

Leggere sempre le istruzioni prima dell'installazione
Always read the instructions before the installation

Italiano

YOSHI® AWS E1/E1J

Yoshi Air Water System

MANUALE DI INSTALLAZIONE – INSTALLATION MANUAL

8-10-13-16-20-25 HP



English

**Al termine dell'installazione, far sempre eseguire il primo avviamento dal
Centro di Assistenza Tecnica Autorizzato AISIN di zona.**
***After the installation, always call the local AISIN Authorised Service Centre to perform the outdoor
and indoor units commissioning.***

DICHIARAZIONE CE DI CONFORMITA'

CE DECLARATION OF CONFORMITY



Dati identificativi del fabbricante: Identification of the manufacturer:

Tecnocasa s.r.l.
Sede legale:
Via Manzoni, 17
60025 Loreto (AN)
Italia

Dichiara che l'insieme per la macchina YOSHI AWS (Air Water System)
Declare that the assembly for the YOSHI AWS (Air Water System) unit:

Modelli:	AWS08HP E1/E1J	Matricola: vedi targa dati	Anno di costruzione: vedi targa
Models:	AWS10HP E1/E1J	Serial n°: see product label	Year of construction: see product label
	AWS13HP E1/E1J		
	AWS16HP E1/E1J		
	AWS20HP E1/E1J		
	AWS25HP E1/E1J		

È conforme ai requisiti essenziali di sicurezza delle seguenti direttive:
Is compliant to the essential safety requirement of the following directives:

- ✓ DIRETTIVA PED 97/23/CE e successive modifiche – Cat. Rischio I° –
(PED DIRECTIVE 97/23/CE and subsequent modification – Cat. Risk I°–)
- ✓ DIRETTIVA MACCHINE 2006/42/CE e successive modifiche
(MACCHINE DIRECTIVE 2006/42/CE and subsequent modification)
- ✓ DIRETTIVA BASSA TENSIONE LVD 2006/95/CE e successive modifiche
(LOW TENSION DIRECTIVE LVD 2006/95/CE and subsequent modification)
- ✓ DIRETTIVA COMPATIBILITA' ELETTROMAGNETICA EMC 2004/108/CE e successive modifiche
(ELECTROMAGNETIC COMPATIBILITY DIRECTIVE EMC 2004/108/CE and subsequent modification)

Loreto, 1° Gennaio 2012

Rappresentante Legale
(the Legal Representative)

TECNOCASA SRL
Via Manzoni, 17 - 60025 LORETO (AN)
Tel. 071.977405 - Fax 071.976981
PIVA 01051530424

YOSHI® AWS E1/E1J





Yoshi Air Water System AWS INSTALLATION MANUAL 8 HP-10 HP-13 HP-16 HP-20 HP-25 HP

Models


AWS		Capacity (kW)	
		COOLING	HEATING (Maximum)
E1/E1J Series	8 HP	21,0	23,5
	10 HP	26,5	30,0
	13 HP	33,5	37,5
	16 HP	41,0	47,5
	20 HP	52,0	60,0
	25 HP	63,5	75,0

■ Safety prescriptions

The following symbols are used to indicate important instructions. Always read, understand and follow these instructions carefully.

 WARNING	Failure to observe the prescriptions indicated with this symbol could result in serious injury or death.
 CAUTION	Failure to observe the prescriptions indicated with this symbol could result in damage to the unit.
	This symbol indicates a forbidden action.
	This symbol indicates a necessary action.

■ Notice for the installer

 WARNING	This unit has to be installed by specialised technical personnel. The installation must be performed in accordance with the contents of this manual. If this unit is not properly installed, it will not realize its full performance potential and could cause injury or damage.
--	---

This manual contains technical prescriptions, precautions and procedures to install the YOSHI AWS unit properly. It addresses to specialised technical personnel with a basic knowledge of gas heat pumps installation methods. Failure to observe the procedures herein indicated, could result in malfunction and damage to the unit. Before beginning the installation of the YOSHI AWS unit, read and fully understand the contents of this manual.

After the installation, always call the local AISIN Authorised Service Centre to perform the outdoor and indoor units commissioning.

Tecnocasa s.r.l. declines any responsibility for any damage whatever caused by improper use of the unit and/or non compliance with the information contained in this manual. Specifications, drawings and technical information in this manual are subject to change without notice.

INDEX

Technical features

1	AWS unit specifications.....	32
1.1	Installation prescriptions.....	32
2	Before installation.....	33
2.1	Parts provided	33
2.2	Locally procured parts.....	33
3	Using a mixture of water and glycol	34

AWS unit installation

4	Installation	34
4.1	Selecting the location for installation	34
4.2	External dimensions, hydraulic and refrigerant gas connections	35
4.3	Installation space.....	36
5	Refrigerant pipes.....	37
5.1	Outline drawing of refrigerant piping.	37
5.2	Piping specifications.....	38
5.3	Refrigerant gas extra charge.....	39
6	Refrigerant circuit and hydraulic circuit	40
6.1	Cooling mode	40
6.2	Heating mode	40

AWS unit wiring

7	Electric wire installation.....	41
7.1	Wiring with GHP outdoor unit for AWS.....	41
7.2	Detailed wiring diagram.....	42
8	Accessories hydronic module	41
8.1	Control pannel Controller Plus.....	42
8.2	External probe temperature.....	42
8.3	Wiring diagram “controller plus” and external probe temperature	42
9	Control panel.....	44
10	Adjustment	45
10.1	Adjusting the hydronic modul	48
10.2	Connectivity hydronic modul	47
10	Installation layouts.....	48
10.1	Central storage tank installation.....	48
10.2	Hydraulic separator installation	48
10.3	Single pump installation	48
10.4	HVAC installation layout AWS E1 (internal pump).....	49
10.5	HVAC installation with proportional distribution of consumption	50
10.6	HVAC installation with pump external variable flow rate	51
11	Trouble diagnosis (reference)	52

1 AWS unit specifications

All versions		AWS 8HP-E1 (E1J)	AWS 10HP-E1 (E1J)	AWS 13HP-E1 (E1J)	AWS 16HP-E1 (E1J)	AWS 20HP-E1 (E1J)	AWS 25HP-E1 (E1J)
Capacity code of the connected GHP outdoor unit		P224	P280	P355	P450	P560	P710
Rated cooling capacity*	kW	21,0	26,5	33,5	41,0	52,0	63,5
Water temperature out - [in]	°C	7 – [11]	7 – [12]	7 – [12]	7 – [12]	7 – [12]	7 – [12]
Rated heating capacity **	kW	23,5	30,0	37,5	47,5	60,0	75,0
Water temperature out - [in]	°C	45,5 – [41]	45,5 – [40]	45,5 – [40]	45,5 – [40]	45,5 – [40]	45,5 – [40]
Flow rate	m ³ /h	4,5	4,5	6,0	7,5	9,5	12
Capacity modulation rate cooling (min-max)	kW	10,0-21,0	10,0-26,5	10,0-33,5	17,0-41,0	17,0-52,0	17,0-63,5
Capacity modulation rate heating (min-max)	kW	13,0-23,5	12,0-30,0	12,0-37,5	19,8-47,5	19,8-60,0	19,8-75,0
19.8-75.0	Power supply***	V/Ph/Hz 230/1/50					
	Power consumption	0,84			1,1		
	Starting current	A 10					
	Available static pressure	80	80	60	100	80	60
Version without Pump (AWS E1J)	Power supply	V/Ph/Hz 230/1/50					
	Starting current	A 1,5					
Drop pressure plate heat exchanger		33	33	46	22	33	46
Water circuit	Water pipes connection	Inch 2 (Each AWS unit is delivered with 2" nipples fittings to be installed if necessary)					
	Primary circuit pipes diameter	Inch 2 or higher (Each AWS unit is fitted with a 2" Y-shape filter to be installed on the primary circuit)					
Refrigerant circuit	Refrigerant gas connection (gas – liquid)	mm 28,6 – 12,7			mm 28,6 – 18,0		
	GHP – AWS pipes diameter (gas – liquid)	mm 19,1 – 9,5 **** (12,7)	mm 22,2 – 9,5 **** (12,7)	mm 25,4 – 12,7 **** (15,9)	mm 28,6 – 12,7 **** (15,9)	mm 28,6 – 15,88 **** (19,05)	mm 35, – 15,88 **** (19,05)
External dimensions and weight	Height	mm 915					
	Width	mm 1020					
	Depth	mm 710					
	With Pump/Without Pump	kg 164/153			kg 204/177		
Connectable GHP outdoor units		Each AWS unit can be connected with a single AISIN GHP outdoor unit					

- * Rated cooling capacity is measured according to the following conditions: water outlet temperature 7°C; outdoor temperature 35°C DB
 ** Rated heating capacity is measured according to the following conditions: water outlet temperature 47°C; outdoor temperature 7°C DB / 6°C WB
 *** A version fitted with 230V, single phase, 60 Hz is available upon order.
 **** If the distance between GHP and AWS exceeds 40 meters, increasing the size of the liquid pipe with a more larger diameter.

1.1 Installation prescriptions



CAUTION

Always foresee the installation of an emergency relief valve and a properly dimensioned expansion vessel. These devices are not built in the AWS unit. Where the storage tank should be installed lower than the AWS unit, foresee the installation of a jolly valve at the higher point of the water piping.

Failure to observe these prescriptions could result in malfunction and/or damage to the unit.

Always foresee the installation of a buffer tank, fitted with anti stratification pipes, which size should be adequate to the AWS unit capacity.

Failure to observe these prescription could result in malfunction and/or damage to the unit.

Always check that the Y-shape water filter (supplied with the unit) is installed on the primary circuit return pipe. In case of multi units plants, install one filter each AWS unit.

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.



WARNING

Welding, refrigerant gas and water piping installation should be always performed by specialised technical personnel in accordance with instructions and prescriptions mentioned in the present manual.

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.

2 Before installation

2.1 Parts provided

The following parts are provided with the YOSHI AWS unit.

	Name			
	Installation manual	Control box wiring diagram	2" Y-shape filter For water pipe [gaskets]	2" brass nipples [gaskets]
Quantity	1	1	1 - [2]	2 - [2]
Location	Inside the control panel		Inside the unit near the water connections	
Note	Always store the manuals in a dry and safe place		Refer to the prescriptions of this manual for the installation of the accessories	

2.2 Locally procured parts

The following items are required for installing the YOSHI AWS unit.

Part	Application
Anchor bolt	For installing the AWS unit on the ground (M8X4)
Washer, Nuts	For installing the AWS unit on the ground (ϕ 8X4)
Ant vibrant carpet	For installing the unit on metal bars or on the roof.
Copper pipe and fittings for refrigerant gas	Refrigerant gas piping (materials and procedures are described in the GHP outdoor unit installation manual)
Steel pipe and fittings for water	Water piping (materials and procedures are described in the present manual)
Insulation	For refrigerant gas and water pipe insulation
Electrical wires	AWS unit power supply, ground wiring, communication and accessories wiring (proper size and wire specifications are described in the GHP outdoor unit installation manual)
R410a refrigerant gas, precision scale and gauge manifolds	Refrigerant circuit extra charge (refrigerant extra charge is described in the present manual)
Oxy acetylene welding kit	Gas bottles, nozzle and copper bars to weld refrigerant pipes
Nitrogen Bottle	Refrigerant gas leakage test (the procedure is described in the GHP outdoor unit installation manual)
Vacuum pump	Vacuum suction (the procedure is described in the GHP outdoor unit installation manual)
Pipe cutter	Refrigerant gas piping installation



WARNING



Never use parts which are not compliant with those listed in the present manual.

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.



The installation of the unit must comply with national and local codes.

Failure to observe this prescription could result in illegal act.




The manufacturer specifically disclaims any liability whatsoever for any claims by any party if any of the procedures in this Installation Manual have not been followed. Failure to observe this prescription makes the warranty no longer valid.

3 Using a mixture of water and glycol

Water	Glycol	Coefficient reduction cooling capacity	Coefficient reduction pump flowrate
°C	% kg	Watt	l/min
+5	0	1	1
-2	5	0,995	0,99
-4	10	0,990	0,98
-6	15	0,985	0,96
-9	20	0,980	0,94
-12	25	0,975	0,92
-15	30	0,970	0,90
-19	35	0,965	0,88
-23	40	0,960	0,86
-29	45	0,955	0,83
-35	50	0,950	0,80

4 Installation

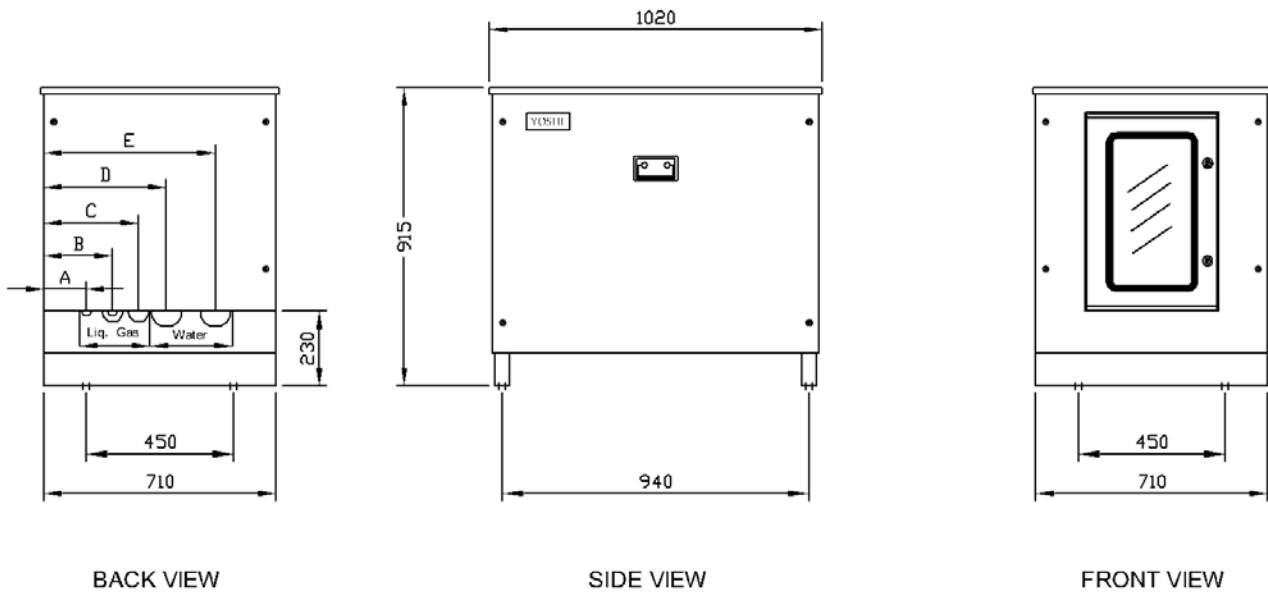
4.1 Selecting the location for installation

 WARNING	
	<ul style="list-style-type: none"> The unit MUST NOT be installed where flammable gas is generated, accumulated or handled. Failure to observe this prescription could result in damage of the unit, injury, fire or explosion.
	<ul style="list-style-type: none"> The AWS unit is for outdoor and indoor installation. Read the present manual carefully to select a proper installation location. Make sure maintenance space is provided around the unit. If the unit is installed at high location, provide a safe access by installing ladders or railings for the operator.

- Always install the AWS unit in an area where its smooth operating noise and small vibration won't be a disturb for the neighbours, particularly in residential areas. Comply to local standards where prescribed.
- Always install the AWS unit in a level location where rainwater cannot accumulate. Provide proper drain routes.
- Always install the AWS unit in a location where it won't be exposed to strong winds. Provide proper anchor bolts.
- The AWS unit might cause slight interference with other electrical equipment, such as televisions, radios, computers and telephones. Provide proper clearances.
- If the AWS unit is installed in a region with heavy snowfall, install a snow protection hood. The base for the unit is high enough to avoid accumulation of snow in front of the body panels.
- Allocate the route for loading/unloading the unit, materials and parts for maintenance at the installation site.



4.2 External dimensions, hydraulic and refrigerant gas connections

TECHNICAL DATA													
Water connections	Inch	$\phi 2$											
Water pipe connections	Inchi	$\phi 2$ or higher											
Refrigerant gas connections	mm	(8 – 10 – 13) HP						(16 – 20 – 25) HP					
		Liquid			Gas			Liquid			Gas		
		12,7			28,6			18,0			28,6		
Refrigerant pipes diameter	mm	8 HP		10 HP		13 HP		16 HP		20 HP		25 HP	
		Liq.	Gas	Liq.	Gas	Liq.	Gas	Liq.	Gas	Liq.	Gas	Liq.	Gas
		9,5	19,1	9,5	22,2	12,7	25,4	12,7	28,6	15,9	28,6	15,9	35
Hydraulic and refrigerant gas connection positions	Liquid	(16-20-25) HP				(8-10-13) HP							
	Gas					(16-20-25) HP				(8-10-13) HP			
	Water									(8-10-13-16-20-25) HP			
		A		B		C		D		E			
	mm	130		210		290		375		525			
Dimensions (W -H - D)	mm	710 -915 - 1020											

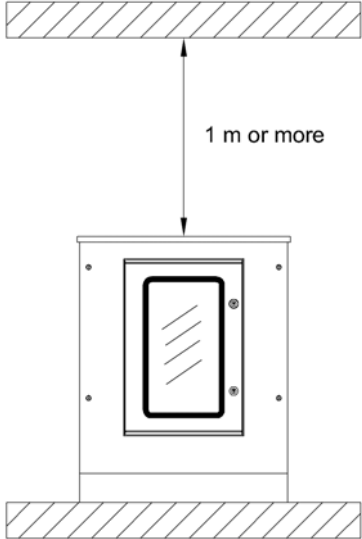
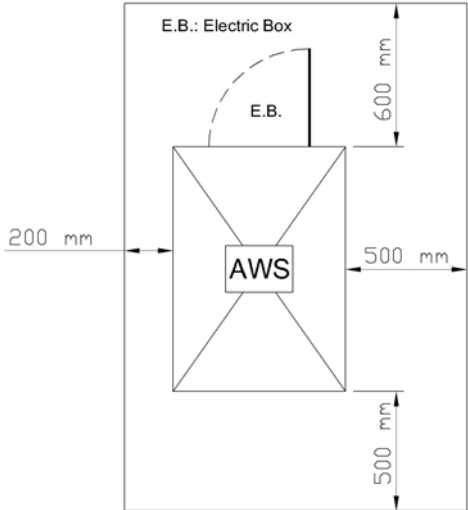
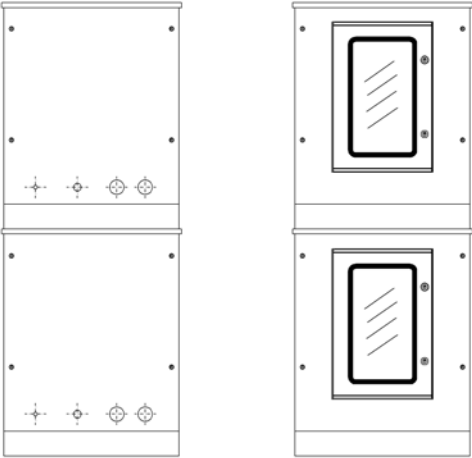
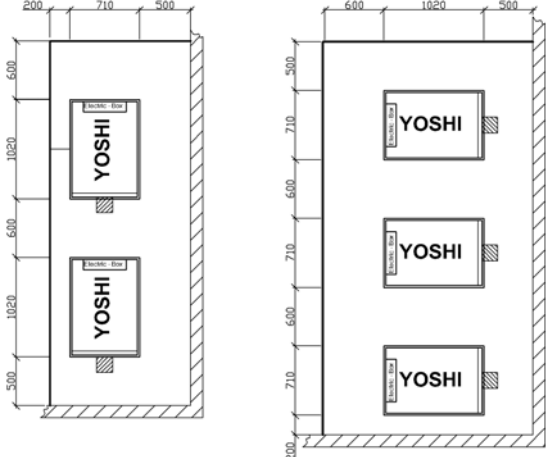


4.3 Installation space

Clearances for maintenance and inspection operations are described in the tables below.

 CAUTION	
	<ul style="list-style-type: none"> • The minimum installation spaces are necessary to provide room for air circulation, inspection and maintenance of the AWS unit. Failure to observe this prescription could result in injury to the maintenance personnel and damage to the unit. • When more units are installed in the same location, make sure that nearby walls, pipes or other objects, are not obstructions for maintenance operations. Maintenance space is described in the table below.

Always provide ample space for inspecting and maintaining the piping for the refrigerant gas and for the water.

Front view	Top view
 <p style="text-align: center;">1 m or more</p> <p style="text-align: center;">Always provide 1 m or more above the AWS unit</p>	<p><Single unit installation ></p>  <p style="text-align: center;">Always leave at least 500 mm on the right side (viewed from coupling tubes AWS)</p>
<p><Overlapped multiple units installation></p>  <p style="text-align: center;">When the units are overlapped, route the pipes of the upper unit so that all the body panels of the lower unit can be disassembled.</p>	<p><Multiple units installation></p>  <p style="text-align: center;">Always leave at least 500 mm on the right side (viewed from coupling tubes AWS)</p>

5 Refrigerant pipes

5.1 Outline drawing of refrigerant piping.

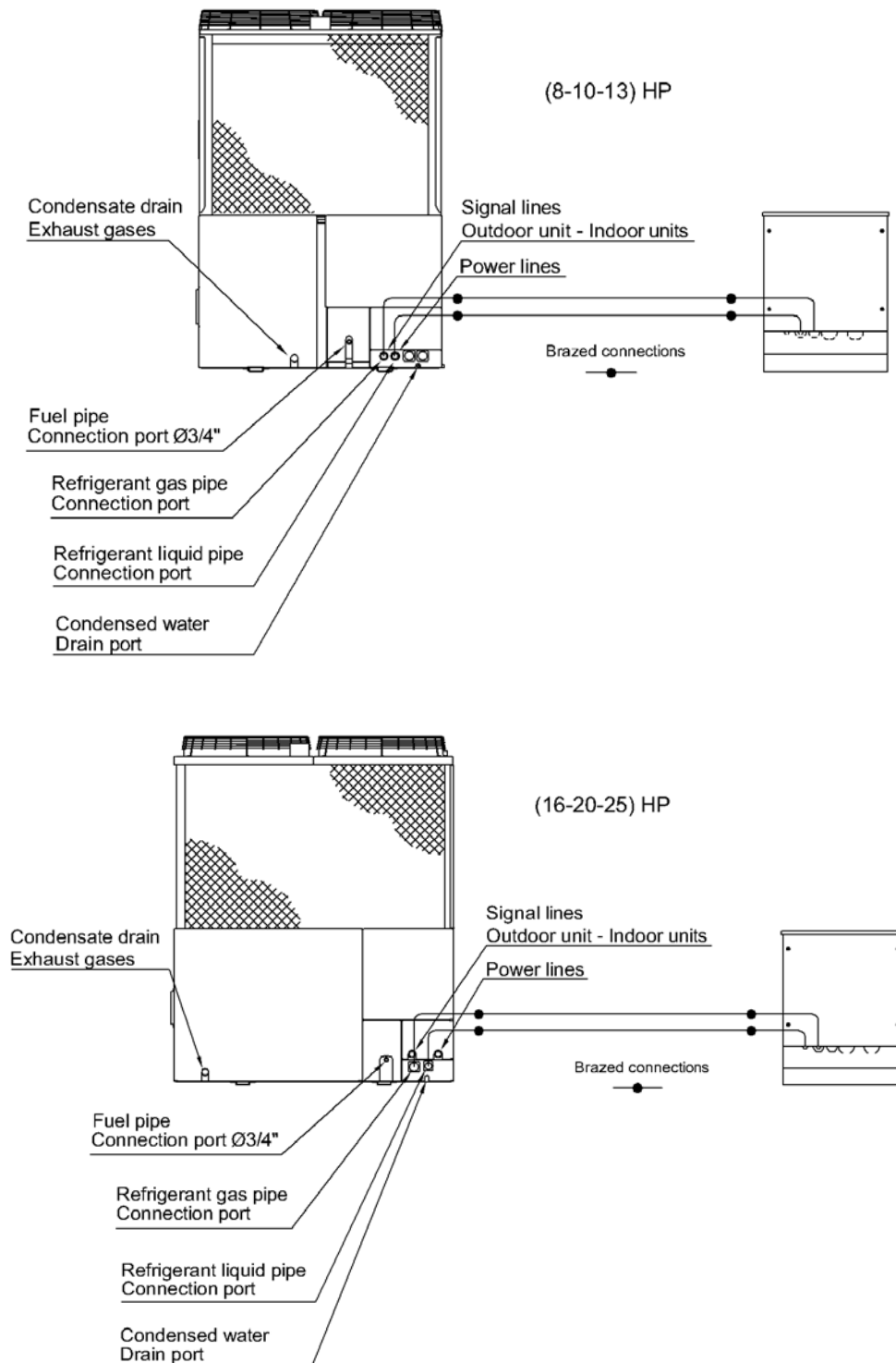


WARNING



All the welding operations on the AWS – GHP refrigerant gas piping must be always performed in accordance with instructions and prescriptions mentioned in the AISIN GHP installation manual (brazing with nitrogen flow).

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.



5.2 Piping specifications



WARNING

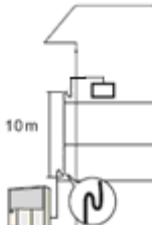
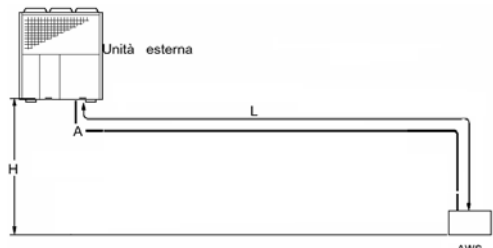


YOSHI AWS refrigerant gas connections diameter differs from the ones prescribed for the refrigerant gas line to the AISIN GHP outdoor unit. Therefore, install proper adapters (not supplied).

Select the proper AWS – GHP pipe diameter according to the table below.

YOSHI AWS AISIN GHP Ubit		Installation item					
		Diameter x Thickness (mm)		Acceptable piping length (m) (relative/actual)	Max. height difference (m)		Compressor oil
		Gas	Liquid		GHP ground	GHP roof	
GHP Multi Type AWS E1/E1J	[8 HP]	ø19,1 x 1,0	ø9,5x 1,0	70/60	20	25	NL10
	[10 HP]	ø22,2 x 1,0					
	[13 HP]	ø25,4 x 1,0	ø12,7 x 1,0				
	[16HP]	ø28,6 x 1,5					
	[20 HP]	ø35 x 1,5	ø15,9 x 1,0				
	[25 HP]						

The refrigerant gas line for the YOSHI AWS unit must be designed and installed in accordance with the prescriptions hereunder listed.

<p>Layout example (in case of AWS connection) If there is a height difference between the locations of indoor and outdoor units, be sure to apply "trap piping" on the vapour line within every 10 m as illustrated.</p> 			
Piping length	Maximum piping length (L) (Relative/Actual)	$L = A$	70/60m or less
Height difference	Height difference between indoor unit and outdoor unit (H)	When GHP outdoor unit is higher than AWS unit	25 m or less
		When GHP outdoor unit is lower than AWS unit	20 m or less



CAUTION



It is forbidden to connect direct expansion indoor units and YOSHI AWS to a single AISIN GHP outdoor unit simultaneously. The YOSHI AWS can be only connected to a specific AISIN GHP outdoor unit for AWS with the same capacity.





WARNING



- **Never exceed the maximum accepted distances when connecting the YOSHI AWS to the AISIN GHP outdoor unit.** Failure to observe this prescription makes the warranty no longer valid and could result in malfunctioning of the YOSHI AWS unit.

5.3 Refrigerant gas extra charge

 CAUTION
 The refrigerant extra charge must be done in accordance with the procedures described in the AISIN GHP installation manual. Failure to observe this prescription makes the warranty no longer no longer valid and could result in malfunctioning of the YOSHI AWS unit.

 WARNING
 Accurately measure the length of the piping and charge with the proper amount of refrigerant gas. Failure to observe this prescription could result in malfunctioning of the YOSHI AWS unit. When charging the refrigerant gas, make sure to wear proper protective gloves. Refrigerant gas leakages can cause frost bites.

- Always charge the refrigerant as a liquid in the tank. In case of charging as a gas may cause a compositional change of the refrigerant, and could result in a performance decline or a breakdown.
- Always use a refrigerant scale when charging the refrigerant. Using a charging cylinder may cause a compositional change of the refrigerant, could result in a performance decline or a breakdown.
- To avoid cross-contamination with other oil types, make sure to separate maintenance tools according to the type of refrigerant used. In particular, never use the gauge manifold and charging hose with other refrigerants than R410a.

After confirming the factory charge on the AISIN GHP label, use the following equation to determine the necessary extra amount of refrigerant gas. Always refer to the liquid pipe lengths and diameters only.

$$\text{Extra charge (kg)} = Q + (L1 \times 0.353) + (L2 \times 0.250) + (L3 \times 0.170) + (L4 \times 0.110) + (L5 \times 0.054) + (L6 \times 0.022)$$

L1: Liquid pipe Ø 22.2 total length (m)
 L2: Liquid pipe Ø 19.1 total length (m)
 L3: Liquid pipe Ø 15.9 total length (m)

L4: Liquid pipe Ø 12.7 total length (m)
 L5: Liquid pipe Ø 9.5 total length (m)
 L6: Liquid pipe Ø 6.4 total length (m)

The value of the variable parameter Q depends on the capacity of the AISIN GHP outdoor unit connected to the YOSHI AWS. Use the table below as reference.

Outdoor unit	Installation type	Q (kg)
8 – 10 – 13 HP	Q	0
16 – 20 – 25 HP	Q	+ 1,5

6 Refrigerant circuit and hydraulic circuit

6.1 Cooling mode

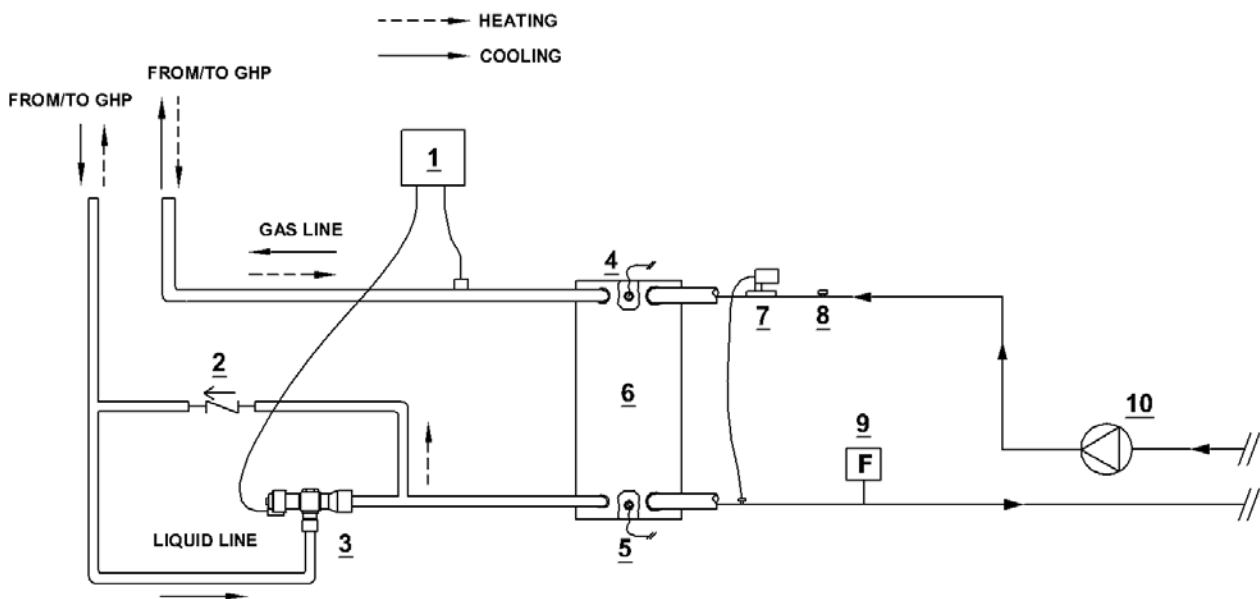
The refrigerant (R410A) processed by the GHP flows through electronic expansion valve and enters the lower part of the AWS unit heat exchanger at low pressure. The gas evaporates in the plate heat exchanger by taking heat from the counter current water flow. It goes back to the GHP as overheated steam. The outdoor unit fans create an air flow through the heat exchanger and thus the refrigerant can condense.

At the same time, the water coming from the buffer tank is cooled and pumped again into the primary circuit by the AWS built in pump. Flow switch, pressure switch and anti freeze thermo sensor overlook the water temperature never to drop inside the heat exchanger. In fact, water may freeze and the heat exchanger can be damaged.

6.2 Heating mode

The refrigerant (R410A) processed by the GHP enters the upper part of the AWS unit heat exchanger as high pressure overheated steam. The gas condenses in the plate heat exchanger by ceasing heat to the co current water flow. It goes back to the GHP as high pressure liquid, through the bypass pipe. The two outdoor unit expansion valves divide the return flow, reducing its pressure. The GHP manages the evaporation through the heat exchanger and the heat recovery.

At the same time, the water coming from the buffer tank is heated and pumped again into the primary circuit by the AWS built in pump.



- | | |
|-----------------------------------|--|
| 1) PID controller | 6) Plate heat exchanger |
| 2) Check valve | 7) Pressure difference switch |
| 3) Electronic expansion valve | 8) Air vent valve |
| 4) Water inlet temperature probe | 9) Flow switch |
| 5) Water outlet temperature probe | 10) Pump (not included in the version E1J) |

7 Electric wire installation

7.1 Wiring with GHP outdoor unit

Power supply specifications are always mentioned on the YOSHI AWS product label. Always check the power supply before installing the unit. Always perform the wiring in accordance with the prescriptions listed in the paragraph 0 of the present manual.



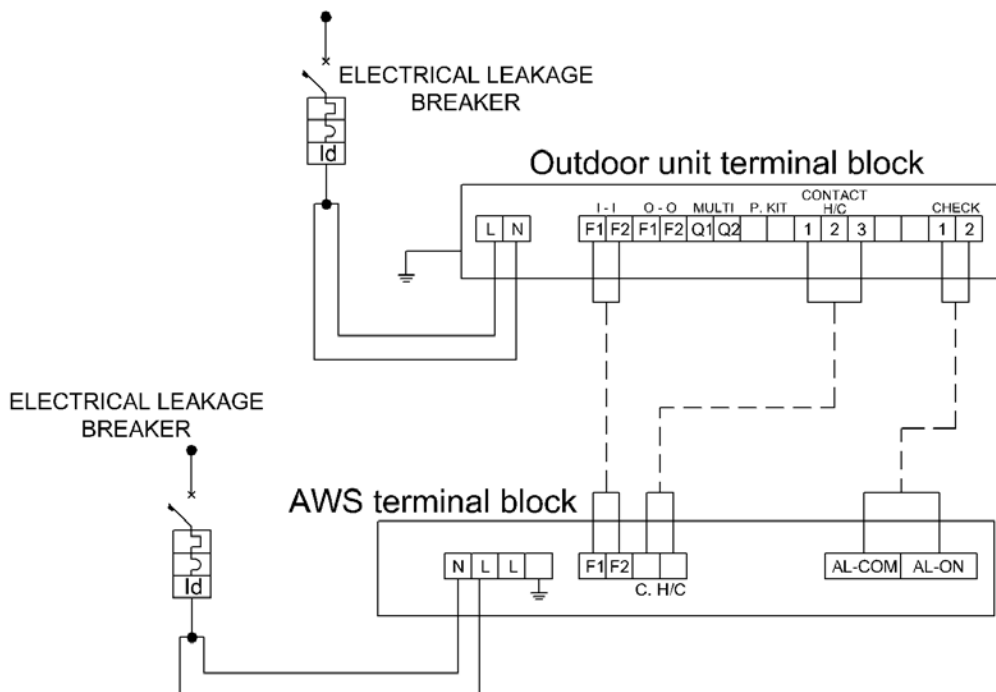
WARNING



- **NEVER** connect the YOSHI AWS unit to a common circuit with other appliances. Use a dedicated branch circuit protected by an earth leakage breaker. Failure to observe this prescription could result in malfunctioning of the unit and hazards for people and/or things.
- **NEVER** ground the unit by connecting the wires to water or gas piping or to a lightning rod.
- **NEVER** switch on the power supply before the final commissioning is performed by the AISIN Authorised Service Centre. Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.



- **All electrical installation work must be performed by specialised technical personnel in accordance with the local and national installation standards. A declaration of conformity must be provided by the installer.** Failure to observe this prescription could result in electrical shock, fire or other hazards.
- **Switch off the main circuit breaker or power meter during the electrical installation work of the YOSHI AWS unit.**
- **Always use the designated cable for wiring, including the ground wiring, according to the national standards.**
- **Always check the power supply specifications on the YOSHI AWS unit.** Failure to observe this prescription could result in malfunction and/or damage to the YOSHI AWS unit.

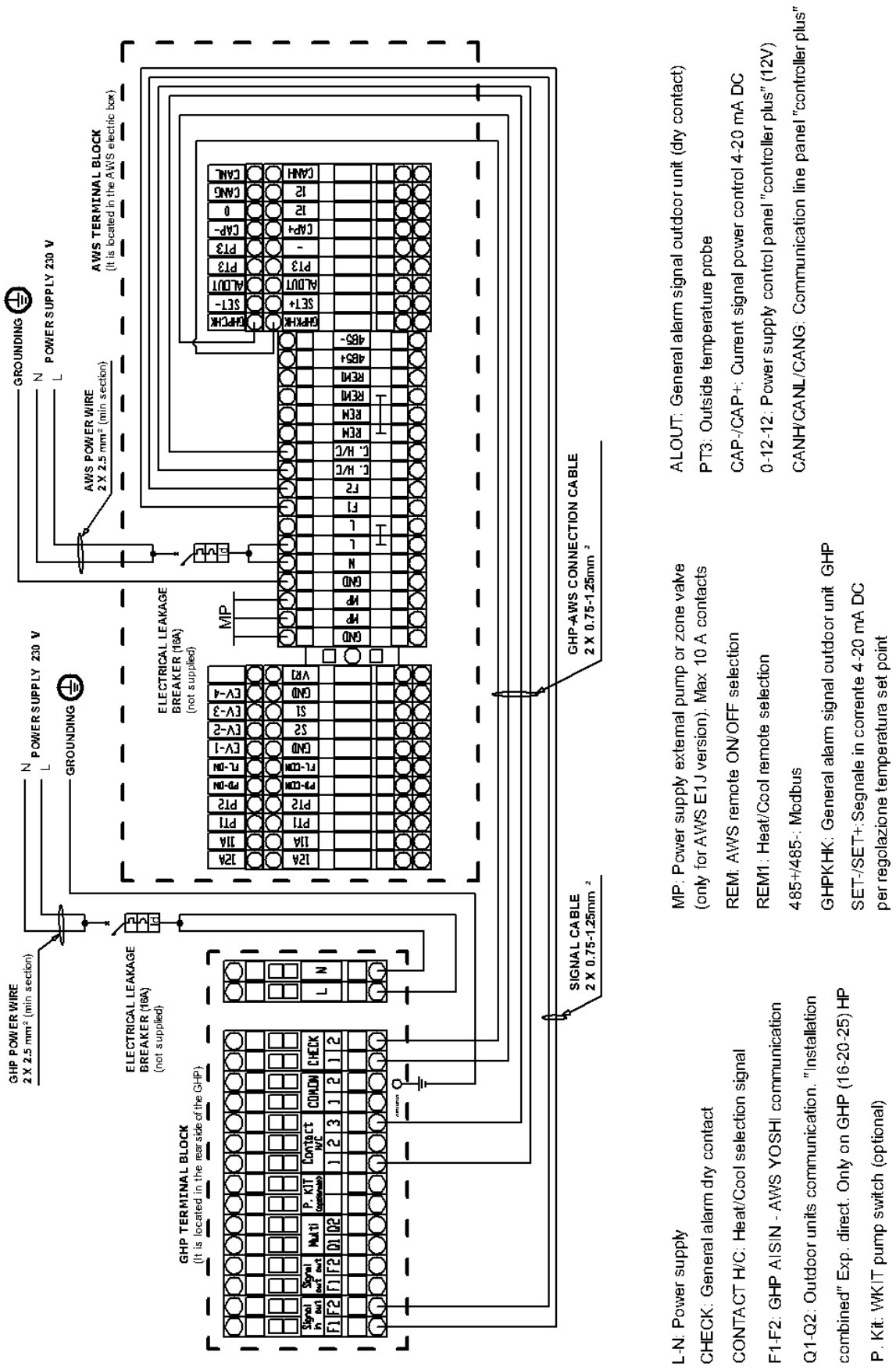


I – I: communication line outdoor unit – AWS.

O – O : communication line outdoor unit – outdoor unit (NOT AVAILABLE WITH AWS).

Never supply the unit with three phase power.

7.2 Detailed wiring diagram



- L-N: Power supply
- CHECK: General alarm dry contact
- CONTACT H/C: Heat/Cool selection signal
- F1-F2: GHP A/SIN - AWS YOSHI communication
- Q1-Q2: Outdoor units communication. "Installation combined" Exp. direct. Only on GHP (16-20-25) HP
- P. Kit: WKIT pump switch (optional)
- MP: Power supply external pump or zone valve (only for AWS E1J version). Max. 10 A contacts
- REM: AWS remote ON/OFF selection
- REM1: Heat/Cool remote selection
- 485+/485-: Modbus
- GHP/KHK: General alarm signal outdoor unit GHP
- SET-/SET+: Segnale in corrente 4-20 mA DC per regolazione temperatura set point
- ALOUT: General alarm signal outdoor unit (dry contact)
- P T3: Outside temperature probe
- CAP-/CAP+: Current signal power control 4-20 mA DC
- 0-12-12: Power supply control panel "controller plus" (12V)
- CANH/CANL/CANG: Communication line panel "controller plus"

8 Accessories hydronic module

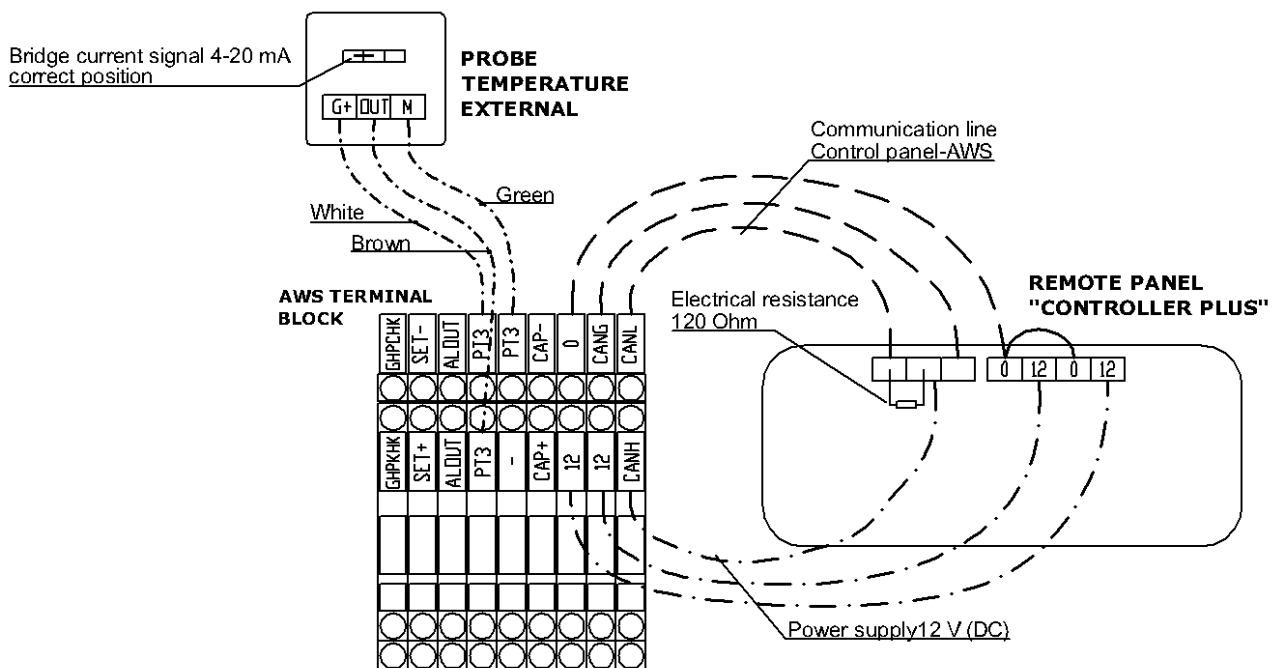
8.1 Control panel Controller Plus

Control panel for the remote management of the hydronic module. It is possible to control and management of a single module from a remote location. The shielded cable connecting the panel to the module will have a maximum length of 60 meters.

8.2 External temperature probe

The probe allows the adjustment of the flow temperature of the module in function of the temperature of the outside air by means of a 4-20 mA current signal.

8.3 Detailed wiring diagram control panel Controller Plus and external temperature probe



9 Control panel



WARNING



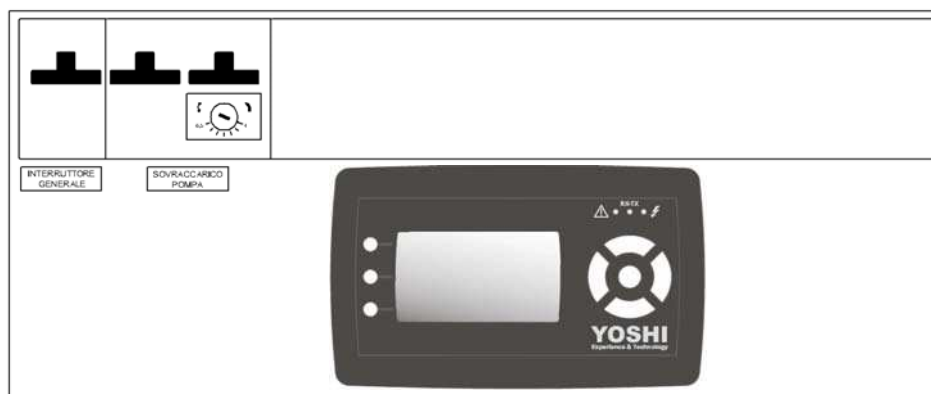
- **NEVER change the factory settings (cooling and heating set point) of the water thermostat.** Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.
- **NEVER disconnect or bypass the YOSHI AWS built in safety devices for a forced operation of the unit.** Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.
- **NEVER change the factory settings of the remote controller fitted in the control panel.** Failure to observe this prescription could result in malfunction and/or damage to the unit.
- **NEVER switch on the power supply before the final commissioning is performed by the AISIN Authorised Service Centre.** Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.



- **Some operation parameters of the YOSHI AWS can be changed under request to the AISIN Authorised Service Centre.** Failure to observe this prescription makes the warranty no longer valid.
- **In case of multiple units installations it is possible to manage a proportional distribution of the capacity by an external optional device.**
- **The built in water thermostat always indicates the return temperature of the primary circuit. NEVER SET THE VALUE BELOW 11°C.**

The YOSHI AWS control panel is represented below.

In case of AISIN GHP outdoor unit malfunction, the error code will be displayed on the remote controller fitted in the YOSHI AWS control panel. Check the failure type on the AISIN GHP installation manual.



The water thermostat factory settings are:

- COOL mode: T set cool = 8°C
- HEAT mode: T set heat = 44°C

The YOSHI AWS has the following safety built in devices:

- **Pressure difference switch:** the AISIN GHP outdoor unit stops in case of missing pressure difference between inlet and outlet of the pump.
- **Flow switch:** the AISIN GHP outdoor unit stops in case of insufficient water flow in the primary circuit.
- **Antifreeze thermostat:** In the summer the AISIN GHP outdoor unit stops in case of water temperature in the primary circuit below +5°C. In the winter the pump is started when the water temperature is below +5 °C and, if necessary, also the GHP is started.
- **Pump overload switch:** the YOSHI AWS pump stops in case of overheating of the pump itself.

10 Adjustment

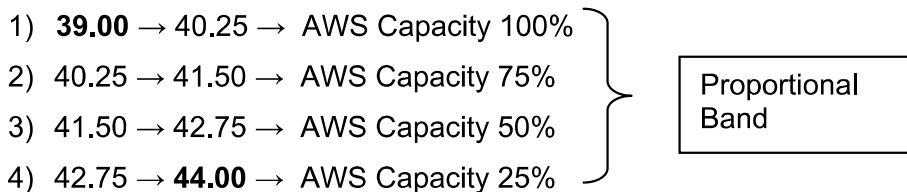
9.1 Adjusting the hydronic module

The AWS modulates the power as a function of the return water temperature.

In the temperature range in which the adjustment takes place (proportional band), the output power varies from 100% to 25%.

Example of modulation in heating

Below is represents a band of 5 ° C divided in the intervals:



- 44 ° C **temperature set point is factory set**
- (44 - 5) ° C = 39 ° C is the **minimum temperature of the band**
- 5 ° C is **the proportional band set at the factory**

With these settings, the hydronic unit modulate the power from 100% to 25% in the temperature range between 39 ° C and 44 ° C.

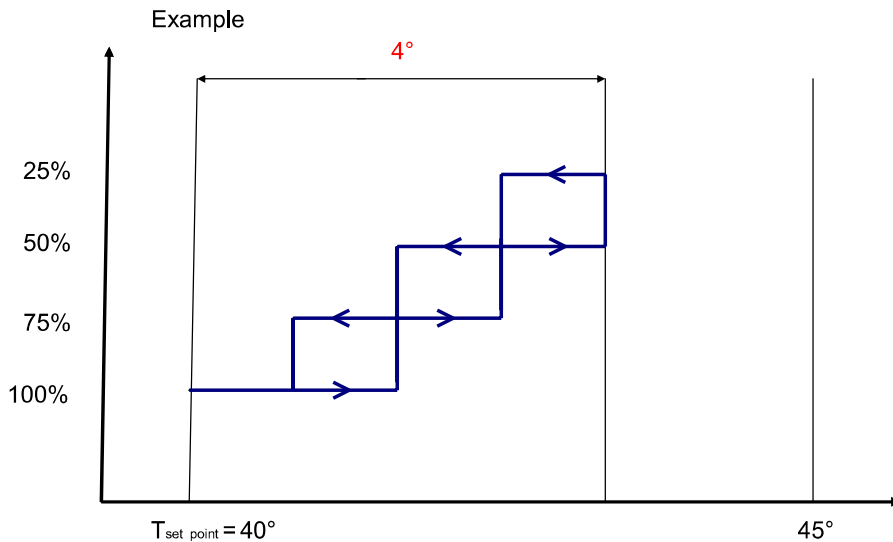
When the temperature rises above 44 ° C the hydronic unit **6 controls make temperature** over a period of one minute (one every 10 seconds). If in each control the temperature will be greater or equal to 44 ° C (that is the set point temperature), the module will stop.

If the temperature will be less than 39 ° C the hydronic module will provide the 100% power.

If you want to correspond to a percentage of the module power hydronic a range of different temperatures have to change the set point temperature or the proportional band.

Stop pump hydronic module

If you want to stop the pump hydronic module also must install a temperature sensor on the tank.



Example of modulation in cooling

Below is represents a band of 5°C divided in the intervals:

1) 13.00 → 11.75 → AWS Capacity S 100%	}	Proportional Band
2) 11.75 → 10.50 → AWS Capacity 75%		
3) 10.50 → 9.25 → AWS Capacity S 50%		
4) 9.25 → 8.00 → AWS Capacity 25%		

- 8°C temperature set point is factory set
- $(8 + 5)^\circ\text{C} = 13^\circ\text{C}$ is the maximum temperature of the band
- 5°C is the proportional band set at the factory

With these settings, the hydronic unit modulate the power from 100% to 25% in the temperature range between 13°C and 8°C .

When the temperature falls below 8°C the hydronic unit **6 controls make temperature** over a period of one minute (one every 10 seconds). If each control the temperature will be less than / equal to 8°C (ie the set point temperature), the module will stop.

If the temperature will be greater than 13°C the hydronic module will provide the 100% power.

If you want to correspond to a percentage of the module power hydronic a range of different temperatures have to change the set point temperature or the proportional band.

Stop pump hydronic module

If you want to stop the pump hydronic module also must install a temperature sensor on the tank.

9.2 Connectivity hydronic module

AWS E1: Connectivity Systems Single



- Additional sensor on the tank or on the return of the secondary circuit to optimize the operation
- User Control Panel for the management and control of plant

AWS E1: Multiple Connectivity Systems

Creating a GHP + AWS + Adjustment



- Management and verification of operation in one place easily accessible
- Ability to use climatic curves (temperature control depending on the weather)
- Optimum choice of the number of AWS function of the power produced

11 Installation layouts

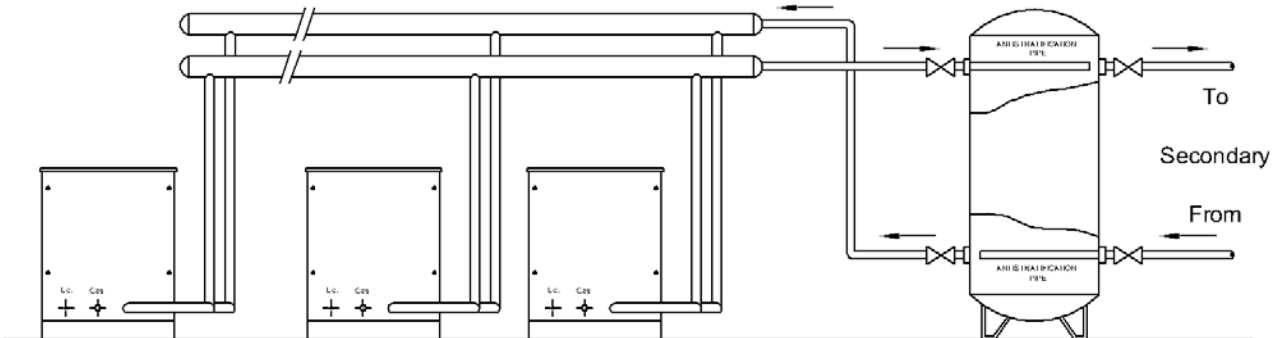


CAUTION

The installation layouts below are just representative of suggested possibilities. Always refer to technical qualified personnel for designing. Further information is available under request by AISIN technical department or on the website www.aisin.it.

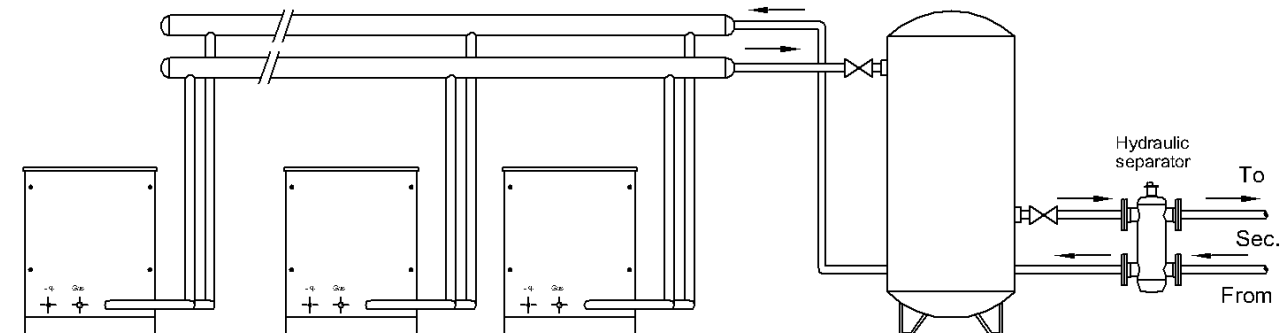
11.1 Central storage tank installation

This layout is recommended by the manufacturer for fan-coil installations. To optimise the operation of the AISIN GHP. When choosing this layout always make sure that the water flow of the primary and the secondary circuits are balanced. Moreover, the storage tank must be provided with anti stratification pipes.



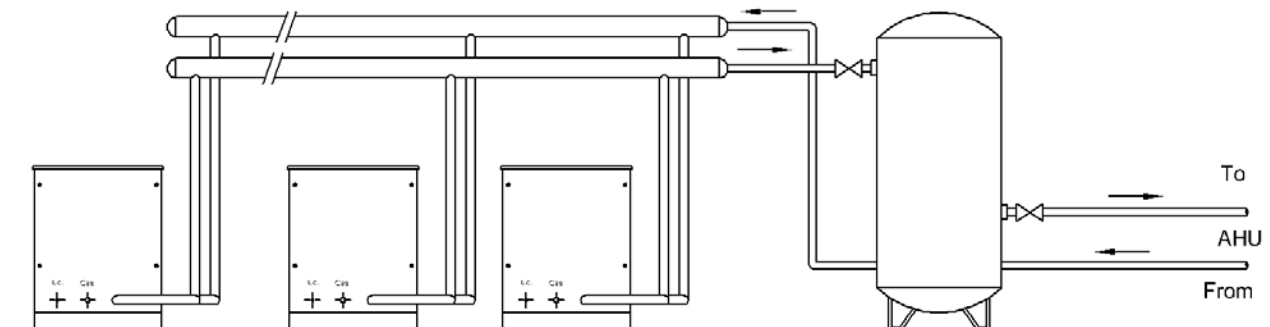
11.2 Hydraulic separator installation

When choosing this layout, make sure that the static pressure of the water pump fitted in the YOSHI AWS unit is enough to win the total pressure drop of the primary circuit. In this case it is possible to install horizontal storage tanks.

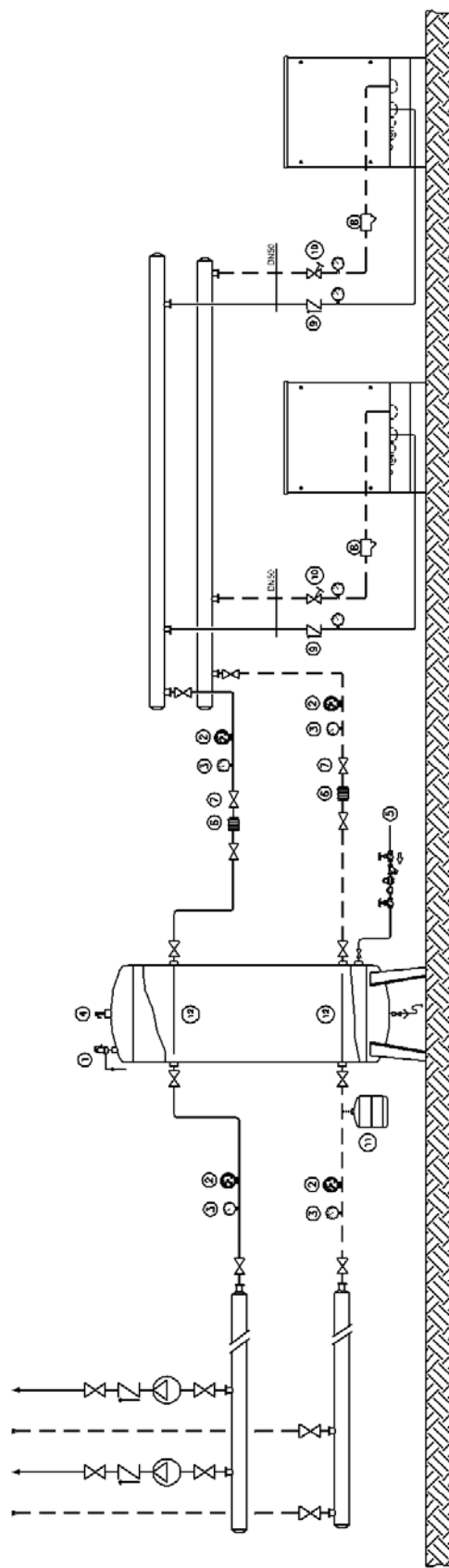


11.3 Single pump installation

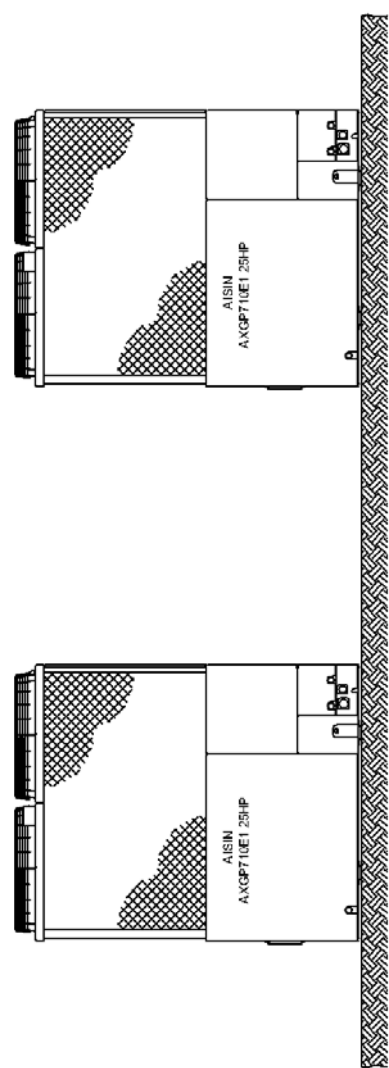
This layout is recommended by the manufacturer for Air Handling Unit (AHU) installations. Make sure that the static pressure of the water pump fitted in the YOSHI AWS unit is enough to win the total pressure drop of the whole circuit.



11.4 HVAC installation layout AWS E1 (Internal Pump)

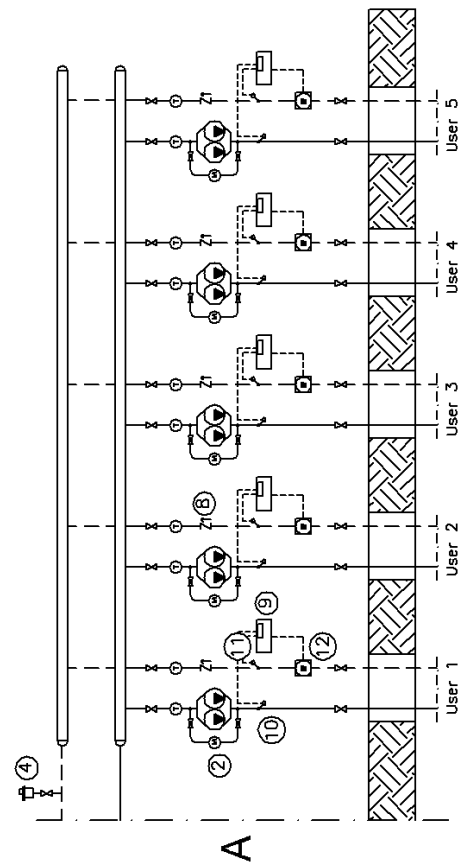
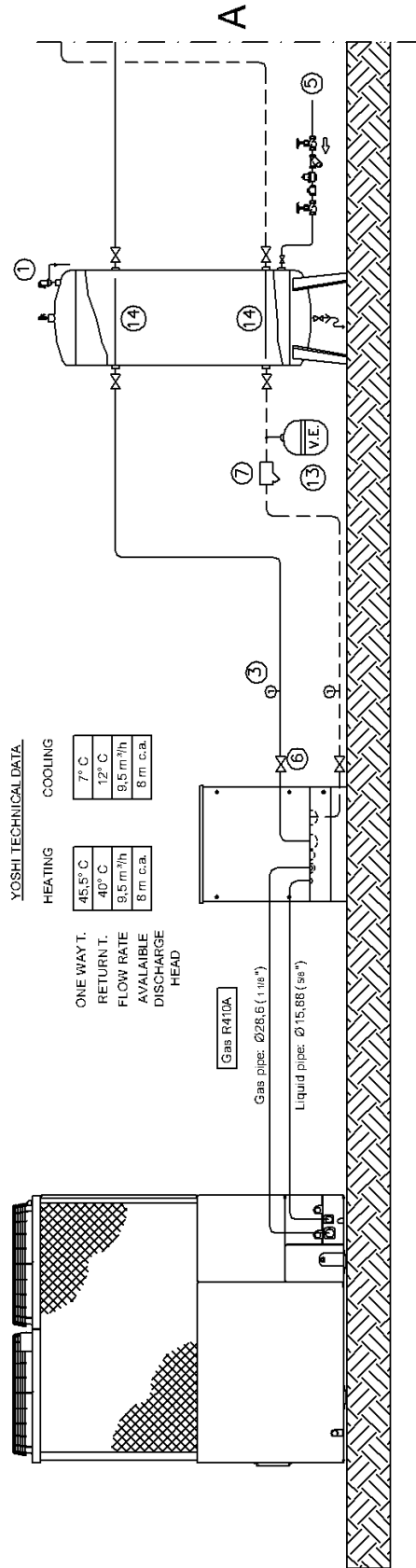


KEY LIST	
1	EMERGENCY RELIEF VALVE
2	DRAUGHT GAUGE
3	THERMOMETER
4	FLOAT VALVE
5	TOPPING UP
6	COUPLING
7	CUT OFF VALVE
8	FILTER
9	CHECK VALVE
10	BALANCING VALVE
11	EXPANSION VESSEL
12	ANTISTRATIFICATION PIPE



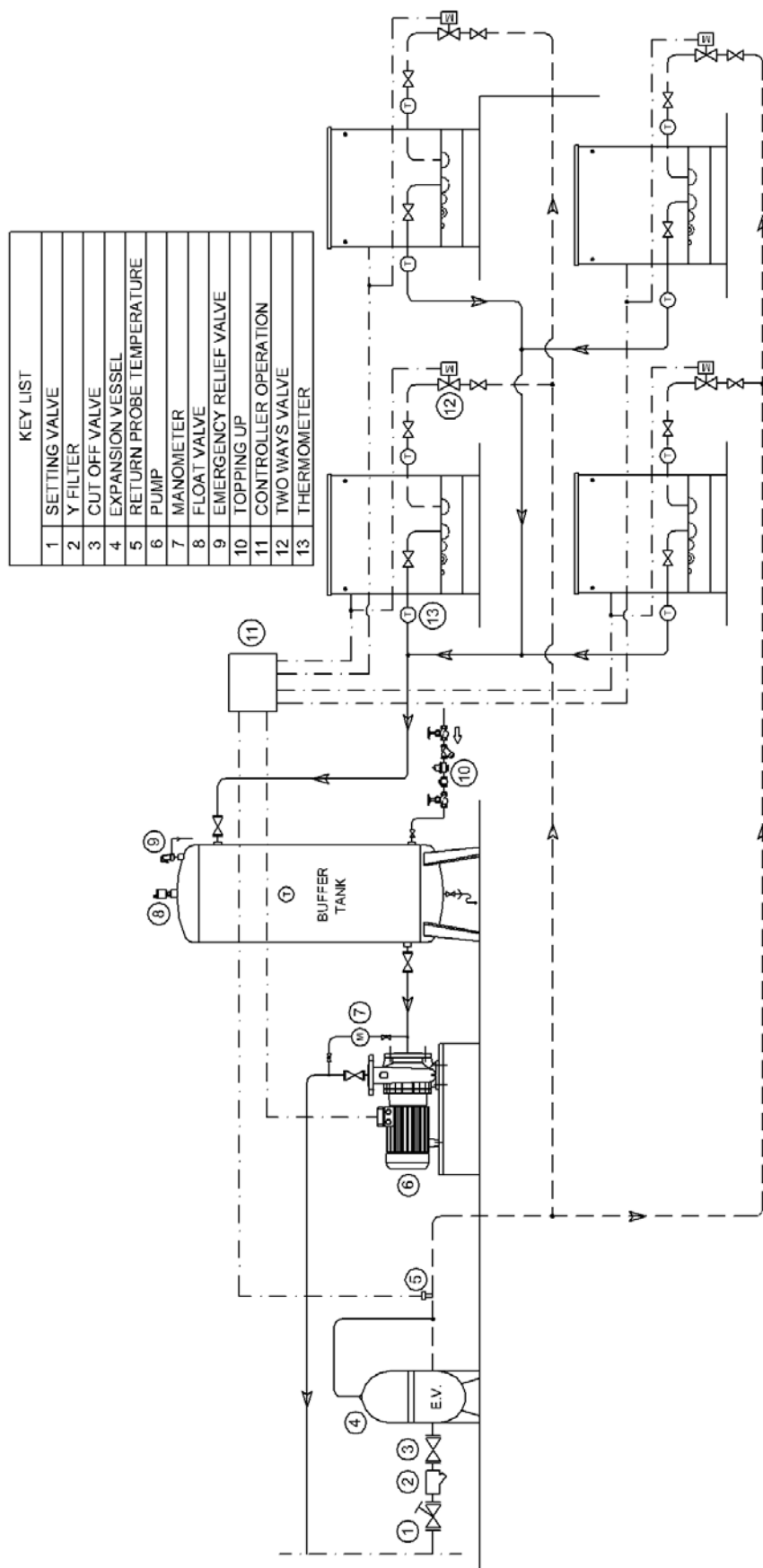
11.5 HVAC installation AWS E1 (Internal Pump) with proportional distribution of consumption

GHP 20 HP TECHNICAL DATA
 Rated cooling capacity: 56.0 kW
 Rated heating capacity: 63.0 kW
 Gas consumption:
 cooling: 39.6 kW
 heating: 39.8 kW
 Power supply: 230 V single phase
 Power consumption: 1.1 kW



KEY LIST	
1	EMERGENCY RELIEF VALVE
2	DRAUGHT GAUGE
3	THERMOMETER
4	FLOAT VALVE
5	TOPPING UP
6	CUT OFF VALVE
7	FILTER
8	CHECK VALVE
9	ENERGY DATA RECORDING DEVICE
10	ONE WAY PROBE TEMPERATURE
11	RETURN PROBE TEMPERATURE
12	WATER COUNTER
13	EXPANSION VESSEL
14	ANTI STRATIFICATION PIPE

11.6 HVAC installation AWS E1J with Pump External variable flow rate



12 Trouble diagnosis (reference)



WARNING



- **NEVER stop the GHP – AWS system by switching off the power supply during the operation.** Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.
- **NEVER switch on the YOSHI AWS power supply after switching on the GHP outdoor unit.** Failure to observe this prescription could result in malfunction and/or damage to the unit.

The table below shows all the possible failures indicated directly by the YOSHI AWS control panel.

ALARM DESCRIPTION	ALARM CODE	POSSIBLE CAUSES	COUNTERMEASURE
Flow Switch Alarm	A1S1	<ul style="list-style-type: none"> • Water filter clogged • Low water flow 	<ul style="list-style-type: none"> • Clean the “Y” filter • Check the pressure water pipes • Check the flow switch
Pressure Difference Switch Alarm	A2S1	<ul style="list-style-type: none"> • Air in the pipes • Pump malfunction 	<ul style="list-style-type: none"> • Remove the air • Replace the pump • Check the pressure differential switch (compare the state with the flow switch)
GHP Alarm	A3S1		<ul style="list-style-type: none"> • Check the code displayed on the GHP. Press UP for the current alarms and DOWN for those in STAN-BY
Flow Switch Alarm Tampering	A4S1		<ul style="list-style-type: none"> • Check the wiring of the flow switch. • Check the operation of the flow switch. • Check the layout of plant (other pumps make circulate water when not expected)
Antifreeze Alarm	A5S1		<ul style="list-style-type: none"> • Check the operation of the pump, the flow switch and pressure differential switch • Verify that the offset values in summer operation are not excessive • Check the temperature probes and their wiring
Return Temperature Sensor Alarm	A6S1		<ul style="list-style-type: none"> • Check the probe and the wiring
Antifreeze Alarm Temperature Probe	A7S1		<ul style="list-style-type: none"> • Check the probe and the wiring
Alarm Expansion Valve Driver	A8S1		<ul style="list-style-type: none"> • Use the Carel display. Press “help” and check which component is in alarm
Pump overload	A9S1		<ul style="list-style-type: none"> • Lift the “ pump overload” switch Located on the Electric box

The table below shows all the error codes displayed on the remote controller fitted in the AWS control panel. In case of malfunction contact the AISIN Authorised Service Centre that usually maintains the GHP outdoor unit.

R/C AWS	Blinking indication (ON doesn't blink) (OFF led off)			GHP outdoor unit display	Type of failure	Possible cause
	Error code	Led ON/OFF	TEST Disp.			
A0	X	X	X	63-n	External input	<ul style="list-style-type: none"> External protection input signal stops the unit Remote controller local setting failure
A1	X	X	X	20-n	Indoor unit PC board	<ul style="list-style-type: none"> PC board defective EEPROM setting error
A3	X	X	X	95-n	Drain lines - AWS flow switch	<ul style="list-style-type: none"> Direct Expansion version – indoor unit drain pump malfunction . AWS version – flow switch or antifreeze thermostat switched off.
A6	X	X	X	15-n	Indoor unit fan motor	<ul style="list-style-type: none"> Fan motor blocked Harness disconnection
A7	ON	X	X	35-n	Indoor unit swing flap motor	<ul style="list-style-type: none"> Swing flap motor malfunction Cam mechanism failure
A9	X	X	X	21-n	Indoor unit PC board	<ul style="list-style-type: none"> LEV malfunction Harness disconnection
AF	ON	OFF	X	30-n	Drain pipe	<ul style="list-style-type: none"> Improper drain piping installation (inverse draft) Pipe clogged
AH	ON	OFF	X	31-n	Air cleaning device	<ul style="list-style-type: none"> Indoor unit circuit board malfunction Air cleaning device failure (optional)
AJ	X	X	X	22-n	Capacity setting	<ul style="list-style-type: none"> Capacity setting failure Missing capacity setting adapter (replacement of PCB)
C4	X	X	X	18-n	Indoor unit temperature sensors	<ul style="list-style-type: none"> Heat exchanger temperature sensor failure Improper harness connection
C5	X	X	X	19-n		<ul style="list-style-type: none"> Gas pipe temperature sensor failure Improper harness connection
C9	X	X	X	97-n		<ul style="list-style-type: none"> Direct Expansion version - Intake air temperature sensor failure AWS version – Resistors group failure Improper harness connection
CA	X	X	X	98-n		<ul style="list-style-type: none"> Exhaust air temperature sensor failure Improper harness connection
CJ	ON	OFF	X	17-n	R/C temperature sensor	<ul style="list-style-type: none"> R/C temperature sensor failure Improper harness connection
U3	X	X	X	-	Test run	<ul style="list-style-type: none"> Test run operation
U4	X	X	X	-	Communication	<ul style="list-style-type: none"> Outdoor unit power supply OFF Outdoor unit – indoor unit transmission error
U5	X	X	X	1-n	Communication	<ul style="list-style-type: none"> Duplicating main remote controller connection Transmission error
	OFF	ON	OFF	-	Remote controller PC board	<ul style="list-style-type: none"> Remote controller PC board failure Remote controller setting failure
U8	X	X	OFF	-	Remote controller PC board	<ul style="list-style-type: none"> Transmission error between main and sub remote controller
U9	X	X	X	-	Communication	<ul style="list-style-type: none"> Transmission error between two indoor units Transmission error between outdoor and indoor unit
UC	ON	ON	ON	36-n	Central remote controller	<ul style="list-style-type: none"> Address duplication of central remote controller Air-net address duplication of indoor units
UE	X	X	X	23-n		<ul style="list-style-type: none"> Transmission error between indoor unit and central remote controller
UF	X	X	X	24-n	Communication	<ul style="list-style-type: none"> Communication error between indoor and outdoor unit Improper wiring
UH	X	X	X	-		<ul style="list-style-type: none"> Indoor unit address setting failure
E1	X	X	X	40-0~2	Outdoor unit PC board	<ul style="list-style-type: none"> EEPROM failure or program failure
	X	X	X	84-3,4		<ul style="list-style-type: none"> Outdoor unit PC board malfunction Transmission error between microcomputer
E3	X	X	X	86-0	Operation failure	<ul style="list-style-type: none"> Refrigerant High pressure alarm
E4	X	X	X	88-0		<ul style="list-style-type: none"> Refrigerant Low pressure alarm
E7	X	OFF	X	86-10~23	Outdoor unit fan	<ul style="list-style-type: none"> Heat exchanger fan (1,2,3) failure DCBL board failure
EA	X	X	X	57-0	4-way valve	<ul style="list-style-type: none"> 4-way valve failure Harness disconnection
EC	X	X	X	80-0	Operation failure	<ul style="list-style-type: none"> Engine coolant overheating (temperature >105°C)
EH	X	X	X	80-10~30	Engine coolant pump	<ul style="list-style-type: none"> Engine coolant pump failure DCBL board failure

R/C AWS	Blinking indication (ON doesn't blink) (OFF led off)			GHP outdoor unit display	Type of failure Error code	Possible cause
	Led ON/OFF	TEST Disp.	Unit No.			
Error code						
F3	X	X	X	91-0	Operation failure	• Compressor discharge temperature too high (>120°C)
F4	X	X	X	87-0,2		• Compressor intake temperature too high (> 40°C)
FE	X	X	X	81-0	Engine oil	• Abnormal engine oil pressure • Engine oil level insufficient
FF	X	X	X	58-0	Compressor oil	• Refrigerant oil supply valve failure • Improper harness connection
FJ	X	X	X	47-0	Catalyser	• Catalyser overheating (where provided)
H3	X	X	X	76-0	High pressure switch	• High pressure switch malfunction • Improper harness connection
H4	X	X	X	88-2	Low pressure switch	• Low pressure switch malfunction • Improper harness connection
H9	X	X	X	61-0	Outdoor unit temperature sensors	• Outdoor temperature sensor malfunction • Improper harness connection
H9	X	X	X	61-1		• Outdoor temperature sensor short circuit
HC	X	X	X	70-0		• Engine coolant temperature sensor malfunction • Improper harness connection
HC	X	X	X	80-1		• Engine coolant temperature sensor short circuit
HJ	X	X	X	80-2		Engine coolant
HF	X	OFF	X	EE-0	Maintenance	• Periodic maintenance alert
J3	X	X	X	78-1~5	Outdoor unit temperature sensors	• Compressor discharge temp sensor disconnected
	X	X	X	91-2~7		• Compressor discharge temp sensor short circuit
J4	X	X	X	54-0		• Super cooling heat ex. temp. sensor disconnected
	X	X	X	54-1		• Super cooling heat ex. temp. sensor short circuit
	X	X	X	55-0,1		• Accumulator outlet temp. sensor disconnected
J5	X	X	X	55-2,3		• Accumulator outlet temp. sensor short circuit
	X	X	X	53-0,1		• Compressor intake temp. sensor disconnected
J6	X	X	X	53-2,3		• Compressor intake temp. sensor short circuit
	X	X	X	65-0		• Heat exchanger liquid pipe temp. sensor disconnected • Improper harness connection
J7	X	X	X	65-2		• Heat exchanger liquid pipe temp. sensor short circuit
	X	X	X	66-0		• Sub heat exchanger liquid pipe temp. sensor disconnected
J8	X	X	X	66-1		• Sub heat exchanger liquid pipe temp. sensor short circuit
	X	X	X	67-0		Outdoor unit temperature sensors
JA	X	X	X	67-2		• Outdoor liquid pipe temp. sensor short circuit
JA	X	X	X	73-0,1	Outdoor unit pressure sensors	• High pressure sensor malfunction
JC	X	X	X	88-4	• Low pressure sensor malfunction	
JE	X	X	X	71-0	Oil pressure sw.	• Oil pressure switch disconnected
JJ	X	X	X	72-0	Outdoor unit temperature sensors	• Engine room temp. sensor disconnected
	X	X	X	72-1		• Engine room temp. sensor short circuit
	X	X	X	72-6		• Catalyser temp. sensor disconnected
LE	X	X	X	75-1~3	Igniter voltage	• Igniter voltage too low or too high
LF	X	X	X	84-0	Operation failure	• Engine start failure – missing supply gas
LJ	X	X	X	75-0		• Unwanted engine stop
P8	X	X	X	74-1~4 74-6 82-0~1	Engine	• Insufficient starting engine speed (starter failure) • Abnormal engine speed (gas mixer failure)
PE	X	X	X	74-7	Gas valves	• Supply electro magnetic gas valves failure
PF	X	X	X	60-0	Starter	• Starter failure
U0	X	X	X	88-5	Ref. Piping	• Refrigerant gas empty
U7	X	X	X	4-0~6	Communication	• master / slave outdoor unit communication failure
UA	X	X	X	43-0,1 44-n	Indoor unit number	• Over connection of capacity units • Too many indoor units connected

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