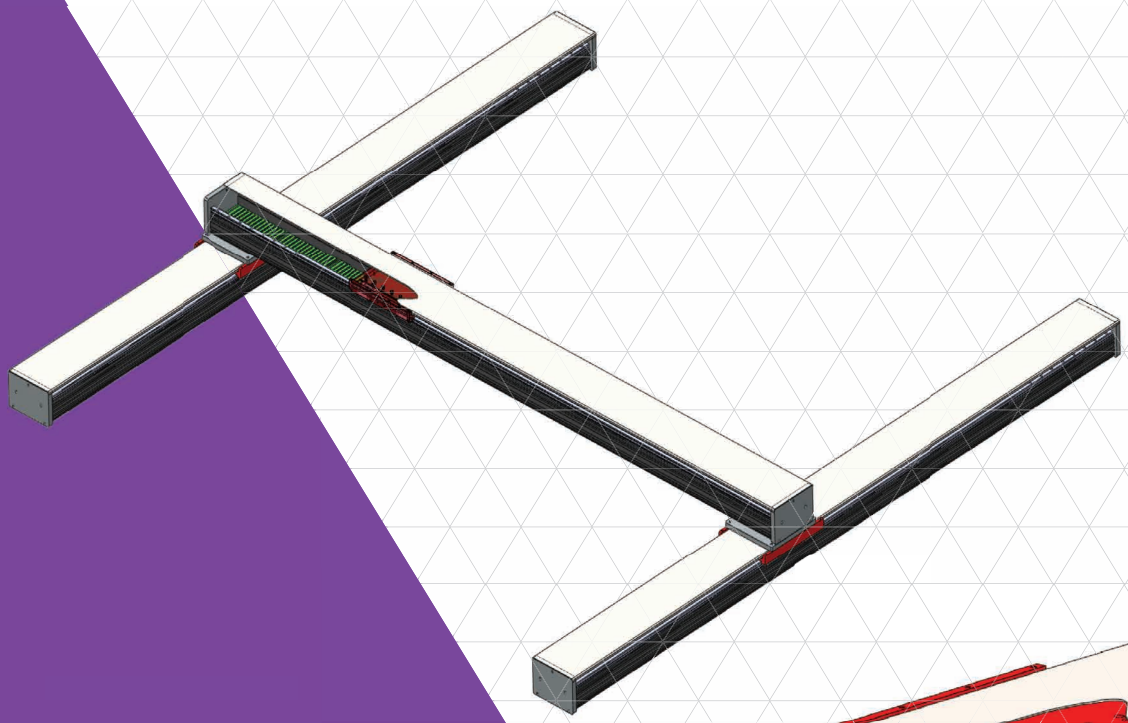
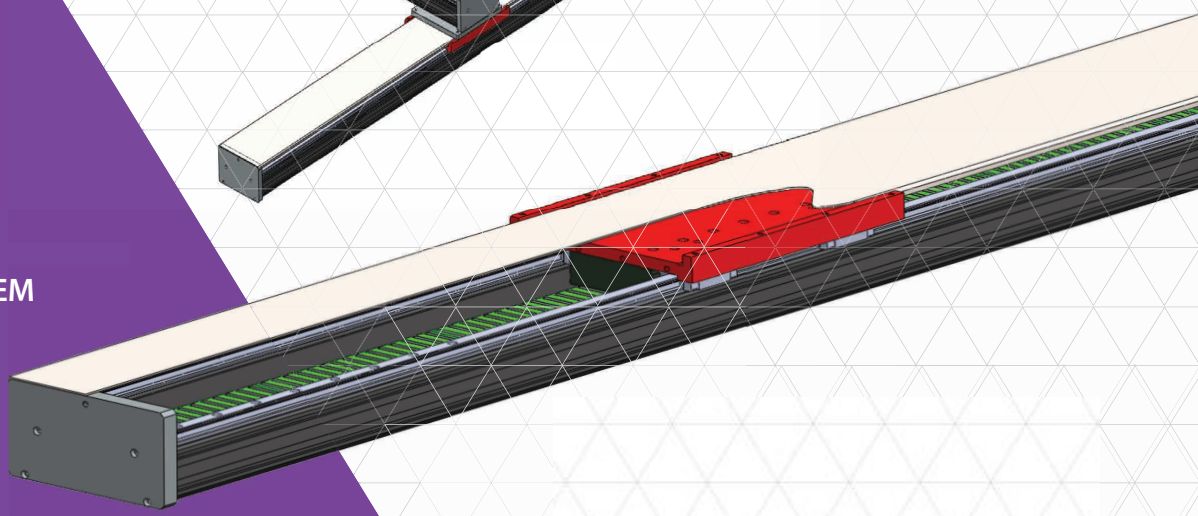
INNOBIZ 기술혁신형중소기업

LINEAR MOTORS

High Speed / High Accracy / Long Life Time





- GANTRY SYSTEM
- GRIPPER & SWIVEL SYSTEM
- APPLICATION

리니어 모터의 특징
Keynote of linear motor

클린룸 적용 가능
(Clean Room Application)

고속 정밀 이송용
(High speed, High precision)

독자적 브랜드 (Private Technology Brand)

–고정자에 자력이 없는 독자적 브랜드로 특허 획득 (Self–developed and patent technology brand)
–원천 기술력의 확보로 최적 솔루션 제공 (Provision of best solution using source technology)

No. 10–1326310

No. 10–1308154

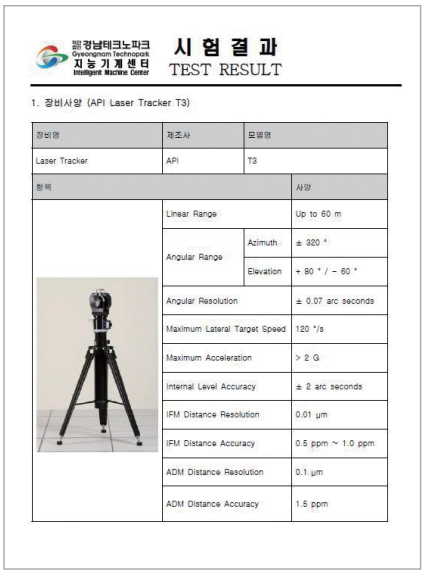
No. 10–1308155

고속 운전 (High Speed performance)

–최대 5m/s 속도 구현 ⇒ Cycle Time 단축으로 생산성 향상
(Maximum speed 5m/s ⇒ Productivity improvement by cycle time reduction)

고정밀도 · 고응답성 (High Precision and response)

동력변환계가 없는 비접촉식 위치, 속도의 closed–loop 제어를 통한 고정밀도, 고응답성 특성 구현
(High level of precision and response by accurate closed–loop control system)


경남테크노파크 Gyeongnam Technopark 지능기계센터 Intelligent Machine Center

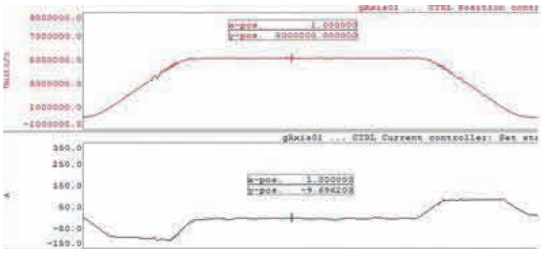
시 험 결 과
TEST RESULT

1. 장비사양 (API Laser Tracker T3)

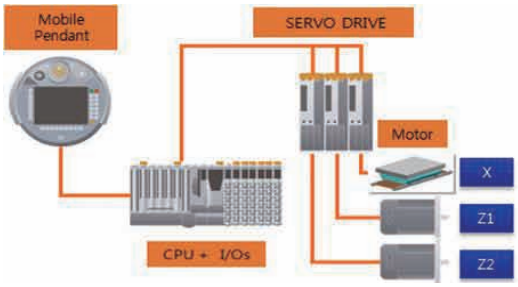
장비명	제조사	모델명
Laser Tracker	API	T3

항목			사양
	Linear Range		Up to 60 m
	Angular Range	Azimuth	± 320 °
		Elevation	+ 90 ° / – 60 °
	Angular Resolution		± 0.07 arc seconds
	Maximum Lateral Target Speed		120 °/s
	Maximum Acceleration		> 2 G
	Internal Level Accuracy		± 2 arc seconds
	IFM Distance Resolution		0.01 μm
	IFM Distance Accuracy		0.5 ppm ~ 1.0 ppm
	ADM Distance Resolution		0.1 μm
	ADM Distance Accuracy		1.5 ppm

주행 속도, 정밀도 측정 시험
(Speed and precision test)



전류, 속도 측정 시험 (Current and speed test data)



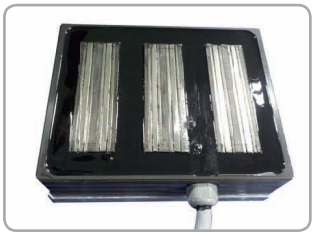
하드웨어 시스템 구성도 (Hardware system diagram)

경제적 원가, CLEAN ROOM 대응 (Cost-effective, Clean room application)

-고정자에 영구자석이 없는 구조로 원가 경쟁력 확보 (Cost-effective structure with non-magnetic secondary section)
-비접촉 구동으로 CLEAN ROOM 적용 대응 및 내구성 확보 (Clean room application and high durability with contactless operation)

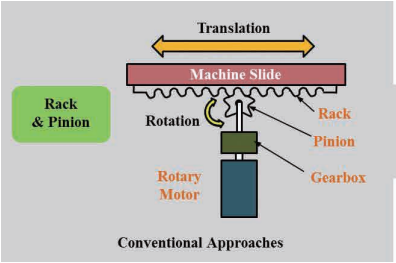
장거리, 고속, 정밀 이송 (Long Stroke, Precision Transfer)

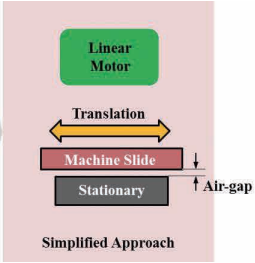
-고정자에 자력이 없어 일반 산업 환경 대응이 가능하며 장거리 이송용 로봇 주행축의 고속 정밀 이송에 적합
(High speed and high precision transfer for long-stroke application with non-magnetic stationary part of linear motor)



이동자 (Mover)

Moving Part
-Magnets
-Coil
-Iron-core





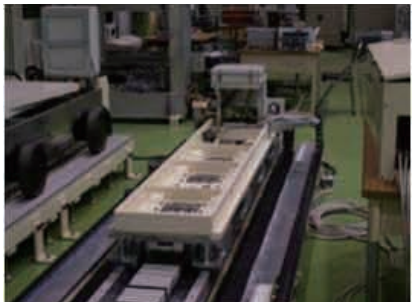
고정자 (Stator)

Stationary Part
Iron-core

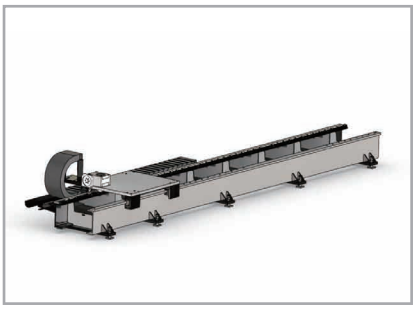
적용분야 (Application)

-중하중, 고속, 장거리 이송용 리니어 모듈 (Heavy load, High speed, Long Stroke Linear Module)
-Gantry Robot, Track Motion, Clean Room Application

Gantry Robot



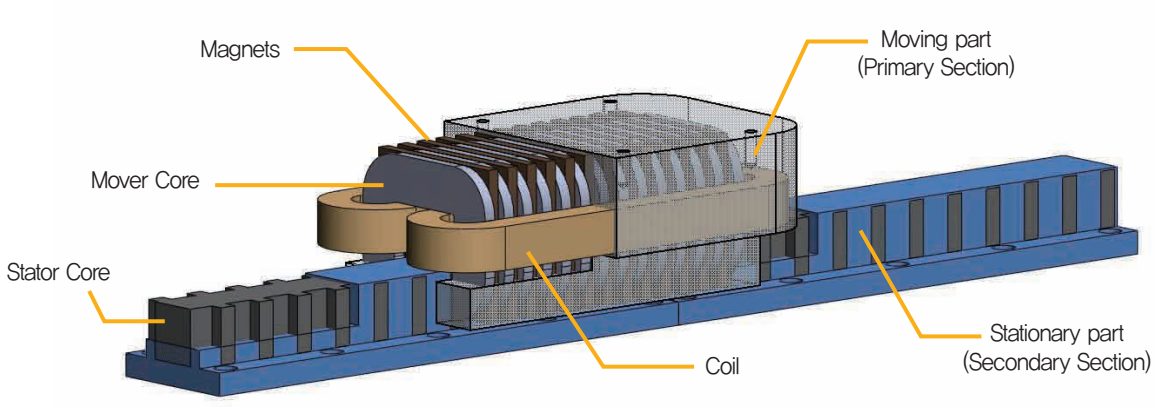
LCD Stocker



Track Motion

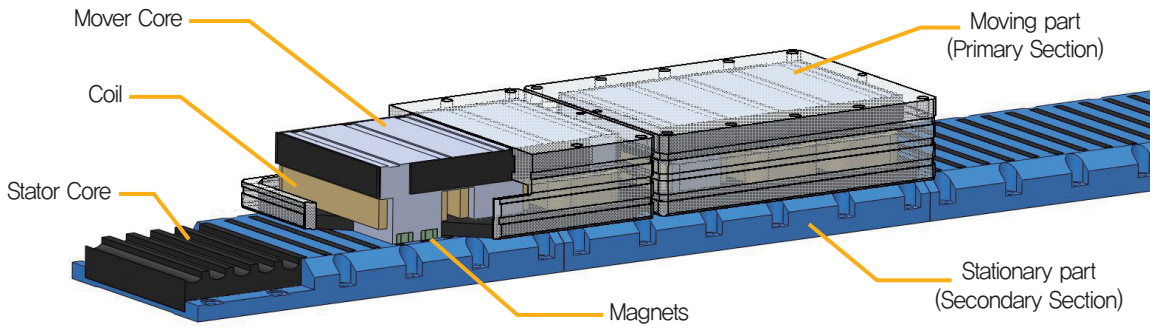
리니어 모터의 종류
Type of linear motor

횡자속 리니어 모터 (Transverse Flux Linear Motor, TF)



- 자석의 흐름과 이동부의 이동방향이 직교하는 영구자석형 선형 동기전동기
  (Magnetic flux path is perpendicular to the moving direction)
- 형태(Construction) –이동자(Mover) : 이동자 철심에 3상 권선과 영구자석을 동시에 취부
  (coils and magnets placed on the iron core)
  –고정자(Stator) : 자력이 없는 치–슬롯 구조의 철심으로만 구성
  (only non–magnetic laminated iron–core)

종자속 리니어 모터 (Longitudinal Flux Linear Motor, LF)



- 자석의 흐름과 이동부의 이동방향이 평행한 영구자석형 선형 동기전동기
  (Magnetic flux path is parallel to the moving direction)
- 형태(Construction) –이동자(Mover) : 이동자 철심에 3상 권선과 할박형 영구자석을 동시에 취부
  (coils and magnets placed on the iron core)
  –고정자(Stator) : 자력이 없는 치–슬롯 구조의 철심으로만 구성
  (only non–magnetic laminated iron–core)

리니어 모터의 사양
Specifications of linear motor

횡자속 리니어 모터 (Transverse Flux Linear Motor, TF)

형번 구성(Type Designation)

TF	N	500	0000
모터 type (Motor type)	N : 표준형 (Standard) S : 주문형 (Customized)	정격 추력 (F_{rated})	길이 (Stator Length) *최대:30m (*Max.:30m)

표준형 모델 사양(Standard Specifications)

	TF-N-500	TF-N-1000	TF-N-2000	TF-N-3000	TF-N-4000
F_{rated} (N)	500	1000	2000	3000	4000
I_{rated} (Arms)	20	45	95	95	120
V_{max} at F_{rated} (m/s)	5	5	5	5	5
Repeatability (mm)	0.01	0.01	0.01	0.01	0.01

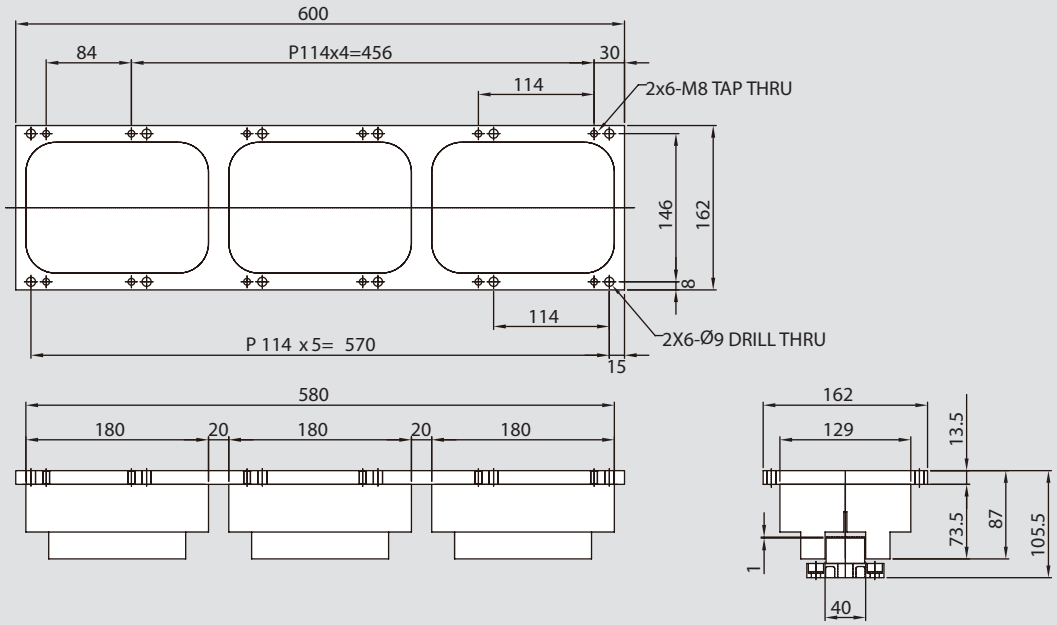
리니어 모터의 사양

Specifications of linear motor

외형 치수도(Dimensions in mm)

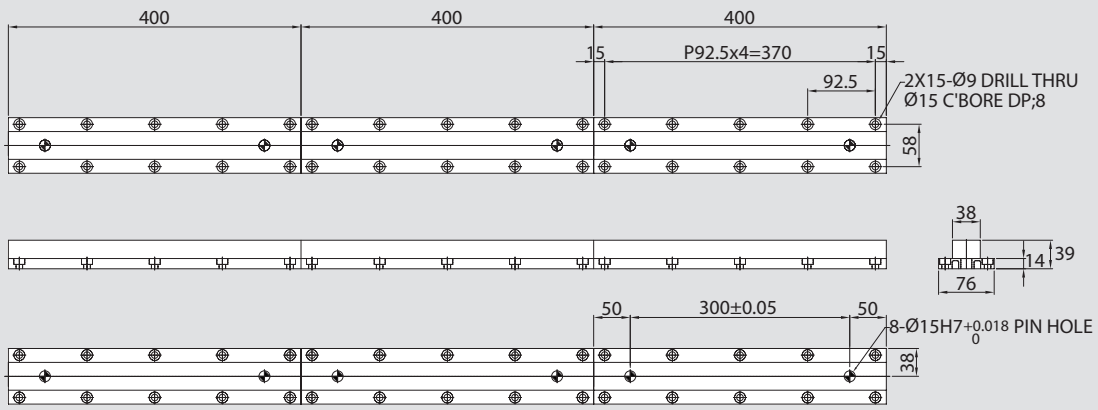
Primary section

TF-N-500



Secondary section

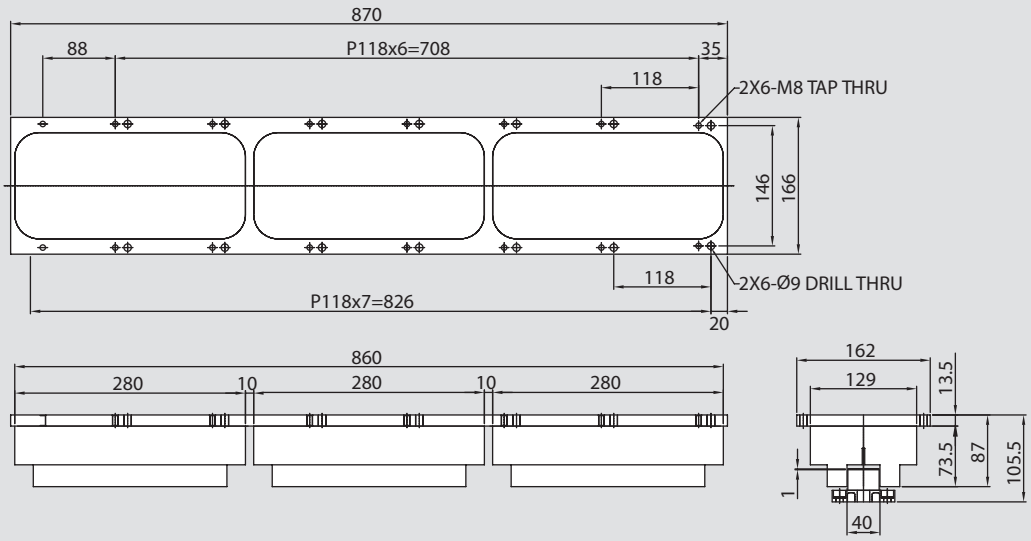
TF-40



※ Air–gap = 1 mm

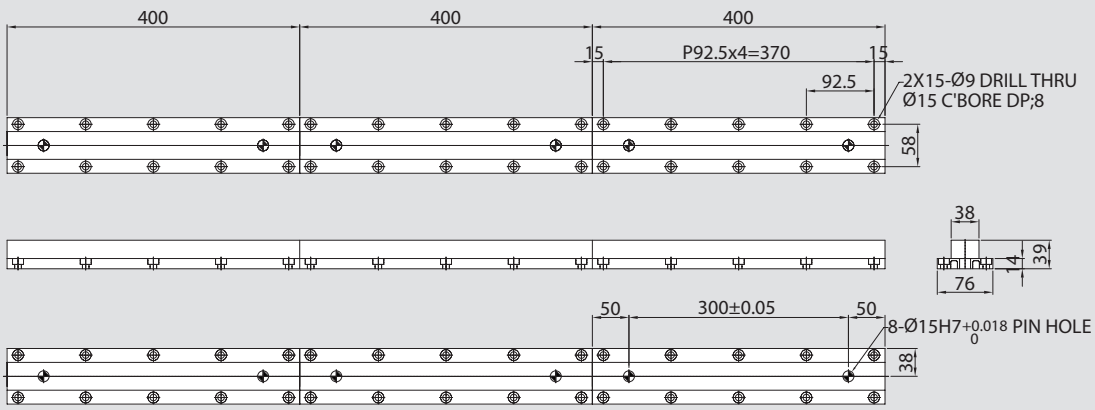
Primary section

TF-N-1000



Secondary section

TF-40



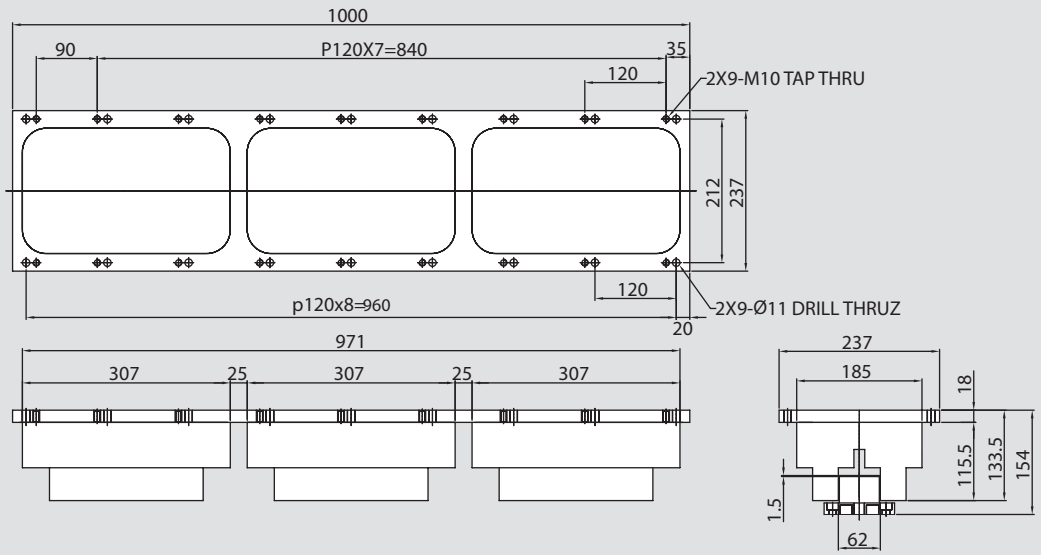
※ Air-gap = 1 mm

리니어 모터의 사양
Specifications of linear motor

외형 치수도(Dimensions in mm)

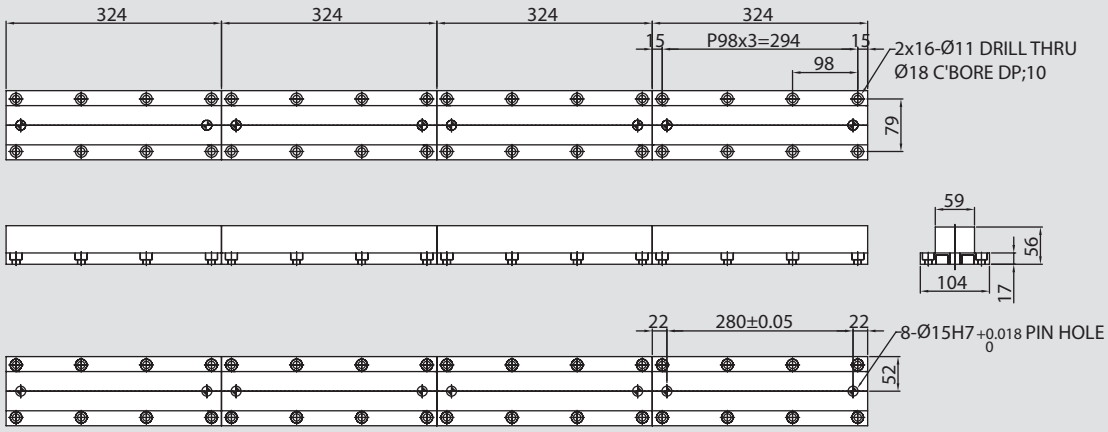
Primary section

TF-N-2000



Secondary section

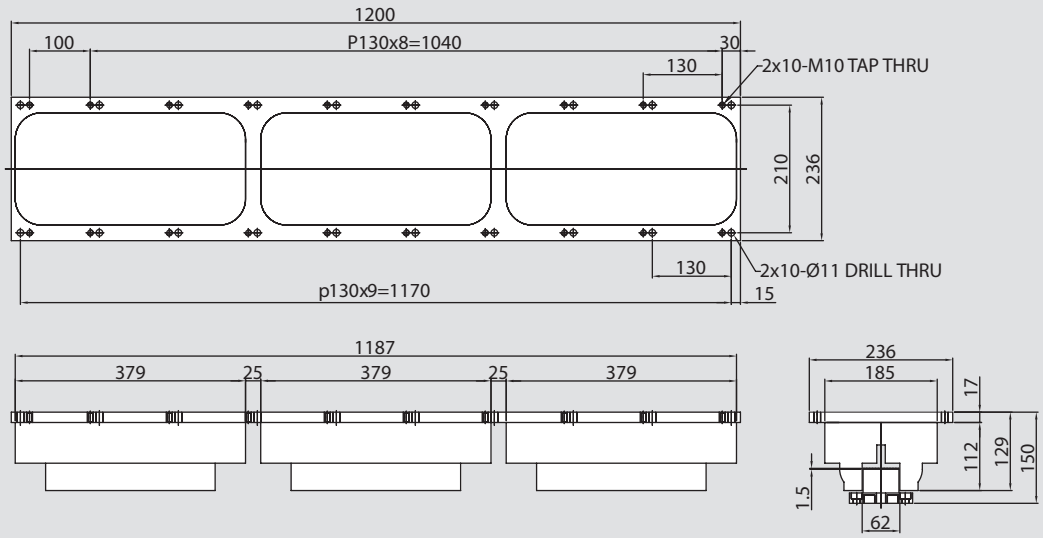
TF-60



※ Air–gap = 1.5 mm

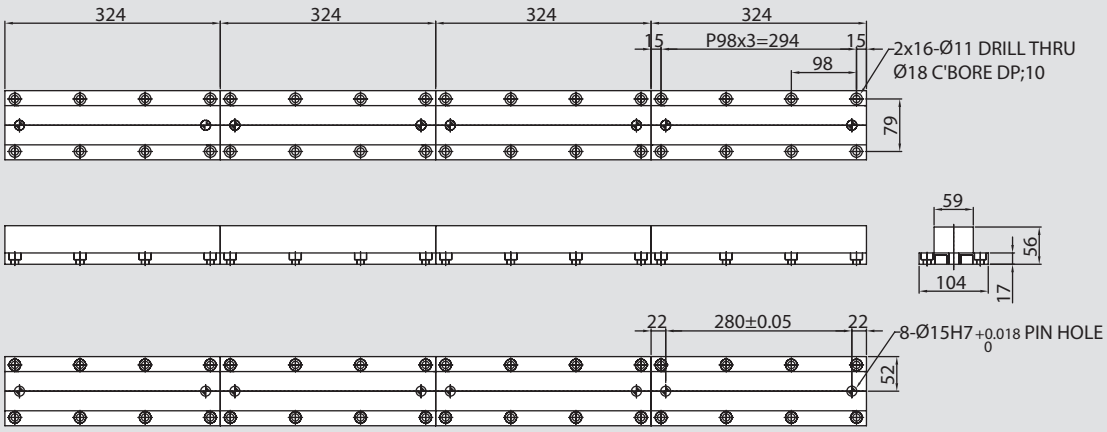
Primary section

TF-N-3000



Secondary section

TF-60



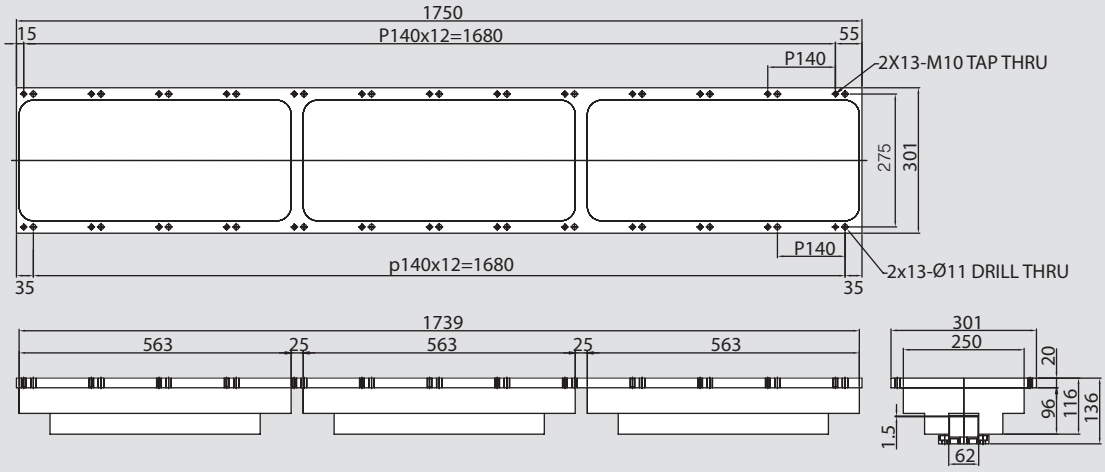
※ Air-gap = 1.5 mm

리니어 모터의 사양
Specifications of linear motor

외형 치수도(Dimensions in mm)

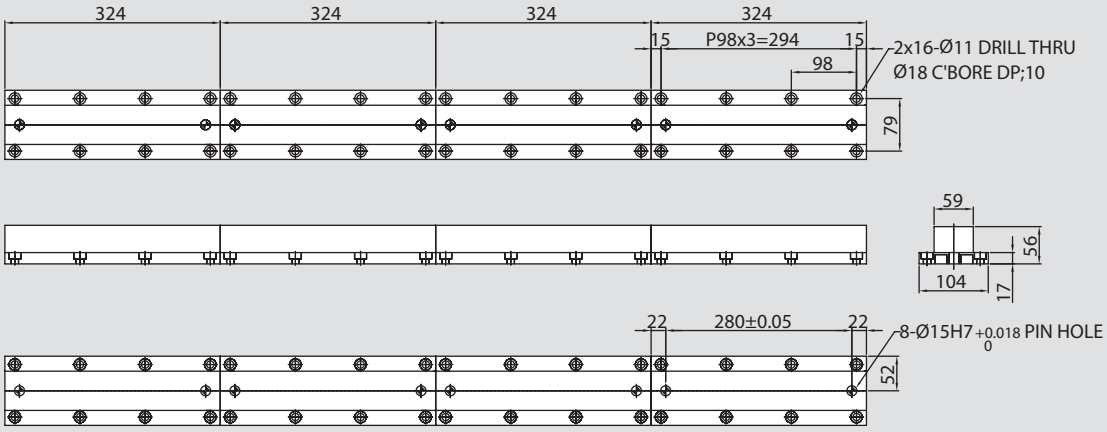
Primary section

TF-N-4000



Secondary section

TF-60



※ Air–gap = 1.5 mm

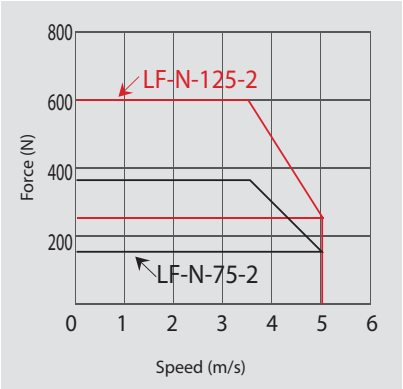
종자속 리니어 모터 (Longitudinal Flux Linear Motor, LF)

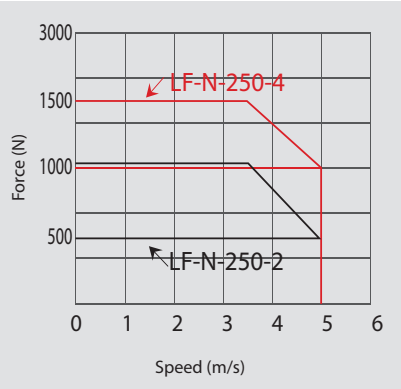
형번 구성(Type Designation)

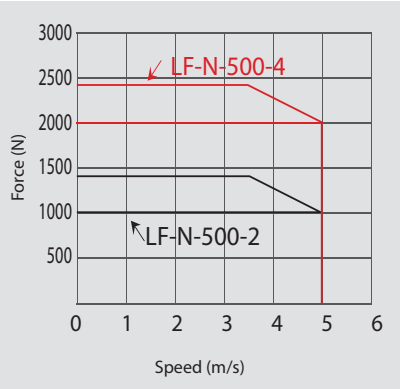
LF	N	75	2	0000
모터 type (Motor type)	N : 표준형 (Standard) S : 주문형 (Customized)	이동자 1모듈당 추력 (F_{rated} per 1 Mover Module)	이동자 모듈 개수 (Number of Mover Modules)	길이 (Stator Length) *최대:30m (*Max.:30m)

표준형 모델 사양(Standard Specifications)

	LF-N-75-2	LF-N-125-2	LF-N-250-2	LF-N-250-4	LF-N-500-2	LF-N-500-4
F_{rated} (N)	150	250	500	1000	1000	2000
F_{max} (N)	360	600	1050	1500	1400	2400
I_{rated} (Arms)	7	7	20	20	60	60
I_{max} (Arms)	20	20	52	46	98	80
V_{max} at F_{rated} (m/s)	5	5	5	5	5	5
V_{max} at F_{max} (m/s)	3.5	3.5	3.5	3.5	3.5	3.5
Repeatability (mm)	0.01	0.01	0.01	0.01	0.01	0.01





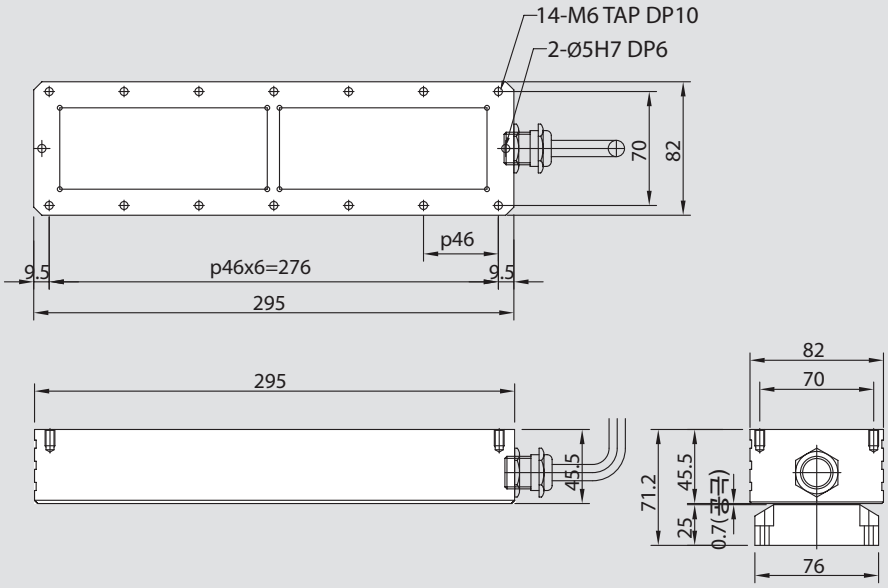


리니어 모터의 사양
Specifications of linear motor

외형 치수도(Dimensions in mm)

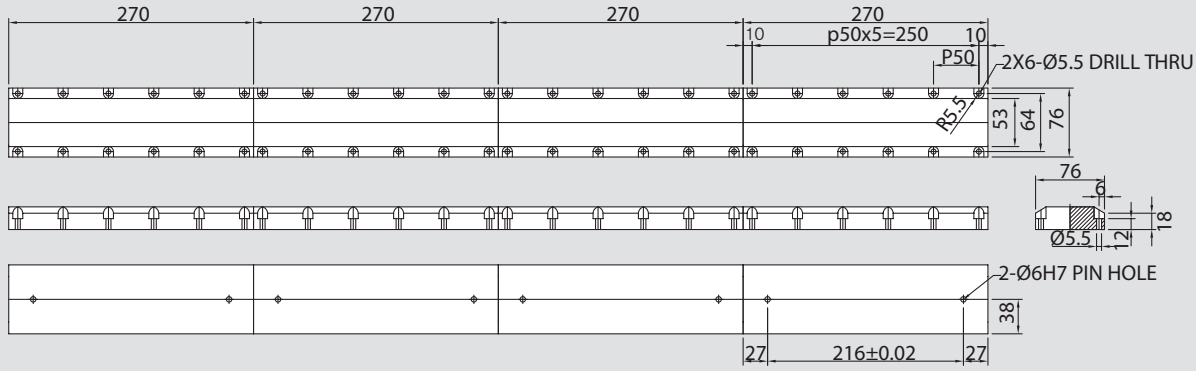
Primary section

LF-N-75-2



Secondary section

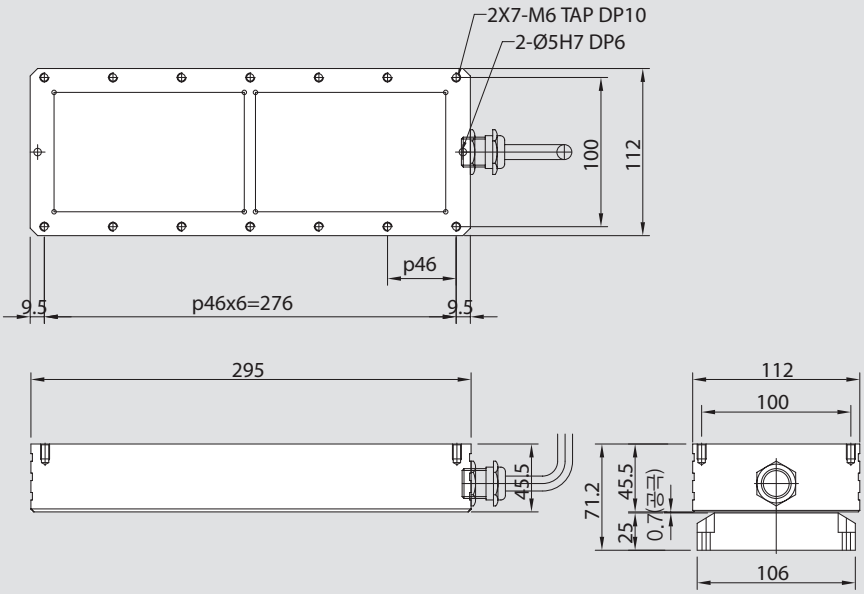
LF-75



※ Air–gap = 0.7 mm

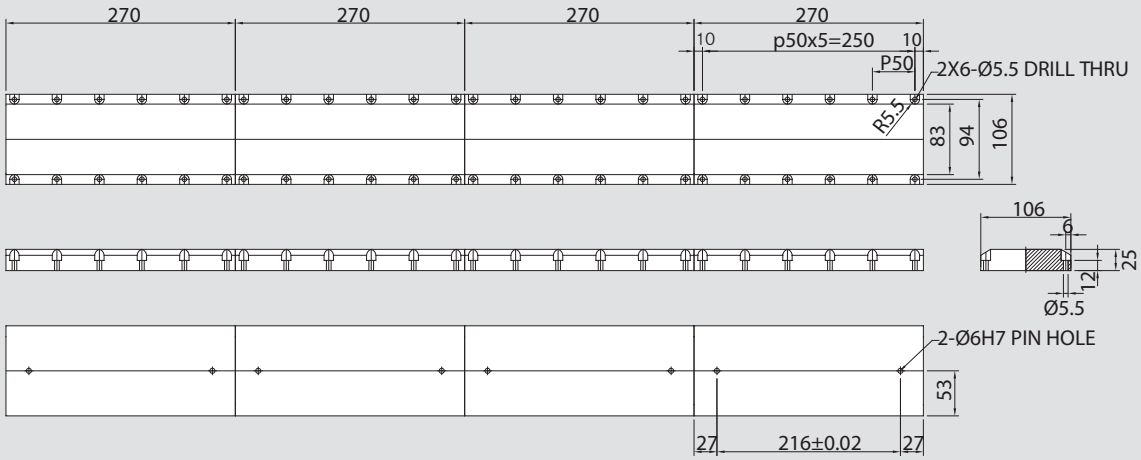
Primary section

LF-N-125-2



Secondary section

LF-125



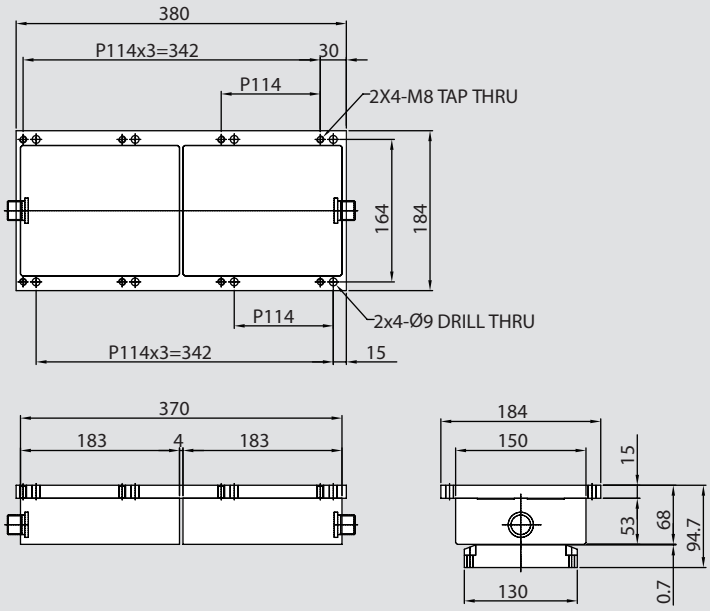
※ Air–gap = 0.7 mm

리니어 모터의 사양
Specifications of linear motor

외형 치수도(Dimensions in mm)

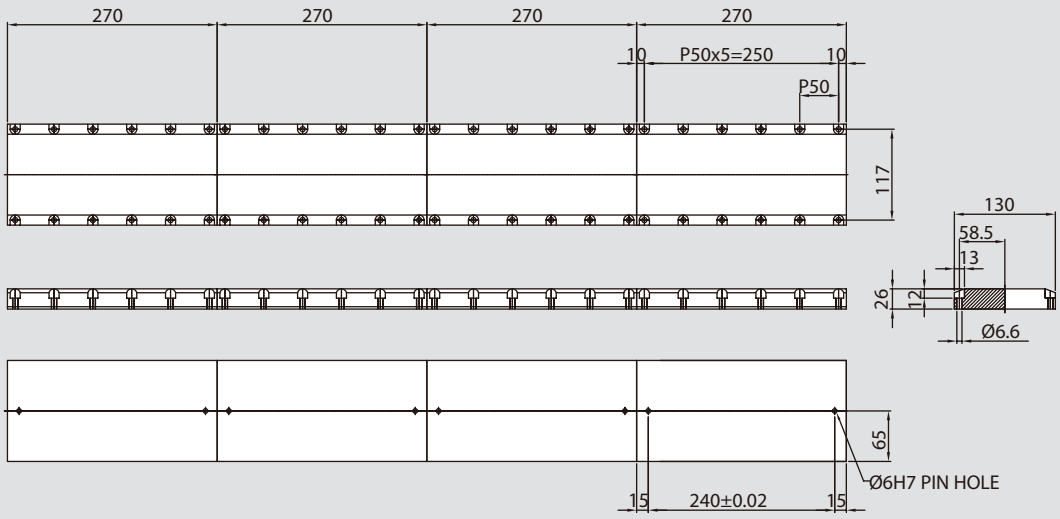
Primary section

LF-N-250-2



Secondary section

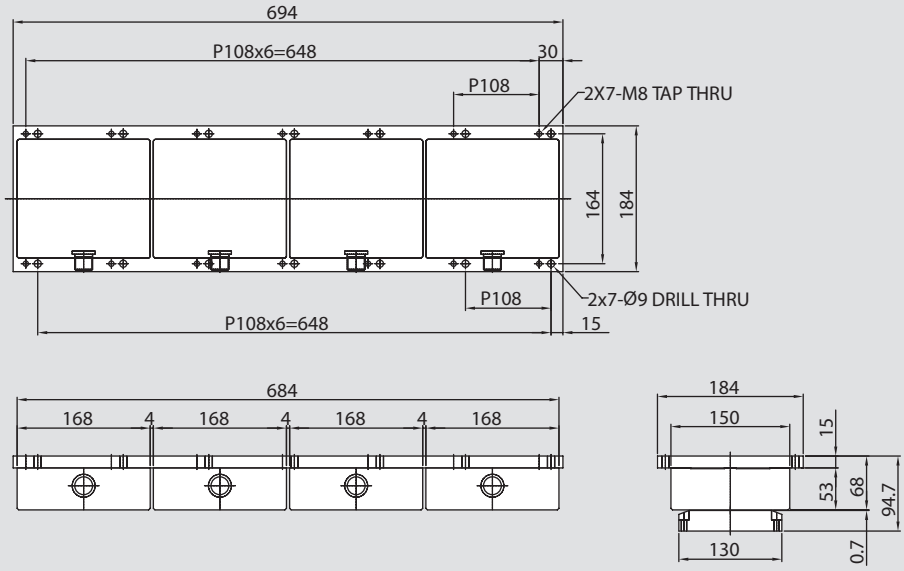
LF-250



※ Air–gap = 0.7 mm

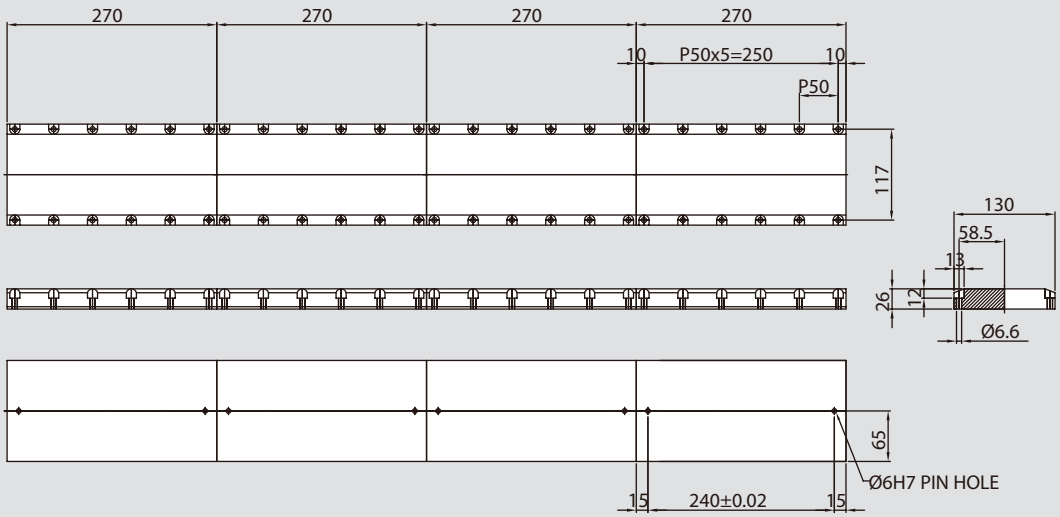
Primary section

LF-N-250-4



Secondary section

LF-250



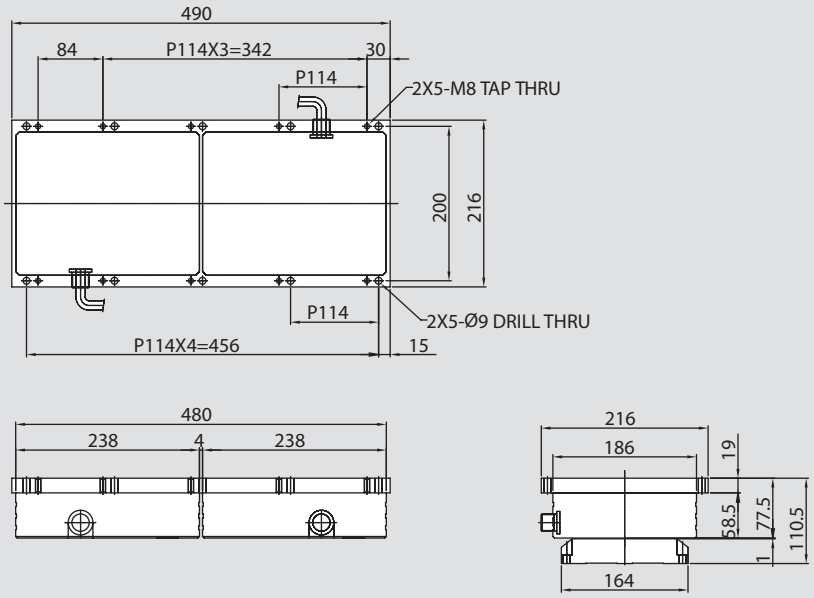
※ Air–gap = 0.7 mm

리니어 모터의 사양
Specifications of linear motor

외형 치수도(Dimensions in mm)

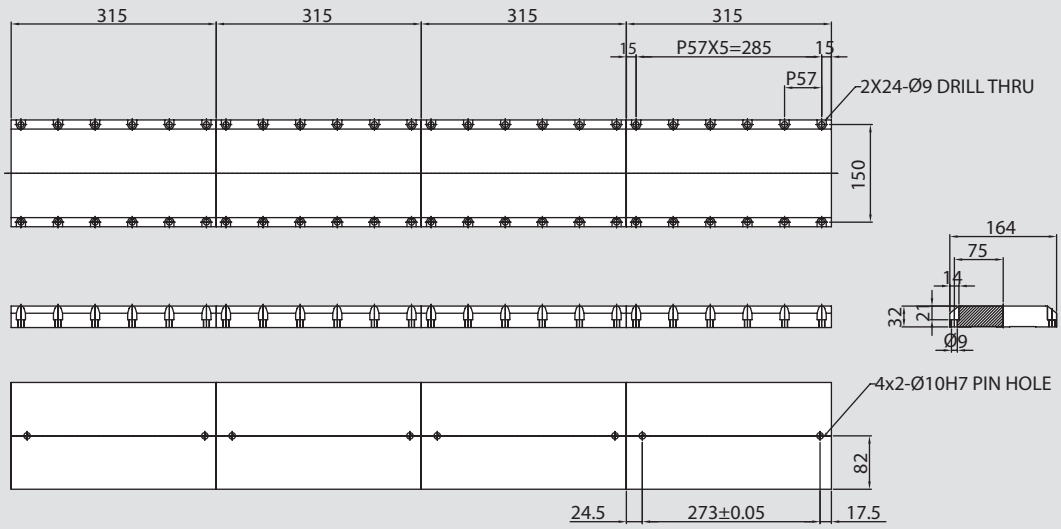
Primary section

LF-N-500-2



Secondary section

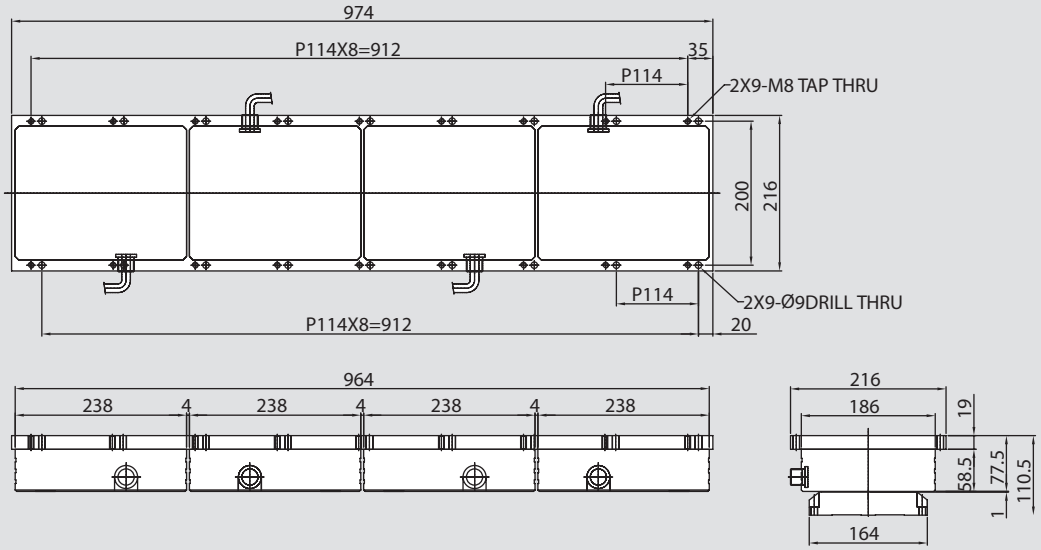
LF-500



※ Air–gap = 1 mm

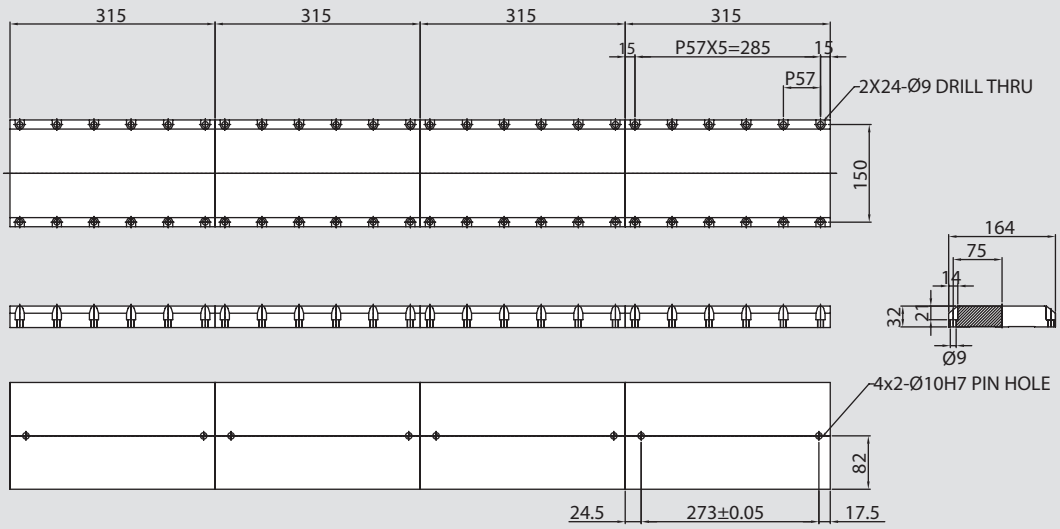
Primary section

LF-N-500-4



Secondary section

LF-500

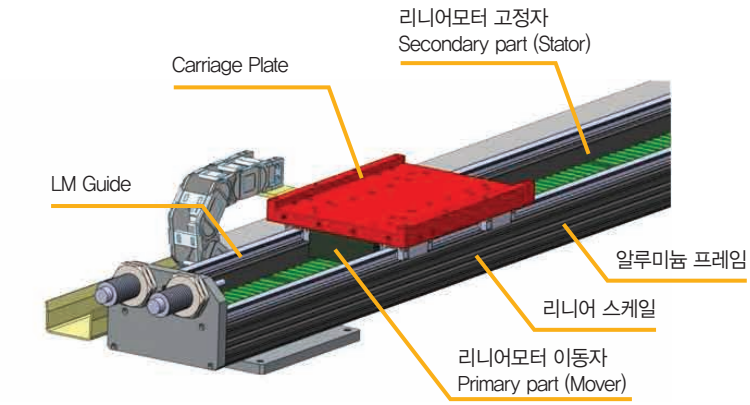


※ Air–gap = 1 mm

리니어 모터 모듈
Linear motor Module

모델 사양(Linear Motor module Specifications)

LFM-N-75-2

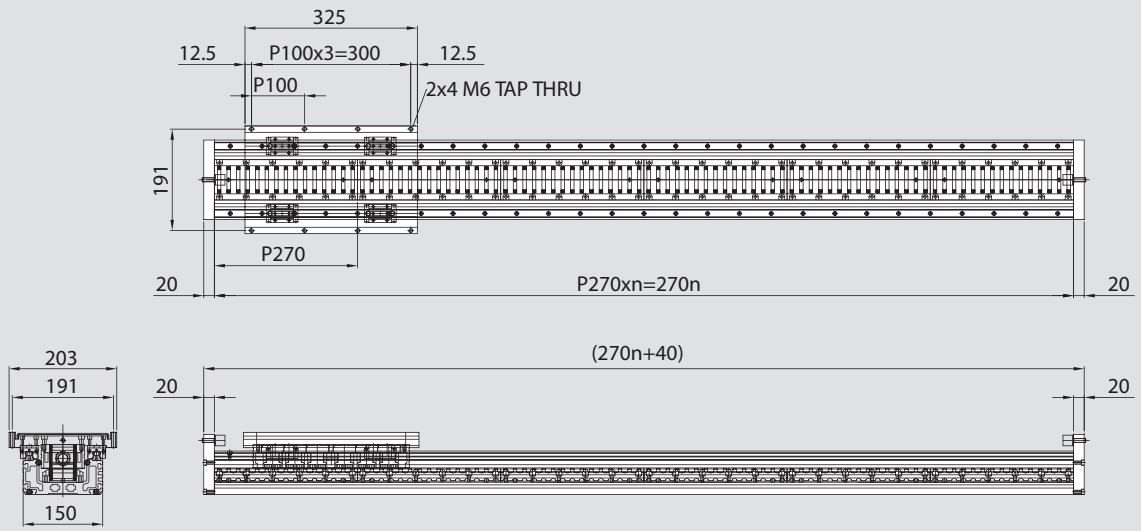


항목		LFM-N-75-2
F_{rated}	N	150
F_{max}	N	360
I_{rated}	Arms	7
I_{max}	Arms	20
V_{max} at F_{rated}	m/s	5
V_{max} at F_{max}	m/s	3.5
Repeatability	mm	0.01
Max. Payload	kg	10
Max. Acceleration	m/s^2	10

외형 치수도(Dimensions in mm)

Primary section

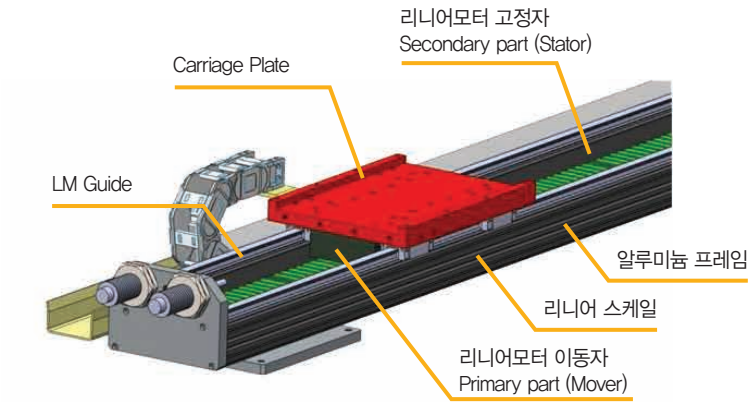
LFM-N-75-2



※ 이동 스트로크 및 Module의 길이는 당사와 협의 필요 (최대 6m까지 가능)

모델 사양(Linear Motor module Specifications)

LFM-N-125-2

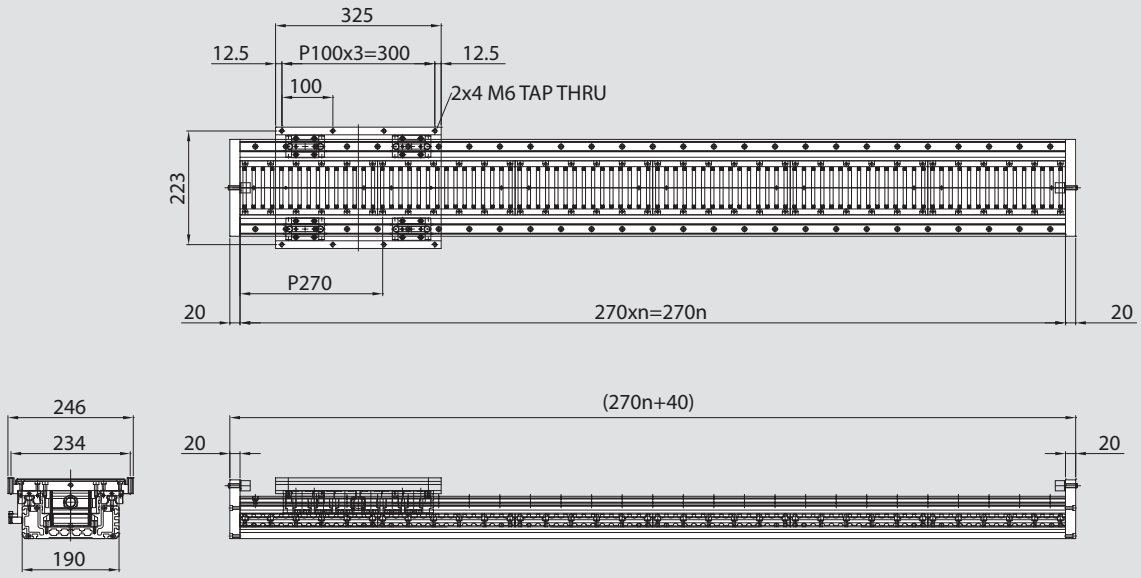


항목		LFM-N-125-2
F_{rated}	N	250
F_{max}	N	600
I_{rated}	Arms	7
I_{max}	Arms	20
V_{max} at F_{rated}	m/s	5
V_{max} at F_{max}	m/s	3.5
Repeatability	mm	0.01
Max. Payload	kg	10
Max. Acceleration	m/s^2	10

외형 치수도(Dimensions in mm)

Secondary section

LFM-N-125-2



※ 이동 스트로크 및 Module의 길이는 당사와 협의 필요 (최대 6m까지 가능)

리니어 서보 드라이브

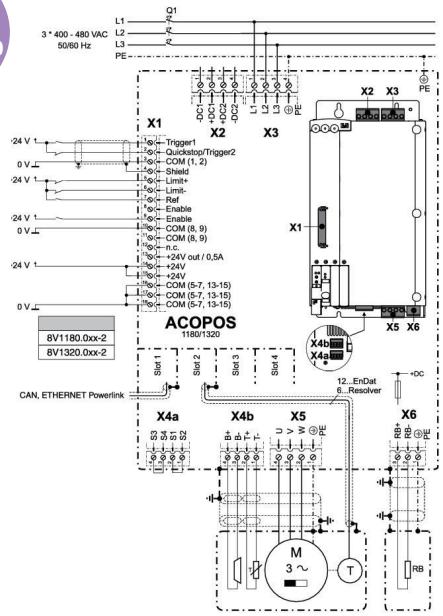
Linear servo drive

Technical specification (B&R Drive)

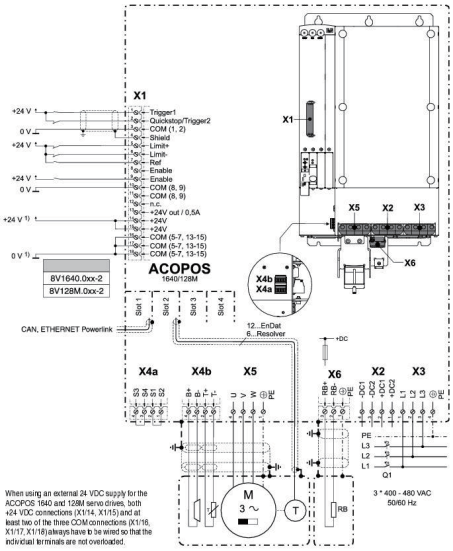
Models		8V1090.0xx-2	8V1180.0xx-2	8V1320.0xx-2	8V1640.0xx-2	8V128M.0xx-2
Performance data						
Continuous current[1)]	A	8.8	19	34	64	128
Maximum current	A	24	50	80	200	300
Main voltage	V	3 x 400 VAC to 480 VAC ± 10%				
DC bus capacity	µF	470	940	1645	3300	6600
Dimensions						
Width	mm	70.5	200		276	402
Height	mm	375			460	460
Depth	mm	235.5	234		295	295
Weight	kg	4.4	10.1	10.6	24.1	33.8

1) Valid in the following conditions: Mains input voltage 3 x 400 VAC, nominal switching frequency, 40°C ambient temperature, installation altitudes < 500 m above sea level.

ACOPOS 1180,1320



ACOPOS 1640,128M

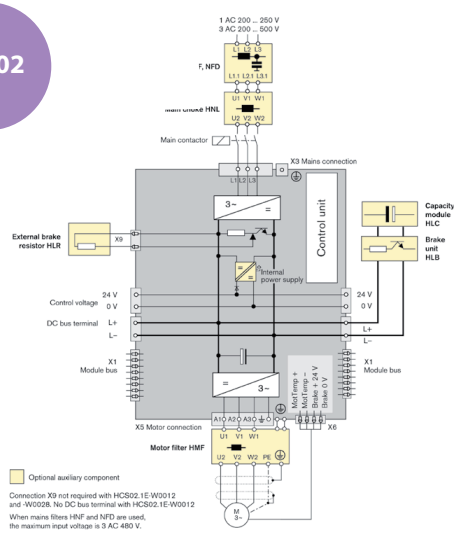


Technical specification (KEBA Drive)

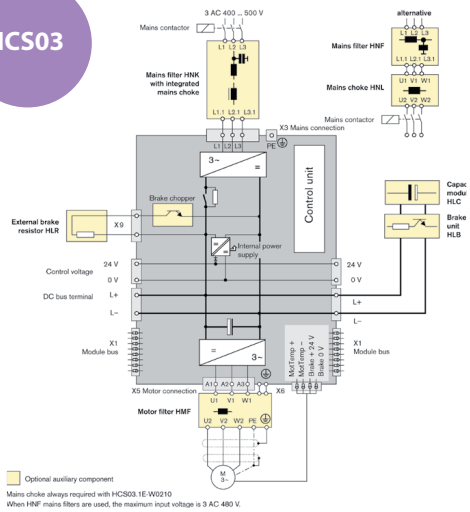
Models		HCS02.1E-W0028 -A-03-NNNN-AA	HCS02.1E-W0054 -A-03-NNNN-AA	HCS02.1E-W0070 -A-05-NNNN-AA	HCS02.1E-W0100 -A-05-NNNN-AA	HCS02.1E-W0210 -A-05-NNNN-AA
Performance data						
Continuous current[1)]	A	11.3	20.6	45	73	145
Maximum current	A	28.3	54	70	100	210
Main voltage	V	3 AC 200 … 500, 1 AC 200 … 250 (±10%)		3 AC 400 … 500 (+10%/-15%)		
DC bus capacity	µF	270	405	940	1,440	4,700
Dimensions						
Width, W	mm	65	105	125	225	350
Height, H	mm	352		440		
Depth, D	mm	252		309		
Weight	kg	3.8	6.7	13	20	38

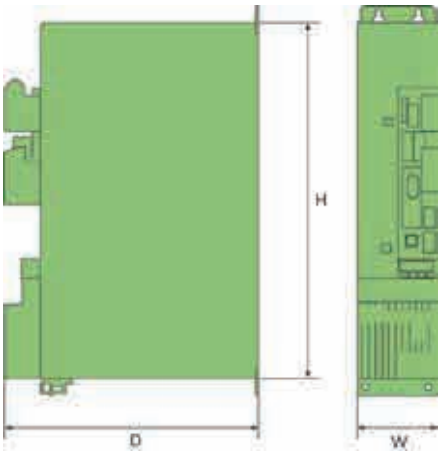
All data apply to nominal rating at 3 AC 400 V mains voltage and 4 kHz switching frequency
1) In case of output frequency less than 4 Hz the output current will be reduced

HCS02



HCS03





리니어 모터 적용 분야
Linear motor application

Application

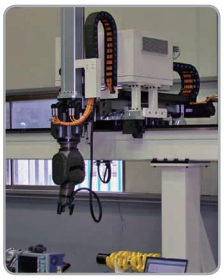
Linear motor

- Clean Room Application
- Gantry Robot & Track Motion
- 고속 이송으로 인한 내구성이 요구되는 구동부 (High durability with high speed and contactless operation)
- 중하중, 고속, 고정밀, 장거리(Long Stroke) 이송용 리니어 모듈 (Heavy load, high speed, high precision, long stroke linear module)

Track Motion

500N

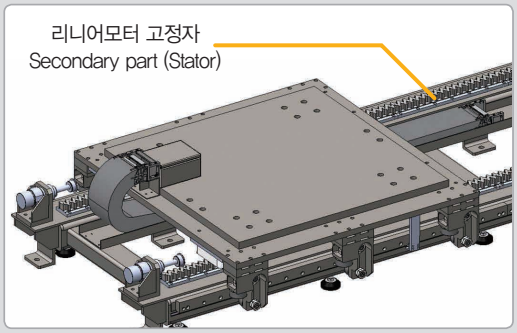
1000N

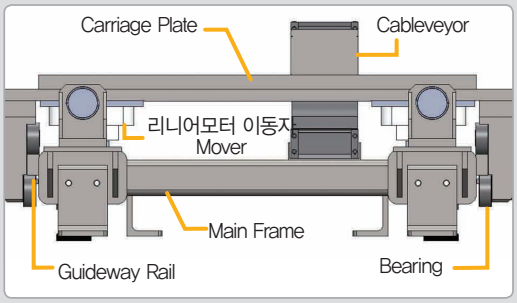


2000N

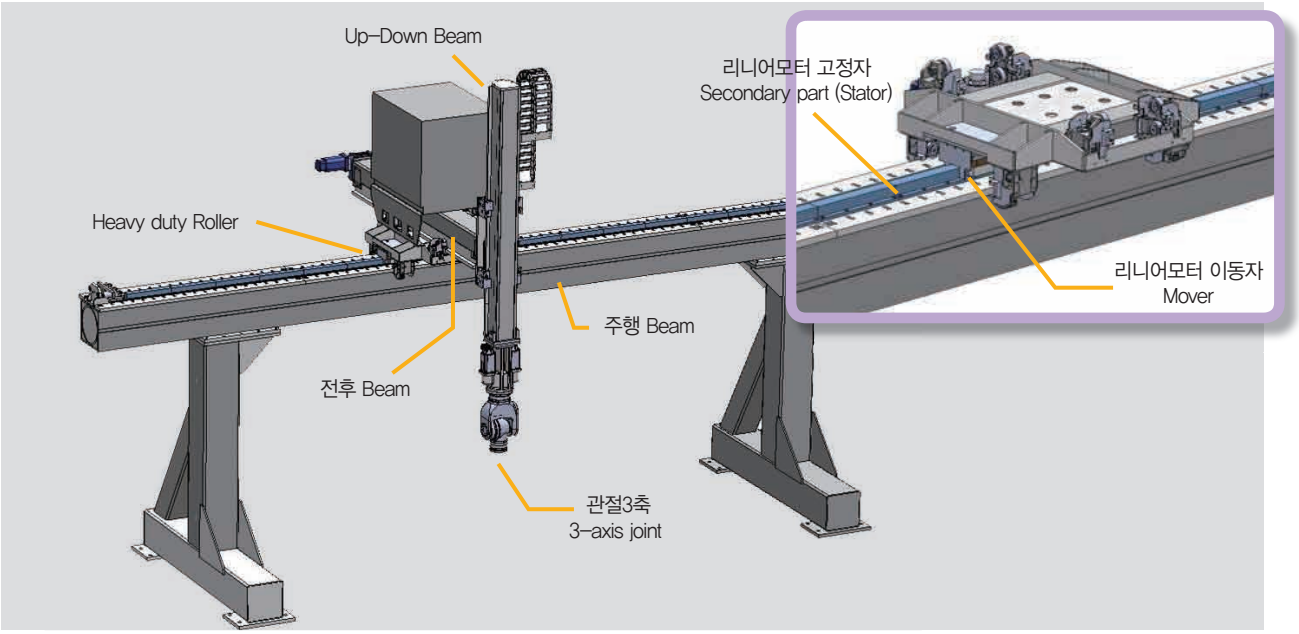
3000N

4000N

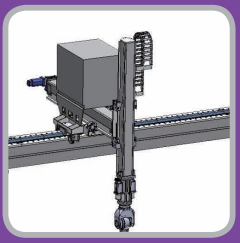
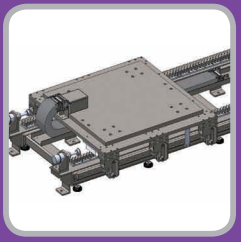
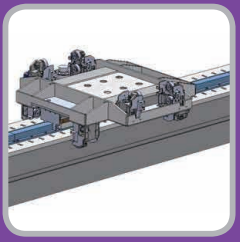




6-Axis Robot



4-Axis Gantry Robot

LINEAR MOTORS

High Speed / High Accracy / Long Life Time