Software FA 01/99

Notes for the User, Operating Instructions

for evaluation units µP-ASD, VTP-FA, VT-FA and VP-FA
for vane wheel flow sensors FA

	1F	1FR	2F	2FR	xF	xFR	NF
for 1-channel instruments µP-ASD	●						
for 1-channel instruments µP-ASD-R		●					
for 2-channel instruments µP-ASD			●				
for 2-channel instruments µP-ASD-R				●			
for multi-channel instruments µP-ASD					●		
for multi-channel instruments µP-ASD-R						●	
for instruments VTP-FA, VT-FA and VP-FA determining standard volume flow							●
Measured value display							
Instantaneous measurements every two seconds	●	●	●	●	●	●	●
Selective display of flow velocity or volume flow	●	●	●	●	●	●	●
Measured value selective display also for simultaneous display of v and V/t	●	●					
Display of ±sign for direction of flow		●		●		●	
Display of measured value and measurement point from one measurement point at a time					●	●	
Measured value display simultaneously from measurement point 1 and 2			●	●			
Display units							
m/s and **cbm/h**, selectable	●	●	●	●	●	●	●
m/s, **km/h, cbm/h** and **l/min**, selectable	+	+	+	+	+	+	+
Operator assistance	●	●	●	●	●	●	●

● Standard ○ Option
\+ on request

v = 15.92 m/s

V/t = 450.4 cbm/h

v = 12.53 m/s
V/t = 234.6 cbm/h

v = +24.42 m/s
V/t = +69080 cbm/h

channel 4
v = 09.30 m/s

v1 = 16.33 m/s
v2 = 07.83 m/s

After switching-on the instrument a **self-presentation** appears for a few seconds.

Höntzsch Instruments
µP-ASD version MF10

After the self-presentation the **measured value display** appears automatically.

During measured value display the menu can be called up with key
| ➔ | and moved forwards

Then the information that the system requires can be entered in order to carry out specific functions.

Microprocessor-controlled instruments (µP-instruments) with keypad and alphanumeric display are conversationally orientated. The Software is organized in such a way that instrument operation is possible, to a large extent, without reading the notes for the user. The key | ➔ | leads through the **menu technique.**

with | ➔ |. With key | C | the measured value display can be reached again. Setting the desired functions and parameters, so-called instrument configuration, is carried out during measured value display or in the menu by operating the digit key displayed in the menu.

Operating instructions, status display and error warnings corresponding to Software.

1F	1FR	2F	2FR	xF	xFR	NF
●	●	●	●	●	●	●

● Standard + on request

<u>Control keypad</u>

Keys | 0 |, | 1 |, ... | 9 | (digit keys) are used for entering numeric symbols.

Keys | 0 |, | 1 |, ... |9| can also be used for calling specific menu points and instrument functions.

key '4' =
probe type, medium

key '4' =
probe type, medium

The menu can be scanned with the | ➔ | key. Within an input field, in which a preliminary entry has been made, operation of the | ➔ | key is ineffective.

Instructions
next = '➔' end 'C'

Key | C | can be used within the menu to call up the measured value display. Within an input field in which at least one but not all character inputs have been made, operation of key | C | makes clearance of previously entered symbols possible.

If after calling up a menu point or after input, 30s pass without key operation, the measured value display will automatically appear.

Unsuitable inputs, which can be recognised as unsuitable, will be rejected.

<u>Inputs, parameters and measurement data</u>

are non-volatile memorised, i.e. they are available after turning OFF/ON or after power supply interruption. A flashing cursor marks the place on the input field where inputs are to be entered.

1F	1FR	2F	2FR	xF	xFR	NF
●	●	●	●	●	●	●

The text shown on the display assists in finding the desired option. Previous inputs / settings will be displayed.

<u>Analog output / outputs</u>

Output signal swing corresponding to Hardware. Instantaneous values corresponding to the processing cycle, mostly every half-second, in the case of extensive Software, every one or two seconds.

Analog output v

Required Hardware: analog output v.
Output value: actual flow velocity.
Type of sensor, medium to be measured configurable.
Output signal: scalable, configurable, expandable

1F	1FR	2F	2FR	xF	xFR	NF
● +	● +	● +	● +	● +	● +	● +

analog output I = 20 mA
v = 20.00 m/s

Analog output signal when using v-sensors FAR: zero flow rate corresponding to the mean analog signal swing. Examples:
0 ... 5...10 V = -20m/s...0...+20 m/s
4...12...20 mA = -40m/s...0...+40 m/s
0...10...20 mA = -10m/s...0...+10 m/s

1F	1FR	2F	2FR	xF	xFR	NF
	●		●		●	

Output RS·232·C / V24

Required Hardware: Output RS 232 C / V24

1F	1FR	2F	2FR	xF	xFR	NF
●	●	+	+	+	+	●

● Standard + on request

Data is transmitted every half second or, in the case of extensive Software , every second or rather every two seconds (= processing cycle).

At the beginning of each transmission the RTS-output is set at „0“. After this and between 6 or more ASCII characters per transmission value, the CTS-input must not be set at „1“ for longer than 10 ms, otherwise the transmission will be stopped and re-started after the next processing cycle.

Should just **one measurable value** be transmitted from **one measurement point**, e.g. flow velocity v, each measured value consits of 6 ASCII characters:

1 sign +, - or blank
4 digits
1 decimal point

Should just **one measurable value** be transmitted from **more than one measurement point**, each measured value, consisting of the above mentioned 6 ASCII characters, has 1 ASCII character in addition as code.

Should just **one measurable value** be transmitted from **one measurement point**, and if this value should be volume flow, then each measured value consists of 9 ASCII characters:

1 sign +, - or blank
8 characters (digits, blanks and decimal points

Should volume flow be transmitted from more than one measurement point, then each measured value has in addition 1 ASCII character as code.

1F	1FR	2F	2FR	xF	xFR	NF
●	●	●	●	●	●	●

Coefficient/Profile factor (BW=PF)

Setting range of the velocity coefficient: 0.001 ... 9.999.

profile factor
BW = 1.000

In larger free-jet wind tunnels as well as in larger tunnels and measuring tubes, the **local velocity v_p** will be displayed with **PF = 1.000**.

PF is also used to calculate the local velocity v_p to the average velocity v_m in measurement cross sections:

$$v_m = v_p \bullet PF$$

This relation is valid for the actual flow velocity as well as for the standard flow velocity.

v_m is displayed. The display value also corresponds to v_p if PF = 1.000 is set. v_m is the output value also at the analog output or RS232-output.

The volume flow results from the mean flow velocity and the measurement cross-section.

$$\dot{V} = v_m \bullet section$$
$$\dot{V} = v_p \bullet PF \bullet section$$

When carrying out measurements with measuring tubes the coefficient determined by the calibration and stated in the delivery documents is to be set.

When carrying out **measurements with flow sensors FA in design as cylinder probe** in circular measurement cross-sections with nominal width of ≈50 mm to ≈225 mm the corresponding coefficients PF determined by Höntzsch are set to calculate the average velocity.

When carrying out measurements with cylinder probes FA in larger measurement cross-sections a pre-examination of flow profile is to be carried out with PF = 1.000. As a result of this examination an optimal measurement point is to be determined and the corresponding coefficient is to be set.

For further information please consult VDI/VDE 2640, „Measurement of velocity area methods in flow cross-sections."

Warning!

Before measuring always check the profile factor setting.

Inner diameter of measuring tube Di

Setting ranges Di: 000.1...999.9 mm and 0001...9999 mm.

Di is for calculating the actual flow rate:

$$\dot{V} = \frac{v_m \bullet \pi \bullet Di^2}{4}$$

In the range 1 cbm/h or l/min can be displayed, in range 2 only cbm/h.

At the analog output v_m respectively the volume flow remains the output value.

If the measurement cross-section is not circular but, for example, rectangular, then the equivalent diameter is to be calculated and set:

$$Di_{in\ m} = \sqrt{4 \bullet area_{in\ m^2} / \pi}$$

Measurement cross-section

Possibility to input the measurement cross-section, e. g. in m^2 or side lengths of rectangular measurement cross-sections.

Selection G,F

1F	1FR	2F	2FR	xF	xFR	NF
●	●	●	●	●	●	●
●	●	+	+	+	+	+

+ on request
● Standard ○ Option

tube diameter max
1 m = '1' 10 m = '2' (2)

tube diameter
Di = 1000 mm

tube = '1'
area = '2' rectangle = '3'

Air / gases **G** Water / liquids **F**	●	●	●	●	●	●	●	
Conversational language								
English, German, French	●	●	●	●	●	●	●	
Others: I = Italian NL =Dutch, E = Spanish	+	+	+	+	+	+	+	
Selection of conversational language: D = German, EN = English, F = French	●	●	+	+	+	+	+	**Language: D = 1 EN = 2 F = 3 (1)**
Quantity measurement / Actual quantity measurement The integral actual volume flow $\dot{V}$ with respect to time amounts to the actual volume V. V = quantity, actual quantity of air / gases. V remains memorised after turning OFF/ON (non-volatile memorised).								The quantity V is displayed in addition to measured value V/t. Quantity display V max. 12 digits + display of measuring unit. **V = 000015973291 ltr** **V/t = 139.4 l/min** **V = 000004386491 cbm** **V/t = 17.45 cbm/h**
Measuring unit is **ltr** (litre) when V/t is displayed in l/min. Measuring unit is **cbm** when V/t is displayed in cbm/h.	○	○	+	+	+	+	○	In the case of instruments with just one channel, it is not possible for v and V/t to be displayed simultaneously.

	1F	1FR	2F	2FR	xF	xFR	NF	
Long-term measurement for display of average velocity from 1 s ... 9999 s. Measuring time in multiples of 1 s adjustable; also for multi-channel instruments <u>one</u> setting is effective for all measuring channels.	○	○	+	+	○	○	○	● Standard ○ Option + on request **long-term period** **LM = 0060 sec**
Time constant The time constant which is set for the measured value display is also effective for the instantaneous values at analog output and RS 232 output. The time constant can be set on the processing cycle raster in multiples from 1...20 respectively 1...99 s.	●	●	+	+	+	+	+	**time constant** **SM = 30 sec**
Digital limit v Required Hardware: Relay output								**Digital limit DL** **v = 15.00 m/s**
Settings Velocity digital limit v_{DL}, hysterisis v_H as well as switching delay. Digital limit settings only in velocity values. Hysteresis = difference between v_{H+} and v_{H-}. $(v_{H+} - v_{DL}) = (v_{DL} - v_{H-})$.								

Switching delay settable in multiples of 1 s or in multiples of the processing cycle raster respectively.

Control
by comparing measured value of velocity and the digital limit setting taking the set value of hysterisis and switching delay into consideration.
Control in processing cycle.

Message at relay output
falling short of / exceeding digital limit

Password = security code
Input or alteration of parameters is only possible by previous input of a personal password (security code). However, the parameter poll is an exception to this limitation.

Data logger

							hysteresis DL v = 00.50 m/s
○	○	+	+	○	○	+	**delay time DL t = 0005 sec**
							security code = xxxx
○	○	+	+	+	+	○	
+	+					+	**DLOG: ON = 1 Mode = 2 clr = 3 pb = 4 # = 5 (X)**

Required Hardware: always clock + 8 Kbytes RAM, additional alternative RS 232-/V24-output.
Required Software: long-term measurement. Memorising measurement values (data logger) for 500-650 data records.

Play-back for printer or PC with RS 232-/V24-input.

PC-Software for taking over data logger data in a PC compatible with IBM.

Automatic logging of measurement values / data records after each expiration of long-term measurement.

Manual logging by key operation.

Linearizing of Characteristics FA

1F	1FR	2F	2FR	xF	xFR	NF
●	●	+	+	○	+	●

● Standard
○ Option + on request

To increase the measurement accuracy when measuring flow velocity or volume flow with a vane wheel flow sensor FA (cylinder probe or measuring tube), it is possible, with microprocessor controlled evaluation units with keypad and display panel, to deposit one characteristic consisting of up to 20 (twenty) measurement points for one vane wheel sensor.

The characteristic can be determined by individual calibration. It can also be a typical characteristic for a type of sensor. The interval of the measurement points can also be closer selected in an especially important measurement range. The evaluation unit always interpolates linear between the measurement points. Each measurement point consists of a pair of variates f and v (f = signal frequency of the sensor, v = flow velocity).

For volumetric calibration the velocity values corresponding to the profile factor / coefficient = 1.000 are to be entered, as can be seen in the relevant Höntzsch calibration certificate.

Important: the coefficient 1.000 and the correct inside diameter Di of the measuring tube must be set.

Software FA 01/99

for Standard Volume Flow determining instruments VTP-FA, VT-FA und VP-FA

The Software Instructions for these instruments can be found in the instructions for the µP-ASD instruments under NF.
NF = Standard Volume Flow determination with vane wheel flow sensors.

Pressure and temperature
are considered as **measurement value or input value** (variable constants) from the translation to standard volume flow / standard velocity.
In the case of **VP**-instruments the flow velocity and absolute pressure are considered as measurement values and the temperature only as an input value.

1F	1FR	2F	2FR	xF	xFR	NF
						●
						●

Meas. actual pressure = '1'
Input = '2' (1)

Meas. actual temp. = '1'
Input = '2' (1)

In the case of **VT**-instruments the flow velocity and temperature are considered as measurement values, the absolute pressure however, only as input value. ●

Linearization of the measurement signal for temperature sensors PT100 in 4 wire configuration ●

Measured value display
Instantaneous values every two seconds. Display selectable:
standard volume flow **NV/t**
actual volume flow **V/t**
standard flow velocity **Nv**
actual flow velocity **v**
temperature **t**
pressure **p** ●
mass flow **m/t** ○

NV/t.= 1320 Ncbm/h
T = +053.4 °C P= 1130 hPa

Display units

Ncbm/h	Nl/min	Nm/s
cbm/h	l/min	m/s ●
hPa	°C	○
kg/h		●
selectable		

Analog Output (s)

Flow
Required Hardware: analog output for flow.
Output value actual flow velocity v or standard flow velocity Nv, selectable.
Nv = standardised NV on the measuring area. configurable assigned to type of sensor and measuring medium.
Output signal:
scalable, configurable, expandable ● +

Anal. output proport.
v = '1' Norm-v = '2' (2)

● Standard ○ Option
+ on request

1F	1FR	2F	2FR	xF	xFR	NF

Temperature
Required Hardware: analog output temperature t for temperatures from -100 °C...+500 °C.
Output signal:
scalable, configurable, expandable ●

anal. output I = 20 mA
T = +100 °C

Pressure
Required Hardware: analog output pressure.
Output signal:
scalable, configurable, expandable ●

anal. output I = 4 mA
Pabs = 1000 hPa

anal. output I = 20 mA
Pabs = 3000 hPa

RS 232 C-/ V24-output

Required Hardware: RS-232- / V24-output.
Software for transfer of measured values **NV/t**. If the **standard volume flow** is transmitted, then each transmission value consists of
9 ASCII characters:
1 sign (+, - or blank)
8 characters (digits, blanks and decimal point).
Instead of NV/t (= resulting value) the measurement values and input values **v**, **p** and **t** (= input values) respectively can also be transmitted: selectable resulting value/ input values.

If more than one measurable value is transmitted, in this case velocity v together with temperature t and pressure p, then each measured value has in addition 1 ASCII character as code.

Standard quantity measurement
Over a period of time the integral standard volume flow NV/t amounts to standard volume NV.
NV = standard quantity. NV remains memorised after operating OFF/ON (non-volatile memorised).
Measuring unit Ncbm: Standard-cbm on NV/t display in Ncbm/h.
Measuring unit Nltr Standard-ltr on NV/t display in Nltr/min.

Longterm measurement
for display of averages from 1 s ... 9999 s. Measuring time in multiples of 1 s adjustable for NV/t, V/t, Nv and v.

Standard volume flow 'dry'
for temperatures 0 ... +100 °C.

							●
							+
							○
							○
							○

● Standard ○ Option
+ on request

The quantity NV is displayed in addition to measured value. Quantity display NV max. 12 digits + display of measuring unit.

NV = 000004386491 Ncbm
NV/t = 25.76 Ncbm/h

Long-term period
LM = 0060 sec

Processing cycle
NV/t = '1' TV/t = '2' (2)

Operating Instructions

Menu

Key | ➔ | **Operating instructions**
Before using each instrument we recommend that the settings be checked for accuracy. The instrument displays which of the following software possibilities is installed.

1F	1FR	2F	2FR	xF	xFR	NF
●	●	●	●	●	●	●

Menu normal status:
measured value display

Key | 1 | Commutation display
Selective display of velocity v or volume flow V/t.

●	●	●	●	●	●	●

Commutation to simultaneous display of v and V/t. Simultaneous display of v and V/t is not applicable with supplementary software: quantity measurement, long-term measurement ...	●	●					
Display of v or V/t from one measurement point in each case. Display of measurement point number also.					●	●	
Commutation of display also effective for printout on Printer HP 3020. Hardware requirement: HP3020.	●	●	●	●	●	●	●
Key | 2 | Coefficient / Profile Factor (PF = BW)							
Input of velocity coefficient. Should the local velocity be displayed, then the coefficient 1.000 must be set!	●	●	●	●	●	●	●
Commutation of coefficient input for measurement points 1 and 2.			●	●			
Commutation of coefficient input see also key | 6 | measurement point commutation.					●	●	
Key | 3 | Inside diameter Di of measuring tube / measurement cross section, display unit							
Input of inside diameter Di / measurement cross section for determining the flow rate. Tube Di = 1, area = 2, rectangle = 3 appears on the display.							
| 1 | Input of **inside diameter Di of measuring tube** differentiating between Di up to 1 m and Di up to 10 m.	●	●	●	●	●	●	●
After input of Di up to 1 m the inquiry whether $\dot{V}$ should be displayed in m³/h or l/min follows.	●	●	●	●	●	●	●
Commutation of Di for measurement points 1 and 2.			●	●			
Commutation of Di see also key | 6 | measurement point commutation.					●	●	
| 2 | Input of **measuring area** differentiating between areas up to 0.1 m², up to 1m², up to 10 m² and up to 100 m².	●	●	+	+	+	+	+
After input of an area of up to 0.1 m² or up to 1 m² the inquiry whether $\dot{V}$ should be displayed in m³/h or l/min follows.	●	●	+	+	+	+	+
| 3 | Input of the **side lengths of a rectangular measuring area** differentiating between side lengths of up to 1 m and up to 10 m.	●	●	+	+	+	+	+
After input of the side lengths of up to 1 m the inquiry whether $\dot{V}$ should be displayed in m³/h or l/min follows.	●	●	+	+	+	+	+
By operating the | ➔ | key, the effective Di / measurement cross section setting can be read.							

● Standard ○ Option + on request

Key | 4 | Type of sensor/vane wheel, medium, conversational communication language, linearizing of characteristics	1F	1FR	2F	2FR	xF	xFR	NF
| 1 | Input of **type of sensor/vane wheel** Identification on the vane wheel flow sensors FA	●	●	●	●	●	●	●

FA type	Identification		FA type	Identification	
MN20	mn20 ...	mn75/20	MC20	mc20 ...	mc75/20...
	ms20...-18	ms75/20...-18		ms20...-9	ms75/20...-9
MN40	mn40...	mn10/40....	MC40	mc40...	mc10/40....
	ms40...-18	ms10/40...-18		ms40...-9	ms10/40...-9
MN80	mn80 ...		MC80	mc80 ...	ms80... -9
	ms80...-18		MC120	mc120...	ms120...-9
MN120	mn120...		MD20	md20 ...	md3/20 ...
	ms120...-18			ms20...-23	ms3/20...-23

The same applies to vane wheel flow sensors with the additional identification R = sensing direction of flow *(=richtungserkennend)*, e.g. mn40...R		●		●		●	
Commutation of input of type of sensor and medium for measurement points 1 and 2.			●	●			
Commutation of input of type of sensor and medium: see also key | 6 | measurement point commutation					●	●	
| ➔ | or input of a vane wheel type lead on to setting **medium/fluid type:** air/gases (G) or water/liquids (F)	●	●	●	●	●	●	●
| ➔ | or input of the medium lead on to the inquiry whether when measuring, a characteristic according to **standard calibration or special calibration** should be taken as a basis. Standard = '1' Special = '2'							
| 1 | Standard calibration for type of sensor set.							
| 2 | Special calibration for type of sensor set.							
If special = '2' is chosen the inquiry: new values yes = '1' no = '2' appears							
| 1 | New data couples f and v can be input.							
For models supplied without special calibration one data couple with zero values is entered; therefore the measured value is always zero when measuring according to special calibration. If a characteristic has already been entered at an earlier stage, then the corresponding data couples can be completely or partially taken over or overwritten. A data couple on the display is taken over by pressing the | ➔ | key. The end of measuring range follows from the data couples with the highest value. If the measured values are greater than the data couples with the highest value, then OVERFLOW or FF.FF respectively will be displayed.							
| 2 | The data couples already entered are taken as characteristic.							
If yes = '1' is chosen the inquiry: number of data couples N = (XX) appears. The number of data couples must be entered, max. 20 couples. After entering 'number of data couples' the inquiry starting correction v = **xx.xx** m/s appears. The starting correction must be entered. Then follows the number of data couples N = (XX) N-times the inquiry of the data couples. frequency value N f = **xxxx** Hz and velocity value N v = **xx.xx** m/s N data couples must be entered. If an evaluation unit is set for measurement according to special calibration, then the special character*, e.g. MC40*, appears after the type of sensor during parameter inquiry.	●	●	+	+	○	+	●
| 2 | <u>Conversational communication language</u>							
D = German, EN = English, F = French commutable	●	●	+	+	+	+	+
others: I = Italian, NL = Dutch, E = Spanish	+	+	+	+	+	+	+

● Standard ○ Option + on request

<u>Key | 5 | Scaling, expanding, configuration of analog output(s)</u>	1F	1FR	2F	2FR	xF	xFR	NF

	1F	1FR	2F	2FR	xF	xFR	NF
Required hardware: analog output.							
Scaling, configuration (as for example signal range 0-20 mA or 4-20 mA)	●	●	●	●	●	●	●
Expanding analog output signal v	+	+	+	+	+	+	+
Expanding analog output signal t and p							●
Commutation of scaling for measurement points 1 and 2			●	●			
Commutation of scaling see also key | 6 | measurement point commutation.					●	●	
Key | 6 | Quantity measurement/quantity meter							
Required software: quantity measurement "on" key | 6 |							
| 1 | ON/OFF							
Switching quantity display on and off. The quantity is always registered with 12 digits, even when the display is turned off,	●	●	+	+			
also irrespective of type of display, see | 3 | DIS		●		+			
| 2 | RESET							
Zero setting of quantity meter	●	●	+	+			
| 3 | DIS							
Commutation of display							
| 1 | V+ 12-digit display of quantity for the +direction of flow							
| 2 | V- 12-digit display of quantity for the -direction of flow							
| 3 | V+ and V- 6 digit display for each quantity for the + and -direction of flow							
The 6 lowest order digits only are displayed.		●		+			
Key | 6 | Commutation of measurement point							
Required software: commutation of measurement points/measuring channel "on" key | 6 |. Commutation key | 6 | only for display.							
| ➔ | Selection of measuring channel proposed by evaluation unit.							
| x | By entering measurement point **x** not only the proposed channel but also every other channel can be selected.							
| C | Returns to measured value display.					●	●	
| 0 | Display of average from measuring channel 1 to N in a combined complete flow cross section. Required software: averaging from measuring channel 1 to N.			○		○		
Key | 7 | Long-term measurement, instantaneous value time constant, start delay							
Required software: long-term measurement and/or setting of instantaneous value time constant and/or start delay "on" key | 7 |							
| 1 | **Commutation LM/SM**							
LM = long-term measurement							
SM = short-term measurement/instantaneous value measurement							
| 2 | Setting **measuring times**							
| 1 | SM time constant							
The time constant is adjustable within the measurement period of the processing cycle in multiples of 1 ... 20 cycles or 1 ... 99 s respectively, effecting the instantaneous values on the display, at analog output(s) and at the RS 232/V24 output	●	●	+	+	+	+	+
| 2 | LM measuring time							
Setting the long-term measurement period in steps of 1 s. Setting range 1 s to 9999 s. Setting only for display.	○	○	+	+	○	○	○
Start delay							
This software variant allows the start of a measurement to begin at an adjustable time after commencement of flow. Therefore, if a flow process is less than the adjustable delay time between 1 ... 99s, the measurement will be prevented.	+	+	+	+	+	+	+

● Standard ○ Option + on request

Key | 7 | Quantity measurement/quantity meter	1F	1FR	2F	2FR	xF	xFR	NF

Required software : quantity measurement „“on“ key | 7 | See also quantity measurement key | 6 |.					○	+	
Commutation of quantity measurement see also key | 6 | measurement point commutation.					○	+	
Key | 7 | TA Air at RS 232/V24 output Required hardware: clock and RS 232/V24 output. Required software: long-term measurement + TA Air at RS 232/V24 output “on“ key | 7 |: Long-term: LM-SM = 1 TA Air = 2 | 1 | LM = long-term measurement SM = short-term measurement | 2 | TA Air average TA-L: ON = 1 OFF = 2 Displ = 3 Clock 4 | 1 | switch on TA Air average: half-hour and 24-hour averages are transmitted at RS232/V24 output. The inquiry follows: TA Air average reset yes = 1. | 1 | effects a new start | 2 | switch off TA Air averages: instantaneous values are transmitted in processing cycle at RS232/V24 output. | 3 | display of TA Air averages: the last half-hour and the last 24-hour averages are displayed. | 4 | set real-time clock	+	+	+	+			+
Key | 8 | Limit value setting Required hardware: relay output. Required software: limit value setting “on“ key | 8 | Commutation of limit value setting see also key | 6 | measurement point commutation.	○	○	+	+	○ +	○ +	+
Key | 9 | Printer Required hardware: clock and HP 3020. Required software: long-term measurement “on“ key | 7 | **Manual print:** printout only on print demand **Automatic print:** printout automatic in selected measurement period key | 7 |. Printout of averages appertaining to selected measurement period. **Printer ON/OFF** **Setting real-time clock**	●	●	+	+			+
Key | 9 | Data logger operation Required hardware: clock with 8k RAM, printer HP 3020, output for HP printer or RS 232/V24 output Required software: long-term measurement “on“ key | 7 | and data logger “on“ key | 9 |. With the 8 Kbytes data logger/ memory 500 to 750 measured values / data records, depending on measuring mode, can be stored, namely inclusive of date, time and measurement point identification as well as setting parameters. The requirements for memory are the same as those for the output for the Höntzsch Printer HP 3020 or Höntzsch Printer HP. Set real-time clock: call via key | 9 |, clock = 1 Switch on data logger: call via key | 9 |, datalogger = 2, ON = 1 Set data logger mode: call via key | 9 |, datalogger = 2, mode = 2 MANUAL = 1 storage of data only after operating key | 0 | AUTO-LM = 2 automatic storage of data after expiry of long-term measurement time, if this was greater than 10 s.	+	+					○

● Standard ○ Option + on request

	1F	1FR	2F	2FR	xF	xFR	NF

Store data:
The displayed data is stored by pressing the | 0 | key. When using the long-term measurement mode measuring times > 10 s are automatically displayed after expiry of long-term measurement period.

Switch off data logger: call via key | 9 |, datalogger = 2, OFF = 2

Clear data logger:
1. Clearance of the entire data.
   Call via key | 9 |, datalogger =2, clr = 3, >DLOG< = 1, yes = 1
   The stored data in the data logger is cleared completely.
2. Clearance of a single data record.
   Call via key | 9 |, datalogger = 2, clr = 3, # = 2
   After clearance the measurement point identification must be entered (see "Input of measurement point identification").

With *yes = 1* the single data record is marked as cleared, with *no = 2* the single data record is not cleared, or the clearance marking of a data record already marked as cleared is deleted.

Playback:
1. Playback (pb) at printer at V24 output.
   Call via key | 9 |, datalogger = 2, pb = 4, print or V24 = 1
   The contents of the data logger are played back. Termination of output occurs by pressing key | C |. The key must be held down until "====" is displayed.
2. Playback via display.
   Call via key | 9 |, datalogger = 2, pb = 4, displ. = 2
   Operation of the | ➔ | key leads to the next storage position.
   | **C** | terminates the playback. Should, however, any one of the numeral keys between | **0** | and | **9** | be operated, then a single data record can be called directly to the display by entering the measurement point identification. (See "Input of measurement point identification"). First of all, the identification of the last stored data record is recommended as call address on the display. This measurement point identification can be overwritten, if the data record is to be displayed at another measurement point. Data records with clearance marking can still be called.

Input of measurement point identification
Each measurement point identification consists of one letter and a 4-figure number. After clearing the entire data logger contents the measurement point identification is set at #0001. Overwrite of this identification with another is possible. If the user does not enter his required identification, then the 4-figure number will be increased by one after every storage.
Call via key | 9 **|**, datalogger = 2, # = 5.

The letter in front of the measurement point identification is entered by a 2-figure number code:
00 = #
01 to 26 = A to Z
27 to 52 = a to z

Then the 4-figure measurement point number can be entered as required. If the user does not enter his required identification, then the 4-figure number will be increased by one after every storage.

RS 232/V24 intersecting point
Call via key | 9 |, RS232/V24 = 3

SM values = 1	continuous output of instantaneous values via the RS232/V24 intersecting point	+	+				○
playback = 2	output of datalogger contents via the RS232/V24 intersecting point.	●	●	+	+		

Key | 0 | Print demand

Required hardware: HP3020 or RS232/V24 output.							
Function HP 3020: PRINT	●	●	+	+			
Function datalogger: store	+	+					○

● Standard ○ Option + on request

Operating Instructions for Standard Volume Flow determining VTP-FA Instruments

	1F	1FR	2F	2FR	xF	xFR	NF
The operating instructions for these instruments are essentially the same as those found under NF in the instructions for the µP-ASD, see NF = standard volume flow determination with vane wheel flow sensors							
Key | 3 | Inside diameter Di of measuring tube / measurement cross section, display unit, standard volume flow dry After input of inside diameter Di / measurement cross section for determining the flow rate and prescribing the display unit in m³/h or l/min (as previously described) the inquiry follows whether display, processing and output as **standard volume flow wet** NV/t or as **standard volume flow dry** TV/t should follow: | 1 | NV/t | 2 | TV/t permissible working temperature range 0 ... +100 °C.							○
Key | 4 | Type of sensor							
Flow sensor with hardware **input v/FA:** see previous description.							●
Temperature probe with hardware **input t/Pt100** no inputs necessary. The standard software takes over the measurement signal from Pt100 in 4 wire configuration.							●
With hardware input **t/4-20 mA** the inquiry about the measuring range of the temperature probe follows. Necessary input: Temperature value according to 4 mA Temperature value according to 20 mA Permissible value range: -100.0 °C ... +999.9 °C. The higher temperature value is to be allocated to the 20mA value!							○
Pressure sensor for absolute pressure with hardware **input p/4-20 mA** the inquiry about the nominal flow value of the pressure sensor follows. Choice between the measurement ranges 0 ... 9999 hPa or 0 ... 9999 kPa respectively. 20 mA according to the nominal flow value 4 mA always relates to vacuum, i.e. 0 hPa or 0 kPa respectively							●
Key | 6 | Operating and standard conditions							
| 1 | Operating conditions 1. Choice whether the **temperature** should be considered as measurable variable or as input variable | 1 | Temperature measurable variable **t** | 2 | Temperature input variable **T** Input range -100.0 ... +999.9 °C							●
2. Choice whether the **absolute pressure** should be considered as measurable variable or as input variable | 1 | Pressure measurable variable **p** | 2 | Pressure input variable **P** Input range 0 ... 9999 hPa or 0 ... 9999 kPa							●
| 2 | Standard conditions Input of standard conditions. 1. Standard temperature e.g. +000.0 C 2. Standard pressure e.g. 1013 hPa							●
3. Standard density in kg/m³ with standard temperature and standard pressure. This input serves to convert the standard volume flow to mass flow.							○

● Standard ○ Option + on request

ON / OFF

various possibilities depending on hardware.

1. For instruments with power supply by rechargeable battery :
   Key | ➔ | : ON
   Key | C | : OFF
2. For instruments without rear ON / OFF switch: by connection/disconnection from the mains supply
3. For instruments with rear ON / OFF switch: by operating the rear ON / OFF switch.