

## الانفيرتر وتنظيم سرعة المحركات التحريضية ثلاثية الطور

### المحركات التحريضية وطرق التحكم بسرعتها:

في ظل انتشار وتطور الصناعات اليوم تطلب الامر ايجاد طرق للتحكم بسرعة المحركات التحريضية لأنها ببساطة هي الاكثر انتشارا كونها ذات اداء عالي ونسبة تأثر سرعتها في حالة الحمل وحالة الحمل لا تتجاوز 5% .

ومن العلاقة  $n=120f/2p$  نلاحظ انه يمكن التحكم بسرعة المحرك من خلال تغيير عدد الاقطاب  $2p$  او من خلال تغيير في التردد  $F$ ، ويمكن ايضا تنظيم السرعة باستخدام محركات ثنائية الملفات.

وسنشرح كل من الحالات الثلاثة بالتفصيل انشاء الله.

### 1- التنظيم بتغيير عدد الاقطاب .

من العلاقة السابقة  $n=120f/2p$  وعند تردد 50 HZ يمكن تنظيم الجول التالي

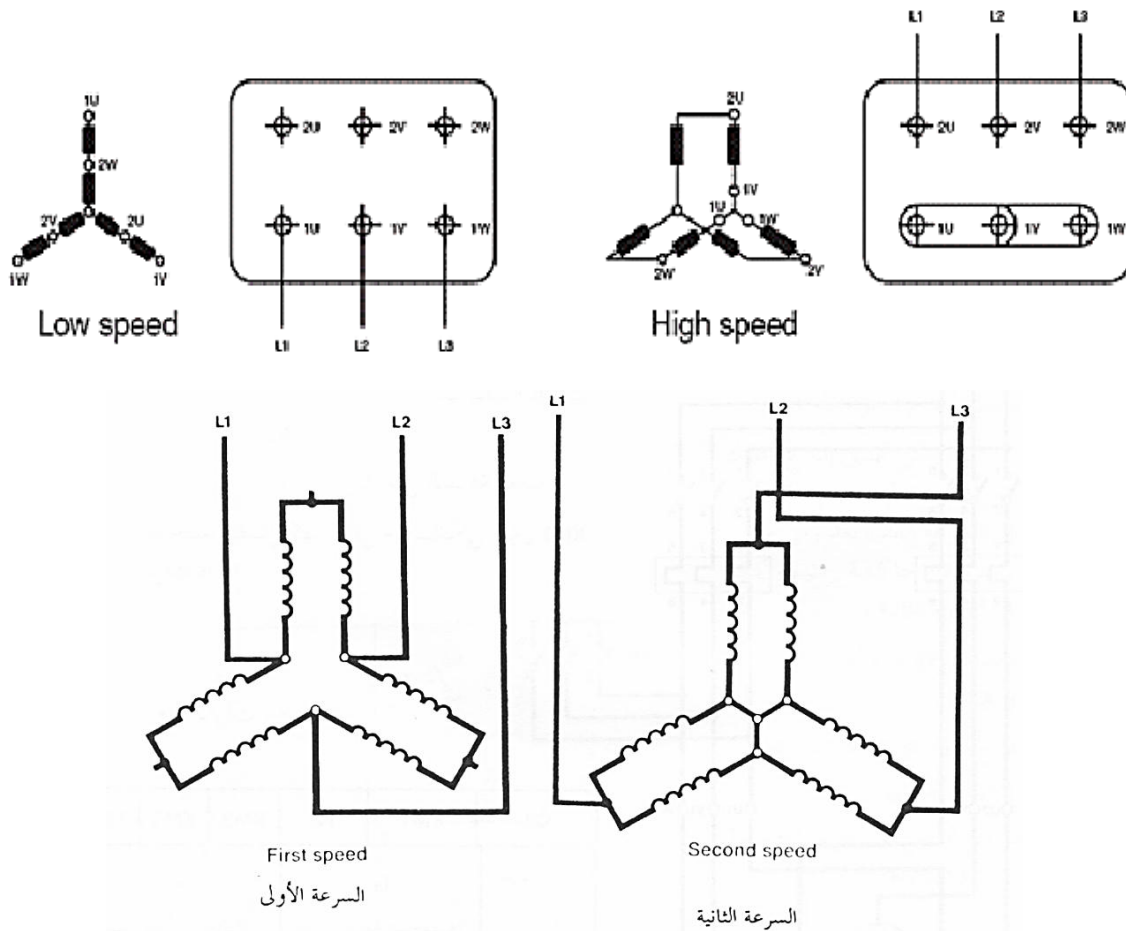
السرعة r.p.m	3000	1500	1000	750	600	500
عدد الاقطاب $2p$	2	4	6	8	10	12

من الجدول السابق نلاحظ ان كلما زاد عدد الاقطاب كلما انخفضت سرعة المحرك وكلما نقص عدد الاقطاب زادت سرعة المحرك (علاقة عكسية).

ويكون لهذا النوع من المحركات ست نهايات كما هو مبين في (الشكل 1) كما يكون المحرك ذو استطاعة وعزم ثابتين او متغيرين .

ويتم تأمين الحماية للمحرك باستخدام (overload relay) ولكن من عيوب هذا النوع من المحركات ان المردود وعامل الاستطاعة منخفضة بشكل عام. ولا ينصح بربط مجموعة من هذه المحركات لتعمل معا على التفرع ولو كانت متماثلة بسبب عدم امكانية مرور تيارات متساوية فيها والتي قد تؤدي الى فصل في (overload relay).

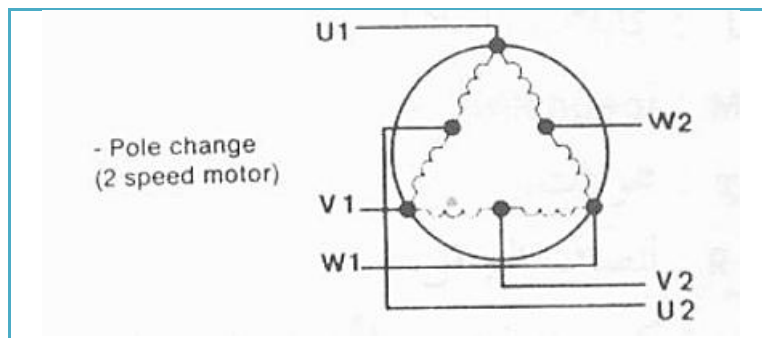
AMV - Dahlander connection Y/YY



الشكل 1

ويسمى مثل هذا النوع من المحركات بـ (dahlander motor)

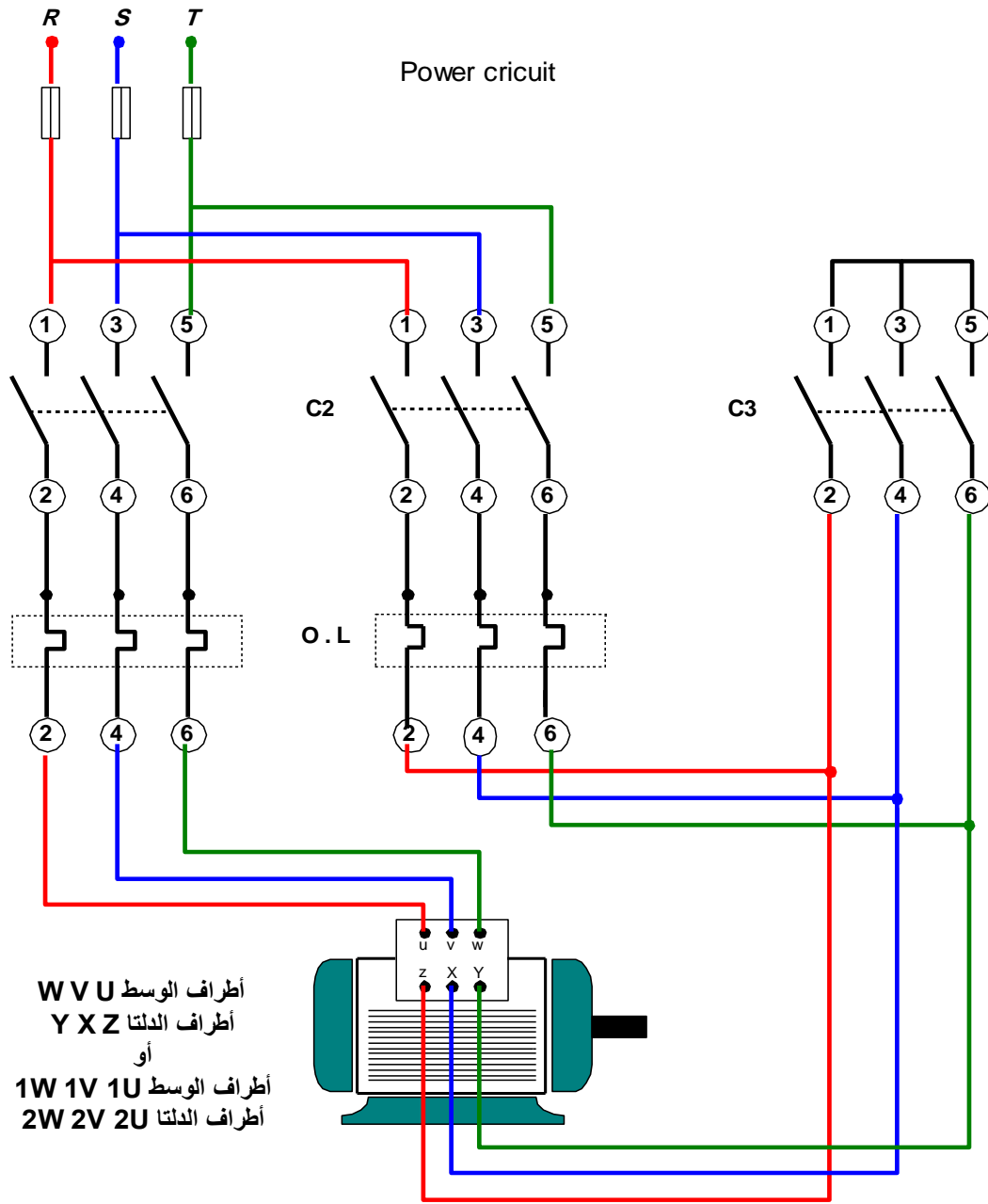
ويرمز له في المخططات الكهربائية كما في الشكل 2.



الشكل 2 (dahlander motor)

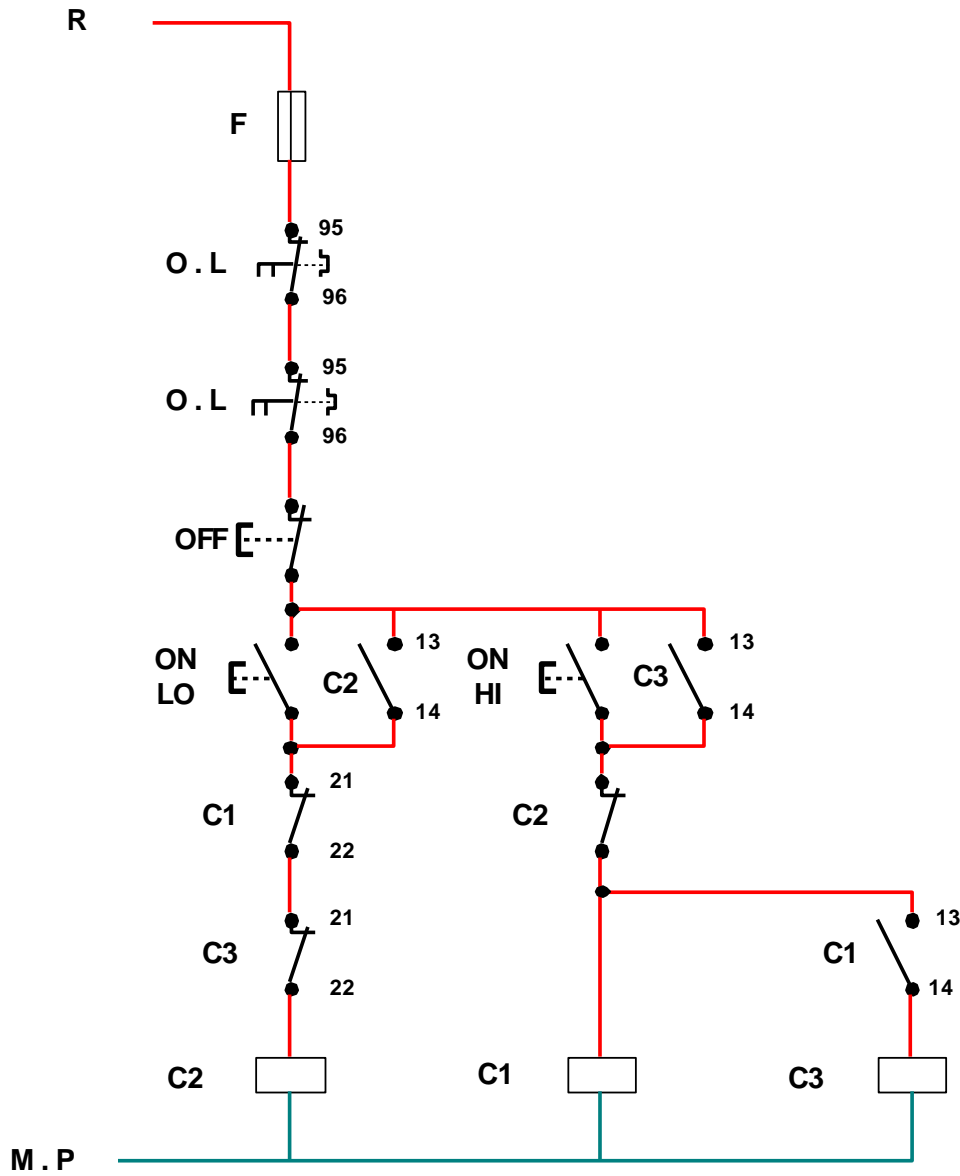
وهنا احدى الدارات التي يمكن استخدامها في التحكم بهذا النوع من المحركات.

دائرة القوى لتشغيل محرك ثلاثة أوجه سرعتين متناصفتين ( دلاندر )



الشكل 3 (دائرة الاستطاعة)

Control circuit



الشكل 4 (دائرة التحكم)

الكونتاكتور **C2** يوصل المحرك على السرعة المنخفضة  
و الكونتاكتور **C1,C3** يوصل المحرك على السرعة المرتفعة

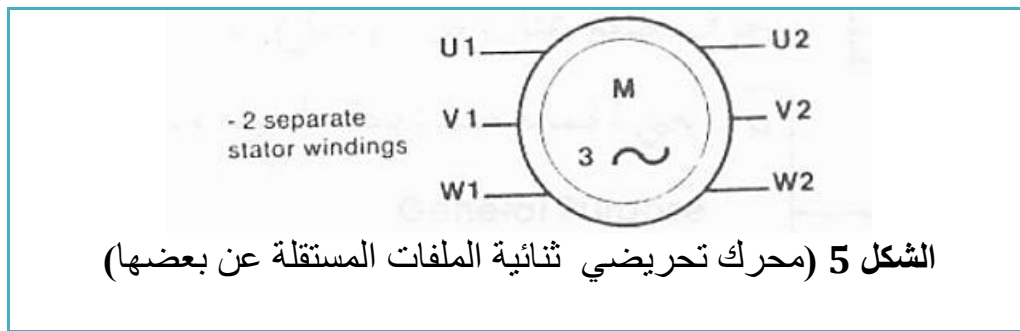


2- تنظيم السرعة باستخدام محركات ثنائية الملفات.

يوجد في الجزء الثابت لهذا النوع من المحركات مجموعتين من الملفات كل منهما مستقلة عن الاخرى استقلالاً تاماً. ولا يوجد اي ربط كهربائي بينهما. و يمكن القول في صحيح العبارة انه عبارة عن محركين في هيكل واحد كل محرك لهو سرعة مختلفة عن الاخر .

تستخدم ملفات المجموعة الاولى للإقلاع على السرعة البطيئة وتستخدم ملفات المجموعة الثانية للإقلاع على السرعة العالية و ولا يوجد اي علاقة نسبية بين سرعتين . تستخدم هذه المحركات في المصاعد الكهربائية حيث تقلع على السرعة العالية ثم تتحول الى السرعة البطيئة اثناء التوقف في احد الادوار.

ويرمز لهذا النوع من المحركات في المخططات الكهربائية كما في الشكل 5.

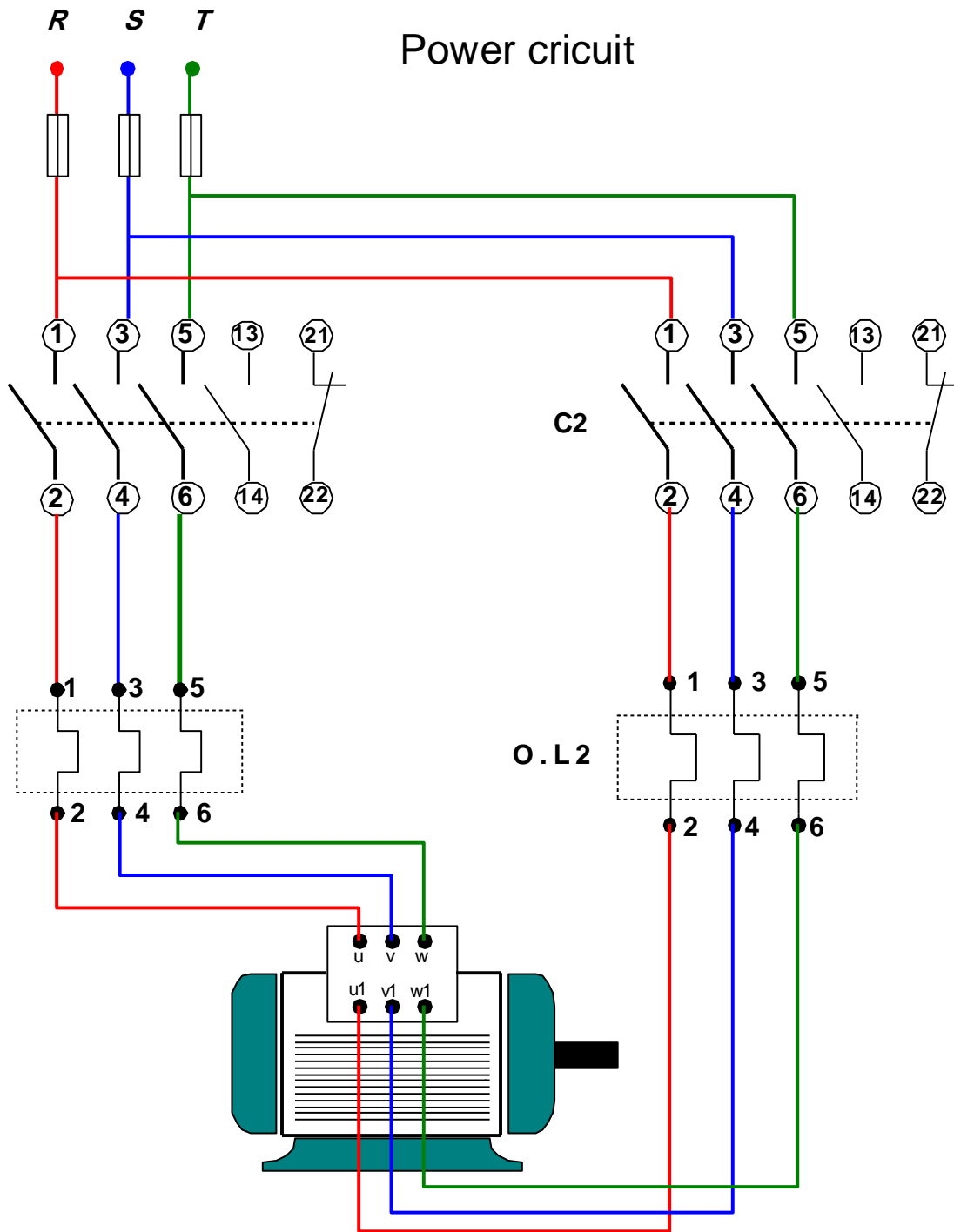


وهناك عدت حالات الاقلاع هذه المحركات نذكر منها .

1. اقلاع مباشر لكل من ملفات السرعة الاولى والسرعة الثانية.
2. اقلاع مباشر لملفات السرعة الاولى (البطيئة) و اقلاع نجمي مثلثي لملفات السرعة الثانية (المرتفعة) وهذه الطريقة الاكثر شيوعاً.
3. اقلاع نجمي مثلثي لملفات السرعتين ولهذه الطريقة حالتان من حالات الاقلاع. التغير من السرعة المنخفضة الى السرعة المرتفعة او بالعكس عند التوقف.

1- اقلاع مباشر لكل من ملفات السرعة الاولى والسرعة الثانية.

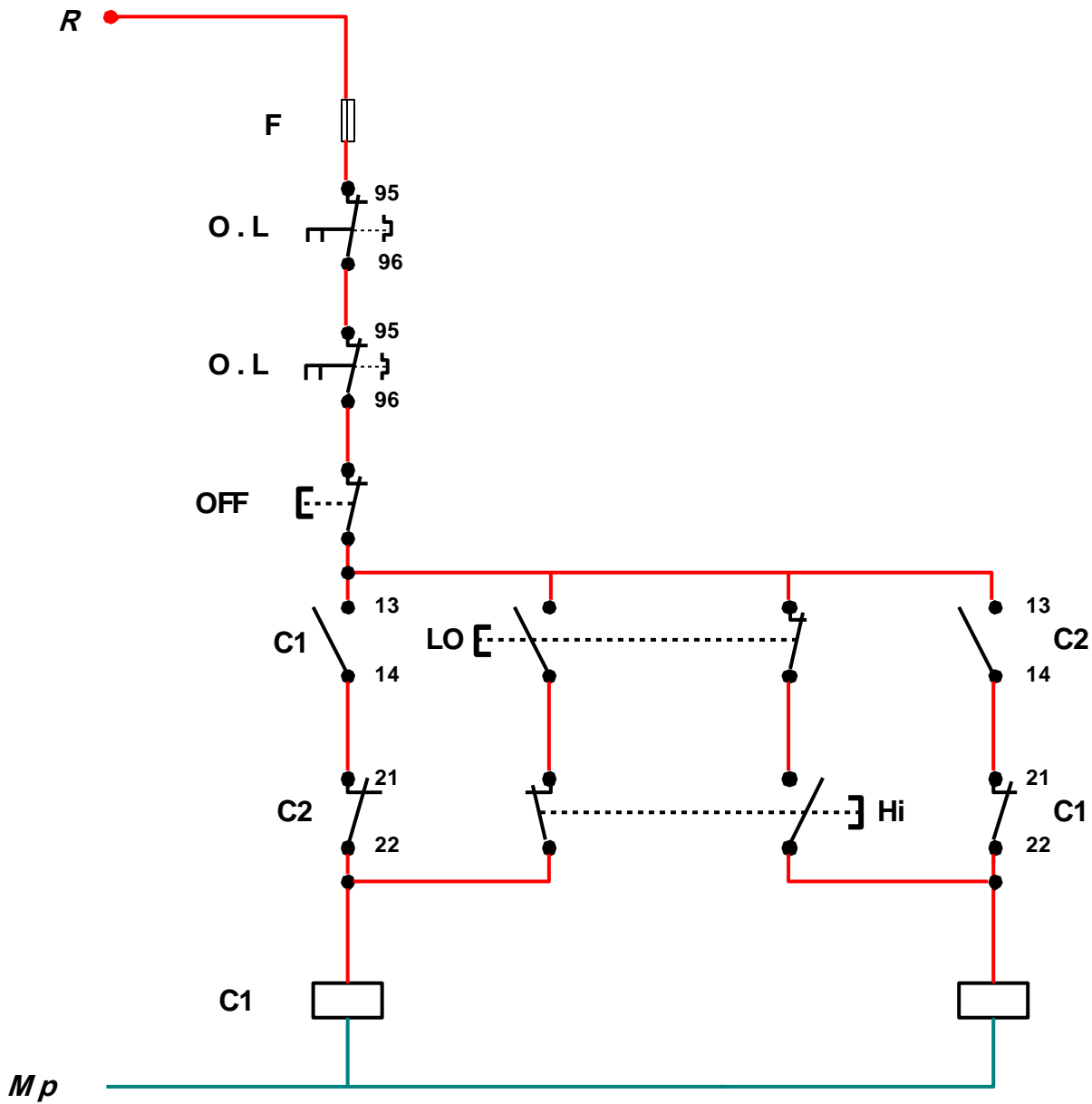
دائرة القوى لتشغيل محرك ثلاثة أوجه ثنائية الملفات المستقلة عن بعضها



الشكل 6 (دائرة الاستطاعة)

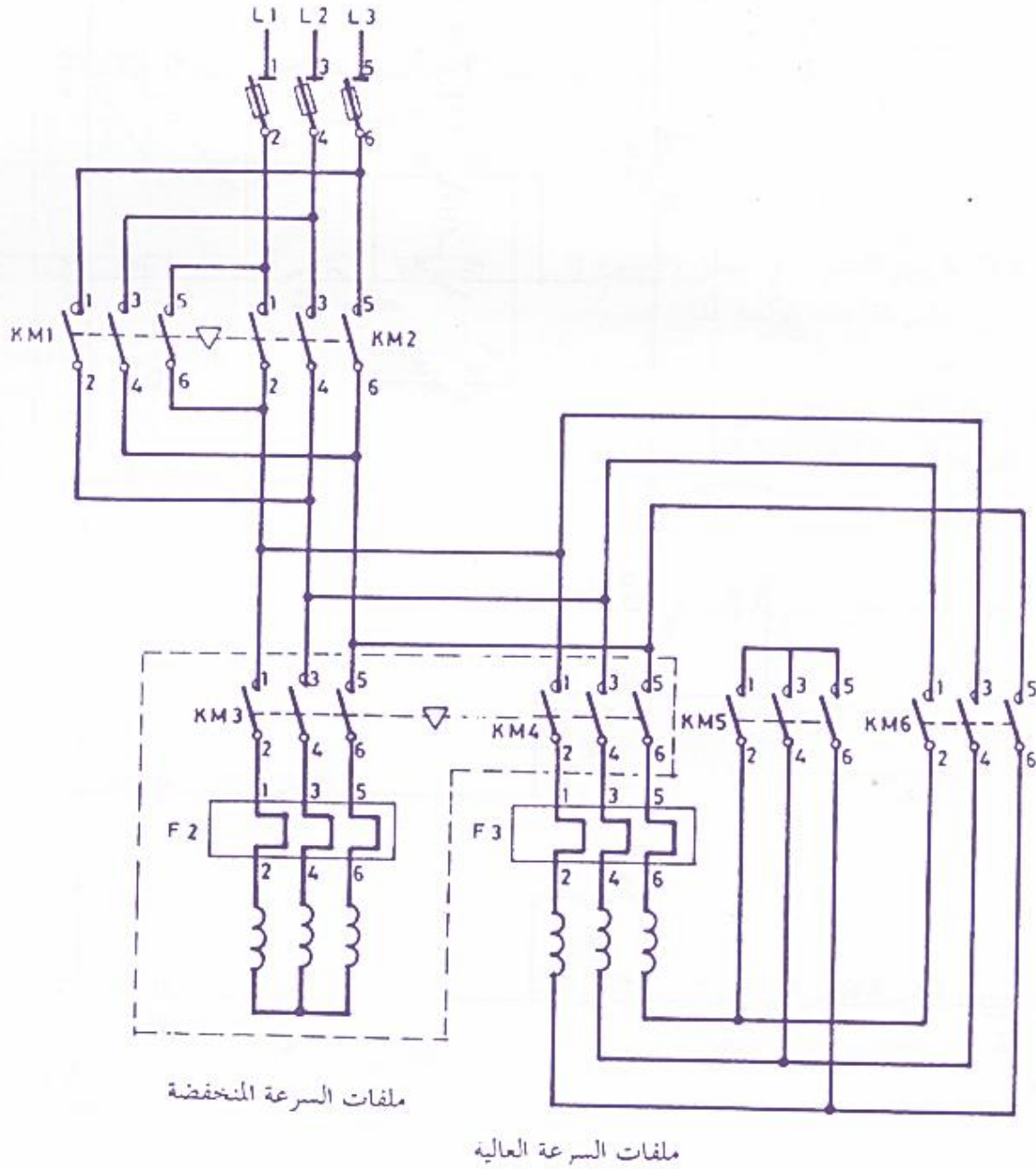
دائرة التحكم لتشغيل محرك ثلاثة أوجه ثنائية الملفات المستقلة عن بعضها

Control circuit

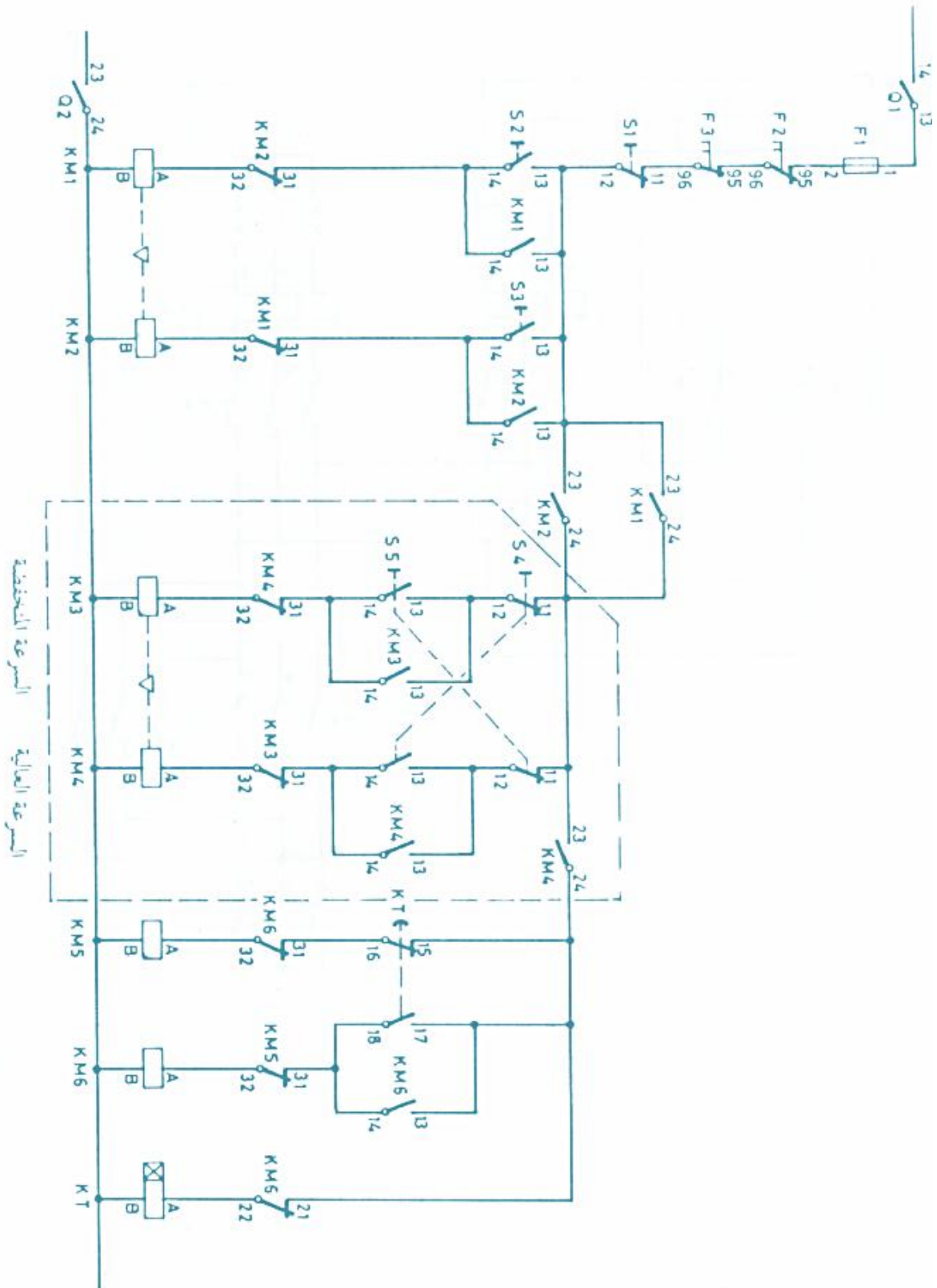


الشكل 7 (دائرة التحكم)

2. اقلاع مباشر لمفاتي السرعة الاولى (البطيئة) واقلاع نجمي مثثي لمفاتي السرعة الثانية (المرتفعة) وهذه الطريقة الاكثر شيوعا



الشكل 8 (دائرة الاستطاعة)



الشكل 9 (دائرة التحكم)

3- إقلاع نجمي مثثي لمفاتيح السرعتين ولهذه الطريقة حالتان من حالات الإقلاع. التغير من السرعة المنخفضة الى السرعة المرتفعة او بالعكس عند التوقف.

هذه الدارة قليلة الاستخدام ولذلك لم اتطرق لشرحها . يمكن الاطلاع عليها من مراجع اخرى .

### 3- تنظيم سرعة المحركات من خلال تغيير في قيم تردد المنبع (F).

تتطلب هذه الطريق استخدام جهاز مغير التردد والذي يسمى انفيرتر (INVERTER) .

**الانفيرتر:** هو جهاز متكامل ومخصص للتحكم بالمحركات التي تعمل على التيار المتناوب مهما كانت قدرت المحرك حيث يوجد اجهزة انفرتر تبدأ من نصف حصان الى 120 حصان وهذا الجهاز يسمى ب المبدلة الترددية وهو يغنى ايضا عن طرق بدأ الحركة المتعرف عليها وهى الاستار دلتا وعن طرق البدا بالمقاومات او المحولات الاولية لان عن طريق هذا الجهاز استطعنا التحكم في التردد والجهد.

#### مميزات الجهاز:

- 1- وجود برامج ضمن هذا الجهاز للتحكم بسرعة المحرك من دورة واحدة بالدقيقة الى اعلى من طاقة المحرك احيانا تصل الى 10 او 20 ضعف من سرعة المحرك الاسمية
  - 2- وجود برامج ضمن الجهاز تقوم بحماية المحرك من الكثير من الاخطار اشهرها
    - 1- انقطاع احد الاطوار (ما يسمى بالفازات)
    - 2- انقلاب احد الاطوار
    - 3- الحمل الزائد (وهو ما يسمى بالأوفر لود)
    - 4- انخفاض الجهد داخل المحرك
    - 5- ارتفاع درجة حرارة المحرك عن الحد المسموح بيه
- وهذا عن طريق شاشة متحركة او ثابتة على الجهاز تقوم بإظهار الكثير من البارامترات اشهرها
- 1- الامبير المسحوب من المحرك اثناء عمله
  - 2- الاخطاء التي حدثت اثناء العمل والتي تسببت في ايقاف المحرك الفجائي
  - 3- اتجاه دوران المحرك
- والكثير من تتابع المحرك اثناء عمله وهذا الجهاز ايضا لديه ميزة جميلة اذا اخطاء المبرمج في البرمجة ممكن استعادته الى برنامج المصنع بعض استخدامات الانفرتر.
- 1- يستخدم في المطارات حيث تقوم بالتحكم بمضخات الوقود اليا بحيث تضخ الى الخزانات بكمية تتناسب مع عدد الطائرات وحجمها وكل ذلك يكون معير عن طريق بارامترات الانفرتر.
  - 2- يستخدم في الفنادق عند مضخات المياه التي يتوجب ان تبقى تحت مراقبة على مدار الساعة بحيث تطفئ او تعدل فتحة المضخات على حسب الكمية المستهلكة في الفندق.
  - 3- تستخدم الانفرترات بشكل عام للحصول على خرج ثلاثي الاطوار من تغذية احادية الطور وذلك حسب التطبيقات الموجودة حيث اننا لا نستطيع الحصول على استطاعات بعض انواع الانفرترات المخصصة لهذه الوظيفة لا يمكن ان تتجاوز h-p-v وجهود كبيرة لان جهد الثلاثي لا يمكن ان يتجاوز جهد الدخل الأحادي.

لإبقاء العزم ثابتا يجب تثبيت السيالة المغناطيسية  $Q_{max}$  ، اما التوتر يجب ان يتناسب كليا مع التردد اي ان النسبة  $u/f$  يجب ان تبقى ثابتة وفق العلاقة .

$$u/f=4.44w1.kw.Q_{,max}=\text{const}.Q_{max}$$

تسمح هذه الطريق بالحصول على مواصفات فنية ثابتة مع سرعات منخفضة .ولكن مثل هذه الطريق مكلفة ماديا لكونها تتطلب جهاز انفيرتر (INVERTER) .

يوجد لدينا في الاسواق عدت شركات تقوم بإنتاج مولدات تردد متغير انفيرتر (INVERTER) ونذكر منها

LS .DELTA. FATEK . MITSUBISHI INVERTER.....

ولكننا سوف نقتصر في شرح منتجات شركة LS لكونه ذو كفاءة عالية وايضا لديه انتشار واسع في سوق العمل مع ملاحظة ان باقي الشركات لديها نفس الكفاءة.

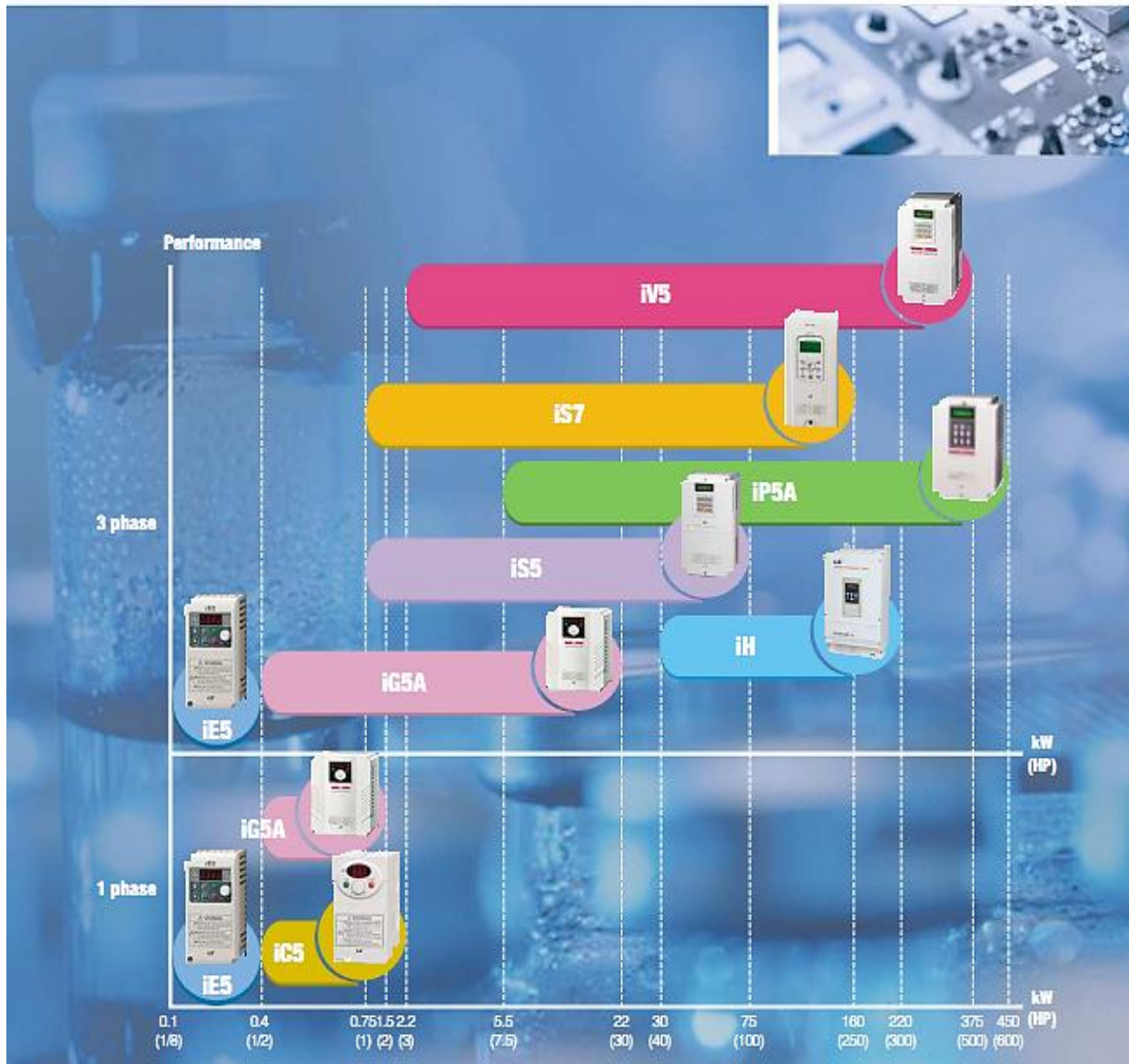
ان اغلب الموديلات التي تطرحها الشركات متشابهة من حيث مبدأ العمل ولكن يوجد اختلاف في طريقة تسمية البارامترات المستخدمة في برمجة ال INVERTER كأحد المميزات التي تتميز بها الشركات عن بعضها كما هو الحال بالنسبة للـ PLCs .

طرحه شركة LS وهو الاسم الصناعي لشركة LG عدت طرازات من inverters بتشكيلة واسعة من الاستطاعات وجميع التوترات المستخدمة في الشبكة الكهربائية مثل

(220 1phase,220 3phase,380 3phase)

ويمكن تقسمها كما في الشكل 10.





الشكل 10



من الشكل السابق نلاحظ وجود ثمان طرازات من سلسلة **LS inverter** وهي:

## IE5, IC5, IG5A, IS5, IS7, IH, IP5A, IV5

تم تقسيمها بالنسبة الى:

1- نوعية جهد الدخل.

2- قدرتها على تحمل احمال ذات استطاعات عالية على مخرجها.

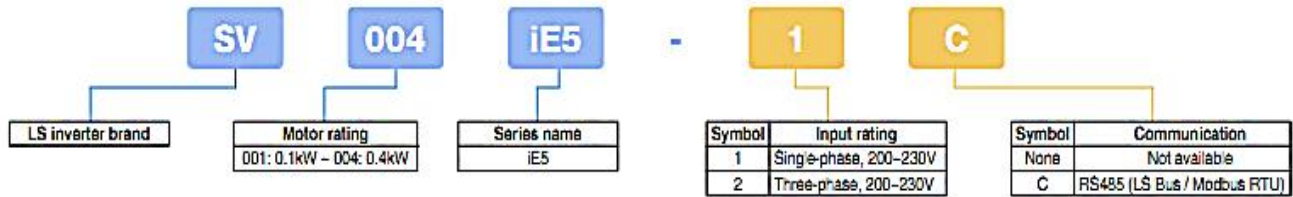
النوع الاول (IE5):

استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 0.4-0.1) (hp 0.5-0.1)	ثلاثي الطور (230-200 [V])	واحد فاز 230- 200 [V]
(kw 0.4-0.1) (hp 0.5-0.1)	ثلاثي الطور (230-200 [V])	ثلاث فاز 230-200 [V]



1 phase 0.1-0.4kW(0.1~0.5HP), 200~230V  
3 phase 0.1-0.4kW(0.1~0.5HP), 200~230V

### Model Number



### General specification

Model number: SV□□□IE5-□		001-1	002-1	004-1	001-2	002-2	004-2
Motor rating	[HP]	0.13	0.25	0.5	0.13	0.25	0.5
	[kW]	0.1	0.2	0.4	0.1	0.2	0.4
Output rating	Capacity [kVA]	0.3	0.6	0.95	0.3	0.6	1.14
	Current [A]	0.8	1.4	2.5	0.8	1.6	3.0
	Voltage [V]	Three-phase 200 ~ 230V					
Input rating	Frequency [Hz]	0.1 - 200Hz					
	Voltage [V]	Single-phase 200 ~ 230V (±10%)			Three-phase 200 ~ 230V (±10%)		
	Frequency [Hz]	50 - 60Hz (±5%)					
Weight	Current [A]	2.0	3.5	5.5	1.2	2.0	3.5
	[kg]	0.44	0.46	1.68	0.43	0.45	0.67

## النوع الثاني (IC5):

1 phase 0.4~2.2kW(0.5~3HP), 200~230V

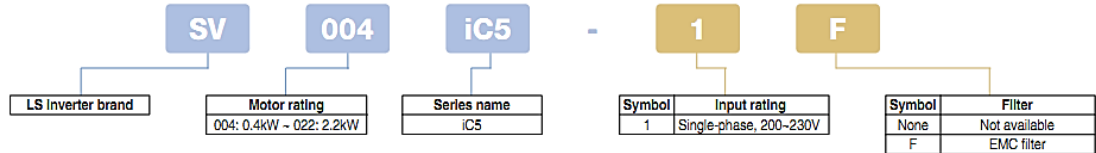


استطاعة الخرج (KW 2.2-0.4)(HP 3-0.5)	جهد الخرج ثلاثي الطور ( 230-200 v )	جهد الدخل واحد فاز 230-200 v
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## ملاحظة:

هذا النوع لا يحتوي على دخل ثلاثي الطور فقط احادي الطور وخرج ثلاثي الطور.

## Model Number



## General specification

Model number: SV□□□iC5-□			004-1	008-1	015-1	022-1
Motor rating	[HP]		0.5	1	2	3
	[kW]		0.4	0.75	1.5	2.2
Output rating	Capacity	[kVA]	0.95	1.9	3	4.5
	Current	[A]	2.5	5	8	12
	Voltage	[V]	Three-phase 200 ~ 230V			
	Frequency	[Hz]	0.1 ~ 400Hz			
Input rating	Voltage	[V]	Single-phase 200 ~ 230V (±10%)			
	Frequency	[Hz]	50 ~ 60Hz (±5%)			
	Current	[A]	5.5	9.2	16	21.6
Weight	[kg]	0.87	0.89	1.79	1.85	

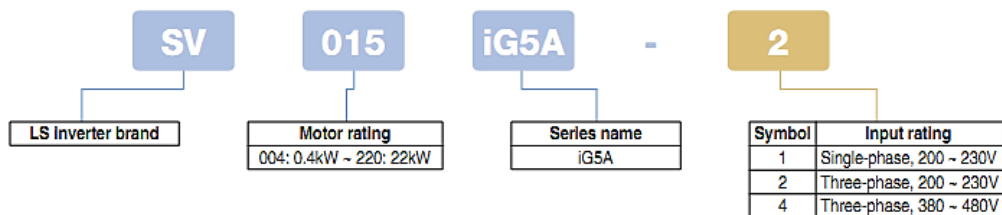
النوع الثالث (IG5A):

1 phase 0.4~1.5kW(0.5~2HP), 200~230V  
 3 phase 0.4~22kW(0.5~30HP), 200~230V  
 3 phase 0.4~22kW(0.5~30HP), 380~480V



استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 0.4-1.5) (hp 0.5-2)	ثلاثي الطور ( v230-200 )	واحد فاز ( v230-200 )
(kw 0.4-22) (hp 0.5-30)	ثلاثي الطور ( v230-200 )	ثلاثي الطور ( v230-200 )
(kw 0.4-22) (hp 0.5-30)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

## Model Number



## General specification

Model number: SV□□□iG5A-1□			004	008	015
Motor rating	[HP]		0.5	1	2
	[kW]		0.4	0.75	1.5
Output rating	Capacity	[kVA]	0.95	1.9	3.0
	Current	[A]	2.5	5	8
	Voltage	[V]	Three-phase 200 ~ 230V		
	Frequency	[Hz]	0.1 ~ 400Hz		
Input rating	Voltage	[V]	Single-phase 200 ~ 230V (+10%, -15%)		
	Frequency	[Hz]	50 ~ 60Hz (±5%)		
Weight		[kg]	0.77	1.12	1.84

Model number: SV□□□iG5A-2□			004	008	015	022	037	040	055	075	110	150	185	220
Motor rating	[HP]		0.5	1	2	3	5	5.4	7.5	10	15	20	25	30
	[kW]		0.4	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22
Output rating	Capacity	[kVA]	0.95	1.9	3	4.5	6.1	6.5	9.1	12.2	17.5	22.9	28.2	33.5
	Current	[A]	2.5	5	8	12	16	17	24	32	46	60	74	88
	Voltage	[V]	Three-phase 200 ~ 230V											
	Frequency	[Hz]	0.1 ~ 400Hz											
Input rating	Voltage	[V]	Three-phase 200 ~ 230V (+10%, -15%)											
	Frequency	[Hz]	50 ~ 60Hz (±5%)											
Weight		[kg]	0.76	0.77	1.12	1.84	1.89	1.89	3.66	3.66	9.00	9.00	13.3	13.3

Model number: SV□□□iG5A-4□			004	008	015	022	037	040	055	075	110	150	185	220
Motor rating	[HP]		0.5	1	2	3	5	5.4	7.5	10	15	20	25	30
	[kW]		0.4	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22
Output rating	Capacity	[kVA]	0.95	1.9	3	4.5	6.1	6.5	9.1	12.2	18.3	22.9	29.7	34.3
	Current	[A]	1.25	2.5	4	6	8	9	12	16	24	30	39	45
	Voltage	[V]	Three-phase 380 ~ 480V											
	Frequency	[Hz]	0.1 ~ 400Hz											
Input rating	Voltage	[V]	Three-phase 380 ~ 480V (+10%, -15%)											
	Frequency	[Hz]	50 ~ 60Hz (±5%)											
Weight		[kg]	0.76	0.77	1.12	1.84	1.89	1.89	3.66	3.66	9.00	9.00	13.3	13.3

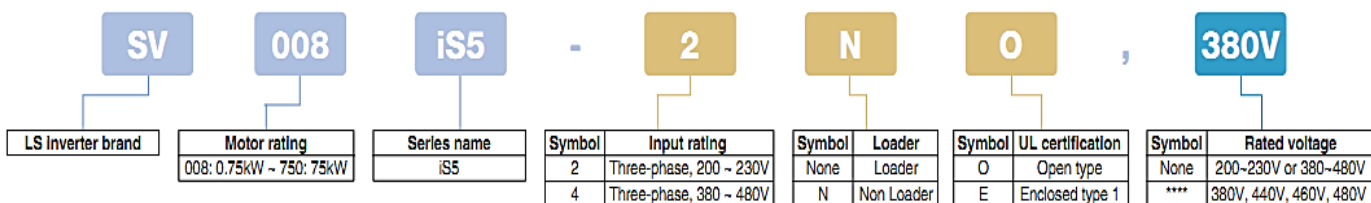
## النوع الرابع (iS5):

3 phase 0.75~55kW(1~75HP), 200~230V  
3 phase 0.75~75kW(1~100HP), 380~480V



استطاعة الخرج	جهد الخرج	جهد الدخل
(0.75-55 kw) (1-75 hp)	ثلاثي الطور (v230-200)	ثلاثي الطور (v230-200)
(0.75-75 kw) (1-100 hp)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

## Model Number



## General specification

Model number: SV□□□iS5-2□		008	015	022	037	055	075	110	150	185	220	300	370	450	550	
Motor rating	[HP]	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	
	[kW]	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	
Output rating	Capacity [kVA]	1.9	3	4.5	6.1	9.1	12.2	17.5	22.9	28.5	33.5	46	55	68	84	
	Current [A]	5	8	12	16	24	32	46	60	74	88	122	146	180	220	
	Voltage [V]	Three-phase 200 ~ 230V														
Input rating	Frequency [Hz]	0.1 ~ 400Hz (Sensorless control: 0.1~300Hz, Sensored control: 0.1~120Hz)														
	Voltage [V]	Three-phase 200 ~ 230V (±10%)														
	Frequency [Hz]	50 ~ 60Hz (±5%)														
Weight [kg]		4.6	4.6	4.8	4.9	7.5	7.7	13.8	14.3	19.4	20.0	42.0	42.0	61	61	

Model number: SV□□□iS5-4□		008	015	022	037	055	075	110	150	185	220	300	370	450	550	750	
Motor rating	[HP]	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	
	[kW]	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	
Output rating	Capacity [kVA]	1.9	3	4.5	6.1	9.1	12.2	17.5	22.9	29.7	34.3	45	56	68	82	100	
	Current [A]	2.5	4	6	8	12	16	24	30	39	45	61	75	91	110	152	
	Voltage [V]	Three-phase 380 ~ 480V															
Input rating	Frequency [Hz]	0.1 ~ 400Hz (Sensorless control: 0.1~300Hz, Sensored control: 0.1~120Hz)															
	Voltage [V]	Three-phase 380 ~ 480V (±10%)															
	Frequency [Hz]	50 ~ 60Hz (±5%)															
Weight [kg]		4.7	4.7	4.8	4.9	7.7	7.7	13.9	14.4	20	20	45	45	63	63	68	

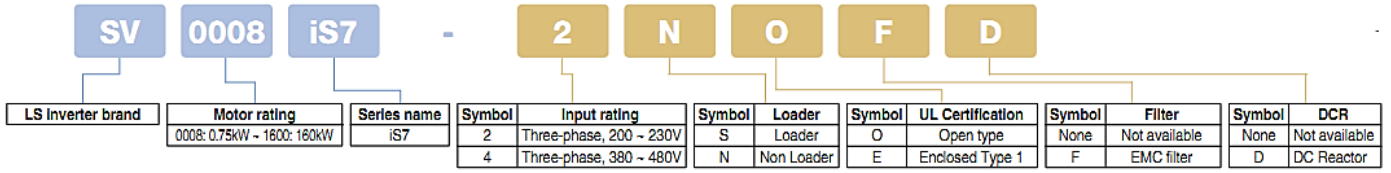
## النوع الخامس (iS7):



3 phase 0.75~22kW(1~30HP), 200~230V  
3 phase 0.75~160kW(1~250HP), 380~480V

استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 22-0.75) (30-1hp)	ثلاثي الطور (v230-200)	ثلاثي الطور (v230-200)
(0.75-160 kw) (1-250 hp)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

### Model Number



### General specification

Model number: SV□□□iS7-2□		008	015	022	037	055	075	110	150	185	220	
Motor rating	[HP]	1	2	3	5	7.5	10	15	20	25	30	
	[kW]	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	
Output rating	Capacity [kVA]	1.9	3	4.5	6.1	9.1	12.2	17.5	22.9	28.5	33.5	
	Current (CT) [A]	5	8	12	16	24	32	46	60	74	88	
	Current (VT) [A]	8	12	16	24	32	46	60	74	88	124	
	Voltage [V]	Three-phase 200 ~ 230V										
Input rating	Frequency [Hz]	0.01 ~ 400Hz (Sensorless-1 control: 0.01~300Hz, Sensorless-2 or Sensored control: 0.01~120Hz)										
	Voltage [V]	Three-phase 200 ~ 230V (-15% ~ +10%)										
	Frequency [Hz]	50 ~ 60Hz (±5%)										
	Current (CT) [A]	8.3	12.9	18.6	24	32.9	41.4	58	69	88	96	
Current (VT) [A]	7	10.6	14.8	21.8	28	42	52	60	75	107		

Model number: SV□□□iS7-4□		008	015	022	037	055	075	110	150	185	220	300	370	450	550	750	900	1100	1320	1600		
Motor rating	[HP]	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	120	150	180	225		
	[kW]	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160		
Output rating	Capacity [kVA]	1.9	3	4.5	6.1	9.1	12.2	17.5	22.9	29.7	34.3	46	57	69	84	116	139	170	201	248		
	Current (CT) [A]	2.5	4	6	8	12	16	24	30	39	45	61	75	91	110	152	183	223	264	325		
	Current (VT) [A]	4	6	8	12	16	24	30	39	45	61	75	91	110	152	183	223	264	325	370		
	Voltage [V]	Three-phase 380 ~ 480V																				
Input rating	Frequency [Hz]	0.01 ~ 400Hz (Sensorless-1 control: 0.01~300Hz, Sensorless-2 or Sensored control: 0.01~120Hz)																				
	Voltage [V]	Three-phase 380 ~ 480V (-15% ~ +10%)																				
	Frequency [Hz]	50 ~ 60Hz (±5%)																				
	Current (CT) [A]	4.3	7.2	10.6	15.4	21	25.8	39	44	57	57	57	69	83	113	154	195	239	286	362		
Current (VT) [A]	3.5	5.3	7.3	10.8	13.8	22.5	26	33	40	52.2	90	109	123	162	195	237	282	350	403			

### النوع السادس (iH):

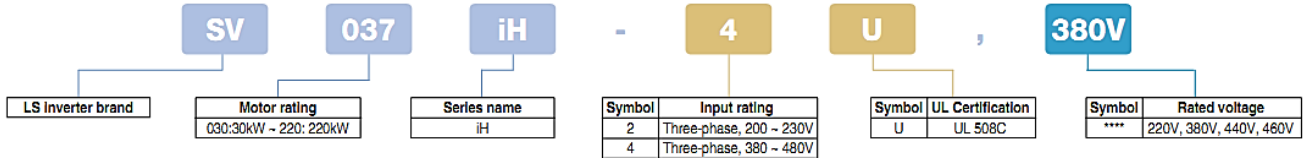


3 phase 30~55kW(40~75HP), 200~230V  
3 phase 30~220kW(40~300HP), 380~480V



استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 55-30) (75-40hp)	ثلاثي الطور (v230-200)	ثلاثي الطور (v230-200)
(30-220 kw) (40-300 hp)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

### Model Number



### General specification

Model number: SV□□□iH-□□			030-2U	037-2U	045-2U	055-2U	030-4U	037-4U	045-4U	055-4U	075-4U	090-4U	110-4U	132-4U	160-4U	220-4U
Motor rating	Constant Torque	[HP]	40	50	60	75	40	50	60	75	100	125	150	175	215	300
	Constant Torque	[kW]	30	37	45	55	30	37	45	55	75	90	110	132	160	220
	Variable Torque	[HP]					50	60	75	100	125	150	175	215	250	350
	Variable Torque	[kW]					37	45	55	75	90	110	132	160	185	280
Output ratings (380V based)	Constant Torque FLA	[A]	122	146	180	220	61	75	91	110	152	183	223	264	325	432
	Constant Torque	[kVA]	46	55	68	83	40	50	60	70	100	120	145	170	200	280
	Variable Torque FLA	[A]					80	96	115	125	160	228	264	330	361	477
	Variable Torque	[kVA]					52	62	74	80	103	147	170	213	233	307
Input ratings	Voltage	[V]	Three-phase, 200 - 230V				Three-phase, 380 - 460V									
	Frequency	[Hz]	0.5 - 400Hz				0.5 - 400Hz									
Input ratings	Voltage	[V]	Three-phase, 200 - 230V (±10%)				Three-phase, 380 - 460V (±10%)									
	Frequency	[Hz]	50 - 60Hz (±5%)				50 - 60Hz (±5%)									
Weight		[kg]	42	42	56	56	45	45	63	63	68	98	98	122	122	175

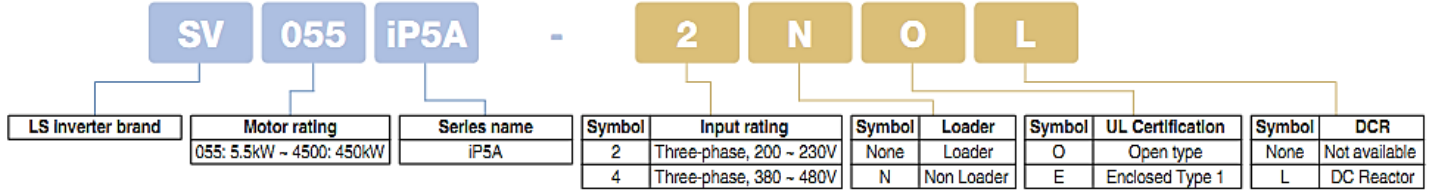
### النوع السابع (IP5A):

3 phase 5.5~30kW(7.5~40HP), 200~230V  
3 phase 5.5~450kW(7.5~600HP), 380~480V



استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 30-5.5) (40-7.5hp)	ثلاثي الطور (v230-200)	ثلاثي الطور (v230-200)
(5.5-450 kw) (7.5-600 hp)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

## Model Number



## General specification

Model number: SV□□□iP5A-2□		055	075	110	150	185	220	300
Motor rating (Fan/Pump)	[HP]	7.5	10	15	20	25	30	40
	[kW]	5.5	7.5	11	15	18.5	22	30
Current (110% overload)	[A]	24	32	46	60	74	88	115
	Normal duty: 110% for 1 minute							
Motor rating (General load)	[HP]	5	7.5	10	15	20	25	30
	[kW]	3.7	5.5	7.5	11	15	18.5	22
Current (150% overload)	[A]	17	23	33	44	54	68	84
	Heavy duty: 150% for 1 minute							
Output rating	[kVA]	9.1	12.2	17.5	22.9	28.2	33.5	43.8
	[V]	Three-phase 200 ~ 230V						
Input rating	[Hz]	0.01 ~ 120Hz						
	[V]	Three-phase 200 ~ 230V (-15% ~ +10%)						
Weight	[Hz]	50 ~ 60Hz (±5%)						
	[kg]	4.9	6	6	13	13.5	20	20

Model number: SV□□□iP5A-4□		055	075	110	150	185	220	300	370	450	550	750	900	1100	1320	1600	2200	2800	3150	3750	4500
Motor rating (Fan/Pump)	[HP]	7.5	10	15	20	25	30	40	50	60	75	100	125	150	175	215	300	350	400	500	600
	[kW]	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	220	280	315	375	450
Current (110% overload)	[A]	12	16	24	30	39	45	61	75	91	110	152	183	223	264	325	432	547	613	731	877
	Normal duty: 110% for 1 minute																				
Motor rating (General load)	[HP]	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	175	215	300	350	400	500
	[kW]	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	220	280	315	375
Current (Non DCR / DCR) (150% overload)	[A]	8.8	12	16	22/24	28/30	34/39	44/45	61	75	91	110	152	183	223	264	325	432	547	613	731
	Heavy duty: 150% for 1 minute																				
Output rating	[kVA]	9.6	12.7	19.1	23.9	31.1	35.9	48.6	59.8	72.5	87.6	121.1	145.8	178	210	259	344	436	488	582	699
	[V]	Three-phase 380 ~ 480V																			
Input rating	[Hz]	0.01 ~ 120Hz																			
	[V]	Three-phase 380 ~ 480V (-15% ~ +10%)																			
Weight	[Hz]	50 ~ 60Hz (±5%)																			
	[kg]	4.9	6	6	12.5	13	20	20	27	27	29	42	43	101	101	114	200	200	243	280	380
	[kg]				19.5	19.5	26.5	26.5	39	40	42	67	68								

## النوع الثامن (iV5):

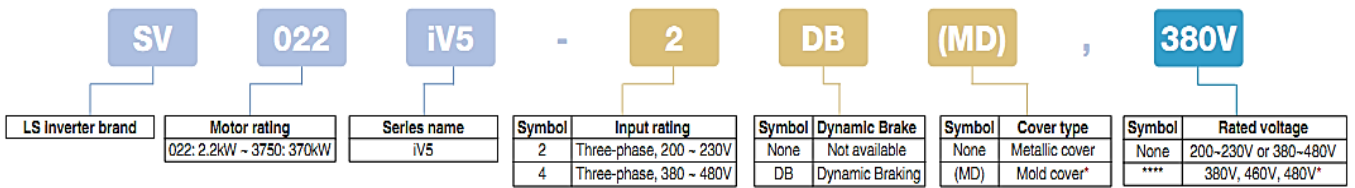


3 phase 2.2~37kW(3~50HP), 200~230V  
3 phase 2.2~375kW(3~500HP), 380~480V



استطاعة الخرج	جهد الخرج	جهد الدخل
(kw 37-2.2) ( 50-3 hp)	ثلاثي الطور (v230-200)	ثلاثي الطور (v230-200)
( 2.2-375 kw) ( 3-500 hp)	ثلاثي الطور (380-400 V)	ثلاثي الطور (380-400 V)

## Model Number



## General specification

Model number: SV□□□iV5-2□		022	037	055	075	110	150	185	220	300	370
Motor rating	[HP]	3	5	7.5	10	15	20	25	30	40	50
	[kW]	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37
Output rating	Capacity [kVA]	4.5	6.1	9.1	12.2	17.5	22.5	28.2	33.1	46	55
	Current [A]	12	16	24	32	46	59	74	88	122	146
Input rating	Voltage [V]	Three-phase 200 - 230V									
	RPM	0 - 3600 [RPM]									
	Frequency [Hz]	50 - 60Hz (±5%)									
Weight	Mold cover type [kg]	6	6	7.7	7.7	13.7	13.7	20.3	20.3		
	Metallic cover type [kg]			14	14	28	28	28	28	42	42

Model number: SV□□□iV5-4□		022	037	055	075	110	150	185	220	300	370	450	550	750	900	1100	1320	1600	2200	2800	3150	3750
Motor rating	[HP]	3	5	7.5	10	15	20	25	30	40	50	60	75	100	120	150	175	215	300	373	420	500
	[kW]	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	220	280	315	375
Output rating	Capacity [kVA]	4.5	6.1	9.1	12.2	18.3	22.9	29.7	34.3	46	57	70	85	116	140	170	200	250	329	416	468	557
	Current [A]	6	8	12	16	24	30	39	45	61	75	91	110	152	183	223	264	325	432	546	614	731
Input rating	Voltage [V]	Three-phase 380 - 480V																				
	RPM	0 - 3600 [RPM]																				
	Frequency [Hz]	50 - 60Hz (±5%)																				
Weight	Mold cover type [kg]	6	6	7.7	7.7	13.7	13.7	20.3	20.3													
	Metallic cover type [kg]			14	14	28	28	28	28	42	42	63	63	68	98	98	112	112	175	243	380	380

سوف نقتصر بالشرح على طراز واحد من الطرازات السابقة وهو (IG5A) وهو الاكثر استخداما مع المحركات التحريضية بسبب قدرته على تحمل احمال بمختلف الاستطاعات تتراوح بين (0.5 HP-30 HP) مع ملاحظة الاختلافات الطفيفة بين باقى الطرازات من حيث طريقة التوصيل وبارامترات البرمجة.

Green Innovators of Innovation

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Compact & Powerful Drive

**STARVERT iG5A**

0.4~1.5kW 1phase 200~230Volts  
0.4~22kW 3Phase 200~230Volts  
0.4~22kW 3Phase 380~480Volts

**LSIS**

## Drive STARVERT iG5A

LS Starvert iG5A is very competitive in its price and shows an upgraded functional strength. User-friendly interface, extended drive ranges up to 22kW, superb torque competence and small size of iG5A provides an optimum use environment.

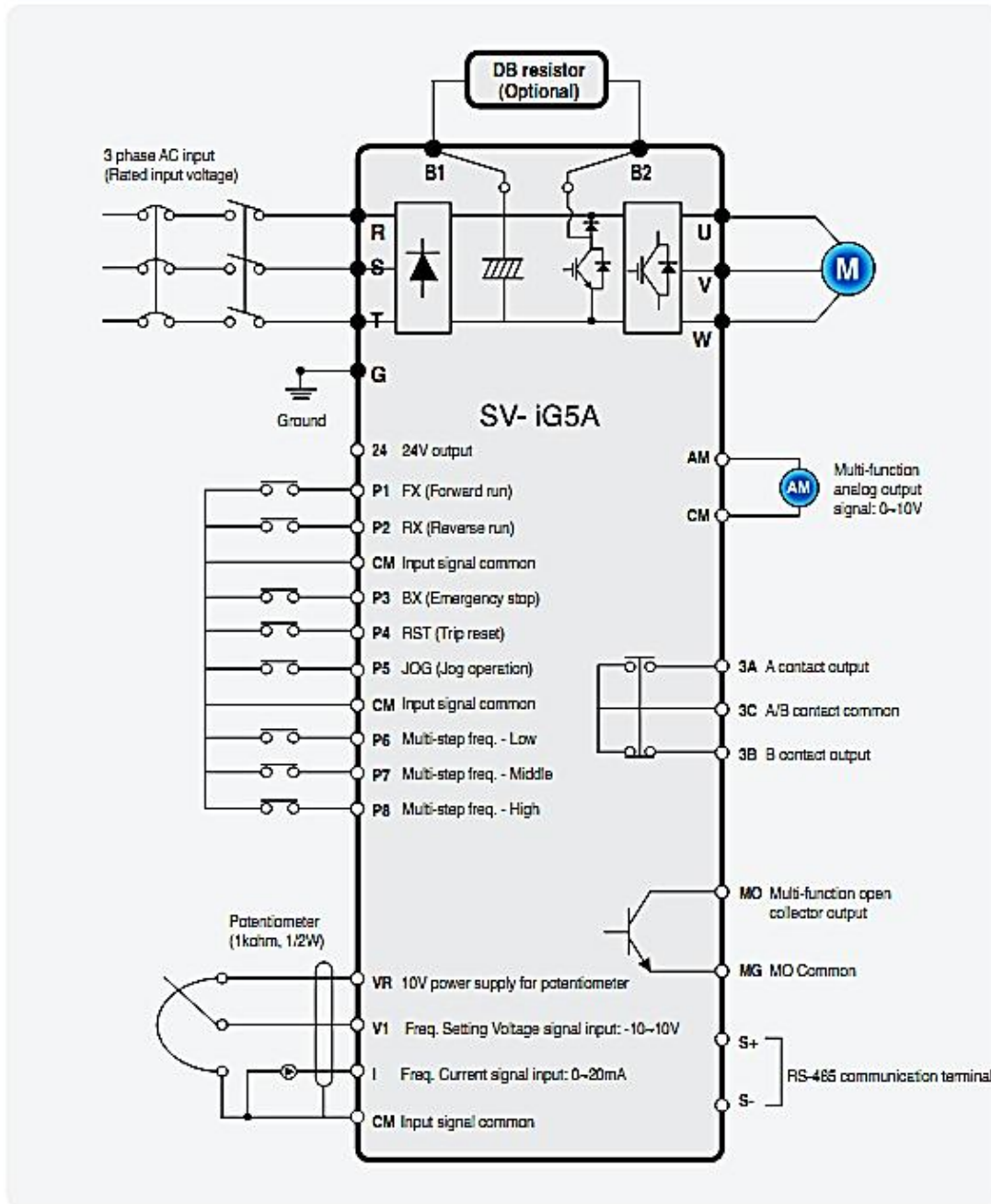




طريقة توصيل الانفيرتر.

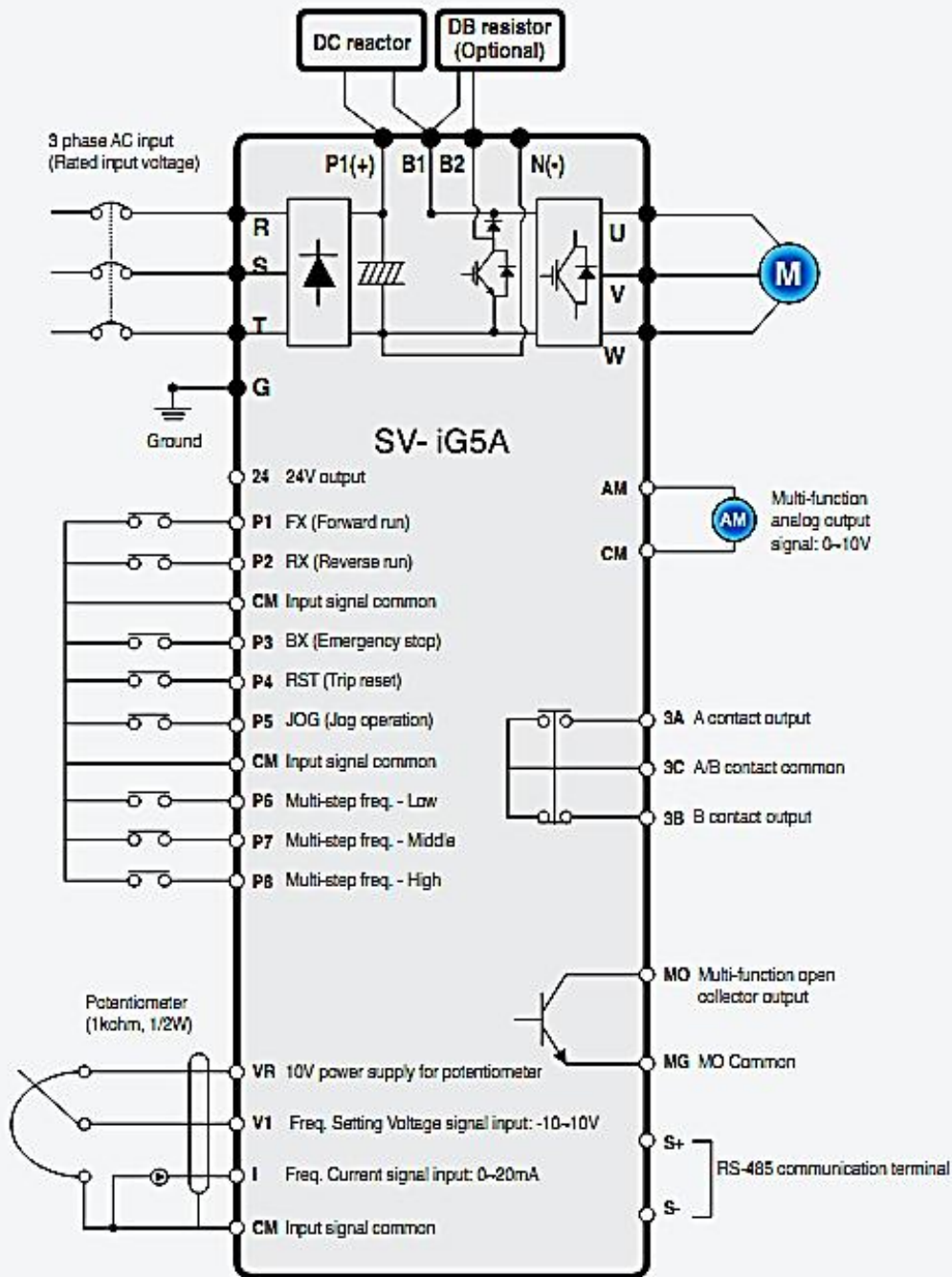
المخطط الاول ويشمل الاحمال من (0.4-7.5 KW)

■ 0.4~7.5kW

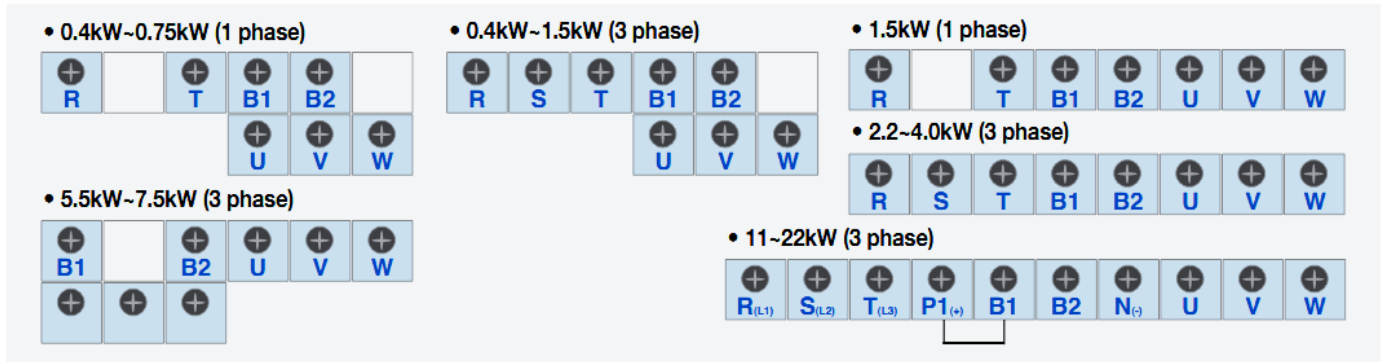


المخطط الثاني ويشمل الاحمال من (11-22 KW)

■ 11.0-22.0kW



## مخطط توزيع اسلاك جهد الدخل والخرج على هيكل الانفيرتر.



## نلاحظ من الاشكال السابقة

. الاطراف المستخدمة في توصيل جهد الدخل (R,S,T).

. والاطراف المستخدمة في توصيل الحمل (U,V,W).

ويمكن استخدام الجدول التالي في استخراج مقاطع الاسلاك المستخدمة في توصيل جهد الدخل والاحمال

	R, S, T wire		U, V, W wire		Ground wire		Terminal Screw Size	Screw Torque (kgf.cm) / lb-in
	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG		
SV0004IG5A-1	2	14	2	14	3.5	12	M3.5	10/8.7
SV0008IG5A-1	2	14	2	14	3.5	12	M3.5	10/8.7
SV0015IG5A-1	2	14	2	14	3.5	12	M4	15/13
SV0004IG5A-2	2	14	2	14	3.5	12	M3.5	10/8.7
SV0008IG5A-2	2	14	2	14	3.5	12	M3.5	10/8.7
SV0015IG5A-2	2	14	2	14	3.5	12	M3.5	10/8.7
SV0022IG5A-2	2	14	2	14	3.5	12	M4	15/13
SV0037IG5A-2	3.5	12	3.5	12	3.5	12	M4	15/13
SV0040IG5A-2	3.5	12	3.5	12	3.5	12	M4	15/13
SV0055IG5A-2	5.5	10	5.5	10	5.5	10	M5	32/28
SV0075IG5A-2	8	8	8	8	5.5	10	M5	32/28
SV0110IG5A-2	14	6	14	6	14	6	M6	30.7/26.6
SV0150IG5A-2	22	4	22	4	14	6	M6	30.7/26.6
SV0185IG5A-2	30	2	30	2	22	4	M8	30.5/26.5
SV0220IG5A-2	38	2	30	2	22	4	M8	30.5/26.5
SV0004IG5A-4	2	14	2	14	2	14	M3.5	10/8.7
SV0008IG5A-4	2	14	2	14	2	14	M3.5	10/8.7
SV0015IG5A-4	2	14	2	14	2	14	M4	15/13
SV0022IG5A-4	2	14	2	14	2	14	M4	15/13
SV0037IG5A-4	2	14	2	14	2	14	M4	15/13
SV0040IG5A-4	2	14	2	14	2	14	M4	15/13
SV0055IG5A-4	3.5	12	2	14	3.5	12	M5	32/28
SV0075IG5A-4	3.5	12	3.5	12	3.5	12	M5	32/28
SV0110IG5A-4	5.5	10	5.5	10	8	8	M5	30.7/26.6
SV0150IG5A-4	14	6	8	8	8	8	M5	30.7/26.6
SV0185IG5A-4	14	6	8	8	14	6	M6	30.5/26.5
SV0220IG5A-4	22	4	14	6	14	6	M6	30.5/26.5

مخطط توزيع مداخل التحكم على هيكل الانفيرتر.

## Control terminal specifications



وطرف الدخل (P1) ويستخدم لتشغيل المحرك او تحديد جهة الدوران مع عقارب الساعة.

وطرف الدخل (P2) ويستخدم لإيقاف تشغيل المحرك او تحديد جهة الدوران عكس عقارب الساعة.

و الطرف (CM) نقطة مشتركة.

وطرف الدخل (P3) توقف طوارئ (Emergency stop).

وطرف الدخل (P4) للتصفير (RST).

وطرف الدخل (P5) للقفز او التجاوز (JOG).

وطرف الدخل (P6) خطوة ترددية الاولى.

وطرف الدخل (P7) خطوة ترددية الثانية.

وطرف الدخل (P8) خطوة ترددية الثالثة.

ويمكن استخدام الجدول التالي في استخراج مقاطع الاسلاك المستخدمة في توصيل مداخل التحكم

Terminal	Description	Wire size (mm <sup>2</sup> )		Screw size	Torque (Nm) <sup>1)</sup>	Specification
		Single wire	Stranded			
P1-P8	Multi-function Input T/M 1-8	1.0	1.5	M2.6	0.4	
CM	Common terminal	1.0	1.5	M2.6	0.4	
VR	Power supply for external potentiometer	1.0	1.5	M2.6	0.4	Output voltage: 12V Max. output current: 100mA Potentiometer: 1-5kohm
V1	Input terminal for voltage operation	1.0	1.5	M2.6	0.4	Max. input voltage: -12V--+12V input
I	Input terminal for current operation	1.0	1.5	M2.6	0.4	0-20mA Input Internal resistor: 500ohm
AM	Multi-function analog output terminal	1.0	1.5	M2.6	0.4	Max. output voltage: 11V Max. output current: 100mA
MO	Multi-function terminal for open collector	1.0	1.5	M2.6	0.4	Below DC 26V,100mA
MG	Ground terminal for external power supply	1.0	1.5	M2.6	0.4	
24	24V external power supply	1.0	1.5	M2.6	0.4	Max. output current: 100mA
3A	Multi-function relay output A contact	1.0	1.5	M2.6	0.4	Below AC 250V, 1A
3B	Multi-function relay output B contact	1.0	1.5	M2.6	0.4	Below DC 30V, 1A
3C	Common for multi-function relays	1.0	1.5	M2.6	0.4	

لوحة المفاتيح.تتألف لوحة المفاتيح من .

- (1) شاشة 7 SEGMENT لعرض البارامترات المختلفة.
- (2) مفتاح التشغيل (RUN).
- (3) مفتاح الايقاف (STOP).
- (4) مفاتيح الاسهم وتستخدم للتنقل بين البارامترات المختلفة.
- (5) مفتاح (ENTER) ويستخدم في ادخال قيم البارامترات المناسبة
- (6) لمبات تأشير لحالة المحرك بالخرج اما في حالة تشغيل او ايقاف او يدور نحو الامام او الخلف كما هو مبين بالشكل السابق .

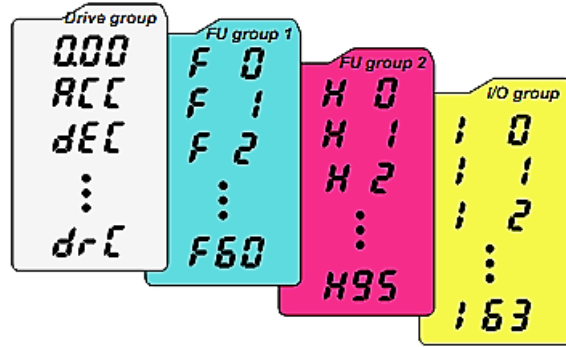
الجدول التالي يلخص عمل لوحة المفاتيح.

	Display	Term	Description
KEY	RUN	Run key	Run command
	STOP/RESET	STOP/RESET key	STOP: Stop command during operation, RESET: Reset command when a fault occurs.
	▲	Up key	Used to scroll through codes or increase parameter value
	▼	Down key	Used to scroll through codes or decrease parameter value
	▶	Right key	Used to jump to other parameter groups or move a cursor to the right to change the parameter value
	◀	Left key	Used to jump to other parameter groups or move a cursor to the left to change the parameter value
	●	Enter key	Used to set the parameter value or save the changed parameter value
LED <sup>1)</sup>	FWD	Forward run	Lit during forward run
	REV	Reverse run	Lit during reverse run
	RUN	Run key	Lit during operation
	SET	Setting	Lit during parameter setting



شرح لاهم البارامترات المستخدمة في برمجة الانفيرتر.

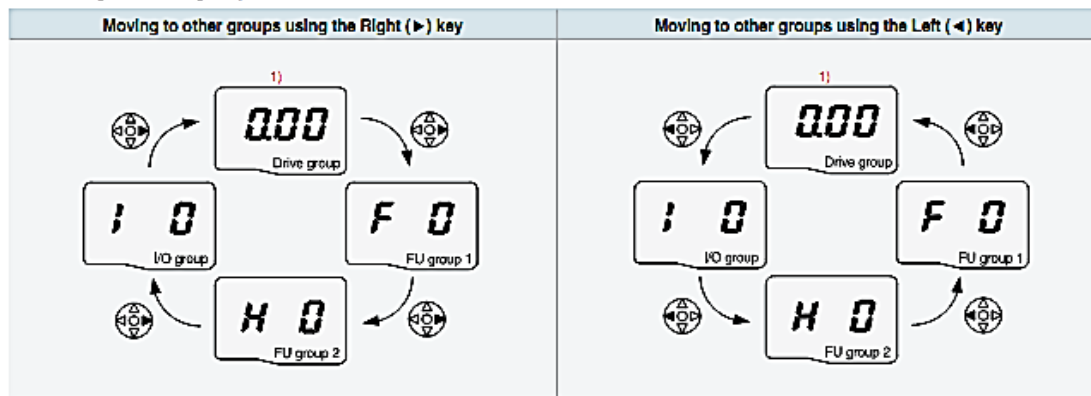
تنقسم البارامترات الى اربع مجموعات مختلفة كل مجموعة لها وظائف محددة وذلك لسهولة التعامل معها كما هو موضح بالشكل التالي.



<b>Drive group</b>	تشمل البارامترات الاساسية لعمل المحرك مثل التردد زيادة او إنقاص زمن التسارع او التباطء وايضا تحديد جهة الدوران ...
<b>Function group 1</b>	وتشمل بارامترات الوظائف الاساسية لضبط جهد وتردد الخرج
<b>Function group 2</b>	وتشمل على بارامترات الوظائف المتقدمة مثل تعيين بارامترات انظمة PID
<b>I/O (Input/Output) group</b>	وتشمل على البارامترات الضرورية لتعويض التسلسل باستخدام الوظائف المتعددة لوحدة الدخل والخرج

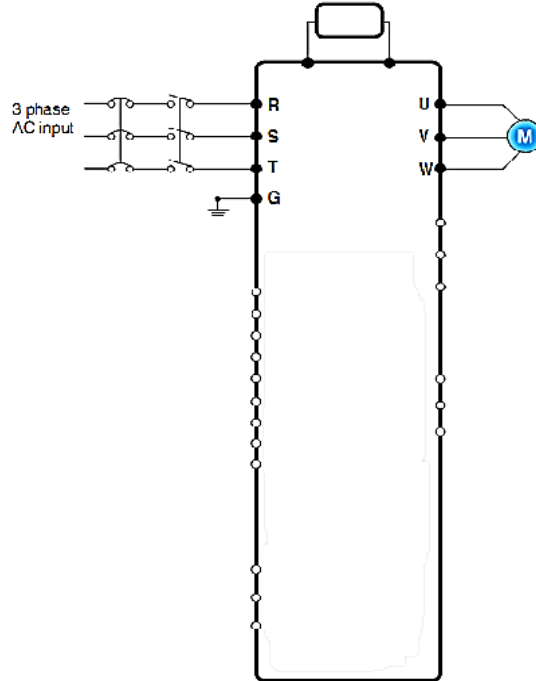
طريقة التنقل بين المجموعات .

## ■ Moving to other groups



من خلال الامثلة التالية سوف نتطرق لشرح اهم البارامترات المستخدمة.

المثال الاول: نريد تشغيل المحرك عن طريق لوحة المفاتيح الاساسية الموجودة على الانفيرتر وذلك بتردد (30 Hz).



(1) توصيل جهد الدخل الى (R,S,T).

(2) توصيل المحرك الى (U,V,W).

بعد توصيل جهد التغذية والمحرك الى الانفيرتر كما هو مبين بالشكل ونقوم بضبط البارامترات التالية .

<b>ACC</b>	زمن التسارع القيمة الافتراضية <b>5 SEC</b> نضببطها على زمن <b>10 SEC</b> وذلك لزيادة زمن تسارع المحرك عند التشغيل
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<b>DEC</b>	زمن التباطء القيمة الافتراضية <b>10 SEC</b> نضببطها على زمن <b>20 SEC</b> وذلك لزيادة زمن تباطء المحرك عند التوقف
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DRV	تساعد هذه الخاصية في تحديد نمط التشغيل حيث يمكن ان نضبطها وفق الجدول التالي	
	0	يتم تشغيل المحرك وإيقافه عن طريق لوحة التحكم
	1	عن طريق مفتاح خارج يربط مع المداخل (P1,P2) FX: تشغيل المحرك نحو الامام RX: تشغيل المحرك نحو الخلف (عكس دوران)
	2	FX: تشغيل واطفاء المحرك RX: عكس دوران
	3	عن طريق الاتصال بـ RS485

Frq	تساعد هذه الخاصية في تحديد طريقة ادخال التردد وذلك وفق الجدول التالي		
	0	ادخال رقمي	عن طريق لوحة المفاتيح 1
	1		عن طريق لوحة المفاتيح 2
	2	ادخال تماثلي	V1 1: -10~+10[v] عن طريق مقاومة متغيرة خارجية موصولة مع المدخل (v1)
	3		V1 2: 0~+10[v] عن طريق مقاومة متغيرة خارجية موصولة مع المدخل (VR)
	4		I: 0~20[MA] عن طريق مقاومة متغيرة خارجية موصولة مع المدخل (I)
	5		V1 1 + I
	6		V1 2 + I
	7		
	8		قيمة رقمية
9		وضع على حقل الاتصالات	

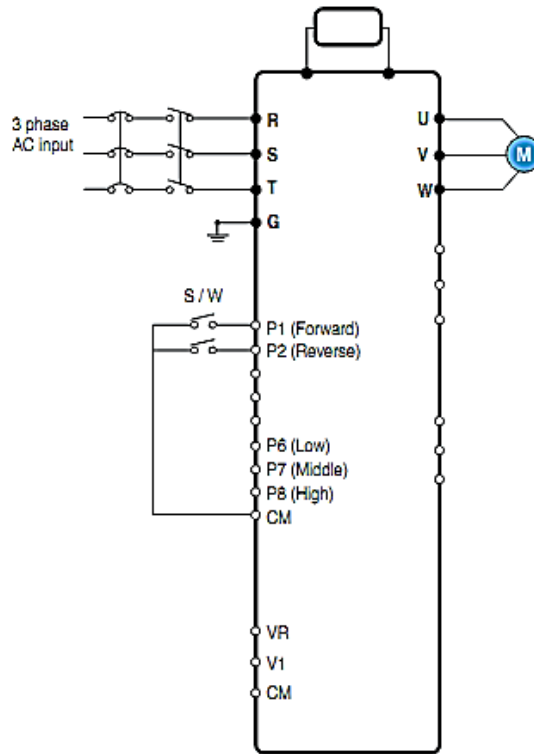
0.00	تساعد هذه الخاصية على تحديد التردد الذي سيعمل عليه المحرك حيث يعطي الانفيرتر مجال تردد 0~400 Hz مع مراعات التردد الاسمي للمحرك
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DRC	تساعد هذه الخاصية على تحديد اتجاه دوران المحرك ويمكن ضبطها وفق الجدول التالي	
	f	مع عقارب الساعة
r	عكس عقارب الساعة	

وفي مثالنا هذا نضبط قيم البارامترات السابقة وفق ما يلي.

ACC	10 sec
DEC	15 sec
DRV	0
0.00	30 Hz
Frq	0
DRC	f

المثال الثاني: نريد تشغيل المحرك عن طريق مفاتيح خارجية موصولة على المداخل (P1,P2)  
بتردد (40 Hz).



(3) توصيل جهد الدخل الى (R,S,T).

(4) توصيل المحرك الى (U,V,W).

(5) توصيل المفتاح (S1) الى طرف الدخل (P1) من اجل دوران المحرك نحو الامام.

(6) توصيل المفتاح (S2) الى طرف الدخل (P2) من اجل دوران المحرك نحو الخلف.

بعد توصيل جهد التغذية والمحرك والمفاتيح الى الانفيرتر كما هو مبين بالشكل نقوم بضبط البارامترات التالية .

لا يوجد اختلاف في قيم البارامترات السابقة سوى قيمة تردد التشغيل وان عملية التشغيل ستم عن طريق مفتاح خارج لذلك ندخل قيم البارامترات التالية.

ACC	10 sec
DEC	20 sec
DRV	1
0.00	40 Hz
Frq	0

**المثال الثالث:** ادخال القيم الاسمية للمحرك الى الانفيرير مثل تيار المحرك الاستطاعة العزم....  
واظهار قيمة تيار الخرج والجهد للمحرك .....على شاشة الاظهار.

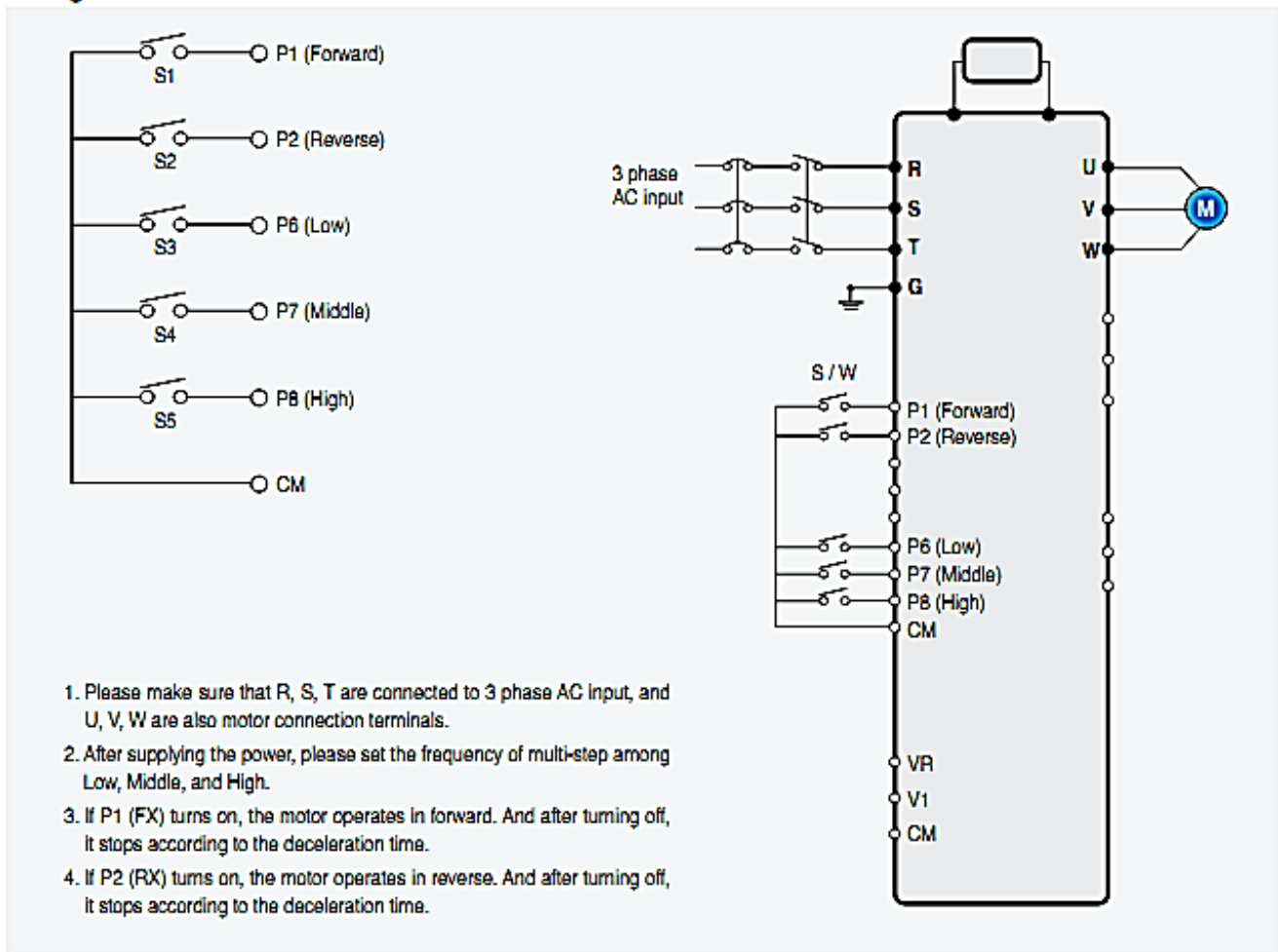
من خلال البارامترات التالية يمكن ادخال القيم الاسمية للمحرك.

H30	ادخال استطاعة المحرك (KW)
H31	ادخال عدد اقطاب المحرك (2P)
H32	ادخال انزلاق التردد
H33	ادخال تيار المحرك (A)
H34	ادخال تيار المحرك في حالة اللاحمل (A)
H36	ادخال كفاءة المحرك

من خلال البارامترات التالية يمكن اظهار قيم تيار وجهد الخرج وعدد الدورات ....

CUR	عرض تيار الخرج (تيار المحرك)						
Rpm	عرض عدد دورات المحرك بالدقيقة						
Dcl	عرض قيمة الجهد المستمر الموجود داخل الانفيرتر						
Vol	هذه الخاصية مرتبطة مع البارامتر H73 لتحديد القيمة المراد عرضها .						
	<table border="1"> <tr> <td>VOL</td> <td>عرض جهد الخرج</td> </tr> <tr> <td>POR</td> <td>عرض استطاعة الخرج</td> </tr> <tr> <td>TOR</td> <td>عرض العزم</td> </tr> </table>	VOL	عرض جهد الخرج	POR	عرض استطاعة الخرج	TOR	عرض العزم
VOL	عرض جهد الخرج						
POR	عرض استطاعة الخرج						
TOR	عرض العزم						
non	عرض الخطأ في التردد او في حالة التشغيل						

## المثال الثالث:



(1) توصيل جهد الدخل الى (R,S,T).

(2) توصيل المحرك الى (U,V,W).

(3) توصيل المفتاح (S1) الى طرف الدخل (P1) من اجل دوران المحرك نحو الامام.

(4) توصيل المفتاح (S2) الى طرف الدخل (P2) من اجل دوران المحرك نحو الخلف.

(5) توصيل المفتاح (S3) الى طرف الدخل (P6) لتحديد الخطوة الترددية الاولى.

(6) توصيل المفتاح (S4) الى طرف الدخل (P7) لتحديد الخطوة الترددية الثانية.

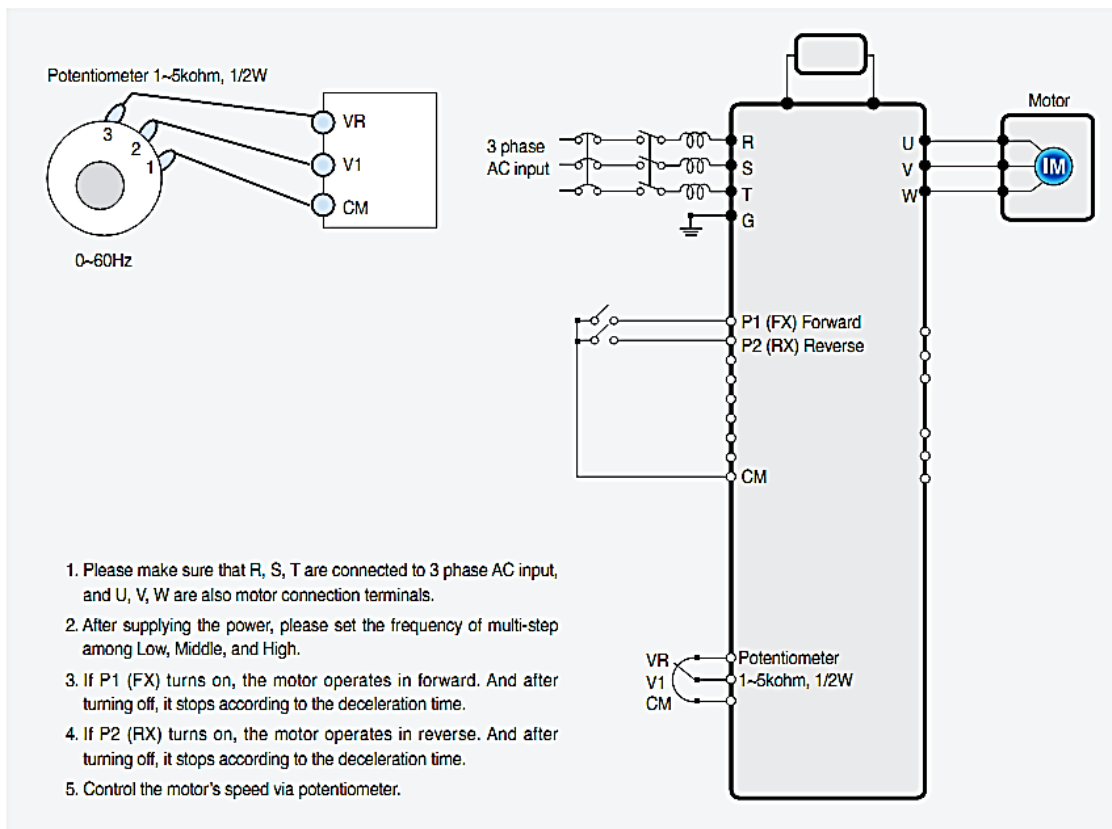
(7) توصيل المفتاح (S5) الى طرف الدخل (P8) لتحديد الخطوة الترددية الثالثة.

**ملاحظة:** كما هو مبين بالشكل نلاحظ ان الطرف الثاني لجميع مفاتيح الدخل موصولة الى نقطة مشتركة (CM).

بعد توصيل جهد التغذية والمحرك والمفاتيح الى الانفيرتر كما هو مبين بالشكل  
نقوم بضبط البارامترات التالية .

<b>ACC</b>	<b>10 sec</b>
<b>DEC</b>	<b>15 sec</b>
<b>DRV</b>	<b>1</b>
<b>Frq</b>	<b>0</b>
<b>St1</b>	<b>الخطوة الترددية الاولى (10 Hz)</b>
<b>St2</b>	<b>الخطوة الترددية الثانية (20 Hz)</b>
<b>St3</b>	<b>الخطوة الترددية الثالثة (30 Hz)</b>

### المثال الرابع:





- 1) توصيل جهد الدخل الى (R,S,T).
- 2) توصيل المحرك الى (U,V,W).
- 3) توصيل المفتاح (S1) الى طرف الدخل (P1) من اجل دوران المحرك نحو الامام.
- 4) توصيل المفتاح (S2) الى طرف الدخل (P2) من اجل دوران المحرك نحو الخلف.
- 5) توصيل لمقاومة المتغيرة الى الأطراف (V1,VR,CM).

بعد توصيل جهد التغذية والمحرك والمفاتيح الى الانفيرتر كما هو مبين بالشكل  
نقوم بضبط البارامترات التالية .

<b>ACC</b>	<b>10 sec</b>
<b>DEC</b>	<b>15 sec</b>
<b>DRV</b>	<b>1</b>
<b>Frq</b>	<b>3</b>

هذه قائمة بجميع البارامترات الموجودة في الانفيرتر:

Compact &amp; Powerful Drive iG5A

## Function List

### ■ Drive Group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run																								
0.00	A100	[Frequency command]	0 ~ 400 [Hz]	This parameter sets the frequency that the drive is commanded to output. During Stop: Frequency Command During Run: Output Frequency During Multi-step operation: Multi-step frequency 0. It cannot be set greater than F21- [Max frequency].	0.00	O																								
ACC	A101	[Accel time]	0 ~ 6000 [Sec]	During Multi-Accel/Decel operation, this parameter serves as Accel/Decel time 0.	5.0	O																								
dEC	A102	[Decel time]			10.0	O																								
drv	A103	[Drive mode]	0 ~ 3	<table border="1"> <tr> <td>0</td> <td>Run/Stop via Run/Stop key on the keypad</td> <td></td> </tr> <tr> <td rowspan="4">1</td> <td rowspan="4">Terminal operation</td> <td>FX: Motor forward run</td> </tr> <tr> <td>RX: Motor reverse run</td> </tr> <tr> <td>FX: Run/Stop enable</td> </tr> <tr> <td>RX: Reverse rotation select</td> </tr> <tr> <td>3</td> <td>RS485 communication</td> <td></td> </tr> <tr> <td>4</td> <td>Set to Field Bus communication <sup>1)</sup></td> <td></td> </tr> </table>	0	Run/Stop via Run/Stop key on the keypad		1	Terminal operation	FX: Motor forward run	RX: Motor reverse run	FX: Run/Stop enable	RX: Reverse rotation select	3	RS485 communication		4	Set to Field Bus communication <sup>1)</sup>		1	X									
0	Run/Stop via Run/Stop key on the keypad																													
1	Terminal operation	FX: Motor forward run																												
		RX: Motor reverse run																												
		FX: Run/Stop enable																												
		RX: Reverse rotation select																												
3	RS485 communication																													
4	Set to Field Bus communication <sup>1)</sup>																													
Frq	A104	[Frequency setting method]	0 ~ 7	<table border="1"> <tr> <td>0</td> <td>Digital</td> <td>Keypad setting 1</td> </tr> <tr> <td>1</td> <td></td> <td>Keypad setting 2</td> </tr> <tr> <td rowspan="4">2</td> <td rowspan="4">Analog</td> <td>V1 1: -10 ~ +10 [V]</td> </tr> <tr> <td>V1 2: 0 ~ +10 [V]</td> </tr> <tr> <td>Terminal I: 0 ~ 20 [mA]</td> </tr> <tr> <td>Terminal V1 setting 1 + Terminal I</td> </tr> <tr> <td>6</td> <td></td> <td>Terminal V1 setting 2+ Terminal I</td> </tr> <tr> <td>7</td> <td>RS485 communication</td> <td></td> </tr> <tr> <td>8</td> <td>Digital Volume</td> <td></td> </tr> <tr> <td>9</td> <td>Set to Field Bus communication <sup>1)</sup></td> <td></td> </tr> </table>	0	Digital	Keypad setting 1	1		Keypad setting 2	2	Analog	V1 1: -10 ~ +10 [V]	V1 2: 0 ~ +10 [V]	Terminal I: 0 ~ 20 [mA]	Terminal V1 setting 1 + Terminal I	6		Terminal V1 setting 2+ Terminal I	7	RS485 communication		8	Digital Volume		9	Set to Field Bus communication <sup>1)</sup>		0	X
0	Digital	Keypad setting 1																												
1		Keypad setting 2																												
2	Analog	V1 1: -10 ~ +10 [V]																												
		V1 2: 0 ~ +10 [V]																												
		Terminal I: 0 ~ 20 [mA]																												
		Terminal V1 setting 1 + Terminal I																												
6		Terminal V1 setting 2+ Terminal I																												
7	RS485 communication																													
8	Digital Volume																													
9	Set to Field Bus communication <sup>1)</sup>																													
St1	A105	[Multi-Step frequency 1]	0 ~ 400 [Hz]	Sets Multi-Step frequency 1 during Multi-step operation.	10.00	O																								
St2	A106	[Multi-Step frequency 2]		Sets Multi-Step frequency 2 during Multi-step operation.	20.00	O																								
St3	A107	[Multi-Step frequency 3]		Sets Multi-Step frequency 3 during Multi-step operation.	30.00	O																								
CUr	A108	[Output current]		Displays the output current to the motor.	-	-																								
rPM	A109	[Motor RPM]		Displays the number of Motor RPM.	-	-																								
dCL	A10A	[Drive DC link voltage]		Displays DC link voltage inside the drive.	-	-																								
vOL	A10B	[User display select]		<table border="1"> <tr> <td colspan="2">This parameter displays the item selected at H73- [Monitoring item select].</td> </tr> <tr> <td>vOL</td> <td>Output voltage</td> </tr> <tr> <td>POr</td> <td>Output power</td> </tr> <tr> <td>tOr</td> <td>Torque</td> </tr> </table>	This parameter displays the item selected at H73- [Monitoring item select].		vOL	Output voltage	POr	Output power	tOr	Torque	vOL	-																
This parameter displays the item selected at H73- [Monitoring item select].																														
vOL	Output voltage																													
POr	Output power																													
tOr	Torque																													

1) This function can be available with iG5A Communication Option Module.

iG5A

## Function List

## ■ Drive Group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run
nOn	A10C	[Fault Display]		Displays the types of faults, frequency and operating status at the time of the fault	-	-
drC	A10D	[Direction of motor rotation select]	F, r	Sets the direction of motor rotation when drv - [Drive mode] is set to either 0 or 1. F Forward r Reverse	F	O
drv2	A10E	[Drive mode 2]	0 ~ 3	0 Run/Stop via Run/Stop key on the keypad 1 Terminal operation 2 Terminal operation 3 RS-485 communication 4 Set to Filed Bus Communication <sup>3)</sup>	1	X
Frq2 <sup>1)</sup>	A10F	[Frequency setting method 2]	0 ~ 7	0 Digital Keypad setting 1 1 Digital Keypad setting 2 2 Analog V1 1: -10 ~ +10 [V] 3 Analog V1 2: 0 ~ +10 [V] 4 Analog Terminal I: 0 ~ 20 [mA] 5 Analog Terminal V1 setting 1 + Terminal I 6 Analog Terminal V1 setting 2+ Terminal I 7 RS485 communication 8 Digital Volume 9 Set to Filed Bus Communication <sup>3)</sup>	0	X
rEF <sup>2)</sup>	A110	PID control standard value setting	0~400[Hz] or 0~100 [%]	If H58 is 0, it is expressed as a [Hz] unit. If H58 is 1, it is expressed as a [%] unit. In [Hz] unit, you can't set Max. frequency more than (F21). In [%] unit, 100% means Max. frequency.	0.00	0
Fbk <sup>2)</sup>	A111	PID control feedback amount		It indicates a feedback amount in PID control. If H58 is 0, it is expressed as a [Hz] unit. If H58 is 1, it is expressed as a [%] unit.	-	-

1) Only displayed when one of the Multi-function input terminals 1-8 [I17~I24] is set to "22".

2) It is indicated when H49(PID control selection) is 1.

3) This function can be available with iG5A Communication Option Module.

## ■ Function group 1

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run
F 0	A200	[Jump code]	0 ~ 71	Sets the parameter code number to jump.	1	O
F 1	A201	[Forward/Reverse run disable]	0 ~ 2	0 Fwd and rev run enable 1 Forward run disable 2 Reverse run disable	0	X
F 2	A202	[Accel pattern]	0 ~ 1	0 Linear	0	X
F 3	A203	[Decel pattern]		1 S-curve		

## Function group 1

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
F 4	A204	[Stop mode select]	0 ~ 3	0	Decelerate to stop	0	X
				1	DC brake to stop		
				2	Free run to stop		
				3	Power Braking stop		
F 8 <sup>1)</sup>	A208	[DC Brake start frequency]	0.1 ~ 60 [Hz]	This parameter sets DC brake start frequency. It cannot be set below F23 - [Start frequency].	5.00	X	
F 9	A209	[DC Brake wait time]	0 ~ 60 [sec]	When DC brake frequency is reached, the drive holds the output for the setting time before starting DC brake.	0.1	X	
F10	A20A	[DC Brake voltage]	0 ~ 200 [%]	This parameter sets the amount of DC voltage applied to a motor. It is set in percent of H33 - [Motor rated current].	50	X	
F11	A20B	[DC Brake time]	0 ~ 60 [sec]	This parameter sets the time taken to apply DC current to a motor while motor is at a stop.	1.0	X	
F12	A20C	[DC Brake start voltage]	0 ~ 200 [%]	This parameter sets the amount of DC voltage before a motor starts to run. It is set in percent of H33 - [Motor rated current].	50	X	
F13	A20D	[DC Brake start time]	0 ~ 60 [sec]	DC voltage is applied to the motor for DC Brake start time before motor accelerates.	0	X	
F14	A20E	[Time for magnetizing a motor]	0 ~ 60 [sec]	This parameter applies the current to a motor for the set time before motor accelerates during Sensorless vector control.	0.1	X	
F20	A214	[Jog frequency]	0 ~ 400 [Hz]	This parameter sets the frequency for Jog operation. It cannot be set above F21 - [Max frequency].	10.00	O	
F21 <sup>2)</sup>	A215	[Max frequency]	40 ~ 400 [Hz]	This parameter sets the highest frequency the drive can output. It is frequency reference for Accel/Decel (See H70)	60.00	X	
				 Caution Any frequency cannot be set above Max frequency except Base frequency			
F22	A216	[Base frequency]	30 ~ 400 [Hz]	The drive outputs its rated voltage to the motor at this frequency (see motor nameplate).	60.00	X	
F23	A217	[Start frequency]	0.1 ~ 10 [Hz]	The drive starts to output its voltage at this frequency. It is the frequency low limit.	0.50	X	
F24	A218	[Frequency high /low limit select]	0 ~ 1	This parameter sets high and low limit of run frequency.	0	X	
F25 <sup>3)</sup>	A219	[Frequency high limit]	0 ~ 400 [Hz]	This parameter sets high limit of the run frequency. It cannot be set above F21 - [Max frequency].	60.00	X	
F26	A21A	[Frequency low limit]	0.1 ~ 400 [Hz]	This parameter sets low limit of the run frequency. It cannot be set above F25 - [Frequency high limit] and below F23 - [Start frequency].	0.50	X	
F27	A21B	[Torque Boost select]	0 ~ 1	0	Manual torque boost	0	X
				1	Auto torque boost		
F28	A21C	[Torque boost in forward direction]	0 ~ 15 [%]	This parameter sets the amount of torque boost applied to a motor during forward run. It is set in percent of Max output voltage.	2	X	
F29	A21D	[Torque boost in reverse direction]	0 ~ 15 [%]	This parameter sets the amount of torque boost applied to a motor during reverse run. It is set as a percent of Max output voltage.	2	X	

1) Only displayed when F 4 is set to 1 (DC brake to stop).

2) If H40 is set to 3 (Sensorless vector), Max. frequency is settable up to 300Hz.

3) Only displayed when F24 (Frequency high/low limit select) is set to 1.

iG5A

## Function List

## Function group 1

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
F30	A21E	[V/F pattern]	0 ~ 2	0 {Linear}	0	X	
				1 {Square}			
				2 {User V/F}			
F31 <sup>1)</sup>	A21F	[User V/F frequency 1]	0 ~ 400 [Hz]	It is used only when V/F pattern is set to 2 (User V/F). It cannot be set above F21 - [Max frequency].  The value of voltage is set in percent of H70 - [Motor rated voltage]. The values of the lower-numbered parameters cannot be set above those of higher-numbered.	15.00	X	
F32	A220	[User V/F voltage 1]	0 ~ 100 [%]		25	X	
F33	A221	[User V/F frequency 2]	0 ~ 400 [Hz]		30.00	X	
F34	A222	[User V/F voltage 2]	0 ~ 100 [%]		50	X	
F35	A223	[User V/F frequency 3]	0 ~ 400 [Hz]		45.00	X	
F36	A224	[User V/F voltage 3]	0 ~ 100 [%]		75	X	
F37	A225	[User V/F frequency 4]	0 ~ 400 [Hz]		60.00	X	
F38	A226	[User V/F voltage 4]	0 ~ 100 [%]		100	X	
F39	A227	[Output voltage adjustment]	40 ~ 110 [%]		This parameter adjusts the amount of output voltage. The set value is the percentage of input voltage.	100	X
F40	A228	[Energy-saving level]	0 ~ 30 [%]		This parameter decreases output voltage according to load status.	0	0
F50	A232	[Electronic thermal select]	0 ~ 1	This parameter is activated when the motor is overheated (time-inverse).	0	0	
F51 <sup>2)</sup>	A233	[Electronic thermal level for 1 minute]	50 ~ 200 [%]	This parameter sets max current capable of flowing to the motor continuously for 1 minute. The set value is the percentage of H33 - [Motor rated current]. It cannot be set below F52 - [Electronic thermal level for continuous].	150	0	
F52	A234	[Electronic thermal level for continuous]	50 ~ 150 [%]	This parameter sets the amount of current to keep the motor running continuously. It cannot be set higher than F51 - [Electronic thermal level for 1 minute].	100	0	
F53	A235	[Motor cooling method]	0 ~ 1	0 Standard motor having cooling fan directly connected to the shaft	0	0	
				1 A motor using a separate motor to power a cooling fan.			
F54	A236	[Overload warning level]	30 ~ 150 [%]	This parameter sets the amount of current to issue an alarm signal at a relay or multi-function output terminal (see I54, I55). The set value is the percentage of H33- [Motor rated current].	150	0	
F55	A237	[Overload warning time]	0 ~ 30 [Sec]	This parameter issues an alarm signal when the current greater than F54- [Overload warning level] flows to the motor for F55- [Overload warning time].	10	0	

1) Set F30 to 2 (User V/F) to display this parameter.

2) Set F50 to 1 to display this parameter.

## Compact &amp; Powerful Drive iG5A

## Function group 1

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run			
F56	A238	[Overload trip select]	0 ~ 1	This parameter turns off the drive output when motor is overloaded.	1	0			
F57	A239	[Overload trip level]	30 ~ 200 [%]	This parameter sets the amount of overload current. The value is the percentage of H33- [Motor rated current].	180	0			
F58	A23A	[Overload trip time]	0 ~ 60 [Sec]	This parameter turns off the drive output when the F57- [Overload trip level] of current flows to the motor for F58- [Overload trip time].	60	0			
F59	A23B	[Stall prevention select]	0 ~ 7	This parameter stops accelerating during acceleration, decelerating during constant speed run and stops decelerating during deceleration.	0	X			
							During Decel	During constant run	During Accel
							Bit 2	Bit 1	Bit 0
				0			-	-	-
				1			-	-	✓
				2			-	✓	-
				3			-	✓	✓
				4			✓	-	-
5	✓	-	✓						
6	✓	✓	-						
7	✓	✓	✓						
F60	A23C	[Stall prevention level]	30 ~ 200 [%]	This parameter sets the amount of current to activate stall prevention function during Accel, Constant or Decel run. The set value is the percentage of the H33- [Motor rated current].	150	X			
F61 <sup>1)</sup>	A23D	[When Stall prevention during deceleration, voltage limit select]	0~1	In Stall prevention run during deceleration, if you want to limit output voltage, select 1					
F63	A23F	[Save up/down frequency select]	0 ~ 1	This parameter decides whether to save the specified frequency during up/down operation. When 1 is selected, the up/down frequency is saved in F64.	0	X			
F64 <sup>2)</sup>	A240	[Save up/down frequency]		If 'Save up/down frequency' is selected at F63, this parameter saves the frequency before the drive stops or decelerated.	0.00	X			
F65	A241	[Up-down mode select]	0~2	We can select up-down mode among three thing	0	X			
				0			Increases goal frequency as a standard of Max. frequency/Min. frequency		
				1			Increases as many as step frequency according to edge input		
2	Available to combine 1 and 2								
F66	A242	[Up-down step frequency]	0~400 [Hz]	In case of choosing F65 as a 1 or 2, it means increase or decrease of frequency according to up-down input	0.00	X			
F70	A246	[Draw run mode select]	0~3	0	Drive doesn't run as a draw mode	0	X		
				1	V1(0~10V) input draw run				
				2	I(0~20mA) input draw run				
				3	V1(-10~10V) input draw run				
F71	A247	[Draw rate]	0~100[%]	Sets rate of draw	0.00	0			

1) It is indicated when setting bit 2 of F59 as 1

2) Set F63 to 1 to display this parameter.



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## Function List

## Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run			
H 0	A300	[Jump code]	0~95	Sets the code number to jump.	1	O			
H 1	A301	[Fault history 1]	-	Stores information on the types of faults, the frequency, the current and the Accel/Decel condition at the time of fault. The latest fault is automatically stored in the H 1- [Fault history 1].	nOn	-			
H 2	A302	[Fault history 2]	-		nOn	-			
H 3	A303	[Fault history 3]	-		nOn	-			
H 4	A304	[Fault history 4]	-		nOn	-			
H 5	A305	[Fault history 5]	-		nOn	-			
H 6	A306	[Reset fault history]	0~1	Clears the fault history saved in H 1-5.	0	O			
H 7	A307	[Dwell frequency]	0.1~400 [Hz]	When run frequency is issued, motor starts to accelerate after dwell frequency is applied to the motor during H8- [Dwell time]. [Dwell frequency] can be set within the range of F21- [Max frequency] and F23- [Start frequency].	5.00	X			
H 8	A308	[Dwell time]	0~10 [sec]	Sets the time for dwell operation.	0.0	X			
H10	A30A	[Skip frequency select]	0 ~ 1	Sets the frequency range to skip to prevent undesirable resonance and vibration on the structure of the machine.	0	X			
H11 <sup>1)</sup>	A30B	[Skip frequency low limit 1]	0.1~400 [Hz]	Run frequency cannot be set within the range of H11 thru H16. The frequency values of the low numbered parameters cannot be set above those of the high numbered ones. Settable within the range of F21 and F23.	10.00	X			
H12	A30C	[Skip frequency high limit 1]			15.00	X			
H13	A30D	[Skip frequency low limit 2]			20.00	X			
H14	A30E	[Skip frequency high limit 2]			25.00	X			
H15	A30F	[Skip frequency low limit 3]			30.00	X			
H16	A310	[Skip frequency high limit 3]			35.00	X			
H17	A311	[S-Curve accel/ decel start side]	1~100 [%]	Set the speed reference value to form a curve at the start during accel/decel. If it is set higher, linear zone gets smaller.	40	X			
H18	A312	[S-Curve accel/ decel end side]	1~100 [%]	Set the speed reference value to form a curve at the end during accel/decel. If it is set higher, linear zone gets smaller.	40	X			
H19	A313	[Input/output phase loss protection select]	0 ~ 3	0	Disabled	1	Output phase protection	0	O
				2	Input phase protection	3	Input/output phase protection		
H20	A314	[Power On Start select]	0 ~ 1	This parameter is activated when drv is set to 1 or 2 (Run/Stop via Control terminal). Motor starts acceleration after AC power is applied while FX or RX terminal is ON.	0	O			
H21	A315	[Restart after fault reset selection]	0 ~ 1	This parameter is activated when drv is set to 1 or 2 (Run/Stop via Control terminal). Motor accelerates after the fault condition is reset while the FX or RX terminal is ON.	0	O			

1) only displayed when H10 is set to 1. # H17, H18 are used when F2, F3 are set to 1 (S-curve)



Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run			
H22 <sup>1)</sup>	A316	[Speed Search Select]	0 ~ 15	This parameter is active to prevent any possible fault when the drive outputs its voltage to the running motor.		0	0		
				1. H20- [Power On start]	2. Restart after instant power failure			3. Operation after fault	4. Normal accel
				0	-			-	-
				1	-			-	✓
				2	-			✓	-
				3	-			✓	✓
				4	-			✓	-
				1. H20- [Power On start]	2. Restart after instant power failure			3. Operation after fault	4. Normal accel
				Bit 3	Bit 2			Bit 1	Bit 0
				5	✓			-	✓
				6	✓			✓	-
				7	✓			✓	✓
				8	✓			-	-
				9	✓			-	✓
				10	✓			✓	-
				11	✓			✓	✓
12	✓	✓	-						
13	✓	✓	✓						
14	✓	✓	-						
15	✓	✓	✓						
H23	A317	[Current level during Speed search]	80~200 [%]	This parameter limits the amount of current during speed search. The set value is the percentage of the H33- [Motor rated current].	100	0			
H24	A318	[P gain during Speed search]	0~9999	It is the Proportional gain used for Speed Search PI controller.	100	0			
H25	A319	[I gain during speed search]	0~9999	It is the Integral gain used for Speed search PI controller.	200	0			
H26	A31A	[Number of Auto Restart try]	0 ~10	This parameter sets the number of restart tries after a fault occurs. Auto Restart is deactivated if the fault outnumbered the restart tries. This function is active when [drv] is set to 1 or 2 {Run/Stop via control terminal}. Deactivated during active protection function (OHT, LVT, EXT, HWT etc.).	0	0			
H27	A31B	[Auto Restart time]	0~60 [sec]	This parameter sets the time between restart tries.	1.0	0			
H30	A31E	[Motor type select]	0.2~ 22.0	0.2	0.2kW	7.5 <sup>2)</sup>	X		
				~	~				
				22.0	22.0kW				
H31	A31F	[Number of motor poles]	2 ~ 12	This setting is displayed via rPM in drive group.	4	X			

1) Normal acceleration has first priority. Even though #4 is selected along with other bits, Drive performs Speed search #4.  
2) H30 is preset based on drive rating.

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## Function List

## Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run
H32	A320	[Rated slip frequency]	0 ~ 10 [Hz]	$f_s = f_r - \left[ \frac{rpm \times p}{120} \right]$ Where, $f_s$ = Rated slip frequency $f_r$ = Rated frequency $rpm$ = Motor nameplate RPM $p$ = Number of Motor poles	2.33 <sup>1)</sup>	X
H33	A321	[Motor rated current]	0.5~150 [A]	Enter motor rated current on the nameplate.	26.3	X
H34	A322	[No Load Motor Current]	0.1~ 50 [A]	Enter the current value detected when the motor is rotating in rated rpm after the load connected to the motor shaft is removed. Enter the 50% of the rated current value when it is difficult to measure H34 - [No Load Motor Current].	11	X
H36	A324	[Motor efficiency]	50~100 [%]	Enter the motor efficiency (see motor nameplate).	87	X
H37	A325	[Load inertia rate]	0 ~ 2	Select one of the following according to motor inertia.	0	X
				0 Less than 10 times		
				1 About 10 times		
2 More than 10 times						
H39	A327	[Carrier frequency select]	1 ~ 15 [kHz]	This parameter affects the audible sound of the motor, noise emission from the drive, drive temp, and leakage current. If the set value is higher, the drive sound is quieter but the noise from the drive and leakage current will become greater.	3	O
H40	A328	[Control mode select]	0 ~ 3	0 {Volts/frequency Control}	0	X
				1 {Slip compensation control}		
				3 {Sensorless vector control}		
H41	A329	[Auto tuning]	0 ~ 1	If this parameter is set to 1, it automatically measures parameters of the H42 and H44.	0	X
H42	A32A	[Stator resistance (Rs)]	0 ~ 28 [Ω]	This is the value of the motor stator resistance.	-	X
H44	A32C	[Leakage inductance (Lσ)]	0~ 300.0 [mH]	This is leakage inductance of the stator and rotor of the motor.	-	X
H45 <sup>2)</sup>	A32D	[Sensorless P gain]	0~ 32767	P gain for Sensorless control	1000	O
H46	A32E	[Sensorless I gain]		I gain for Sensorless control	100	O
H47	A32F	[Sensorless torque limit]	100~220 [%]	Limits output torque in sensorless mode.	180.0	X
H48	A330	PWM mode select	0~1	If you want to limit a drive leakage current, select 2 phase PWM mode. It has more noise in comparison to Normal PWM mode.	0	X
				0 Normal PWM mode		
				1 2 phase PWM mode		
H49	A331	PID select	0~1	Selects whether using PID control or not	0	X

1) H32 ~ H36 factory default values are set based on OTIS-LG motor.  
 2) Set H40 to 3 (Sensorless vector control) to display this parameter.

Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
H50 <sup>1)</sup>	A332	[PID F/B select]	0 ~ 1	0	Terminal I input (0 ~ 20 mA)	0	X
				1	Terminal V1 input (0 ~ 10 V)		
H51	A333	[P gain for PID]	0~999.9 [%]	This parameter sets the gains for the PID controller.	300.0	O	
H52	A334	[Integral time for PID]	0.1~32.0 [sec]		1.0	O	
H53	A335	[Differential time for PID (D gain)]	0 ~ 30.0 [sec]		0.0	O	
H54	A336	[PID control mode select]	0~1	Selects PID control mode		0	X
				0	Normal PID control		
				1	Process PID control		
H55	A337	[PID output frequency high limit]	0.1 ~ 400 [Hz]	This parameter limits the amount of the output frequency through the PID control.	60.00	O	
H56	A338	[PID output frequency low limit]	0.1 ~ 400 [Hz]	The value is settable within the range of F21 ? [Max frequency] and F23 - [Start frequency].	0.50	O	
H57	A339	[PID standard value select]	0~4	Selects PID standard value. Standard value is indicated in "rEF" of Drive group.		0	X
				0	Loader digital setting 1		
				1	Loader digital setting 2		
				2	V1 terminal setting 2: 0~10V		
				3	I terminal setting: 0~20mA		
4	Setting as a RS-485 communication						
H58	A33A	PID control unit select	0~1	Selects a unit of the standard value or feedback amount.		0	X
				0	Frequency[Hz]		
				1	Percentage[%]		
H60	A33C	[Self-diagnostic select]	0 ~ 3	0 Self-diagnostic disabled		0	X
				1 IGBT fault/Ground fault			
				2 Output phase short & open/ Ground fault			
				3 Ground fault (This setting is unable when more than 11kW)			
H61 <sup>2)</sup>	A33D	[Sleep delay time]	0~2000[s]	Sets a sleep delay time in PID drive.	60.0	X	
H62	A33E	[Sleep frequency]	0~400[Hz]	Sets a sleep frequency when executing a sleep function in PID control drive. You can't set more than Max. frequency(F21)	0.00	O	
H63	A33F	[Wake up level]	0~100[%]	Sets a wake up level in PID control drive.	35.0	O	
H64	A340	[KEB drive select]	0~1	Sets KEB drive.	0	X	
H65	A341	[KEB action start level]	110~140 [%]	Sets KEB action start level according to level.	125.0	X	
H66	A342	[KEB action stop level]	110~145 [%]	Sets KEB action stop level according to level.	130.0	X	
H67	A343	[KEB action gain]	1~20000	Sets KEB action gain.	1000	X	
H70	A346	[Frequency Reference for Accel/Decel]	0 ~ 1	0	Based on Max freq (F21)	0	X
				1	Based on Delta freq.		

1) Set H49 to 1 (PID control) to display this parameter.

2) Set H49 as a 1

3): it is indicated when setting H64(KEB drive select) as a 1 (KEB does not operate when cut power after loading ting input (about 10%).

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## Function List

## Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
H71	A347	[Accel/Decel time scale]	0 ~ 2	0	Settable unit: 0.01 second.	1	0
				1	Settable unit: 0.1 second.		
				2	Settable unit: 1 second.		
H72	A348	[Power on display]	0 ~ 15	This parameter selects the parameter to be displayed on the keypad when the input power is first applied.		0	0
				0	Frequency command		
				1	Accel time		
				2	Decel time		
				3	Drive mode		
				4	Frequency mode		
				5	Multi-Step frequency 1		
				6	Multi-Step frequency 2		
				7	Multi-Step frequency 3		
				8	Output current		
				9	Motor rpm		
				10	Drive DC link voltage		
				11	User display select (H73)		
				12	Fault display		
				13	Direction of motor rotation select		
				14	Output current 2		
				15	Motor rpm 2		
16	Drive DC link voltage 2						
17	User display select 2						
H73	A349	[Monitoring item select]	0 ~ 2	One of the following can be monitored via vOL - [User display select].		0	0
				0	Output voltage [V]		
				1	Output power [kW]		
H74	A34A	[Gain for Motor rpm display]	1 ~ 1000 [%]	This parameter is used to change the motor rotating speed (r/min) to mechanical speed (m/mi) and display it.		100	0
				2	Torque [kgf, m]		
H75	A34B	[DB resistor operating rate limit select]	0 ~ 1	0	Unlimited	1	0
				1	Use DB resistor for the H76 set time.		
H76	A34C	[DB resistor operating rate]	0 ~ 30 [%]	Set the percent of DB resistor operating rate to be activated during one sequence of operation.		10	0
H77 <sup>1)</sup>	A34D	[Cooling fan control]	0 ~ 1	0	Always ON	0	0
				1	Keeps ON when its temp is higher than drive protection limit temp. Activated only during operation when its temp is below that of drive protection limit.		
H78	A34E	[Operating method select when cooling fan malfunctions]	0 ~ 1	0	Continuous operation when cooling fan malfunctions.	0	0
				1	Operation stopped when cooling fan malfunctions.		
H79	A34F	[S/W version]	0 ~ 10.0	This parameter displays the drive software version.		1.0	X

1) Exception: Since SV004iG5A-2/SV004iG5A-4 is Natural convection type, this code is hidden.

Function group 2

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
H81 <sup>1)</sup>	A351	[2 <sup>nd</sup> motor Accel time]	0 ~ 6000 [sec]	This parameter activates when the selected terminal is ON after I17-I24 is set to 12 (2 <sup>nd</sup> motor select).	5.0	O	
H82	A352	[2 <sup>nd</sup> motor Decel time]			10.0	O	
H83	A353	[2 <sup>nd</sup> motor base frequency]	30 ~ 400 [Hz]		60.00	X	
H84	A354	[2 <sup>nd</sup> motor V/F pattern]	0 ~ 2		0	X	
H85	A355	[2 <sup>nd</sup> motor forward torque boost]	0 ~ 15 [%]		5	X	
H86	A356	[2 <sup>nd</sup> motor reverse torque boost]			5	X	
H87	A347	[2 <sup>nd</sup> motor stall prevention level]	30~150 [%]		150	X	
H88	A358	[2 <sup>nd</sup> motor Electronic thermal level for 1 min]	50~200 [%]		150	O	
H89	A359	[2 <sup>nd</sup> motor Electronic thermal level for continuous]	50~150 [%]		100	O	
H90	A35A	[2 <sup>nd</sup> motor rated current]	0.1~100 [A]		26.3	X	
H91 <sup>2)</sup>	A35B	[Parameter read]	0 ~ 1	Copy the parameters from drive and save them into remote loader.	0	X	
H92	A35C	[Parameter write]	0 ~ 1	Copy the parameters from remote loader and save them into drive.	0	X	
H93	A35D	[Parameter initialize]	0 ~ 5	This parameter is used to initialize parameters back to the factory default value.			
				0	-	0	X
				1	All parameter groups are initialized to factory default value.		
				2	Only Drive group is initialized.		
				3	Only Function group 1 is initialized.		
				4	Only Function group 2 is initialized.		
5	Only I/O group is initialized.						
H94	A35E	[Password register]	0 ~ FFFF	Password for H95-[Parameter lock]. Set as Hexa value.	0	O	
H95	A35F	[Parameter lock]	0 ~ FFFF	This parameter is able to lock or unlock parameters by typing password registered in H94.			
				UL (Unlock)	Parameter change enable	0	O
				L (Lock)	Parameter change disable		

1) It is indicated when choosing I17~I24 as a 12 (2nd motor select).

2) H91,H92 parameters are displayed when Remote option is installed.



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## Function List

## ■ Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run	
I 0	A400	[Jump code]	0 ~ 87	Sets the code number to jump.	1	○	
I 2	A402	[NV input Min voltage]	0 ~ -10 [V]	Sets the minimum voltage of the NV (-10V~0V) input.	0.00	○	
I 3	A403	[Frequency corresponding to I 2]	0 ~ 400 [Hz]	Sets the drive output minimum frequency at minimum voltage of the NV input.	0.00	○	
I 4	A404	[NV input Max voltage]	0 ~ -10 [V]	Sets the maximum voltage of the NV input.	10.0	○	
I 5	A405	[Frequency corresponding to I 4]	0 ~ 400 [Hz]	Sets the drive output maximum frequency at maximum voltage of the NV input.	60.00	○	
I 6	A406	[Filter time constant for V1 input]	0 ~ 9999	Adjusts the responsiveness of V1 input (0 ~ +10V).	10	○	
I 7	A407	[V1 input Min voltage]	0 ~ 10 [V]	Sets the minimum voltage of the V1 input.	0	○	
I 8	A408	[Frequency corresponding to I 7]	0 ~ 400 [Hz]	Sets the drive output minimum frequency at minimum voltage of the V1 input.	0.00	○	
I 9	A409	[V1 input Max voltage]	0 ~ 10 [V]	Sets the maximum voltage of the V1 input.	10	○	
I10	A40A	[Frequency corresponding to I 9]	0 ~ 400 [Hz]	Sets the drive output maximum frequency at maximum voltage of the V1 input.	60.00	○	
I11	A40B	[Filter time constant for I input]	0 ~ 9999	Sets the input section's internal filter constant for I input.	10	○	
I12	A40C	[I input Min current]	0 ~ 20 [mA]	Sets the minimum current of I input.	4.00	○	
I13	A40D	[Frequency corresponding to I 12]	0 ~ 400 [Hz]	Sets the drive output minimum frequency at minimum current of I input.	0.00	○	
I14	A40E	[I input Max current]	0 ~ 20 [mA]	Sets the Maximum current of I input.	20.00	○	
I15	A40F	[Frequency corresponding to I 14]	0 ~ 400 [Hz]	Sets the drive output maximum frequency at maximum current of I input.	60.00	○	
I16	A410	[Criteria for Analog Input Signal loss]	0 ~ 2	0	Disabled	0	○
				1	activated below half of set value.		
				2	activated below set value.		
I17	A411	[Multi-function input terminal P1 define]	0 ~ 27	0	Forward run command	0	○
				1	Reverse run command		
				2	Emergency Stop Trip		
I18	A412	[Multi-function input terminal P2 define]	0 ~ 27	3	Reset when a fault occurs {RST}	1	○
				4	Jog operation command		
I19	A413	[Multi-function input terminal P3 define]	0 ~ 27	5	Multi-Step freq - Low	2	○
I20	A414	[Multi-function input terminal P4 define]		6	Multi-Step freq - Mid		
				7	Multi-Step freq - High		

\* See "Chapter 14 Troubleshooting and maintenance" for External trip A/B contact.

\* Each multi-function input terminal must be set differently.



Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description								Factory defaults	Adj. during run	
I21	A415	[Multi-function input terminal P5 define]		8	Multi Accel/Decel - Low								4	O
				9	Multi Accel/Decel - Mid									
I22	A416	[Multi-function input terminal P6 define]		10	Multi Accel/Decel - High								5	O
				11	DC brake during stop									
I23	A417	[Multi-function input terminal P7 define]		12	2nd motor select								6	O
				13	-Reserved-									
I24	A418	[Multi-function input terminal P8 define]	0 ~ 27	14	-Reserved-								7	O
				15	Up-down									
				16	Frequency increase (UP) command									
				17	Frequency decrease command (DOWN)									
				18	3-wire operation									
				19	External trip: A Contact (EtA)									
				20	External trip: B Contact (EtB)									
				21	Self-diagnostic function									
				22	Change from PID operation to V/F operation									
				23	2nd Source									
				24	Analog Hold									
				25	Accel/Decel Disable									
				26	Up/Down Save Freq. Initialization									
27	JOG-FX													
I25	A419	[Input terminal status display]		BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	0	O	
				P8	P7	P6	P5	P4	P3	P2	P1			
I26	A41A	[Output terminal status display]		BIT1				BIT0				0	O	
				3AC				MO						
I27	A41B	[Filtering time constant for Multi-function Input terminal]	1 ~ 15	If the value is set higher, the responsiveness of the Input terminal is getting slower.								4	O	
I30	A41E	[Multi-Step frequency 4]	0 ~ 400 [Hz]	It cannot be set greater than F21 - [Max frequency].								30.00	O	
I31	A41F	[Multi-Step frequency 5]										25.00	O	
I32	A420	[Multi-Step frequency 6]										20.00	O	
I33	A421	[Multi-Step frequency 7]										15.00	O	
I34	A422	[Multi-Accel time 1]	0~ 6000 [sec]									3.0	O	
I35	A423	[Multi-Decel time 1]										3.0		
I36	A424	[Multi-Accel time 2]										4.0		

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## Function List

## Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run			
I37	A425	[Multi-Decel time 2]	0~ 6000 [sec]		4.0				
I38	A426	[Multi-Accel time 3]			5.0				
I39	A427	[Multi-Decel time 3]			5.0				
I40	A428	[Multi-Accel time 4]			6.0				
I41	A429	[Multi-Decel time 4]			6.0				
I42	A42A	[Multi-Accel time 5]			7.0				
I43	A42B	[Multi-Decel time 5]			7.0				
I44	A42C	[Multi-Accel time 6]			8.0				
I45	A42D	[Multi-Decel time 6]			8.0				
I46	A42E	[Multi-Accel time 7]			9.0				
I47	A42F	[Multi-Decel time 7]	9.0						
I50	A432	[Analog output item select]	0 ~ 3	Output item	Output to 10[V]		0	O	
				0	Output freq.	200V			400V
				1	Output current	Max frequency			
				2	Output voltage	AC 282V			AC 564V
				3	Drive DC link voltage	DC 400V			DC 800V
I51	A433	[Analog output level adjustment]	10~200 [%]	Based on 10V.	100	O			
I52	A434	[Frequency detection level]	0 ~ 400 [Hz]	Used when I54 or I55 is set to 0-4. Cannot be set higher than F21.	30.00	O			
I53	A435	[Frequency detection]			10.00	O			
I54	A436	bandwidth] [Multi-function output terminal select]	0 ~ 19	0	FDT-1	12	O		
				1	FDT-2				
				2	FDT-3				
				3	FDT-4				
				4	FDT-5				
I55	A437	[Multi-function relay select]	0 ~ 19	5	Overload (OLt)	17	O		
				6	Drive Overload (IOLt)				
				7	Motor stall (STALL)				
				8	Over voltage trip (Ovt)				
				9	Low voltage trip (Lvt)				

## ■ Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description			Factory defaults	Adj. during run	
I55	A437	[Multi-function relay select]	0 ~ 19	10	Drive Overheat (Oht)			17	0
				11	Command loss				
				12	During Run				
				13	During Stop				
				14	During constant run				
				15	During speed searching				
				16	Wait time for run signal input				
				17	Multi-function relay select				
				18	Warning for cooling fan trip				
				19	Brake signal select				
I56	A438	[Fault relay output]	0 ~ 7		When setting the H26 - [Number of auto restart try]	When the trip other than low voltage trip occurs	When the low voltage trip occurs	2	0
					Bit 2	Bit 1	Bit 0		
				0	-	-	-		
				1	-	-	✓		
				2	-	✓	-		
				3	-	✓	✓		
				4	✓	-	-		
				5	✓	-	✓		
				6	✓	✓	-		
7	✓	✓	✓						
I57	A439	[Output terminal select when communication error occurs]	0 ~ 3		Multi-function relay	Multi-function output terminal	0	0	
					Bit 1	Bit 0			
				0	-	-			
				1	-	✓			
				2	✓	-			
3	✓	✓							
I59	A43B	[Communication protocol select]	0 ~ 1	Set communication protocol.			0	X	
				0	Modbus RTU				
1	LS BUS								
I60	A43C	[Drive number]	1 ~ 250	Set for RS485 communication			1	0	
I61	A43D	[Baud rate]	0 ~ 4	Select the Baud rate of the RS485.			3	0	
				0	1200 [bps]				
				1	2400 [bps]				
				2	4800 [bps]				
				3	9600 [bps]				
4	19200 [bps]								
I62	A43E	[Drive mode select after loss of frequency command]	0 ~ 2	It is used when freq command is given via V1 /I terminal or RS485.			0	0	
				0	Continuous operation at the frequency before its command is lost.				
				1	Free Run stop (Output cut-off)				
2	Decel to stop								

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## Function List

## Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run				
I63	A43F	[Wait time after loss of frequency command]	0.1 ~ 120 [sec]	This is the time drive determines whether there is the input frequency command or not. If there is no frequency command input during this time, drive starts operation via the mode selected at I62.	1.0	0				
I64	A440	[Communication time setting]	2 ~ 100 [ms]	Frame communication time	5	0				
I65	A441	[Parity/stop bit setting]	0~3	When the protocol is set, the communication format can be set.	0	0				
				0 Parity: None, Stop Bit: 1						
				1 Parity: None, Stop Bit: 2						
				2 Parity: Even, Stop Bit: 1						
I66	A442	[Read address register 1]	0~42239	The user can register up to 8 discontinuous addresses and read them all with one Read command.	5	0				
							I67	A443	[Read address register 2]	6
							I68	A444	[Read address register 3]	7
							I69	A445	[Read address register 4]	8
							I70	A446	[Read address register 5]	9
							I71	A447	[Read address register 6]	10
							I72	A448	[Read address register 7]	11
							I73	A449	[Read address register 8]	12
I74	A44A	[Write address register 1]	0~42239	The user can register up to 8 discontinuous addresses and write them all with one Write command	5	0				
							I75	A44B	[Write address register 2]	6
							I76	A44C	[Write address register 3]	7
							I77	A44D	[Write address register 4]	8
							I78	A44E	[Write address register 5]	5
							I79	A44F	[Write address register 6]	6
							I80	A450	[Write address register 7]	7
							I81	A451	[Write address register 8]	8
I82 <sup>1)</sup>	A452	[Brake open current]	0~180 [%]	Sets current level to open the brake. It is set according to H33's (motor rated current) size	50.0	0				

1) It is indicated when choosing I54~I55 as a 19 (Brake signal).

## Compact &amp; Powerful Drive iG5A

## ■ Input/output group

LED display	Address for communication	Parameter name	Min/Max range	Description	Factory defaults	Adj. during run
183	A453	[Brake open delay time]	0~10 [s]	Sets Brake open delay time.	1.00	X
184	A454	[Brake open FX frequency]	0~400 [Hz]	Sets FX frequency to open the brake	1.00	X
185	A455	[Brake open RX frequency]	0~400 [Hz]	Sets RX frequency to open the brake	1.00	X
186	A456	[Brake close delay time]	0~19 [s]	Sets delay time to close the brake	1.00	X
187	A457	[Brake close frequency]	0~400 [Hz]	Sets frequency to close the brake	2.00	X


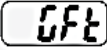
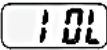
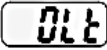

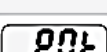
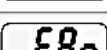

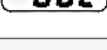

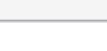

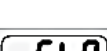
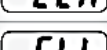
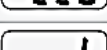
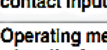
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## Protective Functions

Keypad display	Protective functions	Descriptions
		The drive turns off its output when the output current of the drive flows more than 200% of the drive rated current.
		The drive turns off its output when a ground fault occurs and the ground fault current is more than the internal setting value of the drive.
		The drive turns off its output when the output current of the drive flows more than the rated level (150% for 1 minute).
		The drive turns off its output if the output current of the drive flows at 150% of the drive rated current for more than the current limit time (1 min).
		The drive turns off its output if the heat sink overheats due to a damaged cooling fan or an alien substance in the cooling fan by detecting the temperature of the heat sink.
		The drive turns off its output when the one or more of the output (U, V, W) phase is open. The drive detects the output current to check the phase loss of the output.
		The drive turns off its output if the DC voltage of the main circuit increases higher than 400V when the motor decelerates. This fault can also occur due to a surge voltage generated at the power supply system.
		The drive turns off its output if the DC voltage is below 180V because insufficient torque or overheating of the motor can occur when the input voltage of the drive drops.
		The internal electronic thermal of the drive determines the overheating of the motor. If the motor is overloaded, the drive turns off the output. The drive cannot protect the motor when driving a motor having more than 4 poles or multi motors.
		Drive output is blocked when one of R, S, T is open or the electrolytic capacitor needs to be replaced.
		Displayed when IGBT damage, output phase short, output phase ground fault or output phase open occurs.
		Displayed when user-setting parameters fails to be entered into memory.
		Displayed when an error occurs in the control circuitry of the drive.
		Displayed when the drive cannot communicate with the keypad.
		Displayed when the drive and the remote keypad do not communicate with each other. It does not stop drive operation.
		Displayed after the drive resets the keypad when a keypad error occurs and this ....
		Displayed when a fault condition occurs in the drive cooling fan.
		Used for the emergency stop of the drive. The drive instantly turns off the output when the EST terminal is turned on. <b>Caution:</b> The drive starts to regular operation when turning off the EST terminal while FX or RX terminal is ON.
		When multi-function input terminal (I20-I24) is set to 19 {External fault signal input A: (Normal Open Contact)}, the drive turns off the output.
		When multi-function input terminal (I20-I24) is set to 19 {External fault signal input B: (Normal Close Contact)}, the drive turns off the output.
		When drive operation is set via analog input (0-10V or 0-20mA input) or option (RS-485) and no signal is applied, operation is done according to the method set in I62 (Operating method when the frequency reference is lost).



## Fault Remedy

Keypad display	Cause	Remedy
	Caution: When an overcurrent fault occurs, operation must be started after the cause is removed to avoid damage to IGBT inside the drive.	
 Overcurrent	Accel/Decel time is too short compared to the $GD^2$ of the load. Load is greater than the drive rating. Drive output is issued when the motor is free running. Output short circuit or ground fault has occurred. Mechanical brake of the motor is operating too fast.	<ul style="list-style-type: none"> <li>→ Increase the Accel/Decel time.</li> <li>→ Replace the drive with appropriate capacity.</li> <li>→ Resume operation after stopping the motor or use H22 (Speed search).</li> <li>→ Check output wiring.</li> <li>→ Check the mechanical brake.</li> </ul>
 Ground fault current	Ground fault has occurred at the output wiring of the drive. The insulation of the motor is damaged due to heat.	<ul style="list-style-type: none"> <li>→ Check the wiring of the output terminal.</li> <li>→ Replace the motor.</li> </ul>
 Drive overload	Load is greater than the drive rating.	<ul style="list-style-type: none"> <li>→ Upgrade the capacity of motor and drive or reduce the load weight.</li> <li>→ Reduce torque boost scale.</li> </ul>
 Overload trip	Torque boost scale is set too large.	
 Heat sink overheat	Cooling system has faults. An old cooling fan is not replaced with a new one. Ambient temperature is too high.	<ul style="list-style-type: none"> <li>→ Check for alien substances clogged in the heat sink.</li> <li>→ Replace the old cooling fan with a new one.</li> <li>→ Keep ambient temperature under 50°C.</li> </ul>
 Output Phase loss	Faulty contact of magnetic switch at output. Faulty output wiring.	<ul style="list-style-type: none"> <li>→ Make connection of magnetic switch at output of the drive securely.</li> <li>→ Check output wiring.</li> </ul>
 Cooling fan fault	An alien substance is clogged in a ventilating slot. Drive has been in use without changing a cooling fan.	<ul style="list-style-type: none"> <li>→ Check the ventilating slot and remove the clogged substances.</li> <li>→ Replace the cooling fan.</li> </ul>
 Over voltage	Decel time is too short compared to the $GD^2$ of the load. Regenerative load is at the drive output. Line voltage is too high.	<ul style="list-style-type: none"> <li>→ Increase the Decel time.</li> <li>→ Use Dynamic Brake Unit.</li> <li>→ Check whether line voltage exceeds its rating.</li> </ul>
 Low voltage	Line voltage is low. Load larger than line capacity is connected to line (ex: welding machine, motor with high starting current connected to the commercial line). Faulty magnetic switch at the input side of the drive.	<ul style="list-style-type: none"> <li>→ Check whether line voltage is below its rating.</li> <li>→ Check the incoming AC line.</li> <li>Adjust the line capacity corresponding to the load.</li> <li>→ Change a magnetic switch.</li> </ul>
 Electronic thermal	Motor has overheated. Load is greater than drive rating. ETH level is set too low.  Drive capacity is incorrectly selected. Drive has been operated at low speed for too long.	<ul style="list-style-type: none"> <li>→ Reduce load weight and operating duty.</li> <li>→ Change drive with higher capacity.</li> <li>→ Adjust ETH level to an appropriate level.</li> <li>→ Select correct drive capacity.</li> <li>→ Install a cooling fan with a separate power supply.</li> </ul>
 External fault A contact input	The terminal set to "18 (External fault-A)" or "19 (External fault-B)" in I20-I24 in I/O group is ON.	→ Eliminate the cause of fault at circuit connected to external fault terminal or cause of external fault input.
 External fault B contact input		
 Operating method when the frequency command is lost	No frequency command is applied to V1 and I.	→ Check the wiring of V1 and I and frequency reference level.
 Remote keypad communication error	Communication error between drive keypad and remote keypad.	→ Check for connection of communication line and connector.
 	<ul style="list-style-type: none"> <li>- EEP: Parameter save error</li> <li>- HWT: Hardware fault</li> <li>- Err: Communication Error</li> <li>- COM: Keypad error</li> </ul>	→ Contact your LSIS sales distributor.
