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Specification No. C701138-VS-01-02

IBM

Microelectronics Div. 256M DRAM Project

Ms. Radhika Srinivasan

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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)	9	
			② 3 - Corrected (2 ℓ/min → 3 ℓ/min)	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.	39	
				② 2 - (4) - ③ Corrected.	40
				③ Drawing for flange deleted.	41
				④ Gas flow chart and parts list changed.	44~49
		9	Control System Specification ① 4 - (1) Changed	54	
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③ 6 - (1) Changed	55				
④ 6 - (3) Added	55				
10	Safety specification ① Valve Interlock Table Changed.	67~76			
		② Alarm I/O Table changed.	77~82		
2	Mar.18.'97	1	System Configuration Table ① 3 - (6) Changed	3	
			② 3 - (10) Added	3	
		2	Utility List Changed.	9	

REV.No	DATE	ITEM	CONTENTS	PAGE
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			③ Gas flow chart and parts list changed	44~49
		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±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

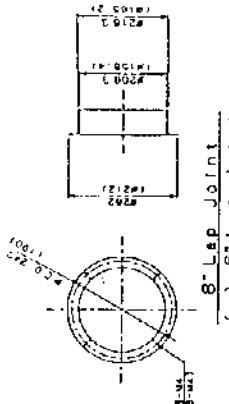
2-1 System Configuration Table

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	

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	

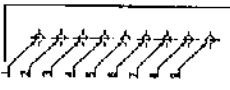
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No.	Component name	Type/Model	Qty	Remarks
8.	Others jig related items			
(1)	Base plate		1	
(2)	Instruction Manual	Cleaned paper	1	
		Normal paper	3	
		Floppy disk	1	
9.	Customer prepared items			
(1)	Dry Pump		1	
10.	N ₂ Purge System			
(1)	N ₂ purge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



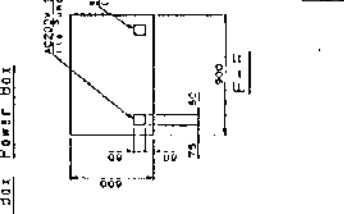
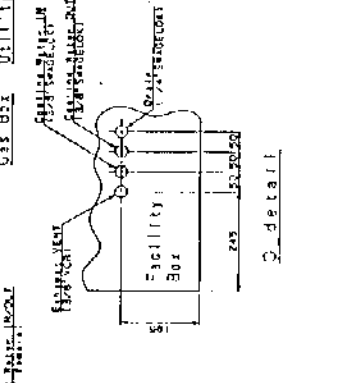
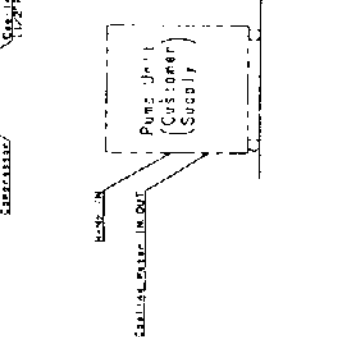
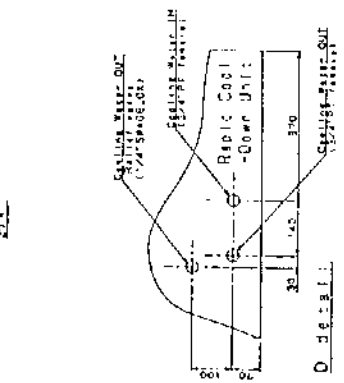
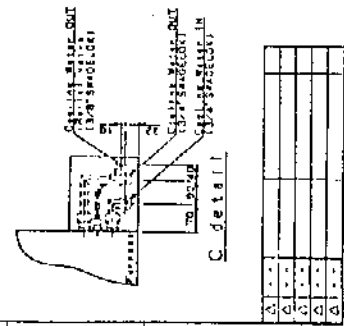
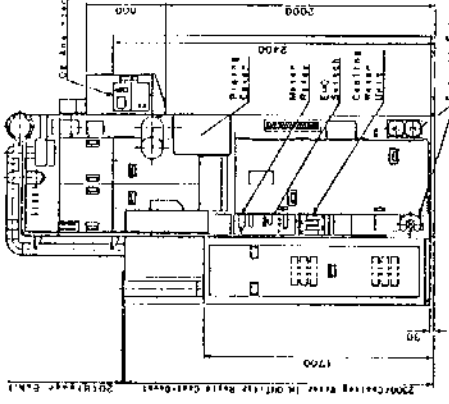
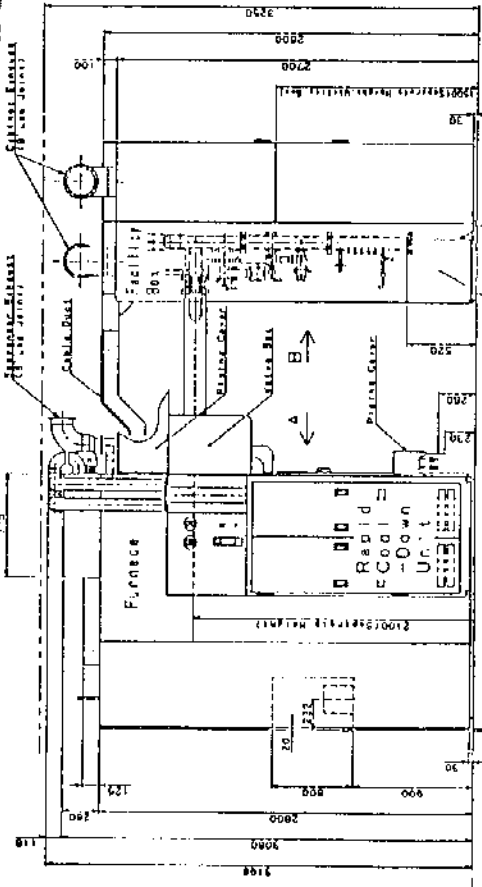
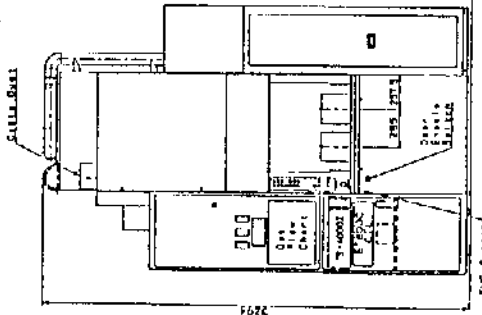
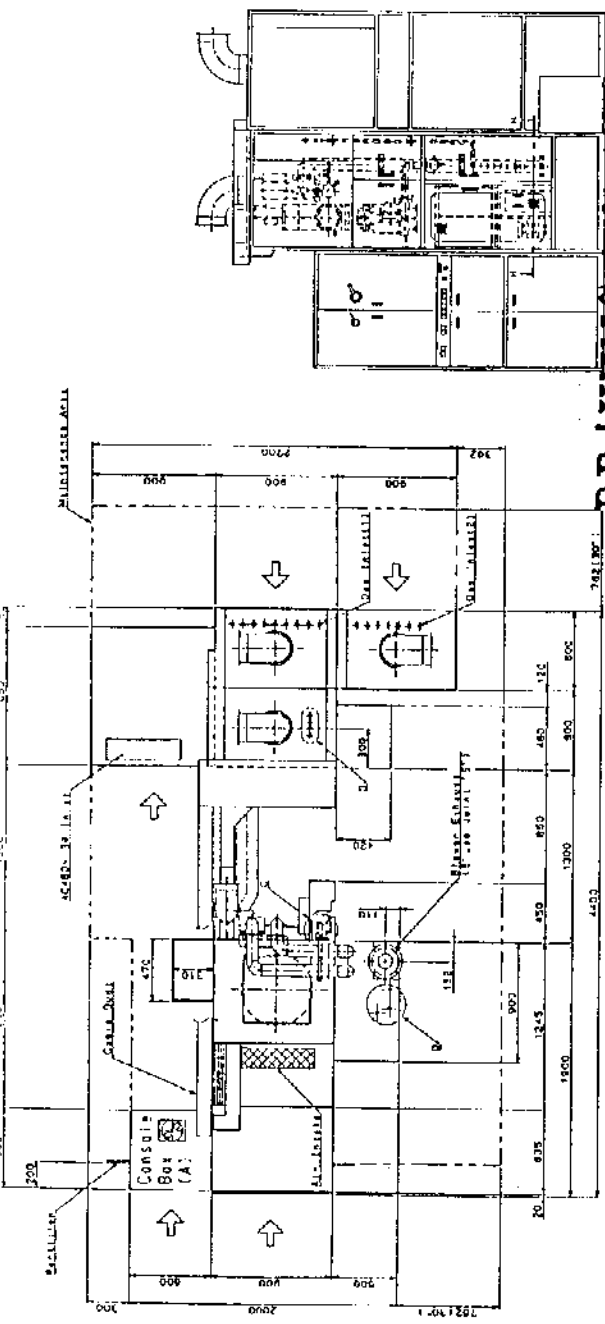
Gas Inlet

1	Gas Inlet	Utility Box
2	Gas Inlet	Utility Box
3	Gas Inlet	Utility Box
4	Gas Inlet	Utility Box
5	Gas Inlet	Utility Box
6	Gas Inlet	Utility Box
7	Gas Inlet	Utility Box
8	Gas Inlet	Utility Box
9	Gas Inlet	Utility Box
10	Gas Inlet	Utility Box



1	Gas Inlet	Utility Box
2	Gas Inlet	Utility Box
3	Gas Inlet	Utility Box
4	Gas Inlet	Utility Box
5	Gas Inlet	Utility Box
6	Gas Inlet	Utility Box
7	Gas Inlet	Utility Box
8	Gas Inlet	Utility Box
9	Gas Inlet	Utility Box
10	Gas Inlet	Utility Box

DRAWING FOR APPROVAL



ALPHA-8S-Z(8" x 10" x 2.5")
1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000

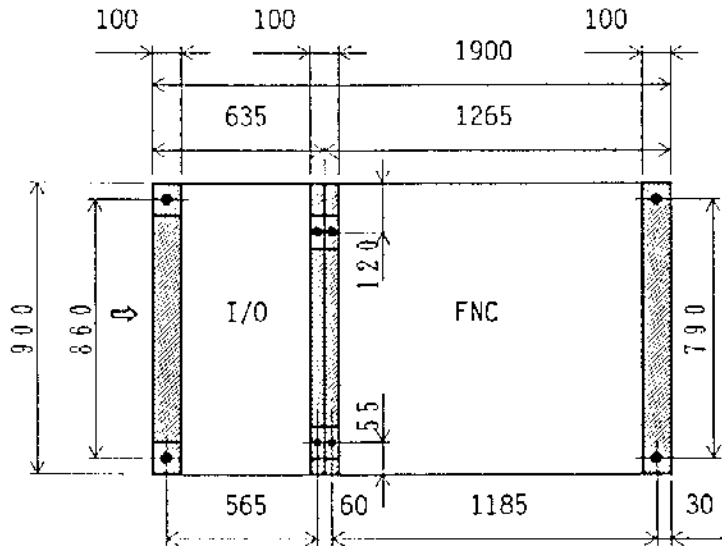
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SETUP

2-3 Layout of Base Plates and Weight of Units

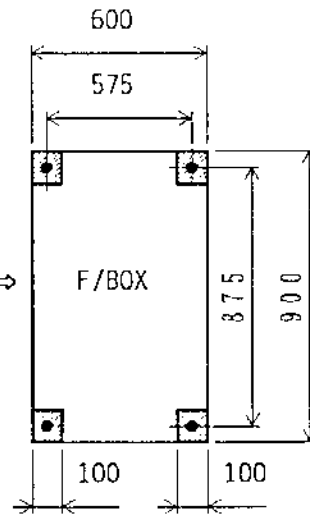
1. Layout of base plates

(1) Furnace unit

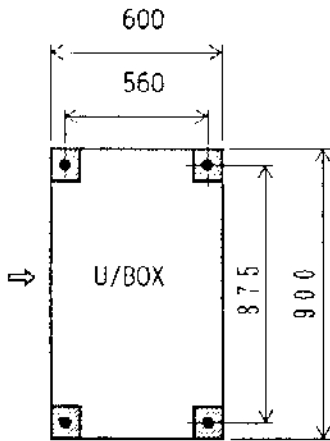


Base plate : t=10mm, W=100mm

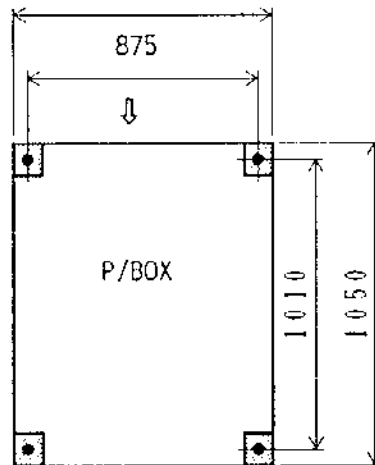
(2) Facility box



(3) Utility box

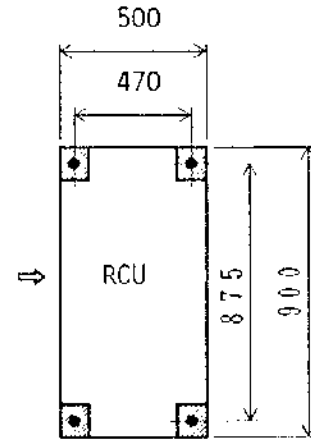


(4) Power box
900



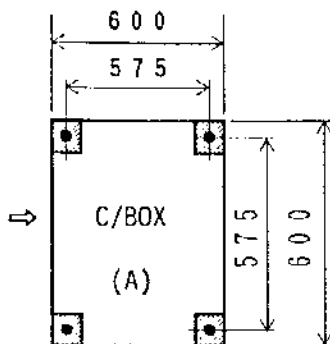
Base plate : t=5mm, W=75mm

(5) Rapid cooling down unit

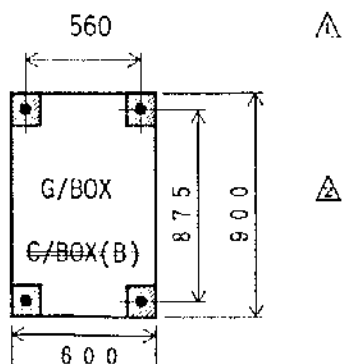


Remarks : (a) ⇨ indicates the operational flow.

(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

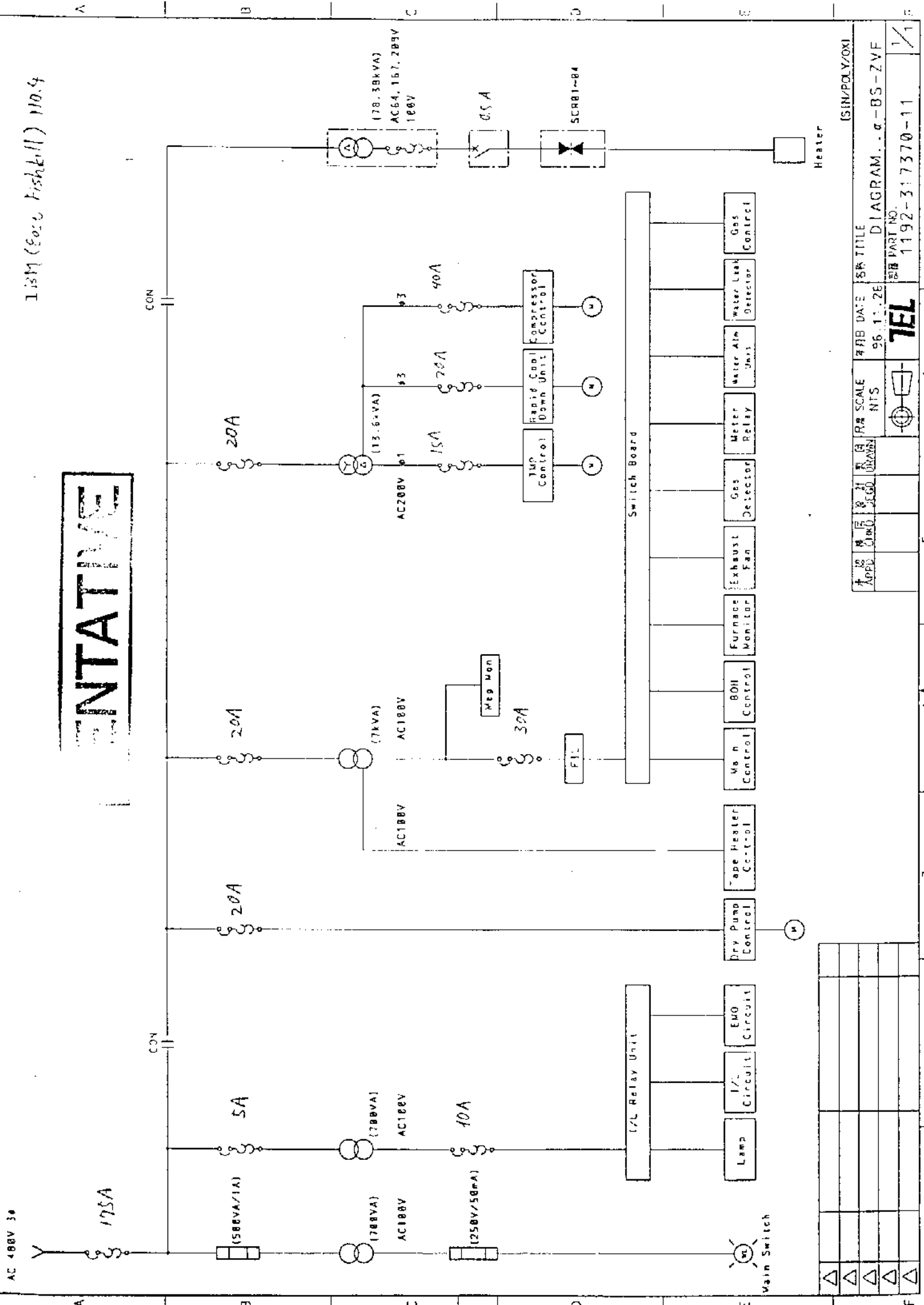
- (1) The capacity indicated is for one tube.
- (2) Every lap joint shall have a mating flange(with the packing manufactured by Viton Co. attached.)
- (3) Every gas fitting shall have a mating fitting and pipe(100mmL).
- (4) There is no dedicated pressure regulator and filter for the cooling water supply.
- (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

PLANT WIRING



△ changed

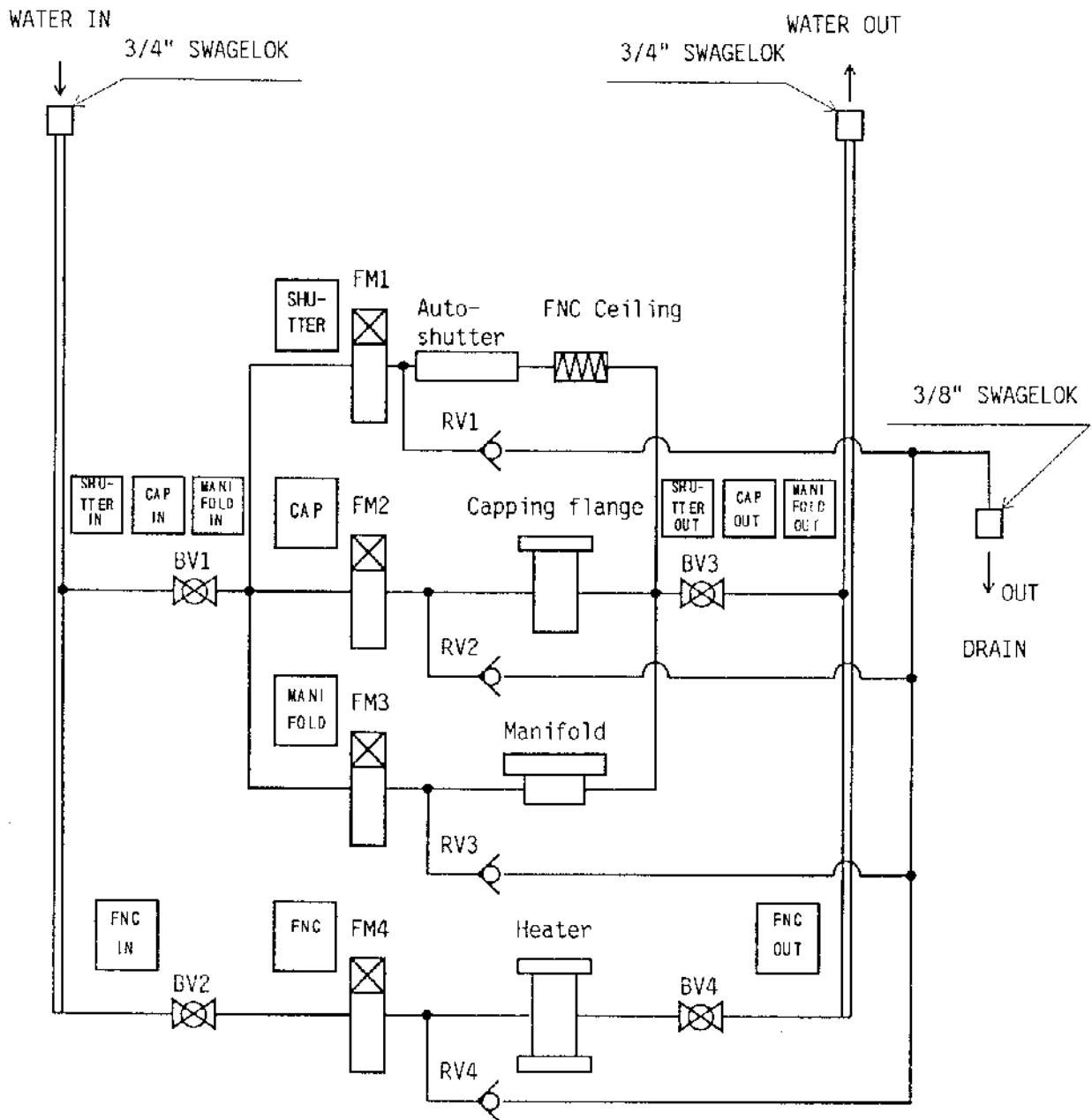
1	2	3	4	5	6
APPROVED	DATE	SCALE	REV	DATE	TITLE
		NTS		96.11.28	DIAGRAM. - BS-ZVF
					1192-317370-11
					1/1

△					
△					
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2-6. Cooling Water Piping System Diagram

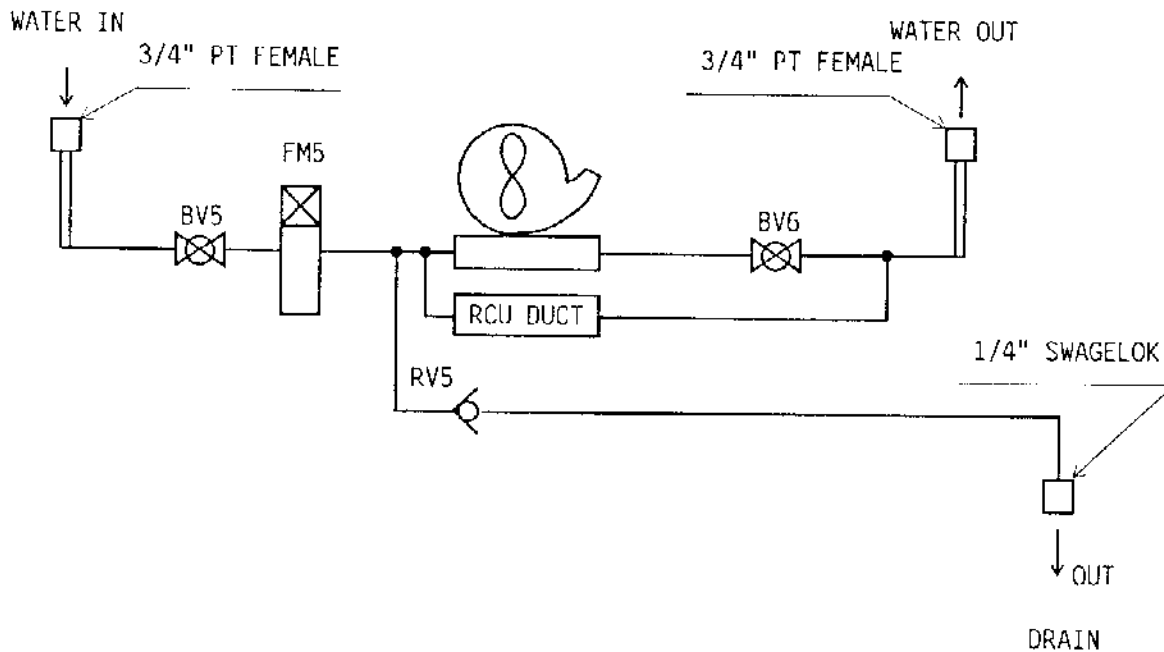
1. FURNACE



	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

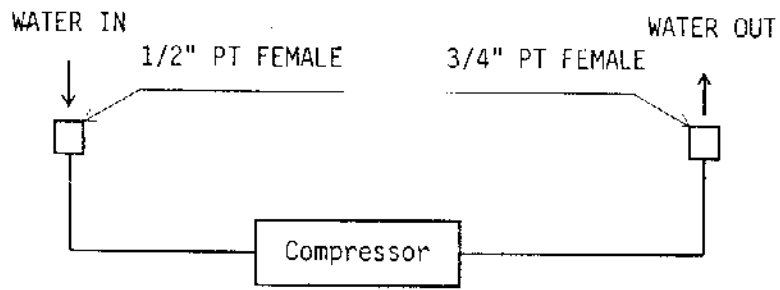
2. RAPID COOL DOWN UNIT



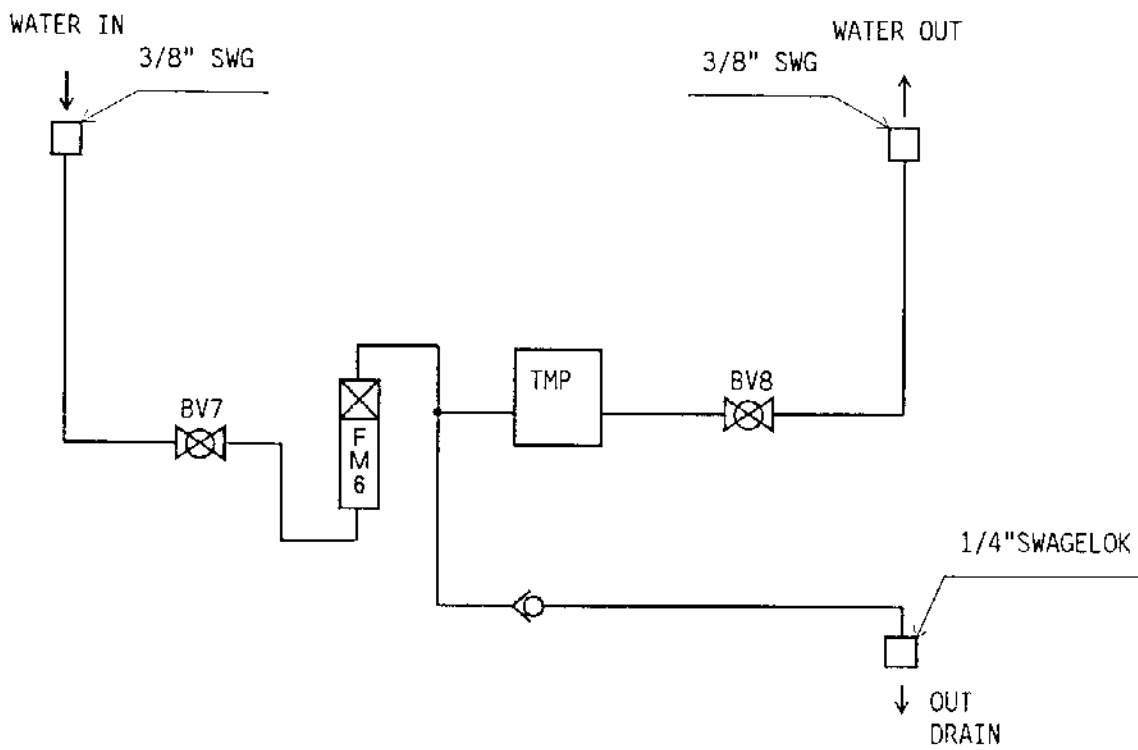
	Normal flow rate	full scale flow rate	Lower limit for alarm
FM 5	2 0 ℓ/min	3 0 ℓ/min	1 0 ℓ/min (REED SWITCH)

	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



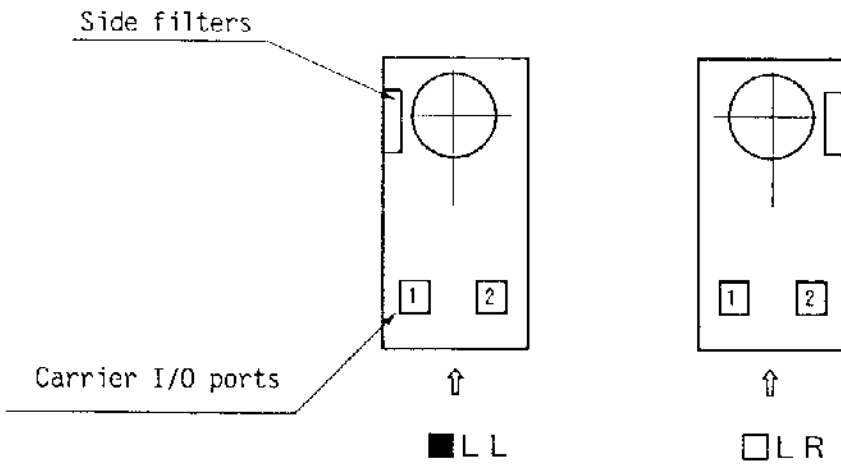
	Normal flow rate	full scale flow rate	Lower limit for alarm
FM 6	3 l/min	5 l/min	1.5 l/min (REED SWITCH)

	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:

