



VA 420

consumption counter with display, 4 ... 20 mA and pulse output (galvanically isolated)

Stationary

Flow and consumption measurement for compressed air
and gases



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INTRODUCTION

Dear CS customer,

You have made the right decision by choosing a measuring instrument from CS Instruments GmbH. Thousands of customers buy our high standard products every year. There are a few good reasons for doing so:

- The cost-performance ratio - reliable quality at a fair price.
- We have the ideal solutions for your measuring tasks based on our expert experience gained over 20 years.
- Our high quality standard.
- Of course, our instruments carry the CE symbol required by the EU.
- We issue calibration certificates and hold seminars.
- Also after the purchase we do not leave you out in the cold - we offer a good after sales service.

Our service guarantees fast help.



Measuring instrument conform to **DIN EN 61326**

Please read carefully before starting  the device!

Warning: Do not exceed the pressure range of 16 bar!

Observe the measuring range of the sensor!

Always observe the direction of flow when positioning the sensor!

The screwed fixture must be pressure tight.

It is absolutely necessary to avoid condensation on the sensor element or water drops in the measuring air as they may cause faulty measuring results.

The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with these instructions. Should the device be tampered with in any manner other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is destined exclusively for the described application.

CS Instruments GmbH offers no guarantee for the suitability for any other purpose and is not liable for errors which may have slipped into this operation manual. CS Instruments GmbH is also not liable for consequential damage resulting from the delivery, capability or use of this device.

We offer you to take back the instruments of the instruments family VA 420 which you would like to dispose of.

Adjustments and calibrations should only be carried out by qualified employees from the measurement and control technology branch.

INSTRUMENTS DESCRIPTION

VA 420 is a compact consumption counter for compressed air and gases.

Special features:

- Optimum accuracy due to compact design
- Integrated in- and outlet section
- Less flow due to measuring section
- Integrated display for Nm³/h and Nm³

Programming via Service Software SFA 300

- Analogue output 4...20 mA scalable
- Selection of gas type (air, nitrogen, argon, nitrous oxide, CO₂, oxygen)
- Read-out the service data

INSTALLATION DESCRIPTION

The following table shows the required inlet sections depending on the existing disturbance / flow disturbance.

Table of additionally required inlet sections

Flow obstruction in front of the measuring section	Minimum length inlet section (L1)	Minimum length outlet section (L2)
Slight curve (bend < 90°)	12 x D	5 x D
Reduction (pipe narrows towards the meas. section)	15 x D	5 x D
Expansion (pipe expands towards the meas. section)	15 x D	5 x D
90° bend or T-piece	15 x D	5 x D
2 bends á 90° on one level	20 x D	5 x D
2 bends á 90° 3-dimensional change of direction	35 x D	5 x D
Shut-off valve	45 x D	5 x D

The respective minimum values required are indicated here. If it is not possible to observe the stipulated equalising sections, considerable deviations in the measuring results must be expected.

Attention: The measuring sections of VA 420 consumption counters with 1 1/2" and 2" measuring section have reduced inlet and outlet sections. Please take into consideration the recommended inlet and outlet sections. Dimensions please see page 6.

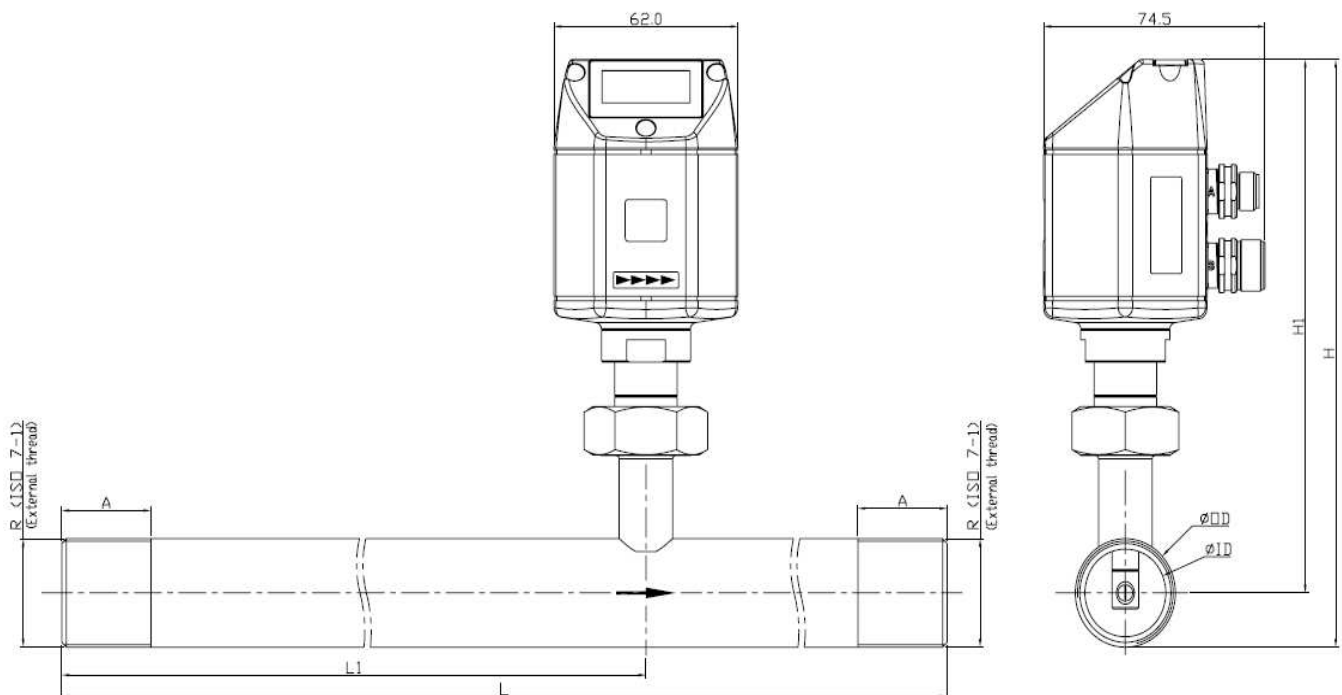
Parameters:	m³/h, m³/min (Standard: DIN 1945, ISO 1217 at 20°C and 1000 mbar)
Selectable units:	m³/h (standard- factory setting), m³/min, l/min, l/s, kg/s, kg/min, kg/h, cfm
Measuring principle:	calorimetric measurement
Sensor:	Pt45, Pt1000
Measuring medium:	air, gases
Operating temperature:	-30 ... 80°C
Operating pressure:	up to 16 bar
Power supply:	12 to 30 VDC smoothed ± 15%
Power input:	max. 80 mA at 24 VDC
Analogue output:	4...20 mA (see table below), max. burden < 500 Ohm

Order no.	Description	Analogue output
0695.0421	VA 420 with integrated 1/2" meas. section	4...20 mA = 0 ...90 m ³ /h
0695.0422	VA 420 with integrated 3/4" meas. section	4...20 mA = 0 ...170 m ³ /h
0695.0423	VA 420 with integrated 1" meas. section	4...20 mA = 0 ...290 m ³ /h
0695.0424	VA 420 with integrated 1 1/2" meas. section	4...20 mA = 0 ...550 m ³ /h
0695.0425	VA 420 with integrated 2" meas. section	4...20 mA = 0 ...900 m ³ /h

Pulse output:	1 pulse per m³ resp. per l, pulse output potential-free max. 30 VDC, 20 mA (pulse length see page 8)
Accuracy:	± 1.5 % m. v., ± 0.05 % f. s.
Display:	Flow in m³/h, Counter in m³ Other units selectable via display Flow values max. 6 digits, counter max. 1,999,999,999 m³ then it drops back to 0 Display operation please see pages 10-11
Mounting thread:	R1/2", R3/4", R1", R1 1/2", R 2" DIN EN 10226 (ISO 7-1)
Material:	Measuring section: Stainless steel 1.4301

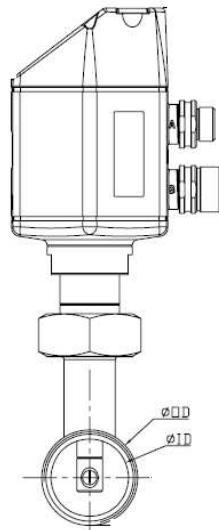
Flow measuring ranges

Pipe size	Inner pipe Ø	Pipe size	VA 420	Consumption
Inch	mm		Meas. ranges from ... to	Standard setting
1/2"	16.1	DN 15	0,2 ... 90 m ³ /h	m ³
3/4"	21.7	DN 20	0,3 ... 170 m ³ /h	m ³
1"	27.3	DN 25	0,5 ... 290 m ³ /h	m ³
1 1/2"	41.8	DN 40	1 ... 550 m ³ /h	m ³
2"	53.1	DN 50	2 ... 900 m ³ /h	m ³

DRAWING OF THE INSTRUMENT / INSTRUMENTS DIMENSIONS


	Pipe size	outer diam/ inner diam (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	R	A (mm)
VA 420 1/2"	DN 15	21.3 / 16.1	300	210	176.4	165.7	R 1/2"	20
VA 420 3/4"	DN 20	26.9 / 21.7	475	275	179.2	165.7	R 3/4"	20
VA 420 1"	DN 25	33.7 / 27.3	475	275	182.6	165.7	R 1"	25
VA 420 1 1/2"	DN 40	48.3 / 41.9	475	275	189.9	165.7	R 1 1/2"	25
VA 420 2"	DN 50	60.3 / 53.1	475	275	195.9	165.7	R 2"	30

DRAWING OF THE INSTRUMENT



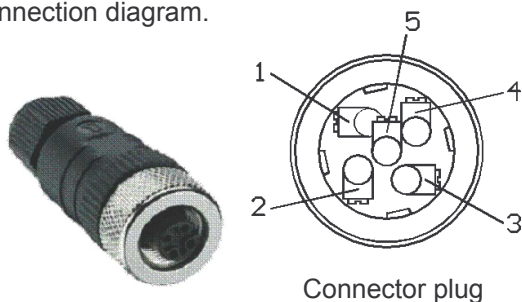
- Connector plug A
- Connecting plug B

ELECTRICAL WIRINGS

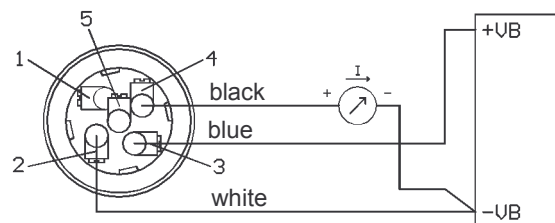
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Connector plug A	SDI*	-VB	+VB	I+ 4..20 mA	*
Colours connection cables 0553.0104 (5 m) 0553.0105 (10 m)	brown	white	blue	black	grey
Connector plug B	* (SDI-SEL)	* (GND)	*	Pulse	Pulse
Colours pulse cables 0553.0106 (5 m) 0553.0107 (10 m)	brown	white	blue	black	grey

SDI	Digital signal (internal data transfer)	Pulse	Pulse for consumption
-VB	Negative supply voltage 0 V	* (SDI_SEL) (GND)	Not assigned resp. only for internal use. Must not be connected to a voltage and/or to protection earth.
+VB	Positive supply voltage 12...30 VDC smoothed		
I +	Current signal 4...20 mA - actual flow		

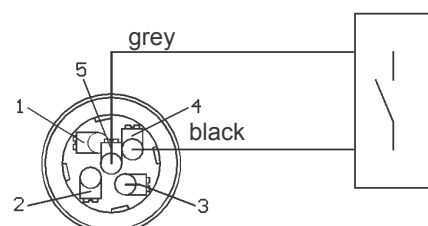
If no connection lead/pulse lead is ordered the sensor will be supplied with a M12 connector plug. the user can connect the supply and signal cables as indicated in the connection diagram.



M12 connector plug A



M12 connector plug B

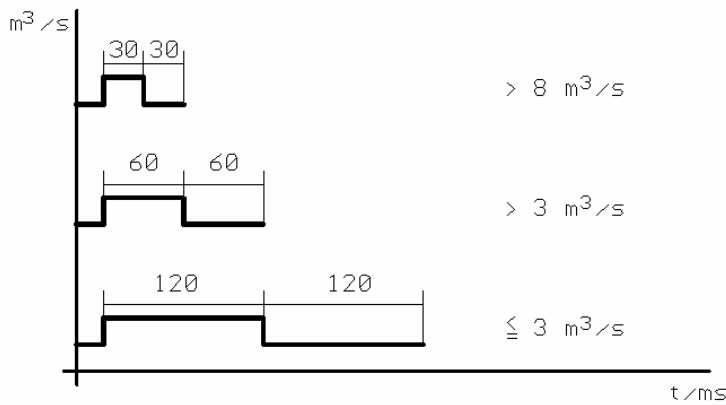


Pulse lengths are indicated consumption-relatedly.

Pulses, one pulse per set consumption unit, are summed up within the sensor and indicated in one second intervals, please see below

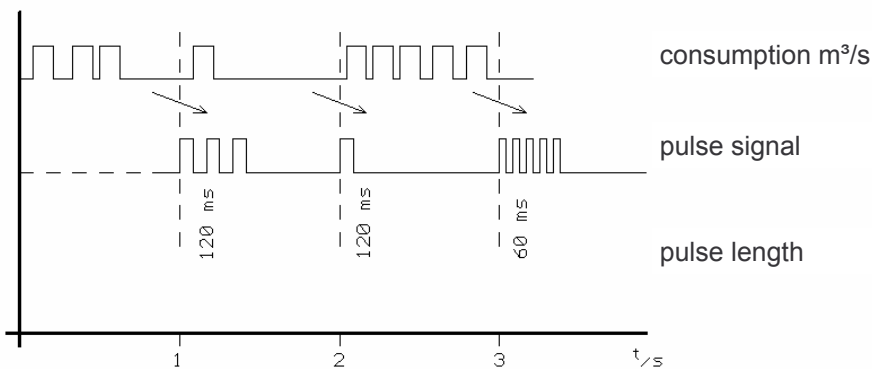
Pulse : There is an isolated contact available. This is closed for the duration of the pulse .
 Max. switching capacity : 30 VDC, 20 mA

Pulse lengths consumption-dependent



Internal pulse receiver:

The numbers of m^3 per second are summed up and indicated after one second. Pulse lengths consumption-independent
 Pulse lengths depending on consumption



148h05

Flow [m^3/sec]	Pulse length [ms]	max. consumpt. [m^3/min]	max. consumpt. [m^3/h]
up to 3	120	180	10800
from 3	60	480	28800
from 8	30	960	57600

Maintenance

The sensor head should be checked regularly for dirt and cleaned if necessary. Should dirt, dust or oil accumulate on the sensor element, a deviation will occur in the measuring value. An annual check is recommended. Should the compressed air be heavily soiled this interval must be shortened.

Cleaning of the sensor head

The sensor head can be cleaned by carefully moving it to and fro in warm water with a small amount of washing-up liquid. Avoid physical intervention on the sensor (e. g. using a sponge or brush). If soiling cannot be removed, service and maintenance must be carried out by the manufacturer.

Re-calibration

If no customer specifications are given then we recommend to carry out calibration every 12 months. For this purpose the sensor must be sent to the manufacturer.

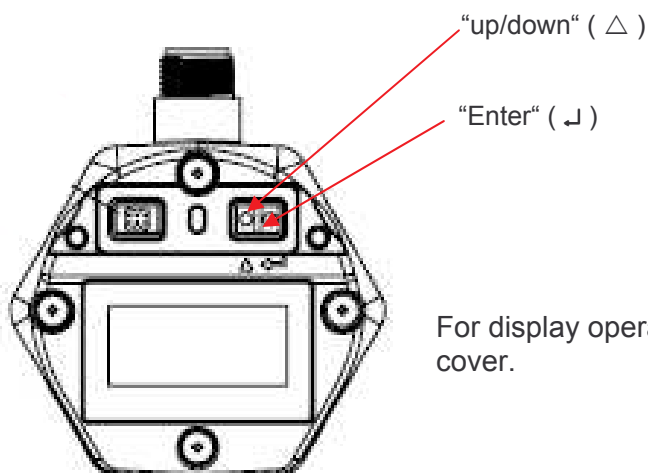
Spare parts and repair

For reasons of measuring accuracy spare parts are not available. If parts are faulty they must be sent to the supplier for repair.

If the measuring device is used in important company installations we recommend to keep a spare measuring system ready.

Calibration certificates

Calibration certificates are issued by the manufacturer on request. This is a fee-paying service. Precision is tested with PTB (German National Metrology Institute) volume flow nozzles.



For display operation please lift up the grey rubber cover.

Display

Reset

Initialization...

After power on the VA 420 the display will go through an initialization procedure and will finally show the actual on-line values.

2 Sec.

Software: 1.20
Hardware: 1.1

Ex factory VA 420 is programmed to show the volume flow and the total consumption. Via the configuration menu up to 3 channels can be configured for on-line indication. VA 420 will toggle between the channels every 2 seconds.

2 Sec.

3457
m³/h

Unit
m³/h

The unit will be indicated by using the "Enter" key (↵). By using that key once more for the duration of 3 seconds the display will change to the selection mode for the units. The units can be selected by means of the "Up" key (Δ). If the "Enter" key (↵) is pressed once more the selected unit will be taken over.

Configuration settings

VA 420 is usually configured ex factory according to the customer settings ordered. In case settings have to be changed, the user has to keep the Enter key (↵) pressed while powering up the device.

IS DS 300 connected?
Yes / No

Enter "Yes" if there is a DS 300 connected to the VA 420, otherwise "**No**". Confirm setting with Enter key (↵).

Display 1
Volume flow

VA 420 can display up to 3 channels, which are volumetric flow or mass flow, velocity and total consumption. Use the **Up** key (△) to select the desired channel. If no further channel is wanted, please select "**nothing**". The channels are toggled during normal operation mode every 2 seconds.

Consumption
3457 m³

In this step the consumption counter can be set to to "**Zero**" by means of "Up" (= △)

Contrast setting
Up change
Enter OK

Display contrast can be adjusted.

Save changes
No Yes

Press Enter key (↵) to confirm the setting changes or press Up/down key (△) to discard all changes.

At CS Instruments

According to DIN ISO certification of the measuring instruments we recommend to calibrate and if applicable to adjust the instruments regularly from the manufacturer. The calibration intervals should comply with your internal specification. According to DIN ISO we recommend a calibration interval of one year for the instrument VA 420.

WARRANTY

If you have reason for complaint we will of course repair any faults free of charge if it can be proven that they are manufacturing faults. The fault should be reported immediately after it has been found and within the warranty time guaranteed by us. Excluded from this warranty is damage caused by improper use and non adherence to the instruction manual.

The warranty is also cancelled once the instrument has been opened - as far as this has not been mentioned in the instruction manual for maintenance purposes - or if the serial number in the instrument has been changed, damaged or removed.

The warranty time for the VA 420 is 12 months. If no other definitions are given the accessory parts have a warranty time of 6 months. Warranty services do not extend the warranty time.

If in addition to the warranty service necessary repairs, adjustments or similar are carried out the warranty services are free of charge but there is a charge for other services such as transport and packaging costs. Other claims, especially those for damage occurring outside the instrument, are not included unless responsibility is legally binding.

After sales service after the warranty time has elapsed

We are of course there for you even after the warranty time has elapsed. In case of malfunctions please send us the instrument with a short-form description of the fault. Please do not forget to indicate your telephone number so that we can call you in case of any questions.

ORDERING DATA

<i>Order no.</i>	<i>Description</i>
0695.0421	VA 420 consumption counter with integrated 1/2" measuring section
0695.0422	VA 420 consumption counter with integrated 3/4" measuring section
0695.0423	VA 420 consumption counter with integrated 1" measuring section
0695.0424	VA 420 consumption counter with integrated 1 1/2" measuring section
0695.0425	VA 420 consumption counter with integrated 2" measuring section
0553.0104	Connection cable* for VA/FA Series 400, 5 m, with M12 plug
0553.0105	Connection cable* for VA/FA Series 400, 10 m, with M12 plug
0553.0106	Pulse cable for consumption sensor with M12 plug, length 5 m
0553.0107	Pulse cable for consumption sensor with M12 plug, length 10 m
0190.0001	Closing cap for measuring section VA 420
3200.0001	5 point precision calibration with ISO certificate
0554.2005	CS Service Software for VA/FA 400 sensors including PC connection set, USB connection and interface adapter as well as CS Soft Professional software for recording the measured data
0554.0108	Mains unit in wall housing 100-240V 10VA 50/60 Hz / 24 VDC 0.35 A
0554.0107	Power supply 100-240 VAC / 24 VDC, 0.35 A for VA/FA 400 Series, 2 m cable
on request	External wall display

EC Declaration of Conformity

for

**DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27. January 2003
on waste electrical and electronic equipment (WEEE)**

and

**DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27. January 2003
on the restriction of the use of certain hazardous substances in electrical and electronic equipment
(RoHS)**

for the following instruments of CS Instruments GmbH:

Pressure dewpoint meters: FA 400 and accessories

Flow and consumption meters: VA 400/VA 410/VA 420/DS 300
and accessories

CS Instruments GmbH as the manufacturer herewith declares that the above instruments and accessories belong to the category 9 (WEEE 2002/96/EC). Therefore the above instruments are not affected by the directive RoHS 2002/95/EC and by the material restriction.

In accordance with directive WEEE 2002/96/EC the measuring instruments specified above will be taken back from CS Instruments GmbH for disposal.

CS Instruments GmbH

Harrislee, 27 March 2007

The Management



This declaration does not guarantee any product characteristics.
Please do also adhere to the safety instructions stated in the enclosed documentation.

CS Instruments GmbH

Declaration of Conformity

Consumption sensor with integrated inlet/outlet section

VA 420

CS Instruments GmbH as the manufacturer herewith declares that the above consumption sensor unit complies with the following directive :

Electro-magnetic compliance	2004/108/EG
Low voltage directive	2006/95/EG

For assessing the consumption sensor, the following standards have been referred to:

Electromagnetic compatibility

Emitted interference:	EN 61326: 1997 + A1: 1998 + A2: 2001 + A3:2003
Interference resistance:	EN 61326: 1997 + A1: 1998 + A2: 2001 + A3:2003

Low voltage directive

Reliability	EN 61010-1: 2001 EN 61010-31: 2002 + A1:2008
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Tannheim, 24. August 2009



Wolfgang Blessing, Managing Director

This declaration does not guarantee any product characteristics.
Please do also adhere to the safety instructions stated in the enclosed product documentation.

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