Installation-Manual
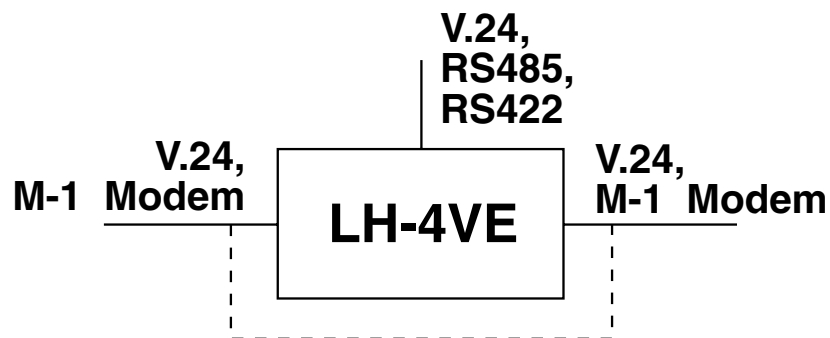
LH-4VE

Line Split Unit with bypass

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

Technical Specification - Configuration
Connection - Blockdiagram
Mounting - Installation Examples

January 2000

Hedin Tex

Description

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). Setting 2-3 supports a token-passing protocol (Every Port sends the received data to the other ports. So the LH-4VE makes a data regeneration 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-4VE this can be done by jumper X14 and X15. If the LH-4VE has a failure (power off), the interface X2 gets no data and the modem interfaces X1 and X3 are connected together. The modem status of port X1 and X3 are connected by an AND function to a relay output, to provide checking the modem interfaces within a line.
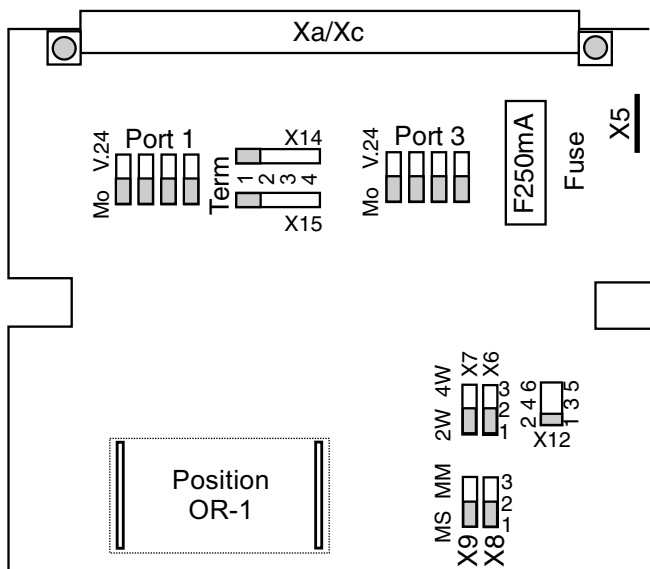
TD is on/flashed -->   The line split unit receives data at port X2.
RD is on/flashed -->   The line split unit receives data at port X1.
DCD is on -->   The line split unit has connection to the remote side.
            (If port X1 is a V.24-interface, DCD is off)

Configuration

The line splitter LH-4VE 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:

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.

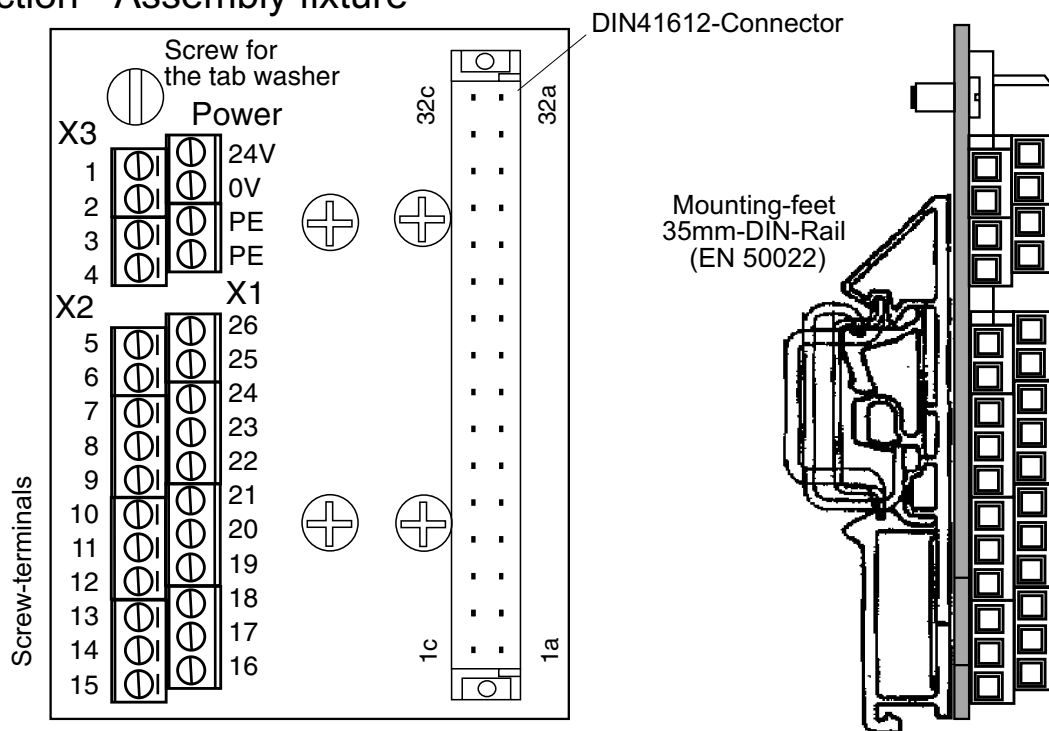OR-1: Extension card for a redundant ring system

▭ Factory setting   ⟷ Jumper

Note:
Althrough the RS232/V.24 Interface is used, the RS422/RS485-interface must be terminated by jumper X14 and X15 depending on X7.

Connection - Assembly fixture

Screw for the tab washer

DIN41612-Connector

Power

X3
1 24V
2 0V
3 PE
4 PE

X2
X1

5 26
6 25
7 24
8 23
9 22
10 21
11 20
12 19
13 18
14 17
15 16

Screw-terminals

32c 32a

1c 1a

Mounting-feet
35mm-DIN-Rail
(EN 50022)

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-Stat. out (+12V pullup)	
	12	10c	Signal ground (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	Relais 1	
	26	26a	Relais 2	
Power	27	32c	Protective Earth	
	28	32c	Protective Earth	
	29	30c	Signal Ground - Power Ground	
	30	28c	24V+ Input 24 VDC	

Description

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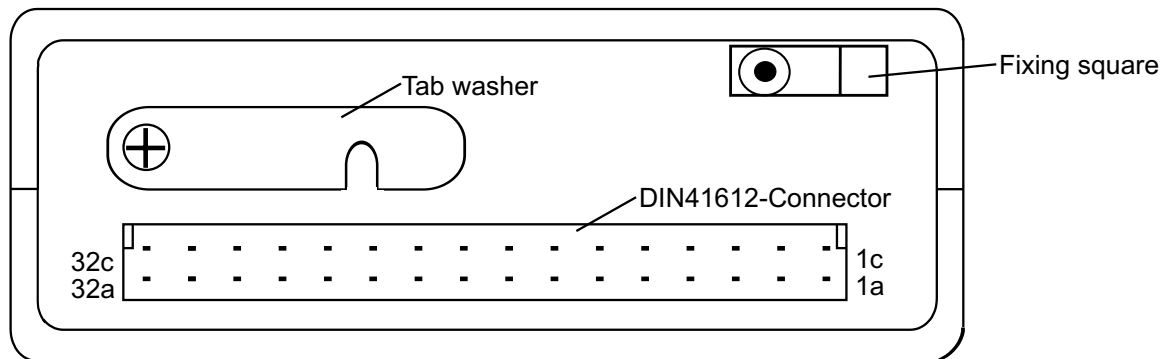
Bypass
If a LH-4VE has a failure, the X-2 interface gets no data and the modem interfaces X1 and X3 are connected directly together.
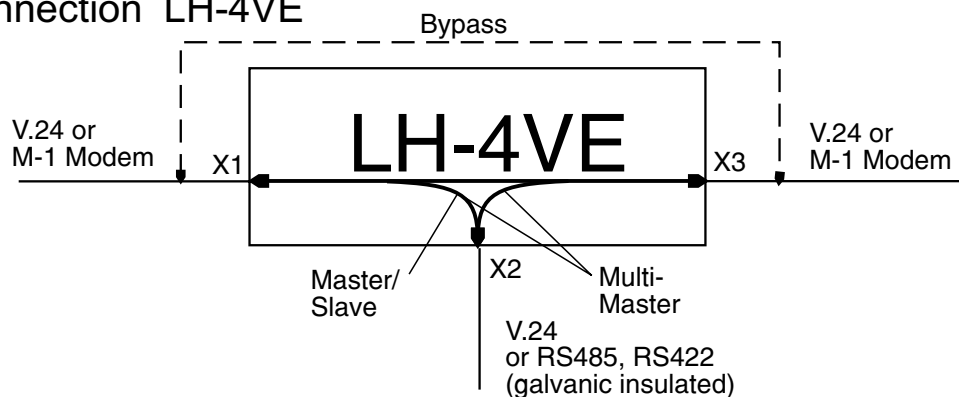Be aware of failures by planning the distance because there is no repeater function.

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.
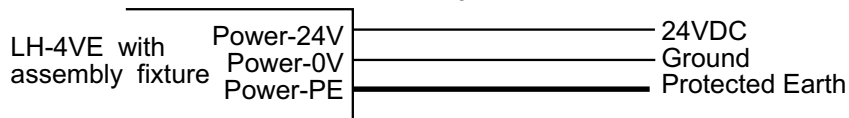
Connection

Tab washer

Fixing square
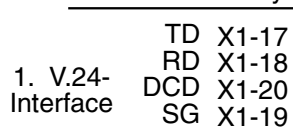
DIN41612-Connector

32c   1c
32a   1a

Logical connection LH-4VE

Bypass

V.24 or
M-1 Modem   X1   LH-4VE   X3   V.24 or
M-1 Modem

Master/
Slave   X2   Multi-
Master

V.24
or RS485, RS422
(galvanic insulated)

Connection power supply

LH-4VE with
assembly fixture

Power-24V	24VDC
Power-0V	Ground
Power-PE	Protected Earth

Connection V.24-interface

LH-4VE with assembly fixture

V.24/RS232-
Interface

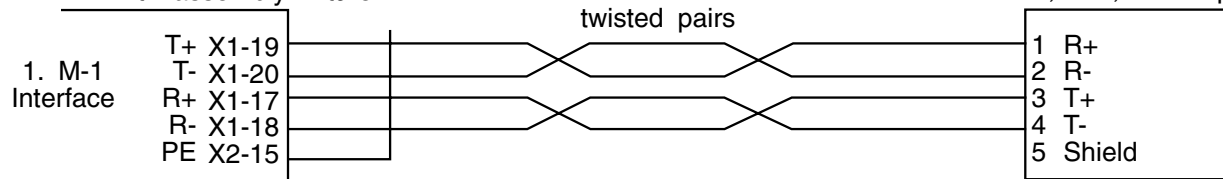|	1. V.24-Interface			2 TD	
TD	X1-17			2	TD
RD	X1-18			3	RD
DCD	X1-20			8	DCD
SG	X1-19			7	SG

DTE
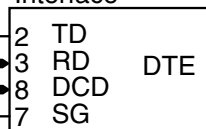
Galvanic isolated interface X2 is: TD=X2-9; RD=X2-10; DCD=X2-11; SG=X2-12

Connection M-1 modem interface

LH-4VE with assembly fixture   M-1, R-1, LT-1V pp.

twisted pairs

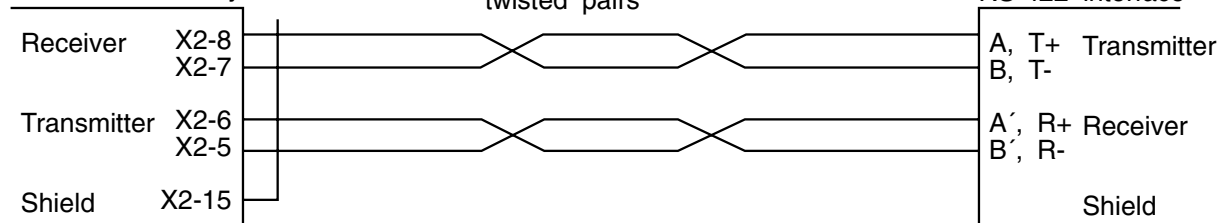| 1. M-1 Interface | T+ X1-19 | | 1 R+ |
	T- X1-20		2 R-
	R+ X1-17		3 T+
	R- X1-18		4 T-
	PE X2-15		5 Shield

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

Line connection RS422 interface

LH-4VE with assembly fixture   twisted pairs   System with RS-422 interface

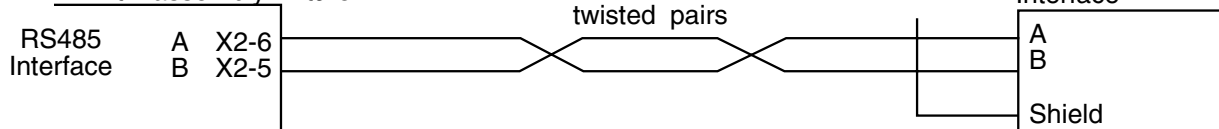| Receiver | X2-8 | | A, T+ Transmitter |
	X2-7		B, T-
Transmitter	X2-6		A´, R+ Receiver
	X2-5		B´, R-
Shield	X2-15		Shield

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

Connection RS485 Interface

LH-4VE 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

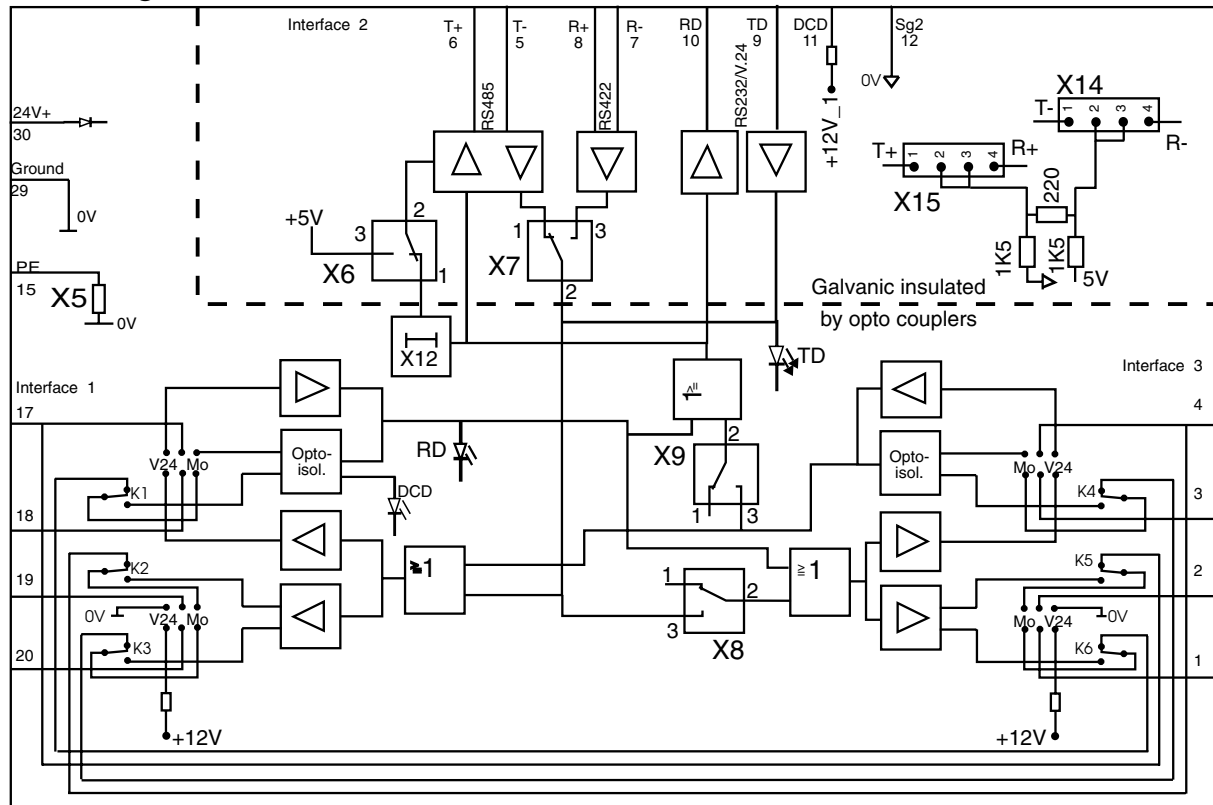## Transmission Distance (RS422/RS485 Interface)

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.

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

Block diagram

Interface monitor and redundance extension (option) 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

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

A master has a connection to many V.24- or RS422/RS485-slaves.
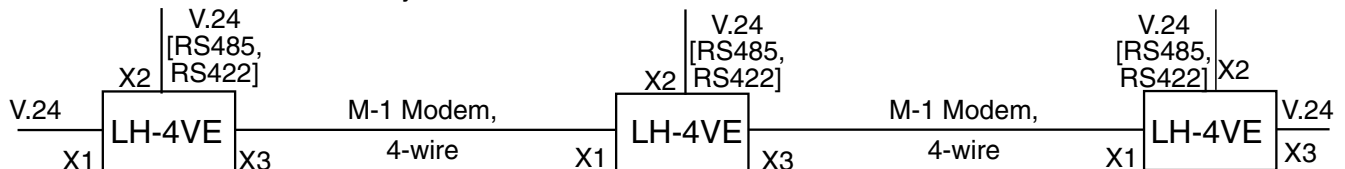
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- Be aware of of failures by planing the distance because there is no repeater function.