

Direct Three-Phase Start

Features



Designed for the maneuver and protection of three-phase motors coupled with the most varied machines. It is recommended for engines that start without load. This switch allows the motor to start with full values of torque and starting current and its coils receive the rated service voltage. It consists of a simple and safe system, recommended for cage engines. It should be used in the following cases:

- Low motor power in order to limit the disturbances caused by the peak current.
- The engine does not require progressive acceleration and is equipped with mechanical devices (speed reducer, belts, etc.) that prevent a very fast start.
- The starting torque is high.

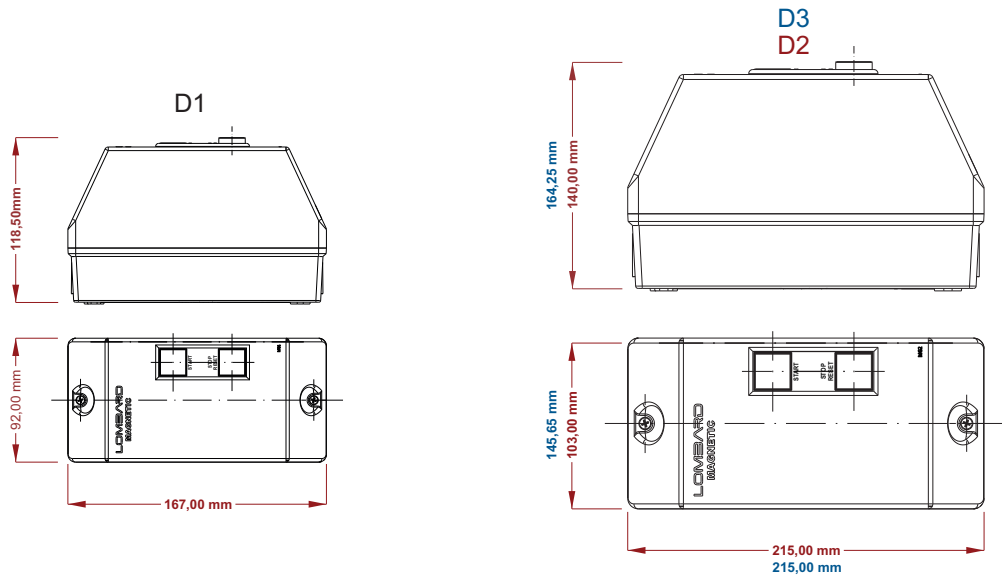
Technical Specifications

POWER MAX - CV AC3/ 60 Hz - 4 POLOS			I (AMP)	CONTACTOR	RELAY ADJUSTMENT RANGE (A)	RECOMMENDED FUSE (A)	
220V	380V	440V					
0,25	0,5	0,75	1,8	NC1 0910	(1,25 - 2)	2	TAMANHO D1
0,33	0,75	1	1,85	NC1 0910	(1,25 - 2)	4	
0,5	1	1,5	2,8	NC1 0910	(2,5 - 4)	6	
-	1,5	-	2,9	NC1 0910	(2,5 - 4)	10	
0,75	-	2	4	NC1 0910	(2,5 - 4)	10	
1	2	-	4,2	NC1 0910	(4 - 6)	10	
1,5	3	3	6,3	NC1 0910	(5,5 - 8)	10	
2	-	-	7	NC1 0910	(5,5 - 8)	16	
-	4	-	7,1	NC1 0910	(5,5 - 8)	20	
-	-	4	8	NC1 0910	(7 - 10)	20	
-	-	5	8,2	NC1 0910	(7 - 10)	20	
3	5	-	9	NC1 0910	(7 - 10)	20	
-	-	6	9,3	NC1 1210	(9 - 13)	20	
-	6	7,5	12	NC1 1210	(9 - 13)	25	
4	7,5	-	12,2	NC1 1810	(9 - 13)	25	
-	-	10	15	NC1 1810	(12 - 18)	32	
5	10	-	17	NC1 1810	(12 - 18)	32	
6	-	-	18,5	NC1 2510	(17 - 25)	32	TAMANHO D2
-	-	12,5	22,5	NC1 2510	(17 - 25)	50	
7,5	12,5	15	23	NC1 2510	(17 - 25)	50	
-	15	-	25	NC1 3210	(23 - 32)	50	
10	-	20	32	NC1 3210	(28 - 36)	50	TAMANHO D3
-	20	-	33	NC1 4011	(28 - 36)	50	
-	-	25	38	NC1 4011	(30 - 40)	63	
12,5	-	30	40	NC1 4011	(37 - 50)	63	
-	25	-	41	NC1 5011	(37 - 50)	63	
15	-	-	42	NC1 5011	(37 - 50)	80	
-	30	40	51	NC1 6511	(48 - 65)	80	
20	40	-	63	NC1 6511	(48 - 65)	80	
25	-	50	65	NC1 6511	(55 - 70)	100	
30	50	60	80	NC1 8011	(63 - 80)	125	

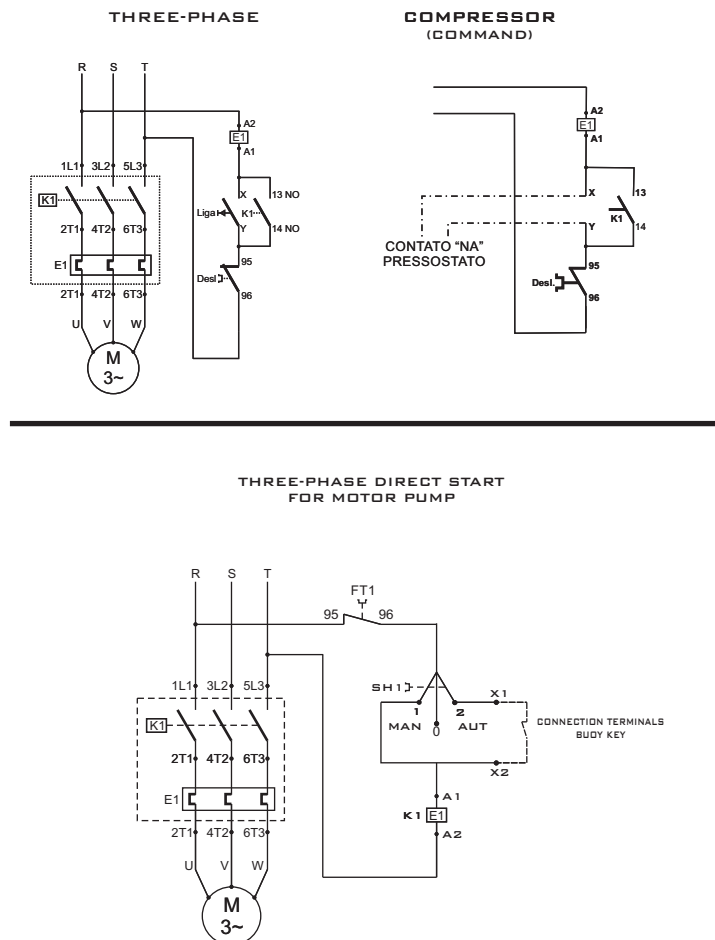
Os valores apresentados estão sujeitos à alteração sem aviso prévio.



Dimensions



Connection Procedure

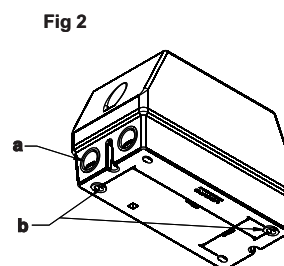
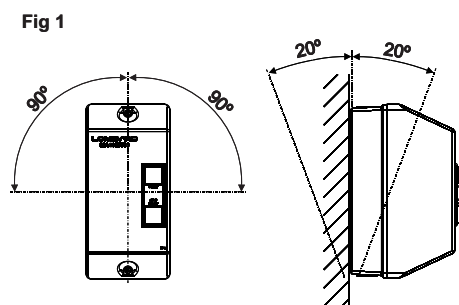


Installation

Install the key on a flat surface, respecting the permissible inclinations. For a good fixation use screws with flat washers. **See fig. 1**

The switch must be installed in places that do not present any risk of explosion, nor contamination by dust or gases that can corrode metals or plastics, or change the electrical insulation characteristics. In addition, the installation location must be free of impacts, shocks or vibrations, as the correct functioning of the relay may be compromised or the contactor may be accidentally closed. Ambient temperature: - 5 °C to + 40 °C, with an average temperature in a period of 24 hours remaining below 35 °C.

Relative air humidity: must not exceed 50% at an ambient temperature of + 40 °C. At lower temperatures, higher relative humidity is allowed, reaching up to 90% at temperatures below +25°C. Avoid condensation on the surface of the internal components.



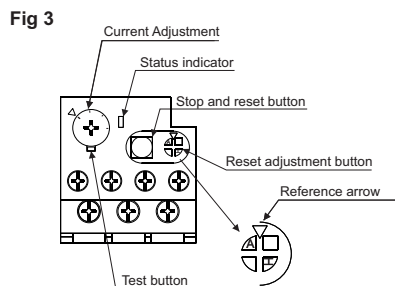
a - The Area of fragility, to be broken for the entrance of the wiring or for fixing of cable glands.
b - Key fixing holes. Use 5.0 mm diameter screws.

The thermal relay offers the functions of temperature compensation, action indications, reset (manual and automatic) and stop activation.

Choosing the Reset method: It must be done before energizing the power circuit. The thermal relay leaves the factory set for automatic reset (position "A" on the reference arrow). To adjust the reset to manual mode, turn the blue reset adjustment knob 90°, counterclockwise, placing the "H" position on the reference arrow. **See fig. 3**

Trigger current adjustment: this adjustment must be made before the power circuit is energized. The thermal relay leaves the factory set to the rated motor current corresponding to the model of the switch in which it is installed. To change, turn the adjusting screw with a screwdriver to the desired nominal current value. Avoid adjusting the current to a value well above the motor rated current. **See fig. 3.** The starter switch should only be energized after the above adjustments. **Never change the reset mode when the thermal relay is live.**

Product according to IEC 60947-4



NOTE: When the switch has been installed a long distance from the motor, it will be necessary to dimension the cables taking into account the voltage drop.

The thermal relay connections are made of PVC insulated copper alloy or equivalent alloy. The following table provides information on the straight section of the power circuit connections. The quality of the power connections directly influences the performance of the trip system due to lack of phase, and overheating due to lack of contact between the terminals must be avoided.

Type of relay	Range current	Fuse aM	Fuse gG	Wire (mm ²) relay/motor
NR2-25	1,6 - 2,5	4	6	1,5
	2,5 - 4,0	6	10	
	4,0 - 6,0	8	16	
	5,5 - 8,0	10	20	
	7,0 - 10	12	20	
	9,0 - 13	16	25	
	12 - 18	20	35	
NR2-36	17 - 25	25	50	6,0
	23 - 32	40	63	
	28 - 36	40	80	
NR2-93	23 - 32	40	63	6,0
	30 - 40	40	100	
	37 - 50	63	100	
	48 - 65	63	100	16,0
	55 - 70	80	125	
	63 - 80	80	125	
	80 - 93	100	160	

Reversible Three-Phase Direct Start

features



They are used to reverse the direction of rotation of electric motors. It has its main application in machine tools, in which the inversion of the direction of rotation of the motor is necessary. It is recommended for engines that start in vacuum. This switch allows the motor to start with full values of torque and starting current and its coils receive the rated service voltage. To correctly execute the command for this operation, the engine must **not be reverted to full rotation from clockwise to counterclockwise or vice versa, unless necessary.**

Technical Specifications

POWER MAX - CV AC3/ 60 Hz - 4 POLOS			CONTACTOR K1	CONTACTOR K2	ADJUSTMENT RANGE RELAY(A)	FUSE RECOMMENDED (A)	
220V	380V	440V					
0,5	1	-	NC1 0910	NC1 0910	(2,5 - 4)	4	SIZE D4
-	-	1,5	NC1 0910	NC1 0910	(2,5 - 4)	6	
0,75	1,5	2	NC1 0910	NC1 0910	(2,5 - 4)	6	
1	2	-	NC1 0910	NC1 0910	(4 - 6)	10	
-	-	3	NC1 0910	NC1 0910	(4 - 6)	10	
1,5	3	-	NC1 0910	NC1 0910	(5,5 - 8)	10	
-	-	4	NC1 0910	NC1 0910	(5,5 - 8)	16	
2	-	-	NC1 0910	NC1 0910	(5,5 - 8)	16	
-	4	-	NC1 0910	NC1 0910	(7 - 10)	16	
-	-	5	NC1 0910	NC1 0910	(7 - 10)	16	
-	-	6	NC1 1210	NC1 1210	(9 - 13)	20	
3	5	-	NC1 1210	NC1 1210	(9 - 13)	25	
-	6	-	NC1 1210	NC1 1210	(9 - 13)	25	
-	-	7,5	NC1 1810	NC1 1810	(12 - 18)	25	
4	-	-	NC1 1810	NC1 1810	(12 - 18)	25	
-	7,5	-	NC1 1810	NC1 1810	(12 - 18)	25	
-	-	10	NC1 1810	NC1 1810	(12 - 18)	32	
5	-	-	NC1 1810	NC1 1810	(12 - 18)	32	
-	10	-	NC1 1810	NC1 1810	(17 - 25)	32	
6	-	12,5	NC1 2510	NC1 2510	(17 - 25)	40	
-	12,5	15	NC1 2510	NC1 2510	(17 - 25)	40	
7,5	-	-	NC1 3210	NC1 3210	(23 - 32)	50	
-	15	-	NC1 3210	NC1 3210	(23 - 32)	50	
-	-	20	NC1 3210	NC1 3210	(23 - 32)	63	
10	-	-	NC1 3210	NC1 3210	(28 - 36)	63	
-	20	-	NC1 4011	NC1 4011	(30 - 40)	63	SIZE D5
-	-	25	NC1 4011	NC1 4011	(30 - 40)	63	
12,5	-	-	NC1 4011	NC1 4011	(30 - 40)	63	
-	25	-	NC1 5011	NC1 5011	(37 - 50)	63	
-	-	30	NC1 5011	NC1 5011	(37 - 50)	63	
15	-	-	NC1 5011	NC1 5011	(37 - 50)	80	
-	30	-	NC1 6511	NC1 6511	(48 - 65)	80	
-	-	40	NC1 6511	NC1 6511	(48 - 65)	80	
20	-	-	NC1 6511	NC1 6511	(55 - 70)	100	
-	40	-	NC1 6511	NC1 6511	(55 - 70)	100	
-	-	50	NC1 8011	NC1 8011	(55 - 70)	100	
25	-	-	NC1 8011	NC1 8011	(63 - 80)	100	
-	50	-	NC1 8011	NC1 8011	(63 - 80)	125	
-	-	60	NC1 9511	NC1 9511	(80 - 93)	125	
30	-	-	NC1 9511	NC1 9511	(80 - 93)	125	

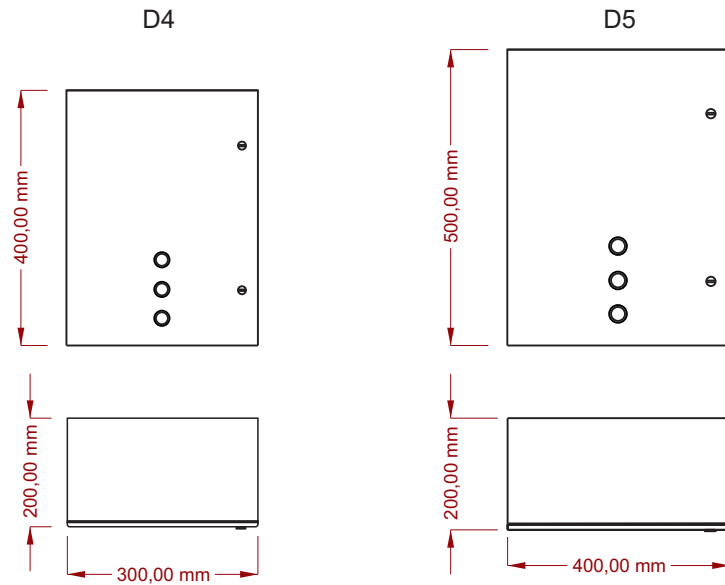
The values shown are subject to change without notice.

For maneuvering and protection of three-phase electric motors;

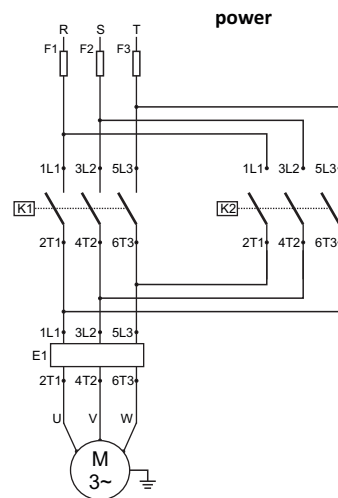
- Overload relays and protection relays against phase failure;
- Degree of protection IP 55;
- For three-phase motors up to 30 CV at 220 V, 50 CV at 380 V and 60 CV at 440 V.
(Other capacities on request).

Selection data: Type of drive, Motor power, Motor polarity, Supply voltage, Supply type (SINGLE-PHASE OR THREE-PHASE).

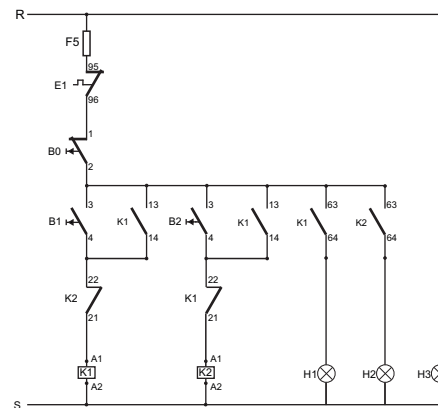
Dimensions



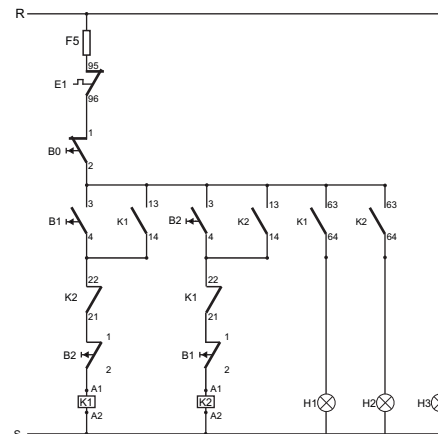
Connection Procedure



COMMAND (SIMPLE REVERSION)



COMMAND (INSTANT REVERSION)



- Component sizing:**
- K1 e K2: IN x 1,15
 - E1: IN
 - F1, F2 e F3: IStart x 5 seg.
- * 1,15 - Safety factor