

BELP Series

Ducted Ultima VRF Indoor Unit

Technical Manual

220-240V/1/50-60Hz



Ultima Duct

1 Specifications	4
2 Dimensions	6
3 Unit Placement	7
4 Piping Diagram	8
5 Wiring Diagram	9
6 Capacity Tables	10
7 Electrical Characteristics	12
8 Sound Levels	13
9 Fan Performance	16

BELP006N0A-DCV018

BELP012N0A-DCV036

BELP007N0A-DCV020

BELP015N0A-DCV045

BELP008N0A-DCV022

BELP019N0A-DCV056

BELP010N0A-DCV028

BELP024N0A-DCV071

1 Specifications

Table 1.1: BELP006 (007,008,010) specifications

Model			BELP006N0A-DCV018	BELP007N0A-DCV020	BELP008N0A-DCV022	BELP010N0A-DCV028	
Power supply			1-phase, 220-240V, 50/60Hz				
Cooling ¹	Capacity	kW	1.5	1.8	2.2	2.8	
		kBtu/h	5.1	6.1	7.5	9.6	
	Power input	W	28	28	28	28	
Heating ²	Capacity	kW	1.8	2.2	2.5	3.2	
		kBtu/h	6.1	7.5	8.9	10.9	
	Power input	W	28	28	28	28	
Fan motor type			DC				
Indoor coil	Number of rows ³		2&3	2&3	2&3	2&3	
	Tube pitch ³	mm	14&18				
	Fin spacing and type		mm	1.32 Hydrophilic aluminum			
	Tube OD and type		mm	Φ5 Inner-groove			
	Dimensions (LxHxW)		mm	380x170x95			
	Number of circuits			4	4	4	4
Air flow rate ⁴		m ³ /h	465/432/407/381/ 352/321/301	465/432/407/381/ /352/321/301	465/432/407/381/ 352/321/301	465/432/407/381/ /352/321/301	
External static pressure ⁵		Pa	10 (10-50)				
Sound pressure level ⁶		dB(A)	33/31/30/29/27/ 26/25	33/31/30/29/27/ 26/25	33/31/30/29/27/ 26/25	33/31/30/29/27/ 26/25	
Unit	Net dimensions ⁷ (WxHxD)		550x199x450				
	Packed dimensions (WxHxD)		715x275x525				
	Net/Gross weight		11/13.5				
Refrigerant type			R410A/R32				
Throttle type			Electronic expansion valve				
Design pressure (H/L)		MPa	4.4/2.6				
Pipe connections	Liquid/Gas pipe		Φ6.35/Φ12.7				
	Drain pipe		OD Φ25				

Notes:

- Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Ultima Duct adopts a brand-new special-shaped heat exchanger with different number of rows and different Tube pitch at different positions.
- Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
- Stable operation external static pressure range. (Note: setting external static pressure outside the unit's optimal static pressure range may lead to higher noise levels and lower airflow rate. For the optimal external static pressure range refer to the unit's installation manual.)
- Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured 1.5m below the unit in an anechoic chamber.
- The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.
- All specifications are measured at standard external static pressure.
- G1 air filter is standard for Ultima Duct.

Table 1.2: BELP012 (015,019,024) specifications

Model			BELP012N0A-DCV036	BELP015N0A-DCV045	BELP019N0A-DCV056	BELP024N0A-DCV071
Power supply			1-phase, 220-240V, 50/60Hz			
Cooling ¹	Capacity	kW	3.6	4.5	5.6	7.1
		kBtu/h	12.3	15.4	19.1	24.2
	Power input	W	31	43	58	65
Heating ²	Capacity	kW	4	5	6.3	8
		kBtu/h	13.7	17.1	21.5	27.3
	Power input	W	31	43	58	65
Fan motor type			DC			
Indoor coil	Number of rows ³		2&3	2&3	2&3	2&3
	Tube pitch ³	mm	14&18			
	Fin spacing and type	mm	1.32 Hydrophilic aluminum			
	Tube OD and type	mm	Φ5 Inner-groove			
	Dimensions (L×H×W)	mm	530×170×95	730×170×95		930×170×95
	Number of circuits		4	6	6	8
Air flow rate ⁴	m ³ /h	603/547/502/456/ 407/361/321	820/722/687/624 /558/514/435	893/779/743/655/ 581/560/472	1118/999/928/84 0/750/664/578	
External static pressure ⁵	Pa	10 (10-50)				
Sound pressure level ⁶	dB(A)	32/30/29/27/25/23/ 22	34/32/31/30/29/ 25/23	38/35/34/31/29/28 /26	38/35/33/31/29/ 27/25	
Unit	Net dimensions ⁷ (W×H×D)	mm	700×199×450	900×199×450		1100×199×450
	Packed dimensions (W×H×D)	mm	865×275×525	1065×275×525		1300×275×525
	Net/Gross weight	kg	13/15.5	16.5/19.5		19.5/23
Refrigerant type			R410A/R32			
Throttle type			Electronic expansion valve			
Design pressure (H/L)		MPa	4.4/2.6			
Pipe connections	Liquid/Gas pipe	mm	Φ6.35/Φ12.7		Φ9.52/Φ15.9	
	Drain pipe	mm	OD Φ25			

Notes:

- Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Ultima Duct adopts a brand-new special-shaped heat exchanger with different numbers of rows and different Tube pitches at different positions.
- Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
- Stable operation external static pressure range. (Note: setting external static pressure outside the unit's optimal static pressure range may lead to higher noise levels and lower airflow rate. For the optimal external static pressure range refers to the unit's installation manual.)
- Sound pressure level is from highest level to lowest level, total 7 levels for each model. The sound pressure level is measured 1.5m below the unit in an anechoic chamber.
- The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.
- All specifications are measured at standard external static pressure.
- G1 air filter is standard for Ultima Duct.

Ultima Ducted VRF Indoor Units

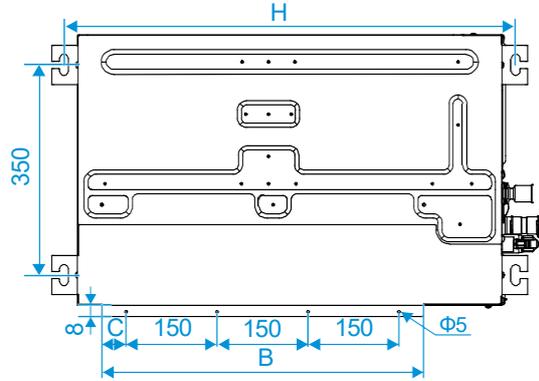
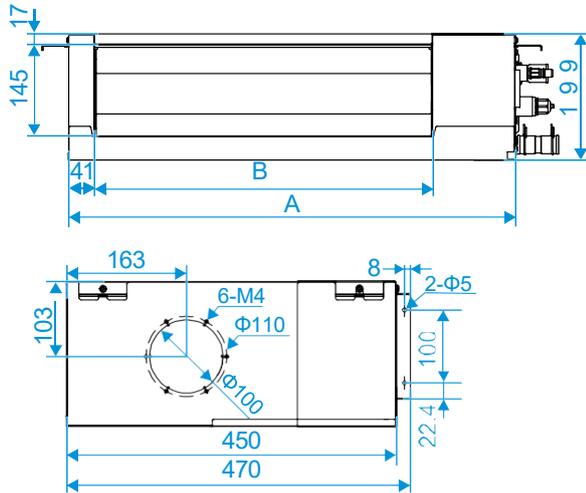
2 Dimensions

2.1 Unit Dimensions

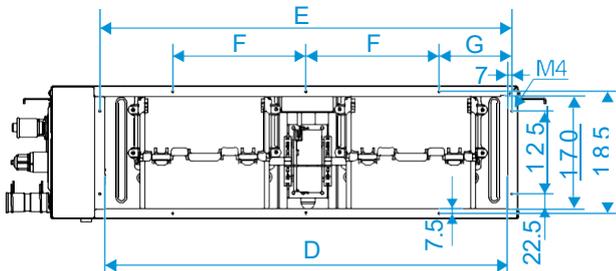
Figure 2.1: External dimension, air outlet size, and size of fresh air outlet: (unit: mm)

kBtu/h ≤ 24:

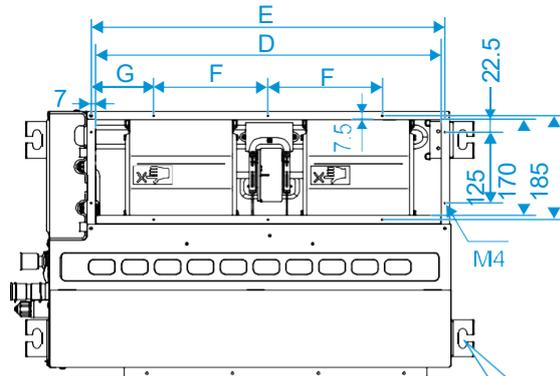
External dimension, air outlet size, and size of fresh air outlet:



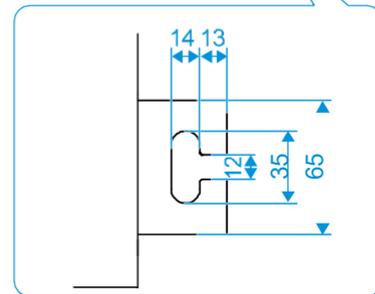
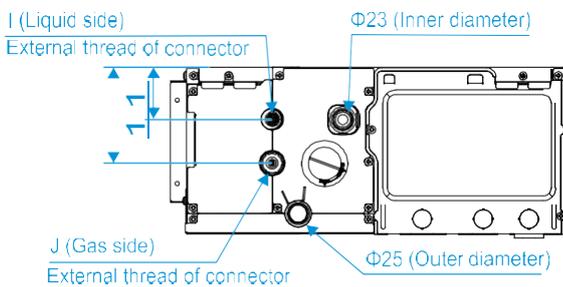
Size of return air inlet (back return air mode):



Size of return air inlet (bottom return air mode), and the distance between the lugs:



Dimension of pipe and water pipe:



Capacity (kBtu/h)	A	B	C	D	E	F	G	H	I	J
kBtu/h ≤ 09	550	380	40	455	469	250	109.5	595		
09 < kBtu/h ≤ 12	700	530	40	605	619	200	109.5	745	7/16-20 UNF	3/4-16 UNF
12 < kBtu/h ≤ 18	900	730	65	805	819	200	109.5	945		
18 < kBtu/h ≤ 24	1 100	930	15	1 005	1 019	200	109.5	1 145	5/8-18 UNF	7/8-14 UNF

3 Unit Placement

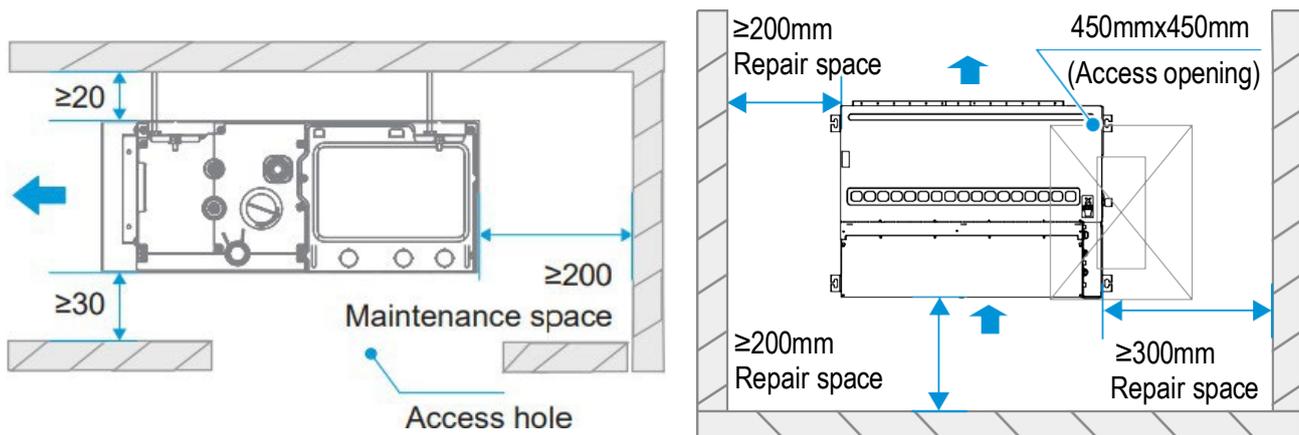
3.1 Placement Considerations

Unit placement should take account of the following considerations:

- Units should not be installed in the following locations:
 - A place filled with mineral oil, fumes or mist, like a kitchen.
 - A place where there are corrosive gases, such as acid or alkaline gases.
 - A place exposed to combustible gases and using volatile combustible gases such as diluent or gasoline.
 - A place where there is equipment emitting electromagnetic radiation.
 - A place where there is a high salt content in the air like a coast.
 - Do not use the air conditioner in an environment where an explosion may occur.
 - Places like in vehicles or cabin rooms.
 - Factories with major voltage fluctuations in the power supplies.
 - Other special environmental conditions.
- Units should be installed in positions where:
 - Ensure that the airflow in and out of the IDU is reasonably organized to form an air circulation in the room.
 - Ensure IDU maintenance space.
 - The nearer the drainage pipe and copper pipe are to the ODU, the lower the pipe cost is.
 - Prevent the air conditioner from blowing directly to the human body.
 - The closer the wiring to the power cabinet, the lower the wiring cost is.
 - Keep the air-conditioning return air away from the setting sun of the room.
 - Be careful not to interfere with the light tank, fire pipe, gas pipe and other facilities.
 - The IDU should not be lifted in the places like load-bearing beam and columns that affect the structural safety of the house.
 - The wired controller and the IDU should be in the same installation space; otherwise, the sampling point setting of the wired controller need to be changed.

3.2 Space Requirements

Figure 3.1: Ultima Duct space requirements (unit: mm)

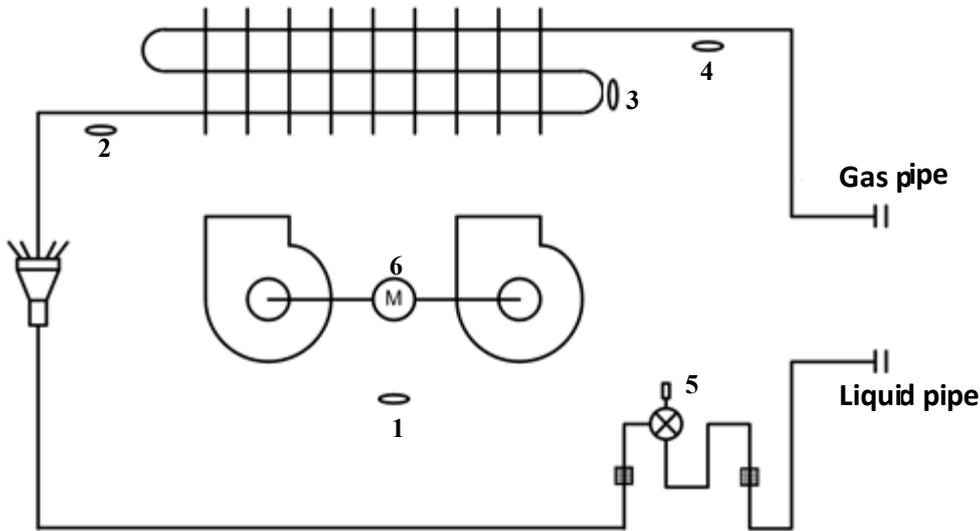


Notes:

1. The centerline of the maintenance hole should be in the same position as the centerline of the indoor unit.

4 Piping Diagram

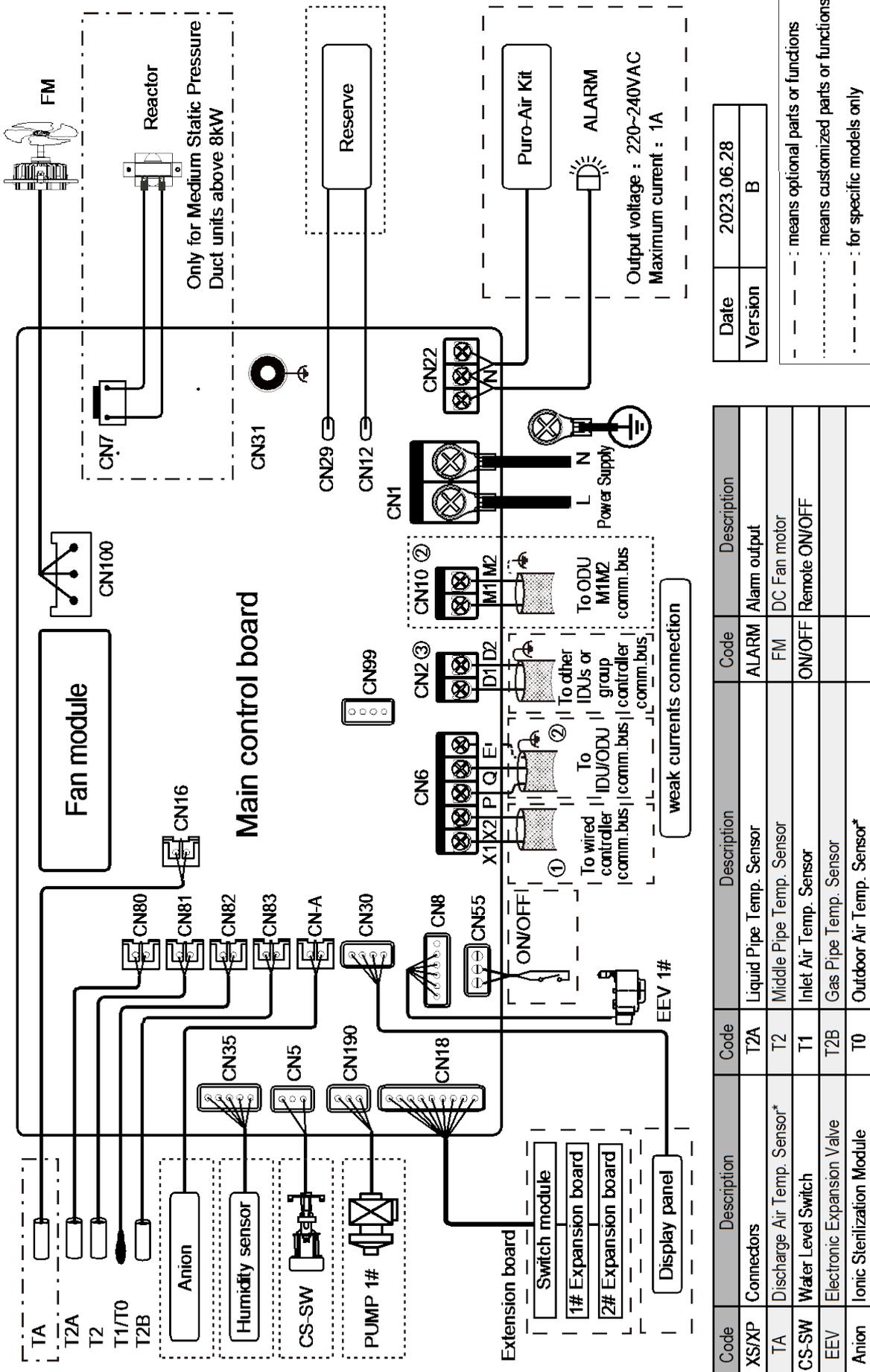
Figure 4.1: Arc Duct piping diagram



Legend	Code	Description
1	T1	Inlet Air Temp. Sensor
2	T2A	Liquid Pipe Temp. Sensor
3	T2	Middle Pipe Temp. Sensor
4	T2B	Gas Pipe Temp. Sensor
5	EEV	Electronic Expansion Valve
6	FAN	DC Fan motor

5 Wiring Diagram

Figure 5.1: Ultima Duct wiring diagram



* Indicates that this sensor is only available for Fresh Air Processing Unit

Notes for installers and service engineers

Caution

- All installation, service and maintenance must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Units should be grounded in accordance with all applicable legislation. Metal and other conductive components should be insulated in accordance with all applicable legislation.
- Power supply wiring should be securely fastened at the power supply terminals – loose power supply wiring would represent a fire risk.
- After installation, servicing or maintenance, the electric control box cover should be closed. Failing to close the electric control box cover risks fire or electric shock.
- The dotted lines indicate the field wiring or optional function.
- PQ and M1M2 communication ports are both used for indoor and outdoor communication, and only one of them can be used at a time. Meanwhile, be sure to connect the same communication ports (PQ to PQ; M1M2 to M1M2) in case of damage of the main control board.
- D1D2 communication ports are used for group control communication. When connecting the group controller, the D1D2 port of the indoor units that are to be group controlled must be connected in daisy chain, and the group controller must be connected to the X1X2 port of one of the indoor units in the group control and set to group control mode. In addition, D1D2 communication ports can also be connected to the central controller.

6 Capacity Tables

6.1 Cooling Capacity Table

Table 6.1: Ultima Duct cooling capacity

Model	Indoor air temperature (°C WB/DB)													
	14/20		16/23		18/26		19/27		20/28		22/30		24/32	
	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
BELP006N0A-DCV018	1.4	1.4	1.5	1.4	1.5	1.3	1.5	1.3	1.6	1.3	1.6	1.2	1.6	1.1
BELP007N0A-DCV020	1.6	1.6	1.7	1.6	1.8	1.6	1.8	1.5	1.9	1.5	1.9	1.4	2.0	1.4
BELP008N0A-DCV022	2.0	1.9	2.1	1.9	2.2	1.9	2.2	1.8	2.3	1.8	2.3	1.7	2.4	1.7
BELP010N0A-DCV028	2.5	2.5	2.7	2.5	2.8	2.4	2.8	2.3	2.9	2.3	2.9	2.1	3.0	2.1
BELP012N0A-DCV036	3.2	3.1	3.4	3.1	3.6	3.1	3.6	3.0	3.7	2.9	3.8	2.8	3.9	2.7
BELP015N0A-DCV045	4.0	3.9	4.3	4.0	4.5	3.9	4.5	3.7	4.6	3.7	4.7	3.5	4.8	3.3
BELP019N0A-DCV056	5.0	4.9	5.3	4.9	5.6	4.9	5.6	4.7	5.7	4.5	5.8	4.3	6.0	4.1
BELP024N0A-DCV071	6.3	6.1	6.7	6.1	7.0	6.0	7.1	5.8	7.2	5.7	7.4	5.4	7.6	5.2

Abbreviations:

TC: Total capacity (kW)

SC: Sensible capacity(kW)

Notes:

1. Shaded cells indicate rating condition.

6.2 Heating Capacity Table

Table 6.2: Ultima Duct heating capacity

Model	Indoor air temperature (°C DB)					
	16	18	20	21	22	24
	SHC	SHC	SHC	SHC	SHC	SHC
BELP006N0A-DCV018	1.8	1.8	1.7	1.6	1.6	1.5
BELP007N0A-DCV020	2.4	2.4	2.2	2.1	2.1	1.9
BELP008N0A-DCV022	2.8	2.8	2.6	2.5	2.4	2.3
BELP010N0A-DCV028	3.4	3.4	3.2	3.1	3.0	2.8
BELP012N0A-DCV036	4.2	4.2	4.0	3.8	3.8	3.5
BELP015N0A-DCV045	5.3	5.3	5.0	4.8	4.7	4.4
BELP019N0A-DCV056	6.7	6.6	6.3	6.1	5.9	5.5
BELP024N0A-DCV071	8.5	8.4	8.0	7.8	7.5	7.0

Abbreviations:

SHC: Sensible Heat Capacity

Notes:

1. Shaded cells indicate rating condition.

7 Electrical Characteristics

Table 7.1: Ultima Duct electrical characteristics

Model name	Power supply						Indoor Fan Motor	
	Hz	Volts	Min. volts	Max. volts	MCA	MFA	Rated motor output (W)	FLA
BELP006N0A-DCV018	50/60	220-240	198	264	0.88	15	20	0.70
BELP007N0A-DCV020	50/60	220-240	198	264	0.88	15	20	0.70
BELP008N0A-DCV022	50/60	220-240	198	264	0.88	15	20	0.70
BELP010N0A-DCV028	50/60	220-240	198	264	0.88	15	20	0.70
BELP012N0A-DCV036	50/60	220-240	198	264	0.94	15	20	0.75
BELP015N0A-DCV045	50/60	220-240	198	264	1.10	15	30	0.85
BELP019N0A-DCV056	50/60	220-240	198	264	1.10	15	30	0.85
BELP024N0A-DCV071	50/60	220-240	198	264	1.20	15	50	0.94

Abbreviations:

MCA: Minimum Circuit Amps

MFA: Maximum Fuse Amps

FLA: Full Load Amps

8 Sound Levels

8.1 Overall

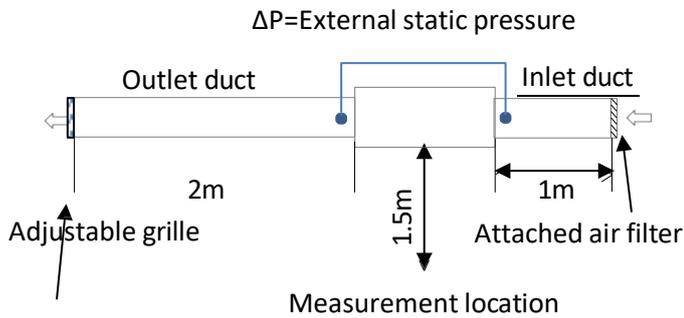
Table 8.1: Ultima Duct sound pressure levels¹

Model name	Sound pressure levels dB						
	SSH	SH	H	M	L	SL	SSL
BELP006N0A-DCV018	33	31	30	29	27	26	25
BELP007N0A-DCV020	33	31	30	29	27	26	25
BELP008N0A-DCV022	33	31	30	29	27	26	25
BELP010N0A-DCV028	33	31	30	29	27	26	25
BELP012N0A-DCV036	32	30	29	27	25	23	22
BELP015N0A-DCV045	34	32	31	30	29	25	23
BELP019N0A-DCV056	38	35	34	31	29	28	26
BELP024N0A-DCV071	38	35	33	31	29	27	25

Notes:

1. The sound pressure level is measured in an anechoic chamber at a distance of 1.5m below the unit, under the default static pressure setting at the factory. During on-site operation, the sound pressure level may be higher due to the influence of environmental noise.

Figure 8.2: Ultima Duct sound pressure level measurement



Connected to a top-discharge outdoor unit and measured in anechoic room. Adjusting the outlet grille to make the ΔP is equal to the rated static pressure, the data was recorded at 1.5m below the unit.

8.2 Octave Band Levels

Figure 8.3: BELP006N0A-DCV018 octave band levels

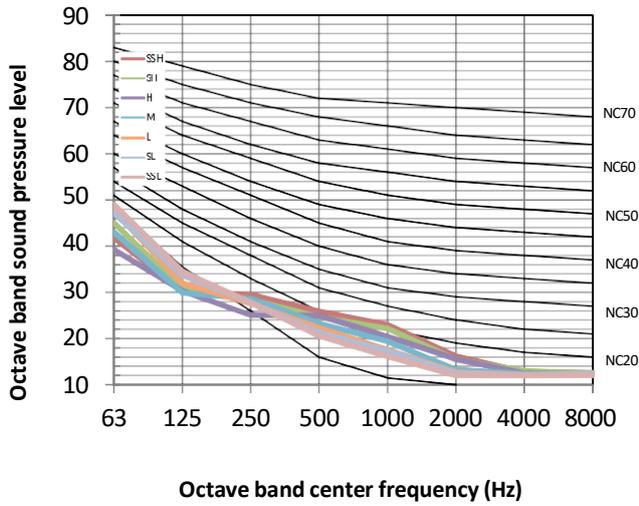


Figure 8.4: BELP007N0A-DCV020 octave band levels

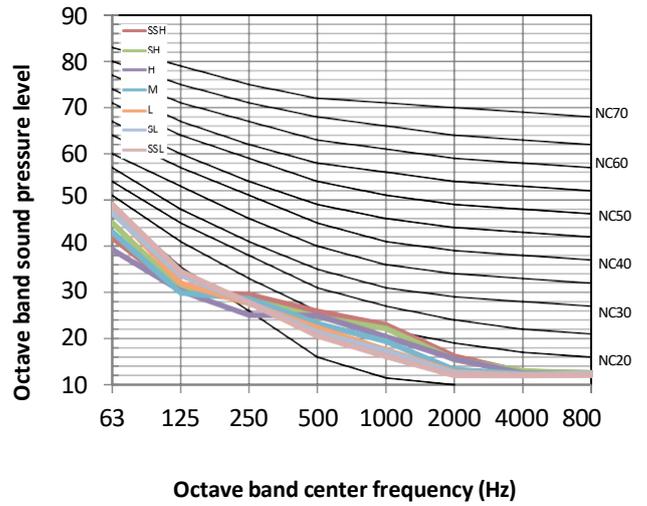


Figure 8.5: BELP008N0A-DCV022 octave band levels

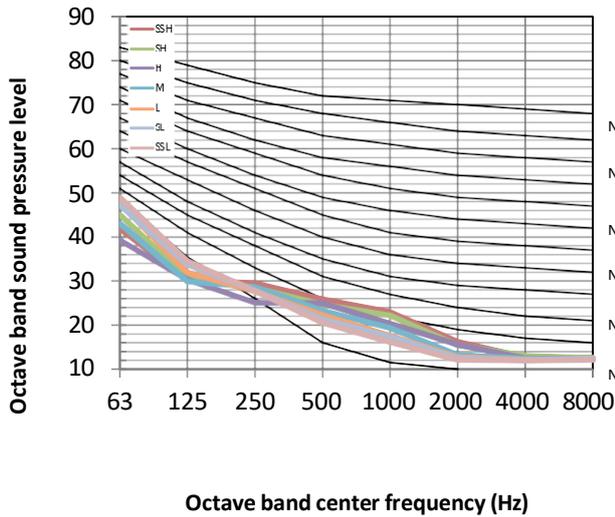


Figure 8.6: BELP010N0A-DCV028 octave band levels

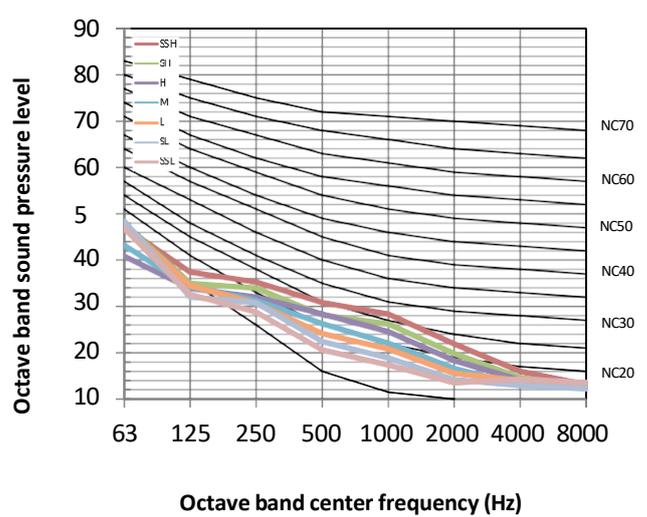


Figure 8.7: BELP012N0A-DCV036 octave band levels

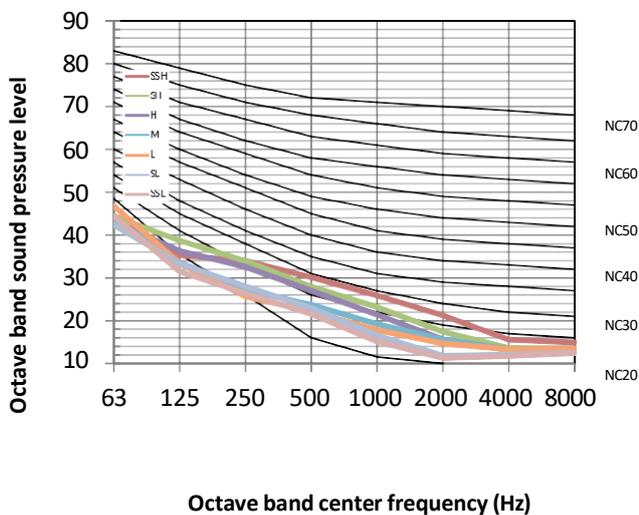


Figure 8.8: BELP015N0A-DCV045 octave band levels

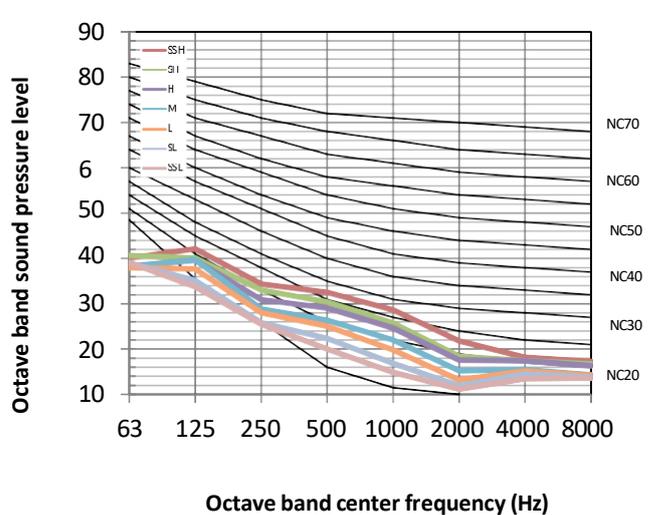


Figure 8.9: BELP019N0A-DCV056 octave band levels

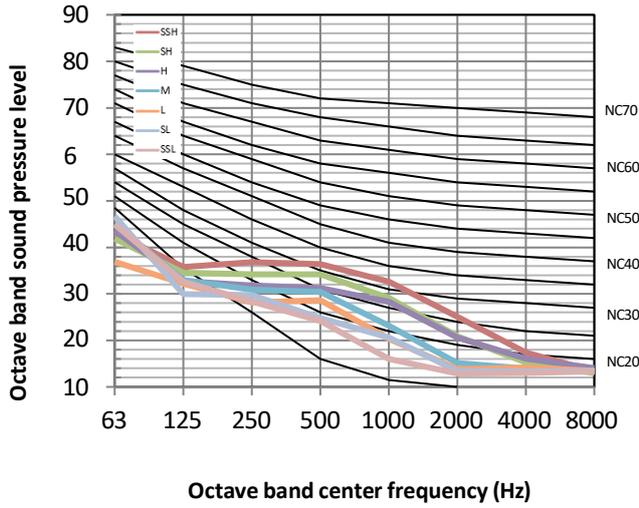
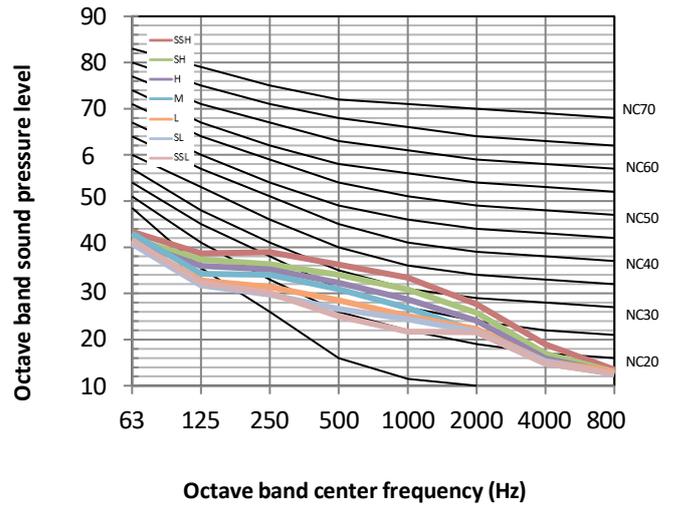


Figure 8.10: BELP024N0A-DCV071 octave band levels



9 Fan Performance

9.1 How to switch between Constant Airflow mode and Constant Speed mode

- ① In the main interface, press "≡" + "↵" for 3 seconds at the same time, and the main interface will display "CC". Press the "▲" and "▼" to select the indoor unit ("n00-n63" is displayed, and the last two digits are the indoor unit addresses). Press the "↵" to enter the Parameter setting interface, and "n00" will be displayed.
- ② Press the "▲" and "▼" until "n58" is displayed on the page, and then press the "↵" to enter the mode setting. Use the "▲" and "▼" keys to adjust to the demand mode parameter values, and press the "↵" to confirm.
- ③ Press the "⌚" button to return to the previous menu and exit the parameter setting. Parameter setting will also exit after 60s of no operation

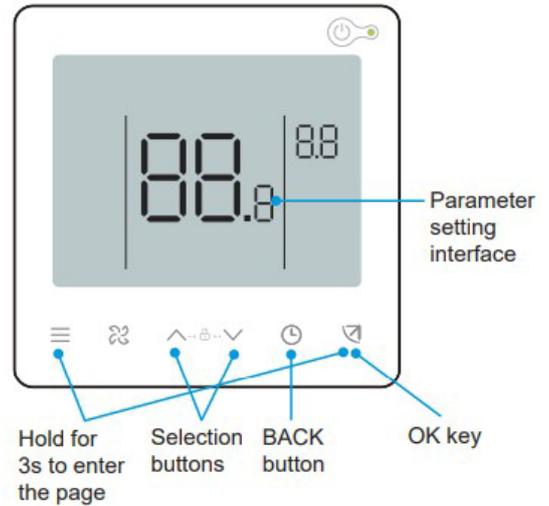


Table 9.1: Ultima Duct mode setting

Parameter code	Parameter name	Parameter range	Default value	Remark
n58	Initial static pressure detection	00/01	00	00: Not reset; 01: Reset

9.2 Constant Airflow mode

9.2.1 Fan performance diagram

Figure 9.1: BELP006N0A-DCV018

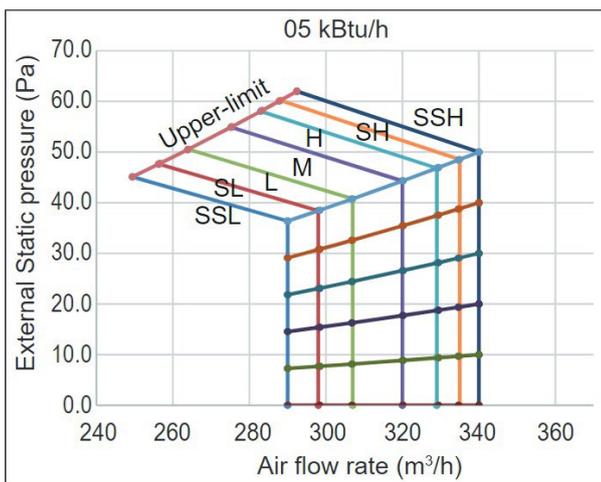


Figure 9.2: BELP007N0A-DCV020

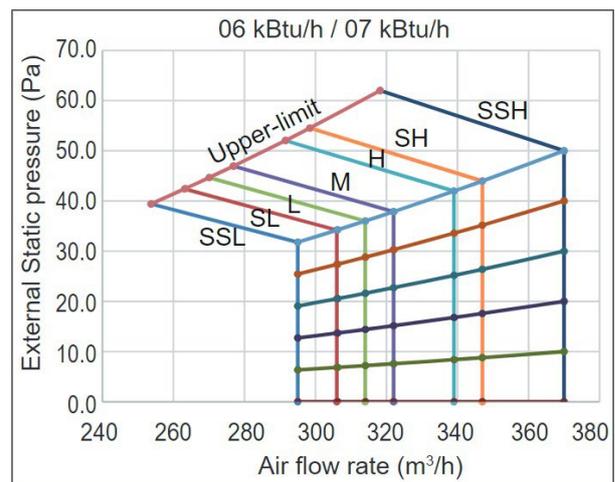


Figure 9.3: BELP008N0A-DCV022

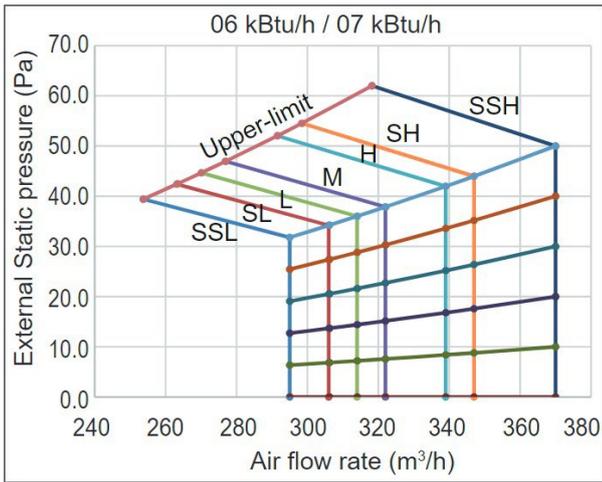


Figure 9.5: BELP012N0A-DCV036

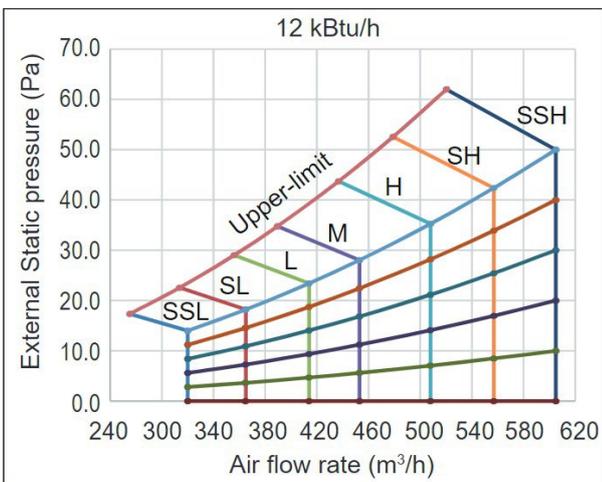


Figure 9.7: BELP019N0A-DCV056

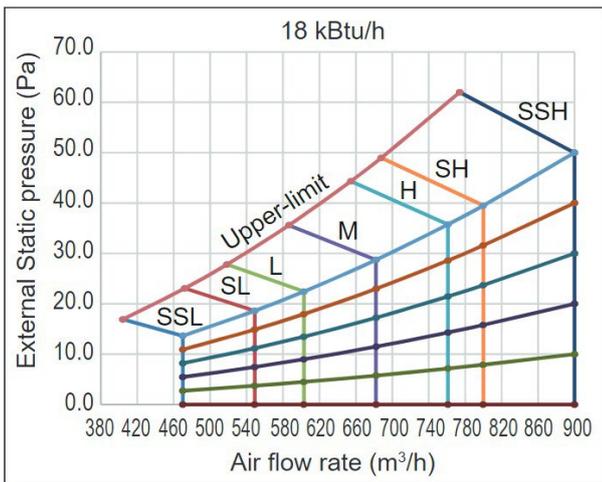


Figure 9.4: BELP010N0A-DCV028

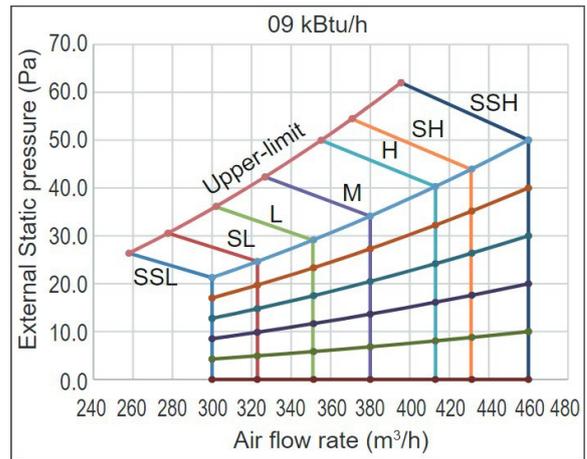


Figure 9.6: BELP015N0A-DCV045

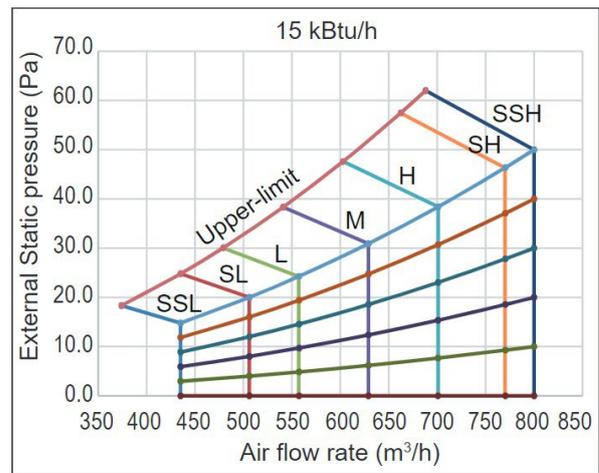
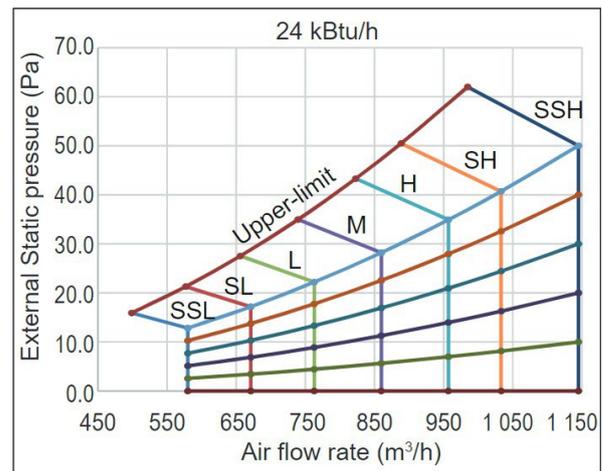


Figure 9.8: BELP024N0A-DCV071



9.2.2 How to Read the Diagram

The vertical axis is the External Static Pressure (Pa) while the horizontal axis represents the Air Flow (m³/h). The characteristic curve for the “SSH”, “SH”, “H”, “M”, “L”, “SL” and “SSL” fan speed control.

For BELP024N0A-DCV071, in “H” windshield, when the external static pressure is less than 63.7 Pa, the air flow keeps 1249 m³/h, but when the external static pressure is greater than 63.7 Pa, the air flow begins to decline, and the allowable maximum external static pressure is 74 Pa.

Ultima Ducted VRF Indoor Units

9.3 Constant Speed mode

9.3.1 Set external static pressure parameters

- ① In the main interface, press "☰" + "↵" for 3 seconds at the same time, and the main interface will display "CC". Press the "▲" and "▼" to select the indoor unit ("n00-n63" is displayed, and the last two digits are the indoor unit addresses). Press the "↵" to enter the parameter setting interface, and "n00" will be displayed.
- ② When "n00" is displayed, press the "↵" to enter the static pressure setting. Use the "▲" and "▼" keys to adjust to the demand parameter values and press the "↵" to confirm.
- ③ Press the "⌚" button to return to the previous menu and exit the parameter setting. Parameter setting will also exit after 60 s of no operation

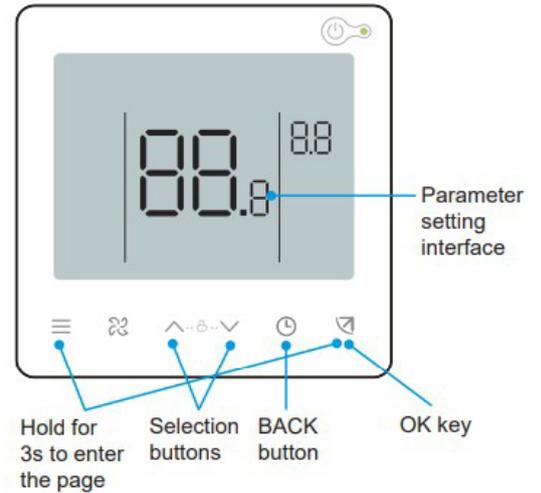


Table 9.1: External static pressure setting (1.5-7.1kW)

First level menu	Second level menu	Description	Default
N00	00/01/02/03/04/05/~ /19	Static pressure level	00

Level	00	01	02	03	04-19
Static pressure (Pa)	10	20	30	40	50

Notes:

1. The above is only an example of 86S wired controller. If you choose other controllers, please refer to their manuals for setting.

9.3.2 Fan performance diagram

Figure 9.11: BELP006N0A-DCV018

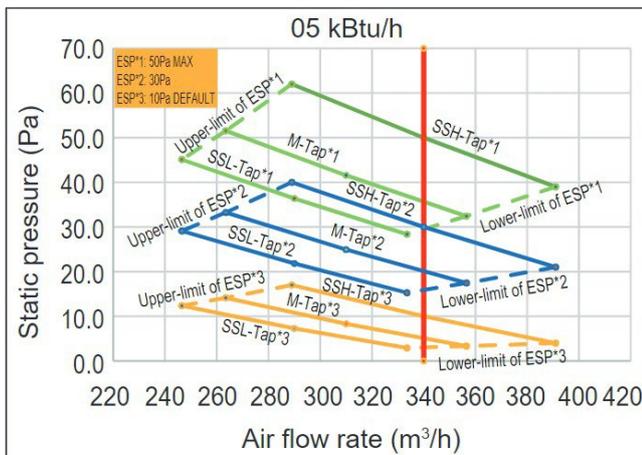


Figure 9.12: BELP007N0A-DCV020

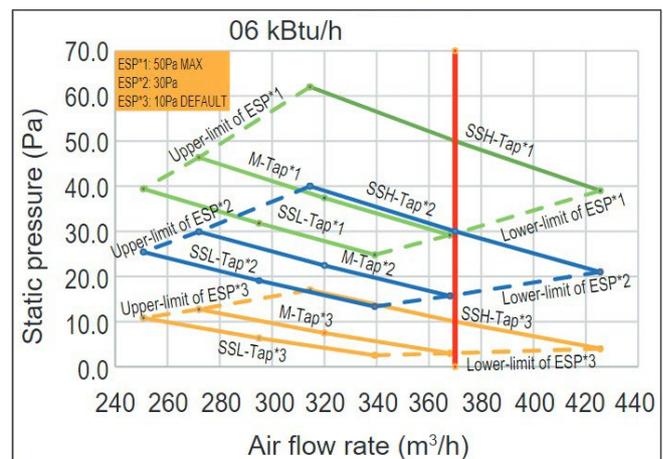


Figure 9.13: BELP008N0A-DCV022

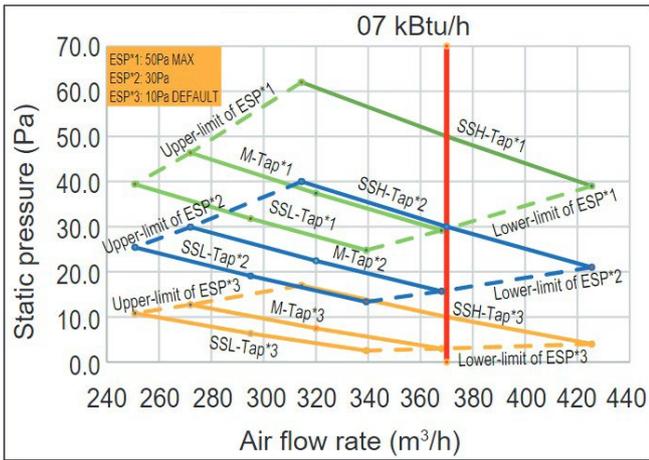


Figure 9.14: BELP010N0A-DCV028

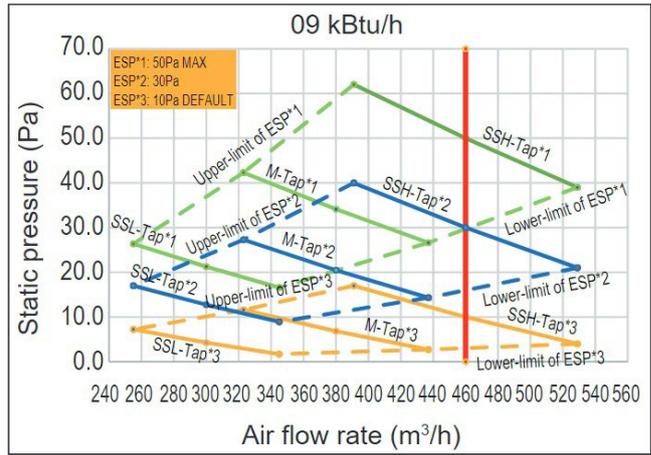


Figure 9.15: BELP012N0A-DCV036

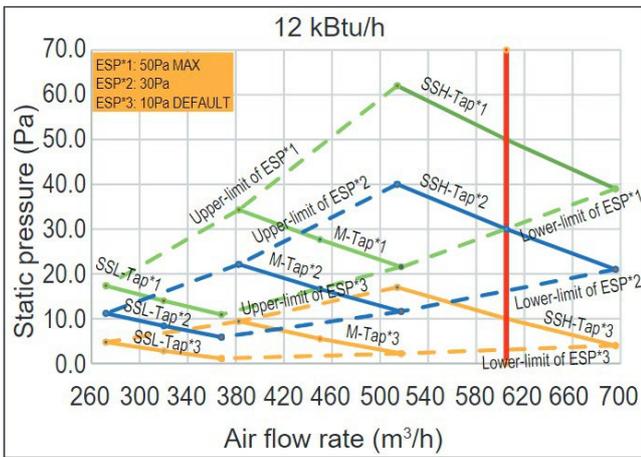


Figure 9.16: BELP015N0A-DCV045

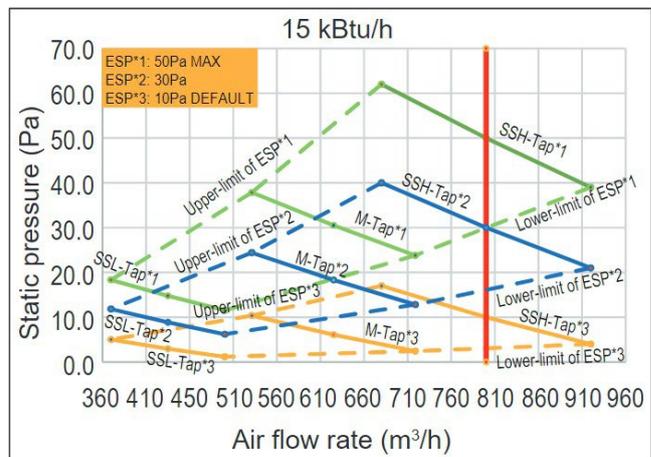


Figure 9.17: BELP019N0A-DCV056

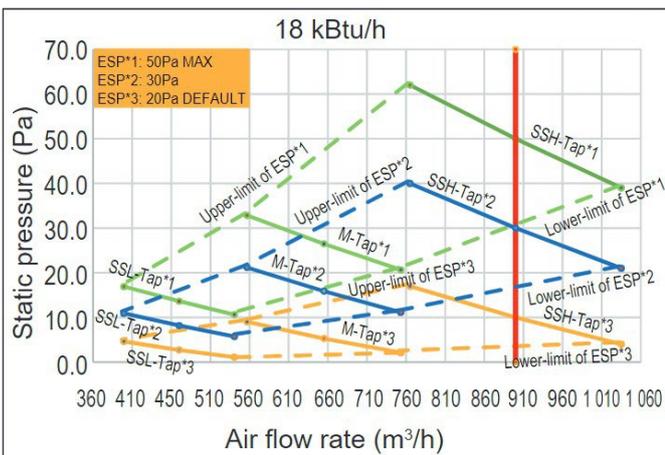
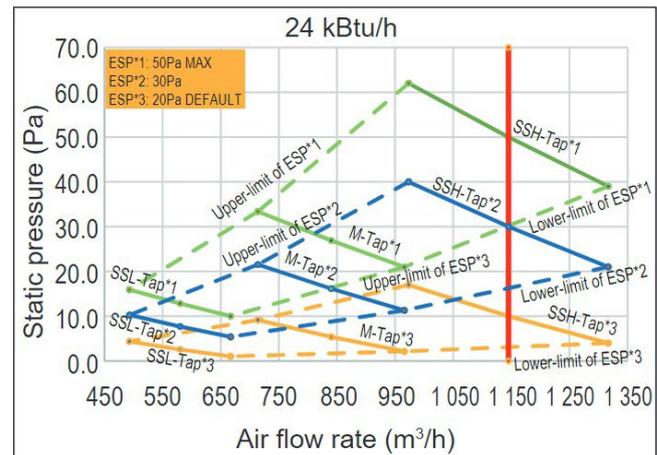


Figure 9.17: BELP024N0A-DCV071



9.3.3 How to Read the Diagram

The vertical axis is the External Static Pressure (Pa) while the horizontal axis represents the Air Flow (m³/h). The characteristic curve for the “SSH”, “M” and “SSL” fan speed control.

The Air Flow decreases with the increase of the external static pressure. For BELP024N0A-DCV071, in “SSH” windshield and “50Pa” setting static pressure, when the externa static pressure is 50Pa, the air flow is 1400 m³/h, and the allowable externa static pressure range is 39 to 62.



ENVIRONMENTAL
TECHNOLOGIES LLC.

Showroom & Technology Center

11380 Interchange Circle North
Miramar, Florida 33025. USA

Tel: +1 (888) 840-7550

Fax: +1 (954) 212-8280

info@otecomega.com

www.otecomega.com



The Art of Comfort

www.otecomega.com

