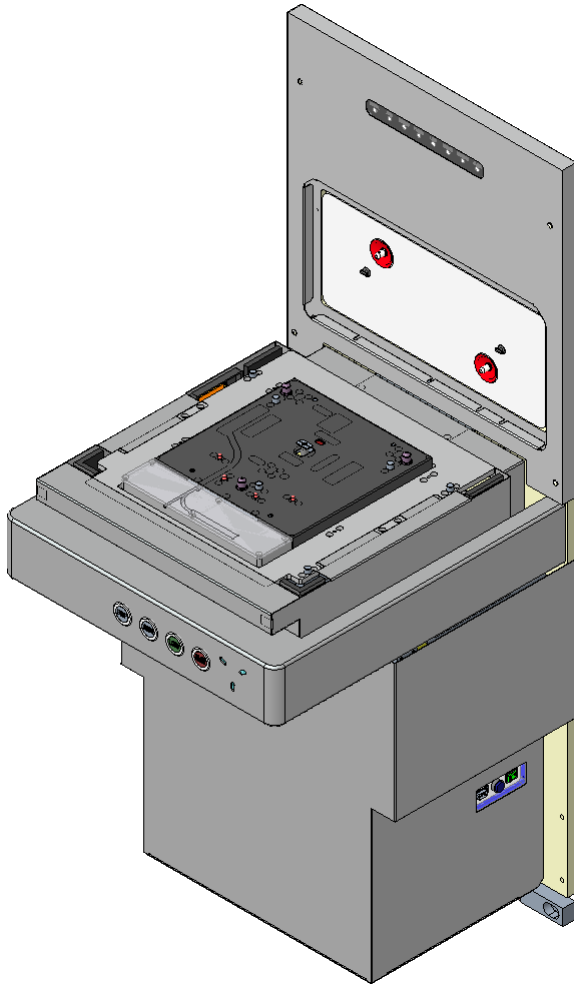


# 프로텍 MAC FOUP & Cassette 혼용 LPM Concept

2023.11.14



# MAC FOUP & Cassette 혼용 LPM



## 1. Basic Configuration

Carrier Type	MAC FOUP	Cassette
Substrate	400mm Ring Frame Wafer	
Number of Wafers	13EA	

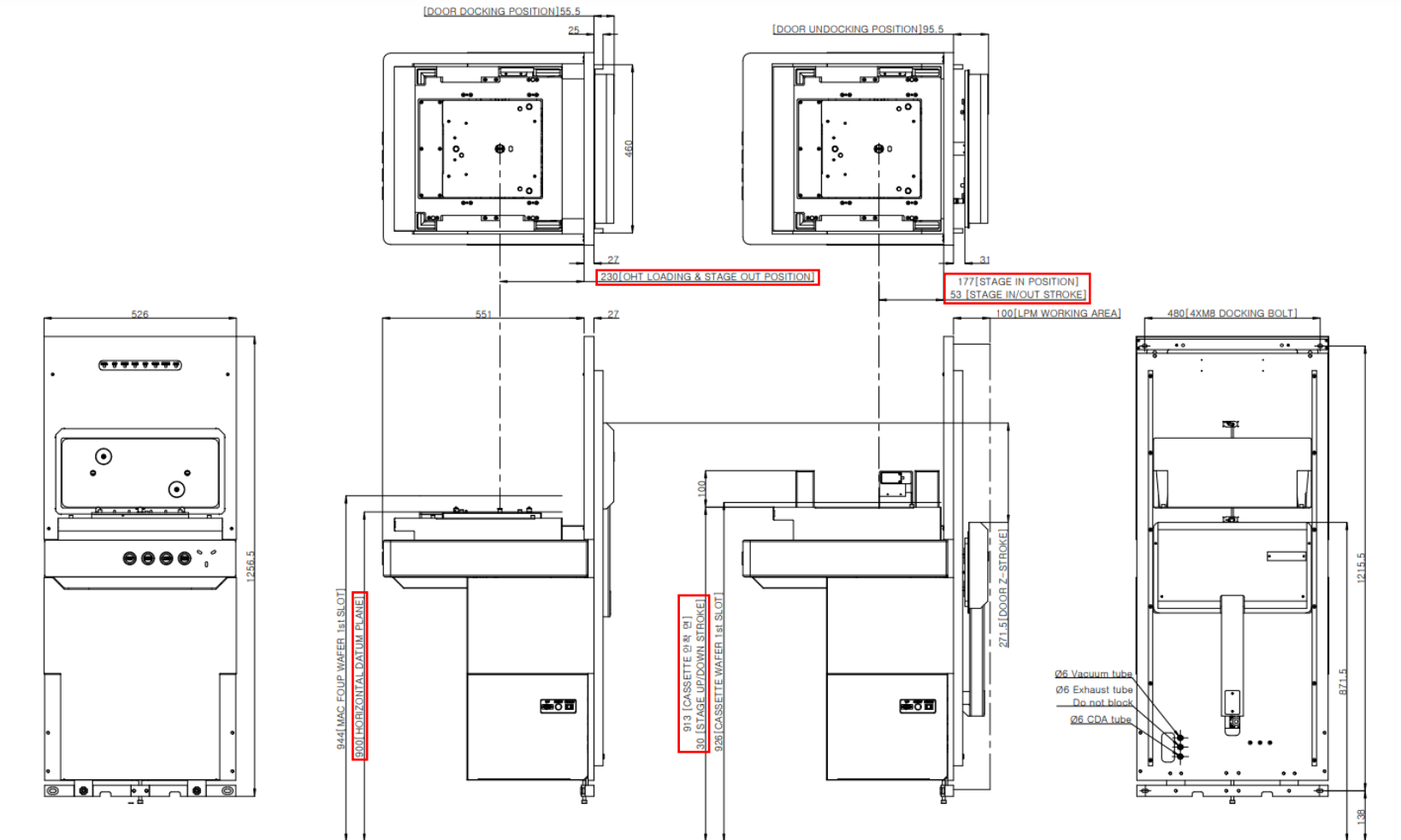
## 2. Mechanical Performance

Size	526 X 578 X 1256.5	
Tact Time	<15sec	
Mapping	O	
OHT Height	900mm	913mm

## 3. Items

Kinematic Pin	13mm	-
Cassette Guide	-	100mm
Placement Pin	3EA X 2 (Carrier Type별 분리 사용)	
Presence Sensor	O	
RFID	134.5kHz (Xedion)	13.56MHz (Ceyon)
Wafer Protrusion	O	

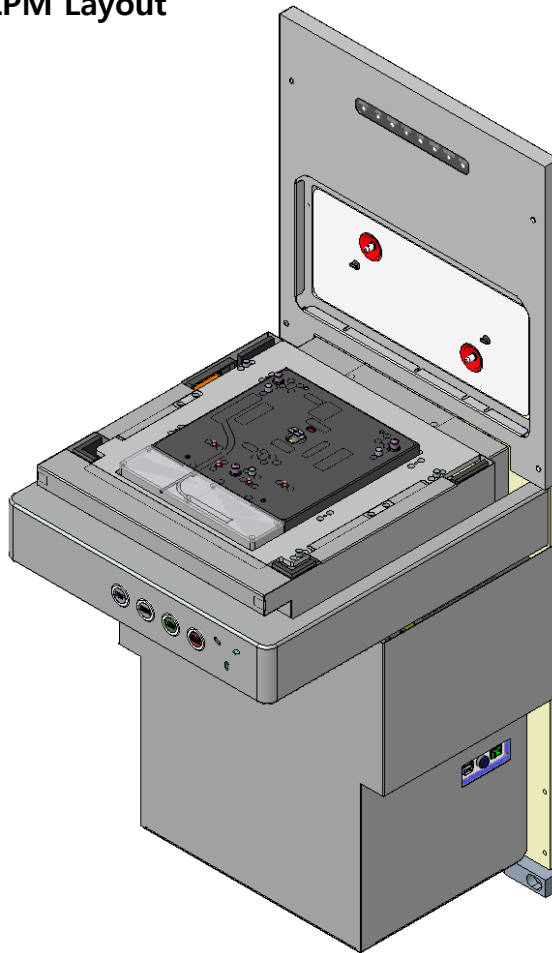
# LPM Layout



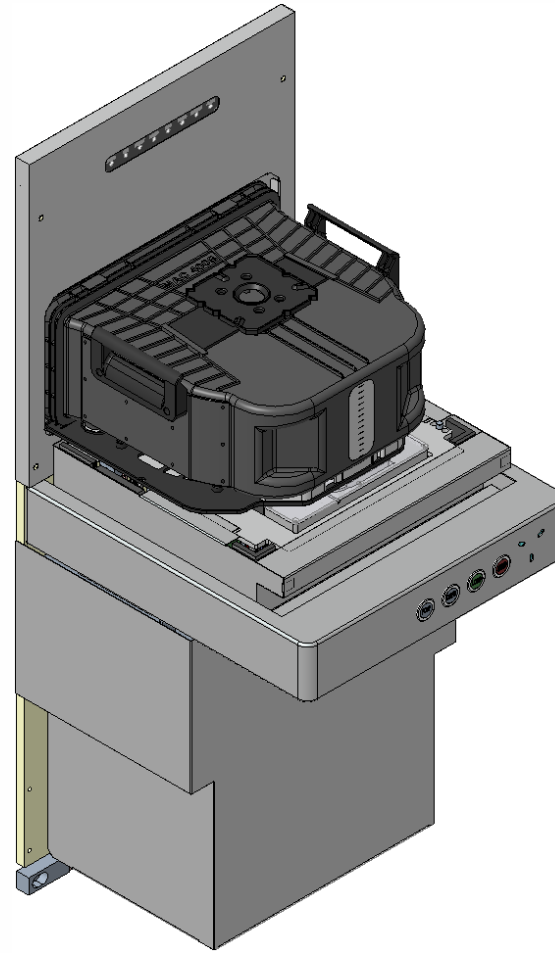
- ✓ MAC FOUP & Cassette OHT Position, Stage In Position 동일
- ✓ Cassette Stage Up/Down 구동 추가 구성

# MAC FOUP 사용 시

LPM Layout



[OHT Position]

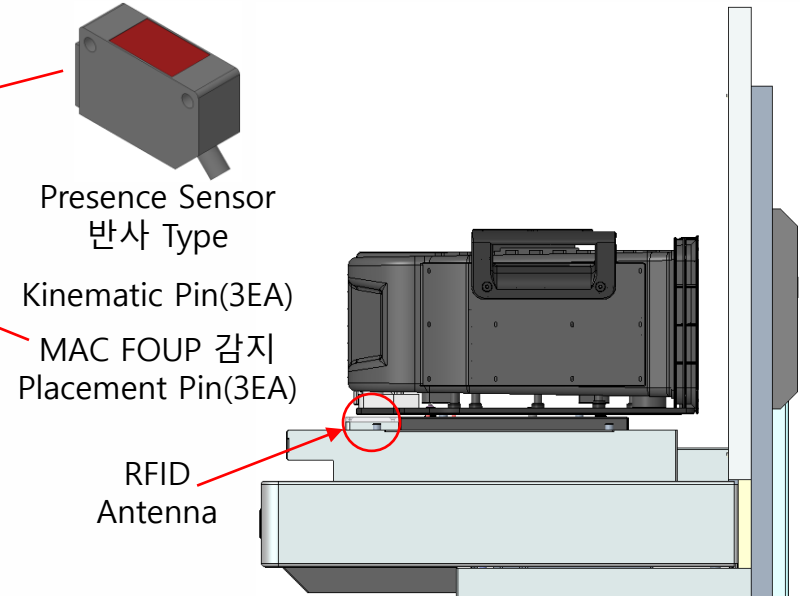
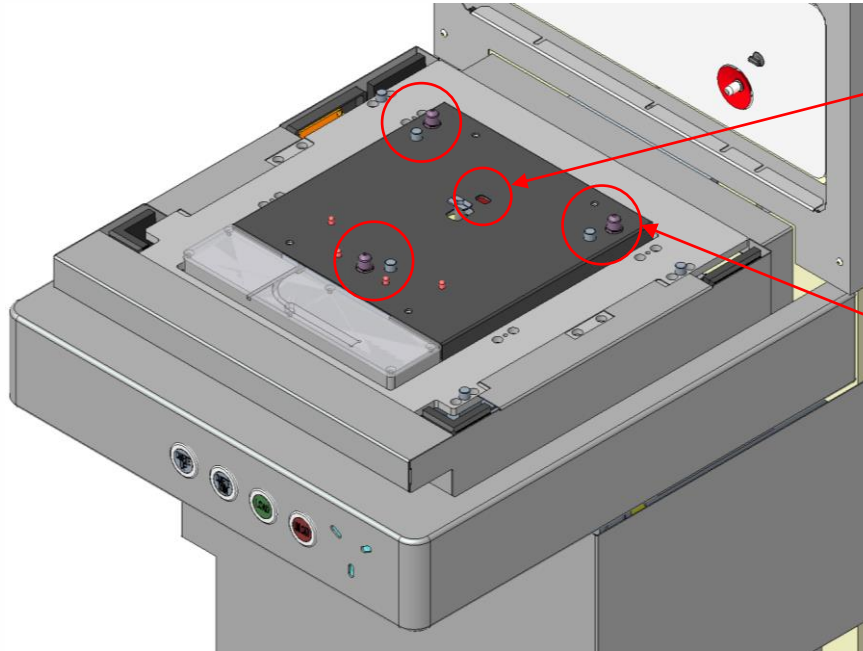


[MAC FOUP Loading Position]

# MAC FOUP 사용 시

## 1. Stage Module 주요 구성

- Kinematic Pin & Placement Pin



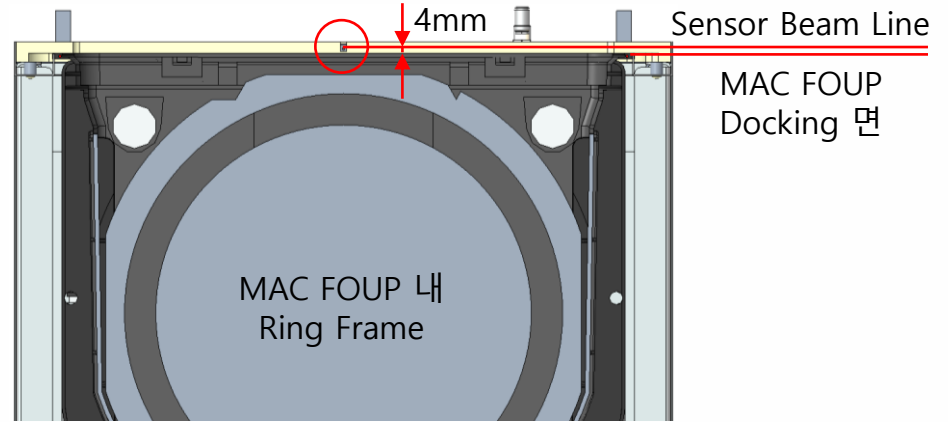
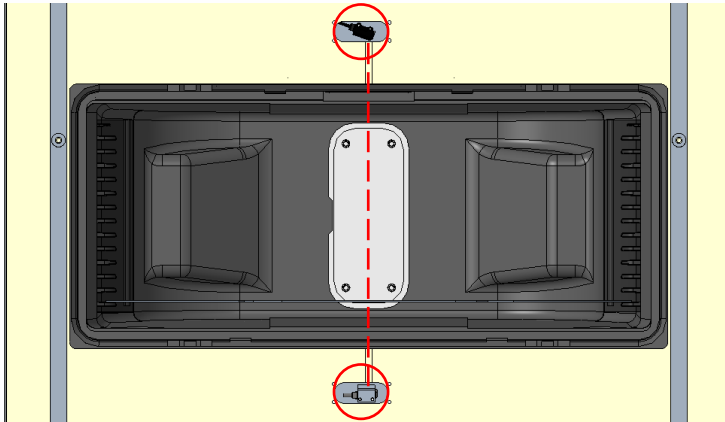
[MAC FOUP 안착]

- Kinematic Pin 위에 MAC FOUP 안착 → OHT 높이 : 900mm
- MAC FOUP Bottom 면에 의해 Placement Pin이 눌리며 정상 안착 확인
- **Presence Sensor**
  - Stage 상단의 물체 유무 확인
- **MAC FOUP 용 RFID**
  - 134.5kHz 사용

# MAC FOUP 사용 시

## 2. Ring Frame 돌출 감지

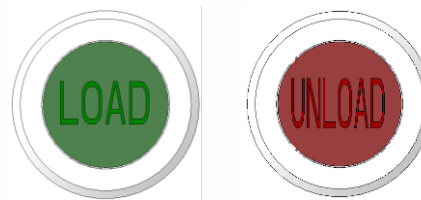
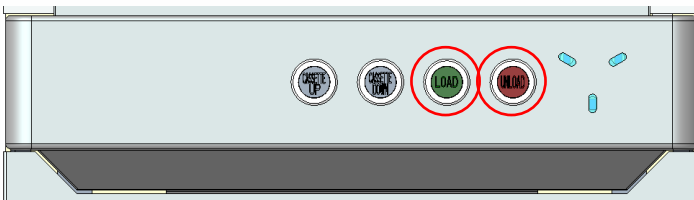
### • Protrusion Sensor



- Protrusion Sensor Beam Type → 발광부 편광 필터 적용하여 Ring Frame Tape 감지 개선
- Ring Frame이 MAC FOUP 외부로 4mm 돌출 시 감지

## 3. MAC FOUP Loading/Unloading Manual Switch

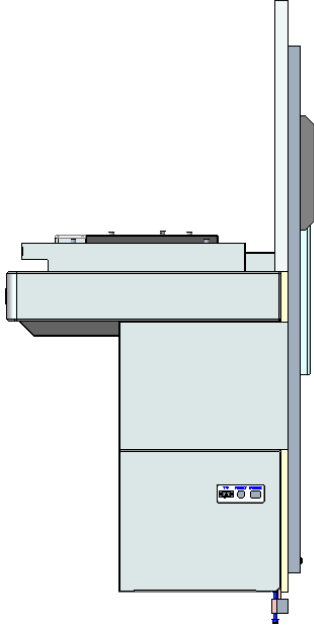
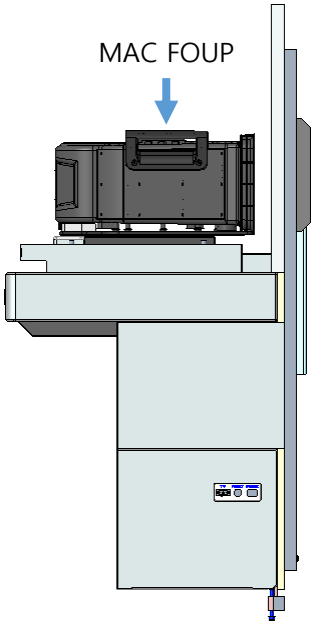
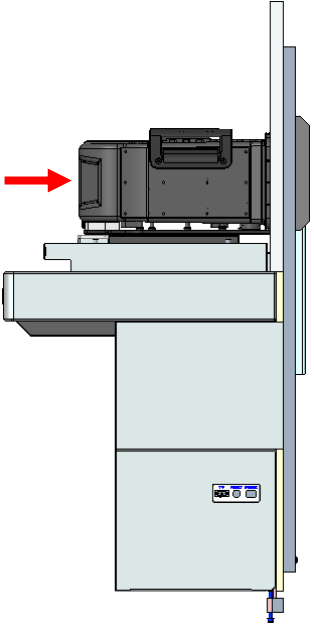
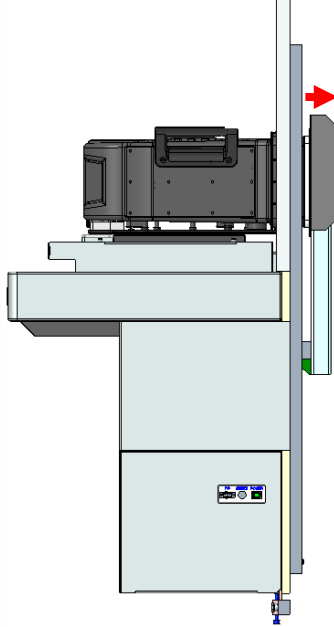
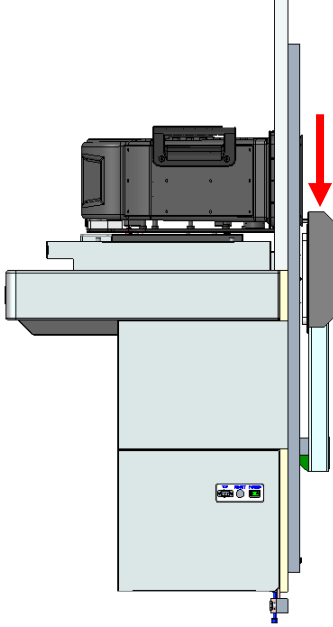
### • Load/Unload Switch



- MAC FOUP Loading/Unloading Manual 동작 가능

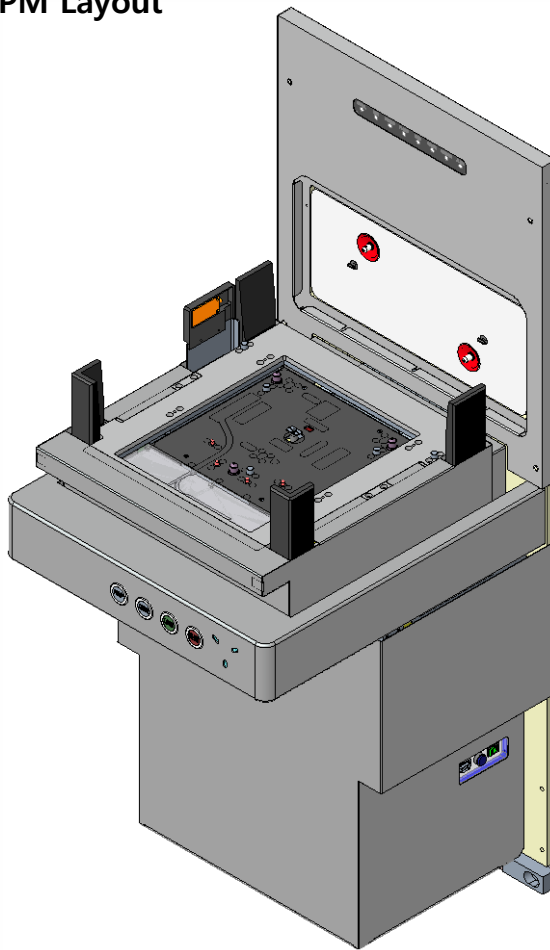
# MAC FOUP 사용 LPM Sequence

## MAC FOUP Loading Sequence

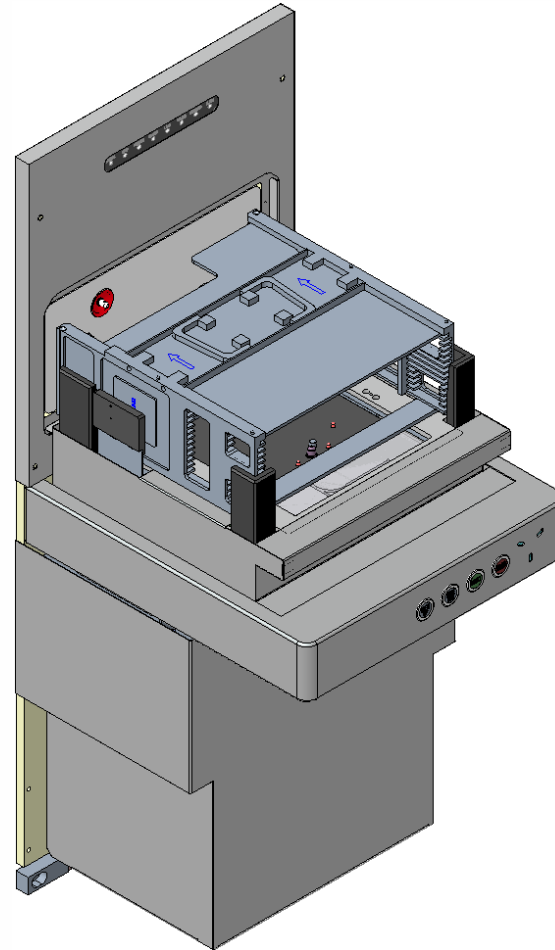
MAC FOUP Loading 준비	MAC FOUP Loading	Stage In	MAC FOUP Door Open	Z-Axis Down
				
<ul style="list-style-type: none"> <li>- OHT에서 MAC FOUP 정보 CTC에 전달</li> <li>- CTC에서 MAC FOUP 정보 LPM에 전달</li> <li>- MAC FOUP Loading 준비 완료</li> </ul>	<ul style="list-style-type: none"> <li>- MAC FOUP Kinematic Pin에 안착</li> <li>- Placement Pin, Presence Sensor로 정상 안착 확인</li> <li>- Pod Lock</li> </ul>	<ul style="list-style-type: none"> <li>- MAC FOUP Loading Position으로 Stage In</li> <li>- Suction Cup Vacuum On</li> <li>- Latch Key 동작</li> </ul>	<ul style="list-style-type: none"> <li>- MAC FOUP Door Open</li> </ul>	<ul style="list-style-type: none"> <li>- Z-Axis Down</li> <li>- Mapping 동작</li> </ul>

# Cassette 사용 시

LPM Layout



[OHT Position]



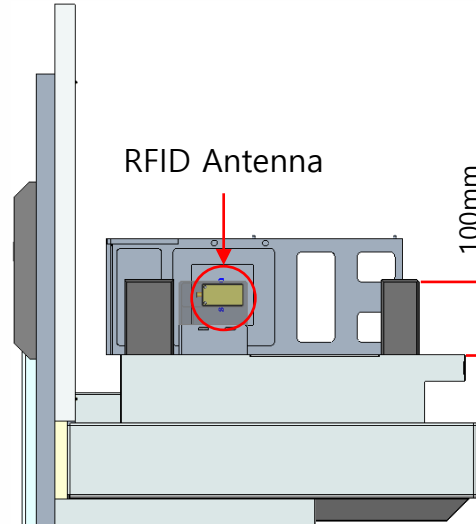
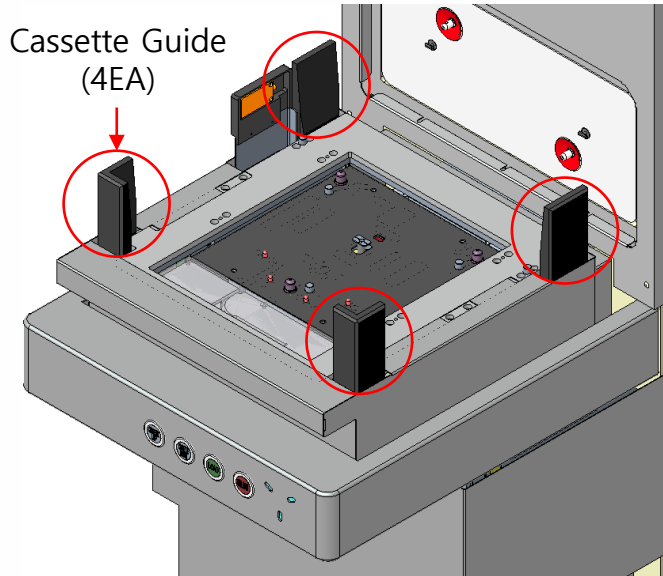
[Cassette Loading Position]



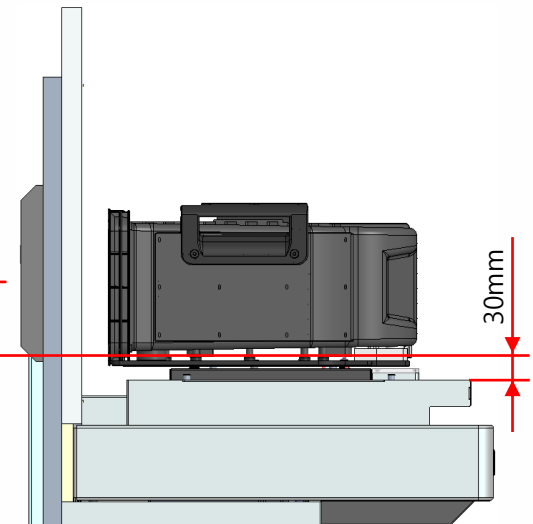
# Cassette 사용 시

## 1. Cassette Stage Up/Down 구동

### • Cassette Stage & Guide



[Cassette 안착]



[MAC FOUP 안착]

- Cassette Stage Up/Down Stroke 30mm → OHT 높이 : 913mm

Cassette와 MAC FOUP용 Kinematic Pin, Placement Pin 등 간의 간섭 회피

- Cassette Guide 높이 100mm → 삼성 Common Spec 형상 참고

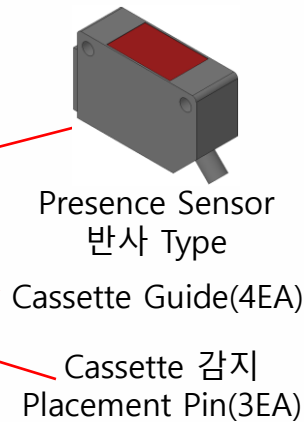
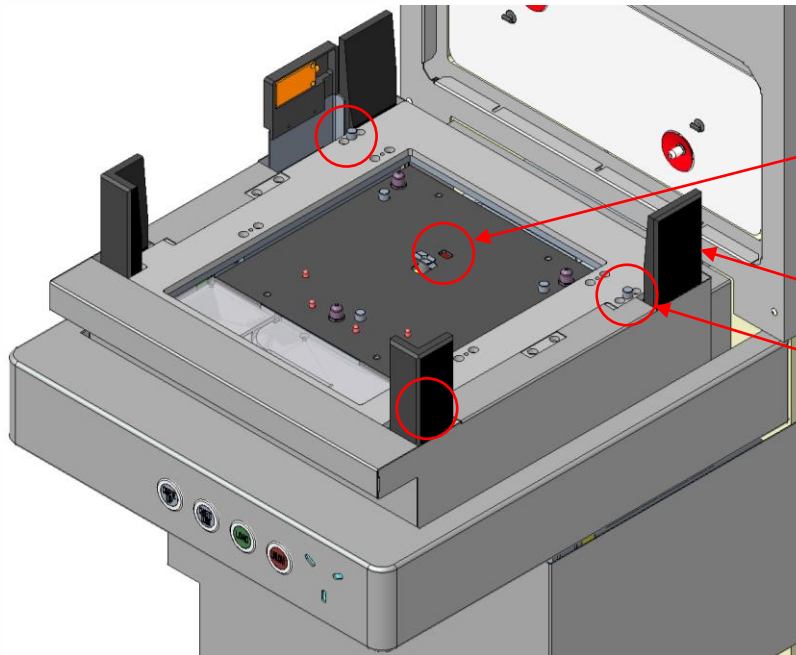
### • Cassette 용 RFID

- 13.56MHz 사용
- RFID Antenna 배치 → Cassette 좌측 RFID Tag 중앙에 1대1 위치
- Cassette Guide와 동시에 Up 동작

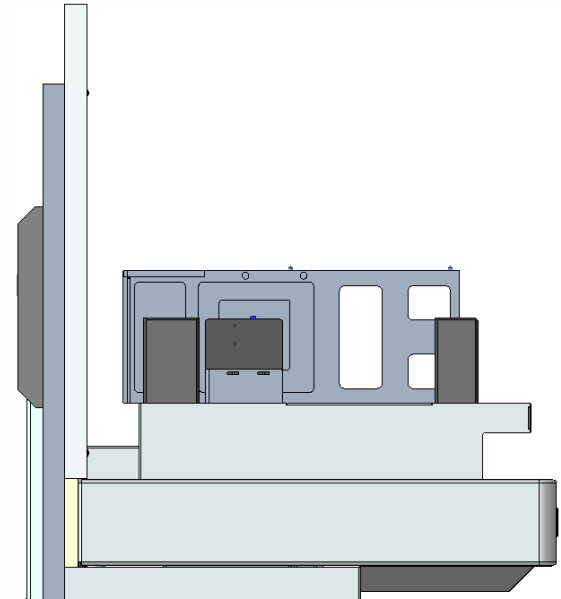
# Cassette 사용 시

## 2. Stage Module 주요 구성

### • Cassette Guide & Placement Pin



Cassette 감지  
Placement Pin(3EA)



[Cassette 안착]

- Cassette Guide에 따라 Stage Plate 위에 Cassette 안착
- Cassette Bottom 면에 의해 Placement Pin이 눌리며 정상 안착 확인

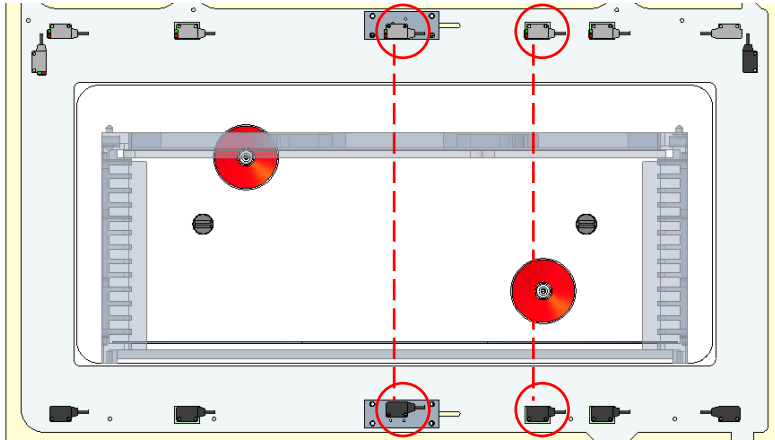
### • Presence Sensor

- Stage 상단의 물체 유무 확인
- Sensor 검출거리 200mm → Cassette 상단 OHT Flange 또는 Wafer 하단 감지 가능

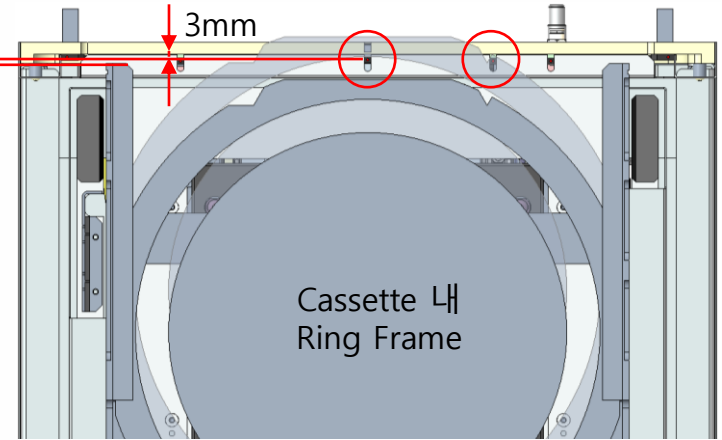
# Cassette 사용 시

## 3. Ring Frame 돌출 감지

### • Protrusion Sensor



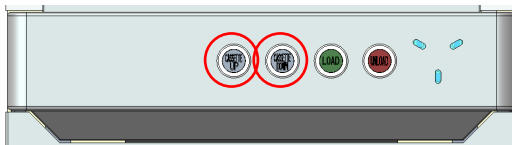
Sensor Beam Line  
Cassette 최외각 면



- Protrusion Sensor Beam Type
- Ring Frame이 Cassette 외부로 3mm 돌출 시 감지(삼성 Common Spec : 4mm 이내 돌출 시 감지)
- 중앙에 위치한 Protrusion Sensor의 Beam이 Ring Frame Tape 감지 범위에 있을 시, 우측 Sensor는 Ring Frame을 감지하여 Dead Zone 제거

## 4. Cassette Loading 준비 Manual Switch

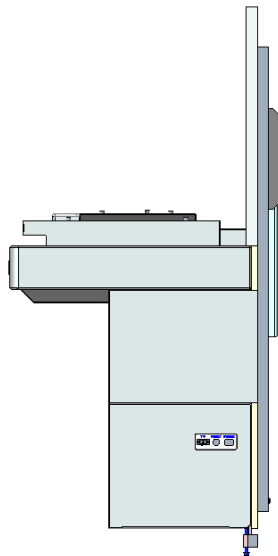
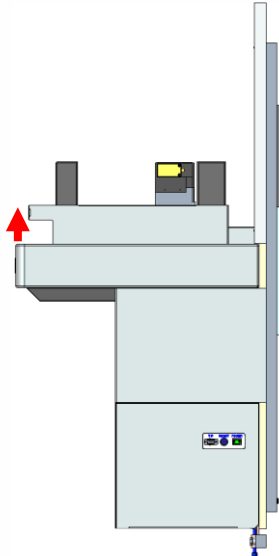
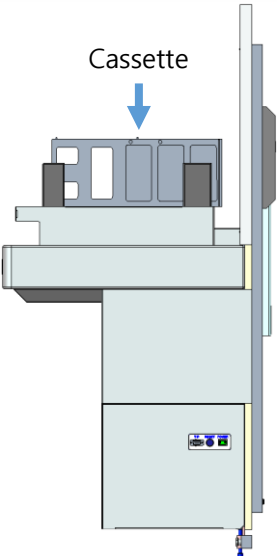
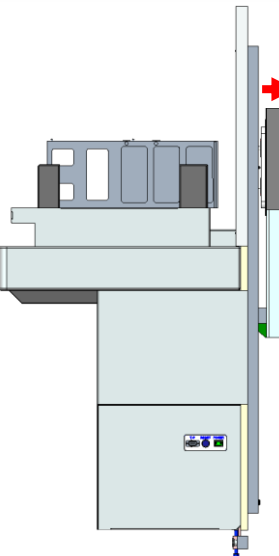
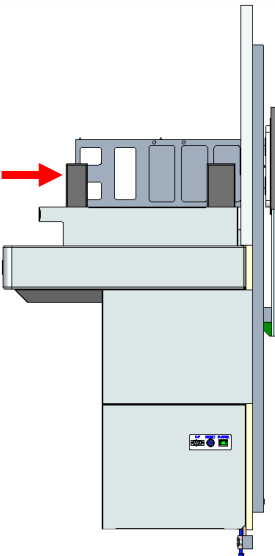
### • Cassette Up/Down Switch



- Manual로 Cassette 사용할 수 있도록 Switch를 눌러 Cassette Loading 준비 위치 가능

# Cassette 사용 LPM Sequence

## Cassette Loading Sequence

Cassette Loading 준비	Cassette Loading	LPM Door Open	Stage In	Z-Axis Down	
					
<ul style="list-style-type: none"><li>- OHT에서 Cassette 정보 CTC에 전달</li><li>- CTC에서 Cassette 정보 LPM에 전달</li></ul>	<ul style="list-style-type: none"><li>- Stage Up 30mm</li><li>- Cassette Guide, RFID Antenna Up 100mm</li><li>- Cassette Loading 준비 완료</li></ul>	<ul style="list-style-type: none"><li>- Cassette Guide에 따라 Plate 위에 안착</li><li>- Placement Pin, Presence Sensor로 정상 안착 확인</li></ul>	<ul style="list-style-type: none"><li>- LPM Door Open</li><li>- Cassette와 LPM Door의 Registration Pin, Latch Key 간의 간섭 회피</li></ul>	<ul style="list-style-type: none"><li>- Cassette Loading Position으로 Stage In</li></ul>	<ul style="list-style-type: none"><li>- Z-Axis Down</li><li>- Mapping 동작</li></ul>



*The Power of Collaboration*

