

Vortex flow sensors // VVX

for fluids

US version available

Note: The US versions are separate products.
The units are not converted, but pre-configured at the factory for the respective variants.



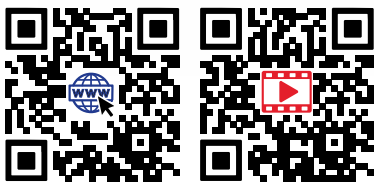
VVX20
LowFlow

Patented
design



VVX20
QuickFasten

Poka
Yoke



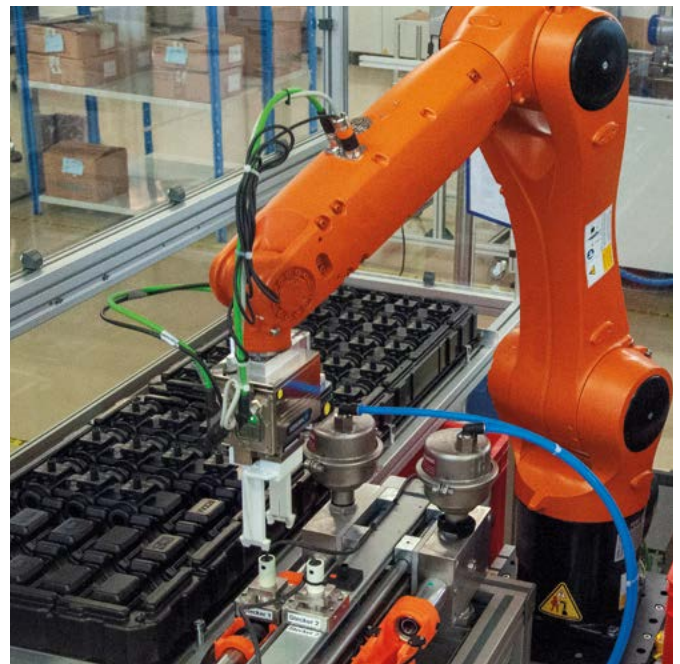
100 %

- Final water flow test by testing robot
- Adjustment of output signal and calibration at 3 test points
→ Traceable measurement performance
- Recording of the test data
→ Test protocols available for customers
- Traceability via serial number

µController

- Customer-specific adaptation through approx. 60 software parameters
- Software filter (optional)
→ exact flow measurement even with vibrations

Final test by testing robot



encapsulated piezoceramic sensor element



Reliable

- Piezoceramic sensor element completely encapsulated
→ no direct medium contact
→ dirt-resistant and fail-safe
- CE Marking
- OEM product developed and produced in Germany

Test reports for customers

- SIKA test labs - many qualification tests
 - Temperature shock
 - Contamination
 - and many other tests
- Test SIKA VVX in provided customer hydraulics
 - Optimization of the measurement performance in real installation situation
- Sample devices can be supplied with works test certificate

Test in provided customer hydraulics



QuickFasten

- Quick and safe plug-in connection
 - Poka Yoke
- Toolless assembly
- Form-fit connection

QuickFasten



Reliable partnership with SIKA



- More than 45 years of experience with flow sensors in heaters
- Leading heat pump manufacturers trust in SIKA Vortex flow sensors

General information on the principle of operation

Alternate vortices rotating in opposite directions are generated behind a bluff body immersed in a flow. The vortices detach from the edges of the bluff body and form a Kármán vortex street in the fluid stream. The distance between the single vortices is constant. The frequency of the vortices flowing past a sensor depends on the flow rate and is proportional to the flow. The sensor detects these vortices which are then converted to an electrical frequency signal.

- Minimal flow obstruction → low pressure drop
- Independent of the conductivity of the medium
- High long-term stability / no zero drift

Technical data

Technical data	VVX15	VVX20	VVX20 LowFlow	VVX25
Nominal diameter	DN 15	DN 20		DN 25
Nominal pipe size	½"	¾"		1"
Process connection	G¾-ISO 228 male, incl. O-rings	G1-ISO 228 male, incl. O-rings or QuickFasten without O-rings		G 1¼-ISO 228 male, incl. O-rings
Process connection	½" NPT	¾" NPT or QuickFasten		1" NPT
Inner diameter [mm]	Ø 13	Ø 19		Ø 25
Inner diameter [inch]	0.5	0.75		1
Flow measuring range*	2...40 l/min 120...2.400 l/h	5...80 l/min 300...4.800 l/h	2...65 l/min 120...3.900 l/h	7...150 l/min 420...9.000 l/h
Flow measuring range*	0.5...10 US gpm 30...600 US gph	1.3...21 US gpm 78...1,260 US gph	0.53...17.2 US gpm 31.8...1,032 US gph	2...40 US gpm 120...2,400 US gph
Accuracy* → at < 50 % of range → at > 50 % of range	±2 % of range ±2 % of range	±0.75 % of range ±1.5 % of reading	±(1% of range + 0.5% of reading) ±(1% of range + 0.5% of reading)	±2 % of range ±2 % of range
Repeatability	±1 % at -20...5 °C ambient temperature ±0.5 % at 5...70 °C ambient temperature			
Repeatability	±1 % at -4...41 °F ambient temperature ±0.5 % at 41...158 °F ambient temperature			
Medium	Water and aqueous solution			
Pressure rating	PN 10			
Pressure rating	Max. 145 psi			
Degree of protection EN 60529 with attached cable socket	IP65 and IP67			
Temperature measuring				
Measuring range	-20...90 °C			
Measuring range	-4...194 °F			
Accuracy	±1 k			
Response time → t ₅₀ → t ₉₀	ca. 10 s ca. 21 s			
Temperature ranges				
Medium	-20...90 °C (nicht gefrierend)			
Medium	-4...194 °F (non-freezing)			
Ambient	-20...70 °C			
Ambient	-4...158 °F			
Electrical data				
Electrical connection	4- or 5-pin plug connector M12 x 1			
Power supply for output signal → Push Pull or NPN → NPN → 4...20 mA or 0...10 V → IO-Link with Push Pull	8...30 V DC 5 V DC (±5 %) 12...24 V DC (±10 %) 24 V DC (±10 %)			
Current consumption	< 15 mA			
Approvals				
				
 <ul style="list-style-type: none"> • Conforms to ANSI UL Std.61010-1 • Cert. to CAN/CSA C22.2 No.61010-1 				

- * Test conditions:
 → Test medium water
 → Media temperature 20...30 °C / 68...86 °F
 → Defined inlet and outlet pipes (see operating manual)
 Deviations with media of higher viscosity

Output signals

Four different versions available:

- Frequency output (1)
- Analogue 0.5...3.5 V and frequency output (1 + 2)
- Analogue 0...10 V or 4...20 mA and frequency output (1 + 3)
- Frequency output with IO-Link (1 + 4)

Frequency output 1	VVX15	VVX20	VVX20 LowFlow	VVX25
Output signal flow	Frequency signal, square wave, pulse duty ratio 50:50, signal current max. 20 mA Push Pull or NPN open collector			
Pulse rate [1/l]	500 (optional 3...1000)	200 (optional 2...800)		100 (optional 1...500)
Pulse rate [pulses/US Gallon]	2000 (optional 12...4000)	750 (optional 8...3000)		400 (optional 4...2000)
Output signal temperature*	Pt1000 2 wire, class B or NTC 10.74k, B 0/100 3450 or none			

Analogue output 2	VVX15	VVX20	VVX20 LowFlow	VVX25
Output signal flow	0.5...3.5 V			
Scaling [l/min]	2...40	5...80	2...65	7...150
Scaling [US gpm]	0.5...10	1.3...21	0.53...17.2	2...40
Voltage rate [V / l/min] → 0.5...3.5 V	0.07895	0.04000	0.04762	0.02098
Voltage rate [V / US gpm] → 0.5...3.5 V	0.31579	0.15228	0.17996	0.07895
Output signal temperature*	Voltage signal 0.5...3.5 V corresponds to 0...90 °C / 32...194 °F or none			

* VVX20 QuickFasten and VVX LowFlow only without temperature signal

Analogue output 3	VVX15	VVX20	VVX25
Output signal flow	0...10 V or 4...20 mA		
Scaling [l/min]	0...40	0...80	0...150
Scaling [US gpm]	0...10	0...21	0...40
Voltage rate [V / l/min] → 0...10 V	0.25000	0.12500	0.06667
Current rate [mA / l/min] → 4...20 mA	0.40000	0.20000	0.10667
Voltage rate [V / US gpm] → 0...10 V	1.00000	0.47619	0.25000
Current rate [mA / US gpm] → 4...20 mA	1.60000	0.76190	0.40000
Output signal temperature	none		

Output signals

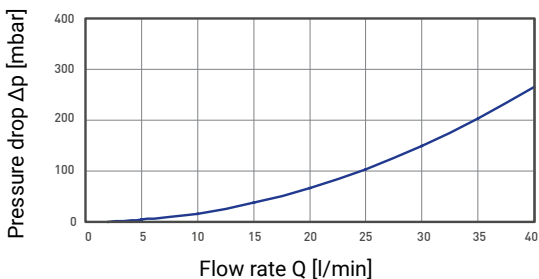
IO-Link ⁴	VVX15	VVX20	VVX25
IO-Link specification	Version 1.1		
IO-Link Device ID:	2		
Transmission type	COM2 (38.4 kBaud)		
Ready for operation	2 seconds after supply voltage is applied		
Min. cycle time	103 ms		
SIO mode:	Yes		
Profiles:	Device Identification, Device Diagnosis		
SDCI standard:	IEC 61131-9		
Required master port:	Class A		
Process data analog:	3		
Download IODD device description	https://www.sika.net or https://ioddfinder.io-link.com		

IO-Link functions

IO-Link functions	
Process data	<ul style="list-style-type: none"> Flow rate Temperature Device status <ul style="list-style-type: none"> Device OK Test sequence active Flow rate out of specification Temperature out of specification Average flow rate Cumulative volume <ul style="list-style-type: none"> max. flow rate min. and max. temperature
Other functions	<ul style="list-style-type: none"> Parameterisation of the flow and volume units Parameterisation of the pulse rate of the frequency output Setting an offset for the frequency output - "Lifesignal" (e.g. 4 Hz without flow) Creep suppression - shifting the start of the measuring range Test sequence - Simulates flow rate and temperature Reset to factory settings

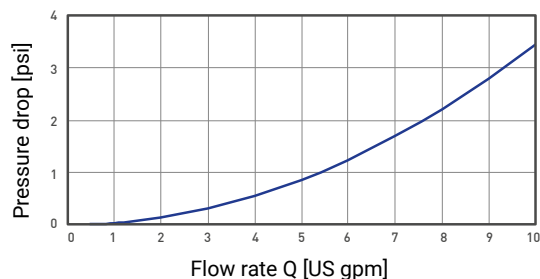
Typical pressure drop

Typical pressure drop VVX15

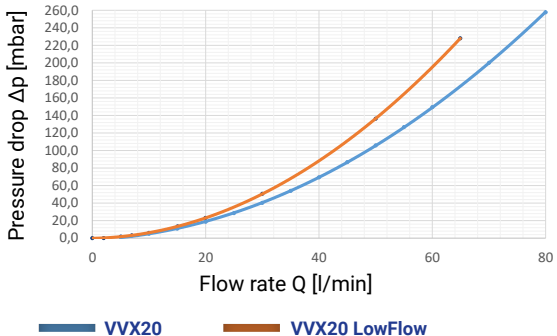


Typical pressure drop VVX15

US version

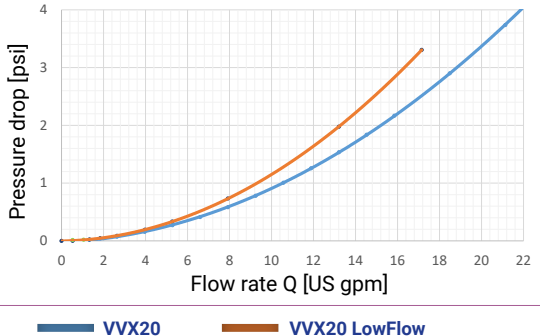


Typical pressure drop VVX20

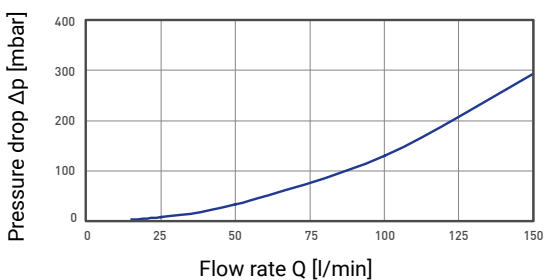


Typical pressure drop VVX20

US version

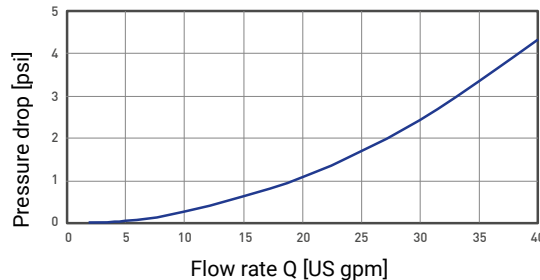


Typical pressure drop VVX25



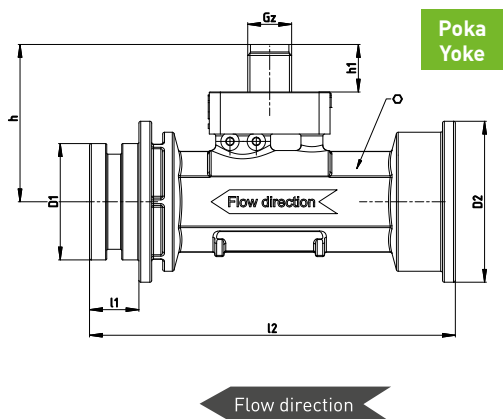
Typical pressure drop VVX25

US version

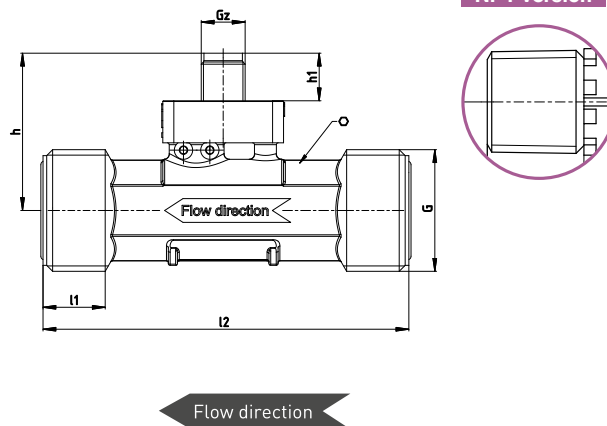


Technical drawings

VVX20 QuickFasten



VVX threaded versions



Dimensions

Dimensions [mm]	h	h1	D1	D2	l1	l2	G	Gz	○ Width across flats
Threaded version									
VVX15	40	13			16.5	80	G 3/4	M12 x 1	19
VVX20	43	13			16.5	100	G 1	M12 x 1	24
VVX25	46	13			16.5	95	G 1 1/4	M12 x 1	30
Quickfasten									
VVX20	43	13	31.8	44	13.5	100		M12 x 1	24
Dimensions [inch]									
Threaded version									
VVX15	1.57	0.51			0.79	3.54	1/2 - 14 NPT	M12 x 1	7.48 and 15/16"
VVX20	1.69	0.51			0.81	3.94	3/4 - 14 NPT	M12 x 1	9.45 and 1 1/8"
VVX25	1.69	0.51			0.53	3.94	1 - 11.5 NPT	M12 x 1	11.81 and 1 1/2"
Quickfasten									
VVX20	1.81	0.51	1.25	1.73	0.94	3.94			

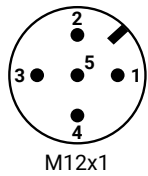
Materials

Materials in contact with media	
VVX15, VVX20, VVX25	
Body /tube	PPS GF40
Sensor	ETFE or PFA (VVX20 LowFlow)
O-rings	EPDM

Wiring

Pin assignment

The pin assignment depends on the chosen configuration of the device.



Possible pin assignments:

Pin 1: $+U_B$

Pin 2: $U_{Flow} \cdot I_{Flow} \cdot R_{Temp}$

Pin 3: **GND**

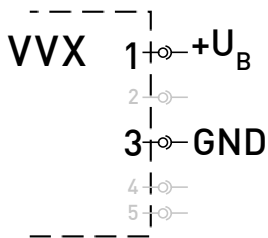
Pin 4: IO-Link • Frequency • Alarm*¹

Pin 5: $U_{Temp} \cdot R_{Temp}$ • Without

*¹ The alarm output is only possible with the corresponding firmware and has been determined during the order.

Wire the connecting cable according to your device version and the pin assignments shown on the type plate.

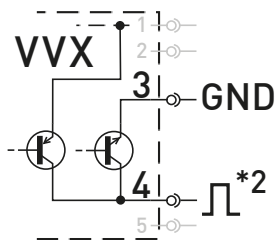
Supply voltage



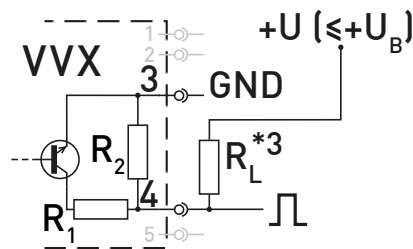
VVX with frequency output

Flow

Push-Pull*¹



NPN Open Collector



$$R_1 \leq 47 \Omega / R_2 \geq 10 \text{ k}\Omega$$

*¹: Not at 5 V.

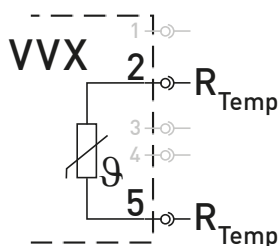
*²: Do not wire the push-pull switch outputs of multiple VVX devices in parallel.

*³: Recommended pull-up / pull-down resistance $R_L \sim 5 \text{ k}\Omega$.

Wiring

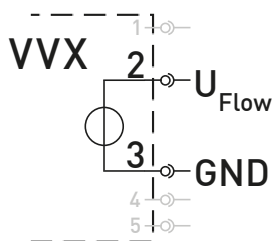
VVX with temperature (optional)

NTC / Pt 1000

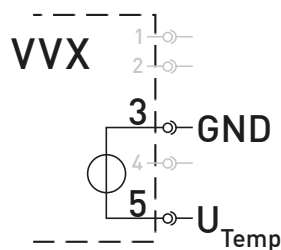


VVX with analogue output 0.5...3.5 V (optional)

Flow U_{Flow}



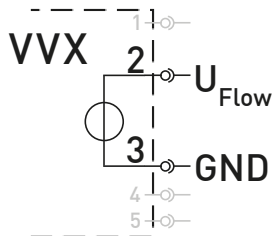
Temperature U_{Temp}



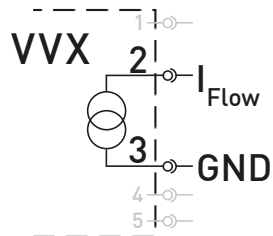
VVX with voltage output 0...10 V or current output 4...20 mA (optional)

Flow

0...10V



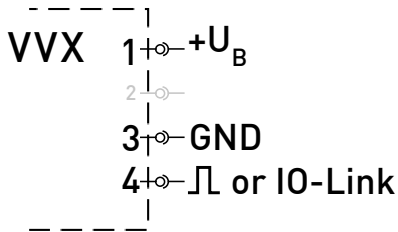
4...20 mA



Wiring

VVX with IO-Link

Flow



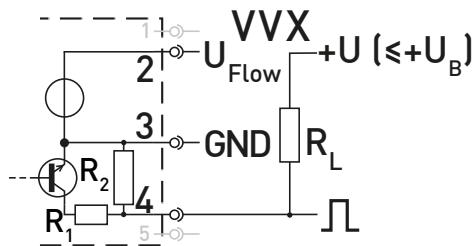
Use of frequency output and optional functions

The frequency output can be wired together with the optional functions. However, not every combination is possible.

In principle, the pins 2, 4 and 5 can only be assigned with one function at a time. A multiple assignment is not possible.

The wiring results from an overlay of the circuit diagrams of the corresponding functions, as shown in the two following examples.

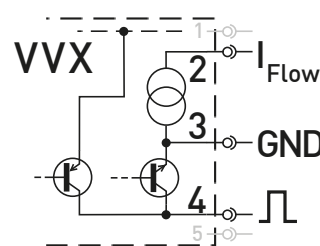
Flow NPN + Analogue 0.5...3.5V



$R_1 \leq 47 \Omega$ / $R_2 \geq 10 \text{ k}\Omega$

Recommendation for resistance $R_L \sim 5 \text{ k}\Omega$

Flow Push-Pull + current 4...20 mA



Article numbers for OEM Versions



OEM Version frequency output NPN open collector, 5 V DC, without temperatur signal

Order code		
Nominal diameter, flow range		
VVX20, DN 20 QuickFasten, 5...80 l/min (300...4,800 l/h)	VVXC9	NB0000242P
VVX20, DN 20 QuickFasten, 2...65 l/min (120...3,900 l/h)	VVXCH	NB0000242P
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9	NB00002427
VVX20, DN 20 G1, 2...65 l/min (120...3,900 l/h)	VVXCH	NB00002427
Nominal pipe size, flow range		
VVX20, 3/4" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK0000242P
VVX20, 3/4" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NK0000242P
VVX20, 3/4" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK00002428
VVX20, 3/4" NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NK00002428
Version		
Standard version		S
Version with ETL-Approval		E
Example order number	VVXC9	S NB0000242P

OEM Version analogue output (0.5...3.5 V) and frequency output NPN open collector, 5 V DC, without temperatur signal

Order code		
Nominal diameter, flow range		
VVX20, DN 20 QuickFasten, 5...80 l/min (300...4,800 l/h)	VVXC9	NBUC00242P
VVX20, DN 20 QuickFasten, 2...65 l/min (120...3,900 l/h)	VVXCH	NBBB00242P
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9	NBUC002427
VVX20, DN 20 G1, 2...65 l/min (120...3,900 l/h)	VVXCH	NBBB002427
Nominal pipe size, flow range		
VVX20, 3/4" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NKUH00242P
VVX20, 3/4" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NKBD00242P
VVX20, 3/4" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NKUH002428
VVX20, 3/4" NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NKBD002428
Version		
Standard version		S
Version with ETL-Approval		E
Example order number	VVXC9	S NBUC00242P

Article numbers

Version frequency output Push-Pull or NPN open collector

Order code							
Nominal diameter, flow range							
VVX15, DN 15 G¾, 2...40 l/min (120...2,400 l/h)	VVXA1			A			514
VVX20, DN 20 QuickFasten, 5...80 l/min (300...4,800 l/h)	VVXC9			B	0000		52P
VVX20, DN 20 QuickFasten, 2...65 l/min (120...3,900 l/h)	VVXCH	N		B	0000		42P
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9			B			527
VVX20, DN 20 G1, 2...65 l/min (120...3,900 l/h)	VVXCH	N		B	0000		427
VVX25, DN 25 G1¼, 7...150 l/min (420...9,000 l/h)	VVXB2			B			516
Nominal pipe size, flow range							
VVX15, ½" NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA			1			51C
VVX20, ¾" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC			K	0000		52P
VVX20, ¾" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	N		K	0000		42P
VVX20, ¾" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC			K			528
VVX20, ¾" NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	N		K	0000		428
VVX25, 1" NPT, 2...40 US gpm (120...2,400 US gph)	VVXBB			2			51E
Version							
Standard version		S					
Version with ETL-Approval		E					
Power supply							
8...30 V DC, Output signal Push-Pull			G			1	
5 V DC, Output signal NPN open collector			N			2	
Output signal temperature							
Pt1000*					RRRP		
NTC 10.74K*					RRRN		
None					0000		
Example order number	VVXA1	S	G	A	RRRP	1	514

* not available for VVX20 QuickFasten and VVX20 LowFlow

Version analogue output (0.5...3.5 V) and frequency output NPN open collector

Order code							
Nominal diameter, flow range							
VVX15, DN 15 G¾, 2...40 l/min (120...2.400 l/h)	VVXA1		NA	U1			514
VVX20, DN 20 QuickFasten, 5...80 l/min (300...4.800 l/h)	VVXC9		NB	UC	00		52P
VVX20, DN 20 QuickFasten, 2...65 l/min (120...3.900 l/h)	VVXCH		NB	BB	00		42P
VVX20, DN 20 G1, 5...80 l/min (300...4.800 l/h)	VVXC9		NB	UC			527
VVX20, DN 20 G1, 2...65 l/min (120...3.900 l/h)	VVXCH		NB	BB	00		427
VVX25, DN 25 G1¼, 7...150 l/min (420...9.000 l/h)	VVXB2		NB	U2			516
Nominal pipe size, flow range							
VVX15, ½" NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA		N1	UA			51C
VVX20, ¾" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC		NK	UE	00		52P
VVX20, ¾" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK		NK	BD	00		42P
VVX20, ¾" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC		NK	UH			528
VVX20, ¾" NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK		NK	BD	00		428
VVX25, 1" NPT, 2...40 US gpm (120...2,400 US gph)	VVXBB		N2	UB			51E
Version							
Standard version		S					
Version with ETL-Approval		E					
Output signal temperature							
0.5...3.5 V*					U1		
none					00		
Power supply							
8...30 V DC						1	
5 V DC						2	
Example order number	VVXA1	S	NA	U1	U1	1	514

* not available for VVX20 QuickFasten and VVX20 LowFlow

Article numbers

Version IO-Link with frequency output Push-Pull














Order code	
Nominal diameter, measuring range	Article number
VVX15, DN 15 G $\frac{3}{4}$, 2...40 l/min (120...2,400 l/h)	VVXA1SIA00004414
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9SIB00004427
VVX25, DN 25 G1 $\frac{1}{4}$, 7...150 l/min (420...9,000 l/h)	VVXB2SIB00004416
Nominal pipe size, measuring range	Article number
VVX15, $\frac{1}{2}$ " NPT, 0.5...10 US gpm (30...600 US gph)	VVXAASI10000441C
VVX20, $\frac{3}{4}$ " NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCCSIK00004428
VVX25, 1" NPT, 2...40 US gpm (120...2,400 US gph)	VVXBBSI20000441E

Version analogue output (0...10 V or 4...20 mA) and frequency output Push-Pull

Order code					
Nominal diameter					
VVX15, DN 15 G $\frac{3}{4}$, 2...40 l/min (120...2,400 l/h)	VVXA1	GA		K003514	
VVX20, DN 20 QuickFasten, 5...80 l/min (300...4,800 l/h)	VVXC9	GB		N00352P	
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9	GB		N003527	
VVX25, DN 25 G1 $\frac{1}{4}$, 7...150 l/min (420...9,000 l/h)	VVXB2	GB		L003516	
Nominal pipe size					
VVX15, $\frac{1}{2}$ " NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA	N1		P00351C	
VVX20, $\frac{3}{4}$ " QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK		Q00352P	
VVX20, $\frac{3}{4}$ " NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK		Q003528	
VVX25, 1" NPT, 2...40 US gpm (120...2,400 US gph)	VVXBB	N2		S00351E	
Version					
Standard version	S				
Version with ETL-Approval	E				
Output signal flow					
0...10 V			V		
4...20 mA			A		
Example order number	VVXA1	S	GA	V	K003514

Article numbers

Order code	
Service - Test in the test bench	Order number
Tests in provided customer hydraulics including a test report	VVXTESTREPORT01
Operation with SIKA test bench pump	VVXTESTREPORT02
Operation with provided customer pump	VVXWPS01
Works calibration certificate for sample devices	

Order code					
Type	Accessories		Length [m]	Length [ft]	Order number
VVX15		Connection cable with 5 pin cable socket M12 x 1, angle type molded lead 5 x 0.34 mm ² , sheathing material PVC, (T _{max} = 80 °C / 176 °F), Pins: 1=brown, 2=white, 3=blue, 4=black, 5=grey, Customized plugs and cable lengths on request UL approval UL approval UL approval UL approval UL approval UL approval	1		XVVX493
VVX20			1.5		XVVX494
VVX25			2		XVVX482
			3		XVVX492
			5		XVVX481
			10		XVVX495
				3	XVVX493UL
				4.9	XVVX494UL
				6.5	XVVX482UL
				10	XVVX492UL
		16	XVVX481UL		
		33	XVVX495UL		
Type	Accessories	Scope of delivery: 1 piece each	Order number	Order number	
VVX15		Screw coupling G 1/2, brass	BVVX1007		
		Soldering coupling Ø 15 mm, brass	BVVX1008		
VVX20		O-ring for QuickFasten, EPDM*	XVVX061		XVVX061
		Joint clip QuickFasten, stainless steel*	XVVX052		XVVX052
		Soldering coupling for QuickFasten, inlet side	BVVX1012		BVVX1012
		Soldering coupling for QuickFasten, outlet side	BVVX1011		BVVX1011
		Screw coupling G 1*, brass, compatibility type	BVVX1021		
VVX25		Screw coupling R1, brass	BVVX1003		
		Soldering coupling Ø 28 mm, brass	BVVX1004		
		Bonding coupling Ø 25 mm, PVC	BVVX1005		
		Screw coupling G 1, stainless steel 1.4571	BVVX1006		
		Screw coupling G 1 1/4*, brass, compatibility type	BVVX1022		

* Two pieces are required for the assembly