	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض								مر شرت تعدیترہ یا	
NISOC	خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک ( <i>قرارداد</i> 03_BK-HD-GCS							HAVAYAR		
شماره پیمان:		DATASH	IEET (W/DR/	AWING) F	OR AUX		TORS			
· 08 - · V8 - 914F	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	<sup>،</sup> از 91	شماره صفحه: 1
	BK	GCS	HY	120	EL	DS	0002	V02		





#### **REVISION RECORD SHEET**

PAGE	V00	V01	V02	V03	V04
1	Х	Х	Х		
2	Х	Х	Х		
3	Х	Х	X		
4	Х	Х	Х		
5	Х	Х	Х		
6	Х	Х	Х		
7	X	Х	Х		
8	X	X	X		
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10	$\sim$	X	X	1	
10	$\hat{\mathbf{v}}$	Ŷ	X		
11	X				
12	X		$\hat{\mathbf{v}}$		
13	X		X		
14	X		X		
15	X	X	X		
16	Х	X	X		
17	Х	Х	Х		
18	Х	Х	Х		
19	X	Х	Х		
20	Х	Х	Х		
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42		X	X		
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44		Х	Х		
45		Х	Х		
46		X	Х		
47		Х	Х		
48		Х	Х		
49		Х	Х		
50		Х	Х		
51	1	X	X		1
52		X	X		
52	1	X	X	1	1
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63		Х	Х		
64		Х	Х		
65		X	X		
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PAGE	V00	V01	V02	V03	V04
66		Х	Х		
67		Х	Х		
68		Х	Х		
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74		Х	Х		
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NISOC	خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک (قرارداد 03 _BK -HD-GCS-CO							HAVAYAR Tomorrow Needs Innovation.	
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS							
· DT - · VT - 91AF	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	شماره صفحه 3 از 91
<u> </u>	BK	GCS	HY	120	EL	DS	0002	V02	

## MOTOR BARRING DEVICE

(# M-2101-BM A/B/C)



	Data Sheets for LV Induction Motors								
Item	Category	Required Specification	Vendor Data						
1	Driven Machine	Electrical Motor	Electrical Motor						
2	Driven Machine Tag No.	-	M-2101-AP A/B/C						
3	Manufacturer	By Vendor	HYOSUNG						
4	Manufacturer's Number / Type	By Vendor	ES1E100562 / EF						
5	Manufacturing Standard	IEC 60034 & IPS-M-EL-131(2)	IEC 60034 & IPS-M-EL-131(2)						
6	Location	[X] Outdoor (Under Shelter) [ ] Indoor	Outdoor						
7	Area Classification	Acc. to requisition data	Zone 2 IIB T3						
8	Ambient Temperature	5 to +55°C	5 to +55°C						
9	Relative Humidity	100 %	100%						
10	Dust	[X] Yes [ ] No	Yes						
11	Corrosion	[X] Yes [ ] No	Yes						
12	Elevation	12.5m Above Sea Level	12.5m Above Sea Level						
13	Quantity	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	3						
14	Tag Number	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	M-2101-AP A/B/C						
15	Motor Type	Asynchronous, Squirrel Cage	Asynchronous, Squirrel Cage						
16	Mounting	[]Horizontal []Vertical	Horizontal						
17	Rotor Construction	[] Brazed Copper Bars [] Aluminum Die Cast	Aluminum Die Cast						
18	Frame Material	Steel Sheet or Cast Iron	Cast Iron						
19	Rotor Cage Material	By Vendor	Aluminum Die Cast						
20	Cooling Method	IC411 According to IPS-M-EL-131(2)	IC411						
21	Ingress Protection Degree for Motor	IP 54	IP 55						
22	Ingress Protection Degree for Terminal Box	IP 55	IP 55						
23	Explosion Protection of Motor	N/A for Safe Area Zone 2, IIB, T3	Ex db llB T4 Gb						
24	Explosion Protection of Terminal Box	N/A for Safe Area Zone 2, IIB, T3	Ex db llB T4 Gb						
25	Ex. Certificate Authority/Certificate No.	By Vendor	SIRA 15ATEX1064X						
26	Driven Machine Shaft Power Requirement <sup>(P</sup> mp <sup>)</sup>	As Per Related Mechanical Data sheet (to be Specified by Vendor)	1.2KW						
27	De-Rating Factor due to Ambient Temperature (Kt)	Vendor Shall Advise	1=De-Rating 0% at 55°C						
28	De-Rating Factor Due to Altitude (Ka)	1	1=De-Rating 0% at 12.5m						
29	Design margin (K <sub>m</sub> )	Acc. to IPS Standard (Note 1)	1.25						

			٢	بدان نفتی بینک مراد من	ش تولید مب مارنیم تح	، و افزاین - الارمز	نگهداشت سطا			0	HIRGAN TO
				يت الأرض	ے و ابنیہ تہ	ح الدرص	<u>سع</u>			شركت تدمه بتروايان	
			تى) يىنك	رفت و بر گش	سور گاز (	کمپر س	کیج های	خريد پا			
N150	JC		(1	BK-HD-GCS	S-CO-00	08_03	(قرارداد	)			Tomorrow Needs Innovation
	شماره پیمان:		DATASH	EET (W/DRA)	WING) FOF	R AUXIL	IARY MO	TORS			
۵۳ – ۲۵	- 9184	پروژه BK	بسته کاری GCS	صادر کننده HY	تسهيلات 120	رشته EL	نوع مدر ک DS	سريال 0002	نسخه V02	از 91	شماره صفحه 5
				Data Shee	ts for LV	Inducti	<mark>on Motor</mark>	S		<u></u>	
Item		Ca	tegory			Requ	ired Spec	ification		Ve	endor Data
30	Motor Shaft Pow	ver Requiren	nent @ Site <sup>cor</sup>	dition (=Km X Pmp)			By Vendo	or			1.7KW
31	Standard Rated M	Aotor Outpu	ıt				By Vendo	or			2.2KW
32	Frame Size						By Vendo	or			112M
33	Frame Earth Bos	s					External	1			M6
34	Rated Voltage						400 V ±10	)%		4	00 V ±10%
35	Rated Frequency	,					50 Hz ±59	%			50 Hz ±5%
36	Protection Devic	es					Switch-Fu	ise			Yes
37	Neutral Earthing	System					TNS				Yes
38	Voltage During I	Motor Start					80% Un	l			80% Un
39	Synchronous Spe	eed					By Vende	or			1500
40	Full Load Speed	[RPM]					By Vende	or			1455
41	Over Speed Capa	ability					By Vendo	or			150%
42	Number of Poles						By Vendo	or			4
43	Starting Method						Direct on L	Line		D	irect on Line
44	Direction of Rota	ation (Viewe	ed from coupli	ng end)	Shall be Rotation	Proposed of Direct	by MFR Ba ion	sed on Drive	en Load	[]	[ ] CW [ X ] CCW Unidirectional Bidirectional
45	Stator Winding O	Connection					Delta				Delta
46	Location of Tern	ninal Box (V	viewed from D	DE)		[	] Right [	] Left			Left
47	Insulation Class						Class F				Class F
48	Class of Tempera	ature Rise					Class B				Class B
49	Max. Permissible	e Starting Ti	me [s]		1		By Vendo	or			15s
50	Accelerating Tin DOL starting, at 100% U	ne n <sup>[s]</sup>					By Vendo	or			0.2sec
51	Accelerating Tin DOL starting, at 80% U	ie [s]			1		By Vendo	or			0.4sec
52	Starting Torque at 100%	<sup>U</sup> n <sup>[N.m]</sup>					By Vendo	or			25.9
53	Starting Torque at 80% U	n <sup>[N.m]</sup>			1		By Vendo	or			16.6
54	Maximum Torqu	ie [N.m]			1		By Vendo	or			33.1
55	Pull-Up Torque						By Vendo	or			23.7
56	Locked Rotor To	orque					By Vendo	or			25.9
57	Rated Torque [N	.m]					By Vende	or			14.4

By Vendor

4.8

58

Rated Current [A]



	Data Sheets for LV Induction Motors								
Item	Category	Required Specification	Vendor Data						
59	Max Starting Current	By Vendor	33.6						
60	No Load Current [A]	By Vendor	2.3						
61	Locked Rotor Current [A]	< <sup>71</sup> n	700%						
62	Locked Rotor Power Factor [A]	By Vendor	46.30%						
63	Torque-Speed Class	Shall be Selected Based on Driven Load Torque Requirement	[ ] A [ v] B [ ] C [ ] D						
64	Duty Cycle	S1	S1						
65	Current at ½ Rated Load	By Vendor	3.2						
66	Current at ¾ Rated load	By Vendor	4.0						
67	Current at Rated Load	By Vendor	4.8						
68	Starting Power Factor	By Vendor	46.30%						
69	Power Factor at ½ Rated Load	By Vendor	59						
70	Power Factor at ¾ Rated load	By Vendor	69						
71	Power Factor at Rated Load	By Vendor	76						
72	Efficiency at 1/2 Rated Load	By Vendor	83.7						
73	Efficiency at ¾ Rated Load	By Vendor	85.7						
74	Efficiency at Rated Load	By Vendor	86.7						
75	No Load Losses	By Vendor	81W						
76	Stall Time (Hot/Cold) (Sec)	By Vendor	15s / 35s						
77	Transient Reactance (X'd)	By Vendor	None						
78	Sub - Transient Reactance (X"d)	By Vendor	None						
79	Acceleration Time At 80% Un (Sec)	By Vendor	None						
	Bearing (DE)								
	Type (Detail Description by Vendor)	Anti Friction (Ball Bearing)	Anti Friction (Ball Bearing)						
	Manufacturer	By Vendor	Later						
80	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours						
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed						
	Lubrication	Grease	Grease						
	Cooling Water/ Oil Capacity	N/A	N/A						
	Permissible Trust Force [N]	By Vendor	Later						
	Bearing (NDE)	1	l						
81	Type (Detail Description by Vendor)	Anti friction (ball bearing)	Anti Friction (Ball Bearing)						
	Manufacturer	By Vendor	Later						
L									



Item	Category	Required Specification	Vendor Data
	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed
	Lubrication	Grease	Grease
	Cooling Water/ Oil Capacity	N/A	None
	Permissible Trust Force [N]	By Vendor	Later
	Space Heater	Not Required	None
	Space Heater Voltage [V]	230VAC, 50Hz, 1Ph	None
	Space Heater Power [W]	By Vendor	None
82	Temp. Detector (Winding/Bearing)	By Vendor	None
83	Terminal Boxes	[X] Power Terminal Box [X] Space heater (if required)	Power Terminal Box
84	Main Power Cable Specification & Size & Orientation	According to (BK-GCS-PEDCO-120-EL-CN-0003)	Not Motor Vendor scope
85	Motor Weight (Net/Shipped)	By Vendor	66 kgf
86	Rotor Moment of Inertia	By Vendor	0.312 kg-m2
87	Method of Cable Entry	[X] Cable Gland [ ] Sealing Gasket	Cable Gland
88	Cable Gland Hub of Main Terminal Box	By Vendor	1-M25x1.5
89	Cable Gland Entry for aux. Terminal Box (if applicable)	1 X M25 (if Required)	None
90	Short Circuit Capability of Terminal Box	30 kA for 0.2 S	None
91	Sound Level at 1 distance meter From Motor	Max. 85 dB(A)	Max. 85 dB(A)
92	Finish Color	Manufacturer Standard	RAL7047 (LIGHT GREY, ENAMEL)
93	Load Torque/Slip, Current/Slip Curves	By Vendor	Refer to document 1STF0238444-L1-0001
94	Motor Torque/Slip, Current/Slip Curves	By Vendor	Refer to document 1STF0238444-L1-0001
95	Time - Current Heating (Thermal Limit) Curve	By Vendor	Refer to document 1TLF0238444-L1-0001
96	Motor Thermal Capacity Data	By Vendor	Refer to document 1TLF0238444-L1-0001
97	Installation, Operation & Maintenance Instruction	By Vendor	Refer to document Instruction Manual
98	Spare Parts List for Two Years Operation	By Vendor	None
99	Commissioning Spare Part List	By Vendor	None
100	Dimensional Outline Drawing	By Vendor	Refer to document ES1E100562
101	Certified Type Test Report & Written Statement	By Vendor	After manufacturing the motor, it will be submitted.
102	Certified Conformity for EX Type Motors	By Vendor	Refer to document Certification
103	Deviation List (if Any)	By Vendor	None

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض									
NISOC	خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک ( <i>قرارداد</i> 03_BK-HD-GCS							HAVAYA	R	
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· ۵۳ - · VT - 911F	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	شماره صفحه: 8 از 91	
	BK	GCS	ΗY	120	EL	DS	0002	V02		

	Data Sheets for LV Induction Motors									
Item	Category	Required Specification	Vendor Data							
104	Test & Inspection	Factory Routine Test Report Shall be Submitted	Will be received with motor.							

DE: Drive End

NDE: Non Drive End CW: Clockwise

CCW: Counter Clockwise

Note 1: IPS design margin is defined in accordance with standard output power rating of motor:

	Standard Output Power Rating	Design margin
1	Up to 22kW	1.25
2	from 22kW to 55kW	1.15
3	Above 55kW	1.10

Note 2: The following values are default unless otherwise specified during finalization of motors:

	Standard Output Power Rating	Cable Size	Gland Size
1	5.5kW	3x6	M25
2	7.5kW	3x6	M25
3	15kW	3x16	M32
4	18.5kW	3x16	M32
5	30kW	3x50	M40
6	37kW	3x50	M40
7	45kW		M50
8	55kW	3x95	M50

		INDUC	TT	ON	JM	TOR	PROJE	CT No.	F023844	4-L	1-0001
	WY LICTRIES							IS No. HLA020106		1060	014870
	UDINICO	<b>D</b> A	<b>ATA</b>	\S]	HEE	T	L-SPEC	No.	DSML21	159	F020H
SHEET 1 OF 1		CUSTOMER	:				ł				
FOR APPROVAL		JOB No.	:	N/A				ITEM	No. :		
SERVICE : N/A		SITE	:	효성깅	∀전_광신기	계공업_UAE PJ	T_220220	QUAN	VTITY	3	SETS
GENER	AL DATA	A				PEF	RFORMA		ΑΤΑ		
FRAME No.	112N	1		OU	TPUT				2.2	2	kW
TYPE	EF			PO	LES				4	ŀ	Р
ENCLOSURE	TE			RO	TOR TY	′PE			SQUIRRE	EL (	CAGE
COOLING METHOD	FC(IC	C411)		STA	ARTING	METHOD			DIRECT	ON	LINE
INSULATION CLASS	F	CLASS		PH	ASE				3	5	PHASE
TEMP. RISE AT FULL LOAD	)			FRI	EQUEN	CY			50	)	Hz
RES. METHOD	65	K (at S.F:	1.0)	SPI	EED (A	T FULL LOAD	D)		1455	;	r/min
RATING	S1	``	,	PR	IMARY		,				
LOCATION	OUT	DOOR		1 [	VOLTA	AGE			400	)	V
ALTITUDE	LESS	THAN 1030	m		NO LO	AD CURREN	IT		2.3		A
HUMIDITY	LESS	THAN 100	%	1	FULL L	OAD CURRI	ENT		4.8		A
AMBIENT TEMP.	55	°			I OCKED	-ROTOR CURF	RENT		700	)	%
EXPLOSION PROOF TYPE	Ex dt	IIB T4 Gb		FFF	FICIENC	CY					
MOUNTING	B3				AT 1/2	LOAD			83.7		%
BEARING TYPE	ANTI	-FRICTION		-	AT 3/4	LOAD			85.7		%
NDE/DE BRG, No	62052	ZZ / 620	06ZZ		AT FU	LL LOAD			86.7		%
BRG. LUBRICATION	N/A	<u> </u>		PO	WFR F	ACTOR					
PROTECTION GRADE	IP55				AT 1/2				59.0		%
SERVICE FACTOR	1.0				AT 3/4				69.0		%
DRIVE	DIRE		)		AT FU				76.0		%
SHAFT				то	ROUE						
EXTENSION	SING	SLE			FULL I	OAD			1.47	,	ka-m
EXTERNAL THRUST	N/A			-					14.4	Ļ	N-m
NOISE LEVEL (MEAN VALUE AT 1	m FROM I	MOTOR)			LOCKE	ED ROTOR			180	)	%
NO-LOAD	STAN	NDARD			BREAK	KDOWN			230	)	%
VIBRATION	2.8 m	nm/s (r.m.s)		МОТ	TOR GD <sup>2</sup>	-			0.078	}	ka-m <sup>2</sup>
NUMBER OF	COLI	) : 3 / HOT : 2	(4P)	MAX	( I OAD G	D <sup>2</sup> AT MOTOR	SHAFT		6.2	>	ka-m <sup>2</sup>
CONSECUTIVE STARTS			( )	MO		PROX. WEI	GHT		60	)	kg
ROTATION(VIEWED FROM DE)	C.C.V	N		PAI	INTING			RAL70	47 (LIGHT (	GRE	EY, ENAMEL)
ACCESSORIE	S (OPTI	ONAL)				SUB	MITTAL	DRAW			· /
TEMPERATURE DETECTO	R	,		OU				ES1AS64655			
WINDING	NO			CO	NDUIT	BOX & COVE	R	ES	1B100912		
TYPE	N/A			SPI	EED-TO	RQUE &		1ST	F0238444	1-L1	-0001
BEARING	NO			CU	RRENT	CURVE					
TYPE	N/A			TH	ERMAL	LIMIT		1TL	F0238444	I-L1	-0001
SPACE HEATER	NO			& T	IME-CU	IRRENT CUF	RVE	400			
RATING	N/A						IOR	196	=F0238444	1-L1	1-0001
				α⊏ <rf< td=""><td>MARKS&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></rf<>	MARKS>						
				1.	ABOVE A	ALL DATA ARE	CALCULAT	ED AT	100% VOLT/	AGE	
				2.	PREMIU	M EFFICIENCY	TYPE MO	OR			
				1							
				_							
APPLICATION STANDARDS											
IEC60034-1, ISO 3746			-								
	ICATION OF	ANDARD									
	-10411018 51	ANUARU. EFT			1	2023-06-27	MSKI	М	<u>рнон</u>		BWKO
ANYTHING FLSE SHALL BE IN ACCORDAN		 KFR'S STANDARD			0	2023-00-27	M S KI	M			B.W.KO
3. THE TEMPERATURE MEASURED AT REA	ARING HOUS	ING DOES NOT FXCF	ED 105℃	RF	V. NO	DATE	PREPAR	ED	CHECKED	,	APPROVED
				1 1 1							

		SPEED - T	Curve No.		
IIIOJUINO INDUSTRIES		CURRENT	1STF0238444-L1-0001		
OUTPUT	2.2	kW	POLES	4	Р
VOLTAGE	400	V	FREQUENCY	50	Hz
FULL LOAD TORQUE	1.47	kg∙m	FULL LOAD CURRENT	4.8	А
LOCKED ROTOR TORQUE	180	%	LOCKED-ROTOR CURR	ENT 700	%
BREAKDOWN TORQUE	230	%	SPEED (at FULL LOAD)	1455	r/min
GD <sup>2</sup> of LOAD :	0.05	kg⋅m²	GD <sup>2</sup> of MOTOR	0.078	kg∙m²



NOTE : SPEED-TORQUE CURVE AT 100% RATED VOLTAGE А : SPEED-TORQUE CURVE AT В 90% RATED VOLTAGE : SPEED-TORQUE CURVE AT 80% RATED VOLTAGE С : SPEED-CURRENT CURVE AT D 100% RATED VOLTAGE Е : SPEED-CURRENT CURVE AT 90% RATED VOLTAGE F : SPEED-CURRENT CURVE AT 80% RATED VOLTAGE : LOAD SPEED-TORQUE CURVE G

		THE	ERMAL LIMIT &	Curve No.		
I I I O SUINCI INDUSTRIES	Т	IME -	CURRENT CURVE	1TLF0238444-L1-0001		
OUTPUT	2.2	kW	POLES	4	Р	
VOLTAGE	400	V	FREQUENCY	50	Hz	
FULL LOAD TORQUE	1.47	kg∙m	FULL LOAD CURRENT	4.8	А	
LOCKED ROTOR TORQUE	180	%	LOCKED-ROTOR CURR	ENT 700	%	
BREAKDOWN TORQUE	230	%	SPEED (at FULL LOAD)	1455	r/min	
GD <sup>2</sup> of LOAD :	0.05	kg∙m²	GD <sup>2</sup> of MOTOR	0.078	kg∙m²	



	L	.OAD	- POWER FACTOR	Curve No.		
I I I O SUINCE INDUSTRIES		& EFI	FICIENCY CURVE	1PEF0238444-L1-000		
OUTPUT	2.2	kW	POLES	4	Р	
VOLTAGE	400	V	FREQUENCY	50	Hz	
FULL LOAD TORQUE	1.47	kg∙m	FULL LOAD CURRENT	4.8	А	
LOCKED ROTOR TORQUE	180	%	LOCKED-ROTOR CURR	ENT 700	%	
BREAKDOWN TORQUE	230	%	SPEED (at FULL LOAD)	1455	r/min	
GD <sup>2</sup> of LOAD :	0.05	kg∙m²	GD <sup>2</sup> of MOTOR	0.078	kg∙m²	









		٢	ان نفتی بینک ت الارض						
NISOC		ىتى) يىنك <i>E )</i>	فت و بر گش 3K-HD-GC	ر گاز (ر S-CO-0:	کمپر سو 0_800	کیج های <sup>-</sup> (قرارداد 3	خرید پ		HAVAYAR Tomorrow Needs Innovation.
شماره پیمان:		DATASH	EET (W/DRA						
· AT - · VT - 91AF	پروژه	بسته کاری	صادر کننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	شماره صفحه: 15 از 91
	BK	GCS	HY	120	EL	DS	0002	V02	

## Cylinder Lubricator Pump Motor

## (# M-2101-LP A/B/C)

		ې	مرکت تومد چرکاریا <sup>ن</sup>	HIRGAN 15						
NISOC	خرید پکیج های کمپرسور گاز (رفت و بر گشتی) بینک (قرارداد 30_BK-HD-GCS-CO) (قرارداد 30_BK-HD)								HAVAYAR Tomorrow Needs Innovation.	
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· ۵۳ – · V۳ – ۹۱۸۴	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	از 91	شماره صفحه: 16
	BK	GCS	HY	120	EL	DS	0002	V02		

Data Sheets for LV Induction Motors										
Item	Category	Required Specification	Vendor Data							
1	Driven Machine	Electrical Motor	Electrical Motor							
2	Driven Machine Tag No.	-	# M-2101-LP A/B/C							
3	Manufacturer	By Vendor	HYOSUNG							
4	Manufacturer's Number / Type	By Vendor	ES1E100550 / EF-F							
5	Manufacturing Standard	IEC 60034 & IPS-M-EL-131(2)	IEC 60034 & IPS-M-EL-131(2)							
6	Location	[X] Outdoor (Under Shelter) [ ] Indoor	Outdoor							
7	Area Classification	Acc. to requisition data	Zone 2 IIB T3							
8	Ambient Temperature	5 to +55°C	5 to +55°C							
9	Relative Humidity	100 %	100							
10	Dust	[X] Yes [ ] No	Yes							
11	Corrosion	[X] Yes [ ] No	Yes							
12	Elevation	12.5m Above Sea Level	12.5m Above Sea Level							
13	Quantity	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	3							
14	Tag Number	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	# M-2101-LP A/B/C							
15	Motor Type	Asynchronous, Squirrel Cage	Asynchronous, Squirrel Cage							
16	Mounting	[] Horizontal [] Vertical	Vertical							
17	Rotor Construction	[] Brazed Copper Bars [] Aluminum Die Cast	Aluminum Die Cast							
18	Frame Material	Steel Sheet or Cast Iron	Cast Iron							
19	Rotor Cage Material	By Vendor	Aluminum Die Cast							
20	Cooling Method	IC411 According to IPS-M-EL-131(2)	IC411							
21	Ingress Protection Degree for Motor	IP 54	IP 55							
22	Ingress Protection Degree for Terminal Box	IP 55	IP 55							
23	Explosion Protection of Motor	N/A for Safe Area Zone 2, IIB, T3	Ex db llB T4 Gb							
24	Explosion Protection of Terminal Box	N/A for Safe Area Zone 2, IIB, T3	Ex db llB T4 Gb							
25	Ex. Certificate Authority/Certificate No.	By Vendor	SIRA 15ATEX1064X							
26	Driven Machine Shaft Power Requirement <sup>(P</sup> mp <sup>)</sup>	As Per Related Mechanical Data sheet (to be Specified by Vendor)	0.07KW							
27	De-Rating Factor due to Ambient Temperature (Kt)	Vendor Shall Advise	1=De-Rating 0% at 55°C							
28	De-Rating Factor Due to Altitude (Ka)	1	1=De-Rating 0% at 12.5m							
29	Design margin (K <sub>m</sub> )	Acc. to IPS Standard (Note 1)	1.25							



Data Sheets for LV Induction Motors										
Item	Category	Required Specification	Vendor Data							
30	Motor Shaft Power Requirement @ Site condition (=Km X Pmp)	By Vendor	0.0875KW							
31	Standard Rated Motor Output = $^{Km \times P}mp'(^{Ka} ^{K}t)$	By Vendor	0.4KW							
32	Frame Size	By Vendor	80M							
33	Frame Earth Boss	External	M6							
34	Rated Voltage	400 V ±10%	400 V ±10%							
35	Rated Frequency	50 Hz ±5%	50 Hz ±5%							
36	Protection Devices	Switch-Fuse	Yes							
37	Neutral Earthing System	TNS	Yes							
38	Voltage During Motor Start	80% Un	80% Un							
39	Synchronous Speed	By Vendor	1500							
40	Full Load Speed [RPM]	By Vendor	1440							
41	Over Speed Capability	By Vendor	150%							
42	Number of Poles	By Vendor	4							
43	Starting Method	Direct on Line	Direct on Line							
44	Direction of Rotation (Viewed from coupling end)	Shall be Proposed by MFR Based on Driven Load Rotation of Direction	[ ] CW [ X] CCW [ ] Unidirectional [ ] Bidirectional							
45	Stator Winding Connection	Delta	Delta							
46	Location of Terminal Box (Viewed from DE)	[]Right []Left	Left							
47	Insulation Class	Class F	Class F							
48	Class of Temperature Rise	Class B	Class B							
49	Max. Permissible Starting Time [s]	By Vendor	17s							
50	Accelerating Time DOL starting, at 100% U <sub>n</sub> [s]	By Vendor	0.2sec							
51	Accelerating Time DOL starting, at 80% U <sub>n</sub> [s]	By Vendor	0.4sec							
52	Starting Torque at 100% U n [N.m]	By Vendor	4.4							
53	Starting Torque at 80% U [N.m]	By Vendor	2.8							
54	Maximum Torque [N.m]	By Vendor	5.7							
55	Pull-Up Torque	By Vendor	4							
56	Locked Rotor Torque	By Vendor	4.4							
57	Rated Torque [N.m]	By Vendor	2.6							
58	Rated Current [A]	By Vendor	1							



	Data Sheets for LV Induction Motors										
Item	Category	Required Specification	Vendor Data								
59	Max Starting Current	By Vendor	6								
60	No Load Current [A]	By Vendor	0.5								
61	Locked Rotor Current [A]	< <sup>71</sup> n	600%								
62	Locked Rotor Power Factor [A]	By Vendor	62.30%								
63	Torque-Speed Class	Shall be Selected Based on Driven Load Torque Requirement	[ ] A [ v] B [ ] C [ ] D								
64	Duty Cycle	S1	S1								
65	Current at ½ Rated Load	By Vendor	0.6								
66	Current at ¾ Rated load	By Vendor	0.8								
67	Current at Rated Load	By Vendor	1								
68	Starting Power Factor	By Vendor	62.30%								
69	Power Factor at ½ Rated Load	By Vendor	60								
70	Power Factor at ¾ Rated load	By Vendor	70								
71	Power Factor at Rated Load	By Vendor	75								
72	Efficiency at 1/2 Rated Load	By Vendor	75								
73	Efficiency at ¾ Rated Load	By Vendor	77								
74	Efficiency at Rated Load	By Vendor	78								
75	No Load Losses	By Vendor	26W								
76	Stall Time (Hot/Cold) (Sec)	By Vendor	17s / 24s								
77	Transient Reactance (X'd)	By Vendor	None								
78	Sub - Transient Reactance (X"d)	By Vendor	None								
79	Acceleration Time At 80% Un (Sec)	By Vendor	None								
	Bearing (DE)										
	Type (Detail Description by Vendor)	Anti Friction (Ball Bearing)	Anti Friction (Ball Bearing)								
	Manufacturer	By Vendor	Later								
	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours								
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed								
	Lubrication	Grease	Grease								
	Cooling Water/ Oil Capacity	N/A	N/A								
80	Permissible Trust Force [N]	By Vendor	Later								
	Bearing (NDE)	-									
81	Type (Detail Description by Vendor)	Anti friction (ball bearing)	Anti Friction (Ball Bearing)								
	Manufacturer	By Vendor	Later								



	Data Sheets for LV Induction Motors										
Item	Category	Required Specification	Vendor Data								
	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours								
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed								
	Lubrication	Grease	Grease								
	Cooling Water/ Oil Capacity	N/A	None								
	Permissible Trust Force [N]	By Vendor	Later								
<u> </u>	Space Heater	Not Required	None								
	Space Heater Voltage [V]	230VAC, 50Hz, 1Ph	None								
	Space Heater Power [W]	By Vendor	None								
82	Temp. Detector (Winding/Bearing)	By Vendor	None								
83	Terminal Boxes	[X] Power Terminal Box [X] Space heater (if required)	Power Terminal Box								
84	Main Power Cable Specification & Size & Orientation	According to (BK-GCS-PEDCO-120-EL-CN-0003)	Not Motor Vendor scope								
85	Motor Weight (Net/Shipped)	By Vendor	34 kgf								
86	Rotor Moment of Inertia	By Vendor	0.048 kg-m2								
87	Method of Cable Entry	[X] Cable Gland [ ] Sealing Gasket	Cable Gland								
88	Cable Gland Hub of Main Terminal Box	By Vendor	1-M25x1.5 (Provided with reducer 1-M20x1.5)								
89	Cable Gland Entry for aux. Terminal Box (if applicable)	1 X M25 (if Required)	None								
90	Short Circuit Capability of Terminal Box	30 kA for 0.2 S	None								
91	Sound Level at 1 distance meter From Motor	Max. 85 dB(A)	Max. 85 dB(A)								
92	Finish Color	Manufacturer Standard	RAL7047 (LIGHT GREY, ENAMEL)								
93	Load Torque/Slip, Current/Slip Curves	By Vendor	Refer to document 1STF0238444-L1-0002								
94	Motor Torque/Slip, Current/Slip Curves	By Vendor	Refer to document 1STF0238444-L1-0002								
95	Time - Current Heating (Thermal Limit) Curve	By Vendor	Refer to document 1TLF0238444-L1-0002								
96	Motor Thermal Capacity Data	By Vendor	Refer to document 1TLF0238444-L1-0002								
97	Installation, Operation & Maintenance Instruction	By Vendor	Refer to document Instruction Manual								
98	Spare Parts List for Two Years Operation	By Vendor	None								
99	Commissioning Spare Part List	By Vendor	None								
100	Dimensional Outline Drawing	By Vendor	Refer to document ES1E100550								
101	Certified Type Test Report & Written Statement	By Vendor	After manufacturing the motor, it will be submitted.								
102	Certified Conformity for EX Type Motors	By Vendor	Refer to document Certification								
103	Deviation List (if Any)	By Vendor	None								

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض								ترکت نید بنوایا <sup>ن</sup>	
NISOC		خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک (قرارداد 0008-03-BK-HD							(hy)	HAVAYAR Tomorrow Needs Innovation.
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· AT - · VT - 911F	پروژه	بسته کاری	صادر کننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	: از 91	شماره صفحه: 20
	BK	GCS	HY	120	EL	DS	0002	V02		

	Data Sheets for LV Induction Motors								
Item	Category	<b>Required Specification</b>	Vendor Data						
104	Test & Inspection	Factory Routine Test Report Shall be Submitted	Will be received with motor						

DE: Drive End

NDE: Non Drive End CW: Clockwise

CCW: Counter Clockwise

Note 1: IPS design margin is defined in accordance with standard output power rating of motor:

	Standard Output Power Rating	Design margin
1	Up to 22kW	1.25
2	from 22kW to 55kW	1.15
3	Above 55kW	1.10

Note 2: The following values are default unless otherwise specified during finalization of motors:

	Standard Output Power Rating	Cable Size	Gland Size
1	5.5kW	3x6	M25
2	7.5kW	3x6	M25
3	15kW	3x16	M32
4	18.5kW	3x16	M32
5	30kW	3x50	M40
6	37kW	3x50	M40
7	45kW		M50
8	55kW	3x95	M50

		INDUC	TI		OTOR	PROJE	CT No.	F0238444-	_1-0002
HYOSUNG HEAVY					HS No.		HLA020106	6014871	
	USIRIES	DA	TA	SHE	ET	L-SPEC	No.	DSML2144	4F020M
SHEET 1 OF 1		CUSTOMER	:				-	-	
FOR APPROVAL		JOB No.	:	N/A			ITEM	No. :	
SERVICE : N/A		SITE	:	효성강전_광신	기계공업_UAE PJ	T_220220	QUAN		SETS
GENERA		<u> </u>			PEF	RFORMA	NCE D	ATA	
FRAME No.	80M			OUTPUT				0.4	kW
TYPE	EF-F			POLES				4	Р
ENCLOSURE	TE			ROTOR T	YPE			SQUIRREL	CAGE
COOLING METHOD	FC(IC	C411)		STARTIN	G METHOD			DIRECT ON	I LINE
INSULATION CLASS	F	CLASS		PHASE				3	PHASE
TEMP. RISE AT FULL LOAD	)			FREQUE	ICY			50	Hz
RES. METHOD	65	K (at S.F:1.	.0)	SPEED (A	T FULL LOAD	D)		1440	r/min
RATING	S1			PRIMARY		,			
LOCATION	OUT	DOOR		VOLT	AGE			400	V
ALTITUDE	LESS	THAN 1030	m	NO LO		IT		0.5	A
HUMIDITY	LESS	THAN 100	%	FULL	LOAD CURR	ENT		1.0	A
AMBIENT TEMP.	55	°C		LOCKE	D-ROTOR CURF	RENT		600	%
EXPLOSION PROOF TYPE	Ex db	IIB T4 Gb		EFFICIEN	CY				
MOUNTING	V1			AT 1/2	2 LOAD			75.0	%
BEARING TYPE	ANTI	-FRICTION		AT 3/4	1 LOAD			77.0	%
NDE/DE BRG. No.	62032	ZZ / 6204	1ZZ	AT FL	ILL LOAD			78.0	%
BRG. LUBRICATION	N/A			POWER F	ACTOR				
PROTECTION GRADE	IP55			AT 1/2	2 LOAD			60.0	%
SERVICE FACTOR	1.0			AT 3/4	1 LOAD			70.0	%
DRIVE	DIRE	CT COUPLED		AT FL	ILL LOAD			75.0	%
SHAFT				TORQUE					
EXTENSION	SING	IE		FULL	LOAD			0.27	kg-m
EXTERNAL THRUST	N/A			-				2.6	N-m
NOISE LEVEL(MEAN VALUE AT 1	m FROM I	MOTOR)		LOCK	ED ROTOR			170	%
NO-LOAD	STAN	NDARD		BREA	KDOWN			220	%
VIBRATION	2.8 m	nm/s (r.m.s)		MOTOR GD	2			0.012	kg-m <sup>2</sup>
NUMBER OF	COLI	D : 3 / HOT : 2 (4	ŧΡ)	MAX LOAD	GD <sup>2</sup> AT MOTOR	SHAFT		1.7	kg-m <sup>2</sup>
CONSECUTIVE STARTS				MOTOR A	PPROX. WEI	GHT		34	kg
ROTATION(VIEWED FROM DE)	C.C.V	V		PAINTING			RAL7047 (LIGHT GREY, ENAMEL)		EY, ENAMEL)
ACCESSORIE	S (OPTI	ONAL)			SUB	MITTAL	DRAW	INGS	
TEMPERATURE DETECTO	R			OUTLINE	DIMENSION		ES1	A126004	
WINDING	NO			CONDUIT	BOX & COVE	R	ES1	B100912	
TYPE	N/A			SPEED-T	ORQUE &		1ST	F0238444-L	.1-0002
BEARING	NO			CURREN			4 71	<b>E0000444</b>	4 0000
	N/A						11L	F0238444-L	1-0002
	N/A						1PF	F0238444-I	1-0002
	11/7			& EFFICIE	INCY			.1 0200444	1-0002
				<remarks< td=""><td>&gt;</td><td></td><td></td><td></td><td></td></remarks<>	>				
			1. ABOVE ALL DATA ARE CALCULATED AT 100% VOLTAGE.						
				2. PREMIL	IM EFFICIENCY	TYPE MOT	FOR		
				-					
			-						
			-						
IFC60034-1 ISO 3746									
< NOTE > 1. THESE DATA ARE ONLY DESIGN VALUES AND SHALL BE			-						
GUARANTEED WITH TOLERANCE OF APPL	ICATION ST	ANDARD.							
2. EXCEPT FOR STATEMENTS SPECIFIED	ON THIS SH	EET,							
ANYTHING ELSE SHALL BE IN ACCORDAN	CE WITH MA	KER'S STANDARD.		0	2023-04-28	M.S.KI	M	D.H.OH	B.W.KO
3. THE TEMPERATURE MEASURED AT BEA	ARING HOUS	ING DOES NOT EXCEED	D 105℃.	REV. NO	DATE	PREPAR	ED	CHECKED	APPROVED

		SPEE	D - TORQUE &	Curve No.		
I I I O SUINCE INDUSTRIES		CURRENT CURVE			1STF0238444-L1-0002	
OUTPUT	0.4	kW	POLES	4	Р	
VOLTAGE	400	V	FREQUENCY	50	Hz	
FULL LOAD TORQUE	0.27	kg∙m	FULL LOAD CURRENT	1.0	А	
LOCKED ROTOR TORQUE	170	%	LOCKED-ROTOR CURR	ENT 600	%	
BREAKDOWN TORQUE	220	%	SPEED (at FULL LOAD)	1440	r/min	
GD <sup>2</sup> of LOAD :	0.01	kg∙m²	GD <sup>2</sup> of MOTOR	0.012	kg∙m²	



NOTE	<b></b>	А	: SPEED-TORQUE CURVE AT	100%	RATED VOLTAGE
		В	: SPEED-TORQUE CURVE AT	90%	RATED VOLTAGE
		С	: SPEED-TORQUE CURVE AT	80%	RATED VOLTAGE
		D	: SPEED-CURRENT CURVE AT	100%	RATED VOLTAGE
	testestestest stestestest strestest	Е	: SPEED-CURRENT CURVE AT	90%	RATED VOLTAGE
	nonnonnonnon as as internetications	F	: SPEED-CURRENT CURVE AT	80%	RATED VOLTAGE
		G	: LOAD SPEED-TORQUE CURVE		

		THI	ERMAL LIMIT &	Curve No.		
I I I O SUINCI INDUSTRIES	Т	IME -	CURRENT CURVE	1TLF0238444-L1-0002		
OUTPUT	0.4	kW	POLES	4	Р	
VOLTAGE	400	V	FREQUENCY	50	Hz	
FULL LOAD TORQUE	0.27	kg∙m	FULL LOAD CURRENT	1.0	А	
LOCKED ROTOR TORQUE	170	%	LOCKED-ROTOR CURRI	ENT 600	%	
BREAKDOWN TORQUE	220	%	SPEED (at FULL LOAD)	1440	r/min	
GD <sup>2</sup> of LOAD :	0.01	kg∙m²	GD <sup>2</sup> of MOTOR	0.012	kg∙m²	



D : TIME-CURRENT CURVE AT 90% RATED VOLTAGE

	L	.OAD	- POWER FACTOR	Curve No.		
I I I O SUINCI INDUSTRIES		& EFI	FICIENCY CURVE	1PEF0238444-L1-0002		
OUTPUT	0.4	kW	POLES	4	Р	
VOLTAGE	400	V	FREQUENCY	50	Hz	
FULL LOAD TORQUE	0.27	kg∙m	FULL LOAD CURRENT	1.0	A	
LOCKED ROTOR TORQUE	170	%	LOCKED-ROTOR CURR	ENT 600	%	
BREAKDOWN TORQUE	220	%	SPEED (at FULL LOAD)	1440	r/min	
GD <sup>2</sup> of LOAD :	0.01	kg∙m²	GD <sup>2</sup> of MOTOR	0.012	kg∙m²	









	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض								
NISOC		تى) يىنك <i>ا)</i>	فت و بر گش 3K-HD-GC	ِر گاز (ر S-CO-0:	کمپر سو 0_800	کیج های <sup>-</sup> (قرارداد 3	خرید پ		HAVAYAR Tomorrow Needs Innovation.
شماره پیمان:	شماره پیمان: DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· 0T - · VT - 911F	پروژه	بسته کاری	صادر کننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	شماره صفحه: 27 از 91
	BK	GCS	HY	120	EL	DS	0002	V02	

## Aux. Oil Pump Motor

#### (# M-2101-AP A/B/C)

#### &

#### Aux. Pump Motor

### (# P-2101-AX A/B/C)

#### &

### Main Pump Motor

(# P-2101-WP A/B/C)



	Data Sheets for LV Induction Motors						
Item	Category	Required Specification	Vendor Data				
1	Driven Machine	Electrical Motor	Electrical Motor				
2	Driven Machine Tag No.	-	M-2101-AP A/B/C, P-2101-AX A/B/C P-2101-WP A/B/C				
3	Manufacturer	By Vendor	JEMCO				
4	Manufacturer's Number / Type	By Vendor	YCd13219-C11T-301				
5	Manufacturing Standard	IEC 60034 & IPS-M-EL-131(2)	IEC 60034 & IPS-M-EL-131(2)				
6	Location	[X] Outdoor (Under Shelter) [ ] Indoor	Outdoor				
7	Area Classification	Acc. to requisition data	Zone 2 IIB T3				
8	Ambient Temperature	5 to +55°C	5 to +55°C				
9	Relative Humidity	100 %	100				
10	Dust	[X] Yes [ ] No	Yes				
11	Corrosion	[X] Yes [ ] No	Yes				
12	Elevation	12.5m Above Sea Level	12.5m Above Sea Level				
13	Quantity	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	3				
14	Tag Number	Acc. To Load List (BK-GCS-PEDCO-120-EL-LI-0001)	M-2101-AP A/B/C, P-2101-AX A/B/C P-2101-WP A/B/C				
15	Motor Type	Asynchronous, Squirrel Cage	Asynchronous, Squirrel Cage				
16	Mounting	[] Horizontal [] Vertical	Horizontal				
17	Rotor Construction	[] Brazed Copper Bars [] Aluminum Die Cast	Aluminum Die Cast				
18	Frame Material	Steel Sheet or Cast Iron	Cast Iron				
19	Rotor Cage Material	By Vendor	Aluminum Die Cast				
20	Cooling Method	IC411 According to IPS-M-EL-131(2)	IC411				
21	Ingress Protection Degree for Motor	IP 54	IP 55				
22	Ingress Protection Degree for Terminal Box	IP 55	IP 55				
23	Explosion Protection of Motor	N/A for Safe Area Zone 2, IIB, T3	Ex db llC T4				
24	Explosion Protection of Terminal Box	N/A for Safe Area Zone 2, IIB, T3	Ex db llC T4				
25	Ex. Certificate Authority/Certificate No.	By Vendor	ECM 23 ATEX 2624 X				
26	Driven Machine Shaft Power Requirement <sup>(P</sup> mp <sup>)</sup>	As Per Related Mechanical Data sheet (to be Specified by Vendor)	3.7KW				
27	De-Rating Factor due to Ambient Temperature (Kt)	Vendor Shall Advise	1=De-Rating 0% at 55°C				
28	De-Rating Factor Due to Altitude (Ka)	1	1=De-Rating 0% at 12.5m				
29	Design margin (K <sub>m</sub> )	Acc. to IPS Standard (Note 1)	1.25				



	Data Sheets for LV Induction Motors							
Item	Category	Required Specification	Vendor Data					
30	Motor Shaft Power Requirement @ Site condition (=Km X P mp)	By Vendor	5.31KW					
31	Standard Rated Motor Output = $Km X P_{mp}/(K_a K_t)$	By Vendor	5.5KW					
32	Frame Size	By Vendor	132					
33	Frame Earth Boss	External	M6					
34	Rated Voltage	400 V ±10%	400 V ±10%					
35	Rated Frequency	50 Hz ±5%	50 Hz ±5%					
36	Protection Devices	Switch-Fuse	Yes					
37	Neutral Earthing System	TNS	Yes					
38	Voltage During Motor Start	80% Un	80% Un					
39	Synchronous Speed	By Vendor	1500					
40	Full Load Speed [RPM]	By Vendor	1445					
41	Over Speed Capability	By Vendor	150%					
42	Number of Poles	By Vendor	4					
43	Starting Method	Direct on Line	Direct on Line					
44	Direction of Rotation (Viewed from coupling end)	Shall be Proposed by MFR Based on Driven Load Rotation of Direction	[ ] CW [ ] CCW [ ] Unidirectional [ X] Bidirectional					
45	Stator Winding Connection	Delta	Delta					
46	Location of Terminal Box (Viewed from DE)	[]Right []Left	Top (Left)					
47	Insulation Class	Class F	Class F					
48	Class of Temperature Rise	Class B	Class B					
49	Max. Permissible Starting Time [s]	By Vendor	22s					
50	Accelerating Time DOL starting, at 100% U <sub>n</sub> [s]	By Vendor	0.2sec					
51	Accelerating Time DOL starting, at 80% U <sub>n</sub> [s]	By Vendor	0.3sec					
52	Starting Torque at 100% U [N.m]	By Vendor	50.4					
53	Starting Torque at 80% U [N.m]	By Vendor	32.4					
54	Maximum Torque [N.m]	By Vendor	86.4					
55	Pull-Up Torque	By Vendor	49.4					
56	Locked Rotor Torque	By Vendor	50.4					
57	Rated Torque [N.m]	By Vendor	36					
58	Rated Current [A]	By Vendor	11.5					



	Data Sheets for LV Induction Motors								
Item	Category	Required Specification	Vendor Data						
59	Max Starting Current	By Vendor	6.5						
60	No Load Current [A]	By Vendor	7.5						
61	Locked Rotor Current [A]	<71 n	650%						
62	Locked Rotor Power Factor [A]	By Vendor	65%						
63	Torque-Speed Class	Shall be Selected Based on Driven Load Torque Requirement	[ ] A [ v] B [ ] C [ ] D						
64	Duty Cycle	S1	S1						
65	Current at ½ Rated Load	By Vendor	8						
66	Current at ¾ Rated load	By Vendor	10						
67	Current at Rated Load	By Vendor	11.5						
68	Starting Power Factor	By Vendor	65%						
69	Power Factor at 1/2 Rated Load	By Vendor	67%						
70	Power Factor at ¾ Rated load	By Vendor	75%						
71	Power Factor at Rated Load	By Vendor	80%						
72	Efficiency at ½ Rated Load	By Vendor	82%						
73	Efficiency at 3/4 Rated Load	By Vendor	84%						
74	Efficiency at Rated Load	By Vendor	86%						
75	No Load Losses	By Vendor	No available						
76	Stall Time (Hot/Cold) (Sec)	By Vendor	10s / 22s						
77	Transient Reactance (X'd)	By Vendor	None						
78	Sub - Transient Reactance (X"d)	By Vendor	None						
79	Acceleration Time At 80% Un (Sec)	By Vendor	None						
	Bearing (DE)		L						
	Type (Detail Description by Vendor)	Anti Friction (Ball Bearing)	Anti Friction (Ball Bearing)						
	Manufacturer	By Vendor	SKF						
	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours						
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed						
	Lubrication	Grease	Grease						
	Cooling Water/ Oil Capacity	N/A	N/A						
80	Permissible Trust Force [N]	By Vendor	Later						
~ ~	Bearing (NDE)								
81	Type (Detail Description by Vendor)	Anti friction (ball bearing)	Anti Friction (Ball Bearing)						
	Manufacturer	By Vendor	SKF						



	Data Sheets for LV Induction Motors							
Item	Category	Required Specification	Vendor Data					
	Minimum Life Without Load	Minimum 40000 Hours	Minimum 40000 Hours					
	Minimum Life With Load	Minimum 32000 Hours	Load info. Be needed					
	Lubrication	Grease	Grease					
	Cooling Water/ Oil Capacity	N/A	None					
	Permissible Trust Force [N]	By Vendor	Later					
	Space Heater	Not Required	None					
	Space Heater Voltage [V]	230VAC, 50Hz, 1Ph	None					
	Space Heater Power [W]	By Vendor	None					
82	Temp. Detector (Winding/Bearing)	By Vendor	None					
83	Terminal Boxes	[X] Power Terminal Box [X] Space heater (if required)	Power Terminal Box					
84	Main Power Cable Specification & Size & Orientation	According to (BK-GCS-PEDCO-120-EL-CN-0003)	Not Motor Vendor scope					
85	Motor Weight (Net/Shipped)	By Vendor	69±10% kg					
86	Rotor Moment of Inertia	By Vendor	0.048 kg-m2					
87	Method of Cable Entry	[X] Cable Gland [ ] Sealing Gasket	Cable Gland					
88	Cable Gland Hub of Main Terminal Box	By Vendor	1-M32x1.5					
89	Cable Gland Entry for aux. Terminal Box (if applicable)	1 X M25 (if Required)	None					
90	Short Circuit Capability of Terminal Box	30 kA for 0.2 S	None					
91	Sound Level at 1 distance meter From Motor	Max. 85 dB(A)	Max. 85 dB(A)					
92	Finish Color	Manufacturer Standard	RAL7047 (LIGHT GREY, ENAMEL)					
93	Load Torque/Slip, Current/Slip Curves	By Vendor	Refer to document 1STF0238444-L1-0002					
94	Motor Torque/Slip, Current/Slip Curves	By Vendor	Submitted					
95	Time - Current Heating (Thermal Limit) Curve	By Vendor	Submitted					
96	Motor Thermal Capacity Data	By Vendor	Submitted					
97	Installation, Operation & Maintenance Instruction	By Vendor	will be submitted in final book					
98	Spare Parts List for Two Years Operation	By Vendor	None					
99	Commissioning Spare Part List	By Vendor	None					
100	Dimensional Outline Drawing	By Vendor	Submitted					
101	Certified Type Test Report & Written Statement	By Vendor	After manufacturing the motor, it will be submitted.					
102	Certified Conformity for EX Type Motors	By Vendor	Submitted					
103	Deviation List (if Any)	By Vendor	None					

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض										
NISOC	خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک <i>(قرارداد 30_BK-HD-</i> GCS							(hy)	HAVAYAR Tomorrow Needs Innovation.		
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS									
· ۵۳ – · V۳ – ۹۱۸۴	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	91 31	شماره صفحه: 32	
	BK	GCS	HY	120	EL	DS	0002	V02		· · · · · · · · · · · · · · · · · · ·	

# Data Sheets for LV Induction Motors Item Category Required Specification Vendor Data 104 Test & Inspection Factory Routine Test Report Shall be Submitted will be submitted in final book

DE: Drive End

NDE: Non Drive End CW: Clockwise

CCW: Counter Clockwise

Note 1: IPS design margin is defined in accordance with standard output power rating of motor:

	Standard Output Power Rating	Design margin			
1	Up to 22kW	1.25			
2	from 22kW to 55kW	1.15			
3	Above 55kW	1.10			

Note 2: The following values are default unless otherwise specified during finalization of motors:

	Standard Output Power Rating	Cable Size	Gland Size
1	5.5kW	3x6	M25
2	7.5kW	3x6	M25
3	15kW	3x16	M32
4	18.5kW	3x16	M32
5	30kW	3x50	M40
6	37kW	3x50	M40
7	45kW		M50
8	55kW	3x95	M50

Jovain electrical machines Co. (JEMCO) Engineering Dept.			Data S	Date Date Rev.			1403/04/13 00	1403/07/01 01	14	03/07/04	
1	Motor Type / Product Number				Rotor Class / Material			Squirrel Cage / Aluminium			
2	Order No.	YCd13219-C11T-301		29	Rotor Voltage		N.A.			V	
3	Output	5.5 Kw		30	Rotor Current			N.A.			А
4	Frame Size	IEC132		31	Sound level		85			dB	
5	Voltage(variation)	400 ±10%	V	32	2 Direction of Rotation(View from D.E.)		□C.W. □C.C.W. ØBidirectio		tional		
6	Frequency(variation)	50±5%	Hz	22	D.E.			Anti friction bearing			
7	Poles	4		- 33	Bearing	Bearing N.D.E.		Anti friction bearing			
8	Speed	1445	RPM	34	4 Lubrication		-				
9	Area classification	EX		35	Location of Terminals(View from D.E.)		According to outline				
10	Type of protection(EX motores)	EX db IIC T4		36	Thermal Protection		Optional				
11	Ambient temperature	55	°C	37	Additional Sensor		Optional				
12	Temperature rise	80	°C	38	Space Heater		Optional				
13	Altitude above sea level	<1000	m	39	Frame Material		Castiron				
14	Insulation class	F		40	) painting		RAL 5010				
15	Duty type	S1		41	11 Painting specification		✓C2 C2	3 C4	_C5	C6	
16	Type of enclosure(IP)	IP55w		42	Net Weight approx		69±10% kg			kg	
17	Cooling method(IC)	IC411		43	Applicable Standards			IEC60034-1			
18	Mounting(IM)	IMB35		Additional Data and Remarks:							
19	Starting method	DOL		1 - Permissible Percentage Voltage Imbalance not greater than 1%							
20	Connection	400V∆ / 690V	Y	2- Cold Starting per Hour (3)							
21	Power factor	0.8		- 3- Hot Starting per Hour (2)							
22	Efficiency	86		4- Maximum Hot Starting Time not more than 60 second							
23	Rated Current	11.5	А	5- Maximum Cold Starting Time not more than 80 second							
24	Starting Current	650(ForDOL Start)	%								
25	Rated Torque	36	Nm								
26	Starting Torque	140(ForDOL Start)	%								
27	Break-down Torque	240(ForDOL Start)	%							FC	)4007/02





Performance	:5.5 KW 400 V 50 Hz 4 pole				
Rated speed	: 1445 rpm	Rated current at 100% Un	: 11.5A		
Locked Rotor Current at 100% Un (pu ) : 6.5		Locked Rotor current at 80% Un (pu)	: 5.2		



Performance		: 5.5 KW 400 V 50 Hz 4 pole				
Rated speed	: 1445 rpm	Rated current	: 11.5	Locked Rotor Current (pu ) : 6.5		


Performance	: 5.5 KW 400	V 50 Hz 4 pole	
Rated speed:	: 1445rpm	Efficiency:	: 86%
Rated Current:	: 11.5 A	Power factor:	: 0.8

# **Performance Curve**



# **Thermal Limit Curve**



Performance	: 5.5 KW 400 V	50 Hz 4 pole	
Rated speed	: 1445 rpm	Rated torque	: 36 N.m
Locked Rotor Torque at 100% Un	(pu ): 1.4	Breakdown torque at 100% Un (pu)	: 2.4
Locked Rotor Torque at 80% Un	(pu) : 0.9	Breakdown torque at 80% Un (pu)	: 1.5



Performance : 5.5 KW 400	V 50 Hz 4 pole
Rated speed : 1445 rpm	Rated torque : 36N.m
Locked Rotor Torque (pu ): 1.4	Breakdown torque (pu) : 2.4



# INSTRUCTION MANUAL

# For MOTOR BARRING DEVICE (# M-2101-BM A/B/C)

# and Cylinder Lubricator Pump Motor (# M-2101-LP A/B/C)

# **Instruction Manual for ED type**

# (Low Voltage Induction Motor for Hazardous Areas)





# **Contents**

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# Induction Motor Operation Manual

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# 1. Safety Guidance for Explosion Proof

### **1.1 Introduction**

This instruction must be followed to ensure safe and proper installation, operation and maintenance of the explosion proof motor. They should be brought to the attention of anyone who installs, operates or maintains the motor or associated equipment. Ignore these instructions may be invalidate all applicable warranties. As explosion proof motors are constructed with special materials and technologies that comply with the legal regulations concerning potentially explosive atmospheres, a wrong connection or a minor modification of the motor destroys the compliance with security regulations. The rules concerning explosion proof apparatus must be observed unconditionally. Note that our motors are approved for a specific group of hazardous and temperature classes.

# **1.2 Protection Type (Applicble Zone)**

• Flameproof enclosure : Ex d (Zone1, Zone2)

### **1.3 Conformity**

Motor designed for explosive atmospheres must also coform to one or more of following European or IEC standard for the protection type.

- IEC 60079-0, Ed6 General requirements concerning electrical apparatus for EN 60079-0 (2011) explosive gas atmospheres
- IEC 60079-1, Ed6 Standard for flameproof "d" protection EN 60079-1 (2007)

#### 1.4 Installation and Start Up

- Electric data of the motor, valid for the rated power, can be found on the nameplate.
- It is the responsibility of the user to ensure that the motor nameplate voltage and frequency are the same as the mains supply.
- Connection to the mains supply should only be executed by a recognized professional, respecting local demands and regulations. The connection of the wires must be done as described in the connection diagram usually located on frame.
- To guarantee the explosion proof protection, certified explosion proof cable glands with sealing joints

adapted to the cable diameters, must be used. The motor will lose its explosion proof characteristic If the cable and gland are not fitted correctly. If a spare opening for a cable gland isn't used, only the use of a certified explosion proof plug retains the explosion proof characteristics.

It may be necessary to open the terminal box for connecting the motor. When re-mounting the cover, only use the original screws. Firstly tighten all screws by hand before applying the full torque. Then tighten the screws until the spring ring is flat.

- When installing the motor, always connect the earth, using earthing screw in the terminal box or on the motor frame.
- The heating must be switched off before the motor is switched on. The heating may only be operated when the motor is switched off and is to be locked against the main circuit. During motor operation the heating must not be switched on. The Heating data for voltage and current is indicated on the additional plate attached to the motor.
- The maximum ambient temperature must not exceed the given value that is indicated on the nameplate and in the motor certificate.
- The maximum Surface temperature of equipment be lower than the ignition temperature of the gas or dust present in the hazardous area.

Temperature Class	Т3	T4	T5	T6
Maximumsurface temperature	200°C	135°C	100°C	85°C

\*The manufacturer cannot be held responsible for damage due to incorrect installation or use.

# 1.5 Repair

The explosion proof motor must not be opened while the motor is energized. Qualified persons only may do repair or service of the motor. When disassembling is needed, disassemble after the motor has cooled down fully, or disassemble it in non-hazardous area. If the customer himself carries out the operation, he must observe the valid standards. If a repairer treats the motor, he has to hand a certificate of conformity to the user.

# 2. Danger, Warning, Caution

On these instructions, the words, "danger", "warning", and "caution" are indicated to highlight the key sentences in accordance with safety practices. The definition of "danger", "warning", and "caution" are explained as follows:



Failure to follow the instruction can lead to a dangerous situation which may cause a death or serious injury.



Failure to follow the instruction may cause a death or serious injury.



Failure to follow the instruction may cause a serious / minor injury or damage on properties.



# 3. Safety Notice

# **DANGER**

- Physical contact to high voltage or a rotating part of the motor may cause a death or a serious injury.
- Read this manual carefully before installation, maintenance and repairing.
- Do not contact an electric part before you are sure that power is not connected. Make sure to cut off power before maintenance or repairing.
- Refer to the National Electrical Code Handbook codes before inserting the plug.

# DANGER

- Use the appropriate explosion-proof Motor in explosive area. Using non-explosion-proof electric motor can cause serious damage.
- Do not modify Motor's parts to use. If taken, personal injury or substantial property damage will result.
- Use the power cable that meets the standard. Using inappropriate cable may cause an electric shock or fire.

# CAUTION

- Turn off the switch when electricity failed. As the power is restored, the motor will automatically be operated.
- Tighten the shaft key before supplying the power. If loosened, personal injury may occur.
- Do not lift the entire motor with the motor part lifting ring, and do not lift the machine with the motor lifting ring. Failure to follow this warning may result in a serious injury.
- Care must be taken to avoid the physical damage.
- Wear appropriate protective gears for installation, maintenance or repairing. You can be injured by the motor parts.
- Install aspirator and vent for cooling at a distance of 30cm from the wall. If not, it may cause

burn down by cooling failure.

To prevent incidental accident, appropriate safeguard against danger or harm for children or unqualified person.

NOTICE Inappropriate mechanical layout or weak mounting structure may cause vibration or mechanical damage during the operation. Excessive voltage variation (±10%) and frequency variation (±5%) may cause shortage of torque or over-heating condition. If you operate the general-type motor by using the inverter-type's one, it will easily breakdown due to insulation or cooling failure. Select the appropriate-type of motor. Do not exceed appropriate voltage rate. Please follow the prescription strictly specified on the nameplate. Driving-type of motor should be selected by considering the load trait. Inappropriate starting method may cause an incapable start due to a low torque. If you use belt-type driving motor, choose the pulley according to the International standard, such as KS or IEC. Especially, care should be taken in accordance with belt's tension and pulley's parallelism. In addition, for all the belt-type driving motor, make sure that installation of protective net should be made to prevent any probable physical injuries. Do not connect with a belt-type between the 2P-type of high speed motor and direct motor. It can cause the incident due to its cutting shaft. Motor's insulation resistance should be thoroughly inspected and cleaned to restore to a "best" condition. Excessive or low grease and oil may cause a damage of bearings and the motor. Pay attention that no contaminant is included in grease or oil. Use the designated grease and oil. Unauthorized grease or oil may reduce life of bearing and cause an overheat damage. Shut off the power supply if motor does not start operating within 15 seconds as of inserting the plug. In this situation, unnecessary flow of electricity may cause serious damage to motor. Call the Hyosung Technician Division refers to further inquires. Operating the motor at the load that exceeds the allowed moment of inertia of the standard motor may shorten the life of the motor due to an electric shock. Contact the Hyosung Technician Division if the allowed moment of inertia is exceeded. Do not repair or alter the motor at you own discretion. A shortened life or accident may occur.

 Use the water with the designated water quality, flow, pressure and temperature only for watercooling motors. Or overheat or rust may occur.

# NOTICE

- When a water-cooling motor is not in operation, drain water from the pipe. Water remained in the pipe may cause a freezing or rust.
- Use the oil with the designated flow, pressure and temperature when using a lubrication device.
   Using unauthorized oil may cause a damage of bearings.
- Use the appropriate lifting equipment when lifting a heavy part to prevent an accident.
- ♦ Y-△ starting motor must be started with Y and operated with △. Continuing operation with Y may cause drop of voltage, overload and overheat.
- Operating a general motor designed for continuous operation (S1) under the operation condition of S3 or higher, the motor can be damaged due to an electric, mechanical and thermal impact. The motor must be operated not more than 5 times a day, 2 COLD and 1 HOT. Contact the Hyosung Technician Division for information on frequent operation.
- Avoid exposure to high noise for a long time. Working near the high-noise motor and machines may damage the hearing capability. Make sure to wear the appropriate protective gear.
- Use the motor with the appropriate protection grade. The motor with inadequate protection grade may be damaged due to foreign substances.
- ◆ Use the standard motor at the temperature range of -20℃ ~ 40℃. Operating a motor out of the designated temperature range may cause deterioration of lubricating capability of bearing and overheating of winding. Contact the Hyosung Technician Division if you need to use the motor out of the designated temperature range.
- Waste from the motor must be handed as general industrial waste. Leaving the parts outdoor or failure to handling as industrial waste may cause a pollution.
- Keep the motor free from dust, oil or grease. Insufficient ventilation may cause a fire.
- Check the rotating direction before operating the motor. Reverse operation may damage the motor due to deteriorated cooling capability.
- Apply heat to the coupling for installation or disassembly. Hold the pulley with a jockey before applying heat.
- Apply heat evenly, and take out the coupling. Excessive force may damage the bearing and the shaft.

# 1. Outline

These instructions must be followed to ensure safe and proper installation, operation and maintenance of the motor. They should be brought to the attention of anyone who installs, operates or maintains this motor. Ignoring the instruction may invalidate the warranty.

# 2. Inspection, Transportation and Storage

# 2.1 Inspection

- (1) Care is taken at the factory to assure that the motor arrives at its destination in first class condition
- (2) Examine the outside of the motor carefully for damage, with particular attention to output, pole, voltage, conduit box, fans, and covers. Should further information be desired or should particular problems arise, the matter should be referred to the local Hyosung Sales Office.

# 2.2 Transportation

Make sure to use the lifting equipment when lifting a motor with the lifting equipment. Be careful not to make damage on the key parts including the shaft when transporting the motor.

### 

Do not lift the entire motor with the motor part lifting ring, and do not lift the machine with the motor lifting ring. Otherwise, it can cause serious injuries due to its fall.

# 

Use an appropriate lifting equipment to prevent an accident.

# 2.3 Storage

The motor should be kept in the place that has no vibration, has small temperature change, and is clean, dry and well-ventilated. In case it needs to be kept for over 3 months, please do the followings:

(1) Check insulation resistance periodically. Any approved method of measuring insulation resistance may be used, provided the voltage across the insulation is at a safe value for the type and condition of the insulation. A hand cranked megger of not over 500 volts is the most convenient and safest method.

 $\bigcirc$  Standard = Rated voltage (KV) + 1 M $\Omega$  or higher (40 °C) <Refer to 4.1 (2) Insulation resistance.>

- (2) Inspect the rust preventive coating on all external machined surfaces, including shaft extension. If necessary, recoat the surfaces with a rust preventive paint.
- (3) Grease the bearings annually.
- (4) In case of not using the motor for over 3 months under the circumstance it is mounted, cover the whole motor with a water-proof cover, put desiccants into it, and seal it if the place for storage has

high humidity and is likely to be attacked by water or foreign materials. Regularly exchange the desiccants.

# 

• Motor's insulation resistance should be thoroughly inspected and cleaned to restore to a "best" condition.

# 3. Installation

#### 3.1 Installation location

- (1) ExnA type is allowed to be used in the hazardous area corresponding to zone2.
- (2) Exd type is allowed to be used in the hazardous area corresponding to zone1 and zone2.
- (3) Normal ambient temperatures should not exceed 40 °C (marine standard -20 or +40 °C) if standard performance is to be achieved.(The motor designed and manufactured depending on customer demands can be operated above 40 °C. Refer to technical document.) Check that the motor has sufficient airflow. Ensure that no nearby equipment, surfaces or direct sunshine, radiate additional heat to the motor. For more information about higher ambient temperatures and cooling, contact to the Hyosung Technician Office.
- (4) The location should be clean, dry, well ventilated, properly drained, and provide accessibility for inspection, lubrication and maintenance. The location should also provide adequate space for motor removal without shifting the driven unit.

# 

• Use the appropriate explosion-proof Motor in explosive area. Using non-explosion-proof electric motor can cause serious damage.

# 

Install aspirator and vent for cooling at a distance of 30cm from the wall. If not, it may cause burn down by cooling failure.

# 

◆ Use the standard motor at the temperature range of -20℃ ~ 40℃. Operating a motor out of the designated temperature range may cause deterioration of lubricating capability of bearing and overheating of winding. Contact the Hyosung Technician Division if you need to use the motor out of the designated temperature range.

#### 3.2 Foundation and installation

(1) Lay the foundation and bury the foundation bolt based on the installation specifications, and minimize subsidence of ground and eccentricity due to lapse of time.

(2) Level the base after the concrete is completely hardened, fastening the liners on both sides of the base bolt. The level must be within 0.05mm for 1m.

# 

- Use the power cable that meets the standard. Using an inappropriate cable may cause an electric shock or fire.
- Refer to the National Electrical Code Handbook codes before inserting the plug.



To prevent incidental accident, appropriate safeguard against danger or harm for children or unqualified person.

#### 

- Use the motor with the appropriate protection grade. The motor with inadequate protection grade may be damaged due to foreign substances.
- (3) Refer to technical document for cable entry information of motor terminal box.

#### 3.3 Assembling coupling

Inspect the shaft surface and inner diameter of the coupling before assembling the coupling. Apply the coupling to make the gap within 0.2 - 0.3 mm. The coupling must be balanced before assembly, and make sure to rotate the shaft while the coupling is cooling down to prevent heat pressure and the bending moment.

# 3.4 Load connection

(1) Direct connection

- (A) The tolerance of height of the shaft center and the levelness between the motor and the load must be not higher than 0.05mm.
- (B) The shaft alignment can be checked with the dial gauge. After installation, rotate the rotor slowly by 90°, record the value, and insert the adequate material between the motor bottom and the base to adjust the deviation.
- (C) A large shaft alignment error may cause a vibration or damage of bearings. The higher the highly operating motor, the error must be lowered.
- (D) Refer to the following drawings for details.



# (2) Belt-type connection

- (A) First, paralleling motor's shaft with that of load, ensure that both side of center of the pulley be in a straight line, be verticality maintained. If the center of the pulley is not kept in a straight line, motor may fail to start.
- (B) When mounting a coupling on the shaft, lubricate, press, and lightly hit it.
- (C) Refer to the KS and IEC standard guideline for selecting pulley & V-belt. Be sure proper installation for Belt's tension & pulley's diameter with following KS or IEC standards guideline, improper installation may impact on horizontality of bearing and shaft strength. If you have any question, please contact to the Hyosung Technical Team.

Note. Minimum pitch diameter of pulley at V-belt operation  $D \ge 2.5 \times (2T / F) \times 10^3$ 

Where, D: minimum pulley pitch diameter (mm)2.5: Belt tension factorF: Radial force (N)T: Rated torque (Nm)



#### 

Wear appropriate protective gears for installation, maintenance or repairing. You can be injured by the motor parts.

# 

- Poor mechanical alignment and weak connection may lead to vibration or mechanical damage during the operation.
- If you use belt-type driving motor, choose the pulley with following the KS or IEC. Standard guideline. Especially, be sure to consider the belt's tension and pulley's parallelism. In addition, for all the belt-type driving motor, Make sure to install a protective device to prevent any physical injuries.
- Do not connect with a belt-type between the 2P-type of high speed motor and direct motor. It can cause the incident due to its cutting shaft.

### 3.5 Caution for installation

- (1) The lifting equipment of the motor is designed for the motor, and therefore, must be used for moving the motor only.
- (2) Be careful not to give an influence to the bearing. Since the key is already installed, mount the pulley or coupling as it is. If you need to push in the key further, support the bottom of the shaft with a wooden support to protect the shaft. Impact to the shaft may cause strange tone due to a damage of bearing or bending of shaft.
- (3) Since the coupling contacts the end of the shaft, it must be fixed accurately and firmly so that no hammering out occurs during the operation. Hammering may cause a bending of the shaft. When you remove a hardened coupling, you should apply heat and use a coupling puller.

# 

Apply heat to the coupling for installation or disassembly. Hold the pulley with a jockey before applying heat. Apply heat evenly, and take out the coupling. Excessive force may damage the bearing and the shaft.

# 4. Earth Pad

### 4.1 Frame

(1) Location



# (2) Method of joint

-Insult the earth line directly to pad and fasten the upper steal with two hexagon bolt.

# 4.2 Terminal box

(1) Location



(2) Method of joint

-Combine the earth line using the terminal lug to the pad with hexagon bolt.

# 5. Test Operating

# 5.1 Check points before test operating

- (1) Check the wire connection
  - (A) Control circuit, overload protection device and grounding of the motor shall comply with the related electricity laws.
  - (B) The motor shall be grounded, and the winding and power supply shall be consistent with the figures specified on the nameplate. If the voltage and frequency of power supply are within the following range, the motor will run differently from the characteristics on the nameplate:
    - -. If the voltage fluctuates within  $\pm 10\%$  of the figures on the nameplate
    - -. If the frequency fluctuates within  $\pm 5\%$  of the figures on the nameplate
    - If the frequency fluctuates within ±5%, and at the same time, the voltage fluctuates within ±10% of the figures on the nameplate

# 

- Physical contact to high voltage or a rotating part of the motor may cause a death or a serious injury. Read this manual carefully before installation, maintenance and repairing.
- Do not contact an electric part before you are sure that power is not connected. Make sure to cut off power before maintenance or repairing.
- Refer to the National Electrical Code Handbook codes before inserting the plug

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 Excessive voltage variation and frequency variation of input power on motor may cause shortage of torque or over-heating.

# (2) Insulation resistance check

Insulation resistance of stator winding must be more than standard measured by 500w MEGGER tester. Usually, it does not matter if it is over 10  $M\Omega$ at the normal temperature(15 $^{\circ}$ C). If insulation resistance measured as low, you must dry the motor before testing operation, so ensure the proper insulation resistance. If there is a space heater, dry the motor until the insulation resistance becomes regulated.

 $\bigcirc$  Rated voltage  $\leq$  690V : 5 M $\Omega$  (25 °C)

 $\bigcirc$  Rated voltage ≥ 690V : 100MΩ (25°C)

### 5.2 Preparation for test operating

- (1) Check if bolts and nuts are loose, if there is dirt, if a connector is loose during storage or transportation.
- (2) Feed appropriate amount of oil or grease through the oil input or grease nipple to each bearing part.
- (3) Check the alignment of shaft of the motor.
- (4) Checkpoints before operation:
  - (A) Does the rotor rotate smoothly?
  - (B) Is the lubricant appropriate?
  - (C) Are there missing bolts?
  - (D) Is coolant sufficient?
  - (E) Do the machines and protective devices work properly?
  - (F) Is the insulation resistance including the lead above the standard?
  - (G) Does the motor support emergency stop?
  - (H) Is the contact system established?
  - (I) Are there an appropriate number of operating staffs? (Number of staffs and capability)
  - (J) Is the voltage appropriate?
  - (K) Is the past test operating result checked?

You may operate the motor if the above check points are appropriate.

#### 5.3 Cautions during test operating

- (1) Perform the test operating to the direction specified on the motor without load.
- (2) The bearing temperature at normal operation status must not exceed 95 °C.
- (3) Monitor the bearing temperature for at least 2 hours after starting the motor. If the temperature rises too steeply, or vibration or noise is too high, stop the motor immediately and check the cause in reference to the "Motor troubleshooting chart". If there is no trouble, connect the load and check the operation status.
- (4) Check points for test operating:
  - (A) Does the rotor rotate properly?
  - (B) Is there a strange noise or irregular noise?
  - (C) Is there a strange smell?
  - (D) Are operating time and current appropriate?
  - (E) Does the sleeve bearing rotate at the magnetic center?
  - (F) Does the sleeve bearing provide good oiling rotation?
  - (G) Is the oil pressure of the oil pressure pump at the shaft end appropriate?

- (H) Is there a problem at the shaft end? (Strange noise, overheat, strange smell, etc.)
- (I) Do inhalation / exhaustion device operate normally?
- (J) Is vibration within the controlled value?
- (K) Is there a problem in the system?
- (L) Does the motor run normally when compared with other operation characteristics?

Correct the problem, check the status and start operation if any one of the above check points is not satisfactory.

# 5.4 End of test operating

You can continue operation when the motor does not generate any abnormal noise or excessive vibration after normal rotation, and stop the motor if the winding temperature and the bearing temperature are within the specified temperature range (after approx. 3-4 hours after starting the motor).

### 5.5 Cautions after test operating

Repeated test operating may result in overheat and damage of the motor. If you need to repeat test operating, you need to give sufficient time between the test operatings.

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- Operating a general motor designed for continuous operation (S1) under the operation condition of S3 or higher, the motor can be damaged due to an electric, mechanical and thermal impact. The motor must be operated not more than 5 times a day, 2 COLD and 1 HOT. Contact the Hyosung Technician Division for information on frequent operation.
- Operating the motor at the load that exceeds the allowed moment of inertia of the standard motor may shorten the life of the motor due to an electric shock. Contact the Hyosung Technician Division if the allowed moment of inertia is exceeded.
- Select an appropriate starting method depending on the load characteristics. In appropriate starting method may cause an incapable start due to a low torque.

# 6. Winding and Bearing Temperature

	ALARM PO	INT (Alarm)	TRIP POI	Dunch		
	B-type temp rise	F-type temp rise	B-type temp rise	F-type temp rise	Remarks	
Winding temp	<b>130</b> ℃	<b>150</b> ℃	<b>140</b> ℃	<b>160</b> ℃		
Bearing temp	90	С С	95	Ĵ		



# 7. Maintenance and Inspection

You need to observe the operation and other states of the motor every day, and check the following points according to the routine inspection plan:

- $\diamond$  Cleaning status  $\diamond$  Insulation and winding
- $\diamond$  Lubrication and bearing  $\diamond$  Vibration

### 7.1 Cleaning

It is important to keep the motor clean to prevent a trouble. Make sure to keep the machine and the surrounding parts clean against dust, oil and other substances which may come in through the ventilation hole or during the operation.

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Excessive or low grease and oil may cause a damage of bearings and the motor. Pay attention that no contaminant is included in grease or oil.

# 7.2 Humidity

Open the drain plug and remove condensed water periodically. Always operate the space heater if the motor is not in use for a long time.

#### 7.3 Maintenance of Stator Winding

(1) Insulation capability of the winding becomes deteriorated due to electric, mechanical and environmental stress as time flows.

Deteriorated insulation layer may easily absorb humidity, and this situation becomes evident when dust is accumulated on the surface. Deteriorated insulation resistance or leakage current may cause a tracking, and even a damage of insulation. To prevent this accident, you need to check the dust and humidity of the insulator and take the appropriate action through a routine diagnosis.

(2) For the insulation resistance with the earth, you need to measure the insulation resistance between the motor terminal and the earth periodically.

You need to check the insulation resistance before you restart the motor since a motor easily absorbs humidity while the motor is stopped. You need to consider the change of insulation resistance, as well as, the resistance.

- (3) The resistance value must be higher than the value calculated with the following formula, and must be substantially lowered from the previous measurement.
  - $\bigcirc$  Standard resistance = Rated voltage (KV) + at least 1 M $\Omega$  (40 °C)

- (4) Check the dust, oil, carbon dust and salt when inspecting the surface insulation resistance. If a damage is found, measure the insulation resistance of the winding surface and check if the value is 10MΩ or higher.
- (5) Check the insulation resistance mainly on the dusted part of the winding at the pitch of approx. 10-15. If the insulation resistance to the earth or the surface insulation resistance is out of the controlled

standard, you should clean, dry, paint and apply varnish. Even if the insulation resistance is within the controlled standard, when damage is found through the appearance inspection, you should clean the surface of winding with air blow or a dry cloth.

(6) If a tracking is found on the winding surface and the insulation resistance is deteriorated again, please contact Hyosung for expert's analysis. The insulated winding must be kept clean against dust, oil, metal dust or other dirt.

You can manage the cleaning status with the following methods:

(A) Vacuum cleaning

You may vacuum dust or other dirt. The vacuum cleaner sucks in dust and dirt without damaging the insulation or other parts.

(B) Compressed air cleaning

Air blower is convenient for removing dust and dirt in the air duct or between the windings. You should use dried air and the air pressure must not be too high.

(C) Solvent cleaning

Oil and grease make the insulation deteriorated and dusted, and obstruct smooth ventilation, and therefore, you should wipe off with a cloth. Solvent has a low ignition point and hazardous to human body. If the winding moves or the varnish is deteriorated, you should apply varnish again.

# 7.4 Maintenance of Rotor Bar

The rotor bar and end ring of the rotor of a squirrel cage 3-p induction motor are subject for the thermal stress caused by temperature rise during operation, the electromagnetic force caused by magnetic flux and current, and the centrifugal force caused by rotation. Therefore, a gap occurs between the rotor bar and the slot, and this gap, when grown, generates an electronic tone from vibrating rotor bar or a cut of rotor bar. Therefore, if a change or looseness of a rotor bar is found during the routine inspection, you should inject epoxy resin through the slot to prevent vibration and movement of the rotor bar. Contact the Hyosung Technician Division for detailed inspection method. You should inspect the rotor bar every 4 years. You should pull out the rotor and inspect each part of the rotor bar.

# 7.5 Reoiling

Excessive oil or grease causes a leakage and overheat of bearing. Therefore, you should maintain the

adequate level of oil. Lubricant also protects the bearing from water, oil and rust. Make sure to keep the inlets clean and pay attention that no dirt is incoming with relubrication.

When using a high-pressure feeder, be careful of excessive lubrication. Sufficient rust-resisting grease is fed to the ball bearing at the factory.

- (1) How to apply oil and grease
  - (A) Stop the motor and cool down sufficiently.
  - (B) Clean the lubricating part.
  - (C) Remove hardened oil and grease from the lubrication inlets.
  - (D) Feed grease slowly by operating the compressed oil feeder.
  - (E) Idle the motor for about 10 minutes so that the excessive grease is completely leaked out.
  - (F) If the motor has a long grease pipe, clean the pipe thoroughly before lubrication.
  - (G) If it is necessary to feed oil during the operation, be careful that you should not feed excessive oil. Idle the motor for about 10 minutes as the lubrication plug is open (grease using motor).
    - Note. If contamination is severe or the temperature is excessively high, you should open the bearing housing and check the grease status once a year or at every 5000 hours. If the grease is deteriorated or contaminated, you should clean the bearing housing and replace grease.

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- Excessive or low grease and oil may cause a damage of bearings and the motor. Pay attention that no contaminant is included in grease or oil.
- Use the designated grease and oil. Unauthorized grease or oil may reduce life of bearing and cause an overheat damage.

# 7.6 Maintenance of grease

(1) Standard grease feeding cycle for ball bearing

- (A) The following tables are based on the standard bearing and ALVANIA #2 grease.
- (B) Standard for ball bearing is applied to the 73-series bearing.
- (C) Grease feeding cycle for outdoor motor must be 1/1.2 times of the standard value.
- (D) If different feeding cycles are set for the same motor, the shorter cycle must be applied.
- (E) The values are based on the ambient temperature of 40  $^{\circ}$ C, and the standard for outdoor type is applied if the ambient temperature is 40  $^{\circ}$ C ~ 50  $^{\circ}$ C.
- (F) If the ambient temperature is  $50^{\circ}$ C or higher, the feeding cycle is reduced by half at every  $15^{\circ}$ C.
- (G) Bearing operation temperature For universal grease:  $40^{\circ}C \le T \le 120^{\circ}C$ For widely used grease:  $40^{\circ}C \le T \le 140^{\circ}C$

(1) Grease feeding cycle

<Unit: months>

Туре	)	Ball Bearing Roller Beari						aring									
No. of p	oles	2	4	6	8	10	12	14	2	4	6	8	10	12	14		
	50	4							2	А							
	60	3								Ŧ	5						
	70		5							3			_	6			
	80		4							2	4	F					
	90		2		_	6						5					
	100		2	F							2						
Inner dia.	110			5							2	4	5				
of bearing	120			2		_					2						
	130			3							2			5			
	140						`			1		3	4				
	150					2											
	160				4									4	5		
	170											2	3		5		
	180																

# (2) Amount of grease applied

	Amount (grar	n)	Initia	Initial amount (gram)		
Inner dia. of bearing	Standard bearing structure	Roller		Ball		
50	65	6	0	150		
60	95	9	5	210		
70	140	15	50	310		
80	160	230		450		
90	160	310		600		
100	160	440		800		
110	160	580		1010		
120	160	690		1320		
130	160	970		1660		
140	160	1160		1980		
150	160	13	50	2320		

# 7.7 Management of bearing

For a motor stored for months, you should check the rotation status of the motor right after installation, and noise and temperature rise during operation. You should use proper amount of oil or grease so that it can obtain sufficient lubricating effects for the bearing. Lubrication cycle must be determined based on size, speed and operating conditions of the bearing.

### (1) BALL bearing sound

You can check the problems of bearing based on the sound of the roll bearing.

(A) Normal sound

A continuous sound (shh- sound, wind sound) is generated as the balls roll on the inner race and the outer race regardless of the rpm.

(B) Normal sound (drop sound)

The drop sound is generated in the horizontal ball bearing as balls dropped from the bearing contact the retainer and the inner race. This sound is heard as rpm drops rather than during the operation. A loud sound may be generated when the bearing idles before it is stopped, but does not indicate a problem.

(C) Retainer sound

This irregular metallic sound is generated as the retainer, balls, inner race and outer race contact with each other regardless of rpm. It is often heard from the bearing with a large gap for high-speed machine.

This sound (Jrr- sound) can be reduced or disappeared as grease is fed. If the retainer sound grows again, you should check the bearing (worn retainer). This sound may not be completely disappeared.

(D) Creak sound

The creak sound is often heard from a roll bearing due to an irregular operation and in relation with the grease status and the gap. You can find the crack-sound preventive bearing, but it is not perfect. Unless the sound is accompanied with vibration, the bearing with this sound has no problem. Normally, this sound (Grr- sound) disappears as grease is fed. In this case, the bearing may be considered to be normal. Like the drop sound, it often grows as it idles with the bracket.

(E) Scratch sound

This sound is generated in proportion to the rpm when the outer/inner race or a ball is scratched or cracked. This sound is normally accompanied with a vibration, but can be easily detected as the cycle gets longer before the bearing is stopped. You can find a scratch by turning the rotor slowly with a hand.

(F) Foreign substance sound

This sound is generated due to a foreign substance inside the bearing. It has an irregular cycle

and volume. If you leave the bearing as it is without removing the cause, a scratch may occur in the bearing.

This sound (Pjj- sound) is often heard when the bearing is assembled in a dirty location.

# 7.8 Overhauling motor

- (1) Checkpoints before disassembly
  - (A) Range of work (To which point will inspection be performed?)
  - (B) Process (Date of possible overhauling, estimated date of test operating, use of heavy machinery including cranes)
  - (C) Number of workers (workers qualified for the works)
  - (D) Work space and drawings (place with good ambient environment)
  - (E) Questions and unreasonable points
  - (F) Tools (general tools and special tools)
  - (G) Spare parts
  - (H) Lubricants
  - (I) Measures against rain and humidity
  - (J) Separation of pipe system for coolant and lubricant
  - (L) Power supply (Main power, heater power)
  - (K) Components
  - (L) Various standards and previous inspection data
- (2) Disassembly and assembly work flow

The following procedure shows the general work procedure. You should perform each process thoroughly, and try your best to secure safety and protect devices. When overhauling two or more motors of a same kind, you should distinguish the part boxes to prevent mixing of parts. If a trouble is found in the measurement when compared with the controlled value, contact the Hyosung Technician Division.

- (A) Separate power cable
- (B) Measure insulation resistance, and winding resistance
- (C) Centering (Center motor shaft and load shaft on the base)
- (D) Move to the work stand
- (E) Remove coupling
- (F) Remove external fan cover
- (G) Remove external fan
- (H) Measure air gap
- (I) Measure shaft concentricity

- (J) Remove brackets
- (L) Remove bearing parts
- (K) Pull out rotor
- (L) Check each part

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Wear appropriate protective gears for installation, maintenance or repairing. You can be injured by the motor parts.

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• Do not repair or alter the motor at you own discretion. A shortened life or accident may occur.

#### 7.9 Handling waste

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 Waste from the motor must be handled as general industrial waste. Leaving the parts outdoor or failure to handling as industrial waste may cause a pollution.

# 8. Routine Inspection and Maintenance

#### 8.1 General rules for routine inspection

A routine inspection is performed for each part of the motor after pulling out the rotor. A routine inspection must be made for the motor of less than 3000KW every 6 years. The motor for middle inertia load (10 sec or longer operation time) must be inspected every 4 years.

# 8.2 Induction motor inspection standard

A :  $\circ$  daily inspection, B : • weekly inspection,

 $C : \triangle$  monthly inspection

D : ▲ overhaul (every 6 months ~ 2 years depending on the environment)

Checkp		Classification				Details or			
Part	int	A	в	с	D	parts of inspection	Method of inspection	Criteria	
1. Bearing		0		Δ		Flux	Check the flow with oil level gauge, flow meter, and sight flow.	The oil level must be within the indication line of the level gauge. However, check the oil level and indicator when the bearing is stopped.	
		0		Δ		Oil pressure	Use the oil pressure gauge at the bearing lubrication inlet or the lubrication system	$\pm 20\%$ of the designated pressure. Normally, 0.8 $\sim$ 2kg/cm <sup>2</sup>	
	Lubricati on	0	•			Rotation of oil ring	Check through the inspection window	The oil ring must rotate smoothly at the same position. It is defective if it rotates unsmoothly or tilted.	
		0	•	Δ		Change of flux in the tank and deterioration	Check the decreased flux for a weak. Check the deposit on the bottom of the tank and discoloration of oil	Check the leakage from the cooler or pipes. If there is deposit on the bottom of the tank and the oil is discolored to brown, replace the oil.	
				Δ		Grease	Check the last feeding date, amount and grease nameplate	Feed grease to the cycle and amount specified on the nameplate.	
	Leakage	0		Δ		Coupling between shaft and bearing cap	Check with bear eyes or hand. Check the inside of sleeve ring and inside of the body.	Wipe stains and check the status. Take the action if oil is formed or dropped.	
	Temp.	0		Δ		Thermometer	Is the temperature is as usual? Check the temperature with hand if there is no thermometer.	The temperature must be 80℃ or lower.	
	Endplay	0		Δ		Shaking to the direction of the shaft	Check the range of shaking with bare eyes or hands, or a scale (make sure not to touch the rotating part). Check the compliance of the center indicator with the shaft indicator.	The shaft must not shake and touch the thrust surface of the metal, nor be overheated as it is bumped on the thrust surface. OK if it is $\pm 1$ mm. (Applied to the shaft with the center indicator.)	

				_						
Dert	Checkpo	Classification			ion	Details or	Mothod of increation	Criteria		
Part	int	Α	в	с	D	inspection	Method of Inspection	ontonu		
	Sound	0		Δ		Strange sound	Check with hands or the listening bar.	The stator and the rotor must not be touched with each other. There should not be strange sound from the roll bearing.		
1. Bearing	Vibration	0		Δ		Size and change of vibration	Check with hands. Use a vibration meter if the vibration is big.	You should check the reason for abnormal vibration or strange sound.		
	Coolant			Δ		Coolant pressure, drain temp., water supply temp.	Check the waterway and drain temp.	Check the coolant if the flux is low or the drain temp. is high.		
	Metal					Exfoliation, crack, metal wear, metal gap	Check with bare eyes. Thickness gauge	Overhaul the bearing metal every year. If the metal gap is more than twice of the designed gap, replace the metal with the spare part. Examine the cause for partial wear and take the action.		
	Shaft					Damage, streak (shaft journal)	Check with bare eyes and hands.	If the streak is felt with a finger nail, cut or grind the shaft. Contact the maker if there is a possibility of rust.		
2. Stator and rotor	Toma	0		Δ		Core, winding	Read the flushed thermometer, or check with hands or bar thermometer.	The temperature must not exceed the value in Table 1. You should examine the cause and take the action. Check the cause if the temperature is not as usual.		
	remp.	0				Inhalation, exhaustion	Read the exhaustion thermometer, or check with hands or bar thermometer. Check if you smell a strange smell.	The temperature must be as usual, and the air temperature must be $40^{\circ}$ C or lower. A special standard is applied if the temperature is $40^{\circ}$ C or higher.		

Read the voltage meter

two hours.

and the current meter every

Use the 1000V Megger for

the machine of 1000V or

higher. Or use the 500V

Megger in other cases.

The voltage must be within  $\pm 5\%$  of the rated voltage, and the current

should not be higher than the rated

current. Contact the maker if you

need to operate the motor with

Measure at hot time in possible.

Record the air temperature,

humidity and the machine

overcurrent.

temperature.

Voltage,

current

Stator winding,

▲ rotor winding,

space heater

Δ

Load

Winding

 $\bigcirc$ 

	Chockpo	Classification			ion	Details or		Critoria	
Part	int	A	в	с	D	parts of inspection	Method of inspection	Criteria	
	Stator					Damage, stain, coupling status	Check with bare eyes, hands or spanner.	Remove the covers and check more closely than the monthly inspection. Remove dust. If the insulation resistance is lowered, clean, dry and apply varnish.	
2. Stator and rotor	Rotor					Band looseness, core looseness, rotor bar breakage, dust	Check with bare eyes, hands, or test hammer magnifier.	Check the looseness of the winding rotor banding with the test hammer, and rewinding if it is loose. Contact the maker if a crack is found at the welded part between the rotor bar and the resistance ring. Remove dust from the core duct. Check the deformation, discoloration or deterioration of other parts, and take the action.	
3. Air filter		0		Δ		Blocking of filter	Check with bare eyes, or read the exhaustion temperature.	If the filter is blocked with dust, remove the filter and blow compressed air. Or beat with a wooden stick to remove dust.	
4. Cooler		0		Δ		Flux and pressure	Check the flux at the water way, and read the water pressure meter.	Check the flux and if the flow is lower than usual.	
		0		Δ		Drain temp.	Check the temperature at the water way.	If the drain temperature is high, there is a possibility of lack of coolant.	
		0		Δ		Water supply temp.	Read the thermometer on the water supply pipe wall.	The temperature of water supply should not be higher than the designated temperature.	
5. Belt		0		Δ		Belt tension	Check the belt tension and rocking status during the operation with hands.	The tension should be as usual. The belt should not touch the belt cover during the operation.	
		0		Δ		Damage	Check if the core is exposed as the surface rubber is worn.	Replace the belt if the core is loose.	
6.Coupling				Δ		Alignment check	Use the dial indicator.	<ol> <li>Compare the measurement with the previous record, and maintain the designated value.</li> <li>Surface error and circumference error must be within 0.05mm.</li> </ol>	



Part	Checkpo int	Classification			ion	Details or		0.11
		A	в	с	D	parts of inspection	Method of inspection	Criteria
7. Slip ring	Current collection status	0		Δ		Flame	Check the flame with bare eyes at the start and operation.	Continuous flames are not allowed even if they are small. There should be no flame if possible.
		0		Δ		Flatness	Check the flatness with bare eyes or hands when the motor is stopped. Check if the frame is lost.	No perturbation groove to the direction of the circumference of 1mm or deeper is allowed. The current collection surface should not be damaged by flames.
	Current			Δ		Film status	Check with bare eyes.	Brass yellow or dark brown glossy surface.
	part	0				Bad gas	Smell the gas.	Caution: Sulfurous acid gas, hydrogen sulfide, chlorine or other corrosive gas contained in the air may obstruct fine film.
		0	•	Δ		Carbon dust and cleanness	Check with bare eyes or hands. Remove dust.	Carbon dust may cause flashover during the operation.
8. Slip ring spiral groove	1	0	•	Δ		Temperature	Check the status with bare eyes.	Partial red or violet color indicates overheating during the operation.
	Contact status	0		Δ		Flatness	Check the contact surface with bare eyes.	Ruggedness of 0.5mm or deeper due to wear and loss of contact surface is not allowed. Correct the problem at the routine inspection.
		0				Contact to stator	Check with bare eyes or ears. Check the contact between slider and shaft roller.	No sound should be generated by the shift roller touched by the slider during the operation.
9. Brush and brush holder	Vibration	0				Vibration	Check the movement of brush during operation with bare eyes or hands.	There should be no strange vibration. Check the vibration with a hand between the insulation bars.
	Brush			Δ		Compliance	Grasp the spring of the brush, and move the brush up/down.	The brush must move smoothly. Carbon dust or small bits must not be attached.
		0	•	Δ		Length	Check the status and size of wear.	Up to 3mm from the spring fastening tool. Be careful not to rub the slip ring with the fastening tool.



	Checkpo int	Classification				Details or		<b>0</b> % 1
Part		A	в	с	D	parts of inspection	Method of inspection	Criteria
		0		Δ		Discoloration	Check the color of the spring connection part.	Must be brass yellow or copper color. Red or violet indicates that the motor is overheated.
			•			Spring	Check the spring terminal with hands.	Fasten the loose screws.
		0	•	Δ		Carbon dust	Check with bare eyes and hands.	Remove carbon dust as it causes an accident.
10. Others		0				Looseness of bolts and nuts	Check if the bolts and nuts are loose.	Fasten the loose bolts and nuts.
		0		Δ		Breaking sound	Check if a strange sound is generated from the inspection window, side plate, slip ring cover or the pipes.	If the noise is louder than usual, check with the vibration meter and the noise meter.

# 9. Motor Troubleshooting Chart

Symptom	Problem Cause	What to do
It is impossible or difficult to start the motor.	The fuse is cut.	Check the fuse capacity.
	The start torque is low.	Change the start method or increase the capacity.
	The voltage is too low.	Check if the voltage is consistent with the nameplate, and raise the voltage.
	The circuit is open, or the connection is imperfect.	Replace the fuse. Check the overload relay, starter and push button.
	The stator winding or the rotor winding is cut.	Check if the connection of the stator winding or the end ring of the rotor bar is
	The resistance of the winding is not correct.	Replace the poor resistance. Repair the open circuit.
The motor is overheated.	Overload	Reduce load.
	Ventilation is obstructed.	Clean dust or dirt from the ventilation
	P1 of the 3-pahse motor is open.	Check the connection.

	The state layers.	or coil is cut between the	Repair the stator coil.	
	The volta	age is uneven.	Repair it in the grounding place.	
	The coil	is grounded.	Repair it in the grounding place.	
	The volta	age is too high or too low.	Correct the voltage.	
		The shaft is bent.	Replace the shaft.	
		The belt is too tight.	Adjust the belt tension.	
The bearing is hot.		The pulley is too far from the bearing.	Move the pulley close to the bearing.	
	General	The pulley diameter is too	Replace the pulley with the one with a	
		small.	larger diameter.	
		The shaft is not in a straight.	Correct the shaft.	
		The bearing is heated by external heat source.	Protect the bearing from the heat.	

Symptom		Problem Cause	What to do
	Roll bearing	The grease is excessive or insufficient.	Add or reduce grease.
		The grease is deteriorated.	Wash the bearing and feed new grease.
		The thrust is too big.	Reduce thrust in the shaft side.
The bearing is		The ball is broken or the race is rough.	Replace the bearing.
hot.	Sleeve bearing	The oil groove is blocked by dust.	Feed new oil.
		The oil ring is bent or broken.	Replace the oil ring.
		The viscosity of oil is inappropriate.	Replace the oil with the one with appropriate viscosity.
		The oil lacks.	Stop the motor, and feed oil to the appropriate level.



-	i i			
		The thrust is too big.	Remove the thrust.	
		The bearing is worn substantially.	Replace the bearing.	
The noise is loud.	The sh	aft is not in a straight line.	Adjust the shaft.	
	The ba	ase is weak.	Strengthen the base.	
	The co has a j	oupling or the geared equipment poor balance.	Adjust the balance of the driving device.	
	The be	earing is defective.	Replace the bearing.	
	The 3-	phase motor runs in 1-p.	Check if there is an open circuit.	
	The er	nd play is too big.	Check the bearing.	


## **10. A/S Center Contact Information**

## 10.1 A/S Center

Bupyeong	TEL	: 82-32-505-2765~8
	FAX	: 82-2-707-6111
<b>Clover Serv</b>	ice	: 080-024-8282 (24 hours)
Changwon Office TEL		: 82-55-268-9714
	FAX	: 82-55-268-9737

### 10.2 Sales Team

Agency Sales Team	TEL	: 82-2-707-6421~8
	FAX	: 82-2-714-8822
Rotary Machine Sales Tear	n TEL	: 82-2-707-6341,6322,6333,6338
	FAX	: 82-2-707-6446
Changwon Sales Team	TEL	: 82-55-268-9205~9208
	FAX	: 82-55-282-3287

## 10.3 Technical Division for Motor

**Changwon Plant Motor Design Team** 

	TEL : 82-55-279-7330~50,
	FAX : 82-55-268-9695
Homepage	: www.hyosung.com
	www.hico.co.kr/electricmoto

## Hyosung Corporation/Heavy Industries

# HYOSUNG CORPORATION

- Service Team
  - Main Office TEL: 82-2-707-6557~8 FAX: 82-2-707-6111
  - Changwon OfficeTEL: 82-55-268-9714 FAX: 82-55-268-9737
  - Clover Service TEL: 080-024-8282
- Sales Team
  - Agency Sales Team TEL: 82-2-707-6421~8 FAX: 82-2-714-8822
  - Rotary Machine Sales Team TEL: 82-2-707-6331~5 FAX: 82-2-707-6446
  - Changwon Sales Team TEL: 82-55-268-9205~8 FAX: 82-55-282-3287
- Technical Division for Motor TEL: 82-55-279-7330~50 FAX: 82-55-268-9695
- Homepage
  - www.hyosung.com
  - www.hico.co.kr/electricmotor



	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض					ن زکت توبتوایا <sup>ن</sup>				
NISOC	خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک (قرارداد 81-BK-HD-GCS-CO					(hy)	HAVAYAR Tomorrow Needs Innovation.			
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· DT - · VT - 911F	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	از 91	شماره صفحه: 74
<u> </u>	BK	GCS	HY	120	EL	DS	0002	V02		

# CERTIFICATION

# For MOTOR BARRING DEVICE (# M-2101-BM A/B/C)

# and Cylinder Lubricator Pump Motor (# M-2101-LP A/B/C)





## 1 EU-TYPE EXAMINATION CERTIFICATE

- 2 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU
- 3 Certificate Number: Sira 15ATEX1064X
- 5 Applicant: HYOSUNG CORPORATION
- 6 Address: (Ungnam-dong), 244, Gongdan-ro, Seongsan-gu, Chang-won-si, Gyeongsangnam-do, Republic of Korea
- 7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

Issue:

3

8 Sira Certification Service, notified body number 0518 in accordance with Articles 17 and 21 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2012/A11:2013 EN 60079-1:2014 EN 6

EN 60079-7:2007 EN 60079-31: 2014

The above list of documents may detail standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation, which is available on request.

- 10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to Specific Conditions of Use identified in the schedule to this certificate.
- 11 This EU-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.
- 12 The marking of the equipment shall include the following: Motor fitted with Increased Safety Terminal Box Motor fitted with Flameproof Terminal Box
  - £x) ⊔
    - II 2GD Ex db e IIB T• Gb IP 54 - 66 Ex db e IIC T• Gb IP 54 - 66 Ex tb IIIC/IIIB T, °C Db IP 6X Ta = -20°C  $\leq$  Ta  $\leq$  + 60°C

II 2GD Ex db IIB T• Gb IP 54 - 66 Ex db IIC T• Gb IP 54 - 66 Ex db IIC/IIIB T, C Db IP 6X Ta =  $-20^{\circ}C \le Ta \le + 60^{\circ}C$ 

· See table in product description for temperature class

, Maximum surface temperature will be assigned for each model number and frame size per Drawing ES1L100230. NOTE: Equipment marked IIIC is suitable for applications requiring Group IIIA or Group IIIB equipment.

Project Number 70164160

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C Ellaby Deputy Certification Manager

Sira Certification Service

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Page 1 of 5





## **EU-TYPE EXAMINATION CERTIFICATE**

Sira 15ATEX1064X Issue 3

#### DESCRIPTION OF EQUIPMENT 13

Motors comprise a cast iron frame with cast iron or steel spigot fitting end shields. The range consists of frame sizes from 71M to 315M (NEMA frame size 143T to 447T).

The motors are rated 690 V maximum, 50/60Hz, for use with or without Inverter Drives and with Class F or H insulation. The motors are available with 2 to 16 poles and can be supplied without terminal box.

Inverter Duty Ratings: Constant Torque (CT) = 10:1 [5Hz to 60Hz] or 3:1 [16.7Hz to 60Hz]" Variable Torque (VT) = 20.1 [2.5Hz to 60Hz]

The following types are available:

- Totally Enclosed, Fan Cooled (TEFC); Foot and/or Flange mount
- Totally Enclosed, Non-Ventilated (TENV) Foot and/or Flange Mount, Short Duty
- Totally Enclosed, Air Over (TEAO) Foot and/or Flange mount

The Drive and Non-drive end endshields are fastened to the frame with M6 to M24 steel Socket Head Cap Screws.

The rotor/shaft assembly passes through the end shields via roller or ball bearings.

The motor is provided with either an increased safety or flameproof terminal box fitted to the top or side of the motor via a compound filled feedthrough adapter assembly. The terminal box is made of cast iron or welded steel and is fastened to the adapter using M6 to M12 steel Socket Head Cap Screws with a bolt-on access cover to allow termination. The cover of the flameproof terminal box is fastened using M6 to M10 steel Hex Head Screws. The cover of the increased safety terminal box is fastened using M6 to M10 steel Socket Head Cap Screws.

For Inverter Duty ratings, the motor is provided with thermal protection devices in the stator winding. Connection to the thermal protection devices is made in the terminal compartment.

The duty type of motor is from S1 to S9 for TEFC and TEAO, S2 (30min.) for TENV

Frame Size (NEMA Size)	Poles	Maximum Rating (kW) [50Hz/60Hz]	T Class	Minimum air flow (TEAO motors)
71M	2/4 and Double Speed	0.4/0.4	T4, T5 or T6	4.0
80M	2/4/6 and Double Speed	0.75/0.75	T4, T5 or T6	3.5
90L (143/145T)	2/4/6/8 and Double Speed	2.2/2.2	T4, T5 or T6	3.0
100L	2/4/6/8 and Double Speed	2.2/2.2	T4, T5 or T6	5.0
112M (182/184T)	2/4/6/8 and Double Speed	4/4	T4, T5 or T6	5.0
132S (213T)	2/4/6/8 and Double Speed	7.5/7.5	T4, T5 or T6	4.0
132M (215T)	2/4/6/8 and Double Speed	7.5/7.5	T4, T5 or T6	6.0
160M (254T)	2/4/6/8 and Double Speed	15/15	T4, T5 or T6	8.5
160L (256T)	2/4/6/8 and Double Speed	18.5/18.5	T4, T5 or T6	7.0
180M (284T)	2/4/6/8 and Double Speed	22/22	T4, T5 or T6	8.5

The motors within the range are listed in the table below:

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## EU-TYPE EXAMINATION CERTIFICATE

## Sira 15ATEX1064X Issue 3

Frame Size (NEMA Size)	Poles	Maximum Rating (kW) [50Hz/60Hz]	T Class	Minimum air flow (TEAO motors)
180L (286T)	2/4/6/8 and Double Speed	30/30	T4, T5 or T6	10.5
200L (326T)	2/4/6/8 and Double Speed	37/45	T4, T5 or T6	12.0
225S (364T)	2/4/6/8 and Double Speed	45/55	T4, T5 or T6	9.0
250S (404T)	2/4/6/8 and Double Speed	55/75	T4, T5 or T6	11.5
250M (405T)	2/4/6/8 and Double Speed	75/90	T4, T5 or T6	12.5
280S (444T)	2/4/6/8 and Double Speed	90/110	T4, T5 or T6	10.5
280M (445T)	2/4/6/8 and Double Speed	110/132	T4, T5 or T6	13.5
280L (447T)	2/4/6/8 and Double Speed	160/200	T4, T5 or T6	9.5
315S	2/4/6/8 and Double Speed	132/160	T4, T5 or T6	10.5
315M	2/4/6/8 and Double Speed	160/200	T4, T5 or T6	9.5
315M	2/4/6/8 and Double Speed	200/-	T4	9.5

Notes: Temperature Code varies based on the Ambient Temperatures (40°C to 60°C), frequency and Inverter Duty Ratings. Motors can be marked with a Temperature Code of T3 to relevant.

All motors are 690 V maximum, 50 or 60 Hz and 3600 rpm (max) As for details of double speed motors, refer to drawing ES1L100169

Variation 1 - This variation introduced the following changes:

- i. Following appropriate assessment to demonstrate compliance with the latest technical knowledge, EN 60079-31:2014 was added to the list of standards and EN 60079-0:2012 was replaced by EN 60079-0:2012/A11:2013, the markings in section 12 were updated accordingly.
- ii. The following motor ratings, 0.75KW to 55KW, were added to the range.
- iii. For clarity, the customer has requested the modification of the Motor Frame table listed on page 2 and 3 of the Certificate.

Variation 2 - This variation introduced the following changes:

- i. Following appropriate assessment to demonstrate compliance with the latest technical knowledge, EN 60079-1:2007 was replaced by EN 60079-1:2014. The marking and Specific Condition of Use was amended accordingly and a new Specific Condition of Use was added.
- ii. Product Description was altered to correct the word "adapter" to "frame" as per the customer's request.

## 14 DESCRIPTIVE DOCUMENTS

### 14.1 Drawings

Refer to Certificate Annexe.

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## EU-TYPE EXAMINATION CERTIFICATE

#### Sira 15ATEX1064X Issue 3

## 14.2 Associated Sira Reports and Certificate History

Issue	Date	Report no.	Comment
0	28 August 2015	R70039471A	The release of the prime certificate.
1	04 September 2015	N.A.	The drawing list in Report R70039417A was modified after Issue 0 of the certificate was released; this was an editorial change that did not affect the product design but needed to be recognised in this Issue of the certificate.
2	20 March 2017	R70079416A	<ul> <li>This Issue covers the following changes:</li> <li>EC Type-Examination Certificate in accordance with 94/9/EC updated to EU Type-Examination Certificate in accordance with Directive 2014/34/EU. (In accordance with Article 41 of Directive 2014/34/EU, EC Type-Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Variations to such EC Type-Examination Certificates may continue to bear the original certificate number issued prior to 20 April 2016.)</li> <li>The introduction of Variation 1.</li> </ul>
3	02 January 2018	R70164160A	The introduction of Variation 2

15 SPECIFIC CONDITIONS OF USE (denoted by X after the certificate number)

- 15.1 The fasteners used for closing the flameproof enclosure shall be at least strength class 12.9.
- 15.2 TENV motors are only rated for short duty and shall not be operated for greater than 30 minutes.
- 15.3 The lengths of the flameproof joints are in parts longer and the gaps of the flameproof joints are in parts smaller than the values of table 2 and 3 of EN 60079-1:2014.
- 15.4 Appropriate ATEX certified cables and cable glands shall be used.
- 15.5 Refer to installation drawing "ES1L100230" for maximum surface temperature, model number and frame size for "tb" applications.
- 15.6 Flame-proof joints are not intended to be repaired.

### 16 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

#### 17 CONDITIONS OF MANUFACTURE

- 17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.
- 17.2 Holders of EU-Type Examination Certificates are required to comply with the conformity to type requirements defined in Article 13 of Directive 2014/34/EU.
- 17.3 For motors with increased safety terminal boxes, an electrical strength test of (1000+ 2*U*)\_2380 V maximum, rms shall be applied between Line and Ground for at least 60 s required by clause 6.1 of EN 60079-7, there shall be no breakdown.

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## Sira Certification Service





## EU-TYPE EXAMINATION CERTIFICATE

Sira 15ATEX1064X Issue 3

- 17.4 For Inverter Duty ratings, the motor shall be provided with thermal protection devices (Thermostat, Thermistor, RTD) in the stator winding.
- 17.5 For Totally Enclosed Air Over motors (TEAO), the minimum air flow is to be marked on the auxiliary nameplate mounted on motor enclosure or hood (fan cover).

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# Sira Certification Service

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Certificate Anne	exe	sira			
Certificate Number:	Sira 15ATEX1064X	CERTIFICATION			
Equipment:	Explosion Proof Induction Motors Model Series E************************************				
Applicant:	HYOSUNG CORPORATION				

Issue 0 (See Issue 1)

Issue 1 (With the exception of drawing ES1E100748, all other documents were introduced in Issue 0)

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
ES1E100630	1 of 1	0	08 Jul 15	Flame path joints and gaps drawing for IIB Ex d motor
ES1E100631	1 of 1	0	08 Jul 15	Flame path joints and gaps drawing for IIB Ex de motor
ES1E100632	1 of 1	0	08 Jul 15	Flame path joints and gaps drawing for IIC Ex d motor
ES1E100633	1 of 1	0	08 Jul 15	Flame path joints and gaps drawing for IIC Ex de motor
ES1E100546	1 of 1	0	08 Jul 15	FR.71M IIB Ex d motor schedule drawing
ES1E100547	1 of 1	0	08 Jul 15	FR.71M IIB Ex de motor schedule drawing
ES1E100548	1 of 1	0	08 Jul 15	FR.71M IIC Ex d motor schedule drawing
ES1E100549	1 of 1	0	08 Jul 15	FR.71M IIC Ex de motor schedule drawing
ES1E100550	1 of 1	0	08 Jul 15	FR.80M IIB Ex d motor schedule drawing
ES1E100551	1 of 1	0	08 Jul 15	FR.80M IIB Ex de motor schedule drawing
ES1E100552	1 of 1	0	08 Jul 15	FR.80M IIC Ex d motor schedule drawing
ES1E100553	1 of 1	0	08 Jul 15	FR.80M IIC Ex de motor schedule drawing
ES1E100554	1 of 1	0	08 Jul 15	FR.90L(143T,145T) IIB Ex d motor schedule drawing
ES1E100555	1 of 1	0	08 Jul 15	FR.90L(143T,145T) IIB Ex de motor schedule drawing
ES1E100556	1 of 1	0	08 Jul 15	FR.90L(143T,145T) IIC Ex d motor schedule drawing
ES1E100557	1 of 1	0	08 Jul 15	FR.90L(143T,145T) IIC Ex de motor schedule drawing
ES1E100558	1 of 1	0	08 Jul 15	FR.100L IIB Ex d motor schedule drawing
ES1E100559	1 of 1	0	08 Jul 15	FR.100L IIB Ex de motor schedule drawing
ES1E100560	1 of 1	0	08 Jul 15	FR.100L IIC Ex d motor schedule drawing
ES1E100561	1 of 1	0	08 Jul 15	FR.100L IIC Ex de motor schedule drawing
ES1E100562	1 of 1	0	08 Jul 15	FR.112M(182T,184T) IIB Ex d motor schedule drawing
ES1E100563	1 of 1	0	08 Jul 15	FR.112M(182T,184T) IIB Ex de motor schedule drawing
ES1E100564	1 of 1	0	08 Jul 15	FR.112M(182T,184T) IIC Ex d motor schedule drawing
ES1E100565	1 of 1	0	08 Jul 15	FR.112M(182T,184T) IIC Ex de motor schedule drawing
ES1E100566	1 of 1	0	08 Jul 15	FR.132S(213T) IIB Ex d motor schedule drawing
ES1E100567	1 of 1	0	08 Jul 15	FR.132S(213T) IIB Ex de motor schedule drawing
ES1E100568	1 of 1	0	08 Jul 15	FR.132S(213T) IIC Ex d motor schedule drawing
ES1E100569	1 of 1	0	08 Jul 15	FR.132S(213T) IIC Ex de motor schedule drawing
ES1E100570	1 of 1	0	08 Jul 15	FR.132M(215T) IIB Ex d motor schedule drawing
ES1E100571	1 of 1	0	08 Jul 15	FR.132M(215T) IIB Ex de motor schedule drawing
ES1E100572	1 of 1	0	08 Jul 15	FR.132M(215T) IIC Ex d motor schedule drawing
ES1E100573	1 of 1	0	08 Jul 15	FR.132M(215T) IIC Ex de motor schedule drawing
ES1E100574	1 of 1	0	08 Jul 15	FR.160M(254T) IIB Ex d motor schedule drawing
ES1E100575	1 of 1	0	08 Jul 15	FR.160M(254T) IIB Ex de motor schedule drawing
ES1E100576	1 of 1	0	08 Jul 15	FR.160M(254T) IIC Ex d motor schedule drawing
ES1E100577	1 of 1	0	08 Jul 15	FR.160M(254T) IIC Ex de motor schedule drawing
ES1E100578	1 of 1	0	08 Jul 15	FR.160L(256T) IIB Ex d motor schedule drawing
ES1E100579	1 of 1	0	08 Jul 15	FR.160L(256T) IIB Ex de motor schedule drawing
ES1E100580	1 of 1	0	08 Jul 15	FR.160L(256T) IIC Ex d motor schedule drawing
ES1E100581	1 of 1	0	08 Jul 15	FR.160L(256T) IIC Ex de motor schedule drawing
ES1E100582	1 of 1	0	08 Jul 15	FR.180M(284T) IIB Ex d motor schedule drawing
ES1E100583	1 of 1	0	08 Jul 15	FR.180M(284T) IIB Ex de motor schedule drawing

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# Sira Certification Service

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Certificate Number: Sira 15ATEX1064X

Equipment: Explosion I

Applicant:

## HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
ES1E100584	1 of 1	0	08 Jul 15	FR.180M(284T) IIC Ex d motor schedule drawing
ES1E100585	1 of 1	0	08 Jul 15	FR.180M(284T) IIC Ex de motor schedule drawing
ES1E100586	1 of 1	0	08 Jul 15	FR.180L(286T) IIB Ex d motor schedule drawing
ES1E100587	1 of 1	0	08 Jul 15	FR.180L(286T) IIB Ex de motor schedule drawing
ES1E100588	1 of 1	0	08 Jul 15	FR.180L(286T) IIC Ex d motor schedule drawing
ES1E100589	1 of 1	0	08 Jul 15	FR.180L(286T) IIC Ex de motor schedule drawing
ES1E100590	1 of 1	0	08 Jul 15	FR.200L(326T) IIB Ex d motor schedule drawing
ES1E100591	1 of 1	0	08 Jul 15	FR.200L(326T) IIB Ex de motor schedule drawing
ES1E100592	1 of 1	0	08 Jul 15	FR.200L(326T) IIC Ex d motor schedule drawing
ES1E100593	1 of 1	0	08 Jul 15	FR.200L(326T) IIC Ex de motor schedule drawing
ES1E100594	1 of 1	0	08 Jul 15	FR.225S(364T) IIB Ex d motor schedule drawing
ES1E100595	1 of 1	0	08 Jul 15	FR.225S(364T) IIB Ex de motor schedule drawing
ES1E100596	1 of 1	0	08 Jul 15	FR.225S(364T) IIC Ex d motor schedule drawing
ES1E100597	1 of 1	0	08 Jul 15	FR.225S(364T) IIC Ex de motor schedule drawing
ES1E100598	1 of 1	0	08 Jul 15	FR.250S(404T) IIB Ex d motor schedule drawing
ES1E100599	1 of 1	0	08 Jul 15	FR.250S(404T) IIB Ex de motor schedule drawing
ES1E100600	1 of 1	0	08 Jul 15	FR.250S(404T) IIC Ex d motor schedule drawing
ES1E100601	1 of 1	0	08 Jul 15	FR.250S(404T) IIC Ex de motor schedule drawing
ES1E100602	1 of 1	0	08 Jul 15	FR.250M(405T) IIB Ex d motor schedule drawing
ES1E100603	1 of 1	0	08 Jul 15	FR.250M(405T) IIB Ex de motor schedule drawing
ES1E100604	1 of 1	0	08 Jul 15	FR.250M(405T) IIC Ex d motor schedule drawing
ES1E100605	1 of 1	0	08 Jul 15	FR.250M(405T) IIC Ex de motor schedule drawing
ES1E100606	1 of 1	0	08 Jul 15	FR.280S(444T) IIB Ex d motor schedule drawing
ES1E100607	1 of 1	0	08 Jul 15	FR.280S(444T) IIB Ex de motor schedule drawing
ES1E100608	1 of 1	0	08 Jul 15	FR.280S(444T) IIC Ex d motor schedule drawing
ES1E100609	1 of 1	0	08 Jul 15	FR.280S(444T) IIC Ex de motor schedule drawing
ES1E100610	1 of 1	0	08 Jul 15	FR.280M(445T) IIB Ex d motor schedule drawing
ES1E100611	1 of 1	0	08 Jul 15	FR.280M(445T) IIB Ex de motor schedule drawing
ES1E100612	1 of 1	0	08 Jul 15	FR.280M(445T) IIC Ex d motor schedule drawing
ES1E100613	1 of 1	0	08 Jul 15	FR.280M(445T) IIC Ex de motor schedule drawing
ES1E100614	1 of 1	0	08 Jul 15	FR.280L(447T) IIB Ex d motor schedule drawing
ES1E100615	1 of 1	0	08 Jul 15	FR.280L(447T) IIB Ex de motor schedule drawing
ES1E100616	1 of 1	0	08 Jul 15	FR.280L(447T) IIC Ex d motor schedule drawing
ES1E100617	1 of 1	0	08 Jul 15	FR.280L(447T) IIC Ex de motor schedule drawing
ES1E100618	1 of 1	0	08 Jul 15	FR.315S IIB Ex d motor schedule drawing
ES1E100619	1 of 1	0	08 Jul 15	FR.315S IIB Ex de motor schedule drawing
ES1E100620	1 of 1	0	08 Jul 15	FR.315S IIC Ex d motor schedule drawing
ES1E100621	1 of 1	0	08 Jul 15	FR.315S IIC Ex de motor schedule drawing
ES1E100622	1 of 1	0	08 Jul 15	FR.315M IIB Ex d motor schedule drawing
ES1E100623	1 of 1	0	08 Jul 15	FR.315M IIB Ex de motor schedule drawing
ES1E100624	1 of 1	0	08 Jul 15	FR.315M IIC Ex d motor schedule drawing
ES1E100625	1 of 1	0	08 Jul 15	FR.315M IIC Ex de motor schedule drawing
ES1E100626	1 of 1	0	08 Jul 15	FR.315M(50Hz only) IIB Ex d motor schedule drawing
ES1E100627	1 of 1	0	08 Jul 15	FR.315M(50Hz only) IIB Ex de motor schedule drawing
ES1E100628	1 of 1	0	08 Jul 15	FR.315M(50Hz only) IIC Ex d motor schedule drawing

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Certificate Number: Sira 15ATEX1064X

Equipment:

Explosion Proof Induction Motors Model Series

Applicant:

HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
ES1E100629	1 of 1	0	08 Jul 15	FR.315M(50Hz only) IIC Ex de motor schedule drawing
ES1E100634	1 of 1	0	08 Jul 15	Ex e AUX. Terminal box schedule drawing #1
ES1E100635	1 of 1	0	08 Jul 15	Ex e AUX. Terminal box schedule drawing #2
ES1E100636	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.71 thru
				FR.180(140T thru 280T) #1
ES1E100650	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.71 thru
				FR.180(140T thru 280T) #2
ES1E100637	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.160 thru
				FR.200(250T thru 320T)
ES1E100638	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.200 thru
				FR.225(320T thru 360T)
ES1E100639	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.225 thru
				FR.250(360T thru 400T)
ES1E100640	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.250 thru
				FR.315(400T thru 440T)
ES1E100641	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.280 thru
				FR.315(440T)
ES1E100642	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.200 thru
				FR.315(320T thru 440T)
ES1E100643	1 of 1	0	08 Jul 15	Ex e Main Terminal box schedule drawing for FR.250 thru
		-		FR.315(400T thru 440T)
ES1L100153	1 of 1	0	08 Jul 15	Frame drawing for FR.71 thru FR.315(1401 thru 4401)
ES1L100154	1 of 1	0	08 Jul 15	Endbell drawing for FR.71 thru FR.315(1401 thru 4401)
ES1L100155	1 of 1	0	08 Jul 15	Adapter drawing for FR. /1 thru FR.315(1401 thru 4401)
ES1B102112	1 of 1	0	08 Jul 15	Ex d Terminal box drawing for FR.71 thru FR.315(1401 thru 440T)
FS1B102113	1 of 1	0	08 Jul 15	Ex d Terminal box cover drawing for FR.71 thru FR.315
		C .		(140T thru 440T)
ES1G100782	1 of 1	0	08 Jul 15	Name plate drawing for FR.71 thru FR.100
ES1G100783	1 of 1	0	08 Jul 15	Name plate drawing for FR.112 thru FR.315
ES1G100784	1 of 1	0	08 Jul 15	Inverter duty name plate drawing for FR.71 thru FR.100
ES1G100785	1 of 1	0	08 Jul 15	Inverter duty name plate drawing for FR.112 thru FR.315
ES1G100817	1 of 1	0	28 Jul 15	Certification name plate drawing for FR.71 thru FR.315
				(140T thru 440T)
ES1L100156	1 of 1	0	08 Jul 15	Cooling fan drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100165	1 of 1	0	08 Jul 15	AUX. Terminal block drawing for FR.71 thru FR.315(140T
				thru 440T)
ES1L100166	1 of 1	0	08 Jul 15	Sealing construction drawing for FR.71 thru FR.315(140T
				thru 440T)
ES1L100175	1 of 1	0	08 Jul 15	Adapter plate drawing for FR.71 thru FR.315(140T thru
				440T)
ES1L100169	1 of 1	0	08 Jul 15	Max. output drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100170	1 of 1	0	08 Jul 15	Temperature code and inverter duty range drawing for
				FR.71 thru FR.315(140T thru 440T)
ES1E100748	1 of 1	0	24 Aug 15	Assembly Drawing – motor without terminal box(es)

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# Sira Certification Service

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Certificate Number: Sira 15ATEX1064X Equipment: Explosion Proof Induct

Applicant:

HYOSUNG CORPORATION

## Issue 2

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1E100546	1 of 1	1	29 Dec 16	FR.71M IIB Ex d motor schedule drawing
ES1E100547	1 of 1	1	29 Dec 16	FR.71M IIB Ex de motor schedule drawing
ES1E100548	1 of 1	1	29 Dec 16	FR.71M IIC Ex d motor schedule drawing
ES1E100549	1 of 1	2	29 Dec 16	FR.71M IIC Ex de motor schedule drawing
ES1E100550	1 of 1	1	29 Dec 16	FR.80M IIB Ex d motor schedule drawing
ES1E100551	1 of 1	1	29 Dec 16	FR.80M IIB Ex de motor schedule drawing
ES1E100552	1 of 1	1	29 Dec 16	FR.80M IIC Ex d motor schedule drawing
ES1E100553	1 of 1	2	29 Dec 16	FR.80M IIC Ex de motor schedule drawing
ES1E100554	1 of 1	1	29 Dec 16	FR.90L(143T,145T) IIB Ex d motor schedule drawing
ES1E100555	1 of 1	1	29 Dec 16	FR.90L(143T,145T) IIB Ex de motor schedule drawing
ES1E100556	1 of 1	1	29 Dec 16	FR.90L(143T,145T) IIC Ex d motor schedule drawing
ES1E100557	1 of 1	2	29 Dec 16	FR.90L(143T,145T) IIC Ex de motor schedule drawing
ES1E100558	1 of 1	1	29 Dec 16	FR.100L IIB Ex d motor schedule drawing
ES1E100559	1 of 1	1	29 Dec 16	FR.100L IIB Ex de motor schedule drawing
ES1E100560	1 of 1	1	29 Dec 16	FR.100L IIC Ex d motor schedule drawing
ES1E100561	1 of 1	2	29 Dec 16	FR.100L IIC Ex de motor schedule drawing
ES1E100562	1 of 1	1	29 Dec 16	FR.112M(182T,184T) IIB Ex d motor schedule drawing
ES1E100563	1 of 1	1	29 Dec 16	FR.112M(182T,184T) IIB Ex de motor schedule drawing
ES1E100564	1 of 1	1	29 Dec 16	FR.112M(182T,184T) IIC Ex d motor schedule drawing
ES1E100565	1 of 1	2	29 Dec 16	FR.112M(182T,184T) IIC Ex de motor schedule drawing
ES1E100566	1 of 1	1	29 Dec 16	FR.132S(213T) IIB Ex d motor schedule drawing
ES1E100567	1 of 1	1	29 Dec 16	FR.132S(213T) IIB Ex de motor schedule drawing
ES1E100568	1 of 1	1	29 Dec 16	FR.132S(213T) IIC Ex d motor schedule drawing
ES1E100569	1 of 1	2	29 Dec 16	FR.132S(213T) IIC Ex de motor schedule drawing
ES1E100570	1 of 1	2	29 Dec 16	FR.132M(215T) IIB Ex d motor schedule drawing
ES1E100571	1 of 1	2	29 Dec 16	FR.132M(215T) IIB Ex de motor schedule drawing
ES1E100572	1 of 1	2	29 Dec 16	FR.132M(215T) IIC Ex d motor schedule drawing
ES1E100573	1 of 1	3	29 Dec 16	FR.132M(215T) IIC Ex de motor schedule drawing
ES1E100574	1 of 1	1	29 Dec 16	FR.160M(254T) IIB Ex d motor schedule drawing
ES1E100575	1 of 1	1	29 Dec 16	FR.160M(254T) IIB Ex de motor schedule drawing
ES1E100576	1 of 1	1	29 Dec 16	FR.160M(254T) IIC Ex d motor schedule drawing
ES1E100577	1 of 1	2	29 Dec 16	FR.160M(254T) IIC Ex de motor schedule drawing
ES1E100578	1 of 1	1	29 Dec 16	FR.160L(256T) IIB Ex d motor schedule drawing
ES1E100579	1 of 1	1	29 Dec 16	FR.160L(256T) IIB Ex de motor schedule drawing
ES1E100580	1 of 1	1	29 Dec 16	FR.160L(256T) IIC Ex d motor schedule drawing
ES1E100581	1 of 1	2	29 Dec 16	FR.160L(256T) IIC Ex de motor schedule drawing
ES1E100582	1 of 1	2	29 Dec 16	FR.180M(284T) IIB Ex d motor schedule drawing
ES1E100583	1 of 1	2	29 Dec 16	FR.180M(284T) IIB Ex de motor schedule drawing
ES1E100584	1 of 1	2	29 Dec 16	FR.180M(284T) IIC Ex d motor schedule drawing
ES1E100585	1 of 1	3	29 Dec 16	FR.180M(284T) IIC Ex de motor schedule drawing
ES1E100586	1 of 1	1	29 Dec 16	FR.180L(286T) IIB Ex d motor schedule drawing
ES1E100587	1 of 1	1	29 Dec 16	FR 180L(286T) IIB Ex de motor schedule drawing
ES1E100588	1 of 1	1	29 Dec 16	FR 180L(286T) IIC Ex d motor schedule drawing
ES1E100589	1 of 1	2	29 Dec 16	FR.180L(286T) IIC Ex de motor schedule drawing

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Certificate Number: Sira 15ATEX1064X

Applicant:

Equipment:

## HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1E100590	1 of 1	1	29 Dec 16	FR.200L(326T) IIB Ex d motor schedule drawing
ES1E100591	1 of 1	1	29 Dec 16	FR.200L(326T) IIB Ex de motor schedule drawing
ES1E100592	1 of 1	1	29 Dec 16	FR.200L(326T) IIC Ex d motor schedule drawing
ES1E100593	1 of 1	2	29 Dec 16	FR.200L(326T) IIC Ex de motor schedule drawing
ES1E100594	1 of 1	1	29 Dec 16	FR.225S(364T) IIB Ex d motor schedule drawing
ES1E100595	1 of 1	1	29 Dec 16	FR.225S(364T) IIB Ex de motor schedule drawing
ES1E100596	1 of 1	1	29 Dec 16	FR.225S(364T) IIC Ex d motor schedule drawing
ES1E100597	1 of 1	2	29 Dec 16	FR.225S(364T) IIC Ex de motor schedule drawing
ES1E100598	1 of 1	1	29 Dec 16	FR.250S(404T) IIB Ex d motor schedule drawing
ES1E100599	1 of 1	1	29 Dec 16	FR.250S(404T) IIB Ex de motor schedule drawing
ES1E100600	1 of 1	1	29 Dec 16	FR.250S(404T) IIC Ex d motor schedule drawing
ES1E100601	1 of 1	2	29 Dec 16	FR.250S(404T) IIC Ex de motor schedule drawing
ES1E100602	1 of 1	1	29 Dec 16	FR.250M(405T) IIB Ex d motor schedule drawing
ES1E100603	1 of 1	1	29 Dec 16	FR.250M(405T) IIB Ex de motor schedule drawing
ES1E100604	1 of 1	1	29 Dec 16	FR.250M(405T) IIC Ex d motor schedule drawing
ES1E100605	1 of 1	2	29 Dec 16	FR.250M(405T) IIC Ex de motor schedule drawing
ES1E100606	1 of 1	1	29 Dec 16	FR.280S(444T) IIB Ex d motor schedule drawing
ES1E100607	1 of 1	1	29 Dec 16	FR.280S(444T) IIB Ex de motor schedule drawing
ES1E100608	1 of 1	1	29 Dec 16	FR.280S(444T) IIC Ex d motor schedule drawing
ES1E100609	1 of 1	2	29 Dec 16	FR.280S(444T) IIC Ex de motor schedule drawing
ES1E100610	1 of 1	1	29 Dec 16	FR.280M(445T) IIB Ex d motor schedule drawing
ES1E100611	1 of 1	1	29 Dec 16	FR.280M(445T) IIB Ex de motor schedule drawing
ES1E100612	1 of 1	1	29 Dec 16	FR.280M(445T) IIC Ex d motor schedule drawing
ES1E100613	1 of 1	2	29 Dec 16	FR.280M(445T) IIC Ex de motor schedule drawing
ES1E100614	1 of 1	1	29 Dec 16	FR.280L(447T) IIB Ex d motor schedule drawing
ES1E100615	1 of 1	1	29 Dec 16	FR.280L(447T) IIB Ex de motor schedule drawing
ES1E100616	1 of 1	1	29 Dec 16	FR.280L(447T) IIC Ex d motor schedule drawing
ES1E100617	1 of 1	2	29 Dec 16	FR.280L(447T) IIC Ex de motor schedule drawing
ES1E100618	1 of 1	1	29 Dec 16	FR.315S IIB Ex d motor schedule drawing
ES1E100619	1 of 1	1	29 Dec 16	FR.315S IIB Ex de motor schedule drawing
ES1E100620	1 of 1	1	29 Dec 16	FR.315S IIC Ex d motor schedule drawing
ES1E100621	1 of 1	2	29 Dec 16	FR.315S IIC Ex de motor schedule drawing
ES1E100622	1 of 1	1	29 Dec 16	FR.315M IIB Ex d motor schedule drawing
ES1E100623	1 of 1	1	29 Dec 16	FR.315M IIB Ex de motor schedule drawing
ES1E100624	1 of 1	1	29 Dec 16	FR.315M IIC Ex d motor schedule drawing
ES1E100625	1 of 1	2	29 Dec 16	FR.315M IIC Ex de motor schedule drawing
ES1E100626	1 of 1	1	29 Dec 16	FR.315M(50Hz only) IIB Ex d motor schedule drawing
ES1E100627	1 of 1	1	29 Dec 16	FR.315M(50Hz only) IIB Ex de motor schedule drawing
ES1E100628	1 of 1	1	29 Dec 16	FR.315M(50Hz only) IIC Ex d motor schedule drawing
ES1E100629	1 of 1	2	29 Dec 16	FR.315M(50Hz only) IIC Ex de motor schedule drawing
ES1E100634	1 of 1	1	29 Dec 16	Ex e AUX. Terminal box schedule drawing #1
ES1E100635	1 of 1	1	29 Dec 16	Ex e AUX. Terminal box schedule drawing #2
ES1E100636	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.71 thru
				FR.180(140T thru 280T) #1

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Certificate Number: Sira 15ATEX1064X

Equipment:

mber: Sira 15ATEX1064X

Explosion Proof Induction Motors Model Series E\*\*\*\*\*\*\*\*\*\* (11 Digits for Flameproof)

Applicant:

HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1E100650	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.71 thru FR 180(140T thru 280T) #2
ES1E100637	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.160 thru FR.200(250T thru 320T)
ES1E100638	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.200 thru FR.225(320T thru 360T)
ES1E100639	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.225 thru FR.250(360T thru 400T)
ES1E100640	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.250 thru FR.315(400T thru 440T)
ES1E100641	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.280 thru FR.315(440T)
ES1E100642	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.200 thru FR.315(320T thru 440T)
ES1E100643	1 of 1	1	29 Dec 16	Ex e Main Terminal box schedule drawing for FR.250 thru FR.315(400T thru 440T)
ES1L100153	1 of 1	1	29 Dec 16	Frame drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100154	1 of 1	1	29 Dec 16	Endbell drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100155	1 of 1	1	29 Dec 16	Adapter drawing for FR.71 thru FR.315(140T thru 440T)
ES1B102112	1 of 1	1	29 Dec 16	Ex d Terminal box drawing for FR.71 thru FR.315(140T thru 440T)
ES1B102113	1 of 1	1	29 Dec 16	Ex d Terminal box cover drawing for FR.71 thru FR.315 (140T thru 440T)
ES1G100782	1 of 1	0	29 Dec 16	Name plate drawing for FR.71 thru FR.100
ES1G100783	1 of 1	1	29 Dec 16	Name plate drawing for FR.112 thru FR.315
ES1G100784	1 of 1	0	29 Dec 16	Inverter duty name plate drawing for FR.71 thru FR.100
ES1G100785	1 of 1	1	29 Dec 16	Inverter duty name plate drawing for FR.112 thru FR.315
ES1G100817	1 of 1	1	29 Dec 16	Certification name plate drawing for FR.71 thru FR.315 (140T thru 440T)
ES1L100156	1 of 1	0	29 Dec 16	Cooling fan drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100165	1 of 1	0	29 Dec 16	AUX. Terminal block drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100166	1 of 1	1	29 Dec 16	Sealing construction drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100175	1 of 1	1	29 Dec 16	Adapter plate drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100169	1 of 1	1	29 Dec 16	Max. output drawing for FR.71 thru FR.315(140T thru 440T)
ES1L100170	1 of 1	0	29 Dec 16	Temperature code and inverter duty range drawing for FR.71 thru FR.315(140T thru 440T)
ES1G101105	1 of 1	1	29 Dec 16	Name plate drawing for FR.71 thru FR.100 (Ex tb)
ES1G101106	1 of 1	1	29 Dec 16	Name plate drawing for FR.112 thru FR.315 (Ex tb)
ES1G101107	1 of 1	1	29 Dec 16	_Inverter duty name plate drawing for FR.71 thru FR.100 (Ex tb)

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Certificate Number: Sira 15ATEX1064X

Equipment:

Applicant:

## HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1G101108	1 of 1	2	29 Dec 16	Inverter duty name plate drawing for FR.112 thru FR.315 (Ex tb)
ES1G101109	1 of 1	3	29 Dec 16	Certification name plate drawing fort FR.71 thru FR.315 (140T thru 440T) (Ex tb)
ES1G101120	1 of 1	0	29 Dec 16	certificate name plate drawing for Fr.71 thru fr.71(140T thur440T) Ex tc
ES1G101121	1 of 1	0	29 Dec 16	Name plate drawing for FR.112 thru FR.315 (Ex tc)
ES1G101122	1 of 1	0	29 Dec 16	Inverter duty name plate drawing for FR.71 thru FR.100 (Ex tc)
ES1G101123	1 of 1	0	29 Dec 16	Name plate drawing for FR.71 thru FR.100 (Ex tc)
ES1G101124	1 of 1	0	29 Dec 16	Inverter duty name plate drawing for FR.112 thru FR.315 (Ex tc
ES1L100230	1 of 1	0	29 Dec 16	Max. surface temperature and inverter duty range drawing for FR.71 thru FR.315(140T thru 440T)

#### Issue 3

Drawing	Sheets	Rev.	Date (Sira stamp)	Title	
ES1E100630	1 of 1	1	07 Dec 17	Flame path joints and gaps drawing for IIB Ex db motor	
ES1E100631	1 of 1	1	07 Dec 17	Flame path joints and gaps drawing for IIB Ex db e motor	
ES1E100632	1 of 1	1	07 Dec 17	Flame path joints and gaps drawing for IIC Ex db motor	
ES1E100633	1 of 1	1	07 Dec 17	Flame path joints and gaps drawing for IIC Ex db e motor	
ES1E100546	1 of 1	2	07 Dec 17	FR.71M IIB Ex db motor schedule drawing	
ES1E100547	1 of 1	2	07 Dec 17	FR.71M IIB Ex db e motor schedule drawing	
ES1E100548	1 of 1	2	07 Dec 17	FR.71M IIC Ex db motor schedule drawing	
ES1E100549	1 of 1	3	07 Dec 17	FR.71M IIC Ex db e motor schedule drawing	
ES1E100550	1 of 1	2	07 Dec 17	FR.80M IIB Ex db motor schedule drawing	
ES1E100551	1 of 1	2	07 Dec 17	FR.80M IIB Ex db e motor schedule drawing	
ES1E100552	1 of 1	2	07 Dec 17	FR.80M IIC Ex db motor schedule drawing	
ES1E100553	1 of 1	3	07 Dec 17	FR.80M IIC Ex db e motor schedule drawing	
ES1E100554	1 of 1	2	07 Dec 17	FR.90L(143T,145T) IIB Ex db motor schedule drawing	
ES1E100555	1 of 1	2	07 Dec 17	FR.90L(143T,145T) IIB Ex db e motor schedule drawing	
ES1E100556	1 of 1	2	07 Dec 17	FR.90L(143T,145T) IIC Ex db motor schedule drawing	
ES1E100557	1 of 1	3	07 Dec 17	FR.90L(143T,145T) IIC Ex db e motor schedule drawing	
ES1E100558	1 of 1	2	07 Dec 17	FR.100L IIB Ex db motor schedule drawing	
ES1E100559	1 of 1	2	07 Dec 17	FR.100L IIB Ex db e motor schedule drawing	
ES1E100560	1 of 1	2	07 Dec 17	FR.100L IIC Ex db motor schedule drawing	
ES1E100561	1 of 1	3	07 Dec 17	FR.100L LIC Fx db e motor schedule drawing	
ES1E100562	1 of 1	2	07 Dec 17	FR.112M(182T,184T) IIB Ex db motor schedule drawing	
ES1E100563	1 of 1	2	07 Dec 17	FR.112M(182T,184T) IIB Ex db e motor schedule drawing	
ES1E100564	1 of 1	2	07 Dec 17	FR.112M(182T,184T) IIC Ex db motor schedule drawing	
ES1E100565	1 of 1	3	07 Dec 17	FR.112M(182T,184T) IIC Ex db e motor schedule drawing	
ES1E100566	1 of 1	2	07 Dec 17	FR.132S(213T) IIB Ex db motor schedule drawing	
ES1E100567	1 of 1	2	07 Dec 17	FR.132S(213T) IIB Ex db e motor schedule drawing	
ES1E100568	1 of 1	2	07 Dec 17	FR.132S(213T) IIC Ex db motor schedule drawing	
ES1E100569	1 of 1	3	07 Dec 17	FR.132S(213T) IIC Ex db e motor schedule drawing	

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Certificate Number: Sira 15ATEX1064X

Equipment: Explosion Proof Induction

Applicant:

## HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1E100570	1 of 1	3	07 Dec 17	FR.132M(215T) IIB Ex db motor schedule drawing
ES1E100571	1 of 1	3	07 Dec 17	FR.132M(215T) IIB Ex db e motor schedule drawing
ES1E100572	1 of 1	3	07 Dec 17	FR.132M(215T) IIC Ex db motor schedule drawing
ES1E100573	1 of 1	4	07 Dec 17	FR.132M(215T) IIC Ex db e motor schedule drawing
ES1E100574	1 of 1	2	07 Dec 17	FR.160M(254T) IIB Ex db motor schedule drawing
ES1E100575	1 of 1	2	07 Dec 17	FR.160M(254T) IIB Ex db e motor schedule drawing
ES1E100576	1 of 1	2	07 Dec 17	FR.160M(254T) IIC Ex db motor schedule drawing
ES1E100577	1 of 1	3	07 Dec 17	FR.160M(254T) IIC Ex db e motor schedule drawing
ES1E100578	1 of 1	2	07 Dec 17	FR.160L(256T) IIB Ex db motor schedule drawing
ES1E100579	1 of 1	2	07 Dec 17	FR.160L(256T) IIB Ex db e motor schedule drawing
ES1E100580	1 of 1	2	07 Dec 17	FR.160L(256T) IIC Ex db motor schedule drawing
ES1E100581	1 of 1	3	07 Dec 17	FR.160L(256T) IIC Ex db e motor schedule drawing
ES1E100582	1 of 1	3	07 Dec 17	FR.180M(284T) IIB Ex db motor schedule drawing
ES1E100583	1 of 1	3	07 Dec 17	FR.180M(284T) IIB Ex db e motor schedule drawing
ES1E100584	1 of 1	3	07 Dec 17	FR.180M(284T) IIC Ex db motor schedule drawing
ES1E100585	1 of 1	4	07 Dec 17	FR 180M(284T) IIC Ex db e motor schedule drawing
ES1E100586	1 of 1	2	07 Dec 17	FR 1801 (286T) IIB Ex db motor schedule drawing
ES1E100500	1 of 1	2	07 Dec 17	FR 1801 (286T) IIB Ex db e motor schedule drawing
ES1E100507	1 of 1	2	07 Dec 17	FR 1801 (286T) IIC Ex db motor schedule drawing
ES1E100500	1 of 1	2	07 Dec 17	FR 180L (286T) LC Ex db motor schedule drawing
ES1E100507	1 of 1	2	07 Dec 17	EP 2001 (226T) UP Ex db motor schedule drawing
ESTE100590	1 of 1	2	07 Dec 17	EP 2001 (226T) IIB Ex db a motor schedule drawing
ESTE100391	1 01 1 1 of 1	2	07 Dec 17	FR.200L(320T) HD EX db e motor schedule drawing
ESTE100592	1 01 1 1 of 1	2	07 Dec 17	FR.200L(326T) HC EX db motor schedule drawing
ESTE100593	1 01 1 1 of 1	3	07 Dec 17	FR.200L(3201) ITC EX db e motor schedule drawing
ESTE100594	1011	2	07 Dec 17	FR.225S(364T) TIB EX db motor schedule drawing
ESTE 100595		2	07 Dec 17	FR.225S(3641) TIB EX db e motor schedule drawing
ESTE 100596		2	07 Dec 17	FR.225S(3641) TIC EX db motor schedule drawing
ESTE 100597		3	07 Dec 17	FR.225S(3641) TIC EX db e motor schedule drawing
ES1E100598	1 of 1	2	07 Dec 17	FR.250S(4041) TIB Ex db motor schedule drawing
ES1E100599	1 of 1	2	07 Dec 17	FR.250S(4041) IIB Ex db e motor schedule drawing
ES1E100600	1 of 1	2	07 Dec 17	FR.250S(4041) IIC Ex db motor schedule drawing
ES1E100601	1 of 1	3	07 Dec 17	FR.250S(404T) IIC Ex db e motor schedule drawing
ES1E100602	1 of 1	2	07 Dec 17	FR.250M(405T) IIB Ex db motor schedule drawing
ES1E100603	1 of 1	2	07 Dec 17	FR.250M(405T) IIB Ex db e motor schedule drawing
ES1E100604	1 of 1	2	07 Dec 17	FR.250M(405T) IIC Ex db motor schedule drawing
ES1E100605	1 of 1	3	07 Dec 17	FR.250M(405T) IIC Ex db e motor schedule drawing
ES1E100606	1 of 1	2	07 Dec 17	FR.280S(444T) IIB Ex db motor schedule drawing
ES1E100607	1 of 1	2	07 Dec 17	FR.280S(444T) IIB Ex db e motor schedule drawing
ES1E100608	1 of 1	2	07 Dec 17	FR.280S(444T) IIC Ex db motor schedule drawing
ES1E100609	1 of 1	3	07 Dec 17	FR.280S(444T) IIC Ex db e motor schedule drawing
ES1E100610	1 of 1	2	07 Dec 17	FR.280M(445T) IIB Ex db motor schedule drawing
ES1E100611	1 of 1	2	07 Dec 17	FR.280M(445T) IIB Ex db e motor schedule drawing
ES1E100612	1 of 1	2	07 Dec 17	FR.280M(445T) IIC Ex db motor schedule drawing
ES1E100613	1 of 1	3	07 Dec 17	FR.280M(445T) IIC Ex db e motor schedule drawing
ES1E100614	1 of 1	2	07 Dec 17	FR.280L(447T) IIB Ex db motor schedule drawing

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# Sira Certification Service

Haward	den,	CH5	3US,	United	Kingdom
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Web:	www.csagroupuk.org

sira	CSA Group
CERTIFICATION	

Certificate Number: Sira 15ATEX1064X

Applicant:

Equipment:

HYOSUNG CORPORATION

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ES1E100615	1 of 1	2	07 Dec 17	FR.280L(447T) IIB Ex db e motor schedule drawing
ES1E100616	1 of 1	2	07 Dec 17	FR.280L(447T) IIC Ex db motor schedule drawing
ES1E100617	1 of 1	3	07 Dec 17	FR.280L(447T) IIC Ex db e motor schedule drawing
ES1E100618	1 of 1	2	07 Dec 17	FR.315S IIB Ex db motor schedule drawing
ES1E100619	1 of 1	2	07 Dec 17	FR.315S IIB Ex db e motor schedule drawing
ES1E100620	1 of 1	2	07 Dec 17	FR.315S IIC Ex db motor schedule drawing
ES1E100621	1 of 1	3	07 Dec 17	FR.315S IIC Ex db e motor schedule drawing
ES1E100622	1 of 1	2	07 Dec 17	FR.315M IIB Ex db motor schedule drawing
ES1E100623	1 of 1	2	07 Dec 17	FR.315M IIB Ex db e motor schedule drawing
ES1E100624	1 of 1	2	07 Dec 17	FR.315M IIC Ex db motor schedule drawing
ES1E100625	1 of 1	3	07 Dec 17	FR.315M IIC Ex db e motor schedule drawing
ES1E100626	1 of 1	2	07 Dec 17	FR.315M(50Hz only) IIB Ex db motor schedule drawing
ES1E100627	1 of 1	2	07 Dec 17	FR.315M(50Hz only) IIB Ex db e motor schedule drawing
ES1E100628	1 of 1	2	07 Dec 17	FR.315M(50Hz only) IIC Ex db motor schedule drawing
ES1E100629	1 of 1	3	07 Dec 17	FR.315M(50Hz only) IIC Ex db e motor schedule drawing
ES1G100782	1 of 1	1	07 Dec 17	Name plate drawing for FR.71 thru FR.100
ES1G100783	1 of 1	2	07 Dec 17	Name plate drawing for FR.112 thru FR.315
ES1G100784	1 of 1	1	07 Dec 17	Inverter duty name plate drawing for FR.71 thru FR.100
ES1G100785	1 of 1	2	07 Dec 17	Inverter duty name plate drawing for FR.112 thru FR.315
ES1G100817	1 of 1	2	07 Dec 17	Certification name plate drawing for FR.71 thru FR.315
				(140T thru 440T)

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# Sira Certification Service

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Web:

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض							نۇك نوپتوايا <sup>ن</sup>		
NISOC	خرید پکیج های کمپرسور گاز (رفت و بر گشتی) بینک (قرارداد 30_BK-HD-GCS) (BK-HD-GCS)							(hy)	HAVAYAR Tomorrow Needs Innovation.	
شماره پیمان:		DATASHEET (W/DRAWING) FOR AUXILIARY MOTORS								
· DT - · VT - 91AF	پروژه	بسته کاری	صادركننده	تسهيلات	رشته	نوع مدر ک	سريال	نسخه	از 91	شماره صفحه:89
	BK	GCS	HY	120	EL	DS	0002	V02	_	

# CERTIFICATION

# For Aux. Oil Pump Motor (# M-2101-AP A/B/C)

# &

Aux. Pump Motor

(# P-2101-AX A/B/C)

&

Main Pump Motor

(# P-2101-WP A/B/C)



# Allegato I Annex I ECM 23 ATEX 2624 X



Rilasciato ai sensi della direttiva 2014/34/UE – Allegato III - Modulo B Issued according to 2014/34/EU Directive – Annex III - Module B

#### Description of equipment:

The Explosion proof three phase squirrel cage induction motors type YCd series are manufactured by squirrel cage rotor and stator windings that can be supplied by mains or inverters, speed is controlled by varying the frequency of the alternating current in the motors. The Electric motors are manufactured with two separate compartments: flameproof enclosures ("Exdb") of Electric motors can be assembled with cooling system IC411 and connection boxes (flameproof enclosures ("Exdb") or increased safety ("Exeb") connected by sealing bushings or by cable glands and cable) that are for supply and auxiliary circuit connection or can be provided with permanently connected cable. These Electric motors can be installed horizontally and vertically. The Electric motors temperature class T4, is provided with insulation system in class 155°C (F) and designed with temperature limit of the insulation class 130°C (B) at ambient temperature Ta = +60°C with a range of formats in various configurations of shapes, power and electric supply. The Electric motors can be provided with thermal detectors (PTC, PT100) to protect the inside windings and also PT100 for protection of the bearings, and the anti-condensation heater as safety device. The enclosure and terminal boxes of Electric motors can be connected to each other by conduit systems (with suitable EX-Certified glands and connections) for auxiliary circuit management.

#### Mains electrical characteristics:

Power (KW): 2 to 7.5 KW Rated Voltage: 220 to 690 VAC Frequency: Up to 50 Hz Rated Speed: ≤ 3000 R.P.M Insulation Class: F (with limit Δt B) Frame Size: 132

#### Degree of protection (IP) by enclosures: IP66

#### **Routine test:**

"Ex db" enclosures: The manufacturer shall carry out the overpressure routine test according to clause 15.2.3.2 of EN 60079-1: 2014 Standard, at the pressure value 12 bar on all enclosures.

"Ex eb" enclosures: the routine test, on increased safety "eb" connection box, shall be performed at 2U+1000V with a minimum value of 1500V (U=rated voltage of the Electric motor).

#### Warning markings:

The connection boxes of Electric motors are marked with: "WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT." The Electric motors incorporating PTC/PT100 is marked with: "WARNING - WINDING PROTECTED WITH PTC/PT100 THERMISTORS"

#### Schedule of limitations (Special condition for safe use):

The Electric motors type YCd series are designed for ambient temperature of -20°C to +60°C.

The cable glands used for cable entries, blanking elements for unused holes and other fittings for field wiring connections shall be protected with a type of protection "Ex db" application, it is therefore the responsibility of the manufacturer to continually monitor the status of the certification associated with these devices.

The Electric motors may present a potential electrostatic charging hazard; the user instruction shall be followed and the effective grounding shall be used to minimize the risk of electrostatic discharge.

The non-threaded and threaded joints are protected against corrosion using of ordinary industrial grease.

#### Descriptive documents:

Schedule Drawing No.: JEM-2023-YCS51 Technical File No.: JEMCO-2023-YCS51

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## Ente Certificazione Macchine srl

# Certificato di esame UE del tipo EU-type examination certificate ECM 23 ATEX 2624 X



Rilasciato ai sensi della direttiva 2014/34/UE - Allegato III - Modulo B Issued according to 2014/34/EU Directive - Annex III - Module B

#### Richiedente Applicant **Ragione Sociale** Jovain Electrical Machines Industries Co. (JEMCO) Company Name Indirizzo Unit 1, No. 2, Bonyad dead end, Jahan Ave., Talegani St., Tehran, Iran Address Luogo di produzione 45<sup>th</sup> km, Sabzevar-Esfarayen road, Sabzevar, Khorasan Razavi, Iran Place of production Explosion proof three phase induction motors Apparecchiatura Equipment Type of production YCd series Modo di protezione Ex db, Ex eb Type of protection

Questa apparecchiatura o sistema di protezione e le sue This equipment or protective system and any acceptable variation eventuali varianti accettate sono descritte nel presente thereto are described in this Certificate and its Annex. Certificato e nell'allegato dello stesso.

L'ECM, Organismo Notificato nº 1282 in conformità all'art. 17 ECM, Notified Body No. 1282 in accordance with Article. 17 of Directive utilizzati in atmosfere potenzialmente esplosive, definiti Directive. nell'allegato II della Direttiva.

Le verifiche ed i risultati di prova sono registrati nel rapporto a PRD-2023-JEMDS24. carattere riservato nº PRD-2023-JEMDS24.

1:2014, EN 60079-7:2015.

produzione e fornitura dell'apparecchiatura o sistema di not covered by this certificate. protezione: questi requisiti non sono oggetto del presente certificato.

della Direttiva 2014/34/UE del Parlamento europeo e del 2014/34/EU of the European Parliament and of the Council of 26 Consiglio del 26 febbraio 2014, certifica che questa February 2014, certifies that this equipment or protective system was apparecchiatura o sistema di protezione verificata secondo la tested according to the procedure set out in Annex III, Module B, procedura di cui all'allegato III, Modulo B, è conforme ai requisiti complies with the essential health and safety requirements for the essenziali di sicurezza e salute per il progetto e la costruzione di project and construction of equipment and protective systems intended apparecchiature e sistemi di protezione destinati ad essere for use in potentially explosive atmospheres given in Annex II of the

The examination and test results are recorded in confidential report no.

I requisiti essenziali di sicurezza e salute sono assicurati dalla The essential health and safety requirements are assured by compliance rispondenza alle Norme applicate: EN 60079-0:2018, EN 60079- with applied Standard: EN 60079-0:2018, EN 60079-1:2014, EN 60079-7:2015.

Questo Certificato di esame UE del tipo è relativo soltanto al This EU-type examination certificate relates only to the design, progetto, all'esame ed alle prove dell'apparecchiatura o sistema examination and tests specified equipment in accordance with Directive di protezione specificato in accordo con la Direttiva 2014/34/UE. 2014/34/EU. Further requirements of the Directive shall be applied to Ulteriori requisiti di questa Direttiva si applicano al processo di the manufacturing process and supply condition: these requirements are

L'apparecchiatura o il sistema di protezione deve riportare i seguenti contrassegni:

The equipment shall be marked with the following symbols: 🖅 II 2 G Ex db IIC T4 Gb II 2 G Ex db eb IIC T4 Gb

Valsamoggia (BO) Data - Date 22/05/2023

εx



Scadenza- Expiry date 21/05/2028

Questo certificato, incluso l'allegato, può essere riprodotto solo integralmente e senza alcuna variazione. This certificate, annex included, can only be reproduced in its entirety and without any change.

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# Ente Certificazione Macchine srl