wires to allow appropriate termination to the peripheral PLC device.

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

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

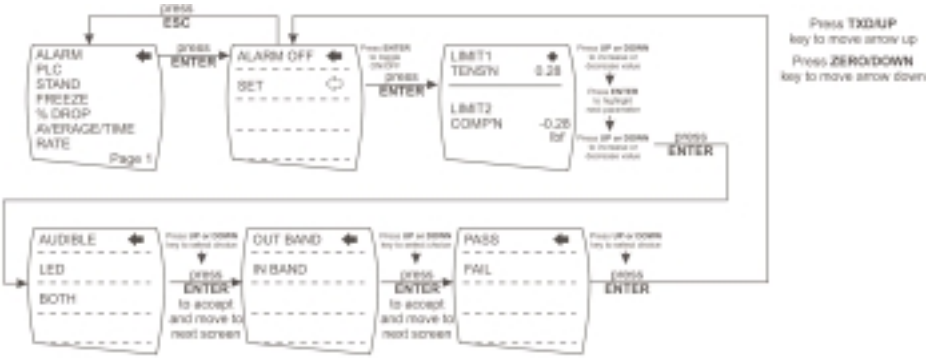
Secondary: 100mA constant current at 9V

Charger pin: Centre = positive Outer = negative

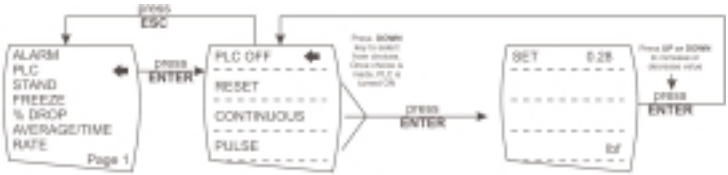
Advanced Menu Options Flow Chart Page 1

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 Gauge.

Alarm

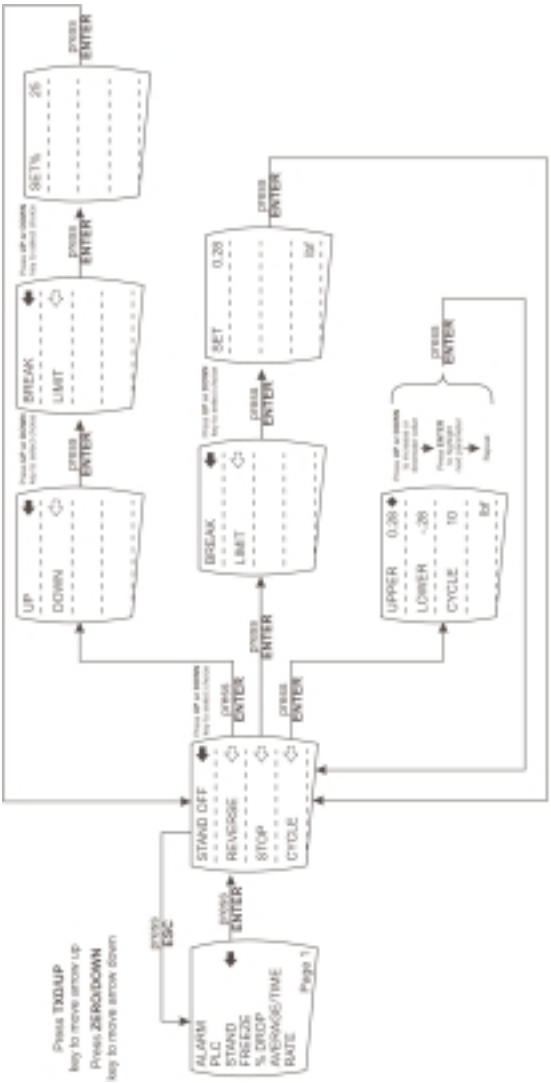


PLC



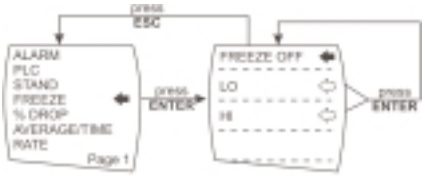
Advanced Menu Options Flow Chart Page 1

Stand

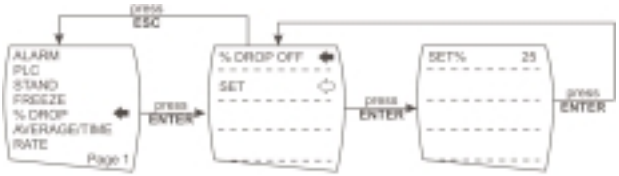


Advanced Menu Options Flow Chart Page 1

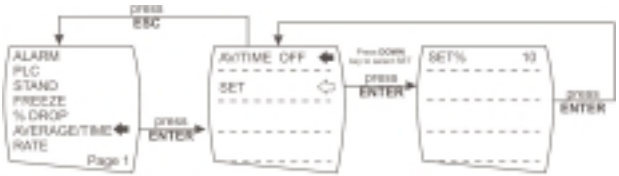
Freeze



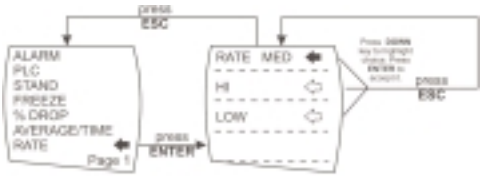
% Drop



Average / Time

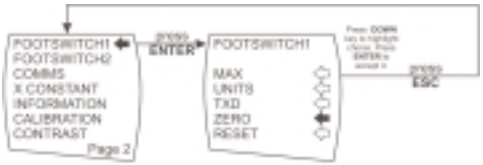


Rate



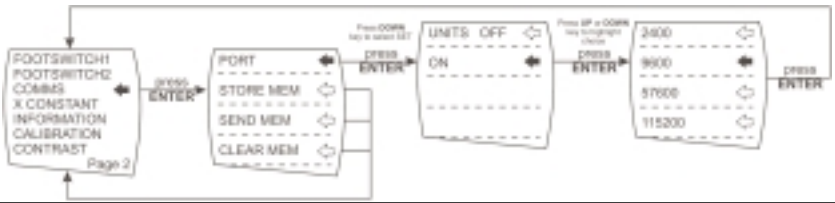
Advanced Menu Options Flow Chart Page 2

Footswitch1

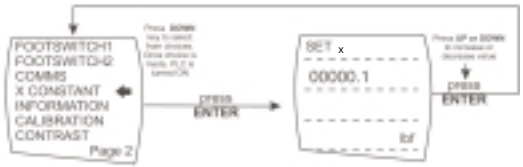


Footswitch2

Comms

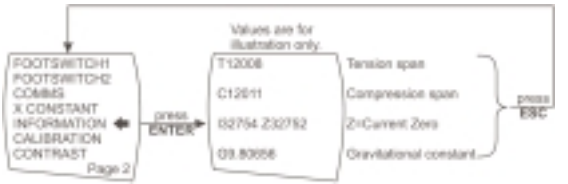


Constant

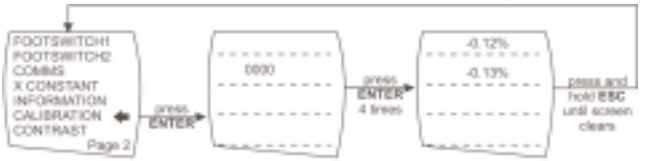


Advanced Menu Options Flow Chart Page 2

Information

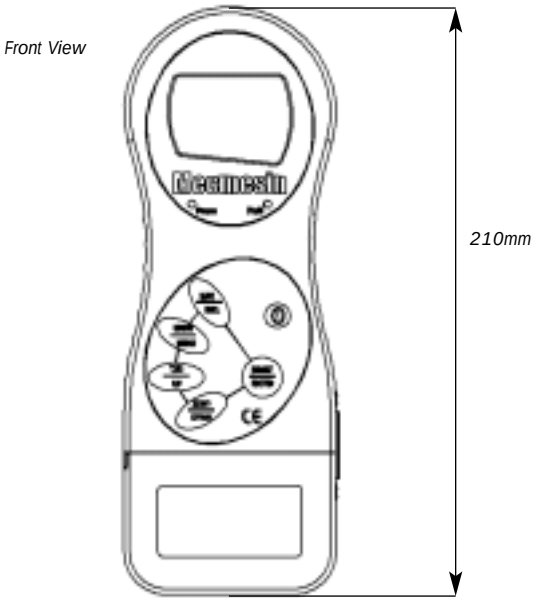


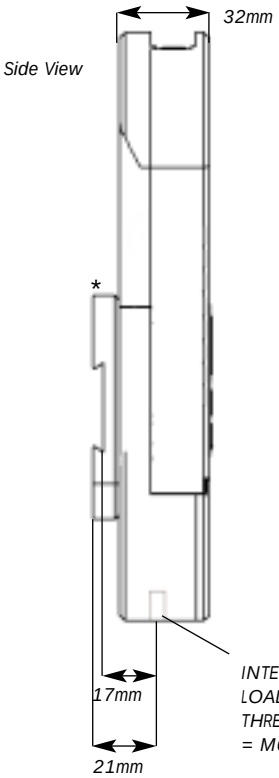
Calibration

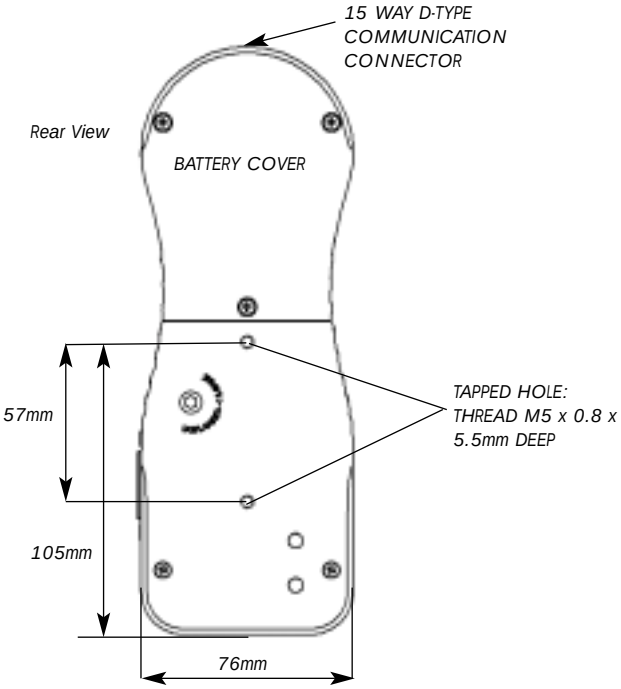


Contrast

Dimensions (incl. Pin-out details)







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

AFG Mk 3 D Connector Pin Out:	
1	Analogue 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 DATAOutput
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

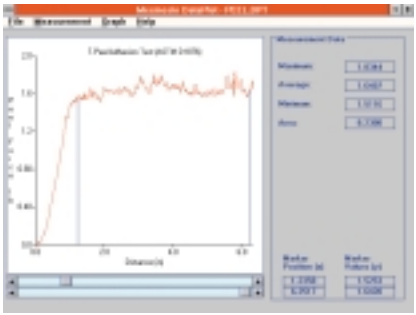
Universal Expansion Module shown for connecting up to a maximum of 5 cables simultaneously.

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

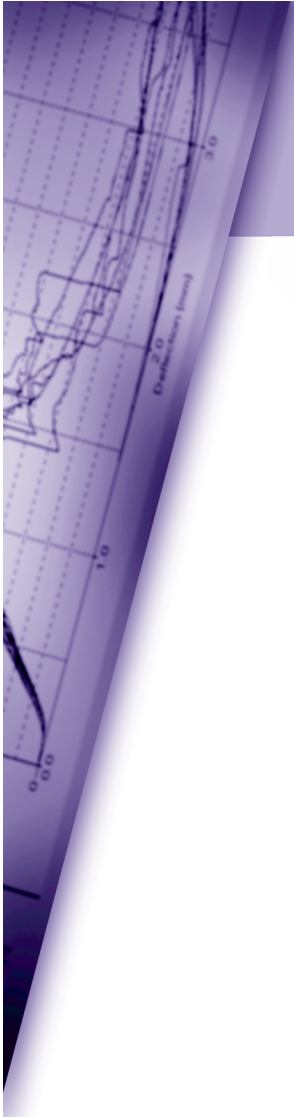
DataPlot

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

DataPlot enables a PC to communicate with Mecmesin digital force gauges, torque gauges 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



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431-141 - Issue OC

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