Power Factor Correction Equipment

Iskra®
Iskra Sistemi

Content

KLV High Voltage Power Capacitors

KLS Induction Heating Capacitors

High Voltage Power Capacitors

SINGLE PHASE CAPACITORS

General
Advanced technology of KLV capacitors is based on construction of all-film capacitor sections, folding foil edge design, improved electrical and mechanical connections between sections and impregnation with environmentally compatible insulating oil. KLV capacitors have very low dielectric losses and are designed for long service life.

KLV 3xxx
Internally fused capacitors. Each capacitor element has a separate internal fuse.

KLV1xxx
Capacitors without internal fuses

KLVxxx4
Single phase capacitors with two outputs (twin). Capacitors are supplied in sets of three to provide an economical unbalance detection scheme. This is particularly advantageous in low output capacitor banks.

Technical data

Rated power (max.)
600 kvar, 50 Hz
720 kvar, 60 Hz

Rated voltage
1,0 - 24 kV

Rated frequency
50 or 60 Hz

Losses
Total losses lower than 0,15 W/kvar
Dielectric losses 0,03 W/kvar max.

Dielectric
All-film (hazy polypropylene)

Impregnating fluid
Environmentally compatible impregnating oil based on M/DBT (NON - PCB)

THREE-PHASE CAPACITORS

Discharge resistor
Built in discharge resistor reduces the voltage on a de-energised capacitor from the crest of rated voltage to 75V in 10 minutes or less (discharge to 50V in 5 minutes on demand).

Permissible overloads

Maximum permissible current
1,3 x In continuously
Maximum permissible voltage
1,1 x Un continuously, 12h per day
Maximum continuous output 1.35x output

Type	Voltage factor x Un (Vr.m.s)	Max duration
Power frequency	1.00	Contentious
	1.10	12 in every 24h
	1.15	30 min in every 24h
	1.20	5 min
	1,30	1 min

Routine tests
Sealing test

Voltage test between terminals
2,15 x rated voltage AC, 10 s
or
4,3 x rated voltage DC, 10 s

AC voltage test between terminals and container
According to IEC 60871-1, Table 3, 10 s

Discharge resistor test

Measurement of losses (tan δ)

Service conditions

Temperature category -25D(-25°C/+55°C)

Installation
Outdoor or indoor

Installation altitude (above sea level)
1000 m standard, up to 4000m on demand

Relative Humidity
95%

SINGLE PHASE WITH TWO OUTPUTS - TWIN CAPACITORS

Case material:
Stainless steel plate 2 mm thick

Finish / Colour
Two-component durable painting RAL 7032 (light grey) on treated surfaces.

Fixing
Depending on the height of capacitor, container is equiped with one or two mounting brackets on the narower sides. Brackets have mounting slots 11 x 20 mm.

Terminals and connections

Bushings
Brown or gray porcelain bushings, welded to the container.

Thread of terminal stud
M14

Current
110A max.

Connections
Terminal clamps with provision to accommodate any combination of 2 conductors from 4 mm^2 solid to 50 mm^2 stranded wire are available on demand.
The capacitor unit grounding is provided by unpainted surface of mounting brackets.

Pressure switch with terminal cap
Supplied on demand.

Nameplate
Durable label with permanent printing

Quality
Iskra MIS is certified according to ISO 9001(quality) and ISO 14001 (environment)

Standards
IEC 60871-1
ANSI / IEEE 18
NEMA CP 1

KLV 1xx1 (1xx0) AND 3xx1 (3xx0), SINGLE-PHASE CAPACITORS, BIL 38/95 kV, TYPICAL DIMENSIONS (Picture 1)

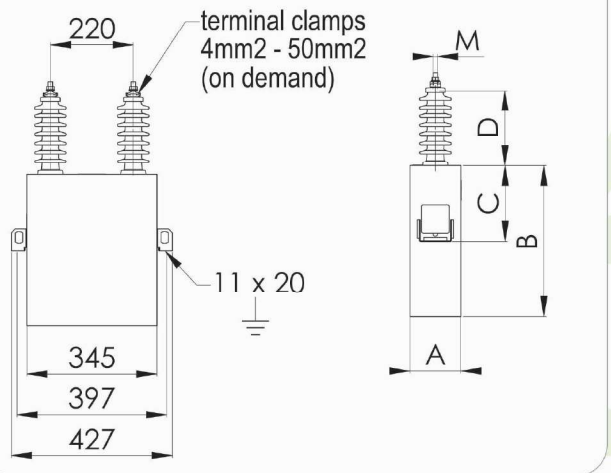
Qn (Kvar)	Un (V)	Fn (Hz)	In (A)	Cn (µF)	Dimensions							Weight (Approx) (kg)	Weight (Approx) (kg)*
					A (mm)	B (mm)	B* (mm)	C (mm)	D BIL 95KV	D BIL 125KV	M (mm)		
60.0 / 50.0	12000 / 11000	50	5	1.33	145	200	225	120	240	315	14	19	21
120.0 / 100.0	12000 / 11000	50	10	2.65	145	325	360	120	240	315	14	28	30
238.0 / 200.0	12000 / 11000	50	19.8	5.26	145	570	620	200	240	315	14	46	49
357.0 / 300.0	12000 / 11000	50	29.8	7.89	145	820	870	200	240	315	14	64	68
476.0 / 400.0	12000 / 11000	50	39.7	10.52	175	880	960	200	240	315	14	82	89

Notes:

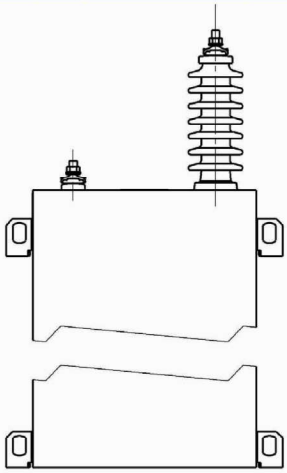
* Dimensions with an asterisk (*) refer to internally fused capacitors

1) For output and voltage outside this range, please contact factory
2) Case sizes are typical and actual sizes will be confirmed at the time of order
3) Dim A may expand up to 115% due to thermal flexure
4) Power at 60Hz = 1,2 x power at 50Hz

Picture 1: Two - bushing capacitor KLVxxx1 (insulated container)



Picture 2: Single - bushing capacitor KLVxxx0 (voltage on the container)



KLV 1xx3 AND 3xx3, THREE-PHASE CAPACITORS, BIL 20/60 kV, TYPICAL DIMENSIONS (Picture 3)

U_n	Q_n	Dimensions (mm)					Weight	Weight*
	at 50 Hz	A	B	B*	D	E		
(kV)	(kvar)						(kg)	(kg)
3,3 - 7,2	50	145	180	200	250	240	16	20
	100	145	275	290	250	240	23	26
	150	145	370	400	250	240	30	33
	200	145	470	520	250	240	37	42
	250	145	570	620	250	240	44	49
	300	145	670	720	250	240	51	55
	350	145	770	825	250	240	60	63
	400	145	870	940	250	240	66	71
	450	145	970	1050	250	240	73	78

KLV 1xx3 AND 3xx3, THREE-PHASE CAPACITORS, BIL 28/75 kV, TYPICAL DIMENSIONS (Picture 4)

U_n	Q_n	Dimensions (mm)					Weight	Weight*
	at 50 Hz	A	B	B*	D	E		
(kV)	(kvar)						(kg)	(kg)
up to 12	50	145	180	200	300	510	22	23
	100	145	275	290	300	510	28	29
	150	145	370	400	300	510	35	37
	200	145	470	520	300	510	42	44
	250	145	570	620	300	510	49	51
	300	145	670	720	300	510	55	60
	350	145	770	825	300	510	63	66
	400	145	870	940	300	510	69	75
	450	145	970	1050	300	510	76	82

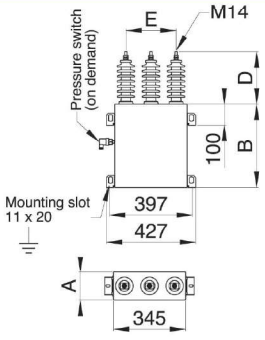
Notes:

* Dimensions with an asterisk (*) refer to internally fused capacitors

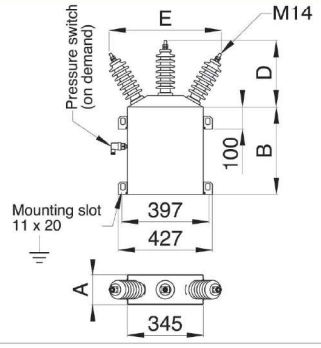
1) For output and voltage outside this range, please contact factory
2) Case sizes are typical and actual sizes will be confirmed at the time of order
3) Pressure switch on demand
4) Either 2 or 4 fixing brackets are used, depending on the height of the unit. Special bracket positions can be provided if required. Please specify at the enquiry stage.
5) Dim A may expand up to 115% due to thermal flexure
6) Power at 60Hz = 1,2 x power at 50Hz

THREE - PHASE CAPACITORS

Picture 3



Picture 4



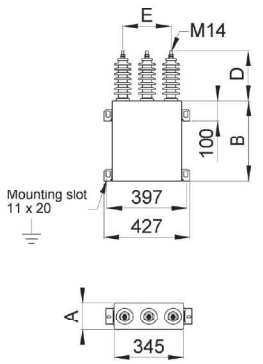
KLV 1xx4 AND 3xx4, SINGLE-PHASE CAPACITORS WITH TWO OUTPUTS (TWIN), BIL 20/60 kV, TYPICAL DIMENSIONS (Picture 5)

U_n	Q_n	Dimensions (mm)					Weight	Weight*
	at 50 Hz	A	B	B*	D	E		
(kV)	(kvar)						(kg)	(kg)
2,0 - 4,16	50 (2x25)	135	200	220	250	240	22	23
	100 (2x50)	135	310	340	250	240	28	29
	150 (2x75)	135	400	430	250	240	35	37
	200 (2x100)	135	520	560	250	240	42	44
	250 (2x125)	135	640	680	250	240	49	51
	300 (2x150)	135	740	780	250	240	51	55
	400 (2x200)	135	940	1000	250	240	66	71

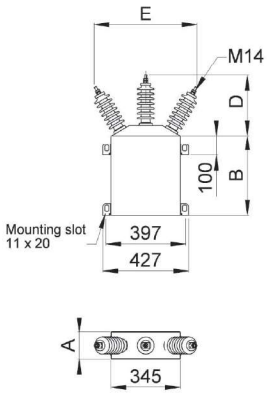
KLV 1xx4 AND 3xx4, SINGLE-PHASE CAPACITORS WITH TWO OUTPUTS (TWIN), BIL 28/75 kV, TYPICAL DIMENSIONS (Picture 6)

U_n	Q_n	Dimensions (mm)					Weight	Weight*
	at 50 Hz	A	B	B*	D	E		
(kV)	(kvar)						(kg)	(kg)
up to 6,93	50 (2x25)	135	200	220	300	510	22	23
	100 (2x50)	135	310	340	300	510	28	29
	150 (2x75)	135	400	430	300	510	35	37
	200 (2x100)	135	520	560	300	510	42	44
	250 (2x125)	135	640	680	300	510	49	51
	300 (2x150)	135	740	780	300	510	55	60
	400 (2x200)	135	940	1000	300	510	69	75

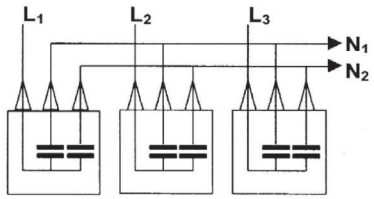
Picture 5



Picture 6



Connection



Notes:

* Dimensions with an asterisk (*) refer to internally fused capacitors

1) For output and voltage outside this range, please contact factory
2) Case sizes are typical and actual sizes will be confirmed at the time of order
3) Either 2 or 4 fixing brackets are used, depending on the height of the unit. Special bracket positions can be provided if required. Please specify at the enquiry stage.
4) Dim A may expand up to 115% due to thermal flexure
5) Power at 60Hz = 1,2 x power at 50Hz

KLS

Advanced technology of low loss KLS capacitor units is based on construction of ALL-FILM capacitor sections and impregnation with environmentally compatible insulating oil (NON-PCB).Applications

Applications

KLS capacitors are especially designed for inductive heat generating plants operating at frequencies between 50 and 10000 Hz. Manufactured by request, these capacitors are designed to comply with the specific requirements of each customer. Most of these capacitors provide for step changes in kvar by virtue of terminated sections within each unit. This allows for the tuning of the circuit for changing inductive loads.

Construction

KLS capacitors utilize a polypropylene film and aluminum foil construction with NON-PCB liquid impregnant. The impregnating fluid M/DBT and textured polypropylene film have exceptional dielectric properties over the entire operating temperature range of induction heating capacitors.

The extended foil design of capacitor elements makes nearly continuous connection to the foils, so capacitor overcurrent and cooling capabilities are increased.

KLS capacitors designed for operating at lower frequencies are air cooled. Medium frequency capacitors utilize internal tubes for cooling. Bushings and connection for cooling water are placed on capacitor case cover.

Safety Requirements

The standard capacitor does not have internal discharge devices - all capacitor units should be connected directly with a discharge device, this may be other electrical equipment connected directly across the capacitor (i.e. furnace coil). The discharge path must not have a disconnecting switch or fuses.

When the capacitors is switched off and re-energized at short intervals, arrangements should be made so that, at the time of re-application of the voltage, the capacitor terminal voltage shall not be more than 10% of the rated voltage of the capacitor.

Before working on a capacitor ensure that the capacitor bank is properly isolated, wait to ensure the capacitor is discharged and short circuit the capacitor terminals before handling.

Quality Assurances

All capacitors are subjected to the following routine tests:
Sealing test on container
short circuit discharge test 1.7 × rated voltage DC, one discharge, for internally fused capacitors
Capacitance measurements
Loss measurements at 50 Hz
Voltage test between terminals at 2.0 × rated voltage AC, 10 sec or 4.0 × rated voltage DC, 10 sec.
Voltage test terminals to container where applicable

Capacitors comply with IEC 60110-1 and VDE 0560 Part 9.

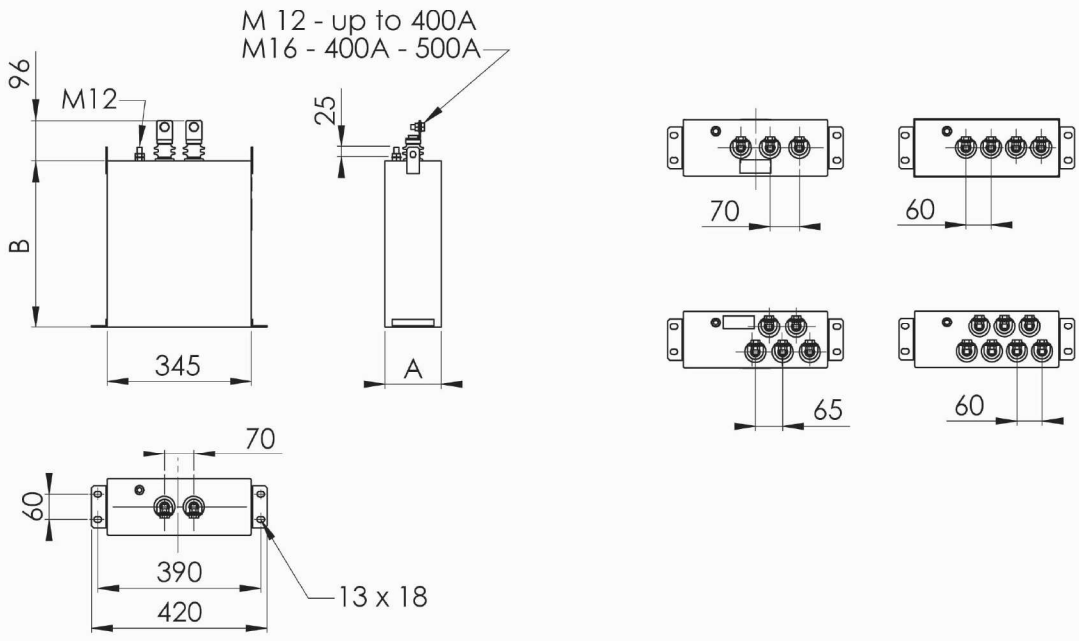
KLS x0xx, KLS x1xx , AIR-COOLED

50 / 60 Hz

TECHNICAL DATA			
Voltage range	U_n	V	500 - 3000
Output range	Q_n	kvar	up to 600
Rated frequency	f_n	Hz	50 / 60
Tolerance of capacity			-5% . . . +10% (narrower tolerances on request)
Losses (typical)		W/kvar	0.15 - 0.3
Temperature category (ambient temperature)		°C	-25 / +45 (air-cooled capacitors)
Impregnating fluid			Biodegradable NON-PCB dielectric oil based on M/DBT
Discharge resistors			On demand
Internal fuses			Built in, without fuses on demand
Temperature monitoring			Temperature sensors can be built-in upon request
Pressure monitoring			Pressure switches can be built-in upon request
Case material			Mild steel or stainless steel
Case finish			One layer of top coat on one layer of primer. Standard colour RAL 7032.
Dimensions			Dim A : 110 - 165 mm, dim B : up to 1000 mm Actual sizes will be confirmed at the time of order.

KLS x0xx, KLS x1xx - AIR COOLED CAPACITORS 50/60 Hz

Picture 1 - KLS x12x Air Cooled Capacitors 50/60 Hz



KLS x2xx, x3xx, x4xx , WATER COOLED

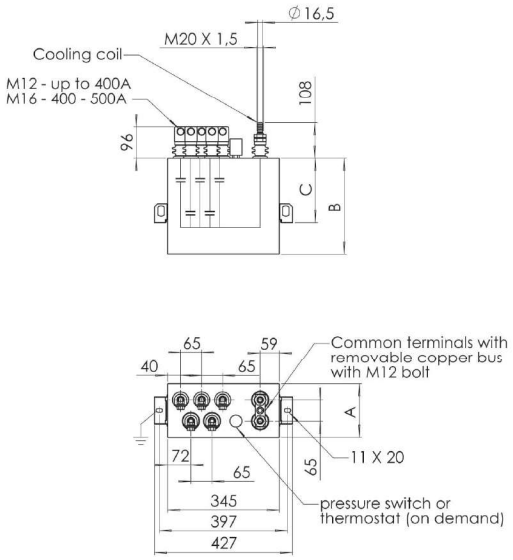
180 ... 10000 Hz

TECHNICAL DATA			
Voltage range	U_n	V	100 - 3000
Output range (fn > 60 Hz)	Q_n	kvar	up to 3000
Rated frequency	f_n	Hz	150 ... 10000
Tolerance of capacity			-10% . . . +10% (narrower tolerances on request)
Losses (typical)		W/kvar	0.2 - 0.7
Temperature category (ambient temperature)		°C	+1 / +45 (water cooled capacitors)
Outlet water temperature		°C	45 max
Max. pressure of incoming cooling water		bar	8
Cooling water flow		l/min	4.5 - 12.5
Impregnating fluid			Biodegradable NON-PCB dielectric oil based on M/DBT
Discharge resistors			NO
Internal fuses			NO
Temperature monitoring			Temperature sensors can be built-in upon request
Pressure monitoring			Pressure switches can be built-in upon request
Case material			Brass or aluminium containers for medium frequency capacitors
Case finish			One layer of top coat on one layer of primer. Standard colour RAL 7032.
Dimensions			Dim A : 110 - 165 mm, dim B : up to 1000 mm Actual sizes will be confirmed at the time of order.
Number of taps			up to 8

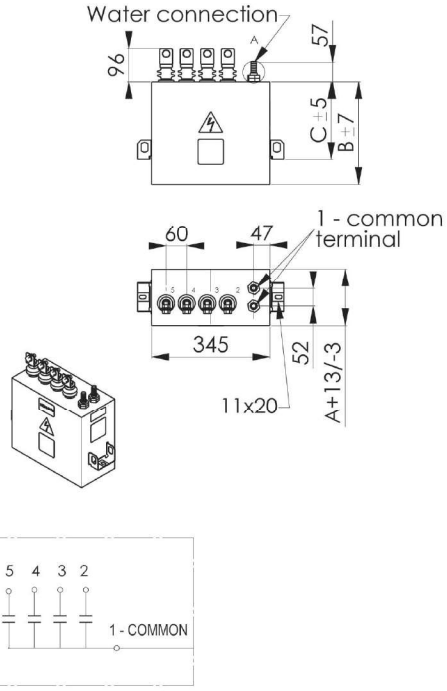
KLS x2xx, x3xx, x4xx, WATER COOLED

180 … 10000 Hz

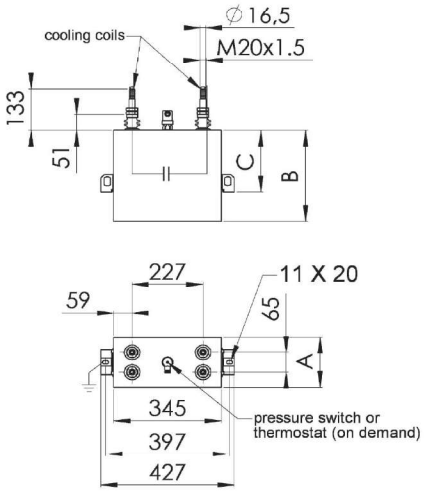
Picture 2 - KLS x3xx Single Cooling Coil Capacitor (Insulated Poles, "Dead"Case)



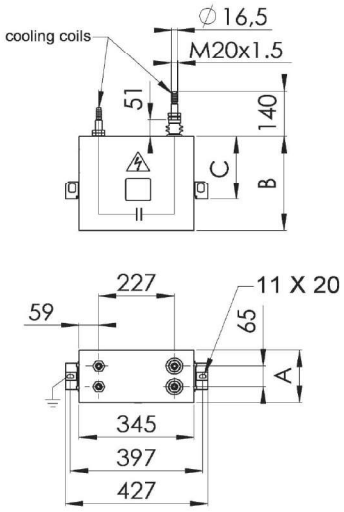
Picture 3 - KLS x2xx Single Cooling Coil Capacitor ("Live" Case)Hz



Picture 4 - KLS x400 Double Cooling Coils Capacitor - "dead"



Picture 5 -KLS x200 Double Cooling Coils Capacitor - "live" case



KLV

Type designation data:

A1 A2 A3 A4 A5-A6 A7

K

DIELECTRIC

APPLICATION

INTERNAL DEVICES

CASE MATERIAL AND FINISH

NUMBER OF TERMINALS, CONNNECTION

A1	K	capacitor
A2	L	dielectric polypropylene (all-film)
A3	V	high voltage capacitor for power factor correction
A4	1	discharge resistor built in
	2	without discharge resistors
	3	internal fuses and discharge resistors built in
	4	internal fuses built in
A5	0	ordinary steel case coated with primer and top coat (intended for indoor installation)
	2	stainless steel case coated with primer and top coat (intended for outdoor and aggressive atmosphere installation)
A6	1	case side mounting (2 brackets)
	2	case side mounting (2 brackets on the top and / or 2 brackets on the bottom)
A7	0	single phase, one bushing capacitor
	1	single-phase, two bushing capacitor
	3	three phase capacitor
	4	single phase capacitor with two outputs

Ordering data:

When ordering, please state:

Rated output	kvar
Rated voltage	V
Rated frequency	Hz
Tolerance of capacitance	-...% / +...%
Number of bushings	Single bushing, two bushings…
Installation	Indoor/Outdoor
Insulation level	.../...kV, if higher than required by U_n
Internal fuses	Yes/No
Pressure switch	Yes/No
Terminal clamps	Yes/No

Iskra Sistemi, d. d., Stegne 21, SI-1000 Ljubljana
Tel.: +386 1 513 10 00, Fax: +386 1 511 15 32
E-mail: info@iskrasistemi.si, www.iskrasistemi.si

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