SMART EC LINEUP

MANUAL

Contents

Encoder geared motor ECM Series

ECM series encoders make an impression with their robust design and high signal quality.
ECM encoder is a 360° angle sensor that provides contactless high-resolution angular position data based on magnetic Circular Vertical Hall techn
The 3-channel encoder with differential signals guarantees interference-free function even under the highest loads.
A variety of smart EC motors and high resolution encoders can be combined to form a high precision control system.
Smart EC motors can be configured and ordered online. Fast , easy and online : **www.dnj.co.kr (dnj@dnj.co.kr)**

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Digital Quadrature Encoder integrated in the Smart EC Motor

ECM series encoders make an impression with their robust design and high signal quality.

ECM encoder is a 360° angle sensor that provides contactless high-resolution angular position data based on magnetic Circular Vertical Hall technology.

Multiple output formats supported for ease of system integration

- ABZ output provides high resolution, low latency, and PWM for initial position
- Output resolution on ABZ are selectable

The 3-channel encoder with differential signals guarantees interference-free function even under the highest loads.

A variety of smart EC motors and high resolution encoders can be combined to form a high precision control system.

Supports harsh operating conditions required for automotive and industrial applications, including direct connection to 12V battery

The resolution can be factory-set.

Features

Built in digitial encoder ECM

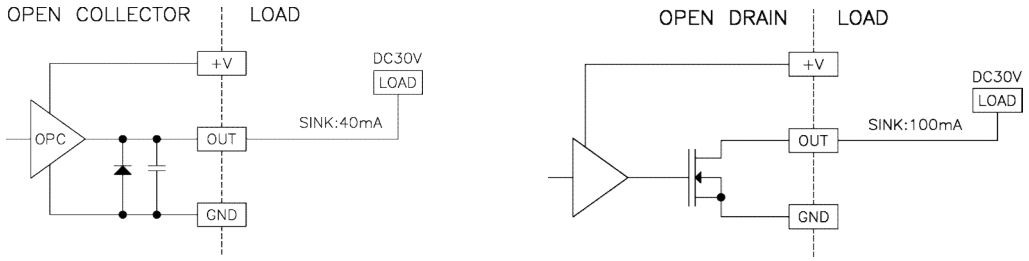
- Relative position signal suitable for positioning tasks
- Rotation direction recognition
- Speed information from number of pulses per time unit
- Incremental ABZ Quadrature Encoder interface with pulse per turn from 128~4096
- PWM Output 12-bit
- Open Collector, Totem Pole, Line Driver, Open Drain
- Wide input range 5~24Vdc
- Standard solution for many applications
- Customizing (absolute type)

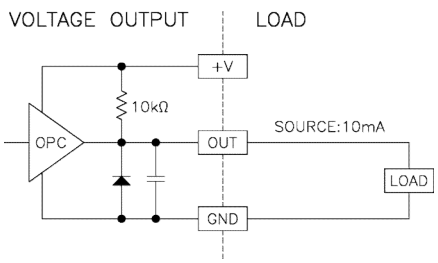
ECM Type	Resolution	Output Phase	Output Type	Supply Voltage
MEI	07 08 09 10	2C 4C	OPC VOP TOP	05
MEI	07 08 09 10	2C 4C	OPD	24
MEI	07 08 09 10	6C	LDP	05
MEI	12	3C	OPD	24

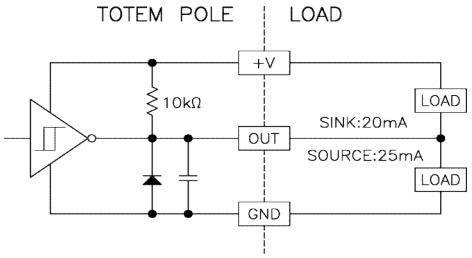
Model information

ECM Type	**MEI**	Incremental type
Resolution	**07**	Cycles per Shaft Turn, 7 bit (Incremental 128 Steps / 2.81°)
	08	Cycles per Shaft Turn, 8 bit (Incremental 256 Steps / 1.40°)
CPR (Count per Revolution)	**09**	Cycles per Shaft Turn, 9 bit (Incremental 512 Steps / 0.70°)
	10	Cycles per Shaft Turn, 10 bit (Incremental 1024 Steps / 0.35°)
	12	Cycles per Shaft Turn, 12 bit (Incremental 4096 Steps / 0.0879°)
Output Phase	**2C**	2 channels dual quadrature A, B
	3C	3 channels dual quadrature A, B, with index Z
No. of channels	**4C**	4 channels dual quadrature A, B, with index Z and PWM output
	6C	3 channels A, B, Z and complementary output A \ , B \ , Z \
Output type	**OPC**	NPN Open Collector output (max 30Vdc)
		Sink current per channel (max 30mA)
Control interface output		External pull-up resistor 4.7k~10kΩ
	VOP	Voltage Output.
		Open collector output of the sensors with integrated pull-up resistor 4.7kΩ
		Supply voltage(Vin) = Ouput voltage(Vout)
		Source current : max 10mA
	TOP	Totem Pole output (Internally has two values, high or low)
		Schmitt trigger (74HC14) and TTL output (DC 5V)
		High : Source (max 25mA, min 3.5Vdc)
		Low : Sink (max 20mA, max 0.4Vdc)
	OPD	N channel Open Drain output
		VH : max 30Vdc
		VL : max DC 0.5Vdc
		Sink current : max 100mA
	LDP	Line Driver output, The 3-channel encoder with differential signals
		High : max -20mA, min 2.5Vdc
		Low : max 20mA, max 0.5Vdc
		Signal rise time : 100ns or less (CL=30pF, RL=1kΩ, 25℃)
		Signal fall time : 100ns or less (CL=30pF, RL=1kΩ, 25℃)
		Line Receiver Recommanded IC : AM26LS32
Supply Voltage	**05**	Supply Voltage Vcc +5Vdc ± 10%
	24	Supply Voltage Vcc +7Vdc ~ +24Vdc

Block Diagram





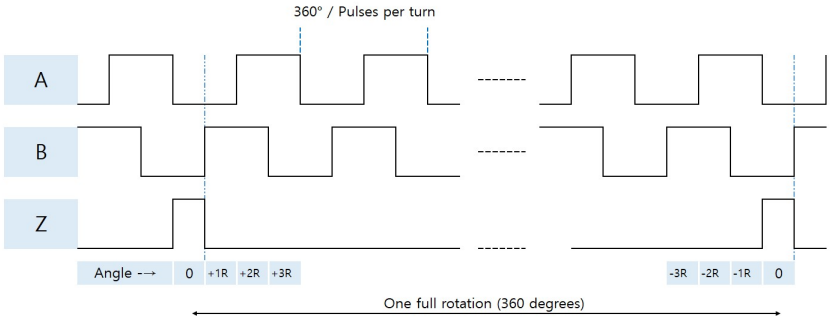


Output Interface

Incremental AB

A/B Phase difference : 1/4T±1/8T

ECM Encoder AB output emulates a 10~12bit incremental encoder providing logic pulses in quadrature. Signals A and B are quadrature signals, shifted by 90°, and signal Z is a reference mark. (index)
The A and B signals toggle with a 50% duty cycle(relative to angular distance, not necessarily time) at a frequency of 2^N cycles per revolution, giving a cycle resolution of (360 / 2^N) degrees per cycle.
B is offset from A by 1/4 of the cycle period.

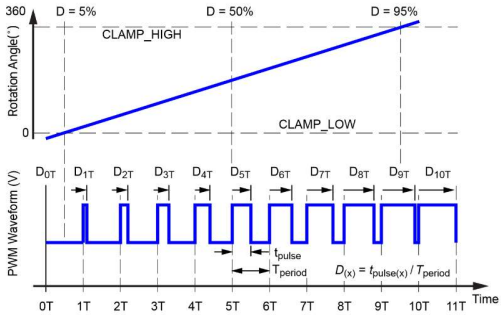


Index Z

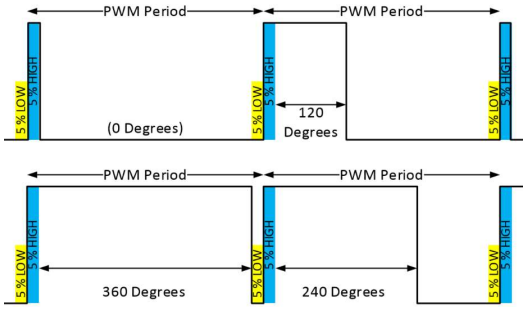
Encoder Z signal is an index pulse that occurs once per revolution to mark the zero (0) angle position.
Under rotation, this allows the receiver to synchronize to a known mechanical/magnetic position, and then se the incremental A/B signals to keep track of the absolute position.
The width of the Z pulse is 1/4 of the quadrature signal period and it is synchronized with the A and B signals.
The index rising edge is aligned with the channel B falling edge.

PWM

The ECM encoder provides a pulse-width-modulated open-drain output, with the duty cycle(DC) proportional to measured angle. The PWM duty cycle is clamped at 5% and 95% for diagnostics purposes.
A 5% DC corresponds to 0°; a 95% DC corresponds to 360°.
Within each cycle, the output is high for the first 5% and low for the last 5% of the period.
The middle 90% of the period is a linear interpolation of the angle as sampled the start of the PWM period
The angle is represented in 12-bit resolution and can never reach 360°.
The maximum duty cycle high period is : **DutyCycleMax (%) = (4095 / 4096) x 90 + 5**



PWM Outputs a Duty-Cycle Proportional To Sensed Angle



Pulse-Width Modulation (PWM) Examples

Pin Allocation

Connection Encoder Interface

UL1061 AWG28
(F.G : AWG22)

Pin No.	COLOR	MEI	MEI (LDP)	MEC	Comments
Pin 1	red	VCC	VCC	VCC	Supply power
Pin 2	black	GND	GND	GND	Ground
Pin 3	brown	ENC A	ENC A	ENC A	
Pin 4	blue	-	ENC nA	-	
Pin 5	gray	ENC B	ENC B	ENC B	
Pin 6	green	-	ENC nB	-	
Pin 7	yellow	ENC Z	ENC Z	ENC Z	
Pin 8	orange	-	ENC nZ	Tx / SSCK	
Pin 9	white	PWM	-	Rx / SSD	
Pin 10	black	F.G	F.G	F.G	Frame Ground

[DSM 701 24V 40P HG ECM]

Smart EC Geared Motor with Encoder

Ø70 mm, 24V, 40 Watt, Cycloid gear, Brushless, Standard Hollow shaft (front only), Encoder

GEARED EC MOTOR

- Cycloid gear train.
- External diameter Ø70
- Brushless DC motor with high resolution encoder
- Output shaft : Free cutting steel
- Concentric gear input and output
- Motor posture : Horizontal (output shaft)
- High reduction ratio in a small space
- Favorably priced and space-saving
- Hall sensor (5~24Vdc, open-collector)

Nominal data [Geared motor]		DSM 701 -24V -40P - HG [Reduction Ratio]			
Reduction Ratio		22.8	51.3	98.7	203.0
Exact Reduction Ratio		187/4275	187/9595	51/5035	51/10355
Gearhead Length L1	mm	20.0	20.0	20.0	20.0
Rated Torque	N.m	2.4	5.1	9.8	18.3
Rated Speed	RPM	95.8	42.6	22.1	10.8
Max. Momentary Tolerance torque	N.m	20	20	40	40
Average Backlash (no load)	min	10	10	10	10
No load Speed	RPM	116.2	51.7	26.8	13.1
No load Current	mA	570	570	570	570
Weight	g	880	890	920	950
* Noise	dB	50	50	50	50

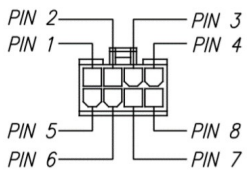
* Condition of measurement : DC24V, Rad.30[cm], With no load, Fix on sponge

Max. permissible axial load	Nm	45	45	45	45
Max. permissible force for press fits	Nm	59	59	59	59
Protection class		IP50			
Temperature ratings (Operation)		Dry bulb temp (-10~50℃), Relative humidity (0~85%)			
Temperature ratings (Storage)		Dry bulb temp (-10~60℃), Relative humidity (10~90%)			

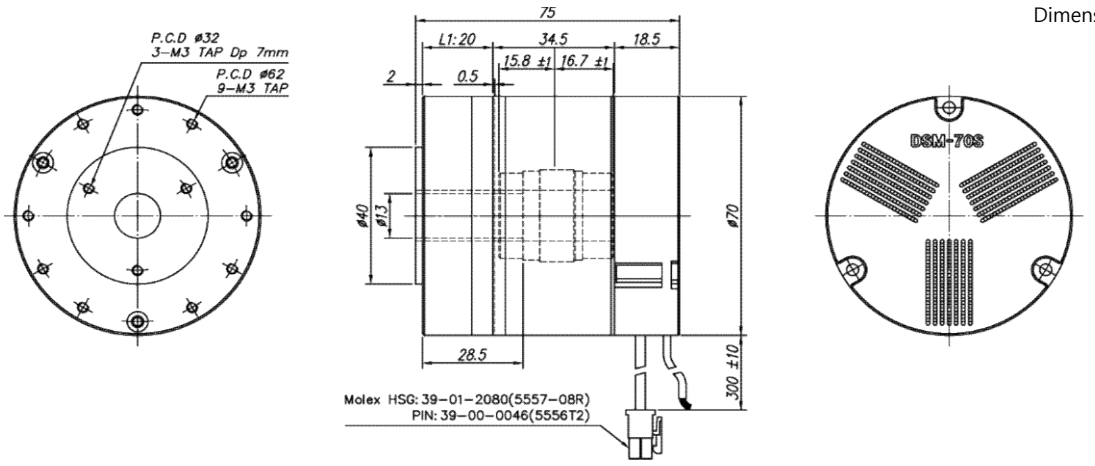
Motor specification		701-24V-40P
Rated Voltage	V	24
Rated Speed	RPM	2300
Rated Torque	N.m	0.18
Rated Current	A	2.5
Rated Power	W	40
No load speed	RPM	2650
No load current	mA	320

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]



[DSM 701H 24V 40P HG ECM]

Smart EC Geared Motor with Encoder

Ø70 mm, 24V, 40 Watt, Cycloid gear, Brushless, Hollow disc flange option, Encoder

GEARED EC MOTOR

- Cycloid gear train.
- External diameter Ø70
- Brushless DC motor with high resolution encoder
- Output shaft : Free cutting steel
- Concentric gear input and output
- Motor posture : Horizontal (output shaft)
- High reduction ratio in a small space
- Favorably priced and space-saving
- Hall sensor (5~24Vdc, open-collector)

Nominal data [Geared motor]		DSM 701 -24V -40P - HG [Reduction Ratio]			
Reduction Ratio		22.8	51.3	98.7	203.0
Exact Reduction Ratio		187/4275	187/9595	51/5035	51/10355
Gearhead Length L1	mm	20.0	20.0	20.0	20.0
Rated Torque	N.m	2.4	5.1	9.8	18.3
Rated Speed	RPM	95.8	42.6	22.1	10.8
Max. Momentary Tolerance torque	N.m	20	20	40	40
Average Backlash (no load)	min	10	10	10	10
No load Speed	RPM	116.2	51.7	26.8	13.1
No load Current	mA	570	570	570	570
Weight	g	940	950	980	1010
* Noise	dB	50	50	50	50

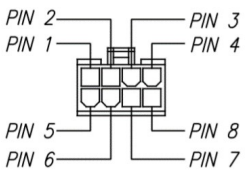
* Condition of measurement : DC24V, Rad.30[cm], With no load, Fix on sponge

Max. permissible axial load	Nm	45	45	45	45
Max. permissible force for press fits	Nm	59	59	59	59
Protection class		IP50			
Temperature ratings (Operation)		Dry bulb temp (-10~50℃), Relative humidity (0~85%)			
Temperature ratings (Storage)		Dry bulb temp (-10~60℃), Relative humidity (10~90%)			

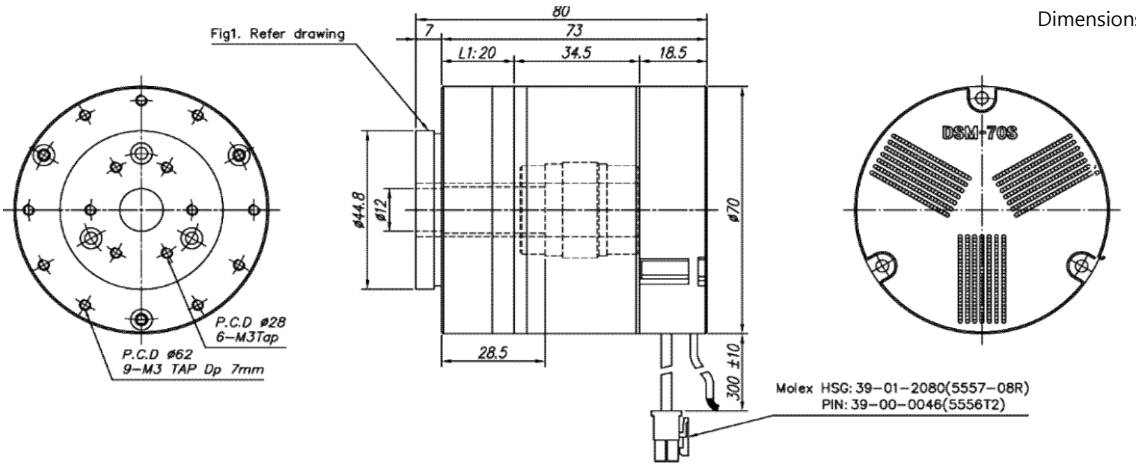
Motor specification		701-24V-40P
Rated Voltage	V	24
Rated Speed	RPM	2300
Rated Torque	N.m	0.18
Rated Current	A	2.5
Rated Power	W	40
No load speed	RPM	2650
No load current	mA	320

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]



[DSM 701 24V 60P HG ECM]

Smart EC Geared Motor with Encoder

Ø70 mm, 24V, 60 Watt, Cycloid gear, Brushless, Standard Hollow shaft (front only), Encoder

GEARED EC MOTOR

- Cycloid gear train.
- External diameter Ø70
- Brushless DC motor with high resolution encoder
- Output shaft : Free cutting steel
- Concentric gear input and output
- Motor posture : Horizontal (output shaft)
- High reduction ratio in a small space
- Favorably priced and space-saving
- Hall sensor (5~24Vdc, open-collector)

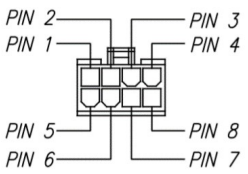
Nominal data [Geared motor]		DSM 701 -24V -60P - HG [Reduction Ratio]			
Reduction Ratio		22.8	51.3	98.7	203.0
Exact Reduction Ratio		187/4275	187/9595	51/5035	51/10355
Gearhead Length L1	mm	20.0	20.0	20.0	20.0
Rated Torque	N.m	2.5	5.4	10.3	19.3
Rated Speed	RPM	125.0	55.6	28.9	14.0
Max. Momentary Tolerance torque	N.m	20	20	40	40
Average Backlash (no load)	min	10	10	10	10
No load Speed	RPM	153.5	68.2	35.5	17.2
No load Current	mA	700	700	700	700
Weight	g	875	885	915	945
* Noise	dB	50	50	50	50

* Condition of measurement : DC24V, Rad.30[cm], With no load, Fix on sponge

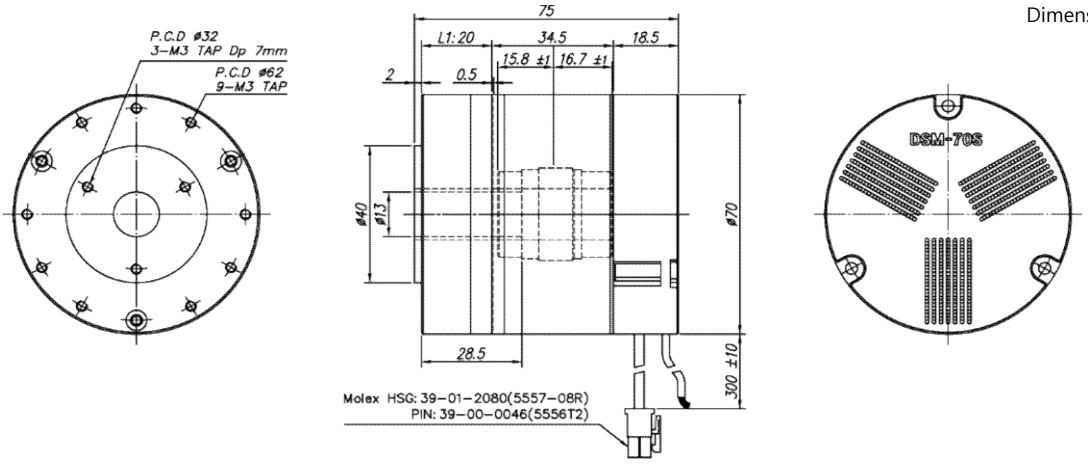
Max. permissible axial load	Nm	45	45	45	45
Max. permissible force for press fits	Nm	59	59	59	59
Protection class		IP50			
Temperature ratings (Operation)		Dry bulb temp (-10~50℃), Relative humidity (0~85%)			
Temperature ratings (Storage)		Dry bulb temp (-10~60℃), Relative humidity (10~90%)			

Motor specification		701-24V-60P
Rated Voltage	V	24
Rated Speed	RPM	3000
Rated Torque	N.m	0.19
Rated Current	A	3.5
Rated Power	W	60
No load speed	RPM	3500
No load current	mA	450

Pin Allocation		(Molex 5557-08R)	
1	black	GND	Motor UL1061 AWG 22
2	blue	Motor winding W	Hall sensor UL1061 AWG 26
3	green	Motor winding V	
4	yellow	Motor winding U	
5	red	Vhall 5 .... 24Vdc	
6	brown	Hall sensor C	
7	gray	Hall sensor B	
8	white	Hall sensor A	



Dimensions in [mm]



[DSM 701H 24V 60P HG ECM]

Smart EC Geared Motor with Encoder

Ø70 mm, 24V, 60 Watt, Cycloid gear, Brushless, Hollow disc flange option, Encoder

GEARED EC MOTOR

- Cycloid gear train.
- External diameter Ø70
- Brushless DC motor with high resolution encoder
- Output shaft : Free cutting steel
- Concentric gear input and output
- Motor posture : Horizontal (output shaft)
- High reduction ratio in a small space
- Favorably priced and space-saving
- Hall sensor (5~24Vdc, open-collector)

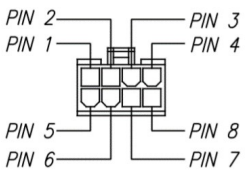
Nominal data [Geared motor]		DSM 701 -24V -60P - HG [Reduction Ratio]			
Reduction Ratio		22.8	51.3	98.7	203.0
Exact Reduction Ratio		187/4275	187/9595	51/5035	51/10355
Gearhead Length L1	mm	20.0	20.0	20.0	20.0
Rated Torque	N.m	2.5	5.4	10.3	19.3
Rated Speed	RPM	125.0	55.6	28.9	14.0
Max. Momentary Tolerance torque	N.m	20	20	40	40
Average Backlash (no load)	min	10	10	10	10
No load Speed	RPM	153.5	68.2	35.5	17.2
No load Current	mA	700	700	700	700
Weight	g	935	945	975	1005
* Noise	dB	50	50	50	50

* Condition of measurement : DC24V, Rad.30[cm], With no load, Fix on sponge

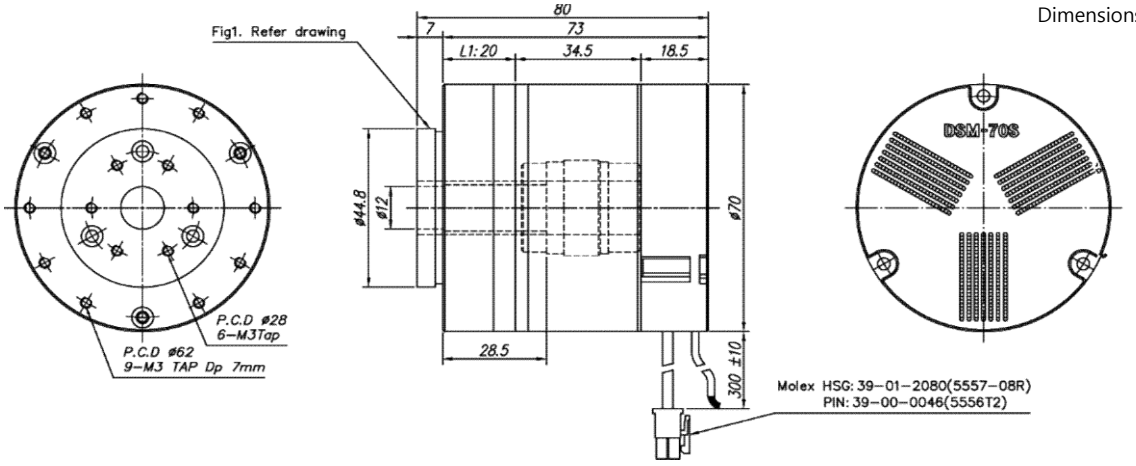
Max. permissible axial load	Nm	45	45	45	45
Max. permissible force for press fits	Nm	59	59	59	59
Protection class		IP50			
Temperature ratings (Operation)		Dry bulb temp (-10~50℃), Relative humidity (0~85%)			
Temperature ratings (Storage)		Dry bulb temp (-10~60℃), Relative humidity (10~90%)			

Motor specification		701-24V-60P
Rated Voltage	V	24
Rated Speed	RPM	3000
Rated Torque	N.m	0.19
Rated Current	A	3.5
Rated Power	W	60
No load speed	RPM	3500
No load current	mA	450

Pin Allocation		(Molex 5557-08R)	
1	black	GND	Motor UL1061 AWG 22
2	blue	Motor winding W	Hall sensor UL1061 AWG 26
3	green	Motor winding V	
4	yellow	Motor winding U	
5	red	Vhall 5 .... 24Vdc	
6	brown	Hall sensor C	
7	gray	Hall sensor B	
8	white	Hall sensor A	



Dimensions in [mm]



[DSM 701 24V 40P IG52 ECM]

Smart EC Geared Motor with Encoder

GEARED EC MOTOR

DSM701, 24V, 40 Watt, IG52 Planetary Gearhead, Brushless, Encoder

- Brushless DC motor with high resolution encoder
- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Rotation direction : CW/CCW (View from output shaft)
- Motor posture : Horizontal (output shaft)
- For transferring high torques up to 10N.m
- Concentric gear input and output
- Reduction ratios of 3:1 to 936:1
- Hall sensor (5~24Vdc, open-collector)

Nominal data [Geared motor]		DSM 701 -24V -40P - IG52 [Reduction Ratio]															
Reduction Ratio		3	4	12	15	19	21	26	43	53	66	81	100	113	126	150	230
		285	353	488	546	676	756	936									
Gearhead Length L	mm	53.0	53.0	68.5	68.5	68.5	68.5	68.5	84.0	84.0	84.0	84.0	84.0	84.0	84.0	99.5	99.5
		99.5	99.5	99.5	99.5	99.5	99.5	99.5									
Rated Torque	N.m	0.43	0.58	1.51	1.89	2.39	2.65	3.28	4.64	5.72	7.13	9.81	9.81	9.81	9.81	9.81	9.81
		9.81	9.81	9.81	9.81	9.81	9.81	9.81									
Max. momentary tolerance torque	N.m	2.94	2.94	8.83	8.83	14.7	14.7	14.7	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
		29.4	29.4	29.4	29.4	29.4	29.4	29.4									
Efficiency	%	80	80	70	70	70	70	70	60	60	60	60	60	60	60	50	50
		50	50	50	50	50	50	50									
Rated Speed	rpm	743.7	557.8	184.0	147.2	116.2	105.1	84.9	50.8	41.2	33.1	27.0	21.9	19.3	17.3	14.6	9.5
		7.7	6.2	4.5	4.0	3.2	2.9	2.3									
No load speed	rpm	883.3	662.5	220.8	176.7	139.5	126.2	101.9	61.6	50.0	40.2	32.7	26.5	23.5	21.0	17.7	11.5
		9.3	7.5	5.4	4.9	3.9	3.5	2.8									
Weigth	g	1150	1150	1335	1335	1335	1335	1335	1525	1525	1525	1525	1525	1525	1525	1695	1695
		1695	1695	1695	1695	1695	1695	1695									

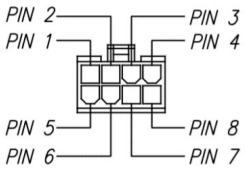
Temperature ratings (Operation) Dry bulb temp (-10~50℃), Relative humidity (0~85%)

Temperature ratings (Storage) Dry bulb temp (-10~60℃), Relative humidity (10~90%)

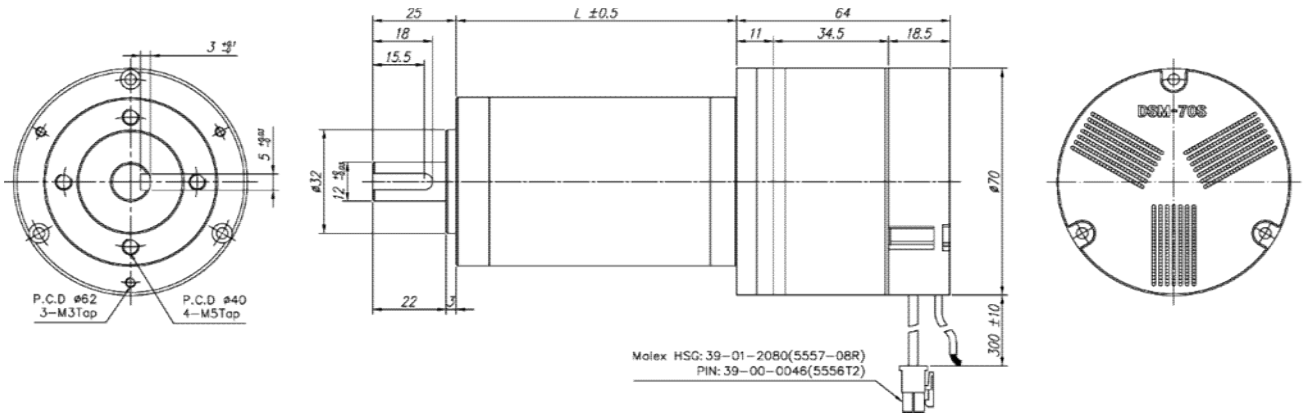
Motor specification		701-24V-40P
Rated Voltage	V	24
Rated Speed	RPM	2300
Rated Torque	N.m	0.18
Rated Current	A	2.5
Rated Power	W	40
No load speed	RPM	2650
No load current	mA	320

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]



[DSM 701 24V 60P IG52 ECM]

Smart EC Geared Motor with Encoder

GEARED EC MOTOR

DSM701, 24V, 60 Watt, IG52 Planetary Gearhead, Brushless, Encoder

- Brushless DC motor with high resolution encoder
- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Rotation direction : CW/CCW (View from output shaft)
- Motor posture : Horizontal (output shaft)
- For transferring high torques up to 10N.m
- Concentric gear input and output
- Reduction ratios of 3:1 to 936:1
- Hall sensor (5~24Vdc, open-collector)

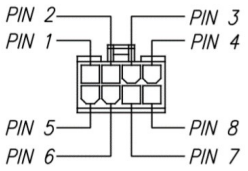
Nominal data [Geared motor]		DSM 701 -24V -60P - IG52 [Reduction Ratio]															
Reduction Ratio		3	4	12	15	19	21	26	43	53	66	81	100	113	126	150	230
		285	353	488	546	676	756	936									
Gearhead Length L	mm	53.0	53.0	68.5	68.5	68.5	68.5	68.5	84.0	84.0	84.0	84.0	84.0	84.0	84.0	99.5	99.5
		99.5	99.5	99.5	99.5	99.5	99.5	99.5									
Rated Torque	N.m	0.46	0.61	1.60	2.00	2.53	2.79	3.46	4.90	6.04	7.52	9.81	9.81	9.81	9.81	9.81	9.81
		9.81	9.81	9.81	9.81	9.81	9.81	9.81									
Max. momentary tolerance torque	N.m	2.94	2.94	8.83	8.83	14.7	14.7	14.7	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
		29.4	29.4	29.4	29.4	29.4	29.4	29.4									
Efficiency	%	80	80	70	70	70	70	70	60	60	60	60	60	60	60	50	50
		50	50	50	50	50	50	50									
Rated Speed	rpm	970.0	727.5	240.0	192.0	151.6	137.1	110.8	66.3	53.8	43.2	35.2	28.5	25.2	22.6	19.0	12.4
		10.0	8.1	5.8	5.2	4.2	3.8	3.0									
No load speed	rpm	1166.7	875.0	291.7	233.3	184.2	166.7	134.6	81.4	66.0	53.0	43.2	35.0	31.0	27.8	23.3	15.2
		12.3	9.9	7.2	6.4	5.2	4.6	3.7									
Weigth	g	1145	1145	1330	1330	1330	1330	1330	1520	1520	1520	1520	1520	1520	1520	1690	1690
		1690	1690	1690	1690	1690	1690	1690									

Temperature ratings (Operation)	Dry bulb temp (-10~50℃), Relative humidity (0~85%)
Temperature ratings (Storage)	Dry bulb temp (-10~60℃), Relative humidity (10~90%)

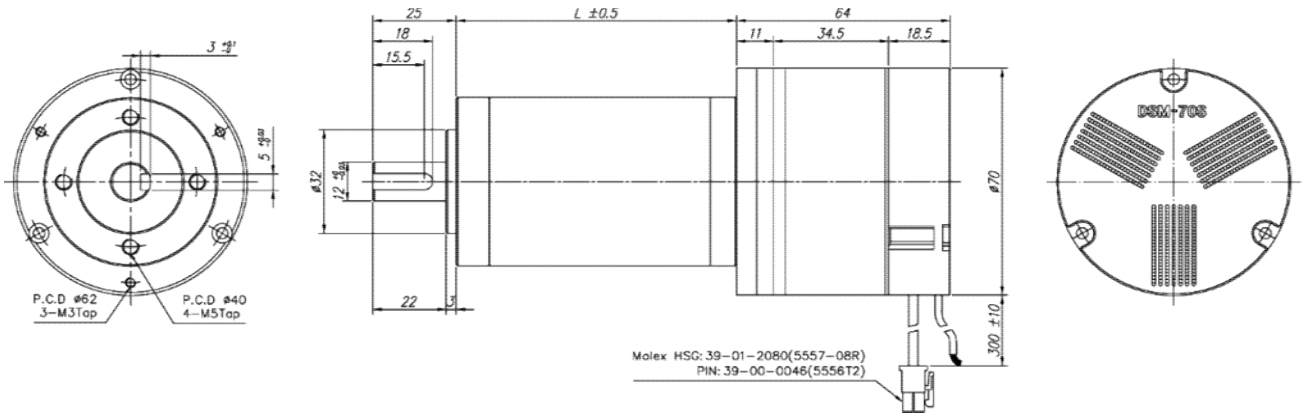
Motor specification		701-24V-60P
Rated Voltage	V	24
Rated Speed	RPM	3000
Rated Torque	N.m	0.19
Rated Current	A	3.5
Rated Power	W	60
No load speed	RPM	3500
No load current	mA	450

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]



[DSM 701 24V 40P IG71 ECM] Smart EC Geared Motor with Encoder

GEARED EC MOTOR

DSM701, 24V, 60 Watt, IG71 Planetary Gearhead, Brushless, Encoder

- Brushless DC motor with high resolution encoder
- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Rotation direction : CW/CCW (View from output shaft)
- Motor posture : Horizontal (output shaft)
- For transferring high torques up to 10N.m
- Concentric gear input and output
- Reduction ratios of 4:1 to 611:1
- Hall sensor (5~24Vdc, open-collector)

Nominal data [Geared motor]		DSM 701 -24V -40P - IG71 [Reduction Ratio]															
Reduction Ratio		4	13	16	20	50	60	75	91	102	126	189	242	300	363	414	493
		543	611														
Gearhead Length L	mm	49.3	65.8	65.8	65.8	82.3	82.3	82.3	82.3	82.3	82.3	98.8	98.8	98.8	98.8	98.8	98.8
		98.8	98.8														
Rated Torque	N.m	0.58	1.64	2.02	2.52	5.40	6.48	8.10	9.83	12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26
		12.26	12.26														
Max. momentary tolerance torque	N.m	4.4	20.6	20.6	20.6	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8
		36.8	36.8														
Efficiency	%	80	70	70	70	60	60	60	60	60	60	50	50	50	50	50	50
		50	50														
Rated Speed	rpm	557.8	169.8	138.0	110.4	44.2	36.8	29.4	24.3	21.4	17.3	11.6	9.0	7.3	6.0	5.3	4.4
		4.0	3.6														
No load speed	rpm	662.5	203.8	165.6	132.5	53.0	44.2	35.3	29.1	26.0	21.0	14.0	11.0	8.8	7.3	6.4	5.4
		4.9	4.3														
Weigth	g	1565	1895	1895	1895	2225	2225	2225	2225	2225	2225	2565	2565	2565	2565	2565	2565
		2565	2565														

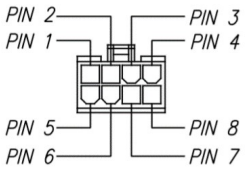
Temperature ratings (Operation) Dry bulb temp (-10~50℃), Relative humidity (0~85%)

Temperature ratings (Storage) Dry bulb temp (-10~60℃), Relative humidity (10~90%)

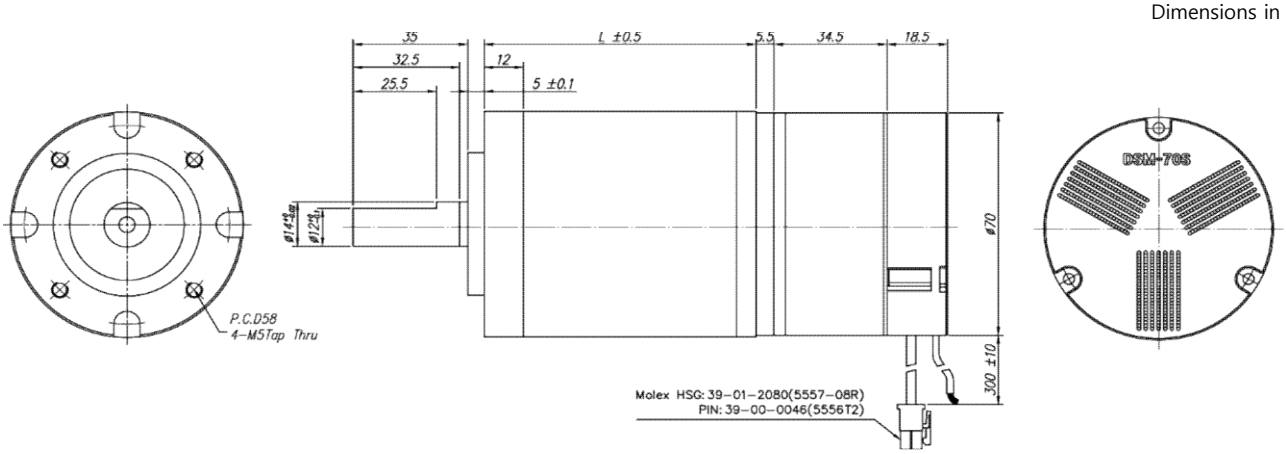
Motor specification		701-24V-40P
Rated Voltage	V	24
Rated Speed	RPM	2300
Rated Torque	N.m	0.18
Rated Current	A	2.5
Rated Power	W	40
No load speed	RPM	2650
No load current	mA	320

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]



[DSM 701 24V 60P IG71 ECM]

Smart EC Geared Motor with Encoder

GEARED EC MOTOR

DSM701, 24V, 60 Watt, IG71 Planetary Gearhead, Brushless, Encoder

- Brushless DC motor with high resolution encoder
- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Rotation direction : CW/CCW (View from output shaft)
- Motor posture : Horizontal (output shaft)
- For transferring high torques up to 10N.m
- Concentric gear input and output
- Reduction ratios of 4:1 to 611:1
- Hall sensor (5~24Vdc, open-collector)

Nominal data [Geared motor]		DSM 701 -24V -60P - IG71 [Reduction Ratio]															
Reduction Ratio		4	13	16	20	50	60	75	91	102	126	189	242	300	363	414	493
		543	611														
Gearhead Length L	mm	49.3	65.8	65.8	65.8	82.3	82.3	82.3	82.3	82.3	82.3	98.8	98.8	98.8	98.8	98.8	98.8
		98.8	98.8														
Rated Torque	N.m	0.61	1.73	2.13	2.66	5.70	6.84	8.55	10.37	12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26
		12.26	12.26														
Max. momentary tolerance torque	N.m	4.4	20.6	20.6	20.6	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8
		36.8	36.8														
Efficiency	%	80	70	70	70	60	60	60	60	60	60	50	50	50	50	50	50
		50	50														
Rated Speed	rpm	727.5	221.5	180.0	144.0	57.6	48.0	38.4	31.6	27.9	22.6	15.1	11.8	9.5	7.9	6.9	5.8
		5.2	4.7														
No load speed	rpm	875.0	269.2	218.8	175.0	70.0	58.3	46.7	38.5	34.3	27.8	18.5	14.5	11.7	9.6	8.5	7.1
		6.4	5.7														
Weigth	g	1560	1890	1890	1890	2220	2220	2220	2220	2220	2220	2560	2560	2560	2560	2560	2560
		2560	2560														

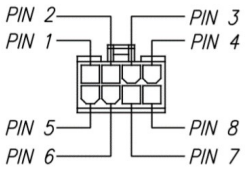
Temperature ratings (Operation) Dry bulb temp (-10~50℃), Relative humidity (0~85%)

Temperature ratings (Storage) Dry bulb temp (-10~60℃), Relative humidity (10~90%)

Motor specification		701-24V-60P
Rated Voltage	V	24
Rated Speed	RPM	3000
Rated Torque	N.m	0.19
Rated Current	A	3.5
Rated Power	W	60
No load speed	RPM	3500
No load current	mA	450
		475

Pin Allocation		
1	black	GND
2	blue	Motor winding W
3	green	Motor winding V
4	yellow	Motor winding U
5	red	Vhall 5 .... 24Vdc
6	brown	Hall sensor C
7	gray	Hall sensor B
8	white	Hall sensor A

(Molex 5557-08R)	
Motor	UL1061 AWG 22
Hall sensor	UL1061 AWG 26



Dimensions in [mm]