

Service Manual

Digital Temperature Indicator

JOFRA DTI-1000 A/B

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1.0 General

1.1 Introduction

This service manual applies to the following instruments:

- JOFRA DTI-1000 A
- JOFRA DTI-1000 B

All indicators are produced from quality components by skilled staff.

Each indicator passes several tests during assembly and undergoes a final inspection and test following a special calibration procedure laid down by our technical staff.



Caution...

If you decide to check and/or re-calibrate the indicator, you must **always** use certified test equipment only.

Operating guidelines and technical specifications are outlined in the reference manual order no. 124745. Please note that the reference manual is only available in English.

Technical assistance

The following information regarding testing and repair was correct at the time of issue. Do not hesitate to contact our service department or your local distributor, however, if you have further queries.

AMETEK DENMARK A/S
Gydevang 32- 34
DK-3450 Allerød

Phone: +45 48 16 80 00
Fax: +45 48 16 80 80



Note...

Please note that we would be very interested in hearing from you if you have any ideas or suggestions for changes to our products.

1.2 Safety instructions



Read this manual carefully before doing any maintenance on the instruments!

Please follow the instructions and procedures described in this manual in order to maintain the instruments correctly and to avoid any personal injuries and/or damage to the instruments.



Warning

- The indicator is designed for **interior use only** and should **not be used in risk-prone areas**, where vapour or gas leaks, etc. may constitute an explosives hazard.



Note...

- The product liability **only** applies if the instrument is subject to a manufacturing defect. This liability becomes void if the service personnel fails to follow the maintenance instructions set out in this manual or uses unauthorised spare parts.

2.0 Adjusting and calibrating the instrument

You are advised to return the DTI-1000 A/B to Ametek Denmark A/S or an accredited laboratory at least once a year for calibration.

Alternatively you can calibrate/adjust the DTI-1000 A/B yourself using the AmeTrim-ATC/DTI Adjust and Calibration software. AmeTrim-ATC/DTI also supports DTI-100 and DTI-1000 manufactured in 1996 or later or with firmware version 1.60 or later. This software is divided into 5 different processes:

- **Reference sensor:** Use this feature to manage the coefficients of the sensors in the DTI.
- **Set to default values:** Use this feature to set internal reference resistor values to default values, if odd values have been downloaded.
- **RTD-input adjustment:** Use this feature to calculate and download new values for internal reference resistors.
- **Calibration date:** Use this feature to download a new calibration date to the DTI.
- **Analog output adjustment:** Use this feature to adjust the analog output (only DTI-1000 with firmware version 1.60 or earlier).

2.1 Introduction to AmeTrim-ATC/DTI Software

This software is supplied on the JOFRACAL CD-ROM. It can be run directly from this CD-ROM and requires no special installation. It is possible to make a disk containing the AmeTrim-ATC/DTI software. From this disk AmeTrim-ATC/DTI can be installed on the hard disk of the computer, but the disk has to be in the disk drive when running the software.

To use the software, you need:

PC hardware requirements

- IBM compatible PC with 486 or higher processor (Pentium™ 200 MHz recommended).
- 32 MB of RAM (64 MB recommended).
- 4 MB available hard-disk space.
- Standard VGA monitor (800 x 600, 256 colours), (1024 x 768 recommended).
- CD-ROM drive.
- One vacant RS 232 Serial Port.

PC software requirements

- Microsoft Windows®98, Microsoft Windows® NT 4.0, Microsoft Windows® 2000, Microsoft Windows® ME, Microsoft Windows® XP.
- System font: MS Sans Serif and Arial.

2.2 Installing the AmeTrim-ATC/DTI Software

The software comes on a CD-ROM and is ready to run – no installation is required. Simply insert the CD-ROM and run the ATC/DTI-adjustment program.

2.2.1 Connecting the PC and the ATC/DTI



Caution...

1. Ensure that both the PC and the ATC/DTI are switched off at the mains. Failure to do so may result in your equipment being damaged.
2. Connect the serial cable provided to the “RS 232” port on the back of the DTI and to the COM port on the PC.
3. Switch on the PC and the DTI.

2.2.2 Starting the AmeTrim-ATC/DTI Software



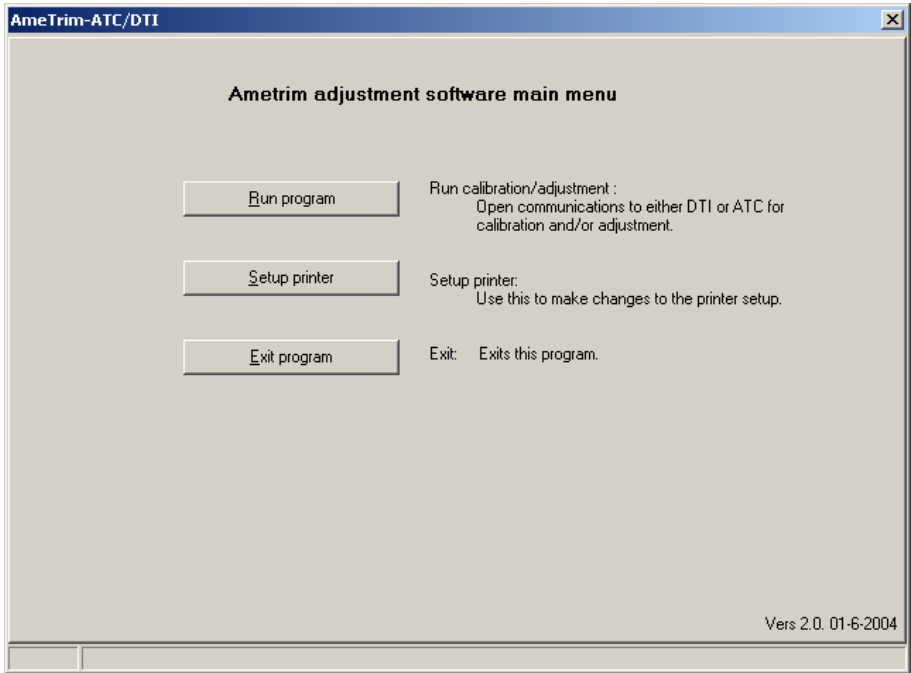
Note...

Before starting this software, the PC and the ATC/DTI must be connected together and the indicator switched on (see section 2.2.1).

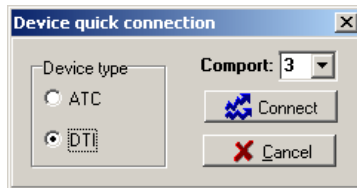
The ATC must not be performing any tasks like switch test, auto step or workorders. That means that the ATC must be in the main menu before starting the software.

Use the normal Windows procedure to start the AmeTrim-ATC/DTI software.

If you are unsure on how to start software programs, refer to your Windows Help

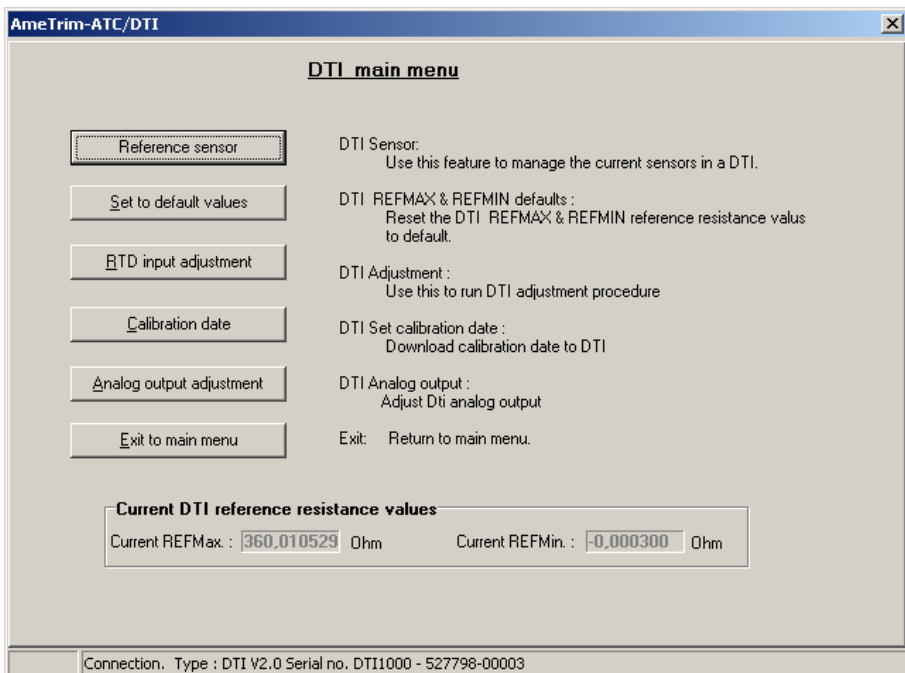


In the main menu select “Run Program” to start the calibration.



Select “DTI” and “Comport” in the “Device Quick Connect” dialog box and press “Connect”. If the DTI is not switched on or is not connected to the selected port, then the software returns to the Ametrin adjustment software main menu.

As the software starts, it detects the type of calibrator connected to the PC and reads its serial number. This information is displayed at the bottom of the DTI main menu window



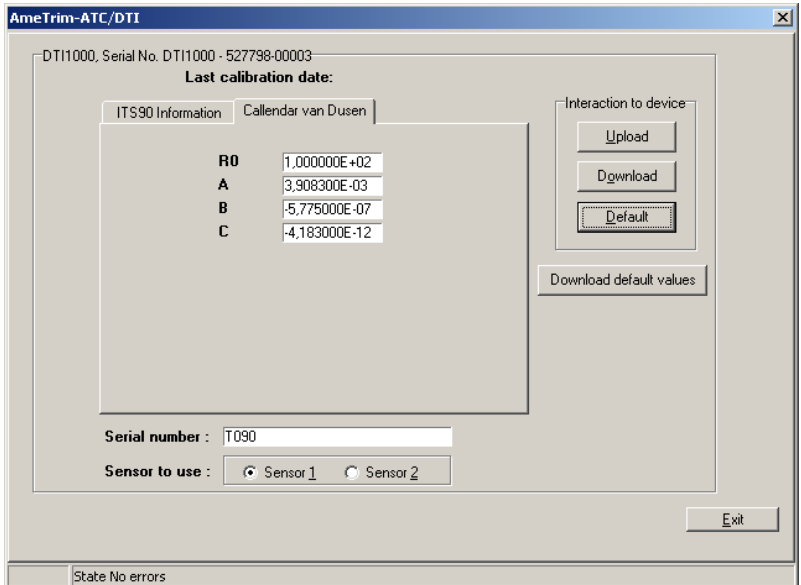
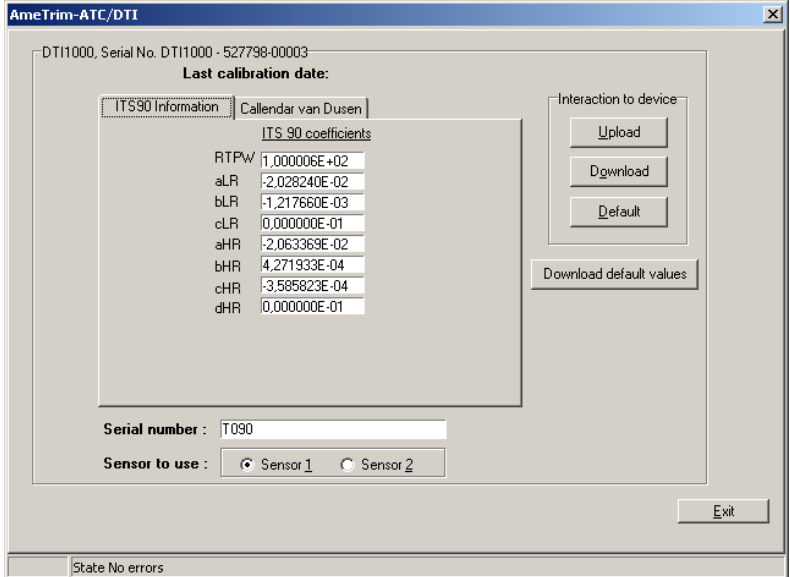
2.2.3 Reference sensor

This option enables you to view the calibration values currently loaded in the DTI for the reference sensors as well as enter and download values for new reference sensors. In addition to the equipment already described in sections 2.1 and 2.2.1, you also require the calibration certificate for the new reference sensor.







In DTI main menu, click “Reference sensor”.

A new dialogue with a table containing the coefficients stored in the DTI for sensor 1 and sensor 2. Current sensor coefficients are automatically uploaded.



To enter values for a new reference sensor

-  Click a radio button to select sensor 1 or sensor 2. And press “Upload” to read current coefficients.
-  Type in a unique and descriptive name for the reference sensor.

Use the mouse to position the pointer in the boxes in the table.
-  Select “ITS-90” or “Callendar van Dusen coefficients” and type in the coefficients from the Calibration Certificate supplied with the reference sensor.
-  When all the values from the Calibration Certificate have been entered, click “Download” values.

When the values are downloaded they overwrite the ones stored in the calibrator.

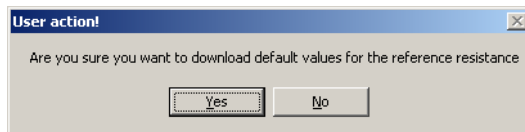


Note...

These coefficients are not saved. Therefore, they must be typed in and downloaded when they need to be used.

2.2.4 Default values

This option downloads a set of default values, which are stored in the AmeTrim-ATC/DTI software.



Press “Yes” to download default values to the DTI.

2.2.5 RTD input adjustment

This option allows you to adjust the DTI by calculating and downloading new values for the internal reference resistors. For adjusting the internal reference resistors you need the following:

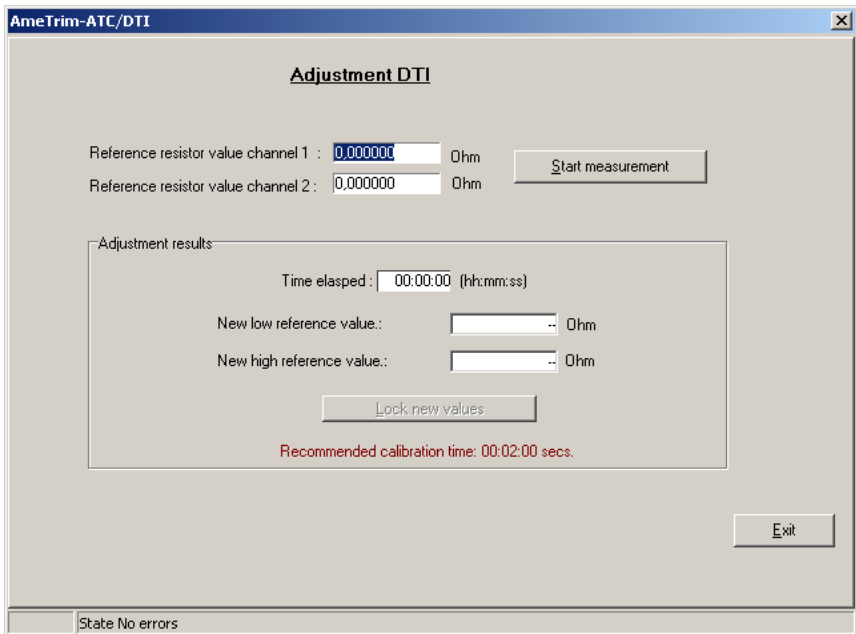
DTI-100 / DTI-1000 / DTI-1000 A :

50 ohm resistor
350 ohm resistor

DTI-1000 B :

12 ohm resistor
85 ohm resistor

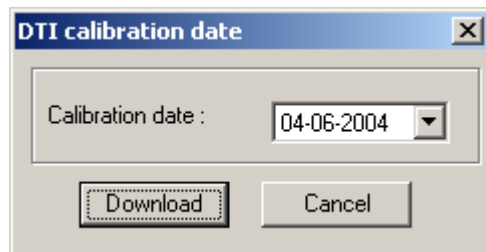
It is recommended to use resistors with an accuracy of 6 ppm or better.



Connect the reference resistors to the input channels and enter the resistor values. Press “Start measurement”, wait until the readings for “New low reference value” and “New high reference value” have stabilized (approx. 2 minutes) and press “Lock new values” to stop the measurement. The locked values can now be downloaded to the DTI or cancelled.

2.2.6 Calibration date

This option allows you to change the calibration date without adjusting the DTI.

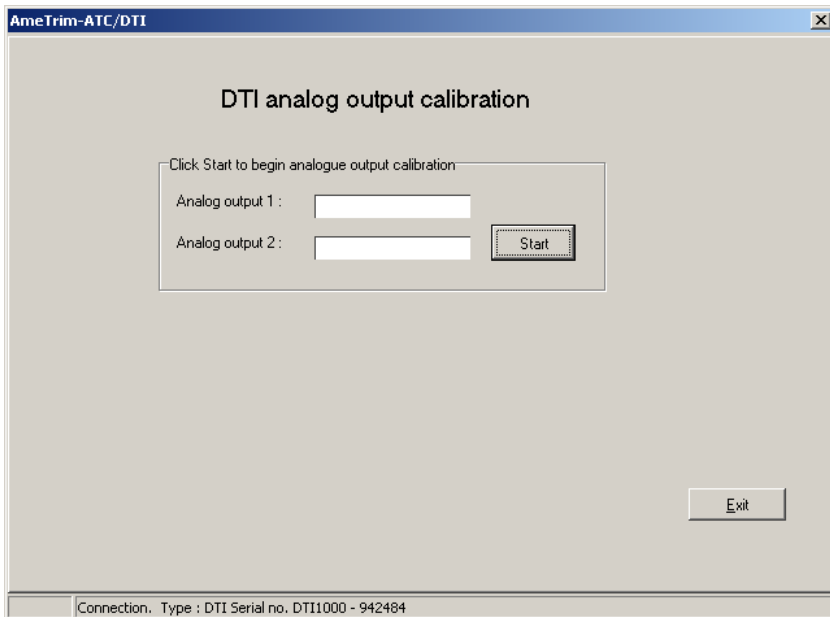


Select the date of calibration and press “Download”.

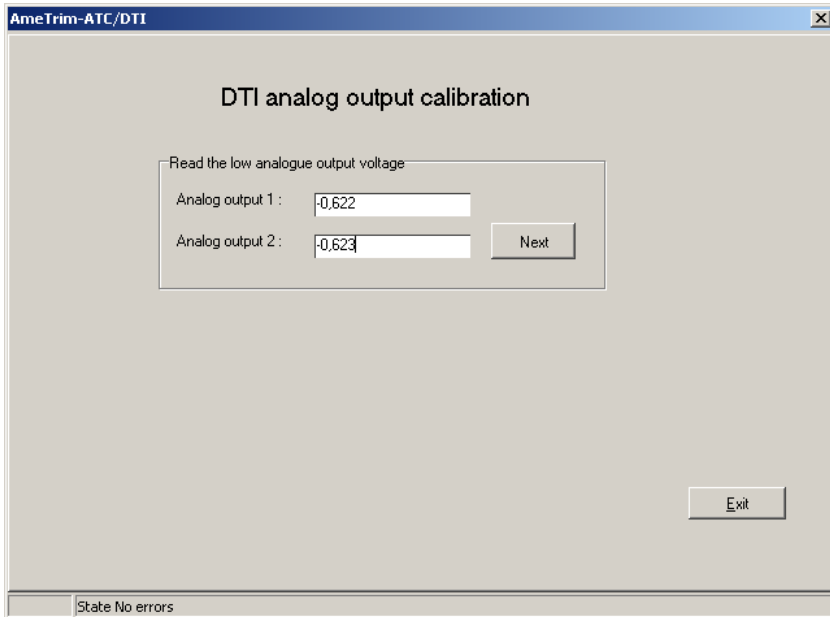
2.2.7 Analog output adjustment

(only DTI-1000 with firmware ver. 1.60 or earlier).

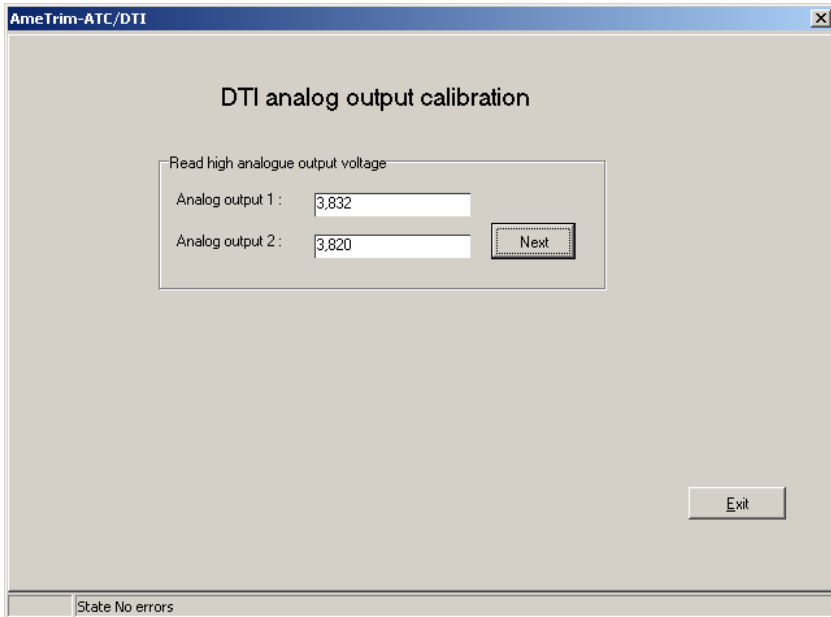
This option allows you to adjust the analog output of the DTI-1000. For adjusting the analog output you need a voltmeter 0V to 5V range with 0.1mV resolution and an accuracy of 0.1 mV.



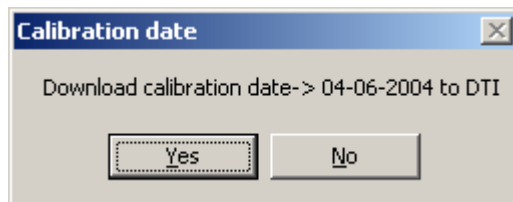
After entering the DTI analog output adjustment window, press "Start" to begin the adjustment procedure.



Measure the output voltages of the two analog outputs, enter the values and press “Next”.



Repeat the measurement of the output voltage for high output, enter the values and press “Next”.



Press “Yes” to download calibration date and then “Exit” to return to the main menu.

2.3 Setup Printer

This option provides a standard Windows® procedure which enables you to edit the settings for the current printer or change to another printer.

If you are unsure how to use these settings, refer to your Windows® Help.

3.0 Repairs



Warning

The indicator **must** be switched off before any attempt is made to service the instrument.



Note...

Ametek Denmark's liability ceases if:

- Parts are replaced/repaired using spare parts which are not identical to those recommended by the manufacturer.
- non-original parts are used in any way when operating the instrument.

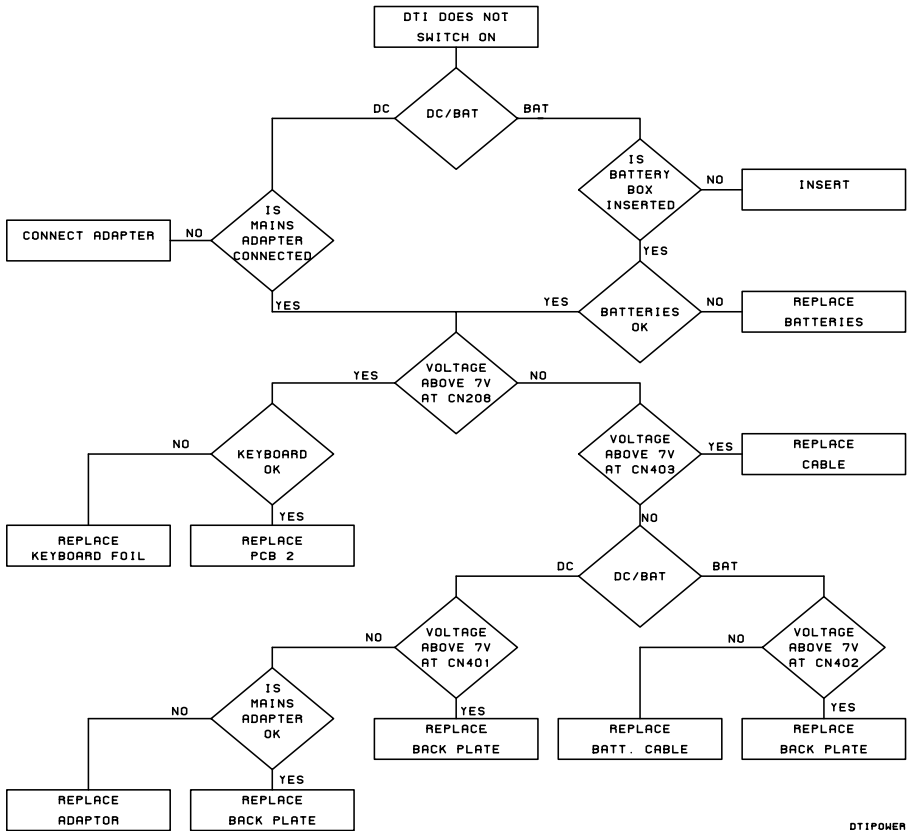
Ametek Denmark's liability is restricted to errors which originated in the factory.

3.1 Trouble shooting

Following nos. are used in the list in order to locate them on the specific PCB:

TOP PLATE:	1xx	(ex. CN104)
DIGITAL:	2xx	(ex. CN204)
ANALOG:	3xx	(ex. CN304)
BACK PLATE:	4xx	(ex. CN404)

Error: DTI does not switch on

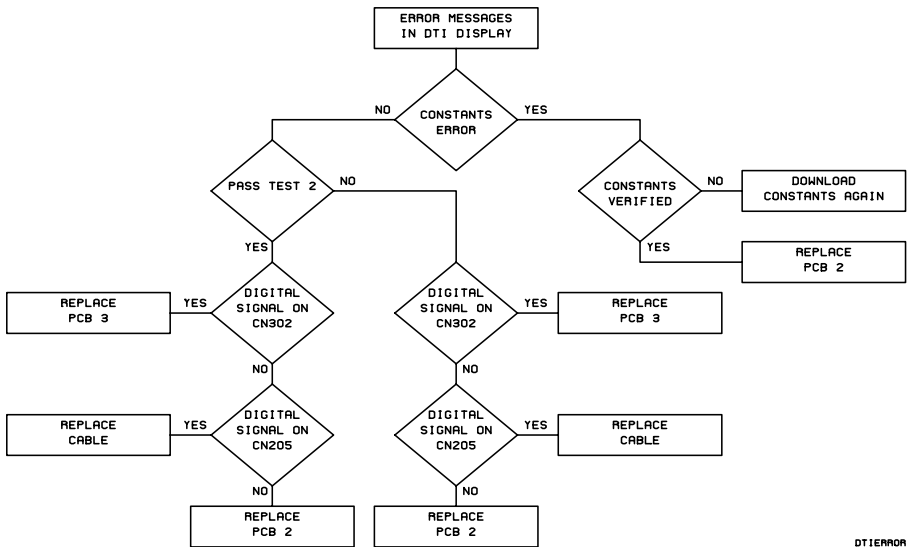


DTIPOWER

Following nos. are used in the list in order to locate them on the specific PCB:

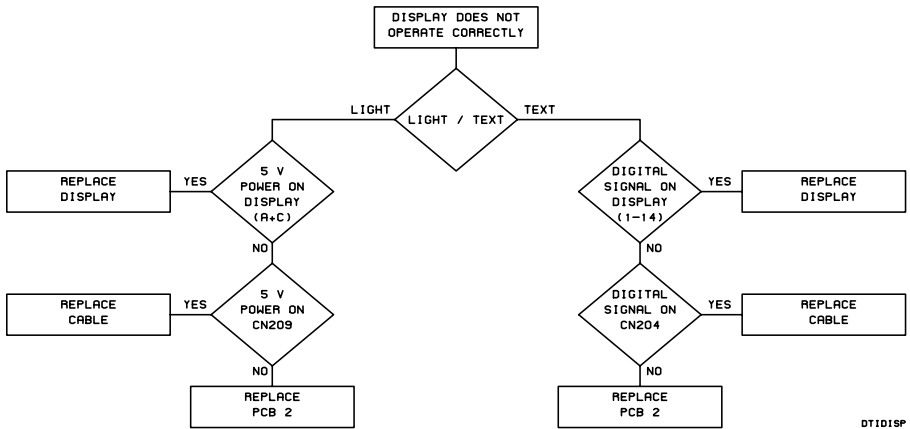
TOP PLATE: 1xx (ex. CN104)
DIGITAL: 2xx (ex. CN204)
ANALOG: 3xx (ex. CN304)
BACK PLATE: 4xx (ex. CN404)

Error: Error message in DTI display



DTIERR09

Error: Display does not operate correctly

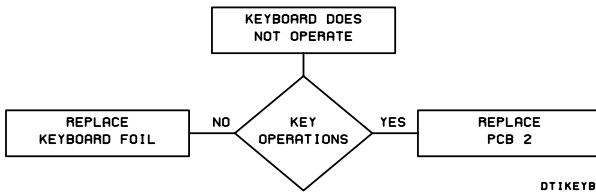


DT1019P

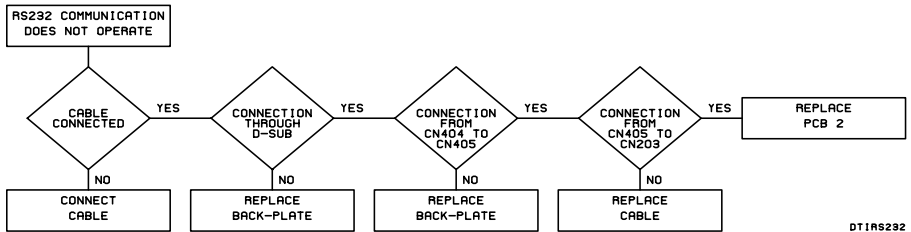
Following nos. are used in the list in order to locate them on the specific PCB:

- TOP PLATE: 1xx (ex. CN104)
- DIGITAL: 2xx (ex. CN204)
- ANALOG: 3xx (ex. CN304)
- BACK PLATE: 4xx (ex. CN404)

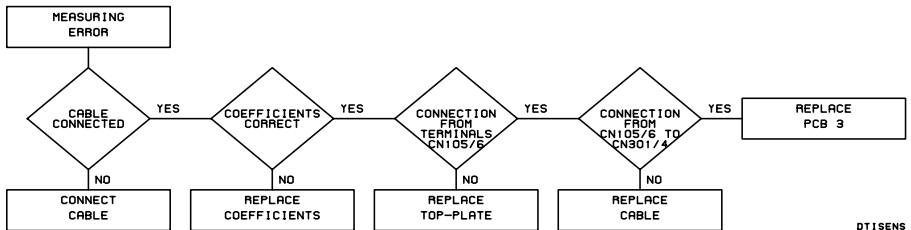
Error: Keyboard does not operate correctly



Error: RS232 communication does not operate correctly



Error: Measuring error on the sensors



3.2 Replacement of spare parts

See exploded views in Chapter 4.0.



Caution...

Remember to disconnect the instrument from the mains supply before it is dismantled.

Necessary tools:

- Screw drivers
- 7 mm wrench

To dismount the instrument please follow this procedure after disconnection from mains adaptor.

Tools: Screw drivers, pozi screw drivers.

A. Removal of bottom plate

Unscrew the screws (pos. 19) with a screw driver and remove the star washers (pos. 20). Unscrew the screws (pos. 6) with a pozi screw driver and remove the star washers (pos. 7).

B. Removal of digital and analog PCB

Remove the cable from the connectors (CN2) of the analog PCB (pos. 13) which are the cable connected to the top-plate unit (pos. 17).

Remove the cables from the connectors (CN2+CN3) of the digital PCB (pos. 12) which are the cables connected to the display unit (pos. 15).

Remove the cable from the connectors (CN1+CN9) of the digital PCB (pos. 12) which are the cables connected to the back-plate unit (pos. 10).

Pull out the digital and analog PCB and remove the cable between the two.

C. Removal of the back plate unit

Unscrew the screws (pos. 11) with a pozi screw driver and pull out the unit.

D. Removal of the top plate unit

Unscrew the upper screw in the back plate (pos. 11) and one of the nuts (pos. 27). Unscrew the screws (pos. 18) with a pozi screw driver and pull up the unit.

E. Removal of the display unit

Unscrew the nuts (pos. 24) and pull out the unit.



Note...

Instruments should be reassembled in reverse order. Ensure that all parts are in good working order and that all wires are connected correctly.

4.0 Spare parts and drawings

4.1 Spare parts - in general

All parts listed in the lists of spare parts (see exploded views) can be obtained from the factory through our dealer.

Please contact your dealer for assistance if you require parts, which do not appear on the list.

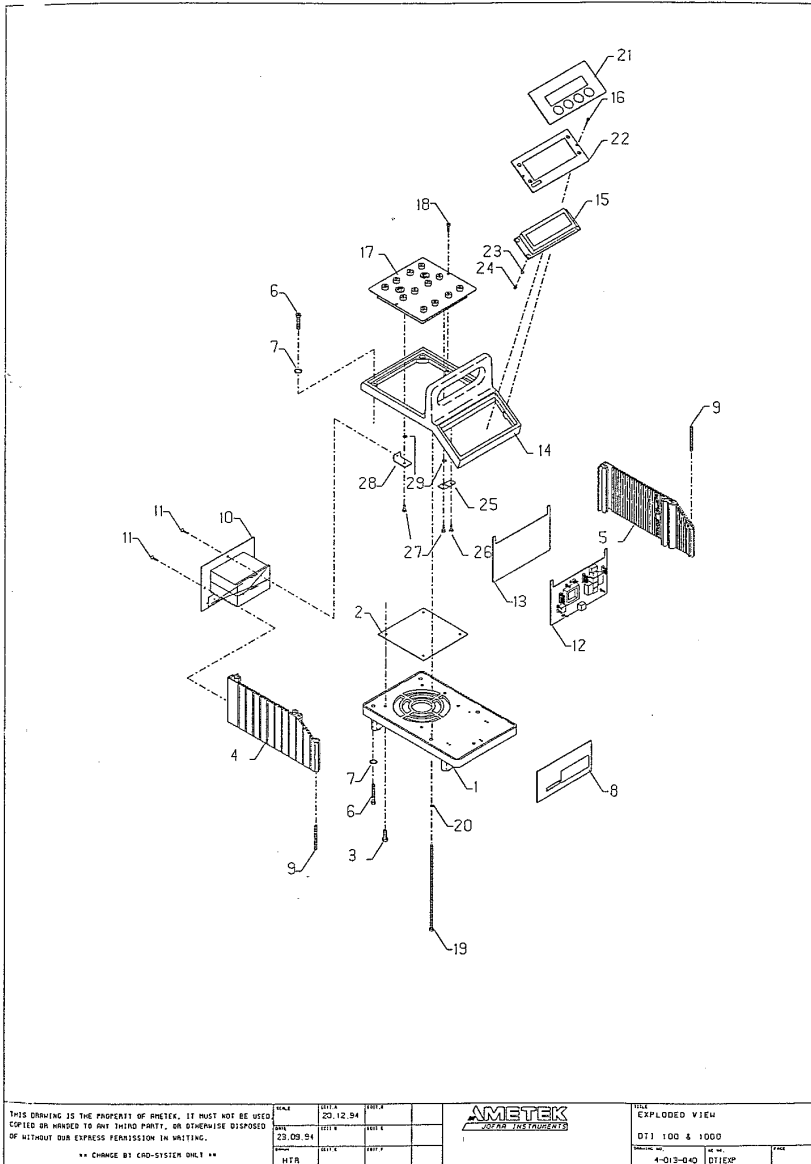
4.2 List of spare parts – DTI-1000 A/B

Pos.	Spare parts	Number
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(Compare exploded view, next page)

1	Rubber foot for bottom part, black	60G032
10	Back plate unit	125176
12	Digital PCB	124624
13	Analog PCB, DTI-1000 A	125179
13	Analog PCB, DTI-1000 B	125180
15	Display	125229
17	Top plate unit	125230
21	Keypad	124609

4.3 Exploded view – DTI-1000 A/B



THIS DRAWING IS THE PROPERTY OF AMETEK. IT MUST NOT BE USED, COPIED OR HANDS TO ANY THIRD PARTY, OR OTHERWISE DISPOSED OF WITHOUT OUR EXPRESS PERMISSION IN WRITING.

DATE	REV. #	DESCRIPTION
23.09.94	20.12.94	
HFA		



FILE	EXPLODED VIEW
DTI 100 & 1000	
REV. #	DATE
4-013-040	DTIEXP

4.4 Wiring diagram – DTI-1000 A/B

