

Sinusoidal output filter for improved symmetrical performance **FN 5020**

- 25 to 120A current ratings
- Increases the service life of motors
- Suitable for motor frequencies up to 600Hz
- Improvement of the service security and reliability of the system
- Nennströme von 25 bis 120A
- Erhöht die Lebensdauer von Motoren
- Für Motorfrequenzen bis 600Hz geeignet
- Verbessert die Betriebssicherheit und die Zuverlässigkeit des Systems
- Courants de service de 25 à 120A
- Augmente la durée de vie des moteurs
- Convient pour des fréquences de moteurs jusqu'à 600Hz
- Améliore le rendement du système et la fiabilité

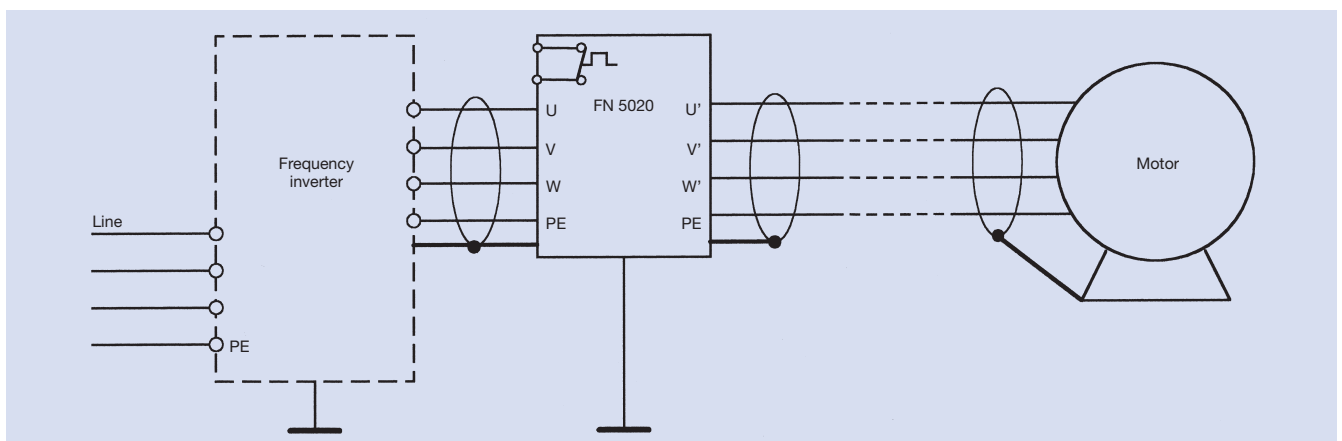


Technical specifications

Maximum operating voltage:	3 x 500VAC/1000VDC
Current ratings:	25 to 120A @ 50°C
Motor frequency:	max. 600Hz
Switching frequency:	f_{\min} 6kHz to f_{\max} 15kHz
Maximum cable length:	200m
Overload:	1.5 times rated current for 1 minute, once per hour
High potential test voltage:	U/V/W → E 3400VDC for 2 sec (factory test) U → V → W 2150VDC for 2 sec (factory test)
Temperature range:	-25°C to +100°C (25/100/21)
Flammability:	UL94V2 (or higher)
Design corresponding to:	UL 1283, CSA 22.2 No. 8 1986, EN 133'200

Electrical schematic

This filter converts pulse width modulated output voltages to sinusoidal voltages (symmetrical – between the phases) at the motor.

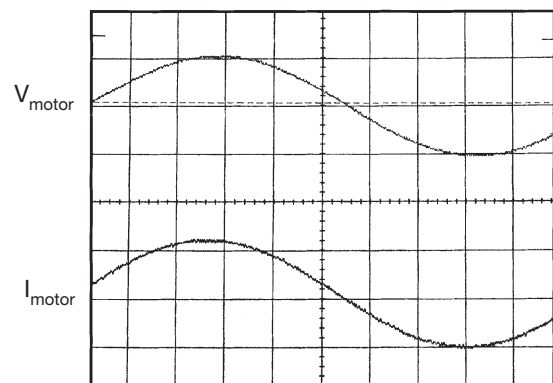
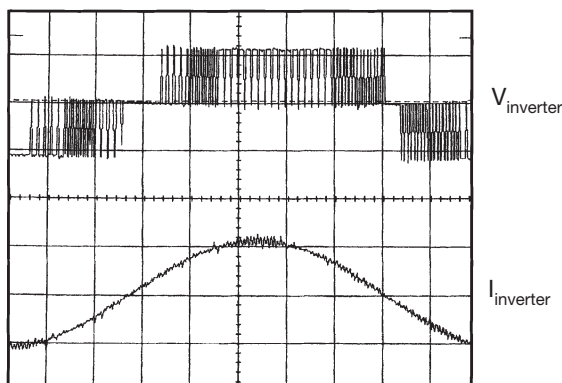


All filters of this range are equipped with a temperature switch. The 75A and 120A versions provide additional internal cooling fan's, which require external supply. Connections for both devices are located on the filter housing, next to the phase-connections.

FN 5020 specifications

Filter	Current rating @ 50°C [A]	Maximum motor power (@ $\cos \gamma = 0.8$) [kW]	Connections	Weight [kg]
FN 5020-25-33	25	17.3	/33	13
FN 5020-55-34	55	38.1	/34	29
FN 5020-75-35	75	51.9	/35	49
FN 5020-120-35	120	83.1	/35	57

Output voltages (symmetrical)

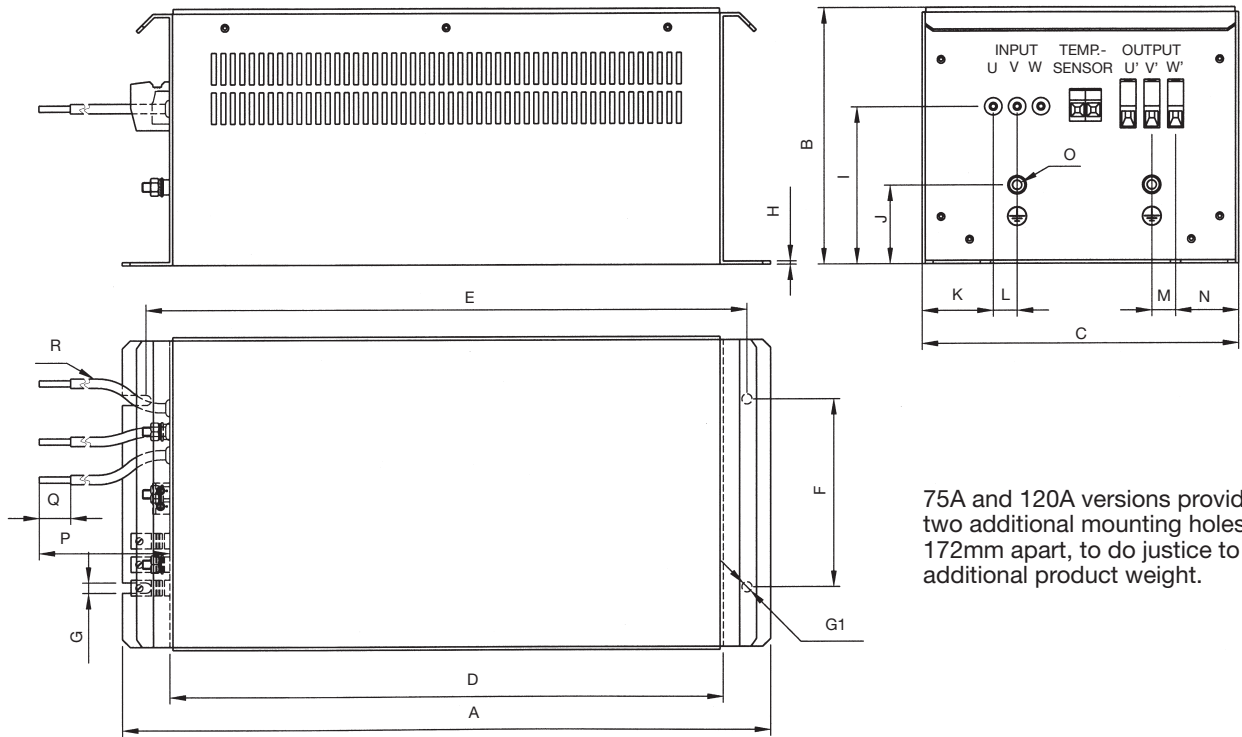


The sinusoidal output filter type FN 5020 offers the following advantages:

- Protects the motor from:
 - dv/dt stress
 - over voltages / surge voltage problems
 - eddy current losses in the motor
 - ripple voltage on the carrier
- Reduces acoustic motor noise
- Reduces EMC related problems by:
 - EMC conscious construction (if mounted correct according to EMC guidelines)
 - lowering the pulse currents in the motor cables and the motor by generating less interference emissions
- Reduced semiconductor losses due to:
 - smaller pulse currents on long motor cables
- Less voltage loss
- Improves system efficiency and reliability
- Exceptional saturation resistance

Temperature monitoring connection

The temperature monitoring facility opens a potential-free contact in the case of filter-temperature (>120°C). The maximum switching capability is 10A (6A) @ 250V. The switch can be used, for example, in the input of a SPS controller or as the trip for a circuit breaker in order to interrupt the main power supply.



75A and 120A versions provide two additional mounting holes, 172mm apart, to do justice to the additional product weight.

Note: This drawing shows a 25A version. The 75A and 120A filters also provide safety terminals to connect the external supply for the internal cooling fan. These terminals are located next to the connections of the temperature sensor.

Dimensions

	25A	55A	75A	120A
A	410	554	799	
B	163	203	280	
C	200	250	343	
D	350	500	725	
E	380	524	760	
F	120	170	296	
G	6.5	9		
G1	Ø 6.5	Ø 9	9x15	
H	2	3		
I	100	114	140	
J	50	69	80	
K	45	40	58	
L	15	30		
M	15	20		
N	40	35	50	
O	M6		M8	
P	1000 ⁺²⁰ ₋₀			
Q	20			
R	AWG 10	AWG 6	25mm ²	35mm ²

All dimensions in mm; 1 inch = 25.4 mm

Tolerances according: ISO2768-m / EN22768-m

Sinusoidal output filter for improved asymmetrical performance

FN 5030

- Additional module for 25 to 120A current ratings
- Enables applications without shielded motor cables
- Suitable for motor frequencies up to 600Hz
- Operates as EMC assurance
- Zusatzmodul für Nennströme von 25 bis 120A
- Ermöglicht Applikationen ohne geschirmte Motorleitungen
- Für Motorfrequenzen bis 600Hz geeignet
- Dient zur Sicherstellung der EMV
- Module additionnel pour courants de service de 25 à 120A
- Convient pour des applications avec câble moteur non blindé
- Convient pour des fréquences de moteurs jusqu'à 600Hz
- Sert à l'assurance de la CEM

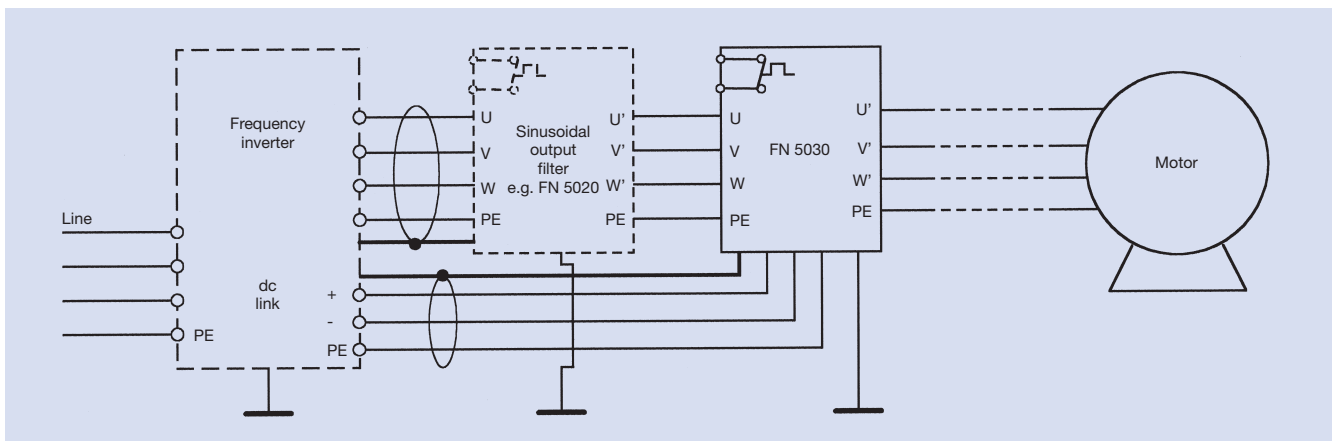


Technical specifications

Maximum operating voltage:	3 x 500VAC / 1000VDC
Current ratings:	25 to 120A @ 50°C
Motor frequency:	max. 600Hz
Switching frequency:	f_{\min} 6kHz to f_{\max} 15kHz
Maximum cable length:	unlimited in combination with FN 5020
Overload:	1.5 times rated current for 1 minute, once per hour
High potential test voltage:	U/V/W → E 3400VDC for 2 sec (factory test) U → V → W 2150VDC for 2 sec (factory test)
Temperature range:	-25°C to +100°C (25/100/21)
Flammability:	UL94V2 (or higher)
Design corresponding to:	UL 1283, CSA 22.2 No. 8 1986, EN 133'200

Electrical schematic

This filter converts pulse width modulated output voltages to sinusoidal voltages (asymmetrical – between phases and earth) at the motor.



All filters of this range are equipped with a temperature switch. The 75A and 120A versions provide additional internal cooling fan's, which require external supply. Further, this whole series requires the connection to the inverter dc-link in order to develop its full potential.

All additional connectors are located on the filter housing, next to the phase-connections.

FN 5030 specifications

Filter	Current rating @ 50°C [A]	Maximum motor power (@ $\cos \gamma = 0.8$) [kW]	Connections	Weight [kg]
FN 5030-25-33	25	17.3	/33	13
FN 5030-55-34	55	38.1	/34	14
FN 5030-75-35	75	51.9	/35	27
FN 5030-120-35	120	83.1	/35	40

IMPORTANT – WICHTIG – IMPORTANT

The FN 5030 filters are additional 'sinus plus' modules.
These filters can NOT work alone!
They always have to be operated downstream of a 'regular' (symmetrical) sinusoidal output filter.

Note: Recommended filter combinations are: FN 5020 + FN 5030 for motor frequencies up to 600Hz, or FN 5010 + FN 5030 for max. 70Hz.
For other combinations of sinusoidal output filters, please contact your local Schaffner office.

The additional 'sinus plus' filter module type FN 5030 offers the following advantages:

- Shielding of motor cables is not necessary
- Extremely low pulse currents towards ground
- No interference effects on other conductors or equipment in the vicinity
- Reduces the required interference suppression efforts on the line side
- Elimination of bearing problems
- Constant current is drawn irrespective of the motor cable length
- Signals in the motor cables have almost the quality of the mains power line signal
- Reduction of inverter losses
- Lower rated inverter can be operated with long motor cables
- Smaller leakage currents in the PE
- Less voltage loss
- Exceptional saturation resistance

Temperature monitoring connection

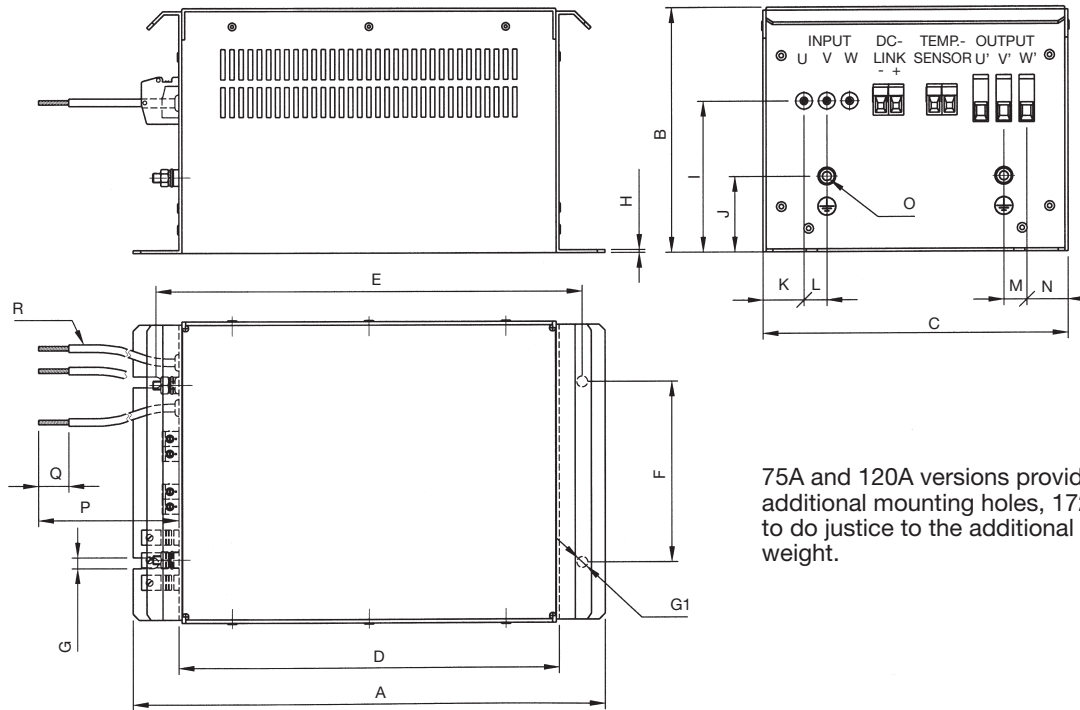
The temperature monitoring facility opens a potential-free contact in the case of filter-temperature (>120°C). The maximum switching capability is 10A (6A) @ 250V. The switch can be used, for example, in the input of a SPS controller or as the trip for a circuit breaker in order to interrupt the main power supply.

Attention

Connection to the control loop is required with this series of filters. If only one connection to the dc link is brought out of the inverter («+» or «-») then the dc link cable connections of the filter (identified by «DC-LINK +» and «DC-LINK -») must be connected together to the «+» or «-» inverter connection.

The operation of the sinus plus filter will not be seriously affected as a result.

The «+» and «-» connections of the inverter must never be connected together! Otherwise a short circuit will result. The switching frequency must lie within 6 and 15kHz in order to ensure a satisfactory operation of the filter. A lower switching frequency or a pure square wave is unsuitable and will result in the inverter switching off with an error message «overcurrent» or «short to earth».



75A and 120A versions provide two additional mounting holes, 172mm apart, to do justice to the additional product weight.

Note: This drawing shows a 25A version. The 75A and 120A filters also provide safety terminals to connect the external supply for the internal cooling fan. These terminals are located next to the connections of the temperature sensor.

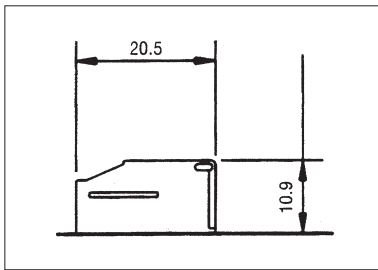
Dimensions

	25A	55A	75A	120A
A	310	354	434	
B	162	200	283	
C	200	250	343	
D	246	300	360	
E	280	324	395	
F	120	170	296	
G	6.5	9		
G1	Ø 6.5	Ø 9	9x15	
H	2	3		
I	100	111		
J	50	66		
K	27	40	63	
L	15	30		
M	15	20		
N	27	35	73	
O	M6		M8	
P	1000 ⁺²⁰ / ₋₀			
Q	20			
R	AWG 10	AWG 6	25mm ²	35mm ²

All dimensions in mm; 1 inch = 25.4 mm

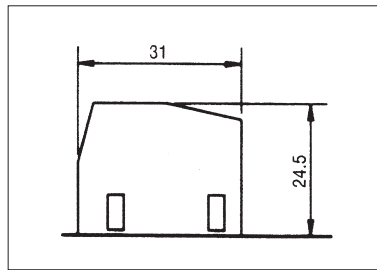
Tolerances according: ISO2768-m / EN22768-m

Filter input/output connections



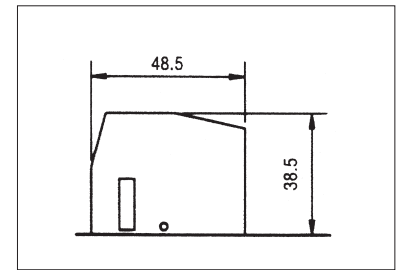
Type /29

Safety terminal block for solid wire 6mm², flex wire 4mm² or AWG 10. Max. Torque: 0.8Nm



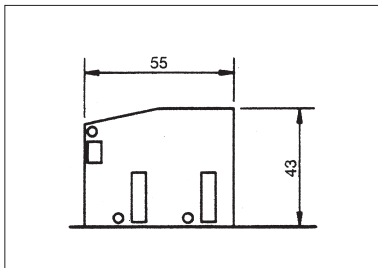
Type /33

Safety terminal block for solid wire 16mm², flex wire 10mm² or AWG 6. Max. Torque: 1.8Nm



Type /34

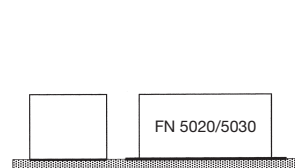
Safety terminal block for solid wire 35mm², flex wire 25mm² or AWG 2. Max. Torque: 4.5Nm



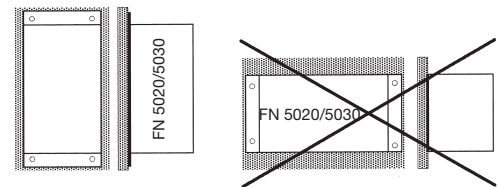
Type /35

Safety terminal block for solid and flex wire 50mm² or AWG 1/0. Max. Torque: 8Nm

Possible installation positions



Correct installation positions



Incorrect position

The Schaffner 'sinus plus' concept

The Schaffner 'sinus plus' concept is a modular system, consisting of the FN 5020 (sym.) sinusoidal output filter and the additional FN 5030 'sinus plus' (asym.) module.

The FN 5020 can be operated as an autonomous component. The FN 5030 on the other hand, always has to be installed downstream of a traditional sinusoidal output filter.

A possible combination could be the FN 5010 and the FN 5030; in this case, the maximum admissible motor frequency would be limited to ~70Hz (due to FN 5010).

To utilize the maximum potential of the 'sinus plus' solution, the FN 5030 is designed to be installed following an FN 5020. This combination allows motor frequencies up to 600Hz.

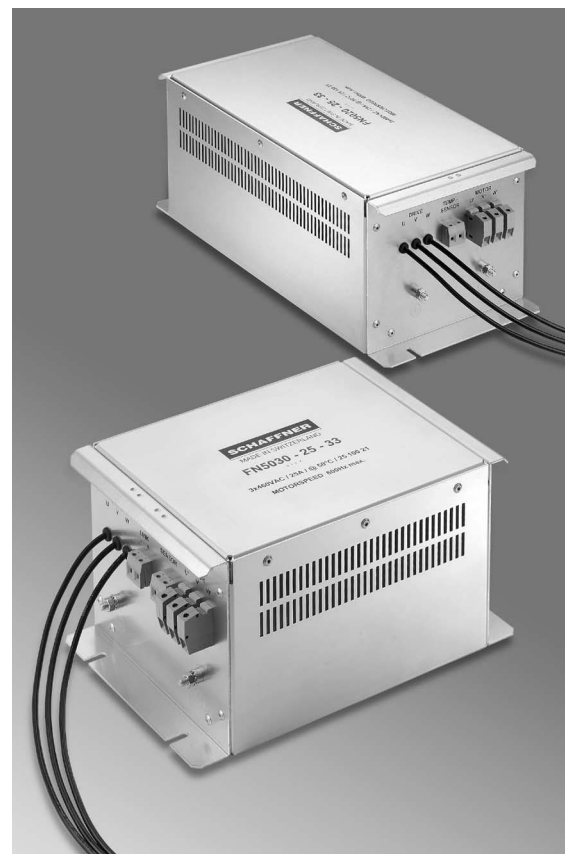
The 'sinus plus' concept offers major advantages: The signal in the motor cables becomes a very pure sinewave, comparable to the signal in the power lines.

This means that shielded cables can be dispensed with for most situations, which reflects in considerable cost savings as well as the increased flexibility in applications where shielded cables are not possible.

Further, the length of the motor cable becomes a subordinated factor to consider.

The 'sinus plus' concept combines all positive features of various output filter series and is THE solution for most problems associated with motor drives or inverter systems.

For more detailed information please contact your local Schaffner subsidiary.



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