

M-bus IoT gateway

WTV776-HB6035



The M-bus IoT gateway reads out wireless or wired M-bus devices using a browser.

- Connect up to 20 M-bus meters directly to the M-bus IoT gateway
- Connect up to 500 M-bus devices (2 lines, each for up to 250 M-bus devices)
- Connect up to 250 district heating controllers RVD2.. per line via M-bus
- M-bus network: Extend with up to 6 parallel connected level converters per line
- M-bus wireless network: Extend with up to 23 RF converters, each with up to 500 wireless devices per RF converter
- System formation with up to 500 logical M-bus devices and 2,500 wireless devices
- Restore customized settings (backup)
- Local readout with PC / browser via Ethernet or WLAN
- Remote readout service (web access)
- Customer access to their own consumption values with the ACT HOME app
- E-mail notification via Synco IC for consumption / trend data and alarms
- Integration in third-party systems, applications or software via REST API

The M-bus IoT gateway reads out devices connected directly to the gateway, devices connected to the gateway via level converters as well as wireless devices or network nodes connected to the gateway via RF converters (WTX660-E05060).

The M-bus IoT gateway can be used:

- Alone with up to 20 directly connected, wired M-bus devices.
- As master on a M-bus network with up to six parallel connected level converters per line. Up to 250 M-bus devices (max. 250 M-bus meters, max. 250 RVD controllers) can be connected per line.
- As a master on an M-bus wireless network with up to 23 RF converters, each with up to 500 wireless devices.
- As master on a network consisting of WTX.. / WTT.. Network nodes with up to 500 RF wireless devices per network. Up to 5 networks can be read in parallel per master.

The M-bus IoT gateway can read out up to 2,500 wireless devices and up to 500 wired devices. It records the data from the connected devices, can evaluate the data, and sends email notifications on events and alarms.

The device storage can save data for a period of up to 10 years. (over the past six months: Saving as per setting; period as of six months: One value per data point per month).

A PC/Internet browser reads the data and log files either locally over Ethernet or from anywhere over the Internet. In addition, the report files can be periodically transmitted with device data to an email recipient or to an FTP server.

An email can be sent on events and alarms.

The M-bus IoT gateway can be integrated in the Synco IC-Cloud. This permits the periodic upload of invoicing and trend data as well as alarm messages to the cloud per customized settings as well as distributing the information to the corresponding customers via email.

The M-bus IoT gateway has three digital inputs and two digital outputs. The change of state to inputs or outputs are recorded in the event log and/or per email depending on the configuration. Both outputs can be manually switched via web operation.

The M-bus IoT gateway is protected against short circuits and surges.

Readout district heating controller / heat meter

District heating controllers as well as heat meters at the district heating substations can be read over M-bus IoT gateway. The data points for the controllers are read/write.

The restore function (backup) can restore earlier controller settings at a later date. In addition, the controller settings can be transferred to a second controller of the same type (on the same application).

We recommend connected the controllers on the one line and the meters on the other for the M-bus IoT gateway since district heating controllers send more data traffic than meters. As a result, the battery power for the meters is not unnecessarily drained when reading the controllers.

When connecting controllers and meters on the same line, operate the devices without batteries (AC/DC 24 V, AC 230 V).

Readout via WLAN

To simplify on-site readout, the M-bus IoT gateway can also be readout using a mobile phone or tablet via WLAN and the readout data can be downloaded to the mobile device.

Web access

The M-bus IoT gateway has a remote access service to simplify web access.

Web access requires only one Internet connection, connected to the M-bus IoT gateway with an Ethernet cable. The M-bus IoT gateway can be comfortably operated remotely after checking the network settings on the IoT gateway; the router and web server must be on the same network.

The web access URL consists of

- the remote access service: www.wtv676.siemens-info.com
- The M-bus IoT gateway serial number, e.g. ev00000001

Example: <https://www.wtv676.siemens-info.com/ev00000001>

Read network nodes

The M-bus IoT gateway reads devices from a WT.. mesh network. Up to 5 networks can be read in parallel by M-bus IoT gateway. Up to 12 network nodes form a network. One WT.. network node per network must be connected to M-bus IoT gateway via a physical M-Bus line. Each network node has access to all consumption data on its own network.

ACT HOME mobile app

With the ACT HOME mobile app, customers can log in directly to the M-bus IoT gateway using their mobile phone and view current consumption values.

M-bus IoT gateway integration in third-party systems, applications or software via REST API

With the REST API interface, data can be read directly from the M-bus IoT gateway and further processed. A connection to third-party systems, applications or software is also possible. For further information, please contact your Siemens representative.

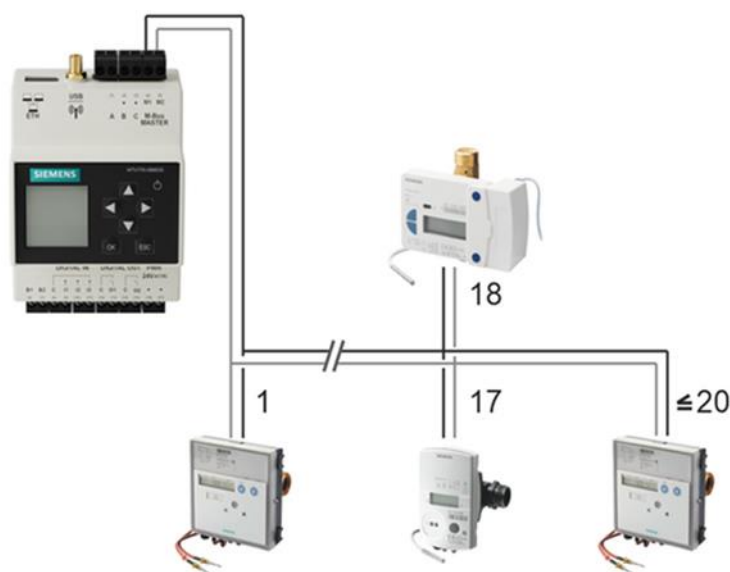
Features

Operating modes

The M-bus IoT gateway can be used in various ways:

M-Bus IoT gateway with wired M-bus devices

The M-bus IoT gateway reads up to 20 directly connected devices (20 simple M-bus loads). M-bus devices are connected over line M1M2.

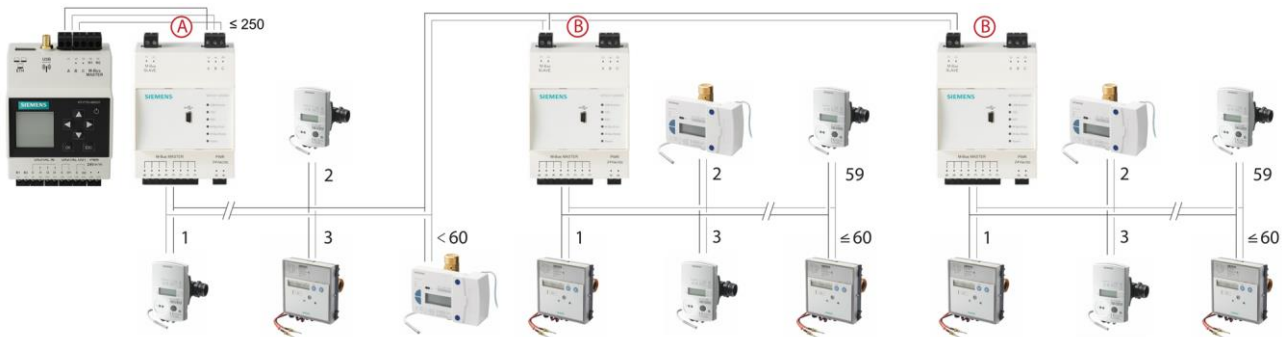


M-Bus IoT gateway with level converters

Up to six level converters (WTV531, WTX631) can be connected in parallel per line to a M-bus IoT gateway.

The level converter (A) is connected to a M-bus IoT gateway via the RS-232 interface (terminals A, B, C). The following level converters (B) can be connected via the M-bus SLAVE connection.

Up to 60 M-bus devices can be connected to each WTV531 level converter.



A Level converter WTV531 (master)

B Level converter WTV531 (slave)

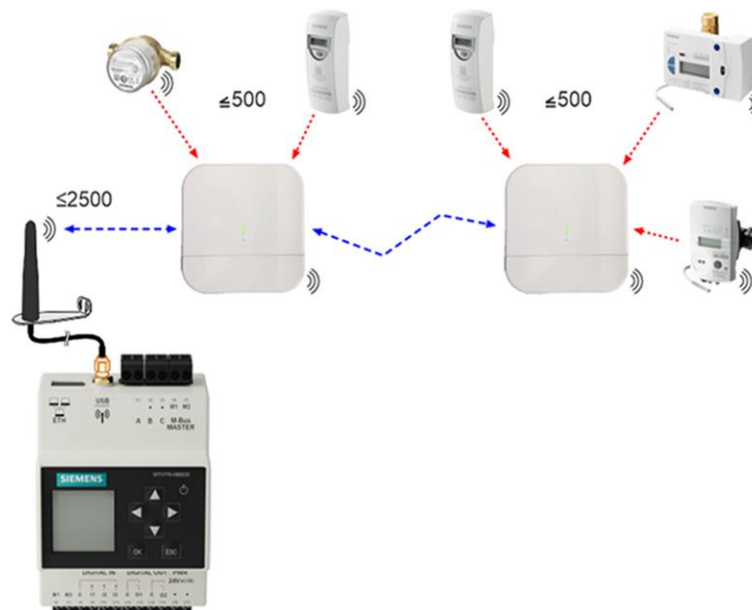
Up to 250 M-bus devices can be connected to each WTX631 level converter.

UP to six level converters WTX631 (one level converter, five repeaters) or up to two level converters WTV531 (one level converter, one repeater) can be connected in series to a M-bus IoT gateway.

M-Bus IoT gateway with wireless devices

The M-bus IoT gateway is equipped with additional RF converters to extend the system up to 2,500 wireless devices. The communication between the M-bus IoT gateway and RF converters takes place over a mesh RF protocol (backbone network).

A minimum of one M-bus IoT gateway and one RF converter is required to read out wireless devices. The backbone RF network can consist of a maximum of 23 RF converters. Communication between the RF converters and wireless devices takes place over the wireless M-bus protocol. The RF converter saves the consumption data from the devices in its environment, while forwarding the data to other RF converters, up to the M-bus IoT gateway (the other RF converters act as repeaters here).



M-Bus IoT gateway with network nodes

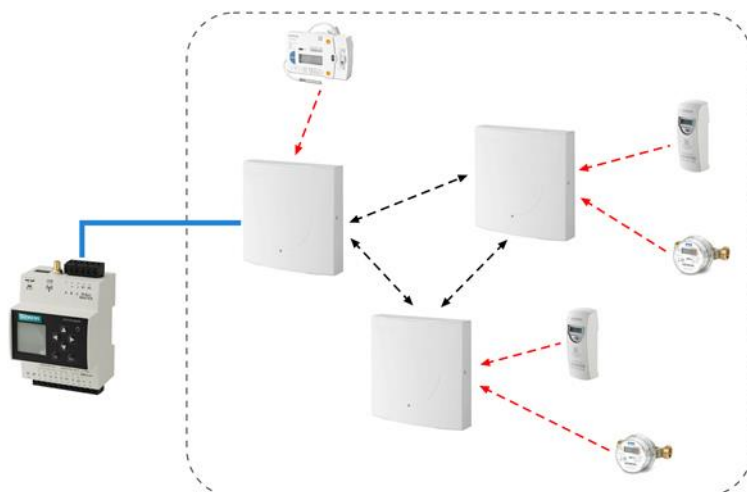
WT.. network nodes receive telegrams from consumption meters.

Up to 12 network nodes can communicate with each other on a network and exchange the respective consumption data (mesh system). This way, up to 500 heat cost allocators and/or wireless heat/water meters can be incorporated in a radio network (manages 500 addresses). This means that each individual network node stores all consumption data for the entire network.

One M-bus IoT Gateway can read up to 5 networks in parallel. At least one of the WT.. network nodes must be connected to M-bus IoT gateway using a physical M-bus line.

The M-Bus primary address for the connected WT.. Network node is 253.

Up to 20 simple M-Bus loads can be connected via line M1M2 without an additional level converter. A level converter is required, however, as soon as the network nodes are connected via line ABC.



NOTICE



Additional electrical consumption

Shorter lifecycle of network nodes

Reading out device data on the network node via M-bus IoT gateway requires additional electricity. This reduces the lifecycle of battery-operated WT.. Nodes compared to other network nodes on the network.

We recommend reading out the network nodes at most once a day since reading out data can increase battery use by ca. 5%.

NOTICE

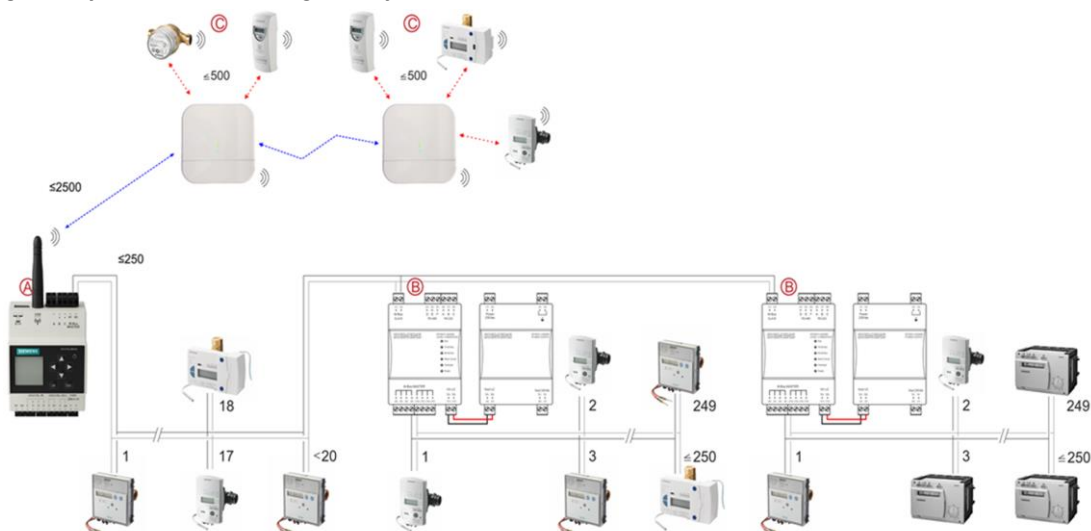


Read out a WTX16.. gateway via M-bus IoT gateway

- Disconnect communications directly on the WTX16.. between the devices upper section (gateway) and the lower section (network nodes, if you intend to read out an existing wireless network with the WTX16.. gateway via the M-Bus IoT gateway. Parallel reading is not possible and can destroy the devices.
- Connect the M-bus IoT Gateway to the network nodes (lower section). The network nodes are still powered with voltage in the upper section.

M-Bus IoT gateway with level converters and district heating controllers

Up to 250 RVD2.._district heating controllers can be connected per line to a M-bus IoT gateway. The M-bus IoT gateway and RVD2.. controllers communicate over M-bus.



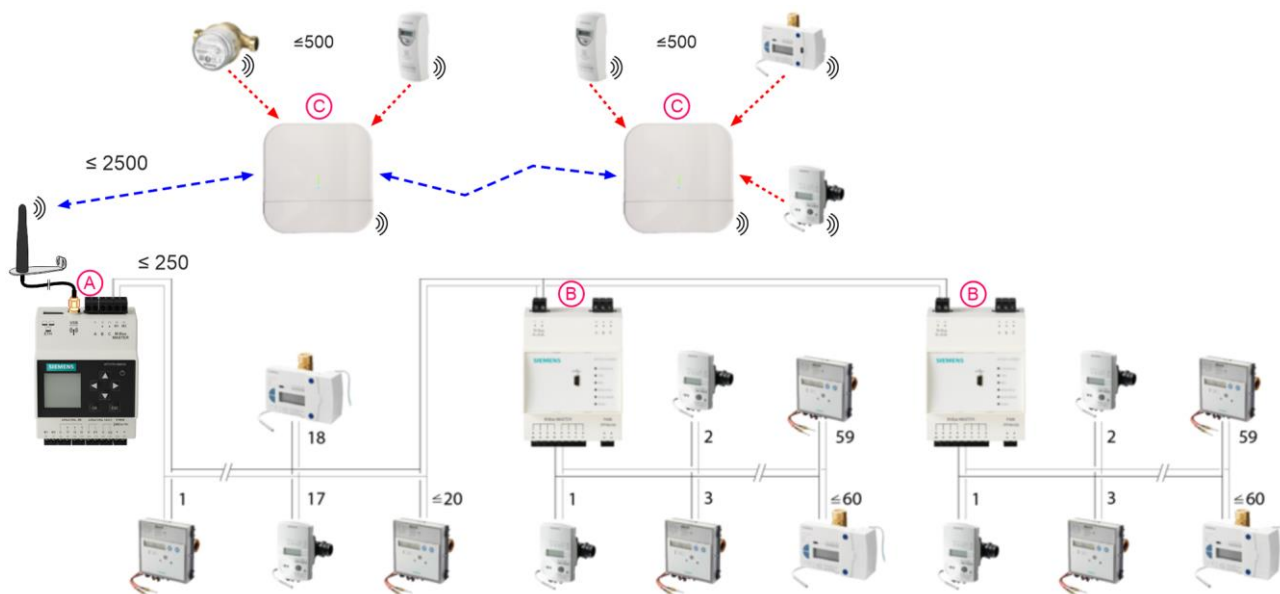
NOTICE



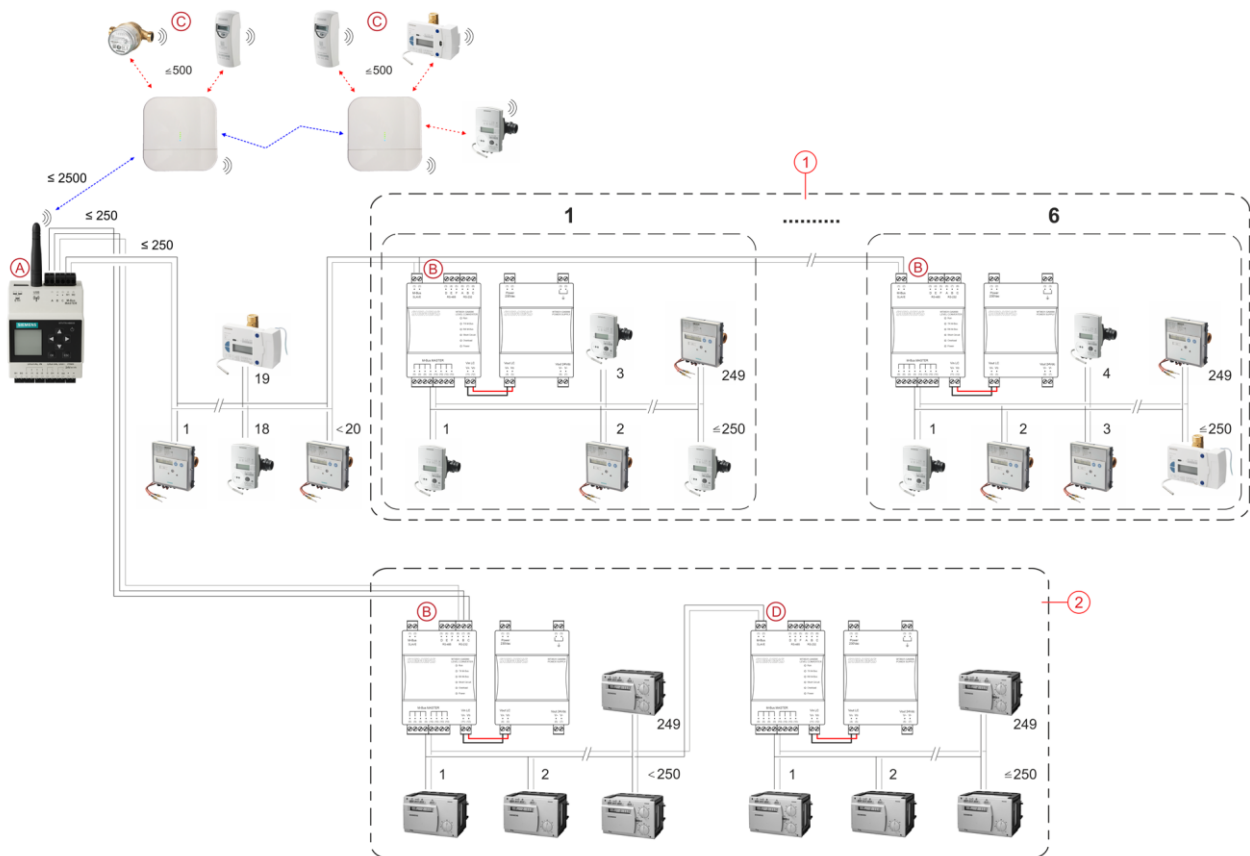
In the event M-bus devices (e.g. meters) and district heating controllers are connected to the same line, operate the devices without batteries (AC/DC 24 V, AC 230 V). Using battery-powered devices may significantly reduce the life of the batteries due to the frequency of the readouts of district heating controllers.

Combined plants

The M-bus IoT gateway can read up to 500 wired and 2,500 wireless devices.



- A M-bus IoT gateway (master)
- B Level converter WTV531 (slave)
- C The RF converter as participant on the backbone mesh network and connected to the wireless devices



- A M-bus IoT gateway (master)
- B Level converter WTX631 (slave)
- C The RF converter as participant on the backbone mesh network and connected to the wireless devices
- D Level converter WTX631 as repeater to overcome large distances
- 1 Parallel connection for level converter WTX631
- 2 Serial connection for level converter WTX631

Readout data

A PC/Internet browser reads the data on all operating modes either locally over Ethernet or from anywhere over the Internet using a PC/Internet browser.

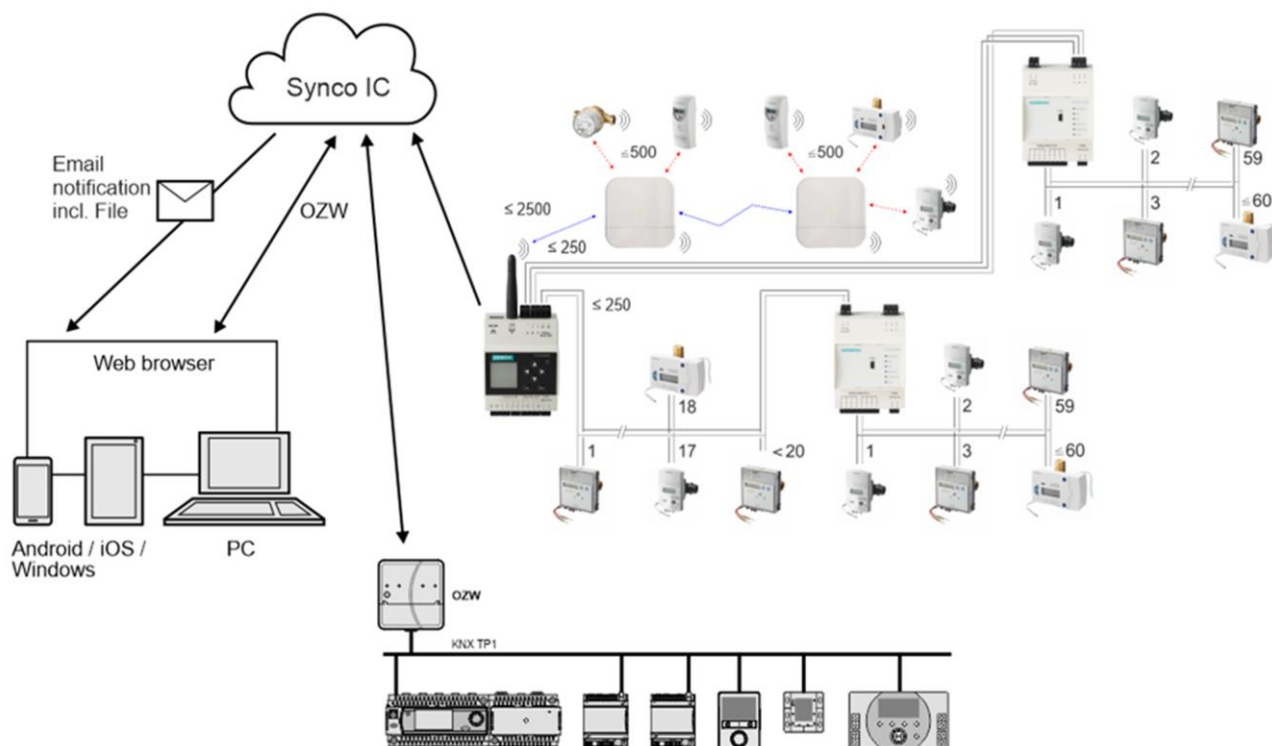
Write RVD parameters

The following parameters can be written to the controllers depending on the connected controller and the corresponding plant image:

Designation	RVD23x	RVD24x	RVD25x	RVD26x
DHW temperature nominal value	X	X	X	X
DHW temperature reduced setpoint	X	X	X	X
Temperature difference solar on	X	X	X	X
Temperature difference Solar off	X	X	X	X
Date of the first day of the heating period	X	X	X	X
Date of the last day of the heating period	X	X	X	X
Heating limit ECO heating circuit 1	X	X	X	X

Designation	RVD23x	RVD24x	RVD25x	RVD26x
Room temperature reduced setpoint heating circuit 1	X	X	X	X
Room temperature setpoint, holiday mode/frost protection HC1	X	X	X	X
Heating curve parallel shift, heating circuit 1	X	X	X	X
Heating limit ECO heating circuit 2	-	X	-	X
Room temperature reduced setpoint heating circuit 2	-	X	-	X
Room temperature setpoint holiday mode/frost protection heating circuit 2	-	X	-	X
Heating curve parallel shift, heating circuit 2	-	X	-	X
Legionella function, frequency	X	X	X	X
Time	X	X	X	X
Scheduler, heating circuit 1 Monday	X	X	X	X
Scheduler, heating circuit 1 Tuesday	X	X	X	X
Scheduler, heating circuit 1 Wednesday	X	X	X	X
Scheduler, heating circuit 1 Thursday	X	X	X	X
Scheduler, heating circuit 1 Friday	X	X	X	X
Scheduler, heating circuit 1 Saturday	X	X	X	X
Scheduler, heating circuit 1 Sunday	X	X	X	X
Scheduler HC2 Monday	-	X	-	X
Scheduler HC2 Tuesday	-	X	-	X
Scheduler HC2 Wednesday	-	X	-	X
Scheduler HC2 Thursday	-	X	-	X
Scheduler HC2 Friday	-	X	-	X
Scheduler HC2 Saturday	-	X	-	X
Scheduler HC2 Sunday	-	X	-	X
Scheduler DHW Monday	X	X	X	X
Scheduler DHW Tuesday	X	X	X	X
Scheduler DHW Wednesday	X	X	X	X
Scheduler DHW Thursday	X	X	X	X
Scheduler DHW Friday	X	X	X	X
Scheduler DHW Saturday	X	X	X	X
Scheduler DHW Sunday	X	X	X	X

The Synco IC-Portal is located at: <https://www.siemens-syncoic.com/>.



Front view		
	A	Operating elements
	B	LED
	C	Display

Operating elements

The operating elements navigate the menu tree of the M-bus IoT gateways.

The device can be commissioned and current data can be viewed directly on the device without a PC.

Additional operating options are available when accessing via PC/Internet browser.

Install the supplied antenna for the wireless application. The antenna can be connected either directly or using a cable (recommended). Additional information on installing the antenna is available in document A6V11157964. See 'Product documentation [► 16]'.

LED

The LED indicated the operating state of the M-bus IoT gateway.

Display

Measured data and basic settings are displayed on an LCD display field.

Press a navigation button to switch on the display. Access is password protected. The display switches off automatically to save energy after 20 minutes.

Information is divided into four main menus:

- System info
- Wired meters
- Wired search
- Search RF
- Settings

Display example



Technical design

Topologies

Wired M-bus devices

The M-bus permits various network topologies. The M-bus devices and level converters can be connected to the M-bus web server in a line, bus, star, or tree topology (or a combination of topologies). The same applies to connecting M-bus devices to level converters.

Ring topology is not permitted.

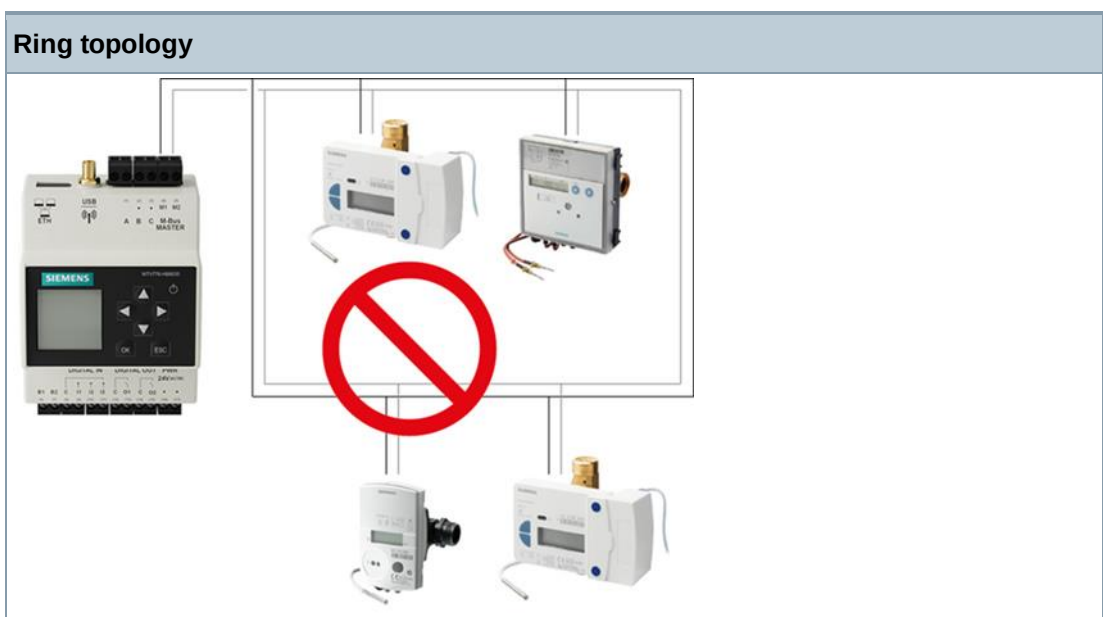
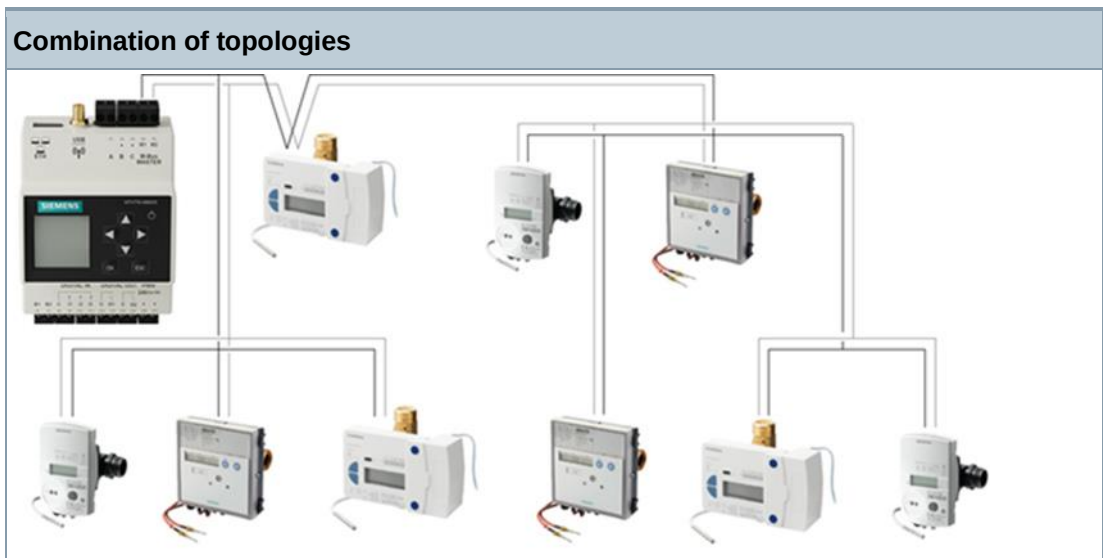
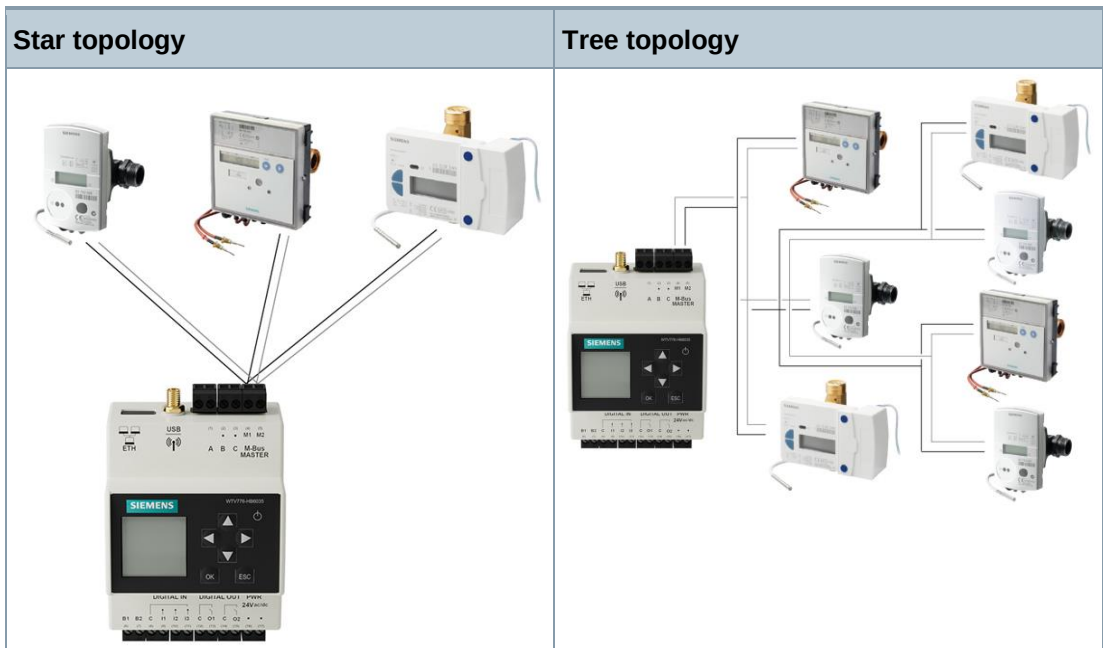
Bus cable polarity is not relevant, simplifying installation.

Line topology



Bus topology

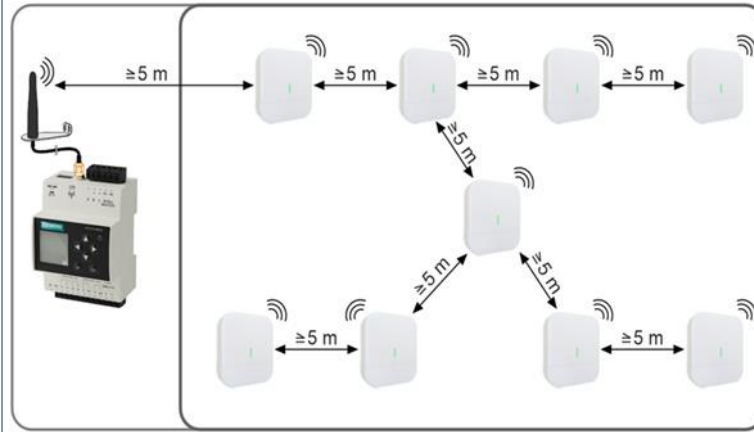




Wireless M-bus devices

The M-bus IoT gateway supports various network topologies for RF read out. The RF converter is self-organizing and searches for the optimum connection to the gateway (mesh network).

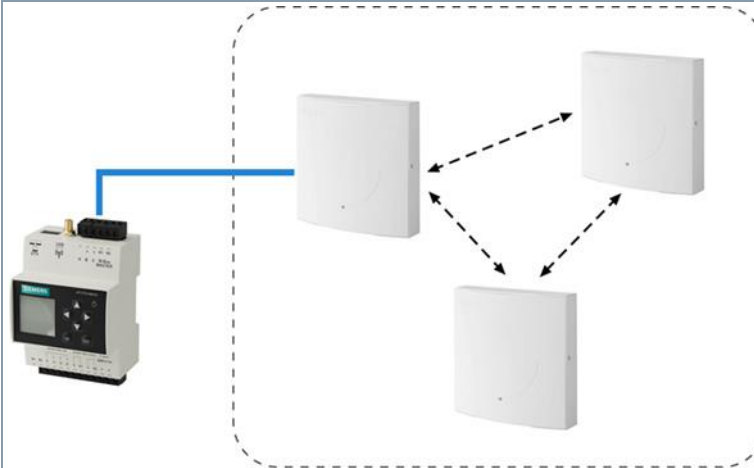
RF network topology



Network nodes with cable connection to the M-bus IoT gateway

The M-bus IoT gateway can read out up to 5 networks in parallel. Each network node has access to all consumption data on its own network (mesh network). At least one of the WT.. network nodes must be connected to the gateway using a physical M-Bus line.

RF network topology



Addressing

M-bus uses two types of addresses to recognize devices:

- Primary addressing: Up to 250 primary addresses can be assigned to an M-bus system. The primary address is normally assigned during device commissioning.
- Secondary addressing: Secondary addressing consists of 8 bytes and permits the assignment of any number. In the default setting, the secondary address for a device normally matches the serial number issued by the device manufacturer. The assignment prevents address conflicts on the bus.

Bus expansion

Plant type	Maximum distance	Total cable length	Cable cross-section	Number of M-bus devices (slave)	Max. transmission rate
Small residential buildings	350 m	1000 m	0.5 mm ²	500 (250 per line)	9600 baud
Large residential buildings	350 m	4000 m	0.5 mm ²	500 (250 per line)	2400 baud
				64	9600 baud
Small developments	1000 m	4000 m	0.5 mm ²	64	2400 baud
Large developments	3000 m*	5000 m	1.5 mm ²	64	2400 baud
Direct vicinity	5000 m*	7000 m	1.5 mm ²	16	300 baud
Point-to-point connection	10000 m*	10000 m	1.5 mm ²	1	300 baud

* Use shielded cables at distances greater an 1000 m (see EN13757-2 Appendix E).

Signal specification

M-bus	Condition	Minimum	Typical	Maximum	Measuring unit
Number of simple M-bus loads per M-bus IoT-Gateway	WTV776-HB6035	0	-	20	-
Transmission rate	$C_{\text{Segment}} \leq 382 \text{ nF}$	300	2400	9600	baud
Bus power	WTV776-HB6035	24	40	42	V
Bus current	WTV776-HB6035	0		30	mA

The device has the following connection terminals / LED		
	A	Ethernet connection
	B	USB connection (no function)
	C	Antenna connection
	D	Terminals A, B, C: For max. 250 M-bus devices connected via a level converter Terminals M1 and M2: For max. 20 M-bus devices connected directly or for 250 M-bus devices connected via a level converter
	E	Terminals (16) and (17): Power supply AC/DC 24 V
	F	Terminals (12) and (13): Relay connections for digital output 1, max. AC/DC 30 V
	G	Terminals (14) and (15): Relay connections for digital output 2, max. AC/DC 30 V
	H	Terminals (9), (10), and (11): Connections for the digital inputs. Terminal (8): Reference for digital inputs
	I	Terminals (6) and (7) are not used. Do not apply electricity to these terminals.

NOTICE	
!	Power supply DC 24 V The M-bus IoT gateway can be powered directly from level converter WTX631.. with DC 24 V.

Type summary

Ordering

Description	Order number	Type
M-bus IoT-Gateway	S55563-F166	WTV776-HB6035

Device combinations

The following products can be used together with the M-bus IoT Gateway:

Description	Order number	Type
M-bus level converter 60	S55563-F145	WTV531-GA5060
M-bus level converter 250	S55563-F159	WTX631-GA0090
RF converter	S55563-F149	WTX660-E05060

The gateway can read the following district heating controllers:

RVD230-A, RVD230-C

RVD235

RVD240

RVD245

RVD250

RVD255

RVD260

RVD265

NOTICE



The M-bus web server WTV676 cannot be upgraded to a M-bus IoT gateway WTV776.

Product documentation

Topic	Title	Document ID
Device mounting, wiring, connecting peripheral devices.	M-bus web server mounting instructions WTV534	A6V10844310
User's guide	M-bus IoT-Gateway WTV776-HB6035 M-bus level converter WTV531-GA5060 M-bus level converter WTV631-GA0090 RF converter WTX660-E05060	A6V14166901
User's guide	Synco IC: Cloud and remote access for OZW772 and OZW672, cloud access for WTV676	A6V10500249
Mounting instructions	M-bus IoT-Gateway WTV776-HB6035	A6V14409691
Open Source Software	OSS Software Declaration	A6V10919216

Product inserts

The OSS Software Declaration (English only) as well as mounting instructions in the following languages are included with the M-bus IoT-Gateway:

German, English, French, Dutch, Italian, Finnish, Spanish, Norwegian, Polish, Czech, Slovakian, Hungarian, Greek, Croatian, Slovenia, Lithuanian, Bulgarian, Turkish.

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

<http://siemens.com/bt/download>

Notes

Safety

 CAUTION	
	National safety regulations Failure to comply with national safety regulations may result in personal injury and property damage. Observe national provisions and comply with the appropriate safety regulations.

Installation

 WARNING	
	No internal line protection for supply lines to external consumers Risk of fire and injury due to short-circuits! Adapt the wire cross sections as per local regulations to the rated value of the installed fuse.

Disposal

	This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national legislation. For additional details, refer to Siemens information on disposal.
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Warranty service

The application-specific technical data is guaranteed only in combination with the Siemens products listed in the 'Device combinations' section. If third-party products are used, any guarantee provided by Siemens will be invalidated.

Power supply	
Operating voltage	AC/DC 24 V +/- 10 % (SELV)
AC frequency	50 / 60 Hz
Maximum power consumption	14.5 W, 15 VA
Internal fuse	PTC resistance and varistor
Transformer with secondary current limit of max. 10 A or external secondary current fuse	Non-renewable fuse: Slow to a max. 10 A Circuit breaker: Max. 13 A, type B, C, D per EN 60898
Battery backup of real-time clock: Lithium type CR2032 (can be replaced on the plant)	Battery operation: A total of 5 years Unused: 7 years

WLAN	
Frequency band	2.4 GHz
WLAN standard	802.11 b/g/n

Pins (terminal block)	
M-bus master (terminals 4 and 5):	Connections for M-bus devices and Connection for the following level converters
3 digital inputs:	Contact sensing: Voltage: DC 2.2 V Current at closed contact: 0.4 mA OFF = Resistance between terminal 8 and 9,10,11 > 6 kΩ ON = Resistance between terminal 8 and 9,10,11 < 3kΩ
2 digital outputs:	Relay with max. contact rating: 5 A @ AC/DC 30 V (resistive load) 2 A @ AC/DC 30 V (inductive load $\cos\phi = 0.4$)
	Insulating strength between relay and electronics: 1kV AC (SELV-SELV circuits)
	External fusing of supply line - Non-renewable fuse: Slow to a max. 5 A - Circuit breaker: Max. 6 A, type B, C, D per EN 60898

Pins (terminal block)	
Terminals A, B, C	RS-232 interface for the following level converters A = RX B = TX C = GND
Terminals M1, M2	Connections for M-bus devices (max. 20) and for follow-on level converters

Interfaces	
Ethernet	Interface type: 10/1000Base-TX, IEEE 802.3 compatible Bit rate: Max. 100 MBit/s Recognition: Auto MDI-X N°1 (1 MAC): ETH: Ethernet port
Field bus	M-bus: Max. 20 devices Max. number of wireless devices: 2,500 Max. number of wired M-bus devices: 250
M-bus interface	Current draw: 1 M-bus load Addressing: Primary or secondary Baud rate: 300, 2400, or 9600 baud Max. permissible reading frequency: Typically twice a day Protocol: As per EN 13757-2/-3, EN 1434-3
RF protocol backbone to RF converter (mesh network)	Frequency band: 868.00...870.00 MHz

M-bus ¹	
Reference standard	EN13757-4 Physical and Link Layer (Operating modes: C, S, T mode) for wireless M-bus
	EN13757-3 (Application layer)
Baud rate	300 bps...9600 bps
Max. number of M-bus IoT gateways connected directly to the web server with a cable	20 (simple M-bus loads)
WT.. network node integration • M-Bus load • Max. number of network nodes per network • Number of networks that can be read out per M-bus IoT gateway	1 simple M-Bus load per network node 12 5

M-bus¹	
Max. number of level converters on the M-bus IoT gateway	6
Max. number of wired M-bus devices per level converter	WTV531: 60 WTV631: 250
Max. number of level RVD2.. M-bus IoT gateways	500
Max. number of RF converters on the M-bus IoT gateway	23
Max. number of wireless devices per RF converter	500
Max. number of readable devices	Wired: 380 M-bus loads or 500 logical M-bus devices Wireless: 2,500 devices The limitations only apply to logical M-bus devices (500). Up to six level converters WTV631 can be connected to each line (1500 M-bus loads per line).
Bus power	Min. 24 V
	Max. 42 V
Bus supply current	Max. 30 mA
Protection against short circuits	Yes

Ambient conditions	
Operation	Per IEC/EN 60721-3-3
Climatic conditions	Class 3K23
Temperature	-5...+50° C
Air humidity	5...95 % r.h.
Mechanical conditions	Class 3M11
Transportation	Per IEC/EN 60721-3-2
Climatic conditions	Class 2K12
Temperature	-40...+70° C
Air humidity	5...95 %
Mechanical conditions	Class 2M4
Storage	Per IEC/EN 60721-3-1
Climatic conditions	Class 1K22

Ambient conditions	
Temperature	-40...+70° C
Air humidity	5...95 %
Mechanical conditions	Class 2M4

Degree of protection	
Degree of protection	IP20 per EN 60529
Protection class	III per EN 62368-1

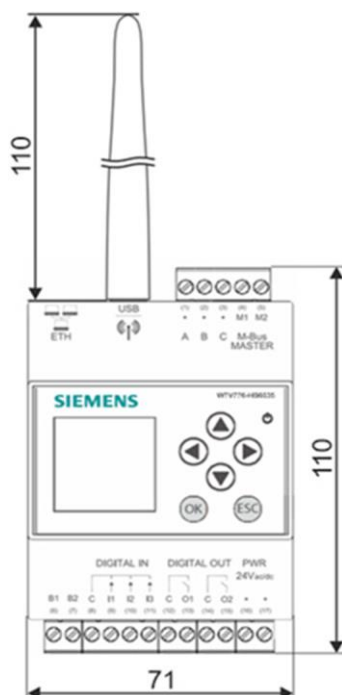
Mounting	
Mounting type	On 35mm DIN rails (EN60715)

Standards and guidelines	
Product standards	EN 62368-1 Information Technology Equipment Safety
Electromagnetic compatibility	For residential, commercial, and industrial environments
EU conformity (CE)	See EU declaration of conformance *)
Environmental compatibility	The product environmental declaration ¹⁾ contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

*) The documents can be downloaded at <http://siemens.com/bt/download>.

External features	
Housing materials and colors	PC + ASA, RAL 9010 (white)
Dimensions (L x W x H)	110 x 71 x 62 mm
Weight, including mounting instructions	0.207 kg

Dimensions



- H = 62 mm
- All dimensions in mm