analog
signals

Modbus

Ether**CAT**

PROFI
NET
INDUSTRIAL ETHERNET

Bluetooth™

VADy®

d · flux multi series product information

Multi-Parameter Mass Flow Meter & Mass Flow Controller for Gases

Suitable for common gases · Flow up to 1400 ln/min · Pressure up to 14 bar a

vögtlin
instruments

Maximum flexibility at high speed:

Multi-parameter mass flow meter & controller for gases

The *d·flux multi series* is a fast and reliable multi-parameter mass flow device for gases with measurement outputs for mass, normalized and volumetric flow, pressure and temperature. The instrument is based on differential pressure measurement over an internal advanced laminar flow element. One of the many advantages of this laminar flow device is the ability to easily switch to a different gas without a loss in accuracy.

The new *d·flux multi series* features:

★ **Meter and Controller**
The unit is available as meter or with a strong integrated control valve as controller

★ **Flow rates up to 1400 ln/min**
Rate for air, other gases according to conversion

★ **Multiple pre-programmed gases**
The unit can contain up to 15 programmed gases. More gases can be added at any time

★ **State-of-the-art communication**
Advanced Modbus communication & analog output / Optional Profinet or EtherCAT interface (Ethernet IP available soon)

★ **Wide application scope IP54**
Suitable up to 14 bar a and from -20 to 60 °C Body in stainless-steel 316L / Protection IP54

★ **Minimum Inlet required**
Compact design, requires no long straight or special in and outlet sections.

★ **Accuracy**
± 0.5% of customer full scale and ± 1% of measured value

★ **High sample rate and fast response**
Sample rate of 1 ms, updated data every 10 msec and a total response time of 90 msec (controller 2s)

★ **Wireless device access with the free Vögtlin Connect app**
Easy device access and configuration of many parameters with our free Android app (Bluetooth®)

★ **Custom application profiles**
The unit offers up to 15 application profiles which allow the storage of individual application details

★ **Alarm, warning and diagnostic features**
The *d·flux multi series* integrates advanced diagnostics, monitoring and reporting every part of its operation. The information is accessible via Vögtlin Connect app or Modbus

★ **Autotare**
To minimize uncertainty, the *d·flux multi controller* detects with an advanced algorithm when there is no flow and will then automatically zero (tare) the units for optimum performance. For the meter this optimization needs to be performed manually.

VADy®

Introducing Vögtlin Automated Dynamics VADy®

With the *d·flux multi series*, Vögtlin for the first time introduces an automatic real-time calculation of the optimum dynamic range*.

With this user selectable setting, the device dynamically adjusts the highest possible dynamic range under actual conditions.

VADy® makes it easy to work with the different gases and applications and offers convenience with optimum device efficiency:

Default dynamic range 1 : 100
1 : 1000 dynamic with VADy® feature available

*available for meter only

ISO 9001

The new Vögtlin Connect App

The Vögtlin Connect app can be used with Android phones and let's you easily and securely (password protected) connect to your *d·flux* device.
Vögtlin Connect is a user friendly configuration software and offers the adjustment of many device parameters:

Bluetooth readable / adjustable variables	Read	Write
Create & edit profiles (set of settings)	✓	✓
Flow range & dynamic range	✓	✓
Filter settings	✓	✓
Alarms and warnings	✓	✓
Analog in/output configuration	✓	✓
Function of push button*	✓	✓
Read current values	✓	
Show Graphs	✓	
Totalizer (read, select, reset)	✓	✓
Node / slave address setting	✓	✓
I/O for external valve on / off	✓	✓
Restart device		✓
Password protection of unit	✓	✓
Factory reset		✓
PID and valve parameters	✓	✓

* The external push button on the device can be programmed for one of the following functions: Device restart, measurement on/off, warning reset or tare (long press). Activation/Deactivation of Bluetooth® connection (short press).

The app works with Bluetooth® and can be downloaded for free from Google Play store.
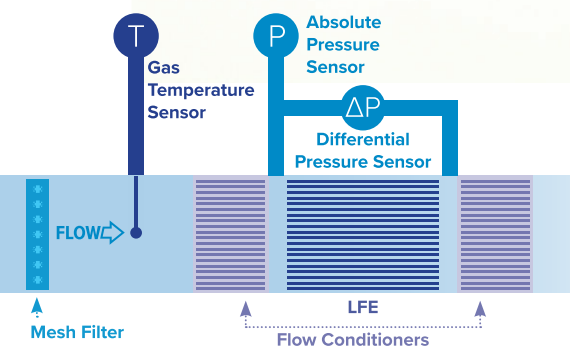
‹d·flux multi series› operating principle

The *d·flux multi series* uses a **differential pressure measurement over a laminar flow element**. The sensors measures the pressure differential, the absolute pressure and the gas temperature. With this information the internal electronics calculates the mass flow going through the device.
A unique advantage of the laminar flowmeter is its **linear relationship between flow rate and developed pressure drop**. This means no «square-root» characterization is necessary to obtain linear flow measurements with a laminar flowmeter. By adding a control valve and a PID controller, the meter becomes a mass flow controller. You give a setpoint to initiate a repeatable, stable flow.

T — Gas Temperature Sensor

P — Absolute Pressure Sensor

ΔP — Differential Pressure Sensor

FLOW

Mesh Filter

LFE

Flow Conditioners

‹d·flux multi series› configurations

The unit is available in 4 ranges (0-500, 0-700, 0-1000 and 0-1400 ln/min for air). Each range can be reduced by the user by 30% without any loss in accuracy. The *d·flux* is an amazingly flexible product, it can handle 15 customer programmable application profiles. Please contact us and discuss any special requirements you have.

Applications: Due to the flexibility of the product, the strengths of the product shines in many different industries and applications. The unit is used for instance in the bio/pharma industry, gas consumption measurements, burner control, gas mix systems, testing systems, light semi industry, food industry and energy market.

Technical data ‹d·flux multi series›

Instrument types
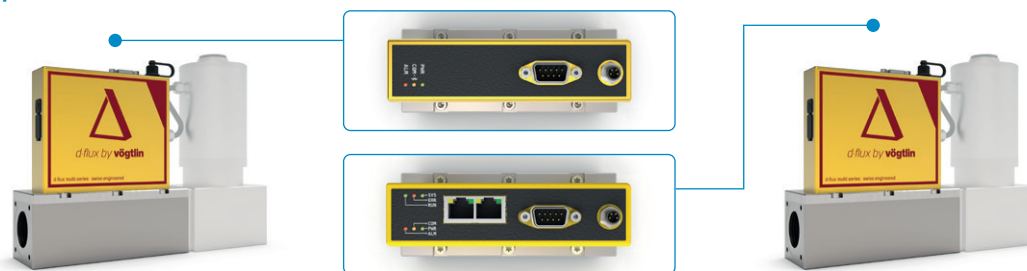
d·flux multi meter / controller *essential*
Mass flow meter / controller with analog signals & Modbus interface

d·flux multi meter / controller *advanced comms*
Mass flow meter / controller with additional Profinet / EtherCAT interface

Measuring ranges	LFE Type	Range (air)	
Standard ranges (air / user adjustable)[1]	LFE1400	from 0-1000 ln/min	to 0-1400 ln/min
	LFE1000	from 0-700 ln/min	to 0-1000 ln/min
	LFE700	from 0-500 ln/min	to 0-700 ln/min
	LFE500	from 0-350 ln/min	to 0-500 ln/min

Gases	Maximum Range
Air	0-1400 ln/min
Oxygen	0-1400 ln/min
Nitrogen	0-1400 ln/min
Argon	0-1250 ln/min
Customer defined gases	Up to total 15 gases or gas mixtures[2]

[1] Unless clearly stated, the specified flow ranges are for an equivalent flow of air at 1013.25 mbar a (760 mmHg) and 0 °C (32 °F). Other common flow, temperature and pressure units can be selected through the Vögtlin Connect app or the digital communication interface. More information available in the d·flux multi operating instructions.

[2] Additional gases or gas mixtures can be added to the above standard list. Stored gases can be replaced by another gas or gas mixture (except for air). Programmed gases/mixtures can be selected through the Vögtlin Connect app or the digital communication interface.

For other gases, gas mixtures and reference conditions please contact the factory. Only suitable for dry and clean gases.

Profiles

Customer defined profiles	Up to 15 user programmable profiles
	Profiles are preset configurations where the customer can set the gas, range, dynamics, totalizers, engineering units and reference conditions for up to 15 different applications

Performance data

Accuracy	0.5% of user full scale + 1% of measured value (after tare at operating conditions)
Media	All gases and gas mixtures that are compatible with the selected materials. The device is not suitable for Hydrogen, Helium, corrosive and explosive gases. Contact the factory for more information.
Dynamic range	*Fixed dynamics*: 1:100 for most gases[3]
	VADy® dynamics: up to 1:1000 (available for meter only)
	VADy® or a fixed dynamic range can be selected during order process. This setting can be changed at any time using the Vögtlin Connect app.
	[3] The dynamic range is gas and pressure dependent, higher pressures means lower dynamic range.
Response time	*Meter*: Typical 90 msec / *Controller*: 2000 msec (according to SEMI standard SEMI E17-1011)[4]
	Update time mass flow value: 10 msec / Sensor sample rate: 1 msec
	[4] With optimized filter settings. All filter modes and values can be set through the Vögtlin Connect app or the digital communication interface.
Repeatability	± 0.2% of factory full scale (according to SEMI standard E56-0309)
Longterm stability	Typical < 0.2% of measured value / year after tare
Power supply	*Meter*: 15-36 Vdc, (200 mA@24Vdc, regulated) / *Controller*: 24 Vdc ±10%, (2000mA@24Vdc, regulated)
	Power in through M8-4P connection or optionally through D-sub connection (ripple should not exceed 100 mV peak-to-peak)
	We recommend that the body of this unit is properly connected to ground
Operation pressure	1 to 14 bar a
Temperature (environment/gas)	-20 to +60 °C (-4 to 140 °F)
Humidity gas	0-95% Rh (non-condensing)
Pressure sensitivity	< 0.08% FFS[5]+0.1% MV per bar (typical air)
Temperature sensitivity	<0.02% FFS[5] per 1 °C of inlet gas temperature @ 7 bar a pressure
	[5] Factory Full Scale (maximum flow range of the device)
Accuracy temperature	Typically ± 0.5 °C (not certified)
Accuracy absolute pressure	<0.5% MV (not certified)
Warm-up time	<2 sec for full accuracy

Materials

Wetted parts	*Body*: Stainless Steel 316L (1.4404) *Valve (controller)*: 316 (1.4401), 416 (1.4005), 430F (1.4104) *Other materials*: SS316Ti (1.4571), silicon, gold, glass, silicone encapsulation, PBT 30GF, ceramics, filter SS316 (1.4401), fastening SS (1.4122) or equivalent
Electronic housing	Powder coated stainless steel
Seals	FKM, optional EPDM
Integrated inlet filter	50 Micron SS316 (1.4401) filter / not customer replaceable / fastener material SS (1.4122) or equivalent
Wetted part surface roughness	1.6 Ra µm or better (contact factory for lower Ra values)

Integration & Installation

Output signals analog	Linear 4–20 mA or customer defined (max 20 mA) user selectable Linear 0–5 VDC or 0-10 VDC or customer defined (max 10 Volt) user selectable mA output: 740 ohms maximum load resistance Volt output: 1000 ohms minimum load resistance All analog outputs are galvanically separated and protected If used with analog signals add 0.2% of FFS to the uncertainty.
Setpoint signals analog	Linear 4–20 mA or customer defined (max 20 mA) user selectable Linear 0–5 VDC or 0-10 VDC or customer defined (max 10 Volt) user selectable
Output signals digital	RS-485 (Modbus RTU 2-wire) The Modbus address can be set with 2 rotating switches on the outside of the housing. All Modbus settings can be set through the Vögtlin Connect app.
Optional digital communication	Dual Port RJ45 with integrated switch (easy to daisy chain) RJ45 LEDs indicating link and activity on the network / Ethernet speed: maximum 100 Mbit *ProfiNet:* PROFINET IO specification v2.33 / PROFINET IO devices conformance class B (RT) / Endianness: conform Siemens S7 (big) *EtherCAT*: IEC standard IEC61158 / Endianness: little *Ethernet IP* will be available end of 2022.
Configuration interface	Bluetooth 4.0 (free Vögtlin Connect app available from Google Play store)
Output I/O mosfet	On/off for external shut-off valve or alarm available through M8-4P connector Contact type: mosfet transistor Maximum voltage: 36 Vdc, Max current 500 mA (Polyfuse protected)
Electrical connection	9 pin D-sub male (power and signals) M8-4P connector (open collector output + power) Optional 2 x RJ45 (EtherCAT / Profinet)
Process connection	1" BSPP female (G1") Optional ½" BSPP, 1" Compression or Tri-clamp 50.5mm flange size (ISO) (see accessories page)
Inlet section	None required if our standard inlet filter / conditioner is installed Without filter / conditioner a 10 D straight inlet is recommended The inlet filter can be deselected at time of order
Pressure drop	*Meter*: Standard 400 mbar at factory full scale air venting to atmosphere (with filter / conditioner) Optional: 325 mbar at factory full scale air venting to atmosphere (without filter / conditioner) Pressure drop is dependent on operating pressure (higher pressure = lower pressure drop) For more information please refer to your sales partner *Controller*: Min. pressure difference required for 1400 ln/min (air) < 2 bar Contact your sales partner for other pressure drop requirements
Mounting orientation	All orientations are possible
Weight	*Meter*: 3.7 kg / *Controller*: 8.7 kg (excluding ethernet and fittings)

Safety

Test pressure	21 bar a
Maximum overpressure sensor	28 bar a
Burst pressure	*Meter*: 100 bar a / *Controller*: 70 bar a
Leak rate	< 1 x 10^{-6} mbar l/s He
Ingress protection class	IP54 if IP54-D-sub is used (see accessories page) For optional EtherCAT/Profinet: IP40

Certifications

EMC	IEC/EN 61326-1, IEC/EN 61000-6-2/4
ATEX certification	None
Material certificates	To be released in 2023 (available for meter only)
FDA compliance	To be released in 2023 (available for meter only)
PED	Fully compliant. Since the unit has 1" process connection, complies with the SEP as defined in article 4, paragraph 3 of the Pressure Equipment Directive (PED) (2014/68/EU)
RoHS / REACH	All components comply with Directive 2002/95/EC (RoHS) and the REACH guidelines
Warranty	3 years

Technical specifications and dimensions subject to change without notice.

Accessories ‹d·flux multi series›

IP54-D9-sub connector

This plug connects to the male D-sub on top of the d·flux unit to connect the signals and power.
With this plug installed and the cap on the DIN M8 connector the integrity rating of this unit is IP54.
Available as plug only (solder connections inside) or with 2 meter cable with fly leads.
Maximum current 2 amp.

Art-N° 328-2093   IP54-D9-sub connector (IP54 rated, 9 solder connections, no cable)
Art-N° 328-2094   IP54-D9-sub connector (IP54 rated with 2 meter cable and fly leads (9))

IP20-D9-sub connector

Available as plug only or with 2 meter cable (for indoor IP20 applications only)

Art-N° 328-2102   IP20-D9-sub connector (IP20 rated, 9 solder connections, no cable)
Art-N° 328-2103   IP20-D9-sub connector (IP20 rated with 2 meter cable and fly leads (9))

IP40-Power supply

In: 100-240 Vac / Out: 24 Vdc, 2.2A with M8-4pin connector
Not suitable for IP54 applications, for indoor IP40 applications only. Suitable for meters and controllers.
Used to configure the d·flux on your desktop with the Vögtlin Connect app

Art-N° 328-2361   Table top power supply (EU plug)
Art-N° 328-2362   Table top power supply (US plug)
Art-N° 328-2363   Table top power supply (GB plug)
Art-N° 328-2364   Table top power supply (AU plug)
Art-N° 328-2365   Table top power supply (CN plug)

IP20-RS485 to USB

A simple way to connect your d·flux over Modbus to your PC

Consisting of 1) RS485 to USB converter (no external power required for converter), 2) a USB-A (version 2.0) connection to your PC and 3) a 9 pin D-sub female connector to the d·flux / Total cable length 3 meters.
USB 2.0-B female to 1 x 9 pin serial RS422/485 male
Chipset: FT232HL, SP3078EE, Dimension: 80 x 72 x 23 (LxWxH)
Power supply for the d·flux needs to be purchased separately – not included in this kit.

Art-N° 328-2112

IP54-M8 plug

Available as plug only or with 2 meter cable. M8-4pin plugs are suitable for IP54 applications.
Maximum current 4 Amp.

Art-N° 328-2096   IP54-M8 connector (4 Pin straight female with screw terminals and cable gland)
Art-N° 328-2097   IP54-M8 connector as above but with 2 meter cable with fly leads

IP54-M8 cap

Cap to seal off M8 connection if not used (required for IP54 protection).
Supplied one with every unit. Only required when IP54 protection is lost or damaged

Art-N° 632-1221   IP54-M8 cap (to close off/open not used M8 connector)

1" Compression fitting

Stainless Steel Compression Tube Fitting, Male Connector, 1". Tube OD x 1" BSPP tread
Male ISO Parallel Thread / Material SS316 (1.4401) including O-rings
Optional 3.1 Certificate upon request when order is placed

Art-N° 328-1254   FKM
Art-N° 328-1255   EPDM

DN50 Tri-clamp

Tri-clamp connection 50.5mm flange (ISO), to 1" BSPP tread
Material 316L (1.4404) including O-rings

Art-N° 328-1426   FKM
Art-N° 328-1427   EPDM

Reducer 1" BSPP to ½" female BSPP

Reduced process connections from 1" BSPP male tread to ½" BSPP female
Material 316Ti (1.4571) including seal rings

Art-N° 328-1257   FKM

gas flow technology by **vögtlin**
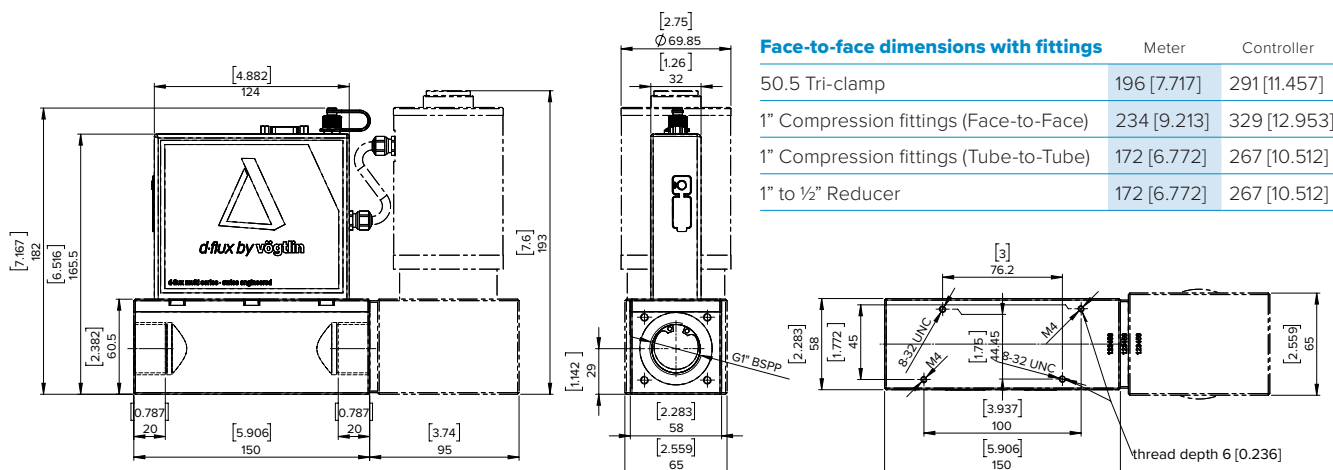
Configuration matrix ‹d·flux multi series›

Functionality
- ☐ d·flux multi meter
- ☐ d·flux multi controller

Gas(es) to measure

Temperature of the gas (range from/to)

Flow range / flow units (f.i. ln/min)

Dynamic range
- ☐ Fixed dynamics* (default 1:100)
  See configurator to determine dynamics for process conditions
- ☐ VADy® (max. 1:1000) customer adjustable (available for meter only)

Pressure (please state absolute or gauge)   Pressure inlet (P1) ____   Pressure outlet (P2) ____

Control valve   The valve type, orifice, springs and position (inlet or outlet) will be determine by the factory

Body material   Stainless steel 316L (1.4404)

Elastomers   ☐ FKM   ☐ EPDM

Analog Signals

For the output there is one Vdc and one separate mA signal. For the setpoint there is only one analog input signal. These signals can be adapted through the Vogtlin Connect app.

Output signals	Setpoint signal (controller only)
☐ 4-20 mA + 0-5V*	☐ 4-20 mA*
☐ 4-20 mA + 1-5V	☐ 0-20 mA
☐ 4-20 mA + 0-10V	☐ 0-5 Vdc
☐ 4-20 mA + 2-10V	☐ 1-5 Vdc
☐ 0-20 mA + 0-5V	☐ 0-10 Vdc
☐ 0-20 mA + 1-5V	☐ 2-10 Vdc
☐ 0-20 mA + 0-10V	
☐ 0-20 mA + 2-10V	

Digital Communication
- ☐ Modbus communication*
- ☐ Modbus & EtherCAT (unit becomes IP40)
- ☐ Modbus & Profinet (unit becomes IP40)

Fittings
All fittings are mounted & full assembly He leak tested
- ☐ None (1" BSPP female connection)*
- ☐ 1" Compression fitting stainless steel 316L (1.4404)
- ☐ Tri-clamp 50.5 mm flange (ISO) stainless steel 316L (1.4404)
- ☐ Reducer to ½" BSPP female stainless steel 316L (1.4571)

Calibration Certificate
- ☐ Factory calibration 5 points*
- ☐ Factory calibration protocol 20 points

Additional Services
- ☐ Certificate of compliance 2.1 according to EN10204
- ☐ Test report 2.2 according to EN10204

*default

Dimensions & electrical connections ‹d·flux multi series›

Dimensions in mm [values in brackets are inch sizes] / Depending on the configuration, the valve can be on right or left side of the body

Face-to-face dimensions with fittings	Meter	Controller
50.5 Tri-clamp	196 [7.717]	291 [11.457]
1" Compression fittings (Face-to-Face)	234 [9.213]	329 [12.953]
1" Compression fittings (Tube-to-Tube)	172 [6.772]	267 [10.512]
1" to ½" Reducer	172 [6.772]	267 [10.512]

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