

K90100 / K90190 Automatic Melting Point Range Apparatus



Operation and Technical Manual

CERTIFICATE OF CONFORMANCE

Automatic Melting Point Range Apparatus K901XX

This certificate verifies that part number K901XX, Automatic Melting Point Range Apparatus, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications: BP Appendix 5-Method 6; GLP

This unit is tested before it leaves the factory, to ensure total functionality and compliance to the above specifications and ASTM standards. Test and inspection records are on file for verification.



Jesse Kelly
Application Engineer
Koehler Instrument Company

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

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1 Introduction

The K90100 / K90190 Automatic Melting Point Range Apparatus is a state-of-art microprocessor-based instrument for determining the melting point range of white and colored samples in crystalline or powdered form. A melting point range of a sample can be acquired using the following steps. Approximately 5mg of sample is uniformly spread on a glass slide and covered with a glass cover slip. The slide is placed on a uniformly heated, round furnace and subjected to the heating rate specified by the operator. A magnified image of sample is observed on the video screen via a CCD camera. The instrument automatically adjusts the sample image brightness by controlling the lamp intensity. The effect of heat on the sample is clearly seen, and its change in physical state is recorded automatically at the start and the end of the melting process. The automatic detection of the melting point range can also be verified by observing the melting process shown on the video monitor screen. A representation of the entire melting process in the form of a graph printout is available for validation. The instrument can also be operation in the manual operation mode where the user can register at the touch of a button on the keypad the start and the end of the sample melting process.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the K90100 / K90190 Automatic Melting Point Range Apparatus. This manual should also be used in conjunction with applicable published laboratory procedures.

1.1 Koehler's Commitment to Our Customers

Providing quality testing instrumentation and technical support services for research and testing laboratories has been our specialty for more than 50 years. At Koehler, the primary focus of our business is providing you with the full support of your laboratory testing needs. Our products are backed by our staff of technically knowledgeable, trained specialists who are experienced in both petroleum products testing and instrument service to better understand your requirements and provide you with the best solutions. You can depend on Koehler for a full range of accurate and reliable instrumentation as well as support for your laboratory testing programs. Please do not hesitate to contact us at any time with your inquiries about equipment, tests, or technical support.

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1.2 Recommended Resources and Publications

American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428-2959, USA
Tel: +1 610 832 9500 • Fax: +1 610 832 9555
<http://www.astm.org> • email: service@astm.org

1.3 Features and Benefits

- Advanced microprocessor-based controller with user friendly design
- Designed for detecting the melting range / point of solid substances
- Water-proof Alphanumeric keyboard with soft keys
- Roll back edit facility for entering / editing program parameters
- User interactive software for ease of operation with protection against invalid entries
- Memory storage of 20 programs with parameters
- Facility to copy program parameters to a new program
- Facility to delete selected or all programs
- Last run result can be viewed or printed
- Alphanumeric entries of sample name, sample number, identification number, and instrument serial number for authentication
- User selectable operating modes:
 - **AUTO detection mode.** The sample melting point range are automatically detected by a photosensing process via the CCD camera system
 - **MANUAL detection mode.** The sample melting point range can be monitored by the user and selected with a single key press by the user.
- Intelligent lamp intensity control with soft start.
- Selectable Report Format: complying with GLP requirements
- Report giving parameter and result
- Report of program parameters for 20 programs
- Calibration Report
- Daily Auto Incremented Run number which makes system full proof and GLP compliant
- Error indication to help user trace problems
- RUN can be started with last run parameters
- Precise temperature control for repeatable results
- Facility to abort RUN by single key
- Status Escape and Back key for better user interface
- STOP key for achieving isothermal condition during Manual RUN
- Built-in Real Time Clock for Date-Time display and on report printout

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1.4 Specifications

Model:	K90100 / K90190
Dimensions, l x w x h, in. (cm):	42x31x33 (16 ¹ / ₂ x12 ¹ / ₄ x13)
Net Weight:	24 lbs (11 kg)
Shipping Weight:	31 lbs (14 kg)
Shipping Dimensions:	3.6 Cu. ft.
Electrical Specifications:	K90100 - 115V 60Hz; K90190 - 220V 50Hz
Temperature Range (Accuracy):	ambient to 300°C (± 0.5°C)
Temperature Sensor:	Pt-100
Heating Rates (°C/min):	0.2, 0.5, 1.0, 2.0, 3.0, 6.0, 12.0
Cooling Time:	20 minutes (300°C to ambient)
Sample Size:	~ 5 mg
Sample Holder:	1 mm glass slide
Sample Cover:	0.17 mm glass cover slip
Test Storage:	Up to 20 tests with parameters

2 Safety Information and Warnings

Safety Considerations. The use of this equipment may involve *hazardous* materials and operations. This manual does not purport to address all of the safety problems associated with the use of this equipment. It is the responsibility of any user of this equipment to investigate, research, and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Equipment Modifications and Replacement Parts. Any modification or alteration of this equipment from that of factory specifications is not recommended, voids the manufacturer warranty, product safety, performance specifications, and/or certifications whether specified or implied, and may result in personal injury and/or property loss. Replacement parts must be O.E.M. exact replacement equipment.

Unit Design. This equipment is specifically designed for use in accordance with the applicable standard test methods listed in this manual. The use of this equipment in accordance with any other test procedures, or for any other purpose, is not recommended and may be extremely hazardous.

Chemical Reagents Information. Chemicals and reagents used in performing the test may exhibit potential hazards. Any user must be familiarized with the possible dangers before use. We also recommend consulting the Material Data and Safety Sheet (MSDS)

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on each chemical reagent for additional information. MSDS information can be easily located on the internet at <http://siri.uvm.edu> or <http://www.sigma-aldrich.com>.

3 Unpacking and Installation

The instructions for preparing the equipment assume that the user is aware of the contents of this document, which lists the warranty conditions and important precautions.

3.1 Packing List

- Automatic Melting Point Range Apparatus (K90100 or K90190)
- Black and White 6" Monitor and Power Adapter
- Furnace Cover Plate
- Connecting Cables
- Spatula
- Sample Preparation Jig
- Power Cord
- Spare Fuses – 1A and 2A (two each)

3.2 Accessories (ordered separately)

1. K90104 Glass Slides and Cover Slips (pack of 100)

3.3 Unpacking

Carefully unpack and place the equipment in a secure location. Use extra care while unpacking glass pieces. Ensure that all parts and accessories listed in previous section are present. Inspect the unit and all accessories for damage. If you find any damage, keep all packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment. Do not return goods to Koehler without written authorization.

3.4 Equipment Placement

Place the apparatus on a firm, level surface in an area with adequate ventilation. Make sure that the unit is leveled, if appropriate. Please note that Koehler does not supply a spirit level with this equipment.

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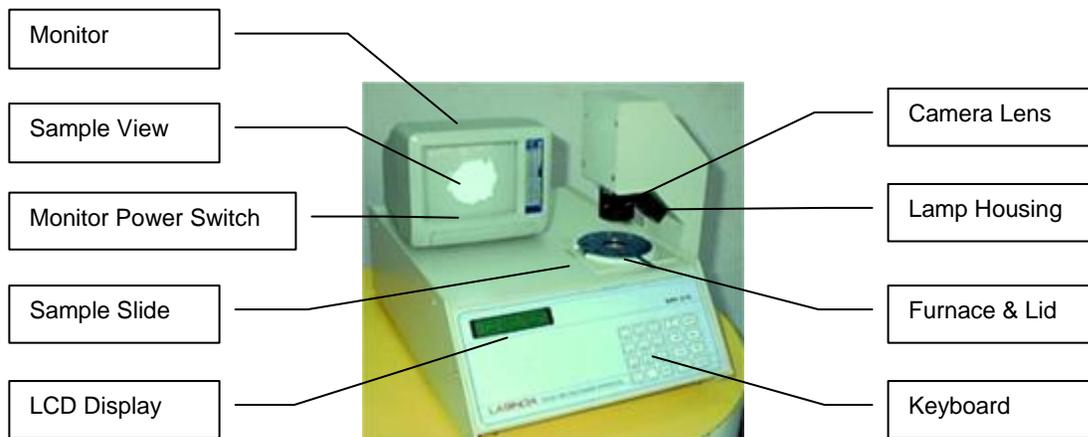
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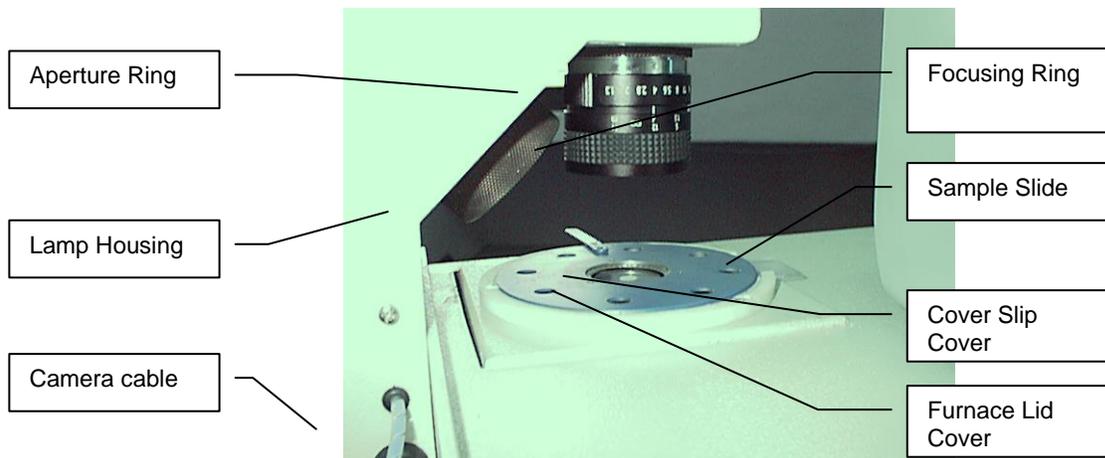
3.5 Equipment Assembly

Remove all packing materials and assemble the Koehler Automatic Melting Point Range Apparatus. Carefully remove the instrument wrapping and the accessories from the packaging. Connect the Power cord to the back of the instrument. Connect the instrument CCD Camera cable to monitor. Connect the DC Power Adapter pin to monitor.

Instrument Setup



Camera Lens Detail (view from back side)



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3.6 Printer Connection and Setup

Place the printer (80 column Dot Matrix) on the side of the instrument. Connect the printer data cable to the 25 pin D-shell connector provided on the back panel. Adjust the printer dip switch settings as shown below and ensure that printer is loaded with paper. After switches are correctly set turn the printer OFF and ON again to load the new settings.

1. EPSON LX-800

SWITCH BANK 1

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
OFF	ON	ON	ON	OFF	ON	ON	ON

SWITCH BANK 2

SW 1	SW 2	SW 3	SW 4
ON	OFF	OFF	OFF



2. TVSE

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
ON	OFF						

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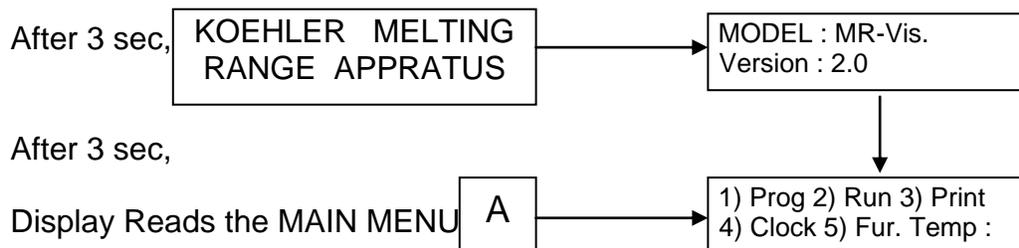
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4 Operation

The K90100 / K90190 Automatic Melting Point Range Apparatus is a state-of-art microprocessor-based instrument for determining the melting point range of white and colored samples in crystalline or powdered form. For your safety, please be sure to read and obey all safety and hazard warnings, the installation procedure, and any of the standard test methods before operating this instrument.

4.1 Switching on the Instrument

Connect the power cord to a proper mains supply socket having the proper stabilized power supply with proper grounding. Connect the monitor's power cord to mains supply socket. Connect the printer power cord mains plug to mains supply socket. Carefully remove the lens cap from the CCD camera lens. This cap is used in shipping to protect the lens and also to keep the lens closed when not used. Switch 'on' the monitor by pressing the power switch. Switch 'on' the instrument. The illuminator lamp will blink on/off and the 20 character, 2 line display will read as shown below. Note: Keep the instrument ON for 20 minutes to warm up before you actually start using it for sample analyses.



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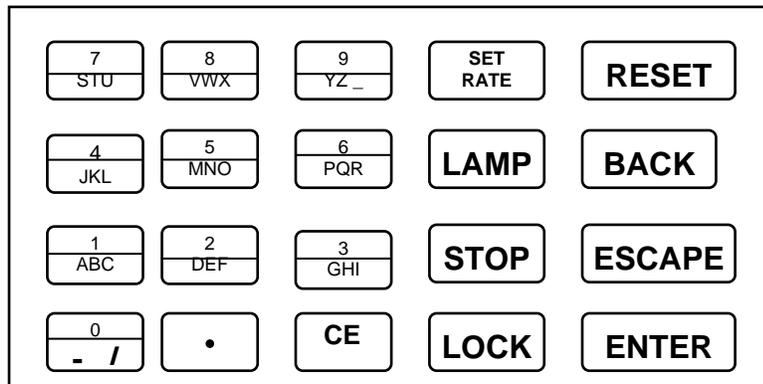
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4.2 Front Panel Details

The front panel consists of name plate, 20 character x 2 line backlit LCD display, and a splash waterproof polyester keyboard (20 keys).

Front Panel – Keyboard



Key Functions:

Left Hand Side Keys: Alphanumeric Dual Function (A~Z , 1~9), Zero (0) with Dot (.), Dash (-), Slash(/), decimal point (.) and Clear Entry (CE) key.

Right Hand Side Keys: Functional Keys and RESET key.

Description of Functional Keys:

-  : To Select 'Heating Rate' while making program entry.
-  : To Reset the instrument.
-  : To Switch the Lamp ON/OFF (Toggled key).
-  : Used to go back to the previous display screen.

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- STOP** : In RUN-MANUAL mode, to hold isothermal condition, while furnace temperature is raised with the user specified heating rate.
- ESCAPE** Used to quickly return to the MAIN menu.
- LOCK** : To lock the Start and End Temperature of Melting process in MANUAL mode.
- ENTER** : To acknowledge the parameter entry.

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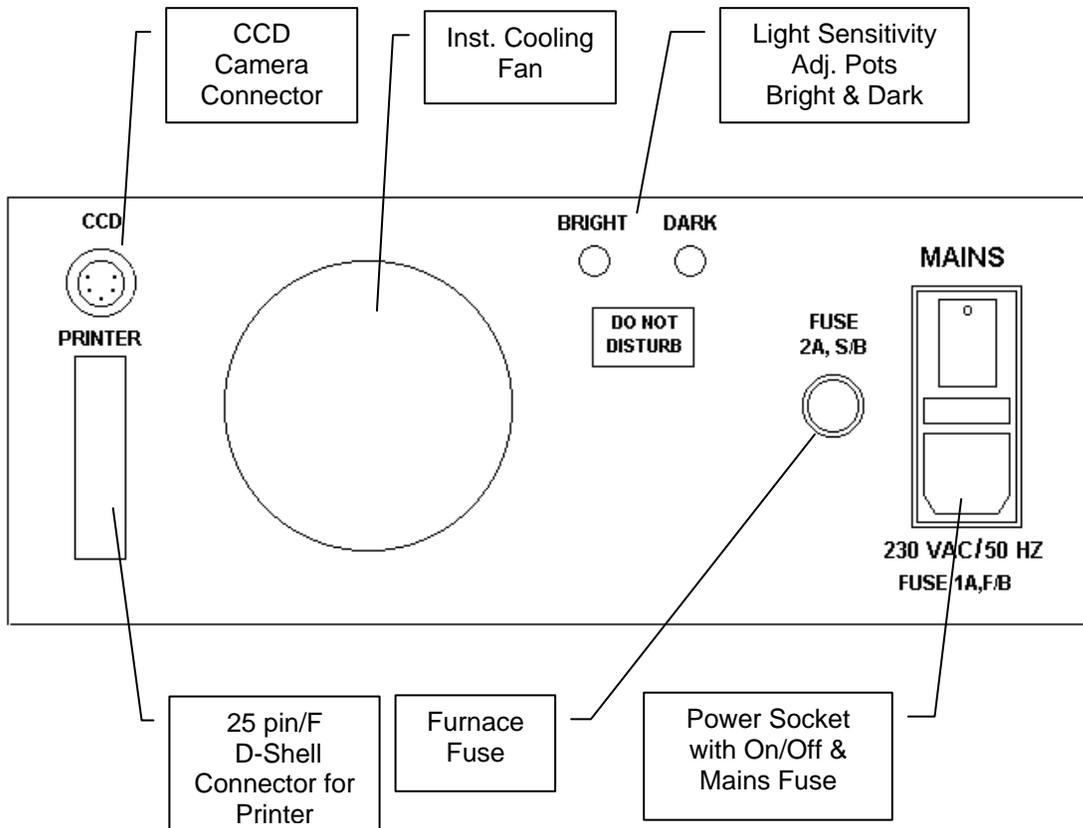
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4.3 Back Panel Details

The back panel consists of 5-pin/M - shell connector for CCD & sensor, Light Sensitivity Pots (Bright & Dark), 25-pin/F - D type connector for Printer, Furnace fuse and Power socket with ON/OFF switch & fuse.

Back Panel



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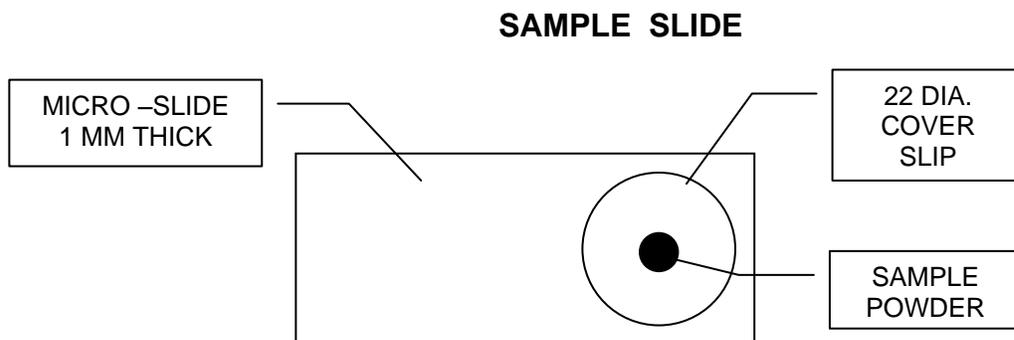
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4.4 Sample Preparation

The sample is prepared using the following items: clear glass slide, clear round cover slip, sample preparation jig (0.5 mm thick, 5 mm hole dia), small spatula, finely crushed sample powder (about 5 mg / sample). Place the jig on one side of the glass slide and finely spread the powder with the help of the spatula. (Do not stack the sample.) Place the round cover slip on it. Observe that the sample is homogeneously spread in a well-defined circle (avoid gaps). Note: Place a round cover slip on the furnace lid. In between the runs, the furnace lid should be sufficiently cooled.

Useful HINTS :

1. For sample whose melting point is not known, use heating rate : 6 or 12 °C/MIN.
2. For plastics / fibers, use heating rate : 12 °C/MIN.
3. For 'Heat & Cool' Mode, it is recommended to use 1°C/MIN.
4. It is recommended to use 'MANUAL' operation for dark colored samples.
5. For samples, that shrink or become transparent during heating process, increase sample size and use heating rates: 3, 6 or 12 °C/MIN.



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4.5 Running the Instrument

When the Instrument is Powered On or Reset key is pressed, it gets initialized and display reads,

1) Prog 2) Run 3) Print 4) Clock 5) Fur.Temp :

Main Menu Functions:

- 1) 'Prog' : To Add (create) / edit, view, copy, delete programs.
- 2) 'Run' : To start the RUN desired program for Melting range determination.
- 3) 'Print' : To view the results of last sample Run ;
To obtain a hard copy of program parameter listing, result report, graph print out (for AUTO operation only).
- 4) 'Clock' : To view/change date / time of the built-in RTC.
- 5) 'Fur.Temp' : To view the furnace temperature.

FUNCTIONS :

1] PROGRAM ENTRY :

Select 'Prog' from main menu options by pressing '1'.

Display reads:-

PROGRAM:1>ADD >VIEW 3>COPY 4>DELETE:_
--

*** To return to main menu press 'ESC'. Use 'BACK' key to go back to previous entry.

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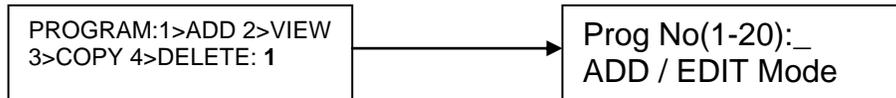
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I) To ADD / Modify a new / existing program :

A) ADDing a New Program :

Select 'ADD' from menu by pressing '1' & 'ENTER'



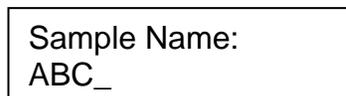
E.g. To create program no. 1

Press '1' & 'ENTER'

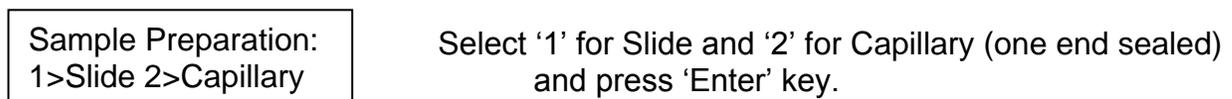


Use Alphanumeric keys to Enter Sample Name.

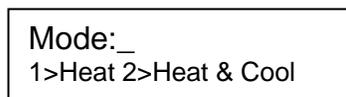
For Example, the Sample Name is ABC and press 'Enter' Key to acknowledge.



Display reads the type of sample preparation done for the analysis.



Display reads the 'Heat' Mode of melting range determination.



For e.g. To select '**Heat**' Mode, Press '1' & 'ENTER'.

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Heat mode: In this mode, the furnace will heat until either the end temperature of melt is detected or until the furnace cutoff temperature is attained. After the furnace temperature reaches 5°C below the SET temperature, temperature starts rising with user specified rate. AUTO / MANUAL detection operation can be used with this mode.

Heat & Cool mode: Only MANUAL operation is to be used with this mode. Procedure to be followed for this mode. When the furnace temperature reaches 5°C below the SET temperature value, then temperature starts rising with user specified rate. The start temperature of melt is recorded by pressing 'LOCK' key. As soon as start of melt is recorded, the heating stops and cooling starts with the same rate as that of heating. However, because of heat flux, the sample continues to melt, to fully melted state and then starts solidifying. The moment it begins to solidify, press 'LOCK' key to record the COOL temperature. The melting point is interpolated as $(\text{HEAT temperature} + \text{COOL temperature}) / 2.0$ where HEAT temperature is the interpolated temperature at fully molten state.

Display reads Melting Range Process/detection.

The Melting Range determination can be done in two ways, i.e. Automatic detection of Start and End as well as Manually by LOCK key.

In Heat Mode the detection can be done in AUTO as well as in MANUAL operation.

Operation:_ 1>Auto 2>Manual

For e.g. to select 'AUTO' operation. Press '1' & 'ENTER'

If 'Heat & Cool' Mode is selected, the Only 'MANUAL' detection is possible since the user has to Lock the Start & End temperature by pressing the LOCK key.

AUTO operation: At 5 °C below the SET temperature, the lamp will automatically adjust to optimum intensity depending on the brightness of the sample. The system will then continue to heat with SET RATE. The start temperature will be automatically logged. The end point is also detected automatically to give the melting range for the particular sample.

MANUAL operation: The start temp. is recorded by using the 'LOCK' key. The end temperature should also be recorded by using 'LOCK' key a second time, to give the melting range for the particular sample.

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The Display waits for Set temperature entry to be made. SET Temperature is the samples expected melting temperature,

Set Temp °C:_

Use Numeric keys to enter Set Temperature value between ambient +5 ~ 310°C & Press ENTER'.

If Entered Temperature is not within limits the Display message reads :

Invalid Entry
 RANGE : 8 to 310

→ Set Temp °C:_

Re-enter the Correct Set temperature.

If Operation is entered as MANUAL ,then :

Furnace
 Temperature

Enter the CUT-OFF Temperature limit of the furnace . If the start and end temperature of melting are not locked manually, the furnace will be heated to until this CUT-OFF Temperature is attained.

If the Furnace Temperature Cutoff Limit is less than SET Temp.+5°C or more than 325°C, then the instrument gives an error message as below,

Invalid Entry!....
 Limits : AB + 5 - 325

where AB is set temperature value,

Re-Enter the Temperature.

The Furnace Temperature Cutoff Limit will be automatically calculated as Set Temp +15 °C in AUTO Operation for Heating Rates (0.2 ,0.5 ,1.0 ,2.0 ,3.0 °C/MIN) ; Set Temp +75 °C for 6°C/MIN; Set Temp +150 °C for 12°C/MIN. (But default Max Cut-off limit is 325°C)

Rate:
 `SET RATE' to select

Press 'SET RATE' key to select the Heating Rate.

NOTE: If 'Heat & Cool' mode has been selected , Rates available will be 0.2, 0.5, 1.0, 2.0, 3.0 °C/MIN. Rate 6 and 12 °C/min are not available for this mode.

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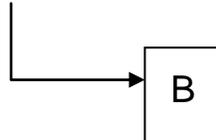
Rate: 0.2°C/MIN
'ENTER' to select...

Press 'SET RATE' key repeatedly until the desired rate is displayed & Press 'ENTER'.

For e.g. To select 1°C/Min, press 'SET RATE' key thrice.

Rate: 1.0°C/MIN
'ENTER' to select...

Now press 'ENTER'. Instrument gives Beep and returns to Program Screen



Now You can Add another Sample Analysis Program.

B) To modify an existing program:

If program parameters are already stored at a particular program number then to modify the desired parameter/s, follow the same procedure as for creating a new program. The previously stored parameters are displayed, which may be acknowledged by pressing 'ENTER' or may be modified as required.

II) To View Program Parameters:

Select 'VIEW' from menu by pressing '2' & 'ENTER'

Display reads,

Prog No(1 – 20):_
VIEW Mode

Enter the program no. whose parameters are to be viewed.
The program parameters v.i.z. Sample Name, Mode, Operation, Set Temp, Furnace Temperature Cutoff Limit, Heating Rate are displayed one after another and

Display screen returns to Program Entry Menu screen  with a beep.

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III) To Copy Program Parameters:

Select 'COPY' from menu by pressing '3' & 'ENTER'

Copy Prg from: _

For e.g. To copy program parameters of program no. 1 to program no. 5.

Press '1' & 'ENTER'.

Press '5'

Copy Prg from: 1
Copy Prg to : _

Copy Prg from: 1
Copy Prg to : 5_

& 'ENTER'.

Instrument Checks the existence of the Program,

If the program parameters of prog no. 5 exist (not empty) :

Program exists !
OVERWRITE?1>Y

For a non-existing Empty Program, this screen will be skipped.

1) If program is to be overwritten then, Press '1' & 'ENTER' .

Message displayed after the program has been successfully copied:

Program Copied!...

2) If program is not to be overwritten , then Press '2' & 'ENTER'.

Copy Prg to : _

Enter other/New program no to complete the COPY function.

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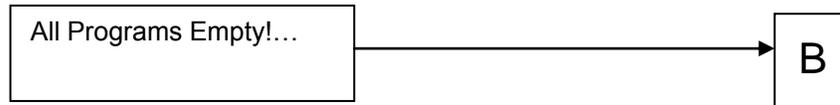
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IV) To Delete Program:

Select 'DELETE' from menu by pressing '4' & 'ENTER'
If All Programs are Empty then display reads,



Else Display reads,

Delete:_
1>Single 2>All

The option is available to delete one particular Program or sequentially delete desired Programs or all Programs can be deleted.

A) To delete particular program

Press '1' and 'Enter'

Delete:_1
1>Single 2>All



e.g. To delete single program say prog.No.1

Press '1' & 'ENTER'.

Delete Prg:_ 1
Press 'ESC' to QUIT

If Program does not exist (Empty program) , a message is displayed:

Delete Prg:1
Prg does not exist !.

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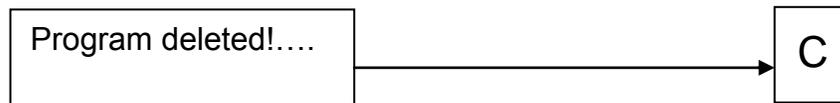
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If program is existing / not empty, then after successful deletion of that program:

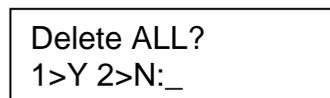


If any other programs are to be deleted, then enter their program numbers accordingly. After all unwanted programs have been deleted, press 'ESC' to return to main menu.

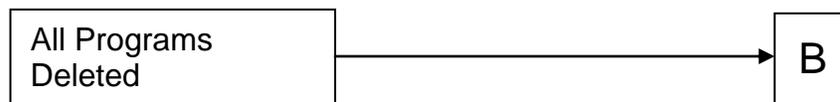
B) To delete ALL Programs:

CAUTION : This option should be used/selected only when ALL programs are to be deleted.

Before all programs are deleted, a confirmation Display appears :



Press '1' & 'ENTER' to delete all programs. A message appears on screen after all programs have been deleted:



Press '2' & 'ENTER' if you do not wish to Delete all programs.

After all unwanted programs have been deleted, Press 'ESC' to return to

Main Menu Screen. 

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2] RUN Process :

Ensure following check before the Sample Analysis run is started.

1. The round Cover-slip on the Furnace Lid is clean (not foggy).
2. The surface of the Furnace should be clean from any foreign particles for a good thermal contact of the slide. (The presence of foreign particle will create the thermal difference and leads to erroneous results).
3. There should not be a direct air draft in the furnace direction.

To Select 'RUN' from main menu options
press '2'.

Display reads,

Prog No.: 1

The Program No. of last RUN is displayed.
If the same program is to be RUN press 'ENTER',
else enter the desired Program No. to be run and press
'ENTER'.

For e.g. To run program no. 5.

Press '5' & press 'ENTER'.

If that program does not exist then message is displayed:

Prog No.:5
Prg does not exist!.

If program exists then :

Prog No.:5
R_No:1

R. No. indicates the run number for that day.

Press '1' and 'Enter'

Sample No:
_

Enter Sample No. using Alphanumeric

Sample No:
A1_

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Press 'ENTER'

Id. No.: _

Enter Id.No. using Alphanumeric keys.
e.g.say ACE1905

Id. No.: ACE1905_

Press 'ENTER' to Start the RUN.

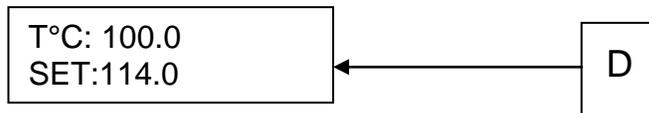
Now the Furnace starts heating,
Display reads ,

T°C: 26.5 SET:114.0

The furnace temperature rises fast until the Sample Insertion Temperature (in this case 99 °C) is reached.

Note : The furnace lid should be placed on the furnace.

If the furnace temperature is more than the Sample Insertion temperature, then:



As soon as the Furnace Temperature reaches Sample Insertion Temperature, display reads,

T°C: 99.0 SET: 114.0

Remove the Furnace lid. Now place the Sample such that it's image appears exactly in the center of the Monitor Screen. Place the furnace lid on the furnace such that it's edge(round) is not visible on the monitor.

If the image appears blurred, re-focus the Camera lens by rotating the Focussing-Ring.

Now press 'ENTER'

The furnace will heat up to 5 °C below Set temperature.

T°C: 26.5 SET:114.0

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NOTE:- If 'ENTER' key is not pressed within 5 minutes, furnace will cool down to room temperature.

The Lamp will be switched ON automatically as soon as the Furnace temperature reaches 5°C below Set Temperature.

Display reads,

Switching Lamp
On...

Instrument checks the light level & adjusts the illuminator intensity automatically for the optimum sensitivity level of Photo sensor.

In AUTO operation, if the sample is not placed properly / sample quantity is less / sample preparation is not correct, a message is given accordingly.

Now, the furnace temperature rises as per user specified Rate.

T°C: 109.0
ST°C: ____

For MANUAL operation, 'MANUAL' will appear in left corner of the display instead of 'AUTO'.

In AUTO operation, as soon as the sample starts melting, the Photo Sensor detects the start and instrument automatically records it and displays this temperature as 'ST'.

Display reads,

T°C: 114.5
ST°C: 114.5

Now further the Furnace temperature is raised as per the Heating Rate, when the sample melts, instrument again automatically records it and display this temperature as 'ET'. In

Display reads,

T°C: 115.5
ST°C: 114.5

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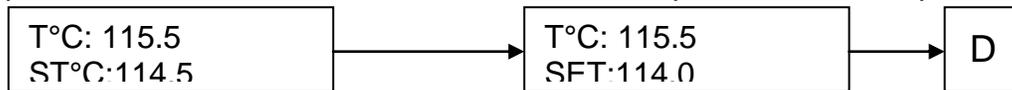
In MANUAL operation, record the Start temperature 'ST' and the End temperature 'ET' by using the 'LOCK' key.

In AUTO operation, end temperature will be held and bulb will remain on for few seconds. **This ends the run.**

To print the Result report or View the Result, press 'ESC' to return to Main menu.

For REPEAT RUN:

Press 'ENTER' key . If the furnace temperature is more than Sample Insertion Temperature then furnace cools down until the Sample Insertion Temperature :



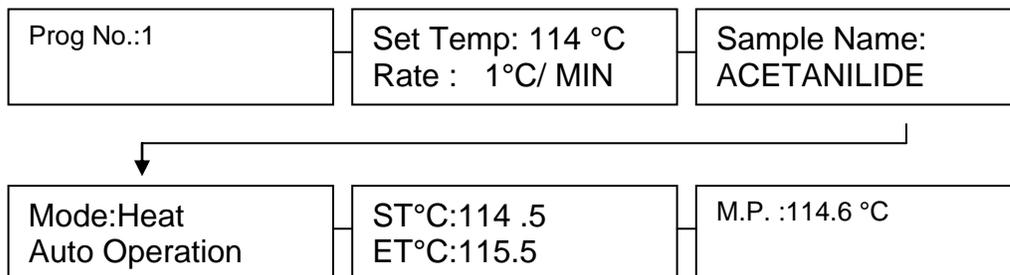
3] To obtain a Hard Copy of Program Parameters Listing / RUN Report / Result Graph :

Main Menu – Display reads, Select 'Print' from Main menu options by pressing '3'.



1] To View the Results of last Sample RUN:

Press '1' and 'ENTER', display reads the complete set of parameters and results in Screen by screen,



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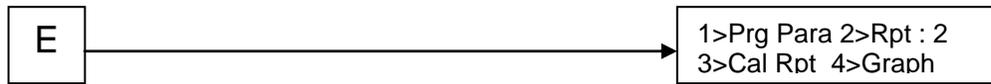
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2] To obtain a hard copy of program parameter listing , RUN report, result graph (available for AUTO operation only)

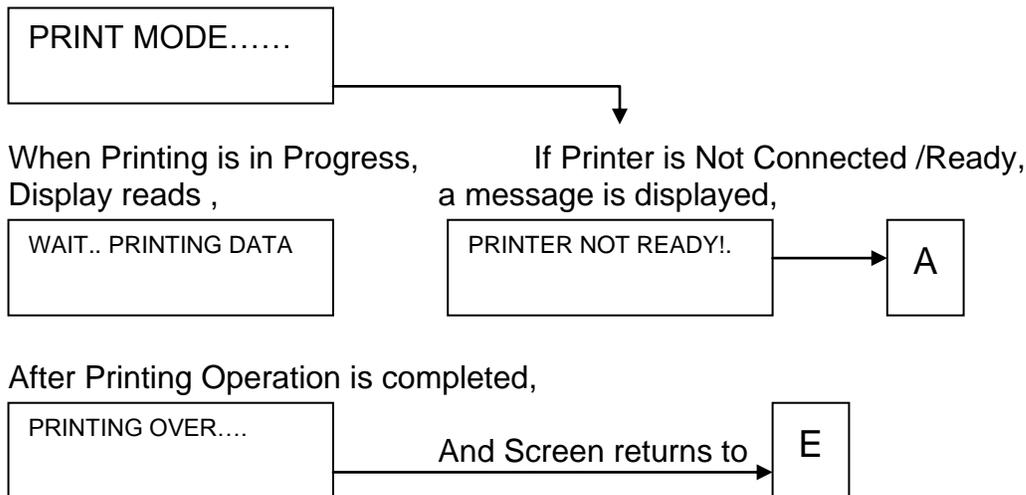
a) For RUN report Press '2' and 'ENTER',



b) For Hardcopy of program parameter listing Press '1' &'ENTER',

c) Report of Instrument Calibration done in the Factory can be taken by pressing '3' &'Enter'.

d) The 'Graph' option will be displayed only if last sample RUN was performed in AUTO operation. (No graph is available for MANUAL Operation).



Press 'ESC' to return to Main menu (A).

4] To SET CLOCK – Edit / view Date & Time :

Select 'Clock ' from main menu options by pressing '4'.



If the stored date/time is not to be changed, then Press 'ESC' or 'BACK' to return to main menu (A).

Press 'ENTER' To change the Date and Time
Display Reads,

01/01/00	08:15
Edit	Mode

The Cursor appears below date entry,

Enter day (1-31) using Numeric keys and press 'ENTER'.
Enter month (1-12) and press 'ENTER'.
Enter year (00-99) and press 'ENTER'.

To only change day then enter new value for day and press 'ENTER' until the display returns to main menu screen

NOTE: 'BACK' Key is active for taking the cursor to previous entry.

For Wrong Entry , the entry position gets blank/clear and cursor returns to start of the entry,

_ /01/00	08:15
Edit	Mode

For Time, if wrong entry is done the display restores the previous Value.

Note : The clock settings are checked for invalid and Leap year entry.

5] To view the Furnace Temperature:

Select 'Fur. Temp' from main menu options by pressing '5'.
Display reads,

T°C: 27.8
Press 'ESC' to

Press 'ESC' / 'BACK' key to return to main menu. (A)

5 Maintenance

WARNING. Disconnect power to any unit before servicing to avoid exposure to high voltages and/or temperatures which may result in personal injury or death. If you have any questions about maintaining your equipment, then please do not hesitate to contact the Koehler technical service department.

5.1 Troubleshooting

1. **ERR 1 – No Heat.** When the furnace starts heating with the user specified rate, then if for any reason the furnace temperature stops rising, switch off the instrument and **check the heater fuse.**
2. **ERR 2 – Shutdown.** When the furnace starts heating with the user specified rate, then if for any reason the furnace gets overheated, switch off the instrument immediately and **call the Service Engineer.**
3. **ERR 3!** While entering alphanumeric characters if entry exceeds specified limits. Limit for Sample Name: 20 characters, Sample No.: 10 characters, Id No.: 10 characters.
4. **RTD UNDER RANGE.** Temperature Sensor Circuit faulty. **Call the Service Engineer.**
5. **RTD OVER RANGE.** Temperature Sensor Circuit faulty. **Call the Service Engineer.**
6. **Run Aborted.** The sample does not melt and furnace temperature rises until furnace reaches Temperature Cutoff Limit.
7. **Place Sufficient Sample at Scr.** In AUTO operation, if sample has not been centered properly to monitor's screen, the sample preparation is not proper, or the sample is not sufficiently bright. **Verify these conditions and even then this message is being displayed, call the Service Engineer.**
8. **ERR 4. Call the Service Engineer.**

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6 Service

Under normal operating conditions and with routine maintenance, the Koehler K90100 / K90190 Automatic Melting Point Range Apparatus should not require service. Any service problem can be quickly resolved by contacting Koehler's technical service department either by letter, phone, fax, or email. In order to assure the fastest possible service, please provide us with the following information.

Model Number: _____

Serial Number: _____

Date of Shipment: _____

7 Storage

This laboratory test instrument is equipped with electrical components. Storage facilities should be consistent with an indoor laboratory environment. This testing equipment should not be subjected to extremes of temperature and/or moisture. This equipment was shipped from the factory in proper containers. If long-term storage is anticipated, re-packing the instrument in a water-resistant container is recommended to ensure equipment safety and longevity.

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8 Warranty

We, at Koehler, would like to thank you for your equipment purchase, which is protected by the following warranty. If within one (1) year from the date of receipt, but no longer than fifteen (15) months from the date of shipment, Koehler equipment fails to perform properly because of defects in materials or workmanship, Koehler Instrument Company, Inc. will repair or, at its sole discretion, replace the equipment without charge F.O.B. its plant, provided the equipment has been properly installed, operated, and maintained. Koehler Instrument Company must be advised in writing of the malfunction and authorize the return of the product to the factory. The sole responsibility of Koehler Instrument Company and the purchaser's exclusive remedy for any claim arising out of the purchase of any product is the repair or replacement of the product. In no event shall the cost of the purchaser's remedy exceed the purchase price, nor shall Koehler Instrument Company be liable for any special, indirect, incidental, consequential, or exemplary damages. KOEHLER INSTRUMENT COMPANY, INC. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. Please save the shipping carton in the event the equipment needs to be returned to the factory for warranty repair. If the carton is discarded, it will be the purchaser's responsibility to provide an appropriate shipping carton.

9 Returned Goods Policy

To return products for credit or replacement, please contact Koehler Customer Service with your purchase order number, our packing list/invoice number, the item(s) to be returned and the reason for the return. You will be issued a Returned Authorization (RA) number, which must be prominently displayed on the shipping container when you return the material to our plant. Shipping containers without an RA number prominently displayed will be returned to the sender. Goods must be returned freight prepaid. Returns will be subject to a restocking charge, the application of which will depend upon the circumstances necessitating the return. Some returns cannot be authorized, including certain products purchased from outside vendors for the convenience of the customer, products manufactured on special order, products shipped from the factory past ninety (90) days, and products which have been used or modified in such a way that they cannot be returned to stock for future sale.

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