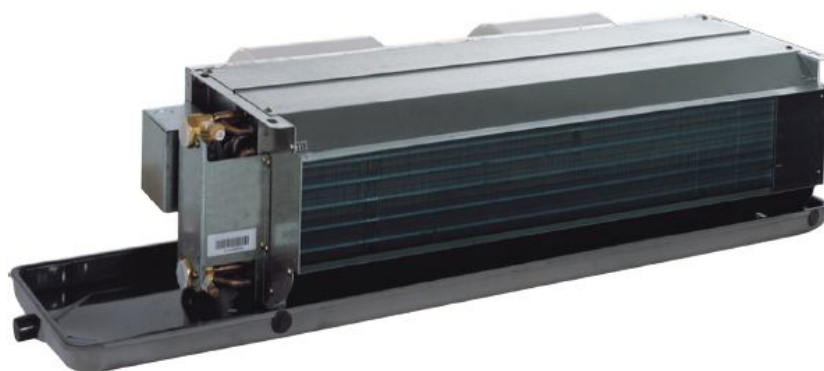




Fan Coil Unit Series

Installation & Operation Instructions



FP SERIES 

TECHNICAL MANUAL

WITH QUALITY SYSTEM

===ISO 9001:2000 ==

Content

1.	Brief introduction.....	1
	(1). Introduction.....	1
	(2). Structure.....	1
	1) Fan.....	1
	2) Motor.....	1
	3) Heat exchanger.....	1
	4) Air filter.....	2
	5) Cabinet.....	2
	6) Condensate pan.....	2
	(3). Features.....	2
	1) Broad application.....	2
	2) Excellent quality.....	2
	3) Low noise.....	2
	4) High effect.....	2
	5) Well shaped, firm and durable.....	2
	6) Convenient adjustment and maintenance.....	3
	7) Flexible installation and low cost.....	3
	8) Kinds of selectable parts.....	3
2.	Instruction of model.....	3
3.	Technical data.....	4
4.	Physical dimension.....	6
5.	Parameter tables in different working condition.....	9
	(1). Parameter tables in different cooling condition (W).....	9
	(2). Parameter tables in different heating condition (W).....	10
6.	Curve diagram.....	11
	(1). Water Resistance (KPa) ---water flow (Kg/h).....	11
	(2). Static press (Pa)---air flow ($\times 100\text{m}^3/\text{h}$).....	11
	1) Normal Static press.....	11
	2) Middle Static press (30Pa).....	11
	3) High Static press (50Pa).....	12
7.	Wiring diagram.....	12
8.	Installation.....	13
	(1). Units receiving.....	13
	(2). Preparation.....	13
	(3). Unit installation.....	13
	(4). Water pipe installation.....	15
	(5). Electrical control and connection.....	16
9.	Operation.....	16
	(1). Check.....	16
	(2). Operation.....	16
10.	Maintenance.....	16
	(1). Air filter.....	16
	(2). Heat exchanger.....	17
	(3). Condensate water pan.....	17
	(4). Seasonal maintain.....	17
11.	Troubleshooting.....	17
	Appendix I: About warranty.....	18

1. Brief introduction

(1). Introduction

Kybom fan coil series of products can meet various requirements. It is well known for its smart figure, superb performance, easy installation, and diversified applications, which is proper for the central air conditioning system of the hotel, office building, and many other sites.

(2). Structure

Fan coil unit for every type is mainly composed with the fan (worm gear, spiral casing), motor, heat changer (coil), air filter, electrical adjuster, with the main features as following:

1) Fan

The fan, including the worm gear and the spiral casing, is the major part of the unit. It is selected due to its large discharge coefficient, small volume, high wheel radius rate, large amount of the blades, and the relatively wide forward blades centrifugal type fan. The blade wheel leads the advanced technology in china with its few parts, superb techniques, and the high strength. The arc-shaped air inlet is designed for the spiral casing, and 5mm gap is kept between the air inlet and the blade wheel inlet according to the fan coil installation mode and the allowable cascade momentum of the motor shaft. The section of the spiral casing is rectangular, and the logarithmic helix shaped female screw is designed for the spiral casing. The fan runs with good dynamic balancing performance and low noise.

2) Motor

The motor is produced by the authorized manufacture according to the special requirements proposed by the research department, fitting for the international unit FC-02—FC-14 (British system 200CFM—1400CFM) with static pressure 12Pa-30Pa-50Pa. The special asynchronous motor with single phase capacitance is applied to the fan coil unit, with the voltage adjusting range 200-240V, 50/60HZ. The quality of the motor is in the leading status at home for its high efficiency, little temperature rise and vibration.

3) Heat exchanger

The aluminum foil used in the heat exchanger is processed with aluminum foil. The copper tube of $\Phi 9.52 \times 0.33$ is used and shaped as "U" through the mechanical processing, thus the welding points will be reduced to half, and the chances of leakage will also be decreased. Through the mechanical tube expansion, the surface and inside should be purged ultrasonically with the cleanser, and then baked, to ensure the tight contact between the tube and the fin, as well as the clean surface, further to improve the heat conduction effect. Braze welding intensity: the 5B silver solder (welding ring) is adopted due to its low melting point and good fluidity, which will make the weld neat and firm. The coil trial pressure is 1.5MPa, work pressure is 1.2MPa, and the requirement for the gas tightness is higher than the national standard (the work pressure of which is 1.0MPa).

The water inlet and outlet are made of the brass, and the water current distribution mode varies according to the unit model. Keep the current distributed equably, with little

resistance.

4) Air filter

The strainer should be installed in the unit inside and the unit buried mounting should be finished during the project, thus the filter with different specification can be supplied according to the requirement of the user and the project and the quality of the air will be improved in this way.

5) Cabinet

The cabinet is made of the superb galvanized steel, processed with numerical control stamping folding machine, which contributes to its firm structure, little distortion, and good process coherence.

6) Condensate pan

No water leakage--superb cold rolling steel is adopted with the mould processing it holistically, and the plastic sprayed to its surface and the inner wall. The 10mmPE insulate sponge wholly sticks on the water pan, which will avoid the condensate and the water leakage. The width and the length of the water pan contain the tubing space for the electrical valves of the water in and out pipes, which will ensure the catchments effect.

(3). Features

1) Broad application

The advanced design scheme applied to the fan coil air conditioning unit of our company brings the unit excellent variable load characteristic and superb performance, which can be widely used for the half centralized air conditioning system, such as that in the hotel, hospital, apartment, villa, office building, and soon.

2) Excellent quality

The superb parts are selected to ensure the excellent unit quality. The strict tests during the manufacturing and the ex-factory test for the 100% products, guarantee the trustable quality.

3) Low noise

The combination of the permanent capacitive motor and the uniquely designed fan, as well as the dynamic balancing test for each part of the unit ensure the entire unit running quietly and efficiently.

4) High effect

The unit is designed with optimization and the heat conduction is fostered with the motor, in order to achieve a superior ratio of the effect to the input energy.

5) Well shaped, firm and durable

The fan coil units of this series are made of superb plates. The condensate pan is shaped with the mould techniques holistically, no weld seam and weld point, and the cold insulator accorded with the fireproof regulation is wholly felted with the water pan, which keeps the

unit structure symmetrical and lines simple. The buried mounted unit is suitable for the normal project and the space for the fan coil unit installation should be reserved in the project design, meanwhile, arrange the air outlet and the indoor upholster, in order to make the room layout compatible and comfortable.

6) Convenient adjustment and maintenance

The operation for the three speed switch in button type or the external thermal control infinitely variable gear is simple to adjust the indoor air volume and the cooling capacity freely. The bearing of the motor can add the lubricating oil automatically. The motor shaft is made of the steel quenched and tempered, the surface of which is plated with the chrome or the nickel-phosphor alloy to prevent rust.

7) Flexible installation and low cost

The cabinet is designed smart with the overall thickness of 245mm. It is easy for the drain pipe and other tubes installation, and the left/right coupling and the return air direction can be switched freely, to adapt to the different field. The unit can be installed at any place. To meet the need of the field construction, the parts' general use is considered in the fan coil design. Change the coupling direction with the field condition. Besides, the position of the return intake can be altered freely in the field, which will save the time and labor in installation.

8) Kinds of selectable parts

The following plans are to be selected according to the user's need:

- ① Backward / downward return air box;
- ② Electrical heating type

2. Instruction of model

FCU 02 CC 23 2 P1 L

① ② ③ ④ ⑤ ⑥ ⑦

- ① FCU(FP): Fan coil unit
- ② 02(34): Air flow (02×100 CFM or 34×10 m³/h)
- ③ Product type:
 - CC: Ceiling Concealed
 - CD: Ceiling Concealed with Down Return Plenum
 - CB: Ceiling Concealed with Back Return Plenum
 - CH: Ceiling Concealed with Large Air Flow and High Static Pressure
 - CT: Ceiling Concealed Ultra-Thin Type
 - VC: Vertical Concealed
 - CE: Ceiling Exposed
 - VE: Vertical Exposed
 - CL: Ceiling Concealed with Large Drain Pan
 - CA: Cassette Four-Way
 - CS: Cassette Single-Way
 - CF: Ceiling Floor
 - DC: Ceiling Concealed with District Cooling Application

④Coil Layout:

22: 2 Pipes-2 Rows

23: 2 Pipes-3 Rows

24: 2 Pipes-4 Rows

42: 4 Pipes-2 Rows Cooling+2 Rows Heating

43: 4 Pipes-3 Rows Cooling+1 Row Heating

⑤Power Supply

Phase1=220V/50Hz/1

Phase2=220V/60Hz/1

Phase3=380V/50Hz/3

Phase4=380V/60Hz/3

Phase5=115V/60Hz/1

Phase6=460V/60Hz/3 Phase

⑥Static Pressure:

P1: 12Pa/30Pa

P2: 50Pa

⑦L: Left

R: Right

3. Technical data

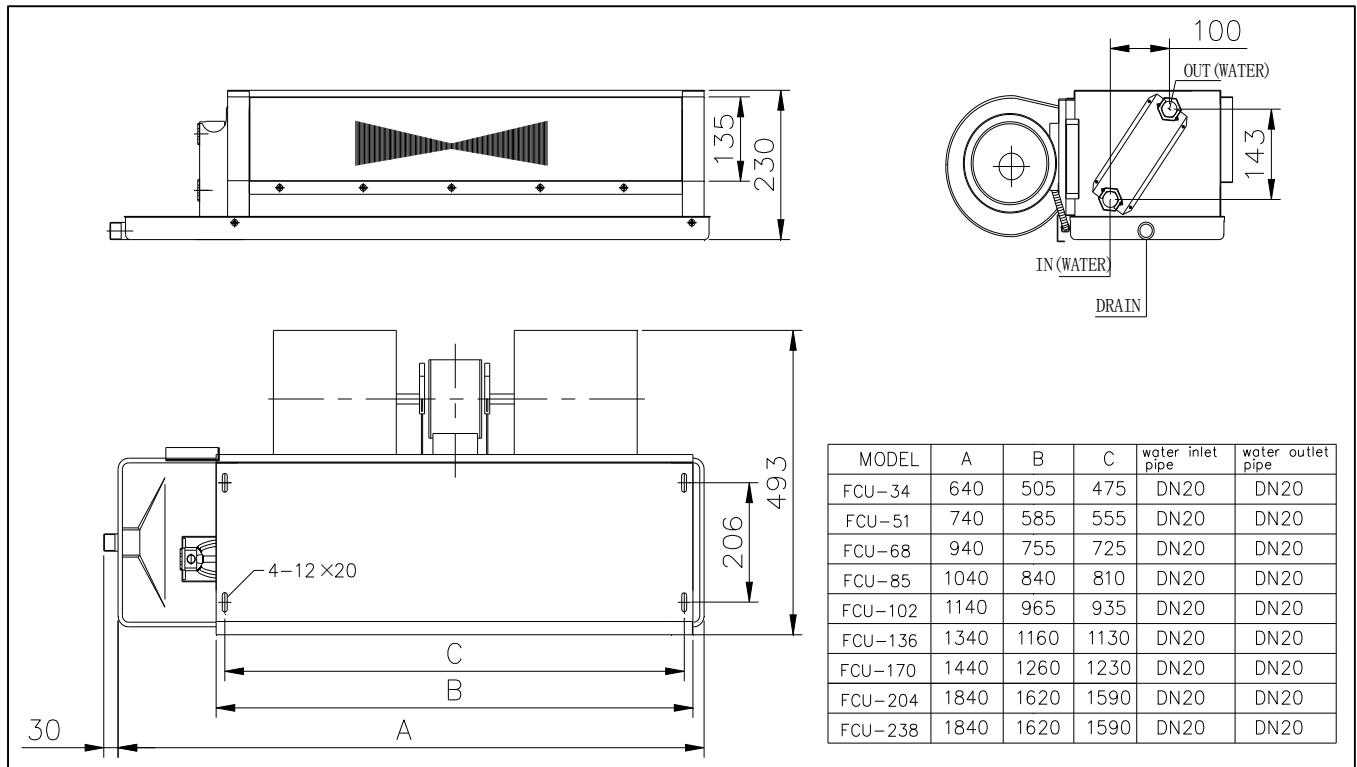
Horizontal /Vertical fan coil unit (three rows) Performance parameters

Product Type			FCU34(FCU02)	FCU51(FCU03)	FCU68(FCU04)	FCU85(FCU05)	FCU102(FCU06)	FCU136(FCU08)	FCU170(FCU10)	FCU204(FCU12)	FCU238(FCU14)
Air Flow	High	m ³ /h	340	510	680	850	1020	1360	1700	2040	2380
	Middle	m ³ /h	255	382	510	637	765	1122	1402	1683	1927
	Low	m ³ /h	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	High	W	2170	3120	4090	4750	6070	8210	9380	11650	12490
	Middle	W	1953	2819	3738	4349	5452	7469	8535	10495	11478
	Low	W	1579	2323	3010	3404	4385	6043	6889	8479	9268
Sensible cooling capacity	High	W	1565	2115	3065	3535	4235	5745	7600	8900	10465
	Middle	W	1450	1965	2655	3015	3730	4895	6490	7980	9430
	Low	W	1240	1680	2045	2400	3050	3955	5310	6570	7810
Total heating capacity	High	W	3497	5014	6738	7618	9760	13176	14812	18030	19700
	Middle	W	3044	4358	5652	6817	8254	11297	12880	15737	17052
	Low	W	2518	3710	4986	5637	7027	9486	10664	13161	13987
Fan quantity			1	2	2	2	2	3	4	4	4
Fan motor Input power	12Pa	W	28	34	55	68	87	125	152	185	205
	30Pa	W	42	55	68	87	108	142	174	210	253
	50Pa	W	49	66	84	100	118	174	210	250	300
Power Supply		V/PH/Hz	220/1/50/60								
Noise	12Pa	dB(A)	34	35	38	42	43	44	46	48	49
	30Pa	dB(A)	37	38	41	44	45	46	48	48	49
	50Pa	dB(A)	42	44	46	47	49	50	52	54	56
Water Flow		kg/h	373	536	703	851	1044	1412	1613	2004	2148
Water Resistance		kPa	4.2	7.8	15.1	21.5	32.1	12.6	20.5	23.6	26.7
Draining pipe		mm	Rc3/4"(DN20)								
Weight	Horizontal concealed	Kg	11	14	15	16	18	23	27	29	34
	Horizontal exposed	Kg	24	26	31	36	40	46	55	66	75
	Vertical concealed	Kg	16	20	21	23	26	33	39	41	47
	Vertical exposed	Kg	31	33	35	36	41	47	57	59	65

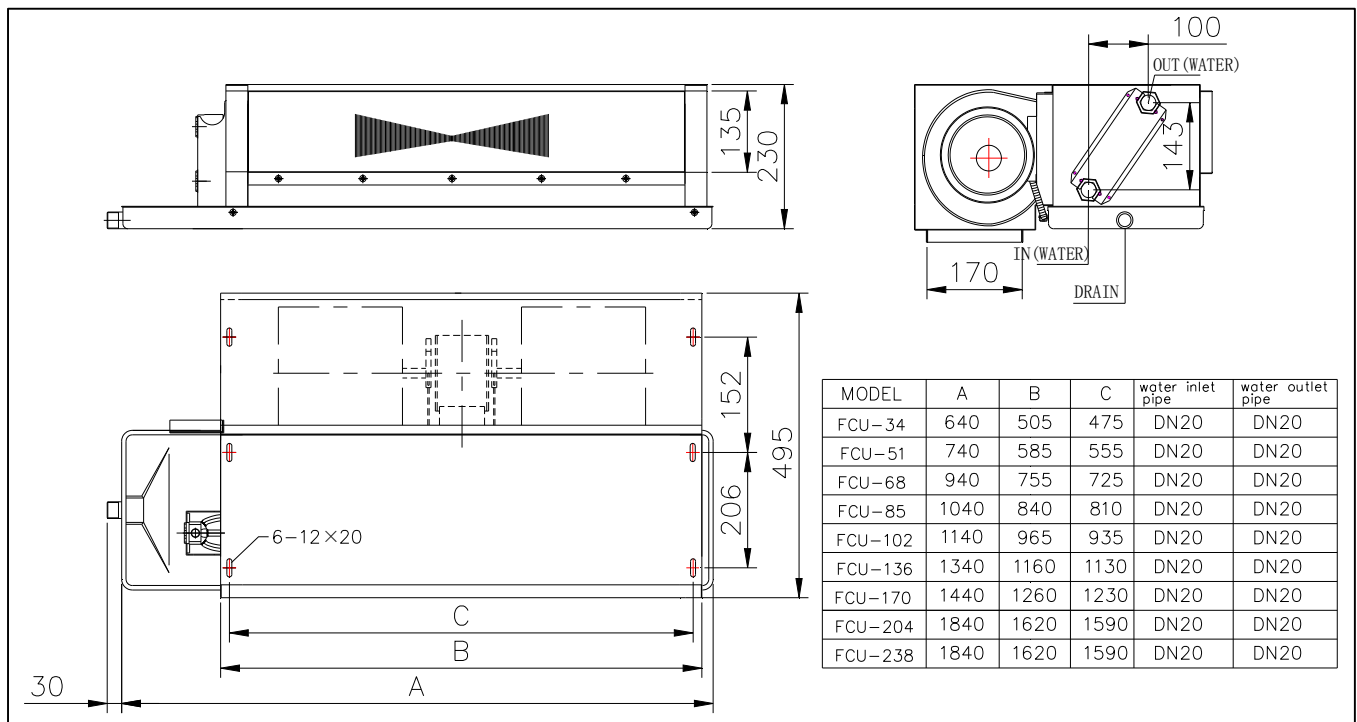
Performance values refer to the following conditions: *Cooling capacity is measured under the condition : Air inlet temperature DB 27°C/WB 19.5°C ,water inlet/outlet temperature 7°C/ 12,*Heating capacity is measured under the condition : Ambient temperature DB 21°C ,water inlet temperature 60°C

4. Physical dimension

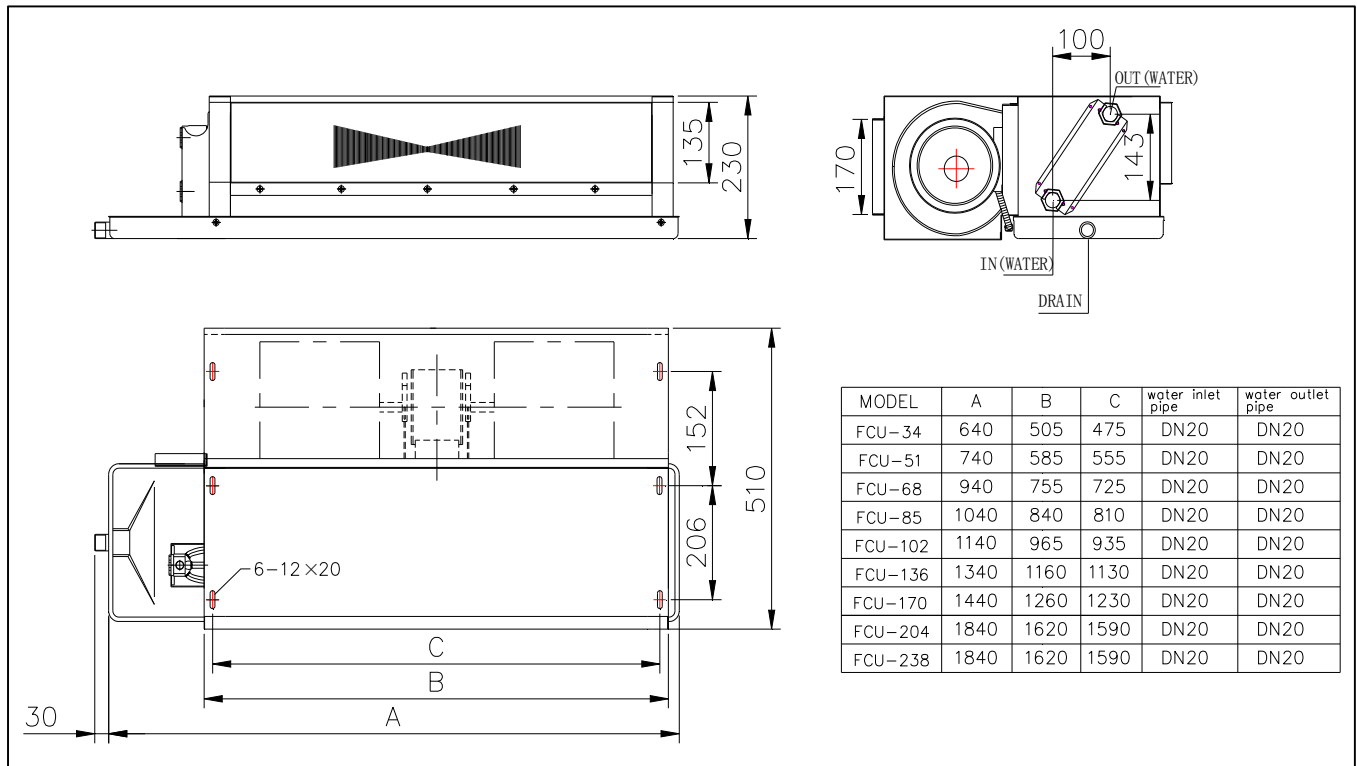
Horizontal concealed without return air box



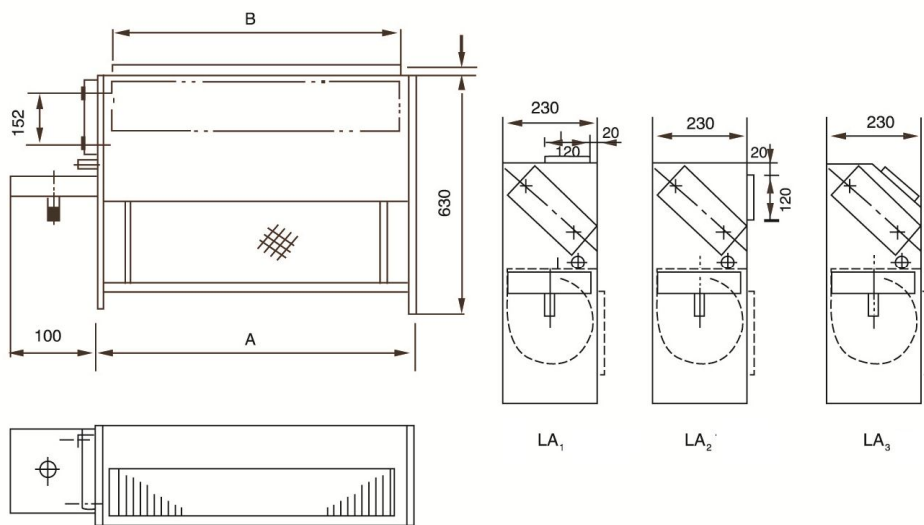
Horizontal concealed with return air box(below return air)



Horizontal concealed with return air box(back return air)

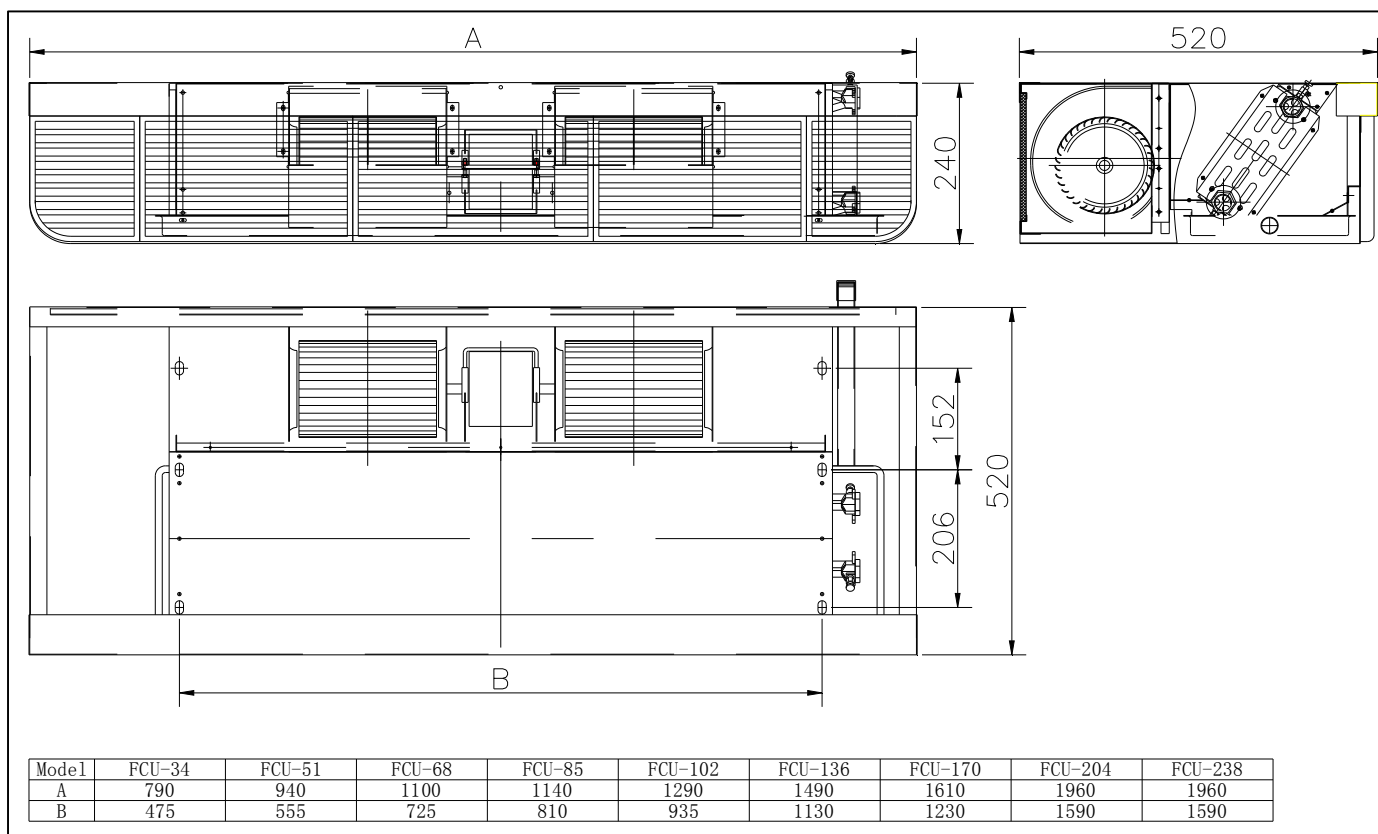


Vertical concealed

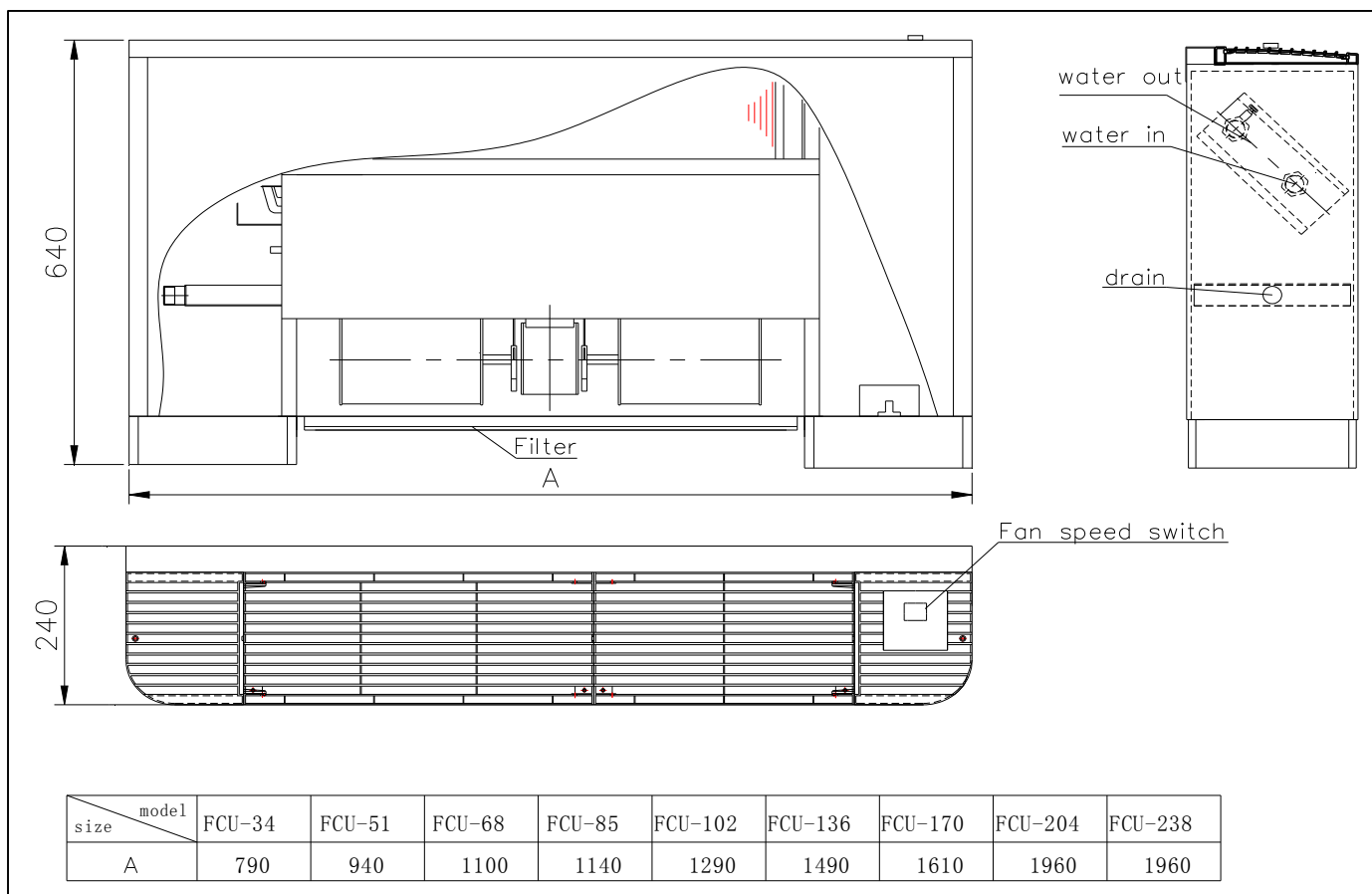


Model	FCU-34	FCU-51	FCU-68	FCU-85	FCU-102	FCU-136	FCU-170	FCU-204	FCU-238
A	565	665	765	865	995	1315	1515	1725	1825
B	490	590	690	790	920	1240	1440	1650	1750

Horizontal exposed



Vertical exposed



5. Parameter tables in different working condition

(1). Parameter tables in different cooling condition (W)

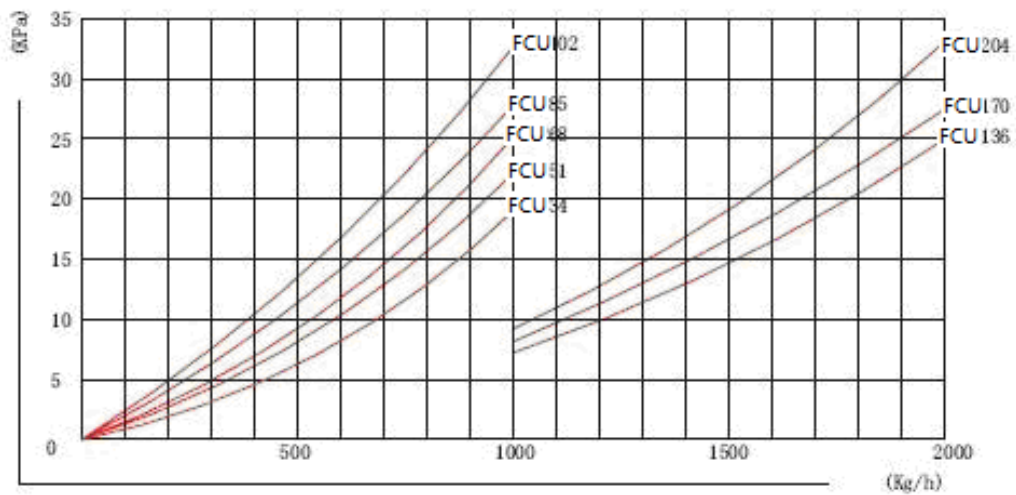
model	water flow (kg/h)	Water inlet temp. (°C)											
		5		6		7		8		9		10	
		TH	SH	TH	SH	TH	SH	TH	SH	TH	SH	TH	SH
FCU34	274	2266	1629	2072	1545	1953	1485	1829	1460	1715	1388	1591	1348
	365	2464	1850	2266	1633	2120	1565	2005	1528	1891	1487	1737	1427
	456	2621	1770	2417	1658	2282	1605	2146	1579	1988	1537	1837	1458
	548	2689	1776	2523	1719	2360	1676	2256	1754	2076	1554	1897	1510
FCU 51	383	3153	2202	2884	2088	2718	2007	2545	1973	2386	1875	2214	1822
	510	3429	2500	3153	2207	2950	2115	2790	2064	2631	2009	2417	1928
	638	3647	2392	3364	2241	3176	2170	2987	2134	2767	2077	2556	1970
	765	3741	2400	3510	2323	3284	2265	3139	2370	2888	2100	2640	2041
FCU 68	529	4371	3191	3998	3027	3768	2908	3528	2860	3308	2718	3069	2641
	705	4754	3624	4372	3199	4090	3065	3867	2992	3648	2912	3351	2794
	881	5056	3467	4664	3248	4403	3144	4141	3093	3836	3010	3544	2855
	1058	5187	3478	4867	3366	4552	3282	4352	3435	4005	3043	3660	2958
FCU85	608	5023	3680	4595	3491	4330	3354	4055	3298	3802	3135	3527	3045
	810	5463	4179	5024	3689	4700	3535	4444	3451	4193	3358	3851	3223
	1013	5810	3999	5360	3746	5060	3626	4759	3567	4408	3472	4073	3293
	1215	5961	4011	5593	3882	5231	3785	5001	3962	4602	3509	4205	3412
FCU102	720	5964	4409	5455	4182	5140	4018	4814	3951	4514	3755	4187	3649
	960	6485	5007	5964	4420	5580	4235	5276	4134	4978	4023	4572	3861
	1200	6898	4790	6363	4487	6007	4344	5650	4273	5233	4159	4836	3945
	1440	7077	4805	6640	4651	6211	4535	5937	4747	5464	4204	4993	4087
FCU136	953	7877	5981	7205	5673	6789	5451	6358	5360	5962	5094	5531	4949
	1270	8566	6792	7878	5996	7370	5745	6969	5608	6574	5457	6039	5238
	1588	9111	6498	8404	6087	7934	5894	7462	5797	6912	5642	6387	5352
	1905	9347	6518	8770	6309	8203	6151	7842	6439	7216	5703	6594	5544
FCU170	1253	10367	7923	9482	7515	8936	7220	8368	7100	7846	6748	7279	6556
	1670	11274	8997	10368	7942	9700	7610	9172	7428	8653	7229	7948	6938
	2088	11991	8608	11061	8063	10443	7807	9821	7679	9097	7474	8406	7089
	2505	12302	8635	11542	8357	10797	8148	10321	8529	9498	7555	8679	7344
FCU204	1455	12067	9266	11037	8788	10401	8444	9740	8304	9133	7892	8472	7668
	1940	13122	10522	12068	9288	11290	8900	10676	8687	10071	8454	9251	8114
	2425	13957	10067	12874	9430	12155	9130	11431	8980	10588	8740	9784	8291
	2910	14318	10098	13434	9774	12566	9530	12013	9975	11055	8836	10102	8589

(2). Parameter tables in different heating condition (W)

model	water flow (kg/h)	Water inlet temp. (°C)								
		40	45	50	55	60	65	70	75	80
FCU34	274	1686	2145	2569	3038	3434	3843	4322	4812	5372
	365	1765	2226	2693	3152	3600	3996	4525	5040	5597
	456	1842	2301	2729	3211	3689	4167	4686	5148	5778
	548	1869	2336	2799	3293	3755	4265	4783	5270	5844
FCU51	383	2361	3002	3597	4253	4807	5380	6051	6737	7521
	510	2470	3116	3770	4413	5040	5595	6336	7055	7836
	638	2579	3222	3820	4496	5164	5834	6560	7207	8090
	765	2617	3270	3919	4611	5257	5970	6697	7377	8182
FCU68	529	3293	4188	5017	5932	6705	7504	8441	9398	10490
	705	3446	4347	5259	6156	7030	7804	8837	9841	10930
	881	3597	4494	5328	6271	7203	8137	9151	10052	11284
	1058	3650	4561	5466	6431	7332	8328	9341	10290	11413
FCU85	608	3687	4688	5616	6641	7506	8400	9449	10520	11743
	810	3858	4866	5887	6892	7870	8737	9893	11017	12236
	1013	4027	5031	5965	7020	8064	9110	10244	11253	12632
	1215	4086	5106	6119	7199	8208	9323	10457	11520	12776
FCU102	720	4413	5612	6722	7949	8985	10055	11310	12592	14056
	960	4617	5825	7046	8249	9420	10457	11842	13187	14645
	1200	4820	6022	7140	8403	9652	10904	12262	13469	15120
	1440	4891	6111	7324	8617	9825	11159	12517	13789	15293
FCU136	953	5903	7506	8991	10632	12018	13449	15128	16843	18801
	1270	6176	7791	9425	11034	12600	13987	15839	17638	19589
	1588	6448	8055	9550	11240	12911	14585	16401	18016	20224
	1905	6542	8174	9796	11527	13142	14926	16742	18443	20455
FCU170	1253	19200	9651	11560	13670	15451	17292	19451	21656	24173
	1670	7940	10017	12118	14186	16200	17984	20364	22678	25186
	2088	8290	10356	12279	14451	16599	18752	21087	23164	26002
	2505	8411	10510	12595	14820	16897	19190	21525	23713	26300
FCU204	1343	8932	11358	13606	16089	18185	20351	22892	25487	28450
	1940	9347	11789	14262	16697	19200	21167	23968	26691	29644
	2238	9756	12189	14451	17007	19537	22071	24818	27263	30604
	2685	9899	12370	14825	17441	19886	22587	25334	27910	30952

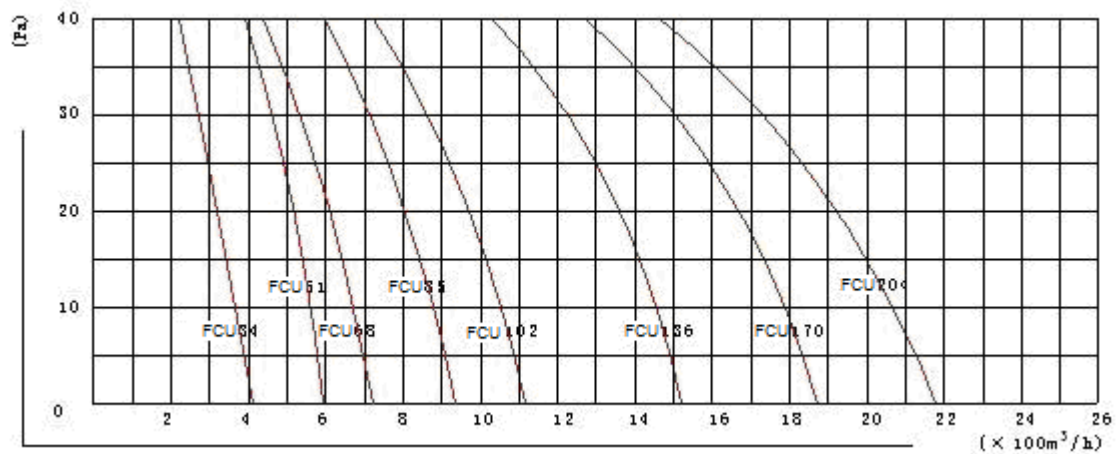
6. Curve diagram

(1). Water Resistance (KPa) ----water flow (Kg/h)

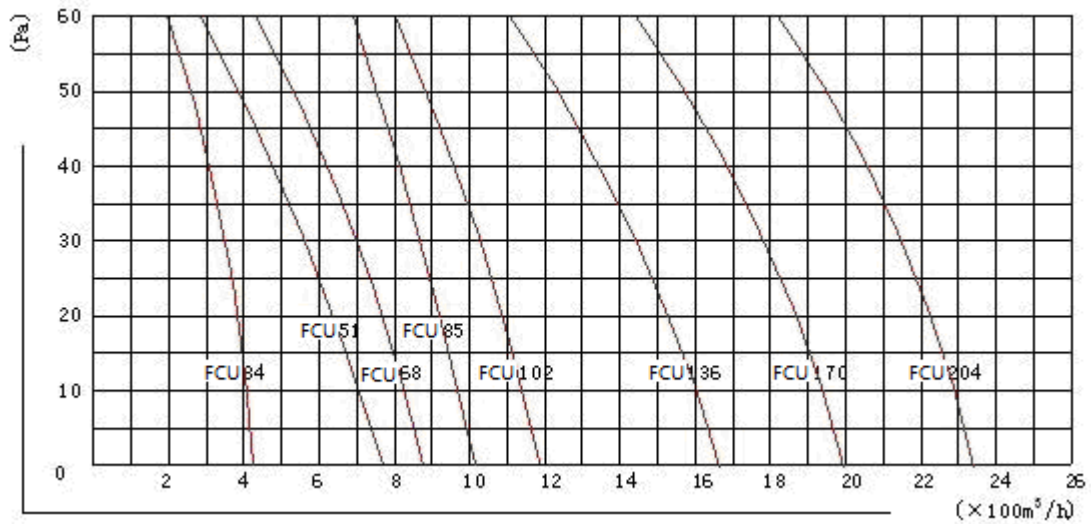


(2). Static press (Pa)----air flow ($\times 100\text{m}^3/\text{h}$)

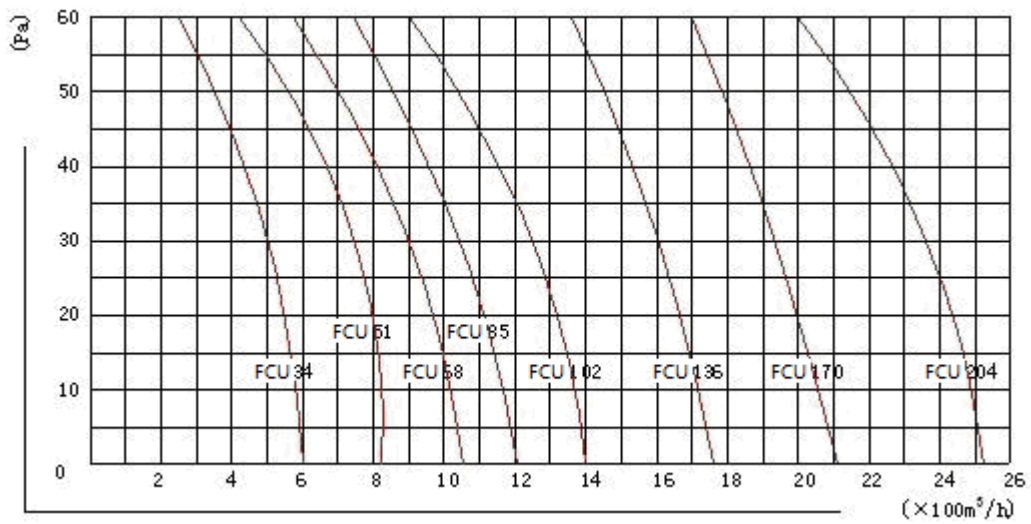
1) Normal Static press



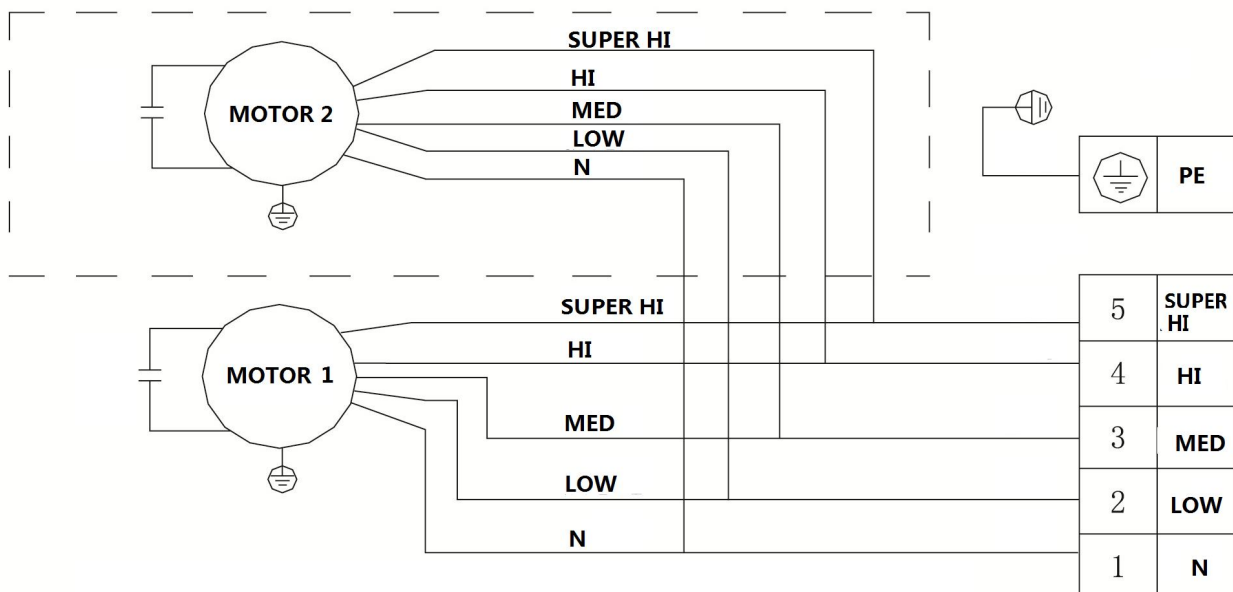
2) Middle Static press (30Pa)



3) High Static press (50Pa)



7. Wiring diagram



8. Installation

(1). Units receiving

Check and make sure there is no any damage of the units, if unit is bruising, serious deformation or fan motors loose, please contact with the seller.

The fan coil equipment should be applied with the ex-factory certification or the quality authentication file.

The structure, installation, outlet direction and the water inlet position of the fan coil equipment should accord with the design requirements.

The specifications and the models of the main and the accessorial materials applied for the equipment installation should accord with the design requirements and be with the ex-factory certification.

(2). Preparation

The fan coil, the main and the accessorial materials should have arrived in the field, all the tools for installation have been prepared, and so are the site, water supply and power supply for the check before installation.

The architectural structure project is finished, the waterproof layer of the ceiling has been constructed, and meanwhile, the indoor wall and floor have been plastered.

The location and dimension for installation should accord with the design requirements, the main tube of the air conditioning system has been installed and the reserved pipe orifice location altitude of the branch tube connected with the fan coil should be in accordance with the demand.

(3). Unit installation

About fan coil installation, please refer to the dimensional drawings and installation diagram.

The fan coil should be connected with the cooling or heating medium pipe after the duct system is purged, in case of the heat exchanger being blocked.

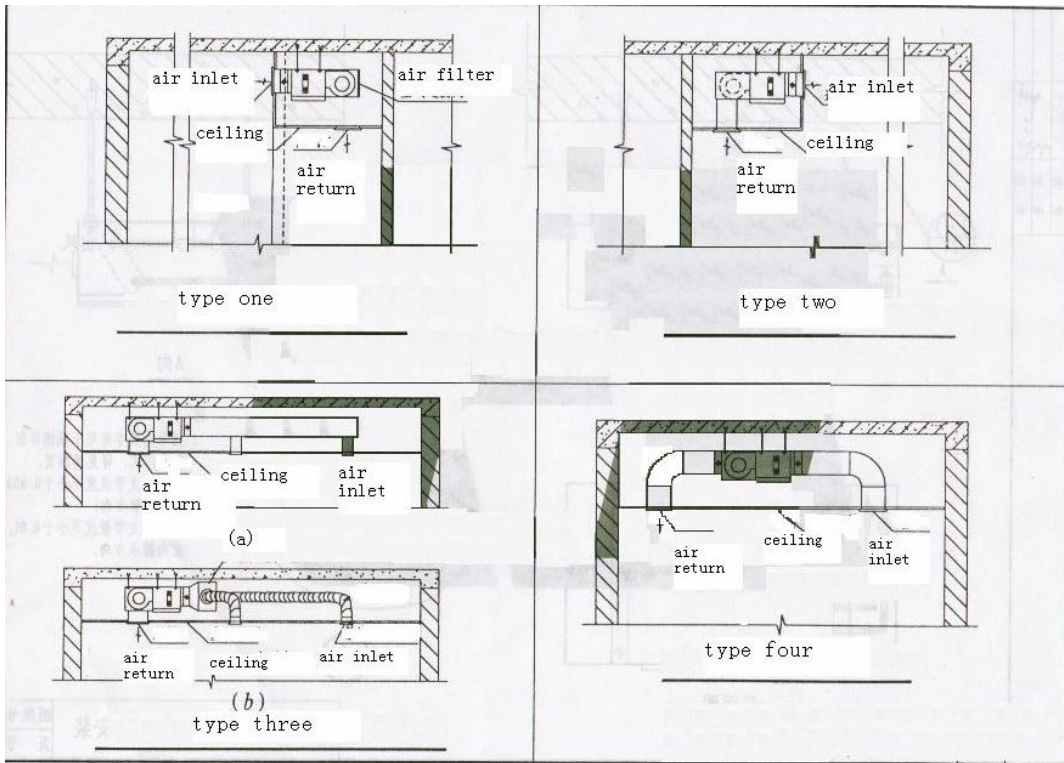
The hangers of the horizontal suspended fan coil should be installed levelly and firmly in the correct position. The suspender should not sway freely but be leveled, fastened with the double nuts and connected with the pallet.

An active checking door should be kept in the hung ceiling for the horizontal buried fan coil in order to wholly dismantle and maintain the unit with convenience.

Check each motor casing and the surface exchanger to see if there is any damage or rust before the fan coil installation.

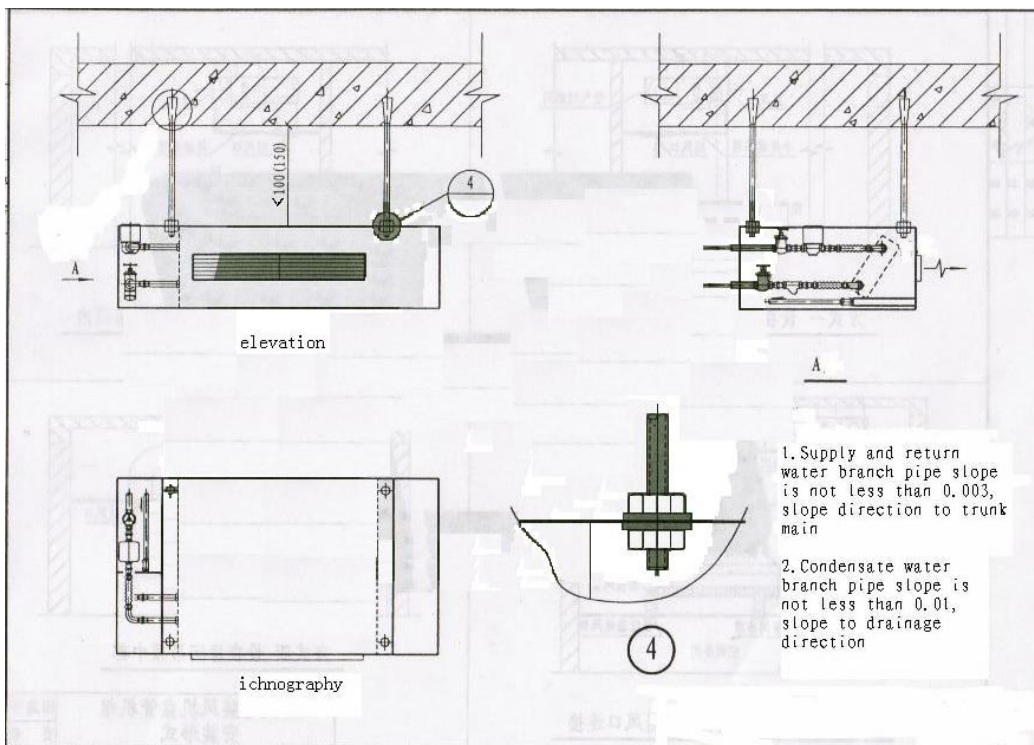
Horizontal concealed

There must be return air box when concealed installation.

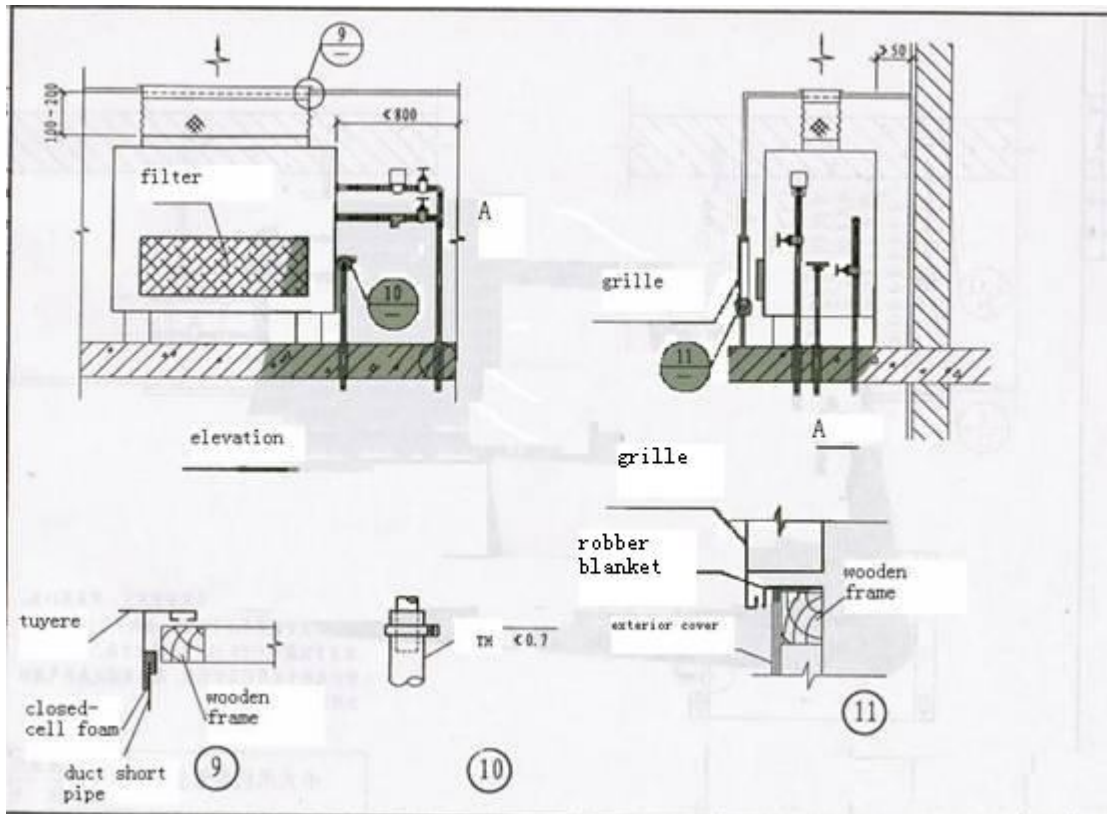


Supply and return water branch pipe slope is not less than 0.003, slope direction to trunk main;
 Condensate water branch pipe slope is not less than 0.01, slope to drainage direction.

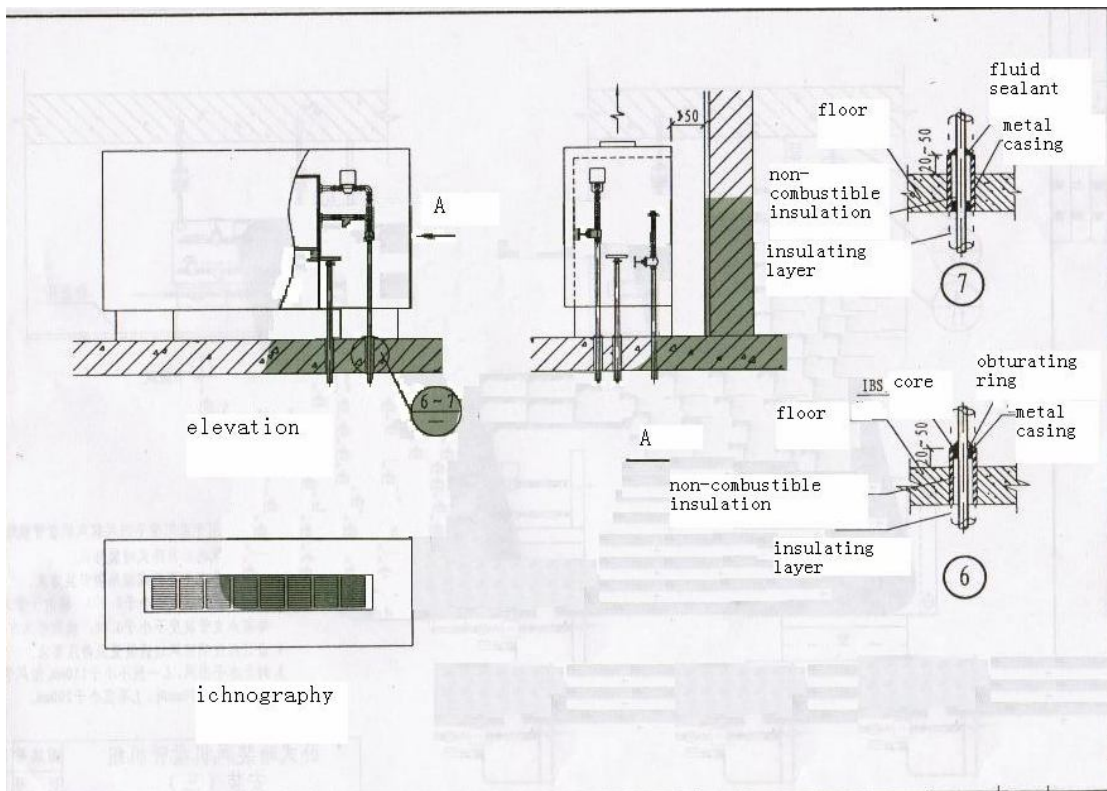
Horizontal exposed



Vertical concealed



Vertical exposed



(4). Water pipe installation

The cooling or heating medium pipe should be connected with the steel pipe or the red copper pipe which should be kept straight. It is better to connect the condensate pipe with the transparent hose whose length should be less than 300mm. Fasten the hose with hoop in case of the leakage, and keep the gradient accurate to ensure the condensate flowing to the desired place quickly and no water accumulated in the water pan.

All the main water pipe must have sufficient support to take the weight of pipe and water in it. In

addition, the pipe must have a certain fixed space to accommodate the thermal expansion and contraction of the pipe when go hot and cold water.

Water inlet / outlet pipes and drainage pipes can be installed in the left of the fan coil (left-style) or in the right of the fan coil (right-style), this is a customer option.

Supply and return water pipe and the condensate pipe must be insulation to prevent dewing when cooling

(5). Electrical control and connection

All electrical wiring should comply with provision of national standards and local standards. Before wiring, check the fan coil supply voltage and current values

All fan coil power supply is AC 220V \pm 10%, please according to the nameplate to determine the appropriate power source.

9. Operation

(1). Check

Need to disconnect the power to prevent personal injury.

Check items as following:

- ✧ Unit is securely connected with the boom and the floor.
- ✧ Duct connection is completed, and firm.
- ✧ Water pipe connection is completed, and no leakage.
- ✧ Condensate water pipe connection is completed, and no leakage.
- ✧ Wire control system connection is completed and no loose contact or miss connection.
- ✧ Have read the manual, familiar operation.

(2). Operation

System should be done the leak detection after unit installed and before running, unit designed for a maximum working pressure is 1.6MPa, the test pressure shall not exceed 2Mpa. Pressure leak test should be conducted in temperatures above 5 °C, or should take freezing measures.

When the water first flows through the coil, there is usually part air gathered at the highest of the coil. If the coil is not empty, there will be fizzy sound or other unusual sounds. In addition, because the air occupies part space of the coil, the heat transfer area reduced, thereby reducing the cooling capacity. So before running must release air in the coil. Method is to manually rotate the air-release valve 1 or 2 rings, release the air from the coil, until there is water flowing out from the release valve, then put the valve closed.

The running of fan coil can be controlled by the motor speed switch or thermostat. Thermostat includes a motor speed selector switch, an ON / OFF switch and a temperature control devices. Speed switch labeled "Off / High / Middle / Low" can control the motor speed to adjust the air volume.

10. Maintenance

Fan coil undergo a rigorous factory testing, users typically do not have maintenance. The capacity of fan coil depends on water temperature, water flow and air volume.

Brief maintenance on the fan coil as following:

(1). Air filter

The role of the air filter is to remove foreign matter in the air, such as dust, soot, pollen and other

unclean substances. Blocked or dirty filter can not only play a filter role, but also due to air resistance, the air flow through the coil reduces, thereby reducing its cooling (heating) capacity. Therefore, it must clean the filter regularly before filter dirty. The method is: to not too dirty filters, remove the dust with a vacuum cleaner, and then install it back into place; to dirty filter, rinse with water, after the filter dry, and install it back into place. Filter must be cleaned regularly and at least four times a year.

(2). Heat exchanger

When the heat exchanger dirty, brush the dirt with a flexible nylon brush between the fins (do not damage fins), then use a vacuum cleaner to suck the dust on the heat exchanger, can also use compressed air to blow dirt. Unit should be connected with filters, if customers used properly, the heat exchanger copper tube need not be cleaned.

(3). Condensate water pan

When the unit running in the summer, be sure to check whether there is dirt in water pan, ensure condensate water smoothly flow to the drain pipe through water pan.

(4). Seasonal maintain

When the unit running in summer, cold water temperature is not lower than 5 °C; in t winter, hot water temperature should be no higher than 65 °C (commonly 45 °C). During stopping use period in summer, the coil should be filled with water to reduce corrosion; measures should be taken in winter, the water inside the coil should be released in order to avoid freeze crack.

11. Troubleshooting

Malfunction	Possible reasons	solution
Air volume is too small	Air filter dirty; Tuyere blocked	clean or change; eliminate clogging;
high noise	fan bearing ring; Air filter dirty;	repair or change; clean or change;
cooling(heating) inadequate	Cold (hot)water is not cold(hot); water flow is too small; Air volume is too small	reduce(increase)water temp; increase water flow; increase air volume;
water leakage	water pan outlet blocked; Pipe and pipe fittings insulation lax; Installation uneven; Heat exchanger cracking	eliminate clogging; thermal insulation; make level; repair or change

Appendix I: About warranty

Dear User:

Thank you for purchasing our products. If unit fails, please contact with our agents or our company. My company has a highly efficient marketing network and perfect after-sales service system, will provide you with the best quality service.

About FCU series unit our warranty are as follows:

- ✧ Since the date of products delivery, within twelve months, if fault because of products quality problems, users can present their purchase invoice and warranty card for free repair.
- ✧ The following situations are not covered under warranty, we may provide paid services
 - Due to improper operation or in an irregular situation (abnormal voltage, improper storage, etc.) using the unit result failure;
 - Disassemble, or modify any part of the unit (such as lines, spare parts) by yourself and vandalism;
 - Installation, commissioning and maintenance cause fault by non-designated or authorized personnel of our company;
 - Exceed the warranty period;
 - Other fault within the scope of no corporate responsibility.