

TQ8000 Touch

48 Channel
Gas
Monitoring
System

OPERATING MANUAL

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WARNINGS, CAUTIONS AND NOTES



Warnings identify an operating or maintenance procedure, practice, condition, or statement that, if not strictly followed, could result in death or injury to personnel.



Cautions, which appear elsewhere in this manual, identify an operating or maintenance procedure, practice, condition, or statement that if not strictly followed could result in equipment damage or serious impairment of system operation.

Notes highlight certain operating or maintenance conditions or statements that are essential but not of known hazardous nature as indicated by Warnings and Cautions.

Warnings, Cautions and Notes are included throughout this manual, as required. Additionally, this section contains important Warnings that may not be contained elsewhere within this instruction manual.



SAFETY WARNINGS

- **FOR SAFETY REASONS, THE TQ8000 Touch GAS MONITORING SYSTEM MUST BE INSTALLED, OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY.**
- **READ AND UNDERSTAND THIS INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING THE TQ8000 Touch.**
- **THE OPERATION DESCRIBED IN THIS DOCUMENT IS THE INTENDED USE OF THE TQ8000 Touch.**
- **TQ ENVIRONMENTAL LIMITED CANNOT BE HELD RESPONSIBLE IF THE TQ8000 Touch IS USED FOR ANY PURPOSE OTHER THAN THAT STATED. ANY OTHER USE OF THE TQ8000 Touch WILL INVALIDATE ANY CERTIFICATES ISSUED.**

1.0 Introduction

The TQ8000 Touch is a Monitoring System capable of accepting 8 inputs as a standard version or up to 48 as a bespoke version from either three wire, or two wire 4-20mA detectors and transducers.

This processor-based control system allows each connected sensor to have its units and level displayed simultaneously on the front panel display. The system also allows each sensor to monitor each level with respect to pre-set alarm trip points.

Three alarm trip points are available for each input. These alarms can be configured to operate relay outputs in the form of volt free contacts for connection to other systems, or 24V dc outputs to operate a local audible / visual device.

The TQ8000 Touch can be controlled and monitored remotely via an RS485 Modbus communications network.

A configurable 'fault' relay also provides a 'fail-safe' volt free, or 24v dc output.

The TQ8000 Touch front panel incorporates a Touch Screen to allow for 'Reset' and 'Mute' functions. An internal password protected Menu allows the user to calibrate or re-configure each input.

The TQ8000 Touch in its native form provides a neat, "flush to wall" installation by using the three internal mounting points.

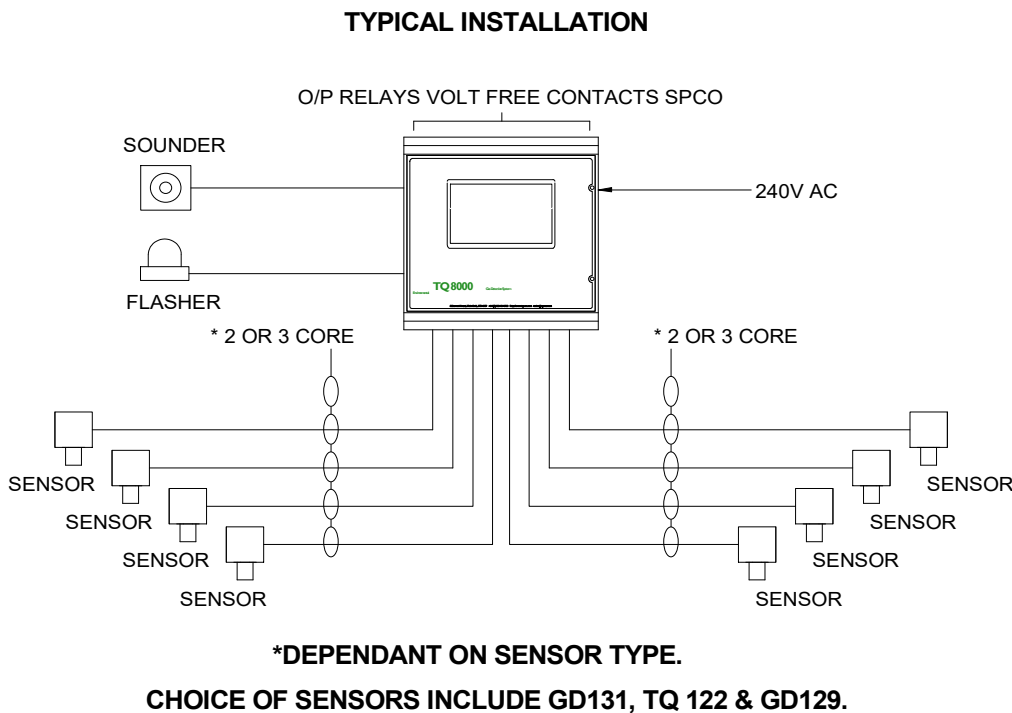


Figure 1

1.1 Specification

Inputs:	Std 8 x 2/3 wire 4-20mA source, or 3 wire Pellistor type. Expandable up to 48 inputs
Outputs:	16 SPCO relays, rating: 24 Vdc/280V ac @ 12A resistive local in Panel 32 SPCO relays, rating: 24 Vdc/280V ac @ 12A resistive local or external to panel 1 x 4-20mA source per input. (non-isolated)
Communications:	RS485 MODBUS protocol. Baud rate up to 115200 bps.
Alarms:	3 alarm levels per channel, adjustable to any point within the full-scale range.
Power Supply:	Universal; 85 to 254 volts ac 50/60Hz (24v dc on request) @ 65VA - 8 Chanel, 150VA - 16 Chanel, 225VA - 24 Chanel, 300VA - 32 Chanel. 375VA - 40 Chanel. 450VA - 48 Chanel
Rating:	IP54
Enclosure:	ABS Box, RFI coated.
Cable entry:	Bottom gland plate.
Display:	7" TFT HDMI Display with Touch Screen Controller
Internal Audible:	80dB
Dimensions:	This depends on the number of channels and client requirements. Below are some typical dimensions: 8-channel: 341mm high x 326mm wide x 160mm deep 16-channel: 600mm high x 600mm wide x 250 mm deep 24-32 channel: 1000.0mm high x 600.0 mm wide x 250.0 mm deep

2.0 Description

The TQ8000 Touch is based around a Control Board communicating with three other electronic units to monitor each of the 8 channels and provide display and alarm functions.

These units are: -

- Adaptor PCB
- Display
- Relay PCB

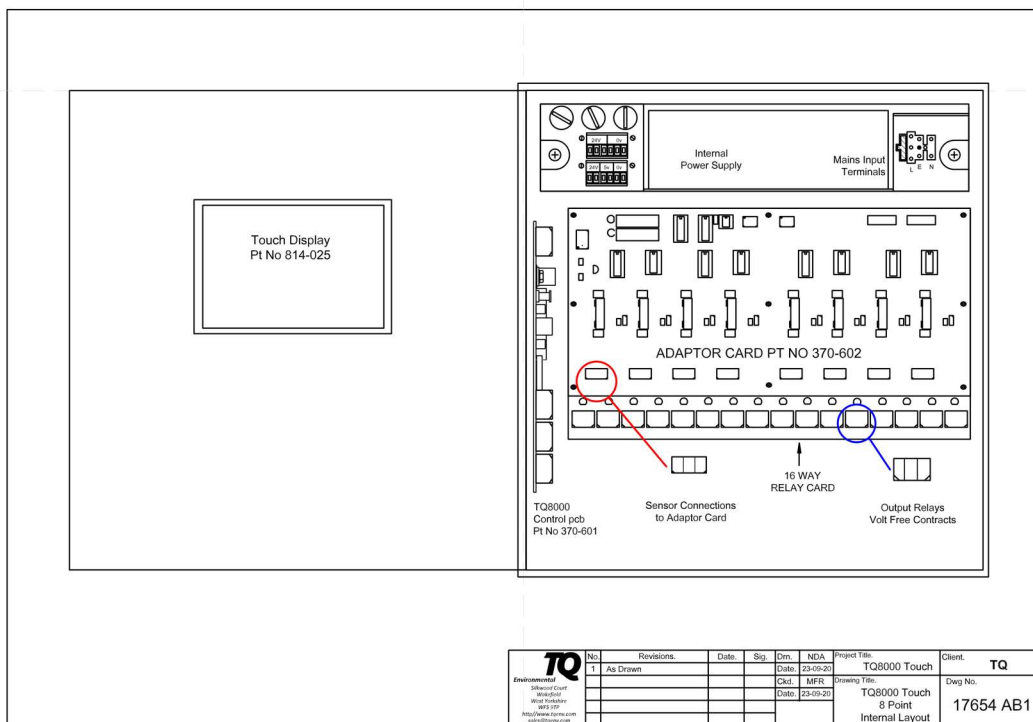


Figure 2

2.1 Adaptor PCB

The Adaptor Board terminates each sensor input and is configurable to accept either 2 or 3 wire 4-20mA or Pellistor type sensors. Links are provided to select the 4-20mA sensor, and an 'input card' is fitted to provide the bridge voltage and zero function for the Pellistor sensor.

The Adaptor Board sends the sensor input data to the Control Board. Also included on the Adaptor Board are LED's and fuses for the 5V and 24V DC power supplies.

2.2 Control Board

The Control PCB is a microcontroller based unit which; accepts the data from each input, monitors the sensor levels for alarm and malfunction and sends this information to the Display.

In an Alarm or Fault condition the Control PCB also sends data to the Relay PCB and any fitted Remote Relay PCB's.

The TQ8000 Touch configuration data is stored on the Control PCB in a non-volatile EEPROM memory, and can be re-configured using the on screen menu system.

2.3 Display

This is a 7" TFT Display with Touch Screen capabilities. The Display is connected to the Control Board via a HDMI connector and a USB connector for the Touch Screen controller.

The Display shows the 8 channels of data on a page by page basis depending on how many channels are selected. The data displayed for each channel is the Location Name, Gas concentration, and Sensor Name. The right hand pane of the display shows the overall system status. At the bottom of the display are four buttons; MENU, MUTE, RESET, and LOG.

2.4 Relay Board (Local)

This PCB has 16 relay SPCO outputs, and is fitted under the Adaptor Board. All of the relays are configurable to operate for any level of alarm on any of the eight channels. The TQ8000 Touch provides a 'Latched' or 'Non-Latched' and 'normally On' or 'Normally Off' configuration for individual relays.

A 'Latched' relay will require a 'Reset' function, whereas the 'Non-Latched' relay will reset automatically only when the input alarm trip level has cleared.

Also relays can be mutable, which means that once a sensor has gone beyond the alarm level the relays can be reset so that they will not switch on again until the sensor goes back into alarm.

2.5 Remote Relay Board (if fitted)

This PCB is available with 16 relay SPCO outputs. It may be fitted within the TQ8000 Touch enclosure or within an enclosure separate from the rest of the TQ8000 Touch unit.

All relays are configurable to operate for any level of alarm or fault on any of the 48 channels.

The board is controlled using RS485 communications from the Main Control Board.

2.6 Power Supply

The Power Supply fitted in the TQ8000 Touch will accept the mains input via the fused input terminal block.

The power supply provides a 24V DC output which is fed to the PCB's via a DC/DC converter. This converter provides a 5V DC output for the Control Board, Adaptor Boards.

On the 8 Channel version three fuses are fitted to the left-hand side of the Power Supply tray;

- F1 mains fuse
- F2 +5V DC to electronics
- F3 +24V DC to electronics
- F4 +24V Auxiliary Outputs

The 24V DC auxiliary supply, through fuse F4, can be utilized to drive two local audible & visual alarm devices via the relay contacts. It is capable of supplying 330mA for each device., with F4 rated at a maximum of 1.0 Amp.

For fuses on other channel configurations please refer to drawing at back of manual for fuse configuration.



WARNING 240VAC

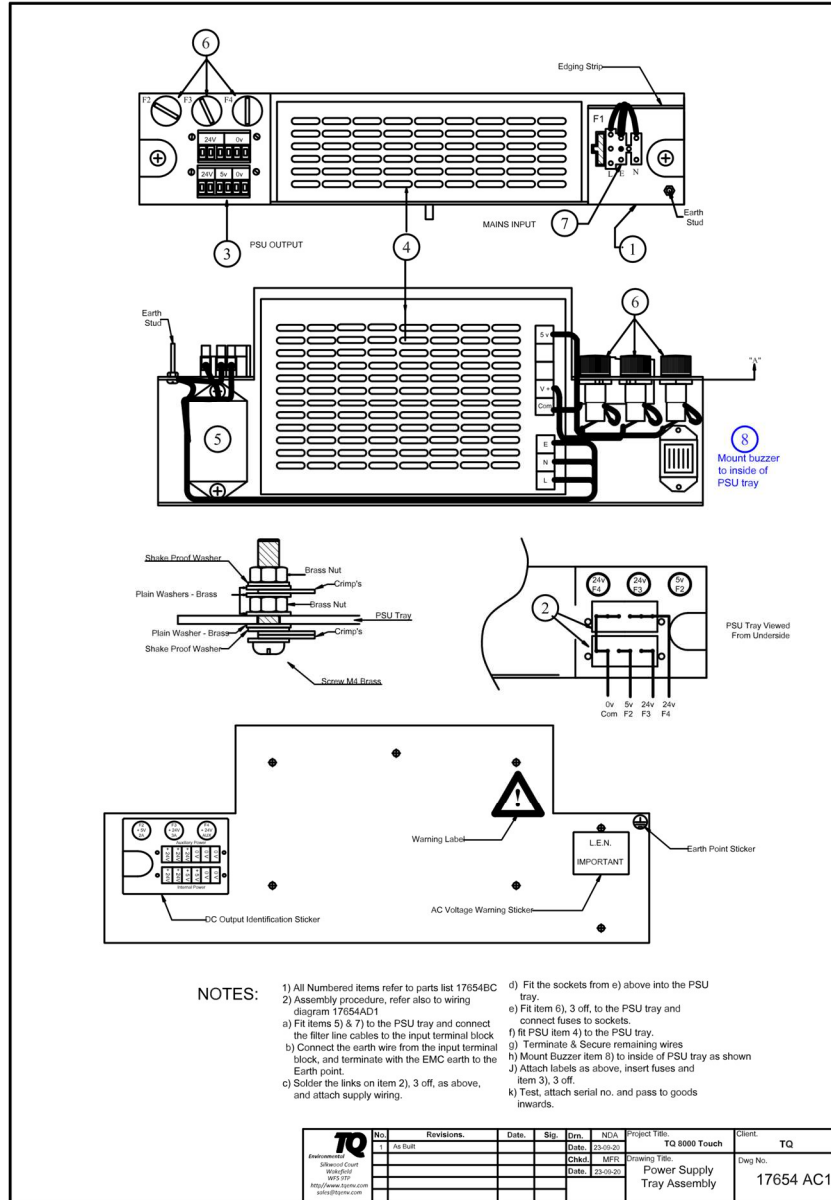


Figure 3

3.0 Operation

When the TQ8000 Touch is first powered on the system starts loading EEPROM configuration data and then enters 'Start-up' mode. It will remain in this mode for 120 seconds to enable the sensors to stabilise. During the start-up mode the TQ8000 Touch will not generate any alarms or activate any relays.

After start-up has completed the TQ8000 Touch will move to the 'Normal' mode.

A formatted SD Card may be inserted to allow for data logging functions. The Data Log file may be viewed on the display or the SD Card inserted into a PC and viewed with Microsoft Excel.

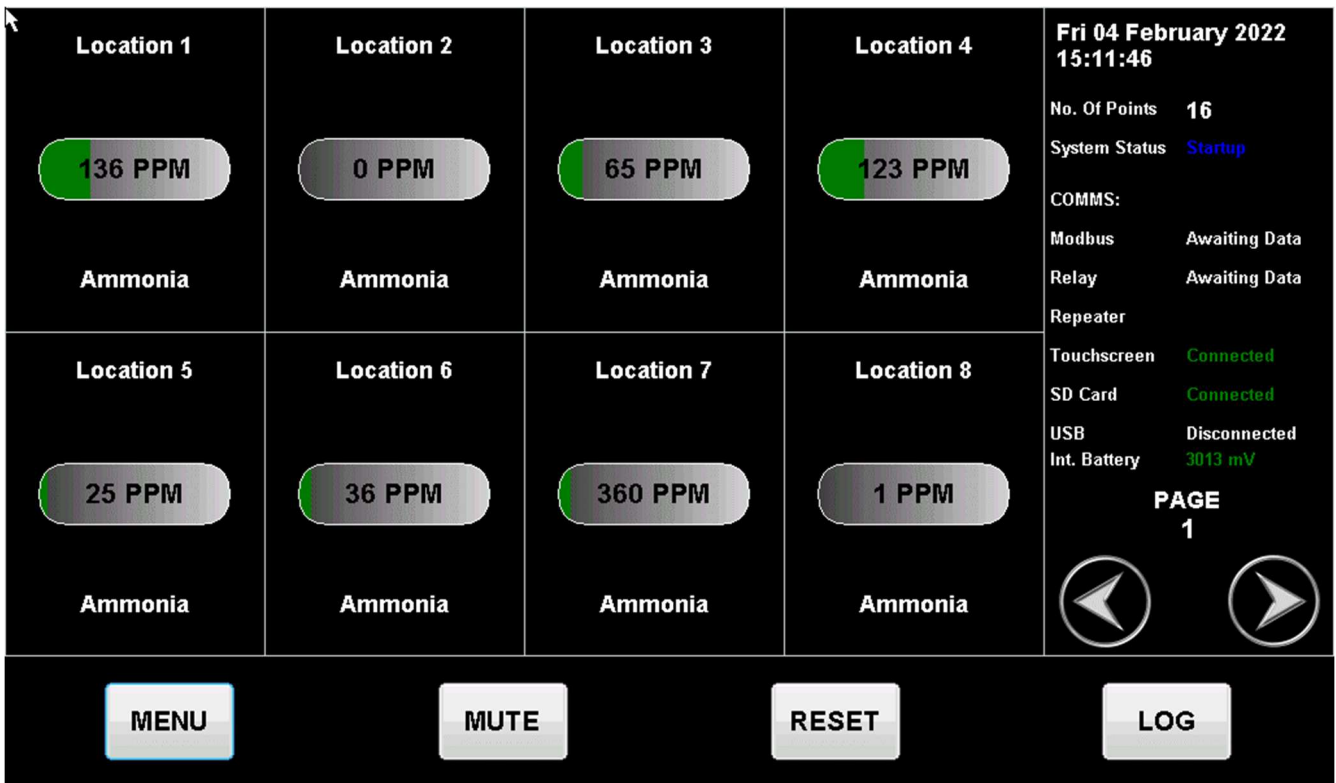


Figure 4

3.1 Normal Operation

For normal operating conditions the TQ8000 Touch display will show the system status on the right-hand part of the screen. A typical display is shown below:

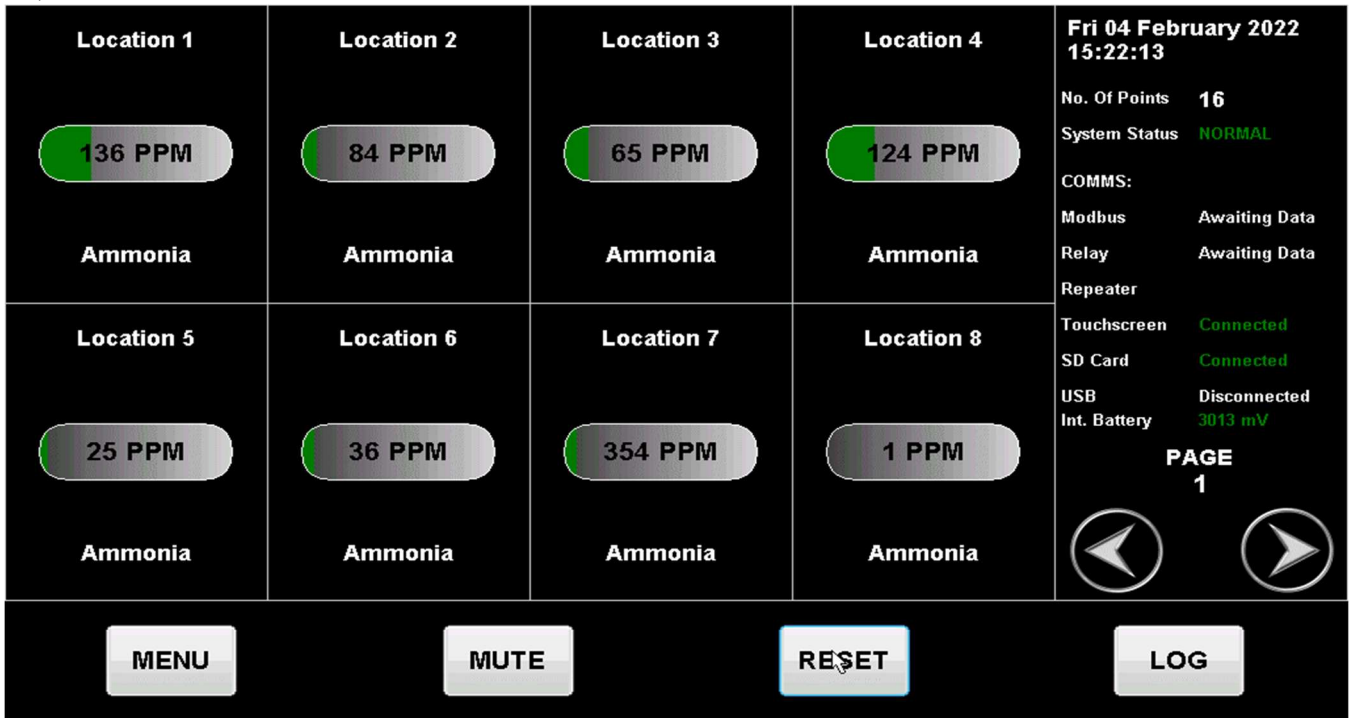


Figure 5

3.2 Gas/Input Alarms

The TQ8000 Touch provides for three trip levels per channel. These are ‘rising’ or ‘falling’ alarms and can be configured in any combination for each channels.

In a low alarm condition (alarm level 1), the TQ8000 Touch display will show the alarm status on the respective channel that is in alarm as well as an alarm condition in the System Status field on the right-hand side of the display. The concentration value is shown inside the concentration box and the colour will change to Yellow to indicate a LO Alarm.

The internal sounder will operate and any relays will activate/de-activate that have been pre-configured for that alarm.

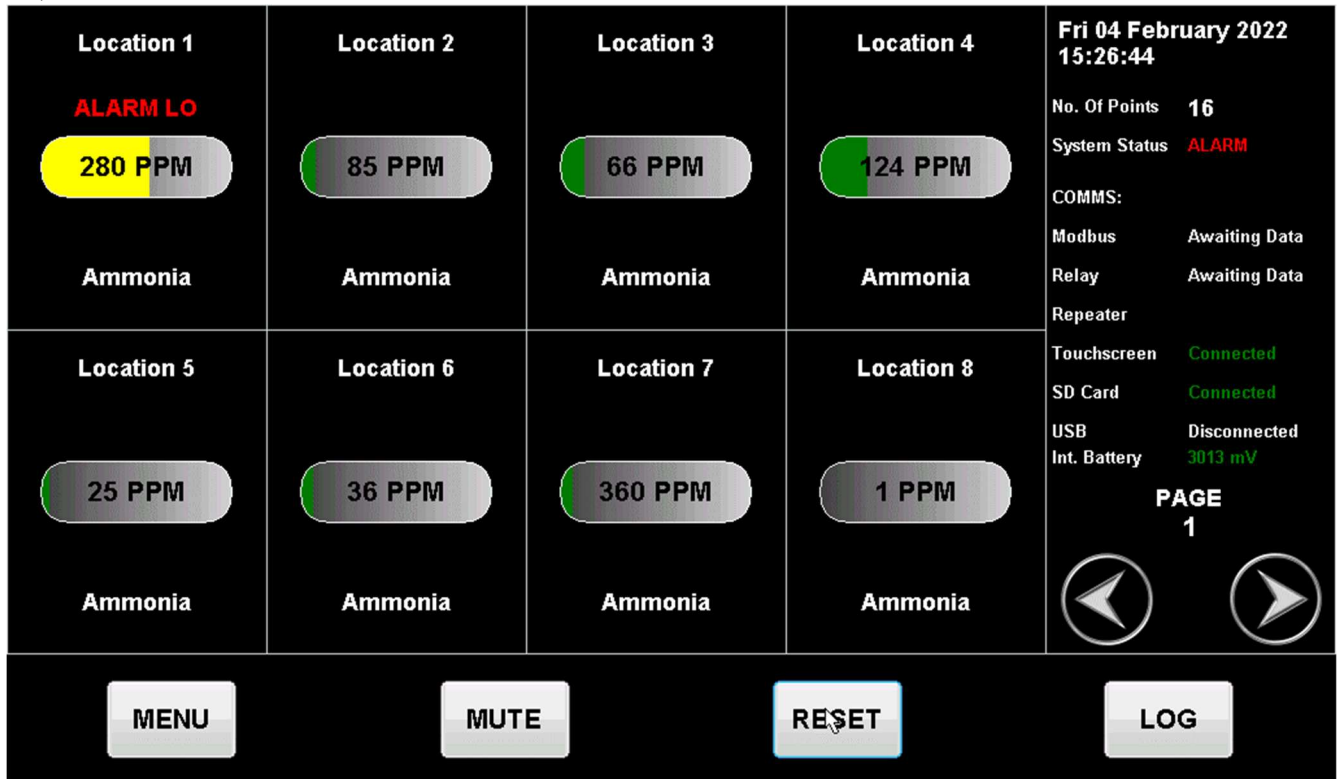


Figure 6

In a High alarm condition (alarm level 2), the TQ8000 Touch display will show the alarm status on the respective channel that is in alarm as well as an alarm condition in the System Status field on the right-hand side of the display. The concentration value is shown inside the concentration box and the colour will change to Orange to indicate a HI Alarm.

The internal sounder will operate and any relays will activate/de-activate that have been pre-configured for that alarm.

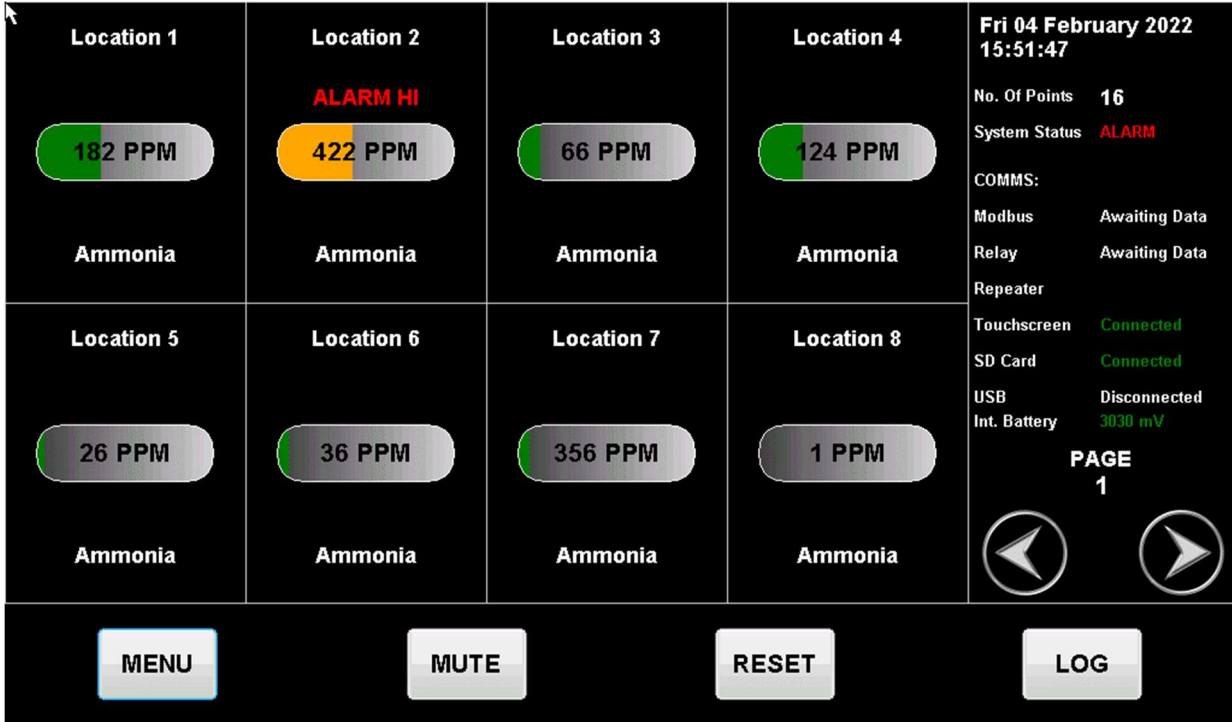


Figure 7

In a High High alarm condition (alarm level 3), the TQ8000 Touch display will show the alarm status on the respective channel that is in alarm as well as an alarm condition in the System Status field on the right-hand side of the display. The concentration value is shown inside the concentration box and the colour will change to Red to indicate a HIHI Alarm.

The internal sounder will operate and any relays will activate/de-activate that have been pre-configured for that alarm.

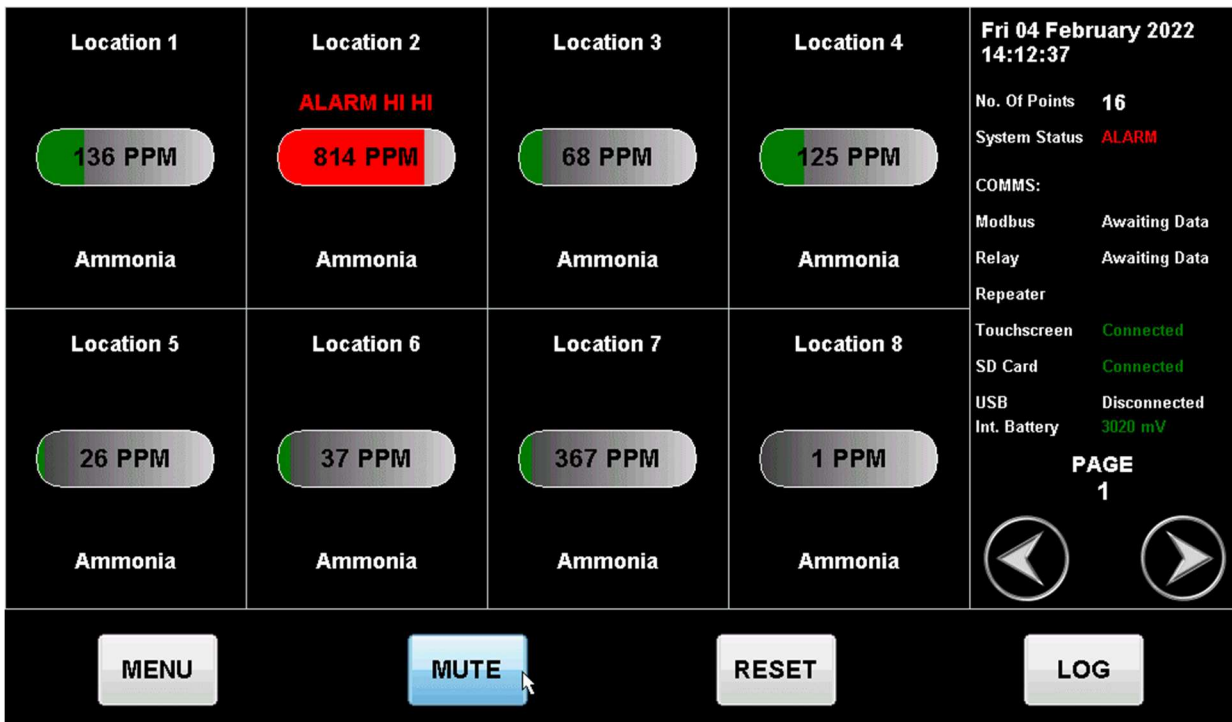


Figure 8

3.3 Fault

Any sensor fault will cause the TQ8000 Touch to indicate a 'FAULT' above the respective sensor as well as a Fault condition in the System Status field on the right-hand side of the display.

The internal sounder will operate and any relays will activate/de-activate that have been pre-configured for that fault condition.

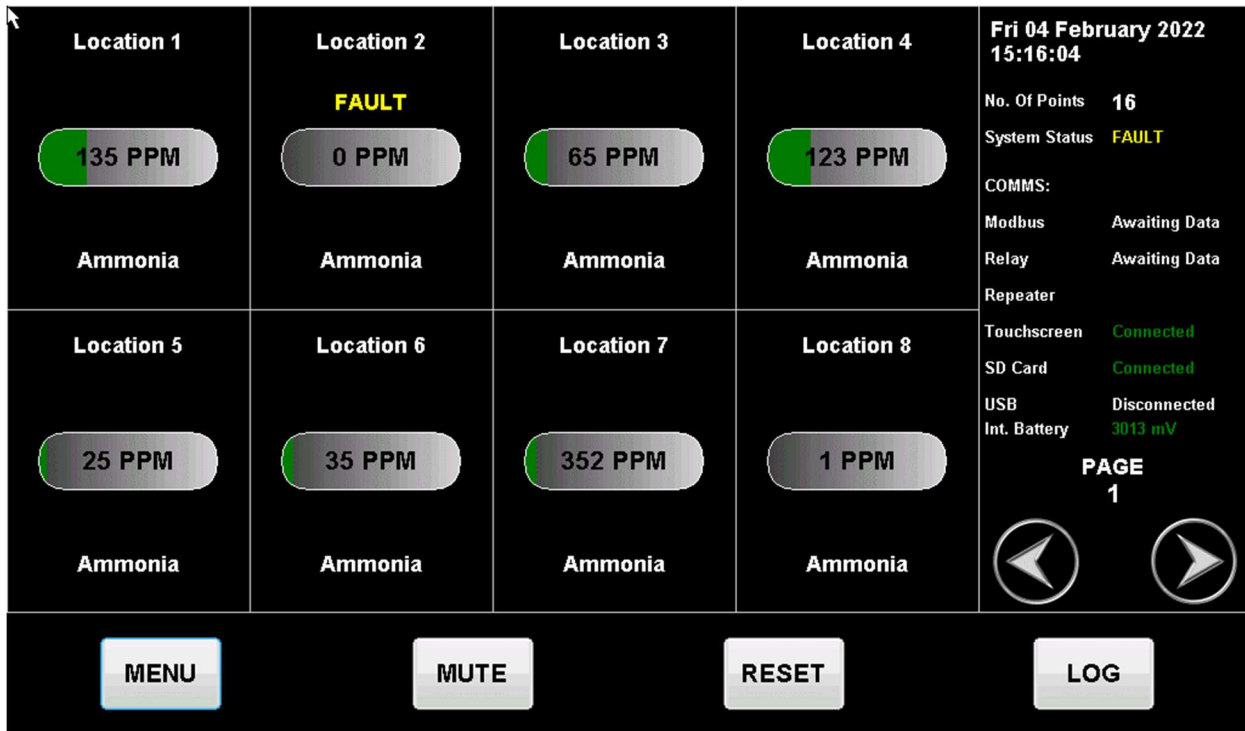


Figure 9

3.4 Over Range Fault

The range of each sensor is established during the TQ8000 Touch configuration procedure. If the sensor concentration exceeds the Over Range level then an Over Range Fault is generated.

The Over Range fault will be displayed as 'OVER RANGE' above the respective sensor as well as a Fault condition in the System Status field on the right-hand side of the display.

The internal sounder will operate and any relays will activate/de-activate that have been pre-configured for that fault condition. and, in the case of a pellistor based sensor, will interrupt power to the sensor.



WARNING

An Over Range Fault is an indicator that the sensor limits have been exceeded and this may affect the operation, or

damage, of the sensor if continuous exposure to these high levels are maintained.

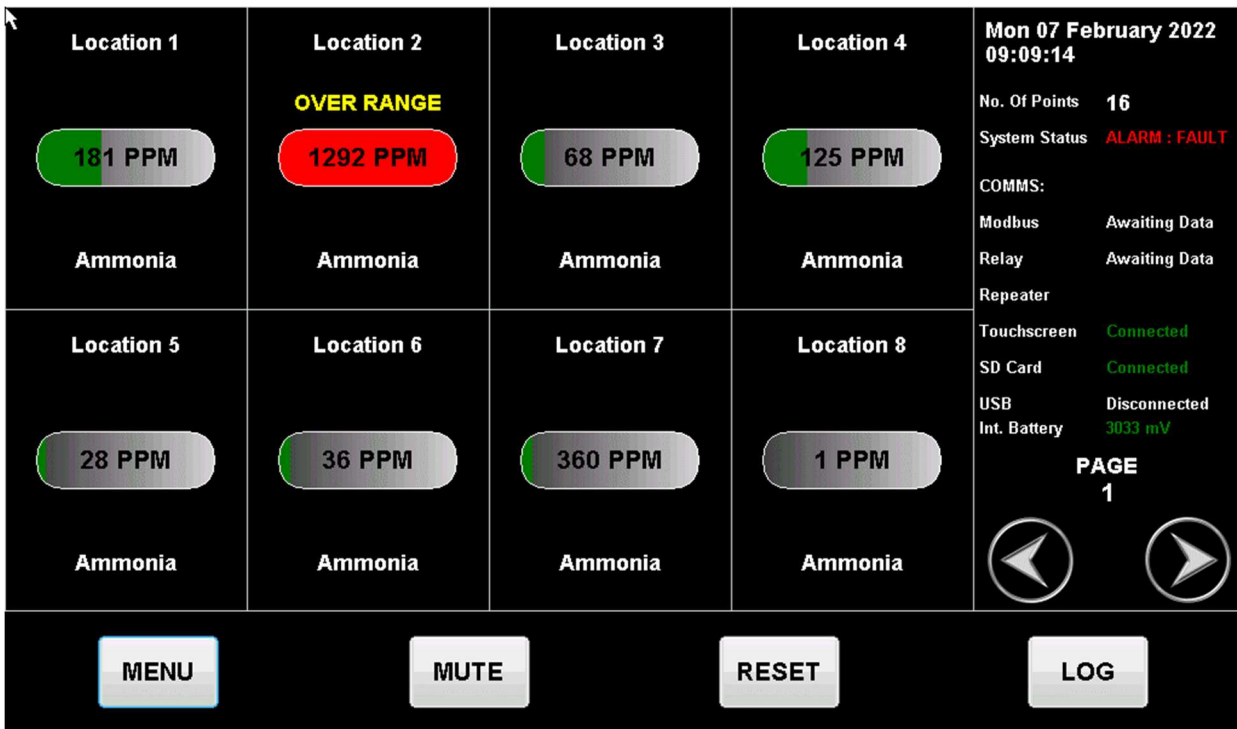


Figure 10

3.5 Acknowledge Alarms

Pressing the 'MUTE' button on the display will silence the internal sounder and indicate acknowledged above the respective sensor.

Relays can be configured for non-latching operation which will automatically reset only when the alarm levels have returned to normal condition. If the relays have been configured for latching operation then the alarm must be reset before the on screen warning and relays are removed.

3.6 Reset Alarms

When the respective channel has returned to its' normal operation from an 'Alarm' or 'Fault' condition, the 'RESET' button will return the TQ8000 Touch Display and relays to normal and the internal sounder will be silenced.

3.7 Sensor View

Individual sensor information may be obtained by pressing on the particular sensors Location Name. A graph will be available indicating the real-time data for that sensor. The concentration is shown on a dashboard with the sensor output (in mA) and the digital ADC value for investigation purposes. To the right there is the configuration data for that particular sensor.

Also shown are two buttons 'DISABLE CHANNEL' and 'INHIBIT CHANNEL'

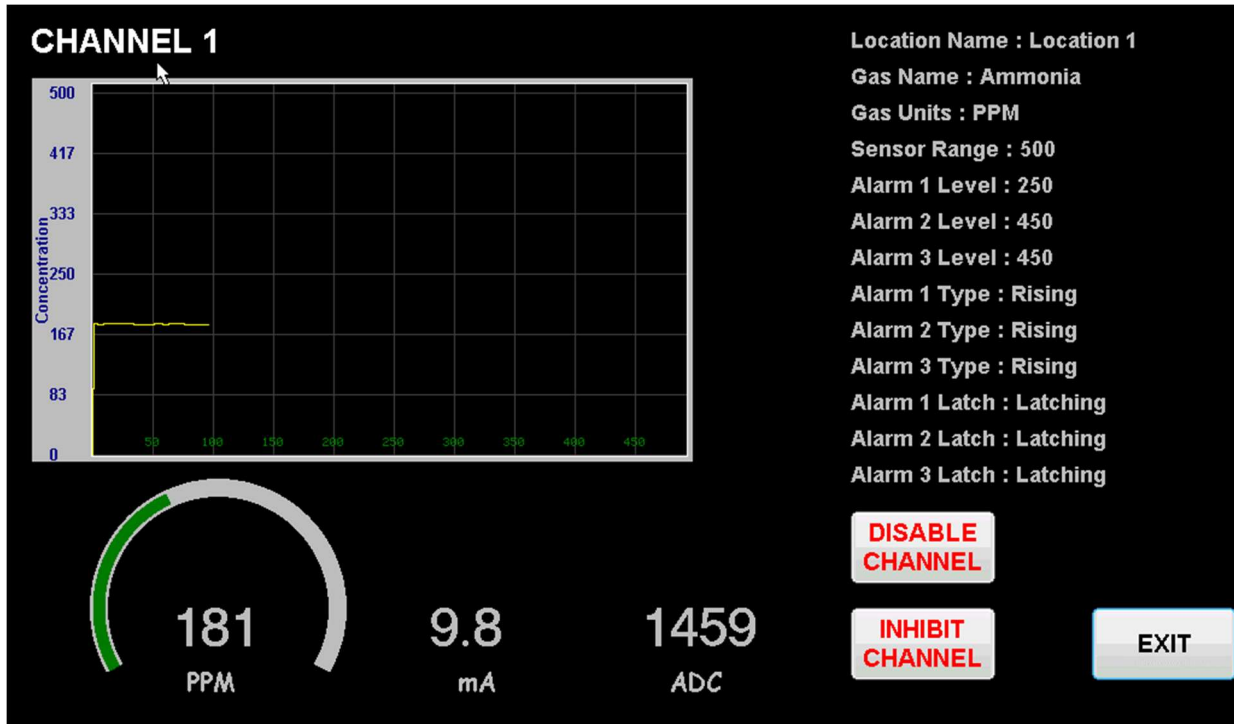


Figure 11

3.8 Disable Channel

A particular sensor may be permanently disabled by pressing the 'DISABLE CHANNEL' button in the Sensor View window. A disabled channel will become 'INACTIVE' and will not generate any subsequent alarm conditions or show any concentration values or activate any relays. The 'DISABLE CHANNEL' button will toggle to an 'ENABLE CHANNEL' button.

An inactive channel/sensor can be enabled again by pressing the 'ENABLE CHANNEL' button from the Sensor View window.

3.9 Inhibit Channel

A particular sensor may be temporarily inhibited by pressing the 'INHIBIT CHANNEL' button in the Sensor View window. An inhibited channel will become 'INHIBITED' and will not generate any subsequent alarm conditions or activate any relays regardless of the sensor output.

An inhibited channel/sensor can be enabled again by pressing the 'REMOVE INHIBIT' button from the Sensor View window. If, after 4 hours of inactivity by the user the Inhibit function will automatically be removed.

3.10 Data Log View

Pressing the 'LOG' button will bring up the Data Log View if an SD Card is present.

Data Log					
Date	Time	Location	Gas Name	Conc.	Units
07/02/22	12:38:14	Location 9	Ammonia	348.3	PPM
07/02/22	12:38:14	Location 10	Ammonia	35.0	PPM
07/02/22	12:38:14	Location 11	Ammonia	35.5	PPM
07/02/22	12:38:14	Location 12	Ammonia	35.7	PPM
07/02/22	12:38:14	Location 13	Ammonia	7.0	PPM
07/02/22	12:38:14	Location 14	Ammonia	7.2	PPM
07/02/22	12:38:14	Location 15	Ammonia	35.7	PPM
07/02/22	12:38:14	Location 16	Ammonia	35.9	PPM

START PREV NEXT END EXIT

Figure 12

Pressing the 'START' button will go to the beginning of the Data Log file, or pressing the 'END' button will go to the last entry of the Data Log file. Pressing the 'NEXT' and 'PREV' buttons will traverse the Data Log file accordingly.

4.0 System Menus

The sensor details, alarm levels and configuration are pre-set within the software on order, however, if any changes are required then it can be done so via the System Menus below.

To enter the Menu system the user must press the 'MENU' button on the Main System View window.

4.1 Password Entry

When the 'MENU' button is pressed the user will be prompted to enter the password to access the menu system. The default password is '6197'. To abort accessing the Menu System the user may press the 'C' button to cancel password entry and return to the Main System View window. While accessing the Menu System, if the user fails to interact with the TQ8000 Touch the system will return to the Main System View window after 20 minutes and resume normal operation.

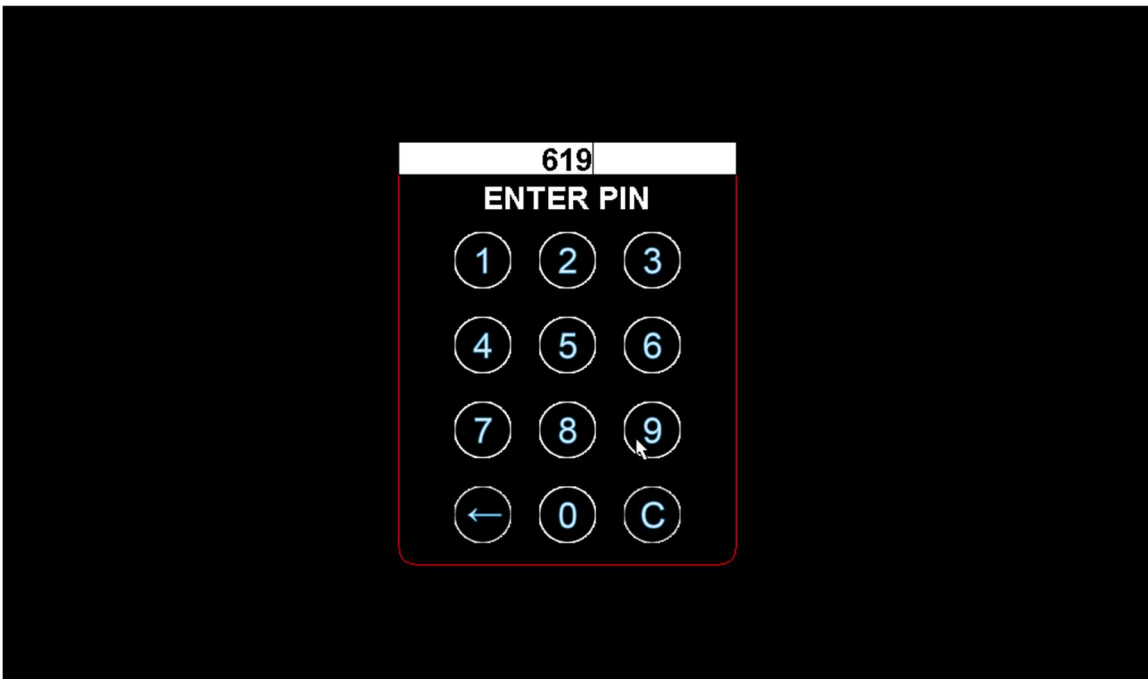


Figure 13

4.2 System Configuration

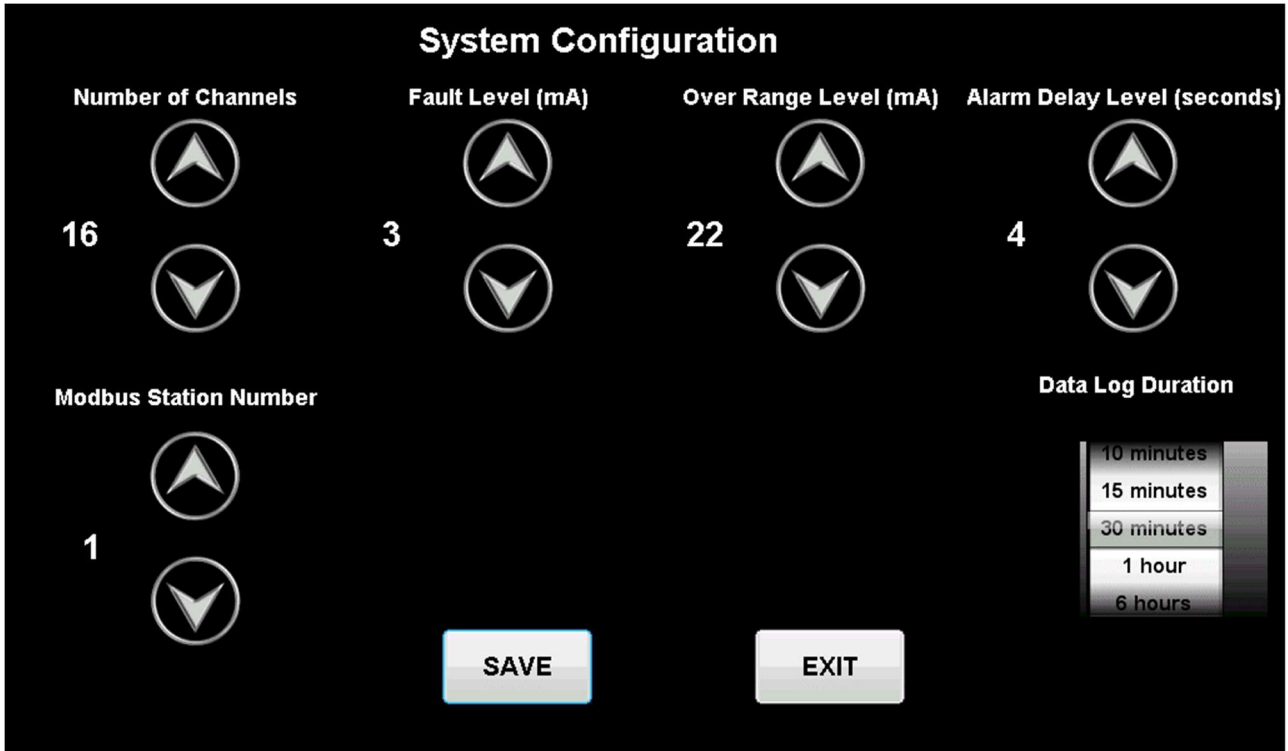


Figure 14

This Menu window enables the setting of the main system configuration. These include:-

- Setting the Number of Channels
- Setting the Modbus Station Number
- Setting the Sensor Fault Level in mA
- Setting the Sensor Over Range Level in mA
- Setting the Sensor Alarm Delay in seconds
- Setting the Data Log frequency

The user must press the 'SAVE' button to save the changes.

4.2 Channel Configuration

This Menu screen will allow the Location Names, Gas Names and Gas Units to be changed by pressing the tabs at the top of the screen.

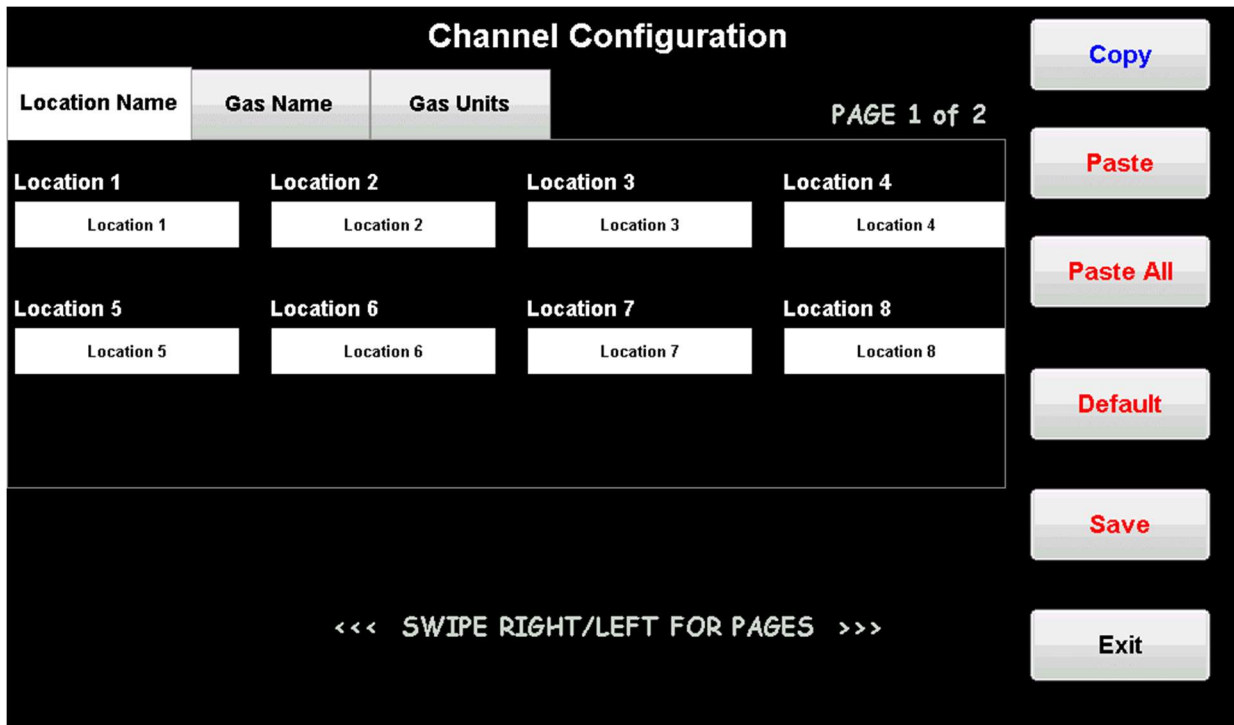


Figure 15

If using a system with more than eight channels/sensors, the user may swipe the bottom of the screen left or right to select other pages of channels/sensors.

Pressing on an Edit Box will enable the user to change the text field by bringing up an on-screen keyboard. Pressing the 'Clr' button will clear the text field or pressing the 'Bck' button will delete the last character in the text field.

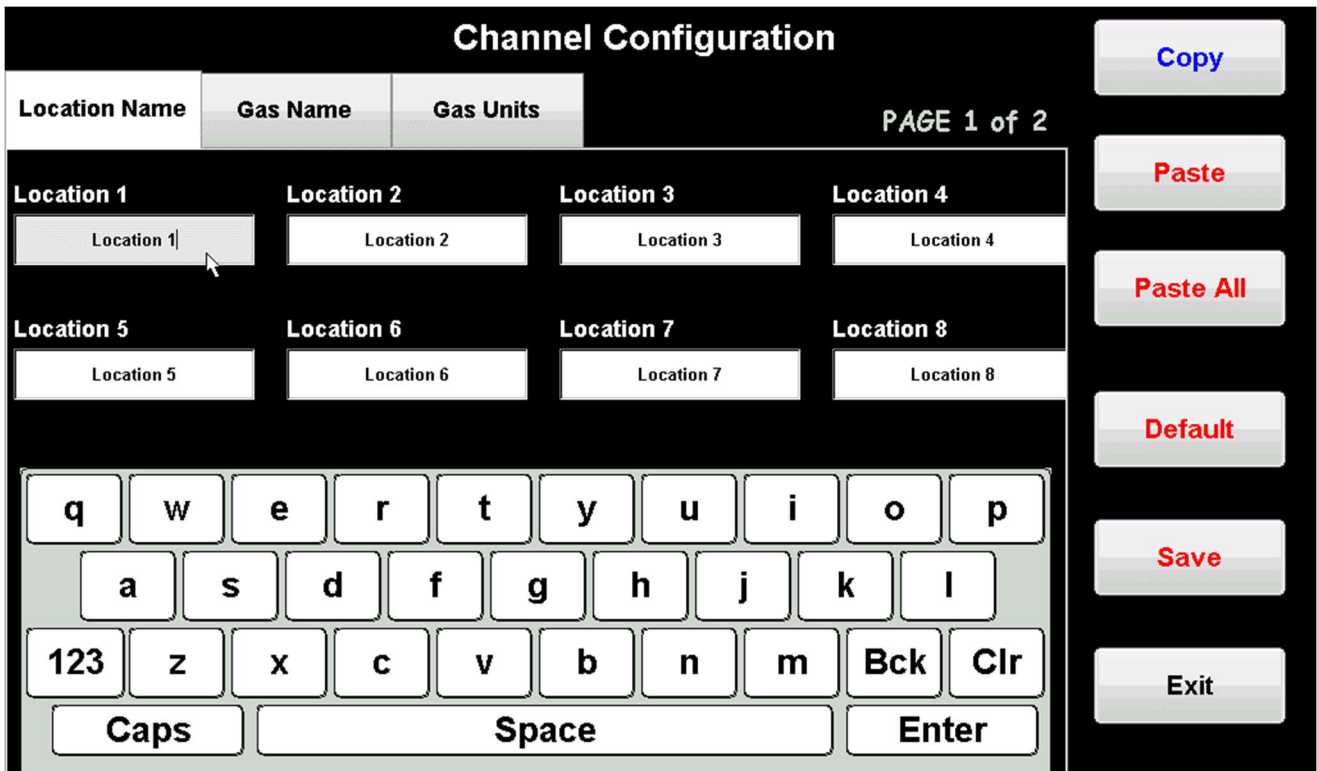
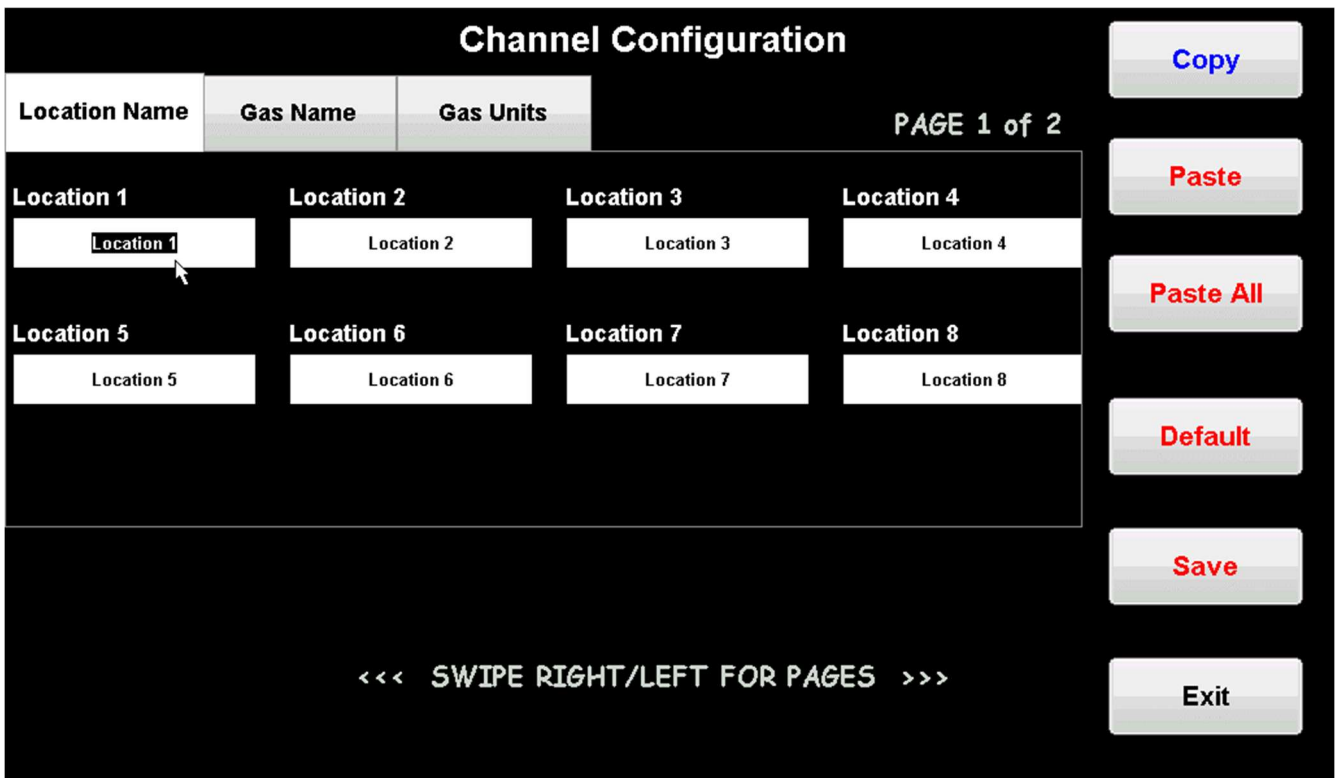


Figure 16

To select text in the Edit Box the user may long-press the desired text to highlight it. When the text field is highlighted the user will be able to Copy the text by pressing the 'Copy' button and long pressing on another Edit Box and pressing the 'Paste' button to replace the text with the copied text. The 'Paste All' button will copy the copied text into all Edit Boxes.

The 'Default' button will set all Edit Boxes to the system default settings.

When the desired changes have been made the user must press the 'Save' button to save the changes.



4.3 Alarm Configuration

This Menu allows the alarms to be configured for each channel/sensor.

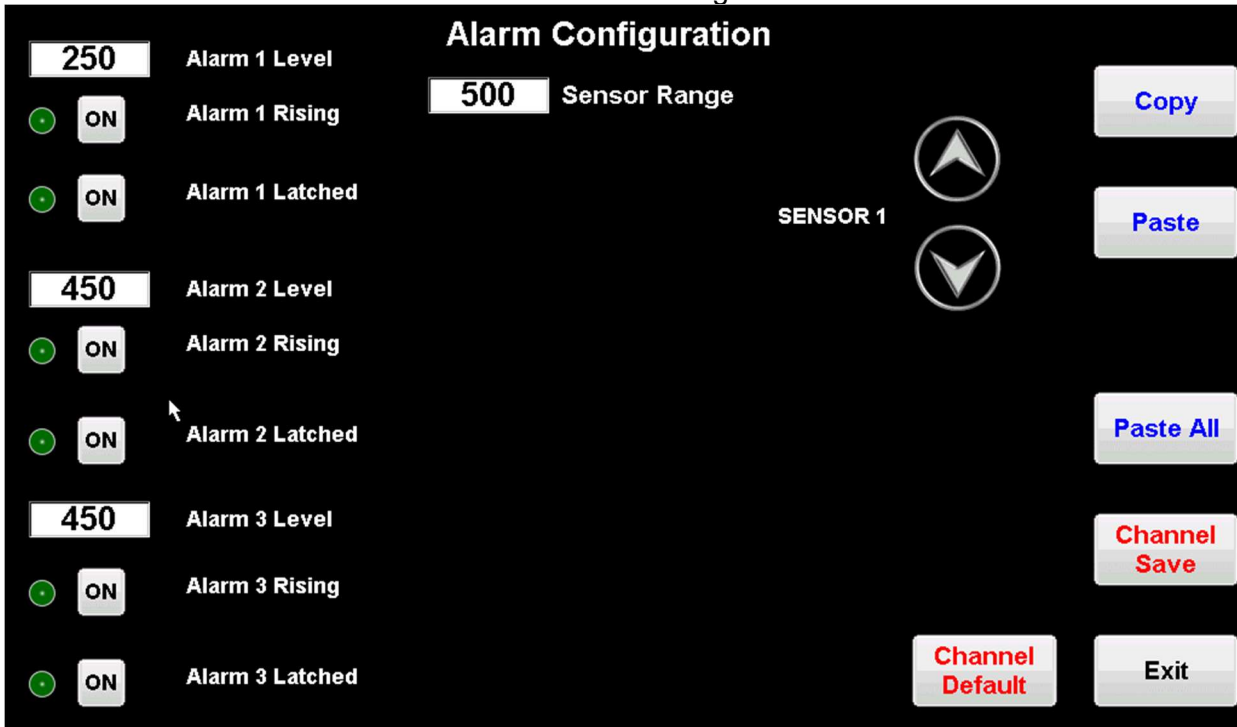


Figure 17

The required channel/sensor may be selected using the Up/Down arrow buttons. With the correct sensor/channel selected the user may set the Sensor Range by pressing the Sensor Range Edit Box. This will then bring up a Number Keypad to enter the desired values.

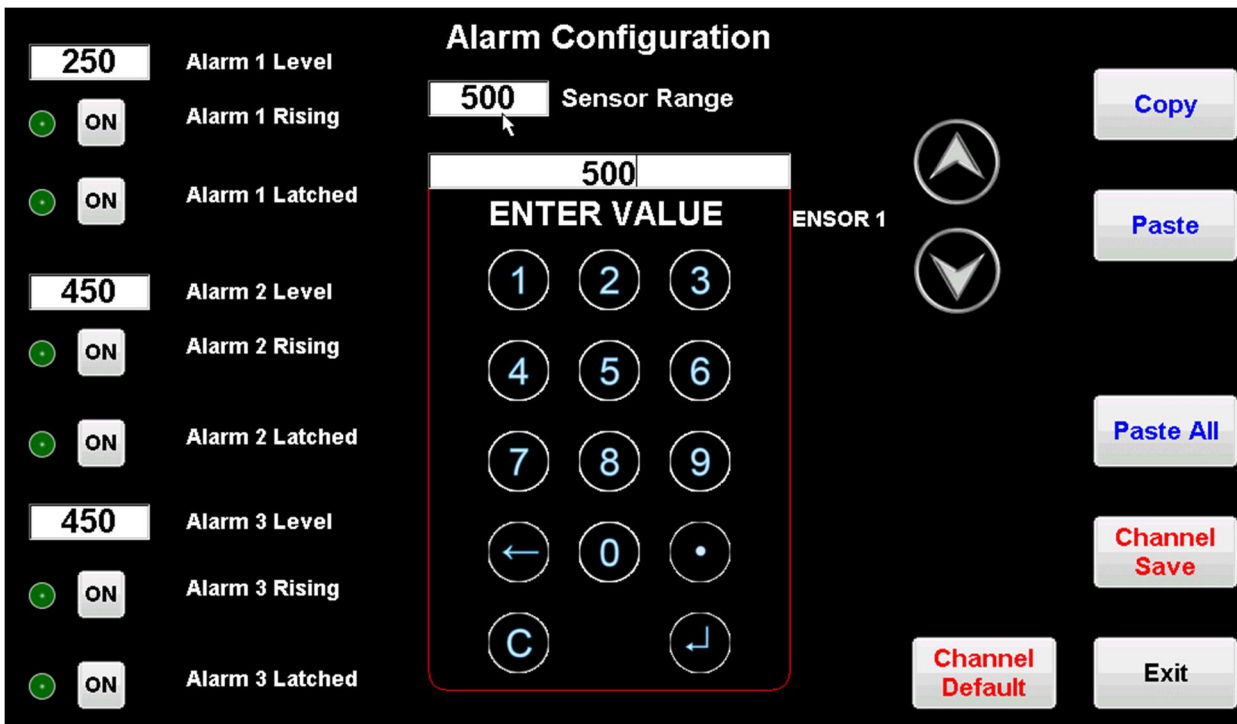


Figure 18

Similarly the alarm set points may be edited for Alarm 1, Alarm 2 and Alarm3. Long pressing the edit boxes will highlight the value to enable the Copy, Paste, Paste All functions.

Alarms may be set to be Rising(+) or Falling(-) by pressing (toggling) the appropriate buttons for Alarm 1, Alarm 2 and Alarm 3.

Alarms may be set to be Latched or Non-Latched by pressing (toggling) the appropriate buttons for Alarm 1, Alarm 2 and Alarm 3.

The 'Channel Default' button can be used to reset the Sensor/Channel to the original default values.

The user must press the 'Channel Save' button to save the altered Sensor/Channel values.

4.4 Relays Configuration

The Relay Configuration Menu allows for the Local and Remote (if fitted) relays to be fully configurable.

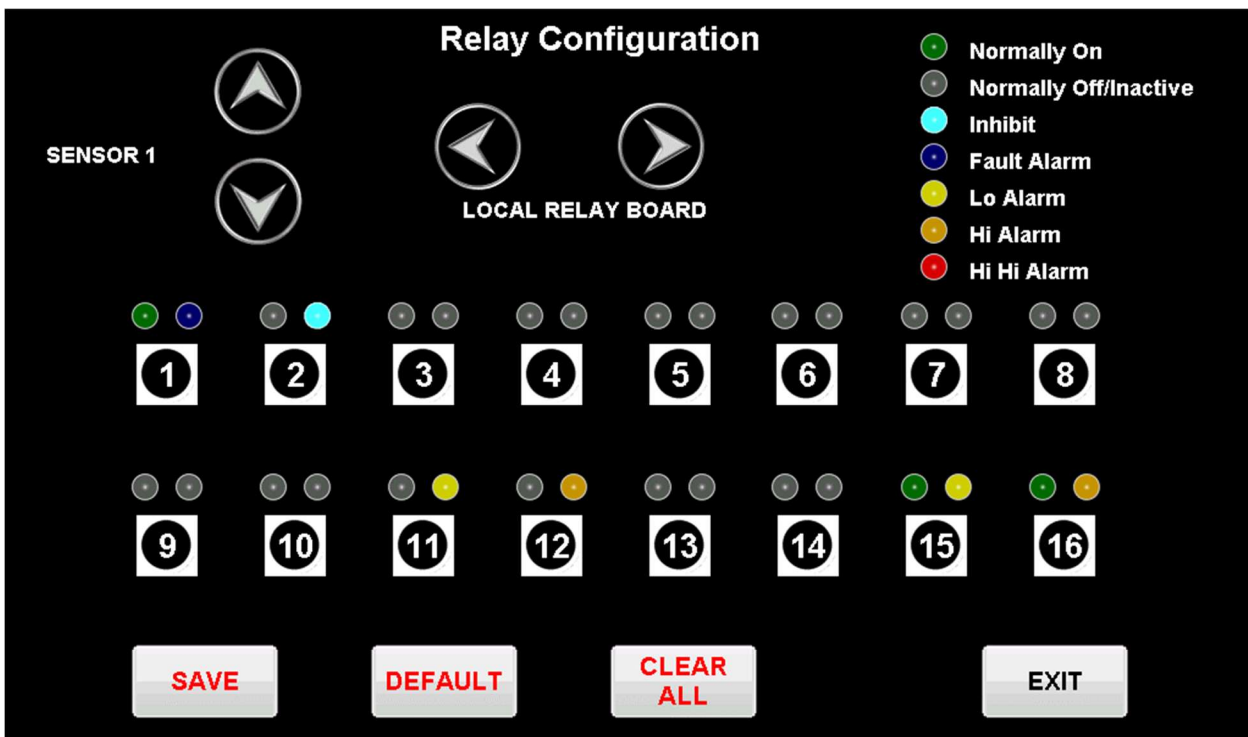


Figure 19

Select the required Channel/Sensor by using the Up/Down arrow buttons.

Select the required Relay Board by using the Left/Right arrow buttons.

The “LED” key to the top right of the display allows for quick examination of the current relay configuration.

The right-hand relay LED above the Relay Number indicates the current alarm to trigger the relay.

Pressing the required Relay Number will cycle through the alarm needed to trigger the relay. The available alarms are LO Alarm (1), HI Alarm (2), HI HI Alarm (3), or Fault Alarm.

The left-hand relay LED above the Relay Number indicates whether the current relay is Normally On (energised) or Normally Off (de-energised).

To select a Normally On/Normally Off relay, the user may long press the required relay button to toggle between the two alternatives.

Default relay configuration settings may be loaded by pressing the 'DEFAULT' button.

The user may save the settings by pressing the 'SAVE' button.

4.5 Calibration

The Calibrate Sensor screen is used to calibrate the TQ8000 Touch system's sensors. The required sensor to calibrate is selected using the Sensor Left/Right arrow buttons.

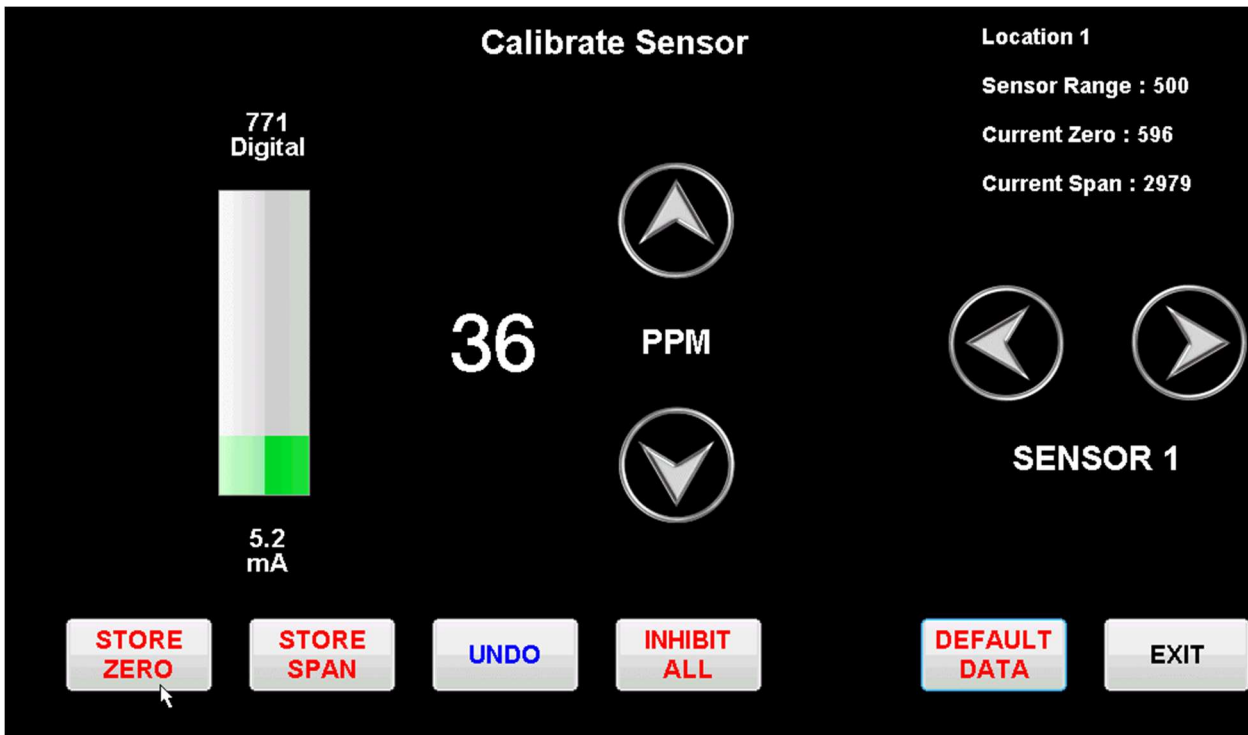


Figure 20

The top right-hand side of the display shows current Location Name, Sensor Range and Digital ADC Calibration Values for the selected sensor. The 'UNDO' button can be used to restart the calibration procedure. The 'DEFAULT DATA' button can be used to load default calibration settings.

4.5.1 Zero Setup

'Zero Setup' defines the minimum point of the range which individual sensors monitor.

Ensure that the sensor under calibration is exposed to its Zero conditions and allow the concentration value displayed to stabilise.

Adjust the concentration value to the 'Zero' required by using the Up/Down arrow buttons.

The Zero value can be saved by pressing the 'STORE ZERO' button.

4.5.2 Span Setup

As with the 'Zero' set-up, to cater for the numerous sensor types that can be used with the TQ8000 Touch, 'Span' setup will be for a value at the higher end of the sensor range.

Ensure that the sensor under calibration is exposed to its span conditions, and allow the concentration value displayed to stabilise.

Adjust the concentration value to the 'Span' required by using the Up/Down arrow buttons.

The Span value can be saved by pressing the 'STORE SPAN' button.

4.6 Date/Time

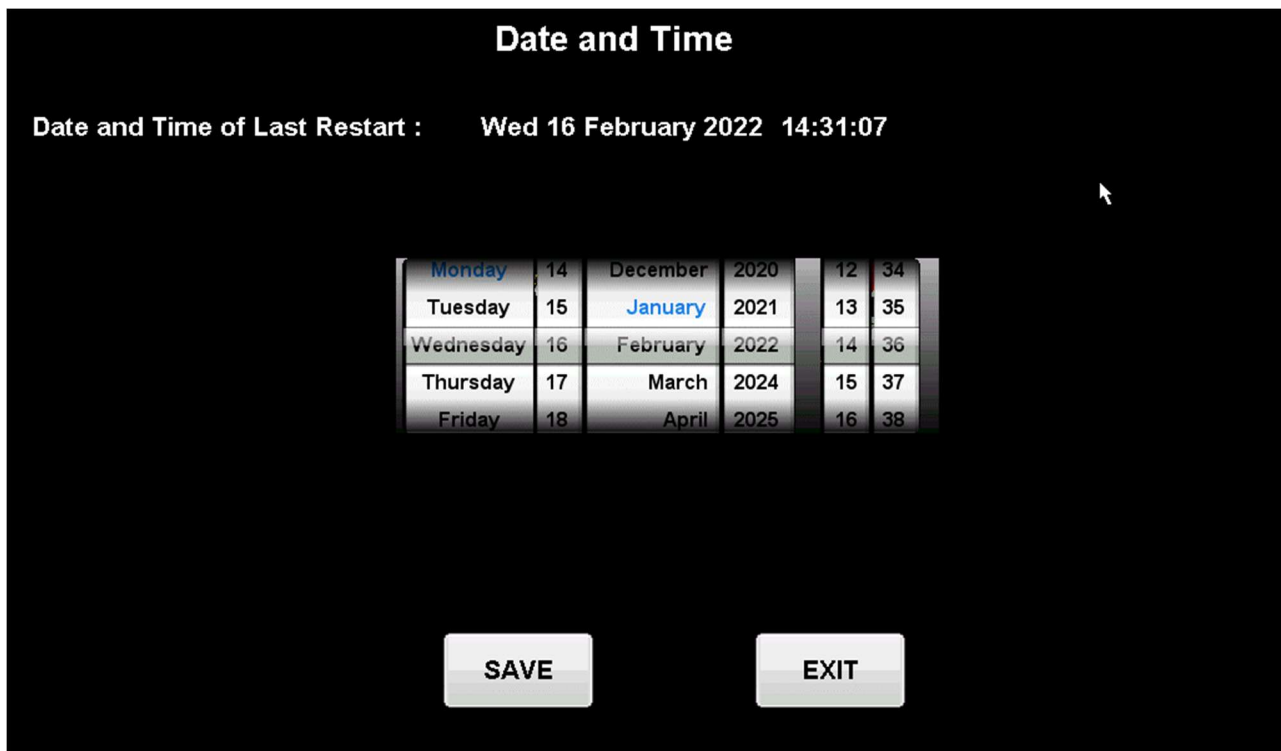


Figure 21

The Date and Time can be set up by moving the wheels to the relevant positions and pressing the 'SAVE' button to save the changes.

4.7 Comms Configuration

The TQ8000 Touch system has four configurable RS485 communications ports labelled COM 1 to COM 4.

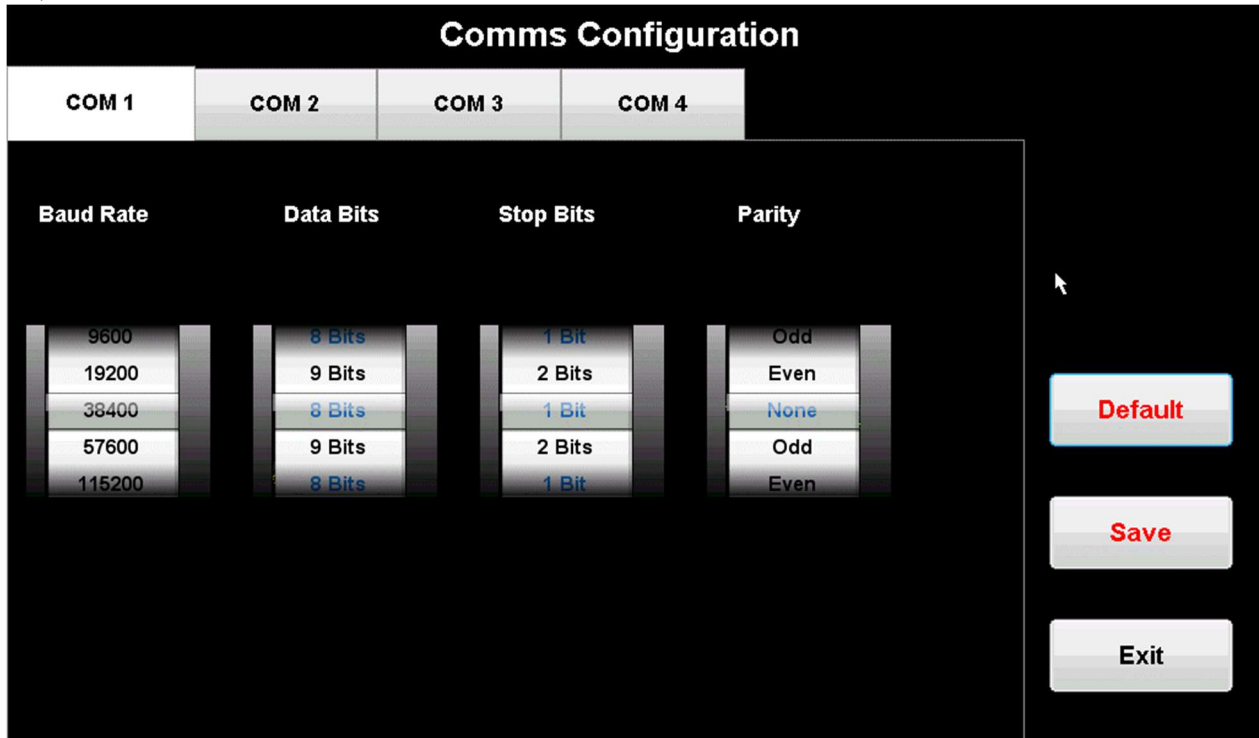


Figure 22

The user selects the Comms ports by pressing the tabs at the top of the screen.

The values can be changed by moving the wheels to the required positions.

The COM ports on the TQ8000 Touch are assigned as follows:

- COM 1 – Remote Relay Board (if fitted) CONN 14 on Main Control PCB
- COM 2 – Repeater Panel (if fitted) CONN17 on Main Control PCB
- COM 3 – Unassigned (Spare) CONN15 on Main Control PCB
- COM 4 – Modbus Communications CONN16 on Main Control PCB

The default system communications settings can be loaded by pressing the 'Default' button.

The altered settings can be saved by pressing the 'Save' button.

4.8 Relay Test

The Local Relays and Remote Relay (if fitted) may be individually activated using this menu screen.

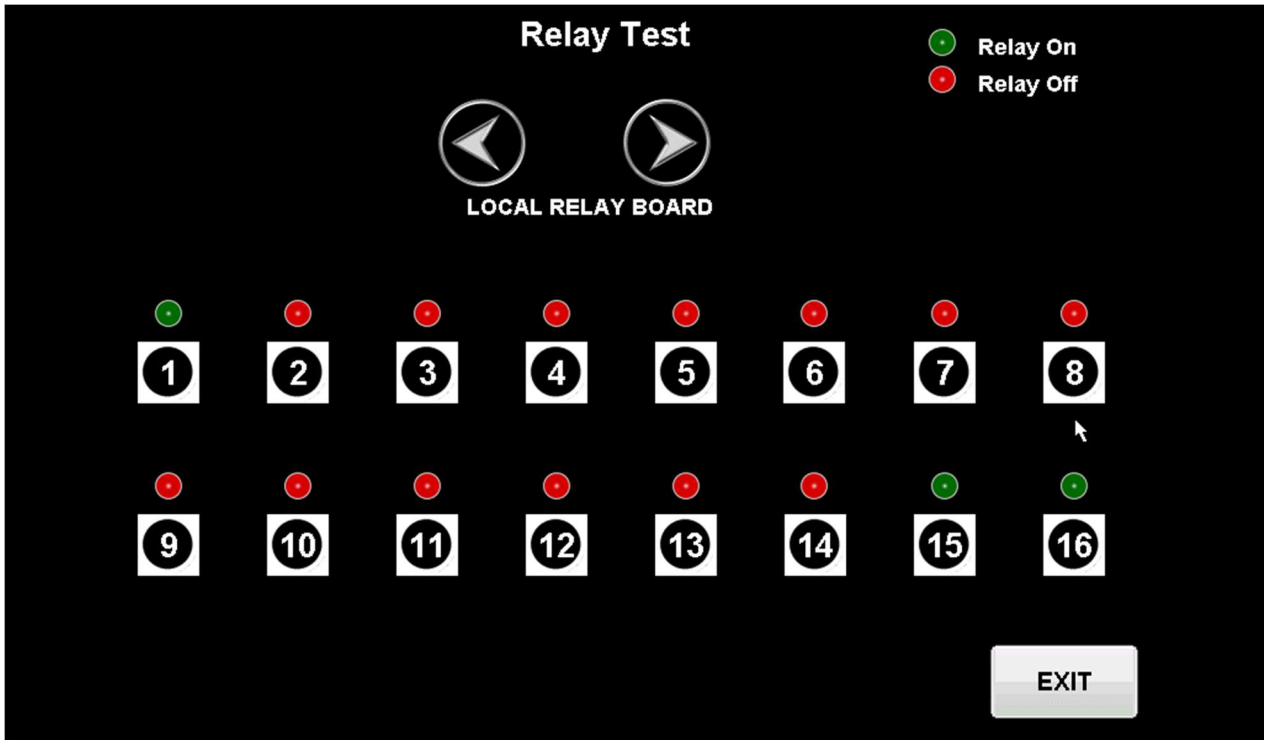


Figure 23

The Relay Board can be selected by pressing the Left/Right arrow buttons.

The Green LED above the relay number indicates that the relay is currently activated while a Red LED indicates that the relay is currently de-activated.

Relays can be activated or de-activated by a long press on the Relay button.

4.9 Default Data

This is used to download the default data for the complete TQ8000 Touch system. A warning dialog window is shown requiring the user to confirm the downloading of the system data.

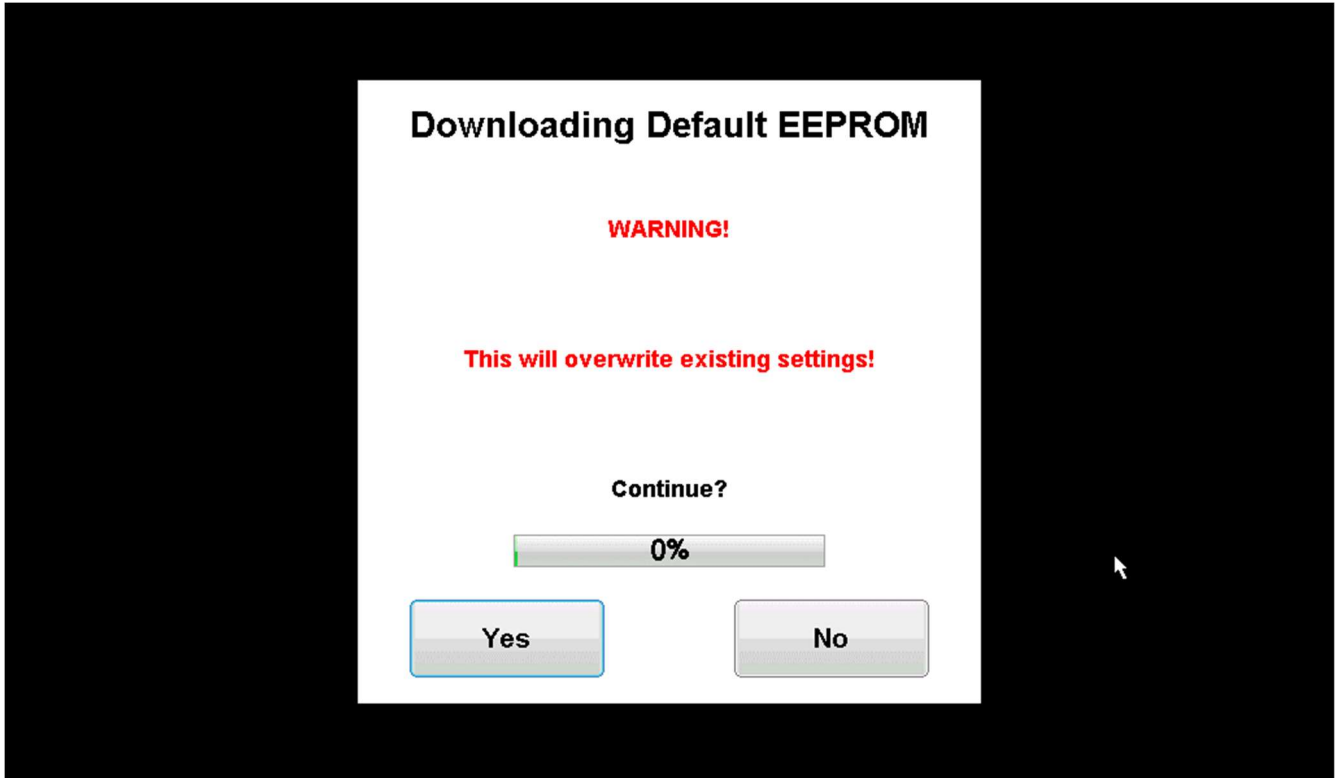


Figure 24

5.0 Modbus Communications

This section specifies the MODBUS output of the TQ8000 Touch. It details the protocol used and information that is made available over the protocol.

5.1 Communications

In MODBUS communications there is a Master device and a number of Slave devices. The Master is usually a central store with one or more slaves on a network containing data that the Master must have access to. The TQ8000 Touch will be one of these slaves. The network will be based on 1 x RS485 communications lines. The TQ8000 Touch MODBUS Station Number is factory set to 1, but may be changed in the range 1 to 247 under the System Configuration Menu.

5.1.1 Communication Specification

Interface:	3 wire RS485 (Twisted pair with 120Ω impedance)
Transmission Mode:	Half Duplex
Transmission Protocol:	MODBUS RTU
Error Check:	CRC-16
Transmission Speed:	19200
Data Bits:	8
Start Bits:	1
Stop Bits:	1
Parity:	Even

5.2 Modbus Addresses

5.2.1 Alarm State

N.B. The greyed out columns below are generally not required and are included only for completeness.

Discrete Inputs – Modbus Function 02							
Channel	Sensor Exists	Alarm 1 Active	Alarm 1 Ack'd	Alarm 2 Active	Alarm 2 Ack'd	Alarm 3 Active	Alarm 3 Ack'd
1	10001	10049	10097	10145	10193	10241	10289
2	10002	10050	10098	10146	10194	10242	10290
3	10003	10051	10099	10147	10195	10243	10291
4	10004	10052	10100	10148	10196	10244	10292
5	10005	10053	10101	10149	10197	10245	10293
6	10006	10054	10102	10150	10198	10246	10294
7	10007	10055	10103	10151	10199	10247	10295
8	10008	10056	10104	10152	10200	10248	10296
9	10009	10057	10105	10153	10201	10249	10297
10	10010	10058	10106	10154	10202	10250	10298
11	10011	10059	10107	10155	10203	10251	10299
12	10012	10060	10108	10156	10204	10252	10300
13	10013	10061	10109	10157	10205	10253	10301
14	10014	10062	10110	10158	10206	10254	10302
15	10015	10063	10111	10159	10207	10255	10303
16	10016	10064	10112	10160	10208	10256	10304

17	10017	10065	10113	10161	10209	10257	10305
18	10018	10066	10114	10162	10210	10258	10306
19	10019	10067	10115	10163	10211	10259	10307
20	10020	10068	10116	10164	10212	10260	10308
21	10021	10069	10117	10165	10213	10261	10309
22	10022	10070	10118	10166	10214	10262	10310
23	10023	10071	10119	10167	10215	10263	10311
24	10024	10072	10120	10168	10216	10264	10312
25	10025	10073	10121	10169	10217	10265	10313
26	10026	10074	10122	10170	10218	10266	10314
27	10027	10075	10123	10171	10219	10267	10315
28	10028	10076	10124	10172	10220	10268	10316
29	10029	10077	10125	10173	10221	10269	10317
30	10030	10078	10126	10174	10222	10270	10318
31	10031	10079	10127	10175	10223	10271	10319
32	10032	10080	10128	10176	10224	10272	10320
33	10033	10081	10129	10177	10225	10273	10321
34	10034	10082	10130	10178	10226	10274	10322
35	10035	10083	10131	10179	10227	10275	10323
36	10036	10084	10132	10180	10228	10276	10324
37	10037	10085	10133	10181	10229	10277	10325
38	10038	10086	10134	10182	10230	10278	10326
39	10039	10087	10135	10183	10231	10279	10327
40	10040	10088	10136	10184	10232	10280	10328
41	10041	10089	10137	10185	10233	10281	10329
42	10042	10090	10138	10186	10234	10282	10330
43	10043	10091	10139	10187	10235	10283	10331
44	10044	10092	10140	10188	10236	10284	10332
45	10045	10093	10141	10189	10237	10285	10333
46	10046	10094	10142	10190	10238	10286	10334
47	10047	10095	10143	10191	10239	10287	10335
48	10048	10096	10144	10192	10240	10288	10336

Channel	Sensor Fault Active	Sensor Fault Ack'd	Sensor Overrange Active	Sensor Overrange Ack'd
1	10337	10385	10433	10481
2	10338	10386	10434	10482
3	10339	10387	10435	10483
4	10340	10388	10436	10484
5	10341	10389	10437	10485
6	10342	10390	10438	10486
7	10343	10391	10439	10487
8	10344	10392	10440	10488
9	10345	10393	10441	10489
10	10346	10394	10442	10490
11	10347	10395	10443	10491
12	10348	10396	10444	10492
13	10349	10397	10445	10493
14	10350	10398	10446	10494

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15	10351	10399	10447	10495
16	10352	10400	10448	10496
17	10353	10401	10449	10497
18	10354	10402	10450	10498
19	10355	10403	10451	10499
20	10356	10404	10452	10500
21	10357	10405	10453	10501
22	10358	10406	10454	10502
23	10359	10407	10455	10503
24	10360	10408	10456	10504
25	10361	10409	10457	10505
26	10362	10410	10458	10506
27	10363	10411	10459	10507
28	10364	10412	10460	10508
29	10365	10413	10461	10509
30	10366	10414	10462	10510
31	10367	10415	10463	10511
32	10368	10416	10464	10512
33	10369	10417	10465	10513
34	10370	10418	10466	10514
35	10371	10419	10467	10515
36	10372	10420	10468	10516
37	10373	10421	10469	10517
38	10374	10422	10470	10518
39	10375	10423	10471	10519
40	10376	10424	10472	10520
41	10377	10425	10473	10521
42	10378	10426	10474	10522
43	10379	10427	10475	10523
44	10380	10428	10476	10524
45	10381	10429	10477	10525
46	10382	10430	10478	10526
47	10383	10431	10479	10527
48	10384	10432	10480	10528

Common Alarm1	10529
Common Alarm 2	10530
Common Alarm 3	10531
System Fault	10532
Sensor Fault	10533
Sensor Over Range	10534
Touchscreen Connected	10535
Internal Battery	10536
Menu Active	10537

5.2.2 Gas Concentrations

Concentrations are stored in Scientific form and stored in two parts, a reading and a precision part. This should be read RR E PP where RR is the reading and PP is the precision, e.g. 21.2% will be represented as 212E-1 or 212x 10⁻¹.

For the concentrations; the Precision would only be required if the Sensor Range contains a decimal point, e.g. Oxygen Sensor (20.9%).

Input Registers – Modbus Function 04					
Channel	Reading	Precision	Channel	Reading	Precision
1	30001	30049	25	30025	30073
2	30002	30050	26	30026	30074
3	30003	30051	27	30027	30075
4	30004	30052	28	30028	30076
5	30005	30053	29	30029	30077
6	30006	30054	30	30030	30078
7	30007	30055	31	30031	30079
8	30008	30056	32	30032	30080
9	30009	30057	33	30033	30081
10	30010	30058	34	30034	30082
11	30011	30059	35	30035	30083
12	30012	30060	36	30036	30084
13	30013	30061	37	30037	30085
14	30014	30062	38	30038	30086
15	30015	30063	39	30039	30087
16	30016	30064	40	30040	30088
17	30017	30065	41	30041	30089
18	30018	30066	42	30042	30090
19	30019	30067	43	30043	30091
20	30020	30068	44	30044	30092
21	30021	30069	45	30045	30093
22	30022	30070	46	30046	30094
23	30023	30071	47	30047	30095
24	30024	30072	48	30048	30096

6.0 Installation

It is recommended that the unit be situated away from equipment, and high current carrying cables, which may emit electromagnetic interference.

6.1 Mechanical

Remembering that the TQ8000 Touch is bottom entry, choose a suitable flat, vertical surface, mark the hole centres, and secure the unit using the 3 off 6.5mm internal fixing holes provided.

After fixing ensure that internally the TQ8000 Touch is free from swarf and debris. Remove the gland plate and drill out the required number of entries.

6.2 Electrical

6.2.1 Mains Supply

Mains power supply to the TQ8000 should be from a suitable 'Fused Isolator' rated at a minimum of 6.0 Amps and fitted adjacent to the TQ8000. Connection to the 8 channel TQ8000 will be to the fused terminal block on the power supply tray for 16-48 channel unit it will be t a rail mount fuse isolator on termination rail.

Mains earth is to be connected to the brass 'Earth' terminal adjacent to the fused terminal block.

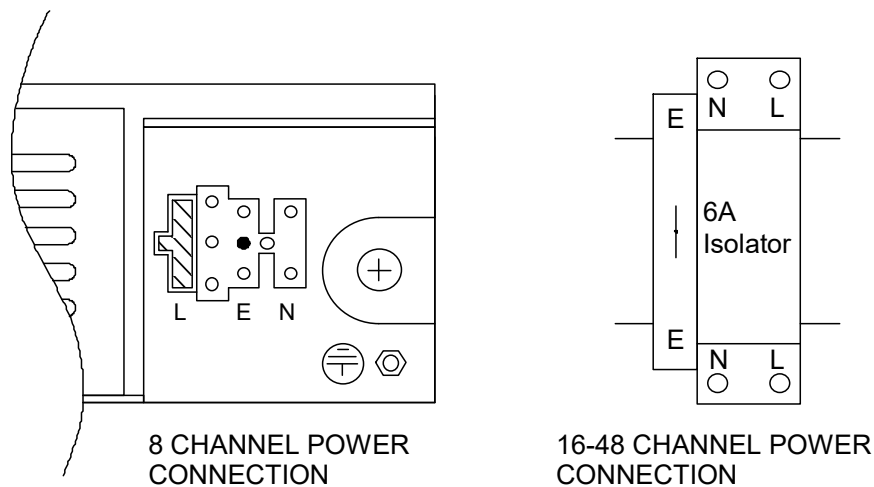


Figure 25

6.2.2 Sensor Inputs

Ensure that the sensor(s) to be connected to the TQ8000 will operate from a 24V dc supply, and are 2 or 3 wire 4-20mA source type. Ensure that the sensor current for each input does not exceed 5.0W, approximately 200mA.

NB This does not apply to Pellistor sensors, as a separate 'Input Module' is provided for these devices. The instrument will have been prepared at the factory to accept the appropriate mixture of Pellistor and 4-20mA sensors. The 'Input Module' associated with a Pellistor sensor CANNOT be used in channel previously reserved for a 4-20mA sensor, and vice versa.

Field wiring for ALL sensors must have an "over-all" screen.

NB The screen of the sensor wiring must not be connected to earth at the sensor, as it must be connected to the 'Earth' stud provided within the TQ8000 on the bottom left hand side of the unit.

If practical, any exposed screening at the sensor is to be insulated with heat-shrink material or similar.

Where the TQ8000 has been configured prior to despatch, particular attention must be given to the connection of the correct sensor to its respective input.

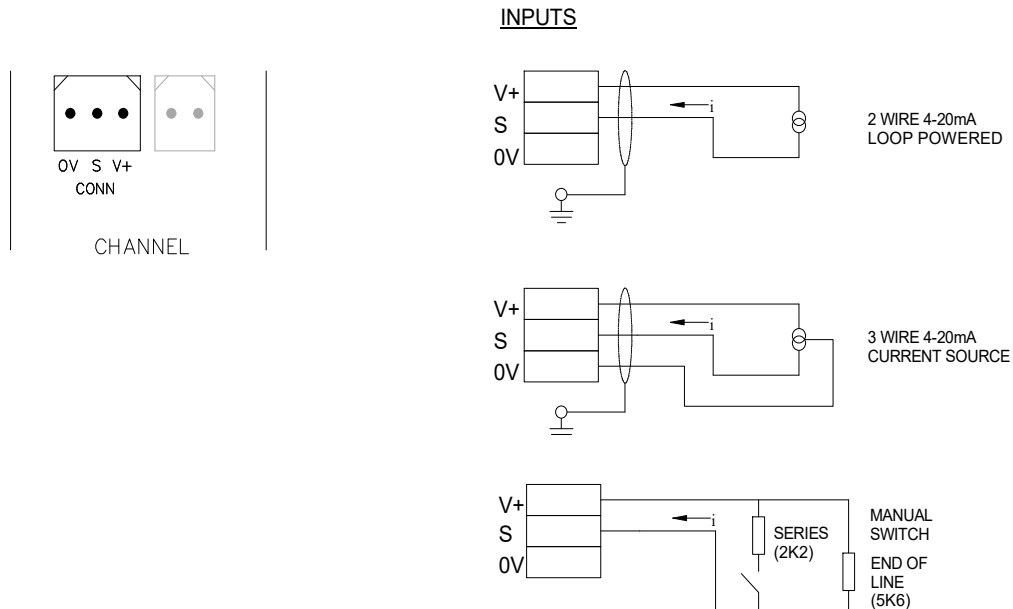


Figure 26

Input termination & typical sensor circuits

Note, Sensor connection for 09 to 48 channel units are provided as terminals in the bottom of the panel, please refer to drawing at back of manual for termination.

6.2.3 Relay Outputs

These are available as 'Volt-Free, Single Pole Change-Over' type and terminated on the 16 way 'Relay board' supplied.

Relay 1 is always the 'Fault' output leaving the remainder as configurable Alarm outputs. Each relay has a 'Red LED' across its' coil to aid in system functional checks.

The TQ8000 Touch 8 channel unit has an auxiliary 24v dc supply on 'TB3' which can be connected to the relay contacts thus providing 24v dc powered outputs.

The total output current must not exceed 1.0Amp resistive, or 660mA inductive.

Additional relays may be added using a "remote relay PCB as described in 2.5. Additionally output current will increase depending on application.

7.0 Commissioning

7.1 Pre-Checks

Prior to the start of any commissioning work ensure that:

- All wires and screens, including earth wires, are correctly terminated and secure.
- All sensors are connected to their respective channel inputs as per the TQ8000 Touch configuration sheet.
- Ensure that all links and Input Modules are fitted correctly in accordance with the requirements of the sensor connected.

7.2 Input Card and Link Setup

The TQ8000 Touch Adaptor Card has several link positions to determine what the sensor input signal and the supply voltage to the sensor is.

7.2.1 4-20mA Input Sensors

When using a 4-20mA input 3 wire or 2 wire sensor e.g. TQ GD129IR Flammable or TQ122-001 Oxygen, then an input card is **not** required for the ten way header marked CONN 16 – CONN 23 on the Adaptor Card .

The links for this type of channel should be set up as follows:-

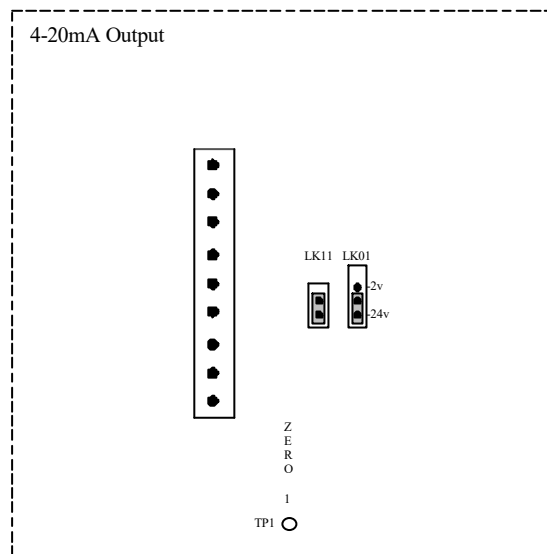


Figure 27

7.2.2 Pellistor / Catalytic Input Sensors

When using a Wheatstone Bridge input 3 wire sensor e.g. TQ122-210 Flammable, then an input card is required for the ten way header marked CONN 16 – CONN 23 on the Adaptor Card. In safety critical applications the input card Part no. is 370-656

The Links for the respective channel should be set up as follows:-

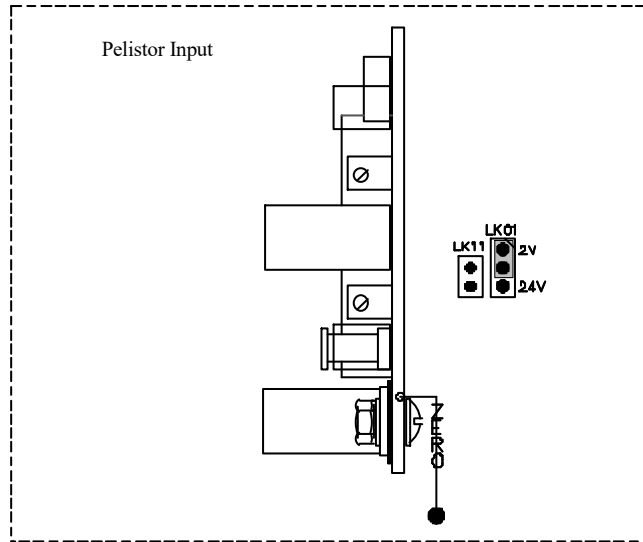


Figure 28

7.3 Power Up

The systematic procedure for applying power to the TQ8000 Touch is as follows:

Remove the input fuse from the TQ8000 Touch, close the mains 'Fused Isolator' and check the supply voltage at the TQ8000 Touch input terminals.

Open the 'Fused Isolator' and replace the TQ8000 Touch input fuse.

Close the 'Fused Isolator' and observe the display on the TQ8000 Touch front panel, which will show the system loading the system data from the EEPROM.

Check that the +5 & +24 volt LED's on the Adaptor Board and Relay Board are lit.

Sensors that have an internal self-check routine could exceed the 120 seconds time period for the TQ8000 Touch, and will therefore show a fault. Consult the sensor manufacturers' data sheet, and perform a system 'Reset' after its' respective self-check period.

If the 'Fault' indication still persists measure the voltage between 'S' and '0v' on the Adaptor Board input terminals, the reading should be 0.44V for a 4.0mA input current. A low 'milli-volt' reading indicates a fault on the sensor or associated wiring, this must be rectified before calibration.

Channels connected to Pellistor type sensors could also show a 'Fault' after the TQ8000 Touch has completed its Start Up period. These sensors operate on the 'Wheatstone Bridge' principle and therefore require the 'bridge voltage' & 'bridge balance' setting up prior to calibration.

Upon power up the TQ8000 Touch will wait 120 seconds to allow the attached sensors to complete their self-test.

7.4 Pellistor Sensor Set Up

The 'Input Card' for a Pellistor type flammable sensors, e.g. TQ122-210, cards must be 'set-up' with the sensor connected to it. This compensates for voltage loss along the cable used.

Note: This procedure is to be carried out at installation/commissioning, and also when Pellistor sensors are replaced.

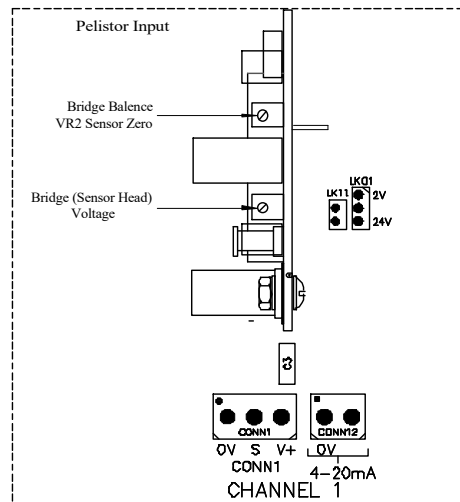


Figure 29

7.4.1 Pellistor Bridge Voltage

The 'bridge' voltage is set by measuring the DC voltage across '+V' and '0V' at the junction box associated with the pellistor while adjusting the trim-pot VR1 on the Input Card (see diagram above). The bridge voltage set-point is that specified by the pellistor manufacturer. For TQ pellistors the set-points are 2.0, 2.5 and 2.0 volts for the 122-210, 122-211 and 122-212 respectively.

7.4.2 Bridge Balance Voltage

After setting the bridge voltage it is important to allow the pellistor to stabilise thermally before the bridge is balanced. This normally takes about 1 hour.

To 'balance' the Pellistor sensor bridge, open the relevant Sensor View page. Adjust the trim-pot VR2 until the reading shows 4.0mA.

To clear any channel 'Fault' indications, press the TQ8000 Touch front panel 'Reset' button.

8.0 Fault Finding

There is no requirement for special equipment or tools when 'Fault Finding' on the TQ8000 Touch.

Diagnosis is limited to a few basic checks with a Digital Multi-meter, and must be carried out only by a competent person.

8.1 Power Supply

To aid fault diagnosis LED's have been fitted to the 'Adaptor Board' to indicate the presence of the 24 & 5 volt dc power supplies, and the 'Relay Board' to indicate for 24 & 5 volt dc power supplies, and relay coil operation.

Failure of either of the 24 & 5 volt dc LED's to operate firstly check the fuses fitted to the respective board. If the supplies are not available to the Adaptor or Relay Board, check;

F2 +5 Volt dc @2A

F3 +24 Volt dc @3A

For a power supply fault on the standard TQ8000 Touch 8 way 24 volt dc powered relay outputs, check the 'Auxiliary' output fuse 'F4'. This is rated for the service required and should not be greater than 1.0A.

Failure of the TQ8000 to provide any indications, including LED's, check Fuse 'F1' on the Input Terminals.

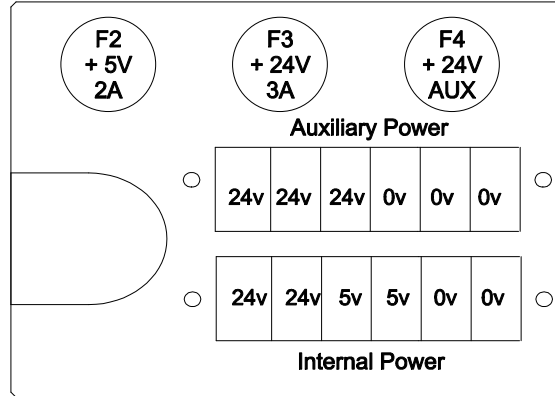


Figure 30

For 9-48 TQ8000sensor version please check drawing supplied for supply fuses and ratings.

8.2 Sensor

In a situation where a TQ8000 Touch displays a higher, or lower, than expected sensor reading, it will initially need to have the sensor location monitored for abnormal conditions.

If the local conditions are confirmed as normal, then a re-calibration could be sufficient.

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A useful check at this point is to measure the voltage at the sensor input between 'S' & '0V'. This will provide a reading in relation to the 4-20mA input from the sensor, and should be between 0.44V & 2.2 V DC. Values outside of this range could indicate a suspect sensor or wiring fault. Although on some devices a low reading could mean that a fault is apparent, and in this case always refer to the manufactures' data sheet.

Pellistor sensors can be also checked using a digital Multi-meter as in 7.4 of this Manual.

In addition to checking the bridge voltage to the manufacturers' instructions, and the bridge zero, the Pellistor sensor can be resistance tested with a multi-meter.

Disconnect the Pellistor sensor, and check the resistance value between '+V' and '0V'. This should be a low value from 3 Ohms upwards, depending upon the manufacturer.

For Technical assistance on any problem encountered when using the TQ8000 Touch, please do not hesitate to contact:

TQ Environmental Ltd

Tel: 01924 271013

Fax: 01924 264420

Email: sales@tqenv.com

Web: <http://www.tqenv.com>

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