confocalDT // Confocal chromatic sensor system

More Precision
Confocal chromatic miniature sensors

<table>
<thead>
<tr>
<th>Model</th>
<th>IFS2402-0,4</th>
<th>IFS2402-1,5</th>
<th>IFS2402-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0.4 mm</td>
<td>1.5 mm</td>
<td>3.5 mm</td>
</tr>
<tr>
<td>Start of measuring range</td>
<td>approx. 1.5 mm</td>
<td>0.9 mm</td>
<td>1.9 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>static 1) 16 nm</td>
<td>static 4) 48 nm</td>
<td>static 4) 48 nm</td>
</tr>
<tr>
<td></td>
<td>dynamic 2) 60 nm</td>
<td>dynamic 2) 192 nm</td>
<td>dynamic 2) 480 nm</td>
</tr>
<tr>
<td>Linearity 3)</td>
<td>Displacement and distance</td>
<td>&lt; ±0.3 µm</td>
<td>&lt; ±1.2 µm</td>
</tr>
<tr>
<td>Light spot diameter</td>
<td>10 µm</td>
<td>20 µm</td>
<td>20 µm</td>
</tr>
<tr>
<td>Max. tilt angle 4)</td>
<td>±8°</td>
<td>±5°</td>
<td>±3°</td>
</tr>
<tr>
<td>Numerical aperture (NA)</td>
<td>0.25</td>
<td>0.20</td>
<td>0.10</td>
</tr>
<tr>
<td>Connection</td>
<td>integrated optical fiber 2 m with E2000/APC connector; extension up to 50 m; bending radius: static 30 mm; dynamic 40 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>Clamping, mounting adapter (see accessories)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>Storage -20... +70 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operation +5 ... +70 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock (DIN-EN 60068-2-27)</td>
<td>15 g / 6 ms in XY axis, 1000 shocks each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration (DIN-EN 60068-2-6)</td>
<td>2 g / 20... 500 Hz in XY axis, 10 cycles each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection class (DIN-EN 60529)</td>
<td>IP64, front operated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum housing, glass lenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 186 g (incl. optical fiber)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Average from 512 values at 1 kHz, near to the midrange onto optical flat
2) RMS noise relates to mid of measuring range (1 kHz)
3) All data at constant ambient temperature (25 ± 1 °C) against optical flat; specifications can change when measuring different objects.
4) Maximum sensor tilt angle that produces a usable signal on reflecting surfaces. The accuracy decreases when approaching the limit values.
### Model IFS2402/90-1,5 IFS2402/90-4

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<thead>
<tr>
<th>Parameter</th>
<th>IFS2402/90-1,5</th>
<th>IFS2402/90-4</th>
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<tr>
<td>Measuring range</td>
<td>1.5 mm</td>
<td>2.5 mm</td>
</tr>
<tr>
<td>Start of measuring range</td>
<td>approx.</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td></td>
<td></td>
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<td>Linearity</td>
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<tr>
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<td>20 µm</td>
<td>20 µm</td>
</tr>
<tr>
<td>Max. tilt angle</td>
<td>±5°</td>
<td>±3°</td>
</tr>
<tr>
<td>Numerical aperture</td>
<td>0.20</td>
<td>0.10</td>
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<td>2 g / 20 ... 500 Hz in XY axis, 10 cycles each</td>
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</tr>
<tr>
<td>Protection class (DIN-EN 60529)</td>
<td>IP40</td>
<td></td>
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<td>Material</td>
<td>Aluminum housing, glass lenses</td>
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1) Start of measuring range measured from sensor axis.
2) Average from 512 values at 1 kHz, near to the midrange onto optical flat
3) RMS noise relates to mid of measuring range (1 kHz)
4) All data at constant ambient temperature (25 ± 1 °C) against optical flat; specifications can change when measuring different objects.
5) Maximum sensor tilt angle that produces a usable signal on reflecting surfaces. The accuracy decreases when approaching the limit values.

MR = measuring range
SMR = start of measuring range
Dimensions in mm, not to scale
The confocalDT system consists of:
- Sensor IFS240x
- Controller IFC24xx
- Fiber optic cable C24xx

Sensor IFS240x
Analog output (option)
RS422, PROFINET/ EtherNet/IP (via IF2030)

Controller IFC242x
IFC2451
IFC2461
IFC2471 LED
Digital I/O
Encoder (option)

Vacuum feed through (optional)

EtherCAT, Ethernet
Supply

System design confocalDT
Customer-specific modifications
Application examples are often found where the standard versions of the sensors and the controllers are performing at their limits. To facilitate such special tasks, it is possible to customize the sensor design and to adjust the controller accordingly. Common requests for modifications include changes in design, mounting options, customized cable lengths and modified measuring ranges.

Possible modifications
- Sensors with connector
- Cable length
- Vacuum suitability up to UHV
- Specific lengths
- Customer-specific mounting options
- Optical filter for ambient light compensation
- Housing material
- Measuring range / Offset distance

Vacuum setup
Accessories: mounting adapter
MA2402 for sensors 2402

Accessories: mounting adapter
MA2403 for sensors 2403

Accessories: mounting adapter
MA2404-12 for sensors IFS2404-2 / IFS2404/90-2 / IFS2407-0,1

Accessories: mounting adapter
MA2400 for sensors IFS2405 / IFS2406 / IFS2407 (consisting of a mounting block and a mounting ring)
Accessories

Software
IFD24xx-Tool  Software demo tool included

Accessories light source
IFL2422/LE  Lamp module for IFC2422
IFL24x1/LED  Lamp module for IFC24x1
IFL2451/LED(003)  Lamp module for IFC2451(003)

Cable extension for sensors
CE2402 cable with 2x E2000/APC connectors
CE2402-x  Extension for optical fiber (3 m, 10 m, 13 m, 30 m, 50 m)
CE2402-x/PT  Extension for optical fiber with protection tube for mechanical stress (3 m, 10 m, customer-specific length up to 50 m)

Cable for IFS2404 sensors
C2404-x  Optical fiber with FC/APC and E2000/APC connectors
Fiber core diameter 20 µm (2 m)

Cables for IFS2405/IFS2406/2407-0,1 sensors
C2401 cable with FC/APC and E2000/APC connectors
C2401-x  Optical fiber (3 m, 5 m, 10 m, customer-specific length up to 50 m)
C2401/PT-x  Optical fiber with protection tube for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m)
C2401-x (01)  Optical fiber core diameter 26 µm (3 m, 5 m, 15 m)
C2401-x(10)  Drag-chain suitable optical fiber (3 m, 5 m, 10 m)

C2400 cable with 2x FC/APC connectors
C2400-x  Optical fiber (3 m, 5 m, 10 m, customer-specific length up to 50 m)
C2400/PT-x  Optical fiber with protection tube for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m)
C2400/PT-x-Vac  Optical fiber with protection tube suitable for use in vacuum (3 m, 5 m, 10 m, customer-specific length up to 50 m)

Cable for IFS2407/90-0,3 sensors
C2407-x  Optical fiber with DIN connector and E2000/APC (2 m, 5 m)

Vacuum feed through
C2402/Vac/KF16  Vacuum feed through with optical fiber, 1 channel, vacuum side FC/APC non-vacuum side E2000/APC, clamping flange KF 16
C2405/Vac/1/KF16  Vacuum feed through on both sides FC/APC socket, 1 channel, clamping flange type KF 16
C2405/Vac/1/CF16  Vacuum feed through on both sides FC/APC socket, 1 channel, flange type CF 16
C2405/Vac/6/CF63  Vacuum feed through FC/APC socket, 6 channels, flange type CF 63

Other accessories
SC2471-x/USB/IND  Connector cable IFC2451/61/71, 3 m, 10 m, 20 m
SC2471-x/IF2008  Connector cable IFC2451/61/71-IF2008, 3 m, 10 m, 20 m
PS2020  Power supply 24V / 2.5A
EC2471-3/OE  Encoder cable, 3m
IF2030/PNET  Interface module for PROFINET connection
IF2030/ENETIP  Interface module for EtherNet/IP connection

Optical fiber
Temperature range: -50 °C to 90 °C
Bending radius: 30/40 mm

- Multimode core 50 µm / 26 µm / 20 µm
- Casing 125 µm
- Acrylate <250 µm
- Coating/buffer
- PVC: polyvinyl chloride
- PVDF: polyvinylidene fluoride

- FC/APC standard connector
- DIN connector
Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

Sensors and measurement devices for non-contact temperature measurement

Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers

3D measurement technology for dimensional testing and surface inspection