



DELTA SCOPE® FMP10
ISO SCOPE® FMP10
DUAL SCOPE® FMP20



Please study the safety information in the operator's manual as well.

Observe the warnings and hints in the operator's manual in order to avoid injury and damage to the instrument!

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1 Notes

This brief guide offers a first, brief overview of your instrument's operation and provides quick steps towards your first measurement results. An extensive operator's manual can be found on the CD-ROM that is supplied with the instrument.

The following symbols are used in this brief guide.



Indicates safety information referring to danger for persons and warnings regarding damage to the measuring instrument or to accessories.



Indicates particularly important information and hints.



Indicates a reference to a page or chapter in this guide.

2 Areas of Application

The instrument is used for coating thickness measurements.

The following table lists the measurement methods that are used in the various FMP instruments.

Instrument	Area of application	Measurement method / Probe type
DELTA-SCOPE	Determination of the thickness of non-magnetic coatings on steel or iron. E.g. chrome, copper, zinc as well as paint, lacquer, enamel or plastic coatings on steel or iron.	Magnetic Induction Method According to DIN EN ISO 2178. Probe: e.g., FGAB1.3
ISO-SCOPE	Determination of the thickness of electrically non-conducting, non-magnetic coatings on non-ferromagnetic electrically conducting base materials. Paint, lacquer or plastic coatings on, for example, aluminum, copper, zinc, etc. as well as anodized coatings on aluminum.	Amplitude-Sensitive Eddy Current Method According to DIN EN ISO 2360. Probe: e.g., FTA3.3
DUALSCOPE	Determination of the thickness of non-magnetic coatings on steel or iron. E.g. chrome, copper, zinc as well as paint, lacquer, enamel or plastic coatings.	Magnetic Induction Method According to DIN EN ISO 2178. Probe: e.g., FD10
	Determination of the thickness of electrically non-conducting, non-magnetic coatings on non-ferromagnetic electrically conducting base materials. Paint, lacquer or plastic coatings on, for example, aluminum, copper, zinc, etc. as well as anodized coatings on aluminum.	Amplitude-Sensitive Eddy Current Method According to DIN EN ISO 2360. Probe: e.g., FD10

The instrument has the capability of setting up up to 1000 readings to save.

3 Description of the Instrument

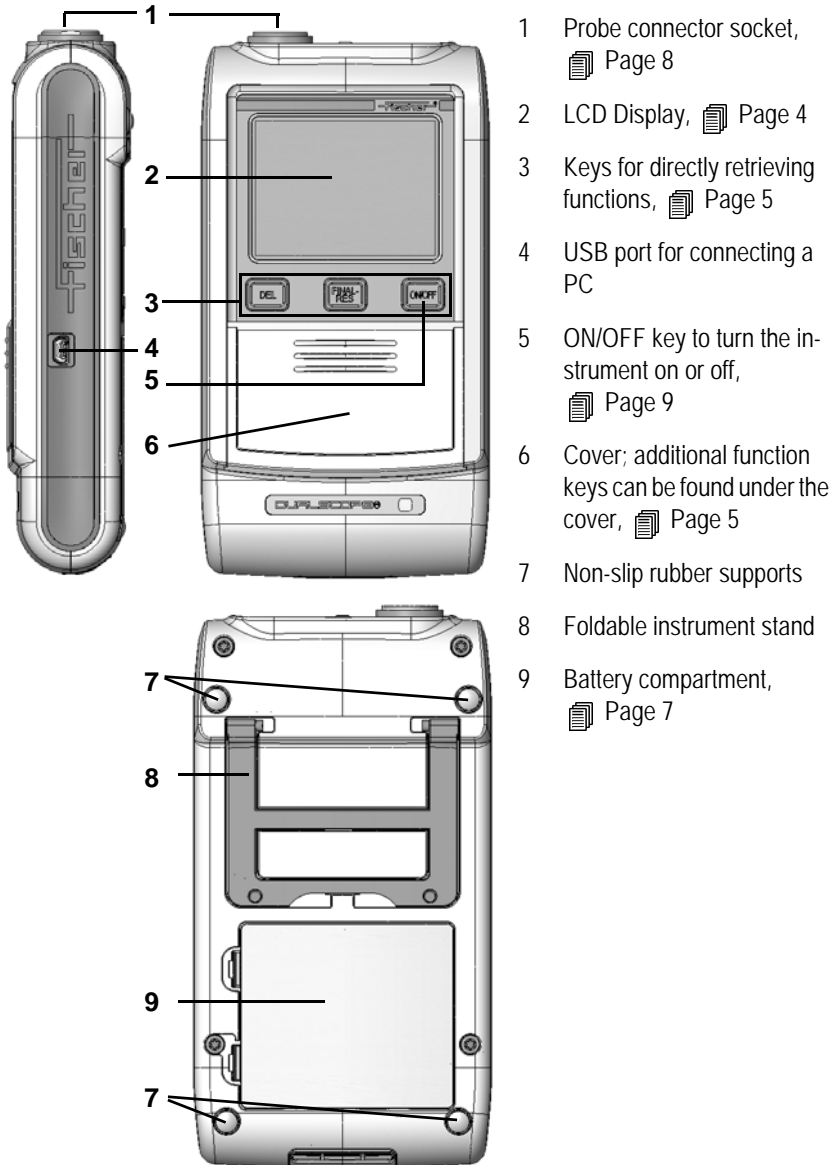
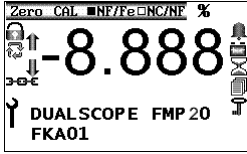



Fig. 3-1 Front and rear view of the instrument, connections

3.1 LCD Display




The LCD display consists of several display elements. When powering up the instrument using **ON/OFF**, all display elements will appear briefly at the same time.

Display element	Explanation
	A normalization is performed (on the uncoated specimen = base material).
	A calibration is carried out.
	The measurement uses the magnetic induction method.
	The measurement uses the eddy current method.
	Padlock: Restricted operating mode is enabled, i.e., the keys ZERO and CAL are not active, the service functions cannot be retrieved.
	Arrow circle: "Free-running" display is enabled, measurements are displayed continuously when the probe is placed on the specimen Alternatively: Area measurement display Automatic measurement display
-8.8.8.8	Numeric elements for presenting readings, errors and warning messages.
MS/m µm mils % mm FN	Unit of measurement for the displayed reading.
	Battery: The battery must be replaced or the rechargeable battery must be charged because the voltage has dropped below a minimum value.

Display element	Explanation
	Hourglass: Measurements are currently not possible because an instrument-internal routine is running.
...SCOPE ... FKA...	Information lines: Instrument type Instrument-internal software version

3.2 Control Panel Key Functions

Key	Function
DEL	<ul style="list-style-type: none"> ● Deletes the last measured reading ● Returns to the previous menu or ● Cancels the procedure
FINAL-RES	Retrieves the final result
ON/OFF	Turns the instrument on and off
ZERO	Retrieves the normalization
CAL	Retrieves the corrective calibration
^	<ul style="list-style-type: none"> ● Changes the information shown on the LCD display. ● The display will change faster if ^ is pressed for longer than 3 seconds.
∨	<ul style="list-style-type: none"> ● Changes the information shown on the LCD display. ● Turns the “free-running” display mode on/off. ● The display will change faster if ∨ is pressed for longer than 3 seconds.
SEND	Transfers the values to a connected computer.
ENTER	<p>Confirms entries</p> <p>5 x ENTER: Calls the service functions</p> <p>The instrument settings in the Service Functions menu are password-protected. “157” will be displayed after pressing ENTER 5 times. Press ^ 2 times to increase this value to the factory-default password “159” and confirm the entry with ENTER.</p>
	

4 Probe handling

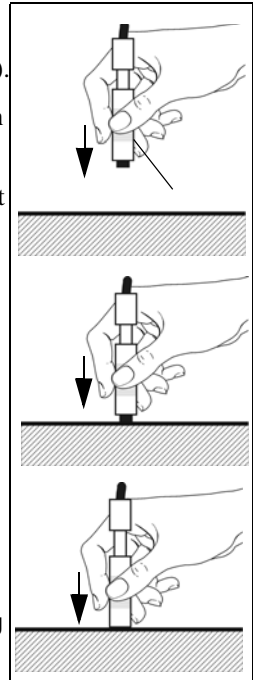
- Always hold the probe at its grip sleeve (right figure).
- Always place the probe gently and at a right angle on the specimen surface.
- Slide the grip sleeve to the specimen surface such that the sleeve rests on the specimen (center and bottom Figure, right).
- With the default setting, a beep will signal the measurement capture.
- Lift the probe off the specimen before making the next measurement.



Avoid hard impacts.

Do not allow the probe to hover directly above the surface. Doing so will lead to erroneous readings.

Do not bend the probe connector cable! Doing so can lead to broken wires.



5 The Path to the First Measurement

- **Instrument Start Up** (☞ 6 ‘System Setup’, beginning on Page 7) insert the batteries, connect the probe and turn on the instrument
- **Adjust the instrument and probe to the base material to be measured** (☞ 7 ‘Adjusting Instrument and Probe’, beginning on Page 11) Normalization and Calibration
- **Make measurements on the specimen** (☞ 8 ‘Measuring’, beginning on Page 16)

6 System Setup

6.1 Install the batteries/rechargeable batteries



Use only type MIGNON, 1.5 V, LR6 - AA - AM3 - MN1500 batteries or 4 individual rechargeable batteries 1.2 V 2400 mAh Type AA.

Using other batteries may lead to instrument damage.

Use only non-damaged batteries/rechargeable batteries.

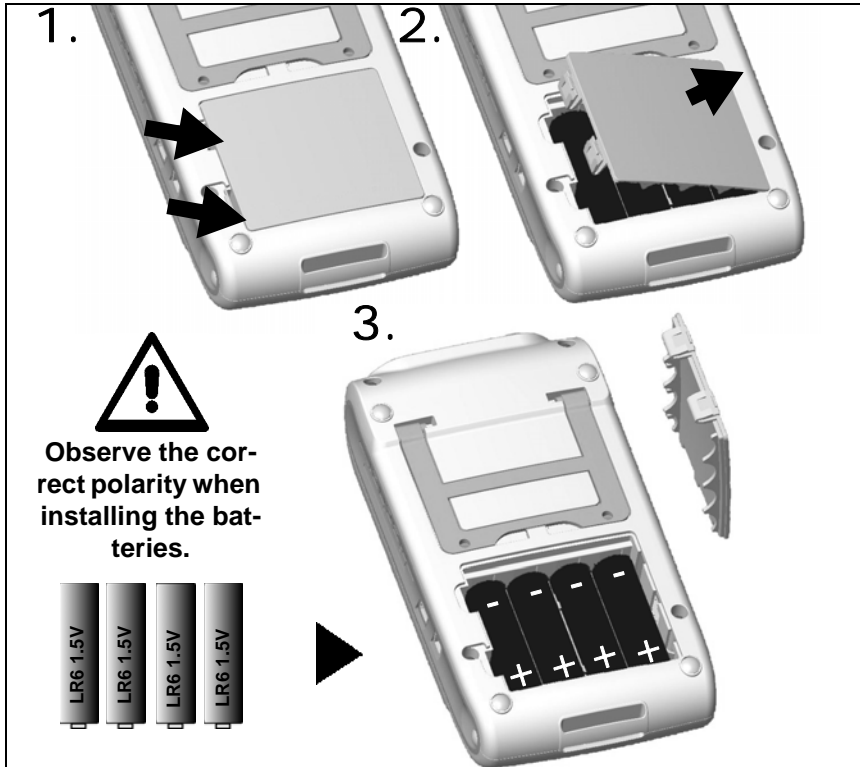


Fig. 6-1 Installing batteries



If the battery voltage is too low, the instrument will turn off automatically!

6.2 Probe connection

A measurement probe must be connected to the instrument to make coating thickness measurements. This must be an appropriate probe suitable for the base material.



Connect probes only when the instrument is off!

To turn the instrument off: Press the ON/OFF key on the right side of the control panel. The LCD display is not backlit and no characters are visible.



Protect the instrument and accessories from electrostatic charges!

Electrical discharges may damage internal components or delete internal memories.

Such discharges may occur, for example, when connecting the probe to the instrument. Thus, please ensure that the person connecting a probe is properly grounded.

It is recommended to store the instrument with the connected probe.

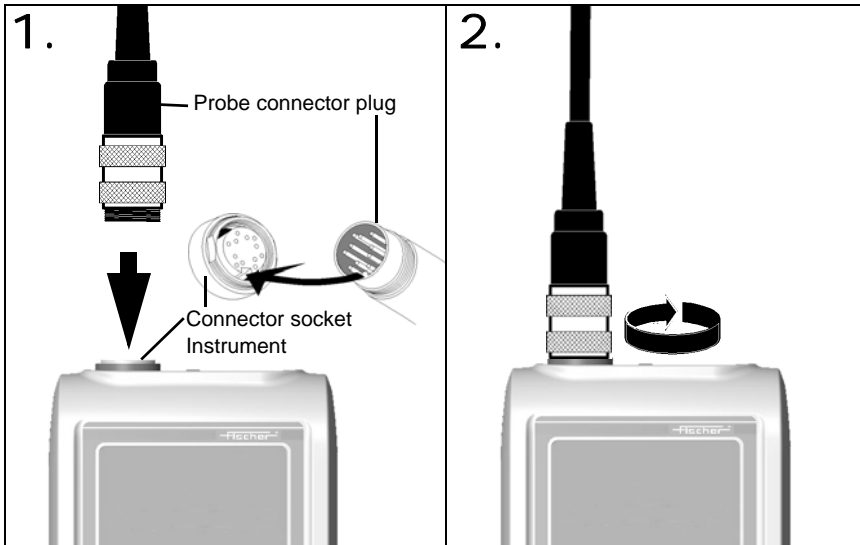
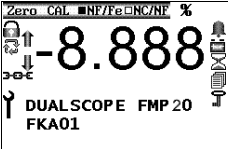

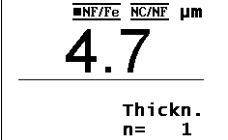



Fig. 6-2 Connecting a probe

6.3 Instrument On/Off

Turning the instrument on

Detail of the LCD display	Explanation
	<p>Press the ON/OFF key to turn on the instrument.</p> <p>An audible signal will sound.</p>
	<p>A monitoring routine will run automatically. All display elements of the LCD display will appear briefly at the same time ( Page 4).</p>
	<p>At the end of the monitoring routine, the instrument is ready to make measurements. The icon of the measurement method of the connected probe is displayed ( Page 10).</p> <p>[μm] or [mm] or [mils]: Unit of measurement for the displayed reading</p> <p>[Thickn.]: Measurement program “Coating thickness” (alternative display options can be set from the service functions in menu option Measurement/Display)</p> <p>[n=]: Number of the stored measurements</p>

Measurement Method of the Connected Probe

Display	Explanation
[■NF/Fe]	Magnetic induction probe connected.
[□NC/NF]	Eddy current probe connected
[NF/Fe NC/NF]	Dual probe connected and dual method [both] set (i.e., in the open application, both measurement methods can be used to make measurements).
[■NF/Fe NC/NF]	Dual probe connected and dual method [NF/Fe] set (i.e., in the open Application, only the magnetic induction method can be used to make measurements). Or: The probe was last placed on an Fe base material.
[NF/Fe □NC/NF]	Dual probe connected and dual method [NC/NF] set (i.e., in the open Application, only the eddy current method can be used to make measurements). Or: The probe was last placed on an NF base material.


Turning Off the Instrument

Press the **ON/OFF** key to turn the instrument off manually.


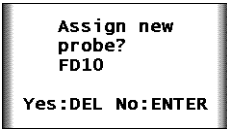
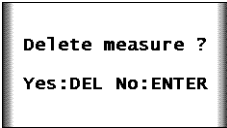
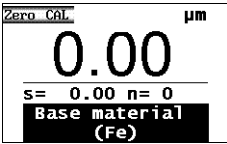

The instrument shuts down automatically if for about 5 minutes no measurements are made or no key is pressed.

7 Adjusting Instrument and Probe

The following options exist after the instrument is turned on:

1. The instrument recognizes the connected probe. The measurement screen appears on the LCD display. The display of the measurement method does not flash. In this case, you can start immediately making measurements.
2. If the instrument is turned on and a probe other than the one used last is connected, the following display will appear: “W006 Probe changed”. The probe must be assigned ( Chapter 7.1).

7.1 Assigning a New Probe

Key sequ. / Action	Detail of the LCD display	Explanation
		This warning appears briefly after power-up if a probe other than the last one used is connected to the instrument.
		After a brief time, the display to the left will appear. Example: FD10 = Name of the connected probe DEL : Probe assignment starts ENTER : Probe will not be assigned, measurement method display flashes
DEL		DEL : All stored readings will be deleted. ENTER : The probe will not be assigned, measurement method display continues to flash
		ZERO and CAL appear on the display. A normalization and a corrective calibration must be performed ( beginning on Page 12).

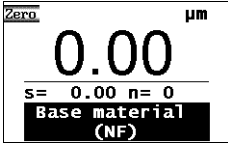
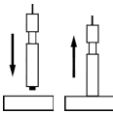
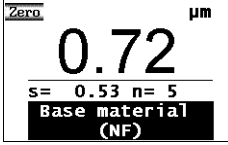
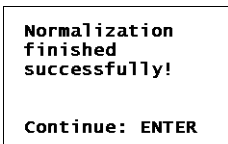
7.2 Normalization

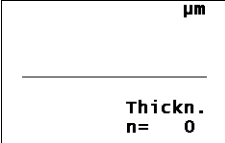
With the normalization, a new zero point is established for the calibration curve and stored in the instrument.

Required materials

Reference part: Uncoated part from the production.

Procedure

Key sequ. / Action	Detail of the LCD display	Explanation
ZERO		<p>Use ZERO to start the normalization. ZERO appears and remains on the LCD display while the normalization is performed.</p> <p>[s]: Standard deviation [n]: Number of measurements [Base material (Fe/NF)]: Measurements should be performed on an uncoated specimen (Fe or NF display for the type of base material). When using dual probes, the type of base material will be displayed only after the 1st measurement is completed.</p>
		<p>Perform measurements on the uncoated specimen (base material). Make measurements at various points of the reference area. The mean value of all readings obtained for the normalization will be displayed.</p>
ENTER		<p>A confirmation indicating that the normalization has been carried out successfully appears. Pressing ENTER confirms the message.</p>

Key sequ. / Action	Detail of the LCD display	Explanation
ENTER		The new characteristic will be computed automatically and stored. The instrument is again ready to make measurements.

7.3 Corrective Calibration

Options

One-point calibration with one calibration standard: A new zero point and one additional point are established for the calibration curve and stored in the instrument.

Two-point calibration with two calibration standards: A new zero point and two additional points are established for the calibration curve and stored in the instrument.

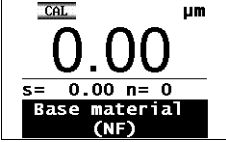
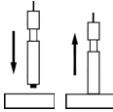
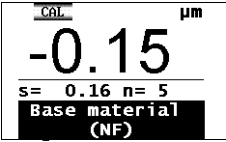
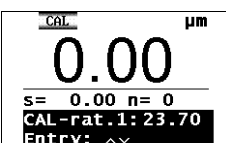
Required materials

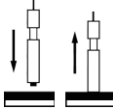
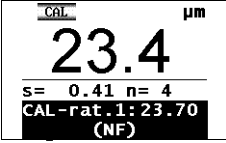
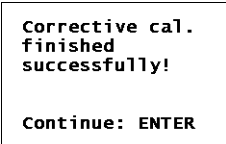
- Reference part (uncoated part from the production)
- Calibration Standards

Selecting the Calibration Standards for the Corrective Calibration

A corrective calibration using the calibration standards included with the probe shipment provides the best measuring precision for the entire measurement range of the probe.

Procedure

Key sequ. / Action	Detail of the LCD display	Explanation
<p>CAL</p>		<p>Use CAL to start the corrective calibration. CAL appears and remains on the LCD display while the corrective calibration is performed.</p> <p>[s]: Standard deviation [n]: Number of measurements [base material (Fe/NF)]: Measurements should be performed on an uncoated specimen (Fe or NF display for the type of base material), i.e., a Normalization is carried out.</p> <p>When using dual probes, the type of base material will be displayed only after the 1st measurement is completed.</p>
		<p>Perform measurements on the uncoated specimen (base material) (normalization). Make measurements at various points of the reference area.</p> <p>The mean value of all readings obtained for the normalization will be displayed.</p>
<p>ENTER</p>		<p>[Entry: ^v]: Use the arrow keys to set the nominal thickness value of the calibration standard. The rated value is printed onto the calibration standard.</p> <p>The rated value can be set faster if a measurement is performed on the calibration standard and then the rated value is corrected using the arrow keys.</p> <p>[CAL Nom. v. 1: 23.70]: Display of the set rated value for the thickness of the calibration standard (Example: 23.7 μm)</p>

Key sequ. / Action	Detail of the LCD display	Explanation
		<p>Place the calibration standard 1 (in the example with a thickness of 23.7 μm) on the uncoated specimen and perform measurements.</p> <p>Make individual measurements at various points of the reference area. Displayed is the mean value of all measurements performed for this step.</p>
<p>^ or v</p>		<p>[Entry: ^v]: Use the arrow keys to set the nominal thickness value of the calibration standard. The rated value is printed onto the calibration standard. The rated value can be set faster if a measurement is performed on the calibration standard and then the rated value is corrected using the arrow keys.</p> <p>This step is not required if - as shown in the example - the rated value for the thickness of the calibration standard coincides with the stored thickness.</p>
<p>ENTER</p>		<p>If a corrective calibration is desired with 2 standards, proceed in the same manner with calibration standard #2.</p> <p>Otherwise: Use ENTER to end the corrective calibration.</p> <p>The new characteristic will be computed automatically and stored.</p> <p>The instrument is again ready to make measurements.</p>
<p>ENTER</p>		<p>A confirmation indicating that the corrective calibration has been carried out successfully appears.</p> <p>Pressing ENTER confirms the message.</p>

7.4 Reference Measurements

- Perform several reference measurements by measuring the thickness of a calibration standard placed on the uncoated reference area in order to verify a correct normalization or corrective calibration. The thickness of the standard should be close to the nominal thickness value of the coating to be measured.
- If the obtained mean value is within the guaranteed error limits stated on the foil, delete the readings of the reference measurement before starting with the measurements on your specimens.
- If the mean value is not within the guaranteed error limits, perform a corrective calibration, or repeat the corrective calibration, respectively.

8 Measuring



The information stated in the operators's manual must be observed when making measurements!



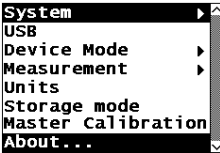
To make a measurement, place the probe at a right angle on the specimen surface. The probe can be lifted off after the measurement acquisition, i.e., after the reading appears on the LCD display. The instrument is again ready to make measurements.

Observe the following during the measurement:

- Measurements should be made within the reference area.
- To avoid erroneous readings, do not allow the probe to hover above the specimen.
- How high the probe should be lifted off depends on the measurement range of the probe. To obtain a correct air value, the distance to the specimen should be at least 3 to 4 times the max. measurable coating thickness.
- To allow sufficient time for a measurement acquisition, the time between individual measurements must be greater than 0.5 seconds.

9 Service Functions

How to access the “Service function” menu

Key sequ. / Action	Detail of the LCD display	Explanation
ON/OFF 5 x ENTER		Use ON/OFF to turn the instrument on. After pressing ENTER 5 times, the identification number 157 appears on the LCD display.
2 x ^		Enter the identification number 159 by pressing the arrow key ^ 2 times. Use ENTER to confirm the setting.
ENTER		The Service settings menu will be displayed. Press the arrow keys ^ or v to select the desired service function.

How to exit the “Service functions” menu

Key sequ. / Action	Explanation
DEL	Press the DEL key to exit the Service functions menu. The instrument is ready to make measurements.

Service Functions Overview

Service menu	Functions
System	Language Contrast Lighting Autom. off Initialization
USB	Send free-running mode
Instrument mode	Restr. Mode Analog display
Measurement	Audible signal Measurement effect External start Measuring mode - Standard/ Area measurement/Automatic measurement Display dual method
Units	metric/imperial
Storage mode	save/don't save/delete on off
Master calibration	Performing a master calibration
About ...	Information about the instrument configuration

Sales and Service Departments

- all around the world -

GERMANY

HELMUT FISCHER GMBH
Industriestraße 21
D-71069 Sindelfingen
☎: +49 (0) 70 31 / 30 3-0
Fax: +49 (0) 70 31 / 30 3-79
mail@helmut-fischer.de
www.helmut-fischer.com



GREAT BRITAIN

FISCHER INSTRUMENTATION
(G.B.) LTD.
Gordleton Industrial Park
Hannah Way · Pennington
GB-Lymington/Hants SO41 8JD
☎: (+44) 15 90 68 41 00
Fax: (+44) 15 90 68 41 10
mail@fischergb.co.uk
www.fischergb.co.uk



USA

FISCHER TECHNOLOGY, INC.
750 Marshall Phelps Road
Windsor, CT 06095 USA
☎: (+1) 86 06 83 07 81
Fax: (+1) 86 06 88 84 96
Watts 800 243 84 17
info@fischer-technology.com
www.fischer-technology.com



SWITZERLAND

HELMUT FISCHER AG
Moosmattstrasse 1 · Postfach · CH-6331 Hünenberg
☎: (+41) 41 785 08 00 · Fax: (+41) 41 785 08 01
switzerland@helmutfischer.com
www.helmutfischer.com



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SQS Registration
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Branch Offices

Branch Offices of Helmut Fischer AG, Switzerland:

SPAIN

FISCHER INSTRUMENTS, S.A.
C/Almogàvers 157 · 3a Planta
E-08018 Barcelona
☎: (+34) 93 309 79 16
Fax: (+34) 93 485 05 94
spain@helmutfischer.com
www.helmutfischer.com

ITALY

HELMUT FISCHER S.R.L.
Tecnica di Misura
Via Columella 40 · I-20128 Milano
☎: (+39) 0 22 55 26 26
Fax: (+39) 0 22 57 00 39
italy@helmutfischer.com
www.helmutfischer.com

JAPAN

FISCHER INSTRUMENTS K.K.
Shinmei 1-9-16 · Souka-shi
Saitama-ken 340-0012 · Japan
☎: (+81) 489 29 34 55
Fax: (+81) 489 29 34 51
japan@helmutfischer.com
www.helmutfischer.com

FRANCE

FISCHER INSTRUMENTATION
ELECTRONIQUE
Parc d'Activités Nord du Pas
du Lac · 5, rue Michaël Faraday
F-78180 Montigny le Bretonneux
BP 289 · F-78053 St Quentin en
Yvelines Cedex
☎: (+33) (0) 1 30 58 00 58
Fax: (+33) (0) 1 30 58 89 50
france@helmutfischer.com
www.helmutfischer.com

HONG KONG

FISCHER INSTRUMENTATION
(FAR EAST) LTD.
Unit 2901 · Level 29
Metroplaza Tower 2
223 Hing Fong Road
Kwai Chung, N.T.
Hong Kong
☎: (+852) 24 20 11 00
Fax: (+852) 24 87 02 18
hongkong@helmutfischer.com
www.helmutfischer.com

THE NETHERLANDS

HELMUT FISCHER
MEETTECHNIEK B.V.
Tarasconweg 10
NL-5627 GB Eindhoven
Postbus 1828
NL-5602 CA Eindhoven
☎: (+31) 40 248 22 55
Fax: (+31) 40 242 88 85
netherlands@helmutfischer.com
www.helmutfischer.com

CHINA

NANTONG FISCHER
INSTRUMENTATION LTD.
7F, No. 2 Building
2601 Songhuajiang Road
Shanghai 200437 · P.R.C.
☎: (+86) 21 65 55 74 55
Fax: (+86) 21 65 55 24 41
china@helmutfischer.com
www.helmutfischer.com

SINGAPORE

FISCHER INSTRUMENTATION (S)
PTE LTD.
102 E Pasir Panjang Road #04-04
Citilink Warehouse Complex
Singapore 118529
☎: (+65) 62 76 67 76
Fax: (+65) 62 76 67 67
singapore@helmutfischer.com
www.helmutfischer.com

INDIA

FISCHER MEASUREMENT
TECHNOLOGIES (INDIA) PVT. LTD.
Florida Amenity
S. No. 41, Keshav Nagar
Mundhwa
IN-Pune 411036
☎: (+91) 20 26 82 20 65
Fax: (+91) 20 26 82 20 75
india@helmutfischer.com
www.helmutfischer.com

