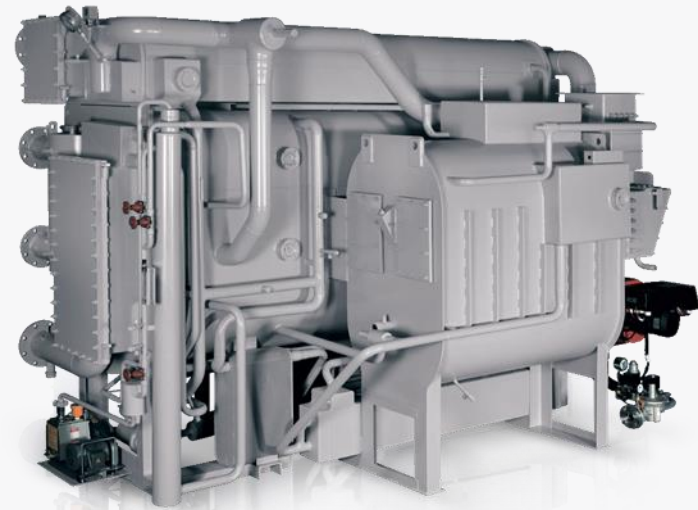


# LG Absorption Chiller

---

## Introduction

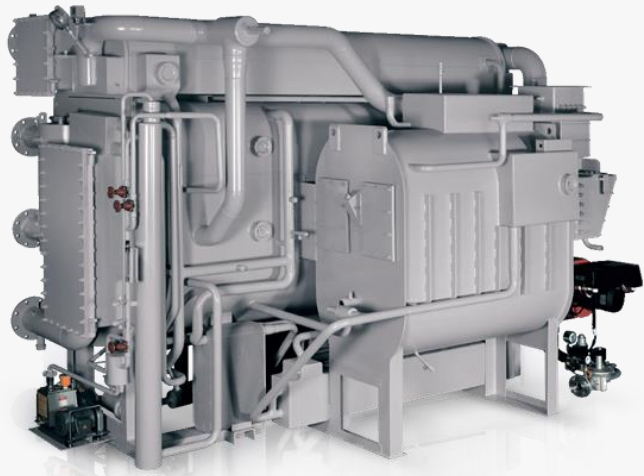


**ABSOTHERM  
SERVICES**

The Grainstore  
Elmhurst Business Park  
Park Lane  
Lichfield, WS13 8EX  
[www.absothermservices.com](http://www.absothermservices.com)

# Contents

---



## 1 History

## 2 Line-up

## 3 Why LG Absorption Chiller?

## 4 Features & Benefits

- High Energy Efficiency
- Reliability & Stability
- Convenience



- **LG is leading the chiller market with long experience of manufacturing chiller and advanced technology.**

**1975**

Established  
Absorption  
Chiller Biz.

**1985**

Developed  
Direct fired  
Absorption  
Chiller Heater

**1994**

Develop/Export  
Absorption  
Heat Pump  
(Finland)

**1996**

Absorption  
Manufacturing  
Technology  
Export  
(Iran)

**2006**

COP 1.34  
High Efficiency  
Direct fired  
Absorption  
Chiller Launch

**2013**

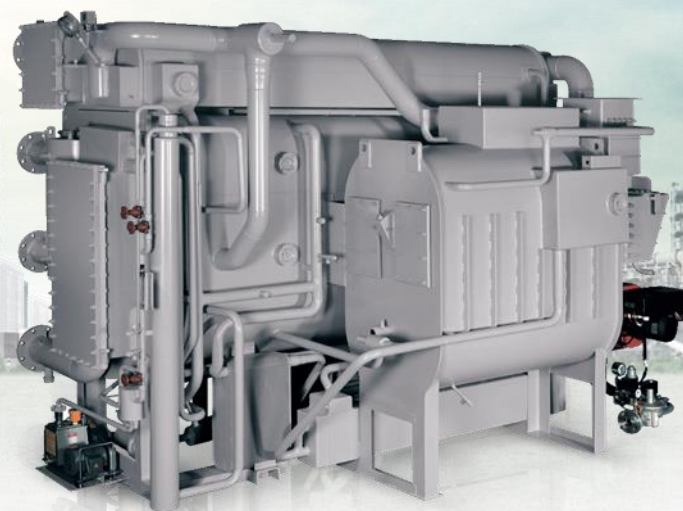
**COP 1.51**  
High Efficiency  
Direct fired  
Absorption  
Chiller Launch

**2014**

**COP 1.51**  
High Efficiency  
Steam fired  
Absorption  
Chiller Launch

**2015**

**Stainless  
Steel Tube  
Absorption  
Chiller  
Launch**



# Direct fired absorption chiller & heater

## Line-up

[Unit : RT]

Model	0	100	500	1,000	1,500	3,000
 WCDH (H Series)		100			1,500	3,000
 WCDN (N Series)		50	700			3,000
 WCDS (S Series)		100			1,500	3,000
 WCDA (A Series)	50	80				

■ Available on request


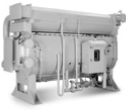
## Application

Energy	Available	Model Selection			(Example) Application
		Efficiency	Model	Remark	
Gas or Oil	LNG LPG Bio-Gas Exhaust gas Oil	COP 1.51	WCDH	World Class High Efficiency	Commercial area Multipurpose building Thermoelectric power plant
		COP 1.34	WCDN	Enhanced Stability & Reliability	
		COP 1.12	WCDS	Steady Best Selling Model	

# Steam fired absorption chiller

## Line-up

[Unit : RT]

Model		0	100	500	1,000	1,500	4,000
	WCSH		100			1,500	4,000
	WCSS		100			1,500	4,000

Available on request


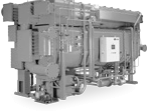

## Application

Energy	Available	Model Selection			(Example) Application
		Efficiency	Model	Remark	
Gas or Oil	LNG LPG Bio-Gas Exhaust gas Oil	COP 1.50 Consumption (3.5 kg/hRT)	WCSH	<b>World Class</b> High Efficiency Steam Pressure : 4 ~ 8kg/cm <sup>2</sup>	Commercial area Multipurpose building <b>Petroleum and Chemical Factory</b>
		COP 1.21 Consumption (4.4 kg/hRT)	WCSS	Steady Best Selling Model Steam Pressure : 4 ~ 8kg/cm <sup>2</sup>	

# Hot water fired absorption chiller

## Line-up

[Unit : RT]

Model		0	100	500	1,000	1,500	4,000
	WCMH		28		1,020		2,000
	WCMW		28		1,020		2,000
	WC2H			73		1,350	2,000


■ Available on request

## Application

Energy	Available	Model Selection			(Example) Application
		Efficiency	Model	Remark	
Hot Water	Inlet Temperature Standard 95°C (130 ~85°C)	COP 0.80	WCMH	<b>World Class</b> High Efficiency Outlet Temp. : 85 ~ 75 °C	Solar system District energy system Cogeneration
		COP 0.72	WCMW	Steady Best Selling Model Outlet Temp. : 85 ~ 70 °C	
		COP 0.74	WC2H	<b>Low Temperature outlet</b> Outlet Temp. : 70 ~ 55 °C	

## Line-up

[Unit : kW]

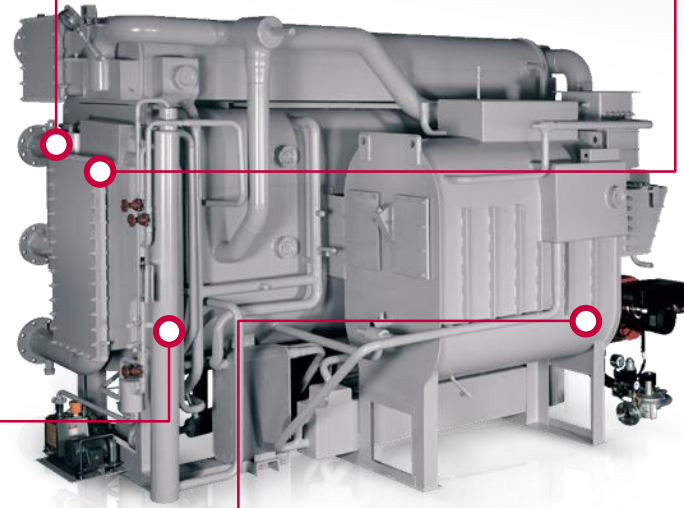
Model	0	300	1,000	5,000	10,000	20,000	30,000
 WCPX				349			30,218

Available on request

## Application

Energy	Available	Model Selection			(Example) Application
		Efficiency	Model	Remark	
Waste heating Source	Gas Steam Hot water	COP 1.65~1.80	WCPX	World Class High Efficiency Hot water Temp. : 55 → 90°C	Combined Heat and Power Incinerator system

## ABSORPTION CHILLER



### ▪ Stainless steel tube

Corrosion resistance characteristic  
Powerful heat transfer performance



### ▪ Marine type water box

Simple & convenience pipe cleaning



### ▪ Purge system

Oil separator for protecting machine  
Absorbent separator for protecting vacuum pump



Vacuum pump



Purge system

### ▪ User Friendly Controller

LCD display : easy to check status  
Various control functions



### ▪ Series solution flow

Inverter pump : easy & reliable flow control  
Simple piping line : maintenance convenience



Inverter pump



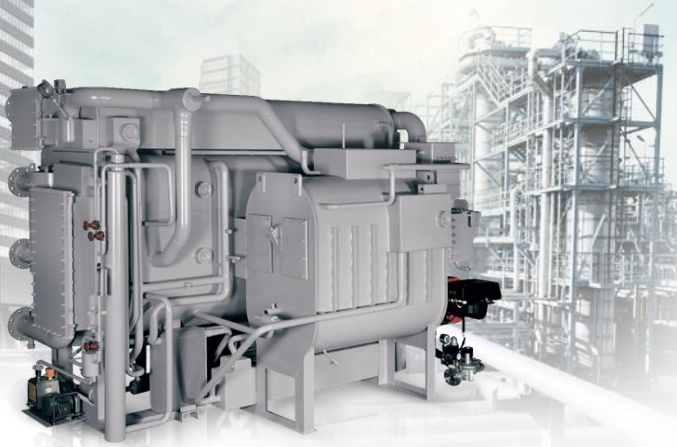
## Absorption Chiller

- Direct fired Absorption chiller : COP 1.51

### Temperature condition

- Evaporator : 12 °C → 7 °C
- Condenser : 32 °C → 37 °C

Fouling Factor : 0.0001 m<sup>2</sup>/hr °C kcal



### High Energy Efficiency

- Develop COP 1.51 absorption chiller
- Economical Operation with high part load efficiency

### Reliability & Stability

- Adopt stainless steel tube
- Gravity loading tray type dropping
- Series flow with inverter pump control
- Self-diagnosis functions, Safety functions (Crystallization prevention, Freezing prevention, Leakage detection)

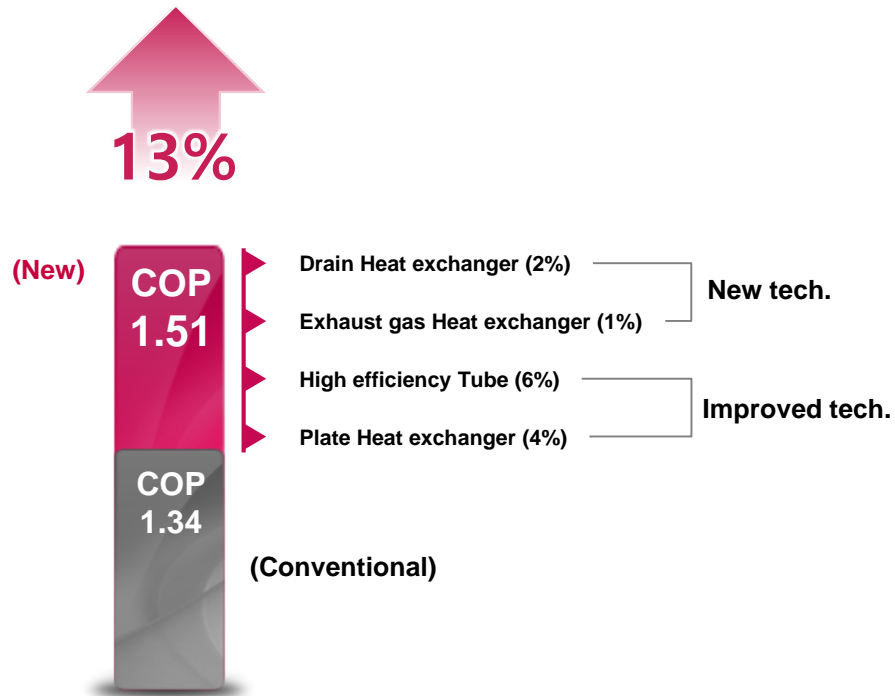
### Convenience

- Multi-sectional shipment
- Easy Maintenance (Simple pipe cleaning)
- Digital pressure transmitter
- Easy BMS Interface (Modbus, TCP/IP, BACnet, LONWORK)

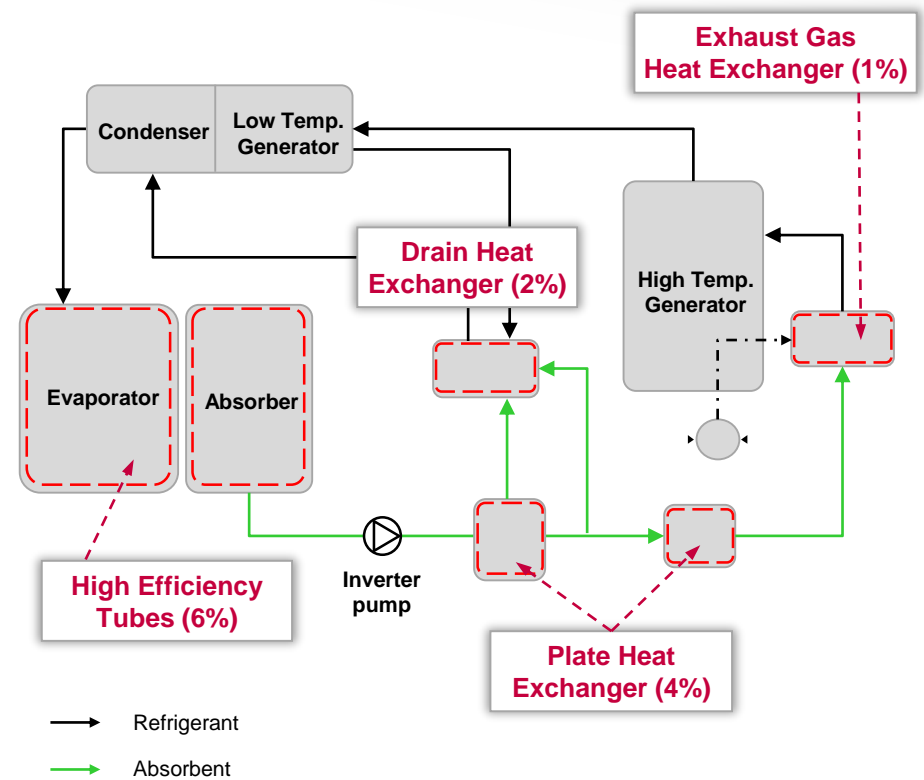
# Develop COP 1.51 absorption chiller

➤ LG Absorption chiller achieves COP 1.51 through cycle optimization design

## High Performance efficiency

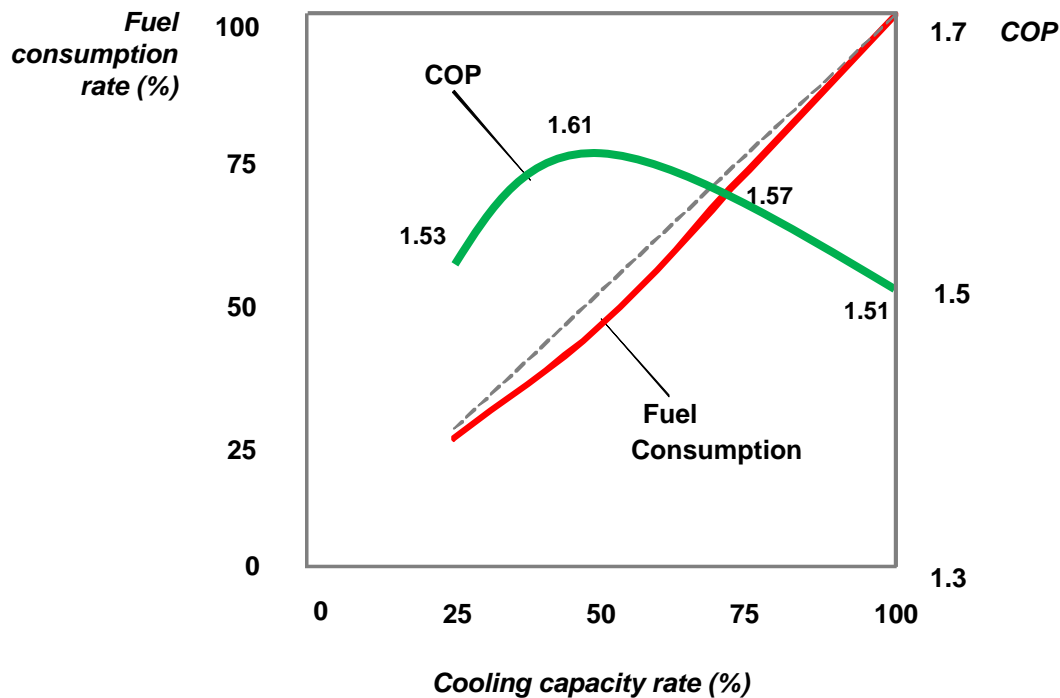


## Cycle optimization design



➤ LG's absorption chiller achieves high part-load efficiency

Part load curves



Rated COP : 1.51

**IPLV COP : 1.58**

Load (%)	COP	Factor	Result
A 100	1.51	0.01	0.0151
B 75	1.57	0.42	0.6594
C 50	1.61	0.45	0.7245
D 25	1.53	0.12	0.1836
<b>Total</b>			<b>1.58</b>

Note:

\* IPLV (or NPLV) = 0.01A+0.42B+0.45C+0.12D

\* Based on KS B 6271 Standard

\* Chilled water outlet temperature : 7°C

\* Cooling water condition

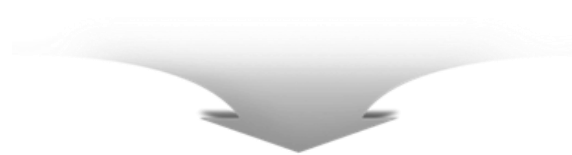
Load (%)	Chilled Water Inlet temperature (°C)
A 100%	32
B 75%	30.75
C 50%	29.5
D 25%	28.25

# High Reliable stainless steel tube

- Specially designed stainless steel(STS) tube achieved powerful heat transfer performance which is nearly same as copper tube's performance

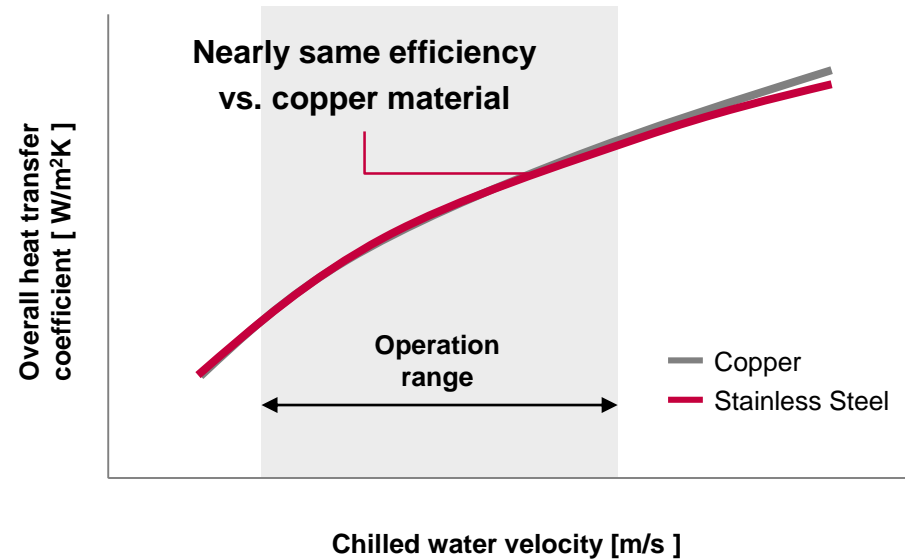


Copper end-cross shape tube



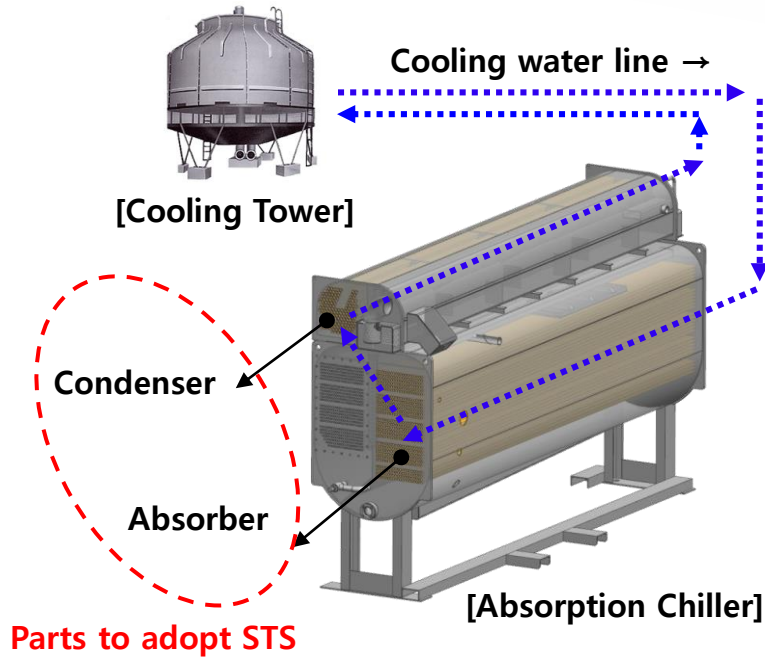
Newly developed stainless steel tube  
(LG Only)

**Powerful Heat Transfer efficiency**  
*Almost same (vs. copper)*

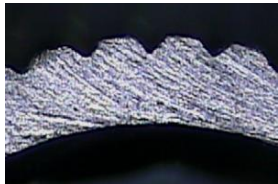


# High Reliable stainless steel tube

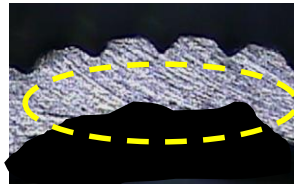
- Specially designed stainless steel(STS) tube has much lower corrosiveness compared to copper tube.



- Main corrosion type of tube : Pitting Corrosion



[Section of non-corrosion]

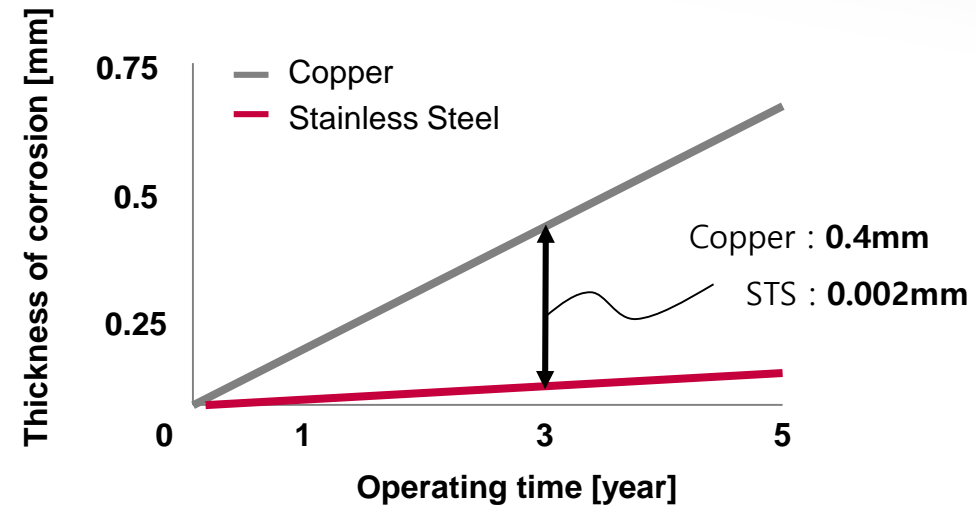


[Section of corrosion]

## Much lower corrosiveness

Corrosion rate : 24 times ↓

Weight Loss rate : 15 times ↓

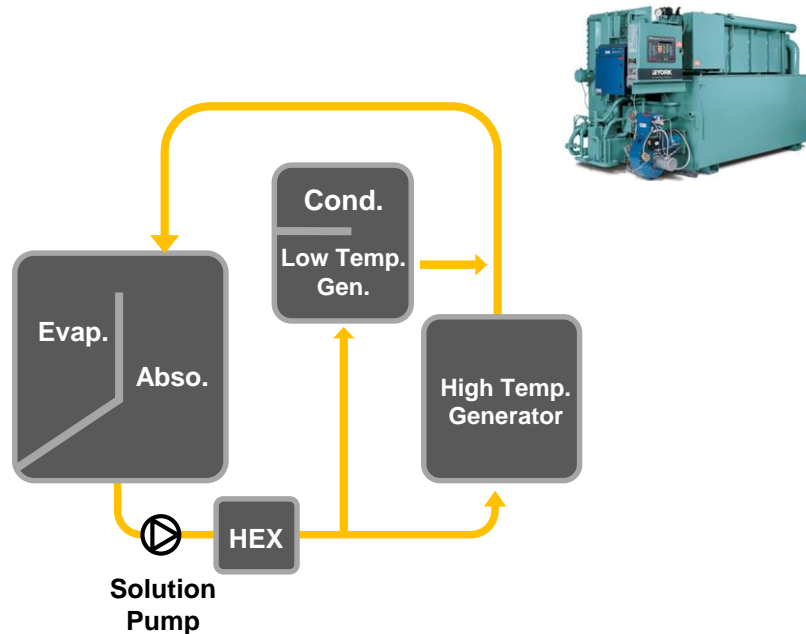


	Copper	Stainless steel (LG)
Corrosion rate (mm/year)	2400% (0.1352700)	100% (0.0056209)
Weight loss rate (mg/year)	1500% (-0.0196)	100% (-0.00013)

- By utilizing Series Flow and inverter pump, it becomes easier to control absorbent flow along the pipe line.

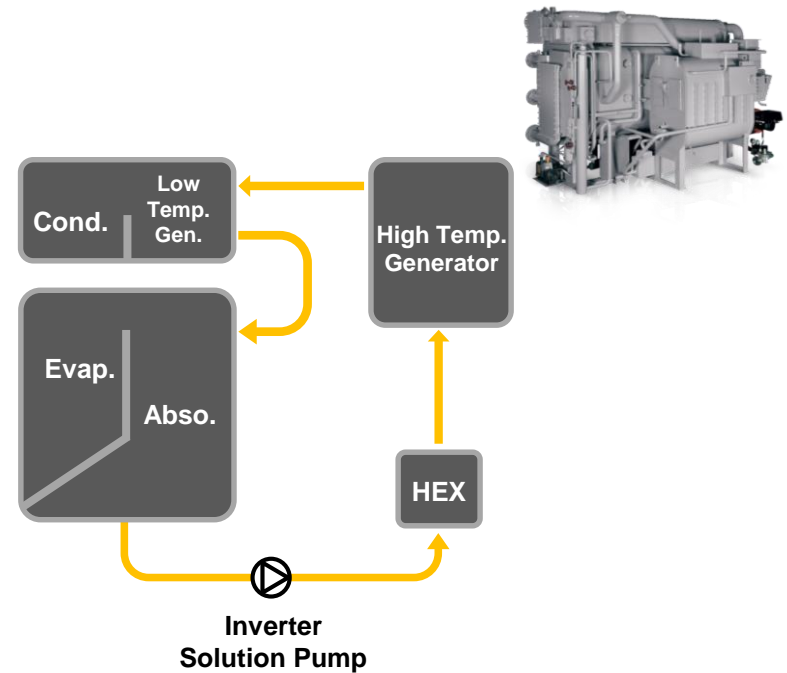
## Parallel Flow

- Difficult to control absorbent flow rate according to load
- Increasing number of pipe line
- Inconvenient maintenance
- Inverter pump is not available



## Series Flow (LG)

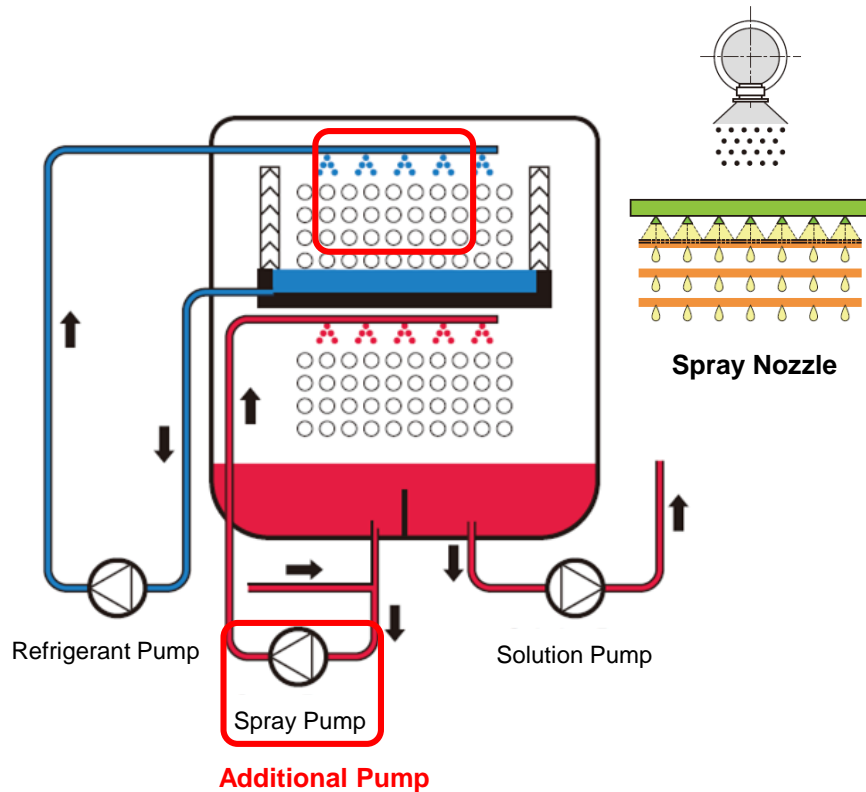
- Precise control of absorbent flow rate by load
- Decreasing number of pipe line
- Convenient maintenance
- Soft start/stop by inverter pump



➤ LG developed tray type distributor instead of nozzle type

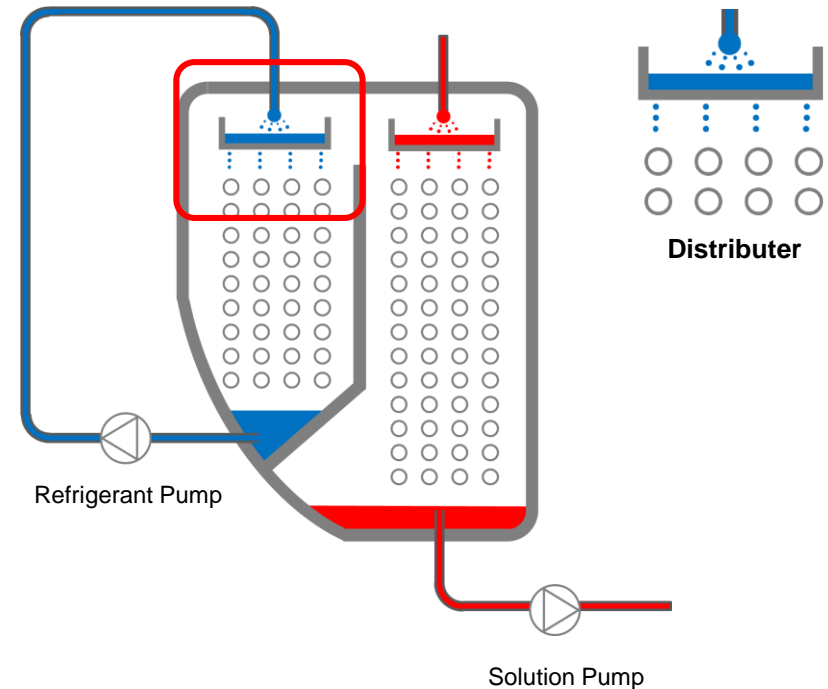
## Spray Nozzle Type (Other Co.)

- Additional spray pump is required
- Nozzle might be blocked by sludge

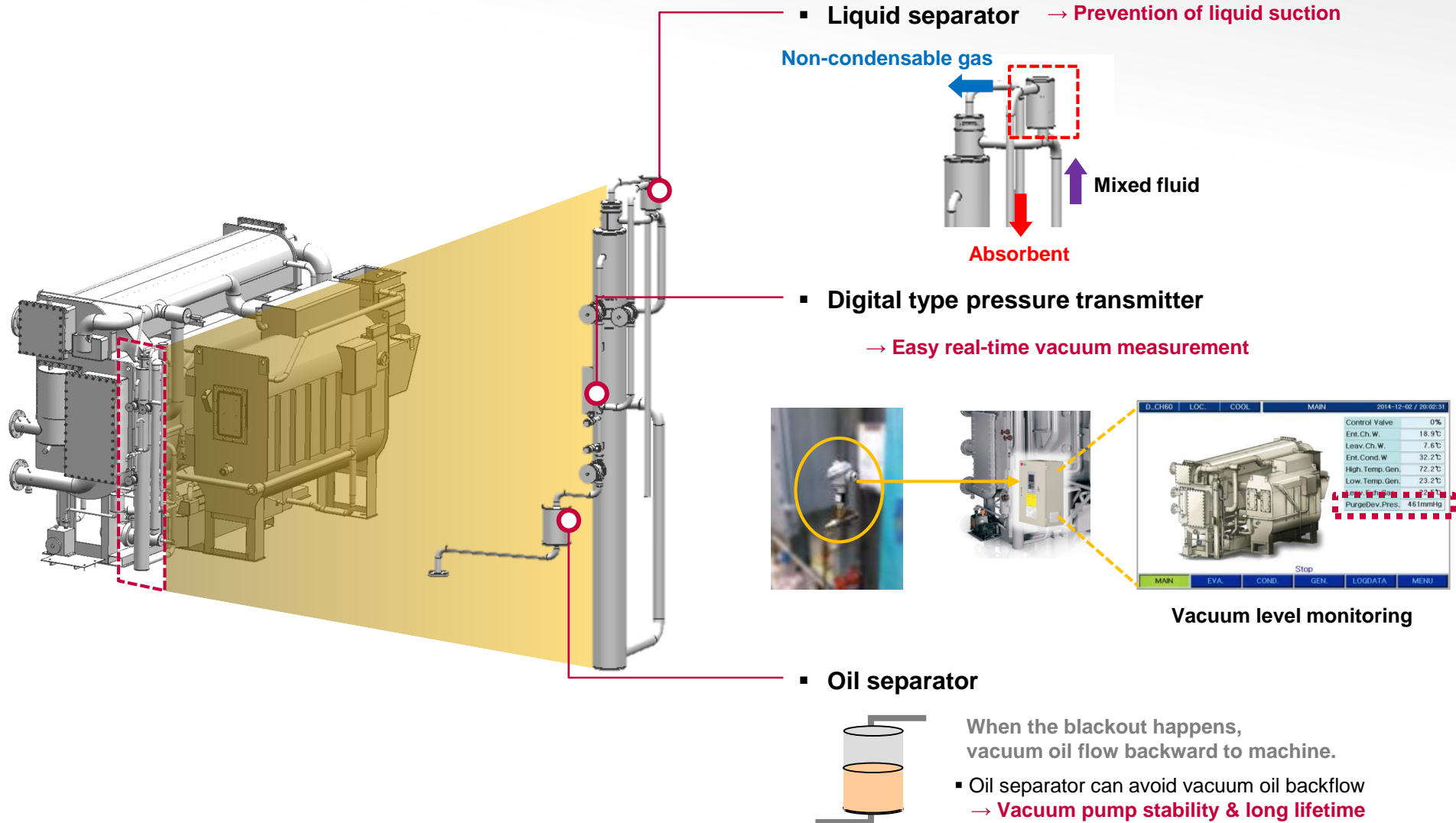


## Tray Type (LG)

- Not required spray pump for dropping
- No risk to have sludge in the hole
- Gas & liquid separation technique enhances distribution



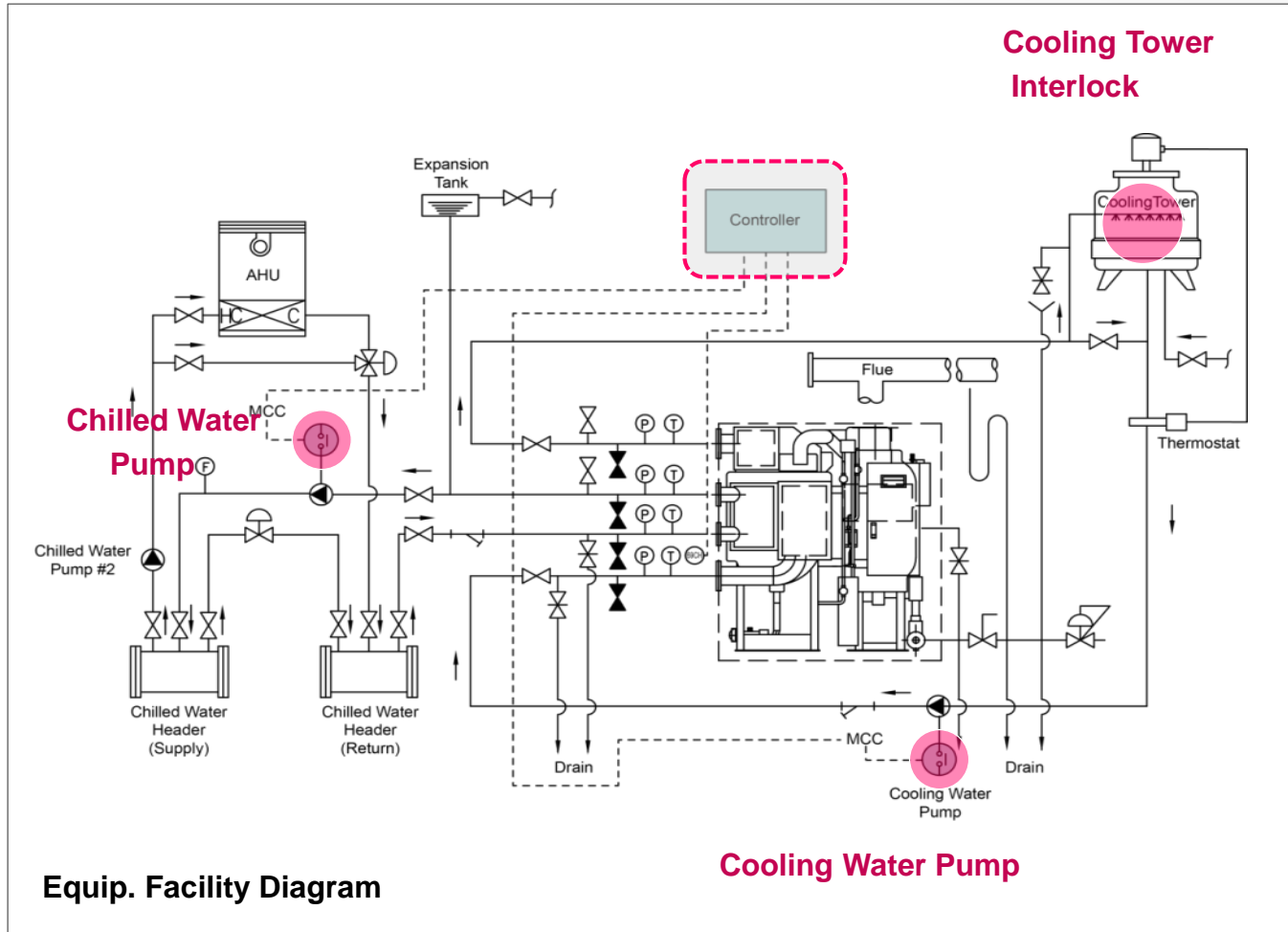
- Maintain stable vacuum condition by avoiding liquid carry over and oil backflow when blackout or emergency stop occur.



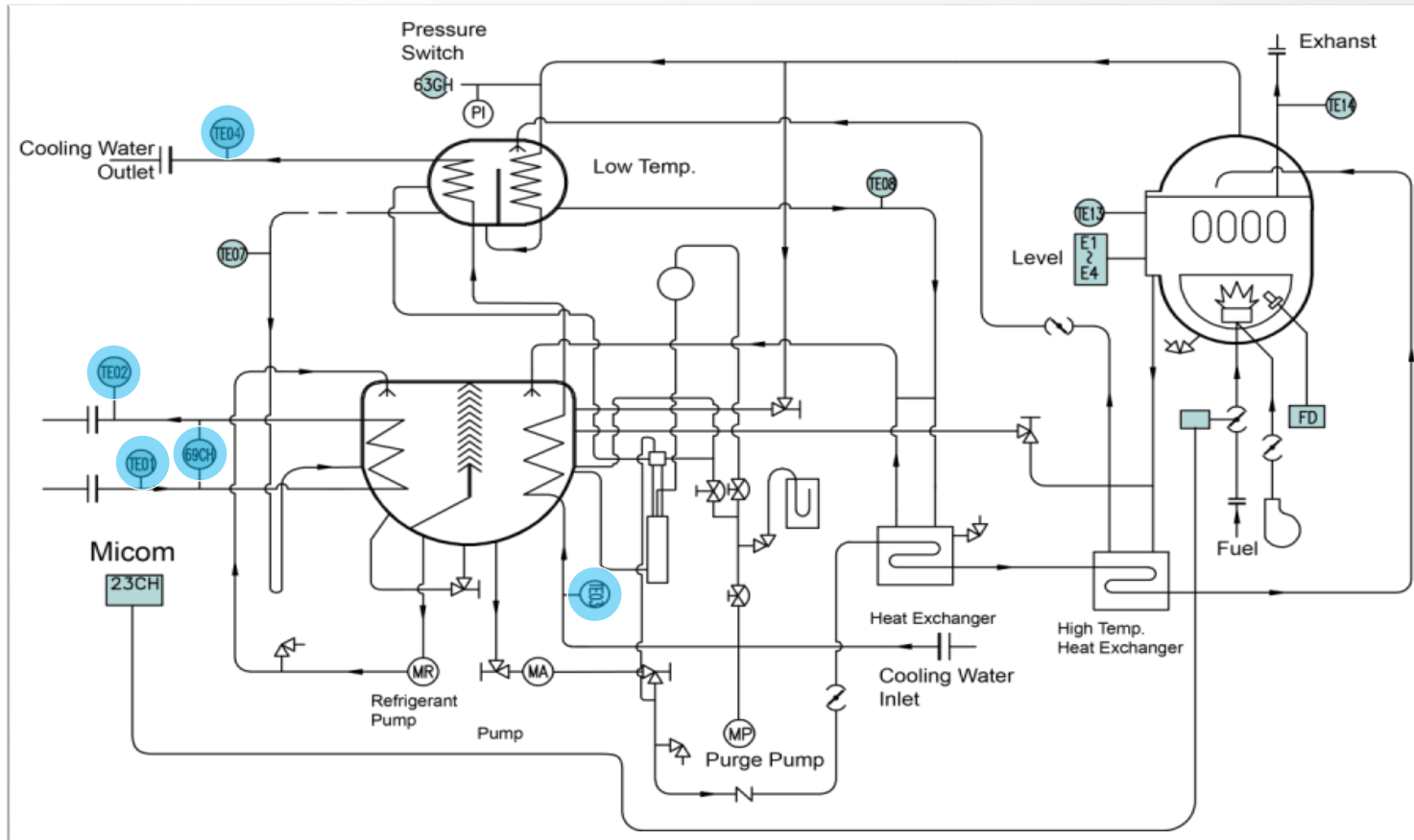


## ➤ Equipment safeties

- Prevention of crystallization and frozen burst (caused by maintenance error)
- Self-diagnosis of equipment facility at start-up (Chilled water / Cooling water pump, Cooling tower interlock)



## ➤ Anti-freezing protection



### ● Water side safeties

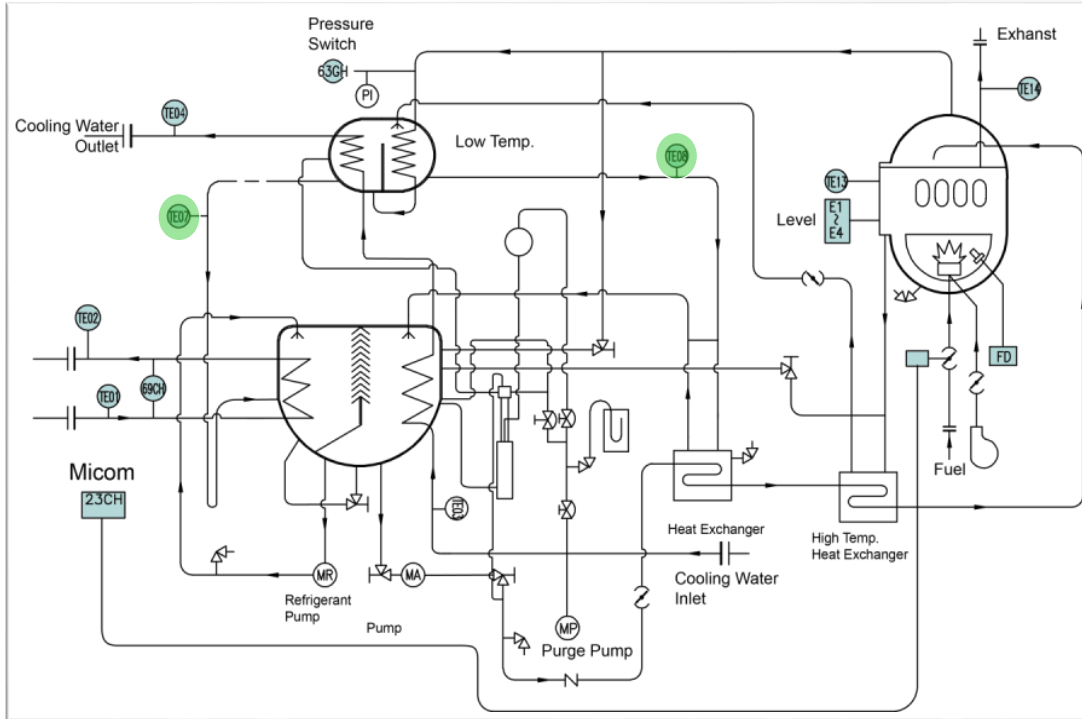
#### Equipment

- TE01~04 : Temp. sensor  
Water temp. measuring
- 69CH : Press. switch  
Water flow detecting

#### Function

- Anti-freezing protection
- Cooling load control
- Cooling tower load control
- Chilled water, Cooling water inlet/outlet temp. check

## Crystallization prevention



### Crystallization Prevention

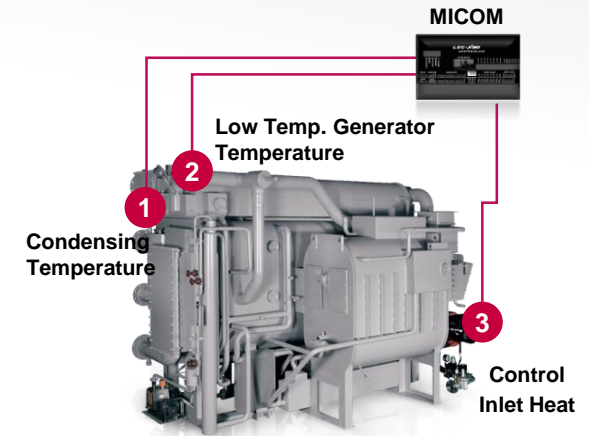
#### Equipment

- TE07~08 : Temp. sensor
- Solution temp. measuring

#### Function

- Concentration calculation for crystallization control
- Condensation refrigerant / Absorbent temp. check

## Absorbent concentration control



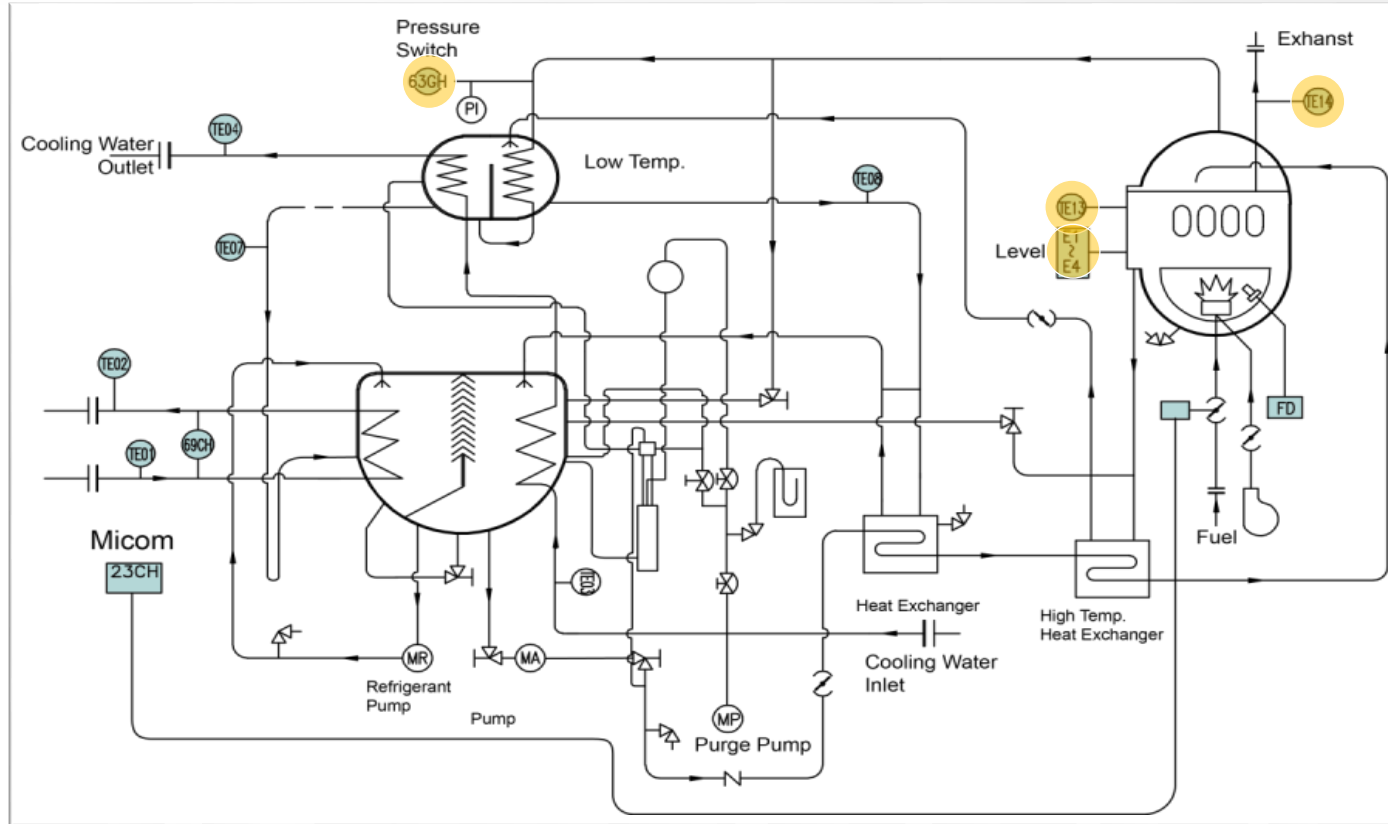
**Step 1** Absorbent concentration calculation (①+②)

Concentration over setting value

**Step 2** Control program start (③)

**Step 3** Crystallization prevention control

## ➤ Overload of heat source prevention



### ● Generator protection

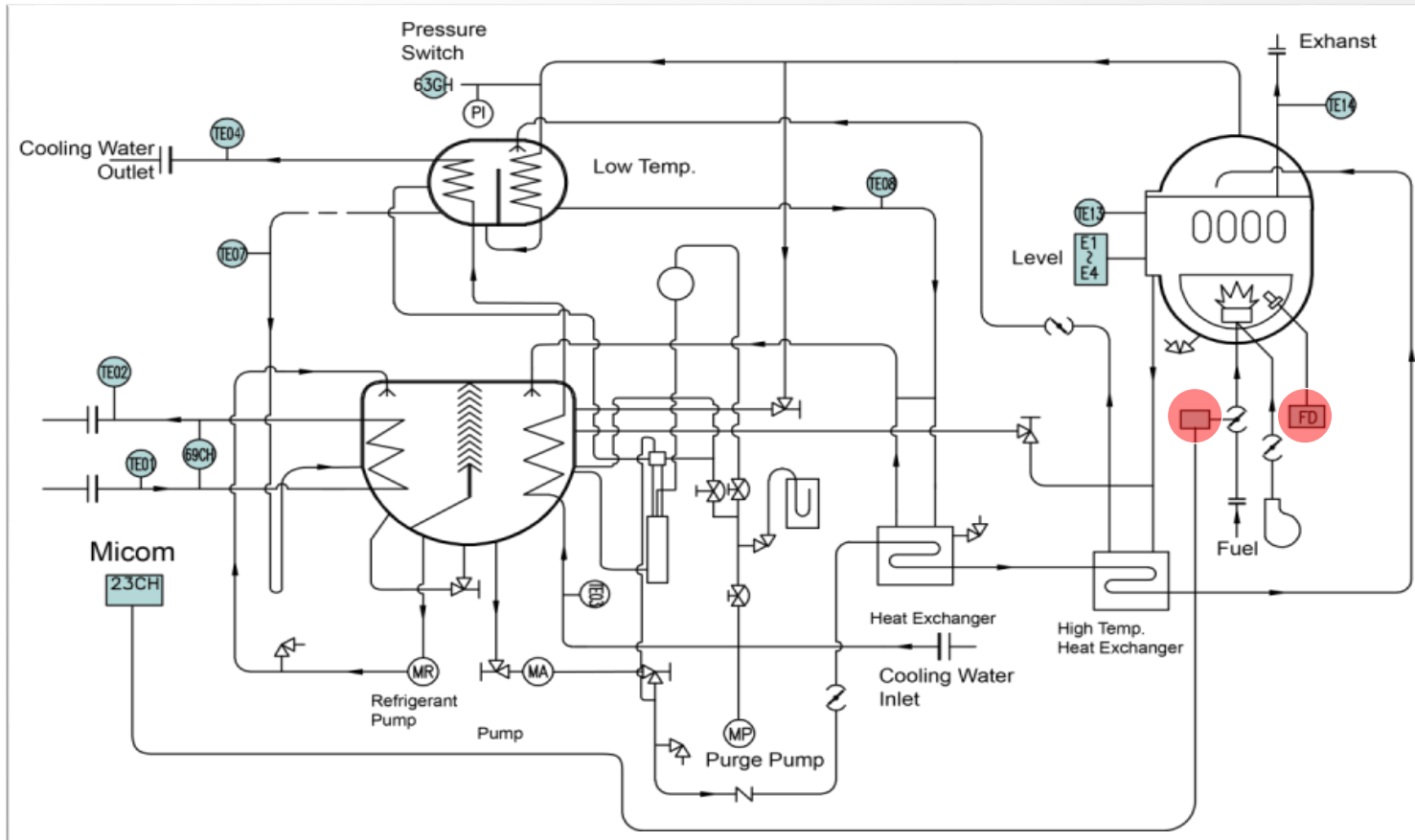
#### Equipment

- TE13~14 : Temp. sensor  
Solution temp. measuring
- E1~4 : Level sensor  
Solution level measuring
- 63GH : Press. switch  
High gen. Pressure measuring

#### Function

- High temp. generator protection
- Control of amount of Input heat source
- Prevention of secondary accident (caused by high temp./pressure)
- Constant performance by absorbent level control
- High temp. generator / exhaust gas temp. check

## ➤ Combustion safeties



### ● Combustion Safeties

#### Equipment

- . FD : Flame detector  
Solution temp. measuring
- . Gas modulator

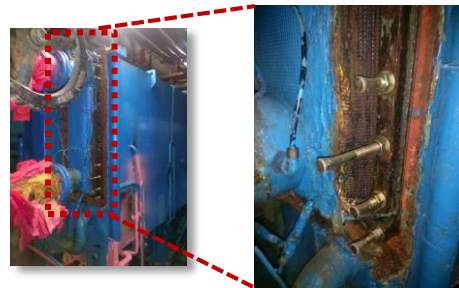
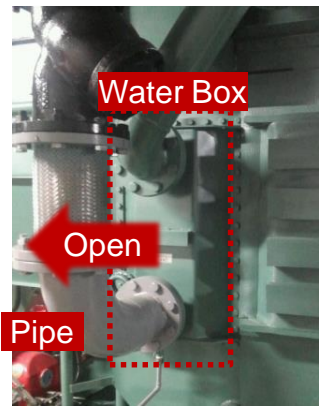
#### Function

- Combustion device(burner) protection
- Prevention of secondary accident (caused by gas leakage)

➤ Tube cleaning is more rapid, simple and cost saving without the pipe fitting disassembly.

## Other Co.

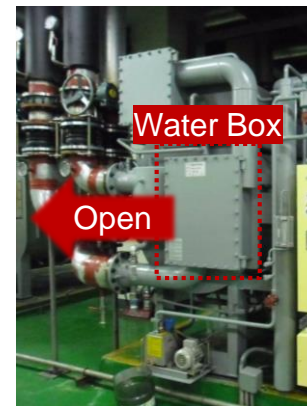
- **Water Box on the front**
    - For cleaning, opening the lid causes disassemble pipe and insulation
    - Joint part corrosion due to periodic disassemble
- **Complicated, Time-consuming**



**Joint part corrosion**

## LG

- **Water Box on the side (Marine Hatch Type)**
    - For cleaning, just water box cover can be opened
    - Do not need disassembly of pipe and insulation
- **Simple, Convenience**



**Simple opening & cleaning**

※ Heat exchange tube requires periodic cleaning (To prevent efficiency decrease and pipe blocking)

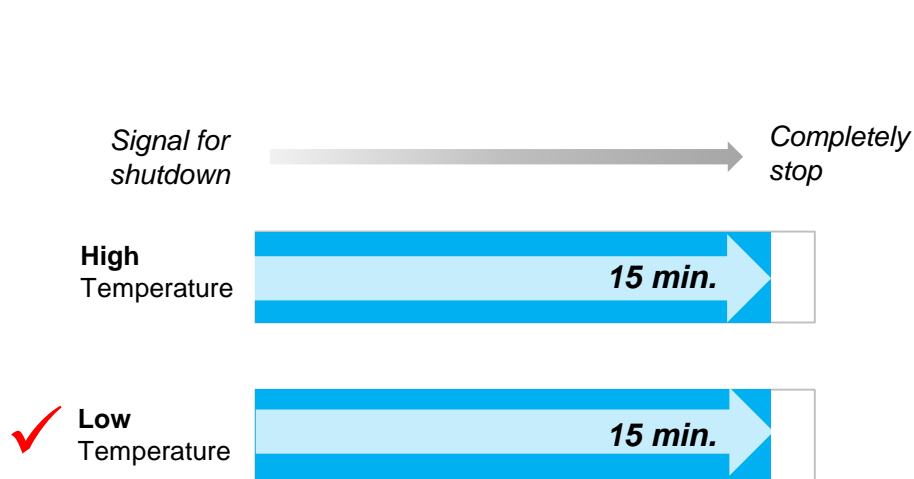
# Dilution Operation Time

- Dilution operation time is reduced by measuring residual heat and remove unnecessary operation.

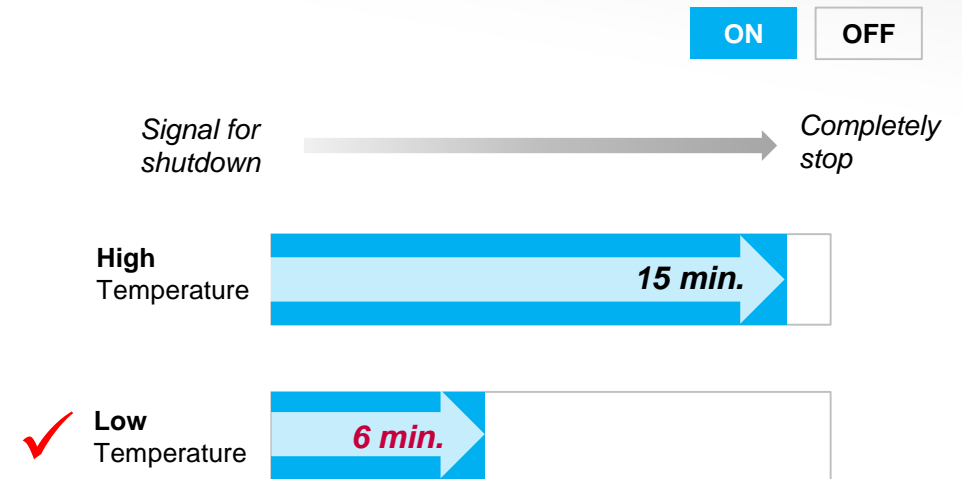
*Without considering residual heat*

**VS.**

*Considering residual heat*



**Same dilution time  
regardless of temperature**



**Save dilution time  
according to the temperature**

※ Temperature is measured from High temperature generator. Decreasing dilution operation time is depending on solution pump.

# User Friendly Controller

- High Quality 7" LCD screen offers various functions for easy operation & maintenance.

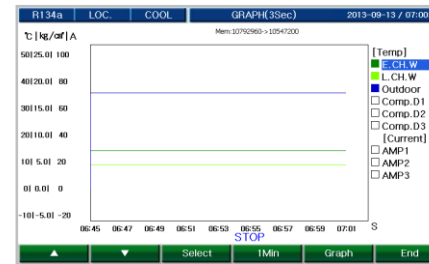
## Control Panel

### • Various Protocols

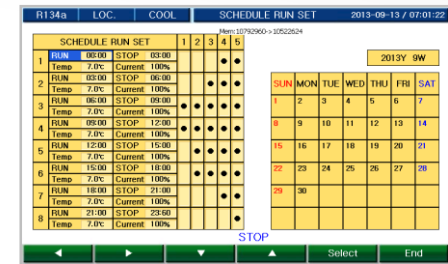
- Standard : MODBUS
- Option : BACnet, TCP/IP



## Various functions



**Trend Display**  
(Easy to check operation status)



**Scheduling**  
(Automatic operation)

**Log Data**  
(Save operation record)

**System Information**



## ➤ Intelligent building management system with BMS communication function

