

Two-stage filter

- 1 to 10A current ratings
- 2-stage design with earth line choke
- Nennströme von 1 bis 10 A
- Zweistufen-Design mit Erdleiterdrossel
- courants de service de 1 à 10 A
- conception à double-étage avec self de terre





Filter selection table

Choose the family FN xxx with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 343-3/01 is a 3A filter with solder lug connections.

Approvals



Family	Connections		Current ratings at 40°C (25°) A	Inductance L/L ₁ /L ₂ mH	Housing	Weight g
						
FN 343 -1 /??	/01	/05	1 (1.15)	5.6/10/0.4	J2	160
FN 343 -3 /??	/01	/05	3 (3.4)	1.1/2/0.4	J2	160
FN 343 -6 /??	/01	/05	6 (6.9)	0.43/0.77/0.4	J2	160
FN 343 -10 /??	/01	/05	10 (11.5)	0.27/0.66/0.4	J2	170

Additional specifications

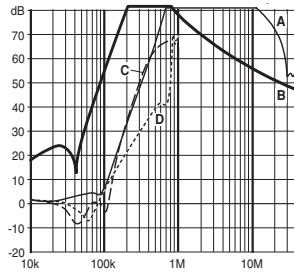
Filter type	Capacitance		Res. R MΩ	Maximum leakage μA/phase	Maximum operating voltage		Operating frequency Hz	Hipot test voltage	
	C _x /C _{x1} nF	C _y nF			VAC	Hz		PN→E VAC	P→N VAC
Standard types	100/100	2.2	1	190	250	50/60	DC to 400	2000	1700

MTBF at 40°C, 230V, per Mil-HB-217F: 970,000 hours.

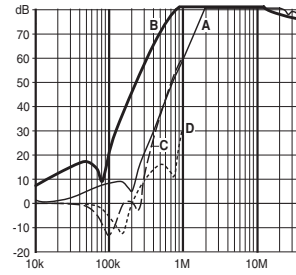
FN 343 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

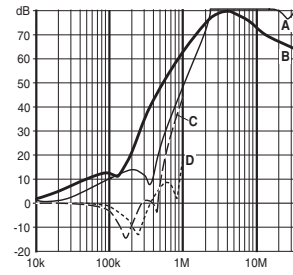
1 amp types



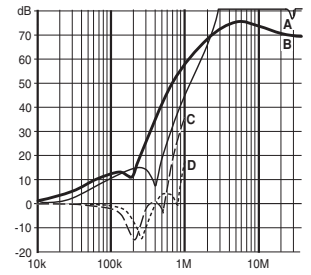
3 amp types



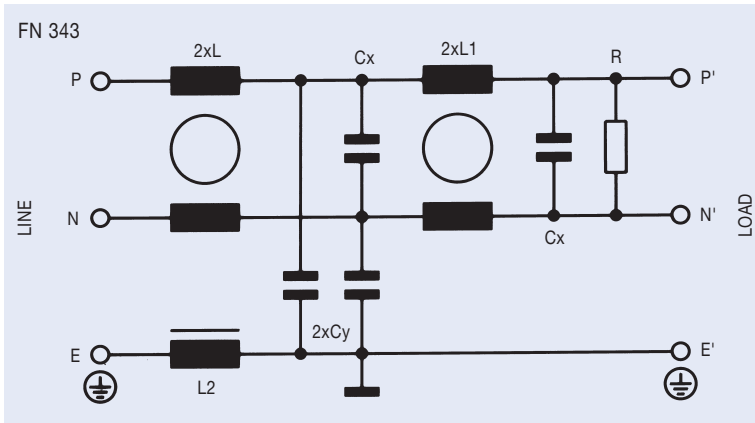
6 amp types



10 amp types



Electrical schematic

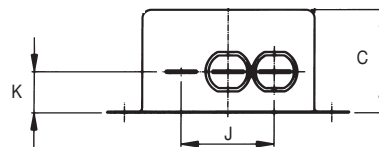


See tables for component values.

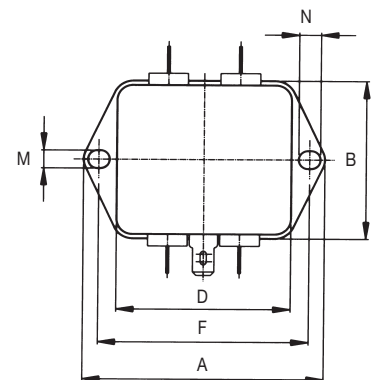
Mechanical data

		Tol. mm
A	70	± 0.5
B	69	± 0.5
C	30	± 1
D	49.8	± 1
F	60	± 0.2
J	27	± 0.5
K	12	± 0.5
M	5.3	± 0.1
N	6.3	± 0.1

FRONT VIEW



TOP VIEW



All dimensions in mm; 1 inch = 25.4 mm

Two-stage general-purpose filter

FN 660

- current ratings from 1 to 20A
 - high differential and common mode attenuation
 - four choices of output connector
 - optional medical versions (B type)
- Nennströme von 1 bis 20 A
 - Gute differentielle und Gleichtakt-Dämpfung
 - Vier Anschlußarten
 - Für medizinische Geräte als Option (Typ B)
- courants de service de 1 à 20 A
 - bonne atténuation en modes différentiel et commun
 - quatre types de connexions de sortie
 - version pour appareils médicaux en option (type B)



Filter selection table

Choose the family FN xxx with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 660-3/07 is a 3A filter with wire connections.

Approvals



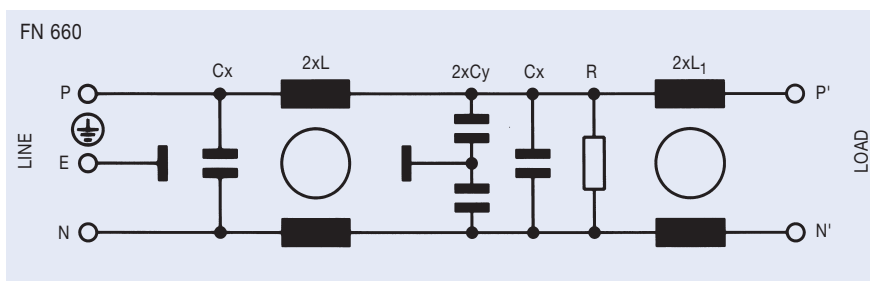
Family	Connections				Current ratings at 40°C (25°) A	Inductance L/L1 mH	Housing	Weight g			
								/03	/06	/07	/10
FN 660 -1 /??	-	/06	/07	-	1 (1.15)	3/3	H21	-	115	125	-
FN 660 -3 /??	-	/06	/07	-	3 (3.4)	2/2	K1	-	170	180	-
FN 660 -6 /??	-	/06	/07	-	6 (6.9)	0.75/0.75	K1	-	170	180	-
FN 660 -10 /??	-	/06	/07	-	10 (11.5)	0.45/0.45	K21	-	230	240	-
FN 660 -16 /??	/03	/06	-	/10	16 (18.4)	0.44/0.44	K2	290	260	-	290
FN 660 -20 /??	/03	/06	-	/10	20 (23)	0.48/0.48	L1	600	590	-	640

Additional specifications

Filter type	Capacitance		Res. R MΩ	Maximum leakage μA/phase	Maximum operating voltage		Operating frequency Hz	Hipot test voltage	
	Cx nF	Cy nF			VAC	Hz		PN→E VAC	P→N VAC
Standard types	150	2.2	1	190	250	50/60	DC to 400	2000	1700
B types (medical)	150	-	1	2	250	50/60	DC to 400	2500	1700

MTBF at 40°C, 230V, per Mil-HB-217F: 350,000 hours (for VDE-approved current ratings).

Electrical schematic

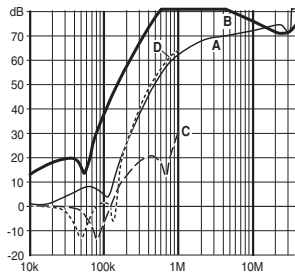


See tables for component values.

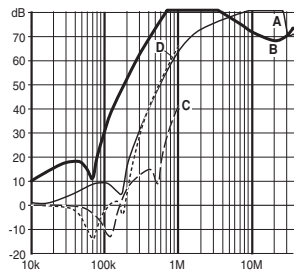
FN 660 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

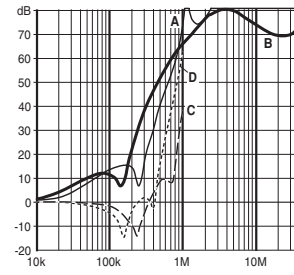
1 amp types



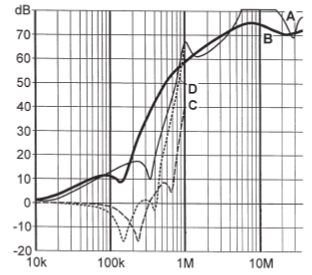
3 amp types



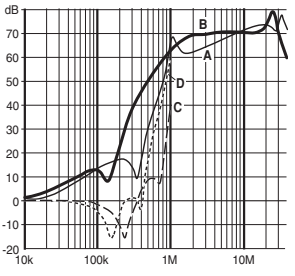
6 amp types



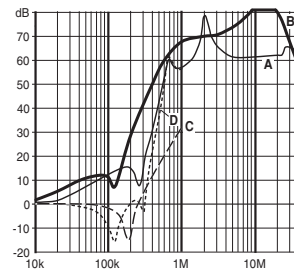
10 amp types



16 amp types



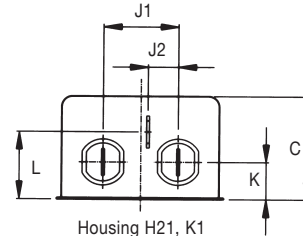
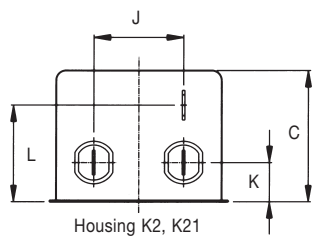
20 amp types



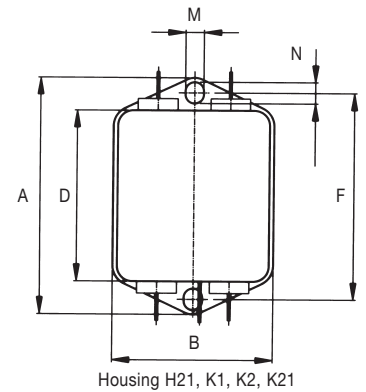
Mechanical data

	FN 660-1 H21	ToI. mm
A	71	± 0.5
B	46.6	± 1
C	29	± 1
D	50.5	± 1
F	61	± 0.2
J	21(J1) 8.5(J2)	± 0.5
K	10.5	± 0.3
L	19	± 0.5
M	5.3	± 0.1
N	6.3	± 0.1
Y	6	± 1
Z	140	+ 5

FRONT VIEW

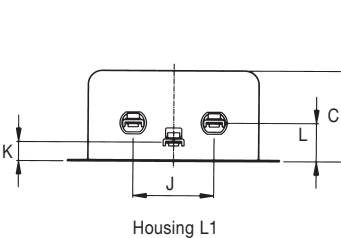


TOP VIEW

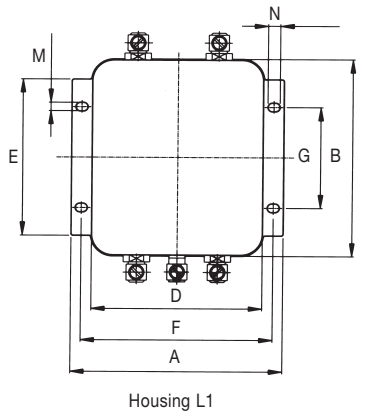


	FN 660 -3-6 K1	FN 660 -10/-16 K2, K21	FN 660 -20 L1	ToI.* mm
A	85	85	105	± 0.5
B	54	54	99.5 ± 1	± 0.5
C	30	40	38	± 1
D	65	65	84.5	± 1
E			79	± 0.5
F	75	75	95	± 0.2
G			51	± 0.1
J	27(J1) 8.5(J2)	27	40	± 0.5
K	7	12	9.5	± 0.5
L		29.5	19	± 0.5
M	5.3	5.3	4.4	± 0.1
N	6.3	6.3	6	± 0.1
W	AWG 16			-
Y	6	6		± 1
Z	300	140 + 5		+ 10

FRONT VIEW



TOP VIEW



* Measurements share this common tolerance unless otherwise stated.

All dimensions in mm; 1 inch = 25.4 mm

FN 670

Two-stage performance filter

- current ratings from 1.8 to 10A
- very high differential and common mode attenuation
- good high frequency attenuation
- Nennströme von 1,8 bis 10 A
- Sehr hohe differentielle und Gleichtakt-Dämpfung
- Gute Hochfrequenzdämpfung
- courants de service de 1,8 à 10 A
- très bonne atténuation en modes différentiel et commun
- bonne atténuation à des hautes fréquences





Filter selection table

Choose the family FN xxx with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 670-3/06 is a 3A filter with fast-on connections.

Approvals



Family	Connections		Current ratings at 40°C (25°) A	Inductance L/L1 mH	Housing	Weight g	
						/06	/07
FN 670 -1.8 /??	/06	/07	1.6 (1.8)	7.2/7.2	K2	225	240
FN 670 -3 /??	/06	/07	2.5 (3)	12.2/1.8	K2	240	245
FN 670 -6 /??	/06	/07	5 (6)	7/7	K2	245	260
FN 670 -10 /??	/06	/07	8.0 (10)	10.4/2.7	L1	570	620

Additional specifications

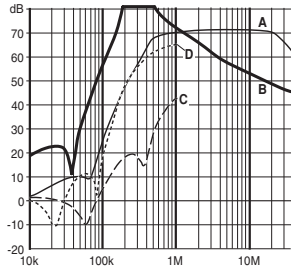
Filter type	Capacitance		Res. R MΩ	Maximum leakage μA/phase	Maximum operating voltage		Operating frequency Hz	Hipot test voltage	
	Cx/Cx1 nF	Cy nF			VAC	Hz		PN→E VAC	P→N VAC
Standard types	470/150	2.2	0.47	190	250	50/60	DC to 400	2000	1700

MTBF at 40°C, 230V, per Mil-HB-217F: 300,000 hours (for VDE-approved current ratings).

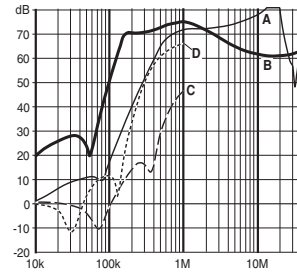
FN 670 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

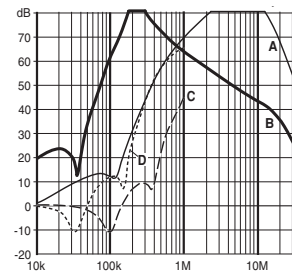
1.8 amp types



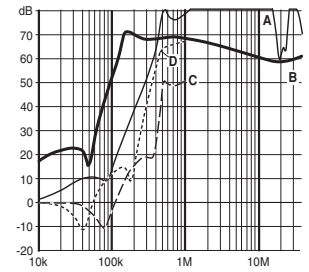
3 amp types



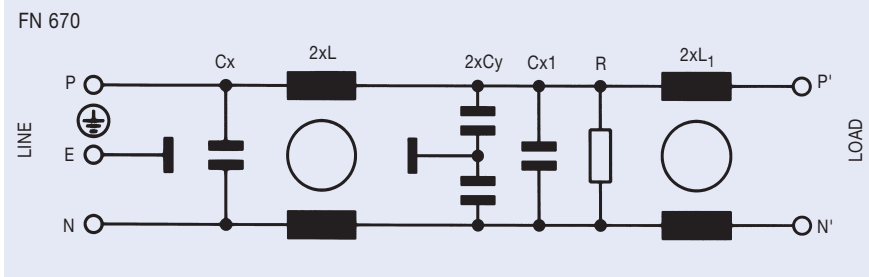
6 amp types



10 amp types



Electrical schematic



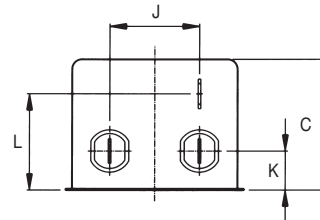
See tables for component values.

Mechanical data

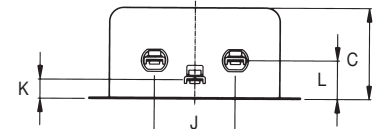
	FN 670-1.8 /-3/-6	FN 670-10	Tol.* mm
	K2	L1	
A	85	105	± 0.5
B	54	99.5 ± 1	± 0.5
C	40	38	± 1
D	65	84.5	± 1
E		79	± 0.5
F	75	95	± 0.2
G		51	± 0.1
J	27	40	± 0.5
K	12	9.5	± 0.5
L	29.5	19	± 0.5
M	5.3	4.4	± 0.1
N	6.3	6	± 0.1
Y	6		± 1
Z	140		+ 5

* Measurements share this common tolerance unless otherwise stated.

FRONT VIEW

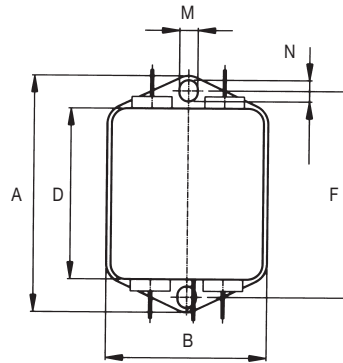


Housing K2

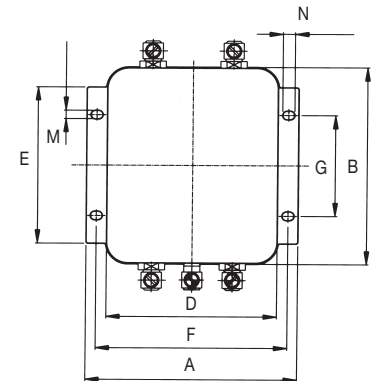


Housing L1

TOP VIEW



Housing K2



Housing L1

All dimensions in mm; 1 inch = 25.4 mm

Two-stage performance filter

- current ratings from 1 to 10A
- very high differential and common mode attenuation
- good low frequency attenuation
- Nennströme von 1 bis 10 A
- Sehr hohe differentielle und Gleichtakt-Dämpfung
- Gute Niederfrequenzdämpfung
- courants de service de 1 à 10 A
- très bonne atténuation en modes différentiel et commun
- bonne atténuation à des basses fréquences



Filter selection table

Choose the family FN xxx with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 682-4/07 is a 4A filter with wire connections.

Approvals



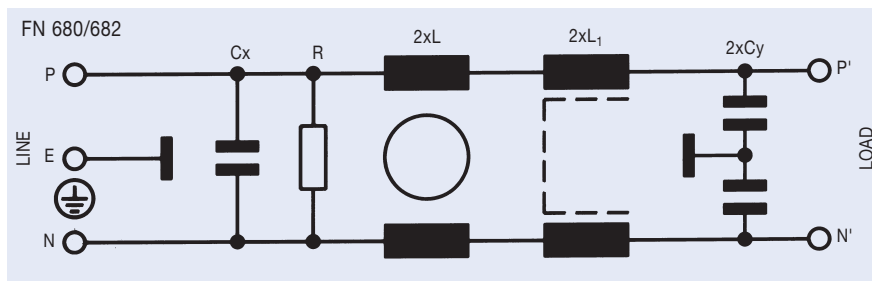
Family	Connections		Current ratings at 40°C (25°) A	Inductance L/L ₁ mH	Housing	Weight g	
						/06	/07
FN 680 -1 /??	/06	/07	1 (1.2)	22.5/1.2	J11	120	130
FN 680 -2.5 /??	/06	/07	2.5 (3)	16/0.27	K2	230	245
FN 682 -4 /??	/06	/07	4 (4.8)	8/0.08	K2	250	255
FN 682 -6.5 /??	/06	/07	6.5 (7.8)	4.1/0.055	L1	590	600
FN 682 -10 /??	/06	/07	10 (12)	4/0.04	L2	950	970

Additional specifications

Filter type	Capacitance		Res. R MΩ	Maximum leakage μA/phase	Maximum operating voltage		Operating frequency Hz	Hipot test voltage	
	C _x nF	C _y nF			VAC	Hz		PN→E VAC	P→N VDC
FN 680 types	220	4.7	1	410	250	50/60	DC to 400	2000	1700
FN 682 types (4A)	1000	22	0.33	1900	250	50/60	DC to 400	2000	1700
FN 682 types (6.5-10A)	470	22	0.47	1900	250	50/60	DC to 400	2000	1700

MTBF at 40°C, 230V, per Mil-HB-217F: 1,400,000 hours.

Electrical schematic

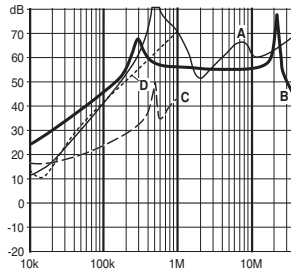


See tables for component values.

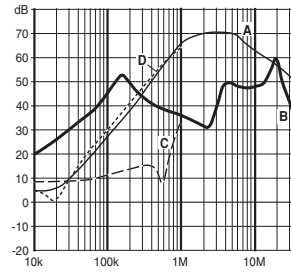
FN 680 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

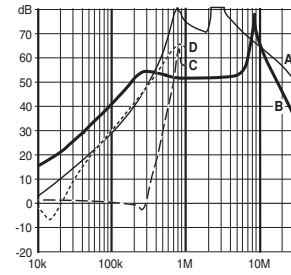
1 amp types



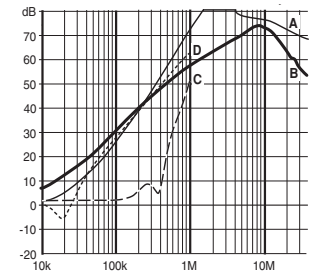
2.5 amp types



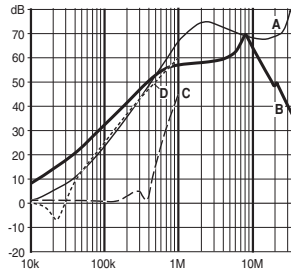
4 amp types



6.5 amp types



10 amp types



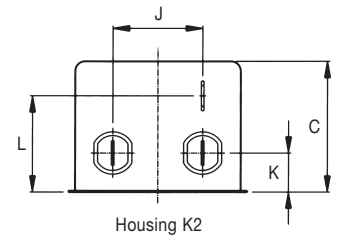
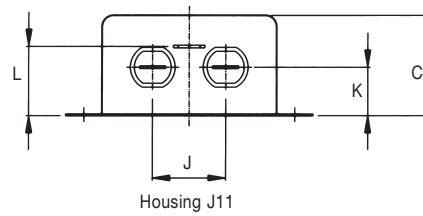
Mechanical data

FN 680-1

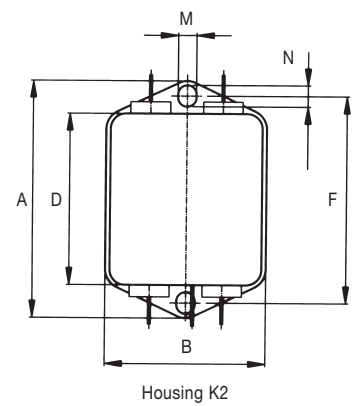
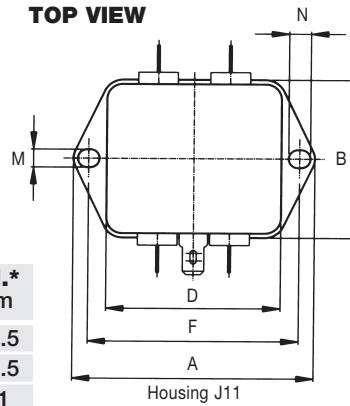
J11

		Tol. mm
A	71	± 0.5
B	52.6	± 0.5
C	29	± 0.5
D	50.5	± 1
F	61	± 0.2
J	21	± 0.5
K	14	± 0.5
L	20	± 0.5
M	5.3	± 0.1
N	6.3	± 0.1
Y	6	± 1
Z	140	+ 5

FRONT VIEW



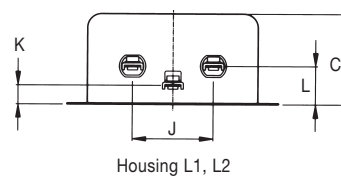
TOP VIEW



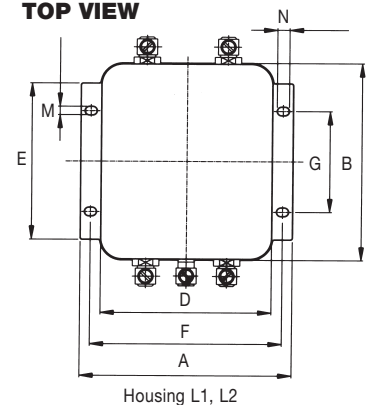
FN 680-2.5 FN 682-6.5 FN 682-10 FN 682-4

	K2	L1	L2	Tol.* mm
A	85	105		± 0.5
B	54	99.5 ± 1		± 0.5
C	40	38	57	± 1
D	65	84.5		± 1
E		79		± 0.5
F	75	95		± 0.2
G		51		± 0.1
J	27	40		± 0.5
K	12	9.5		± 0.5
L	29.5	19		± 0.5
M	5.3	4.4		± 0.1
N	6.3	6		± 0.1
Y	6			± 1
Z	140			+ 5

FRONT VIEW



TOP VIEW



* Measurements share this common tolerance unless otherwise stated.

All dimensions in mm; 1 inch = 25.4 mm

High-power performance filter

FN 685

- current ratings from 10 to 36A
- excellent attenuation characteristics
- Nennströme von 10 bis 36 A
- Ausgezeichnetes Dämpfungsverhalten
- courants de service de 10 à 36A
- excellentes caractéristiques d'atténuation



Filter selection table

Choose the family FN xxx with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 685-10/06 is a 10A filter with fast-on connections.

Approvals



Family	Connections			Current ratings at 40°C (25°) A	Inductance L/L1 mH	Housing	Weight g
FN 685 -10 /??	/03	/06	-	10 (12)	4.2/0.04	B7A	1200
FN 685 -16 /??	/03	/06	-	16 (19.2)	2.3/0.04	B7A	1350
FN 686 -25 /??	-	-	/23	25 (30)	1.35/0.04	B23	2350
FN 686 -36 /??	-	-	/23	36 (43.2)	0.8/0.03	B23	2850

Additional specifications

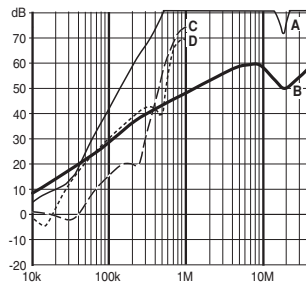
Filter type	Capacitance		Res. R MΩ	Maximum leakage μA/phase	Maximum operating voltage		Operating frequency Hz	Hipot test voltage	
	Cx/Cx1 nF	Cy nF			VAC	Hz		PN→E VAC	P→N VDC
FN 685 types	470/220	4.7	0.33	410	250	50/60	DC to 400	2000	1700
FN 686 types	470/220	22	0.33	1900	250	50/60	DC to 400	2000	1700

MTBF at 40°C, 230V, per Mil-HB-217F: 400,000 hours.

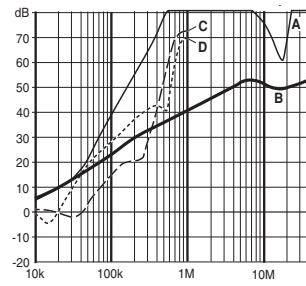
FN 685 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

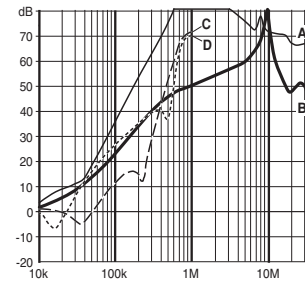
10 amp types



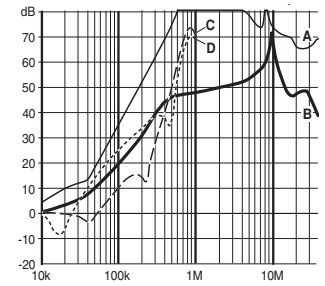
16 amp types



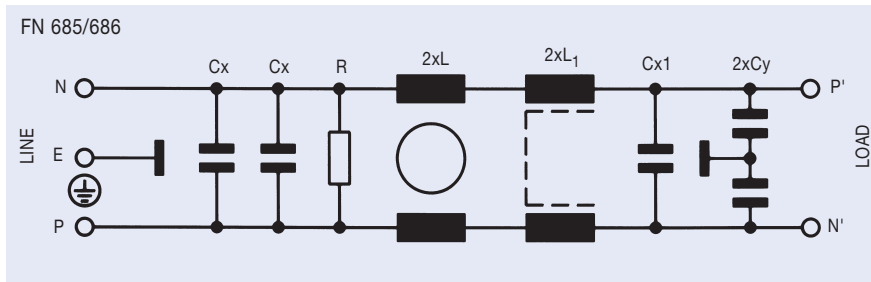
25 amp types



36 amp types



Electrical schematic



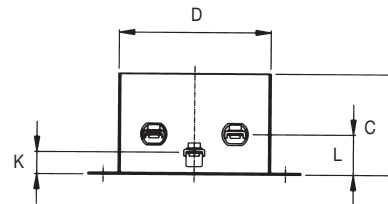
See tables for component values.

Mechanical data

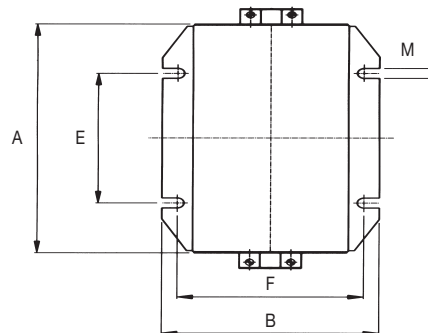
	FN 685	FN 686	Tol.* mm
	B7A	B23	
A	150	170	± 0.5
B	105	129 ± 1	± 0.5
C	50	60	± 0.5
D	75	100	± 0.5
E	85	115 ± 0.2	± 0.1
F	90	113 ± 0.2	± 0.5
K	11	15	± 0.5
L	20	24	± 0.5
M	6.5		± 0.1

* Measurements share this common tolerance unless otherwise stated.

FRONT VIEW



TOP VIEW



All dimensions in mm; 1 inch = 25.4 mm

Multi-stage general-purpose filter

FN 2060

- current ratings from 1 to 30A
 - high differential and common mode attenuation
 - optional medical versions (B types)
 - optional safety versions (A types)
-
- Nennströme von 1 bis 30A
 - Hohe Gleich- und Gegentaktdämpfung
 - Optionale medizinische Versionen (Typ B)
 - Optionale Sicherheitsversionen (Typ A)
-
- courants de service de 1 à 30 A
 - bonne atténuation en modes différentiel et commun
 - en option version pour appareils médicaux (type B)
 - en option version pour la sécurité (type A)



Filter selection table

Choose the filter FN xxxx-x with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 2060-10/06 is a 10A filter with fast-on connections.

Approvals



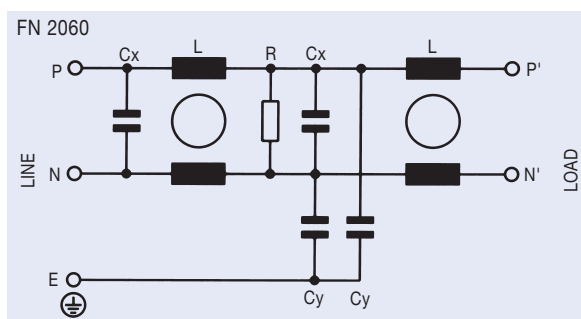
Filter	Connections			Current ratings at 40°C (25°) A	Inductance L mH	Capacitance		Resistance R MΩ	Housing	Weight g
	/06	/07	/08			Cx μF	Cy nF			
FN 2060-1 /??	/06	/07	-	1 (1.15)	12	0.22	4.7	1	H2	120
FN 2060-3 /??	/06	/07	-	3 (3.45)	2.5	0.22	4.7	1	H2	120
FN 2060-6 /??	/06	/07	-	6 (6.9)	0.97	0.22	4.7	1	H2	120
FN 2060-10 /??	/06	/07	-	10 (11.5)	0.8	0.47	4.7	0.47	K1	190
FN 2060-12 /??	/06	/07	-	12 (13.8)	0.58	0.47	4.7	0.47	K1	190
FN 2060-16 /??	/06	/07	/08	16 (18.4)	0.65	0.33	4.7	1	K2	260
FN 2060-20 /??	/06	-	/08	20 (23)	0.6	1	4.7	0.22	P	480
FN 2060-30 /??	-	-	/08	30 (34.5)	0.6	1	10	0.22	L2	950

Additional specifications

Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		MTBF Per Mil-HB-217F at 40°C 230V hours	Maximum leakage mA/phase
	VAC	Hz		PN→E VAC	P→N VDC		
Standard types	250	50/60	DC to 400	2000	1700	450 000	0.4*
B medical types (no Y capacitors)	250	50/60	DC to 400	2500	1700	450 000	0.002
A safety types (lower capacitance)	250	50/60	DC to 400	2500	1700	450 000	0.040

* 1mA for 30A version

Electrical schematic

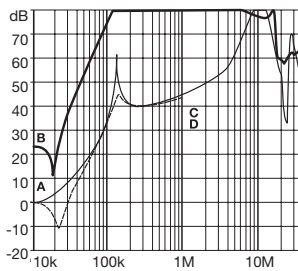


See tables for component values.

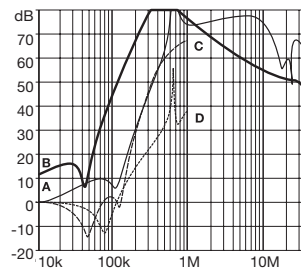
FN 2060 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

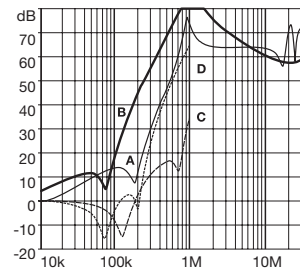
1A types



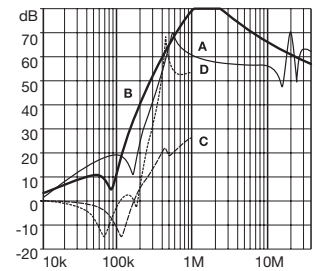
3A types



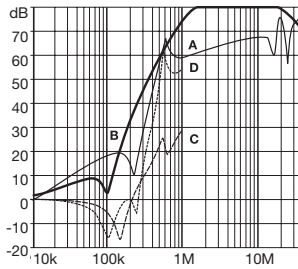
6A types



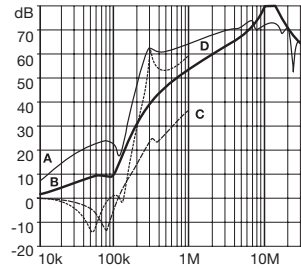
10A types (12A*)



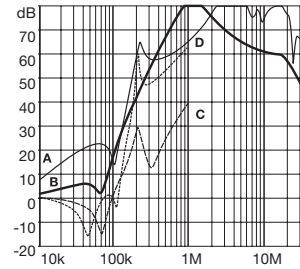
16A types



20A types



30A types



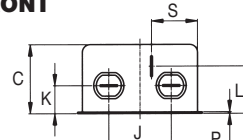
* attenuation performance of the 12A version is similar to the 10A component.

Mechanical data

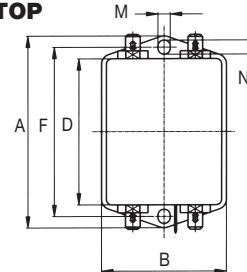
Housing style	H2	K1	K2	Tol. ± mm
A	71	85		± 0.5
B	46.6	54		± 0.5
C	29.3	30.3	40.3	± 0.5
D	50.5	64.8		± 0.5
F	61	75		± 0.3
J	21	27		± 0.2
K	10.8/8.3 [§]	12.3/8.3 [§]		± 0.5
L	19.3	20.8/23.3	29.8	± 0.5
M		5.3		± 0.1
N		6.3		± 0.1
P		0.7		± 0.1
S	20.1/30.5 [§]	19.9/34.9 [§]	11.4/34.9 [§]	± 0.5

[§] with /07 connections
wire length of /07: 140 +5 mm

FRONT



TOP

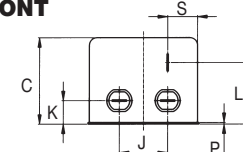


Housings H2, K1 and K2

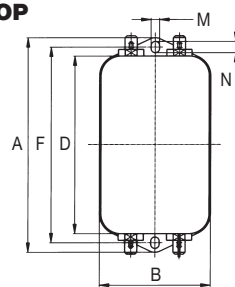
Housing style	P	L2	Tol.* ± mm
A	113.5	119 ± 0.5	± 1
B	57.5	85.5	± 1
C	45.4 ± 1.2	57.6	± 1
D	94	98.5	± 1
F	103	109	± 0.3
J	25	40	± 0.2
K	12.4	15.6	± 0.5
L	32.4		± 0.5
M	4.4	4.4	± 0.1
N	6	7.4	± 0.1
P	0.9	1.2	± 0.1
Q		66	± 0.3
R		51	± 0.2
S	15.5		± 0.5

* Measurements share this common tolerance unless otherwise stated.

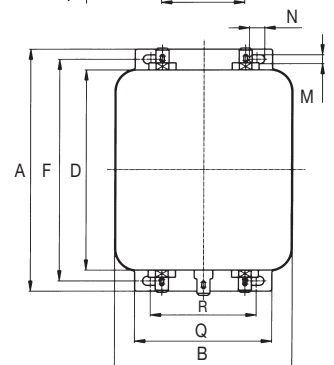
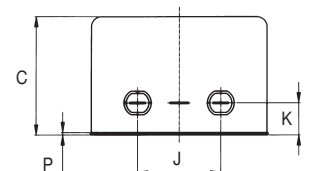
FRONT



TOP



Housing P



Housing L2

All dimensions in mm; 1 inch = 25.4 mm

FN 2070

Multi-stage performance filter

- current ratings from 1 to 36A
 - very high differential and common mode attenuation
 - good high-frequency attenuation
 - optional medical versions (B types)
-
- Nennströme von 1 bis 36A
 - Sehr hohe Gleich- und Gegentaktdämpfung
 - Gute Hochfrequenzdämpfung
 - Optionale medizinische Versionen (Typ B)
-
- courants de service de 1 à 36A
 - très bonne atténuation en modes différentiel et mode commun
 - bonne atténuation à des hautes fréquences
 - en option version pour appareils médicaux (type B)



Filter selection table

Choose the filter FN xxxx-x with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 2070-10/06 is a 10A filter with fast-on connections.

Approvals

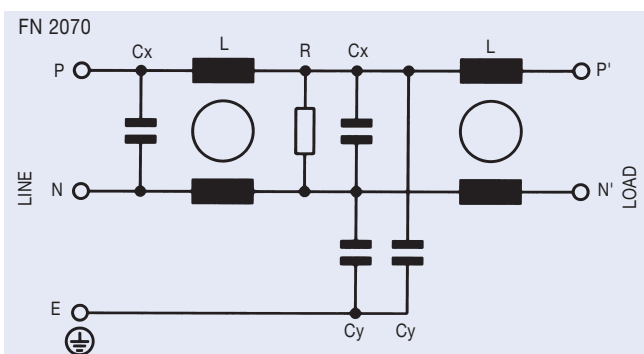


Filter	Connections			Current ratings at 40°C (25°) A	Inductance L mH	Capacitance		Resistance R MΩ	Housing	Weight g
	/06	/07	/08			Cx μF	Cy nF			
FN 2070-1 /??	/06	/07	-	1 (1.15)	22	0.33	4.7	1	K1	190
FN 2070-3 /??	/06	/07	-	3 (3.45)	9.8	0.47	4.7	0.47	K2	250
FN 2070-6 /??	/06	/07	-	6 (6.9)	7.8	1	4.7	0.22	P	450
FN 2070-10 /??	/06	/07	-	10 (11.5)	4.5	1	4.7	0.22	Q	730
FN 2070-12 /??	/06	/07	-	12 (13.8)	3.25	1	4.7	0.22	Q	730
FN 2070-16 /??	/06	/07	/08	16 (18.4)	2.8	1	4.7	0.22	L2	1000
FN 2070-25 /??	-	-	/08	25 (28.75)	2	2.2	4.7	0.22	Q	760
FN 2070-36 /??	-	-	/08	36 (41.4)	1.23	2.2	4.7	0.22	Q	790

Additional specifications

Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		MTBF Per Mil-HB-217F at 40°C 230V hours	Maximum leakage mA/phase
	VAC	Hz		PN→E VAC	P→N VDC		
Standard types	250	50/60	DC to 400	2000	1700	400 000	0.4
B medical types (no Y capacitors)	250	50/60	DC to 400	2500	1700	400 000	0.002
A safety types (lower capacitance)	250	50/60	DC to 400	2500	1700	400 000	0.040

Electrical schematic

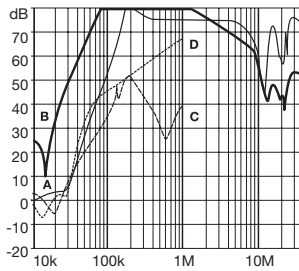


See tables for component values.

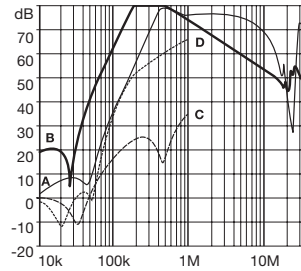
FN 2070 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

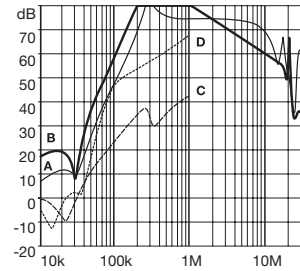
1A types



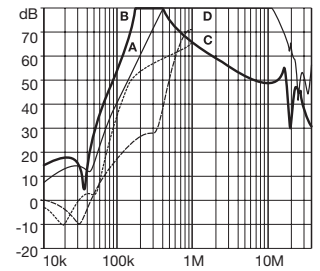
3A types



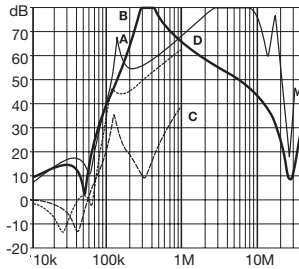
6A types



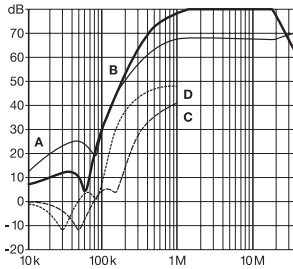
10A types (12A*)



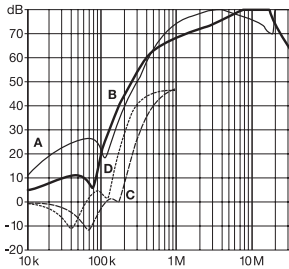
16A types



25A types



36A types



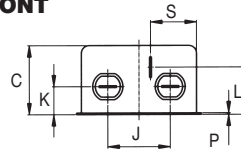
* attenuation performance of the 12A version is similar to the 10A component.

Mechanical data

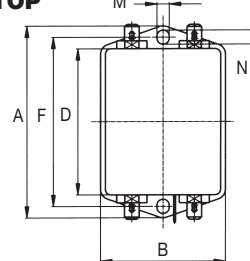
Housing style	K1	K2	Tol. ± mm
A		85	± 0.5
B		54	± 0.5
C	30.3	40.3	± 0.5
D		64.8	± 0.5
F		75	± 0.3
J		27	± 0.2
K		12.3/8.3 [§]	± 0.5
L	20.8/23.3	29.8	± 0.5
M		5.3	± 0.1
N		6.3	± 0.1
P		0.7	± 0.1
S	19.9/34.9 [§]	11.4/34.9 [§]	± 0.5

§ with /07 connections
wire length of /07: 140 +5 mm

FRONT



TOP



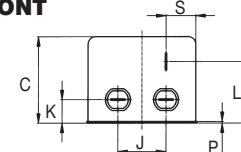
Housings K1, K2

Housing style	P	Q	L2	Tol.* ± mm
A	113.5	156	119 ± 0.5	± 1
B		57.5	85.5	± 1
C		45.4 ± 1.2	57.6	± 1
D	94	130.5	98.5	± 1
F	103	143	109	± 0.3
J		25	40	± 0.2
K		12.4/8.4 [§]	15.6/8.6 [§]	± 0.5
L		32.4		± 0.5
M	4.4	5.3	4.4	± 0.1
N		6	7.4	± 0.1
P		0.9	1.2	± 0.1
Q			66	± 0.3
R			51	± 0.2
S		15.5/38 [§]		± 0.5

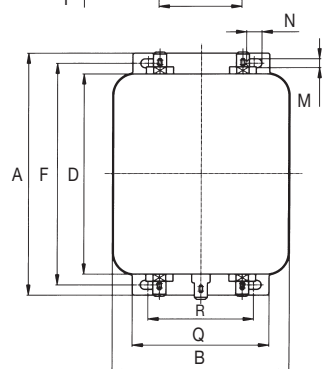
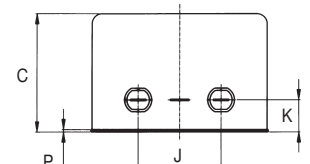
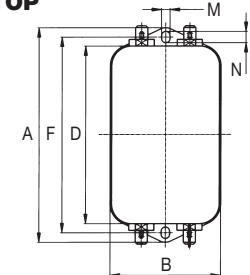
§ with /07 connections
wire length of /07: 140 +5 mm

* Measurements share this common tolerance unless otherwise stated.

FRONT



TOP



Housings P, Q

Housing L2

All dimensions in mm; 1 inch = 25.4 mm

Multi-stage high-performance filter FN 2080

- current ratings from 1 to 16A
 - very high differential and common mode attenuation
 - good low-frequency attenuation
 - optional medical versions (B types)
-
- Nennströme von 1 bis 16A
 - Sehr hohe Gleich- und Gegentaktdämpfung
 - Gute Niederfrequenzdämpfung
 - Optionale medizinische Versionen (Typ B)
-
- courants de service de 1 à 16 A
 - très bonne atténuation en modes différentiel et commun
 - bonne atténuation à des basses fréquences
 - en option version pour appareils médicaux (type B)



Filter selection table

Choose the filter FN xxxx-x with the required current rating and features, and add /?? to determine input/output (line/load) connection style. Example: FN 2080-10/06 is a 10A filter with fast-on connections.

Approvals

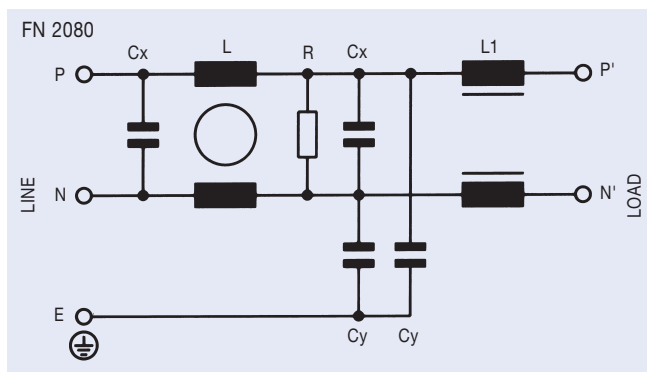


Filter	Connections			Current ratings at 40°C (25°) A	Inductance		Capacitance		Resistance R MΩ	Housing	Weight g
					L mH	L1 mH	Cx μF	Cy nF			
FN 2080-1 /??	/06	/07	-	1 (1.15)	22	0.49	0.33	4.7	1	K1	200
FN 2080-3 /??	/06	/07	-	3 (3.45)	9.8	0.16	0.47	4.7	0.47	K2	270
FN 2080-6 /??	/06	/07	-	6 (6.9)	7.8	0.11	1	4.7	0.22	P	470
FN 2080-10 /??	/06	/07	-	10 (11.5)	4.5	0.06	1	4.7	0.22	Q	750
FN 2080-12 /??	/06	/07	-	12 (13.8)	3.25	0.05	1	4.7	0.22	Q	750
FN 2080-16 /??	/06	/07	/08	16 (18.4)	2.8	0.043	1	4.7	0.22	L2	1020

Additional specifications

Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		MTBF Per Mil-HB-217F at 40°C 230V hours	Maximum leakage mA/phase
	VAC	Hz		PN→E VAC	P→N VDC		
Standard types	250	50/60	DC to 400	2000	1700	350 000	0.4
B medical types (no Y capacitors)	250	50/60	DC to 400	2500	1700	350 000	0.002
A safety types (lower capacitance)	250	50/60	DC to 400	2500	1700	350 000	0.040

Electrical schematic

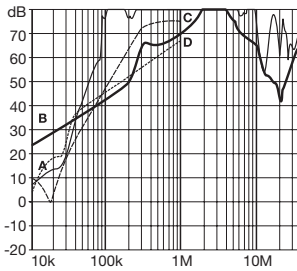


See tables for component values.

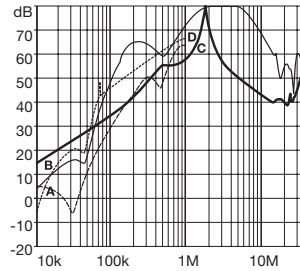
FN 2080 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

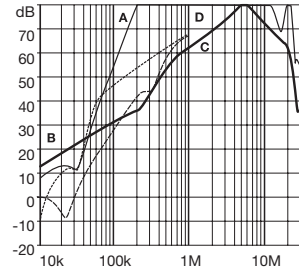
1A types



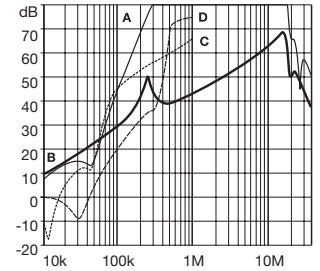
3A types



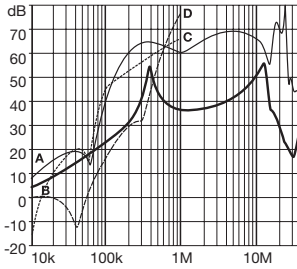
6A types



10A types (12A*)



16A types



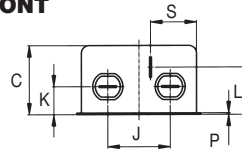
* attenuation performance of the 12A version is similar to the 10A component.

Mechanical data

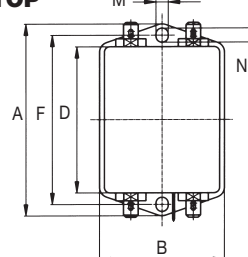
Housing style	K1	K2	Tol. ± mm
A	85		± 0.5
B	54		± 0.5
C	30.3	40.3	± 0.5
D	64.8		± 0.5
F	75		± 0.3
J	27		± 0.2
K	12.3/8.3 [§]		± 0.5
L	20.8/23.3	29.8	± 0.5
M	5.3		± 0.1
N	6.3		± 0.1
P	0.7		± 0.1
S	19.9/34.9 [§]	11.4/34.9 [§]	± 0.5

§ with /07 connections
wire length of /07: 140 +5 mm

FRONT



TOP



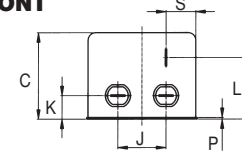
Housings K1, K2

Housing style	P	Q	L2	Tol.* ± mm
A	113.5	156	119 ± 0.5	± 1
B	57.5		85.5	± 1
C	45.4 ± 1.2		57.6	± 1
D	94	130.5	98.5	± 1
F	103	143	109	± 0.3
J	25	40	40	± 0.2
K	12.4/8.4 [§]		15.6/8.6 [§]	± 0.5
L	32.4			± 0.5
M	4.4	5.3	4.4	± 0.1
N	6		7.4	± 0.1
P	0.9		1.2	± 0.1
Q			66	± 0.3
R			51	± 0.2
S	15.5/38 [§]			± 0.5

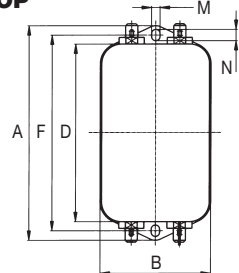
§ with /07 connections
wire length of /07: 140 +5 mm

* Measurements share this common tolerance unless otherwise stated.

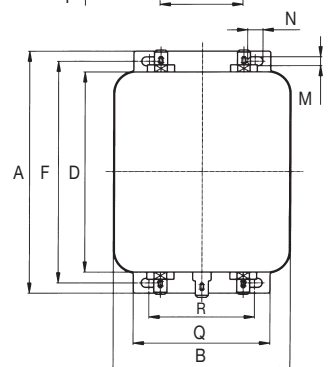
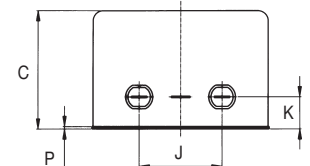
FRONT



TOP



Housings P, Q



Housing L2

All dimensions in mm; 1 inch = 25.4 mm

Single-phase chassis-mounting filter FN 2320

- Current ratings from 3 to 20A
- Broadband attenuation characteristics
- UL-rated materials
- Nennströme von 3 bis 20A
- Breitbandige Dämpfungseigenschaften
- UL konformes Material
- Courants de service de 3 à 20A
- Atténuation large bande
- Matériaux UL



Filter selection table

Approvals



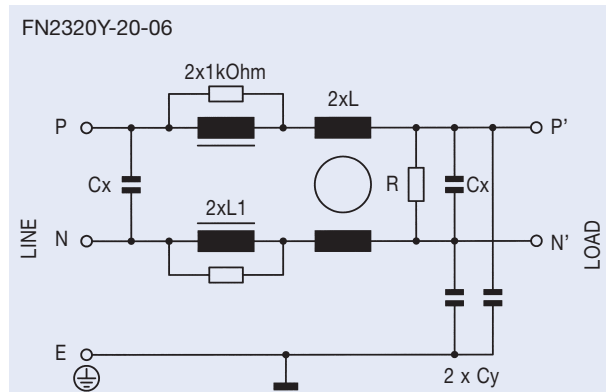
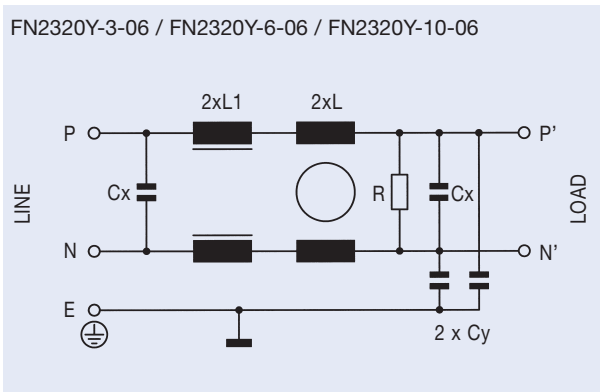
Filter	Conn. / Housing		Current ratings @40°C (25°C) A	Inductance		Capacitance		Resistance R MΩ	Weight g
				L mH	L1 μH	Cx μF	Cy nF		
FN2320Y-3-06	Fast-on	H2	3 (3.35)	1.1	30	0.33	5.5	1	125
FN2320Y-6-06	Fast-on	K2	6 (6.7)	1.9	70	0.33	5.5	1	275
FN2320Y-10-06	Fast-on	K2	10 (11.2)	1.3	40	0.33	5.5	1	285
FN2320Y-20-06	Fast-on	L1	20 (22.4)	1.0	30	0.33	5.5	1	600

Additional specifications

Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		Maximum leakage @ 230VAC/50Hz mA	Temperature range
	VAC	Hz		PN→E VAC	P→N VDC		
All types	250	50/60	DC to 400	2000	1100	0.94	-25°C - +100°C

MTBF at 40°C, 230V, per Mil-HB-217F: 1,300,000 hours.

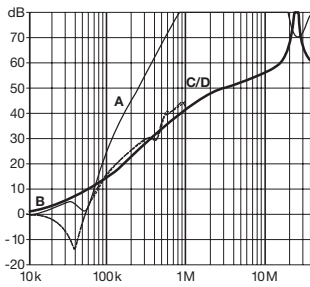
Electrical schematics



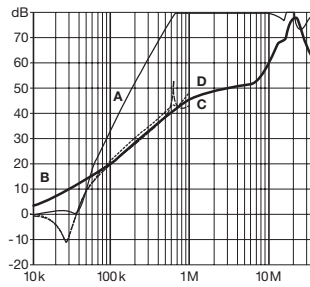
FN 2320 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

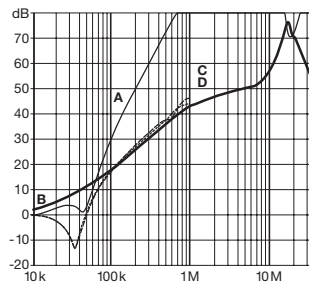
3 amp types



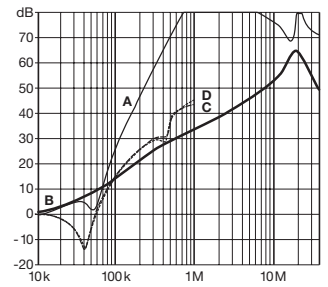
6 amp types



10 amp types

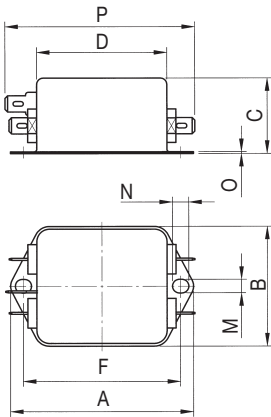


20 amp types



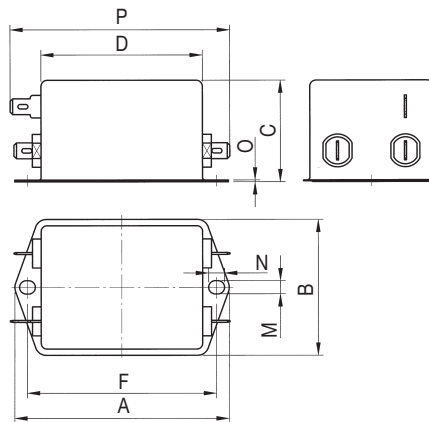
Mechanical data

-3A



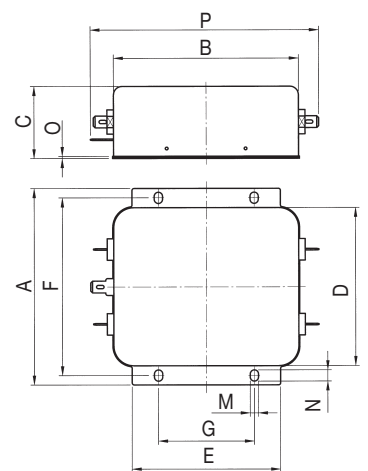
Housing H2

-6A, -10A



Housing K2

-20A



Housing L1

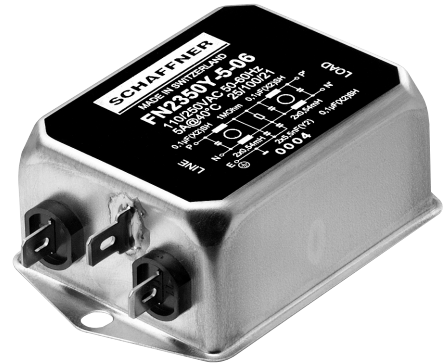
FN2320Y

	3A	6A	10A	20A	Tol.* [mm]
A	71	85		105	± 0.5
B	46.6	54		98.5 ± 1	± 0.5
C	29.3	40.3		38.6 ± 1	± 0.5
D	50.5	64		84.5 ± 1	± 0.5
E				79	± 0.5
F	61	75		95	± 0.3
G				51	± 0.1
M		5.3		4.4	± 0.1
N		6.3		6	± 0.1
O		0.7		1.2	± 0.1
P	74	87		121.6	± 1

* Measurements share this common tolerance unless otherwise stated.

All dimensions in mm; 1 inch = 25.4mm.

Single-phase chassis-mounting filter FN 2350



- Current ratings from 2 to 10A
- Exceptional differential and common mode attenuation
- UL-rated materials
- Nennströme von 2 bis 10A
- Sehr hohe Gleich- und Gegentaktdämpfung
- UL konformes Material
- Courants de service de 2 à 10A
- Très bonne atténuation en modes différentiel et commun
- Matériaux UL

Filter selection table

Approvals



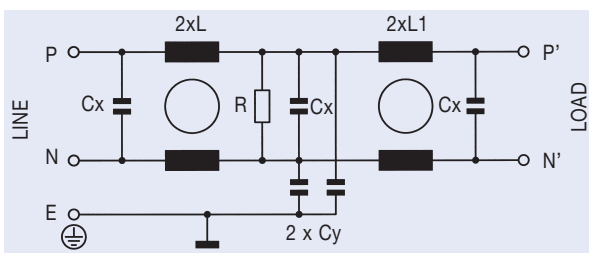
Filter	Conn. / Housing		Current ratings @40°C (25°C) A	Inductance		Capacitance		Resistance R MΩ	Weight g
				L mH	L1 mH	Cx μF	Cy nF		
FN2350Y-2-06	Fast-on	H2	2 (2.25)	0.52	0.52	0.1	5.5	1	115
FN2350Y-3-06	Fast-on	K1	3 (3.35)	1.7	1.7	0.1	5.5	1	175
FN2350Y-5-06	Fast-on	K1	5 (5.6)	0.54	0.54	0.1	5.5	1	175
FN2350Y-10-06	Fast-on	K2	10 (11.2)	0.54	0.54	0.1	5.5	1	225

Additional specifications

Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		Maximum leakage @ 230VAC/50Hz mA	Temperature range
	VAC	Hz		PN→E VAC	P→N VAC		
All types	250	50/60	DC to 400	2000	760	0.94	-25°C - +100°C

MTBF at 40°C, 230V, per Mil-HB-217F: 2,200,000 hours.

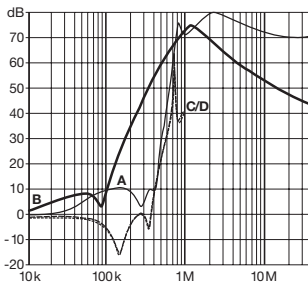
Electrical schematic



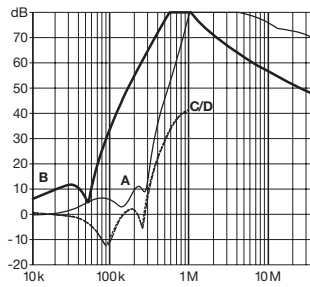
FN 2350 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

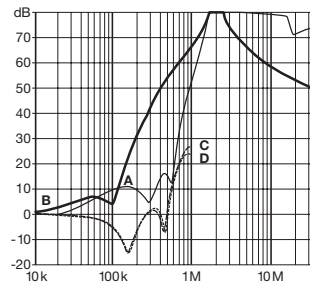
2 amp types



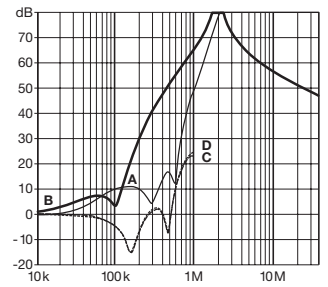
3 amp types



5 amp types

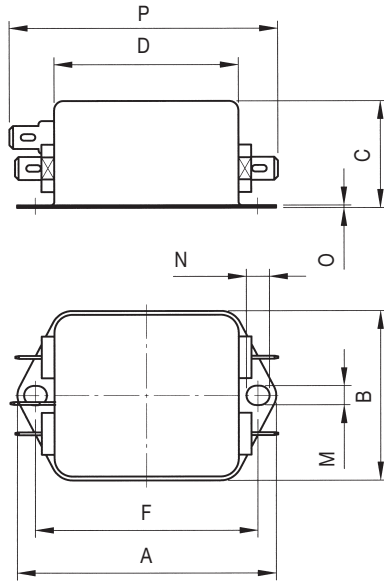


10 amp types



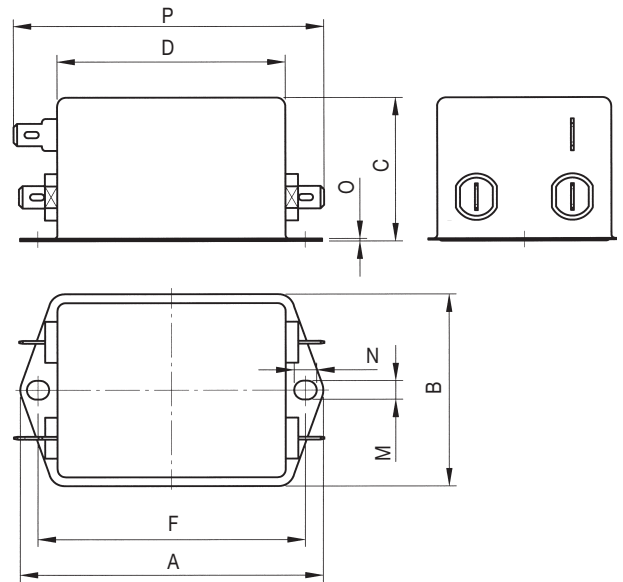
Mechanical data

-2A, -3A, -5A



Housing H2, K1

-10A



Housing K2

FN2350Y					Tol. [mm]
	2A	3A	5A	10A	
A	71		85		± 0.5
B	46.6		54		± 0.5
C	29.3		30.3	40.3	± 0.5
D	50.5		64		± 0.5
F	61		75		± 0.3
M			5.3		± 0.1
N			6.3		± 0.1
O			0.7		± 0.1
P	74		87		± 1

All dimensions in mm; 1 inch = 25.4mm.

Single-phase chassis-mounting filter FN 2360



- Current ratings of 3 and 6A
- Medical versions (B types)
- UL-rated materials
- Nennströme von 3 und 6A
- Versionen für medizinische Anwendungen (B-Typen)
- UL konformes Material
- Courants de service de 3 et 6A
- Version pour appareils médicaux (type B)
- Matériaux UL

Filter selection table

Approvals



Filter	Conn. / Housing		Current ratings @40°C (25°C) A	Inductance		Capacitance		Resistance R MΩ	Weight g
				L mH	L1 mH	Cx μF	Cy nF		
FN2360W-3-06	Fast-on	K2	3 (3.35)	32.3	0.4	0.47	3	1	300
FN2360B-3-06	Fast-on	K2	3 (3.35)	32.3	0.4	0.47	-	1	300
FN2360X-6-06	Fast-on	P	6 (6.7)	48.2	1.7	1.5	4	1	500
FN2360B-6-06	Fast-on	P	6 (6.7)	48.2	1.7	1.5	-	1	500

Additional specifications

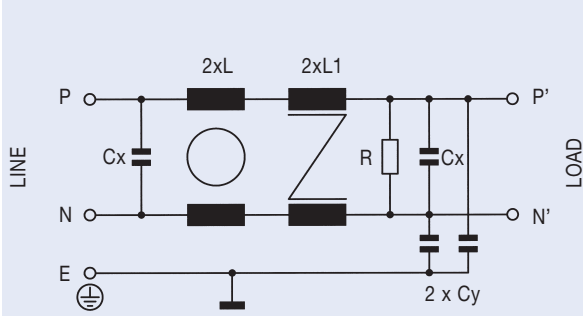
Filter type	Maximum operating voltage		Operating frequency Hz	Hipot test voltage		Maximum leakage @ 230VAC/50Hz mA	Temperature range
	VAC	Hz		PN→E VAC	P→N VDC		
Standard types	250	50/60	DC to 400	2000	1100	0.52 *	-25°C - +100°C
B medical types	250	50/60	DC to 400	2500	1100	0.004	-25°C - +100°C

MTBF at 40°C, 230V, per Mil-HB-217F: 2,400,000 hours.

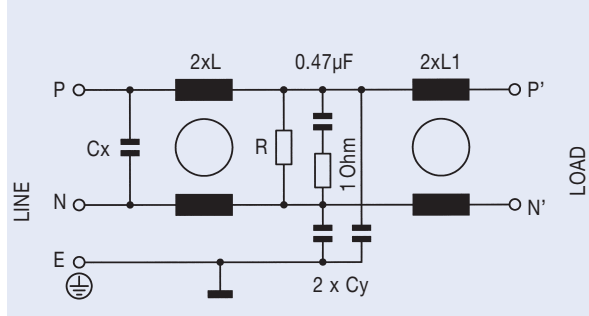
* 0.70mA for FN2360X-6-06

Electrical schematics

FN2360W-3-06 / FN2360B-3-06



FN2360X-6-06 / FN2360B-6-06

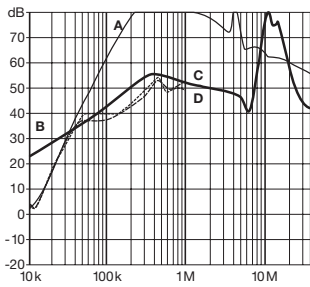


Note: Medical types (B-types) without Y-capacitors.

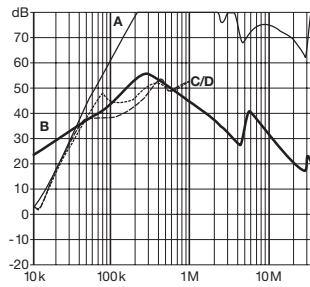
FN 2360 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym, B = 50Ω/50Ω asym, C = 0.1Ω/100Ω sym, D = 100Ω/0.1Ω sym

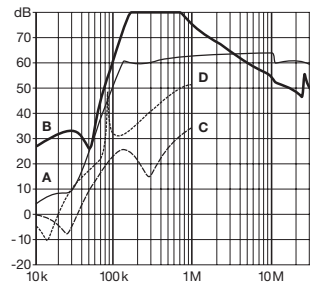
3 amp (W-types)



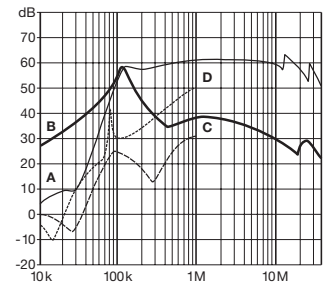
3 amp (B-types)



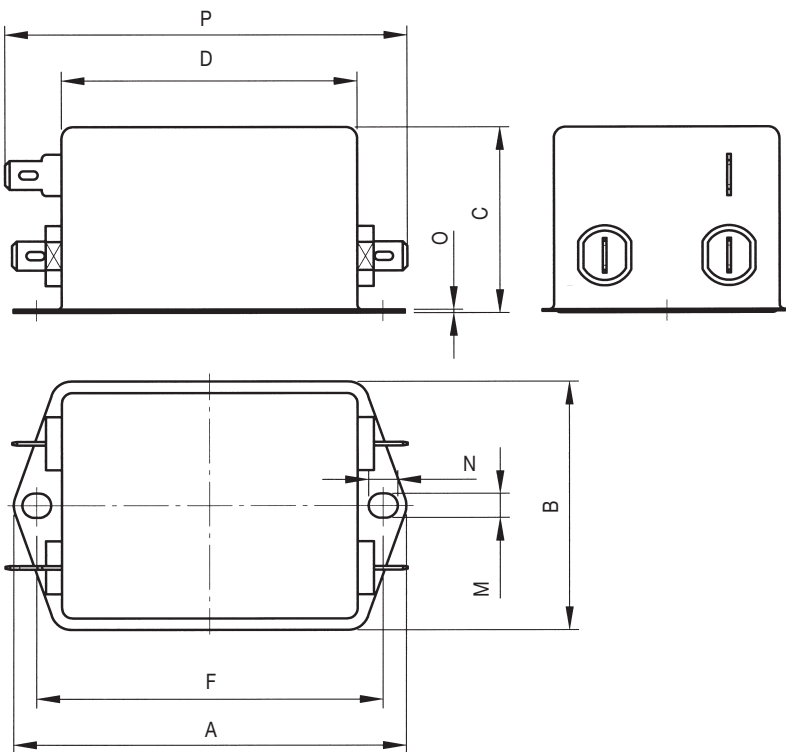
6 amp (X-types)



6 amp (B-types)



Mechanical data



FN2360

	FN2360W-3-06	FN2360B-3-06	FN2360X-6-06	FN2360B-6-06	Tol.* [mm]
A	85		113.5 ± 1		± 0.5
B	54		57.5 ± 1		± 0.5
C	40.3		45.5 ± 1		± 0.5
D	64		94 ± 1		± 0.5
F	75		103.5		± 0.3
M	5.3		4.4		± 0.1
N	6.3		6		± 0.1
O	0.7		1		± 0.1
P	87		117		± 1

* Measurements share this common tolerance unless otherwise stated.

All dimensions in mm; 1 inch = 25.4mm.

Single-phase filter for the control line of equipment

FN 2415

- Filter for the control line of complex equipment and machinery
- Ensures the interference-free operation of the control unit / PLC
- Improves the immunity and reliability of the entire system
- Compact EMC-filter design with minimum space requirement
- Zusatzfilter für die Steuerleitung komplexer Anlagen und Maschinen
- Gewährleistet den störungsfreien Betrieb der Steuerung / SPS
- Erhöht die Störfestigkeit und Zuverlässigkeit der Gesamtanlage
- Kompakter EMV-Filter mit minimalem Platzbedarf
- Filtre pour le contrôle des alimentations d'équipements complexes et de machines
- Assure l'élimination des interférences lors des fonctionnements des unités de contrôle PLC
- Améliore l'immunité et la fiabilité des systèmes complets
- Filtre CEM au design compact qui requiert une surface minimum



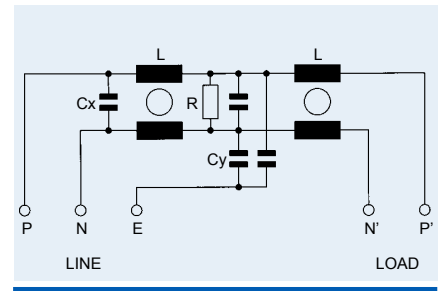
Technical specifications

Maximum operating voltage:	250VAC (230VAC +10% possible)
Operating frequency:	dc to 60Hz
Current ratings:	6 to 16A @ 50°C
High potential test voltage:	P/N → E 2250VDC for 2 sec P → N 1100VDC for 2 sec
Protection category:	IP 20
Overload:	4 times rated current at switch on, 1.5 times rated current for 1 minute, once per hour
Temperature range:	-25°C to +100°C (25/100/21)
Flammability corresponding to:	UL 94V2
Design corresponding to:	UL 1283, CSA 22.2 No. 8 1986, EN 133'200

Approvals



Typical electrical schematic



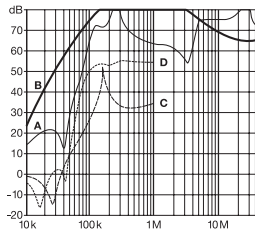
Filter	Current rating @ 50°C (40°C) [A]	Leakage current* 250VAC/50Hz [mA]	Power loss @ 25°C [W]	I/O connections	Weight [kg]
FN 2415-6-29	6 (6.6)	9.4	2.2	29	0.4
FN 2415-10-29	10 (11)	9.4	2.4	29	0.4
FN 2415-16-29	16 (17.5)	9.4	4.3	29	0.4

* Maximum leakage under normal operating conditions. Note: if the neutral line is interrupted, worst case leakage could reach 2x this level.

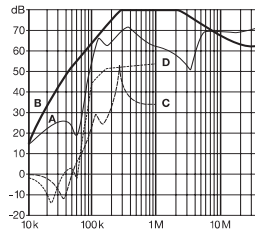
FN 2415 insertion loss

Per CISPR 17; A = 50Ω/50Ω sym; B = 50Ω/50Ω asym; C = 0.1Ω/100Ω sym; D = 100Ω/0.1Ω sym.

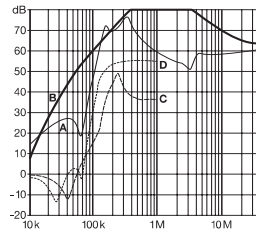
6A types



10A types



16A types



Features and advantages

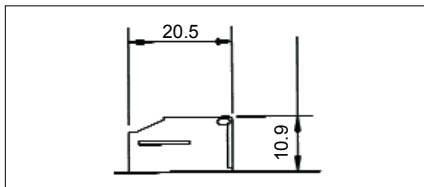
- An additional filter for the supply cables of controls of rather large and complex systems, to ensure a fault free operation of the control unit (PLC, Motion Control etc.).
- Improves the immunity, reliability and service security of the entire system significant by reducing the risk of internal interference propagation and coupling.
- An extremely compact and light-weight filter design requiring minimum mounting space in machinery and equipment.
- Simple and time-saving installation with good accessibility for automatic- and hand-tools.
- Solid, touch-safe terminal blocks offering sufficient contacting cross section according to the EN60204-1 installation standard, which is very common for machine tools and industrial equipment.
- By providing a very decent attenuation performance, FN 2415 contributes significant to the achievement of electromagnetic compliance according to the latest standards (like EN50370-1 for machine tools).

Typical applications

Ideal for industrial equipment, machinery, machine tools and diverse process automation systems, which involve any kind of numeric control units (NC, CNC, PLC, Motion Controls). Rather large and complex machine tools, with 8 or even more driving axes and very long motor cables, can be subjected to major reliability problems, caused by internal coupling of interference's from the drive system to the control lines. Very often, this causes a drop out of the control unit and consequently downtimes of the entire machine. By operating an FN 2415 in addition to a mains input filter, these negative effects can be eliminated for most situations.

FN 2415 can also be used for the most diverse single-phase applications with medium to high interference levels, such as single-phase motor drives or (switch mode-) power supplies.

Filter input/output connections

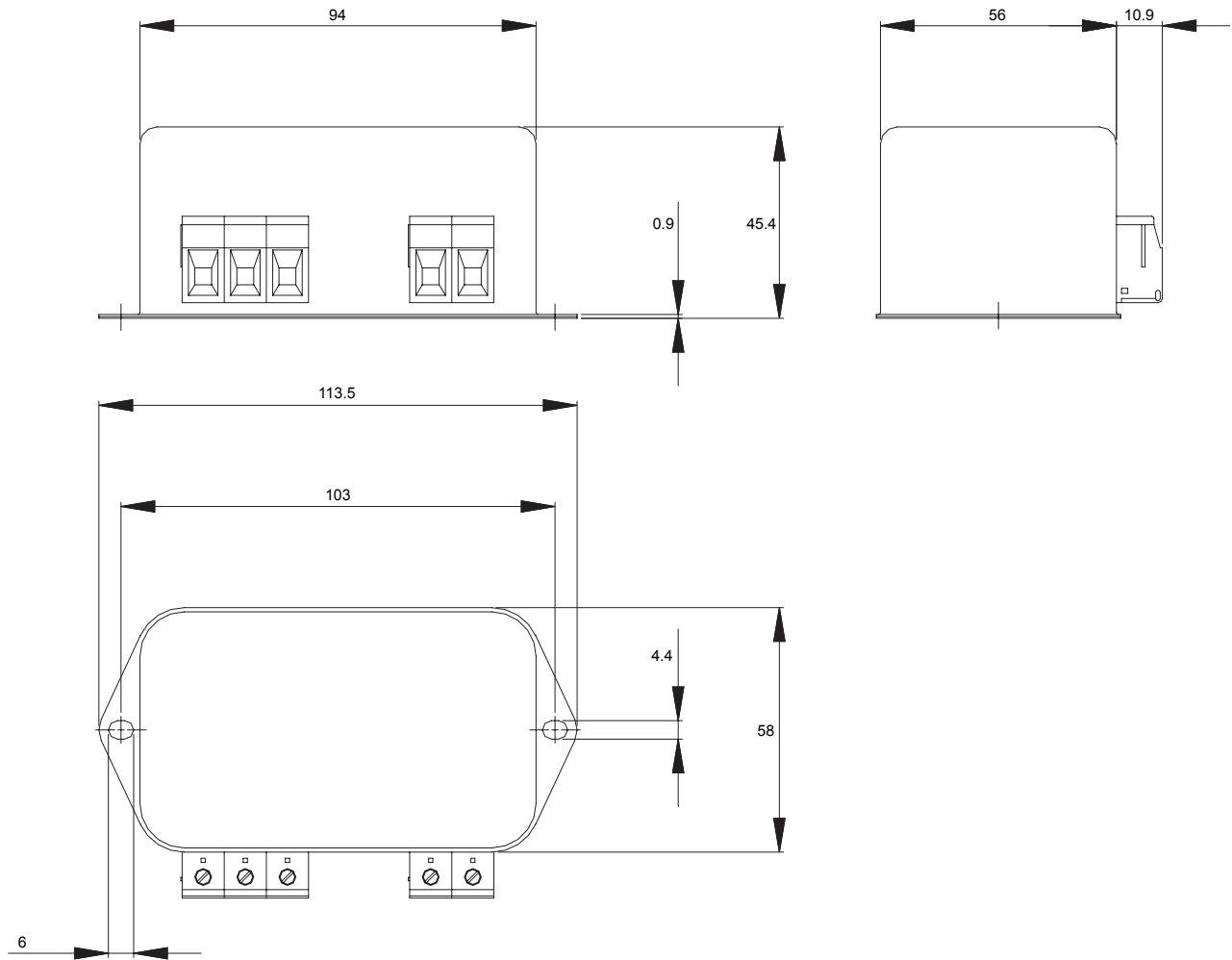


Type /29

Safety terminal block for solid wire
6mm², flex wire 4mm² or AWG 10.

Max. torque: 0.8Nm

FN 2415 mechanical data



All dimensions in mm; 1 inch = 25.4 mm

Tolerances according: ISO2768-m / EN22768-m