i/fB 3 User Guide:
Project FMD090619 board guide.

V1.0

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Contents.

1. Introduction

The PPM Technology interface board (ifB) has been designed to connect a PPM Technology Formaldemeter or Glutaraldemeter to third party systems. The interface board can be configured to give either a 4-20mA current output or a number of different voltage outputs and also give a relay alarm output if a pre-set threshold has been exceeded. Various modes of operation are available to suit a whole array of uses, applications and situations.

Typical Uses:

- Simple integration into existing sensor networks.
- PLC control systems.
- Stand–alone area monitoring.
- Clean rooms; Packing rooms & Workshops.
- Single-point remote monitoring.

Modes of operation.

The ifB can be used in one of three sampling modes, depending on what best suits your needs. These are: Triggered, continuous and timed mode.

Triggered mode

In this mode samples are only taken when a valid signal is detected on the sample input line. Sample requests are only processed when the Error line is low. This only occurs if the instrument has cleared sufficiently. The clearing time can vary based to on the concentration of the previous sample (higher concentrations take longer to clear). This is ideal for use with PLC or other controller based systems as the input lines control the sampling rate and the current status is available as logic levels on the output lines.

Continuous mode

This mode does not require any external trigger for sampling. Samples are taken as often as possible by the PPM instrument. The sampling duration would be dependant on factors such as sample concentration (e.g. higher concentration samples will take longer to clear and will delay the next sample). This mode is easy to set-up and is ideal for applications where no controller is available or the sampling frequency can vary.

Timed mode

This mode does not require an external trigger but unlike the previous Continuous mode it uses an internal timer to trigger samples at a set frequency. This frequency can be adjusted by the user between 1 and 60 minutes in increments of a single minute. However, the sampling frequency is not guaranteed as samples may be delayed if the PPM instrument is not ready to sample at the designated time.

A configuration menu allows the user to choose output type; operation mode; select output tests; sampling range and also calibrate the PPM instrument. The menu also allows for the incorporated voltage-less relay to be triggered at various concentrations so that external equipment can be controlled.
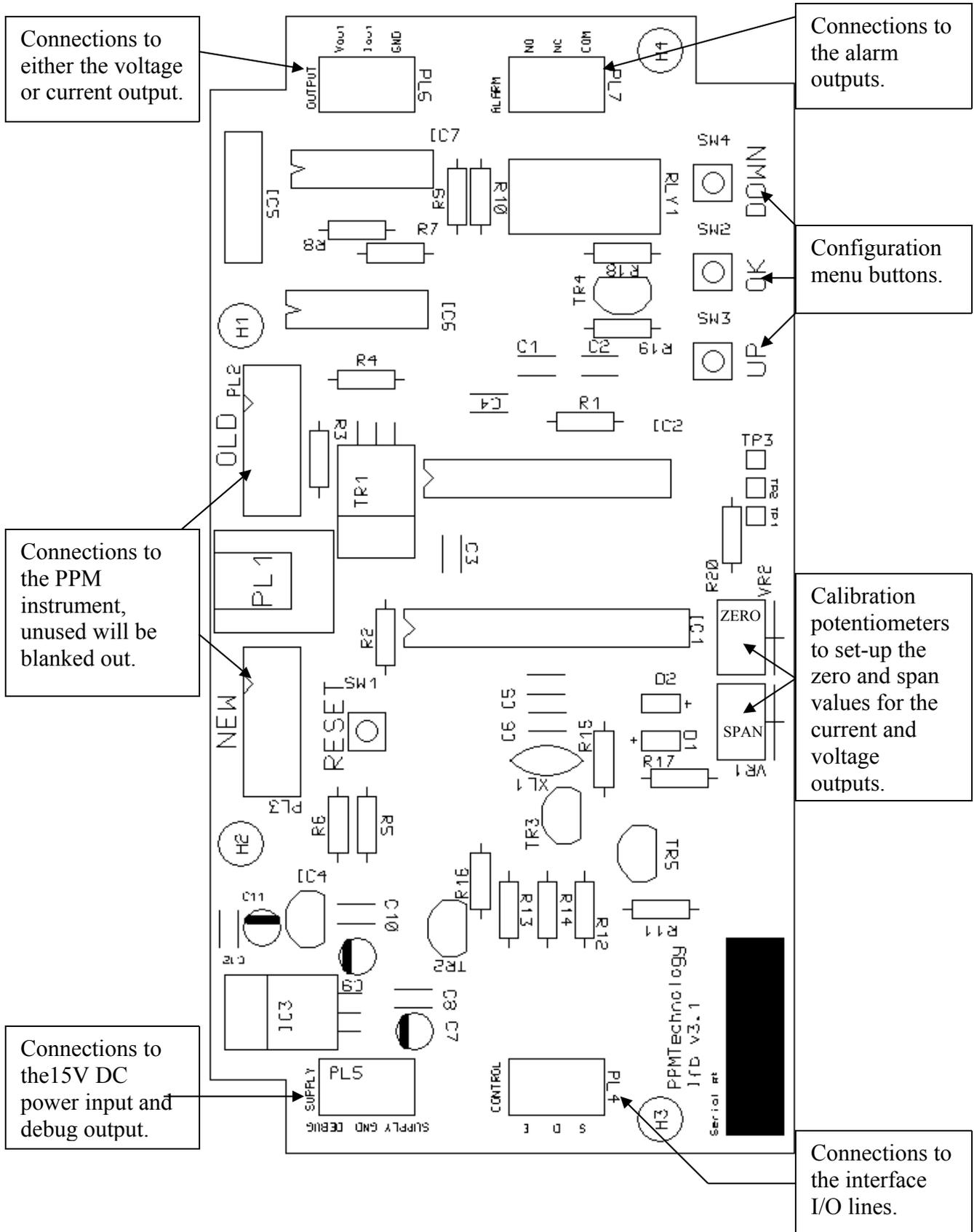
Specifications:

Supply	15V DC (Mains adaptor supplied)
Input Concentration	0–10ppm (1ppb resolution)
Selectable Input Full Scale Deflection FSD.	2.5ppm; 5ppm;10ppm or 100ppm
Analogue Outputs	0–2.5v; 0–5v; 0–10v; or 4–20mA
Analogue Resolution	16–bits (65536 steps from zero to FSD)
Digital I/O	Sample, Data & Error
Alarm Relay	Rated at 0.5A@125VAC/2A@30VDC
Advanced Features	Simple administration menu to change settings; Analogue test patterns & calibration output cycle; Instrument calibration routine; Backup of samples stored in non-volatile memory.
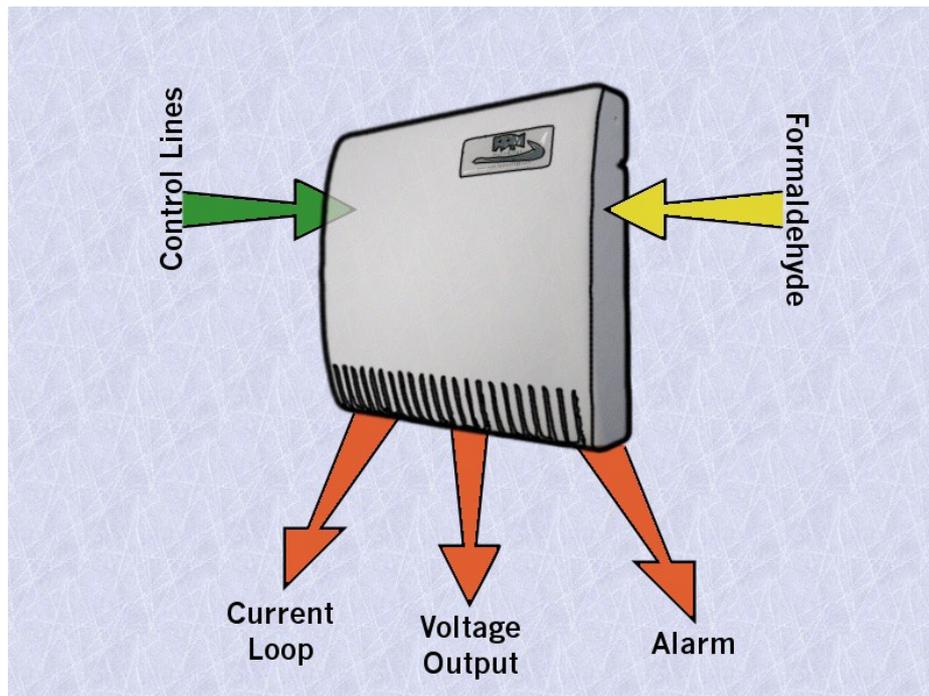
The PPMonitor instrument is housed in a rigid wall mountable white ABS enclosure. The instrument is powered via 15v DC mains power adaptor (supplied).

Within the enclosure the interface board will already be connected to a PPM instrument. To connect the voltage or current output to a third party devices, simply open the instrument by unscrewing the four pozi screws on the back and remove the enclosure from the back plate and connect to PL6 connector as shown in figure 1.1. Similarly connect the interface I/O lines to a third party device via PL4 and alarm output to PL7. Additional holes may be required in the metal plate for the cables, this is left to the discretion of the customer, since most applications that use the interface board are slightly different.

2. Board Layout.

Figure 1.1. The main features of the i/fB v3

Connections to either the voltage or current output.

Connections to the alarm outputs.

Configuration menu buttons.

Connections to the PPM instrument, unused will be blanked out.

Calibration potentiometers to set-up the zero and span values for the current and voltage outputs.

Connections to the15V DC power input and debug output.

Connections to the interface I/O lines.

3. Connecting to the Board.

By following these instructions one should be able to correctly connect power and third party systems to the interface board – if in doubt ask a qualified engineer for help or contact your distributor or PPM Technology Ltd. for assistance. Many features are for test, maintenance and set up only and are rarely used.

First of all ensure that the PPM instrument you wish to use is properly set up and calibrated. When the instrument is first sent to you it should already be calibrated. However, you will need to regularly check the calibration of the instrument and recalibrate if any drift occurs. In-order to calibrate you will need a valid PPM Technology Formaldehyde calibration standard (calibration standards have a six month shelf life).

Assuming that the PPM instrument is connected, calibrated and configured correctly then as soon as power is connected to the interface board the PPM instrument should show the message **iF:b.3** on it's screen. It will then enter Timed/Continuous mode (**timE**) or Triggered mode(**trig**). Once a sample is taken the last value received is displayed on the LCD screen. If the instrument is not calibrated it will go to the calibration section of the configuration menu (**r.CAL**). (See section five for details of the calibration routine). If the interface board is not configured correctly it will go to the configuration menu (**L.run**). (See section four for details of the configuration menu).

If you request a specific set-up for the interface board before the instrument is sent to you we will make sure that the board is correctly configured and ready for use. You can change the board configuration at any time by use of the configuration menu.

Available Connections:

Supply & GND

Connect a power supply to these terminals with the negative terminal connected to GND. The supply should be a ground referenced regulated DC voltage between 15V and 32V.

Iout & GND

When configured for current output a regulated 4mA to 20mA current output dependant on the detected formaldehyde concentration is available on these pins.

Vout & GND

When configures for voltage output a voltage output that is dependant on the detected formaldehyde concentration is available on these pins. The voltage output can be set by the interface board to give a 0–2.5v, 0–5v or 0v–10v.

The interface I/O lines (PL4) are at TTL levels. The interface I/O lines are Sample (S), Data (D) and Error (E).

Sample

Used in Triggered mode to request a sample from the PPM instrument is required. The board can be set up to trigger on either a rising or falling edge on the Sample line. This is an input from an external system.

Data & Error

The Error and Data output lines tell us the status of the interface board to a third party system:
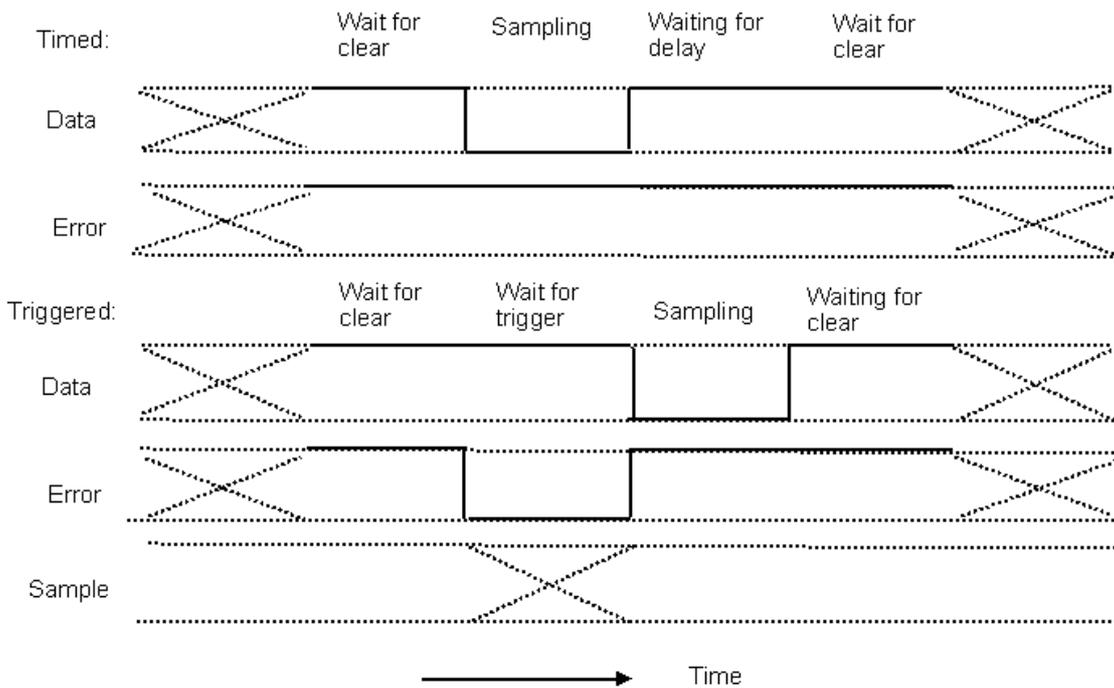
Figure 3.1 – Status indication time line.

Table 3.1 – The status indicator table

	Waiting for clear	Waiting for trigger	Sampling	Waiting for delay
Data	High	High	Low	High
Error	High	Low	High	High

From the table we see that the Error line gives the status of the trigger while the Data line gives the status of the sampling. The Error line is low when the interface board is waiting for an external trigger. The external circuitry will need to keep track of the Error signal, if the external circuitry attempts to trigger a sample when error is high then the interface board will ignore this trigger. The Data line keeps a record of the validity of the output signal, the data is valid if the system is not sampling. The state

of the data line changes from low to high after a sample finishes to show that a new reading is available. The Error line also pulses if there is no PPM instrument connected or if the calibration on the PPM instrument is invalid. If the calibration is invalid then the error line pulses for a time and then enters the calibration section in the configuration menu.

N.B: "Waiting for trigger" only occurs in Triggered mode whilst "Waiting for delay" only occurs in Timed mode.

Relay

The Relay Common (COM) pin will switch from Normally Closed (NC) to Normally Open (NO) when the formaldehyde concentration exceeds a predefined value set-up in the configuration menu. You can use the relay alarm outputs to switch third-party circuitry. You will need to power this circuitry separately as the relay contacts are of the voltage-free type.

Debug

This pin is used in in-house tests for fault detection. Do not use.

4. Board Set Up and Configuration

The configuration menu performs the set up and configuration of the board. If the system is not set-up then the micro controller jumps into the configuration menu. However if the system has been previously set-up you can get to the configuration menu by holding down the OK button at power-up. You can navigate through the configuration menu by using the UP, DOWN and OK buttons. The interface board stores it's last configuration menu selection in the EEPROM of the micro controller. After the configuration has been set up the user can finish configuration by navigating to the 'done' menu option and pressing OK – This reboots the code.

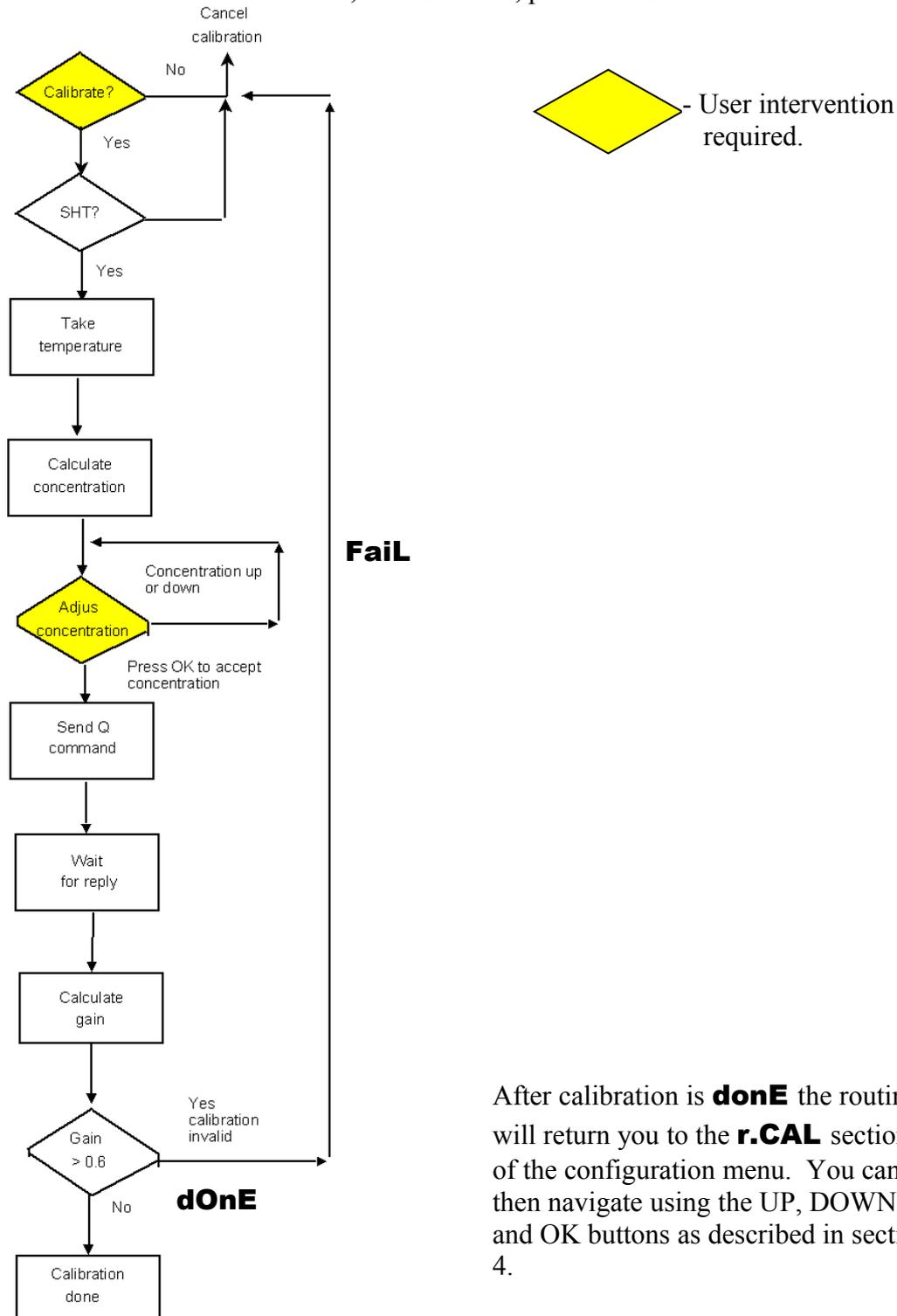**Configuration menu:**

1. **L.run** – Run type
   [Press OK to select or UP/DOWN to scroll through configuration menu options].
   - **timE** – Timed / Continuous mode
   [Press OK to select or UP/DOWN to scroll through Run type options].
     i. **1** to **60** – Timed delay between samples in increments of 1 minute
        [Press OK to select or UP/DOWN to scroll through the time delay options].
     ii. Set to zero to enable Continuous mode.
   - **trig** – Triggered mode.
     i. **LH** – Trigger sampling on low to high edge.
     ii. **HL** – Trigger sampling on high to low edge.
        [Press OK to select or UP/DOWN to scroll through trigger edge options].
2. **L. AL** – Level of alarm.
   - **0.1** to **10.0** or if the PPM instrument set-up for high concentration **1** to **100** – Alarm threshold level in ppm.
     [Press OK to select or UP/DOWN to scroll through Alarm options]
   - Set to zero to turn off the alarm feature.
3. **L. OP** – Output type.
   - 0v–10v voltage output – **0-10**
   - 0v–5v voltage output – **0-5.0**
   - 0v–2.5v voltage output – **0-2.5**
   - 4–20mA current output – **4-20**
     [Press OK to select or UP/DOWN to scroll through output type options]

4. **L.tst** – Test outputs.
   - **SPAn** – Output to full scale **(**span). Once the test option has been selected the test will run with ---- on the screen until OK is pressed again.
   - **ZerO** – Output to zero. Once the test option has been selected the test will run with ---- on the screen until OK is pressed again.
   - **iP** – Input test. When Sample input changes it shows **H** or **L** on the LCD screen from High to Low as Sample TTL logic level changes.
   - **oP** – Output test. When Sample input changes it shows **H** or **L** on the LCD screen depending on the Sample TTL logic level and Data and Error logic levels and the Relay output follows the Sample line.
   [Press OK to select or UP/DOWN to scroll through test output options].

5. **modE** – ppm concentration for FSD on the analogue output.
   - **2.5** – 2.5ppm full scale.
   - **5** – 5ppm full scale.
   - **10** – 10ppm full scale.
   - **100** – 100ppm full scale.
   [Press OK to select or UP/DOWN to scroll through ppm concentration for zero options].

6. **r.CAL** – Remote calibration.
   - **YES** – Execute remote calibration of the connected PPM Instrument.
   - **NO** – Cancel remote calibration
   [The remote calibration routine will be explained later].

7. **dOnE** – Done (When this option is selected the program will exits the configuration menu).

5. Calibration Routine

The interface board also has a calibration menu option. If the calibration is successful the screen will show **done**. If the calibration has failed for any reason then **FaiL** will be shown.

The remote calibration routine, once selected, proceeds as follows:

- User intervention required.

After calibration is **donE** the routine will return you to the **r.CAL** section of the configuration menu. You can then navigate using the UP, DOWN and OK buttons as described in section 4.

6. Further Developments and Suggestions.

Please fill in this page with your comments or suggestions and return to
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