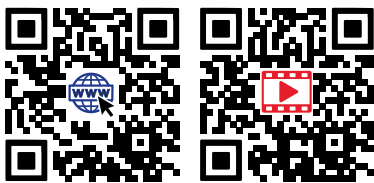
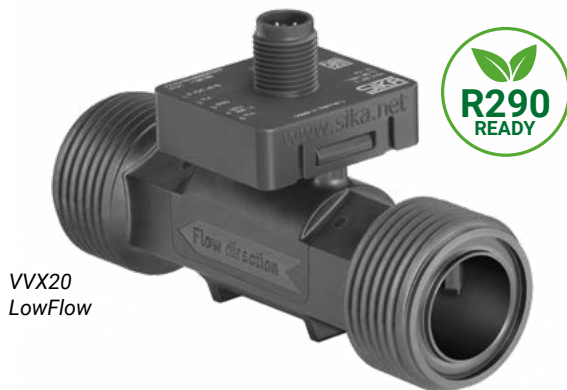


Vortex flow sensors // VVX

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.



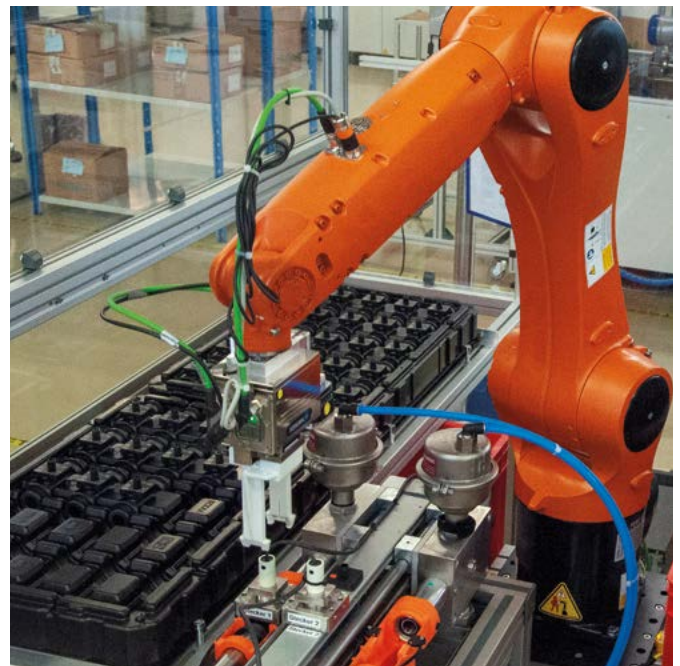
100 %

- 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

QuickFasten

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

Test in provided customer hydraulics



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 datasheet

Technical data

Technical data	VVX15	VVX20	VVX20 LowFlow	VVX20 Low Delta p	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	2.5...85 l/min 150...5,100 l/h	7...150 l/min 420...9,000 l/h
Flow measuring range*	0.53...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	0.66...22.4 US gpm 39.6...1,344 US gph	2...40 US gpm 120...2,400 US gph
Accuracy* → at < 50 % of range	±2 % FS	±0.75 % FS	±(1 % FS + 0.5 % of reading)	±0.8 % FS	±0.75 % FS
→ at > 50 % of range	±2 % FS	±1.5 % of reading	±(1 % FS + 0.5 % of reading)	±1.6 % of reading	±1.5 % of reading
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	approx. 10 s approx. 21 s				
Temperature ranges					
Medium	-20...90 °C (non-freezing)				
Medium	-4...194 °F (non-freezing)				
Ambient	-22...70 °C (-30 °C with medium min. +3.5 °C for max. 24 h over the product life)				
Ambient	-7.6...158 °F (-22 °F with medium min. +38.3 °F for max. 24 h over the product life)				
Storage	- 30...70 °C				
Storage	-22...158 °F				

* 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

FS = Full scale

Technical data

Technical data	VVX15	VVX20	VVX20 LowFlow	VVX20 Low Delta p	VVX25
Electrical data					
Electrical connection	4- or 5-pin plug connector M12 x 1				
Power supply for output signal	8...30 V DC 5 V DC (±5 %) 12...24 V DC (±10 %) 24 V DC (±10 %)				
→ Push Pull or NPN					
→ NPN					
→ 4...20 mA or 0...10 V					
→ IO-Link with Push Pull					
Current consumption	< 15 mA				
Approvals					
	WRAS (approved product)				
	Conforms to ANSI UL Std.61010-1 Cert. to CAN/CSA C22.2 No.61010-1				
	Variants according to certificate IEC 60335-2-40 DIN EN 60335-2-40				

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	VVX20 Low Delta p	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	VVX20 Low Delta p	VVX25**
Output signal flow	0.5...3.5 V				
Scaling [l/min]	2...40	5...80	2...65	2.5...85	7...150
Scaling [US gpm]	0.5...10	1.3...21	0.53...17.2	0.66...22.4	2...40
Voltage rate [V / l/min] → 0.5...3.5 V	0.07895	0.04000	0.04762	0.03636	0.02098
Voltage rate [V / US gpm] → 0.5...3.5 V	0.31579	0.15228	0.17996	0.13799	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

** Accuracy of the analog output at 1.5 % of full scale

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		

** Accuracy of the analog output at 1.5 % of full scale

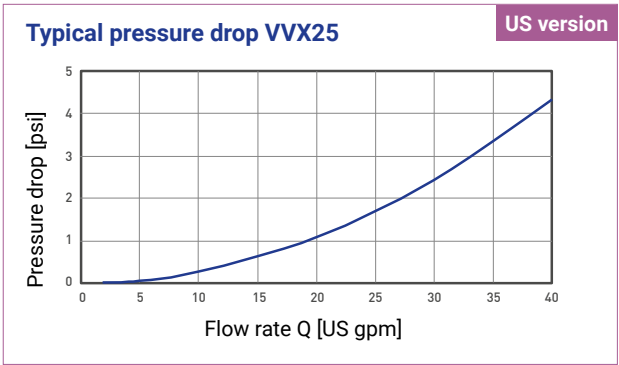
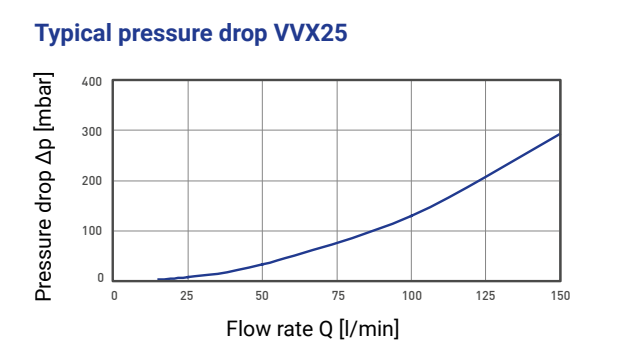
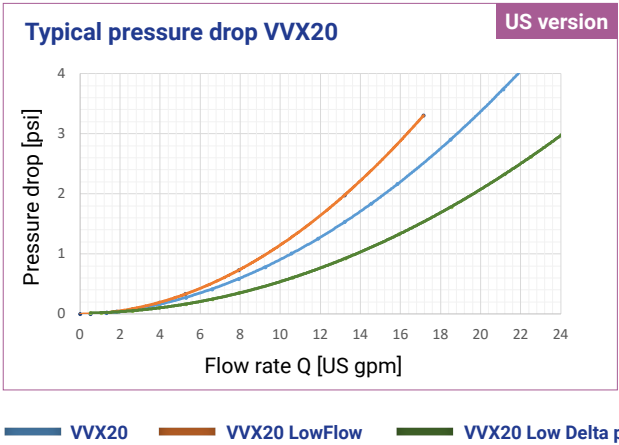
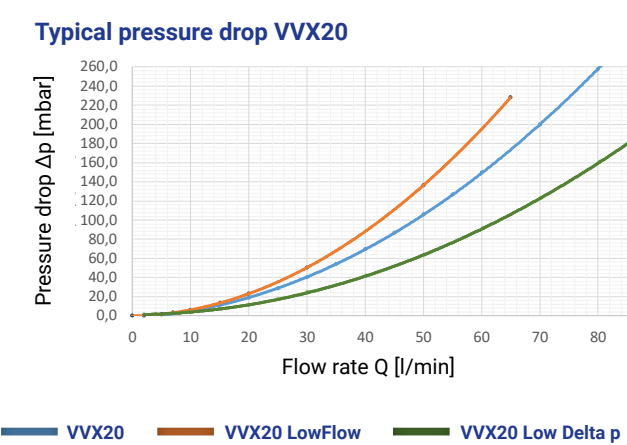
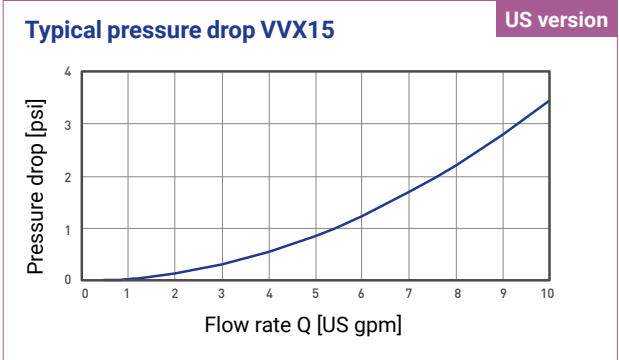
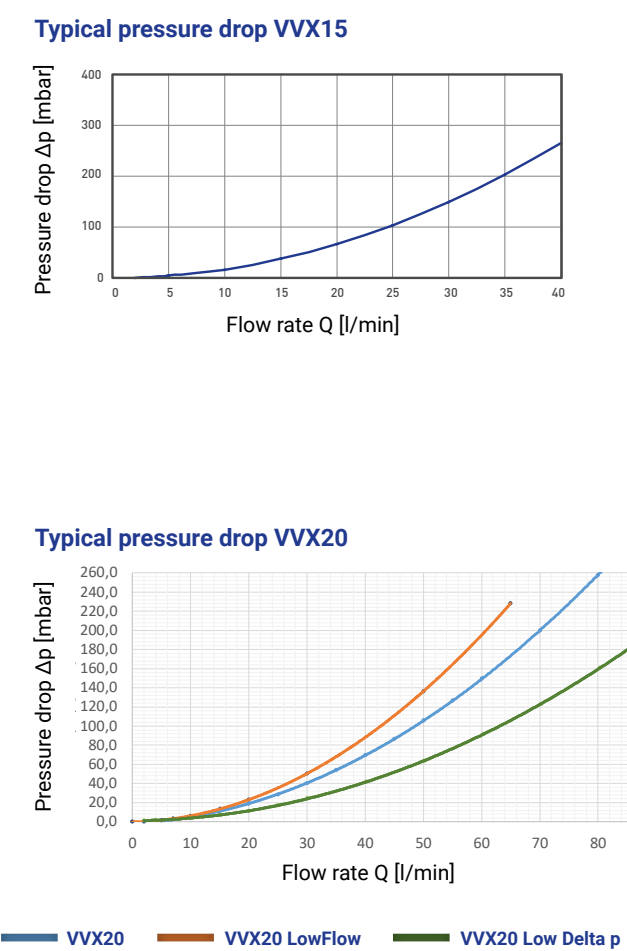
Output signals

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

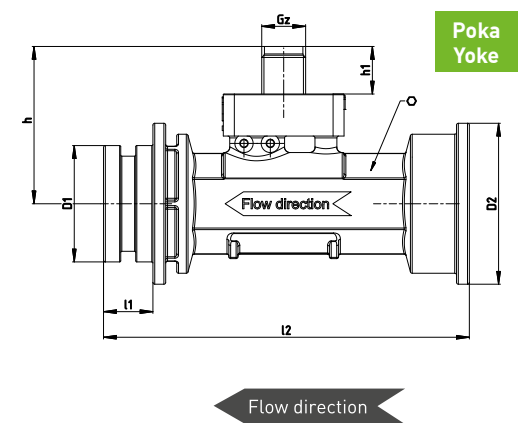
IO-Link functions	
Process data	Flow rate Temperature Device status Device OK Test sequence active Flow rate out of specification Temperature out of specification Average flow rate Cumulative volume max. flow rate min. and max. temperature
Other functions	Parameterisation of the flow and volume units 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

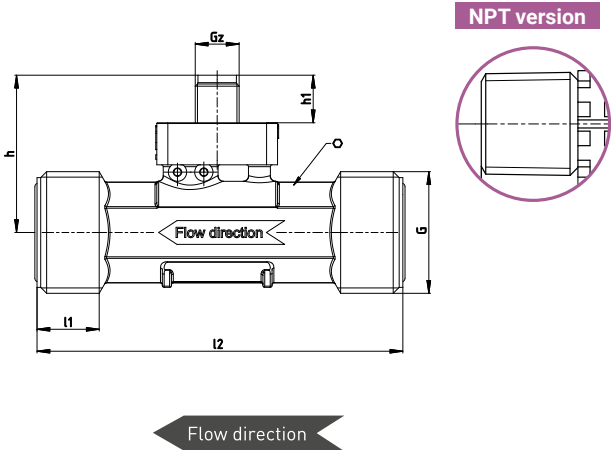


Technical drawings

VVX20 QuickFasten



VVX threaded versions



Dimensions

Dimensions [mm]	h	h1	D1	D2	l1	l2	G	Gz	○ Width across flats
Threaded version									
VVX15	40	13			13.5	80	G ¾	M12 x 1	19
VVX20	43	13			17	100	G 1	M12 x 1	24
VVX25	46	13			16.5	95	G 1¼	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	½ - 14 NPT	M12 x 1	0.75 and 15/16"
VVX20	1.69	0.51			0.81	3.94	¾ - 14 NPT	M12 x 1	0.94 and 1⅝"
VVX25	1.81	0.51			0.98	3.94	1 - 11.5 NPT	M12 x 1	1.18 and 1½"
Quickfasten									
VVX20	1.69	0.51	1.25	1.73	0.53	3.94			

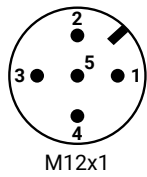
Materials

Materials in contact with media	
VVX15, VVX20, VVX25	
Body /tube	PPS GF40
Sensor	ETFE or PFA (VVX20 LowFlow and VVX20 Low Delta p)
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**

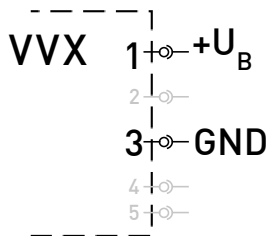
Pin 4: IO-Link • Frequenzy • Alarm*¹

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

*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.

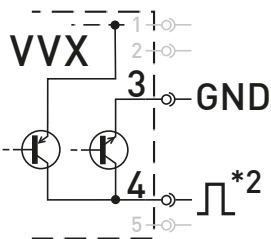
Supply voltage



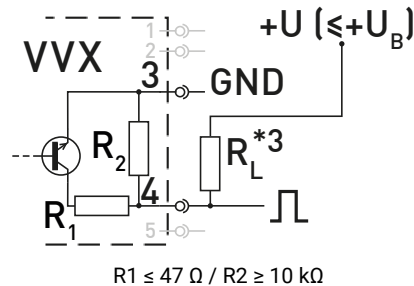
VVX with frequency output

Flow

Push-Pull*¹



NPN Open Collector



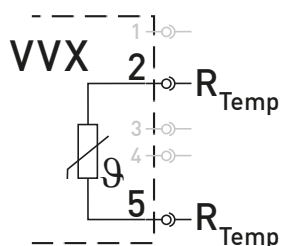
*¹: Not at 5 V.

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

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

VVX with temperature (optional)

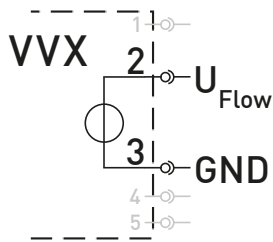
NTC / Pt 1000



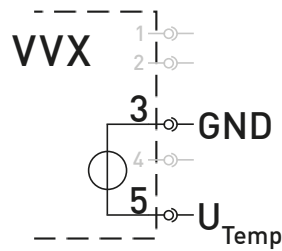
Wiring

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

Flow U_{Flow}



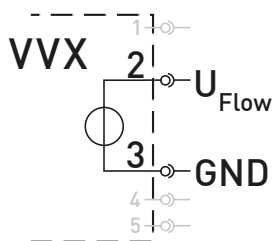
Temperature U_{Temp}



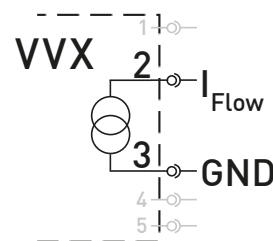
VVX with voltage output 0...10 V or current output 4...20 mA (optional)

Flow

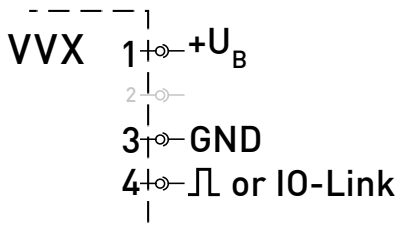
0...10V



4...20 mA



VVX with IO-Link



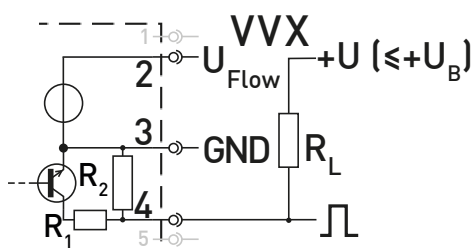
Use of frequency output and optional functions

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

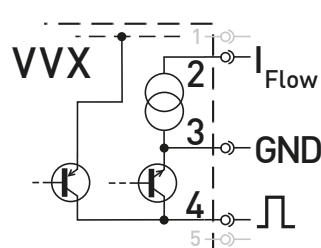
In principle, the pins 2, 4 and 5 can only be assigned with one function at a time. A multiple assignment is not possible.

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



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



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

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

Article numbers for OEM Versions

Most
Economic

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

Order code		
Nominal diameter, flow measuring 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 QuickFasten, 2,5...85 l/min (150...5,100 l/h)	VVXCL	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 measuring range		
VVX20, ¾" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK0000242P
VVX20, ¾" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NK0000242P
VVX20, ¾" QuickFasten, 0.66...22.4 US gpm (39.6...1,344 US gph)	VVXCM	NK0000242P
VVX20, ¾" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK00002428
VVX20, ¾" 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 measuring 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 QuickFasten, 2,5...85 l/min (150...5,100 l/h)	VVXCL	NBBF00242P
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 measuring range		
VVX20, ¾" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NKUH00242P
VVX20, ¾" QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NKBD00242P
VVX20, ¾" QuickFasten, 0.66...22.4 US gpm (39.6...1,344 US gph)	VVXCM	NKBE00242P
VVX20, ¾" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NKUH002428
VVX20, ¾" 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 measuring range									
VVX15, DN 15 G $\frac{3}{4}$, 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	2			52P
VVX20, DN 20 QuickFasten, 2...65 l/min (120...3,900 l/h)	VVXCH	N		B	0000				42P
VVX20, DN 20 QuickFasten, 2,5...85 l/min (150...5,100 l/h)	VVXCL	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	2			427
VVX25, DN 25 G1 $\frac{1}{4}$, 7...150 l/min (420...9,000 l/h)	VVXB2			B					516
Nominal pipe size, flow measuring range									
VVX15, $\frac{1}{2}$ " NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA			1					51C
VVX20, $\frac{3}{4}$ " QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC			K	0000	2			52P
VVX20, $\frac{3}{4}$ " QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	N		K	0000				42P
VVX20, $\frac{3}{4}$ " QuickFasten, 0.66...22.4 US gpm (39.6...1,344 US gph)	VVXCM	N		K	0000				42P
VVX20, $\frac{3}{4}$ " NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC			K					528
VVX20, $\frac{3}{4}$ " NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	N		K	0000	2			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

Article numbers

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

Order code									
Nominal diameter, flow measuring range									
VVX15, DN 15 G $\frac{3}{4}$, 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	2				42P
VVX20, DN 20 QuickFasten, 2,5...85 l/min (150...5.100 l/h)	VVXCL	NB	BF	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	2				427
VVX25, DN 25 G1 $\frac{1}{4}$, 7...150 l/min (420...9.000 l/h)	VVXB2	NB	U2						516
Nominal pipe size, flow measuring range									
VVX15, $\frac{1}{2}$ " NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA	N1	UA						51C
VVX20, $\frac{3}{4}$ " QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK	UE	00					52P
VVX20, $\frac{3}{4}$ " QuickFasten, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NK	BD	00	2				42P
VVX20, $\frac{3}{4}$ " QuickFasten, 0.66...22.4 US gpm (39.6...1,344 US gph)	VVXCM	NK	BE	00					42P
VVX20, $\frac{3}{4}$ " NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC	NK	UH						528
VVX20, $\frac{3}{4}$ " NPT, 0.53...17.2 US gpm (31.8...1,032 US gph)	VVXCK	NK	BD	00	2				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

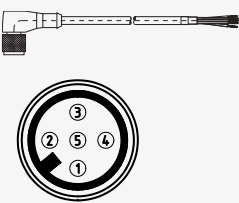
Order code			
Nominal diameter, flow measuring range			
VVX15, DN 15 G¾, 2...40 l/min (120...2,400 l/h)	VVXA1		IA00004414
VVX20, DN 20 G1, 5...80 l/min (300...4,800 l/h)	VVXC9		IB00004427
VVX25, DN 25 G1¼, 7...150 l/min (420...9,000 l/h)	VVXB2		IB00004416
Nominal pipe size, flow measuring range			
VVX15, ½" NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA		I10000441C
VVX20, ¾" NPT, 1.3...21 US gpm (78...1,260 US gph)	VVXCC		IK00004428
VVX25, 1" NPT, 2...40 US gpm (120...2,400 US gph)	VVXBB		I20000441E
Version			
Standard version		S	
Version with ETL-Approval		E	
Example order number	VVXA1	S	IA00004414

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

Order code					
Nominal diameter, flow measuring range					
VVX15, DN 15 G¾, 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 G1¼, 7...150 l/min (420...9,000 l/h)	VVXB2		GB		L003516
Nominal pipe size, flow measuring range					
VVX15, ½" NPT, 0.5...10 US gpm (30...600 US gph)	VVXAA		N1		P00351C
VVX20, ¾" QuickFasten, 1.3...21 US gpm (78...1,260 US gph)	VVXCC		NK		Q00352P
VVX20, ¾" 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 Operation with SIKA test bench pump Operation with provided customer pump	VVXTESTREPORT01 VVXTESTREPORT02 VVXWPS01
Works calibration certificate for sample devices	

Order code				
Type	Accessories		Length [m]	Length [ft]
VVX15 VVX20 VVX25		Connection cable with 5 pin cable socket M12 x 1, angle type molded lead 5 x 0.34 mm², sheathing material PVC, (T = -22...80 °C / -7.6...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 1.5 2 3 5 10	3 4.9 6.5 10 16 33
Type	Accessories	Scope of delivery: 1 piece each	Order number	Order number
VVX15		Screw coupling G 1/2, brass	BV VX1007	
		Soldering coupling Ø 15 mm, brass	BV VX1008	
VVX20		O-ring for QuickFasten, EPDM*	XV VX061	XV VX061
		Joint clip QuickFasten, stainless steel*	XV VX052	XV VX052
		Soldering coupling for QuickFasten, inlet side	BV VX1012	BV VX1012
		Soldering coupling for QuickFasten, outlet side	BV VX1011	BV VX1011
		Screw coupling G 1*, brass, compatibility type	BV VX1021	
VVX25		Screw coupling R1, brass	BV VX1003	
		Soldering coupling Ø 28 mm, brass	BV VX1004	
		Bonding coupling Ø 25 mm, PVC	BV VX1005	
		Screw coupling G 1, stainless steel 1.4571	BV VX1006	
		Screw coupling G 1 1/4*, brass, compatibility type	BV VX1022	

* Two pieces are required for the assembly