Service Manual

Temperature Calibrator

JOFRA ATC-125/140/155/156/157/250/320/650 A/B

List of contents

1.0 General

1.1 Introduction

This service manual applies to the following instruments:

- **JOFRA ATC-125 A/B**
- **JOFRA ATC-140 A/B**
- **JOFRA ATC-155 A/B**
- **JOFRA ATC-156 A/B**
- **JOFRA ATC-157 A/B**
- **JOFRA ATC-250 A/B**
- **JOFRA ATC-320 A/B**
- **JOFRA ATC-650 A/B**

All calibrators are produced from quality components by skilled staff.

Each calibrator passes several tests during assembly. It undergoes a final inspection and test, followed by a special calibration procedure laid down by our technical staff.

Caution…

If you decide to check and/or re-calibrate the calibrator, you must **always** use certified test equipment only and ensure proper contact between the test probe and the well of the calibrator.

Operating guidelines and technical specifications are outlined in reference manual order no. 105446. Please note that this 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, if you have further queries.

AMETEK Denmark A/S
Gydevang 32- 34
3450 Allerød
Denmark

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.

For a more detailed description of the safety instructions we refer to the reference manual 105446 or the user manual 105447.

Safety Symbols

This manual contains a number of safety symbols designed to draw your attention to instructions that must be followed when using the instrument, as well as any risks involved.

Warning

Events that may compromise the safe use of the instrument and result in considerable personal or material damage.

Caution…

Events that may compromise the safe use of the instrument and result in slight personal or material damage.

Note…

Special situations which demand the user's attention.

1.3 Adjusting and Calibrating the Instrument

For adjusting and calibrating the instrument we refer to the reference manual 105446, section 7.2.

Please follow the guidelines in chapter 5.0 “Storing and transporting the calibrator” in the reference manual in order to care properly for the instrument after use.

2.0 Repairs

Warning

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

Note…

If the software detects an error during operation, the error will be shown in the display.

Make a note of the error message and contact your distributor or AMETEK Denmark's Service Department.

AMETEK Denmark's liability ceases if:

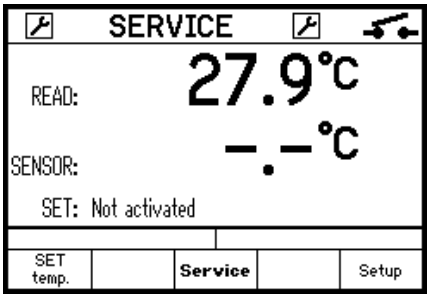
- parts are replaced/repaired using spare parts, which are not identical to those recommended by the manufacturer.
- non-original parts are used in any way when repairing the instrument.

AMETEK Denmark's liability is restricted to errors that originated from the factory.

2.1 Service Menu

In the Service Menu it is possible to check a number of conditions in the equipment. To reach the Service Menu, follow the procedure described on the following pages:

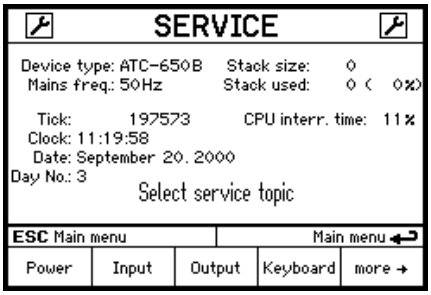
☞ Turn the equipment on while pressing the i and ESC button. The start sequence stops and the following menu appears:



The instrument can now be monitored while still functioning normally, however, there is no access to the functions Switch Test and Auto Step. Likewise, Work Orders cannot be executed.

2.1.1 Service Main Menu

☞ Press F3 and the Service Menu will appear



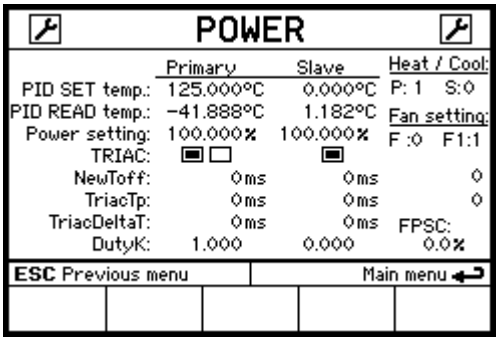
Following information can be seen

- **Mains freq** shows mains frequency, which is measured by the ATC itself. This has to comply with the actual mains frequency (50Hz or 60 Hz)
- **Tick** is a counter with 1ms increment that starts when the instrument is turned on.

- **Clock and date**. These are set by the factory and cannot be changed from the keyboard. When AmeCal or JOFRACAL downloads work orders to the ATC, the clock is synchronised with the PC so the time stamp on the certificates follows the PC, which has set up the ATC.
- **Day No**. registers the number of days that the instrument has been switched on.

2.1.1.1 Service Power Menu

☞ Press F1 in the Service Menu and the Service Power Menu will appear.



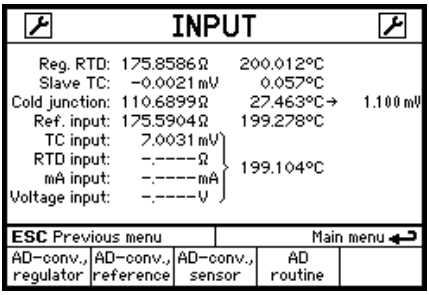
The information has been listed in 2 columns, relating to the primary regulator and the differential regulator (Slave), respectively. The slave readout shows the activity in the top zone. (ATC-155 does not have a top zone).

- **PID SET temp**. tells which temperature the calibrator is set to (even if it is not activated) (“Slave” is always set to 0)
- **PID READ temp**. explains the readout of the regulating sensor in °C.
- **Power setting** informs about the regulation percentage in the two PID regulators.
- **NewToff, TriacTp, TriacDeltaT** are calculated time for the Triac’s. These variables are set to zero on the cooling calibrators.
- **DutyK** is a variable compensation for alternating mains voltage. At nominal mains voltage (230V or 115V) this is approx. 1.00
- **Heat/cool** explains whether the regulation is heating or cooling.

- **Fan setting** tells about the speed of the fan.
- **FPSC %** control signal for Stirling engine only visible for ATC-125.

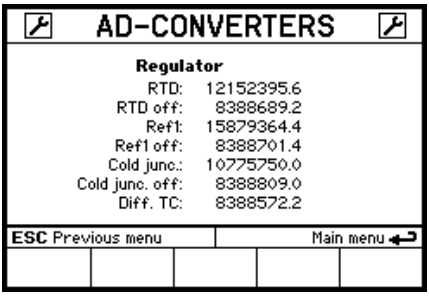
2.1.1.2 Service Input Menu

☞ Press F2 in the Service Menu and the Service Input Menu will appear.



Measurements performed by the A/D-converters are displayed in the two columns. The first column shows values as electrical units and the other column the corresponding values in °C.
Next to **Cold Junctions** also a converted mV value is displayed. This value is the voltage the chosen thermocouple type has to be compensated with.

☞ Press F1 in the Input Menu and the regulating AD-converters Menu will appear.



Shown here are the A/D-converted values for the regulating sensors.

The displayed values are typical values.

RTD, RTD off, Ref1, Ref1 off and **Cold junc.**

RTD off has to be between 8.300.000 and 8.500.000.

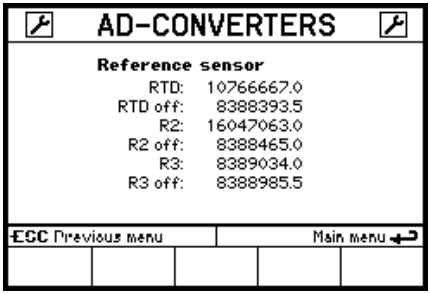
RTD will have a value, which is depending on the temperature in the well. The value will vary between 10.000.000 and 16.000.000. If the value is 16.777.215 and Ref1 at the same time is below 9.000.000, there is probably an error with the Pt100 sensor in the block.

Ref 1 must have a value between 15.000.000 and 16.700.000. If the value is 16.777.215 or is below 15.000.000, there is an error in the circuit.

Cold junc. will have a value, which is depending on the temperature in the instrument. The value may vary between 10.500.000 and 12.000.000. If the value is 16.777.215, and Ref1 at the same time is below 9.000.000, there is probably an error with the Pt100 sensor, placed in the thermocouple connector on the front panel.

Diff. TC has to be between 8.300.000 and 8.500.000, when the calibrator is stable.

☞ Press ⓟ in the Service Input Menu and the Reference sensor AD-converter Menu will appear.



Shown here are the A/D-converted values for the measurements on the external reference. The shown values are typical values.

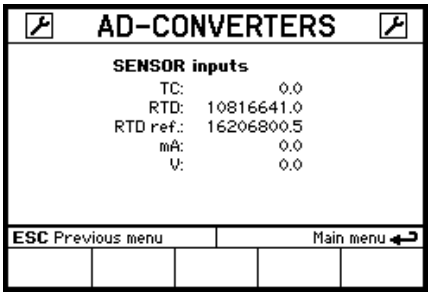
RTD, RTD off, R2, R2 off, R3 and **R3 off**.

RTD off, R2 off, R3 and **R3 off** have to be between 8.300.000 and 8.500.000.

RTD will have a value, which is depending on the temperature in the well. The value may vary between 10.000.000 and 16.000.000. If the value is 16.777.215 and R2 at the same time is below 9.000.000, there is probably an error with the external reference sensor.

R2 must have a value between 15.000.000 and 16.700.000. If the value is 16.777.215 or below 15.000.000, there is an error in the circuit.

☞ Press in the Service Input Menu and the Sensor input AD-converter Menu will appear.



Shown here are the A/D-converted values for the measurements on the **SENSOR inputs**.

The shown values are typical values. The values are only updated for the inputs that are active.
The values for RTD and RTD ref. apply, when a Pt100 has been chosen as sensor.

TC must have a value between 8.300.000 and 8.500.000, when the input is short-circuited.

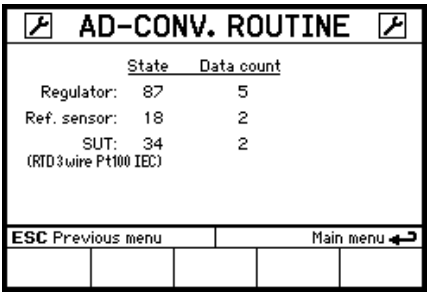
RTD must have a value between 10.000.000 and 11.000.000, when a 100-ohm resistance is connected to the input.

RTD ref must have a value between 15.000.000 and 16.700.000.
The values for RTD and RTD ref. apply, when a Pt100 has been chosen as sensor.

mA must have a value between 32.000 and 33.500, when the inputs are open. At 20mA the value must be between 58.000 and 61.000.

V must have a value between 32.000 and 33.500, when the inputs are short-circuited. At 10V the value has to be between 56.000 and 59.000.

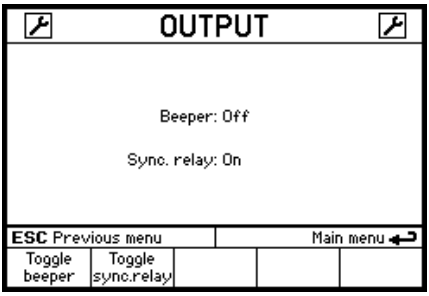
☞ Press F4 in the Service Input Menu and the AD-converter Status Menu will appear.



Information on A/D-converter status.

2.1.1.3 Service Output Menu

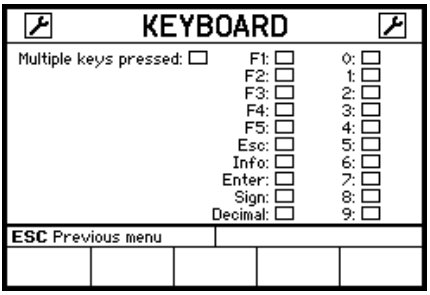
☞ Press F3 in the Service Main Menu and the Output Menu will appear.



Here it is possible to test whether the beeper works and whether the Sync. relay can change.

2.1.1.4 Service Keyboard Menu

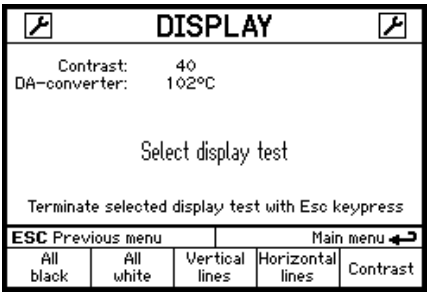
☞ Press F4 in the Service Main Menu and the Keyboard Status Menu will appear.



Here the individual keys may be tested.

2.1.1.5 Service Display Menu

☞ Press F5 followed by F2 in the Service Main Menu and the Display Status Menu will appear.



Here contrast setting is shown in %.

Also, it is possible to show various pictures to test the display.

For further information about operation of display see user manual 105447, section 3.12.

2.2 Trouble Shooting

Error code: **10**

Error message: Display called recursively

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **11**

Error message: Display structure no. illegal

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **21**

Error message: Display array index illegal

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **22**

Error message: Display array called recursively

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **23**

Error message: Display array structure No. illegal

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **24**

Error message: Display array index mismatch

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **25**

Error message: Variable type illegal

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **30**

Error message: Negative array index

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **50**

Error message: Too many edit fields

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **60**

Error message: Too many slow data fields

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **61**

Error message: Too many fast data fields

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **70**

Error message: Too many listbox lines

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **80**

Error message: Message on message not allowed

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **81**

Error message: No message to remove

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **100**

Error message: Calibrator type illegal

Likely cause:	Solution:
Wrong calibrator type setting	Check that calibrator setting is correct on Main PCB (see section 2.3.1 on DIP Switch Setting)

Error code: **200**

Error message: MenuLevel too high

Likely cause:	Solution:
Internal software error	Please report error to AMETEK Denmark A/S.

Error code: **300**

Error message: AD-converter not responding

Likely cause:	Solution:
Error in communication with one of the A/D-converters	Check that all voltages on the power PCB are correct. If they are, the Main PCB is defective. Replace the Main PCB. If not, replace Power PCB.

Error code: **310**

Error message: Slave temperature too high

Likely cause:	Solution:
When main adjustment has become stable, differential temperature between top and bottom is still outside the limits.	Check measuring circuit with a short circuit in the differential TC connection (CN16 on input board) instead of the sensors. Check in Service Input Menu that Slave TC shows 0°C±0.1°C. If this is OK, there is an error on the sensor. Otherwise, there is an error on the Main PCB.

Error: **No light in display**

Error message: -

Likely cause:	Solution:
Defective fuse	Check fuses in the mains inlet Check fuses on the Power PCB ATC-125 (F1 – F6) ATC-140/155/156/157 (F1 – F7) ATC-250/320/650 (F1 – F7)
Defective regulator on Power PCB	Check supplies and replace PCB if necessary

Error: **No readout in display**

Error message: -

Likely cause:	Solution:
Communication between CPU and display is defective	Check ribbon cable between Main PCB and display PCB Check ribbon cable between display PCB and display module

Error: **One or more keys are not functioning**

Error message: -

Likely cause:	Solution:
The connection to the Main PCB is defective	Check cable connection between the keyboard and the display PCB Check all keys in the Service Menu

Error: **Calibrator does not heat (ATC-250/320/650)**

Error message: -

Likely cause:	**Solution:**
Defective well	Check impedance of the heating elements (29Ω +10% - 5% for each of the main elements and 96Ω +10% - 5% for each of the top elements). For ATC-250 main 60Ω ±10% and top 200Ω ±10%. Turn on the instrument and set the SET temperature to max. temp. (250°C (ATC-250), 320°C (ATC-320) or 650°C (ATC-650)). Check that relay K1 has been pulled. If the relay has not been pulled, check with a short circuit in the connector CN4. If this pulls the relay, the sensor is defective. Change the sensor if possible, otherwise change the entire well, adjust and calibrate the unit.
Defective Power PCB	If this does not pull the relay the Power PCB is defective. Change and adjust the Power PCB.

Defective Power PCB	If the 3 LED's on the Power PCB are not lit, measure the following voltages on the terminals of CN3 with the Main PCB connected. 11 (+) to 12 (-) U > 0,6V 17 (+) to 18 (-): U > 0,6V 19 (+) to 20 (-): U > 0,6V 15 (+) to 16 (-): U > 1,0V The voltages will appear in pulses. If these are below the limits change the Main PCB, adjust and re-calibrate the calibrator. If not, change and adjust the Power PCB.

Error: **Calibrator does not cool or heat sufficiently (ATC-155 only).**

Error message: -

Likely cause:	**Solution:**
Defective well	Set the SET temperature to –50°C. On the power PCB measure the voltage between CN8 terminal 1(+) and terminal 2(-) and the voltage between CN1 terminal 1(+) and terminal 2(-). If the voltage on CN1 is higher than 30V replace the well and re-calibrate the unit. If the voltage on CN8 is 0.45V ±0.01V and the calibrator does not cool down sufficiently, replace the well and re-calibrate the unit.
Defective Power PCB	If the voltage on CN1 is less than 30V and the voltage on CN8 differs from 0.45V ±0.01V, adjust R9 until the voltage is 0.45V ±0.01V. If it is impossible to adjust the voltage on CN8, replace the Power PCB.

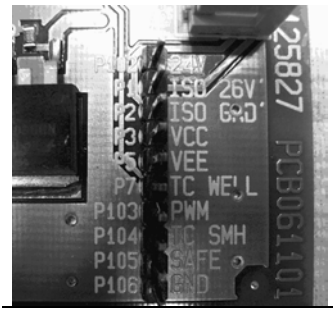
Error: **Calibrator does not cool or heat sufficiently (ATC-140/156/157 only).**

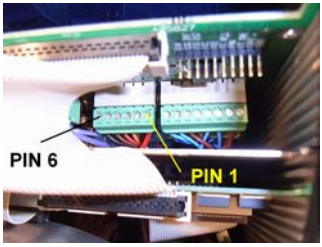
Error message: -

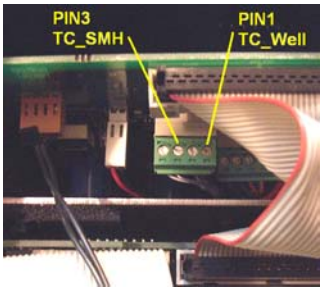
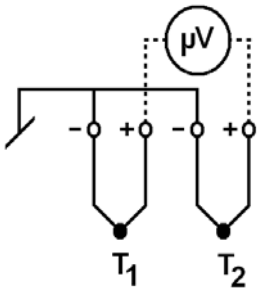
Likely cause:	Solution:
Defective well	Set the SET temperature to –50°C. On the Power PCB measure the voltage between CN3 and CN6 terminal 1(+) and terminal 2(-) and the voltage between CN1 and CN4 terminal 1(+) and terminal 2(-). If the voltage on CN1 and CN4 is higher than 30V replace the well and re-calibrate the unit. If the voltage on CN3 and CN6 is 0.33V ±0.01V and the calibrator does not cool down sufficiently, replace the well and re-calibrate the unit.
Defective Power PCB	If the voltage on CN1 is less than 30V and the voltage on CN3 differ from 0.33V ±0.01V, adjust R6 until the voltage is 0.33V ±0.01V. If it is impossible to adjust the voltage on CN6, replace the Power PCB. If the voltage on CN4 is less than 30V and the voltage on CN6 differ from 0.33V ±0.01V, adjust R16 until the voltage is 0.33V ±0.01V. If it is impossible to adjust the voltage on CN16, replace the Power PCB.

Error:	**Calibrator does not cool or heat sufficiently or is slower than specified (ATC-125 only).**

Error message: -

Likely cause:	**Solution:**
	Set the calibrator to –90°C Check voltages on test pins: Between GND and 24V >23V Between GND and TC_Well 1,4V+(6.20 mV/°C x T) Between GND and PWM >1V and <2V Between GND and TC_SMH 0,8V+(6.20 mV/°C x T) Between GND and SAFE >4,5V
Defective Power PCB	Set the SET temperature to 125°C. On the Power PCB measure the voltage between test pin 24V and GND. If the voltage is less than 23V, pull out CN103 and re-measure. If the voltage still is too low, check fuse F3 on Power PCB, else replace Power PCB. If pulling out CN103 re-establishes the 24V, the Stirling Controller PCB is defect.
Defect safety thermocouples	If “Safe” is low, check “TC_Well” or “TC_SMH”. If defective replace the sensor.
Broken ribbon cable	If the PWM signal is missing, the 34-poled ribbon cable between Main Board and Power Board is broken or the Main Board is defect.

Likely cause:	Solution:
Defective Stirling Controller PCB  	Measure potentials on CN103 Stirling Out. Set Calibrator to –90°C PIN1 Stirling Supply PIN2 Stirling GND PIN3 Stirling CTRL PIN4 Stirling On/Off PIN5 Stirling Alarm PIN6 FPSC GND Between PIN1 and PIN2 > 23V Between PIN6 and PIN3 > 0,8V and < 5V Between PIN6 and PIN4 = 0V Between PIN6 and PIN5 < 30mV
If the Stirling Alarm is high  	Pull out blue connecter on Stirling Controller PCB and measure the resistance over the Stirling engine safety termister. @23°C $R_{termister} \approx$ 43Kohm If broken, replace sensor else replace Stirling Controller PCB. NB! Before replacing sensor, contact AMETEK Denmark's Service Department for guidance.

Likely cause:	Solution:
Defect heatpipe.   	Set the calibrator to –90°C, wait until temperature has reached –90°C (or lowest possible temperature) and measure potentials between PIN1 and PIN3 on connector CN103 on Power PCB. A temperature difference between the two sensors of 1°C equals a voltage difference of approximately 40µV. If the difference is more than 200µV (5°C), the heat pipe is defect. Replace cooling unit or return calibrator to AMETEK Denmark A/S for maintenance and refilling.

Error: **Switch test does not work.**

Error message: -

Likely cause:	Solution:
Defective Main PCB	Check signal from Switch Test Input. The voltage between the terminals on the panel should be at least 4.0V. Check the signals SW-TEST(+) and SW-TEST(-) on the connector CN1 on the INPUT PCB. Otherwise, replace the Main PCB and adjust and re-calibrate the unit

Error: **Fan does not work.**

Error message: -

Likely cause:	Solution:
Fan obstructions	Remove any obstructions.

Supply for fan	Check the voltage on the fan connector on Power PCB: On PCB with date older than 2004 (see copper print) ATC-155/156/157: CN7 ATC-320/650: CN6 On PCB with date from 2004 and newer (see copper print on PCB e.g. 040422) ATC-125/140/155/156/157: CN10 ATC-250/320/650: CN10 Note: The fan can run in up to 3 modes: Idle mode, when the well is heating. U_{min} = 7,0V Medium speed . U_{min} = 16,5V (ATC-156/157 only) (17,5V (ATC-125)). Full speed when the calibrator is cooling down. U_{min}= 21,8V) (24V (ATC-125)). • If supply voltages are above the minimum limits, replace fan. • If supply voltages are lower than the limits replace and adjust Power PCB.

Error: **The READ temperature in the display is displayed as -.--°**

Error message: -

Likely cause:	**Solution:**
The measured temperature is out of range	Check the ribbon cable connection between Input PCB and Main PCB. Check RTD sensor. Disconnect the sensor from the Input PCB. At 23°C in the well the impedance should be 109 Ω ±3 Ω.

	If RTD sensor is OK, replace Main PCB and then adjust and re-calibrate the unit. Otherwise, replace RTD sensor and re-calibrate the unit.

Error: **The well temperature can not become stable**

Error message: -

Likely cause:	**Solution:**
Sensor fault	Check the RTD sensor. Disconnect the sensor from the PCB. Check the leak resistance from the RTD sensor. The resistance between one RTD terminal and chassis terminal should be more than 10 MΩ. For the ATC-650 this should also be tested with a well temperature above 600°C.

Error: **The RTD input is not measuring**

Error message: -

Likely cause:	Solution:
The current source is not working	Set up the input measuring RTD 3-wire measurement. Check that the current between the lowest red terminal and the lowest black terminal is between 0.40 mA and 0.44 mA. With a short circuit between these terminals, check that the current between the lowest red terminal and the upper black is within 2.5% from the first current. If these are not correct change the Main PCB and re-calibrate the unit.
A/D-converter is defective.	With a sensor connected check that the A/D-converter readings in the Service Menu are normal. If not change the Main PCB and re-calibrate the unit.

Error: **The reference input is not measuring.**

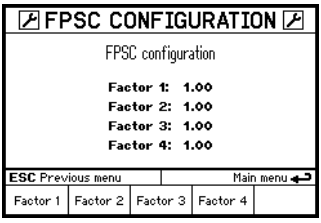
Error message: -

Likely cause:	Solution:
The current source is not working or the A/D-converter is defective.	With a sensor connected check that the A/D-converter readings in the Service Menu are normal.

Error:	**Stirring motor is not pulling stirring magnet ATC-140/250 A/B only**
Error message:	-

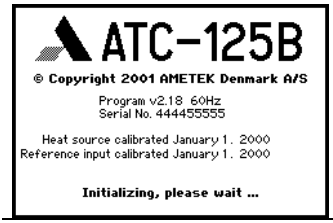
Likely cause:	**Solution:**
Motor is broken	Set stirring speed to 50. Measure voltage over CN11 on ATC-250 and CN13 on ATC-140. This should read about 18V. If this is the case, replace motor.
Broken ribbon cable or Main PCB	If there is no signal, check that there is a 5V signal on (ATC-140 Power PCB CN9 pin 11) or (ATC-250 Power PCB CN3 pin 11). If there is, replace Power PCB else check ribbon cable and Main PCB.
Defective stirring magnet	If the stirring magnet has got a flat side, due to wear and tear, it will not spin properly and must be replaced.

Error:	**Sound of internal rattling noises from the instrument. ATC-125 A/B only**
Error message:	-

Likely cause:	**Solution:**
Internal piping is rattling	Open the top frame and carefully bend the internal piping, until the problem is solved.
Incorrect FPSC - adjustment  	Set the instrument in Service Mode and enter the Service Mode. Open the menu FPSC menu If the rattling noise occurs, reduce the factors mentioned below in steps of 0.05 (e.g. from 1.00 to 0.95). Factory default is 1.00 for all factors. If the rattling noise occurs within the first 2 minutes after start up, adjust Factor 1. If the rattling noise occurs after 2 minutes of operation at well temperatures above 0°C and only at high ambient temperatures, adjust Factor 3. If the rattling noise occurs after 2 minutes of operation and at well temperatures above 0°C, adjust Factor 1 and 2. If the rattling noise occurs after 2 minutes of operation and at well temperatures below 0°C, adjust Factor 1, 2 and 4.

Error: **The instrument is locked in the opening menu**

Error message: -

Likely cause:	**Solution:**
Locked by software due to wrong frequency setup 	Contact AMETEK Denmark A/S

2.2.1 Supplies

ATC-140/155/156/157

Isolated supply (refers to GND')	+26V' :	26.6V	±1.8V
Non-isolated supplies (refer to GND)	+25 V :	+24.6V	±1.5V
	VCC :	+5V	±0.25V
	VEE :	–20.2V	±0.9V
	+27V :	26.6V	±1.6V

ATC-250/320/650

Isolated supply (refers to GND')	+26V' :	26.6V	±1.8V
Non-isolated supplies (refers to GND)	+25 V :	+24.6V	±1.5V
	VCC :	+5V	±0.25V
	VEE :	–20.2V	±0.9V
	+27V :	26.5V	±1.5V

ATC-125

Refers to GND	VCC:	5V	±0,5V
	24V:	24V	±1V
	VEE:	-19V	±1V
Refers to ISOGND	ISO 26V:	26V	±1V

2.2.2. Oil Problems

Spilling

If for any reason it is necessary to remove silicone oil spilling from the interior or exterior of the instrument, it is advisable to use OS20 from DOW CORNING.

OS20 is silicone oil with a viscosity low enough to dissolve the silicone oil used for calibrating purposes.

Warning

Read the product information before use. Due to flammable liquid, precautions might have to be taken.

Due to transport safety regulations, the liquid is not distributed by AMETEK Denmark A/S, but is readily obtainable from your local DOW CORNING distributor.

Inserts
If an insert is placed in a well, which has not been cleaned properly, the insert might get stuck. Heating up the well, melting the oil readily solves the problem.

2.3 Replacement of Spare Parts

Compare exploded views in chapter 3.0.

Caution…

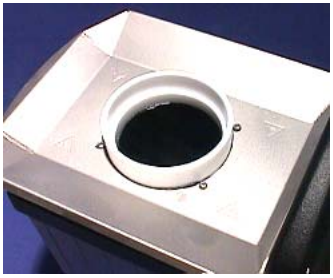
Remember to disconnect the instrument from the mains supply before it is dismantled.

Necessary tools:

- Wire cutter
- Screw drivers
- 7 mm wrench
- 2 mm Allen key
- Torx screw drivers

A. Removal of Spill Tray
(Exploded views, fig. 3.3 + 3.7, pos. 19).

ATC-140/250 A/B



Remove the spill tray 125161 by unscrewing the 4 Allen screws.

For safety reasons the spill tray has been attached to the handle by using silicone. Thoroughly clean off all the old silicone.

Remove the 3 metal springs from under the spill tray. When reassembling the instrument they must be mounted again.

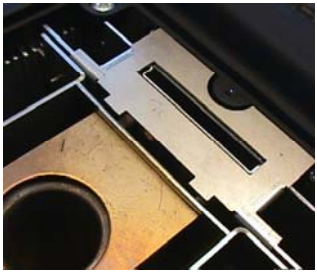
Replace the rubber gasket under the spill tray, if the gasket has become brittle or deformed.

When remounting the spill tray the screws have to be cross tightened with a force of approximately 1N/m. For best result, tighten the screws when the calibrator is heated to 80°C. This will soften the rubber seal, making the junction vertically waterproof.

After tightening the screws, replace the silicone seal between the handle and the spill tray. Put a thin line of silicone between the spill tray and the handle and smooth it out with a wet finger. A god tip is to recalibrate the instrument, before the silicone is applied.

B. Removal of Display and Keyboard Unit, all Models
(Exploded views, pos. 2).

Remove the grid plate by unscrewing the 3 screws (all models except ATC-140/250 A/B).



Remove the protection shield if present (only in the early models of ATC-320/650 A/B).

ATC-125 only

Unscrew and remove the 4 screws in the top frame. Carefully remove the insertion funnel guide and loosen the entire top plate.

Unscrew and remove the 2 screws and washers in the top frame to enable the keyboard unit to be removed.

ATC-125 only

Unscrew and remove the 2 screws and washers in the top frame, enabling the keyboard unit to be removed.

Lift the keyboard unit carefully and disconnect the 2-poled connector and the flat ribbon cable on the backside.

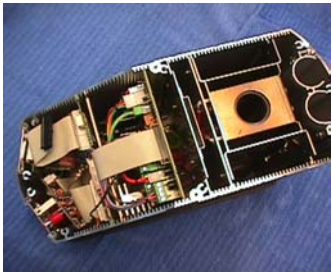
The top frame must be removed if further replacements are necessary.

C. Removal of Top Frame, all Models

Remove the screws and washers holding the top frame in place.

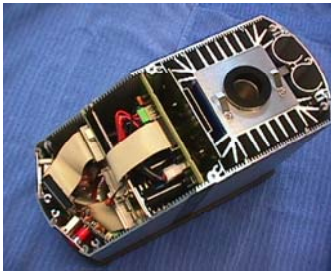
ATC-125 only

First remove the 6 screws holding the top plate with globe.

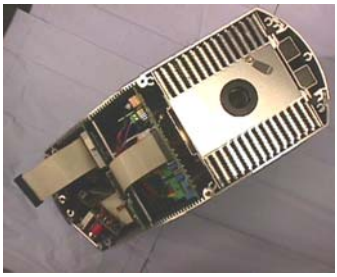


The top frame can now be removed entirely to expose the interior of the instrument.

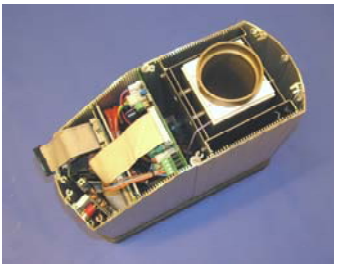
This picture shows an ATC-650 B.



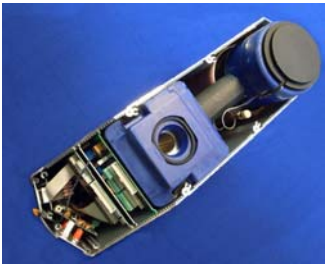
This picture shows an ATC-155 B.



This picture shows an ATC-157 B.



This picture shows an ATC-250 B.



This picture shows an ATC-125 B.

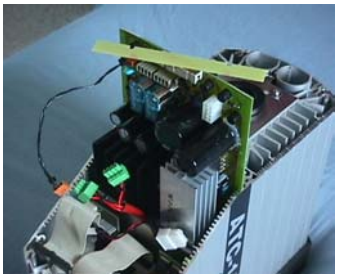
D. Removal of Power PCB

(Exploded views, pos. 7).

ATC-140/155/156/157 A/B

Mark the 2 connectors to the Peltier elements with a pen as shown on the picture, before disconnecting the connectors on the Power PCB. The numbers correspond to the text on the PCB.

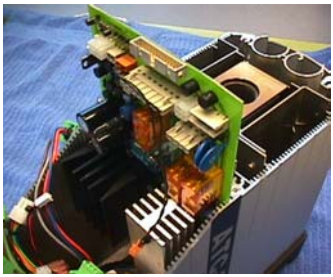
When reassembling the connectors be careful not to mistake the wire to the FAN (red and black) with the wires to the stirring motor (red and blue).



It is now possible to retract the small Support PCB and the Power PCB from the instrument. The small Support PCB is only found in the early models of ATC-155 A/B.

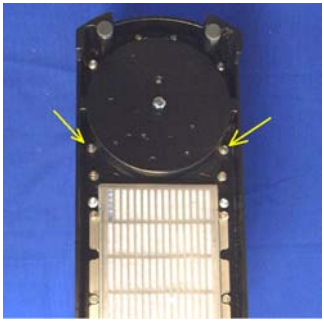
ATC-250/320/650 A/B

Disconnect the cables on the Power PCB. Leave the one that connects the Power PCB to the Display Unit.



It is now possible to retract the Power PCB from the instrument (a small support PCB as described in section D is also found in the early models of the ATC-320/650 A/B).

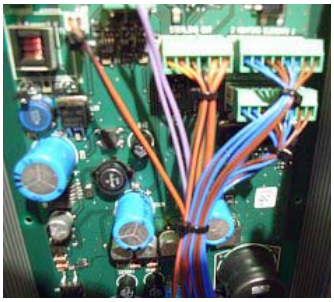
ATC-125 A/B



Loosen the 2 screws in the bottom of the instrument.

Disconnect the cables on the Power PCB.

If the PCB still is stuck, it can be necessary to loosen the big Torx screws in the bottom of the instrument.

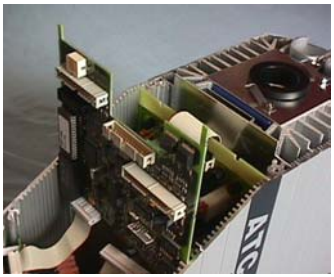


The connections CN108 and CN109 are parallel on the PCB, so they can be placed in any order, without any problems.

All other connecters cannot be misplaced due to physical appearance.

E. Removal of Main PCB
(Exploded views, pos. 8 + 9).

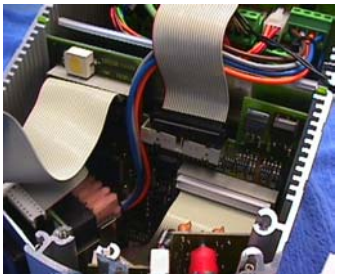
ATC-125/140/155/156/157 A/B



After removing the top frame as described above disconnect the 4 ribbon cables on the Main PCB. Now retract the Main PCB from the instrument.

This picture shows an ATC-155 B.

ATC-250/320/650 A/B



After removing the top frame as described above disconnect the 4 ribbon cables on the Main PCB. Also remove the cable from the power inlet to the Power PCB from the Power PCB to make retraction of the Main PCB possible.

Note…

If the Power PCB has been replaced, you must adjust the new PCB in accordance with section 2.4.

Note…ATC-125 only
The system is filled with the flammable gas propylene.

F. Removal of Well, all Models
(Exploded views, pos. 5).

Please follow steps A through D for all models.

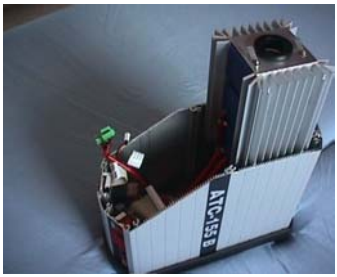
Remove the thin aluminium plate placed above the transformer by pulling it up.

Remove the M4 nut and the washers securing the protective conductor with a 7-mm socket wrench.

In the ATC-250/320/650 A/B models you will find 2 protective wires.

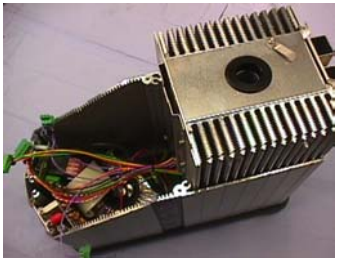
Now retract the aluminium plate in front of the well.

This plate is mounted on the well in ATC-140/157 A/B and cannot be retracted.



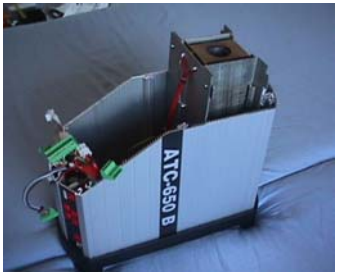
Cut the strap holding together the cables and carefully retract the well.

This picture shows the ATC-155 B calibrator. Note the position of the straps for later assembly.



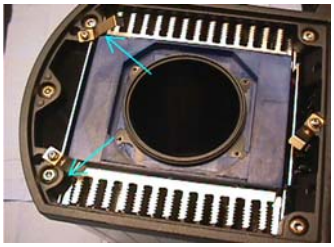
This picture shows the ATC-157 B.

Note that the aluminium plate is mounted on the well.

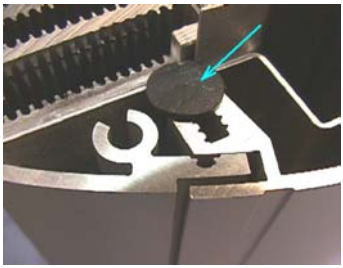


This picture shows the ATC-650 B calibrator.

ATC-140/157 A/B



To prevent the well in ATC-140 and ATC-157 from rattling, rubber plugs (60G032) are fitted in between the heat sink on the well and the outer casing of the instrument, one in each side.



ATC-125 A/B

Note…

The well, Stirling engine, connecter tube and expansion tank, are to be considered as one unit. If any fittings in this unit are to be loosened, the entire system will not be operational. It is though possible to loosen the Stirling engine to replace the fan.

Warning

The ATC-125 cooling system contains the gases R-1270 (flammable) and R-704 (Helium) under pressure.
The cooling system (well, Stirling engine, connecter tube and expansion tank) must be handled with care to avoid leaks from the system.
DO NOT dismantle the cooling system.

Note…

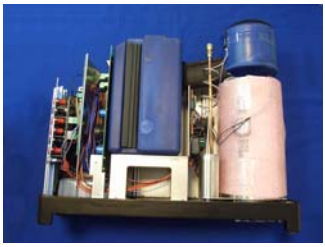
Remember that it is necessary to calibrate the instrument after the well has been removed/replaced.

G. Removal of Fan, all Models

(Exploded views, pos. 6)

Please follow steps A through E for all models.

Remove the 4 screws securing the fan and the protection grid in front of it.

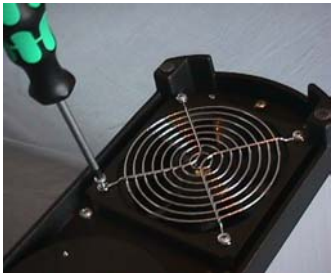


ATC-125 only

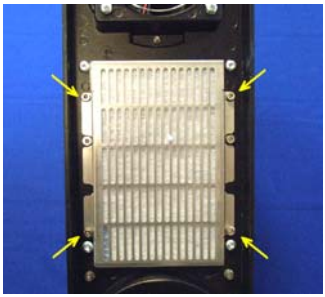
Remove one side and the back panel of the instrument. This is done by first loosening the Allen screw in the front and the Torx screws in the back, securing the side panel.

Loosen the Torx screws holding one side of the instrument.

Carefully lift up the entire side and the back panel.

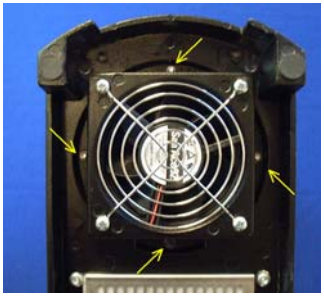


Remove the 4 screws securing the fan and the protection grid in front of it.

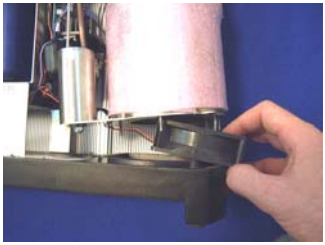


Remove the air filter by loosening the 4 screws holding it.

If the air filter is dirty, replace it.



Now loosen the 4 nuts holding the Stirling engine.



Lift the Stirling engine as little as possible to slide out the fan, max. 5cm.

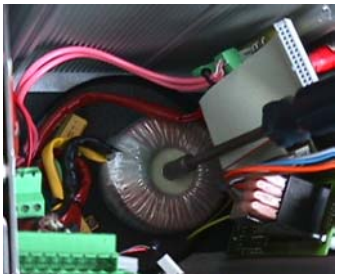
H. Removal of Transformer
(Exploded views, pos. 11)

First follow steps A through D followed by retraction of the two aluminium plates as described in the guidelines above.

ATC-125/140/155/156/157 A/B

Remove the M6 nut and washer with a 10-mm socket wrench. Cut the straps holding together the wires and retract the transformer after having disconnected the wires to the power-inlet module. Note the position of the straps for later assembly.

ATC-250/320/650 A/B

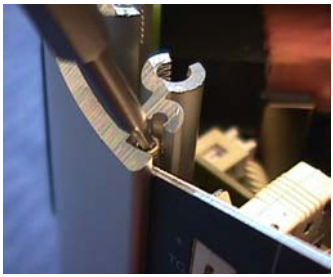


Remove the M4 nut and washer with a 7-mm socket wrench. Cut the straps holding together the wires and retract the transformer after having disconnected the wires to the power-inlet module. Note the position of the straps for later assembly.

I. Removal of I/O Plates, all Models

(Exploded views, pos. 3a + 3b)

First follow steps A through D followed by retraction of the two aluminium plates as described in the guidelines above.



The I/O plates are identically secured in all calibrator types: From above remove the two Allen screws with a 2mm Allen key.

From beneath: Remove the 2 screws.

Retract the I/O plate after disconnecting all wires. This picture shows the input plate for an ATC-650 B calibrator.

J. Replacement of Reference Sensor

(Exploded views, pos. 4)

To replace the reference sensor in the well unit, follow steps A through D followed by step F and then follow the procedure given below.

For the ATC-125/140/155/156/157 A/B the hole for the reference sensor will be filled with compound and the well unit must be heated up to 100 – 150°C in order to soften the compound and thereby avoid breaking the sensor when removing it.

ATC-155 A/B:

Place the well unit with the reference sensor towards you.

Remove the 2 screws and retract the reference sensor from the Well Unit.

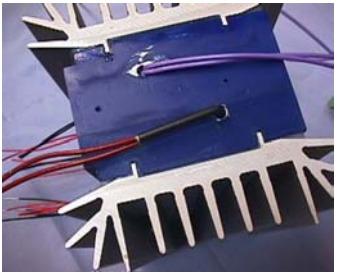
When remounting a new sensor, it must be placed in the hole together with 0.2ml compound.

ATC-156 A/B:

Place the well unit upside down and remove the 2 screws from the Connection PCB.

Carefully lift up the Connection PCB and retract the reference sensor from the well unit.

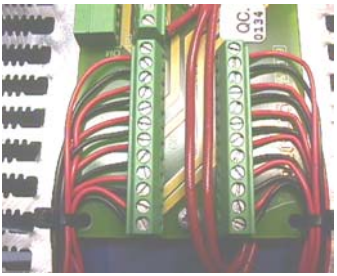
When remounting a new sensor, it must be placed in the hole together with 0.3ml compound.



The reference sensor is the one placed in the right hole beneath in the picture.

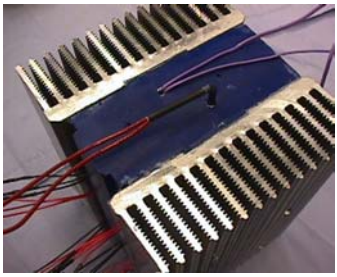
Disconnect the 2 sensor wires from the Connection PCB.

ATC-157 A/B:



Place the Well Unit upside down and remove the 2 screws from the Connection PCB.

Carefully lift up the Connection PCB and retract the reference sensor from the well unit.

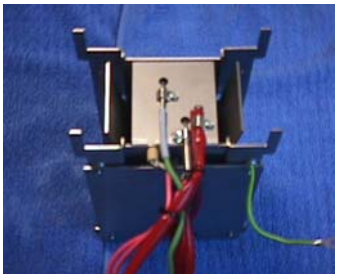


The reference sensor is the one placed in the right hole beneath in the picture.

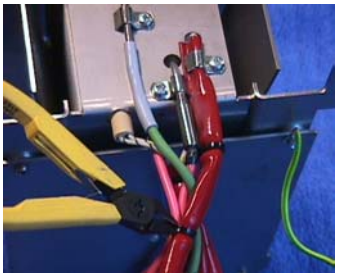
Disconnect the 2 sensor wires from the Connection PCB.

When remounting a new sensor, it must be placed in the hole together with 0.5ml compound.

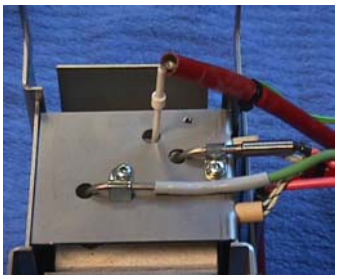
ATC-320/650 A/B:



Place the well unit upside down with the wires pointing towards you. The reference sensor is the one placed to the right.

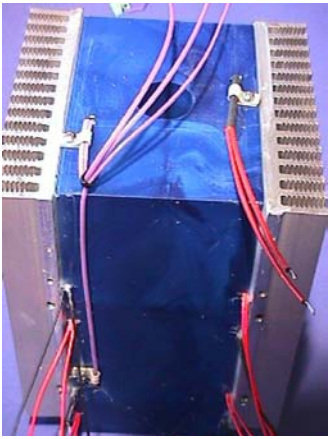


Cut the plastic strap holding together the wires from the reference sensor and the two thermocouples with pink wires. Note the position of the straps for later assembly.



Remove the 3-mm screw, washer and bracket holding the reference sensor. Now it is possible to retract the reference sensor from the unit.

ATC-140 A/B:

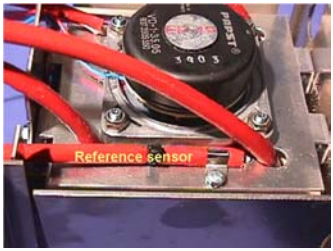


Remove the side panel by unscrewing the 4 Allen screws and the ground wire.

When remounting the ground wire bee sure to replace the washers, one on either side of the cable ring tongues terminal.

Place the sensor (sensor kit 125152) in the hole at the bottom of the well, together with 0.2ml compound. The wires must point in the same direction as on the picture. The wires are secured to the well with a wire holder. The loose ends of the sensor are connected to the reference sensor connector pin 1 and 4. Remember to short pin 1 and 2, and, 3 and 4.

ATC-250 A/B:

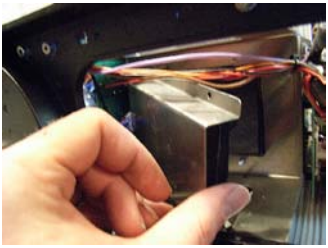


Place the well unit upside down.

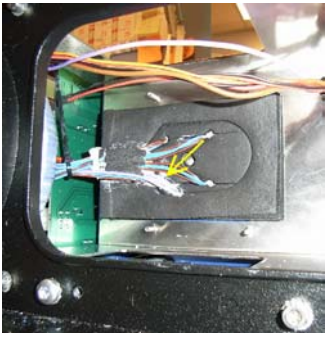
Unscrew the cable holder and retract the reference sensor.

To reinstall a new reference sensor, make sure that the hole is free from foreign objects, install the sensor and secure it with the cable holder.

ATC-125 A/B:



In the bottom of the well, unscrew the 4 nuts holding the sensor cover and gently remove it.



Remove the outer layer of insulation - when reassembling a new insulation layer must be used.

Cut the plastic strap holding together the wires from the reference sensor and the 3 thermocouples.

Now the sensor can be retracted.

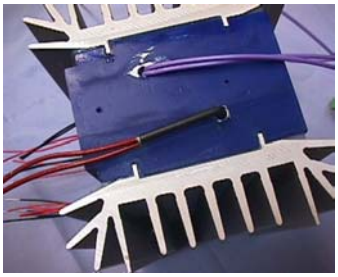
K. Replacement of Thermocouples
(Exploded views – fig. 3.2, pos. 21, fig. 3.3 + 3.5 + 3.7, pos.18)

To replace the thermocoupler in the well unit, follow steps A through D followed by step F and then follow the procedure given below:

ATC-156 A/B:

Place the well unit upside down and remove the 2 screws from the Connection PCB.

Carefully lift up the Connection PCB and retract the thermo-coupler from the well unit.



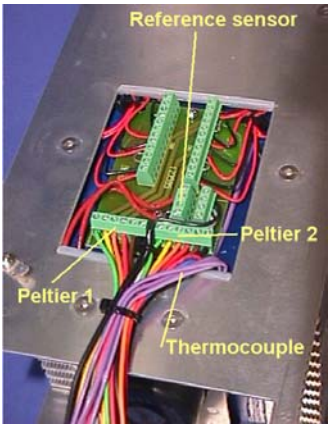
The thermocouple is the one placed in the left hole from above in the picture. Note that there are 2 wires to be retracted.

Remove the screw and the small bracket attaching the thermo-coupler to the well unit.

Retract the thermocouple from the well unit.

When remounting the new sensor, it must be placed in the two holes together with 0.1ml compound.

ATC-140 A/B:

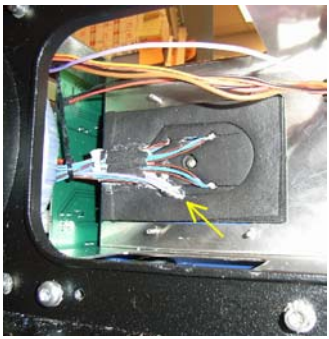


Remove the side panel by unscrewing the 4 Allen screws and the ground wire.

When remounting the ground wire be sure to replace the washers, one on either side of the Cable Ring Tongue Terminal.

When installing the thermocouple sensor (TC Kit 125170), the one end with two wires, must be bend 90° 50mm from the tip of the wire. The sensor is placed in the hole, in the bottom of the well, together with 0.3ml compound. The other end is placed in the hole on the side of well, together with 0.2ml compound. Both ends of the sensor are secured with a wire holder.

ATC-125 A/B:



Remove the outer layer of insulation - when reassembling a new insulation layer must be used.

Cut the plastic strap holding together the wires from the reference sensor and the thermocouples.

Now the sensor can be retracted.

The retracted sensor bundle consists, of 2 difference temperature sensors and one safety sensor.

ATC-250 A/B:

Retract the thermocouple sensor by loosening the wire holder in the bottom of the well and pull out the bottom end of the sensor.

To retract the upper end of the sensor, the isolating Teflon top must be loosened with a screwdriver and the sensor is pulled out.

After retracting the sensor the isolating Teflon top, the top of the well, the sensor hole and the wire canal are cleaned very firmly.

When installing the thermocouple sensor (TC 125170), the one end of the sensor with two wires, must be bend 90° 50mm from the tip of the wire and placed in the hole next to the stirring motor and secured with a wire holder.

The other end is bend 25mm from the tip of the sensor and placed in the sensor hole on top of the well.

After reinstalling both ends of the sensor in the well, the wires must be strapped together.

When a new sensor has been installed, a new gasket has to be installed on top of the well. The new gasket is supplied with the sensor kit.

L. Replacement of Stirling Control PCB FPSC

(Exploded view – fig. 3.2, pos. 22)

ATC-125 A/B only:

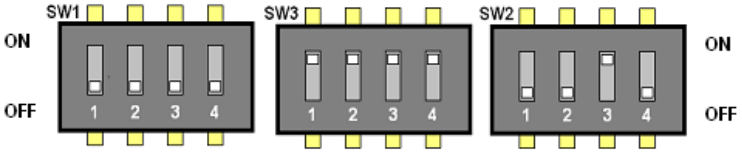
Remove the 4 nuts holding the PCB.

Carefully pull out the PCB.

Placement of Wires:

Power	Red	0,75mm^2	CN1		+
Power	Black	0,75mm^2	CN1		–
Signal	Orange	0,25mm^2	CN7	PIN 1	CTRL. V+
Signal	Red	0,25mm^2	CN7	PIN 4	Drv. Sig.
Signal	Brown	0,25mm^2	CN7	PIN 5	CN7 Error
Signal	Black	0,25mm^2	CN7	PIN 8	0V out

DIP-Switch Settings:



Note…

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

2.3.1 DIP-Switch Settings

The difference between version 1 and version 2 is described as follows:

PCB type	Version 1	Version 2
Main PCB	4 pole DIP-Switch	5 pole DIP-Switch
Power PCB	None	8 pole DIP-Switch

Main PCB

Version 1 main board with version 1 power PCB.
When version 1 Main PCB's (A and B model) are connected to version 1 Power PCB's, the DIP-Switch Settings on the Power PCB are as follows:

Model	DIP-Switch Setting	
	A model	B model
ATC-155	0000	0001
ATC-156	1100	1101
ATC-157	0010	0011
ATC-320	1000	1001
ATC-650	0100	0101

DIP-Switch Settings on Version 2 Main PCB
Regardless which Power PCB is connected to version 2 Main PCB's (A and B model), the DIP-Switch Settings are as follows:

Model	DIP-Switch Setting	
	A model	B model
ATC-125	10100	10110
ATC-140	01100	01110
ATC-155	00000	00010
ATC-156	11000	11010
ATC-157	00100	00110
ATC-250	11100	11110
ATC-320	10000	10010
ATC-650	01000	01010

When connecting new Main PCB's to old Power PCB's they must be connected with a cable 125232.

Power PCB

ATC-125
There is no DIP-Switch on the power PCB for the ATC-125 and the Power PCB has no need for any further adjusting or configuration.

New Power PCB with new Main PCB
When version 2 Power PCBs are connected to version 2 Main PCBs, the DIP-Switch Settings on the Power PCBs are as follows:

Model	DIP-Switch Setting
ATC-140	00010101
ATC-155/156/157	01000100
ATC-250	00010100
ATC-320 *	00000000
ATC-650	01000000

New Power PCB **with old Main** PCB
When version 2 Power PCB's are connected to version 1 Main PCB's, the DIP-Switch Settings on the Power PCB's are as follows:

Model	DIP-Switch Setting
ATC-155/156/157	10001110
ATC-320*	00001010
ATC-650	10001010

When connecting new Power PCB's with old Main PCB's they must be connected with a cable 125231.

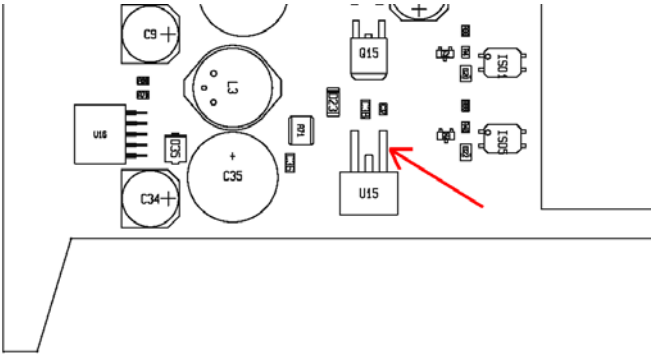
* See section 2.3.3 for configuring the Power PCB, version 2.

2.3.2 Configuring the Power PCB for ATC-320 A/B (version 1)

Remove the diode D14 from the Power PCB.

2.3.3 Configuring the Power PCB for ATC-320 A/B (version 2)

When setting up a ATC-320 A or B with version 2 Power PCB, one terminal on U15 must be disconected. See drawing below.



2.3.4 Configuring the Power PCB for ATC-650 A/B (version 1)

Remove the resistor R20 from the Power PCB.

2.4 Adjusting and Testing PCB's

2.4.1 Current limiter for ATC-140/155/156/157 A/B

Necessary equipment

Voltmeter 0-1V with an accuracy of 0.01V.

Set-up

Voltmeter.

Adjustment – ATC-155 A/B

① Turn the pre-set potentiometer R9 clockwise as far as possible.

② Switch the calibrator on using the power control switch.

③ Set the calibrator to –50°C.

④ Connect a voltmeter to CN8.

⑤ Adjust R9 until the voltage for CN8 reaches

a) 0.45V for PCB marked PCB 991025

b) 0.41V for PCB marked PCB 010125 or the latest PCB.

Adjustment – ATC-140/156/157 A/B

① Turn the pre-set potentiometer R6/R16 counter clockwise as far as possible.

② Switch the calibrator on using the power control switch.

③ Set the calibrator to –50°C.

④ Connect a voltmeter to CN3.

⑤ Adjust R6 until the voltage for CN3 reaches 0.33V

⑥ Connect a voltmeter to CN6.

⑦ Adjust R16 until the voltage for CN6 reaches 0.33V

2.4.2 MVI Circuit for ATC-250/320/650 A/B

Necessary Equipment

Voltage stabilizer with output voltage 230V ±10V (or at 115V ±5V).

Set-up

PCB is adjusted when mounted in the calibrator.

Adjustment

① Turn the pre-set potentiometer R37 counter clockwise as far as possible.

② The calibrator is started in service mode by pressing and holding i and ESC while the calibrator is switched on.

③ Press F1 (SET temp.) and set the calibrator to max. temperature (250°C, 320°C or 650°C) and press ”ENTER”.

④ Press F3 (Service) and then F1. (Power).

⑤ R37 is now turned clockwise until DutyK for Primary is between 0.95 and 0.98.

⑥ Switch off the calibrator using the power control switch.

3.0 Spare Parts and Drawings

3.1 Spare Parts

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

List of Spare Parts – ATC-125 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.2)		
1	126395	I/O Power plate with RS232
2	126396	Display module with keyboard and PCB board
3a	126397	I/O Plate without sensor input A model only
3b	126398	I/O Plate with sensor input B model only
4	126399	Reference sensor
6	126400	Fan, Complete
7	125824	Power PCB, ATC-125
8	123181	Main board without sensor input A Models only
9	123182	Main board with sensor input B Models only
10	125870	Grid plate for ATC-125
11	105328	Transformer
12	122800	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16	124978	Cable, 34-pol
17	125868	Top plate with globe
18	126185	Stirling power cable length 660mm
19	125871	Insulation collar
20	126402	Complete FPSC cooling unit and Well
21	126403	Thermo Coupler sensor
22	125434	FPSC Power PCB
23	125432	Thermister for FPSC cooling unit
24	126093	Gasket set
-	123653	Complete set of insulation foam for cooling unit
-	60B302	Fuse 10A (F) 6.3 x 32 mm UL
-	123185	Fuse 315mAT, MRT315
-	123158	Fuse 1.6AT, MRT1.6
-	123187	Fuse 800mAT, MRT800
-	123690	Fuse 2.5AT,Ø6.3 x 32mm UL
-	60B301	Fuse 5A (F) 5 x 20 mm IEC
-	126404	Screw set, Complete
-	126305	Spring for FPSC cooling unit
-	50-REP EPROM 3	E-prom for ATC

List of Spare Parts – ATC-140 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.3)		
1	123125	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	125155	Reference sensor
5	125149	Well, Complete without sensor
4+5	125151	Well, Complete with sensor
6	123787	Fan, Complete
7	125157	Power PCB, cooling device
8	125158	Main board without sensor input A Models only
9	125159	Main board with sensor input B Models only
11	123628	Transformer ATC-140/156/157
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	124978	Cable, 34-pol
15	105577	Cable, 16-pol
16	105576	Cable, 34-pol
17	105581	Cable, 2-pol
18	125170	Thermo Coupler
19	125161	Spill tray including gasket
20	125162	Gasket Kit
21	125153	Stirring motor
-	125146	Tube of black silicone
-	60E013	Power Entry Module 3A
-	125651	Backlight module for all ATC display
-	50-REP EPROM 3	E-prom for ATC
-	125160	Fuse 10A (T), 5 x 20MM
-	60B315	Fuse 5A (T) 6.3 x 32 mm UL
-	123690	Fuse 2.5AT,Ø6.3 x 32mm UL
-	123158	Fuse 1.6AT, MRT1.6
-	123185	Fuse 315mAT, MRT315
-	123187	Fuse 800mAT, MRT800
-	123160	Screw set, Complete

List of Spare Parts – ATC-155 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.4)		
1	123125	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	123130	Reference sensor
5	123132	Well, Complete without sensor
4+5	123137	Well, Complete with sensor
6	123135	Fan, Complete
7	123180	Power PCB, cooling device
8	123181	Main board without sensor input A Models only
9	123182	Main board with sensor input B Models only
10	105465	Grid plate
11	105327	Transformer
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16*	105580	Cable, 26-pol
16*	125232	Cable, 26/34-pol
17	105581	Cable, 2-pol
-	60B315	Fuse 5AT
-	105786	Fuse 3AT
-	123690	Fuse 2.5AT
-	105783	Fuse 1.6AT
-	123187	Fuse 800mAT (F1) for Power PCB
-	123159	Fuse 5AT (F2) for Power PCB
-	123185	Fuse 315mAT (F3) for Power PCB
-	123158	Fuse 1,6AT (F4) for Power PCB
-	123160	Screw set, Complete
	50-REP-EPROM 3	E-prom

List of Spare Parts – ATC-156 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.5)		
1	123125	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	123781	Reference sensor
5	123782	Well, Complete without sensor
4+5	123784	Well, Complete with sensor
6	123135	Fan, Complete
7	123786	Power PCB, cooling device
8	123181	Main board without sensor input A Models only
9	123182	Main board with sensor input B Models only
10	105464	Grid plate for ATC-156
11	123628	Transformer ATC-140/156/157
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16*	105580	Cable, 26-pol
16*	124978	Cable, 34-pol
16*	125231	Cable, 34-pol to 26-pol
16*	125232	Cable, 26-pol to 34-pol
17	105581	Cable, 2-pol
18	123790	Thermo Couple
-	60E013	Power Entry Module 3A
-	125651	Backlight module for all ATC display
-	50-REP EPROM 3	E-prom for ATC
-	123789	Fuse 8A (T), 5 X 20mm
-	60B315	Fuse 5A (T) 6.3 x 32 mm UL
-	105786	Fuse 3AT, ø6.3 x 32mm UL
-	123690	Fuse 2.5AT,Ø6.3 x 32mm UL
-	105783	Fuse 1.6AT,ø6.3 x 32mm UL
-	123158	Fuse 1.6AT, MRT1.6
-	123185	Fuse 315mAT, MRT315
-	123187	Fuse 800mAT, MRT800
-	123160	Screw set, Complete

List of Spare Parts – ATC-157 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.6)		
1	123125	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	126035	Reference sensor
5	123783	Well, Complete without sensor
4+5	123785	Well, Complete with sensor
6	123787	Fan, Complete
7	123786	Power PCB, cooling device
8	123181	Main board without sensor input A Models only
9	123182	Main board with sensor input B Models only
10	123632	Grid plate for ATC-157
11	123628	Transformer ATC-140/156/157
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16*	105580	Cable, 26-pol
16*	124978	Cable, 34-pol
17	105581	Cable, 2-pol
-	60E013	Power Entry Module 3A
-	125651	Backlight module for all ATC display
-	50-REP EPROM 3	E-prom for ATC
-	60B315	Fuse 5A (T) 6.3 x 32 mm UL
-	105786	Fuse 3AT, ø6.3 x 32mm UL
-	123690	Fuse 2.5AT,Ø6.3 x 32mm UL
-	105783	Fuse 1.6AT,ø6.3 x 32mm UL
-	123158	Fuse 1.6AT, MRT1.6
-	123185	Fuse 315mAT, MRT315
-	123187	Fuse 800mAT, MRT800
-	123789	Fuse 8A (T), 5 X 20mm
-	123160	Screw set, Complete

List of Spare Parts – ATC-250 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.7)		
1	123126	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	125169	Reference sensor
5	125166	Well, Complete without sensor
4+5	125167	Well, Complete with sensor
6	123136	Fan, Complete
7	125163	Power PCB, Heating device
8	125158	Main board without sensor input A Models only
9	125159	Main board with sensor input B Models only
10	124790	Grid plate
11	105328	Transformer
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16	124978	Cable, 34-pol
17	105581	Cable, 2-pol
18	125172	Thermo Coupler
19	125161	Spill tray including gasket
20	125162	Gasket Kit
21	125171	Stirring motor
22	105101	Cable, 230 mm, 4 Wire
-	125146	Tube of black silicone
-	60D542	Power entry module 10A
-	125651	Backlight module for all ATC display
-	50-REP EPROM 3	E-prom for ATC
-	60B302	Fuse 10A (F) 6.3 x 32 mm UL
-	60B301	Fuse 5A (F) 5 x 20 mm IEC
-	123157	Fuse 500mAT, MRT500
-	123158	Fuse 1.6AT, MRT1.6
-	123185	Fuse 315mAT, MRT315
-	123187	Fuse 800mAT, MRT800
-	123160	Screw set, Complete

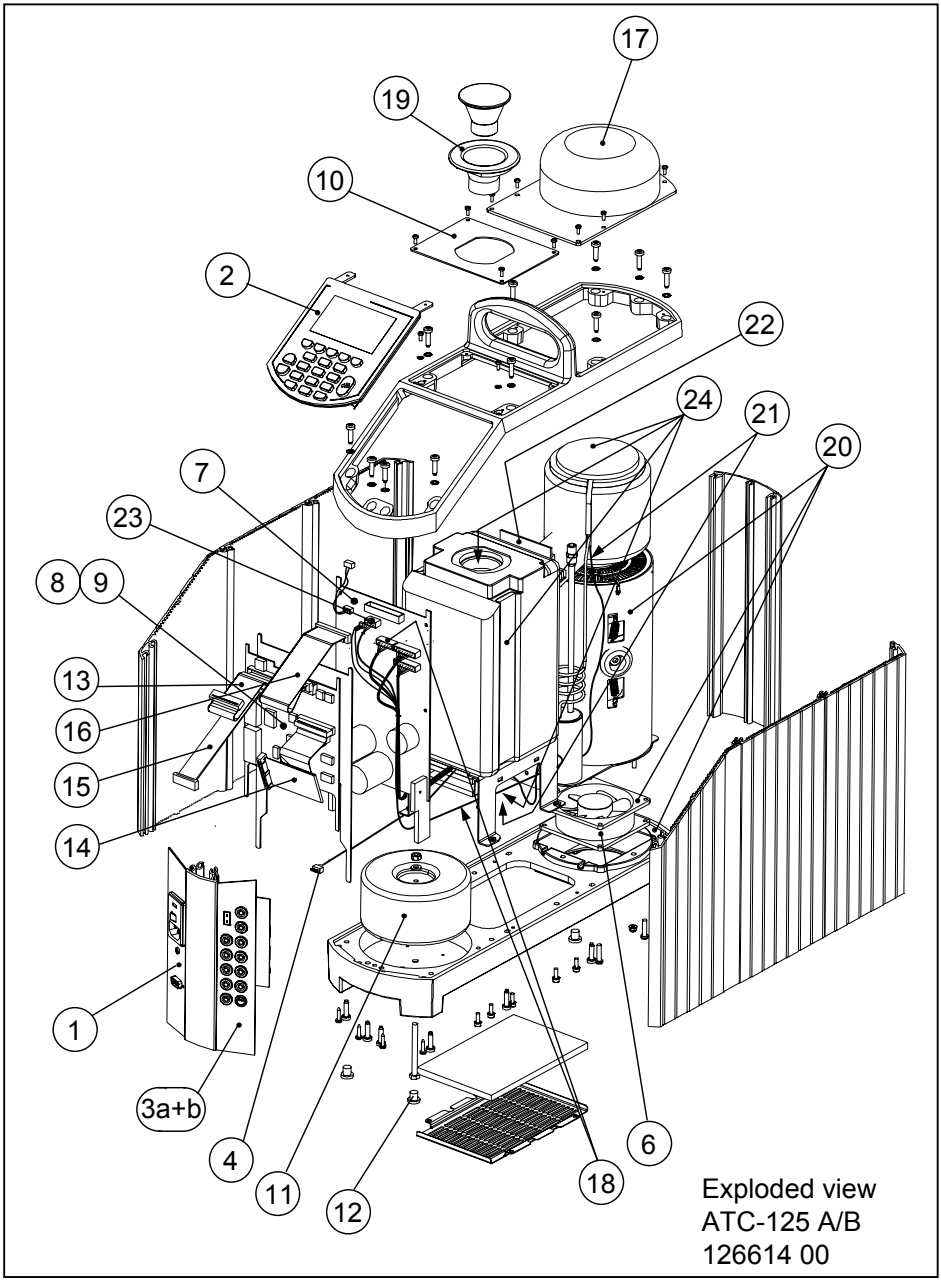
List of Spare Parts – ATC-320/650 A/B

Pos.	Number	Spare Parts
(Compare exploded view section 3.8)		
1	123126	I/O Power plate with RS232
2	123127	Display module with keyboard and PCB board
3a	123128	I/O Plate without sensor input A Models only
3b	123129	I/O Plate with sensor input B Models only
4	123131	Reference sensor
5	123133	Well, Complete without sensor (ATC-320 A/B)
5	123134	Well, Complete without sensor (ATC-650 A/B)
4+5	123138	Well, Complete with sensor (ATC-320 A/B)
4+5	123139	Well, Complete with sensor (ATC-650 A/B)
6	123136	Fan, Complete
7	123140	Power PCB, heating device
8	123181	Main board without sensor input A Models only
9	123182	Main board with sensor input B Models only
10	105465	Grid plate
11	105328	Transformer
12	60G032	Rubber foot
13	105575	Cable, 30-pol
14	105576	Cable, 34-pol
15	105577	Cable, 16-pol
16*	105580	Cable, 26-pol
16*	124978	Cable, 34-pol
17	105581	Cable, 2-pol
-	60D542	Power entry module 10A
-	125651	Backlight module for all ATC display
-	50-REP EPROM 3	E-prom for ATC
-	105101	Cable, 230 mm, 4 Wire
-	60B301	Fuse 5A (F) 5 x 20 mm IEC
-	60B302	Fuse 10A (F) 6.3 x 32 mm UL
-	123157	Fuse 500mAT, MRT500
-	123158	Fuse 1.6AT, MRT1.6
-	123185	Fuse 315mAT, MRT315
-	123187	Fuse 800mAT, MRT800
-	123160	Screw set, Complete

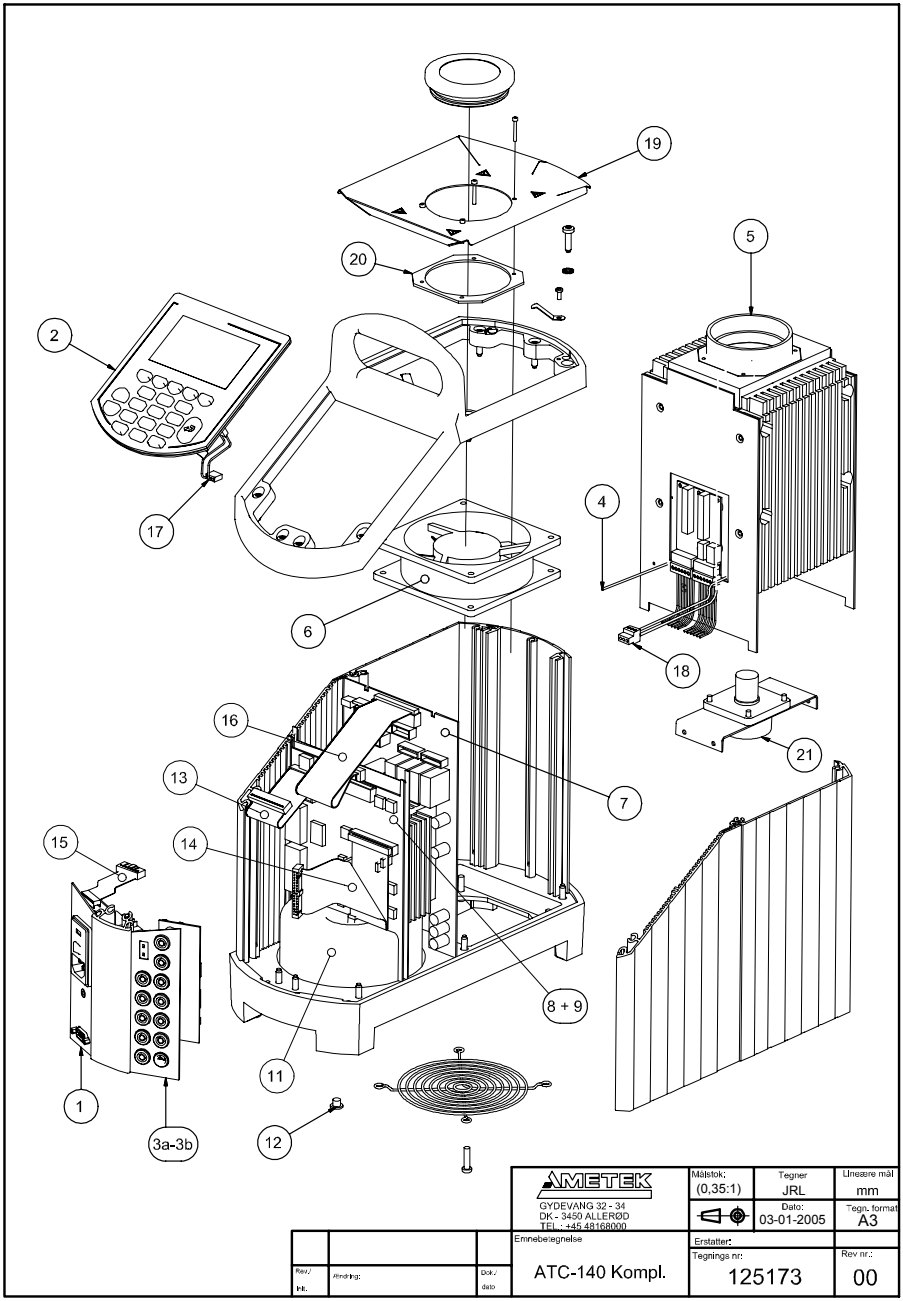
* Schedule for use of ribbon cable pos. 16

No. of pins		
Main PCB connector	Power PCB connector	Part no.
26	26	105580
26	34	125231
34	26	125232
34	34	124978

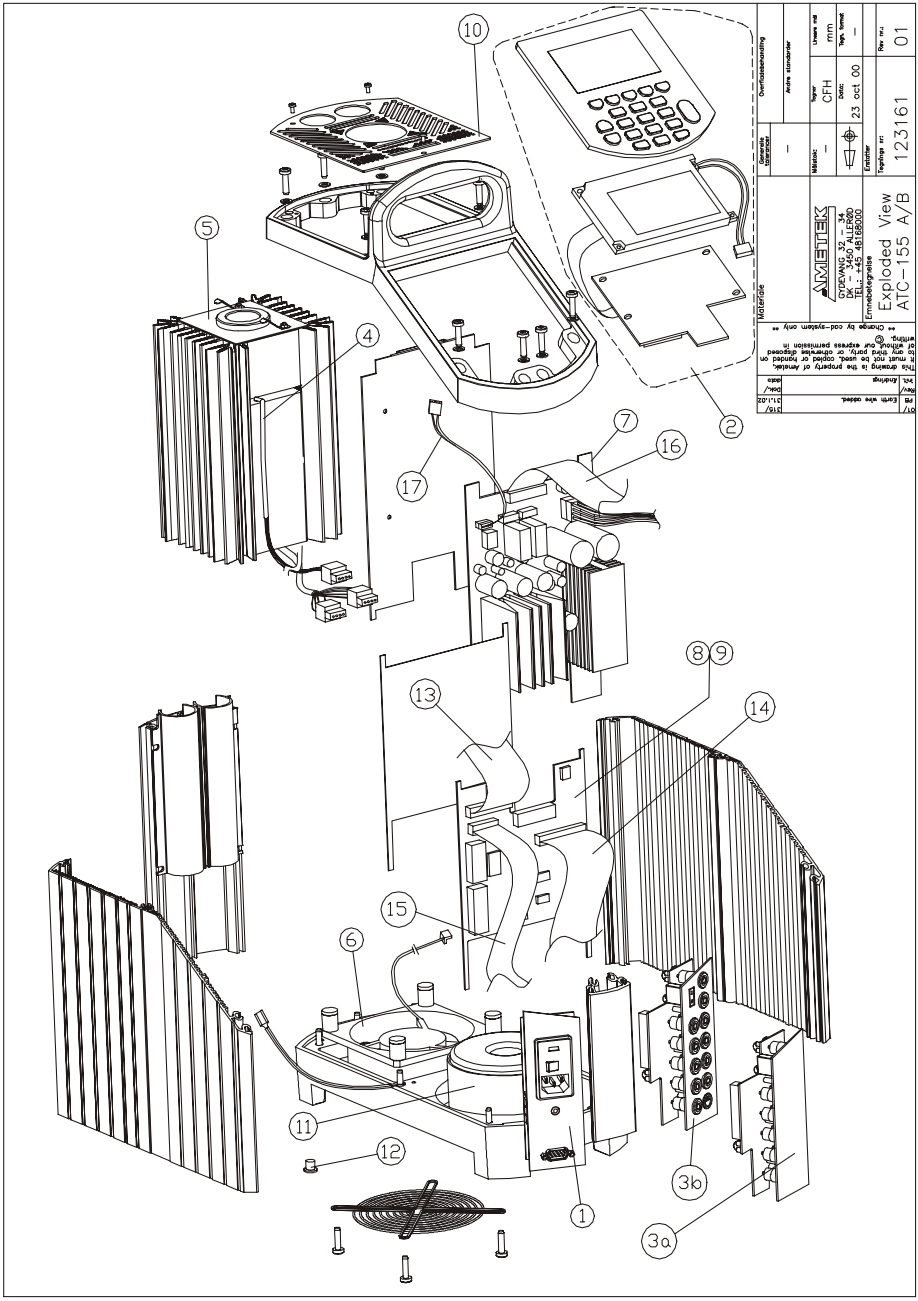
3.2 Exploded View – ATC-125 A/B



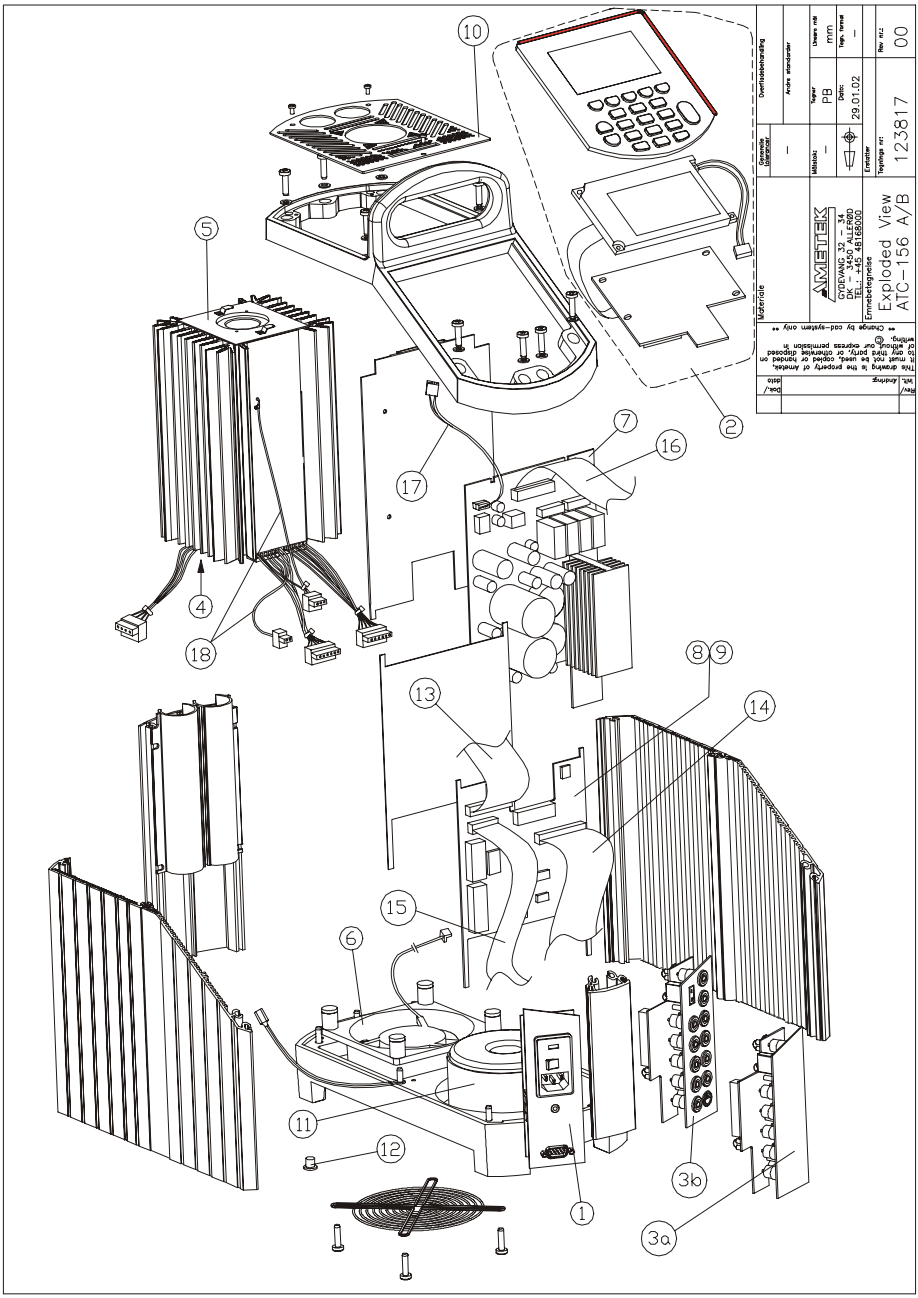
3.3 Exploded View – ATC-140 A/B



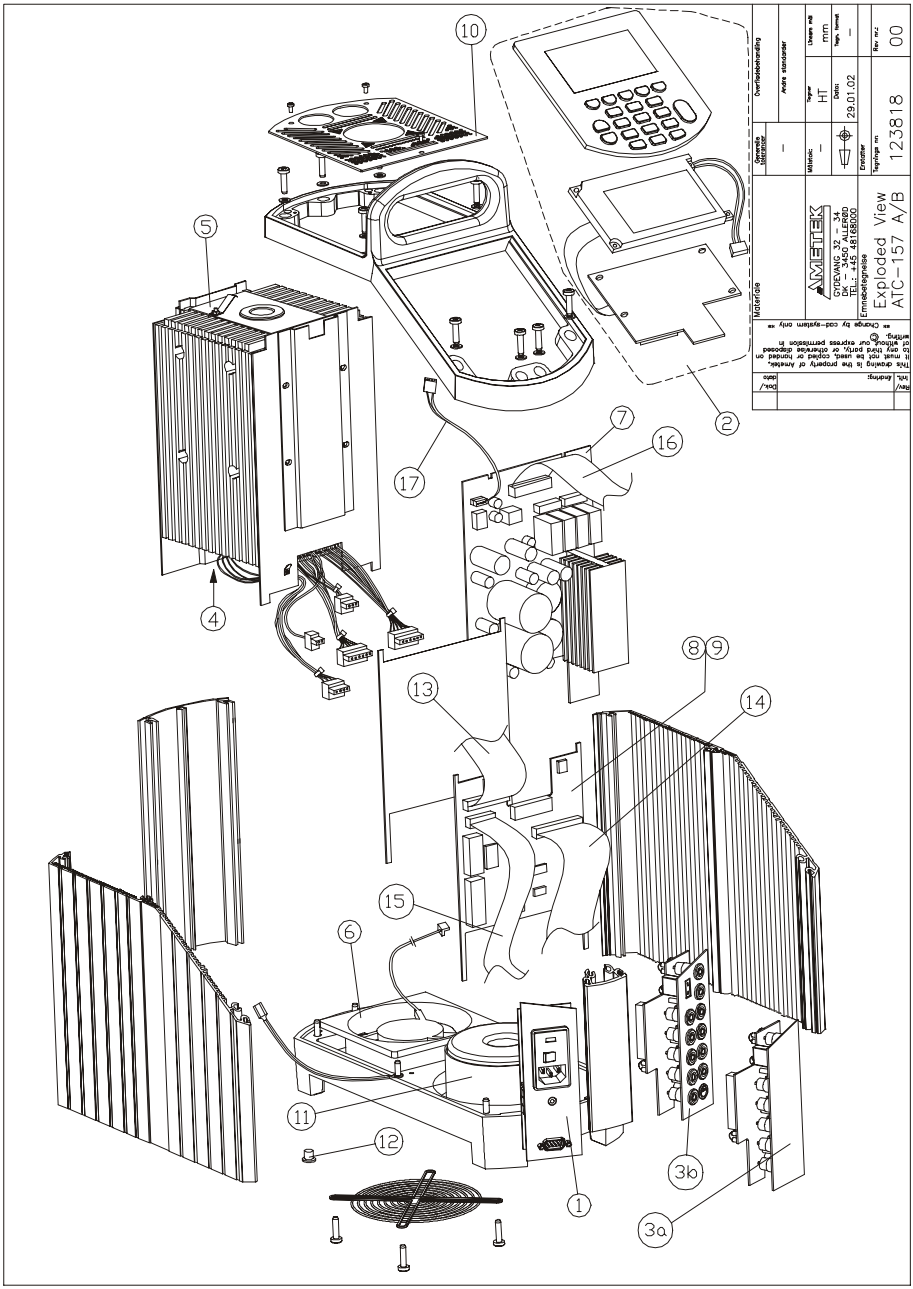
3.4 Exploded View – ATC-155 A/B



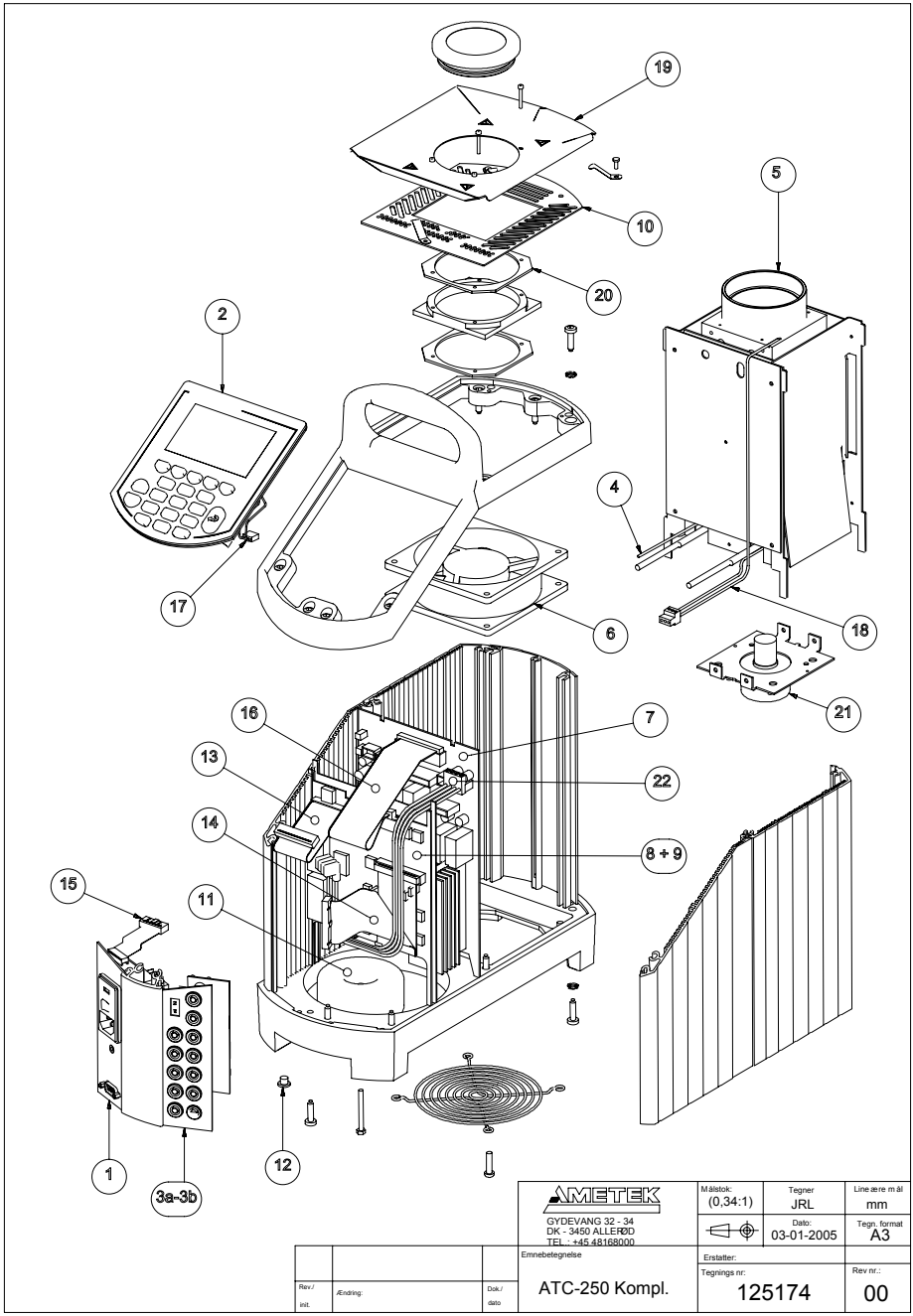
3.5 Exploded View – ATC-156 A/B



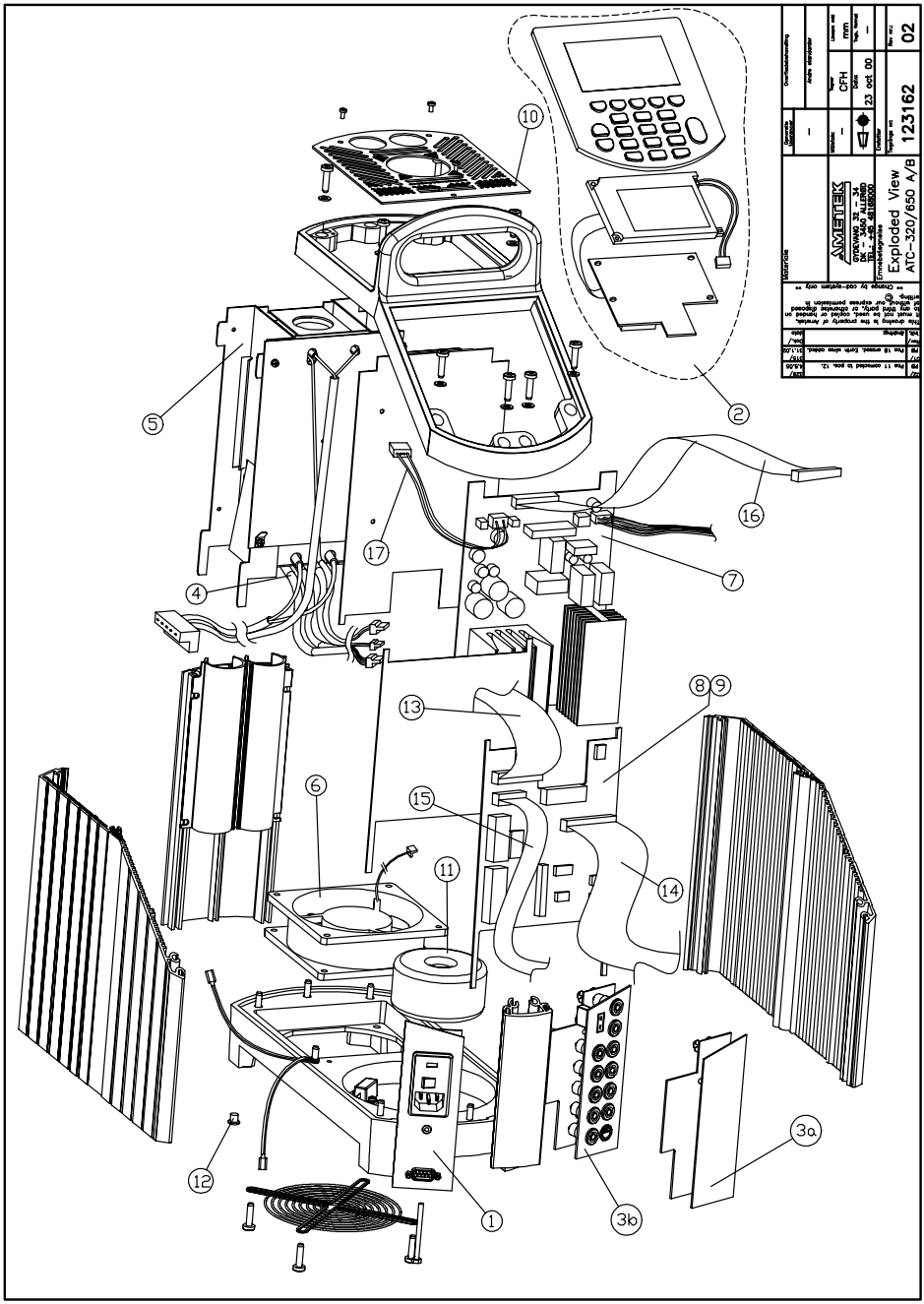
3.6 Exploded View – ATC-157 A/B



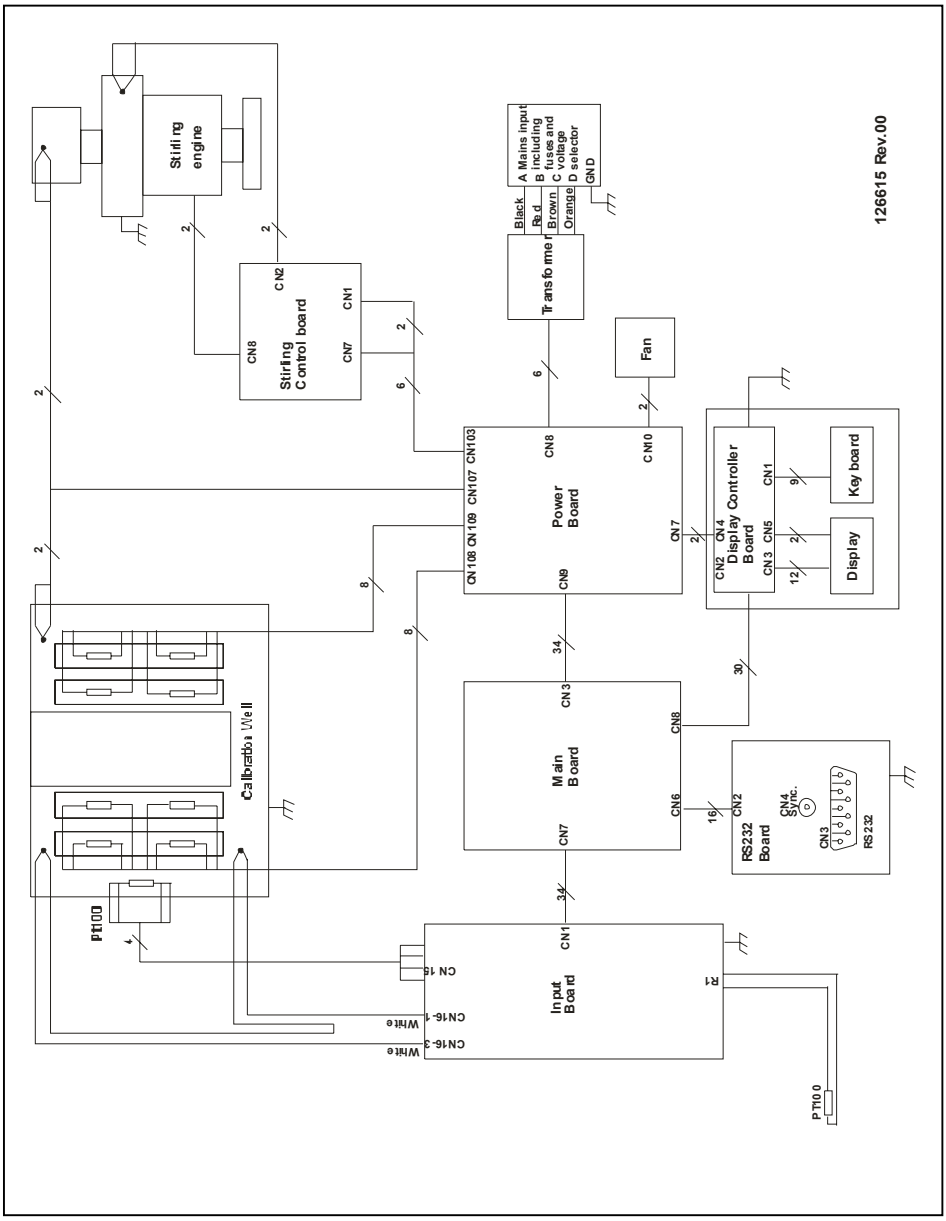
3.7 Exploded View – ATC-250 A/B



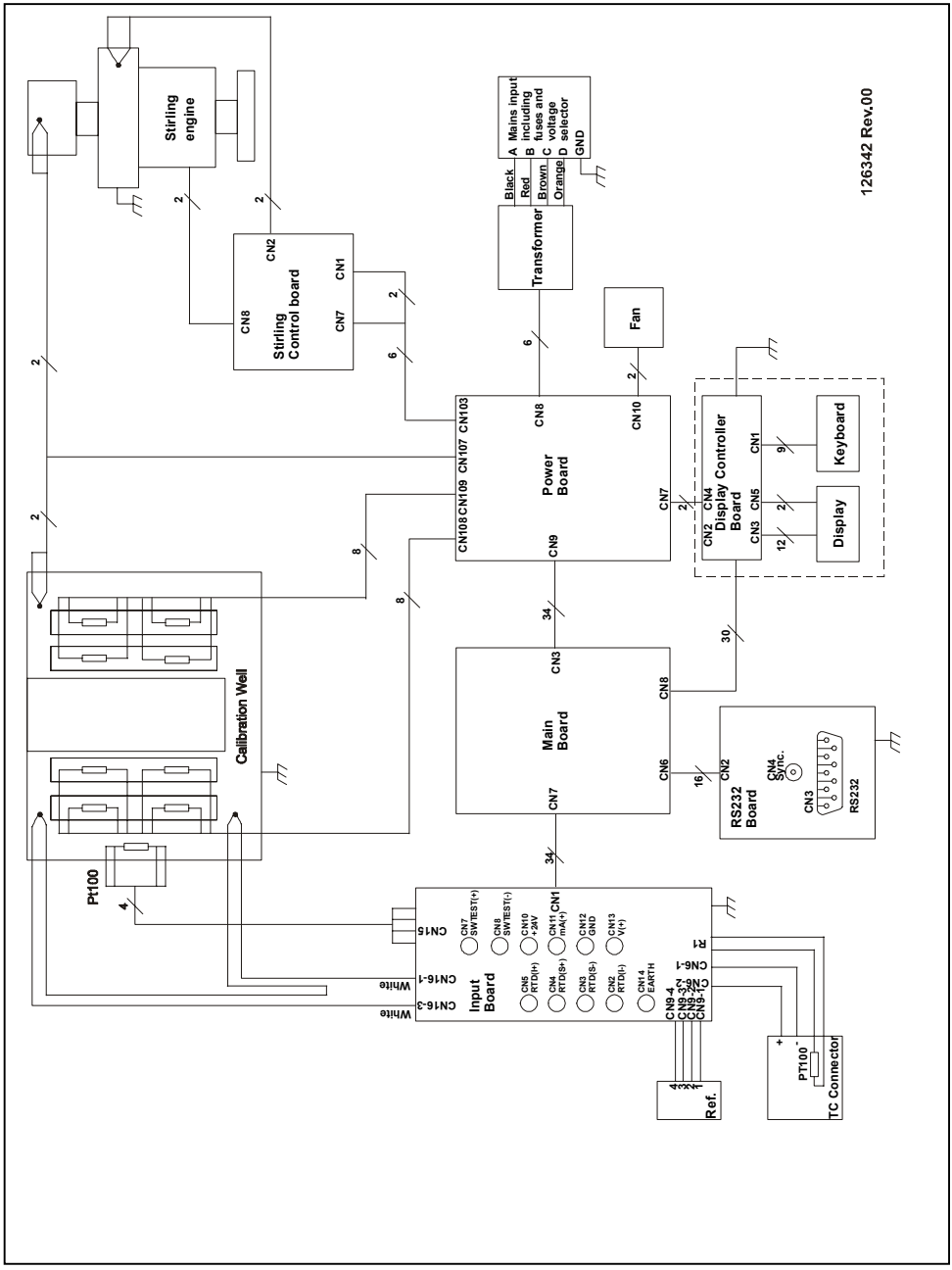
3.8 Exploded View – ATC-320/650 A/B



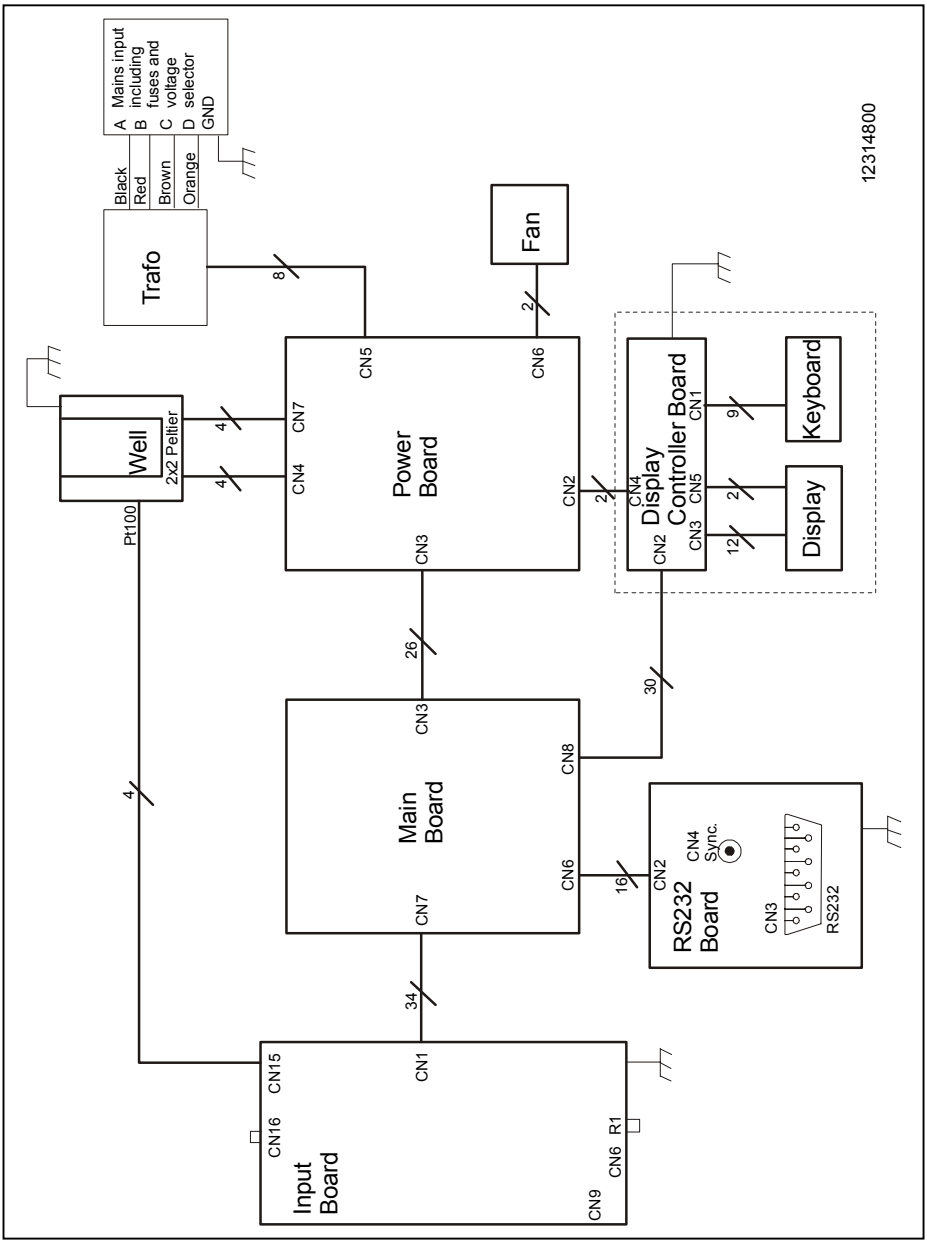
3.9 Wiring Diagram – ATC-125 A



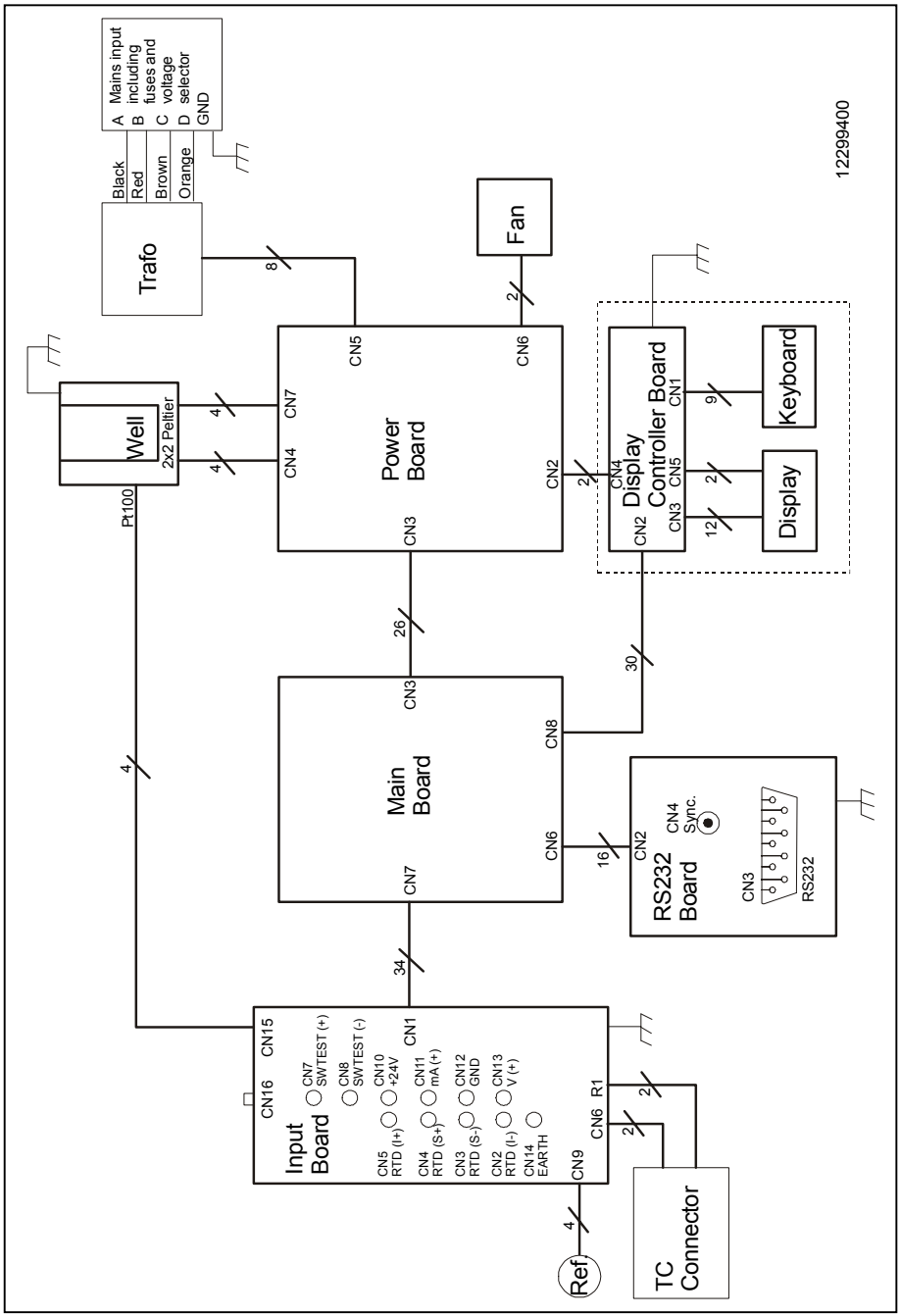
3.10 Wiring Diagram – ATC-125 B



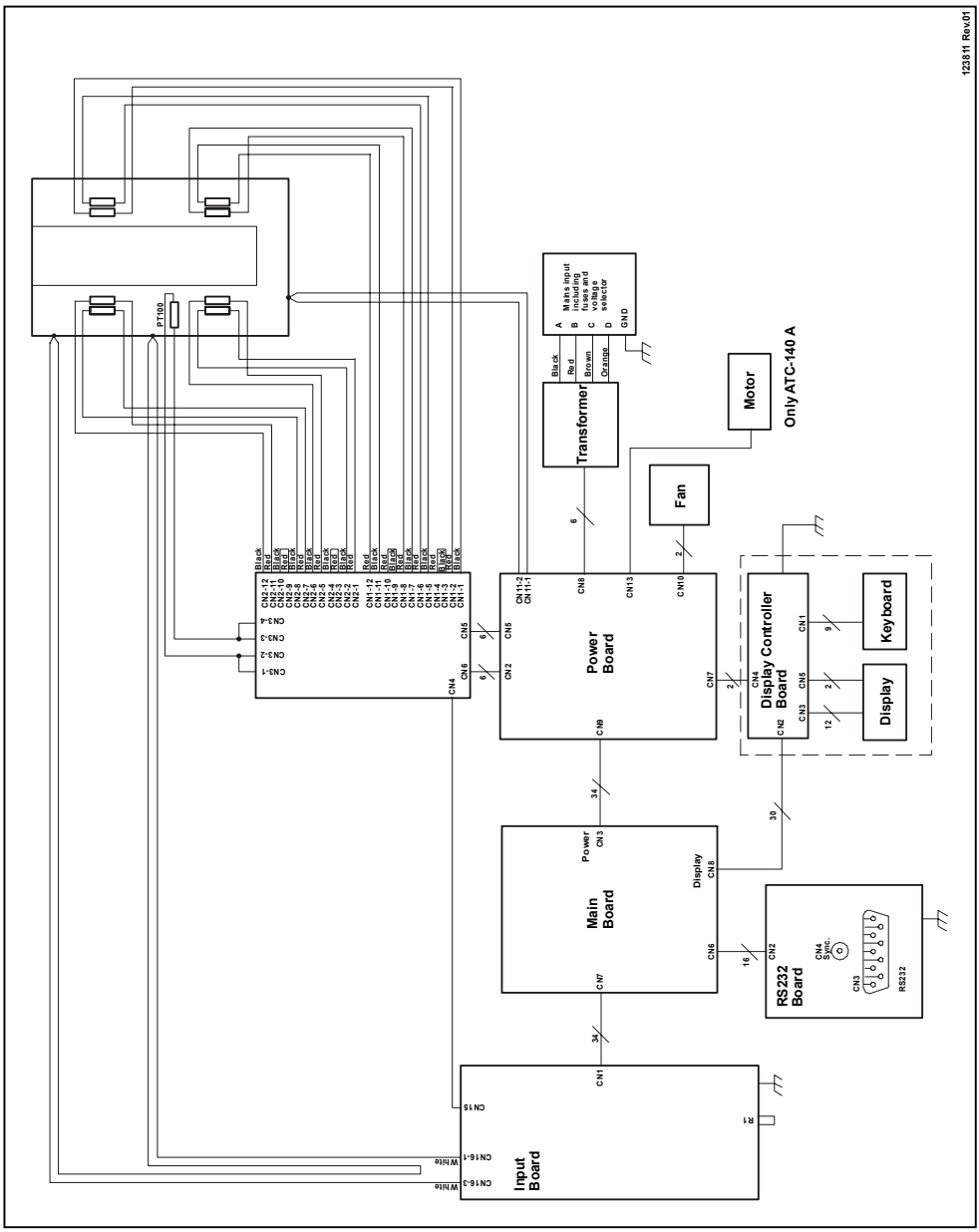
3.11 Wiring Diagram – ATC-155 A



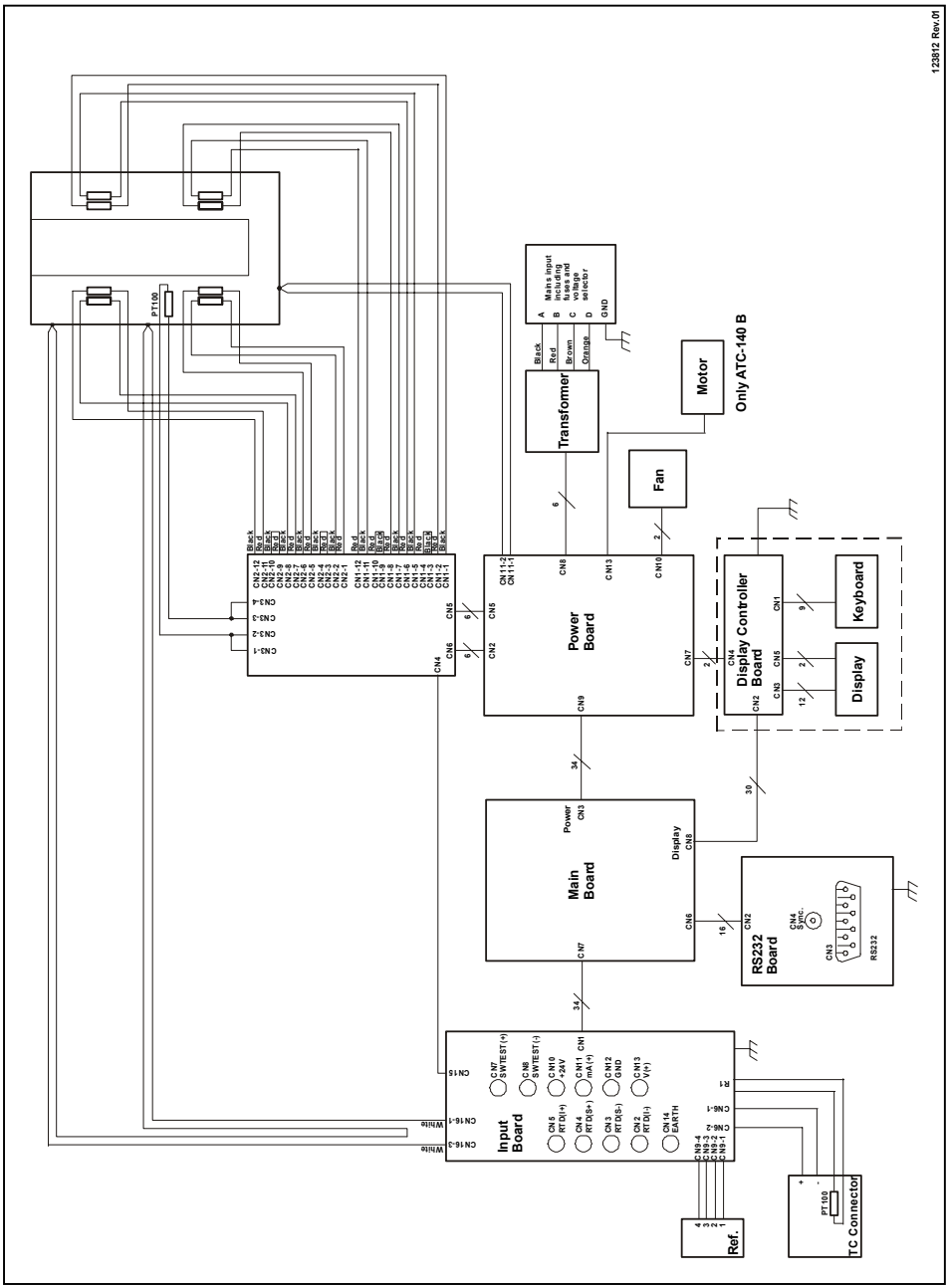
3.12 Wiring Diagram – ATC-155 B



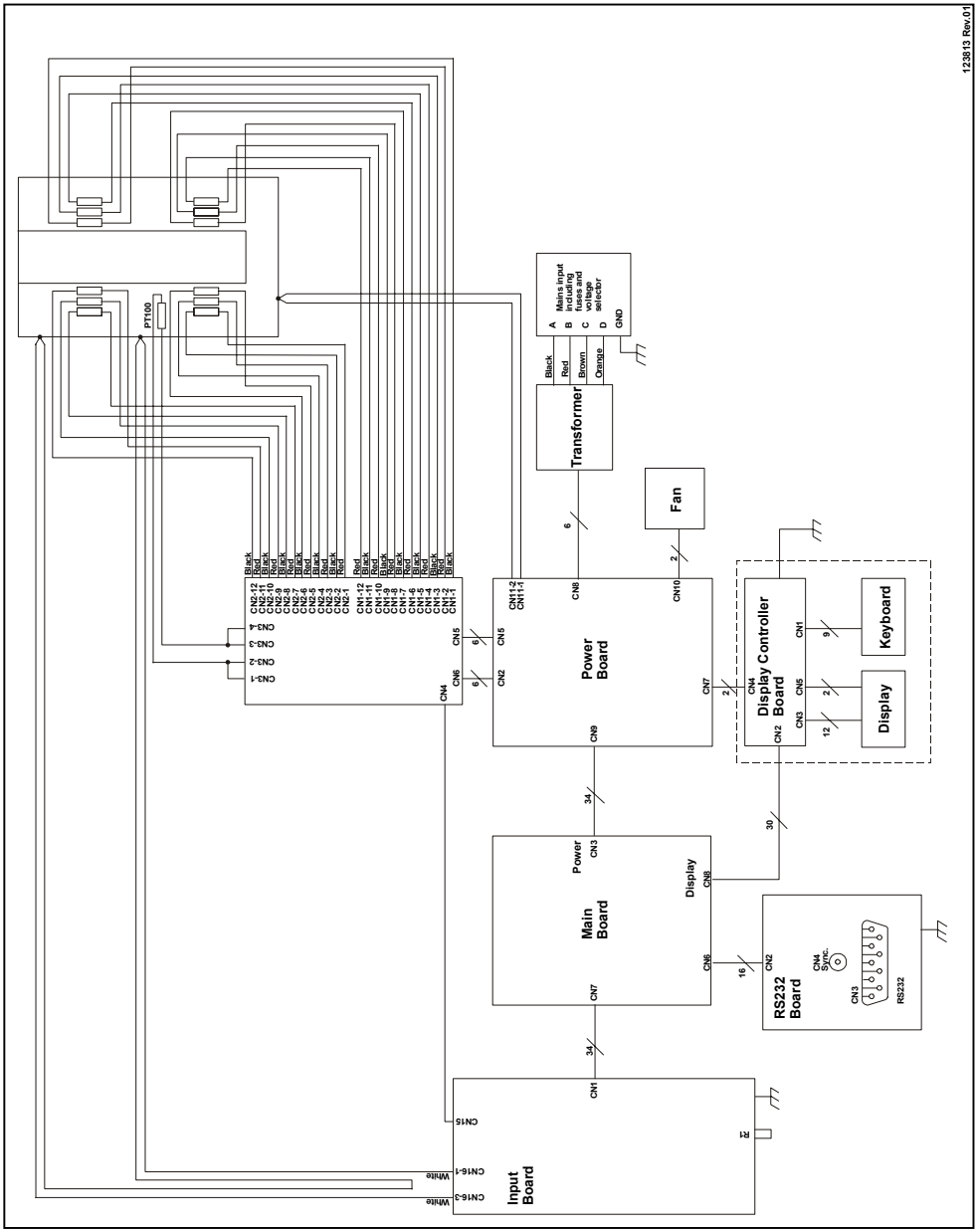
3.13 Wiring Diagram – ATC-140/156 A



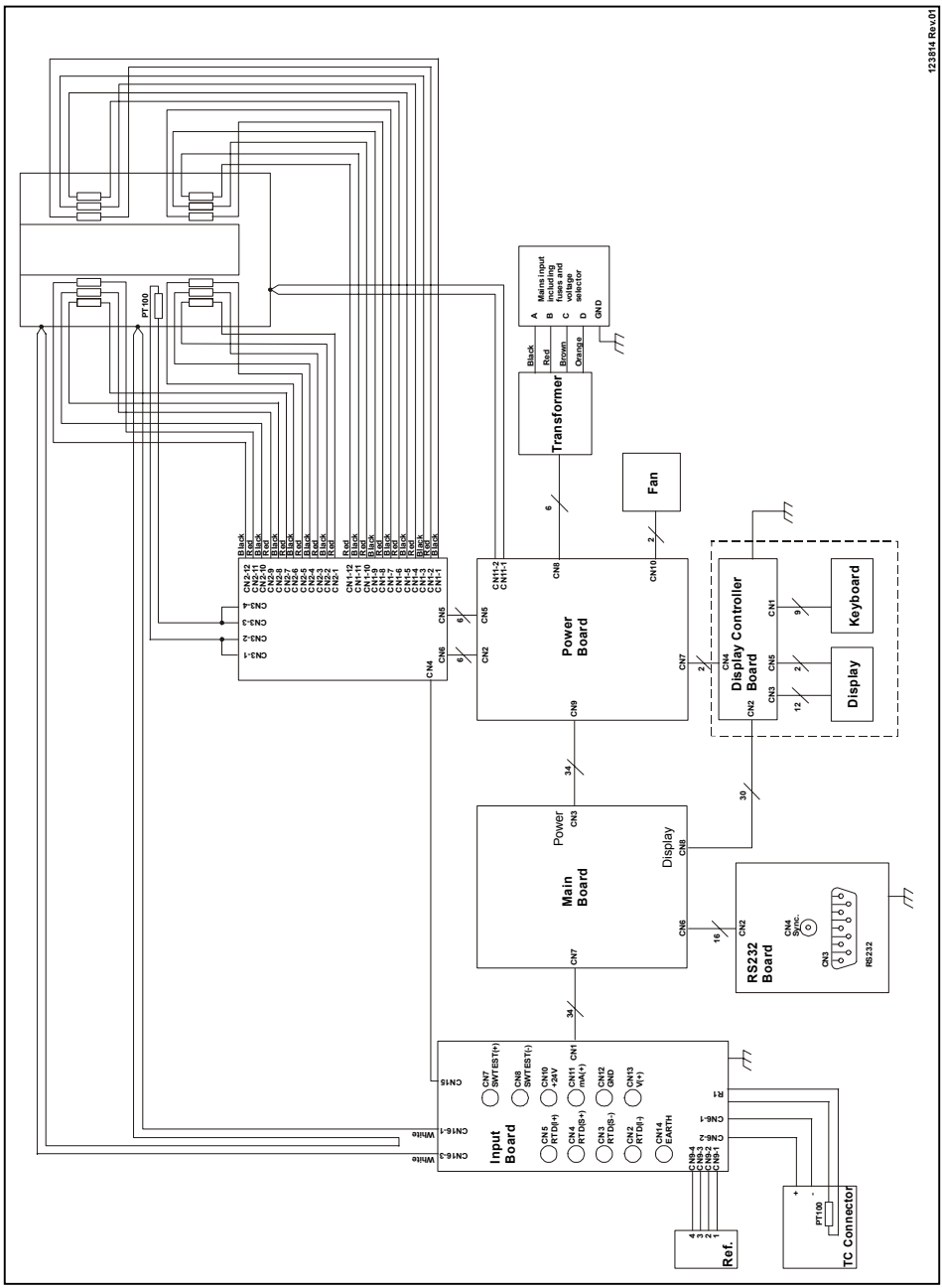
3.14 Wiring Diagram – ATC-140/156 B



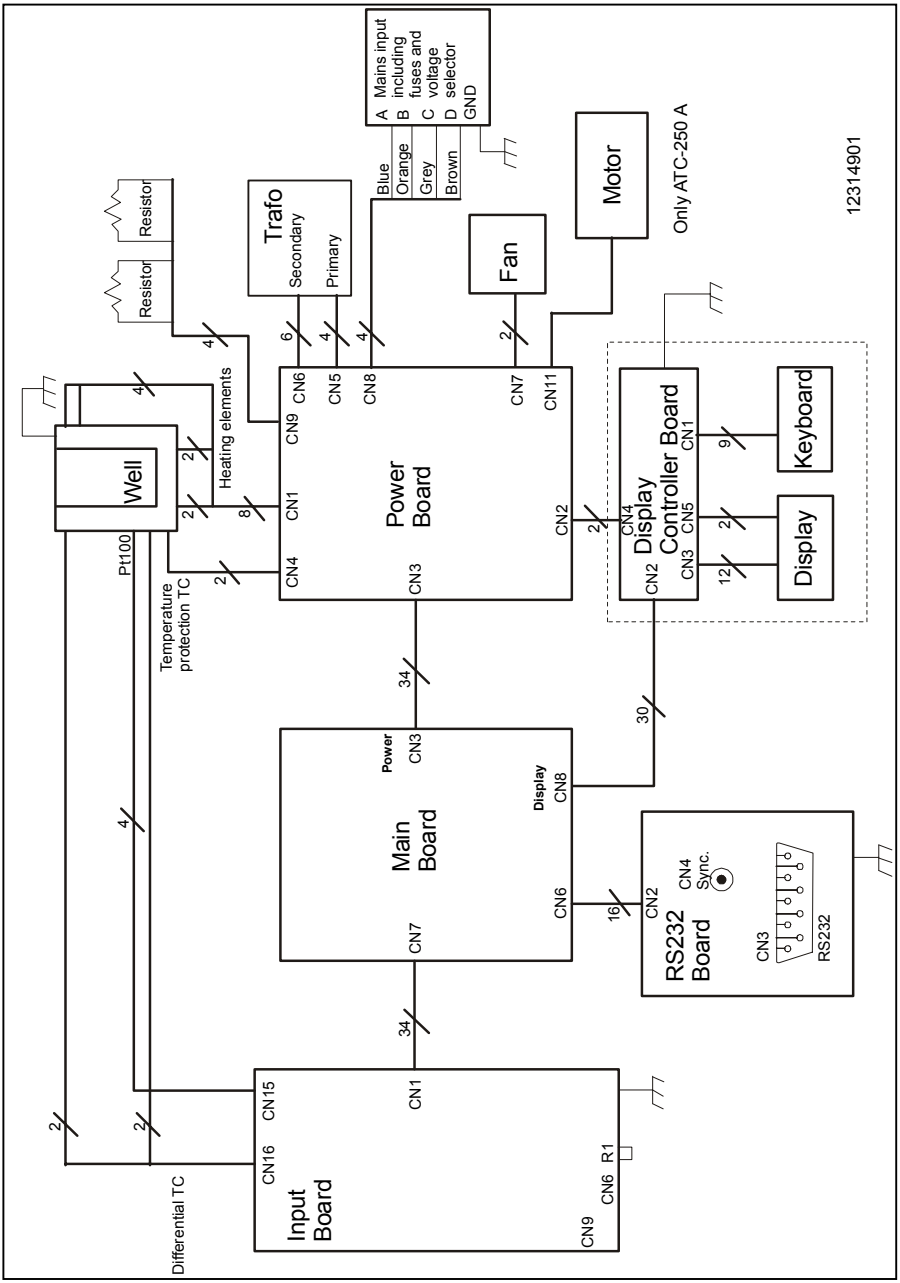
3.15 Wiring Diagram – ATC-157 A



3.16 Wiring Diagram – ATC-157 B



3.17 Wiring Diagram – ATC-250/320/650 A



3.18 Wiring Diagram – ATC-250/320/650 B