

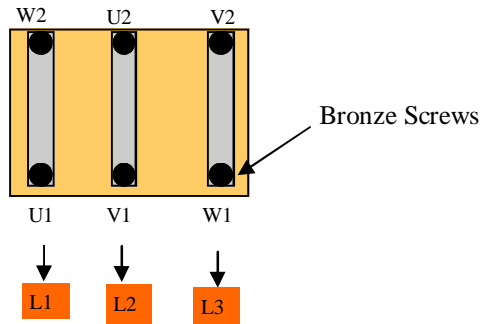


EUROPEAN MOTOR CONNECTIONS

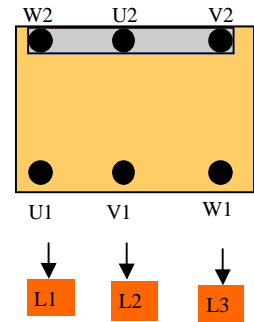
Shown below are representations of the wiring connections made to European Motor terminal blocks

DUAL VOLTAGE-SINGLE SPEED -6 MOTOR LEADS—6 TERMINALS

A. LOW VOLTAGE
1 DELTA

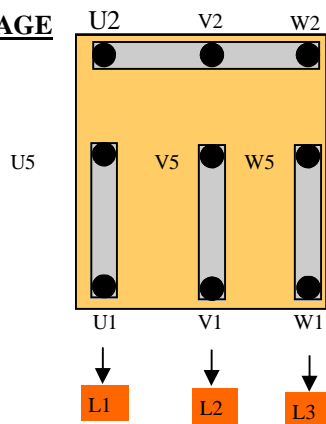


B. HIGH VOLTAGE
1 WYE

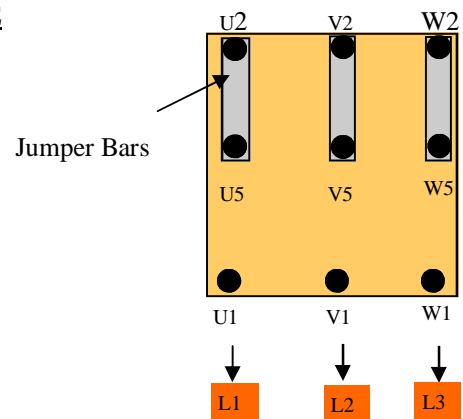


DUAL VOLTAGE-SINGLE SPEED -9 MOTOR LEADS -9 TERMINALS

A. LOW VOLTAGE
2 WYE

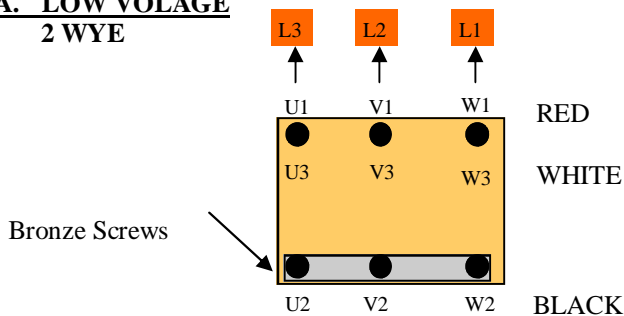


B. HIGH VOLTAGE
1 WYE

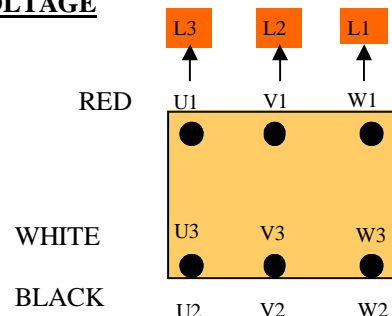


DUAL VOLTAGE-SINGLE SPEED -9 MOTOR LEADS -6 TERMINALS (LAFERT HE/ST Motors)

A. LOW VOLTAGE
2 WYE



B. HIGH VOLTAGE
1 WYE

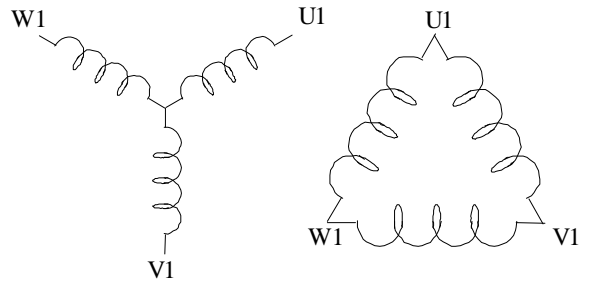
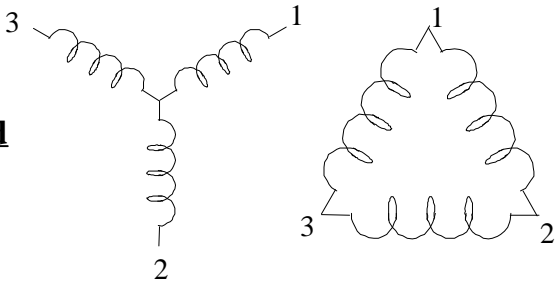


Note: U1 = 1, V1 = 2, W1 = 3, U2 = 4, V2 = 5, W2 = 6, U5 = 7, V5 = 8, W5 = 9 (If numbers are used)

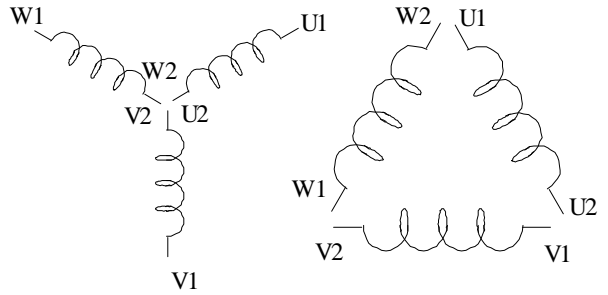
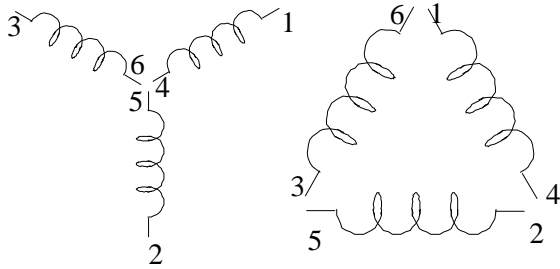
NEMA

New IEC

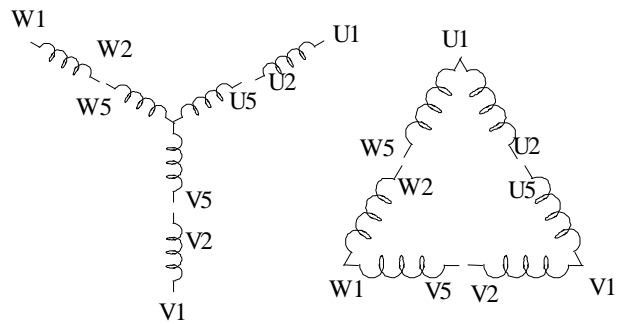
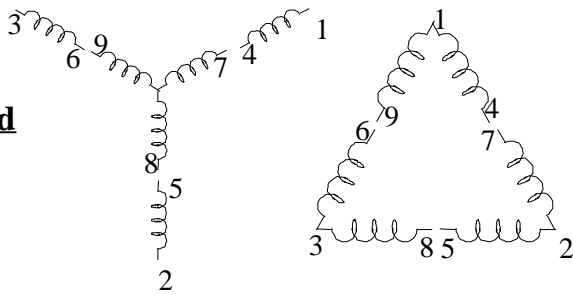
3 Lead



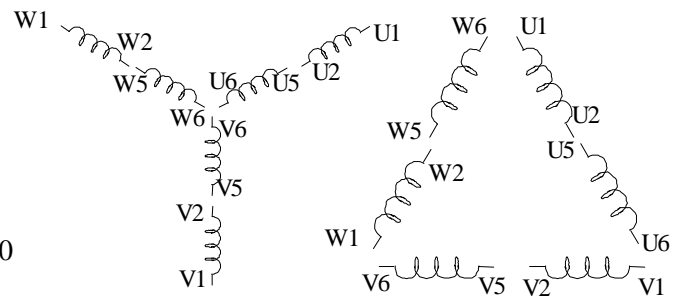
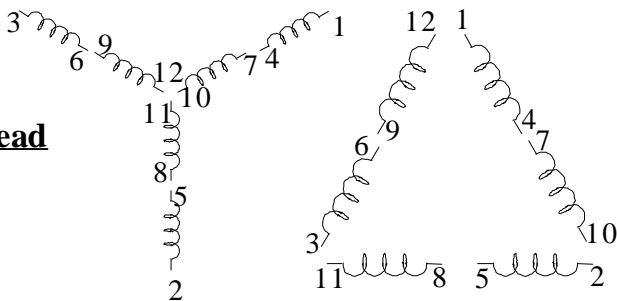
6 lead



9 Lead



12 Lead



Title: Wye & Delta Numbering, 3 Phase Motors	
Author: NG	
Date: 10/21/05	Sheet:
Revision:	

Single Speed Motors, 3 Phase, 3, 6 and 9 Leads

Leads Out of Motor	Lead Markings NEMA	Possibilities	Lead Markings IEC Old	Lead Markings IEC New
3	1,2,3,	Across The Line Start	U,V,W,	U1,V1,W1,
6	1,2,3,4,5,6,	(a) Can be a single voltage Wye or (b) Single Voltage Delta, or (c) A Two Voltage motor (where higher voltage) Star, is 1.73 x Lower Voltage, Delta. or it could be configured (d) as a Soft Start, Wye Start Delta Run	U,V,W,X,Y,Z,	U1,V1,W1,U2,V2,W2,
		(a) If single (higher) voltage Wye then L1,L2 and L3 goes to 1,2,&3 and 4,5,&6 are joined together	If single voltage Wye then L1,L2 and L3 goes to U,V,& W and X,Y,and Z are joined together	If single voltage Wye then L1,L2 and L3 goes to U1,V1,&W1 and U2,V2,&W2 are joined together
		(b) If single (lower) voltage Delta then 1&6 are connected to L1, 2&4 are connected to L2 and 3&5 are connected to L3	If single voltage Delta then U&Z are connected to L1, V&X are connected to L2 and W & Y are connected to L3	If single voltage Delta then U1&W2 are connected to L1, V1&U2 are connected to L2 and W1&V2 are connected to L3
		(c) If two voltage motor then for low voltage(Delta) hook up as (b) above and for high voltage(Wye) hook up as (a) above		
		If Wye Start Delta Run then for Wye Start L1,L2 & L3 connect to 1,2, & 3 and 4,5&6 are joined together and for Delta Run 1&6 are connected to L1, 2&4 are connected to L2 and 3&5 are connected to L3. The above sequence is carried out by a Wye Delta Starter, consisting of 3 contactors and 1 timer	If Wye Start Delta Run then for Wye Start L1,L2 & L3 connect to U,V,& W and X,Y,and Z are joined together and for Delta Run U&Z are connected to L1, V&X are connected to L2 and W & Y are connected to L3	If Wye Start Delta Run then for Wye Start L1,L2 & L3 connect to U1,V1,&W1 and U2,V2,&W2 are joined together and for Delta Run U1&W2 are connected to L1, V1&U2 are connected to L2 and W1&V2 are connected to L3
6	1,2,3,7,8,9,	Part Winding Start. On first step T1,T2 & T3 connect to motor leads 1,2 & 3 through 1M contactor. On second step M stays energised and 2M contactor pulls in and connects T7,T8 & T9 to motor leads 7,8,& 9 The sequence is carried out by a Part Winding Starter consisting of 2 contactors and 1 timer		
9	1,2,3,4,5,6,7,8,9,	(a) Dual voltage Wye connected (b) Dual voltage Delta connected		
		If (a) dual voltage wye connected For high voltage connection L1 goes to lead 1, L2 goes to 2 and L3 goes to 3, also 4&7 are joined together, 5&8 are joined together and 6&9 are joined together. For low voltage connection leads 1&7 are joined together and connected to L1, leads 2&8 are joined together and connected to L2 and 3&9 are joined together and connected to L3		If (a) dual voltage wye connected For high voltage connection L1 goes to lead U1, L2 goes to V 1 and L3 goes to W 3, also U2&U3 are joined together, V 2 & V3 are joined together and W 2 & W 3 are joined together. (1 Y conn) For low voltage connection leads U1 & U3 are joined together and connected to L1, leads V 1 & V 3 are joined together and connected to L2 and W1 & W 3 are joined together and connected to L3 (2 Y conn)
		If (b) dual voltage delta connected For high voltage connection L1 goes to lead 1, L2 goes to lead 2 and L3 goes to lead 3, also 4&7 are joined together and taped aslo 5&8 are joined and taped and 6&9 are joined and taped For low voltage connection leads 1,6,7 are joined L1, leads 2,4,8 are joined to L2 and leads 3,5,9 are joined to L3		

Nema	1	2	3	4	5	6	7	8	9	10	11	12
New IEC	U1	V1	W1	U2	V2	W2	U5	V5	W5	U6	V6	W6
Old IEC	U1	V1	W1	X1	Y1	Z1	U2	V2	W2	X2	Y2	Z2
Also	U	V	W	X	Y	Z						

Title: <u>Single Speed, Three Phase, Motor Connections</u> <u>3, 6 and 9 Leads</u>	
Author: NG	
Date: 10/17/05	Sheet: 1
Revision:	Holland Industrial

Single Speed Motors, 3 Phase, 12 Leads

Leads Coming Out of Motor	Lead Markings NEMA	Possibilities	Lead Markings IEC Old	Lead Markings IEC New
12	1,2,3,4,5,6,7,8,9,10,11,12,	(a) Single voltage Wye connection (b) Single Voltage Delta Connection (c) Dual voltage Wye connection (d) Dual voltage Delta connection (e) Wye start delta run		U1,U2,V1,V2,W1,W2,U5,U6,V5,V6,W5,W6
		(a) If single voltage Wye connection then L1,L2 and L3 connect to 1,2,and 3. Also 10,11&12 are joined together and 4&7 are joined,5&8 are joined and 6&9 are joined.		(a) If single voltage Wye connection then L1,L2 and L3 connect to U1,V1, and W1. Also U6,V6 and W6 are joined together and U2&U5 are joined, V2&V5are joined and W2&W5 are joined.
		(b) If single voltage Delta connection then 1&12 are joined and connected to L1,2&10 are joined and connected to L2,and 3&11 are joined and connected to L3. Also 4&7 are joined together,5&8 are joined together and 6&9 are joined together.		(b) If single voltage Delta connection then U1&W6 are joined and connected to L1, V1 & U6 are joined and connected to L2,and W1& V6 are joined and connected to L3. Also U2 & U5 are joined together,V2 & V5 are joined together and W2 & W5 are joined together.
		(c) If dual voltage Wye connection For high voltage connection is as (a) above For low voltage connection 1&7 are joined and connected to L1,2&8 are joined and connected to L2 and 3&9 are joined and connected to L3 Also 4&5&6 are joined together and 10&11&12 are joined together.		(c) If dual voltage Wye connection For high voltage connection is as (a) above For low voltage connection U1 & U5 are joined and connected to L1,V1 & V5 are joined and connected to L2 and W1 & W5 are joined and connected to L3 Also U2 & V2 & W2 are joined together and U6 & V6 & W6 are joined together.
		(d) If dual voltage delta connection For high voltage hook up as (d) above. For low voltage join 1&6&7&12 together and connect to L1, join 2&4&8&10 together and connect to L2, join 3&5&9&11 together and connect to L3		(d) If dual voltage delta connection For high voltage hook up as (d) above. For low voltage join U1 & W2 & U5 & W6 together and connect to L1, join V1 & U2 & V5 & U6 together and connect to L2, join W1& V2 & W5 & V6 together and connect to L3
		(e) If wye start delta run then for wye start hook up as (a) above and for delta run hook up as (b) above. The above sequence is carried out by a Wye Delta starter consisting of 3 contactors and 1 timer. Motor always runs as a delta after wye connection soft start.		(e) If wye start delta run then for wye start hook up as (a) above and for delta run hook up as (b) above. The above sequence is carried out by a Wye Delta starter consisting of 3 contactors and 1 timer. Motor always runs as a delta after wye connection soft start.

Emma	1	2	3	4	5	6	7	8	9	10	11	12
New IEC	U1	V1	W1	U2	V2	W2	U5	V5	W5	U6	V6	W6
Old IEC	U1	V1	W1	X1	Y1	Z1	U2	V2	W2	X2	Y2	Z2

Title: Single Speed, Three Phase, Motor Connections
12 Leads

Author: NG

Date: 10/17/05

Sheet: 2

Revision:

Holland Industrial

Two Speed Motors, 3 Phase

Leads Coming Out of Motor	Lead Markings NEMA	Description	Lead Markings& Notes IEC Old	Lead Markings IEC New
6	T1,T2,T3, T11,T12,T13	2 Speed - 2 Winding - Single Voltage T1,T2,T3 Low Speed T11,T12,T13 High Speed **To reverse rotation,interchange any 2 line leads To reverse rotation of Low or High Speed only,interchange any 2 motor leads of the respective speed e.g. interchange T1 and T2, or T12 and T13	Ua , Va , Wa, Xa , Ya , Za , 2 electrically separate windings ie no ohmic connection between them	1U, 1V, 1W Low Speed 2U, 2V, 2W High Speed
6	T1,T2,T3 T4,T5,T6	2 Speed - 1 Winding - Single Voltage Variable Torque or Constant Torque For Low Speed T1,T2 and T3 are connected to L1,L2,and L3 and T4,T5 and T6 are open For High Speed T6 goes to L1, T4 goes to L2 and T5 goes to L3, leads T1, T2 and T3 are joined together **To reverse rotation,interchange any 2 line leads <u>Speeds always in ratio of 1:2</u>	Pole Changeable Winding (Dahlander) Windings are not electrically separate For Constant Torque the typical internal motor connection of the motor is : 1 Delta for Low Speed and 2 Wye(Star) for the High Speed Also Low Speed HP is half of High Speed HP For Variable Torque the typical internal motor connection is : 1 Wye for Low Speed and 2 Wye for High Speed Also Low Speed HP is a quarter of High Speed HP	1U, 1V, 1W Low Speed 2U,2V,2W High Speed
6	T1,T2,T3 T4,T5,T6	2 Speed - 1 Winding - Single Voltage Constant Horsepower For Low Speed T1,T2 and T3 connect to L1,L2 and L3 and T4,T5 and T6 are joined together For High Speed T6 goes to L1,T4 goes to L2 and T5 goes to L3 Leads T1 ,T2 and T3 are open **To reverse rotation,interchange any 2 line leads <u>Speeds always in ratio of 1:2</u>	Pole Changeable Winding (Dahlander) Windings are not electrically separate For Constant Horsepower the typical internal motor connection is : 2 Wye for Low Speed and 1 Delta for High speed Horsepower is the same at both speeds,however this may not apply to some European Motors	1U, 1V, 1W Low Speed 2U,2V,2W High Speed

For Pole Changeable Windings

Nema	T1	T2	T3	T4	T5	T6
New IEC	1U	1V	1W	2U	2V	2W
Old IEC	Ua	Va	Wa	Ub	Vb	Wb

Additional Notes

3 Speed Motors	Usually accomplished using one Pole Change Winding(1:2) and one separate winding
4 Speed Motors	Usually accomplished using two Pole Change Windings(1:2)

Title: Two Speed, Three Phase, Motor Connections

Author: NG

Date: 10/23/05

Sheet3

Revision:

Holland Industrial

European Motor Lead & Terminal Block Identifications

		Old			New		
1.	Line Connection	R	S	T	L1	L2	L3
		MP			N		
2.	Single Speed Motors	U	V	W	U1	V1	W1
		X	Y	Z	U2	V2	W2
	Rotor Connection	u	v	w	K	L	M
	Multi Voltage Motors	Ua	Va	Wa	U1	V1	W1
		Xa	Ya	Za	U2	V2	W2
		Ub	Vb	Wb	U5	V5	W5
		Xb	Yb	Zb	U6	V6	W6
3.	Multi Speed Motors	Ua	Va	Wa	1U	1V	1W
		Ub	Vb	Wb	2U	2V	2W
		Uc	Vc	Wc	3U	3V	3W
		Ud	Vd	Wd	4U	4V	4W
	Multi Speed w/separate winding or Y-Delta start	Ua	Va	Wa	1U1	1V1	1W1
		Xa	Ya	Za	1U2	1V2	1W2
		Ub	Vb	Wb	2U1	2V1	2W1
		Xb	Yb	Zb	2U2	2V2	2W2
4.	Single Phase Motors	U	V		U1	U2	
		W	Z		Z1	Z2	
5.	Aux. Components						
	Thermistor	P1	P2		10	11	
	Bimetal - NC	O1	O2		20	21	
	Bimetal - NO	S1	S2		30	31	
	Magnetic Brake	M1	M2		60	61	
	Heater Element	H1	H2		70	71	

Title:
European Motor Lead & Term Block Identification

Author:

Date:

Sheet:

Revision: