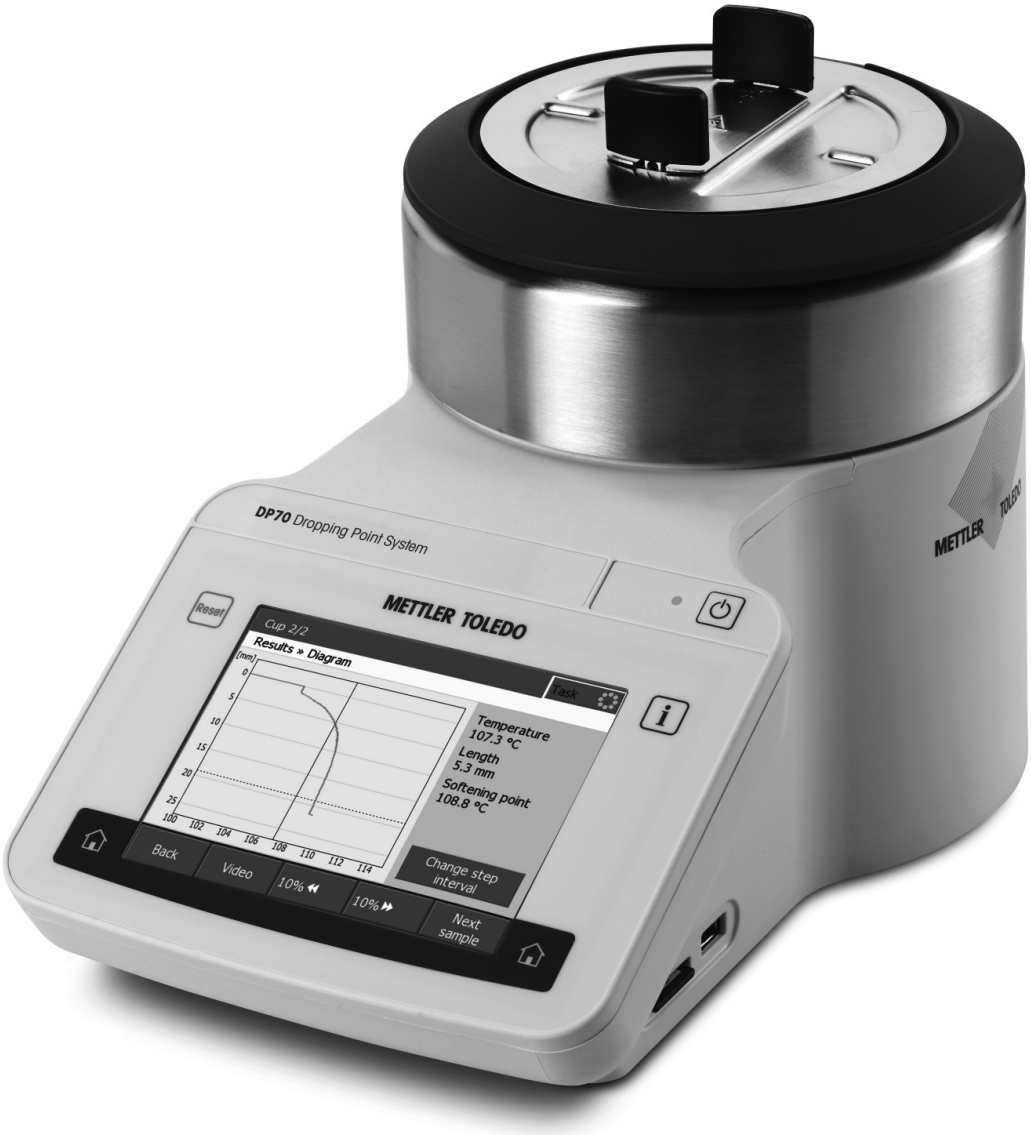
User Manual

Dropping Point Excellence System

DP70/DP90



METTLER TOLEDO

Table of Contents

1 Introduction

Thank you for choosing a METTLER TOLEDO Excellence Dropping Point System. The Excellence Dropping Point System is an easy-to-operate instrument for automated and accurate measurements of the following physical values:

- Dropping point
- Softening point

About this document

This document provides you with the information you need to get started with your METTLER TOLEDO Excellence Dropping Point System.

For a comprehensive description of the instrument and its functions, refer to the Operating Instructions, supplied as PDF file on the CD.

The instructions in this document refer to Excellence Dropping Point Systems running firmware version 2.10 or higher.

If you have any additional questions, contact your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

Conventions and symbols

Refers to an external document.

Note for useful information about the product.

Elements of instructions

- Prerequisites

1 Steps

2 …

⇨ Intermediate results

⇨ Results

2 Safety information

- Read and understand the information in this User Manual before you use the instrument.
- Keep this User Manual for future reference.
- Include this User Manual if you pass on the instrument to other parties.

If the instrument is not used according to the information in the Operating Instructions or if it is modified, the safety of the instrument may be impaired and Mettler-Toledo GmbH assumes no liability.

For a comprehensive description of the instrument and its functions, refer to the Operating Instructions, supplied as PDF file on the CD.

2.1 Definitions of signal words and warning symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

Signal words

WARNING	for a hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.
CAUTION	for a hazardous situation with low risk, resulting in minor or moderate injury if not avoided.
NOTICE	for a hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Warning symbols

Electrical shock

Hot surface

2.2 Product specific safety notes

Intended use

This instrument is designed to be used in laboratories by trained staff. The dropping point instrument is intended for performing measurements to determine the dropping point and the softening point.

Any other type of use and operation beyond the limits of technical specifications without written consent from Mettler-Toledo GmbH is considered as not intended.

Responsibilities of the instrument owner

The instrument owner is the person that uses the instrument for commercial use or places the instrument at the disposal of the staff. The instrument owner is responsible for product safety and the safety of staff, users and third parties.

METTLER TOLEDO assume that the instrument owner provides the necessary protective gear, appropriate training for the daily work and for dealing with potential hazards in their laboratory.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Protective clothing

Gloves that protect from contact heat.

⚠ WARNING

Danger of death or serious injury due to electric shock!

Contact with parts that contain a live current can lead to injury and death.

1 Only use a METTLER TOLEDO power cable and AC adapter designed for your instrument.
2 Connect the power cable to a grounded power outlet.
3 Keep all electrical cables and connections away from liquids.
4 Replace damaged power cables and AC adapters immediately.

⚠ CAUTION

Danger of burns due to hot surfaces!

The oven can reach temperatures that are high enough to cause burns and heats up parts contained in the oven, the lid and the back of the instrument.

1 Never touch a sample you have just removed from the furnace (capillary tubes, glass tubes, slides, sample cups or crucibles).
2 Do not operate the instrument without the lid.
3 Never touch the furnace, furnace lid or the back of the device before the instrument has cooled down.

NOTICE

Danger of malfunction due to overheating of the instrument!

If the cooling is impeded, the instrument can overheat and malfunction.

1 Do not stack paper on top of the instrument.
2 Do not block the ventilation openings in the back and at the bottom of the instrument.
3 Respect the clearance around the instrument specified in the installation instructions.

NOTICE

Danger of damage to the instrument due to incorrect parts!

Using incorrect parts with the instrument can damage the Instrument or cause the instrument to malfunction.

– Only use parts supplied with the instrument, listed accessories and spare parts from METTLER TOLEDO.

NOTICE

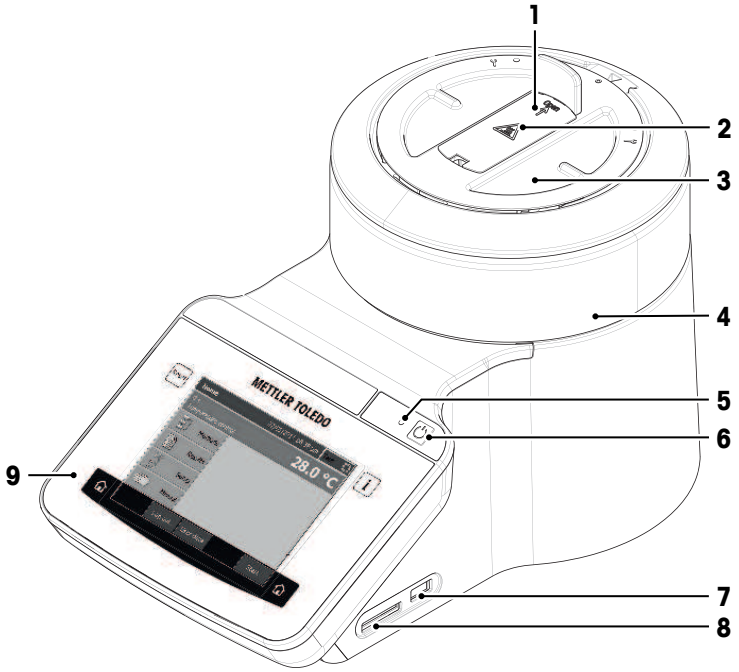
Danger of damaging the touch screen with pointed or sharp objects!

Pressing on the touch screen with pointed or sharp objects may damage it.

– Operate the touch screen by applying gentle pressure with the pad of your finger.

3 Design and Function

3.1 DP70 instrument overview



Nr.	Name	Function
1	Protective lid	Covers the opening through which the samples are inserted.
2	Safety sign for hot surfaces	The safety signs warns that the lid, the handle of the protective lid and the handle of the sample carrier can be hot enough to cause burns.
3	Lid	Protects the user from hot parts and protects the furnace from dust. The lid allows access to the measuring cell for maintenance tasks.
4	Housing	The cylindrical part of the housing contains the measuring cell and the furnace.
5	Power indicator light	Shows the status of the instrument: • Power indication light on: The instrument is on. • Power indication light off: The instrument has shut down. • Power indication light fades on and off: The instrument is on and the screen saver is active.
6	Power button	The power button has the following functions: • Start the instrument. • Shut down the instrument. • Activate the screen saver if the instrument is on. • Deactivate the screen saver.
7	USB A socket	Is used to insert a USB stick if you want to export data to the USB stick or import data from the USB stick.
8	Slot for SD cards	Is used to insert an SD card if you want to export data to the SD card.
9	Control panel	Consists of an integrated touchscreen and the four hard keys.

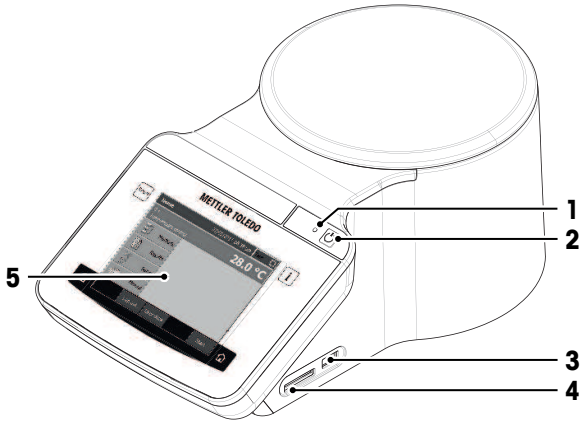
See also

- Control panel layout ▸ Page 9
- Clean the instrument ▸ Page 26
- DP90 instrument overview ▸ Page 7

3.2 DP90 instrument overview

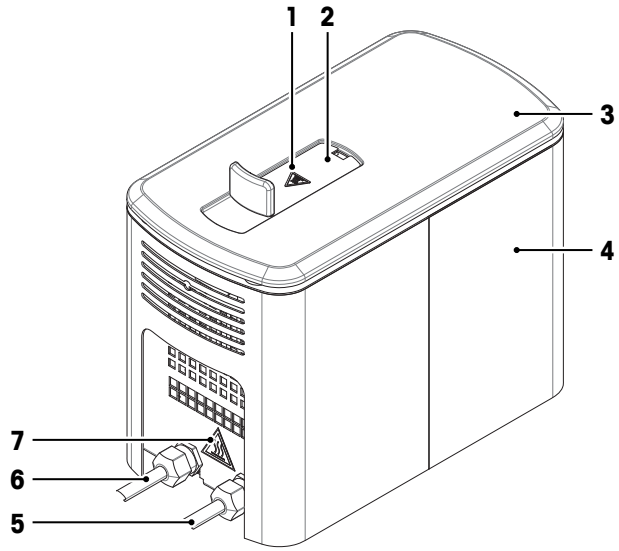
The DP90 consists of two units: the control unit and the measuring cell. The measuring cell can be placed in a refrigerator or freezer if temperatures below the ambient temperature are required.

Control unit



Nr.	Name	Function
1	Power indicator light	Shows the status of the instrument: • Power indication light on: The instrument is on. • Power indication light off: The instrument has shut down. • Power indication light fades on and off: The instrument is on and the screen saver is active.
2	Power button	The power button has the following functions: • Start the instrument. • Shut down the instrument. • Activate the screen saver if the instrument is on. • Deactivate the screen saver.
3	USB A socket	Is used to insert a USB stick if you want to export data to the USB stick or import data from the USB stick.
4	Slot for SD cards	Is used to insert an SD card if you want to export data to the SD card.
5	Control panel	Consists of an integrated touchscreen and the four hard keys.

Measuring cell



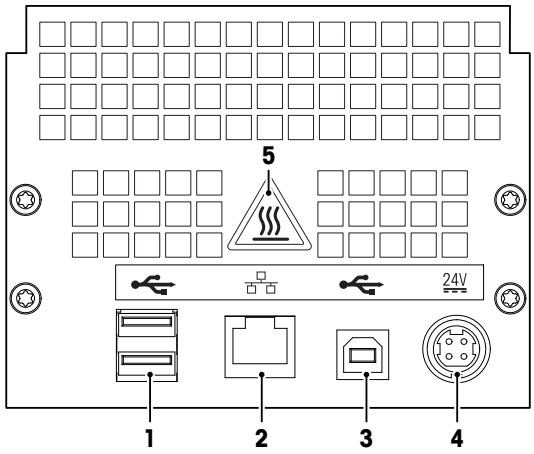
Nr.	Name	Function
1	Safety sign for hot surfaces	The safety signs warns that the lid, the handle of the protective lid and the handle of the sample carrier can be hot enough to cause burns.
2	Protective lid	Covers the opening through which the samples are inserted.
3	Lid	Protects the user from hot parts and protects the furnace from dust. The lid allows access to the measuring cell for maintenance tasks.
4	Housing	Contains the measuring cell and the furnace.
5	Cable (furnace signal)	Transmits signals needed to control the furnace.
6	Cable (camera signal)	Transmits signals from the camera in the measuring cell to the control unit.
7	Safety sign for hot surfaces	The safety sign warns that the back of the measuring cell can be hot enough to cause burns.

See also

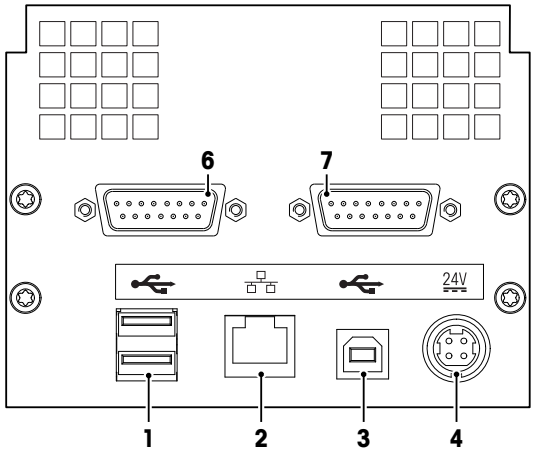
Clean the instrument ▸ Page 26

3.3 Connections at the back of the DP70 and DP90

DP70



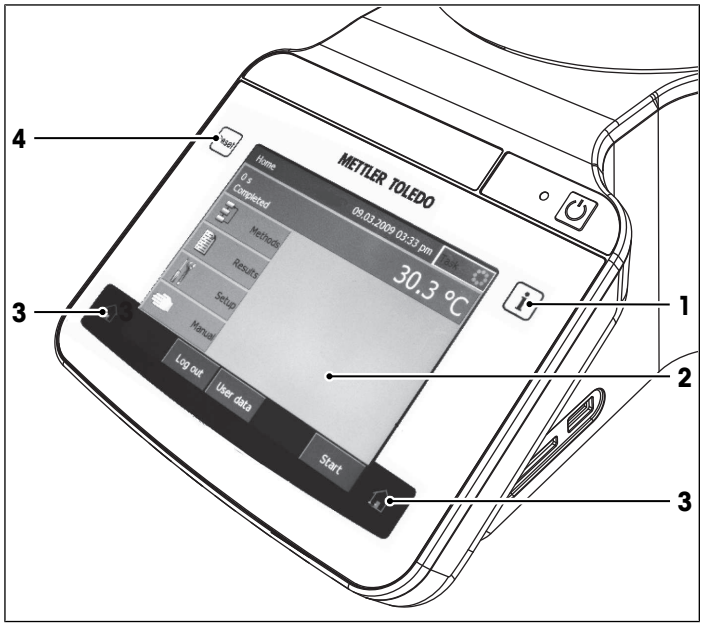
DP90 (control unit)



Nr.	Name	Function
1	USB type A ports	Connection for printers, mouse, keyboards, or USB sticks

Nr.	Name	Function
2	Ethernet connection	Connection to a network for example for a network printer or network storage.
3	USB type B port	Used for service purposes
4	Power supply connection	Socket for AC adapter
5	Safety label for hot surfaces	The safety label warns that the back of the instrument can be hot enough to cause burns.
6	Port (furnace signal)	Data transfer between control unit and measuring cell.
7	Port (camera signal)	Data transfer between control unit and measuring cell.

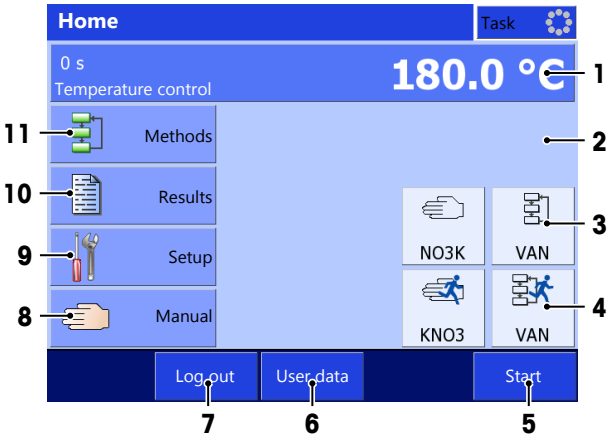
3.4 Control panel layout



Nr.	Name	Function
1	Info	The Info key opens a window with general information about the instrument.
2	Touch screen	The touch screen displays information and can be used to enter information.
3	Home	The home key opens the home screen.
4	**Reset**	The **Reset** key stops the task that is currently running.

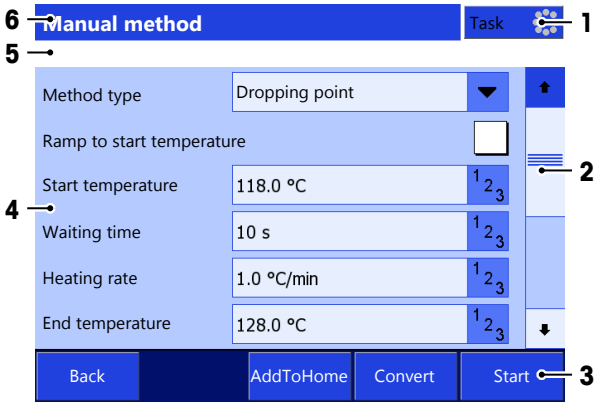
3.5 User interface

3.5.1 Home screen



Nr.	Name	Function
1	Furnace monitor area	The furnace monitor area shows the current temperature of the furnace. If you tap the furnace monitor area, you can switch to a full display of the furnace temperature.
2	Shortcut area	The shortcut area holds up to twelve shortcuts for frequently used methods.
3	Indirect shortcut	An indirect shortcut for a method opens the window **Start analysis**. An indirect shortcut for a manual method opens the window **Manual method**.
4	Direct shortcut	A direct shortcut starts the analysis directly and opens the analysis window.
5	**Start**	Opens the window **Start analysis** of the last analysis that was run.
6	**User data**	Opens the window **User data** with information about the user that is logged in.
7	**Log out**	Logs the current user out and opens the window **Login** window.
8	**Manual**	Opens the window **Manual operations**, where you can start a manual operation.
9	**Setup**	Opens the window **Setup** where you can configure the hardware and the resources.
10	**Results**	Opens a window with the results of the last analysis.
11	**Methods**	Opens the window **Methods** where you select an existing method or create a new the method.

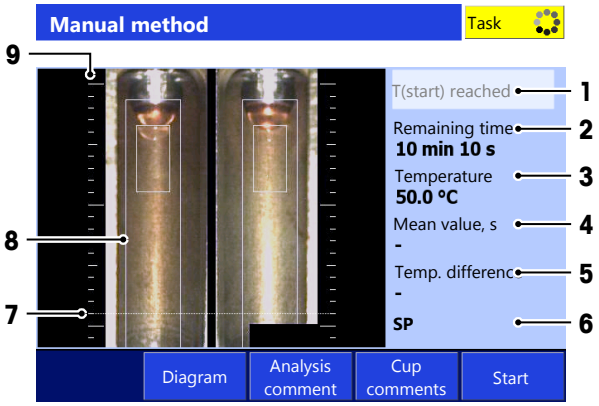
3.5.2 Basic elements of windows



Nr.	Name	Function
1	**Task**	The task panel shows if a task is running or not. Blue: No task is running. Yellow: A task is running. If you tap **Task** while a task is running, the analysis window of the running task opens.
2	Scroll bar	The scroll bar is visible if the content of the window extends beyond the viewable area. You can use either the arrows or the slider to move the viewable area of the screen up or down. To page up and down, tap the area below or above the slider.
3	Footer	Up to five buttons are located in the footer. Which buttons are visible depends on the context of the open window.
4	Body	The body of the window shows information like the video of an ongoing analyses or items like shortcuts or parameters.
5	Navigation	The navigation shows the path to the open window.
6	Title bar	The title bar shows the name of the open window.

3.5.3 Information displayed during an analysis

Information on the current analysis is displayed in the analysis window. The information is constantly updated and includes the following data.



Nr.	Name	Description
1	Analysis status bar	The analysis status bar displays the various positions reached during the analysis: **Go to T(start)**, **T(start) reached**, **Waiting time**, **Ramp**, **Isothermal**, **Create report**
2	**Remaining time**	Remaining time until the end of the analysis. The time indicated includes the waiting time, the duration of temperature ramp and that of the isothermal segment.
3	**Temperature**	Current temperature reading inside the measuring cell.

Nr.	Name	Description
4	**Mean value, s**	**Mean value, s**: current mean value of all the temperature readings of the individual cups and the standard deviation
5	**Temp. difference**	Difference of the temperatures measured for the 2 cups
6	**DP** **SP**	Method type of the running analysis **DP**: **Dropping point** **SP**: **Softening point**
7	Detection line	The dotted line shows where the softening point is detected.
8	Evaluation window	Shows the region where the softening point is detected.
9	Ruler	Shows the distance to the cup outlet in [mm]

3.5.4 Menu structure

Methods

The menu **Methods** has no submenus.

Results

The menu **Results** has no submenus.

Setup

The menu **Setup** has the following submenus.

Calibration substances	–	–
Hardware	**Peripherals**	**Printer**
		PC settings
		Network
		Network storage
		SOAP Settings
	Temperature sensor	–
User settings	**Language**	–
	Screen	–
	Beep	–
	Shortcuts	–
	Keyboards	–
Global settings	**System**	**Identification**
		Date / Time
		Header and footer
		Data storage
	User management	**User**
		Account Policies
	Behavior of analyses and resources	**Analysis sequence settings**
		Action on expiration of adjustment data
		Furnace
Adjustment	–	–
Mainten. & Service	**Import / Export**	–
	Reset to factory settings	–
	Update	–
	Delete data on SD card	–

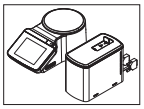
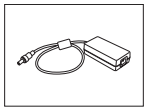
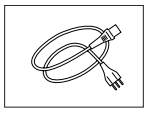
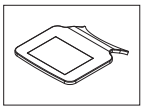
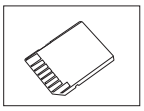
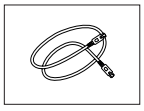
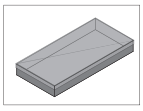
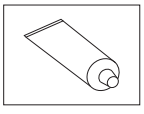
Manual

The menu **Manual** has the following submenus.

- **Manual method**
- **Furnace power off**
- **Set furnace temperature**
- **Furnace inside view**

4 Installation and commssioning

4.1 Scope of Delivery

Part		Order number	DP70	DP90
	DP70 Dropping Point System	–	•	–
	DP90 Dropping Point System	–	–	•
	Power supply unit, 120 W	30298362	•	•
	Power cable (country specific)	Country-specific	•	•
	Protective film for Touchscreen	51143540	•	•
	SD Card 2 GB	51192017	•	•
	Ethernet Cable RJ45	51191860	•	•
	DP accessories box (complete) containing: • Sample carrier • Handle of the sample • Cups, dropping point, chromium plated brass (ø 2.8 mm, set 2 pcs., ASTMD6090-99) • Cups, softening point, chromium plated brass (ø 6.35 mm, set 2 pcs., ASTMD6090-99) • Cup lid (2 pcs.) • Collector glass (6 pcs.) • Steel ball 11/32'' (2 pcs., ø 8.7 mm, 2.77 ± 0.02 g • Sample preparation tool DP • Spatula • Tamping rod • Rod • Sample carrier stand • Calibration standard Benzoic acid (5 g)	51143740	•	•
	Calibration substance lubricating grease	30024217	•	•

Part		Order number	DP70	DP90
	User Documentation	–	•	•
	Quick Guide	–	•	•
	Declaration of conformity	–	•	•
	Test report	–	•	•

4.2 Unpack the instrument

1 Remove the instrument (and accessories) from the protective packing material.
2 Store the packing material for later transport over long distances.
3 Check whether you received all parts listed in the scope of delivery.
4 Inspect the parts visually for flaws or damage.
5 If parts are missing or damaged, report it immediately and file a freight claim if needed.

4.3 Position the instrument

The instrument has been developed for indoor operation in a well-ventilated area. The following site requirements apply:

- The ambient conditions are within the limits specified in the technical data.
- No powerful vibrations
- No direct sunlight
- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

DP70 and DP90 control unit

1 Place the instrument on a level surface.
2 Make sure that there are at least 15 cm clearance in front, above and behind the instrument.
3 Make sure that nothing blocks the ventilation openings at the bottom and the back of the instrument.

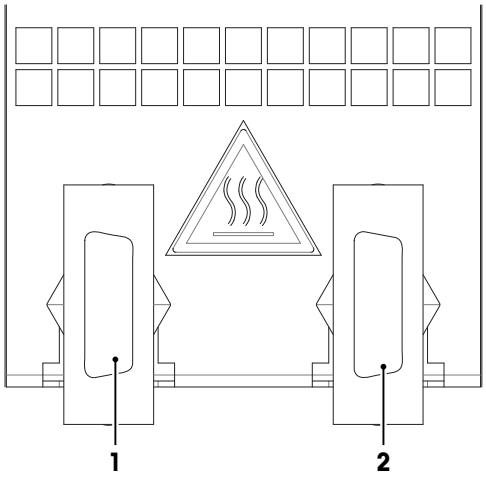
DP90 Measuring cell

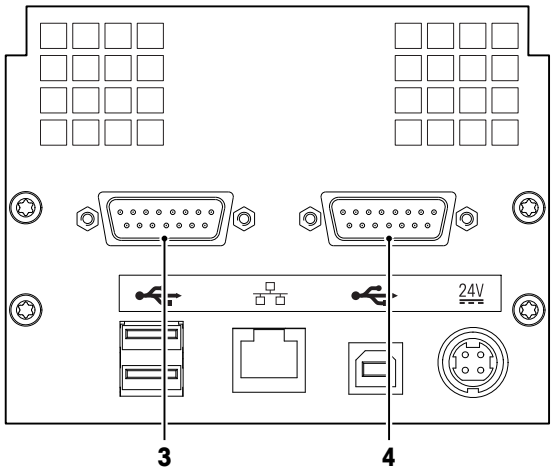
1 If you run an analysis at a temperature equal or above room temperature, follow the instructions for the DP90 control unit.
2 If you run an analysis at a temperature below room temperature, place the measuring cell in a refrigerator or a freezer.

METTLER TOLEDO recommends a top loading freezer because a top loading freezer has better temperature stability and easier sample preparation. With a front loading freezer the temperature cannot be stabilized quickly when you open the door and the collector glasses could fog up and freeze.

4.4 Connect measuring cell and control unit (DP90 only)

1 Connect the cable (furnace signal) (1) of the measuring cell with the port (furnace signal) (3) on the control unit.
2 Connect the cable (camera signal) (2) of the measuring cell with the port (camera signal) (4) on the control unit.





4.5 Connect the instrument to the power supply

The AC adapter is suitable for all supply line voltages ranging from 100…240 V AC and 50/60 Hz.

⚠ WARNING

Danger of death or serious injury due to electric shock!

Contact with parts that contain a live current can lead to injury and death.

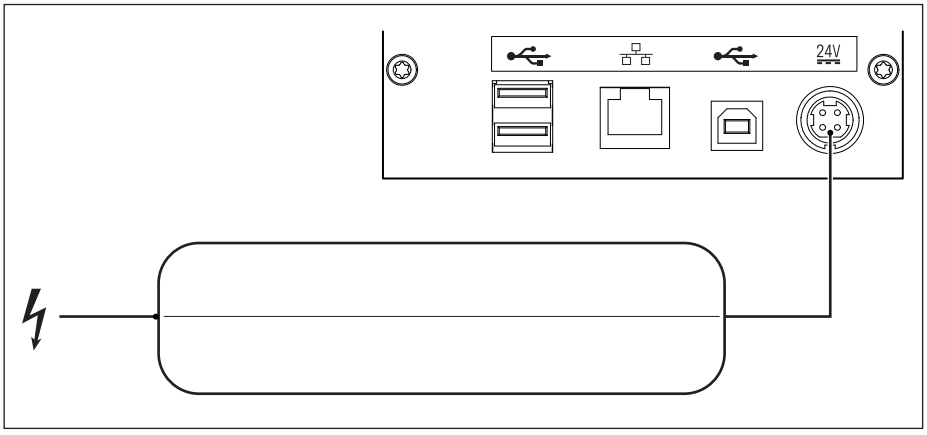
1 Only use a METTLER TOLEDO power cable and AC adapter designed for your instrument.
2 Connect the power cable to a grounded power outlet.
3 Keep all electrical cables and connections away from liquids.
4 Replace damaged power cables and AC adapters immediately.

NOTICE

Danger of damage to the AC adapter due to overheating!

If the AC adapter is covered or in a container, it is not sufficiently cooled and overheats.

1 Do not cover the AC adapter.
2 Do not put the AC adapter in a container.



1 Install the cables in such a way that they cannot be damaged or interfere with operation.
2 Insert the plug of the power cable in the socket of the AC adapter.
3 Insert the plug of the AC adapter in the socket **24V** at the back of the instrument.
4 Insert the plug of the power cable in a grounded power outlet that is easily accessible.

See also

Start up the instrument ▸ Page 18
Log in ▸ Page 18

4.6 Disconnect the instrument from the power supply

- The instrument has shut down.

1 Pull the plug of the power cable out of the power outlet.

2 Pull the plug of the AC adapter out of the socket **24V** at the back of the instrument.

5 Operation

5.1 Start up the instrument

- The instrument is connected to the power supply
- No samples are inserted.

1 Press ⏻.
   ⇨ METTLER TOLEDO logo appears and the fan starts.
   ⇨ The screen darkens and the fan stops.
   ⇨ The screen **Starting up the system** appears and the white light flashes.
   ⇨ The home screen or the window **Login** appears.
2 Login if the window **Login** appears.

See also

Log in ▸ Page 18

5.2 Log in

Log in with user name

- The window **Login** is open.

1 In the text field **Name** tap ☰ and select your user name from the list.
2 Tap **Login**.
⇨ The home screen opens.

Log in with user name and password

- The window **Login** is open.

1 In the text field **Name**, select your user name from the list or enter your user name.
2 In the text field **Password**, enter your password.
3 Tap **Login**.
⇨ The home screen opens.

5.3 Shut down the instrument

NOTICE

Danger of losing data due to wrong shut down procedure.

If you press ⏻ longer than 5 seconds, the instrument performs a forced shut down. If an analysis is running, it will be terminated prematurely and any data produced during this time will be lost.

– Do not press ⏻ for more than 5 seconds unless you need to force the instrument to shut down.

Shut down the instrument using the touch screen

- You are on the home screen.
- No task is running.
- No samples are inserted.

1 Press **Log out**.
   ⇨ The **Login** window opens.
2 Press **Shut down**.
   ⇨ The screen **Shutting down the system** appears and then the screen turns dark.
   ⇨ An acoustical signal informs you that you are logged out and the instrument has shut down.
⇨ The AC adapter and the control circuit for the power button are energized. The rest of the instrument is no longer energized.

Shut down the instrument using the power button

- No task is running.
- No samples are inserted.

– Press ⏻ for 1…4 seconds.
  ⇨ The screen **Shutting down the system** appears and then the screen turns dark.
  ⇨ An acoustical signal informs you that you are logged out and the instrument has shut down.

⇨ The AC adapter and the control circuit for the power button are energized. The rest of the instrument is no longer energized.

Forced shut down

The instrument should only be shut down in this way if it is absolutely necessary.

1 Press ⏻ for more than 5 seconds.
  ⇨ The instrument performs a forced shut down.
  ⇨ If an analysis is running, it is terminated prematurely and any data produced during this time is lost.
  ⇨ The AC adapter and the control circuit for the power button are energized. The rest of the instrument is no longer energized.
2 Remove all samples.

Shut down of the instrument in emergency situations

– Pull the plug of the power cable out of the power outlet.

5.4 Lock and unlock the instrument

Running tasks continue when you lock the instrument but only messages for critical errors are displayed.

- Only instruments with password protection can be locked.
- Only the user that locked the instrument can unlock the instrument.

Lock the instrument

1 Go to **Home**.
2 Tap **Lock**.

⇨ The window **Instrument locked** opens and displays the name of the user that is logged in.

Unlock the instrument

1 Enter the password.
2 Tap **Login**.

⇨ The instrument is unlocked.

End a task on a locked instrument

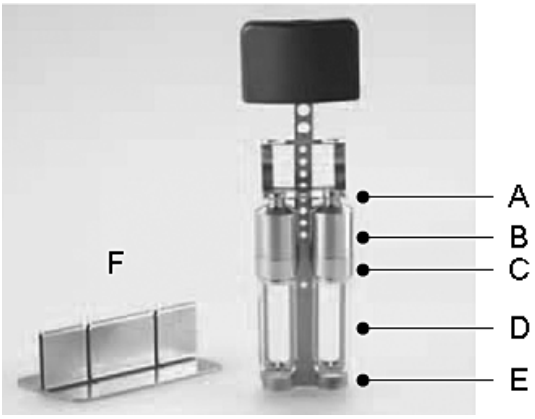
– On the control panel, press the button **Reset**.

⇨ The task is ended but the instrument remains locked.

5.5 Determine dropping points or softening points

5.5.1 Prepare samples

5.5.1.1 Assemble the sample carrier



The parts marked are:

- **B**: closed cup lid with vent hole prevents spilling and furnace contamination in case of expanding sample
- **C**: standard compliant cup for dropping or softening point determinations
- **D**: disposable glass collector

The sample carrier keeps all parts together and can be placed into the stand **F** which is delivered with the instrument.

1 Assemble the cup lid (**B**) , the cup (**C**) and the glass collector (**D**) as shown in the picture.
2 Place the assemble unit into the sample carrier making sure the glass collector (**D**) rests in the base (**E**) and each cup lid (**B**) sits the hole (**A**).
3 To keep the furnace clean, make sure that cups, cup lids, and sample carrier are free of residue.

5.5.1.2 Prepare samples for dropping point methods

This section describes the sample preparation for the following types of substances:

- Original sample of a pasty consistency
- Pre-melted samples
- Dropping points below room temperature (DP90, cooled)

Edible fats, for instance, can occur in various modifications with different dropping points. To obtain reproducible and comparable measured values with pre-melted samples, it is absolutely essential to ensure that the same conditions are maintained during heating and cooling. This is of particular importance when several labs compare measured values.

Original sample of a fatty consistency (e.g. lubricating grease)

1 Place some sample on a smooth, clean surface (e.g. glass plate).
2 Press the cup into the sample until some sample flows out of the opening. Make sure no air bubbles are enclosed.
3 Smooth off surface and drop opening with a spatula.
4 Assemble the sample carrier (with cup, cup lid and collector glass).

Pre-melted samples (e.g. paraffin)

1 Place the sample cup on a smooth surface (glass, ceramic or plastic plate) and pour in the melted sample.
2 Place the plate, the sample carrier (disassembled), cup with sample, cup lid and collector glass into the cooling chamber. Leave all parts in long enough for the sample to solidify in the cup at a defined temperature and time period. The temperature depends on the sample (e.g. at 25 °C, at 5 °C in a refrigerator or at –18 °C in a deep freezer).
3 After a specified time, assemble the cold parts.

For dropping points below room temperature (DP90, cooled, e.g. liquids)

Note: Do not hold the sample cup in your bare hands, use tweezers or hold the collector glass.

1 Place the sample cup on a smooth surface (glass, ceramic or plastic plate).
2 Place the plate, the sample carrier (disassembled), cup with sample, cup lid and collector glass into the cooling chamber. Leave all parts in long enough for the sample to solidify in the cup at a defined temperature and time period. The temperature depends on the sample (e.g. at 25 °C, at 5 °C in a refrigerator or at –18 °C in a deep freezer).

3 Pour in the melted sample.

4 After a specified time, assemble the cold parts.

5.5.1.3 Prepare samples for softening point methods

This section describes the sample preparation for the following substance: pitch.

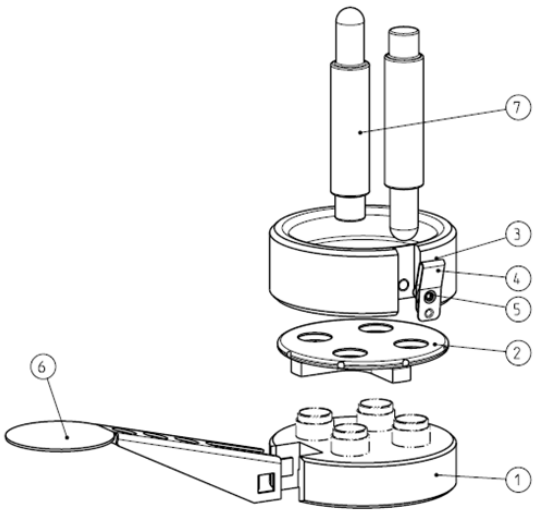
1 Following for example, ASTM D 3104, cut up pitch into 6–12 mm pieces and melt about 25 ml of these in a 50 ml beaker. **Note**: The temperature must never rise more than 50 °C above the expected softening point.

2 Place the necessary number of sample cups (usually two) on a brass plate (purchased locally) at room temperature.

3 Slightly overfill several 6.35 mm sample cups on the brass plate with the liquid pitch.

4 After cooling, level the surface with a hot knife.

5.5.1.4 Prepare powders and liquids with the sample preparation tool



1. Base

2. Positioning disc

3. Funnel

4. Spring

5. Screw

6. Handle

7. Tamping rod

Preparing powders

1 Put four metal cups into the base (**1**) and place the positioning disc (**2**) on top, followed by the funnel (**3**).

2 Fill the sample into the funnel (**3**) and slide a bit of the sample with the spatula into the opening above the cup.

3 Fill the cup with enough sample until the fill height is even with the upper edge.

4 Press in the sample firmly using the round end of the tamping rod (**7**).

5 Turn the positioning disc and repeat steps 1-4 for the other cups.

⇨ All cups are partially filled

6 Position the funnel over the first cup again and press in the sample firmly with the flat end of the tamping rod. An excess of about 1 mm should remain above the upper edge.

7 Turn the positioning disc to the next cup and repeat step 6 for the other cups. While turning the positioning disc, the excess sample is removed.

8 To access the cups, turn the funnel to a position between cups and press the spring.

9 Lift off the positioning disc and the funnel.

⇨ The cups are filled with the sample and ready for analysis.

Preparing liquids

Use the sample preparation tool without the funnel to prepare liquid samples.

1 Put four metal cups into the base and place the positioning disc on top.

2 Pour the molten substance directly into the cups. The fill height should be slightly above the edge of the positioning disc.

⇨ A convex meniscus should be visible.

3 When the sample has reached a suitable consistency (after some cooling), remove the excess with the spatula. The sample should be even with the positioning disc.

4 Lift off the positioning disc.

⇨ The cups are filled with the sample and ready for analysis.

5.5.2 Run an analysis using a method

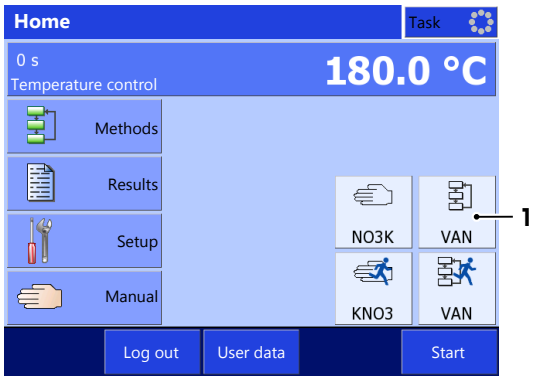
The following procedure shows you how to run an analysis using an indirect shortcut. The procedure is based on an example of a softening point determination. Some steps may differ if the method you use is configured differently.

Aside from an indirect shortcut you can also start a method using a direct shortcut or the button Methods on the home screen. Some differences are described after the example below.

- At least one indirect shortcut of a method is defined.
- The samples are prepared.

1 Select the indirect shortcut (1) of the method you want to run.

⇨ The method window opens.

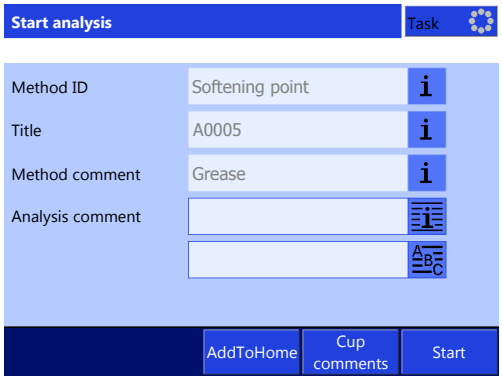


2 If needed, enter comments to the method.

3 Tap **Start**.

⇨ The window **Start analysis** opens.

4 If needed, enter comments to the analysis or the samples.

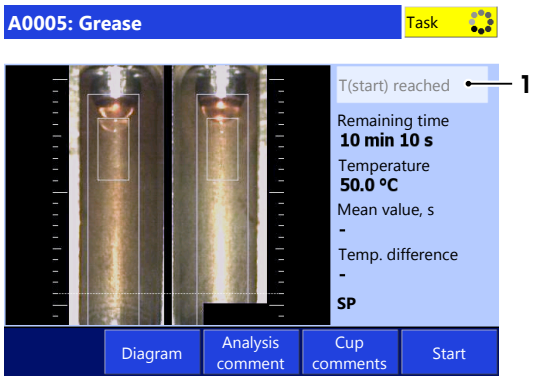


5 Tap **Start**.

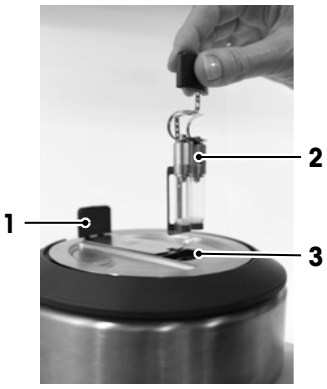
⇨ The analysis window opens.

⇨ The instrument heats up to the start temperature.

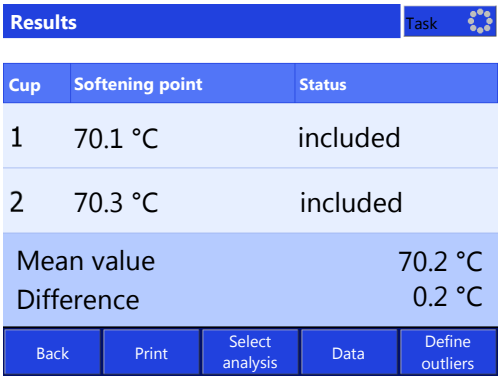
6 Wait until **T(start) reached** (1) is displayed.



7 Open the protective lid (1) and hold it open.
8 Insert the sample carrier (2) in the opening (3).
9 Release the protective lid (1).
⇨ The protective lid closes.
10 Tap **Start**.
⇨ The waiting time starts.
⇨ The instrument performs the measurement.



11 Wait until the results are displayed.
12 **CAUTION Danger of burns due to the hot handle of the sample carrier and hot samples!** Do not remove the sample carrier and the samples until the instruments has cooled down or wear gloves that protect from contact heat when you remove the sample carrier or handle the samples.
13 Let the samples cool down and dispose of them according to the safety data sheet of the substance that you measured.
14 Tap **Back**.
⇨ The home screen opens.



Start the analysis using the button Methods

1 Go to **Home** > **Methods** and select the method you want to run.
⇨ The method window opens.
2 Continue with step 2 of the procedure for an indirect shortcut.

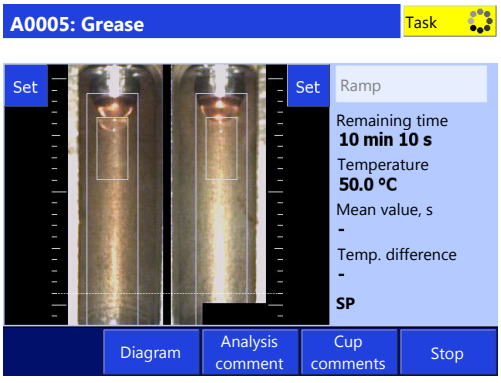
Start the analysis using a direct shortcut

1 Go to **Home** and select the direct shortcut of the method you want to run.
⇨ The analysis window opens.
⇨ The instrument heats up to the start temperature.
2 Continue with step 6 of the procedure for an indirect shortcut.

Manual determination of a dropping point or softening point

- The method is configured for manual determination of the dropping point or softening point.
- You have started an analysis as described above.
- The analysis window is open.

1 For dropping point determinations, tap **Set** when the first drop falls from the cup.
⇨ The temperature for the dropping point is displayed below the capillary.
2 For softening point determinations, tap **Set** when the substance starts to leave the cup.
⇨ The start temperature for the softening point is displayed below the capillary.
3 For softening point determinations, tap **Set** when the substance reaches the detection line.
⇨ The end temperature for the softening point is displayed below the capillary.



4 Finish the analysis as described in the procedure for an indirect shortcut.

5.5.3 Run an analysis using a manual method

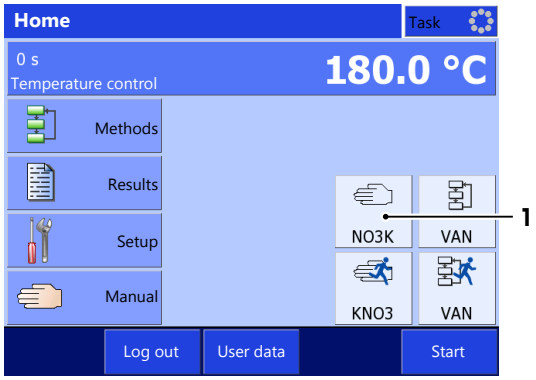
The following procedure shows you how to run an analysis using an indirect shortcut. The procedure is based on an example of a softening point determination. Some steps may differ if the manual method you use is configured differently.

Aside of an indirect shortcut you can also start a manual method using a direct shortcut or the button **Manual method**. Some differences are described after the example below.

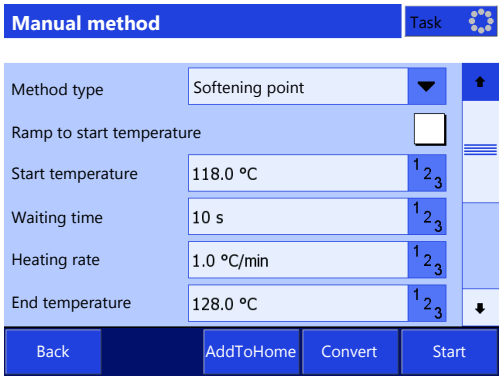
Start an analysis using an indirect shortcut

- At least one indirect shortcut of a manual method is defined.
- The samples are prepared.

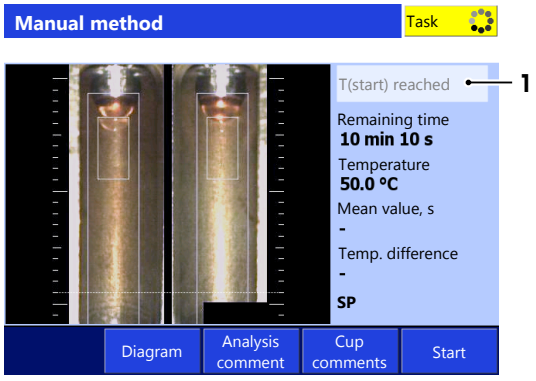
1 Select the indirect shortcut (1) of the manual method you want to run.
   ⇨ The window **Manual method** opens.



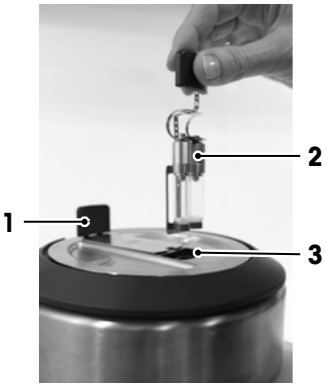
2 If needed, enter comments to the method.
3 Tap **Start**.
   ⇨ The analysis window opens.
   ⇨ The instrument heats up to the start temperature.



4 If needed, enter comments to the analysis or the samples.
5 Wait until **T(start) reached** (1) is displayed.



6 Open the protective lid (1) and hold it open.
7 Insert the sample carrier (2) in the opening (3).
8 Release the protective lid (1).
   ⇨ The protective lid closes.
9 Tap **Start**.
   ⇨ The waiting time starts.
   ⇨ The instrument performs the measurement.



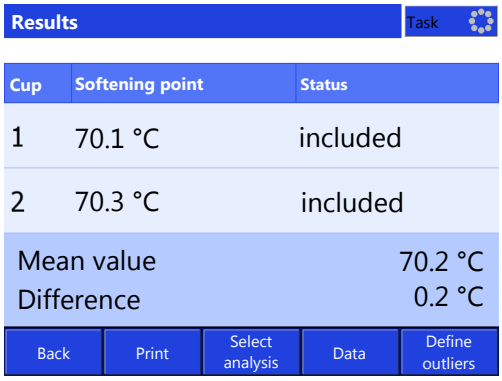
10 Wait until the results are displayed.

11 **CAUTION Danger of burns due to the hot handle of the sample carrier and hot samples!** Do not remove the sample carrier and the samples until the instruments has cooled down or wear gloves that protect from contact heat when you remove the sample carrier or handle the samples.

12 Let the samples cool down and dispose of them according to the safety data sheet of the substance that you measured.

13 Tap **Back**.

⇨ The home screen opens.



Start the analysis using the button Manual method

1 Go to **Home** > **Manual** > **Manual method**.

⇨ The window **Manual method** opens with the setting of the last manual method you started with the button **Manual method**.

2 Continue with step 2 of the procedure for an indirect shortcut.

Start the analysis using a direct shortcut

1 Go to **Home** and select the direct shortcut of the manual method you want to run.

⇨ The analysis window opens.

⇨ The instrument heats up to the start temperature.

2 Continue with step 4 of the procedure for an indirect shortcut.

5.5.4 Stop an analysis

If you stop a running analysis, you still have the opportunity to save the results up to the point of interruption.

- An analysis is running in the analysis window.

1 Tap **Stop** or press the key **Reset**.

⇨ The analysis is interrupted.

⇨ The message **Do you want to stop the analysis?** is displayed.

2 To stop the analysis, tap **Yes**.

⇨ The analysis is stopped.

⇨ The message **Do you want to save the results?** is displayed.

3 To save and print the results, tap **Yes**.

⇨ The results are save and printed according to you setting.

4 If you do not want to save the results, tap **No**.

⇨ The homescreen opens.

6 Maintenance

This chapter describes the maintenance measures for the DP70 and DP90 instruments.

In this chapter you find descriptions of the maintenance tasks you should perform on your instrument. Any other maintenance tasks need to be performed by a service technician that has been qualified by METTLER TOLEDO.

Do not open the housing of the instrument; it does not contain any parts that can be maintained, repaired or replaced by the user. If you experience problems with your instrument, contact your authorized METTLER TOLEDO dealer or service representative.

METTLER TOLEDO recommends that a preventive maintenance and calibration certification is done at least once a year through your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

6.1 Clean the instrument

⚠ CAUTION

Danger of injuries due to hot surfaces

If the instrument is accidently turned on during the cleaning, hot surfaces can cause burns.

1 Before you clean the instrument, shut down the instrument and disconnect the power cable.

2 Before you clean the instrument, make sure the instrument has cooled off to room temperature.

NOTICE

Danger of damage to the instrument due to inappropriate cleaning methods!

Attempts to remove debris from the camera lens can damage the camera lens.

– If debris is on the camera lens, contact your authorized METTLER TOLEDO dealer or service representative.

See also

Clean the insulation glass and glass plate ▶ Page 28

6.1.1 Clean the housing and control panel

To keep the instrument looking good and functioning properly, clean the housing and control panel as needed.

- The instrument is switched off and disconnected from the power supply.
- The instrument has cooled off to room temperature.
- All samples have been removed.

1 Remove any loose particles from the housing and control panel with a fine brush.

2 On a DP70, turn the metal lid to the ○ position.

⇨ No cleaning agent can enter the instrument.

3 Moisten a soft cloth with water and a mild detergent.

4 Clean the housing with the soft, slightly moist cloth.

5 Dry off any residual moisture.

6 On a DP70, turn the metal lid to the ◎ position.

7 Reconnect the instrument to the power supply and switch on the instrument.

⇨ The instrument housing is clean and the instrument ready for your next analyses.

6.1.2 Remove, clean and reinstall insulation glass and glass plate

In order to prevent false readings, the insulation glass and glass plate should be checked regularly and cleaned as needed. Particles and smudges can block the light or cause bothersome spots in the pictures.

You can check the condition of the two glass plates by viewing the furnace from the inside. If the light appears homogeneous and bright, then you do not have to undertake any further action.

See also

View the inside of the furnace ▶ Page 29

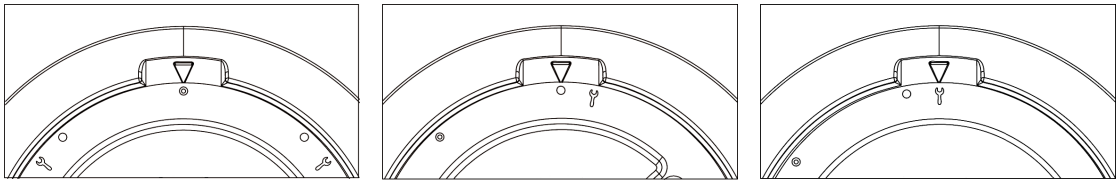
6.1.2.1 Remove and reinstall the lid

DP70

The lid has three different markings on it.

- **Filled circle**: You can insert the sample carrier.
- **Open circle**: The furnace is protected and you cannot insert the sample carrier.
- **Wrench**: You can remove the lid for cleaning and servicing.

Lid markings and positions

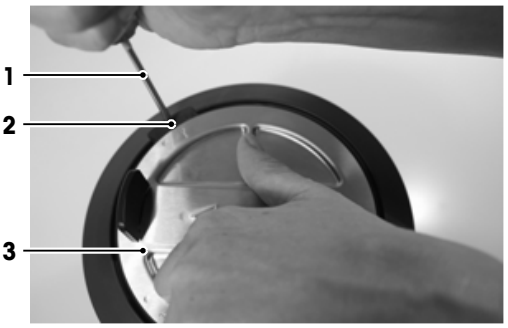


Filled circle position **Open circle position** **Wrench position**

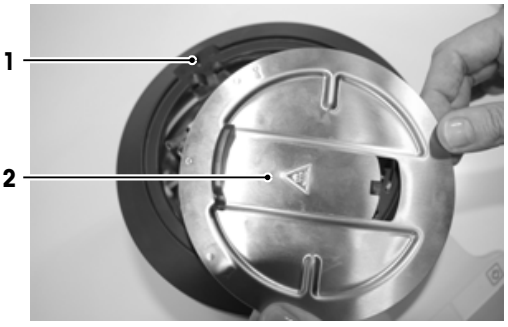
- The instrument has shut down and is disconnected from the power supply.
- The instrument has cooled off to room temperature.
- The sample carrier has been removed.

1 Gently press the release latch inside the opening (2) with a long object (1) such as a screw driver and turn the lid (3) to ⚷.

⇨ The lid pops up slightly.



2 Lift out the screw driver and insert your finger in the recess (1) at the top of the measuring cell and lift off the lid (2) with both hands.



3 To reinstall the lid, replace the lid and turn it to ○ or to ◎.

Remove and reinstall the lid on a DP90

- The instrument has shut down and is disconnected from the power supply.
- The instrument has cooled off to room temperature.
- The sample carrier has been removed.

1 Insert a long object such as a screw driver (3) into the opening (2) at the back of the measuring cell.

2 Push the screw driver into the opening until the latch releases the lid.

⇨ The lid (1) pops up slightly.

3 Pull the screw driver out of the opening.

4 Lift off the lid (1) with both hands.

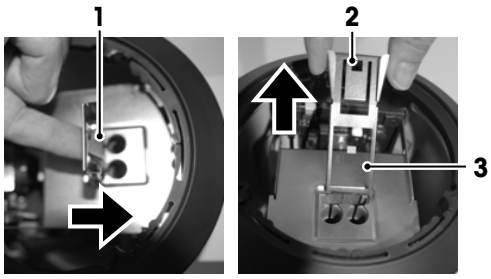
⇨ Insulation glass and glass plate are accessible.

5 To reinstall the lid, put the lid onto the measuring cell and push it down until the clamps click in place.

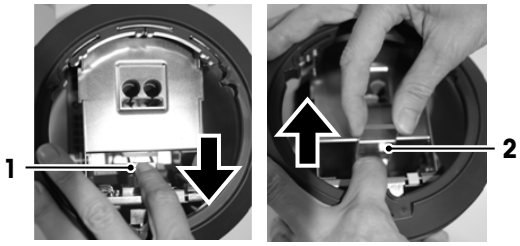
6.1.2.2 Remove insulation glass and glass plate

- The instrument has shut down and is disconnected from the power supply.
- The lid has been removed.

1 To remove the insulation glass, press the metal latch (1) and lift the sample carrier guide (2) with the insulation glass (3) carefully out of the recess.



2 To remove the glass plate, pull the metal latch (1) out slightly and lift the glass plate (2) carefully out of the recess.



6.1.2.3 Clean the insulation glass and glass plate

1 Moisten a soft, lint-free cloth with water or a mild detergent.

2 Clean the two glass plates with the slightly moist cloth.

3 Dry the two glass plates with a soft, lint-free cloth so that no moisture enters the instrument.

See also

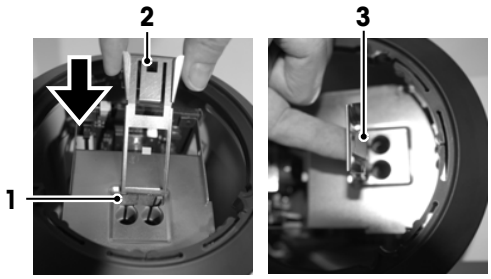
Clean the instrument ▸ Page 26

6.1.2.4 Reinstall insulation glass and glass plate

1 Insert the sample carrier guide (1) into the recess (2).

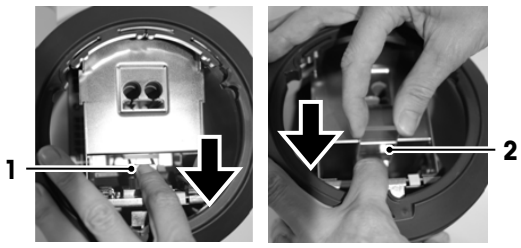
⇨ The metal latch (3) clicks into place.

2 To prevent damage to the sample carrier guide, check that the metal latch has clicked in place underneath the cover of the furnace.



3 To reinstall the glass plate, pull the metal latch (1) out slightly and insert the glass plate (2) carefully in the recess.

4 Reinstall the lid.



6.1.3 Remove condensation from the measuring cell (DP90 only)

Condensation can build up in the measuring cell, for example, when opening and closing the door of the refrigerator or freezer. Condensation blurs the image of the video and the instrument cannot detect a dropping point or softening point.

1 Remove the measuring cell from the refrigerator or freezer.

2 Remove the samples.

3 Heat the furnace to 200 °C until all of the moisture has evaporated.

6.2 Check the temperature accuracy of the instrument

To check if the temperature accuracy of your instrument is still within the specified tolerance limits, you need to perform a calibration. To perform a calibration, you run a melting point method for a reference substance and compare the results with the values on the Certificate of Analysis of the reference substance.

Perform the calibration

- A calibration method for the relevant reference substance is available.

1 Run an analysis using the appropriate calibration method.

⇨ A message is displayed at the end of the analysis informing you whether or not the calibration results are within the tolerance limits specified for the particular calibration substance.

2 Tap **OK** to confirm the message.

3 If the calibration results are not within the tolerance limits, inform the person responsible for the adjustment of the instrument.

6.3 View the inside of the furnace

- No task is running.

1 Go to **Home** > **Manual**.

2 Tap **Furnace inside view**.

⇨ The window shows the inside of the furnace and the furnace temperature.

6.4 Prepare the instrument for storage

If you do not use the instrument for a longer period of time, you should do the following:

1 Remove all samples.

2 Shut down the instrument.

3 Disconnect the instrument from the power supply.
4 Close the protective lid.
5 Clean the instrument.

6.5 Transport the instrument

If you have questions about transporting your instrument, contact your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

Note

When you send or transport the instrument over long distances, please use all of the original packing material and shipping carton.

1 Remove all samples.
2 Shut down the instrument.
3 Disconnect the instrument from the power supply.
4 Disconnect any accessories like keyboard and mouse.
5 If you want to transport a DP90, disconnect the measuring cell from the control unit.
6 Close the protective lid.
7 Clean the instrument.
8 Move the instrument to the new location.

6.6 Dispose of the instrument

In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

7 Technical data

7.1 DP70

Instrument

Characteristic		Value
Power rating instrument	Input values	24 V DC ±5 %, 5 A
	Connector type	4-pin, power Mini-DIN female
Power rating AC adapter	Input values	100...240 V AC, 1.8 A ±10 %
	Input frequency	50 - 60 Hz
	Output values	24 V DC, 5 A
Dimensions	Width	190 mm
	Depth	350 mm
	Height	230 mm
	Weight	4000 g
Display	Technology	VGA color with touch screen
	Size	5.7″ VGA
Materials	Housing	Crastin® PBT
	Measuring cell	Stainless steel
	Chassis	Stainless steel
	Protective film (touch screen)	PET
Ambient conditions	Ambient temperature	10…35 °C
	Relative humidity	Noncondensing, max. 80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C
	Altitude	Up to 2000 m above sea level
	Use	Interior spaces
	Polution degree	2
	Overvoltage category	II

*Subject to sample, environment and handling

Directives and standards

Directives and standards complied with are listed on the declaration of conformity and on the internet http://www.mt.com/mpdp-norms.

7.2 DP90

Instrument

Characteristic		Value
Power rating instrument	Input values	24 V DC ±5 %, 5 A
	Connector type	4-pin, power Mini-DIN female
Power rating AC adapter	Input values	100...240 V AC, 1.8 A ±10 %
	Input frequency	50 - 60 Hz
	Output values	24 V DC, 5 A
Dimensions control unit	Width	190 mm
	Depth	350 mm
	Height	150 mm
	Weight	2500 g

Characteristic		Value
Dimensions measuring cell	Width	130 mm
	Depth	250 mm
	Height	210 mm
	Weight	4500 g
Display	Technology	VGA color with touch screen
	Size	5.7″ VGA
Materials	Housing	Crastin® PBT
	Measuring cell	Stainless steel
	Chassis	Stainless steel
	Protective film (touch screen)	PET
Ambient conditions	Ambient temperature for control unit	10…35 °C
	Ambient temperature for measuring cell	-20…35 °C
	Relative humidity	Noncondensing, max. 80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C
	Altitude	Up to 2000 m above sea level
	Use	Interior spaces
	Polution degree	2
	Overvoltage category	II

*Subject to sample, environment and handling

Directives and standards

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To protect your product's future:
METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of this product for years to come.

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