



JSL INDUSTRIES LTD.

'JYOTI' AIR BREAK MOTOR STARTERS

Introduction

Features & Technical Specifications

D.O.L. Starters

Star / Delta Starters

Automatic Star / Delta Starters

Manual Star / Delta Starters

Dimensional Details

- Air Break Full Voltage Motor Starter
- Air Break Reduced-Voltage Motor Starters
- Manually Operated Star Delta Starters

'Jyoti' Air Break Motor Starters



'JYOTI' AIR BREAK FULL VOLTAGE MOTOR STARTERS

FULL-VOLTAGE MOTOR STARTERS are suitable for high inertia motors and motors having higher starting - time. Motor-windings are connected across supply-voltage as soon as starter is switched 'ON'. These are most economical devices to start and run motors having no loss-of-protection measures.

DIRECT ON-LINE STARTERS

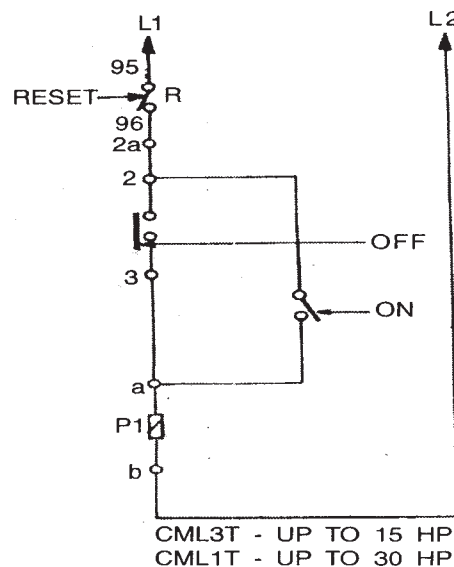
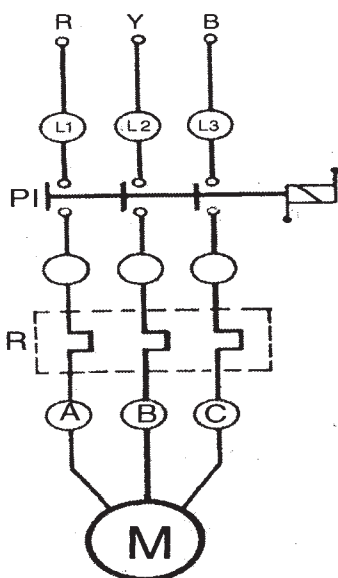
The motor-windings are directly connected across the supply voltage with the help of Direct On-Line Starters. It consists of Contactor and Thermal Overload Relay-assemblies as major inserts. JYOTI provides Direct On-Line Starters upto 22kW / 30 HP at 415V in dust and vermin proof enclosures.

SALENT FEATURES

- Satisfactory operation for voltage variations $\pm 15\%$
- Operational frequency of 30 Operations per hour
- Push-button operation
- Selection for Auto-Reset and Manual-Reset
- In-built under-voltage protection for system voltages below 50%
- Close thermal protection to motor against overloads due to single-phasing and excessive loading.
- Large room for external cable terminations
- Elegant sheet steel enclosures designed for protection grade IP-52 category.
- Complies with standard specification IS: 13947 (PART-4) : 1993 AND IEC : 947-4-1

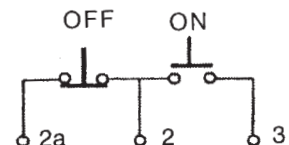
SELECTION TABLE

KW/HP At 415 V	TYPE Direct on line Starters Standard	I.F.L In AMP.	Relay Range In AMP.	Cable Sizes in mm ²		Delayed * Action HRC Fuse in AMP
				Copper	Aluminium	
0.75/1	CML3T-7.5	2	1.6-2.5	1.5	1.5	6
1.5/2	CML3T-7.5	3.5	3.2-5	1.5	1.5	10
2.2/3	CML3T-7.5	5	4-6.3	1.5	2.5	10
3.7/5	CML3T-7.5	7.5	6.3-10	1.5	2.5	16
5.5/7.5	CML3T-7.5	11	10-14.5	1.5	2.5	20
7.5/10	CML3T-10	14	12.5-20	2.5	4	25
11/15	CML3T-15	21	16-25	4	6	35
15/20	CML1T-20	28	20-32	6	10	50
22/30	CML1T-30	39	25-36	10	16	63



NOTES :

1. CONNECT 95 (R) AND b (P1) TO THE SUPPLY VOLTAGE SAME AS COIL VOLTAGE
2. FOR REMOTE OPERATION REMOVE CONNECTION BETWEEN 2a & 2 CONNECT AS SHOWN BELOW



AIR BREAK REDUCED - VOLTAGE MOTOR STARTERS

Automatic
Star-Delta Starters
Upto 37kW / 50HP

Manual
Star-Delta Starters
Upto 22kW / 30HP

The motors are switched on at reduced voltage with the help of STAR-DELTA STARTERS to limit starting current. Starting current reduces by square of the factor by which voltage has reduced.

SALENT FEATURES

- Satisfactory operation for voltage variations $\pm 15\%$
- Selection for Auto and Manual reset
- Close thermal protection to motor against overloads due to single-phasing and excessive loading.
- In-built under-voltage protection for system voltage below 50%
- Adequate terminal stations for connecting incoming cable
- Elegant sheet steel enclosures designed for protection grade IP-52 category.
- Complies with standard specification IS: 13947 (PART-4) 1993 AND IEC : 947-4.1

STAR DELTA STARTERS

Star-Delta Starter are used for normal standard motor patterns where the rated motor voltage, if delta connected, equals the system voltage, There are no special devices needed, such as starting transformers.

Starter-interlocks ensure that motor always starts in Star condition, reducing the starting current to one third. The motor-windings are connected in Delta, when motor attains full speed. Star breaking and Delta-making current can be kept at modest level. This ensures longer life for the starter. Adjust setting on thermal relay at 0.58 times full load current of motor as relays are connected in phase. The starter performance is satisfactory for operational frequency of 12 operations per hour.

AUTOMATIC STAR-DELTA STARTERS

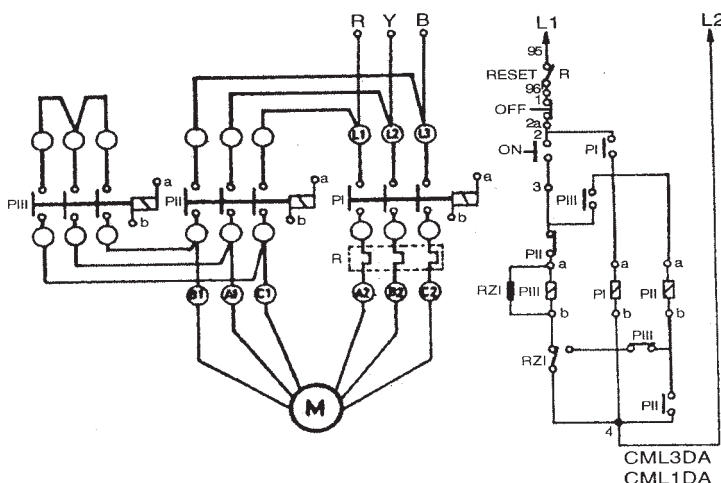
'ON' push-button connects motor winding in 'STAR' through Star and Main Contactors and actuates timer coil. Starting time in Star condition can be adjusted within 3 to 12 seconds by adjusting timer setting. Motor-winding changes over to Delta, once the timer sends signal. Operational reliability is ensured with adequate interlocks. Starter can be switched ON-OFF with push-buttons.

JYOTI provides automatic Star-Delta Starters upto 37 kW/50HP at 415 V, in dust and vermin proof metallic enclosures.

SELECTION TABLE : AUTOMATIC STAR DELTA STARTERS

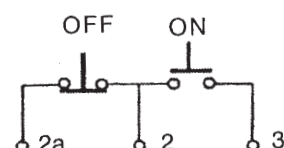
kW/HP	Automatic (Type)	I.F.L. in AMP.	Relay Range in AMP.	Cable Sizes in MM ²				Delayed Action HRC Fuses in AMP
				Supply		Motor		
				AL	CU	AL	CU	
2.2/3	CML3DA-10	5	3.2-5	2.5	1.5	1.5	1.5	10
3.7/5	CML3DA-10	7.5	4-6.3	2.5	1.5	1.5	1.5	16
5.5/7.5	CML3DA-10	11	6.3-10	2.5	2.5	1.5	1.5	20
7.5/10	CML3DA-10	14	6.3-10	4	2.5	2.5	1.5	25
9.3/12.5	CML3DA-15	17	10-14.5	6	4	4	2.5	35
11/15	CML3DA-15	21	10-14.5	6	4	4	2.5	35
15/20	CML3DA-20	28	12.5-20	10	6	6	2.5	35
18.5/25	CML3DA-30	34	16-25	16	10	6	4	50
22/30	CML3DA-30	39	20-32	16	10	10	6	50
30/40	CML1DA-40	55	25-36	25	16	16	6	63
37/50	CML1DA-50	66	32-50	35	25	25	10	80

SCHEMATIC DIAGRAM FOR AIR BREAK AUTOMATIC STAR-DELTA STARTER



NOTES :

1. CONNECT 95 (R) AND 4 TO THE SUPPLY VOLTAGE SAME AS COIL VOLTAGE
2. FOR REMOTE OPERATION REMOVE CONNECTION BETWEEN 2a & 2 CONNECT AS SHOWN BELOW



JYOTI MAKE MANUALLY OPERATED STAR-DELTA STARTERS

The Manual Star-Delta Starters includes a star-delta cam-operated switch for the change over of connections from Star to Delta, a contactor with over-load relay and 'ON-OFF' Push-Buttons.

The cam-operated switch has three position :- OFF-STAR-RUN. To start the ON, Push Button marked 'ON' is pressed and the switch handle is moved from OFF to START position. When the motor has almost come to its rated speed, the switch handle is moved from START to RUN, still taking care to keep 'ON' Push-Button pressed. Only now should the 'ON' button and switch handle be released. The 'ON' Push-Button has been provided to ensure that the motor is not inadvertently left running in star condition due to the negligence or ignorance of the operator.

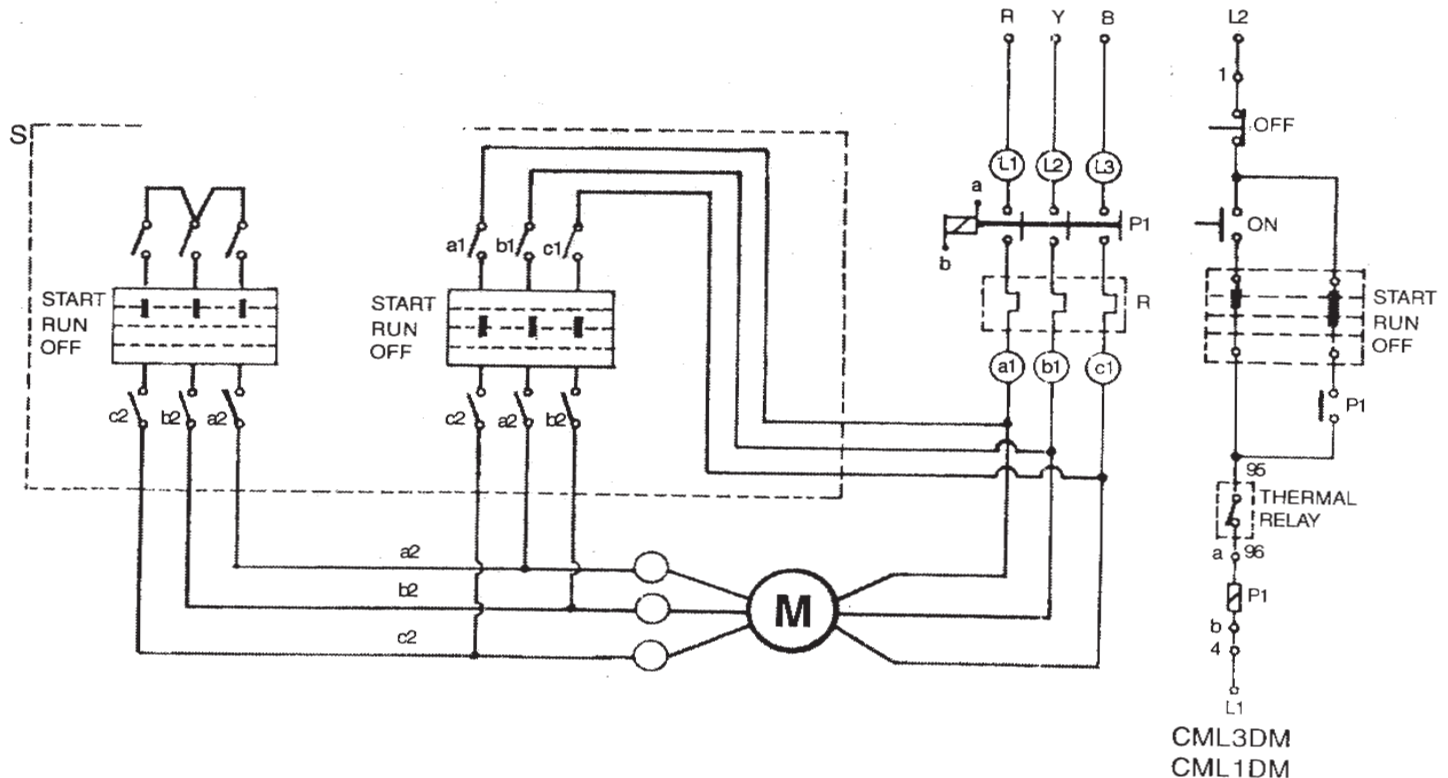
Likewise, if the starter trips due to over-load or any other reason, the switch handle must be first brought to OFF position. For repeat starting of motor, procedure described above is to be adopted.

To stop the motor, switch handle is to be brought to OFF position.

SELECTION TABLE : MANUAL STAR DELTA STARTERS

kW/HP	Manual (Type)	I.F.L. in AMP.	Relay Range in AMP.	Cable Sizes in mm ²				Delayed Action HRC Fuses in AMP
				Supply		Motor		
				AL	CU	AL	CU	
2.2/3	CML3DM-5	5	3.2-5	2.5	1.5	1.5	1.5	10
3.7/5	CML3DM-5	7.5	4-6.3	2.5	1.5	1.5	1.5	16
5.5/7.5	CML3DM-10	11	6.3-10	2.5	2.5	1.5	1.5	20
7.5/10	CML3DM-10	14	6.3-10	4	2.5	2.5	1.5	25
9.3/12.5	CML3DM-15	18	10-14.5	6	4	4	2.5	35
11/15	CML3DM-15	21	10-14.5	6	4	4	2.5	35
15/20	CML1DM-20	28	12.5-20	10	6	6	2.5	35
18.5/25	CML1DM-30	34	16-25	16	10	6	4	50
22/30	CML1DM-30	39	20-32	16	10	10	6	50

SCHEMATIC DIAGRAM FOR AIR BREAK MANUALLY OPERATED STAR-DELTA STARTER



NOTE : CONNECT 1 & 4 TO THE SUPPLY VOLTAGE SAME AS COIL VOLTAGE

The manually operated star-delta starter is provided with sturdy handle which can withstand rough handling

ORDERING CODE :

Type of starter should be suffixed as follows to complete specifications.

- TYPE**
- Specify as per Selection Table
 - Specify maximum Relay Range.
 - Specify Coil Voltage Code
 - A - 110 V AC Coil
 - B - 230 V AC Coil
 - C - 380 V AC Coil
 - D - 415 V AC Coil
 - No Code Standard Auto-Reset Relay

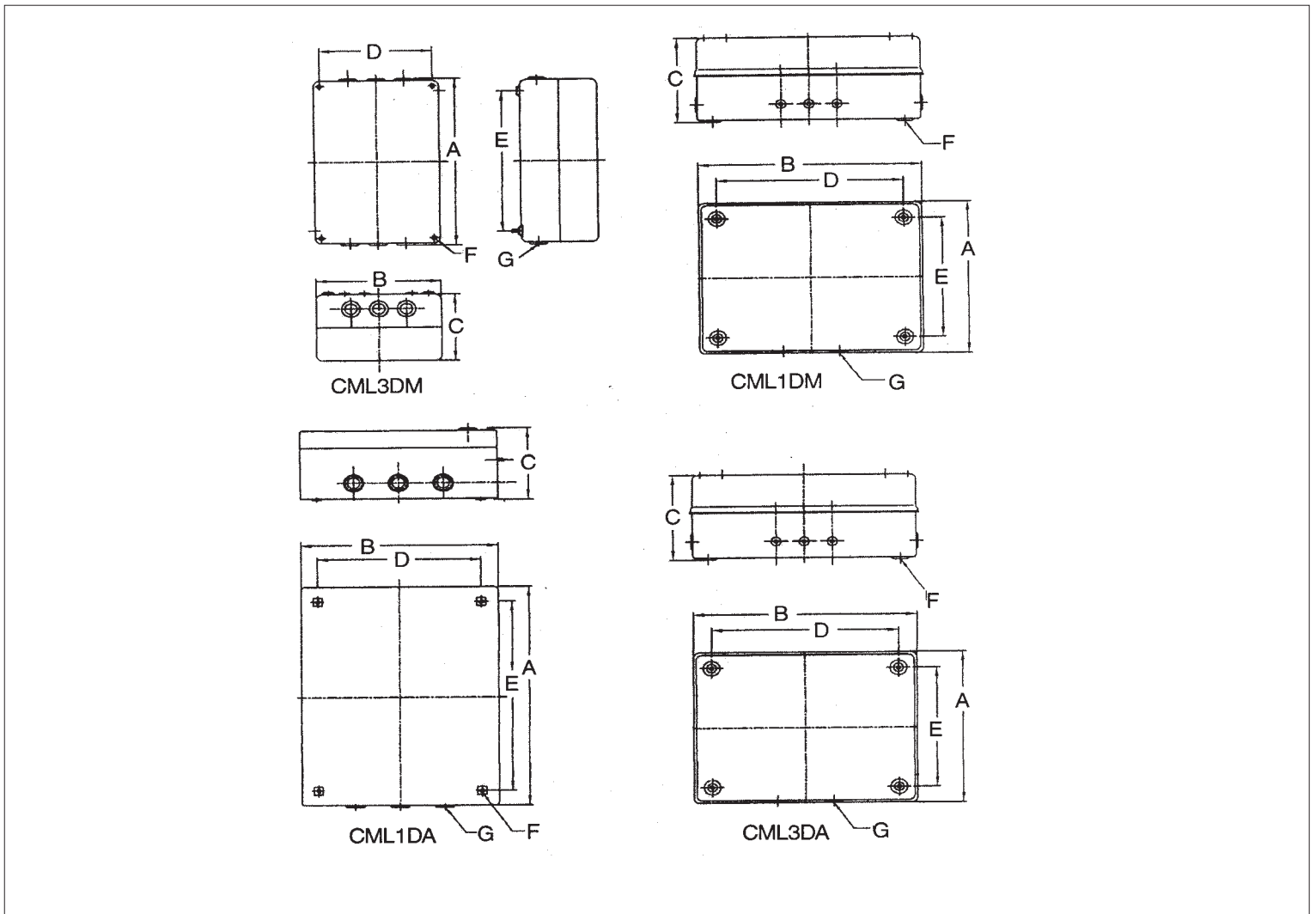
- M-Manual Reset Relay
- No Code-Standard Local Control
- R-Remote Control facility.

For example :
CML3DA-10-6-C

Indicates :
Air Break Automatic Star-Delta starters for 7.5 kW/10HP with Relay-Range 6.3-10A, 380V, AC Coil, Auto Reset and local control facility.

For example :
CML3DM-15-15-C

Indicates :
Air Break Manually Operated Star-Delta starters for 11 kW/15HP with Relay-Range 10-14.5 A, 380V, AC Coil & Auto Reset.



TYPE	DIMENSIONS IN mm						
	A	B	C	D	E	F	G
CML3DM-5/10	306	248	163	160	260	4-6.5 \emptyset HOLE	3+3-27 \emptyset HOLE
CML3DM-15	306	248	163	160	260	4-6.5 \emptyset HOLE	3+3-27 \emptyset HOLE
CML1DM-20/30	306	208	163	160	260	4-6.5 \emptyset HOLE	3-27 \emptyset HOLE
CML3DA-upto 30	285	360	167	300	225	4-6.5 \emptyset HOLE	3-27 \emptyset HOLE
CML1DA-40/50	500	415	185	340	440	4-6.5 \emptyset HOLE	3-27 \emptyset HOLE

JYOTI has developed special starters for agricultural applications also. They have satisfactory performance for voltage fluctuations, in rural areas, as high as - 40% to + 10% of system voltage. They are available upto 11kW/15HP at 415V, in dust and vermin proof enclosures.

Contactors energises when 'ON' push-button is pressed. Magnet-coils are designed to withstand environmental variations and temperature shocks because of frequent switching. The coils are vacuum impregnated. The contactors are designed to switch 'ON' and 'OFF' induction Motors for millions of operations.

Thermal Over-load-Relays protect motors during running conditions either because of single-phasing or excessive over-loading. Set relay-setting just near to full-load current for adequate protection. Auto-reset and Manual-Reset should be specified while ordering.

ORDERING CODE :

Type of starter should be suffixed as follows to complete specifications.

TYPE

- Specify as per Selection Table
- Specify maximum Relay Range.
- Specify Coil Voltage Code

A - 110 V AC Coil	C - 380 V AC Coil
B - 230 V AC Coil	D - 415 V AC Coil
- No Code- Standard Auto-Reset
M-Manual- Reset Relay
- No Code-Standard Local Control
R-Remote Control facility.

For example :
CMLT-10-20-D-M-R

Indicates :

Air Break Direct-On-Line starter for 7.5 kW/10HP with Relay-Range 12.5-20A, 415V, AC Coil, Manual-Reset and Remote Control facility.

