Function Guide to the GOLD version E/F/G, SMART Link+

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1. General

The SMART Link+ function is designed to be used for optimized control of heating and/or cooling production on one or more GOLD air handling units together with one or more cooling and/or heating producers.

A large number of different types of Swegon products including water chillers, heat pumps and multifunction machines with liquid-borne media can be used.

All controls in GOLD for liquid-borne heating and cooling can be freely combined and used in the function.

The function requires GOLD software version 1.32 or a later version.

This function guide describes only the functions, connections and settings that are specific to SMART Link+.

Individual functions such as All Year Comfort, Combi coils, Xzone and more are described in the Operation and maintenance instructions as well as separate function guides and manuals.

2. Material specification

Air handling unit (1-10 units)	**GOLD RX/PX/CX/SD**
Water chiller/Heat pump, Reversible heat pump, Multifunction unit with liquid-borne media and control system iPro.* (1-2 pcs. for heating production, 1-2 pcs. for cooling production).**	**Omicron, Zeta, Tetris, Kappa, Omega**
Air heater, liquid	**TBLA, TCLA, TBLF, TCLF, TCLK**
Air cooler, liquid	**TBKA, TCKA, TCLK, TCEK**
Valve set	**TBVL, TBVA**
Set of electrical connections	**TBLZ-1-27-a**
Pump set	**TBPA**
Xzone	**TBLZ-3-50**
All Year Comfort (AYC)	**TBLZ-2-59**
Control, air heater for preheating	**TBLZ-2-53-0**
Control combi coils, IQlogic+ (1 or 2 pcs.)	**TBIQ-3-2**

* Functions for variable liquid flows and pressure such as Flowzer and Hyzer-E can ideally be combined with SMART Link+. These functions are described in separate documentation.

** By combining SMART Link+ with the MultiLogic function several heating and cooling producers can be used. This is described in separate documentation.

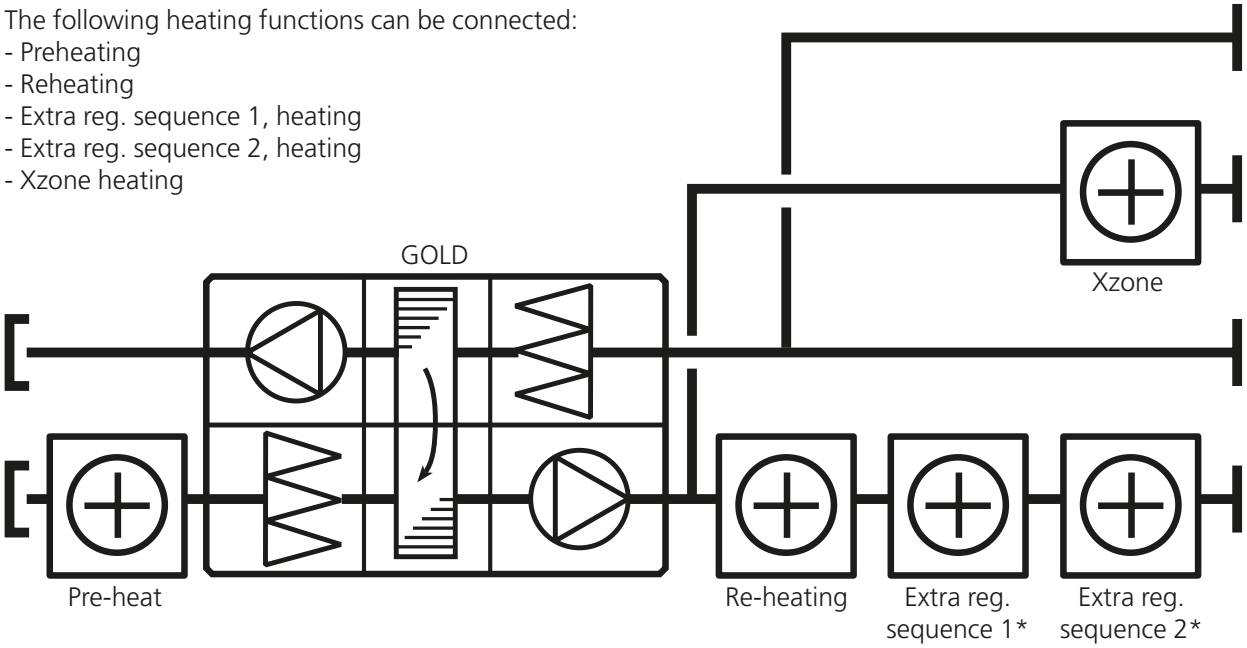
3. Function

3.1 General

Up to 10 GOLD air handling units, in any variant, can be integrated in the SMART Link+ function. All regulation functions for liquid-borne heating and cooling are possible to use and combine.

3.1.1 Heating functions

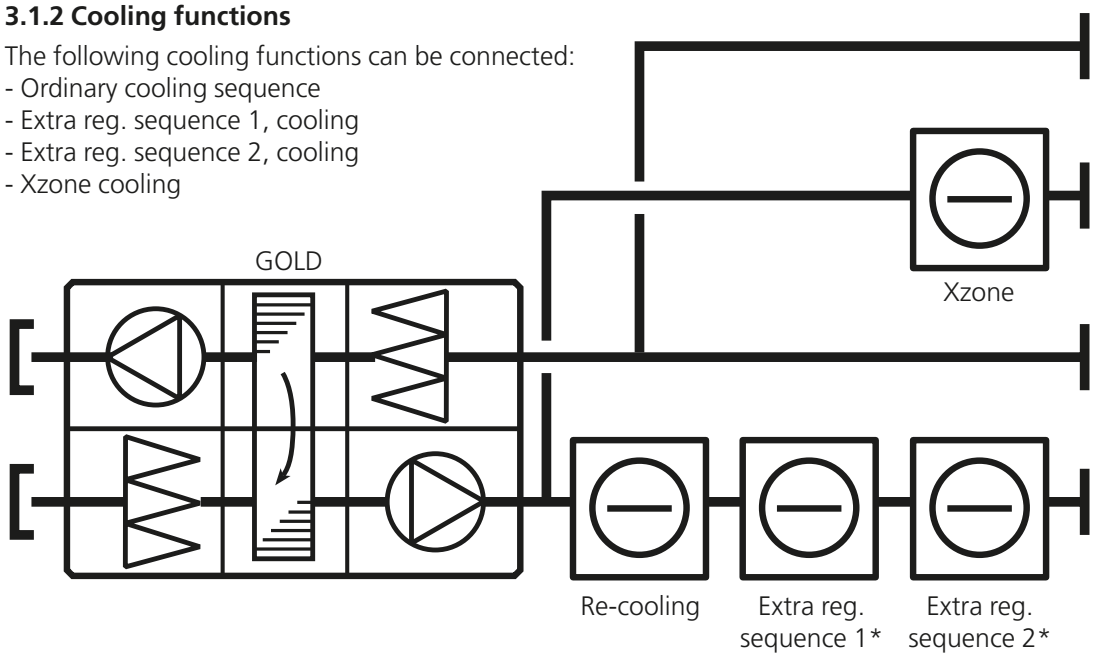
The following heating functions can be connected:
- Preheating
- Reheating
- Extra reg. sequence 1, heating
- Extra reg. sequence 2, heating
- Xzone heating



** Extra regulation sequences 1 and 2 are common to heating, cooling and combi coils.*

3.1.2 Cooling functions

The following cooling functions can be connected:
- Ordinary cooling sequence
- Extra reg. sequence 1, cooling
- Extra reg. sequence 2, cooling
- Xzone cooling



** Extra regulation sequences 1 and 2 are common to heating, cooling and combi coils.*

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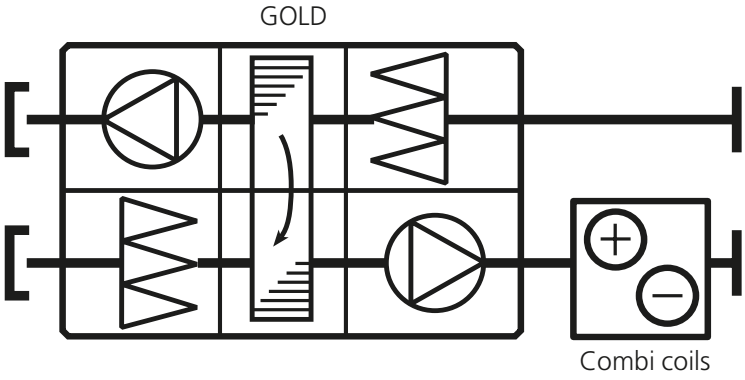
3.1.3 Combi coils

With a common air heater/air cooler, the combi coils function can also be used.

Extra regulation sequence 1 or 2 can be used for a reversible heat pump.

For a four-pipe system, with separate heat pump and water chiller or multifunction unit, both extra regulation sequences 1 and 2 are used.

Other regulation sequences can be freely combined with the combi coils function.

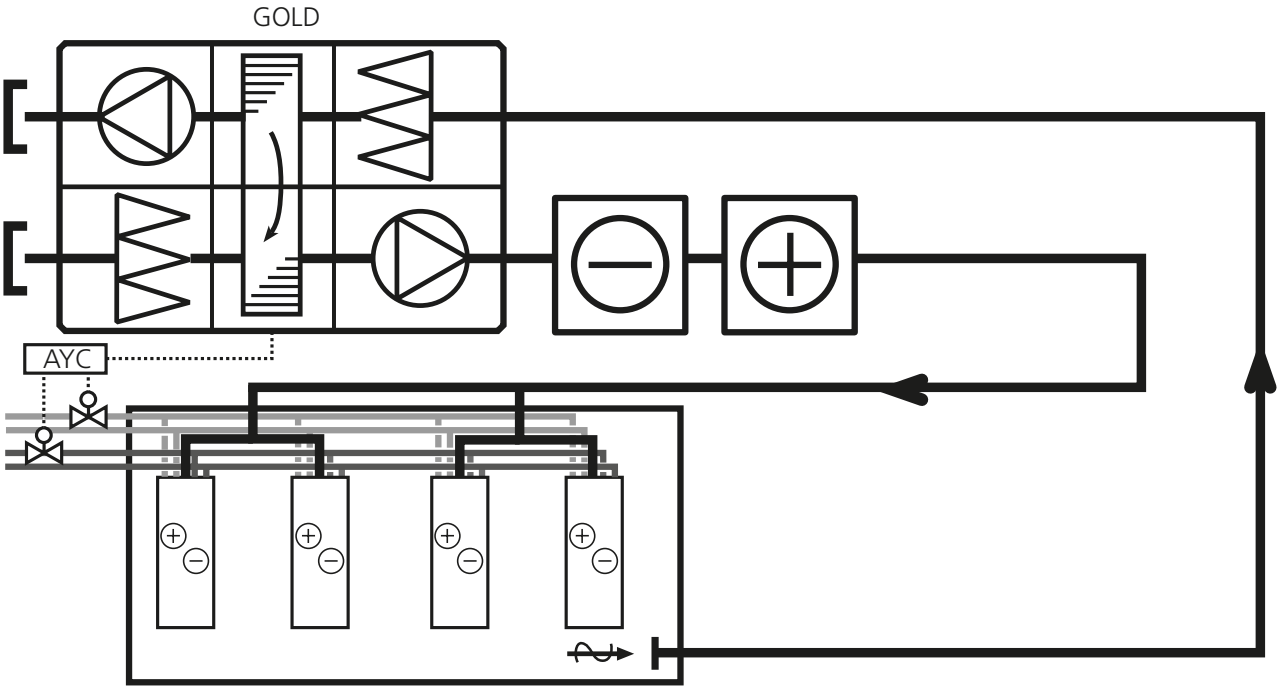


3.1.4 All Year Comfort (AYC)

The GOLD air handling unit has a separate control to maintain the supply flow temperature on the cooling medium/heating medium.

The control can regulate all types of liquid-borne systems such as climate beams, chilled beams and radiators.

The following can be connected:
- All Year Comfort (AYC) heating
- All Year Comfort (AYC) cooling



3.2 Heating and cooling production

It is possible to use up to 2 producers for heating production and up to 2 producers for cooling production (together with the MultiLogic function several producers can be used, see separate documentation). Cooling and heating producers can be separate water chillers or heat pumps, reversible heat pumps or multifunction units.

Communication between the GOLD air handling unit and the different cooling and heating producers takes place via Modbus TCP/IP.

Several GOLD units with different types of cooling and heating sequences can be connected to the same cooling and/or heating producer.

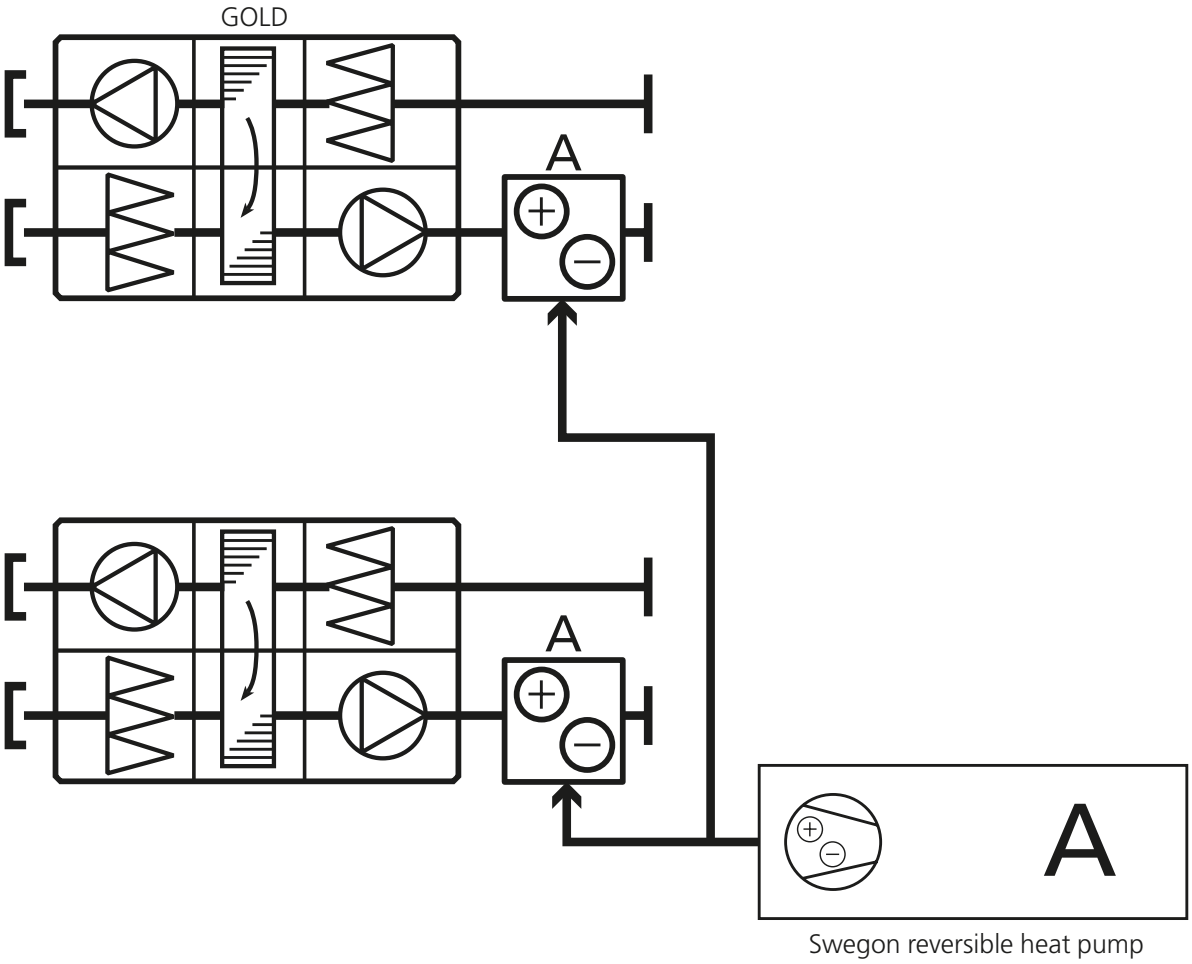
Each producer is set with the address "Cooling producer A" or "Cooling producer B", and #Heating producer A" or "Heating producer B".

Cooling and heating producers that are to be used as the GOLD air handling unit's air heater or air cooler can be selected individually by setting A or B for all connected functions on the GOLD air handling unit's hand-held terminal.

In this way, a specific common circuit is created where one producer and one or more functions are included

Examples of different systems are presented below and on the following pages.

Example 1. Reversible heat pump produces heating and cooling to 2 GOLD air handling units.



Swegon reversible heat pump

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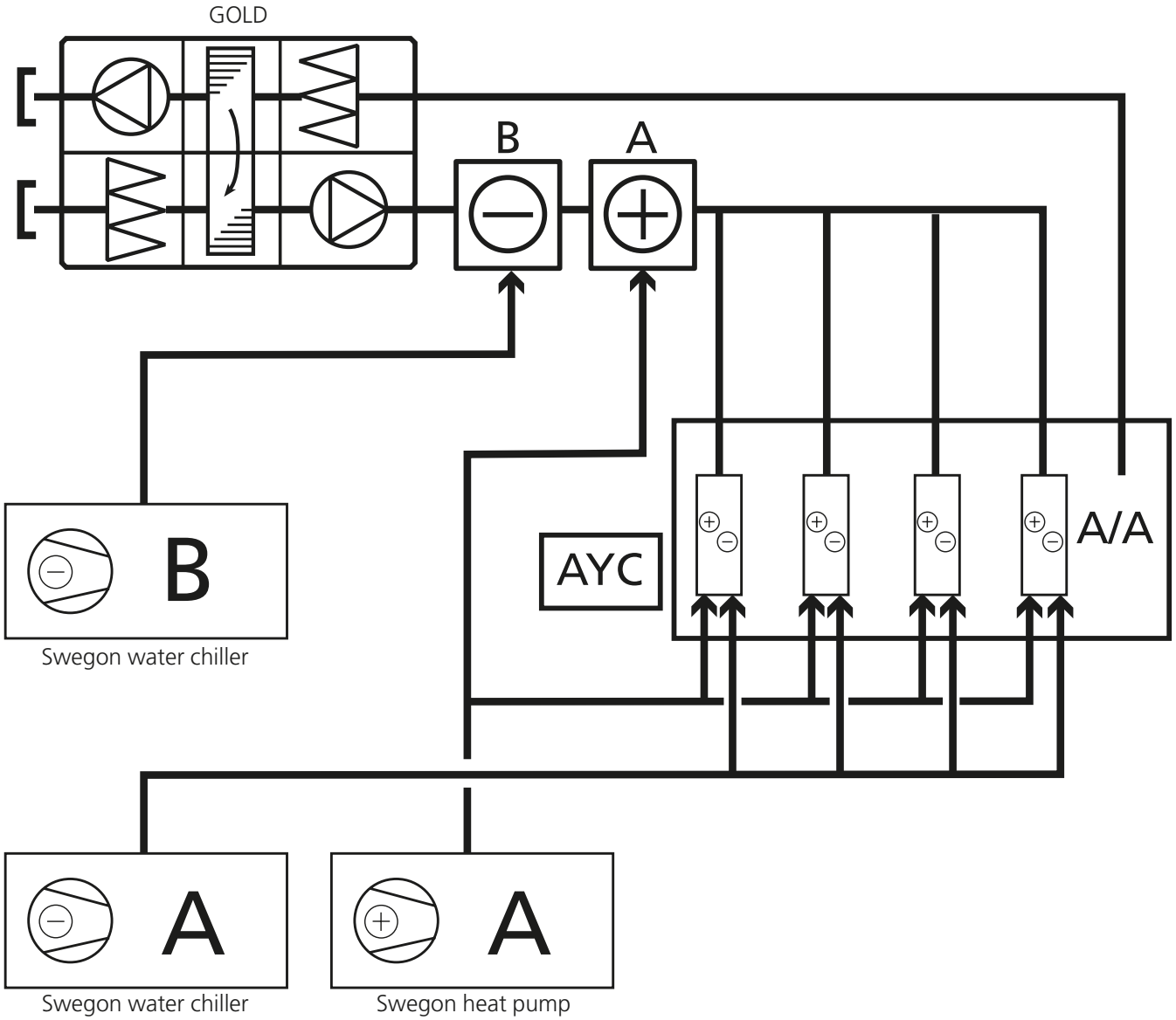
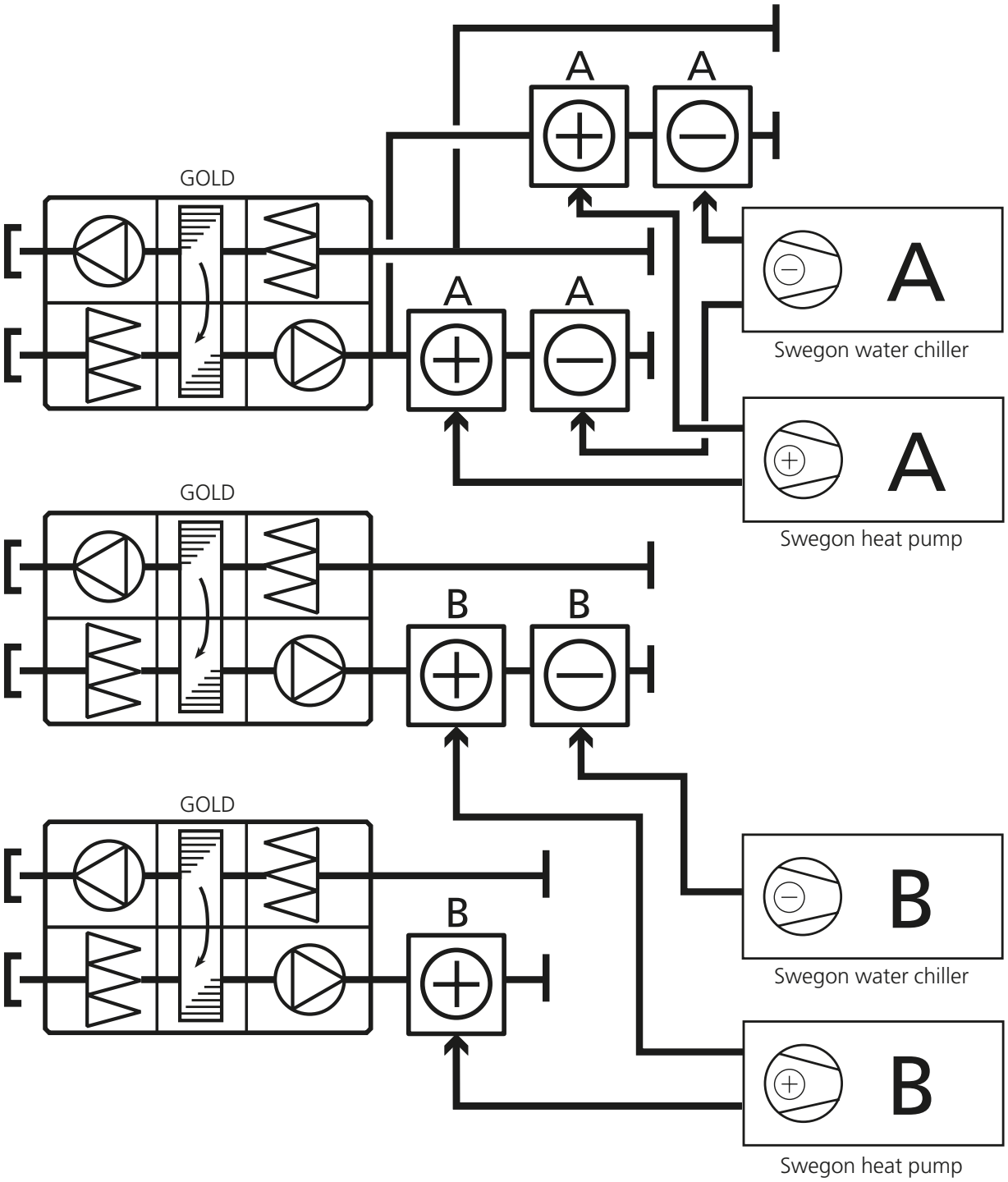
Example 2. Water chiller and heat pump that produces cooling and heating to a climate beam system via AYC and heats the primary air from GOLD. Separate water chiller for cooling and dehumidifying the primary air from GOLD.



Example 3. Two water chillers and two heat pumps serve three GOLD air handling units of which one unit has an extra zone.



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3.3 Optimization function

Water chillers/heat pumps are more efficient if the difference between the outdoor temperature and the liquid temperature is as small as possible. This means that the energy consumption to produce heating and cooling will be lower.

A liquid-borne air heater or air cooler is selected according to the largest capacity requirement that occurs during the days of the year.

The supply of energy is controlled by a valve that opens and closes depending on the capacity requirement. By attempting to keep as many valves in the system as open as possible, the liquid temperature for cooling and heating can be controlled according to current needs. A significant energy saving can be made by controlling the cooling medium to as high temperature as possible and the heating medium to as low temperature as possible.

3.4 Control of liquid temperature from cooling/heating producer

Each individual cooling/heating is controlled by the GOLD air handling unit according to the requirement that exists for each regulation.

All governing functions such as frost guard and heat retention are active and are not affected by the SMART Link+ function.

By controlling the setpoint for the liquid temperature from the cooling/heating producer, the position of the valve can be optimized and the liquid temperature can be kept as low as possible for the heating requirement and so high as possible for the cooling requirement.

3.4.1 Heating production

A basic temperature for heating production is set to a setpoint of 30 °C in the GOLD air handling unit.

There is a reference sensor fitted in the heating producer, that measures the heating medium temperature and regulates this as well as maintaining the required temperature from GOLD. The heating medium is then used for the connected air heater and secondary heating medium in the system.

Each connected heating valve for each function then regulates according to the requirement and ordinary settings.

The SMART Link+ function reads the reference temperature and if necessary offsets the setpoint on the set basic temperature so that the position of the valve comes between 70-90% (factory setting). If the valve position falls below 70%, the setpoint of the heating medium temperature is reduced and if it goes over 90% the setpoint of the heating medium temperature is increased.

If several valves are connected to the same heating producer, the valve and the heating medium circuit will require the highest heating medium temperature to be governing. Other valves are permitted to go to a more closed position.

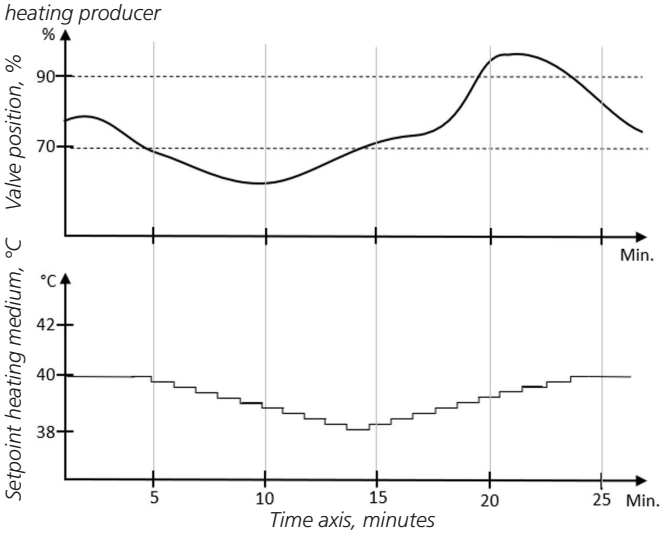
If the available capacity is below 75% on any of the connected heating medium circuits, an information text appears on the hand-held terminal's instrument panel.

If any setpoint in any of the GOLD air handling unit's regulation is higher than the setpoint specified for the heating medium temperature from the heating producer, this setpoint will be set as the new setpoint for the heating medium temperature. It can, for example, be a room controller that sets a supply air setpoint of 35 °C or that the setpoint for AYC is 45 °C.

There is a slope function so that optimization of the reference temperature in the heating producer does not occur too quickly. If the valve is outside of 70-90%, the setpoint for the heating medium temperature is changed by 0.2K every 60 seconds (factory setting). A limit value of 2K (factory setting) ensures that the deviation between the required heating medium temperature and the true heating medium temperature does not become too large. If this occurs, the sloping function temporarily ceases until the required temperature is within the limit value again.

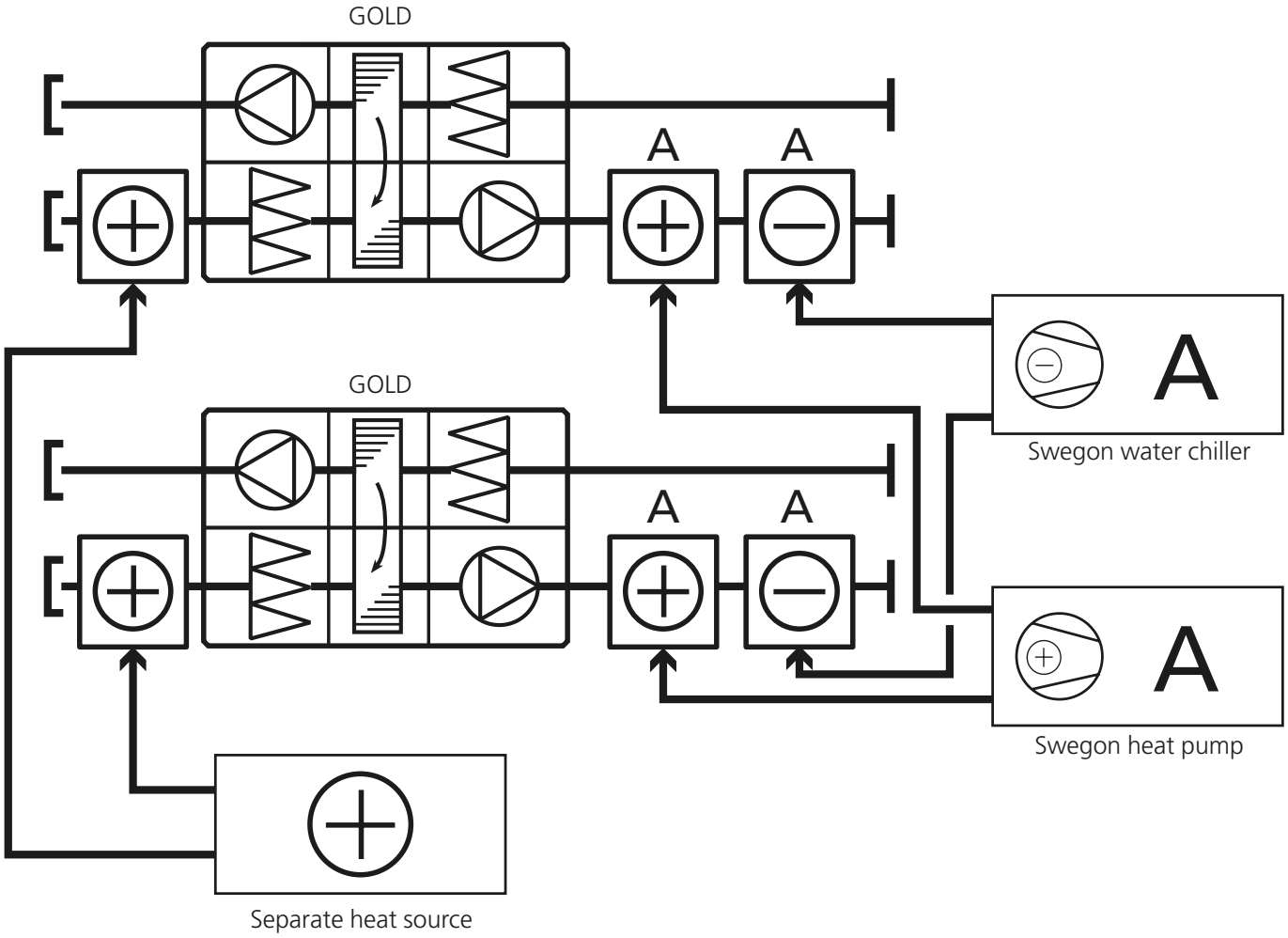
All of the aforementioned settings are common for the heating producer A and B.

Example. The position of the heating valve changes the setpoint on the heating medium temperature to the heating producer



When a heating medium circuit is not needed, the system excludes this from optimization as long as there is no heating requirement. This ensures the system is always working with the lowest possible temperature at any given moment. This is especially effective when an installation has differently sized temperatures, for example, air heater (+45 °C) in the GOLD air handling unit together with floor heating (+35 °C).

Each individual heating medium circuit that is controlled by GOLD can be included or excluded from the optimization. This enables separate heat sources such as district heating or heating from another source to be integrated in the system, see the example below.



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3.4.2 Cooling production

A basic temperature for cooling production is set to a setpoint of 12°C in the GOLD air handling unit.

There is a reference sensor fitted in the cooling producer, that measures the cooling medium temperature and regulates this as well as maintaining the required temperature from GOLD. The cooling medium is then used for the connected air cooler and secondary cooling medium in the system.

Each connected cooling valve for each function then regulates according to the requirement and ordinary settings.

The SMART Link+ function reads the reference temperature and if necessary offsets the setpoint on the set basic temperature so that the position of the valve comes between 70-90% (factory setting). If the valve position falls below 70%, the setpoint of the cooling medium temperature is increased and if it goes over 90% the setpoint of the cooling medium temperature is reduced.

If several valves are connected to the same cooling producer, the valve and the cooling medium circuit will require the lowest cooling medium temperature to be governing. Other valves are permitted to go to a more closed position.

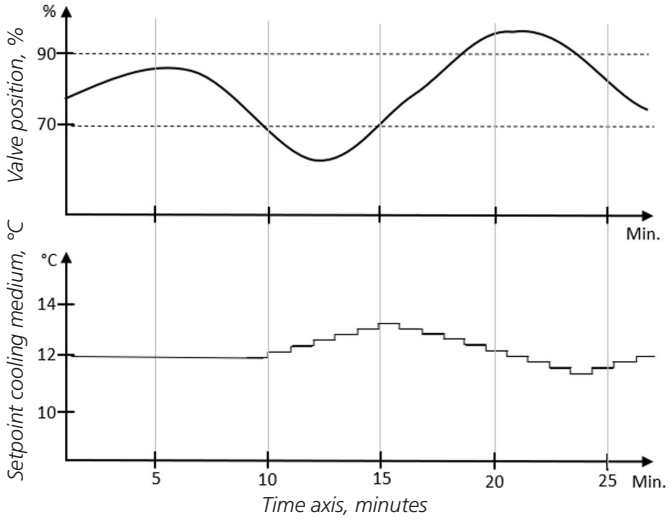
If the available capacity is below 75% on any of the connected refrigerant circuits, an information text appears on the hand-held terminal's instrument panel.

If any setpoint in any of the GOLD air handling unit's regulation is lower than the setpoint specified for the cooling medium temperature from the cooling producer, this setpoint will be set as the new setpoint for the cooling medium temperature. It can, for example, be a dehumidifying controller that sets a supply air setpoint of 10 °C or that the setpoint for AYC is 10 °C.

There is a slope function so that optimization of the reference temperature in the cooling producer does not occur too quickly. If the valve is outside of 70-90%, the setpoint for the cooling medium temperature is changed by 0.2K every 60 seconds (factory setting). A limit value of 2K (factory setting) ensures that the deviation between the required cooling medium temperature and the true cooling medium temperature does not become too large. If this occurs, the sloping function temporarily ceases until the required temperature is within the limit value again.

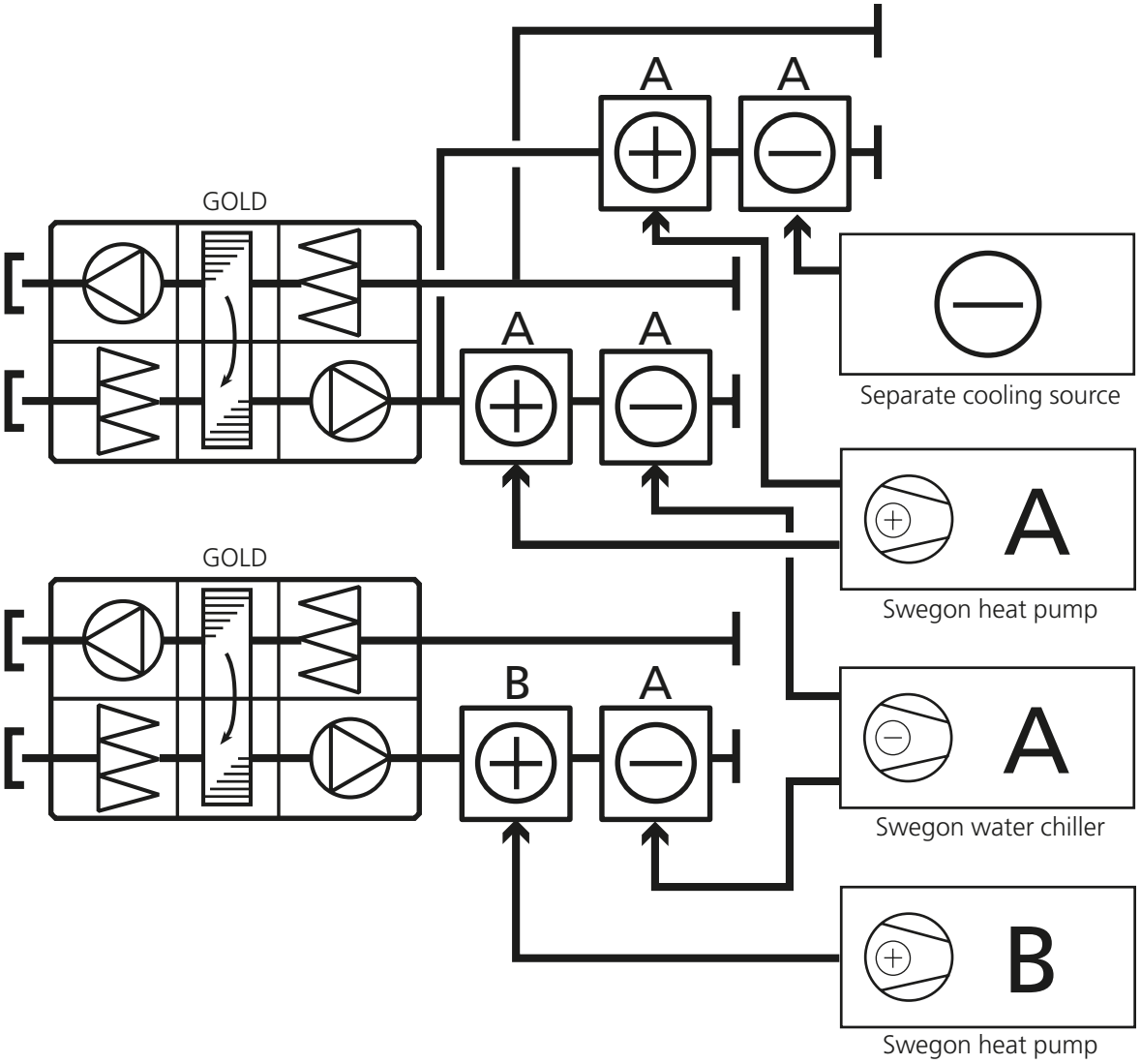
All of the aforementioned settings are common for the cooling producer A and B.

Example. The position of the cooling valve changes the setpoint on the cooling medium temperature to the cooling producer



When a cooling medium circuit is not needed, the system excludes this from optimization as long as there is no cooling requirement. This ensures the system is always working with the highest possible temperature at any given moment. This is especially effective when an installation has differently sized temperatures, for example, air cooler (+8 °C) in the GOLD air handling unit together with chilled beams (+14 °C).

Each individual cooling medium circuit that is controlled by GOLD can be included or excluded from the optimization. This enables separate cooling sources such as district cooling or cooling from another source to be integrated in the system, see the example below.



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3.4.3 Reversible heat pump

The combi coils function can be used with a reversible heat pump. The Xzone and All Year Comfort functions can, to a limited extent, also be used.

The outdoor temperature is measured in the reversible heat pump. Whether the reversible heat pump needs to produce heating or cooling is determined by a number of different conditions:

- If only one function is used with a GOLD air handling unit, it is the heating or cooling requirement from this that controls the reversible heat pump.

- If several functions and/or several GOLD air handling units are used and all functions have a cooling requirement, the reversible heat pump will produce cooling.

- If several functions and/or several GOLD air handling units are used and all functions have a heating requirement, the reversible heat pump will produce heating.

- If several functions and/or several GOLD air handling units are used and specific functions have a heating requirement and others have a cooling requirement, the reversible heat pump will produce heating or cooling depending on the outdoor temperature. Valves that have an opposite need will then be run to the closed position.

When the Xzone and All Year Comfort functions are used together with a reversible heat pump, the cooling valve will be blocked when heating is produced and the heating valve will be blocked when cooling is produced.

4. Sizing

4.1 Accessories heating/cooling GOLD

Sizing of the liquid-borne air heater/air cooler and valves is performed using the AHU-Design sizing software. The air heater's heating medium temperature is sized normally for 45/40 °C and the air cooler's cooling medium temperature is sized normally for 7/12°C.

A secondary pump type, pump set TBPA, is recommended for air heaters that have frost guard and heat-retaining functions.

4.2 All Year Comfort (AYC)

All Year Comfort is used to maintain a supply flow temperature on the cooling and heating media to all types of liquid-borne systems, for example, climate beams, chilled beams, radiators, etc.

In these systems a separate circulation pump is required, and here pump set TBPA is recommended. Ideally valve set TBVA is used to control the liquid flow.

Valves and circulation pumps are sized with regard to the capacity requirement and liquid temperatures for the system in question.

4.3 Heating/cooling producer

Water chiller/heat pump, reversible heat pump and multifunction unit sizing is carried out using the CH Design sizing software. The type and size of the system and the total capacity requirement give the type and size of the heating/cooling producers.

5. Connections

5.1 Electrical connections

All component parts of the system must be wired and connected according to the installation instructions, manuals and product sheets that are available for each component part.

Electrical connections must be wired in accordance applicable provisions by a qualified electrician.

5.2 Communication

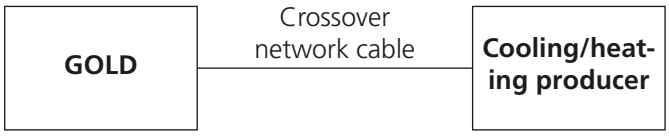
Communication between the GOLD air handling unit and the heating and cooling producers takes place via Modbus TCP/IP.

A standard twisted pair network cable type CAT5 with RJ45 connectors is used for connection between the units and network. The network cable can be shielded or unshielded.

Connection can be done in three ways, see below and the next page.

5.2.1 Direct connection between two units

Use a crossover network cable and connect directly to each unit.



Crossover network cable

1	——	3
2	——	6
3	——	1
6	——	2

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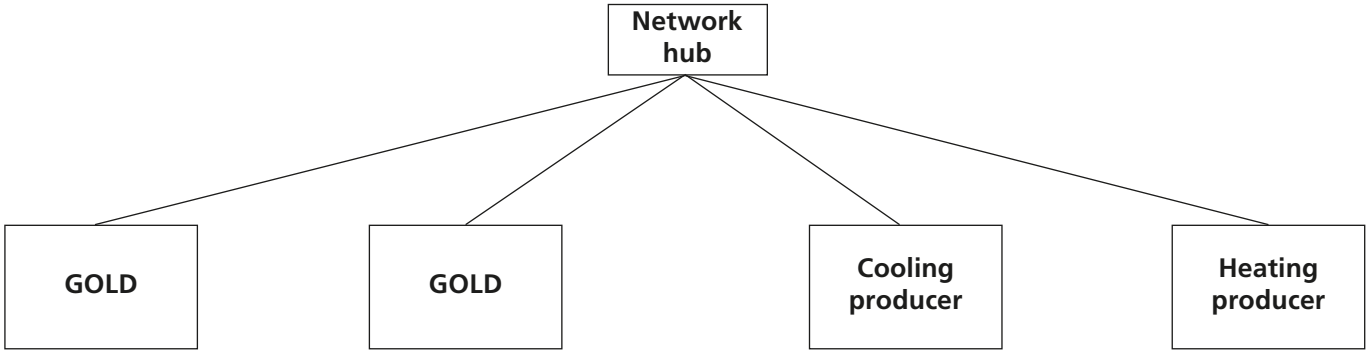
5.2.2 Connection of several units via a local network hub

Use a straight network cable for connection to a local network hub (Hub, Switch or Router).



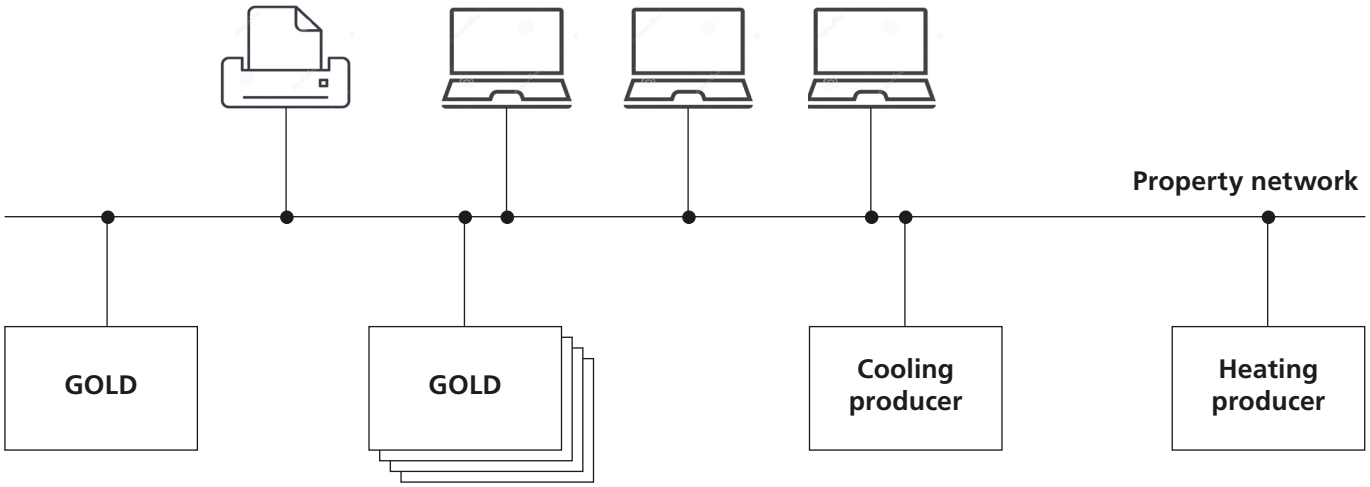
Straight network cable

1 —— 1
2 —— 2
3 —— 3
6 —— 6

5.2.3 Connection of two or more units to an existing property network

Use a straight network cable for connection between the unit and existing property network.

Note that port 502 is normally used for Modbus communication. This port must therefore be open in the network.

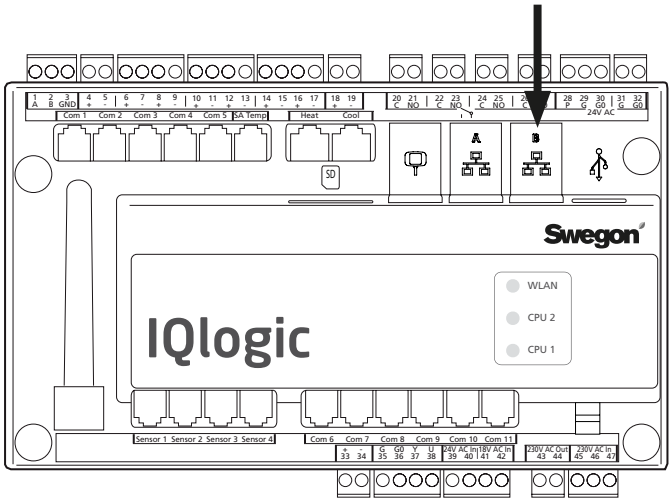


Straight network cable

1 —— 1
2 —— 2
3 —— 3
6 —— 6

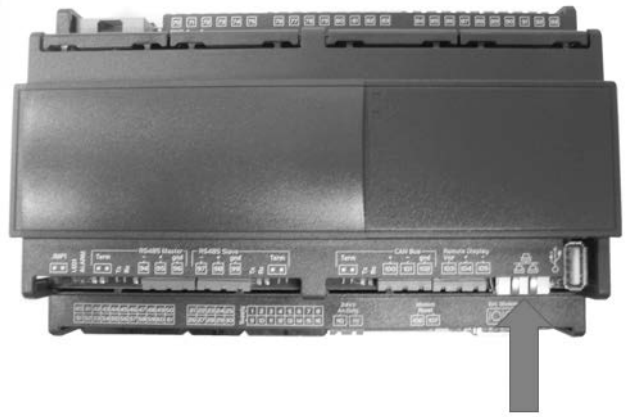
5.3 Connection GOLD

Connect the network cable to the IQlogic controller's port B.



5.4 Connection Heating/cooling producer

Connect the network cable to the network jack on the iPro controller.



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6. Settings

For basic operation and hand-hand terminal settings for the GOLD air handling unit, see the Function manual installation.

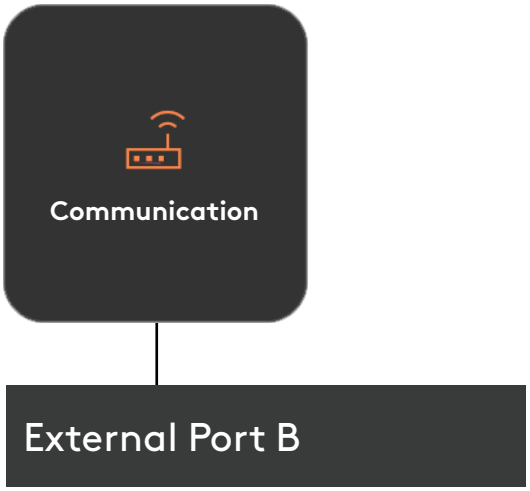
For basic operation and iPro settings, see the manual for each Swegon cooling/heating producer.

Only specific settings that apply to the SMART Link+ function are described below.

6.1 Settings GOLD

The SMART Link+ function can only be activated and configured by personnel accredited by Swegon.

Settings under External Port B:
IP address, see chapter 6.2.
Net mask, 255.255.255.0.
Standard gateway, 10.2.3.1



6.1.1 Communication

Activate Modbus TCP.

Port 502 is normally used for Modbus TCP.

Set Approved client IP address, 0.0.0.0.

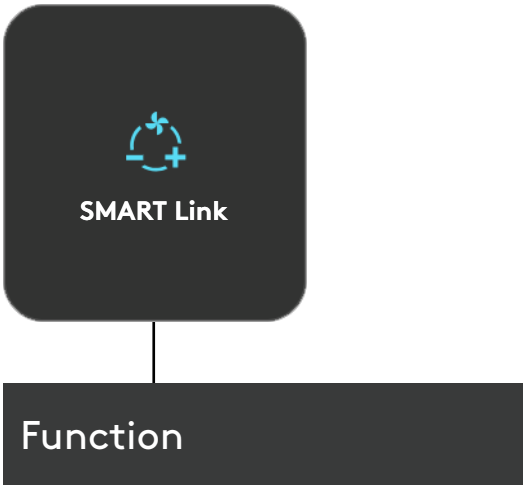
Set Approved client subnet mask, 0.0.0.0.

6.1.2 SMART Link

Activate the SMART Link+ function.

It is also possible, on the Service level under Settings, to change the basic setpoint for cooling and heating, upper and lower limits for valves, sloping and temperature limits.

Note that these values are common to all installed units.



6.1.3 Heating

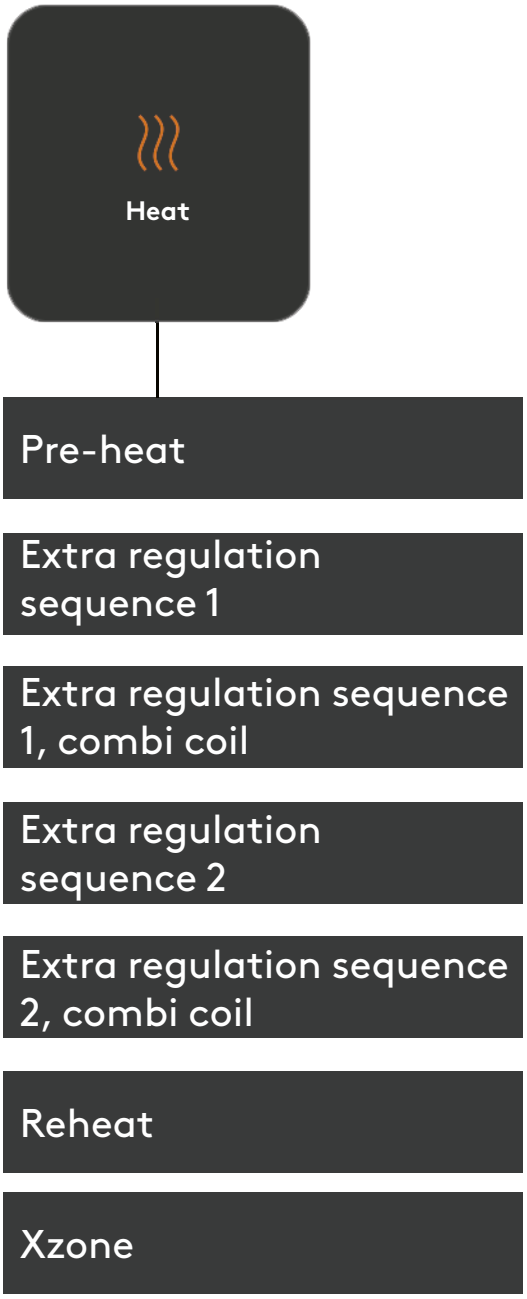
Activate SMART Link+ on the heating functions and circuits to be optimized.

Circuits that are to be part of the optimization are addressed to heating producer A or B.

Other heating functions that are not a part of optimization can be used as a part of the heating sequence or separate functions and be connected to a separate heat source.

A reversible heat pump can be used if the combi coils function is used.

"Reversible heat pump" must be set to On if a reversible heat pump is used for Xzone heating and cooling.



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6.1.4 Cooling

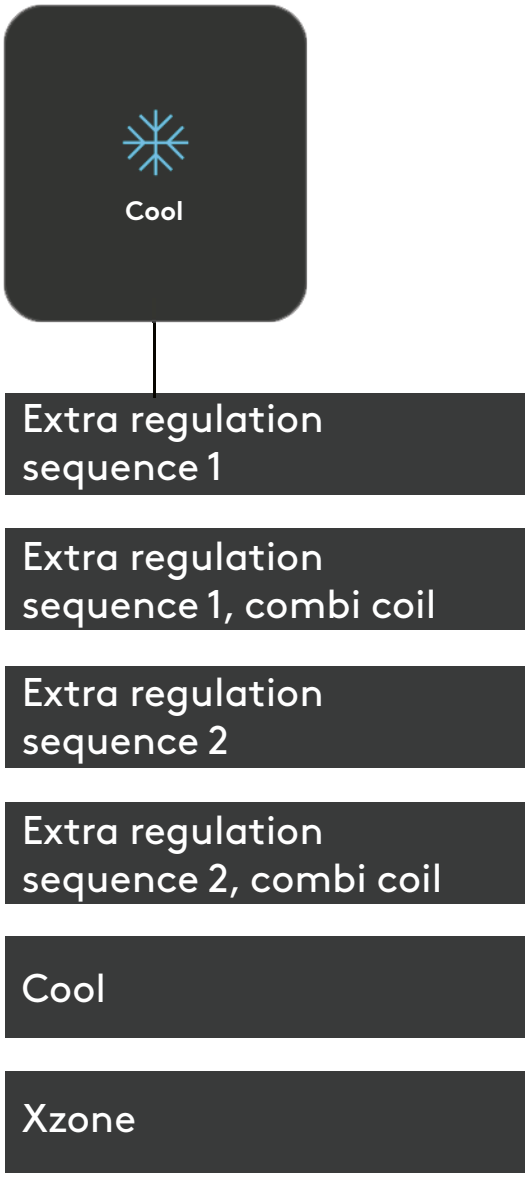
Activate SMART Link+ on the cooling functions and circuits to be optimized.

Circuits that are to be part of the optimization are addressed to cooling producer A or B.

Other cooling functions that are not a part of optimization can be used as a part of the cooling sequence or separate functions and be connected to a separate cooling source.

A reversible heat pump can be used if the combi coils function is used.

"Reversible heat pump" must be set to On if a reversible heat pump is used for Xzone heating and cooling.

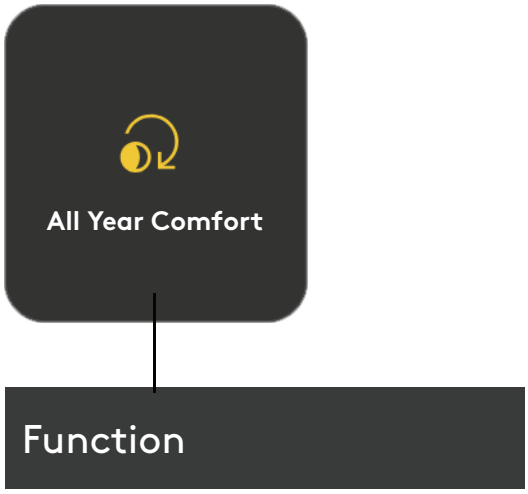


6.1.5 All Year Comfort

Activate SMART Link+ on Heating and/or Cooling.

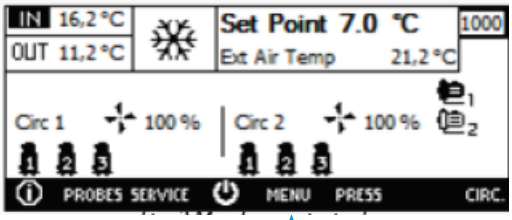
Choose whether the function must be connected to heating producer A or B or cooling producer A or B respectively.

"Reversible heat pump" must be set to On if a reversible heat pump is used for All Year Comfort heating and cooling.

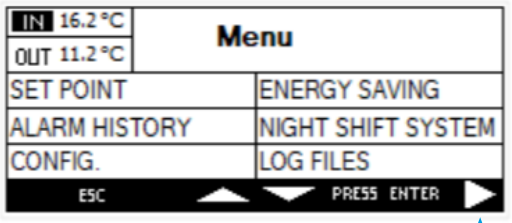


6.2 Settings cooling/heating producer

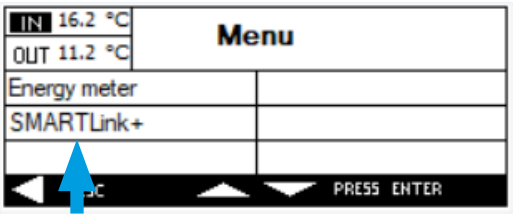
6.2.1 Activate communication



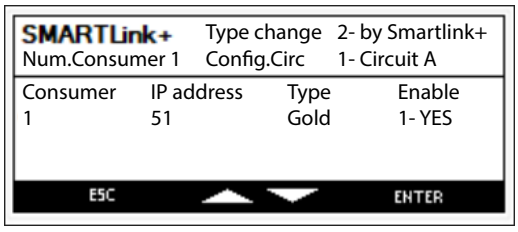
Press the MENU button.



Press the arrow button on the right side.



Press SMART Link+.



1. Update the numbers of units to handle.
2. Adjust the operation mode of the unit (heat pump only).
3. Enable the hydronic circuit (factory setting = A)
4. Adjust the IP address of the unit (X), i.e. 10.2.3.X.
5. Enable unit communication.

IP addresses (factory settings)

AHU 1	10.2.3.51
AHU 2	10.2.3.52
AHU 3	10.2.3.53
AHU 4	10.2.3.54
AHU 5	10.2.3.55
AHU 6	10.2.3.56
AHU 7	10.2.3.57
AHU 8	10.2.3.58
AHU 9	10.2.3.59
AHU 10	10.2.3.60

Alarm

If communication is not achieved, the following alarms appear. The alarms only appear if the consumer is enabled.

AL 386	Offline Consumer AHU 1
AL 387	Offline Consumer AHU 2
AL 388	Offline Consumer AHU 3
AL 389	Offline Consumer AHU 4
AL 390	Offline Consumer AHU 5
AL 391	Offline Consumer AHU 6
AL 392	Offline Consumer AHU 7
AL 393	Offline Consumer AHU 8
AL 394	Offline Consumer AHU 9
AL 395	Offline Consumer AHU 10

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6.2.2 SMART Link+

See table below for settings.

Activate the SMART Link + function by specifying the number of consumers (functions) that are connected to the machine (Parameter SML1 >0).

Set the hydraulic circuit to which the relevant producer is connected (Parameter SML2).

Choose an IP address for each connected consumer/function (Parameter SML3 – SML12).

Also see separate documentation for water chiller/heat pump, reversible heat pump or multifunction unit.

Parameter name	Description	Min	Max	UOM	Default
SML1	Number of consumer to handle	0	10		10
SML2	Hydraulic circuit 0 - None 1 - Circuit A 2 - Circuit B	0	2		0
SML3	Consumer 1 - IP address	1	254		51
SML4	Consumer 2 - IP address	1	254		52
SML5	Consumer 3 - IP address	1	254		53
SML6	Consumer 4 - IP address	1	254		54
SML7	Consumer 5 - IP address	1	254		55
SML8	Consumer 6 - IP address	1	254		56
SML9	Consumer 7 - IP address	1	254		57
SML10	Consumer 8 - IP address	1	254		58
SML11	Consumer 9 - IP address	1	254		59
SML12	Consumer 10 - IP address	1	254		60
SML13	Consumer 1 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML14	Consumer 2 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML15	Consumer 3 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML16	Consumer 4 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML17	Consumer 5 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML18	Consumer 6 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML19	Consumer 7 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0

Parameter name	Description	Min	Max	UOM	Default
SML20	Consumer 8 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML21	Consumer 9 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML22	Consumer 10 - Configured circuits 0 - GOLD 1 - SuperWise	0	1		0
SML23	Not Used				
SML24	Not Used				
SML25	Producer - Setpoint update time	1	999	s	600
SML26	Producer - Toa - Thresold	-50.0	99.9	°C	15.0
SML27	Producer - Toa - Cooling differential	0.0	25.0	°C	1.0
SML28	Producer - Toa - Heating differential	0.0	25.0	°C	1.0

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