

**Models 653T / 653L
Electronic temperature
transmitters**



ABB INSTRUMENTATION

The Company

ABB Instrumentation is an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The NAMAS Calibration Laboratory No. 0255(B) is just one of the ten flow calibration plants operated by the Company, and is indicative of ABB Instrumentation's dedication to quality and accuracy.

BS EN ISO 9001



St Neots, U.K. – Cert. No. Q5907
Stonehouse, U.K. – Cert. No. FM
21106

UNI EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A



Stonehouse, U.K. – Cert. No. 0255

Use of Instructions



Warning.

An instruction that draws attention to the risk of injury or death.



Note.

Clarification of an instruction or additional information.



Caution.

An instruction that draws attention to the risk of damage to the product, process or surroundings.



Information.

Further reference for more detailed information or technical details.

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it must be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process system performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of Technical Communications Department, ABB Instrumentation.

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

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1 GENERAL DESCRIPTION

Model 653T is a field mounted temperature transmitter with microprocessor based electronics.

The output signal is 4-20 mA.

It is designed to measure signals from thermocouples, resistance thermometers, or e.m.f. (mV) sources.

Model 653L only accepts linear resistance input and resistance thermometer.

The temperature transmitters are available either as a compact version without temperature sensor and with standard configuration, or in a version with integrally mounted temperature sensor and specific configuration and calibration.

The electronics use non-volatile memory; additional security is given by up/down scale procedure under sensor anomalies.

2 TRANSPORT, HANDLING AND PRODUCT IDENTIFICATION

TRANSPORT

After final calibration, the instrument is packed in a carton (*) intended to provide protection from physical damage.

(*) Type 2 to ANSI/ASME N45.2.2-1978

STORAGE

The instrument does not require any special treatment if stored as despatched and within the specified ambient conditions level. There is no limit to the storage period, although the terms of guarantee remain as agreed with the Company and as given in the order acknowledgement.

HANDLING

The instrument does not require any special precautions during handling although normal good practice should be observed.

PRODUCT IDENTIFICATION

The instrument is identified by the data plates shown in the figure 1.

The Nameplate (ref. A) provides information concerning the code number, input source, power supply and output signal.

The Serial Number plate (ref. B) shows the transmitter serial number. Please refer to this number when making enquiries.

Two other plates are optionally supplied:

A wired-on type, providing the customer tag number and calibrated range.

A Safety Marking plate (ref. C) fitted when the transmitter is required to comply with hazardous area regulations e.g. flameproof or intrinsic safety protection.

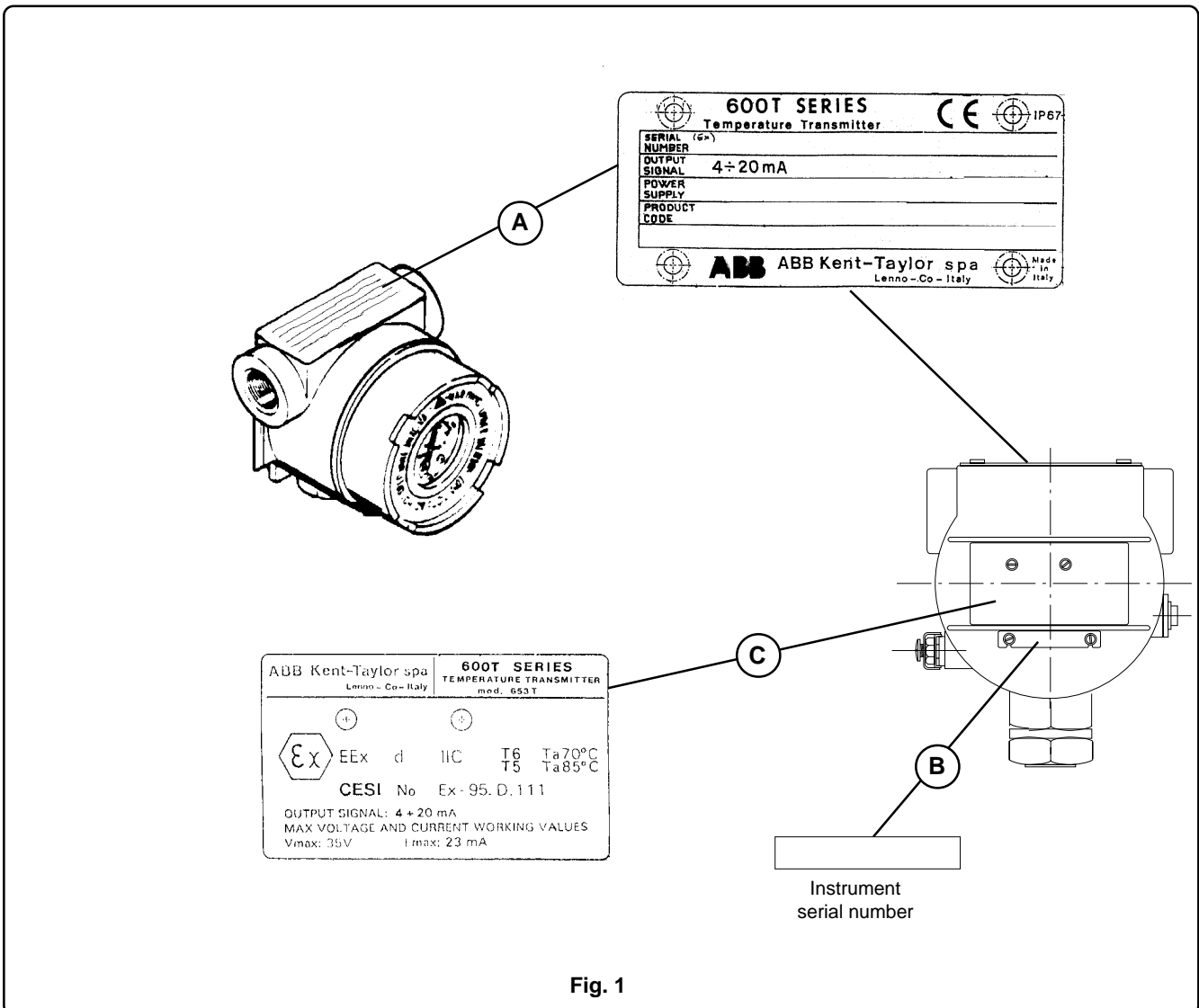


Fig. 1



Important. The instrument serial number must always be quoted when making enquiries.

3 PRINCIPLE OF OPERATION

The instrument consists of housing containing the electronic unit including the terminal block for connecting the input signal (from thermocouple, thermoresistance, etc), the supply/output (4-20 mA) and the output meter (optional). The transmitter may be supplied with or without integral sensor, appropriately fitted to the housing.

The signal from the sensor is connected to the input circuit which automatically provides appropriate amplification for the type of sensor selected, burn out protection (up scale/down scale according to the selection) and cold junction compensation (for the THC).

Galvanic separation is provided between the input circuitry and the output to guarantee proper immunity from ground loops. The main electronic circuit includes the microprocessor with its auxiliary timing/clock circuits and PROM, the characterization EEPROM, the D/A converter and the output stage 4 ± 20 mA.

Modifiable data like the calibration and, generally speaking, all the data that can be changed by the user through the configurator devices are stored in a non volatile memory.

These parameters are processed by the microprocessor using a suitable algorithm to provide an accurate input/output relationship with temperature compensation.

Using the configuration devices it is possible to remotely modify the configuration of the transmitter including the measuring range (see below for connection). It is also possible to read other transmitter data and diagnostic information.

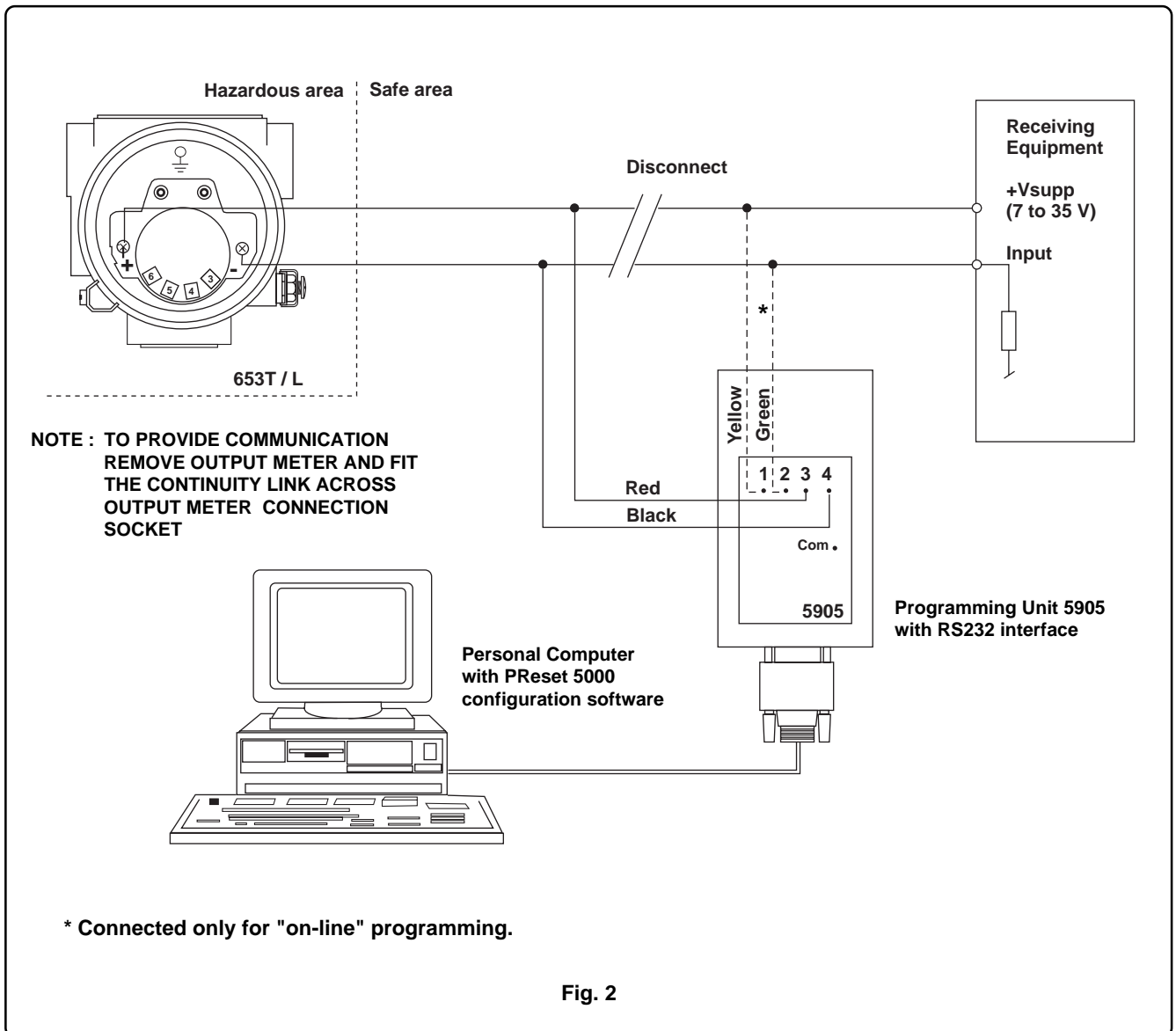


Fig. 2

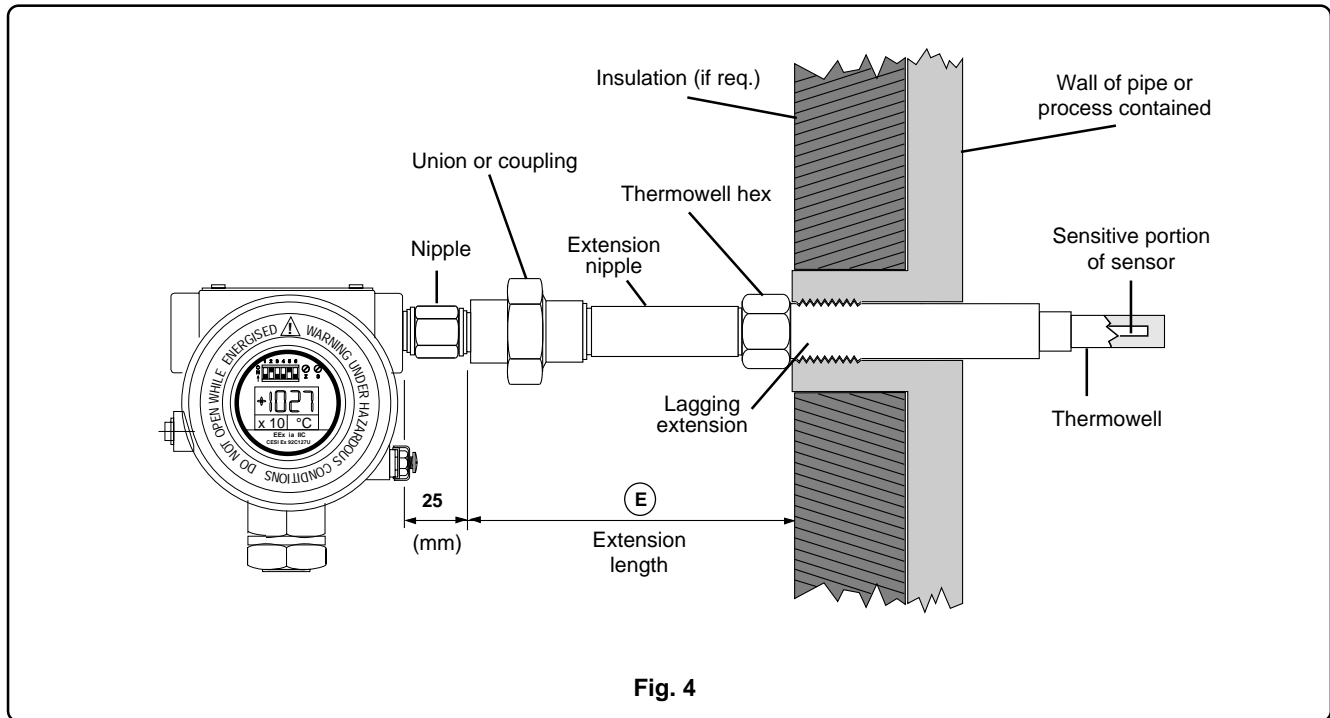
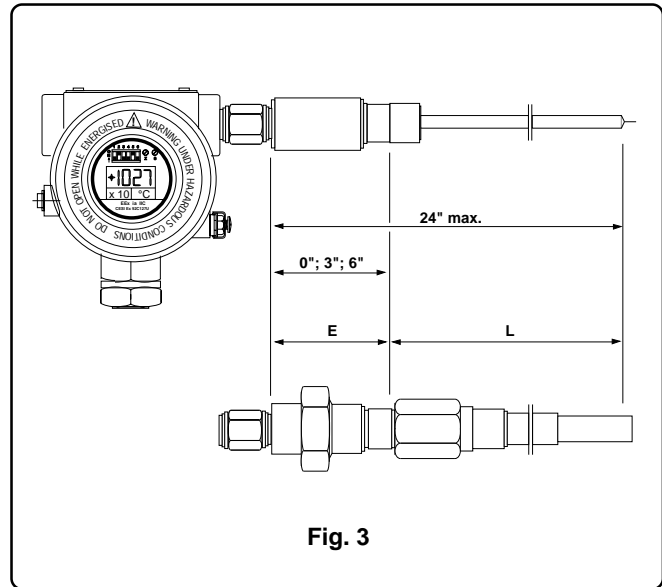
4 INSTALLATION

Electrical temperature sensors such as RTDs and thermocouples produce low-level signals proportional to the temperature. The Models 653T / L Temperature Transmitters convert the low-level sensor signal into a standard 4-20 mA dc signal that is relatively insensitive to lead length and electrical noise. This current signal is then transmitted to the control room via two wires.

Figures 3 and 4 show recommended mounting for complete transmitter and sensor assemblies.

These mechanical and electrical installation considerations are intended to serve as guidelines for preparing the site and selecting transmitter options. Actual installation procedures are provided under Mechanical Installation and Electrical Installation later in this section.

The transmitter can be attached directly to the sensor as shown in Fig. 4. An optional mounting bracket (see Fig. 6 and 7) permits the transmitter to be mounted remotely from the sensors, either on a flat surface or attached to a 50 mm (2") pipe.



Mounting stability is an important consideration. The transmitter, though rugged, may require separate support under high-vibration conditions, particularly if extensive thermowell lagging or long extension fittings are used. In such instances, pipe stand mounting using the optional mounting bracket is recommended.

The transmitter will operate within specifications for ambient temperatures in the range of -40 to $+85$ °C (-104 to $+185$ °F).

Ambient temperature variations, aside heat from the process is conducted from the thermowell to the transmitter housing. If the process temperature is near or beyond specification limits, thermowell lagging or an extension nipple should be used to isolate the transmitter from these high temperatures.



WARNING. Hazardous area installation

Ensure that the temperature of the transmitter and associated accessories does not exceed the values indicated on the Safety Marking Plate of the instrument, e.g., T6 (85°C) and T4 (135°C) according to the appropriate European Standards.

EXAMPLE:

Housing temperature rise for the installation illustrated is shown in Fig. 5.

Suppose the maximum ambient temperature is 40°C (104 °F) and the temperature to be measured is 540°C (1000 °F). The maximum allowable housing temperature rise is the rated specification limit (85°C) minus the existing ambient (40°C) it yields 45 K. As shown in Fig. 5, an "E" dimension of 3 inches (length recommended) will result in a housing temperature rise of 32 K; this would provide a safety factor of 13 K. A longer "E" dimension, such as 6 inches, would be desirable in order to reduce errors caused by transmitter temperature effect (rise 10 K only), although in that case, the transmitter may require extra support. Refer to the mounting information above. If a thermowell with lagging is used, the "E" dimension may be reduced by the length of the lagging.

The Models 653T and 653L Transmitters have been designed to resist attack by moisture and corrosives. O-ring seals protect the interior when the covers are installed. In humid environments, however, it is possible for moisture to accumulate in conduit lines.

Mount the transmitter at a high point in the conduit run, if possible. If the transmitter is mounted at a low point in the conduit run, the terminal compartments could fill with water. The transmitter should be mounted so that moisture from the conduits will not drain into the housing. In some instances a drain seal is advisable.

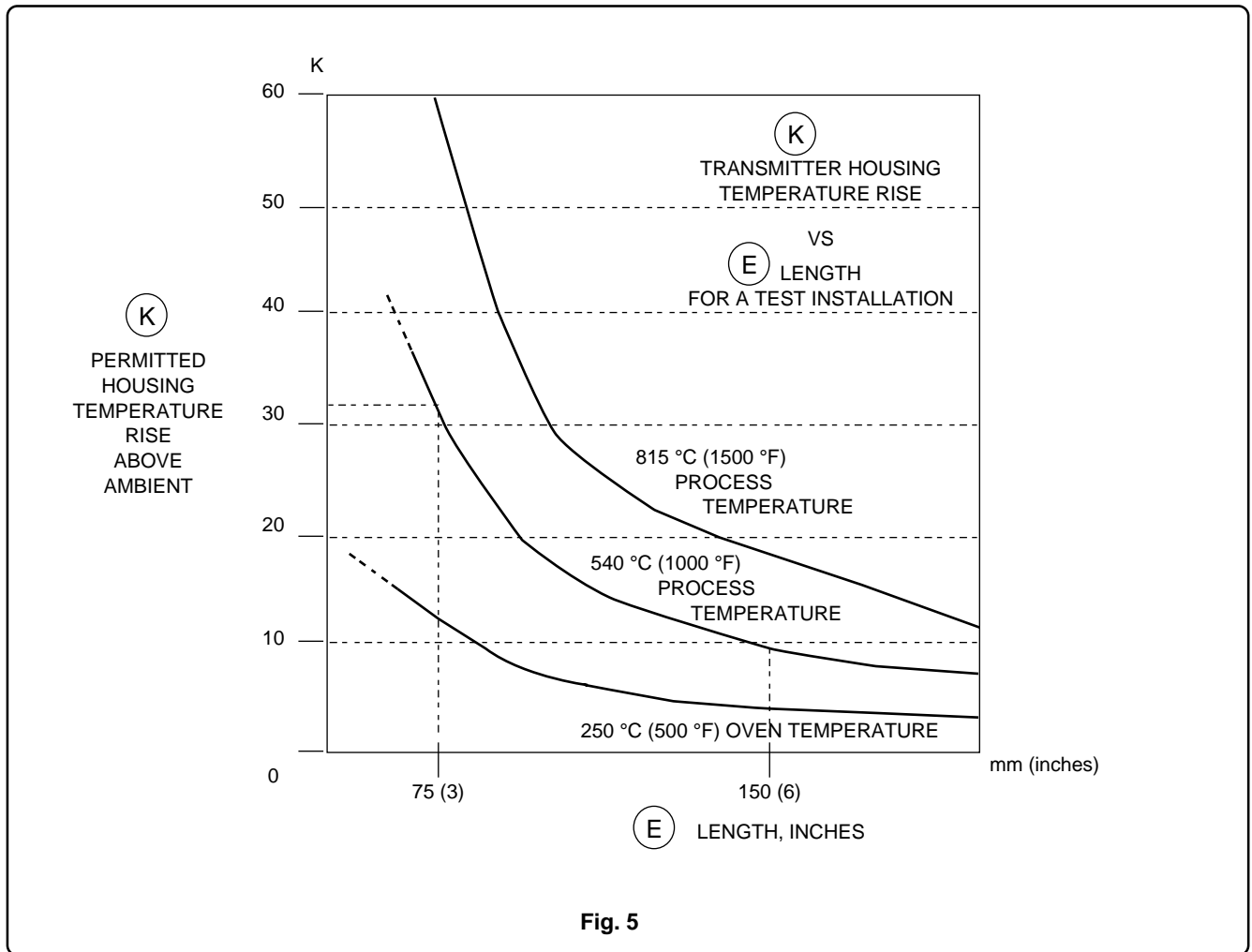


Fig. 5



WARNING. For installations in Hazardous Areas, i.e. areas with danger of fire or explosion, irrespective of the protection mode used, the installation must be carried out in accordance with local authority regulations.

5 ELECTRICAL CONNECTIONS

Two user connections are required: one to the remote sensor, the other to the signal line. Two connection ports, one for sensor the other for signal, are provided on the top of the housing, for cable glands or conduit fittings. The connection ports are protected by plastic plugs for transit purposes only.



WARNING - For Hazardous Location installations, at least five (5) threads on both conduit fittings and permanent proper metallic plug must be engaged in order for the transmitter to meet flameproof (explosion-proof) requirements.

If connections are made through one port only, the other must be stopped by a proper metallic plug to ensure the environmental protection degree and satisfy hazardous area regulations.

- Remote sensor connection

This connection can be accomplished by removing the cover. To ensure proper cable gland sealing use a single multi-core cable. The cores must be a maximum of 1.5 mm dia (16 AWG) each. Make the connections as indicated in fig. 8.



NOTE : for field strength applications over 10 V/m it is highly recommended to route the cable through solid conduit to retain EMI/RFI protection.



CAUTION Unless absolutely necessary, avoid the removal on site of the cover which gives access to the electronic circuitry. Although the electronics is fully tropicalized it should not be subjected to humidity for long periods.

- Signal connection

This connection can be accomplished by removing the cover. Make the connections to the terminal block as indicated in fig. 8. The internal output meter, when required, can be mounted simply by plugging it into the appropriate socket after the removal of the short circuit link.



WARNING - For installation in Hazardous Areas, i.e. areas with danger of fire and/or explosion, prior to making electrical connections, ensure compliance with safety information on the safety marking plate. Failure to comply with this warning can result in fire or explosion.

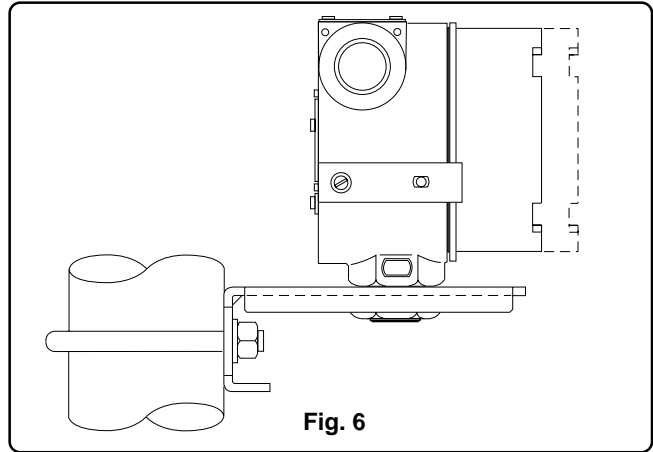


Fig. 6

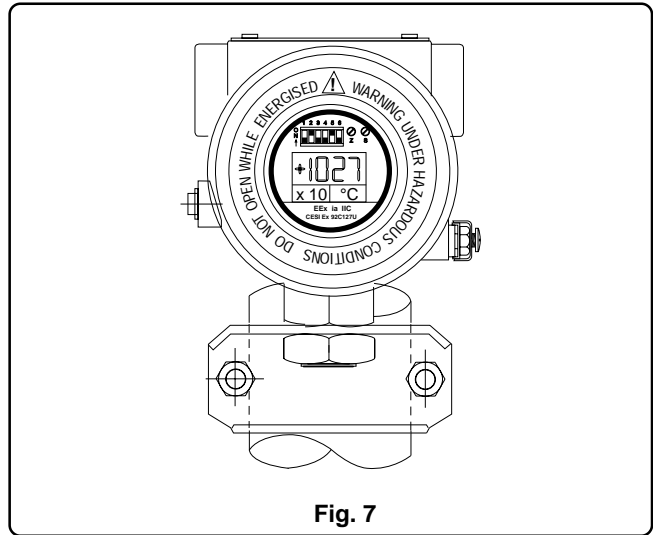


Fig. 7

The power to the transmitter is supplied over the signal wiring and no additional wiring is required. The signal wiring does not need to be shielded but the use of a twisted pair is highly recommended. Do not run the signal wiring in close proximity of power cable or high power equipment: use dedicated conduits or trays for signal wiring. Signal wiring may be ungrounded (floating) or grounded at any place in the signal loop. For intrinsically safe applications the wiring and grounding must follow the specific rules for this technique. The transmitter case may be grounded or ungrounded.

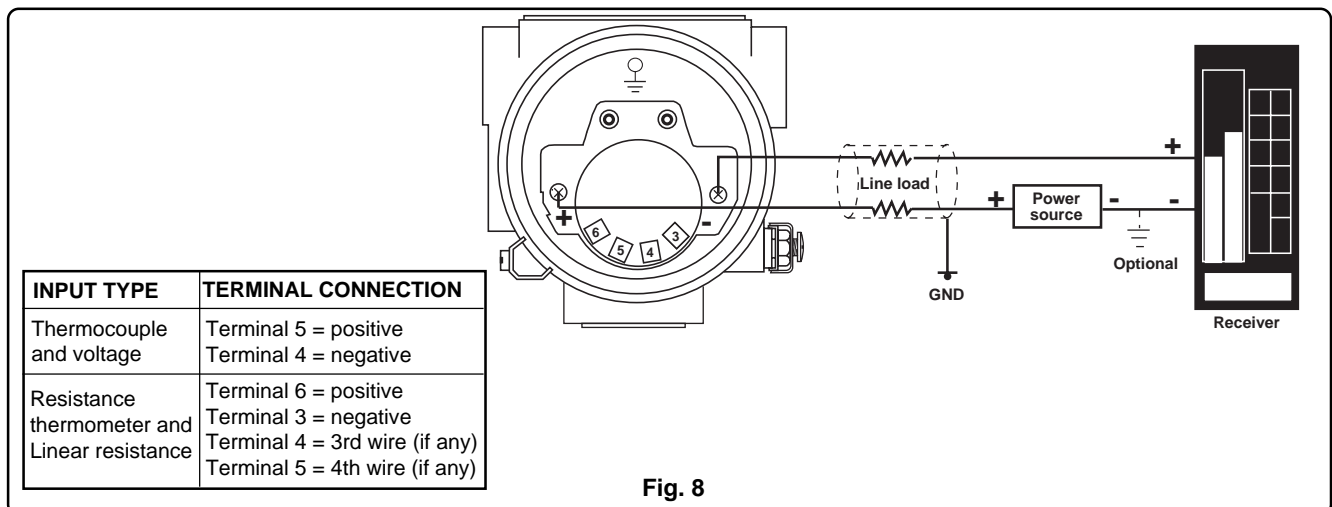
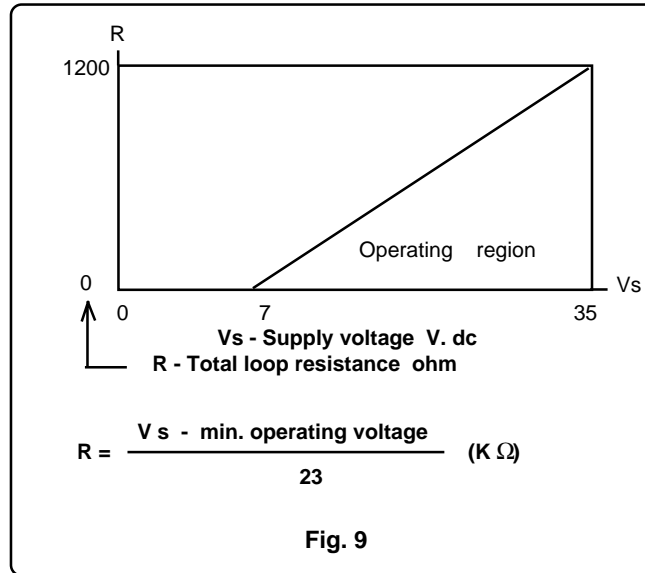


Fig. 8

6 ELECTRICAL REQUIREMENTS

The transmitter operates on a minimum voltage of 7 Vdc to a maximum of 35 Vdc and is protected against polarity inversion. The minimum voltage increases to 9 V dc when a digital LCD meter is fitted.

The total loop resistance, including optional remote indicator line (max 15 ohm), is indicated in the figure and expression below.



The total loop resistance is the sum of the resistance of all elements of the loop, including wiring, conditioning resistor, safety barriers and additional indicators (excluding the equivalent resistance of the transmitter).

7 CONFIGURATION AND CALIBRATION

"PReset 5000" is an easy to use, menu driven application software facilitating parameter setup and setup-file management for 653T/L temperature transmitter.

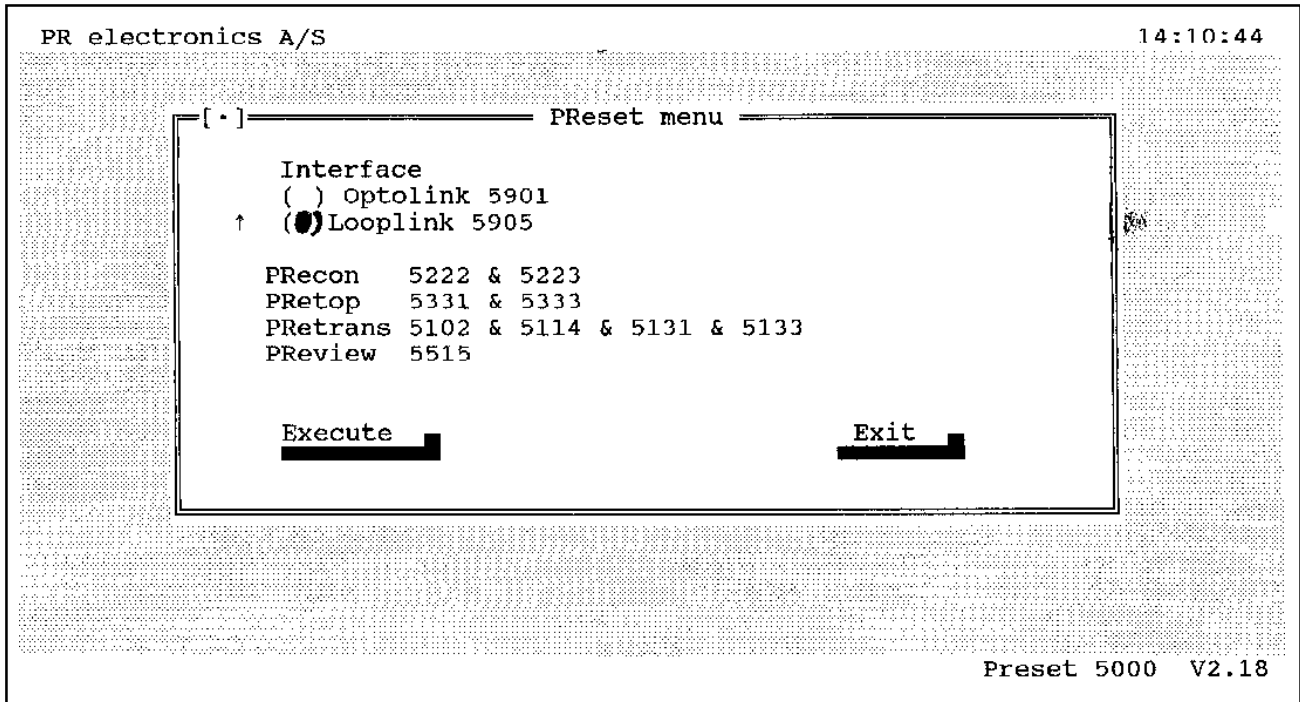
Preset enables storage and retrieval of setup files from disk or from 653T / 653L Units.

Printout of setup files including all parameters is available.

This manual is updated for PReset software version 2.18.

At start, the initial Menu displays two interface options; select Looplink 5905 (use up-down arrow) and press ENTER to proceed.

INITIAL PReset MENU



The software has been designed for use with several product, as in the product list.

Next, the program allows you to select 653T (Pretop 5331) or 653L (Pretop 5333), in a list of device, under the **Product Menu** selection (see below).

File	Product	Input	Output	SerialCom	Language	Option	14:11:18
Date	PREtrans	5102		ALT-1			
Seri	PREtrans	5114_1 (temperature)		ALT-2			
Tag	PREtrans	5114_2 (signal)		ALT-3			
	PREtrans	5131_1 (temperature)		ALT-4			
Anal	PREtrans	5131_2 (signal)		ALT-5		output	
	PREtrans	5133		ALT-6			
Inpu	PREcon	5222_1 (temperature)		ALT-7		type: 4.000...20.000 mA	
Inpu	PREcon	5222_2 (signal)		ALT-8		limits: No	
Conn	PREcon	5223		ALT-9		error: Upscale	
	PREtop	5331		ALT-0		sation: Yes	
	PREtop	5333		ALT-Q			
	PREview	5515_1 (temperature)					
Resp	PREview	5515_2 (signal)					

8 INTRODUCTION TO PRESET

8.1 System requirements

The PReset 5000 software is based on Turbo Vision, which will operate on most IBM-compatible PCs with the following configuration:

Memory:	min. 512 kB accessible memory
Display:	CGA, HCG, EGA, or VGA
Operating system:	DOS 3.1 or later versions
Printer (option):	Epson or IBM compatible ASCII printer
Mouse (option):	Microsoft compatible mouse (MOUSE.COM)

8.2 Installation

PReset is loaded from the enclosed diskette.

The diskette contains the following files:

READ.ME	Latest changes
*.EXE	PReset system
*.INI	PReset initializing file (saves first time PReset is Exit)
*.TXT	PReset languages files
*.HLP	PReset help files

Always remember to create a working copy of the PReset diskette before installation starts. Please consult your DOS-manual for copying procedure.

PReset may be operated directly from the working copy diskette by following this procedure:

Insert the diskette in the A-drive and enter the following:

```
A: <Enter>
PRESET <Enter> for color display, PRESET /MC <Enter> for monochrome display and PRESET
/BW <Enter> for black and white display
```

It is however advisable to run the PReset from your harddisk. Use the following procedure to install PReset on your harddisk: Insert the diskette in the A-drive and enter the following:

```
C: <Enter>
CD\ <Enter>
MD PRESET <Enter>
CD PRESET <Enter>
COPY A:\*. * <Enter>
PRESET <Enter> for a color display, PRESET /MC <Enter> for monochrome display and
PRESET /BW <Enter> for black and white display
```

Call PReset by entering the following:

```
C: <Enter>
CD\PRESET <Enter>
PRESET <Enter> for a color display, PRESET /MC <Enter> for monochrome display and
PRESET /BW <Enter> for black and white display
```

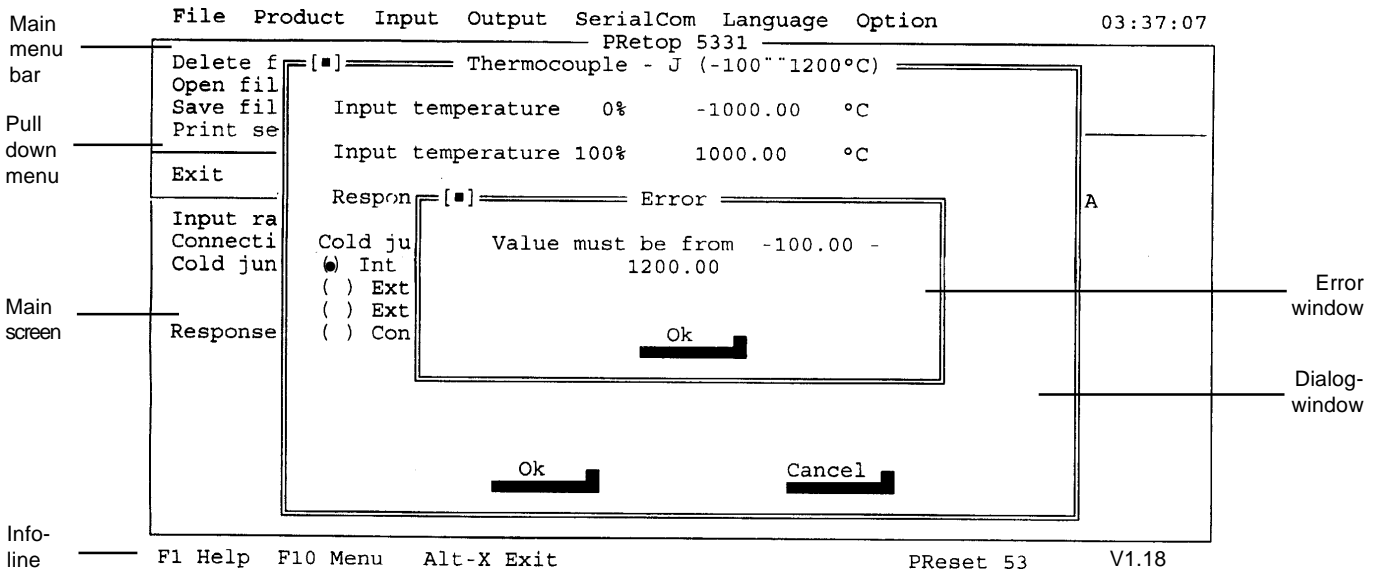
For easy access the above procedure may be included in a batch-file - please consult your DOS manual!

ON LINE help is available from all the dialogue windows and all pull-down menus, without opening a dialogue window. Sometimes in the pull-down menus it is necessary when using the mouse to use the <> and <F1> keys to get the help information.

.... 8 INTRODUCTION TO PRESET

8.3 The PReset menu

To understand PReset, the illustration below may be useful:



The upper **menu bar** contains the **main menu**. Selecting a submenu causes the corresponding **pull-down menu** to appear.

Selecting a parameter from a pull-down menu often calls for a **dialog window** presenting additional information.

Entering non valid data causes an **Error window** to appear.

The **Info line** in the bottom of the screen contains helpful information like e.g.: Alt-X Exit.

When not covered by pull-down windows, dialog windows or error windows the main screen will contain transmitter data as shown below:

EXAMPLE FOR PResetop 5331 (653T)

File	Product	Input	Output	SerialCom	Language	Option	
				PResetop	5331		14:49:46
Date:							1997-02-05
Serial no.:							960394167
Tag no.:							
Analog input				Analog output			
Input type:		Pt100 DIN/IEC		Output type:			4.000...20.000 mA
Input range:		0.00...150.00 °C		Output limits:			3.800...20.500 mA
Connection:		3-wire		Sensor error:			Upscale
Cold junction comp:		-----		Linearisation:			Yes
Cable compensation:		-----					
CJC range:		-----					
Response time:		1.00 sec					
F1 Help	F10 Menu	Alt-X Exit		PReset 53	V1.18		

EXAMPLE FOR PRetop 5333 (653L)

```
File Product Input Output SerialCom Language Option 14:50:38
                PRetop 5333
```

Date:	1996-10-31		
Serial no.:	960333126		
Tag no.:			
Analog input		Analog output	
Input type:	Pt100 DIN/IEC	Output type:	4.000...20.000 mA
Input range:	0.00...150.00 °C	Output limits:	No
Connection:	3-wire	Sensor error:	Upscale
		Linearisation:	Yes
Response time:	0.310 sec		

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

8.4 Navigating in PRreset

There are several ways to move around in the PRreset environment. For the inexperienced user a combination of the arrow keys and the Enter and Escape keys is recommended, whereas the experienced user will benefit from using the single letter commands, the hot-keys and, particularly, a mouse.

All four methods will be illustrated in the following example, but for the rest of the manual only the Arrow-Enter-Escape combination will be shown.

To select the English language option from the main status screen use one of the following methods:

- 1) Arrow keys
 - Press F10 to get to the menu bar
 - Move to the Language menu using the ← → arrows
 - Press Enter to activate the pull-down menu
 - Move to English using the ↑ ↓ arrow keys
 - Press Enter to activate the English language
- 2) Single letter commands
 - Press Alt-L to open the language pull-down menu
 - Press E to activate the English language
- 3) Hot keys
 - Press Shift-F3 to activate the English language
- 4) Mouse
 - Click Language to open the language pull-down menu
 - Click English to activate the English language

A list of available hot keys is shown in appendix A.

9 MENU BAR

All pull-down menus are listed in the menu bar in the top of the screen.

Pressing "F10" will indicate cursor position in the menu bar.

Move the cursor to the desired function by operating "← →".

Open the pull-down menu by pressing CR.

The cursor is moved to a function within the pull-down menu by operating "↑ ↓".

Main menu function may also be changed when the cursor is positioned in a pull-down menu by operating "← →".

Return to the menu bar by executing one of the functions in the pull-down menu and press "F10" again. To remove a pull-down menu press "Escape".

9.1 "File" : Operations on a file

9.1.1 Delete - delete a specific setup file from disk

Move the cursor to "Delete" and press CR.

The dialog window "Delete a file" will appear.

Use "Tab" to select from menu options and press CR

"Name" enters file name to be deleted or enters new directory name to change directory.

"Files" lists files of the current directory.

Select file by operating "↑ ↓" and press CR.

"OK" deletes the file specified.

"Cancel" returns to the main screen.

9.1.2 Open - retrieve a specific setup file from disk.

Move the cursor to "Open" and press CR.

The dialog window "Open a file" will appear.

Use "TAB" to select from menu options and press CR.

"Name" enters file name to be retrieved or enters new directory name to change directory.

"Files" lists files of the current directory.

Select file by operating "↑ ↓" and press CR.

"Open" opens the file specified.

The main screen is updated.

"Cancel" returns to the main screen.

9.1.3 Save - store current setup file.

Move the cursor to "Save" and press CR. The dialog window "Save a file" will appear.

Use "TAB" to select from menu options and press CR.

"Name" Enters file name to be stored or enters new directory name to change directory.

"Files" lists files of the current directory.

Select file by operating " ↑ ↓ " and press CR.

"OK" Stores the current file and returns to main screen.

"Cancel" Returns to main menu.

9.1.4 Print setup - printout of all parameters in the current file.

4 lines of 35 characters can be added to the printout. (e.g. an extended description of the unit function)

Move the cursor to "Print Setup" and press CR.

Use "TAB" to select menu options and to shift through text lines.

"CR" Selects the menu option.

"Print" Printouts to printer an return to main menu (see PRINT example)

"Files" Saves parameters and additional text in a .txt file

"Delete" Deletes text in text window.

"Cancel" Returns to the main screen.

9.1.5 Exit - return to DOS.

File	Product	Input	Output	SerialCom	Language	Option	16:06:12
				PRetop	5331		
Delete file		F2	1998-03-09				
Open file		F3	970249617				
Save file		F4					
Print setup		F5					
Exit		Alt-X	Analog output				
Input range:			Pt100 DIN/IEC	Output type:		4.000...20.000 mA	
Connection:			0.00...150.00 °C	Output limits:		No	
Cold junction comp:			3-wire	Sensor error:		Upscale	
Cable compensation:			-----	Linearisation:		Yes	
CJC range:			-----				
Response time:			1.00 sec				

F1 Help F10 Menu Alt-X Exit PRetop 53 V1.18

... 9 MENU BAR

File Product Input Output SerialCom Language Option 16:07:26

PRetop 5331

Date: 1998-03-09
Serial no.:
Tag no.:

Analog input

Input type:
Input range:
Connection:
Cold junction
Cable compens
CJC range:
Response time

[.] Open a file

Name
*.TOP

Files
TAG01.TOP
TAG02.TOP
TAG03.TOP
..\

Open
Cancel

00...20.000 mA
cale

C:\PRESET*.TOP
TAG01.TOP 534 Mar 9, 1998 16:06

F1 Help F10 Menu Alt-X Exit

PRetop 53 V1.18

File Product Input Output SerialCom Language Option 16:09:09

PRetop 5331

Date: 1998-03-09
Serial no.: 970249617
Tag no.:

Analog input

Input type:
Input range:
Connection:
Cold junction
Cable compens
CJC range:
Response time

Analog output

[.] Printer report text

Comment
Printer report text

Print Files Delete Cancel

0...20.000 mA
ale

F1 Help F10 Menu Alt-X Exit

PRetop 53 V1.18

PRINT EXAMPLE

```

P R e t o p      5 3 3 1

Date:                1998-03-09
Serial no.:          970249617
Tag no.:

Analog input:

                                Pt100 DIN/IEC
                                0.00... 150.00 °C
Connection:
Cold junction comp:  -----
Cable compensation:  -----
CJC range:           -----
Response time:      1.00 sec

Analog output:

                                Current
                                4.0000...20.0000 mA
Output limits:      3.5000...23.0000 mA
Sensor error:      Upscale
Linearisation:      Yes

Comment:

Printer report text

```

9.2 "Product" : Select product type

PRetop 5331 type is available for 653T
 PRetop 5333 type is available for 653L

9.3 "Input" : Select analog input

The pull-down window contains a list of all available input types, which can be handled by the transmitter.

The input types are grouped as follows;

1. Thermocouple. (Only for 653T)
2. Pt100 and Ni100 sensor.
3. Linear resistor.
4. Voltage input (V). (Only for 653T)

Move the cursor to the desired input type by operating the "↑↓" and press CR. The corresponding dialog window will appear.

Use the "TAB" key to get access to the individual parameters in the dialog window.

The cursor highlights the current parameter which may be changed.

Certain parameters contains a list of options. Move the cursor to the desired option by operating the "↑↓" and press "TAB". Move the cursor to "OK" and press CR to accept the total input setup.

In case that an input parameter is out of range an error window will appear to inform of the limits of the current input type.

Certain parameters will cause additional dialog windows to appear on the screen. Move the cursor by operating the "TAB" key and press CR.

...9 MENU BAR

File	Product	Input	Output	SerialCom	Language	Option	16:24:30
Date:		Thermocouple - B		Alt-B			
Serial no.:		Thermocouple - E		Alt-E			
Tag no.:		Thermocouple - J		Alt-J			
Analog input		Thermocouple - K		Alt-K			
Input type:		Thermocouple - L		Alt-L		og output	
Input range:		Thermocouple - N		Alt-N		ut type:	4.000...20.000 mA
Connection:		Thermocouple - R		Alt-R		ut limits:	3.800...20.500 mA
Cold junction		Thermocouple - S		Alt-S		or error:	Upscale
Cable compens		Thermocouple - T		Alt-T		arisation:	Yes
CJC range:		Thermocouple - U		Alt-U			
Response time		Thermocouple - W3		Alt-W			
		Thermocouple - W5		Alt-W			
		Pt 100 (DIN/IEC)		Alt-C			
		Ni 100		Alt-A			
		Linear resistor		Alt-Z			
		Voltage input		Alt-V			

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

9.3.1 Thermocouple input

Move the cursor to the desired TC by operating the "↑↓" and press CR.

Enter Input temperature - 0%

Enter Input temperature - 100%

Response time :

Enter Response time in seconds.

Cold junction comp.:

"Int. CJC/" Select Internal CJC/ when the CJC terminal with a built-in Pt100 sensor is connected to the transmitter.

"Ext. CJC/Pt100" Select External CJC/Pt100 when the cold junction is placed remotely from the transmitter. A Pt100 sensor is placed at the cold junction.

"Ext. CJC/Ni100" Select External CJC/Ni100 when the cold junction is placed remotely from the transmitter. A Ni100 sensor is placed at the cold junction.

"Constant CJC" Select constant CJC for fixed temperature at the cold junction. This option will release an additional dialog Line "Constant CJC". Enter the cold junction temperature.

File	Product	Input	Output	SerialCom	Language	Option	16:25:08
Date:		[.]	Thermocouple - J		PRetop	5331	
Serial n		Input temperature	0%	0.00		°C	
Tag no.:		Input temperature	100%	150.00		°C	
Analog i		Response time:		1.0		sec	
Input ty		Cold junction comp.					0.000 mA
Input ra		(●) Int. CJC					0.500 mA
Connecti		() Ext. CJC / Pt100					
Cold jun		() Ext. CJC / Ni100					
Cable co		() Constant CJC					
CJC rang		CJC range					
Response		() Specify					
		(●) -40°C..135°C					
		() -20°C..60 °C					
		() 0°C..40 °C					
		Ok					
		Cancel					

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

File	Product	Input	Output	SerialCom	Language	Option	16:28:08
Date:	[.]	PRetop 5331 Thermocouple - J (-100...1200°C)					
Serial n		Input temperature	0%	-1000.00	°C		
Tag no.:		Input temperature	100%	1000.00	°C		
Analog i		Response	[.]	Error		A	
Input ty		Cold ju		Value must be from -100.00 -			
Input ra		(*) Int		1200.00			
Connecti		() Ext		Ok			
Cold jun		() Ext		Ok			
Cable comp		() Ext		Cancel			
CJC range		() Con		Ok			
Response				Cancel			

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

9.3.2 Pt100 and Ni100 input

Select desired RTD-sensor

Enter Input temperature - 0%

Enter Input temperature - 100%

Response time :

Enter Response time in seconds

Connection :

"2-wire system" 2-wire cable is connected.

"3-wire system" 3-wire cable is connected. Automatic cable compensation is performed.

"4-wire system" 4-wire cable is connected. Automatic cable compensation is performed ((Only for 653T)

Pt100 selection for 653L

File	Product	Input	Output	SerialCom	Language	Option	16:42:58
Date:	[.]	PRetop 5333 Pt 100 (DIN/IEC) (-200...850 °C)					
Serial n		Input temperature	0%	0.00	°C		
Tag no.:		Input temperature	100%	150.00	°C		
Analog i		Response time:		0.310	sec	0.000 mA	
Input ty		Number of Rtd's in series					
Input ra		(*) 1					
Connecti		() 10					
		() Specify					
Response		Ok					
		Cancel					

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

... 9 MENU BAR

Pt100 selection for 653T

File	Product	Input	Output	SerialCom	Language	Option	
Date:	[.]	Pt 100	(DIN/IEC)	(-200...850	°C)		16:43:31
Serial n		Input temperature	0%	0.00	°C		
Tag no.:		Input temperature	100%	150.00	°C		
Analog i		Response time:		1.0	sec		
Input ty		Connection:		Number of Rtd's in series			0.000 mA
Input ra		() 2-wire system		<input checked="" type="radio"/> 1			0.500 mA
Connecti		<input checked="" type="radio"/> 3-wire system		() 10			
Cold jun		() 4-wire system		() Specify			
Cable co							
CJC rang							
Response							

Ok Cancel

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

9.3.3 Linear resistor

Specify input resistance.

Enter Input resistance - 0%

Enter Input resistance - 100%

Response time :

Enter Response time in seconds.

Custom-defined linearization :

"Yes", See section 9, chapter 9.7.7

"No", Output is resistance linear.

Connection :

"2-wire system" 2-wire cable is connected.

"3-wire system" 3-wire cable is connected. Automatic cable compensation is performed.

"4-wire system" 4-wire cable is connected. Automatic cable compensation is performed (Only for 653T)

9.3.4 Voltage input (Only for 653T)

Response time :

Enter Response time in seconds.

Voltage input:

"Specify" Enter any voltage input range not listed in the standard ranges. This option releases an additional dialog window

"Voltage input" :

Enter Input voltage - 0%

Enter Input voltage - 100%

Input voltage must be within 0 to 100 mV limits.

Custom-defined linearization :

"Yes" See section 9, chapter 9.7.7

"No" Output is voltage linear.

```

File Product Input Output SerialCom Language Option
PRetop 5331
Date: 1998-03-09
Serial no.:
Tag no.: 970249617

Analog input [■] Voltage input
Input type: Input voltage 0% 0.00 mV - 20mA scale
Input range: Input voltage 100% 100.00 mV
Connection:
Cold junction
Cable compensat Response time: 1.0 sec
CJC range:
Response time Custom defined lin. ( ) Yes
(•) No

Ok Cancel
    
```

F1 Help F10 Menu Alt-X Exit PRreset 53 V1.18

9.4 "Output" Select output for sensor error

Using this option it is possible to specify the transmitter output and to drive the reaction of analog output in case of sensor error detection.

```

File Product Input Output SerialCom Language Option
Current output
Date:
Seri
Tag
Anal
Input
Input
Conn
Cold
Cabl
CJC
Resp
Output limits:
( ) Specify
(•) 4-20 mA
( ) 20-4 mA
( ) Fixed output
Low limit: 3.8 mA
High limit: 20.5 mA
Sensor error:
( ) Specify
( ) Namur NE43 upscale
( ) Namur NE43 downscale
(•) Upscale
( ) Downscale
( ) Off
Error value: > 23.0 mA

Ok Cancel
    
```

F1 Help F10 Menu Alt-X Exit PRreset 53 V1.18

9.5 "Serialcom" : Transmit, receive or Monitor data

1. Receive - enables configuration data to be retrieved from a transmitter to the PC for review and editing.
2. Transmit - enables configuration data to be transmitted from the PC to the transmitter.
3. Monitor - enables to continuously monitor the analog output signal.

Select option, move the cursor and press CR.

If communication is not successful an error message will appear.

...9 MENU BAR

File	Product	Input	Output	SerialCom	Language	Option	17:18:13
Date:		1997-10		Receive	Ctrl-F1		
Serial no.:		9604590		Transmit	Ctrl-F2		
Tag no.:				Monitor	Ctrl-F3		
Analog input				Analog output			
Input type:		Pt100 DIN/IEC		Output type:		4.000...20.000 mA	
Input range:		0.00...150.00 °C		Output limits:		No	
Connection:		3-wire		Sensor error:		Upscale	
				Linearisation:		Yes	
Response time:		1.000 sec					

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

MONITOR OPTION

File	Product	Input	Output	SerialCom	Language	Option	17:17:49	
				PRetop	5333			
Dat	[.]	Monitor						
Ser		Analog input		54.551 °C				
Tag		Analog output		9.819 mA				
Ana								
Inp								
Inp								
Con								
Res								
		0	10	20	30	40	50	
		60	70	80	90	100%		
		4.000				20.000 mA		
		Input range:		0.000... 150.000 °C				
				Cancel				

F1 Help F10 Menu Alt-X Exit

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TRANSMIT OPTION

File	Product	Input	Output	SerialCom	Language	Option	17:22:16	
				PRetop	5331			
Date:		1997-02-05						
Serial no.:		960394167						
Tag no.:								
Analog input				Analog output				
Input type:						4.000...20.000 mA		
Input range:						3.800...20.500 mA		
Connection:						Upscale		
Cold junction comp						Yes		
Cable compensation								
CJC range:								
Response time:								
		Warning						
		Overwrite product setup?						
				Ok		Cancel		

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

9.6 "Language" Select language

The following languages are available:

1. Dansk all texts will be Danish
2. Deutsch all texts will be German
3. English all texts will be English
4. Español all texts will be Spanish
5. Français all texts will be in French
6. Nederlands all texts will be in Dutch
7. Suomi all texts will be in Finnish
8. Svenska all texts will be in Swedish

Move the cursor to the desired language by operating the "↑↓" and press CR. The display will be updated accordingly.

File	Product	Input	Output	SerialCom	Language	Option	17:25:23
				PRetop	Dansk	Shift-F1	
Date:			1997-02-05		Deutsch	Shift-F2	
Serial no.:			960394167		English	Shift-F3	
Tag no.:					Español	Shift-F3	
Analog input					Français	Shift-F4	
Input type:			Pt100 DIN/IEC		Nederlands	Shift-F5	
Input range:			0.00...150.00 °C		Suomi	Shift-F6	..20.000 mA
Connection:			3-wire		Svenska	Shift-F7	..20.500 mA
Cold junction comp:			-----	Linearisation:	Yes		e
Cable compensation:			-----				
CJC range:			-----				
Response time:			1.00 sec				

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

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9.7 "Option" Select additional options in software

The pull down menu offers the following options:

1. Temperature units
2. Mains frequency (only for 653T)
3. Tag no.
4. Cable resistance (only for 653T)
5. Process calibration
6. Communication port
7. Linearisation
8. Change password
9. Computer
10. Comment

Move the cursor to the desired option by operating the " ↑ ↓ " keys and press CR.

Use the "TAB" key to get access to the parameters in the dialog window.
The current parameter is indicated by the highlighted cursor.

If the dialog window contains several options, select desired option by operating the " ↑ ↓ " keys and press "TAB". Move the cursor to "OK" and press CR to confirm setup.

File	Product	Input	Output	SerialCom	Language	Option	
				PRetop	5331		09:10:21
Date:			1997-02-05			Temperature Units	F7
Serial no.:			960394167			Mains frequency	F8
Tag no.:						Tag no.	F9
Analog input				Analo		Cable resistance	Ctrl-F7
Input type:		Voltage		Output		Process calibration	Ctrl-F8
Input range:		0.00... 50.00 mV		Output		Communication port	Ctrl-F9
Connection:		-----		Senso		Linearisation	Ctrl-F10
Cold junction comp:		-----		Linea		Change password	Ctrl-F6
Cable compensation:		-----				Computer	
CJC range:		-----				Comment	
Response time:		1.00 sec					

F1 Help F10 Menu Alt-X Exit

PRreset 53 V1.18

9.7.1 Temperature Units: Enter temperature units.

Temperature unit :

Use one of the available temperature unit for your temperature measurement.

```

File Product Input Output SerialCom Language Option          09:11:10
----- PRetop 5331
Date:          1997-02-05
Serial no.:    960394167
Tag no.:
Analog input
Input type:
Input range:
Connection:
Cold junction comp
Cable compensation
CJC range:
Response time:
    
```

```

[*]----- Temperature Units -----
Temperature Units
(●) Celcius      [°C]
( ) Fahrenheit  [°F]
( ) Kelvin      [K]
( ) Rankine     [Ra]
( ) Réamur     [°R]
    
```

Ok
Cancel

```

    
```

0.000 mA
0.500 mA

```

F1 Help F10 Menu Alt-X Exit                               Preset 53 V1.18
    
```

9.7.2 Mains frequency: Enter Mains frequency

Use this menu to select the optimized frequency.

```

File Product Input Output SerialCom Language Option          09:22:36
----- PRetop 5331
Date:          1997-02-05
Serial no.:    960394167
Tag no.:
Analog input
Input type:
Input range:
Connection:
Cold junction comp
Cable compensation
CJC range:
Response time:
    
```

```

[*]----- Mains frequency -----
Mains frequency
(●) 50 Hz
( ) 60 Hz
    
```

Ok
Cancel

```

    
```

4.000...20.000 mA
3.800...20.500 mA
Upscale
No

```

F1 Help F10 Menu Alt-X Exit                               Preset 53 V1.18
    
```

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9.7.3 Tag no: Enter unit Tag number

Tag no:

The unit may be identified by tag numbering. The tag number including a maximum of 15 characters is displayed in the status window.

```
File Product Input Output SerialCom Language Option          09:12:15
                               PRetop  5331
Date:                          1997-02-05
Serial no.:                     960394167
Tag no.:
-----
Analog input                    Analog output
Input type:                     Tag no.
Input range:                    4.000...20.000 mA
Connection:                    3.800...20.500 mA
Cold junction comp             Upscale
Cable compensation             No
CJC range:
Response time:
                               Ok          Cancel
-----
F1.. Help  F10 Menu      Alt-X Exit          PReset 53  V1.18
```

9.7.4 Cable resistance : Measure the cable resistance

This function is used with 2-wire RTD connection, to measure the cable resistance.

The resistance is measured by short-circuiting the RTD sensor, while the measurement is made by the product. When the measurement is completed, the RTD-sensor is removed and the measured resistance is updated on the main screen. If the measured resistance is to be used, the main screen must be transmitted to the product with "transmit".

```
File Product Input Output SerialCom Language Option          09:23:31
                               PRetop  5331
Date:                          1997-02-05
Serial no.:                     960394167
Tag no.:
-----
Analog input                    Analog output
Input type:                     Cable resistance
Input range:                    4.000...20.000 mA
Connection:                    3.800...20.500 mA
Cold junction comp             Upscale
Cable compensation             Yes
CJC range:
Response time:
                               Ok          Cancel
-----
F1 Help  F10 Menu      Alt-X Exit          PReset 53  V1.18
```

9.7.5 Process calibration

This function is very useful when the analog output needs to be adjusted to the input signal, e.g. when the temperature sensor does not correspond to the ideal values for the selected temperature range. The results from this procedure depends on the accuracy of the equipment used for measuring the input/output signals. In the following a process calibration for temperature measurement is shown, however the principle can be used for all input types.

Setup: Input Pt100, 0 - 100% °C, Output 4 - 20 mA. Use a precision thermometer and ampere-meter to measure input/output values. Low value (Analog input x0) is measured at 10 °C corresponding (Analog output y0) 5.44 mA, high (Analog output x1) value is measured at 75 °C corresponding (Analog output y1) 16.15 mA.

Enter the measured values:

Low values

Analog input (x0) 10°C
 Analog output (y0) 5.44 mA

High values

Analog input (x1) 75°C
 Analog output (y1) 16.15 mA

The span is now changed accordingly from 0 - 100 °C to -1.26 - 101.72 °C.

"Transmit" the process calibrated setup to the unit, which is now calibrated according to the sensor characteristics.

```

File Product Input Output SerialCom Language Option          09:24:19
                                PRetop  5331
Date:                          1997-02-05
Serial no.:                     960394167
Tag no.:                         [=]
                                Process calibration
Analog input                    Analog input (x0)      0.0000 °C
Input type:                    Analog output (y0)     4.0000 mA
Input range:                   0...20.000 mA
Connection:                    Analog input (x1)     150.0000 °C
Cold junction                  Cable compens
CJC range:                    Analog output (y1)    20.0000 mA
Response time
                                Ok
                                Cancel
    
```

F1 Help F10 Menu Alt-X Exit Preset 53 V1.18

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9.7.6 Communication port: Select communication port

"Autodetect" Com port 1 or 2 is automatically selected

"Com1" Com port 1 is used for communication between PC and transmitter

"Com2" Com port 2 is used for communication between PC and transmitter

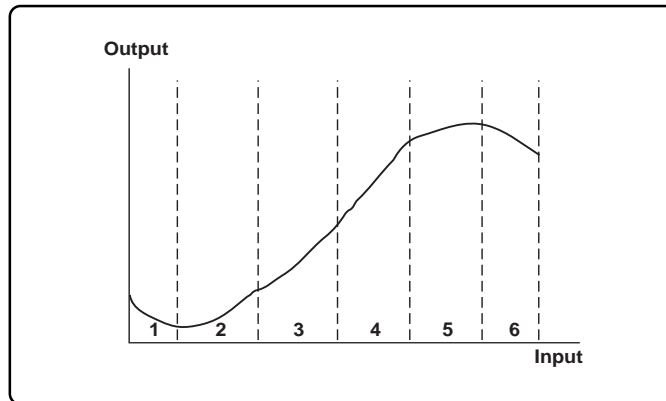
```
File Product Input Output SerialCom Language Option          09:24:45
                               PRetop  5331
Date:                          1997-02-05
Serial no.:                     960394167
Tag no.:
Analog input                    Analog output
Input type:                      [-]==== Communication port ===== 4.000...20.000 mA
Input range:                     Communication port 3.800...20.500 mA
Connection:                      ( ) AutoDetect Upscale
Cold junction comp               (●) Com1 Yes
Cable compensation               ( ) Com2
CJC range:
Response time:
                               Ok          Cancel
```

F1 Help F10 Menu Alt-X Exit PReset 53 V1.18

9.7.7 Linearisation

PRreset 5000 units facilitate custom defined linearization for the following input types: linear resistance and voltage input.

PRreset 5000 units operate on a polynomial fit principle. The programmed span is divided into 6 sections, each section is fitted by means of a third order polynomial, see figure.



PReset must calculate 4 coefficients a0, a1, a2 and a3 for all 6 sections including 5 section limits, indicating curve sections for 0-100% of the input span. This means that PReset must transfer all together 5 section limits and 24 coefficients to PReTrans or PReview. These calculations are rather cumbersome, thus PReset offers two alternative ways to enter data :

1. Linear interpolation : Enter start - and end points of up to 7 straight lines.
2. Polynomial : Enter from 24 to 60 coordinates from any curvature.
PReset will calculate a polynomial fit according to the least squares method.

For both alternative Xmin, Xmax, Ymin and Ymax must be included. Furthermore corresponding XY must be entered in the table.

Before coefficients are calculated all X and Y's are normalized to values between 0 and 1, according to the following equations:

$$X_{norm} = \frac{(X_n - X_{min})}{(X_{max} - X_{min})} \text{ and } Y_{norm} = \frac{(Y_n - Y_{min})}{(Y_{max} - Y_{min})}$$

***** **Note** : As linearization is carried out on a normalized basis, all scaling must be performed in PReset input, output or display dialog windows.

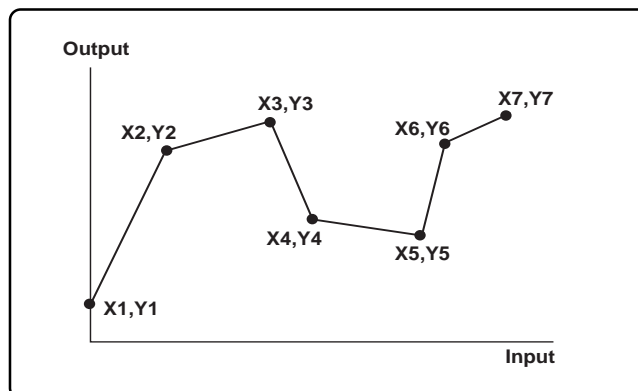
```

File Product Input Output SerialCom Language Option          09:25:20
                                PRetop  5331
Date:                          1997-02-05
Serial no.:                     960394167
Tag no.:
-----
Analog input                    Analog output
[ * ] ----- Linearisation -----
Input ty                        Custom-defined lin.      0.000 mA
Input ra                        (●) Linear Interpolation  0.500 mA
Connecti                        ( ) Polynomial
Cold jun                        ( ) No linearisation
Cable co
CJC rang
Response
                                Ok          Cancel
    
```

F1 Help F10 Menu Alt-X Exit PReset 53 V1.18

Linear interpolation

Enter from 2 to 7 corresponding sets of XY values, defining the start-/end points for 1 to 6 straight line, see figure.



***** **Note** : Highest and lowest input values (Xmax and Xmin) plus highest and lowest output values (Ymax and Ymin) must be among the entered values as linearization is scaled according to these values.

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From the entered values PReset calculates the coefficients a0 and a1, defining the equation of each straight line section.

$$Y = a_0 + a_1 * X \quad (a_0 = \text{Y-axis interception, } a_1 = \text{slope})$$

(Coefficient a2 = a3 = 0)

or

$$\text{Output}_{(0-1)} = a_0 + a_1 * \text{input}_{(0-1)}$$

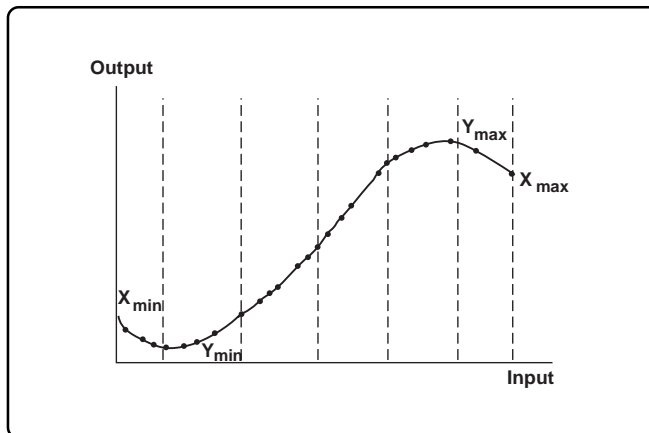
```
File Product Input Output SerialCom Language Option 01:45:26
[■]----- Linear Interpolation -----
X (Input)      Y (OutPut)      Total of XY
1.0000000     2.0000000           7
2.0000000     7.0000000
3.0000000     9.0000000
4.0000000    19.0000000      ( ) Clear XY
5.0000000    22.0000000      ( ) Delete file
6.0000000    22.0000000      (●) Open file
7.0000000     8.0000000      ( ) Save file
8.0000000    23.0000000      ( ) Calc. coef.
10.0000000   23.0000000

                Ok                Cancel

F1 Help  F10 Menu  Alt-X Exit                PReset 53  V1.18
```

Polynomial linearization

If the function has the shape of a curve, the polynomial linearization is the best choice. Enter from 24 to 60 corresponding sets of XY values from the curve, see figure.



***** **Note** : Highest and lowest input values (Xmax and Xmin) plus highest and lowest output values (Ymax and Ymin) must be among the entered values as linearization is scaled according to these values.

PRreset divides the curve into the 6 sections. To ensure the best possible fit, most XY-values should be entered in the sections where the function is most curved.

The coefficients for a 3. order polynomial are calculated for the 6 sections according to the least squares method. PRreset will adapt the coefficients, to minimize discrepancy from the entered values.

$$Y = a_0 + a_1 * X + a_2 * X^2 + a_3 * X^3$$

or: $Output_{(0-1)} = a_0 + a_1 * input_{(0-1)} + a_2 * input_{(0-1)}^2 + a_3 * input_{(0-1)}^3$

File	Product	Input	Output	SerialCom	Language	Option	01:55:23	
[■] Polynomial								
X	Y	X	Y	X	Y	X	Y	
0.2500▶	0.0000▶	0.6400▶	0.2041▶	2.5000▶	0.5000▶	17.500▶	0.9200▶	
0.3000▶	0.0396▶	0.6600▶	0.2108▶	2.7500▶	0.5200▶	20.000▶	0.9500▶	
0.3500▶	0.0731▶	0.7300▶	0.2327▶	3.0000▶	0.5400▶	20.950▶	0.9600▶	
0.3750▶	0.0880▶	0.7500▶	0.2400▶	3.2000▶	0.5536▶	22.500▶	0.9800▶	
0.4000▶	0.1020▶	0.7700▶	0.2443▶	3.5000▶	0.5700▶	25.000▶	1.0000▶	
0.4200▶	0.1126▶	0.8300▶	0.2606▶	4.0000▶	0.6000▶	0.0000▶	0.0000▶	
0.4500▶	0.1276▶	0.8700▶	0.2707▶	4.5000▶	0.6300▶	0.0000▶	0.0000▶	
0.4750▶	0.1394▶	0.9600▶	0.2921▶	5.0000▶	0.6500▶	0.0000▶	0.0000▶	
0.4900▶	0.1461▶	1.0000▶	0.3000▶	6.0000▶	0.6900▶	0.0000▶	0.0000▶	
0.5000▶	0.1500▶	1.2500▶	0.3500▶	7.0000▶	0.7200▶	0.0000▶	0.0000▶	
0.5200▶	0.1590▶	1.4000▶	0.3740▶	8.0000▶	0.7500▶	0.0000▶	0.0000▶	
0.5400▶	0.1672▶	1.5000▶	0.3900▶	9.0000▶	0.7800▶	0.0000▶	0.0000▶	
0.5600▶	0.1751▶	1.7500▶	0.4225▶	10.000▶	0.8000▶	0.0000▶	0.0000▶	
0.5800▶	0.1827▶	2.0000▶	0.4500▶	12.500▶	0.8500▶	0.0000▶	0.0000▶	
0.6200▶	0.1972▶	2.2500▶	0.4800▶	15.000▶	0.8900▶	0.0000▶	0.0000▶	
Total of XY		60						
				Ok		Cancel		
								() Clear XY
								() Delete file
								(●) Open file
								() Save file
								() Calc. coef.

F1 Help F10 Menu Alt-X Exit

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9.7.8 Change password : enable-disable password protection

It is possible to password protect the Preset 53 software configuration program against unauthorised transmitter configuration. When password protection is activated the user will be prompted for password before transmitting to the PR-unit. When correct password is given transmitting will be activated, and there will be no further restriction for the present program session. The password may be altered through the menu OPTION/CHANGE PASSWORD. To change an existing password the user will be prompted for:

- Entering the old password
- Entering the new password
- Re-entering the new password

Setting the password to our empty string will disable the password protection.

Password protection is by default disabled. When password protection is deactivated all functions in the configuration program will be available.

```
File Product Input Output SerialCom Language Option 09:28:05
PRetop 5331
Date: 1997-02-05
Serial no.:
Tag no.:
-----
Analog input
Input type:
Input range:
Connection:
Cold junction comp
Cable compensation
CJC range:
Response time: 1.00 sec
```

[-] Change password

Old password

[]

Ok Cancel

```
4.000...20.000 mA
3.800...20.500 mA
Upscale
Yes
```

F1 Help F10 Menu Alt-X Exit

PRetop 53 V1.18

9.7.9 Computer : select computer type

Computer:

Specify the type of the computer you are using for communication with the product.

```
File Product Input Output SerialCom Language Option
PRetop 5331
Date: 1997-02-05
Serial no.: 960394167
Tag no.:
-----
Analog input
Input type:
Input range:
Connection:
Cold junction comp
Cable compensation
CJC range:
Response time:
```

[*] Computer

Computer:

() Fast 486, 586, Pentium

(●) Slow 8088, 286, 386

Ok Cancel

```
0.000 mA
0.500 mA
```

F1 Help F10 Menu Alt-X Exit

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10 APPENDIX A

Hot keys

MENU BAR

ALT F : File
ALT P : Product
ALT I : Input
ALT O : Output
ALT S : Serial communication
ALT L : Language
ALT N : Option

FILE

F2 : Delete
F3 : Open
F4 : Save
F5 : Print status
ALT X : Return to DOS

INPUT

ALT B : TC B
ALT E : TC E
ALT J : TC J
ALT K : TC K
ALT G : TC L
ALT M : TC N
ALT R : TC R
ALT D : TC S
ALT T : TC T
ALT U : TC U
ALT Y : TC W3
ALT W : TC W5
ALT C : Pt100 (DIN/IEC)
ALT A : Ni100
ALT Z : Linear resistor
ALT V : Voltage input

OUTPUT

ALT F6 : Analog output

COMMUNICATION

Ctrl F1 : Receive data
Ctrl F2 : Transmit data
Ctrl F3 : Monitor

LANGUAGE

Shift F1 : Dansk
Shift F2 : Deutch
Shift F3 : English (Español)
Shift F4 : Français
Shift F5 : Nederlands
Shift F6 : Suomi
Shift F7 : Svenska

OPTION

F7 : Temperature Unit
F8 : Mains Frequency
F9 : Tag no.
CTRL F7 : Cable resistance
CTRL F8 : Process calibration
CTRL F9 : Communication port
CTRL F10 : Linearisation
CTRL F6 : Change Password

STATUS LINE

F1 : Help
F10 : Menu
ALT X : Exit (Return to DOS)

11 ASSEMBLING OF A TEMPERATURE SENSOR TO THE HOUSING

To fit an integral sensor to an existing 653T or 653L Temperature Transmitter (comprising top works complete of electronics and terminal block), proceed as follows:



Fig. 10



NOTE - Be sure that the electrical wires of the sensor are flexible (stranded) and 1 mm dia (AWG 20) max.

- 1) Remove the instrument from the mounting bracket.
- 2) Provide the sensor with a 1/2 NPT nipple and free cables of appropriate length (see fig. 10).
- 3) Insert the wires into the side hole (1/2 NPT threaded).
- 4) At the same time offer the sensor to the housing and screw in using a hexagonal spanner suitable for the 1/2 NPT nipple.
- 5) Connect the wires to the terminals, according to the sensor/ measurement type.



WARNING

For the Flameproof instrument version (EEx d) ensure, that the sensor is a flameproof type sensor as well, complying with the data of the Safety Marking plate of the transmitter.
(In case of doubt, please contact ABB Kent-Taylor).



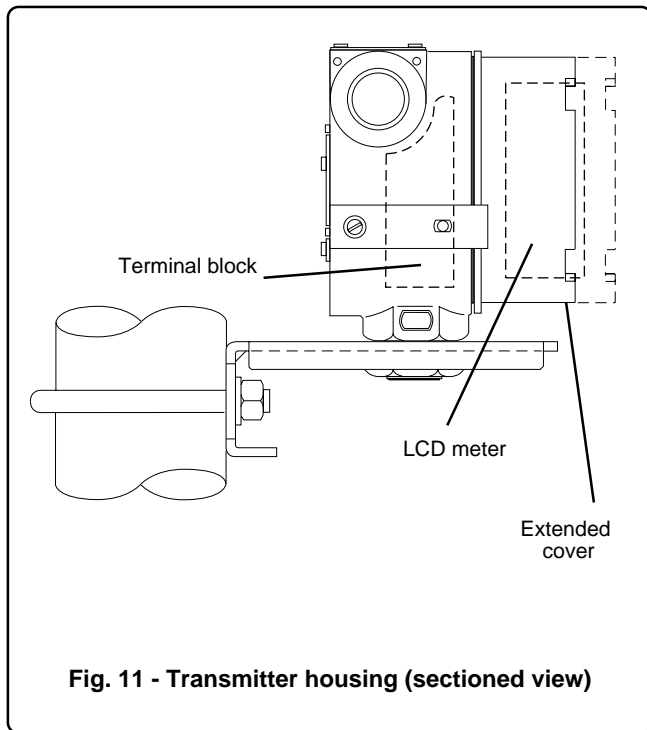
WARNING - For installation of flame proof (EExd) instruments in Hazardous Areas, i.e. areas with danger of fire and/or explosion, do not remove any cover.
Failure to comply with this warning can result in fire or explosion.

12 ADDENDUM FOR METER OPTION

The LCD meter provides local indication of the transmitter output. The meter can be easily installed on the terminal block of the transmitter using an extended windowed cover to accommodate the meter. Fig. 11 shows the transmitter fitted with the cover for LCD meter.

The meter features a 3 1/2 digits liquid crystal display providing a direct indication of the transmitter output signal. It can display the output either in mA, percent of span, or engineering units. The zero and span adjustments and the decimal point setting switches on the meter front allow its correct calibration. A set of plastic labels, supplied with the meter, can be fitted in a recess below the indicator in order to display the multiplying factor and the engineering units in use.

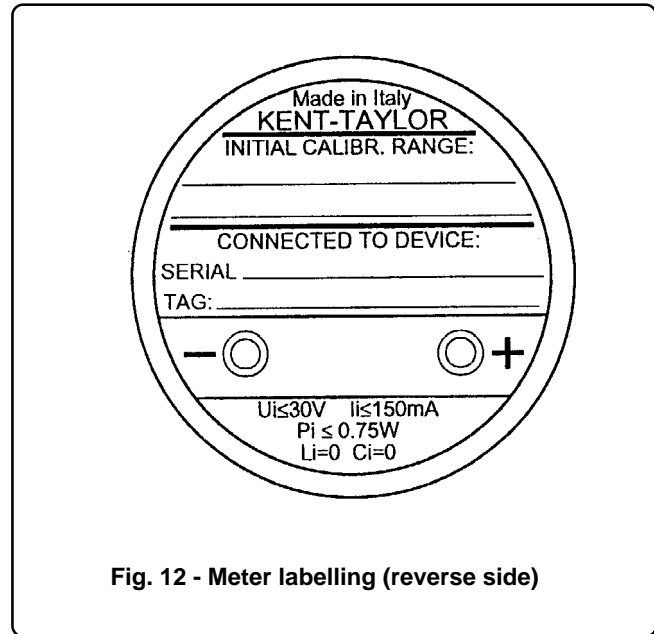
For transmitters ordered with the LCD meter, the meter is installed and calibrated in the factory. The standard calibration/indication scale is 0 to 100%. If the meter is ordered and shipped separately the following instructions must be followed for mounting and calibration. The meter can be calibrated either before or after the installation.



Product Identification

Three labels are provided with the LCD digital meter:

- 1) in the lower part of the meter front a label indicates the type of safety protection with, if selected, the relevant certification number.
- 2) in the upper part of the reverse side, a label indicates the initial calibration range (usually 0 to 100% unless otherwise specified). If the meter is supplied already installed the label indicates the serial and tag identifier of the connected device.
- 3) in the lower part of the reverse side a label indicates the electrical limits allowed by the I.S. certification.



Meter installation

To install (or to replace) the meter use the following procedure:

- 1) If the transmitter is part of a control loop, put the loop in manual.



WARNING - If the transmitter is not certified as Intrinsic Safety type (EEx-i), DO NOT REMOVE THE COVER in area classified as "HAZARDOUS LOCATIONS: CAN RESULT IN HAZARD OF FIRE AND EXPLOSION". Contact your Safety Dept. in order to establish a correct installation procedure.

- 2) Remove the cover.
- 3) Remove the link between terminal plugs.
- 4) Plug the meter (see fig. 13) and rotate as required. The meter can rotate, in 15° steps, 270° degree clockwise and 75° counterclockwise (see fig. 14). Further rotation causes damage to the meter stop or to the "banana" connections and should be avoided. Note that considerable torque must be applied for 15° rotation.
- 5) Check that the O-ring gasket is properly in place, screw on the extended cover and tighten properly.

... 12 ADDENDUM FOR METER OPTION

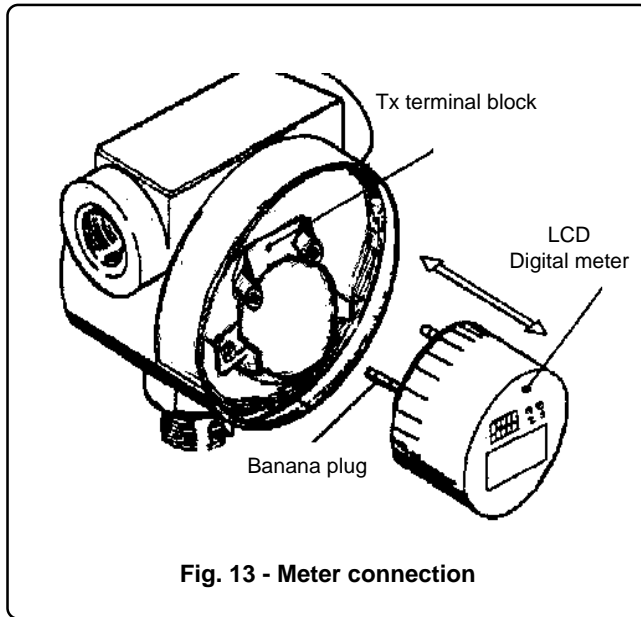


Fig. 13 - Meter connection



NOTE

If the meter should be removed, be careful to replace it immediately by another one or by the proper link provided. This operation is important for I.S. loop application, as, with the meter removed the loop continuity protection can drop a max. voltage of 4V.

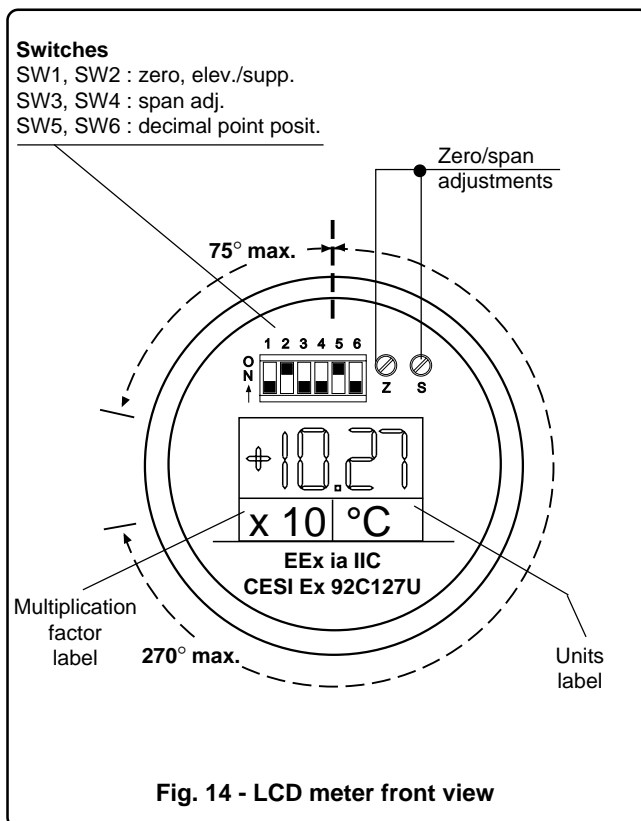
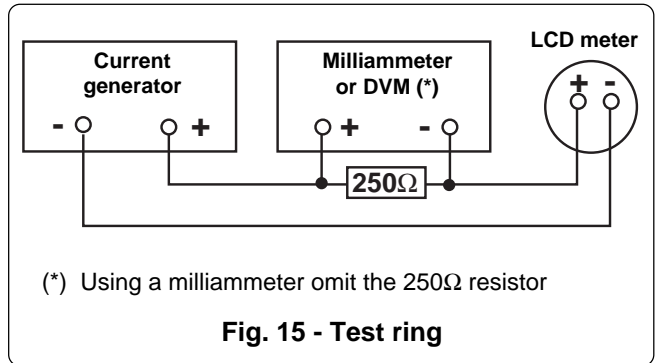


Fig. 14 - LCD meter front view



(*) Using a milliammeter omit the 250Ω resistor

Fig. 15 - Test ring

Calibration procedure

The LCD meter can be calibrated either using a conventional current generator and an accurate milliammeter or utilizing the 653T/653L as a current generator in which case the meter can be calibrated using a calibrator to set the output current to the desired value. In the first case a suitable test rig should be used, as indicated in fig. 15. The accuracy of the milliammeter or of the DVM and the relevant measuring resistor (250 Ω) should be better than 0.03%.

The switches must be positioned as follows:

SW1	SW2	For ZERO adjustment, between
OFF	OFF	-1999 ÷ -1000
OFF	ON	-1000 ÷ 0
ON	OFF	0 ÷ 1000
ON	ON	1000 ÷ 1999

SW3	SW4	For SPAN adjustment, between
ON	ON	100 ÷ 1000
ON	OFF	1000 ÷ 2000
OFF	ON	2000 ÷ 3000
OFF	OFF	3000 ÷ 3998

SW5	SW6	For DECIMAL POINT position, like
ON	OFF	4.00 ÷ 19.99
OFF	ON	40.0 ÷ 199.9
OFF	OFF	400 ÷ 1999

Then proceed as follows:

- 1) Set the output current of the current generator to 4 mA on the milliammeter or 1 V. on the DVM. Alternatively, force the output of your transmitter to 4 mA.
- 2) Adjust the zero trimmer (Z) to read approximately the lower range value (LRV) on the digital meter.
- 3) Set the output current to 20 mA, on the milliammeter or 5 V. on the DVM. Alternatively force the output of the transmitter to 20 mA.
- 4) Adjust the span trimmer (S) to read approximately the upper range value (URV) on the digital meter.
- 5) Repeat the points 1) 2) to read exactly (± 0.1) the LRV.
- 6) Repeat the points 3) 4) to read exactly (± 0.1) the URV.
- 7) Complete the calibration procedure by fitting the multiplication factor label (if any) in the left recess below the display and the engineering unit label in the right recess (see fig. 14).



TROUBLE SHEET

WARRANTY REPAIR REPAIR ORDER

Rejection or discrepancy reports

Copy attached Not available

● IDENTIFICATION

Customer

Purchase order No.

Plant

Name of person to contact

Instrument tag No.

Model

Serial No.

● OPERATING CONDITIONS

Specify location, environmental conditions, type of service and approximate number of operating hours or date of installation if known.

[Empty text box for operating conditions]

● REASON FOR RETURN

[Empty text box for reason for return]

Trouble found during : Installation Commissioning Maintenance
At start up On service

Shipping information for the return of the equipment

Material returned for factory repair, should be sent to the nearest ABB Instrumentation Service Center, transportation charges prepaid by the Purchaser.

Please enclose this sheet duly completed to cover letter and packing list

Date

Signature

Originator



The Company's policy is one of continuous product improvement and the right is reserved to modify the specifications contained herein without notice.

IM/653TL Rev 5

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