

TECH TALK

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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



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





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



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

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V2

W1

L3



									l L	Sing	gle (Spe	eed I	Mo	otors, 3 Phase	<u>e, 3,</u>	68	and 9 L	ea	<u>ds</u>	
Leads Out of Motor		<u>Lea</u> NE	ad Marl MA	<u>kings</u>	Po	Possibilities			Lead Markings IEC (<u>Old</u>			Ŀ	_ead Markings_lE	<u>C New</u>						
3		1,2	,3,		Across The Line Start			U,V,W,				ι	U1,V1,W1,								
6		1,2,3,4,5,6,				(a)Can be a single voltage W ye or (b)Single U 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,			l	U1,V1,W1,U2,V2,W2,						
					(a L1 joi) <u>If si</u> ,L2 a ned t	ngle and La cogeth	(hig 3 goe ner	n er) es to	volt 1,2,8	age \ &3 an	Nye d 4,:	_then 5,&6 a	re	If single voltage Wye then L1,L2 and L3 goes to U,V,& W and X,Y,and Z are joined together				li g je	f single voltage ' goes to U1,V1,& oined together	Wye then L1,L2 and L3 W1 and U2,V2,&W2 are
					(b 18 cc L3) <u>If si</u> &6 are onnec	e con	(low nect o L2	er) v ed to and	/ olta o L1, : 3&5 :	ge D 2&4 a are c	elta are onne	∟then ected t	0	If single voltage Delt connected to L1, V& L2 and W & Y are c	ta the &X ar conne	en U& re co ecteo	&Z are onnected to I to L3	li c t	f single voltage l connected to L1 o L2 and W1&V	Delta then U1&W2 are , V1&U2 are connected 2 are connected to L3
					(C vc hi	<u>) lf tw</u> oltage gh vo	<u>vo vo</u> e(Delt oltage	l <u>tage</u> a) hc e(Wye	mot oku e)ho	or th p as ok u	en fo (b) a p as (r lov bove a) al	v e and f bove	or							
					If L1 joi co an se St	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			1 L 1, [2	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	6 1,2,3,7,8,9,			Pa T3 1N er cc Tł W an	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 connectrs 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	6,7,8,9	9, (a (b)Dua)Dual	l volta I volta	age V Ige D	Vyeo elta	conne conn	ected ectec	I									
				If 1, ar foi joi 28 an to	(a) d or hig L 2 ge e join of 6& or low on ed t &8 are of 3& L 3	ual v jh vol oes to ed to 9 are v volta ogeth e join 9 are	olta tage o 2 an geth joine age c age c age c ier a ed to	ge w conr nd L3 er,58 ed to onne nd co geth ed to	y e c nectio 3 goe &8 ard gethe ectioc onne er an gethe	on L1 s to 3 e join er. on lea cted t d cor er and	ected goe a als ed to ads 1 to L1 anec d cor	L s to lea o 4&7 ogethe &7 are ,leads ted to nnecte	ad er e L2 d					L I I I I I I I I I I I I I I I I I I I	f (a) dual volta For high voltage ead U1, L2 goes a, also U2&U3 ar / 2 & V3 are joined For low voltage J3 are joined tog _1,leads V 1& V connected to L2 ogether and cor	e connection L1 goes to s to V 1 and L3 goes to W re joined together, ned together and W 2 & ogether.(1Y conn) e connectioon leads U1 & gether and connected to 3 are joined together and and W1& W 3 are joined nected to L3 (2Y conn)	
				If Fo lea 3,, joi Fo joi lea	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	Τ	2 3	4	5	6	7	8	9	10	11	12	1								
New IEC	U1	1 \	/1 W	U2	V2	W2	U5	V5	W5	U6	V6	W6				'Titl	Single Speed, Three Phase, Motor Connections 3, 6 and 9 Leads			, Motor Connections	
Old	U1	1	/1 W	X1	Y1	Z1	U2	V2	W2	X2	Y2	Z2				Aut	thor	: N	G		Γ
Also	U	J	v w	x	Y	Z										Dat	te:	10/17/	05		Sheet: 1
					Rev	Revision: Holland Industrial			Holland Industrial												

Single Speed	Motors, 3 Ph	ase, 12 Leads

Leads Coming C	Dut N	ead Ma IEMA	arkings	Poss	ibilities						Lea	d Mark	ings IE	<u>C Old</u>		Lead Marking	<u>as IEC New</u>
12	1 ,ç	,2,3,4,5 9,10,11	5,6,7,8 ,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 W5,W6	.,W1,W2,U5,U6,V5,V6,			
				(a) <u>If</u> L1,L2 10,1 ⁻ joine	singl 2 and L 1&12 a d,5&8	e volta 3 coni are join are joir	age W nect to ed togo ned ano	/ ye _co 1,2,ar ether a d 6&9	nnectio nd 3. A and 4& are joir	on ther Ilso 7 are ned.	n					(a) If single L1,L2 and L3 connor and W6 are joined joined,V2&V5a	voltage Wye connection then set to U1,V1,and W1. Also U6,V6 together and U2&U5 are re joined and W2&W5 are joined.
				(b) lf 1&12 are jo are jo are jo and 6	single are jo bined a bined a bined to 5&9 are	volta ined a and cor and cor ogethe e joine	d con necte necte r,5&8 d toget	elta co inected d to L2 d to L3 are join ther.	nnection d to L1 2, and 3 3. Also ned tog	on ther ,2&10 &&11 4&7 gether	ו					(b) If single connection th and connect joined and co V6 are joined Also U2 & U5 & V5 are joined W5 are joined	voltage Delta nen U1&W6 are joined ed to L1, V1& U6 are onnected to L2, and W1& and connected to L3. 5 are joined together,V2 ed together and W2 & d together.
				(c) <u>If dual voltage Wye</u> conection 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.					e					(c) If dual vo For high volt above For low volta are joined an V5 are joine and W1 & W connected to are joined to are joined to	Itage Wye conection age connection is as (a) age connection U1 & U5 d connected to L1,V1 & d and connected to L2 5 are joined and b L3 Also U2 &V2 & W2 gether and U6 &V6 &W6 gether.		
				(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 vo For high vol above. For low volt W6 together V1 & U2 & V connect to L2 V6 together	bltage delta connection tage hook up as (d) age join U1 & W2 &U5 & and connect to L1, join 5 &U6 together and 2, join W1& V2 & W5 & and connect to L3		
				(e) If start hook The a Wye and after	wyes hook u up as above Delta s 1 timer wye c	atart d up as ((b) ab seque starter . Moto connec	elta ru a) abo ove. nce is consis r alway	un the ve and carried sting o /s runs oft star	n for v d for de d out b f 3 cor s as a rt.	v ye elta rur y a ntactor delta	s					(e) If wye st w ye start ho for delta run The above se a W ye Delta contactors a runs as a de soft start.	art delta run then for ok up as (a) above and hook up as (b) above. equence is carried out by starter consisting of 3 nd 1 timer. Motor always Ita after w ye connection
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 12 Leads	,Three Phas	e. Motor Connections
														Author Date:	10/17/05		Sheet: 2
														Revisio	on:		Holland Industrial

		Two Speed Mo	otors, <u>3 Phase</u>	
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, IW 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 Speeds always in ratio of 1:2	Pole Changeable Winding (Dahlander) Windings are not electrically separate For <u>Constant Torque</u> the typical <u>internal</u> 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 <u>Variable Torque</u> 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, I W 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 Speeds always in ratio of 1:2	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, I W Low Speed 2U,2V,2W High Speed

For Pole Changeable Windings

Nema	T1	T2	T3	T4	T5	T6
New	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 S	peed,Three	Phase,	Motor	Connections

Author: NG	
Date: 10/23/05	Sheet3
Revision:	Holland Industrial

European	Moto	r Leac	l & Te	rminal	Block	
	ld	entifica	ations			
		Old			New	
1. Line Connection	R	S	Т	L1	L2	L3
	MP			N		
2. Single Speed Motors	U	V	W	U1	V1	W1
	Х	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	Ua	Va	Wa	1U1	1V1	1W1
winding or Y-Delta start	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	S 1	S2		30	31	
Magnetic Brake	M1	M2		60	61	
Heater Element	H1	H2		70	71	

Title: European Motor Lead & Te	Title: European Motor Lead & Term Block Identification							
Author:	Author:							
Date:	Sheet:							
Revision:								