

## Features

### USAGE:



When choosing the Star-Delta switch it must be considered that in the start moment in star, the current and the start moment are reduced to roughly  $\frac{1}{3}$  of its correspondent values at boot time.

This equipment is destined to the start of three-phase voltage motors with short-circuit rotor. This kind of equipment applies solely to motors in which the rated voltage in delta coincides with the rated voltage between the power supply phases, therefore a 220/380 Y motor can not be turned on with a star-delta switch in a 380 V network between phases. It is crucial for the start that the motor is capable of starting in a dual tension, which means in 220/380V, in 380/660V or 440/760V. The motors must have at least six connection terminals.



The star-delta starting must be used when the power curve of the motor is high enough to guarantee the machine's acceleration in case of reduced current. In star connection, the current is reduced from 25 to 33% of the start current in delta start. The loads power resistant, can not exceed the start load of the motor and in the moment of changing the start load" for star it cannot have unacceptable value. There are cases in which this starting system cannot be used.

Motors that have the rated voltage of operation over 660V must have a special isolated system suitable for their conditions.

They are used for three-phase motor starting with the purpose of reducing the starting current to limit the voltage drop in the power supply phase. The usage of this kind of switch is usually demanded by the electricity concessionaire so its energy grade lines are not overloaded, due to the start of higher power electrical motors (consult the electricity concessionaire of the region where the installation will be made). For security reasons the gauntlet is never locked in the START position.



In some cases the machine's characteristics forces us to use this kind of switch. They are machines with overestimated steering wheels (all kinds of presses), wire drawing machine, conveyor belts, injection machines, cutters, etc.

Generally the star-delta switch can only be used machines starting in empty, which means, unladen. Only after reached the nominal speed, the load can be applied.

### APPLICATION:

Winches, turning presses, excentric presses, guillotines presses, agricultural machinery and all kinds of machine tools.

**OBS:** The Delta-Star switch is extremely used due to its low-cost when compared to the compensating switch. There is no limit regards its number of manoeuvre. The components are space-saving. The starting current is reduced to  $\frac{1}{3}$ . The switch can only be used in motors where the six terminals are accessible. The system voltage must coincide with the delta tension of the motor. With the starting current reduced to around  $\frac{1}{3}$  of the rated current is also reduced to  $\frac{1}{3}$  in the starting moment.

If the motor does not achieve at least 90% of its regular nominal speed, the current peak in switching status from star to delta will be almost as in a direct starting, which becomes harmful to the motors contacts and it doesn't result in any advantage for the electric network.

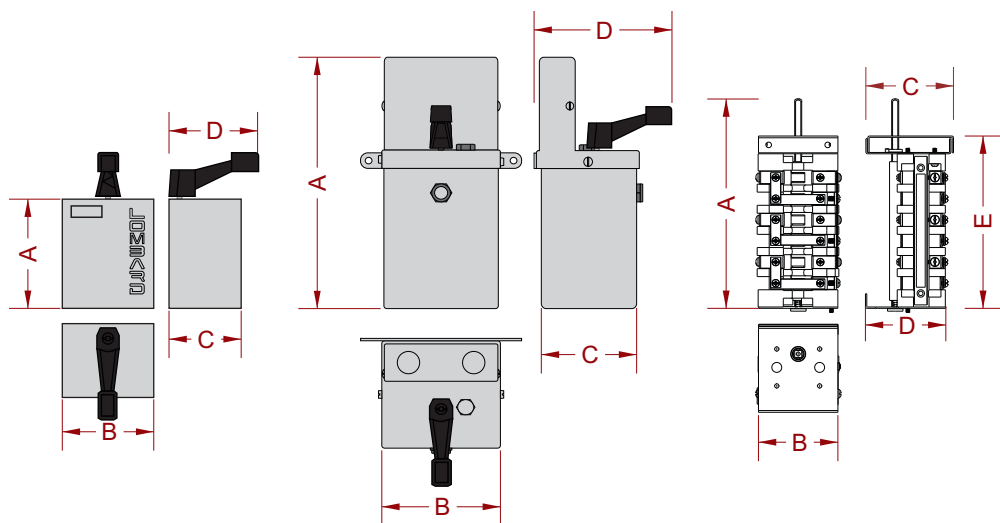


## Technical Specifications

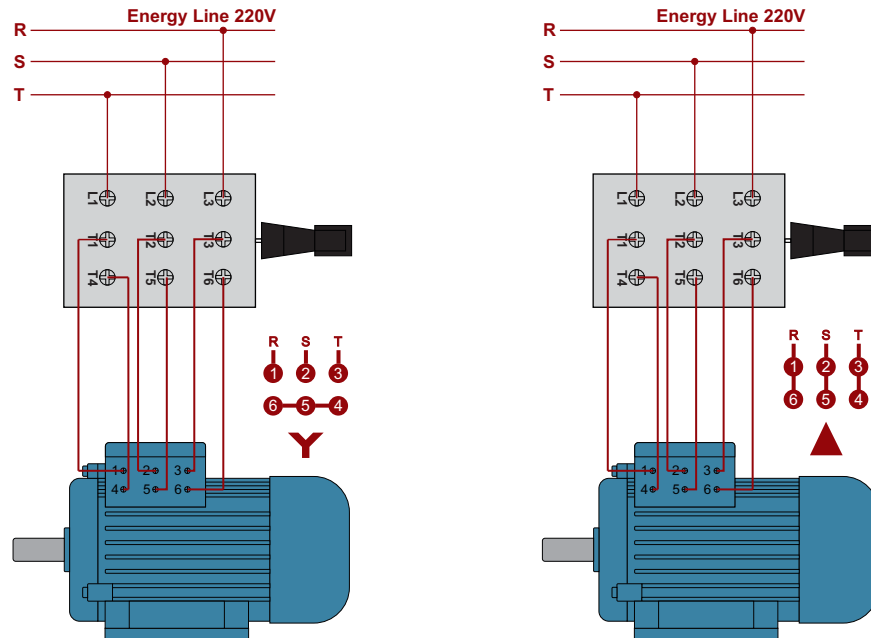
STAR-DELTA OF OVERLAP										
REF.	TYPE	CV / HP			AMP	DIMENSIONS (mm)				
		220V	380V	440V		A	B	C	D	E
14	ET	5	7,5	10	15	215	99	78	100	-
15	ET	7,5	12,5	15	20	215	99	78	100	-
160	ET	10	15	20	30	235	102	83	103	-
161	ET	15	25	30	45	275	135	110	141	-
162	ET	20	30	40	60	275	135	110	141	-
163	ET	30	50	60	90	275	135	110	141	-
164	ET	40	60	75	120	315	218	124	186	-

STAR-DELTA OIL										
REF.	TYPE	CV / HP			AMP	DIMENSIONS (mm)				
		220V	380V	440V		A	B	C	D	E
2026	ETO	5	7,5	7,5	15	250	142	135	166	-
2028	ETO	10	15	15	30	270	142	135	166	-
2031	ETO	15	25	25	45	353	171	150	175	-
2032	ETO	20	30	30	60	353	171	150	175	-
2035	ETO	30	50	50	90	390	209	197	261	-
2038	ETO	40	60	60	120	390	209	197	261	-

STAR- DELTA OF EMBED										
REF.	TYPE	CV / HP			AMP	DIMENSIONS (mm)				
		220V	380V	440V		A	B	C	D	E
6010	EBET	2	3	4	15	194	75	62	73	155
6020	EBET	3	5	6	20	194	75	62	73	155
6030	EBET	5	7,5	31	30	213	80	70	77	171
6040	EBET	7,5	12,5	15	45	248	90	91	97	205
6050	EBET	10	15	20	60	248	90	91	97	205



## Connection Procedure



- 6 WIRES MOTOR WITH 220/380 WINDING AND TENSION SERVICE OF 220V  
- 6 WIRES MOTOR WITH 380/660 WINDING AND TENSION SERVICE OF 380V

WIRE - MOTOR	1	2	3	4	5	6
SWITCHES	↓	↓	↓	↓	↓	↓
TERMINALS	1	2	3	4	5	6

- 12 WIRES MOTOR WITH 220/380/440/760 WINDING AND TENSION SERVICE OF 440V

WIRE - MOTOR	1	2	3	10	11	12
SWITCHES	↓	↓	↓	↓	↓	↓
TERMINALS	1	2	3	4	5	6

OBS: - WIRES 4 E 7 TIE AND ISOLATE IT  
- WIRES 5 E 8 TIE AND ISOLATE IT  
- WIRES 6 E 9 TIE AND ISOLATE IT

- 12 WIRES MOTOR WITH 220/380/440/760 WINDING AND TENSION SERVICE OF 220V

WIRE - MOTOR	1 - 7	2 - 8	3 - 9	4 - 10	5 - 11	6 - 12
SWITCHES	↓	↓	↓	↓	↓	↓
TERMINALS	1	2	3	4	5	6

MOTOR WINDING	WORKING TENSION	STARTING WITH Y SWITCH - ▲
220 / 380	220 V	YES
	380 V	NO
220 / 440 / 230 / 460	220 V	YES
	380 V	NO
380 / 360	220 / 230 V	NO
	440 / 460 V	NO
220 / 380 / 440 / 760	380 V	YES
	220 V	YES
	380 V	NO
	440 V	YES