FINAL

Desiccant (Heatless) Type
CONTROL AIR DRYER

MODEL NO. : KHDM - 600

SHIP YARD	SAMSUNG HEAVY INDUSTRIES CO., LTD.
SHIP TYPE	170K LNG FSRU
QUANTITY	2 SET(S) / SHIP
SHIP NO	SN2056
POWER SUPPLY	AC 230V x 60Hz x 1Ph

Sales No.	IMO No.	Class	Registration
SN2056	9655808	DNV	Marshall Islands

KYUNG NAM DRYER CO., LTD.
120-2, JANGGOK-RO, JORI-EUP, PAJU-SI, GYEONGGI-DO, KOREA
TEL : 031) 963 - 0080 , 949 - 7210 FAX : 031) 962 - 0180

REV.	DATE	DESCRIPTION	DRAWN BY	REV'D BY	APP'D BY
1	2015-09-15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014-09-25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE
DESICCANT(HEATLESS) TYPE CONTROL AIR DRYER
TOTAL(12) SHEET INCLUDING COVER

MODEL NO.	DWG.NO.
KHDM - 600	KHDM-600-CO-001

INDEX

(CONTROL AIR DRYER)
MODEL : KHDM - 600

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Desiccant (Heatless) Type CONTROL AIR DRYER	SHIP NO. SN2056

SPECIFICATIONS

TYPE	HEATLESS TYPE	
APPLICATION FLUID	COMPRESSED WET AIR	
FLOW RATE	530 N. m3/Hr (OUTLET OF DRYER)	
OUTLET DEW POINT	- 40 °C at 7 bar.g	
INLET CONDITIONS	WORKING PRESSURE	8 bar.g
	TEMPERATURE	50 °C (MAX)
	HUMIDITY	R.H. 50% SATURATED
OUTLET CONDITIONS	PRESSURE	8.6 bar.g
	TEMPERATURE	45 °C
	PRESSURE DROPS	0.4 bar.g
OPERATING CYCLES	DRYING	5 MIN
	REGENERATION	4 MIN
	REPRESSURIZING	1 MIN
DESIGN FACTORS (PRESSURE VESSEL)	DESIGN PRESSURE	9.9 bar.g
	DESIGN TEMPERATURE	100 °C
	PNEUMATIC TEST PRESSURE	15 bar.g
	CLASSIFICATION	DNV Class
NOZZLE & PIPINGS	IN/OUTLET CONNECTION	JIS 10K 50A FLANGE
	DRYING PROCESS LINE	50A
	REGENERATION LINE	40A
	ORIFICE LINE	40A
	PURGE LINE	40A
DEMENSIONS & WEIGHT	DIMENSIONS	2750 W x 1350 D x 2495 H
	WEIGHT	1000 kg/UNIT APPROX.
PAINTING COLOR	MUNSELL NO.	7.5 BG 7/2 (BLUE GREEN)

REV.	DATE	DESCRIPTION	DRAWN BY	REV'D BY	APP'D BY
1	2015.09.15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014.09.25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE
DESICCANT(HEATLESS) TYPE CONTROL AIR DRYER
SPECIFICATIONS(A)

MODEL NO.	DWG.NO.
KHDM - 600	KHDM600-SP-003

Desiccant (Heatless) Type CONTROL AIR DRYER	SHIP NO. SN2056

SPECIFICATIONS

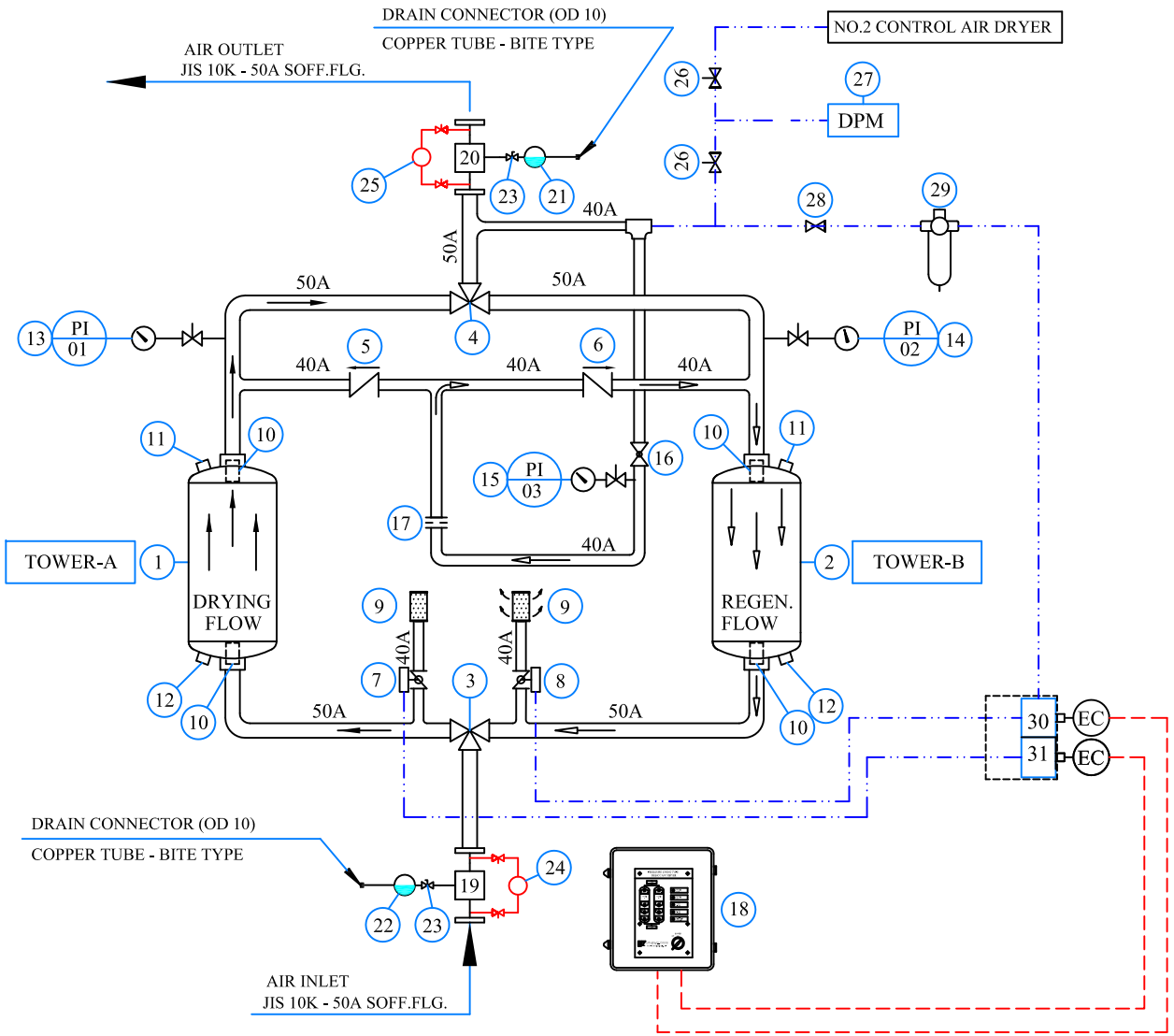
VESSEL & EQUIPMENTS	TOWER & VESSEL	DUAL TOWER (VERTICAL TYPE)
	TYPE OF DESICCANT	ACTIVATED ALUMINA
	QUANTITY OF DESICCANT	110 kg/TOWER (220 kg/ 2 TOWER)
	AIR INLET VALVE	50A-3 WAY SHUTTLE VALVE
	AIR OUTLET VALVE	50A-3 WAY SHUTTLE VALVE
	REGEN. PURGE FLOW VALVE	JIS 10K 40A- CHECK VALVE
	REGEN. PURGE VALVE	40A-CYLINDER VALVE
	REGEN. PURGE ADJUSTING VALVE	JIS 10K 40A-GLOBE VALVE
AIR FILTER	INLET (PRE) FILTER	KNAF-13/50AN (0.01 MICRON)
	OUTLET (AFTER) FILTER	KNAF-31/50AN (1 MICRON)
MATERIAL	VESSEL	SS400
	SEAT	SS400
	PIPE AND FITTING	STPG(SCH 20)
	AIR INLET VALVE	ALUMINUM
	AIR OUTLET VALVE	ALUMINUM
	REGEN. PURGE FLOW VALVE	BRONZE(BC6)
	REGEN. PURGE VALVE	BRASS(BC3)
	GLOBE VALVE	BRONZE(BC6)
	DESICCANT	ACTIVATED ALUMINA
	FILTER SCREEN	SUS316L
	GASKET / FLANGE	NON-ASBESTOS / SS400
	INSTRUMENT FITTING	BRASS(BC3)
UTILITY REQUIRED	ELECTRICITY	AC230V / 1Ph / 60Hz

REV.	DATE	DESCRIPTION	DRAWN BY	REV'D BY	APP'D BY
1	2015.09.15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014.09.25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE
DESICCANT(HEATLESS) TYPE CONTROL AIR DRYER
SPECIFICATIONS(B)

MODEL NO.	DWG.NO.
KHDM - 600	KHDM600-SP-004



SYMBOL	DESCRIPTION							GENERAL NOTE
	BALL VALVE(NOR.OPEN)		3-WAY TEST COCK VALVE	———	AIR MAIN LINE	DT	DRYER TOWER	
	BALL VALVE(NOR.CLOSE)		SAFETY VALVE	—·—·—	INSTRUMENT AIR LINE	DPM	DEW POINT METER	
	GLOBE VALVE		3-WAY SHUTTLE VALVE	- - -	ELECTRIC LINE	OF	ORIFICE	
	ROOT VALVE		SOLENOID V/V 2WAY	T1	TEMPERATURE GAUGE	TS	THERMOSTAT	
	CHECK VALVE		PISTON VALVE	P1	PRESSURE GAUGE	EH	ELECTRIC HEATER	
	GATE VALVE	-----	AUTO DRAIN TRAP	EC	ELECTRIC CONNECTOR	OL	OIL LUBRICATOR	
		-----	ELECTRIC CABLE	STV	SHUTTLE VALVE	AF	AIR FILTER	

SPECIFICATION

APPLICATION FLUID	: COMPRESSED AIR
OUTLET AIR CAPACITY	: 530 Nm3/hr
AIR INLET TEMP.	: 50°C (Max.)
WORKING PRESSURE	: 8 bar.g
DESIGN PRESSURE	: 9.9 bar.g
OUTLET DEW POINT	: - 40 °C at 7 bar.g
PURGE CONTROL SET	: 3 bar.g
POWER CONSUMPTION	: MAX. 25VA
CONTROL SOURCE	: AC 230V, 60Hz ,1Ph
1 CYCLE	: 10 MINUTES
DRYING	: 5 MINUTES
REGENERATING	: 4 MINUTES
PRESSURE EQUALIZING	: 1 MINUTES
DESICCANT	: ACTIVATED ALUMINA 220 kg / 2Towers

NO	DESCRIPTION
1.	DESICCANT CHAMBER (L.S)
2.	DESICCANT CHAMBER (R.S)
3.	AIR INLET 3-WAY SHUTTLE VALVE- 50A
4.	AIR OUTLET 3-WAY SHUTTLE VALVE- 50A
5.	REGENERATION PURGE FLOW CHECK VALVE (L.S)- 40A
6.	REGENERATION PURGE FLOW CHECK VALVE (R.S)- 40A
7.	REGENERATION PURGE CYLINDER VALVE(L.S)- 40A
8.	REGENERATION PURGE CYLINDER VALVE(R.S)- 40A
9.	REGENERATION PURGE SILENCER - 40A
10.	DESICCANT SCREEN - 50A
11.	DESICCANT FILL PORT - 50A
12.	DESICCANT REMOVAL PORT - 50A
13.	CHAMBER(A-TOWER) PRESSURE GAUGE & ROOT VALVE
14.	CHAMBER(B-TOWER) PRESSURE GAUGE & ROOT VALVE
15.	REGENERATION PURGE FLOW GAUGE & ROOT VALVE
16.	REGENERATION PURGE ADJUSTING GLOBE VALVE-40A
17.	REGENERATION PURGE NORMAL ORIFICE-40A
18.	ELECTRICAL ENCLOSURE
19.	INLET FILTER , KNAF-13/50AN(0.01 MICRON)
20.	OUTLET FILTER , KNAF-31/50AN(1 MICRON)
21.	AUTO DRAIN TRAP OF OUTLET AIR FILTER
22.	AUTO DRAIN TRAP OF INLET AIR FILTER
23.	PT 1/2 - BALL VALVE FOR AUTO DRAIN TRAP
24.	DIFFERENTIAL PRESSURE GAUGE OF INLET AIR FILTER
25.	DIFFERENTIAL PRESSURE GAUGE OF OUTLET AIR FILTER
26.	ROOT VALVE OF DEW POINT METER
27.	HYGROMETER(DEW POINT METER)
28.	ROOT VALVE OF CONTROL AIR LINE
29.	PILOT AIR FILTER & REGULATOR
30.	REGENERATION PURGE SOLENOID (R.S)
31.	REGENERATION PURGE SOLENOID (L.S)

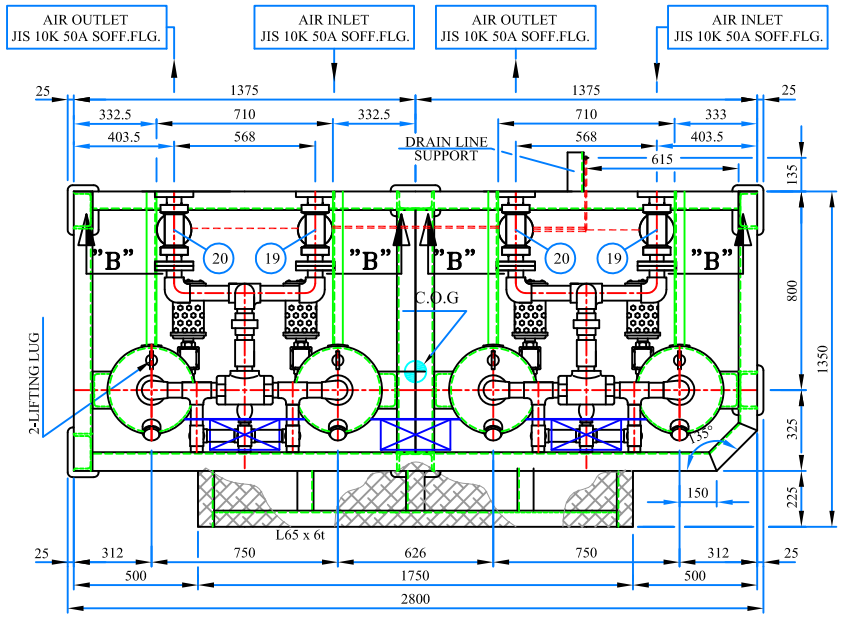
REV	DATE	DESCRIPTION	DRAWN	REV'D	APP'D
1	2015-09-15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014-09-25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

HULL NO. SN2056

KYUNG NAM DRYER CO., LTD
GYEONGGI-DO, KOREA

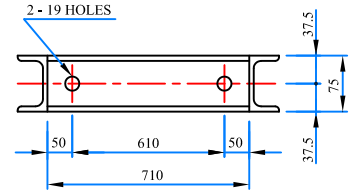
TITLE
No. 1 & 2 CONTROL AIR DRYER
PROCESS & INSTRUMENT DIAGRAM

MODEL NO.	DWG.NO.
KHDM - 600	KHDM-600-PI-005



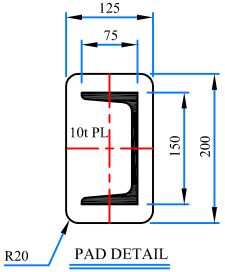
NOTE.

1. PRESSURE GAUGE : LIQUID FILLED TYPE (PRESSURE UNIT : bar)
2. LIFE TIME OF ACTIVATED ALUMINA. : THE DURABILITY OF ACTIVATED ALUMINA IS 2.5 YEARS.
3. MAINTENANCE SPACE : BE APART FROM THE WALL AROUND 900 mm
4. DPM - DEW POINT METER (RANGE : -100°C ~ 20°C , SETTING : - 15°C)

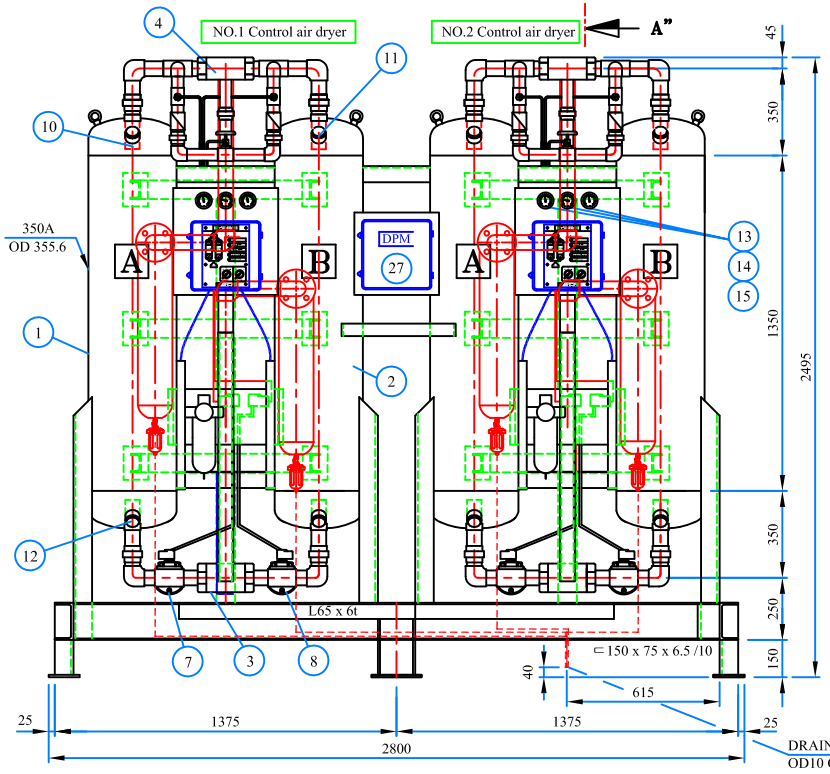


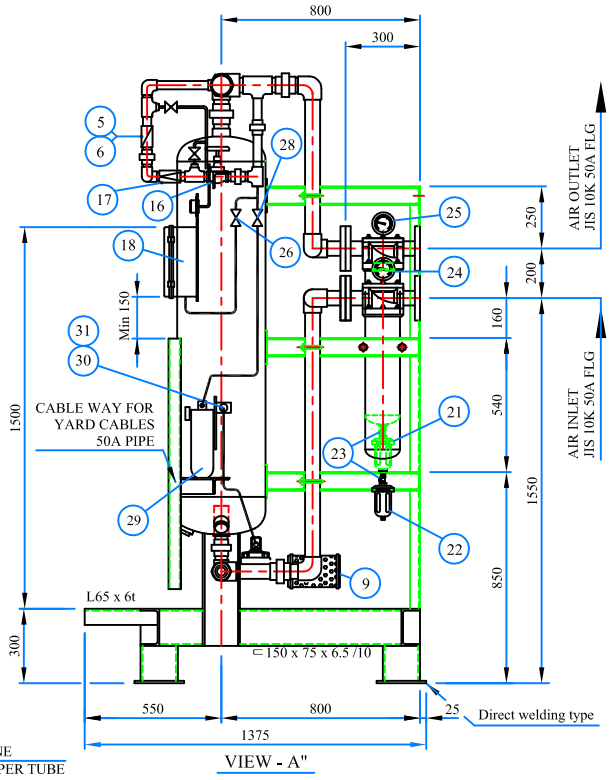
PART NO. 23 - SUPPORT FOR VIBRATION

VIEW B"-B"



PAD DETAIL





VIEW - A"

SPECIFICATION

APPLICATION FLUID	: COMPRESSED AIR
OUTLET AIR CAPACITY	: 530 Nm3/hr
NORMAL AIR PURGE	: 70 Nm3/hr
INLET AIR CAPACITY	: 600 Nm3/hr
AIR INLET TEMP.	: 50°C Max.
WORKING PRESSURE	: 8 bar.g
DESIGN PRESSURE	: 9.9 bar.g
OUTLET DEW POINT	: - 40 °C at 7 bar.g
PURGE CONTROL SET	: 3 bar.g
POWER CONSUMPTION	: MAX. 25VA
CONTROL SOURCE	: AC 230V , 60Hz , 1Ph
1 CYCLE	: 10 MINUTES
DRYING	: 5 MINUTES
REGENERATING	: 4 MINUTES
REPRESSURIZING	: 1 MINUTES
DESICCANT	: ACTIVATED ALUMINA 220 kg/2Towers
TOTAL WEIGHT	: 1000 kg

NO	DESCRIPTION
1.	DESICCANT CHAMBER (L.S)
2.	DESICCANT CHAMBER (R.S)
3.	AIR INLET 3-WAY SHUTTLE VALVE
4.	AIR OUTLET 3-WAY SHUTTLE VALVE
5.	REGENERATION PURGE FLOW CHECK VALVE (L.S)
6.	REGENERATION PURGE FLOW CHECK VALVE (R.S)
7.	REGENERATION PURGE CYLINDER VALVE(L.S)
8.	REGENERATION PURGE CYLINDER VALVE(R.S)
9.	REGENERATION PURGE SILENCER
10.	DESICCANT SCREEN
11.	DESICCANT FILL PORT
12.	DESICCANT REMOVAL PORT
13.	CHAMBER(A-TOWER) PRESSURE GAUGE & ROOT VALVE
14.	CHAMBER(B-TOWER) PRESSURE GAUGE & ROOT VALVE
15.	REGENERATION PURGE FLOW GAUGE & ROOT VALVE
16.	REGENERATION PURGE ADJUSTING VALVE
17.	REGENERATION PURGE NORMAL ORIFICE
18.	ELECTRICAL ENCLOSURE
19.	INLET FILTER , KNAF-13/50A(0.01 MICRON)
20.	OUTLET FILTER , KNAF-31/50A(1 MICRON)
21.	AUTO DRAIN TRAP OF OUTLET AIR FILTER
22.	AUTO DRAIN TRAP OF INLET AIR FILTER
23.	PT 1/2 - BALL VALVE FOR AUTO DRAIN TRAP
24.	DIFFERENTIAL PRESSURE GAUGE OF INLET AIR FILTER
25.	DIFFERENTIAL PRESSURE GAUGE OF OUTLET AIR FILTER
26.	ROOT VALVE OF DEW POINT METER
27.	HYGROMETER(DEW POINT METER)
28.	ROOT VALVE OF CONTROL AIR LINE
29.	PILOT AIR FILTER & REGULATOR
30.	REGENERATION PURGE SOLENOID (R.S)
31.	REGENERATION PURGE SOLENOID (L.S)

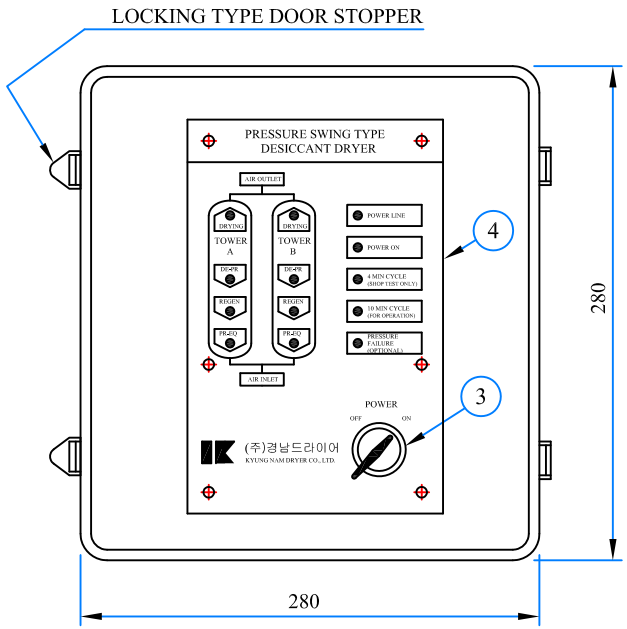
REV	DATE	DESCRIPTION	DRAWN	REV'D	APP'D
1	2015-09-15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014-09-25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

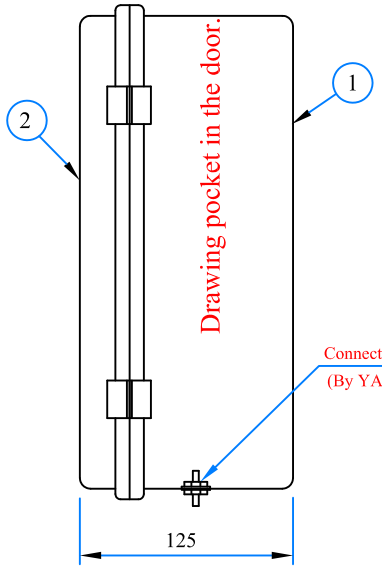
HULL NO. SN2056

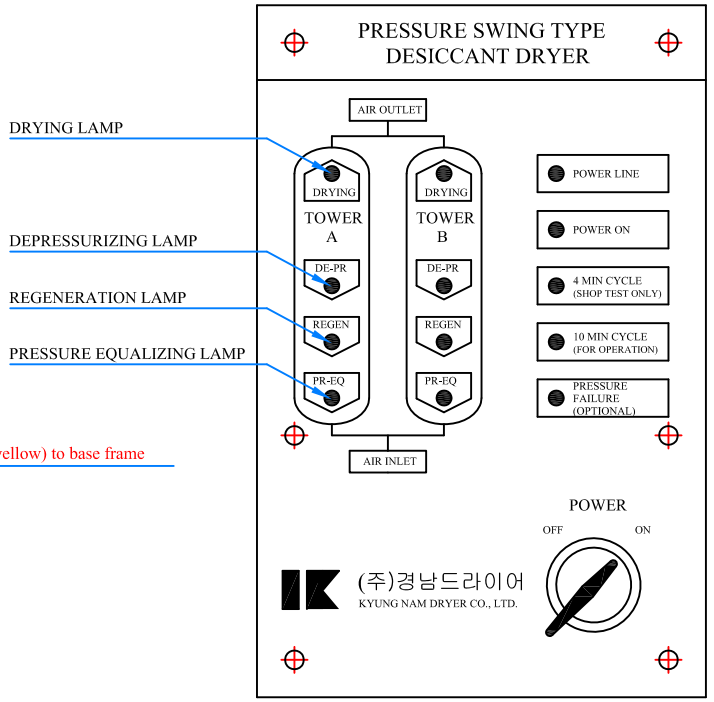
KYUNG NAM DRYER CO., LTD
GYEONGGI-DO, KOREA

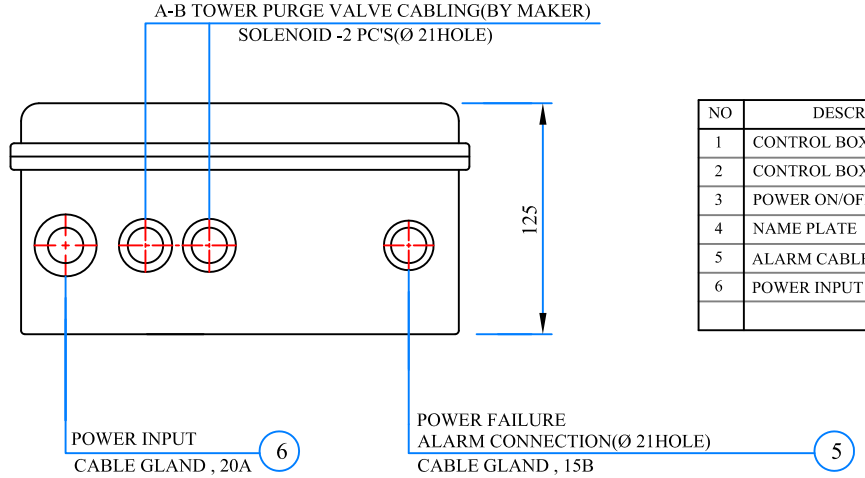
TITLE
NO.1 , 2 CONTROL AIR DRYER
GENERAL ARRANGEMENT DRAWING

MODEL NO.	DWG.NO.
KHDM - 600	KHDM-600-GA-006









NO	DESCRIPTION	Q'TY	REMARK
1	CONTROL BOX CASE	1	POLYCARBONATE(PC)
2	CONTROL BOX COVER	1	
3	POWER ON/OFF SWITCH	1	
4	NAME PLATE	1	
5	ALARM CABLE GLAND	1	15B
6	POWER INPUT CABLE GLAND	1	20A

NOTE.!
1. MAIN POWER : AC230V x 60Hz x 1Ph
2. CONTROL POWER : AC230V x 60Hz x 1Ph
3. POWER CONSUMPTION : MAX. 25VA
4. IP GRADE : IP44
5. COLOR : RAL 7032
6. OPEN SPACE : 350mm

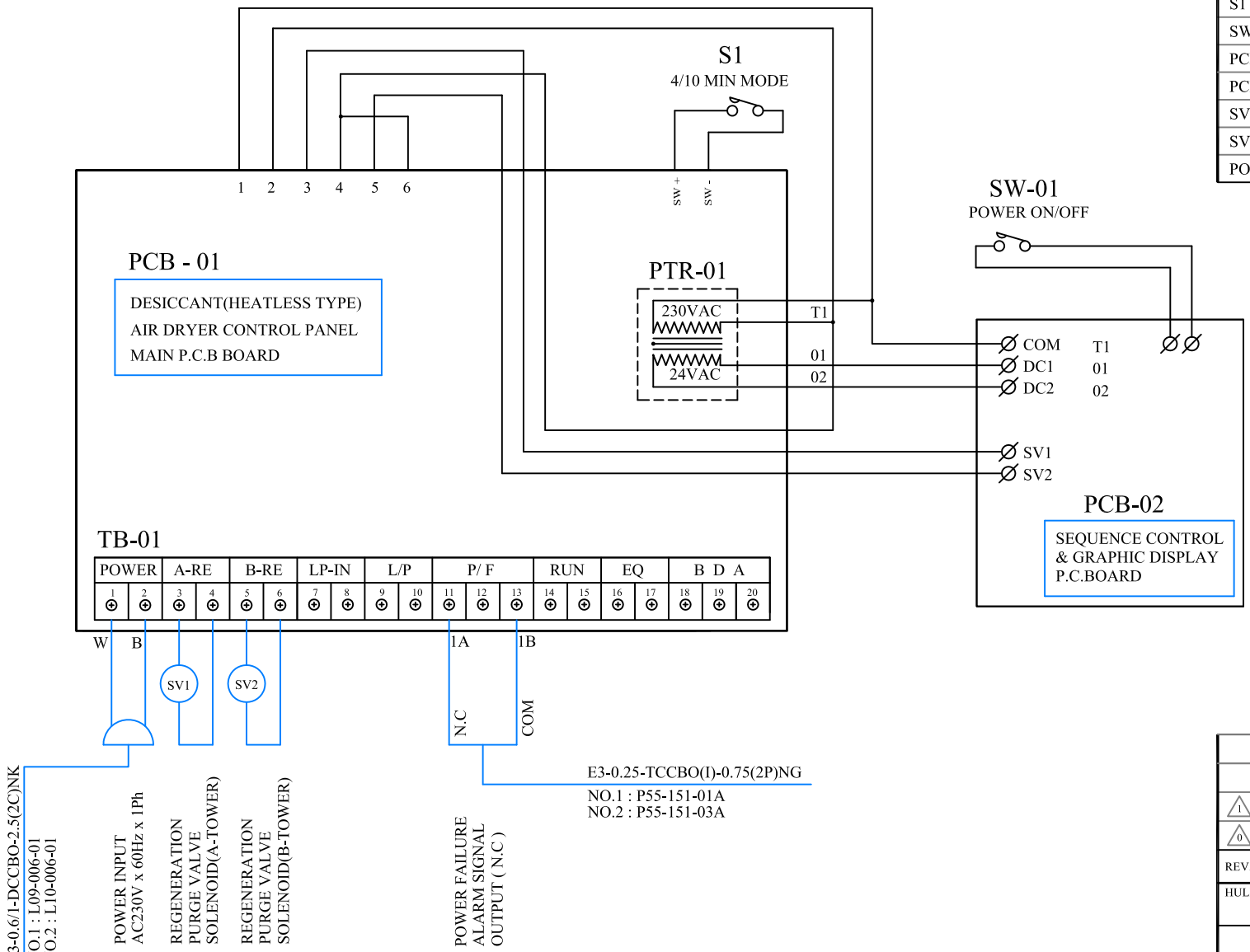
REV	DATE	DESCRIPTION	DRAWN	REV'D	APP'D
1	2015.09.15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014.09.25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

HULL NO.
SN2056

KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE
DESICCANT(HEATLESS) TYPECONTROL AIR DRYER
CONTROL PANEL OF AIR DRYER

MODEL NO.	DWG. NO.
KHDM - 600	KHDM-600-CB-007



ELECTRICAL CONNECTION DIAGRAM

REGENDS	
PTR-01	POWER TRANSFORMER 230/24VAC 25VA
TB-01	TERMINAL BLOCK 20P x Ø4mm
S1	4/10 Min. MODE SELECTOR SWITCH
SW-01	POWER ON-OFF SELECTOR SWITCH 1P/1C
PCB-01	MAIN P.C.B BOARD : DRYER-A(REV 0)
PCB-02	DISPLAY P.C.B BOARD : DRYER-B(REV 0)
SV1	TOWER - A PURGE SOLENOID VALVE
SV2	TOWER - B PURGE SOLENOID VALVE
POWER	AC230V x 60Hz x 1Ph

SPECIFICATION

1. MAIN POWER : AC230V x 60Hz x 1Ph
2. CONTROL POWER : AC230V x 60Hz x 1Ph
3. POWER CONSUMPTION : MAX. 25VA
4. PROTECTION DEGREE : IP44

REV.	DATE	DESCRIPTION	DRAWN	CHK'D	APP'D
1	2015. 09. 15	FINAL	Y.H.CHO	I.G.KIM	H.Y.JEON
0	2014. 09. 25	FOR WORKING	W.H.LEE	I.G.KIM	H.Y.JEON

HULL NO. SN2056

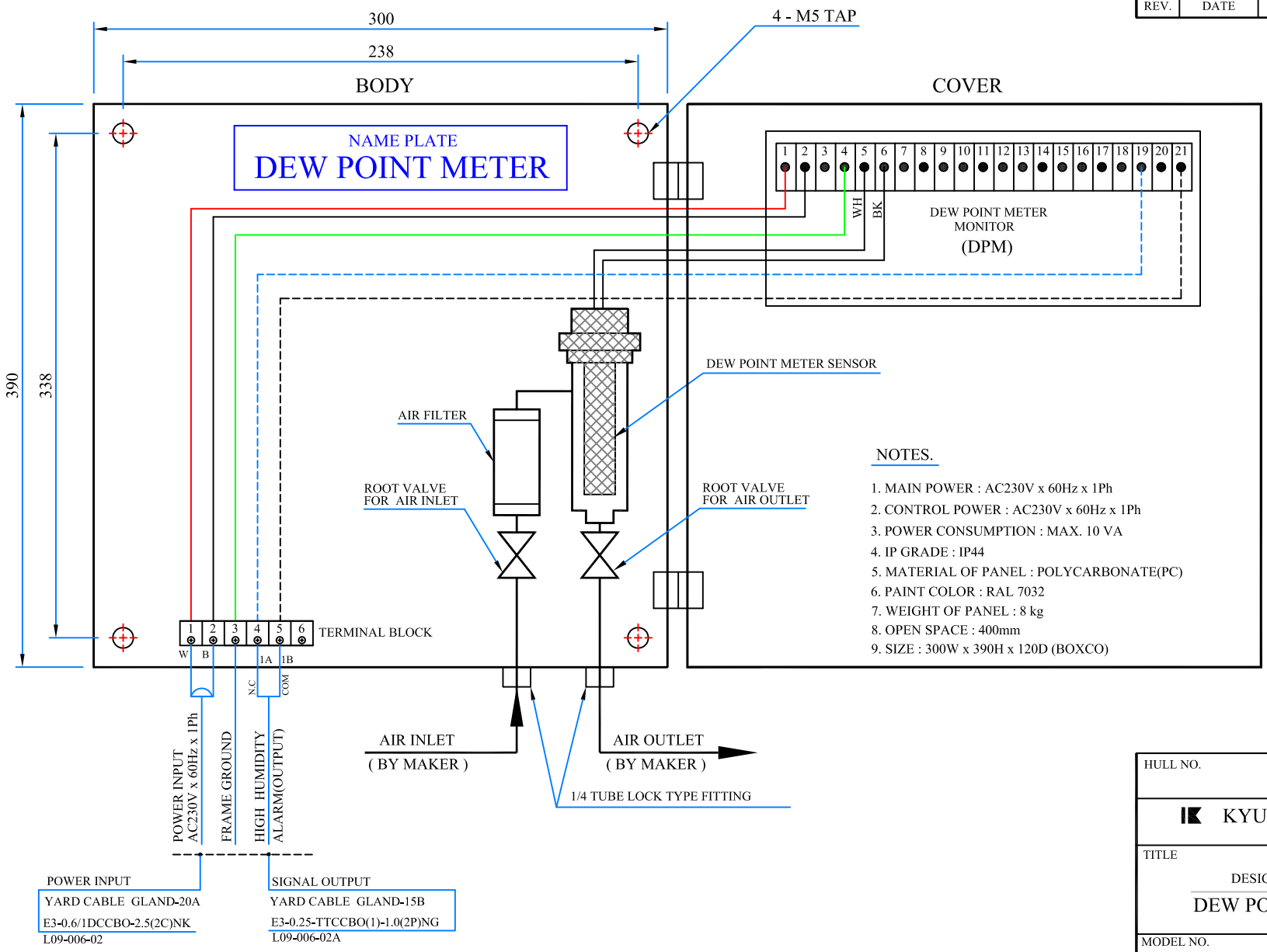
KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE
DESICCANT(HEATLESS) TYPE CONTROL AIR DRYER
ELECTRICAL CIRCUIT DIAGRAM

MODEL NO.	DWG NO.
KHDM-600	KHDM-600-EW-008

Dew Point Meter---> 1 set/ship

REV.	DATE	DESCRIPTION	DRAWN	CHK'D	APP'D
1	2015. 09. 15	FINAL	Y. H. CHO	I. G. KIM	H.Y.JEON
0	2014. 09. 25	FOR WORKING	W. H. LEE	I. G. KIM	H.Y.JEON



NOTES.

1. MAIN POWER : AC230V x 60Hz x 1Ph
2. CONTROL POWER : AC230V x 60Hz x 1Ph
3. POWER CONSUMPTION : MAX. 10 VA
4. IP GRADE : IP44
5. MATERIAL OF PANEL : POLYCARBONATE(PC)
6. PAINT COLOR : RAL 7032
7. WEIGHT OF PANEL : 8 kg
8. OPEN SPACE : 400mm
9. SIZE : 300W x 390H x 120D (BOXCO)

HYGROMETER
(DPM-DEW POINT METER)

RANGE : - 100°C ~ 20°C
HIGH ALARM SETTING : - 15°C

POWER INPUT
YARD CABLE GLAND-20A
E3-0.6/1DCCBO-2.5(2C)NK
L09-006-02

SIGNAL OUTPUT
YARD CABLE GLAND-15B
E3-0.25-TTCCBO(1)-1.0(2P)NG
L09-006-02A

HULL NO. SN2056

KYUNG NAM DRYER CO., LTD.
GYEONGGI-DO, KOREA

TITLE

DESICCANT(HEATLESS) TYPE AIR DRYER

DEW POINT METER FOR AIR DRYER

MODEL NO.	DWG NO.
KHDM-600	KHDM-600-DP-009

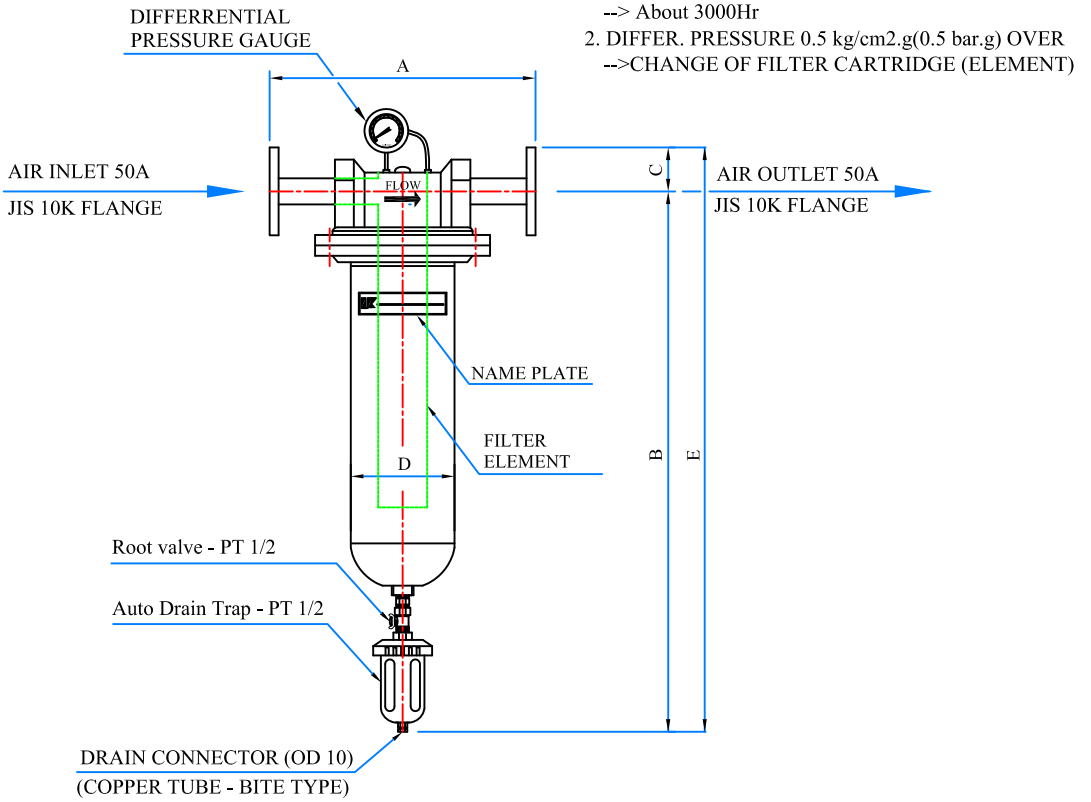
Coalescent Filter

KNAF-13/50AN

SHIP NO.

SN2056

NOTE!
1.LINE FILTER LIFE TIME
--> About 3000Hr
2. DIFFER. PRESSURE 0.5 kg/cm2.g(0.5 bar.g) OVER
-->CHANGE OF FILTER CARTRIDGE (ELEMENT)



Specifications

Model Number	KNAF-13/50AN
Operating Flow Rate	840 m3/hr
Operating Pressure	8 bar.g
Maximum Operating Temp.	150 °F(65.5°C)
Design Pressure	9.9 bar.g
Standard Filtration	0.01 Micron
In/Out Connection Size	50A Flange
Flow Direction	Inside To Outside
Life Time	About 3000 Hour
Pressure Drop	0.2 bar.g

Housing Materials of Construction

Head	Aluminum
Bowl	Aluminum
Filter Element	Glass fiber , micro fiber
O-ring	Rubber

Dimensions

mm

A	B	C	D	E
300	1150	78	140	1228

TITLE INLET AIR FILTER (COALESCENT FILTER)	APPROVED I. G. KIM	APPROVED DOC NO.
	DRAWING Y. H. CHO	DRAWING NO.
KNAF-13/50AN(0.01 MICRON)	DATE 2015.09.15	KNAF13/50AN-010 — 1

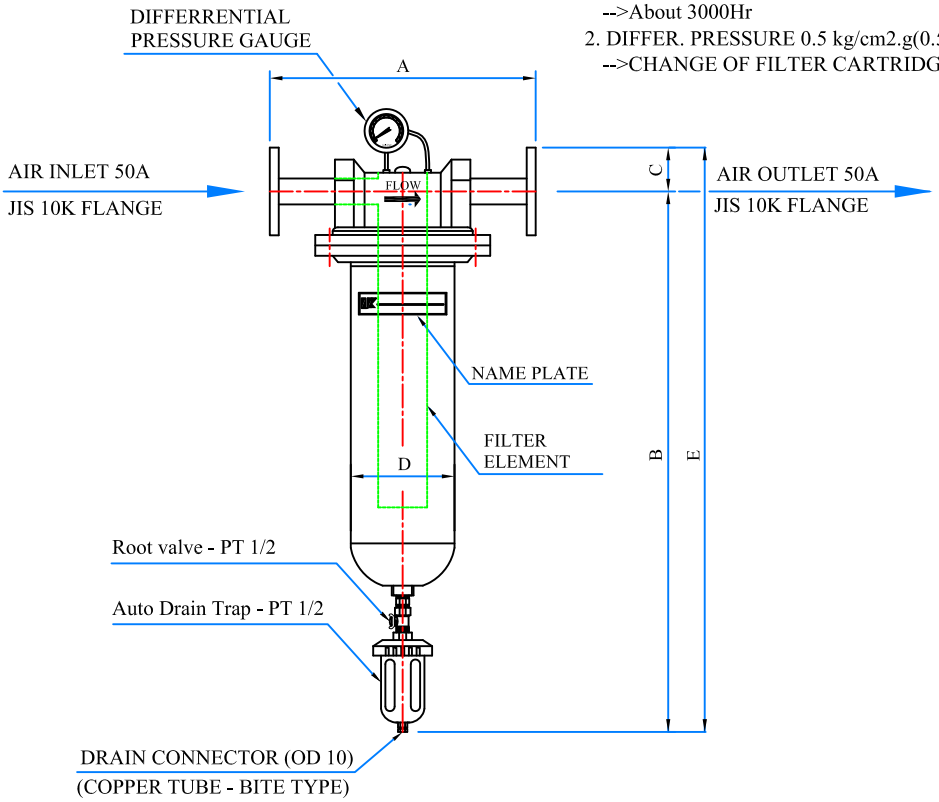
Line Filter

KNAF-31/50AN

SHIP NO.

SN2056

NOTE!
1.LINE FILTER LIFE TIME
-->About 3000Hr
2. DIFFER. PRESSURE 0.5 kg/cm2.g(0.5 bar.g) OVER
-->CHANGE OF FILTER CARTRIDGE (ELEMENT)



Specifications

Model Number	KNAF-31/50AN
Operating Flow Rate	1320 m3/hr
Operating Pressure	8 bar.g
Maximum Operating Temp.	150°F(65.5°C)
Design Pressure	9.9 bar.g
Standard Filtration	1 Micron
In/Out Connection Size	50A Flage
Flow Direction	Inside To Outside
Life Time	About 3,000 Hour
Pressure Drop	0.2 bar.g

Housing Materials of Construction

Head	Aluminum
Bowl	Aluminum
Filter Element	Micro fiber & glass fiber
O-ring	Rubber

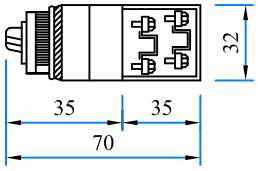
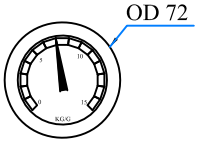
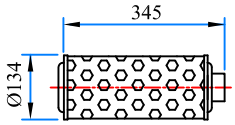
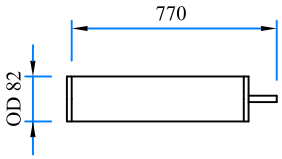
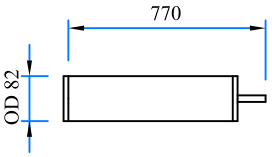
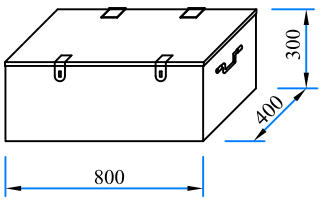
Dimensions

mm

A	B	C	D	E
300	1150	78	140	1228

TITLE OUTLET AIR FILTER (LINE FILTER)	APPROVED I. G. KIM	APPROVED DOC NO.
	DRAWING Y. H. CHO	DRAWING NO.
KNAF-31/50AN(1 MICRON)	DATE 2015.09.15	KNAF31/50AN-011 — △1

TWO (2) YEAR SPARE PART LIST

DESICCANT(HEATLESS) TYPE CONTROL AIR DRYER				HULL NO.		SN2056		
				MODEL NO.		KHDM-600		
NO	NAME	SKETCH	MATERIAL	SUPPLY / SHIP		DRAWING		REMARKS
				WORKING	SPARE	NO	PART NO.	
1	SELECTOR SWITCH		PLASTIC	2	2			
2	A , B- CHAMBER PRESSURE FLOW GAUGE			4	2			LIQUID FILLED TYPE FACE DIA:60 (UNIT : bar)
	PRESSURE FLOW GAUGE			2	1			
3	SILENCER		ALUMINUM	4	4			MODEL15 40A
4	INLET FILTER ELEMENT (13/50AN)		Micro fiber Glass fiber	2	10			0.01 micron
5	OUTLET FILTER ELEMENT (31/50AN)		Micro fiber Glass fiber	2	10			1 micron
6	SPARE BOX		STEEL		2			

Instruction & Operating Manual
of
Desiccant(Heatless Type) Air Dryer

(주)경남드라이어
KYUNG NAM DRYER CO., LTD
306-1 NAEYU-DONG, DEOGYANG-GU, GOYANG-SI, KYONGGI-DO, KOREA
TEL : 031) 963 - 0080 / 963 - 7832 / 962 - 7830 / 962 - 7837
FAX : 031) 962 - 0180

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1. PRINCIPAL

1) It is widely recognized that the ultra air is very useful in the industrial field. To get this ultra dried air, Heatless Pressure Swing type (heatless regeneration type) is the most preferable equipment in the economic and secure respect.
2) It has been observed that the air supplied into air dryer from compressor has lots of dust, moisture. The heatless air dryer is equipment that discharge air agter absorbs moisture from the compressed air using a desiccant in the tower.
3) The air dryer of heatless pressure swing type is the most economic desiccant dryer eliminated costs on exchanging of electric heater line needed for regenerating dryer and on spending electronic power compared with a traditional air dryer.
4) Desiccant Air Dryer is designed as double tower structure to repeat drying and regeneration, generally applied where requires dew point below -40℃ dew point.
5) To use products safely and efficiently, you should read usage instruction before installation.

2. INSTALLATION AND PIPING

When installing dryer, it is necessary to select suitable places as below.
1) Avoid the place trembling.
2) Install the unit in the hard and flat place.
3) Prepare for the trembling of compressor.
(When the compressor trembling, connect the high-pressure hose or flexible hose so as to absorb trembling in connecting part of piping.)
4) Wide space is recommended ror easiness of installation and servicing.
5) Install the unit where is no sudden change in temperature and not exceeding **0~45℃** limit.

◆ OIL MIST WATER SEPARATOR

It is necessary to install a filter for eliminating dusts and high performance oil mist condensate separator in the unit as the desiccant has to be avoided from the condensed water.

▷ Pre-Filter (Recommended item)
KHDM Model is equipped with pre-filter supplying both function of separator and filter additionally. Pre-filter well compounded the separated type of centrifugal force, collision, and the drain of condensed water is discharged into auto trap. Internal filter element is constructed of 0.01micron and 1 micron of particle and neede periodical check. (Once per 3 months)

▷ After-Filter (Recommended item)

As the air passed by dryer may have sometimes debris of deseccant. It is necessary to install after-filter outlet of dryer to prevent the unit from trouble by debris.

KHDM Model is equipped with after-filter additionally.

The particle is 1micron, and life of filter is 3~6 months.

However, it is necessary to clean the filter element once per 1~2 month for 6 months.

◆ Wiring

1) Confirm the sequence between power supply and the rated voltage of the unit.

2) Wiring in the system finished by connecting the electronic power to an outlet box.

3. STRUCTURE

3-way shuttle valve of KHDM Model is a simple structured unit as non-oiling type, has the function of preventing the temperature falling off by sudden insulation expasion, improving degumidification capacity and reducing exhaust noises by falling compressed air pressure to atmospheric condition as a poppet type having certain sealing capacity. And there is no stagnation in case of electronic power failure.

But make sure of installing filter inlet part because the airtightness is not working by inflow of solid particles.

2) 2-way purge cylinder valve

It discharges regenerated air outside on pressurizing and regenerating. Occasionally in case of making troubles by inflow of a desiccant or debris, dissolve and clean the coil part.

3) Pressure gauge

Two pressure gauges are installed in both tower respectively, it shows dryness and regeneration pressure of tower. The higher pressure shows dryness of tower, the lower shows regeneration of tower.

When the pressure is equalized, the lower increases the pressure up to the higher.

After making an equalization of pressure, it shifts to the opposite direction.

4) Control panel

KHDM dryer control panel has PCB controlled by simple timer. There are lamps shows operating condition like dryness, pressurizing at a glance and on/off switch.

As the inner part of the panel is very sensitive against moisture and dust, do not touch and open the cap frequently. It may cause malfunction of the unit.

The special caution is required for corrosion by sea wind.

The power supply for the model is 208V, single-phase current, 60Hz and below 25VA in consumption power.

◆ Adjustment of Timer

The hour of dryness and regeneration can be extended under the condition below.

1. Dry winter season
2. When dry smaller flows compared with the design size.
3. When dry lower temperature compressed air compared with the design size.

(But, maximum extended hour can not be exceed 10 minutes)

◆ The method of adjustment of Timer

See appendix A

- Adjustment method of dryer timer and demonstration of terminal board.

5) Vessel

The vessel of KHDM model produced on JIS, KS standard passed the pressure regulation exam, prevent outflows of a desiccant by sticking the strainer made of mesh stainless screen.

6) Desiccant

The desiccant is made of activated alumina gel that has excellent moisture adsorption capacity exclusively used for compressed air dryer. Desiccant maintains maximum dehumidification capacity by perfect regeneration. When the temperature of inlet part is below 50℃ and the 7 kg/cm2.g pressure. The dew point below -40℃ can be acquired. Desiccant has limited life about 3years.

If sample color of desiccant changed into brown or black color, it is necessary to change desiccant immediately. But minor change in color can be disregarded.

7) Silencer

The inside component of Silencer is a sound-absorbing materials which could reduce noise occurred in desiccant regeneration. After a long time operation, if you notice that Silencer couldn't exhaust air or there is too much noise at Silencer, change or clean the Silencer.

4. FUNCTION

1) Dehumidification

KHDM Model improves the effectiveness of dehumidification by eliminationg moisture physically as passing the compressed air into tower having excellent desiccant. (Desiccant : Activated Alumina Gel)

2) Dryness

The compressed air flows into one tower through 3-way shuttle valve in inlet part.
During the air goes up to the upper level of desiccant in the tower, moisture and other debris is eliminated and outflow to outlet part in the state of the ultra dried air(Dew point -40℃). In this procedure, small quantity of dried air descends to the lower part, regenerating desiccant in the opposite tower after adiabatic expansion passing the orifice since decompressed in the regeneration adjustment valve. That is, during the dried air produced in one tower, desiccant referated automatically in the other tower.

① Time

After 5minutes dehumidfication, regenerate desiccant for 5 minutes.
PCB timer controls this dehumidification-regeneration cycle.

② Dew Point

As alumina gel is very sensitive against moisture and dust, the temperature in inlet part has to be below 50℃ in any occasion.

3) Regeneration

KHDM Dryer is the dryer of heatless type that don't make use of heat in generation of desiccant.
The theory of desiccant regeneration is using the differences in pressure. It makes the regeneration air for dehumidification by expanding a portion of dried air, and the expanded air actually makes the more quantity of air for dehumidification than the quantity of pressure air.

① Time

The regeneration cycle is 10 minutes. While one tower is drying 5 minutes, the other tower goes through a mode of desiccant regeneration and purge for about 4 minutes and then the purge exhaust valve closes to allow the tower to pressurize for 1 minute.

② Regeneration Air

The regeneration air makes use of a portion of dried air. The ideal quantity of air can be properly adjusted.

③ Pressurization

Pressurizing procedure is one of the very important performances in regenerating adsorption.
This procedure runs automatically due to fixing up PCB timer. The time of pressurizing is around 60 seconds.
And regeneration tower pressurized sufficiently prevent air from pulsation and impulsive load.

4) Control system

The every function of air dryer works by PCB timer which handing is convenient depends on the condition of humidity in four seasons. The basic setting of operation is 5 minutes drying, 4 minutes regeneration and 1 minute pressurization. It is possible to operate by adjusting PCB timer based on the condition of the open air, to adjust of the time based on dew point.

5. OPERATION AND MAINTENANCE

Dryer consists of 2 Tower, 2-way cylinder valve, 2 check valve, 2 3-way shuttle valve.
It is not necessary of high technology or maintenance.

1) Operation (**See appendix " B "**)

2) Test-working checkpoint.

- Before operating, increase the quantity of flow into the air dryer gradually and pressurize the tower to operation pressure. Then turn on the switch.
- Check out the lamp on. Inspect the function of the wire connection and the bulb when the lamp is out.
- Check out the pressure of the gauge attached to the tower. The pressure lower than the designated criteria causes overload to the air dryer.

2) Maintenance

Exchange desiccant in case that cannot keep up the dew point neede level in operation. The durability of desiccant is 3 years. But debris like mist or dust in the compressed air lowers the adsorption ability and causes shortening durabilityof desiccant by locking out the capillary tube.

3) The exchange order of adsorption

① Turn off the air dryer.
② Lower the pressure of tower to the atmospheric pressure.
③ Extract the adsorption through the discharge pipe installed at the bottom of the tower.
and seal the plug of discharge pipe using teflon tape.

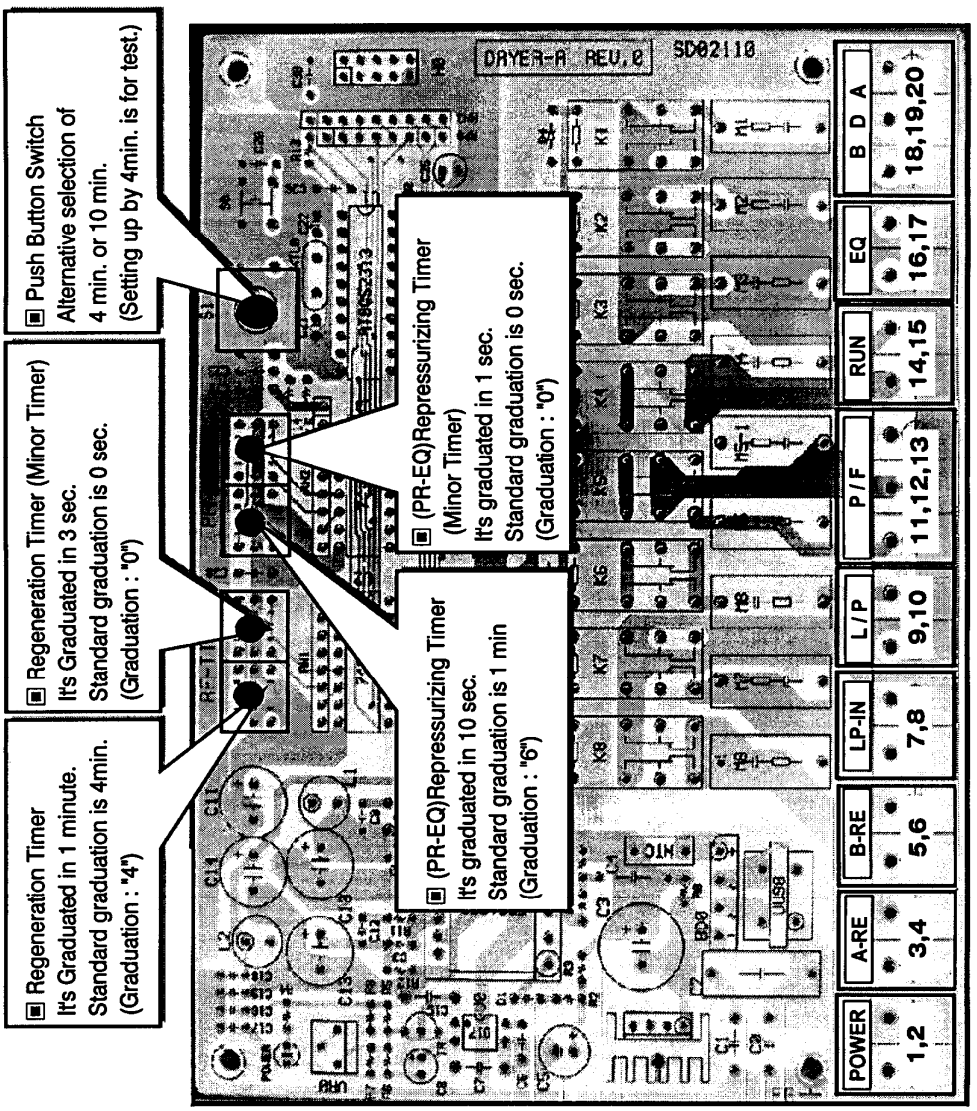
④ Fill up the adsorption through the injection pipe installed at the top of the tower, and seal the plug pipe using teflon tape.

6. TROUBLE SHOOTING GUIDE

Symptoms	Cause	Remedy
A. Dew point rising up	1. Shortage of regeneration air	1. Increase the quantity of regeneration air by checking out regeneration-adjusting valve.
	2. Low pressure in entrance.	2. Bad pressure adjusting of compressor or high differences in pressure.
	3. High temperature in entrance	3. Low the temperature in entrance by checking out air refrigerator.(Applied)
	4. Contaminated desiccant	4. Check out the and air filter, exchange element, replace the desiccant with new one.
B. Trouble in exchanging tower	1. Power off	1. Check out the power supply equipment of panel and switch.
	2. Malfunction of PCB timer	2. Check out the PCB timer and exchange timer.
	3. Bad running in the solenoid valve.	3. Check out the solenoid coil and dismantle the valve. Reassemble the seat and components.
C. Bad exhaustion	1. Bad inflow of the regeneration air	1. Control pressure by adjusting the regeneration regulator or checking out the valve.
	2. Clogged muffler	2. Check out and clean the muffler or exchange it.
	3. Malfunction in the solenoid valve.	3. Check out the solenoid valve and exchange the valve.
D. Heavy pressure loss	1. Malfunction of the solenoid valve.	1. Check out and exchange the solenoid valve. Adjust regeneration regulator in case of excess in the regeneration air adjustment.
E. Heavy pressure when exchanging the tower	1. Malfunction of the entrance 3-way shuttle valve.	1. Check out and exchange the 3-way shuttle valve after dismantles valve.

** Appendix. A : THE METHOD OF ADJUSTMENT OF TIMER

Adjustment method of Dryer Timer and Demonstration of Terminal board



㈜경남드라이어
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ELECTRICAL CONNECTION DIAGRAM

1.2	POWER	Combination 110V and 220V 60Hz
3.4	A-RE	Connect to regen. Solenoid valve in A-Tower when B-Tower is drying.
5.6	B-RE	Connect to regen. Solenoid valve in B-Tower when A-Tower is drying.
7.8	LP IN	Low pressure s/w Input.(Applied), N.O
9.10	L / P	Low pressuew alarm Output.(Applied)
11.12.13	P / F	Power failure alarm Output.(Needed)
14.15	RUN	Run signal Output(Needed).
16.17	EQ	Connect to equality pressure Solenoid valve.(Applied).
18.19.20	B D A	Connect to air inlet valve.(Applied)

Particular
1. Power failure alarm output
- 11,13 : Connection : N.C
- 12,13 : Connection : N.O
2. Connect to air inlet valve.(Applied)
- 18,19 : Connect to regen. Solenoid valve in A-Tower when B-Tower is drying.
- 20,19 : Connect to regen. Solenoid valve in B-Tower when A-Tower is drying.

** Appendix B : OPERATION (See P&ID drawing)

OPERATION (See P&ID drawing)

1). Compressed air enters through lnlet 3-way shuttle valve, passes through and is dried by the desiccant in tower A, and is directed by system of outlet check valve to air outlet.

2). A portion of dried air is expanded to near atmospheric pressure through orifice and check valve.

3). This expanded is directed through Tower B where it removes moisture from the desiccant (Re-activating) and exhausted to atmoshere through regeneration 2-way purge solenoid valve (R.T) and silencer.

4). After four minutes (for dryers operating on a 10 minute cycle) 2-way purge solenoid valve (R.T) closes allowing tower B to repressurize slowly.

5). After five minutes 2-way purge solenoid valve (L.T) open allowing tower A to de-pressurise through 2-way purge solenoid valve (L.T) also inlet valve(3-way shuttle valve) position is transferred to tower B on-line position.

6). Air now flows through tower B and is dried while the desiccant in tower A is being regenerated.