Products

TURBOVAC
with Hybrid Rotor Suspension (mag/mech)

with integrated Frequency Converter
TURBOVAC 90 i, 250 i, (T) 350 i and (T) 450 i

TURBOVAC 90 i (left), 250 i (T), 350 i and (T) 450 i (right)

with integrated Frequency Converter and integrated Vacuum System Controller
TURBOVAC 90 iX, 250 iX, (T) 350 iX and (T) 450 iX

TURBOVAC 90 iX (left), 250 iX, (T) 350 iX and (T) 450 iX (right)

Typical Applications

- Analytical technologies / Research & Development
  - Mass spectrometers
  - Electron microscopes
  - Surface analysis
  - X-ray-analysis
  - Particle accelerators and synchrotons
  - Laboratory coating systems
  - MBE (Molecular Beam Epitaxy)
  - UHV systems
- Life Sciences
  - Proton therapy
  - Gamma sterilisation
  - Production of high quality implants
- Industrial and Coating applications
  - PVD- Physical Vapour deposition
  - Optical coatings
  - CD/DVD/Blu-Ray Disc production
  - Thin film technologies, photovoltaics
- Load locks, transfer chambers, handling systems
- Electron beam welders
- Insulation vacuum and leak detection

Technical Features

TURBOVAC i

- Integrated electronic drive unit with 24/48 V DC supply
- Best in class pumping speed and compression especially for light gases
- Vacuum port design flexibility
- Installation in any orientation
- Superior reliability due to innovative pump and bearing design
- The only maintenance free hybrid mechanical TMP
  - no need for oil changes
- On-site maintenance possibility (bearing exchange) to reduce service costs and time
- Widest range of interface options (USB, RS 485 and 15 pin digital I/O as standard)
- Optimized size/performance ratio on 100 and 160 flanges

TURBOVAC iX

- Integrated vacuum system controller with flexible interfaces and several accessory ports for control of cooling units, valves, gauges, forevacuum pumps etc.
- Flexible accessory program options for easy plug & play
- Flexibility to match different process and application requirements

TURBOVAC T i, T iX

- Variant without Compound Stage
- increased gas throughput
- Increased tolerance against dust and particles
- Improved run-up time

Advantages to the User

TURBOVAC i

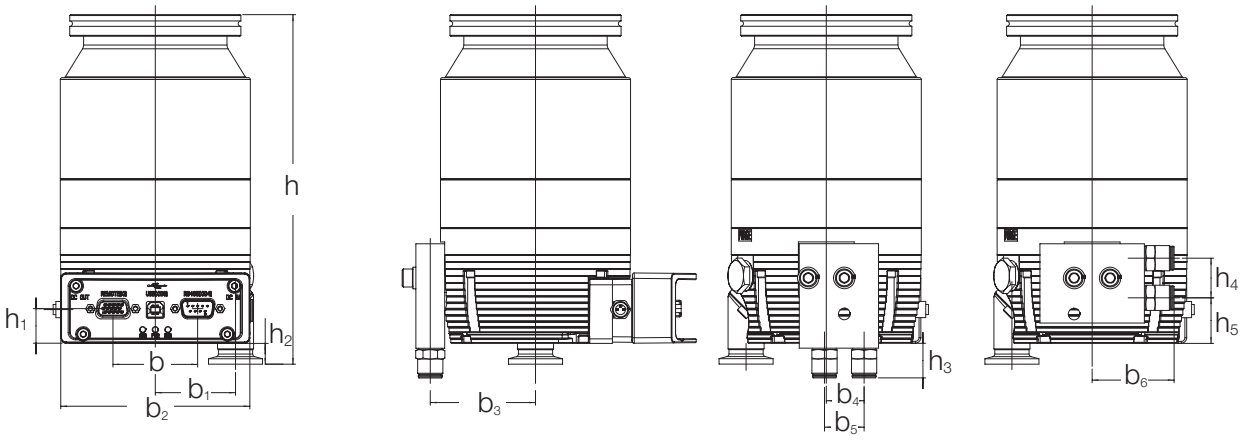
- Best performance and functionality for your money
- Maximum user flexibility for easy system integration, operation and control
- Highest productivity and system uptime at lowest CoO (Cost of Ownership)
- Improved pump-down time and target pressures
- Superior pumping performance for light gases
- Down-sizing of vacuum system in terms of costs and dimensions (use of small forevacuum pumps)

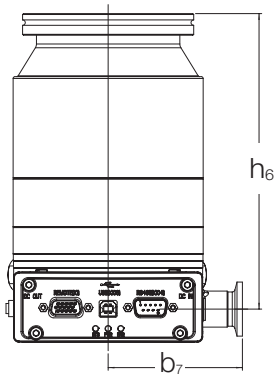
TURBOVAC iX

- Easy plug & play pump system control
- Avoid extra costs for separate pump system control units and cabling

TURBOVAC T i, T iX

- Suitable for demanding process applications and high throughput operation
- Fast cycle operation and pump down possible

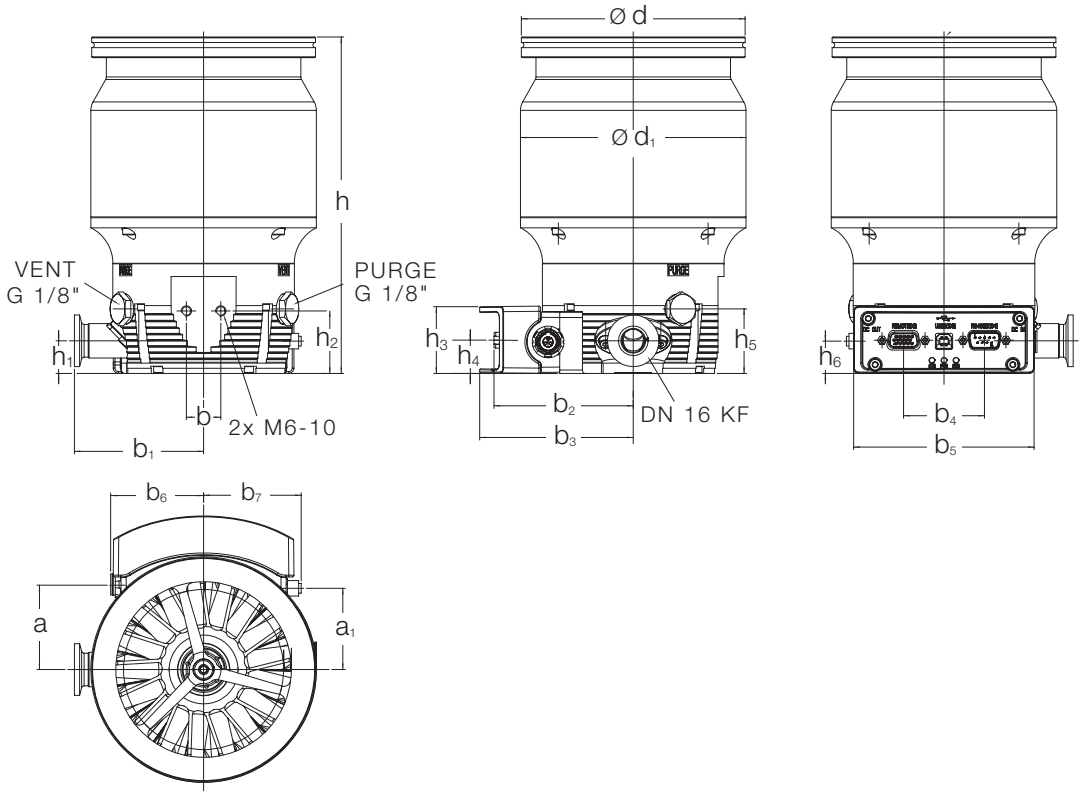




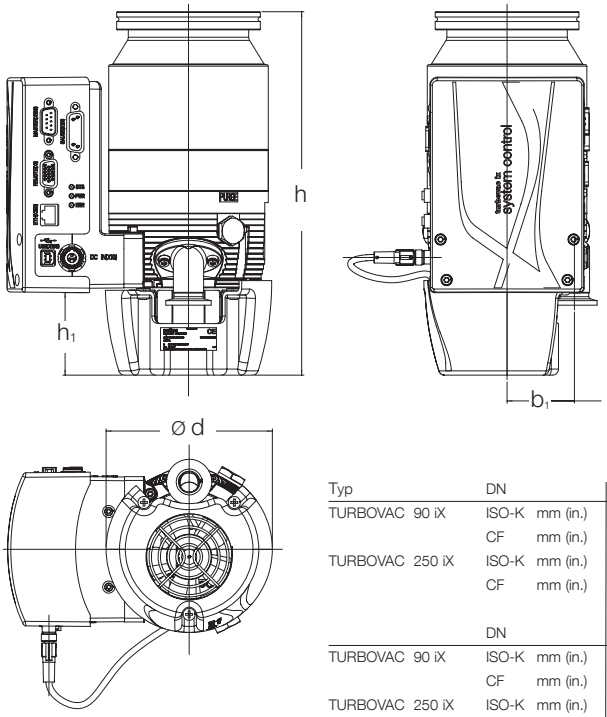
Typ	DN		a	a_1	b	b_1	b_2	b_3	b_4
TURBOVAC 90 i	ISO-K	mm (in.)	-	-	47 (1.85)	45 (1.77)	105 (4.13)	58 (2.28)	21 (0.83)
	CF	mm (in.)	-	-	47 (1.85)	45 (1.77)	105 (4.13)	58 (2.28)	21 (0.83)
TURBOVAC 250 i	ISO-K	mm (in.)	49 (1.93)	47 (1.85)	20 (0.79)	75 (2.95)	81 (3.19)	89 (3.50)	47 (1.85)
	CF	mm (in.)	49 (1.93)	-	20 (0.79)	75 (2.95)	81 (3.19)	89 (3.50)	47 (1.85)

	DN		b_5	b_6	b_7	d	d_1	h	h_1
TURBOVAC 90 i	ISO-K	mm (in.)	22 (0,87)	46 (1.81)	75 (2.95)	110 (4.33)	-	194 (7.64)	19 (0.75)
	CF	mm (in.)	22 (0,87)	46 (1.81)	75 (2.95)	110 (4.33)	-	194 (7.64)	19 (0.75)
TURBOVAC 250 i	ISO-K	mm (in.)	105 (4.13)	54 (2.13)	57 (2.24)	130 (5.12)	131 (5.16)	196 (7.32)	19 (0.75)
	CF	mm (in.)	105 (4.13)	54 (2.13)	52 (2.05)	151.5 (5.96)	131 (5.16)	205 (8.07)	19 (0.75)

	DN		h_2	h_3	h_4	h_5	h_6
TURBOVAC 90 i	ISO-K	mm (in.)	12 (0.47)	19 (0.75)	22 (0,87)	25 (0.98)	164 (6.46)
	CF	mm (in.)	12 (0.47)	19 (0.75)	22 (0,87)	25 (0.98)	164 (6.46)
TURBOVAC 250 i	ISO-K	mm (in.)	36 (1.41)	39 (1.54)	19 (0.75)	38 (1.50)	19 (0.75)
	CF	mm (in.)	36 (1.41)	39 (1.54)	19 (0.75)	38 (1.50)	19 (0.75)



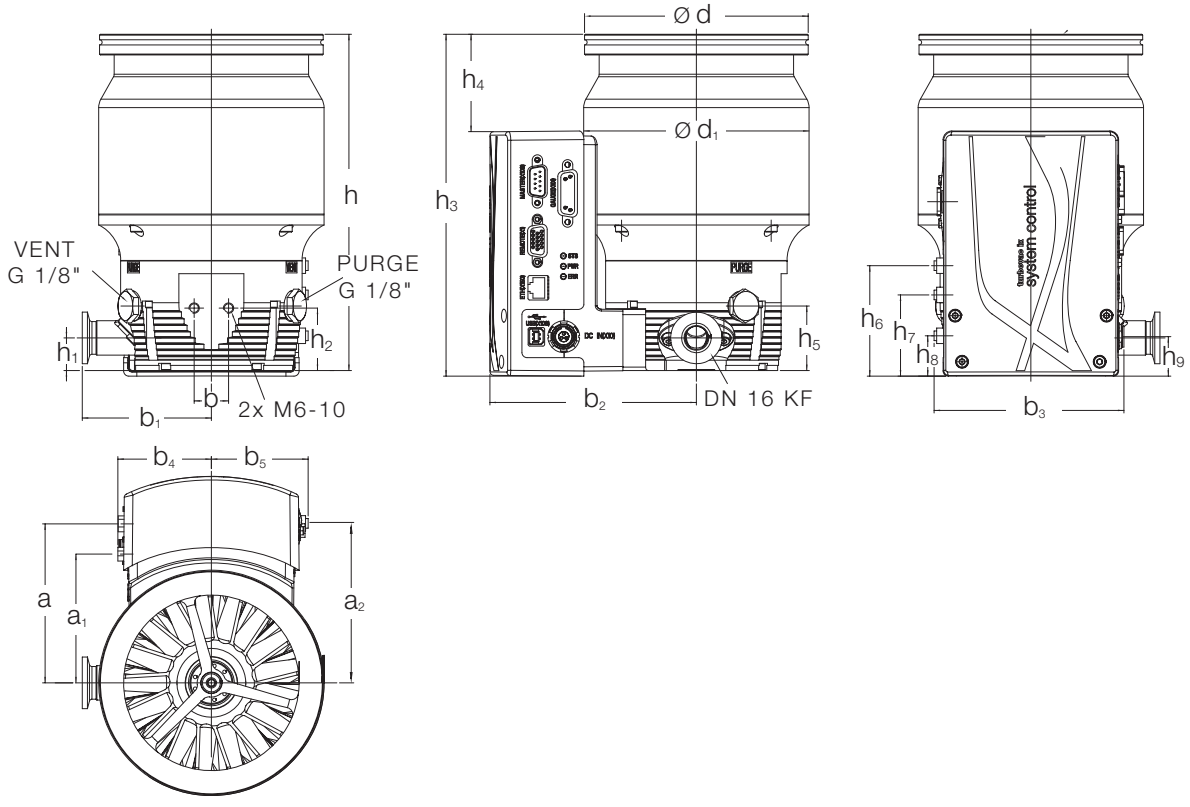
Dimensional drawing for the TURBOVAC pumps, 90 i top and 250 i bottom



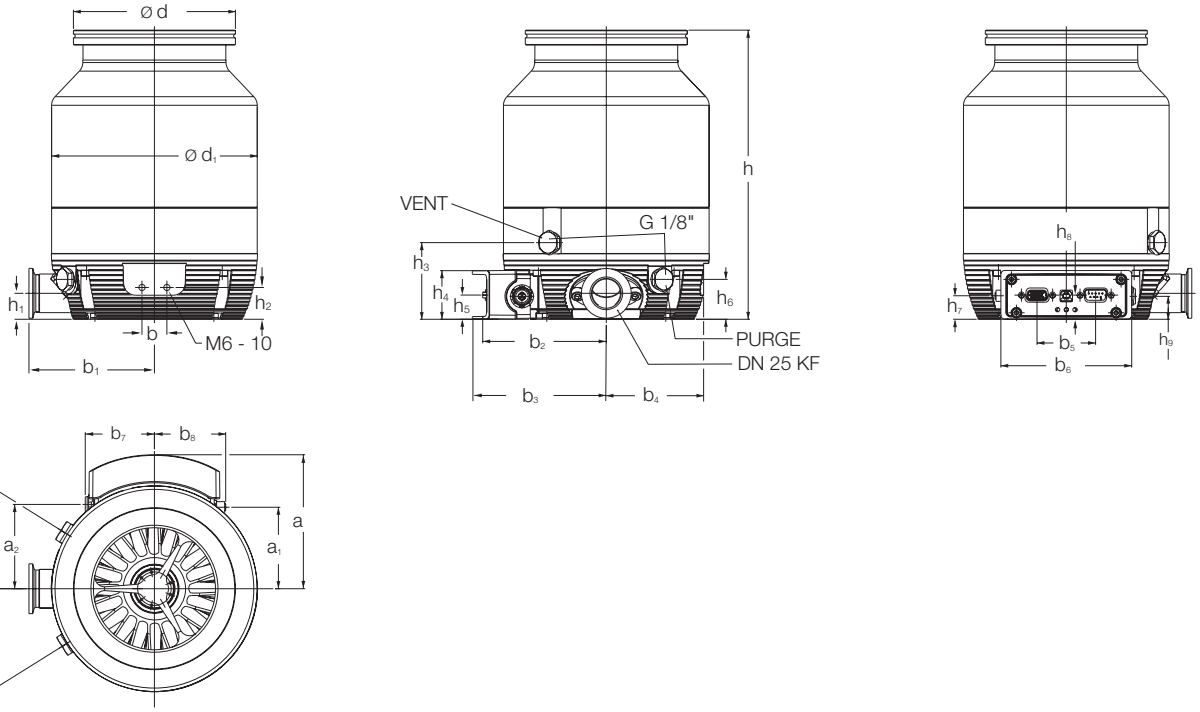
Typ	DN		a	a_1	a_2	b	b_1	b_2	b_3
TURBOVAC 90 iX	ISO-K	mm (in.)	-	-	-	-	45 (1.77)	-	-
	CF	mm (in.)	-	-	-	-	45 (1.77)	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	92 (3.62)	75 (295)	93 (3.66)	20 (0.79)	75 (2.95)	120 (4.72)	110 (4.33)
	CF	mm (in.)	92 (3.62)	75 (295)	93 (3.66)	20 (0.79)	75 (2.95)	120 (4.72)	110 (4.33)

Typ	DN		d	d_1	h	h_1	h_2	h_3	h_4
TURBOVAC 90 iX	ISO-K	mm (in.)	110 (4.33)	-	240 (9.45)	55 (2.16)	-	-	-
	CF	mm (in.)	110 (4.33)	-	240 (9.45)	55 (2.16)	-	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	130 (5.12)	131 (5.16)	196 (7.72)	19 (0.75)	36 (1.42)	199 (7.83)	57 (2.24)
	CF	mm (in.)	151,5 (5.96)	131 (5.16)	205 (8.07)	19 (0.75)	36 (1.42)	208 (8.19)	66 (2.60)

Typ	DN		h_5	h_6	h_7	h_8	h_9
TURBOVAC 90 iX	ISO-K	mm (in.)	-	-	-	-	-
	CF	mm (in.)	-	-	-	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	38 (1.50)	64 (2.52)	47 (1.85)	23 (0.91)	23 (0.91)
	CF	mm (in.)	38 (1.50)	64 (2.52)	47 (1.85)	23 (0.91)	23 (0.91)



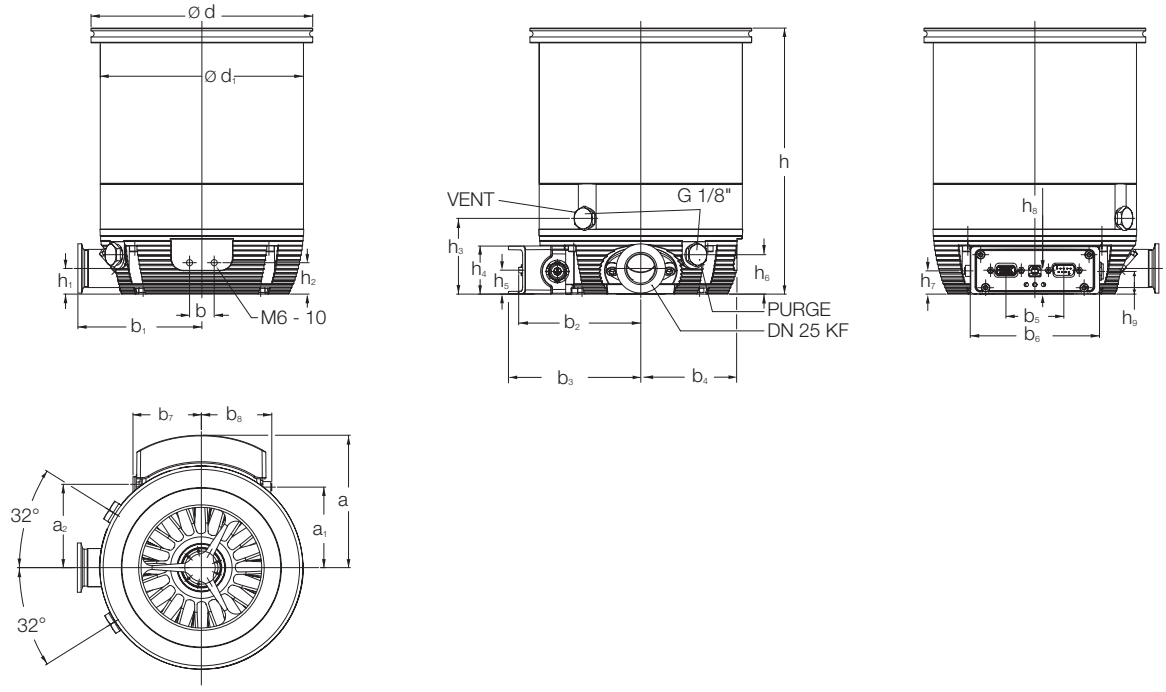
Dimensional drawing for the TURBOVAC pumps, 90 iX top and 250 iX bottom



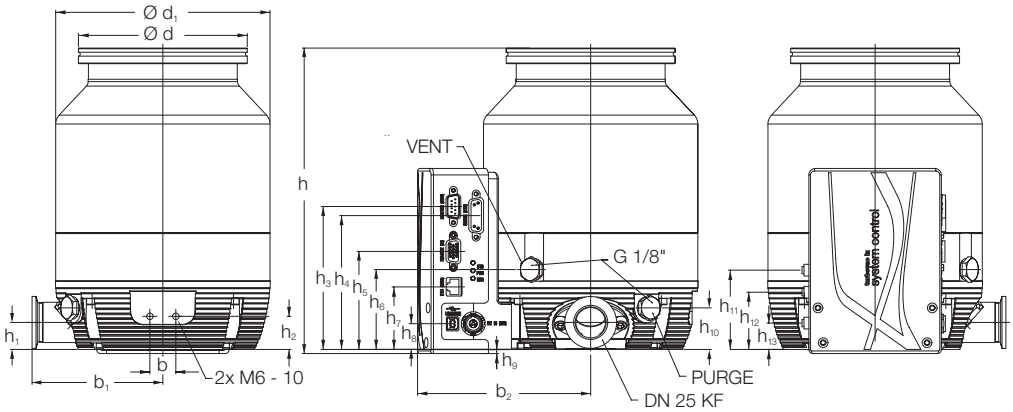
Type	DN		a	a_1	a_2	b	b_1	b_2	b_3	b_4
TURBOVAC (T) 350 i	ISO-K	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23)	78.1 (3.07)
	CF	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)
	CF	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)

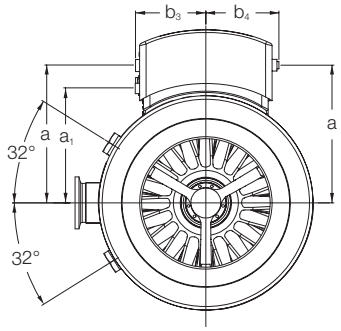
	DN		b_5	b_6	b_7	b_8	d	d_1	h	h_1
TURBOVAC (T) 350 i	ISO-K	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	130 (5.12)	165 (6.5)	232 (9.13)	20.8 (0.82)
	CF	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	180 (7.09)	165 (6.5)	245 (9.65)	20.8 (0.82)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	130 (5.12)	165 (6.5)	216 (8.5)	20.8 (0.82)
	CF	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	180 (7.09)	165 (6.5)	222 (8.74)	20.8 (0.82)

	DN		h_2	h_3	h_4	h_5	h_6	h_7	h_8	h_9
TURBOVAC (T) 350 i	ISO-K	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
	CF	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
	CF	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)



Dimensional drawing for the TURBOVAC (T) pumps, 350 i top and 450 i bottom

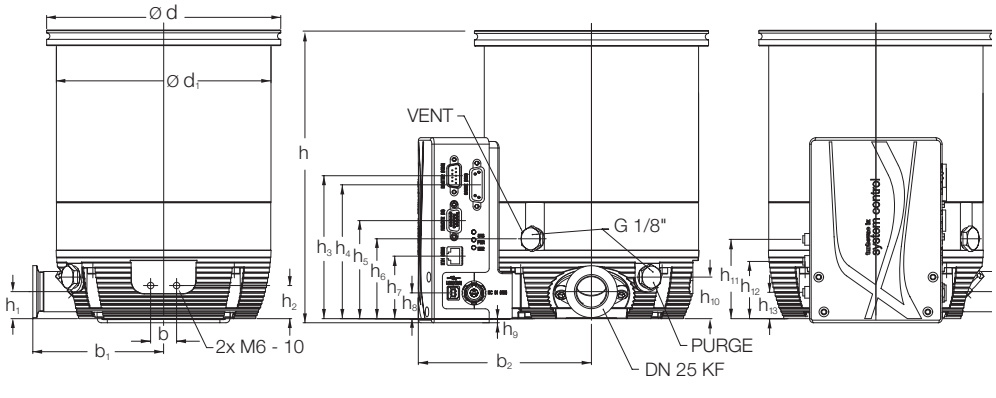


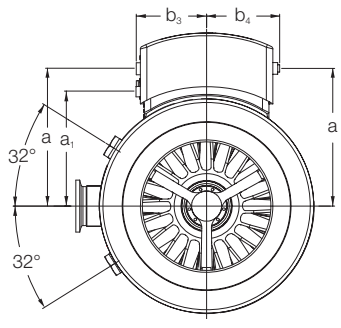


Type	DN		a	a_3	b	b_1	b_2	b_3	b_4
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
	CF	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
	CF	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)

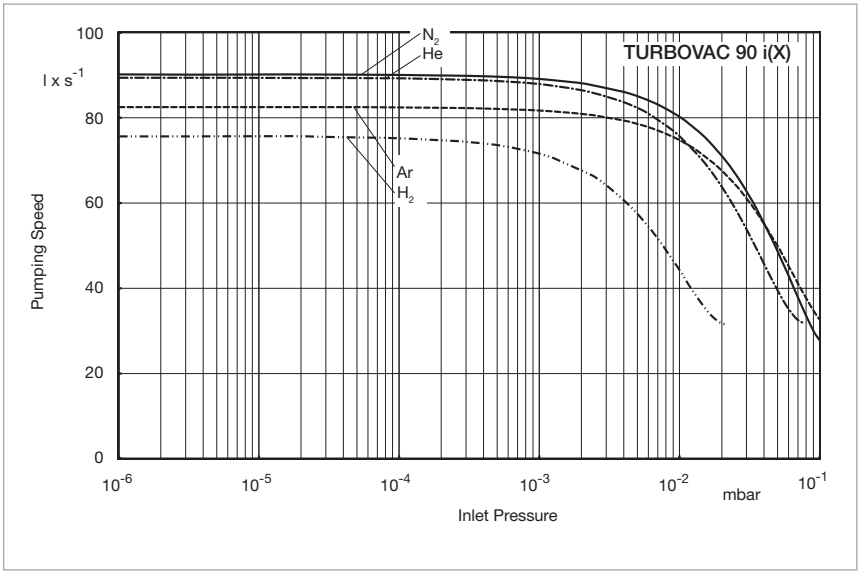
	DN		d	d_1	h	h_1	h_2	h_3	h_4	h_5
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	130 (5.12)	165 (6.5)	235 (9.25)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
	CF	mm (in.)	180 (7.09)	165 (6.5)	248 (9.76)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	130 (5.12)	165 (6.5)	219 (8.62)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
	CF	mm (in.)	180 (7.09)	165 (6.5)	225 (8.86)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)

	DN		h_6	h_7	h_8	h_9	h_{10}	h_{11}	h_{12}	h_{13}
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
	CF	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
	CF	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)

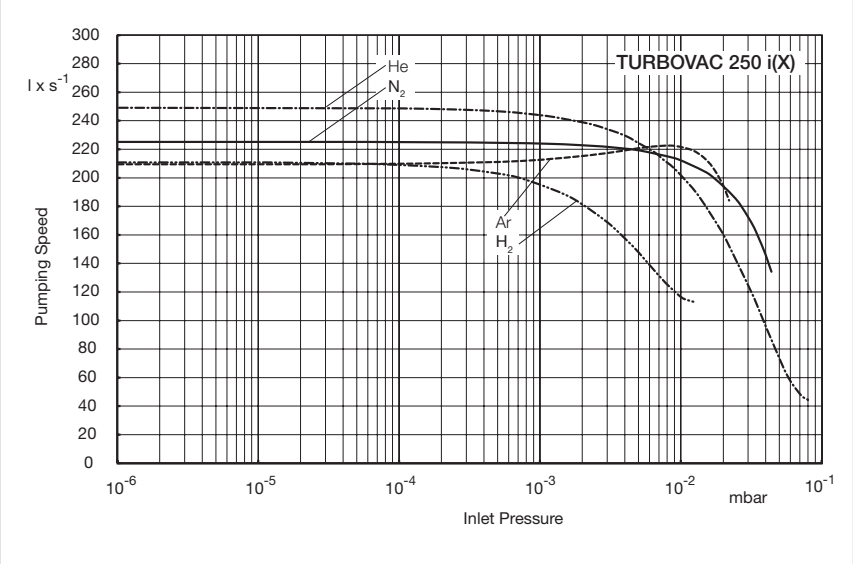




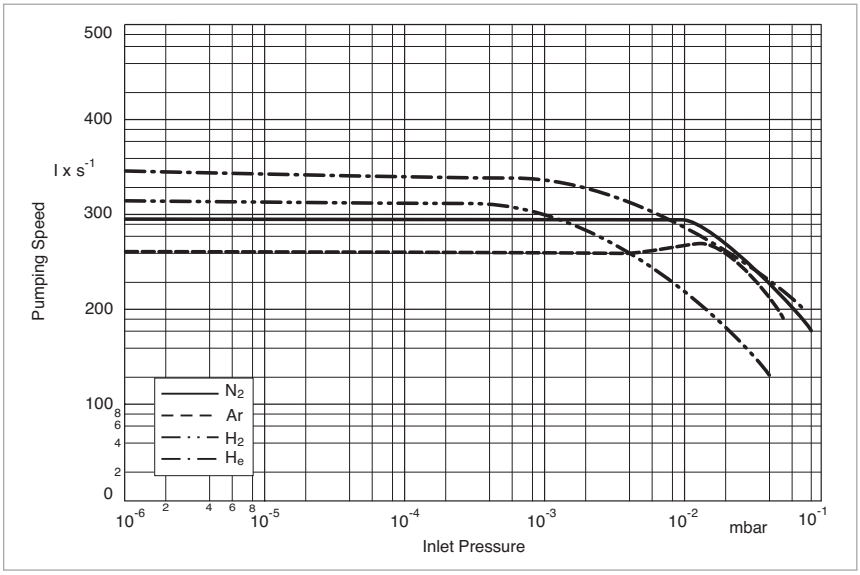
Dimensional drawing for the TURBOVAC (T) pumps, 350 iX top and 450 iX bottom



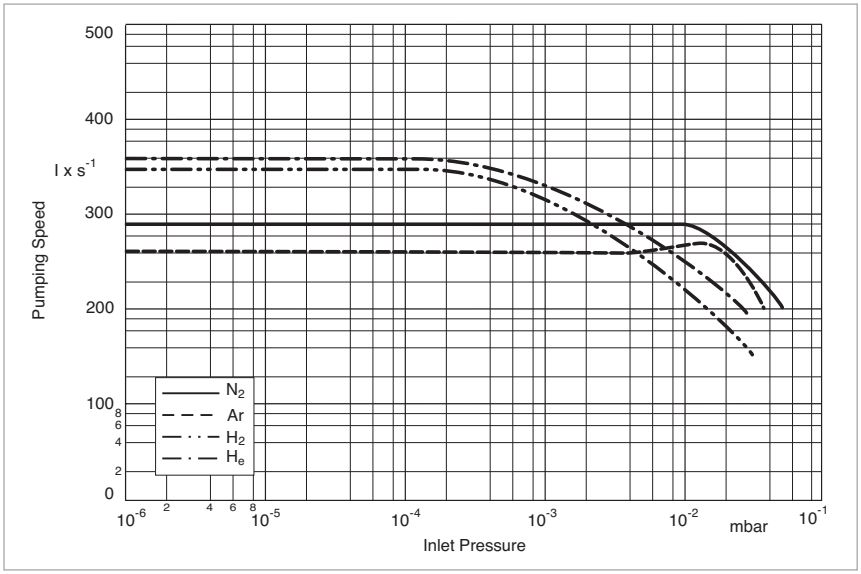
Pumping speed as a function of the inlet pressure for the TURBOVAC 90 i (DN 63 Flange)



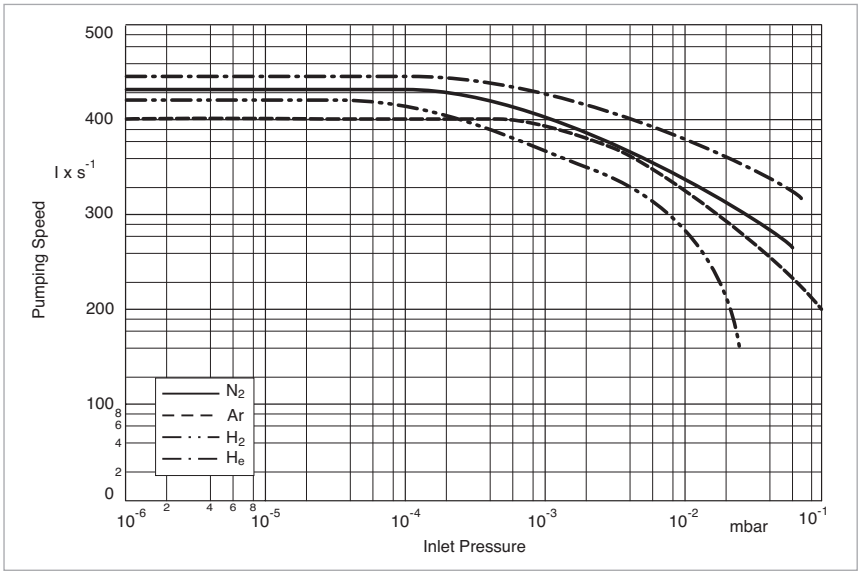
Pumping speed as a function of the inlet pressure for the TURBOVAC 250 i



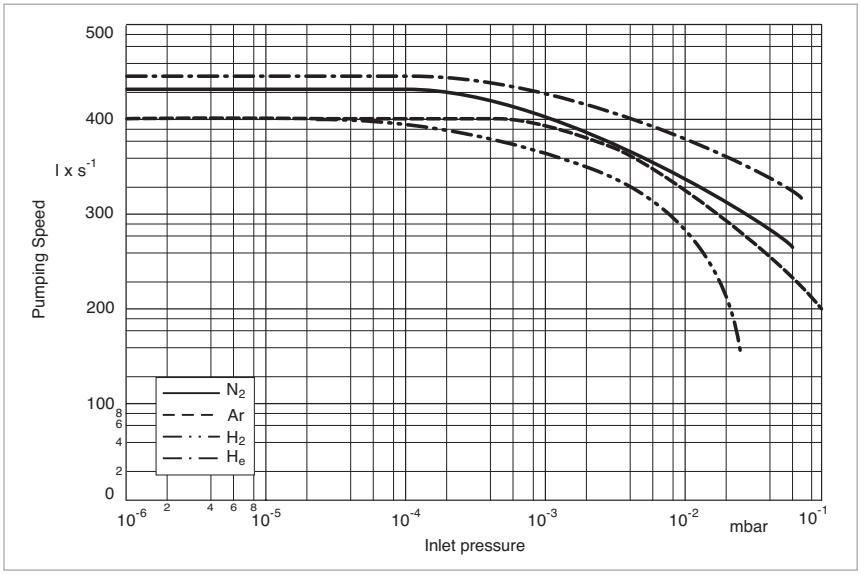
Pumping speed as a function of the inlet pressure for the TURBOVAC 350 i



Pumping speed as a function of the inlet pressure for the TURBOVAC T 350 i



Pumping speed as a function of the inlet pressure for the TURBOVAC 450 i



Pumping speed as a function of the inlet pressure for the TURBOVAC T 450 i

Technical Data

TURBOVAC

		90 i/iX	250 i/iX	350 i/iX	450 i/iX	T 350 i/iX	T 450 i/iX
High-vacuum connection	DN	63 ISO-K 63 CF	100 ISO-K 100 CF	100 ISO-K 100 CF	160 ISO-K 160 CF	100 ISO-K 100 CF	160 ISO-K 160 CF
Forevacuum connection	DN	16 ISO-KF	16 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF
Pumping speed							
N_2	l/s	90	225	290	430	290	430
Ar	l/s	83	210	260	400	260	400
He	l/s	90	250	360	440	360	440
H_2	l/s	78	210	350	420	320	400
Gas throughput							
N_2	mbar x l/s	10	6	4.5	4.5	11.5	115
Ar	mbar x l/s	3	3	2	2	6	6
He	mbar x l/s	11	6	8	8	20	20
H_2	mbar x l/s	11	>10	8	8	20	20
Compression ratio							
N_2		1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{10}	1×10^{10}
Ar		1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}
He		-	-	1×10^{8}	1×10^{8}	1×10^{6}	1×10^{6}
H_2		5×10^{7}	2×10^{7}	1×10^{6}	1×10^{6}	1×10^{4}	1×10^{4}
Ultimate pressure with 2-stage oil-sealed rotary vane vacuum pump ISO-K / CF flange	mbar (Torr)	$< 8 \times 10^{-8}$ / $< 5 \times 10^{-10}$ ($< 6 \times 10^{-8}$ / $< 3.75 \times 10^{-10}$)					
Max. forevacuum pressure N_2	mbar (Torr)	14 (10.5)	14 (10.5)	10 (7.5)	10 (7.5)	0.5 (0.375)	0.5 (0.375)
Recommended forevacuum pumps							
TRIVAC		D 2,5 E / D 4 B	D 2,5 E / D 4 B	D 4 B	D 4 B	D 16 B	D 16 B
SCROLLVAC		SC 5 D	SC 5 D / 15 D	SC 5 D / 15 D	SC 5 D / 15 D	SC 15 D / 30 D	SC 15 D / 30 D
DIVAC		1.4 HV3	3.8 HV3	3.8 HV3	3.8 HV3	–	–
Operating speed	min^{-1} (rpm)	72 000	72 000	60 000	60 000	60 000	60 000
Speed adjustment range	%	62 to 100	62 to 100	50 to 100	50 to 100	50 to 100	50 to 100
Run-up time, approx.	min	1.5	2	5.5	5.5	3.5	3.5
Ambient temperature							
during operation	°C	+5 to +45					
	(°F)	(+41 to +113)					
during storage	°C	-15 to -70					
	(°F)	(+5 to -94)					
Cooling							
standard		Convection					
optional		Air or water					
Cooling water connection		Plug connection for 6 x 1 hose					
alternatively		G 1/8" Screw-in thread					
Cooling water consumption	l/h	30 to 60	30 to 60	50 to 100	50 to 100	50 to 100	50 to 100
Permissible cooling water pressure	bar(g)	3 to 6					
Permissible cooling water temperature	°C	+15 to +35					
	(°F)	(+59 to +95)					
Noise level							
with convection cooling	db(A)	< 41	< 41	< 44	< 44	< 44	< 44
with radial cooler	db(A)	< 44	< 44	< 47	< 47	< 47	< 47
with axial cooler	db(A)	< 49	< 49	< 49	< 49	< 49	< 49

Additional Technical Data for the Frequency Converter (i Version)

		TURBOVAC					
		90 i	250 i	350 i	450 i	T 350 i	T 450 i
Technical Data for the integrated Drive Electronics							
Supply voltage	V DC	24/48 ±10%					
Max. current consumption	A	10 at 24 V DC					
Max. power consumption	W	240					
Power consumption at ultimate pressure	W	20					
Type of protection	IP	40					
Interfaces		RS 485, USB,					
Other interfaces		15-pin digital I/O Upon request					
Accessory connection		1 pcs. M 8 connector, 24 V DC					
Weight ISO-K / CF	kg (lbs)	3.1 / 4.8 (6.8 / 10.6)	4 / 6.6 (8.8 / 14.5)	7.5 / 11.5 (16.5 / 25.4)	7.7 / 12.5 (17.0 / 27.6)	7.0 / 11.0 (15.4 / 14.3)	7.2 / 12.0 (15.9 / 26.5)

Additional Technical Data for the Frequency Converter (iX-Version)

		TURBOVAC					
		90 iX	250 iX	350 iX	450 iX	T 350 iX	T 450 iX
Technical Data for the integrated Drive Electronics and Vacuum System Controller							
Supply voltage	V DC	24/48 ±10%					
Max. current consumption	A	10 at 24 V DC					
Max. power consumption	W	240					
Power consumption at ultimate pressure	W	20					
Type of protection	IP	40					
Interfaces		USB+,15 pin Standard, Anybus (either RS 485, RS 232, Profibus, ...)					
Accessory connections		3 pcs. M 8 connector, 24 V DC					
Max. load for the 24 V DC output (cooler or valve supply)	V / W	24 / max. 12					
Gauge head connection		15-way Sub-D					
Weight ISO-K / CF	kg (lbs)	3.6 / 5.3 (7.9 / 11.7)	4,5 / 7.1 (9.9 / 15.6)	8.0 / 12.0 (17.6 / 26.5)	8.2 / 13.0 (18.1 / 28.7)	7.5 / 11.5 (16.5 / 25.4)	7.7 / 12.5 (17.0 / 27.6)

Ordering Information

TURBOVAC

	Wide Range				Classic	
	90 i	250 i	350 i	450 i	T 350 i	T 450 i
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
TURBOVAC with integrated frequency converter, RS 485, USB+ and 15-Pin digital I/O interface						
DN 40 ISO-K	810011V1000	–	–	–	–	–
DN 63 ISO-K	810031V1000	–	–	–	–	–
DN 63 CF	810041V1000	–	–	–	–	–
DN 100 ISO-K	–	820051V1000	830051V1000	–	830050V1000	–
DN 100 CF	–	820061V1000	830061V1000	–	830060V1000	–
DN 160 ISO-K	–	–	–	830071V1000	–	830070V1000
DN 160 CF	–	–	–	830081V1000	–	830080V1000
other interfaces	Upon request					

	Wide Range				Classic	
	90 iX	250 iX	350 iX	450 iX	T 350 iX	T 450 iX
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
TURBOVAC with integrated frequency converter, and vacuum system controller, RS 485, USB+ and 15-Pin digital I/O interface						
DN 63 ISO-K	810031V3300	–	–	–	–	–
DN 63 CF	810041V3300	–	–	–	–	–
DN 100 ISO-K	–	820051V3300	830051V3300	–	830050V3300	–
DN 100 CF	–	820061V3300	830061V3300	–	830060V3000	–
DN 160 ISO-K	–	–	–	830071V3300	–	830070V3300
DN 160 CF	–	–	–	830081V3300	–	830080V3300
other interfaces	Upon request					

Included in the Delivery of the Pump

High and forevacuum flanges are protective-capped

The flange mounting components and the inlet screen are not included in the delivery

Ordering Information

TURBOVAC (T)

90 i, iX / 250 i, iX / 350 i, iX / 450 i, iX

Mandatory Accessories P PS	Part No.
Power supply TURBO.POWER integra, including 0.3 (1.1 ft) long cable	800100V0003
Mains cable, 3 m (10.5 ft)	
EU plug	800102V0002
UK plug	800102V0003
US plug 5-15P, 115 V	800102V1002
Cable pump – TURBO.POWER integra	
1 m (3.5 ft)	800096V0100
3 m (10.5 ft)	800096V0300
5 m (17.5 ft)	800096V0500
Mounting kit TURBOVAC	
DN 63 ISO-K	800134V0010
DN 100 ISO-K	800134V0020
DN 160 ISO-K	800134V0030
DN 100 ISO-K to ISO-F	800134V0025
DN 160 ISO-K to ISO-F	800134V0035
DN 63 CF	800134V0011
DN 100 CF	800134V0021
DN 160 CF	800134V0031

Forevacuum pumps TRIVAC D 4 B and TRIVAC D 16 B see Catalog Part “Oil Sealed Vacuum Pumps”

Forevacuum pumps SCROLLVAC 7 plus to SCROLLVAC 18 plus and DIVAC 3.8 HV3 see Catalog Part “Dry Compressing Vacuum Pumps”

Accessories, optional	Part No.
Power supply, cable, other accessories	
24VDC display unit TURBO.CONTROL i	800100V0004
Plug-in power supply 24 V/DC – TURBO.CONTROL i	800110V0027
Standard cable for communication – TURBO.CONTROL i	
USB cable 2.0 Type A/B, 1.8 m (5.9 ft)	800110V0108
RS485 cable, 5 m (16.4 ft)	800103V0029
RS485 cable, 1 m (3.3 ft)	800103V0027
Power supply and control unit TURBO.CONTROL 300	800100V0001
Cable pump – TURBO.CONTROL 300	
1 m (3.3 ft)	800092V0100
3 m (10.5 ft)	800092V0300
5 m (16.4 ft	800092V0500
Extension cable - only in combination with connecting cable 1m (3.5 ft)	
10 m (35 ft)	800092V1000
20 m (70 ft)	800092V2000
24/48 V DCIn plug TURBOVAC	800090V0000
USB-Kabel 2.0, Typ A/B, 1.8 m (5.9 ft) long	800110V0108
Y cable M 8	800110V0020
Relaybox for forevacuum pump, 1-phase, 10 A	800110V0030
Start stop switch	800110V0021
Cooling	
Air cooler	
TURBOVAC 90 i(X)	
radial	800136V0007
axial	800136V0008
TURBOVAC 250 i(X)	
radial	800136V0009
axial	800136V0008
TURBOVAC 350/450 i(X)	
radial	800136V0005
axial	800136V0006
Water cooling TURBOVAC i(X), connection thread G 1/8”	800135V0005
Water cooling TURBOVAC i(X), connection thread G 1/4”	800135V0006
Venting and purge gas	
Venting valve, 24 V DC, G 1/8"	800120V0012
Power failure venting valve, 24 V DC, G 1/8"	800120V0022
Purge gas valve, 24 V DC, G 1/8", 24 sccm	800120V0013
Purge gas throttle, 24 sccm	800120V0014
Air filter, G 1/8"	800110V0022
Heating	
Flange heater (needs mains cable, see above)	
DN 63 CF, 230 V	800137V0003
DN 63 CF, 115 V	800137V0004
DN 100 CF, 230 V	800137V0005
DN 100 CF, 115 V	800137V0006
DN 160 CF, 230 V	800137V0007
DN 160 CF, 115 V	800137V0008
Installation	
Vibration absorber	
DN 100 ISO-K	800131V1100
DN 160 ISO-K	500073
DN 100 CF	500071
DN 160 CF	500072
Centering ring	
with fine inlet screen, 0.8 mm (0.03") mesh	
DN 63 ISO-K/F	800133V0012
DN 100 ISO-K/F	800133V0022
DN 160 ISO-K/F	800133V0032
with coarse inlet screen, 3.2 mm (0.13") mesh	
DN 63 ISO-K/F	800133V0011
DN 100 ISO-K/F	800133V0021
DN 160 ISO-K/F	800133V0031
Fine Inlet screen, 0.8 mm (0.03") mesh	
DN 63 CF	800132V0012
DN 100 CF	800132V0022
DN 160 CF	800132V0032
Coarse inlet screen, 3.2 mm (0.13") mesh	
DN 63 CF	800132V0011
DN 100 CF	800132V0021
DN 160 CF	800132V0031