



The Value Leader™
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TPI 712BT



Flue Gas Analyser

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1. Introduction

Thank you for purchasing TPI brand products. The TPI 712BT Flue Gas Analyser is a state of the art, easy to use analyser designed not only to display and calculate the required readings from a flue but also to cover most of the other desirable parameters associated with combustion. The instrument is ruggedly constructed and comes with a limited 3 Year Warranty

This manual will guide you through the functions of the TPI 712, which will give you many years of reliable service. The TPI 712 software has in-built self-diagnostics that can easily be interrogated by our fully qualified and professional engineers should an error occur. Please call the number below before returning your instrument to your distributor should an error occur. We can rectify over 75% of proposed faults over the phone.

TPI HELPLINE **01293 530196**

Your TPI 712BT Flue Gas Analyser comes complete with the following items as standard: -

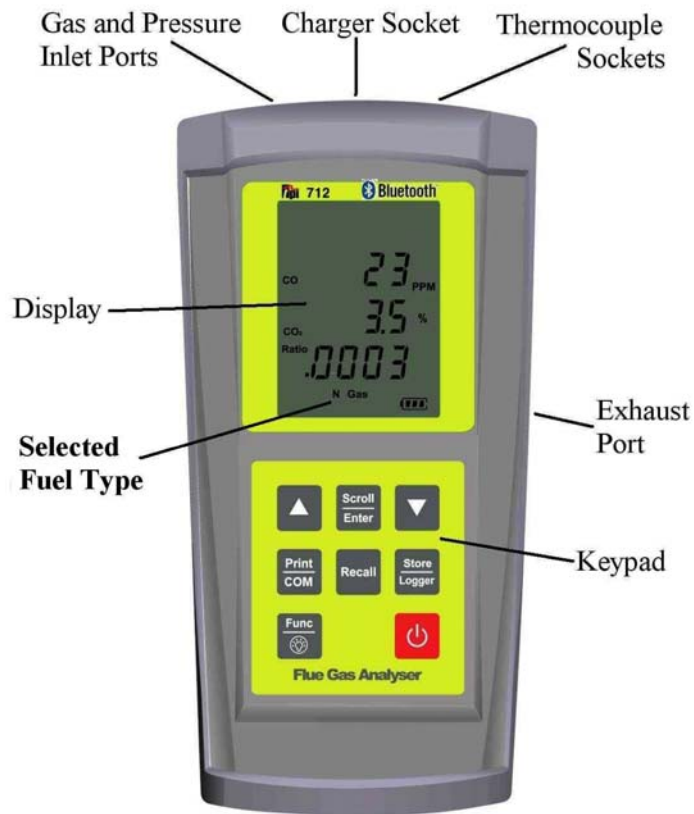
- TPI 712BT Instrument
- Rubber Boot
- Soft Carrying Case
- Sampling Probe (c/w Type "K" Thermocouple)
- In-Line Water Trap Bowl Filter (c/w Spare Particle Filter)
- Battery Charger
- Mini In-Line Pump Protection Filter (c/w 5 spare filters)
- Exhaust Spigot (removable)
- Pressure Tubing (2 x 1 metres)
- GK11M Air Probe
- Instruction Manual

Your TPI 712BT Flue Gas Analyser has the following options available: -

- Infrared Printer (see Appendix)
- Various Temperature Probes (see Appendix B)

2. Instrument Overview

2.1 Front View



<u>Rubber Boot</u>	Protects the instrument from accidental damage
<u>Display</u>	Large 3 Parameter Backlit Display
<u>Battery Indicator</u>	Showing battery life
<u>Selected Fuel Type</u>	N Gas, LPG, L Oil, Heavy Oil, OPT (1-6) (See 3.1)



Scrolls through selectable fuels (see 3.1)
Switches between Gross and Nett Efficiency (see 4.1.2)
Switches between °C and °F (see 4.2.1)
Scrolls through mbar, kPa and inH₂O (see 4.3.1)
Moves up through the Stored Data Addresses (see 5, 6 & 7)
Increases data logging time intervals (see 8)



Zeroes pressure reading (see 4.3.1)
Moves down through the Stored Data Addresses (see 5, 6 & 7)
Decreases data logging time intervals (see 8)



Scrolls through Flue Gas Analysis Function Screens (see 4.1)
Turns temperature differential calculation ON/OFF (see 4.2.1)
Turns ch2 temperature ON/OFF (see 4.3.1)
Allows you to change the Date and Time (see 4.5)
Allows you to choose a Stored Data Address (see 5, 6, 7, & 8)



Sends stored data to a separate infrared printer (see 7)
Sends real time, stored or logged data to a PC (see 9)



Allows you to view stored data on the display (see 6)



Stores readings to memory (see 8)
Starts and Stops data logging (see 8)

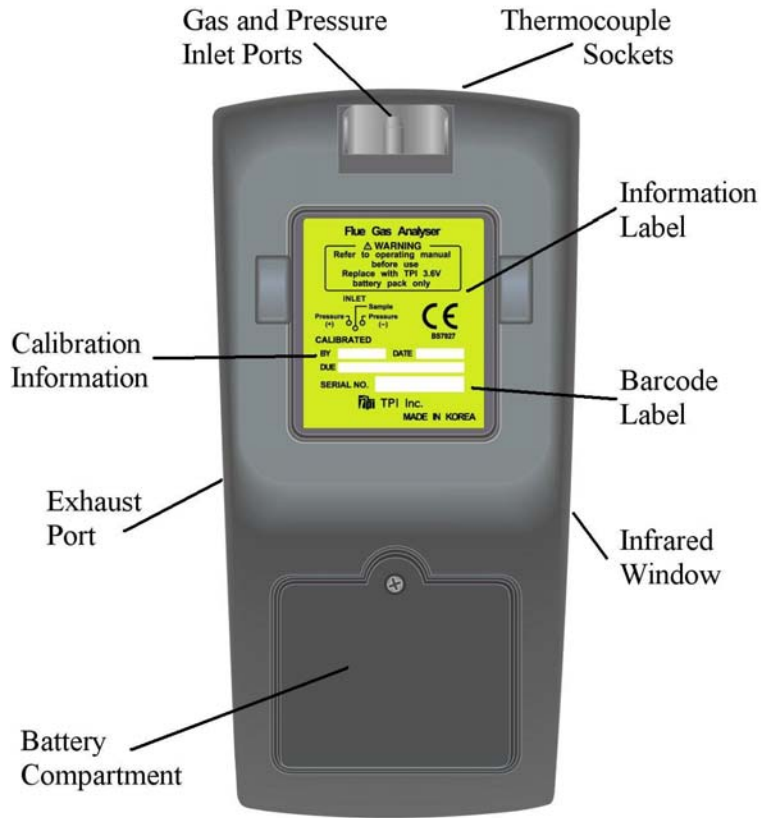


Moves you through the 5 Functions (see 4)
Turns Backlight ON and OFF (see 4)



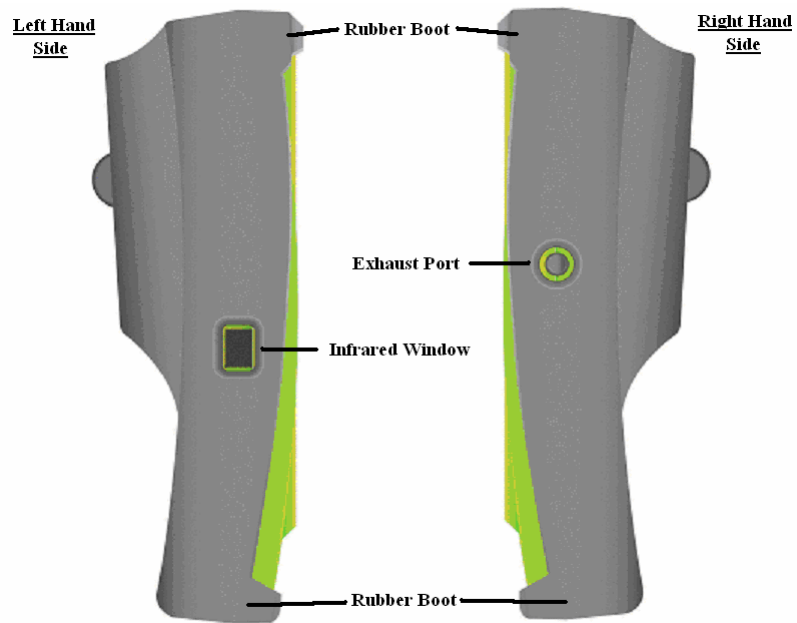
Turns the instrument ON and OFF (see 3.1 & 3.2)

2.2 Back View



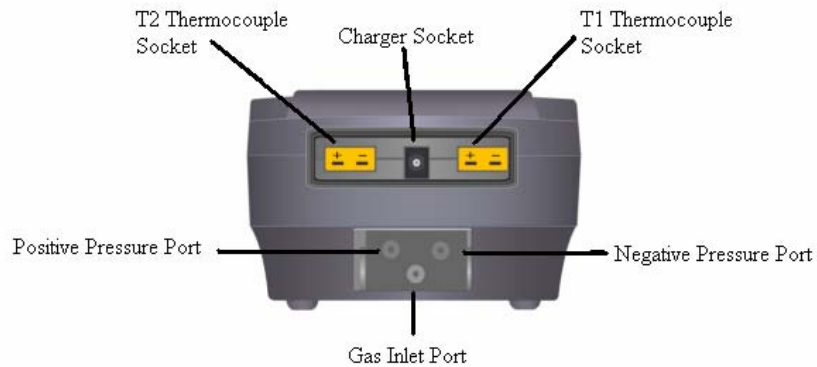
<u>Gas and Pressure Inlet Ports</u>	Connection for In-Line Pump Protection Filter (see 2.4 & 4.4) Connections for Pressure Tubing (see 2.4 & 4.3)
<u>Calibration and Info Label</u>	Displays calibration information Displays serial number
<u>Battery Compartment</u>	Holds rechargeable battery
<u>Rubber Boot</u>	Protects the instrument from accidental damage

2.3 Side Views



<u>Exhaust Port</u>	Port for connection of Exhaust Adaptor
<u>Infrared Window</u>	Window for sending stored data to IR Printer (see 7)
<u>Rubber Boot</u>	Protects the instrument from accidental damage

2.4 Top View



<u>Charger Socket</u>	Connection for 220V/115V charger (see 3.3)
<u>Thermocouple (ch1) T1 Socket</u>	Connection for thermocouple plug on probe (see 4.1) Connection for any 'K' type thermocouple probe (see 4.2)
<u>Thermocouple (ch2) T2 Socket</u>	Connection for any 'K' type thermocouple probe (see 4.2)
<u>Gas Inlet Port</u>	Connection for In-Line Pump Protection Filter for (see 4.4)
<u>Pressure (+) Port</u>	Connections for Pressure Tubing (see 4.3)
<u>Pressure (-) Port</u>	Connections for Pressure Tubing (see 4.3)

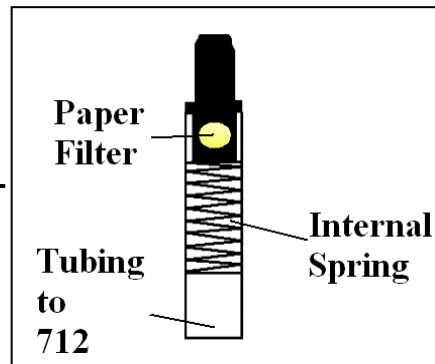
3. Turning On & Fuel Selection


3.1 Turning On

Always: - Before turning on please ensure that the **In-Line Pump Protection Filter** (shown across) is connected to the Gas Sample Port (see 2.2 or 2.4).

****THIS MUST REMAIN ON THE UNIT AT ALL TIMES.****

Failure to do so may result in pump failure and will invalidate the warranty.



Press the **Power Key**  for approximately 2 seconds and the TPI 712 will start up and display ALL Segments on the display for approx. 1 second. The 712 will then enter its 30-second purge period countdown with the following screen being displayed.




The instrument should ALWAYS be turned on in a clean air environment as the 30 second purge will attempt to set the Carbon Monoxide level to 0 ppm and the Oxygen to 20.9%.

*If there is insufficient clean air in the sensor chamber after the 30 second purge period an error indicating this **may** be displayed, please see troubleshooting guide (appendix D) for appropriate remedy. If the error is still present after attempting the suggested remedy please call the*

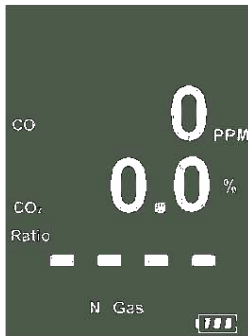
TPI HELPLINE
01293 530196

3.2 Fuel Selection


During the last 20 seconds of the 30 second purge time (i.e. as the 712 counts down from 19 to 0) the user can scroll through the following Fuels: - Natural Gas, LPG, Light Oil, Heavy Oil & OPT 1-6 (1=Bituminous Coal, 2=Anthracite Coal, 3=Coke, 4=Butane, 5=Wood(Dry) & 6=Bagasse) by repeatedly pressing the **Up Arrow Key**  to select the Fuel they are working with.


4. THE 5 FUNCTIONS

After the 30-second countdown the instrument is ready to take **Flue Gas, Temperature, Pressure** or **Leak Detection** readings and will Display the following Screen.



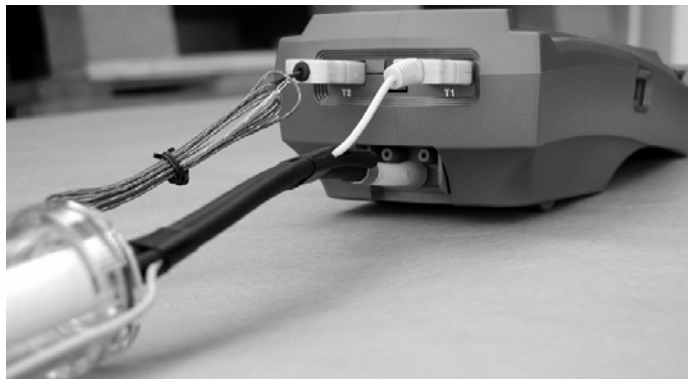
You are now ready to take **Flue Gas Analysis Readings**. Please continue on with the manual from **Section 4.1 (below)** which will guide you through the various **Analysis Screens**.

However, if you do not wish to perform a **Flue Test** at this moment Press the **Func/Backlight Key** and move onto **Section 4.2** of the manual. 

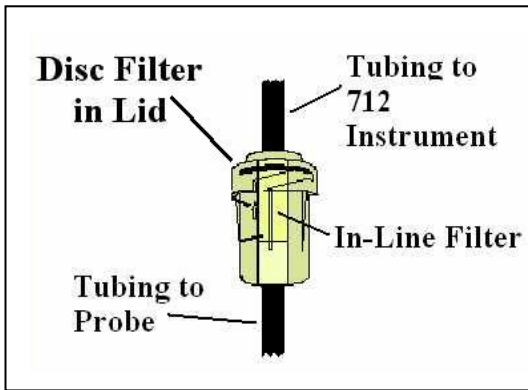
At any time you can activate the Backlight by **holding down** the **Func/Backlight Key**  for 2 seconds.

4.1 Function 1: - Flue Gas Analysis

Ensure you have connected the **Temperature Sampling Probe** complete with **In-Line Water Trap Bowl Filter** to the **In-Line Pump Protection Filter (See 3.1)** which should **ALWAYS** be connected to the **Gas Sample Port (see 2.2 or 2.4)** and that the **'K' Type Thermocouple Plug** is in **Thermocouple Socket (ch1)** (see 2.4). Also ensure that a **'K' Type Air Probe** is connected to **Thermocouple Socket (ch2)** (see 2.4) in order to calculate efficiency.

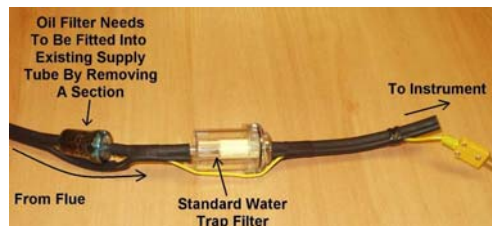


Your temperature-sampling probe comes complete with an In-Line Water Trap Bowl Filter as standard.

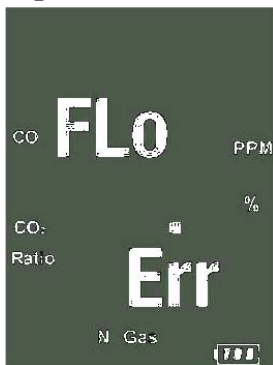


This consists of a Particle Filter in the Bowl Compartment and a Disc Filter in the Lid (as shown in the diagram across). The Disc Filter in Lid will prevent any excessive water from entering the 712 Flue Gas Analyser if used correctly.

If you are working with **OIL** then you **MUST** ensure that you also use the optional Oil Filter as shown below. **Failure to do so will result in erroneous readings.**



If any of the filters become excessively dirty or blocked then the following screen will be displayed as a warning and no further readings will be able to be taken until either the dirty filters are replaced or the blockage removed:-




The 712 will also give off an audible Beeping Alarm to warn that a "FLO Err" is being detected

WARNING: - Ensure that the In-Line Water Trap Bowl Filter hangs in a vertical position whilst readings are being taken, particularly if water is visible (see below). **Failure to comply may result in damage to the instrument and will invalidate the warranty.**



WARNING: - There is **ONLY** one correct way to connect the 'K' type thermocouple plug into the socket (see 2.4). The thermocouple plug is designed with one thick (negative) and one thinner (positive) prong. Forcing the plug into the socket the wrong way round may result in damage to the instrument. **Failure to comply may result in damage to the instrument and will invalidate the warranty.**



Pressing the **Scroll/Enter Key**  will take you through the following Flue Gas Analysis Screens

4.1.1 Screen 1



Displays Carbon Monoxide (CO) reading in parts per million (ppm)

Displays calculated Carbon Dioxide (CO₂) figure in percentage (%)

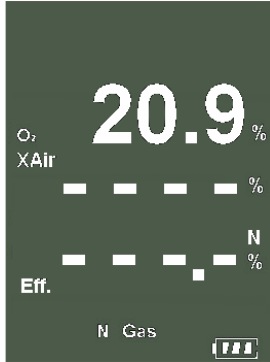
Displays calculated CO/CO₂ (Ratio) figure

4.1.2 HIGH CO ALARM

Should the CO reading rise above 2,000ppm a continuous series of Alarm Beeps will be heard. If this occurs then the Probe should immediately be disconnected from the instrument and the instrument returned to a clean air environment. This Alarm alerts the user that there is a high concentration of CO, and this procedure will protect the sensors within the instrument.

Failure to comply may result in damage to the instrument and will invalidate the warranty.

4.1.3 Screen 2



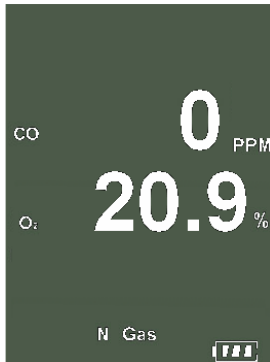
Displays Oxygen (O₂) reading in percentage (%)

Displays calculated Excess Air (X Air) figure in percentage (%)

Displays calculated Efficiency (Eff.) figure in percentage (%)

Pressing the Up Arrow Key  will toggle between Gross & Nett Efficiency


4.1.4 Screen 3






Displays Carbon Monoxide (CO) reading in parts per million (ppm)


Displays Oxygen (O₂) reading in percentage (%)

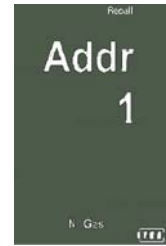
4.1.5 CO Build Up Feature

Whilst on Screen 3 of the Combustion Screens (see 4.1.3) press and **HOLD** the **Store/Logger Key**  until the 712 beeps and the following screen is displayed:-




“S-L9” will be flashing. Press the **Scroll/Enter Key**  and choose an address location by pressing the **Up**  & **Down**  **Arrow Keys**.

When an address location (0-4) has been chosen press the **Scroll/Enter Key**  to start the CO logging session.

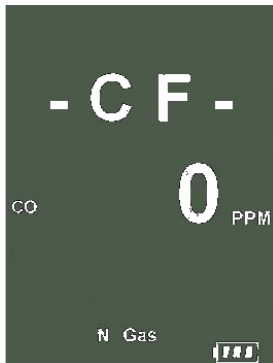


The 712 will return to the previous screen and “**Logger**” will be flashing at the top of the display. The instrument will now log the CO level every minute for the next 30 minutes and store the results in the chosen address location.

You can end the CO logging at any point by pressing and holding down the **Store/Logger Key**. 

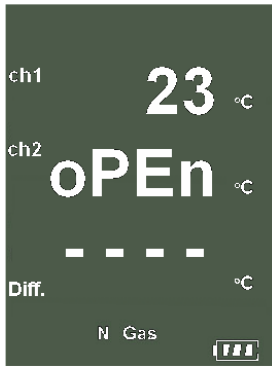
Both the Maximum and Average CO readings will be stored during this test. These readings can then be either Printed to a compatible IR Printer (see 7) or Downloaded to a compatible PC (see 9)

4.1.6 Screen 4



Displays CO air free calculated reading

4.1.7 Screen 5



Displays Temperature reading of Channel 1 (ch1) in degrees Centigrade (°C)

Displays Temperature reading of Channel 2 (ch2) in degrees Centigrade (°C)

Displays the Differential Temperature (Diff.) between ch1 and ch2 in °C

'oPEN' will be displayed if no 'K' type probe is connected to the thermocouple socket

4.1.8 CO above 15ppm (Failsafe) Protection Beep

The 712 will not allow the user to either Turn the instrument OFF or to move to another Function whilst the CO level is above 15ppm. A short beep will be heard should the user attempt either of the above with the CO above 15ppm.

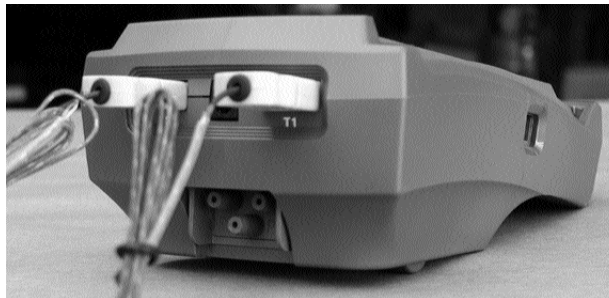
This is a Failsafe Feature of the 712 to protect the instrument from giving false readings when next turned on. The 712 should be run in a clean air environment with just the In-Line Pump Protection Filter attached until the CO level drops below 15ppm. The 712 will then be able to be moved to a different function screen or be turned OFF.

4.2 Function 2: - Temperature Reading

The pump will stop running when in this function

Remember:- It was the **Function Key**  that got you here!!!

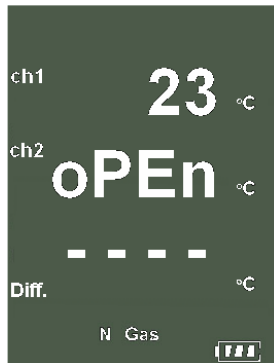
Ensure you have a 'K' type probe connected to one or both of the thermocouple sockets ch1 or ch2 (see 4.2)



WARNING: - There is **ONLY** one correct way to connect the 'K' type thermocouple plug into the socket (see 2.4). The thermocouple plug is designed with one thick (negative) and one thinner (positive) prong. Forcing the plug into the socket the wrong way round may result in damage to the instrument.
Failure to comply may result in damage to the instrument and will invalidate the warranty.



4.2.1 Screen 1



Displays Temperature reading of Channel 1 (ch1) in degrees Centigrade (°C) or degrees Fahrenheit (°F)
Displays Temperature reading of Channel 2 (ch2) in degrees Centigrade (°C) or degrees Fahrenheit (°F)
Displays the Differential Temperature (Diff.) between ch1 and ch2 in °C or °F

Pressing the Up Arrow Key  will toggle between °C and °F

'oPEn' will be displayed if no 'K' type probe is connected to the thermocouple socket

4.3 Function 3: - Pressure Testing

The pump will stop running when in this function

Remember:- It was the **Function Key**  that got you here!!!

Ensure you have Pressure Sampling Tube connected to one or both of the Pressure Ports (see 2.2 or 2.4)



4.3.1 Screen 1





Displays Pressure reading in either millibars (mbar), kiloPascals (kPa), or inches of Water (inH₂O)

Pressing the Up Arrow Key  will scroll through mbar, kPa and inH₂O


Pressing the Down Arrow Key  will Zero the Pressure reading

Pressing the Scroll/Enter Key  will toggle the ch2 temperature reading ON and OFF


Pressure Resolution

The pressure resolution can be toggled between 0.01mbar & 0.1mbar by pressing and holding down both the Up  & Down  Arrow Keys simultaneously.



4.3.2 Tightness Test Feature

Whilst on Screen 1 of the Pressure Screen (see 4.3.1) press the Store/Logger Key  and the following screen will be displayed:-

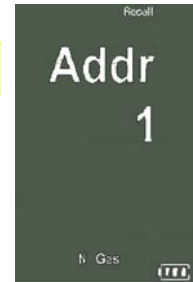


“Stor” will be flashing. Press the Up Arrow Key  and “t ltn” will be flashing.

Choose the Tightness Test Feature by pressing the Scroll/Enter Key 

Choose an address location (0-49) by pressing the Up  & Down  Arrow Keys.

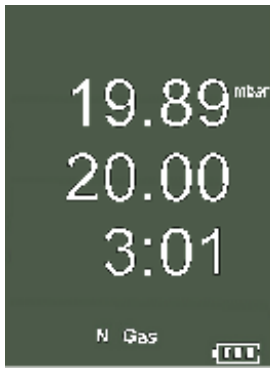
When an address location (0-49) has been chosen press the Scroll/Enter Key  to start the Tightness Test.





When the Tightness Test starts the **Live Pressure Reading** is displayed on the top line, **tltm** on the middle line and the **Timer** on the bottom line.

Once the timer reaches 1 minute it will start to flash.




After the correct stabilisation period has elapsed press the **Scroll/Enter Key** 

The **Start Pressure** will be stored and displayed on the middle line.

The **Timer** will continue to count up with the **Live Pressure Reading** still being displayed on the top line.




Once the required test period has elapsed press the **Scroll/Enter Key** 


The **Stop Pressure Reading** will be stored and displayed on the bottom line.



The **Start Pressure Reading** will be displayed on the middle line and both will be flashing.

The timer will stop with the **Live Pressure Reading** being displayed on the top line.



Press the **Scroll/Enter Key**  and “End YES” with “YES” flashing will be displayed.

To end the Tightness Test Feature press the **Scroll/Enter Key**  and you will be returned to Screen 1 of the Pressure Screen (see 4.3.1).

However if you wish to continue and perform another Tightness Test then press the **Up Arrow Key**  so that “no” is flashing and press the **Scroll/Enter Key.** 

The information stored during the Tightness Test Feature can be either Reviewed on the screen (see 6), Printed to a compatible IR Printer (see 7) or Downloaded to a compatible PC (see 9)

4.4 Function 4: - Leak Detection

The pump will start running in this function with a 25 second countdown

Remember:- It was the **Function Key**  that got you here!!!

Ensure you have the In-Line Pump Protection Filter connected to the Gas Sample Port (see 2.2 or 2.4) and that the instrument is in a clean air environment.



PLEASE ENSURE THAT THE MINI IN-LINE PUMP PROTECTION FILTER IS IN PLACE AT ALL TIMES WHILST IN ALL FUNCTIONS.

4.4.1 Screen 1



During 25 second purge period “LEAK” is displayed on the screen.

It is not uncommon for the 25 second purge period to be repeated. This may happen to give the sensor sufficient time to warm up before readings can be taken.

Displays and Sounds an indication to the level of Flammable Gas detected as follows: -






Value on Screen	Value of Flammable Gas	Tone Sounded
0	< 100ppm	No Tone
1	> 100ppm but < 1,000ppm	Long Pitched Tone
2	> 1,000ppm but < 5,000ppm	Medium Pitched Tone
3	> 5,000ppm	Short Pitched Tone

4.5 Function 5: - Date/Time

The Time, Date and Year can be changed whilst in this function as below:-





4.5.1 Screen 1

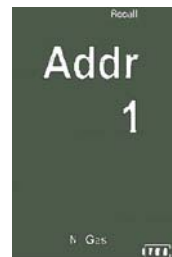


1. Press the **Scroll/Enter Key**  once to allow you to change the Time, Date and Year
2. Press the **Up Arrow Key**  to Increase the Minutes
3. Press the **Down Arrow Key**  to Decrease the Minutes
4. Press the **Scroll/Enter Key**  to confirm the desired Minute and move  onto the Hours
5. Repeat steps 2 to 4 to change the Hour, the Day, the Month and the Year
6. The unit will return to normal after the desired Year has been confirmed





5. SAVING DATA

In addition to the CO Build Up Test & the Tightness Test it is also possible to save complete combustion readings, temperature and single pressure readings as follows:-

1. Have the 712 analyser set to the relevant screen for the readings that you wish to save (i.e. Any of the combustion screens (see 4.1) for combustion readings or pressure screen (see 4.3.1) for single pressure reading)
2. Press the **Store/Logger Key**  once and 'Stor' will be displayed on the screen.
3. Press the **Scroll/Enter Key**  once. 'Addr' will be displayed and a location number (0 to 49) will be flashing on the screen.
4. Select the required address location that you wish to save the data to by pressing the **Up**  and **Down Arrow Keys** 




****Please Note:-** Choosing the same Address Location on which previously Stored Data is being held will OVERWRITE the previous readings with the New Stored Data. This will be the case regardless of the particular readings you are attempting to save (i.e. should you have Combustion Readings stored at Address 1 and you Save Temperature Readings to Address 1 then the Previous Combustion Readings will be overwritten with the New Temperature Readings) and the previously Stored Readings will not be retrievable.

5. Press the **Scroll/Enter Key**  once and the readings will be stored to the location that was chosen in step 3 and "End yES" with "yES" flashing will be displayed
6. If you do not wish to save any further readings at this moment press the **Scroll/Enter Key**  and you will be returned to the screen you were originally on.
7. However if you wish to continue and save another set of readings then press the **Up Arrow Key**  so that "no" is flashing and press the **Scroll/Enter Key** 





The information that you just stored can be either be Reviewed on the screen (see 6), Printed to a compatible IR Printer (see 7) or Downloaded to a compatible PC (see 9)



6. REVIEWING DATA

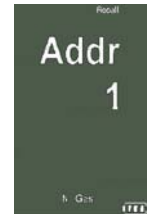
1. Press the **Recall Key**  once and the following screen will be displayed.




'Stor' will be flashing on the display. If you wish to review the Tightness Test Readings or the Last Time Calibrated Date then press the **Down**  **Arrow Key** to have 'tltN' or 'CAL' flashing rather than 'Stor'



2. Press the **Scroll/Enter Key**  once and if you have chosen to view the Last Time Calibrated (**CAL**) then the Date that the Last Time the 712 was calibrated will be displayed flashing on the screen. (Go To Step 6)

3. However if you have chosen to view either Stored (**Stor**) or Tightness Test (**tltN**) Readings then '**Addr**' will be displayed and a location number will be flashing. **Select the required address location that you wish to review by pressing the Up**  **and**  **Down Arrow Keys.**





4. Press the **Scroll/Enter Key**  once and the **Time & Date of the Saved Data** from the selected address location will be displayed flashing on the screen.
****If there is no data present at that location then 'nULL dAtA' will be displayed flashing****

5. **The rest of the Saved Data at this address location can be reviewed by pressing the Up**  **and**  **Down Arrow Keys**

6. Press the **Scroll/Enter Key**  once and "**End YES**" with "**YES**" flashing will be displayed. Should you not wish to view any further stored data then press the **Scroll/Enter Key**  once to Exit and be returned to the screen you were originally on.




7. However if you wish to continue and review another set of readings then press the **Up Arrow Key**  so that "**no**" is flashing.
8. Press the **Scroll/Enter Key**  once and repeat from Step 2


7. PRINTING DATA

WARNING: - To operate correctly there must be a clear line of sight between the Infrared Window on the instrument (see 2.3) and the Infrared Window on the IR Printer (see Printer instructions)

1. Press the **Print/COM Key**  once and the following screen will be displayed.



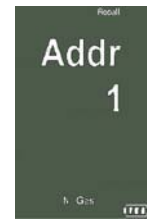
'rREAL' will be flashing.
If you wish to Print Out previously Stored (**Stor**) or Tightness Test (**tltn**) or CO Build Up Test (**S-L9**) Readings then press the **Down**  **Arrow Key** to have '**Stor**', '**tltn**' or '**S-L9**' flashing rather than 'rREAL'






2. Press the **Scroll/Enter Key**  once and if you have chosen to print out Real Time (**rREAL**) readings then the '**Print Out**' screen (below left) will be displayed and the Real Time (**rREAL**) readings will be sent to the printer.



However if you have chosen to print either Stored (**Stor**) or Tightness Test (**tltn**) or CO Build Up Test (**S-L9**) Readings then '**Addr**' will be displayed and a location number will be flashing.

Select the required address location that you wish to review the saved data from by pressing the **Up**  and **Down**  **Arrow Keys**



3. Press the **Scroll/Enter Key** . The '**Print Out**' screen (above left) is displayed and the selected readings will be sent to the printer.
4. Once the selected data has been sent to the IR printer "**End YES**" with "**YES**" flashing will be displayed. Should you not wish to print any further stored data then press the **Scroll/Enter Key**  once to Exit and be returned to the screen you were  originally on.
5. However if you wish to continue and review another set of readings then press the **Up Arrow Key**  so that "**no**" is flashing.
6. Press the **Scroll/Enter Key**  once and repeat.





8. TIMED LOGGING

Press and hold down the **Store/Logger Key**  for approximately 2 seconds until the instrument beeps and the following screen is displayed:-

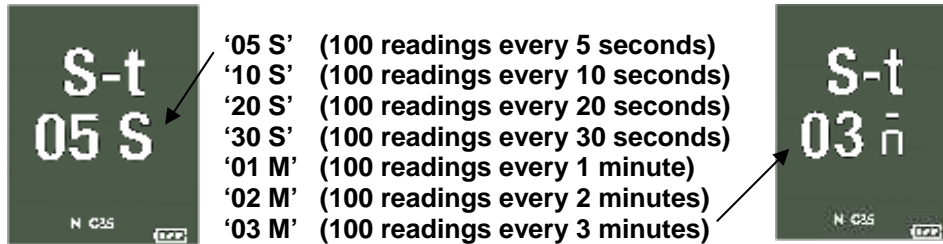


'S-L9' will be flashing.


Press the **Down Arrow Key**  so that 'Lo99' is flashing then press the **Scroll/Enter Key**  and follow the steps below:-

1. 'S-t' will be displayed with '05 S' flashing indicating that the instrument will log a set of 100 readings every 5 seconds.

You can choose from the following logging times





by pressing either the Up  or Down  Arrow Keys

2. Once you have chosen your required logging period press the **Scroll/Enter Key**  once and 'PAGE' will be displayed.

A page number from 0 to 3 will be flashing.

Select the required page location that you wish to log the data to by pressing the Up  or Down  Arrow Keys



3. Press the **Scroll/Enter Key**  once and the instrument will return to the previous screen/function with 'Logger' flashing on the top line. The instrument will continue logging until all 100 sets of readings have been saved or you press and hold down the **Store/Logger Key**. 

The data logged during this process can ONLY be downloaded to a compatible PC. **WARNING:** - The instrument will **NOT** turn off if data logging is commencing. A beep will be heard to warn you of this fact if you try to turn the instrument off.

9. Connecting to a Compatible Bluetooth Device

1. Press and hold down the **Print/COM Key** to instruct the 712BT to search for other Bluetooth devices. “**Comm**” will be displayed solid & “**Wait**” will be flashing on the 712BT LCD.
2. Initiate communication with the 712BT via the relevant means on your Bluetooth enabled PC, Laptop, XDA etc....
3. If this is the first time you have tried to connect the 712BT to your device then you must first pair the 2 devices. On your device you will be prompted to enter a Pairing Pin No. (Please enter the 5 digit Serial No. on the back of the 712BT). Once the devices have been paired then there is no need to repeat this step in the future.
4. Upon a successful connection between the 712BT and your device the “**Wait**” will disappear and the “**COMM**” will be flashing on the 712BT LCD. You are now ready to download the data from the 712BT to your device.
5. Open up an appropriate program on your device such as Hyper Terminal on a PC etc... You may need to use the following settings:-
 - i. Bits per second = 9600
 - ii. Data Bits = 8
 - iii. Parity = None
 - iv. Stop Bits = 1
 - v. Flow Control = None
6. You may also need to select the relevant Com Port number that was assigned to your Bluetooth connection.
7. Press and hold down the **Recall Key** for approx 2 seconds. “**rEAL**”, “**Stor**” & “**tltn**” will be displayed with “**rEAL**” flashing. The “**rEAL**” flashing indicates that Real Time Data will be sent to your Device.
8. However should you wish to send either a Stored Set of Readings, Tightness Test, CO Build Up Test or Logged Data then press the **Down & Up Arrow Keys** until the desired ‘**Stor**’, ‘**tltn**’, ‘**S-L9**’ or ‘**Lo99**’ are flashing.
9. **Once you have selected the mode of data that you wish to send to your device press the Scroll/Enter Key once.**

10. Upon a successful transfer of data the 712BT will return to the original screen.
11. “**Comm**” will remain flashing on the 712BT LCD. Should you wish to transfer more data to your device repeat from step 7.
12. Should the connection between the 712BT and your device be lost then go back to step 2.

10. Turning Off & Charging

Always: - Before turning off the TPI 712 return to a clean air environment and allow the Carbon Monoxide level to return to below 15ppm and the Oxygen level to return to 20.9% ($\pm 0.3\%$).

Press the **Power Key**  to turn the instrument off.

NOTE: Should you attempt to turn the instrument Off and the CO reading is above 15ppm then the instrument will remain On and a short Beep will be heard. The instrument can only be switched off if the CO is below 15ppm.

The instrument has an auto shut off after 10mins should no keys have been pressed for this period and, as mentioned above, that the CO is below 15ppm. Should the CO be above 15ppm then the 10-minute auto shut off countdown will not begin till the CO has gone below 15ppm.

10.1 Charging

Plug the Charger supplied into the charger socket on the instrument (see 2.4). If the instrument is turned on then a charging symbol will be displayed. Should the instrument then be turned off or turn off automatically with the charger plugged in then the charging symbol will not be displayed BUT the instrument will still be charging.

The instrument should be charged overnight for a period of 10 to 12 hours and will give over 6 hours Operating Time.

Alternatively the instrument can be used whilst plugged into the mains

Appendix A : SPECIFICATIONS

Instrument

Operating Temperature Range	-10°C to +50°C
Battery	Rechargeable Ni-MH
Battery Life	> 6 Hours
Charger Input Voltage	115V or 230V : 50/60 Hz AC
Fuels	Natural Gas, LPG, Light Oil, Heavy Oil & OPT 1 = Bituminous Coal OPT 2 = Anthrachite Coal OPT 3 = Coke OPT 4 = Butane OPT 5 = Wood (Dry) OPT 6 = Bagasse
Pressure Ranges	mbar, kPa & inH ₂ O
Display	Backlit LCD
Data Storage	50 sets of readings
Data Logging	4 sets of 100 readings on Timed Interval Logging
CO Logging	4 sets of 30 minutes of CO readings
Time & Date	24 Hour Real Time Clock
Dimensions	200mm x 90mm x 60mm
Weight	500g
Casing	Rubber Boot as Standard
Switch Off	Failsafe
Exhaust	Safety Spigot
Conforms to	BS7927 (and the draft BS7967)

Flue Temperature Probe

Construction	Pistol Grip with Stainless Steel Shaft
Hose Length	2500mm
Insertion Length	200mm
'K' Type Thermocouple Accuracy	+/- 0.3%, +/- 1°C
Maximum Temperature	800°C

Gases

	<u>Range</u>	<u>Resolution</u>	<u>Accuracy</u>
Oxygen	0-25%	0.1%	+/- 0.3%
Carbon Monoxide	0-10,000 ppm	1 ppm	<20 ppm : +/- 3 ppm >100 ppm : +/- 5 % +/- 0.3%
Carbon Dioxide (calculated)	0-25%	0.1%	
CO/CO ₂ Ratio (calculated)	0-0.999		
Combustion Efficiency	0-100%	0.1%	
Gas Leak Sensor	100-10,000 ppm		

Pressure Measurement

Selectable Ranges	mbar, kPa and inH ₂ O
Range	- 150 mbar to + 150 mbar
Resolution	0.01 mbar
Accuracy	+/- 0.5% fsd

Appendix B : CALIBRATION & SERVICE

It is recommended that the instrument be calibrated every 12 months. Please consult your instrument supplier for further details.

The following are consumable parts for the instrument: -

In-Line Filter Element (pack of 10)	User Replaceable	Part No. A794/F
Leak Detector Mini Filter Complete	User Replaceable	Part No. A763
Oxygen Sensor	Factory Replaceable	
Carbon Monoxide Sensor	Factory Replaceable	

The following are accessories for the instrument: -

Flue Temperature Probe	Standard	Part No. A770
Various 'K' Type Probes	Optional	See TPI Brochure
In-Line Filter Complete	Standard	Part No. A794
Battery Charger	Standard	Part No. A766
Rubber Boot	Standard	Part No. A765
Infrared Printer	Standard	Part No. A740
Soft Carrying Case	Standard	Part No. A768
Exhaust Spigot	Standard	Part No. TBC
PC Software	Optional	Part No. A769
IRDA-RS232C Adaptor	Optional	Part No. A767
Oil Filter Complete	Optional	Part No. A773
Air Probe	Standard	Part No. GK11M

Appendix C : GUARANTEE

Your TPI 712 Flue Gas Analyser is guaranteed free from defects in materials and workmanship for 6 Years from the date of purchase. (Subject to annual service carried out by TPI Europe Ltd).

Covered by TPI: - Repair parts and labour; or replacement of the product at the option of TPI. Normal transportation charges to the purchaser are also covered.

Not covered by TPI: - Damage to the product which are the result of abuse, improper use or maintenance are not covered. Any other expenses, consequential damages, incidental expenses including damages to property are not covered. Transportation expenses to the customer are not covered.

To obtain warranty performance: - Include with the product your name, address, phone number, fax number, written description of the problem and proof of purchase date. Carefully package and return to TPI.

This guarantee does not affect your statutory rights.

Appendix D : TROUBLESHOOTING GUIDE

Problem	Probable Cause	Possible Remedy
Unit does not turn on	Batteries are flat	Recharge batteries or run on mains.
Unit does not turn on	Dislodged battery	Disconnect and Re-connect battery
Continuous alarm Sounds	Excessive levels of CO are being detected	Remove probe from flue and run in clean air for 5/10 minutes
Negative pressure readings on Display	Pressure tubing connected to wrong pressure port	Reconnect pressure tubing to positive pressure port rather than negative pressure port
Negative pressure readings on display	Either there is suction or pressure was not zeroed in atmospheric air	Re-zero in atmospheric air.
Negative temperature readings on display	Thermocouple plug has been plugged in the wrong way round	Remove thermocouple plug and plug in the correct way round
"Flo Err" is displayed	Blockage in sampling probe or kink/blockage in sample tube	Check and rectify as necessary
"Flo Err" is displayed	Dirty/blocked filters	Remove and replace in-line filters
Battery life shorter than usual	Excessive use of backlight or leak detector	Turn off backlight when not needed
"Inlt O2 Err" is displayed	Instrument turned on in contaminated air.	Turn instrument off and then turn instrument on again in clean air.
"Inlt CO Err" is displayed	Instrument has turned off with Gas Sample still present	Run instrument in clean air until after turning the instrument on/off the error disappears. Depending on the level of CO present this may take up to 1 hr.

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www.tpieurope.com



This symbol indicates that at the end of its life this product must not be disposed of in household waste. This equipment should be environmentally disposed of. Please contact your supplier or manufacturer who will be able to advise you on the correct method of disposal



TPI 712 "5-in-1" Combustion Analyser

TPI offers a complete line of...

Handheld Oscilloscopes

Digital Multimeters

Digital Clamp-On Meters

Carbon Monoxide Analysers

Combustion Efficiency Analysers

Combustible Gas Detectors

Digital Manometers

Refrigerant Leak Detectors

Temperature Instruments

Electrical Testers

Humidity Testers

Airflow Testers

Service & Calibration

Accessories

The Value Leader™



The TPI 712 "5-in-1" Flue Gas Analyser Allows:

1) Combustion Analysis

- ❖ Check Net/Gross Efficiency
- ❖ Adjust CO, CO₂ & Ratio Values
- ❖ Check CO₂, O₂ Values in Flues

2) Differential Pressure

- ❖ Adjust Gas/Air Mixture
- ❖ Test Air Pressure Switch
- ❖ Use for Tightness Testing

3) Differential Temperature

- ❖ Flow & Return Adjustments
- ❖ Balance Radiators
- ❖ Check Thermostat & Water Temperatures

4) CO Detection & Logging

- ❖ Records Levels for BS7967
- ❖ Highlights CO Spillage
- ❖ Indicates areas of High CO Production in Fires, Ovens etc..

5) Combustible Gas Detector

- ❖ Check Tightness of Valve & Pipe connections
- ❖ Audible & Visual Alarms change with concentration levels
- ❖ Starts working at 30ppm

Why choose the TPI 712?

The "5-in-1" TPI 712 is the professional's choice for flue gas analysis and is available in a number of kit formats to meet all requirements. The feature packed TPI 712 has all the measurements required by the modern heating engineer to commission and service domestic & industrial heating systems.

Features include:

- Six Year Warranty*
- Least Expensive Published Service Costs
- 10,000 ppm CO Cell for longer life and reliability
- Various Kit Options Available including IR Printer & Pipe Clamps
- Remote Diagnostics to reduce unnecessary instrument return
- CO Build Up Test Software
- Tightness Test Software
- Robust Design complete with Protective Rubber Boot as Standard
- Free Software Upgrades During Annual Service
- Conforms to BS7927 (and the draft BS7967)
- Either IRDA or Bluetooth® Data Transfer to PC

* Warranty Subject to Annual Servicing by TPI Europe Ltd.

Improved Features

NEW!! 3 Year O₂ & CO Sensors.

Longer Life O₂ Sensor means only 1 major service during a 6 year period from new. Saving time and money.

Water Trap & Disc Filter as standard on the thermocouple gas sampling probe. Complete protection from water ingress into 709R.

In-line Pump Protection Filter as standard. Stopping dust/dirt ingress into pump (the main cause of pump/analyser failure)



TPI 712 "5-in-1" Combustion Analyser

TECHNICAL SPECIFICATIONS AND ACCESSORIES

NOTE:
When selecting OIL as a fuel be sure to use the optional (A773) oil filter or readings could become erratic

Carbon Monoxide (CO) Measurement	
Range	0 to 10,000 ppm
Resolution	1 ppm
Accuracy	±5 ppm or 5%, whichever is greater
Oxygen (O₂) Measurement	
Range	0 to 25%
Resolution	0.1%
Accuracy	±0.3%
Carbon Dioxide (CO₂)	
Range	0 to 25%
Resolution	0.1%
Accuracy	Calculated
Ratio (CO/CO₂)	
Range	0 to 0.999
Resolution	0.001
Accuracy	Calculated
Gross/Net Efficiency	
Range	0 to 100%
Resolution	0.1%
Temperature Measurement	
Range	-40° to 800° C (-40° to 1472° F)
Resolution	1°C or F
Accuracy (K-type)	±0.3%, ±1°C or ±2°F
Draft/Pressure Measurement	
Selectable Ranges	mBar, kPa, and inH ₂ O
Ranges	-150 mBar to +150 mBar -15 kPa to +15 kPa -60 inH ₂ O to +60 in H ₂ O
Resolution	0.01mBar
Accuracy	±0/5% fsd

Instrument Specifications	
Operating Temperature Range	-10° to 50°C (14° to 122°F)
Battery	Rechargeable Ni-MH, >6 Hour Life
Charger Input Voltage	115V or 230V : 50/60 Hz AC
Fuels	Natural Gas, LPG, Light Oil, Heavy Oil
	OPT 1 = Bituminous Coal
	OPT 2 = Anthrachite Coal
	OPT 3 = Coke
	OPT 4 = Butane
	OPT 5 = Wood (Dry)
	OPT 6 = Bagasse
Display	Backlit LCD
Data Storage	50 sets of readings
Data Logging	400 sets of readings on 'Timed Interval Logging'
Time & Date	24 Hour Real Time Clock
Dimensions	200mm x 90mm x 60mm
Weight	500g
Exhaust	Safety Spigot
Conforms To:	BS7927 (and the draft BS7967)

Standard Accessories	
Flue Temperature Probe	A770
'K'-Type Temperature Air Probe	GK11M
In-Line Water Trap Bowl Filter Complete	A794
Mini Pump Protection Filter Assembly	A763
Battery Charger	A766
Protective Boot	A765
Soft Carrying Case	A768
Exhaust Spigot	A764

Optional Accessories:-

A773 - Oil Filter 

A788 - Smoke Test Pump 

CK21M - Temperature Pipe Clamps 

A767 - IRDA to RS232 Adaptor for PC 

A772 - PC Software

A746 - 10 Spare Paper Rolls for IR Printer

Plus Various 'K' Type Thermocouple Probe



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To learn about the entire line of TPI products visit:
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