DS 500 mobile
Intelligent mobile chart recorder

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 connectable 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 calculations, e.g. the typical key data of a compressed air plant:
- costs in € per generated m³ air
- kWh/m³ generated air
- flow of single lines including summation

Easy & intuitional in its operation

Saves time & costs on installation

Technical Data DS 500 mobile - mesurement 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 allocatable. See options • Digital CS sensors for dew point and flow with SDI interface FA/VA series, digital third-party sensors RS 485 / Modbus RTU. • 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, 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 sensor inputs 2 integrated mains unit, each max. 24 VDC, 25 W
Interfaces:	USB stick, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, Webserver optionally, GSM module
Memory card:	Memory size 4 GB SD Memory card
Voltage supply:	100...240 VAC / 50-60 Hz
Colour display:	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.
Intelligent chart recorder DS 500 mobile, 4 sensor inputs	0500 5012
Intelligent chart recorder DS 500 mobile, 8 sensor inputs	0500 5013
Intelligent chart recorder 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 „mathematics calculation 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 - data evaluation in graphic and table form, reading out of the measured data via USB or Ethernet	0554 7040
CS Soft Energy Analyzer for energy and leakage analysis of compressed air stations	0554 7050
Software Upgrade of the already existing CS Soft Basic to CS Soft Energy Analyzer	0554 7045
GSM module for data transfer via the GSM network (mobile network)	on request
Connection cable on mobile instruments, ODU / open ends, 5 m	0553 0501
Connection cable on mobile instruments, ODU / open ends, 10 m	0553 0502
Connection cable for VA/FA series on mobile instruments, ODU/M12, 5m	0553 1503
Extension cable for mobile instruments ODU/ODU, 10m	0553 0504
Connection cable for mobile current/effectiv power meter	0553 0506
Case of all sensors (dimensions: 500 x 360 x 120 x mm)	0554 6006

Input signals	
Current signal internal or external power supply	(0...20mA/4...20mA)
Measuring range	0...20 mA
Resolution	0.0001 mA
Accuracy	± 0.03 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
Accurancy	± 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

Intelligent mobile chart recorder 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 cost 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 means 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 m³ 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 intelligent chart recorder **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 measuring range (-80° to +20° Ctd)
- For all driers: Desiccant driers, membrane driers, refrigeration driers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

- Large selection of pressure sensors with different measu-ring ranges for each measuring purpose
- Quick installation under pressu-re 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 0-1.6 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

Clamp-on ammeters

- 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 recor-ded via clamp-on ammeters
- Measuring ranges of the clamp-on ammeters:

0 - 400 A

0 - 1000 A

Current/effective power meters

- 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

- Mobile current/effective power meters with external current transformer 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 DS 500 mobile via Modbus

By means of the mobile chart recorder **DS 500 mobile**, all measuring data of a compressor station can be recorded, indicated and evaluated.

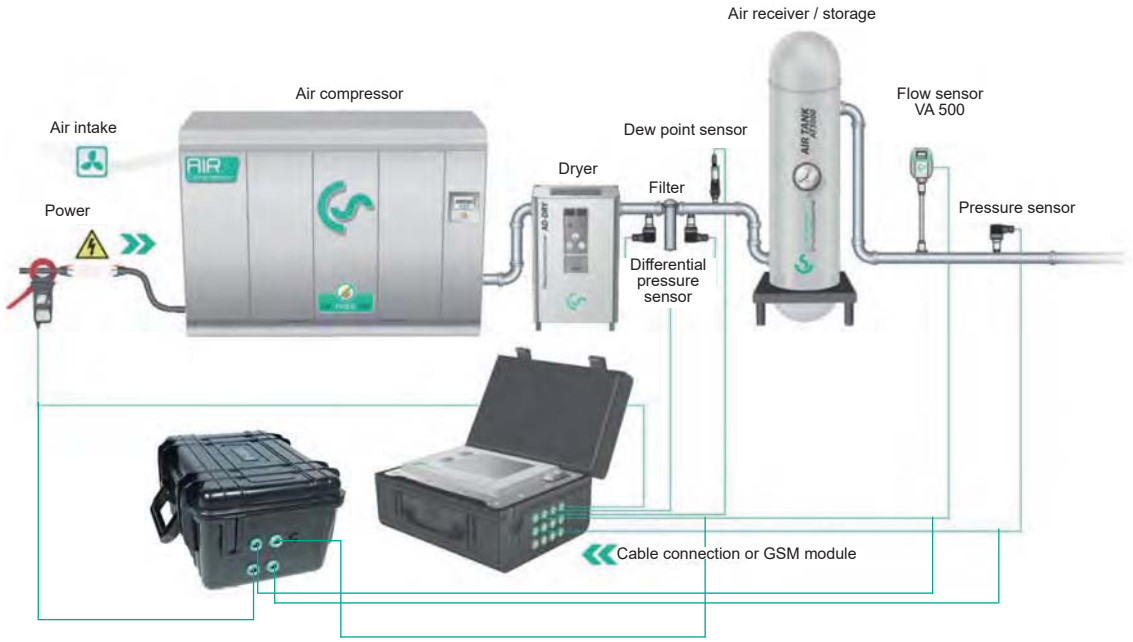
At **12 freely assignable sensor inputs** all our sensors can be connected as well as any optional third-party sensors and meters **with the following signal outputs:**

4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-30 V I Pt 100 (2- or 3-wire), Pt 1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas meters) frequency output I Modbus protocol.

Chart recorder

Step 1:
The measurement

It is a special advantage 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 quantity is calculated by the software on the basis of the performance data of the compressor which have to be calculated. 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 500.

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 500 measures the supplied quantity of air. During the down time the compressor delivers compressed air in order to keep a constant pressure.

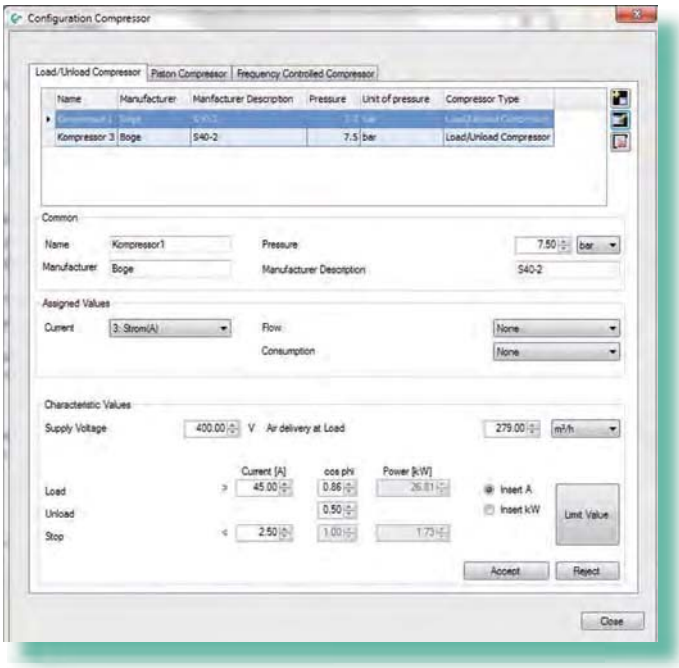
According to statistics even if production is carried out day and night there is at least one short period of time during which all load is switched off. By means of this data the software defines a leakage rate and calculates the incurred leakage costs in €.

Step 3:
Evaluation at the PC with graphics and statistics

3.1 Entry of necessary parameters

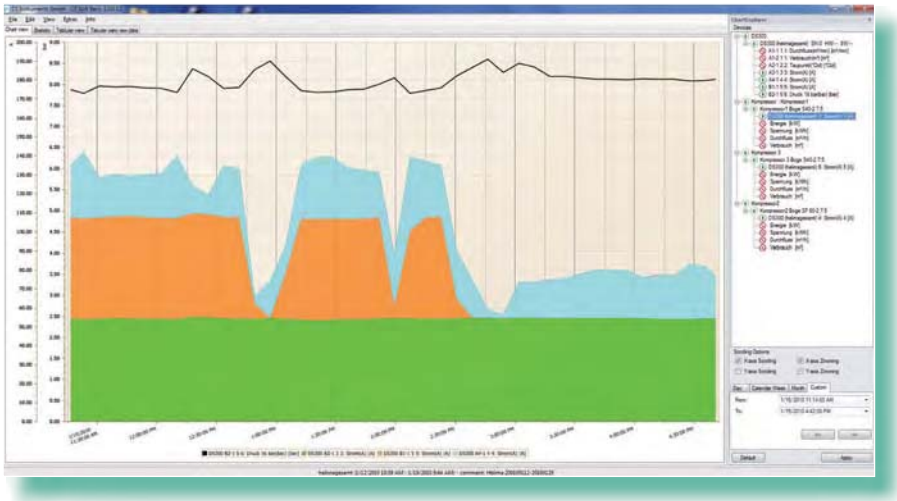
Specific data have to be entered before the analysis is carried out:

- 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 1 kWh



3.2 Graphic evaluation with day view and week view

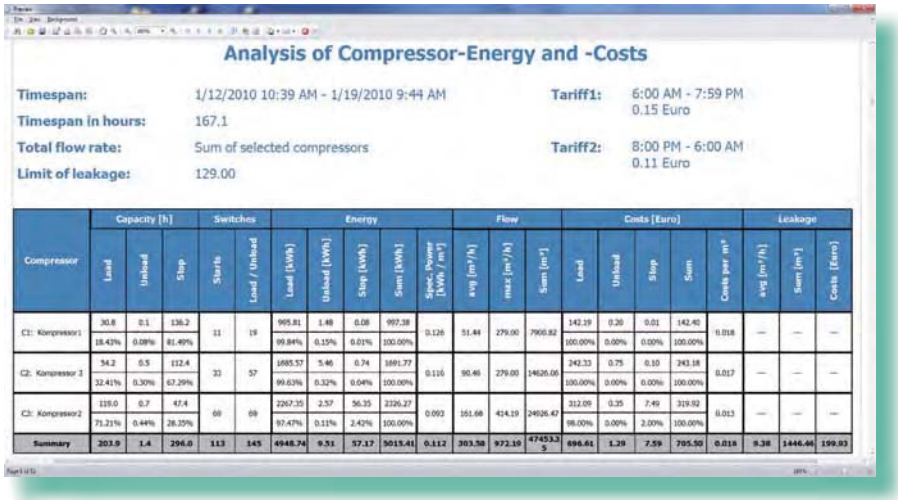
Everything at a glance: The user gets a day and a week view of all stored measured data with his company logo (can be easily integrated) at the touch of a button. By means of the zoom and the crosslines function peak values can be determined.



3.3 Compressed air costs in €/ US$

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

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



Suitable sensors for **DS 500 mobile & DS 400 mobile**

Flow sensors VA 500:	**Order No.**
Flow sensor VA 500-Max. Version (185 m/s) sensor length 220 mm, incl. 5 m cable to mobile instruments	0695 1124
Flow sensor VA 500 High-Speed Version (224 m/s), sensor length 220 mm, 5 m cable to mobile instruments	0695 1125
Options for VA 500: (see page 81)	
Flow measuring range VA 520 for compressed air:(ISO 1217: 1000 mbar, 20°C)	
Flow meter VA 520, 0,8... 90 l/min, (R 1/4“ DN 8)	0695 0520
Flow meter VA 520, 0,2... 90 m³/h, (R 1/2“ DN 15)	0695 0521
Flow meter VA 520, 0,3... 170 m³/h, (R 3/4“ DN 20)	0695 0522
Flow meter VA 520, 0,5... 290 m³/h, (R 1“ DN 25)	0695 0523
Flow meter VA 520, 0,7... 480 m³/h, (R 1 1/4“ DN 32)	0695 0526
Flow meter VA 520, 1,0... 550 m³/h, (R 1 1/2“ DN 40)	0695 0524
Flow meter VA 520, 2,0... 900 m³/h, (R 2“ DN 50)	0695 0525
Dew point sensors:	
FA 510 dew point sensor for mobile instruments, -80…+20°Ctd, incl. mobile measuring chamber, 5 m cable and perforated cap	0699 1510
FA 510 dew point sensor for mobile instruments, -20...50°Ctd incl. mobile measuring chamber, 5 m cable and perforated cap	0699 1512
Connection cable for VA/FA sensors:	
Connection cable for VA/FA series on mobile instruments, ODU / M12, 5m	0553 1503
Extension cable, 10 m	0553 0504
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

Pressure sensors:	**± 1 % accuracy of full scale**	**± 0,5 % accuracy of full scale**
Standard pressure sensor CS 16 from 0…16 bar	0694 1886	0694 3555
Standard pressure sensor CS 40 from 0…40 bar	0694 0356	0694 3930
Standard pressure sensor CS 1.6 from 0...1.6 bar abs.		0694 3550
Standard pressure sensor CS 10 from 0...10 bar	0694 3556	0694 3554
Standard pressure sensor CS 100 from 0…100 bar		0694 3557
Standard pressure sensor CS 250 from 0…250 bar		0694 3558
Standard pressure sensor CS 400 from 0…400 bar		0694 3559
Precision pressure sensor CS -1...+15 bar, ± 0.5 % accuracy of full scale		0694 3553
Precision differential pressure sensor CS 400, 0...400 mbar differential pressure, 0.075% accuracy of full scale, static pressure max. 40 bar	0694 3560	
Pressure calibration certificate, 5 calibration points within the measuring range	3200 0004	

Suitable sensors for **DS 500 mobile & DS 400 mobile**

Temperature sensors:	**Order No.**
Bendable temperature probe PT 100 (2-wire) class A, length: 300 mm, d=3 mm, -70°C to +500°C, connection cable PFA, 2 m with ODU-plug (8 pole) to mobile instruments	0604 0200
Screw-in temperature probe PT 100 class A, length: 300 mm, d=6mm, with integrated transducer 4…20 mA = -50°C…+500°C (2-wire)	0604 0201
Cross-band surface temperature probe, thermocouple Type K, with integrated transducer 4…20 mA = 0°C…+180°C, 2 m connection calbe (PVC) with ODU-plug (8-pole) to mobile instruments	0604 0202
Temperature probe PT 100 class A (4-wire) with cable, length: 300 mm, d=6 mm, -70°C to +260°C, 5 m connection cable (PFA) with open ends	0604 0205
Temperature probe PT 100 class A (4-wire) with cable, length: 100 mm, d=6 -70°C to +260°C, 5 m connection cable (PFA) with open ends	0604 0206
Temperature probe PT 100 class A (4-wire) with cable, length: 200 mm, d=6 -70°C to +260°C, 5 m connection cable (PFA) with open ends	0604 0207
Surface temperature probe, magnetic, magnet dimensions 39x26x25 mm, PT 100 class B (2-wire), -30 to +180°C, 5 m connection cable (PFA) with open ends	0604 0208
Clamp screwing 6mm; G 1/2“ PTFE clamp ring pressure tight up 10 bar material: stainless steel, temperature range: max. +260°C	0554 0200
Clamp screwing 6mm; G 1/2“ stainless steel clamp ring pressure tight up to 16 bar, material: stainless steel, temperature range: max. +260°C	0554 0201
Temperature calibration certificate 2 measuring points	0520 0180
Connection 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, 10 m	0553 0504
Mounted Odu plug for connection on mobile instruments	Z604 0104
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 0519
Calibration certificate for clamp-on ammeter	0554 3333
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 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 for DS 500 mobile / DS 400 mobile via Modbus, incl. connection cable for mobile current/effective power meter to mobile instruments, 5 m	
Current transformer 100A/1A consisting of 3 transformers for mobile instruments	Z554 0001
Current transformer 600A/1A consisting of 3 transformers for mobile instruments	Z554 0002
Current transformer 1000A/1A consisting of 3 transformers for mobile instruments	Z554 0003
Optional third-party sensors connectable:	
e.g. heat meters, current meters, gas meters, water meters and so on. To the 12 freely assignable sensor inputs all our sensors 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), Pt 1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas counters) I Frequency output I Modbus protocol