FINAL DRAWING

PACKAGE TYPE AIR CONDITIONER FOR

1) E.C.R

(MODEL : HIP-08WG)

2) GALLEY

(MODEL : HIP-08WDE)

3) WORKSHOP

(MODEL : HIP-05WGD)

- **YARD** : **JIANGNAN SHIPYARD**
- **HULL NO.** : **2431/2432/2433**
- **DATE** : **2009. 12. 23.**

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

PACKAGE A/C FOR ENGINE CONTROL ROOM	**A**
PACKAGE A/C FOR GALLEY	**B**
PACKAGE A/C FOR WORKSHOP	**C**
COMPRESSOR INSTRUCTION MANUAL	**D**
CONTROLLER OPERATING MANUAL	**E**
MISCELLANEOUS INSTRUCTION MANUAL - THERMOSTATIC EXPANSION VALVE - SOLENOID VALVE - PRESSURE CONTROLER - DRYER	**F**

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA
Co., Ltd.
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PACKAGE A/C FOR ENGINE CONTROL ROOM

-GENERAL SPECIFICATION
-GENERAL DESCRIPTION
-TECHNICAL SPECIFICATION
& SUPPLY SCOPE
-DIMENSION SKETCHES
-PIPING DIAGRAM
-ELECTRIC DIAGRAM
-SPARE PARTS

A

FINAL DRAWING

PACKAGED AIR CONDITIONER
FOR
ENGINE CONTROL ROOM
(MODEL : HIP-08WG)

- **YARD** : JIANGNAN SHIPYARD
- **HULL NO.** : 2431/2432/2433
- **SHIP TYPE** : 5,100 TEU
- **DATE** : 2008. 05. 02.

GENERAL SPECIFICATION

*** YARD** : **JAANGNAN SHIPYARD**

*** YARD NO** : **2431/2432/2433**

*** SHIP TYPE** : **5,100TEU**

*** CLASSIFICATION** : **GL**

*** APPLICATION** : **ENGINE CONTROL ROOM**

*** EQUIPMENTS** : **PACKAGE TYPE UNIT COOLER**

*** REFRIGERANT** : **R-404A**

*** COOLING WATER** : **FRESH WATER 36℃**

*** DESIGN CONDITION**

IN SUMMER	IN WINTER
Outside : -℃ DB, -% R.H	Outside : -℃ DB, -% R.H
Inside : -℃ DB, -% R.H	Inside : -℃ DB, -% R.H
Fresh air : / Return air :	Fresh air : / Return air :

GENERAL DESCRIPTION

1. Cooling system

(1) Cooling method	**:**	**R-404A direct expansion central cooling system**
(2) Temperature control	**:**	**Automatically controlled by thermostatic expansion valve and thermostat which is actuated by room temperature.**

2. Heating system

(1) Heating method	**:**	**N/S**
(2) Temperature control	**:**	**N/S**

3. Ventilation system

(1) Ducting method	**:**	**Grill type**
(2) Air velocity	**:**	**Low velocity**
(3) Air pressure	**:**	**Low pressure**

4. Power source

(1) Main circuit	**:**	**AC440V x 3P x 60Hz**
(2) Control circuit	**:**	**AC220V x 1P x 60Hz**

5. Painting color	**:**	**RAL 9010 (BASE COLOR : MUNSELL NO.1.5YR 4.9/0.7)**

TECHNICAL SPECIFICATION & SUPPLY SCOPE

1. Packaged Air conditioner ---------- 1Unit

. Model : HIP - 8WG

. Refrigerant : R-404A

. Cooling capacity : 25,000 kcal/h

. Power source : AC440V x 3P x 60Hz

. Control source : AC220V x 1P x 60Hz

2. Components of Water cooled Package air conditioner

(1) Compressor ---------- 1SET

. Type : One-stage hermetic receiprocating type,

. Model : MTZ-80

. Manufacturer : MANEUROP DANFOSS INC

. Cooling capacity : 25,000 kcal/h at Te= +5℃ & Tc= +48℃

. Capacity regulation : 100% - 0%

. Power comsumption : 9.3 Kw

. Rating current : 13A (efficiency 84%) Max.18A

. Power source : AC440Vx 3P x 60Hz

(2) Marine water-cooled condenser ---------- 1SET

. Type : Horizontal shell & tube type

. Capacity : 30,000 kcal/h

. Size : Φ216 X 800EL

. Material : Tube = Copper

: Tube plate = SB 410

. Water flow rate : 7.0 ㎥/hr

. Pressure drop : 2.0 mAq

(3) Control & Safety Devices

. Dual pressure switch :1 piece

High pressure setting : Cut-out 2.4 MPa(24kg/cm2)

Cut-in Manual reset

Low pressure setting : Cut-out 0.2MPa(2kg/cm2)

Cut-in Manual reset (Apply to Anti System)

. High pressure gauge : 1 piece (Range : 0 ~ 3.5Mpa)

. Low pressure gauge : 1 piece (Range : -76cmHg ~ 1.5Mpa)

(4) Charging chemicals ---------- 1 LOT

. Refrigerant : 10kg (R-404A)

. Refrigerant Oil : 1.8Liter (Polyolester Oil 160PZ)

(5) Evaporator ---------- 1 SET

. Type : Multi-pass crossed fin tube type

. Material : Fin=Coating Aluminum / Tube = Copper

. Cooling method : R-404A direct expansion cooling system

. Cooling capacity : 25,000 kcal/h

. Evaporating t0mperature : 5℃

. Accessories : 1 piece – Distributor

(6) Fan with motor ---------- 1 SET

. Type : Double suction multi blade Centrifugal fan

. Air flow rate : 70 ㎥/min (4,200㎥/h)

. External Static Press : 15mmAq

. Motor Output : 0.35 kW x 6Poles

. Rated current : 1.2A(Max. current 2.0A)

. Power Source : AC440V x 3P x 60Hz

(7) Air – filter ---------- 2 SET

. Type : Washable and removable type

. Size : 480x375x5t

(8) Other components and accessories, fitted in/on PAC unit ----- 1LOT

. Expansion valve on liquid line : 8RT

. Service angle valve : 5/8"

. Filter drier on liquid line : 5/8"

. Safety valve on condenser : 5/8"

. Gas inlet pipe connection : 1 1/8"

. Liquid outlet pipe connection : 5/8"

. Power in cable gland : 30a

. External signal cable gland : 20c

. Cooling water inlet pipe connection : JIS 5K 40A flange

. Cooling water outlet pipe connection : JIS 5K 40A flange

(9) Control Box with Starter Panel ----- 1LOT

. Type : Dead-front built-in type,
Mounted on inside of the front panel of PAC

. Components

: Manual off/on selector switch for compressor

: Power supply Indicating lamps

:Alarm indicating lamps

: Magnetic contactor with over-current relays

:Transformer(440/220V)for control voltage

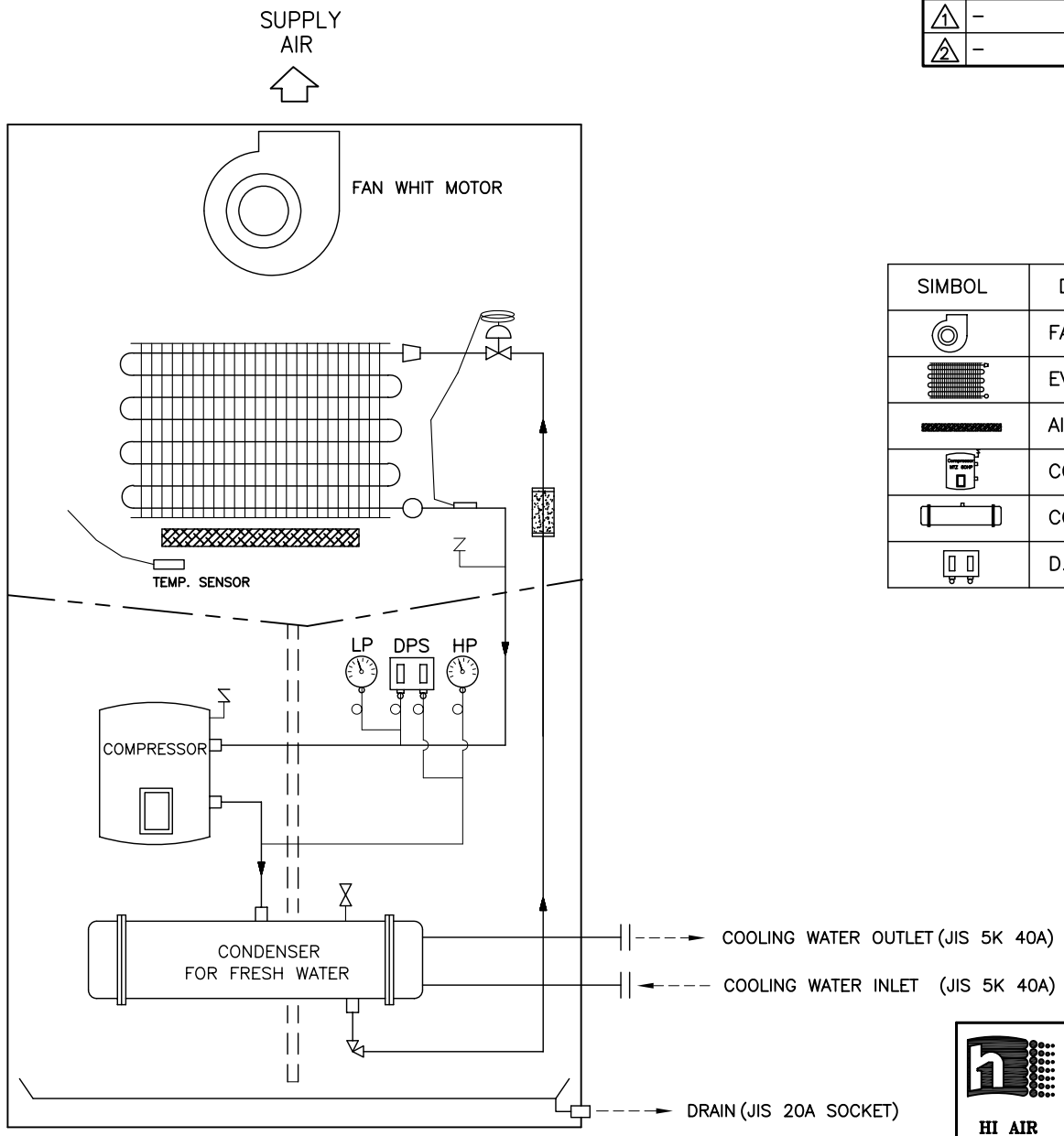
:Automatic indicator temperature controller

:Other components

3. Standard Spare parts ---------- 1LOT

. 1 Set of spare parts & tools, according to spare parts drawing

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–



PARTS TABLE

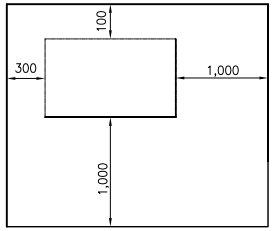
SIMBOL	DESCRIPTION	SIMBOL	DESCRIPTION
	FAN & MOTOR		EXPANSION V/V
	EVAPORATOR		PRESS. GAUGE
	AIR FILTER		FILTER DRIER
	COMPRESSOR		SAFETY V/V
	CONDENSER		CHARGING & SERVICE V/V
	D.P.S		CHECK NIPPLE

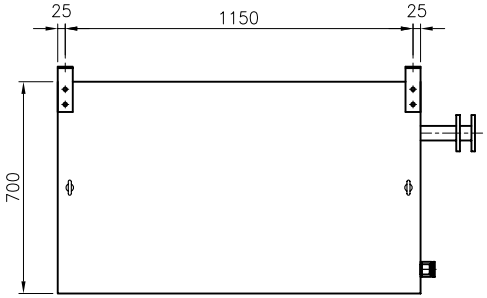
HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO. : 2431~2433		Scale : N/S	A 4
TITLE : FLOW DIAGRAM(R-404A)		Drawn by : YHK	Date:2007.07.26
		Check by : BCA	Approv. by:
TYPE : HIP-8WG APPLI.: E.C.R		DWG No.: HIP-8WG-01	Rev. 0

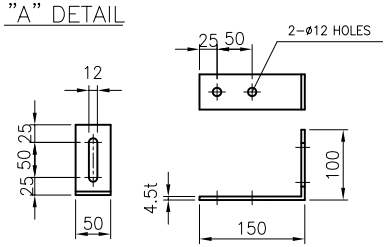
NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	CABLE GLAND REVISION	–	–
2	–	–	–	–

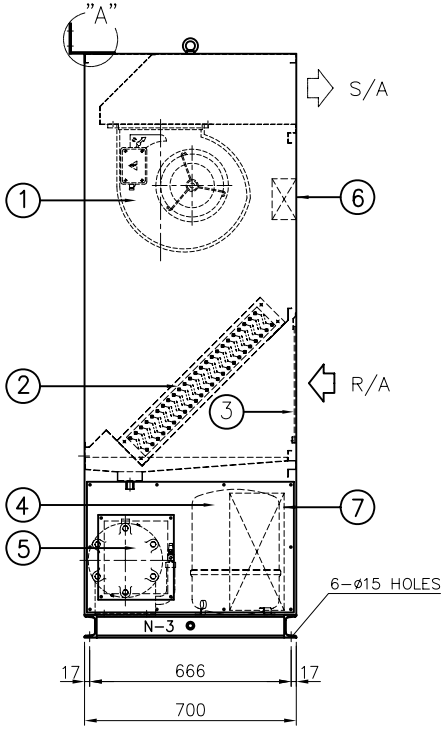
MIN.SERVICE SPACE.

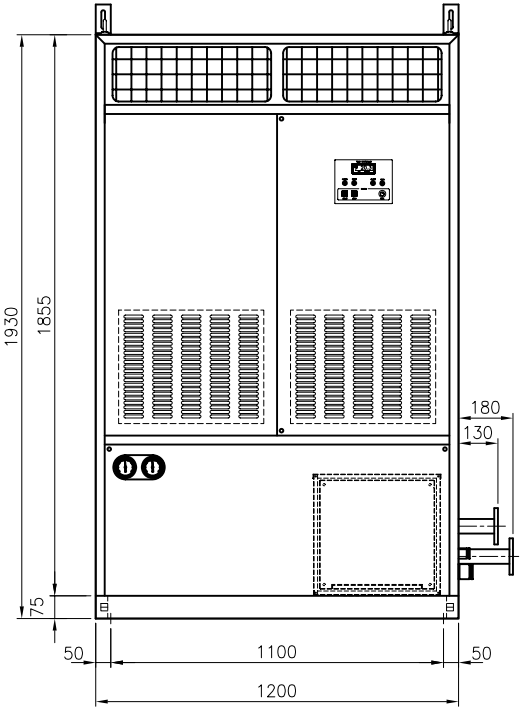


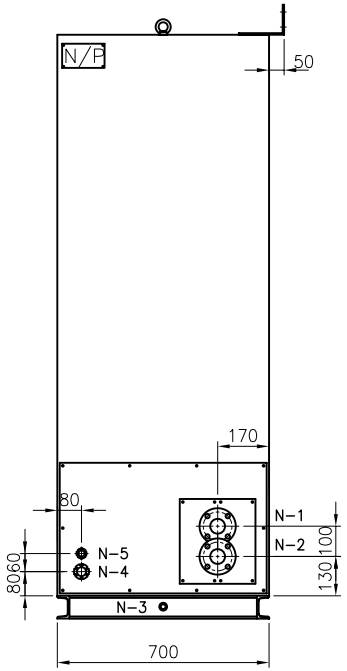


"A" DETAIL









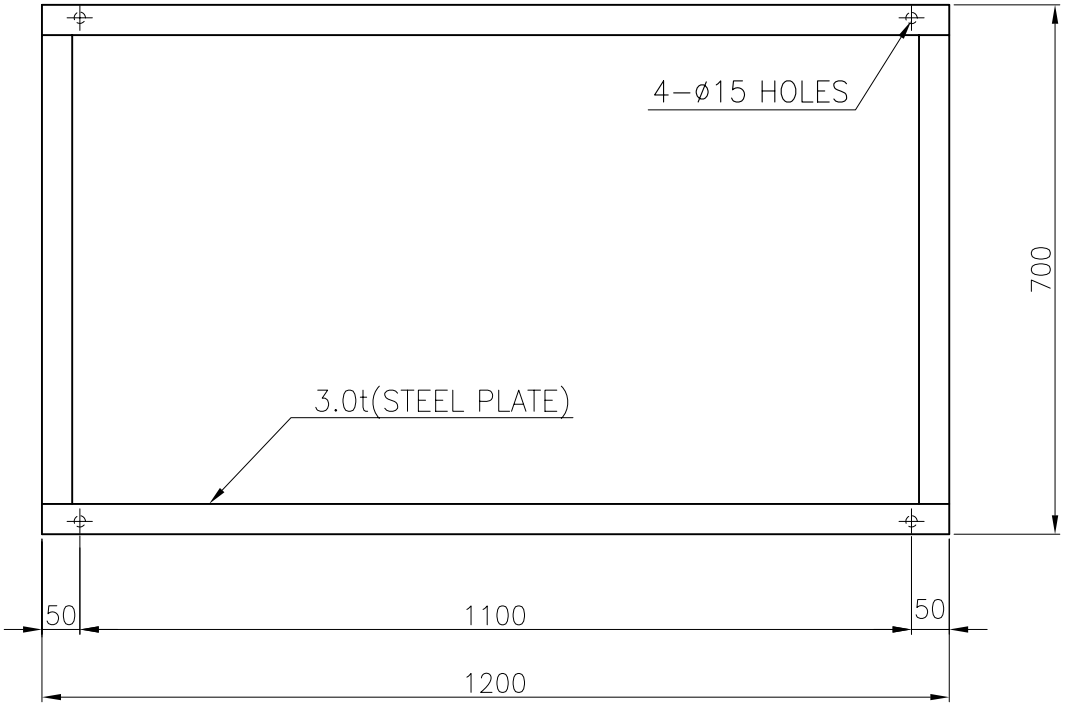
* WEIGHT : 460 kg
* COLOR : RAL 9010 (1)

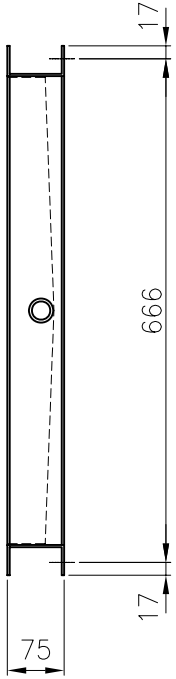
N-5	CABLE GLAND	1	20c	EXT. WIRING
N-4	CABLE GLAND	1	30a	POWER INLET
N-3	DRAIN	1	20A	SOCKET
N-2	WATER INLET	1	40A	FLANGE 5K
N-1	WATER OUTLET	1	40A	FLANGE 5K
7	CONTROL BOX	1		450x400x180 (410x360)
6	SWITCH BOARD	1		TC,SW,LAMP
5	CONDENSER	1		ø216X800L(HIC-8W)
4	COMPRESSOR	1		MTZ80HP
3	AIR FILTER	2		480Wx375H
2	EVAPORATOR	1		FACE AREA: 0.57M 2
1	FAN & MOTOR	1		DDM10-10 (0.35kWx6P)
NO	DESCRIPTION	QT'Y	SIZE	REMARK

HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO. : 2431~2433	Scale : 1/25	A 4
TITLE : OUTLINE DIMENSION	Drawn by : YHK	Date: 2007.07.26
	Check by : HYL	Aprov. by :
TYPE : HIP-8WG APPLI.: ENGINE CONTROL ROOM	DWG No.: HIP-8WG-02	Rev. 1

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–

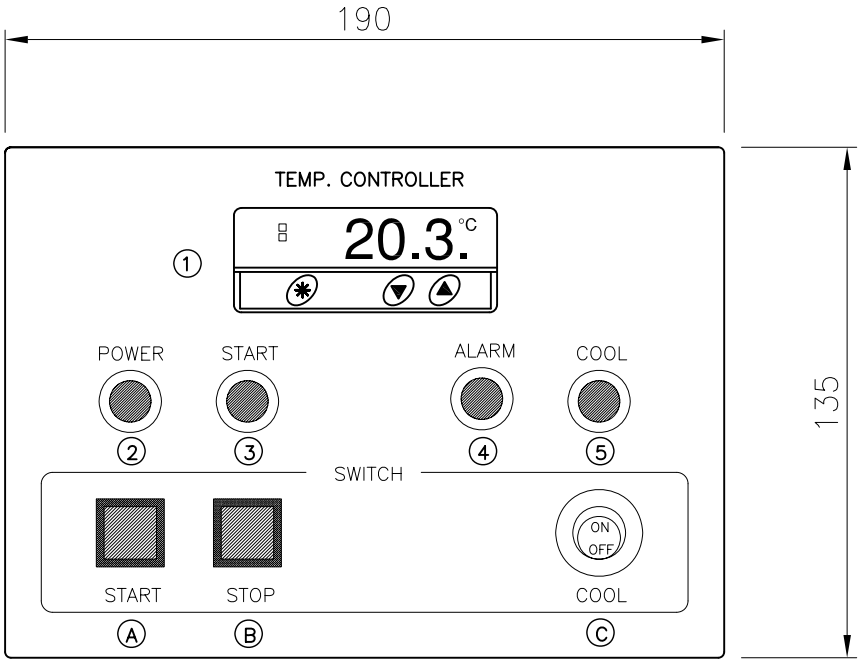




* PAINT COLOR : Munsell No. 1.5YR 4.9/0.7(GRAY)

HI AIR KOREA	YARD : JIANGNAN SHIPYARD NO.: 2431~2433	Scale : 1/10	A 4
	TITLE : BED FRAME OF UNIT	Drawn by : YHK	Date: 2007.07.26
		Check by : HYL	Approv. by:
	TYPE : HIP–8WG APPLI.: E.C.R	DWG No.: HIP–8WG–03	Rev. 0

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–



LED DESCRIPTION

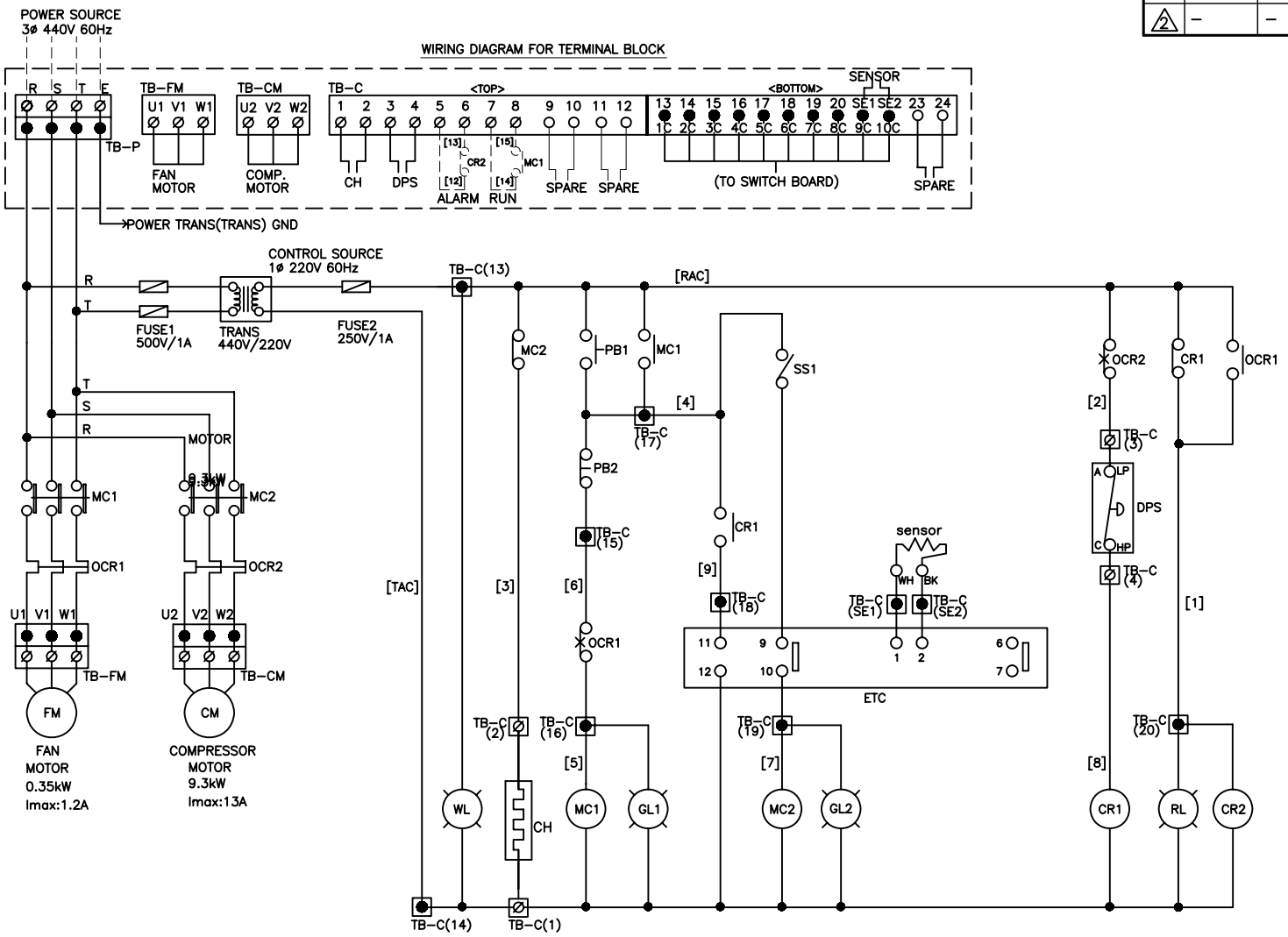
NO	DESCRIPTION	COLOR	NAME TAG
1	TEMP. INDICATOR	RED	TEMP. CONTROLLER
2	POWER LAMP	WHITE	POWER
3	START LAMP	GREEN	START
4	ALARM LAMP	RED	ALARM
5	COOLER LAMP	GREEN	COOL

SWITCH DESCRIPTION

NO	DESCRIPTION	FUNCTION
A	START PUSH BUTTON	START
B	STOP PUSH BUTTON	STOP
C	COOLING LOCK SWITCH	COOL ON/OFF

HI AIR KOREA	YARD : JIANGNAN SHIPYARD NO.: 2431~2433	Scale : 1/2	A 4
	TITLE : SWITCHBOARD	Drawn by : YHK	Date: 2007.07.26
	TYPE : HIP-8WG	Check by : HYL	Approv. by:
	APPLI.: E.C.R	DWG No.: HIP-8WG-04	Rev. 1

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–



PARTS LIST

NO.	DESCRIPTION	SYMBOL	REMARKS
1	TRANSFORMER	TRANS	
2	MAGNETIC CONTACTOR	MC1	FAN
3	MAGNETIC CONTACTOR	MC2	COMP.
4	OVER CURRENT RELAY	OCR1	FAN
5	OVER CURRENT RELAY	OCR2	COMP.
6	FUSE	FUSE	
7	RELAY, CONTROL	CR1,2	
8	PUSH BUTTON SWITCH	PB1	START(GREEN)
9	PUSH BUTTON SWITCH	PB2	STOP(RED)
10	SELECTOR SWITCH	SS1	COOLING OFF/ON
11	TEMP. CONTROLLER	ETC	COOLING
12	POWER LAMP	WL	WHITE
13	FAN RUN LAMP	GL1	GREEN
14	COOLING RUN LAMP	GL2	GREEN
15	ALARM LAMP	RL	RED
16	CRANK CASE HEATER	CH	
17	DUAL PRESSURE SWITCH	DPS	

SYMBOL EXPLANATION

SYM.	EXPLANATION
●	CONNECTED POINT
●	INTERNAL WIRING
⌀	EXTERNAL WIRING
□	TERMINAL BLOCK
( )	TERMINAL NUMBER
[ ]	TUBE NUMBER

TERMINAL COLOR

R (U)	GREEN
S (V)	YELLOW
T (W)	WHITE

* CABLE : FLAME RETARDANT TYPE

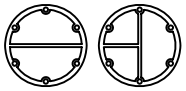
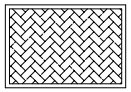
HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433		Scale : N/S	A 4
TITLE : ELECTRIC WIRING DIAGRAM		Drawn by : YHK	Date:2007.07.26
		Check by : HYL	Approv. by:
TYPE : HIP-8WG		DWG No.: HIP-8WG-05	Rev. 0
APPLI.: E.C.R			

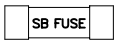
* SPARE PARTS AND TOOLS FOR ENGINE CONTROL ROOM ---------- 1Lot/Unit (HIP-8WG x 1Unit)

NO.	DATE	DESCRIPTION	CHE.	APP.
1	-	-	-	-
2	-	-	-	-

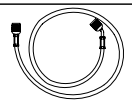
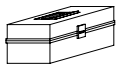
SPARE PARTS FOR PLANT

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	RUBBER PACKING (FRESH WATER)		O/D236	2		
2	AIR FILTER		480Wx375Hx5t	2		

SPARE PARTS FOR ELECTRIC PARTS

NO	NAME	SKETCH	SPEC'	Q'TY	MAKER	MODEL
1	CONTROL RELAY		220V 14FIN	1	HAN KUK	HR705-4PL
2	FUSE ELEMENT		250V 1A	4	JEKYUNG	
			500V 1A	1	SB FUSE	

TOOLS

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	BRUSH		ø25	1		
2	HOSE		1M	1		
3	SPARE PART BOX		350X160X130	1		

HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433		Scale : N/S	A 4
TITLE : SPARE PARTS LIST		Drawn by : YHK	Date:2007.07.26
		Check by : HYL	Approv. by:
TYPE : HIP-8WG APPLI.: E.C.R		DWG No.: HIP-8WG-06	Rev. 0

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

PACKAGE A/C FOR GALLEY

-GENERAL SPECIFICATION
-GENERAL DESCRIPTION
-TECHNICAL SPECIFICATION
& SUPPLY SCOPE
-DIMENSION SKETCHES
-PIPING DIAGRAM
-ELECTRIC DIAGRAM
-SPARE PARTS

B

FINAL DRAWING

PACKAGED AIR CONDITIONER
FOR
GALLEY
(MODEL : HIP-08WDE)

- **YARD : JIANGNAN SHIPYARD**
- **HULL NO. : 2431/2432/2433**
- **SHIP TYPE : 5,100TEU**
- **DATE : 2008. 05. 02.**

GENERAL SPECIFICATION

*** YARD** : **JIANGNAN SHIPYARD**

*** YARD NO** : **2431/2432/2433**

*** SHIP TYPE** : **5,100TEU**

*** CLASSIFICATION** : **GL**

*** APPLICATION** : **GALLEY**

*** EQUIPMENTS** : **PACKAGE AIR CONDITIONER**

*** REFRIGERANT** : **R-404A**

*** COOLING WATER** : **FRESH WATER 36℃**

*** DESIGN CONDITION**

IN SUMMER	IN WINTER
Outside : -℃ DB, -% R.H	Outside : -℃ DB, -% R.H
Inside : -℃ DB, -% R.H	Inside : -℃ DB, -% R.H
Fresh air : / Return air :	Fresh air : / Return air :

GENERAL DESCRIPTION

1. Cooling system

(1) Cooling method	**:**	**R-404A direct expansion central cooling system**
(2) Temperature control	**:**	**Automatically controlled by thermostatic expansion valve and thermostat which is actuated by room temperature.**

2. Heating system

(1) Heating method	**:**	**Electric heating method**
(2) Temperature control	**:**	**Automatically controlled by thermostatic**

3. Ventilation system

(1) Ducting method	**:**	**Duct type**
(2) Air velocity	**:**	**Low velocity**
(3) Air pressure	**:**	**Low pressure**

4. Power source

(1) Main circuit	**:**	**3Ph x AC 440V x 60Hz**
(2) Control circuit	**:**	**1Ph x AC 220V x 60Hz**

5. Painting color **: RAL 9010**
(BASE COLOR : MUNSELL NO. 1.5YR 4.9/0.7)

TECHNICAL SPECIFICATION & SUPPLY SCOPE

1. Packaged Air conditioner ---------- 1Unit

. Model : HIP - 8WDE

. Refrigerant : R-404A

. Cooling capacity : 25,000 kcal/h (29 kW)

. Heating capacity : 10,320 kcal/h (12 kW)

. Power source : 3Ph x AC440V x 60Hz

. Control source : 1Ph x AC220Vx 60Hz

. Electric capacity : 15kVA

2. Components of Water cooled Package air conditioner

(1) Compressor ---------- 1SET

. Type : One-stage hermetic,

. Model : MTZ-80

. Manufacturer : MANEUROP DANFOSS INC

. Cooling capacity : 25,000 kcal/h at Te= +5℃ & Tc= +45℃

. Capacity regulation : 100% - 0%

. Power consumption : 8.33 Kw

. Rate current : 12A (Max. current : 18A)

. Power source : 3Ph x AC440V x 60Hz

(2) Marine water-cooled condenser ---------- 1SET

. Type : Horizontal shell & tube type

. Capacity : 30,000 kcal/h

. Size : Φ216 x 800EL(HIC-8W)

. Material : Tube = Copper

: Tube plate = SB 410

. Water flow rate : 7.0 ㎥/hr

. Pressure drop : 2.5 mAq

(3) Control & Safety Devices

. Dual pressure switch :1 piece

High pressure setting : 2.4MPa

Cut-in Manual reset

Low pressure setting : Cut-out 0.2MPa

Cut-in Manual reset

. High pressure gauge : 1 piece (Range : 0 ~ 3.5Mpa)

. Low pressure gauge	: 1 piece (Range : -76cmHg ~ 1.5Mpa)
(4) Charging chemicals	---------- 1 LOT
. Refrigerant	: 10 kg (R-404A)
. Refrigerant Oil	: 1.8 Liter (Polyester Oil 160PZ)
(5) Evaporator	---------- 1 SET
. Type	: Multi-pass crossed fin tube type
. Material	: Fin=Coating Aluminum / Tube = Copper
. Cooling method	: R-404A direct expansion cooling system
. Cooling capacity	: 25,000 kcal/h
. Evaporating temperature	: 5℃
. Accessories	: 1 piece – Distributor
(6) Heater	---------- 1 SET
. Capacity	: 12KW(10,320Kcal/h)
. Rated current	: 15.8A
. Power Source	: 3Ph x AC440V x 60Hz
(7) Fan with motor	---------- 1 SET
. Type	: Double suction multi blade Centrifugal fan
. Air flow rate	: 20 ㎥/min (1,200㎥/h)
. Total Static Press	: 55mmAq
. Motor Output	: 2.2 kW x 4Poles
. Rated current	: 4.4A(starting current 30.5A)
. Power Source	: 3Ph x AC440V x 60Hz
(8) Air – filter	---------- 1 EA
. Type	: Washable and removable type
. Size	: 480W x 680H x 5t

(9) Other components and accessories, fitted in/on PAC unit ----- 1LOT

. Expansion valve on liquid line	: 8RT
. Solenoid valve	: 5/8" x 220V
. Service angle valve	: 5/8"
. Filter drier on liquid line	: 5/8"
. Safety valve on condenser	: 1/2"
. Gas inlet pipe connection	:1 1/8"
. Liquid outlet pipe connection	: 5/8"

. Power in cable gland : 30a
. External signal cable gland : 20c
. Cooling water inlet pipe connection : JIS 5K 40A flange
. Cooling water outlet pipe connection : JIS 5K 40A flange

(10) Control Box with Starter Panel ----- 1LOT

. Type : Dead-front built-in type,
Mounted on inside of the front panel of PAC

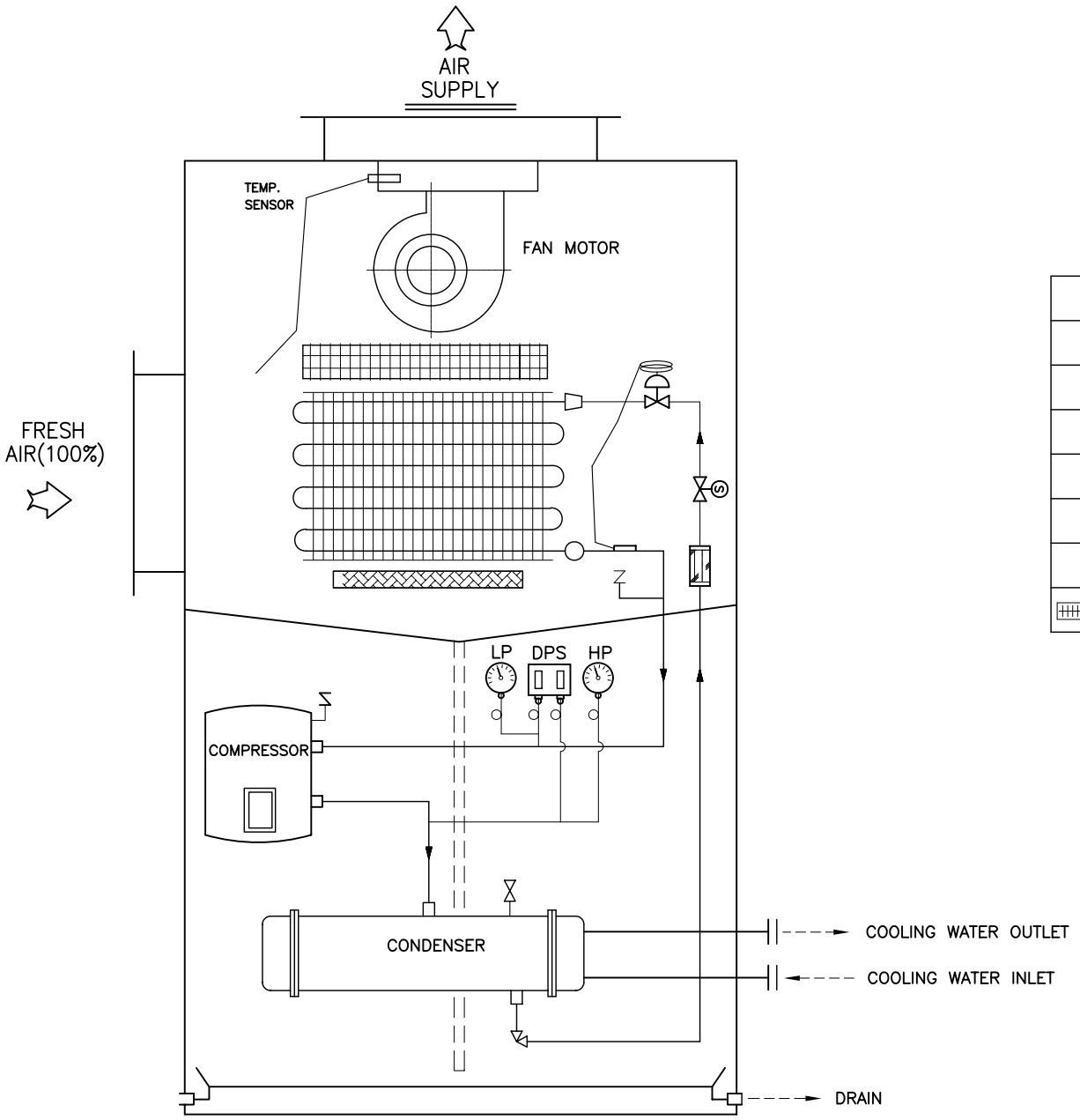
. Components

: Manual off/on selector switch for compressor
: Manual off/on selector switch for electric heater
: Indicating lamps
:Alarm indicating lamps
: Magnetic contactor with over-current relays
:Transformer(440/220V)for control voltage
:Automatic indicator temperature controller
:Other components

3. Standard Spare parts ---------- 1LOT

. 1 Set of spare parts & tools, according to spare parts drawing

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–



PARTS TABLE

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FAN & MOTOR		EXPANSION V/V
	EVAPORATOR		PRESS. GAUGE
	AIR FILTER		FILTER DRIER
	COMPRESSOR		SAFETY V/V
	CONDENSER		CHARGING & SERVICE V/V
	D.P.S		SOLENOID VALVE
	ELECTRIC HEATER		CHECK NIPPLE

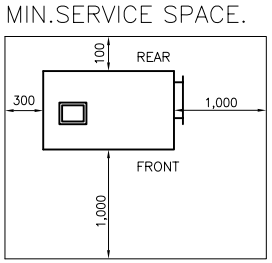
* REMARK

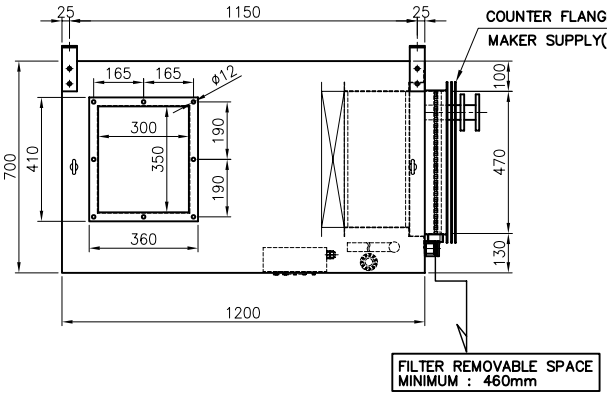
------ YARD PIPING

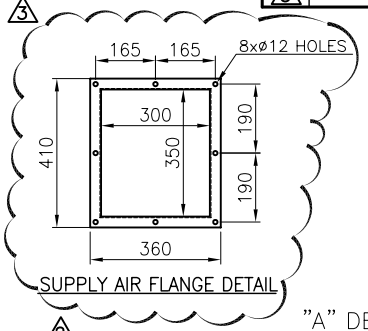
——— MAKER PIPING

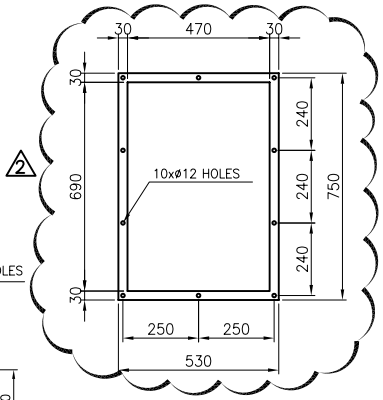
HI AIR KOREA	YARD : JIANGNAN SHIPYARD No.: 2431~2433	Scale : N/S	A 4
	TITLE : FLOW DIAGRAM	Drawn by : YHK	Date: 2007.02.12
	TYPE : HIP-8WDE	Check by : HYL	Aprov. by :-
	APPLI.: GALLEY	DWG No.: HIP-8WDE-01	Rev. 0

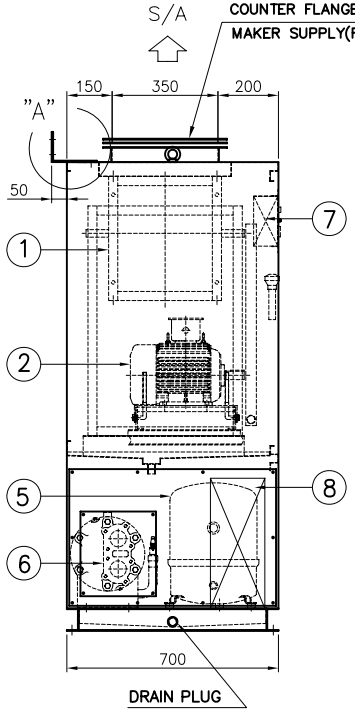
NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	RE-APPROVAL DRAWING	-	-
2	'07.09.15	DIMENSION REVISION	-	-
3	'08.08.06	S/A FLANGE DETAIL ADDTION	-	-

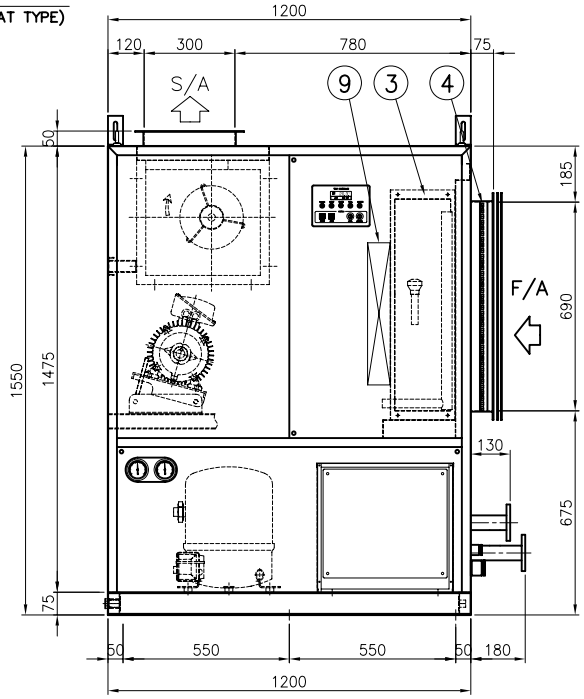


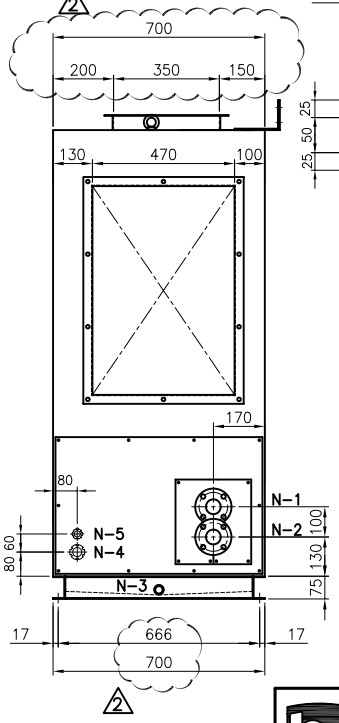


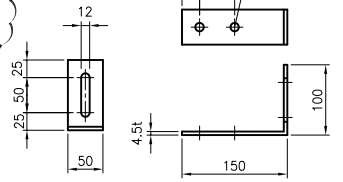












N-5	CABLE GLAND	1	20c	EXT. WIRING
N-4	CABLE GLAND	1	30a	POWER INLET
N-3	DRAIN	1	20A	SOCKET
N-2	WATER INLET	1	40A	FLANGE 5K
N-1	WATER OUTLET	1	40A	FLANGE 5K
9	ELECTRIC HEATER	1		12kW (3Phx440Vx60Hz)
8	CONTROL BOX	1		
7	SWITCH BOARD	1		
6	CONDENSER	1		ø216X800L(HIC-8W)
5	COMPRESSOR	1		MTZ80HP
4	AIR FILTER	1		480Wx680Hx5t
3	EVAPORATOR	1		3/8"x8Rx28Sx450EL
2	MOTOR	1		2.2kW x 4P
1	FAN	1		AS110D
NO	DESCRIPTION	QT'Y	SIZE	REMARK

* WEIGHT : 460 kg

* PAINTING COLOR: RAL 9010

HI AIR KOREA

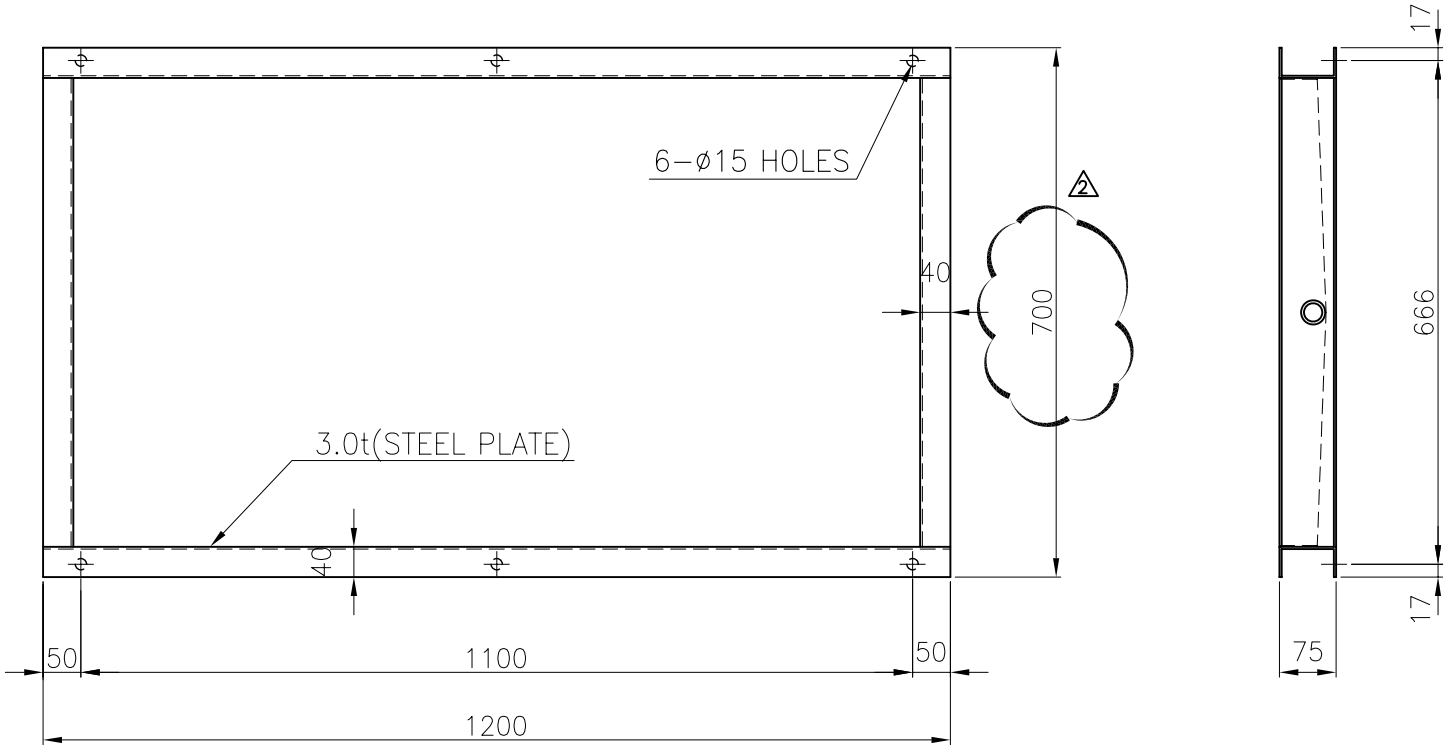
YARD : JIANGNAN SHIPYARD No.: 2431~2433 | Scale : 1/25 | A 4

TITLE : OUTLINE DIMENSION | Drawn by : YHK | Date: 2007.09.15

TYPE : HIP-8WDE | Check by : HYL | Aprov. by : -

APPLI.: GALLEY | DWG No.: HIP-8WDE-02 | Rev. 3

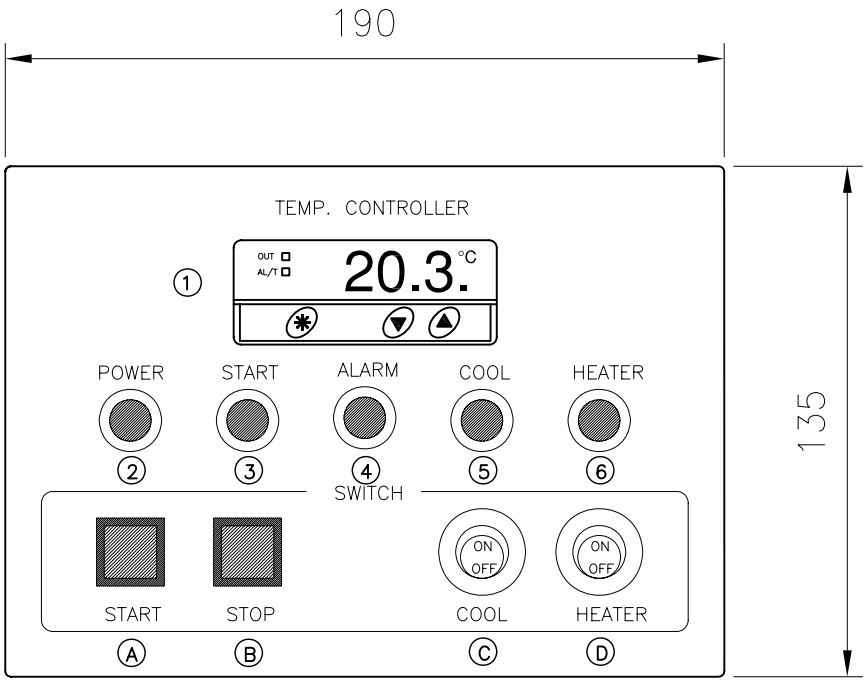
NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	SIZE REVISION	–	–
2	'07.09.17	SIZE REVISION(DEPTH)	–	–



* PAINT COLOR : Munsell No. 1.5YR 4.9/0.7(GRAY)

HI AIR KOREA	YARD : JIANGNAN SHIPYARD No.: 2431~2433	Scale : 1/10	A 4
	TITLE : BED FRAME OF UNIT	Drawn by : YHK	Date:2007.09.17
	TYPE : HIP-8WDE	Check by : HYL	Aprov. by :
	APPLI.: GALLEY	DWG No.: HIP-8WDE-03	Rev. 2

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–



LED DESCRIPTION

NO	DESCRIPTION	COLOR	NAME TAG
1	TEMP. INDICATOR	RED	TEMP. CONTROLLER
2	POWER LAMP	WHITE	POWER
3	START LAMP	GREEN	START
4	ALARM LAMP	RED	ALARM
5	COOLER LAMP	GREEN	COOL
6	HEATER LAMP	YELLOW	HEATER

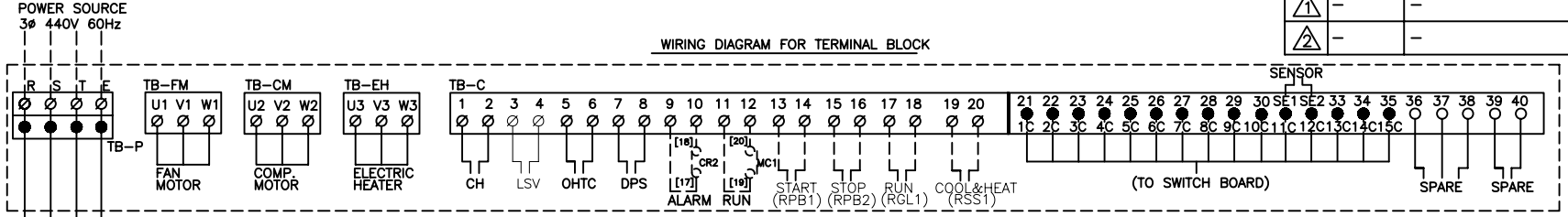
SWITCH DESCRIPTION

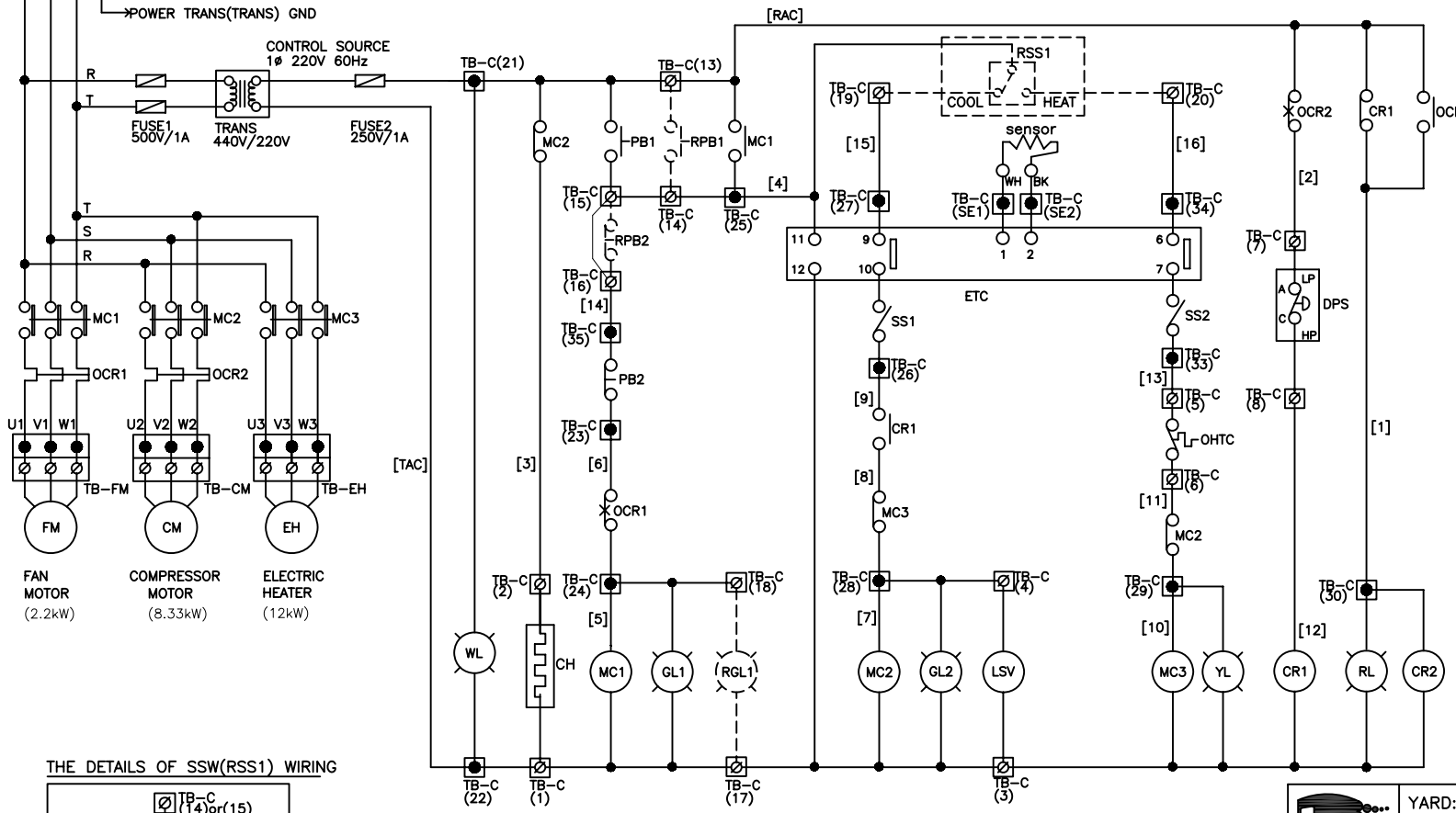
NO	DESCRIPTION	FUNCTION
A	START PUSH BUTTON	START
B	STOP PUSH BUTTON	STOP
C	COOLING LOCK SWITCH	COOL ON/OFF
D	HEATING LOCK SWITCH	HEATER ON/OFF

HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433		Scale : 1/2	A 4
TITLE : SWITCH BOARD		Drawn by : HYL	Date: 2007.02.12
		Check by : BCA	Approv. by:
TYPE : HIP-8WDE APPLI.: GALLEY		DWG No.: HIP-8WDE-04	Rev. 0

NO.	DATE	DESCRIPTION	CHE.	APP.
1	–	–	–	–
2	–	–	–	–





PARTS LIST

NO.	DESCRIPTION	SPEC.	MAKER	SYMBOL	REMARKS
1	TRANSFORMER	440/220V 60VA	WOONYOUNG	TRANS	
2	MAGNETIC CONTACTOR	GMC9, 7A	LG	MC1	FAN
3	MAGNETIC CONTACTOR	GMC22, 20A	LG	MC2	COMP.
4	MAGNETIC CONTACTOR	GMC32, 25A	LG	MC3	HEATER
5	OVER CURRENT RELAY	GTH22 4~6A	LG	OCR1	FAN
6	OVER CURRENT RELAY	GTH22 16~22A	LG	OCR2	COMP.
7	RELAY, CONTROL	MY4	KACON	CR1,2	
8	FUSE	500V/1A	SB FUSE	FUSE1	
9	FUSE	250V/1A	JEKYUNG	FUSE2	
10	PUSH BUTTON SWITCH	SRM20G21	HANYOUNG	PB1	START(GREEN)
11	PUSH BUTTON SWITCH	SRM20R21	HANYOUNG	PB2	STOP(RED)
12	SELECTOR SWITCH	DJB101-2205	DAJEON	SS1	COOLING OFF/ON
13	SELECTOR SWITCH	DJB101-2205	DAJEON	SS2	HEATER OFF/ON
14	TEMP. CONTROLLER	BR6	HANYOUNG	ETC	COOLING&HEATING
15	POWER LAMP	BN-6	DAJEON	WL	WHITE
16	BLOWER RUN LAMP	BN-6	DAJEON	GL1	GREEN
17	COOLING RUN LAMP	BN-6	DAJEON	GL2	GREEN
18	HEATER RUN LAMP	BN-6	DAJEON	YL	YELLOW
19	ALARM LAMP	BN-6	DAJEON	RL	RED
20	CRANK CASE HEATER	600VAC 27W		CH	
21	LIQUID SOLENOID VALVE	EVR6-10W	DANFOSS	LSV	
22	OVER HEATER TEMP.			OHTC	
23	DUAL PRESS SWITCH	KP-15	DANFOSS	DPS	

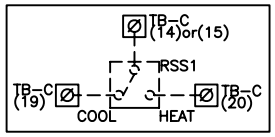
SLEEVE COLOR

R(U)	GREEN
S(V)	YELLOW
T(W)	WHITE

SYMBOL EXPLANATION

SYM.	EXPLANATION
•	CONNECTED POINT
●	INTERNAL WIRING
⌀	EXTERNAL WIRING
□	TERMINAL BLOCK
( )	TERMINAL NUMBER
[ ]	TUBE NUMBER

THE DETAILS OF SSW(RSS1) WIRING



*THIS WIRING IS APPLIED TO REMOTE SYSTEM

HI-AIR KOREA

YARD: JIANGNAN SHIPYARD | No.: 2431/-33 | Scale: N/S | A4

TITLE: ELECTRIC WIRING DIAGRAM | Drawn: | Date:'07.12.04

Check: | Appr.:

TYPE: HIP-8WDE

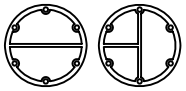
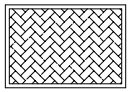
APPL.: GALLEY

DWG No.: | Rev.: 0

NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.09.17	AIR FILTER SIZE REVISION	-	-
2	-	-	-	-

* SPARE PARTS AND TOOLS FOR GALLEY ---------- 1Lot/Unit (HIP-8WDE x 1Unit)

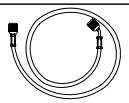
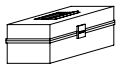
SPARE PARTS FOR PLANT

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	RUBBER PACKING (FRESH WATER)		O/D236	2		
2	AIR FILTER		480Wx680Hx5t ⚠1	1		

SPARE PARTS FOR ELECTRIC PARTS

NO	NAME	SKETCH	SPEC'	Q'TY	MAKER	MODEL
1	CONTROL RELAY		220V 14FIN	1	HAN KUK	HR705-4PL
2	FUSE ELEMENT		250V 1A	4	JEKYUNG	
			500V 1A	1	SB FUSE	

TOOLS

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	BRUSH		ø25	1		
2	HOSE		1M	1		
3	SPARE PART BOX		350X160X130	1		

HC 2433 GALLEY

HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433		Scale : N/S	A 4
TITLE : SPARE PARTS LIST		Drawn by : HCP	Date: 2007.09.17
		Check by : HYL	Approv. by:
TYPE : HIP-8WDE APPLI.: GALLEY		DWG No.: HIP-8WDE-06	Rev. 1

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA
Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

PACKAGE A/C FOR WORKSHOP

-GENERAL SPECIFICATION
-GENERAL DESCRIPTION
-TECHNICAL SPECIFICATION
& SUPPLY SCOPE
-DIMENSION SKETCHES
-PIPING DIAGRAM
-ELECTRIC DIAGRAM
-SPARE PARTS

C

FINAL DRAWING

PACKAGED AIR CONDITIONER FOR WORKSHOP (MODEL : HIP-05WGD)

- **YARD : JIANGNAN SHIPYARD**
- **HULL NO. : 2431/2432/2433**
- **SHIP TYPE : 5,100 TEU**
- **DATE : 2008. 05. 02.**

GENERAL SPECIFICATION

*** YARD** : **JIANGNAN SHIPYARD**

*** YARD NO** : **2431/2432/2433**

*** SHIP TYPE** : **5,100TEU**

*** CLASSIFICATION** : **GL**

*** APPLICATION** : **WORKSHOP**

*** EQUIPMENTS** : **PACKAGE AIR CONDITIONER**

*** REFRIGERANT** : **R-404A**

*** COOLING WATER** : **FRESH WATER 36℃**

*** DESIGN CONDITION**

IN SUMMER	IN WINTER
Outside : -℃ DB, -% R.H	Outside : -℃ DB, -% R.H
Inside : -℃ DB, -% R.H	Inside : -℃ DB, -% R.H
Fresh air : / Return air :	Fresh air : / Return air :

GENERAL DESCRIPTION

1. Cooling system

(1) Cooling method : R-404A direct expansion central cooling system

(2) Temperature control : Automatically controlled by thermostatic expansion valve and thermostat which is actuated by room temperature.

2. Heating system

(1) Heating method : N/A

(2) Temperature control : N/A

3. Ventilation system

(1) Ducting method : Duct connection type

(2) Air velocity : Low velocity

(3) Air pressure : Low pressure

4. Power source

(1) Main circuit : AC 440V x 3Ph x 60Hz

(2) Control circuit : AC 220V x 1Ph x 60Hz

5. Painting color : RAL 9010(BASE:Munsell No.1.5YR 4.9/0.7)

TECHNICAL SPECIFICATION & SUPPLY SCOPE

1. Packaged Air conditioner ---------- 1Unit

. Model	: HIP - 5WGD
. Refrigerant	: R-404A
. Cooling capacity	: 15,000 kcal/h (17.4 kW)
. Power source	: AC440V x 3Ph x 60Hz
. Control source	: AC220V x 1Ph x 60Hz
. Electric capacity	: 15KVA

2. Components of Water cooled Package air conditioner

(1) Compressor ---------- 1SET

. Type	: One-stage hermetic,
. Model	: MTZ-64
. Manufacturer	: MANEUROP DANFOSS INC
. Cooling capacity	: 15,000 kcal/h at Te= +5℃ & Tc= +48℃
. Capacity regulation	: 100% - 0%
. Power consumption	: 6.32 Kw
. Rate current	: 10A (Max. current : 15A)
. Power source	:AC 440Vx 3Ph x 60Hz

(2) Water-cooled type condenser ---------- 1SET

. Type	: Horizontal shell & tube type
. Capacity	: 22,100 kcal/h
. Size	: Φ165 x 800EL(HIC-5W)
. Material	: Tube = Copper
	: Tube plate = SB 410
. Water flow rate	: 4.0 ㎥/hr
. Pressure drop	: 2.5 mAq

(3) Control & Safety Devices

. Dual pressure switch	:1 piece
High pressure setting	: 2.4MPa
	Cut-in Manual reset
Low pressure setting	: Cut-out 0.2MPa
	Cut-in Manual reset (Apply to Anti System)
. High pressure gauge	: 1 piece (Range : 0 ~ 3.5Mpa)
. Low pressure gauge	: 1 piece (Range : -76cmHg ~ 1.5Mpa)

(4) Charging chemicals ---------- 1 LOT

- . Refrigerant : 5 kg (R-404A)
- . Refrigerant Oil : 2 Liter (Polyester Oil 160PZ)

(5) Evaporator ---------- 1 SET

- . Type : Multi-pass crossed fin tube type
- . Material : Fin=Coating Aluminum / Tube = Copper
- . Cooling method : R-404A direct expansion cooling system
- . Cooling capacity : 15,000 kcal/h
- . Evaporating temperature : 5℃
- . Accessories : 1 piece – Distributor

(6) Fan with motor ---------- 1 SET

- . Type : Double suction multi blade Centrifugal fan
- . Air flow rate : 40 ㎥/min (2,400㎥/h)
- . Total Static Press. : 550Pa
- . Motor Output : 0.55 kW x 4Poles
- . Rated current : 1.3A(Max.current 2.5A)
- . Power Source : AC 440Vx 3Ph x 60Hz

(7) Air – filter ---------- 2 EA

- . Type : Washable and removable type
- . Size : 430 x 390 x 5t

(8) Other components and accessories, fitted in/on PAC unit ----- 1LOT

- . Expansion valve on liquid line : 5RT
- . Service angle valve : 1/2"
- . Filter drier on liquid line : 1/2"
- . Safety valve on condenser : 1/2"
- . Gas inlet pipe connection : 7/8"
- . Liquid outlet pipe connection : 1/2"
- . Power in cable gland : 30a
- . External signal cable gland : 20a
- . Cooling water inlet pipe connection : JIS 5K 32A flange
- . Cooling water outlet pipe connection : JIS 5K 32A flange

(10) Control Box with Starter Panel ----- 1LOT

. Type : Dead-front built-in type,
Mounted on inside of the front panel of PAC

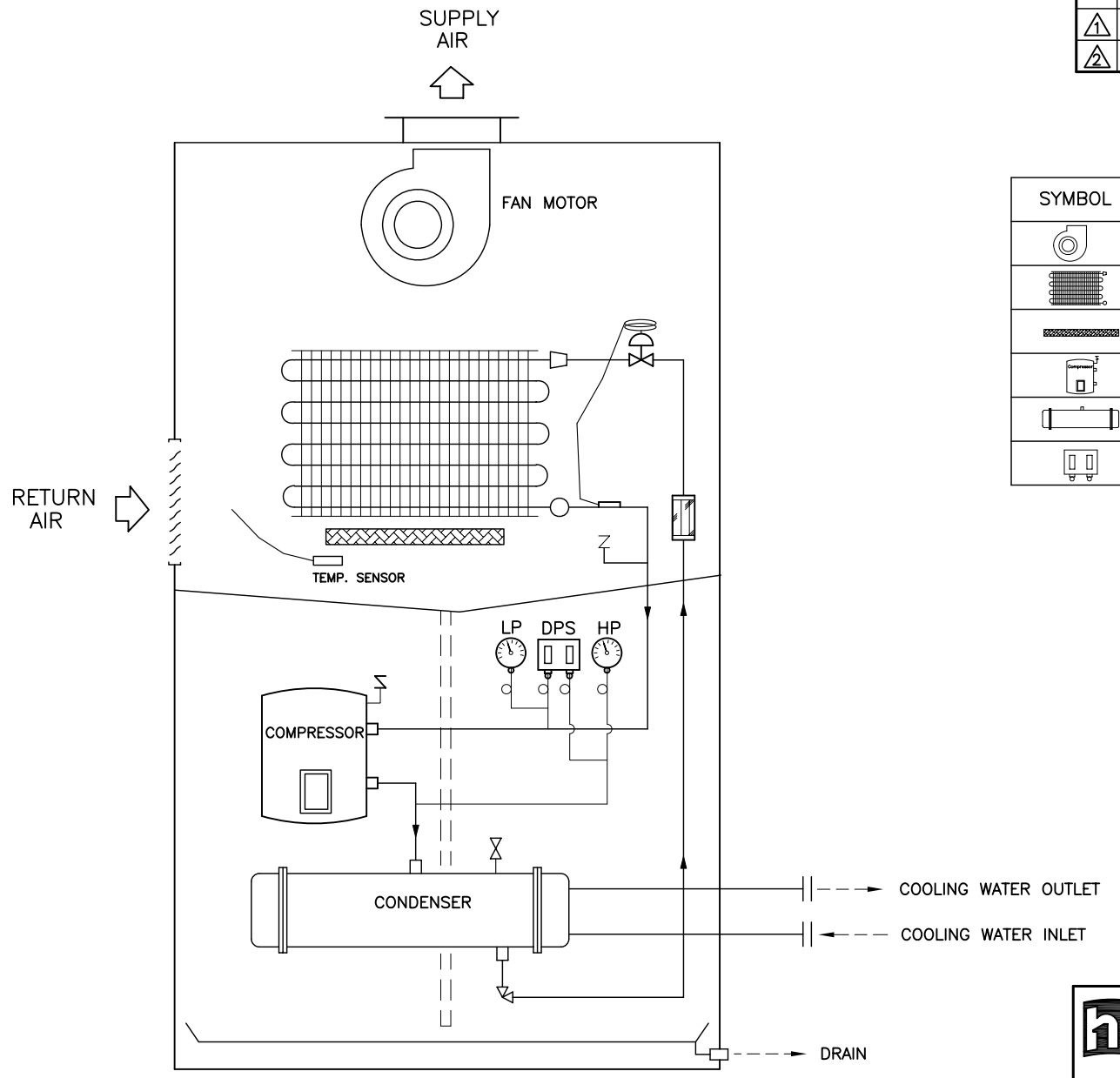
. Components

: Manual off/on selector switch for compressor
: Manual off/on selector switch for electric heater
: Indicating lamps
:Alarm indicating lamps
: Magnetic contactor with over-current relays
:Transformer(440/220V)for control voltage
:Automatic indicator temperature controller
:Other components

3. Standard Spare parts ---------- 1LOT

. 1 Set of spare parts & tools, according to spare parts drawing

NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	MODEL REVISION :HIP-5WG => HIP-5WGD	-	-
2	-	-	-	-



PARTS TABLE

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FAN & MOTOR		EXPANSION V/V
	EVAPORATOR		PRESS. GAUGE
	AIR FILTER		FILTER DRIER
	COMPRESSOR		SAFETY V/V
	CONDENSER		CHARGING & SERVICE V/V
	D.P.S		CHECK NIPPLE

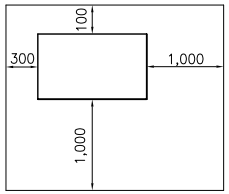
* REMARK

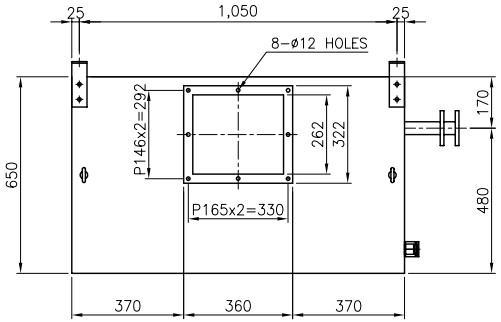
- - - - - - YARD PIPING

——— MAKER PIPING

HI AIR KOREA	YARD : JIANGNAN SHIPYARD NO.: 2431~2433	Scale : N/S	A 4
	TITLE : FLOW DIAGRAM	Drawn by : YHK	Date: 2007.07.26
	TYPE : HIP-5WGD	Check by : HYL	Approv. by: -
	APPLI.: WORKSHOP	DWG No.: HIP-5WGD-01	Rev. 1

MIN.SERVICE SPACE.





NO.	DATE	DESCRIPTION	CHE.	APP.
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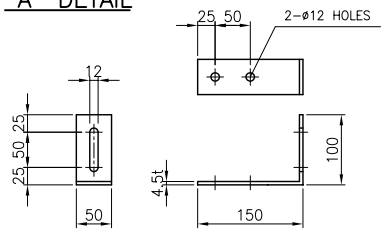
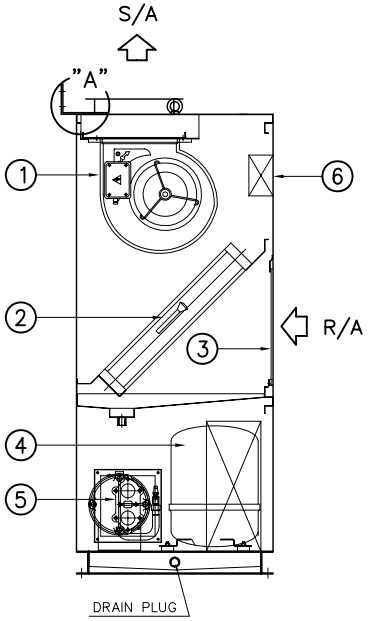
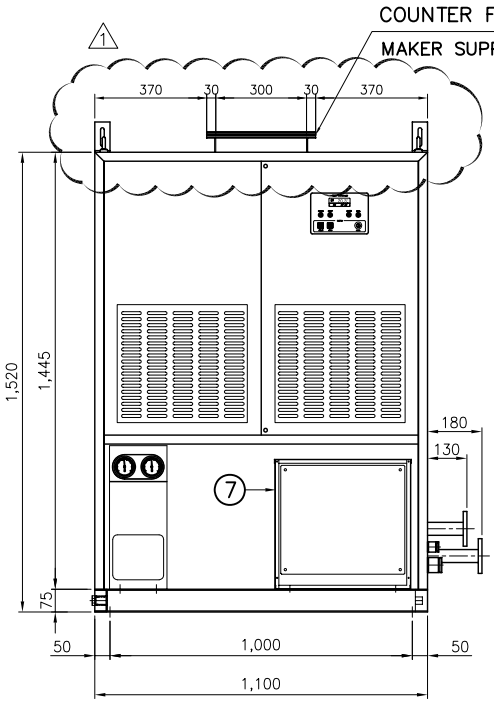
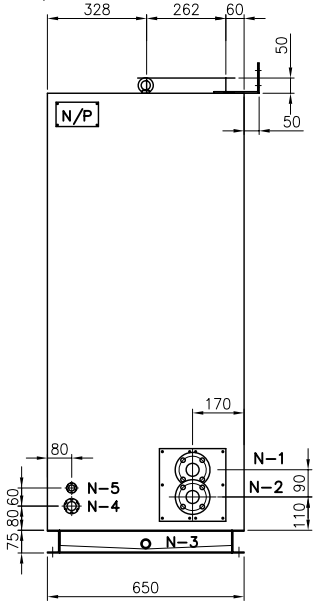
2	-	-	-	-

"A" DETAIL









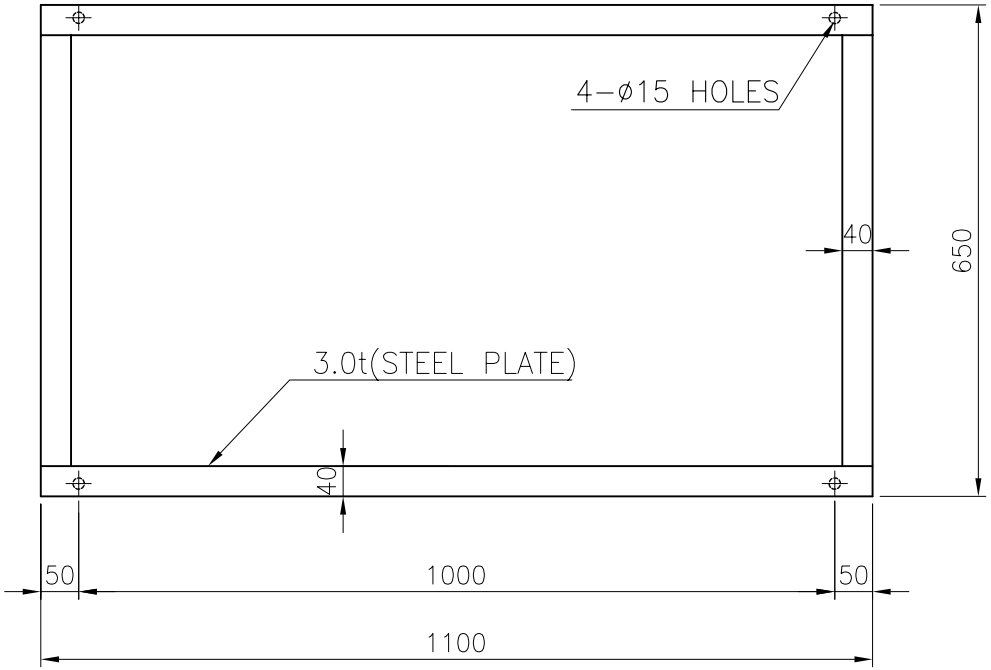
NO	DESCRIPTION	QT'Y	SIZE	REMARK
N-5	CABLE GLAND	1	20a	EXT. WIRING
N-4	CABLE GLAND	1	30a	POWER INLET
N-3	DRAIN	1	20A	SOCKET
N-2	WATER INLET	1	32A	5K FLANGE
N-1	WATER OUTLET	1	32A	5K FLANGE
7	CONTROL BOX	1		
6	SWITCH BOARD	1		
5	CONDENSER	1		ø165X800L (HIC-5W)
4	COMPRESSOR	1		MTZ 64HM
3	AIR FILTER	2		430Wx390Hx5t
2	EVAPORATOR	1		FACE AREA 0.41m²
1	FAN & MOTOR	1	1	DDM9-9 (0.55kWx4P)

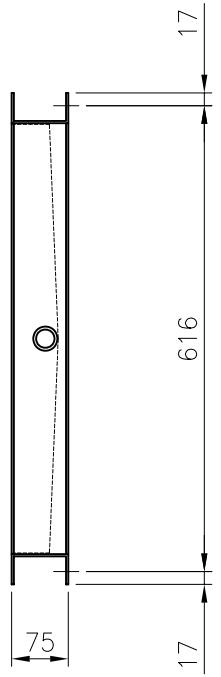
* WEIGHT : ABOUT 365Kg
* PAINT COLOR : RAL9010
* BASE PAINT COLOR : Munsell No.1.5YR 4.9/0.7

HI AIR KOREA

YARD: JIANGNAN SHIPYARD No.: 2431~2433		Scale : 1/25	A 4
TITLE : OUTWARD DIMENSION		Drawn by : YHK	Date: 2007.07.26
		Check by : HYL	Aprov. by : -
TYPE : HIP-5WGD		DWG No.: HIP-5WGD-02	Rev. 1
APPL': WORKSHOP			

NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	MODEL REVISION :HIP-5WG => HIP-5WGD	-	-
2	-	-	-	-

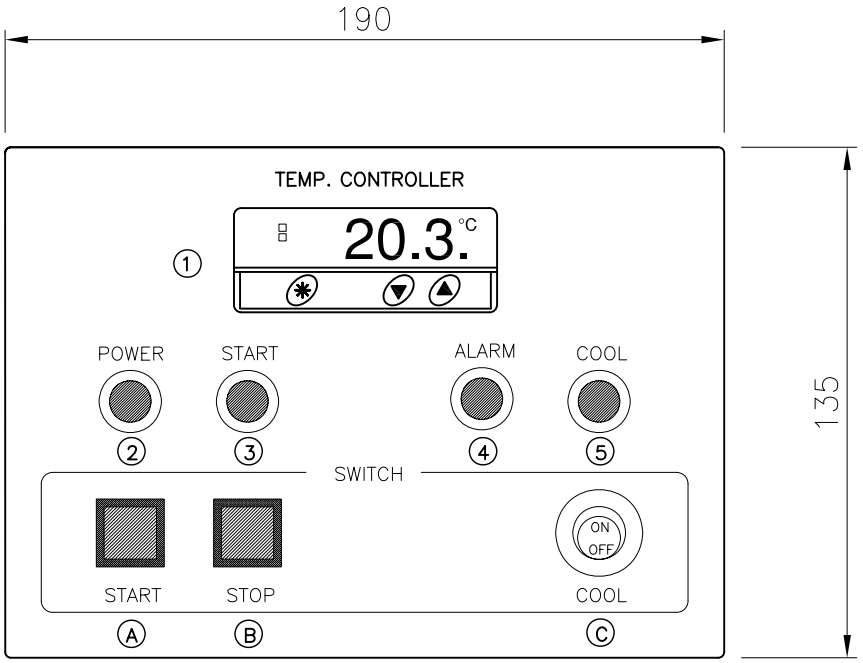




BASE COLOR : Munsell No.1.5YR 4.9/0.7(GRAY)

HI AIR KOREA	YARD : JIANGNAN SHIPYARD NO.: 2431~2433	Scale : 1/10	A 4
	TITLE : BED FRAME OF UNIT	Drawn by : YHK	Date: 2007.07.26
		Check by : HYL	Approv. by: -
	TYPE : HIP-5WGD APPLI.: WORKSHOP	DWG No.: HIP-5WGD-03	Rev. 1

NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	MODEL REVISION :HIP-5WG => HIP-5WGD	-	-
2	-	-	-	-



LED DESCRIPTION

NO	DESCRIPTION	COLOR	NAME TAG
1	TEMP. INDICATOR	RED	TEMP. CONTROLLER
2	POWER LAMP	WHITE	POWER
3	START LAMP	GREEN	START
4	ALARM LAMP	RED	ALARM
5	COOLER LAMP	GREEN	COOL

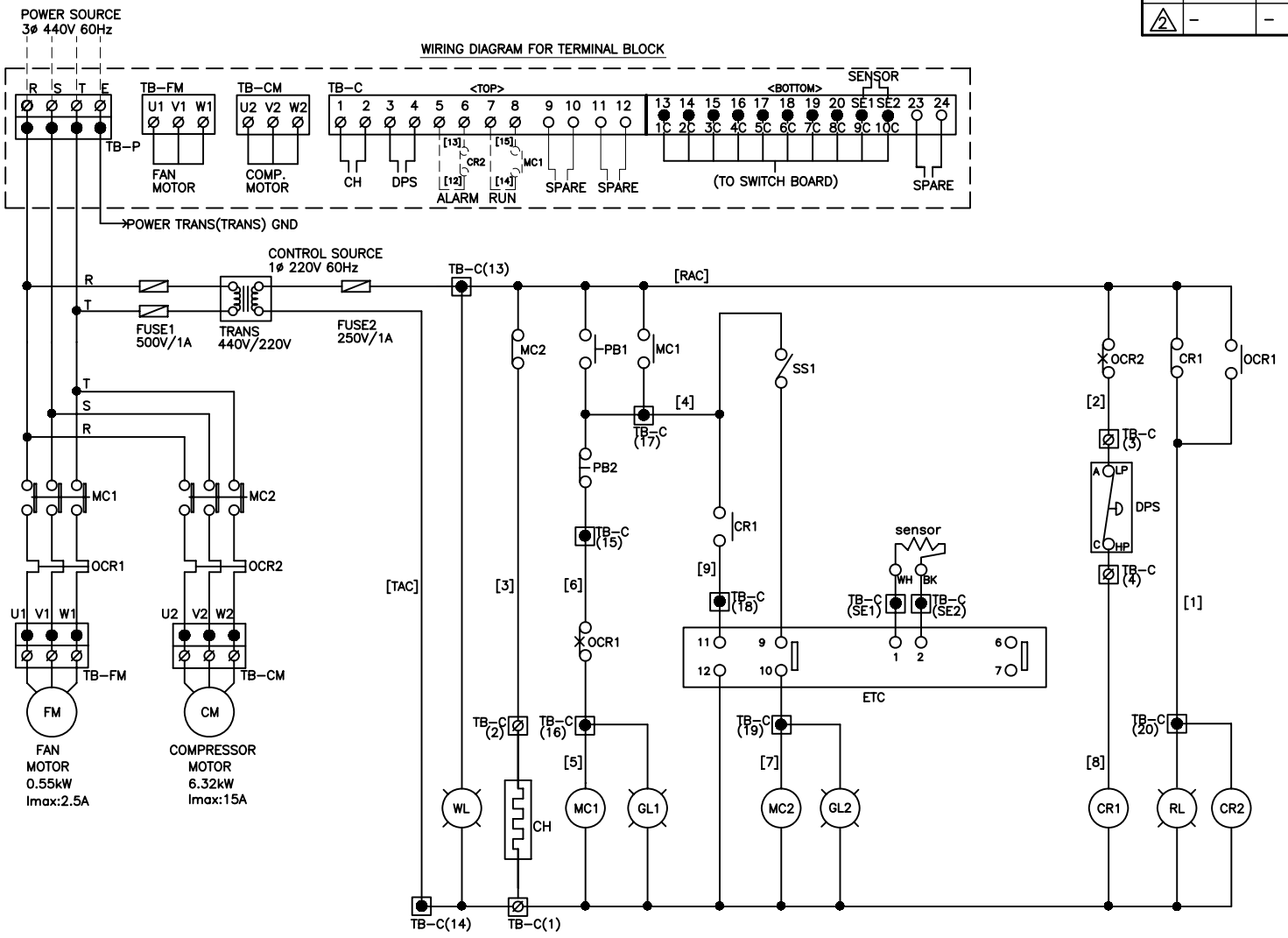
SWITCH DESCRIPTION

NO	DESCRIPTION	FUNCTION
A	START PUSH BUTTON	START
B	STOP PUSH BUTTON	STOP
C	COOLING LOCK SWITCH	COOL ON/OFF

HI AIR KOREA

YARD : JIANGNAN SHIPYARD No.: 2431~2433		Scale : 1/2	A 4
TITLE : SWITCHBOARD		Drawn by: YHK	Date:2007.07.26
		Check by: HYL	Aprov. by: -
TYPE : HIP-5WGD APPLI.: WORKSHOP		DWG No.: HIP-5WGD-04	Rev. 1

NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	MODEL REVISION :HIP-5WG => HIP-5WGD	-	-
2	-	-	-	-



PARTS LIST

NO.	DESCRIPTION	SYMBOL	REMARKS
1	TRANSFORMER	TRANS	
2	MAGNETIC CONTACTOR	MC1	FAN
3	MAGNETIC CONTACTOR	MC2	COMP.
4	OVER CURRENT RELAY	OCR1	FAN
5	OVER CURRENT RELAY	OCR2	COMP.
6	FUSE	FUSE	
7	RELAY, CONTROL	CR1,2	
8	PUSH BUTTON SWITCH	PB1	START(GREEN)
9	PUSH BUTTON SWITCH	PB2	STOP(RED)
10	SELECTOR SWITCH	SS1	COOLING OFF/ON
11	TEMP. CONTROLLER	ETC	COOLING
12	POWER LAMP	WL	WHITE
13	FAN RUN LAMP	GL1	GREEN
14	COOLING RUN LAMP	GL2	GREEN
15	ALARM LAMP	RL	RED
16	CRANK CASE HEATER	CH	
17	DUAL PRESSURE SWITCH	DPS	

SYMBOL EXPLANATION

SYM.	EXPLANATION
●	CONNECTED POINT
●	INTERNAL WIRING
⌀	EXTERNAL WIRING
□	TERMINAL BLOCK
( )	TERMINAL NUMBER
[ ]	TUBE NUMBER

TERMINAL COLOR

R (U)	GREEN
S (V)	YELLOW
T (W)	WHITE

* CABLE : FLAME RETARDANT TYPE

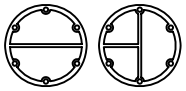
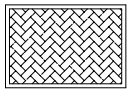
HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433	Scale : N/S	A 4
TITLE : ELECTRIC WIRING DIAGRAM	Drawn by : YHK	Date:2007.07.26
	Check by : HYL	Approv. by: -
TYPE : HIP-5WGD APPLI.: WORKSHOP	DWG No.: HIP-5WGD-05	Rev. 1

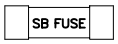
NO.	DATE	DESCRIPTION	CHE.	APP.
1	'07.07.26	MODEL REVISION :HIP-5WG => HIP-5WGD	-	-
2	-	-	-	-

* SPARE PARTS AND TOOLS FOR WORKSHOP ---------- 1Lot/Unit (HIP-5WGD x 1Unit)

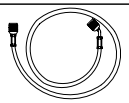
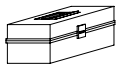
SPARE PARTS FOR PLANT

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	RUBBER PACKING (FRESH WATER)		O/D192	2		
2	AIR FILTER		430Wx390Hx5t	2		

SPARE PARTS FOR ELECTRIC PARTS

NO	NAME	SKETCH	SPEC'	Q'TY	MAKER	MODEL
1	CONTROL RELAY		220V 14FIN	1	HAN KUK	HR705-4PL
2	FUSE ELEMENT		250V 1A	4	JEKYUNG	
			500V 1A	1	SB FUSE	

TOOLS

NO	NAME	SKETCH	SPEC'	Q'TY FOR SPARE	MAKER	MODEL
1	BRUSH		ø25	1		
2	HOSE		1M	1		
3	SPARE PART BOX		350X160X130	1		

HI AIR KOREA

YARD : JIANGNAN SHIPYARD NO.: 2431~2433		Scale : N/S	A 4
TITLE : SPARE PARTS LIST		Drawn by : HCP	Date:2007.02.12
		Check by : HYL	Approv. by:
TYPE : HIP-5WGD APPLI.: WORKSHOP		DWG No.: HIP-5WGD-06	Rev. 1

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA
Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

COMPRESSOR INSTRUCTION MANUAL

D

INSTRUCTIONS / INSTRUKTION

Maneurop®
RECIPROCATING COMPRESSORS

8510196 P02-A

Danfoss Commercial Compressors

Contens

1 - Introduction

These instructions pertain to the Maneurop® hermetic reciprocating compressors used for A/C and refrigeration purposes. They are intended to provide necessary information regarding safety features and proper handling of this product.

Note that this is a general document for the entire range of reciprocating compressors; certain details therefore may not be applicable to the particular model you purchased. Please keep your manual and all relevant information handy for future reference.

• Equipment description: This compressor is delivered with all assembly equipment (rubber grommets + screws + washers), an electrical box (cover + spring), connecting sleeves and gaskets, and instructions.

• Approved list of refrigerants:
- The MT series can be used with R22, R12 and R502.
- The MTZ series can be used with R404A, R507A, R134a and R407C.
- The LT series can be used with R502 and R22 (booster).
- The LTZ series can be used with R404A and R507A.

• Compressors are filled with lubricant before leaving the factory:
- The MT and LT series with mineral oil (ref. 160P),
- The MTZ series with polyolester oil (ref. 160PZ),
- The LTZ series with polyolester oil (ref. 160Z).

These lubricants must not be mixed with one another.
Be aware that alkylbenzen oil (ref. 160ABM) is available for refrigerant substitutes (not listed on the compressor nameplate), yet is never filled in the compressors at the factory.

• Maneurop® compressors must only be used for their designed purpose(s) and within their scope of application (refer to Fig. 1).

⚠ Compressors are delivered under nitrogen gas pressure (between 1 and 2 bar) and hence cannot be connected as is; please refer to the «**Assembly**» section for further details.

⚠ Compressors are not certified for mobile and explosion-proof applications. Any use of flammable refrigerant (e.g. hydrocarbons) or air is also strictly forbidden.

• Under all circumstances, the EN378 (or other applicable local regulation) requirement must be fulfilled.

⚠ When pressure tests are required on the system, they are to be performed by qualified personnel, in paying close attention to potential pressure related hazards and heeding the pressure limits displayed on the compressor nameplate or in the application guidelines.

⚠ Modifications or alterations (such as brazing on the shell) not expressly approved by the party responsible for ensuring compliance could invalidate the user's authorization to operate the equipment.

2 - Transportation, storage

• The compressor must be handled in the vertical position (maximum offset from the vertical: 15°). Should the compressor be handled in an upside-down position, its performance may no longer be insured.

• Beware that all compressor handling must be carried out with extreme caution to avoid any shocks. Dedicated packing handles are to be used for all required manipulation of the compressor; otherwise appropriate and safe lifting equipment is to be used during handling and unpacking.

• Any damage noticed on either the packaging or the product itself upon reception should be indicated on a Customer Claim addressed to the shipping company. The same recommendation applies to all instances when transport instructions have not been fully respected.

• Please review the safety instructions printed on the cardboard packaging before storage.

• Verify that the compressor is never stored in an ambient temperature of below -35°C (-31°F) or above 50°C (122°F).

• Ensure that the compressor and its packaging are not exposed to rain and/or a corrosive, flammable atmosphere.

3 - Safety measures prior to assembly

• All installation and servicing is to be performed by qualified personnel in compliance with all pertinent practices and safety procedures.

• The compressor must be located in a ventilated area to ensure that the ambient temperature never exceeds 50°C (122°F) during the off-cycle.

• Make certain that the compressor can be mounted onto a horizontal plane with a maximum slope of 3°.

• Check that the compressor model corresponds to system specifications (capacity, use of refrigerant, etc.).

• Verify that the power supply corresponds to compressor motor characteristics (refer to the compressor nameplate for precision).

• Ensure that refrigerant charging equipment, vacuum pumps, etc. for HFC refrigerant systems have been specifically reserved for these refrigerants and never used with other CFC, HCFC refrigerants.

• Use only clean and dehydrated refrigeration-grade copper tubes as well as silver alloy brazing material.

• Verify that all system components are appropriate (use of refrigerant, etc.), clean and dehydrated before being connected to the completed assembly.

• Perform a check on the suction lines: horizontal sections are to be sloped downwards towards the compressor. Suction gas velocity must be high enough to provide for an adequate oil return. This velocity must be with in 8 to 12 m/s in vertical risers. In horizontal pipes, this velocity can decrease to 4 m/s.

• The use of U-trap and double-suction risers may be required on vertical sections, but not in excess of 4 m unless a second U-trap system has been fitted (refer to Figs. 3 and 4). Suction line piping must be insulated in order to minimize the effects of superheating.

• Perform a check on the discharge lines : piping to the condenser must be designed so as to prevent liquid return to the compressor. The use of non-return valves may prove necessary, depending on the position of the compressor with respect to the condenser. A suitably-sized U-trap may also be necessary if the condenser has been placed above the compressor (refer to Fig. 2).

• The piping connected to the compressor must be configured on the basis of a flexible 3-axis design to dampen vibrations and designed in such a way as to prevent free liquid refrigerant migration and drainage back to the compressor sump and discharge cylinder heads (refer to fig. 2).

Note that all local and regional regulations and safety standards, such as EN378, must be taken into account when designing, connecting and running the system.

4 - Assembly

⚠ The compressor's time of exposure to the atmosphere during installation shall be held to aminimum (less than 1/2 hour). The compressor connection must be fast in order to avoid moisture contamination of the lubricant.

• The grommets must be installed under the compressor feet, as shown in Fig. 5. Rubber grommets are to undergo compression until contact is made between the flat washer and the steel mounting sleeve.

⚠ Before opening the compressor connection fittings, it is mandatory to connect a 1" service hose to the Schrader fitting on the compressor shell in order to gradually release the nitrogen holding charge.

• Ensure that no material enters into the system while cutting the tubing. Moreover, never drill holes in the pipe work after installation.

• Should additional components need to be connected onto the compressor sight glass or oil equalization ports, it is recommended that such an operation be carried out prior to final assembly, to allow for compressor inclination and movement.

• Avoid flare-type connections and exercise great care while brazing (use only state-of-the-art practices); apply a nitrogen gas flow to prevent oxidation inside the tubing, especially when HFC refrigerants are being used. All brazing material is to contain a minimum of 5% silver. If flux additive is used, don't put the copper tube into the receiver of flux, but put flux around the tube (i.e. with a pencil). This will prevent pure flux getting inside the tube.

• When brazing, protect the terminal box and painted surfaces of the compressor from torch heat damage.

• Remove the Teflon gaskets when brazing Rotolock connectors with the solder sleeve and be aware that original suction and discharge gaskets must be replaced.

• When installing Rotolock fittings, always use two wrenches when tightening any fittings to insure that the torque is effectively cancelled on the adjacent tubing and fittings. Do not exceed the maximum tightening torque for Rotolock connections to the compressor :
1 " rotolock 80 Nm
1 " 1/4 rotolock 90 Nm
1 " 3/4 rotolock 110 Nm.

• Be sure to connect the required safety and control devices onto compressor shut-off valves or fittings. In case of oil return through the Schrader fitting on the compressor shell, make sure the internal valve is removed.

5 – Leak detection

⚠ Never use oxygen or dry air in order to avoid the risk of fire or explosion.

Perform a leak detection test on the complete system by means of: a dry nitrogen pressure test, a mixture of nitrogen and the refrigerant to be used in the system, a helium leak test and/or a deep vacuum test.

• The test should be long enough in duration to ensure the absence of any slow leaks in the system.

• Use tools specifically designed for detecting leaks.

• The low side test pressure must not exceed 1.1 x Ps pressure indicated on the compressor nameplate.

• For high side test pressure recommendations, please refer to the Application Guidelines.

• Whenever the compressor is equipped with suction and discharge shut-off valves, these valves are to remain in the closed position while performing the leak test (compressor leak test already performed in the factory).

Should a leak be discovered, proceed with repair steps and repeat the leak detection.

• When a deep vacuum leak detection test is selected, observe the following:
1) The level to reach is 500 μm Hg.
2) Wait 30 min.
3) If pressure increases rapidly, the system is not airtight. Locate and repair leaks. Restart the vacuum procedure, followed by steps 1, 2, etc.
4) If pressure increases slowly, the system contains moisture inside. Break the vacuum with nitrogen gas and restart the vacuum procedure, followed by steps 1, 2, etc.
5) Connect the compressor to the system by opening the valves.
6) Repeat the vacuum procedure, followed by steps 1, 2, etc.
7) Break the vacuum with nitrogen gas.
8) Repeat the vacuum procedure, steps 1, 2; a vacuum of 500 μm Hg (0.67 mbar) should be reached and maintained for 4 hours. This pressure is to be measured in the refrigeration system, not at the vacuum pump gauge.

⚠ Do not use a megohmeter or apply power to the compressor while it is under vacuum, as this may cause motor winding damage (motor burn-out).

⚠ Do not use colored leak detection fluids. Do not use chlorofluorocarbon in leak testing systems designed for HFC fluids.

6 - Vacuum dehydration procedure

Whenever possible (if shut-off valves are present), the compressor must be isolated from the system. It is essential to connect the vacuum pump to both the LP & HP sides, in order to avoid dead-ending system parts.

Recommended procedure:
1) Once leak detection has been completed,
2) Pull down the system under a vacuum of 500 μm Hg (0.67 mbar).
3) When the vacuum level of 500 μm Hg has been reached, the system must be isolated from the pump.
4) A vacuum of 500 μm Hg (0.67 mbar) has to be reached and maintained for 4 hours. This pressure is to be measured in the refrigeration system, not at the vacuum pump gauge. If pressure increases, restart the leak-detection procedure (refer to the «**Leak detection**» section of this manual if necessary).

Vacuum pump:
A two-stage vacuum pump with gas ballast (0,04-mbar standing vacuum) shall be used; its capacity is to be consistent with system volume. Never use the compressor as a vacuum pump.

It is recommended to use large-diameter connection lines and to connect these lines to the shut-off valves, rather than to the Schrader connection. This recommendation allows avoiding excessive pressure losses.

Moisture level:
At the time of commissioning, system moisture content may be as high as 100 ppm. During operation, the liquid line filter dryer must reduce this level to < 20 ppm.

Additional notes:
• To improve moisture removal, the temperature of the system should not be lower than 10°C.

• A proper vacuum procedure is even more important with HFC and polyolester lubricant than it has "traditionally" been with HCFC (R22) or CFC and mineral oil.

• For further details, please refer to TI 2-026.

⚠ Do not use a megohmeter or apply power to the compressor while it is under vacuum, as this may cause motor winding damage (motor burn-out).

7 - Electrical connections

• Make sure the main power supply to the system has been switched off and isolated, in accordance with applicable regulations, before performing any electrical connection.

• Refer to Fig. 6 for wiring connection details with respect to the various motor codes.

• Note that Maneurop® compressors are protected against overheating and overloading by an internal safety motor protector. However, an external manual reset overload is recommended for protecting the circuit against over-current. The "must trip" value of this overload relay must be set in accordance with power line sizing and design and shall never exceed the "A max." value stamped on the nameplate.

• The single-phase compressor models are internally protected by a bimetallic temp./current sensor cut-out, which senses both the main winding current and the start winding current.

• Maneurop® compressors are able to operate in both directions (rotation).

• Depending on motor size, the power supply connection utilizes either a spade connector (1/4"-AMP-AWE) or a T-block connector (screw type 10-32 UNF x 9.5 mm). For screw type connections, be aware that the maximum tightening torque is 3 Nm.

• A 5-mm earth terminal screw is provided in the compressor junction box for the grounding connection.
All electrical components must be selected as per local standards and compressor requirements.

8 - Filling the system

• Before charging the refrigerant, verify that the oil level is between 1/4" and 3/4" on the compressor oil sight glass (when mounted) and/or ensure that the oil charge of the original compressor is sufficient as regards system dimension and piping design:
- An additional quantity of oil might be necessary for line lengths (back and forth) inexcess of 20 m.
- In the event additional oil is required, use only an approved lubricant (refer to the «**Introduction**» section of this manual).
- An oil sight glass compressor model is recommended for split systems and remote condenser installations.
For all information necessary on adding oil to the compressor, refer to TI 2-025.

• Make sure the refrigerant used to fill the system is compatible with compressor design. Refer to the **"Introduction"** section of this manual for an approved list of refrigerants.

• Compressor switched off: the liquid refrigerant is charged into the condenser and/or liquid receiver in the liquid phase (compulsory for refrigerant blends). The charge must be as close to the nominal system charge as possible in order to avoid both low pressure operations and excessive superheating at start-up. Throughout this operation, both compressor service valves must remain closed.

• Remember that vapor-charging is only appropriate for pure refrigerants, such as R22.

• To the extent possible, maintain the refrigerant charge below 2.5 kg per cylinder. Above this limit, install a system, such as a pump-down cycle or suction line accumulator, to prevent against liquid flood-back into the compressor.

• Be sure that the refrigerant charge is suitable for both winter and summer operations.

9 - Verification before commissioning

⚠ Ensure that all service valves are in the open position before start-up. A closed discharge or suction service valve may cause serious damage to the compressor and/or compromise safety device operation, thereby resulting in potential injury to personnel.

• Check that all safety devices are operational and properly set (safety pressure switch set point, mechanical relief valve if necessary, etc.). Make sure that these devices comply with both generally - and locally - applicable regulations and standards (e.g. EN378).

• When using high-pressure switches or relief valves, the setting must not exceed maximum service pressure of any system component. Refer to the Application Guidelines for relevant compressor pressure safety limits.

• A low-pressure switch is recommended to prevent operation under vacuum. Use a minimum setting of 1.1 bar (absolute).

• Verify that all electrical connections are properly fastened and in compliance with local safety regulations.

• When a crankcase heater is required (refer to the Application Guidelines), ensure that it has been energized for a minimum of 12 hours before initial start-up and/or after prolonged shutdown periods.

10 - Start up

⚠ Never start the compressor in the absence of a refrigerant charge.

• Do not bypass the LP or any other safety switches during start-up.

• Check current draw and voltage levels.

• Suction superheat setting: optimal compressor suction superheat would be around 10K, with the maximum allowable superheat being 30K.

• In all cases, the application limits of the compressor must be respected; moreover, high superheat values lead to high discharge temperatures and decrease compressor capacity. The maximum discharge temperature is 130°C: operating at a higher temperature may result in refrigerant decomposition.

• Under steady-state operating conditions, check refrigerant piping or capillary tubes for abnormal vibrations (refrigeration line movement in excess of 1.5 mm necessitates corrective actions, pipe brackets, etc.).

• Monitor the oil sight glass (when mounted) to ensure proper oil return to the compressor. After 2 to 4 hours of operations under established conditions, check the oil level and add oil if necessary (refer to TI 2-025). If oil return continues to perform poorly, further investigation of the piping design is required.

• Ensure that refrigerant flow through the liquid line sight glass (when mounted) is adequate and that operating temperatures correspond with system specifications.

• When needed, refrigerant may be added in the liquid phase, carefully throttling the refrigerant on the low-pressure side and as far as possible from the compressor. The compressor must be operating during this process.

⚠ Do not overcharge the system.

11 – Troubleshooting

• Compressor failure to start: verify that the compressor is hooked up to the power supply; check the power lead connections and all suitable capacitors on single-phase models. If these verifications reveal no abnormality, control the motor windings with an ohmmeter.

Note: when the internal motor protector has tripped out, it may take up to several hours toreset and restart the compressor.

• Compressor failure to build up pressure: check to make sure that all bypass valves in the system have not been opened.
Also check that all solenoid valves are in their proper position. If the internal pressure relief valve is open, the compressor sump will be warm and the compressor will trip out on the motor protector. If this happens, it may take up to 2 or 3 hours to reset and automatically restart thecompressor.

• Abnormal running noise: ensure the absence of any liquid flood-back to the compressor by means of measuring the return gas superheat and compressor sump temperature. The sump should be at least 10K above the saturated suction temperature under steady-state operating conditions.

• The high-pressure switch trips out: check condenser operations (condenser cleanliness, fan operations, water flow and water pressure valve, water filter, etc.). If above check out OK, the problem may be due to either refrigerant overcharging or the presence of a non-condensable (e.g. air) in the circuit.

• The low-pressure switch trips out: check evaporator operations (coil cleanliness, fan operations, water flow, water filter, etc.), liquid refrigerant flow and pressure drops (solenoid valve, filter dryer, expansion valve, etc.), refrigerant charge.

• Low refrigerant charge: the correct refrigerant charge is given by the liquid sight glass indication, the condenser delta T in relation to the refrigerant pressure tables (pressure-temperature), the superheat and the sub-cooling, etc.(if additional charge is deemed necessary, refer to the “Filling the system” section).

• Compressor maximum short cycling: there must be a minimum delay of five minutes between two compressor starts. DCC recommends the compressor should run at least two minutes after each start, and between each stop and start must be three minutes standstill. Only during pump down cycle, the compressor may run much shorter until the pumpdown pressure has been reached or when safety devices will prohibit compressor further operation.

12 - Maintenance

Maneurop® compressors do not necessitate any special maintenance procedure. However, it must be recalled that proper operations and maintenance of the system serve to prevent against system-related compressor problems. The following preventive maintenance checks, to be performed at regular intervals, are highly recommended:

- Control operating conditions (evaporating temperature, condensing temperature, compressor discharge temperature, temperature difference on heat exchangers, superheat, sub-cooling). These conditions must always remain within compressor operation limits.
- Verify that safety devices are operational and properly set.
- Check the compressor oil level and quality; this step may include an acid test, humidity check, spectrometer analysis, etc. whenever the oil becomes discolored.
- Ensure that the circuit is leak tight.
- Verify the proper operation of heat exchangers and, if necessary, clean them.
- Check the current draw on the compressor motor as well as proper voltage balance between phases.
- Check that all electrical connections are still adequately fastened.
- Make sure the compressor is clean and in good working order; verify the absence of rust on the compressor shell, piping and electrical connections.
- Make sure the refrigerant charge is suitable for both winter and summer operations. Insure that periodic in-service inspections required by local regulations are performed.

13 – Replacement

⚠ Precaution must be taken when disconnecting, cutting or drilling holes in the tubing to ensure that no refrigerant under pressure is present in the system.

⚠ The refrigerant shall not be discharged directly into the atmosphere; rather, it must be removed using approved reclamation techniques and equipment and then safely stored, in accordance with applicable legislation.

⚠ The presence of refrigerant vapor can displace air and lead to suffocation. Proper ventilation is mandatory at all times when servicing the equipment.

⚠ A refrigeration system component change must be carried out in compliance with local regulations.

• Make sure that the main power supply has been switched off.

• Before replacement, it is necessary to determine the cause of failure and implement remedial action. If such analysis and repair are not performed, repetitive failure may occur. Note that an oil acidity test always proves helpful in diagnosis when undertaking compressor replacement.

• Check that the new Maneurop® compressor and the on-site compressor to be replaced display the same electrical and refrigeration performance characteristics.

• Use the rubber grommets and gaskets supplied with the new compressor.

• Whenever piping needs to be modified, please refer to the «**Safety measures prior to assembly**» section.

• For further details on replacement steps, refer to the previous sections of this manual.

Note: *In the event of motor failure, flush and clean the entire circuit before replacing the compressor in order to remove acids and contaminants. Systematically install a new filter dryer on the liquid line. Prior to this step (if necessary), run the system for at least 2 hours with anti-acid cartridges (in such instances, the installation of a suction filter might also be required). After an operating period of approximately 2 weeks, check the level of oil acidity. If the oil acid test proves positive, drain and replace the oil, replace the anti-acid liquid line filter dryer cartridges and the suction filter previously installed. Repeat oil and filter dryer replacements until the system is clean and acid-free. When there is no longer any sign of acidity, replace the anti-acid cartridges by the standard model and remove the suction strainer cartridge as required.*

14 - User advisory

Insist that all service operations only be performed by qualified personnel.

⚠ The compressor and tubing surface temperatures may exceed 100°C (212°F) and cause severe bodily burns. Special precaution must be taken when working around the compressor and refrigerant tubing. Moreover, a compressor inoperation can generate very cold surface temperatures (as low as -45°C / -49°F), thereby exposing personnel to the risk of freezing burns.

⚠ Pressure inside the compressor can reach dangerously high levels (e.g. abnormal operation, fire,…) leading to personnel injury if suddenly released; therefore, never drill, weld or cut the compressor shell and adjacent tubing (release of liquid refrigerant can cause flash freezing on exposed skin).

Be aware that the product warranty may be deemed null and void in the following cases :
• external modifications to the compressor (absence of nameplate, drilling, welding, broken feet, shock marks),

• compressor opened by the customer or returned unsealed (i.e. open discharge or suction ports),

• presence of rust or water inside the compressor,

• addition of leak-detection fluid in the lubricant,

• use of a refrigerant or lubricant not approved by Danfoss Commercial Compressors,

• any deviation from recommended instructions pertaining to installation, application or maintenance,

• use in mobile applications (boats, trains, trucks, etc.) or under explosive atmospheric conditions (the compressor connecting box is not explosion-proof).

The date of production of the compressor is indicated on the nameplate. Ensure that the model and serial number information is always transmitted with any claim filed regarding this product.

SPECIFICATIONS

Technical specifications

Compressor model	Displacement			Cyl. number	Oil charge	Net weight *
	cm^3/rev	m^3/h at 2900 rpm	m^3/h at 3500 rpm		dm^3	kg
MPZ038	38	6.6	8.0	1	1.1	25.2
MPZ048	48	8.4	10.1	1	1.1	25.2
MPZ054	54	9.4	11.3	1	1.1	25.2
MPZ061	61	10.6	12.7	1	1.1	25.75
MPZ068	68	11.8	14.3	1	1.1	25.75

* Net weight apply only on code 4

Approvals and certificates

Danfoss MPZ compressors comply with the following approvals and certificates.

Certificates are listed on the product datasheets:
http://www.danfoss.com/odsg

CE (European Directive)	All models
UL (Underwriters Laboratories)	All 60 Hz models
CCC (China Compulsory Product Certification)	All 50 Hz models
Gost certificate (for Russia)	All 50 Hz models

SPECIFICATIONS

Nominal performance data - R404A

50 Hz

Compressor model	To = -10°C, Tc = 45°C, RGT= 20°C, SC = 0 K				To = -10°C, Tc = 45 °C , SH = 10 K, SC = 0 K				To = 5°C, Tc = 50°C , RGT = 20°C, SC = 0 K			
	Cooling capacity W	Power input W	Current input A	COP W/W	Cooling capacity W	Power input W	Current input A	COP W/W	Cooling capacity W	Power input W	Current input A	COP W/W
MPZ038	2995	1419	2.9	2.11	2795	1419	2.86	2.0	5049	1837	3.4	2.75
MPZ048	4005	1896	3.5	2.11	3738	1896	3.49	2.0	6446	2515	4.4	2.56
MPZ054	4464	2154	3.9	2.07	4167	2154	3.86	1.9	7329	2906	5.0	2.52
MPZ061	5030	2522	4.9	1.99	4695	2522	4.86	1.9	8080	3357	6.2	2.41
MPZ068	5707	2905	5.5	1.96	5327	2905	5.48	1.8	9027	3928	7.1	2.30

To: Evaporating temperature at dew point (saturated suction temperature)
Tc: Condensing temperature at dew point (saturated discharge temperature)
SC: Subcooling,
SH: Superheat
3 phase - 400 V

60 Hz

Compressor model	To = -10°C, Tc = 45°C, RGT= 20°C, SC = 0 K				To = -10°C, Tc = 45 °C , SH = 10 K, SC = 0 K				To = 5°C, Tc = 50°C , RGT = 20°C, SC = 0 K			
	Cooling capacity W	Power input W	Current input A	COP W/W	Cooling capacity W	Power input W	Current input A	COP W/W	Cooling capacity W	Power input W	Current input A	COP W/W
MPZ038	3545	1657	2.7	2.14	3309	1657	2.71	2.0	5925	2175	3.3	2.72
MPZ048	4680	2271	3.4	2.06	4368	2271	3.43	1.9	7554	2975	4.3	2.54
MPZ054	5306	2576	3.8	2.06	4952	2576	3.81	1.9	8593	3523	5.0	2.44
MPZ061	5912	2978	4.7	1.99	5518	2978	4.71	1.9	9581	3975	5.9	2.41
MPZ068	6765	3410	5.2	1.98	6314	3410	5.21	1.9	10773	4668	6.9	2.31

To: Evaporating temperature at dew point (saturated suction temperature)
Tc: Condensing temperature at dew point (saturated discharge temperature)
SC: Subcooling,
SH: Superheat
3 phase - 460 V

Specifications

Technical specifications

Compressor model	Displacement		Cyl. number	Oil charge	Net weight	Design versions** motor voltage code						
	(in3/rev)	(cfh)*		(oz)	(lbs)	1	3	4	5	6	7	9
MT / MTZ 18 JA	1.84	231	1	32	46	S-VE	S-VE	S-VE	S-VE	VE***	-	-
MT / MTZ 22 JC	2.33	291	1	32	46	S-VE	S-VE	S-VE	S-VE	S-VE	VE***	VE***
MT / MTZ 28 JE	2.93	367	1	32	51	S-VE	S-VE	S-VE	S-VE	S-VE	VE***	-
MT / MTZ 32 JF	3.29	411	1	32	53	S-VE	S-VE	S-VE	S-VE	S-VE	S-VE	S-VE
MT / MTZ 36 JG	3.69	461	1	32	55	S-VE	S-VE	S-VE	S-VE	S-VE	VE***	S-VE***
MT / MTZ 40 JH	4.14	518	1	32	57	S-VE	S-VE	S-VE	-	S-VE	-	-
MT / MTZ 44 HJ	4.65	581	2	61	77	S-VE	S-VE	S-VE	-	S-VE	-	-
MT / MTZ 45 HJ	4.65	581	2	61	77	-	S-VE	S-VE	-	-	-	-
MT / MTZ 50 HK	5.23	653	2	61	77	S-VE	S-VE	S-VE	VE	S-VE	S-VE	S-VE
MT / MTZ 51 HK	5.23	653	2	61	77	-	S-VE	S-VE	-	-	-	-
MT / MTZ 56 HL	5.87	733	2	61	82	S-VE	S-VE	S-VE	-	S-VE	S-VE	S-VE
MT / MTZ 57 HL	5.87	733	2	61	82	-	S-VE	S-VE	-	-	-	-
MT / MTZ 64 HM	6.57	822	2	61	82	S-VE	S-VE	S-VE	-	S-VE	-	S-VE
MT / MTZ 65 HM	6.57	822	2	61	82	-	S-VE	S-VE	-	-	-	-
MT / MTZ 72 HN	7.38	922	2	61	88	-	S-VE	S-VE	-	S-VE	-	S-VE
MT / MTZ 73 HN	7.38	922	2	61	88	-	S-VE	S-VE	-	-	-	-
MT / MTZ 80 HP	8.29	1036	2	61	88	-	S-VE	S-VE	-	S-VE	-	S-VE
MT / MTZ 81 HP	8.29	1036	2	61	88	-	S-VE	S-VE	-	-	-	-
MT / MTZ 100 HS	10.45	1306	4	132	132	-	S-VE	S-VE	-	S-VE	S-VE	S-VE
MT / MTZ 125 HU	13.15	1643	4	132	141	-	S-VE	S-VE	-	S-VE	S-VE	S-VE
MT / MTZ 144 HV	14.76	1845	4	132	148	-	S-VE	S-VE	-	S-VE	S-VE	S-VE
MT / MTZ 160 HW	16.57	2071	4	132	152	-	S-VE	S-VE	-	S-VE	S-VE	S-VE

* At 3600 rpm

** S & VE versions, see table on page 4.

*** Only MTZ

Nominal performance
R22, R407C - 60 Hz

	NOMINAL RATINGS * MT - R22				NOMINAL RATINGS * MTZ - R407C			
Compressor model	cooling capacity (BTU/h)	Power input (kW)	Current input (A)	EER (BTU/h/kW)	Cooling capacity (BTU/h)	Power input (kW)	Current input (A)	EER (BTU/h/kW)
MT / MTZ 18 JA	15 900	1.74	2.73	9.15	15 300	1.67	2.47	9.13
MT / MTZ 22 JC	22 000	2.27	3.31	9.68	19 600	2.17	3.31	9.00
MT / MTZ 28 JE	30 200	3.07	4.56	9.86	25 100	2.83	4.39	8.90
MT / MTZ 32 JF	33 000	3.58	4.98	9.22	28 400	3.21	5.04	8.86
MT / MTZ 36 JG	38 000	4.05	5.77	9.38	32 700	3.75	5.72	8.73
MT / MTZ 40 JH	42 900	4.63	6.47	9.27	37 400	4.33	6.46	8.64
MT / MTZ 44 HJ	45 200	4.67	7.37	9.69	43 000	4.37	6.84	9.84
MT / MTZ 45 HJ	44 200	4.35	n.a.	10.16	43 500	4.25	6.35	10.22
MT / MTZ 50 HK	50 500	5.18	8.47	9.74	48 100	4.96	7.33	9.71
MT / MTZ 51 HK	50 400	4.81	n.a.	10.46	48 200	4.87	7.07	9.89
MT / MTZ 56 HL	56 400	6.05	10.28	9.32	54 300	5.67	8.42	9.59
MT / MTZ 57 HL	56 200	5.45	n.a.	10.31	54 800	5.40	8.03	10.14
MT / MTZ 64 HM	64 800	6.80	9.54	9.53	60 400	6.36	9.48	9.50
MT / MTZ 65 HM	64 600	6.28	n.a.	10.28	61 700	6.15	9.01	10.04
MT / MTZ 72 HN	70 100	7.58	10.55	9.26	67 900	7.22	10.79	9.41
MT / MTZ 73 HN	73 200	7.18	n.a.	10.19	70 900	7.30	10.62	9.71
MT / MTZ 80 HP	80 000	8.56	11.59	9.35	76 900	8.24	12.36	9.33
MT / MTZ 81 HP	83 100	8.33	n.a.	9.98	78 100	8.25	11.99	9.47
MT / MTZ 100 HS	95 900	9.59	14.60	10.00	94 400	9.90	14.15	9.53
MT / MTZ 125 HU	124 600	12.81	17.39	9.73	122 100	12.62	17.40	9.67
MT / MTZ 144 HV	140 700	14.36	22.76	9.80	137 200	14.47	19.85	9.48
MT / MTZ 160 HW	156 800	16.09	22.17	9.75	155 100	16.67	22.77	9.31

* Ratings at ARI conditions

- 45°F evaporating temperature (dew point for R407C)
- 130°F condensing temperature (dew point for R407C)
- 15°F subcooling
- 20°F superheat
- 60 Hz, 460 V.

Capacity and power input data ± 5%.

Specifications

Nominal performance
R134a, R404A, R507 - 60 Hz

	NOMINAL RATINGS * MT - R134a				NOMINAL RATINGS ** MTZ - R404A / R507A			
Compressor model	cooling capacity (BTU/h)	Power input (kW)	Current input (A)	EER (BTU/h/kW)	Cooling capacity (BTU/h)	Power input (kW)	Current input (A)	EER (BTU/h/kW)
MTZ 18 JA	11 200	1.22	2.09	9.20	10 300	1.76	2.86	5.10
MTZ 22 JC	14 800	1.54	2.56	9.63	14 100	2.05	3.27	6.01
MTZ 28 JE	19 300	2.04	3.37	9.42	18 300	2.68	4.23	5.96
MTZ 32 JF	20 900	2.39	3.89	8.76	20 100	2.99	4.56	5.85
MTZ 36 JG	24 500	2.75	4.20	8.91	23 200	3.34	5.10	6.05
MTZ 40 JH	27 900	3.08	4.72	9.03	26 400	3.77	5.89	6.11
MTZ 44 HJ	29 800	3.14	5.47	9.51	27 800	4.18	6.59	6.65
MTZ 45 HJ	n.a.	n.a.	n.a.	n.a.	27 900	3.85	5.85	6.31
MTZ 50 HK	34 500	3.60	5.37	9.57	32 500	4.83	7.04	6.73
MTZ 51 HK	n.a.	n.a.	n.a.	n.a.	32 800	4.42	6.53	6.47
MTZ 56 HL	38 000	3.95	5.92	9.62	36 500	5.44	7.80	6.71
MTZ 57 HL	n.a.	n.a.	n.a.	n.a.	37 200	4.98	7.53	6.51
MTZ 64 HM	45 300	4.68	7.12	9.66	41 500	6.12	8.98	6.78
MTZ 65 HM	n.a.	n.a.	n.a.	n.a.	41 400	5.67	8.32	6.36
MTZ 72 HN	50 000	5.19	7.60	9.63	46 500	6.91	9.77	6.72
MTZ 73 HN	n.a.	n.a.	n.a.	n.a.	46 900	6.53	9.74	6.26
MTZ 80 HP	56 500	6.00	8.80	9.42	52 500	8.03	11.35	6.54
MTZ 81 HP	n.a.	n.a.	n.a.	n.a.	53 400	7.82	11.36	5.95
MTZ 100 HS	63 900	6.50	10.11	9.84	60 800	8.72	12.79	6.07
MTZ 125 HU	78 900	7.72	11.10	10.22	78 400	11.37	15.41	6.00
MTZ 144 HV	96 900	9.82	14.29	9.87	92 300	13.00	17.94	6.19
MTZ 160 HW	107 600	10.92	15.55	9.85	100 300	14.74	20.18	5.93

* Ratings at ARI conditions for R134a

- 45°F evaporating temperature
- 130°F condensing temperature
- 15°F subcooling
- 20°F superheat
- 60 Hz, 460 V.

Capacity and power input data ± 5%.

** Ratings at ARI conditions for R404A / R507

- 20°F evaporating temperature
- 120°F condensing temperature
- 15°F subcooling
- 20°F superheat
- 60 Hz, 460 V.

Capacity and power input data ± 5%.

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA
Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

CONTROLLER OPERATING MANUAL

E

Digital Temperature Controller

BR6

INSTRUCTION MANUAL

We appreciate you for purchasing NARA E&C INC. product. Before using the product you have purchased, check to make sure that it is exactly what you ordered. Then, please use it following the instructions below.

HEAD OFFICE
Room No.503-1, Hanshin IT TowerII, 60-18 Gasan-dong, Guemcheon-gu,Seoul, Korea 153-801
TEL: (82-2)2619-0277 FAX: (82-2)2619-0278
E-mail : naracontrols@naracontrols.com

■ Safety information

Before you use, read safety precautions carefully, and use this product properly. The precautions described in this manual contain important contents related with safety; therefore, please follow the instructions accordingly. The precautions are composed of DANGER, WARNING and CAUTION.

⚠ DANGER

There is a danger of occurring electric shock in the input/output terminals so please never let your body or conductive substance is touched.

⚠ WARNING

1. To prevent defection or malfunction of this product, apply a proper power voltage in accordance with the rating.
2. Since this product is not designed with explosion-protective structure, do not use it any place with flammable or explosive gas.
3. Reassemble this product while the power is OFF. Otherwise, it may be a cause of malfunction or electric shock.
4. There is a possibility of occurring electric shock so please use this product after installing it to a panel while it is operating.

⚠ CAUTION

1. The contents of this manual may be changed without prior notification.
2. Before using the product you purchased, make sure that it is exactly what you ordered.
3. Make sure that there is no damage or abnormality of the product during the delivery.
4. Do not use this product at any place with occurring corrosive (especially noxious gas or ammonia) or flammable gas.
5. Do not use this product at any place with direct vibration or impact.
6. Do not use this product at any place with liquid, oil, medical substances, dust, salt or iron contents. (Use at Pollution level 1 or 2)
7. Do not use this product at any place with a large inductive difficulty or occurring static electricity or magnetic noise.
8. Do not use this product at any place with possible thermal accumulation due to direct sunlight or heat radiation.
9. In case of inputting thermocouple, use a compensating cable. (If using a normal wire, there is a possibility of occurring temperature error.)
10. For R.T.D input, use a cable which is a lead wire has small resistance and resistances of three wires shall be the same. (If the three wires have different resistances then there will be a temperature error.)
11. To avoid an effect of inductive noise to input signal cables, use the product after separating the input signal cables from power, output and load cables.
12. Separate an input signal cable from an output signal cable. If separating is not possible, please use the input signal cable after shielding it.
13. Use non-earth sensor with thermocouple. (In case of using earth sensor, there is a possibility of occurring malfunction caused by a short circuit.)
14. If there is excessive noise from the power supply, using insulated transformer or noise filter is recommended. The noise filter must be attached to a panel which is already connected to a ground and the wire between the filter output side and power supply terminal must be short as possible.
15. If twisting the power cables closely together then it is effective against noise.
16. When this product is connected onto a panel, use a circuit breaker or switch approved with IEC947-1 or IEC947-3.
17. Write down on a label that if the circuit breaker or switch is operating then the power will be disconnected since the circuit breaker or switch is installed.
18. Some parts of this product have limited life span, and others are changed by their usage.
19. The warranty period for this product including parts is one year if this product is properly used.
20. When the power is on, the preparation period of contact output is required. In case of using signals of external interlock circuit or etc., use it with a delay relay.
21. In case of replacing this unit with a spare unit, make sure its compatibility because its operation can be different by different parameter settings even though the model name is the same.

■ Model and Suffix code

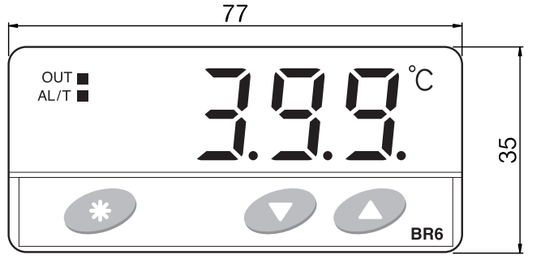
MODEL	Suffix code			Description
BR6	□	□	□ □	External dimension (77×35 mm)
Control Operation	F			ON / OFF
	P			Proportional Operation (P control)
Input	D			Diode (-40.0 ~ 100.0 ℃)
Output		M		Relay contact
		S		SSR driving (12 V DC)
Power voltage			P3	10 ~24 V DC, AC
			P4	85 ~265 V AC (50-60 Hz)

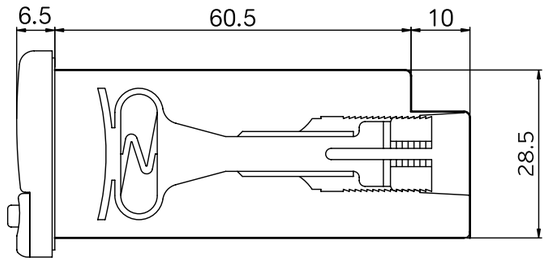
■ Specification

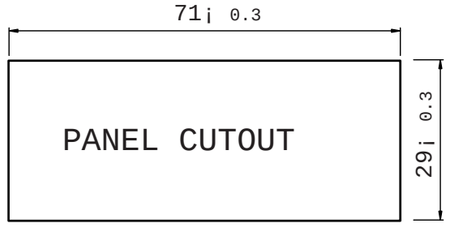
Power Supply	Refer to Model & Suffix code	
Power Consumption	4 - 5 VA	
Input Sensor	Refer to Model & Suffix code	
Display accuracy	Max. range ±1 % + 1 Digit	
Control output (Main Output)	Relay Output	250 V AC, 5 A (Resistive load)
	SSR Output	5 V AC, 50 mA (Max.)
Alarm / Defrost	Relay Output	250 V AC, 5 A (Resistive load)
Control mode	ON / OFF, P control	
Setting method	Digital method by up and Down key	
Other function	Deforsting Timer, Alarm function, Heating/cooling control	
Resistance between wires	Below 10 Ω for each wire	
Ambient temperature	0 ~ 50 ℃	
Ambient humidity	Max. 85 % RH	

■ Dimension & Panel cutout

Unit : mm

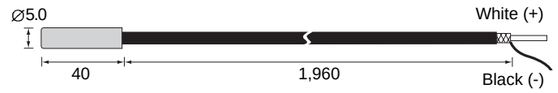




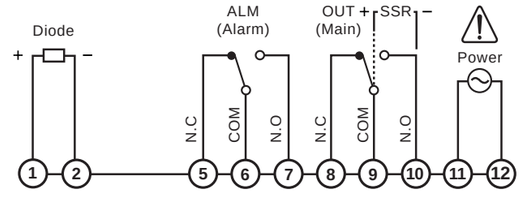


● SENSOR (Diode)

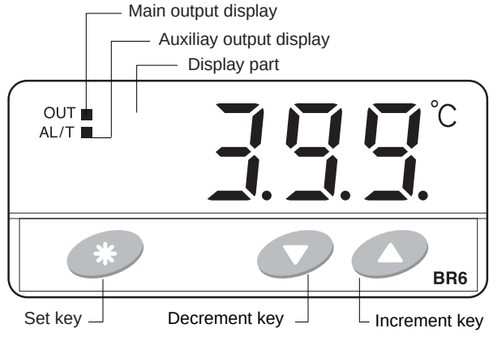
- This sensor is only for the BR6
- Temperature range : -40 ~ 100 ℃
- TH-540D (Diode)



■ Connection



■ Functional Description



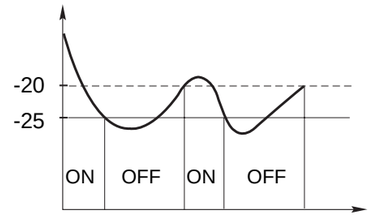
Display part	SV / PV Display
Main output display	Main output ON/OFF display (Control Output)
Auxiliary output display	Auxiliary output ON/OFF display (Alam/Timer output)
Set key	Function selecton & preservation
Increment key	Set-Value (SV) increment
Decrement key	Set-Value (SV) decrement

■ Control method for temperature

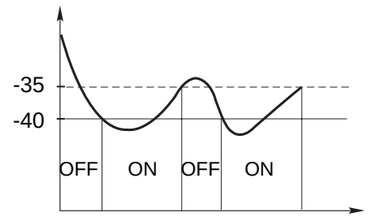
■ Heating / Cooling Control Selection

[SEt] → [oUtP] — HEAt : Heating control
cooL : Cooling control

● Cooling Control (ON/OFF)
P.V > S.V. → Main output relay "ON"
P.V < S.V. → Main output relay "OFF"

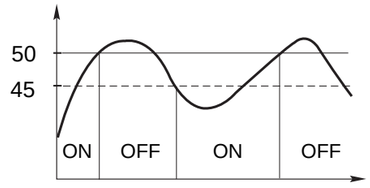


Main output
[setting=-25 ℃, dlf=5, dLy=0, tyP=CoL]

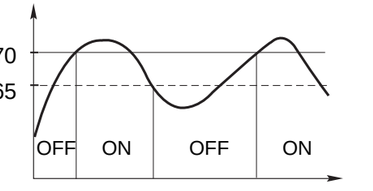


Alarm Output (Low Limit Alarm)
[AtS=-40, AdF=5, AdL=0, SAo=0]

● Heating Control (ON/OFF)
P.V > S.V. → Main output relay "OFF"
P.V < S.V. → Main output relay "ON"



Main output
[setting=50 ℃, dlf=5, dLy=0, tyP=HEt]



Alarm Output (High Limit Alarm)
[AtS=-70, AdF=5, AdL=0, SAo=0]

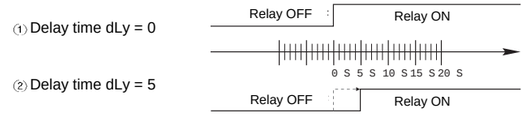
■ Delay timer set

Press ✱ Key continuously for 3sec. And then, press ✱ Key until getting " dELY ".

Change a set point by ▲ / ▼ Key, and preservation it by ✱ Key

[oUtP] → [idLF] → [dELY] (0 ~ 240 sec.)

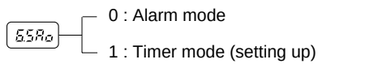
● Operating description by Delay-Timer

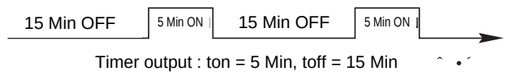


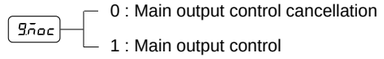
※In case of Delay Time=0, Relay is immediately ON when output signal is generating. In case of Delay Time=5, Relay is ON after 5 sec. when output signal is generating. In the interval of 5 sec, the output indicator is flickering during Delay Timer Operation. After the delay time, the output indicator lights as the relay is on.

■ Auxiliary output(Timer-mode) set and operating description

It is possible to use timer-mode as defrosting function in case of freezer.







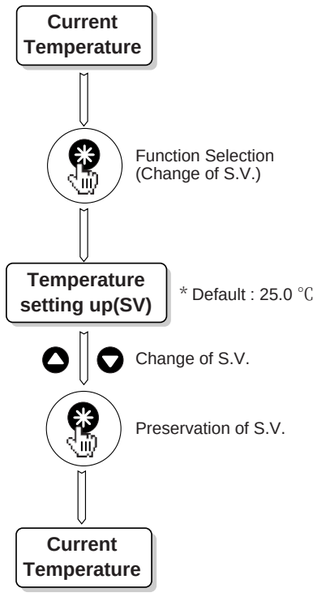
When using MOC '1', main output will be OFF automatically as timer is ON. If using MOC function, you can effectively use timer output as a defrosting function.

※ Set menu position

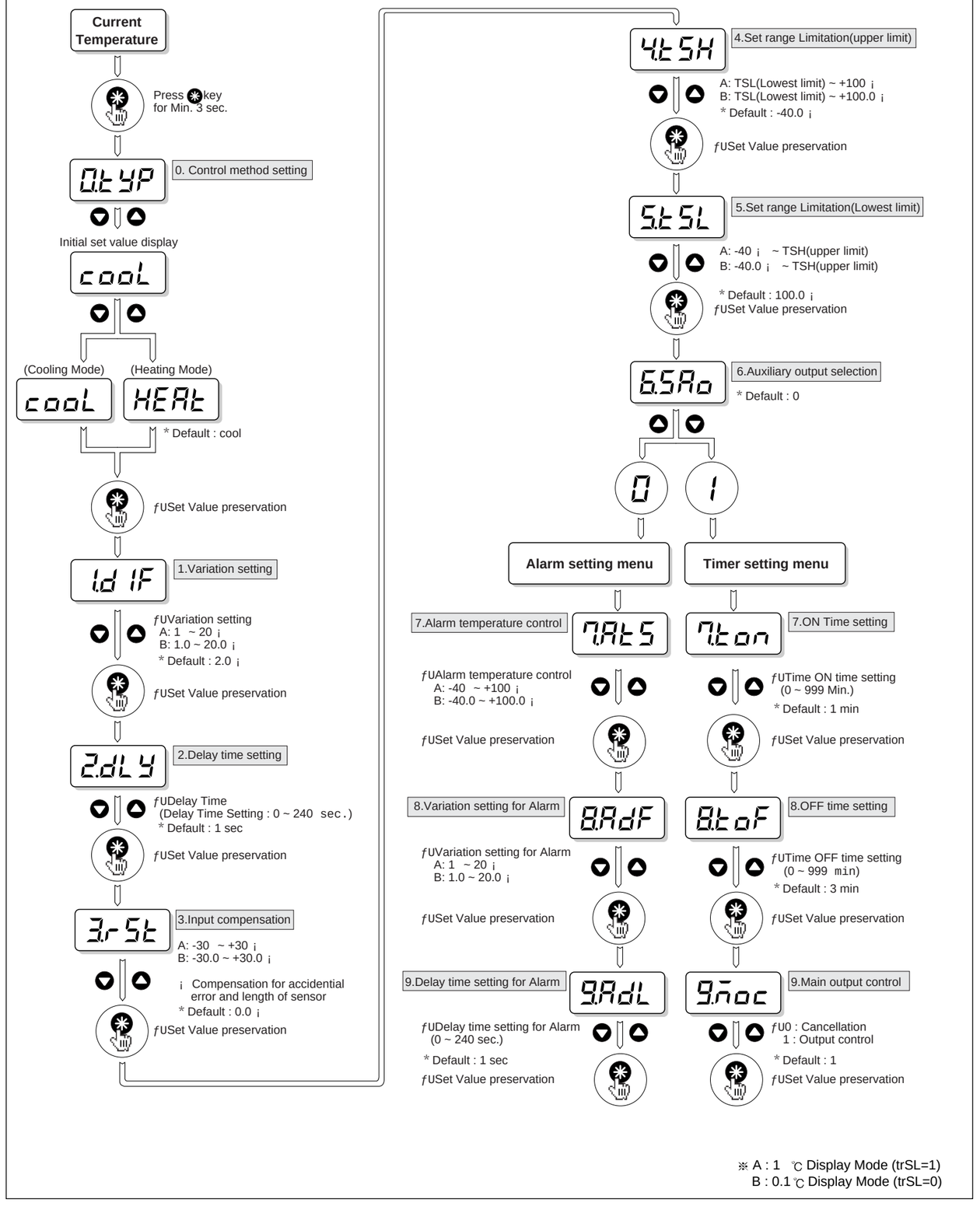
[0.tyP] → [1d1F] → [2.dLY] → [3.rSt] → [4.tSH]
→ [5.tSL] → [6.SAo] → [7.ton] → [8.toF]
→ [9.noc]

■ Setting up menu

■ Set mode for normal users



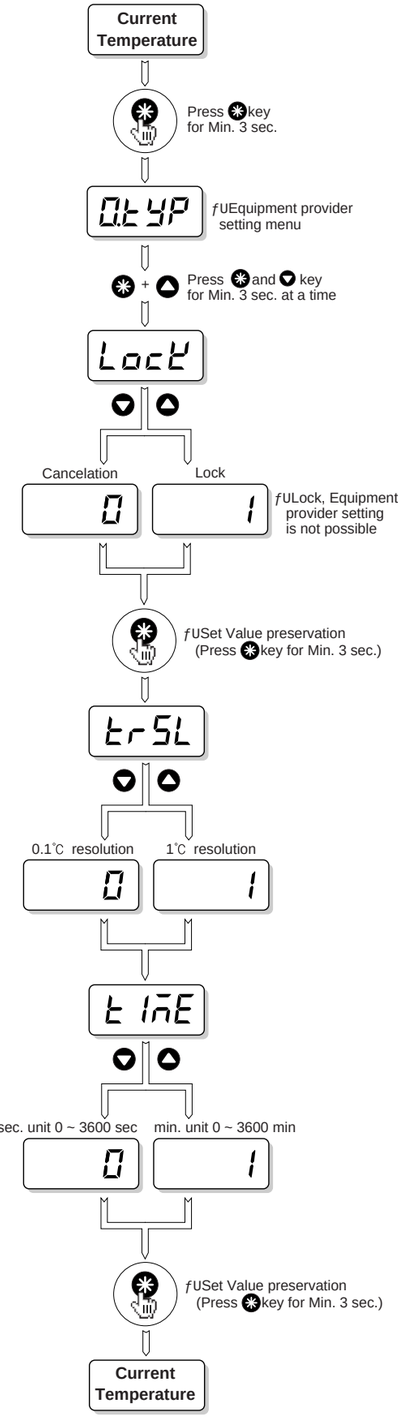
■ Set mode for equipment provider



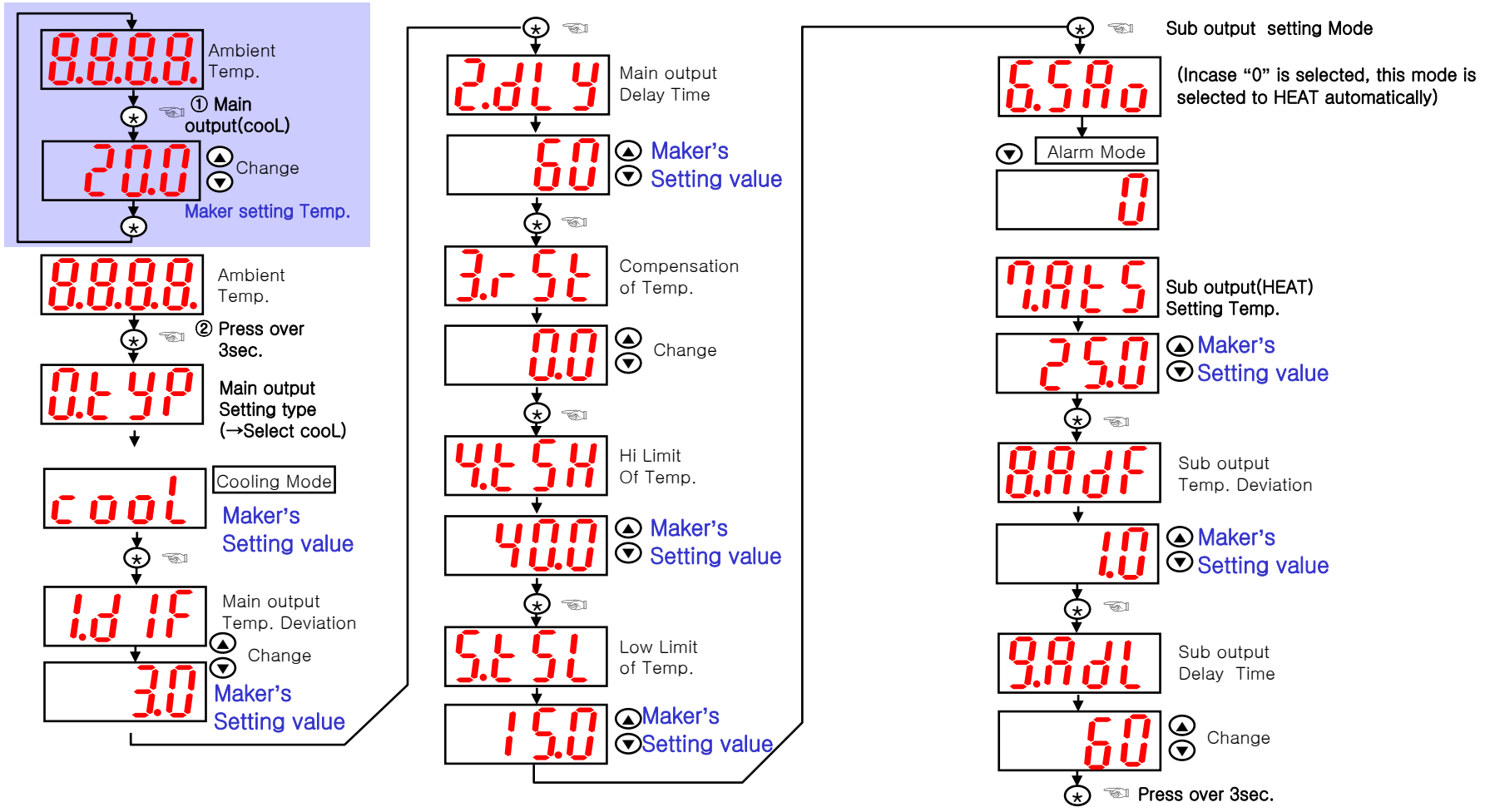
■ Set Value lock function and decimal point function

It is possible to prevent a change of equipment provider setting caused by mistake of normal users.

Function	S.V.	Description
Lock	0	Cancellation of lock function
	1	Operation of lock function
trSL	0	Decimal point 0.1 ℃
	1	No Decimal point 1 ℃
Time	0	"sec." setting in Timer (0 ~3600 sec)
	1	"min." setting in Timer (0 ~3600 min)



Setting For Installer Mode (Program)



If ⊛ key is pushed for 3 seconds,all programs are closed and saved.

Please don't change maker's setting values.

HEATER turn off at 26℃, and turn on below 25℃ in 60second.

PACKAGE TYPE AIR CONDITIONER

HI AIR KOREA
Co., Ltd.
#1432-11 Daman-Ri Chillye-Myon
Gimhae-city, Gyeongnam, Korea
Tel. +82 55 340 5200
Fax:+82 55 346 3502

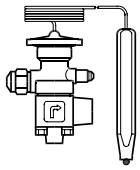
MISCELLANEOUS INSTRUCTION MANUAL

F

- THERMOSTATIC EXPANSION VALVE
- SOLENOID VALVE
- PRESSURE CONTROLER
- DRYER

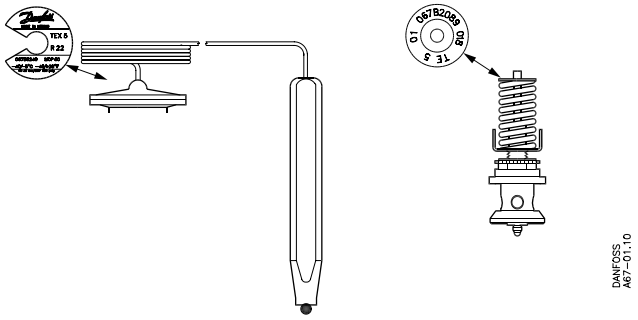
INSTRUCTIONS

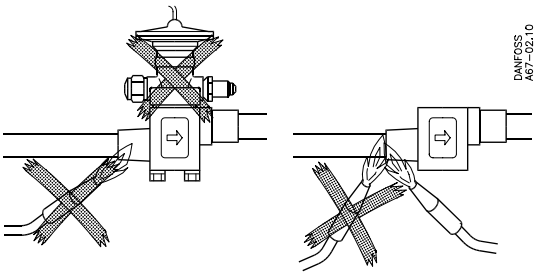
TE 5, TE 12, TE 20, TE 55

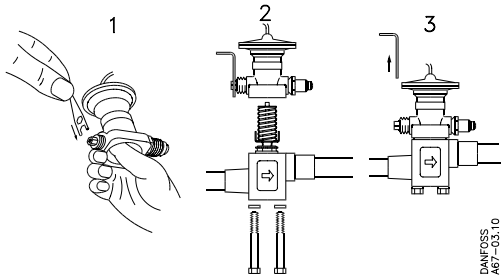


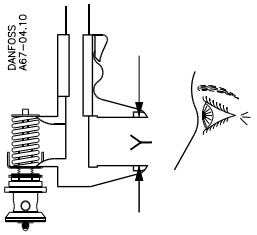
067R9504

067R9504

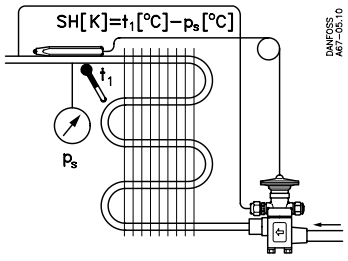


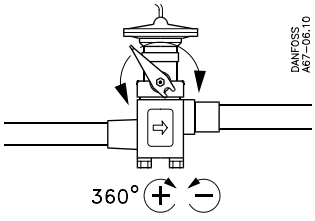






SH= 4°C (7°F)





TE5,TE12: N ∼ 0.5 °C(1°F)SH
B ∼ 1.5 °C(3°F)SH

TE20,TE55: N ∼ 0.5 °C(1°F)SH
B ∼ 1.0 °C(2°F)SH

Range N = –40°C → +10°C (–40°F → +50°F)
Range B = –60°C → –25°C (–75°F → –15°F)

TE 5

Orifice no.	Orifice code no.	Y = ±1 mm							
		R 22 Range		R 134a Range	R 404A Range		R 12 Range	R 502 Range	
		N	B	N	N	B	N	N	B
01	**067B2089**	26	26	27	27.5	27.5	28	26	26
02	**067B2090**	26	26	27	27.5	27.5	28	26	26
03	**067B2091**	26	26	27	27.5	27.5	28	26	26
04	**067B2092**	26	26	27	27.5	27.5	28	26	26

TE 12

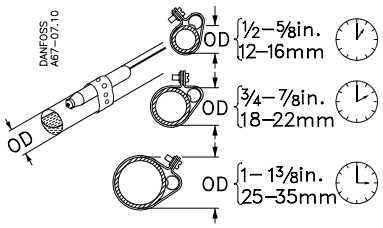
Orifice no.	Orifice code no.	Y = ±1 mm							
		R 22 Range		R 134a Range	R 404A Range		R 12 Range	R 502 Range	
		N	B	N	N	B	N	N	B
01	**067B2005**	35	35	35	36	36	36	32	32
02	**067B2006**	35	35	35	36	36	36	32	32
03	**067B2007**	35	35	35	36	36	36	32	32
04	**067B2008**	35	35	35	36	36	36	32	32

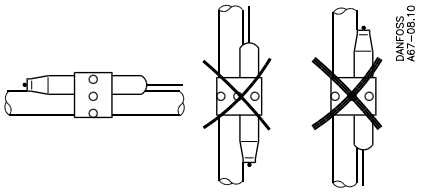
TE 20

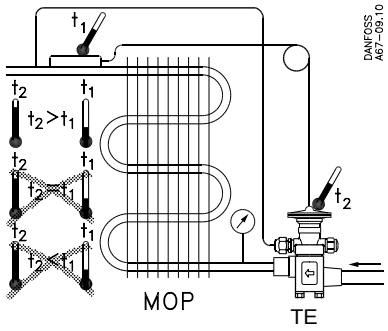
Orifice no.	Orifice code no.	Y = ±1 mm							
		R 22 Range		R 134a Range	R 404A Range		R 12 Range	R 502 Range	
		N	B	N	N	B	N	N	B
01	**067B2170**	-	-	32	-	-	34	-	-
02	**067B2172**	33.5	36	-	-	-	-	-	-
03	**067B2175**	-	-	-	35	35	-	33	33

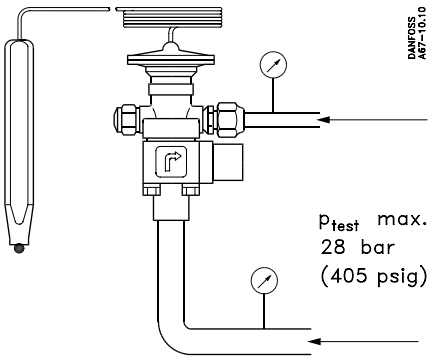
TE 55

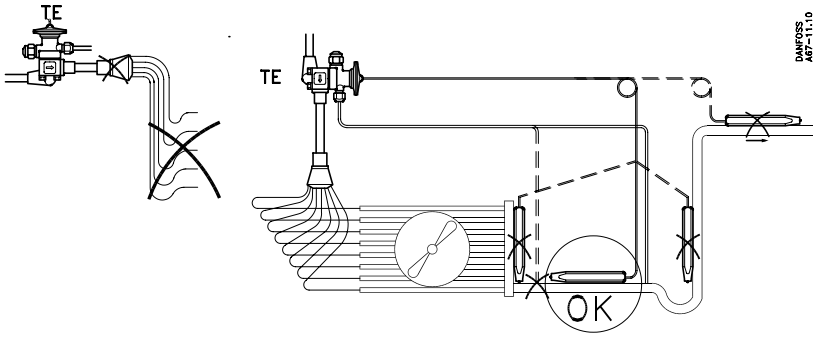
Orifice no.	Orifice code no.	Y = ±1 mm							
		R 22 Range		R 134a Range	R 404A Range		R 12 Range	R 502 Range	
		N	B	N	N	B	N	N	B
01	**067G2001**	-	-	31	33	33	33	-	-
02	**067G2002**	-	-	31	33	33	33	-	-
01	**067G2005**	32	34	-	-	-	-	-	-
02	**067G2006**	32	34	-	-	-	-	-	-
01	**067G2011**	-	-	-	-	-	-	33	34
02	**067G2012**	-	-	-	-	-	-	33	34

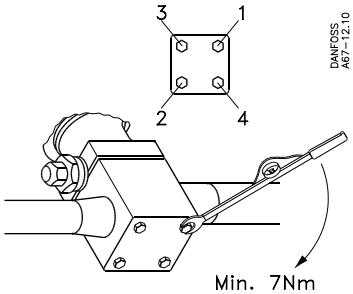




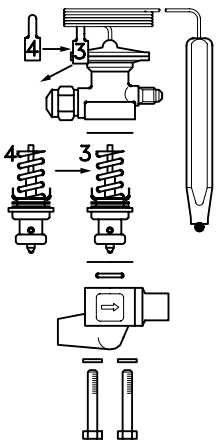




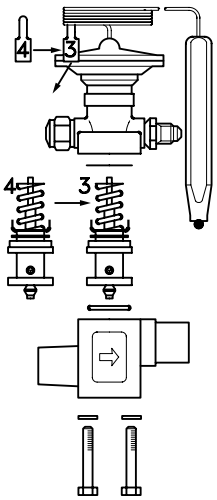




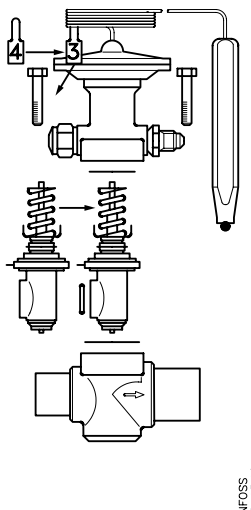
Min. 7Nm
(0.7kpm/5ft-lbs)
Max. 10Nm
(1kpm/7ft-lbs)



TE 5



TE 5, TE 12, TE 20

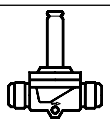


TE 55

Instruction

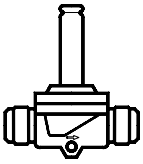
032R9500

EVR 2 - 22, Normally Closed/Normally Open (NC/NO)

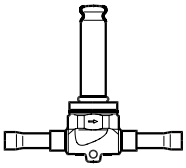


032R9500

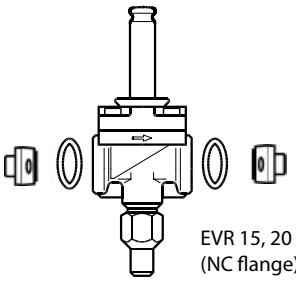
Refrigerants CFC, HCFC, HFC



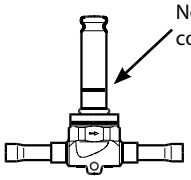
EVR 2, 3, 4, 6, 8, 10 (NC flare)



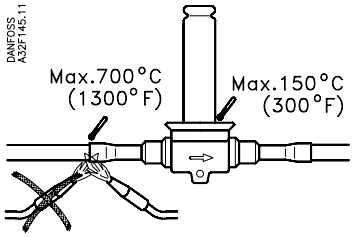
EVR 6, 10 (NC solder)

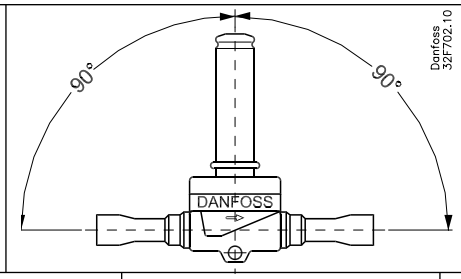


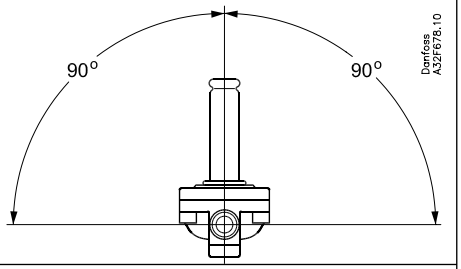
EVR 15, 20 (NC flange)



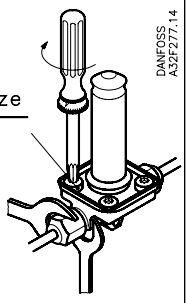
EVR 2, 3, 4, 6, 8, 10 (NO solder)

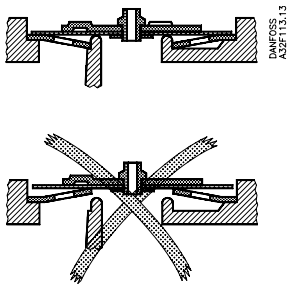




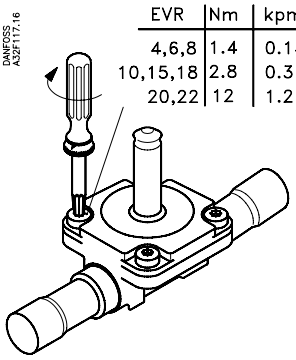


EVR	Nm	kpm	ft–lbs	Torx size
2–3	1.4	0.15	1	T 15





EVR	Nm	kpm	ft–lbs	Torx size
4,6,8	1.4	0.14	1	T 20
10,15,18	2.8	0.3	2	T 25
20,22	12	1.2	9	T 40



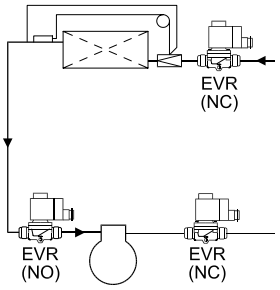
9 W a.c. EVR 2 — $t_{max.}$ 40°C (105°F)

10/12 W a.c. — $t_{max.}$ 80°C (175°F)

20 W d.c. — $t_{max.}$ 50°C (120°F)

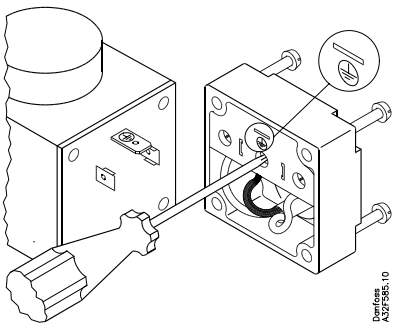
10 W a.c. — $t_{max.}$ 55°C (130°F)

$t_{min.}$ -40°C (-40°F)

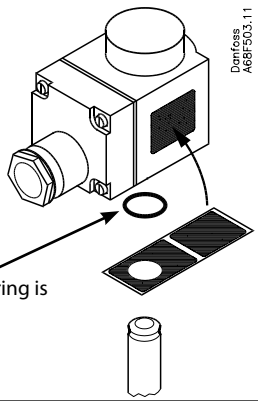


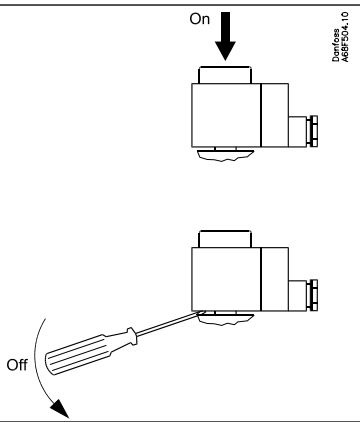
Min. medium temperature: -40°C (-40°F)
Max. medium temperature: 105°C (221°F)
Max. working pressure:EVR2-10 PB=35bar
Max. working pressure:EVR15-22 PB=32bar
Max. opening diff. pressure (MOPD): →

Danfoss A32F593.11



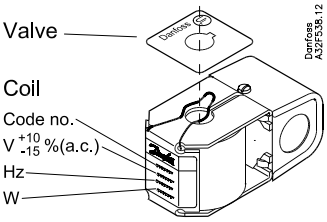
Warning
Never switch on power to the coil when the coil is dismounted from the valve. Otherwise the coil may be damaged and there is risk of injuries and burns





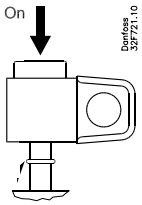
UL approved coils

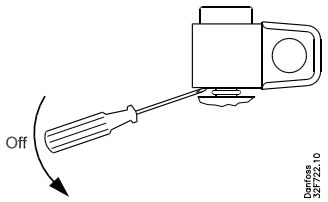
Conduit coil Junction box

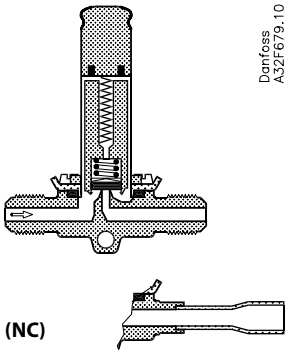


Caution
Wiring and fusing (when used) must comply with prevailing local and national wiring codes and ordinances

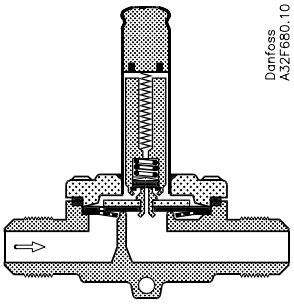
UL approved coils



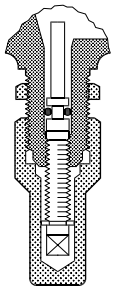




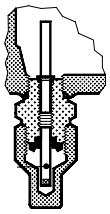
EVR 3 (NC)



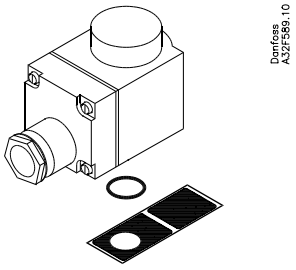
EVR 4 - 22 (NC)

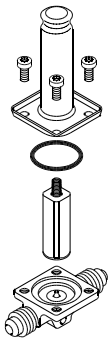


EVR 4 - 10 (NC)

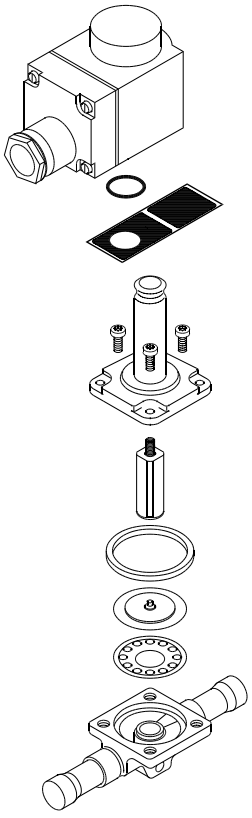


EVR 15 - 22 (NC)

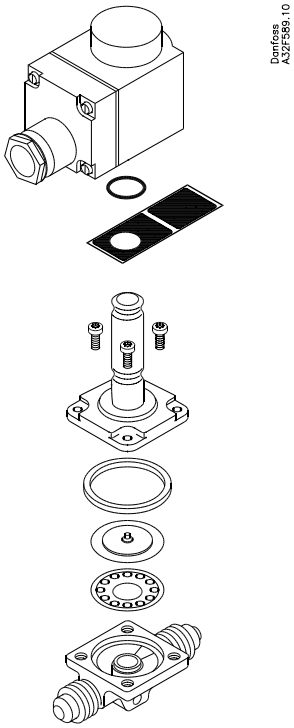




EVR 2, 3 (NC)

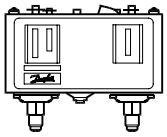


EVR 4 - 22 (NC)



EVR 6 - 20 (NO)

INSTRUCTIONS

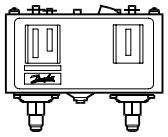


KP 15, 15A, 17W, 17B

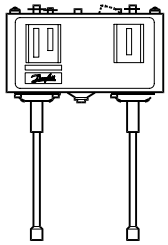
060R9753

060R9753

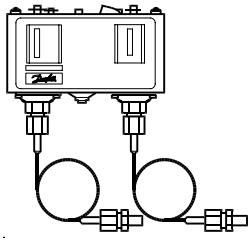
KP 15, 17W, 17B: R 12, R 22, R 500, R 502
KP 15A: R 717 (NH_3)



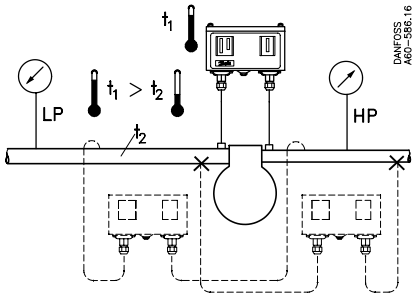
KP 15, 17



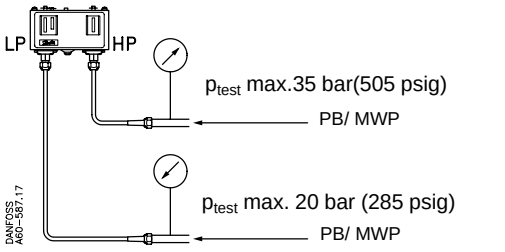
KP 15, 17



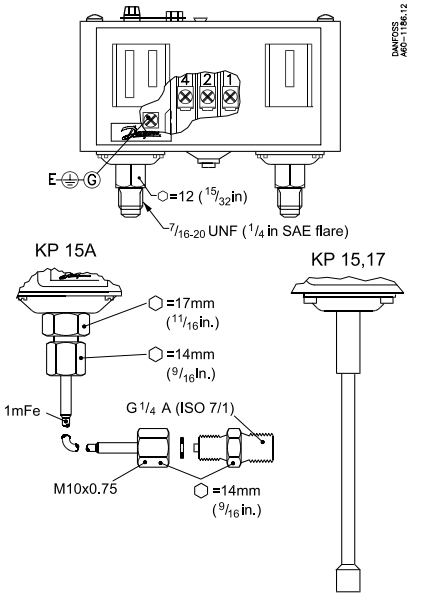
KP 15A

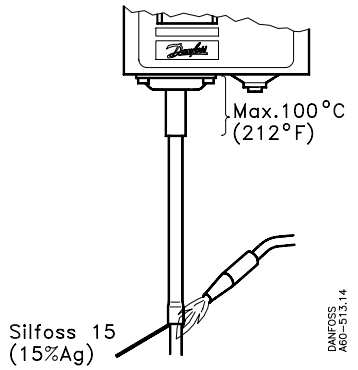


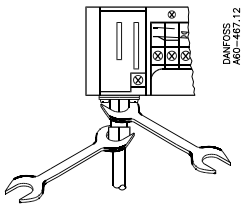
t_1 min. KP 15: –40°F (–40°C)
KP 17: –25°C (–13°F)
t_1 max. 65°C (150°F)

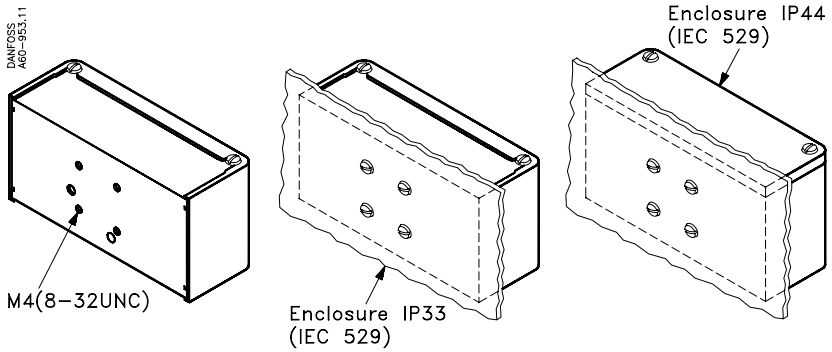


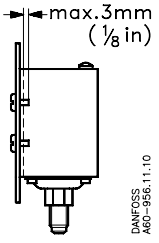
Type	Range	PB	MWP
KP 15	LP: -0.2 → 7.5 bar	17 bar	250 psi
	HP: 8 → 32 bar	35 bar	505 psi
KP 15	LP: -0.9 → 7 bar	17 bar	250 psi
	HP: 8 → 32 bar	35 bar	505 psi
Reset			
KP 17	LP: -0.2 → 7.5 bar	17 bar	250 psi
	HP:8 → 32 bar	35 bar	505 psi

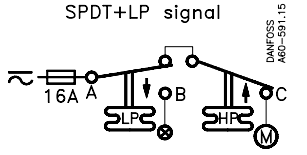


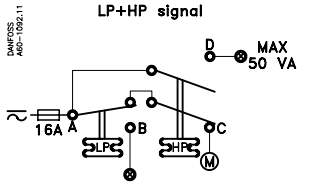












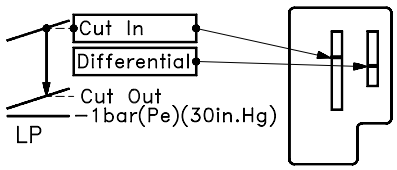
When used acc. to UL regulations

c UL us Listed refrigeration controller 61B5

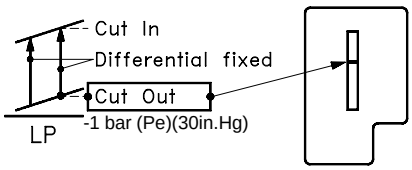
Con-tacts	Voltage AC	Voltage DC	FL A	LR A	Resist. load	Pilot duty
A-B	240		8	48	8A	3A
A-C	120		16	96	16A	
		240				12W
A-D	240					50VA

Use copper wire only
Tightening torque 20lb.in.

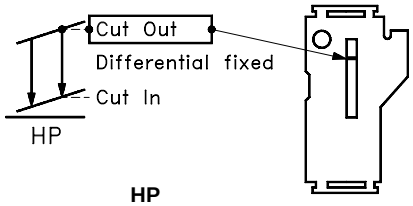
LR 112A	AC1 16 A AC3 16 A AC11 10 A	400 V≃	DC 11 12 W 220 V≃



LP, aut. reset

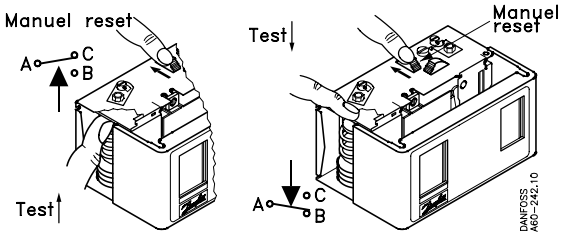


LP, man. reset

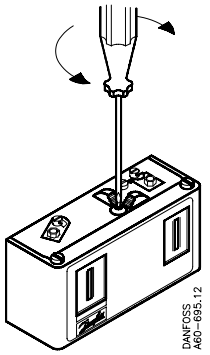


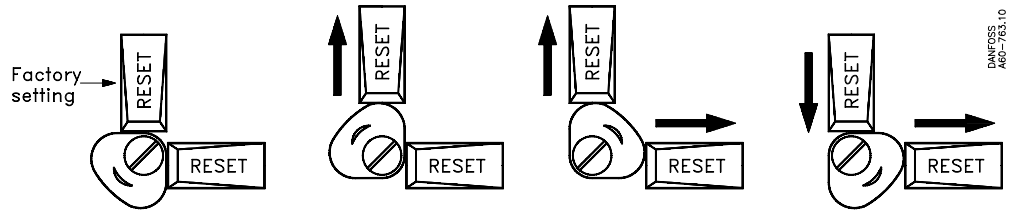
HP

Manual test

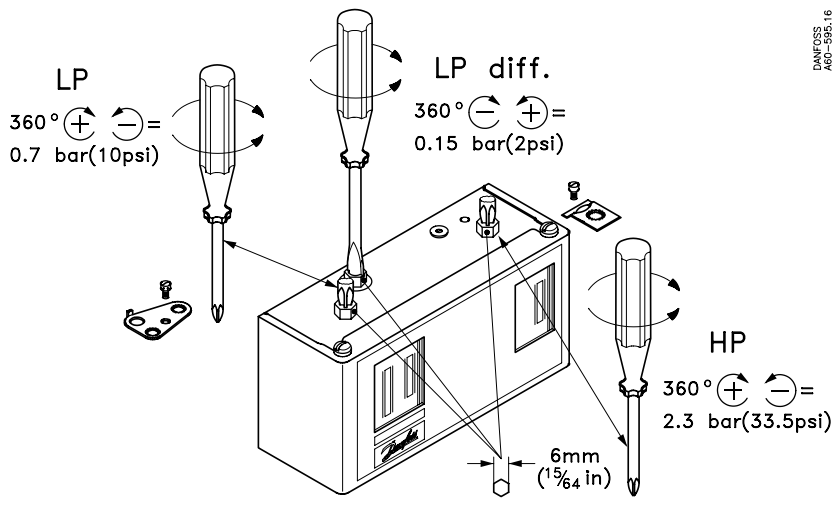


Konvertibel reset / Convertible reset / Austauschbares Reset / Réarmement convertible
KP 15 060-1154, 060-1220, 060-1261, 060-1263, 060-1283



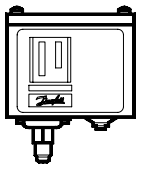


LP-man. HP-man. | LP-auto. HP-man. | LP-auto. HP-auto. | LP-man. HP-auto.



INSTRUCTIONS

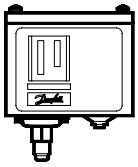
KP 1, 1W, 1A, 2, 5, 5A, 6, 7W, 7B, 7S



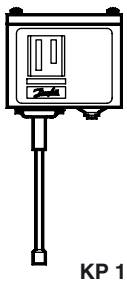
060R9750

060R9750

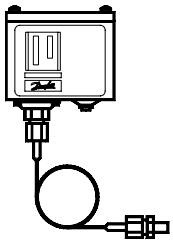
KP 1, 2, 5, 6, 7: HFC, HCFC, CFC
KP 6: HFC, CO_2
KP 1A, 5A: R 717 (NH_3)



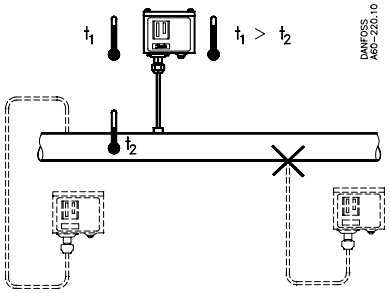
KP 1, 2, 5, 6, 7

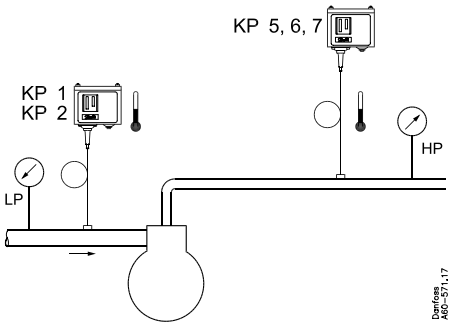


KP 1, 2, 5, 6, 7

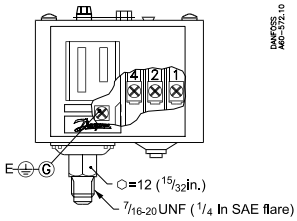


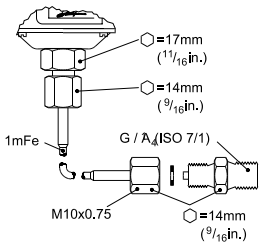
KP 1A, 5A

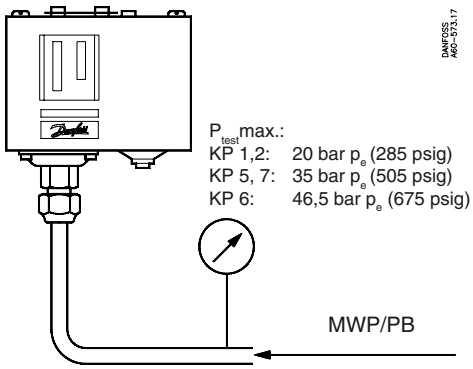




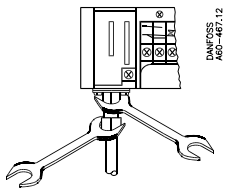
KP 1, 2,
KP 5, 6, 7

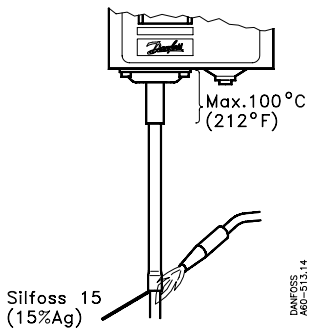


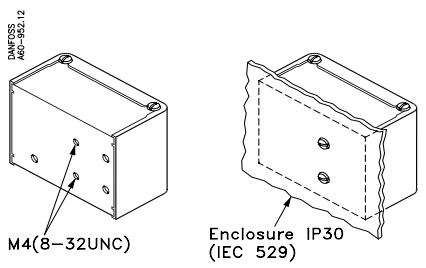


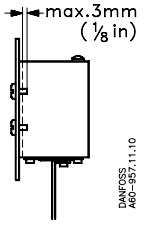


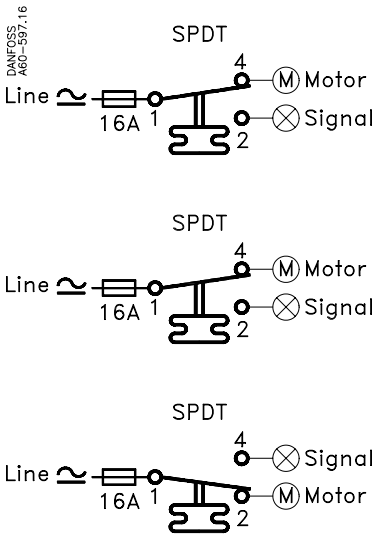
Type	Range	MWP/PB
KP 1	–0.2 → 7.5 bar	250 psi / 17 bar
KP 1, reset	–0.9 → 7 bar	250 psi / 17 bar
KP 1W	0.5 → 3 bar	250 psi / 17 bar
KP 2	–0.2 → 5 bar	250 psi / 17 bar
KP 5, 7W	8 → 32 bar	505 psi / 35 bar
KP 5, reset	8 → 32 bar	505 psi / 35 bar
KP 6	8 → 42 bar	675 psi / 46.5 bar
KP 7B, 7S	8 → 32 bar	505 psi / 35 bar

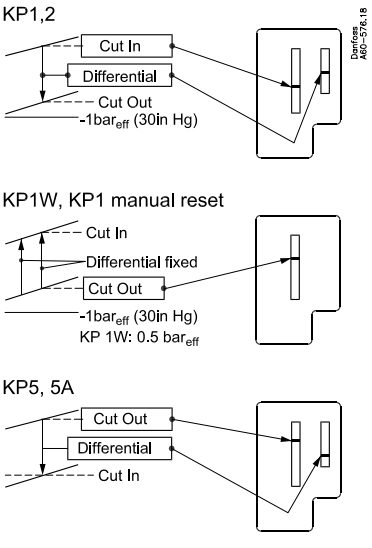












Electrical rating - General

LR 112A	AC 1: 16A AC 3: 16A AC 11: 10 A	400 V~	DC 11 12 W 220 V~

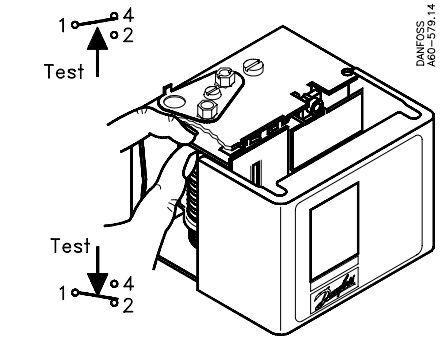
When used acc. to UL regulations

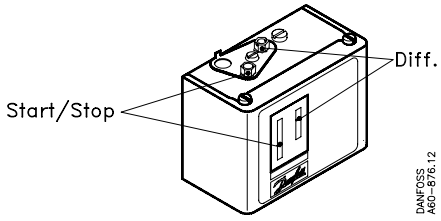
c UL us Listed refrigeration controller 61B5

Voltage AC	Voltage DC	FL A	LR A	Resist. load	Pilot duty
240		8	48	8A	3A
120		16	96	16A	
	240				12W

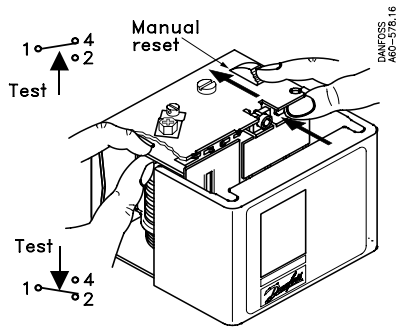
Use copper wire only
Tightening torque 20lb. in.

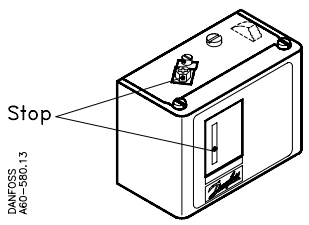
Automatic reset



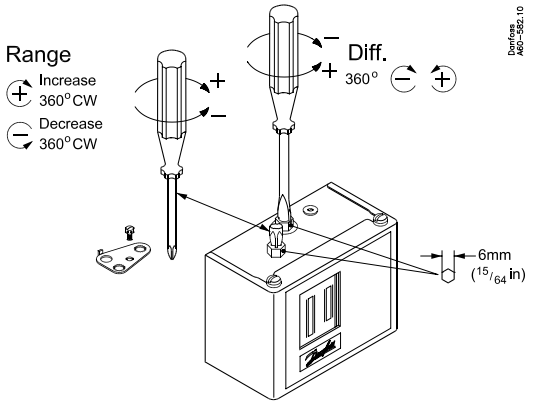


Manual reset



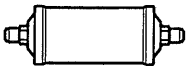


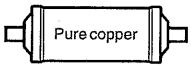
Diff.
KP 1, 1A: 0.7 bar (10 psi)
KP 5, 5A: 3 bar (43 psi)
KP 6, 7B, 7S: 4 bar (58 psi)

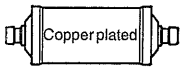


Instruction

DML / DCL Filter Drier



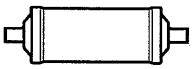




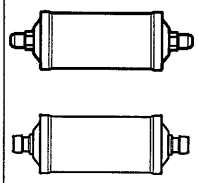
023R9514

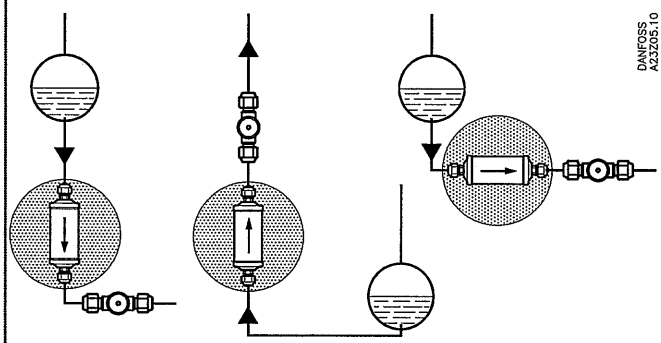
DML: R134a, R404A, R407C, R410A, R507, R22 et al.
DCL: R12, R22, R502 et al.

Pure copper solder versions
Lötausführungen aus reinem Kupfer
Versions à braser avec cuivre pur
Versiones soldar cobre puro
Versioni a brasare in rame puro
純銅継手による仕様
纯铜焊接型
Паяные соединения из чистой меди

Symbol Symbol Symbole Símbolo Simbolo シンボル 标记 Символ	Connection Anschluss Raccord Conexión Connessione 接続サイズ 连接尺寸 Соединение	Max. working pressure Max. zul. Betriebsüberdruck Pression de service maximale ¡Presión de trabajo máx.! Massima pressione operativa! 最高使用圧力 最大工作压力 Макс. рабочее давление
	1/4" 5/16" 3/8" 1/2" 5/8"	610 psig / 42 bar 610 psig / 42 бар
	3/4" 7/8"	507 psig / 35 bar 507 psig / 35 бар
	1 1/8"	435 psig / 30 bar 435 psig / 30 бар

Flare / face seal versions (ORS) / copper plated solder versions
Bördel-/Dichtflächenausf. (ORS) / verkupferte Lötausführungen
Versions flare/joint facial (ORS) / versions à braser avec placage cuivre
Versiones abocardadas / sello de junta tórica / acero chapado de cobre para soldar
Versioni a cartella / ad attacco rapido con O-ring / versioni ramate a brasare
フレア継手 / 面シール(ORS) / 銅メッキ継手仕様
喇叭口 / 端面密封型 (ORS) / 镀铜焊接型
Под отбортовку (с кольцевым уплотнением) / паяные соединения с медным покрытием

Symbol Symbol Symbole Símbolo Simbolo シンボル 标记 Символ	Connection Anschluss Raccord Conexión Connessione 接続サイズ 连接尺寸 Соединение	Max. working pressure Max. zul. Betriebsüberdruck Pression de service maximale ¡Presión de trabajo máx.! Massima pressione operativa! 最高使用圧力 最大工作压力 Макс. рабочее давление
	All sizes Alle Größen Toutes tailles Todos los tamaños Tutte le dimensioni すべてのサイズ 所有规格 Все размеры	610 psig / 42 bar 610 psig / 42 бар



Note!
Max. working pressure (PB/MWP) shall not be less than the pressure outlined in sect. 8.2 of ANSI / ASHRAE 15 for the refrigerant used in the system.
After charging, the system shall be marked with the refrigerant and the oil used.

Anmerkung!
Der max. Betriebsüberdruck darf nicht kleiner als der in Abschn. 8.2 von ANSI / ASHRAE 15 angegebene Druck für das in der Anlage verwendete Kältemittel sein.
Nach dem Befüllen ist die Anlage mit Angaben über das verwendete Kältemittel und Öl zu kennzeichnen.

Attention!
La pression de service maximale (PB/MWP) ne doit pas être inférieure à la pression définie au chapitre 8.2 des ANSI / ASHRAE 15 pour les fluides frigorigènes utilisés dans le système.
Après remplissage, indiquer sur le système les fluides frigorigènes et huiles utilisées.

¡Atención!
La presión de trabajo máx. (PB/MWP) no debe ser menor que la presión especificada en ANSI / ASHRAE 15, apartado 8,2 para el refrigerante utilizado en el sistema.
Después de la carga, se deberá marcar el sistema con el refrigerante y aceite utilizados.

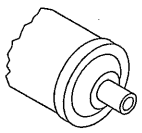
Nota bene!
La massima pressione operativa (PB/MWP) non deve essere minore della pressione specificata nel paragrafo 8.2 di ANSI / ASHRAE 15 per il refrigerante utilizzato nel sistema.
A caricamento avvenuto, il sistema dovrà essere contrassegnato con il refrigerante e l'olio utilizzati.

注意
使用する冷媒のANSI/ASHRAE 15の8.2に記載されている圧力がフィルタドライヤの最高使用圧力以下である事を確認して使用して下さい。
装置にチャージした冷媒および冷凍機油を明記して下さい。

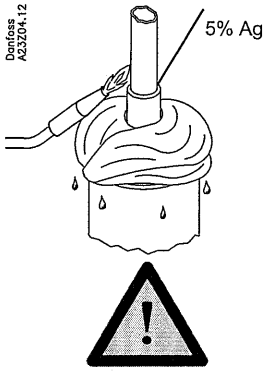
注意!
最大工作压力(PB/MWP)应不小于ANSI/ASHRAE15, 8.2中注明的系统所用制冷剂的压力。
充注后应注明系统所用的制冷剂和润滑油。

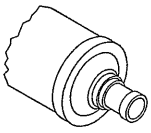
Примечание!
Максимальное рабочее давление (PB/MWP) не должно быть ниже, чем давление, приведенное в разделе 8.2 ANSI / ASHRAE 15 (Американское Общество инженеров теплотехники, искусственного холода и кондиционирования воздуха/Американский Национальный Институт Стандартизации) для хладагента, использующегося в системе.
После заправки системы на ней следует обозначить тип используемого хладагента и масла.

⚠ **SAFETY WARNING. SEE REVERSE SIDE.**
⚠ **SICHERHEITSHINWEIS. BITTE BEACHTEN SIE DIE RÜCKSEITE.**
⚠ **TOURNER LA PAGE S.V.P., INFORMATION IMPORTANTE.**
⚠ **ADVERTENCIAS DE SEGURIDAD. VER REVERSO.**
⚠ **AVVISO DI SICUREZZA. GUARDARE IL RETRO.**
⚠ **安全注意事項:裏面参照**
⚠ **安全注意事项, 请参看背面。**
⚠ **Инструкция по безопасности. Смотри обратную сторону.**

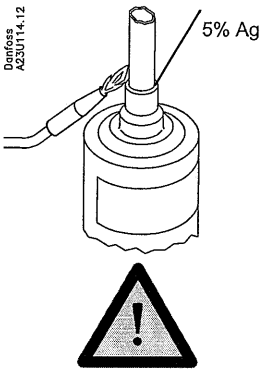


Pure copper connectors.
Always wet wrap the connector.





Copper plated steel connectors.



WARNING

Potential Harmful Fumes During Soldering

Only solder in a WELL-VENTILATED area. When soldering, only apply heat to the connection with the flame pointed away from the Filter Drier. Excess heating of the paint may cause toxic fumes. Exposure to these fumes may cause skin and eye irritation, and damage internal organs. For pure copper connectors, always wet wrap the connector.

ACHTUNG

Beim Löten können gefährliche Dämpfe entstehen

Lötarbeiten dürfen nur in GUT BELÜFTETEN Bereichen vorgenommen werden. Beim Löten nur den Stutzen erhitzen, wobei die Flamme vom Trockenfilter weg gerichtet sein muss. Bei Überhitzung des Anstrichs können giftige Dämpfe entstehen. Diese Dämpfe können zu Haut- und Augenirritationen führen und inneren Organen Schäden zufügen. Bei Anschlüssen aus reinem Kupfer den Anschluss immer feucht einwickeln.

AVERTISSEMENT

Risque d'émission de fumées toxiques pendant le brasage

Braser uniquement dans une zone BIEN VENTILÉE. Pour effectuer le brasage, appliquer la chaleur uniquement sur le raccord ; ne pas diriger la flamme vers le filtre déshydrateur. Une surchauffe de la peinture peut entraîner un dégagement de fumées toxiques. Une exposition à ces fumées peut causer une irritation de la peau et des yeux, ainsi que des lésions des organes internes. Toujours envelopper les raccords en cuivre pur dans un chiffon humide.

ADVERTENCIA

Humos tóxicos durante la soldadura

Soldar únicamente en un área BIEN VENTILADA. Al soldar, sólo aplicar calor en la conexión con la llama en dirección contraria al filtro secador. El calentamiento excesivo de la pintura puede originar humos tóxicos. El contacto con estos humos puede causar irritaciones en la piel y en los ojos, y también puede dañar los órganos internos. Para conectores de cobre puro, envolver siempre el conector con paño húmedo.

ATTENZIONE

Fumi tossici durante la saldatura

Saldare esclusivamente in ambienti BEN VENTILATI. Al momento della saldatura, applicare il calore alla connessione soltanto con la fiamma in direzione opposta al filtro essiccatore. Un eccessivo riscaldamento della vernice può provocare fumi tossici. L'esposizione a tali fumi può causare irritazione alla pelle e agli occhi, nonché lesioni agli organi interni. Per i connettori in rame puro, avvolgere sempre uno straccio bagnato attorno al connettore.

警告

ろう付け中に有害なガスが発生する恐れがあります。

ろう付け作業は、換気が行き届いた場所で行ってください。ろう付け時は炎の方向をフィルタドライヤ本体側に向けず、継手を過熱してください。
塗装を加熱しすぎると有害なガスが発生することがあります。このガスに触れると肌や目がかゆくなったり、内臓器官が害を受けたりすることがあります。
純銅製のコネクターの場合は、コネクターを必ず濡れた布でくるんでください。

警告！

焊接时有可能产生有害的烟尘

只能在通风良好的地方焊接。焊接时将火焰对着与干燥过滤器体相反的方向加热接管。
过烧会使漆产生有害的烟尘，暴露在这些烟尘下会引起皮肤和眼睛发炎，并会损害内部器官。
采用纯铜接管时，应随时用湿布包裹接管。

ПРЕДУПРЕЖДЕНИЕ

Вероятность появления вредных дымов во время пайки

Производите пайку только в ХОРОШО ПРОВЕТРИВАЕМЫХ помещениях. При пайке нагревайте только соединение, так чтобы пламя не было направлено на фильтр-осушитель. Перегрев красочного покрытия может вызвать появление токсичного дыма. Воздействие этого дыма может привести к раздражению кожи и слизистой оболочки, а также нанести вред внутренним органам.
При пайке соединений из чистой меди всегда оборачивайте соединение мокрой тканью.