

Dynamic Power Factor Correction Systems

Dynamic Power Factor Correction Systems in sheet steel cabinets



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LSFC-E

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The SBS dynamic Power Factor Correction System from FRAKO switches without delay at the next voltage zero at the thyristor switch and thus avoids any peak inrush current. Wear-free switching. The solid-state switches function without any problems even when the capacitors are not discharged and without causing peak inrush currents.

Description

The FRAKO LSFC-E Dynamic Power Factor Correction System provides switching of the capacitor stages with complete elimination of contact wear and network perturbation.

With the RM 2012 fast-acting control relay systems of the LSFC-E series are used in low voltage networks:

- with low short-circuit capacities where disruptions occur when large consumers are switched on
- where a fast-acting Power Factor Correction System and a large number of switching cycles are necessary
- where Power Factor Correction is required for only a few supply cycles at a time

Power Range

LSFC-E: 100 to 300 kvar

Construction

Sheet steel cabinet with door and lifting lugs. Ventilation via air inlet filter in the cabinet door and electric fan. Modular construction combining up to three type C-E capacitor-reactor modules.

The components comprise:

- Self-healing LKT type power capacitors with low loss self-healing dielectric made from segmented metallised polypropylene film. Filled with a PCB-free filler. With discharge resistors, as per EN 60831-1 and -2 as well as IEC 60831-1 and -2
- Electronic switching assemblies designed for 100 % operating time
- Fuselinks, 3-pole, size NH00
- Busbar system
- Control terminal strip with control circuit fuse and thermal switch
- The basic units are equipped with an RM 9606 Reactive Power Control Relay with reaction times about 5 seconds. All systems can also be supplied with EMR 1100 S, EMR 1100 or RM 2012 Control Relays
- Fan, air inlet filter and temperature controller

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- Low-loss Harmonic Filter Reactors with thermal trip switch for the following series resonance frequencies:

Version	Resonance frequency	Detuning factor	For mains with utility audio frequency ¹⁾
P1	134 Hz	p = 14 %	≥ 166 Hz
P8	177 Hz	p = 8 %	≥ 217 Hz
P7	189 Hz	p = 7 %	≥ 228 Hz

¹⁾ Utility company specifications inconsistent with the above must be taken into account.

In addition, also note version specifications given in our Manual of Power Factor Correction.

Installation Site

The place of installation must comply with the requirements of the ingress protection and ambient temperature concerned.

Regulations

For installation and connection of Power Factor Correction Capacitors in Germany the following regulations must be complied with: VDE 0100, VDE 0105, VDE 0560 Part 46 and VDE 0106 Part 100 (German Association of Electrical Engineers). In other countries the equivalent local regulations must be followed.

Connection

The power supply cable enters the bottom of the cabinet through a sliding gland plate and a cable clamp rail, and is connected directly to the busbar system. The control cables are connected to the terminal strip provided for them.

System Expansion

The easy-to-maintain design simplifies the task of extending existing installations with less than three modules in one cabinet at a later date. It is also always possible to extend existing systems by installing an additional cabinet, type LSFCZ-E (extension unit without control relays).

Accessories / Options

- RM 2012 fast-acting Reactive Power Control Relay with reaction times of 20 to 40 ms (order code -212 instead of -606; see chapter Power Factor Control Relays) instead of a PQC Relay
- LV HBC switch-disconnectors instead of LV HBC fuselinks for group overcurrent protection
- Customized colour to specified RAL standard
- Additional floor standing base (height: 100 or 200 mm), not fitted
- System installation in cabinet provided free issue by customer (types on request)

Technical Data

Enclosure	Sheet steel cabinet with internal fan at top, door right hinged
Rated voltage	400 V / 50 Hz
Rated capacitor voltage	440 V / 50 Hz (-P8, -P7, -P5) 480 V / 50 Hz (-P1)
Ingress protection	IP20 or IP41 per EN 60529
Ambient temperature	-5 °C to +40 °C as per VDE 0660 Part 500
Relative humidity	Max. 90 %, no condensation
Discharge	With discharge resistors acc. to VDE 0560 Part 46
Cabinet colour	RAL 7035
Standards	EN 60831-1 and -2 IEC 60831-1 and -2 EN 61921 IEC 61921 EN 61439-1 and -2 IEC 61439-1 and 2

Important Notes

For further information on power factor correction and harmonics please refer to our "Manual of Power Factor Correction".

FRAKO systems are designed for connecting 5 core cables. If a 4-core cable is used, a jumper must be fitted to connect PE and N, or a control transformer must be installed.

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Version: P1 (Detuning factor $p = 14\%$)

Article-No.	Type	Rated power [kvar]	Stage power [kvar]	Switching sequence	Dimensions			Weight (gross) approx. [kg]	Protection IP
					Width [mm]	Height [mm]	Depth [mm]		

Power Factor Correction Systems in sheet steel cabinets (width = 800 mm), rated mains voltage: 400 V / 50 Hz

Type series: LSFC ...-P1-E

34-22804	LSFC 200-25-23-400-86-620-P1-E	200	25	1:1:2:2:2	800	2110	600	533	41
34-22805	LSFC 200-50-4-400-86-620-P1-E	200	50	1:1:1:1	800	2110	600	526	41
34-22806	LSFC 225-25-14-400-86-620-P1-E	225	25	1:2:2:2:2	800	2110	600	552	41
34-22807	LSFC 250-25-24-400-86-620-P1-E	250	25	1:1:2:2:2	800	2110	600	580	41
34-22808	LSFC 250-50-5-400-86-620-P1-E	250	50	1:1:1:1:1	800	2110	600	573	41
34-22809	LSFC 275-25-15-400-86-620-P1-E	275	25	1:2:2:2:2	800	2110	600	632	41
34-22810	LSFC 300-50-6-400-86-620-P1-E	300	50	1:1:1:1:1:1	800	2110	600	653	41

Power Factor Correction Systems, extension units in sheet steel cabinets (width = 800 mm), rated mains voltage: 400 V / 50 Hz

Type series: LSFCZ ...-P1-E

34-16652	LSFCZ 100-50-2-400-86-P1-E	100	50	1:1	800	2110	600	246	41
34-16653	LSFCZ 150-50-3-400-86-P1-E	150	50	1:1:1	800	2110	600	442	41
34-16654	LSFCZ 200-50-4-400-86-P1-E	200	50	1:1:1:1	800	2110	600	508	41
34-16655	LSFCZ 250-50-5-400-86-P1-E	250	50	1:1:1:1:1	800	2110	600	548	41
34-16656	LSFCZ 300-50-6-400-86-P1-E	300	50	1:1:1:1:1:1	800	2110	600	628	41

Other rated voltages, frequencies and power ratings on request

Recommended supply lead cross sections: please refer to the technical annex (page 141 ff.)

Version: P7 (Detuning factor $p = 7\%$)

Article-No.	Type	Rated power [kvar]	Stage power [kvar]	Switching sequence	Dimensions			Weight (gross) approx. [kg]	Protection IP
					Width [mm]	Height [mm]	Depth [mm]		

Power Factor Correction Systems in sheet steel cabinets (width = 600 mm), rated mains voltage: 400 V / 50 Hz

Type series: LSFC ...-P7-E

34-22811	LSFC 200-25-23-400-85-620-P7-E	200	25	1:1:2:2:2	800	2000	500	*	20
34-22812	LSFC 200-50-4-400-85-620-P7-E	200	50	1:1:1:1	800	2000	500	*	20
34-22813	LSFC 225-25-14-400-85-620-P7-E	225	25	1:2:2:2:2	800	2000	500	*	20
34-22814	LSFC 250-25-24-400-85-620-P7-E	250	25	1:1:2:2:2	800	2000	500	*	20
34-22815	LSFC 250-50-5-400-85-620-P7-E	250	50	1:1:1:1:1	800	2000	500	*	20
34-22816	LSFC 275-25-15-400-85-620-P7-E	275	25	1:2:2:2:2	800	2000	500	*	20
34-22817	LSFC 300-50-6-400-85-620-P7-E	300	50	1:1:1:1:1:1	800	2000	500	*	20

Power Factor Correction Systems, extension units in sheet steel cabinets (width = 600 mm), rated mains voltage: 400 V / 50 Hz

Type series: LSFCZ ...-P7-E

34-16244	LSFCZ 100-50-2-400-85-P7-E	100	50	1:1	800	2000	500	*	20
34-16245	LSFCZ 150-50-3-400-85-P7-E	150	50	1:1:1	800	2000	500	*	20
34-16246	LSFCZ 200-50-4-400-85-P7-E	200	50	1:1:1:1	800	2000	500	*	20
34-16247	LSFCZ 250-50-5-400-85-P7-E	250	50	1:1:1:1:1	800	2000	500	*	20
34-16248	LSFCZ 300-50-6-400-85-P7-E	300	50	1:1:1:1:1:1	800	2000	500	*	20

Other rated voltages, frequencies and power ratings on request

Recommended supply lead cross sections: please refer to the technical annex (page 141 ff.)

* on request

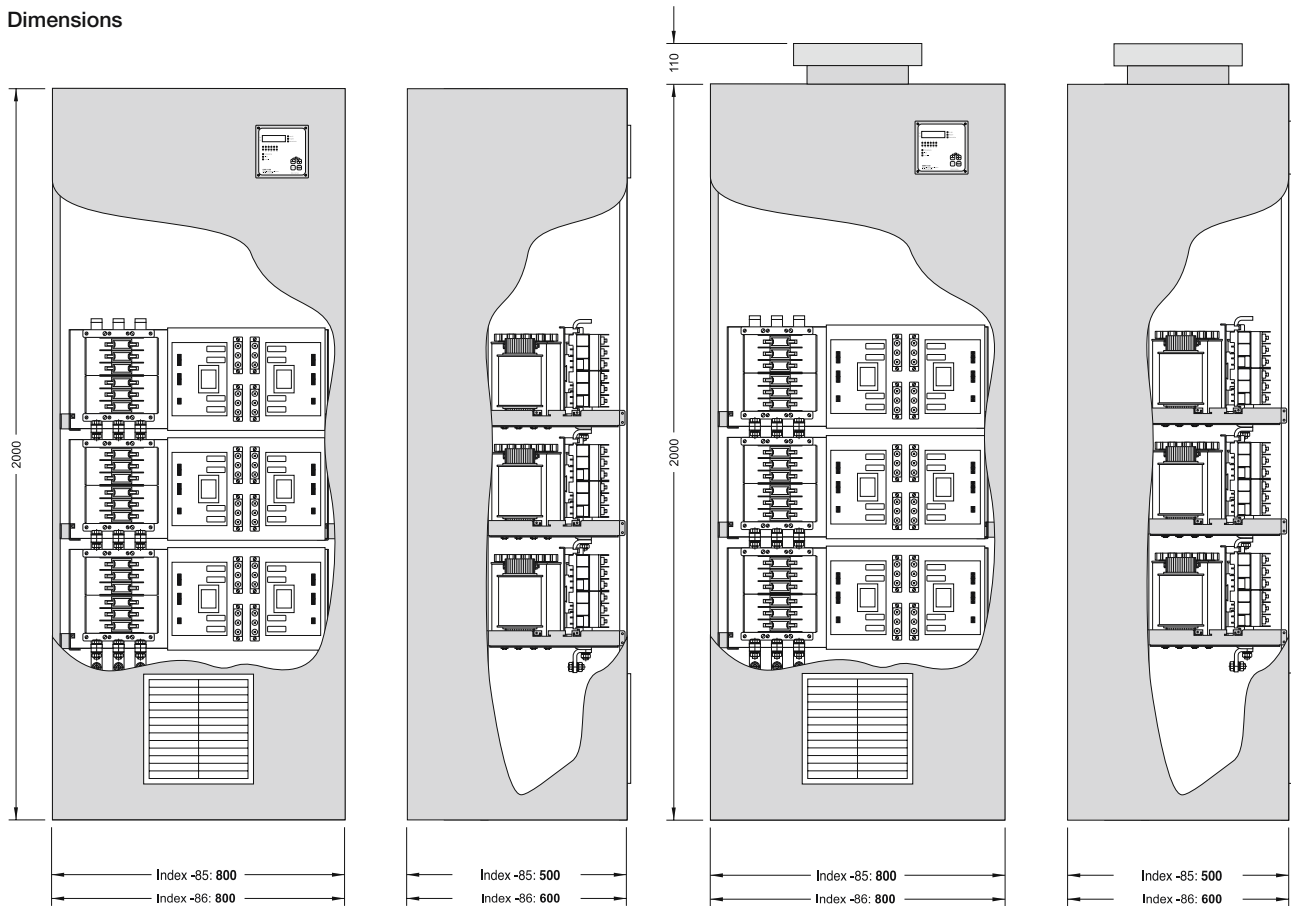
For options and accessory equipment for PFC Systems, module rails, ordering examples and dimensional drawings see page 87 ff.

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Dimensions



Dimensional drawing LSFC-E (100 to 300 kvar)

All dimensions in mm