Induction Motor

Index

OTT GmbH & Co. KG 78652 Deißlingen Tel.: 07420-9399-0 Fax.: 07420-9399-25 Email: info@ott-antriebe.de

B AC Motors

Outline of Induction Motor

Suitable for Unidirectional Continuous Operation

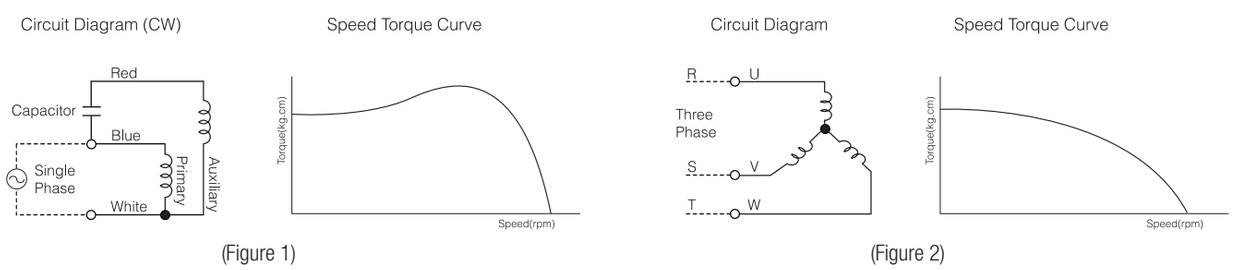
- Induction motors are suitable for unidirectional continuous operation such as conveyor belt system.

Single Phase Run

- For the running of a single phase motor, please use the capacitor complying with the capacity of the motor. For a single phase induction motor, it is not possible to reverse the direction within a short time during operation. So stop the motor first and change the direction next. (Figure 1)

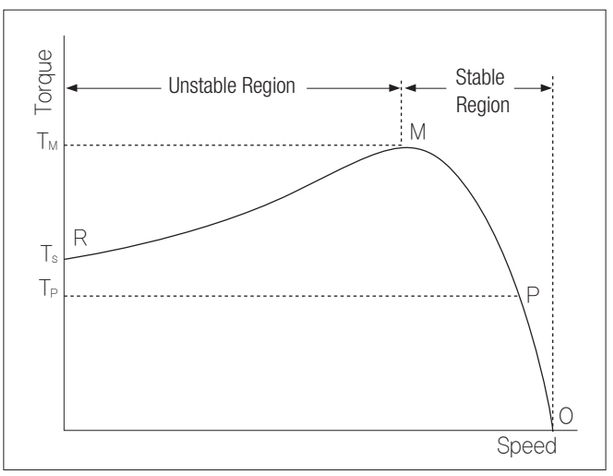
Three Phase Run

- Three phase induction motor has relatively high starting torque comparing single phase motor and has high reliability because it can be directly operated by a three phase power source. (Figure 2)



The Relation between Speed and Torque

- In a condition of constant power voltage, the relation between speed and torque is like next figure.
  Under the condition of no-load, the number of rotation is roughly same as the number of synchronous rotation.
  But if the load increases, the number of rotation decreases and approaches to the speed (r/min) indicated by the point P where the torque Tp horizontally meets the load curve.
  When the load further increases and reaches the point M, the motor stops at the point R because the motor no longer generates further torque.
  Therefore, the leg R-M is referred to as an unstable zone and the leg O-M is a stable zone for operation.



Features of Voltage and Capacitor

- Generally the torque of induction motor changes proportionate to twice the voltage and it also changes according the capacity of the capacitor.
  If the capacity of the capacitor increases, the starting torque and rated torque will increase. But if the capacity increases by over 2 times, the rated torque decreases and starting torque do not increase.
  When the induction motor is short on torque, it is possible to increase the torque by increasing the voltage or the capacity of the capacitor to continue the operation. But please be informed that in this case the loss input of the motor increases and the temperature rises rapidly.
  However, if the motor must be run with insufficient torque, take measures to let the motor release heat as much as possible by installing separate fan as an example and operate the motor while keeping the temperature of the motor's housing below 90℃.

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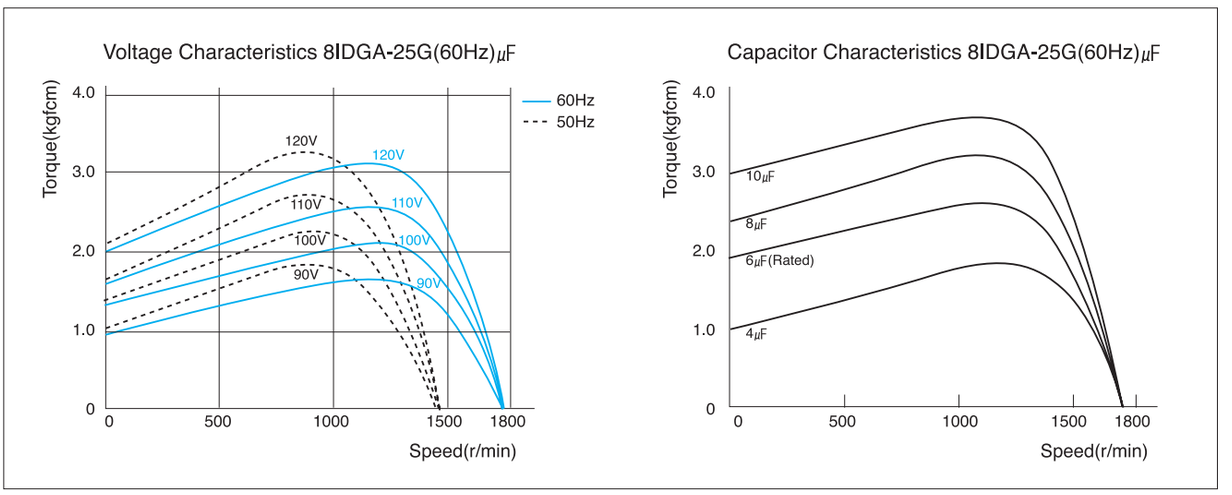
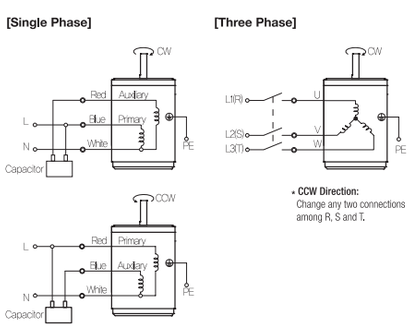


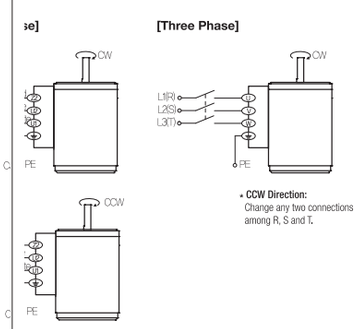
General Specifications

Item	Specification
Insulation Resistance	100MΩ or more when DC500V MEGA is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5KV at 50Hz and 60Hz applied between the windings and the frame for 1 minute after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	Temperature rise of windings are 80℃ or less measured by the resistance change method after rated motor operation with connecting a Gearbox or equivalent heat radiation plate.
Insulation Class	Class B [130℃]
Overheat Protection	Operating temperature (Built-in thermal protector type motor): Open 120℃±5℃, Close 90℃±5℃
Ambient Temperature	-10℃~+40℃ (Three phase 220VAC: -10℃~+50℃)
Ambient Humidity	85% maximum

Connection Diagrams

Lead Wire Type	Terminal Box Type





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A Information

I Product Coding System

AC Motors

Motor
- **I** : Induction Motor
- **R** : Reversible Motor
- **B** : Electromagnetic Brake Motor
- **CI** : Clutch & Brake Motor
- **T** : Torque Motor
- **S** : Speed Control Induction Motor
- **SR** : Speed Control Reversible Motor
- **SB** : Speed Control . Brake Motor
- **CS** : Speed Control Clutch & Brake Motor

Phase & Voltage
- **1** : 1Ø AC 110V 60Hz
- **2** : 1Ø AC 220V 60Hz
- **3** : 3Ø AC 220~230V 50/60Hz
- **4** : 3Ø AC 380V~400V 50/60Hz
- **5** : 3Ø AC 415V~440V 50/60Hz
- **6** : 3Ø AC 220/380V 60Hz
- **7** : 3Ø AC 230/400V 50Hz
- **8** : 3Ø AC 440V 50/60Hz

Phase & Voltage
[Built-in Thermal Protector Type]
- **A** : 1Ø AC 110V 60Hz
- **D** : 1Ø AC 220V 60Hz
- **E** : 1Ø AC 220~240V 50Hz
- **G** : 3Ø AC 220V 50/60Hz
- **K** : 3Ø AC 380V~400V 50/60Hz
- **L** : 3Ø AC 415V~440V 50/60Hz

Fan Type
- **F** : General Fan (Self Cooling)
- **F2** : Powerful Fan (Separate Fan Motor) Powerful fan makes powerful cooling performance rotating in high speed regardless of motor shaft speed.
- **No Mark** : Without Fan

Connection Type
- **T** : Terminal Box Type
- **No Mark** : Lead Wire Type

Pole
- **A** : 2 Pole
- **No Mark** : 4 Pole

9	I	D	G	A	—	90	F	P	—	A	T

Brand
- **D** : DKM

Output Shaft Type
- **G** : Gear Type Shaft (Pinion Shaft for Attaching Gearbox)
- **S** : Round Type Shaft
- **D** : D-Cut Type Shaft
- **K** : Key Type Shaft

Output
- **6** : 6W
- **10** : 10W
- **15** : 15W
- **25** : 25W
- **40** : 40W
- **60** : 60W
- **90** : 90W
- **120** : 120W
- **150** : 150W
- **180** : 180W
- **200** : 200W
- **250** : 250W (E)
- **300** : 300W (D, 7, 8)
- **400** : 400W (6)

Attaching Gearbox
- **G** : General Box Type
- **P** : Powerful Box/Flange Type
- **H** : High Powerful Box/Flange Type
- **W** : Worm Solid Type
- **WH** : Worm Hollow Type
- **No Mark** : Without Gearbox

Motor Frame Size
- **6** : □60mm sq. (2.36 inch sq.)
- **7** : □70mm sq. (2.76 inch sq.)
- **8** : □80mm sq. (3.15 inch sq.)
- **9** : □90mm sq. (3.54 inch sq.)
- **10** : □104mm sq. (4.09 inch sq.)

DC Motors

DC
DC MOTOR

Output Shaft Type
- **D** : D-Cut Type Shaft
- **K** : Key Type Shaft
- **G** : Shaft for General Type Gearbox
- **P** : Shaft for Powerful Type Gearbox
- **W** : Shaft for Worm Solid Type Gearbox

9	DC	G	12	—	25	—	30

Motor Frame Size
- **6** : □60mm sq. (2.36 in.sq.)
- **8** : □80mm sq. (3.15 in.sq.)
- **9** : □90mm sq. (3.54 in.sq.)

DC Voltage
- **12** : DC 12V
- **24** : DC 24V
- **90** : DC 90V

Output
- **15** : 15W
- **25** : 25W
- **40** : 40W
- **60** : 60W
- **90** : 90W
- **120** : 120W

r/min
- **30** : 3000r/min

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Parallel Gearbox

Gearbox Frame Size
6 : □60mm sq. (2.36 in.sq.)
7 : □70mm sq. (2.76 in.sq.)
8 : □80mm sq. (3.15 in.sq.)
9 : □90mm sq. (3.54 in.sq.)

Frame Type
B : Box Type □
F : Flange Type (Only available for powerful and high powerful type Gearbox)

Bearing Type
B : Ball Bearing
BM : Ball Bearing + Metal Bearing
M : Metal Bearing

9	P	B	K	36	B	H

Gear Type
G : General Gear
P : Powerful Gear
H : High Powerful Gear

Output Shaft Type
K : Key Type
D : D-Cut Type

Gear Ratio
36 : 1/36

Input Gear Type
H : Helical Gear

Worm Solid Gearbox

Gearbox Type
W : Worm Solid Type
WH : Worm Hollow Type

Gear Ratio
30 : 1/30

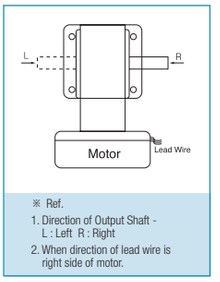
Direction of Output Shaft
L : Left
R : Right
RL : Bi-directional
※ No mark in Worm Hollow Type Gearbox

9	W	D	30	B	L

Gearbox Frame Size
8 : □ 80mm sq. (3.15 in.sq.)
9 : □ 90mm sq. (3.54 in.sq.)

Brand
D : DKM

Bearing Type
B : Ball Bearing
※ No mark in Worm Hollow Type Gearbox



※ Ref.
1. Direction of Output Shaft - L : Left R : Right
2. When direction of lead wire is right side of motor.

Worm Hollow Gearbox

Gearbox Type
WH : Worm Hollow Gearbox

Gear Ratio
30 : 1/30

9	WH	D	30	—	030

Gearbox Frame Size
9 : □ 90mm sq. (4.09 inch.sq.)
10 : □ 104mm sq. (4.09 inch.sq.)

Brand
D : DKM

Center Distance between Worm Wheel and Shaft
030 : 30mm
040 : 40mm

Inter-decimal Gearbox

X10 Inter-decimal Gearbox

G : "G" Type Shaft Motor (40W)
P : "P" Type Shaft Motor (60~120W)

9	X	D	10	G	Z

Gearbox Frame Size
8 : □ 80mm sq. (3.15 in.sq.)
9 : □ 90mm sq. (3.54 in.sq.)

Brand
D : DKM

Gear Ratio
10 : 1/10

Attaching Gearbox
G : General Type (Helical)
P : Powerful Type
H : High Powerful Type
Z : Worm Hollow Type
W : Worm Solid type

In case of requiring high gear reduction ratio that cannot be generated by single Gearbox, please use Inter-decimal Gearbox with general Gearbox. And please be advised that in this case only revolution speed of output shaft will reduce by 10:1 without increasing of maximum permissible torque.

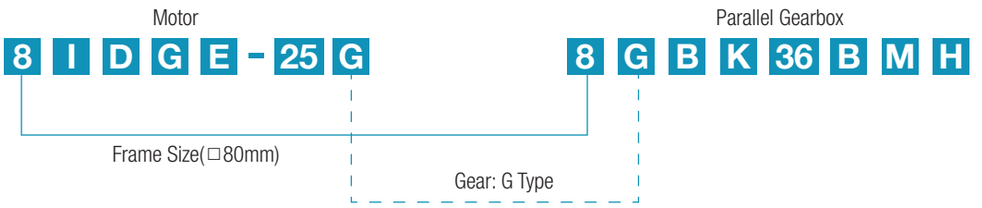
A Information

I Product Coding System

Assembly of Motor and Gearbox

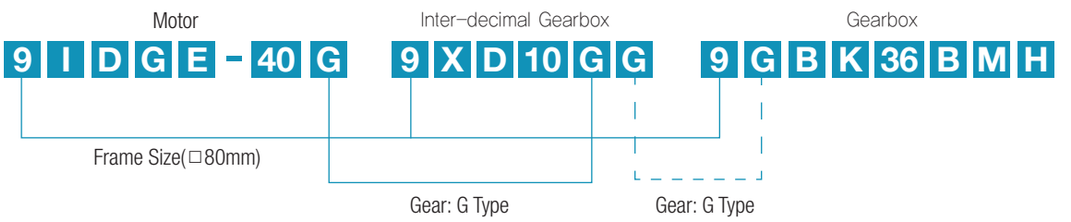
Motor + Gearbox

- As shown in the following scheme, motor and Gearbox which have same frame size and gear type could be assembled.



Motor + Inter-decimal Gearbox + Gearbox

- When using an inter-decimal Gearbox together, give attention to the gear types of motor, Gearbox and inter-decimal Gearbox.



- When attaching inter-decimal Gearbox, the output shaft type of the motor is always G Type.
  For example, when using P/H/W/WH type Gearbox, only the gear type of inter-decimal Gearbox is identical with attached Gearbox and the output shaft type of the motor is G type. (Refer to the scheme below.)

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200W Induction Motor 200W(□90mm)

Motor Specification

Model (9IDG*-200F□(-T): Gear Type Shaft, 9IDD*-200F(-T): D-Cut Type Shaft, 9IDK*-200F(-T): Key Type Shaft)		Output	Voltage	Frequency	Poles	Duty	Starting Torque		Rated Load				Capacitor
									Speed	Current	Torque		
Lead Wire Type	Terminal Box Type	W	V	Hz			kgfcm	N.m	r/min	A	kgfcm	N.m	μF / VAC
9IDGG-200F□	9IDGG-200F□-T	200	3ø220	50	4	Cont.	32.00	3.200	1300	1.40	15.00	1.500	–
				60			27.00	2.700	1550	1.20	13.00	1.300	
9IDGK-200F□	9IDGK-200F□-T	200	3ø380	50	4	Cont.	26.00	2.600	1300	0.69	15.00	1.500	–
				60			22.00	2.200	1550	0.61	12.80	1.280	
			3ø400	50	4	Cont.	30.00	3.000	1300	0.75	15.00	1.500	
				60			25.00	2.500	1600	0.60	12.20	1.220	

1) Enter the phase & voltage code in the place * and enter the model type of attaching Gearbox in the box (□) within the motor model name.
2) All models contain a built-in thermal protector.
3) Gear Type Shaft is for attaching Gearbox and D-Cut & Key Type Shafts are for using motor only.
※ It is not possible to use inverter for three phase 380~440V motor. When inverter is used, the insulation of winding coil becomes hot and may cause damage to the motor.

Max. Permissible Torque at Output Shaft of Gearbox

60Hz

Motor Model	Gearbox Model	Gear Ratio	3	3.6	6	9	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
		r/min	600	500	300	200	144	120	100	90	72	60	50	36	30	24	20	18	15	12	10	9
9IDG□ -200FH	9HBK□BH 9HFK□BH	kgfcm	32.4	38.8	64.7	97.1	121.9	146.3	175.5	176.8	221.0	265.2	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
		N.m	3.17	3.81	6.34	9.52	11.94	14.33	17.20	17.33	21.66	25.99	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40

Motor Model	Gearbox Model	Gear Ratio	7.5	10	15	20	25	30	40	50	60	80	100
		r/min	240	180	120	90	72	60	45	36	30	22.5	18
9IDG□-200FWH	9WHD□-030	kgfcm	81.9	105.3	148.2	183.7	214.3	204.1	183.7	173.5	163.3	132.7	–
		N.m	8.02	10.32	14.52	18.00	21.00	20.00	18.00	17.00	16.00	13.00	–
	9WHD□-040	kgfcm	–	–	–	–	–	–	–	315.0	330.0	295.0	270.0
		N.m	–	–	–	–	–	–	–	30.88	32.35	28.92	26.47

50Hz

Motor Model	Gearbox Model	Gear Ratio	3	3.6	6	9	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
		r/min	500	417	250	167	120	100	83	75	60	50	42	30	25	20	17	15	13	10	8	7.5
9IDG□ -200FH	9HBK□BH 9HFK□BH	kgfcm	37.4	44.8	74.7	112.1	140.6	168.8	202.5	204.0	255.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
		N.m	3.66	4.39	7.32	10.98	13.78	16.54	19.85	19.99	24.99	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40

Motor Model	Gearbox Model	Gear Ratio	7.5	10	15	20	25	30	40	50	60	80	100
		r/min	200	150	100	75	60	50	37.5	30	25	18.75	15
9IDG□-200FWH	9WHD□-030	kgfcm	94.5	121.5	171.0	183.7	214.3	204.1	183.7	173.5	163.3	132.7	–
		N.m	9.26	11.91	16.76	18.00	21.00	20.00	18.00	17.00	16.00	13.00	–
	9WHD□-040	kgfcm	–	–	–	–	–	–	–	350.0	330.0	295.0	270.0
		N.m	–	–	–	–	–	–	–	34.31	32.35	28.92	26.47

1) Enter the phase & voltage code in the box (□) within the motor model name.
2) Enter the gear ratio in the box (□) within the Gearbox model name.
3) A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
4) The rotating speed is calculated by dividing the motor's synchronous speed (50Hz: 1,500r/min, 60Hz: 1,800r/min) by the gear ratio.
The actual speed is 2~20% less than the displayed value, depending on the size of the load.

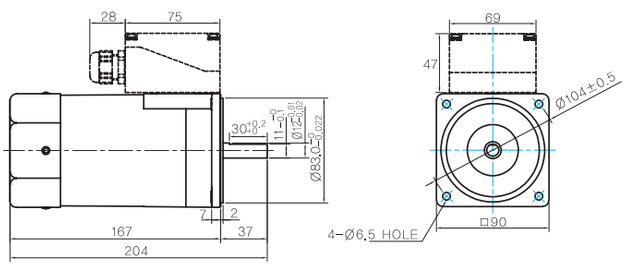
B AC Motors

Induction Motor 200W(□90mm)

Dimensions

MOTOR ONLY

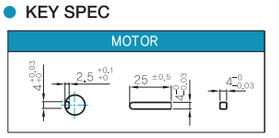
● MOTOR MODEL:
9IDD□–200F(–T) (GENERAL FAN)



● MOTOR OUTPUT SHAFT

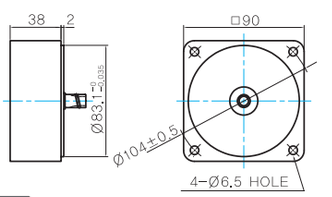
MODEL	SPEC
D-CUT TYPE	
9IDD□–200F	
KEY TYPE	
9IDK□–200F	

● KEY SPEC



INTER-DECIMAL GEARBOX

● MODEL:
9XD10□□



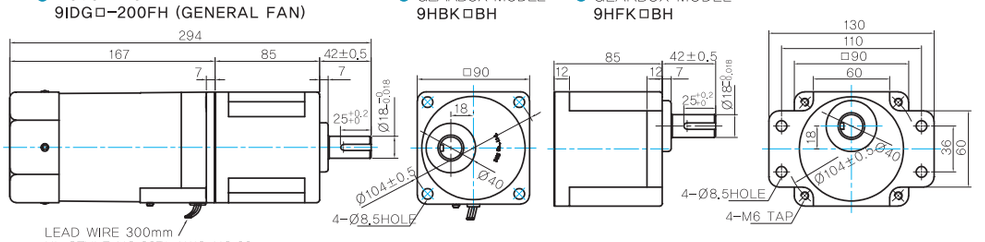
GEARED MOTOR

H TYPE GEARBOX

● MOTOR MODEL:
9IDG□–200FH (GENERAL FAN)

● GEARBOX MODEL:
9HBK□BH

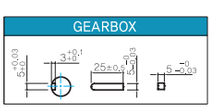
● GEARBOX MODEL:
9HFK□BH



● GEARBOX OUTPUT SHAFT

MODEL	SPEC
KEY TYPE	
9HBK□BH 9HFK□BH	

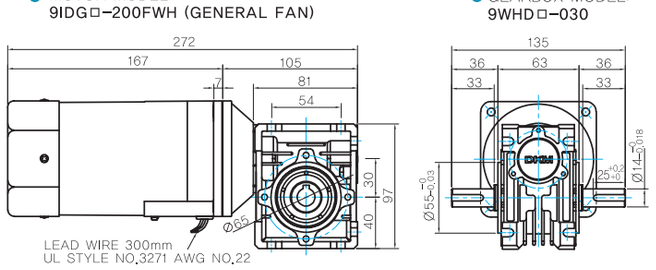
● GEARBOX



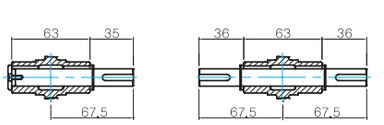
WH TYPE GEARBOX

● MOTOR MODEL:
9IDG□–200FWH (GENERAL FAN)

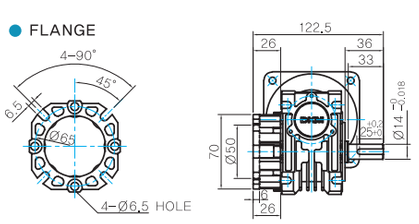
● GEARBOX MODEL:
9WHD□–030



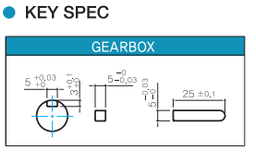
● SHAFT(Unidirectional, Bi-directional)



● FLANGE



● KEY SPEC



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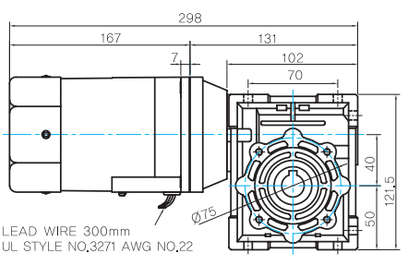
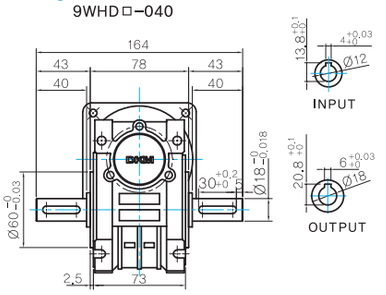
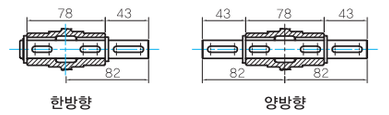
● MOTOR MODEL:
9IDG□-200FWH (GENERAL FAN)



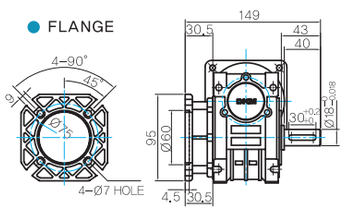
● GEARBOX MODEL:
9WHD□-040



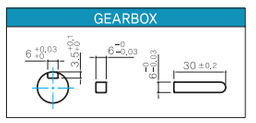
● SHAFT



● FLANGE



● KEY SPEC



● WEIGHT

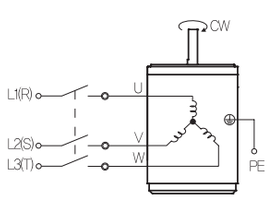
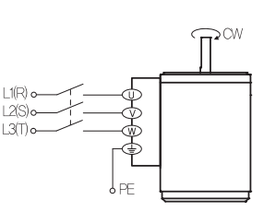
PART		WEIGHT(Kg)
MOTOR		3.0
GEAR BOX	9HB(F)K3BH ~ 9HB(F)K9BH	1.45
	9HB(F)K12.5BH ~ 9HB(F)K18BH	1.5
	9HB(F)K20BH ~ 9HB(F)K60BH	1.7
	9HB(F)K75BH ~ 9HB(F)K200BH	1.8
	9WHD□-030	1.13
	9WHD□-040	2.2
	9XD10□□	0.5

* 출력 FLANGE와 SHAFT는 별매입니다.

Motor Images

9IDD□-200F	9IDD□-200F-T	9IDG□-200FH+9HBK□BH	9IDG□-200FH+9HFK□BH	9IDG□-200FWH+9WHD□-030
				

Connection Diagrams

Lead Wire Type	Terminal Box Type
	

* **CCW Direction:**
Change any two connections among R, S and T.

* **CCW Direction:**
Change any two connections among R, S and T.

1) The direction of motor rotation is as viewed from the shaft end of the motor.
2) CW represents the clockwise direction, while CCW represents the counterclockwise direction.