A4 Series

Energy-efficient dry multi-stage Roots process pumps for all semiconductor and coating applications.

PFEIFFER VACUUM

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Full range of green dry process pumps for harsh duty applications from 100 to 3,000 m^3/h

Harsh duty processes in semiconductor production always provide new challenges for vacuum pumps. Based on the proven and energy efficient multi-stage Roots technology, the A4 series offers a wide range of dry pump solutions, with different pumping speeds from 100 to 3,000 m^3/h.
The new A 3004 pump extends the range as the high capacity solution for emerging deposition or etch applications.
New XN models feature Pfeiffer Vacuum' advanced materials for full corrosion resistance. Additionally, new integrated options are available, increasing pump health monitoring capabilities or extending pump service intervals. With an extended process lifetime – associated with a low power consumption – the A4 series pumps are counted among those with the lowest cost of ownership in the market.

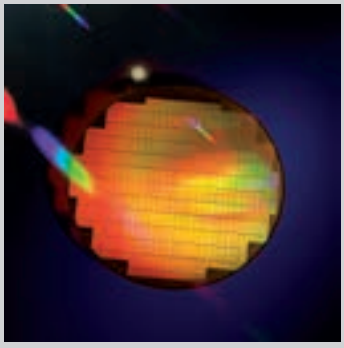
A 3004: The energy saver Highest performance at the lowest operating cost of its class

The A 3004 pump sets a new standard in the 3,000 m^3/h pumping speed category. Its optimized construction provides the best compression ratio under process flow operation, resulting in the lowest power consumption on the market. Additionally, the A 3004 features the highest pumping capacity above 30 slm inlet flow, providing a wider process window and margin even on the most advanced CVD applications.

Extended operating temperature range

The pumps are equipped with an extended temperature management covering low and high operating temperature to prevent by-product deposition or cracking within the pumping stages. Associated with high temperature precision bearings, this results in enhanced process reliability.

Applications



Semi wafer

Display

Solar cells

Customer benefits

- High energy efficiency thanks to multi-stage Roots technology, high efficiency motors and limited use of electrical heaters
- Wide operating temperature range protects the pump against precursor cracking or condensable deposition
- Full corrosion resistant materials for increased lifetime
- High MTBF and low cost of ownership
- High particle tolerance increases tool uptime
- Extended monitoring functionalities provide better control of pump conditions (water sensor, vibration box)
- Integrated hot N_2 injection prevents exhaust clogging
- IP33, Semi S2 and UL compliant

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Full corrosion resistance

Launched several years ago, the A4X models use special materials to protect the rotors of the primary pumps from corrosion. This solution has already proven its efficiency in the field, greatly increasing pump lifetime.
However, some applications such as conductor etch require high temperature operation to prevent deposition inside the pumps, further increasing the corrosion rate. For these most demanding applications, the XN coating technology has been developed, protecting all parts in contact with corrosive gas. Using XN technology, the pump lifetime has drastically improved – up to a factor 5 on some processes. This makes these dry pumps the optimum choice for the most corrosive CVD and etch processes.

Intelligent

Equipped with a sophisticated monitoring system, the A4 series includes new functionalities to improve trouble shooting and monitor pump health in real time.
A new optional water sensor detects the presence of water in the pump enclosure that may occur during pump lifetime, increasing safety of sub Fab operations.
The new optional V-Box features dry pump vibration monitoring in real time. Correlated with other pump parameters, V-Box allows the detection of abnormal pump behavior.
We can reduce the risk of exhaust line clogging and increase dilution below LEL on applications using flammable gas with our new I-HN option that features an integrated hot N_2 injection at the pump exhaust. Compared to conventional external systems installed on exhaust lines, I-HN is a zero footprint solution at lower operating costs.
Idle modes is also available, reducing N_2 purge and/or power consumption up to 35 % meaning operating costs are dramatically reduced.

Low maintenance

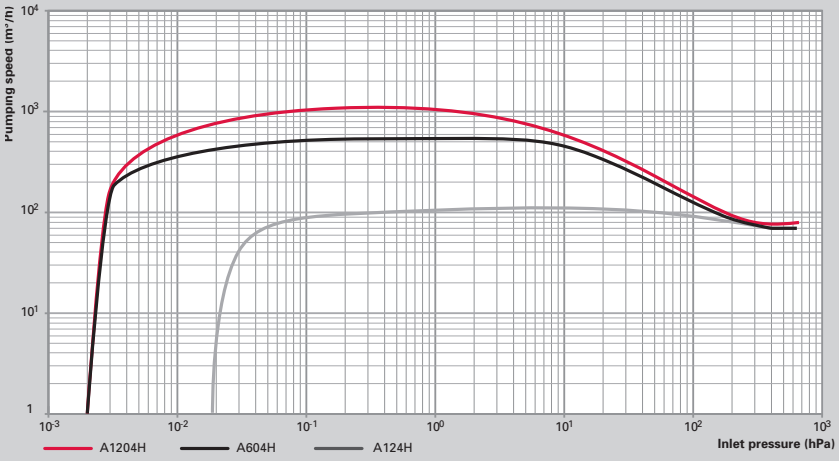
Through the improved particle tolerance, corrosion and condensation resistance, lifetime of the pumps is extended. Additionally, the XN technology drastically increases maintenance intervals, which means an additional reduction of operating costs. There is no required on-site routine maintenance.

A4 Series

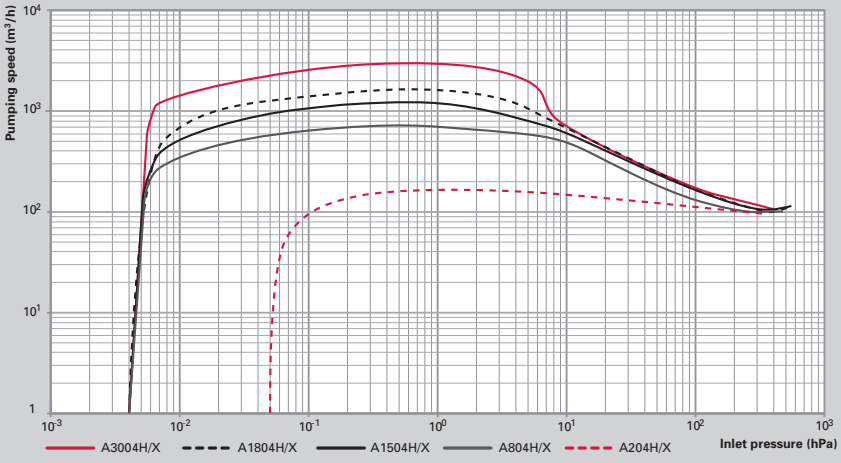
Pumping speed

Pumping speed

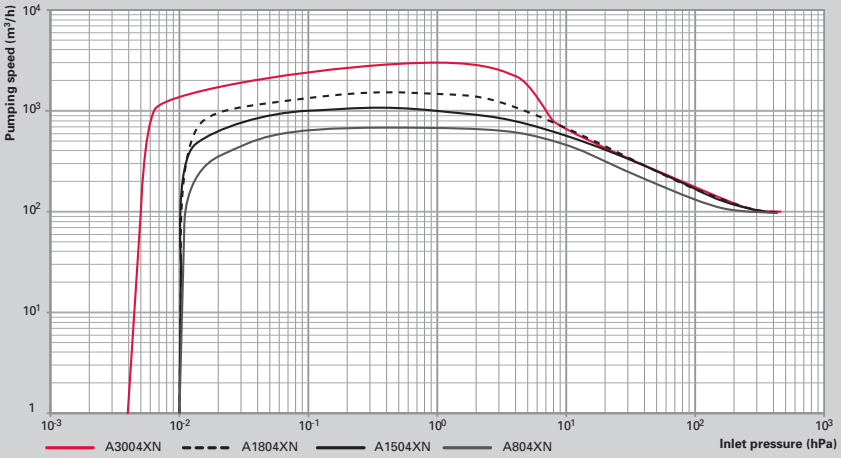
A 124 H, A 604 H, A 1204 H
For non-critical applications



A 204 H/X, A 804 H/X,
A 1504 H/X, A 1804 H/X,
A 3004 H/X
For harsh applications



A 804 XN, A 1504 XN,
A 1804 XN, A 3004 XN
For very corrosive
applications

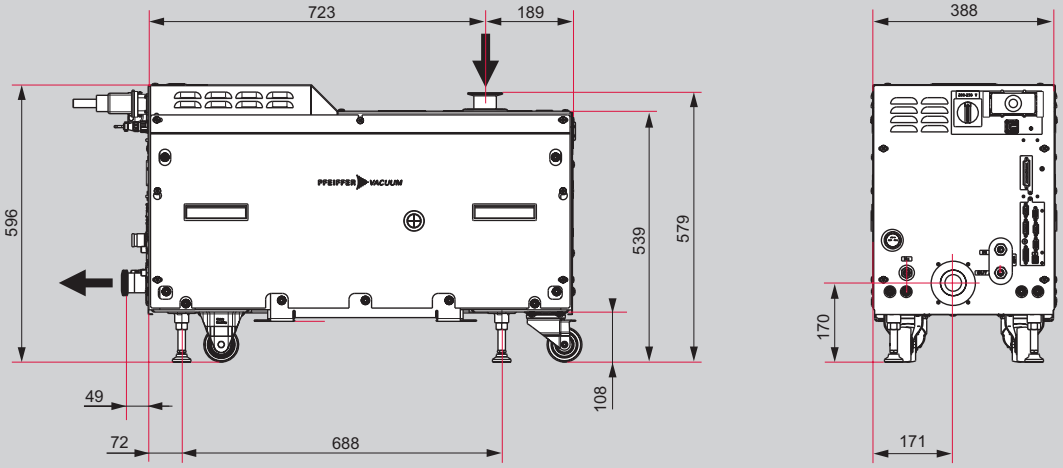


A4 Series

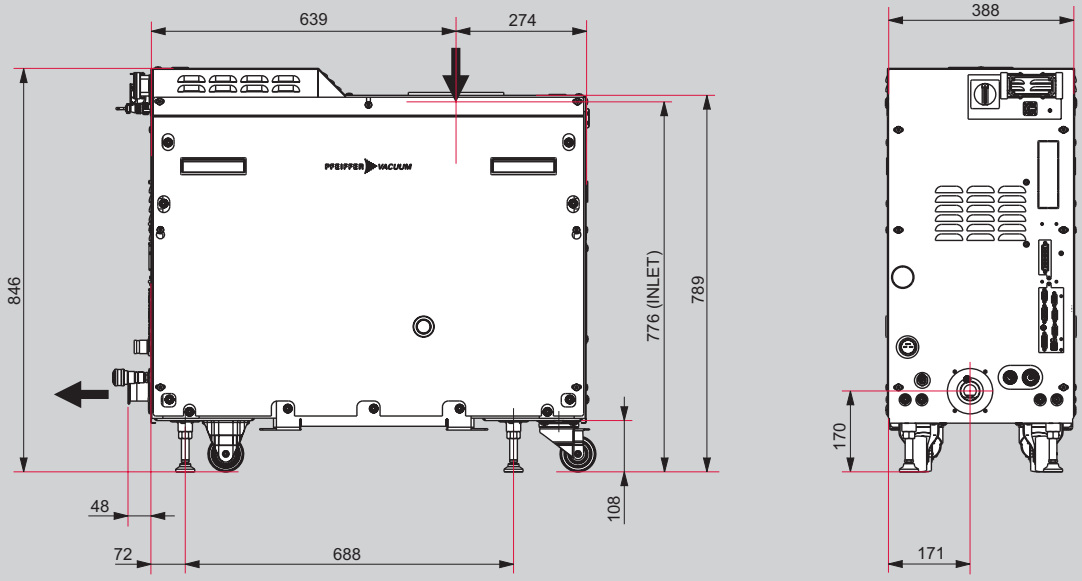
Dimensions

Dimensions

A 124 H
A 204 H/X

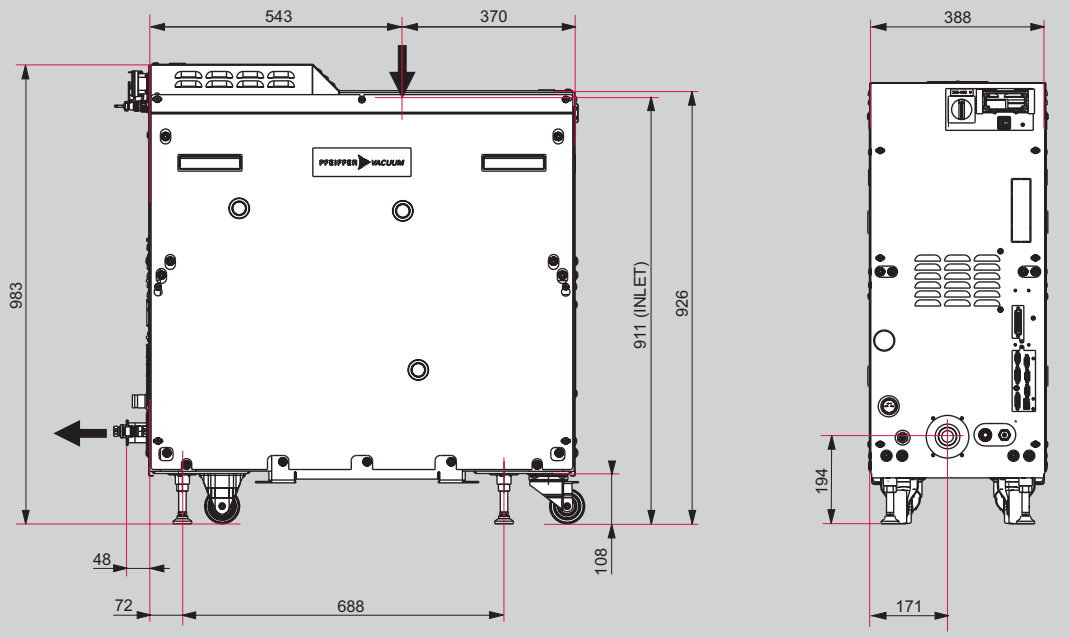


A 604 H
A 804 H/X/XN

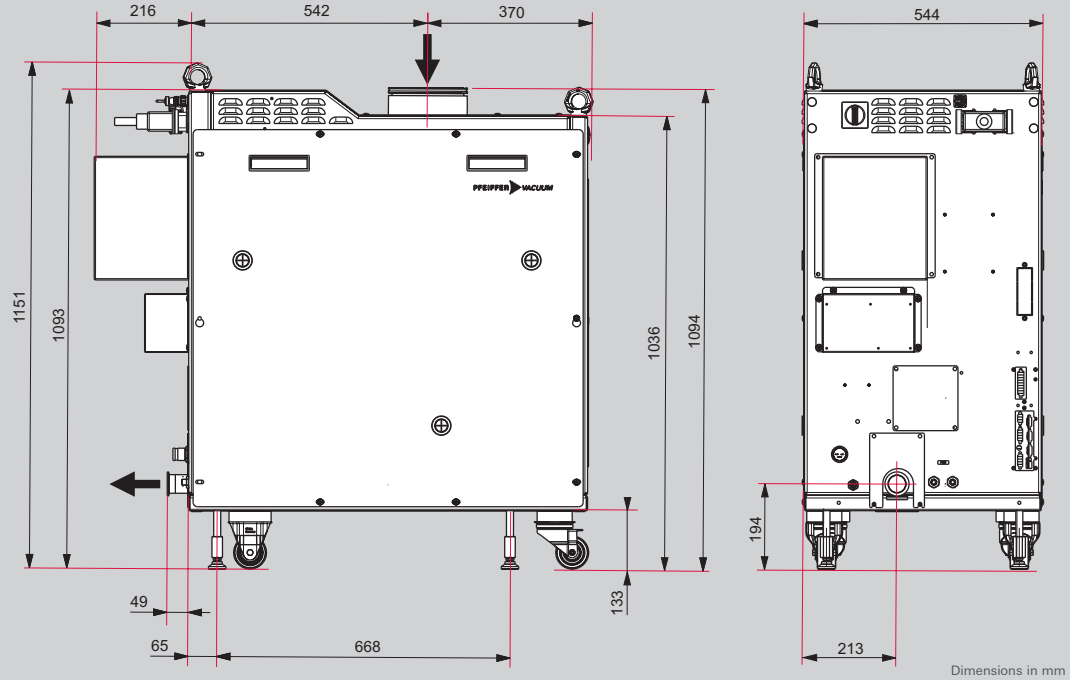


Dimensions in mm

A 1204 H
A 1504 H/X/XN
A 1804 H/X/XN



A 3004 H/X/XN



Dimensions in mm

A4 Series

Technical data

Technical data

Characteristics		Units	A124H	A204H / A204X
Maximum peak pumping speed N_2 at 50 Hz		m^3/h	95	130
Maximum peak pumping speed N_2 at 60 Hz		m^3/h	110	160
Maximum ultimate pressure (No Purge) at 50 Hz		hPa	$5 \cdot 10^{-2}$	$2 \cdot 10^{-1}$
Maximum ultimate pressure (No Purge) at 60 Hz		hPa	$2 \cdot 10^{-2}$	$5 \cdot 10^{-2}$
Maximum ultimate pressure (50 SLM Purge) at 50 Hz		hPa	$3 \cdot 10^{-1}$	$7 \cdot 10^{-1}$
Maximum ultimate pressure (50 SLM Purge) at 60 Hz		hPa	$1 \cdot 10^{-1}$	$2 \cdot 10^{-1}$
Maximum continuous inlet flow at full rotational speed		slm	80	150
Power supply		V		
Power consumption at ultimate pressure, no exhaust heater at 50 Hz		kW	1.3	1.6
Power consumption at ultimate pressure, no exhaust heater at 60 Hz		kW	1.5	1.8
Maximum exhaust overpressure		hPa		
Cooling water flow[1)]		l/mn	2.3–3	2.3–4
Cooling water temperature[1)]		°C		
Water connect				
N_2 purge flow		Slm		
Operating temperature		°C		
Inlet flange		ISO-K	DN 50	DN 50
Exhaust flange		ISO-KF		
Dimensions	Length (to exhaust flange)	mm	961	961
	Width	mm	388	388
	Height (to inlet flange)	mm	579	579
Weight		kg	240	250
Maximum vibration level at pump inlet flange		g / mm/s		
Maximum noise level (at ultimate pressure)		dB(A)	< 65	< 68

[1)] Subject to pump T° setting

Characteristics	Units	A804 XN[2)]	A1504 XN	A1804 XN	A3004 XN[2)]
Maximum peak pumping speed N_2 at 60 Hz	m^3/h	600	1.100	1.600	2.900
Maximum ultimate pressure (No Purge) at 60 Hz	hPa	$1.45 \cdot 10^{-2}$	$1.45 \cdot 10^{-2}$	$1.45 \cdot 10^{-2}$	$4 \cdot 10^{-3}$
Maximum ultimate pressure (50 SLM Purge) at 60 Hz	hPa	$2.4 \cdot 10^{-2}$	$2.4 \cdot 10^{-2}$	$2.4 \cdot 10^{-2}$	$9 \cdot 10^{-3}$
Maximum continuous inlet flow at full rotational speed	slm	75	75	55	75
Power supply	V	200–230 V / 380–480 V - 3 phases ± 10%–50/60 Hz			
Power consumption at ultimate pressure, no exhaust heater at 60 Hz	kW	2.4	2.7	2.8	2.7
Maximum exhaust overpressure	hPa	1200			
Cooling water flow[3)]	l/mn	2.5 - 5	2.5 - 5	2.5 - 5	2.5 - 5
Cooling water temperature[3)]	°C	10 to 35			
Water connect		1/4 or 3/8 NPT			
N_2 purge flow	slm	10 to 120			
Operating temperature	°C	5 to 40			
Inlet flange	ISO-K	DN 100	DN 160	DN 160	DN 160
Exhaust flange	ISO-KF	DN 40			
Dimensions Length (to exhaust flange)	mm	961	961	961	961
Width	mm	388	388	388	544
Height (to inlet flange)	mm	776	911	911	1094
Weight	kg	380	540	540	800
Maximum vibration level at pump inlet flange	g / mm/s	< 0.1 / 1.5			
Maximum noise level (at ultimate pressure)	dB(A)	< 68	< 69	< 69	< 72

[2)] Provisional
[3)] Subject to pump T° setting

A604H	A804H / A804X	A1204H	A1504H / A1504X	A1804H / A1804X	A3004H / A3004X
480	600	1.050	1.100	1.650	–
560	700	1.150	1.200	1.700	3.000
$3 \cdot 10^{-3}$	$8 \cdot 10^{-3}$	$3 \cdot 10^{-3}$	$8 \cdot 10^{-3}$	$8 \cdot 10^{-3}$	–
$2 \cdot 10^{-3}$	$4 \cdot 10^{-3}$	$2 \cdot 10^{-3}$	$4 \cdot 10^{-3}$	$4 \cdot 10^{-3}$	$4 \cdot 10^{-3}$
$1 \cdot 10^{-2}$	$2 \cdot 10^{-2}$	$1 \cdot 10^{-2}$	$2 \cdot 10^{-2}$	$2 \cdot 10^{-2}$	–
$6 \cdot 10^{-3}$	$9 \cdot 10^{-3}$	$6 \cdot 10^{-3}$	$9 \cdot 10^{-3}$	$9 \cdot 10^{-3}$	$9 \cdot 10^{-3}$
60	100	55	100	70	100
200–230 V / 380–480 V–3 phases ± 10%–50/60 Hz					
1.8	2.1	2.1	2.4	2.4	–
2.0	2.3	2.3	2.6	2.6	2.6
1200					
2.5–4	2.5–5	2.5–4	2.5–5	2.5–5	2.5–5
10 to 35					
1/4 or 3/8 NPT					
10 to 120					
5 to 40					
DN 100	DN 100	DN 160	DN 160	DN 160	DN 160
DN 40					
961	961	961	961	961	961
388	388	388	388	388	544
776	776	911	911	911	1094
370	380	530	540	540	800
< 0.1 / 1.5					
< 68	< 68	< 69	< 69	< 69	< 72

A4 Series

Order number guide and matrix

Order number guide A4 series

F4	a	b	c	C	e	f	g	h	1	j	k	l	m
Product range	Version	Pump model	Application[1]	Reserved	Functional block temperature management	Roots blower temperature management	Voltage	Water / N_2 connection	Reserved	Inlet flange connection	Rootsblower by-pass	N_2 purge line	Options[2]
F4	H or X	A	4	C	S	0	1, 6	2, 6	1	1	0	1	0, 2
		A	7	C	S, L	0	1, 6	2,6	1	1	0	1	0, 2
		B	4	C	S	S	1, 6	2,6	1	0, 2	1	1	0, 2, 3, A
		B	7	C	S, L	S	1, 6	2,6	1	0, 2	1	1	0, 2, 3, A
		C	4	C	S	S	1, 6	2,6	1	0, 2, 3	1	1	0, 2, 3, A
		C	7	C	S, L	S, L, H	1, 6	2,6	1	0, 2, 3	1	1	0, 2, 3, A
		D	4	C	S	S	1, 6	2,6	1	0, 2, 3	1	1	0, 2, 3, A
		D	7	C	S, L	S, L, H	1, 6	2,6	1	0, 2, 3	1	1	0, 2, 3, A
		I	4	C	S	S, H	1, 6	2,6	1	2, 3	1	1	0, 3, A
		I	7	C	L	S, L	1, 6	2,6	1	2, 3	1	1	0, 3, A
		I	7	C	S	S, H	1, 6	2,6	1	2, 3	1	1	0, 3, A
	N	B	4	C	S	S	1, 6	2, 6	1	0, 2	1	4	0, 2, 3, A
		B	7	C	S	S	1, 6	2, 6	1	0, 2	1	4	0, 2, 3, A
		C	4	C	S	S, H	1, 6	2, 6	1	0, 2, 3	1	4	0, 2, 3, A
		C	7	C	S	S, H	1, 6	2, 6	1	0, 2, 3	1	4	0, 2, 3, A
		D	4	C	S	S, H	1, 6	2, 6	1	0, 2, 3	1	4	0, 2, 3, A
		D	7	C	S	S, H	1, 6	2, 6	1	0, 2, 3	1	4	0, 2, 3, A
		I	4	C	S	S, L, H	1, 6	2, 6	1	2, 3	1	1, 4	0, 3, A
		I	7	C	S	S, L, H	1, 6	2, 6	1	2, 3	1	1, 4	0, 3, A
	H	E	4	C	L	0	1, 6	2, 6	1	1	0	1	0
		E	7	C	L	0	1, 6	2, 6	1	1	0	1	0
		F	4	C	L	S	1, 6	2, 6	1	0, 2	1	1	0, 3
		F	7	C	L	S	1, 6	2, 6	1	0, 2	1	1	0, 3
		G	7	C	L	S, H	1, 6	2, 6	1	0, 2, 3	1	1	0, 2, 3

Order number matrix
A4 series

Order number F4 a b c C e f g h 1 j k l m

Version	a
Harsh	H
Corrosive	X
Very corrosive – Full Ni coated	N

Pump model	b
A 204	A
A 804	B
A 1504	C
A 1804	D
A 124	E
A 604	F
A 1204	G
A 3004	I

Application[1)]	c
Large volume[1)]	4
Standard	7

Functional block temperature management	e
Standard version	S
Cold version	L

Roots blower temperature management	f
Standard version	S
Cold version	L
Hot version	H
NA (no Roots)	0

Voltage	g
Low voltage 60 Hz	1
High voltage 60 Hz	6

Water / N_2 connection	h
FSS QC 1/4" NPT / QC 1/8 NPT	2
FSS QC 3/8" NPT / QC 1/8 NPT	6

Inlet flange connection	j
Without	0
DN 50 ISO-KF	1
DN 100 ISO-KF	2
DN 160 ISO-KF	3

Roots blower by-pass	k
NA (no Roots)	0
With standard by-pass	1

N_2 purge line	l
H line	1
XN line	4

Options[2)]	m
Standard	0
Water sensor	2
I-HN	3
V-Box	A

[1)] Large volume version: A 124 and A 604: max. 5 m^3 chamber volume. A 204, A 804, A 1504, A1804, A 3004: max. 50 m^3 chamber volume
[2)] I-HN option requires specific exhaust line configuration – Please consult Pfeiffer Vacuum SAS, France

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