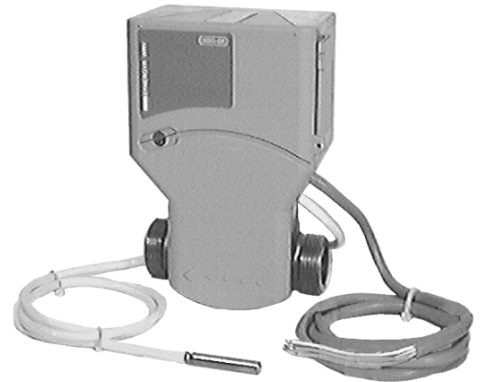


SYNERGYR®

Control and Heating Cost Allocation Valve

with local acquisition of the flow temperature

WRV81...



Electronic metering, control and regulating unit. Controls the room temperature through regulation of a valve, 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 WRV81... is a component of the SYNERGYR Control & Metering System. For field of use of the system, refer to data sheet 2800.

Functions

- Control of the reference room temperature with a room unit QAW...
- 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 meter 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

<i>Description</i>	<i>Typ reference</i>
Control and heating cost allocation valve	
Nominal flow rate 200 l/h	WRV81.200
Nominal flow rate 400 l/h	WRV81.400
Nominal flow rate 750 l/h	WRV81.750
Nominal flow rate 1500 l/h	WRV81.1500

Mounting kit	ALG81
Conduit box for WRV81...	ALW30
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
 - 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 when the plant is commissioned.

Commissioning by Landis & Staefa staff includes:

- Delivery and installation of the control and heating cost allocation valve
- Delivery and setting of the address plugs
- Parameter settings of the whole SYNERGYR plant
- Sealing the units

Equipment combinations

Each apartment requires one control and heating cost allocation valve WRV81..., a maximum of two pulse adapters AEW2.1, 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 WRV81.... In the other rooms, room temperature control is ensured by thermostatic radiator valves.

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.

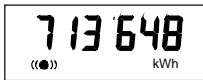
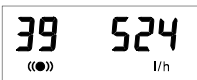
The return temperature sensor is integrated in the valve body.

The flow rate is determined based on the effective pressure principle. For this purpose, the valve features an orifice, a two-stage valve plug and a diaphragm measuring system. The two-stage valve plug is used to change the measurement range in function of the effective pressure.

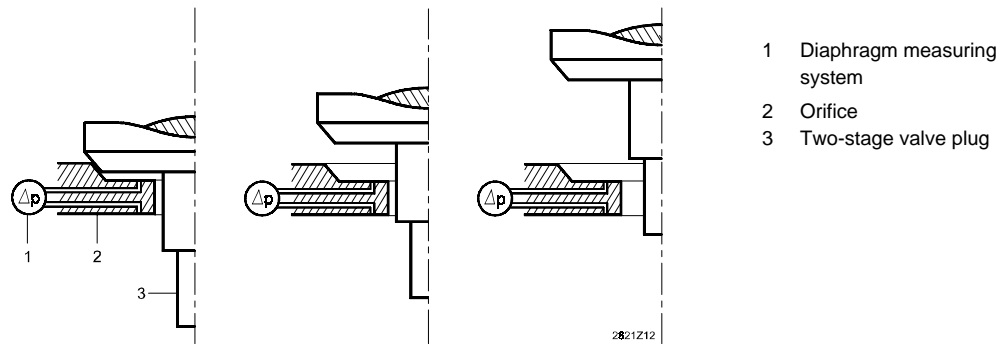
Suppression of hydraulic creep

If the flow rate or the temperature differential falls below the respective low limit value, the actual 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 become available: <ul style="list-style-type: none">– 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. For this purpose, the seal must be broken.
Valve kick	To prevent the valve from seizing after longer off periods, it is briefly opened and shut again after no more than 200 hours.
Handling of pulses from non-SYNERGYR meters	Any meter with a pulse interface (e.g. gas, water, or electricity meter) can be connected to the control and heating cost allocation valve. The connection is made via the conduit box ALW30. 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 WRV81... monitors itself and is able to detect errors and malfunctions. They are handled as follows: <ul style="list-style-type: none">– Display of the respective error code on the display– Signalling via the building bus to the OZW30 central unit and display of the respective error code on the central unit's display 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 WRV81... consists of electronics, actuator and valve. All components are accommodated in a housing made of die-cast zinc. Due to its compact design, the WRV81... 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 will be displayed.
Parameter setting 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 valve when commissioning the plant. The service interface is required for the connection of 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 appropriately positioned in the orifice by the actuator. The position of the valve plug is displayed.



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 by a sealable adjusting screw. The connecting cable is 1.5 m long and is ready fitted to the control and heating cost allocation valve.

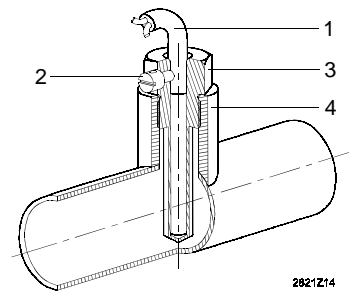
Accessories

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.

Detector 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 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:

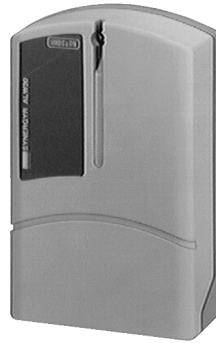
- Three knockout holes for cable glands Pg11 or plastic grommets on the underside
- Five knockout holes at the rear when using a recessed conduit box

The terminal block is designed as follows:

- Five connection terminals each of which can accept four wires (1.5 mm²) which are then galvanically interconnected
- Two connection terminals each of which can accept two wires (1.5 mm²) which are then galvanically interconnected

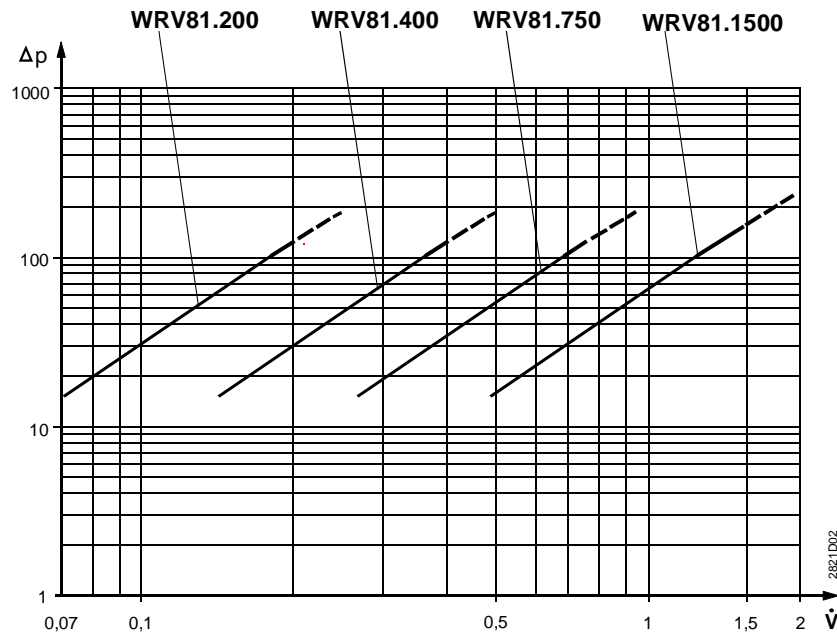
The connection terminals are of the clamping type.

The control and heating cost allocation valve has a ready connected 7-wire cable of 1 m. It establishes the electrical connection to the conduit box.



Conduit box ALW30

Sizing



Pressure drop curves (measurement range position 2)

Δp Pressure drop in mbar

\dot{V} Flow rate in m³/h

The valve size should be selected such that the design flow 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.

Control and heating cost allocation valve

Since the WRV81... operates with a variable measurement range, the pressure drop across the valve should never exceed **0.12 bar** (WRV81.1500: 0.15 bar). The surplus pressure must be reduced by a throttle mounted upstream of the WRV81....

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 has to absorb the full pump pressure without producing any pump head. To avoid damage to the WRV81... in this situation, the circulating pumps need to be appropriately sized: at a flow rate of 0 m³, the pump head of the heating zone pump must 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 required fittings for the adapter piece are to be mounted on site.

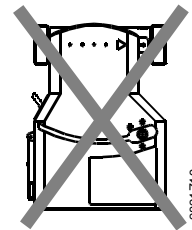
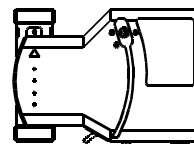
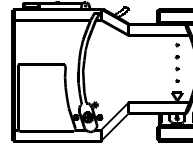
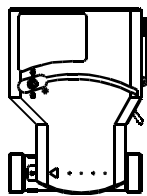
Mounting

The control and heating cost allocation valve and the address plugs are supplied when the plant is commissioned.

Prior to mounting the WRV81..., 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 plug 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 7-wire cable of the WRV81... 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 Landis & Staefa staff after mounting, thus ensuring a uniform metering start.

After commissioning, all SYNERGYR units will be sealed.

If the reference room is equipped with thermostatic radiator valves, they must be locked in their fully open position.

Technical data

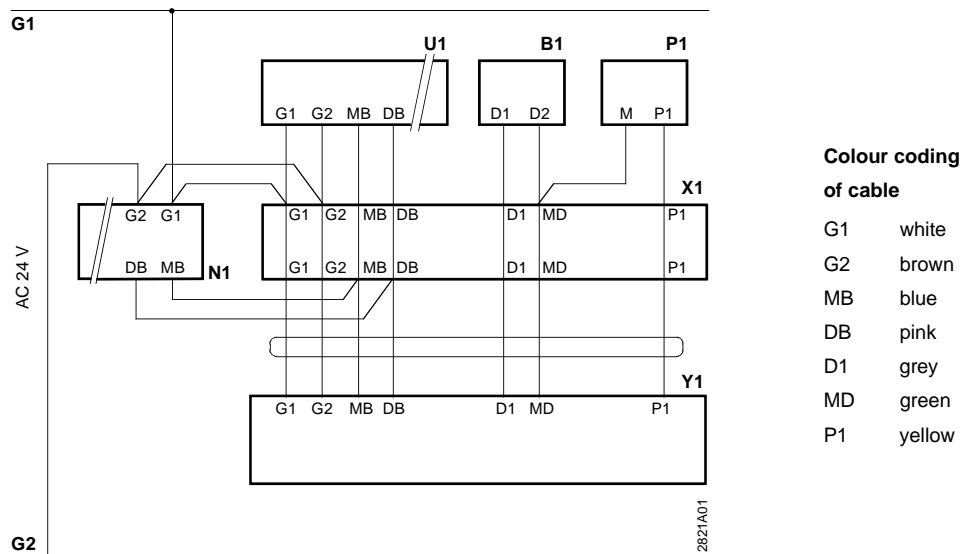
General data

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" - 3/4"
Length of connecting cable	
to the 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
Error 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 ₂ S)	< 0.1 mg/l

Specific flow values

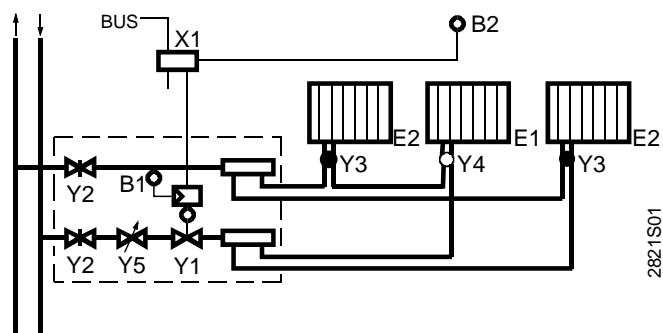
WRV81.200	
Nominal flow rate	200 l/h
Max. flow rate	200 l/h
Min. flow rate	25 l/h
Flow rate display range	20...300 l/h
Max. pressure drop at nominal flow	120 mbar
WRV81.400	
Nominal flow rate	400 l/h
Max. flow rate	400 l/h
Min. flow rate	50 l/h
Flow rate display range	40...600 l/h
Max. pressure drop at nominal flow	120 mbar
WRV81.750	
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
Max. pressure drop at nominal flow	120 mbar
WRV81.1500	
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
Max. pressure drop at nominal flow	150 mbar

Connection diagram



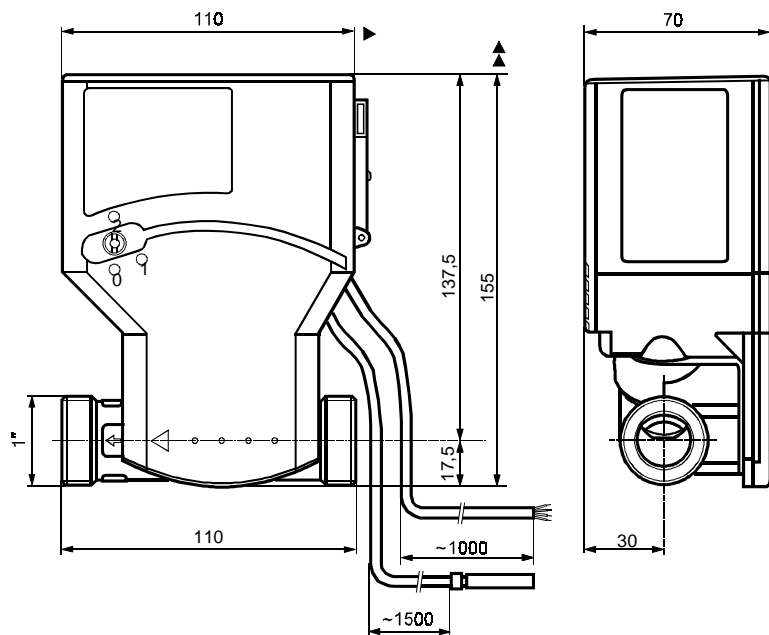
- B1 Room unit QAW...
- N1 Central unit OZW30 or bus power pack TRW30
- P1 Any non-SYNERGYR meter with a pulse source (e.g. for d.h.w.)
- U1 Pulse adapter AEW2.1
- X1 Conduit box ALW30
- Y1 Control and heating cost allocation valve WRV81...

Application example



- B1 Flow temperature sensor
- B2 Room unit QAW...
- E1 Radiator in the reference room of the apartment
- E2 Radiator in another room of the apartment
- X1 Conduit box ALW30
- Y1 Control and heating cost allocation valve WRV81...
- Y2 Shutoff valve
- Y3 Thermostatic radiator valve
- Y4 Manual valve (without thermostatic radiator valve)
- Y5 Throttle (sealable)

Dimensions



Minimum clearance:

▶ = min. 100 mm

▲ = min. 50 mm