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MR-E071-C-1812

HITACHI

Direct-fired Absorption

EXH/EXS series

Cooling & Heating

OVERVIEW

HITACHI DIRECT-FIRED ABSORPTION CHILLER-HEATER EXH/EXS SERIES

Hitachi has led the development of the chiller industry for over 50 years internationally and has demonstrated high efficiency, reliability and durability. Utilizing the expertise that has been cultivated over many years, Hitachi developed a new and powerful model of high-efficiency absorption chiller – the EXH/EXS series – that satisfies the customer's demands and expectations.

ADVANTAGES

Excellent Durability
- 8,000 hours of operation (standard).
- Statutory durable period: 15 years, with recommended maintenance.
- Low possibility of crystallization during operation.

High Efficiency (COP = 1.40 *EXH series)
- Less gas is required to produce chilled water.

Easy to Operate
- Fully automatic purge pump system reduces burden imposed on operator's daily work.
- Easy operation by 10.4 inch wide screen touch panel with simple construction and various information indication.
- Fast start up time, comparing with conventional Hitachi absorption chiller.
- Automatic flame detector self check function. (1 time/day)

High Reliability
- More than 22,000 Hitachi absorption chillers are shipped out throughout the world here and abroad.
- Our absorption chiller incorporates the epoch-making "Parallel flow" design structure, invented by Hitachi.

MODEL NAME

HAU – C GN 500 EXS A

HAU
Hitachi Absorption Unit

Operating Condition
C: Heavy Load / under 8,000 hrs (Standard)

Heating Source
GN: Gas
AN: Diesel Oil

Nominal cooling capacity (USRT)

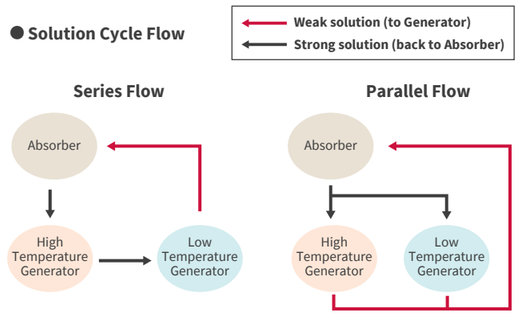
Series Code
EXH, EXWH : High efficiency type
EXS, EXWS : Standard efficiency type

Temperature Difference
A: Chilled water (large temperature difference)
B: Chilled water/Cooling water (large temperature difference)
C: Cooling water (large temperature difference)

FEATURES

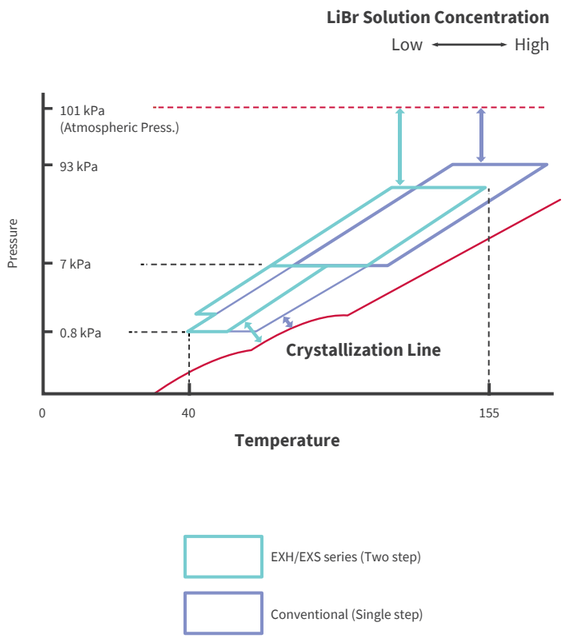
INNOVATIVE PARALLEL FLOW DESIGN

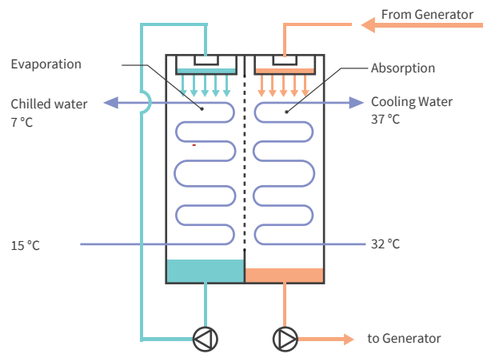
Hitachi has invented the innovative parallel flow solution cycle, which fulfills customer expectations for stable operation of chillers. Compared with typical serial (series) flow, this parallel flow cycle allows Hitachi absorption chiller to operate with weaker LiBr solution concentration and lower High Temp. Gen. pressure, resulting in stable operability accommodate to severe conditions and secular changes. Concurrently, parallel flow design reduces the possibility of crystallization during operation.



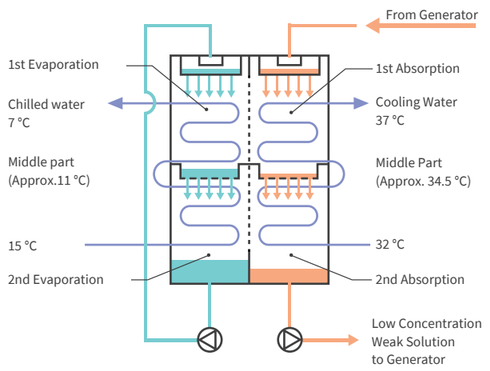
TWO-STEP EVAPORATOR AND ABSORBER

Hitachi EXH/EXS series are designed based on “Two-step evaporator and absorber” structural concept that divides the absorption process into two steps. This unique design enhances the absorption ability of the LiBr solution and enables the solution concentration to become weaker than single step. This brings to a dramatic reduction on potential of crystallization and inner corrosion risk comparing with conventional single step design.





Conventional (Single step)
***CHW Large temperature differential condition**



EXH/EXS series (Two step)
***CHW Large temperature differential condition**

ADVANTAGES

STANDARD HEAVY LOAD OPERATION (UNDER 8000 HOURS)

One of the most remarkable achievement of Hitachi EXH/EXS series development was the realization of standard 8000 hours operation. Combination of Parallel flow cycle and two-step evaporator and absorber design made plenty of margin upon solution cycle thus allows the chiller to operate under heavy duty condition without upgrading the chiller frame size.

FAST START-UP

Combination of gravity feed type Low-temperature generator and Water-tube type High-temperature generator significantly reduces the LiBr solution amount charged inside the absorption chiller, resulting in remarkably shortening the chiller start-up time comparing with conventional flooded type generator.

FULLY AUTOMATIC PURGE PUMP SYSTEM (STANDARD)

Manual operation of the vacuum pump is one of the most essential daily work for the operator to maintain the absorption chiller performance. No matter the chiller automatically collects non-condensible gases by auto purge unit, operator still has to periodically run the vacuum pump manually to discharge the gas from the chiller. And what is worse is that manual purge is required frequently especially during the initial start up period and after operating the chiller for long years.
In contrast, Hitachi supplies not only the auto purge unit, but also the self controlled purge pump as a standard which does the operator's daily purge pump operation full automatically.

This resolution of adding fully automatic purge pump system as a standard was a break through for absorption chiller and will provide trouble free and comfortable operation without operator’s interference.

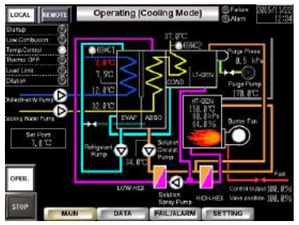
BURNER FLAME SAFE GUARD CONTROL

The absorption chiller is equipped with a fully automated pre-purge and post-purge sequence for the lower burner motor, ignition interruption system and fuel/air flow components, with a UV sensor for flame detection.
The burner controller automatically stops and re-starts in a short period once every 24 hours during uninterrupted operation, in order to protect the UV sensor.

ADVANTAGES

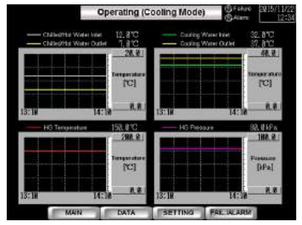
FEATURES OF WIDE TYPE 10.4 INCH FULL COLOR LCD TOUCH PANEL FOR EXCELLENT OPERABILITY

- Wide type 10.4 inch full color LCD touch panel.
- Shows comprehensible cycle flow diagram.
- Indicates essential operating data for easy data recording.
- Indicates trend graph of chiller operation.
- Shows handling guide in case of failure and alarm.
- Indicates and stores operation, failure and alarm histories.
- Capable for downloading 3-months operation data to USB memory.
- RS485 and Ethernet port are equipped for MODBUS communication as a standard.
- Multilingual languages indication. (Japanese, English, Traditional Chinese, Simplified Chinese and Arabic.)



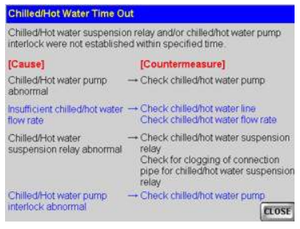
Normal operation screen

Operating data screen



Trend graph screen

Failure & Alarm screen



Handling guides for troubles

Language selection

ADDITIVE PROPOSAL

SOLUTION PUMP INVERTER (OPTION)

The VFD solution pump improves partial load efficiency by reducing gas consumption compared to the constant speed pump. It is recommended that solution pump inverter be added if the chiller is rarely operated with a full load.

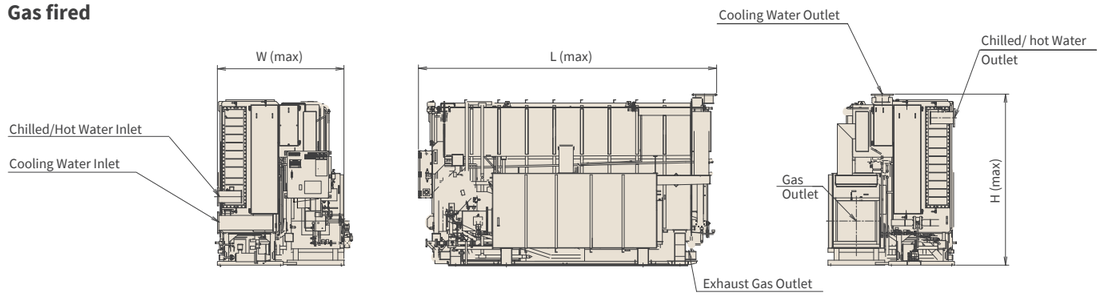
DUAL FUEL BURNER (OPTION)

The dual fuel fired absorption chiller is able to operate not only with natural gas but also diesel oil. The chiller will be able to operate by diesel oil by switching the bar manually when the natural gas supply gets interrupted for some reason.

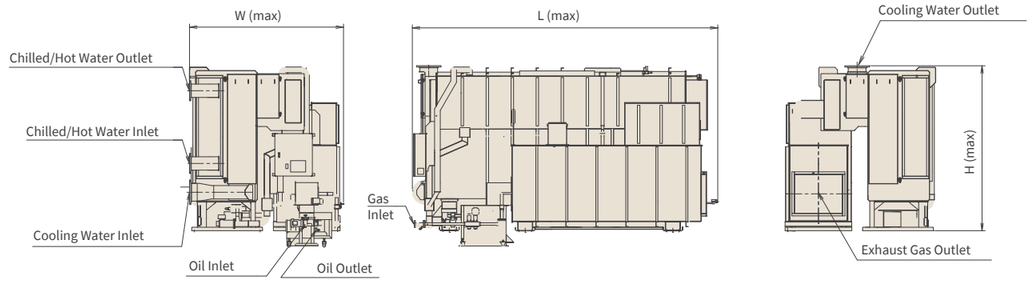
INSTALLATION

EXTERNAL DIMENSIONS

Gas fired

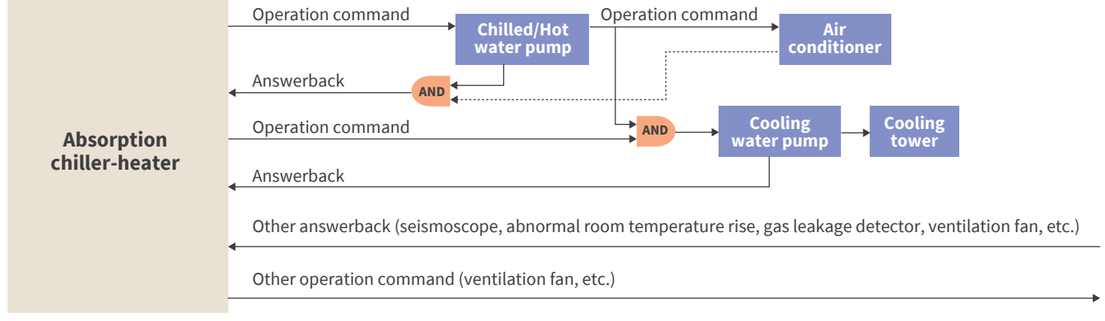


Dual Fuel fired (Option)



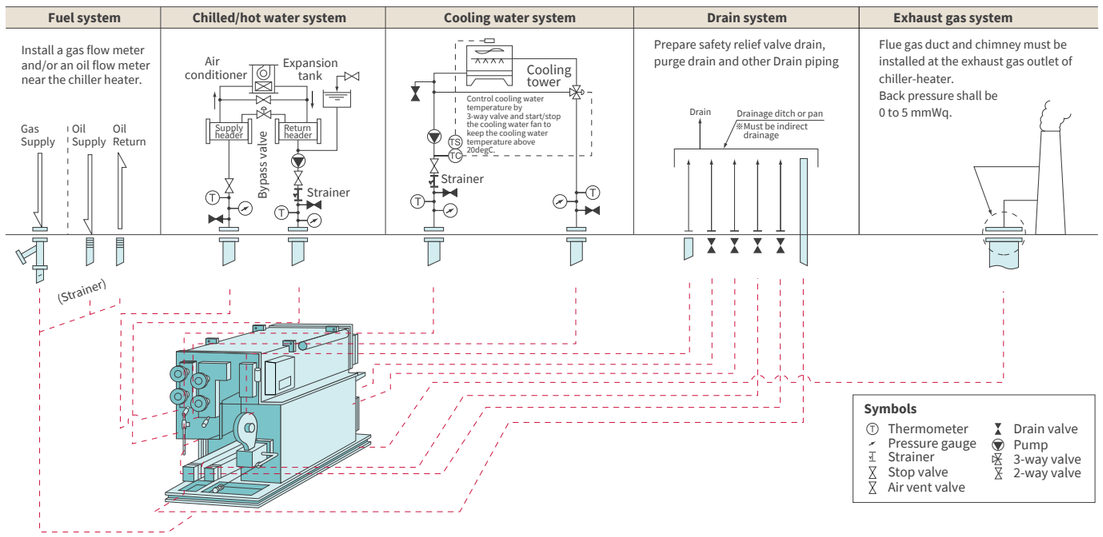
EXH/ EXS Series	150	180	240	300	360	400	450	500	560	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
L	3,200	3,600	4,300	4,700	5,930	6,430	5,090	5,590	6,090	6,590	7,390	8,090	6,800	7,600	8,300	8,300	8,800	9,300	9,800	10,300
W	2,200	2,200	2,200	2,200	2,260	2,260	2,220	2,390	2,390	2,520	2,660	2,710	3,200	3,200	3,200	3,200	3,300	3,300	3,600	3,600
H	2,500	2,500	2,500	2,500	2,500	2,500	3,102	3,102	3,102	3,102	3,102	3,102	3,150	3,150	3,150	3,300	3,300	3,300	3,550	3,550

INTERLOCK SYSTEM



INSTALLATION

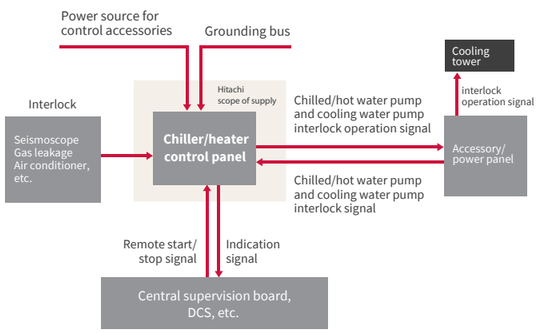
PIPING WORK



Precautions for Chilled/Hot Water and Cooling Water Piping Work

1. Install water piping according to instruction as above figure.
2. Direction of water nozzles varies depending on specification. See installation diagram for direction of water nozzles.
3. Be sure not to apply 1.0MPa (10kg/cm^{2}G) or hig her pressure to chiller-heater. (In case manufactured for high pressure application, refer to its specification.)
4. Install drain valves at the lowest part of piping between shut-off valve and chiller-heater.
5. Install air vent valves at the top of piping higher than chiller-heater.
6. Install thermometers and pressure gauges according to instruction as above figure.
7. In case chilled/hot water line is not open system, install expansion tank according to above figure. Expansion tank capacity shall be designed according to chiller specification.
8. Install cooling tower where no exhaust gas from chimney will be sucked in it. If exhaust gas is sucked in cooling tower, cooling water may contaminated and cause tube corrosion.
9. Be sure to install approx. 10-mesh strainer. In case a lot of substance is contained in chilled waterline, it can be accumulated in tubes and causes chilled water freezing. Clogging of cooling water line may cause pressure rise and tube corrosion during operation.
10. Provide tap water line around chiller-heater for tube cleaning.

WIRING WORK



Safety Precautions

(For daily operation)
Prior to use, read instruction manual carefully and receive explanation from authorized personnel to use chiller-heater appropriately.

(For installation)
1. Do not install chiller-heater where inflammable material (gasoline, thinner, etc.) is handled or where corrosive gas (ammonia, chlorine, etc.) is generated. Otherwise, fire may result.
2. When carry-in work, installation work, foundation work, wiring work, piping work, and thermal insulation work are required, consult expert companies.
3. In case flue and chimney work is required, consult expert company. Improper work may cause fire, burn, oxygen deficiency accident, or other problems.
4. In case ventilation system is required to be installed, consult expert company. Improper work may cause oxygen deficiency accident or other problems.
5. Waterproofing is required on floor surface where chiller-heater is installed. A drainage ditch is also required around chiller-heater. Improper waterproofing may cause water leakage, resulting in water damage to neighboring facilities.
6. Service and maintenance space is required around chiller-heater. Insufficient maintenance space may disturb safety work and result in injury.

(For service and maintenance)
Special techniques are necessary for proper maintenance. Please consult our service agent. Improper maintenance may cause failure, oxygen deficiency accident, fire, electric shock, etc.

STANDARD SPECIFICATION

		Standard Specification	Optional items
Chilled water line	Flow rate	See specification table (constant flow rate)	Variable flow rate (Minimum 50%)
	Temperature	Standard: 12/7°C Large temperature difference: 15/7°C	Outlet temperature 5-12°C
	Max.working press.	0.78MPa (8kg/cm^{2}G)	Max. 2.0MPa
Cooling water line	Flow rate	See specification table (constant flow rate)	Variable flow rate (Minimum 50%)
	Temperature	Standard: Inlet=32°C, Outlet=37°C (EXS)/ 37°C (EXH) Inlet temperature lower limit: 20°C (gas-fired), 28°C (oil-fired)	Large temperature difference: Inlet=32°C, Outlet=38.9°C
	Water quality	City water (Based on JRA9001)	Industrial water, well water (investigation is required)
	Max.working press.	0.78MPa (8kg/cm^{2}G)	Max. 2.0MPa
Hot water line	Flow rate	See specification table (constant flow rate)	Variable flow rate (Minimum 50%)
	Temperature	See specification table	Outlet temperature 61-75°C (in heating mode)
	Max.working press.	0.78MPa (8kg/cm^{2}G)	Max. 2.0MPa
Installation place	Indoor	Main unit: Anti-corrosive primer coating (without cold/hot insulation)	
	Ambient environment	Ambient temperature: 7-40°C (cooling), 2-40°C (heating) Relative humidity: 10-90%RH, Altitude: Max.1000m	In case altitude exceeds 1000m, special design is required
Delivery form		Complete unit carrying in	
Power source	Phase	3-phase / 4-wires	3-phase / 3-wires
	Voltage-Frequency	380V-50Hz	415V-50Hz, 440V-50Hz, etc.
Wiring cable	Cable on machine	Cabling (control cables, power cables)	
Safety device		Motor overload: Burner fan, Solution pump, Refrigerant pump, etc. Abnormal combustion: Combustion interlock, Flame failure, Abnormal press. Abnormal cycle: HG high temp., HG high press., High exhaust gas temp. HG low liquid level, Refrigerant overcooled, etc. Chilled water suspension	Cooling water flow switch, Seismoscope, Band heater
Control panel		See "Control System"	
Capacity control	Type	PID control (gas-fired), Three position control (oil-fired) , with PID compensation	
Purge unit	Type	Accumulate non-condensable gas via solution ejector to purge tank. Discharge accumulated gas by mechanical vacuum pump automatically.	
Burner unit	Safety shut-off valve	Full automatic double shut-off valves	
	Combustion range	Gas-fired: 100-approx. 25% Oil-fired: 100/approx. 40%	
Fuel	Gas	Natural gas	Other gas Provide gas component (heating value, pressure, composition, etc.)
	Oil	Light oil (sulfur: below 0.5wt%)	
Commissioning	Site commissioning		Commissioning at site (performed only once)

SCOPE OF WORK

Item	Classfication		Arranged by Hitachi	Arranged by customer	Remarks
Transportation	Factory to site		×	○	
Carry-in and installation	Unloading		×	○	
	Site entrance to machine base		×	○	
	Installation and leveling		×	○	
	Parts installation	Anchor bolts and nuts	×	○	
		Liner plates for level adjustment	×	○	
Insulation	Cold and hot surface insulation		×	○	
Finish coating	Chiller-heater unit		×	○	Hitachi complete up to anti-corrosive primer coating
	Control panel		○	×	Gray (Anti-Rust Undercoating)
Electrical work	Primary power source panel to chiller-heater control panel		×	○	AC380V / 3-phase
	Another power source panel, remote monitoring board, etc. ⟷ Chiller control panel		×	○	Interlock operation of chilled/hot water pump and cooling water pump wiring, wiring between Chiller and DCS, etc.
	Grounding (Earthing)		×	○	
	Cooling water temperature control		×	○	Cooling tower fan start/stop control, three-way valve control, etc.
Related work	Equipment work		×	○	Foundation work, piping work for chilled/hot water/cooling water/fuel / water drain, exhaust flue and chimney work (indoor)
	Parts for installation	Companion flange, gasket, bolts and nuts	×	○	For chilled/hot water and cooling water piping
		Gasket, bolts and nuts for exhaust duct	×	○	
Others	Commissioning		○	×	(optional)
	Utilities for commissioning		×	○	Electricity, Chilled water, Cooling water, Gas, Oil etc.
	Disposal of packing materials		×	○	
	After sales service		○	×	Service contract shall be made between customer and Hitachi local agent for after sales service.

SPECIFICATIONS

EXS SERIES GAS SINGLE BURNER (STANDARD EFFICIENCY / HEAVY LOAD TYPE)

CHW 12-7°C / CW 32-37°C COP:1.32

Model			HAU-CGN	150EXS	180EXS	240EXS	300EXS	360EXS	400EXS	450EXS	500EXS	560EXS	600EXS	700EXS	800EXS	900EXWS	1000EXWS	1100EXWS	1200EXW3S	1300EXW3S	1400EXW3S	1500EXW3S	1600EXW3S
Cooling Capacity			USRT	150	180	240	300	360	400	450	500	560	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
			kW	527	633	844	1,055	1,266	1,407	1,582	1,758	1,969	2,110	2,461	2,813	3,165	3,516	3,868	4,220	4,571	4,923	5,274	5,626
Heating Capacity			kW	500	644	779	1,000	1,291	1,291	1,291	1,613	1,613	1,936	1,936	2,264	2,695	2,695	3,256	3,256	3,762	3,762	4,293	4,293
Chilled / Hot water	Temperature (Cooling)	In	˚C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	13	13
		Out	˚C	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Temperature (Heating)	In	˚C	55.3	54.9	55.4	55.3	54.9	55.4	55.9	55.4	55.9	55.4	56.1	56	55.7	56.2	55.8	56.1	55.9	56.2	55.1	55.4
		Out	˚C	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	Flow Rate		m^3/h	90.7	108.9	145.2	181.4	217.7	241.9	272.2	302.4	338.7	362.9	423.4	483.8	544.3	604.8	665.3	725.8	786.2	846.7	756.0	806.4
	Pressure drop		kPa	75	78	89	75	127	56	77	105	45	59	89	126	55	75	99	94	116	142	121	144
	Connection Piping Size		DN	100	125	125	150	150	200	200	200	200	200	250	250	250	300	300	300	300	300	300	300
Cooling Water	Temperature	In	˚C	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
		Out	˚C	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37.5	37.5
	Flow Rate		m^3/h	156.5	187.7	250.3	312.9	375.4	417.2	469.3	521.5	584.0	625.7	730.0	834.3	938.6	1,042.9	1,147.2	1,251.5	1,355.8	1,460.1	1,422.2	1,517.0
	Pressure drop		kPa	84	81	87	73	49	64	70	94	125	48	71	97	45	59	76	75	91	110	111	131
	Connection Piping Size		DN	125	150	200	200	200	250	250	250	250	300	300	300	350	350	400	400	400	450	400	450
Natural Gas Consumption	Cooling		Nm^3/h	40.0	47.9	63.9	79.9	95.9	106.6	119.9	133.2	149.2	159.8	186.5	213.1	239.8	266.4	293.0	319.7	346.3	372.9	399.6	426.2
	Heating		Nm^3/h	52.4	67.5	81.7	104.8	135.3	135.3	135.3	169.1	169.1	202.9	202.9	237.3	282.5	282.5	341.3	341.3	394.3	394.3	450.0	450.0
Exhaust Gas	Air Intake		m^3/h	742	956	1,157	1,485	1,917	1,917	1,917	2,395	2,395	2,875	2,875	3,362	4,002	4,002	4,835	4,835	5,586	5,586	6,375	6,375
	Exhaust Gas Temperature		˚C	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	Exhaust Gas Volume		m^3/h	1,325	1,707	2,064	2,650	3,421	3,421	3,421	4,275	4,275	5,131	5,131	6,000	7,142	7,142	8,629	8,629	9,970	9,970	11,377	11,377
Power source	Voltage, Frequency		V,Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz
	Capacity		kVA/kW	9.6/7.7	11.8/9.4	12.8/10.2	14.1/11.3	15.0/12.0	15.0/12.0	19.1/15.3	21.2/17.0	21.2/17.0	21.2/17.0	21.2/17.0	23.3/18.6	27.4/21.9	31.0/24.8	34.3/27.4	34.3/27.4	39.1/31.3	39.1/31.3	43.7/35.0	43.7/35.0
Motor Output	Solution pump		kW	2.2+1.1	2.2+2.2	2.2+2.2	3.0+2.2	3.0+2.2	3.0+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	7.5+2.2	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7
	Refrigerant pump		kW	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.3	1.3	1.5	1.5	1.5	1.5	1.5	1.5
	Burner fan		kW	0.75	0.75	1.5	1.5	2.2	2.2	2.2	4.0	4.0	4.0	4.0	5.5	7.5	7.5	7.5	7.5	11.0	11.0	15.0	15.0
	Purge pump		kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Dimensions	Length × Width × Height		m	3.2×2.2×2.5	3.6×2.2×2.5	4.3×2.2×2.5	4.7×2.2×2.5	6.0×2.3×2.5	6.5×2.3×2.5	5.1×2.3×3.2	5.6×2.4×3.2	6.1×2.4×3.2	6.6×2.6×3.2	7.4×2.7×3.2	8.1×2.8×3.2	6.8×3.2×3.2	7.6×3.2×3.2	8.3×3.2×3.2	8.3×3.2×3.3	8.8×3.3×3.3	9.3×3.3×3.3	9.8×3.6×3.6	10.3×3.6×3.6
Weight	Operating / Shipping		ton	8.1/7.5	9.7/9.0	11.1/10.3	12.7/11.8	14.9/13.6	16.7/15.3	16.2/14.5	18.3/16.5	20.4/18.4	22.8/20.6	25.2/22.8	27.8/25.0	32.0/29.0	37.5/33.4	40.4/35.9	43.4/38.4	47.1/41.9	49.8/44.4	55.2/43.1*	56.7/44.4*
Insulation	Cold / Hot		m^2	8.0/17.0	10.0/18.0	12.0/22.0	14.0/26.0	14.0/33.0	15.0/36.0	14.0/33.0	16.0/36.0	17.0/39.0	19.0/40.0	20.0/41.0	23.0/46.0	26.0/53.0	35.0/56.0	38.0/63.0	43.0/67.0	46.0/77.0	48.0/81.0	51.0/91.0	53.0/95.0
Water Volume	Chilled / Cooling		m^3	0.21/0.32	0.25/0.38	0.30/0.45	0.36/0.54	0.46/0.81	0.50/0.86	0.55/1.17	0.60/1.25	0.65/1.39	0.71/1.48	0.79/1.61	0.88/1.88	0.99/2.04	1.40/2.67	1.52/3.00	1.68/3.28	1.80/3.40	1.89/3.55	1.99/3.70	2.08/3.85

EXH SERIES GAS SINGLE BURNER (HIGH EFFICIENCY / HEAVY LOAD TYPE)

CHW 12-7°C / CW 32-37°C COP:1.40

Model			HAU-CGN	150EXH	180EXH	240EXH	300EXH	360EXH	400EXH	450EXH	500EXH	560EXH	600EXH	700EXH	800EXH	900EXWH	1000EXWH	1100EXWH	1200EXW3H	1300EXW3H	1400EXW3H	1500EXW3H	1600EXW3H
Cooling Capacity			USRT	150	180	240	300	360	400	450	500	560	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
			kW	527	633	844	1,055	1,266	1,407	1,582	1,758	1,969	2,110	2,461	2,813	3,165	3,516	3,868	4,220	4,571	4,923	5,274	5,626
Heating Capacity			kW	500	644	779	1,000	1,291	1,291	1,291	1,613	1,613	1,936	1,936	2,264	2,695	2,695	3,256	3,256	3,762	3,762	4,293	4,293
Chilled / Hot water	Temperature (Cooling)	In	˚C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	13	13
		Out	˚C	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Temperature (Heating)	In	˚C	55.3	54.9	55.4	55.3	54.9	55.4	55.9	55.4	55.9	55.4	56.1	56	55.7	56.2	55.8	56.1	55.9	56.2	55.1	55.4
		Out	˚C	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	Flow Rate		m^3/h	90.7	108.9	145.2	181.4	217.7	241.9	272.2	302.4	338.7	362.9	423.4	483.8	544.3	604.8	665.3	725.8	786.2	846.7	756.0	806.4
	Pressure Loss		kPa	75	78	89	75	42	56	77	105	45	59	89	126	55	75	99	94	116	142	121	144
	Connection Piping Size		DN	100	125	125	150	150	200	200	200	200	200	250	250	250	300	300	300	300	300	300	300
Cooling Water	Temperature	In	˚C	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
		Out	˚C	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37.5	37.5
	Flow Rate		m^3/h	152.7	183.2	244.3	305.3	366.7	407.1	458.0	508.9	570.0	610.7	712.5	814.3	916.0	1,017.8	1,119.6	1,221.4	1,323.2	1,425.0	1,387.9	1,480.5
	Pressure Loss		kPa	80	78	83	70	47	61	67	90	120	46	68	93	43	56	73	71	88	106	106	126
	Connection Piping Size		DN	125	150	200	200	200	250	250	250	250	300	300	300	350	350	400	400	400	450	400	450
Natural Gas Consumption	Cooling		Nm^3/h	37.7	45.2	60.3	75.4	91.1	100.5	113.0	125.6	140.7	150.7	175.8	200.9	226.1	251.2	276.3	301.4	326.5	351.6	376.7	401.9
	Heating		Nm^3/h	52.4	67.5	81.7	104.8	135.3	135.3	135.3	169.1	169.1	202.9	202.9	237.3	282.5	282.5	341.3	341.3	394.3	394.3	450.0	450.0
Exhaust Gas	Air Intake		m^3/h	742	956	1,157	1,485	1,917	1,917	1,917	2,395	2,395	2,875	2,875	3,362	4,002	4,002	4,835	4,835	5,586	5,586	6,375	6,375
	Exhaust Gas Temperature		˚C	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	Exhaust Gas Volume		m^3/h	1,325	1,707	2,064	2,650	3,421	3,421	3,421	4,275	4,275	5,131	5,131	6,000	7,142	7,142	8,629	8,629	9,970	9,970	11,377	11,377
Power source	Voltage, Frequency		V,Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz
	Capacity		kVA/kW	9.6/7.7	11.8/9.4	12.8/10.2	14.1/11.3	15.0/12.0	15.0/12.0	19.1/15.3	21.2/17.0	21.2/17.0	21.2/17.0	21.2/17.0	23.3/18.6	27.4/21.9	31.0/24.8	34.3/27.4	34.3/27.4	39.1/31.3	39.1/31.3	43.7/35.0	43.7/35.0
Motor Output	Solution pump		kW	2.2+1.1	2.2+2.2	2.2+2.2	3.0+2.2	3.0+2.2	3.0+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	7.5+2.2	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7	7.5+3.7
	Refrigerant pump		kW	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.3	1.3	1.5	1.5	1.5	1.5	1.5	1.5
	Burner fan		kW	0.75	0.75	1.5	1.5	2.2	2.2	2.2	4.0	4.0	4.0	4.0	5.5	7.5	7.5	7.5	7.5	11.0	11.0	15.0	15.0
	Purge pump		kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Dimensions	Length × Width × Height		m	3.2×2.2×2.5	3.6×2.2×2.5	4.3×2.2×2.5	4.7×2.2×2.5	6.0×2.3×2.5	6.5×2.3×2.5	5.1×2.3×3.2	5.6×2.4×3.2	6.1×2.4×3.2	6.6×2.6×3.2	7.4×2.7×3.2	8.1×2.8×3.2	6.8×3.2×3.2	7.6×3.2×3.2	8.3×3.2×3.2	8.3×3.2×3.3	8.8×3.3×3.3	9.3×3.3×3.3	9.8×3.6×3.6	10.3×3.6×3.6
Weight	Operating / Shipping		ton	8.6/8.0	10.2/9.5	11.6/10.8	13.2/12.3	15.6/14.3	17.4/16.0	16.9/15.2	19.1/17.3	21.3/19.3	23.8/21.7	26.4/24.0	29.2/26.4	33.6/30.6	39.5/35.4	42.4/37.9	45.4/40.4	49.1/43.9	51.8/46.4	57.0/44.9*	58.5/46.2*
Insulation	Cold / Hot		m^2	8.0/17.0	10.0/18.0	12.0/22.0	14.0/26.0	14.0/33.0	15.0/36.0	14.0/33.0	16.0/36.0	17.0/39.0	19.0/40.0	20.0/41.0	23.0/46.0	26.0/53.0	35.0/56.0	38.0/63.0	43.0/67.0	46.0/77.0	48.0/81.0	51.0/91.0	53.0/95.0
Water Volume	Chilled / Cooling		m^3	0.21/0.32	0.25/0.38	0.30/0.45	0.36/0.54	0.46/0.81	0.50/0.86	0.55/1.17	0.60/1.25	0.65/1.39	0.71/1.48	0.79/1.61	0.88/1.88	0.99/2.04	1.40/2.67	1.52/3.00	1.68/3.28	1.80/3.40	1.89/3.55	1.99/3.70	2.08/3.85

Notes:
1.1 USRT is 3.516 kW (3,024 kcal/h)
2.Capacity control range is 100% - approx. 25%.
3.Chilled/Hot water and Cooling water quality should be controlled in accordance with JRA-GL-02-1994
4.Scale factor is 0.086 m^2K/kW (0.0005 ft2hF/BTU) for both chilled/hot water and cooling water.
5.Maximum working pressure is 780 kPa(G) (8kgf/cm^2G) for both chilled/hot water and cooling water.
6.Gas calorific value used for above specification is (LHV) 36,000 kJ/m^3N.
7.Natural Gas inlet pressure shall be 20.0 kPaG and shall be controlled within ±20%.
8.Specifications in this catalogue are subject to change without notice.
9.Above COP does not include power consumption.

SPECIFICATIONS

EXS SERIES DUAL FUEL BURNER (STANDARD EFFICIENCY / HEAVY LOAD TYPE)

CHW 12-7°C / CW 32-37°C COP:1.28

Model			HAU	CGN150EXS	CGN180EXS	CGN240EXS	CGN300EXS	CGN360EXS	CGN400EXS	CGH450EXS	CGN500EXS	CGH560EXS	CGN600EXS	CGH700EXS	CGH800EXS	CGN900EXWS	CGH1000EXWS	CGN1100EXWS
Cooling Capacity			USRT	150	180	240	300	360	400	450	500	560	600	700	800	900	1,000	1,100
			kW	527	633	844	1,055	1,266	1,407	1,582	1,758	1,969	2,110	2,461	2,813	3,165	3,516	3,868
Heating Capacity			kW	385	461	615	769	923	1,025	1,156	1,282	1,435	1,538	1,794	2,050	2,307	2,563	2,819
Chilled / Hot water	Temperature (Cooling)	In	˚C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
		Out	˚C	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Temperature (Heating)	In	˚C	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4
		Out	˚C	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	Flow Rate		m^3/h	90.7	108.9	145.2	181.4	217.7	241.9	272.2	302.4	338.7	362.9	423.4	483.8	544.3	604.8	665.3
	Pressure drop		kPa	75	78	89	75	127	56	78	105	45	59	89	126	55	75	99
	Connection Piping Size		DN	100	125	125	150	150	200	200	200	200	200	250	250	250	300	300
Cooling Water	Temperature	In	˚C	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
		Out	˚C	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
	Flow Rate		m^3/h	156.8	188.2	251.0	313.7	376.4	418.3	471.5	522.8	585.6	627.4	732.0	836.5	941.1	1,045.7	1,150.2
	Pressure drop		kPa	102	82	87	74	49	64	71	94	126	48	72	98	45	59	77
	Connection Piping Size		DN	125	150	200	200	200	250	250	250	250	300	300	300	350	350	400
Natural Gas Consumption	Cooling		Nm^3/h	41.2	49.4	65.9	82.4	98.9	109.9	123.9	137.3	153.8	164.8	192.3	219.8	247.2	274.7	302.2
	Heating		Nm^3/h	41.2	49.4	65.9	82.4	98.9	109.9	123.9	137.4	153.8	164.8	192.3	219.8	247.2	274.7	302.2
Deisel Oil Consumption	Cooling		L/h	40.9	49.0	65.4	81.7	98.1	109.0	122.9	136.2	152.6	163.5	190.7	218.0	245.2	272.5	299.7
	Heating		L/h	40.9	49.0	65.4	81.7	98.1	109.0	122.9	136.2	152.6	163.5	190.7	218.0	245.2	272.5	299.7
Exhaust Gas	Air Intake		m^3/h	569	683	911	1,139	1,366	1,518	1,711	1,898	2,125	2,875	2,657	3,036	3,416	3,795	4,175
	Exhaust Gas Temperature		˚C	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
	Exhaust Gas Volume		m^3/h	1,049	1,258	1,677	2,097	2,516	2,796	3,152	3,495	3,914	4,194	4,893	5,592	6,291	6,990	7,688
Power source	Voltage, Frequency		V,Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz
	Capacity		kVA/kW	16.1/12.9	16.1/12.9	16.1/12.9	21.2/17.0	15.3/13.6	21.2/17.0	27.7/22.2	27.7/22.2	21.6/19.2	30.0/24.0	30.7/24.6	31.0/24.8	32.5/26.0	41.8/33.4	45.0/36.0
Motor Output	Solution pump		kW	2.2+1.1	2.2+2.2	2.2+2.2	3.0+2.2	3.0+2.2	3.0+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	7.5+2.2	7.5+3.7
	Refrigerant pump		kW	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.3	1.3	1.5
	Burner fan		kW	2.20	2.20	2.2	3.7	3.7	3.7	5.5	5.5	7.5	7.5	7.5	7.5	7.5	11.0	11.0
	Oil Pump		kW	0.40	0.40	0.4	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Purge pump		kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Dimensions	Length × Width × Height		m	3.2×2.2×2.5	3.6×2.2×2.5	4.3×2.2×2.5	4.7×2.2×2.5	6.0×2.3×2.5	6.5×2.3×2.5	5.1×2.9×3.2	5.6×2.4×3.2	6.1×3.0×3.2	6.6×2.6×3.2	7.4×2.9×3.2	8.1×3.3×3.2	6.8×3.2×3.2	7.6×3.3×3.2	8.3×3.2×3.2
Weight	Operating / Shipping		ton	8.3/7.5	9.9/9.0	11.3/10.3	12.9/11.8	15.3/13.6	17.1/15.3	17.7/15.6	18.7/16.5	21.6/19.2	23.2/20.6	25.9/23.1	31.3/28.1	32.4/29.0	39.7/35.0	41.0/35.9
Insulation	Cold / Hot		m^2	8.0/17.0	10.0/18.0	12.0/22.0	14.0/26.0	14.0/33.0	15.0/36.0	14.0/36.0	16.0/36.0	17.0/43.0	19.0/40.0	20.0/44.0	23.0/52.0	26.0/53.0	35.0/62.0	38.0/63.0
Water Volume	Chilled / Cooling		m^3	0.21/0.32	0.25/0.38	0.30/0.45	0.36/0.54	0.46/0.81	0.50/0.86	0.55/1.17	0.60/1.25	0.65/1.39	0.71/1.48	0.79/1.61	0.88/1.88	0.99/2.04	1.40/2.67	1.52/3.00

Notes:
1. 1 USRT is 3.516 kW (3,024 kcal/h)
2. Capacity control range is 100% - approx. 25% for gas fired and 100% - approx. 40% for oil fired.
3. Chilled/Hot water and Cooling water quality should be controlled in accordance with JRA-GL-02-1994
4. Scale factor is 0.086 m^2K/kW (0.0005 ft2hF/BTU) for both chilled/hot water and cooling water.
5. Maximum working pressure is 780 kPa(G) (8kgf/cm^2G) for both chilled/hot water and cooling water.
6. Gas calorific value used for above specification is (LHV) 36,000 kJ/m^3N.
7. Natural Gas inlet pressure shall be 20.0 kPaG and shall be controlled within ±20%.
8. Deisel Oil calorific value used for above specification is 42,700 kJ/kg
9. Deisel Oil specific gravity is 0.85 and sulfur content shall be 0.5% or less
10. Specifications in this catalogue are subject to change without notice.
11. Above COP does not include power consumption.

SPECIFICATIONS

EXH SERIES DUAL FUEL BURNER (HIGH EFFICIENCY / HEAVY LOAD TYPE)

CHW 12-7°C / CW 32-37°C COP:1.35

Model			HAU	CGN150EXH	CGN180EXH	CGN240EXH	CGN300EXH	CGN360EXH	CGN400EXH	CGN450EXH	CGN500EXH	CGN560EXH	CGN600EXH	CGN700EXH	CGN800EXH	CGN900EXWH	CGH1000EXWH	CGN1100EXWH
Cooling Capacity			USRT	150	180	240	300	360	400	450	500	560	600	700	800	900	1,000	1,100
			kW	527	633	844	1,055	1,266	1,407	1,582	1,758	1,969	2,110	2,461	2,813	3,165	3,516	3,868
Heating Capacity			kW	365	437	583	729	875	972	1,094	1,215	1,361	1,458	1,701	1,944	2,307	2,430	2,673
Chilled / Hot water	Temperature (Cooling)	In	˚C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
		Out	˚C	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Temperature (Heating)	In	˚C	56.5	56.6	56.6	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5
		Out	˚C	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	Flow Rate		m^3/h	90.7	108.9	145.2	181.4	217.7	241.9	272.2	302.4	338.7	362.9	423.4	483.8	544.3	604.8	665.3
	Pressure drop		kPa	75	78	89	75	127	56	77	105	45	59	89	126	55	75	99
	Connection Piping Size		DN	100	125	125	150	150	200	200	200	200	200	250	250	250	300	300
Cooling Water	Temperature	In	˚C	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
		Out	˚C	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
	Flow Rate		m^3/h	153.4	184.1	245.5	306.8	368.2	409.1	460.3	511.4	572.8	613.7	716.0	818.2	941.1	1,022.8	1,125.1
	Pressure drop		kPa	98	79	84	71	47	62	68	90	121	47	69	94	45	57	74
	Connection Piping Size		DN	125	150	200	200	200	250	250	250	250	300	300	300	350	350	400
Natural Gas Consumption	Cooling		Nm^3/h	39.1	46.9	62.5	78.1	93.8	104.2	117.2	130.2	145.9	156.3	182.3	208.4	247.2	260.5	286.5
	Heating		Nm^3/h	39.1	46.9	62.5	78.1	93.8	104.2	117.2	130.2	145.9	156.3	182.3	208.4	247.2	260.5	286.5
Deisel Oil Consumption	Cooling		L/h	38.7	46.5	62.0	77.5	93.0	103.3	116.3	129.2	144.7	155.0	180.8	206.7	245.2	258.3	284.2
	Heating		L/h	38.7	46.5	62.0	77.5	93.0	103.3	116.3	129.2	144.7	155.0	180.8	206.7	245.2	258.3	284.2
Exhaust Gas	Air Intake		m^3/h	540	648	864	1,080	1,295	1,439	1,619	1,799	2,015	2,159	2,519	2,879	3,416	3,598	3,958
	Exhaust Gas Temperature		˚C	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
	Exhaust Gas Volume		m^3/h	994	1,193	1,590	1,988	2,386	2,651	2,982	3,314	3,711	3,976	4,639	5,302	6,291	6,627	7,290
Power source	Voltage, Frequency		V,Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz	AC380V, 50Hz
	Capacity		kVA/kW	16.1/12.9	16.1/12.9	16.1/12.9	21.2/17.0	21.2/17.0	21.2/17.0	25.2/20.2	27.7/22.2	27.7/22.2	30.0/24.0	30.0/24.0	31.0/24.8	32.5/26.0	41.8/33.4	45.0/36.0
Motor Output	Solution pump		kW	2.2+1.1	2.2+2.2	2.2+2.2	3.0+2.2	3.0+2.2	3.0+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	5.5+2.2	7.5+2.2	7.5+3.7
	Refrigerant pump		kW	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.3	1.3	1.5
	Burner fan		kW	2.2	2.2	2.2	3.7	3.7	3.7	5.5	5.5	7.5	7.5	7.5	7.5	7.5	11.0	11.0
	Oil Pump		kW	0.4	0.4	0.4	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Purge pump		kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Dimensions	Length × Width × Height		m	3.2×2.2×2.5	3.6×2.2×2.5	4.3×2.2×2.5	4.7×2.2×2.5	6.0×2.3×2.5	6.5×2.3×2.5	5.1×2.3×3.2	5.6×2.4×3.2	6.1×3.0×3.2	6.6×2.6×3.2	7.4×2.7×3.2	8.1×2.8×3.2	6.8×3.2×3.2	7.6×3.3×3.2	8.3×3.2×3.2
Weight	Operating / Shipping		ton	8.8/8.0	10.4/9.5	11.8/10.8	13.4/12.3	16.0/14.3	17.8/16.0	17.3/15.2	19.5/17.3	21.7/19.3	24.2/21.7	26.8/24.0	29.6/26.4	32.4/29.0	41.7/37.0	43.0/37.9
Insulation	Cold / Hot		m^2	8.0/17.0	10.0/18.0	12.0/22.0	14.0/26.0	14.0/33.0	15.0/36.0	14.0/33.0	16.0/36.0	17.0/39.0	19.0/40.0	20.0/41.0	23.0/52.0	26.0/53.0	35.0/62.0	38.0/63.0
Water Volume	Chilled / Cooling		m^3	0.21/0.32	0.25/0.38	0.30/0.45	0.36/0.54	0.46/0.81	0.50/0.86	0.55/1.17	0.60/1.25	0.65/1.39	0.71/1.48	0.79/1.61	0.88/1.88	0.99/2.04	1.40/2.67	1.52/3.00

Notes:
1. 1 USRT is 3.516 kW (3,024 kcal/h)
2. Capacity control range is 100% - approx. 25% for gas fired and 100% - approx. 40% for oil fired.
3. Chilled/Hot water and Cooling water quality should be controlled in accordance with JRA-GL-02-1994
4. Scale factor is 0.086 m^2K/kW (0.0005 ft2hF/BTU) for both chilled/hot water and cooling water.
5. Maximum working pressure is 780 kPa(G) (8kgf/cm^2G) for both chilled/hot water and cooling water.
6. Gas calorific value used for above specification is (LHV) 36,000 kJ/m^3N.
7. Natural Gas inlet pressure shall be 20.0 kPaG and shall be controlled within ±20%.
8. Deisel Oil calorific value used for above specification is 42,700 kJ/kg
9. Deisel Oil specific gravity is 0.85 and sulfur content shall be 0.5% or less
10. Specifications in this catalogue are subject to change without notice.
11. Above COP does not include power consumption.