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Specification No. C701138-VS-01-02

IBM

Microelectronics Div. 256M DRAM Project

Ms. Radhika Srinivasan

TEL PO.No.	A2-44995		
TTL No.	C701138	R/N	109021

Customer Approval Specifications

Equipment : ALPHA-8S-Z
(ALPHA-8S-ZVFN)

Your Signatures for Approval				
/ /	/ /	/ /	/ /	/ /

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REVISION LIST

1st Engineering Dept. System Engineering Group

The first edition	Oct.9.'96	S.W	H.F.	Rev.0
Approval				Rev.
The final edition				Rev

TTL No. :

REV.No	DATE	ITEM	CONTENTS	PAGE		
0	Oct.9.'96		The First Edition			
1	Feb.12.'96	1	System Module changed.	6		
		2	Layout of Base Plates. (7) Changed	7		
		3	Weight of Units 7 changed.	8		
		4	Utility List. ① 1 - Corrected (105kVA → 121.2kVA) ② 3 - Corrected (2 ℓ/min → 3 ℓ/min)	9 9		
		5	Power Supply System Diagram Changed.	12		
		6	Furnace Specification ① 1 - 3 -(4) Deleted	19		
		7	Mechanism Specification ① 9 -(2) Added (Carrier Type)	32		
		8	Gas System Specification ① 2 -(2)-② Corrected. ② 2 -(4)-③ Corrected. ③ Drawing for flange deleted. ④ Gas flow chart and parts list changed.	39 40 41 44~49		
		9	Control System Specification ① 4 -(1) Changed ② 4 -(4) Deleted ③ 6 -(1) Changed ④ 6 -(3) Added	54 54 55 55		
		10	Safety specification ① Valve Interlock Table Changed. ② Alarm I/O Table changed.	67~76 77~82		
		2	Mar.18.'97	1	System Configuration Table ① 3 -(6) Changed ② 3 -(10) Added	3 3
				2	Utility List Changed.	9

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2	Mar.18.'97	3	Gas System Specification	
			① No.4 Changed	40
			② 6-(1) Changed	43
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		4	Safety specification	
			① Valve Interlock Table Changed	67,752/3
			② PT, VG TABLE Added	762/2
		5	Quartz Jig list added	84
		6	By changed box name (C/BOX(B) + Gas Box → Gas Box)	3,4,7,8 16,55

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I OBJECTIVE OF THE SPECIFICATION

The specifications stated here in are to describe the standard, alternate, and optional specifications of the Low pressure CVD Processing system for 8" wafers.

Note 1: For any extra specifications you desire but not included here, please consult with us.

2: The communication with a host is not described here since that is compatible with an optional item.

1-1 Main Features

1. Wafers to Process:

- (1) Size : 200 mm \pm 0.5 (Notch Type)
- (2) Number of wafers : 100 at the maximum (+26 dummy wafers)
(5.2mm Pitch)

2. Specified Temperature range / process

Normal specified
temperature range : 500~1000°C

3. Transfer of wafers:

- (1) Wafer transfer : 5 wafer forks or 1 wafer fork
(4 wafer forks +1 wafer fork)
- (2) Wafer transfer unit comprises:
 - ① Carrier port
 - ② Carrier stage
 - ③ Transfer stage
 - ④ Wafer transfer mechanism
 - ⑤ Boat elevator
 - ⑥ Auto Shutter
- (3) The wafers are transferred between a carrier and a quartz boat either by a unit of 5 wafers or single wafer according to a program specified.

4. Control system:

A system controller (TS-4000ZC) compiles recipes for film-forming, and monitors the status of the system.

5. Clean environment specifications:

- (1) Wafers, while in the system, shall have their mirror surface in parallel with clean air flow regardless of their posture.
- (2) The inside of the system is made into a perfect and independent clean room almost free from outside elements.
(This is on condition that the differential pressure between your clean room and utility room is below 0.5 mm H₂O.)
- (3) We recommend the differential pressure to be 0.3 ~ 0.5 mm H₂O between clean room and utility room.

II SYSTEM CONFIGURATION

2-1 System Configuration Table

No.	Component name	Type/Model	Qty	Remarks
1. Furnace related items				
(1)	Furnace mount frame	VFA-090N	1	
(2)	Heater chamber	VOS-40-017	1	
(3)	Cooling water pipe		1	on heaters, water cooled flange, etc.
(4)	Scavenger	VSC-BSN	1	
(5)	Rapid cooling unit		1	
2. Automechanism related items				
(1)	Auto-door		1	
(2)	Carrier port		1	2 carrier I/O Port
(3)	Carrier Transfer		1	
(4)	Carrier stage		1	12 carrier stage
(5)	Transfer stage		1	
(6)	Wafer transfer		1	4-wafer forks and 1-wafer fork with pitch changer
(7)	Boat elevator	8" VEL rotated	1	up/down
(8)	Auto-shutter		1	full-closed
3. Gas system related items				
(1)	Gas system	POLY/SiN/OX	1	
(2)	Utility Box		1	
(3)	Facility Box		1	
(4)	Manifold unit		1	For Hi-Temp and Hi-Vacuum type
(5)	Vacuum exhaust line		1	
(6)	Gas detector		3	$\left\{ \begin{array}{l} \text{H}_2(\text{Diffusion}) \times 2 \\ \text{H}_2(\text{Suction}) \times 1 \end{array} \right.$
(7)	Gas Box		1	(H ₂ , Ar, N ₂ Gas, TS-4000 Remote, Gas flow chart)
(8)	Turbo Molecular pump		1	
(9)	Compressor		1	
(10)	Mini Q-Mass		1	

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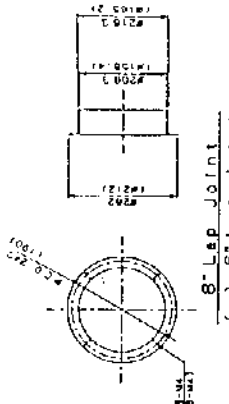
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No	Component name	Type/Model	Qty	Remarks
4. Controller related items				
(1)	Process controller	TS 4000ZC	1	
(2)	Transfer unit controller	TB-0800-PV1	1	
(3)	Temperature controller	Model 120 phase	1	
(4)	Gas flow chart		1	
(5)	Furnace monitor		1	
(6)	Power box		1	
(7)	TS-4000Z Remote		1	Including Gas flow chart
(8)	HCT		1	
(9)	Step Down Trans		3	
(10)	Console Box (A)		1	(TMP CTL etc.)
(11)	Console Box (B)		1	(TS-4000Z Remote, Gas flow chart)
5. Quartz related items				
(1)	Process jigs		1set	
(2)	Loading jigs		1set	
6. Quartz jigs for temperature				
(1)	Ratio T/C		1	with Calibration Data
(2)	P-T/C	4 Point	1	with Calibration Data
7. Others jig related items				
(1)	Tube Cart		1	
(2)	Fork gage		1	
(3)	Inner Tube setting jig		1	

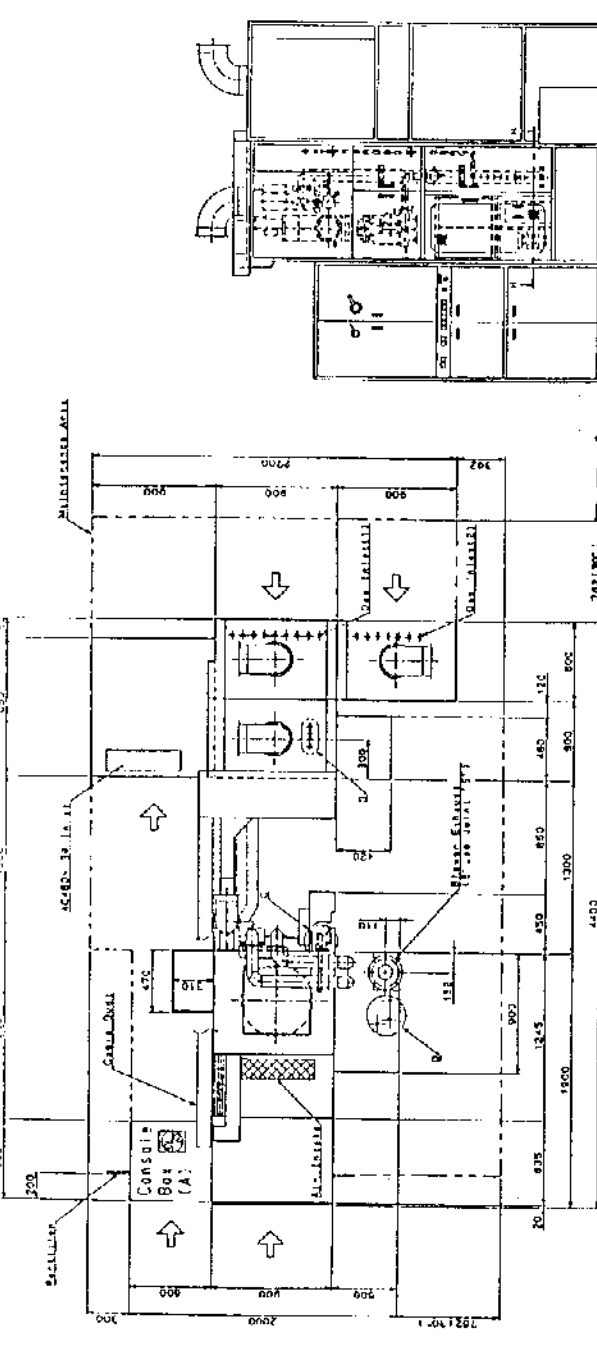
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No.	Component name	Type/Model	Qty	Remarks
8.	Others jig related items			
(1)	Base plate		1	
(2)	Instruction Manual	Cleaned paper	1	
		Normal paper	3	
		Floppy disk	1	
9.	Customer prepared items			
(1)	Dry Pump		1	
10.	N ₂ Purge System			
(1)	N ₂ purge unit		1 set	
(2)	O ₂ monitor		1 set	

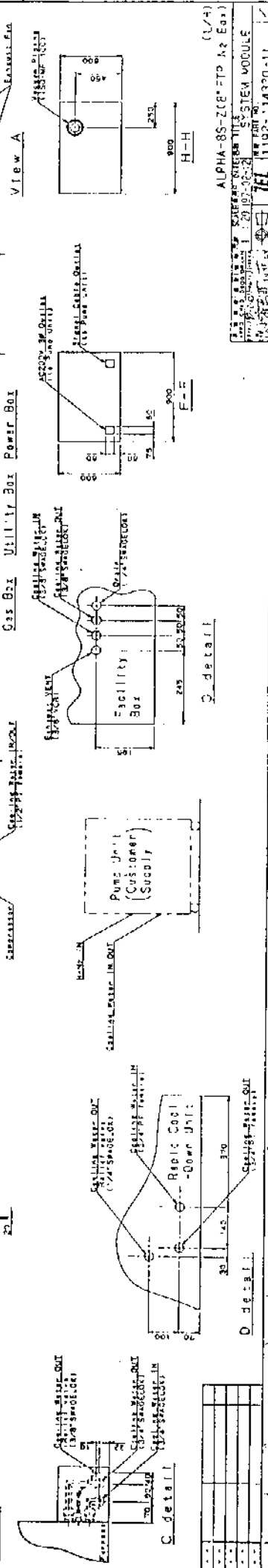
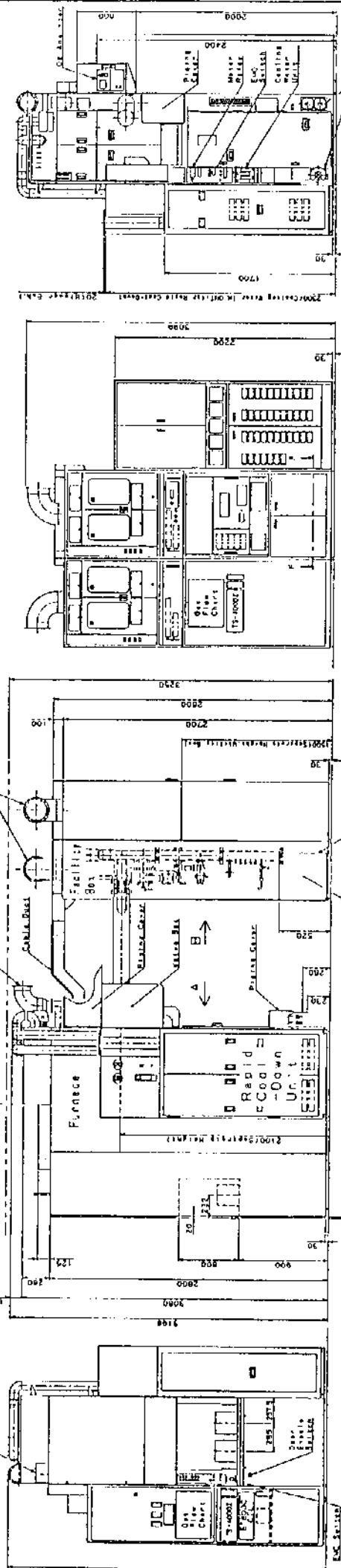


Gas Inlet

1	Gas Inlet	1/2" NPT
2	Gas Inlet	1/2" NPT
3	Gas Inlet	1/2" NPT
4	Gas Inlet	1/2" NPT
5	Gas Inlet	1/2" NPT
6	Gas Inlet	1/2" NPT
7	Gas Inlet	1/2" NPT
8	Gas Inlet	1/2" NPT
9	Gas Inlet	1/2" NPT
10	Gas Inlet	1/2" NPT



DRAWING FOR APPROVAL



ALPHA-8S-Z(8" x 10" x 2" Ex)

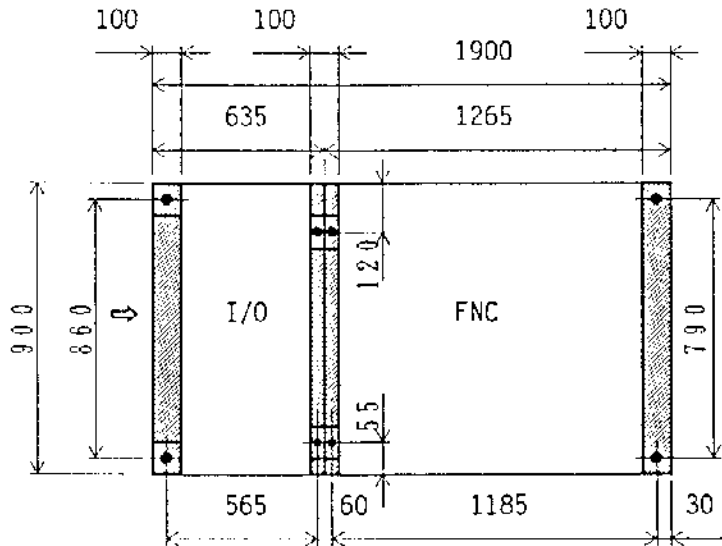
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SETUP

2-3 Layout of Base Plates and Weight of Units

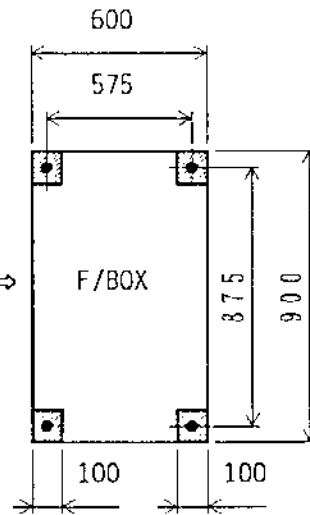
1. Layout of base plates

(1) Furnace unit

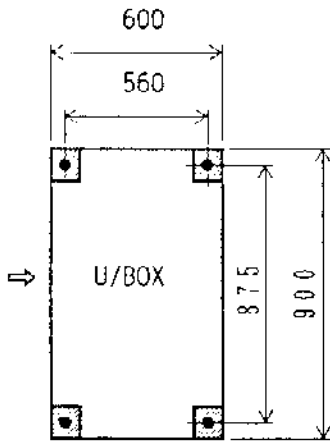


Base plate : t=10mm, W=100mm

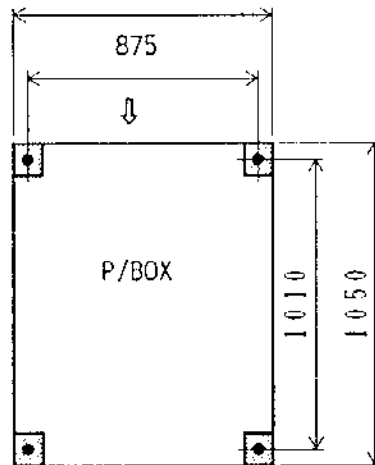
(2) Facility box



(3) Utility box

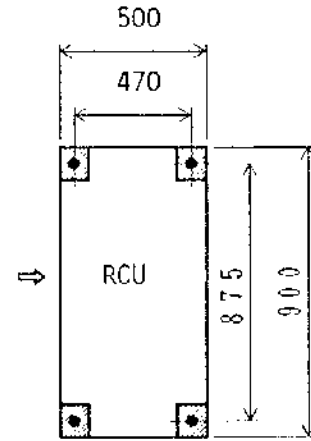


(4) Power box
900



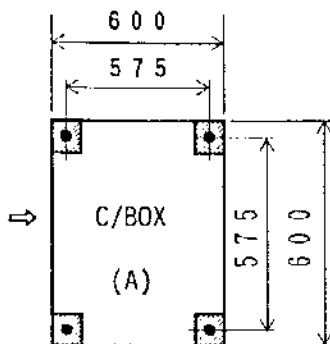
Base plate : t=5mm, W=75mm

(5) Rapid cooling down unit

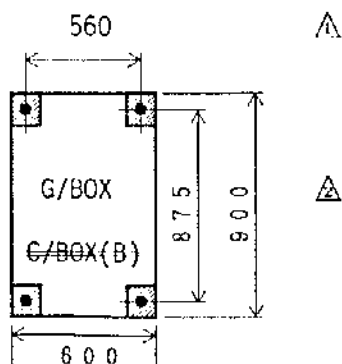


Remarks : (a) ⇨ indicates the operational flow.

(6) Console box (A)



(7) Gas box
-Console Box (B)



2. Weight of Units

	Name	Weight	Remarks
1	Furnace	approx.1750 kg	Includes the carrier I/O port.
2	Facility box	" 350 kg	
3	Utility box	" 400 kg	
4	Power box	" 1000 kg	
5	Rapid cooling down unit	" 250 kg	
6	Console Box (A)	" 150 kg	
7	Gas Box	" 350 kg	

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2-4 Utility list

No	Item	Spec.	Capacity	Fitting	Connection	Purpose	
1	Power Supply	Heater, RCU, CTL, PUMP AC 480V φ3 60Hz	121.2 =105kVA	Breaker (A)	Power Box		
2	Gas	House N ₂	3~5kg/cm ²	10 ℓ /min	1/4" VCR	U/BOX Ciling	Carrier and purging
		Cylinder N ₂ (1)	3~5kg/cm ²	2 ℓ /min	1/4" VCR	U/BOX Ciling	Purging
		NH ₃	2 kg/cm ²	2 ℓ /min	1/4" VCR	U/BOX Ciling	Processing
		SiH ₄	2 kg/cm ²	0.5 ℓ /min	1/4" VCR	U/BOX Ciling	Processing
		SiH ₂ Cl ₂	2 kg/cm ²	0.2 ℓ /min	1/4" VCR	U/BOX Ciling	Processing
		Cylinder N ₂ (2)	2 kg/cm ²	5 ℓ /min	1/4" VCR	U/BOX Ciling	Purging
		ClF ₃	2 kg/cm ²	5 ℓ /min	1/4" VCR	U/BOX Ciling	Cleaning
		O ₂	2 kg/cm ²	10 ℓ /min	1/4" VCR	U/BOX Ciling	Processing
		House N ₂	5~7kg/cm ²	—	1/4" SWG	G/BOX Ciling	Driving air operated valve
		House N ₂	3~5kg/cm ²	37 ℓ /min	1/4" VCR	G/BOX Ciling	Carrier and purging
		Ar	2 kg/cm ²	10 ℓ /min	1/4" VCR	G/BOX Ciling	Processing
		H ₂	2 kg/cm ²	10 ℓ /min	1/4" VCR	G/BOX Ciling	Processing
		House N ₂	5~7kg/cm ²	620 ℓ /min	φ 1/2" VCR	G/BOX Ciling	N ₂ purge unit
		House N ₂	5~7kg/cm ²	310 ℓ /min	1/2" VCR	For Pump	Dilution and pump purging
3	Water	Furnace	△3kg/cm ²	13.0 ℓ /min	3/4" SWG	FNC.lower re	
		RCU	△3kg/cm ²	30.0 ℓ /min	3/4" PT FEMALE	Ceiling	
		Pump	△3kg/cm ²	7 ℓ /min	3/8"NPT FEMALE	Pump unit	
		F/Box	△3kg/cm ²	3 ≈ 2 ℓ /min	3/8" SWG	Ceiling	TMP
		Compressor	△3kg/cm ²	6~7.2ℓ/min	1/2" PT FEMALE	Unit rear	
4	Exhaust	Heat Exh.	—	4.5m ³ /min	φ5" Lap Joint	FNC.upper re	
		Process Exh.	—	0.3m ³ /min	NW40	Pump TOP	
		General Exh.	—	6m ³ /min	φ8" Lap Joint	U/BOX TOP	
		General Exh.	—	4m ³ /min	φ8" Lap Joint	F/BOX TOP	
		Heat Exh.	—	8m ³ /min	φ8" Lap Joint	RCU (TOP)	
		General Exh.	—	0.5m ³ /min	φ50mm pipe	Pump (TOP)	
		Vent	—	—	3/8"VCR(TOP)	F/BOX BTM	
		General Exh.	—	6m ³ /min	φ8" Lap Joint	G/BOX Top	

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No.	Item		Spec.	Capacity	Fitting	Connection	Remarks
5	Resistance	Ground	<100Ω				
	-	Insulation	<100MΩ				
6	Drain	Furnace	————	————	3/8" SWG	FNC. lower rear	Relief line
		RCU	————	————	1/4" SWG	Ceiling	Relief line
		F/BOX	————	——	1/4" SWG	Box Bottom	Relief line
7	Vacuum line	Pump EXH	————	————	ISOMF100 Flange	Box Bottom	
[Note] (※) RCU : Rapid cooling down unit							

Special Note

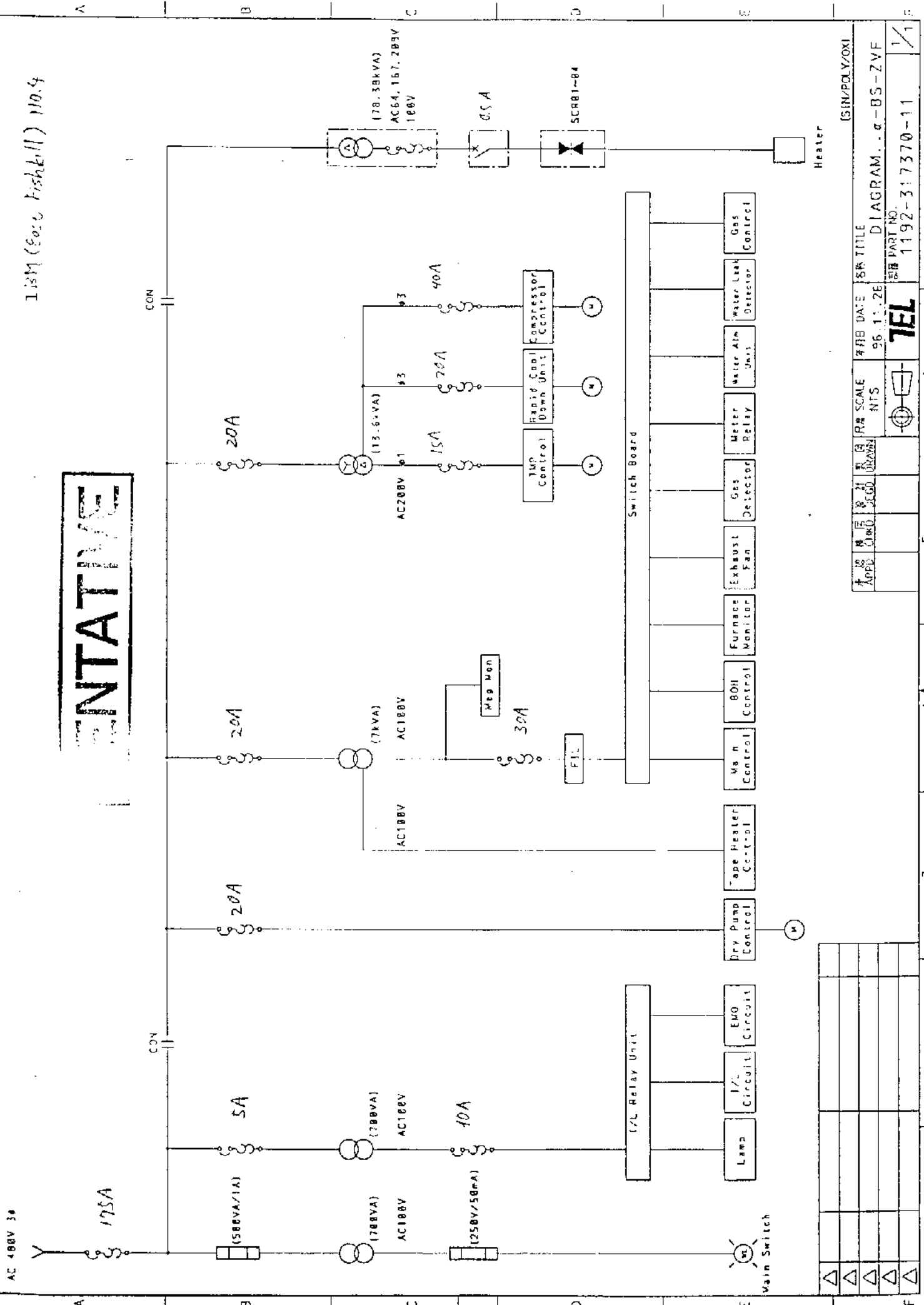
- (1) The capacity indicated is for one tube.
- (2) Every lap joint shall have a mating flange (with the packing manufactured by Viton Co. attached.)
- (3) Every gas fitting shall have a mating fitting and pipe (100mmL).
- (4) There is no dedicated pressure regulator and filter for the cooling water supply.
- (5) The quality of cooling water must be on the level of city water.
○ Please attach the filter (100 μ m) on your water line.

PH	M Alkalinity	HARDNESS	Fe ²⁺	Cu ⁺	Zn ²⁺	SO ₄ ²⁻	Cl ⁻	NH ₄ ⁺	resistance
7~8	<50ppm	<50ppm	<0.3 ppm	<1.0 ppm	<1.0 ppm	<20ppm	<15ppm	<0.1 ppm	6.5~10 K Ω cm

- (6) Since the scavenger exhaust becomes very hot at the time of loading and unloading (80~100°C), the interface must be made with a stainless steel duct.
- (7) Electric power Wiring indicated by the dashed lines will be supplied by your company.
- (8) Electric power Wiring indicated by the solid lines will be fabricated at our facilities.

ISM (East Fishkill) 110.4

SCHEMATIC



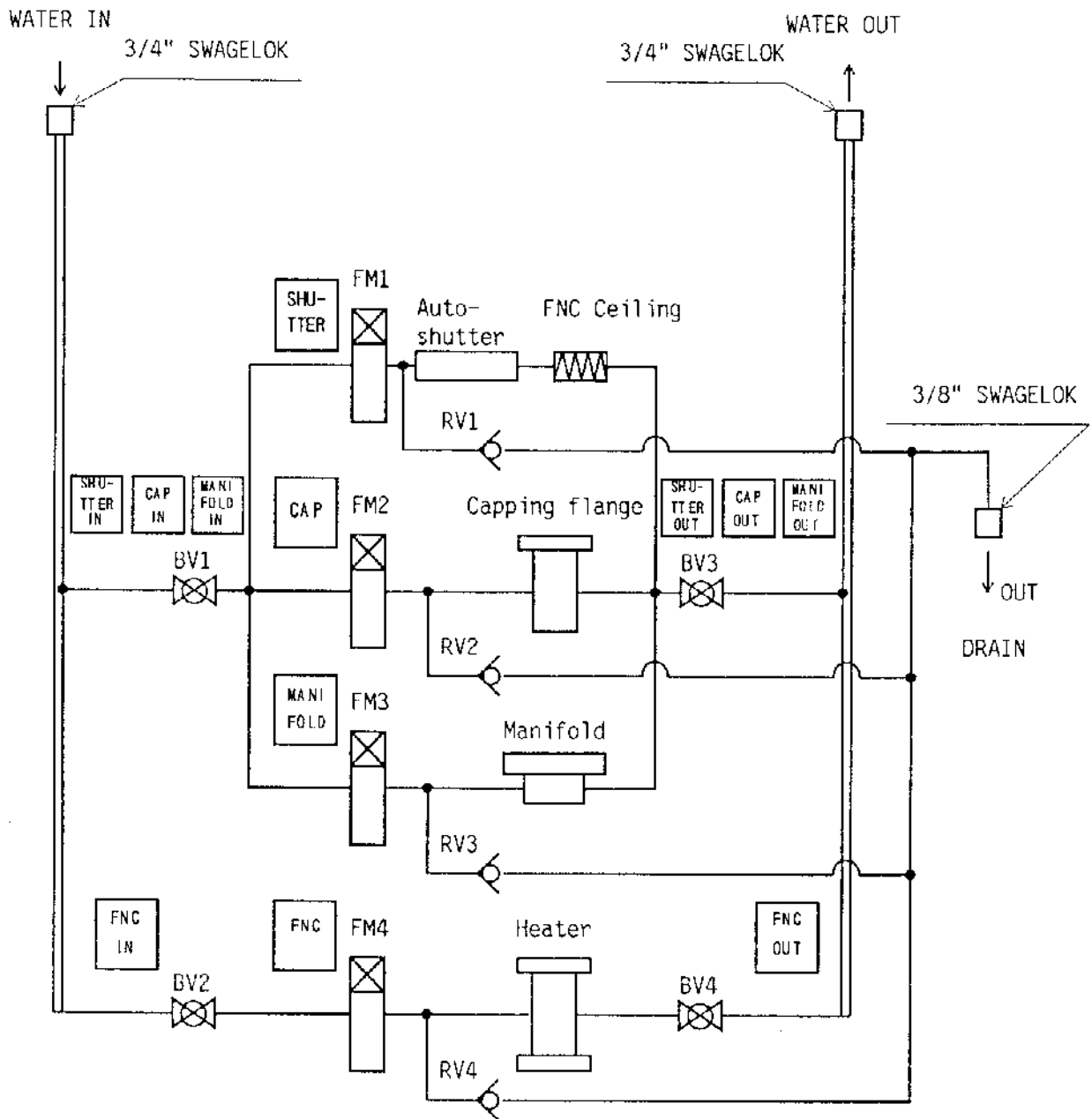
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			NTS		96.11.28				
TEL									
ISIM/POLY/OXI						DIAGRAM. - BS-ZVF			
PART NO. 1192-317370-11						1/1			

△									
△									
△									
△									

2-6. Cooling Water Piping System Diagram

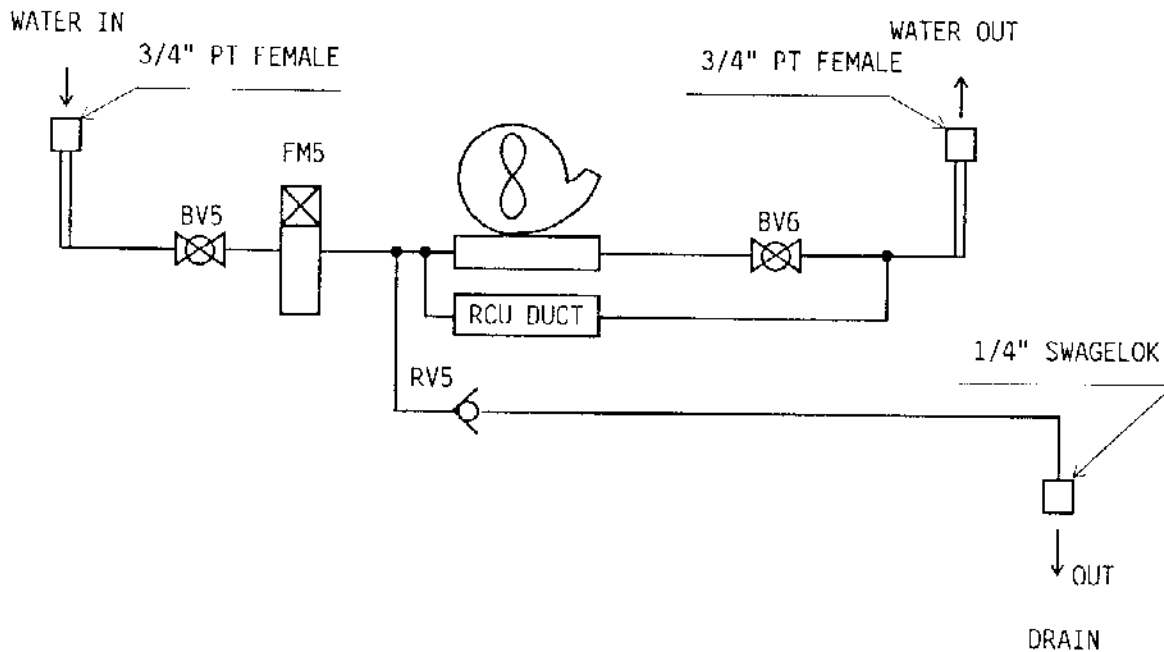
1. FURNACE



	Normal flow rate	full scale flow rate	Lower limit for alarm
FM 1	2 ~ 3 ℓ/min	5 ℓ/min	1.5 ℓ/min (REED SWITCH)
FM 2	0.5~0.6 ℓ/min	1.5 ℓ/min	0.4 ℓ/min (REED SWITCH)
FM 3	0.9~1.0 ℓ/min	1.5 ℓ/min	0.4 ℓ/min (REED SWITCH)
FM 4	2 ~ 3 ℓ/min	5 ℓ/min	1.6 ℓ/min (REED SWITCH)

	NAME	TYPE	Qty	Remarks
BV 1,3	BALL VALVE	UBV-14D-BU	2	FUJIKIN
BV 2,4	BALL VALVE	UBV-14C-BU	2	FUJIKIN
FM 1,4	FLOW METER	P-831-3A-5L-6S-L-NO	2	TOKYO KEISO
FM 2,3	FLOW METER	P-831-3A-1.5L-6S-L-NO	2	TOKYO KEISO
RV 1~4	RELIEF VALVE	SS-4CA-50	5	NUPRO

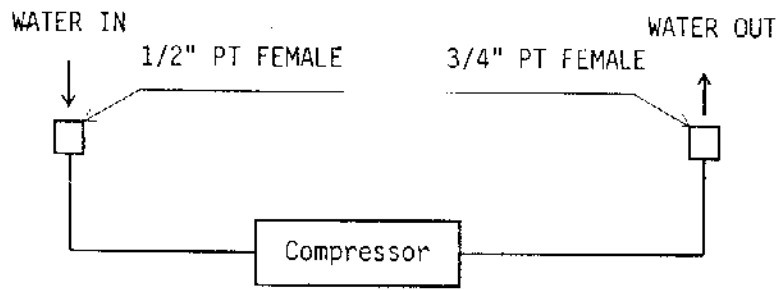
2. RAPID COOL DOWN UNIT



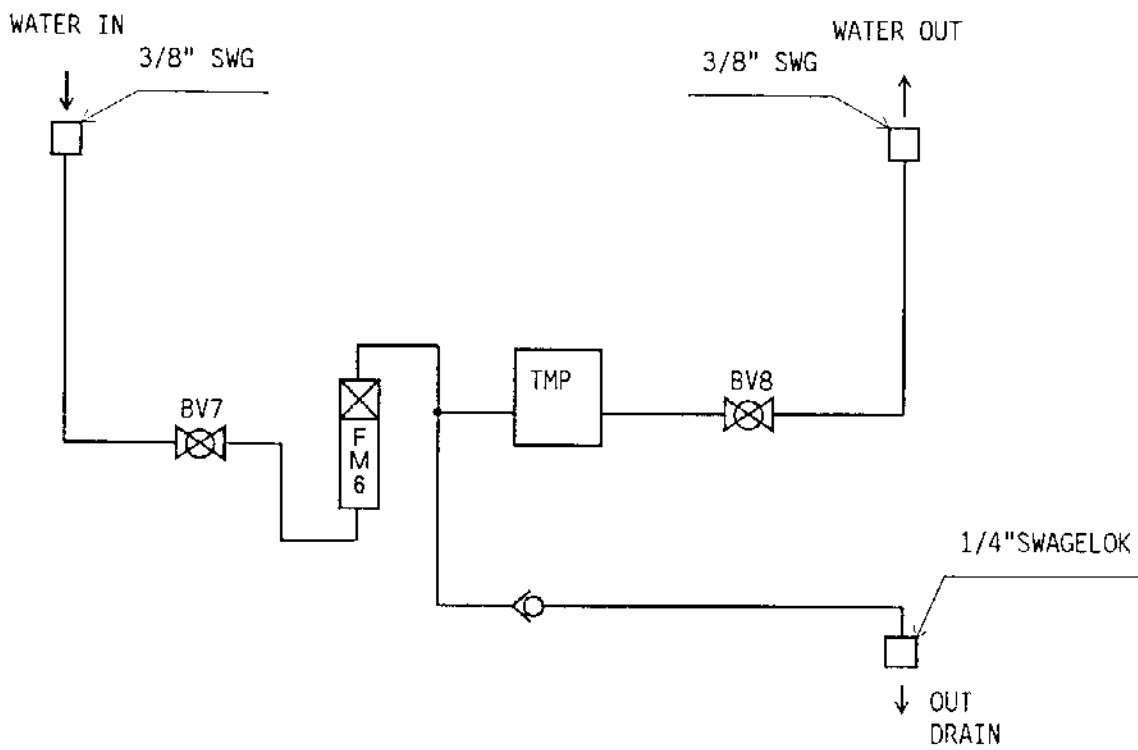
	Normal flow rate	full scale flow rate	Lower limit for alarm
FM 5	2 0 ℓ/min	3 0 ℓ/min	1 0 ℓ/min (REED SWITCH)

	NAME	TYPE	Qty	Remarks
BV 5,6	BALL VALVE	UBV-14D-BU	2	FUJIKIN
FM 5	FLOW METER	P-510-LA-30L-12P-L-NO-N-V	1	TOKYO KEISO
RV 5	RELIEF VALVE	SS-4CA-50	1	NUPRO

3. Compressor unit



4. F/BOX



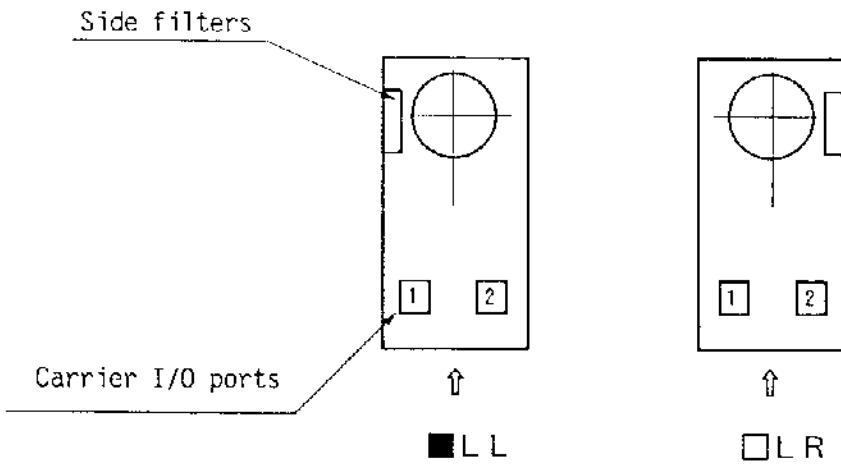
	Normal flow rate	full scale flow rate	Lower limit for alarm
FM 6	3 l/min	5 l/min	1.5 l/min (REED SWITCH)

	NAME	TYPE	Qty	Remarks
BV 7,8	BALL VALVE	UBV-14C-BU	2	FUJIKIN
FM 6	FLOW METER	P-831-3A-5L-6S-L-NO	1	TOKYO KEISO
RV	RELIEF VALVE	SS-4CA-50	1	NUPRO

2-7 Color Classification of the Units

1. Coated colors of the system:

	Unit	Color	Munsell No. (approx.)
1	Furnace unit		
	(1) Frame	White	2.5PB 9/1
	(2) Door panel	White	2.5PB 9/1
	(3) Operating box	White	2.5PB 9/1
	(4) Side filter	White	2.5PB 9/1
2	Utility box, Gas Box △		
	(1) Frame	White	2.5PB 9/1
	(2) Door, Panel	White	2.5PB 9/1
3	Rapid Cool Down Unit		
	(1) Frame	White	2.5PB 9/1
	(2) Door, Panel	White	2.5PB 9/1
4	Facility Box		
	(1) Frame	White	2.5PB 9/1
	(2) Door, Panel	White	2.5PB 9/1
5	Power Box		
	(1) Frame	White	2.5PB 9/1
	(2) Door, Panel	White	2.5PB 9/1
6	Console Box (A) △		
	(1) Frame	White	2.5PB 9/1
	(2) Door, Panel	White	2.5PB 9/1



How the directional orientation is defined:

