Rev.02
20/04/26

MORIS
lifting up, make it safe

Chapter 7

CURRENT RATINGS,
OIL CHARACTERISTICS,
ELECTRICAL CONNECTIONS,
MODIFICATION OF DISTRIBUTOR FROM START DIRECT TO START ⅄/▲
HEATING OIL RESISTANCE

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MORIS ITALIA S.r.l. reserves the right to make changes without notice to all the documents Enclosed with this handbook and related production.

DRAWING	DESCRIPTION
9270	Table to show three-phase motor without flywheel absorption rates (50 Hz)
9270-60Hz	Table to show three-phase motor without flywheel absorption rates (60 Hz)
9270-1F	Table to show single-phase motor without flywheel absorption rates (50-60 Hz)
9290	Characteristics of the oil to be used
9376/2	Power unit modification from direct starting to star-delta starting (Distributor 15-250 L/min - Type 07/93)
9377	Power unit modification from direct starting to star-delta starting (Distributor 300-650 L/min)
9470	Oil heater with thermostat (On request)
9310/1	Electrical wiring in the power unit (TE.SEP)
9312/1	Auxiliary electrical wiring in the power unit HL, MH-2V valve
9312/2	Auxiliary electrical wiring in the power unit MARK2
9312/3	Auxiliary electrical wiring (common separated) in the power unit MARK2
9312/4	Three-phase Motor 8-16 CV electrical wiring in the power unit MARK2
9312/4-10	Three-phase Motor 20-25 CV electrical wiring in the power unit MARK2
9312/5	Single-phase Motor electrical wiring in the power unit MARK2
9311	Motor thermal protection
9312/9	Relay circuit breaker

- CURRENT FOR DIRECT STARTING ~I = I_A x 3 I_N
- CURRENT FOR STAR/DELTA STARTING ~I_A = I_N x 1.5
- MORIS S.r.l., ALWAYS RECOMMENDS THE USE OF A STAR/DELTA STARTING FOR ENGINES WITH A POWER OF 16 Hp (12 Kw)
- COS φ = 0.79/0.88
- CLASS F
- THREE-PHASE MOTOR, 2 POLE, 50 Hz WITH 110 °C THERMAL RESISTANCE (PTC), SUITABLE FOR USING IMMERSED IN OIL
- THE VALUES ARE FOR OIL AT 45 °C (cSt= 40 °C)
- 120 RUNS/HOURS OF THE SYSTEM ARE CONSIDERED NORMAL AND ARE EQUIVALENT TO 60 STARTING/HOUR OF THE ENGINE, AT THE CONDITION TO KEEP THE OIL TEMPERATURE UNDER CONTROL; IF NECESSARY, BY USING AN OIL COOLER/HEAT EXCHANGER
- IT'S PRESCRIBED THE DOUBLE SHEATH CABLES USE, WHICH GUARANTEES CONTINUITY, AND CONDUCTOR SECTION AT LEAST OF 4 MM

MOTOR POWER		VOLTAGE (V)				
		200	230	240	400	415
CV	KW	NOMINAL CURRENT A. (50Hz)				
2.7	2	10.6	9.2	8.8	5.3	5.1
4	2.9	14.8	12.9	12.3	7.4	7.5
6	4.4	20.9	18.2	17.4	10.4	10.6
8	5.9	29.2	25.4	24.3	14.6	14.8
10	7.7	37	32	31	18.5	18.8
13	9.6	47	41	39	23.4	23.8
16	11.8	56	48	46	27.8	28.2
20	14.7	64	56	53	32	33
25	18.4	81.7	71.1	68	40	40
30	22.1	96.6	84	80.4	47	48
40	29.4	126	110	105	63	64
50	36.8	154.6	134.5	128.8	77.3	79
60	44.1	182.8	159.1	152.4	91.4	92
80	58.8	238.3	207.4	198.6	119.1	114.8
100	73.5	292.6	254.6	244	146.3	141

UT		TABLE TO SHOW THREE-PHASE MOTOR (50Hz) ABSORPTION RATES	DATE 02/22
			DWG N. 9270

- CURRENT FOR DIRECT STARTING ~$I_A = I_N \times 3$
- CURRENT FOR STAR/DELTA STARTING ~$I_A = I_N \times 1.5$
- COS φ =0.79/0.89
- CLASSE F
- THREE-PHASE MOTOR, 2 POLE, 60 Hz WITH 110 °C THERMAL RESISTANCE (PTC), SUITABLE FOR USING IMMERSED IN OIL
- THE VALUES ARE FOR OIL AT 45 °C (cSt= 40 °C)
- 120 RUNS/HOURS OF THE SYSTEM ARE CONSIDERED NORMAL AND ARE EQUIVALENT TO 60 STARTING/HOUR OF THE ENGINE.
- IT'S PRESCRIBED THE DOUBLE SHEATH CABLES USE, WHICH GUARANTEES CONTINUITY, AND CONDUCTOR SECTION AT LEAST OF 4 MM

MOTOR POWER		VOLTAGE (V)				
		200	208	220	380	440
CV.	KW.	NOMINAL CURRENT A. (60Hz)				
3	2.2	11.8	11.4	10.7	6.2	5.4
5	3.6	17.3	16.6	15.7	9.1	7.9
7.2	5.3	25.2	24.2	22.9	13.3	11.4
10	7.3	33	32	30	17.3	15
12.5	9.2	42	40	38	21.8	18.9
15	11	51	49	46	26.8	23.1
20	15	68	65	62	36	31
25	18.5	80	77	72	42	36
33	24	101	97	92	53	46
40	29	120	115	109	63	54
50	37	154	148	140	81	70
65	48	199	191	181	105	90
77	57	230	221	209	121	105
98	72	288	277	262	152	131

- COS φ = 0.90/0.98
- CLASS F
- SINGLE-PHASE MOTOR, 2 POLE, 50/60 Hz WITH 110 °C THERMAL RESISTANCE, SUITABLE FOR USING IMMERSED IN OIL
- THE VALUES ARE FOR OIL AT 45 °C
- IT'S PRESCRIBED THE DOUBLE SHEATH CABLES USE, WHICH GUARANTEES CONTINUITY, AND CONDUCTOR SECTION AT LEAST OF 4 MM

50 Hz		
MOTOR POWER		VOLTAGE (V) 220-230
CV	KW	I_N (A)
2	1.5	10.6
3	2.2	14.9
4	2.9	17.5
5	3.7	22.4
6.5	4.8	31
8	5.9	37

60 Hz			
MOTOR POWER		VOLTAGE (V)	
		200-208	220-230
CV	KW	I_N (A)	I_N (A)
2	1.5	13	11.8
2.4	1.8	13.8	12.7
3.6	2.6	21	17.2
5	3.7	28	25.4
6	4.4	31	28.6
8	5.9	43	39
10	7.4	51	46

UT		TABLE TO SHOW SINGLE-PHASE MOTOR ABSORPTION RATES	DATE 02/22
			DWG N. 9270-1F

THE VALUES SHOWN BELOW COVER THE MAJORITY OF NORMAL APPLICATIONS

ADDITIVES

- ANTI-OXIDANT
- ANTI-FOAM
- ANTI-WEAR
- WATER REPELLANT

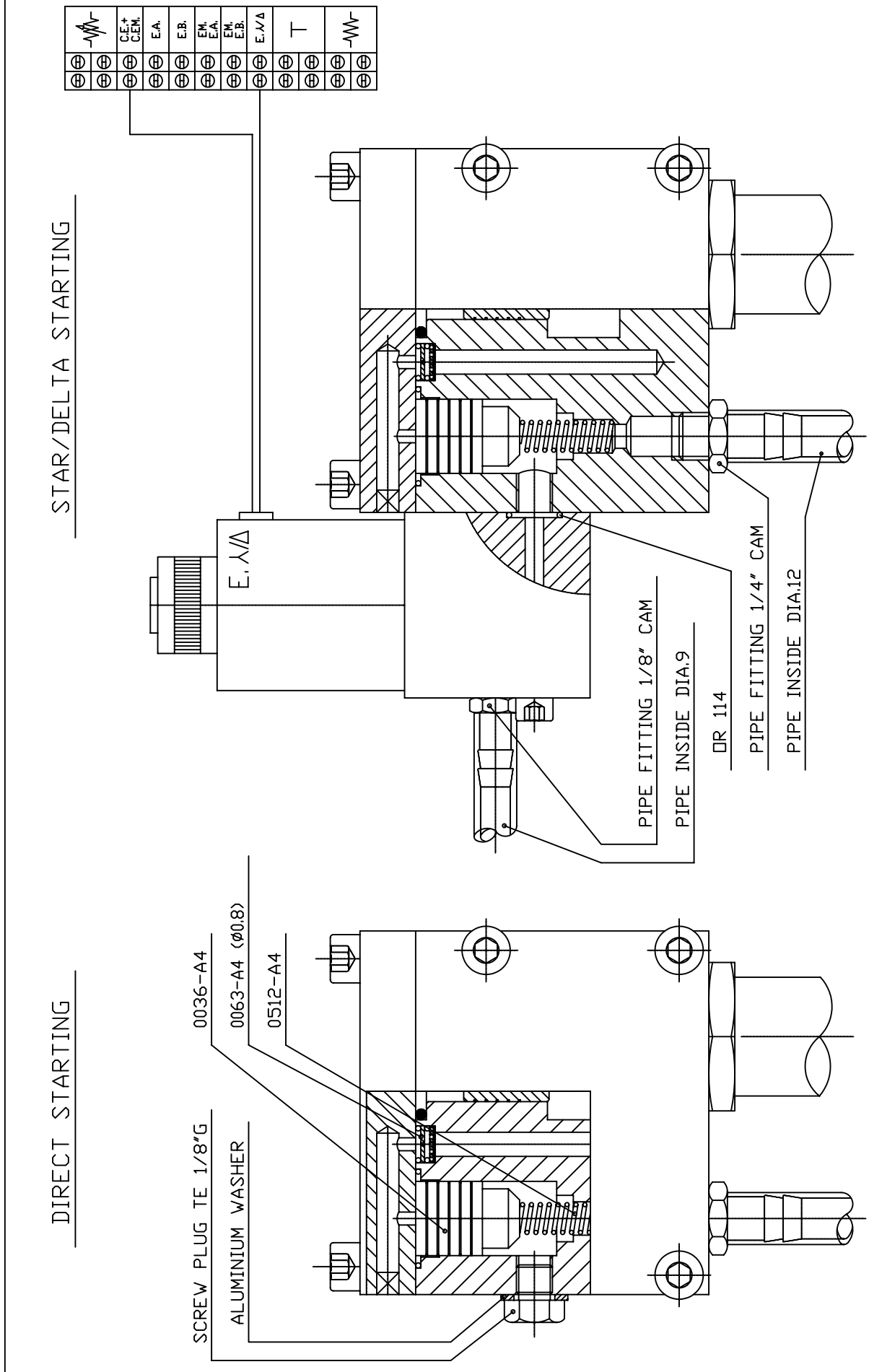
PHYSICAL CHARACTERISTICS

OIL TYPE	ISO VG 46 (ADVICE)	ISO VG 68
SPECIFIC GRAVITY Kg/dm	~0.88	~0.88
VISCOSITY KINEMATIC (a 40°C) CST	41.4 ÷ 50.6	61 ÷ 75
VISCOSITY °ENGLER (a 40°C)	~4.10	~5.68
INDEX OF VISCOSITY	>150	>150
MELTING POINT (°C)	~ -30	~ -30
INFLAMMABILITY VA. E VC. °C	>190	>190
AIR RELEASE (a 50°C) MIN.	<6	<6

N.B.:

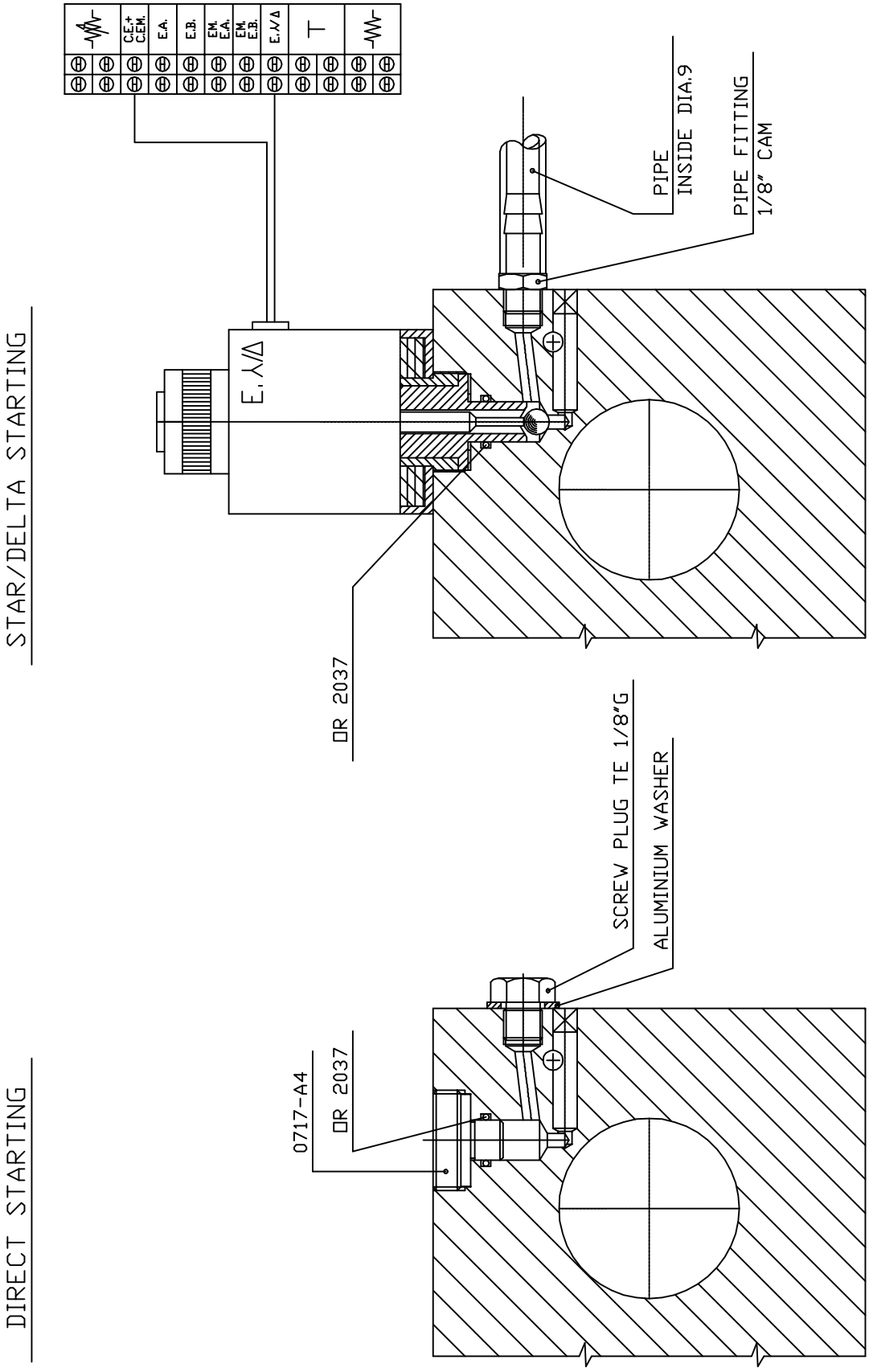
- IF OIL IS SUBJECTED TO LOW TEMPERATURES (LESS THAN 15°C FOR ISO VG 46 AND 20°C FOR ISO VG 68) IT NEEDS TO BE HEATED WITH CORRESPONDING RESISTANCE
- MINIMUM OPERATING TEMPERATURES 15°C
- MAXIMUM OPERATING TEMPERATURE 70°C
- FOR "HL" TYPE PLANTS OR WITH ELECTRONIC VALVE "VEM" USE ONLY OIL ISO VG 46

UT		CARATTERISTICHE DELL'OLIO DI UTILIZZO	DATE 02/22
			DWG N. 9290/1



	POWER UNIT MODIFICATION FROM DIRECT STARTING TO STAR/DELTA STARTING DISTRIBUTOR 15-250 L/min (TYPE 07/93)	DATE 01/95 DWG.N. 9376/2

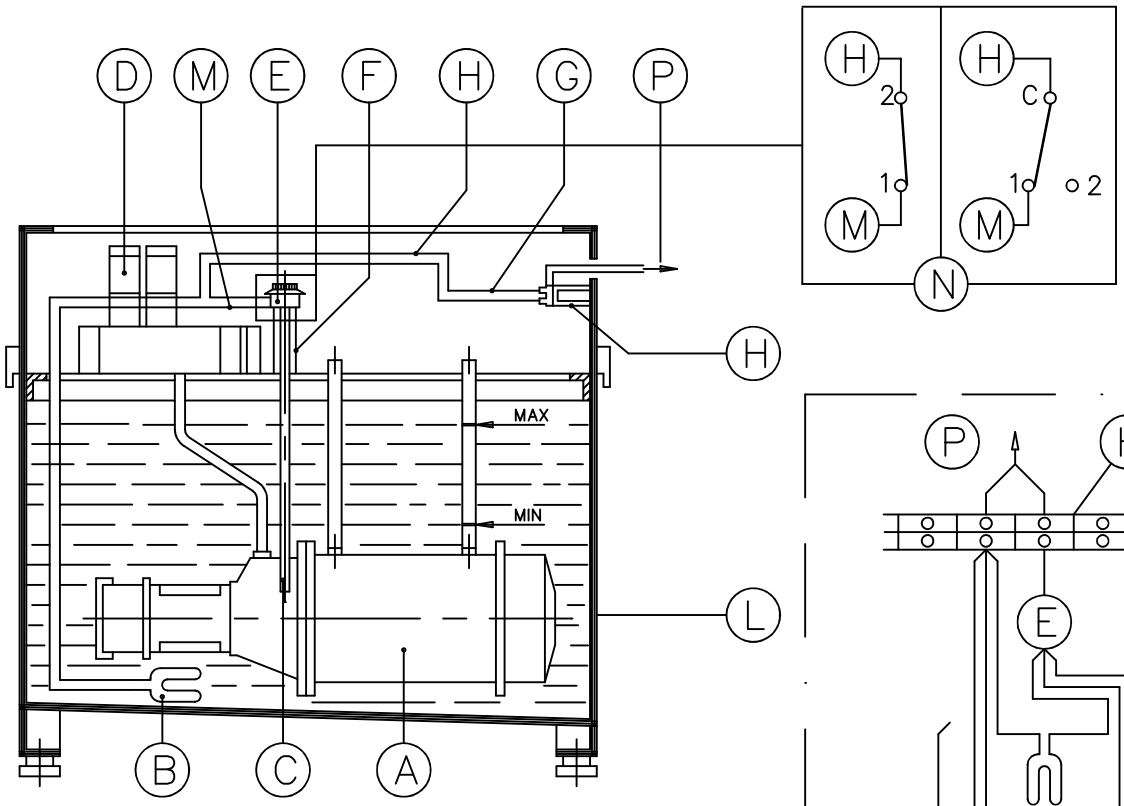
9376/2-IN



	POWER UNIT MODIFICATION FROM DIRECT STARTING TO STAR/DELTA STARTING DISTRIBUTOR 300-650 L/min	DATE 01/95 DWG.N. 9377

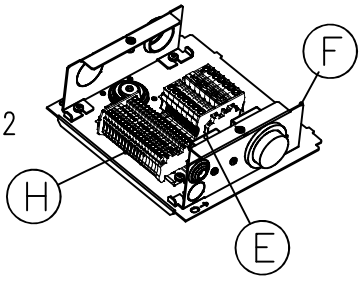
9377-IN

10°C = NC
30°C = NA



ON REQUEST (SPECIFY)
N° 1 (HL320-CM320-CM)MARK2
N° 2 CA
N° 3 CA/A-CG

ONLY FOR: (HL320-CM320-CM)MARK2

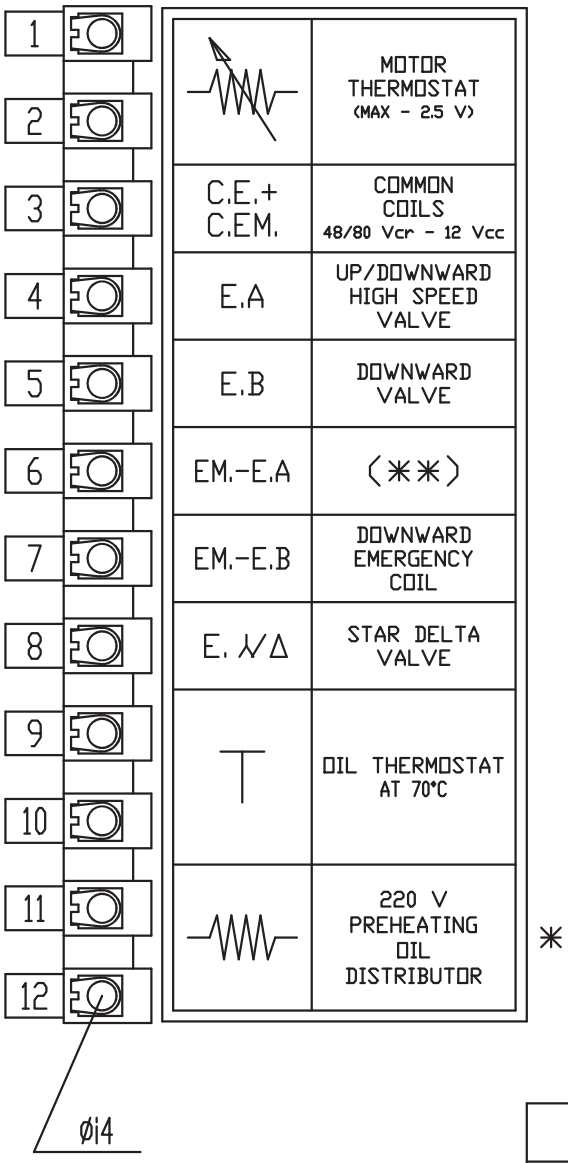


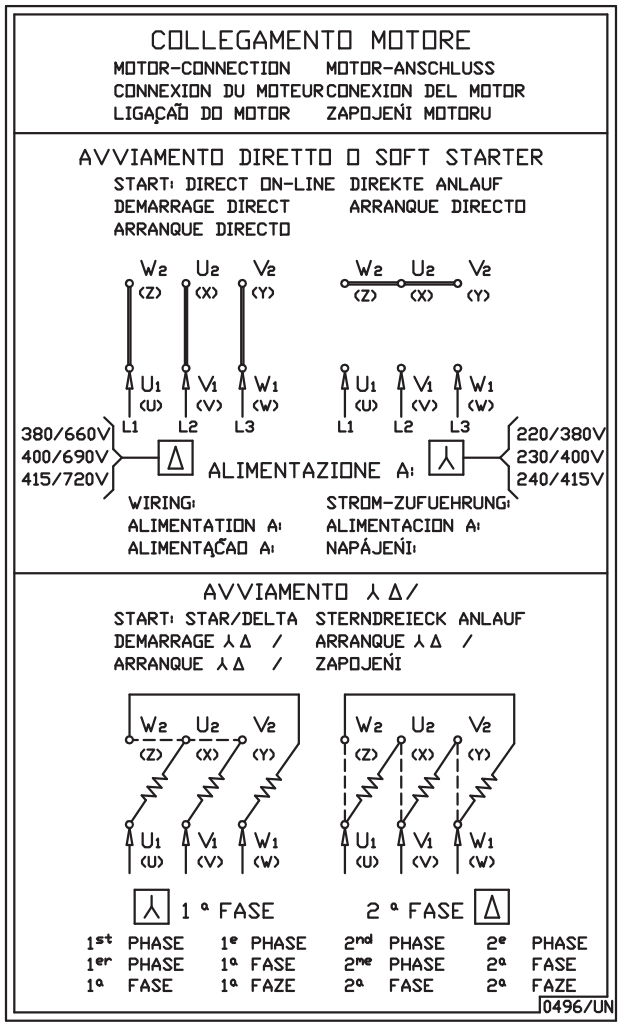
A =MOTOR-PUMP SET
B =OIL HEATER 220 V - 400 W (N° 1)
C =OIL TEMPERATURE CONTROLLING PROBE (THE SENSOR MUST REMAIN UNDER THE MINIMUM OIL LEVEL)
D =DISTRIBUTOR BLOCK
E =ADJUSTABLE THERMOSTAT FOR OIL (PRESET AT 25°C)
F =THERMOSTAT HOLDER (TO BE FASTENED ON "L" PROFILE INSIDE THE TANK)
G =FEEDING LINE
H =TERMINAL BOARD (MAMMUT)
L =POWER UNIT TANK
M =TO HEATER
N =THERMOSTAT CONNECTION
P =TO ELECTRICAL PANEL

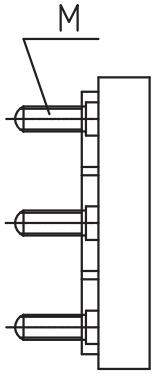
N.B.: CONNECT THE RESISTOR 50 W - 220 V INSIDE THE DISTRIBUTOR BLOCK, TO 220 V, NET ONLY DURING COLD MONTHS

UT			OIL HEATER WITH THERMOSTAT (ON REQUEST)	DATE 02/22
				9470

9470-IN







MOTOR POWER		PUMP	M
CV	Kw	L/1'	
2-20	1.5-15	15-150	M6
13-50	9.5-37	180-650	M8
60-100	45-75	440-650	M10

E.A
E.B
E. λ/Δ — VALVES (STAR/DELTA ON REQUEST)

C.E. — COMMON VALVE
C.EM. — COMMON EMERGENCY VALVE
EM. — EMERGENCY

E.A-E.B-E. λ/Δ — NORMAL USE 48V. RECTIFIED CURRENT-BLACK WIRE
E.B — AUTOMATIC USE IN EMERGENCY 12 V. DIRECT CURRENT-WHITE WIRE

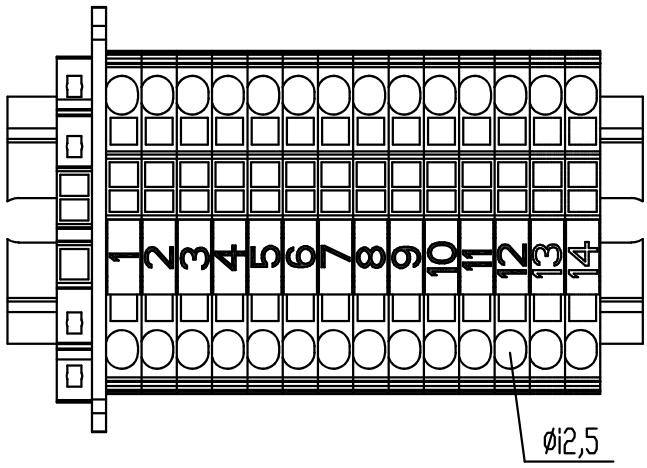
* NOTE: CONNECT DURING WINTER / COLD MONTHS (220V. - 50W.)

(**) FOR DOWNWARD HIGH SPEED JUMP WITH EM.-E.B

UT			ELECTRICAL WIRING IN THE POWER UNIT (TE.SEP)	DATE 03/09
				DWG N. 9310/1

ELECTRICAL WIRING
for 8-30 l/min 2 speed

1		MOTOR THERMOSTAT (MAX - 2.5 V)	
2			
3	C.E.+ C.EM.	COMMON COILS 48/80 Vcr - 12 Vcc	
4	E.A	UP/DOWN WARD HIGH SPEED VALVE	
5	E.B	DOWN WARD VALVE	
6	EM.-E.B	DOWN WARD EMERGENCY COIL	
7	X.M. max.		**
8			
9		OIL THERMOSTAT AT 70°C	
10			
11		OIL HEATING RESISTOR	*
12			
13	X.M. min.		**
14			



E.A
E.B - SOLENOID VALVES

C.E. - COMMON VALVE
C.EM. - COMMON EMERGENCY VALVE
EM. - EMERGENCY

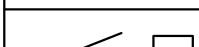
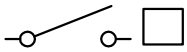
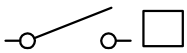
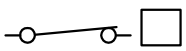
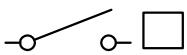
E.A-E.B-E. - NORMAL USE 48V.c.r. BLACK WIRE
E.A.-E.B - AUTOMATIC USE IN EMERGENCY 12 V.cc WHITE WIRE

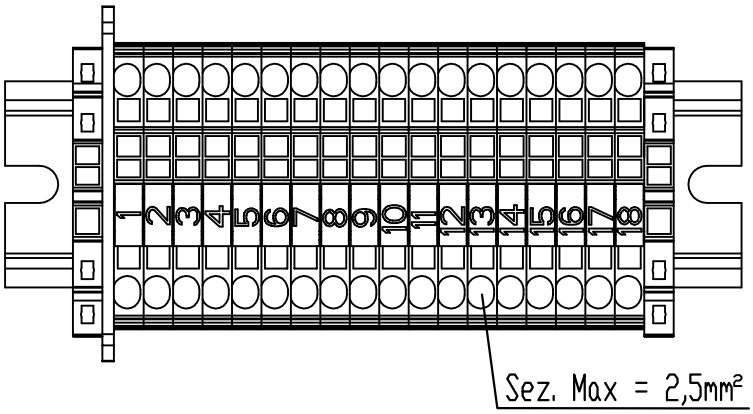
* N.B.: CONNECT THE OIL HEATING RESISTOR (WITH THERMOSTAT)
(230V BLACK WIRE; 400V BLUE WIRE)

** OPTIONAL

UT	ELECTRICAL WIRING IN THE POWER UNIT (ONLY VALVE MH2V)	DATE 07/20
		DWG N. 9312/1

9312/1-ING

1		MOTOR THERMOSTAT (MAX - 2.5 V)	
2			
3	C.E.+ C.EM.	COMMON COILS 48/80 Vdc - 12 Vdc	
4			
5	E.A	UP/DOWN WARD HIGHT SPEED VALVE	
6	E.B	DOWN WARD VALVE	
7	EM.-E.B	DOWN WARD EMERGENCY COIL	
8	E. ⅄/△	STAR/DELTA COIL	
9		OIL THERMOSTAT AT 70°C	
10			
11		230V/400V PREHEATING OIL DISTRIBUTOR	*
12			
13	X.M. min.		**
14			
15	X.M. max.		**
16			
17	X.M. max.		**
18			



E.A
E.B - SOLENOID VALVES

C.E. - COMMON VALVE
C.EM. - COMMON EMERGENCY VALVE
EM. - EMERGENCY

E.A-E.B-E. - NORMAL USE 48Vdc BLACK WIRE

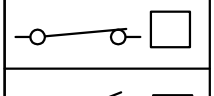
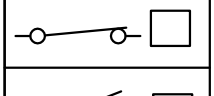
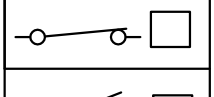
E.A.-E.B - AUTOMATIC USE IN EMERGENCY 12 Vdc WHITE WIRE

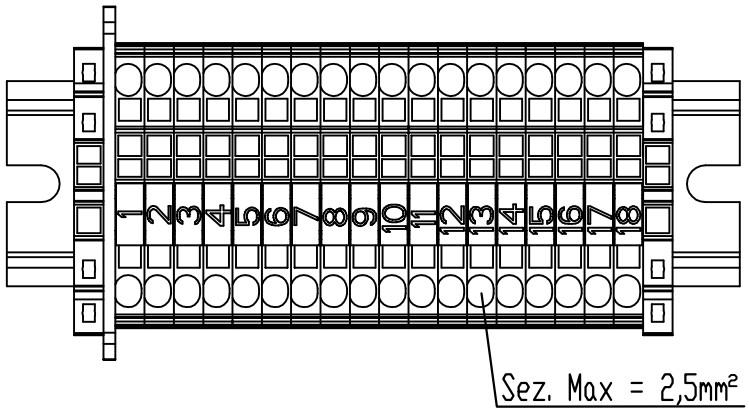
* N.B.: CONNECT IN PARALLEL THE OIL HEATING RESISTOR (WITH THERMOSTAT) AND THE VALVE HEATING RESISTOR DURING COLD SEASON (230V BLACK WIRE; 400V BLUE WIRE)

** OPTIONAL

UT		ELECTRICAL WIRING FOR POWER UNIT MARK2 (auxiliary circuits)	DATE 07/18
			DWG N. 9312/2

9312/2-EN

1 2		MOTOR THERMOSTAT (MAX - 2.5 V)
3	C.E.+ C.EM.	COMMON COILS 48/80 Vdc - 12 Vdc
4	C.E.	COMMON COILS 230 Vac
5	E.A	UP/DOWN WARD HIGHT SPEED VALVE
6	E.B	DOWN WARD VALVE
7	EM.-E.B	DOWN WARD EMERGENCY COIL
8	E. ⅄/△	STAR/DELTA COIL
9 10		OIL THERMOSTAT AT 70°C
11 12		230V/400V PREHEATING OIL DISTRIBUTOR *
13 14	X.M. min.	 **
15 16	X.M. max.	 **
17 18	X.M. max.	 **



E.A
E.B - SOLENOID VALVES

C.E. - COMMON VALVE
C.EM. - COMMON EMERGENCY VALVE
EM. - EMERGENCY

E.A-E.B-E. - NORMAL USE 48Vdc
BLACK WIRE

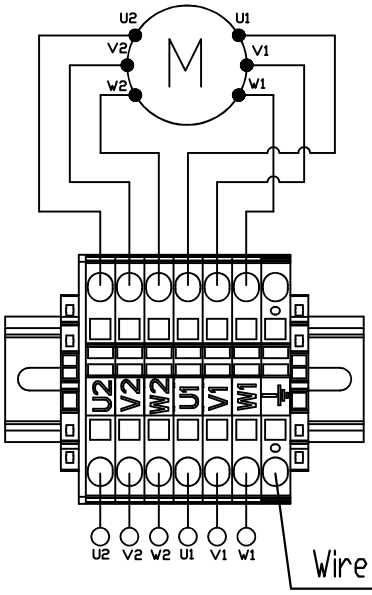
E.A.-E.B - AUTOMATIC USE IN EMERGENCY
12 Vdc WHITE WIRE

* N.B.: CONNECT IN PARALLEL THE OIL HEATING RESISTOR (WITH THERMOSTAT) AND THE VALVE HEATING RESISTOR DURING COLD SEASON (230V BLACK WIRE; 400V BLUE WIRE)

** OPTIONAL

UT	ELECTRICAL WIRING FOR POWER UNIT MARK2 (auxiliary circuits common separated)	DATE 07/18 DWG N. 9312/3

9312/3-EN



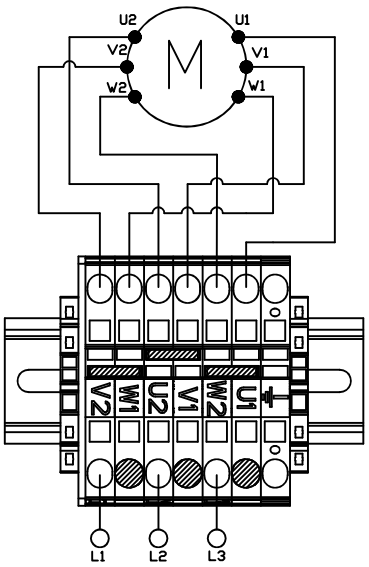
STARTING

⅄/△

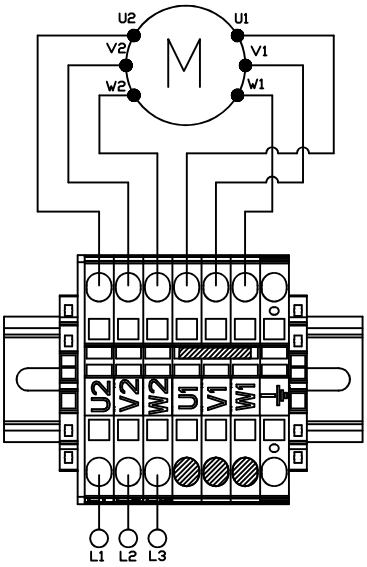
THREE PHASE WIRING - DIRECT STARTING OR SOFT STARTER
modular terminal board

LINE VOLTAGE	MOTOR VOLTAGE	CONNECTION
220..240	230/400	△
380..415	230/400	⅄
380..415	400/690 - 415/720	△

△ DIRECT AND SOFT-STARTER

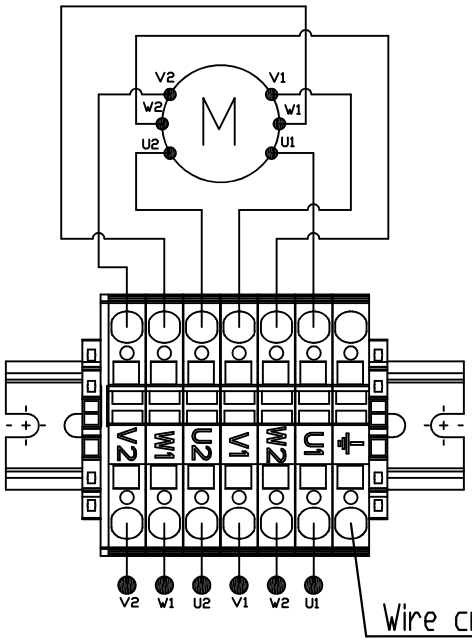


⅄ DIRETTO E SOFT-STARTER



UT			ELECTRICAL WIRING FOR POWER UNIT MARK2 (main power 3-phase motor 8-16 CV)	DATE 09/24 DWG N. 9312/4

9312/4-EN



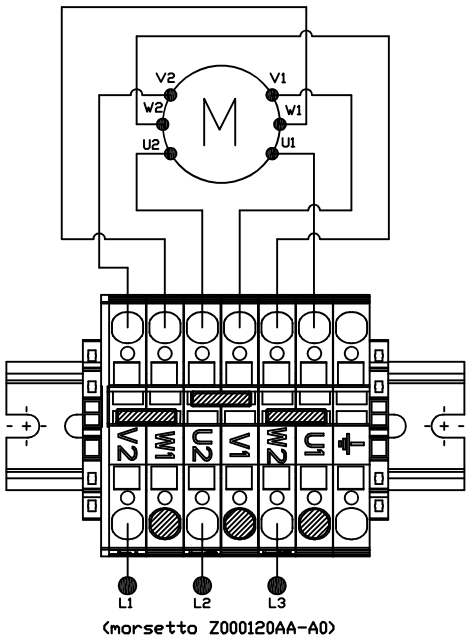
STARTING

⅄/△

THREE PHASE WIRING - DIRECT STARTING OR SOFT STARTER
modular terminal board

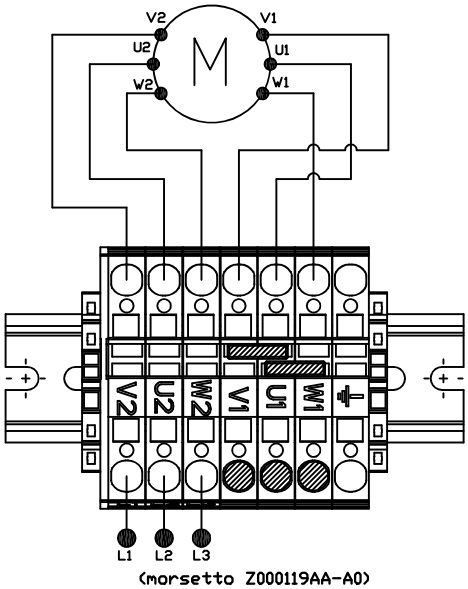
LINE VOLTAGE	MOTOR VOLTAGE	CONNECTION
220..240	230/400	△
380..415	230/400	⅄
380..415	400/690 - 415/720	△

△



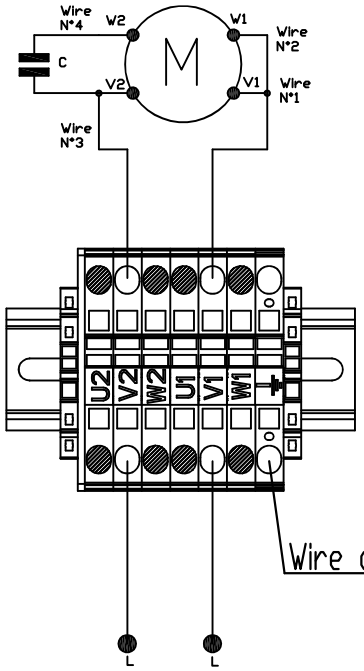
(morsetto Z000120AA-A0)

⅄



(morsetto Z000119AA-A0)

UT		ELECTRICAL WIRING FOR POWER UNIT MARK2 (main power 3-phase motor 20-25 CV)	DATE 03/21 DWG N. 9312/4-10



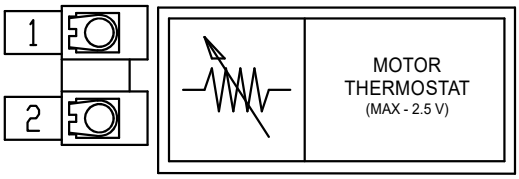
WIRING
modular terminal board

Wire cross-section Max = 6mm²

UT	ELECTRICAL WIRING FOR POWER UNIT MARK2 (main power single phase motor)	DATE 03/21 DWG N. 9312/5

9312/5-EN

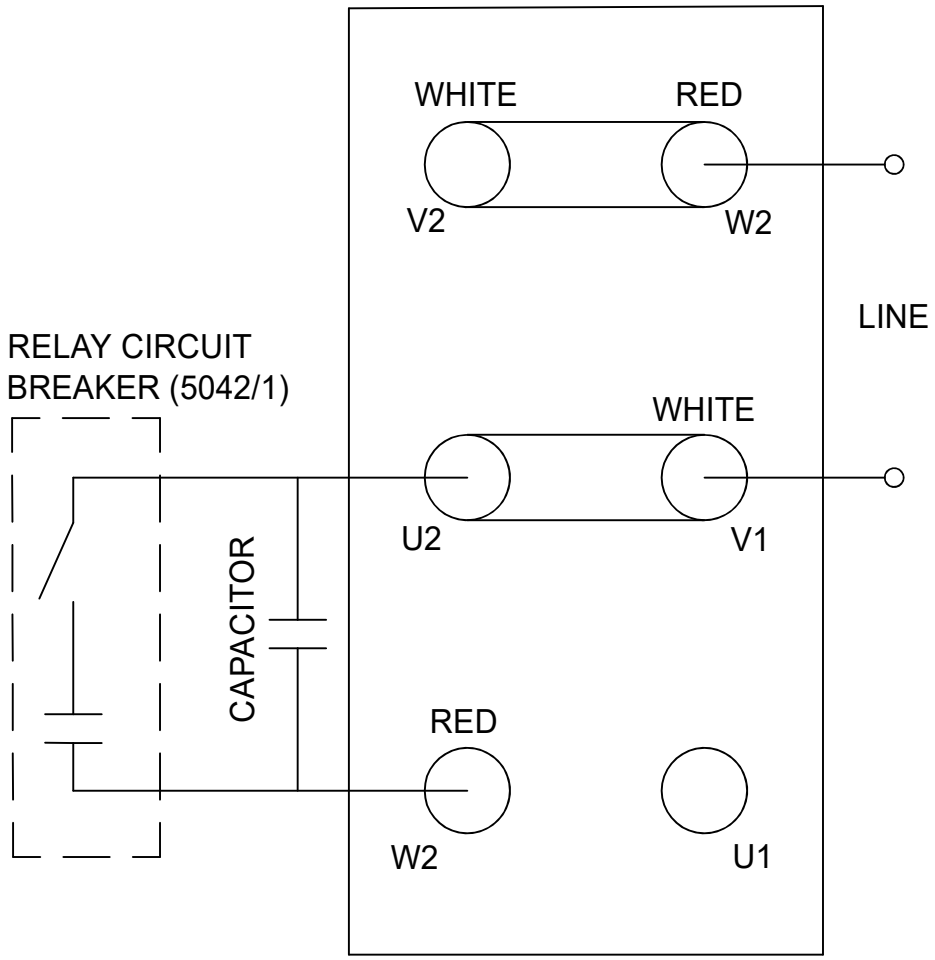
- DON'T ENERGIZE THE MOTOR WITHOUT ACTIVATED THERMAL PROTECTIONS, AND NOT BYPASS THEM ACTING ON THE REMOTE CONTROL SWITCH
- THE PTC THERMISTOR MUST BE CONNECTED TO A CONTROL THERMISTOR UNIT INSIDE THE BOARD, IN ORDER TO GUARANTEE THE BREAK
- THE INTERRUPTED METAL DETECTORS (NCC) COULD BE INDIFFERENTLY CONNECTED TO A THERMISTOR UNIT CONTROL, OR USED AS A THERMOSTAT
- N.B.: DON'T ENERGIZE THE PTC THERMISTOR WITH A VOLTAGE HIGHER THAN 2.5 VDC



UT			MOTOR THERMAL PROTECTION	DATE 04/26
				DWG N. 9311

- THE RELAY CIRCUIT BREAKER MUST BE USED WHERE THERE ARE SINGLE PHASE POWER SUPPLY PROBLEMS
- IF THE VOLTAGE DROPS UNDER THE VALUE OF 210 V, THE MOTOR MAY DON'T START AND CAUSE THE SYSTEM STOP
- THE RELAY CIRCUIT BREAKER MUST BE CONNECTED IN PARALLEL TO THE STARTING CAPACITOR

- SINGLE PHASE MOTOR



UT			ELECTRICAL CONNECTION RELAY CIRCUIT BREAKER	DATE 02/22
				DWG N. 9312/9