LINE SPLITTER

Applications

HedinTex

In catalogs and other reference books, one frequently looks in vain for practice-oriented information. Product specifications, brand names and technical details dominate, whereby coherence between product families as well as application examples are seldom found.

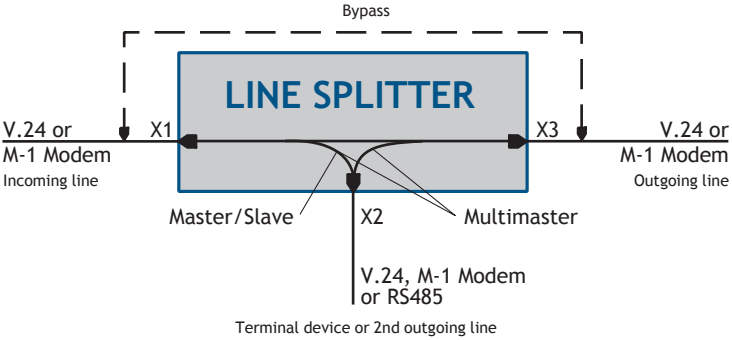
How can their use be clearly represented?

This brochure would like to give suggestions on how line splitters can be universally employed. *On the following pages we show usage possibilities and fields of application. In this way, we would like to offer support and instructions for the network planner's project realization efforts. All examples illustrate practice-tested projects from many various areas, e.g. process control engineering, automation engineering and tele-control engineering.*

Hedin Tex

4 What is a line splitter?

A line distribution within an RS422/RS485 bus is realized with a line amplifier in form of a repeater. It is possible to carry out a line distribution on a modem interface only with carriers or line splitters. With carriers as a splitter, however, losses arise because of the carrier attenuation. A line splitter unites the advantages of the great range of a point-to-point connection with that of a party-line constellation (multi-point/bus modem). The carrier loss problem no longer exists since the line splitter assumes the separation in an active way. After every line splitter the maximum transmission distance is again possible.



The Hedin Tex line splitter comes into use on private company leased lines or on transmission paths of private network operators. Also simple telecommunication lines can be used. Through the use of a main primary line and a line splitter, terminals can be connected together anywhere in a decoupled way. Through the integrated amplifier function, devices can be connected to this bus although they are physically far apart. The significant interface functionality makes steliform, bus-like or mixed structuring possible. The line splitter does not impose any hardware limitations on the participant in that a DC-decoupling of the data transmission prevents distur-

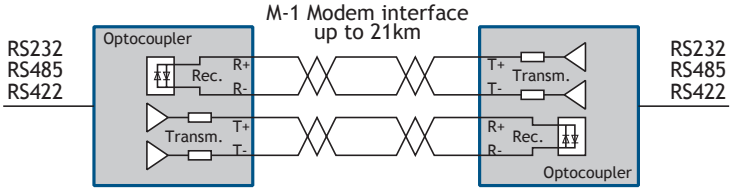
bances by compensatory currents. The communication data will be transferred code-transparent whereby the addressing of the terminals occurs from the software side so that many master/slave or token-passing protocols operate without limitations.

A secure four-wire modem connection with continuous line supervision makes fast reaction times possible through an always active modem transmitter. The operational security is increased by the bypass function at the line splitter. Should a power supply fault occur, the interface connections X1 and X3 in the configuring/setting ”modem” become linked. Through this, the device is bridged and the communication in the main line continues.

At installation, no transmission rate configurations are required i.e. no arduous new configuration is required after transmission rate changes. Also, unlike for a multi-point FSK (Frequency Shift Keying) modem, the send/receive channel state need not be taken into account.

6 Interface: M-1 Modem

The M-1 modem interface is a further development of the 20 mA current loop interface (TTY). It joins the advantages of a symmetrical interface, such as RS485, with the advantages of the TTY interface. The M-1 modem interface transfers serial data over a four-wire connection (two pairs) up to 21 km, depending on the transmission rate. The data transfers as +10 mA or -10 mA current flow. This technology provides the interface the possibility to transfer an additional signal in both directions so that the condition of the line and the terminals will be supervised. The current loop technology offers reliable transfer also with low quality lines and disturbance-prone surroundings. Through an opto-coupler interface, the devices are galvanically isolated from each other during data transmission.



Modem transmission is code-transparent, i.e. it is completely independent of data structures and protocols. No transmission rate configurations are necessary. In the transmission line the wires are twisted pair and an ohmic connection exists between the end points. There must not be any carriers in the line.

Range of the M-1 Modem Interface, cable type 0,3 mm² 42pF/m									
Speed, bps	600	1200	2400	4800	9600	19200	38400	64000	100000
Range, metres	21000	15000	10000	6700	4000	2500	1300	800	300

The table entries above are indicative of the possibilities whereby other cable specifications are possible. Standard telecommunication cables and other installation cables can be used keeping in mind the importance of twisted pairing.

Examples of data cables according to the table data:

J-YY	e.g. 2x2x0.6mm	2 pairs @ 0.6 mm
J-Y(ST)Y	e.g. 2x2x0.6mm	2 pairs @ 0.6 mm
J-2Y(ST)Y		
A-2Y(L)2Y	e.g. 2x2x0.6mm	2 pairs @ 0.6 mm
A-02YSF(L)2Y		

8 Interface: V.24/RS232

The serial interface used most frequently is the RS232, also called the V.24 interface. The interface finds its use in PC systems, terminals, printers, controls, modems, transducers and other devices requiring data transfer. The transmission distance of the asymmetrical interface is approximately 15 m, whereby the serial data in asynchronous or synchronous format, full or half duplex or simplex mode is transferred. A transmitter is always dedicated to a receiver whereby all signals are in respect to the chassis (signal ground) reference. There are no bi-directional lines.

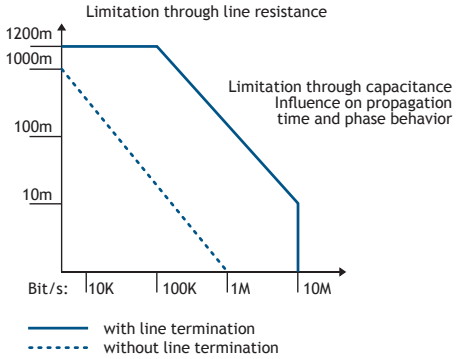
The direction of signal flow of the interface signals is given by the description or name of the physical port. At the data terminal equipment (German: DEE; English: DTE) is, for example, one output 103/BA (TD, TxD) and at a data communication equipment (e.g. a modem), (German: DÜE; English: DCE) is an input. It can be most of the time assumed that a plug (male) is a DTE and a socket (female) is a DCE.

For all of the many signal lines of the V.24/ RS232 interface, most often they are not all necessary. For an asynchronous data transmission with software handshaking, like Xon/Xoff, only receive data (RD), transmit data (TD), and SG are used. If hardware handshaking is employed, additional control and registration circuits (e.g. RTS and CTS) will be necessary for data flow control. In some cases systems need an additional one or two hardware signals (control and registration circuits) to indicate off and error status.

The RS485 interface has established itself as an efficient and fast communication interface in the most various of areas such as Profibus and C-Bus. With this multipoint connection, up to 32 participants can communicate on a main artery-pair (shielded/unshielded twisted pair) in half-duplex mode with each other. This means that sending and receiving of serial data occurs in alternating fashion and must be controlled. Every bus user is addressed and only one participant may send at any given time. The other participants are, meanwhile, in receive mode.

You can transfer a maximum of 100,000 bits per second up to a cable length of 1200 m. The 2-wire bus conductor must be terminated at each end with a terminating resistor (100..300 ohms). The terminating resistors prevent reflections, cross-talk on the bus conductor and contribute additionally through the resulting current flow, to transmission security. Pull-up and pull-down resistors at the termination points create a stable voltage potential and protect thereby against undefined levels with a tri-state condition in the system as well as open-circuit lines (fail-safe).

Transmission Distance - Data Rate:



10 Interface: RS422

The RS422 is a symmetrical interface like the RS485. The electrical characteristics of the interface are very similar to those of the RS485. Therefore, RS422 interfaces are created partially with component parts for the RS485. With this bus-capable interface, a transmitter (Master) is switched onto several receivers (tributary stations) with the last receiver on the cable being provided with a terminating resistor. The transmitters of the tributary stations are connected to the receiver of the master and only one transmitter is free to transmit at any given time. The transmission distance is, as for the RS485, 1200 m at a maximum 100 Kbit/s.

Interface: Fiber Optic Cable

In Fiber Optic Cable (FOC) data transfer the electrical signals are changed into pulses of light and transmitted over a thin glass or synthetic fiber. Therefore, these cables are not affected by electromagnetic disturbances. One can distinguish between multi-modem and single-modem fibers. Single-mode fibers (mono-mode) offer the optimal transmission characteristics. A light beam is fed in an axis-parallel form so that the signal at the exit point of the cable is almost unchanged. With the multi-modem fiber (gradient fiber or step-index fibers) the light is divided into several beams and moves along the cable's length by reflecting off the edges. Delay differences in propagation occur and the signals seem somewhat broader at the cable exit. Therefore the bandwidth of the signal and the range is limited.

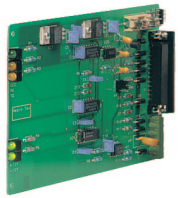
An additional factor in fiber optic data transmission is the employed wave length. Every fiber optic cable has a transmission loss depending on the wave length of the light. Three light wave lengths (850 nm, 1300 nm and 1550 nm) are available for use in transmitting. Thereby, the longer the wavelength, the smaller the attenuation loss. Depending on the fiber optic cable and the light wave length used, these point-to-point glass fiber connections make possible a range of 3 km to 100 km. The transmission rate can be up to 1 Gigabit/s.

Devices

Hedin Tex line splitters are available in three installation variations. Every device has a display with four LEDs to report interface and device status at the front side.

Table model. The table-top housing is a black plastic housing with its own power supply for 230 V AC nets (partially also 24 V DC). The 230 V AC power cord is removable. The housing dimensions are 129 x 47 x 134 mm (WxHxD) and can be installed in two different ways; either with self-adhesive rubber feet or Velcro tape. The rubber feet and Velcro tapes are enclosed in the packing.

Adapter cards for 19 inch modular chassis. The boards are conceived for installation in the Hedin Tex 19 in. modular chassis RV-1 (BGT*). Power for the pluggable cards is via a power supply circuit board mounted on the rear side of the BGT. All other interface connections are also on the rear side. The adapter cards require a supply voltage of 15-17 V DC. Card format is 100x160 mm (Europe-card).



Mounting rails housing. The device can be installed by means of a base assembly on a 35 mm DIN mounting rail (”cap” rail per EN55022). The base assembly consists of a holding appliance for the mounting rail, a DIN 41612 plugging strip and a screw terminal strip. All cable connections are found on the base assembly. This means that in case of a device failure, only the device needs to be exchanged. The device is in a black plastic housing. The housing dimensions: 47x129x134 mm (WxHxD), assembly base

excluded. Assembly base: 75x100x25 (WxHxD). The total dimensions are 75x129 mm (WxH). All devices are provided with 24 V DC.

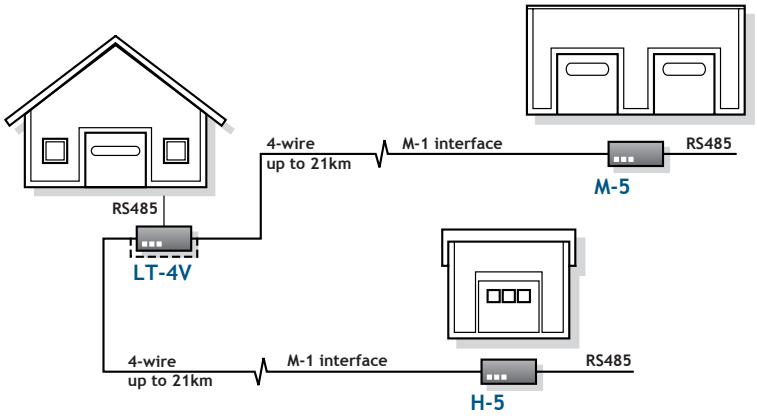
* BGT = German abbreviation for this hardware designation

Line splitter overview

LT-1V	Asynchronous line splitter, table-top model, 3 interfaces: V.24 or M-1
LR-1V	Slide-in card for mounting rack, function like LT-1V
LH-1V	LT-1V variation for 35 mm DIN rails; 24 V DC supply connection
LT-4V	Asynchronous line splitter like LT-1V, providing, however, one interface V.24 or RS485 with galvanic separation
LT-4VLWL	Line splitter, 2x glass fiber, 1 x V.24 or RS485/RS422 interface
LH-4V	LT-4V variation for 35 mm DIN rails, 24 V DC supply connection
LH-4VLWL	Variation for 35 mm DIN rails, functionally like LT-4VLWL, 24 V DC supply connection
LH-10	Multi-function modem for 35 mm DIN rails: 24 V DC supply connection
LR-3C	Interface multiplier as slide-in card, central processing unit,
LR-3	V.24 expansion board for LR-3C
LT-2	RS485/RS422 line repeater, 2/4 wire conversion
LH-2	LT-2 variation for 35 mm DIN rails; 24 V DC supply connection
LT-2G	RS485 line repeater, table-top model with increased interface insulation voltage level
LR-2S	RS485/RS422 line repeater amplifier, slide-in card for mounting rack

LWL* = German abbreviation for the factory type designation as Fiber Optic Cable (FOC)

RS485 Line splitter
Application 1.1



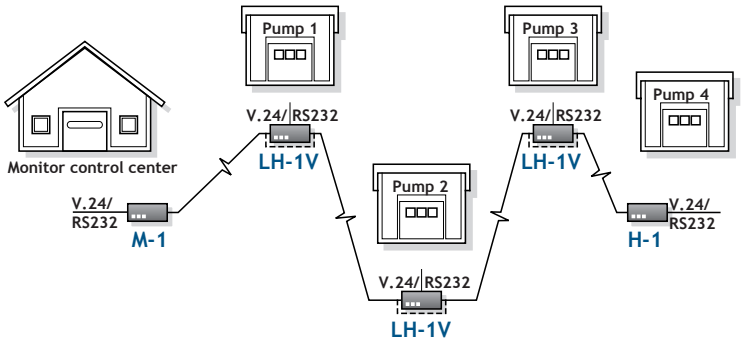
Prerequisites: Two building annexes which are respectively 3 and 4 km remote from a main building and are to be connected to a control there by available private telecommunication lines. The control functions in the buildings have RS485 interfaces for communication.

Realization:

LT-4V	Line splitter, RS485, M-1 modem, table-top housing
M-5	RS485 short-distance modem, table-top housing
H-5	RS485 short-distance modem, 35 mm DIN bar

Description: All RS485 participants are combined to a common bus. The data will be transfered code-transparent and without delay. The master control can be anywhere on the bus. A token method is also supported

Line network
Application 1.2



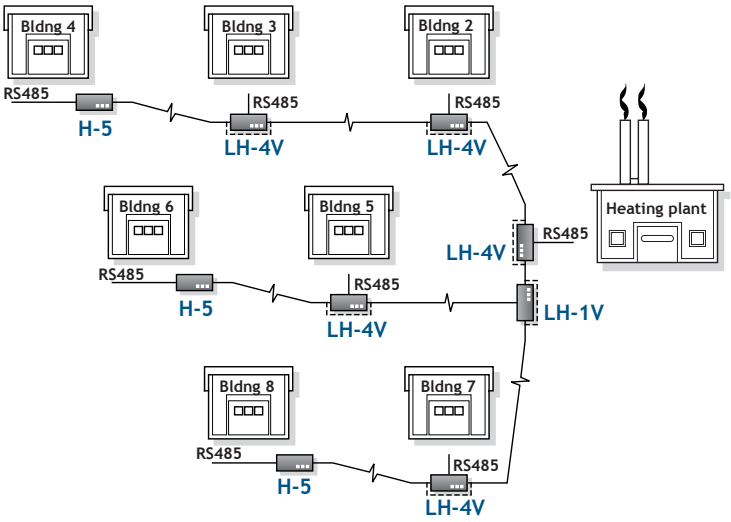
Prerequisites: Pumping stations lie along a pipeline at various distances from each other. A telecommunications cable has been laid parallel to the pipeline. All stations shall communicate via the RCOM protocol with the monitor control center. The pumps use V.24/RS232 for communication.

Realization:

—∿— M-1 Modem interface, 4-wire up to 21 km
LH-1V Line splitter for 35 mm DIN bar
M-1 Short-distance modem, table-top housing
H-1 Short-distance modem for 35 mm DIN bar

Description: The monitor control center is connected to every pumping station over a common leased line. The communication protocol handles the connection with the addressed slaves in the stations. Between the individual pumping stations, transmission distances of up to 21 km are possible as after every line splitter the freshly amplified data is passed on. In pumping station 4, instead of the short-distance modem H-1, a line splitter can be employed if the system is to be expanded in the future.

RS485 Line network
Application 1.3

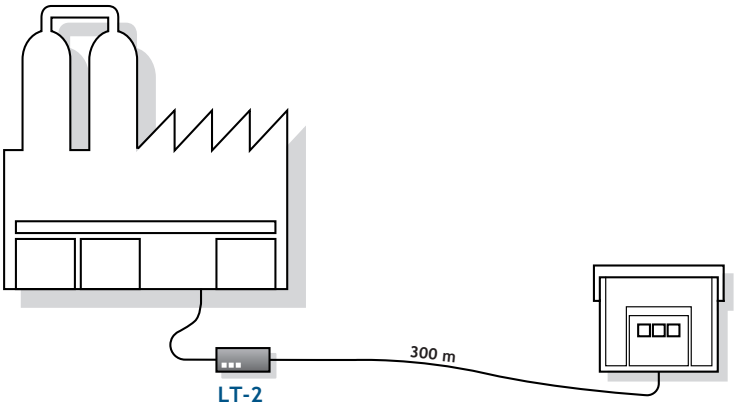


Prerequisites: In an airport all ventilation and air conditioning systems are to be integrated into a network. The associated controls are equipped with RS485 communication interfaces. Private telecommunication circuits shall be used.

Realization:

—∿—	M-1 Modem interface, 4-wire up to 21 km
H-5	RS485 short-distance modem for 35 mm DIN bar
LH-1V	M-1 modem line splitter for 35 mm DIN bar
LH-4V	RS485 line splitter for 35 mm DIN bar

Description: Through the line splitters it is possible to transfer the RS485 interface over the telecommunication circuits whereby distances up to 4 km (9600 bps) aren't a problem. Despite the problematic network topology, the system appears as a common bus to every bus participant. All data will transfer code-transparent and without delay.

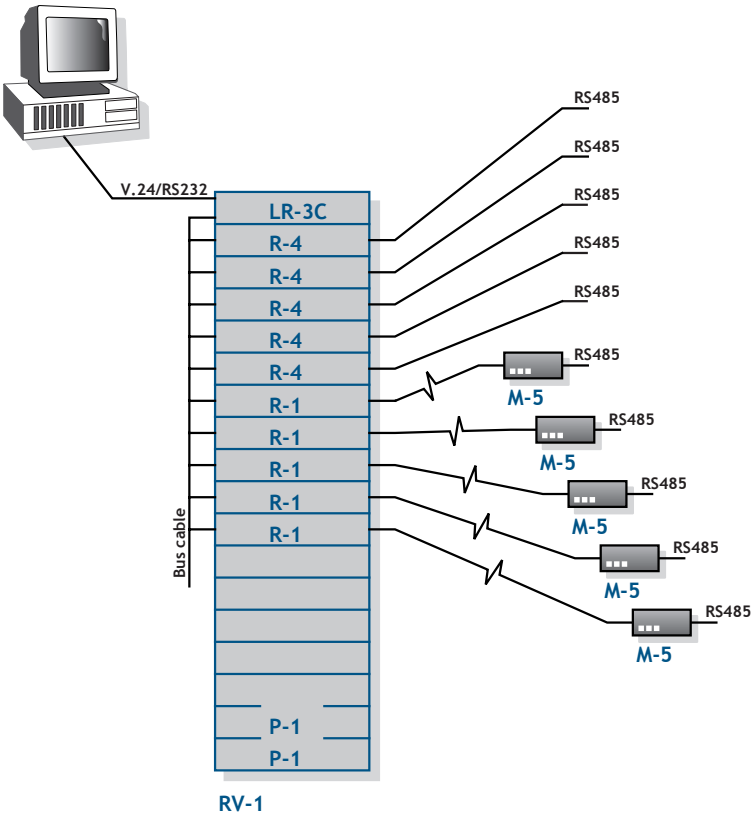


Prerequisites: An access control system based on RS485 is installed in a factory building. After an out of the way situated building was connected to the system, network and device interruptions occurred without apparent reason.

Realization:
LT-2 RS485/RS422- repeater, table-top housing

Description: As a result of the prolongation of the RS485 bus to another building, communication disturbances arise due to the added cable length and the differences in potential. The LT-2 repeater galvanically separates the connection to the new building and through this prevents potential differences through compensatory currents. The signals are passed on amplified by the repeater. This means transmission distances of up to 1200 m are possible on each side of the repeater.

RS485 Star net
Application 1.5



Prerequisites: Ten ModBus tributary stations (RS485) are steliform ordered to a master. The slave tributary stations are separated at various distances of 400 m to 3 km.

Realization:

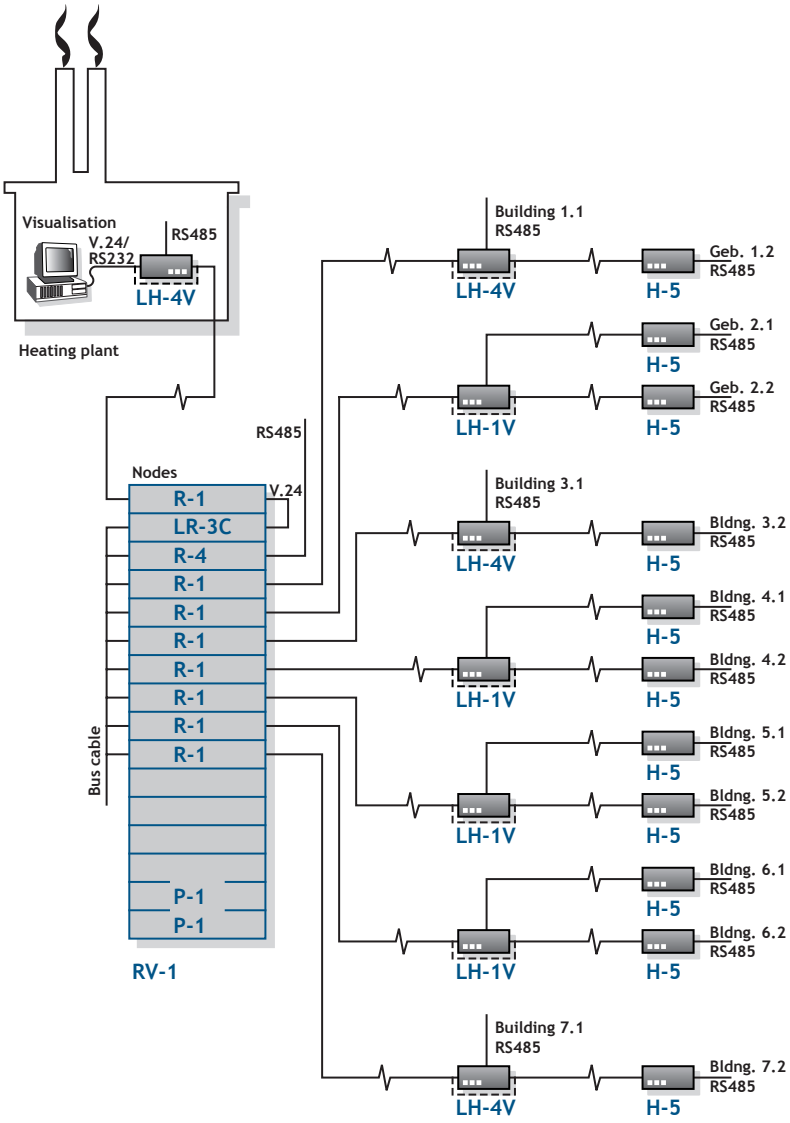
—⩘— M-1 Modem interface, 4-wire up to 21 km
LR-3C V.24 line splitter, insert card
M-5 RS485 short-haul modem, table-top model
R-1 Short-haul modem, insert card
R-4 RS485 interface converter, insert card
RV-1 19 inch modular chassis, 3 HE, 82TE
P-1 230 V AC power unit

Description: A space-saving control cubicle installation can be achieved at the master through the modular chassis. The Master is connected by V.24 / RS232 to the line splitter LR-3C. The line splitter distributes the data to all slide-in cards and gathers (through an “OR“-function) the data of the tributary stations.

If the transmission distances to the tributary stations are shorter than 1.2 km, the interface card R-4 will be used. The card changes the V.24 into RS485 signals for the line splitter LR-3C. If the transmission distance is longer, then the short-distance modem R-1 will be used which transfers the data to a short-distance modem M-5. The M-5 modem changes the M-1 modem interface into the RS485 interface. Although all cards are combined in an 19“ modular chassis, the single tap lines are separated galvanically from each other.

Heating system control network

Application 1.6



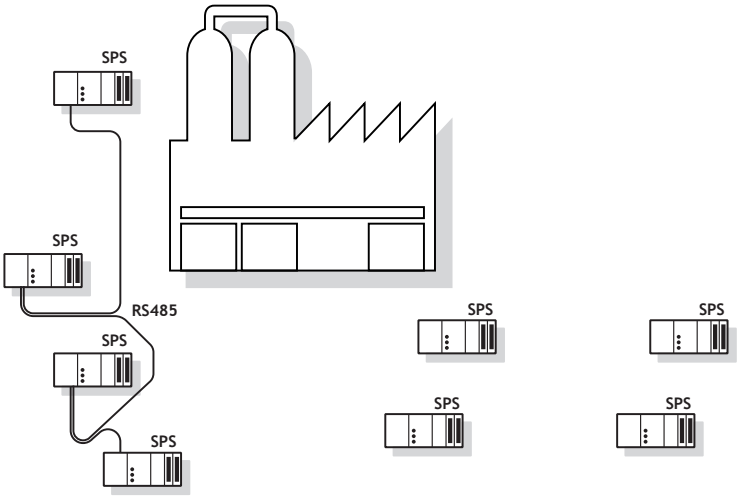
Prerequisites: The heating system controls of a remote heating system must be connected to the boiler house on a property. For the data transmission, an available private telecommunications network shall be used. From the boiler house to a node point is 800 m of cable length. All buildings are within reach of this node point over the telecommunications network. The heating system controls in the buildings are equipped with RS485 interfaces for communication.

Realization:

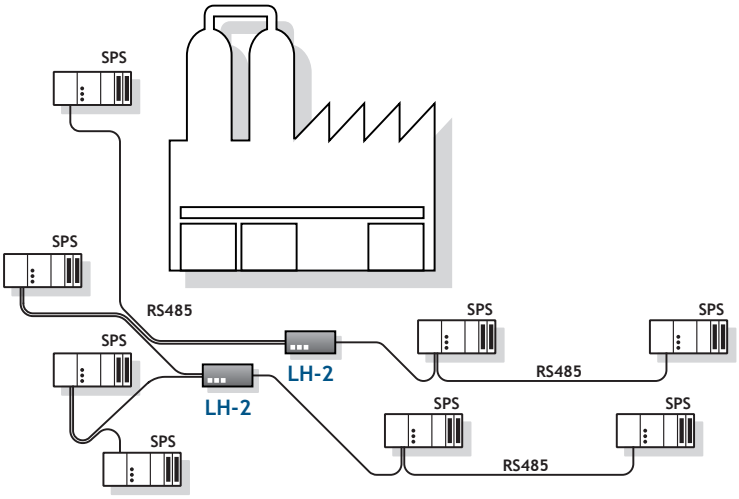
—∿— M-1 Modem interface, 4-wire up to 21 km
H-5 RS485 short-distance modem for 35 mm DIN bar
LH-1V M-1 modem line splitter for 35 mm DIN bar
LH-4V RS485-line splitter for 35 mm DIN bar
LR-3C V.24- line splitter, insert card
P-1 Power unit, 230 V AC
R-4 RS485-interface converter, insert card
RV-1 19 inch modular chassis, 3HE, 82TE

Description: All RS485 participants are combined on to a common bus. The control in the boiler house is connected over a line splitter LH-4V. The third interface of the line splitter transfers the data further to the node point. There the communications data is distributed and gathered by a steliform distributor. The node building is directly connected over an interface converter R-4 to the steliform distributor. The other buildings are addressed over line splitters and short-distance modems. Some connections offered the possibility to use the line splitter LT-4V since an additional station was found in this line. At other positions, a division of the modem interface was carried out by the LT-1V in order to address two separate buildings.

RS485 Tap lines
Application 1.7



Prerequisites:
Additional devices should be connected to an RS485 bus. The available bus already has a cable length of 950 m. The new bus users are 300 m and 400 m remote from the bus cable.

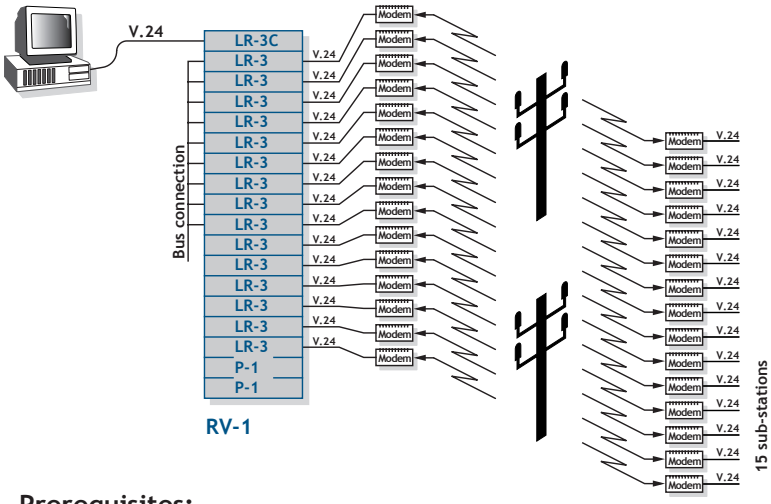


Realization:
LH-2 Line splitter, repeater for RS422/RS485, DIN bar

Description: An RS485 bus allows tap lines only to a maximum of 5 m. If this value is exceeded, communication disturbances arise from reflections and signal distortions. Through a repeater, longer tap lines can be connected to a bus. This tap line is signal-wise independent. This means up to 31 participants can be connected and the full RS485 range of up to 1.2 km can be used. The application “sees” all RS485 participants as a common bus. The data will transfer code-transparent with the help of the repeater without delay. The bus sections are galvanically separated from each other.

RS232/V.24 Interface multiplier

Application 1.8



Prerequisites:

A process graphic display computer shall query various addressed controls over multiple leased/private line modems. Both the graphic display computer and the leased/private line modems have 24 interfaces at their disposal. The communication between the computer and the controls occurs with a master/slave protocol.

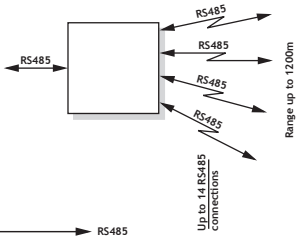
Realization:

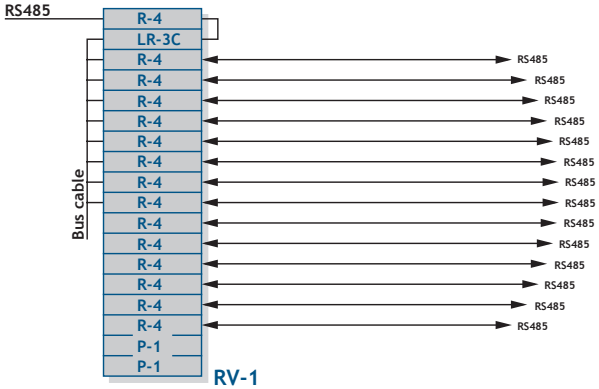
LR-3C V.24 line splitter, central card
LR-3 V.24 line splitter, port connection
P-1 Power unit, 230 V AC
RV-1 19 inch modular chassis, 3HE, 82TE

Description: The RS232/V.24 is not multi-point capable like, for example, the RS485 interface. In order to connect all leased/private line modem interfaces to the graphic display computer, the line splitter combination LR-3C/LR-3 can be employed. The LR-3C, as the central card, takes over the distribution and collection of the tributary station data for the computer. The LR-3 cards serve to connect each modem to the LR-3C ports.

RS485 Star repeater
Application 1.9

Prerequisites: All participants of an RS485 bus are ordered in a steliform manner. Only one conductor pair is available per participant.





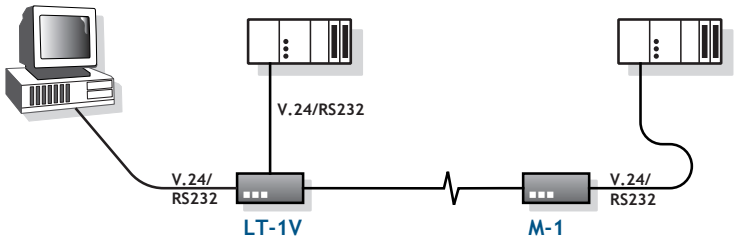
Realization:

LR-3C V.24 line splitter, insert card
R-4 RS485 interface converter, insert card
P-1 Power unit, 230 V AC
RV-1 19 inch modular chassis carrier, 3HE, 82TE

Description: An RS485 bus allows tap lines only up to a maximum distance of 5 m. If all conductors are brought together to a star-point, the incoming data signal ”sees” several parallel lines. The capacitive portions of the lines add themselves together, destroy the signal, and it comes to communication disturbances. The RS485 star repeater brings the single tap lines together data-wise so that the application sees a common bus. Every tap line is signal-wise independent. This means up to 31 participants can be connected and the full RS485 range of up to 1.2 km can be used. The application ”sees” all RS485 participants as a common bus. The tap lines are separated galvanically from each other. The data transmission of the repeater is carried out without delay and is code-transparent.

2 zu 1 Interface exchanger

Application 1.10



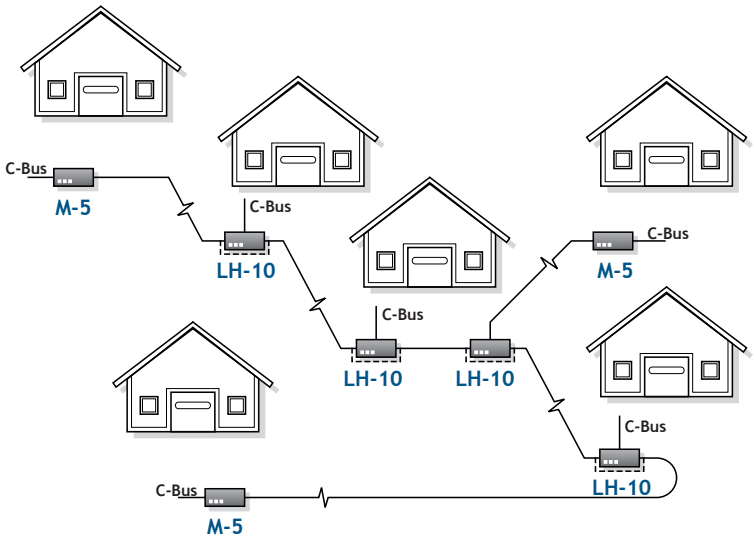
Prerequisites: Two addressable data loggers shall be connected to a computer with a free interface port (COM2). All devices have RS232/V.24 interfaces. One data logger is next to the computer and the other one is approximately 750 m remote from the computer at a second logging console.

Realization:

—∿— M-1 Modem interface, 4-wire up to 21 km
LT-1V V.24/M-1 modem line splitter, table-top model
M-1 V.24 short-distance modem, table-top model

Description: The LT-1V divides the RS232/V.24 interface of the computer into two interfaces. The local data logger is connected to the RS232/V.24 interface X2 of the line splitter. To bridge the 750 m, the third interface of the line splitter is configured as a modem interface. Thereby, the data can be transferred over a 4-wire connection. The M-1 short-distance modem then makes the RS232/V.24 available for the remote data logger.

C-Bus Lines network 27
Application 1.11



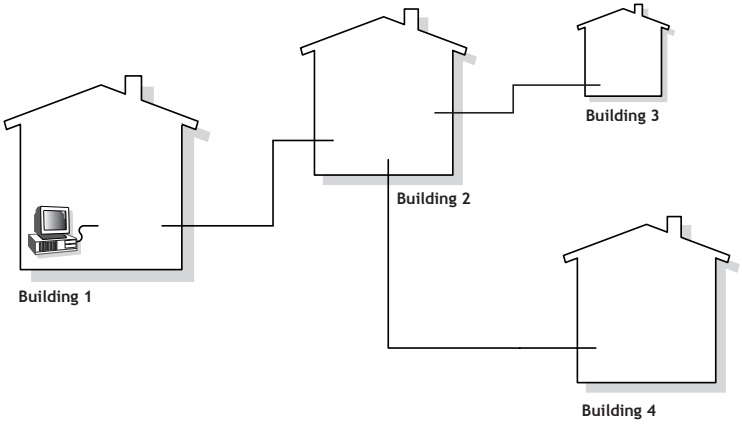
Prerequisites: Different systems of building control technology are equipped with C-Bus communication interfaces (RS485). Private telecommunications cables are available between the single buildings. The RS485 communication on the telecommunication circuits occurs only with transmission errors.

Realization:

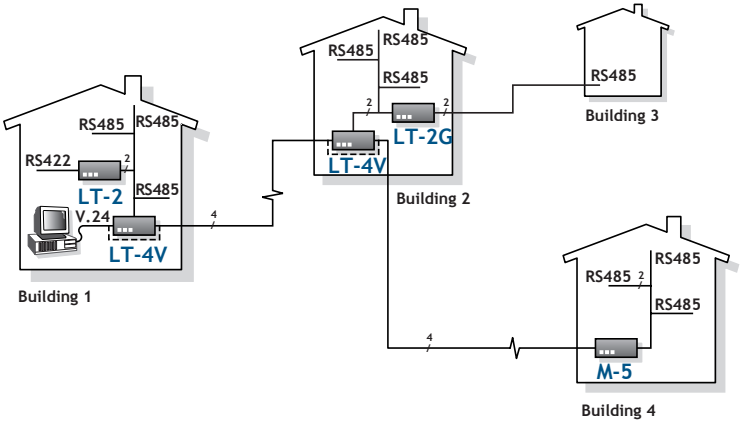
—∿— M-1 Modem interface, 4-wire up to 21 km
LH-10 Multi-function modem with RS485 port
M-5 RS485 short-distance modem, table-top model

Description: So that the building network operates without communication errors, the C-Bus (RS485) can be converted onto the more efficient M-1 modem interface. The complete system appears to the C-Bus participant as a common bus. The buildings are separated galvanically from each other because of the M-1 modem's connection and no communication errors arise from differences in potential.

28 Building network
Application 1.12



Prerequisites:
A planned building automation system extends over several structures. Private telecommunication circuits are available to be used for the communication between the structures. During installation of the devices, voltage is found to be present on the lines. The reason found is potential differences between the buildings.

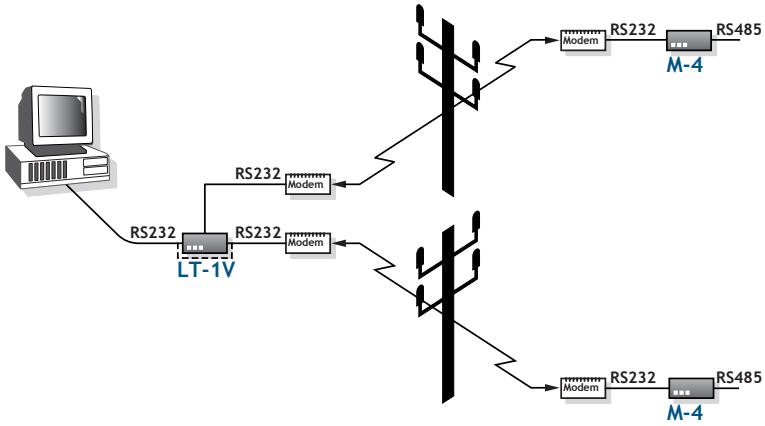


Realization:

—∿— M-1 Modem interface, 4-wire up to 21 km
LT-2 RS422/RS485 repeater/converter, table-top model
LT-2G RS485 repeater, table-top model
LT-4V RS485 line splitter, table-top model
M-5 RS485 short-haul modem, table-top model

Description: The graphic display computer is connected to the first interface of the line splitter LT-4V. The line splitter takes over the conversion to RS485 and with the third interface transfers the data galvanically decoupled to building 2. There an additional line splitter LT-4V couples a RS485 interface out and transfers the data amplified and galvanically separated to the next building. For building 3, an RS485 amplifier is used to for the galvanic decoupling because of the short distance. In building 4, an M-5 is used as an end-modem to convert the modem interface to the RS485.

Leased line network
Application 1.13



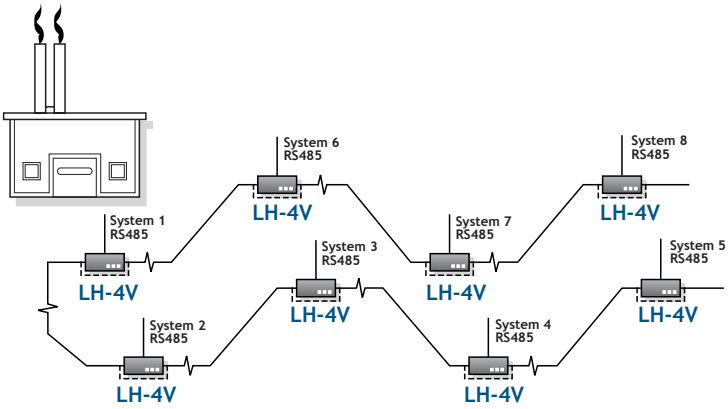
Prerequisites: Two Profi-Bus participants must be connected over two telephone company leased lines to a computer with a free serial interface.

Realization:

LT-1V M-1 modem/RS232 line splitter, table-top housing
M-4 RS485/RS232 interface converter, table-top housing

Description: The two leased line modems are connected at the computer by a line splitter LT-1V. The line splitter distributes and collects the information for the computer interface. At the tributary stations the RS232 interface of the leased line modem is converted by an interface converter M-4 to RS485. Of course this can be ignored if the tributary stations are equipped with RS232 interfaces.

RS485 network, long distances 31
Application 1.14



Prerequisites: In a sewage plant the external buildings (e.g. pumping stations) are spatially arranged in 2 strands to the main control center. The external buildings are connected by communication lines and have to communicate by Profibus DP with the control system. These leased lines are differently long, usually repaired and of a bad quality (simple phone cables). The distance often exceeds 1 km. A multipoint connection has to be realized so that the external buildings can be supervised and serviced by the central control system.

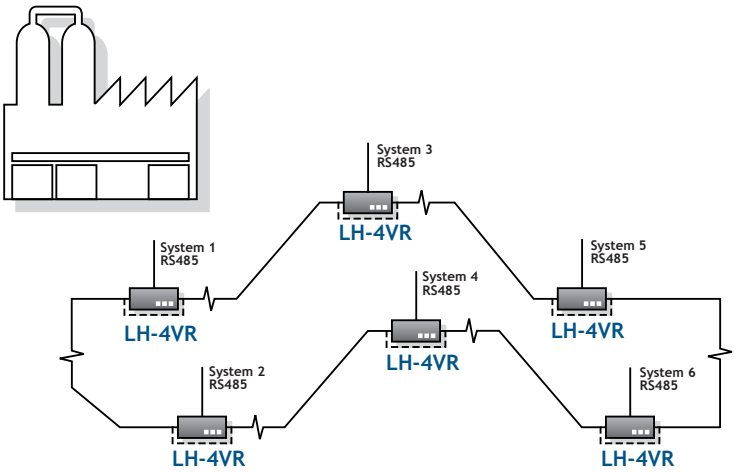
Realization:
LH-4V RS485 Line splitter with insulated RS485-interface

Description: Physically the RS485 interface which is often used for Profibus and Modbus is conceived for long transmission distances up to 1.200 m. But very often this distance is not sufficient for networking. In such a case a repeater must be used to bridge the developed distances. In addition the cycle time of the system is changed and the numbers of repeaters in a line is limited by the protocol.

Secure C-bus connections
Applikation 1.15

Therefore for long distances and many stub lines the combination of a repeater and a line driver is a good idea. Here the line splitter LH-4V is used.

The line splitter converts directly the RS485-interface into the efficient M-1 current interface and transmits the data delay-free, galvanically isolated and without interference even with bad cables between the external buildings. By defect the bypass function of the line splitter protects the communication system while the failed unit is bridged and the other substations are available for further communication.



Prerequisites: For control and display of pumping stations of a municipal sewage system the substations shall be connected to a central control station. The substations collect and process the process data. The stations internally use Profibus DP as communication protocol which is also used in the main control station.

Due to the experience of the last years with extreme weather conditions and simultaneous cable damages the communication between the main station and substations required more safety precautions in order to guarantee the function of the failure and security system even in extreme situations.

Realization:

LH-4VR Line splitter with insulated RS485-interface and redundancy control

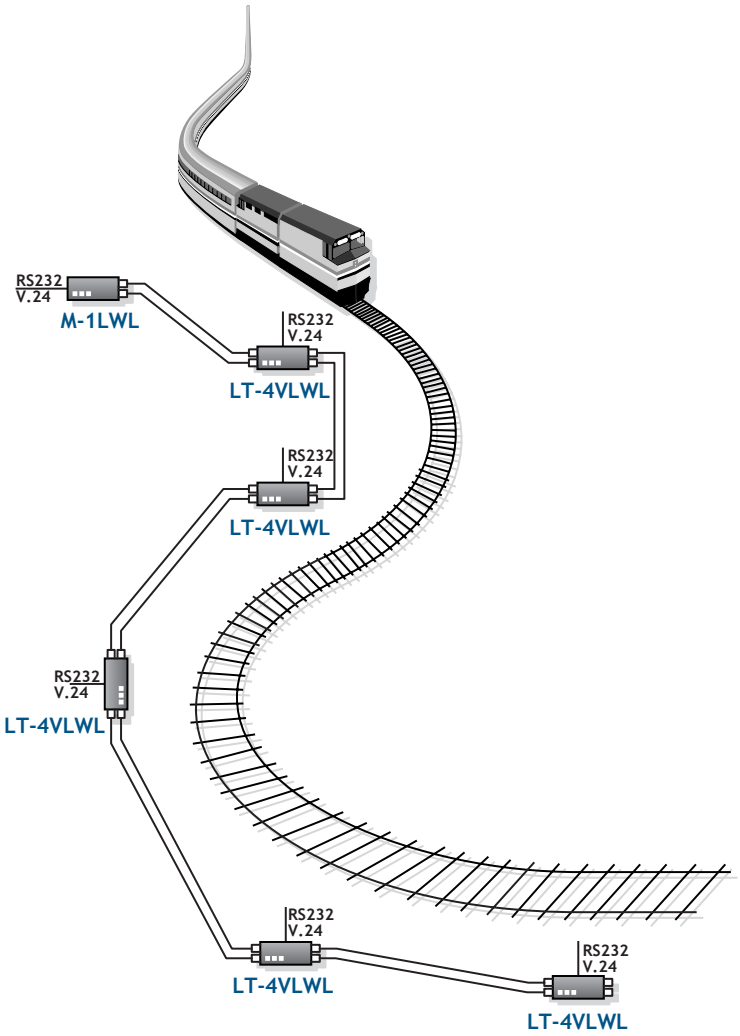
Description: Physically the RS485 interface is well-known as a safe transmission interface. Potential differences and interferences are compensated. However a disturbance at a bus participant can affect the whole RS485 bus. Because of a cable interruption it can happen that not only the cut off RS485 bus section will be missed but also the whole RS485 system is disturbed by a wire short-circuit or open wire ends.

Data communication with a LH-4VR is different. The RS485 is converted into the powerful M-1 modem interface without a change of the Bus communication parameters.

The transmission distance between 2 bus participants is increased, whereby potential differences and interferences are ignored. The redundancy logic of the LH-4VR guarantees that a ring system can be realized, so that in case of a cable interruption the system continues working reliably. The cable interruption is signaled over a contact to the LH-VR concerned.

In case of failure of a LH-4VR the equipment is bridged by the bypass function and the redundant communication ring remains closed.

FOC Line net
Application 2.1



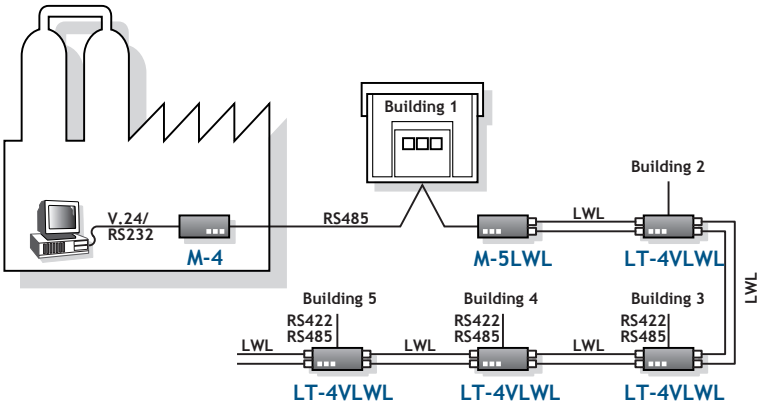
Prerequisites: Along a rail-road track are six control stations at various distances from each other of up to 3 km. Each has a V.24/RS232 communication interface. For EMC reasons a fiber optic cable of type 50/125 µm is strung between the single stations.

Realization:

LT-4VLWL	FOC line splitter, RS232/V.24, table-top model
M-1LWL	FOC short-haul modem, RS232/V.24, table-top model

Description: All stations communicate with the master via a master/slave protocol at the starting point of the trunk line. The master is connected by a glass fiber modem M-1LWL to the glass fiber network. The stations are given access over a line splitter LT-4VLWL. Thereby, the data is freshly-amplified over the RS232 and at the same time is decoupled before being sent on its way. The glass fiber makes sure that no communication problems arise on the trunk line.

RS485-Bus with FOC
Application 2.2



Prerequisites: An access control system uses RS485 for communication. The available fiber-optic cable net shall be used for a comprehensive building-to-building network.

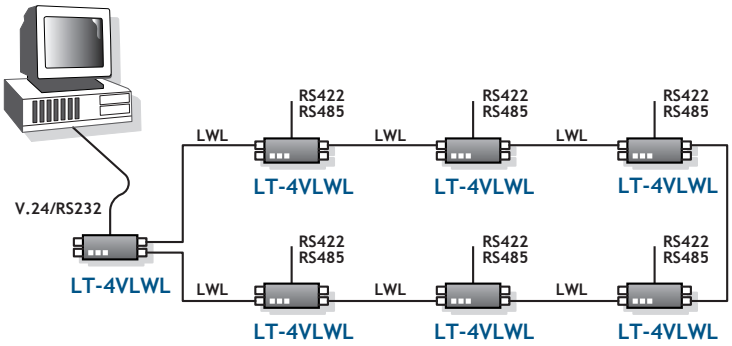
Realization:

LT-4VLWL FOC line splitter, RS485/RS422, table-top model

M-4 RS485/RS232 interface converter, table-top model

M-5LWL FOC short-haul modem, RS485/RS422 table-top model

Description: The glass fiber lines prevent communication problems on the trunk line and are insensitive to differences in potential and external influences between structures. Through this, no overvoltage protection is necessary. For the RS485 participant the glass fiber net appears over the line splitter hook-up as a common bus. On the protocol side, no changes are required as opposed to a copper cable bus.

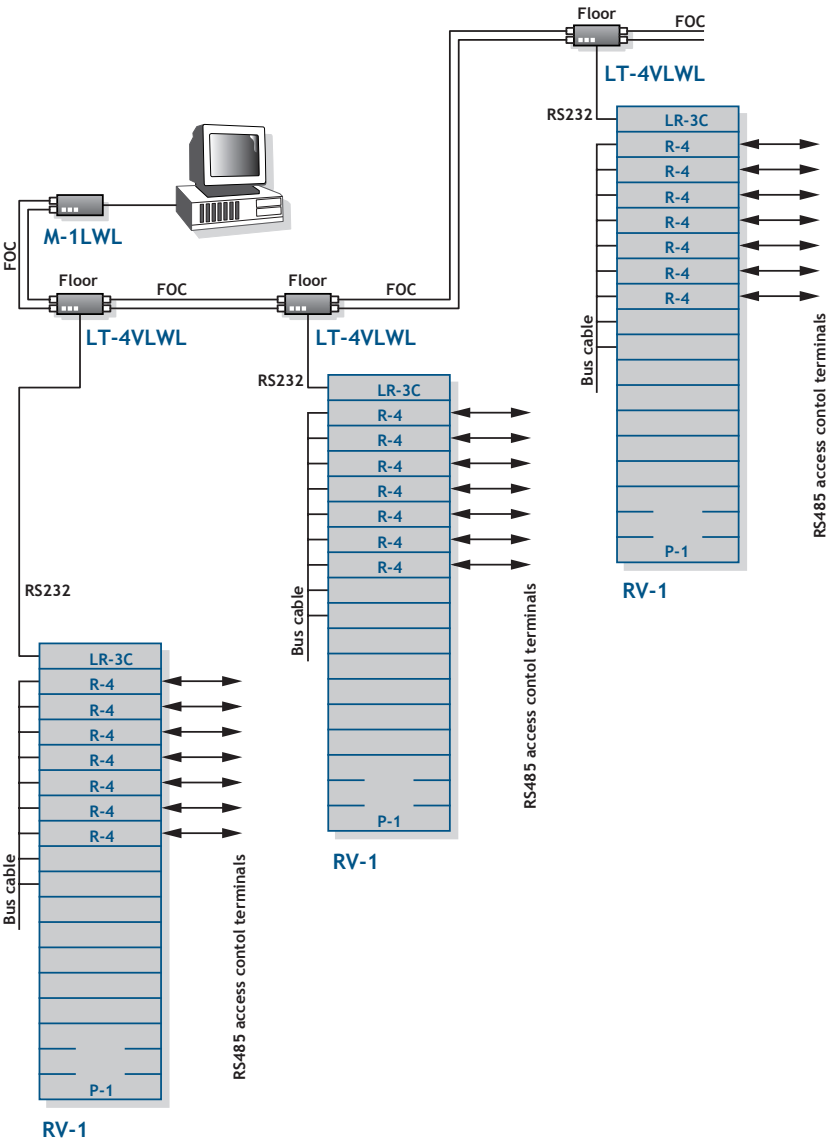


Prerequisites: A time acquisition system is installed on a factory premises. The time acquisition terminals are equipped with RS485 communication interfaces. For the interconnecting cables, glass fiber is planned.

Realization:
LT-4VLWL FOC line splitter, RS485/RS422/V.24, table-top model

Description: During the installation it was discovered that between the time acquisition terminals only a single fiber-optic link was available. A ring system with line splitters LT-4VLWL solved this problem. At each time acquisition terminal one line splitter was installed configured as ring/slave. A line splitter in the head office (ring master) supervises the communication in the FOC ring system.

Structured building cabling
Application 2.4



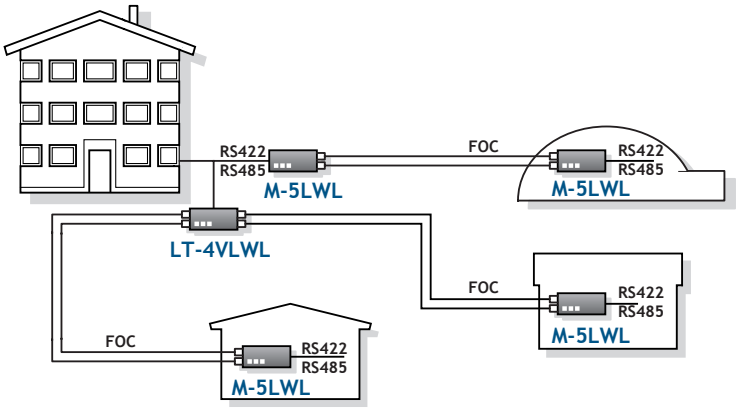
Prerequisites: An access control system is installed in a building complex. Glass fiber cables are laid between the single floors. Copper cables are available on the individual building floors for communication purposes. The access terminals are steliformed to the floor distributor. The control system uses RS485 for communication.

Realization:

LR-3C	V.24 line splitter, insert card
LT-4VLWL	FOC line splitter, RS232/V.24, table-top model
M-1LWL	FOC short-haul modem, RS232/V.24, table-top model
R-4	RS485 interface converter, insert card
P-1	Power unit, 230 V AC
RV-1	19 inch modular chassis, 3HE, 82TE

Description: The access control terminals are integrated into a floor by floor RS485 network in steliform distribution. Networking floor-to-floor is carried out via the FOC line splitter LT-4VLWL which connects the star distributors over the FOC cables. The head office gets connected to the floor network over a short-distance modem M-1LWL. For the RS485 participants the mixed net appears through the line splitter hook-up as a common bus.

FOC Star net
Application 2.5



Prerequisites: From a main building, three RS422 field bus sections shall be connected to the internal network. Each section is integrated in a building and these are in a circular form around the main building. Fiber optic cables of type 50/125 µm can be used for the communication between the main building and the annexes.

Realization:

LT-4VLWL	FOC line splitter, RS422/RS485, table-top model
M-5LWL	FOC short-haul modem, RS422/RS485, table-top model

Description: An RS422 interface can be converted to multimode glass fiber cable through the M-5LWL modem and be transferred up to 3 km. Each annex is connected over an M-5LWL trunk line. To avoid that the three M-5s in the main building are side by side, two devices can be combined through a line splitter LT-4VLWL. The line splitter divides an RS422 interface into two FOC connections. For the communication master, the system appears as a net as do the FOC con

Notes

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