

Optics carrier and heating element for the diagnosis of caries



Pushing Performance

HARTING Mitronics

People | Power | Partnership

Intended use and function

The MID assembly is used for laser fluorescence-based diagnosis of caries. By irradiating the teeth with high-energy 780nm light, areas affected by caries are demarcated by weaker fluorescent luminosity and can consequently be distinguished from healthy tooth substance by color. The result is a minimally invasive method of diagnosis for patients. The evaluation takes place in conjunction with a monitor, giving the patient a direct overview of the state of their teeth. The assembly consists of two metallized and loaded MID components (optics carrier and heating element) and a thermo-plastic cover.



Figure 1: Optics carrier (top left) and heating element (top right), shown separately and assembled (bottom)

Advantages of the MID solution

- MID permits miniaturization with higher integration density.
- Integrated heating enables significant simplification of assembly.
- Results in reduction in weight and the number of assembly steps, as well as lower costs.

Application areas	Medical technology
User	KaVo Dental GmbH
Product	KaVo DIAGNOcam – diagnosis of caries
Main function	Switch, heating, optics carrier

Optics carrier and heating element for the diagnosis of caries

HARTING Mitronics



Pushing Performance

People | Power | Partnership

Project implementation

The project commenced in 2009 with pre-development and potential conceptual studies. Concrete implementation began in 2010 with different samples, integration tests and design tests at the customer's, followed by verification. In 2011, milling samples made of LCP material were provided to the customer. The pilot series began in 2011 after a needed design optimization in the tool. Ramp-up took place in April 2012.

Functions of the MID component

- The optics carrier serves as a housing to protect the optical system (in connection with an additional component), as well as a component carrier for three separate switching functions.
- The heating element is built into the optics carrier and heats a sapphire glass via the meander structure to prevent potential fogging due to moisture.
- The optics carrier handles the electrical connection to the temperature control.
- The optics carrier is used to position the optical system.

Manufacturing aspects

- LPKF-LDS technology is employed to structure the injection molded component from the LCP material. Metallization is performed without external current and consists of Cu-Ni-Au, which is a typical layer composition for MIDs.
- Special thin-walled (0.5mm) injection molding is required for the housing components and the heating element.
- The laser process requires multiple reclamping of the component.
- The stranded wires are attached by hand soldering.

Substrate material	LCP (Vectra E 840i LDS)
Structuring	LDS
Metallization	Chemical Cu-Ni-Au
Connection technology	Solder (vapor phase, hand soldering) / plug
Number of components	11
Start of production	2013
Production run	2,500 per annum
Development period	3 years