Installation-Manual
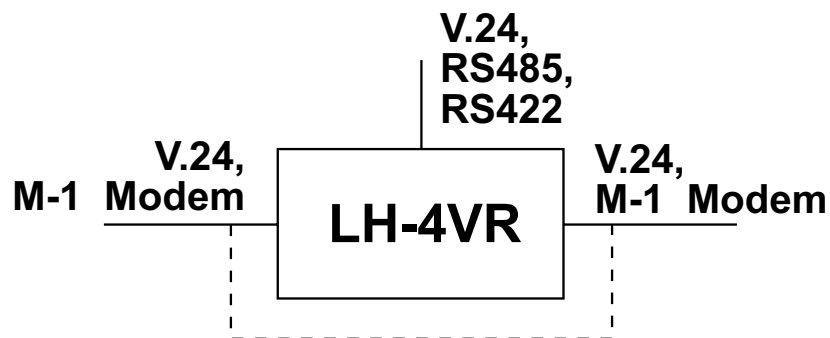
LH-4VR

Line Split Unit
for redundant systems

Modem/V.24 - RS422/RS485/V.24 - Modem/V.24

```
                      V.24,
                      RS485,
                      RS422
                        |
    V.24,          ┌─────────┐          V.24,
 M-1 Modem ────────┤ LH-4VR  ├──────── M-1 Modem
                   └─────────┘
            ┊                    ┊
            └────────────────────┘
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Technical Specification - Configuration
Connection - Blockdiagram
Mounting - Installation Examples

November 2002

Hedin▪▪Tex

Description

The LH-4VR is LH-4VE extended by the redundancy card OR-1. Thereby ring systems on base of the M-1 modem interfaces are possible. The information of the attached devices is sent on 2 separate ways to the communication partner. During a break of the ring the communication remains and the line splitters at the interrupted connection announce the disturbance by a reporting contact.

The line split unit divides a V.24-/M-1 modem interface into a V.24-/M-1 modem and a isolated RS422/RS485/V.24 interface. Jumper X8 and X9 set the data flow direction. Position 1-2 is for a master-slave communication (Port X1 <--> Port X2/Port X3; not Port X2 <--> Port X3). Position 2-3 supports a token-passing protocol (Every Port sends the received data to the other ports. So the LH-4VR supports a data regenration inside a M-1 Modem connection and splits the information to a third interface.

The RS422/RS485-transmitter is controlled by data or set constantly on by jumper X6. X12 extends the RS422/RS485-transmitter driver-on signal if controlled by data for better transmission-characteristics. The RS422/RS485-bus should be terminated at the end of the line. In LH-4VR this can be done by jumper X14 and X15. If the LH-4VR has a failure (power off), interface X2 gets no data and the modem interfaces X1 and X3 are connected together.

LED´s

TD is on/flashed -->	The line split unit receives data at port X2.
RD is on/flashed -->	The line split unit receives data at port X1.
DCD is on -->	The line split unit has connection to the remote side.
	(If port X1 is a V.24-interface, DCD is off)

Transient-Protection
In LH-4VR the signal ground SG and the PE are connected together with a 0 Ohm resistor (X5). To be sure of the transient protection in any case the line splitter should be grounded.

RS422/RS485-Termination
This interface should allways be terminated (also if it not used). In a 2-wire system both units at the ends of the wires should be terminated. In RS422 mode the receiver with longest distance away from the transmitter should be terminated.

RS485-data control
If the RS485-transmitter is controlled by data jumper X12 sets the Driver-ON-time for the transmitter.The transmitter is ON depending on X12 delay time after the last sending bit.
In this case a termination is neccessary with pullup and pulldown resistors. The termination (X14 and X15) is realized with pullup and pulldown resistors.

Bypass
If a LH-4VR has a failure, the X-2 interface gets no data and the modem interfaces X1 and X3 are connected directly together.
Be aware of failures by planning the distance because there is no repeater function.

Redundancy
The data of interface port X2 the LH-4VR sends over the interfaces port X1 and X3 into the ringsystem. During the transmission process (additional the delay X1) the ring is interrupted by the transmitting line splitter, so that the system is not blocked by a continuous datastream. If the LH-4VR receives data over two interfaces (port X1 and X3), the receiver with the first data, switches the receiver of the second interface off (receive data and the delay time X2 or X3).

Interface monitor
The status of the M-1 interfaces X1 and X3 are joined by an AND-function and are leaded to a relay contact (Pin 25, 26). If both interfaces detect the remote side, the contact is closed.

Logical connection LH-4VR
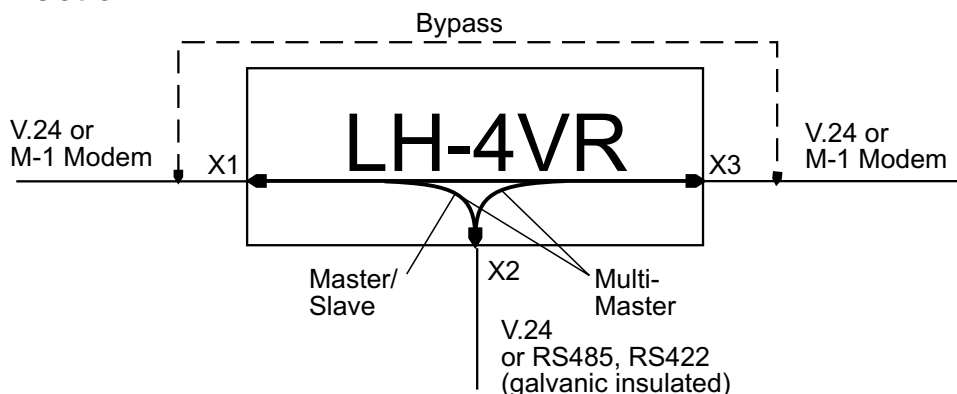
Configuration

The line splitter LH-4VR can be adapted by a number of different onfigurations to a variety of running conditions. After removing the top of the case the jumpers/switches are accessible. The top of the case can be removed by untying the screws.
On the circuit board the switches have the following location and function.
Position on the board:
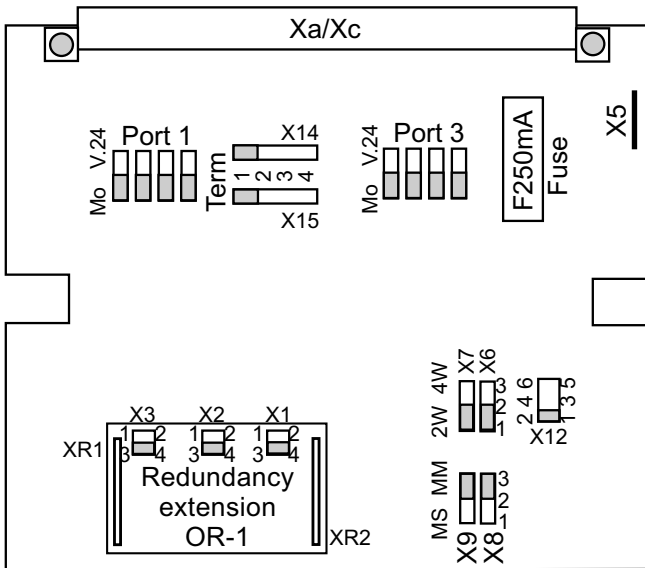
Note:
Althrough the RS232/V.24 Interface is used, the RS422/RS485-interface must be terminated by jumper X14 and X15 depending on X7.

▭ Factory setting   ⟷ Jumper

RS485/RS422 transmitter controlled by			
	1	2	3	
X6	⟷			Data (TD)
		⟷		Always active

X7			
1	2	3	2-wire/4-wire transmission
⟷			2-wire (simplex/HD)
	⟷		4-wire (HD/VD)

	1	2	3	Data flow direction
X8	⟷			Port X1 can communicate with port X2 und port X3. There is no communication possible between port X2 and port X3. (t. ex. Master-Slave protocol)
X9	⟷			
X8		⟷		Every port can communicate with every other. (t. ex. Token-Passing,- MultiMaster protocol)
X9		⟷		

X12	
Pos.	Delay-Time for Transmitter-Control-Signal
1-2	No delay (3µs ±20%)
3-4	0,75 ms ±20%
5-6	1,5 ms ±20%

X14	1	2	3	4	Termination
X15	1	2	3	4	
		⟷			Transceiver terminated (2-wire)
		⟷			
			⟷		No termination
			⟷		
				⟷	Receiver terminated (4-wire)
				⟷	

|	Mo	V24	Interface
Port 1 Port 3	⟷		Port X1 and Port X3 configured as M-1 Modem-Interface
Port 1 Port 3		⟷	Port X1 and Port X3 configured as V.24-Interface.

Settings for the redundant extension

X1	
Pos.	Ring interruption
1-2	0,25ms ±20%
3-4	0,5ms ±20%
Open	1ms ±20%

X2	
Pos.	Disable time for receiver port X1
1-2	0,5ms ±20%
3-4	1ms ±20%
Open	2ms ±20%

| X3	
Pos.	Disable time for receiver port X3
1-2	0,5ms ±20%
3-4	1ms ±20%
Open	2ms ±20%

Connection - Assembly fixture
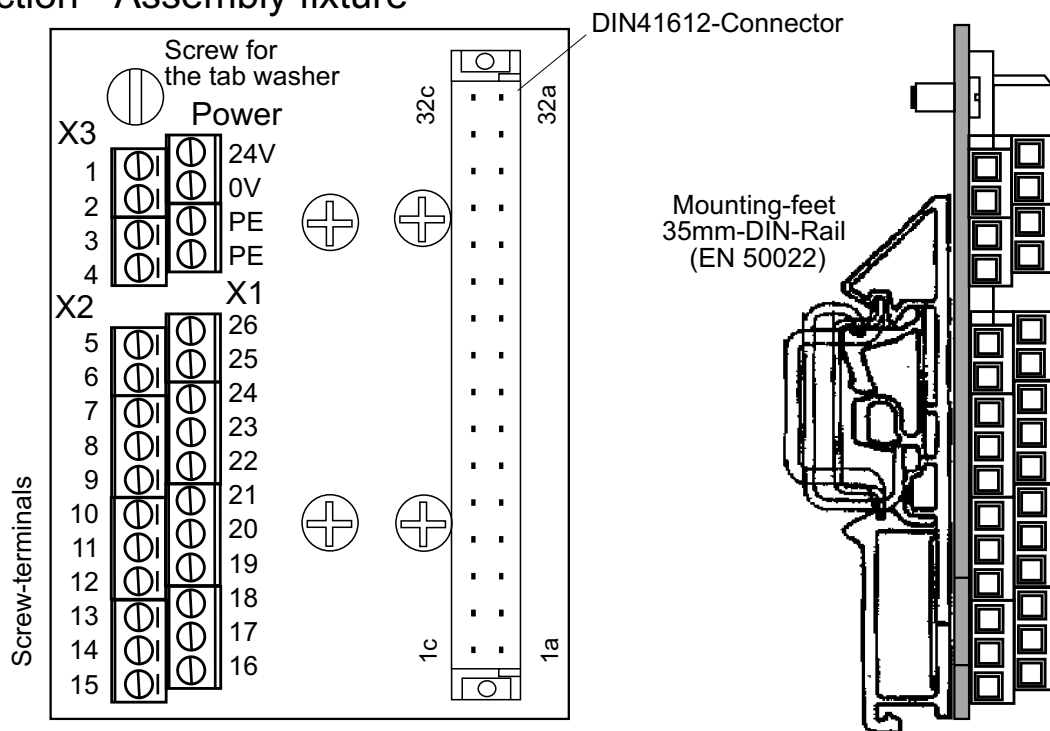
Total connection

Screw terminal		DIN-Connection	Jumper in position V24	Jumper in position Mo
X3	1	22c	3 - V.24 Status out (+12V pull up)	M-1 Transmitter 3 T-
	2	20c	Signal Ground (SG1)	M-1 Transmitter 3 T+
	3	22a	3 - V.24 Data out (RD)	M-1 Receiver 3 R-
	4	20a	3 - V.24 Data in (TD)	M-1 Receiver 3 R+
X2	5	18c	TB/T- for 4-wire or B for 2-wire	
	6	18a	TA/T+ for 4-wire bzw. A for 2-wire	
	7	16c	RB/R- for 4-wire	
	8	14c	RA/R+ for 4-wire	
	9	16a	V.24-Data TD (in)	
	10	14a	V.24-Data RD (out)	
	11	12c	V.24-Status out (+12V pullup)	
	12	10c	SG2	
	13	12a		
	14	10a		
	15	32c	Protective Earth	Protective Earth
X1	16	32a	Signal Ground (SG1)	Signal ground (SG1)
	17	2a	1 - V.24 Data in (TD)	M-1 Receiver 1 R+
	18	4a	1 - V.24 Data out (RD)	M-1 Receiver 1 R-
	19	2c	Signal Ground (SG1)	M-1 Transmitter 1 T+
	20	4c	1 - V.24 Status out (+12V pull up)	M-1 Transmitter 1 T-
	21	6a		
	22	8a		
	23	6c		
	24	8c		
	25	24c	Relay 1	
	26	24a	Relay 2	
Power	27	32c	Protective Earth	
	28	32c	Protective Earth	
	29	30c	Signal Ground - Power Ground	
	30	28c	24V+ Input 24 VDC	

Connection

Tab washer
Fixing square
DIN41612-Connector
32c · · · · · · · · · · · · · · · · 1c
32a · · · · · · · · · · · · · · · · 1a
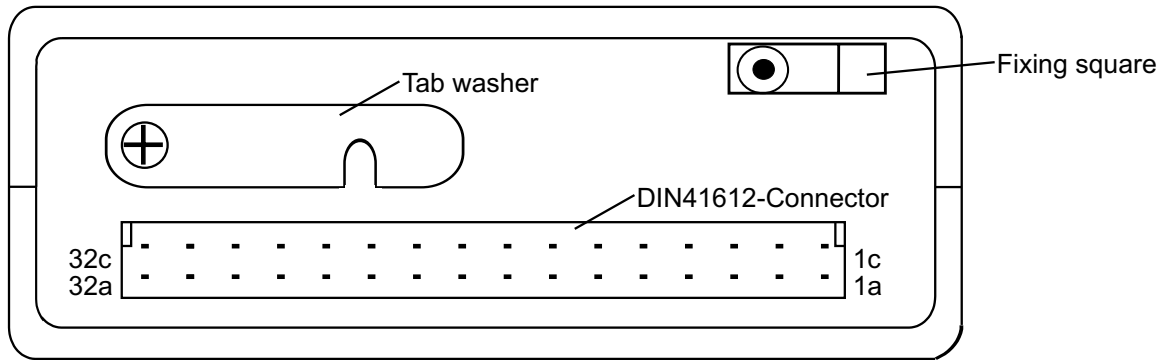
Connection power supply

LH-4VR with assembly fixture
Power-24V ———————— 24VDC
Power-0V ———————— Ground
Power-PE ———————— Protected Earth
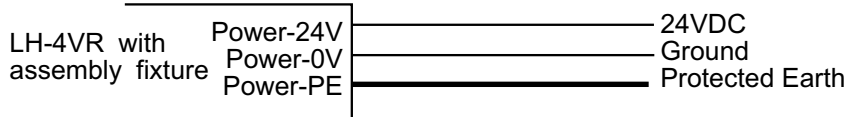
Connection V.24-interface

LH-4VR with assembly fixture

V.24/RS232-Interface

1. V.24-Interface
TD X1-17 ←———————————— 2 TD
RD X1-18 ————————————→ 3 RD   DTE
DCD X1-20 ————————————→ 8 DCD
SG X1-19 ———————————— 7 SG
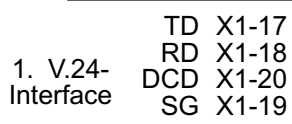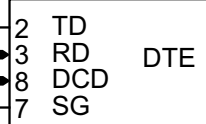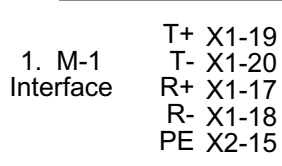
Galvanic isolated interface X2 is: TD=X2-9; RD=X2-10; DCD=X2-11; SG=X2-12

Connection M-1 modem interface

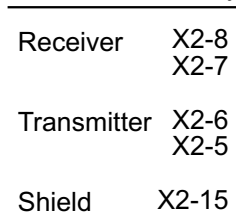LH-4VR with assembly fixture

twisted pairs

Connection to
M-1, R-1, LT-1V pp.

1. M-1 Interface
T+ X1-19 ———————— 1 R+
T- X1-20 ———————— 2 R-
R+ X1-17 ———————— 3 T+
R- X1-18 ———————— 4 T-
PE X2-15 ———————— 5 Shield

If shielded cable is used, connect the shield only at one end to avoid ground loop currents.

Connection RS422 interface

LH-4VR with assembly fixture

twisted pairs

System with
RS-422 interface
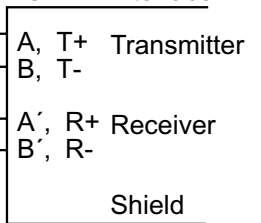
Receiver   X2-8 ———————— A, T+ Transmitter
           X2-7 ———————— B, T-

Transmitter X2-6 ———————— A´, R+ Receiver
            X2-5 ———————— B´, R-

Shield   X2-15 ————————   Shield

If shielded cable is used, connect the shield only at one end to avoid ground loop currents.

Connection RS485 Interface

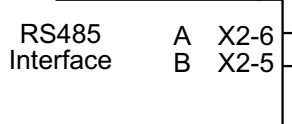LH-4VR with assembly fixture

twisted pairs

Unit with RS485
Interface

RS485 Interface   A X2-6 ———————— A
                  B X2-5 ———————— B
                                    Shield

If shielded cable is used, connect the shield only at one end to avoid ground loop currents.

Transmission distance (modem interface)

| Cable-characteristics	Speed (bps)								
	600	1200	2400	4800	9600	19200	38400	64000	100000
0,3 mm² 42 pF/m	21000m	15000m	10000m	6700m	4000m	2500m	1300m	800m	300m

Transmission Distance (RS422/RS485 Interface)

Maximum distance: 1200m at 0-115200 bps

Use unshielded twisted pair cable. The transmission distance is increased with lower capacitance and increased area. Please use screened cable in heavy interference environment but consider that the higher capacitances reduce the transmission distance.

Block diagram
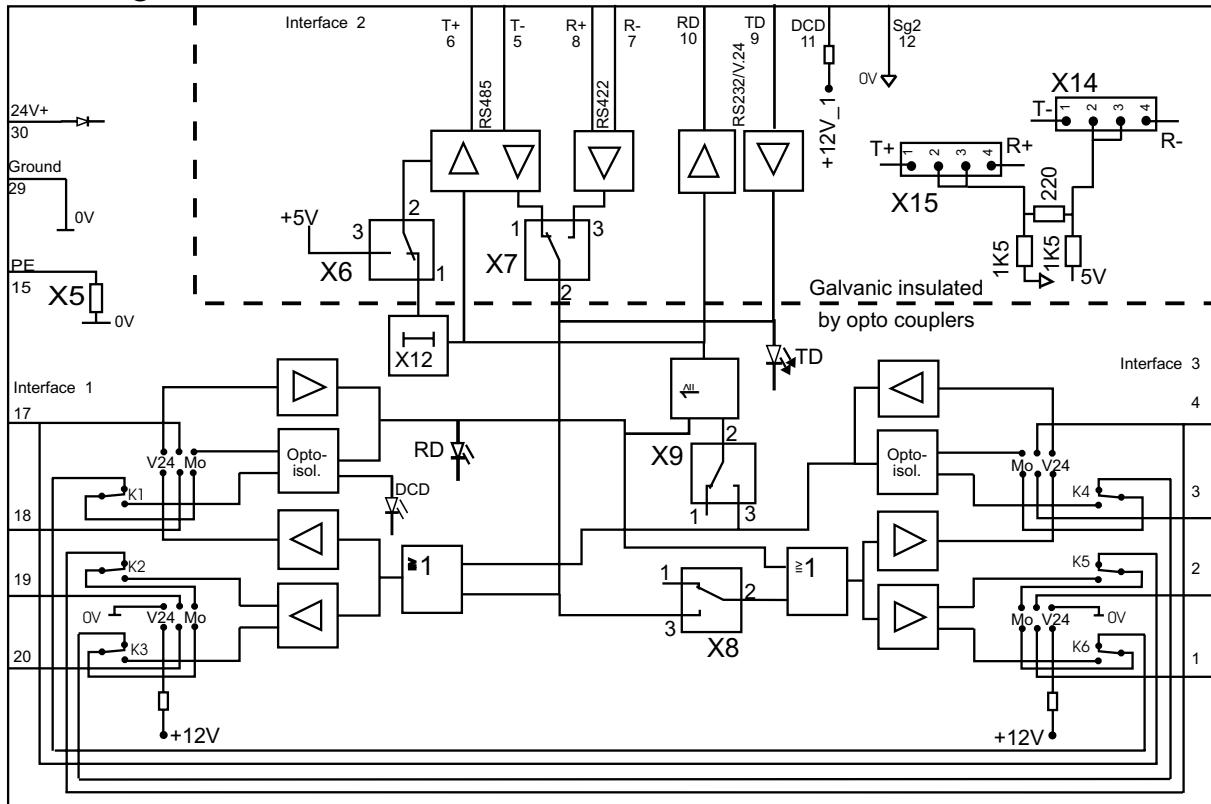
Interface monitor and redundance extension not shown

Configuration

Termination of RS422/RS485-Interface
Mode of operation from interface X1, X2 and X3
Data flow direction
RS485/RS422-transmitter controlled by data or always active
Disable time for receiver port X1 and X3
Ring interruption

Technical Specification

Transmission:	Asynchronous, code independent, Full-/half-duplex or simplex
Interface X1:	EIA RS232-C and CCITT V.24/V.28 or 10mA tristate balanced current loop; M-1 compatibel
Interface X2:	EIA RS232-C and CCITT V.24/V.28, EIA RS485, V.11 (2-wire) or or EIA RS422 (4-wire) Isolated from interface 1, 2 and power.
Interface X3:	EIA RS232-C and CCITT V.24/V.28 or 10mA tristate balanced current loop; M-1 compatibel
Connector:	DIN 41612-connector (male) or with screw terminals on the assembly fixture
Speed:	0-115,200 bps
Indicators:	Power, TD, RD and DCD
Isolation:	Datatransmission with optocoupler; only at M-1 interfaces Interface X2: Galvanic isolated from interface X1, X2 and power.

Isolation Voltage:	M-1 Interface 420 Vrms; Interface 2 to power, port X1 and X3: 420 Vrms
Transient protection:	Suppressor diodes and varistors
Power:	24 VDC ±10% Other supplies on request
Power consumption:	max. 200 mA
Temperature Range:	5-50° C
Humidity:	0-95%RH, non-condensing
Dimension (mm):	47*129*134 without assembly fixture; assembly fixture: 75*100*25
Case material:	ABS-plastics, black; backplane aluminium
Weight:	0.25 kg assembly fixture + 0,1kg
Mounting:	With an assembly fixture on the 35mm cap-rail (EN 50022)
Confirm to:	CE

Mounting

The case can be mounted with the assembly fixture on the 35mm cap rail (EN50022). The assembly fixture consists of a clamp for the cap rail, a DIN 41612 connectior and four screw terminal blocks.
After mounting the assembly fixture on the rail and connecting the wires to the screw terminals the case can be put on the DIN 41612 connector. Before mounting the tab washer should have a right angled position to the case. Then the unit is shifted easily downward bent onto the DIN-connector, whereby the fixing square strap rear side of housing seizes behind the printed circuit board of the assembly fixture. When the tab washer is bolt to the assembly fixture, the case has to be mounted on the rail.

Installation example

Different Profibus networks (RS485) shall connected redundant to new network.
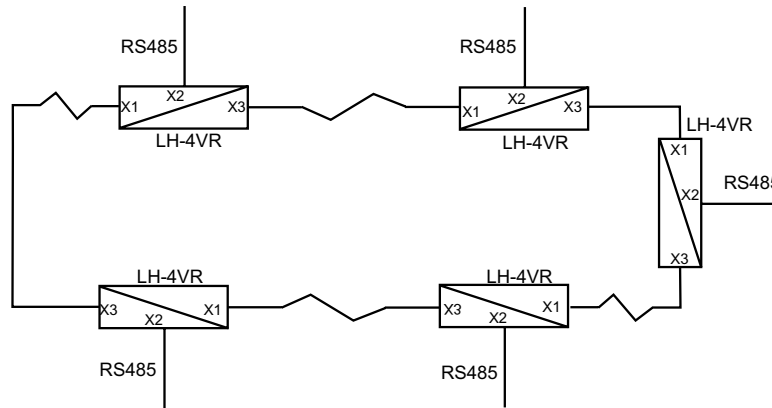
Setting
Port X1 and Port X3 in configuration modem.
X6 in position 1-2:   RS485 transmitter is activated by data (Modem)
X7 in position 1-2:   RS485 2-wire transmission
X8, X9 in position 2-3: Every port can communicate with every other
X12 in position 1-2:   depends on speed, protocol and line quality
X14, X15 position 1-2:   RS485-Line is terminated

X1 in position 3-4:   Ring interruption 0,5ms.
X2 in position 3-4:   Disable time for receiver port X1 1ms
X3 in position 3-4:   Disable time for receiver port X3 1ms.