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Geared ECP Drive Series

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The EC drivers feature a compact structure of speed/positioning controllers, sensors and Smart EC motors.

Various operating modes allow an adaptable use in a wide range of drive systems.

Smart EC driver features extensive analog and digital I/O functionality and are being configured via RS485 interface using the graphical user interface "uSMART" for Windows PCs.

A wide range of operating modes allows flexible use in a variety of fields in drive systems, automation, and mechatronics.

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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ECP Selection Guide

ECP Model No.	Shaft type	Voltage	Interface	Input		Output		Drawing No.
				Speed set	Position set	(FG)	(encoder)	
PC4 03	Standard Hollow	24	RS485	PWM	Steps	X	X	DSM-701-24V-A-M-ECD
PC4 04	Hollow Disk (F)	24	RS485	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701H-24V-A-M-DI-ECD(ENC)
PC4 04A(*)	Hollow Disk (F)	24	RS485	PWM	Angle	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701H-24V-A-M-DI-ECD(ENC)
PC4 05	Hollow Disk	24	RS485	PWM	Steps	O	X	DSM-701H-24V-A-M-DI-ECD
PC2 04	Standard Hollow	24	RS232	PWM	Steps	X	X	DSM-701-24V-A-M-ECD
PC2 05	Hollow Disk (F)	24	RS232	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701H-24V-A-M-DI-ECD(ENC)
PC2 06	Hollow Disk	24	RS232	PWM	Steps	O	X	DSM-701H-24V-A-M-DI-ECD
PC4 08	IG52	24	RS485	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701-24V-A-IG52-ECD
PC4 09	IG52	24	RS485	PWM	Steps	X	X	DSM-701-24V-A-IG52-ECD
PC2 07	IG52	24	RS232	PWM	Steps	O	X	DSM-701-24V-A-IG52-ECD
PC2 08	IG52	24	RS232	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701-24V-A-IG52-ECD
PC4 08	IG52	24	RS485	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701-24V-A-IG71-ECD
PC4 09	IG52	24	RS485	PWM	Steps	X	X	DSM-701-24V-A-IG71-ECD
PC2 07	IG52	24	RS232	PWM	Steps	O	X	DSM-701-24V-A-IG71-ECD
PC2 08	IG52	24	RS232	PWM	Steps	X	Incremental (12 bit, A,B,Z, OPD)	DSM-701-24V-A-IG71-ECD

(*) Protocol customizing

Intelligent compact ECP drivers (positioning control)

DSM EC drivers feature a compact structure of speed/positioning controllers, sensors and Smart EC motors.

The use of existing DSM products with an adapted design results in robust, space-saving drive solution with high power density.

ECP drivers are digital positioning controllers internally mounted on Smart EC motors with FG or encoder signals.

EC drive solution is the key to production machinery with many years of maintenance-free operation in a variety of applications.

- Speed control set : PWM (duty %)
- Positioning command set : steps
- Position command error : ± 5 step
- Home position return (zero position setting)
- Source Power outage compensation
- RS232, RS485 Interface
- Protocol : MODBUS-RTU
- Protection (over voltage, over current, under voltage, thermal shutdown)
- Switching frequency of power stage : 20kHz
- FG gen, Alarm output
- Incremental encoder A,B,Z output (12-bit, 4096 steps, Open drain)
- Customizing

Standard Hollow	Standard hollow shaft type. The front and rear hollow shafts rotate equally. (Dual hollow shaft)				
Hollow Disk	A hollow disc flange (optional) is assembled to the hollow shaft. The inside of the hollow shaft is fixed with a pipe and does not rotate.				
Hollow Disk (F)	The rear shaft of the motor is blocked. (Encoder output type). The motor front consists of a hollow disc flange.				
Solid shaft	It is assembled as a solid shaft on the front shaft of the hollow standard type smart motor.				
Control Input Mode	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">PC2</td><td>RS232 interface type</td></tr> <tr> <td>PC4</td><td>RS485 interface type</td></tr> </table>	PC2	RS232 interface type	PC4	RS485 interface type
PC2	RS232 interface type				
PC4	RS485 interface type				
FG	<p>FG(Frequency Generator) signal output. FG is the abbreviation of Frequency Generator. It is called square wave.</p> <p>It is a square waveform generated while the motor rotates one cycle. Its signal frequency follows the motor rotating.</p> <p>With this function, your electric control circuit can always read the motor rotation, and then monitor the motor operation.</p> <p>FG = Motor pole number x motor phase</p> <p>(DSM701 series FG = 8 [poles] x 3 [phase] = 24 [pulse])</p>				
OPD	Open drain output				

[DSM 701 24V 40P HG ECP]

Positioning control Smart geared EC motor**Ø70 mm, 24V, 40 Watt, Cycloid gear, Brushless, Standard hollow shaft, Positioning control**

GEARED EC MOTOR

Nominal data [Geared motor]**DSM 701 -24V -40P - HG [Reduction Ratio]**

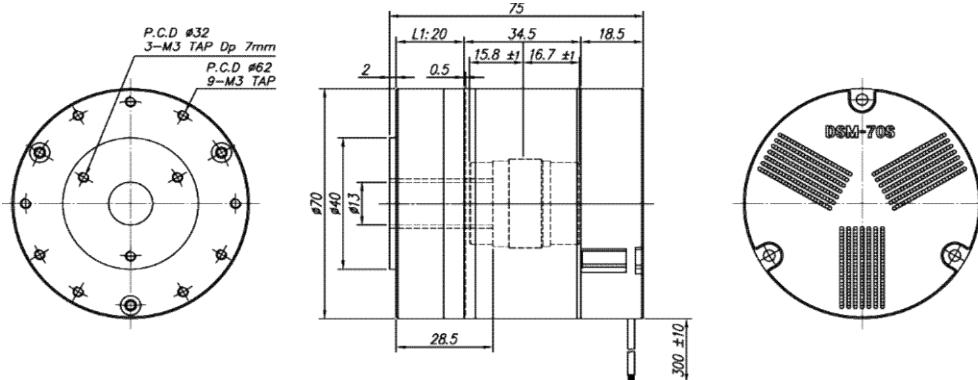
Reduction Ratio	22.8	51.3	98.7	203.0				
Exact Reduction Ratio		187/4275	187/9595	51/5035	51/10355			
Gearhead Length L1	mm	20.0	20.0	20.0	20.0			
Rated Torque	N.m	2.4	5.1	9.8	18.3			
Rated Speed	RPM	95.8	42.6	22.1	10.8			
Max. Momentary Tolerance torque	N.m	20	20	40	40			
Average Backlash (no load)	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	870	880	910	940			
* 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°C), Relative humidity (0~85%)		
Temperature ratings (Storage)						Dry bulb temp (-10~60°C), Relative humidity (10~90%)		

Motor specification	701-24V-40P	Pin Allocation		
Rated Voltage	V	1 Red	VM (24 Vdc)	UL1061
Rated Speed	RPM	2 Black	GND	AWG22
Rated Torque	N.m	3 Orange	D+ / Tx	
Rated Current	A	4 White	D- / Rx	UL1061
Rated Power	W	5 Green	FG GEN	AWG28
No load speed	RPM	6 Black	GND	
No load current	mA	7 Brown	ENC A OUT	
		8 Gray	ENC B OUT	UL1061
		9 Yellow	ENC C OUT	AWG28

Dimensions in [mm]



[DSM 701H 24V 40P HG ECP]

Positioning control Smart geared EC motor

Ø70 mm, 24V, 40 Watt, Cycloid gear, Brushless, Hollow disc flange, Positioning control

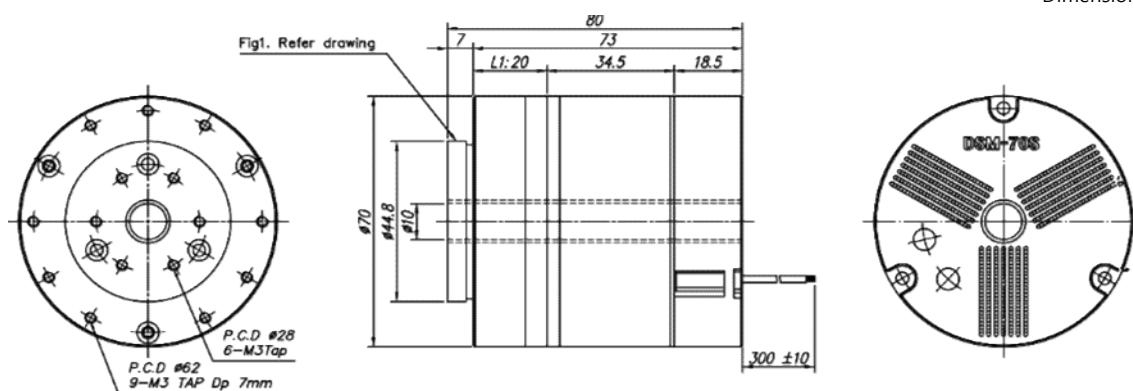


GEARED EC MOTOR

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	930	940	970	1000	
* 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°C), Relative humidity (0~85%)				
Temperature ratings (Storage)		Dry bulb temp (-10~60°C), Relative humidity (10~90%)				

Motor specification	701-24V-40P	Pin Allocation		
Rated Voltage	V	1 Red	VM (24 Vdc)	UL1061
Rated Speed	RPM	2	Black	GND AWG22
Rated Torque	N.m	3	Orange	D+ / Tx
Rated Current	A	4	White	D- / Rx UL1061
Rated Power	W	5	Green	FG GEN AWG28
No load speed	RPM	6	Black	GND
No load current	mA	7	Brown	ENC A OUT
		8	Gray	ENC B OUT
		9	Yellow	ENC C OUT UL1061 AWG28

Dimensions in [mm]



DSM 701 24V 60P HG ECP

Positioning control Smart geared EC motor

Ø70 mm, 24V, 60 Watt, Cycloid gear, Brushless, Standard hollow shaft, Positioning control



GEARED EC MOTOR

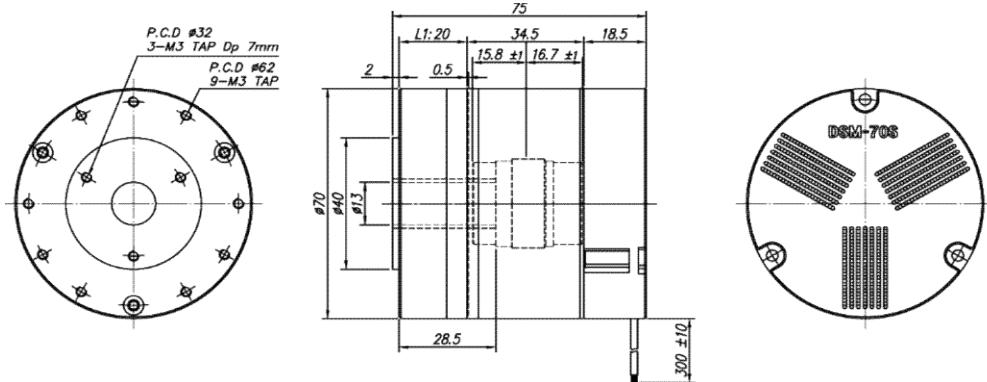
Built in Positioning Control ECP drivers

- Cycloid gear train.
 - Output shaft : Free cutting steel
 - Control IO : RS232, RS485
 - Motor speed (duty %), positioning (steps) set
 - Source Power outage compensation function
 - Home position return (zero position setting)
 - Protection (UVLO, OVP, OCP, TSD)
 - 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	865	875	905	935		
* 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°C), Relative humidity (0~85%)			
Temperature ratings (Storage)				Dry bulb temp (-10~60°C), Relative humidity (10~90%)			

Motor specification		701-24V-60P	Pin Allocation		
Rated Voltage	V	24	1 Red	VM (24 Vdc)	UL1061 AWG22
Rated Speed	RPM	3000	2 Black	GND	
Rated Torque	N.m	0.19	3 Orange	D+ / Tx	
Rated Current	A	3.5	4 White	D- / Rx	UL1061
Rated Power	W	60	5 Green	FG GEN	AWG28
No load speed	RPM	3500	6 Black	GND	
No load current	mA	450	7 Brown	ENC A OUT	UL1061 AWG28
			8 Gray	ENC B OUT	
			9 Yellow	ENC C OUT	

Dimensions in [mm]



[DSM 701 24V 60P HG ECP]

Positioning control Smart geared EC motor**Ø70 mm, 24V, 60 Watt, Cycloid gear, Brushless, Hollow disc flange, Positioning control**

GEARED EC MOTOR

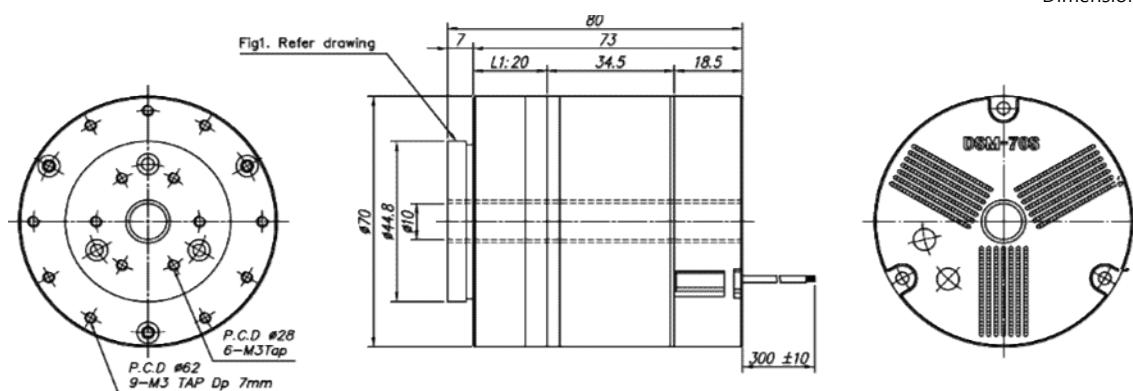
Built in Positioning Control ECP drivers

- Cycloid gear train.
- Output shaft : Free cutting steel
- Control IO : RS232, RS485
- Motor speed (duty %), positioning (steps) set
- Source Power outage compensation function
- Home position return (zero position setting)
- Protection (UVLO, OVP, OCP, TSD)
- 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	925	935	965	995	
* 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°C), Relative humidity (0~85%)				
Temperature ratings (Storage)		Dry bulb temp (-10~60°C), Relative humidity (10~90%)				

Motor specification	701-24V-60P	Pin Allocation		
Rated Voltage	V	24	1 Red	VM (24 Vdc)
Rated Speed	RPM	3000	2 Black	GND
Rated Torque	N.m	0.19	3 Orange	D+ / Tx
Rated Current	A	3.5	4 White	D- / Rx
Rated Power	W	60	5 Green	FG GEN
No load speed	RPM	3500	6 Black	GND
No load current	mA	450	7 Brown	ENC A OUT
			8 Gray	ENC B OUT
			9 Yellow	ENC C OUT

Dimensions in [mm]



[DSM 701 24V 40P IG52 ECP]

Positioning control Smart geared EC motor**DSM701, 24V, 40 Watt, IG52 Planetary Gearhead, Brushless, Positioning control**

GEARED EC MOTOR

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	173	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	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	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	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											
Weighth	g	1140	1140	1325	1325	1325	1325	1325	1515	1515	1515	1515	1515	1515	1515	1685	1685		
		1685	1685	1685	1685	1685	1685	1685											

Temperature ratings (Operation)

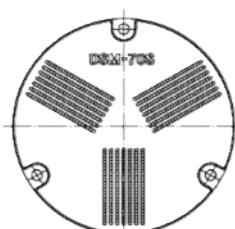
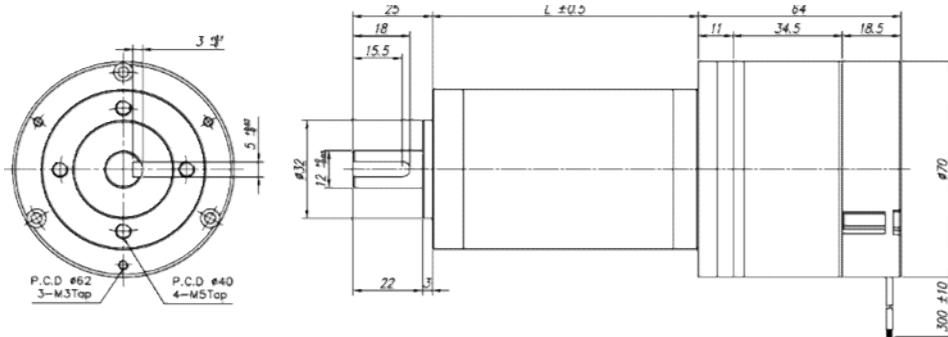
Dry bulb temp (-10~50°C), Relative humidity (0~85%)

Temperature ratings (Storage)

Dry bulb temp (-10~60°C), Relative humidity (10~90%)

Motor specification		701-24V-40P		Pin Allocation								
Rated Voltage	V	24		1 Red								
Rated Speed	RPM	2300		2 Black								
Rated Torque	N.m	0.18		3 Orange								
Rated Current	A	2.5		4 White								
Rated Power	W	40		5 Green								
No load speed	RPM	2650		6 Black								
No load current	mA	320		7 Brown								
				8 Gray								
				9 Yellow								

Dimensions in [mm]



[DSM 701 24V 60P IG52 ECP]

Positioning control Smart geared EC motor**DSM701, 24V, 60 Watt, IG52 Planetary Gearhead, Brushless, Positioning control**

GEARED EC MOTOR

Built in Positioning Control ECP drivers

- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Control IO : RS232, RS485
- Motor speed (duty %), positioning (steps) set
- Source Power outage compensation function
- Home position return (zero position setting)
- Protection (UVLO, OVP, OCP, TSD)
- 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	173	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	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	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	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											
Weighth	g	1135	1135	1320	1320	1320	1320	1320	1510	1510	1510	1510	1510	1510	1510	1680	1680		
		1680	1680	1680	1680	1680	1680	1680											

Temperature ratings (Operation)

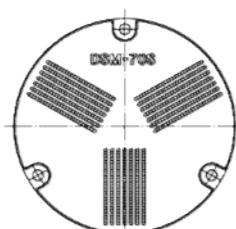
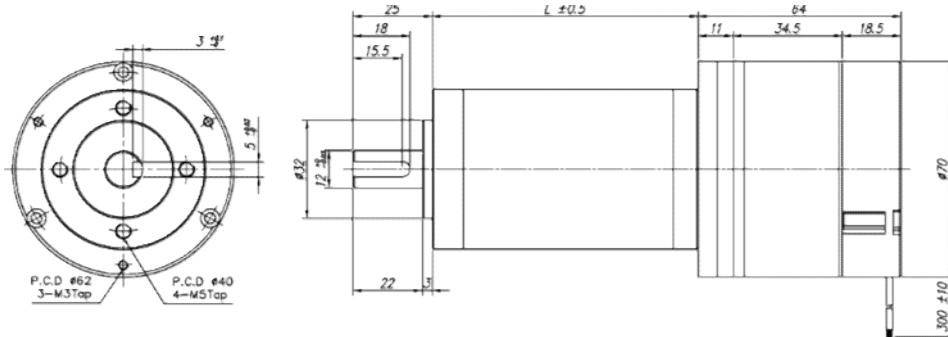
Dry bulb temp (-10~50°C), Relative humidity (0~85%)

Temperature ratings (Storage)

Dry bulb temp (-10~60°C), Relative humidity (10~90%)

Motor specification		701-24V-60P		Pin Allocation							
Rated Voltage	V	24		1 Red							
Rated Speed	RPM	3000		2 Black							
Rated Torque	N.m	0.19		3 Orange							
Rated Current	A	3.5		4 White							
Rated Power	W	60		5 Green							
No load speed	RPM	3500		6 Black							
No load current	mA	450		7 Brown							
				8 Gray							
				9 Yellow							

Dimensions in [mm]



[DSM 701 24V 40P IG71 ECP]

Positioning control Smart geared EC motor

GEARED EC MOTOR

DSM701, 24V, 40 Watt, IG71 Planetary Gearhead, Brushless, Positioning control**Built in Positioning Control ECP drivers**

- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Control IO : RS232, RS485
- Motor speed (duty %), positioning (steps) set
- Source Power outage compensation function
- Home position return (zero position setting)
- Protection (UVLO, OVP, OCP, TSD)
- 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	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	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	36.8																
Efficiency	%	80	70	70	70	60	60	60	60	60	60	50	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																
Weighth	g	1555	1885	1885	1885	2215	2215	2215	2215	2215	2215	2555	2555	2555	2555	2555	2555	2555	
		2555	2555																

Temperature ratings (Operation)

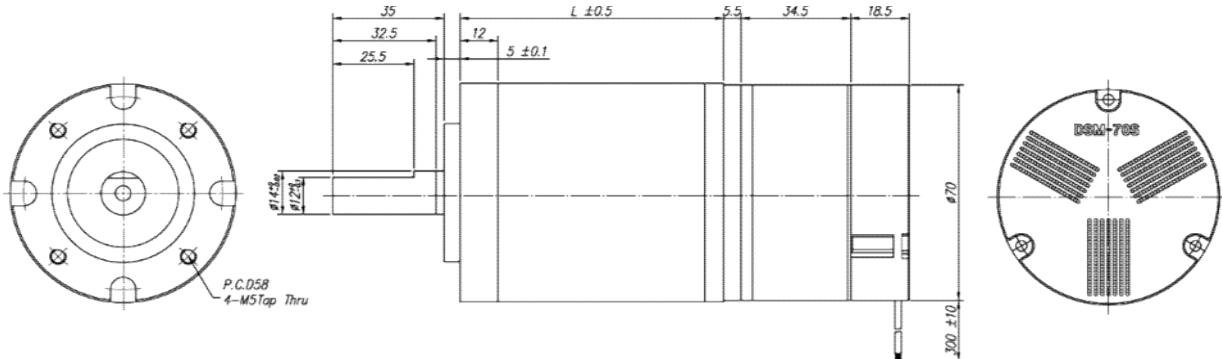
Dry bulb temp (-10~50°C), Relative humidity (0~85%)

Temperature ratings (Storage)

Dry bulb temp (-10~60°C), Relative humidity (10~90%)

Motor specification		701-24V-40P		Pin Allocation									
Rated Voltage	V	24		1	Red		VM (24 Vdc)						UL1061
Rated Speed	RPM	2300		2	Black		GND						AWG22
Rated Torque	N.m	0.18		3	Orange		D+ / Tx						
Rated Current	A	2.5		4	White		D- / Rx						UL1061
Rated Power	W	40		5	Green		FG GEN						AWG28
No load speed	RPM	2650		6	Black		GND						
No load current	mA	320		7	Brown		ENC A OUT						UL1061
				8	Gray		ENC B OUT						AWG28
				9	Yellow		ENC C OUT						

Dimensions in [mm]



[DSM 701 24V 60P IG71 ECP]

Positioning control Smart geared EC motor

GEARED EC MOTOR

DSM701, 24V, 60 Watt, IG71 Planetary Gearhead, Brushless, Positioning control**Built in Positioning Control ECP drivers**

- Planetary Gearhead : straight teeth
- Bearing at output : ball bearing
- Control IO : RS232, RS485
- Motor speed (duty %), positioning (steps) set
- Source Power outage compensation function
- Home position return (zero position setting)
- Protection (UVLO, OVP, OCP, TSD)
- 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	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	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	36.8																
Efficiency	%	80	70	70	70	60	60	60	60	60	60	50	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																
Weighth	g	1550	1880	1880	1880	2210	2210	2210	2210	2210	2210	2550	2550	2550	2550	2550	2550	2550	
		2550	2550																

Temperature ratings (Operation)

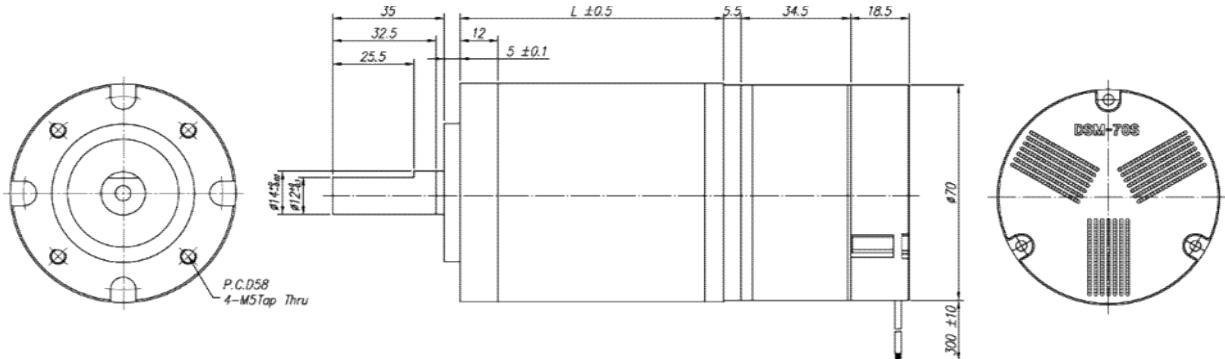
Dry bulb temp (-10~50°C), Relative humidity (0~85%)

Temperature ratings (Storage)

Dry bulb temp (-10~60°C), Relative humidity (10~90%)

Motor specification		701-24V-60P		Pin Allocation					
Rated Voltage	V	24			1 Red		VM (24 Vdc)		UL1061
Rated Speed	RPM	3000			2 Black		GND		AWG22
Rated Torque	N.m	0.19			3 Orange		D+ / Tx		
Rated Current	A	3.5			4 White		D- / Rx		UL1061
Rated Power	W	60			5 Green		FG GEN		AWG28
No load speed	RPM	3500			6 Black		GND		
No load current	mA	450			7 Brown		ENC A OUT		UL1061
					8 Gray		ENC B OUT		AWG28
					9 Yellow		ENC C OUT		

Dimensions in [mm]



RS485 type built in positioning control driver ECP series

- DSM EC Drivers feature a compact structure of speed & positioning controllers, sensors and Smart EC motors.
- ECP drives are digital positioning controllers internally mounted on DSM EC motors with FG or encoder signals.
- The use of existing DSM products with an adapted design results in robust, space-saving drive solution with high power density.
- EC drive solution is the key to production machinery with many years of maintenance-free operation in a variety of applications.
- Interface I/O protocol : RS485 (MODBUS RTU)

Interface

[VM] (red)
[GND] (black)

[RS485] (D+ : orange, D- : white)
MODBUS RTU

VM	24 [Vdc] ± 25%	Operating Voltage
GND	Power Ground	DC power ground

Baudrate	115,200 bps
Data	8 bit
Parity bit	None
Stop bit	1
Flow control	None
Address No.	Current Direction : 0x0008 Current Speed : 0x007
Read	0x03 (Read holding registers)
Write	0x06 (Write single registers)

*** Positioning set value : Steps**

position error : about ±5 step

Step is the number of feedback Hall sensor signals (FG signals) of the smart EC motor.

[Step = Number of motor Poles x motor phase x reduction ratio]

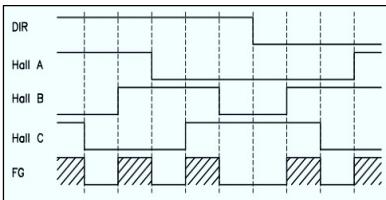
ex) Brushless dc geared motor 4 pole, 3 phase, reduction ratio 50 : 1

$$4 \text{ (pole)} * 3 \text{ (phase)} * 50 \text{ (reduction)} = 600 \text{ steps}$$

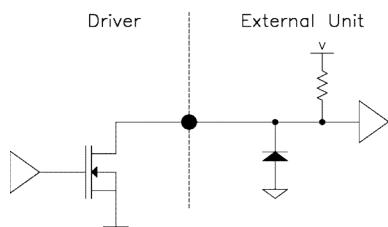
[FG GEN out] (green)

1FG puts into toggle-operation in which the logic reverses every time when excitation phase is switched by hall input.

* FG output pulse (DSM701) = 24 pulse / round

**Open Drain**

VH : 30Vdc max
VL : 0.5Vdc max
Sink current : 100mA max



You need to pull up for FG terminal, so that the terminal is open-drain output.

[Alarm out]**Fault output : RS485**

Error status (0: Normal / 1: Fault)

UVLO (undervoltage lockout)

TSD (thermal shutdown)

OCP (overcurrent protection-peak current limit)

Reset High & Brake ON (REMOTE_RESET: 1 & REMOTE_BRAKE: 1)

Reset Low (REMOTE_RESET: 0)

Reset High (REMOTE_RESET: 1)

[Encoder out] (A: brown, B: gray, Z: yellow)**Optional Model : IC403, IC404**

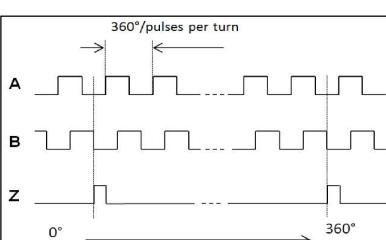
Incremental quadrature signals A, B

Reference mark(index) Z

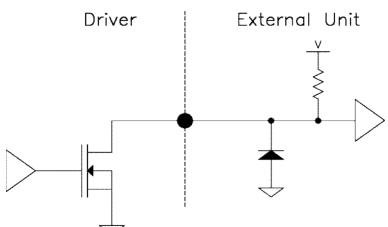
Cycles per Shaft Turn

: 12 bit (4096 Steps / 0.0879°)

Open drain output

**Open Drain**

VH : 30Vdc max
VL : 0.5Vdc max
Sink current : 100mA max



You need to pull up for encoder terminal, so that the terminal is open-drain output.

Motor protection

Parameters	Typ.	Description
Current limit (OCP)	10 [A]	
Thermal shutdown (TSD)	160±15 [°C]	(IC temperature/Design specification) When the driver IC and MOSFET reaches the defined temperature, the motor current automatically cuts off. Component reliability can't be ensured when motor is used in exceeded 150[°C]. There is no guarantee of proper operation when thermal shutdown motor is reused.
Undervoltage Lockout (UVLO)	8.5 [Vdc]	Driver protects when the power state reaches down to normally operable voltage value or less. Normal operation resumes when the VM undervoltage condition is removed.
Over-voltage protection (OVP)		Built-in ceramic surge absorbers (varistor 7D-470K)

Service life and product safety

1. Bearings and service life

- Service life is affected by maximum speed, residual imbalance and bearing load.
- Exceeding maximum torque can lead to excessive wear.
- Bearings designed for ones of thousands of hours (more than 5000[hrs], no load, rated, 20±5°C)
- Exposure of bearing to corrosive gas may cause corrosion, which may affect the motor's characteristics and durability

2. Locked motor

3. Circuit Protect

- No burning after locked rotor condition at rated voltage by using a specified drive circuit
- This motor does not have the protect circuit for surge voltage and wrong connection.

So, don't apply surge voltage such as over rated voltage and wrong connection.



The Smart EC drivers are features extensive analog and digital I/O functionality and are being configured via RS485 interface using the graphical user interface "uSMART" for Windows PCs.

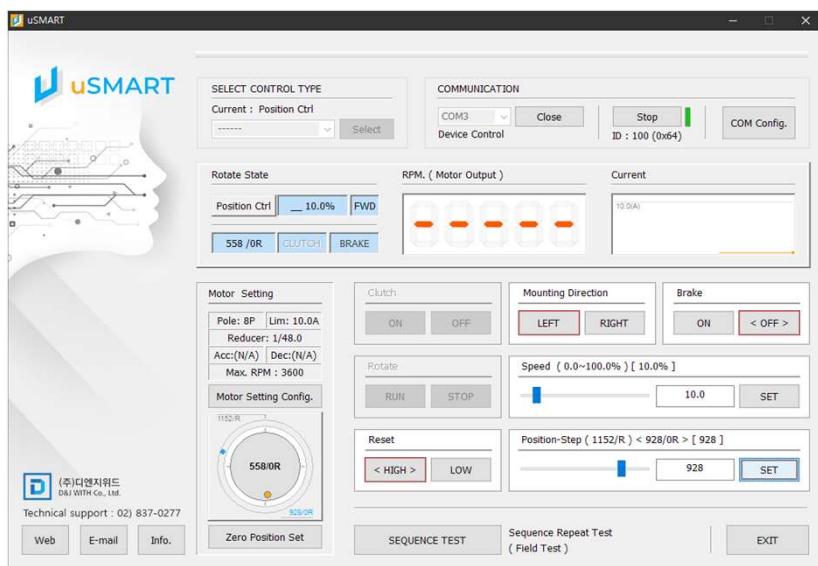
Installation Program : uSMART

Language : English

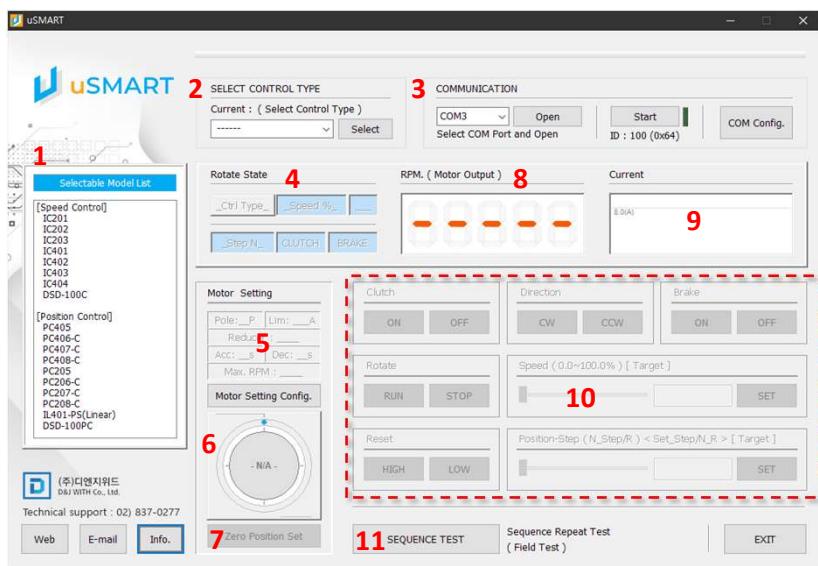
Operating System : Window 10, Windiw 8, Window 7

Communication interface : Serial (use USB to serial converter)

Program – Layout



Program – Component



1 [Info] Displays model information of the motor that can be controlled.

2 [Select control type] Select the control mode of the motor. You can check the model information of the product in [Info.]. The control items for the selected mode are activated.

3 [Communication] Set the COM(serial) port for communication.

[Start] Start communication with the motor.

[Com Config] Set the device ID, COM Port Baudrate

4 [Rotate State] The control status of the connected motor is displayed.

5 [Motor Setting] The set value of the motor is displayed. (Number of poles, current limit, reduction ratio, acceleration / deceleration time, maximum rotation speed)

[Motor Setting Config] Change motor settings.

6 [Jog & shuttle] The position control angle of the motor can be set directly.

7 [Zero Position Set] Zero position value of positioning control motor can be set.

You can change the current position to the zero position.

8 [RPM] Displays the rotation speed of the motor.

9 [Current] The current of the motor is displayed.

10 [Control set value] Set the control value of the motor.

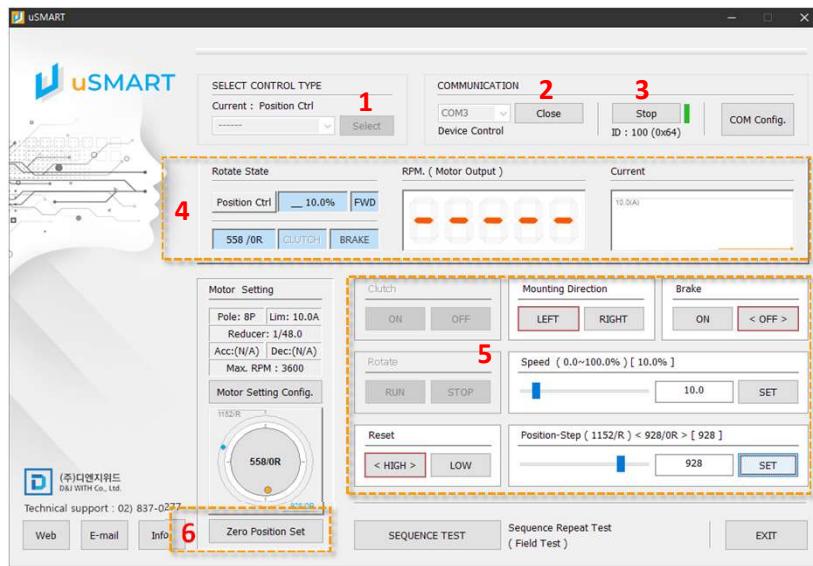
The input button is activated according to the selected mode.

The selected control item is indicated by a red border.

11 [Sequence test] The motor can be operated repeatedly with the set value.

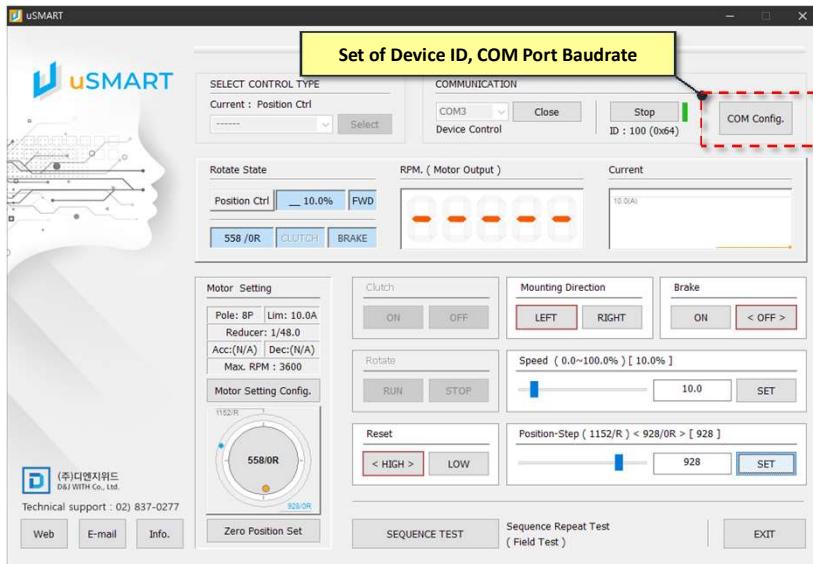
Program – Usage

Basic use of the control program



1	[Select]	Select the control mode.
2	[Open / Close]	Open COM Port (Serial)
3	[Start / Stop]	Start communication with motor
4	[Monitoring]	Check connected motor status, rotation speed, current graph
5	[Control Setting]	Input setting value to control the motor Input button activated (depends on selection mode)
6	[Zero Position Set]	The selected control item is indicated by a red border on the button home position return Set the zero position value of the control motor. Change current position to zero position.

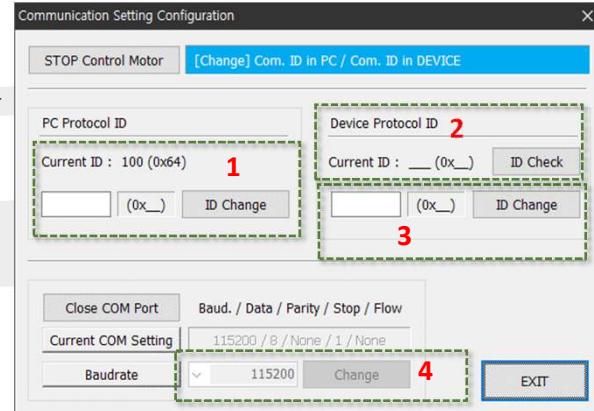
Program – Setting



Program – Setting

/ COM Config.

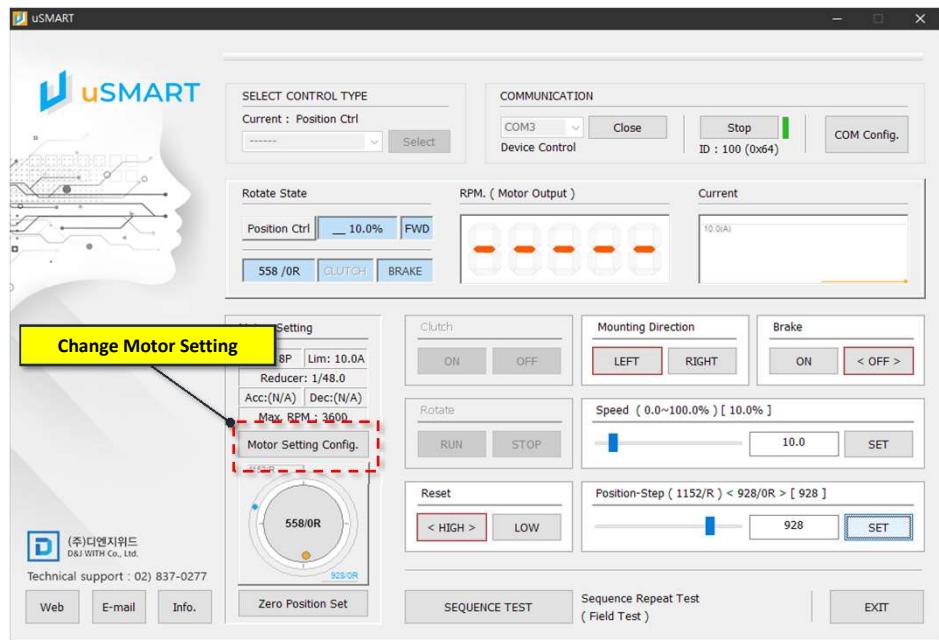
- 1 Communication ID set in the PC program.
 - 1) Enter ID to change
 - 2) "ID Change" button
- 2 Check the device ID of the connected motor
- 3 Change device ID.
 - 1) Enter ID to change
 - 2) "ID Change" button
- 4 Change communication speed
 - 1) Select speed to change
 - 2) "Change" button



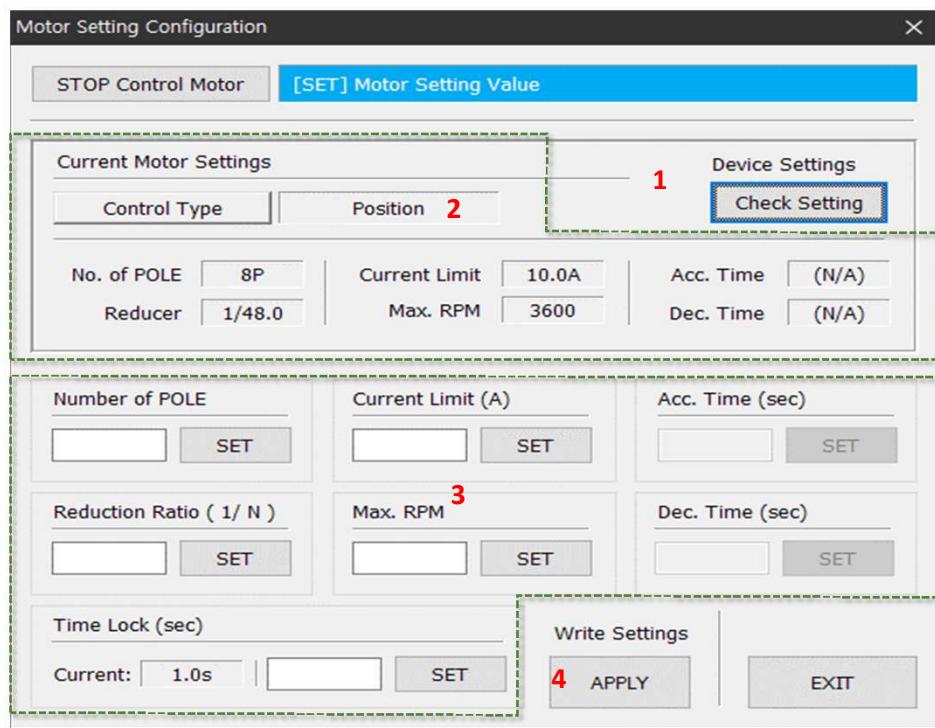
Caution

- 1 ID can be changed while communication is connected.
- 2 It cannot be changed while the motor is running.
- 3 Baudrate can be changed only when the port is "Close".

Program – Setting



Program – Setting / Motor setting config.

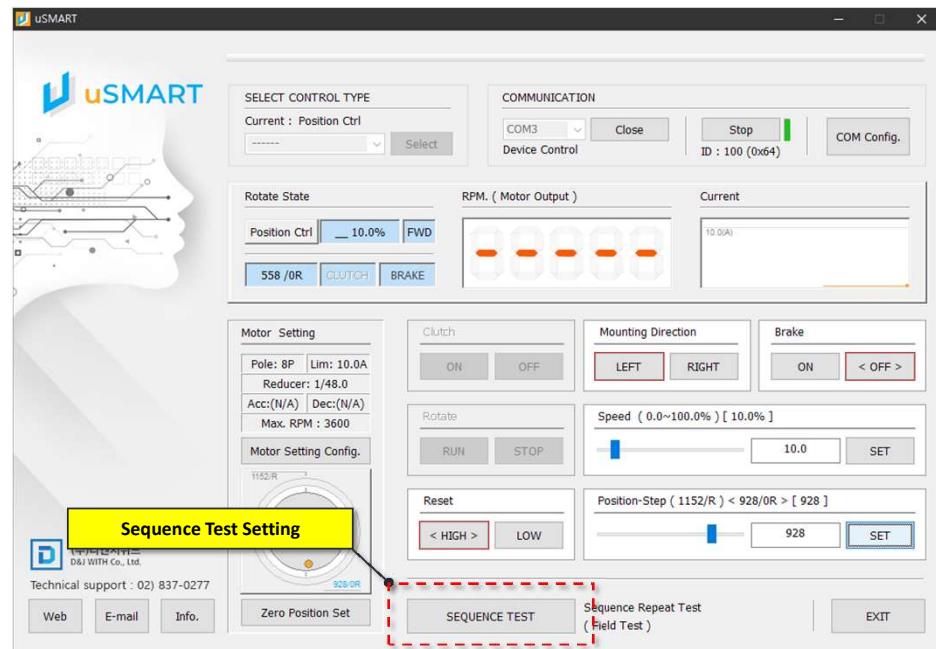


- 1 Check default setting of connected motor
- 2 Display of control settings
- 3 Control settings
- 4 Apply settings

Caution

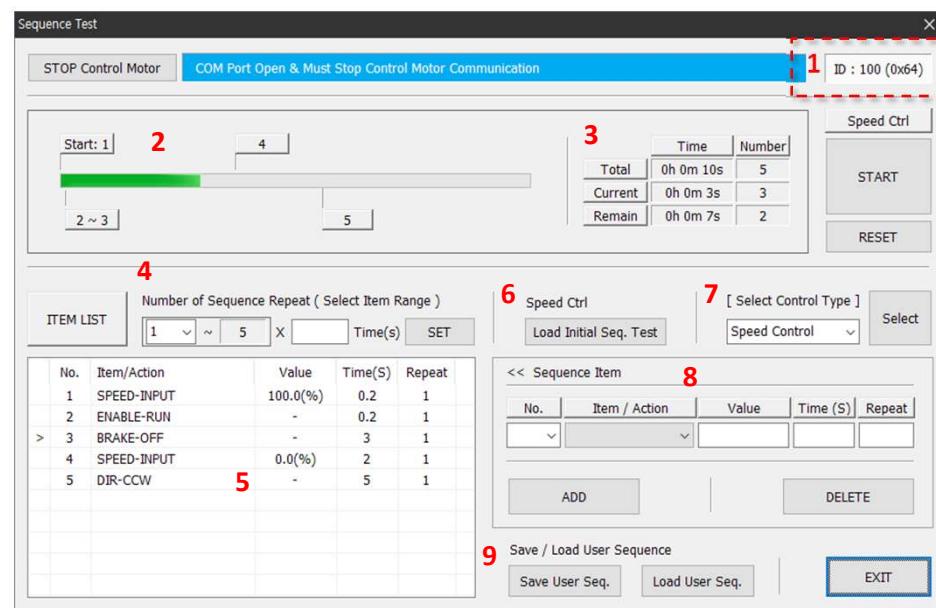
- 1 The set value can be changed only when communication is connected.
- 2 It cannot be changed while the motor is running.

Program – Setting



Program – Setting

/ Sequence Test Setting



- 1 Display the set communication ID
 - 2 Display the set test item order and progress
 - 3 Display setting time and test repeat count
 - 4 Set the number of test repetitions
 - 5 Sequential display of test setting items
 - 6 Load default settings
 - 7 Control mode selection
 - 8 Test Item Settings
 - 1) Run / Time / Repeat: Setting
"Add" Button : Add Item
 - 2) Sequential Selection
"Delete" Button : Delete Item
 - 9 Save the setting items
Load saved setting items
- Caution**
- 1 Sequence test item can be changed only when communication is connected.
 - 2 It cannot be changed while the motor is running.