



## Measure compressed air quality according to ISO 8573 Residual oil content - particles - moisture



### Residual oil content measurement – OIL-Check 400

For permanent and highly precise measurement of the vaporous residual oil content from 0.001 mg/m<sup>3</sup> to 2.5 mg/m<sup>3</sup>. Due to the deep detection limit of 0.001 mg/m<sup>3</sup> the compressed air quality class 1 (ISO 8573) can be monitored.

### Particle counter PC 400

The highly precise optical particle counter PC 400 measures particles from a size of 0.1 µm and is therefore suitable for monitoring of the compressed air quality class 1 (ISO 8573).

### Moisture – dew point sensor FA 510

FA 510 measures the pressure dew point down to -80 °Ctd. Also in this case the continuous measurement takes care that alert is triggered immediately if the compressed air dryer breaks down.

### DS 500 - the intelligent chart recorder of the next generation

The centerpiece of compressed air quality measurement is the chart recorder DS 500. It measures and documents the measured data of the sensors for residual oil content, particles and moisture. The measured values are indicated on a 7" color screen. The curve progressions from the beginning

of the measurement can be viewed by an easy slide of the finger. The integrated data logger stores the measured values safely and reliably. The threshold value can be freely entered for each measured parameter. 4 alarm relays are available for automatic alarm in case of an exceeding of the threshold values. Optionally DS 500 can be upgraded with up to 12 sensor inputs. For connection to a PLC DS 500

has an Ethernet interface as well as a RS 485 interface. The communication is done via the Modbus protocol.

ISO 8573-1:2010 Class	Solids			Water	Oil
	Maximum number of particles per m <sup>3</sup>			Pressure dew point vapor	Totalshare in oil (liquid aerosol and mist) mg/ m <sup>3</sup>
	0,1 - 0,5 µm	0,5 - 1 µm	1 - 5 µm		
0	According to determination by the instruments user, more severe requirements than Class 1				
1	<= 20.000	<= 400	<= 10	<= -70 °C	0,01
2	<= 400.000	<= 6.000	<= 100	<= -40 °C	0,1
3	--	<= 90.000	<= 1.000	<= -20 °C	1
4	--	--	<= 10.000	<= +3 °C	5
5	--	--	<= 100.000	<= +7 °C	--
6	--	--	--	<= +10 °C	--
7	--	--	--	--	--
8	--	--	--	--	--
9	--	--	--	--	--
X	--	--	--	--	--



## Stationary solution

DESCRIPTION	ORDER-NO.
DS 500 – intelligent chart recorder in basic version (4 sensor inputs)	0500 5000
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040
<b>Residual oil measurement:</b> OIL-Check 400 – residual oil content measurement of the vaporous residual oil content from 0.001...2,5 mg/m <sup>3</sup> , 3...16 bar. Highly precise PID sensor, integrated mini catalyst for zero point calibration, without integrated display, with analogue output 0...10 Volt for connection to an external chart recorder.	0699 0070
<b>Sampling system OIL-Check 400:</b> Sampling system consisting of ½" ball valve (oil- and grease-free), 1 m stainless steel tube 6x1 mm (oil- and grease-free), clamp screwing (oil- and grease-free)	Z699 0075
<b>Alternative:</b> Portable sampling system consisting of 2 m PTFE hose, quick-lock coupling (oil- and grease-free)	Z699 0074
<b>Options for systems &gt; 16 bar:</b> Pressure reducer (oil- and grease-free), input pressure max. 300 bar, output pressure up to 10 bar	Z699 0076
Connection cable for probes, 5 m with open ends	0553 0108
<b>PC 400 particle counter</b> up to 0.1 µm for compressed air and gases, incl. pressure reducer/sampling hose/ calibration certificate, Modbus-RTU interface	0699 0040
Connection cable for probes, 5 m with open ends	0553 0108
<b>FA 510 dew point sensor</b> for adsorption driers -80°...+20°Ctd incl. inspection certificate, 4...20 mA analogue output (3-wire technology) and Modbus-RTU interface	0699 0510
Standard measuring chamber up to 16 bar	0699 3390
Connection cable for VA/FA Series, 5 m	0553 0104

## Mobile solution with DS 500 mobile, OIL-Check 400, PC 400, FA 510



DESCRIPTION	ORDER-NO.
DS 500 mobile - intelligent chart recorder with 4 sensor inputs	0500 5012
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040
<b>Residual oil measurement:</b> OIL-Check 400 – residual oil measurement of the vaporous residual oil content from 0.001...2.5 mg/m <sup>3</sup> , 3...16 bar. Highly precise PID sensor, integrated mini catalyst for zero point calibration, without integrated display, with analogue output 0...10 Volt for connection to external chart recorders	0699 0070
Mobile transport trolley including roles (outer dimensions: 0,68 x 1,06 x 0,41 m) (W x H x D) with firmly mounted components of OIL-Check 400, PC 400, FA 510	0554 6017
Mobile sampling system consisting of 2 m PTFE hose, quick lock coupling (oil- and grease-free)	Z699 0074
Connection cable for pressure, temperature, third party sensors to portable devices, ODU/ open ends, 5 m	0553 0501
PC 400 particle counter up to 0.1 µm for compressed air and gases, incl. pressure reducer/ sampling hose, calibration certificate, Modbus-RTU interface	0699 0040
Connection cable for pressure, temperature, third party sensors to portable devices, ODU/ open ends, 5 m	0553 0501
FA 510 dew point sensor, -80°...+20°Ctd, incl. mobile measuring chamber and 5 m connection cable to portable devices	0699 1510



## OIL-Check 400

The monitoring system for permanent highly precise measurement of the vaporous residual oil content in compressed air



### The advantage at a glance:

- Permanent, highly precise residual oil measurement (oil vapor) with PID sensor (photo-ionic-detector)
- Ideal for mobile measurement: The PID sensor is ready for measurement within about 30 minutes
- Long-term stable measuring results due to automatic zero-point calibration. The integrated mini catalyst reliably generates a defined reference gas for zero-point calibration
- Contrary to measuring systems which generate the "zero air" resp. reference gas by means of active carbon filters and which are there fore depending on the ageing and the saturation of the active carbon filters, the mini catalyst generates the "zero air" without ageing or wear. There is no change of active carbon filters necessary
- Easy sampling via PTFE hose or stainless steel pipe

### Integrated chart recorder DS 400:

- Data logger for long-term monitoring
- Display shows trend curves (online and history curves are available)
- Zoom function directly at the touch screen
- Integrated Ethernet interface (Modbus/TCP) and RS 485 interface (Modbus-RTU) for data transfer to a PLC
- 2 alarm relays (changeover contact 230VAC, 3A) - threshold values freely adjustable
- Easy operation via 3.5" touch screen

### TECHNICAL DATA OIL-CHECK 400

<b>Measuring medium:</b>	Compressed air, free from aggressive, corrosive, acid, toxic, flammable and oxidizing components.
<b>Measuring unit:</b>	Residual oil content in mg oil/norm m <sup>3</sup> referred to 1.0 bar [abs], +20° C, 0% relative humidity, according to ISO 8573-1
<b>Identifiable substances:</b>	Hydrocarbons, functional hydrocarbons, aromatic hydrocarbons
<b>Application points:</b>	After activated carbon filter, after activated carbon adsorber, after oil-free compressor, always with connected upstream filtration and dryer
<b>Ambient temperature:</b>	+5 °C... +45 °C, rel. humidity <= 75% without condensation
<b>Pressure dew point:</b>	max. +10 °Ctd.
<b>Compressed air temp.:</b>	+5 °C.... +50 °C,
<b>Operational overpressure:</b>	3...16 bar [g] optionally pressure reducer connected upstream for up to 300 bar [g]
<b>Setting operational pressure:</b>	By means of integrated pressure reducer with display
<b>Humidity of measured gas:</b>	<= 40% rel. humidity, pressure dew point max. +10 °C, non-condensable humidity
<b>Compressed air connection:</b>	G 1/8" inner thread according to ISO 228-1
<b>Measured values:</b>	mg/Norm m <sup>3</sup> , pressure and temperature compensated, residual oil vapor content
<b>Measuring range:</b>	<= 0.001 ... 2.5 mg/m <sup>3</sup>
<b>Detection limit (residual oil):</b>	0,001 mg/m <sup>3</sup>
<b>Flow of measuring gas:</b>	~ 1.20 norm liters/minute, referred to 1.0 bar [abs] and + 20 °C, in ambient condition
<b>Reference gas generation:</b>	By means of integrated mini catalyst
<b>Power supply:</b>	100...240 VAC / 1 Ph. / PE / 50...60 Hz / ± 10%
<b>Outputs:</b>	Ethernet interface (Modbus/TCP) RS 485 interface (Modbus-RTU) 2 alarm relays (change 230 VAC 3A) 4...20 mA (on request)
<b>Operation hours counter:</b>	integrated
<b>Dimensions (mm):</b>	410 x 440 x 163 (W x H x D)
<b>Weight:</b>	approx. 16.3 kg

## OIL-Check 400 - Stationary solution



DESCRIPTION	ORDER-NR.
OIL-Check 400 – residual oil content measurement of the vaporous residual oil content from 0.001...2,5 mg/m <sup>3</sup> , 3...16 bar. Highly precise PID sensor, integrated mini catalyst for zero point calibration, without integrated display, with analogue output 0...10 Volt for connection to an external chart recorder	0699 0070
<b>Option:</b> DS 400 chart recorder integrated in the OIL-Check 400	Z699 0071
<b>Sampling OIL-Check 400:</b> Sampling system consisting of ½" ball valve (free of oil and grease), 1 m stainless steel tube 6x1 mm (free of oil and grease), clamp screwing (free of oil and grease)	Z699 0075
Portable sampling system consisting of 2 m PTFE hose, quick-lock coupling (free of oil and grease)	Z699 0074
for systems > 16 bar: Pressure reducer (free of oil and grease), input pressure max. 300 bar, output pressure up to 10 bar	Z699 0076
<b>Option for DS 400:</b>	
Integrated data logger for 100 million measured values	Z500 4002
Integrated Ethernet and RS 485 interface	Z500 4004
Integrated Webserver	Z500 4005
2 additional sensor inputs for analogue sensors (pressure sensors, temperature sensors and so on)	Z500 4001
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040

## OIL-Check 400 - Portable solution with handle



Carrying handle and stand



Flight case

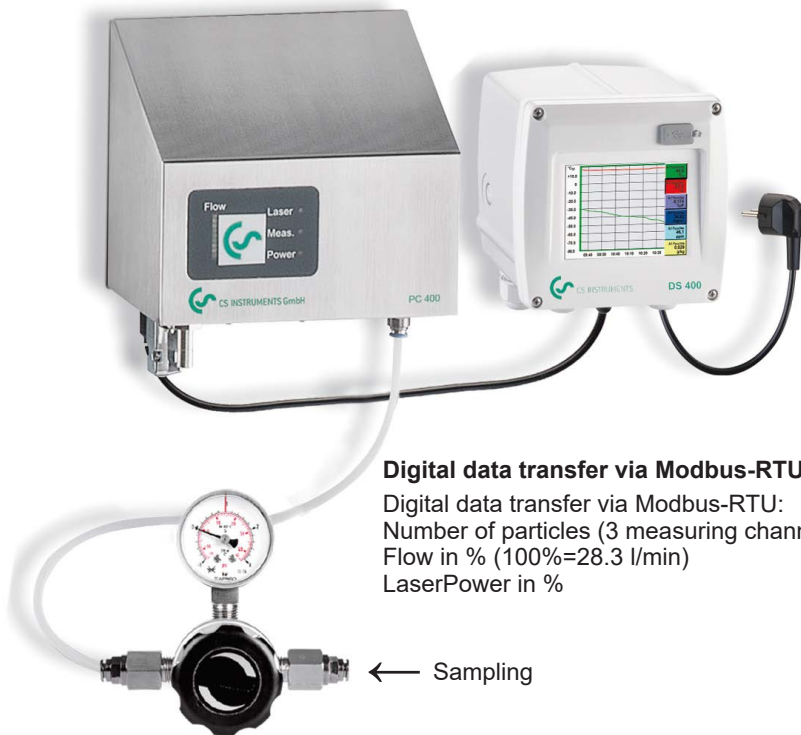
DESCRIPTION	ORDER-NR.
OIL-Check 400 – residual oil measurement of the vaporous residual oil content from 0.001...2.5 mg/m <sup>3</sup> , 3...16 bar. Highly precise PID sensor, integrated mini catalyst for zero point calibration. Without integrated display, with alarm output 0...10 Volt for connection to external chart recorder	0699 0070
<b>Option:</b>	
DS 400 chart recorder integrated in the OIL-Check 400	Z699 0071
Handle and pedestal for mobile use of the OIL-Check 400	Z699 0072
Flight case for OIL-Check 400	Z699 0073
Mobile sampling system consisting of 2 m PTFE hose, quick lock coupling (oil- and grease-free)	Z699 0074
<b>Options for DS 400:</b>	
Integrated data logger for 100 million measured values	Z500 4002
Integrated Ethernet and RS 485 interface	Z500 4004
Integrated Webserver	Z500 4005
2 additional sensor inputs for analogue sensors (pressure sensors, temperature sensors and so on)	Z500 4001
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040



DESCRIPTION	ORDER-NR.
Replacement unit OIL-Check for the period of re-calibration	0699 3910
Replacement unit OIL-Check incl. DS 400 for the period of re-calibration	0699 3920
Re-calibration OIL-Check incl. certificate	0699 3301
Re-calibration and maintenance OIL-Check incl. certificate, rate 1 for up to 8760 hours of operation	0699 3302
Re-calibration and maintenance OIL-Check incl. certificate, rate 2 for over 8760 hours of operation	0699 3303



## Particle counter PC 400 and DS 400



### Digital data transfer via Modbus-RTU:

Digital data transfer via Modbus-RTU:  
Number of particles (3 measuring channels)  
Flow in % (100%=28.3 l/min)  
LaserPower in %

← Sampling

The DS 400 shows all 3 measuring channels according to ISO 8573-1

Particle size 0.1...0.5 µm: Number of particles per m<sup>3</sup>

Particle size 0.5...1.0 µm: Number of particles per m<sup>3</sup>

Particle size 1.0...5.0 µm: Number of particles per m<sup>3</sup>

A1a	PC 400	0.1-0.5µ	1458 cts/m <sup>3</sup>
A1b	PC 400	0.5-1.0µ	459 cts/m <sup>3</sup>
A1c	PC 400	1.0-5.0µ	388 cts/m <sup>3</sup>
Home		Setup	Alarm Lg.stop 10.01.2012 1 days, ... 22:34:33

### The advantages at a glance:

- Highly precise optical laser particle counter for the use in compressed air and technical gases
- Highly precise optics for detection of smallest particles up to 0.1 µm and therefore it is suitable for monitoring of the compressed air class 1 according to ISO 8573-1.
- The flow rate of 28.3 l/min (1 cfm) is 10 times higher than the one of the generally available particle counters (2,83 l/min). Advantage: It counts smallest particles at simultaneously high counting accuracy
- Due to the digital data transfer (Modbus-RTU) to the chart recorders DS 400 / DS 500, 3 measuring channels can be transferred at the same time (without any faults due to check sum)
- The class 1 filter which is included in the scope of delivery can be used for on-site calibration at any time. So pollutions at the optics can be recognized resp. excluded quickly

### The advantages of DS 400

- Data logger for long-term monitoring
- Display shows trend curves (online and history curves available)
- Zoom function directly at the touch screen
- Integrated Ethernet interface (Modbus/TCP) and RS 485 interface (Modbus-RTU) for data transfer to a PLC
- 2 alarm relays (changeover contact 230 VAC, 3A) threshold values freely adjustable
- Easy operation via 3.5" touch screen

### TECHNICAL DATA PC 400

<b>Measuring medium:</b>	Compressed air, free from aggressive, corrosive, acid, toxic, flammable and oxidizing components as well as gas types like N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> Further gas types on request
<b>Application points:</b>	In case of compressed air after filtration In case of gases / pure gases also without filtration
<b>Measuring unit:</b>	Number of particles per m <sup>3</sup> (referred to ambient air: 20°C, 1000 hPa)  Size channels of PC 400 0.1 µm: Particle size 0.1...0.5 µm: number of particles per m <sup>3</sup> Particle size 0.5...1.0 µm: number of particles per m <sup>3</sup> Particle size 1.0...5.0 µm: number of particles per m <sup>3</sup>  Size channels of PC 400 0.3 µm: Particle size 0.3...0.5 µm: number of particles per m <sup>3</sup> Particle size 0.5...1.0 µm: number of particles per m <sup>3</sup> Particle size 1.0...5.0 µm: number of particles per m <sup>3</sup>
<b>Operating pressure:</b>	Max. input pressure at pressure reducer: 40 bar
<b>Humidity of meas. gas:</b>	<= 90% rel. humidity, pressure dew point max. 10°Ctd, non-condensable humidity
<b>Comp. air connection:</b>	6 mm PTFE hose incl. quick-lock coupling
<b>Flow rate:</b>	28,3 l/min (1 cfm)
<b>Interface:</b>	RS 485 (Modbus-RTU)
<b>Light source:</b>	Laser diode
<b>Power supply:</b>	24 VDC, 300 mA
<b>Dimensions:</b>	150 x 200 x 300 mm
<b>Weight:</b>	8 kg
<b>Housing:</b>	Stainless steel

## Stationary solution with particle counter PC 400 and DS 400



DESCRIPTION	ORDER-NR.
PC 400 particle counter up to 0.1 µm for compressed air and gases, incl. pressure reducer and calibration certificate	0699 0040
Connection cable for probes 5 m, with open ends	0553 0108
DS 400 chart recorder with graphic display and touch screen operation	0500 4000 D
<b>Option:</b>	
Integrated data logger for 100 million measured values	Z500 4002
Integrated Ethernet and RS 485 interface	Z500 4004
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040
As an alternative to PC 400 up to 0,1 µm: PC 400 particle up to 0,3 µm for compressed air and gases, incl. pressure reducer and calibration certificate	0699 0041

## Mobile solution with particle counter PC 400 in a service case and DS 500 mobile



DESCRIPTION	ORDER-NR.
PC 400 particle counter for up to 0.1 µm for compressed air and gases incl. pressure reducer and calibration certificate in a service case	0699 0042
Connection cable for third party sensors to portable devices, ODU/open ends, 5 m	0553 0501
Chart recorder DS 500 mobile, 4 sensor inputs	0500 5012
CS Basic - data evaluation in graphic and table form - readout of the measured data via USB or Ethernet. License for 2 working places	0554 8040
<b>Alternative to PC 400 to 0.1 µm:</b>	
PC 400 particle counter up to 0.3 µm for compressed air and gases, incl. pressure reducer, incl. calibration certificate in service case	0699 0043

## Re-calibration and accessories of particle counter

CS INSTRUMENTS GmbH  
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Tel: +49 481 700 20 25  
www.cs-instruments.com

 CS INSTRUMENTS GmbH

Werkkalibrierprotokoll Nr. CS\_8862\_16-2017

Gegenstand: DL - CHECK  
Ölump/Messgerät

Hersteller: Messer Instruments GmbH

Serien-Nr.: 1385020

Auftraggeber: CS Instruments GmbH  
Zweckstraße 15  
78534 Vö-Talheim

Auftragsnummer: 711261

Ort der Kalibrierung: Neuss

Datum der Kalibrierung: 12.09.2017

Anzahl der Seiten: 5

Wir erklären hiermit, dass das oben genannte Produkt unter Beachtung und Einwirkung eines zertifizierten Qualitätsmanagementsystems nach dem internationalen Qualitätsstandard DIN EN ISO 9001:2008 geprüft und kalibriert wurde.

Da für die Kalibrierung verwendete Messmittelrichtungen werden regelmäßig geprüft und kalibriert, sind erforderlichenfalls Messdaten auf der nachfolgenden Seite dieses Kalibrierprotokolls aufgeführt.

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Anwender verantwortlich.

Dieses Kalibrierprotokoll darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des Ausstellers. Kalibrierprotokolle ohne Unterschrift haben keine Gültigkeit.

Datum: 12.09.2017

Leiter Produktion:    
Ulrich Papp

Beauftragter:    
Ulrich Papp

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DESCRIPTION	ORDER-NR.
Re-calibration of particle counter PC 400 incl. certificate	0699 3304
CS service software incl. PC connection set for PC 400	0554 2009