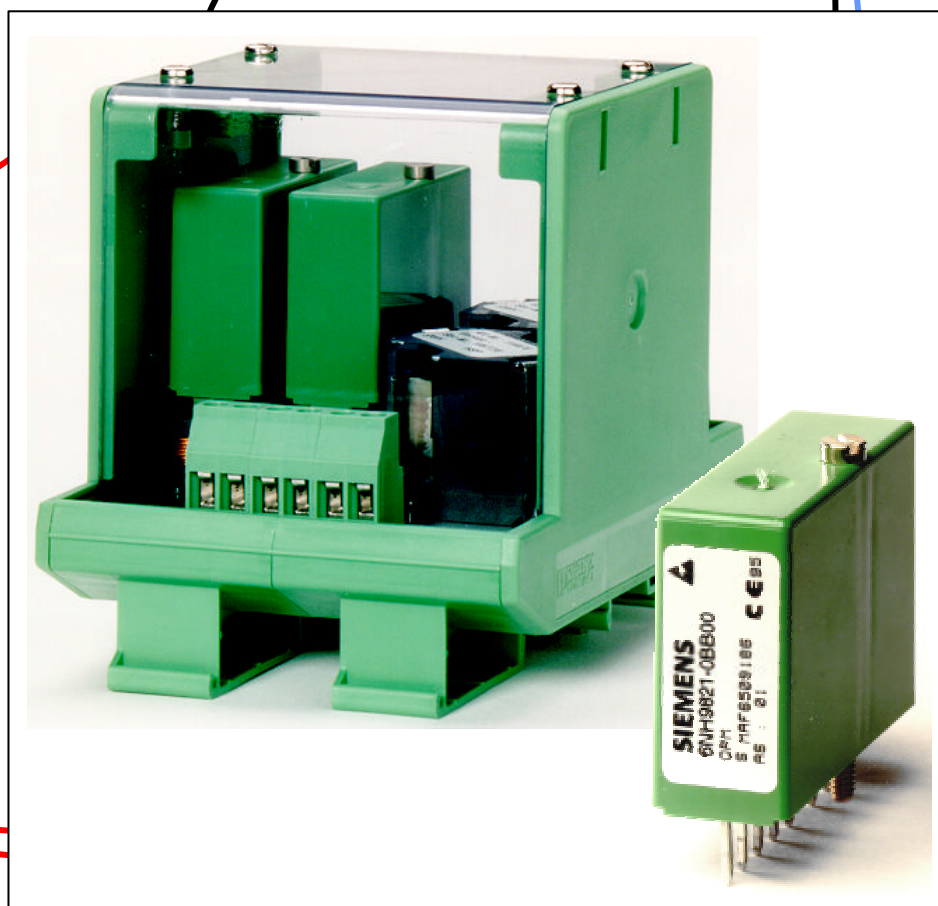


SINAUT ST7

Line Transformer with Overvoltage Protection LTOP

Operating Instructions

Edition 09/2002



SINAUT – Telecontrol
with SIMATIC S7

Line Transformer with Overvoltage Protection

Automation islands are being increasingly incorporated into networks. The networking is still being carried out to a large extent using modems on private telephone cables. However, metal lines are highly sensitive to coupling and carry-over of external potentials. Coupling of external potentials may be inductive or capacitive, for example, as the result of lightning. Direct galvanic coupling may also occur as a result of insulation faults.

LTOP limits interference voltages and overvoltages to a non-critical level. The floating transformer provides electrical isolation in addition, thus preventing potential carry-over onto other sections of the line.

LTOP protects persons and investments and is thus an indispensable protective element in private telecontrol networks.

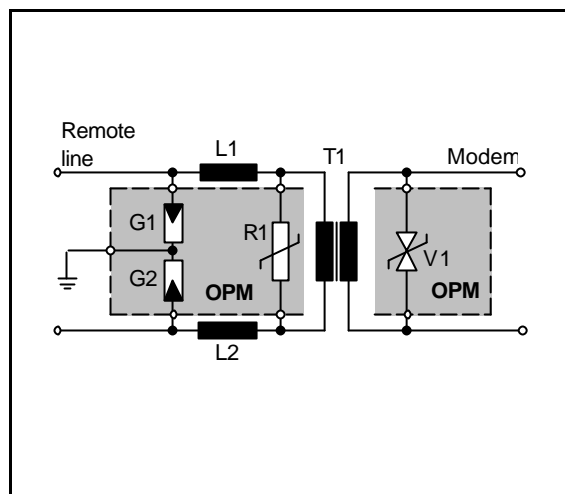
The most important features

- LTOP suppresses voltage surges down to acceptable levels before they reach the sensitive electronics.
- LTOP electrically segments the network; the carry-over of external potentials is prevented.
- LTOP limits the damage caused by voltage surges to the affected segment.
- The protective elements are fitted on a plug-in OPM (overvoltage protection module). The OPM can be replaced without interrupting the telecontrol line.

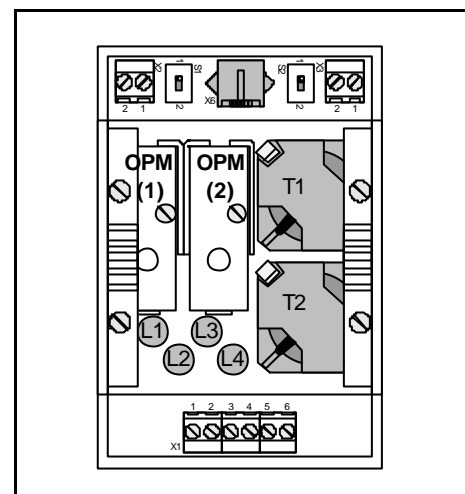
Design

The protective concept comprises a combination of components whose functions supplement one another (Fig.: Block diagram of an LTOP unit):

- Overvoltage suppressors filled with inert gas as coarse protection (G1, G2)
- Inductors which limit rises in current (L1, L2)
- Metal oxide varistor as fine protection (voltage-dependent resistance; R1)
- Transformer for electric decoupling (T1)
- Suppressor diode to limit the secondary voltage of the transformer (V1)



Block diagram of an LTOP unit



LTOP2 design (plan view)

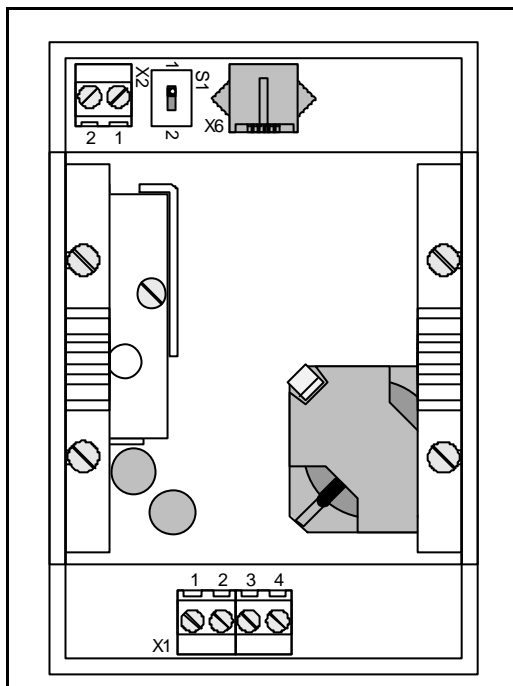
Function

The combination of discharging and limiting components which are supplemented by the line transformer is superior to electrically-bound safety designs.

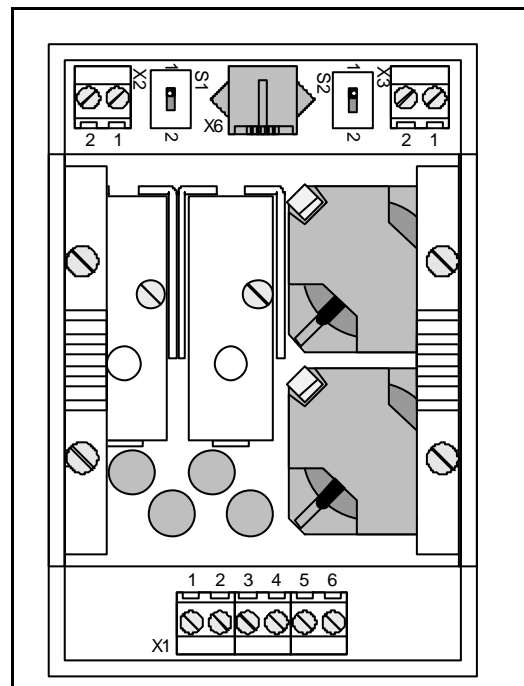
The protective elements inside of an OPM are greatly stressed during discharge processes and are slowly destroyed. Therefore, it is recommended to replace the OPMs once a year. To be on the safe side, in regions with frequent thunderstorms this period should be reduced to about 6 months.

The LTOP versions

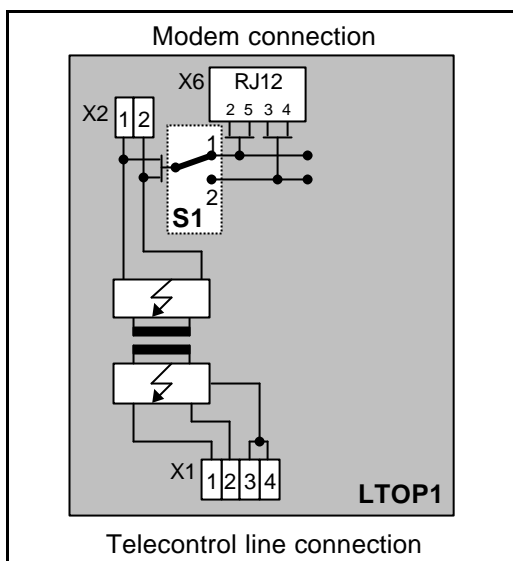
Either one LTOP unit (= LTOP1) or two LTOP units (= LTOP2) is accommodated in a single housing. The following diagrams show the design of both LTOP versions with their connectors and adjustment switches.



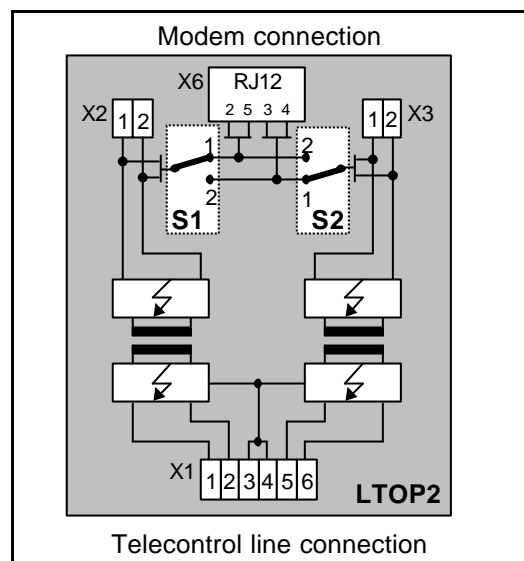
LTOP1 (plan view)



LTOP2 (plan view)



Schematic diagram of LTOP1



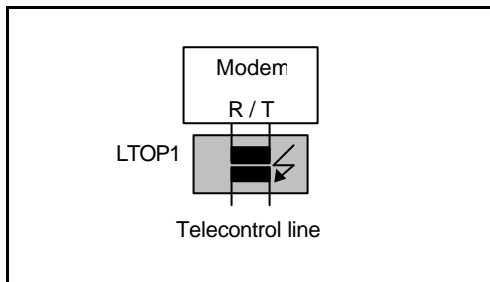
Schematic diagram of LTOP2

Legend:

- X1** Telecontrol line (screw terminals 1, 2, 5, 6)
Ground (screw terminals 3, 4)
- X2** 2-wire modem connection
- X2 + X3** 4-wire modem connection
- X6** 2-wire/4-wire modem connection via RJ12 Western connector; for direct connection of the SINAUT ST7 modems MD1 and MD2 via the standard cross-connection cable (RJ12 – RJ12) which is supplied with these modems.
- S1 + S2** Adjustment switches



Configurations

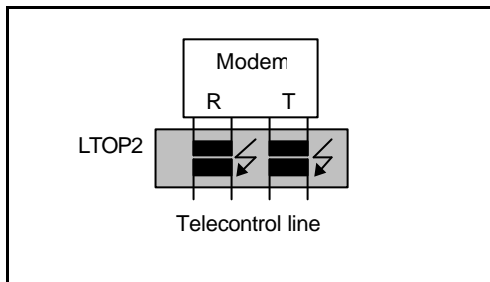
Several LTOP housings can be connected together if necessary. The following examples show possible and meaningful configurations.



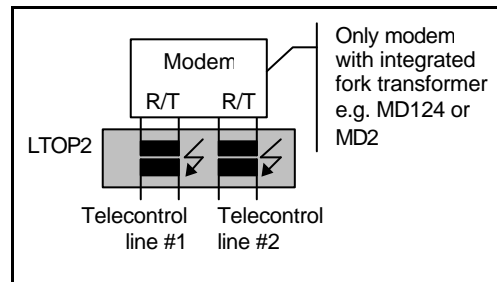
2-wire terminal unit

Legend:

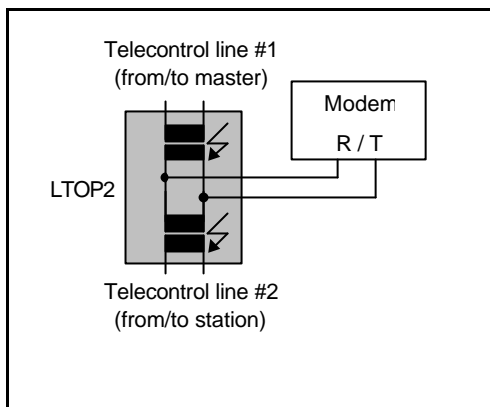
-  Line Transformer
-  Overvoltage Protection
- T Transmitter
- R Receiver



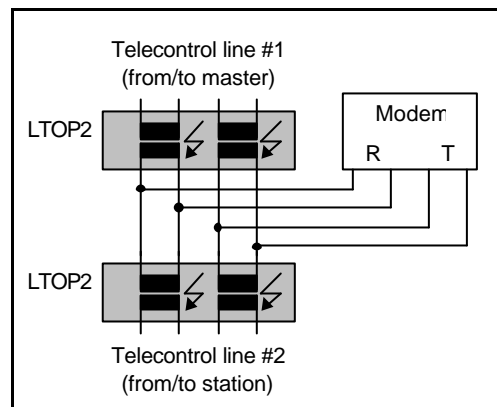
4-wire terminal unit



2 x 2-wire terminal unit



2-wire tapping point



4-wire tapping point

Connection of the SINAUT ST7 MD1 and MD2 Modems

The following diagrams show the connection of the dedicated line MD1 and MD2 modems. The connection to LTOP1 or LTOP2 is made via the standard cross-connection cable which is supplied with the modems. This cable has RJ12 Western connectors at both ends.

Note

Instead of the MD2 modem as shown in the diagrams, the MD2 modem integrated in TIM32 or TIM42 can be also connected. In this case the connection to the LTOP is also made via the standard RJ12 cable supplied with the TIM.

Please take care that the MD2 modem has the correct line termination:

- With terminal unit and 1200 or 2400 bps: 600 Ohm
- With terminal unit and 19.200 bps: 150 Ohm
- With tapping point: high-resistance.

For more details see description of MD2.

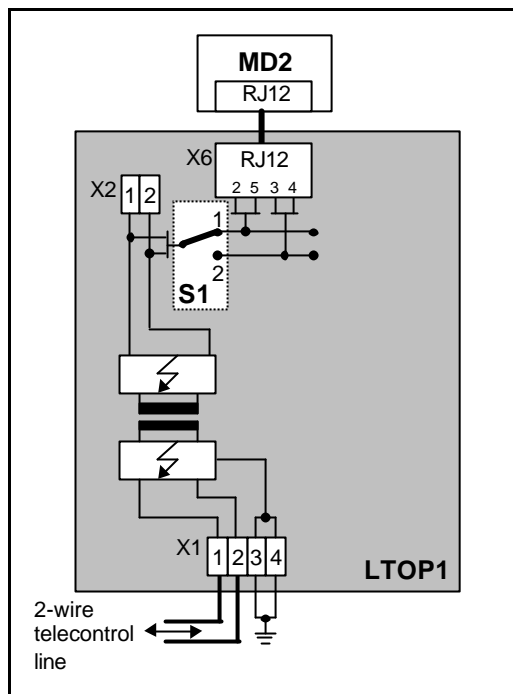
The MD1 modem does not require any line termination adjustment.

!

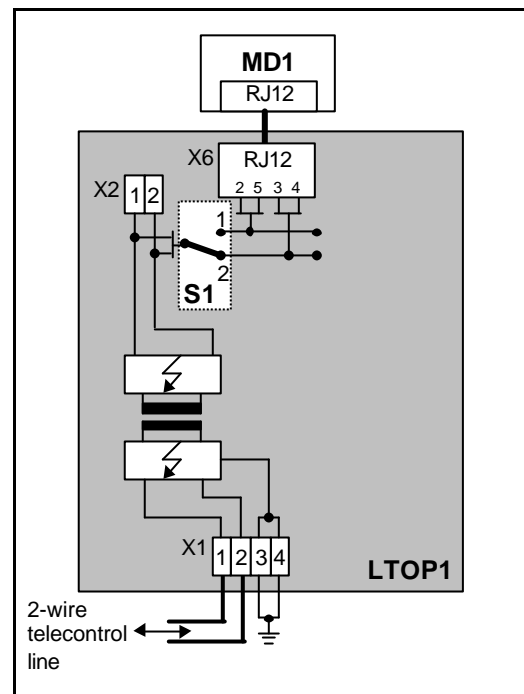
Important

Please take care that the switches S1 and S2 are in the correct position 1 or 2 as shown in the diagrams!

Connection of a 2-wire terminal unit (via LTOP1)

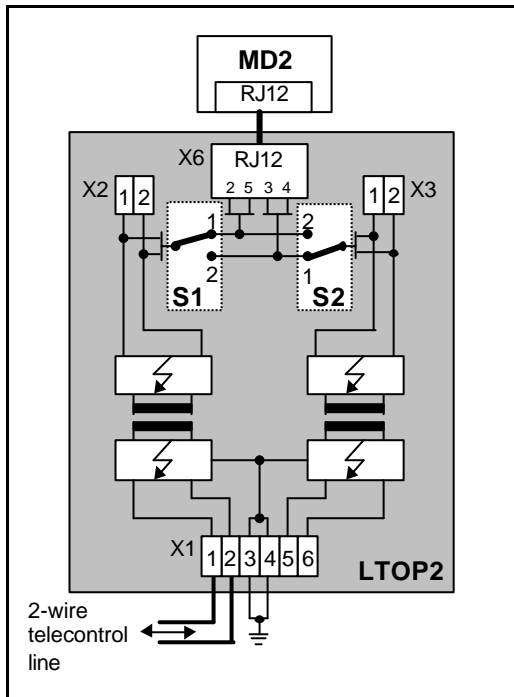


MD2: 2-wire terminal unit via LTOP1

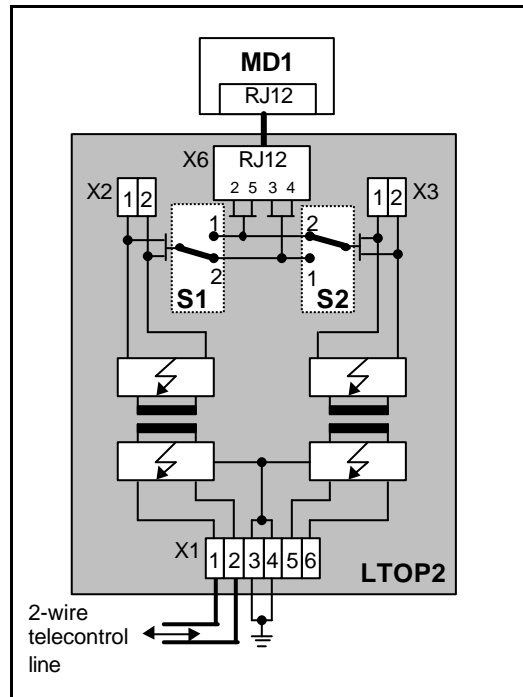


MD1: 2-wire terminal unit via LTOP1

Connection of a 2-wire terminal unit (via LTOP2)

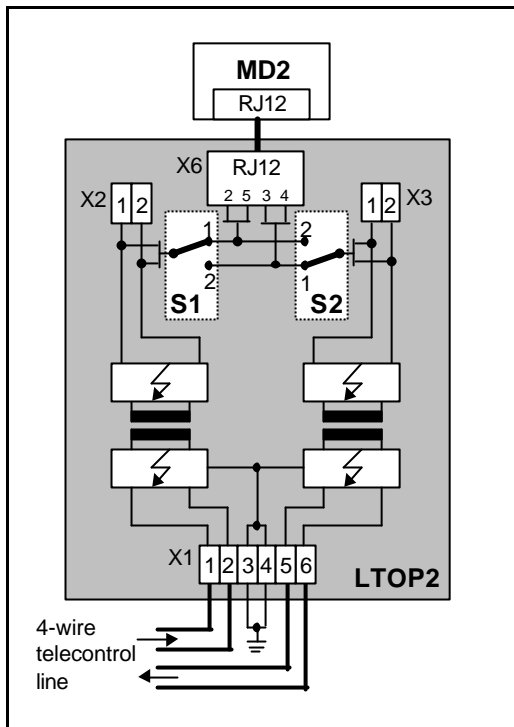


MD2: 2-wire terminal unit via LTOP2

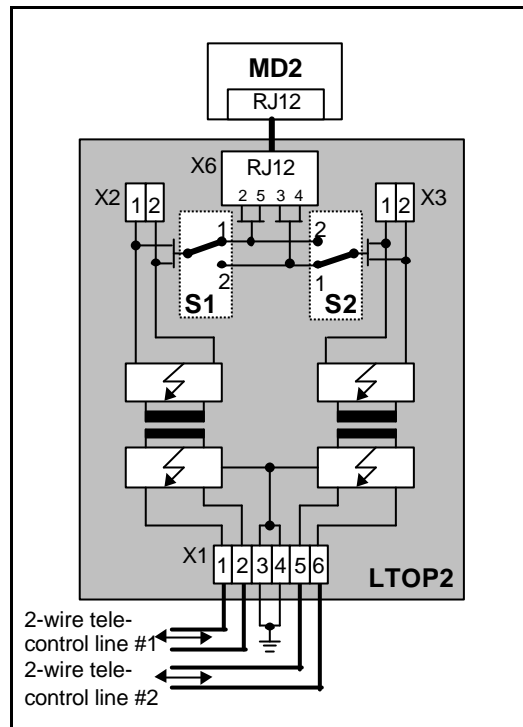


MD1: 2-wire terminal unit via LTOP2

Connection of a 4-wire terminal unit or 2 x 2-wire terminal unit

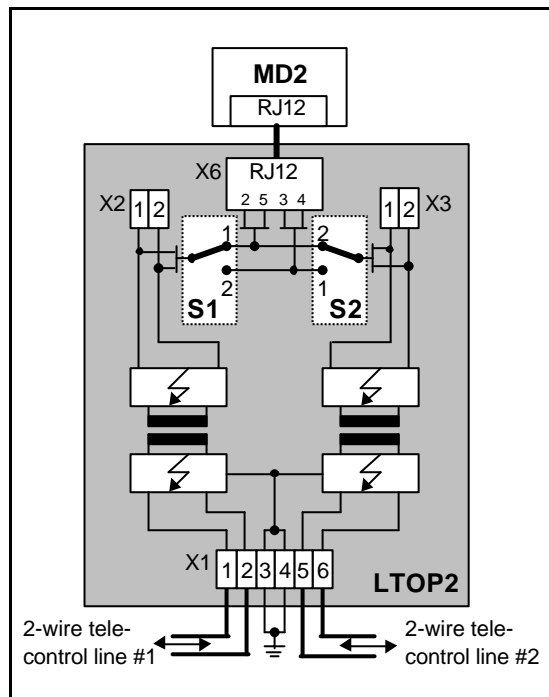


MD2: 4-wire terminal unit via LTOP2



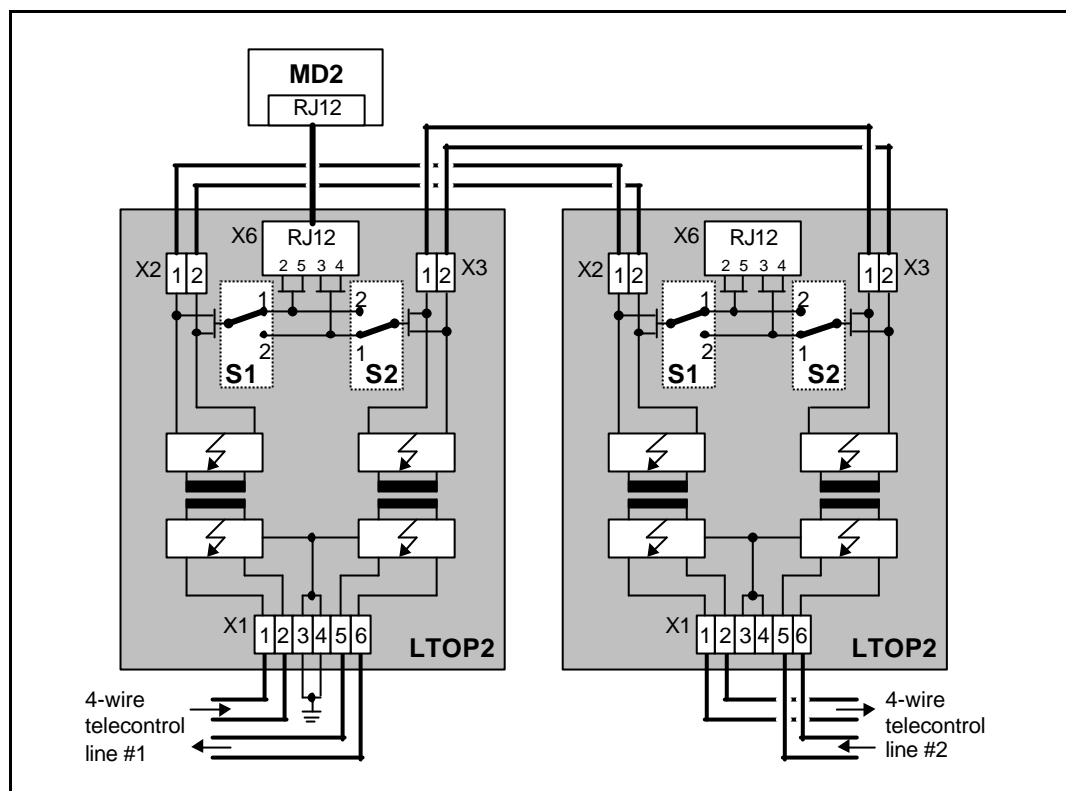
MD2: 2 x 2-wire terminal unit via LTOP2

Connection of a 2-wire tapping point



MD2: 2-wire tapping point via LTOP2

Connection of a 4-wire tapping point



MD2: 4-wire tapping point via two LTOP2

Connection of the modems MD100, MD124 and similar modems

The following diagrams show the connection of the dedicated line modems MD100 and MD124. The connection between modem and LTOP1 and LTOP2 is made via a two-core or four-core cable or single cores.

Note

Instead of the modems MD100 and MD124 shown in the diagrams also any other modem for dedicated lines can be connected.

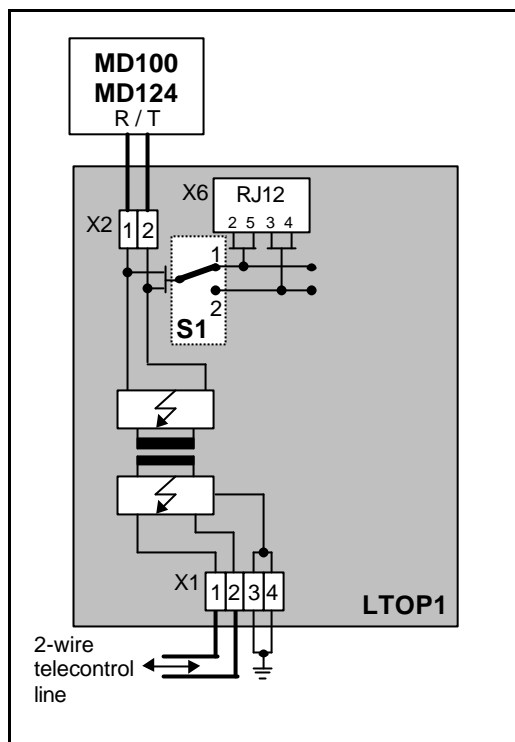
Please take care that the modems MD100 or MD124 have the correct line termination if they are connected to the end of the line (600 or 150 ... 450 Ohm) or if they are tapped in (high-resistance). For more details see description of the MD100 and MD124.



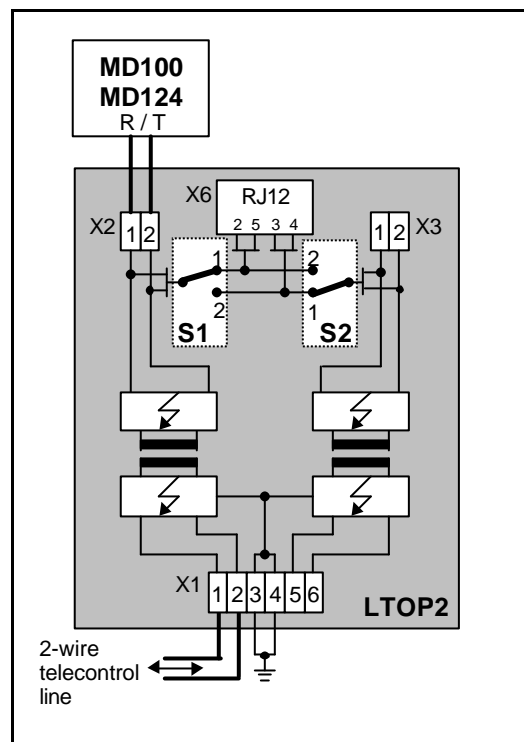
Important

Please take care that the switches S1 and S2 are in the correct position 1 or 2 as shown in the diagrams!

Connection of a 2-wire terminal unit

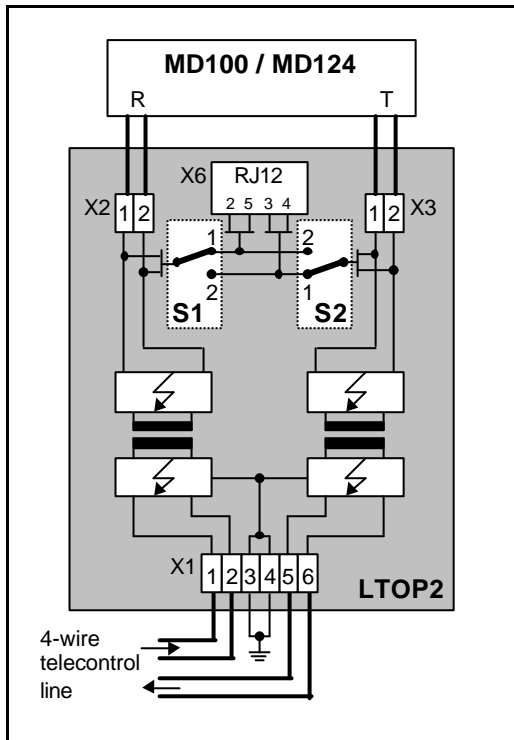


MD100 / MD124: 2-wire terminal unit via LTOP1

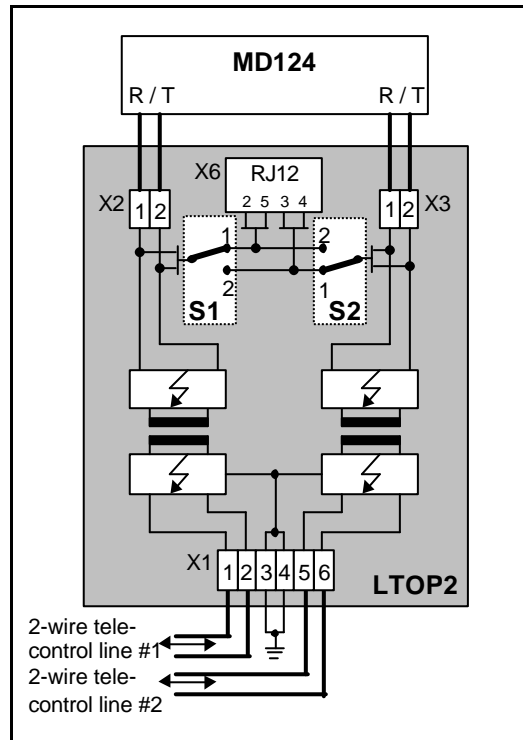


MD100 / MD124: 2-wire terminal unit via LTOP2

Connection of a 4-wire terminal unit or 2 x 2-wire terminal unit

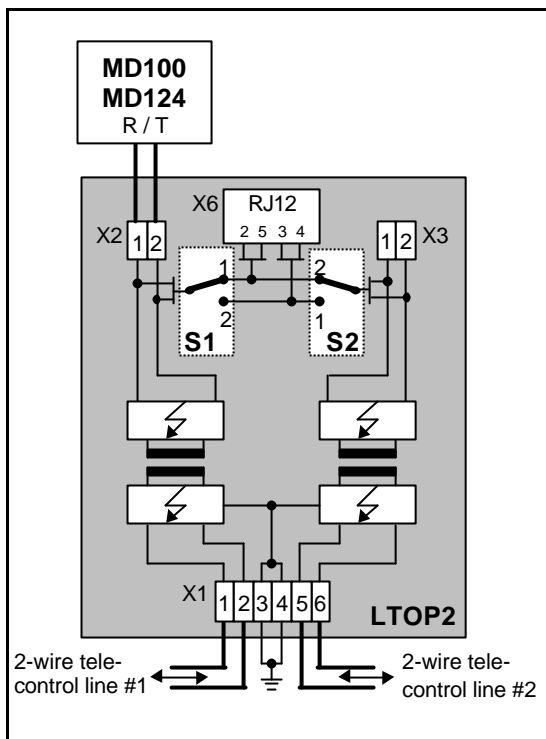


MD100 / MD124: 4-wire terminal unit via LTOP2



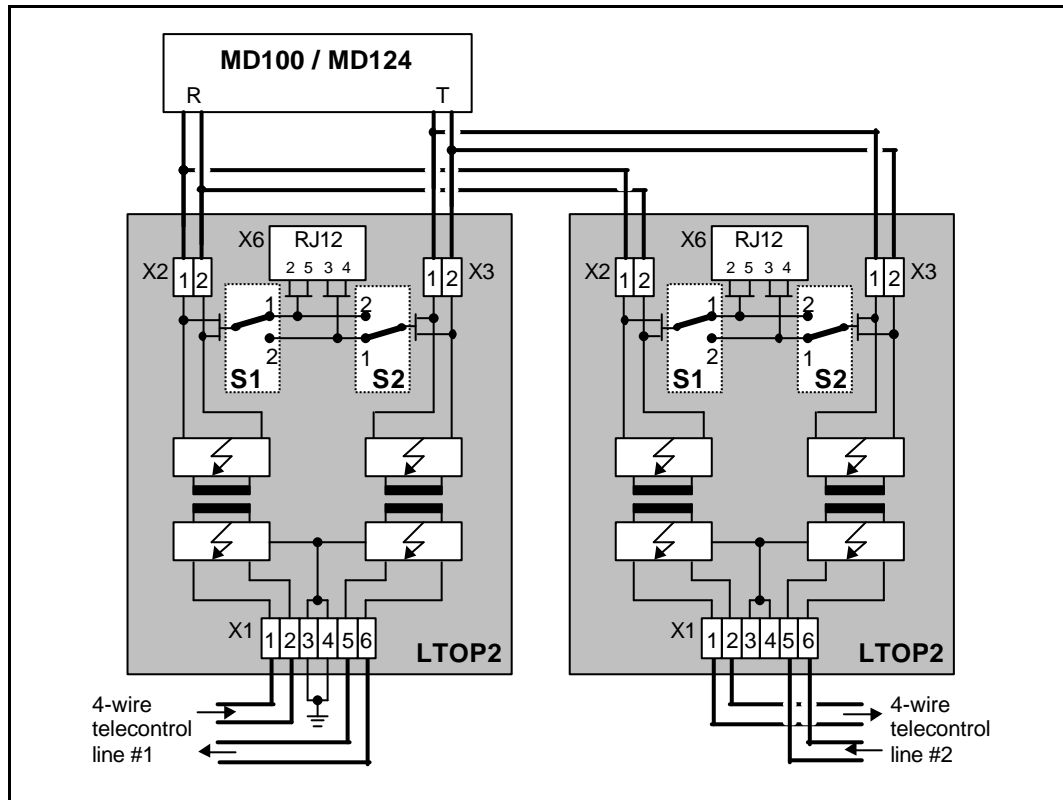
MD124: 2 x 2-wire terminal unit via LTOP2

Connection of a 2-wire tapping point



MD100 / MD124: 2-wire tapping point via LTOP2

Connection of a 4-wire tapping point



MD100 / MD124: 4-wire tapping point via two LTOP2

Overview of the adjustments of the switches S1 and S2

The following two tables give a summary of the possible adjustments of the switches S1 and S2. You will also find these tables as stickers on the LTOP1 and LTOP2 units.

SIEMENS		2W	2wire	2Draht			
6NH9821-0BC11		P	Point	Endstelle			
LTOP1 AS:01 CE							
Einstellung / Position S1 für / for SINAUT-Modems							
	MD100 / MD124	MD1	MD2				
	2W		2W	2W			
	P		P	P			
	X2		X6	X6			
S1	1		2	1			

SIEMENS		2W	2wire	2Draht				
6NH9821-0BC12		4W	4wire	4Draht				
LTOP2 AS:01 CE		P	Point	Endstelle				
		M	Multi-point	Staffelstelle				
Einstellung / Position S1 + S2 für / for SINAUT-Modems								
	MD100 / MD124	MD1	MD2					
	2W	2W	4W	2W	2W	2W	2 x 2W	4W
	P	M	P/M	P	P	M	P	P/M
	X2	X2	X2+X3	X6	X6	X6	X6	X6
S1	1	1	1	2	1	1	1	1
S2	1	2	1	2	1	2	1	1

Ordering data

LTOP1	LTOP1 line transformer with overvoltage protection with one built-in OPM overvoltage protection module	Order no.: 6NH9821-0BC11
LTOP2	LTOP2 dual line transformer with overvoltage protection with 2 built-in OPM overvoltage protection modules	Order no.: 6NH9821-0BC12
OPM	OPM overvoltage protection module, plug-in (pack of 4)	Order no.: 6NH9821-0BB00

Technical data

Transmission paths	Private coiled or uncoiled telecontrol lines					
Transmission ratio	1 : 1; $\pm 5\%$ (e.g. 600/600 ohms within voice frequency band)					
Transmission range	300 Hz to 35 kHz					
Frequency-dependent attenuation	Attenuation [dB]	Frequency [Hz]	Transmission rate [bps]			
			MD100	MD124	MD1	MD2
	0,2	1300 ... 3300	1200	1200 2400	1200 2400 9600 14400	1200 2400
	0,8	5200 ... 8400		4800		
	0,9	10400 ... 16800		9600		
	1,0	20800 ... 30600		19200		9600 19200
Insulation resistance	> 2000 MOhm					
Test voltage	4 kV, 50 Hz, 10 sec.					
Impulse strength	6 kV/2 J acc. to EN 60 099-1					
Nominal impulse discharge current i_{sn} (8/20 μ s)	5 kA					
Output voltage limitation at i_{sn}	approx. 15 V					
Telecontrol line connection	Screw terminals X1 - Cross-section 0,2 – 4 mm ² with solid conductors - Cross-section 0,2 – 2,5 mm ² with stranded conductors					
Modem connection	Screw terminals X2 and X3 (see X1 for cross-section) or X6 (RJ12 socket for Western plug)					
Mounting location	As near as possible to the cable inlet to the building					
Dimensions (h x w x d)	90 x 75 x 110 mm					
Weight	LTOP1: 300 g LTOP2: 320 g OPM: 10 g					
Degree of protection	IP20					
Assembly	DIN rail TS35 (35 mm; EN 50 022)					

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