SYNERGYR®

Control and Heating Cost Allocation Valve for individual Room Control WRV84...

with local acquisition of the flow temperature

Electronic metering, control and regulating unit. Controls the room temperature through regulation of an additional valve. Provides central night setback during non-occupancy times. Measures the flow rate and the temperature differential, calculates the amount of thermal energy drawn from the network. Acquires pulses from non-SYNERGYR meters, stores data, and communicates with other SYNERGYR units via building bus.

Use

The control and heating cost allocation valve WRV84... is a component of the SYNERGYR Control & Metering System. For the field of use of SYNERGYR, refer to data sheet 2800.

Functions

- Control of the reference room temperature with a room unit QAW... during occupancy times through regulation of a zone valve driven by an electrothermal actuator; during occupancy times, the WRV84... remains open
- Control of the reference room temperature with a room unit QAW... during non-occupancy times through regulation of the valve of the WRV84... (central night set-back)
- Acquisition of thermal energy consumption of each apartment
- Limitation of flow rate to an adjustable level
- Suppression of hydraulic creep
- Acquisition of pulses from a non-SYNERGYR meter
- Display of
  – current reading of thermal energy consumption
  – current flow rate
  – check number
  – errors and faults
  – incoming pulses
- Detection of alarms and faults and passing them on to the central unit
- Periodic actuation of the valve in the summer (valve kick)
- Transmission of all relevant data to the central unit

Type summary

Description	*Type reference*
Control and heating cost allocation valve with a nominal flow rate of 200 l/h with a nominal flow rate of 400 l/h with a nominal flow rate of 750 l/h with a nominal flow rate of 1500 l/h	 **WRV84.200** **WRV84.400** **WRV84.750** **WRV84.1500**
Mounting kit	**ALG81**
Conduit box for WRV84...	**ALW84**
Set of address plugs for address numbers 1...16	**PTG1.16**
Set of address plugs for address numbers 1...32	**PTG1.32**
Set of address plugs for address numbers 33...64	**PTG1.64**
Set of address plugs for address numbers 65...96	**PTG1.96**
Set of address plugs for address numbers 97...128	**PTG1.128**

Ordering

When ordering, please give type reference of the control and heating cost allocation valve according to "Type summary".
The delivery comprises:
- The control and heating cost allocation valve
- A set of address plugs
- A conduit box
- A mounting kit, consisting of:
  - adapter piece
  - fittings
  - protection pocket for the flow temperature sensor
  - welding sleeve for the protection pocket

The initial delivery includes the conduit box and the mounting kit. The control and heating cost allocation valve along with the address plugs are delivered later when the plant is commissioned.
Commissioning by Landis & Staefa service staff includes:
- Delivery of the control and heating cost allocation valve
- Delivery and setting of the address plugs
- Parameter settings of he whole SYNERGYR plant
- Sealing of units

Equipment combinations

Each apartment requires one control and heating cost allocation valve WRV84..., a maximum of two pulse adapters AEW2.1, one control module AEK84, and one room unit (QAW10 or QAW20).
For more information about the system structure, refer to data sheet 2800 and the data sheets of the individual units.

Technical design

Room temperature control

The control and heating cost allocation valve features a two-position controller which provides control similar to PID. In the reference room, the room unit acquires the room temperature and passes it on to the controller integrated in the WRV84....
- During occupancy times, the valve of the WRV84... remains open. The temperature in the reference room is controlled via a zone valve whose electrothermal actuator is driven by the control module AEK84
- During non-occupancy times, room temperature control is provided by the valve of the WRV84...(central night setback)

In the other rooms, the temperature is controlled individually (e.g. with a room thermostat and an electrothermal regulating unit).

Determination of thermal energy consumption

Measurement of thermal energy consumption

To determine the amount of thermal energy consumed, the control and heating cost allocation valve measures the flow temperature, the return temperature and the flow rate.
The return temperature sensor is integrated in the valve body.
The flow rate is determined based on the effective pressure principle. For this purpose, the valve has an orifice, a two-stage valve plug and a measuring system with a diaphragm. The two-stage valve plug is used to change the measurement range in function of the effective pressure.

Suppression of hydraulic creep

If the flow rate or the temperature differential falls below the respective low limit, the heat demand of the apartment has dropped below the acquisition limit of the control and heating cost allocation valve. To make certain the guaranteed error limits will be observed in such a situation, suppression of hydraulic creep is activated. It closes the valve for eight minutes. If, after the subsequent test openings, the limit values are adhered to, the valve will resume normal control operation.

Storage

The thermal energy consumption values are stored in non-volatile memory. In connection with the central unit, the following data also becomes available:
- Heat consumption on the set day
- Monthly heat consumption values

Manual operation

In the event of a power failure, the valve can be operated manually, in which case the seal must be broken.

Valve kick

To prevent the valve from seizing after longer off periods, it is briefly opened and shut down after no more than 200 hours.

Handling of pulses from non-SYNERGYR meters

Any meter with a pulse interface (e.g. water, gas, or electricity meter) can be connected to the control and heating cost allocation valve. The connection is made via the conduit box ALW84. The meter's pulses are converted to consumption data and then stored like energy consumption data (current value, set day value, and monthly values).
Incoming pulses are shown on the display.
For additional meters, pulse adapter AEW2.1 is required. It has the same storage capabilities as the control and heating cost allocation valve.

Self-supervision

The control and heating cost allocation valve monitors itself and is able to detect errors and malfunctions. They are handled as follows:
- Display of the respective error code on the LCD
- Signalling via the building bus to the central unit OZW30 and display of the respective error code on the central unit's LCD

The central unit stores the last 50 fault status signals.

Limitation of flow rate

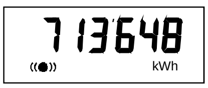
If the current flow rate exceeds the adjusted design value, the valve will limit the flow rate (dynamic balancing). Flow rate limitation has priority over room temperature control.
This function can be deactivated.

Mechanical design

The control and heating cost allocation valve WRV84... consists of electronics, actuator and valve. All components are accommodated in a housing made of die-cast zinc.
Due to its compact design, the WRV84... can be mounted in the apartment's cabinet or in the installation trunk.

Display

At the top of the valve, there is an alternating 7-digit display:



Display for 10 seconds:
Meter reading of proportional amount of thermal energy drawn from the system

Display for 5 seconds:
Two-digit check number and flow rate in l/h

The check number is coded and generated from the displayed value. It permits the reading to be verified. The check number is useful when doing the reading directly on

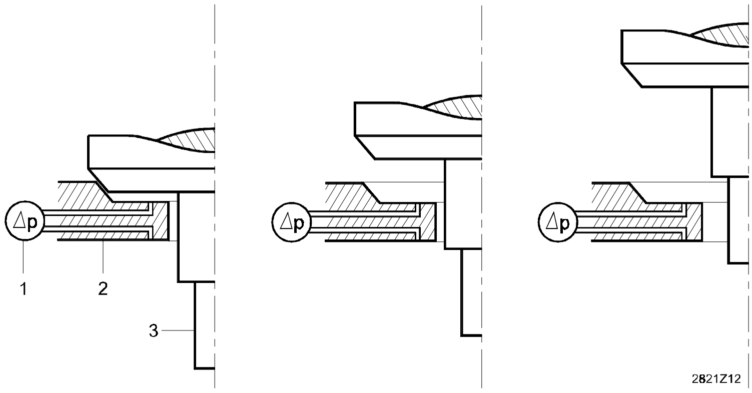
the valve, for communication to the billing agency.
If errors or faults occur, an appropriate error code is displayed.

Parameter settings and addressing

At the side of the valve, there is a socket for an address plug and a service interface.
With the address plug, a number is assigned to the control and heating cost allocation vale when commissioning the plant.
The service interface is required for connecting the service unit AZW30.

Actuator and valve

The valve's travel is generated by an electric motor which drives an eccentric disk through a geartrain.
The valve consists of valve body, orifice and valve plug. The plug has two different diameters and is positioned in the orifice by the actuator. The position of the valve plug is displayed.



1 Diaphragm measuring system
2 Orifice
3 Valve plug

Valve fully closed (position indication 0) | Valve in mid-position (position indication 1) | Valve fully open (position indication 2)

Flow temperature sensor

The sensor acquires the medium temperature with a sensing element made of nickel. The sensing element is located at the end of an immersion rod which is inserted in the protection pocket and then secured with a sealable adjusting screw. The connecting cable is 1.5 m long and ready fitted to the control and heating cost allocation valve. Should a failure occur, the cable must be replaced together with the WRV84...

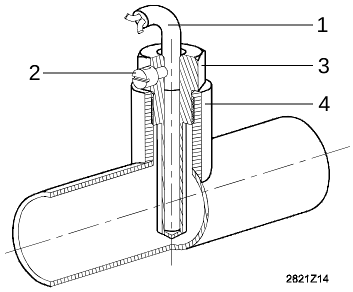
Accessories

Adapter piece for premounting

To facilitate installation of the control and heating cost allocation valve when commissioning the plant, there is an adapter piece available. It has the same dimensions as the valve (110 mm long and threaded connections of 1").
The adapter piece must be fitted when laying the piping.

Sensor accessories

To mount the flow temperature sensor, a 3/8" sleeve and a protection pocket are required. The sleeve is welded into the pipe which then accommodates the protection pocket.



Mounting the flow temperature sensor

1 Sensor with connecting cable
2 Sealable adjusting screw
3 Protection pocket
4 Sleeve

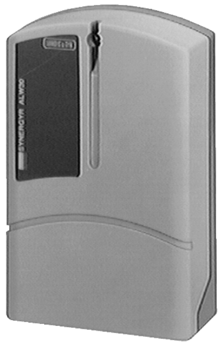
Conduit box

The conduit box ALW84 consists of base, terminal block and cover. The overall dimensions are the same as those of the pulse adapter AEW2.1 (refer to data sheet 2831).
The base has three holes for fitting the box to the wall. DIN rail mounting is made possible by a snap-on facility at the rear. For wiring there are:
– Three knockout holes for cable glands Pg11 or plastic grommets on the underside
– Five knockout holes at the rear when using a recessed conduit box

The terminal block is designed as follows:
– Five connection terminals each of which can accept four wires (1.5 mm^2), which are then galvanically interconnected
– Three connection terminals each of which can accept two wires (1.5 mm^2), which are then galvanically interconnected

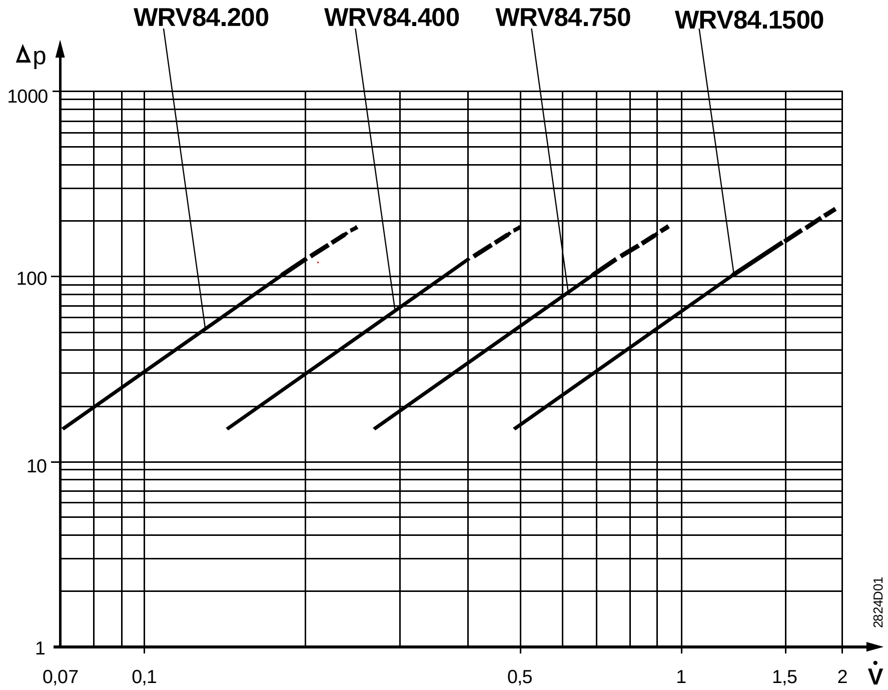
The connection terminals are of the clamping type.

The control and heating cost allocation valve has a ready connected 8-wire cable of 1 m. It establishes the electrical connection to the conduit box.



Conduit box ALW84

Sizing



Pressure drop curves (measurement range position 2)

Δp Pressure drop in mbar
V̇ Flow rate in m^3/h

The valve size should be selected such that the design flow temperature represents 50 to 100 % of the nominal flow rate.

Engineering notes

General

The local regulations for heat metering and electrical installations must be observed. The operating voltage of AC 24 V is supplied by an isolating transformer which powers the whole SYNERGYR system and which must be installed near the central unit. When sizing the transformer the power consumption of all units connected to the building bus must be taken into consideration. The secondary side of the transformer may not be earthed.
In the case of several buildings, it is recommended to use a separate AC 24 V supply for each building.

Control and heating cost allocation valve

Since the WRV84... operates with a variable measurement range, the pressure drop across the valve should never exceed 0.12 bar (WRV84.1500: 0.15 bar).
The surplus pressure must be reduced by a throttle mounted upstream of the valve.

Circulating pump

- When the heating zone pump runs and all valves are shut, and with no pressure regulation at the end of the pipe, the flow pipe must absorb the full pump pressure without producing any pump head. To avoid damage to the valve in this situation, the circulating pumps must be appropriately sized: at a flow rate of 0 m^3, the pump head of the heating zone pump may not exceed 0.8 bar
- To avoid damage to the circulating pump and the control and heating cost allocation valve, a spill valve should be installed at the end of the piping system
- For differential pressure control, it is recommended to use a speed-controlled pump

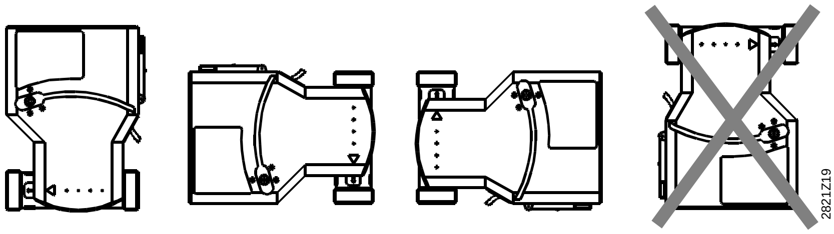
Mounting notes

Prior to mounting

When laying the pipes, the adapter piece must be fitted. The fittings required for the adapter piece are to be mounted on site.

Mounting

The delivery of the control and heating cost allocation valve and of the address plugs is part of the commissioning procedure.
Prior to mounting the valve, the plant must be thoroughly flushed.
Above the control and heating cost allocation valve, there must be a clearance of at least 50 mm to make certain the display can be read. To the right of the valve, the clearance required is 100 mm, allowing the address plugs to be fitted and the service unit to be connected (refer to "Dimensions").
The control and heating cost allocation valve may be mounted horizontally or vertically, but not upside down:



Permitted:	Yes	Yes	Yes (note: LCD upside down!)	No

The valve body may not be lagged.

Electrical installation

When connecting the 8-wire cable of the valve to the conduit box, the individual wires can be identified by their colours (refer to "Connection diagram").

Commissioning notes

The parameters of the control and heating cost allocation valve will be set by authorized staff after mounting, thus ensuring a uniform metering start.
After commissioning, all SYNERGYR units will be sealed.

Technical data

General data

Operating voltage (safety extra low voltage to EN 60730)	AC 24 V
Frequency	50 Hz
Power consumption	3.2 VA
Degree of protection to EN 60529	IP52
Safety class to EN 60730	III
Electromagnetic compatibility	
Immunity	EN 50082-2
Emissions	EN 50081-1
Perm. ambient temperatures	
Operation	5...50 °C
Transport and storage	-25...+65 °C
Mounting length	110 mm
Connecting thread	1"
Fittings (ALG81)	1" - ¾"
Length of connecting cable	
to conduit box	1 m (fixed)
to the flow temperature sensor	1.5 m (fixed)
to terminal P1 (pulse source)	max. 10 m
Weight	2.1 kg
Max. flow temperature	80 °C
Min. flow temperature	20 °C
Max. return temperature	80 °C
Min. return temperature	20 °C
Max. temperature differential	60 K
Min. temperature differential	2 K
Overload range	
Max. pressure drop across valve	900 mbar
Max. heating medium temperature (short-time)	90 °C
Max. static pressure	10 bar (PN10)
Min. static pressure	0 bar
Fault limits	to OIML, class 5
Water quality to	VDI 2035
Conductance	< 150 µS/cm
Oxygen (O_2)	< 0.2 mg/l
Alkaline earths (Ca + Mg)	< 0.02 mg/l
Phosphate (PO_4)	< 2.5 mg/l
Hydrogen sulphide (H_2S)	< 0.1 mg/l

Specific flow values

WRV84.200

Nominal flow rate	200 l/h
Max. flow rate	200 l/h
Min. flow rate	25 l/h
Flow rate display range	20...300 l/h
Pressure drop at nominal flow	120 mbar

WRV84.400

Nominal flow rate	400 l/h
Max. flow rate	400 l/h
Min. flow rate	50 l/h
Flow rate display range	40...600 l/h
Pressure drop at nominal flow	120 mbar

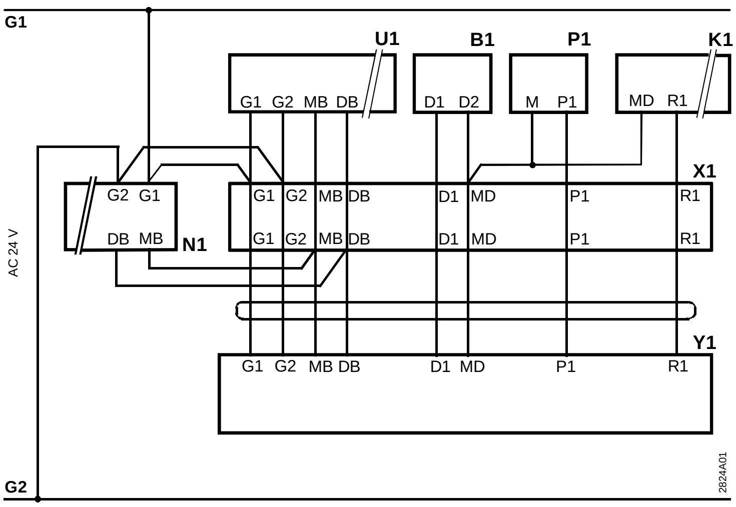
WRV84.750

Nominal flow rate	750 l/h
Max. flow rate	750 l/h
Min. flow rate	90 l/h
Flow rate display range	75...1125 l/h
Pressure drop at nominal flow	120 mbar

WRV84.1500

Nominal flow rate	1500 l/h
Max. flow rate	1500 l/h
Min. flow rate	180 l/h
Flow rate display range	150...2250 l/h
Pressure drop at nominal flow	150 mbar

Connection diagram

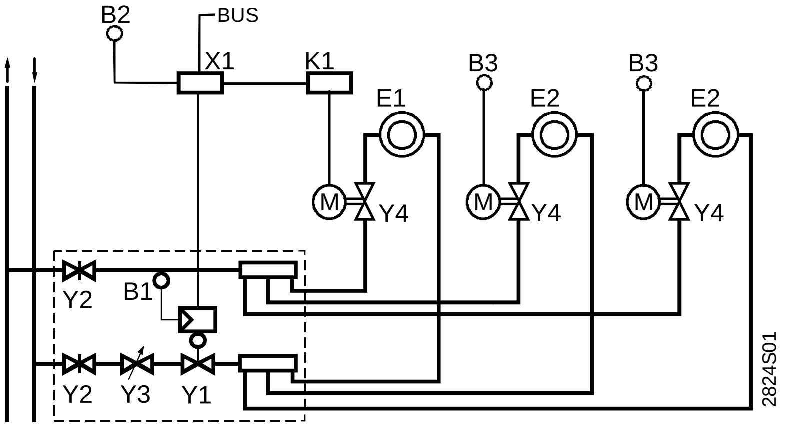


Colour coding of cable

G1	white
G2	brown
MB	blue
DB	pink
D1	grey
MD	green
P1	yellow
R1	red

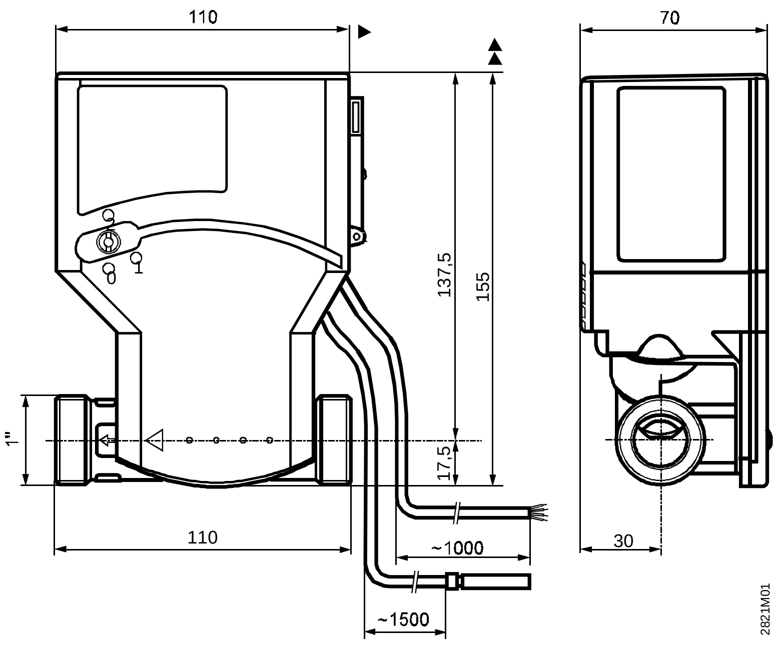
B1	Room unit QAW...
K1	Control module AEK84
N1	Central unit OZW30 or bus power pack TRW30
P1	Any non-SYNERGYR meter with a pulse source (e.g. for d.h.w.)
U1	Pulse adapter AEW2.1
X1	Conduit box ALW84...
Y1	Control and heating cost allocation valve WRV84...

Application example



B1 Flow temperature sensor of WRV84...
B2 Room unit QAW...
B3 Room thermostat RAD9...
E1 Underfloor heating system in the apartment's reference room
E2 Underfloor heating system in the other rooms of the apartment
K1 Control module AEK84
X1 Conduit box ALW84
Y1 Control and heating cost allocation valve WRV84...
Y2 Shutoff valve
Y3 Throttle (sealable)
Y4 Zone valve with electrothermal actuator STE21.1

Dimensions



Minimum clearances:

▶ = min. 100 mm

▲▲ = min. 50 mm

 Subject to modification