

Product Information



Control 4000 Photometric Analyzers

Control 8000 Universal Analyzers



english

deutsch

español

portuguese

русский язык

中国

日本語

français

italiano

04 | C4000 - Photometric Converter

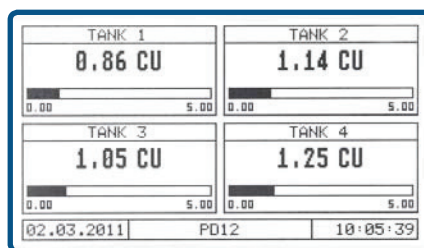
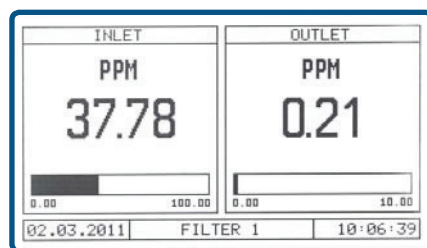


Sensor		4101	4201	4202	—	—
		4121	4221	4222	4322	4422
1	2	4151	4251	4252	4352	4452
AF16 (AS16)	—	✓	✓	✓	✓	✓
AF16 (AS16)	AF16 (AS16)	—	—	✓	✓	✓
AF16 (AS16)	AF26 or AF45 or TF16	—	—	—	✓	✓
AF26	—	—	✓	✓	✓	✓
AF26	AF26 or AF45 or TF16	—	—	—	—	✓
AF45	—	—	✓	✓	✓	✓
AF45	AF45 or TF16	—	—	—	—	✓
AF46	—	—	—	—	—	✓
TF16	—	—	✓	✓	✓	✓
TF16	TF16	—	—	—	—	✓

*C4422 can handle up to 4 sensors AS56

The Control 4000 is available in various configurations to meet the exact needs of your process.

- Multiple photometric sensors
- Multiple parameter sets
- Multiple linearization tables
- Data logger
- Factory zero for scattered light sensors
- Remote control
- Ex proof versions FM and ATEX



Display Modes

- 1 - 4 simultaneously displayed values (configurable)
- Numeric with bar graph and alarm setting
- Trendline

Software Tools

- 8 parameter sets (incl. range, alarm, display, etc.)
- 16 linearization tables (max. 11 points)
- 8 offset and slope sets
- Auto zero (local or remotely activated)
- Factory zero (scattered light sensors only)
- Password protection (3 levels and none)
- Memory (non-volatile) retains all configurations and logged data

Remote Control

- Parameter set
- Zero
- Hold

08 | C4000/C8000 - Accessories

The PC-Transfer software allows communication between converter and PC via a RS-232 port. Documentation and set-up including identical set-up of multiple converters are made simple.

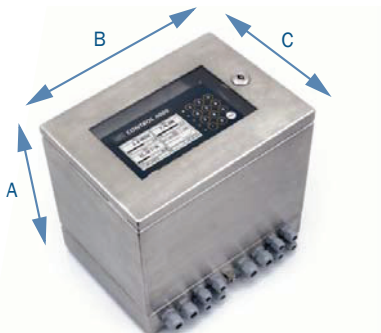
Converter to PC:

- Parameter set
- Trend data online
- Data logger

PC to converter:

- Parameter set
- Software update
- Mathematics module

The advanced version features an additional mathematics module for complex measuring tasks and parameter creation at the PC.



S19-42

Wall mount housing (IP65)
Material: stainless steel 1.4301 / SS304
A: 301 mm (11.9 in.)
B: 340 mm (13.4 in.)
C: 237 mm (9.4 in.)



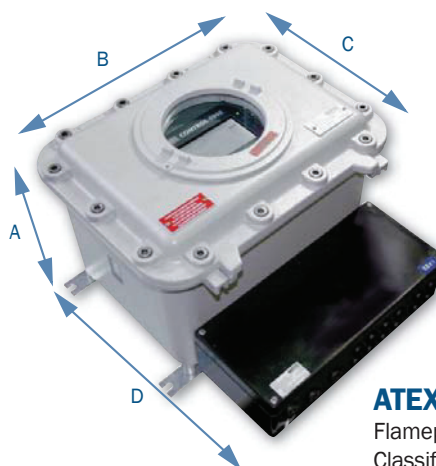
B19-42

Wall mount housing (IP66)
Material: plastic (ABS)
A: 287 mm (11.3 in.)
B: 353 mm (13.9 in.)
C: 147 mm (5.8 in.)
D: 237 mm (9.4 in.)



T19-42

Table top housing (IP65)
Material: aluminum
A: 150 mm (5.9 in.)
B: 260 mm (10.2 in.)
C: 320 mm (12.6 in.)



ATEX EX-D

Flameproof housing Ex d (IP65)
Classification: II 2(2) G Ex de [ia] II B T5
Approval: KEMA 08 ATEX 0123
Material: cast aluminum
A: 320 mm (12.6 in.)
B: 450 mm (17.7 in.)
C: 355 mm (14.0 in.)
D: 500 mm (19.7 in.)

Front-Kit

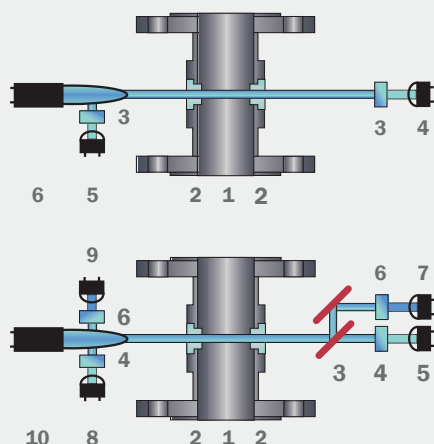
Front panel mounting (IP65 - front only)
(not shown)



C4000/C8000 - Technical Data | 09

Technical Data	C4000	C8000
Housing	19"-version for mounting in control cabinets 3 U / 42 HP - dimensions: W 213.0 mm (8.39 in.) H 128.4 mm (5.06 in.) D 230.0 mm (9.05 in.) - material: stainless steel / polyester / silicone / glass / diverse plastics - protection: front IP40 / rear IP20 (mains supply secured against accidental touching)	
Display	LCD graphic display black on white (240 x 128 pixel), LED background illuminated	
Operation	18-button keyboard	
System clock	accuracy approx. 1 minute/month (battery life approx. 15 years)	
LED	1 LED (green): power on 1 LED (red-flashing): system failure 3 LEDs (yellow): alarm I, II, III	1 LED (green): power on 1 LED (red-flashing): system failure
Data logger	4 parallel measuring values (ring buffer with approx. 25,000 data points x 4) (interval: 1/second - 1/hour)	8 parallel measuring values (ring buffer with approx. 12,500 data points x 8) (interval: 1/second - 1/hour)
Sensor-inputs	1 - 4 for optek photometric sensors n/a n/a	4 for optek photometric sensors 2 for optek conductivity sensors 2 for pH-probes (temperature compensated)
Sensor-inputs (explosion proof)	optional: 1 - 4 for optek photometric sensors (intrinsic safe)	n/a
mA-inputs	optional: 2 x 4 - 20 mA (functionally galvanically isolated) - accuracy: < 0.5 % - resolution: < 0.05 % - load: < 200 Ohm	n/a
Remote-inputs	optional: 7 x 24 V (19 ... 29 V DC), typically 6.0 mA for remote range setting, remote zero, remote hold	standard: 4 x 24 V (19 - 29 V DC), typically 6.0 mA for remote range setting, remote zero
Profibus PA interface	optional: Profibus PA profile, version 3.01, amendment 2 - voltage range: 9 ... 32 V DC - power consumption: 18 mA (functionally galvanically isolated)	n/a
Sensor lamp-outputs	1 or 2 lamp supply for optek photometric sensors - 4.5 ... 8.5 V DC	1 lamp supply for optek photometric sensors - 4.5 ... 7.8 V DC
mA-outputs	2 or 4 x 0/4 - 20 mA (NAMUR) (functionally galvanically isolated) - accuracy: < 0.5 % - resolution: < 0.05 % - load: < 600 Ohm	8 x 0/4 - 20 mA (NAMUR) (functionally galvanically isolated) - accuracy: < 0.5 % - resolution: < 0.05 % - load: < 600 Ohm
Relay-outputs	3 independent software-configurable relay contacts - 0 - 50 V AC, 0 - 75 V DC, 0 - 2 A - for alarm or status feedback - initiation delay configurable: 0 - 999 sec.	n/a
Failsafe-output	1 SPDT contact to alarm in case of lamp or system failure (active) - 0 - 50 V AC, 0 - 75 V DC, 0 - 2 A	
Serial communication	RS232 bi-directional interface on front panel (with software package optek PC-transfer) - up- and download of configuration, download of data logger content	
Cable lengths (sensor)	2, 3, 5, 10, 15, 20, 30 ... 100 m (7, 10, 16, 33, 49, 66, 98 ... 328 ft) cable length > 100 m on request up to 1,000 m (3,280 ft) sensors: AS56 / AS16: max: 50 m	2, 3, 5, 10, 15, 20, 30 m (7, 10, 16, 33, 49, 66, 98 ft)
Power supply	115 / 230 V AC, selectable (93.5 - 132 / 187 - 264 V AC, 47 - 64 Hz) or 24 V AC / DC (AC: 20.4 - 26.4 V AC, 47 - 64 Hz; DC: 20.4 - 28.8 V DC) - power consumption: < 50 VA	
Ambient conditions	temperature during operation (no direct sunlight): - converter: -10 - 55 °C (14 - 131 °F) - with optional stainless steel housing S19-42 (IP65): -20 - 45 °C (-4 - 113 °F) - with optional plastic housing B19-42 (IP65): -10 - 40 °C (14 - 104 °F) (C4000 only) - with optional Ex D housing (IP65): -20 - 40 °C (-4 - 104 °F) (C4000 only) temperature during transport (no direct sunlight) : -20 - 70 °C (-4 - 158 °F)	
Software languages	English, German, French, Spanish, Dutch, Portuguese, Russian	

16 | UV Sensors AF45/AF46



④ Model AF45 Single Channel Absorption (UV)

- | | |
|----------------------|-------------------------|
| 1 Sensor body | 2 Windows |
| 3 Filter | 4 Measurement detector |
| 5 Reference detector | 6 Lamp module (mercury) |

⑤ Model AF46 Dual Channel Absorption (UV)

- | | |
|--------------------------|--------------------------|
| 1 Sensor body | 2 Windows |
| 3 Beam splitter | 4 Filter A |
| 5 Measurement detector A | 6 Filter B |
| 7 Measurement detector B | 8 Reference detector A |
| 9 Reference detector B | 10 Lamp module (mercury) |

Models AF45 and AF46 are high precision UV Absorption sensors for use in the biotech and chemical industries. The sensors are designed for inline operation and provide accurate concentration measurements with remarkable repeatability, linearity and resolution.

Modular construction of the sensors offers maximum flexibility in adapting to various process needs. Options include electro-polished sensor bodies, hazardous location (explosion-proof) capability, chemical resistant materials (sapphire windows, titanium, Hastelloy, etc.) and high temperature or high pressure versions.

UV-Absorption

A special mercury lamp produces a constant light beam that passes through the process medium. The attenuation of the light intensity, caused by absorption and/or scattering by dissolved and undissolved substances, is detected by sealed silicon photodiodes.

In addition, the light intensity of the lamp itself is measured by sealed silicon photodiodes using the same filter as the measurement wavelength. The sealed silicon photodiodes also compensate for any variances in lamp intensity, assuring the highest level of precision and long-term performance. Specific lamp design and capability of

optek converters operating with lowest photo-currents provide a prolonged life time at the lowest cost of ownership.

OPL

Special optical windows are made from a single crystal sapphire, providing superior resistance to all abrasive and corrosive media. With the appropriate choice of sensor bodies and windows in various lengths, the optimal OPL (optical path length = distance between the windows) can be achieved to meet the measurement requirements, i.e. low/high measuring ranges at highest resolution.

Dual Wavelengths

Selected combinations of optical filters make it possible to focus on specific wavelengths. Different peak wavelengths are available with a variety of bandwidth options ensuring suitable adaption to the application.

While the AF45 uses one wavelength,

an AF46 is equipped with an internal beam splitter making it possible to measure two wavelengths simultaneously. Connected to optek Control 4000 or Control 8000 converters, a wide dynamic range is possible to measure at high and low values with one sensor in one setup. Thus ensuring minimal hold-up volume and installation cost.

NIST-traceable

NIST-traceable calibration accessories provide absolute measurement confidence (for details refer to page 23).

Typical applications:

- Monitoring of chromatographic columns (i.e. protein concentration)
- Measuring concentrations of aromatics

See our TOP 5 brochures for applications in your industry.



optek AF45-VB
Single Channel UV Absorption Sensor
with calibration option

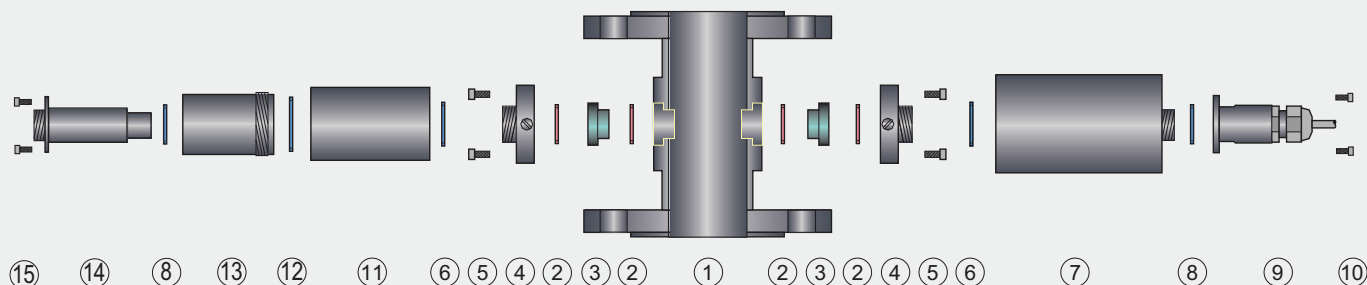


UV Sensors AF45/AF46 | 17

Technical Data	AF45 (UV)	AF46 (UV)
Measurement		
Measurement principle	1- Channel Absorption of light	2- Channel Absorption of light
Measurement wavelength(s)	254-13, 280-09, 280-13, 290-13, 300-13, 313-13, ... others on request	254-13 / 280-13, 254-13 / 313-13, 280-09 / 300-05, 280-09 / 300-13, 280-09 / 313-13, 280-13 / 300-13, 280-13 / 313-13, 290-13 / 313-13, ... others on request
Measuring detector(s)	1 silicon photodiode (hermetically sealed)	2 silicon photodiodes (hermetically sealed)
Reference detector(s)	1 silicon photodiode (hermetically sealed)	2 silicon photodiodes (hermetically sealed)
Measuring range	any measuring range between 0 - 0.05 to 3 CU (dependent on used filter / OPL) (contact product specialist for application specific ranges)	any measuring range between 0 - 0.05 to 2 CU (dependent on used filter / OPL) (contact product specialist for application specific ranges)
Optical path length	1 - 160 mm	
Calibration	CU (concentration units) application specific calibration	
Light source	low pressure mercury lamp typical life span: 1 to 2 years (8,000 to 16,000 hours)	
Resolution	< ± 0.05 % of respective measuring range	
Repeatability	< ± 0.5 % of respective measuring range (scattered light < ± 0.3 %)	
Linearity	< ± 1 % of respective measuring range (specific to application)	
Protection	all optical parts have an IP rating of IP65 or higher	
Sensor body		
Material	Stainless steel 1.4435 (SS 316L), 1.4539, 1.4571 (SS 316Ti), 1.4462, Titanium 3.7035 (Grade 2), Hastelloy 2.4602 (C22), Plastic TFM4215, PVC, ... others on request	
Line size	1/4 in. to 6 in. (DN 6 to DN 150), ... others on request	
Process connection	Flanges (ASME, DIN, JIS), Clamps (TC, ISO, DIN), Female Threads (NPT, DIN), Sanitary Threads (DIN 11851), Tube Ends (DIN, ISO, OD), Varivent, ... others on request	
Process pressure	10 mbar to 100 bar (0.15 psi to 1450 psi) - higher on request depending on process connection, materials and design	
Windows	2-Sapphire, 3-Sapphire Biotech (do not use Pyrex®)	
Window gaskets	Viton® (FDA), EPDM (FDA / USP Cl VI), Kalrez® 4079, ... others on request (do not use Silicone)	
Temperature ratings		
Process temperature	permanent: 0 - 70 °C (32 - 158 °F) / peak 15 min/day: 0 - 135 °C (32 - 275 °F)	
Process temperature OPTION HT	permanent: -30 - 120 °C (-22 - 248 °F) / peak 15 min/day: -30 - 150 °C (-22 - 302 °F)	
Process temperature OPTION EX	permanent: -30 - 70 °C (-22 - 158 °F) / peak 15 min/day: -30 - 135 °C (-22 - 275 °F)	
Process temperature OPTION EX-HT	permanent: -30 - 120 °C (-22 - 248 °F) / peak 15 min/day: -30 - 150 °C (-22 - 302 °F)	
Ambient temperature	operation: 0 - 40 °C (32 - 104 °F) operation: -30 - 40 °C (-22 - 104 °F) with options HT / EX / EX-HT transport: -20 - 70 °C (-4 - 158 °F)	
Explosion proof		
Ex-proof	none	
Ex-proof OPTION EX (EN-D)	Sensor assembly in ex-proof version accor. ATEX (EN-D) - Approval: DMT ATEX E 176	
Ex-proof OPTION EX (FM-D)	Sensor assembly in ex-proof version accor. FM (FM-D) - Approval: FMG J. I. 3013884	
Calibration		
Calibration adapter	none	
Calibration adapter OPTION VB	Filter adapter FH03 (detector side) for calibration filter used for sensor verification	

Pressure and temperature ratings specified herein may be subject to limitations - see instruction manual.
The appropriate choice of material for all wetted parts is the sole responsibility of the user.
Data given are subject to changes without prior notice.

22 | Sensor Body (Armature)



Description AF26:

- 1 Sensor body ¼ in. to 6 in. (DN 6 to DN 150)
- 2 O-ring (EPDM, Viton®, Kalrez® etc.)
- 3 Window (Sapphire, Pyrex®)
- 4 Window ring M24 (1.4571 / 316 Ti)
- 5 8 Screws with washer
- 6 O-ring (Viton®)
- 7 Detector module AF26
- 8 O-ring (EPDM, Viton®, Kalrez® etc.)
- 9 SS-plug protection (1.4571 / 316 Ti)
- 10 4 Screws (M3 x 6)
- 11 Optics module AF26
- 12 O-ring 31,47 x 1,78 mm
- 13 Optical housing OP06 (1.4571 / 316 Ti)
- 14 Lamp module AF26
- 15 4 Screws (M3 x 6)



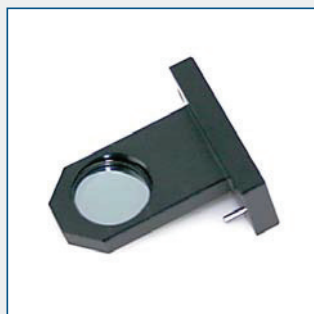
Sensor body - For all variations and details see separate sensor body datasheet.

Material	Stainless steel 1.4435 (SS 316L), 1.4539, 1.4571 (SS 316Ti), 1.4462, Titanium 3.7035 (Grade 2), Hastelloy 2.4602 (C22), Plastic TFM4215, PVC, ... others on request
Line size	1/4 in. to 6 in. (DN 6 to DN 150), ... others on request
Process connection	Flanges (ASME, DIN, JIS), Clamps (TC, ISO, DIN), Female Threads (NPT, DIN), Sanitary Threads (DIN 11851), Tube Ends (DIN, ISO, OD), Varivent, ... others on request
Process pressure	10 mbar to 100 bar (0.15 psi to 1450 psi) - higher on request depending on process connection, materials and design
Windows	1-Pyrex®, 2-Sapphire, 3-Sapphire Biotech
Window gaskets	Silicone (FDA), Viton® (FDA), EPDM (FDA / USP class VI), Kalrez® 4079, ... others on request



Windows available in different lengths for OPL (optical path length) adjustment.





optek calibration accessories have been specially designed for nonintrusive calibration and verification of optek systems.

UV Sensors

Three series of solid filters are available to ensure confidence in measurements. The UV-L filter series is used to calibrate photometric accuracy and linearity. The UV-B filter series verifies integral blocking and the UV-S filter series tests for long term stability of the sensor.

VIS/NIR Sensors

A special series of solid filters is available for each wavelength (range) to ensure best measurement performance. The calibration filters are used to calibrate photometric accuracy and linearity.

NIST-traceable

All optek filters ship with NIST-traceable certification (National Institute of Standards and Technology). optek laboratory is equipped with a high quality, NIST-traceable spectrophotometer assuring quality and quick turn around time for recertification of filters.

Concept

Advantages of optek calibration concept include:

- only 1 filter (set) for multiple sensors ensures identical calibration
- only the filter needs to be sent back for recertification, while the sensor remains operating.

• Calibration Filters UV-L

Nominal absorption:
0.45, 0.9, 1.8 and 2.4 CU

• Calibration Filter UV-B

Nominal absorption:
> 3 CU

• Calibration Filters UV-S

Nominal absorption:
Application specific

• Calibration Filters VIS-L

Nominal absorption:
0.45, 0.9 and 1.8 CU

• Calibration Filters NIR-L

Nominal absorption:
0.45, 0.9 and 1.8 CU

• Calibration Case

Holds up to 7 calibration filters

• Calibration Cuvette

The unique calibration cuvette enables product calibration without need to interfere with the process line. It allows users to create a correlation of absorption signals to the concentration of product or an equivalent substance, creating an easy link from lab to process.

