Power^{IT} LV Active Filters
PQFI-PQFM-PQFK-PQFS

Detailed technical specifications

Industrial IT enabled™

ABB

Technical specifications PQFI	
Installation location	
Indoor installation on firm foundations in a clean environment	
Altitude	Nominal output at 0 to 1000m (3300ft) above sea level [(a)]
Minimum temperature	-5°C (23°F) non condensing
Maximum temperature	40°C (104°F) [(b)]
Recommended maximum average temperature (over 24 h)	35°C (95°F)
Relative humidity	Max. 95% non condensing
Contamination levels (IEC 60721-3-3)	Chemical class 3C2 [(c)] Mechanical class 3S2 [(d)]
Vibration (IEC 60068-2-6)	Max. 0.3mm (2-9Hz) Max. 1m/s^2 (9-200Hz)
Shock (IEC 60068-2-27)	40m/s² - 22ms
Filter installation information	
Degree of protection	IP21 (IP20 open door) For other protection classes, see options.
Dimensions per power unit cubicle (appr.)	
CE version	W x D x H: 800 x 600 x 2150 mm (without base frame)
cULus version	W x D x H: 1400 x 600 x 2250 mm (with base frame)
Weight per power unit cubicle (unpacked) CE version	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 250 A	520 kg
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 450 A	640 kg
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) • Unit rating: 180 A	540 kg
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) • Unit rating: 320 A	640 kg
Weight per power unit cubicle (unpacked) cULus version	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 250 A	630 kg
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 450 A	750 kg
• Network voltage: 480 V < Ue ≤ 600 V (Voltage group V2) • Unit rating: 180 A	650 kg
• Network voltage: 480 V < Ue ≤ 600 V (Voltage group V2) • Unit rating: 320 A	750 kg
Color	RAL 7035 (light gray) Other colors on request.
Mechanical installation	Floor fixation, lifting lugs provided
Cable entry method	
CE version	Bottom cable entry Common cable entry cubicle on request
cULus version	Top or bottom cable entry
CT requirements	3 CTs are required (Class 1.0 or better) Filter burden: 5 VA

	15 VA burden for up to 30 m of standard size cable 5 A secondary rating CTs must be installed in closed loop configuration
Airflow requirements	A minimum of 2100 m^3/h cooling air has to be supplied to each cubicle.
Network voltage characteristics	
Network voltage ratings	208 V ≤ Ue ≤ 480 V between phases (Voltage group V1) 480 V < Ue ≤ 690 V between phases (Voltage group V2) [e]
Network voltage tolerance	+/- 10 %
Network frequency	50 Hz or 60 Hz
Network frequency tolerance	+/- 5 %
Maximum rate of frequency variation	20%/s
Maximum phase jump of network voltage	30°
Network voltage distortion	Maximum 20% phase to phase
Minimum network fault level	2 MVA
Voltage notch limits	According to IEEE519-1992, dedicated systems category Notch depth: ≤ 50% Notch area: ≤ 76*U V*µs Connection requirement: z_{load} (%) ≥ S_{load}/S_{trafo} * z_{trafo} (%) where: S_{load} : Notch producing load power S_{trafo}: Transformer nominal power z_{trafo}: Transformer impedance in % z_{load} : Impedance between notch producing load and filter connection point (% in load base)
Line voltage imbalance	Maximum 2% of phase to phase voltage
Surge withstand capability with optional surge arrester	According to IEC1643-1
Insulation voltage (Ui)	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1)	480V
• Network voltage: 480 V ≤ Ue ≤ 690 V (Voltage group V2) [e]	690V for CE version 600V for cULus version
Auxiliary circuit voltage	230 Vrms (+/- 10%)
Neutral connection systems	Not applicable
EMC-Environment class (according to IEC 60439-1) (CE version only)	2
Compliance with standards	
General construction aspects	EN-60439-1 (1999)
EMC immunity (CE version only)[i]	EN/IEC 61000-6-2, Industrial level
EMC emissions (CE version only)[i]	EN/IEC 61000-6-4, Class A
Filter characteristics	
RMS output current per power unit type[h] (50Hz or 60Hz network).	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1)	Unit type 1 (M25, S25): 250 A Unit type 2 (M45, S45): 450 A
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [e]	Unit type 1 (M18, S18): 180 A [f] Unit type 2 (M32, S32): 320 A [f]
Modularity	Up to 8 power units/filter (possible to use different power unit ratings of the same voltage group.) One power unit per cubicle.
Harmonics that can be filtered	20 harmonics individually selectable in the range 2^{nd} – 50^{th} harmonic order
Degree of filtering	Programmable per harmonic in absolute terms
Filtering efficiency	Better than 97% of filter rating typically
Response time	< 0.5 instantaneous 40 ms typically (10% - 90% filtering)

Reactive power	Static/dynamic Power factor programmable from 0.6 inductive to 0.6 capacitive
Load balancing	Off Line to line balancing (3-W mode)
Setting possibilities	Main and auxiliary settings functionality. Three possible filter modes that allow to set different priorities
Start and stop settings	Local/remote control functionality. Filter standby functionality. Auto restart after power outage functionality.
Digital inputs	2 multi purpose digital inputs on PQF-Manager. Vlow: 0 Vdc, Vhigh: 15-24 Vdc, driving current: 13 mA@ 24Vdc (Rint = 1.88 kΩ). Can be used to implement remote control functionality, start/stop buttons and switching between main and auxiliary settings.
Digital outputs	6 multi purpose digital outputs on PQF-Manager. Maximum continuous ac rating: 440 Vac/1.5 A Maximum continuous dc rating: 110 Vdc/0.3 A Common rating: 9A/terminal, totaling 18 A Can be used to monitor the filter state (e.g. filter on/off or specific filter warnings/alarms) and the network state.
Alarm contact	1 universal alarm contact with two complimentary outputs (NO/NC) on PQF-Manager. Triggered by any fault. Maximum continuous rating: 250 Vac/1.5 A
Filter losses (maximum values)	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 250 A	≤ 5.2 kW
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 450 A	≤ 11 kW
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)] • Unit rating: 180 A	≤ 7.1 kW
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)] • Unit rating: 320 A	-[(g)]
Phase to earth resistance	200 kΩ/filter system
Noise intensity	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 250 A	70 dBA typically
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 450 A	78 dBA typically
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)] • Unit rating: 180 A	70 dBA typically
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)] • Unit rating: 320 A	78 dBA typically
Communication	Through PQF-Manager display. Through Modbus RTU (with optional adapter). Through RS-232 port with dedicated optional software (PQF-Link).
Programming	Through PQF-Manager display. Through RS-232 port with dedicated optional software (PQF-Link).

Fuse information	
Auxiliary circuit fuses (CE version): Vsupply: 208 V ≤ Ue ≤ 480 V Vsupply: 480 V < Ue ≤ 690 V	 French Ferrule 10 x 38 gG/gL, 16A, 500V, Isc ~120kA French Ferrule 14 x 51 gG/gL, 16A, 690V, Isc ~80kA
Auxiliary circuit fuses (cULus version): Vsupply: 208 V ≤ Ue ≤ 480 V Vsupply: 480 V < Ue ≤ 600 V	 NAPF 10 x 38 Fact Acting, 15A, 600V, Isc ~200kA NAPF 10 x 38 Fact Acting, 15A, 600V, Isc ~200kA
Distribution board fuses	5 x 20T, 10A / 250V
DC link protection fuses	Ferraz Schawmut, French Standard PSC, Size 70, 350A, Ref W300491
Surge arrester fuses (CE version)	Size 0, 125A, gG/gL, with striker
Surge arrester fuses (cULus version)	OVR 15-660 US
Options	
PQF-Link software	
Common cable entry cubicle (1200A) (CE version only)	
IP41 execution (filter derating of 10% has to be applied)	
Base frame (100 mm height) for single unit (CE version only)	
Modbus kit (RS-485 based)	
Printer kit (RS-232 based, including thermal paper and battery)	
Surge arresters (CE version only)	
Space heaters	
Temperature probe 3 m	
Temperature probe 10 m	
Base frame for complete unit (CE version only)	
Reinforced output filter for networks beyond IEEE519-1992, dedicated systems category	

Remark:

[a] At sites over 1000m (3300ft) above sea level, the maximum output current must be derated by 1% every additional 100m (330ft). The derating factor must be entered at commissioning.

[b] Above 40°C (104°F), the maximum output current must be derated by 3.5% every additional 1°C (1.8°F) up to 50°C (122°F) maximum limit. The derating factor must be entered at commissioning.

[c] Locations with normal levels of contaminants, experienced in urban areas with industrial activities scattered over the whole area, or with heavy traffic.

[d] Locations without special precautions to minimize the presence of sand or dust, but not situated in proximity to sand or dust sources.

[e] cULus versions of PQFI are limited to 600 Vrms.

[f] If the nominal system voltage is higher than 600V (Ue > 600V) the current rating of PQFI units in this voltage range may be derated automatically depending on the operating temperature.

[g] Not available at time of printing.

[h] Under exceptional circumstances other limits may be reached before the RMS current limit (e.g. temperature limit, peak current limit, peak voltage limit).

[i] C-Tick mark available.

Technical specifications PQFM	
Installation location	
Indoor installation on firm foundations in a clean environment	
Altitude	Nominal output at 0 to 1000m (3300ft) above sea level [(a)]
Minimum temperature	-5°C (23°F) non condensing
Maximum temperature	40°C (104°F) [(b)]
Recommended maximum average temperature (over 24 h)	35°C (95°F)
Relative humidity	Max. 95% non condensing
Contamination levels (IEC 60721-3-3)	Chemical class 3C2 [(c)] Mechanical class 3S2 [(d)]
Vibration (IEC 60068-2-6)	Max. 0.3mm (2-9Hz) Max. 1m/s^2 (9-200Hz)
Shock (IEC 60068-2-27)	Max. 40m/s² - 22ms
Filter installation information	
Degree of protection	Cubicle version: IP21 (IP20 open door) Plate version: IP00 For other protection classes, see options.
Dimensions per power unit cubicle (appr.)	W x D x H: 600 x 600 x 2150 mm (without base frame)
Weight per power unit cubicle (unpacked)	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 70 A	IP21: 250 kg IP00: 130 kg
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 100 A	IP21: 260 kg IP00: 140 kg
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 130 A	IP21: 260 kg IP00: 150 kg
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)] • Unit rating: 100 A	IP21: 270 kg IP00: 150 kg
Color	RAL 7035 (light gray) Other colors on request.
Mechanical installation	Plate version: mountable in cubicle. Cubicle version: floor fixation, lifting lugs provided
Cable entry method	Plate version: bottom or top cable entry Cubicle version: bottom cable entry, optional top cable entry cable feed through Common cable entry cubicle on request
CT requirements	3 CTs are required (Class 1.0 or better) Filter burden: 5 VA 15 VA burden for up to 30 m of 2.5 mm² cable 5 A secondary rating CTs must be installed in closed loop configuration
Airflow requirements	A minimum of 700 m³/h cooling air has to be supplied to each cubicle.
Network voltage characteristics	
Network voltage ratings	208 V ≤ Ue ≤ 480 V between phases (Voltage group V1) 480 V < Ue ≤ 690 V between phases (Voltage group V2) [(e)]
Network voltage tolerance	+/- 10 %
Network frequency	50 Hz or 60 Hz
Network frequency tolerance	+/- 5 %
Maximum rate of frequency variation	20%/s
Maximum phase jump of network voltage	30°
Network voltage distortion	Maximum 20% phase to phase
Minimum network fault level	1 MVA
Voltage notch limits	According to IEEE519-1992, dedicated systems category

	Notch depth: ≤ 50% Notch area: ≤ 76*U V*µs Connection requirement: z_{load} (%) ≥ S_{load}/S_{trafo} * z_{trafo} (%) where: S_{load}: Notch producing load power S_{trafo}: Transformer nominal power z_{trafo}: Transformer impedance in % z_{load} : Impedance between notch producing load and filter connection point (% in load base)
Line voltage imbalance	Maximum 2% of phase to phase voltage
Surge withstand capability with optional surge arrester	According to IEC1643-1
Insulation voltage (Ui)	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1)	480V
• Network voltage: 480 V ≤ Ue ≤ 690 V (Voltage group V2) [(e)]	690V for CE version 600V for cULus version
Auxiliary circuit voltage	230 Vrms (+/- 10%)
Neutral connection systems	Not applicable
EMC-Environment class (according to IEC 60439-1) (CE version only)	2
Compliance with standards	
General construction aspects	EN-60439-1 (1999)
EMC immunity (CE version only)[(i)]	EN/IEC 61000-6-2, Industrial level
EMC emissions (CE version only)[(i)]	EN/IEC 61000-6-4, Class A
Filter characteristics	
RMS output current per power unit type[(h)] (50Hz or 60Hz network).	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1)	Unit type 1 (M07, S07): 70 A Unit type 2 (M10, S10): 100 A Unit type 3 (M13, S13): 130 A
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [(e)]	Unit type 1 (M10, S10): 100 A [(f)]
Modularity	Up to 8 power units/filter (possible to use different power unit ratings of the same voltage group but difference between smallest and biggest unit should maximum be one current category.) One power unit per cubicle.
Harmonics that can be filtered	20 harmonics individual selectable in the range 2^{nd} – 50^{th} harmonic order
Degree of filtering	Programmable per harmonic in absolute terms
Filtering efficiency	Better than 97% of filter rating typically
Response time	< 0.5 ms instantaneous 40 ms typically (10% - 90% filtering)
Reactive power	Static/dynamic Power factor programmable from 0.6 inductive to 0.6 capacitive
Load balancing	Off Line to line balancing (3-W mode)
Setting possibilities	Main and auxiliary settings functionality. Three possible filter modes that allow to set different priorities
Start and stop settings	Local/remote control functionality. Filter standby functionality. Auto restart after power outage functionality.

Digital inputs	2 multi purpose digital inputs on PQF-Manager. Vlow: 0 Vdc, Vhigh: 15-24 Vdc, driving current: 13 mA@ 24Vdc (Rint = 1.88 kΩ). Can be used to implement remote control functionality, start/stop buttons and switching between main and auxiliary settings.
Digital outputs	6 multi purpose digital outputs on PQF-Manager. Maximum continuous ac rating: 440 Vac/1.5 A Maximum continuous dc rating: 110 Vdc/0.3 A Common rating: 9A/terminal, totaling 18 A Can be used to monitor the filter state (e.g. filter on/off or specific filter warnings/alarms) and the network state.
Alarm contact	1 universal alarm contact with two complimentary outputs (NO/NC) on PQF-Manager. Triggered by any fault. Maximum continuous rating: 250 Vac/1.5 A
Filter losses (maximum values)	
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 70 A	≤ 2.3 kW
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 100 A	≤ 2.8 kW
• Network voltage: 208 V ≤ Ue ≤ 480 V (Voltage group V1) • Unit rating: 130 A	≤ 3.5 kW
• Network voltage: 480 V < Ue ≤ 690 V (Voltage group V2) [e] • Unit rating: 100 A	- [g]
Phase to earth resistance	200 kΩ/filter system
Noise intensity	67 dBA typically
Communication	Through PQF-Manager display. Through Modbus RTU (with optional adapter). Through RS-232 port with dedicated optional software (PQF-Link).
Programming	Through PQF-Manager display. Through RS-232 port with dedicated optional software (PQF-Link).
Fuse information	
Main circuit fuses (CE version): Vsupply: 208V ≤ Ue ≤ 480V Vsupply: 480V < Ue ≤ 690V	 NH Fuse gL or gG, 160A, 500V, Isc 120kA NH Fuse gL or gG, 125A, 690V, Isc 80kA
Main circuit fuses (cULus version): Vsupply: 208V ≤ Ue ≤ 480V Vsupply: 480V < Ue ≤ 600V	 Class J Time delay, 175A, 600V, Isc 120kA Class J Time delay, 175A, 600V, Isc 120kA
Auxiliary circuit fuses (CE version): Vsupply: 208V ≤ Ue ≤ 480V Vsupply: 480V < Ue ≤ 690V	 French Ferrule 10 x 38 gG/gL, 6A, 500V, Isc ~120kA French Ferrule 14 x 51 gG/gL, 6A, 690V, Isc ~80kA
Auxiliary circuit fuses (cULus version): Vsupply: 208V ≤ Ue ≤ 480V Vsupply: 480V < Ue ≤ 600V	 Class CC, 6A, 600V, Isc 200kA Class CC, 6A, 600V, Isc 200kA
Distribution board fuses	5 x 20T, 10A / 250V
DC link protection fuses	Ferraz Schawmut, French Standard PSC, Size 70, 200A, Ref S300488
Surge arrester fuses (CE version only)	size 0, 125A, gG/gL, with striker

Options
PQF-Link software
Common cable entry cubicle (1200A)
IP41 execution (filter derating of 10% has to be applied)
Base frame (100 mm height) for single unit
Modbus kit (RS-485 based)
Printer kit (RS-232 based, including thermal paper and battery)
Surge arresters (CE version only)
Space heaters (CE version only)
Temperature probe 3 m
Temperature probe 10 m
Top cable entry for IP21 execution
Top cable entry for IP41 execution
Base frame for complete unit
Reinforced output filter for networks beyond IEEE519-1992, dedicated systems category

Remark:

(a) At sites over 1000m (3300ft) above sea level, the maximum output current must be derated by 1% every additional 100m (330ft). The derating factor must be entered at commissioning.

(b) Above 40°C (104°F), the maximum output current must be derated by 3.5% every additional 1°C (1.8°F) up to 50°C (122°F) maximum limit. The derating factor must be entered at commissioning.

(c) Locations with normal levels of contaminants, experienced in urban areas with industrial activities scattered over the whole area, or with heavy traffic.

(d) Locations without special precautions to minimize the presence of sand or dust, but not situated in proximity to sand or dust sources.

(e) cULus versions of PQFM are limited to 600 Vrms.

(f) If the nominal system voltage is higher than 600V (Ue > 600V) the current rating of PQFM units in this voltage range may be derated automatically depending on the operating temperature.

(g) Not available at time of printing.

(h) Under exceptional circumstances other limits may be reached before the RMS current limit (e.g. temperature limit, peak current limit, peak voltage limit).

(i) C-Tick mark available.

Technical specifications PQFK	
Installation location	
Indoor installation on firm foundations in a clean environment	
Altitude	Nominal output at 0 to 1000m (3300ft) above sea level [(a)]
Minimum temperature	-5°C (23°F) non condensing
Maximum temperature	40°C (104°F) [(b)]
Recommended maximum average temperature (over 24 h)	35°C (95°F)
Relative humidity	Max. 95% non condensing
Contamination levels (IEC 60721-3-3)	Chemical class 3C2 [(c)] Mechanical class 3S2 [(d)]
Vibration (IEC 60068-2-6)	Max. 0.3mm (2-9Hz) Max. 1m/s^2 (9-200Hz)
Shock (IEC 60068-2-27)	Max. 40m/s² - 22ms
Filter installation information	
Degree of protection	Cubicle version: IP21 (IP20 open door) Plate version: IP00 For other protection classes, see options.
Dimensions per power unit cubicle	W x D x H: 600 x 600 x 2150 mm (without base frame)
Weight per power unit cubicle (unpacked)	
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 40 A	IP21: 250 kg IP00: 130 kg
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 70 A	IP21: 260 kg IP00: 150 kg
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 100 A	IP21: 270 kg IP00: 150 kg
Color	RAL 7035 (light gray) Other colors on request.
Mechanical installation	Plate version: mountable in cubicle. Cubicle version: floor fixation, lifting lugs provided
Cable entry method	Plate version: bottom or top cable entry Cubicle version: bottom cable entry, optional top cable entry cable feed through. Common cable entry cubicle on request
CT requirements	3 CTs are required (Class 1.0 or better) Filter burden: 5 VA 15 VA burden for up to 30 m of 2.5 mm² cable 5 A secondary rating CTs must be installed in closed loop configuration
Airflow requirements	A minimum of 700 m³/h cooling air has to be supplied to each cubicle.
Network voltage characteristics	
Network voltage ratings	208 V ≤ Ue ≤ 415 V between phases
Network voltage tolerance	+/- 10 %
Network frequency	50 Hz or 60 Hz
Network frequency tolerance	+/- 5 %
Maximum rate of frequency variation	20%/s
Maximum phase jump of network voltage	30°
Network voltage distortion	Maximum 20% phase to phase
Minimum network fault level	1 MVA
Voltage notch limits	No notching allowed.
Line voltage imbalance	Maximum 5% of phase to phase voltage
Surge withstand capability with optional surge arrester	Not applicable
Insulation voltage (Ui)	415V
Auxiliary circuit voltage	230 Vrms (+/- 10%)
Neutral connection systems [(f)]	IT, TT, TNC and TNS
EMC-Environment class (according to IEC	2

60439-1) (CE version only)	
Compliance with standards	
General construction aspects[(e)]	EN-60439-1 (1999)
EMC immunity (CE version only)[(g)]	EN/IEC 61000-6-2, Industrial level
EMC emissions (CE version only)[(g)]	EN/IEC 61000-6-4, Class A
Filter characteristics	
RMS output current per power unit type[(e)] (50Hz or 60Hz network).	
• Network voltage: 280 V – 415 V	Unit type 1 (M04, S04): 40 A Unit type 2 (M07, S07): 70 A Unit type 3 (M10, S10): 100 A
Modularity	Up to 4 power units/filter (power units must have same rating.) One power unit per cubicle.
Harmonics that can be filtered	15 harmonics individual selectable in the range 2^{nd} – 50^{th} harmonic order
Degree of filtering	Programmable per harmonic in absolute terms
Filtering efficiency	Better than 97% of filter rating typically
Response time	< 0.5 ms instantaneous 40 ms typically (10% - 90% filtering)
Reactive power	Static/dynamic Power factor programmable from 0.6 inductive to 0.6 capacitive
Load balancing	Off Line to neutral balancing Line to line balancing Line to neutral and line to line balancing
Setting possibilities	Main and auxiliary settings functionality. Three possible filter modes that allow to set different priorities
Start and stop settings	Local/remote control functionality. Filter standby functionality. Auto restart after power outage functionality.
Digital inputs	2 multi purpose digital inputs on PQF-Manager. Vlow: 0 Vdc, Vhigh: 15-24 Vdc, driving current: 13 mA@ 24Vdc (Rint = 1.88 kΩ). Can be used to implement remote control functionality, start/stop buttons and switching between main and auxiliary settings.
Digital outputs	6 multi purpose digital outputs on PQF-Manager. Maximum continuous ac rating: 440 Vac/1.5 A Maximum continuous dc rating: 110 Vdc/0.3 A Common rating: 9A/terminal, totaling 18 A Can be used to monitor the filter state (e.g. filter on/off or specific filter warnings/alarms) and the network state.
Alarm contact	1 universal alarm contact with two complimentary outputs (NO/NC) on PQF-Manager. Triggered by any fault. Maximum continuous rating: 250 Vac/1.5 A
Filter losses (maximum values)	
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 40 A	≤ 2.5 kW
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 70 A	≤ 2.8 kW
• Network voltage: 208 V ≤ Ue ≤ 415 V • Unit rating: 100 A	≤ 3.5 kW
Phase to earth resistance	200 kΩ/filter system
Noise intensity	63 dBA typically
Communication	Through PQF-Manager display. Through Modbus RTU (with optional adapter). Through RS-232 port with dedicated optional software (PQF-Link).

Programming	Through PQF-Manager display. Through RS-232 port with dedicated optional software (PQF-Link).
Fuse information	
Main circuit fuses (CE version): Vsupply: 208V ≤ V ≤ 415V	NH Fuse gL or gG, 160A, 500V, Isc 120kA
Main circuit fuses (cULus version): Vsupply: 208V ≤ V ≤ 415V	Class J Time delay, 175A, 600V, Isc 200kA
Auxiliary circuit fuses (CE version): Vsupply: 208V ≤ V ≤ 415V	French Ferrule 10 x 38 gG/gL, 6A, 500V, Isc ~120kA
Auxiliary circuit fuses (cULus version): Vsupply: 208V ≤ V ≤ 415V	Class CC, 6A, 600V, Isc 200kA
Distribution board fuses	5 x 20T, 10A / 250V
DC link protection fuses	Ferraz Schawmut, French Standard PSC, Size 70, 350A, Ref W300491
Options	
PQF-Link software	
Common cable entry cubicle (1200A)	
IP41 execution (filter derating of 10% has to be applied)	
Base frame (100 mm height) for single unit	
Modbus kit (RS-485 based)	
Printer kit (RS-232 based, including thermal paper and battery)	
Temperature probe 3 m	
Temperature probe 10 m	
Base frame for complete unit	
Reinforced output filter for networks beyond IEEE519-1992, dedicated systems category	

Remark:

(a) At sites over 1000m (3300ft) above sea level, the maximum output current must be derated by 1% every additional 100m (330ft). The derating factor must be entered at commissioning.

(b) Above 40°C (104°F), the maximum output current must be derated by 3.5% every additional 1°C (1.8°F) up to 50°C (122°F) maximum limit. The derating factor must be entered at commissioning.

(c) Locations with normal levels of contaminants, experienced in urban areas with industrial activities scattered over the whole area, or with heavy traffic.

(d) Locations without special precautions to minimize the presence of sand or dust, but not situated in proximity to sand or dust sources.

(e) Under exceptional circumstances other limits may be reached before the RMS current limit (e.g. temperature limit, peak current limit, peak voltage limit).

(f) The PQF active filter is not compatible with high impedance devices installed upstream of the filter in the neutral. The PQF may refuse to start or may not function correctly when such a device is present. For best PQF performance, these devices have to be removed or bypassed.

(g) C-Tick mark available.

Technical specifications PQFS	
Installation location	
Indoor installation, wall mounted in a clean environment.	
Altitude	Nominal output at 0 to 1000m (3300ft) above sea level [(a)]
Minimum temperature	-5°C (23°F) non condensing
Maximum temperature	40°C (104°F) [(b)]
Recommended maximum average temperature (over 24 h)	35°C (95°F)
Relative humidity	Max. 95% non condensing
Contamination levels (IEC 60721-3-3)	Chemical class 3C2 [(c)] Mechanical class 3S2 [(d)]
Vibration (IEC 60068-2-6)	Max. 0.3mm (2-9Hz) Max. 1m/s^2 (9-200Hz)
Shock (IEC 60068-2-27)	Max. 40m/s^2 - 22ms
Filter installation information	
Standard degree of protection	IP30
Dimensions per power unit enclosure (appr.)	W x D x H: 585 x 310 x 700 mm
Weight per power unit enclosure (unpacked)	Appr. 120 kgs
Color	RAL 7035 (light gray) Other colors on request.
Mechanical installation	Wall mounted (rail provided)
Cable entry method	Bottom cable entry
CT requirements	3 CTs are required (Class 1.0 or better) Filter burden: 5 VA 15 VA burden for up to 30 m of standard size cable 5 A secondary rating CTs must be installed in closed loop configuration
Airflow requirements	A minimum of 400 m^3/h cooling air has to be supplied to each enclosure.
Network characteristics	
Network voltage ratings	208 V-240 V or 380 V-415 V between phases
Network voltage tolerance	+/- 10 %
Network frequency	50 Hz or 60 Hz
Network frequency tolerance	+/- 5 %
Maximum rate of frequency variation	20%/s
Maximum phase jump of network voltage	30°
Network voltage distortion	Maximum 20% phase to phase
Minimum network fault level	1 MVA
Voltage notch limits	No notching allowed.
Line voltage imbalance	Maximum 5% of phase to phase voltage
Surge withstand capability with optional surge arrester	Not applicable.
Insulation voltage (Ui)	415V
Neutral connection systems [(f)]	IT, TT, TNC and TNS.
EMC-environment class (according to IEC 60439-1)	2
Compliance with standards	
General construction aspects	EN-60439-1 (1999)
EMC immunity[(g)]	EN/IEC 61000-6-2, Industrial level
EMC emissions[(g)]	EN/IEC 61000-6-4, Class A
Filter characteristics	
RMS output current per power unit type[(e)] (50Hz or 60Hz network).	
• Network voltage: 208 V – 240 V	Unit type 1 (M03, S03): 30 A Unit type 2 (M04, S04): 45 A Unit type 3 (M06, S06): 60 A

• Network voltage: 380 V – 415 V	Unit type 1 (M03, S03): 30 A Unit type 2 (M04, S04): 45 A Unit type 3 (M06, S06): 60 A
Modularity	Up to 4 power units/filter (all power units must have same rating). One power unit per enclosure.
Harmonics that can be filtered	3-wire mode: 20 harmonics individually selectable in the range 2^{nd} – 50^{th} harmonic order. 4-wire mode: 15 harmonics individually selectable in the range 2^{nd} – 50^{th} harmonic order.
Degree of filtering	Programmable per harmonic in absolute terms
Filtering efficiency	Better than 97% of filter rating typically
Response time	< 0.5 ms instantaneous 40 ms typically (10% - 90% filtering)
Reactive power	Static/dynamic Power factor programmable from 0.6 inductive to 0.6 capacitive
Load balancing	Off Line to neutral balancing (4-W mode) Line to line balancing (3-w and 4-W mode) Line to neutral and line to line balancing (3-W and 4-W mode)
Setting possibilities	Main and auxiliary settings functionality. Three possible filter modes that allow to set different priorities
Start and stop settings	Local/remote control functionality. Filter standby functionality. Auto restart after power outage functionality.
Digital inputs	2 multi purpose digital inputs on PQF-Manager. Vlow: 0 Vdc, Vhigh: 15-24 Vdc, driving current: 13 mA@ 24Vdc (Rint = 1.88 kΩ). Can be used to implement remote control functionality, start/stop buttons and switching between main and auxiliary settings.
Digital outputs	6 multi purpose (NO) digital outputs on PQF-Manager. Maximum continuous ac rating: 440 Vac/1.5 A Maximum continuous dc rating: 110 Vdc/0.3 A Common rating: 9A/terminal, totaling 18 A Can be used to monitor the filter state (e.g. filter on/off or specific filter warnings/alarms) and the network state.
Alarm contact	1 universal alarm contact with two complimentary outputs (NO/NC) on PQF-Manager. Triggered by any fault. Maximum continuous rating: 250 Vac/1.5 A
Filter losses (maximum values)	
• Unit rating: 30 A	1.5 kW
• Unit rating: 45 A	1.8 kW
• Unit rating: 60 A	2.1 kW
Phase to earth resistance	180 kΩ/filter system
Noise intensity	60 dBA typically
Communication	Through PQF-Manager display. Through Modbus RTU (with optional adapter). Through RS-232 port with dedicated optional software (PQF-Link).
Programming	Through PQF-Manager display. Through RS-232 port with dedicated optional software (PQF-Link).

Fuse information	
Main circuit fuses (not included):	NH Fuse gL or gG, 500V, Isc 120kA
Auxiliary circuit fuses:	French Ferrule 10 x 38 gG/gl, 6A, 500V, Isc ~120kA
Options	
PQF-Link software	
Cable connection box	
Modbus kit (RS-485 based)	
Printer kit (RS-232 based, including thermal paper and battery)	
Temperature probe 3 m	
Temperature probe 10 m	
Cable extension for PQF-Manager	

Remark:

(a) At sites over 1000m (3300ft) above sea level, the maximum output current must be derated by 1% every additional 100m (330ft). The derating factor must be entered at commissioning.

(b) Above 40°C (104°F), the maximum output current must be derated by 3.5% every additional 1°C (1.8°F) up to 50°C (122°F) maximum limit. The derating factor must be entered at commissioning.

(c) Locations with normal levels of contaminants, experienced in urban areas with industrial activities scattered over the whole area, or with heavy traffic.

(d) Locations without special precautions to minimize the presence of sand or dust, but not situated in proximity to sand or dust sources.

(e) Under exceptional circumstances other limits may be reached before the RMS current limit (e.g. temperature limit, peak current limit, peak voltage limit).

(f) The PQF active filter is not compatible with high impedance devices installed upstream of the filter in the neutral. The PQF may refuse to start or may not function correctly when such a device is present. For best PQF performance, these devices have to be removed or bypassed.

(g) C-Tick mark available.