Instruction manual Vortex Ultrasonic Flow sensor VU 570



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I. Forword



Read these operating instructions carefully and completely before installation, start-up and maintenance work. Follow the instructions to ensure safe operation and proper functioning.

The operating instructions must always be available at the place of use. It is not permitted to make only individual pages available.

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1 Scope of delivery

- Flow-Sensor VU 570
- Calibration certificate
- This instruction manual

2 Name plate

VU 570 Part number: 0697 0570 Serial number: 0421 0012	CS Instruments GmbH & Co.KG Gewerbehof 14 D-24955 Harrislee www.cs-instruments.com		
Supply / Versorgung: 1836 VDC Gas: Air max. Pressure: 16 bar Thread/Gewinde: R 2" Diameter/Durchmesser: 53.1 mm Tamb: -20°C70°C	Signal / Bus: 420mA CH1: 121000 m³/h RS 485 (Modbus RTU)		
Tmedium: -40°C100°C Order-Code; A1B1C1D1E1F1G1H1			

3 Intended Use

The VU 570 flow sensor is used for continuous flow measurement, based on the measurement of the vortex shedding frequency, derived from the phenomenon of Karman's vortex street.

The VU 570 flow sensor is designed and constructed exclusively for the intended use described here and may only be used accordingly.

A check as to whether the device is suitable for the selected application must be carried out by the user. It must be ensured that the medium is compatible with the wetted parts. The technical data listed in the data sheet are binding.

Improper handling or operation outside the technical specifications is not permitted. Claims of any kind due to improper use are excluded.

4 Safety instructions

4.1 In this manual warning and information symbols used

This symbol is found at all work safety instructions in this operating manual where there is danger to life and limb of persons. Observance of these instructions and cautious behavior are particularly important in these cases. All work safety instructions must also be passed on to other users. In addition to the information in these operating instructions, the general safety and accident prevention regulations must also be observed.

Achtung This symbol is located at the points in the operating instructions that require special attention in order to comply with the guidelines, regulations, instructions and the correct sequence of operations, as well as to prevent damage and destruction.

This symbol indicates important information or measures for environmental protection.

^J This symbol indicates particularly important information for operators.

4.2 Warnings

Warnings are subdivided according to the hazard levels **DANGER**, **WARNING** and **CAUTION**. Meaning of the warnings:



Danger

WARNING

Note

Immediate danger!

Failure to observe this warning may result in serious injury or death.



Possibly dangerous situation!

Failure to observe this warning may result in serious injury or death.



Caution Possibly dangerous situation!

Failure to observe this warning may result in moderate to minor injuries.



Possibly dangerous situation!

Failure to observe this warning may result in property damage.

4.3 General safety instructionsSicherheitshinweise

Important notes for installation and maintenance personnel

Installation of the flow sensor is only permitted by trained skilled staff with knowledge and experience in compressed air and electrical engineering.

Electrical connection, commissioning and maintenance may only be carried out by qualified electricians in accordance with the electrotechnical regulations (DIN EN 50110-1, DIN EN 60204-1 etc.). Prerequisite: Professional training and knowledge of the technical standards, EU directives and EU regulations.

Observe applicable national accident prevention regulations and ordinances. Observe general occupational health and safety measures,

E.g. wear suitable and prescribed personal protective equipment (PPE). Repairs and adjustments may only be carried out by the manufacturer.

Duties of the installer and plant operator

The flow sensor must be checked and maintained regularly by an instructed and qualified person.

Cleaning and maintenance intervals are to be determined by the plant operator according to DIN-ISO certification - frequency depending on ambient conditions and expected impairments.

Calibration: As part of DIN ISO certification, have the flow sensor calibrated at regular intervals, after 2 years at the latest.

Remove the flow sensor for calibration and send it to CS Instruments GmbH & Co.KG.



Note

► Work on power-operated equipment may only be carried out by trained, instructed or by authorized personnel.

Note

▶ Without consultation and approval of CS Instruments GmbH & Co. KG the warranty claim is void in case of modification works which are not listed in this operating manual. This symbol is used at points in the operating instructions where special attention must be paid to ensure that the guidelines, regulations, instructions and the correct sequence of operations are observed and damage and destruction are prevented.

Risk of injury and accidents during operation outside the permissible ambient/operating conditions or operating temperatures due to excess pressure or faulty installation. Depending on the application, the pipeline pressure can be up to 40 bar / 580 psig depending on the application. Ensure that the flow sensor is only operated within the permissible limit values (\rightarrow type plate, specified max. PS pressure) and that the measuring range end values are taken into account.

Risk of injury due to unauthorized device modifications, incorrect installation or damaged components. The operating permit becomes invalid in these cases. Operation is only permitted with original components.

Only operate the flow sensor when it is completely assembled. Do not operate a damaged sensor and prevent further use until it has been repaired. The sensor must be checked and maintained regularly by instructed and qualified persons. Device modifications are not permitted and release the manufacturer from any warranty and liability.

Explosion risk in Ex-protected areas due to ignition of explosive substances when sparks are generated. The flow sensor does not have Ex approval! Do not use the flow sensor in Ex-protected areas.

4.4 Environmental protection

The flow sensor and also the packaging contain recyclable materials which must not be disposed of in the residual waste. Dispose of the packaging materials and the flow sensor in an environmentally friendly manner at the end of its service life in accordance with the regulations applicable in your country.

The used operating and auxiliary materials as well as replacement parts produced during operation of the flow sensor must be disposed of in accordance with the environmental protection regulations.

DE: Disposal code according to Waste Catalogue Ordinance (AVV) **16 02 14**, electrical and electronic devices and their components.

5 Product information

The VU 570 is a flow sensor for air, technical gases and mixed gases (non-aggressive and non-condensing).

5.1 Product features

- Measurement of standard volume flow, operating volume flow and mass flow
- Integrated pressure and temperature compensation
- Display with indication of flow, consumption, speed, pressure and temperature
- Units freely selectable m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Modbus RTU (RS485) interface
- analog output 4..20mA free assignable
- Pulse output galv. insulated.

Inch	mm	DN	from	m/s to	from m³/h to		from cfm to				
1⁄2"	16,1	15	0.5		0,4	18,3	0.2	10,8			
3/4"	21,7	20	0,0		0,7	33,3	0.4	19,6			
1"	27,3	25			0,6	52,7	0,4	31,0			
1 ¼"	36	32	0,3	25	1,1	91,6	0,6	53,9			
1 1⁄2"	41,9	40		0.3	0.3	0.3	20	1,5	124,1	0,9	73,0
2"	53,1	50			2,4	199,3	1,4	117,3			
2 1⁄2"	68,9	65			4,0	335,6	2,4	197,5			
3"	80,9	80			5,6	462,6	3,3	272,3			

5.2 Measuring ranges (under operating conditions)

Note



► Vortex flow sensors are intended for measuring largely uniform flow velocities. Flow conditions such as pulsating flow or pendulum flow can influence the measurement depending on frequency (> 5 Hz) and amplitude (> 0.3 m/s).

6 Technical data

6.1 Technical data and environmental conditions

Measurement values	Flow rate, total consumption, pressure, temperature, velocity
Sensor technology	Vortex ultrasonic - vortex frequency measurement
Measuring range	See chapter 5.2 (measuring ranges)
Accuracy Volume flow m³/h	±1,5 % f.m.**
Mass flow (kg/h) or Standard volume flow (Nm³/h)	±2 % f.m.**
Media temperature	-40 100 °C
Ambient temperature	-20 60 °C
Storage temperature	-40 80 °C
Process pressure	Up to 40 bar
Available measuring ranges for integrated pressure sensor (overload)	0 1,5 bar(g) (10 bar) 0 16 bar(g) (60 bar) 0 40 bar(g) (100 bar)
Accuracy pressure	0,5 % v. e** (at 20 °C)
Power supply	18 to 36 VDC via SELV supply,5 W. Option: Power over Ethernet according to IEEE 802.3af, class 2 (3.84 6.49 W).
Signal output	Modbus RTU (RS-485) 1x 420 mA (flow, pressure, temperature or velocity) 1x pulse Option: Ethernet, MBus
Measured values via Modbus	Flow rate (m³/min, m³/h, cfm,) Counter total (m³, cf,) Temperature (°C, °F) Pressure (bar, MPa, mbar, psi,) Air velocity (m/s, fpm)
Protection class	IP 67
Process connection	Flange DIN EN1092-1 Flange ANSI 150lbs/ 300lbs R ¹ / ₂ " – R2" (BSP British Standard Piping) ¹ / ₂ " - 2" NPT thread

** f.m. = of measured value | f.e. = of final value

7 Installation



7.1 General notes for the Installation

Information!

Check the packaging carefully for damage. In case of damage, please contact the carrier or CS Instruments GmbH & Co.KG.



Information!

Check the completeness of the delivery.

7.2 Storage

- Store the sensor in a dry and dust-free place
- Store the sensor in the original packaging
- The permissible storage temperatures are -40°C ... 80°C

7.3 Transport



Attention!

- There is a risk of injury from unsecured devices. During transport, prevent the device from slipping or turning unintentionally.
- Do not use transport chains, as these will damage the housing.
- The unit must not be lifted by the housing head for transport.
- For transport, use carrying straps which you place around both process connections.

7.4 Pipe/tube requirements

- Correctly sized gaskets
- Correct aligned flanges and gaskets
- Diameter mismatch at the pipe junctions should be avoided but must be less than 1mm. For further information see ISO 14511
- Ensure clean pipes after installation

7.5 Inlet / outlet runs

In order to maintain the accuracy stipulated in the data sheets, the sensor must be inserted in the center of a straight pip e section with an undisturbed flow progression.

An undisturbed flow progression is achieved if the sections in front of the sensor (inlet) and behind the sensor (outlet) are sufficiently long, straight and without any obstructions such as edges, seams, curves etc.

Therefore, it is necessary to ensure the recommended inlet and outlet runs.

Flow obstruction before the measurement section	Min length Inlet run (L1))	Min length Outlet run (L2))
Slight curve (elbow < 90°)	12 x D	5 x D
Reduction (Pipe narrows to the measurement section)	15 x D	5 x D
Expansion (Pipe expands to the measurement section)	15 x D	5 x D
90° elbow or T-piece	15 x D	5 x D
2x elbow á 90°in einer Ebene	20 x D	5 x D
2x elbow á 90° 3-dimensional	35 x D	5 x D
Control valve	45 x D	5 x D



The values represent the min. lengths. In case the min. inlet / outlet runs could not be ensured, it must be expected to get increased or significant deviations of the measurement values.

8 Commissioning

- Depressurize the system
- Ensure correct direction of flow during installation
- Maintain an undisturbed flow course while observing the required calming distances in the measuring range, see section 7.5

8.1 Installation position

In the case of condensation, only installation with the measuring head aligned vertically is permitted. Otherwise, risk of standing water on ultrasonic sensor. (Functional failure).



8.2 Alignement Display (Housing

The sensor housing VU 570 can be turned in both directions, max. 345 °. For this purpose, the housing-connecting nut must be opened. The housing can be rotated to the desired position, a bigger rotation angle is prevented by internal stop pins.

After that, the housing-connecting nut is firmly retightened



• Flange connection nut must not be opened, danger due to sensor head falling off.

9 Dimension

9.1 Flange Version





Piper	OD Pipe	ID Rohr mm	L ges	L1 mm	L2 mm	H ges	B	ØD	ØK	nxØL
DN 15	21,3	16,1	300	210	113,4	258,5	156	95	65	4x14
DN 20	26,9	21,7	475	275	113,4	263,5	156	105	75	4x14
DN 25	33,7	27,3	475	275	113,4	276	156	115	85	4x14
DN 32	42,4	36,0	475	275	113,4	288,5	156	140	100	4x18
DN 40	48,3	41,9	475	275	113,4	293	156	150	110	4x18
DN 50	60,3	53,1	475	275	113,4	306,5	156	165	125	4x18
DN 65	76,1	68,9	475	275	113,4	325	156	185	145	8x18
DN 80	88,9	80,9	475	275	113,4	339	156	200	160	8x18

9.2 R-Thread Version





Thread	Piper	OD Pipe	ID Rohr	L ges	L1	L2	H ges	В	А
		mm	mm	mm	mm	mm	mm	mm	mm
R 1⁄2"	DN 15	21,3	16,1	300	210	113,4	238	156	20
R ¾"	DN 20	26,9	21,7	475	275	113,4	238	156	20
R 1"	DN 25	33,7	27,3	475	275	113,4	253	156	25
R 1 ¼"	DN 32	42,4	36,0	475	275	113,4	253	156	25
R 1 ½"	DN 40	48,3	41,9	475	275	113,4	260	156	25
R 2"	DN 50	60,3	53,1	475	275	113,4	271	156	30

10 Electrical wiring

10.1 Cable glands – clamping range

For ensuring the tightness and strain relief, connector cables with the following diameters must be used.

VU 570 Standard clamping range : Ø 5- 9mm

10.2 Connector pin assignment



Standard version with 1x analogue output (not galvanically isolated)



Version with option board 2x analogue outputs galvanically isolated



Version with option board MBus

Connector	Pin	Signal Description
1 wer pply	1	VB - (GND)
× dns	2	VB+
	1	Modbus (B)
X2 Modbus	2	Modbus shield
	3	Modbus (A)
3 output	1	I- Active
urrent	2	I+ Active
Φ	1	Pulse / Alarm *
4 / r	2	Pulse / Alarm *
Direction	3	Direction input
	4	GND
5 toutput	1	I- Active**
Curren	2	I+ Active **
6 t output 2	1	I- Active **
Current	2	I+ Active **
L sus	1	MBus
X ≞	2	MBus

* Outputs are galvanically isolated.

** The Current outputs, X5 and X6, are optional. (Active and passive version available).

10.3 Wiring

10.3.1 General

- Wiring to be done in strain less state only.
- Length of cable skinning to be minimized
- Not used cable entries must be closed with end caps
- Use of cables with cross section of >= 0.25mm²

10.3.2 Power Supply



10.3.3 Modbus RTU :

If the sensor placed at the end of the Modbus system a termination is required. Therefore, the enclosed 120R resistor is to be connected at Pin 1 and Pin 3 of connector "X2"





<u>M12 x-coded</u> Data LINES: 1,2 und 3,4 PoE LINES: 5,6 und 7,8



Connection cable: Cat 6.

*PoE: Power over Ethernet





11 Operation

The operation of the VU 570 is carried out by 2 optical keys through the glass cover. Thus, the VU 570 can be operated from the outside without opening the cap.



Selection of the individual menu items is done by pressing the ">" and confirm by pressing "OK".

Inputs or changes can be made with all white deposit fields, selected filed will be highlighted with yellow background.

Words in green font refer mainly to the pictures in the section of the chapter, but also on important menu paths or menu items that are related to are in green font.

The menu navigation is generally in a green font!

The table of contents and chapter references in blue font contain links to the respective chapter title.

11.1 Main menu (Home)

11.1.1 Initialization



11.2 Value screens (after switching on)



Switching to pages 2-5 or back by pressing key "> "

*** Compressed Air ***	*** Compressed Air *** 920.35 mba					
83.25						
24.1 Air °c	901.85 932.15 mbar					
HW: 1.02 SW:1.00 MBID: 127 2/5	HW: 1.02 SW:1.00 3/5					
*** Average Min Max ***	*** Average Min Max ***					
Flow: m ³ /h AV Min Max	Velocity: m/s AV Min Max					
395.38 0	83.25 0					
207.45 870.87	55.92 152.8 7					
Total Counter: m ³	Temperature: °C					
78562	24.1 21.3					
82.7	23.7 24.6					
AV-Time: 1440 minutes 4/5	AV-Time: 1440 minutes 5/5					

AV-Time (Period for average value calculation) could be changed under Sensor Setup.-Advanced– AV-Time.

11.3 Settings

The settings menu could accessed by pressing the key **"OK"**. But the access to the *settings menu* is password protected.



Factory settings for password at the time of delivery: 0000 (4 times zero).

If required the password could be changed at *Setup–User setup-Password*.

Selection of a menu item or to change a value is done with the key ">", a final move to the chosen menu item or takeover of the value change needs the confirmation by pressing the key "*OK*"

11.3.1 Sensor Setup

Setup → Sensor Setup



For changes, first select the menu item with key <i>">"</i> and then confirm it with <i>"OK".</i>	

11.3.1.1 Input / change tube diameter

With VU 570 not changeable(locked) because adjusted to the integrated measuring section.

11.3.1.2 Input / change consumption counter

Setup \rightarrow Sensor Setup \rightarrow Total Counter \rightarrow Unit button





In order to change, e.g. the unit, first select by pressing key ">" the button " <i>Unit</i> " and then key " <i>OK</i> ".
Select with the key $_{,,}$ the correct unit and then confirm selection by pressing $2x$ $_{,,}OK$.
Entering / changing the consumption counter via button ">", select the respective position and activate the position with the "OK" button. By pressing ">" the position value is incremented by 1. Complete with "OK" and activate next number position.
Confirm entry by pressing "OK".

Important!

When the counter reach 100000000 m³ the counter will be reset to zero.

11.3.1.3 Definition of the units for flow, velocity, temperature and pressure

Setup \rightarrow Sensor Setup \rightarrow Units

m³/h
m/s
°C
mbar
back

To make changes to the unit for the respective measurement value, first select by pressing ">" the field of the "measurement value" and activate "it with "*OK*".

Selection of the new unit with ">"

In case the quantity of units selectable are not presentable on one page, pleas move to next page by pressing *"*<<*"*.

Confirm selection by pressing 2x "OK".

Procedure for all 4 measurement-variables is analogous.

Unit Flow	Unit Velocity	Unit Temperature	Unit Pressure
m³/h	Nm/s	°C	mbar
Nm³/mi m³/min Nm³/h m³/h	SFPM fpm Nm/s m/s	°F °C	hpa psi mbar
NI/min Itr/min NItr/h Itr/h			
< Back	Back	Back	Back

11.3.1.4 Definition of the reference conditions

Here can be defined the desired measured media reference conditions for pressure and temperature and times for the filter and averaging.

- Factory pre-setting for reference temperature and reference pressure are 20 °C, 1000 hPa
- All volume flow values (m³/h) and consumption values indicated in the display are related to 20 °C and 1000 hPa (according to ISO 1217 intake condition)
- Alternatively 0 °C and 1013 hPa (=standard cubic meter) can also be entered as a reference.
- Do not enter the operation pressure or the operation temperature under reference conditions!



Filtertime

AV-Time

Setup \rightarrow Sensor Setup \rightarrow Advanced



Setup \rightarrow Sensor Setup \rightarrow Advanced \rightarrow Ref.Pref

back

200 ms

1 min



Setup \rightarrow Sensor Setup \rightarrow Advanced \rightarrow Ref.Temp



In order to change, e.g. the unit, first select by pressing key ">" the field "*Units*" and then key "*OK*".

Select with the key $_{,}$ >" the correct unit and then confirm selection by pressing 2x $_{,}OK$ ".

Input / change of the value by selecting the respective position with button ">" and entering by pressing button "*OK*".

By pressing ">" the position value is incremented by 1. Complete with "*OK*" and activate next number position.

Procedure for changing the reference temperature is the same.

Setup \rightarrow Sensor Setu \rightarrow Advanced \rightarrow Filtertime



Under item **"Filtertime"** " an attenuation can be defined. Input values of 0 -10000 in [ms] are possible

Setup \rightarrow Sensor Setup \rightarrow Advanced \rightarrow AV-Time



The time period for averaging can be entered here.
Input values of -1440 1 [minutes] are possible.
For average values, see display window 3 + 4.

11.3.2 Modbus RTU

11.3.2.1 Setup

The Flow sensors VU 570 comes with a Modbus RTU Interface. Before commissioning the sensor the communication parameters

• Modbus ID, Baud rate, Parity und Stop bit

must be set in order to ensure the communication with the Modbus master.

Settings → Modbus Setup



Remark: If the sensor placed at the end of the Modbus system, a termination is required.

Byte Order:

Therefore, the enclosed 120R resistor is to be connected at Pin 1 and Pin 3 of connector "X2"

ABCD

11.3.3 Modbus TCP (Optional)

11.3.3.1 Setup

The Flow sensors VU 570 comes optional with a Modbus TCP Interface (HW Interface:M12 x 1 X-coded connector).

Device supports with this option the Modbus TCP protocol for communication with SCADA systems. TCP port is set to 502 by default. Port can be changed at the sensor or using PC Service Software

Modbus device address (Unit Identifier) can be set in the range of 1- 255. Specification and description of the Modbus protocol is free to download on: <u>www.modbus.org</u>.

Supported Modbus commands (functions):							
Command Code Description							
Function Code	3	(Read holding register)					
Function code	16	(Write multiple registers)					

For more details, please see VA 5xx Modbus RTU_TCP Installation V1.09

Settings → Network Setup

*** Network Setup ***							
IP Address	192.168.172.010						
МВ ТСР							
	-						
	back						

11.3.3.1.1 Network Setup DHCP

Settings \rightarrow Network Setup Settings \rightarrow IP Address

*** IP Address Setup ***							
DHCP							
IP Address	192.168.172.010						
Subnet	255.255.255.000						
Gateway	Gateway 192.168.172.001						
Advanced	Save Cancel						

Here you can set up and made a connection, with or without *DHCP*, to a computer.

Remark:

With activated DHCP the automatic integration of the sensor in an existing network is possible, without a manual configuration.

Storing of settings by pressing "Save"

11.3.3.1.2 Network Settings static IP Settings → Network Setup Settings → IP Address → IP Address Settings → Network Setup Settings → IP Address → Sub Netz Settings → Network Setup Settings → IP Address → Gateway



Subnet Setup 2 5 5	Gateway Setup	
CLR back	CLR back	
*** IP Address Setup ***		
DHCP	Store the settings h	v pressing Save"
IP Address 192 168 172 011		y pressing "Save

Subnet

Gateway

Advanced

255.255.255.000

192.168.172.001

Cancel

Save

11.3.3.1.3 Modbus TCP Settings Settings → Network Setup Settings → MB TCP

*** MB TCP ***					
ID	5				
Port	502				
Byte Order	ABCD				
Set to Default	back				

Settings \rightarrow Network Setup Settings \rightarrow IP Address \rightarrow ID Settings \rightarrow Network Setup Settings \rightarrow IP Address \rightarrow Port

	Modbus TCP UI	
	5	
CLR	back	
	Modbus TCP Port	
	502	
CLB		

For changes, e.g. the sensor ID, first select by pressing key ">" the field "ID" and then key " OK ".
Select the desired position by pressing the ">" and select with "OK" button.
Change values by pressing the ">" values takeover by pressing " OK ".
Input for the port is done analogue.
By means of the button " <i>Byte Format</i> " it is possible to change the data format (Word Order). Possible formats are " <i>ABCD</i> " (Little Endian) and " <i>CDAB</i> " (Middle Endian)
Saving the changes by pressing "Save", therefore select it with key ">" and then confirm it with "OK". Reset to the default settings by activating "Set to Default"-

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default Setting	Read Write	Unit /Comment
2001	2000	2	UInt16	Modbus ID	1	R/W	Modbus ID 1247
2002	2001	2	UInt16	Baudrate	4	R/W	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400
2003	2002	2	UInt16	Parity	1	R/W	0 = none 1 = even 2 = odd
2004	2003	2	UInt16	Number of Stopbits		R/W	0 = 1 Stop Bit 1 = 2 Stop Bit
2005	2004	2	UInt16	Word Order	0xABCD	R/W	0xABCD = Big Endian 0xCDAB = Middle Endian

11.3.3.2 Modbus Settings (2001...2005)

11.3.3.3 Values Register (1001 ...1500)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default	Read Write	Unit /Comment
1101	1100	4	Float	Flow in m³/h		R	
1109	1108	4	Float	Flow in Nm³/h		R	
1117	1116	4	Float	Flow in m³/min		R	
1125	1124	4	Float	Flow in Nm³/min		R	
1133	1132	4	Float	Flow in ltr/h		R	
1141	1140	4	Float	Flow in Nltr/h		R	
1149	1148	4	Float	Flow in ltr/min		R	
1157	1156	4	Float	Flow in Nltr/min		R	
1165	1164	4	Float	Flow in ltr/s		R	
1173	1172	4	Float	Flow in Nltr/s		R	
1181	1180	4	Float	Flow in cfm		R	
1189	1188	4	Float	Flow in Ncfm		R	
1197	1196	4	Float	Flow in kg/h		R	
1205	1204	4	Float	Flow in kg/min		R	
1213	1212	4	Float	Flow in kg/s		R	
1221	1220	4	Float	Flow in kW		R	

Operation

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default	Read Write	Unit /Comment
1269	1268	4	UInt32	Consumption m ³ before comma	x	R	
1275	1274	4	UInt32	Consumption Nm ³ before comma	x	R	
1281	1280	4	UInt32	Consumption Itr before comma	x	R	
1287	1286	4	UInt32	Consumption Nltr before comma	x	R	
1293	1292	4	UInt32	Consumption cf before comma	x	R	
1299	1298	4	UInt32	Consumption Ncf before comma	x	R	
1305	1304	4	UInt32	Consumption kg before comma	x	R	
1311	1310	4	UInt32	Consumption kWh before comma	x	R	
1347	1346	4	Float	Velocity m/s	x	R	
1355	1354	4	Float	Velocity Nm/s	x	R	
1363	1362	4	Float	Velocity Ft/min	x	R	
1371	1370	4	Float	Velocity NFt/min	x	R	
1419	1418	4	Float	GasTemp °C	x	R	
1427	1426	4	Float	GasTemp °F	x	R	
1475	1474	4	Float	System pressure mbar	x	R	Only with option pressure available
1481	1480	4	Float	System pressure bar	x	R	Only with option pressure available
1487	1486	4	Float	System pressure psir	x	R	Only with option pressure available

 For DS400 / DS 500 / Handheld devices - Modbus Sensor Datatype "Data Type R4-32" match with "Data Type Float"

• For more additional Modbus values please refer to VA5xx_Modbus_RTU_TCP Installation_1.09_EN.doc

11.3.4 Pulse /Alarm The galvanically isolated output can be defined as Setup \rightarrow Sensor Setup \rightarrow Pulse/ Alarm pulse- or alarm output. Relay Mode: Alarm Selection of field "Relay Mode" with key ">" and Unit °C change modus by pressing key "OK". Value 20.0 Hyst. 5.0 For alarm output following units could be chosen: OK Cancel Hi-Lim. kg/min, cfm, ltr/s, m³/h, m/s, °F, °C and kg/s. "Value" defines the Alarm value, "Hyst." defines the desired hysteresis and with "Hi-Lim" or. "Lo-Lim" the alarm settings when the alarm is Alarm Relay Mode: activated °C Unit: Hi-Lim: Value over limit Value 20.0 Lo-Lim: Value under limit 5.0 Hyst. Hi-Lim. For the pulse output following units could be OK Cancel chosen: kg, cf, ltr and m³. The pulse value definition to be done in menu "Value". Lowest value is depending on max. flow of sensor and the max frequency of pulse output of 50Hz. Relay Mode: Pulse Unit: m³ With "Polarity" the switching state could be 0.1 Value defined. Pos. = $0 \rightarrow 1$ neg. $1 \rightarrow 0$ pos. Polarity Pls per second at max Speed: Back pos neg closed open

11.3.4.1 Pulse output

The maximum frequency for pulse output is 50 pulses per second (50Hz). The Pulse output is delayed by 1 second.

Pulse value	[m³ /h]	[m³ /min]	[l/min]
0.1 ltr / Pulse	18	0,3	300
1ltr / Pulse	180	3	3000
0.1m ³ / Pulse	18000	300	300000
1 m ³ / Pulse	180000	3000	3000000

Table 1 Maximum flow for pulse output

Entering pulse values that are not allow a presentation to the full scale value, are not allowed. Entries are discarded and error message displayed.

11.3.5 User Setup

11.3.5.1 Password

Settings → User Setup → Password





11.3.5.2 Language

Settings → UserSetup → Language



Currently 4 languages have been implemented and could be selected with button ">".

Change of language by confirming with *"OK*". Leaving the menu with button *"back"*.

11.3.5.3 Display / Touch Settings → UserSetup → Display / Touch





11.3.6 Advanced Settings → Advanced

*** Advar	nced Settings ***
Factory Reset	
	Back
	Back



11.3.7 4 -20mA Settings → 4-20mA

*** 4 - 20mA Settings ***			
Channel 1	Flow		
Channel 2	unused		
Error Current	22mA		
	Back		

To make changes, first select an item with ">" and
confirm selection by pressing "OK".

Settings \rightarrow 4-20mA \rightarrow Channel 1

*** 4 - 20mA	Channel 1 ***			
Flow	Unit			
AutoRange	on			
Scale 4mA	0.000 m³/h			
Scale 20mA	1098.9 m³/h			
End Rang ^{169,8}	back m/s 1098.9 m ³ /h			
Unit Flow				
m ³	<mark>/h</mark>			
Nm³/mi m³/min	Nm³/h m³/h			
NI/min Itr/min	Nitr/h ltr/h			
<<	Back			





Settings \rightarrow 4-20mA \rightarrow Channel 1 \rightarrow AutoRange

*** 4 - 201	mA CH 1 ***
Flow	Unit
AutoRange	off
Scale 4mA	0.000m³/h
Scale 20mA	1098,9 m³/h
	Save Cancel
End Range 169,	8m/s 1098,9 m³/h
4mA Scale Low	
0.00	m³/h
CLR B	ack
20mA Scale Higi	h
0.00	m³/h
CLR	ack

Settings → 4-20mA → Error Current



The scaling of the 4-20mA channel can be done automatically "Auto Range = on" or manual "AutoRange = off".

With button ">" select the menu item "AutoRange" select with "*OK*" the desired scaling method. (Automatically or manually)

In case of *AutoRange* = off with *"Scale 4mA"* und *"Scale 20mA"* the scale ranges needs to be defined.

Select with button ">" the item "*Scale 4mA*" or "*Scale 20mA*" and confirm with "*OK*".

Input of the scaling values will be analogous as described before for value settings.

Using "CLR" clears up the complete settings at once.

For *"Auto on"*, the max. scaling is calculated based on the inner tube diameter, max. measurement range and the reference conditions settings.

Take over of the inputs with **"Save**" or discard the changes with **"Cancel"**

Leaving the menu with "Back".

This determines what is output in case of an error at the analog output.

- 2 mA Sensor error / System error
- 22 mA Sensor error / System error
- None Output according to Namur (3.8mA 20.5 mA)

< 4mA to 3.8 mA Measuring range under range
 >20mA to 20.5 mA Measuring range exceeding

To make changes first select a menu item "Current Error" with button ">" and then select by pressing the "OK" the desired mode

For saving the changes done press button **"Save"** to discard the changes press button **"Cancel"**.

Leaving the menu with "Back".

 Remark: Default setting for VU 570 analogue output is
 Channel 1:0,3...max. speed [m/s]

 Default settings for VU 570 with option board analogue output
 Channel 1:0,3...max. speed [m/s]

 Channel 2: -20°C ... 100°C]

For max. speed see label on Sensor.

11.3.8 VU 570 Info

Settings → Info

*** Infe) ***
Produktions Daten SerienNr.: 1234567890	Details
Kal. Datum10.01.2013	
Sensor Type: CSFlow	1 1.8
Max. Geschw 0.0m/	s 0.0m³/h
Max. Temp. 100.0 °C	
Laufzeit: 0T 0S 00M	1005
Uln: 0.0 V Temp.	°C
	zurück
*** Kalibrier	Details ***
Kalibrier Bedingung	en
Ref. Druck	1000.00mbar
Ref. Temp	20.0°C
Durchmesser	53.1 mm
Druck	6000.00mbar
Termperatur	24.0°C
Ausführung	Standard

Kurze Beschreibung der Sensordaten incl. der Kalibrierungsdaten.

Unter *Details* erhält man zusätzlich die Kalibrierbedingungen.

11.4 MBus

11.4.1 Change communication settings

The communication settings Primary-address and baud rate could be changed directly at the sensor, in case sensor has a display, or with the CS Service software (Order-No. 0554 2007).

Settings → M-Bus

*** Set	
Sensor Setup	4 - 20mA
ModBus Setup	M-Bus
Pulse/Alarm	
User Setup	Info
Advanced	Back to Main

Settings \rightarrow M-Bus \rightarrow Adr

Possible inputs are values from 1-255 (Default setting = 1)

Adr 1 Baudrate 2400 ID 123456	With ">" select the button "Adr" and confirm it with "OK. Select the desired position by pressing the button " Δ " and select it with "OK" button.
Units as String	Change values by pressing ">" with step of 1, taking the value by confirming with "OK". Move to next position with ">" Using "CLR" clears up the complete settings at once.
Primary Address	For saving the changes done press button "Save" to discard the changes press button "Cancel" . Leaving the menu with "Back ".
CLR back	Remark: Secondary address "ID" is not changeable the ID is fixed.

Settings → M-Bus →Baudrate

Possible values are 2400, 4800 and 9600 Baud (Default setting = 2400).

	1	*** M-Bus ***	
Adr	1	Baudrate	2400
ID	123	456	
ຼ່ມ	nits a	as String	
		-	
			back

Baudrate change by pressing the button "OK"
For saving the changes done press button "Save" to discard the changes press button "Cancel" .
Leaving the menu with <i>"Back</i> ".

11.4.2 Coding VIF (Value Information Field)



11.4.3 Default Settings communication

Primary Address*:	1
ID:	Serial number of Sensor
Baud rate*:	2400
Medium*:	depending on medium (Gas or Compressed Air)
Manufacturer ID:	CSI
VIF coding:	Primary VIF

Both addresses, Primary address and ID, could be searched in the M-Bus system automatically.

11.4.4 Default values transmitted

Value 1 with [Unit]*:	Consumption [m ³]
Value 2 with [Unit]*:	Flow [m ³ /h]
Value 3 with [Unit]*:	Gas temperature [°C]

*All Values could be changed / pre-set in production or with CS Service software (Order-No. 0554 2007)

12 Status / Error messages

12.1 Status messages

• CAL

CS Instruments GmbH & Co.KG recommends a regular re-calibration, see chapter 13. This means that the date at which the next recalibration is recommended is entered internally on delivery.

When this date is reached, the status message "Cal" is displayed.

Note: Measurement continues without interruption or restriction.

Status message:



12.2 Error messages

Low Voltage

If the supply voltage is lower than 11V, the warning message "Low Voltage" is displayed.

This means that the sensor can no longer work / measure properly and therefore no measured values for measured values for flow rate, consumption, speed, pressure and temperature are available.

• Internal Error

In case of this message "*Internal Error*" the sensor has detected an internal read error on e.g. EEProm, AD converter etc..

• Temp out of Range

In case of media temperatures outside the specified temperature range, the status message *"Temp out of Range*" status message.

This leads to incorrect measured values (outside the sensor specification).

Low Voltage 4-20mA

Sensors with a galvanically isolated 4-20mA output require a minimum supply voltage of 17.5V. If this is not reached, the error message **"Low Voltage 4-20mA**" is displayed.

Error messages:



13 Maintenance

The sensor head must be checked regularly for dirt and cleaned if necessary. Deposits of dirt, dust or oil will cause a measured value deviation.

Checking is recommended annually; if the compressed air is heavily contaminated, the checking interval is reduced.

14 Re-Calibration

If no customer specifications have been made, we recommend a calibration interval of 12 months. The sensor must be sent to CS Instruments for this purpose.

15 Spare parts and repair

Spare parts are not available for reasons of measuring accuracy. In case of defects, the sensors must be sent to the supplier for repair.

When using the measuring instruments in plants which are important for operation, we recommend keeping a spare measuring system on hand.

16 Calibration

Within the scope of DIN ISO certification, we recommend having the measuring instruments calibrated and, if necessary, adjusted at regular intervals. The calibration cycles should be based on your internal specifications. Within the scope of DIN ISO certification, we recommend a calibration cycle of one year for the VU 570.

On request, calibration certificates can be issued for a fee. Here, the precision is given and verifiable by DKD-certified volumetric flow meters.

17 Warranty

Defects which are demonstrably due to a factory defect will of course be repaired free of charge. The prerequisite is that you report this defect immediately upon discovery and within the warranty period granted by us. Damage caused by improper use or by non-compliance with the operating instructions is excluded from this warranty.

are excluded from this warranty.

The warranty is also void if the measuring device has been opened - unless this is expressly described in the operating instructions for maintenance purposes - or if serial numbers in the device have been changed, damaged or removed.

The warranty period for VU 570 consumption meters is 12 months. Unless otherwise defined, 6 months apply to accessories. Warranty services do not cause an extension of the warranty period. If necessary, repairs, adjustments or the like have been carried out in addition to the warranty service, the warranty services are free of charge, but the other services will be charged, as will transport and packaging. Further or other claims, especially in case of damages not concerning the device, are excluded - as far as liability is not mandatory by law.

Services after the warranty period

Of course, we are also there for you after the warranty period has expired. In case of malfunctions, please send us your measuring device with a short description of the error.)