TOC-20 SERIES
Refrigerant Gas Monitor

Installation and Operation Manual
Version 4

Document Ref: T20-V4

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International Gas Detectors

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INDEX

Who should read this manual.

This manual is intended for use by trained installers of gas detection systems who are technically competent and have all necessary tools to undertake installation and maintenance on this type of equipment.

Failure to install and maintain the equipment properly can render the detector ineffective.

You should not undertake any of the procedures in this manual if you do not have access to the correct equipment, have not undertaken training on this or similar equipment or are not technically qualified to install this equipment.

Calibration gases and test equipment is available from Sensors.

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CH4 H2S CO2 NO2 SO2 NO2 CO

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EC Declaration of Conformity

Issuers name and address:

Oliver IGD Limited of
Triton House
Crosby St,
Stockport,
United Kingdom

CE

Declares that the product listed as:

TOC-20

4-20mA or Addressable Output Gas Detector with display

Are in conformity with the provisions of the following European Directive(s) when installed, operated, serviced and maintained in accordance with the installation and operating instructions contained in the product documentation.

2004/108/EC   **EMC Directive**
2006/95/EC   **Low Voltage Equipment Directive** *(note not applicable to 24V DC Powered Versions)*

And that the standards and/or technical specifications referenced below have been applied or considered.

EN 61779-1:2000   Electrical apparatus for the detection and measurement of flammable gases, general requirements and test methods.

EN 50271:2010   Electrical apparatus for the detection and measurement of combustible gases, toxic gases or Oxygen: requirements and tests for apparatus using software and or digital technologies. *Excluding requirements for SIL*

EN 61000-6-2: 2005   EMC Generic standards. Immunity for industrial environments
EN 61000-6-4: 2007   EMC Generic standards. Emission standard for industrial environments
EN 61000-3-2/A2:2009   EMC Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3: 2008   EMC Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase

Technical File Reference   T20-TF9

Product Markings   CE   **TOC-20**   S/-*serial number*

Oliver IGD Limited Operate and Independently assessed ATEX/IECEX QAN.	Oliver IGD Limited operate an independently assessed ISO9001:2008 Quality Management System.	Testing Agency:
Quality Assurance Certificate Number **ExVeritas 16PQAN0014**		TUV - SUD Octagon House Concorde Way PO 15 5RL Fareham
Quality Assurance Notification Number: **2585**	Quality Management Certificate Number **FS 646773**	
ExVeritas, Units 16-18, Abenbury Way, Wrexham Industrial Estate, Wrexham, UK, LL13 9UZ	BSI Assurance UK LTD, Chiswick High Road, London W4 4AL UK	

TUV Certificates and reports can be checked on-line at https://www.tuev-sued.de/industry_and_consumer_products/certificates

Issued on: June2016   At Oliver IGD Limited, Stockport, SK2 6SH , United Kingdom

Signature:

Name

Position: Managing Director

Declaration of Conformity in accordance with EN ISO/IEC 17050-1:2010

Andrew J Collier M.I.O.D

Date: June 2016   Declaration Ref: TOC-20DEC-3

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Standard Specifications

Power	18-28V DC (230V AC Adaptor Supplied)
Construction	ABS
Outputs	1 off 4-20mA Linear Output for CFC/HCFC
	Modbus RTU Interface
	2 off SPCO Relays Rated 4A Non Inductive
	85dB Alarm Sounder

Operating Environment

Temperature	-5 to 55 Deg C
Humidity	5-95% RH Non-Condensing
Sealing	IP54 (Excluding Sensor)

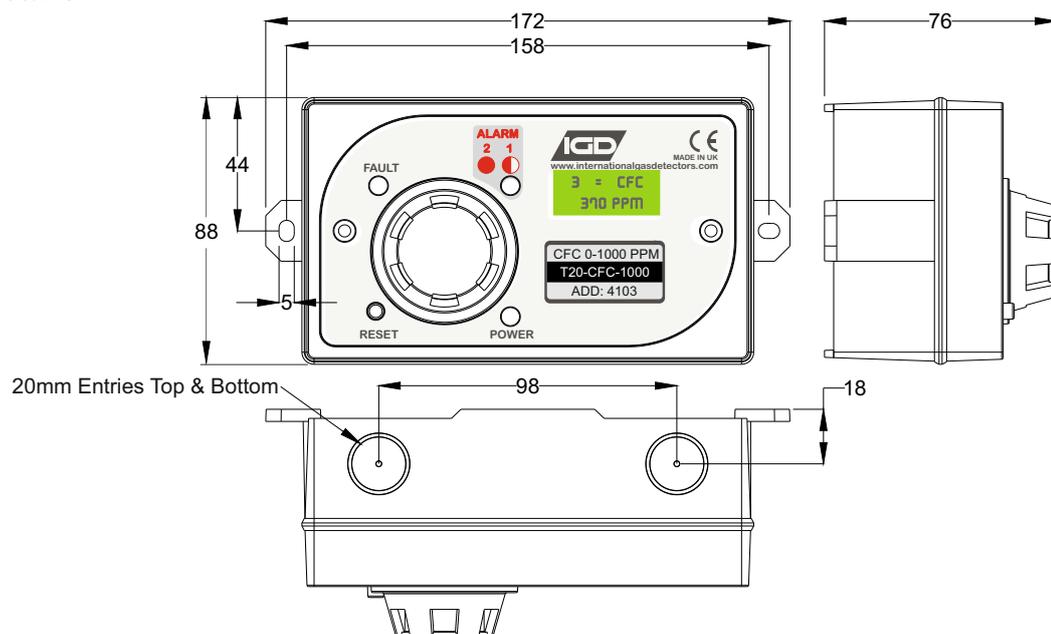**Measuring Ranges**   CFC/HCFC 0-1000ppm, Resolution 10ppm, Accuracy +/- 5% of Range

Initial Stabilisation   Typically up to 48 Hours on first installation
Note for installers: Do not make adjustments to zero or calibration settings until the unit has fully stabilised.

Package Size   180mm X 100mm X 75mm (See Dimension Drawing)

Weight   375g

Physical Details

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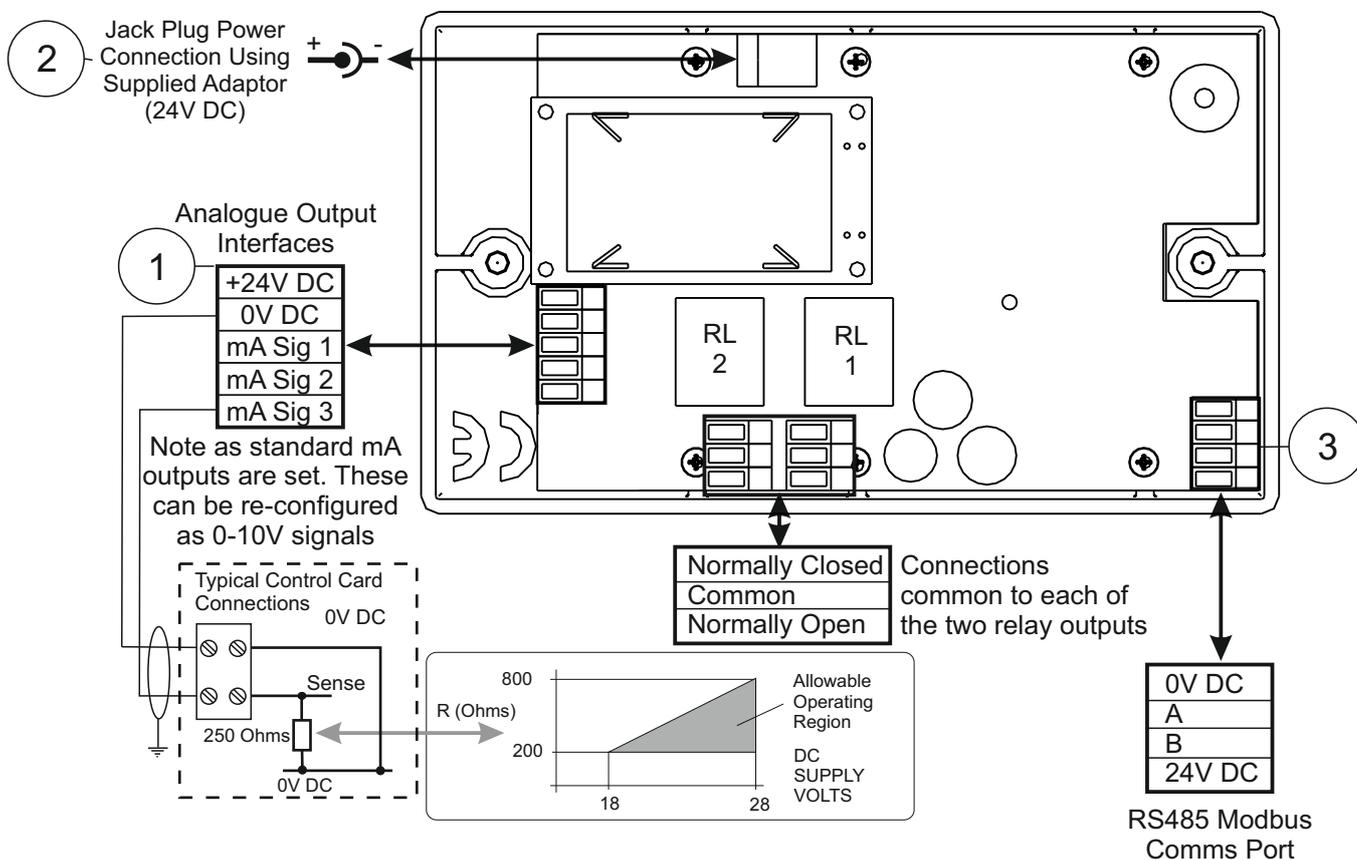FS646773

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NOTE

TOC-20 can be supplied with a bulkhead mounting PSU allowing permanent connection to a 230V AC mains power source. Mains power should be fed via a fused spur.
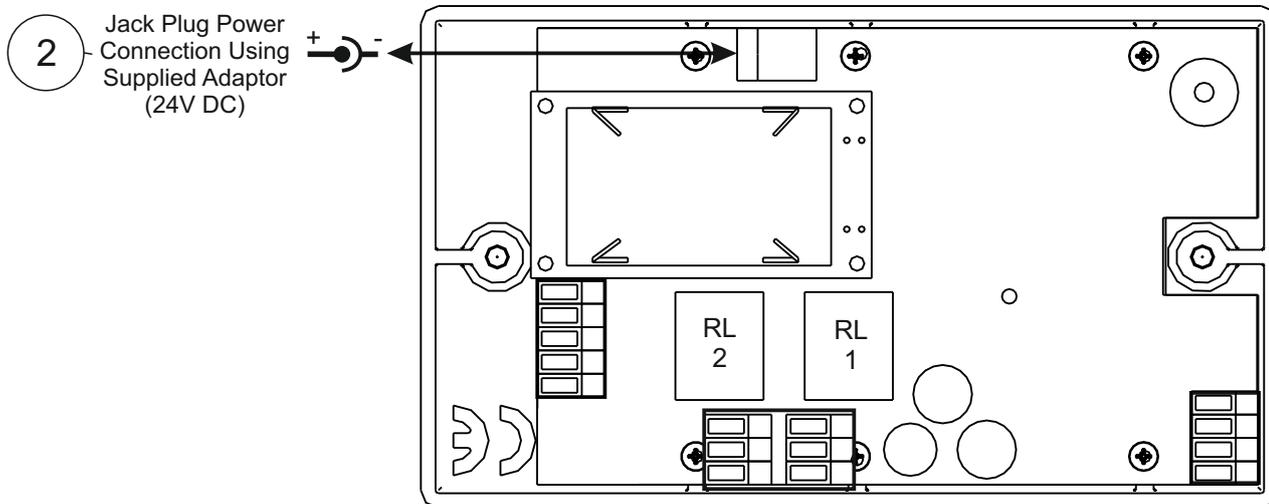
When working with stranded cable ensure ferrules (bootlaces) are fitted to prevent stray cable strands.

The following information shows the main electrical connection points labelled as points and interfaces. These points are referred to in the manual supplied. When installing ensure you have the full manual available. This page is also supplied inside the TOC-20 enclosure as a quick reference for site engineers. If you do not have the full manual a copy is available on our website at www.internationalgasdetectors.com/downloads/

INTERFACES

2 Jack Plug Power Connection Using Supplied Adaptor (24V DC)

1 Analogue Output Interfaces

| +24V DC |
| 0V DC |
| mA Sig 1 |
| mA Sig 2 |
| mA Sig 3 |

Note as standard mA outputs are set. These can be re-configured as 0-10V signals

Typical Control Card Connections

0V DC

Sense

250 Ohms

0V DC

RL 2   RL 1

Normally Closed	Connections
Common	common to each of
Normally Open	the two relay outputs

3

800

R (Ohms)

200

18   28

Allowable Operating Region

DC SUPPLY VOLTS

| 0V DC |
| A |
| B |
| 24V DC |

RS485 Modbus Comms Port

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Power Options Figure 2

(2) Jack Plug Power Connection Using Supplied Adaptor (24V DC)

+ -

RL 2   RL 1

Notes

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Controller Overview

Alarm Indicator LED (Red)
Flashes on Alarm Level 1
Continuous on Alarm Level 2

Colour Backlit LCD Display
Flashes Red on alarm
Flashes Yellow on Fault Detection
Blue during menu operation
Note the back light is off in normal operation and
is on during an alarm, fault detected or when editing
or checking.

Internal Sounder 85dB
Sounds on alarm 1 or 2 activation
and can be muted

Fault Detected
Indicator LED (Yellow)

FAULT

ALARM
2 1

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3 = CFC
370 PPM

CFC 0-1000 PPM
T20-CFC-1000
ADD: 4103

RESET

POWER

Power LED (Green)

Selector Button

Typical display during warm up

WARMUP
3600s

On initial power up the backlight will perform the
following cycle:

Backlight cycles: green-yellow-red

The display then shows:

Software Version
Software checksum and date
Connected sensor info

Finally a countdown starts to enable connected
sensors to stabilise prior to normal operation.

From initial power up the TOC-20 will take 1 hour
to stabilise. Additionally for a new installation it can
take up to 48 hours for detectors to fully stabilise to
new conditions.

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User Actions....Day to Day Operation

Once fully installed the TOC-20 controller will continuously monitor the CFC level continuously comparing current values with any set alarm thresholds. The display will cycle to display each reading in turn. Normally the backlight will be green to indicate correct operation below set thresholds

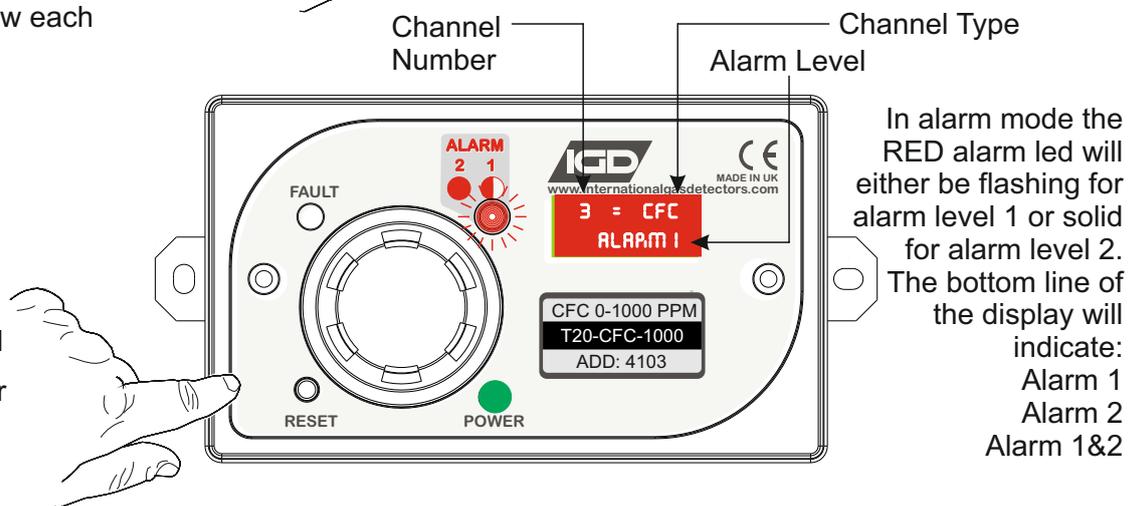### To access the display click the button

Note that each channel will be displayed in turn as indicated by pressing the button. The background colour changes to blue to indicate manual channel selection. After 60s if the button is not pressed the display reverts to a green background and the display will revert to show each reading in turn.

Channel Number ———— Reading Type

```
3 = CFC
475 PPM
```

Current Channel Reading
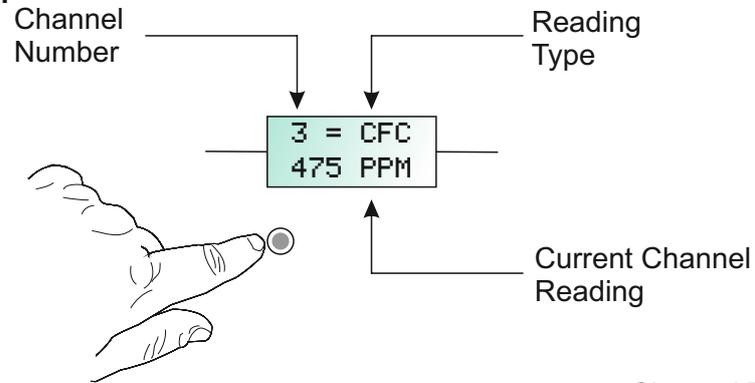
In Alarm Condition

The back light will flash red and the display will indicate which alarm level and which channel is in alarm. The sounder will also activate. Pressing the button will silence the sounder. If the gas is still breaching the alarm threshold it will not be possible to reset the alarm

Channel Number ———— Channel Type / Alarm Level

ALARM 2 1
FAULT
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```
3 = CFC
ALARM 1
```

CFC 0-1000 PPM
T20-CFC-1000
ADD: 4103

RESET   POWER

In alarm mode the RED alarm led will either be flashing for alarm level 1 or solid for alarm level 2. The bottom line of the display will indicate:
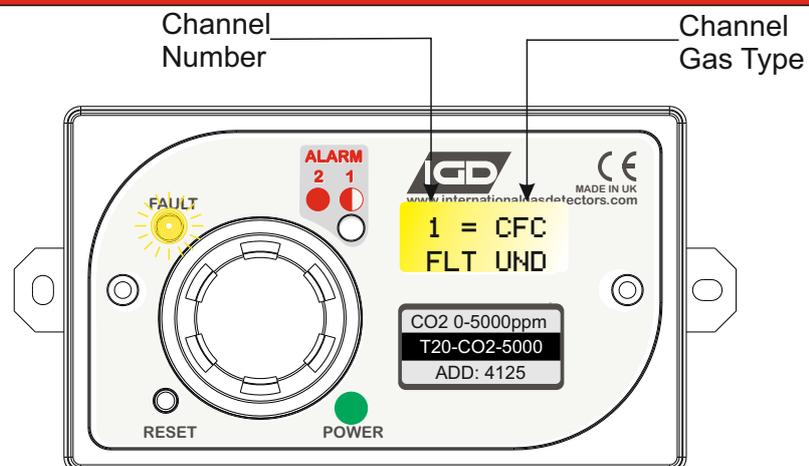Alarm 1
Alarm 2
Alarm 1&2

In the event of alarm or fault, CALL FOR SERVICE.
The owner operator is not usually a gas engineer or competent person as defined by Health and Safety guidelines. If there is any doubt call your service company and get it checked.
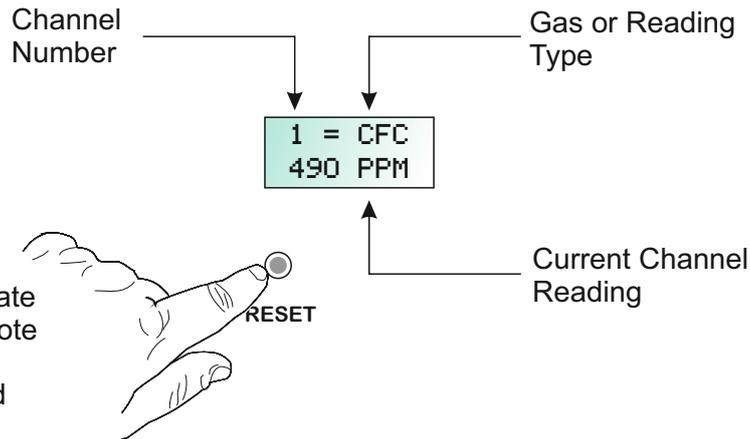
In Fault Condition

In FAULT mode the Yellow fault led will be on. The bottom line of the display will indicate as follows:

FLT COM communication error to sensors
FLT SEN Sensor Error
FLT OVR Sensor Over Range
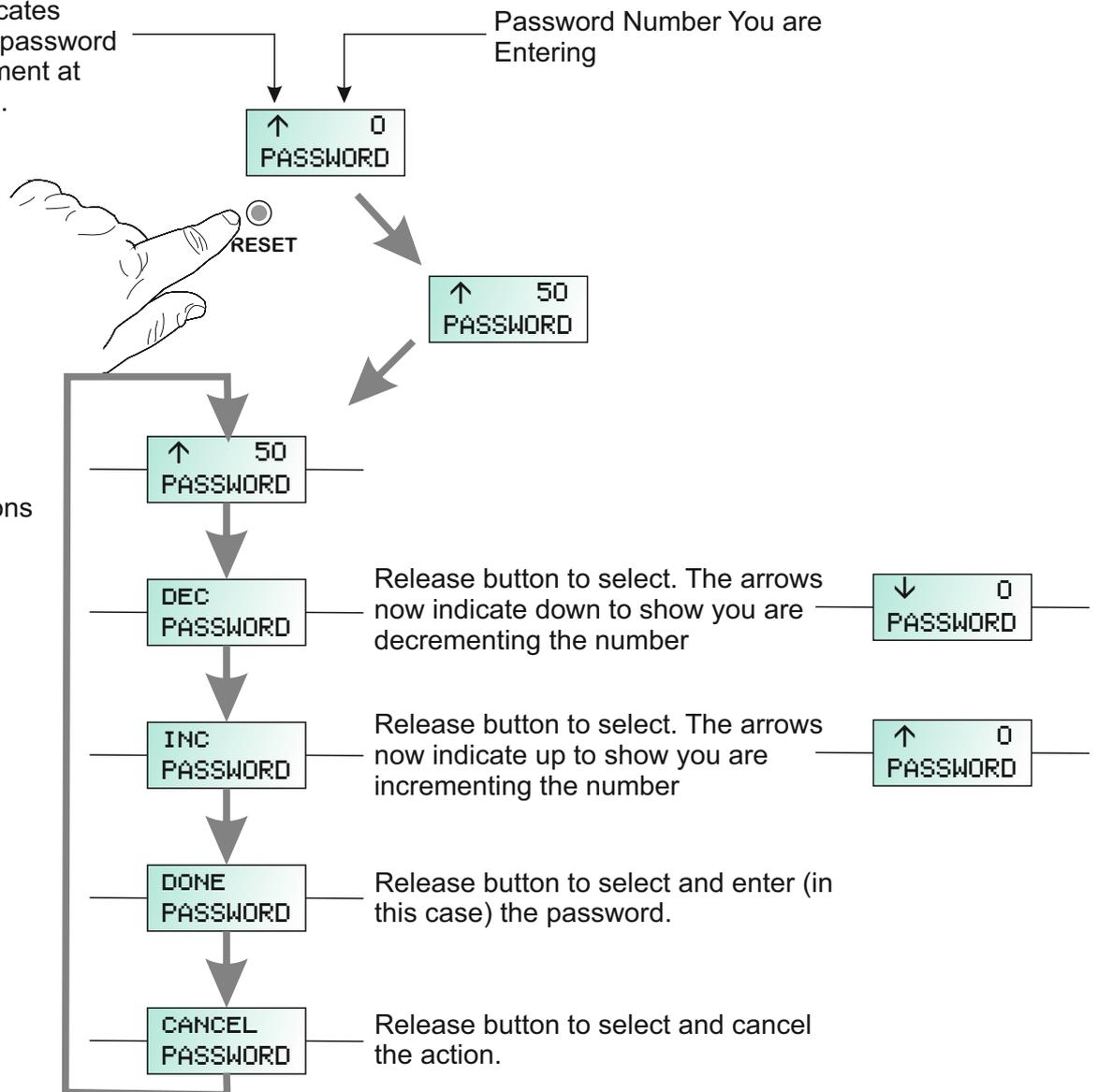FLT UND Sensor Under Range

Channel Number ———— Channel Gas Type

ALARM 2 1
FAULT
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```
1 = CFC
FLT UND
```

CO2 0-5000ppm
T20-CO2-5000
ADD: 4125

RESET   POWER

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To access the display press the button for 1-2 seconds

Channel Number

Gas or Reading Type

```
1 = CFC
490 PPM
```

Current Channel Reading

The back turns blue to indicate manual channel selection. Note that each channel will be displayed in turn as indicated

RESET

Data entry and menu selection using the password entry as an example.
To access the menu system press the button until the message
"Release button and enter password"
message is displayed.

The up arrow indicates that the indicated password number will increment at each button press.

Password Number You are Entering

```
↑      0
PASSWORD
```

RESET

```
↑     50
PASSWORD
```

Keep the button pressed and the following menu options appear.

```
↑     50
PASSWORD
```

```
DEC
PASSWORD
```
Release button to select. The arrows now indicate down to show you are decrementing the number

```
↓      0
PASSWORD
```

```
INC
PASSWORD
```
Release button to select. The arrows now indicate up to show you are incrementing the number

```
↑      0
PASSWORD
```

```
DONE
PASSWORD
```
Release button to select and enter (in this case) the password.

```
CANCEL
PASSWORD
```
Release button to select and cancel the action.

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TOC 20 Menu Overview

```
↑        0
PASSWORD
```

50

Engineer Menu Options

Provides access for control panel set up and diagnostic functions

```
OUTPUT 1
1 OF 7
```
Use this option to test, zero or calibrate analogue output 1

```
OUTPUT 2
2 OF 7
```
Use this option to test, zero or calibrate analogue output 2

```
OUTPUT 3
3 OF 7
```
Use this option to test, zero or calibrate analogue output 3

```
USR MENU
4 OF 7
```
Use this option to move to the user menu

```
RESPONSE
5 OF 7
```
Use this option to adjust how quickly the sensors respond

```
SOUNDER
6 OF 7
```
Use this option to Enable or Disable the sounder output on alarm

```
EXIT
6 OF 7
```
Use this option to EXIT back to normal operation

100

User Menu Options

Provides access for maintenance functions

```
ZERO
1 OF 9
```
Use this option to ZERO connected devices

```
CAL
2 OF 9
```
Use this option to CALIBRATE connected devices

```
ALARM 1
3 OF 9
```
Use this option to set ALARM 1 level and action

```
ALARM 2
4 OF 9
```
Use this option to set ALARM2 level and action

```
DISABLE
5 OF 9
```
Use this option to disable a channel

```
CONTRAST
6 OF 9
```
Use this option to set the screen contrast

```
SEN INFO
7 OF 9
```
Use this option to access sensor information

```
ABOUT
8 OF 9
```
Use this option to view software version etc

```
EXIT
8 OF 9
```
Use this option to EXIT to normal operation

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Monitoring CFC/HCFC Plant Using T20-HFC or CFC Models

Here the TOC-20 is being used to monitor for possible leaks from fixed refrigeration or air conditioning plant. Good detector placement is key to ensuring correct operation. Most CFC's and HCFC's are heavier than air so it would be normal practice to place detectors below valve stations, manifolds and coils. Note that detectors cannot be placed in cold stores and should be away from areas of air movement such as ventilation fans. Avoid moisture and condensation onto units, enclosures are IP rated but the sensor is not, condensation and moisture ingress to the sensor can cause damage. IGD are available to advise on specific installations provided details are available. Inclusion for the detection at an early design stage is always adviseable.

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With the TOC-20 correctly located and powered the system will perform a self check then proceed through its stabilisation period. This is 1 hour, during this period the sensors are stabilising to their environment, during this period the alarm relay outputs are inactive and the analogue outputs will indicate zero. At the end of the stabilisation period the system will go into normal operation.

Normal Operation

In normal operation mode the TOC-20 displays each channel and its reading in turn. In normal mode the back light will be green. Pressing the button will change the backlight to blue, indicating manual mode. each button press then indicates the next channel reading. After 60 seconds without a button press the system reverts to normal operation.

Channel Number   Channel Type

```
3 = CFC
490 PPM
```

Reading   Units
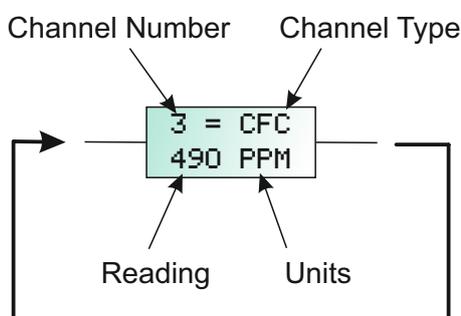
Supplied Set Up

The T20-HFC-1000 will be supplied with the following default set up.

	Channel 3 CFC 0-1000ppm
Alarm 1 Level	500 ppm
Alarm 1 Relay	Relay 1
Sounder	On
Alarm 2 Level	800ppm
Alarm 2 Relay	Relay 2
Sounder	On
Analogue Output	3

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NO SO2 NO2 CO

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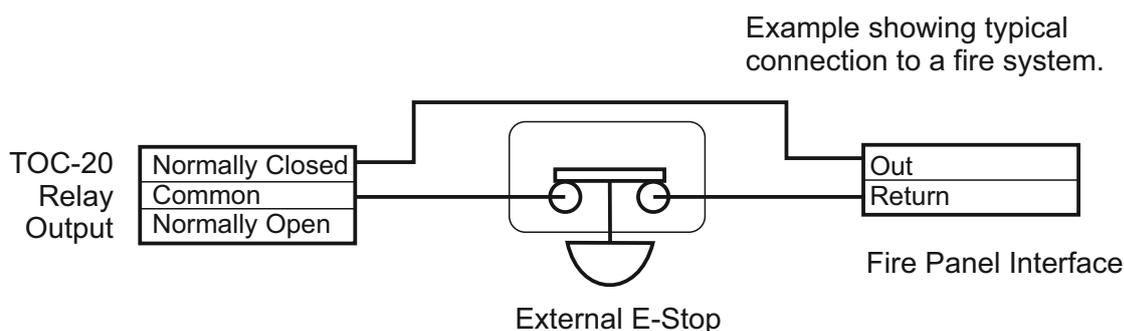SYSTEMS
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Relay Connection

As standard the TOC-20 system is equipped with two relay outputs. The function of these two relay outputs can be user configured and is discussed in a later section. The relays are rated to operate 4A non inductive loads. Typical wiring arrangements are indicated below and show typical methods to protect the relays during installation.

TOC-20 Relay Output
Normally Closed
Common
Normally Open

24V DC
A1
A2
0V DC
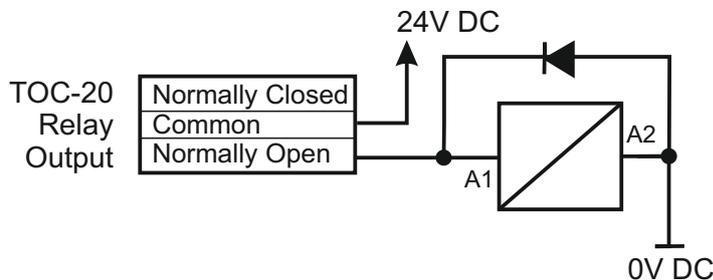
Example fit protection diodes when switching external DC loads.

TOC-20 Relay Output
Normally Closed
Common
Normally Open
A1
A2
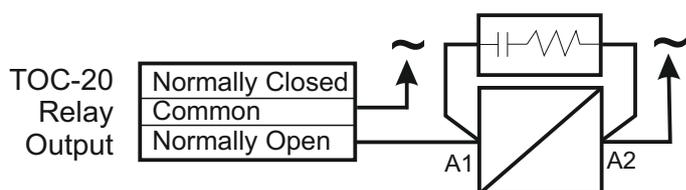
Example fit protection supressors when switching external AC loads typical device Farnell Ref 1438460 (0.22uF 47R X1)

Example showing typical connection to a fire system.

TOC-20 Relay Output
Normally Closed
Common
Normally Open

Out
Return

Fire Panel Interface

External E-Stop

Analogue Outputs (mA)

As standard the TOC-20 is equipped with three analogue outputs. By default these are configured as 4-20mA current outputs. By request these can be set to 0-10V DC outputs during production. This is a factory only setting. The following diagrams indicate the connections
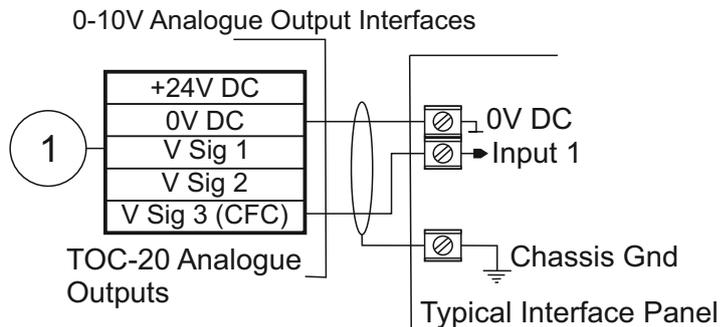
mA Analogue Output Interfaces
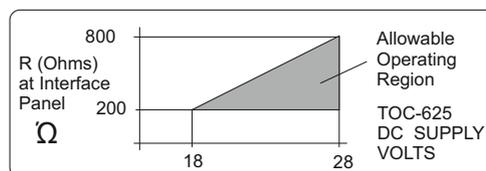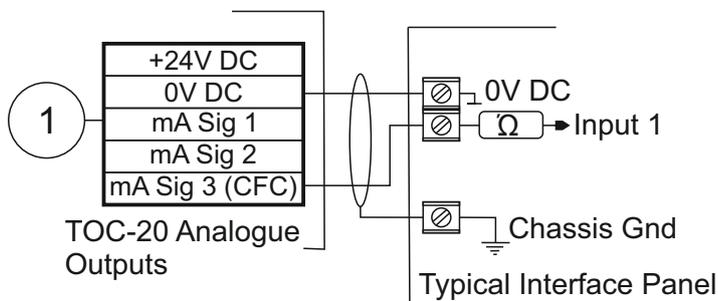
1
+24V DC
0V DC
mA Sig 1
mA Sig 2
mA Sig 3 (CFC)

TOC-20 Analogue Outputs

0V DC
Ω → Input 1
Chassis Gnd

Typical Interface Panel

800
R (Ohms) at Interface Panel
200
Ω

Allowable Operating Region

TOC-625 DC SUPPLY VOLTS

18   28

Note this diagram shows the use of screened cabling when interfacing signal cables. Signal cables should be segregated from power and control cables for best results.

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Analogue Outputs (Voltage)

If requested at the time of ordering the TOC-20 can be supplied with its analogue outputs re-configured as 0-10V DC. The following diagrams indicate the connections

0-10V Analogue Output Interfaces

1	+24V DC
	0V DC
	V Sig 1
	V Sig 2
	V Sig 3 (CFC)

0V DC
Input 1

Chassis Gnd

TOC-20 Analogue Outputs

Typical Interface Panel

Note this diagram shows the use of screened cabling when interfacing signal cables. Signal cables should be segregated from power and control cables for best results.

Testing Analogue Outputs

| OUTPUT 1 | OUTPUT 2 | OUTPUT 3 |
| 4 OF 9 | 5 OF 9 | 6 OF 9 |

The operating system has a simulation mode for the analogue output channels. This allows the commissioning engineer to force a signal output to prove correct interfacing at the host system.

From Normal Operation press the function button until the display alters to show 'release button.

RELEASE

The system now requests a password. Enter 50 to enter the Engineer Menu.

↑   50
PASSWORD

Press the function button until the required option, OUTPUT 1, 2 or 3 is displayed. Now hold down the button until prompted to release.

OUTPUT 1
4 OF 9

OUTPUT 1
RELEASE

In this example output 1 will be tested.

Press the button until TEST is indicated and hold until prompted to release.

ZERO
CLICK TO
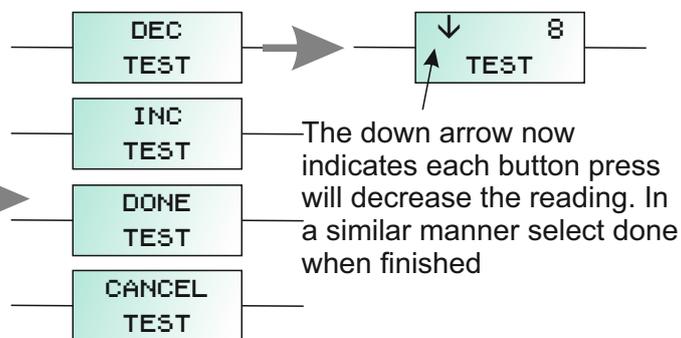
CAL
CLICK TO

TEST
CLICK TO

The display now shows a mV or mA output reading which can be increased or decreased as desired during testing as follows (mA output shown)..
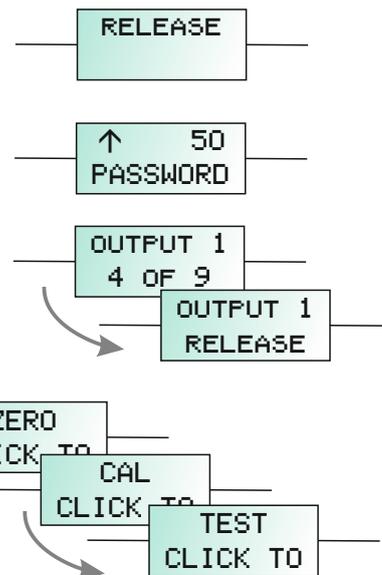
Indicates each button click will increase the reading/output

Current Reading

↑   8
TEST
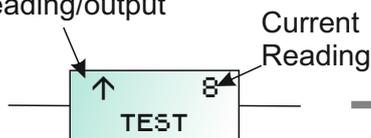
To decrease the reading press and hold the button. The display cycles through the following options

DEC
TEST

INC
TEST

DONE
TEST

CANCEL
TEST

↓   8
TEST

The down arrow now indicates each button press will decrease the reading. In a similar manner select done when finished

Release the button when the desired option is displayed

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Putting into Service Test Schedule

In conclusion by following the steps discussed your checklist for putting into service should be:

1   Ensure Location of the TOC-20 is optimum for the application. If the bulkhead PSU option is being used then ensure this is fed from a fused spur.

2   Ensure terminations via glands provide a positive seal.
    Leave all interfaces unplugged and check installation cabling terminations

3   Check the required alarm setup has been entered. Amend the default alarm set up if required
    Power up the TOC-20. Allow the system to stabilise and that the normal green display is indicated at the end of the stabilisation period with no faults indicated.

4   If the relay outputs are being used check the cabling then plug in and test using the TST RLY function the relay action.

5   If the analogue outputs are being used check the cabling to connector 1 , plug in and test using the OUTPUT 1, 2 or 3 functions.

6   After stabilisation is complete the display should indicate zero with no leaks present.

7   The normal response for the sensors is 90 seconds to 90% of final reading. This is the FAST response setting. In some applications, such as densely populated call centres this may be too fast. If a slower response is required to reduce peak readings then choose either the Medium or Slow settings in the engineer menu RESPONSE option.

8   The TOC-20 should now be operating correctly

In the event that the controller needs amendment to set up follow the instructions in the following sections.

Changing alarm levels

Assigning relay outputs

Zero and Calibration Function (analogue outputs)

Calibration of the sensors is not covered in this manual and should only be undertaken by a trained engineer with the appropriate equipment and software.
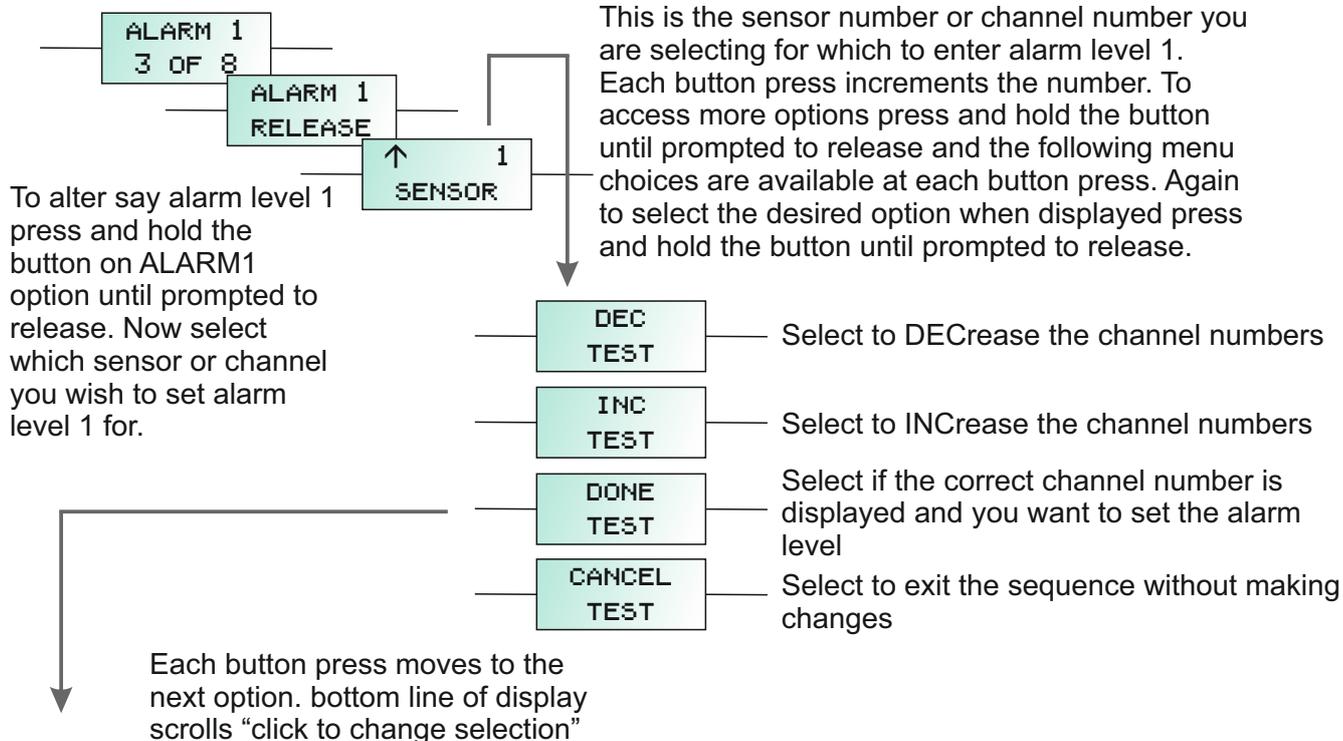
NOTE: Detectors will require a period of time to stabilise to the environment into which they are installed. It is quite normal for this to take up to 48 Hours.

Do not use Aerosol or other cleaning agents with the detector, these can upset readings.

International Gas Detectors

CH4 H2S CO2 NO2 SO2 NO CO

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Alarm Level Set Up

```
ALARM 1
 3 OF 8
```
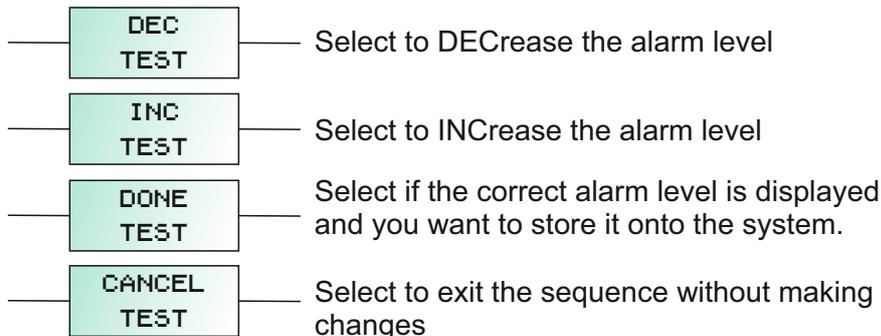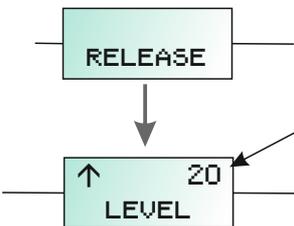
```
ALARM 2
 4 OF 8
```

As previously described enter password mode and enter password 100 to enter the user menu.

Press the button until either menu 3 or 4 is displayed and hold the button until prompted to release.

The set up sequence for the alarm level selected is as follows:

```
ALARM 1
 3 OF 8
```

```
ALARM 1
RELEASE
```

```
↑        1
SENSOR
```

This is the sensor number or channel number you are selecting for which to enter alarm level 1. Each button press increments the number. To access more options press and hold the button until prompted to release and the following menu choices are available at each button press. Again to select the desired option when displayed press and hold the button until prompted to release.

To alter say alarm level 1 press and hold the button on ALARM1 option until prompted to release. Now select which sensor or channel you wish to set alarm level 1 for.

```
 DEC
TEST
```
Select to DECrease the channel numbers

```
 INC
TEST
```
Select to INCrease the channel numbers

```
DONE
TEST
```
Select if the correct channel number is displayed and you want to set the alarm level

```
CANCEL
 TEST
```
Select to exit the sequence without making changes

Each button press moves to the next option. bottom line of display scrolls "click to change selection"

```
 LEVEL
CLICK TO
```

```
  TYPE
CLICK TO
```

```
 RELAY
CLICK TO
```

```
SUMMARY
CLICK TO
```

```
  EXIT
CLICK TO
```

To select an option press and hold the button until prompted to release.

```
RELEASE
```

Each button press increments the indicated alarm level. To access more options press and hold the button until prompted to release and the following menu choices are available at each button press. Again to select the desired option when displayed press and hold the button until prompted to release.

```
↑       20
LEVEL
```

```
 DEC
TEST
```
Select to DECrease the alarm level

```
 INC
TEST
```
Select to INCrease the alarm level

```
DONE
TEST
```
Select if the correct alarm level is displayed and you want to store it onto the system.

```
CANCEL
 TEST
```
Select to exit the sequence without making changes

International Gas Detectors

Once the alarm level has been set you then need to set the Alarm TYPE and decide which relay activates once the set alarm level is breached. The following sequence continues from the previous page and describes the set up sequences

LEVEL		TYPE		RELAY		SUMMARY		EXIT
CLICK TO		CLICK TO		CLICK TO		CLICK TO		CLICK TO
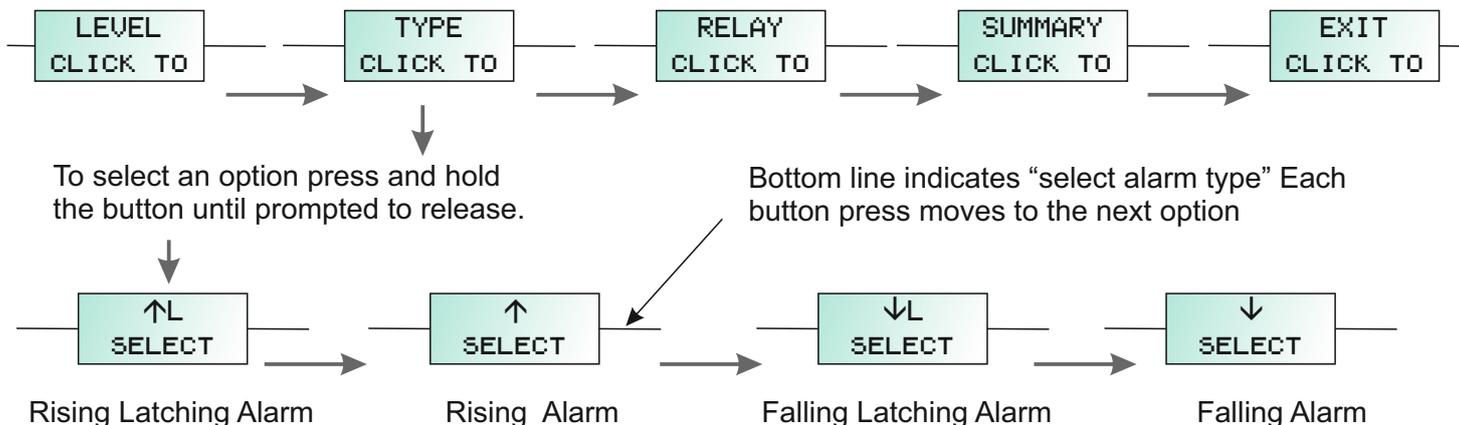
To select an option press and hold the button until prompted to release.

Bottom line indicates "select alarm type" Each button press moves to the next option

↑L		↑		↓L		↓
SELECT		SELECT		SELECT		SELECT

Rising Latching Alarm

Latching alarms remain set until the button is pressed to reset the alarm. The gas level must be below the alarm level threshold for the reset to operate. This type of alarm is typically used in safety applications. Where alarm is required in response to rising gas levels

Press and hold until prompted to release to select this option.

Rising Alarm

Rising alarms will automatically reset once the gas level falls below the alarm threshold. This type of alarm is typically used in control applications where action is required in response to rising gas levels.

Press and hold until prompted to release to select this option.
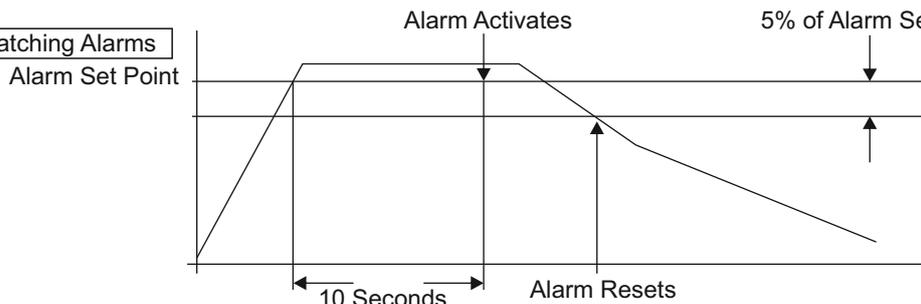
Falling Latching Alarm

Latching alarms remain set until the button is pressed to reset the alarm. For a falling alarm the gas level must be above the alarm level threshold for the reset to operate. This type of alarm is typically used in safety applications for Oxygen deficiency monitoring where you are monitoring for a falling Oxygen level.

Press and hold until prompted to release to select this option.
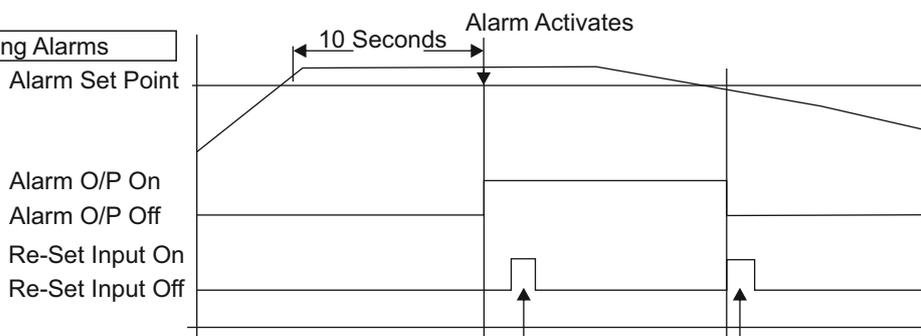
Falling Alarm

Falling alarms will automatically reset once the gas level rises above the alarm threshold. This type of alarm is typically used in control applications where action is required in response to falling gas level (typical in Oxygen deficiency applications).

Press and hold until prompted to release to select this option.
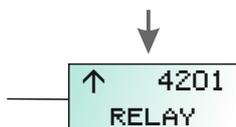
Rising and Falling Non Latching Alarms

Alarm Set Point

Alarm Activates

5% of Alarm Set Point

10 Seconds

Alarm Resets

Rising and Falling Latching Alarms

Alarm Set Point

10 Seconds

Alarm Activates

Alarm O/P On
Alarm O/P Off
Re-Set Input On
Re-Set Input Off

Indicates pressing the front panel 'jog wheel' to cancel the alarm

International Gas Detectors

Once the alarm TYPE has been set you then need to set the RELAY output, that is deciding which relay activates once the set alarm level is breached. The following sequence continues from the previous page and describes the set up sequence

LEVEL	TYPE	RELAY	SUMMARY	EXIT
CLICK TO	CLICK TO	CLICK TO	CLICK TO	CLICK TO

To select an option press and hold the button until prompted to release.

```
↑    4201
     RELAY
```

Each button press increments the indicated relay to activate. Note that relays 1 and 2 are physically on the control panel. If you increment past 2 then the panel assumes the relay is addressable and jumps to start from 4201. In this case enter the address of the addressable relay to activate. To access more options press and hold the button until prompted to release and the following menu choices are available at each button press. Again to select the desired option when displayed press and hold the button until prompted to release.

```
  DEC
  TEST
```
—— Select to DECrease the relay number

```
  INC
  TEST
```
—— Select to INCrease the relay number

```
  DONE
  TEST
```
—— Select if the correct relay number is displayed and you want to store it onto the system.

```
 CANCEL
  TEST
```
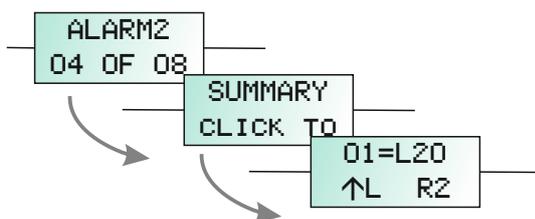—— Select to exit the sequence without making changes

Selecting SUMMARY from this group of menu options allows you to see what has already been set up

LEVEL	TYPE	RELAY	SUMMARY	EXIT
CLICK TO	CLICK TO	CLICK TO	CLICK TO	CLICK TO

To select an option press and hold the button until prompted to release.

```
01=L20
↑L   R1
```

```
02=L20
↑L   R1
```

In this example a two channel system has two alarm level 1's set up. When you enter the option alarm level one settings for the channel are displayed. Click the button to return to the previous menu options. To view alarm level 2 settings go back and select ALARM2 option. Note you only view the summary one channel at a time.
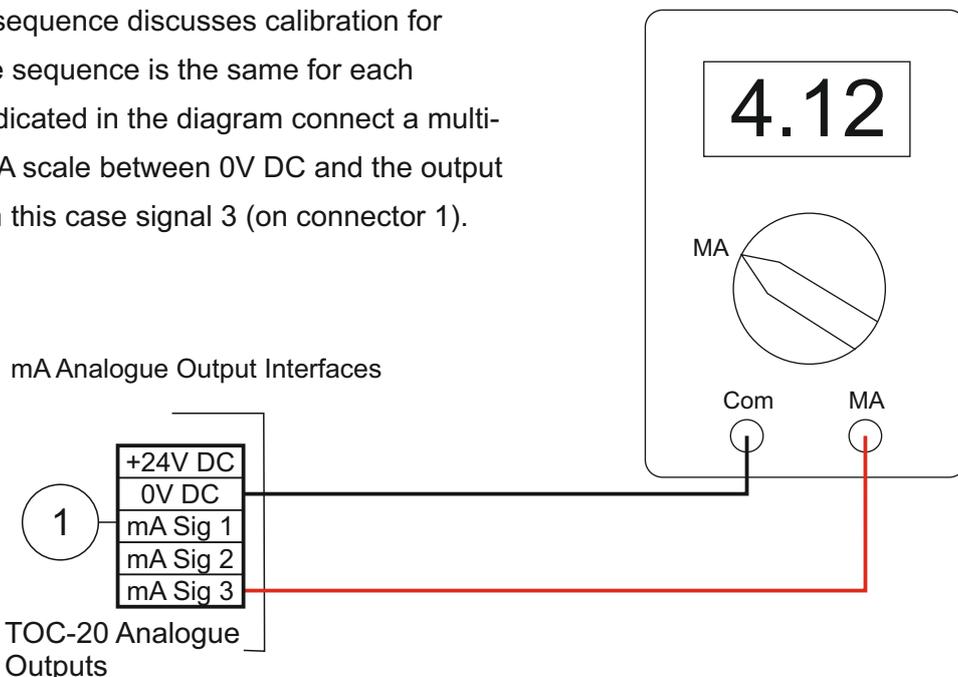
```
ALARM2
04 OF 08
```

```
SUMMARY
CLICK TO
```

```
01=L20
↑L   R2
```

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CH4 H2S CO2 NO SO2 NO2 CO

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CALIBRATIONS

4-20mA Output Calibration and Test

The TOC-20 is equipped with three 4-20mA analogue outputs. By default these are configured so that output 1 relates to input channel 1, output 2 is input channel 2 and output 3 is input channel 3. The TOC-20 is shipped with these channels pre-calibrated. It should not normally be necessary to calibrate these channels. The system has functions to allow zero, calibration and test of these channels as follows:
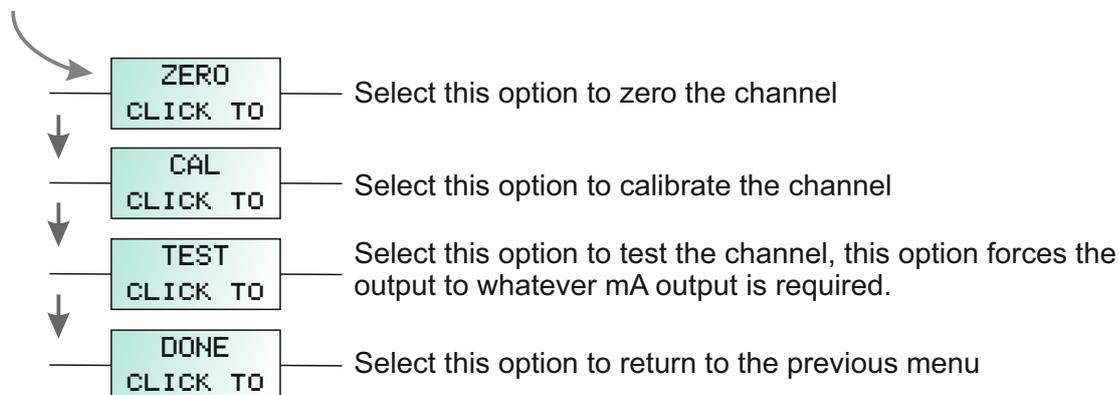
The following sequence discusses calibration for channel 3. The sequence is the same for each channel. As indicated in the diagram connect a multi-meter on its mA scale between 0V DC and the output to be tested, in this case signal 3 (on connector 1).

```
4.12
MA
Com    MA
```

mA Analogue Output Interfaces

```
+24V DC
  0V DC
1   mA Sig 1
    mA Sig 2
    mA Sig 3
```
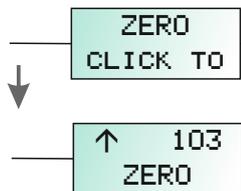
TOC-20 Analogue Outputs

As previously described enter password mode and enter password 50 to enter the engineer menu. Press the button until either menu 3, 4 or 5 is displayed depending on the required output channel and hold the button until prompted to release. The following sequence shows output 1 being calibrated as an example.:

```
↑    50
PASSWORD

OUTPUT 3
6 OF 9
```
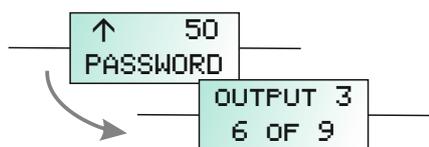
Each click of the button now cycles you through the available menu options as follows. As with previous menu's press and hold the button to select the displayed option:

```
ZERO
CLICK TO
```
Select this option to zero the channel

```
CAL
CLICK TO
```
Select this option to calibrate the channel

```
TEST
CLICK TO
```
Select this option to test the channel, this option forces the output to whatever mA output is required.

```
DONE
CLICK TO
```
Select this option to return to the previous menu

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CH4 H2S CO2 NO SO2 NO2 CO

International Gas Detectors

4-20mA Output Zero Function

```
  ZERO
CLICK TO
```

```
↑     103
  ZERO
```

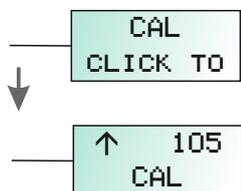From the menu previously described select the zero option.

The display now shows the current 'setting' for the channel zero, in this case 103. Increasing this setting will increase the indicated 4mA setting and vice versa. Increase or decrease the setting until the meter reads 4mA +/-0.1mA then from the sub menu select DONE (press and hold for sub menu as previously described).

4.12

MA

Com   MA

mA Analogue Output Interfaces

(1)

+24V DC
0V DC
mA Sig 1
mA Sig 2
mA Sig 3

TOC-20 Analogue Outputs
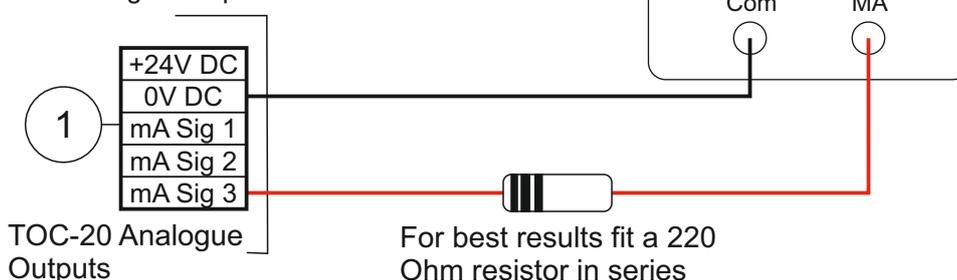
For best results fit a 220 Ohm resistor in series

4-20mA Cal Zero Function

```
   CAL
CLICK TO
```

```
↑     105
   CAL
```
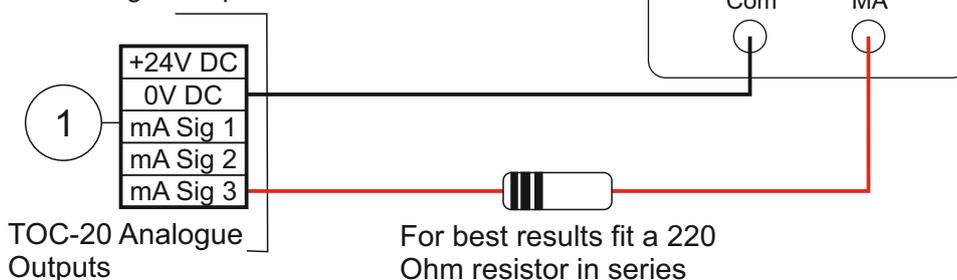
From the menu previously described select the CAL option.

The display now shows the current 'setting' for the channel Calibration, in this case 105. Increasing this setting will increase the indicated 20mA setting and vice versa. Increase or decrease the setting until the meter reads 20mA +/-0.1mA then from the sub menu select DONE (press and hold for sub menu as previously described).

19.85

MA

Com   MA

mA Analogue Output Interfaces

(1)

+24V DC
0V DC
mA Sig 1
mA Sig 2
mA Sig 3

TOC-20 Analogue Outputs

For best results fit a 220 Ohm resistor in series

CH4 H2S CO2
NO SO2 NO2 CO