SERVOMEX
ANALYZERS
HIGH-PERFORMANCE GAS ANALYSIS

SERVOFLEX MiniTransfill 5200

OPERATOR MANUAL

Part Number:	**05220091A**
Revision:	**5**
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1 DESCRIPTION AND DEFINITIONS

1.1 Scope of this manual

This manual provides installation, operation and routine maintenance instructions for the Servomex 5200 Transfill Gas Analyzer, abbreviated to "Transfill" in the remainder of this manual.

1.2 Safety information

Read this manual and ensure that you fully understand its content before you attempt to install, use or maintain the Transfill. Important safety information is highlighted in this manual as WARNINGs and CAUTIONs, which are used as follows:

WARNING

Warnings highlight specific hazards which, if not taken into account, may result in personal injury or death.

CAUTION

Cautions highlight hazards which, if not taken into account, can result in damage to the Transfill or to other equipment or property.

This manual also incorporates ‘Be aware of’ information, which is used as follows:

\+ This highlights information which it is useful for you to be aware of (for example, specific operating conditions, and so on).

1.3 Description

WARNING

This analyzer is not a medical device as defined in the medical devices directive 93/42/EEC and is not intended to be used on human beings for the diagnosis, prevention, monitoring, treatment or alleviation of disease, injury or replacement or modification of the anatomy.

WARNING

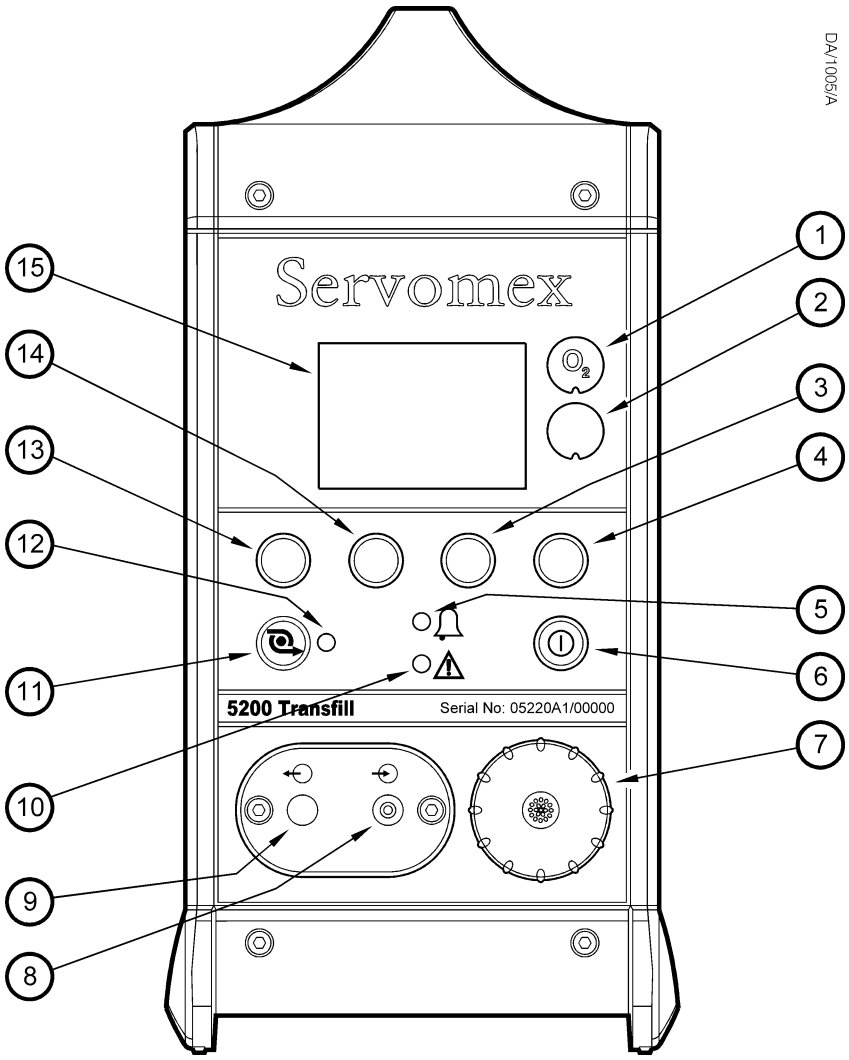
The Transfill must not be used as personal protective equipment.

The Transfill is a lightweight gas analyzer, suitable for applications such as monitoring the oxygen purity of oxygen bottles newly filled from bulk liquid storage tanks. The Transfill uses a paramagnetic transducer to determine the oxygen content of gas samples in concentrations up to 100%.

The Transfill is simple to operate, with an intuitive user interface (see Section 4).

Gas sample measurements are shown on the Transfill display, and can also be output to a serial device connected to the Transfill.

The Transfill requires little routine maintenance (see Section 7), other than calibration (which is essential for the accuracy of sample gas measurements) and regular inspection of the inlet filter element.

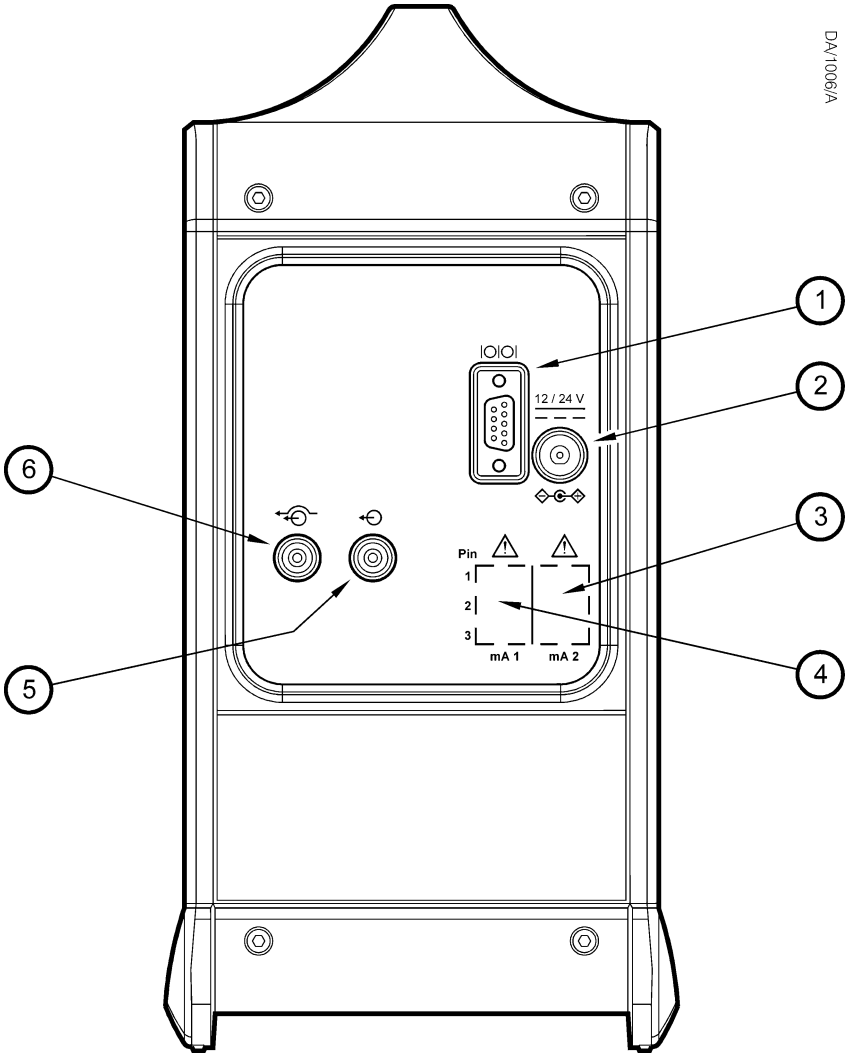


Key	Description
1.	Oxygen label
2.	* (see below)
3.	Soft key 3
4.	Soft key 4
5.	Alarm LED (red)
6.	Power On/Off key
7.	Filter retaining cap
8.	Sample gas inlet

Key	Description
9.	* (see below)
10.	Fault LED (amber)
11.	* (see below)
12.	* (see below)
13.	Soft key 1
14.	Soft key 2
15.	Display

* Not used on the 5200 Transfill. Included as provision for other models.

Figure 1 - Front of the Transfill



Key	Description
1.	Serial output port
2.	Power inlet
3.	* (see below)

Key	Description
4.	* (see below)
5.	Sample gas outlet
6.	Bypass gas outlet

* Not used on the 5200 Transfill. Included as provision for other models.

Figure 2 - Rear of the Transfill

2 SPECIFICATION

WARNING

You must install and use the Transfill in accordance with the requirements of this section and subsequent sections of the manual. If you do not, the protection facilities incorporated into the design of the Transfill may not operate as intended, sample gas measurements may not be accurate, or the Transfill may be damaged.

2.1 General

Dimensions (height x width x depth)	12 x 6 x 10 inches
Mass	5 lb (maximum)
Electrical supply requirements	
Power supply unit	100 to 240 V a.c., 47 to 63 Hz (nominal)
Transfill	12 to 24 V d.c., 2 W *

* As supplied by the power supply unit (through a center pin +ve connector).

2.2 Sample gas

Pressure range	1 to 10 psig (max)
Dew point	< (ambient temperature - 18 °F)
Particulate size	< 2 µm

2.3 Calibration gases

Low calibration gas	Oxygen-free nitrogen, 99.9% pure
High calibration gas	Certified >99.2% pure oxygen, balance gas nitrogen

2.4 Environmental limits

Ambient temperature range	
Operation	+14 to +122 °F
Storage	-4 to +140 °F *
Battery charging	+50 to +104 °F
Operating ambient pressure range	14.7 psi ±10%
Operating ambient humidity range	0 to 95% RH, non-condensing
Operating altitude range	-1640 † to 16400 ‡ feet
Ingress protection	IP40

* Storage below 70 °F is recommended to ensure optimum battery life.
† Below sea level. ‡ Above sea level.

2.5 Performance

Display indication	Measured volume % oxygen
Range	0 to 100% oxygen
Resolution	0.1% oxygen
Linearity	± 0.1% oxygen
Intrinsic error (accuracy)	± 0.1% oxygen
Zero drift per week	± 0.4% oxygen
Output fluctuation	± 0.1% oxygen
Response time *	10 seconds (approximate)
Flow effect †	± 0.1% oxygen for a ± 0.5 psig change in sample gas supply pressure
Zero temperature coefficient	± 0.2% oxygen per 18 °F
Span temperature coefficient	± 0.3% oxygen per 18 °F
Tilt effects	± 0.3% oxygen per 22.5° of tilt
Pressure effects	Directly proportional to ambient barometric pressure #
Power cycle offset	± 0.4% maximum

* T_{90} at 10 psig supply pressure.
† Within sample gas supply pressure range specified in Section 2.2.
# A 1% change in ambient barometric pressure will result in a 1% change in sample reading.

2.6 Rechargeable battery (optional feature)

Battery type	Lithium ion
Time to recharge (from empty)	4 hours *
Operating life (from fully charged)	Approximately 35 hours †
Service life	Approximately 300 to 500 discharge/ recharge cycles (depending on ambient conditions)

* This is the recharge time with the Transfill switched off. With the Transfill switched on, recharge time depends on ambient conditions, and on the Transfill configuration and usage.

† Battery operating life depends on ambient conditions.

\+ Lithium ion batteries have no ‘memory effects’, so you can recharge the battery, from any charge level, for any length of time and for often as you like, without affecting the battery’s service life.

To ensure the optimum service life of the battery, we recommend that you recharge the battery after each session of operation, and that you store the Transfill when not in use in a cool environment: see Section 2.4.

3 UNPACK THE TRANSFILL

1. Remove the Transfill and any other equipment from its packaging.
2. Remove the protective plastic cover from the sample gas inlet on the front of the Transfill (see Figure 1).
3. Remove the protective plastic covers from the sample gas outlet and the bypass gas outlet on the rear of the Transfill (see Figure 2).
4. Inspect the Transfill and the other items supplied, and check that they are not damaged. If any item is damaged, immediately contact Servomex or your local Servomex agent.
5. If you do not intend to use the Transfill immediately:
   - Refit the protective plastic covers to the gas inlet, the sample gas outlet and the bypass gas outlet.
   - Place the Transfill and any other equipment supplied back in its protective packaging.
   - Store the Transfill as described in Section 9.1.

   Otherwise, read Section 4 (User Interface), then continue at Sections 5 onwards to install, set up, and use the Transfill.

\+ Retain the shipping documentation and packaging for future use (for example, return of the Transfill to Servomex for servicing or repair).

CAUTION

You must remove the protective plastic covers as specified in Steps 2 and 3 above before you use the Transfill. If you do not, you may damage the Transfill when you try to pass calibration or sample gases through it.

4 TRANSFILL USER INTERFACE

+ Throughout this manual, reference is made to product options (such as "rechargeable battery") which must be specified at the time of purchase. Associated menus and menu options will not be available if your Transfill does not have the corresponding product options.

4.1 Introduction

The Transfill user interface comprises the following (shown on Figure 1):

Power On/Off key	Use this key to switch the Transfill on (see Section 5.1) or to switch it off (see Section 6.6).
Display	Shows various screens: see Section 4.2 onwards.
Soft keys	The function of each of the soft keys depends on the screen currently being shown on the display: see Section 4.2.
Alarm LED	On when an alarm condition exists: see Section 6.3.4.
Fault LED	On when a fault condition exists: see Section 8.

The Transfill also has an audible alarm which will go on (emit a tone):

- On initial switch-on: see Section 5.1.
- When a measurement alarm condition is detected (if the audible measurement alarm is enabled): see Section 6.3.5.
- When a fault condition is detected: see Section 8.

4.2 Start-up and measurement screens

When you first switch on the Transfill, a 'start-up screen' is displayed while the Transfill carries out a self-test.

The start-up screen shows the Servomex name, a 'self-test time elapsed/remaining' indicator, and messages identifying the tasks being carried out as part of the self-test:

The screen will initially display the message "System Check".

The Measurement screen is then displayed, as shown in Figure 3 below.

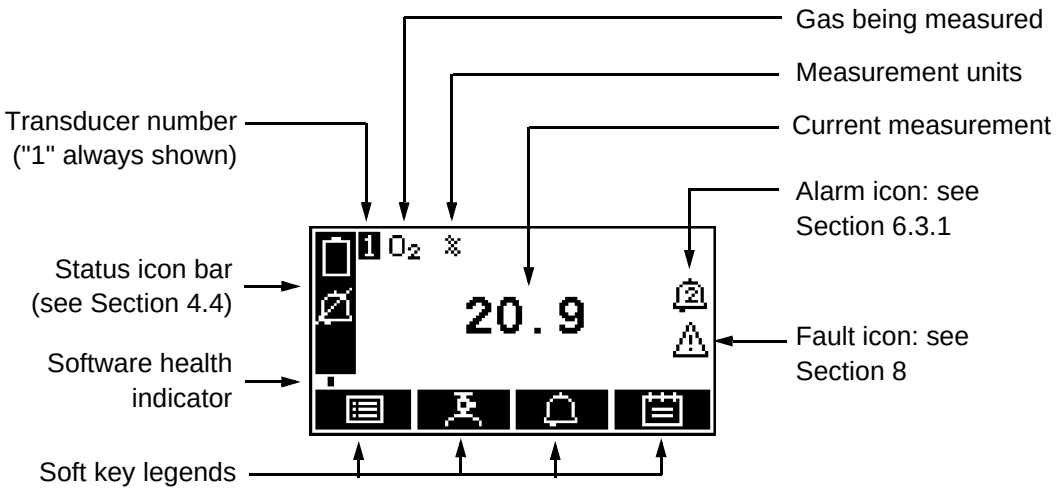


Figure 3 - The Measurement screen

+ During normal Transfill operation, the software health indicator continuously moves from left to right and then back again, below the status icon bar. If the indicator stops moving, this means that the Transfill is not operating correctly, and you must refer to Section 8.

+ If no soft key is pressed for 10 minutes, the Measurement screen will be automatically displayed. (You will also then have to enter the password again to access any password-protected screens: refer to Figure 4 and to Section 4.6.)

4.3 Soft key legends

The four soft key legends at the bottom of the Measurement screen (Figure 3) correspond to the four soft keys on the front of the Transfill. (The first legend corresponds to the function of soft key 1, the second legend corresponds to the function of soft key 2, and so on).

On the Measurement screen, the soft key functions are as follows:

Legend	Meaning	Function (when soft key pressed)
	Menu	Displays the Menu screen: see Section 4.7.
	Calibrate *	Displays the Calibrate screen: see Section 6.1.
	Alarm *	Displays the Alarm option screen: see Section 6.3.4.
	Logging † #	Displays the Data logging screen: see Section 6.4.
	Print † #	Produces a printed sample measurement report: see Section 6.4.9.

* These soft keys are ‘shortcuts’ to these menus, which can also be selected by pressing the  soft key with the corresponding menu option highlighted on the Menu screen: see Section 4.7.
† May not be available: see the note at the start of Section 4.
# If you have selected printed outputs (see Section 6.4.1), the ‘Print’ legend is shown instead of the ‘Logging’ legend.

Other soft key legends which are used on the various screens are as follows:

Legend	Meaning	Function (when soft key pressed)
	Back	Cancels the current screen and displays the previous screen in the menu structure.
	Accept	Accepts the currently selected option or data. (A new screen may be displayed accordingly.)
	Edit	Allows the highlighted data to be edited.
	Batch	Starts a new batch (for data logging).
	Up	Moves the cursor up a list (or increases a digit during editing).
	Down	Moves the cursor down a list (or decreases a digit during editing).
	Left	Moves the cursor left.
	Right	Moves the cursor right.

4.4 Status icon bar

The status icon bar appears on all screens. The icons which can be shown and their meanings are as follows:

Icon		Meaning
		Indicates that a fault has been detected by the Transfill: refer to Section 8.
		Indicates that the audible alarm is disabled: refer to Section 6.3.5.
	*	Battery less than 10% full.
	*	Battery 10% to 32% full.
	*	Battery 33% to 65% full.
	*	Battery 66% to 100% full.

* These icons will only be shown on a Transfill with the optional rechargeable battery fitted. See Section 5.2 for more information.

+ When the ‘battery less than 10% full’ icon starts to flash, this indicates that the rechargeable battery is virtually empty. The Transfill will automatically shut down approximately 15 seconds after the icon starts to flash.

4.5 Scroll bars

On some screens (for example, see Figure 5), there may be more options available than can be shown on the screen, and you have to scroll down the screen to view all of the options: this is identified by a scroll bar at the right-hand side of the screen.

The height of the wide part of the scroll bar gives an indication of what proportion (of all the options) are currently shown on the screen. As you scroll up or down the options (using the  and  soft keys), the wide part of the scroll bar will also move on the screen, indicating approximately where the currently displayed options are, within the complete list of options. For example, compare the scroll bars in Figures 5 and 12.

4.6 Menu options/screens and password protection

The menu structure of the Transfill is shown in Figure 4, which shows that some of the options/screens are password protected.

When an option/screen is password protected, this means that the correct corresponding password has to be entered before the option/screen can be accessed.

Password protection operates as follows:

- The first time you try to access a password-protected option/screen, you will be prompted for the corresponding password. You must then enter the correct password (using the editing method described in Section 4.10) before the option/screen can be displayed.
- If you have already entered the corresponding password, you will gain access to all options/screens protected by that password immediately (you do not need to enter the password again).

+ Once you have entered a password, it remains active until 10 minutes after the last soft key is pressed. After this, the password becomes inactive; you must re-enter the password to access password-protected options/screens again.

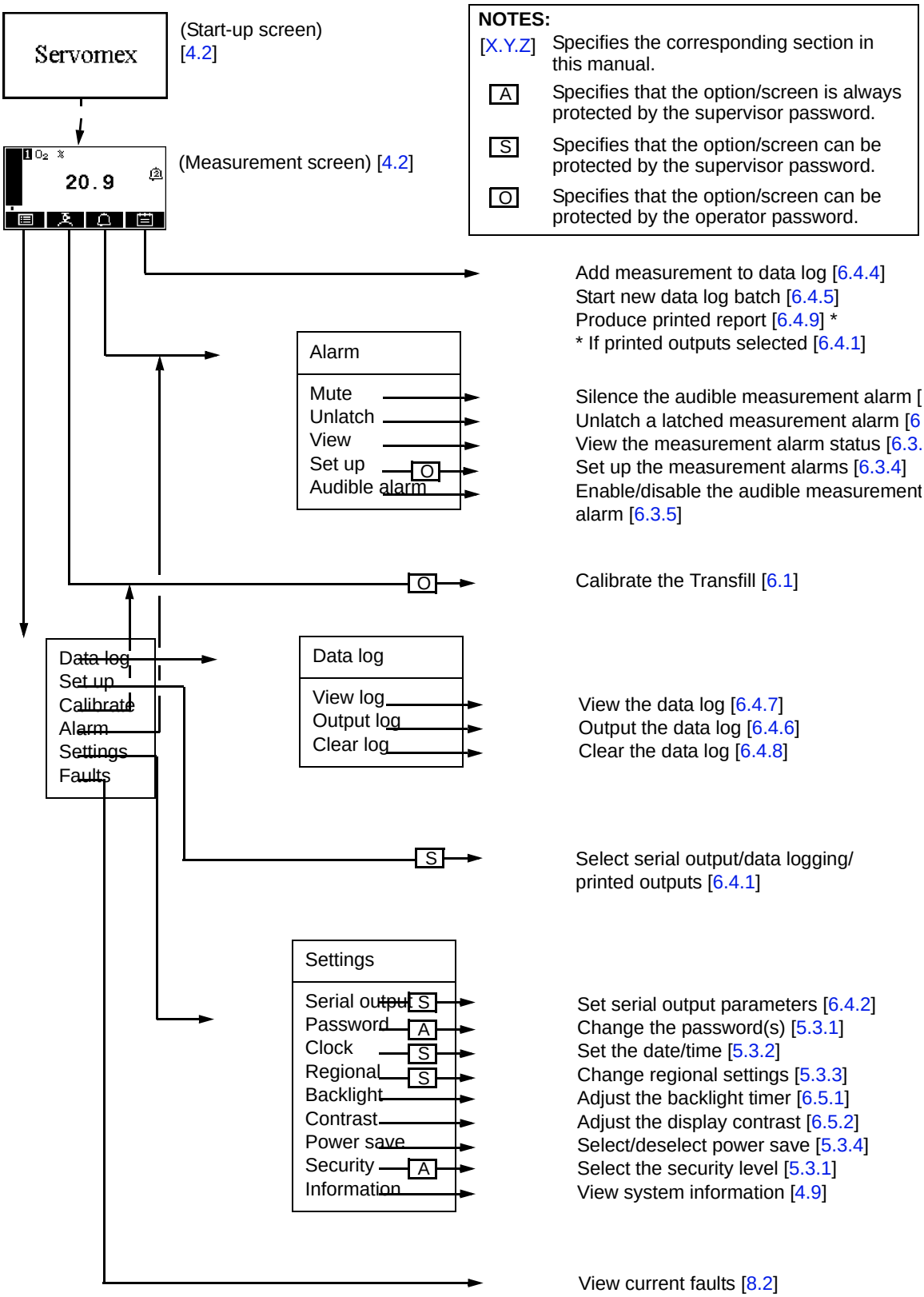


Figure 4 - The Transfill menu structure

4.7 The Menu screen

+ Some of the menu screens referenced below may not be available: refer to the note at the start of Section 4.

The Menu screen (see Figure 5) provides access to other screens in the menu structure, and is displayed by pressing the soft key when the Measurement screen is displayed.

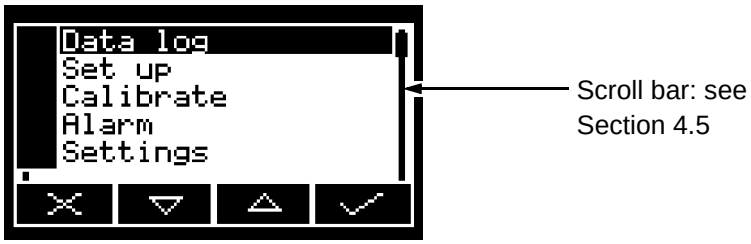


Figure 5 - The Menu screen

Use the and soft keys to highlight the required screen option, then press the soft key to display the selected screen:

Screen	Use	Section
Data Log	Select this screen to view, output or clear the data log.	6.4.6 to 6.4.8
Set up	Select this screen to select serial outputs, data logging or printed outputs.	6.4.1
Calibrate	Select this screen to calibrate the Transfill.	6.1
Alarm	Select this screen to set up the measurement alarms, or to silence (mute) the audible measurement alarm.	6.3.4
Settings	Select this screen to change Transfill settings (password, display language and so on).	4.8
Faults	Select this screen to view current faults.	8.2

Alternatively, press the soft key to display the Measurement screen again.

4.8 The Settings screen

The Settings screen is shown in Figure 6.

Use the ▲ and ▼ soft keys to highlight the required screen option, then press the ✓ soft key to display the selected screen, as shown below:

Figure 6 - The Settings screen

Screen	Use	Section
Serial output	Configuring the serial output parameters	6.4.2
Password	Changing the password.	5.3.2
Clock	Setting the clock time and/or date.	5.3.2
Regional	Changing regional settings (language and so on).	5.3.3
Backlight	Adjusting the backlight timer duration.	6.5.1
Contrast	Adjusting the contrast of the screen.	6.5.2
Power save *	Selecting/deselecting 'power save' operation.	5.3.4
Security	Selecting the security level.	5.3.1
Information	Viewing Transfill system information.	4.9

* Only available on a Transfill with the optional rechargeable battery fitted.

Alternatively, press the ✕ soft key to display the Menu screen again.

4.9 The Information screen

A typical Information screen is shown in Figure 7.

This screen shows information (such as the Transfill serial number and the version of the operating software embedded in the Transfill) which is useful to the Servomex support team.

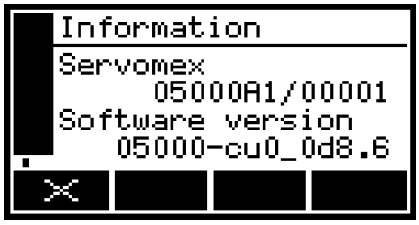


Figure 7 - Typical information screen

Note that the information shown on the screen will vary, depending on the Transfill model.

After viewing (and if necessary recording) the information shown on the screen, press the ✕ soft key to display the Settings screen again, or press and hold the ✕ soft key to show the Measurement screen again.

\+ You may be asked to provide the information from this screen to the Servomex support team; for example, as an aid to fault diagnosis.

4.10 Editing on-screen data

A common method is used for editing data shown on all of the different screens.

When you press the soft key to edit an item of data, the screen changes to show the corresponding edit screen, with the first digit highlighted; a typical edit screen is shown in Figure 8:

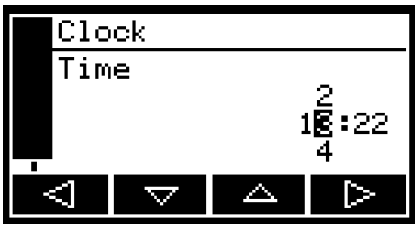


Figure 8 - A typical edit screen

When the first digit is highlighted, press the soft key to exit the menu without changing the data.

Alternatively, use the soft keys to edit the data as follows:

Soft key	Function
	Increases the highlighted digit by 1.
	Decreases the highlighted digit by 1.
	Moves the cursor left to the previous digit.
	Moves the cursor right to the next digit.

Note that the figures above and below the highlighted digit show the digits above and below the currently highlighted value.

When the last digit is highlighted, press the soft key to enter the new data.

+ When editing numerical values, the decimal point appears between digits "9" and "0".

5 INSTALLATION AND SET-UP

5.1 Installation and switch-on

WARNING

Ensure that the cables and tubes that you connect to the Transfill are routed so that they do not present a trip hazard to people.

WARNING

Ensure that the electrical installation of the Transfill and the power supply unit conforms with all applicable local and national electrical safety requirements.

WARNING

Calibration gases may be asphyxiant. Ensure that the Transfill sample and bypass gas outlets are vented to an area where they will not be a hazard to people.

CAUTION

Do not use the Transfill in an area subject to high levels of vibration or sudden jolts. If you do, sample measurements may not be accurate, or the Transfill may be damaged.

1. Place the Transfill in a suitable operating location, within easy reach of a suitable electrical supply outlet.
2. If required, use quick-connect fittings to connect suitable sized tubes to the sample gas outlet and the bypass gas outlet on the rear of the Transfill (see Figure 2); route the ends of the tubes so that they can freely vent to atmosphere.

   \+ The two outlets can be left to vent to local atmosphere. However if you do fit a tube to one or both of the outlets, the tube(s) must be suitably sized so that the gases can vent from the Transfill without over-pressurization of the Transfill or the tubes.

3. If you have ordered and received a printer, connect the printer to the serial connector on the rear of the Transfill (see Figure 2). Alternatively, if required, connect a PC (personal computer) or other device to the serial connector: refer to Appendix A4.
4. Fit the power outlet on the power supply unit to the power socket on the rear of the Transfill.
5. Fit the power supply unit plug to a suitable electrical supply outlet.

6. Press and hold the Power On/Off key on the front of the Transfill for at least 2 seconds to switch the Transfill on.

   + When the Transfill is switched on, the Alarm LED, the Fault LED and the audible alarm will all go on for 1 second to demonstrate that they are functioning correctly, and will then go off again.

5.2 Charging/recharging the battery (Transfill with optional rechargeable battery)

5.2.1 Charging

The first time you use a Transfill with the optional rechargeable battery, you should leave the Transfill connected to the electrical supply for at least 4 hours, to fully charge the battery.

When the battery is fully charged, you can leave the Transfill connected to the electrical supply, or you can disconnect the electrical supply and continue to use the Transfill powered by the battery.

5.2.2 Recharging

+ We recommend that you recharge the battery as soon as possible after the ‘battery less than 10% full ’ icon is displayed.

During normal use, the battery icon on the status icon bar of the display will identify the level of charge within the battery (see Section 4.4).

You can recharge the battery as and when required during normal use. To recharge the battery, simply connect the Transfill to an external electrical supply outlet.

+ During recharging, the status icon bar will continually show the ‘battery less than 10% full’, ‘battery 10 to 32% full’, ‘battery 33 to 65% full’ and ‘battery 66 to 100% full’ icons in sequence.

+ You can recharge the battery with the Transfill switched on or off. However, recharging will take longer when the Transfill is switched on.

5.3 Transfill set-up

When you switch on the Transfill, a 'start-up screen' is first displayed (see Section 4.2), then the Measurement screen (Figure 3) is displayed.

When the Measurement screen is displayed, you can set up the Transfill as described below.

5.3.1 Selecting the security level and changing the password(s)

Introduction to security levels/passwords

You can configure the Transfill to provide any of three levels of security:

Security level	Function
Low	None of the options/screens are password protected *.
Standard	Some of the options/screens are protected by a supervisor password.
High	Some of the options/screens are protected by a supervisor password and some of the options/screens are protected by an operator password †.

* Except for the 'change the password(s)' and 'select the security level' options/screens: see notes below.

† The supervisor password can also be used to access options/screens protected by the operator password: see notes below.

+ The 'change the password(s)' and 'select the security level' screens/options are always protected by the supervisor password, regardless of the security level selected. This is to ensure that unauthorized personnel cannot change the security level and password(s) and so lock out the Transfill from other users.

+ The supervisor password provides access to all password protected options/ screens. That is, if you have selected the 'high' security level and are prompted to enter the operator password, you can also access the option/ screen by entering the supervisor password.

+ Password protection can be used to prevent adjustment of the clock by unauthorized persons, so ensuring the validity of measurement times and the 'time since last calibration' history.

Figure 4 shows the options/screens which can be password-protected within the menu structure.

Selecting the security level

+ As supplied, the security level is set to ‘high’, the supervisor password is set to "2000" and the operator password is set to "1000". We recommend that you select your required security level and change the password(s) as described below to provide additional protection.

Before the Transfill is used for sample measurement, we recommend that you select the security level (low, standard or high: see Section 4.6) most suitable for the way in which the Transfill will be used by you and/or your personnel.

Use the following procedure to select the required security level:

1. With the Settings screen displayed, use the ▵ and ▽ soft keys to highlight the "Security" menu option, then press the ✓ soft key. The Security level screen will then be displayed showing the currently selected level: see Figure 9.

Figure 9 - The Security level screen

2. To change the security level, press the ✎ soft key. You will then be prompted to enter the supervisor password.
3. Once the supervisor password has been entered correctly, the Security select screen will be displayed (see Figure 10), with the currently selected security level highlighted.

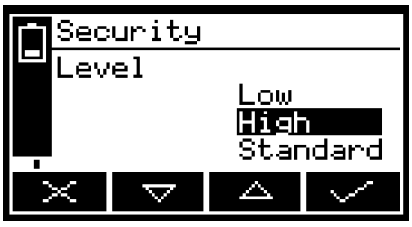


Figure 10 - The Security select screen

4. To change the security level, use the ▵ and ▽ soft keys to highlight the required level, then press the ✓ soft key. The Security level screen will then be displayed again, showing the newly selected security level.
5. Press the ✕ soft key twice to display the Menus screen again.

Changing passwords

+ If you change a password, ensure that you record the new password somewhere safe. Otherwise, if you cannot recall the new password, you will have to contact Servomex or your local Servomex agent for assistance.

Use the following procedure to change the supervisor and operator passwords:

1. With the Measurement screen displayed, press the soft key to display the Menu screen, use the and soft keys to highlight the "Settings" menu option, then press the soft key. The Settings screen will then be displayed (see Figure 6).
2. Use the and soft keys to highlight the "Password" menu option, then press the soft key. The Edit supervisor password screen will then be displayed with the supervisor password shown, as shown in Figure 11.

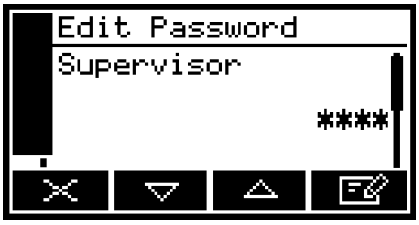


Figure 11 - The Edit supervisor password screen

3. To change the supervisor password, press the soft key, then enter the new password: use the editing method described in Section 4.10.
4. When you enter the last digit, the soft key changes to the soft key. Press the soft key to enter the new supervisor password value.
5. To change the operator password, press the soft key to display the edit operator password screen, press the soft key, then enter the new password: use the editing method described in Section 4.10.
6. When you enter the last digit, the soft key changes to the soft key. Press the soft key to enter the new operator password value.
7. Press the soft key to display the Settings screen again.

5.3.2 Setting the clock

Use the following procedure to set the date and time:

1. Press the soft key to display the Menu screen, use the and soft keys to highlight the "Settings" menu option, then press the soft key. The Settings screen will then be displayed.
2. Use the and soft keys to highlight the "Clock" menu option, then press the soft key. The Clock (time) screen will then be displayed, as shown in Figure 12.

+ Time is always shown in 24-hour format.

Figure 12 - The Clock (time) screen

3. Press the soft key, then edit the displayed time as described in Section 4.10. When you change the last digit, the soft key changes to the soft key. Press the soft key to show the Clock (time) screen again.
4. Press the soft key to show the Clock (date) screen, as shown in Figure 13.

+ You can change this format from day/month/year to month/day/year: refer to Section 5.3.3.

Figure 13 - The Clock (date) screen

5. To change the date, press the soft key, then edit the displayed date as described in Section 4.10. When you change the last digit, the soft key changes to the soft key. Press the soft key to show the Clock (date) screen again.
6. Press the soft key twice to display the Menus screen.

+ The date format can be set to your regional preference (’day/month/year’ or ’month/day/year’ format): refer to Section 5.3.3.

+ On a Transfill without an optional rechargeable battery: once set, date and time will remain set until approximately 1 week after the Transfill has been disconnected from the electrical supply. If the Transfill is left connected to the electrical supply, date and time will remain set indefinitely, even if the Transfill is switched off.

5.3.3 Changing regional settings

You can configure the following Transfill regional settings so that the information shown on the various screens is better suited to your local conventions:

Setting	Options available
Language	Various languages are supported.
Date format	Day/Month/Year * or Month/Day/Year.
Decimal format	Use of "." (period) or "," (comma) as the decimal point.

* Default option.

To change the regional settings:

1. With the Settings screen displayed, use the ▲ and ▼ soft keys to highlight the "Regional" menu option, then press the ✓ soft key. The first Regional settings option screen will then be displayed, as shown in Figure 14.

Figure 14 - The Regional settings (language) option screen

2. This screen shows the first regional option (Language). If necessary, press the ✎ soft key, use the ▲ and ▼ soft keys to highlight the required display language, then press the ✓ soft key.
3. If required, for each of the other two selectable options (date format and decimal format):
   - Use the ▲ and ▼ soft keys to select the corresponding option screen.
   - Press the ✎ soft key.
   - Use the ▲ and ▼ soft keys to highlight the required option, then press the ✓ soft key.

5.3.4 Selecting power save mode (Transfill with optional rechargeable battery)

If your Transfill has the optional rechargeable battery, you can select the ‘power save’ mode of operation, to conserve battery power. When power save mode is selected, the Transfill will automatically switch off after 30 minutes has elapsed during which no key has been pressed.

To select/deselect power save mode:

1. With the Settings screen displayed, use the △ and ▽ soft keys to highlight the "Power save" menu option, then press the ✓ soft key. The Power save option screen will then be displayed, as shown in Figure 15.

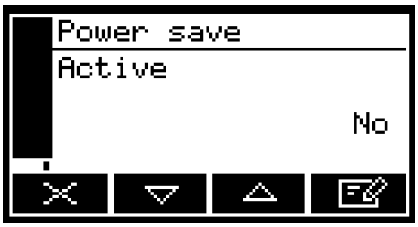


Figure 15 - The Power save option screen

2. "No" or "Yes" on this screen identifies whether power save is selected or not. If necessary, press the ✎ soft key to select the alternative setting, then press the ✓ soft key.

+ Power save mode is automatically disabled when the Transfill is connected (through the power supply unit) to the electrical supply.

6 GENERAL OPERATION

CAUTION

Sample and calibration gases must be as specified in Sections 2.2 and 2.3. If your sample or calibration gas pressures and/or flow rates are above those specified in Sections 2.2 and 2.3, you must regulate the gases externally, before they enter the Transfill.

6.1 Calibrating the Transfill

+ The pressure of your calibration gas supply must be the same as the pressure of the gases to be sampled. If the pressures are different, sample gas measurements may not be accurate.

+ If you do not allow calibration gas to pass through the Transfill for 3 to 5 minutes before you start the calibration procedure, the measurement system in the Transfill may not be fully purged of other residual gases, and the calibration may not be accurate.

+ Do not knock or move the Transfill during calibration. If you do, the calibration measurements may be affected.

You must calibrate the Transfill as part of the initial set-up (see Section 5.3), and whenever the Transfill has been moved to a different environment. We also recommend that you calibrate the Transfill at each power up to avoid measurement errors due to changes in ambient conditions.

Calibrate the Transfill as follows:

1. Connect your calibration gas supply to the sample gas inlet on the front of the Transfill (see Figure 1).
2. Allow the calibration gas to pass through the Transfill for 3 to 5 minutes, then continue at Step 3.
3. Press the soft key on the Measurement screen (or select the "Calibrate" option from the Menu screen) to display the Calibrate screen (see Figure 16).

Figure 16 - The Calibrate screen

Note that the "9999d" field of the screen shown in Figure 16 will identify the period of time that has elapsed since the last calibration, and can be in any of the following forms:

- 9999d specifying days
- 9999h specifying hours
- 9999m specifying minutes
- Any combination of these.

4. Use the △ and ▽ soft keys to select the required calibration, that is:
   - 'Lo' (low calibration gas: nitrogen).
   - 'Hi' (high calibration gas: oxygen).

5. Press the ✓ soft key. The Calibrate target value screen will then be shown (see Figure 17), identifying the target value and the current reading.

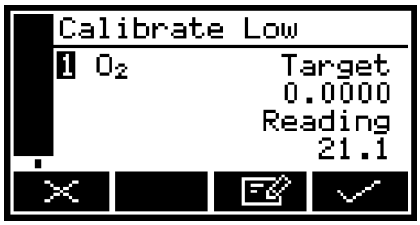


Figure 17 - The Calibrate target value screen

6. If the target value is not that for the calibration gas which you are using, change the target value to the required value: use the edit method in Section 4.10.

   + Refer to Sections 2.2 and 2.3 for the required pressures, flow rates (if applicable) and concentrations of the calibration gases.

7. When the current reading is stable, press the ✓ soft key. The Transfill will then carry out the specified calibration.
8. Repeat Steps 2 to 7 of this section for the second calibration.
9. Press the ✕ soft key to display the Measurement screen again.

6.2 Taking sample readings

+ Depending on how you have configured the measurement alarms, and on how you connect the sample gases to the Transfill, a measurement alarm may occur when you change sample gases as described below.

1. If necessary, calibrate the Transfill: see Section 6.1.
2. Ensure that the Measurement screen is displayed: see Section 4.
3. Use the quick-connect fitting supplied to connect the sample gas supply to the sample gas inlet on the front of the Transfill (see Figure 1).
4. Wait until the measurement shown on the screen has stabilized, then take note of the reading.
5. Turn off the sample gas supply, or disconnect it from the sample gas inlet on the front of the Transfill.

Repeat Steps 3 to 5 as necessary, for different gas samples to be measured.

Note that the composition of any typical background gas in a gas sample will have a negligible effect on the Transfill measurement. In gases which contain a 99% concentration of oxygen, errors due to a 1% concentration of a specific background gas will be as shown below:

Background gas	Error
Argon	-0.002%
Carbon dioxide	-0.003%
Halothane	-0.019%
Helium	-0.003%

Background gas	Error
Krypton	-0.004%
Neon	-0.002%
Nitrous oxide	-0.002%
Xenon	-0.009%

6.3 Configuring the measurement alarms

6.3.1 Alarm modes and levels

Two separate measurement alarms are available, and you can configure each alarm to operate in one of three modes:

Alarm mode	Operation
None	The alarm is not used (that is, an alarm condition will not be activated under any circumstances).
Low alarm	An alarm condition will be activated when a sample measurement is lower than the preset alarm level.
High alarm	An alarm condition will be activated when a sample measurement is higher than the preset alarm level.

While a measurement alarm condition is activated:

- An ‘alarm’ icon is shown on the measurement screen (see Section 4.2). The number ("1" or "2") in the icon will identify the alarm which has been triggered.
- If the audible measurement alarm is enabled (see Section 6.3.5), the audible alarm goes on.
- The alarm LED on the front of the Transfill (see Figure 1) flashes on and off.
- You can view the details of the activated alarm: see Section 6.3.8.

6.3.2 Latching/non-latching alarms

You can configure each of the two measurement alarms to be either latching or not latching:

Alarm setting	Meaning
Latching	Once the alarm condition has been activated, the alarm condition remains activated (even if subsequent sample measurements would not trigger the alarm) until the alarm is manually unlatched: see Section 6.3.7.
Not latching	Once the alarm condition has been activated, the alarm condition remains activated only until a subsequent sample measurement which would not trigger the alarm is made. The alarm condition is then deactivated.

6.3.3 Hysteresis levels

The hysteresis level associated with a measurement alarm determines when an alarm condition (once activated) is deactivated, and this depends on the alarm mode, as follows:

Alarm mode	Effect of hysteresis
Low alarm	Once the low alarm condition has been activated, the alarm condition will not be deactivated until a sample measurement is above (alarm level + hysteresis level).
High alarm	Once the high alarm condition has been activated, the alarm condition will not be deactivated until a sample measurement is below (alarm level - hysteresis level).

For example:

- If a ‘low’ alarm has an alarm level of 18% and a hysteresis level of 1%, the alarm will be activated when a sample measurement is < 18%, and the alarm will not be deactivated until a sample measurement is > 19%.
- If a ‘high’ alarm has an alarm level of 20% and a hysteresis level of 2%, the alarm will be activated when a sample measurement is > 20%, and the alarm will not be deactivated until a sample measurement is < 18%.

6.3.4 Setting the measurement alarm levels and modes

+ Ensure that the measurement alarm and hysteresis levels are not too close to the expected sample measurements. (If they are, minor - and acceptable - variations in your sample gas concentrations will result in spurious alarms.)

+ If you configure one measurement alarm as ‘low’ and configure the other alarm as ‘high’, ensure that the ‘high’ alarm and hysteresis levels are higher than the ‘low’ alarm and hysteresis levels. (If you do not, the Transfill can be permanently in an alarm condition, until you correct the levels.)

Before you start to take sample readings, you must ensure that the measurement alarms are correctly configured for your sample gases.

1. On the Measurement screen, press the soft key. The Alarm option screen will then be displayed, as shown in Figure 18.
2. Highlight the "Set up" menu option, then press the soft key. The Alarm set up screen will then be displayed, as shown in Figure 19.
3. Use the and soft keys to highlight the required alarm, then press the soft key. The Alarm mode screen will then be displayed, as shown in Figure 20.
4. If the alarm mode is not the required mode, press the soft key, use the and soft keys to select the required mode (none, low or high), then press the soft key.

Figure 18 - The Alarm option screen

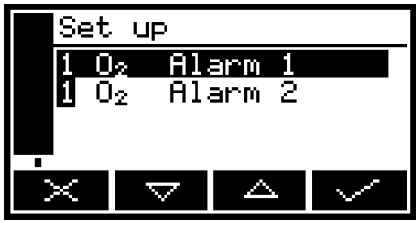


Figure 19 - The Alarm set up screen

Figure 20 - The Alarm mode screen

5. On the Alarm mode screen, use the and soft keys to highlight each of the following alarm options, and select the required option (using the method in Step 4 above) or enter the appropriate levels (using the method described in Section 4.10):
   - Latching
   - Level
   - Hysteresis.

6.3.5 Enabling/disabling the audible measurement alarm

+ The audible measurement alarm options are "Yes" (for enable) and "No" (for disable).

1. With the Alarms option screen displayed (see Section 6.3.4), use the ▲ and ▼ soft keys to highlight the "Audible alarm" option, then press the ✓ soft key.
2. If the displayed alarm setting is not the required setting, press the ✎ soft key. The Audible alarm option screen will then be displayed: see Figure 21.

Figure 21 - The Audible alarm option screen

3. Use the ▲ and ▼ soft keys to select the required option ("Yes" or "No"), then press the ✓ soft key.

6.3.6 Silencing (muting) the audible measurement alarm

+ The audible alarm will only go on when a measurement is made which triggers a measurement alarm condition **and** the audible measurement alarm has been enabled (see Section 6.3.5).

When the audible alarm is on because of a measurement alarm condition, you can temporarily silence (mute) the audible alarm, as follows:

1. On the Measurement screen, press the 🔔 soft key; the Alarm option screen (Figure 18) will then be displayed.
2. With the "Mute" option highlighted, press the ✓ soft key. The audible alarm will then go off and the Measurement screen will be displayed again.

+ Once silenced, the audible alarm will go on again:
  - If a new measurement alarm condition is activated.
  - If the measurement alarm condition which caused the audible alarm to go on is deactivated and is then re-activated.

  You will then need to silence the audible measurement alarm again.

6.3.7 Unlatching measurement alarms

When necessary, use the following procedure to unlatch any ‘latched’ measurement alarm(s) (see Section 6.3.2):

1. On the Measurement screen, press the soft key; the Alarm option screen (Figure 18) will then be displayed.
2. With the "Unlatch" option highlighted, press the soft key. All latched alarms will then be unlatched and the Measurement screen will be displayed again.

6.3.8 Viewing the measurement alarm status

1. On the Measurement screen, press the soft key; the Alarm option screen (see Figure 18) will then be displayed.
2. With the "View" option highlighted, press the soft key. The Alarm status screen will then be displayed (see Figure 22).

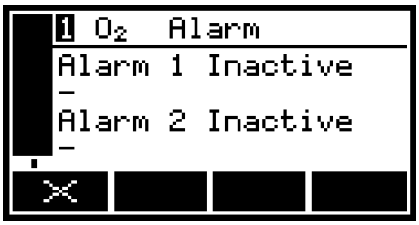


Figure 22 - The Alarm status screen

In the Alarm status screen shown in Figure 22, both measurement alarms are shown as "Inactive"; that is, either the mode of each alarm is set to ‘none’, or no alarm condition currently exists.

If a measurement alarm condition exists when you view this screen, the screen will show:

- The alarm number ("1" or "2").
- The sample reading which triggered the alarm condition.
- The alarm mode (where "<" indicates a low alarm and ">" indicates a high alarm).
- The alarm level.

6.4 Data logging, serial outputs and printed outputs (optional features)

6.4.1 Selecting data logging/serial output/printed outputs

You can configure the Transfill to provide data logging, to provide serial outputs, or to provide printed outputs to an optional Servomex supplied printer:

- When serial output is selected, data is continuously output to your PC (or other device) connected to the serial output port on the rear of the Transfill.
- When data logging is selected, measurement information is stored in Transfill memory (see Section 6.4.3). You must manually initiate output of the stored data log to a connected device, as described in Section 6.4.6.
- When printer (printed output) is selected, you must manually initiate the printing of a sample measurement report (to the optional Servomex supplied printer), as described in Section 6.4.9.

Use the following procedure to select the required option:

1. With the Menus screen displayed, use the △ and ▽ soft keys to highlight the "Set up" menu option, then press the ✓ soft key. The Serial type screen will then be displayed, as shown in Figure 23.

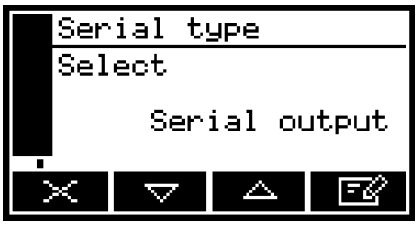


Figure 23 - The Serial type screen

2. If the option shown on the Serial type screen is not the required option, press the soft key; the Serial type select screen will then be displayed (see Figure 24).

Figure 24 - The Serial type select screen

3. Use the △ and ▽ soft keys to select the required option, then press the ✓ soft key.
4. Press the ✕ soft key to display the Menu screen.

6.4.2 Configuring the serial output parameters

+ The serial output parameters apply to both the data logging and serial output options (see Section 6.4.1).

If you have selected data logging or serial outputs, you must configure the Transfill serial output parameters to suit the requirements of the PC (or other device) which you have connected to the serial output port on the rear of the Transfill. The output parameters which you can configure are listed below:

Parameter	Valid settings
Period *	0 to 999 seconds.
Baud rate	2400, 4800, 9600, 19200 and 38400 are all supported.
Stop bits	1 or 2.
Data bits	7 or 8.
Parity	None, odd parity, or even parity.

* Time between updates: not applicable to data logging.

To configure the parameters:

1. From the Settings screen, use the ▲ and ▼ soft keys to highlight the "Serial output" menu option, then press the ✓ soft key. The first parameter screen will then be displayed: if you have selected serial outputs, the RS232 period screen will be shown (see Figure 25); if you have selected data logging, the RS232 baud rate screen will be shown (see Figure 26).

Figure 25 - The RS232 period screen

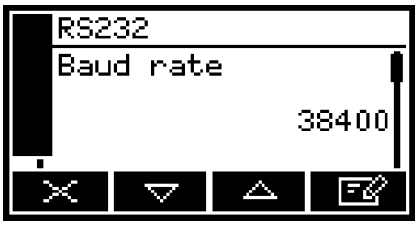


Figure 26 - The RS232 baud rate screen

2. If necessary, change the displayed parameter using the edit method described in Section 4.10.
3. For each of the other configurable parameters (see above):
   - Use the ▲ and ▼ soft keys to select the corresponding parameter screen.
   - Change the parameter as necessary: use the ▲ and ▼ soft keys to highlight the required option, or edit the data as described in Section 4.10.

6.4.3 Introduction to data logging

The Transfill allows you to maintain a data log of sample measurements made, within the Transfill memory. The data log consists of one or more ‘batches’ of measurements, and a total of 200 measurements can be stored.

Each sample measurement entered in the log has:

- an associated batch number
- a sequence number of the sample measurement within the batch
- the date and time that the measurement was made
- an alarm indication (if the measurement caused a measurement alarm to be raised)
- a fault indication (if a fault existed at the time of the measurement).

You must manually transfer measurements into the data log, specify when a new batch is to start within the data log, and clear the data log when necessary.

At any time, you can view the currently stored data log on the Transfill display, or you can output it to a device (such as a PC) connected to the Transfill serial output port.

+ The Transfill cannot be configured to automatically log data over specified periods of time. If you require such a facility, we recommend that you select serial outputs (instead of data logging) and connect the serial output to a PC or a commercially available data logger.

6.4.4 Entering measurement data into the data log

When you want to enter a sample measurement from the Measurement screen into the data log:

1. Press the soft key. When you press the soft key, the current sample measurement at the time of the key press is ‘captured’ (stored in internal memory), and the Data logging screen will then be displayed (see Figure 27).

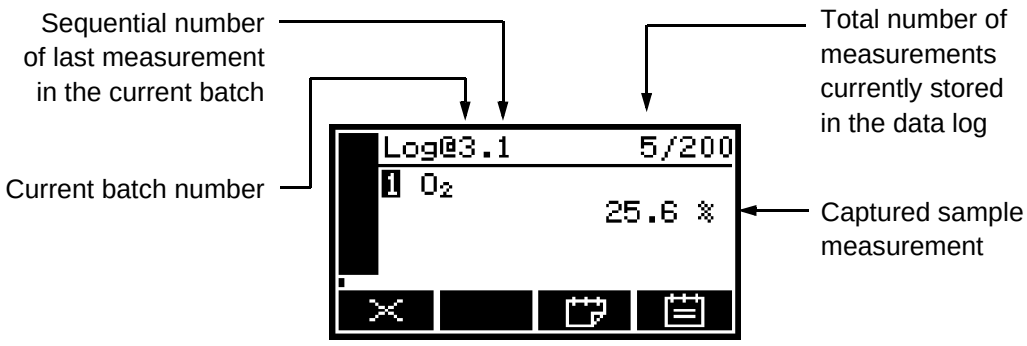


Figure 27 - The Data logging screen

2. To store the measurement data in the data log, press the soft key.

   A Log taken screen (Figure 28) is then displayed for a few seconds to verify that the measurement data has been stored in the data log, then the Measurement screen is shown again

Figure 28 - The Log taken screen

+ To return to the Measurement screen without storing the captured sample measurement data in the data log, press the soft key when the data logging screen is displayed.

6.4.5 Starting a new data log batch

1. With the Measurement screen displayed, press the soft key. The Data logging screen will then be displayed (see Figure 27).
2. Press the soft key. A new batch will then be started within the data log (and the batch sequence number of the next measurement will be reset to "1").

+ No new measurement data is entered into the data log when you press the soft key. To enter data into the new batch, you must press the soft key again, or use the procedure given in Section 6.4.4.

6.4.6 Outputting the data log

1. With the Menu screen displayed, use the and soft keys to highlight the "Data log" option, then press the soft key. The Data log options screen will then be displayed, as shown in Figure 29.

Figure 29 - The Data log options screen

2. Use the and soft keys to highlight the "Output log" option, then press the soft key. The output of the data log will be initiated, and the Measurement screen will then be shown again.

+ The data log will only be output if you have correctly configured the serial output parameters as described in Section 6.4.2.

6.4.7 Viewing the data log

1. With the Menu screen displayed, use the ▲ and ▼ soft keys to highlight the "Data log" option, then press the ✓ soft key. The Data log options screen will then be displayed, as shown in Figure 29.
2. Use the ▲ and ▼ soft keys to highlight the "View log" option, then press the ✓ soft key. The View log (batch) screen is then displayed, alternating with the View log (date) screen: see Figures 30 and 31.
3. Use the ▲ and ▼ soft keys to scroll through all of the measurements stored in the data log.
4. When you have finished viewing the data log, press the ✓ soft key or the ✕ soft key to display the Data log options screen again.

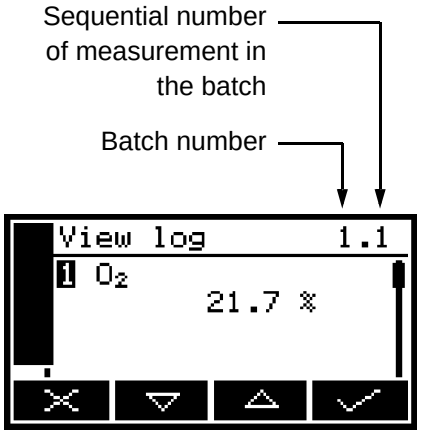


Figure 30 - The View log (batch) screen

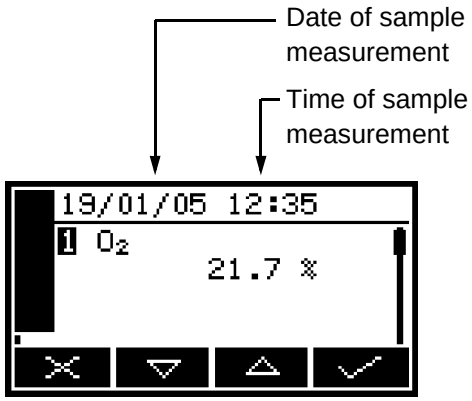


Figure 31 - The View log (date) screen

6.4.8 Clearing the data log

+ Ensure that you have viewed the data log (see Section 6.4.7) or have output the data log if required (see Section 6.4.6) before you clear the log.

+ You cannot clear batches or individual measurements from the data log.

1. With the Menu screen displayed, use the ▲ and ▼ soft keys to highlight the "Data log" option, then press the ✓ soft key. The Data log options screen will then be displayed, as shown in Figure 29.
2. Use the ▲ and ▼ soft keys to highlight the "Clear log" option, then press the ✓ soft key. The screen will then show an "Are you sure?" message:
   - Press the ✓ soft key to clear the data log. The Data log options screen is then displayed again.
   - Press the ✕ soft key to display the Data log options screen again without clearing the data log.

6.4.9 Printing a sample measurement report

If you have selected printed outputs (see Section 6.4.1), you must manually initiate the printing of each sample measurement report.

Press the soft key when you want to print a report. Refer to Appendix A3 for the format of the printed sample measurement report.

6.5 Adjusting the display

At any time, you can adjust the screen display to suit the ambient light conditions, as described in Sections 6.5.1 and 6.5.2.

6.5.1 Adjusting the backlight timer

When the Transfill is first switched on, the backlight goes on to illuminate the screen. If no soft key is pressed, the backlight will remain on for the preset 'backlight time', and will then go off. The timer associated with the backlight time is restarted whenever a soft key is pressed (that is, the backlight remains on for the backlight time after the last soft key press). To adjust the backlight time:

1. On the Settings screen, highlight the "Backlight" option, then press the soft key. The Backlight timer screen will then be displayed, as shown in Figure 32.
2. Change the backlight time (Duration) setting as required, then press the soft key.

Figure 32 - The Backlight timer screen

+ The backlight time (Duration) can be set between 0 and 999 seconds. Set the backlight time (Duration) to 0 seconds to leave the backlight permanently switched on.

6.5.2 Adjusting the contrast

1. On the Settings screen, highlight the "Contrast" option, then press the ✓ soft key. The Contrast screen will then be displayed, as shown in Figure 33.

Figure 33 - The Contrast screen

2. Use the △ and ▽ soft keys to increase or decrease the contrast to the required level, then press the ✓ soft key.

\+ Hold the △ or ▽ soft key pressed in to adjust the contrast quickly.

6.6 Switching off the Transfill after use

When you have finished using the Transfill:

1. Switch off the Transfill: press and hold the Power On/Off key for approximately 2 seconds, then release the key when the audible alarm goes on.
2. If you will not use the Transfill for several days:
   - Disconnect any tubes from the sample gas outlet and bypass gas outlet on the rear of the Transfill: see Figure 2.
   - Fit protective plastic caps to the sample gas outlet and bypass gas outlet on the rear of the Transfill (see Figure 2), and to the sample gas inlet on the front of the Transfill (see Figure 1).
3. If required, disconnect the Transfill from the electrical supply.

\+ If your Transfill has the optional rechargeable battery, we recommend that you allow the battery to fully recharge before you disconnect the Transfill from the electrical supply.

\+ If your Transfill has the optional rechargeable battery, you can leave the Transfill connected to the electrical supply. This will not affect the service life of the battery.

7 ROUTINE MAINTENANCE

7.1 Cleaning the Transfill

Regularly use a damp (but not wet) cloth to wipe clean the outer surfaces of the Transfill, to prevent the entry of dust or other particulates into the gas sample inlet or the interior of the Transfill.

7.2 Inspecting the inlet filter element

+ The filter element is made of borosilicate glass, and the filter retainer cap 'O' ring is made from Viton® (fluoroelastomer).

+ New filter elements and filter retainer cap 'O' rings are available as spares: see Section 10.

If you only use the Transfill on applications which use clean, dry cylinder gases, you will only need to inspect the inlet filter element every 3 months. On other applications, we recommend that you inspect the inlet filter element more frequently.

1. Ensure that the Transfill is switched off.
2. Unscrew and remove the filter retainer cap (see Figure 1).
3. Inspect the condition of the white filter element (fitted to the spigot on the rear of the filter retainer cap). If the filter element is wet or dirty:
   - Remove the used filter element from the filter retainer cap, then dispose of the element.
   - Push a new filter element onto the spigot on the inner side of the filter retainer cap.
4. Inspect the 'O' ring on the inner side of the filter retainer cap. If the 'O' ring is twisted or damaged:
   - Remove the 'O' ring, then dispose of it.
   - Fit a new 'O' ring to the inner side the filter retainer cap.
5. Ensure that the 'O' ring is correctly located in the recess in the inner side of the filter retainer cap, then refit and tighten the filter retainer cap.

CAUTION

Do not operate the Transfill with the filter element removed. If you do, particulates in the sample gas will seriously damage the Transfill.

7.3 Preventative maintenance

To minimize unscheduled Transfill downtime, to ensure the proper operation of the Transfill, and to comply with the guidelines of applicable regulatory bodies, we recommend that you utilize the Servomex annual preventative maintenance program for your Transfill.

The preventative maintenance program consists of a yearly inspection of the Transfill at a Servomex service facility, and repair of any faults, to ensure that the Transfill meets its original factory specification. Once inspection and repair are complete, the Transfill is returned, together with a dated service certificate.

Note that:

- Loan analyzers are available for your use while your Transfill is undergoing preventative maintenance.
- You will always be informed in advance if any repairs or new parts are required for your Transfill.

Contact Servomex or your local Servomex agent to arrange for a preventative maintenance contract.

7.4 Training/certification for medical gas transfilling

Medical gas transfilling is a critical operation required to be carried out by competent operators. Because of this, Servomex offer a variety of training courses and materials that enable us to certify customer personnel in the proper calibration, operation and routine maintenance of the Transfill.

Upon successful completion of this training, we will provide a dated certificate, which can be used to demonstrate compliance with Section 211.25(a) (Personnel Qualifications) of the US FDA "Fresh Air 2000" guidelines.

8 FAULT FINDING

8.1 Introduction to faults and fault messages

When the Transfill internal self-test facilities detect a fault:

- The audible alarm emits a single short tone.
- The amber fault LED (see Figure 1) goes on.
- A fault icon is shown on the measurement screen (see Figure 3).
- An appropriate fault message is stored.

You can view the current faults as described in Section 8.2. The fault messages which can be shown - together with the recommended actions you should take - are listed (in alphabetical order) in the table below:

Fault message	Recommended actions
Battery fault	(This message will only be shown on a Transfill which has the optional rechargeable battery fitted.) Disconnect the power supply unit plug from the electrical supply outlet, wait 30 seconds, then reconnect the plug to the electrical supply outlet. If the fault persists, contact Servomex or your local Servomex agent for assistance.
Calibration fault	Recalibrate (both low and high) as described in Section 6.1. If the fault persists, contact Servomex or your local Servomex agent for assistance.
Charging Timeout	(This message will only be shown on a Transfill which has the optional rechargeable battery fitted.) Check that the ambient temperature is in the correct range for recharging (see Section 2.4), and try to recharge the battery again. If the fault persists, contact Servomex or your local Servomex agent for assistance.
Code fault	Contact Servomex or your local Servomex agent for assistance.
Communication fail	Turn the Transfill off, and then turn it on again. If the fault message is then displayed again, contact Servomex or your local Servomex agent for assistance.
Database fault	Contact Servomex or your local Servomex agent for assistance.

Fault messages (Sheet 1 of 2)

Fault message	Recommended actions
Date/Time invalid	This usually occurs because a Transfill without the optional rechargeable battery has been left disconnected from the electrical supply for more than a week. On a Transfill with the optional rechargeable battery, this may occur when the battery is empty (fully discharged). Connect the Transfill to the electrical supply, then set the date/time as described in Section 5.3.2. If the fault persists, contact Servomex or your local Servomex agent for assistance.
Fatal fault	Contact Servomex or your local Servomex agent for assistance.
Power Config fault	Contact Servomex or your local Servomex agent for assistance.
Static RAM fault	Turn the Transfill off, and then turn it on again. If the fault message is then displayed again, contact Servomex or your local Servomex agent for assistance.
Transducer error	Ensure that you are using the Transfill in the specified operating conditions (refer to Section 2). If the fault persists, contact Servomex or your local Servomex agent for assistance.
Tx incorrect type	Contact Servomex or your local Servomex agent for assistance.
Tx Maintenance	Recalibrate (both low and high) as described in Section 6.1. If this does not clear the fault, turn the Transfill off, and then turn it on again. If the fault message is then displayed again, contact Servomex or your local Servomex agent for assistance.
Tx not detected	Contact Servomex or your local Servomex agent for assistance.

Fault messages (Sheet 2 of 2)

8.2 Viewing fault messages

If you want to view details of faults currently detected by the Transfill, use the △ and ▽ soft keys to highlight the "Faults" option on the Menu screen, then press the ✓ soft key. The Fault status screen will then be displayed as shown in Figure 34.

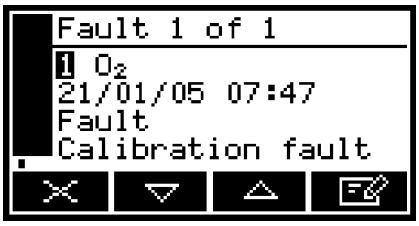


Figure 34 - The Fault status screen

If there is more than one currently detected fault, this will be indicated by the screen heading and by the scroll bar at the right of the screen. If required you can use the △ and ▽ soft keys to scroll through and view all of the current faults.

Each fault status screen shows:

- Date and time of fault
- Fault indicator
- Fault message.

Refer to Section 8.1 for the recommended actions associated with the displayed fault messages.

8.3 General fault finding

For general Transfill fault finding, refer to the table on the following pages.

If you have read through the table and still cannot rectify a fault, or cannot identify the cause of a fault, contact Servomex or your local Servomex agent for assistance.

Fault symptom	Recommended actions
The Fault LED is on.	Check any current fault messages (see Section 8.2), and carry out the recommended actions (see Section 8.1). If there are no applicable fault messages stored, or if you cannot rectify the fault after you have carried out the recommended actions: • Switch off the Transfill, then switch it on again. • If the fault persists, contact Servomex or your local Servomex agent for assistance.
The software health indicator is not moving on the display.	Carry out the recommended actions for the "The Fault LED is on" symptom above.
" - - - - - " is displayed instead of a sample measurement (or appears in the data log).	This indicates a possible measurement error, or a communications error between a transducer and the Transfill controller. Check that the Transfill is not being knocked, moved, or subjected to high levels of vibration during sample measurements. If the Transfill is not being knocked, moved or subjected to vibration and the fault persists, contact Servomex or your local Servomex agent for assistance.
Transfill response is slow.	Check that the sample gas inlet is not blocked, and that the sample gas supply to the Transfill is not restricted. Check that the sample gas outlet and bypass gas outlet are not blocked, and that any tubes or pipes connected to the outlets are not restricted. Inspect the inlet filter element and replace it if necessary: refer to Section 7.2. Check that the sample gas supply pressure is correct: refer to Section 2.2.

General fault finding (Sheet 1 of 4)

Fault symptom	Recommended actions
Transfill measurements are unstable.	Check that the sample gas supply pressure is correct: refer to Section 2.2. Check that the Transfill is not being subjected to high levels of vibration. Check that the sample gas inlet is not blocked, and that the sample gas supply to the Transfill is not restricted. Check that the sample gas outlet and bypass gas outlet are not blocked, and that any tubes or pipes connected to the outlets are not restricted. Inspect the filter element and replace it if necessary: refer to Section 7.2.
The Transfill will not calibrate.	Check that the correct low and high calibration gases are being used: refer to Section 2.3. Check that the sample gas inlet is not blocked, and that the sample gas supply to the Transfill is not restricted. Check that the sample gas outlet and bypass gas outlet are not blocked, and that any tubes or pipes connected to the outlets are not restricted. Inspect the filter element and replace it if necessary: refer to Section 7.2.

General fault finding (Sheet 2 of 4)

Fault symptom	Recommended actions
The Transfill will not switch on.	If the green light on the power supply unit is on: • Check that the power supply is correctly connected to the Transfill: see Section 5.1. • If the power supply is already correctly connected to the Transfill, contact Servomex or your local Servomex agent for assistance. If the green light on the power supply unit is off: • Check that the power supply unit is correctly connected to your electrical supply outlet, and that your external electrical supply is correct: see Section 2.1. • Check the fuze in the power supply unit plug. If the fuze has failed, replace it with a new fuze of the correct rating. • If the power supply unit is correctly connected to your electrical supply outlet and your external electrical supply is correct, the power supply unit may have failed: contact Servomex or your local Servomex agent for assistance. If you have a Transfill with the optional rechargeable battery, and the power supply unit is not connected to the electrical supply and to the Transfill, the battery may be flat: connect the power supply unit and recharge the battery (refer to Section 5.2).
The Transfill display is blank or is too dark.	Check that the ambient temperature is within the valid Transfill operating temperature range: refer to Section 2.4. Check that the display contrast adjustment has been correctly set (refer to Section 6.5.2), and has not been altered.

General fault finding (Sheet 3 of 4)

Fault symptom	Recommended actions
The measurement alarms are activating more often than expected.	Check that the Transfill is not being knocked, moved, or subjected to high levels of vibration during sample measurements. Check that the alarm modes, alarm levels and hysteresis levels have been correctly set: refer to Section 6.3.4.
The Transfill does not communicate correctly through the serial output connector.	Check that the update rate has been correctly set. Check whether data logging has been enabled, and disable data logging if necessary (refer to Section 6.4.1). (If data logging is enabled, continuous serial data outputs will be disabled.) Check that the Transfill serial output parameters have been correctly set for the system to which you have connected the serial outputs (refer to Section 6.4.2). Check that the external device is correctly connected to the Transfill serial port: refer to Appendix A4. If you have connected the serial outputs to a PC (Personal Computer), check that the correct serial port is selected on the PC. (Note that you may have to restart the PC for serial port changes to take effect.)

General fault finding (Sheet 4 of 4)

9 STORAGE AND DISPOSAL

9.1 Storage

Refit any protective plastic covers (see Section 3) and place the Transfill and any associated equipment in its original packaging before storage. Alternatively, seal it inside a waterproof plastic bag, sack, or storage box.

Store the Transfill and any associated equipment in a clean, dry area. Do not subject it to excessively hot, cold, or humid conditions: see Section 2.4.

+ If your Transfill has an optional rechargeable battery, recharge the battery every 2 months: see Section 5.2.2.

9.2 Disposal

Dispose of the Transfill, the power supply unit and any other associated equipment safely, and in accordance with all of your local and national safety and environmental requirements.

+ The Transfill is not suitable for disposal in municipal waste streams (such as landfill sites, domestic recycling centers and so on).

10 SPARES

The standard spares available for the Transfill are shown below. You can order these spares from Servomex or your agent.

Spare	Part Number
Inlet filter element (pack of 5)	00570982
Filter retainer cap ‘O’ ring	2323-7029
Inlet/outlet quick-connect fitting	202517
Power supply unit	202578
Thermal printer paper (pack of 5 rolls)	203022
Rechargeable battery pack	05200931

+ We recommend that you maintain a stock of inlet filter elements and a filter retainer cap ‘O’ ring, so you can replace them when necessary: see Section 7.2.

APPENDIX

A1 DATA LOG OUTPUT FORMATS

The data log is output in the form of an identifier line, followed by a number of log lines, one line for each entry stored in the data log.

The identifier line is in the form: "Servomex <serial number> ; <gas>", where <serial number> is the Transfill serial number as shown on the Information screen (see Figure 7) and <gas> is as specified below.

Each log line consists of a number of elements, separated from each other by the delimiter string " ; " (space, semicolon, space), in the following format:

<log id> ; <date> ; <time> ; <gas> ; <measurement> ; <units> ; <fault status> ; <alarm status>

where:

<log id>	Is in the form "X.Y", where "X" is a digit (or digits) specifying the batch number and "Y" is a digit (or digits) specifying the number of the measurement within the batch.
<date>	Is the date on which the data log entry was made.
<time>	Is the time at which the data log entry was made.
<gas>	Specifies the sample gas measured.
<measurement>	Is the actual sample measurement as displayed on the measurement screen.
<units>	Is the measurement units, as displayed on the measurement screen.
<alarm status>	Is either blank (not output), or "Alarm" if a measurement alarm condition existed when the log entry was made.
<fault status>	Is either blank (not output), or "Fault" if a fault condition existed when the log entry was made.

A typical extract from a typical data log output is shown below:

```
Servomex 05123A1/45678 ; O2
  1.1   ; 19/01/05 ; 14:57:04 ; O2 ;  14.8 ; % ; Alarm ;
  1.2   ; 19/01/05 ; 14:57:09 ; O2 ;  14.8 ; % ; Alarm ;
  1.3   ; 19/01/05 ; 14:57:16 ; O2 ;  14.8 ; % ; Alarm ; Fault
  2.1   ; 19/01/05 ; 14:57:36 ; O2 ;  14.8 ; % ; Alarm ;
  2.2   ; 19/01/05 ; 14:57:42 ; O2 ;  14.8 ; % ; Alarm ;
  2.3   ; 19/01/05 ; 14:57:58 ; O2 ;  14.8 ; % ; Alarm ; Fault
  3.1   ; 19/01/05 ; 14:58:13 ; O2 ;  14.8 ; % ; Alarm ;
  3.2   ; 19/01/05 ; 14:58:46 ; O2 ;  20.5 ; % ; ;
  3.3   ; 19/01/05 ; 14:58:51 ; O2 ;  20.5 ; % ; ;
  3.4   ; 19/01/05 ; 14:58:55 ; O2 ;  20.5 ; % ; ; Fault
  4.1   ; 19/01/05 ; 14:59:03 ; O2 ;  20.5 ; % ; ; Fault
  4.2   ; 19/01/05 ; 14:59:08 ; O2 ;  20.5 ; % ; ;
```

APPENDIX

A2 SERIAL OUTPUT FORMATS

The serial output consists of a number of measurement lines, one line for each update.

Each measurement line consists of a number of elements, separated from each other by the delimiter string " ; " (space, semicolon, space), in the following format:

<date> ; <time> ; <gas> ; <measurement> ; <units>

where:

<date>	Is the date on which the data log entry was made.
<time>	Is the time at which the data log entry was made.
<gas>	Specifies the sample gas measured.
<measurement>	Is the actual sample measurement, as displayed on the measurement screen.
<units>	Is the measurement units, as displayed on the measurement screen.

An extract from a typical serial output is shown below:

```
19/01/05 ; 14:50:25 ; O2 ;  20.3 ; %
19/01/05 ; 14:50:35 ; O2 ;  20.3 ; %
19/01/05 ; 14:50:45 ; O2 ;  20.3 ; %
19/01/05 ; 14:50:55 ; O2 ;  20.3 ; %
19/01/05 ; 14:51:05 ; O2 ;  20.3 ; %
```

+ Alarms and fault information are not provided in the serial outputs.

APPENDIX

A3 PRINTER OUTPUT FORMATS

If you have selected printed outputs (see Section 6.4.1), each time you press the soft key, a single sample measurement report is printed (on the Servomex supplied printer). The format of this report is as shown below:

Date:	<date>	
Time:	<time>	
I.D.:	<serial number>	
Batch:	_____	
Product:	_____	
Measurement:		
1 O2	XXXX%	<alarm>
Signature	_____	

where:

<date>	Is the date on which the report was printed, in the currently selected format (see Section 5.3.2).
<time>	Is the time at which the report was printed, in the format hh:mm:ss (hours:minutes:seconds).
<serial number>	Is the serial number of the Transfill.
XXXX%	Is the oxygen concentration of the sample measurement.
<alarm>	Specifies the alarm status: • "Pass" indicates that alarms have been configured, and that the sample measurement has not triggered an alarm. • "FAIL" indicates that alarms have been configured, and that the sample measurement has triggered an alarm. If no alarms have been configured, <alarm> will be blank.

Batch and Product	Are fields which you can complete (by hand) to identify, for example, a specific batch, and a specific product within that batch.
Signature	Is a field which can be used for the signature of the person who printed the report.

+ Refer to your company procedures for the correct usage of the Batch, Product and Signature fields of printed sample measurement reports.

+ Refer to the printer manual for additional information (for example, on how to replace the printer roll).

APPENDIX

A4 RS232 CONNECTION DETAILS

WARNING

Ensure that the electrical installation of any equipment connected to the Transfill conforms with all applicable local and national electrical safety requirements.

A4.1 Overview

The serial port on the rear of the Transfill (see Figure 2) is an RS232 ± 5.5 V 9-way ‘D’ type connector.

The pins on the connector are used as shown in Figure A1 below:

Pin(s)	Use
1	Not used
2	Rx (to Transfill)
3	Tx (from Transfill)
4	Not used
5	0 V
6, 7, 8, 9	Not used

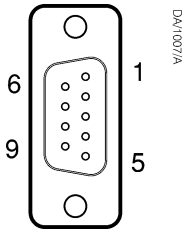


Figure A1 - RS232 connection pin details

A4.2 Connecting the Transfill to a PC

The Transfill can be directly connected to the 9-way ‘D’ type serial port (usually designated "COM1" or "COM2") on your PC. We recommend that you use the serial output cable supplied. If you do not use the cable supplied, use a compatible 9-way ‘D Null Modem’ cable, with female-to-female connectors.

If your PC only has USB serial ports, use a commercially available 9-way ‘D’ type serial to USB converter to connect the Transfill to one of the serial ports.

A4.3 Capturing data using Windows® and Hyper Terminal™

If you use one of the Windows operating systems, HyperTerminal is probably already installed on your PC. For detailed instructions on the installation and use of HyperTerminal, refer to the help files on your PC, or to the documentation supplied with your PC. The following information is provided as a summary only, for quick reference.

1. Install HyperTerminal (if not already installed).
2. Start HyperTerminal. You can usually do this by clicking on the Start button, then by clicking on: Programs, Accessories, Communications, HyperTerminal.
3. Enter a suitable name and select a ‘connect’ icon for the connection.

   \+ You can drag the icon onto your desktop for quick access to HyperTerminal.

4. Identify the "COM" port that you have used to connect the Transfill to the PC.
5. Set the port settings to be consistent with the Transfill serial output parameters (see Section 6.4.2). The recommended settings are as follows:

Parameter	Recommended setting
Baud rate	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None *

* This is not an option on the Transfill.

6. Click on the ‘connect’ icon to initiate the connection:
   - If you have configured the Transfill to provide serial output (see Section 6.4.1), data will then be displayed on the PC.
   - If you have configured the Transfill for data logging, data will only be sent to the PC when you output the data log (see Section 6.4.6).

Data output from the Transfill can be saved (as a text file) using the ’capture text’ command in HyperTerminal. You can then import this text directly into applications such as Excel ®.

APPENDIX

A5 MATERIALS IN CONTACT WITH SAMPLE AND CALIBRATION GASES

The materials of the parts of the Transfill in contact with the sample and calibration gases are listed below. These materials have a wide range of chemical compatibility and corrosion resistance.

316 stainless steel
302 stainless steel
Borosilicate glass
PPS (polyphenylene sulfide) with PTFE (polytetrafluorotheylene)/glass filler
PPS (polyphenylene sulfide) with carbon fibre filler
Gold
Platinum/iridium alloy
Nickel
Epoxy adhesive (EPO-TEK H72)
Polypropylene
Viton®
Krytox® GPL205 grease
Kynar® (PVDF: polyvinylidene disulfide)
Polysulfone

APPENDIX

A6 COMPLIANCE AND STANDARDS INFORMATION

- The 5200 Transfill Gas Analyzer complies with the European Community "Electromagnetic Compatibility Directive", 89/336/EEC (as amended by 92/31/EEC and 93/68/EEC).
- The 5200 Transfill is excluded from the scope of the European Community "Low Voltage Directive", 73/23/EEC.
- The 5200 Transfill has been assessed to IEC 61010-1:2001 (+Corr 1: 2002 + Corr 2:2003) for electrical safety, rated in accordance to IEC 60664-3 Category II, Pollution Degree 2.
- The 5200 Transfill has been validated and fully complies with the requirements of The Food and Drug Act - specifically, 21 CFR 211.165 (e) and 211.194 (a)(2) - for verification of the strength, identity and purity of: MEDICAL OXYGEN (USP).
- The power supply unit supplied with the 5200 Transfill complies with the European Community "Low Voltage Directive", 73/23/EEC.
- Servomex Group Ltd is a BS EN ISO 9001:2000 and EN ISO 14001:1996 certified organization.