

Contactors combinations

KMPL AND KPL DIRECT ON-LINE STARTERS

KMPL9, KMPL12, KMPL16, KMPL18, KMPL22, KPL9, KPL12, KPL16, KPL18, KPL22



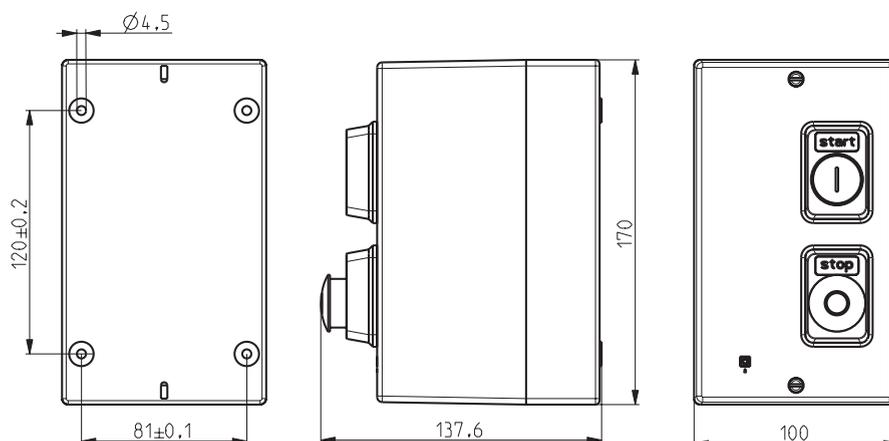
They are mainly used for start-up, overload protection and switch-off of electric motors and also for other loads. A contactor and a corresponding bimetal relay are built in the enclosure of degree of protection IP55. They are switched on with the ON pushbutton and switched off with the OFF pushbutton. The mushroom pushbutton functions as an emergency stop pushbutton.

Corresponding back-up fuses should be built in a circuit in front of an automatic contactor for the protection against short-circuit. The KPL starters are not provided with overload protection, while KMPL starters are.

TECHNICAL DATA

				KPL9	KPL12	KPL16	KPL18	KPL22
Type of direct starter without overload protection				KMPL9	KMPL12	KMPL16	KMPL18	KMPL22
Type of direct starter with overload protection								
Corresponding thermal overload relay				BR16, BR30				
Standards				IEC/EN 60947-4-1				
Rated insulation voltage	U_i	V		690				
Max. permitted powers of three-phase motors at AC-3	230 V	P_m	kW/ HP	2.2 / 3	3 / 4	4 / 5.5	4 / 5.5	5.5 / 7.5
	400 V			4 / 5.5	5.5 / 7.5	7.5 / 10	9 / 10	11 / 15
	500 V			5.5 / 7.5	5.5 / 7.5	7.5 / 10	9 / 10	11 / 15
	690 V			5.5 / 7.5	7.5 / 10	7.5 / 10	9 / 10	11 / 15
Max. back-up fuse for short-circuit protection gL Coordination type 2			A	25	25	35	35	50
Range at control voltage	U_c	%		85 ... 110				
Max. operating frequency		op. c./h		15				
Degree of protection				IP55				
Ambient temperature		°C		-20 ... +40				
Terminal capacity	rigid	S	mm ²	0.75 ... 6				2.5 ... 10
	flexible			0.5 ... 6				1.5 ... 10

DIMENSIONS



Contactors combinations

ZK STAR-DELTA MOTOR STARTER

All required elements for start-up, overload protection and switch-off of asynchronous electric motors are built in the enclosure of degree of protection IP55.



TECHNICAL DATA

Starter type	Relay type	Permitted motor power					
		230 V		400 V		500 V	
		kW	HP	kW	HP	kW	HP
ZK 12	BR16 / 8,5 - 12,5	4	5.5	7.5	10	7.5	10
ZK 16	BR16 / 12,5 - 18	5.5	7.5	11	15	11	15
ZK 18	BR16 / 15 - 20	5.5	7.5	15	20	15	20
ZK 22	BR30 / 17 - 24	8	11	18.5	25	18.5	25
ZK 30	BR30 / 22 - 30	12.5	17	25	34	25	34
ZK 43	BR43 / 30 - 43	20	27	37	50	45	60
ZK 63	BR43 / 40 - 63	25	34	55	75	65	88
ZK 95	BRA180 / 75 - 125	40	54	75	100	100	136
ZK 115	BRA180 / 90 - 150	63	86	110	150	147	200
ZK 145	BRA180 / 120 - 200	80	108	132	180	185	252
ZK 180	BRA180 / 120 - 200	92	125	160	220	210	272

Contactors combinations

KO-LD, KNL-LD COMBINATIONS FOR REVERSING



TECHNICAL DATA

Type	AC-3 Rated operational power (kW)			
	230V	400V	500V	690V
KO-LD 7	3	5.5	5.5	5.5
KNL-LD 9	2.2	4	5.5	5.5
KNL-LD 12	3	5.5	5.5	7.5
KNL-LD 16	4	7.5	7.5	7.5
KNL-LD 18	4	9	9	9
KNL-LD 22	5.5	11	11	11
KNL-LD 30	7.5	15	15	15

KMSPL COMBINATION STARTERS



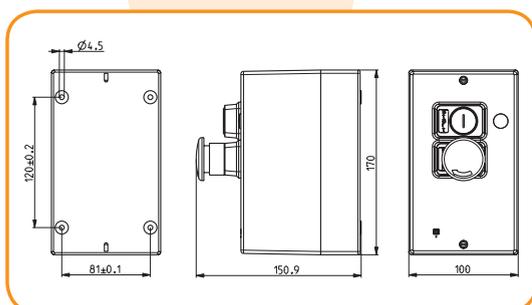
They are mainly used for start-up and switch-off of electric motors up to 11 kW power. MS25 motor protection switch with undervoltage release and a corresponding contactor are built in the enclosure of degree of protection IP55.

The advantages of combination starters over direct starters are:

- it is not necessary to build in back-up fuses for protection against short-circuit up to rated motor power 1.5 kW at 400 V
- after each overload and power line failure the automatic switch-on is not possible

TECHNICAL DATA

Type of combination starter				KMSPL3	KMSPL9	KMSPL12	KMSPL16	KMSPL18	KMSPL22
Type of motor protection switch				MS25-6,3	MS25-10	MS25-16	MS25-16	MS25-20	MS25-25
Setting range of bimetal release				4 ... 6,3	6,3 ... 10	10 ... 16	10 ... 16	10 ... 16	20 ... 25
AC-3, max. permitted powers of three-phase motors	230 V	P_m	kW	1.5	2.2	3	4	4	5.5
	400 V			2.2	4	5.5	7.5	9	11
	500 V			3	5.5	5.5	7.5	9	11
	690 V			4	5.5	7.5	7.5	9	11



Contactors combinations

DIRECT ON-LINE STARTERS UP TO 30 A



To define the starter, the following data have to be known:

- motor power, operational current
- coil control voltage
- required pushbuttons (none, start, stop, reset)
- main switch (yes or no)

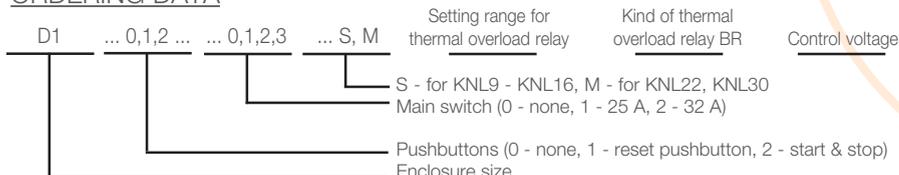
Based on these data, a convenient contactor and an overload relay as well as correspondingly equipped enclosure are selected.

You can choose between overload relay BR16/30.

COMPONENT SELECTION

	Permitted motor power 400/415 V, three-phase		Thermal overload relay BR16/30 Operational current (A) min.-max	Direct-on contactor*	Enclosure		
	kW	HP			Push-button arrangement	Main switch	Ordering code
BR16/KNL18	0.06	0.08	0.16 - 0.25	KNL9	start & stop reset none	—	D120S** D110 D100
	0.12	0.16	0.25 - 0.4				
	0.18	0.25	0.45 - 0.63				
	0.25	0.33	0.75 - 1				
	0.55	0.75	1.1 - 1.6				
	1.1	1.5	2.3 - 3.2				
	1.5	2	2.9 - 4	KNL12	start & stop reset none	with main switch	D121** D111 D101
	2.2	3	4.5 - 6.3				
	4	5.5	7.2 - 10				
	5.5	7.5	9 - 12.5				
7.5	10	11.3 - 16	KNL16	KNL18			
9	10	15 - 20					
BR30/KNL30	11	15	17.5 - 21.5	KNL22	start & stop reset none	—	D120M** D110 D120M
	15	20	24.5 - 30	KNL30	start & stop reset none	with main switch	D122** D112 D102

ORDERING DATA



* Standard control voltages (50/60 Hz)
B7 24 V
F7 110/125 V
M7 220/240 V
Q7 380/415 V
Other control voltages on request.

** ND16-11 snap-on auxiliary switch block included.

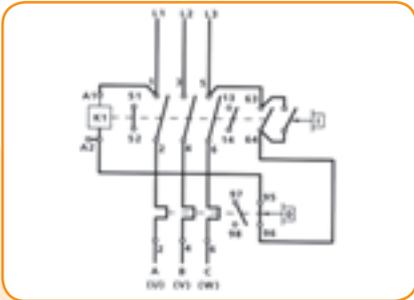
Enclosures: IP66, a metal base with a polycarbonate cover

Contactors combinations

KNL9-KNL30 direct-on-line starters

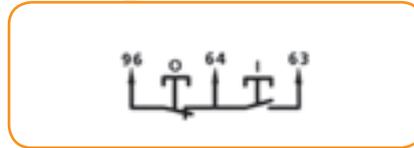
WIRING DIAGRAMS

KNL9-KNL30 direct-on-line starters

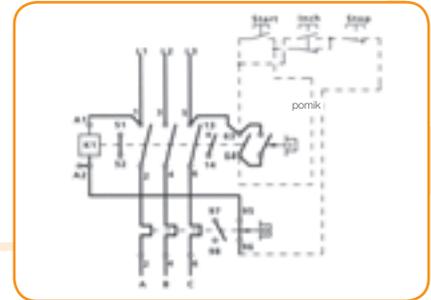


Connection for three-phase three-wire system-as shown above

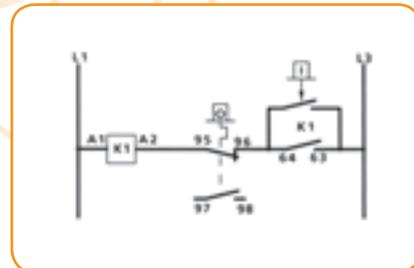
Connection for four-wire system:
1. Remove connection 1 (L1) - A1
2. Connect a neutral conductor to A1 terminal



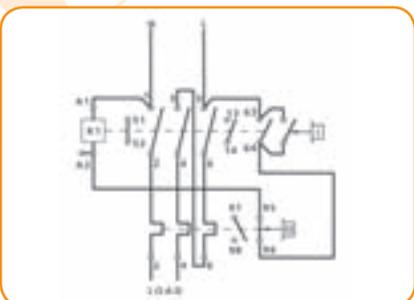
Connection for remote push-button control:
1. Remove connection 96 - 64
2. Connect as illustrated



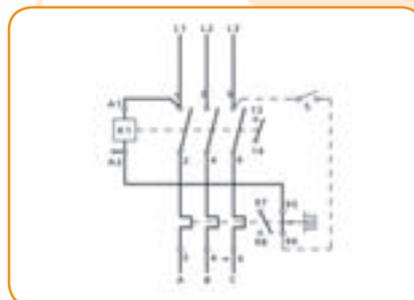
Connection for remote start-inch-stop control



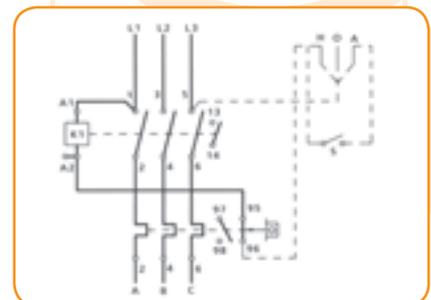
Connection diagram



Connection for single-phase motors



Connection for remote pilot switch control



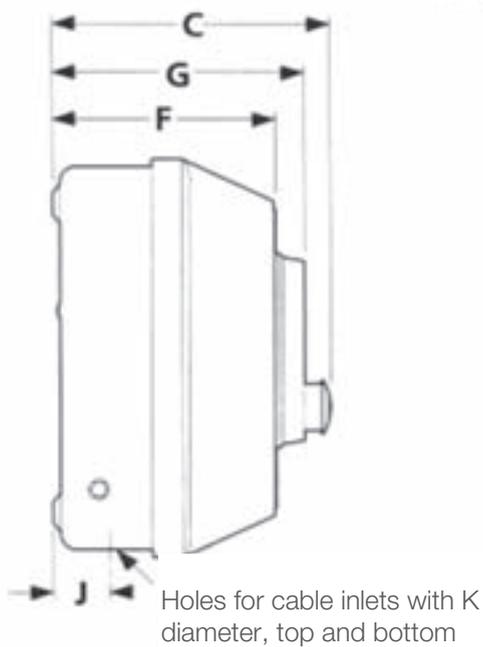
Connection for remote control with selection switch, manual - 0 - automatic

Contactors combinations

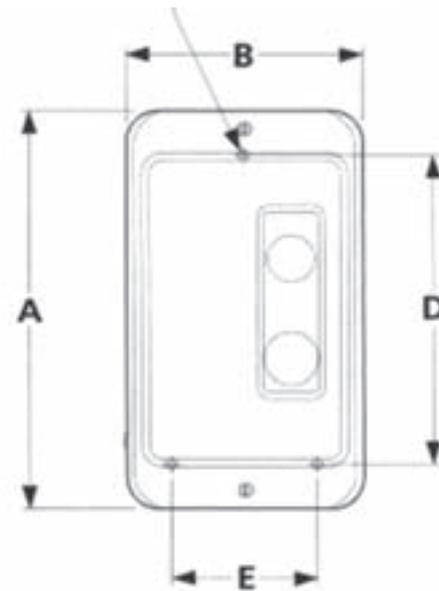
DIRECT ON-LINE STARTERS UP TO 30 A

DIMENSIONS

An enclosure for contactors and direct-on-line starters (size D1)



Fixing holes with L diameter



IP66	A	B	C	D	E	F	G	H	J	K	L
KNL9 - KNL30 (enclosure D1)	212	124	146	164	76	117	132.5	-	29.5	3 x 20	5.5
KNL9 - KNL30 + main switch (enclosure D1)	212	124	156	164	76	117	132	146	29.5	3 x 20	3 x 5.5

Contactors combinations

REVERSING STARTERS UP TO 30 A



To define the starter, the following data have to be known:

- motor power, operational current
- coil control voltage
- required pushbuttons (none, I, II, 0, reset)
- main switch (yes or no)

Based on these data, a convenient contactor and an overload relay as well as correspondingly equipped enclosure are selected.

COMPONENT SELECTION

	Motor power at 400/415 V, three-phase		Thermal overload relay BR16/30 Operational current (A) min.-max	Reversing starter*	Enclosure		
	kW	HP			Push-button arrangement	Main switch	Ordering code
BR16/KNL18	0.06	0.08	0.16 - 0.25	RS9	I, II and 0 reset none	—	R420S
	0.12	0.16	0.25 - 0.4				R410
	0.18	0.25	0.45 - 0.63				R400
	0.25	0.33	0.75 - 1		I, II and 0 reset none	with main switch	R221
	0.55	0.75	1.1 - 1.6				R211
	1.1	1.5	2.3 - 3.2				R201
	1.5	2	2.9 - 4				
	2.2	3	4.5 - 6.3		RS12		
	4	5.5	7.2 - 10	RS16			
	5.5	7.5	9 - 12.5	RS18			
7.5	10	11.3 - 16					
9	10	15 - 20					
BR30/KNL30	11	15	17.5 - 21.5	RS22	I, II and 0 reset none	—	R420M R410 R400
					I, II and 0 reset none	with main switch	R221 R211 R201
	15	20	24.5 - 30	RS30	I, II and 0 reset none	—	R420M R410 R400
					I, II and 0 reset none	with main switch	R222 R212 R202

ORDERING DATA

R2, R4	... 0,1,2 0,1,2 S, M -	Kind of thermal overload relay BR	Control voltage
					Setting range for thermal overload relay. S - for KNL9 - KNL16, M - for KNL22, KNL30 Main switch (0 - none, 1 - 25 A, 2 - 32 A) Pushbuttons (0 - none, 1 - reset pushbutton, 2 - I, II and 0) Enclosure size	

* Standard control voltages (50/60 Hz)
B7 24 V
F7 110/125 V
M7 220/240 V
Q7 380/415 V

Other control voltages also available

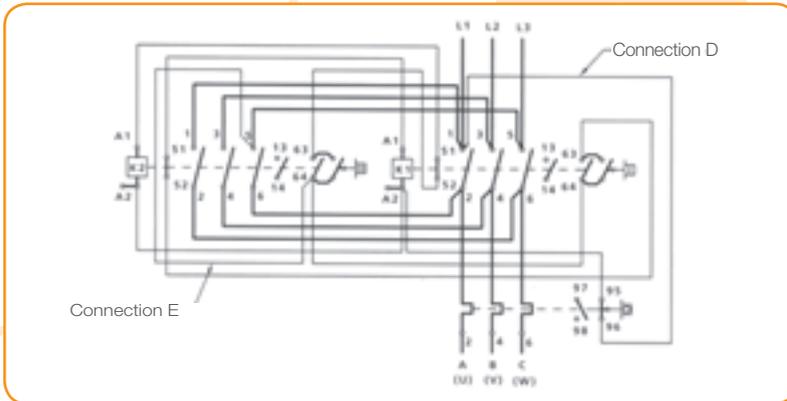
Enclosure: I, II and 0 pushbuttons can be marked: FOR/REV, UP/DOWN, OPEN/CLOSED, LEFT/ RIGHT
Degree of protection IP66, a metal base and a polycarbonate cover

Contactors combinations

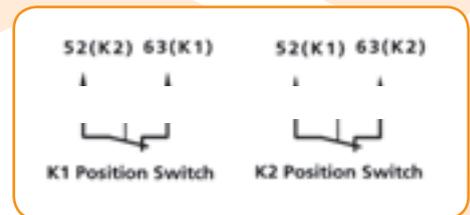
REVERSING STARTERS UP TO 30 A

CONNECTION DIAGRAM

KNL9-KNL30 reversing starters



Wiring if a position switch is required:
 1. Remove connections 52 - 63
 2. Connect as illustrated



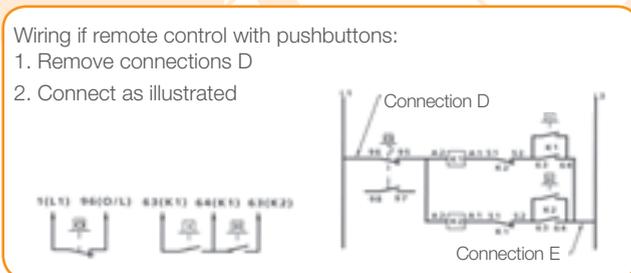
NOTE: Auxiliary contact 13-14 belongs to a KNL9-KNL16 contactor standard equipment

CONTROL CIRCUIT SUPPLY ARRANGEMENTS

SUPPLY	WIRING
Phase to phase	See a figure
Phase to neutral	Remove connection D connect neutral to terminal 96
Separate supply	Remove connections D and E. Connect separate coil supply to terminal 96 on overload relay and terminal 64 on K2 contactor

Wiring if remote control with pushbuttons:

1. Remove connections D
2. Connect as illustrated



Push to run

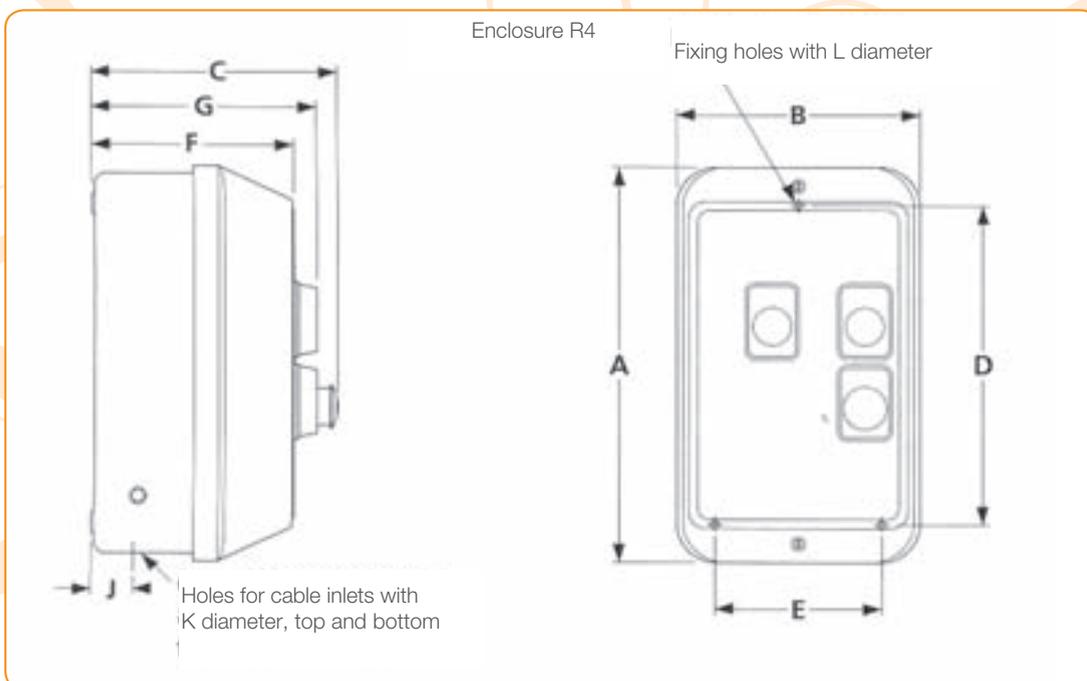
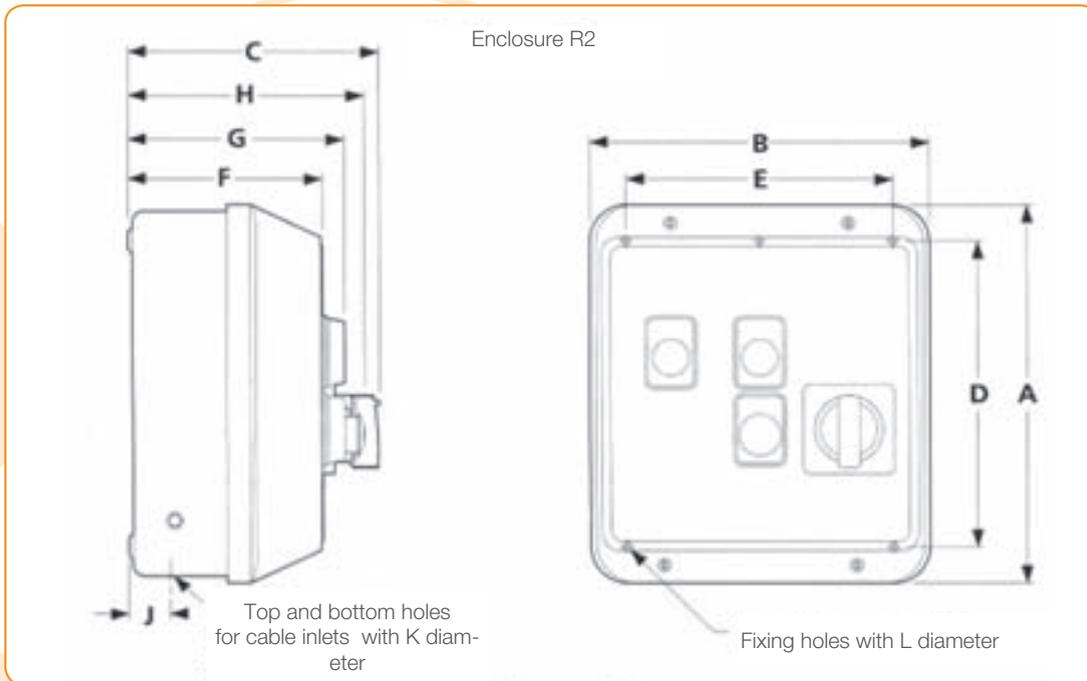
A simple push-to-run arrangement can be achieved in one or both directions by changing the top start switches.

Contactors combinations

REVERSING STARTERS UP TO 30 A

DIMENSIONS

Enclosures for reversing starters (enclosure sizes R2 and R4)



IP66	A	B	C	D	E	F	G	H	J	K	L
KNL9 - KNL30 (enclosure R4)	260	158	160	210	108	132	147	-	27.5	2 x 20 1 x 25	3 x 5.5
KNL9 - KNL30 + main switch (enclosure R2)	260	230	171	210	180	133	148	161	28.5	2 x 20 1 x 25	4 x 5.5

Contactors combinations

STAR-DELTA STARTERS UP TO 25 kW



To define the starter, the following data have to be known:

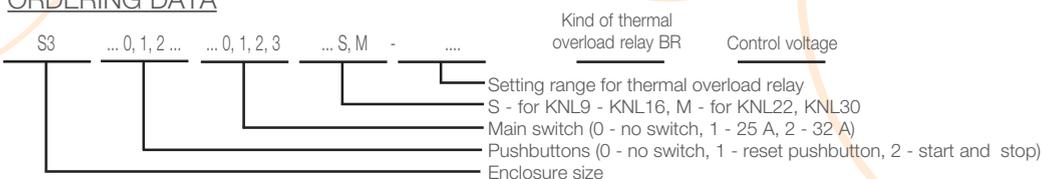
- motor power, operational current
- coil control voltage
- required pushbuttons (none, start, stop, reset)
- main switch (yes or no)

Based on these data, a convenient contactor and an overload relay as well as correspondingly equipped enclosure are selected.

COMPONENT SELECTION

	Motor power at 400/415 V, three-phase		Thermal overload relay BR16/30 Operational current (A) min.-max	Star-delta starter*	Enclosure		
	kW	HP			Push-button arrangement	Main switch	Ordering code
BR16/KNL18	2.2	3	2.3 - 3.2	SD16	start & stop	—	S320S
	4	5.5	4.5 - 6.3		reset		S310
	7.5	10	07.2 - 10		none		S300
	11	15	11.3 - 16		start & stop	with main switch	S321
	15	20	15 - 20		reset		S311
				none	S301		
BR30/KNL30	18.5	25	21 - 25	SD22	start & stop	—	S320
					reset		S310
					none		S300
	22	30	21 - 25	SD30	start & stop	with main switch	S321
					reset		S311
					none		S301
25	34	24.5 - 30	start & stop	—	S320		
			reset		S310		
			none		S300		
				start & stop	with main switch	S322	
			reset	S312			
			none	S302			

ORDERING DATA



* Standard control voltages (50/60 Hz)
B7 24 V
F7 110/125 V
M7 220/240 V
Q7 380/415 V

Other control voltages also available

STAR-DELTA STARTERS APPLICATION

For a star-delta unit, the overload relay is connected to a delta loop and therefore protects the motor only at this connection. For easier selection of the relay, motor currents are stated in a table.

A star-delta starter is equipped with an electronic time relay with a minimum range from 3 to 45 seconds.

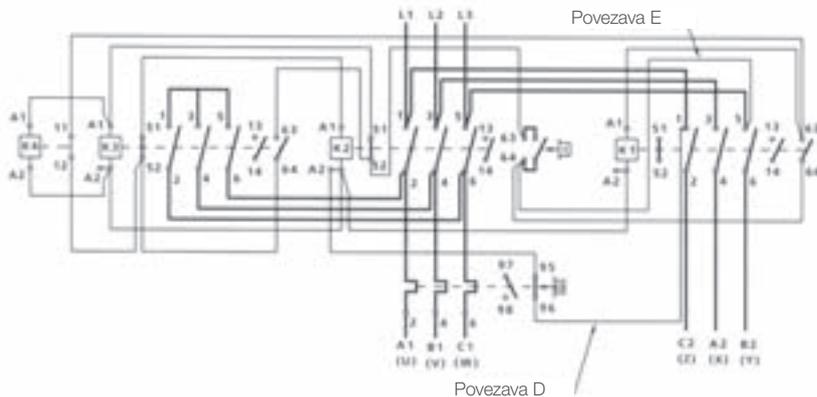
The time relay assures required delay between a "star" contactor opening and a "delta" contactor closing.

Contactors combinations

STAR-DELTA STARTERS UP TO 25 kW

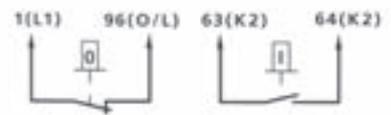
CONNECTION DIAGRAM

KNL9-KNL30 star delta starter contactors



Wiring for remote control with pushbuttons

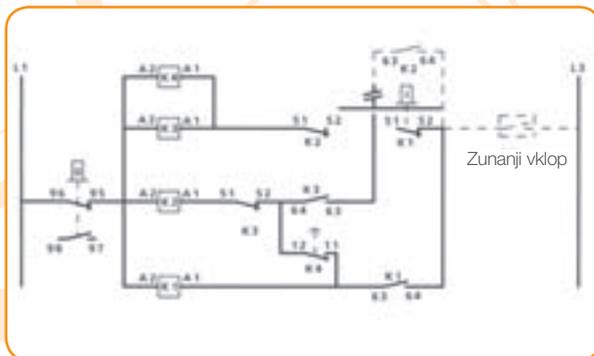
1. Remove connection D
2. Connect as illustrated



Connection diagram (control with pushbuttons)



NOTE: AUXILIARY CONTACT 13-14 BELONGS TO A KNL9-KNL16 CONTACTOR STANDARD EQUIPMENT



CONTROL CIRCUIT SUPPLY ARRANGEMENTS

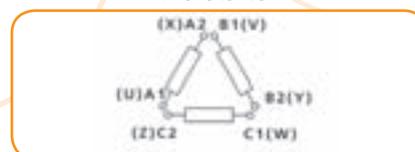
SUPPLY	WIRING
Phase to phase	See a figure
Phase to neutral	Remove connection D Connect terminal 96 to a neutral conductor
Separate supply	Remove connections D and E Connect separate coil supply to terminal 96 on overload relay and terminal 64 on K2 contactor

Connection diagram (Remote Pilot Switch Control)

1. Remove connection 63 to 52 on the K2 contactor
2. Connect between 52 and 64 on the K1 contactor and from terminal 51 on the K1 contactor to terminal 52 on the K2 contactor
3. Connect the pilot switch in place of connection E
4. Set overload relay to manual reset position.

Motor windings

Connect to appropriate terminals on the starter

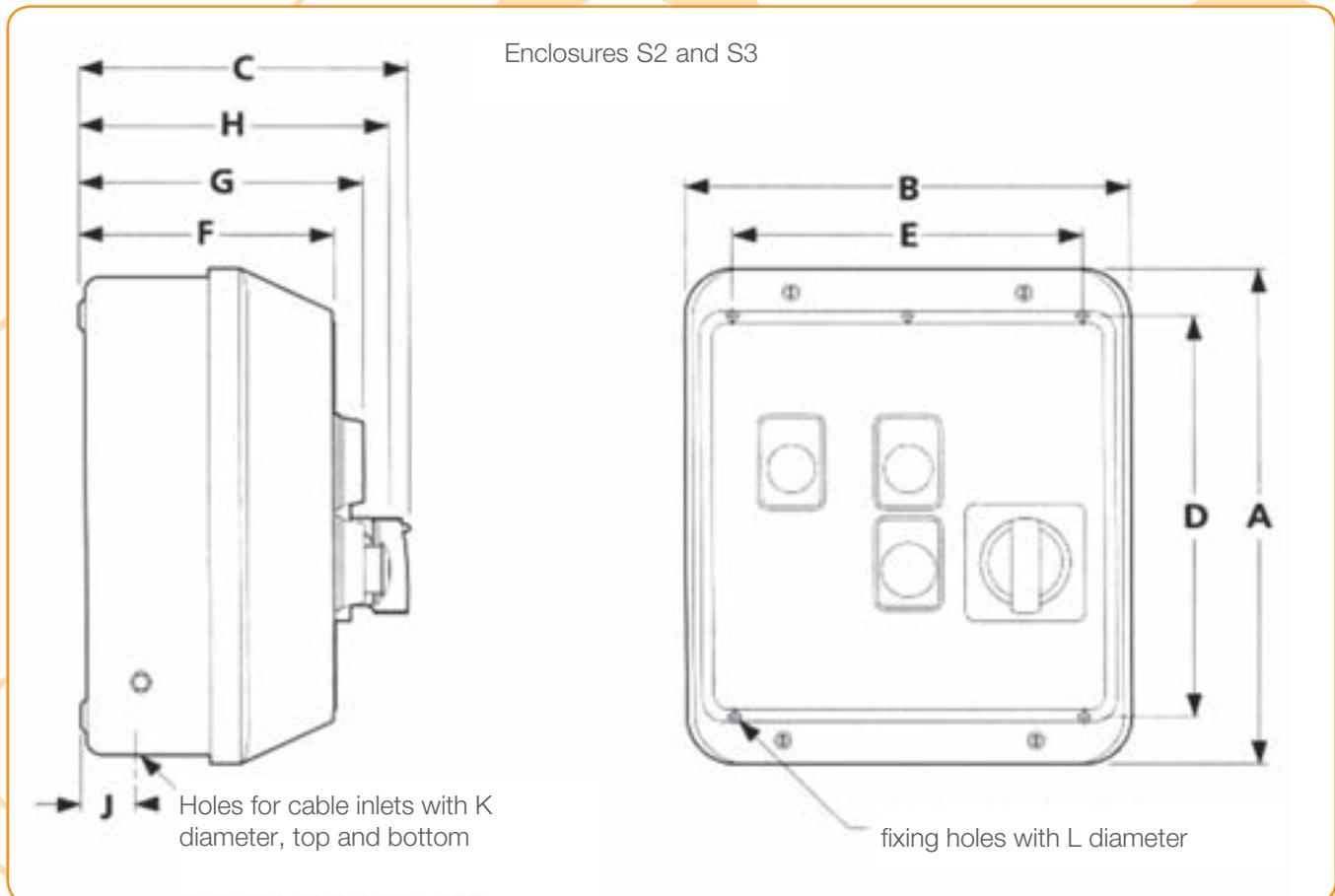


Contactors combinations

STAR-DELTA STARTERS UP TO 25 kW

DIMENSIONS

Enclosures for star-delta starters (sizes S2 and S3)



IP66	A	B	C	D	E	F	G	H	J	K	L
KNL16 - KNL30 (enclosure S2)	260	230	161	210	180	133	148	-	28,5	2 x 20 1 x 25	3 x 5,5
KNL16 - KNL30 + main switch (enclosure S3)	260	332	171	210	282	133	148	161	28,5	3 x 20 1 x 25	4 x 5,5