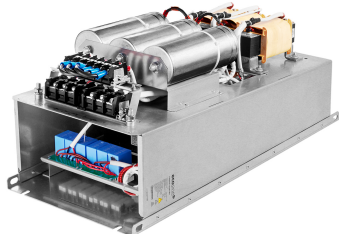


Ecosine evo, 50 Hz Passive Harmonic Filters



- The industry standard for 6-pulse rectifier and motor drives
- Filters for diode rectifier without DC-link choke and thyristor rectifier
- Best-in-class partial load performance
- Most compact design
- Plug and play, ready to use



Approvals & Compliances



(depending on filter configuration)

UL pending for 250 kW types

Features and benefits

Schaffner ecosine harmonic filters represent an economical solution to the challenge of load-applied harmonics mitigation in three-phase power systems. With a plug-and-play approach and more compact dimensions than comparable products, they can be quickly installed and easily commissioned. They increase the reliability and service life of electric installations, help utilize electric system capacity better, and are the key to meet Power Quality standards such as IEEE 519. Ecosine filters reshape your distorted current back to the desired sinusoidal waveform. Schaffner ecosine filters can be applied to virtually any kind of power electronics with front-end six-pulse rectifiers, 3-phase diode or thyristor bridges, where harmonic current distortion needs to be reduced to defined limits.

Typical applications

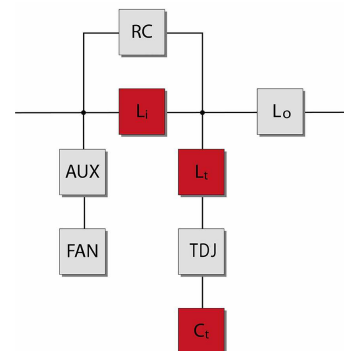
- Equipment with front-end six-pulse rectifier
- Motor drives
- Factory automation equipment
- Water/wastewater treatment facilities
- Fan and pump applications
- HVAC installations
- Mission-critical processes
- DC fast chargers

Technical specifications

Nominal operating voltage	3 x 380 VAC to 415 VAC ±10%
Operating frequency	50 Hz ±1 Hz
Nominal motor drive input power rating	1.1 to 250 kW
Total harmonic current distortion THID*	≤5% at rated power
Efficiency	>98% for rated voltage and power
High potential test voltage	P → E 2160 VAC (1 s)
Protection category	IP 00, IP 20
Cooling	Internal fan cooling or external cooling**
Overload capability	1.6x rated current for 1 minute, once per hour
Ambient temperature range	-25°C to +45°C fully operational +45°C to +70°C derated operation*** -25°C to +85°C transport and storage
Flammability corresponding to	UL 94 V-2
Design corresponding to	Filter: UL 61800-5-1, EN 61800-5-1 Chokes: EN 61558-2-20 or EN 60076-6
MTBF @ 45°C/415 V (Mil-HB-217F)	>200,000 hours
SCCR****	100 kA
Earthing System	TN, TT, IT
Overvoltage category	OV III (IEC 60664-1 / UL 61800-5-1)

* System requirements: THVD <2%, line voltage unbalance <1%
 Note: performance specifications in this brochure refer to six-pulse diode rectifiers. SCR rectifier front-ends will produce different results, dependent upon the firing angle of the thyristors. THID ~5% at rated power for filter <6 kW
 ** Please check the inlet air flow required for cooling table on page 6 of this document.
 *** $I_{derated} = I_{nominal} \cdot \sqrt{\frac{(T_{max} - T_{amb})}{(T_{max} - T_{nominal})}} = I_{nom} \cdot \sqrt{\frac{(70^\circ\text{C} - T_{amb})}{25^\circ\text{C}}}$
 **** External UL-rated fuses required. Please consult the user manual.

Typical electrical schematic



Filter selection table – IP 00 enclosure

Filter	Rated load power @ 400 V/50 Hz [kW]	Motor drive input current [Arms]**	Rated filter input current [Arms]	Weight [kg]	Typical losses [W]****	Terminal	Frame size
FN 3440-1-110-E0_____*	1.1	3	1.63	6.6	61	110	A
FN 3440-2-110-E0_____*	2.2	5.5	3.26	9.6	87	110	A
FN 3440-4-112-E0_____*	4	10	5.93	13.2	135	112	B
FN 3440-6-112-E0_____*	5.5	13	8.17	16.9	183	112	C
FN 3440-8-112-E0_____*	7.5	16	11.1	20.9	256	112	C
FN 3440-11-113-E0_____	11	24	16.3	28.2	287	113	D
FN 3440-15-113-E0_____	15	32	22.2	32.0	359	113	D
FN 3440-19-113-E0_____	19	38	28.2	33.3	343	113	D
FN 3440-22-115-E0_____	22	45	32.5	47.5	460	115	E
FN 3440-30-115-E0_____	30	60	44.4	49.3	570	115	E
FN 3440-37-115-E0_____	37	75	54.8	59.8	581	115	E
FN 3440-45-115-E0_____	45	90	66.7	66.8	783	115	E
FN 3440-55-115-E0_____	55	110	81.6	69.3	858	115	E
FN 3440-75-116-E0_____	75	150	111	117.6	1036	116	G
FN 3440-90-116-E0_____	90	180	134	138.6	1166	116	G
FN 3440-110-118-E0_____	110	210	164	157.9	1365	118	H
FN 3440-132-118-E0_____**	132	260	197	176.3	1392	118	H
FN 3440-160-118-E0_____**	160	320	240	201.8	1462	118	H
FN 3440-200-118-E0_____**	200	400	300	249.7	1644	118	H
New							
FN 3440-250-119-E0XSXX	250	530	376	324	1746	119	J

* Filter rating which does not require forced cooling or fan module

** Filter rating which does not require RC damping module for rectifiers with EMI filter

*** Motor drive input current without harmonic filter

**** Typical losses @ 45°C, 400 V, 50 Hz and rated load power

Filter power terminals

Terminal designation*	Screw thread	Flex wire AWG	Flex wire [mm ²]	Screw torque value [Nm]	Max width** cable lug [mm]	Frame size
110	M3	14-22	0.4-2.5	0.5	7	A
112	M4	10-22	0.4-6	1.2	10	B, C
113	M6	6-18	0.75-16	3	15	D
115	M8	1/0-8	10-50	8	15	E, F
116	M8	3/0-8	10-95	8	17	G
118	M10	3/0-500 kcmil	95-240	10	35	H
119	M16	350-750 kcmil	95-240	10	35	J

* Recommended connector type: wire or cable lug for 110 to 113, only cable lug for 115 to 118

** To fulfill creepage/clearance acc. UL 61800-5-1 without additional protection (insulation). Creepage/clearance can vary depending on applicable standard and must be reviewed by customer. Creepage/clearance may be reduced when additional protection (insulation) is provided.

Filter signal and earth terminals

Terminal type	Screw thread	Screw torque value [Nm]	Frame size
Signal	M3*	0.5	All
Earth (PE)	M5	2.2	A
Earth (PE)	M6	4	B, C
Earth (PE)	M8	9	D, E
Earth (PE)	M10	17	F, G, H
Earth (PE)	M12	25	J

* Max width cable lug = 7 mm

Filter selection table - IP 20 enclosure

Filter	Rated load power @ 400 V/50 Hz [kW]	Motor drive input current [Arms]**	Rated filter input current [Arms]	Weight [kg]	Typical losses [W]***	Terminal	Frame size
FN 3440-1-110-E2_*****	1.1	3	1.63	8	61	110	A
FN 3440-2-110-E2_*****	2.2	5.5	3.26	11	87	110	A
FN 3440-4-112-E2_*****	4	10	5.93	15	135	112	B
FN 3440-6-112-E2_*****	5.5	13	8.17	19	183	112	C
FN 3440-8-112-E2_*****	7.5	16	11.1	23	256	112	C
FN 3440-11-113-E2_****	11	24	16.3	32	287	113	D
FN 3440-15-113-E2_****	15	32	22.2	36	359	113	D
FN 3440-19-113-E2_****	19	38	28.2	37	343	113	D
FN 3440-22-115-E2_****	22	45	32.5	53	460	115	E
FN 3440-30-115-E2_****	30	60	44.4	55	570	115	E
FN 3440-37-115-E2_****	37	75	54.8	66	581	115	E
FN 3440-45-115-E2_****	45	90	66.7	73	783	115	E
FN 3440-55-115-E2_****	55	110	81.6	75	858	115	E
FN 3440-75-116-E2_****	75	150	111	126	1036	116	G
FN 3440-90-116-E2_****	90	180	134	147	1166	116	G
FN 3440-110-118-E2_****	110	210	164	175	1365	118	H
FN 3440-132-118-E2_******	132	260	197	194	1392	118	H
FN 3440-160-118-E2_******	160	320	240	219	1462	118	H
FN 3440-200-118-E2_******	200	400	300	267	1644	118	H
New							
FN 3440-250-119-E2FASXX	250	530	376	350	1746	119	J

* Filter rating which does not require forced cooling or fan module

** Filter rating which does not require RC damping module for rectifiers with EMI filter

*** Motor drive input current without harmonic filter

**** Typical losses @ 45°C, 400 V, 50 Hz and rated load power

Filter power terminals

Terminal designation*	Screw thread	Flex wire AWG	Flex wire [mm ²]	Screw torque value [Nm]	Max width** cable lug [mm]	Frame size
110	M3	14-22	0.4-2.5	0.5	7	A
112	M4	10-22	0.4-6	1.2	10	B, C
113	M6	6-18	0.75-16	3	15	D
115	M8	1/0-8	10-50	8	15	E, F
116	M8	3/0-8	10-95	8	17	G
118	M10	3/0-500 kcmil	95-240	10	35	H
119	M16	350-750 kcmil	95-240	10	35	J

* Recommended connector type: wire or cable lug for 110 to 113, only cable lug for 115 to 118

** To fulfill creepage/clearance acc. UL 61800-5-1 without additional protection (insulation). Creepage/clearance can vary depending on applicable standard and must be reviewed by customer. Creepage/clearance may be reduced when additional protection (insulation) is provided.

Filter signal and earth terminals

Terminal type	Screw thread	Screw torque value [Nm]	Frame size
Signal	M3*	0.5	All
Earth (PE)	M5	2.2	A
Earth (PE)	M6	4	B, C
Earth (PE)	M8	9	D, E
Earth (PE)	M10	17	F, G, H
Earth (PE)	M12	25	J

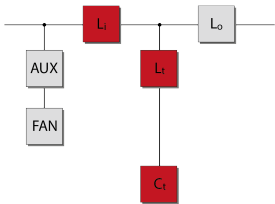
* Max width cable lug = 7 mm

Table 2: Filter configurations with embedded ventilation

(Filters contain fan and aux. power supply)

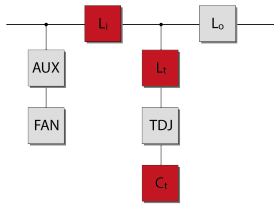
E0FAXXX and E2FAXXX

- For rectifiers without DC-link choke
- Filters contain fan, aux. power supply



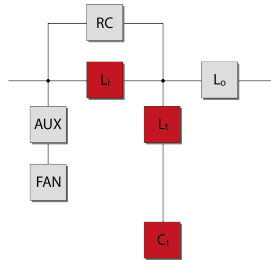
E0FAJXX and E2FAJXX

- For rectifiers without DC-link choke
- Filters contain fan, aux. power supply and trap disconnect jumper



E0FAXRX and E2FAXRX

- For rectifiers without DC-link choke and with EMI filter
- Filters contain fan, aux. power supply and RC damper module



E0FAJRX and E2FAJRX

- For rectifiers without DC-link choke and with EMI filter
- Filters contain fan, aux. power supply, RC damper module and trap disconnect jumper

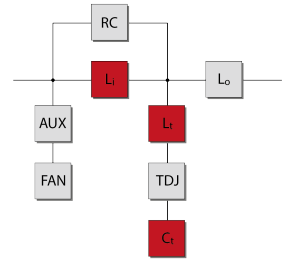
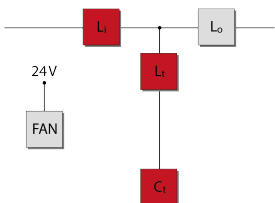


Table 3: Filter configurations if external aux. power supply for the fan is available

(Filters contain fan but do not contain aux. power supply, user should provide aux. power supply to the fan)

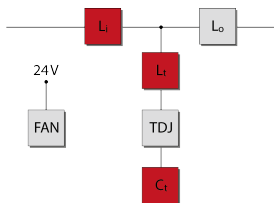
E0FXXXX and E2FXXXX

- For rectifiers without DC-link choke
- Filters contain fan



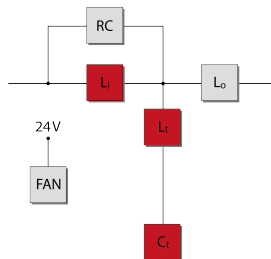
E0FXJXX and E2FXJXX

- For rectifiers without DC-link choke
- Filters contain fan and trap disconnect jumper



E0FXXRX and E2FXXRX

- For rectifiers without DC-link choke and with EMI filter
- Filters contain fan and RC damper module



E0FXJRX and E2FXJRX

- For rectifiers without DC-link choke and with EMI filter
- Contain fan, RC damper module and trap disconnect jumper

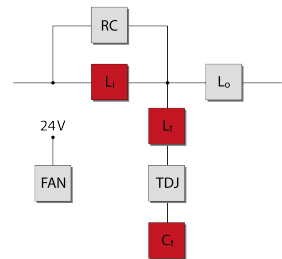
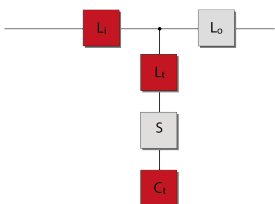


Table 4: 250 kW Filter configuration

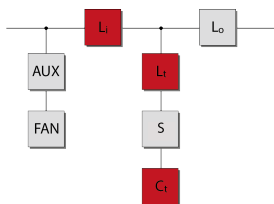
E0XXSXX

- For rectifiers without DC-link choke
- Filters contain circuit breaker

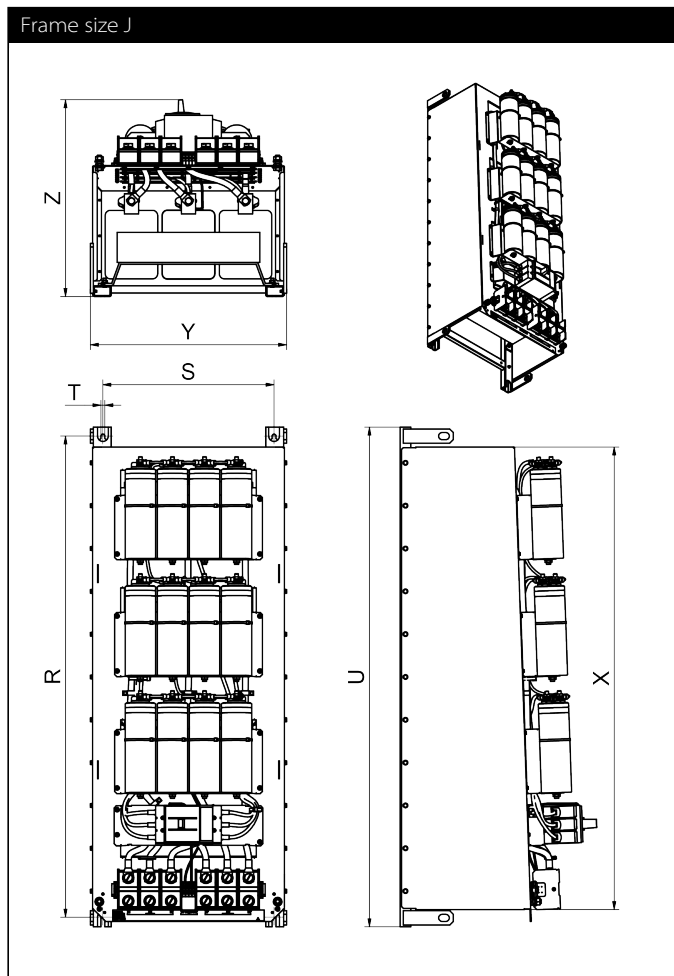
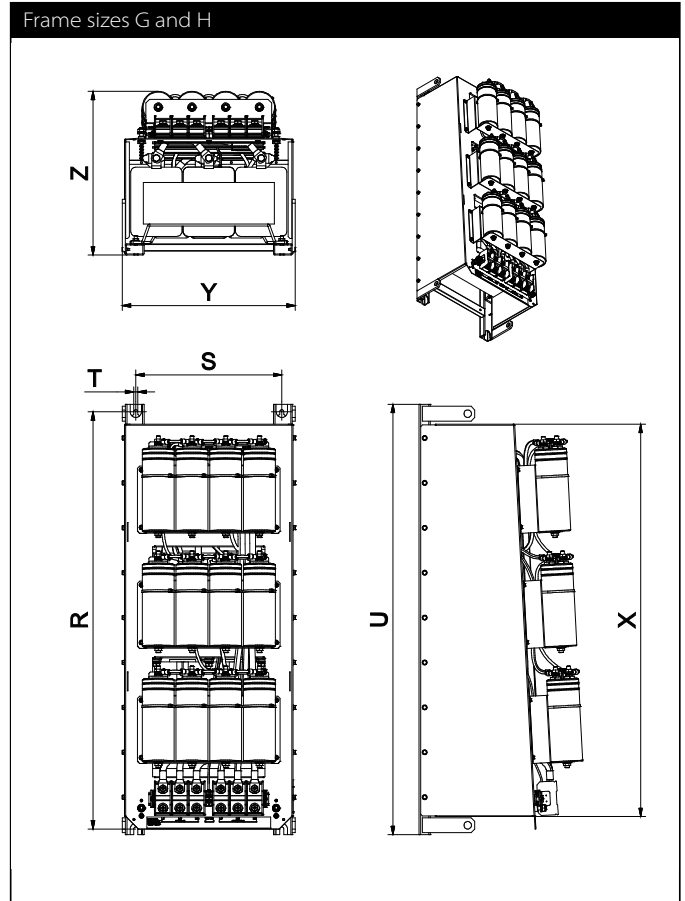
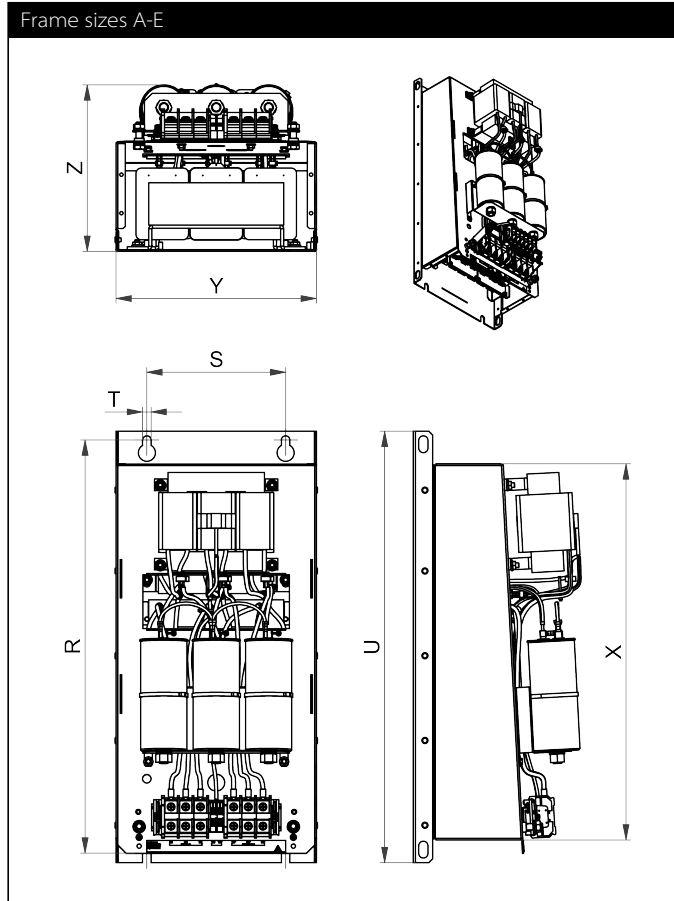


E2FASXX

- For rectifiers without DC-link choke
- Filters contain fan aux. power supply and circuit breaker



Mechanical data of IP 00 enclosure



Dimensions

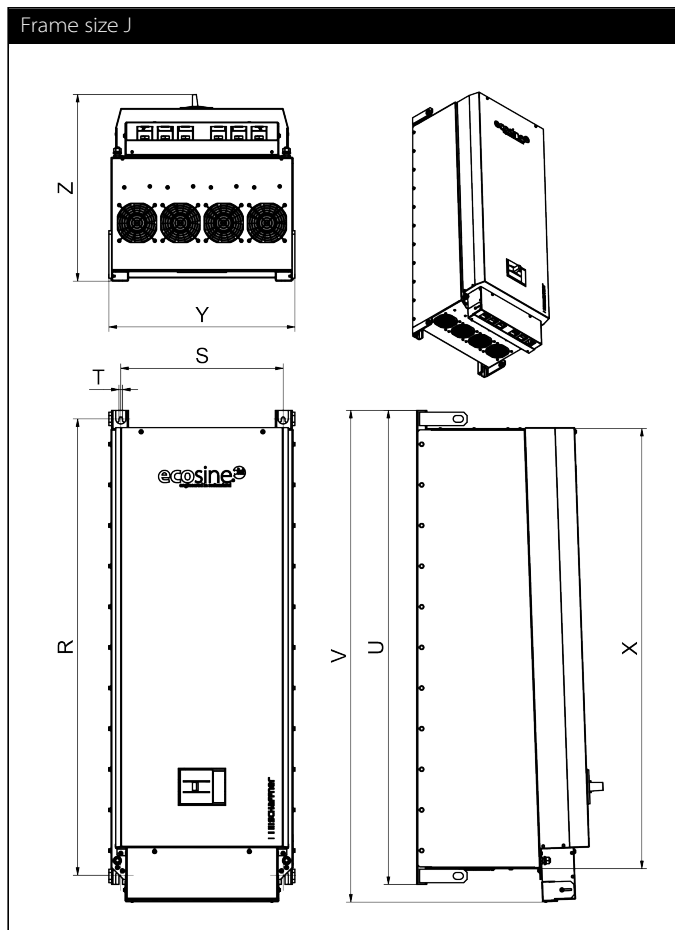
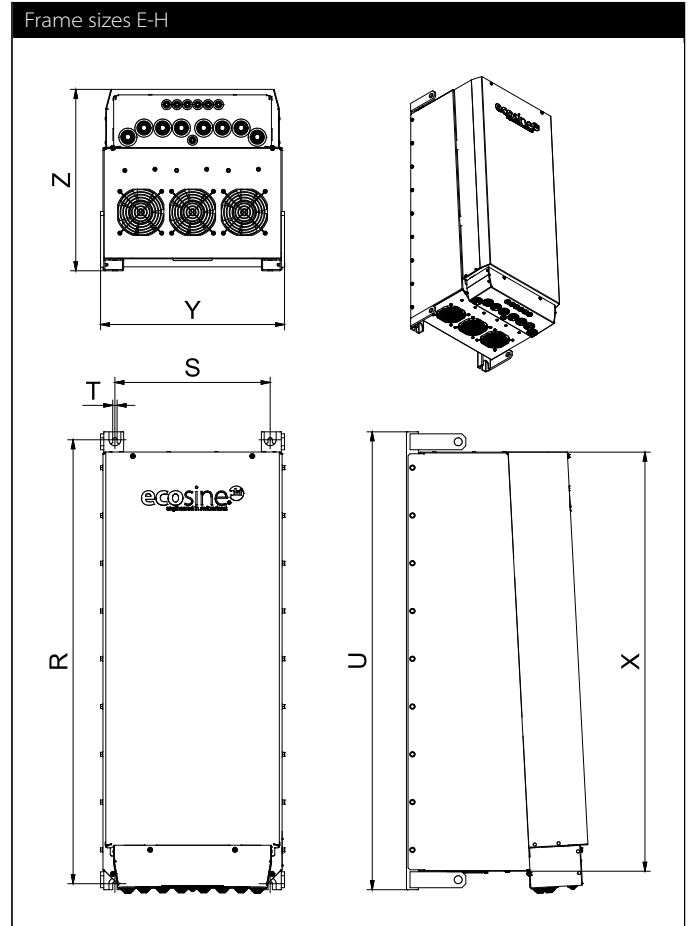
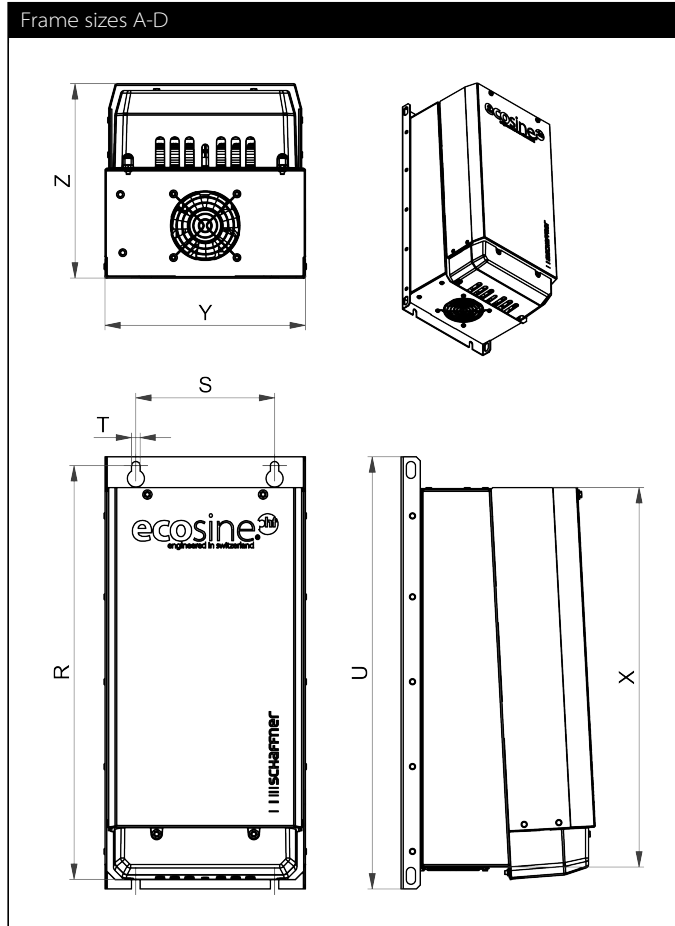
Frame	Drill pattern [mm]			Base [mm]			Volume [mm] V
	R	S	T	U	X	Y	
A	340	120	7	360	302	160	185
B	405	120	7	425	370	180	206
C	460	150	7	483	430	210	221
D	540	180	11	560	491	260	252
E	680	220	11	705	635	290	319
F	730	250	11	752	684	340	343
G	920	280	11	960	863	353	386
H	115	390	11	1150	1053	462	456
J	1348	480	11	1400	1300	550	555

Inlet air flow required for cooling

Frame size	Min air volume* [m ³ /h]
A, B, C	0
D	128
E	204
G	408
H	612
J	816

* External air flow required for filter configurations without embedded ventilation

Mechanical data of IP 20 enclosure



Dimensions

Frame	Drill pattern [mm]			Base [mm]			Volume [mm] V
	R	S	T	U	X	Y	
A	340	120	7	360	302	160	185
B	405	120	7	425	370	180	206
C	460	150	7	483	430	210	221
D	540	180	11	560	491	260	252
E	680	220	11	705	635	290	319
F	730	250	11	752	684	340	343
G	920	280	11	960	863	353	386
H	115	390	11	1150	1053	462	456
J	1348	480	11	1400	1300	550	555

Inlet air flow required for cooling

Frame size	Min air volume* [m ³ /h]
A, B, C	0
D	128
E	204
G	408
H	612
J	816

* External air flow required for filter configurations without embedded ventilation



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