SERVOMEX

QuickStart™

2700
Combustion Gas Analyser

Please record your analyser details below

Part Number	
Serial Number	
Tag Number	

GB OPERATING INSTRUCTIONS ☐

I ISTRUZIONI PER L'USO ☐

D BEDIENUNGSANLEITUNG ☐

F MODE D'EMPLOI ☐

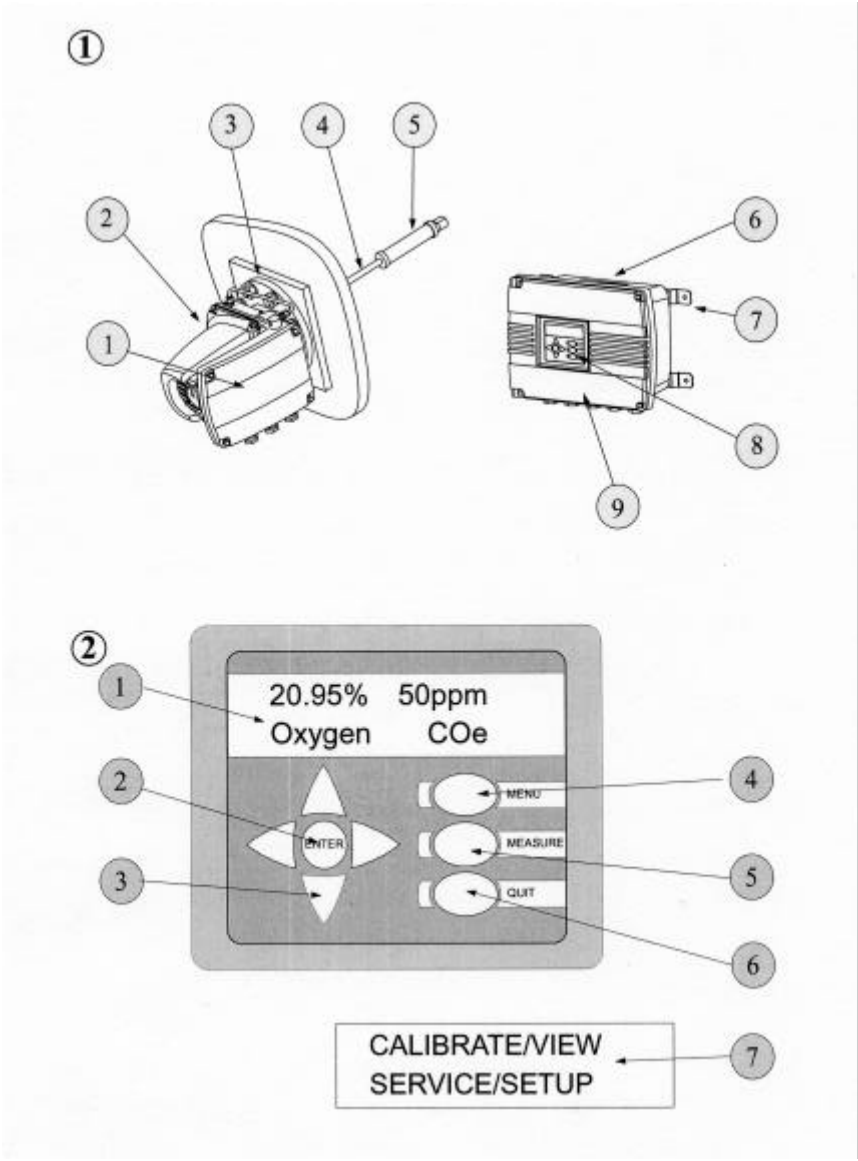
NL HANDLEIDING ☐

E MANUAL DE INSTRUCCIONES ☐

P MANUAL DE INSTRUCOES ☐

J 運転指針 ☐

C 中文 操作指導 ☐


①
3
4
5
2
1
6
7
8
9
②
1
20.95% 50ppm
Oxygen COe
2
3
ENTER
MENU
MEASURE
QUIT
4
5
6
CALIBRATE/VIEW
SERVICE/SETUP
7

1. INTRODUCTION

1.1 Warnings, Cautions and Notes

This manual includes **WARNINGS**, **CAUTIONS** and **NOTES** which provide information relating to the following:

WARNINGS

Hazards which could result in personal injury or death

CAUTIONS

Hazards which could result in damage to equipment or property

NOTES

Alert the user to pertinent facts and conditions

1.2 Scope of this manual

This manual describes the operation of the **Servomex 2700** Combustion Gas Analyser and details the various options that are available.

- For the technical specification, see Section 5 of this manual.
- For installation details, see the Installation Manual (part no. **02700005B**).
- For servicing details, see the Service Manual (part no. **02700002B**). This is written for use by suitably qualified personnel.
- For the addresses for technical assistance and spares, see the rear cover of this manual.

About this manual

Reference: 02700/003B/5
Order as part number: 02700003B

CE Marking

The Servomex 2700 analyser carries the CE mark which indicates conformity with the European Community Directives on CE Marking (93/68/EEC), Electromagnetic Compatibility (EMC 89/336/EEC) and Low Voltage Directive (LVD 73/23/EEC).

Servomex 2700 control units are marked in conformity with the Explosive Atmospheres (ATEX) Directive (94/9/EC) when fitted with a European hazardous area certification marking plate.

1.3 Key to Figures on inside of front cover of this manual (Figures 3a and 3b can be found at the end of this manual)

Figure 1 Sensor head and control unit

1	Terminal box	6	Control unit
2	Sensor head	7	Wall mounting straps
3	4" mounting flange	8	Display and keypad
4	Sample probe	9	Hinged access door
5	Sample filter		

Figure 2 Control unit display and keypad layout

1	LCD with measurement display	5	**MEASURE** key
2	**ENTER** key	6	**QUIT** key
3	**ARROW** keys	7	Alternative main menu display
4	**MENU** key		

NOTES

As good practice it is recommended that the analyser is checked/validated with check gas every month and then calibrated as required. This period can be extended as a result of operating experience.

2. STARTUP AND SHUTDOWN

2.1 Analyser startup

CAUTION

If the analyser is to be installed in a low temperature environment (-20°C) then it should be powered up for a period of two hours before the compressed air aspirator supply is applied. This prevents corrosive sample gases from condensing inside the sensor head pipe work.

If the sensor head and sample probe have been removed from the flue, then refit the sensor head and sample probe to the flue and reconnect any interconnecting wiring (see Installation Manual).

Switch on the electrical power to the sensor head and to the control unit.

Leave the unit for two hours to warm up and then check that no faults are indicated on the control unit display screen.

Connect the aspirator air supply to the sensor head. The correct operating pressure is stated on a label attached to the inside of the terminal enclosure on the side of the sensor head.

If necessary, connect calibration gases to the sensor head to verify correct operation. See Section 3.4 for Calibration procedure.

NOTES

- The analyser should be allowed to stabilise for several hours (typically overnight) before calibration.
- It is then recommended that calibration gases be passed through the sensor head to confirm operation of the analyser.

2.2 Analyser shutdown

WARNING

The sensor head is heated and may be attached to a hot flue. The external surfaces will be uncomfortably hot even after power down for several hours. Exercise care when handling the sensor head even when un-powered on a hot flue.

CAUTION

- The sensor head should always be powered when left on a flue which is in use. If left un-powered, the sensor head can suffer corrosion damage.
- If the process is out of service for a short time it is recommended that the analyser sensor head is left powered. It is not essential that the aspirator air is left flowing.
- If the analyser has to be switched off for more than 1 week whilst on a flue which is in use, it is recommended that a flow of dry air be connected to the calibration port. Alternatively, the sensor head can be removed from the flue and a blanking plate fitted. This will prevent corrosive gases from entering the sensor head.

Attach a dry air supply to the calibration port of the sensor head and purge the sensor head for 5 minutes at 600 ml/min flow rate. The aspirator air supply should be left on at this point.

Switch off the aspirator air supply to the sensor head.

Switch off the electrical supply at the control unit and then at the sensor head.

Leave the sensor head to cool down for a minimum of two hours.

If the analyser is to be un-powered for more than 1 week then please note the cautions above.

3. OPERATION

3.1 Operating the analyser (Refer to Figure 2)

The Servomex 2700 control unit has a tactile 8 button keypad and back lit LCD (2 lines x 16 characters). During normal use the LCD will display either the default measurement display or a menu-based screen editor display. A user can toggle between the menu display and measurement display and access the menu-based screen editor using the keypad.

The functions of the keys on the keypad are:

MEASURE Returns the analyser to the measurement display.

MENU Activates the top level menu of the screen editor.

QUIT Aborts the current activity returning the screen editor to the menu level at which the activity was selected.

ARROWS Arrow keys select the desired option. When entering numeric information, the left and right arrow keys are used to move between digits and the up and down arrow keys are used to change the value of each digit. The active digit is highlighted by blinking. The user presses the '**ENTER**' key to indicate that the numeric input is complete and the data is to be saved. If the '**QUIT**' key is pressed then the data is not saved and the input is aborted.

Measurement display - Scrolls through alarm and/or fault messages.

ENTER Indicates that the menu selection is to be processed or that numerical input is complete.

To initiate any menu operation the **MENU** key should be pressed. The LCD will then present the top level menu, which in turn leads on to other menus.

At each menu, the user highlights the desired option using the arrow keys and then presses **ENTER**. Blinking is used to highlight the selected menu option. During any menu operation, the fundamental measurements are still being made by the analyser and all relevant outputs, alarms and diagnostics remain active.

The measurement display is shown in Figure 2. The top line of the display shows the current measured value (with its units) for each of the sensors fitted.

In normal operation the bottom line of the display labels the gases measured. Should a fault or alarm occur then the lower line of the display will detail the nature of the fault or alarm. Should more than one fault and/or alarm be active then arrow keys on the keypad may be used to scroll through these messages.

The fault messages that may appear are as follows:

OXYGEN LOW	Oxygen too low for reliable COe measurement
OXYGEN °C LOW	Oxygen sensor temperature too low
OXYGEN °C HIGH	Oxygen sensor temperature too high
COe mV LOW	Combustibles sensor output voltage low
COe mV HIGH	Combustibles sensor output voltage high
COe °C LOW	Combustibles sensor temperature too low
COe °C HIGH	Combustibles sensor temperature too high
SENSOR °C HIGH	Sensor head temperature too high (OPTIONAL)
SENSOR °C LOW	Sensor head temperature too low (OPTIONAL)
AUTO CAL FAIL	Autocalibration out of tolerance error
COe mV OUTPUT LOW	Combustibles sensor sensitivity low (updated after calibration only)
COe CONC HI	Combustibles sensor has been exposed to very high Coe levels
mV OUT OF TOLERANCE	Combustibles sensor mV greater than +/-60mV
DISPLAY OVER RANGE	Measurement is too large to display
COe WARMING	Combustibles sensor is warming up
O_2 WARMING	Oxygen sensor warming up

The **MEASURE** key may be used to return to the measurement display at any time.

3.2 View/Configure functions (Refer to Figures 3a & 3b)

The view functions allow the user to interrogate the analyser diagnostics and examine the alarm and fault history logs. No password is required to access the view functions. The view functions are updated dynamically and values may change while they are being viewed. To access this display, press the **MENU** key and then select **VIEW**. If the **DIAGNOSTICS** option is chosen, the diagnostics appear as a scrolling list of values and associated descriptions. There are up to ten diagnostics depending on which sensors are fitted.

The ↑ ↓ keys are used to switch between the following diagnostic measurements:

Software version
Oxygen sensor output voltage in mV
Oxygen sensor temperature in °C
Oxygen high calibration point in mV
Oxygen low calibration point in mV
Combustibles sensor output voltage in mV
Combustibles sensor temperature in °C
Combustibles high calibration point in mV
Combustibles low calibration point in mV
Probe head temperature in °C (if connected)

If the **HISTORY** option is chosen, either the alarm or fault history logs can be examined. The ↑ ↓ keys are used to scroll through the list of history entries in chronological order.

The configure function allows the user to modify and view the analyser settings. These functions are password protected. To access these functions, press the **MENU** key, select **CONFIGURE** and then enter a password. There are two passwords that can be entered; a supervisor password (default - 2700) which gives access to **CALIBRATE**, **VIEW**, **SERVICE** & **SETUP** and an operator password (default - 2000) which gives access to **CALIBRATE** and **VIEW** only. Both passwords are factory set and may be changed if required.

3.3 Analyser setup (Refer to Figures 3a and 3b)

The setup function allows the user to modify and view the analyser configuration (outputs, alarms, blowback, clock, passwords and auxiliary air).

3.3.1 Setting up the concentration alarms

The control unit has 2 concentration alarms that can be assigned to either of the 2 possible sensors in the sensor head. Each concentration has a user configurable level, hysteresis and polarity (high or low alarm).

Each alarm may also be configured to either freeze (remain fixed at the last value) or follow (track the concentration changes) during analyser calibration.

The setup process is as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **ASSIGN**.
2. Select **ALARMS** to set up the concentration alarms.
3. Select **AL1** or **AL2** to specify which alarm is to be set up.
4. Select either **NONE**, **OXYGEN** or **COe** to disable the alarm or to specify the measurement to be the subject of the alarm.
5. Select either **FREEZE** or **FOLLOW** to specify if the alarm is to be fixed at its current value or to track the concentration during analyser calibration.
6. Select either **LOW** or **HIGH** to specify the alarm as a low alarm or a high alarm.
7. Use the **arrow keys** followed by the **ENTER** key to set the concentration level at which the alarm is to be triggered.
8. Use the **arrow keys** followed by the **ENTER** key to set the hysteresis on the alarm level.

The alarm assignment is now complete and the user is returned to the select alarms display (step 3 above) to allow other alarms to be configured. Use the **QUIT** or **MEASURE** key to return to the assign menu or the measure display as required.

3.3.2 Setting up the relay outputs

The Servomex 2700 analyser is supplied with 4 relay outputs that can be assigned to a number of outputs. Output options include concentration alarms, analyser fault, calibration in progress, blowback in progress, autocalibration solenoid valve control lines and blowback solenoid valve control line.

Default relay assignments are: Relay 1 is concentration alarm (AL1), Relay 2 is concentration alarm (AL2), Relay 3 is Analyser Fault (AF) and Relay 4 is the 'IN CALIBRATION' message. The default assignments can be changed as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **ASSIGN**.
2. Select **RELAYS** to set up relay outputs.
3. Select **1**, **2**, **3** or **4** for the relevant relay number.
4. The available assignments are presented as a scrolling list. Use the ↑ or ↓ keys to select the required assignment and then press the **ENTER** key.

The possible relay assignments are:

ALARM 1	Concentration alarm AL1
ALARM 2	Concentration alarm AL2
FAULTS	Analyser fault present AF
IN CALIBRATION	Calibration in progress
IN BLOWBACK	Blowback in progress
GAS 1	Autocalibration gas 1 solenoid valve
GAS 2	Autocalibration gas 2 solenoid valve
GAS 3	Autocalibration gas 3 solenoid valve
BLOWBACK AIR	Blowback air solenoid valve

5. The display is returned to the relay number select screen to allow other relays to be assigned. Use the **QUIT** or **MEASURE** keys to return to the assign menu or measurement display as required.

3.3.3 Setting up the analogue outputs

The Servomex 2700 is supplied with one dedicated analogue output for each sensor fitted in the sensor head (maximum of 2 analogue outputs). Each analogue output has a minimum and maximum analogue output range.

For the oxygen sensor, 0-1% is the minimum range and 0-25% is the maximum. For a 1750702 combustibles sensor, 0-500ppm is the minimum range and 0-10000ppm is the maximum. For a 1750703 combustibles sensor, 0-500 is the minimum and 0-30000 is the maximum.

Each analogue output can be configured as either 0-20mA or 4-20mA and to either freeze (remain at the last value) or follow (track the concentration changes) during calibration and blowback. The 20mA high point is limited to an over-range of 20.5mA during normal operation. If 4-20mA is selected, then this can also be configured to under-range that can be set down to 3.6mA in 0.1mA increments.

An optional "Jam" facility is available to allow the output to set to 0mA (LOW) or 21mA (HIGH) when an analyser fault is detected. The outputs are capped so that their value can not exceed 21mA. The setup process is as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter the supervisor password, select **SETUP** and then **ASSIGN**.
2. Select **mA OUTPUTS** to set up the analogue outputs.
3. If two sensors are fitted then the analyser will prompt the user to select the output to be configured. Select either **OXYGEN** or **COe** to specify the output dedicated to the oxygen sensor or combustibles sensor as required.
4. Select the measuring range required, then **ENTER**.
5. Select either **FREEZE** (to freeze the output at the last value) or **FOLLOW** (to follow concentration changes during calibration or blowback).
6. Select either **4-20mA** or **0-20mA** for the analogue output type.
7. If 4-20mA is selected, set the low limit desired.
8. Select either **LOW**, **HIGH** or **NONE** to specify whether the output should be fixed at 0mA (LOW), 21mA (HIGH) or be unaffected should an analyser fault occur.

The analogue output configuration is now complete. The user is returned to the sensor selection display (step 3 above) to allow other analogue outputs to be configured. Use the **QUIT** or **MEASURE** keys to return to the assign menu or measurement display as required.

3.3.4 Setting up a blowback process

The blowback procedure allows the user to apply a burst of a selected gas to the calibration port of the analyser to back flush the sample probe and filter. The blowback gas is controlled via a solenoid valve switched by one of the relay outputs. The required relay output must be assigned before starting a blowback operation. The blowback setup will include a start time and date, a time period between blowback processes, and a duration for the blowback process.

A blowback operation may be executed by one of the following means:

1. By timer when the indicated start time and date is reached.
2. By external contact closure between pins 13 and 14 on terminal block TB2 on control unit PCB.
3. From the keypad using the **START BLOWBACK** entry in the setup blowback menu. The supervisor password will be required and a relay output must be assigned to blowback.

If a start date and time is not set then the blowback can only be initiated by contact closure or from the keypad. If the period between blowback processes is set to zero then only a single timed blowback will be executed. The process for setting the blowback parameters is as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **BLOWBACK**.
2. Select **SET UP BLOWBACK** to set the blowback parameters.
3. Use the arrow keys to define the duration in minutes (**MM**) and seconds (**SS**) of the blowback. Use the **ENTER** key to save the value.
4. Use the arrow keys to define the period in days and hours, between successive blowback processes. Use the **ENTER** key to save the value.

5. Use the arrow keys to define the start date for the first blowback. The format will be either day/month/year (**DDMMYY**) or month/day/year (**MMDDYY**) as defined in the setup clock procedure (see Section 3.3.5).
   Use the **ENTER** key to save the value.
6. Use the arrow keys to define the start time for the first blowback. Use the **ENTER** key to save the value.
   Successive blowback operations will start at the time and frequency previously set.

NOTE

After completion of the BLOWBACK process, if FREEZE has also been selected the analogue outputs remain at freeze and display shows ‘flushing’ for a fixed period of 90 seconds.

3.3.5 Setting up the real time clock and date format

The process for changing the time, date and the date display format is as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **UTILITY**.
2. Select **CLOCK** to change the time and date.
3. The current time and date will be shown on the display for 4 seconds before proceeding. Select **YES** to continue changing the time/date or **NO** to return to the utility menu.
4. Use the arrow keys to define the new date. The date will be specified either as day/month/year (**DDMMYY**) or month/day/year (**MMDDYY**). Press the **ENTER** key to save the new date.
5. Use the arrow keys to define the new time. The format is hours:minutes (**HH:MM**).
6. Select either **DDMMYY** or **MMDDYY** to specify if dates are to be displayed in day/month/year or month/day/year format.
7. The new time and date will be displayed in the selected format for 4 seconds before returning to the utility menu.

3.3.6 Setting a new password

Both passwords are factory set and can be changed as follows:

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **UTILITY**.
2. Select **PASSWORD** to change the passwords.
3. Select either **SUPERVISOR** (default - 2700) or **OPERATOR** (default - 2000) to define which password is to be changed.
4. Use the arrow keys to set a new 4 digit password. Use the **ENTER** key to save the new password.
5. The new password will be repeated by the analyser. Select either **YES** or **NO** to accept or reject the new password value.

3.3.7 Setting the auxiliary air option

This option allows the user to define that auxiliary air is applied to the sensor head. Informing the analyser software of the auxiliary air status is required for dual sensor configuration. If auxiliary air is not applied to the sensor head (only on some older analysers) then the analyser will warn the user when the oxygen level present is too low for the combustibles sensor to produce a true reading.

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password, select **SETUP** and then **UTILITY**.
2. Select **AUX AIR** to set the auxiliary air status.
3. Select either **YES** or **NO** to indicate if auxiliary air is applied to the sensor head or not.

3.4 Calibration (Refer to Figures 3a & 3b)

The operator/supervisor passwords are required to access the calibration functions. The user may either perform a manual calibration, set up the automatic calibration parameters or execute an automatic calibration. Servomex recommend that the oxygen sensor is calibrated every three months and the combustibles sensor every one month. In some applications the calibration interval may be extended as a result of operating experience.

During manual calibration, a LOW calibration must be made prior to a HIGH calibration for the combustibles sensor.

NOTE

When a low calibration is performed, the zero may be offset between the limits of -250 and +99ppm which enables the effects of non-CO combustibles to be compensated for. If this is done, the span calibration target value should be adjusted by the same amount in order to maintain accuracy. E.g. if the zero is adjusted by -50ppm then the span should be set to 450ppm when using a 500ppm CO calibration gas.

3.4.1 Manual calibration procedure

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid password and then select **CALIBRATE**.
2. If two sensors are fitted in the sensor head then select either **OXYGEN** or **COe** for the sensor to be calibrated.
3. Select **LOW CAL** or **HIGH CAL** for a low calibration or high calibration measurement. The procedure for performing the low or high calibration of an OXYGEN or COe sensor are the same.
4. Use the arrow keys to set the actual concentration value for the calibration gas used. Press the **ENTER** key to accept the value.
5. Use the arrow keys to set the required tolerance level. This is the permitted change in the stored calibration value. Press the **ENTER** key to accept the value.
6. Apply the calibration gas to the sensor head calibration port at a flow of 600ml/min. Note: if autocalibration is selected then the relay outputs will be automatically set to admit the required calibration gas.
7. Wait until the value displayed on the screen is stable. Select **Y** and the **ENTER** key to accept the measured value. Note: the displayed value will be calculated using the existing stored calibration value.
8. Should the user accept a value that is outside of the tolerance limits an **OUT OF TOLERANCE** message will be displayed. Select **Y** or **N** and press the **ENTER** key to accept or refuse the new calibration value.

9. Press **MEASURE** to view and check the actual concentration value and then remove the calibration gas from the analyser.

3.4.2 Automatic calibration

The automatic calibration facility allows the Servomex 2700 analyser to perform routine calibrations without user intervention. The calibration procedure to be used is specified by a number of calibration parameters. These parameters must be set up before an autocalibration is started. The autocalibration procedure can perform either a low calibration only or a high and low calibration on either one or both of the possible sensor combinations in the analyser.

An automatic calibration may be started in three ways:

1. **By timer**
   The automatic calibration will commence when a specified start time and date is reached. If the start time is not specified then the timed start is disabled. The calibration procedure will then be repeated at specified time intervals. If the specified time interval is zero then only one calibration process will be done.
2. **By contact closure**
   The automatic calibration will commence when the automatic calibration initiation contacts (TB2 pins 11 and 12) are closed.
3. **From the keypad**
   From the **CALIBRATE** menu, select **AUTOCALIBRATE** and then **START AUTOCAL**.

In the automatic calibration process the calibration gases are admitted to the sensor head via remotely actuated solenoid valves. These solenoid valves are controlled by the relay outputs on the control unit PCB. If a single sensor is being calibrated then two gases and two relay outputs will be required. If two sensors are being calibrated then three gases and three relay outputs will be required. The relay outputs to be used are configured and assigned by the user in the Setup facility (see Section 3.3). Table 1 specifies the composition and calibration duty for the three calibration gases.

Table 1: Recommended calibration gas

Solenoid number	Gas composition	Oxygen sensor	Combustibles sensor
GAS 1	Zero air (20.95%(v) O_2)	HIGH	LOW
GAS 2	0.3%(v) O_2 balance N_2 *	LOW	N/A
* gas composition can be between 0.25% and 2.5% O_2 in N_2			
GAS 3	1000ppm(v) CO balance air**	N/A	HIGH
** gas composition can be between 500ppm and 1000ppm CO balance air for a 1750702 sensor, or 1000 to 2000ppm for a 1750703 sensor.			

The following procedure is executed on automatic calibration.

- The relay assignments are checked to ensure that the required relay contacts have been assigned as solenoid valve drives. If the relay assignments are incorrect then the autocalibrate will abort with an appropriate error message being displayed for 5 seconds.
- The required calibration gases will be admitted to the sensor head in turn. When each gas is admitted the process will wait for a user-defined flushing time before recording the calibration response values. Between 1 and 3 gases will be admitted depending on the calibrations to be performed.
- The new calibration parameters are calculated and compared with the existing stored values. If the change in the calibration parameters is outside of the specified tolerance values then the autocalibration is aborted, a fault is raised and the calibration values are not updated.

3.4.3 Setting up the automatic calibration parameters

From the **CALIBRATE** menu, select **AUTO CALIBRATE** and then **SET UP AUTO CAL**.

1. If two sensors are fitted in the sensor head then select **OXYGEN**, **COe** or **OXYGEN & COe** to calibrate either the oxygen sensor only, the combustibles sensor only or both the oxygen and combustibles sensors.
2. Select **LOW CAL ONLY** to perform a low point only calibration for the selected sensors or **LOW AND HIGH CAL** to perform both a low point and high point calibration.
3. The user will be prompted to enter a calibration level and tolerance level (see manual calibration procedure, Section 3.4.1) for the low (and, if selected, high) calibration gas for each sensor to be calibrated.
4. Use the arrow keys to select the flushing time to be used. This is the time delay to allow the reading to stabilise after each change of gases. The up/down keys alter the selection by 0.5 minutes over the range 0.5 to 8.0 minutes.
5. Use the arrow keys to set the time period between successive automatic calibrations. The period is specified in days with a range 0 to 999 days. If the period is set as 0 then only the first automatic calibration will be made.
6. The current date and time are displayed for five seconds for reference. Then use the arrow keys to set the start date and start time for the first automatic calibration. The start date and time will then be displayed for five seconds.
7. When the automatic calibration parameters are complete the display will return to the start time entry screen. The user should press the **QUIT** key if all is satisfactory.

3.5 Service functions (Refer to Figure 3b)

The supervisor password is required to access the service functions. The service functions are accessed by pressing the **MENU** key, then selecting **CONFIGURE**, enter a valid password and then select **SERVICE**.

3.5.1 Testing the analogue outputs

This function allows the user to test and adjust the analogue outputs. Select **SET OUTPUTS**, then **mA OUTPUTS**, then **0mA**, **4mA** or **20mA** and then press **ENTER** to set all the analogue outputs to 0, 4 or 20mA. If the span of the analogue outputs needs adjustment, then potentiometers RV3 and RV4 on the control PCB may be used to set the 20mA point for the combustibles and oxygen sensor outputs. Select **QUIT** or press the **MEASURE** key to return to normal measurement. The test function times out after 5 minutes.

3.5.2 Testing the relay outputs

CAUTION

Do not use this function if autocalibration is assigned to the relays as this could cause damage to the transformer in the utilities unit.

This function allows the user to test the operation of the relay outputs. Select **SET OUTPUTS**, then **RELAYS** and then **SET TO DISABLED** or **SET TO ENABLED** to set all 4 of the relay outputs to enabled or disabled state. Select **QUIT** or **MEASURE** to return to normal measurement. The test function times out after 5 minutes.

3.5.3 Delete history

Select **SERVICE** and then **HISTORY**. The option to delete the alarm and fault history logs is then available.

3.6 Software filtration (Refer to Figure 3b)

Due to the fast response of the analyser, it maybe required to 'slow' the measurement signal, allowing it to be integrated into certain control systems more easily.

This function allows the user to achieve this by setting a filtration rate for the analyser from 0 to 9, in unit increments; 0 being unfiltered and 9 being the maximum filtration rate. As a default the filtration rate is set to 0.

The software filter will also progressively reduce the output fluctuation of the instrument as the filter setting is increased from 0 to 9.

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid supervisor password, select **SETUP**.
2. From the **SETUP** menu, select **FILTER**.
3. If two sensors are fitted in the sensor head then select **OXYGEN** or **COe**.
4. Input a value from 0 to 9, then press the **QUIT** or **MEASURE** key when all is satisfactory.

The user may need to make several adjustments to optimise the filter settings for their process conditions and control system requirements.

3.7 Language options (Refer to Figure 3b)

The user is able to configure the display of the analyser to one of three languages; English, French or German.

1. Press the **MENU** key, then select **CONFIGURE**, enter a valid supervisor password and select **SETUP**.
2. From the **SETUP** menu, select **UTILITY**, then **LANG** and then select **ENGLISH**, **FRANCAIS**, or **DEUTSCH**.
3. Press the **QUIT** or **MEASURE** key, when all is satisfactory.

NOTES

4. ROUTINE MAINTENANCE AND SPARES

WARNING

2700 spares must be supplied by **Servomex**

4.1 Spare parts

Item	Servomex 2700 Control Unit - description	Spare part number
1	Control Unit PCB O_2 only	S2710903A
2	Control Unit PCB COe only	S2710913A
3	Control Unit PCB O_2 & COe	S2710923A
4	Transformer	4961-1173
5	Keypad Assembly	02710353
6	Display Assembly	2553-9307
7	Mains Protection Cover	S2710994
8	Purge Kit	S2710995
9	Breather	2371-0052
10	Wall Mounting Kit	S2710997
11	Rack Mounting Kit	S2710996
12	Enclosure Gasket Kit	S2700999
13	Fuse Kit (Control Unit & Sensor Head)	S2700998 *
* includes: F1.6A HRC (5 x 20mm), F2.5A HRC (5 x 20mm), F3.15A HRC (5 x 20mm) & F6.3A HRC (5 x 20mm)		

Item	Servomex 2700 Sensor Head - description	Spare part number
1	Sensor Head O_2 only, 100-120Vac	S2720704A
2	Sensor Head Low COe Only, 100-120Vac	S2720705A
3	Sensor Head High COe Only, 100-120Vac	S2720707A
4	Sensor Head O_2 & Low COe, 100-120Vac	S2720706A
5	Sensor Head O_2 & High COe, 100-120Vac	S2720708A
6	Sensor Head O_2 only, 220-240Vac	S2721704A
7	Sensor Head Low COe only, 220-240Vac	S2721705A
8	Sensor Head High COe Only, 220-240Vac	S2721707A
9	Sensor Head O_2 & Low COe, 220-240Vac	S2721706A
10	Sensor Head O2 & High COe, 220-240Vac	S2720708A
11	Solenoid Valve Kit	S2720993
12	Solid State Relay (SSR) Kit	S2720992
13	Sensor Head PCB O_2 only	S2720902A
14	Sensor Head PCB COe only	S2720912A
15	Sensor Head PCB O_2 & COe	S2720922A
16	Zr 703 Oxygen Cell	S2720995
17	Tfx 1750702 Combustibles Cell	S1750702
18	Tfx 1750703 Combustibles Cell	S1750703
19	Cell Connector O_2 only	S2720991
20	Cell Connector COe only	S2720990
21	Cell Connector O_2 & COe	S2720989
22	Aspirator pipe O_2 & O_2/COe	S2720988
23	Aspirator Kit	S2720987
24	Flame Trap Kit	00022907
25	Internal Filter/Flame Arrester Assembly	02720955
26	Thermostat Assembly	02720994
27	Thermistor	2651-7131
28	Band Heater - 120Vac	2653-1825

Item	Servomex 2700 Sensor Head - description	Spare part number
29	Band Heater - 240Vac	2653-1832
30	4" Mounting Gasket Kit	S2720985
31	4" Weld-On Flange Mounting Kit	S2720984
32	Mains Protection Cover	S2720983
33	Enclosure Gasket Kit (Control Unit & Sensor Head)	S2700999
34	Fuse Kit (Control Unit & Sensor Head)	S2700998 *
* includes: F1.6A HRC (5 x 20mm), F2.5A HRC (5 x 20mm), F3.15A HRC (5 x 20mm) & F6.3A HRC (5 x 20mm)		

Item	Servomex 2700 Sample Probes - description	Spare part number
1	Silicon Carbide Filter Kit	S2740998
2	Probe Tube Coupling	2344-2294
3	Probe Shroud	S2740996A
4	Probe Support Disc*	S2740995
5	Thermal Spacer Flange Kit	02750997
6	High Temperature Standoff	02750995
7	Probe Retention Flange Kit	02750998

* Item 4 (Probe Support Disc) is required for Items 13 to 16 when replacing the <700°C filtered probe in a Supported Probe Installation.

Sample Probes continued on next page.

Servomex 2700 Sample Probes continued.

Item	Servomex 2700 Sample Probes - description	Spare part number
8	<700°C, Probe, Open-ended, 0.5m	S2740701A
9	<700°C, Probe, Open-ended, 1.0m	S2740701B
10	<700°C, Probe, Open-ended, 1.5m	S2740701C
11	<700°C, Probe, Filtered, 0.5m	S2740702A
12	<700°C, Probe, Filtered, 1.0m	S2740702B
13	<700°C, Probe, Filtered, 1.5m *	S2740702C
14	<700°C, Probe, Filtered, 2.0m * & **	S2740702D
15	<700°C, Probe, Filtered, 2.5m * & **	S2740702E
16	<700°C, Probe, Filtered, 3.0m * & **	S2740702F
17	<1000°C, Probe, Open-ended, 0.5m	S2740704A
18	<1000°C, Probe, Open-ended, 1.0m	S2740704B
19	<800°C, Probe, Open-ended, 1.5m	S2740704C
20	<700°C, Probe, Open-ended, 2.0m	S2740704D
21	<1000°C, Probe, Filtered, 0.5m	S2740705A
22	<1000°C, Probe, Filtered, 1.0m	S2740705B
23	<700°C, Probe Support, 1.5m	S2740997C
24	<700°C, Probe Support, 2.0m	S2740997D
25	<700°C, Probe Support, 2.5m	S2740997E
26	<700°C, Probe Support, 3.0m	S2740997F
27	<1750°C, Ceramic Probe, 0.5m	02740707A
28	<1750°C, Ceramic Probe, 1.0m	02740707B
29	<1750°C, Ceramic Probe, 1.5m	02740707C

* Item 4 (Probe Support Disc) is required for Items 13 to 16 when replacing the <700°C filtered probe in a Supported Probe Installation.

** Items 14,15 and 16. Filter probes exceeding 1.5m in length are only available as part of a supported probe installation and should not be used alone.

Item	Description	Spare part number
1	Quickstart Manual - English	02700003B
2	Quickstart Manual - French	02700013B
3	Quickstart Manual - German	02700023B
4	Quickstart Manual - Spanish	02700033B
5	Quickstart Manual - Russian	02700103B
6	Quickstart Manual - Chinese	02700083B
7	Installation Manuals - English	02700005B
8	Installation Manuals - French	02700015B
9	Installation Manuals - German	02700025B
10	Installation Manuals - Spanish	02700035B
11	Installation Manuals - Russian	02700105B
12	Installation Manuals - Chinese	02700085B
13	Service Manual - English	02700002B
14	Best Practice Guide - English	02700006B

NOTES

5. TECHNICAL SPECIFICATION

5.1 Oxygen measurement performance

Item	Specification
Analogue output ranges	0-1 min. to 0-25% max. O_2, in 1% steps
Display resolution	0.01% O_2
Accuracy	±1% of reading or 0.1% O_2*
Response time (T_{90}), unfiltered software	<10 seconds (sensor head only at 300ml/min)

* whichever is greater

5.2 Combustibles measurement performance

Item	Specification
Analogue output ranges	1750702 – 0-500 min. to 0-10000ppm max. COe, in 1ppm steps 1750703 – 0-500 min. to 0-30000ppm max. COe, in 1ppm steps
Display resolution	1ppm(v) COe
Accuracy	±5% of full scale output range
Response time (T_{90}), unfiltered software.	<20 seconds (sensor head only at 300ml/min)

5.3 General specification

Analyser inputs and outputs

Digital display	2 line by 16 character back lit LCD.
User interface	Menu driven with 8 button tactile keypad.
Analogue outputs	One user-configurable 0-20mA or 4-20mA isolated current output dedicated to each measurement. Maximum load 1 kΩ. Clamped at 21mA.
Relay outputs	Four SPCO relays. Contact rating 3A/250V AC or 1A/28V DC (non inductive) maximum and 10mA/5V AC or DC minimum. User assigned as concentration (2), fault alarms, calibration in progress, blowback in progress, autocalibration solenoid valves (2/3) and blowback solenoid valve control.
Digital inputs	Two external digital inputs for autocalibration and auto-blowback initiation. Non-isolated, requiring voltage-free contact closure (or equivalent) to analyser ground to initiate.

Physical

Size	Sensor head 290mm x 320mm x 250mm Control unit 360mm x 167mm x 260mm
Weight	Sensor head <17kg (38lbs) Control unit <10kg (22lbs)
Power Supply	Two voltage ranges are provided: 100-120Vac, 50/60Hz 220-240Vac, 50/60Hz Control unit 250VA Sensor head 600VA Sensor head and control unit are powered separately. Control unit voltage is user set. Sensor head voltage is factory set.

Ambient temperature	Operating -10°C to +55°C (+14°F to +131°F)
Control unit	Storage -20°C to +55°C (-4°F to +131°F)
Ambient temperature	Operating -20°C to +70°C (-4°F to +160°F)
Sensor head	Storage -30°C to +80°C (-2°F to +176°F)
Installation category	Category II. Local level power distribution with over voltage withstand up to 2,500V in accordance with IEC 664.
Ingress protection	IP66 to IEC529:1989 and BS EN60529:1992. Type 4X to NEMA standards publication no. 250.
Aspirator air requirements	Pressure 0.07 to 0.7 barg (1 to 10 psig). Flow 2 litres/min typical. Instrument grade compressed air, free from oil, water and dirt (See ISA-S7.0.01-1996).

Materials in contact with sample

Oxygen sensor	316 and 310 stainless steel, zirconia, platinum, alumina, Ni/Fe/Cr alloy, high temperature sealing glasses.
Combustibles sensor	316 stainless steel, platinum, platinum/iridium, zirconia, alumina, corrosion resistant glass, graphite gasket.
Sensor head	316 and 303 stainless steel, gasket sealing material.
Sample probes	316 and 310 stainless steel, Haynes alloy 556, silicon carbide, high temperature ceramic.

Hazardous area classification

Sensor head Non hazardous locations.

Control unit Approved as Type N to BS 6941: 1998 for Zone 2 Group IIC T5 hazardous location
or
Approved as EEx nC IIC T5 (-20°C<Ta<+55°C) for ATEX Group II, Category 3,
Gas and Dust hazardous atmospheres, T75°C, BAS02ATEX3205 (BASEEFA).

Approved as non-incendive for:
Class I, Div. 2, Groups A,B,C & D.
Class II, Div. 2, Groups F & G.
Class III, Div. 1 & 2.
Enclosure Type 4X.
T5. Ambient Temperature 55°C max.
(Factory Mutual - FMRC)

Suitable for use in:
Class I, Div. 2, Groups A,B,C & D.
Class II, Div. 1, Groups E,F & G.
Class III, Div. 1.
T5. Ambient Temperature 55°C max.
Enclosure Type 4X.
(Canadian Standards Association - CSA)

Design standards

Conforms to the following normalised European and International and National standards for product safety and electromagnetic compatibility:

Electromagnetic Compatibility

IEC 61326-1: 1997 (BS EN 61326-1: 1997)
Control unit - Emission Class B
Sensor head - Emission Class A

Electrical Safety

EN61010-1: 1993
IEC1010-1: 1990: amendments A1:1992 and A2:1995

Figure 3a

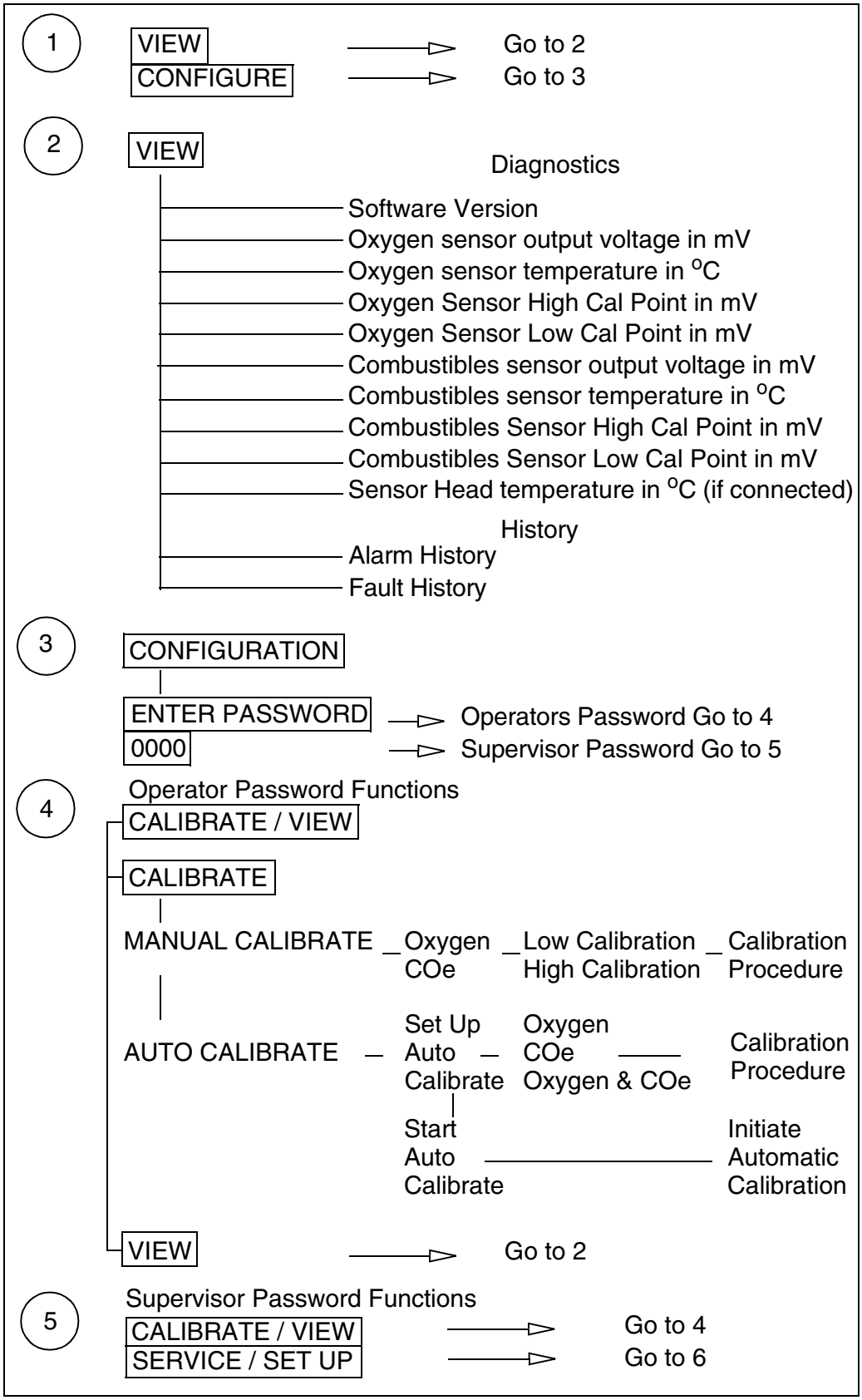
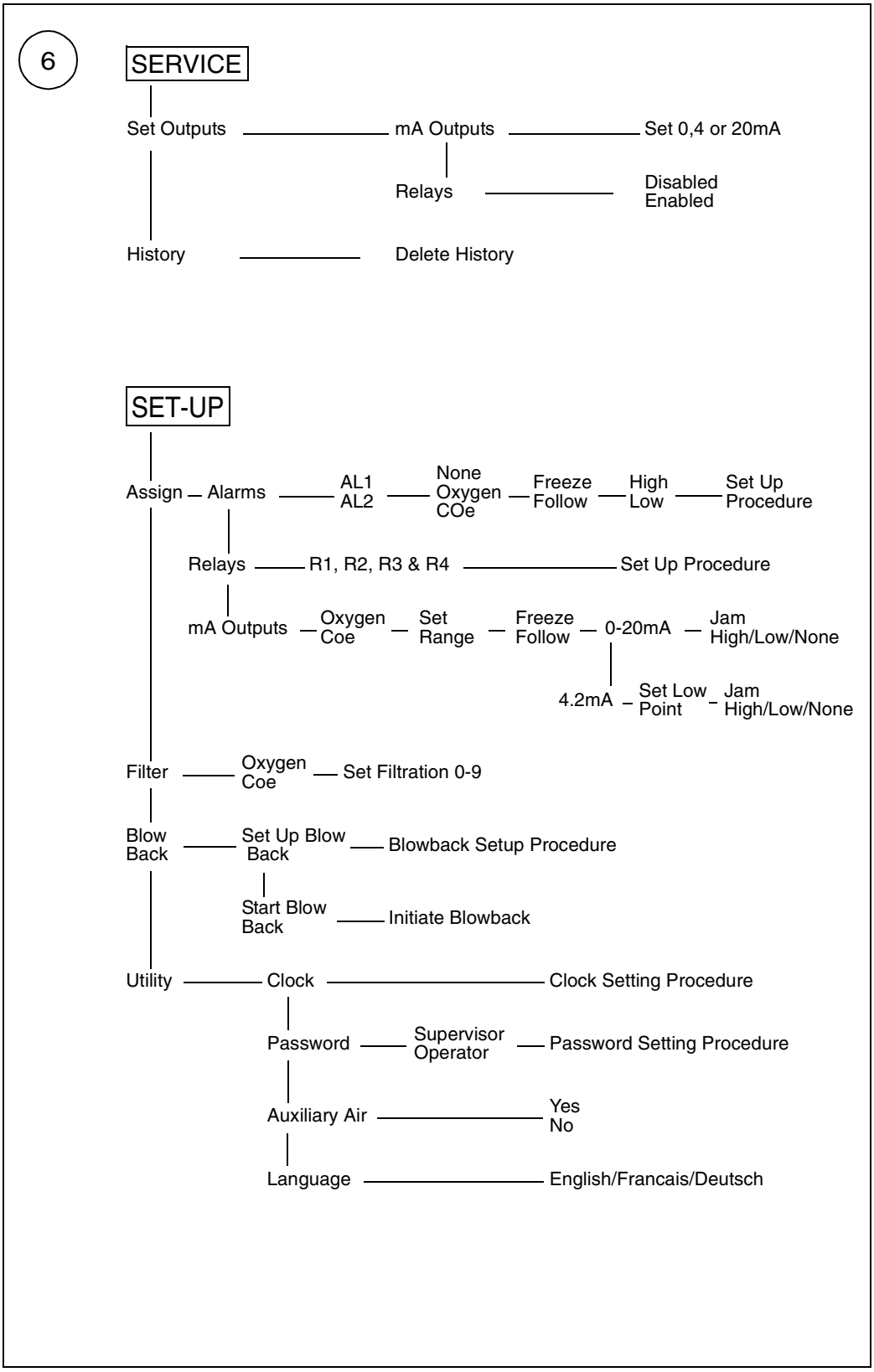

1
VIEW
Go to 2
CONFIGURE
Go to 3
2
VIEW
Diagnostics
Software Version
Oxygen sensor output voltage in mV
Oxygen sensor temperature in °C
Oxygen Sensor High Cal Point in mV
Oxygen Sensor Low Cal Point in mV
Combustibles sensor output voltage in mV
Combustibles sensor temperature in °C
Combustibles Sensor High Cal Point in mV
Combustibles Sensor Low Cal Point in mV
Sensor Head temperature in °C (if connected)
History
Alarm History
Fault History
3
CONFIGURATION
ENTER PASSWORD
0000
Operators Password Go to 4
Supervisor Password Go to 5
4
Operator Password Functions
CALIBRATE / VIEW
CALIBRATE
MANUAL CALIBRATE
Oxygen
COe
Low Calibration
High Calibration
Calibration
Procedure
AUTO CALIBRATE
Set Up
Auto
Calibrate
Oxygen
COe
Oxygen & COe
Calibration
Procedure
Start
Auto
Calibrate
Initiate
Automatic
Calibration
VIEW
Go to 2
5
Supervisor Password Functions
CALIBRATE / VIEW
SERVICE / SET UP
Go to 4
Go to 6

Figure 3b


6
SERVICE
Set Outputs
mA Outputs
Set 0,4 or 20mA
Relays
Disabled
Enabled
History
Delete History
SET-UP
Assign
Alarms
AL1
AL2
None
Oxygen COe
Freeze
Follow
High
Low
Set Up Procedure
Relays
R1, R2, R3 & R4
Set Up Procedure
mA Outputs
Oxygen Coe
Set Range
Freeze Follow
0-20mA
Jam High/Low/None
4.2mA
Set Low Point
Jam High/Low/None
Filter
Oxygen Coe
Set Filtration 0-9
Blow Back
Set Up Blow Back
Blowback Setup Procedure
Start Blow Back
Initiate Blowback
Utility
Clock
Clock Setting Procedure
Password
Supervisor Operator
Password Setting Procedure
Auxiliary Air
Yes
No
Language
English/Francais/Deutsch

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