



Diamond-tipped and conventional probes for research and process development application

Models DPR-207 and DMD-270 are ATR Immersion probes featuring excellent photometric accuracy and precision combined with the small diameter commonly required for research and process development applications. The key to their high performance is the use of a single gold coated light guide combined with ATR element designs which precisely control the range of incidence angles and number of reflections at the sample interface. As a result, calibrations developed with these probes can be transferred between the two models or between these and Axiom's larger diameter, high transmission "process" probes with only a minor scaling adjustment.

DPR-207: Versatile Probe for Diverse Applications

The DPR-207 is a robust ATR probe employing interchangeable conical ATR elements in conjunction with nearly collimated IR radiation. This combination insures that all optical rays strike the sample interfacing surface within a range of $\pm 1^\circ$, resulting in a very high degree of response linearity and precision. The selection of standard element materials includes ZnSe, ZnS, AMTIR-1, silicon, and sapphire, allowing the probe characteristics to be altered as application requirements change.

DMD-270: Diamond-tipped Probe for Aggressive Chemistries

The DMD-270 provides high performance throughout the mid-IR fingerprint region combined with the ability to stand up to strong acids, bases, and many other aggressive chemistries. In addition, its proprietary optical design

(Patent pending) insures that each ray experiences exactly three reflections at a well defined angle of incidence, resulting in excellent accuracy and precision.

Spectrometer Interfacing

Three different standard interfaces are available for coupling either a DPR-207 or a DMD-270 to an FTIR spectrometer. Model DSR-207XY ables the probe to be coupled directly to the sample compartment of a conventional FTIR spectrometer. The suffixes X and Y are used to specify the spectrometer make and model. Model DSX-207 interfaces to Axiom's AXM-601 outboard sample module. This provides a high degree of flexibility in placement of the probe by allowing various combinations of Axiom mirror and conduit modules to be used between the sample module and the spectrometer. Finally, model DSD-207XS couples the probe to a dedicated process FTIR spectrometer employing dual input and output beam ports. Whichever optical configuration is employed, the small diameter probes should be operated with a liquid nitrogen cooled detector for best performance.

Sample Interfacing

Single lightguide probes are normally supplied with an O-ring sealed sliding tapered joint (24/40) to mate to a glass reaction vessel. For operation at

DPR-207/DMD-270

SMALL DIAMETER ATR IMMERSION PROBES



Features:

- Small diameter to minimize required sample size
- Easily interfaced to any FTIR spectrometer
- Diamond element for excellent corrosion resistance (DMD-270)
- Interchangeable ATR elements to meet diverse requirements (DPR-207)
- Proprietary optical designs for maximum photometric accuracy and precision
- Robust construction for maximum reliability

U.S. Patent Numbers 4,812,041
4,835,389

5,459,316 (DPR-207)

Additional Patent Pending (DMD-270)

elevated pressures, the probes can be provided with an optional welded-on flange or port fitting.

Axiom's Comprehensive Immersion Probe Product Line

Axiom Analytical pioneered the field of in-situ IR reaction monitoring with the introduction of the first ATR immersion probes in 1989. Since then, the company's immersion probe product lines have continued to expand to include ATR, transmission, diffuse reflectance, and Raman probes to meet virtually all applications. In addition to the DPR-207 and DMD-270, the company's ATR probe family includes the DIPPER-210 QC sampler and the DPR-240 and the DMD-370 high transmission process probes.

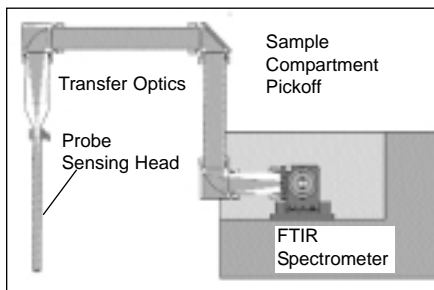


Figure 1: Cross-section of an inboard DMD-270 or DPR-207 System (recommended configuration).

Specifications:	DPR-207	DMD-270
Probe Diameter:	16 mm	16 mm
Immersion Depth:	30 cm	30 cm
ATR Reflections:	2 (See Note)	3
Angle of Incidence:	45° (See Note)	45°
Nominal Transmission:	2-4 %	1.5-2 %
Maximum Temperature:	280°C	200°C (Continuous) 250°C (Intermittent)
Maximum Pressure:	See table below	30 bar
Wetted Metal:	316 Stainless Steel	Hastelloy C-276
Seal Type:	Energized, filled PTFE	Energized, filled PTFE

DPR-207 ATR Elements				
Material	Spectral Cutoff	Hardness (KNOOP)	Attacked By	Max Pressure
ZnSe	600 cm-1	120	Acids, oxidizers	60 bar
ZnS (CVD)	950 cm-1	250	Strong oxidizers, some acids	60 bar
AMTIR-1	850 cm-1	170	Strong alkalis	20 bar
Ge ⁽²⁾	700 cm-1	780	Hot sulphuric acid, aqua regia	50 bar
Sapphire ⁽¹⁾	2200 cm-1	1370	Concentrated acids and alkalis	100 bar
Silicon	1150 cm-1	1500	HF, HNO ₃ , NaOH	60 bar

Notes: 1. Sapphire elements provide three reflections at an incidence angle of 60°.
2. Ge elements are limited to <100°C.

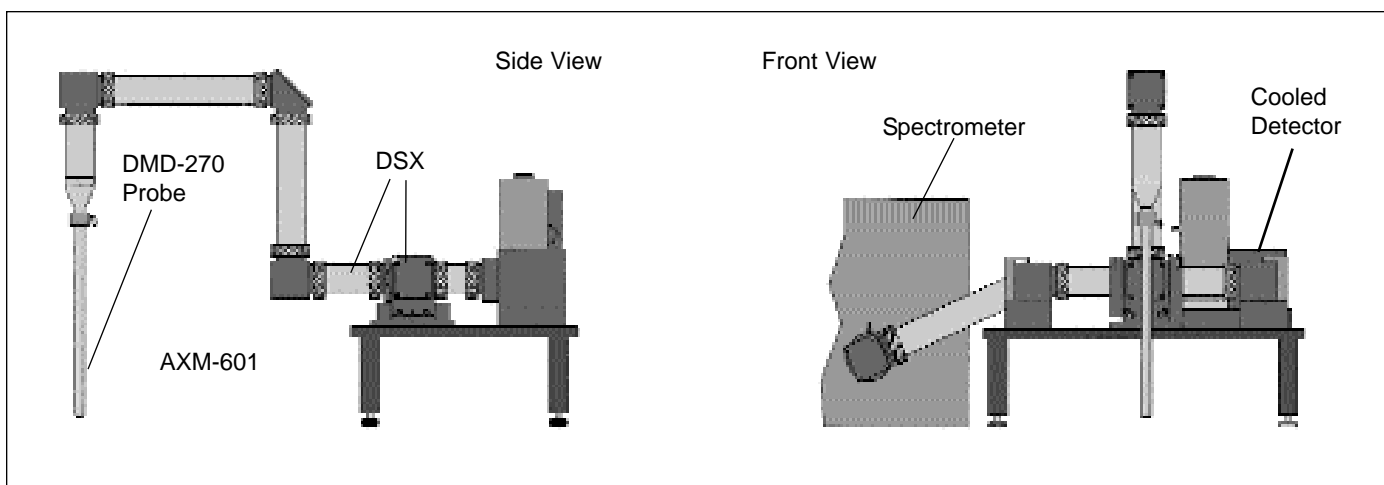


Figure 2: Front & side view of a standard DMD-270 or DPR-207 outboard sampling configuration including DSX-207 interface, AXM remote sampling region, and an LN2 cooled detector.