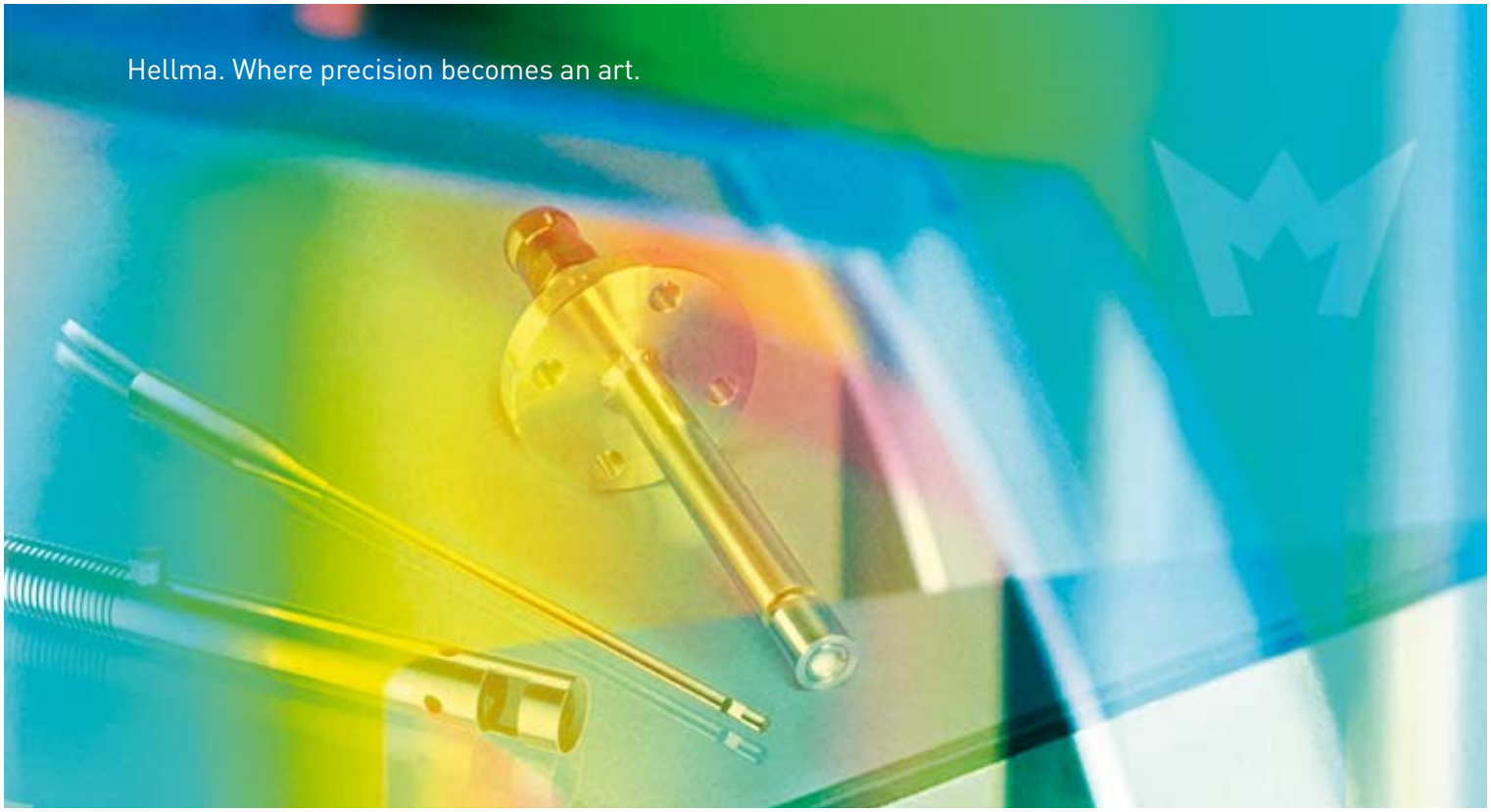
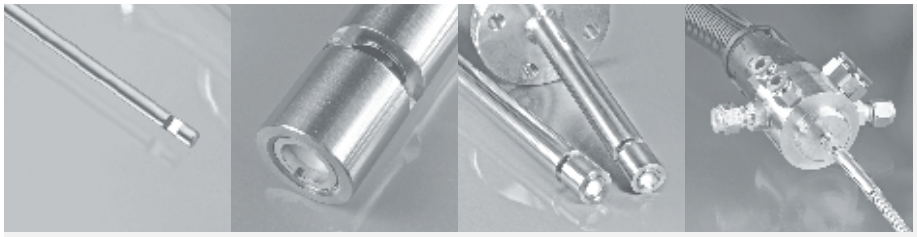
Hellma®
Precision in Spectro-Optics. Worldwide.





Fibre-optical systems
for the spectral analysis of samples directly on the reaction site

 www.hellma-worldwide.com

Fibre-optical systems

Safe. Efficient. And in real time.

The development of optical fibres has caused a small revolution also in chemical analysis:

Based on this technique, photometric measurements do not longer have to be performed under laboratory conditions with cells only. Thanks to the development of fibre-optic probes, the analysis has turned into a process - measurements can be performed on site directly and continuously. This allows for better control of ongoing processes with much less effort.

For spectrophotometric measurements in the laboratory and process area

- **Determination of concentration**
  quantitative analysis
- **Identification**
  qualitative analysis

Examples of use

Monitoring the production of plastic melts, varnishes, colours and pigments
Checking the release of active ingredients of drugs (TDA)
Monitoring and controlling reactions
Determining concentration and colour
Determination of dissociation constant, acid value and partition coefficient
Analysing strong absorbing media (ATR measurement)

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Evident advantages with a high cost-effectiveness

Measurements with the fibre-optical system

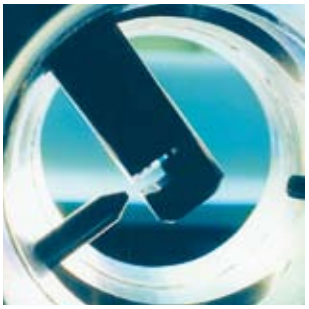
Safe
Safe measurement of poisonous and dangerous substances as there is no need to handle the sample.

Non-destructive
The product is measured without any damage. The effort involved in reaching just the right temperature beforehand for example thus becomes superfluous.

Economical
Saves valuable product, as laboratory samples usually have to be thrown away.

Fast
Measurement of samples without delay as transportation is not necessary. Measurement results for purposes of regulation can be made available in real time (inline process control).

Reduced costs
Reduction of costs involved in sampling and analysis.



High quality materials

Perfectly tuned to the application conditions

A precise knowledge of the chemical and physical parameters in normal measuring conditions and during cleaning is essential for the selection of the right probe types and materials. The following materials are generally used:

Probe body: Quartz or metallic materials such as:
Stainless steel 1.4571 (316 Ti), 1.4404 (316 L), 1.4435 (316 L), material 2.4602 (Hastelloy® C-22), titanium, tantalum, plastics

Optics: Optical components of sapphire or quartz such as:
Quartz SUPRASIL® 300

Seals: Adhesives and elastomers such as:
FFPM (Kalrez®, Chemraz®), FPM (Viton®)

Fibre-optic cables: Low solarisation UV fibre-optic cables of 190 nm - 1,100 nm, UV fibre-optic cables of 240 nm - 1,100 nm, NIR fibre-optic cables of 400 nm - 2,300 nm

Hellma has vast material data bases at its disposal from which the ideal material combination can be chosen for your needs.

Further indications can be provided by the materials used at the point of use. When in doubt, the resistance of the materials can be tested by means of a material sample.

Special solutions

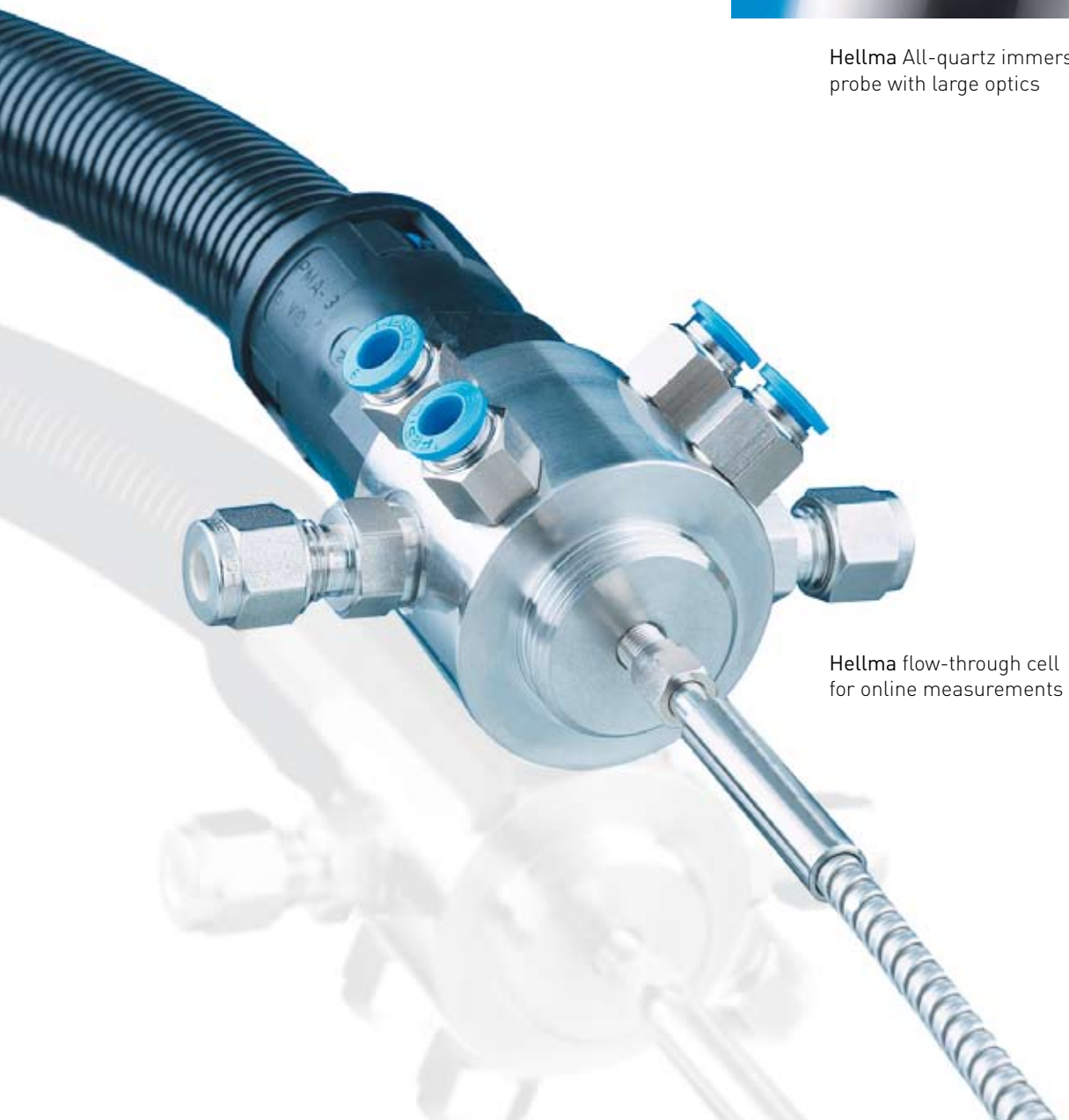
For special situations

Hellma fibre-optical probes have been offering industry and science advanced solutions for demanding measurement tasks for over 15 years. Together with the customers, Hellma has developed several individual solutions.

Profit from our long experience and ask for our advice.

Length, diameter and material of each of our standard probes can be changed. Different stainless steels, titanium, quartz or plastics can be used. If indeed a suitable probe material is not available – e.g. for measurements in particularly aggressive media – the probe can also be coated with a protective coat.

Hellma All-quartz immersion probe with large optics

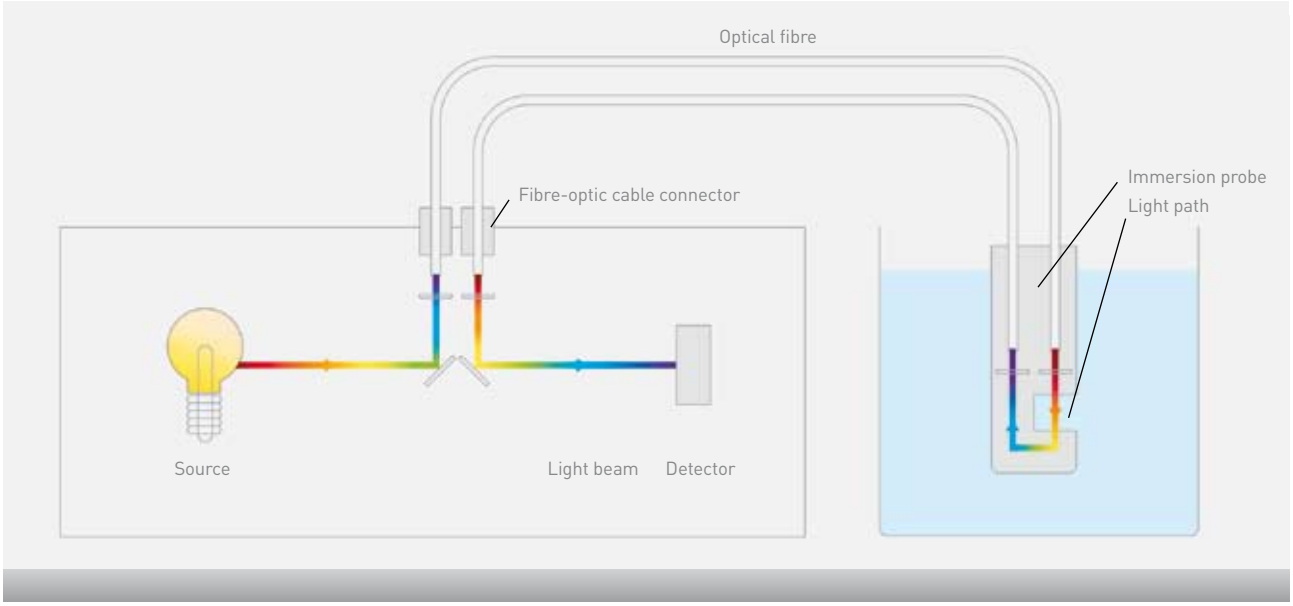


Hellma flow-through cell for online measurements

Simple and effective
Connection to spectrophotometer

Each fibre-optical probe has two fibre-optic cables.

One fibre-optic cable is used for the transmission of the light from the spectrophotometer in the probe up to the measuring point. The second fibre-optic cable conducts the light that has passed through the sample, back to the spectrophotometer.



Connection options
SMA connector. Fibre-optic cable interface.

SMA connector
The ends of the fibre-optic cables are usually equipped with SMA connectors, which connect to the corresponding sockets on your spectrophotometer. Fibre-optic cables can also be extended easily by means of the SMA couplers. Couplers for other standard optical connectors are also available on request.

Fibre-optic cable interface
For spectrophotometer without SMA connections, a fibre-optic cable interface is recommended. This is equivalent in its external dimensions to a standard cell and it is placed like a cell in the cell holder of the photometer.

Fibre-optical probes

Transmission

Laboratory

Standard probes
Hellma standard immersion probes are ideally suited to laboratory measurements. As with conventional cell measurements, the collimated light beam passes through the solution only once. The use of a deflecting prism with two fully reflective surfaces leads to very low values for stray light.

All-quartz probes
All-quartz immersion probes from Hellma have a probe head made of quartz SUPRASIL® 300 that is fused to a quartz tube, forming a leakproof seal. For this reason, these probes are particularly useful for transmission measurements in corrosive solutions, where the use of metal probes is not practical.

Immersion probes for small volumes
These Hellma micro immersion probes have been specifically developed for measurements in small volumes. Due to their slim form, less sample material is required for a measurement to be taken.

Ultra-mini probes
The probes are equipped with removable light path tips. The tips can be exchanged simply and easily to adjust the light path between 1 mm and 20 mm.

Immersion probe with vertical measuring slit
Thanks to the optimised geometry of the probe, the product can flow freely through the measuring slit during immersion of the probe. In this way air bubbles, which can interfere with measurements, are forced out of the slit. This design is particularly advantageous for measurements in highly viscous (thick) media.

Process

Probes for process control
Hellma transmission probes are suitable for the special conditions of process controls at high temperatures and high pressure. A special probe has been developed for very high pressure and temperature. It can be used for a maximum temperature of 300°C and a maximum pressure of 35 bar.

Polymer probe
This Hellma transmission probe has been developed for use at high temperatures and pressures in low corrosive environments. Conditions like these can be found within polymer extruders. The probe body is made of titanium, the optical components are made of sapphire.

Laboratory and process

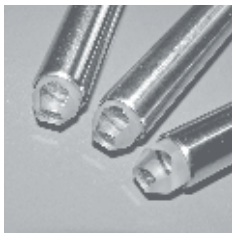
Mini immersion probes with fixed and removable light path tip
The probes are ideal for manual use in the laboratory. The tips can be exchanged simply and easily to adjust the light path to 2 mm, 5 mm or 10 mm. Thanks to the fact that it is fixed by means of a clamping ring (e.g. Swagelok) the probe can be permanently installed for continuous process monitoring in a reactor, for example.

Fibre-optical probes

ATR

Laboratory and process

ATR probes
ATR means Attenuated Total Reflection.
ATR probes are suitable for situations involving the direct measurements of strongly absorbing solutions, where standard transmission probes cannot be used.



Reflection

Laboratory and process

Reflection probes
These probes are particularly suitable for diffuse reflection measurements in the VIS and in the NIR range and were developed for the analysis of scattering goods.

Fluorescence measurement

Laboratory

Fluorescence probes
The Hellma fluorescence immersion probe makes it posible to measure fluorescence directly in the medium being investigated.

Flow-through

Process

Flow-through cell
This flow-through cell has been specially developed for on-line measurements with small cross sections. Cell bodies are in stainless steel or Hastelloy®, the optical window is of sapphire or quartz SUPRASIL®. Fibre-optic cables link the measuring cell with the spectrometer. As with cell measurements, the light beam passes through the sample compartment only once.

Hastelloy® is a registered trademark of Haynes International, Inc.
SUPRASIL® is a registered trademark of Heraeus Quarzglas GmbH & Co.KG

Fibre-optics

Standard fibre-optic cables and SMA connectors
Immersion probes from Hellma can be connected to spectrophotometers in two different ways.

Process fibre-optic cables
As long distances between the place of measurement and the location of the spectrophotometer may have to be bridged, great demands are made on fibre-optic cables. This fact often leads to damaging of the sensitive glass fibres while installing them. For this reason achieving resilience for Hellma fibre-optic cables is of utmost importance.

Fibre-optic cable interface
Always the right solution: for spectrophotometers without SMA sockets an immersion probe from Hellma can still be connected.

External cell holder
The external cell holder is useful when the spectrophotometer does not have an internal cell holder or when measurements with cells are to be made at some distance from the photometer.

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