CS INSTRUMENTS GmbH

Catalogue for measuring professionals 2014

Proven and innovative measuring technology for compressed air and gases

- Flow
- Dew point
- Multifunction
- Pressure
- Leakage
- Current
- Compressed air quality

New

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Flow

Dew point
Pressure
Current
Temperature

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Confidence is good – **measuring** is better

Approven and innovative measuring technology of CS Instruments GmbH

Welcome to the new CS Instruments catalogue 2014 drawn up for measuring professionals.

Increasing energy costs force many enterprises to use possible savings in case of different kinds of energy like compressed air, electrical energy, gas, cooling energy/ thermal energy, … For this purpose the consumptions and the costs within an enterprise have to be transparent.

CS Instruments GmbH accommodated this trend with its newly developed intelligent chart recorder DS 500. Up to 12 energy counters (current counters, heat meters, water meters, gas meters etc.) can be connected to DS 500 and evaluated automatically.

Daily, weekly or monthly reports give a quick survey on the consumption and the cost savings of saving measures which have been carried out.

Picture:
DS 500
(For details please see pages 4 to 13)

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DS 500

Intelligent chart recorder for compressed air and gases

Measurement - control - indication - alarm - recording - evaluation

Advantages at a glance:

- **Clear layout:** 7" colour screen with touch panel…
- **Versatile:** Up to 12 optional sensors can be connected…
- **Suitable for industrial applications:** Metal housing IP 65 or panel mounting…
- **Data available though world wide web:** Network-compatible and remote transmission via webserver
- **Intelligent:** Daily/weekly monthly reports…
- **Mathematical function** for internal calculations
- **Totalizer function** for analogue signals
- **… Saves time and costs during installation**

DS 500 — the intelligent chart recorder of the next generation

For more than 20 years CS Instruments has been developing, manufacturing and marketing measuring instruments for compressed air and gases.
From recording of the measured data, indication on a big colour screen, alerting, storage up to remote read-out via web-server … this is all possible with DS 500.
By means of the CS Soft software alarms can be sent via SMS or e-mail.
All measured values, measured curves and threshold exceedings are indicated. The curve progressions from the beginning of the measurement can be viewed by an easy slide of the finger.

Daily/weekly/monthly reports with costs in € and counter reading in m³ for each consumption sensor are completing the sophisticated system concept.
The big difference to ordinary paperless chart recorders reveals in the easy initiation and in the evaluation of the measured data.
All sensors are identified directly and powered by DS 500. Everything is matched and tuned.
Mathematical function for internal calculations, e. g. the typical figures of a compressed air plant:
- costs in € per generated m³ air
- kWh/m³ generated air
- consumption of single lines including summation

Totalizer function for analogue signals (e. g. 0/4…20 mA, 0…10 V). In case of third-party sensors which e. g. only give a 4…20 mA signal for the actual flow in m³/h a total counter reading in m³ can be generated by means of the totalizer function.

No time consuming studying of the instruction manual **… this saves time.**
Internal voltage supply of all sensors, no wiring of external mains units
… this saves additional costs.

Technical data DS 500

Dimensions of housing	280 x 170 x 90 mm, IP 65
Connections	18 x PG 12 for sensors and supply, alarm relays 1 x RJ 45 Ethernet connection
Version panel mounting	Cutout panel 250 x 156 mm
Weight	7.3 kg
Material	Die cast metal, front screen polyester
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors freely allocatable. See options Digital CS sensors for dew point and flow with SDI interface FA/VA 400 Series, Digital third-party sensors RS 485 / Modbus RTU, other Bus systems realizable on request Analogue CS sensors for pressure, temperature, clamp-on ammeters preconfigured Analogue third-party sensors 0/4 ..20 mA, 0..1/10/30V, pulse, Pt 100 / Pt 1000, KTY
Power supply for sensors	24 VDC, max. 130 mA per sensor, integrated mains unit max. 24 VDC, 25 W in case of version 8/12 sensor inputs 2 integrated mains units each max.24 VDC, 25 Watt
Interfaces	USB stick, USB cable, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, WEB server optionally
Outputs	4 relays (changeover contact 230 VAC, 6 A), alarm management, relays freely programmable, collective alarm Analogue output, pulse in case of sensors with own signal output looped, like e. g. VA/FA Series
Memory card	Memory size 2 GB SD memory card standard, optionally up to 4 GB
Power supply	100...240 VAC / 50-60 Hz, special version 24 VDC
Colour screen	7" touch panel TFT transmissive, graphics, curves, statistics
Accuracy	see sensor specifications
Operating temperature	0...50°C
Storage temperature	-20...70°C
Optionally	Web server
Optionally	Quick measurement with 10 ms sampling rate for analogue sensors, Max/Min indication per second
Optionally	Option "energy and flow report" statistics, daily/weekly/monthly report

Description	Order no.
DS 500 - intelligent chart recorder in basic version (4 sensor inputs)	0500 5000
Option 4 additional sensor inputs for DS 500	Z500 5001
Option 8 additional sensor inputs for DS 500	Z500 5002
Option Integrated webserver	Z500.5003
Option "energy and flow report" statistics, daily/weekly/monthly report	Z500.5004
Option "quick measurement with 10 msec sampling rate" for analogue sensors	Z500.5005
Option version for panel mounting	Z500.5006
Option power supply 24VDC (instead of 100...240 VAC)	Z500.5007
Option "mathematics calculat. function" for 4 freely selectable "virtual" channels, (mathematical functions: addition, subtraction, division, multiplication)	Z500 5008
Option: "Totalizer function for analogue signals"	Z500 5009
CS Soft Basic for DS 500 - data evaluation in graphic and table form, reading out of the measured data of one DS 500 via USB or Ethernet	0554.7040
CS Soft Network - Database Client/Server Solution (up to 5 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7041
CS Soft Network - Database Client/Server Solution (up to 10 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7042
CS Soft Network - Database Client/Server Solution (up to 20 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7043
CS Soft Network - Database Client/Server Solution (> 20 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7044

Input signals	
Current signal	(0...20mA/4...20mA)
internal or external power supply	
Measuring range	0…20 mA
Resolution	0.0001 mA
Accuracy	± 0.003 mA ± 0.05 %
Input resistance	50 Ω
Voltage signal	(0...1 V)
Measuring range	0…1 V
Resolution	0.05 mV
Accuracy	± 0.2 mV ± 0.05 %
Input resistance	100 kΩ
Voltage signal	(0...10 V / 30 V)
Measuring range	0…10 V
Resolution	0.5 mV
Accuracy	± 2 mV ± 0.05 %
Input resistance	1 MΩ
RTD Pt 100	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0.2°C (-100...400°C) ± 0.3°C (further range)
RTD Pt 1000	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0.2° (-100...400°C)
Pulse	
Measuring range	min pulse length 100 µs frequency 0...1 kHz max. 30 VDC

DS 500

Intelligent chart recorder for compressed air and gases

Versatile:

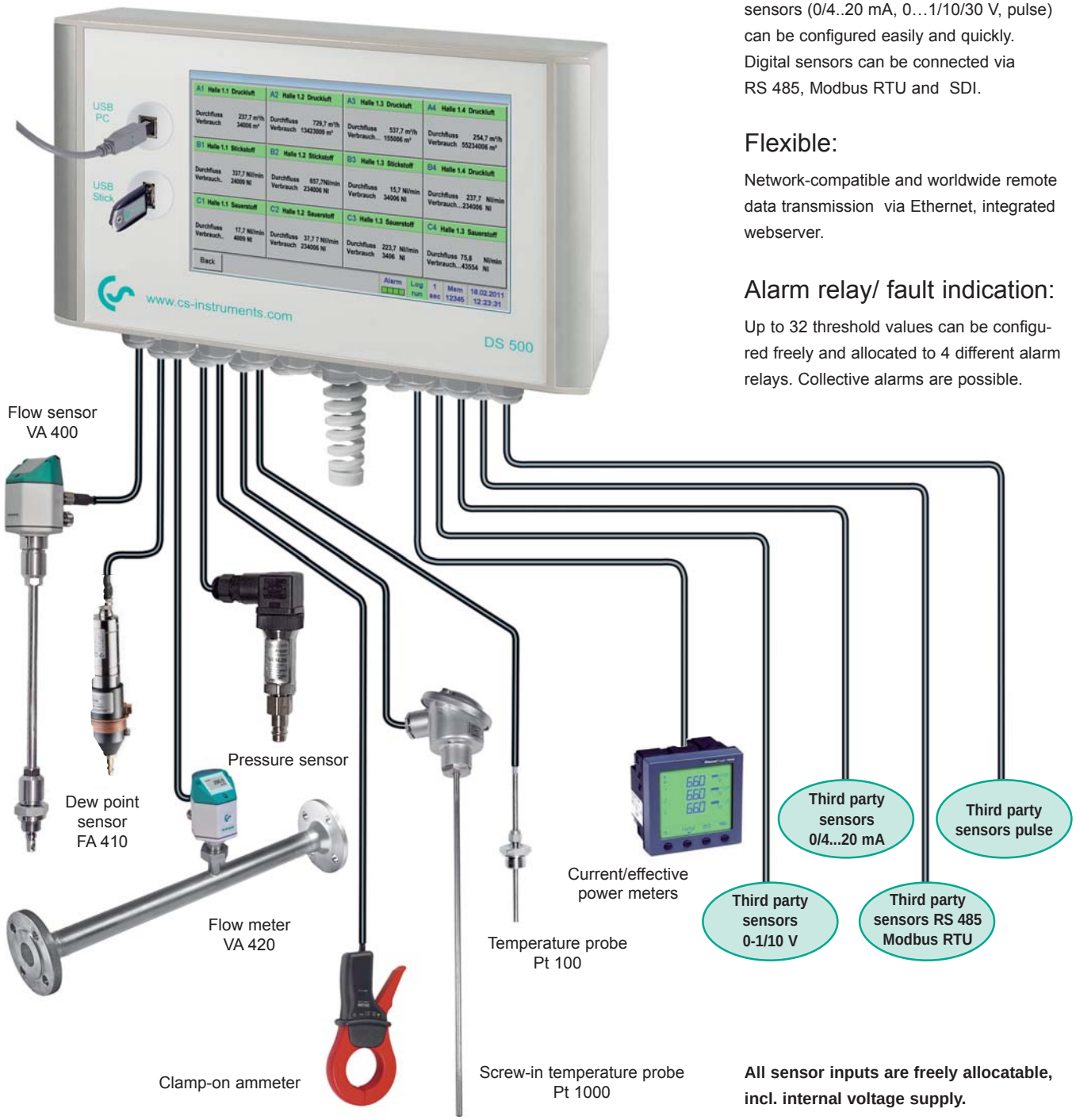
Up to 12 sensors, incl. all CS sensors (consumption, dew point, pressure, current, KTY, PT 100, PT 1000) are identified automatically by DS 500. Optional analogue sensors (0/4..20 mA, 0…1/10/30 V, pulse) can be configured easily and quickly. Digital sensors can be connected via RS 485, Modbus RTU and SDI.

Flexible:

Network-compatible and worldwide remote data transmission via Ethernet, integrated webserver.

Alarm relay/ fault indication:

Up to 32 threshold values can be configured freely and allocated to 4 different alarm relays. Collective alarms are possible.



All sensor inputs are freely allocatable, incl. internal voltage supply.

Flow | Leakage | Dew point | Pressure | Current | Temperature

MULTIFUNCTION

Flow sensors
for compressed air and gases

- Installation and removal under pressure via standard 1/2" ball valve
- A safety ring avoids the uncontrolled ejection in case of installation/removal under pressure
- Usable for different gases: compressed air, nitrogen, argon,

Dew point sensors

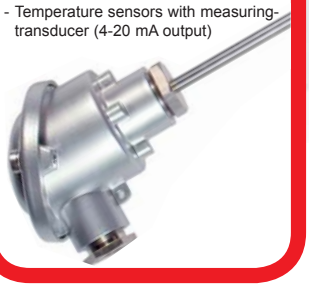
- Extremely long-term stable
- Quick adaption time
- Large measuring range (-80° to +20° Ctd)
- For all dryers: Adsorption dryers, membrane dryers, refrigeration dryers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

- Large selection of pressure sensors with different measuring ranges for each measuring purpose
- Quick installation under pressure by quick coupling
- Pressure sensors 0-10/16/40/100/250/400/600 bar overpressure
- Pressure semsors -1 - +15 bar (under-/overpressure)
- Differential pressure 1.5 mbar up to 4.2 bar
- Absolute pressure 0-1.6 bar (abs:)

Temperature sensors

- Large selection of temperature sensors e.g. for measurement of the ambient temperature or gas temperature
- Pt100 (2-wire or 3-wire)
- Pt1000 (2-wire or 3-wire)
- KTY sensors
- Temperature sensors with measuring-transducer (4-20 mA output)



Heat meters-/water and gas meters

- For direct measurement of the heat volume (in kWh)
- Customary heat meters e.g. at heating systems, heat exchangers, district heating networks and so on can be connected to **DS 500 mobile** either via pulse signals or 4 -20 mA

Current/effective power metrs

- **CS PM 710** current/effective power meters for panel mounting with external current transformer for big machines and plants
- External current transformers for clamping around the phases (max. 2000 A)
- Measures KW, kWh, cos phi, kVar, kVA
- Data transfer **DS 500** via Modbus

By means of the multifunction measuring instruments **DS 500** for the first time all measuring data of a compressor station can be recorded, indicated and evaluated.

At **12 freely assignable sensor inputs** all CS Instruments sensors can be connected as well as any optional third-party sensors and meters **with the following signal outputs:**

4-20 mA, 0-20 mA I 0-1 V / 0-10 v / 0-30 V I Pt100 (2- or 3-wire), Pt1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas meters) frequency output I Modbus protocol

Suitable **probes** from the **CS Instruments** product range

Flow sensors VA 400:	**Order no.**
VA 400 flow sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 4001
Option for VA 400:	
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400

Flow

Flow meters VA 420:	
Flow meter VA 420 with integrated measuring section (R 1/4” DN 8)	0695 0420
Flow meter VA 420 with integrated measuring section (R 1/2 DN 15)	0695 0421
Flow meter VA 420 with integrated measuring section (R 3/4” DN 20)	0695 0422
Flow meter VA 420 with integrated measuring section (R 1” DN 25)	0695 0423
Flow meter VA 420 with integrated measuring section (R 1 1/4” DN 32)	0695 0426
Flow meter VA 420 with integrated measuring section (R 1 1/2” DN 40)	0695 0424
Flow meter VA 420 with integrated measuring section (R 2” DN 50)	0695 0425

Flow

Dew point sensors:	
FA 410 dew point sensor, -80°...20°Ctd incl. inspection certificate	0699 0410
FA 415 dew point sensor, -20°...50°Ctd incl. inspection certificate	0699 0415
Standard measuring chamber for compressed air up to 16 bar	0699 3390
Connection cables for VA 400, VA 420, FA 410 and FA 415:	
Connection cables for flow sensors / dew point sensors:	
Connection cable 5 m	0553 0104
Connection cable 10 m	0553 0105

Dew point

Pressure sensors:	
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Standard pressure sensor CS 1,6 absolute, 0...1,6 bar abs., ± 1 % accuracy of full scale	0694 3551
Standard pressure sensor CS 100, 0...100 bar, ± 1 % accuracy of full scale	0694 3557
Standard pressure sensor CS 250, 0...250 bar, ± 1 % accuracy of full scale	0694 3558
Standard pressure sensor CS 400, 0...400 bar, ± 1 % accuracy of full scale	0694 3559
Precision pressure sensor CS, -1...+15 bar, ± 0.5 % accuracy of full scale	0694 3553
Precision differential pressure sensor CS 0…400 mbar differential pressure, accuracy: 0.075 % of full scale, static pressure max. 40 bar	0694 3560
Precision differential pressure sensor for further measuring, ranges, e. g. 0…75 mbar, 0…2 bar, 0…8 bar, 0…21 bar, 0…70 bar, 0…200 bar, 0…420 bar	on request

Pressure

Temperature probes:	
Screw-in temperature probe Pt 100, class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = -50...+500°C (2-wire-technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180°C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm,, -50...+180°C, 5 m probe connection cable with open ends	0604 0100
Clamp screwing 6 mm, G1/2”, VA clamping, pressure-tight up to 10 bar	0554 6004
Connection cables for pressure sensors / temperature probes:	
Connection cable 5 m	0553 0108
Connection cable 10 m	0553 0109

Temperature

Clamp-on ammeters:	
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable with open ends	0554 0507
Clamp-on ammeter 0...400 A TRMS incl. 3 m connection cable with open ends	0554 0510
Optional third-party sensors 0/4...20 mA, 0...1/10/30 V, PT 100 / PT 1000, KTY, pulse, RS 485 Modbus connectable.	

Current

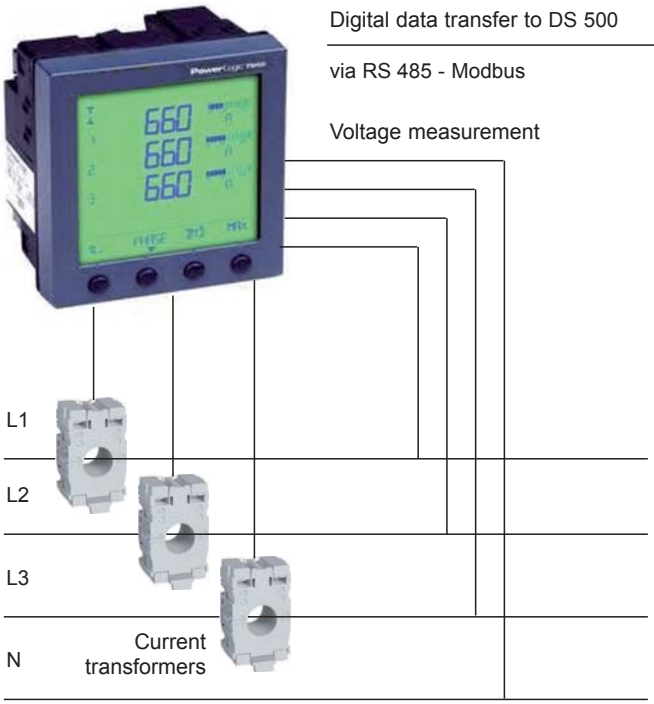
CS PM 710

Current/effective power meter for panel mounting

Measures voltage, current and calculates:

Active power	[kW]
Apparent power	[kVA]
Reactive power	[kVar]
Active energy	[kWh]
cos phi	

All measured data are transferred digitally (Modbus) to DS 500 and can be recorded there.



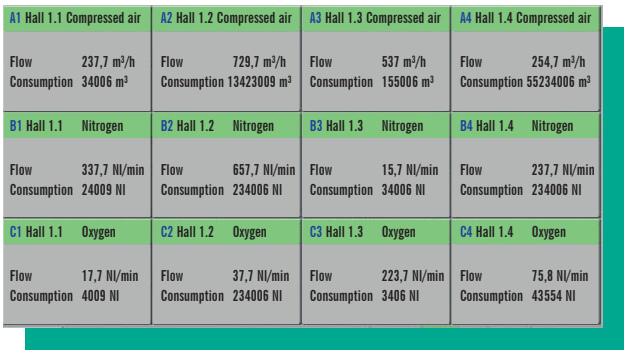
Description	Order no.
CS PM 710 CS PM 710 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5343
Current transformer 100/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 21 mm)	0554 5344
Current transformer 200/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 21 mm)	0554 5345
Current transformer 300/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5346
Current transformer 500/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5347
Current transformer 600/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5348
Current transformer 1000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 65 x 32 mm)	0554 5349
Current transformer 2000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 127 x 38 mm)	0554 5350
Connection cable to DS 500, 5 m, with open ends	0553 0108
Connection cable to DS 500, 10 m, with open ends	0553 0109

Technical data:

Parameters:	Voltage (Volt) Current (Ampere) Cos phi Active power (kW) Apparent power (kVA) Reactive power (kVar) Active energy (kWh) Supply frequency (Hz) All parameters are transferred digitally to DS 500.
Accuracy current measurement:	± 0,5% of 1 to 6 A
Accuracy voltage:	± 0,5% of 50 V to 277 V
Accuracy active energy:	IEC 62053-21 Class 1
Interfaces:	RS 485 (Modbus protocol)
Measuring range:	Voltage measurement max. 480 Volt
Dimensions:	96 x 96 x 69 mm (W x H x D)
Operating temperature:	-5…+55°C

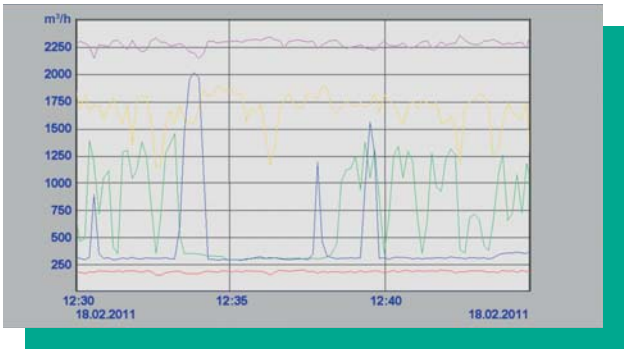
All important information at a glance:

Measured values, statistics, curves with the 7 inch colour screen touch panel



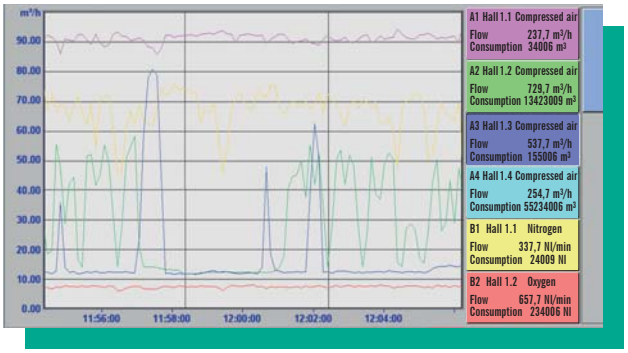
Real time measured values

All measured values can be seen at a glance. Threshold exceedings are indicated in red colour. A "measuring site name" can be allocated to each sensor.



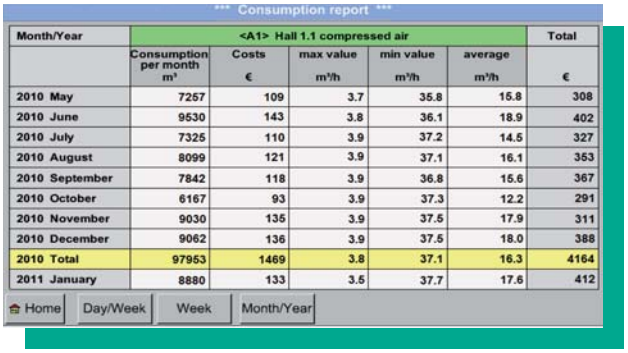
Graphic display

This display replaces the former evaluation of ordinary paper chart recorders and offers lots of advantages. The time axis can be moved by a finger slide. The "zoom function by finger movement" which enables an analysis of peak values is unique.



Real time measured values and graph

Additionally to the measurement curves the real time value is indicated as well.



*** Consumption report ***

Month/Year	<A1> Hall 1.1 compressed air					Total
	Consumption per month m³	Costs €	max value m³/h	min value m³/h	average m³/h	€
2010 May	7257	109	3.7	35.8	15.8	308
2010 June	9530	143	3.8	36.1	18.9	402
2010 July	7325	110	3.9	37.2	14.5	327
2010 August	8099	121	3.9	37.1	16.1	353
2010 September	7842	118	3.9	36.8	15.6	367
2010 October	6167	93	3.9	37.3	12.2	291
2010 November	9030	135	3.9	37.5	17.9	311
2010 December	9062	136	3.9	37.5	18.0	388
2010 Total	97953	1469	3.8	37.1	16.3	4164
2011 January	8880	133	3.5	37.7	17.6	412

Home | Day/Week | Week | Month/Year

Statistics and reports

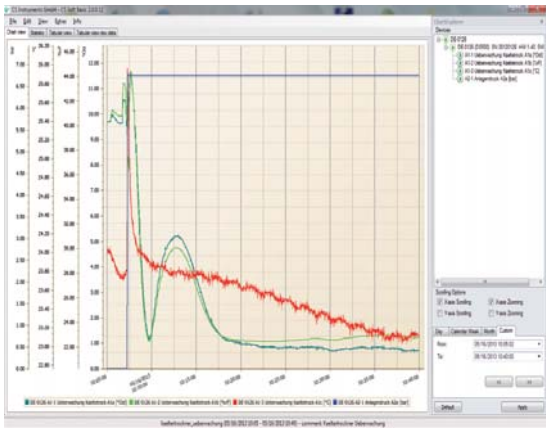
Different to ordinary chart recorders the DS 500 offers not only the recording of the measured data but also the evaluation of all flow sensors optionally as daily/weekly/monthly report at the push of a button. It is no longer necessary to read-out the counter and transfer the values manually into a list. The reports can be imported to every PC into Excel® by means of a USB stick and after that they can be printed out without any additional software. This saves time and money and simplifies the evaluation enoumously.

Flexible data transfer for each application

1. Data transfer via USB stick or USB cable

If no Ethernet-/Bus connection is existing or if the installation would be too costly the recorded data can be stored onto a USB stick and transferred to the PC. DS 500 will automatically identify the USB stick. The user will be guided through the menu "Read-out data".The data stored in the USB stick can be comfortably evaluated at the PC by means of the **CS Soft Basic.**

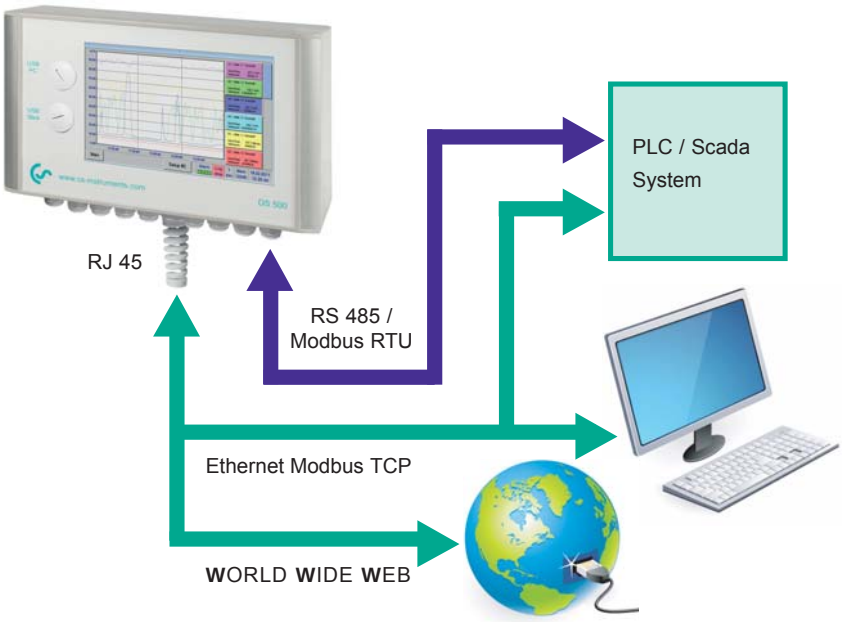
CS Soft Basic



2. Data transfer, remote maintenance and energy and flow analysis via webserver and integrated Ethernet interface, Modbus, RS 485…

The current measured data and the stored measured data can be transferred via Ethernet or RS 485 (Modbus).

The integrated webserver enables the user to read out the measured data via internet. For the evaluation of the data at the PC the user can dispose of the comfortable and versatile CS Soft Basic, which leaves nothing to be desired. Threshold exceedings can be sent via SMS and e-mail.



DS 500 can be connected via Ethernet/ RS 485 to customers' own systems (PLC, Scada).

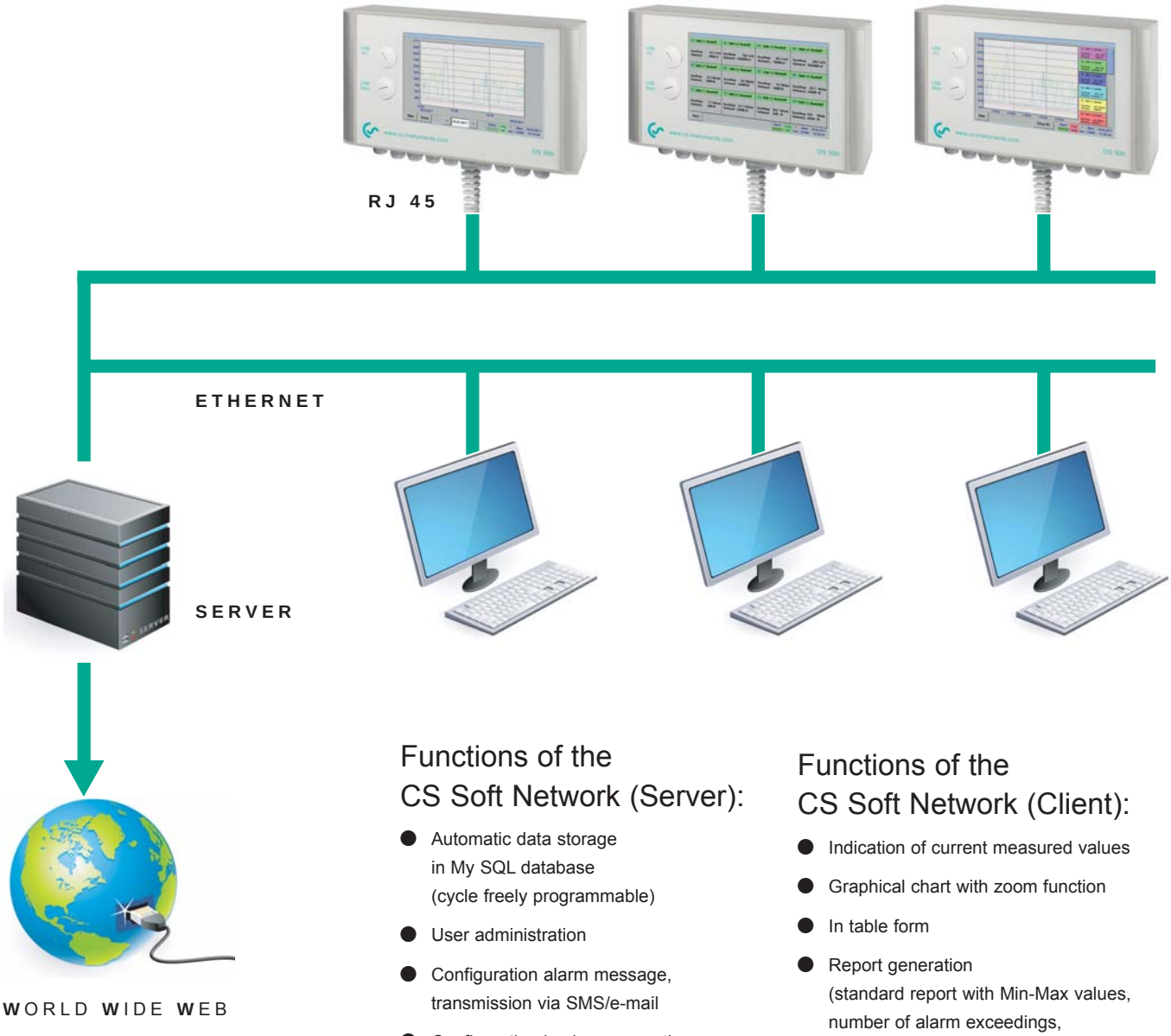
By means of the CS Soft Basic the data can be evaluated comfortably.

As an alternative the web server in DS 500 can be addressed via any web browser. Current measured values and consumption statistics can be transferred via the web server.

Transparent measurement data any time at any PC

CS Soft Network Database Client / Server Solution

By means of the CS Soft Network Database Client / Server Solution an optional number of DS 500 /DS 400 instruments can be evaluated via Ethernet. The software stores the measured data of all DS 500 / DS 400 cyclically (cycle freely adjustable) in a SQL database on the server. In case of an exceeding of the stored alarm values the software automatically sends an SMS or an e-mail. Furthermore, different user levels can be defined in the server software so that single staff members only can access the measured data of certain DS 500 / DS 400.
The evalulation of the measured data can be carried out by means of the client software from each PC within the company.



Functions of the CS Soft Network (Server):

- Automatic data storage in My SQL database (cycle freely programmable)
- User administration
- Configuration alarm message, transmission via SMS/e-mail
- Configuration backup generation

Functions of the CS Soft Network (Client):

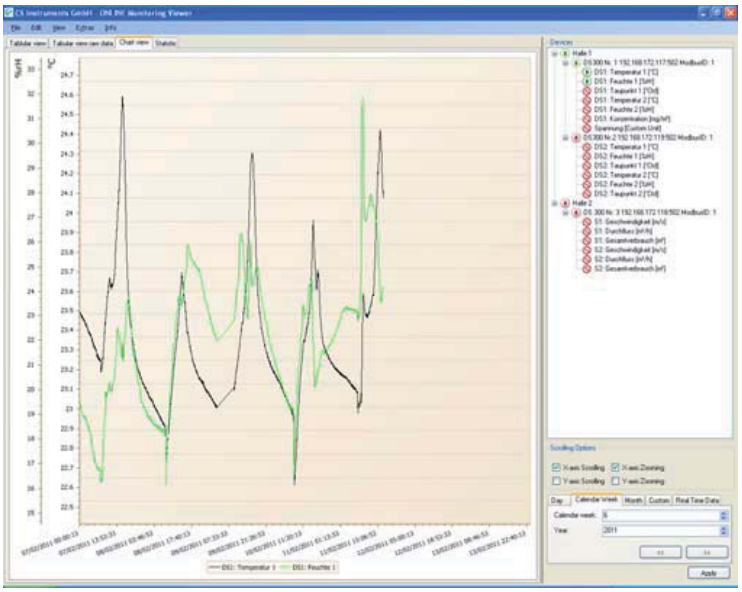
- Indication of current measured values
- Graphical chart with zoom function
- In table form
- Report generation (standard report with Min-Max values, number of alarm exceedings, moment of alarm exceeding)
- Automatic consumption report

View:
Current measurement values

- Load background image
- Place/fix window with measurement values
- Red measurement values in case of alarm exceeding

Graphical chart
with zoom function

- Selection of the measuring channels to be indicated
- Easy zoom in and zoom out
- Up to 8 y-axis
- Quick access to day, week, month view



			Unit		Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10	Sum 2010
Hall 1	**DS 500**	**Channel A1**	**m³**	Counter beginning	9.560	18.440	26.550	34.502	43.201	50.458	59.988	67.313	75.412	83.254	89.421	98.451	
		Machine 1	**m³**	Counter end	18.440	26.550	34.502	43.201	50.458	59.988	67.313	75.412	83.254	89.421	98.451	107.513	
			m³	**Monthly consumption**	**8.880**	**8.110**	**7.952**	**8.699**	**7.257**	**9.530**	**7.325**	**8.099**	**7.842**	**6.167**	**9.030**	**9.062**	**97.953**
			m³/h	Average consumption	17,6	16,1	15,8	17,3	15,8	18,9	14,5	16,1	15,6	12,2	17,9	18,0	16,2
			m³/h	Min. value	3,5	3,5	3,7	3,7	3,7	3,8	3,9	3,9	3,9	3,9	3,9	3,9	
			m³/h	Max. value	37,7	38,0	38,5	35,1	35,8	36,1	37,2	37,1	36,8	37,3	37,5	37,5	
			€	**Costs**	**133**	**122**	**119**	**130**	**109**	**143**	**110**	**121**	**118**	**93**	**135**	**136**	**1.469 €**
		Channel A2	**m³**	Counter beginning	24.750	57.002	87.541	113.245	113.245	138.451	167.865	195.354	219.874	248.798	279.477	312.313	
		Machine 2	**m³**	Counter end	57.002	87.541	113.245	113.245	138.451	167.865	195.354	219.874	248.798	279.477	312.313	345.554	
			m³	**Monthly consumption**	**32.252**	**30.539**	**25.704**	**0**	**25.206**	**29.414**	**27.489**	**24.520**	**28.924**	**30.679**	**32.836**	33.241	**320.804**
			m³/h	Average consumption	64,0	60,6	51,0	0,0	50,0	58,4	54,5	48,7	57,4	60,9	65,2	66,0	
			m³/h	Min. value	11,4	11,5	11,5	0,0	11,6	11,7	14,7	14,7	14,8	14,8	14,8	14,8	
			m³/h	Max. value	97,4	94,2	95,5	94,5	94,2	95,6	95,6	95,8	100,7	97,4	95,2	96,2	
			€	**Costs**	**484**	**458**	**386**	**0**	**378**	**441**	**412**	**368**	**434**	**460**	**493**	**499**	**4.812 €**
Sum Hall 1			**m³**	**Monthly consumption**	**41.132**	**38.649**	**33.656**	**8.699**	**32.463**	**38.944**	**34.814**	**32.619**	**36.766**	**36.846**	**41.866**	**42.303**	**418.757**
			€	**Costs**	**617**	**580**	**505**	**130**	**487**	**584**	**522**	**489**	**551**	**553**	**628**	**635**	**6.281**
			m³/h	Average consumption	81,6	76,6	66,8	17,3	64,4	77,3	69,1	64,7	72,9	73,1	83,1	83,9	

Consumption analysis (in connection with option "consumption report")

Multifunctional measuring instrument DS 500 mobile

The intelligent mobile chart recorder - energy analysis according to DIN EN ISO 50001

Energy analysis - flow measurement - leakage calculation at compressed air systems

Your advantages at a glance

Easy and clear layout:
Very easy operation via 7" color display with touch panel

Versatile:
Up to 12 sensors/meters connectible also third-party sensors/meters including power supply

Reliable:
Stores all measured values on a memory card, easy reading-out via USB stick possible

Intelligent energy analysis:
Daily/weekly/monthly evaluations
Mathematic function for internal calulations, e.g. the typical key data of a compressed air plant:
- costs in € per generated m^3 air
- kWh/ m^3 generated air
- flow of single lines including summation

Blindingly easy operation
Easy & intuitional in its operation
Saves time & costs on installation

Technical Data DS 500 mobile

Measurement of up to 12 compressors

Technical Data DS 500 mobile

Case dimensions	360 x 270 x 150 mm
Connections	4 / 8 / 12 sensors and supply, 1 x RJ 45 Ethernet connection
Weight	4.5 kg
Material	diecast, front foil polyester, ABS
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors; freely assignable, see options Digital CS sensors for dew point and flow with SDI interface FA/VA 400 series, dgital third-party sensors RS 485 / Modbus RTU Analogue CS sensors for pressure, temperature, clamp-on ammeters pre-configured Analogue third-party sensors 0/4 ..20 mA, 0..1/10/30V, pulse, Pt 100 / Pt 1000, KTY, counter
Voltage supply for sensor	24 VDC, max. 130 mA per sensor, integrated mains unit, max. 24 VDC, 25 W In case of version 8/12 sensorr inputs 2 integrated mains unit, each max.24 VDC, 25 Watt
Interfaces	USB stick, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, WEB Server optionally, GSM module
Memory Card	Memory size 2 GB SD Memory card standard, optionally up to 4 GB
Voltage supply	100...240 VAC / 50-60 Hz
Colour disply	7" touch panel TFT transmissive graphics, curves, statistics
Accuracy	Please see sensor specifications
Operating temperature	0...50°C
Storage temperature	-20...70°C

Description	Order no.
Multifunction measuring instrument DS 500 mobile, 4 sensor inputs	0500 5012
Multifunction measuring instrument DS 500 mobile, 8 sensor inputs	0500 5013
Multifunction measuring instrument DS 500 mobile, 12 sensor inputs	0500 5014
Option “integrated Webserver”	Z500 5003
Option “energy and flow report” statistics, daily/weekly/monthly report	Z500 5004
Option “quick measurement with 10 ms sampling rate” for analogue sensors, max/min value storage per second	Z500 5005
Option “mathematics calculat. function” for 4 freely selectable “virtual” channels, (mathematical functions: addition, subtraction, division, multiplication)	Z500 5008
Option: "Totalizer function for analogue signals"	Z500 5009
CS Soft Basic for DS 500 data evaluation in graphic and table form reading out of the measured data of one DS 500 via USB or Ethernet	0554 7040
CS Soft Energy Analyzer for energy and leakage analysis of compressed air stations	0554 7050
GSM module for data transfer via the GSM network (mobile network)	on request
Connection cable DS 500 mobile ODU / open ends, 5 m	0553 0501
Connection cable DS 500 mobile ODU / open ends, 10 m	0553 0502
Connection cable DS 500 mobile ODU / M 12 for VA/FA series, 5 m	0553 0503
Extension cable DS 500 mobile ODU / ODU, 10 m	0553 0504
Connection cable for mobile current/effective power meter to DS 500 mobile, 5 m	0553 0506
Case for all sensors (dimensions: 500 x 360 x 120 mm)	0554 6006

Input signals	
Signal current	(0...20mA/4...20mA)
internal or external voltage supply	
Measuring range	0…20 mA
Resolution	0.0001 mA
Accuracy	± 0.003 mA ± 0,05 %
Input resistance	50 q
Signal current	(0...1 V)
Measuring range	0…1 V
Resolution	0.05 mV
Accuracy	± 0.2 mV ± 0.05 %
Input resistance	100 kq
Signal voltage	(0...10 V / 30 V)
Measuring range	0…10 V
Resolution	0.5 mV
Accuracy	± 2 mV ± 0.05 %
Input resistance	1 Mq
RTD Pt 100	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0,2°C (-100...400°C) ± 0,3°C (remain. range)
RTD Pt 1000	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0.2° (-100...400°C)
Pulse	
Measuring range	Min. pulse length 100 µs Frequenz 0...1 kHz Max. 30 VDC

Multifunction measuring instruments DS 500 mobile energy analysis to DIN EN ISO 50001

If we talk about operational costs of compressed air plants we are actually talking about the energy costs as they make up about 70 to 80 % of the total costs of a compressed air plant.

Depending on the size of the plant this meeans considerable operating costs. Even in smaller plants this may quickly add up to 10.000 to 20.000 € per year. This is an amount which can be considerably reduced - even in the case of well operated and maintained plants.

Does this also apply to your compressed air plant? Which actual costs per generated m^3 air do you actually have? Which energy is grined due to the waste heat recovery? What is the total performance balance of your plant? How high are the differencial pressures of single filters, how high is the humidity (pressure dew point), how much compressed air is used? ...

By means of the new multifunction measuring instrument **DS 500 mobile** and the suitable sensors and meters all these questions can be answered easily. For example by means of a long-term measurement over 7 days, data recording and evaluation at the PC.

Touch screen

12 sensor inputs

Including voltage supply for all sensors

USB stick

External GSM module

Ethernet connection

Flow sensors
for compressed air and gases

- Installation and removal under pressure via standard 1/2" ball valve
- A safety ring avoids the uncontrolled ejection in case of installation/removal under pressure
- Usable for different gases: compressed air, nitrogen, argon, CO2, oxygen

Dew point sensors

- Extremely long-term stable
- Quick adaption time
- Large mesuring range (-80° to +20° Ctd)
- For all dryers: Asorptions dryers, membrane dryers refrigeration dryers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

- Large selection of pressure sensors with different measuring ranges for each measuring purpose
- Quick installation under pressure by quick coupling
- Pressure sensors 0-10/16/40/100/250/400/600 bar overpressure
- Pressure sensors -1 - +15 bar (under-/overpressure)
- Differential pressure 1.5 mbar up to 4.2 bar
- Absolute pressure: 0-16 bar (abs:)

Temperature sensors

- Large selection of temperature sensors e.g. for measurement of the ambient temperature or gas temperature
- Pt100 (2-wire or 3-wire)
- Pt1000 (2-wire or 3-wire)
- KTY sensors
- Temperaturse sensors with measuring transducer (4-20 mA output)

- For direct measurement of the heat volume (in kWh)
- Customary heat meters e.g. at heating systems, heat exchangers, district heating networks and so on can be connected to **DS 500 mobile** either via pulse signals or 4-20 mA

Heat meters/water and gas meters

- For the analysis of compressors (load and unload times, energy consumption, switch-on/switch-off cycles) the current input of up to 12 compressors is recorded via clamp-on ammeters
- Measuring ranges of the clamp-on ammeters:

  0 - 400 A
  0 - 1000 A

Clamp-on ammeters

- Mobile current/effective power meters with 32 A CEE socket and plug for small machines and plants
- Easily to join up into the current circuit by means of an extension cable with 32 A CEE plug
- Measures KW, kWh, cos phi, kVar, kVA
- Data transfer to **DS 500 mobile** via Modbus

Current/effective power meters

- **CS PM 600** Mobile current/effective power meters with external current transform. for big machines and plants
- External current transformers for clamping around the phases (100 A or 600 A)
- External magnetic measuring tips for measuring the voltage
- Measures KW, kWh, cos phi, kVar, kVA
- Data transfer to **DS 500 mobile** via Modbus

Current/effective power meters

By means of the multifunction measuring instrument **DS 500 mobile** for the first time all measuring data of a compressor station can be recorded, indicated and evaluated.

At **12 freely assignable sensor inputs** all CS Instruments sensors can be connected as well as any optional third-party sensors and meters **with the following signal outputs:**

4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-30 V I Pt100 (2- or 3-wire), Pt1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas meters) frequency output I Modbus protocol

Multifunction

Step 1:
The measurement

It is a special advantages that up to 12 compressors can be measured with one DS 500 mobile at the same time.

Step 2:

1 Compressor analysis (current / power measurement)

The energy consumption of every single compressor is measured by means of a clamp-on ammeter. The produced compressed air quantitiy is calculated by the software on the basis of the performance data of the compressor which have to be culated. The following parameters are calculated additionally: Energy consumption in kWh, load-, unload-, stop time, compressor load in %, number of load/ unload cycles.

2 System analysis (current measurement and real flow measurement)

The system analysis has the same function like the compressor analysis, however, it additionally offers the possibility to measure the actually produced resp. used quantity of compressed air by means of the flow sensor VA 400.

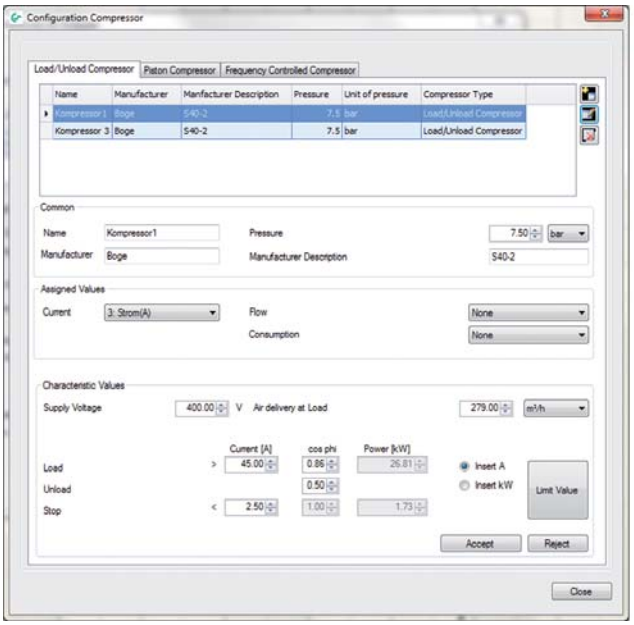
With the additional "real flow measurement" the leakages and therefore the cost share of the leakages in comparison to the total costs in € can be determined.

3 Leakage calculation

The leakage calculation is done during the production free time (shutdown, weekend, holidays). The flow sensor VA 400 measures the supplied quantity of air. During the down time the compressor delivers compressed air in order to keep a constant pressure.

According to statistics even if production is carried out day and night there is at least one short period of time during which all load is switched off. By means of this data the software defines a leakage rate and calculates the incurred leakage costs in €.

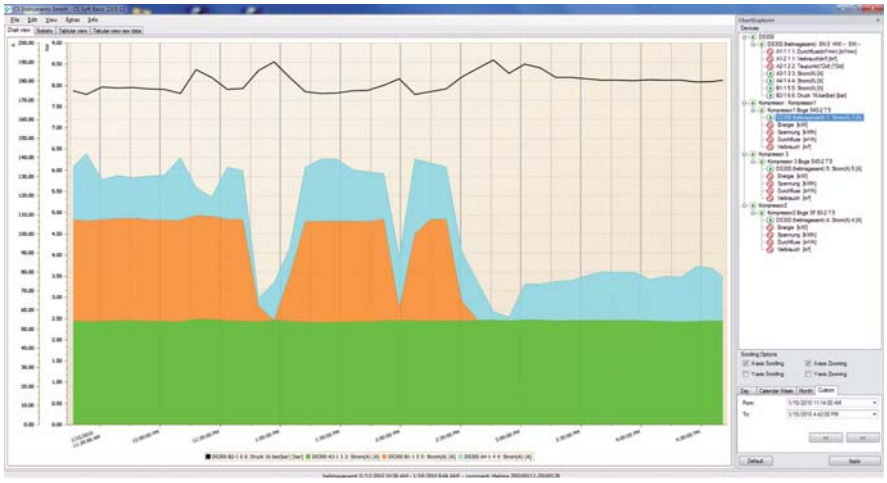
Step 3:
Evaluation at the PC with graphics and statistics



3.1 Entry of nevessary parameters

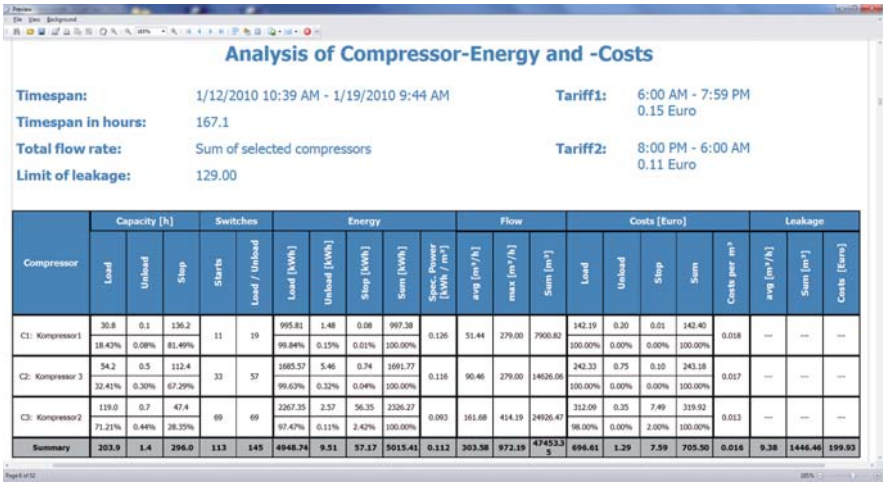
Specific data have to be entered before the analysis is carried out:

- Selection of compressor type (load/idle resp. variable speed drive controlled)
- as well as entry of the performance data according to data sheet
- Period of measurement
- Costs in € for 1kWh



3.2 Graphic evaluation with day view and week view.

Everything at a glance: The user gets a day and a week view of all stored measured data with his company logo (can be easily integrated) at the touch of a button. By means of the zoom and the crosslines function peak values can be determined.



Analysis of Compressor-Energy and -Costs

Timespan: 1/12/2010 10:39 AM - 1/19/2010 9:44 AM
Timespan in hours: 167.1
Total flow rate: Sum of selected compressors
Limit of leakage: 129.00

Tariff1: 6:00 AM - 7:59 PM 0.15 Euro
Tariff2: 8:00 PM - 6:00 AM 0.11 Euro

Compressor	Capacity [h]			Switches		Energy					Flow			Costs [Euro]					Leakage		
	Load	Unload	Stop	Starts	Load / Unload	Load [kWh]	Unload [kWh]	Stop [kWh]	Sum [kWh]	Spec. Power [kWh / m³]	avg [m³/h]	max [m³/h]	Sum [m³]	Load	Unload	Stop	Sum	Costs per m³	avg [m³/h]	Sum [m³]	Costs [Euro]
C1: Kompressor1	30.8	0.1	136.2	11	19	995.81	1.48	0.08	997.38	0.126	51.44	279.00	7900.82	142.19	0.20	0.01	142.40	0.018	---	---	---
	18.43%	0.08%	81.49%			99.84%	0.15%	0.01%	100.00%					100.00%	0.00%	0.00%	100.00%				
C2: Kompressor 3	54.2	0.5	112.4	33	57	1685.57	5.46	0.74	1691.77	0.116	90.46	279.00	14626.06	242.33	0.75	0.10	243.18	0.017	---	---	---
	32.41%	0.30%	67.29%			99.63%	0.32%	0.04%	100.00%					100.00%	0.00%	0.00%	100.00%				
C3: Kompressor2	119.0	0.7	47.4	69	69	2267.35	2.57	56.35	2326.27	0.093	161.68	414.19	24926.47	312.09	0.35	7.49	319.92	0.013	---	---	---
	71.21%	0.44%	28.35%			97.47%	0.11%	2.42%	100.00%					98.00%	0.00%	2.00%	100.00%				
Summary	203.9	1.4	296.0	113	145	4948.74	9.51	57.17	5015.41	0.112	303.58	972.19	47453.35	696.61	1.29	7.59	705.50	0.016	9.38	1446.46	199.93

3.3 Compressed air costs in €/U$$

At the touch of a button the user gets all important data like e.g.

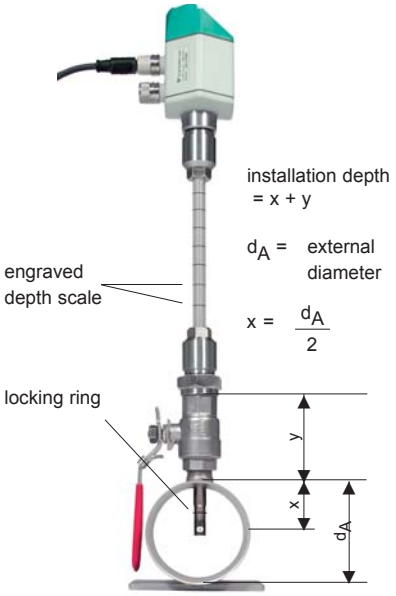
- Energy costs
- Compressed air costs
- Leakage costs in €/U$$
- Compressor data with load / unload time
- Specific energy kWh/m³
- Costs for 1 m³ in €/U$$

Suitable **probes** from the **CS Instruments** product range

Flow sensors VA 400:	**Order no.**
VA 400 flow sensor, max.version (185 m/s), sensor length 220 mm including 5 m connection cable to DS 500 mobile	0695 1122
VA 400 flow sensor, high speed version (224 m/s), sensor length 220 mm, including 5 m connection cable to DS 500 mobile	0695 1123
Option for VA 400:	
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400

Flow measuring ranges VA 400 for compressed Air (ISO 1217: 1000 mbar, 20°C)

Inner diameter of pipe			**VA 400 Max.** (185.0 m/s)	**VA 400 HighSpeed** (224.0 m/s)
Inch	mm		Meas. ranges from ... to	Meas. ranges from ... to
1/2”	16.1	DN 15	3.5... 1516 l/min	6.0... 1836 l/min
3/4”	21.7	DN 20	0.4... 178 m³/h	0.7... 215 m³/h
1”	27.3	DN 25	0.6... 295 m³/h	1.1... 357 m³/h
1 1/4”	36.0	DN 32	1.2... 531 m³/h	2.5... 644 m³/h
1 1/2”	41.9	DN 40	1.5... 732 m³/h	3.0... 886 m³/h
2”	53.1	DN 50	2.5... 1198 m³/h	4.6... 1450 m³/h
2 1/2”	71.1	DN 65	5... 2187 m³/h	7... 2648 m³/h
3”	84.9	DN 80	7... 3133 m³/h	12... 3794 m³/h
4”	110.0	DN 100	12... 5279 m³/h	16... 6391 m³/h
5”	133.7	DN 125	18... 7808 m³/h	24... 9453 m³/h
6”	159.3	DN 150	25... 11097 m³/h	43... 13436 m³/h
8”	200.0	DN 200	33... 17533 m³/h	50... 21230 m³/h
10”	250.0	DN 250	52... 27429 m³/h	80... 33211 m³/h
12”	300.0	DN 300	80... 39544 m³/h	100... 47881 m³/h



Flow

Flow meters VA 420 with integrated measuring section:			
Flow meter VA 420	0.8... 90 l/min	(R1/4” DN 8)	0695 0420
Flow meter VA 420	0.2... 90 m³/h	(R1/2” DN 15)	0695 0421
Flow meter VA 420	0.3... 170 m³/h	(R3/4” DN 20)	0695 0422
Flow meter VA 420	0.5... 290 m³/h	(R1” DN 25)	0695 0423
Flow meter VA 420	0.7... 480 m³/h	(R11/4” DN 32)	0695 0426
Flow meter VA 420	1.0... 550 m³/h	(R11/2” DN 40)	0695 0424
Flow meter VA 420	2.0... 900 m³/h	(R2” DN 50)	0695 0425

Flow

Dew point sensors:	
FA 410 dew point sensor, -80...20°Ctd including mobile measuring chamber and 5 m connection cable to DS 500 mobile	0699 1411
FA 415 dew point sensor, -20...50°Ctd including mobile measuring chamber and 5 m connection cable to DS 500 mobile	0699 1415
Extension cable, 10 m	0553 0504

Dew point

Calibration certificates for flow / dew point sensors:	
5 point precision calibration for flow sensors including ISO certificate	3200 0001
Precision calibration at -40 °Ctd including ISO certificate	0699 3396

Suitable **probes** from the **CS Instruments** product range

Pressure sensors:	**Order no.**
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Standard pressure sensor CS 1,6 absolut, 0...1,6 bar abs., ± 1 % accuracy of full scale	0694 3551
Standard pressure sensor CS 100, 0...100 bar, ± 1 % accuracy of full scale	0694 3557
Standard pressure sensor CS 250, 0...250 bar, ± 1 % accuracy of full scale	0694 3558
Standard pressure sensor CS 400, 0...400 bar, ± 1 % accuracy of full scale	0694 3559
Precision pressure sensor CS, -1...+15 bar, ± 0,5 % accuracy of full scale	0694 3553
Precision differential pressure sensor CS, 0...400 mbar, differential pressure, accuracy 0.0075 % of full scale, static pressure max. 40 bar.	0694 3560
Pressure calibration certificate, 5 calibration points within the measuring range	3200 0004

Pressure

Temperature probes:	
Screw-in temperature probe Pt 100, Class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = 50...+500 °C (2-wire-technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0100
Miniature cable temperature sensor Pt 100, Class A, length 25 mm, Ø 4 mm, -50...+180 °C, 5 m connection cable	0604 0105
Clamp screwing 6 mm, G1/2", VA-clamping, pressure-tight up to 10 bar	0554 6004
Temperature calibration certificate, 2 calibration points	0520 0180
Connection cables for pressure sensors / temperature probes:	
Connection cable 5 m	0553 0501
Connection cable 10 m	0553 0502
Extension cable 10 m	0553 0504

Temperature

Clamp-on ammeters:	
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable	0554 0508
Clamp-on ammeter 0...400 A TRMS incl. 3 m connection cable on DS 500 mobil	0554 0511
Calibration certificate for clamp-on ammeter	0554 3333

Power

Current / effective power meter up to 32 A	**0554 5340**
- Mobile current/effective power meter with 32 A CEE socket and plug to small machines and plants - Easy to link into the current circuit by means of an extension cable with 32 A CEE plug - Measures kW, kWh, cos phi, kVar, kVA - Data transfer to DS 500 mobile via Modbus	
CS PM 600 Mobile current / power meter up to 100 A	**0554 5341**
CS PM 600 Mobile current / power meter up to 600 A	**0554 5342**
- Mobile current/effective power meter with 3 external current transducers for big machines and plants - External current transformers for clamping on cables (100 or 600 A) - Exteral magnetic measuring tips for measuring the voltage - Measures kW, kWh, cos phi, kVar, kVA - Data transfer to DS 500 mobile via Modbus	
Connection cable for mobile current/effective power meter to DS 500 mobile, 5 m	0553 0506

Power

Optional third-paty sensors connectible:
e.g. heat meters, current meters, gas meters, water meters and so on. With **12 freely assignable sensor inputs** all sensors of CS Instruments can be connected as well as optional third-party sensors
Third-party sensors and meters with the following signal outputs:
4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-20 V I Pt100 (2 or 3-wire), Pt1000 (2 or 3wire), KTY I puls outputs (e.g. of gas meters) I frequency output I Modbus protocol

3rd Party

CS PM 600

Mobile current/effective power meter suitable for DS 500 mobile

Measures voltage, current and calculates:

Active power	[kW]
Apparent power	[kVA]
Reactive power	[kVar]
Active energy	[kWh]
cos phi	

All measured data are transferred digitally (Modbus) to DS 500 mobile and can be recorded there.

Example: Measurement at a compressor

Special advantages:

- Magnetic voltage measuring tips for measuring the voltage during operation.
- Hinged current transformers encompass the conductors of the phases L1, L2, L3. This can also be done during operation.

Technical data:

Parameters:	Voltage (Volt) Current (Ampere) Cos phi Active power (kW) Apparent power (kVA) Reactive power (kVar) Active energy (kWh) Supply frequency (Hz) All parameters are transferred digitally to DS 500 mobile.
Accuracy current measurement:	Threshold values for current deviation. Loss angle according to IEC 60044-1. Current deviation in % at rated current in 120 % 1 100 % 1 20 % 1.5 5 % 3
Accuracy active energy:	IEC 62053-21 Class 1
Sensor connections:	3 x current transformers (L1, L2, L3) 4 x voltage measurement (L1, L2, L3, N)
Interfaces:	RS 485 (Modbus protocol)
Meas. range:	Voltage measurement max. 400 Volt Current measurement max. 100 A resp. 600 A
Size current transformer:	100 A / 1 A (max. 24 mm conductor) 600 A / 1 A (max. 36 mm conductor)
Dimensions case:	270 x 225 x 156 mm (W x H x D)
Operating temperature:	-10…+40°C

Description	Order no.
CS PM 600 current/effective power meter up to 100 A	**0554 5341**
CS PM 600 current/effective power meter up to 600 A	**0554 5342**
- Mobile current effective power meter with 3 external current transformers for big machines and plants - External current transformers for clamping around the phases (100 A or 600 A) - External magnetic measuring tip for measuring the voltage - measures kW, kWh, cos phi, kVar, kVA - Data transfer to DS 500 mobile via Modbus	
Connection cable for mobile current/effective power meter to DS 500 mobile, 5 m	**0553 0506**

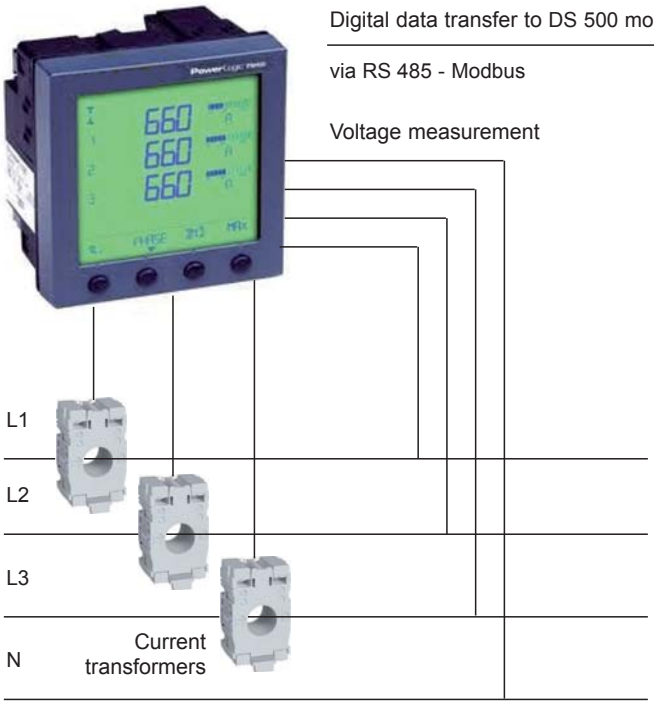
CS PM 710

Current/effective power meter for panel mounting

Measures voltage, current and calculates:

Active power	[kW]
Apparent power	[kVA]
Reactive power	[kVar]
Active energy	[kWh]
cos phi	

All measured data are transferred digitally (Modbus) to DS 500 mobile and can be recorded there.

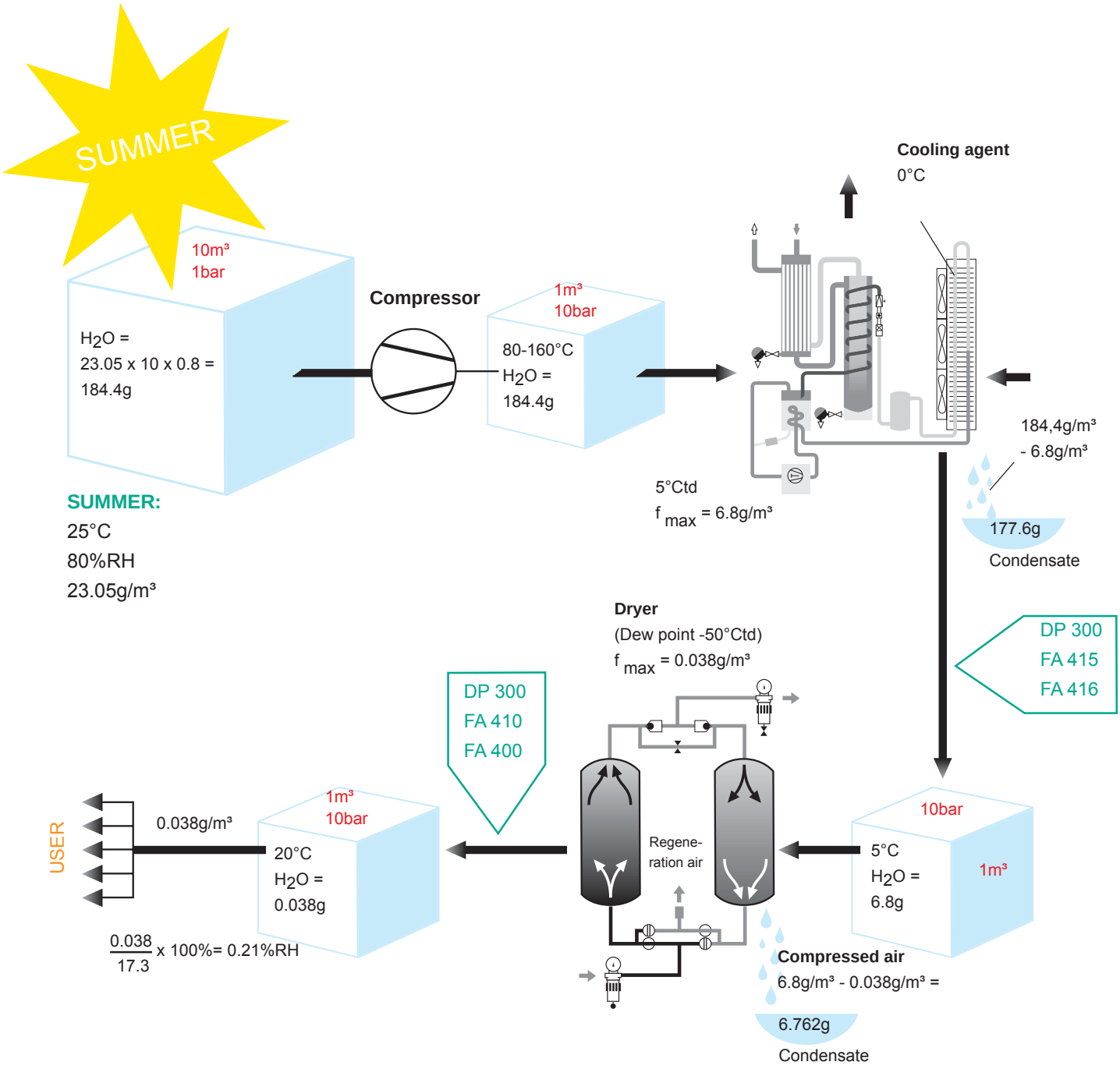


Description	Order no.
CS PM 710 CS PM 710 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5343
Current transformer 100/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 21 mm)	0554 5344
Current transformer 200/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 21 mm)	0554 5345
Current transformer 300/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5346
Current transformer 500/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5347
Current transformer 600/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 22 mm)	0554 5348
Current transformer 1000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 65 x 32 mm)	0554 5349
Current transformer 2000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 127 x 38 mm)	0554 5350
Connection cable to DS 500 mobile, 5 m, with open ends	0553 0501
Connection cable to DS 500 mobile, 10 m, with open ends	0553 0502

Technical Data:

Parameters:	Voltage (Volt) Current (Ampere) Cos phi Active power (kW) Apparent power (kVA) Reactive power (kVar) Active energy (kWh) Supply frequency (Hz) All parameters are transferred digitally to DS 500 mobile.
Accuracy current measurement:	± 0,5% of 1 to 6 A
Accuracy voltage:	± 0,5% of 50 V to 277 V
Accuracy active energy:	IEC 62053-21 Class 1
Interfaces:	RS 485 (Modbus protocol)
Measuring range:	Voltage measurement max. 480 Volt
Dimensions:	96 x 96 x 69 mm (W x H x D)
Operating temperature:	-5…+55°C

Typical procedure of **compressed air** drying with dew point **measurement**



Notes:

DP 500 / DP 510

Portable dew point meters with data logger

The new instruments **DP 500/DP510** are the ideal portable service instruments for dew point measurement for all types of driers down to -80°Ctd dew point.

The 3.5" graphic display with touch screen makes the operation very easy.

The graphic indication of colored measuring curves is unique.

Ideal for measurement of the current dew point and for graphic indication of the dew point curve/the switching behavior of the drier over a longer period of time.

Up to 100 million measured values can be stored with date and measuring site name. The measured data can be transferred to the computer via USB stick.

The data can be evaluated comfortably by means of the software CS Soft Basic. Measured data and service reports can be issued easily and quickly.

DP 510 additionally disposes of one further freely assignable sensor input.

Apart from the internal dew point measurement one further optional sensor can be connected like for example:

- Pressure sensors
- Flow sensors, VA 400/420
- Temperature sensors Pt 100, 4..20 mA
- Further dew point sensors
- Effective power meters
- Optional third-party sensors with the following signals: 0...1/10 V, 0/4...20 mA, Pt100, Pt1000, pulse, Modbus

Pressure sensor

2nd freely assignable sensor input for for third-party sensors (only DP 510)

Special features:

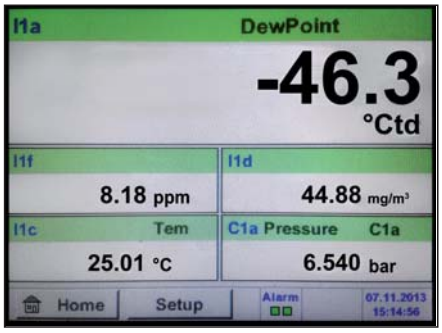
- Precise dew point measurement down to -80°Ctd.
- Quick response time
- 3.5" graphic display / easy operation via touch screen
- Integrated data logger for storage of the measured values
- USB interface for reading out via USB stick
- Calculates all necessary moisture parameters like g/m³, mg/m³, ppm V/V, g/kg, °Ctdatm
- 2nd freely assignable sensor input for third-party sensors (only DP 510)
- International: Up to 8 languages selectable

Application ranges:

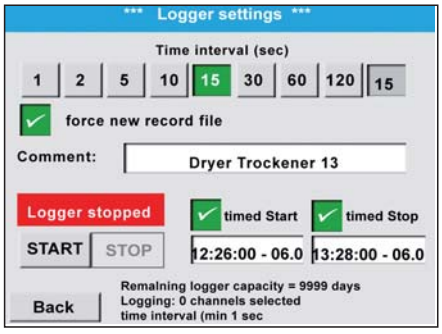
- Compressed air: Examination of refrigeration, membrane, adsorption driers
- Technical gases: Residual moisture meas. in gases like N2, O2 and so on
- Plastics industry: Examination of granulate driers
- Medical compressed air/breathing air

Everything at a glance

Measurement curves are indicated graphically and thus the user can see at a glance the behaviour of the drier since the start of the measurement.



All physical parameters of moisture measurement are calculated automatically.
In case of DP 510 the measured values of the third-party sensor are indicated additionally.



It is possible to store up to 100 million measured values.
Each measurement can be stored with a comment, e. g. measuring site name.
The time interval can be freely determined.

Quick installation by means of measuring chamber

Ideal for service technicians - everything in one case

Dry container - for sensor protection and quick adaptation time

Description	Order No.
Set DP 500 in a case - consisting of:	0600 0500
Portable dew point meter DP 500 for compressed air and gases	0560 0500
Mobile measuring chamber up to 16 bar	0699 4490
Diffusion-tight PTFE hose with quick connector, length 1 m	0554 0003
Power supply for DP 500/510	0554 0009
Control and calibration set 11.3 % RH	0554 0002
Quick-lock coupling	0530 1101
Dry container for CS dew point sensors	0699 2500
Transportation case (small) for DP 500	0554 6500
Further options, not included in the set	
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DP500/510 via USB	0554 7040
Precision calibration at -40°Ctd with ISO certificate	0699 3396
Additional calibr. point freely selectable in the range between -80…+20°Ctd	0700 7710
High pressure measuring chamber up to 350 bar	0699 3590
Measuring chamber for atmospheric dew point	0699 3690
Measuring chamber for granulate driers with minimum overpressure	0699 3490
Measuring chamber for respiratory air bottles up to 350 bar	0699 3790
Portable dew point meter DP 500 for compressed air and gases (high pressure version up to 350 bar)	0560 0501

Technical data:

Display:	3.5" touch screen
Measuring range:	-80…+50°Ctd -20…+70°C 0…100 %RH
Accuracy:	± 0,5°Ctd at -10…+50°Ctd typ. ± 2°Ctd remain. range
Moisture-parameters:	g/m³, mg/m³, ppm V/V, g/kg, °Ctdatm, %RH
Pressure range:	-1…50 bar standard -1…350 bar special version
Interface:	USB interface
Data logger:	2 GB SD memory card (100 million values)
Power supply:	Internal rechargeable Li-Ion batteries, approx 12 h continuous operation, 4 h charging time
Screw-in thread:	G1/2" stainless steel
Surrounding temperature:	0…+50°C
EMV:	DIN EN 61326

Daten für ext. Fühler DP 510:
Siehe Techn. Daten DS 400 Seite 50.

DP 500 / DP 510

Flexible data recording and transfer via USB cable or USB stick

The stored measured data can be easily transferred to the computer via a USB stick or via a USB cable.

The time periods are freely selectable or you just read out the whole memory.

The data can be evaluated by means of the software CS Soft Basic in table and in graphic form.

USB stick

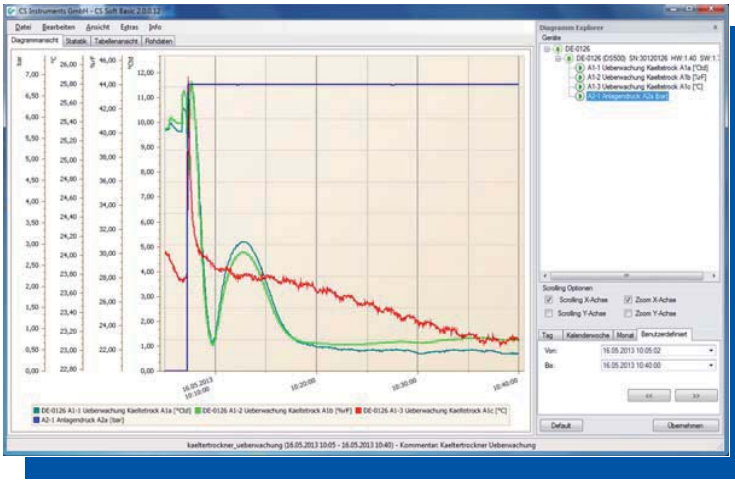
World debut photo key

Ideal for documentation of the measured values/measurement curves on site. Coloured measurement curves can be sent by e-mail or integrated into a service report. By means of the photo key the "current screen" can be stored as an image file and printed out at the computer or edited without any additional software.

In the past mini thermo transfer printers were used frequently. The lifetime of the printout is temporary and it cannot be used in the computer. Therefore the printout was glued onto a paper very often.

Data evaluation in 5 languages by means of CS Soft Basic

Everything at a glance: Table, graph, statistics -
at the touch of a button the user gets all necessary information.



Graphic evaluation

All measurement curves are indicated in terms of colour. All necessary functions such as zoom, selection/deselection of single measurement curves, freely selectable time periods, scaling of the axis, selection of colours and so on are integrated:

This view can be stored as a pdf file and sent by e-mail. Different data can be consolidated to a common file.

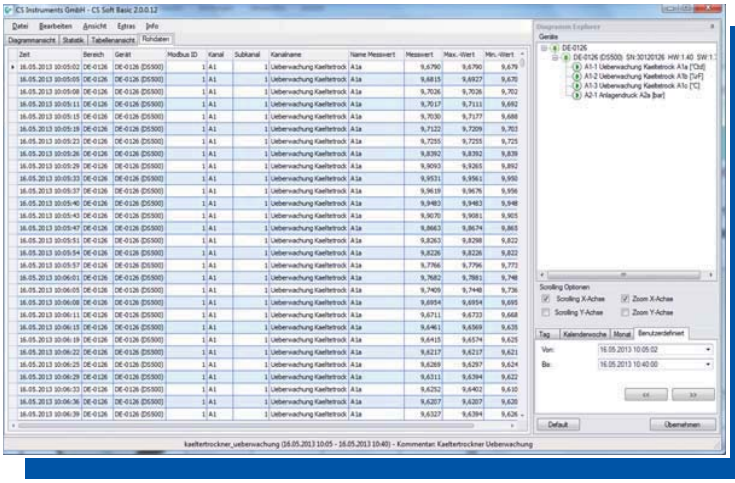
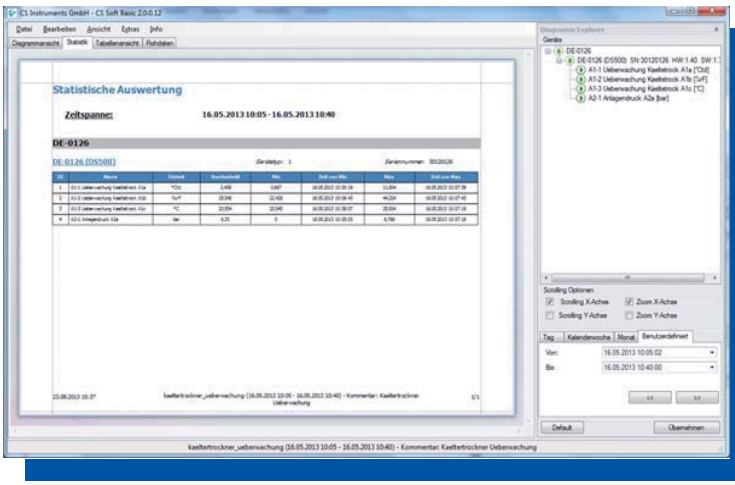


Table view

All measuring points are listed with exact time interval. The desired measuring channels with measuring site name can be selected via the diagram explorer.



Statistics

All necessary statistic data are visible at a glance.
So the user can quickly see which minimum or maximum measured values occurred at which time and for how long.

DP 510

Portable dew point meter with data logger and third-party sensor

Additionally to the internal dew point measurement one further optional sensor can be connected.

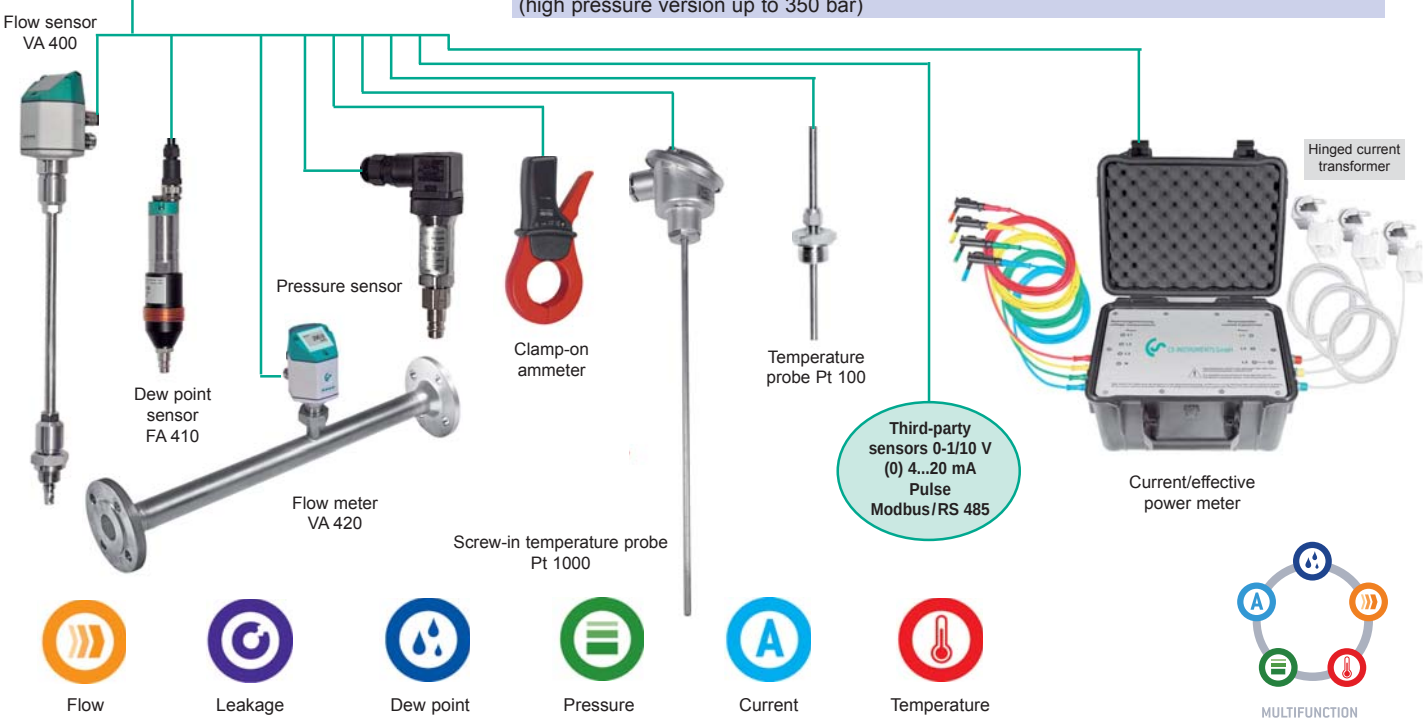
So the user can meet nearly all industrial measuring tasks like for example:

- Separate pressure measurement
- Dew point distance via external temperature sensor
- Compressed air consumption measurement
- Active power in kWh/kW

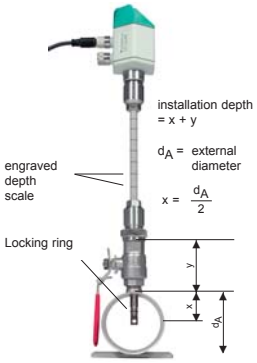
Performing measuring tasks with one instrument

DP 510 disposes of all functions of DP 500 and has an additional freely assignable sensor input.

Description	Order No.
Set DP 510 in a case - consisting of:	0600 0510
Portable dew point meter DP 510 with one additional sensor input	0560 0510
Mobile measuring chamber up to 16 bar	0699 4490
Diffusion-tight PTFE hose with quick connector, length 1 m	0554 0003
Power supply for DP 500/510	0554 0009
Control and calibration set 11.3 % RH	0554 0002
Quick-lock coupling	0530 1101
Dry container for CS dew point sensors	0699 2500
Transportation case (big) for DP 510 as well as further sensors	0554 6510
Further options, not included in the set	
Option for DP 510: "Mathematics calculation function" for 4 freely selectable channels, (virtual channels): addition, subtraction, division, multiplication	Z500 5107
Option for DP 510: "Totalizer function for analogue signals"	Z500 5106
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DP500/510 via USB	0554 7040
Precision calibration at -40°Ctd with ISO certificate	0699 3396
Additional calibr. point freely selectable in the range between -80…+20°Ctd	0700 7710
High preassure measuring chamber up to 350 bar	0699 3590
Measuring chamber for atmospheric dew point	0699 3690
Measuring chamber for granulate driers with minimum overpressure	0699 3490
Measuring chamber for respiratory air bottles up to 350 bar	0699 3790
Portable dew point meter DP 510 for compressed air and gases (high pressure version up to 350 bar)	0560 0512



Suitable sensors for **DP 510**



Flow sensors VA 400:		**Order No.**
VA 400 flow sensor, Max version (185 m/s), sensor length 220 mm, incl. 5 m connection cable to DP 510		0695 1122
VA 400 flow sensor, HighSpeed version (224 m/s), sensor length 220 mm, incl. 5 m connection cable to DP 510		0695 1123
Option for VA 400:	sensor length 120 mm	ZSL 0120
	sensor length 160 mm	ZSL 0160
	sensor length 300 mm	ZSL 0300
	sensor length 400 mm	ZSL 0400

Flow measuring range VA 420 for compressed air (ISO 1217: 1000 mbar, 20°C)				
Flow meter VA 420	0.8...	90 l/min	(R1/4" DN 8)	0695 0420
Flow meter VA 420	0.2...	90 m^3/h	(R1/2" DN 15)	0695 0421
Flow meter VA 420	0.3...	170 m^3/h	(R3/4" DN 20)	0695 0422
Flow meter VA 420	0.5...	290 m^3/h	(R1" DN 25)	0695 0423
Flow meter VA 420	0.7...	480 m^3/h	(R11/4" DN 32)	0695 0426
Flow meter VA 420	1.0...	550 m^3/h	(R11/2" DN 40)	0695 0424
Flow meter VA 420	2.0...	900 m^3/h	(R2" DN 50)	0695 0425

Flow

Dew point sensor:	
FA 410 dew point sensor, -80...20°Ctd incl. mobile measuring chamber and 5 m connection cable to DP 510	0699 1411
Connection cable for VA/FA sensors:	
Connection cable for VA/FA series on mobile instruments, ODU / M12, 5 m	0553 0503

Dew point

Calibration certificate for flow/dew point sensors:	
5 point precision calibration for flow sensors incl. ISO certificate	3200 0001
Precision calibration at -40°Ctd with ISO certificate	0699 3396

Pressure sensors:	**Order No.**
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356

Pressure

Temperature sensors:	
Bendable temperature probe, Pt100 Class B, length 300 mm, Ø3 mm, -70…+500°C, 2 m probe connection cable glass fibre /stainless steel with ODU plug for mobile instruments	0604 0106
Screw-in temperature sensor Pt 100, Class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = 50...+500°C (2-wire technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180°C, 5 m probe connection cable with open ends	0604 0102
Miniature temperature probe cable Pt 100, Class A, length 25 mm, Ø 4 mm, -50...+180°C, 5 m connection cable	0604 0105
Clamp screwing 6 mm, G1/2", VA clamping ring, pressure tight up to 10 bar	0554 6004
Temperature calibration certificate, 2 calibration points	0520 0180
onnection cables for pressure sensors/temperature sensors:	
Connection cable for pressure, temperature or external sensors on mobile instruments, ODU / open ends, 5 m	0553 0501
Connection cable for pressure,temperature or external sensors on mobile instruments, ODU / open ends, 10 m	0553 0502
Extension cable for mobile instruments,ODU / ODU, 10 m	0553 0504

Temperature

Clamp-on ammeters:	
Clamp-on ammeter 0…400 A TRMS incl. 5 m connection cable	0554 0511
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable	0554 0508
Calibration certificate for clamp-on ammeter	0554 3333

Current

Current/effective power meter up to 100 A	**0554 5341**
Current/effective power meter up to 600 A	**0554 5342**
- Mobile current/effective power meter with 3 external current transducers for big machines and plants - External current transformers for clamping on cables (100 or 600 A) - External magnetic measuring tips for measuring the voltage - Measures kW, kWh, cos phi, kVar, kVA - Data transfer to DP 510 via Modbus	
Connection cable for mobile current/effective power meter to DP 510, 5 m	0553 0506

Current

Optional third-party sensors connectibel:
e.g. heat meters, current meters, gas meters, water meters and so on. To the 2nd freely assignable sensor input all sensors of CS Instruments can be connected as well as optional third-party sensors and counters with the following signal outputs: 4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-30 V I Pt100 (2- or 3-wire), Pt1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas counters) I Frequency output I Modbus protocol

Third-party sensors

FA 410 from -80 to 20 °C_{td}

FA 410 – the ideal dew point sensor for monitoring membrane and adsorption dryers

Typical use in compressed air dryers/granulate dryers at very low dew points down to -80 °C.

Recommendation:

Mounting with standard measuring chamber for compressed air up to 16 bar
Advantage: Easy installation via fast coupling.

Special features

- Measuring range -80...20 °C_{td}
- Extremely long-term stable
- Analogue output 4...20 mA
- Condensation insensitive
- Quick response time
- Pressure-tight up to 350 bar (special version)

Technical data FA 410

Measuring range:	-80...20 °C_{td} resp. -20...50 °C_{td}
Accuracy:	± 1 °C at 20...-20 °C_{td} ± 2 °C at -20...-50 °C_{td} ± 3 °C at -50...-80 °C_{td}
Pressure range:	-1...50 bar special version up to 350 bar
Power supply:	24 VDC (16...30 VDC)
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp:	-20...70 °C
Connection:	M12, 5-pole
PC connection:	SDI interface
Analogue output:	4...20 mA = -80...20 °C_{td} resp. 4...20 mA = -20...50 °C_{td}
Burden for analogue output:	< 500 Ohm
Screw-in thread:	G1/2"
Dimensions:	Ø 30 mm, length approx. 130 mm
Via service software:	
– choose units:	% RH, °Ctd, g/m³, mg/m³, ppm V/V
– scaling	change 4...20 mA
Special version:	4...20mA, 2-wire technology

Description	Order no..
FA 410 dew point sensor, -80°...20°Ctd incl. inspection certificate	0699 0410
FA 410 dew point sensor, -20°...50°Ctd incl. inspection certificate	0699 0412
Connection cables:	
Connection cable, length: 5 m	0553 0104
Connection cable, length: 10 m	0553 0105
Options for FA 410:	
Option special version up to 350 bar	0699 4003
Option output in mg/m³, g/kg, oder %RH, special scaling 4...20 mA	0699 4004
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
High-pressure measuring chamber up to 350 bar	0699 3590
Measuring chamber for respiratory air bottles up to 350 bar	0699 3790
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S Software, please see page 39	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Calibration:	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at 3 °Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Dew point set DS 52 for adsorption dryers

Dew point set DS 52

consisting of:

• Digital process meter DS 52

• Standard measuring chamber

• Dew point sensor FA 410

Option alarm unit (buzzer and continuous red light):

The measuring range of -80...20 °Ctd makes the dew point set DS 52 with alarm the ideal dew point monitor with analogue output 4...20 mA.

The dew point sensor FA 410 is extremely long-term stable and can be installed and removed quickly and easily under pressure by means of the screwable measuring chamber including quick-coupling. The dew point set is supplied ready for plug-in, i. e. everything is completely wired. The alarm values can be freely adjusted.

Description	Order no.
Dew point set DS 52 for adsorption dryers consisting of:	**0600 0420**
DS 52 LED digital process meter in wall housing	0500 0007
FA 410 dew point sensor (-80...20 °Ctd)	0699 0410
Standard measuring chamber up to 16 bar	0699 3390
Connection cable for VA/FA Series, 5 m with M12 plug	0553 0104
Options:	
Power supply 24 VDC (instead of 230 VAC)	Z500 0001
Power supply 110 VAC (instead of 230 VAC)	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m cable	Z500 0004
Additional accessory:	
Precision calibration at -40°Ctd including ISO certificate	0699 3396

Special features

- System ready for plug-in: Everything completely wired
- No time-consuming studying of the instruction manual
- 2 alarm contacts (230 VAC, 3 A) pre- and main alarm freely adjustable
- 4...20 mA analogue output
- Option alarm unit: Buzzer and continuous red light

Technical data display DS 52

Dimensions:	118 x 92 x 93 mm
Display:	LED red, 7 segments, height: 13 mm, 5 digits, 2 LED for alarm relay
Keypad:	4 keys
Input:	dew point sensor FA 410
Power supply:	230 VAC, 50/60 Hz; Option: 24 VDC or 110 VAC 50/60 Hz
Alarm outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Operating temperature:	-10...+60 °C (storage temp. -20 °C...+80 °C)
Alarm thresholds:	freely adjustable
Hysteresis:	2 °Ctd
Analogue output:	4...20 mA = -80...20 °Ctd

Technical data dew point sensor FA 410

Measuring range:	-80...20 °Ctd
Accuracy:	± 1 °C at 20...-20 °Ctd ± 2 °C at -20...50 °Ctd ± 3 °C at -50...-80 °Ctd
Pressure range:	-1...50 bar (with meas. chamber 16 bar), special version up to 350 bar
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Burden analogue output:	< 500 Ohm
Screw-in thread:	G 1/2" without meas. chamber

FA 415 from -20 to 50 °C_{td}

The dew point sensors FA 415
for the typical use in refrigeration dryers

FA 415 dew point sensor

The ideal dew point sensor for the monitoring of refrigeration dryers with analogue output 4...20 mA

Special features

- Analogue output 4...20 mA
- Precise, long-term stability
- Quick response time
- Measuring range -20...50 °C_{td}

Technical data FA 415

Measuring range:	-20...50 °C_{td} resp. 0...100 % RH
Accuracy:	± 1 °C at 0...20 °C_{td} ± 2 °C remaining range
Pressure range:	-1...16 bar
Power supply:	24 VDC (10...30 VDC)
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Connection:	M12, 5-pole
PC connection:	SDI interface
Screw-in thread:	G1/2"
Dimensions:	Ø 30 mm, length 130 mm
Output FA 415:	4...20 mA = -20...50 °C_{td}
Burden for analogue output:	< 500 Ohm

Recommendation:

Mounting with standard meas. chamber for compressed air up to 16 bar
Advantage: Easy installation via fast coupling.

Description	Order no.
FA 415 dew point sensor	0699 0415
Connection cables:	
Connection cable, length: 5m	0553 0104
Connection cable, length: 10m	0553 0105
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S Software, see page 39	0554 2005
Mains unit in wall housin 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Calibration:	
Precision calibration at 3° Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Dew point set DS 52 for refrigeration dryers

Dew point set DS 52

consisting of:

• Digital process meter DS 52

• Standard measuring chamber

• Dew point sensor FA 415

Option: Alarm unit (buzzer and continuous red light)

The measuring range of -20...50 °Ctd makes the dew point set DS 52 with alarm the ideal dew point monitor with analogue output 4...20 mA.

The dew point sensor FA 415 is extremely long-term stable and can be installed and removed quickly and easily under pressure by means of the screwable measuring chamber including quick coupling. The dew point set is supplied ready for plug-in, i. e. everything is completely wired. The alarm values can be freely adjusted.

Description	Order no.
Dew point set DS 52 for refrigeration dryers, consisting of:	**0600 0425**
DS 52 LED digital process meter in wall housing	0500 0008
FA 415 dew point sensor (-20...50 °Ctd)	0699 0415
Standard measuring chamber up to 16 bar	0699 3390
Connection cable for VA/FA Series, 5 m with M12 plug	0553 0104
Options:	
Power supply 24 VDC (instead of 230 VAC)	Z500 0001
Power uspply 110 VAC (instead of 230 VAC)	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m lead	Z500 0004
Additional accessory:	
Precision calibration at 3°Ctd including ISO certificate	3200 0003

Special features

- System ready for plug-in
  Everything completely wired
- No time-consuming studying of the instruction manual
- 2 alarm contacts (230 VAC, 3 A)
  pre- and main-alarm freely adjustable
- 4...20 mA analogue output
- Option alarm unit:
  Buzzer and continuous red light

Technical data display DS 52

Dimensions:	118 x 92 x 93 mm
Display:	LED red, 7 segments, height: 13 mm, 5 digits, 2 LED for alarm relay
Keypad:	4 keys
Input:	dew point sensor FA 415
Power supply:	230 VAC, 50/60 Hz; Option: 24 VDC or 110 VAC 50/60 Hz
Alarm outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Operating temperature:	-10...+60 °C (storage temp. -20 °C...+80 °C)
Alarm thresholds:	freely adjustable
Hysteresis:	2 °Ctd
Analogue output:	4...20 mA = -20...50 °Ctd

Technical data dew point sensor FA 415

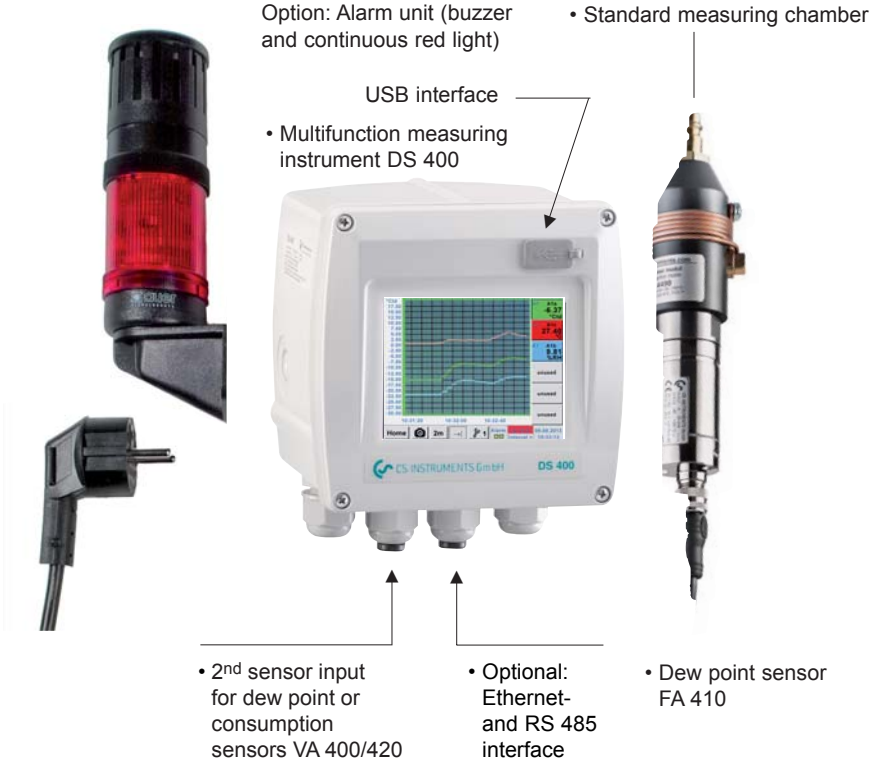
Measuring range:	-20...50 °Ctd
Accuracy:	± 1 °C at 0...20 °Ctd ± 2 °C remaining range
Pressure range:	-1...16 bar
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Connection:	M12, 5 pole
PC connection:	SDI interface
Burden analogue output:	< 500 Ohm
Screw-in thread:	G 1/2" without meas.chamber

Dew point set DS 400

for stationary dew point monitoring of refrigeration or adsorption dryers. The touch screen graphic display enables an intuitive operation and shows the progress of the measured values. 2 alarm relays are available for monitoring of threshold values. Available either with a classic analogue output 4…20 mA or optionally with digital interfaces like Ethernet and RS 485 (Modbus protocol). As a stand-alone solution the measured data stored in the optional data logger can be read-out via USB stick and evaluated by means of the software CS Soft Basic.

Dew point set DS 400

consisting of:



Description	Order no.
Dew point set DS 400 for adsorption dryers (-80…+20°Ctd)	0601 0410
Dew point set DS 400 for refrigeration dryers (-20…+50°Ctd)	0601 0412
Options	
Option: Integrated data logger for 100 million measured values	Z500 4002
Option: Integrated Ethernet and RS 485 interface	Z500 4004
Option: 2 additional sensor inputs for analogue sensors (pressure sensors, temperature sensors and so on)	Z500 4001
Option: Integrated webserver	Z500 4005
Further accessories	
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data from DS 400 via USB or Ethernet	0554 7040
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m cable	Z500 0004
Calibration	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at +3 °Ctd including ISO certificate	3200 0003

Special features

- 3.5" graphic display - easy operation with touch screen
- System ready for plug-in: Everything completely wired
- 2 alarm contacts (230 VAC, 3 A) pre- and main alarm freely adjustable
- **NEW:** An alarm delay can be set for each alarm relay
- 4...20 mA analogue output
- Option: Ethernet and RS 485 interface (Modbus protocol)
- Option: webserver

Option: Integrated data logger

- Recording of the dew point progression of up to 100 million meas. values
- CS Soft Basic for evaluation in graphic and table form. Read-out of the data either via USB stick or via Ethernet.

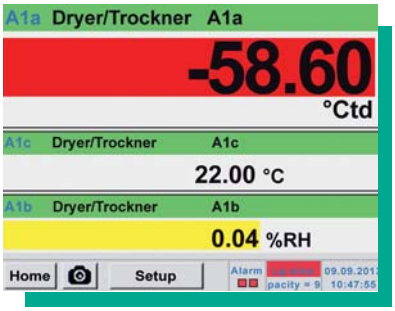
Technical data DS 400

Dimensions:	118 x 115 x 98 mm, IP 54 (wall housing) 92 x 92 x 75 mm, IP 54 (panel mounting)
Inputs:	2 digital inputs for FA 410 resp. VA 400/420
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	please see FA 410
Alarm outputs:	2 relays, (pot.-free)
OPTIONS	
Data logger:	100 million meas. values start/stop time, meas. rate freely adjustable
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA 0 to 10 V, Pt100, Pt1000

Technical data FA 410

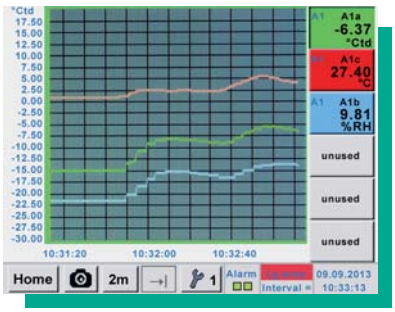
Meas. range:	-80...20°Ctd resp. -20...50°Ctd
Accuracy:	± 1°C at 20...-20°Ctd ± 2°C at -20...-50°Ctd ± 3°C at-50...-80°Ctd
Pressure range:	-1...50 bar, special version up to 350 bar

Easy operation via touch screen



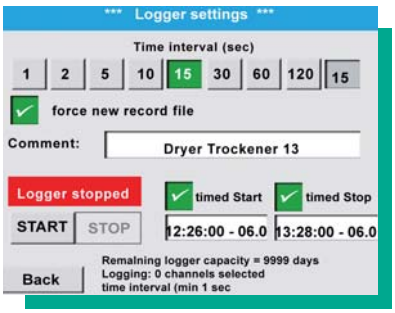
Actual measured values

All measured values can be seen at a glance.
Threshold exceedings are indicated in red colour.
A "measuring site name" can be allocated to each sensor.



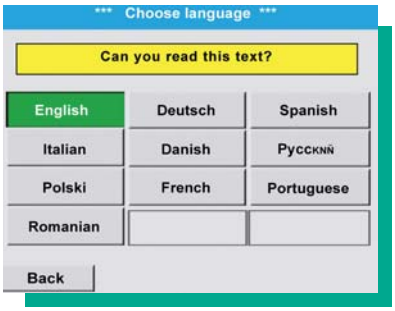
Graphic view

In the graphic view all measured values are indicated as curves.
It is possible to browse back on the time axis by a slide of the finger (without data logger maximum 24 h, with data logger back to the start of the measurement).



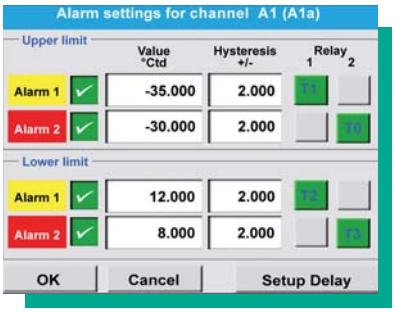
Data logger

Measured values are stored in DS 400 by means of the option "integrated data logger".
The time interval can be freely set. Furthermore there is the possibility to fix the starting time and the end time of the data recording.
Read-out of the measured data via USB interface or via the optional Ethernet interface.



Selection of the language

DS 400 "speaks" several languages. The required language can be selected by means of the select button.



Adjustment of the alarm relays

Each one of the 2 alarm relays can be allocated individually to a connected sensor. The alarm thresholds and the hysteresis can be freely adjusted.
NEW: It is possible to set an alarm delay for each alarm relay so that the relay is just triggered after that period of time.

DS 400 - Multifunction measuring instrument

for all relevant parameters of compressed air

Software options:
- Integrated webserver
- Mathematics calculation function
- Totalizer function

Hardware options:
- Integrated data logger
- Ethernet / RS 485 interface
- additional sensor inputs (digital or analogue) selectable

Standard equipment:
- USB interface
- 3.5" graphic display with touch screen
- Integrated mains unit for supply of the sensors
- 4...20 mA output of all connected active sensors
- Pulse output (for total consumption) in case of flow sensors
- 2 alarm relays (pot.-free switch-over contacts, max. 230 V, 3 A)

The sensor inputs 1+2 as well as 3+4 can be selected according to the required sensors:

Digital	Digital	Digital	Digital	Analogue	Analogue	Analogue	Analogue
m³/h, m³	°Ctd	A, kW/h	variable	bar	A	°C	°C

Flow-sensor	Dew point sensor	Current meters	Third-party sensors with RS 485	Pressure sensor	Clamp-on ammeter	Temperature sensor	Third-party sensors analogue output

Description	Sensor input 1+2	Sensor input 3+4	Order no.
DS 400 - Multifunction measuring instrument with graphic display and touch screen	Digital	----------	0500 4000 D
	Digital	Digital	0500 4000 DD
	Digital	Analogue	0500 4000 DA
	Analogue	----------	0500 4000 A
	Analogue	Analogue	0500 4000 AA
Options			
Option: Integrated data logger for 100 million measured values			Z500 4002
Option: Integrated Ethernet and RS 485 interface			Z500 4004
Option: Integrated webserver			Z500 4005
Option: "Mathematics calculation function" for 4 freely selectable channels, (virtual channels): addition, subtraction, division, multiplication			Z500 4007
Option: "Totalizer function for analogue signals"			Z500 4006
Further accessories			
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 400 via USB or Ethernet			0554 7040
CS Soft Network - Database Client/Server Solution (up to 5 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7041
CS Soft Network - Database Client/Server Solution (up to 10 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7042
CS Soft Network - Database Client/Server Solution (up to 20 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7043
CS Soft Network - Database Client/Server Solution (> 20 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7044

Technical data DS 400

Dimensions:	118 x 115 x 98 mm, IP 54 (wall housing) 92 x 92 x 75 mm, IP 54 (panel mounting)
Inputs:	2 digital inputs for FA 410 resp. VA 400
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	see FA 410
Alarm outputs:	2 Relays, (pot.-free)
OPTIONS	
Data logger:	100 million meas. values start/stop time, meas. rate freely adjustable
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA 0 to 10 V, Pt100, Pt1000

Input signals	
Current signal	(0...20mA/4...20mA)
internal or external power supply	
Measuring range	0…20 mA
Resolution	0,0001 mA
Accuracy	± 0,003 mA ± 0,05 %
Input resistance	50 Ω
Voltage signal	(0...1 V)
Measuring range	0…1 V
Resolution	0,05 mV
Accuracy	± 0,2 mV ± 0,05 %
Input resistance	1 MΩ
Voltage signal	(0...10 V / 30 V)
Measuring range	0…10 V
Resolution	0,5 mV
Accuracy	± 2 mV ± 0,05 %
Input resistance	1 MΩ
RTD Pt 100	
Measuring range	-200…850° C
Resolution	0,1° C
Accuracy	± 0,2°C (-100...400°C) ± 0,3°C (further range)
RTD Pt 1000	
Measuring range	-200…850° C
Resolution	0,1° C
Accuracy	± 0,2° (-100...400°C)
Pulse	
Measuring range	min.pulse length 500 µs frequency 0...1 kHz max. 30 VDC

Suitable **probes** from the **CS Instruments** product range

Description	Order no.
VA 400 flow sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 4001
Optionsn for VA 400:	
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400
Flow meters VA 420:	
Flow meter VA 420 with integrated measuring section (R 1/4" DN 8)	0695 0420
Flow meter VA 420 with integrated measuring section (R 1/2" DN 15)	0695 0421
Flow meter VA 420 with integrated measuring section (R 3/4" DN 20)	0695 0422
Flow meter VA 420 with integrated measuring section (R 1" DN 25)	0695 0423
Flow meter VA 420 with integrated measuring section (R 1 1/4" DN 32)	0695 0426
Flow meter VA 420 with integrated measuring section (R 1 1/2" DN 40)	0695 0424
Flow meter VA 420 with integrated measuring section (R 2" DN 50)	0695 0425
Dew point sensors:	
FA 410 dew point sensor, -80°...20°Ctd including inspection certificate	0699 0410
FA 415 dew point sensor, -20°...50°Ctd including inspection certificate	0699 0415
Standard measuring chamber for compressed air up to 16 bar	0699 3390
Connection cables for VA 400, VA 420, FA 410 and FA 415: Connection cables for flow sensors / dew point sensors	
Connection cable 5 m	0553 0104
Connection cable 10 m	0553 0105
Pressure sensors:	
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Further pressure sensors please see complete catalogue	
Temperature sensors:	
Screw-in temperature sensor Pt 100, Class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = 50...+500 °C (2-wire-technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0100
Clamp screwing 6 mm, G1/2", VA clamping ring, pressure tight up to 10 bar	0554 6004
Connection cables for pressure sensors / temperature sensors:	
Connection cable 5 m	0553 0108
Connection cable 10 m	0553 0109
Clamp-on ammeters:	
Clamp-on ammeter 0...400 A TRMS incl. 3 m connection cable with open ends	0554 0510
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable with open ends	0554 0507
Optional third-party sensors 0/4...20 mA, 0...1/10/30 V, PT 100 / PT 1000, KTY, pulse, RS 485 Modbus connectible.	

Flow

Flow

Dew point

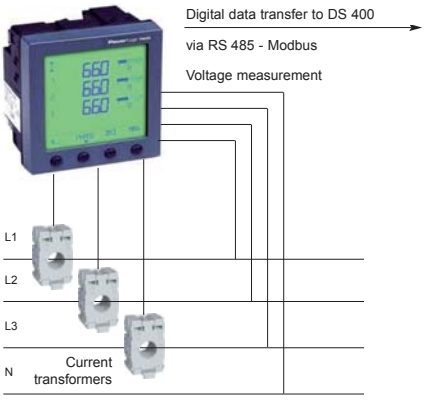
Pressure

Temperature

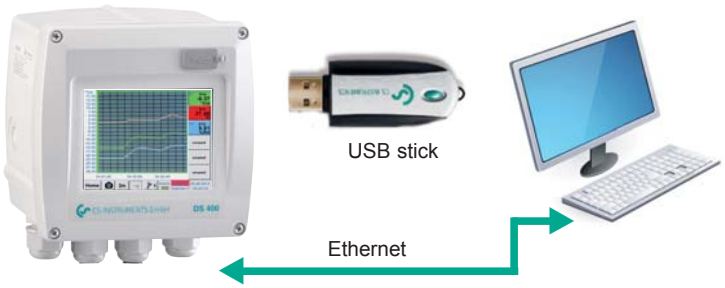
Power

Current / effective power meter

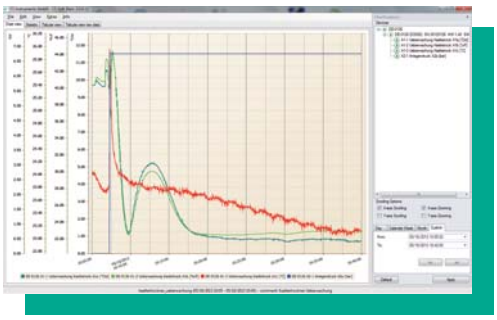
Description	Order no.
CS PM 710 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5343
Current transformer 100/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 21 mm)	0554 5344
Current transformer 200/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 21 mm)	0554 5345
Current transformer 300/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5346
Current transformer 500/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5347
Current transformer 600/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5348
Current transformer 1000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 65 x 32 mm)	0554 5349
Current transformer 2000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 127 x 38 mm)	0554 5350
Connection cable to DS 400, 5 m, with open ends	0553 0108
Connection cable to DS 400, 10 m, with open ends	0553 0109



CS Soft Basic - evaluation of measured data for single computers



The measured data stored in the data logger integrated in DS 400 can be read-out via USB stick.
If DS 400 has the optional Ethernet interface the measured data can also be read-out over big distances via the computer network.



Graphic evaluation

All measurement curves are indicated in different colours.
All necessary functions like free zoom, selection/deselection of single measured curves, free selection of time periods, scaling of the axis, selection of colours and so on are integrated:
This view can be stored as a pdf file and sent by e-mail.
Different data can be merged in one common file.

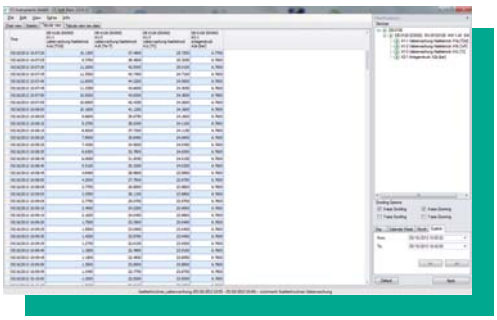
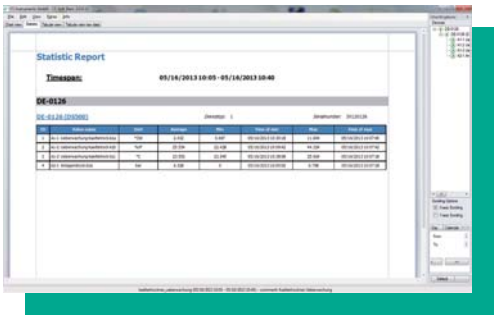


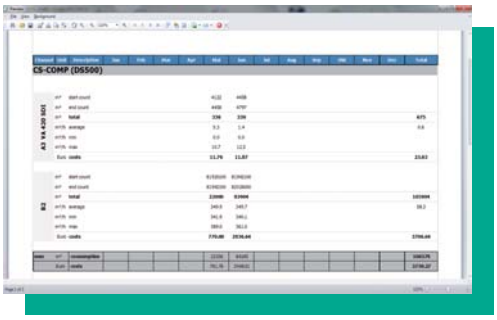
Table view

All measured points are listed with the exact time interval.
The desired measuring channels with the measuring site name can be selected via the diagram explorer.



Statistics

All necessary statistic data are apparant at a glance.
So the user can quickly see which minimum or maximum measured values occurred at which time and for how long.

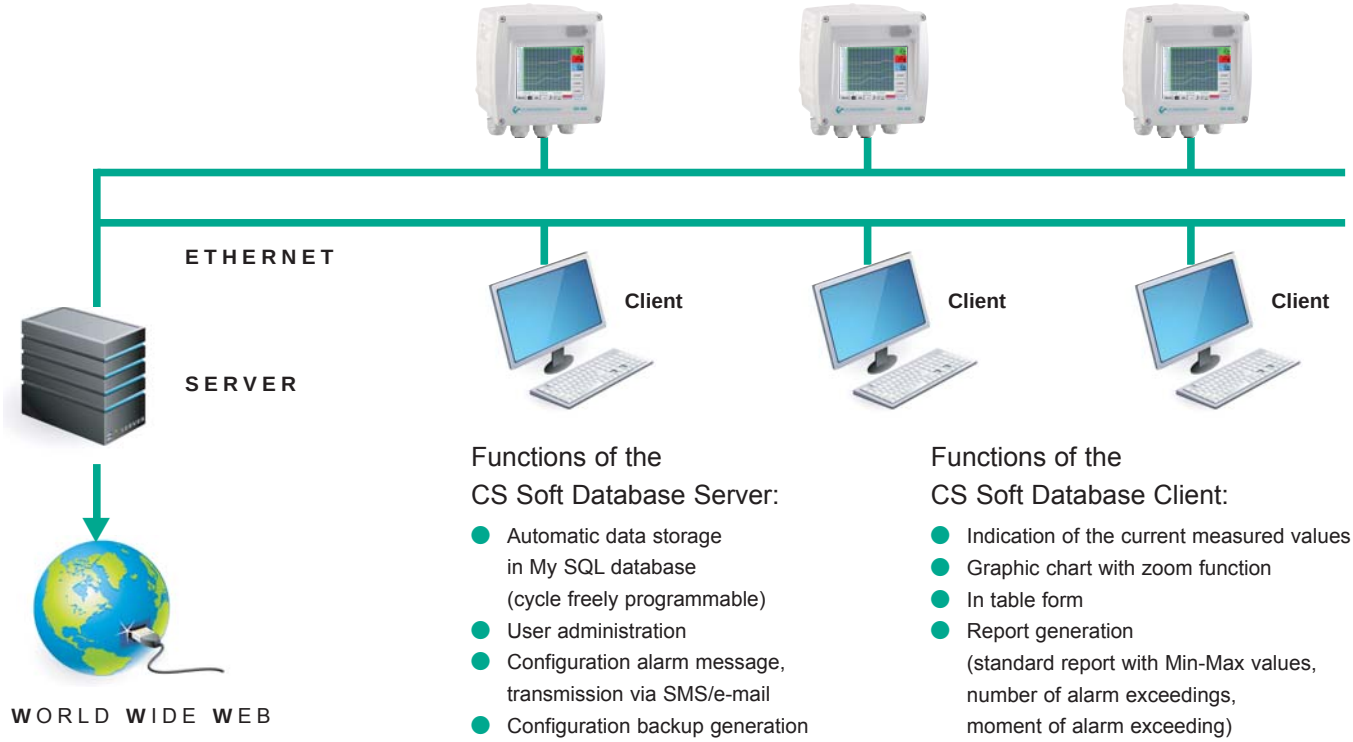


Energy and flow evaluation

The software carries out on energy and flow analysis for all connected flow sensors optionally as daily, weekly or monthly report.

CS Soft Network - evaluation of the measured data for several computers in the network

By means of the CS Soft Database Client/ Server Solution an optional number of DS 500/DS 400 instruments can be evaluated via Ethernet. The software stores the measured data of all DS 500/DS 400 cyclically (cycle freely selectable) in a SQL database on the server. In case of an exceeding of the given alarm thresholds the software automatically sends an SMS or an e-mail. Furthermore, different user levels can be defined in the server software so that single staff members only can access measured data of certain DS 500/DS 400. The evaluation of the measured data can be carried out by means of the client software from each PC within the company.



Functions of the CS Soft Database Server:

- Automatic data storage in My SQL database (cycle freely programmable)
- User administration
- Configuration alarm message, transmission via SMS/e-mail
- Configuration backup generation

Functions of the CS Soft Database Client:

- Indication of the current measured values
- Graphic chart with zoom function
- In table form
- Report generation (standard report with Min-Max values, number of alarm exceedings, moment of alarm exceeding)
- Automatic consumption report

Access to the measured values via the webserver

With the option "Webserver" (order no. Z500.4005) DS 400 can be contacted without any special software from each web browser (e.g. Mozilla Firefox ®, Microsoft Internet Explorer ®).
The access can also be done via the World Wide Web. The webserver indicates the actual measured values of all sensors as well as the status of the alarm relays and the logger status in the web browser.

Connection to Bus systems

RS 485 network (Modbus RTU)
or Ethernet (Modbus/TCP)

With the option "Ethernet / RS 485 - interface" (order no. Z500.4004) DS 400 can be connected to customer-owned Bus systems (e.g. PLC, building management system BMS, central control system, SCADA, …).
The measured values of all sensors can be retrieved via Modbus protocol. A detailed protocol description is enclosed with each DS 400 instrument. When using the Ethernet interface the IP address at DS 400 can be freely adjusted. As an alternative DS 400 waits for the address allocation by a DHCP server.

FA 400 from -80 to 20 °C_{td}

FA 400 is the ideal dew point measuring instrument with integrated display and alarm relay for refrigeration, membrane and adsorption dryers

It replaces the worldwide proven instrument FA 200.
The threshold value can be easily adjusted via the keypad.

Alarm adjustable via keypad

Special features

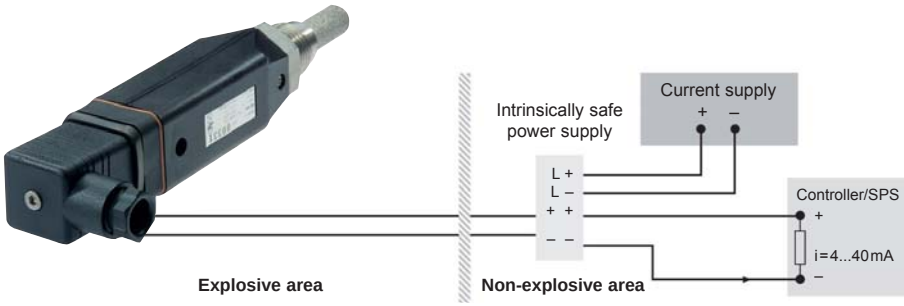
- -80...20 °C_{td}
- Integrated display
- Threshold value adjustable via keypad alarm relay (max. 60 VDC, 0.5 A)
- Pressure-tight up to 350 bar (special version)
- Extreme long-term stability
- Quick response time
- 4...20 mA analogue output
- 2 versions: Refrigeration dryers and adsorption dryers

Description	Order no.
FA 400 dew point sensor for refrigeration dryers, -20...50 °Ctd	0699 0401
FA 400 dew point sensor for adsorption dryers, -80...20 °Ctd	0699 0402
FA 400 dew point sensor, replacement of FA 200, -60...30 °Ctd	0699 0403
Connection cables:	
Connection cable, length: 5m (power supply and analogue output)	0553 0104
Connection cable, length 10m (power supply and analogue output)	0553 0105
Alarm cable, length: 5m	0553 0106
Alarm cable, length: 10m	0553 0107
Options for FA 400:	
Special version FA 400 up to 350 bar	0699 4003
Special scaling, output in ppm V/V, % RH, mg/m³	0699 4004
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S Software, see page 39	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Power supply 100-240 VAC/24 VDC, 0.35 A for FA/VA 400 Series, 2 m cable	0554 0107
Calibration:	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at 3 °Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Technical data FA 400

Measuring range:	-80...20 °C_{td}, -60...30 °C_{td}, -20...50 °C_{td} resp. 0...100 % RH
Accuracy:	± 1 °C at 20...-20 °C_{td} ± 2 °C at -20...-50 °C_{td} ± 3 °C at -50...-80 °C_{td}
Pressure range:	-1...50 bar special version up to 350 bar
Power supply:	24 VDC (16...30 VDC) smoothed
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...50 °C
Connection:	2 x M12, 5-pole for analogue output and alarm output
PC connection:	SDI interface
Output:	4...20 mA = -80...20 °C_{td} 4...20 mA = -60...30 °C_{td} 4...20 mA = -20...50 °C_{td}
Burden for analogue output:	< 500 Ohm
Alarm relay:	NO, max. 60 VDC, 0.5 A
Screw-in thread:	G1/2"
Dimensions:	Ø 65 mm, length 160 mm
Output signals via software:	% RH, °C_{td}, g/m³, mg/m³, ppm V/V

FA 300 Ex -80 to 20 °C_{td}



Special features

- Robust design
- Pressure-tight up to 300 bar
- Long-term stable humidity sensor, approved for years
- 4...20 mA analogue output in 2-wire system
- Further parameters adjustable via software: % RH, g/m³, mg/m³, ppm V/V, g/kg
- CS Service Software for data storage and calibration (no approval for explosive areas)

Technical data FA 300-2 Ex

Measuring range:	Pressure dew point in °C_{td}
FA 300-2 Ex:	-80...20 °C_{td} = 4...20 mA
Pressure range:	-1...300 bar
Power supply:	24 VDC (10...30 VDC)
Accuracy:	± 0,5 °C at -10...50 °C_{td} typical ± 2 °C at -40 °C_{td}
Output:	4...20 mA in 2-wire technology
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Storage temp.:	-40...80 °C
Burden for analogue output:	< 500 Ohm
Screw-in thread:	G1/2" stainless steel
Housing material:	polycarbonate
Sensor protection:	Sintered filter 50 µm stainless steel

FA 300-2 Ex measures the dew point resp. the pressure dew point in explosive areas of Zone 1.
Protection class: FA 300-2 Ex:
I 2G Ex ia II C T4

With the Atex approval for Zone 1 the established dew point measuring instruments FA 300-2 can now be used in explosive areas of the industry as well.
FA 300-2 Ex may only be used in connection with approved Ex-rated power supplies or safety barriers or galvanic separating elements
with max.: U0 = 30 V max.
I0 = 100 mA max.
P0 = 1 W max.

Description	Order no.
FA 300-2 Ex pressure dew point meter	0699 3070
Measuring chamber up to 350 bar	0699 3590
Special scaling Analogue output to other humidity parameters: % RH g/m³, mg/m³, ppm V/V, g/kg	0699 4004
Intrinsically safe power supply, safety barriers	0554 3071

Mains units

Mains unit in wall housing ▶

Mains unit in wall housing ▲

Mains unit on DIN rail ▶

Power supply ▲

Mains unit in wall housing:

Special features:

- Detachable screwing clamps for easy wiring
- Galvanic separation of the pulse output of consumption sensors VA 400/410
- 2 relay outputs (230 VAC, 3 A) for alarm signal amplification at dew point sensors FA 400, FA 416
- Live parts protected untouchably in housing

Description	Order no.
Mains unit in wall housing for sensors of the Series VA/FA, 100-240 V, 10 VA, 50-60 Hz / 24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail, 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Power supply 100-240 VAC/24 VDC, 0.35 A for Series VA/FA 400, 2 m cable	0554 0107

Technical data for mains unit in wall housing

Dimensions:	118 x 133 x 92 mm (WxHxD)
Power supply:	100-240 VAC, 10 VA, 50-60 Hz
Output:	24 VDC, 0.35 A
Relay:	2 pieces, change-over contacts, 230 VAC, 3 A

Accessories for **dew point measurement** and **calibration**

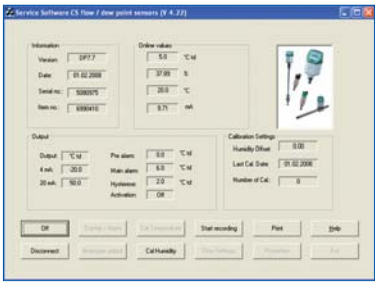
CS Service Software

for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S for data recording.

The humidity sensors FA 400, FA 410, FA 415, FA 416 can be connected to the PC and the following adjustments can be carried out by means of the CS Service Software:

- Scaling of the 4...20 mA analogue output
- Selecting the units: % RH, °C_{td}, g/m^3, mg/m^3, ppm V/V
- Reading out of: Version no., production date, serial no., date of last calibration
- Adjustment of the alarm limits
- Single-point calibration (adjustment) - for this purpose a reference measuring instrument is required

By means of the CSM-S the measured data can be read out online at the PC. It can be stored and evaluated in graphic and in table form.



The right measuring chamber for each measuring task:

Standard measuring chamber for compressed air up to 16 bar
Order no. **0699 3390**

Measuring chamber for atmospheric dew point
Order no. **0699 3690**

High-pressure measuring chamber for compressed air up to 350 bar*
Order no. **0699 3590**

Measuring chamber for respiratory air bottles up to 350 bar*
Order no. **0699 3790**

Measuring chamber for granulate dryers
up to 250 mbar
Order no. **0699 3490**

* in case of pressures higher than 50 bar please order special version FA 400 / FA 410.

Mounting recommendation

The dew point meters can be mounted directly into the air stream.

However, we recommend always to use a screwable measuring chamber.

Screwable measuring chamber
Advantage: Easy installation via fast coupling

Calibration of **dew point sensors**

The calibration range for dew point sensors is -80...+20°C_{td}

It is possible to calibrate dew point sensors of CS Instruments as well as of other manufacturers.
High precision reference measuring instruments with DKD resp. BAM certificate grant an accuracy of up to 0.1°C dew point.

Calibration range: from -80 to 20°C_{td}

Accuracy of the DKD reference: 0.1°C_{td}

Description	Order no.
Recalibration and precision calibration at -40 °Ctd including ISO certificate	0699 3333
Precision calibration in the range -80...20 °Ctd, °Ctd points freely selectable	0700 7710
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Special feature

- Due to the digital data transfer only the dew point sensor has to be calibrated, enabling the display unit DS 300 to stay on-site at all times.

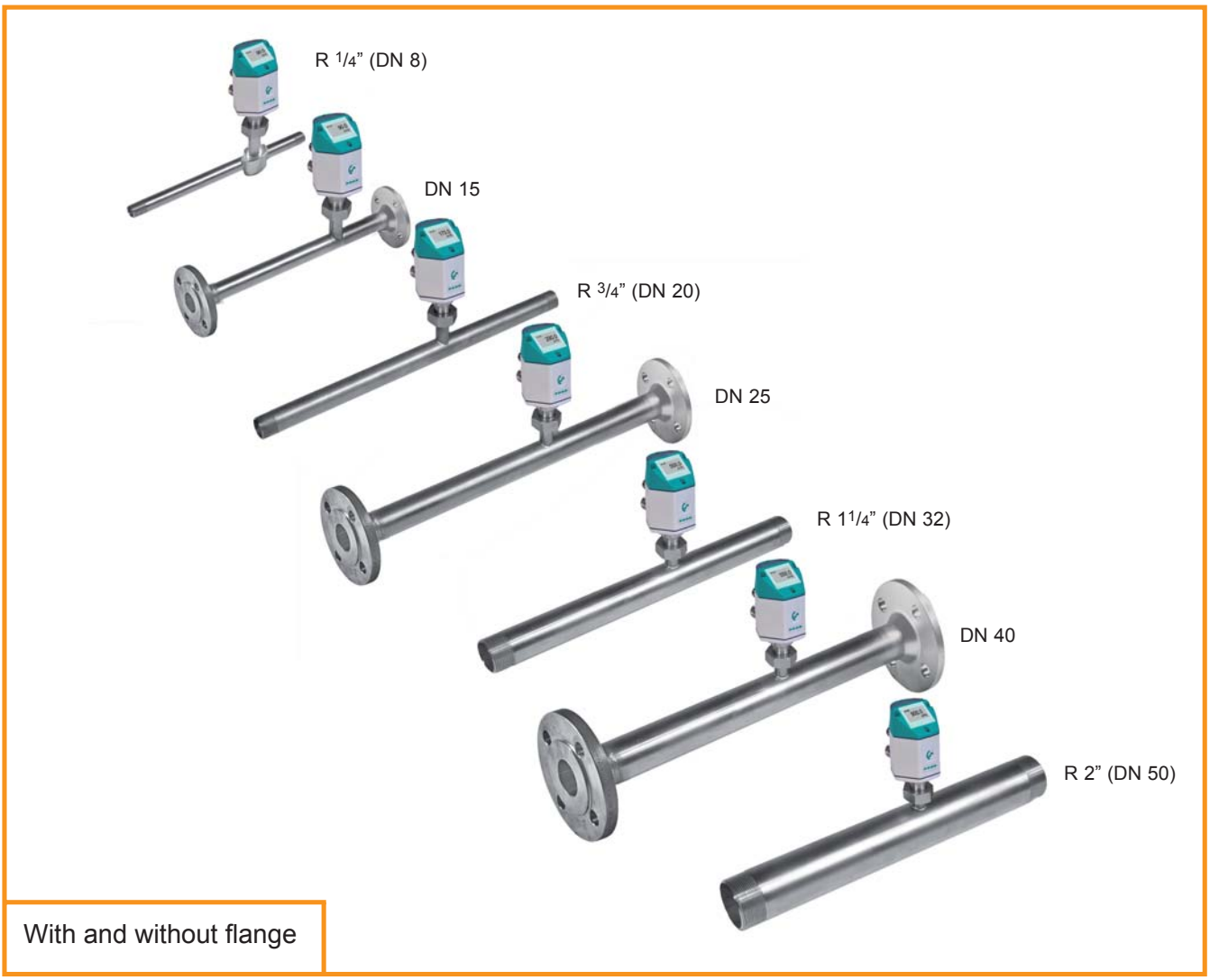
Control and calibration set

Control and calibration sets gurantee a defined humidity by means of a saturated saline solution.

The control and calibration set is screwed onto the dew point sensor and therefore enables an easy and low-priced possibility for on-site control and calibration down to -20°C dew point.

VA 420

The affordable flow meter for compressed air and gases



With and without flange

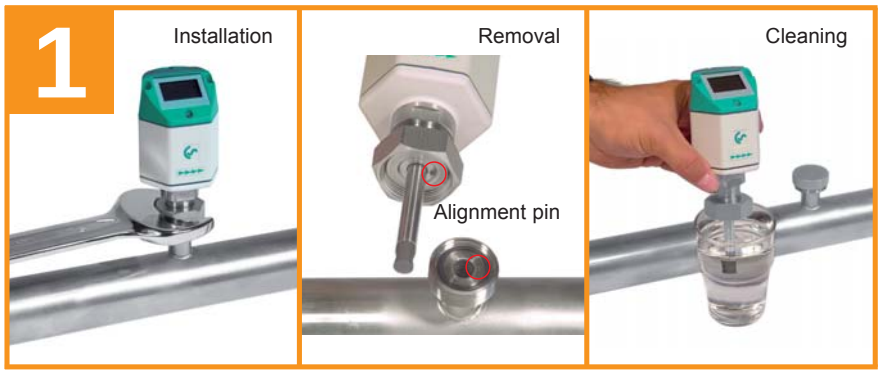
Intelligent solutions for accurate flow measurement for compressed air and gases

The new affordable flow meters VA 420 work according to the approved calorimetric measuring principle. In this process a heated sensor is cooled down by the gas circulating around it. The flow-dependent cooling-down is used as a measuring effect while the degree of cooling-down is directly depending on the passing air resp. gas mass. Therefore, an additional pressure and temperature compensation is not necessary.

Due to its compact design it is possible to monitor all compressed air systems from the compressor to the smallest compressed air tool (1/4" to 2 inch) with the new affordable flow meter VA 420.
VA 400 flow sensors are available for larger pipe diameters from DN 50 to DN 300. Apart from compressed air also other gases like e. g. nitrogen, oxygen and CO_2 can be measured.

The installation of the compressed air flow meter VA 420 can be done easily and quickly. A special advantage is the removable measuring device. The measuring device can be demounted quickly and easily for calibration or cleaning purposes without removing the complete measuring section.

Removal of the measuring device without complete dismounting of the measuring section



In most cases the compressed air in not free from oil, condensate, dirt and particles. In the course of time this leads to a soiling of the flow meters which may cause errors in measurement or even a total breakdown.
The flow meters which have been on the market up to now generally cannot be cleaned and will be exchanged if they are soiled. In case of compressed air meters with integrated measuring section the "measuring device" cannot be removed. For this reason an expensive bypass line is necessary.

New. The design of **VA 420** enables the removal and cleaning of the "measuring device" with e. g. soap water without any dismounting of the measuring section.
A closing cap grants a continuous use of the line for the duration of the cleaning.
A bypass line is not necessary.
The alignment pin grants an accurate installation of the measuring device.

Stationary use

For stationary use there are the following outputs available for the data transfer to a building management system or PLC:
4…20 mA for actual flow.
Pulse output (galvanically separated) for the total consumption.

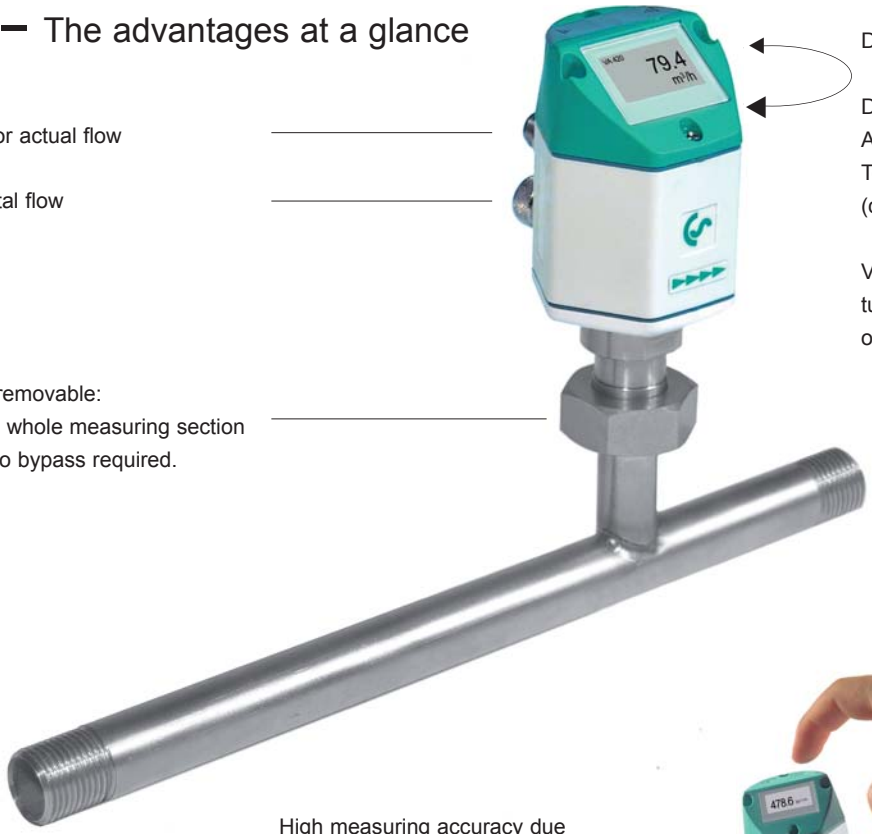
Mobile use

By means of quick couplings the flow meter can be integrated quickly into the feed hose of a machine. During the shutdown of the machine it is possible to determine the leak rate, the actual flow can be obtained when the machine is running. The power supply is effected via the power socket by means of the mains unit. For data recording over a longer period of time we recommend to use the compressed air analyzer DS 300 mobile.

Solution for large pipe diameters

The approved flow sensor VA 400 is available for pipe diameters of 2" to DN 300. Its constructively sophisticated design enables the installation into pipes with nominal diameters up to DN 300 even under pressure. The installation is effected by means of a standard ½" ball valve.

VA 420 – The advantages at a glance



4…20 mA output for actual flow

Pulse output for total flow
(counter reading)

Measuring device removable:
Dismounting of the whole measuring section is not necessary, no bypass required.

Display twistable by 180°

Display shows 2 values:
Actual flow in m³/h, l/min,…
Total consumption
(counter reading) in m³, l

Values indicated in the display turnable by 180°, e. g. in case of overhead installation

Screw-in thread:
Easy installation into the existing pipeline due to integrated measuring section (suitable for 1/4", 1/2", 3/4", 1", 1 1/4", 1½" or 2" lines).

High measuring accuracy due to defined measuring section (inlet and outlet section).

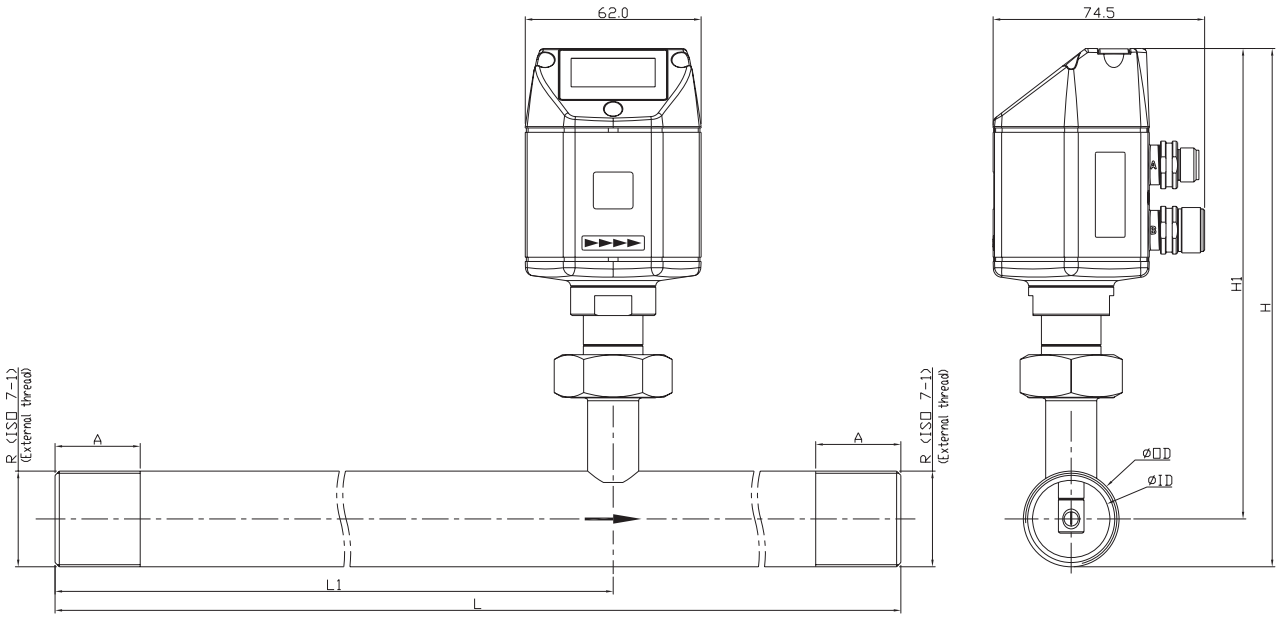
At the touch of a button:
– reset of counter reading
– selection of units

Application-technological features of the flow meters VA 420:

- Easy and affordable installation
- Units freely selectable via keypad m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Compressed air counter up to 1,999,999,999 m³. Resettable to "zero" via keypad
- Analogue output 4...20 mA, pulse output (galvanically separated)
- High measuring accuracy also in the lower measuring range (ideal for leakage measurement)
- Negligibly small loss of pressure
- Calorimetric measuring principle, no additional pressure and temperature measurement necessary, no mechanically moved parts
- Gas types adjustable via software (nitrogen, oxygen, CO_2, nitrous oxide, argon)

Application range of VA 420:

- Compressed air balancing, compressed air consumption measurement
- Leakage air / leak rate determination
- Mobile compressed air measurement in front of single machines/plants
- Flow measurement of process gases like e. g. nitrogen, CO_2, oxygen, argon, nitrous oxide
- Flow measurement at nitrogen generators



Flow measuring ranges VA 420 for compressed air (ISO 1217: 1000 mbar, 20°C)

Connection thread	Outer pipe dia. mm	Inner pipe dia. mm	Measuring range from	to	L mm	L_1 mm	H mm	H_1 mm	A mm
R 1/4"	13.7	8.9	0.8	90 l/min	194	137	174.7	165.7	15
R 1/2"	21.3	16.1	0.2	90 m³/h	300	210	176.4	165.7	20
R 3/4"	26.9	21.7	0.3	170 m³/h	475	275	179.2	165.7	20
R 1"	33.7	27.3	0.5	290 m³/h	475	275	182.6	165.7	25
R 1 1/4"	42.4	36.0	0.7	480 m³/h	475	275	186.9	165.7	25
R 1 1/2"	48.3	41.9	1.0	550 m³/h	475*	275	189.9	165.7	25
R 2"	60.3	53.1	2.0	900 m³/h	475*	275	195.9	165.7	30

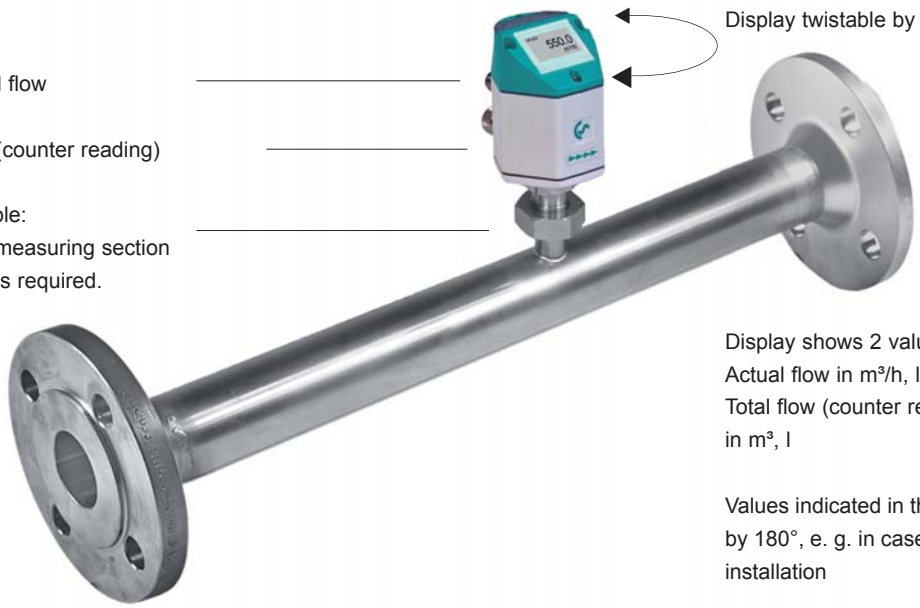
* Attention: Shortened inlet section! Please observe the recommended minimum inlet section (length = 10 x inner diameter) on site.

Description	Order no. Stainless steel 1.4404	Order no. Stainless steel 1.4301
VA 420 with integrated 1/4" measuring section	0695 1420	0695 0420
VA 420 with integrated 1/2" measuring section	0695 1421	0695 0421
VA 420 with integrated 3/4" measuring section	0695 1422	0695 0422
VA 420 with integrated 1" measuring section	0695 1423	0695 0423
VA 420 with integrated 1 1/4" measuring section	0695 1426	0695 0426
VA 420 with integrated 1 1/2" measuring section	0695 1424	0695 0424
VA 420 with integrated 2" measuring section	0695 1425	0695 0425
Option: High-pressure version PN 40		Z695 0411
Special measuring range VA 420 according to customer's requirements		Z695 4006
Connection cables:		
Connection cable 5 m (power supply, analogue output)		0553 0104
Connection cable 10 m (power supply, analogue output)		0553 0105
Pulse cable for flow sensors with M12 plug, length 5 m		0553 0106
Pulse cable for flow sensors with M12 plug, length 10 m		0553 0107
Further accessories:		
Closing cap for meas. section VA 420 (Material: Aluminium)		0190 0001
Closing cap for meas. section VA 420 (Material: Stainless steel 1.4404)		0190 0002
CS Service Software for FA/VA 400 sensors including PC connection set, USB interface and interface adapter to the sensor as well as CSM-S Software		0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24VDC, 0.35 A		0554 0108
Mains unit 100-240 VAC / 24 VDC, 0.35 A for VA/FA 400 Series, 2 m cable		0554 0107
5 point precision calibration with ISO certificate		3200 0001

Technical data VA 420

Parameters:	m³/h, l/min (1000 mbar, 20 °C) in case of com pressed air resp. Nm³/h, Nl/min (1013 mbar, 0 °C in case of gases
Adjustable via keypad:	m³/h, m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, nitrous oxide, CO_2, oxygen
Meas. range:	see table at the left
Accuracy:	±1.5% of m.v., ±0.05% of f.s. On request: Special calibration via 5 point ISO calibration certificatet
Operating temp.:	-30...80 °C
Operating press.:	up to 16 bar Optional up to PN 40
Analogue output:	4...20 mA for m³/h resp. l/min
Pulse output:	1 pulse per m³ resp. per liter galvanically separated
PC connection:	SDI interface
Power supply:	24 VDC smoothed ± 15 %
Burden:	< 500 Ohm
Housing:	polycarbonate
Meas. section:	stainless steel, 1.4301 or 1.4404
Mounting thread meas. section:	R 1/4", R 1/2", R 3/4", R 1", R 1 1/4", R 1 1/2", R 2" external thread

VA 420 – The advantages at a glance



Display twistable by 180°

4…20 mA output for actual flow

Pulse output for total flow (counter reading)

Measuring device removable:
Dismounting of the whole measuring section is not necessary, no bypass required.

Display shows 2 values:
Actual flow in m³/h, l/min,…
Total flow (counter reading) in m³, l

Values indicated in the display turnable by 180°, e. g. in case of overhead installation

Easy installation into the existing pipeline due to integrated measuring section and weld neck flange (according to EN 1092-1 PN 40)

High measuring accuracy due to defined measuring section (inlet and outlet section).

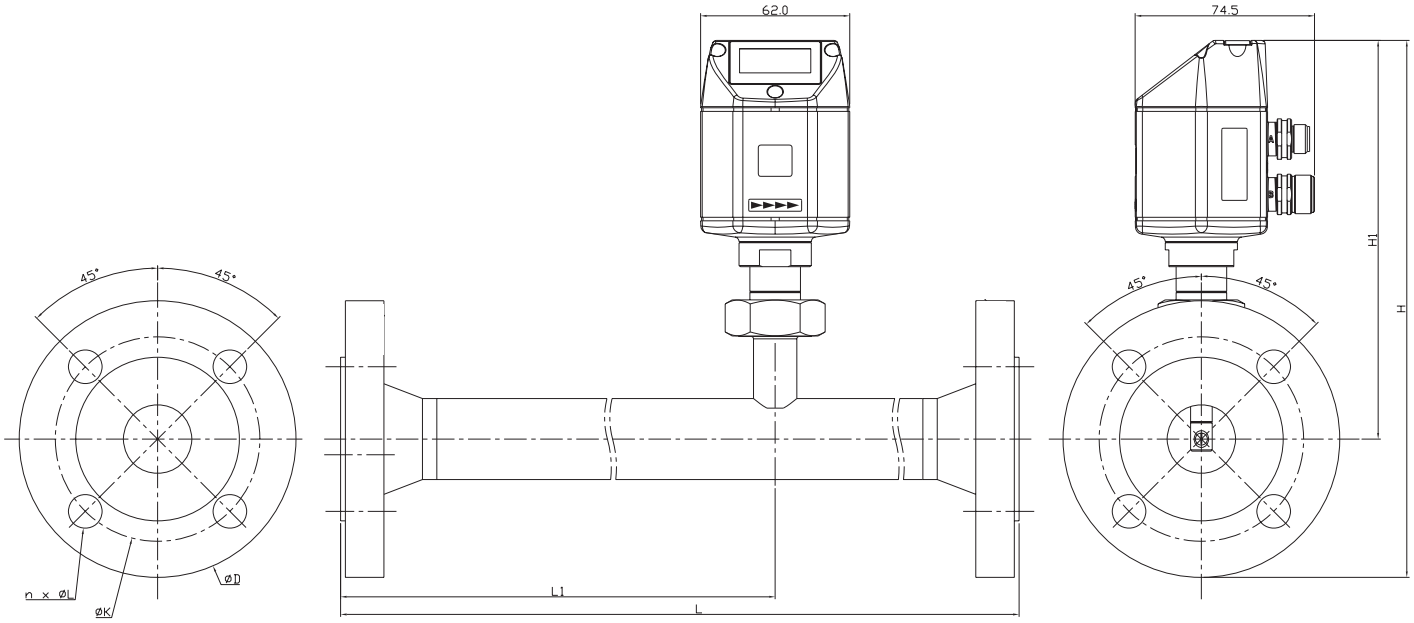
At the touch of a button:
– reset of counter reading
– selection of units

Application-technological features of the consumption counters VA 420:

- Easy and affordable installation
- Units freely selectable via keypad m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Compressed air counter up to 1,999,999,999 m³. Resettable to "zero" via keypad
- Analogue output 4...20 mA, pulse output (galvanically separated)
- High measuring accuracy also in the lower measuring range (ideal for leakage measurement)
- Negligibly small loss of pressure
- Calorimetric measuring principle, no additional pressure and temperature measurement necessary, no mechanically moved parts
- Gas types adjustable via software (nitrogen, oxygen, CO_2, nitrous oxide, argon)

Application range of VA 420:

- Compressed air balancing, compressed air consumption measurement
- Leakage air / leak rate determination
- Flow measurement of process gases like e. g. nitrogen, CO_2, oxygen, argon, nitrous oxide
- Flow measurement at nitrogen generators



Flow measuring ranges VA 420 for compressed air (ISO 1217: 1000 mbar, 20°C)

Measur. section	Outer pipe dia. mm	Inner pipe dia. mm	Measuring range from	to	L mm	L_1 mm	H mm	H_1 mm	Flange DIN EN 1092-1 ØD	ØK	n x ØL
DN 15	21.3	16.1	0.2	90 m³/h	300	210	213.2	165.7	95	65	4 x 14
DN 20	26.9	21.7	0.3	170 m³/h	475	275	218.2	165.7	105	75	4 x 14
DN 25	33.7	27.3	0.5	290 m³/h	475	275	223.2	165.7	115	85	4 x 14
DN 32	42.4	36.0	0.7	480 m³/h	475	275	235.7	165.7	140	100	4 x 18
DN 40	48.3	41.9	1.0	550 m³/h	475*	275	240.7	165.7	150	110	4 x 18
DN 50	60.3	53.1	2.0	900 m³/h	475*	275	248.2	165.7	165	125	4 x 18

* Attention: Shortened inlet section! Please observe the recommended minimum inlet section (length = 10 x inner diameter) on site.

Description	Order no.
VA 420 with integrated DN 15 measuring section with weld neck flange	0695 2421
VA 420 with integrated DN 20 measuring section with weld neck flange	0695 2422
VA 420 with integrated DN 25 measuring section with weld neck flange	0695 2423
VA 420 with integrated DN 32 measuring section with weld neck flange	0695 2426
VA 420 with integrated DN 40 measuring section with weld neck flange	0695 2424
VA 420 with integrated DN 50 measuring section with weld neck flange	0695 2425
Option: High-pressure version PN 40	Z695 0411
Special measuring range VA 420 according to customer's requirements	Z695 4006
Connection cables:	
Connection cable 5 m (power supply, analogue output)	0553 0104
Connection cable 10 m (power supply, analogue output)	0553 0105
Pulse cable for flow sensors with M12 plug, length 5 m	0553 0106
Pulse cable for flow sensors with M12 plug, length 10 m	0553 0107
Further accessories:	
Closing cap for meas. section VA 420 (Material: Aluminium)	0190 0001
Closing cap for meas. section VA 420 (Material: Stainless steel 1.4404)	0190 0002
CS Service Software for FA/VA 400 sensors including PC connection set, USB interface and interface adapter to the sensor as well as CSM-S Software	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24VDC, 0.35 A	0554 0108
Mains unit 100-240 VAC / 24 VDC, 0.35 A for VA/FA 400 Series, 2 m cable	0554 0107
5 point precision calibration with ISO certificate	3200 0001

Technical data VA 420

Parameters:	m³/h, l/min (1000 mbar, 20°C) in case of com pressed air resp. Nm³/h, Nl/min (1013 mbar, 0°C) in case of gases
Adjustable via keypad:	m³/h, m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, nitrous oxide, CO_2, oxygen
Meas. range:	see table at the left
Accuracy:	±1.5% of m.v., ±0.05% of f.s. On request: Special calibration via 5 point ISO calibration certificatet
Operating temp.:	-30...80 °C
Operating press.:	up to 16 bar Optional up to PN 40
Analogue output:	4...20 mA for m³/h resp. l/min
Pulse output:	1 pulse per m³ resp. per liter galvanically separated
PC connection:	SDI interface
Power supply:	24 VDC smoothed ± 15 %
Burden:	< 500 Ohm
Meas. section:	stainless steel, 1.4404
Flanges:	Weld neck flange according to DIN EN 1092-1 Groove-faced and tongue-faced flange on request

What are the advantages of **the flow measuring technology** of CS Instruments?

❶ Even under pressure, the flow sensor VA 400 is mounted by means of a standard 1/2" ball valve. During mounting and dismounting the safety ring avoids an uncontrolled ejection of the probe which may be caused by the operating pressure.

For the mounting into different pipe diameters VA 400 is available in the following probe lengths: 120, 160, 220, 300, 400 mm.

So the flow sensors are being mounted into existing pipelines with inner diameters of 1/2" upwards.

The exact positioning of the sensor in the middle of the pipe is granted by means of the engraved depth scale. The maximum mounting depth corresponds with the respective probe length. Example: VA 400 with probe length 220 mm has a maximum mounting depth of 220 mm.

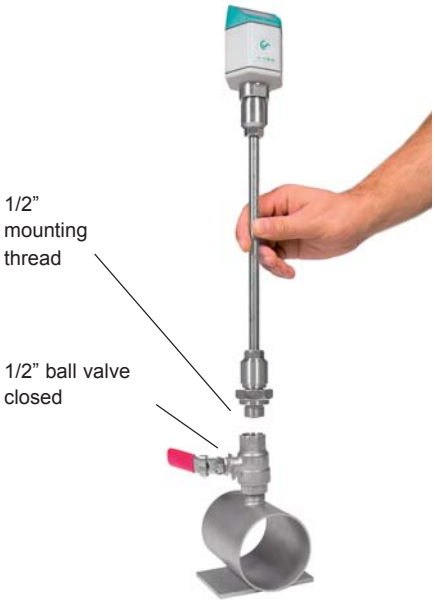
❷ If there is no suitable measuring site with a 1/2" ball valve present there are two simple possibilities to set up a measuring point:

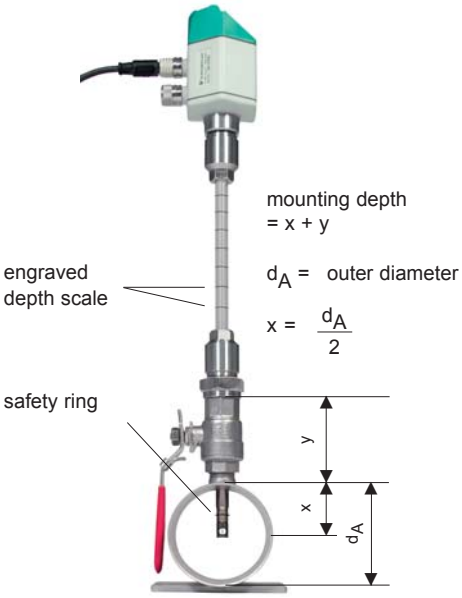
A Weld on a 1/2" screw neck and screw on a 1/2" ball valve.

B Mount spot drilling collar incl. ball valve (see accessories).

By means of the drilling jig it is possible to drill under pressure through the 1/2" ball valve into the existing pipeline. The drilling chips are collected in a filter. Then the probe can be mounted as described under point A.

❸ Due to the large measuring range of the probe even extreme requirements to the consumption measurement (high volume flow in small pipe diameters) can be met. The measuring range is depending on the pipe diameter - see table on the right hand side.





A Screw neck

B Spot drilling collar

Drilling under pressure

Flow measuring ranges VA 400 for compressed air (ISO 1217: 1000 mbar, 20°C)

Inner diameter of pipe			**VA 400 Standard** (92.7 m/s)	**VA 400 Max.** (185.0 m/s)	**VA 400 HighSpeed** (224.0 m/s)
Inch	mm		Meas. ranges from ... to	Meas. ranges from ... to	Meas. ranges from ... to
1/2"	16.1	DN 15	2.5...760 l/min	3.5...1516 l/min	6.0...1836 l/min
3/4"	21.7	DN 20	0.3...89 m^3/h	0.4...178 m^3/h	0.7...215 m^3/h
1"	27.3	DN 25	0.5...148 m^3/h	0.6...295 m^3/h	1.1...357 m^3/h
1 1/4"	36.0	DN 32	0.9...280 m^3/h	1.2...531 m^3/h	2.5...644 m^3/h
1 1/2"	41.9	DN 40	1.2...366 m^3/h	1.5...732 m^3/h	3.0...886 m^3/h
2"	53.1	DN 50	2...600 m^3/h	2.5...1198 m^3/h	4.6...1450 m^3/h
2 1/2"	71.1	DN 65	3.5...1096 m^3/h	5...2187 m^3/h	7...2648 m^3/h
3"	84.9	DN 80	5...1570 m^3/h	7...3133 m^3/h	12...3794 m^3/h
4"	110.0	DN 100	9...2645 m^3/h	12...5279 m^3/h	16...6391 m^3/h
5"	133.7	DN 125	13...3912 m^3/h	18...7808 m^3/h	24...9453 m^3/h
6"	159.3	DN 150	18...5560 m^3/h	25...11097 m^3h	43...13436 m^3/h
8"	200.0	DN 200	26...8786 m^3/h	33...17533 m^3/h	50...21230 m^3/h
10"	250.0	DN 250	40...13744 m^3h	52...27429 m^3/h	80...33211 m^3/h
12"	300.0	DN 300	60...19815 m^3/h	80...39544 m^3/h	100...47881 m^3/h

VA 400

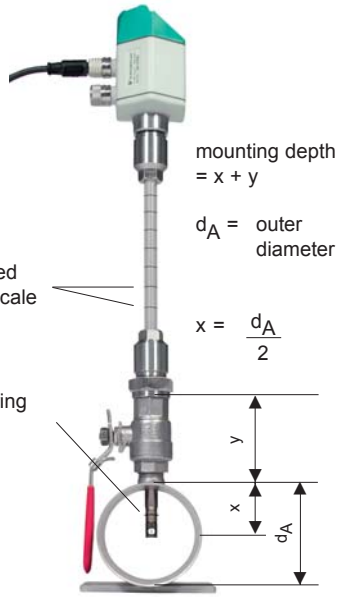
Flow sensor for compressed air and gases

The new VA 400 for flow measurement of compressed air and gases in a robust housing with and without display with actual flow in m^3/h and counter in m^3.

Special features

- Integrated display for m^3/h und m^3
- Depth scale for accurate installation
- Usable from 1/2” to 12” (DN 300)
- Easy installation under pressure
- 4...20 mA analogue output for m^3/h resp. m^3/min
- Pulse output for m^3
- Inner diameter adjustable via keypad
- Consumption counter resettable

Inner diameter adjustable via keypad

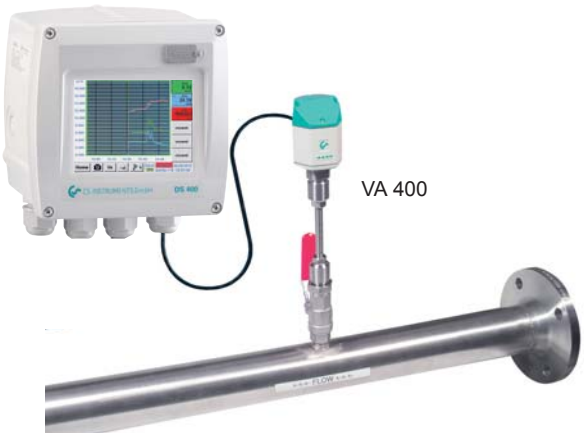


Description	Order no.
VA 400 flow sensor in basic version: Standard (92.7 m/s), probe length 220 mm, without display	0695 4001
Options for VA 400:	
Display	Z695 4000
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Probe length 120 mm	ZSL 0120
Probe length 160 mm	ZSL 0160
Probe length 300 mm	ZSL 0300
Probe length 400 mm	ZSL 0400
Connection cables:	
Connection cable, 5 m (power supply, analogue output, pulse output)	0553 0104
Connection cable, 10 m (power supply, analogue output, pulse output)	0553 0105
Additional accessories:	
CS Service Software for FA/VA 400 sensors incl. PC connection set, USB adapter and interface adapter to sensor as well as CSM-S Software	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0,35 A	0554 0108
External wall display multifunction measuring instrument DS 300	see page 36
5 point precision calibration with ISO certificate	3200 0001

Technical data VA 400

Parameters:	m^3/h, l/min (1000 mbar, 20 °C) in case of com pressed air resp. Nm^3/h, Nl/min (1013 mbar, 0 °C) in case of gases
Adjustable via software:	m^3/h, m^3/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min.
Adjustable via keypad:	diameter for volume flow calculation, counter resettable
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, helium, CO_2, oxygen
Meas. range:	see table page 34
Accuracy:	± 4 % m.v. ± 3 % m.v. via 5 point ISO precision calibration
Operating temp.:	-30...110 °C probe tube -30...80 °C housing
Operating pressure:	up to 50 bar
Analogue output:	4...20 mA for m^3/h resp. l/min; on request: scaling for cfm, m^3/min, l/min, l/s, ft/min, m/s
Pulse output:	1 pulse per m^3, signal high 24 VDC, for 30 ms
PC connection:	SDI interface
Power supply:	24 VDC
Burden:	< 500 Ohm
Housing:	polycarbonate
Probe tube:	stainless steel, 1,4301 mounting length 220 mm, Ø 10 mm
Mounting thread:	G1/2”
Diameter housing:	65 mm

Flow station **DS 400** for compressed air and gases



Inner diameter of pipe			VA 400 Standard (92.7 m/s)	VA 400 Max. (185.0 m/s)	VA 400 HighSpeed (224.0 m/s)
Inch	mm		Meas. ranges from ... to	Meas. ranges from ... to	Meas. ranges from ... to
1/2”	16.1	DN 15	2.5...760 l/min	3.5...1516 l/min	6.0...1836 l/min
3/4”	21.7	DN 20	0.3...89 m^3/h	0.4...178 m^3/h	0.7...215 m^3/h
1”	27.3	DN 25	0.5...148 m^3/h	0.6...295 m^3/h	1.1...357 m^3/h
1 1/4”	36.0	DN 32	0.9...280 m^3/h	1.2...531 m^3/h	2.5...644 m^3/h
1 1/2”	41.9	DN 40	1.2...365 m^3/h	1.5...728 m^3/h	3.0...882 m^3/h
2”	53.1	DN 50	2...600 m^3/h	2,5...1198 m^3/h	4,6...1450 m^3/h
2 1/2”	71.1	DN 65	3,5...1096 m^3/h	5...2187 m^3/h	7...2648 m^3/h
3”	84.9	DN 80	5...1570 m^3/h	7...3133 m^3/h	12...3794 m^3/h
4”	110.0	DN 100	9...2645 m^3/h	12...5279 m^3/h	16...6391 m^3/h
5”	133.7	DN 125	13...3912 m^3/h	18...7808 m^3/h	24...9453 m^3/h
6”	159.3	DN 150	18...5560 m^3/h	25...11097 m^3/h	43...13436 m^3/h
8”	200.0	DN 200	26...8786 m^3/h	33...17533 m^3/h	50...21230 m^3/h
10”	250.0	DN 250	40...13744 m^3/h	52...27429 m^3/h	80...33211 m^3/h
12”	300.0	DN 300	60...19815 m^3/h	80...39544 m^3/h	100...47881 m^3/h

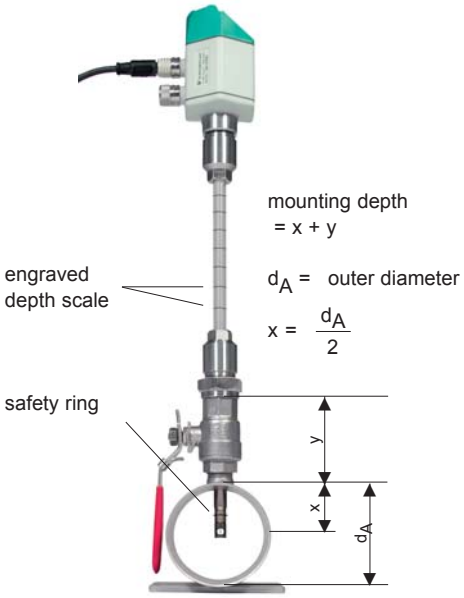
New multifunction measuring instruments DS 400

- 3.5" graphic display with touch screen - shows the progression of the measured values in graphic form
- 2 sensor inputs for flow sensors/ dew point sensors
- USB interface for reading out the data logger via USB stick
- 2 additional sensor inputs for pressure sensors, current meters and so on
- Option: Data logger for 100 million measured values (2 GB SD card)
- Option: Ethernet and RS 485 interface (Modbus protocol)
- Option: Webserver
- Option: CS Soft Basic - comfortable evaluation of the measured data

Flow sensor VA 400

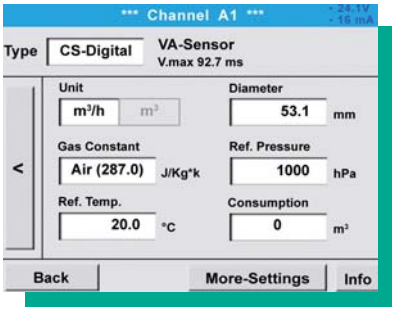
- Easy installation and removal under pressure via 1/2" ball valve
- Several gas types - freely adjustable at DS 400
- Usable from 1/2" to 12" DN 300
- Diamater freely adjustable at DS 400
- Output for 4...20 mA for m^3/h
- Pulse output for m^3 (total flow)

Description	Order no.
Flow station DS 400 for installation into existing pipelines consisting of: Multifunction measuring instrument DS 400 and flow sensor VA 400 in basic version, Standard (92,7 m/s), sensor length 220 mm	0601.4005
Options for DS 400	
Option: Integrated data logger for 100 million measured values	Z500.4002
Option: Integrated Ethernet and RS 485 interface	Z500.4004
Option: 2 additional sensor inputs for analogue sensors (pressure sensors, temperature sensors etc.)	Z500.4001
Option: Integrated webserver	Z500.4005
Options for flow sensor VA 400	
Max. version (185 m/s)	Z695.4003
High Speed version (224 m/s)	Z695.4002
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400
Further accessories	
CS Soft Basic - data evaluation in graphic an table form - reading out of measured data of DS 400 via USB or Ethernet	0554.7040
Calibration	
5 point precision calibration including ISO certificate	3200.0001



Installation even under pressure via customary 1/2” ball valve

Easy operation via touch screen

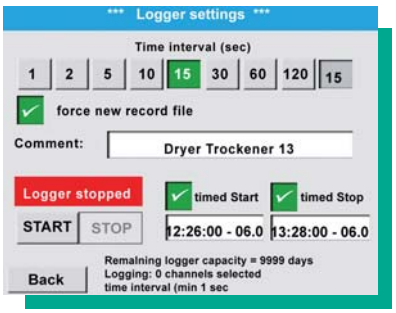


Configuration of flow sensor

The flow sensor VA 400 can be adjusted to the respective inner diameter of the pipe in the menu of DS 400.
Furthermore, the unit, the gas type as well as the reference conditions can be entered.
The counter can be set to "zero" if required.

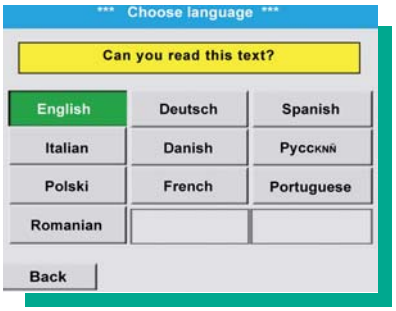
Graphic view

In the graphic view all measured values are indicated as curves.
It is possible to browse back on the time axis by a slide of the finger (without data logger maximum 24 h, with data logger back to the start of the measurement).



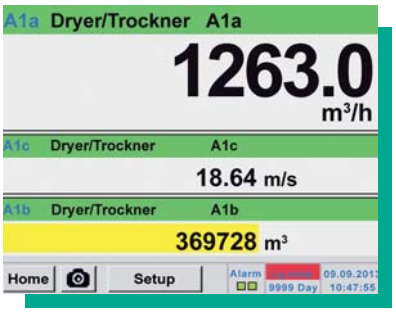
Data logger

Measured values are stored in DS 400 by means of the option "integrated data logger".
The time interval can be freely set. Furthermore there is the possibility to fix the starting time and the end time of the data recording.
Read-out of the measured data via USB interface or via the optional Ethernet interface.



Selection of the language

DS 400 "speaks" several languages.
The required language can be selected by means of the select button.



All relevant parameters at a glance

In addition to the flow in m³/h DS 400 shows further parameters like the total flow in m³ and the velocity in m/s.

Technical data VA 400

Parameters:	m³/h, l/min (1000 mbar, 20°C) in compressed air resp. Nm³/h, Nl/min (1013 mbar, 0°C) in gases
Adjustable via software:	m3/h, m3/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min.
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types selectable via sotware:	air, nitrogen, argon, CO2, oxygen, natural gas
Meas. range:	see table on page 54
Accuracy:	± 4 % v. M. ± 3 % v. M. via 5 point ISO precision calibration
Operating temp:	-30...110 °C probe tube -30...80 °C housing
Operating press.:	up to 50 bar
Analogue output:	4...20 mA
Burden:	< 500 Ohm
Pulse output:	1 pulse per m³
Probe tube:	stainless steel 1.4301
Mounting thread:	G1/2”
Housing diameter:	65 mm

Technical data DS 400

Dimensions:	118 x 115 x 98 mm, IP 54 (wall housing) 92 x 92 x 75 mm, IP 54 (panel mounting)
Inputs:	2 digital inputs for FA 410 resp. VA 400/420
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	please see FA 410
Alarm outputs:	2 relays, (pot.-free)
OPTIONS	
Data logger:	100 million meas. values start/stop time, meas. rate freely adjustable
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA 0 to 10 V, Pt100, Pt1000

DS 400 - Multifunction measuring instrument

for all relevant parameters of compressed air

Software options:
- Integrated webserver
- Mathematics calculation function
- Totalizer function

Hardware options:
- Integrated data logger
- Ethernet / RS 485 interface
- additional sensor inputs (digital or analogue) selectable

Standard equipment:
- USB interface
- 3.5" graphic display with touch screen
- Integrated mains unit for supply of the sensors
- 4...20 mA output of all connected active sensors
- Pulse output (for total flow) in case of flow sensors
- 2 alarm relays (pot.-free switch-over contacts, max. 230 V, 3 A)

The sensor inputs 1+2 as well as 3+4 can be selected according to the required sensors:

Digital	Digital	Digital	Digital	Analogue	Analogue	Analogue	Analogue
m³/h, m³	°Ctd	A, kW/h	variable	bar	A	°C	°C
			MOD BUS				4...20 mA 0...20 mA 0...10 V Pulse Pt 100 Pt 1000
Flow-sensor	Dew point sensor	Current meters	Third-party sensors with RS 485	Pressure sensor	Clamp-on ammeter	Temperature sensor	Third-party sensors analogue output

Description	Sensor input 1+2	Sensor input 3+4	Order no.
DS 400 - Multifunction measuring instrument with graphic display and touch screen	Digital	----------	0500 4000 D
	Digital	Digital	0500 4000 DD
	Digital	Analogue	0500 4000 DA
	Analogue	----------	0500 4000 A
	Analogue	Analogue	0500 4000 AA
Options			
Option: Integrated data logger for 100 million measured values			Z500 4002
Option: Integrated Ethernet and RS 485 interface			Z500 4004
Option: Integrated webserver			Z500 4005
Option: "Mathematics calculation function" for 4 freely selectable channels, (virtual channels): addition, subtraction, division, multiplication			Z500 4007
Option: "Totalizer function for analogue signals"			Z500 4006
Further accessories			
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 400 via USB or Ethernet			0554 7040
CS Soft Network - Database Client/Server Solution (up to 5 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7041
CS Soft Network - Database Client/Server Solution (up to 10 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7042
CS Soft Network - Database Client/Server Solution (up to 20 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7043
CS Soft Network - Database Client/Server Solution (> 20 DS 400) - database (MySQL) to Server - data evaluation via Client-Software			0554 7044

Technical data DS 400

Dimensions:	118 x 115 x 98 mm, IP 54 (wall housing) 92 x 92 x 75 mm, IP 54 (panel mounting)
Inputs:	2 digital inputs for FA 410 resp. VA 400
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	see VA 400
Alarm outputs:	2 Relays, (pot.-free)
OPTIONS	
Data logger:	100 million meas. values start/stop time, meas. rate freely adjustable
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA 0 to 10 V, Pt100, Pt1000

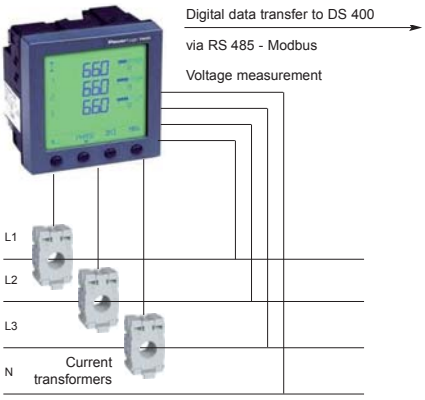
Input signals	
Current signal	(0...20mA/4...20mA)
internal or external power supply	
Measuring range	0…20 mA
Resolution	0,0001 mA
Accuracy	± 0,003 mA ± 0,05 %
Input resistance	50 Ω
Voltage signal	(0...1 V)
Measuring range	0…1 V
Resolution	0,05 mV
Accuracy	± 0,2 mV ± 0,05 %
Input resistance	1 MΩ
Voltage signal	(0...10 V / 30 V)
Measuring range	0…10 V
Resolution	0,5 mV
Accuracy	± 2 mV ± 0,05 %
Input resistance	1 MΩ
RTD Pt 100	
Measuring range	-200…850° C
Resolution	0,1° C
Accuracy	± 0,2°C (-100...400°C) ± 0,3°C (further range)
RTD Pt 1000	
Measuring range	-200…850° C
Resolution	0,1° C
Accuracy	± 0,2° (-100...400°C)
Pulse	
Measuring range	min.pulse length 500 µs frequency 0...1 kHz max. 30 VDC

Suitable **probes** from the **CS Instruments** product range

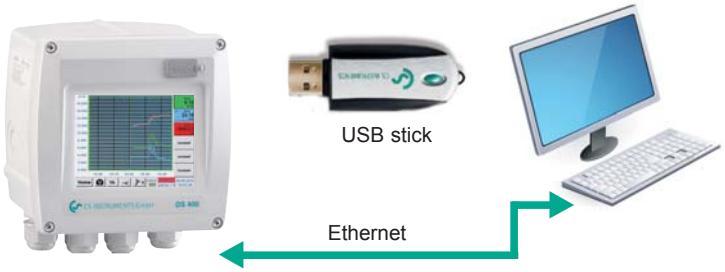
Description	Order no.
VA 400 flow sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 4001
Options for VA 400:	
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400
Flow meters VA 420:	
Flow meter VA 420 with integrated measuring section (R 1/4" DN 8)	0695 0420
Flow meter VA 420 with integrated measuring section (R 1/2" DN 15)	0695 0421
Flow meter VA 420 with integrated measuring section (R 3/4" DN 20)	0695 0422
Flow meter VA 420 with integrated measuring section (R 1" DN 25)	0695 0423
Flow meter VA 420 with integrated measuring section (R 1 1/4" DN 32)	0695 0426
Flow meter VA 420 with integrated measuring section (R 1 1/2" DN 40)	0695 0424
Flow meter VA 420 with integrated measuring section (R 2" DN 50)	0695 0425
Dew point sensors:	
FA 410 dew point sensor, -80°...20°Ctd including inspection certificate	0699 0410
FA 415 dew point sensor, -20°...50°Ctd including inspection certificate	0699 0415
Standard measuring chamber for compressed air up to 16 bar	0699 3390
Connection cables for VA 400, VA 420, FA 410 and FA 415: **Connection cables for flow sensors / dew point sensors**	
Connection cable 5 m	0553 0104
Connection cable 10 m	0553 0105
Pressure sensors:	
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Further pressure sensors please see complete catalogue	
Temperature sensors:	
Screw-in temperature sensor Pt 100, Class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = 50...+500 °C (2-wire-technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0100
Clamp screwing 6 mm, G1/2", VA clamping ring, pressure tight up to 10 bar	0554 6004
Connection cables for pressure sensors / temperature sensors:	
Connection cable 5 m	0553 0108
Connection cable 10 m	0553 0109
Clamp-on ammeters:	
Clamp-on ammeter 0...400 A TRMS incl. 3 m connection cable with open ends	0554 0510
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable with open ends	0554 0507
Optional third-party sensors 0/4...20 mA, 0...1/10/30 V, PT 100 / PT 1000, KTY, pulse, RS 485 Modbus connectible.	

Current / effective power meter

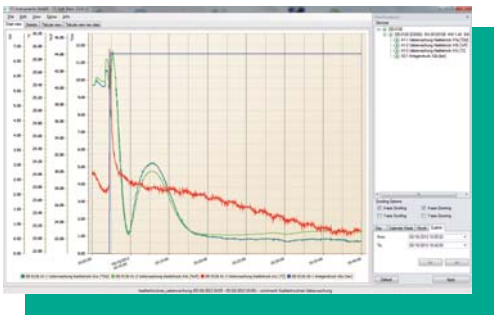
Description	Order no.
CS PM 710 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5343
Current transformer 100/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 21 mm)	0554 5344
Current transformer 200/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 21 mm)	0554 5345
Current transformer 300/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5346
Current transformer 500/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5347
Current transformer 600/5 A connectible to current/effective power meter for panel mounting (for cabels up to x 22 mm)	0554 5348
Current transformer 1000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 65 x 32 mm)	0554 5349
Current transformer 2000/5 A connectible to current/effective power meter for panel mounting (for current bar up to 127 x 38 mm)	0554 5350
Connection cable to DS 400, 5 m, with open ends	0553 0108
Connection cable to DS 400, 10 m, with open ends	0553 0109



CS Soft Basic - evaluation of measured data for single computers



The measured data stored in the data logger integrated in DS 400 can be read-out via USB stick.
If DS 400 has the optional Ethernet interface the measured data can also be read-out over big distances via the computer network.



Graphic evaluation

All measurement curves are indicated in different colours.
All necessary functions like free zoom, selection/deselection of single measured curves, free selection of time periods, scaling of the axis, selection of colours and so on are integrated:
This view can be stored as a pdf file and sent by e-mail.
Different data can be merged in one common file.

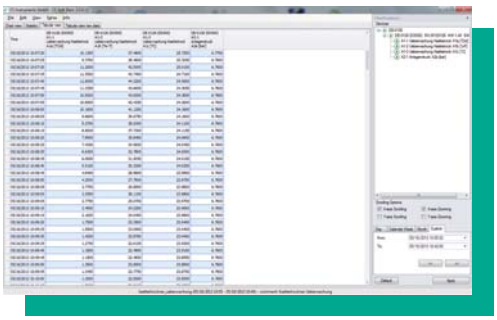
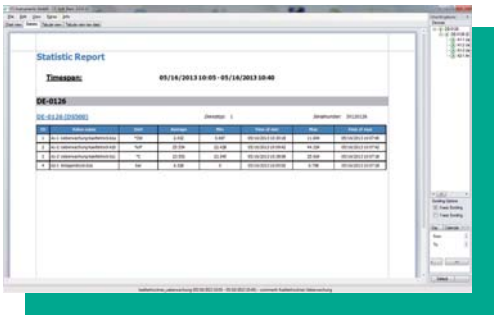


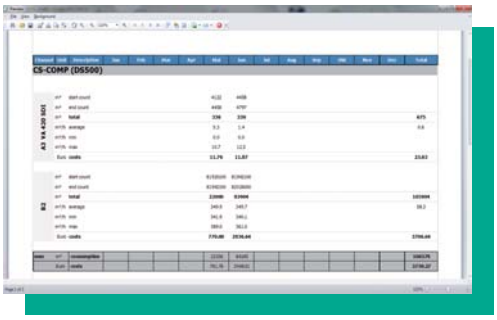
Table view

All measured points are listed with the exact time interval.
The desired measuring channels with the measuring site name can be selected via the diagram explorer.



Statistics

All necessary statistic data are apparant at a glance.
So the user can quickly see which minimum or maximum measured values occurred at which time and for how long.

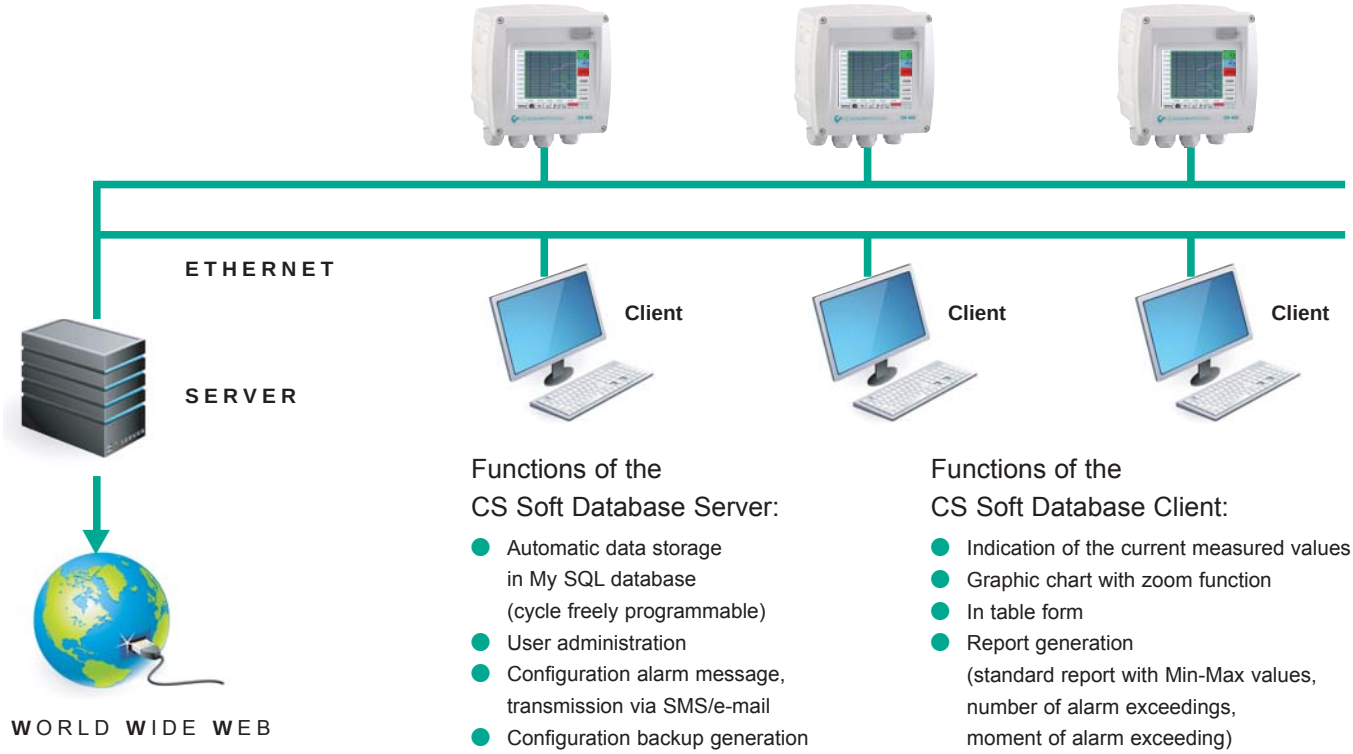


Consumption evaluation

The software carries out a consumption analysis for all connected flow sensors optionally as daily, weekly or monthly report.

CS Soft Network - evaluation of the measured data for several computers in the network

By means of the CS Soft Database Client/ Server Solution an optional number of DS 500/DS 400 instruments can be evaluated via Ethernet. The software stores the measured data of all DS 500/DS 400 cyclically (cycle freely selectable) in a SQL database on the server. In case of an exceeding of the given alarm thresholds the software automatically sends an SMS or an e-mail. Furthermore, different user levels can be defined in the server software so that single staff members only can access measured data of certain DS 500/DS 400. The evaluation of the measured data can be carried out by means of the client software from each PC within the company.



Functions of the CS Soft Database Server:

- Automatic data storage in My SQL database (cycle freely programmable)
- User administration
- Configuration alarm message, transmission via SMS/e-mail
- Configuration backup generation

Functions of the CS Soft Database Client:

- Indication of the current measured values
- Graphic chart with zoom function
- In table form
- Report generation (standard report with Min-Max values, number of alarm exceedings, moment of alarm exceeding)
- Automatic consumption report

Access to the measured values via the webserver

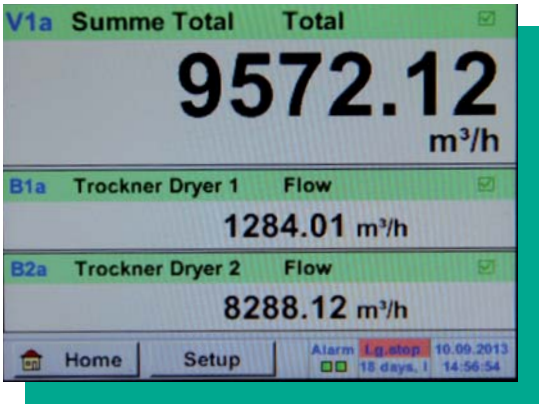
With the option "Webserver" (order no. Z500.4005) DS 400 can be contacted without any special software from each web browser (e.g. Mozilla Firefox ®, Microsoft Internet Explorer ®).
The access can also be done via the World Wide Web. The webserver indicates the actual measured values of all sensors as well as the status of the alarm relays and the logger status in the web browser.

Connection to Bus systems

RS 485 network (Modbus RTU)
or Ethernet (Modbus/TCP)

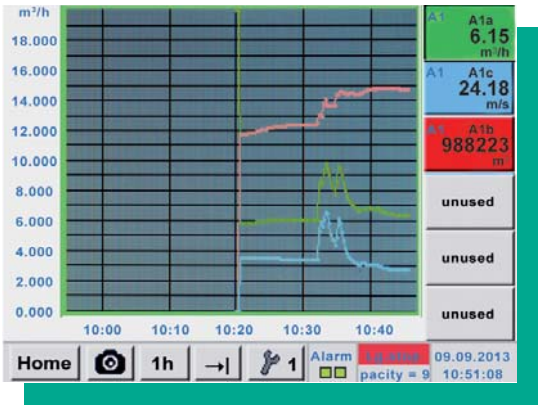
With the option "Ethernet / RS 485 - interface" (order no. Z500.4004) DS 400 can be connected to customer-owned Bus systems (e.g. PLC, building management system BMS, central control system, SCADA, …).
The measured values of all sensors can be retrieved via Modbus protocol. A detailed protocol description is enclosed with each DS 400 instrument. When using the Ethernet interface the IP address at DS 400 can be freely adjusted. As an alternative DS 400 waits for the address allocation by a DHCP server.

Innovations:



Summation of several flow sensors

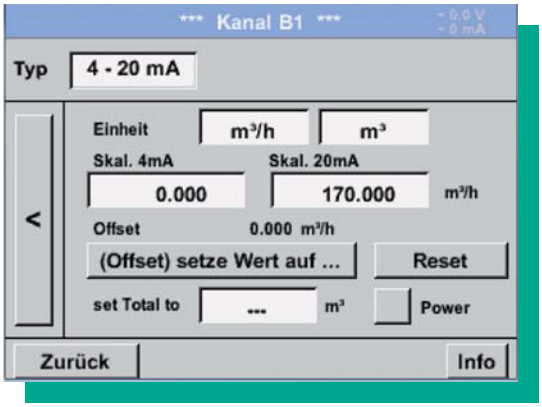
By means of the option "mathematics calculation function" (order no. Z500 4007) it is possible to calculate mathematically the sum of several connected flow sensors.
Of course the new "virtual" value "sum of all sensors" can also be indicated graphically and stored in the data logger.



Print function

By means of the print key it is possible to store the actual screen as an image file onto the internal SD card or on a USB stick and print it out at the PC without any additional software.

This is ideal for documentation of the measured values/ measured curves on-site. Coloured measured curves can be sent as image files by e-mail or integrated into a service report.



Totalizer function

Lots of low-priced flow sensors which are available on the market just have a 4…20 mA analogue output for the current flow in liters/min or m³/h. An output signal for the recording of total flow readings is not integrated.

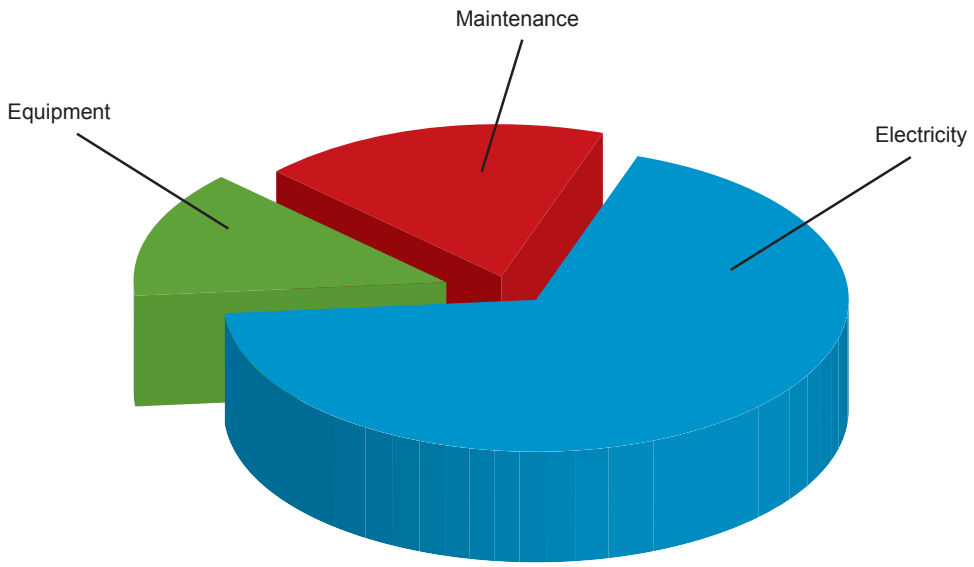
By means of the option "totalizer function" DS 400 can integrate the analogue signal and generate a total flow reading in m³ or liters from the measured actual flow.
The total flow reading can be set to zero in the user menu at any time.

Consumption and **flow measurement**

Cost saving
In Germany 60,000 compressed air plants use 14,000,000,000 kWh electrical energy per year. 15 to 20% could be easily saved (Peter Radgen, Fraunhofer Institut, Karlsruhe). Most of these costs are caused by leakages in the compressed air system. The air "escapes" unused. **1 leak with a diameter of 1 mm causes costs of approximately 270 EUR/year**

The leak detector LD 300 (please see page 40) **will be payed off after 4 leakages**

Cost distribution in compressed air systems:



Example for a calculation of leakage costs at different pressures:

Leak Ø (mm)	Air loss at 6 bar (l/s)	Air loss at 12 bar (l/s)	Energy loss kWh at 6 bar	Energy loss kWh at 12 bar	Costs € p.a. at 6 bar	Costs € p.a. at 12 bar
1	1.2	1.8	0.3	1.0	144	480
3	11.1	20.8	3.1	12.7	1,488	6,96
5	30.9	58.5	8.3	33.7	3,984	16,176
10	123.8	235.2	33.0	132.0	15,840	63,360

Source: www.druckluft.effizient.de

VA 409
Flow direction switch for compressed air systems

The new thermal flow direction switch VA 409 with direction indication serves for determination of the flow direction of compressed air and gases especially in closed circular pipelines.

By means of VA 409 with flow direction indication the flow direction of the compressed air can be determined quickly and safely. Compared with the former mechanical paddle flow switches VA 409 is able to detect even the smallest changes in the flow direction quickly and without any mechanical movement.

The direction information in form of a potential-free contact (normally closed max. 60 VDC, 0.5 A) is transferred to the consumption sensors VA 400/VA 420 or to a separate building management system (mbs). Two LEDs show the flow direction.

In connection with 2 consumption sensors VA 400/VA 420 incoming and outflowing compressed air in closed circular pipelines can be measured precisely.

Special features

- detects smallest changes < 0.1 m/s referred to 20 °C and 1000 mbar
- no mechanical wear parts
- easy installation under pressure

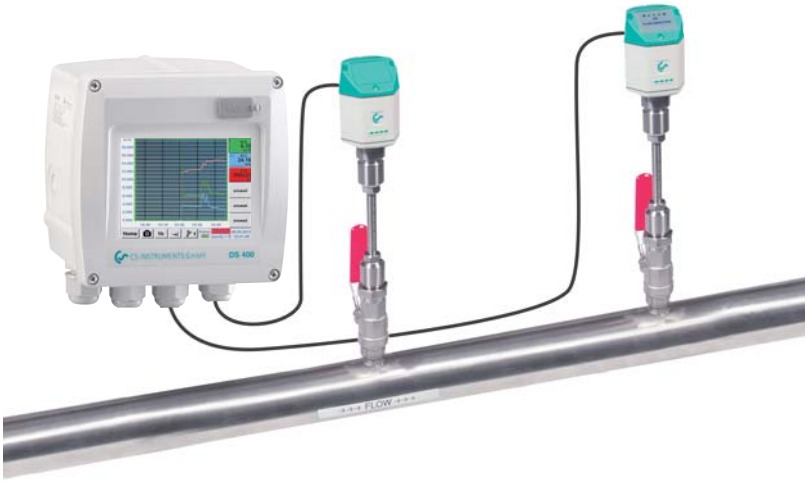
Description	Order no.
Flow direction switch VA 409	0695 0409
Mains unit in wall housing	0554 0108
Connection cable VA/FA Series 400, 5 m with M12 plug	0553 0104
Connection cable VA/FA Series 400, 10 m with M12 plug	0553 0105

Technical data VA 409

Detection range recognition flow direction:	< 0.1 m/s referred to 20°C and 1000 mbar
Measuring principle:	calorimetric measurement
Sensor:	Pt 30/Pt 700/Pt 330
Measuring medium:	air, gases
Operating temp.:	0...50 °C probe tube -20...70 °C housing
Operating pressure:	up to 16 bar
Power supply:	24 VDC, 40 mA
Power input:	max. 80 mA up to 24 VDC
Protection class:	IP 54
EMV:	acc. to DIN EN 61326
Connection:	2 x M12, 5-pole, plug A and plug B
2 potential-free contacts:	2 x U max. 60 VDC, I max 0,5 A (normally closed); on request: Normally open
Housing:	polycarbonate
Probe tube:	stainless steel, 1,4301, length 160 mm, Ø 10 mm, safety ring Ø 11.5 mm, longer probes on request
Mounting thread:	G 1/2”
Diameter housing:	65 mm
Flow direction:	2 LEDs

Flow station DS 400 with direction indication in one direction

By connecting the flow direction switch VA 409 to the flow station DS 400 only the flow in one direction is measured. So it is guaranteed that the back-flowing compressed air is not counted twice.



Special features

- precise flow measurement in one direction
- when doing the cost calculation of the compressed air it is avoided that back-flowing compressed air is counted twice

Flow station DS 400 with flow direction indication in both directions

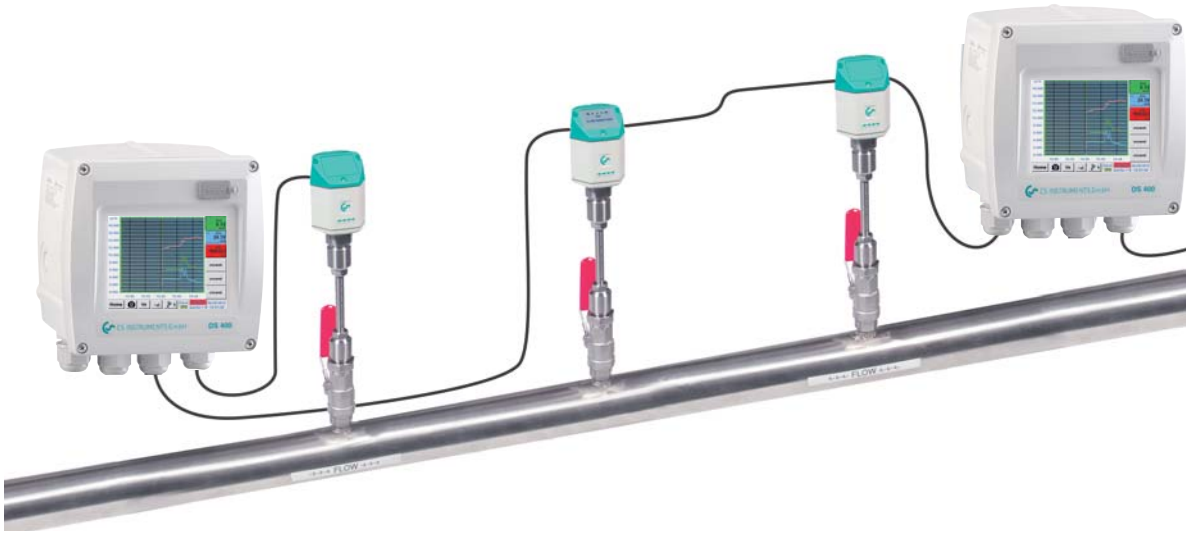
In case the flow direction switch VA 409 indicates the flow direction and forwards this information to the flow station DS 400.

Each of both flow stations DS 400 exclusively measures the flow in one direction. The flow direction switch VA 409 is mounted in the middle between both flow stations in order to avoid flow turbulences.

For this reason two flow stations DS 400 are used for precise flow measurement of both flow directions.

Special features

- precise consumption measurement in both directions
- separate indication of the actual flow (m^3/h resp. m^3/min etc…) separate summing of the total flow (m^3 resp. l)
- forwarding of the analogue output and of the pulse output for the respective flow direction



Useful **accessories:**
Measuring sections

• Measuring section 1/2”

• Measuring section 1/4”

Measuring sections for precise measurements

Meas. section made of stainless steel 1.4301 incl. ball valve, up to DN 65 (G2 1/2”) with external thread, from DN 80 with weld neck flange according to DIN 2633.

External thead	Pipe (outerø x wall thickness)	Total length	Order no.
G 1/4”	20.0 x 7.0 mm	180 mm	4000 0006
G 1/2”	21.3 x 2.6 mm	500 mm	4000 0015
G 3/4”	26.9 x 2.6 mm	600 mm	4000 0020
G 1”	33.7 x 3.2 mm	750 mm	4000 0025
G 1 1/4”	42.4 x 3.2 mm	900 mm	4000 0032
G 1 1/2”	48.3 x 3.2 mm	1000 mm	4000 0040
G 2”	60.3 x 3.6 mm	1250 mm	4000 0050
G 2 1/2”	76.1 x 3.6 mm	1500 mm	4000 0065
from DN 80 with flange DIN 2633			
DN 80/88.9	88.9 x 2.0 mm	1850 mm	4000 0080
DN 100/114.3	114.3 x 2.0 mm	2104 mm	4000 0100
DN 125/139.7	139.7 x 3.0 mm	2860 mm	4000 0125
DN 150/168,3	168,3 x 3,0 mm	3110 mm	4000 0150

Drilling jig for drilling under pressure

By means of a special drilling device a measuring site with 1/2" ball valve can be easily set up within a few minutes.
As an alternative to the welding of the 1/2” fitting also a spot drilling collar (see page 45) can be used.

• Drilling jig

• High-pressure protection

• Drilling under pressure

Description	Order no.
Drilling jig incl. drill (Ø 13 mm)	0530 1108
High-pressure protection recommended for installation from 10 to 50 bar	0530 1105

Useful **accessories:**
Spot drilling collars

If there is no measuring site with 1/2" ball valve present it can be set up by means of spot drilling collars.
The spot drilling collar is imposed onto the pipe and tightened via thread rods. The enveloping rubber gasket is pressure-tight up to 10 bar. By means of the drilling jig (page 44) it is possible to drill through the 1/2" ball valve into the existing pipe.
Important: Please indicate the exact outer diameter of the existing pipe when placing the order resp. please select the suitable spot drilling collar from the adjoining list.

• Spot drilling collar

Description	DN	Order no.
Spot drilling collar for pipe Ø 032 - 036 mm, Length: 100 mm,*		0500 0446
Spot drilling collar for pipe Ø 036 - 040 mm, Length: 100 mm,*		0500 0448
Spot drilling collar for pipe Ø 040 - 044 mm, Length: 150 mm,*		0500 0449
Spot drilling collar for pipe Ø 044 - 051 mm, Length: 200 mm,*		0500 0610
Spot drilling collar for pipe Ø 048 - 055 mm, Length: 200 mm,*	40	0500 0611
Spot drilling collar for pipe Ø 052 - 059 mm, Length: 200 mm,*		0500 0612
Spot drilling collar for pipe Ø 057 - 064 mm, Length: 200 mm,*	50	0500 0613
Spot drilling collar for pipe Ø 063 - 070 mm, Length: 200 mm,*		0500 0614
Spot drilling collar for pipe Ø 070 - 077 mm, Length: 200 mm,*	65	0500 0615
Spot drilling collar for pipe Ø 075 - 083 mm, Length: 200 mm,*		0500 0616
Spot drilling collar for pipe Ø 082 - 090 mm, Length: 200 mm,*		0500 0617
Spot drilling collar for pipe Ø 087 - 097 mm, Length: 200 mm,*	80	0500 0618
Spot drilling collar for pipe Ø 095 - 104 mm, Length: 200 mm,*		0500 0619
Spot drilling collar for pipe Ø 102 - 112 mm, Length: 200 mm,*		0500 0620
Spot drilling collar for pipe Ø 108 - 118 mm, Length: 200 mm,*	100	0500 0621
Spot drilling collar for pipe Ø 118 - 128 mm, Length: 200 mm,*		0500 0622
Spot drilling collar for pipe Ø 125 - 135 mm, Length: 200 mm,*		0500 0623
Spot drilling collar for pipe Ø 133 - 144 mm, Length: 200 mm,*	125	0500 0624
Spot drilling collar for pipe Ø 145 - 155 mm, Length: 250 mm,*		0500 0625
Spot drilling collar for pipe Ø 151 - 161 mm, Length: 250 mm,*	150	0500 0626
Spot drilling collar for pipe Ø 159 - 170 mm, Length: 250 mm,*		0500 0627
Spot drilling collar for pipe Ø 168 - 180 mm, Length: 250 mm,*		0500 0628
Spot drilling collar for pipe Ø 180 - 191 mm, Length: 250 mm,*	175	0500 0629
Spot drilling collar for pipe Ø 193 - 203 mm, Length: 300 mm,*		0500 0630
Spot drilling collar for pipe Ø 200 - 210 mm, Length: 300 mm,*		0500 0631
Spot drilling collar for pipe Ø 209 - 220 mm, Length: 300 mm,*	200	0500 0632

* incl. 1/2" ball valve

Thickness meter
CS 0495

The entry of the correct inner diameter is essential for an accurate consumption measurement.

The thickness meter CS 0495 enables a quick, easy and accurate measurement of the wall thickness of pipes. So the determination of the inner diameter becomes very easy.

Description	Order no.
Thickness meter CS 0495 including case and calibration block	0560 0495

Technical data CS 0495

Meas. range:	1.5…200 mm, 0.06…8 Inch
Meas. prinicple:	ultrasonic
Measured materials:	steel, cast iron, aluminium, copper, brass, zinc, quartz glass, polyethylene, PVC, grey iron, nodular cast iron
Calibration block:	included in shipment
Resolution:	0.1 mm
Accuracy:	± (0.5 % n+0.1)
Power supply:	4 x 1.5 V AA (UM-3) batteries
Dimensions:	160 x 68 x 32 mm
Weight:	208 g

Calibration of **flow sensors** and **flow stations**

In the CS calibration laboratory for flow sensors it is possible to calibrate flow measuring instruments of CS Instruments as well as of other manufacturers. High precision reference measuring instruments grant an accuracy of up 0.5 % of the measured value.

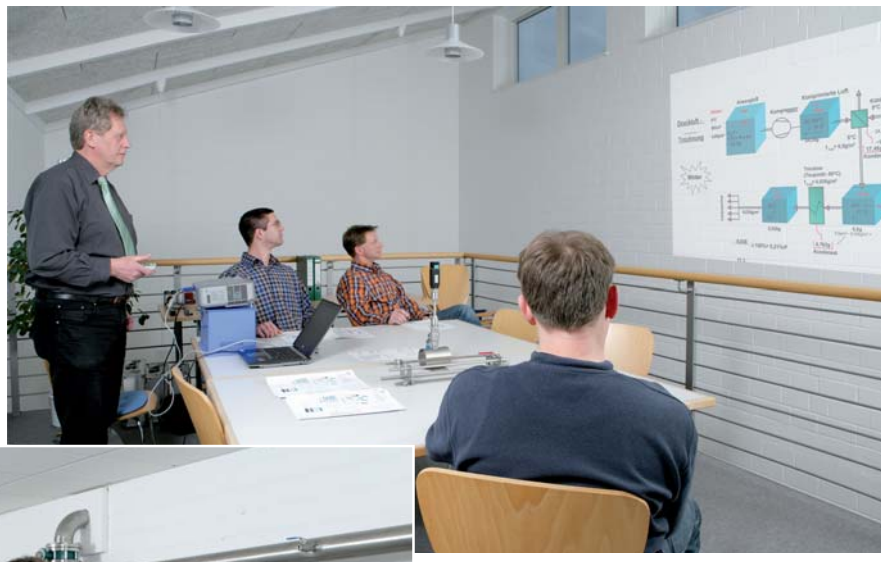
Special feature

- Due to digital data transfer only the flow sensor has to be calibrated, enabling the display unit DS 300 to stay on-site at all times.

Calibration range:	from 0 to 4,000 m^3/h under pressure
Accuracy of the reference:	between 0.5 and 1 % of the meas. value

Description	Order no.
Recalibration and 5 point precision calibration of flow sensor with ISO certificate	0695 3333
Volume flow, freely selectable measuring points	on request
Real gas calibration	3200 0015

Compressed air analysis seminar:
m^3/h, °C_{td}, °C, A, bar…



Practical measurements and evaluation of the measuring results

Basics in theory for humidity and consumption measurement

Hands-on seminar on compressed air analysis:

- Compressed air quality according to ISO 8573
- Practical applications: Which compressed air quality is needed?
- Methods of compressed air drying and compressed air processing
- Moisture measurement in compressed air
- Costs of compressed air consumption
- Flow measurement

Target groups / participants

- Quality assurances employees
- Application planners
- Measurement and control technicians
- Maintenance employees

Compressed air quality meas. according to ISO 8573

Residual oil content - particles - moisture

DS 500 - the intelligent chart recorder of the next generation

The centrepiece 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 the 7" colour 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 495 interface. The communication is done via the Modbus protocol.

Extract from ISO 8573-1 - threshold values

ISO 8573-1:2010 CLASS	Solids			Water	Oil
	Maximum number of particles per m³			Pressure dew point vapour	Total share in oil (liquid aerosol and mist) mg/m³
	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	≤ -30 °C	1
4	--	--	≤ 10.000	≤ -3 °C	5
5	--	--	≤ 100.000	≤ +7 °C	--
6	--	--	--	≤ +10 °C	--
7	--	--	--	--	--
8	--	--	--	--	--
9	--	--	--	--	--
X	--	--	--	--	L 10

Residual oil content measurement - OIL check

The residual oil content sensor OIL check measures the vaporous residual oil content in the compressed air. By means of a sample taking a representative part volume flow is taken from the compressed air and led to the OIL check.
Due to the continuous measurement threshold value exceeding will be recognized immediately and remedial actions initiated.

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).
The correct function the filtration elements mounted in the compressed air is monitored and possible filter perforations are recognized immediately.
The compressed air flow through the particle counter is automatically supervised.

Moisture - dew point sensor FA 410

FA 410 measures the pressure dew point in the compressed air down to -80° Ctd.
The mounting is effected either directly into the pipe via the G ½" thread or better by means of the measuring chamber which allows a defined stream of about 2 litres/minute to bypass the sensor. Also in this case the continuous measurement takes care that alert is triggered immediately if the compressed air dryer breaks down.

Technical data DS 500

Dimensions housing	280 x 170 x 90 mm, IP 65, 7.3 kg
Connections	18 x PG 12 for sensors and power supply, alarm relay 1 x RJ 45 Ethernet connection
Version panel mounting	Cutout panel 250 x 156 mm
Weight	7.3 kg
Material	Diecast, front keypad: Polyester
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors freely assignable, see options Digital CS sensors for dew point and flow with SDI interface FA/VA 400 Series Digital third-party sensors RS 485 / Modbus RTU, other bus systems can be realized on request Analogue CS sensors for pressure, temperature, clamp-on ammeters pre-configured Analogue third-party sensors 0/4 ..20 mA, 0...1/10/30 V, pulse, Pt 100 / Pt 1000, KTY
Power supply sensors	24 VDC, max. 130 mA per sensor, integrated mains unit max. 24 VDC, 25 W In case of version 8/12 sensor inputs 2 integrated mains units each 24 VDC, 25 W
Interfaces	USB stick, Ethernet / RS 485 Modbus RTU / TCP
Alarm relays	4 relays (changeover contact 230 VAC, 6 A), alarm management Rrelays freely programmable, collective alarm Analogue output, pulse in case of sensors with own signal output looped, like e.g. VA/FA Series
Memory card	Memory size 2 GB SD memory card standard optionally up to 4 GB
Power supply	100...240 VAC / 50-60 Hz, special version 24 VDC
Colour screen	7" touch panel TFT transmissive , graphics, curves, statistics
Accuracy	see sensor specifications
Operating temperature	0...50°C
Storage temperature	-20...70°C
Optional	Webserver

Technical data OIL Check

Dimensions	487 x 170 x 120 mm (L x H x W)
Power supply	230 VAC 50 Hz ±10% resp. 115 VAC 60 Hz ±10%
Medium	Compressed air
Noticeable substances	Polyalphaolefins aliphatic hydrocarbons hydrocarbons functional hydrocarbons aromatics
Ambient temp.	+5 ... +45°C
Compres. air temp.	+5 ... +55°C
Operating overpres.	3 bar ... max. 16 bar (ü)*
Meas. gas humidity	≤ 40% rel. humidity
Measuring unit	mg/m^3 (standard cubic meters in accordance with ISO 1217; 1 bar, 20°C, 0 % rel. humidity)
Measuring range	≤ 0,01 - 5.000 mg/m^3 residual oil vapour content (according to ISO 8573-1)
Measuring accuracy	0.003 mg/m^3
Detection limit	0.0006 mg/m^3
Connections	G3/8" internal thread. Please observe install. instructions
Installation requirements	Vertically** into the rising main pipe via oil and grease-free measuring sectione
Inlet section	10 x DN (min. 200 mm) according to ISO 8573-2
Outlet section	3 x DN (min. 100 mm) according to ISO 8573-2

* further operating pressures on request
** horizontal mounting on request

Technical data PC 400

Measuring range	Number of particles per m³ Particle size channels: 0.1…0.5 µm 0,5…1 µm 1…5 µm Further particle size channels on request
Flow rate	28.3 l/min (1 cfm)
Light source	laser diode
Interface	RS 485 (Modbus protocol)
Power supply	24 VDC, 300 mA
Dimensions	150 x 200 x 300 mm
Weight	8 kg

Technical data dew point sensor FA 410

Measuring range	-80...20°C_{td}
Accuracy	± 1°C at 20...-20°C_{td} ± 2°C at -20...-50°C_{td} ± 3°C at -50...-80°C_{td}
Pressure range	-1...50 bar (with measuring chamber 16 bar, special version up to 350 bar)
Protection class	IP 65
EMC	according to DIN EN 61326
Einsatztemperatur:	-20...70 °C
Burden for analogue output	< 500 Ohm
Screw-in thread	G½" without meas. chamber

Stationary solution with particle counter PC 400 and DS 400

Description	Order no.
PC 400 particle counter up to 0.1 µm for compressed air and gases including pressure reducer	0699 0040
Connection cable 5 m	0553 0108
DS 400 multifunction measuring instrument with graphic display and touch screen operation	0500 4000 D
Option: Integrated data logger for 100 million measured values	Z500 4002
Option: Integrated Ethernet and RS 485 interface	Z500 4004
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 500 via USB or Ethernet	0554 7040
Alternative version to PC 400 up to 0.1 µm: PC 400 particle counter up to 0.3 µm for compressed air and gases including pressure reducer	0699 0041

Portable solution with particle counter PC 400 and DS 500 mobile

The particle counter is fixed onto a portable mounting plate with pedestal

Description	Order no.
PC 400 particle counter up to 0.1 µm for compressed air and gases including pressure reducer	0699 0040
Connection cable for third-party sensors to portable devices, ODU/open ends, 5 m	0553 0501
Portable mounting plate with pedestal	0554 6016
Multifunction measuring instrument DS 500 mobile, 4 sensor inputs	0500 5012
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 500 mobile via USB or Ethernet	0554 7040
Alternative version to PC 400 up to 0.1 µm: PC 400 particle counter up to 0.3 µm for compressed air and gases including pressure reducer	0699 0041

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

Description	Order no.
Portable PC 400 particle counter up to 0.1 µm for compressed air and gases including pressure reducer, in a service case	0699 0042
Connection cable for third-party sensors to portable devices, ODU/open ends, 5 m	0553 0501
Multifunction measuring instrument DS 500 mobile, 4 sensor inputs	0500 5012
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 500 mobile via USB or Ethernet	0554 7040
Alternative solution to PC 400 up to 0.1 µm: Portable PC 400 particle counter up to 0.3 µm for compressed air and gases including pressure reducer, in a service case	0699 0043

Stationary solution with OIL-Check and DS 400

Description	Order no.
OIL-Check - residual oil content measurement for vaporous residual oil content (DN20-DN40), 3-16 bar, measuring range <0.01…5.000 mg/m³, including sampling probe (DN 20-DN40), inspection certificate, 4…20 mA. analogue output. Please order measuring section for sampling separately.	0699 0060
OIL-Check measuring section for sampling (DN 20, 3/4"), 16 bar, stainless steel, outer diameter 26.9 mm, outer thread R3/4"	4000 2001
Ball valve G3/8" incl. connection fittings for installation between sampling probe and OIL-Check, cleaned oil- and grease-free	3300 0004
Connector plug for 4…20 mA analogue output	3300 0005
Connection cable 5 m	0553 0108
DS 400 multifunction meas. instrument with graphic display and touch screen operation	0500 4000 A
Option: Integrated data logger for 100 million measured values	Z500 4002
Option: Integrierte Ethernet- und RS 485-Schnittstelle	Z500 4004
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 400 via USB or Ethernet	0554 7040
OIL-Check versions for different pipe diameters: OIL-Check - residual oil content measurement for vaporous residual oil content (DN50-DN80), 3-16 bar, meas. range <0.01…5.000 mg/m³, including sampling probe (DN 50-DN80), inspection certificate, 4…20 mA analogue output. Please order meas. section for sampling separately.	0699 0061
OIL-Check - residual oil content measurement for vaporous residual oil content (>DN80), 3-16 bar, measuring range <0.01…5.000 mg/m³, incl. sampling probe (customer-specific length), insp. certificate, 4…20 mA analogue output. Please order meas. section for sampling separately.	0699 0062
OIL-Check measuring section for sampling (DN 25, 1"), 16 bar, stainless steel, outer diameter 33.7 mm, R1"	4000 2002
OIL-Check measuring section for sampling (DN 32, 11/4"), 16 bar, stainless steel, outer diameter 42.4 mm, R11/4"	4000 2003
OIL-Check measuring section for sampling (DN 40, 11/2"), 16 bar, stainless steel, outer diameter 48.3 mm, R11/2"	4000 2004
OIL-Check measuring section for sampling (DN 50, 2"), 16 bar, stainless steel, outer diameter 60.3 mm, R2"	4000 2005
OIL-Check measuring section for sampling (DN 65, 21/2"), 16 bar, stainless steel, outer diameter 76.1 mm, R21/2"	4000 2006
OIL-Check measuring section for sampling (DN 80, 3"), 16 bar, stainless steel, outer diameter 88.9 mm, R3"	4000 2007
Stainless steel pipe 6x1 mm for horizontal installation, length max. 1000 mm including connection fittings	4000 2008

Stationary solution with OIL-Check, particle counter PC 400 and DS 500

Description	Order no.
OIL-Check - residual oil content measurement for vaporous residual oil content (DN20-DN40), 3-16 bar, measuring range <0.01…5.000 mg/m³, including sampling probe (DN 20-DN40), inspection certificate, 4…20 mA. analogue output. Please order measuring section for sampling separately.	0699 0060
OIL-Check measuring section for sampling (DN 20, 3/4"), 16 bar, stainless steel, outer diameter 26.9 mm, outer thread R3/4"	4000 2001
Ball valve G3/8" incl. connection fittings for installation between sampling probe and OIL-Check, cleaned oil- and grease-free	3300 0004
Connector plug for 4…20 mA analogue output	3300 0005
Connection cable 5 m	0553 0108
PC 400 particle counter up to 0.1 µm for compr. air and gases incl. pressure reducer	0699 0040
Connection cable 5 m	0553 0108
DS 500 - intelligent chart recorder in basic version (4 sensor inputs)	0500 5000
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 400 via USB or Ethernet	0554 7040
OIL-Check versions for different pipe diameters: Optionally available: dew point sensor, pressure sensor, flow sensor	Please see above

Portable solution with OIL-Check, particle counter PC 400 + DS 500 mobile

Description	Order no.
OIL-Check - residual oil content measurement for vaporous residual oil content (DN20-DN40), 3-16 bar, measuring range <0.01…5.000 mg/m³, including sampling probe (DN 20-DN40), inspection certificate, 4…20 mA. analogue output. Please order measuring section for sampling separately.	0699 0060
OIL-Check measuring section for sampling (DN 20, 3/4"), 16 bar, stainless steel, outer diameter 26.9 mm, outer thread R3/4"	4000 2001
Mobile transport case with wheels including mounting plate	0554 6015
Connector plug for 4…20 mA analogue output	3300 0005
Connection cable for third-party sensors to portable devices, ODU/open ends, 5 m	0553 0501
PC 400 particle counter up to 0.1 µm for compr. air and gases, incl. pressure reducer	0699 0040
Connection cable for third-party sensors to portable devices, ODU/open ends, 5 m	0553 0501
Multifunction measuring instrument DS 500 mobile, 4 sensor inputs	0500 5012
CS Soft Basic - data evaluation in graphic and table form - reading out of the measured data of DS 500 mobile via USB or Ethernet	0554 7040
OIL-Check versions for different pipe diameters: Optionally available: dew point sensor, pressure sensor, flow sensor	Please see above

Leak detector **LD 400**

Highly sensitive leak detector

If gases escape through leaks in piping systems (e. g. untight screwed connections, corrosions and so on) ultrasonic noises are generated. By means of LD 400 even the smallest leakages which cannot be heard by the human ear and which are not visible due to their size can be detected even from distances of several meters. LD 400 transforms the inaudible signals into a frequency which can be identified. By means of the comfortable sound-proof headset these noises can be realized even in extremely noisy environments.

The LD 400 leak detector is the advancement of the proven LD 300 and it convinces by its obviously refined sensor technology and its improved support in the tracing of leaks.

By means of the integrated laser pointer which serves for target heading the leak can be localized more accurately.

Sound-proof headset enables leak detection in extremely noisy environments.

Special features

- Robustness and the little weight ensure a fatigue-proof use in industrial environments
- Improved detection of leaks with optional acoustic trumpet
- Modern lithium-ion battery with high capacity, external recharger
- Minimum operating time 10 h
- Easy operation via keypad

Annual energy costs caused by leakages

Hole	**Loss in air**		**Energy loss**		**Costs p.a.**	
Ø (mm)	at 6 bar (l/s)	at 12 bar (l/s)	at 6 bar kW/h	at 12 bar kW/h	at 6 bar €	at 12 bar €
1	1.2	1.8	0.3	1.0	144	480
3	11.1	20.8	3.1	12.7	1.488	6.096
5	30.9	58.5	8.3	33.7	3.984	16.176
10	123.8	235.2	33.0	132.0	15.840	63.360

Source: www.druckluft.effizient.de (*) kW x 0.06 € x 8.000 Bh/a

Applications:

Leak detection in:

- Compressed air lines, gas, vapour and vacuum plants
- Refrigerating plants
- Door seals

LD 400 with focus tube and focus tip for precise locating.

LD 400 leak detector

Due to a particularly designed acoustic trumpet a better focusing of the acoustic waves is achieved. This acoustic trumpet acts like a directional microphone while interfering ambient noises are cushioned and the accurate localization of the leakages is eased even in areas which are difficult to access. Due to the special design of the acoustic trumpet the use of the laser pointer is not obstructed.

A handy ultrasonic transmitter is available for detecting leaks in depressurized systems. The transmitter is positioned in a way that the sound can access the piping system. The ultrasonic signal passes through smallest holes which then can be detected by means of LD 400. Even very small leaks at hatches, doors and windows can be realized.

LD400 is available either as stand-alone device or in a complete set.
The set includes a robust impact-proof transportation case which contains all necessary components and accessories.

Description	Order no.
Set LD 400 consisting of:	**0601 0104**
LD 400 Sleak detector	0560 0104
Transport case	0554 0106
Sound-proof headset	0554 0104
Focus tube with focus tip	0530 0104
Battery charger	0554 0009
Acoustictrumpet	0530 0109
Accessory, not included in the set: Ultrasonic tone generator	0554 0103

Technical data LD 400

Working frequency:	40 kHz ± 2 kHz
Connections:	3.5 mm stereo jack for headset Power supply socket for connecting an external recharger
Laser:	wave length: 645...660 nm output power: < 1 nW (laser class 2)
Operating duration:	10 hours
Charging time:	approx. 1.5 hours
Operating temp.:	0 to 40 °C
Storage temp.:	-10 °C to 50 °C

DS 52 – digital process meter

in wall housing for 0 (4)...20 mA signals

With the new digital process meter DS 52 in a shapely wall housing the annoying search and the mounting into a suitable plastic housing is no longer necessary. DS 52 disposes of 2 potential-free alarm contacts (switch-over contacts) which can be charged with maximum 230 VAC, 3 A. The alarm limits can be adjusted via the keys.
The diplay is supplied with 230 VAC and disposes of an internal mains unit which provides a voltage of 24 VDC/100 mA for the sensor. Free screwing clamps are available for forwarding the (0)4...20 mA signal to superordinated systems.

Special features:

- Integrated in a shapely wall housing
- Suitable for all customary sensors with 0(4)...20 mA signal
- Easy operation
- 2 relay outputs (230 VAC, 3 A)

Example of use:
Pressure monitoring with optional alarm unit (buzzer + continuous light)

Example of use:
Temperature monitoring with alarm

Technical data DS 52

Dimensions:	118 x 133 x 92 mm (WxHxD)
Display:	LED, 5 digits, height 13 mm, 2 LED for alarm
Keypad:	4 keys: Enter, Back, Up, Down
Sensor input:	For sensors with 0(4)...20 mA signal. Connectable in 2-/3-/4-wire technology
Accuracy:	max. +/- 20 µA, typical +/- 10 µA
Burden:	100 Ohm
Sensor supply:	24 VDC, max. 100 mA
Volate supply: (option)	230 VAC, 50/60 Hz or 24 V DC or 110 VAC
Outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Alarm limits:	Freely adjustable via keypad
Hysteresis:	Freely adjustable via keypad
Operation temp.:	-10...+60°C (storage temp.: -20...+80°C)
Operation menu:	Lockable by code against third-party access

Description	Order no.
DS 52 – digital process meter in wall housing, supply 230 VAC, sensor input for 0(4)...20 mA signal, 2 alarm relays	0500 0008
Options:	
Supply 24 VDC instead of 230 VAC	Z500 0001
Supply 110 VAC instead 230 VAC	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting	Z500 0004
All-in one sets:	
DS 52 – all-in one set for pressure monitoring /alerting, consisting of DS 52 LED display and pressure sensor 0...16 bar	on request
DS 52 – all-in one set for temperature monitoring /alerting, consisting of DS 52 LED display and screw-in temperature probe -50...+500°C	on request

DS 51 – digital panel meter

for 0 (4)...20 mA signals

The DS 51 digital panel meter disposes of 2 potential-free alarm contacts (change- over adjusted via the keys. The digital panel meter is supplied with 230 VAC and disposes of an internal mains unit which provides the voltage supply of 24 VDC/100 mA for the sensor.

Special features:

- Suitable for all customary sensors with 0(4)...20 mA signal
- Easy operation
- 2 relay outputs (230 VAC, 3 A)

Description	Order no.
DS 51 – digital meter for panel mounting, supply 230 VAC, sensor input for 0(4)...20 mA signal, 2 alarm relays	0500 0006
Options:	
Supply 24 VDC instead of 230 VAC	Z500 0001
Supply 110 VAC instead of 230 VAC	Z500 0002

Technical data DS 51

Dimensions:	96 x 48 mm (WxH) Mounting depth: 95 mm
Display:	LED, 5 digits, height 13 mm, 2 LED for alarm
Keypad:	3 keys: Set, Up, Down
Sensor input:	For sensors with 0(4)...20 mA signal. Connectable in 2-/3-/4-wire technology
Accuracy:	max. +/- 20 µA, typical +/- 10 µA
Burden:	100 Ohm
Sensor supply:	24 VDC, max. 100 mA
Voltage supply: (option)	230 VAC, 50/60 Hz or 24 V DC or 110 VAC
Outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Alarm values:	Freely adjustable via keypad
Hysteresis	Freely adjustable via keypad
Operation temp.:	-10...+60°C (storage temp.: -20...+80°C)
Operation menu:	Lockable by code against third-party access

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