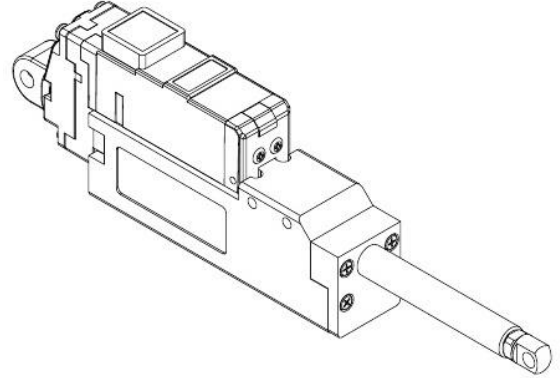


Features / 주요 특징점

- Micro size / 마이크로 사이즈
- Precise position control / 정밀위치제어
- Strong force comparing to the size / 체적대비 강한 힘
- Built-in Drive Circuitry / 드라이브 회로 내장
- TTL/PWM communication /TTL통신
- Parameter programmable on the Manager software / 매니저 소프트웨어를 통한 파라미터 셋팅가능



Common Specifications / 공통 사양

- Stroke / 스트로크 : 41mm
- Force / 정격 힘 : 17N~78N according to gear ratio (See appendix.) / 기어비에 따라 17~78N(별첨 참조)
- Micro controller : 32 bit ARM Core, 4960 resolution (A/D converter)
- Input Voltage / 입력전압: 12.0V(Rated/정격), 7V~13V(Operating)
- Motor Type / Watt : coreless DC Motor / 26W
- Recommended duty cycle / 권장 듀티 사이클 : under 50% (50% 이하)
- Current consumption / 소모전류 : 30mA(Idle), 380mA(Rated), 2.3A(Stall)
- Position accuracy / 위치정밀도 : less than 0.05mm(50um)
- Position sensor / 위치센서 : 10k Ω linearity potentiometer
- Size / Weight /크기,무게 : 86.9(L)x36(W)x18(H)mm / 96~99g (to be varied according to gear ratio)
- Communication / 통신 :TTL / PWM (Automatic signal recognition / 신호자동인식)
 - TTL Level voltage : 3.3~5.0V
 - PWM Pulse range : 900us(retracted/최대수축)-1500us(center)-2100us(extended/최대확장)
 - TTL Communication range / TTL 통신 통달 거리 : Max. 4m
- Operating Temperatures / 동작온도 :-10 $^{\circ}$ C ~ 60 $^{\circ}$ C
- Ingress protection / 방수방진 : IP-54
- Mechanical Backlash / 기구백래쉬 : 0.03mm(30um)
- Audible Noise / 가청소음 : Approx. 50db at 1m
- Gear ratio / 기어비 :10:1(20PT,30PT) /30:1(50PT) /50:1(80PT)
- Gear type / 기어타입 : Engineering plastic gears (20PT,30PT)
 - 4 metal & 2engineering plastic gears (64PT,100PT)
 - (Alluminum and stainless steel combination)
- Rod type / Rod 타입 : Stainless steel rod / 스테인레스 스틸
- Standard Accessory / 표준악세서리 :1xHinge base, 1x Hinge, 1xHinge shaft, 1xRod end tip, 2x M3 NUT, 3 x M2.5x6 screws, 1x Molex wire harness (200mm), 3xSocket head M3x8 mounting bolts
- Wire Harness : Molex(50-37-5033) to Molex(50-37-5033) / 200mm / 0.08x60(22AWG)

Data Sheet_L12-XXPT-4_R.1.2

Parameter	Symbol 심볼	Limit Values / 한계값			Unit 단위	Remarks 비고
		Min.	Typ.	Max.		

Voltages / 전압

Supply voltage / 공급전압	V	7.0	12.0	13.0	V	
Logic input voltage / 로직인가전압	V	2.0	3.3	5.5	V	TTL Level

Currents / 전류

Maximum peak Current / 최대 피크 전류	I	2.1	2.2	2.3	A	Stall Current
No Load Current / 무부하전류	I	180	200	220	mA	No Load
Full Load Current / 정격 부하 전류	I	380	400	420	mA	Full Load
Idle Current	I	25	30	35	mA	

Temperatures / 온도

Storage Temp. / 보관온도	T	-20	-	70	℃	
Operating Temp. / 동작온도	T	-10	-	60	℃	

Strokes / 스트로크

MIN Position / 최소수축위치	L	-	2.5	-	mm	
MAX Position / 최대확장위치	L	-	43.5	-	mm	
Stroke length / 스트로크	L	-	41.0	-	mm	

PWM

MIN Pulse / 최소수축 펄스	sec	-	900	-	us	Period is 4ms over / 4ms이상 주기
Neutral Pulse / 센터 펄스	sec	-	1500	-	us	
MAX Pulse / 최대확장 펄스	sec	-	2100	-	us	

No Load Speed / 무부하 속도

Maximum Speed at 12.0V 최대 속도 at 12.0V	S	79.5	80.0	80.5	mm/s	L12-20PT-4
	S	27.5	28.0	28.5	mm/s	L12-30PT-4
	S	10.0	10.5	11.0	mm/s	L12-50PT-4
	S	7.3	7.7	8.1	mm/s	L12-80PT-4

Data Sheet_L12-XXPT-4_R.1.2

Force / 힘

Parameter	Symbol 심볼	Limit Values / 한계값			Unit 단위	Remarks 비고
		Min.	Typ.	Max.		

Rated Force / 정격 힘

Rated Force at 12.0V 정격 힘 at 12.0V	F	16.5	17.0	17.5	N	L12-20PT-4
		3.70	3.82	3.93	lbf	
		1.68	1.73	1.78	kgf	
	F	30.0	31.0	32.0	N	L12-30PT-4
		6.74	6.96	7.19	lbf	
		3.05	3.16	3.26	kgf	
	F	48.0	50.0	52.0	N	L12-50PT-4
		10.79	11.24	11.69	lbf	
		4.89	5.09	5.30	kgf	
	F	76.0	78.0	80.0	N	L12-80PT-4
		17.08	17.53	17.98	lbf	
		7.74	7.95	8.15	kgf	

* 1 kgf = 9.8N , 1lbf = 4.45N

Self Lock Force / 셀프-락 포스

	Fl	-	7.0	-	N	L12-20PT-4
	Fl	-	31.0	-	N	L12-30PT-4
	Fl	-	50.0	-	N	L12-50PT-4
	Fl	-	78.0	-	N	L12-80PT-4

- Self-lock force : The force which actuator maintains its position by mechanical friction without motor power.
- 셀프-락 포스 : 액츄에이터가 전원을 통한 모터의 힘 없이, 기구마찰력만으로 위치를 고수할 수 있는 힘

Z Axis Force / Z축 포스

	Fz	-	7.0	-	N	L12-20PT-4
	Fz	-	23.0	-	N	L12-30PT-4
	Fz	-	37.5	-	N	L12-50PT-4
	Fz	-	58.5	-	N	L12-80PT-4

- Z axis force : Actuator force when it is installed vertically.
- Z축 포스 : 수직 중력방향 설치 시 액츄에이터의 힘

Figure 1.

Figure1-1 . CURRENT VS FORCE (12 VDC)

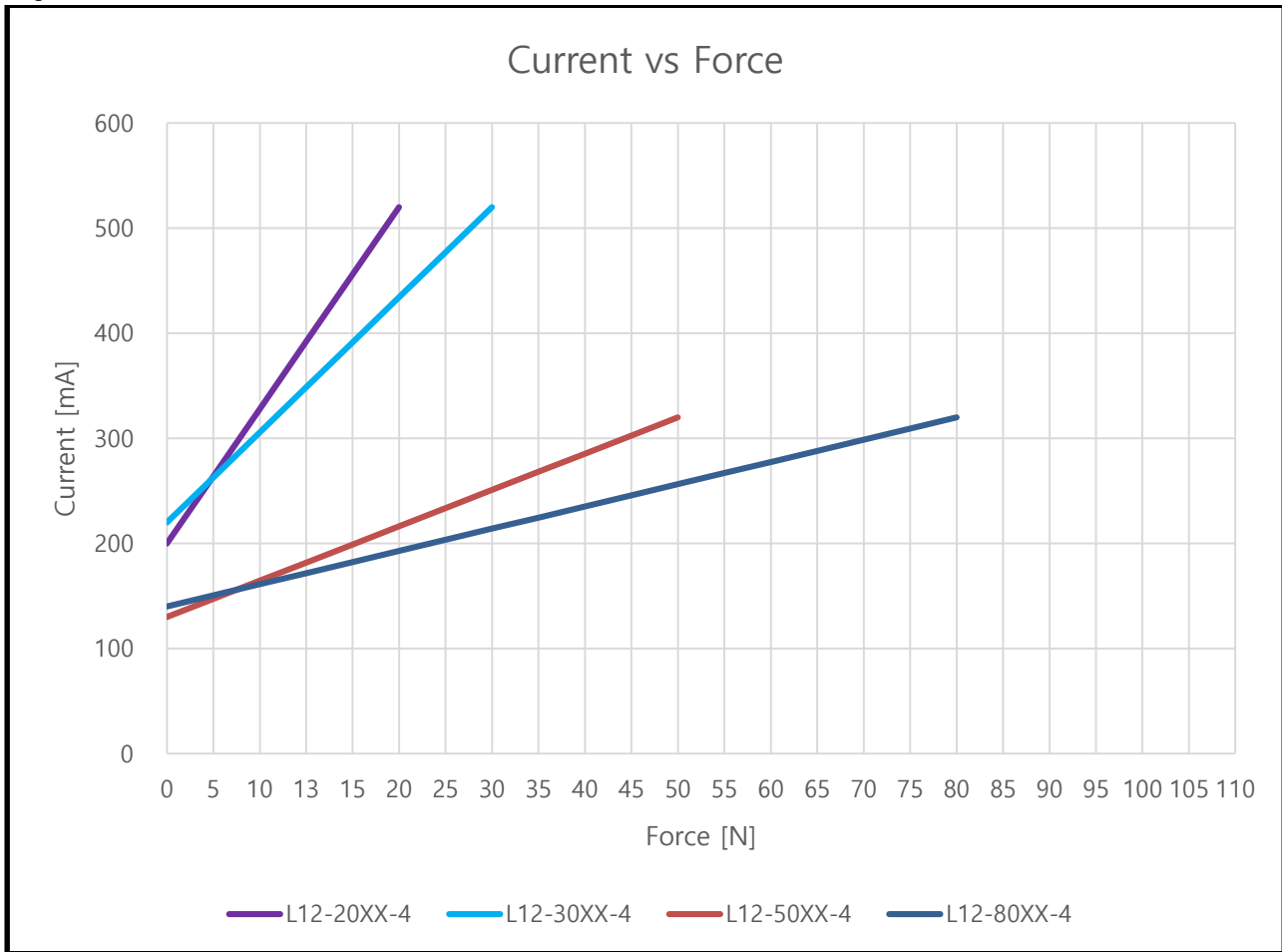


Figure1-2 . SPEED VS LOAD (12 VDC)

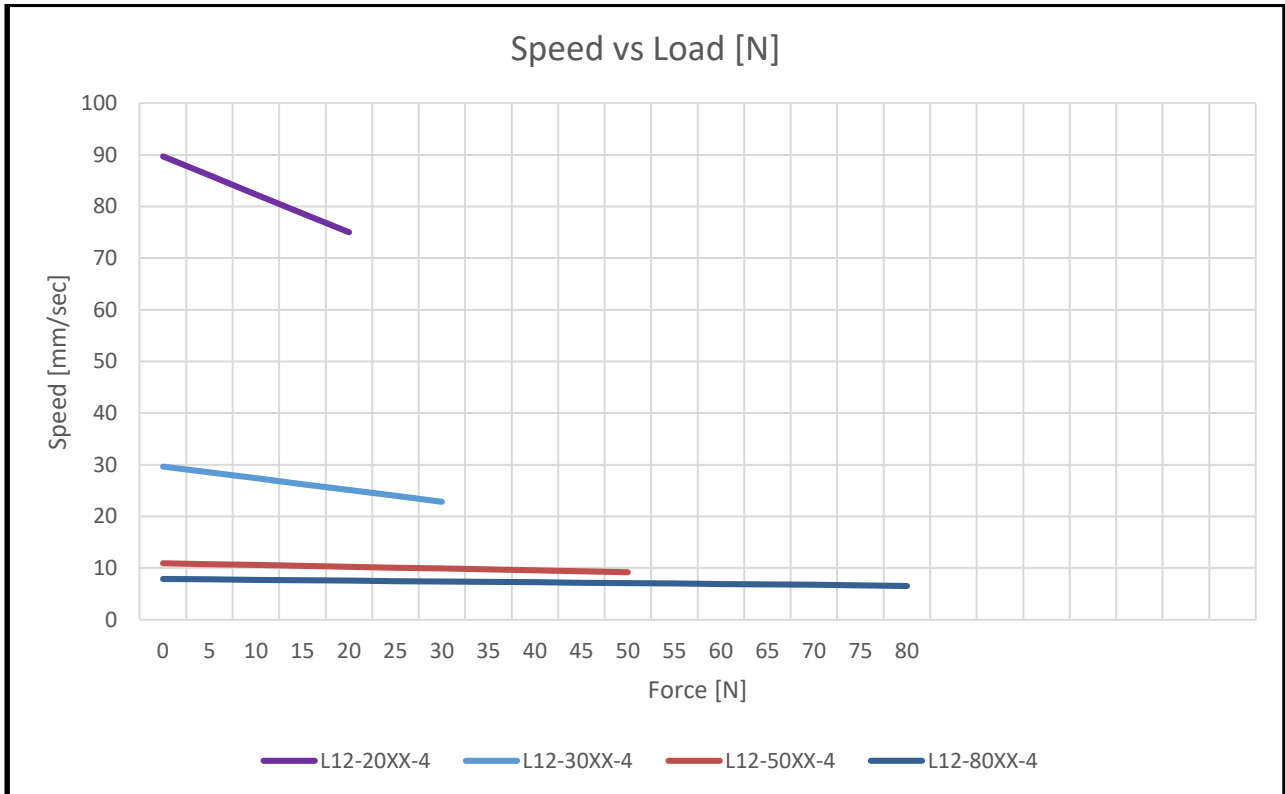


Figure 2.

Figure2-1 . Voltage /Speed[m/s] (12V / 41mm Products)

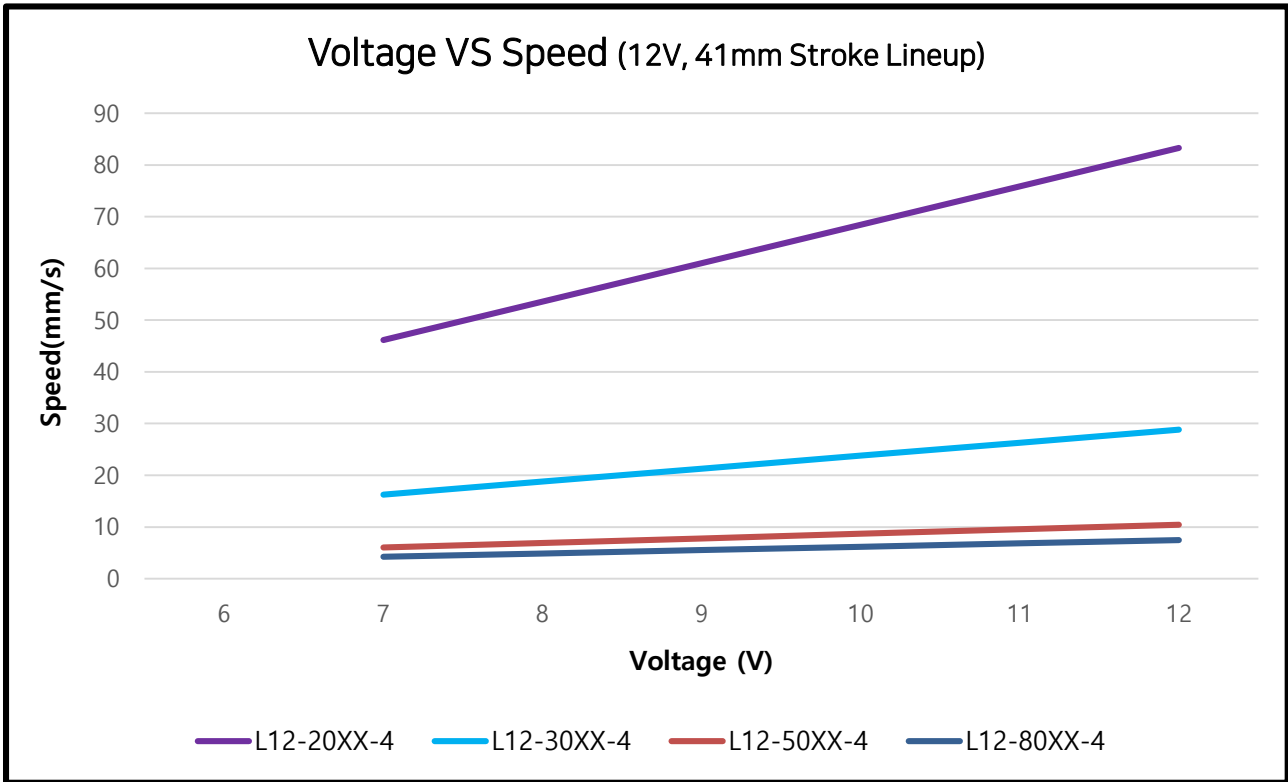
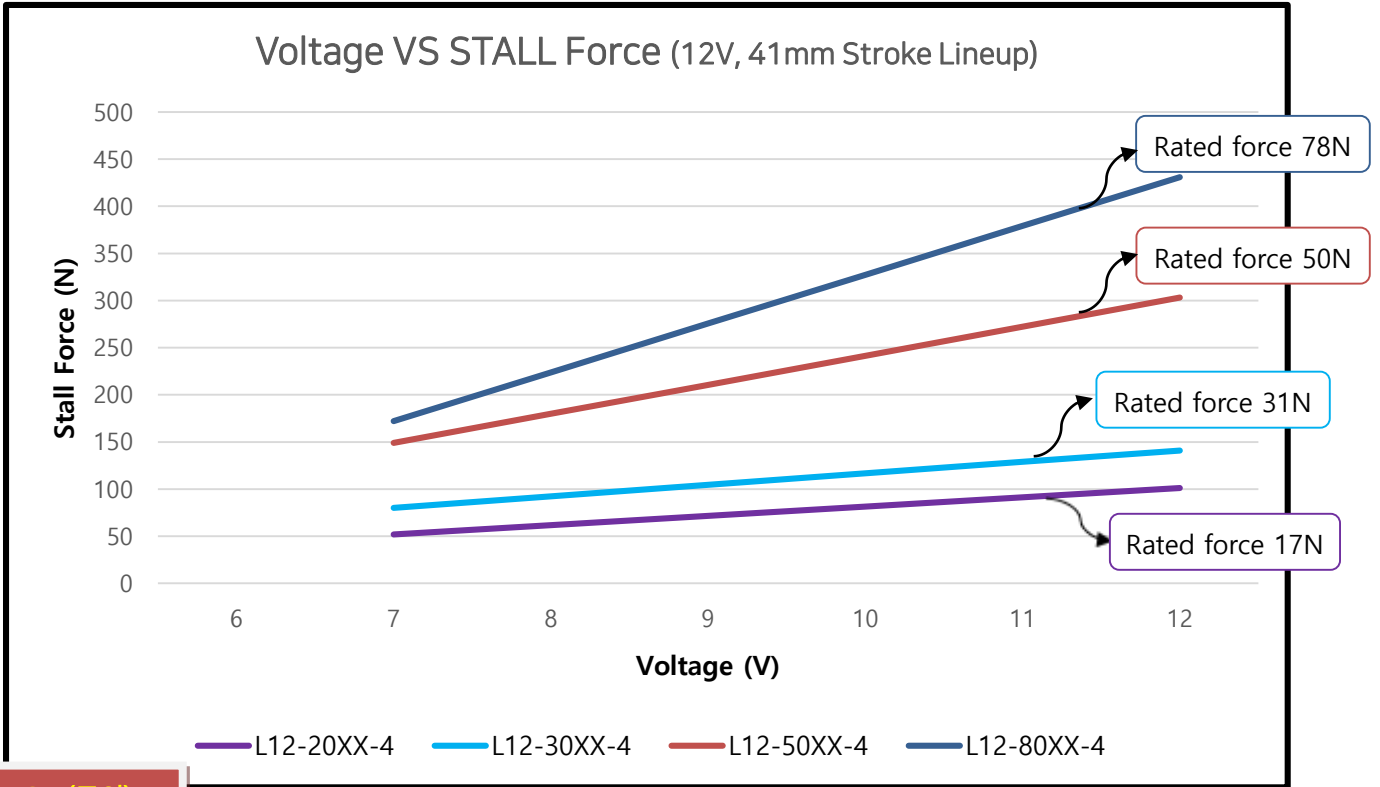


Figure2-2 . Voltage /Stall Force[N] (12V / 41mm Products)



CAUTION (주의)

- Stall force는 참고용으로, 제품의 파손을 방지하기 위해 실제 application에서의 사용시에는 Rated force에 맞추어 사용하여 주십시오.
- Stall force is for reference only. In order to prevent damage of the product, please use it according to the Rated force when using in actual application.

Figure 3.

Figure3-1 . Speed/Motor Operating Rate[mm/sec]

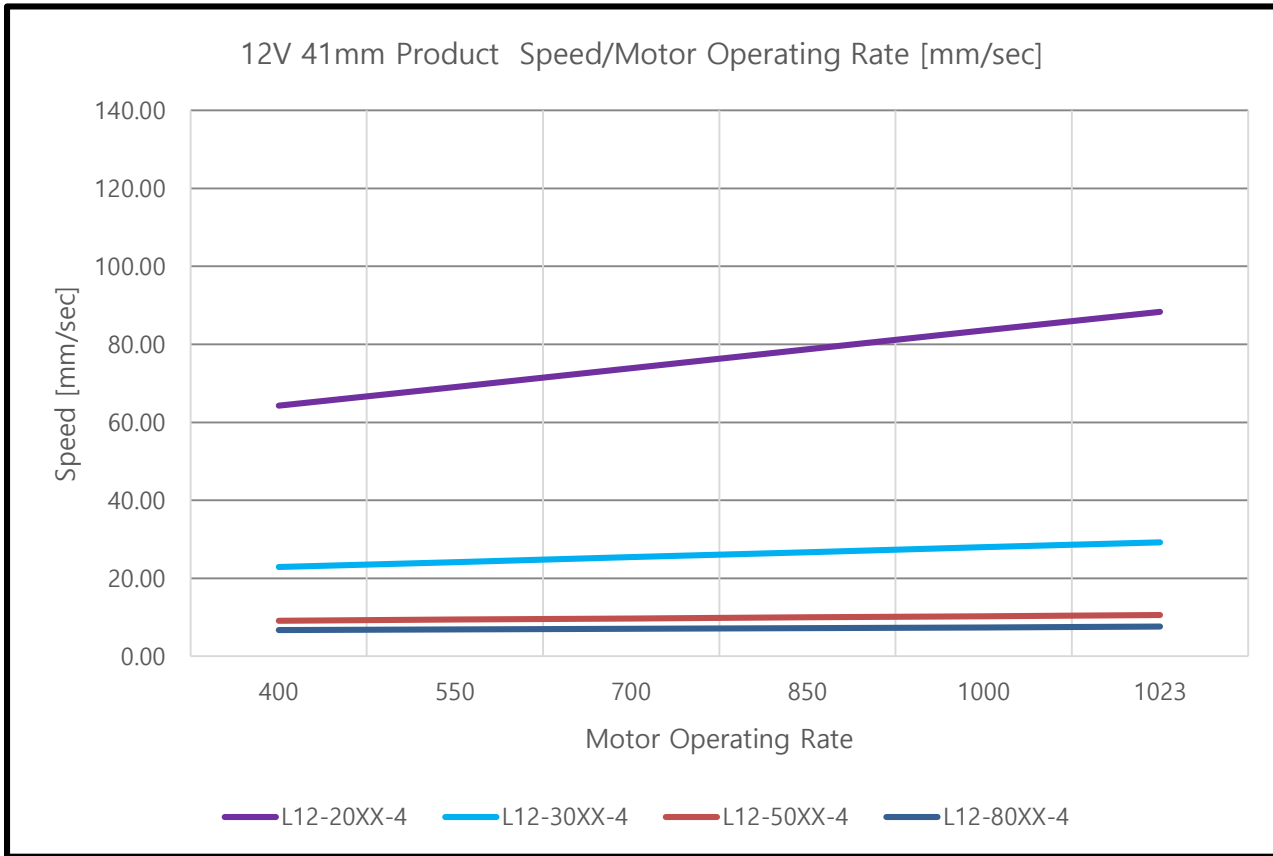
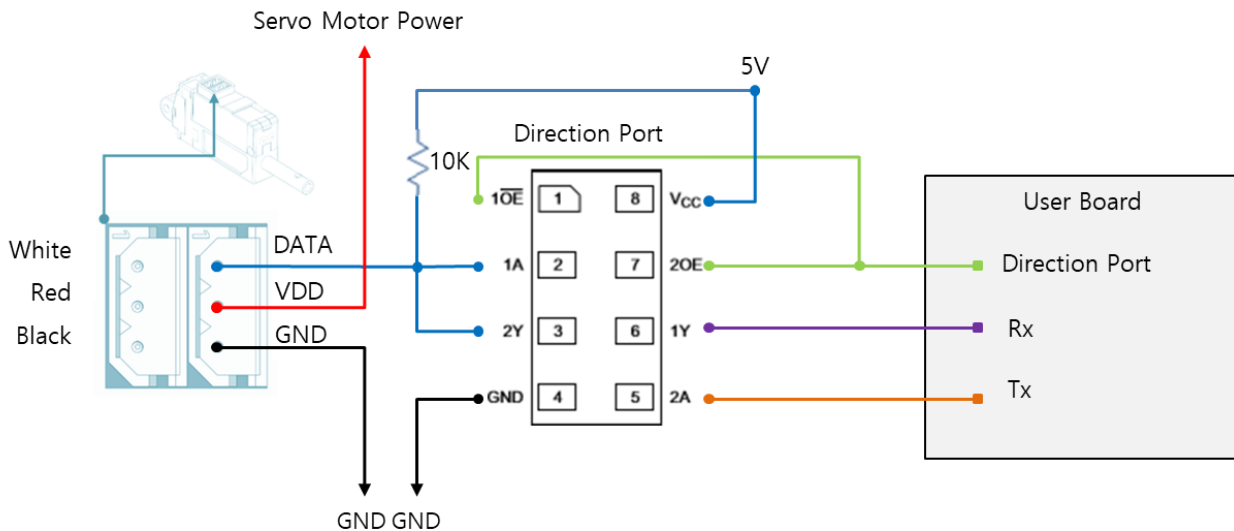


Figure 4. PIN Map

PIN NUMBER(COLOR)	PIN NAME	FUNCTION
1(WHITE)	DATA	통신(Communication)
2(RED)	VCC	Power +
3(BLACK)	GND	Power -



< HALF DUPLEX UART >

Figure 5. Dimension

