

QMI 3500

PRESSURE METER



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GENERAL OPERATION

The nominal pressure range of the meter is indicated on the label fixed to the back of the meter.

When the meter is first switched on using , the top line of the display scrolls through the model version number, battery status, pressure units, date and time. The bottom line of the display shows a countdown number that starts at 10 and reduces to zero. At zero the meter displays two lines of data.

All data can be printed via an optional infrared printer. The printed data can be 'live' data, 'frozen' data or 'stored' data. 255 sets of tests can be stored in the non-volatile memory.

Two lines of 20 characters can be added to the header of printouts.

The meter is controlled using 8 buttons.

The eight buttons are:

ON/OFF 

Press for ON or OFF.

The meter counts down from 10 after OFF is pressed.

Press  during this period to cancel OFF.

MENU 

Press for MENU.

ZERO 

Press and hold until there is a beep to ZERO the pressure reading.

BACKLIGHT 

Press and hold until there is a beep to switch on the BACKLIGHT. Press and hold to cancel.

HOLD/ PRINT 

Press quickly to HOLD the reading - the display flashes. Press quickly to cancel HOLD. Press for 2+ seconds to PRINT. Press again to cancel PRINT.

UP / DOWN /

Press either to change the bottom line of the display.

ENTER

The buttons with ,  and  arrows change settings such as date, time, and other menu items when MENU mode has been selected.

Press  to cancel OFF.

The  button is also a shortcut to the let-by / stabilization / tightness test.
(Only applies to QMI 3500-1/UK and QMI 3500-2/UK)

BOTTOM LINE OPTIONS

The  /  buttons change the bottom line of the display. The bottom line can display...

Maximum Pressure

Minimum Pressure

Time

Date

Pressure Units

Battery Status

Instrument Internal Temp.

MAXIMUM PRESSURE is displayed as:

| | |
|---|-----|
| P | 1.3 |
| - | 1.9 |

MINIMUM PRESSURE is displayed as:

| | |
|---|-----|
| P | 1.3 |
| - | 1.1 |

1. BEFORE USING THE METER FOR THE FIRST TIME:

Remove the cover and fit a new battery in the battery compartment. **Take great care to ensure that the battery is fitted with the correct battery polarity.** Replace the battery cover. Always check that the meter is working correctly after replacing the battery.

Set the meter's correct date, time and pressure units. These are stored when the meter is switched off.

2. BEFORE USING THE METER EVERY TIME:

After switch on check that date, time and pressure units are correct and that the battery power is sufficient.

SAFETY WARNING

Never connect to a pressure source where you are not sure what the maximum pressure might be. Always ensure that the meter you are using is correctly rated for the pressure that you intend to measure. **Excessive pressure (>5 times nominal range) can permanently damage the meter's pressure sensor.**

NOTE:

Use the '+' input for all single input measurements of pressure or vacuum. Only use the '-' input when taking a differential measurement.

3. THE MENU FUNCTIONS

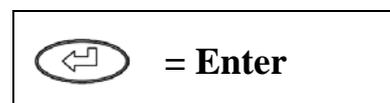
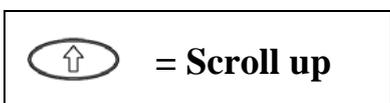
The MENU structure comprises main menu options. STORE, SETUP and PRESSURE have a sub-menu structure. SERVICE is for use by an approved service organisation only.

Press  and use the ,  and  buttons to navigate through the MENU structure which is illustrated by the table on the following page, 'Using the MENU'.

To exit the MENU function the final logical  is pressed. No changes are made if the MENU function is aborted by pressing .

USING THE MENU

Press  then navigate through the menu by using following keys...



| MENU | SUB-MENU | OPTIONS / COMMENTS |
|------|----------|--------------------|
|------|----------|--------------------|

| | | |
|--------------|------------|---|
| STORE | VIEW | Use the ↑/↓ and ↵ keys to view a previously logged test. Other tests can then be viewed using the ↑/↓ keys. Press the menu key to exit. |
| | LOG | Press the ↵ key to manually log a test including date and time. Storage capacity is 255 tests. |
| | AUTO STORE | Select YES to automatically log tests at a preset interval. The log interval can be set at between 2 and 99 seconds. Logging starts immediately after the log interval is set. To stop AUTO STORE either switch off or select menu / auto store / NO. |
| | DEL ALL | Clears <u>all</u> the memory when YES is selected |
| | EXIT | |

| | | |
|--------------|----------|---|
| SETUP | C ← → F | The internal temperature of the meter can be displayed in °C or °F |
| | AUTO OFF | Auto power off timer in minutes. Set at 00 to disable the auto power off. |
| | SET TIME | Uses “Military” time. 7am = 07:00, 7pm = 19:00 |
| | SET DATE | Select format, e.g. DD-MM-YY, then set the date |
| | HEADER | Sets printout header. 2 lines of up to 20 characters per line |
| | LANGUAGE | English, French, Italian, German and Spanish |
| | CONTRAST | Sets the display contrast. |
| | EXIT | |

| | | |
|-----------------|--|--|
| PRESSURE | SMOOTH | OFF = standard response. ON = slow response to damp out pulses |
| | RESOLVE | HIGH or LOW. Selects the number of decimal places |
| | PS UNITS | mbar, mmH ₂ O, Pa, kPa, PSI, mmHg, hPa, inH ₂ O |
| | REPORT (3500-1/UK and 3500-2/UK only. Also see section 5) | TEST. Starts the timed Let-by, Stabilisation and Tightness tests VIEW. View all logged Let-by and Tightness tests DEL ALL. Deletes <u>all</u> Let-by and Tightness tests SETTINGS. Sets the duration of Let-by and Tightness tests in minutes |
| | EXIT | |

| | | |
|----------------|------|---|
| SERVICE | CODE | For use by an approved service organisation only. Leave set at ‘0000’ |
|----------------|------|---|

| | | |
|-------------|--|--|
| EXIT | | |
|-------------|--|--|

4. MEASURING

Make sure you do not exceed the meter's operating specifications.

- Do not exceed the meter's internal temperature operating range
- Do not put the meter on a hot surface

Switch the meter on **with no hose connected** to ensure that the initial 'zero' is accurately set.

When taking draft readings or other readings at very low pressure, for maximum accuracy, re-zero the meter in the orientation that it is being used. This eliminates gravity effects on the very sensitive pressure transducer. It is also recommended that the meter is switched on for at least five minutes and then re-zeroed before taking such sensitive measurements.

If the pressure being measured exceeds the meter's design range the display will show **OR** for "over-range"



Always use the top right hand port (Port 1) for taking single channel measurements (pressure or vacuum). Only use the left hand port for differential measurements.

EXAMPLE PRINTOUTS

The standard printout is:

The MAX and MIN readings are those observed since last switch on

```
K3500 V1.0
.....
.....
DATE      29/12/09
TIME      10:28:30
.....
PRS  mbar   0.36
MAX  mbar   0.72
MIN  mbar   0.00
.....
```

NOTE:

Printouts of stored readings will also include the TEST NO. below the header.

```
K3500 V1.0
.....
.....
TEST      02
DATE      29/12/09
TIME      10:29:13
.....
PRS  mbar   0.45
.....
```

5. LET-BY and TIGHTNESS TESTING

(only applies to QMI 3500-1/UK and QMI 3500-2/UK)

Switch the meter ON **with no hose connected** and wait for the 10 second countdown to finish.

| STEP | DISPLAY | COMMENTS / ACTIONS |
|--|----------------------|---|
| 1 | P 0.00 mbar | Press ↵ to enter the let-by/stabilisation/tightness test sequence. This test sequence can also be entered via menu/pressure/report/test |
| 2 | LET BY? YES | Use ↑ and ↓ to select 'YES' or 'NO' then press ↵ . If 'NO' is selected go straight to step 6, the stabilisation period. |
| 3 | CONNECT P1 10.00 | Connect a pressure hose from the '+' connection to the test point. Manually set the let-by pressure as usual. Press ↵ to start the test. |
| 4 | TIME 59 P2 10.00 | The let-by test counts down in seconds. Duration can be set via menu. P2 = 'live' pressure reading during the let-by test. |
| 5 | P1 10.00 P2 10.00 | P1 = pressure at the start of the let-by test. P2 = pressure at the end of the let-by test. Press ↵ to continue. |
| 6 | SET PS PS 20.00 | Manually set the stabilisation pressure as usual. When PS is correct press ↵ to start the stabilisation period. |
| 7 | TIME 59 PS 20.00 | The stabilisation test counts down in seconds. Duration is set via menu. PS = 'live' pressure reading during the stabilisation period. |
| 8 | TIME 00 PS 20.00 | End of the stabilisation period. <u>Either</u> press ↑ to return to step 6 and repeat the stabilisation test <u>or</u> press ↵ to continue to the tightness test. |
| 9 | SET P3 P3 20.00 | Manually adjust the tightness test pressure if necessary. P3 = pressure at the start of the tightness test. Press ↵ to start the test. |
| 10 | TIME 119 P4 20.00 | The tightness test counts down in seconds. Duration is set via menu. P4 = 'live' pressure reading during the tightness test. |
| 11 | P3 20.00 P4 20.00 | P3 = pressure at the start of the tightness test. P4 = pressure at the end of the tightness test. Press ↵ to continue |
| 12 | LOG 0? | This is the log number of the let-by/stabilisation/tightness test that has just been completed. Memory capacity is 20 complete tightness tests. |
| 13 | PRINTING ===== | To print the complete test press the PRINT key with the bottom of the instrument pointing at the printer and approximately 150mm apart. |
| <ul style="list-style-type: none"> • To exit the test sequence press MENU • Previously logged tests can be viewed and printed via menu/pressure/report/view/↑ or ↓ • Previously logged tests can be deleted via menu/pressure/report/delete all/yes/↵ | | |

Let-By Test and Tightness Test Printout

NOTE:

Printouts of stored readings will also include the LOG NO. Below the header

```
K3500 V1.0
.....

LOG          06
TIME 10:25 19/01/10
.....

Let By Test

PRS_1 mbar   10.20
PRS_2 mbar   10.02
LET BY mins  1:00

.....
Tightness Test
.....
PRS_3 mbar   20.15
PRS_4 mbar   19.84
ΔPRS mbar    -0.31
STABIL'N mins 1:00
TIGHTN'S mins 2:00

.....
Customer
.....

.....
Appliance
.....

.....
Ref.
.....
```

6. METER ANNUAL RECALIBRATION AND SERVICE

The meter should be re-calibrated and serviced annually by a QMI approved service centre.

Local regulations may require more frequent re-calibration.

Calibration is performed in firmware and there are no user accessible adjustments or user serviceable parts.

7. SPECIFICATION

Model: QMI 3500-1

Nominal Pressure Ranges

| mbar | mmH ₂ O | Pa | kPa |
|-------|--------------------|------|-------|
| 80.00 | 800.0 | 8000 | 8.000 |

| PSI | mmHg | hPa | inH ₂ O |
|-------|-------|-------|--------------------|
| 1.000 | 60.00 | 80.00 | 30.00 |

Model: QMI 3500-2

Nominal Pressure Ranges

| mbar | mmH ₂ O | Pa | kPa |
|--------|--------------------|-------|--------|
| 160.00 | 1600.0 | 16000 | 16.000 |

| PSI | mmHg | hPa | inH ₂ O |
|-------|--------|--------|--------------------|
| 2.000 | 120.00 | 160.00 | 60.00 |

Model: QMI 3500-5

Nominal Pressure Ranges

| mbar | mmH ₂ O | Pa | kPa |
|-------|--------------------|-------|-------|
| 400.0 | 4000 | 32000 | 40.00 |

| PSI | mmHg | hPa | inH ₂ O |
|-------|-------|-------|--------------------|
| 5.000 | 300.0 | 400.0 | 150.0 |

Model: QMI 3500-15

Nominal Pressure Ranges

| mbar | kPa | PSI |
|--------|--------|-------|
| 1040.0 | 100.00 | 15.00 |

| mmHg | hPa | inH ₂ O |
|-------|--------|--------------------|
| 780.0 | 1040.0 | 400.0 |

Model: QMI 3500-30

Nominal Pressure Ranges

| mbar | kPa | PSI |
|--------|--------|-------|
| 2070.0 | 207.00 | 30.00 |

| mmHg | hPa | inH ₂ O |
|--------|--------|--------------------|
| 1560.0 | 2070.0 | 800.0 |

Pressure Measurement

WARNING - Maximum over-range without damage to sensor is 5 times nominal range

Model: QMI 3500-1

| <u>Range</u> | <u>Resolution</u> | <u>Accuracy</u> |
|---------------|-------------------|----------------------|
| ± 20 Pa | 0.1 Pa | ± 0.5 Pa |
| ± 100 Pa | 0.1 Pa | ± 3 Pa |
| ± 2000 Pa | 1 Pa | $\pm 3\%$ of reading |
| ± 80 hPa | 0.01 hPa | $\pm 3\%$ of reading |

Model: QMI 3500-2

| <u>Range</u> | <u>Resolution</u> | <u>Accuracy</u> |
|---------------|-------------------|----------------------|
| ± 20 Pa | 0.3 Pa | ± 2 Pa |
| ± 2000 Pa | 0.3 Pa | ± 5 Pa |
| ± 160 hPa | 0.01 hPa | $\pm 3\%$ of reading |

Model: QMI 3500-5

| <u>Range</u> | <u>Resolution</u> | <u>Accuracy</u> |
|----------------|-------------------|----------------------|
| ± 32000 Pa | 1 Pa | ± 5 Pa |
| ± 300 hPa | 0.01 hPa | ± 0.05 hPa |
| ± 400 hPa | 0.1 hPa | $\pm 3\%$ of reading |

Model: QMI 3500-15

| <u>Range</u> | <u>Resolution</u> | <u>Accuracy</u> |
|------------------|-------------------|----------------------|
| ± 309.99 hPa | 0.01 hPa | ± 10 hPa |
| ± 1040.0 hPa | 0.1 hPa | $\pm 3\%$ of reading |

Model: QMI 3500-30

| <u>Range</u> | <u>Resolution</u> | <u>Accuracy</u> |
|------------------|-------------------|----------------------|
| ± 1076 hPa | 0.1 hPa | ± 10 hPa |
| ± 2070.0 hPa | 1 hPa | $\pm 3\%$ of reading |

Dimensions

| | |
|--|---|
| Weight | 310 grams with battery |
| Handset | 160mm x 80mm x 40mm (180mm incl. spigots) |
| Ambient Operating Range | +0°C to +45°C 10% to 90% RH non- condensing |
| Power Supply | 9 Volt PP3 alkaline battery |

8. ELECTROMAGNETIC COMPATIBILITY

European Council Directive 89/336/EEC requires electronic equipment not to generate electromagnetic disturbances exceeding defined levels and have adequate immunity levels for normal operation. Specific standards applicable to this meter are stated below.

As there are electrical products in use pre-dating this Directive, they may emit excess electromagnetic radiation levels and, occasionally, it may be appropriate to check the meter before use by:

Use the normal start up sequence in the location where the meter will be used.

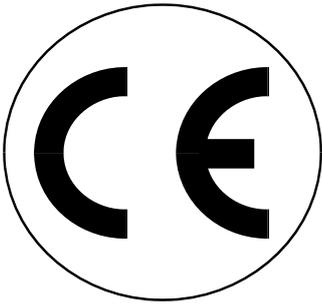
Switch on all localized electrical equipment capable of causing interference.

Check all readings are as expected. A level of disturbance is acceptable.

If not acceptable, adjust the meter's position to minimize interference or switch off, if possible, the offending equipment during your test.

At the time of writing this manual (Jan 2010) QMI Europe Ltd are not aware of any field based situation where such interference has occurred and this advice is only given to satisfy the requirements of the Directive.

ELECTROMAGNETIC COMPATIBILITY



This product has been tested for compliance with the following generic standards:

EN 61000-6-3:2001

EN 61000-6-1:2001

and is certified to be compliant

Specification EC/EMC/KI/QMI3500 details the specific test configuration, performance and conditions of use.

Please Note:

Batteries used in this instrument should be disposed of in accordance with current legislation and local guidelines.

At the end of its life the meter should be sent to the appropriate recycling centre in accordance with current legislation and local guidelines.

APPENDIX 1 – Main Parameters :

UNITS : User selectable from :
PSI
hPa
inH2O
mbar
mmH2O
Pa
kPa

NOTE! Not all units available on all models.

DATE : Date shown as day, month and year. The order can be changed using the menu function. Date is recorded when each test is printed.

TIME : The time is shown in hours and minutes, expressed in « Military » time or the 24 hr clock. Time is recorded when each test is stored/printed.

NOTE! When changing the batteries on the instrument the memory will store the date and time for up to one minute, if outside this time it may be necessary to re-enter the details.

SYMBOLS used on the display.

T The internal temperature of the meter

P The pressure reading in the user's selected units



Displays the Battery power available in %

When the LO BAT symbol appears this indicates the batteries are less than 10% of charge and should be replaced, readings may be affected if used with low power batteries