



CS INSTRUMENTS GmbH

Flow station DS 400

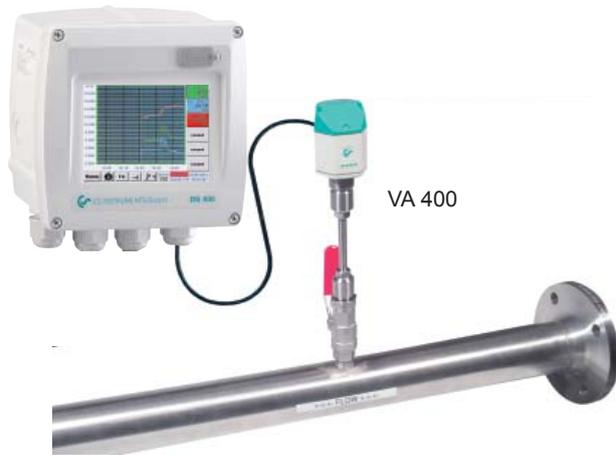
for compressed air and gases



←←← FLOW ←←←



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"	41.8	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

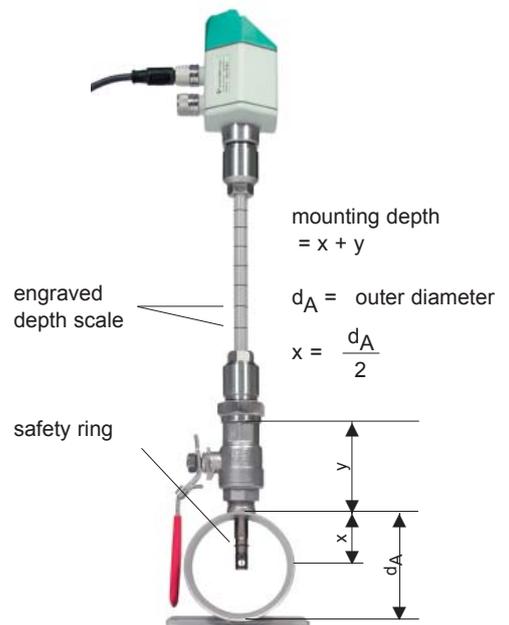
New multifunction measuring instruments DS 400

- 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
- Diameter freely adjustable at DS 400
- Output for 4...20 mA for m³/h
- Pulse output for m³ (total consumption)

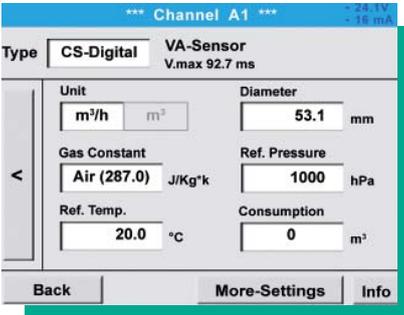
Description	Order no.
Flow station DS 400 for installation into existing pipelines consisting of: Multifunction measuring instrument DS 400 and flow sensor VA 400 in basic version, Standard (92,7 m/s), sensor length 220 mm	0601.4005
Options for DS 400	
Option: Integrated data logger for 100 million measured 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 and 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

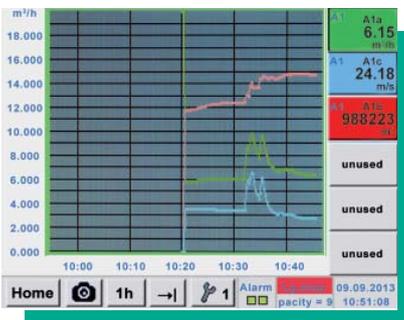


Easy operation via touch screen



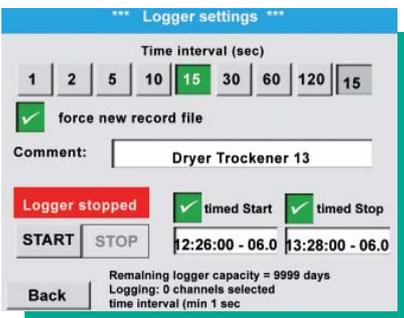
Configuration of flow sensor

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 consumption 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, NI/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 software:	air, nitrogen, argon, CO2, oxygen, natural gas
Meas. range:	see table on page 2
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 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
m ³ /h, m ³	°Ctd	A, kW/h	beliebig	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			Order no.
DS 400 - Multifunction measuring instrument with graphic display and touch screen	Sensor input 1+2	Sensor input 3+4	
	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	± 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

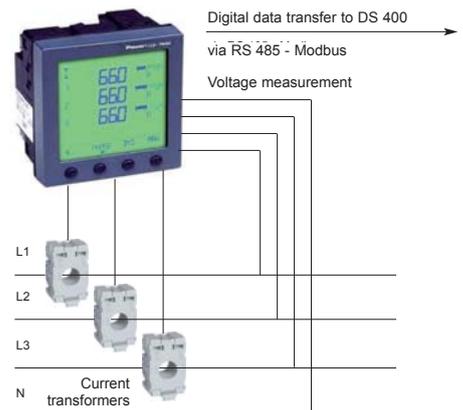


Suitable probes from the CS Instruments product range

Description	Order no.	
VA 400 flow sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 4001	  Consumption
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	
Consumption counter VA 420:		
Consumption counter VA 420 with integrated measuring section (R 1/4" DN 8)	0695 0420	  Consumption
Consumption counter VA 420 with integrated measuring section (R 1/2" DN 15)	0695 0421	
Consumption counter VA 420 with integrated measuring section (R 3/4" DN 20)	0695 0422	
Consumption counter VA 420 with integrated measuring section (R 1" DN 25)	0695 0423	
Consumption counter VA 420 with integrated measuring section (R 1 1/4" DN 32)	0695 0426	
Consumption counter VA 420 with integrated measuring section (R 1 1/2" DN 40)	0695 0424	
Consumption counter 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	  Dew point
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	  Pressure
Connection cable 10 m	0553 0105	
Pressure sensors:		
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886	  Pressure
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
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	  Power
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	  Power
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.		

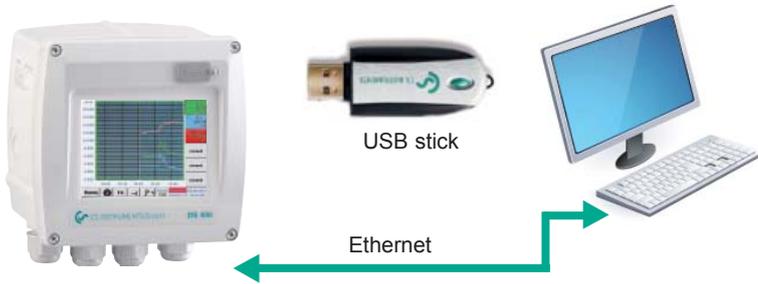
Current / effective power meter

Description	Order no.	
CS PM 710 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5343	 Digital data transfer to DS 400 via RS 485 - Modbus Voltage measurement
Current transformer 100/5 A connectible to current/effective power meter for panel mounting (for cables up to Ø 21 mm)	0554 5344	
Current transformer 200/5 A connectible to current/effective power meter for panel mounting (for cables up to Ø 21 mm)	0554 5345	
Current transformer 300/5 A connectible to current/effective power meter for panel mounting (for cables up to Ø 22 mm)	0554 5346	
Current transformer 500/5 A connectible to current/effective power meter for panel mounting (for cables up to Ø 22 mm)	0554 5347	
Current transformer 600/5 A connectible to current/effective power meter for panel mounting (for cables 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 400, 5 m, with open ends	0553 0108	
Connection cable to DS 400, 10 m, with open ends	0553 0109	

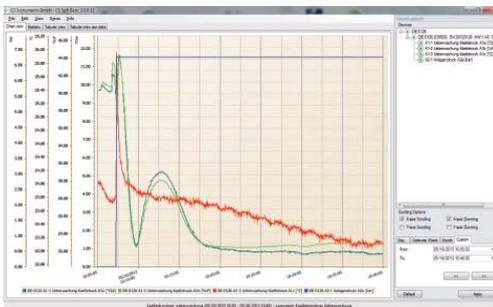




CS Soft Basic - evaluation of measured data for single computers



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.

The screenshot displays a table view of the measured data. The table has columns for time, channel, and value. The data points are listed in chronological order, showing the exact time interval for each measurement.

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.

The screenshot shows a 'Statistic Report' window. It contains a table with columns for 'Time', 'Channel', 'Min', 'Max', 'Time of Max', and 'Time of Min'. The data is summarized for a specific time period.

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.

The screenshot displays a 'Consumption evaluation' window. It features a table with columns for 'Channel', 'Description', 'Unit', 'Min', 'Max', 'Time of Max', and 'Time of Min'. The data is organized into sections for different measuring sites, providing a detailed overview of consumption.

Consumption evaluation

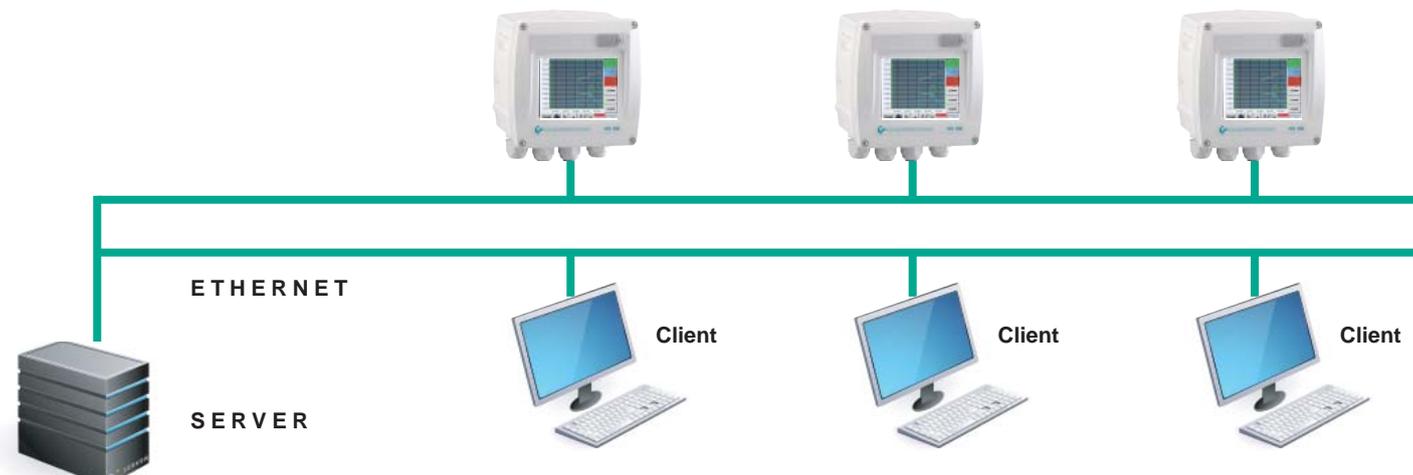
The software carries out a consumption analysis for all connected flow sensors optionally as daily, weekly or monthly report.

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

WORLD WIDE WEB

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

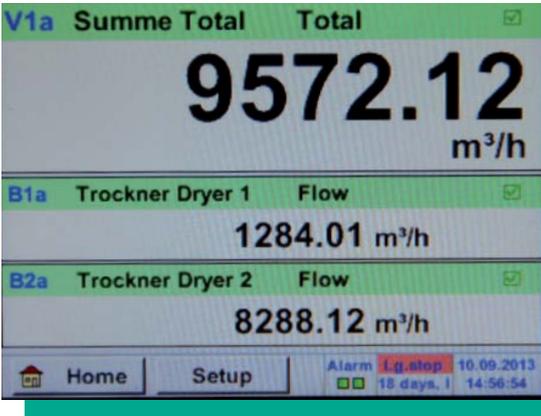


RS 485 network (Modbus RTU) or Ethernet (Modbus/TCP)

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

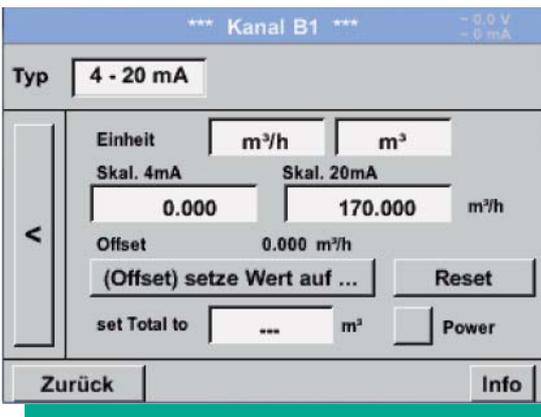
By means of the option "mathematics calculation function" (order no. Z500 4007) it is possible to calculate mathematically the sum of several connected flow sensors. Of course the new "virtual" value "sum of all sensors" can also be indicated graphically and stored in the data logger.



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.