OneTemp pty ltd
MEASURE | CONTROL | RECORD
www.onetemp.com.au
1300 768 887

DS 400 Flow station for compressed air and gases

Chart recorder 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 measuring ranges VA 500 for compressed air (ISO 1217:1000 mbar, 20 °C)					
Inner diameter of pipe			VA 500 Standard (92.7 m/s)	VA 500 Max. (185.0 m/s)	VA 500 HighSpeed (224.0 m/s)
Inch	mm		Measuring range from to	Measuring range from to	Measuring range 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 m³/h	0.4...178 m³/h	0.7...215 m³/h
1"	27.3	DN 25	0.5...148 m³/h	0.6...295 m³/h	1.1...357 m³/h
1 1/4"	36.0	DN 32	0.9...280 m³/h	1.2...531 m³/h	2.5...644 m³/h
1 1/2"	41.9	DN 40	1.2...365 m³/h	1.5...728 m³/h	3.0...886 m³/h
2"	53.1	DN 50	2...600 m³/h	2.5...1198 m³/h	4.6...1450 m³/h
2 1/2"	71.1	DN 65	3.5...1096 m³/h	5...2187 m³/h	7...2648 m³/h
3"	84.9	DN 80	5...1570 m³/h	7...3133 m³/h	12...3794 m³/h
4"	110.0	DN 100	9...2645 m³/h	12...5279 m³/h	16...6391 m³/h
5"	133.7	DN 125	13...3912 m³/h	18...7808 m³/h	24...9453 m³/h
6"	159.3	DN 150	18...5560 m³/h	25...11097 m³/h	43...13436 m³/h
8"	200.0	DN 200	26...8786 m³/h	33...17533 m³/h	50...21230 m³/h
10"	250.0	DN 250	40...13744 m³/h	52...27429 m³/h	80...33211 m³/h
12"	300.0	DN 300	60...19815 m³/h	80...39544 m³/h	100...47881 m³/h

Flow sensor VA 500

- 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 flow)

Description	Order No.
Flow measurement DS 400 for installation into existing pipelines consisting of: Chart recorder DS 400 and flow sensor VA 500 in basic version, Standard (92,7 m/s), sensor length 220 mm	0601 4006
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 500	
Max. version (185 m/s)	Z695 5003
HighSpeed version (224 m/s)	Z695 5002
Option 1 % Accuracy of m.v. ± 0,3 % of f.s.	Z695 5005
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 via USB or Ethernet	0554 7040
Calibration	
5 point precision calibration including ISO certificate	3200 0001

engraved depth scale

mounting depth = x + y
dA = outer diameter
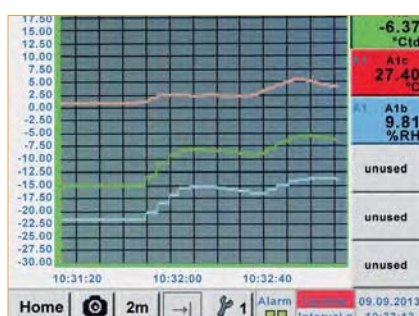$x = \dfrac{dA}{2}$
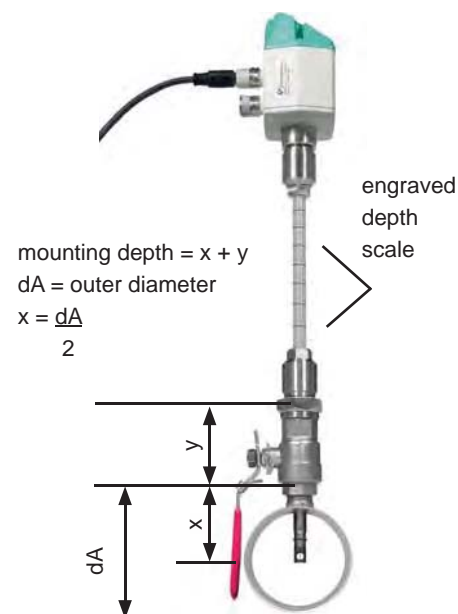
Easy operation via touch screen
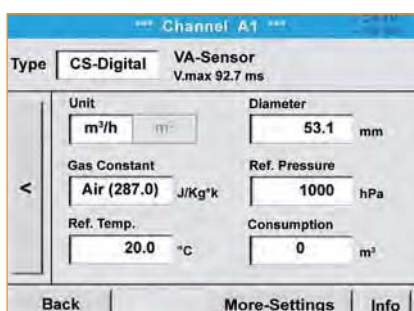
Configuration of flow sensor

The flow sensor VA 500 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. Readout 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 500

Parameters:	m³/h, l/min (1000 mbar, 20°C) in case of compressed air resp. Nm³/h, Nl/min (1013 mbar, 0°C) in case of gases
Units adjustable via keys at display:	m³/h, m³/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:	Thermal mass flow sensor
Meas. medium:	air, gases
Gas types adjustable via external device DS 400, DS 500, PI 500	air, nitrogen, argon, nitrous oxide, CO2, oxygen
Accuracy: (m.v.: of meas. value) (f.s.: of full scale)	± 1.5 % of m.v. ± 0.3 % of f.s. on request ± 1.0 % of m.v. ± 0.3 % of f.s.
Operating temp.:	-30...110 °C probe tube -30...80 °C housing
Operating pressure:	up to 50 bar
Digital output:	RS 458 interface, Modbus RTU
Analogue output:	4...20 mA for m³/h resp.l/min; on request: scaling for cfm,m³/min, l/min, l/s, ft/min, m/s
Pulse output:	1 pulse per m³ resp. per liter galvanically separated
Power supply:	18...36 VDC, 5 W
Burden:	< 500 Ω
Housing:	polycarbonate
Probe tube:	stainless steel, 1.4301 mounting length 220 mm, Ø 10 mm
Mounting thread:	G 1/2"

Technical data DS 400

Dimensions:	118 x 115 x 98 mm IP 54 (wall housing) 92 x 92 x 75 mm (panel mounting)
Inputs:	2 digital inputs for VA 500/520
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	please see VA 500
Alarm outputs:	2 relays, (pot.-free)
Options:	
Data logger:	100 million measuring values start/stop time, measuring 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, Pt 100, Pt 1000

DS 400 - chart recorder
for all relevant parameters of compessed air

Software options:
- Integrated webserver
- Mathematic 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 2 sensor inputs board 1 and 2 can be selected according to the required sensors:

Digital	Digital	Digital	Digital	Analogue	Analogue	Analogue	Analogue
m³/h, m³	°Ctd	A, kW/h	optional	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 am-meter	Tempe-rature sensor	Third-party sensors analogue output

Description			Order No.
DS 400 - Mobile chart recorder with graphic display and touch screen	2 sensor inputs board 1	2 sensor inputs board 2	
	Digital (Z500 4003)	--------	0500 4000 D
	Digital (Z500 4003)	Digital (Z500 4003)	0500 4000 DD
	Digital (Z500 4003)	Analogue (Z500 4001)	0500 4000 DA
	Analogue (Z500 4001)	--------	0500 4000 A
	Analogue (Z500 4001)	Analogue (Z500 4001)	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
External Gateway Profibus	Z500 3008

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 (panel mounting)
Inputs:	2 digital inputs for FA 510 resp. VA 500/520
Interface:	USB
Power supply:	100...240 VAC, 50-60 Hz
Accuracy:	please see VA 500
Alarm outputs:	2 relays, (pot.-free)
Options:	
Data logger:	100 million measuring values start/stop time, measuring 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, Pt 100, Pt 1000

| Input signals	
Current signal internal or external power supply Measuring range Resolution Accuracy Input resistance	(0...20mA/4...20mA) 0...20 mA 0.0001 mA ± 0.03 mA ± 0.05 % 50 Ω
Voltage signal Measuring range Resolution Accuracy Input resistance	(0...1 V) 0...1 V 0.05 mV ± 0.2 mV ± 0.05 % 1 MΩ
Voltage signal Measuring range Resolution Accuracy Input resistance	(0...10 V / 30 V) 0...10 V 0.5 mV ± 2 mV ± 0.05 % 1 MΩ
RTD Pt 100 Measuring range Resolution Accurancy	 -200...850°C 0.1°C ± 0.2°C (-100...400°C) ± 0.3°C (further range)
RTD Pt 1000 Measuring range Resolution Accuracy	 -200...850°C 0.1°C ± 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

| Flow sensors VA 500:	Order No.
VA 500 flow sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 5001
Option for VA 500:	
Max. version (185 m/s)	Z695 5003
High Speed version (224 m/s)	Z695 5002
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 520:	
Flow meter VA 520 with integrated measuring section, (R 1/4" DN 8)	0695 0520
Flow meter VA 520 with integrated measuring section, (R 1/2" DN 15)	0695 0521
Flow meter VA 520 with integrated measuring section, (R 3/4" DN 20)	0695 0522
Flow meter VA 520 with integrated measuring section, (R 1" DN 25)	0695 0523
Flow meter VA 520 with integrated measuring section, (R 1 1/4" DN 32)	0695 0526
Flow meter VA 520 with integrated measuring section, (R 1 1/2" DN 40)	0695 0524
Flow meter VA 520 with integrated measuring section, (R 2" DN 50)	0695 0525
Dew point sensors:	
FA 510 dew point sensor, -80...+20 °Ctd incl.inspection certificate	0699 0510
FA 510 dew point sensor, -20…+50°Ctd, incl.inspection certificate	0699 0512
Standard measuring chamber for compressed air up to 16 bar	0699 3390
Connection cables for flow sensors / dew point sensors:	
Connection cable 5 m	0553 0104
Connection cable 10 m	0553 0105
Pressure sensors: (further pressure sensors please see page 9)	
Standard pressure sensor CS 16 from 0…16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40 from 0…40 bar, ± 1 % accuracy of full scale	0694 0356
Temperature sensors:	
Bendable temperature probe, Pt100 Class B, length 300 mm, 2 m probe connection cable glass fibre/stainless steel open end wires	0604 0107
Screw-in temperature probe Pt 100 Class A, length: 300 mm with measuring transducer 4 to 20 mA = -50 to +500 °C (2-wire technology)	0693 0002
Indoor/outdoor temperature probe -50...+100°C	0604 0101
Temperature probe cable Pt 100, Class A, length: 300 mm, Ø 6 mm, -50...+180°C, with 5 m connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length: 150 mm, Ø 6 mm, +50...+180°C with 5 m connection cable with open ends	0604 0100
Clamp screwing 6 mm, G 1/2", PTFE clamping, pressure-tight up to 6 bar	0554 6003
Clamp screwing 6 mm, G 1/2", VA clamping, 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...1000 A TRMS incl. 5 m connection cable with open ends	0554 0518
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 / effective power meter (Further Current transformer please find on page 9)	
CS PM 210 current/effective power meter for panel mounting, current transformer from 100 A to 2000 A connectible	0554 5353
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 500/5 A connectible to current/effective power meter for panel mounting (for cabels up to Ø 21 mm)	0554 5347
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
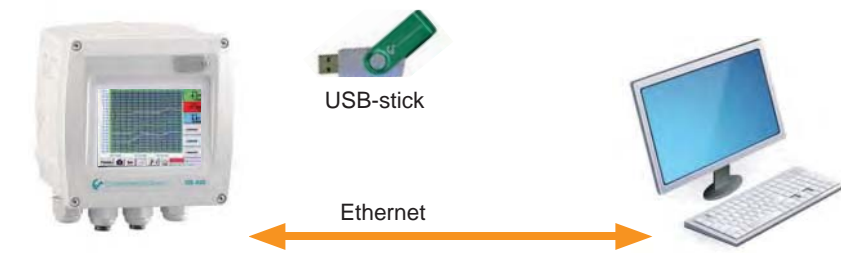
USB-stick

Ethernet

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
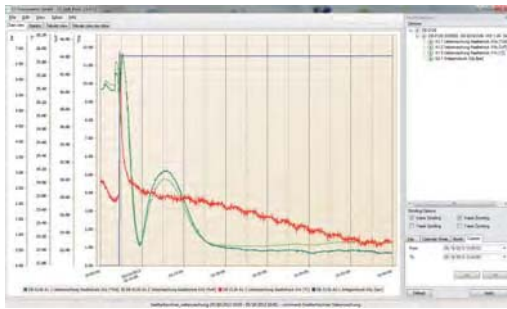
Graphic evaluation

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 million 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 statistics 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.
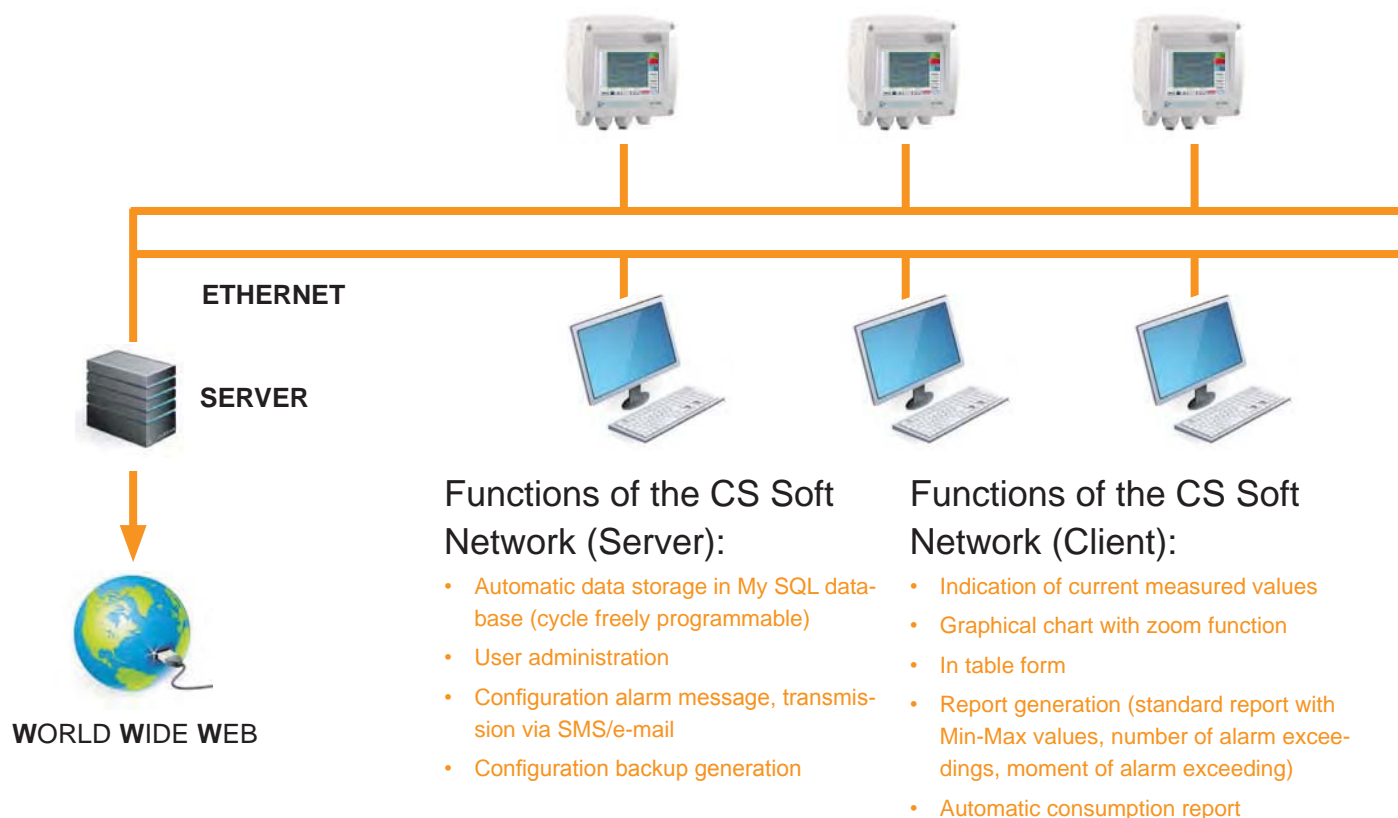

Energy and flow evaluation

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 Network 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 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 evaluation of the measured data can be carried out by means of the client software from each PC within the company.
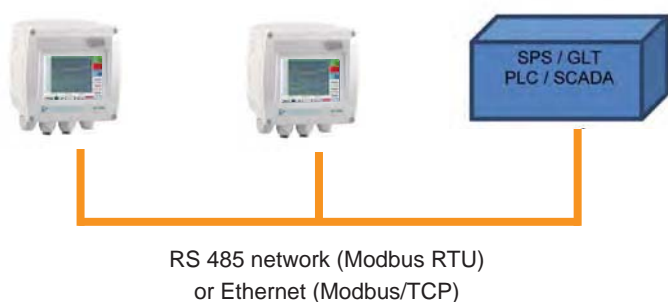
ETHERNET

SERVER

WORLD **W**IDE **W**EB

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

Access to the measured values via the webserver

WORLD **W**IDE **W**EB

Ethernet

With the option „Webserver" (order no. Z500 4005) DS 400 can be contacted without any special software from each web browser (eg. 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 system

SPS / GLT
PLC / SCADA

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 system (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.
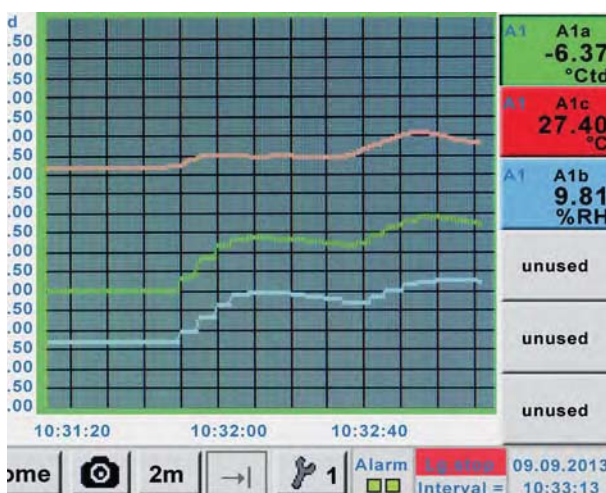
# Innovations
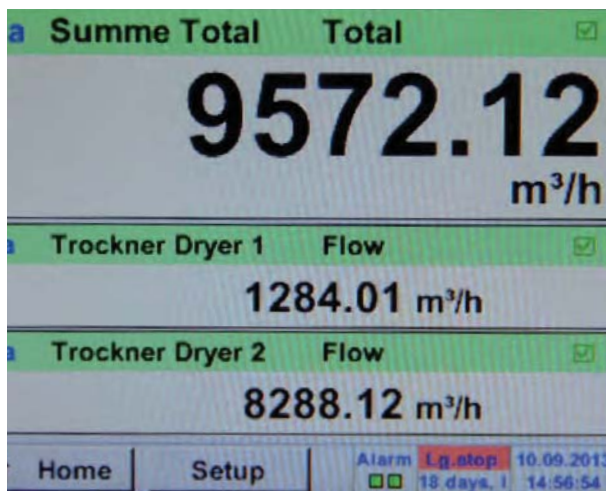
Summation of several flow sensors

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.

Screen-shot 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.
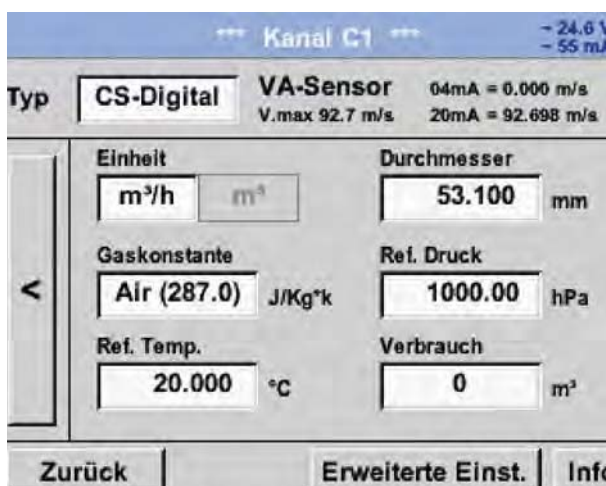
Totalizer function

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, Frauenhofer 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 400 of CS Instruments GmbH **will be paied off after 4 leakages** (please see page 94-95)

Cost distribution in compressed air systems:

Maintenance
Electricity
Equipment
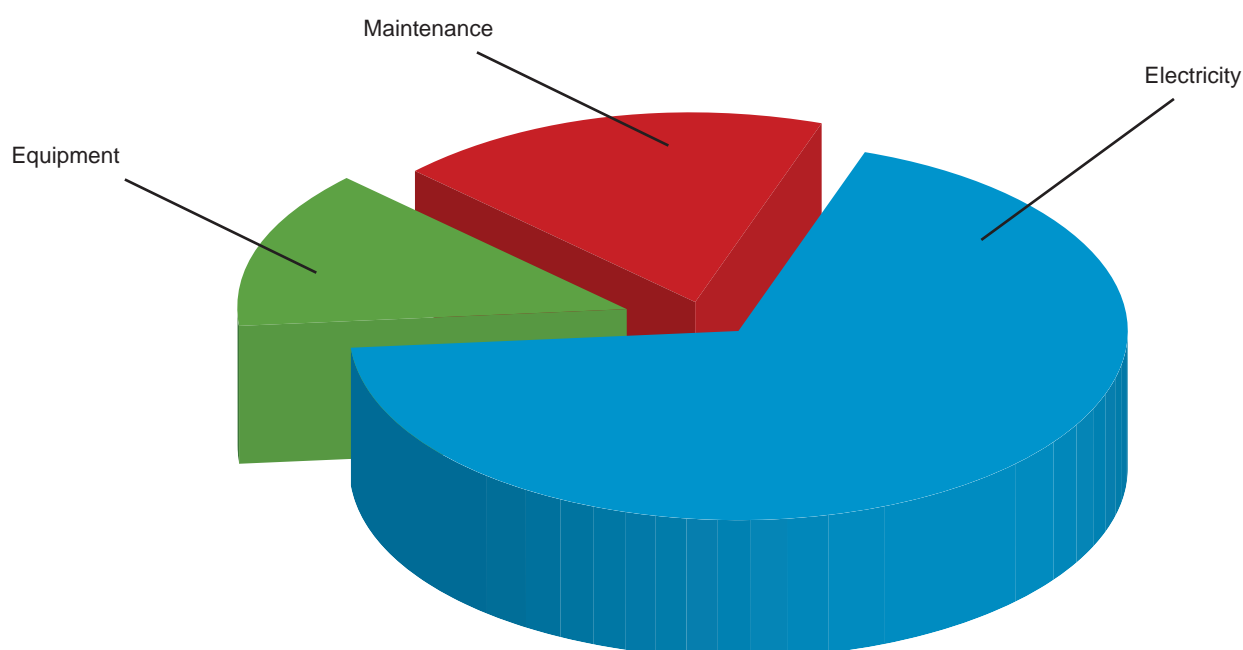
Example for a calculation of leakage costs at different pressure:

Leak Ø (mm)	Air loss at 6 bar (l/s)	Air los 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	6,960
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