

# Standard Harmonic Filter Reactors

Type FDR/FKD



## // Features that matter:

- Low losses
- Complete with mounting brackets and connecting cables
- Including temperature switches
- Temperature range up to +60°C

# Harmonic Filter Reactors

## Type FDR / FKD



### // Application

Used in conjunction with LKT type Power Factor Correction Capacitors, harmonic filter reactors (blocking reactors) make it possible to install detuned versions of fixed capacitor banks and power factor correction systems. This enables users installing distribution boards to construct customized systems themselves.

### // Design

Low-loss, three-phase assembly complete with mounting brackets, connecting cables and thermal trip.

### // Series Resonance Frequency

Version	Series resonance frequency	Detuning factor	For networks with utility company AF remote control <sup>1)</sup>
P1	134 Hz	p=14 %	> 166 Hz
P7	189 Hz	p= 7 %	> 228 Hz

<sup>1)</sup>Utility company specifications inconsistent with the above must be taken into account.

Please refer also to the design notes given in our Manual of Power Factor Correction. (other series resonance frequencies on request)

### // Mounting

The reactor must be mounted in a suitable enclosure ensuring an ambient temperature within the specified range.

### // Connections

The coil line-side (U1, V1, W1) and load-side (U2, V2, W2) cables can be connected to the switchgear directly or via terminals. The temperature switch (contacts open at 140 °C) must be connected to a trip/alarm circuit in the control system.

### // Applicable Standards

When installing and connecting power capacitors in Germany, the standards VDE 0100 IEC 60364, VDE 0105 IEC 60050, IEC 60529, VDE 0560 part 46 IEC 60831 and VDE 0106 part 100 must be complied with. In other countries the equivalent local regulations must be observed.

### // Load Capacity

Version	Power loss W/kvar	Permissible harmonic voltage	
		250 Hz	350 Hz
P1	4-6	6%	6%
P7	3.5-6	6%	6%

### // Power Loss

3.5 – 6 W/kvar (depending on version and level of harmonics)

### // Temperature Range

-10 to +60 °C

### // Ingress Protection

IP00 to IEC 60529 for mounting within an enclosure

### // Important Note

Please use only the correct number of the appropriate power capacitors as stated in the table for each individual harmonic filter reactor. If this requirement is not adhered to, the resulting series resonance frequency can under certain circumstances move into a critical range. Apart from possibly overloading the installed components, the utility company's remote control systems could also be adversely affected.

### // Technical Data

#### Specimen order 1

P.F. correction stage with 7 % detuning factor 25 kvar at 400 V/50 Hz supply voltage

2 power capacitors		
Type	<b>LKT 11.7 – 400 – DL</b>	<b>Art.-No. 31-10604</b>
2 terminal blocks		
Type	<b>AKD 25/3</b>	<b>Art.-No. 31-08000</b>
1 low-loss harmonic filter reactor with temperature switch		
Type	<b>FDR 25 – 400 – P7</b>	<b>Art.-No. 88-01768</b>

#### Specimen order 2

P.F. correction stage with 14 % detuning factor 12.5 kvar at 400 V/50 Hz supply voltage

1 power capacitor		
Type	<b>LKT 15.5 – 480 – DP</b>	<b>Art.-No. 31-10513</b>
1 terminal block		
Type	<b>AKD 25/3</b>	<b>Art.-No. 31-08000</b>
1 low-loss harmonic filter reactor with temperature switch		
Type	<b>FKD 12.5 – 400 – P1</b>	<b>Art.-No. 88-01168</b>

#### Specimen order 3

P.F. correction stage with 14 % detuning factor 20 kvar at 400 V/50 Hz supply voltage

1 power capacitor		
Type	<b>LKT 7.6 – 440 – DL</b>	<b>Art.-No. 31-10608</b>
1 power capacitor		
Type	<b>LKT 15.5 – 480 – DP</b>	<b>Art.-No. 31-10513</b>
2 terminal blocks		
Type	<b>AKD 25/3</b>	<b>Art.-No. 31-08000</b>
1 low-loss harmonic filter reactor with temperature switch		
Type	<b>FKD 20 – 400 – P1</b>	<b>Art.-No. 88-01038</b>

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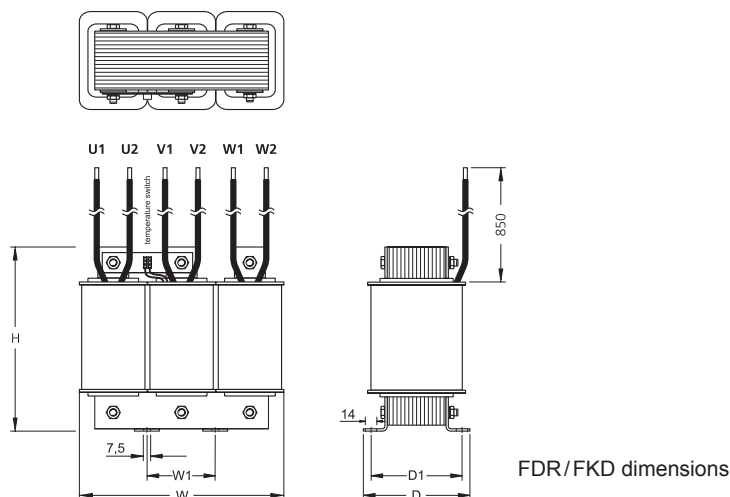


### Capacitors and Harmonic Filter Reactors for 230 V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%												
Rated power of Capacitor Reactor combination $Q_{LC}$ [kvar]	Rated current of Capacitor Reactor combination In [A]	Type and Quantity of the required capacitors					Dimensions in mm					Weight kg	Harmonic Filter Reactors	
		LKT 10.0-400-DP Art.-No.31-10501	LKT 12.5-400-DP Art.-No.31-10502	LKT 10.0-440-DP Art.-No.31-10508	LKT 10.0-525-DP Art.-No.31-10517		W	W1	H	D	D1		Art.-No.	Type
5.0	12.6			1	1		150	50	132	97	77	5	88-01980	FDR 5-230-P7
10.0	26.9	3					180	60	156	91	71	9	88-01575	FKD 10-230-P7
12.5	31.3	1	2				180	60	156	101	81	9	88-01974	FDR 12.5-230-P7
16.7	44.9		4				180	60	156	111	91	10	88-01583	FKD 16.7-230-P7
20.0	53.8	1	4				204	68	177	121	101	15	88-01576	FKD 20-230-P7
25.0	62.5	2	4				204	68	177	121	101	16	88-01943	FDR 25-230-P7
33.0	89.9		8				240	80	197	125	105	21	88-01568	FKD 33-230-P7

### Capacitors and Harmonic Filter Reactors for 230 V/60 Hz – mains network

Resonance frequency		fres: 227 Hz, detuning factor p= 7%												
Rated power of Capacitor Reactor combination $Q_{LC}$ [kvar]	Rated current of Capacitor Reactor combination In [A]	Type and Quantity of the required capacitors					Dimensions in mm					Weight kg	Harmonic Filter Reactors	
		LKT 10.0-400-DP Art.-No.31-10501	LKT 7.1-300-DP Art.-No.31-10523				W	W1	H	D	D1		Art.-No.	Type
17.0	43.1	4					180	60	156	111	91	10	88-01809	FKD 17-230-60Hz-P7
25.0	62.2	2	3				204	68	177	121	101	21	88-01892	FDR 25-230-60Hz-P7



FDR/FKD dimensions

# Harmonic Filter Reactors

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### Capacitors and Harmonic Filter Reactors for 400 V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%												
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm			Weight	Harmonic Filter Reactors			
		LKT 7.6-440-DL Art.-No.31-10608	LKT 9.1-440-DL Art.-No.31-10609	LKT 12.5-440-DP Art.-No.31-10507	LKT 11.7-400-DL Art.-No.31-10604	LKT 15.0-440-DP Art.-No.31-10506	W	W1	H		D	D1	kg	Art.-No.
$Q_{LC}$ [kvar]	In [A]						W	W1	H	D	D1	kg	Art.-No.	Type
6.25	9.0	1					150	50	132	97	77	7	88-01410	FKD 6.25-400-P7
7.5	10.8	1					150	50	132	97	77	7	88-01482	FKD 7.5-400-P7
10.0	14.4	1					180	60	156	111	91	10	88-01479	FKD 10-400-P7
12.5	18.0	1					180	60	156	111	91	10	88-01767	FDR 12.5-400-P7
15.0	21.6	2					204	68	177	121	101	15	88-01362	FKD 15-400-P7
20.0	29.0	2					204	68	177	121	101	19	88-01363	FKD 20-400-P7
25.0	36.0	2					204	68	177	121	101	21	88-01768	FDR 25-400-P7
30.0	43.0	3					264	88	235	114	94	21	88-01484	FKD 30-400-P7
40.0	58.0	3					264	88	235	114	94	21	88-01782	FDR 40-400-P7
50.0	72.0	4					264	88	235	140	120	27	88-01769	FDR 50-400-P7

Resonance frequency		fres: 134 Hz, detuning factor p= 14%												
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm			Weight	Harmonic Filter Reactors			
		LKT 7.8-480-DL Art.-No.31-10616	LKT 7.7-525-DL Art.-No.31-10621	LKT 7.6-440-DL Art.-No.31-10608	LKT 15.5-480-DP Art.-No.31-10513	LKT 12.1-440-DL Art.-No.31-10610	LKT 9.1-440-DL Art.-No.31-10609	W	W1		H	D	D1	kg
$Q_{LC}$ [kvar]	In [A]						W	W1	H	D	D1	kg	Art.-No.	Type
6.25	9.0	1					180	60	156	111	91	10	88-01505	FKD 6.25-400-P1
10.0	14.4	2					180	60	156	111	91	10	88-01695	FKD 10-400-P1
12.5	18.0	1					204	68	177	121	101	15	88-01168	FKD 12.5-400-P1
20.0	28.8	1					228	76	197	128	108	21	88-01038	FKD 20-400-P1
25.0	36.0	2					264	88	235	140	120	27	88-01171	FKD 25-400-P1
40.0	57.6	2					300	100	265	164	144	33	88-01779	FDR 40-400-P1
50.0	72.0	4					300	100	265	164	144	33	88-01780	FDR 50-400-P1

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### Capacitors and Harmonic Filter Reactors for 415 V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%								
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Weight	Harmonic Filter Reactors		
		LKT 15.5-480-DP Art.-No.31-10513	LKT 12.5-525-DP Art.-No.31-10516	Dimensions in mm						
$Q_{LC}$ [kvar]	$I_n$ [A]		W	W1	H	D	D1	kg	Art.-No.	Type
12.5	17.3	1	180	60	156	111	91	10	88-01937	FDR 12.5-415-P7
16.8	23.4	2	180	60	156	111	91	11	88-01977	FDR 16.8-415-P7
25.0	34.7	2	204	68	177	121	101	15	88-01938	FDR 25-415-P7
33.6	46.7	4	228	76	197	128	108	19	88-01978	FDR 33.6-415-P7
50.0	69.3	4	264	88	235	140	120	27	88-01930	FDR 50-415-P7

### Capacitors and Harmonic Filter Reactors for 440 V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%								
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Weight	Harmonic Filter Reactors		
		LKT 12.1-440-DL Art.-No.31-10610	Dimensions in mm							
$Q_{LC}$ [kvar]	$I_n$ [A]		W	W1	H	D	D1	kg	Art.-No.	Type
25.0	34.2	2	228	76	197	128	108	21	88-01008	FKD 25-440-P7
50.0	68.4	4	264	88	235	114	94	28	88-01124	FKD 50-440-P7

# Harmonic Filter Reactors

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### Capacitors and Harmonic Filter Reactors for 440 V/60 Hz – mains network

Resonance frequency		fres: 227Hz, detuning factor p= 7%													
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm					Weight	Harmonic Filter Reactors		
		LKT 8.33-525-DL Art.-No.31-10622	LKT 15.5-480-DP Art.-No.31-10513	LKT 12.1-440-DL Art.-No.31-10610	LKT 7.7-525-DL Art.-No.31-10621	LKT 5.9-525-DL Art.-No.31-10620	LKT 7.8-480-DL Art.-No.31-10616	W	W1	H	D		D1	kg	Art.-No.
6.25	9.2	1					150	50	132	97	77	6	88-01914	FKD 6.25-440-60Hz-P7	
7.5	9.9	1					150	50	132	97	77	6	88-01795	FKD 7.5-440-60Hz-P7	
12.5	16.9	1				1	180	60	156	91	71	21	88-01883	FKD 12.5-440-60Hz-P7	
15.0	19.8	1					180	60	156	111	91	10	88-01796	FKD 15-440-60Hz-P7	
25.0	33.1	1					1	204	68	177	121	101	11	88-01884	FKD 25-440-60Hz-P7
50.0	66.2	3					264	88	235	114	94	29	88-01875	FDR 50-440-60Hz-P7	

### Capacitors and Harmonic Filter Reactors for 460 V/60 Hz – mains network

Resonance frequency		fres: 227 Hz, detuning factor p= 7%												
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm					Weight	Harmonic Filter Reactors	
		LKT 12.5-525-DP Art.-No.31-10516					W	W1	H	D	D1		kg	Art.-No.
12.5	15.5	1					180	60	156	111	91	10	88-01854	FDR 12.5-460-60Hz-P7
25.0	31.1	2					204	68	177	121	101	21	88-01855	FDR 25-460-60Hz-P7
50.0	62.1	4					264	88	235	132	112	27	88-01856	FDR 50-460-60Hz-P7

# Harmonic Filter Reactors

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### Capacitors and Harmonic Filter Reactors for 480 V/60 Hz – mains network

Resonance frequency		fres: 227 Hz, detuning factor p= 7%											
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors				Dimensions in mm			Weight	Harmonic Filter Reactors			
		LKT 12.5-525-DP Art.-No.31-10516	LKT 7.7-525-DL Art.-No.31-10621	LKT 4.17-525-DL Art.-No.31-10619	LKT 8.33-525-DL Art.-No.31-10622	W	W1	H		D	D1	kg	Art.-No.
33.3	43.1	2			1	264	88	235	114	94	21	88-01736	FKD 33.3-480-60Hz-P7
41.6	53.9	3			1	264	88	235	114	94	21	88-01737	FKD 41.6-480-60Hz-P7
50.0	60.5		6			264	88	235	140	120	27	88-01858	FDR 50-480-60Hz-P7

### Capacitors and Harmonic Filter Reactors for 525V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%											
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors				Dimensions in mm			Weight	Harmonic Filter Reactors			
		LKT 4.17-525-DL Art.-No.31-10619	LKT 5.9-525-DL Art.-No.31-10620	LKT 7.7-525-DL Art.-No.31-10621	LKT 8.33-525-DL Art.-No.31-10622	W	W1	H		D	D1	kg	Art.-No.
6.25	7.0		1			150	50	132	97	77	7	88-01801	FKD 6.25-525-P7
12.5	14.1		2			180	60	156	111	91	10	88-01802	FKD 12.5-525-P7
20.0	24.7	1			2	228	76	197	104	84	19	88-01080	FKD 20-525-P7
25.0	29.6			3		228	76	197	128	108	21	88-01838	FDR 25-525-P7
30.0	34.6	1			3	228	76	197	128	108	21	88-01533	FKD 30-525-P7
50.0	55.0			6		264	88	235	140	120	29	88-01872	FDR 50-525-P7

Resonance frequency		fres: 134 Hz, detuning factor p= 14%											
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors				Dimensions in mm			Weight	Harmonic Filter Reactors			
		LKT 4.17-525-DL Art.-No.31-10616	LKT 5.9-525-DL Art.-No.31-10620			W	W1	H		D	D1	kg	Art.-No.
25.0	27.9	1	3			264	88	235	140	120	25	88-01960	FDR 25-525-P1
50.0	55.8	2	6			300	100	265	164	144	52	88-01900	FDR 50-525-P1

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### Capacitors and Harmonic Filter Reactors for 690 V/50 Hz – mains network

Resonance frequency		fres: 189 Hz, detuning factor p= 7%												
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm	Weight	Harmonic Filter Reactors					
		LKT 9.4-440-EP Art.-No.31-10511							Art.-No.	Type				
$Q_{LC}$ [kvar]	In [A]						W	W1	H	D	D1	kg	Art.-No.	Type
25.0	22.6	3					204	68	177	121	101	19	88-01932	FDR 25-690-P7
50.0	45.2	6					264	88	235	140	120	27	88-01933	FDR 50-690-P7

Resonance frequency		fres: 134 Hz, detuning factor p= 14%												
Rated power of Capacitor Reactor combination	Rated current of Capacitor Reactor combination	Type and Quantity of the required capacitors					Dimensions in mm	Weight	Harmonic Filter Reactors					
		LKT 4.8-480-EP Art.-No.31-10515	LKT 6.0-480-EP Art.-No.31-10514	LKT 8.33-525-EP Art.-No.31-10518					Art.-No.	Type				
$Q_{LC}$ [kvar]	In [A]						W	W1	H	D	D1	kg	Art.-No.	Type
25.0	21.7	3	3				264	88	235	140	120	27	88-01842	FKD 25-690-P1
50.0	43.4	9					300	100	265	164	144	33	88-01843	FKD 50-690-P1