MITSUBISHI ELECTRIC

Changes for the Better

THREE PHASE INDUCTION MOTOR WITH CYCLO DRIVE GEAR

SUPER LINE Q SERIES

Brilliant engineering with unmatched performance advantages

1/4~10HP 4P(63~132Fr.)

SF-QRGC 2HP 4P

SF-QRGC 7.5HP 4P

- Motor efficiency class IE1 conformed with IEC 60034-30-1
- Same installation base on cyclo gear motor
- Compatible with distribution control devices
- High corrosion resistance
- Degrees of protection IP55
- Thermal class 155(F)
- Developed & made in Thailand, Gear set by SM-Cyclo (Thailand) Co.,Ltd.

ENERGY SAVING FOR A GREEN WORLD

MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD.

What's New

Advance efficiency for energy saving

Efficiency is higher than non IE1 motor, Advanced energy saving is possible with three phase Q-Series.

MITSUBISHI ELECTRIC THREE PHASE INDUCTION MOTOR

3 HP (2.2 kW)		4 POLE		TYPE SF-QRGC	
Hz	50	50	50	FRAME	100L
V	220	380	415	RATING	S1
A	8.7	5.0	4.9	TH. CLASS	155 (F)
min-1	1420	1420	1440	AMB TEMP	40°C
P.F.	0.84	0.84	0.78	BEARING	6205ZZ
RATED EFF.	79.7%	79.7%	79.7%		6205ZZ
EFF. CLASS.	IE1	IE1	IE1	IP55	IC411
STD.	IEC 60034-1	IEC 60034-30-1		SERIAL	

MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO.,LTD.

NM54N703-XX

Sample name plate model : SF-QRGC 3HP(2.2kW) 4P IP55

*The efficiency values and IE code are specified on nameplate.

Corrosion resistance

Steel part of motor Q-series have been change under coat painting by electric process EDP (Electro Deposited Paint). Which renowned for its superior corrosion resistance, rust protection, uniformed coating film and long life used.

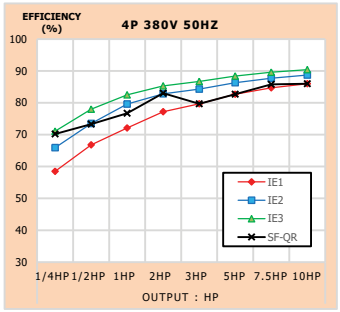
Old : under coat by dipping

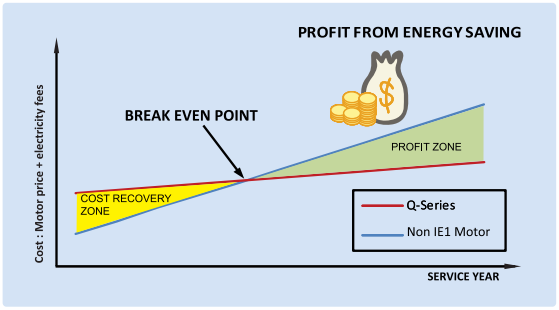
New : under coat by EDP

By salt spray test 192Hr

Hidden profit from energy saving

The investment cost of motor doesn't refer to only price, but including the variable electricity fees. Three phase Q-Series can be helped to reach a break even point sooner by advance energy saving performance, to consume less electricity fees.





Features and benefits

Efficiency class guarantee

The optimized electrical design and the material with low generation loss are used for core that make MITSUBISHI ELECTRIC AUTOMATION(THAILAND) are the first manufacturer in thailand who guarantee "IE1" efficiency class on three phase motor.

Smooth operation and low noise

In comparison to the sliding tooth contact of the conventional gearing, the rolling contact of the cyclo system provide to reduce a noise level.

Ease of maintenance

Cyclodrive can be easily disassembled and assembled for maintenance using only simple hand tool. Furthermore, the number of parts are less than conventional involve gear system thereby enabling saving on spare parts costs.

500% Over shock load

This photoelastic experiment cleary shows a number of cycloidal teeth constantly in contact with the rollers thereby distributing the loads.

No catastrophic failure

Due to the fact that cycloidal teeth can not break, there is no chance for the cyclo to experience catastrophic (Immediate) failure.

Compatibility with distribution control devices

Since the motors are designed for combined use with Mitsubishi's distribution control devices. The devices with equivalent specifications to those used for conventional motors can be used.

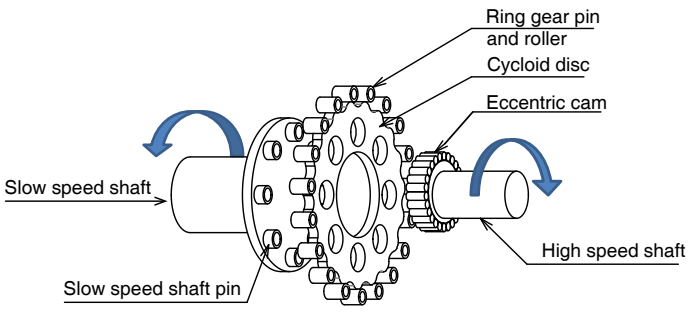
Installation

Q-series models can be installed instead of the J-series.

How it works

The unique CYCLO speed reducing system is base on an ingeniously simple principle offering many benefits to the designer and user of power transmission drives. Basically, speed reducer has only three major moving part :

- High speed input shaft with integrally mounted eccentric cam and roller bearing assembly.
- Cycloid discs.
- Slow speed shaft assembly.



Ordering

Model name	Output	Gear ratio (or speed)	Voltage	Frequency
EX. SF-QR GC	5HP (3.7kW)	1:35 or 41 rpm*	220V or 380V	50Hz

SF-QR: Three phase induction motor, Super line Q series
GC: CYCLO DRIVE Gear, 6000 Series

Remark : min^{-1} = r/min or rpm (Revolutions per minute)

Load factor by the drive application

[Load factor] U: Uniform load M: Moderate shock H: Heavy shock

Table 1 - Load factor

Daily duty	~3 hours/day			~10 hours/day			~24 hours/day		
	U	M	H	U	M	H	U	M	H
Load factor	0.80	1.00	1.35	1.00	1.20	1.50	1.20	1.35	1.60

Lubrication detail

(1) For the grease lubrication type, grease is filled from factory. For ambient temperature between -15°C to +40°C, lithium soap grease (extreme pressure) NLGI No.000 is applicable. Grease lubrication type can be installed in universal direction is as show in Fig. 1

(2) For the oil lubrication type, no filled oil from factory shipment. Select appropriate oil type and quantity by refer to table 4-5. Before operation, Oil level must be above red line on oil level gauge. Do not overfill, doing so can cause to leak or overheat. Allowable inclination for horizontal installation is as show in Fig. 1

Table 2 - Recommended grease

Ambient temperature (°C)	Model		
	Maintenance-free series	Other grease model	
	FUCHS	Cosmo Oil	Shell
-10 ~ 50	RENOLIT LX2	COSMO GREASE DYNAMAX SH No.2	SHELL GADUS S2 V100 2

Table 3 - Grease Quantity (grams)

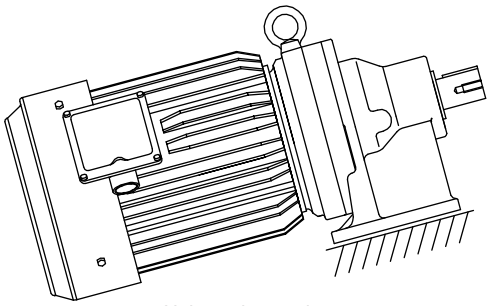
Frame size	608	609	610	611	612
Reduction portion	65	90	140	200	330
Slow speed shaft bearing portion	70	100	100	90	120

Table 4 - Recommended Oil

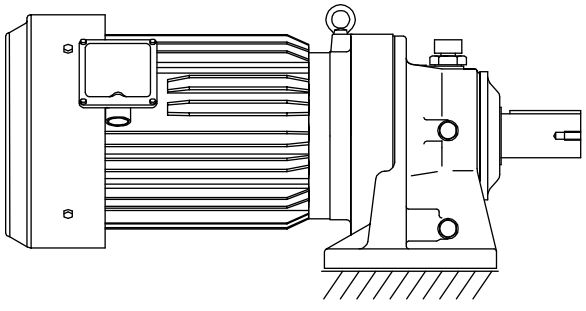
Ambient temperature (°C)	Nisseki Mitsubishi	Idemitsu Kosan	Gulf Oil	Esso Oil	Mobil Oil	Shell Oil	BP Oil
-10 ~ 5	Bonnok M 68	Daphe Super Gear Oil 68	EP Lubricant HD 68	Spatan EP 68	Mobil Gear 626 (ISO VG 68)	Omala Oil 68	Energol GR-XP 68
0 ~ 35	Bonnok M 100, 150	Daphe Super Gear Oil 100, 150	EP Lubricant HD 100 HD 150	Spatan EP 100 EP 150	Mobil Gear 627 629 (ISO VG 100, 150)	Omala Oil 100, 150	Energol GR-XP 100 GR-XP 150
30 ~ 50	Bonnok M 200 ~ 460	-	EP Lubricant HD 220 HD 320 HD 460	Spatan EP 220 EP 320 EP 460	Mobil Gear 630 632 633 634 (ISO VG 200 ~ 460)	Omala Oil 220, 230 460	Energol GR-XP 220 GR-XP 320 GR-XP 460

Table 5 - Oil Quantity (litre)

Frame size	613	614	616	617
Horizontal shaft	0.7	0.7	1.4	1.9



Universal mounting
for grease lubrication type



Horizontal mounting
for oil lubrication type

Fig. 1 - Mounting position

Motor characteristic

Table 6 - Motor characteristic for 1/2 ~ 10HP (0.4 ~ 7.5kW) LT : 220/380/415V 50Hz

Output HP(kw)	Output Speed (min^{-1})	Reduction ratio	Output Torque (N·m)	Allowable Radial load (N)	SF	Motor specification V	Hz	A
1/2(0.4)	242	1:6	15	1920	1.48	220 380 415	50 50 50	2.00 1.14 1.18
	132	1:11	27.5	2300	1.48			
	97	1:15	37.5	2550	1.48			
	85	1:17	42.5	2560	1.48			
	69	1:21	52.6	2560	1.38			
	58	1:25	62.6	3340	1.68			
	50	1:29	72.6	3340	1.56			
	41	1:35	87.6	3340	1.53			
	34	1:43	108	3340	1.51			
1(0.75)	242	1:6	28.2	2840	1.53	220 380 415	50 50 50	3.20 1.85 1.80
	132	1:11	51.6	3340	1.53			
	97	1:15	70.4	3340	1.53			
	85	1:17	79.8	3340	1.53			
	69	1:21	98.5	3340	2.01			
	58	1:25	117	5400	1.69			
	50	1:29	136	5400	1.61			
	41	1:35	164	5400	1.6			
	34	1:43	202	5400	1.44			
2(1.5)	242	1:6	56.3	4130	1.57	220 380 415	50 50 50	6.1 3.5 3.5
	132	1:11	103	5220	1.57			
	97	1:15	141	5400	1.57			
	85	1:17	160	5400	1.33			
	69	1:21	197	5400	1.52			
	58	1:25	235	8650	2.06			
	50	1:29	272	8990	1.91			
	41	1:35	328	9490	1.58			
	34	1:43	404	9810	1.56			
3(2.2)	242	1:6	82.6	4640	1.61	220 380 415	50 50 50	8.7 5.0 4.9
	132	1:11	151	5900	1.61			
	97	1:15	206	6490	1.61			
	85	1:17	234	6550	1.45			
	69	1:21	289	6920	1.41			
	58	1:25	344	8560	1.4			
	50	1:29	399	8880	1.58			
	41	1:35	482	9350	1.31			
	34	1:43	592	11800	1.52			
5(3.7)	242	1:6	139	5210	1.37	220 380 415	50 50 50	14.0 8.1 8.0
	132	1:11	255	6580	1.37			
	97	1:15	347	7260	1.37			
	85	1:17	394	7320	1.53			
	69	1:21	486	8010	1.29			
	58	1:25	579	9790	1.55			
	50	1:29	671	10300	1.31			
	41	1:35	810	16000	1.69			
	34	1:43	995	16000	1.26			
7.5(5.5)	242	1:6	206	6060	1.71	220 380 415	50 50 50	20.2 11.7 11.6
	132	1:11	379	7680	1.71			
	97	1:15	516	8130	1.41			
	85	1:17	585	8710	1.51			
	69	1:21	723	9260	1.22			
	58	1:25	860	14500	1.44			
	50	1:29	998	14800	1.37			
	41	1:35	1200	18800	1.46			
	34	1:43	1480	20000	1.42			
10(7.5)	242	1:6	282	5980	1.51	220 380 415	50 50 50	26.8 15.5 15.0
	132	1:11	516	7570	1.51			
	97	1:15	704	8000	1.2			
	85	1:17	798	12900	1.6			
	69	1:21	985	13800	1.27			
	58	1:25	1170	16900	1.79			
	50	1:29	1360	17600	1.52			
	41	1:35	1640	18600	1.28			
	34	1:43	2020	22500	1.51			

Motor characteristic

Table 7 - Motor characteristic for 5 ~ 10HP (3.7 ~ 7.5kW) HT : 380/415V 50Hz

Output HP(kw)	Output Speed (min^{-1})	Reduction ratio	Output Torque (N·m)	Allowable Radial load (N)	SF	Motor specification V	Hz	A
5(3.7)	242	1:6	139	5210	1.37	380 415	50 50	8.1 8.0
	132	1:11	255	6580	1.37			
	97	1:15	347	7260	1.37			
	85	1:17	394	7320	1.53			
	69	1:21	486	8010	1.29			
	58	1:25	579	9790	1.55			
	50	1:29	671	10300	1.31			
	41	1:35	810	16000	1.69			
	34	1:43	995	16000	1.26			
7.5(5.5)	242	1:6	206	6060	1.71	380 415	50 50	11.7 11.7
	132	1:11	379	7680	1.71			
	97	1:15	516	8130	1.41			
	85	1:17	585	8710	1.51			
	69	1:21	723	9260	1.22			
	58	1:25	860	14500	1.44			
	50	1:29	998	14800	1.37			
	41	1:35	1200	18800	1.46			
	34	1:43	1480	20000	1.42			
10(7.5)	242	1:6	282	5980	1.51	380 415	50 50	15.4 14.7
	132	1:11	516	7570	1.51			
	97	1:15	704	8000	1.2			
	85	1:17	798	12900	1.6			
	69	1:21	985	13800	1.27			
	58	1:25	1170	16900	1.79			
	50	1:29	1360	17600	1.52			
	41	1:35	1640	18600	1.28			
	34	1:43	2020	22500	1.51			

Outline dimensions

Grease lubrication type

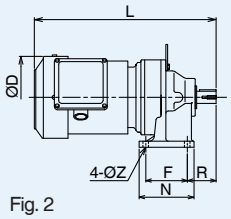


Fig. 2

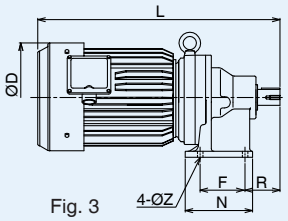
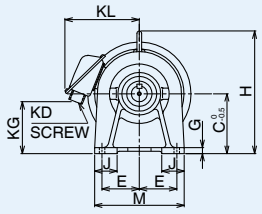


Fig. 3



Oil lubrication type

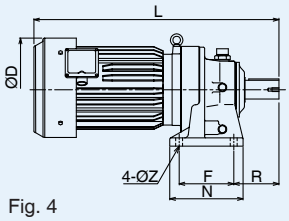


Fig. 4

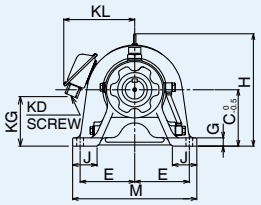


Table 8 - Outline dimensions

Output HP(kW)	Gear ratio	Frame size	Dimensions (mm) L	ØD	F	R	N	KD	KL	KG	J	E	M	G	C	H	ØZ	Weight (kg)	Fig.
1/2(0.4)	1:6 - 1:21	608 □	338.5	148	75	52	99	PF1/2	140	86	37	60	144	13	90	185	9	12	2
	1:25 - 1:43	609 □	353	148	90	60	135	PF1/2	140	96	40	75	180	12	100	205	11	15	2
1(0.75)	1:6 - 1:21	609 □	367	162	90	60	135	PF3/4	145	58	40	75	180	12	100	205	11	19	2
	1:25 - 1:43	610 □	381	162	90	60	135	PF3/4	145	58	40	75	180	12	100	205	11	23	2
2(1.5)	1:6 - 1:21	610 □	426	184	90	60	135	PF3/4	158	69	40	75	180	12	100	216	11	31	2*
	1:25 - 1:43	612 □	453.5	184	115	82	155	PF3/4	158	89	55	95	230	15	120	251	14	41	2*
3(2.2)	1:6 - 1:21	611 □	477	207	90	70	135	PF3/4	170	84	45	75	180	12	120	239	11	39.5	3
	1:25 - 1:35	612 □	501	207	115	82	155	PF3/4	170	84	55	95	230	15	120	251	14	46.5	3
	1:43	613 □	557	207	145	100	195	PF3/4	170	114	65	145	330	22	150	294	18	60	4
5(3.7)	1:6 - 1:21	612 □	513	228	115	82	155	PF3/4	182	95	55	95	230	15	120	254	14	53.5	3
	1:25 - 1:29	613 □	567	228	145	100	195	PF3/4	182	125	65	145	330	22	150	296	18	71	4
	1:35, 1:43	614 □	587	228	145	120	195	PF3/4	182	125	65	145	330	22	150	296	18	73.5	4
7.5(5.5)	1:6 - 1:21	613 □	616.5	266	145	100	195	PF1	210	114	65	145	330	22	150	304	18	88	4
	1:25 - 1:29	614 □	636.5	266	145	120	195	PF1	210	114	65	145	330	22	150	304	18	94.5	4
	1:35, 1:43	616 □	684.5	266	150	139	238	PF1	210	124	75	185	410	25	160	349	18	130	4
10(7.5)	1:6 - 1:15	613 □	654.5	266	145	100	195	PF1	210	114	65	145	330	22	150	304	18	100	4
	1:17, 1:21	614 □	674.5	266	145	120	195	PF1	210	114	65	145	330	22	150	304	18	101	4
	1:25 - 1:35	616 □	722.5	266	150	139	238	PF1	210	124	75	185	410	25	160	349	18	136	4
	1:43	617 □	766.5	266	275	125	335	PF1	212	164	80	190	430	30	200	403	22	162	4

* use eye bolt at connector bracket

Table 9 - Shaft end dimensions

Frame size	Dimensions (mm) Q	QK	øS h6		W(key) h9		T(key) h9		U	ZT	ZH	øSD	Fig.
608 □	35	30	22h6	0 -0.013	6	0 -0.030	6	0 -0.030	3.5	M6	16	45	5
609 □	35	32	28h6		8	0 -0.036	7	0 -0.090	4	M8	20	45	5
610 □	35	32	28h6		8		7		4	M8	20	50	5
611 □	45	37	32h6	0 -0.016	10		8		5	M8	20	55	5
612 □	55	50	38h6		10		8		5	M8	20	65	5
613 □	70	56	50h6		14	0 -0.043	9		5.5	M10	18	65	5
614 □	90	80	50h6		14		9		5.5	M10	18	65	5
616 □	90	80	60h6	0 -0.019	18	0 -0.052	11	0 -0.110	7	M10	18	85	5
617 □	90	80	70h6		20		12		7.5	M12	24	95	5

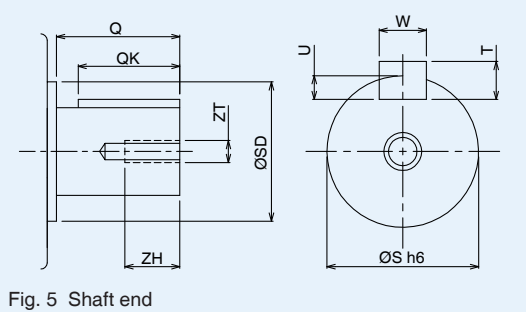


Fig. 5 Shaft end

Standard Specification

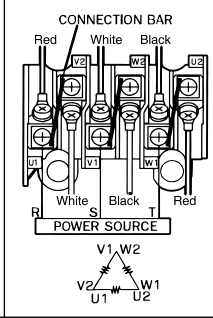
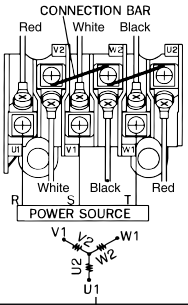
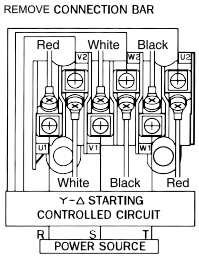
Table 10 - Standard specification

Item	Specification
Output	1/2HP (0.4kW) ~ 10HP (7.5kW)
Pole	4
Phase	3 Phase
Voltage and frequency	LT : 220/380/415V 50Hz (1/2 ~ 10HP) HT : 380/415V 50Hz (5 ~ 10HP)
Gear ratio	1:6 ~ 1:43
Method of cooling	IC411
Rating	S1 (Continuous)
Thermal class	155(F)
Starting	Direct, Y- Δ
Enclosure condition	Totally-enclosed fan-cooled
Degree of protection	Outdoor (IP55)
Mounting	Foot mount
Frame material	Steel plate
Mounting direction	Grease lubrition type : Slow speed shaft in universal direction Oil lubrication type : Slow speed shaft in horizontal direction
Lubrication	Grease lubrication : 1/2HP ~ 2HP (1:6 ~ 1:43) , 3HP (1:6 ~ 1:35) and 5HP (1:6 ~ 1:21) Oil Lubrication (no filled oil from factory) : 3HP (1:43), 5HP (1:25 ~ 1:43) and 7.5HP ~ 10HP (1:6 ~ 1:43)
Direction of output shaft rotation	Clockwise rotation (CW)
Ambient temperature	-10°C ~ +40°C
Ambient humudity	95% RH or less
Altitude	1,000m above sea level or less
Coating color	Munsell N1.5 (Black)
Conformed standard	IEC 60034-1, IEC 60031-30-1

Connection

Connect power supply to terminal as shown in Table 11. To rotate in opposite direction, swap any pair of wire (from R, S, and T).

Table 11 - Standard wiring

<table>
<tr><td rowspan="3">OUTPUT (HP)</td><td colspan="3">TERMINAL CONNECTION & WIRE CONNECTION METHOD</td></tr>
<tr><td colspan="2">DIRECT START</td><td>Y- Δ START</td></tr>
<tr><td>220V (Δ)</td><td>380/415V (Y)</td><td>220V</td></tr>
<tr><td>LT
1/2 ~ 10HP</td><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td rowspan="2">HT
5 ~ 10HP</td><td colspan="2">DIRECT START</td><td>Y- Δ START</td></tr>
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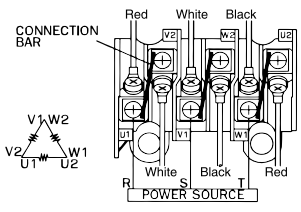
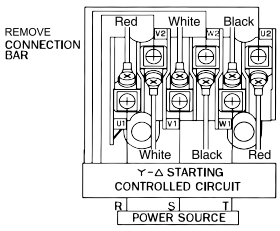
<tr><td></td><td colspan="2"> 
</td><td> 
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