Instruction manual
MTL intrinsic safety solutions

January 2016
INM PCS45 rev2

CROUSE-HINDS
SERIES

PCL45USB/PCS45 configurator

For temperature converters and pulse isolator modules

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EC Declaration of Conformity

PCL45USB

Document No. MTL15DOCPCL45USB

Issue No. 1

We declare under our sole responsibility that the product(s) listed below, to which this declaration relates, conform with the requirements of the Directives below by compliance with the standards listed.

Council Directive 2004/108/EC (EMC Directive) relating to Electro-Magnetic Compatibility.

    a.   EN 61326-1:2013   Class A equipment. Table 2 – Industrial locations

Council Directive 2006/95/EC (Low Voltage Directive), relating to Product Safety.

    b.   EN 61010-1:2010

Council Directive 94/9/EC (ATEX Directive) relating to equipment and protective systems intended for use in potentially explosive atmospheres.

    c.   EN 60079-0:2012 + A11:2013†
    d.   EN 60079-11:2012†

    † Where products were initially assessed for compliance with the Essential Health and Safety Requirements of the Directive using earlier harmonised standards, a subsequent review has determined that compliance is unaffected by the current harmonised standard(s) listed above.

Council Directive 2011/65/EU (RoHS Directive) relating to hazardous substances in electrical and electronic equipment

    The object of the declaration above is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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Products covered by this declaration:

Product	Description	EMC[1] Standards	LVD[1] Standards	Year LVD Applied	ATEX[1] Standards	ATEX[2] Marking	R&TTE[1] Standards	Cat1/Cat2 ATEX Cert. No.	Cat3 ATEX Cert. No.
PCL45USB	Configurator	a	b	2015	c, d	3	N/A	TUV99ATEX1390	None

Notes:

1   Entries in this column may be either letter notation (a,b,c etc..) indicating which standards from page 1 apply, or N/A if the directive does not apply

2   Entries in this column refer to notes below indicating ATEX markings present on products, or N/A if the directive does not apply

3   ATEX marking ⟨Ex⟩ II (1) G [Ex ia Ga] IIC

Notified Bodies responsible for issuing Cat 1 or 2 ATEX Certificates:
0044   TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 ESSEN Germany

Notified Body responsible for ATEX QA regime:
1180   SGS Baseefa, Buxton, SK17 9RZ. United Kingdom

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NOTE

Much of the information contained within this document and further explanation of some of the features can be found in the HELP file that is an integral part of the PCS45 software (version 3.11 and later).

Please consult this resource when you have any questions before contacting us. However if you still have any queries that are not resolved by the HELP file, please contact your local Eaton's MTL product line representative or use the product support request facility through the website at www.mtl-inst.com/onlineforms/product.support.

1 INTRODUCTION

The PCS45/PCL45USB configurator enables Eaton's MTL temperature converters and pulse isolators, part of Crouse-Hinds series, to be configured from a standard PC running a Microsoft® Windows® operating system. The configurator comprises PC software (PCS45) provided on a CD, and an ATEX certified interfacing link (PCL45USB). Temperature converters and pulse isolators can be configured in the safe area, while on-line, and the software allows configurations to be saved to disk and printed out when required.
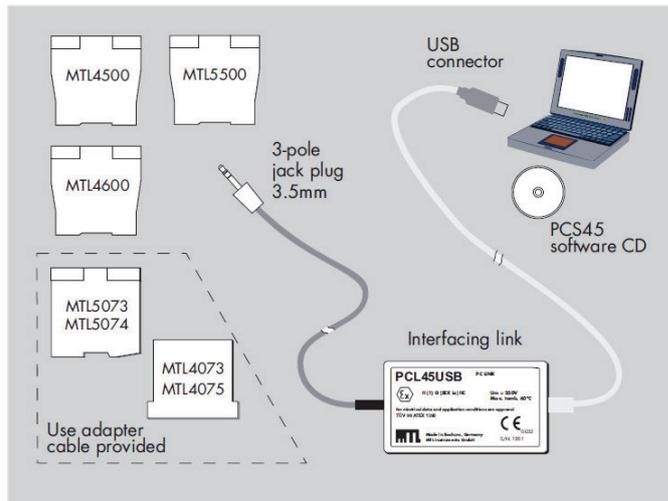
This manual concentrates on its use with the **MTL4500** and **MTL5500** range of products, but the tools may also be used to configure the earlier MTL4000 and MTL5000 range of products.

PCL45USB hardware

The PCL45USB provides the interfacing link between the converter module and the personal computer (PC) running the software and connects to the PC using the USB cable provided. The PCL45USB has a built-in cable fitted with a 3.5mm jackplug to connect to the 'Config' socket on MTL4500 and MTL5500 range of converters. An adapter cable is also provided to accommodate earlier converters.

PCS45 Configuration software

The software requires only approximately 20Mb of hard disk space and is compatible with Windows 2000, Windows XP, Windows 7 or Windows 8. Consult Eaton's MTL product line for operation with any other operating systems, e.g. Windows Vista™.

CAUTION

The PCL45USB is designed for use only with devices authorised by Eaton and no responsibility will be accepted for the consequences of its use with any other device. Authorised devices are either named on the PCL45USB certificate or compatible devices name the PCL45USB on their individual data sheet.

Repairs to the PCL45USB are not permitted. The equipment can be used only in the safe area.

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2   INSTALLATION

Although the software is supplied on a CD the user is strongly advised to check for the latest revision of the PCS45 application; this is a free download from our website at:

http://www.mtl-inst.com/product/configuration_tools_and_software/

The site page also provides a USB driver file that must be downloaded and installed on the target PC to allow the application to communicate with the PCL45USB hardware. The driver file needs only to be installed once on the machine and is not affected by subsequent updates to the PCS45 application.

Download and install the USB driver before trying to load and run PCS45.

Unzip the driver files from the downloaded folder and store them in a location on the hard disc drive of the PC where they can found easily. Refer to the instruction document related to the installation of the USB driver that is located with the file on our website. When the PCL45USB equipment is connected to a USB port on the PC the installation wizard will recognise that it has found new hardware. At this stage, follow the on-screen instructions to direct the installation wizard to the location on the hard drive where you stored the driver files; continue until the USB driver is fully installed. Refer to the instruction document related to the installation of the USB driver that is located with the file on our website.

To install the PCS45 software on the PC, extract the file from the compressed download file and simply run the PCS45_Install_Vxxx.exe application. Again, an installation wizard will take you through the process and indicate the required responses.

Do not connect the PCS45USB interface to the isolator module at this stage.

At the initial run of the PCS45 software the Port Selection screen confirms that the PCL45USB option is the default, and then the password entry screen appears. Enter 'MTL' as the password at this point (password entry is not case sensitive). This default password can be changed later as explained below.

3   OPENING SCREEN

On first running the application, the main screen will appear.

The top Menu Bar provides access to the main features of PCS45; each of which is detailed in later sections of this document. The Status Bar at the bottom of the application window is divided into sections that provide a visual indication of the operating mode.

Help Field	Module type	Tag Field	Operational mode	Access level
Press F1 for help	Selected device	Configured data	Offline	restricted access

The software automatically opens a new file when the application is started. This clears the working database of the tool ready for a new configuration. The screen shot above shows the status bar for a new file.

The password protects the configuration database. In the absence of a valid password, access is restricted to read-only (i.e. the user can only view the current configuration of the isolator). A user wishing to modify any of the details must log in with the current password.

3.1 Changing the password

As previously stated, the software is shipped with a default password setting of 'MTL', however the user is free to change this at any time.

Under the *Options* heading on the Menu Bar, select *Change Password* and a dialog box (right) will appear.

Enter the current password and then follow the instructions.

An incorrect password will leave the user with restricted, i.e. read-only, access.

4 OPERATING MODES

The configuration software supports a number of different operation modes. These give various levels of access, however the two key modes for configuring isolator functions are *Offline* and *Online*.

4.1 Offline Mode

In Offline mode the application does not require an isolator to be connected, or even a PCL45USB interface. Offline mode allows a user to create, import or open a stored configuration file and edit it in readiness for downloading to a module. This process is explained in more detail later in this manual.

4.2 Online

For Online mode the isolator must be connected, via the PCL45USB, to the PC.

Configuration values are uploaded from the target device to the application database. Any changes to the values on screen are written to both the database and the configuration memory of the isolator when the user accepts the values by clicking on the button provided.

The user can switch between Online and Offline mode via the Menu Bar. Select *Connection* and then either *Establish* or *Disconnect* options as required.

4.3 Demo mode

This mode is useful for training purposes. It simulates an Online mode, without a connection to an isolator. The target configuration memory of the isolator is simulated with local PC memory.

The user can select Demo mode by changing the *Port selection* settings. This can be found under the *Options* heading of the Menu Bar.

Click on the *Demo* radio button and click *Accept*. Then click on *Connection* at the Menu Bar and choose the *Establish* option. The selection of *Demo* mode automatically inhibits the transfer of data to the isolator. The Tag Field of the *Status Bar* now displays "DEMO".

Operating in *Demo* mode permits all of the configuration variables of the target isolator type (temperature or pulse) to be explored.
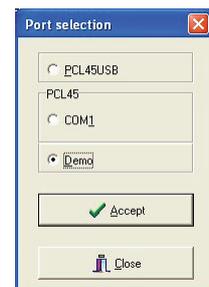
4.4   Access Control

To avoid unauthorised access a user is required to enter a password before being permitted to change any parameters.

4.4.1   Restricted Access

This provides read-only access. Details of the current configuration can be viewed or printed.

4.4.2   Full access

This provides both read and write operations. The user is permitted to edit or create new configuration files.

5   CONNECTION TO TARGET MODULE

Provide DC power to the isolator module, then insert the jack plug from the PCL45USB and connect its USB lead to the PC to establish a logical connection between PCS45 software and the target's microprocessor.

(Remember that the jack plug connector on the end of the PCL45USB cable is for use only with the MTL4500/5500 ranges modules. Use the extension adaptor cable for older temperature converters such as MTL4073 and MTL5074).

Click on *Connection* on the Menu Bar and then the *Establish* option. The software will then attempt to communicate with the isolator. If PCS45 has already been used during this session then the database may already contain data.

The software will automatically prompt the user with a pop-up window when this occurs.

At this stage the data in the database is likely to be meaningless for the current task. Click **OK** and wait as the software establishes a connection and copies the isolator's configuration into the database.
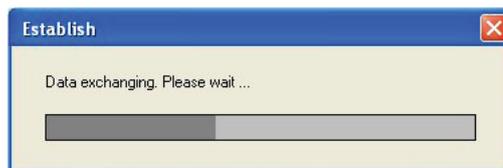
If there is a problem with the connection, the software will report an error message.

The fault shown indicates a serious failure of the serial communications. If this occurs, the user should check the physical connection, (i.e. the cables between the PC, PCL45USB and the isolator). Another reason for this fault is the incorrectselection of a serial port for the application.

Once the user has established a connection with the isolator the Status Bar will be updated.

The screen shows an example of successful connection.

- **Module Type** = MTL4573/MTL5573
- **Tag Field** = ANDY 73 (This is simply the last TAG setting that was stored.)
- **Operational Mode** = Online.
- **Access Level** = full access.

6   DISPLAYING THE CURRENT CONFIGURATION

In **Online** mode PCS45 automatically uploads the current configuration from the isolator. The user can view the current settings via the *Display* menu of the Menu Bar.

The configuration data is segmented into different categories that reflect the feature-set of the target isolator. The examples shown here are for an MTL4575 temperature converter.

6.1   Basic Configuration

The upper half of the window displays the predefined manufacturer's settings by MTL that describe the target device and its revision level, while the lower half displays the user configurable settings.

Remember that at this stage you can view only the configuration data. There is a different procedure for modifying the configuration.

6.2   Module Configuration

Details of the operational parameters of the module are grouped in the three 'tabs' of the Module Configuration window.

6.2.1 Module Input Information

This window displays the current settings of the module input parameters that have been configured by the user.

See the later sections of this manual for the parameter selections that can be made.

6.2.2 Module Output Information

This window displays the current settings of the user configurable output parameters for the specific module.

See the later sections of this manual for the parameter selections that can be made.
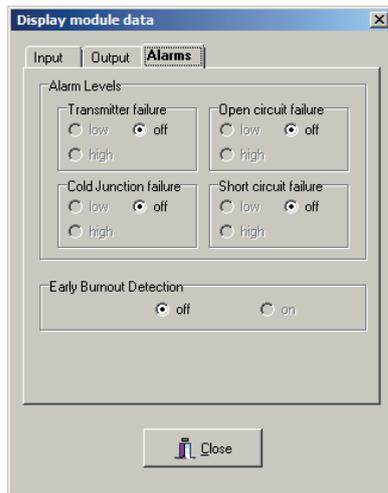
6.2.3 Module Alarm Information

This window displays the relevant alarm parameters currently set for the module.

As before, see the later sections of this manual for the parameter selections that can be made.

7 ONLINE CONFIGURATION

In **Online** mode the user can directly modify the configuration of the isolator. This is done via the **Device Data** menu of the **Menu Bar**. The configuration data is segmented into different categories, just like those of the **Display** menu.

New configurations can be set up by selecting the File menu of the **Menu Bar** and choosing **New**. The selection screen for the module type to be configured shows the valid options for this version of PCS45.
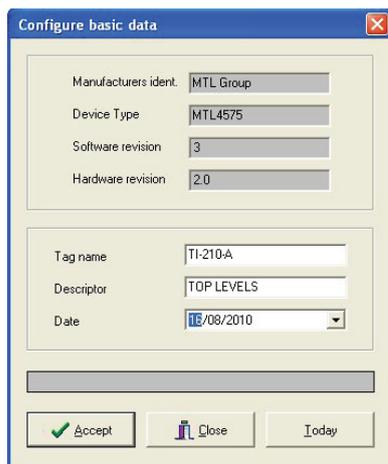
7.1 Basic Configuration

The upper half of the window displays the predefined manufacturer's settings, while the lower half displays the user configurable settings.

The Tag Name and Descriptor fields are straightforward text entries. The Tag name and Descriptor have maximum character lengths of 8 and 16 characters respectively. All lower case letters in these fields are converted to upper case automatically and illegal characters are suppressed.

The date format is dd/mm/yyyy.

The date can be set automatically by clicking the Today button, which synchronises the date with that of the PC. Alternatively the user can either type the required date directly, or use the drop-down calendar, (available via the down arrow).
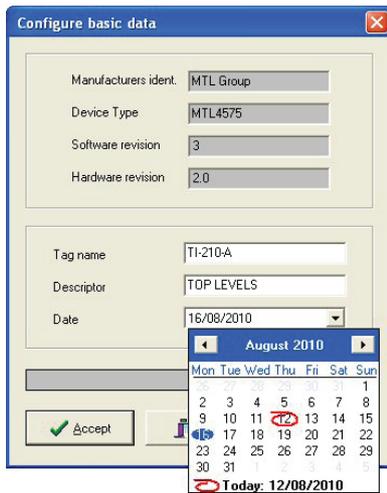
The current month is displayed automatically with today's date circled in red. The user is free to click through the pages (using the arrows either side of the month name) and to click on any date.

On completion the configuration needs to be download to the module (because, so far, these changes have taken place only in the database on the PC). Click on the *Accept* button to transfer the modified configuration to the configuration memory of the isolator. A loading bar should move from left to right- in the grey window at the bottom- as the download takes place.

7.2 Configuration MTL45/5573 & MTL45/5575

The signal parameters of the MTL45/5573 and MTL45/5575 single channel temperature converters are configured through different tabs of the **Module Config.** screen. Click on the Device Data menu and choose from **"Input", "Output"** or **"Alarms"** configuration.
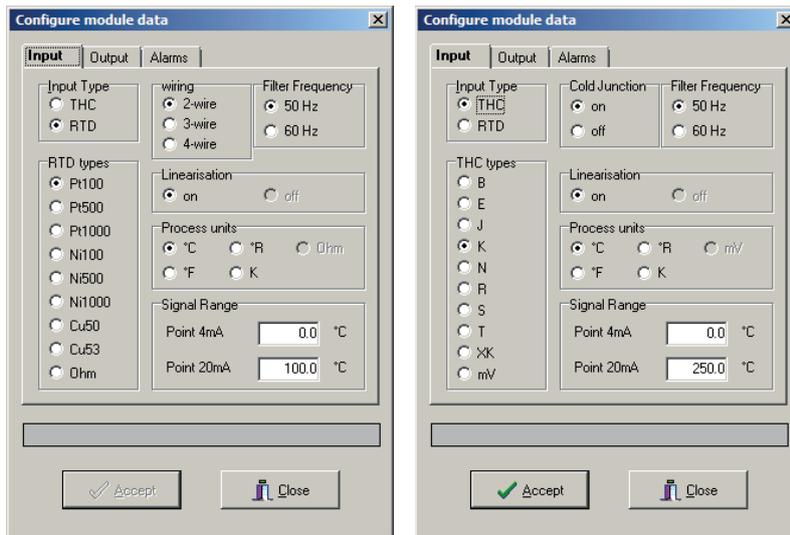
Input tab dialogue box MTLx573 and MTLx575

7.2.1 Input configuration

From the "Input" tab of the 'Configure module data screen the first selection to be made is for the input type; thermocouple/mV – THC, or resistance temperature detector/ohms – RTD.

After making this selection the relevant options for the parameters of each type of input can be entered. Select the particular input variant, the process units, linearization and filter frequency options by clicking on the appropriate 'radio button' in the boxes. For RTD inputs the field wiring arrangement (2-, 3-, or-4 wires) must be selected and for THC inputs the cold-junction compensation can be enabled if linearization has been selected.

The range of measurement for the sensor to be reflected in the analogue output current is entered as numeric values of the process units selected. Note also that the operation of the output current can be reversed simply by swapping the values assigned to the 4mA and 20mA points.

7.2.2   Input restrictions

Some settings in this dialog box can appear to be unavailable ("greyed out") because some options depend upon what others have been chosen. For example, CJ compensation is not available for RTD and mV inputs, because it is not applicable to the input type.

The table below indicates the available options appropriate to the input type chosen. The shaded cells indicate where there is no choice, i.e. the options have been limited by previous choices.

Input Type		Linearisation	Cold Junction Compensation	Process Units
THC types	B, E, J, K, N, R, S, T, XK	On	Optional- on or off	°C, °F, °R, K or mV
		Off	Off only	mV
	mV	Off only	Off only	mV
RTD types	2-wire, 3-wire or 4-wire	On	Off only	°C, °F, °R, K or Ohms
		Off	Off only	Ohms

Output tab dialogue box MTLx573

Output tab dialogue box MTLx575

7.2.3   Output configuration

The upper portion of the dialog box contains the damping and smoothing parameter fields for filtering the output current.

For an explanation of some of the terms used for these screens please see section 10 of this document.

The lower portion contains the selection for the output characteristic to follow either the Eaton's MTL standard or for the NAMUR NE43 type.

Simply type in the required values, select the required options and click Accept. The loading bar will pan from left to right during the download.

For the MTL45/5575 a response time can be selected to reflect the needs of the process, but it is strongly recommended to leave the module on the 'slow' default value to achieve the best accuracy of measurement. See section 10.2 for details.

As for the input configuration parameters, the software automatically restricts the configurable parameters. The output configuration options reflect the associated Input Type and its units of measure.
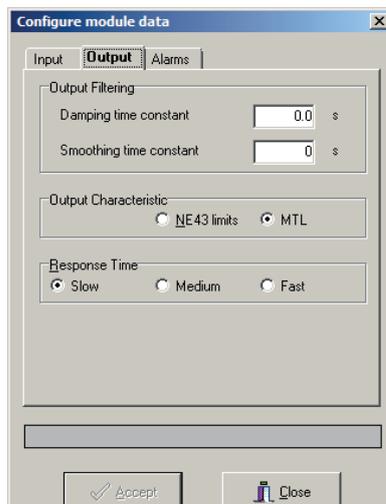
7.2.4   Alarms Configuration

The alarm parameters that can be set are changed dependent upon the input type selected and the base model being configured.

In addition to the standard alarms for transmitter, cold-junction and line condition, an Early Burnout Detection can be enabled for thermocouple sensors

Finally, the MTL45/5575 includes an alarm monitoring relay which, when enabled, requires the trip point and hysteresis to be set.
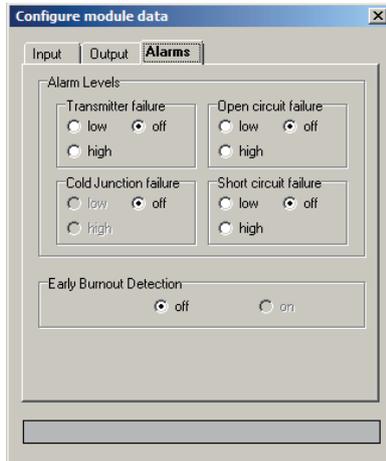
Alarms tab dialogue box MTLx573
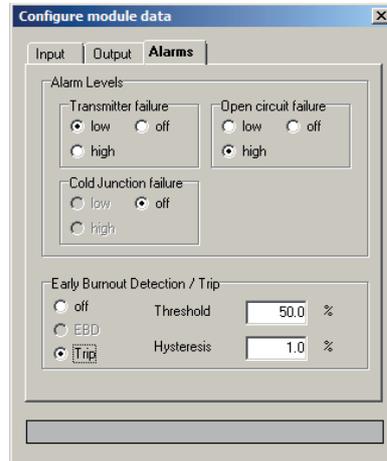
Alarms tab dialogue box MTLx575

7.3   Configuration MTL45/5576-RTD

The MTL4576 and MTL5576 are 2-channel temperature converters. They can be supplied either with standard field-terminal connectors for use with resistance temperature sensors (-RTDs) or with connectors that have integral cold-junction sensors for use with thermocouple sensors (-THCs). The basic electronic interface module is the same but must be configured to suit the sensor type.

The input and output configuration settings for the MTLx576 appear as two tabs on the same screen. See the following Input and Output tab dialog boxes.
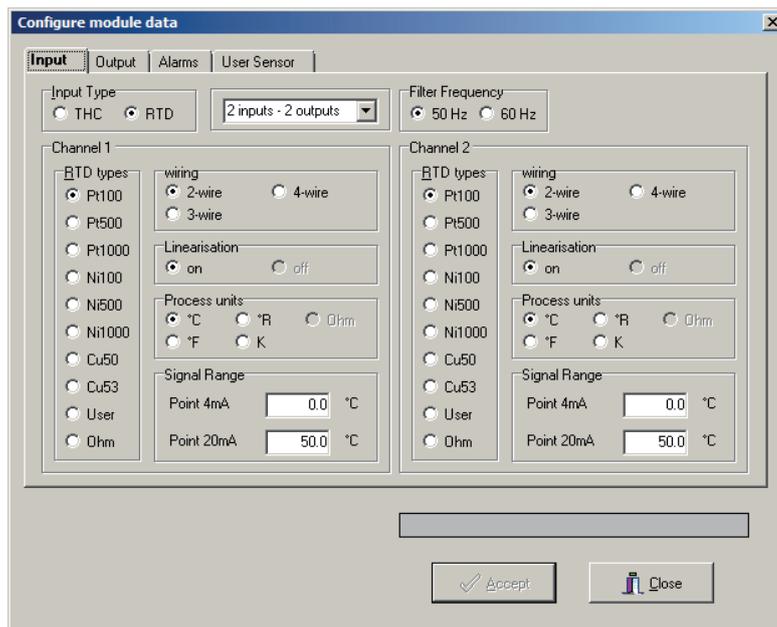
Input tab dialogue box MTLx576-RTD

The module has two modes of operation, available from the drop-down box at the top of the Input dialog box.

- 2 inputs – 2 outputs = two separate input/output channels
- 1 input – 2 outputs = one input driving both outputs

This selection should be made first.
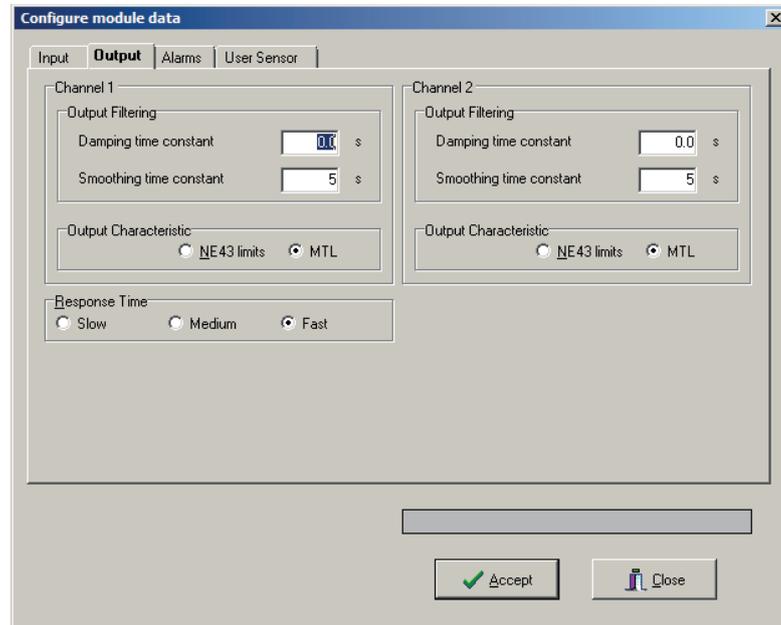
Output tab dialogue box MTLx576

For the RTD model, select the 'Input' tab and choose RTD as the 'Input type' (top left), then select the channel options as required, i.e. RTD type, Process units, Linearisation and wiring (2- or 3-wire).

The range settings at the bottom of the screen define the portion of the sensor characteristic that will be used for the analogue output. Note that these are entered using the process units that have been chosen for that channel. Range reversal is simply a matter of swapping the values assigned to the 4mA and 20mA points.

See section 10 for an explanation of some of the terms used on the 'Output' tab dialog box. For additional assistance, refer to the Help file (F1 key) provided with the PCS45 software.

7.4   Configuration MTL45/5576-THC

The configuration for the THC version is very similar to the RTD model explained above.

For the THC model, select the 'Input' tab and choose THC as the 'Input type' (top left), then select the channel options as required, i.e. THC type, Process units, Linearisation and Cold Junction.
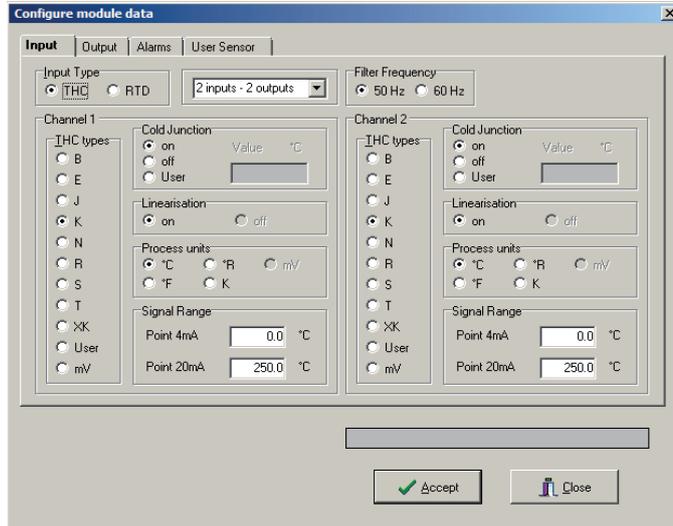
Input tab dialogue box MTLx576-THC

Refer to section 10 for an explanation of some of the terms used on the 'Output' tab dialog box. For additional assistance, refer to the Help file (F1 key) provided with the PCS45 software.

Configuration of the output and alarm parameters is essentially the same for both forms of the MTL45/5576, with the available options being determined by the type of sensor already selected.

The representation of the User Sensor configuration screen is included here for completeness, but please contact your Eaton's MTL product line representative for advice on the use of this facility before any attempt is made to generate your own sensor profile. It is primarily intended for the adjustment of thermocouple sensor characteristics to suit local material variances rather than the origination of completely new thermocouple types.
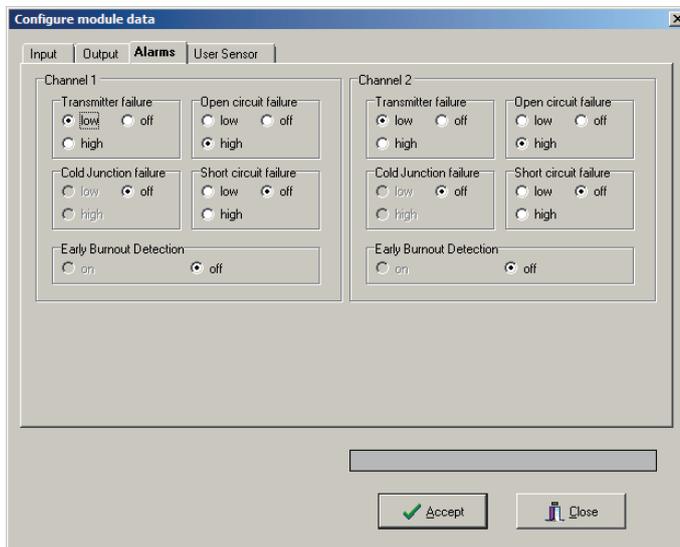
Alarms tab dialogue box MTLx576
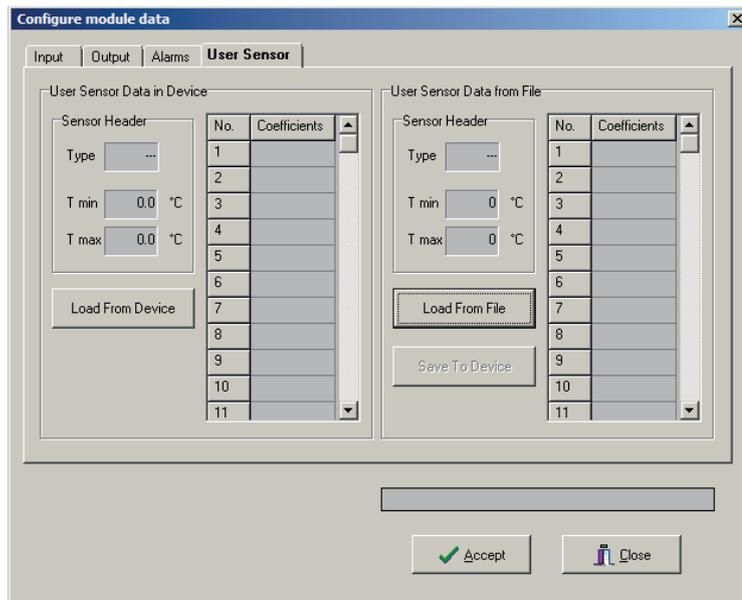
User Sensor tab dialogue box MTLx576

7.5 Configuration MTL45/5532

The MTLx532 pulse isolator and converter offers the option of an analogue output signal that can be scaled to represent the frequency of the input signal. To obtain this type of output, DIP switches at the side of the module must be pre-configured. See the instruction manual (INM4500 or INM5500) for details of these settings.

Switches located on the edge of the module define the mode of operation
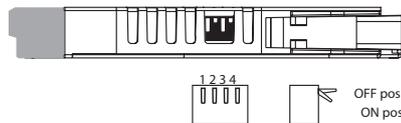
SW1	SW2	SW3	SW4
Vsp	Vsp	LFD	Mode

To enable the configurable parameters of the MTL45/5532 module to be set, SW4 must be "ON".
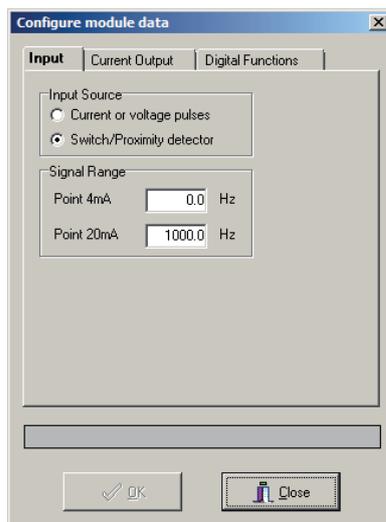
In providing an analogue representation of the input frequency there are several aspects of the intended application to consider and then configure. The basic settings allow the assignment of the output type (0-20, 4-20, NE43) and the frequency to use for the 4mA bottom of range and the 20mA top of range. As well as the primary scaling that this defines it is possible to set small adjustments as a percentage of the span – for example when driving an analogue indicator the calibration may need adjusting to compensate for the (in)accuracy of the indicator.

Input tab dialogue box MTLx532
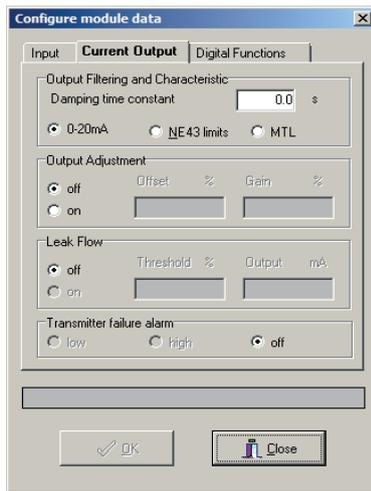
Output tab MTLx532
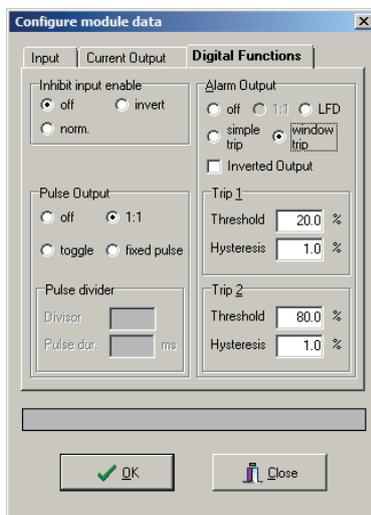
Digital Functions tab MTLx532

The leak-flow parameters enable a threshold to be set which effectively ignores inputs below the set value. This facility is used, for example, when there is the possibility of a small residual trickle flow in either direction of material flow and this should not be included in the totalised values. By setting the leak-flow threshold to, say, 2% then a flow of greater than this value is required before the output starts to change.

Once the type of input signal has been set, the transfer function to create the output pulse form can be defined. The pulse output can be suppressed if the requirement is only for an analogue output (see reference above to DIP switch settings). Note that in the simple fixed-function mode of the product, all the input types are essentially connected in parallel and it is the user choice as to which signal is connected. When using the configurable functions of the product then the type of input signal must be defined since features such as line-fault-detection (LFD) only apply to the switch/prox input type and not to the voltage/current input types.

Output pulses can be associated on a 1:1 basis related to the input, i.e. 1 pulse out for 1 pulse in, or a frequency divider option can be applied offering a divisor from 1 to 65534, but with an output frequency limit of 1kHz. The format of the output pulses can also be set such that it simply 'toggles' (i.e. changes state), or produces a pulse of fixed duration, based on the input pulse count and the division setting. See Section 10.5 for more details.

Finally the alarm output can be configured. There are three ways to make use of this option. One use of this relay output channel can be to signal the LFD status if the input type is a switch or proximity detector. Next, the output can be set for a simple trip operation where the output is triggered based upon the threshold value and hysteresis values selected.

Finally there is a 'window' trip mode where the alarm output is determined with reference to two trip points that define a lower and an upper value. The alarm can be defined to occur while the signal sits *between* the two trip points, or 'inverted' to alarm when the signal goes outside of the trip point window. An example of the use of this alarm feature is for the monitoring of fan or conveyor speed where a certain minimum value is required and yet a maximum value must also be set. Note that although two trip points can be assigned there is only one relay output, which is why we use the

"window" terminology to describe this feature rather than a hi/lo alarm.

7.6   Calibration

In **Online** mode the user can opt to re-calibrate the output current. The original factory calibration of the isolator is accurate to within ±1 bit (which means around ±6µA) but for some applications it is useful to be able to 'fine tune' the loop current. In this process the user enters *observed* values in place of the software driven values, the software then calculates a correction factor for it to use.

IMPORTANT: Before performing this calibration the user must connect a calibrated milliammeter in series with the current loop and ensure that the loop is not being

driven, i.e. that it is "open".

From the **Menu Bar** select the **Device Data** menu and **Calibration**. A warning message appears, see above. Ensure that the loop in question is open before clicking the OK button.

The software now tries to output a loop current of 4.00mA, (i.e. the previous zero
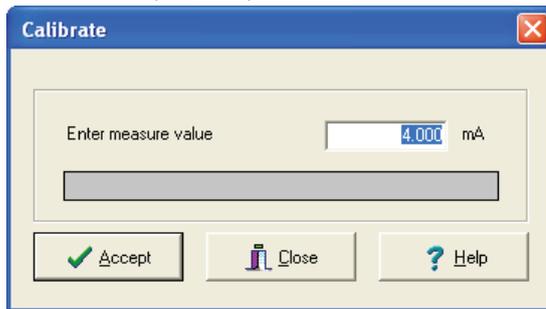
calibration point).

The user is required to read the *measured* loop current on the ammeter, enter the value in place of the 4.00 mA value shown and then click the *Accept* button.

The software now tries to output a loop current of 20.00mA, (i.e. the previous span
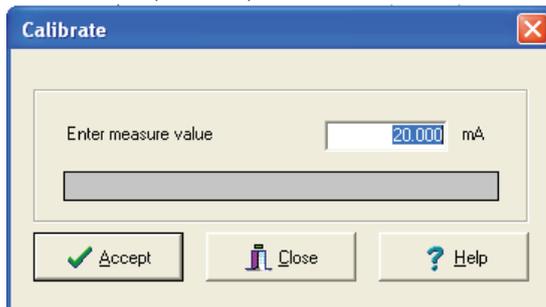
calibration point).

The user must once again read the *measured* loop current on the ammeter, enter the value in place of the 20.00 mA value shown and then click the *Accept* button.

The zero and span settings are slightly interactive, so the calibration process must be repeated a few times until both calibration points are correct.

8 OFFLINE CONFIGURATION

The process of **Offline** configuration is identical to that of **Online**, (see section 5). This time rather than writing data directly into the memory of the isolator, configuration files are held locally within the database of PCS45. This method of working is sometimes referred to as **Edit** mode, (see section 2.4).

8.1 Configuration

The configuration process uses the same menus and windows as **Online** configuration. Each **Accept** action simply updates the contents of the local database.

The operation of the software is a little unusual as the database must contain data before you can create an **Offline** configuration. Each time the user instigates the application it automatically creates a new file. This deletes some of the required data fields and stops the user working in **Edit** mode. A warning message appears should the user attempt to edit an empty database.

To circumvent this minor problem, click **OK** and **Establish** a connection with the isolator. This takes the system **Online** and automatically fills the database (i.e. it
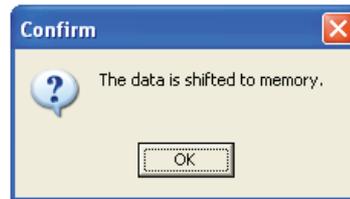
copies the current configuration file from the isolator). The user must then revert back to **Offline** mode. Select **Connection** from the **Menu Bar** and then **Disconnect** from the pull-down menu.

Note: If the software has previously been Online, then the database will already contain data. In this case PSC45 will give access to Edit mode straight away.

The user should now be in a position to start creating an **Offline** configuring file. This is done in the usual way via the **Device Data** menu of the **Menu Bar**. In **Edit** mode the software warns the user each time a configuration parameter is modified.

The user builds up their configuration in the local database. The resulting file can be saved to disk or hard drive via the **File Menu**.

9   DIAGNOSTICS

The software provides a number of helpful system diagnostic tools. These are available via the **Diagnostics** menu of the **Menu Bar**. When running one of the diagnostic tools the software needs to be in communication with the isolator.

In **Offline** mode PCS45 momentarily establishes a connection with the isolator.
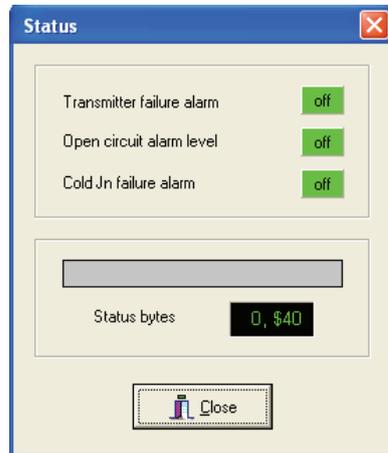
9.1   Status

This diagnostic window shows the current status of the, Transmitter Alarm, Open Circuit Alarm and the Cold Junction Alarm.

For the two-channel MTL45/5576 the data from channel 1 or channel 2 is selected through the window within the display screen.

In addition to the above alarm status information the window also displays two different Status Bytes.
In the status window if the first status byte is not 0 there is a configuration error and if the second byte is not $00 then there is an interface error

The indicated alarm items are module specific and therefore different for the temperature converter and for pulse isolator

0 – Isolator contains a valid configuration.

Any other setting – configuration error.

The second hexadecimal byte indicates the status of the communications interface. The following error codes are possible.

The message is displayed as a hexadecimal value with the following types of errors (where for example value $03 means two errors: $02 + $01):

- $01 – input signal outside of the measuring range.
- $02 – cold junction out of range.
- $08 – current output ‹frozen›.
- $10 – more status data detected.
- $20 – cold start (reset) detected.
- $04 – current output halted.
- $40 – configuration changed.
- $80 – device is defective.

The message ‹device defective› ($80) will also show up if there is a power failure while programming. Until the configuration is corrected, the module will remain in the defective mode. An error is indicated on the interface module by a flashing green ‹PWR LED› or the ‹FLT LED›.

The messages $01 to $40 do not reflect a defect but indicate a reason for the exception or disturbance.
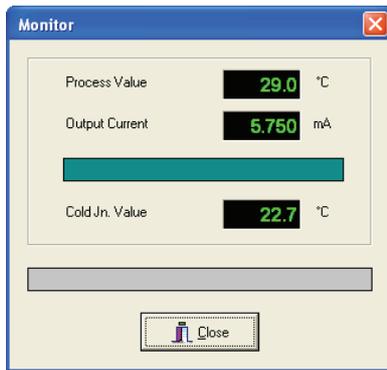
9.2   Monitor

This diagnostic window shows the Process Value, Output Current and the Cold Junction Value. This diagnostic tool remains active as long as the window is open. Data is automatically refreshed once every two seconds.

9.3   Data-Logger

This function allows the user to record either the Process Variable or Output current to a file for viewing with a separate software package e.g. a spread sheet application.

The data logger has a default setting of measuring the Process variable for 10 seconds with 100 reading points and a target file name "DEMO.CSV" but this can be altered by user.

The settings available are:

- Variable to measure – Process variable or Output current

- Interval type – seconds or minutes

- Length of interval

- Number of points

- Filename

For the two-channel MTL45/5576 the data from channel 1 or channel 2 is selected through the window within the display screen.

The data is saved to the file when logging is interrupted or recording has finished.

Note: If the software is in demo mode then the filename "DEMO.CSV" cannot be changed.

Logging commences after pressing the **Start** button. As an indication that logging is active the 'Recording progress' bar gradually moves from left to right. In addition the **Process Value** or **Current** window becomes active, displaying the last sampled value.
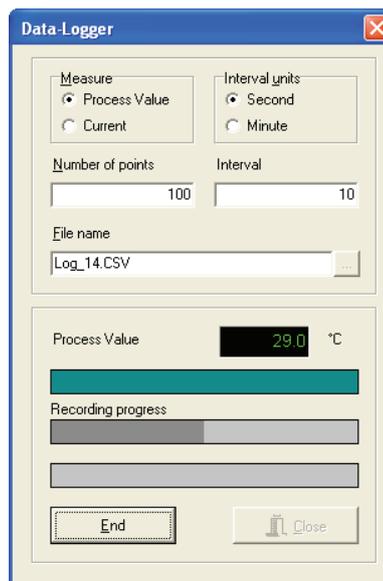
At the end of the logging interval the following type of message appears.

The data logging can be terminated at anytime via the **End** button. The user can opt to save the partial recording to file. If for any reason the data transfer is interrupted the logging will freeze until the PC-Link connection is re-established.
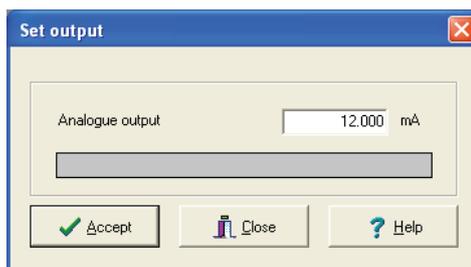
9.4 Set Output

This diagnostic tool lets the user force known values onto the output current loop. It provides the user with a simple test mechanism for establishing the integrity of the current loops. The user is warned that this tool can be used only when the control loop is open.

Type in the required loop current and click **Accept**. The **Set output** window remains active until **Close** is clicked. This enables the user to force successive current values.

9.5 Reset

This feature resets the internal hardware of the isolator module. In normal use the isolator should never require resetting, however under adverse conditions the reset feature can prove useful. If for example the PCL45USB (PC-Link) accidentally becomes disconnected with a forced output, (see section 8.4) then the output would remain in this state even after reconnecting the PC-Link. This is because the isolator has missed the **Close** command, which it needs in order to end current task. The **Reset** feature simply clears the internal buffer, thus restoring normal operation. Alternatively it is possible to clear the buffer by cycling the +24V power supply.

10   PARAMETERS EXPLAINED

10.1   Damping and smoothing

Damping and smoothing are both filter functions, which are configurable, and have different effects on the way the input signal is processed.

Damping, causes conventional single-pole low-pass filtering which is similar to an R-C network.

Smoothing, which is available only for the temperature converters and not the pulse isolators, causes a more ‹intelligent› damping where small changes (noise) are heavily suppressed and large (tendency) changes are processed normally.

Although high damping values will greatly suppress noise and make the output signal stable, it causes a slow response time. The smoothing function avoids this disadvantage by removing the filtering while there are very large signal changes on the input.

Higher damping values are recommended for slow input signals requiring high levels of stability, while fast signals require lower damping values. If in doubt, some experimentation will yield the best results.

10.2   Response time

For the temperature converters the device Response Time can be set to one of the following values:
* Slow (approx. 500ms) default
* Medium (approx. 200ms)
* Fast (approx. 100ms)

Response Time values lower than 500ms are achieved through reduced filtering of the input signal and therefore this selection can be used only with adequate, noise free sensor installation. Note that the measurement accuracy is also reduced with faster processing times as well as affecting stability.

10.3   Output characteristics

The standard current output range for all Eaton's MTL converters is 4-20mA with under/over range 0-22.250mA. The input signal range will be converted, so that the start of the range is corresponding to 4.000mA and the range end to 20.000mA. Input signals outside of the configured range will be converted accordingly into the under- or over range output values. This output characteristic allows the configuration of alarm output signals for some input signal conditions or for specific transmitter status.

The output signal range on the temperature converters MTL575 and MTL576 can be also configured according to the NAMUR-Recommendation NE43, which requires the limitation of the under range to 3.8mA and the over range to 20.5mA.

The output signal range on the pulse isolators MTL5432 can be configured either to the standard 4-20mA range or according to the NAMUR-Recommendation or to Full scale mode (0-20mA). In the Full scale mode the alarm output signal configuration is not available.

Please note that the output has some leakage current and therefore signals below 0.1mA should not be used.

Output current

22.250mA

20mA

20.5mA

Signal limitation
according to NE43

Standard 4-20mA
characteristic

Full scale 0-20mA
characteristic

4mA

3.8mA

Range
begin

Input signal range

Range
end
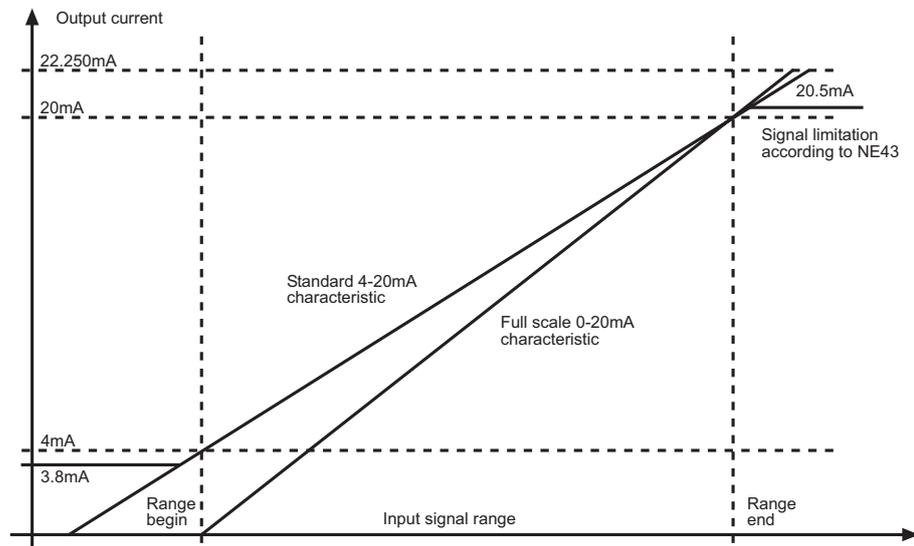
10.4 Early Burn-out Detection

This feature is an aid to anticipate the failure of thermocouple sensors. With age and exposure to temperature cycling the junction of the two dissimilar thermocouple materials starts to break down and eventually becomes an open circuit. This is commonly known as "burnout" of the sensor. Most temperature converters provide the option to drive the output signal upscale or downscale when the sensor becomes open-circuit to activate process protection or to warn the operators (open circuit alarm).

Early Burnout Detection (EBD) enables the monitoring of the sensor connection to detect increasing loop resistance which can forewarn of the sensor breakdown.

When the converter is powered up, or after re-connection of a thermocouple sensor, the loop resistance is measured and stored as a reference. If the loop resistance increases by more than 50ohms then the EBD alarm is activated (relay on and LED lit). Note that this does not initiate upscale or downscale drive activity until the input connection is detected to be an open circuit.

The alarm condition is reset and a new base value of loop resistance is stored after the input thermocouple circuit is open-circuited (remove the connector) or the power is interrupted.

10.5 Pulse output

The Pulse Output on the pulse isolator can be switched off (high impedance) or selected to provide any of the following options:

- 1:1
- toggle
- fixed pulse duration

The "1:1" option selection causes direct signal connection to the input. The output signal frequency and phase conforms to the input (except shape deformation for high frequency).

The "toggle" selection requires specification of a "divider" parameter, chosen in the range 1 to 65534. The pulse output will then "change state" (high to low, or low to high) every n^{th} input pulse.

The "fixed pulse duration" selection requires the specification of "divider" value and pulse "duration" value. The pulse output will then create a fixed duration ON state signal every n^{th} input pulse. The pulse duration can be configured anywhere in the range from 0.05 to 10ms, however care must be taken to ensure that the output signal does not exceed a 50% duty cycle at the chosen maximum input frequency. Refer to Section 7.5 for screen views and further information.

The following figure shows input and output signal examples for all three available options.
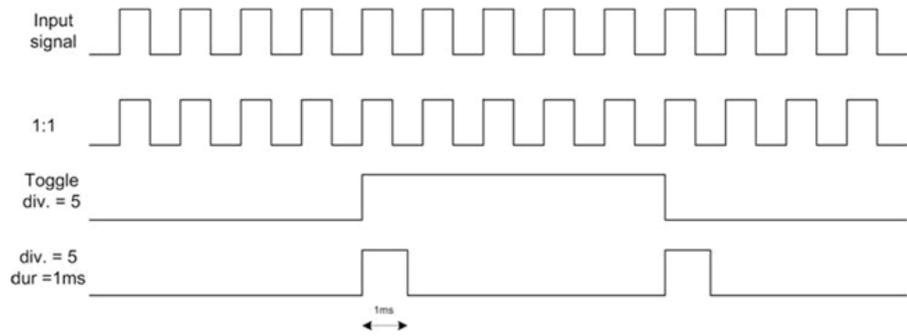
10.6 Leak flow

The current output for the pulse isolator can be limited to a specific value when the input signal sits below a user-specified threshold. This facility is designed to overcome possible issues with low
(or even negative) flow values and permits the user to set the output current to a low level.

The Leak Flow threshold can be set anywhere between 0.75% and 20% of the input signal range and the output current value assigned to this option can be set between 2.000 and 4.999mA. The hysteresis is fixed at 1%, so the switching points will be evaluated as "threshold – 0.5 hysteresis" and "threshold + 0.5 hysteresis".
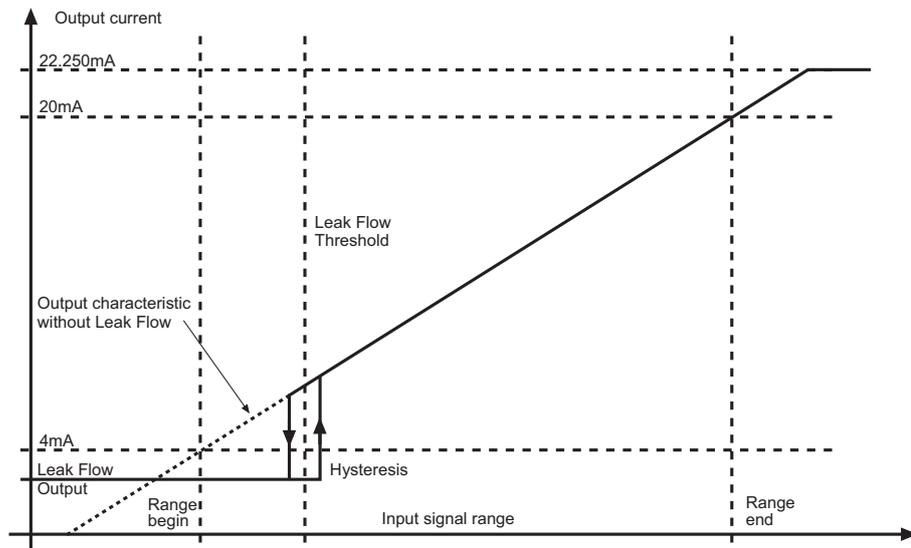
11   FAQs

Q1:   What is the user password.

A1:   PCS45 is shipped with a default user password of MTL.

_____

Q2:   I keep seeing the following message. How do I get out of DEMO mode?

A2:   This normally indicates that the password has not been properly acknowledged and that PCS45 is restricting the user access.

It is worth noting that the "DEMO" text at the bottom of the screen isn't necessarily an indication that the software is locked in DEMO mode. During restricted access operation PCS45 simply adopts its default Tag Name, which is "DEMO".

Close down PCS45 and then restart the application. Afterwards it should automatically prompt the user for their password. If it fails to do so then this is a good indication that the password hasn't been properly acknowledged. The best solution to this problem is to set-up a completely new password, (see section 3.1). In subsequent operations the software should always prompt the user correctly.

_____

Q3:   I don't have the option of USB port on the Options | Port Selection menu?

A1:   Check that you have installed the driver files correctly. See Section 2 for further details.

_____

Q4:   I cannot configure my MTL4532/MTL5532 with the PCS45 software?

A4:   Check that you have set the DIP switches on the module correctly. See Section 7.5 for further details or consult instruction manual INM4500 or INM5500, as appropriate.

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