More Precision

confocalDT // Confocal chromatic measuring system
The universal confocalDT IFC2451 controllers are used for various industrial measurement tasks. Due to their excellent signal-to-noise ratio, these controllers achieve measuring rates of 10 kHz with white light LEDs.

The active exposure regulation feature in the CCD line enables accurate, fast surface compensation on changing surfaces during dynamic measurement processes.

Due to a user-friendly web interface, no additional software is necessary to configure the controller and the sensors. Data output is via Ethernet, EtherCAT, RS422 or analog output.

The confocalDT controllers are used for complex distance and thickness measurements and can be combined with any IFS sensor. Furthermore, up to 6 peaks are provided which allows for the thickness of transparent, multi-layer objects to be measured. Optical signals are transferred between sensor and controller via optical fibers.

The web interface can be accessed via Ethernet and provides set up and configuration options for controller and sensors. For thickness measurements, materials are stored in an expandable materials database.
### IFC2451 controller

<table>
<thead>
<tr>
<th>Model</th>
<th>IFC2451</th>
<th>IFC2451MP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution</strong></td>
<td>Ethernet/EtherCAT 1 nm</td>
<td>RS422 18 bit</td>
</tr>
<tr>
<td><strong>Measuring rate</strong></td>
<td>continuously adjustable from 100 Hz to 10 kHz</td>
<td></td>
</tr>
<tr>
<td><strong>Linearity</strong></td>
<td>typ. &lt; ± 0.025 % FSO (depends on sensor)</td>
<td></td>
</tr>
<tr>
<td><strong>Multi peak measurement</strong></td>
<td>1 layer</td>
<td>5 layers</td>
</tr>
<tr>
<td><strong>Light source</strong></td>
<td>internal white LED</td>
<td></td>
</tr>
<tr>
<td><strong>No. of characteristic curves</strong></td>
<td>up to 20 characteristic curves for different sensors per channel, selection via table in the menu</td>
<td></td>
</tr>
<tr>
<td><strong>Permissible ambient light</strong></td>
<td>30,000 lx</td>
<td></td>
</tr>
<tr>
<td><strong>Synchronization</strong></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td><strong>Supply voltage</strong></td>
<td>24 VDC ± 15 %</td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>approx. 10 W</td>
<td></td>
</tr>
<tr>
<td><strong>Signal input</strong></td>
<td>sync-in / trig-in; 3x encoder (A, B, index)</td>
<td></td>
</tr>
<tr>
<td><strong>Digital interface</strong></td>
<td>Ethernet; EtherCAT; RS422</td>
<td></td>
</tr>
<tr>
<td><strong>Analog output</strong></td>
<td>Current: 4 … 20 mA; voltage: 0 ... 10 V / -10 ... +10 V (16 bit D/A converter)</td>
<td></td>
</tr>
<tr>
<td><strong>Switching output</strong></td>
<td>Error1-Out, Error2-Out</td>
<td></td>
</tr>
<tr>
<td><strong>Digital output</strong></td>
<td>sync-out</td>
<td></td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td>3-pin supply terminal strip; Encoder connection (15-pin, HD-Sub socket, max. cable length 3 m); RS422 connection socket (9-pin, Sub-D, max. cable length 30 m); 3-pin output terminal strip (max. cable length 30 m); 12-pin I/O terminal strip (max. cable length 30 m); RJ45 socket for Ethernet / EtherCAT (max. cable length 100 m)</td>
<td></td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td>free-standing, DIN rail mounting</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>-20 ... +70 °C</td>
<td></td>
</tr>
<tr>
<td><strong>Shock (DIN-EN 60068-2-29)</strong></td>
<td>15 g / 6 ms in XYZ axis, 1000 shocks each</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration (DIN-EN 60068-2-6)</strong></td>
<td>2 g / 20 … 500 Hz in XYZ axis, 10 cycles each</td>
<td></td>
</tr>
<tr>
<td><strong>Protection class (DIN-EN60529)</strong></td>
<td>IP40</td>
<td></td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>Aluminum</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>approx. 2.2 kg</td>
<td></td>
</tr>
<tr>
<td><strong>Compatibility</strong></td>
<td>compatible with all confocalDT sensors</td>
<td></td>
</tr>
<tr>
<td><strong>No. of measurement channels</strong></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Control and display elements</strong></td>
<td>ON/OFF switch; multifunction button (for dark alignment and reset to factory settings after 10 s); 4x LEDs for intensity, range, status and supply voltage</td>
<td></td>
</tr>
</tbody>
</table>

FSO = Full Scale Output

1) Illuminant: light bulb

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**Diagram:**
- IFC2451 controller diagram showing various connection points and dimensions.
- Fiber-optic sensor cable fitting panel for DIN rail.
System design

The confocalDT system consists of:
- Sensor IFS240x
- Controller IFC24xx
- Fiber optic cable C24xx

- EtherCAT, Ethernet
- RS422
- Digital I/O
- Vacuum feed through (optional)
- Analog output (option)
- Encoder (option)
- Supply
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 feed through
C2405... / Vac (KF or CF flange)
C2402... / Vac (KF flange)
IFS24xx / Vac
C2400/PT-x-Vac C2401-x
Controller IFC24xx
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

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

Strain relief
PVDF: polyvinylidene fluoride

FC/APC standard connector

DIN connector
Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

Optical micrometers and fiber optics, measuring and test amplifiers

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3D measurement technology for dimensional testing and surface inspection

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