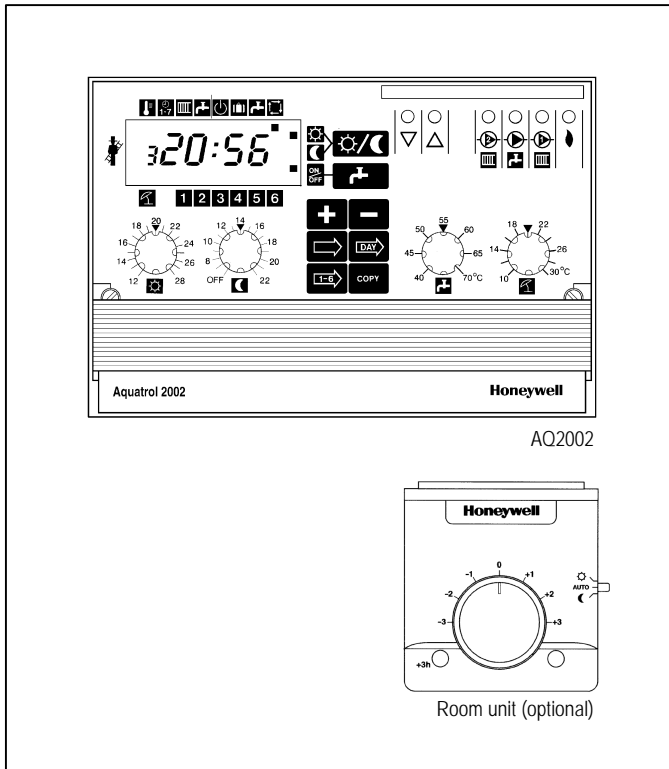


AQ2002

OPTIMISER/COMPENSATOR CONTROLLER

PRODUCT SPECIFICATION SHEET



FEATURES

- Digital control technology with easy to understand analogue installation adjustments
- Outside compensated control of low pressure hot water heating system
- Fixed or self-adaptive heating curve (with optional remote unit)
- Two independent heating curves for 1st and 2nd heating zone
- Heating time programme offering switching between comfort and economy operation up to 6 times per day, independently for each day of the week (selectable night off period is also available)
- Optimum Start/Stop (with optional space sensor) or Heating Boost on start-up (without space sensor)
- Domestic Hot Water (DHW) time programme offering up to 6 switching points per day independently for each day of the week
- DHW programme can alternatively be used as the heating programme for second heating zone
- Holiday mode with programmable 1 to 99 day holiday period and dynamic countdown display
- Automatic, DHW only, Holiday or Standby operation
- LED's indicate control output status
- Pump and valve exercise which helps prevent sticking during long periods of inactivity
- Frost protection of the pipework, hot water cylinder and the building fabric (with optional space sensor)
- Automatic summer heating mode changeover (user adjustable)
- Automatic heating shutdown under minimal load conditions
- Softstart to help prevent pipe expansion noise
- Service switch to assist installer on start-up and technician during service
- Intelligent pump control with energy efficient pump overrun
- Built-in user programme
- Optional remote unit providing space temperature sensing, space temperature adjustment, comfort/economy override switch and 3 hour comfort extension button with confirmation LED

APPLICATION

Aquatrol 2002 is a straightforward, versatile controller which forms the basis of an outside compensated control system for single or dual zone low pressure hot water heating systems. The controller offers build-in optimizer and many other advanced features whilst still retaining simple user adjustments.

It provides self adaptive heating curve, optimum start/stop operation, outside air compensated mixed water control using a 3-port motorized valve and pump, boiler, and domestic hot water control using a valve and/or pump.

A wide range of compatible sensors, a remote unit, valves and actuators complement the control system.

SPECIFICATIONS

Supply voltage : 230 V~, +10% -15%, 50 Hz

Power : 8 W

Consumption

Relay ratings : Pumps and boiler:
3 A, 230 V~ @ 0.6 pf - 400,000 oper.
Mixing valve:
0.25 A, 230 V~ @ 0.4 pf - 1,000,000 oper

Sensor accuracy : Water sensors: 20°C to 90°C ±2 K
Outside sensor: -20°C to +20°C ±2 K
Room sensor: 10°C to 25°C ±0.5 K

Ambient temp. : 0 to 50°C
rating

Humidity rating : 0 to 90% rh (non-condensing)

Storage/shipping : -30°C to +70°C
temperature

Electromagnetic : Emissions to EN55014-1
compatibility Immunity to EN55014-2

Protection class : IP40 (with base fitted and when installed
to EN60529)

Dimensions : 144 x 96 x 107 mm (with standard base)
(w x h x d) 144 x 153 x 109 mm (with wiring centre)

Panel cut-out : 138 x 92 mm
(w x h)

Weight : 600 g

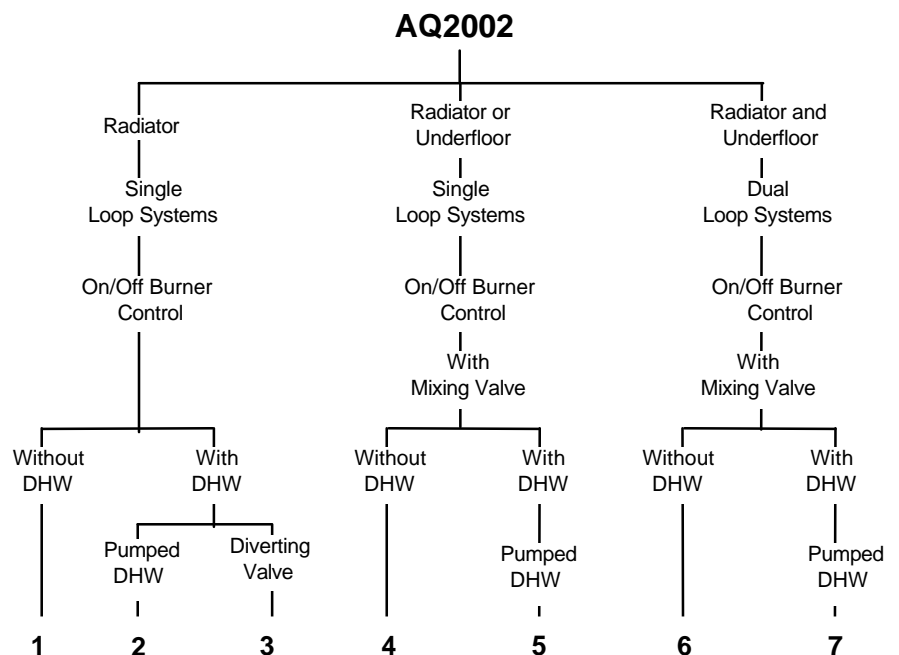
SYSTEM SELECTION CHART

The chart can be used to determine the system number (1-7) corresponding to the required application.

Systems 1, 2 and 3 are typical Radiator applications without mixing valve.

Systems 4 and 5 are Radiator OR Underfloor applications with mixing valve.

Systems 6 and 7 are Dual loop Radiator AND Underfloor applications.

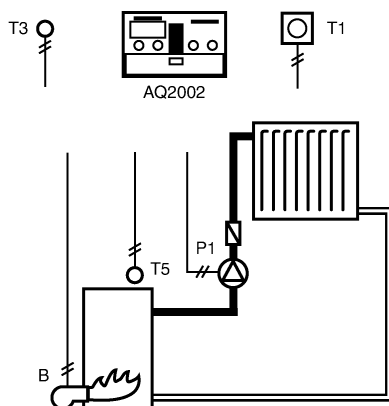


APPLICATIONS

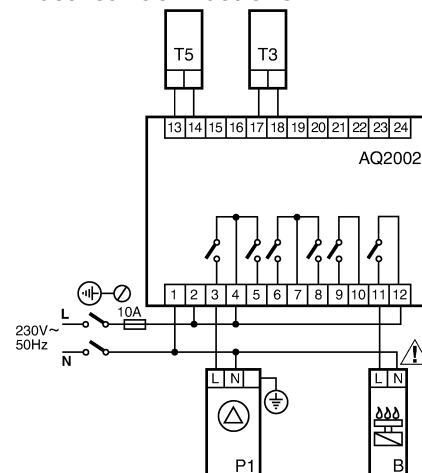
SYSTEM 1

Application

This system offers intelligent ON/OFF burner and pump control for radiator heating.



Electrical Connections



⚠ For potential free connection, please refer to boiler connection section

Temperature sensors

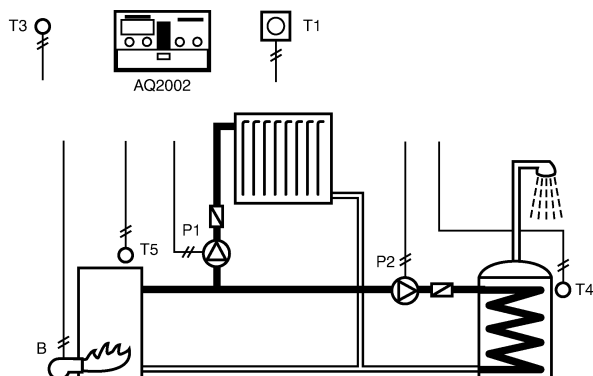
T3 Outside air	T7043E
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

SYSTEM 2

Application

This system offers intelligent ON/OFF burner and pump control for radiator heating.

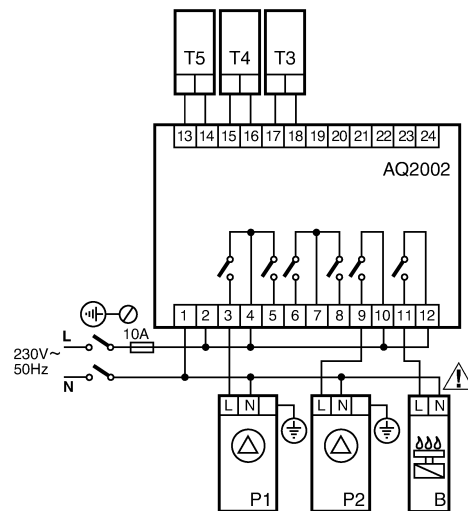
This system also provides a second pump to meet the demands for domestic hot water.



Temperature sensors

T3 Outside air	T7043E
T4 Domestic hot water	T7076D insertion or T7043F immersion
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

Electrical Connections

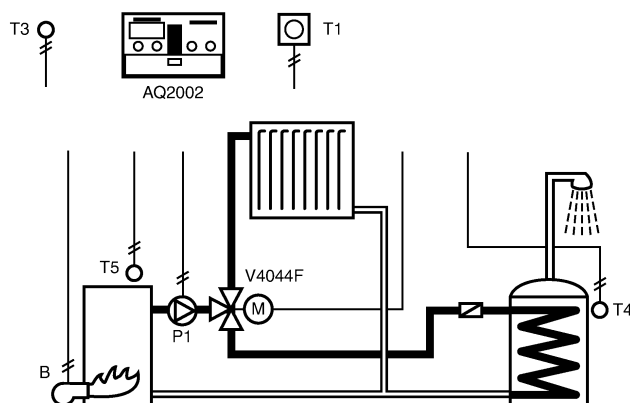


⚠ For boiler potential free connection, please refer to boiler connection section

SYSTEM 3

Application

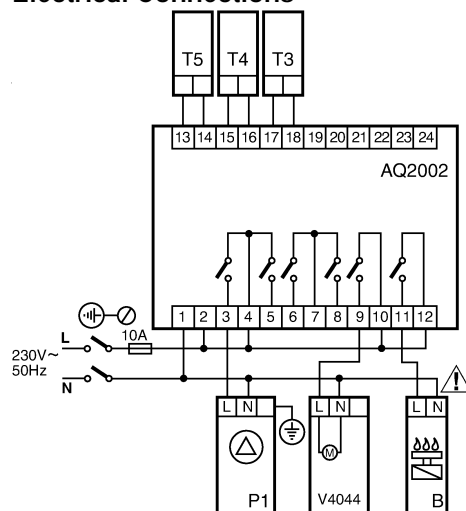
This system offers intelligent ON/OFF burner and pumps control for radiator heating and uses a diverted valve to meet the demands of domestic hot water



Temperature sensors

T3 Outside air	T7043E
T4 Domestic hot water	T7076D insertion or T7043F immersion
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

Electrical Connections



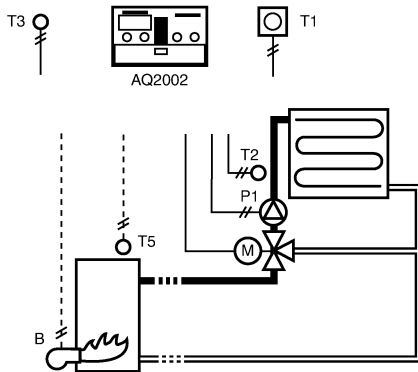
⚠ For boiler potential free connection, please refer to boiler connection section

SYSTEM 4

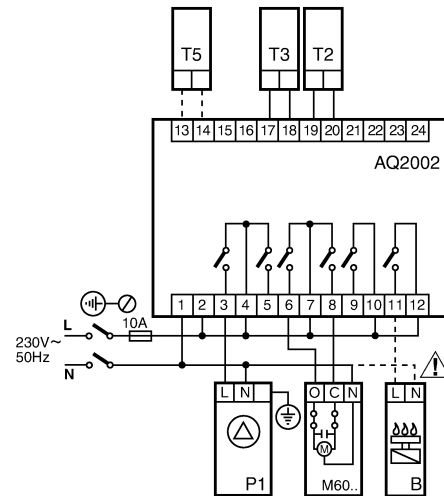
Application

This system offers intelligent ON/OFF burner and pump control with mixing valve control for radiator or underfloor heating.

This system can also be used for a single heating loop equipped with a mixing valve and a pump control without boiler control.



Electrical Connections



⚠ For boiler potential free connection, please refer to boiler connection section

Temperature sensors

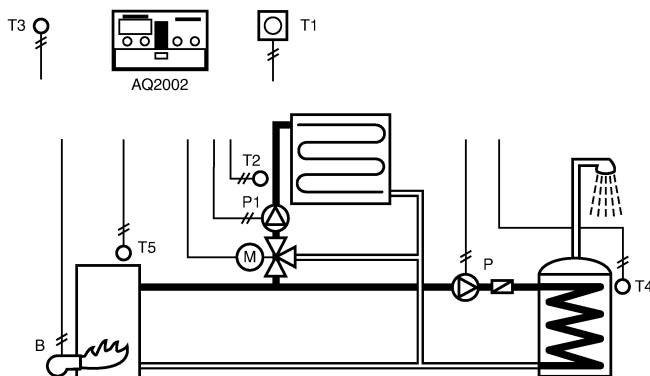
T2 Mixed water	T7044C strap on or T7043F immersion
T3 Outside air	T7043E
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

SYSTEM 5

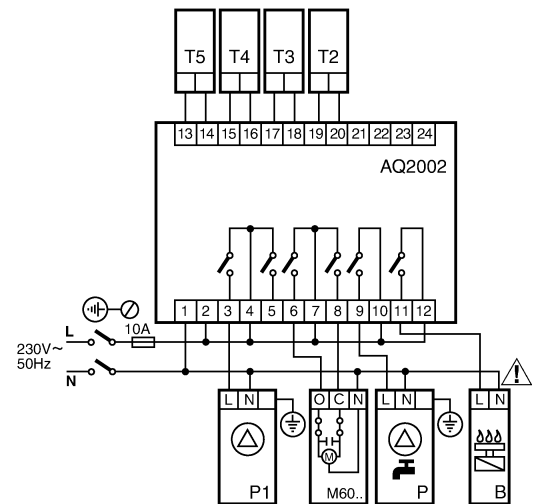
Application

This system offers intelligent ON/OFF burner and pump control with mixing valve control for radiator or underfloor heating.

This system also provides a second pump to meet the demands for domestic hot water.



Electrical Connections



⚠ For boiler potential free connection, please refer to boiler connection section

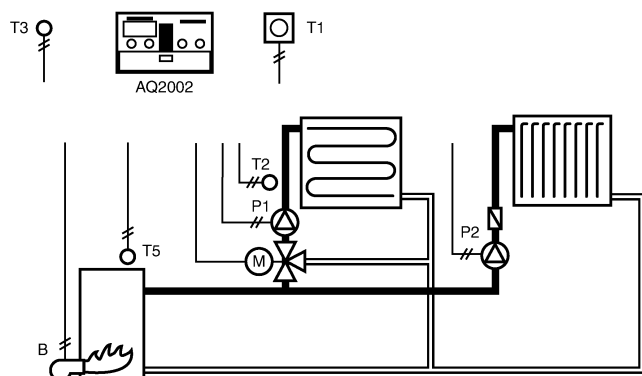
Temperature sensors

T2 Mixed water	T7044C strap on or T7043F immersion
T3 Outside air	T7043E
T4 Domestic hot water	T7076D insertion or T7043F immersion
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

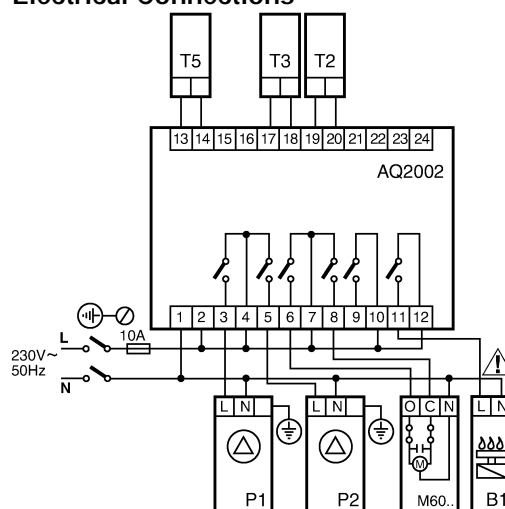
SYSTEM 6

Application

This dual loop system offers intelligent ON/OFF burner and pump control for radiator loop and mixing valve control for underfloor loop.



Electrical Connections



⚠ For boiler potential free connection, please refer to boiler connection section

Temperature sensors

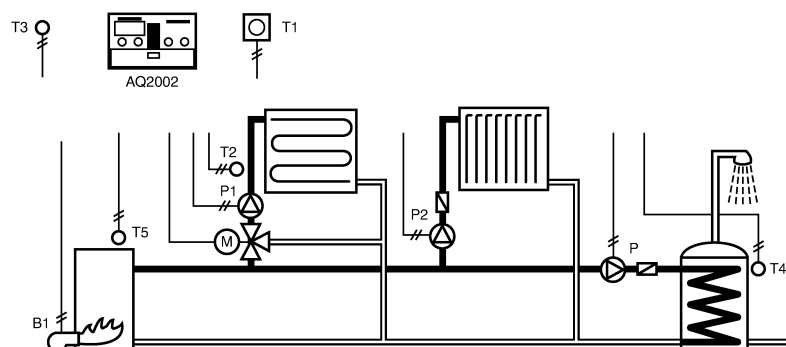
T2 Mixed water	T7044C strap on or T7043F immersion
T3 Outside air	T7043E
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

SYSTEM 7

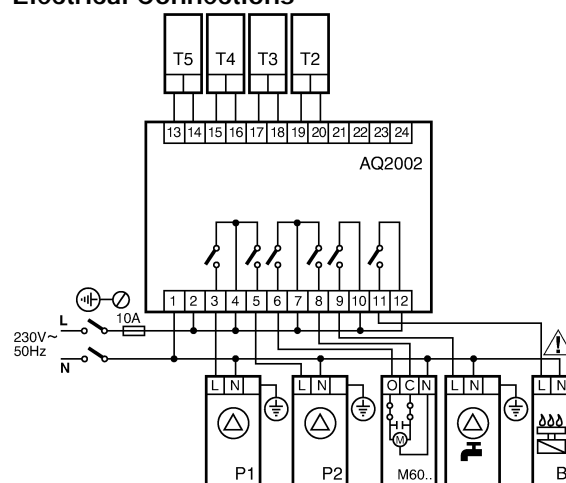
Application

This dual loop system offers intelligent ON/OFF burner and pump control for radiator loop and mixing valve control for underfloor loop.

This system also provides a third pump to meet the demands for domestic hot water.



Electrical Connections

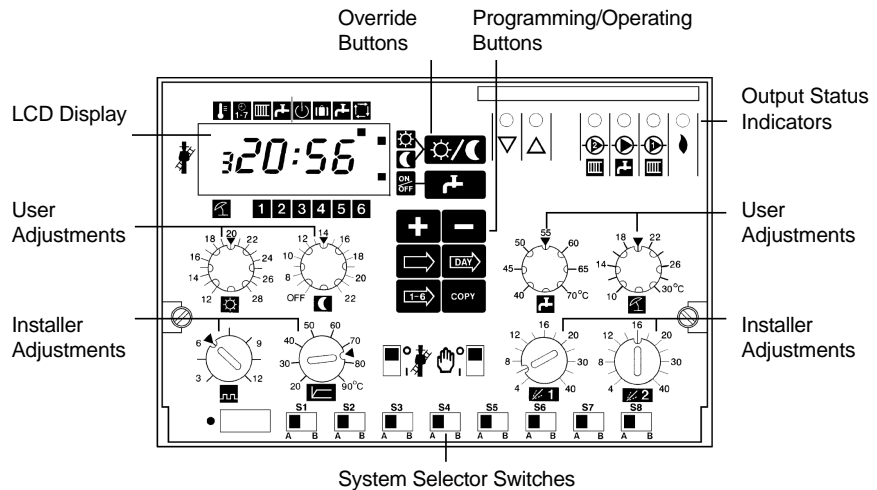


⚠ For boiler potential free connection, please refer to boiler connection section

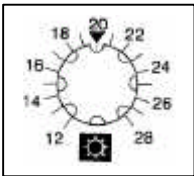
Temperature sensors

T2 Mixed water	T7044C strap on or T7043F immersion
T3 Outside air	T7043E
T4 Domestic hot water	T7076D insertion or T7043F immersion
T5 Boiler supply	T7076D insertion or T7043F immersion
Optional	
T1 Remote unit	T8102B1001 Full function remote unit including wall plate.

CONTROLLER FEATURES

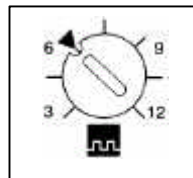


Comfort Setpoint



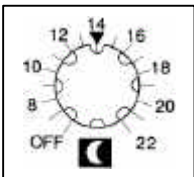
The desired space Comfort temperature can be set within the range 12 to 28°C.

Cycle Rate Adjustment



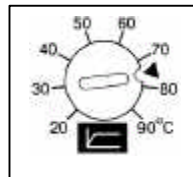
The cycle rate adjustment allows the cycle rate as recommended by the boiler manufacturer to be set directly on the controller.

Economy Setpoint



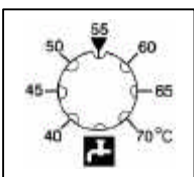
The desired Economy temperature can be set within the range 8 to 22°C. Economy OFF can be selected by turning the knob to the OFF position.

Boiler/Mixed Flow Temperature High Limit



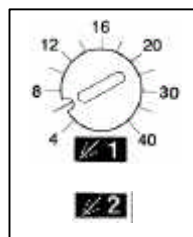
In systems with no mixing valve (no T2 sensor) the maximum value of the boiler supply water temperature (T5) can be adjusted by this setting. In systems with T2 sensor and mixing valve the maximum mixed water temperature will be adjusted by this setting. In this case, the maximum boiler supply temperature is fixed at 90°C.

Domestic Hot Water Setpoint



The DHWS temperature can be set within the range 40 to 70°C.

Heating Curve Ratio Adjustment

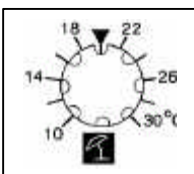


Two Heating Curve Ratio Adjustments are proposed, one for each loop.

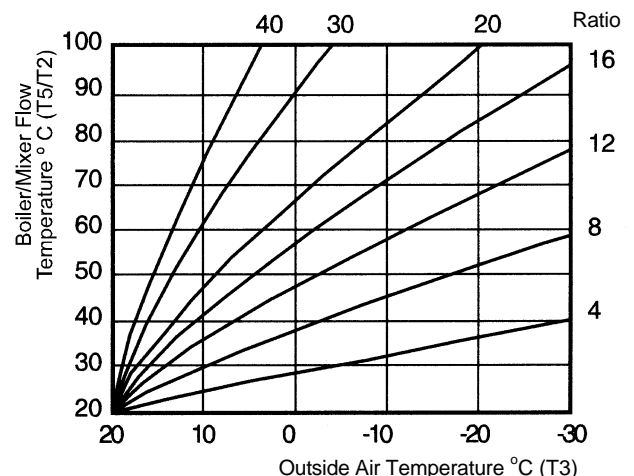
If a fixed value of the heating curve ratio is required then this value can be set within the range 4 to 40 using this potentiometer.

To determine the heating curve required refer to the graph displayed below.

Automatic Summer/Winter Changeover Temperature Setpoint



The automatic Summer/Winter changeover temperature can be set within the range 10 to 30°C. When the average daily outdoor temperature is above the automatic Summer/Winter setpoint the heating will be turned off.



USER OPERATION

Built-in Heating and DHW Program

Two different built programs are available, the first one is designed for the first heating loop, and the second one can be assigned either for second heating loop or DHW system (depending of switch S2 position).

Heating program offer switching between comfort and economy operation up to 6 times per day, independent for each day of the week.

DHW program offer switching between ON and OFF operation up to 6 times per day, independent for each day of the week.

Holiday Program

When the holiday mode of operation is selected, the heating will operate at the economy space setpoint and the hot water control will be inactive (except for frost protection) until the set number of days has elapsed. When the heating and hot water will be restarted in automatic mode and controlled according to the programmed data.

The return to automatic occurs at 0:00 the day the heating is required.

System Temperature Enquiry

By switching to the enquiry mode all system temperature and the adapted heating curve value (or the value of the heating curve compensation slope knob if fixed compensation is selected) can be displayed on the LCD.

Only the current temperature and parameter value will be displayed.

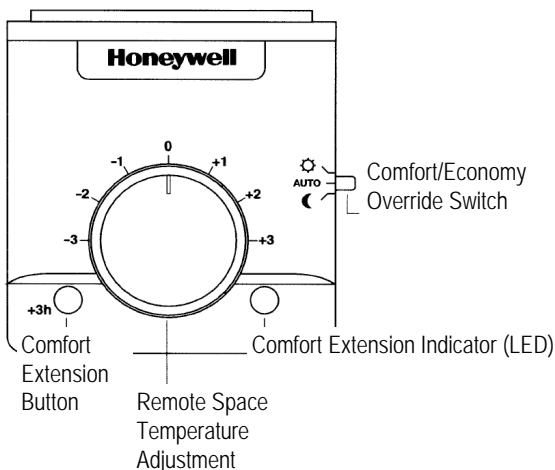
This facility is not available during the initial start-up procedure

REMOTE UNIT

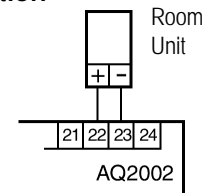
The AQ2002 controller can be completed by a remote unit (optional), it allows the user to adjust rapidly on controller setpoints without going to the boiler room.

The remote unit incorporates a space temperature sensor, a remote setpoint adjustment knob with adjustable range stops, a 3 hour extension push button with LED indication, and a manual switch to override the operating mode. The day or night flag will flash on controller when the mode is overridden. When used as a space temperature sensor, the same mounting directions for the space sensor temperature applies.

The unit is a 2 wire connection polarized.



Electrical connection



CONTROLLER OPERATION

Outside temperature compensation

The Aquatrol 2002 is an outside temperature controller compensated designed for most of heating systems composed by boiler, circuit with or without mixing valve, and domestic hot water.

Fixed or Self Adaptive Heating Curve

Room temperature compensation is available (in CH zone 1 only) when a remote room unit is connected. The fixed or self adaptive heating curve function is selected by switch S7.

Optimum Start/Stop

If a remote room unit is present, the controller automatically calculates the ideal times for starting the setback and heating-up phases defined by the heating program, in order to save energy without sacrificing comfort. Without a room sensor, optimum start/stop is not possible and a heating boost is implemented in advance of an upward heating setpoint change.

Note: optimum start and stop are applicable only to CH zone 1 since only that zone can have a remote room unit.

Frost Protection of the Pipework

Frost protection of the heating system applies at all times and in all operating modes of the controller.

Automatic Shutdown

During periods when there is no requirement for heat, the controller will shut down the system including turning off the heating pumps.

Automatic Summer/Winter Changeover

When the daily average outdoor temperature is high, then the heating is turned off (pumps off, boiler off, valve closed). The summer/winter changeover temperature is adjustable via a potentiometer.

Pump and Valve Exercise

In order to prevent sticking or jamming of components during long periods of inactivity, for example in the summer, then a pump/valve exercise will take place once a week at 12:00 on Fridays.

DHWS Operation

When a DHW temperature (T4) sensor is connected, the DHW temperature is controlled to a user-adjustable set point.

There are two variants for combined DHWS; DHWS Priority/Shifting or Parallel priority operation. In all two cases a demand for DHWS occurs when the DHWS

DHWS Priority/Shifting Priority

In heating circuits with no mixing valve (and no mixed flow temperature sensor), the DHWS has priority over the heating.

In heating circuits with mixing valve, operation is as follows:

While the boiler temperature is less than a differential of 10K above the DHW setpoint, the mixing valve will be closed giving DHW priority. However if there is surplus heat available and the boiler temperature is more than 20K (the differential plus a proportional-band of 10K) above the DHW setpoint then the mixed heating loop will control at its calculated setpoint, servicing the heating in parallel with the DHW. If the boiler temperature is between these two values then the mixed water setpoint is reduced.

Note: In dual loop systems, the CH zone 2 pump will be switched off during a DHW service.

DHWS Parallel

In heating circuits with mixing valve when parallel operation has been selected central heating will continue to operate normally during a DHW service.

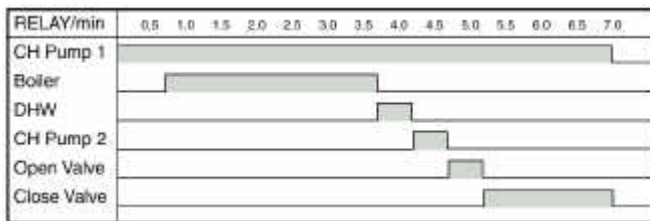
Note: In some systems selection of parallel operation may result in extended DHW recovery times or in extreme cases DHW never being satisfied

Note: Any heating loop supplied directly from the boiler will be shut down during DHW demand period no matter what is the position of S4 switch.

INSTALLER START UP SEQUENCE

To initiate the installer start up sequence the service switch must be set to the "1" position with the power to the controller switched OFF.

When power is now switched ON the above sequence will start. The sequence can be stopped at any time by moving the service switch to the "0" position.



SYSTEM SELECTION

System selection is achieved in two manners:

- Automatic System Selection
- System Selector Switches

Automatic System Selection

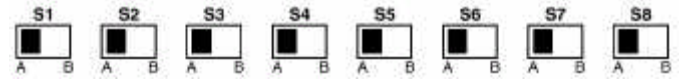
The AQ2002 is able to recognize which temperature sensor is connected.

- If a mixed flow water sensor (T2) is connected, the controller assumes that a mixing valve is present.
- If a Remote Unit (T1) is present the controller activates the space temperature compensation, the optimum Start/Stop and the self-adaptive heating curve (if switch S7 on position A).

- If a DHWS sensor (T4) is present then combined or separate temperature control of the DHWS will be available. If no DHWS sensor (T4) is present only time control is available on the DHWS output.

Automatic system detection takes place during the first minute after powering the controller.

System Selection Switches



Switch	Description	Position A	Position B
S1	Boiler low limit	20°C	45°C
S2	2nd time programme	DHW	CH zone 2
S3	DHWS program	programmed	continuous
S4	DHWS operation	Priority/ Shifting operation	parallel
S5	DHW actuator device	pump	valve
S6	Type of heating	radiator	underfloor
S7	Adaptive heat curve 1	yes	no
S8	Heating zones	one/single loop	two/dual loop

Shading indicates position as supplied from the factory

S1 Boiler Minimum Temperature

Allows to set the minimum boiler temperature:

- Position A: 20°C, no boiler temperature low limit
- Position B: 45°C

NOTE: Low limit will apply also to the 2nd CH heating zone flow temperature

S2 Second time program

See table

S3 DHW Time Programme

Allows to select the timed or continuous operation of DHW.

If the S2 is in position B and S3 in position A, DHW will operate according to both heating zone programmes.

S4 DHW Operation

DHW demand can be served in one of the following modes:

- Position A: Priority or Shifting Priority.
Please refer to "DHWS Operation" section
- Position B: parallel.
Please refer to "DHWS Operation" section

S5 DHW Actuator Device

S5 allows you to configure AQ2002 for systems where diverting valve is used to switch the boiler output to CH or DHW installation. Use of diverting valve is only allowed in systems without mixing valve.

- Position A: on DHW demand the DHW pump will be switched on.
- Position B: on DHW demand the diverting valve will be driven to DHW position and CH pump will continue to run forcing the flow through the hot water heat exchanger.

S6 Type of heating

Continued on next page

S6 Type of heating

See table

S7 Adaptive Heating Curve 1

To benefit from this feature a remote unit must be installed. During normal heating periods estimates are made for the heating curve ratio 1. Each day controller compares its performance to meet the criteria of achieving the day space temperature.

A new value for the heating curve ratio 1 is stored daily in the controller's memory such that within 4 to 6 days, from the initial start-up it will have changed the initial heating curve to one that more closely matches the building's thermal characteristics.

During this learning phase the room compensation will assist in providing comfortable space temperature conditions.

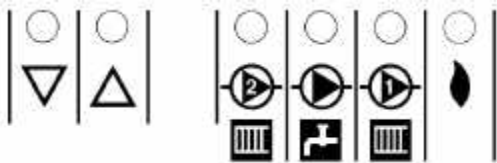
S8 Heating zones

See table

Fault Code	Description	Controller Action
F1	Dual loop ratio setting fault	CH1 ratio has priority; set ratio 1 under ratio 2 following installation requirements
F2	T2 sensor fault	Acts as system without mixing valve.
F3	T3 sensor fault	Heating on at or above frost protection values.
F4	Not used	
F5	T4 sensor fault	DHW output held off.
F6	T5 sensor fault	If frost protection active: Boiler cycles at 20%. If no frost protection: Boiler off
F7	T1 remote unit fault	Acts as system without remote unit.
F8	Internal fault	Boiler cycles at 20%, valve opens.
F9	Remote unit fault	Acts as system without remote unit.

SYSTEM ON INDICATION

Each output is monitored by LED.



When the LED is illuminated it indicates that:



The mixing valve actuator is being driven closed, reducing Heating.



The mixing valve actuator is being driven open, increasing Heating.



Heating pump 2 is ON.



The DHW is ON.



Heating pump 1 is ON.



Boiler output is ON.

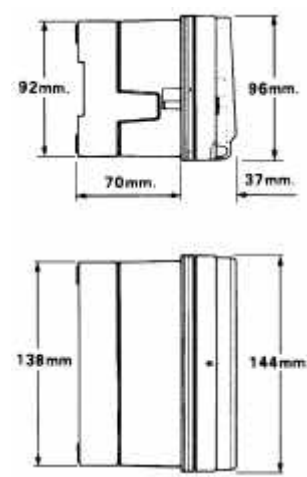
FAULT CODES

Should a fault occur in the system a fault code will be displayed on the LCD. The table below gives details of the codes and the action taken by the controller.

Information:

The above table also indicates the priority of the fault. The lower the code the higher the priority.

An open circuit is used to automatically select the control system configuration for DHW, mixing systems and for the Remote Unit. A fault is not displayed if an open circuit is detected on the T2, T4 & T5 sensors or the Remote Unit terminals within the first minute after switching power on.

DIMENSIONS**Controller Dimension in mm****Surface Mounting**

The Aquatrol 2000 controller can be surface mounted in either a control panel or directly on the wall.

Panel Mounting

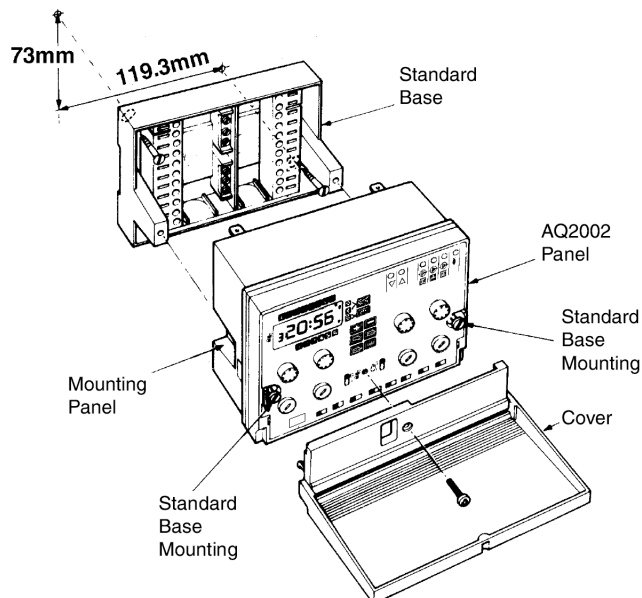
The controller can be panel mounted in a control panel door and features integral panel mounting clips for ease of installation.

Panel cut-out (w x h) : 138 x 92 mm

INSTALLATION

Important

1. The installer must be a trained engineer
2. Disconnect the power supply before beginning installation



Tamper-Proofing

The controller can be made tamperproof, if required, by inserting a wire link through the hole in the front clear cover and the front housing at the top center of the front panel and twisting or crimping to fix the front panel permanently shut, thus preventing unauthorized adjustment.

Wall Mounting using Wiring Centre (Optional)

For wall mounting the optional Wiring Center K42007745-005 can be used for protection and termination of electrical conduits, MICC cable or Pirelli FP200 cables with suitable adapters.

CONNECTIONS

Controller Connection

The controller operates from a 230V 50Hz power supply. Cables providing power to the controller should be sized to match the individual installation requirements for distance and power consumption. The AQ2002 controller requires an effective earth directly from the building's consumer unit in order to meet the same earthing requirements for the temperature sensors.

Each terminal within the controller is capable of accepting either two cables with a maximum cross sectional area of 1.5mm^2 or one cable with a maximum cross sectional area of 2.5mm^2 .

Please refer to your system for the correct input/output wiring.

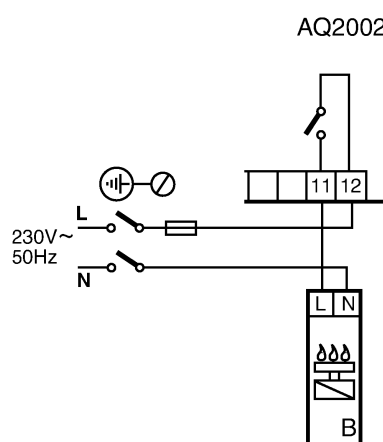
The recommended wiring is as follow:

From Controller to ...	Maximum Length	Type of wire
Temperature sensor	100m	To meet the requirements of local standards
Remote unit	50m	
Boiler/Burner	100m	
Motorized valve	100m	
Pumps	100m	
Other devices	100m	

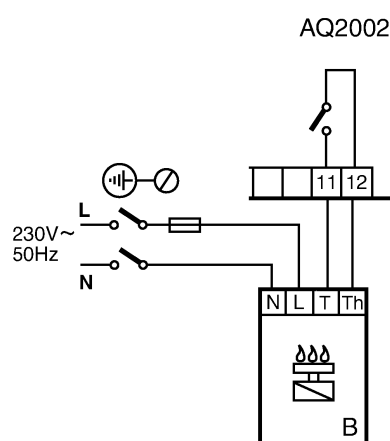
Boiler connection

ON/OFF boilers can be connected and controlled by two different manners:

- ON/OFF boiler supplied and controlled by line voltage



- ON/OFF boiler supplied by the line voltage and control by a free voltage contact



Boiler relay ratings

Boiler: 3 A, 230 V~ @ 0.6 pf

CONTROLLER ORDERING SPECIFICATION

Ordering specification: W6060C1141 Belgium and French version
W6060C1158 English version

OTHER SYSTEM COMPONENTS (to be ordered separately)

Outside Temperature Sensor T7043E

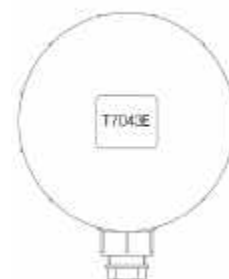
Application

The Outside Temperature Sensor consists of a thermistor element housed in a tough plastic case. It is mounted outside the building providing a temperature input signal to the controller.

Ordering Specification: T7043E1008

Specifications

Sensing range : -30 to +40°C
Sensor : NTS type 10 k Ω @ 25°C
Enclosure : Plastic with integral Pg11 fitting
Dimensions : 66 \varnothing x 35 mm



Flow Temperature Sensor T7044C

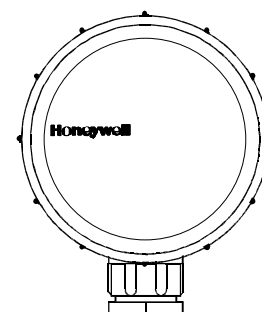
Application

The T7044C Strap-on Flow Water Temperature Sensor consists of a thermistor sensing element housed in a tough plastic case. It is strapped to the flow water pipe providing a temperature input signal to the controller.

Ordering Specification: T7044C1002

Specifications

Sensing range : 0 to 115°C
Sensor : NTS type 10 k Ω @ 25°C
Enclosure : Plastic with integral Pg11 fitting
Dimensions : 72 \varnothing x 48 mm



Flow Temperature Sensor T7043F

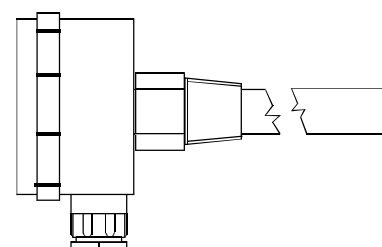
Application

The T7043F Immersion Flow Water Temperature Sensor consists of a thermistor sensing element housed in an immersion pocket. It should be mounted on a bend on the flow water pipe providing a temperature input signal to the controller.

Ordering Specification: T7043F1006

Specifications

Sensing range : 0 to 115°C
Sensor : NTS type 10 k Ω @ 25°C
Enclosure : Plastic with integral Pg11 fitting
Dimensions : 72 \varnothing x 45 mm
Well : 1/2" BSPT x 100 mm



Insertion Temperature Sensor T7076D

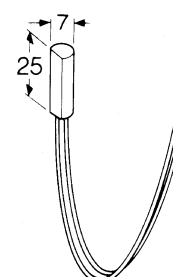
Application

The T7076D tape-on or insertion sensor consists of a thermistor sensing element encapsulated in plastic. It is designed for use in outside temperature compensated heating systems. It can be taped on to a hot water pipe, or inserted in a well, and provides a temperature input signal to the controller. For tape-on installation, a polyester and an aluminium tape are supplied.

Ordering Specification: T7076D1001

Specifications

Sensing range : 0 to 110°C
Maximum Ambient temp. : 115°C
Wire dimensions : 1.3mm \varnothing x 1.5m long.
Sensor : NTS type 10 k Ω @ 25°C
Wire rating : -30 to +115°C
Dimensions : 7 \varnothing x 25 mm



Temperature Sensor Characteristics

Temp. °C	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Value K Ω	55.34	42.34	32.66	25.4	19.9	15.71	12.49	10	8.058	6.532	5.326	4.368	3.602	2.86	2.488	2.082	1.751	1.48	1.256	1.071	0.916

Remote Unit T8102B

Application

The Remote Unit provides a space temperature sensor input signal to the AQ2000 for space temperature compensation and to enable the optimization and adaptive ratio to function. Remote adjustment of the setpoint is also possible and an override switch gives the possibility of selecting permanent comfort or economy settings. A "party" button allows a three hour comfort extension to be selected.

Ordering Specification:

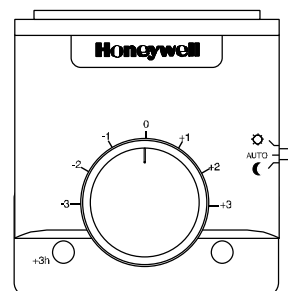
T8102B1001 with English literature

T8102B1050 with French literature

T8102B1068 with Italian literature

Specifications

Sensor	: NTS type 10 k Ω @ 25°C
Housing	: White plastic
Weight	: 70 g
Dimensions	: 70 x 75 x 31 mm (w x h x d)
Setpoint adjustment	: ± 3 K



Wiring Centre K42007745-005

Application

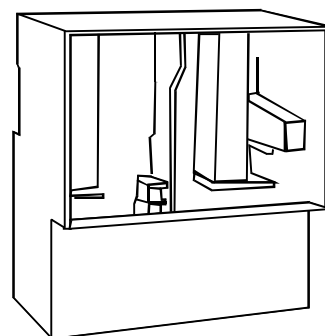
The Wiring Centre is an essential component when mounting the controller on a wall. It provides a number of conduit entries through the bottom, back and sides. In addition, it provides extra terminals to link multiple incoming cables such as line, neutral and earth.

Ordering Specification:

K42007745-005

Specifications

Housing	: White Plastic
Cable entries	: 17 x 19 mm conduit entries (9 bottom, 3 right side, 1 left side, 4 back)
Dimensions	: 70 x 75 x 31 mm (w x h x d)



RELATED LITERATURE

AQ2002 Installation Guide 42010344-001 in English
 42010344-002 in French

AQ2002 User Guide 42010345-001 in English
 42010345-002 in French