

Ducted Split System Air Conditioners

Technical Data

ISDL Series



**Optional
HAN-L6 Controller**

Extra Long Life
Epoxy Coated Outdoor Coil

Nominal Cooling Capacity
2.9 kW – 10.0 kW

ISDL SERIES – DUCTED SPLIT SYSTEM AIR CONDITIONERS

GENERAL

ISDL *Q - Indoor unit

OSA *R - Outdoor unit, reverse cycle

The ISDL indoor units, together with their associated OSA outdoor units, provide a split system air conditioner designed and developed to comply with and exceed AS/NZS 3823 specified conditions (i.e. guaranteed cooling cycle performance at 43°C outdoor temperature).

APPLICATIONS

These units have been specifically developed for air conditioning of light commercial premises, e.g. offices, motels, and shops.

FEATURES

User Friendly. The air conditioning system is available with an optional HAN-L6 Controller. This thermostat has been designed to maintain a high level of comfort for room occupants. Emphasis has been placed on providing controls that are easy to use — despite the sophisticated microprocessor system that runs it. Use of the Auto and Timer function settings allows you to "set it and forget it".

Efficient. Each outdoor unit incorporates a high efficiency compressor. Heat exchange coils use inner grooved (rifled) tube for better heat transfer.

Performance. A dynamically balanced forward curved fan with a multi-speed motor enables fine tuning of the indoor unit to match the supply air requirements. The system includes a temperature sensing head pressure control which enables the system to compensate for outdoor ambient temperatures below 20°C on cooling cycle, and above 15°C on heating cycle.

Low Profile. The indoor units have a low 250/260 mm height making them ideal for small ceiling spaces.

Quiet. The outdoor units' coil design permits low fan speeds and hence low noise levels. The compressor is isolated in a built-in, insulated compartment to minimise noise. The indoor unit is also insulated for noise attenuation.

Slimline. The compact up-right design of the outdoor units requires only a 100 mm gap on the coil side where installation is against a wall. Their slimline cabinets are particularly practical where there is restricted space, e.g. side access pathways, balconies, narrow ledges, etc. The units are free standing, but can be fitted on a wall using the optional wall mounting brackets.

Durable. The outdoor coil fins are epoxy coated for extra protection in corrosive environments, e.g. salt laden sea air. Each outdoor unit's cabinet is constructed from high grade galvanised steel - polyester powder coated for all weather protection (IP 45). External fasteners are stainless steel. Heat exchange coils comprise aluminium corrugated plate fins on mechanically expanded rifled copper tube. Each indoor unit's cabinet is constructed from high grade galvanised steel and includes a plastic drain tray for complete corrosion resistance.

Serviceable. To enable a thorough clean, the indoor units' drain tray is removeable.

Insulation. Closed cell foam insulation has been used in the indoor units' cabinet to ensure no particles are introduced into the air stream. The insulation is foil faced and meets fire test standards AS 1530.3 (1989) and BS 476 parts 6 & 7.

Compatibility. The supply air spigots on the indoor unit have been designed to fit standard flexible ducting. Alternatively they can easily be removed for attaching rigid ducting.

Self Diagnostics. The Outdoor Unit Controller (OUC) has a display of LEDs to indicate faults and running conditions. A non-specific fault indicator is included for interface to external systems.

STANDARD EQUIPMENT

ISDL Indoor Unit:

1. Coil
2. Fan - forward curved centrifugal
3. Fan motor - multi-speed
4. Accurator expansion device
5. Drain tray - plastic, removeable
6. Electrical box
7. Spigots - supply, to suit flexible ducting
8. Filter - rated EU2, washable

OSA Outdoor Unit:

1. Compressor
2. Coil - epoxy coated
3. Fan motor - multi-speed
4. Propeller fan - direct drive
5. Fan guard
6. High pressure switch
7. Reversing valve
8. Accurator expansion device
9. Outdoor Unit Controller (OUC)

OPTIONAL EQUIPMENT

Outdoor Unit:

1. LP switch.
2. Fault indicating auxillary relay board.
3. Wall mounting brackets.

Indoor Unit:

1. HAN-L6 Controller.
2. Electric booster heat (factory fitted)
 - 1 kW for ISDL 29Q
 - 1.5 kW for ISDL 45Q
 - 2 kW for ISDL 71Q
 - 2 kW for ISDL 84Q
 - 3 kW for ISDL 100QComplete with safety cutouts required to meet AS/NZS 3350.2.40 1997.

SAFETY FEATURES

1. HP and loss of refrigerant protection.
2. Anti-rapid cycle timer and internal overload for compressor protection.
3. Circuit breaker control circuits.
4. Time-and-temperature controlled electronic de-ice switch prevents icing up of the outdoor coil during heating cycle.
5. Frost protection on cooling cycle.
6. Sensor fault indication.
7. Compressor minimum run time to ensure oil return.

COMPRESSOR

Each high efficiency compressor is hermetically sealed, quiet running and supported on rubber mounts to minimise vibration. OSA 29 and 45 have rotary compressors. OSA 73–101 have scroll compressors.

REFRIGERATION PIPING

The standard unit allows for a line length of:

- OSA 29, 45: up to 15 m (maximum)
OSA 73–101: up to 30 m.

For extended line lengths on OSA 73–146 contact your nearest temperzone sales office for additional details on piping requirements.

Max. height separations between units are:

OSA 29, 45 :

- Outdoor unit above indoor unit : 10 m
Outdoor unit below indoor unit : 10 m.

OSA 73 – 101 :

- Outdoor unit above indoor unit : 12 m
Outdoor unit below indoor unit : 12 m.

The OSA 29 is shipped from the factory with a charge of HCFC-22 (R22) refrigerant sufficient for a 10 m line length. Liquid and suction service valves are provided. The matched indoor unit is shipped with a holding charge of nitrogen. Both units have flared pipe connections.

WIRING

The electrical supply required (including voltage fluctuation limits) is:

OSA 29 – 100 :

- 1 phase 200–252 V a.c. 50 Hz
with neutral and earth.

OSA 101 :

- 3 phase 342–436 V a.c. 50 Hz
with neutral and earth.

A control panel, located in each outdoor unit, is fully wired ready to accept the main power supply.

DISTRIBUTING CAPACITY

Two half capacity indoor units can be coupled to one single compressor outdoor unit and controlled from one room thermostat. This tandem arrangement is often quieter than a larger single unit and permits air distribution closer to where it's needed most. A slave version of each indoor unit and a Tandem Kit is available to facilitate this arrangement.

NOTE

Materials and specifications are subject to change without notice due to the manufacturer's ongoing research and development programme.

The manufacturer operates a quality management system that conforms to AS/NZS ISO 9001:2000.

HAN-L6 CONTROLLER (Optional)



Features Summary

- Cool / Dry / Fan modes.
- Heat / Auto modes
- Auto / High / Medium / Low fan speed selection.
- Temperature setting range from 18°C – 28°C.
- LED to indicate status of the unit [Power On/Off].
- Room temperature display.
- Real time clock.
- 7 day timer – six start and/or stops per day
- On demand countdown run timer, up to 12 hours.
- External Time Clock compatibility
- Auto-Restart or No Restart after power failure.
- Continuous or Intermittent selection of fan run-on in dead zone.
- Indoor coil protection.
- Backlit screen for ease of reading.
- Soft touch tab keys
- Battery backup (Lithium).
- Hot start – for cold draft prevention.
- Sleep function.
- Zone Control – up to six zones.
- Dual Control option.
- Filter due for clean indicator.
- Low voltage control cable.
- Colour: white and grey.
- Optional: Remote return air sensor, remote wall sensor, extended interface lead, Zone Control board, Zone Control transformer, extra Wall Control plaques (up to 4 in total).

PERFORMANCE DATA

COOLING CAPACITY (kW)

Total = Total Capacity (kW) Sens. = Sensible Capacity (kW)
 E.A.T. = Entering Air Temperature ○ = Nominal Capacity (kW)

Note: Capacities are gross and do not include allowance for fan motor heat loss. Capacities are for close coupled systems. Interconnecting pipework will reduce capacity (refer page 6).

MODELS Indoor Unit / Outdoor Unit	INDOOR FAN SPEED AIR I/s		INDOOR COIL E.A.T. W.B. °C D.B. °C		OUTDOOR COIL ENTERING AIR TEMPERATURE °C D.B.											
					23		27		31		35		39		43	
					Total	Sens.	Total	Sens.	Total	Sens.	Total	Sens.	Total	Sens.	Total	Sens.
ISDL 29Q / OSA 29	HIGH	175	15	21	3.0	2.3	2.8	2.3	2.8	2.2	2.6	2.2	2.5	2.1	2.4	2.0
			17	23	3.1	2.2	3.0	2.2	2.9	2.1	2.8	2.1	2.7	2.0	2.5	2.0
			19	27	3.3	2.5	3.2	2.5	3.1	2.4	2.9	2.4	2.8	2.4	2.7	2.3
			21	31	3.6	2.9	3.4	2.8	3.3	2.8	3.1	2.7	3.0	2.7	2.9	2.6
ISDL 45Q / OSA 45	HIGH	270	15	21	4.3	3.3	4.2	3.3	4.0	3.2	3.8	3.1	3.7	3.0	3.5	3.0
			17	23	4.7	3.3	4.5	3.3	4.3	3.2	4.1	3.1	3.9	3.0	3.7	2.9
			19	27	5.0	3.9	4.8	3.8	4.6	3.7	4.5	3.6	4.1	3.5	3.9	3.4
			21	31	5.4	4.4	5.1	4.3	4.9	4.2	4.6	4.1	4.4	4.0	4.1	3.9
ISDL 71Q / OSA 73	HIGH	425	15	21	6.9	5.3	6.8	5.2	6.6	5.2	6.3	5.0	6.1	4.9	5.8	4.8
			17	23	7.3	5.3	7.1	5.2	6.9	5.1	6.7	5.0	6.5	4.9	6.3	4.8
			19	27	7.8	6.1	7.6	6.0	7.4	5.9	7.3	5.8	7.0	5.8	6.8	5.7
			21	31	8.4	6.9	8.2	6.8	7.9	6.7	7.7	6.7	7.5	6.6	7.3	6.5
ISDL 84Q / OSA 85	HIGH	500	15	21	8.3	6.2	8.1	6.1	7.8	6.0	7.6	5.9	7.3	5.8	6.9	5.6
			17	23	8.6	6.1	8.4	6.1	8.2	6.0	8.0	5.9	7.8	5.8	7.5	5.7
			19	27	9.2	7.0	8.9	7.0	8.7	6.9	8.5	6.8	8.2	6.7	8.0	6.6
			21	31	9.7	7.9	9.5	7.9	9.2	7.8	9.0	7.7	8.8	7.6	8.5	7.5
ISDL 100Q / OSA 100 or ISDL 100Q / OSA 101	HIGH	600	15	21	9.5	7.4	9.3	7.3	9.0	7.2	8.7	7.0	8.4	6.9	8.1	6.8
			17	23	10.3	7.6	10.0	7.5	9.7	7.4	9.4	7.3	9.1	7.1	8.8	7.0
			19	27	10.9	8.8	10.6	8.7	10.3	8.6	10.0	8.5	9.7	8.4	9.3	8.2
			21	31	11.6	10.0	11.3	9.9	11.0	9.8	10.6	9.7	10.3	9.6	9.9	9.4

Indoor Air Flow Correction Factors @ nominal conditions

	Indoor Air Flow (%)			
	-20%	-10%	Rated	+10%
Total Capacity	0.95	0.975	1.0	1.025
Sensible Capacity	0.89	0.950	1.0	1.050

PERFORMANCE DATA

HEATING CAPACITY (kW)

G = Gross Heating Capacity kW, based on nominal air flow of 175 l/s.

N = Net Heating Capacity kW allowing for average defrost.

○ = Nominal Capacity (kW)

Reverse Cycle Systems

MODELS Indoor / Outdoor Unit / Unit	INDOOR ENTERING AIR TEMP. °C D.B.	OUTDOOR COIL ENTERING AIR TEMPERATURE (E.A.T.) °C D.B.															
		-5		-3		-1		1		3		5		7		9	
		G	N	G	N	G	N	G	N	G	N	G	N	G	N	G	N
ISDL 29Q / OSA 29R	15	1.8	1.6	1.9	1.7	2.1	1.9	2.2	1.9	2.3	2.0	2.5	2.3	2.7	2.6	2.8	2.8
	20	1.7	1.6	1.9	1.7	2.0	1.8	2.2	1.9	2.3	1.9	2.4	2.2	2.6	2.6	2.7	2.7
	25	1.7	1.5	1.8	1.6	1.9	1.8	2.1	1.8	2.2	1.9	2.4	2.1	2.5	2.5	2.6	2.6
ISDL 45Q / OSA 45R	15	2.9	2.6	3.1	2.8	3.3	3.0	3.5	3.1	3.8	3.2	4.0	3.6	4.3	4.2	4.5	4.5
	20	2.8	2.5	3.1	2.7	3.3	2.9	3.5	3.1	3.7	3.1	4.0	3.6	4.2	4.2	4.4	4.4
	25	2.7	2.4	2.9	2.6	3.1	2.8	3.3	2.9	3.5	3.0	3.8	3.4	4.0	4.0	4.3	4.3
ISDL 71Q / OSA 73R	15	4.7	4.2	5.1	4.6	5.5	4.9	5.8	5.1	6.2	5.2	6.6	6.0	7.0	7.0	7.4	7.4
	20	4.6	4.2	5.0	4.5	5.4	4.8	5.7	5.0	6.0	5.1	6.5	5.9	6.9	6.8	7.3	7.3
	25	4.5	4.0	4.8	4.3	5.2	4.6	5.5	4.8	5.8	5.0	6.3	5.6	6.6	6.6	7.0	7.0
ISDL 84Q / OSA 85R	15	6.1	5.5	6.6	5.9	7.0	6.3	7.5	6.6	7.9	6.7	8.5	7.7	9.1	9.0	9.5	9.5
	20	6.0	5.4	6.5	5.8	6.9	6.2	7.3	6.5	7.8	6.6	8.4	7.5	8.9	8.8	9.4	9.4
	25	5.7	5.2	6.2	5.6	6.6	6.0	7.1	6.2	7.5	6.3	8.1	7.3	8.6	8.5	9.0	9.0
ISDL 100Q / OSA 100R or ISDL 100Q / OSA 101R	15	6.9	6.2	7.5	6.8	8.1	7.3	8.6	7.6	9.1	7.7	9.8	8.8	10.4	10.3	10.9	10.9
	20	6.8	6.2	7.4	6.7	7.9	7.1	8.4	7.4	8.9	7.5	9.6	8.6	10.2	10.1	10.7	10.7
	25	6.6	5.9	7.1	6.4	7.6	6.9	8.1	7.1	8.6	7.3	9.2	8.3	9.8	9.7	10.3	10.3

PIPE LENGTH CAPACITY LOSS

ON COOLING CYCLE DUE TO PRESSURE DROP

Note: Loss percentage is approximate only.

No allowance made for vertical piping.

System	Pipe Size (mm)		Equivalent Line Pipe Length (m)					Suction Pipe Size OD	Additional Pipe Length to allow per Bend Long 90° Radius (2 x pipe dia.)
	Liquid	Suction	5	10	15	20	25		
ISDL 29Q / OSA 29	6	13	3 %	4 %	6 %	—	—	13 mm	0.25 m
ISDL 45Q / OSA 45	6	13	4 %	6 %	9 %	12 %	15 %		
	6	16	—	1.5 %	2.5 %	3.5 %	5 %	16 mm	0.30 m
ISDL 71Q / OSA 73	Liquid	Suction	5	10	15	20	30		
	10	16	2 %	4 %	6.5 %	9 %	13 %	19 mm	0.42 m
10	19	—	—	3 %	4 %	6 %			
ISDL 84Q / OSA 85	10	16	2 %	4 %	6 %	8 %	12 %	19 mm	0.42 m
	10	19	1 %	1.5 %	2.5 %	3.5 %	5 %		
ISDL 100Q / OSA 100	10	19	0.75 %	1.5 %	2.25 %	3 %	5 %	19 mm	0.42 m
ISDL 100Q / OSA 101	10	19	0.75 %	1.5 %	2.25 %	3 %	5 %		

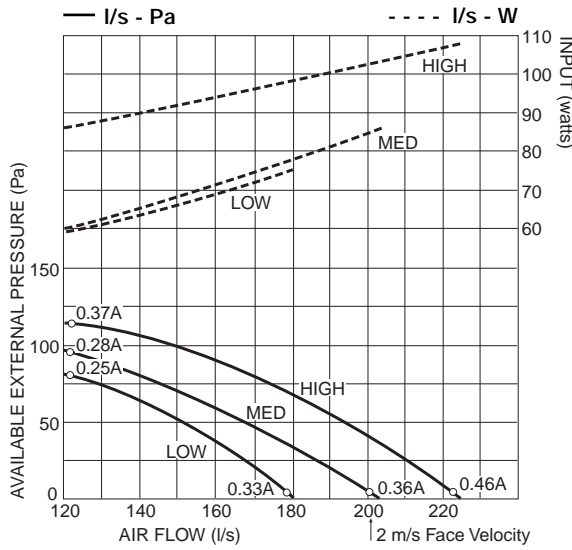
PERFORMANCE DATA

AIR HANDLING

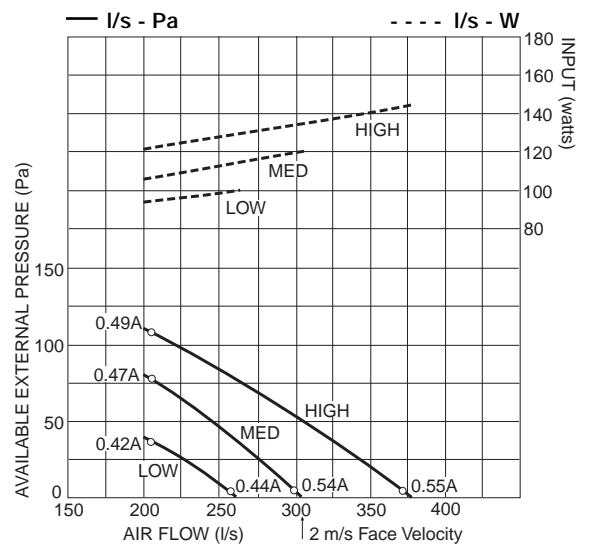
Note: In a free blow application, beware of exceeding indoor fan motor's full load amp limit.

Air flows given are for ISDL units without filter installed.

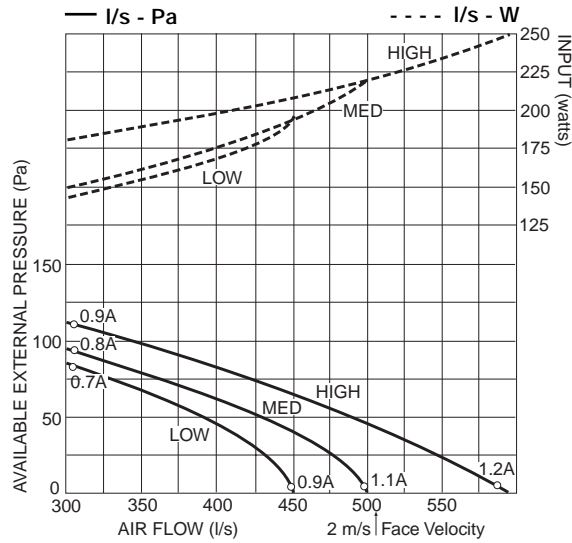
ISDL 29Q



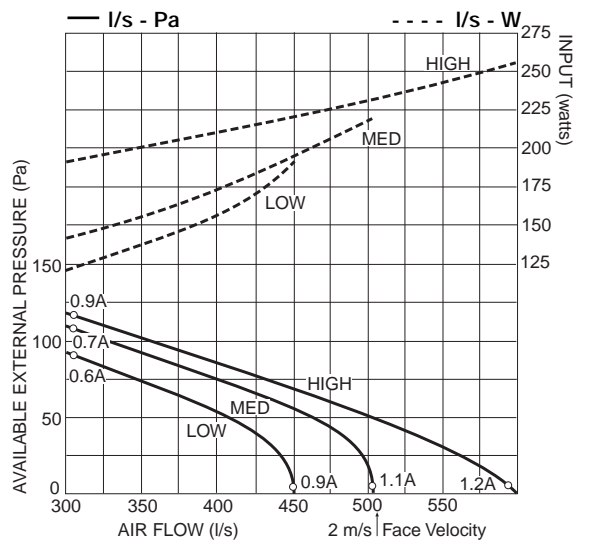
ISDL 45Q



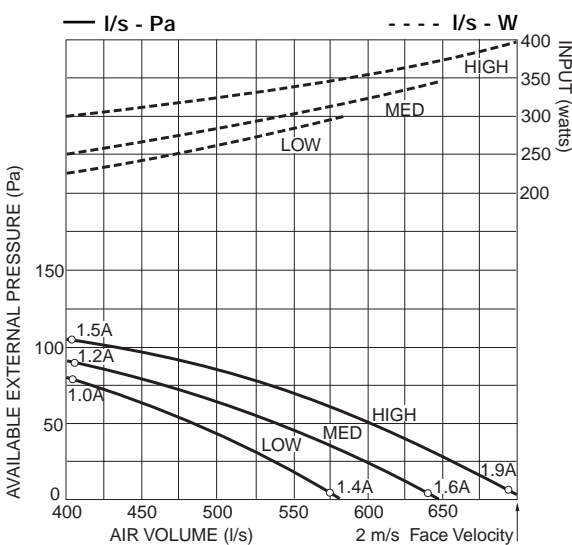
ISDL 71Q



ISDL 84Q



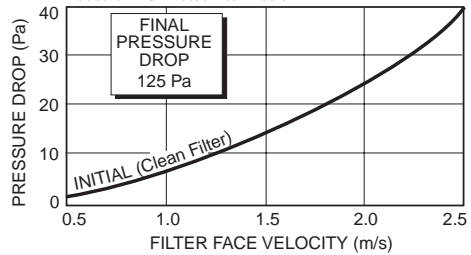
ISDL 100Q



FILTERS - PRESSURE DROP

An allowance must be made for filter pressure drop (if filters required) when calculating Total Available External Pressure.

Based on EU-2 rated filter media



$$\text{Face Velocity} = \frac{\text{Airflow (l/s)}}{\text{Filter Face Area (m}^2\text{) x 1000}}$$

Filter Areas:

- ISDL 29Q - 0.128 m²
- ISDL 45Q - 0.186 m²
- ISDL 71Q - 0.254 m²
- ISDL 84Q - 0.254 m²

PERFORMANCE DATA

SOUND LEVELS

Test Conditions: JIS 8616. 0.5 m insulated flexible ducting.
Sound Pressure Levels (SPL) are at 1 m from source.
Sound Power Levels (SWL) are measured in decibels re 1 picowatt.

Indoor Unit: Supply Air Outlet

MODEL	FAN SPEED	SPL dB(A)	SWL dB(A)	OCTAVE BAND FREQ. Hz					
				125	250	500	1 k	2 k	4 k
				SOUND POWER LEVELS dB					
ISDL 29Q	LOW	48	51	53	53	49	44	41	36
	MED	50	53	54	55	51	47	44	38
	HIGH	52	55	55	57	53	49	46	41
ISDL 45Q	LOW	48	51	55	54	50	45	40	32
	MED	52	55	56	56	53	49	44	37
	HIGH	55	58	59	60	56	52	48	41
ISDL 71Q	LOW	56	59	62	59	57	54	48	43
	MED	57	60	63	61	58	55	50	44
	HIGH	58	61	65	61	58	55	50	45
ISDL 84Q	LOW	56	59	62	60	57	53	49	41
	MED	58	61	64	62	59	55	51	43
	HIGH	59	62	69	64	60	56	52	45
ISDL 100Q	LOW	57	60	63	63	59	54	49	43
	MED	58	61	65	64	60	56	50	44
	HIGH	59	62	65	64	61	56	51	45

Return Air Inlet + Case Breakout

SWL dB(A)	OCTAVE BAND FREQ. Hz					
	125	250	500	1 k	2 k	4 k
	SOUND POWER LEVELS dB					
55	54	57	52	50	45	39
57	54	59	54	51	47	41
59	55	61	56	54	50	44
55	53	55	53	50	47	40
58	54	58	55	53	50	43
61	57	61	57	57	53	46
63	62	65	59	58	54	48
64	62	66	60	59	55	49
65	63	67	61	60	57	51
62	66	64	59	57	52	45
63	66	65	60	58	54	47
66	70	67	63	61	56	51
65	63	67	62	60	54	49
65	63	67	62	60	55	50
65	64	68	63	60	56	51

Outdoor Unit

Sound Pressure Level (SPL) in decibels re 20 µPa.

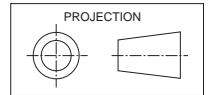
MODEL	FAN SPEED	SWL dB(A)	OCTAVE BAND FREQ. Hz						SPL @ 3 m dB(A)	OCTAVE BAND FREQ. Hz					
			125	250	500	1 k	2 k	4 k		125	250	500	1 k	2 k	4 k
			SOUND POWER LEVELS dB							SOUND PRESSURE LEVELS dB					
OSA 29	LOW	58	60	60	56	54	47	39	42	44	44	40	38	31	23
	MED	62	65	64	60	57	52	44	46	49	48	44	41	36	28
OSA 45	LOW	58	67	60	54	52	45	41	42	51	44	38	36	29	25
	MED	60	64	63	56	55	49	44	44	48	47	40	39	33	28
OSA 73	LOW	61	66	63	58	56	51	45	45	50	47	42	40	35	29
	MED	63	70	65	60	58	52	47	47	54	49	44	42	36	31
OSA 85	MED	64	69	66	63	59	53	46	48	53	50	47	43	37	30
	HIGH	66	73	67	64	60	53	46	50	57	51	48	44	37	30
OSA 100	LOW	65	71	69	63	58	51	46	49	55	53	47	42	35	30
	MED	67	72	69	66	60	54	47	51	56	53	50	44	38	31
OSA 101	LOW	65	71	69	63	58	51	46	49	55	53	47	42	35	30
	MED	67	72	69	66	60	54	47	51	56	53	50	44	38	31

DIMENSIONS (mm)

Not to Scale

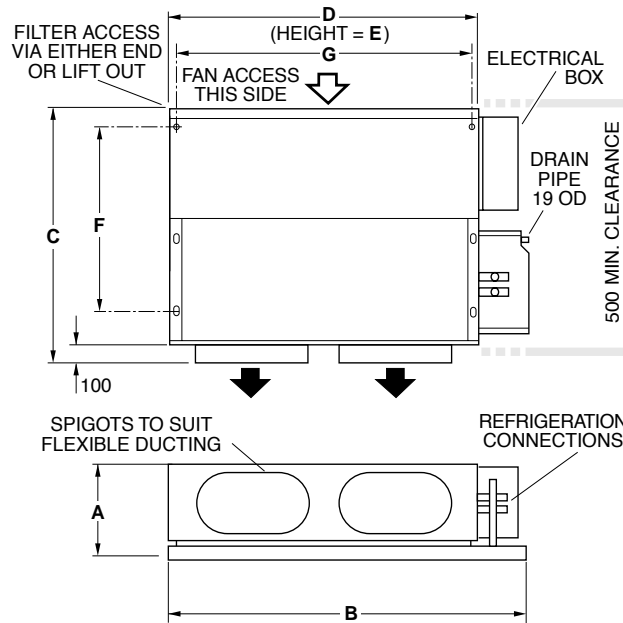
ISDL Indoor Unit

MODEL	A	B	C	D	E	F	G	Supply Air Spigots
ISDL 29Q	250	680	715	550	245	470	525	200 dia. (x2)
ISDL 45Q	250	930	715	795	245	470	775	250 dia. (x2)
ISDL 71Q	260	1195	755	1050	255	510	1025	250 dia. (x3)
ISDL 84Q	260	1195	755	1050	255	510	1025	250 dia. (x3)
ISDL 100Q	260	1595	755	1445	255	510	1425	250 dia. (x4)



Allow adequate clearance for the filter to be removed.

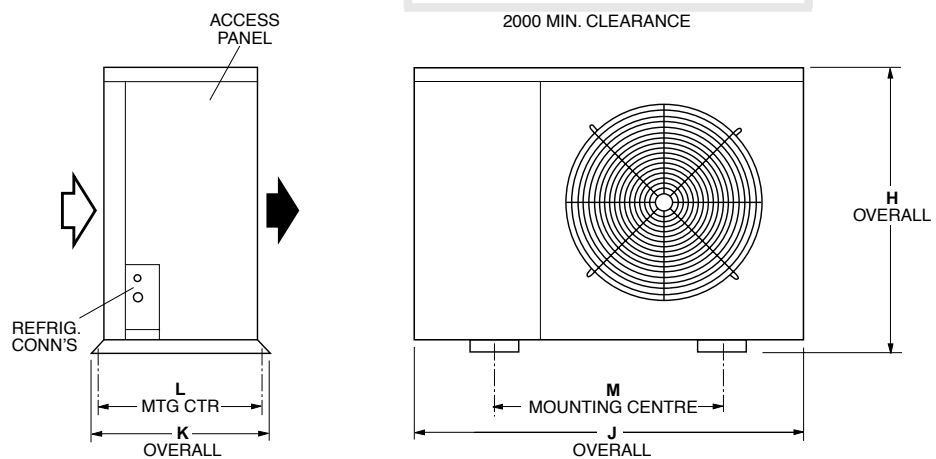
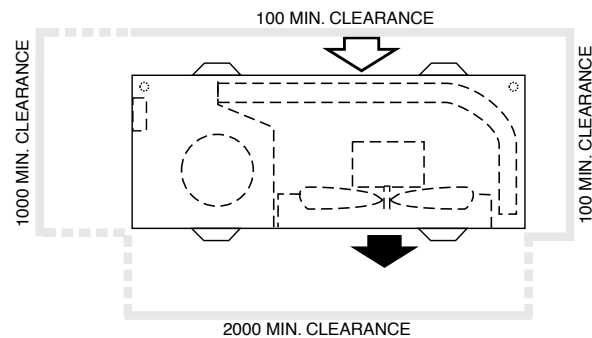
Note: ISDL 100Q has two half length filters.



Note
Materials and specifications are subject to change without notice due to the manufacturer's ongoing research and development programme.

OSA Outdoor Unit

MODEL	H	J	K	L	M
OSA 29	660	750	365	340	595
OSA 45	660	750	360	330	590
OSA 73	655	885	380	350	515
OSA 85	610	935	410	380	585
OSA 100	695	935	410	380	585
OSA 101	695	935	410	380	585



SPECIFICATIONS

SYSTEM	Indoor Unit : Outdoor Unit :	ISDL 29Q OSA 29	ISDL 45Q OSA 45	ISDL 71Q OSA 73	ISDL 84Q OSA 85	ISDL 100Q OSA 100	ISDL 100Q OSA 101	
Cooling Capacity *1	kW	2.9	4.5	7.3	8.5	10.0	10.0	
Heating Capacity *2 (Rev. Cycle versions)	kW	2.6	4.2	6.9	8.9	10.2	10.2	
E.E.R. (cooling)		2.73	2.70	2.84	2.85	2.60	2.51	
Air Flow *3	l/s	175	270	425	500	600	600	
Sound Levels (SWL) *4	Indoor Unit	53	51	56	57	58	58	
	Outdoor Unit	58	58	61	64	65	65	
Power Source *5		1 phase 230 V a.c. 50 Hz					3 ph. 415 V	
Indoor Fan Motor Rating (4 pole)	W	50	75	150	150	75 + 150	75 + 150	
Indoor Fan Full Load Amps	A	0.6	0.7	1.4	1.4	0.7 + 1.4	0.7 + 1.4	
Running Amps (Total System)	A	4.4	6.9	12.5	14.2	18.5	6.7 / 5.3 / 5.1	
Recommended External Fuse	A	16	20	25	25	32	25	
Refrigerant		H C F C - 2 2 (R 2 2)						
Maximum Vertical Separation *6	m	10	10	12	12	12	12	
Maximum Standard Line Length	m	15	15	30	30	30	30	
Maximum Extended Line Length	m	–	–	40	40	40	40	
Recommended Pipe Sizes (Suction/Liquid)mm OD		13 / 6	13 / 6	16 / 10	19 / 10	19 / 10	19 / 10	
Finish	Indoor Unit	zinc galvanised steel						
	Outdoor Unit	tan polyester powder coat						
Weight (net/shipping) kg	Indoor Unit	21 / 23	28 / 30	35 / 38	35 / 37	50 / 53	50 / 53	
	Outdoor Unit	44 / 47	46 / 56	72 / 77	78 / 81	87 / 97	83 / 95	

Notes:

*1 Nominal Cooling Capacity (gross) at AS/NZS 3823 conditions:
Indoor Entering Air Temperature 27°C D.B., 19°C W.B.;
Outdoor Entering Air Temperature 35°C D.B.

*2 Heating Capacity (for reverse cycle units only) at AS/NZS 3823 conditions:
Indoor Entering Air Temperature 21°C D.B.;
Outdoor Entering Air Temperature 7°C D.B., 6°C W.B.

*3 Supply air flow at Nominal Cooling Capacity conditions stated above.

*4 Sound Power Levels (SWL) are measured at nominal cooling capacity conditions stated above.

*5 Voltage fluctuation limits: Single phase systems 200–252 V; Three phase systems 342–436 V.

*6 Reverse Cycle Systems. Maximum height separation for Cooling Only systems may be greater; refer to temperzone.

Note

Materials and specifications are subject to change without notice due to the manufacturer's ongoing research and development programme.



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