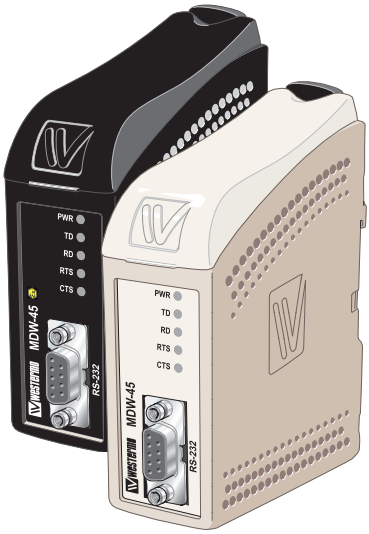
User Guide
6617-2203

MDW-45



Converter
RS-232 – RS-422/485

www.westermo.com

Legal information

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy and reliability or contents of this document. Westermo reserves the right to revise this document or withdraw it at any time without prior notice.

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More information about Westermo can be found at the following Internet address:

http://www.westermo.com

Safety

Before using this unit:

Read this manual completely and gather all information on the unit. Make sure that you understand it fully. Check that your application does not exceed the safe operating specifications for this unit.

Hazardous voltage may occur within this unit when connected to power supply or TNV circuits.

Prevent access to hazardous voltage by disconnecting the unit from power supply and all other electrical connections.

Prevent damage to internal electronics from electrostatic discharges (ESD) by discharging your body to a grounding point (e.g. use of wrist strap).

Before installation:

This unit should only be installed by qualified personnel.

This unit should be built-in to an apparatus cabinet, or similar, where access is restricted to service personnel only.

The power supply wiring must be sufficiently fused, and if necessary it must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

This unit uses convection cooling. To avoid obstructing the airflow around the unit, follow the spacing recommendations (see Installation section).

Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfil the warranty obligations.

This unit must not be operating with removed covers or lids.

Do not attempt to disassemble the unit. There are no user serviceable parts inside.

Do not drop, knock or shake the unit, rough handling above the specification may cause damage to internal circuit boards.

Do not use harsh chemicals, cleaning solvents or strong detergents to clean the unit.

Do not paint the unit. Paint can clog the unit and prevent proper operation.

Do not expose the unit to any kind of liquids (rain, beverages, etc). The unit is not waterproof. Keep the unit within the specified humidity levels.

Do not use or store the unit in dusty, dirty areas, connectors as well as other mechanical part may be damaged.

If the unit is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo Tech support.

Maintenance

No maintenance is required, as long as the unit is used as intended within the specified conditions.

Agency approvals and standards compliance

Type	Approval / Compliance	
EMC	EN 61000-6-2	Immunity industrial environments
	EN 55024	Immunity IT equipment
	EN 61000-6-3	Emission residential environments
	FCC part 15	Class B
	EN 50121-4	Railway signalling and telecommunications apparatus
	IEC 62236-4	Railway signalling and telecommunications apparatus
Safety	EN 60950	IT equipment
Ex*	EN 60079-0 and EN 60079-15	Explosive atmospheres – General requirements and type "n" electrical appratatus

* Only MDW-45 LV EX

FCC Part 15.105 Notice:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

ATEX Information (Applicable for MDW-45 LV EX only)

General

This unit is intended for use in Zone 2 hazardous location only.

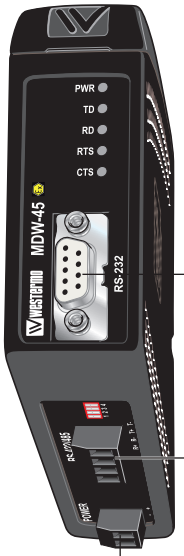
Marking

II 3 G
Ex nA IIC 136°C (T3) Gc
SPECIAL CONDITION
WARNING – DO NOT SEPARATE WHEN ENERGIZED

	Indicate that this unit complies with relevant European standards that are harmonised with the 94/9/EC Directive (ATEX).
II	Equipment group II. This unit can be installed in all places with an explosive gas atmosphere other than mines susceptible to firedamp.
3	Equipment category 3. A category is the classification according to the required level of protection. This unit ensures the requisite level of protection during normal operation and is intended for use in areas in which explosive atmosphere caused by gases, vapours, mists, or dust mixtures are unlikely to occure or, if they do occure, are likely to do so only infrequently and for a short periode only.
G	Indicates protection concerning explosive atmospheres caused by gases, vapours or mists (G).
Ex	Indicates that this unit is in conformity with relevant European Ex standard(s).
nA	The type of protection used. This unit is a non-sparking device "nA" which is constructed to minimize the risk of occurence of arcs or sparks capable of creating an ignition hazard during conditions of normal operation.
IIC	Gas group, a typical gas i hydrogen.
136°C (T3)	Maximum surface temperature assigned = 136°C with the next highest temperature class T3 (T3 = 200 °C). This unit is classified in accordance with its maximum surface temperature (external and internal).
Gc	Equipment protection level Gc (EPL Gc) Equipment for explosive gas atmospheres, having a "enhanced" level of protection, which is not a source of ignition in normal operation and which may have some additional protection to ensure that it remains inactive as an ignition source in the case of regular expected occurences. EPL Gc are analogous to the ATEX Categories (Category 3 G = EPL Gc).
SPECIAL CONDITION	This unit has a special condition for safe use. The special conditon for safe use contains safety related information that is necesarry for the correct installation and safe use.

Ratings and safety control drawing

Power	12 – 48 VDC; 95 mA
Ambient temperature	–40°C ≤ Ta ≤ +70°C
Maximum surface temperatur	136 °C (temperatur class T3)
Degree of protection	IP21
Installation spacing	Minimum 25 mm above / below and minimum 10 mm left / right



RS-232

Position	Direction* / description	Input /Output values
1	Not connected	U_{max} = ± 12 Vpk I_{max} = ± 60 mA Data rate: 1.2 – 115.2 kbit/s
2	Out / Received Data (RD)	
3	In / Transmitted Data (TD)	
4	Not connected	
5	– / Signal Ground (SG)	
6	Out / Data Set Ready (DSR)	
7	In / Request To Send (RTS)	
8	Out / Clear To Send (CTS)	
9	Not connected	

RS-422/485

Position	Direction* / description	Input /Output values
1	In / R+ line RS-422	U_{max} = ± 5 Vpk I_{max} = ± 250 mA Data rate: 1.2 – 115.2 kbit/s
2	In / R– line RS-422	
3	In / Out / T+ line RS-422/485	
4	In / Out / T– line RS-422/485	

Power – LV

Position	Direction* / description	Intput values
1	In / COM	U_{in} = 9.6 – 57.6 VDC Max_{in} = 0.16 A @ 9.6 VDC P_{In} = 2 W
2	In / +VA	
3	In / +Voltage B	
4	In / Common	
Galvanically isolated via power transformer and optocoupler. Capacitively isolated via Y1 capacitor rated 440 Vrms 3300 pF.		

SPECIAL CONDITION FOR SAFE USE

Ambient temperature:

This unit is designed for use in extreme ambient temperature conditions according to the following:
$-40°C \leq Ta \leq +70°C$

Installation in an apparatus cabinet:

This unit requires installation in an Ex certified apparatus cabinet suitable for the area of use and providing a degree of protection of at least IP54.

Resistance to impact:

This unit requires installation in an apparatus cabinet where adequate resistance to impact is provided by the apparatus cabinet. See "Installation in an apparatus cabinet" above for requirements on the external apparatus cabinet.

Resistance to light:

This unit requires installation in an apparatus cabinet where it is protected from light (for example daylight or light from luminaires).
See "Installation in an apparatus cabinet" above for requirements on the external apparatus cabinet.

Secureness of plugs:

When this unit is installed in an explosive atmospheres, all connectors must be mechanically secured to prevent loosening.

Conductor temperature:

When this unit is installed in locations with high ambient temperature, special precautions shall be taken upon the choice of external conductor(s) and the temperature rating of the conductor(s).

Directive 94/9/EC alongside with other directives:
Directive 2004/108/EC (EMC) applies and to assure a safe performance of this unit under the scope of Directive 94/9/EC, refer to the electromagnetic immunity level specified under "Type tests and environmental conditions" in this manual.

Standards and date of compliance

EN 60079-0 and EN 60079-15
2011-06-15

Westermo Teleindustri AB

Declaration of conformity

The manufacturer Westermo Teleindustri AB
SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

Type of product	Model	Art no
RS-232 – RS-422/485 Converter	MDW-45 LV	3617-0001
	MDW-45 LV EX	3617-5001

is in conformity with the following EC directive(s).

No	Short name
2004/108/EC	Electromagnetic Compatibility (EMC)
94/9/EC[1]	Equipment Explosive Atmospheres (ATEX)

References of standards applied for this EC declaration of conformity.

No	Title	Issue
EN 55024	Information technology equipment - Immunity	1998 + A1:2001 + A2:2003
EN 61000-6-1	Electromagnetic compatibility – Immunity residential environments	2007
EN 61000-6-2	Electromagnetic compatibility – Immunity industrial environments	2005
EN 61000-6-3	Electromagnetic compatibility – Emission residential environments	2007
EN 61000-6-4	Electromagnetic compatibility – Emission industrial environments	2007
EN 50121-4	Railway applications – Electromagnetic compatibility – Emission and immunity of the signalling and telecommunications apparatus	2006
EN 60079-0	Explosive atmospheres – Equipment – General requirements	2009
EN 60079-15	Electrical apparatus for explosive gas atmospheres – Construction, test and marking of type of protection “n” electrical apparatus	2005

The last two digits of the year in which the CE marking was affixed: 11

Signature

Pierre Öberg
Technical Manager
29 June 2011

[1] Applicable for MDW-45 LV EX only.

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Westermo Teleindustri AB

Declaration of conformity

The manufacturer Westermo Teleindustri AB
SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

Type of product	Model	Art no	
RS-232 – RS-422/485 Converter	MDW-45 HV	3617-0101	

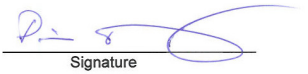
is in conformity with the following EC directive(s).

No	Short name
2004/108/EC	Electromagnetic Compatibility (EMC)
2006/95/EC	Low Voltage (LVD)

References of standards applied for this EC declaration of conformity.

No	Title	Issue
EN 55024	Information technology equipment - Immunity	1998 +A1:2001 +A2:2003
EN 61000-6-1	Electromagnetic compatibility – Immunity for residential environments	2007
EN 61000-6-2	Electromagnetic compatibility – Immunity for industrial environments	2005
EN 61000-6-3	Electromagnetic compatibility – Emission for residential environments	2007
EN 61000-6-4	Electromagnetic compatibility – Emission for industrial environments	2007
EN 50121-4	Railway applications -- Electromagnetic compatibility -- Emission and immunity of the signaling and telecommunications apparatus	2006
EN 60950-1	Information technology equipment -- Safety -- General requirements	2006 +A11:2009

The last two digits of the year in which the CE marking was affixed: 10



Signature

Pierre Öberg
Technical Manager
31th August 2010

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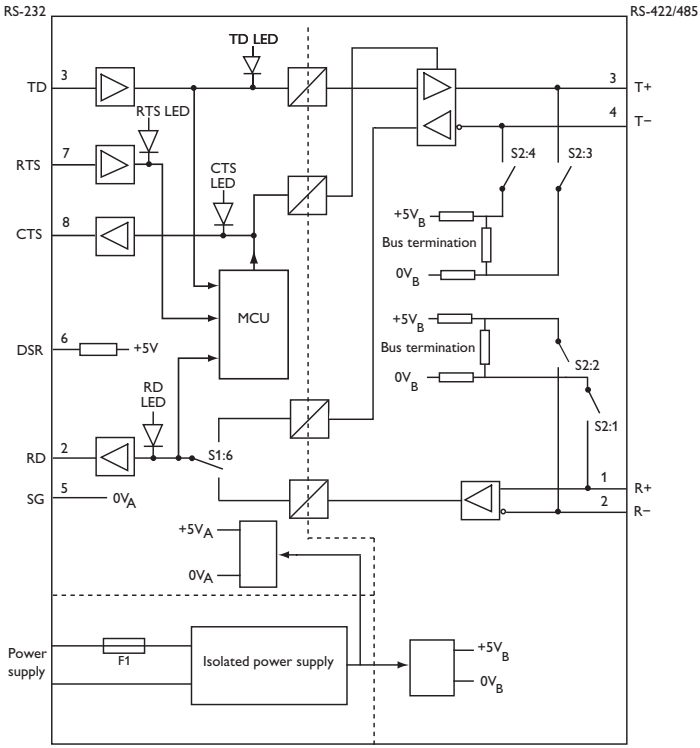
Type tests and environmental conditions

Electromagnetic Compatibility			
Phenomena	**Test**	**Description**	**Level**
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	10 V/m 80% AM (1 kHz), 80 – 1 000 MHz 20 V/m 80% AM (1 kHz), 800 – 960 MHz 20 V/m 80% AM (1 kHz), 1 400 – 2 700 MHz
RF field 900 MHz	ENV 50204	Enclosure	20 V/m pulse modulated 200 Hz, 900 ± 5 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports unbalanced	± 2 kV line to earth, ± 2 kV line to line
		Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 2 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Magnetic field, power freq.	EN 61000-4-8	Enclosure	100 A/m, 50 Hz, 16.7 Hz & 0 Hz
Pulse Magnetic field	EN 61000-4-9	Enclosure	300 A/m, 6.4 / 16 ms pulse
Voltage dips and interruption	EN 61000-4-11	AC power ports	10, 20 & 5000 ms, interruptions 10 & 500 ms, 30% reduction 100, 200 & 1 000 ms, 60% reduction
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 & 100 ms, interruption 10 ms, 30% reduction 10 ms, 60% reduction +20% above & –20% below rated voltage
Radiated emission	EN 55022	Enclosure	Class B
	FCC part 15		Class B
Conducted emission	EN 55022	AC power ports	Class B
	FCC part 15	AC power ports	Class B
	EN 55022	DC power ports	Class B
Dielectric strength		Signal port to all other	2 kVrms 50 Hz 1min
		Power port to all other	3 kVrms 50 Hz 1min 2 kVrms 50 Hz 1min (@ rated power < 60V)
	MDW-45 LV EX	Any port to any port and enclosure	0,5 kVrms 50 Hz 1 min
Environmental			
Temperature		Operating	–40 to +70°C
		Storage & Transport	–40 to +70°C
Humidity		Operating	5 to 95% relative humidity
		Storage & Transport	5 to 95% relative humidity
Altitude		Operating	2 000 m / 70 kPa
Service life		Operating	10 year
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Packaging			
Enclosure, MDW-45	UL 94	PC / ABS	Flammability class V-1
Enclosure, MDW-45 EX		Cabelec 6141	
Dimension W x H x D			35 x 121 x 119 mm
Weight			0.19 kg
Degree of protection	IEC 529	Enclosure	IP 21
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail

Fuctional description

The MDW-45 is an RS-422/485 to RS-232 converter. This device can be used in multidrop and point to point applications to connect devices like PCs, PLCs, drives and other automation equipment.

In 2-wire half duplex applications (RS-485) the MDW-45 can automatically control the state of the data bus based just on the data it receives. This allows the unit to be used with equipment that has no handshaking signal. The maximum transmission rate possible is 115.2 kbit/s.



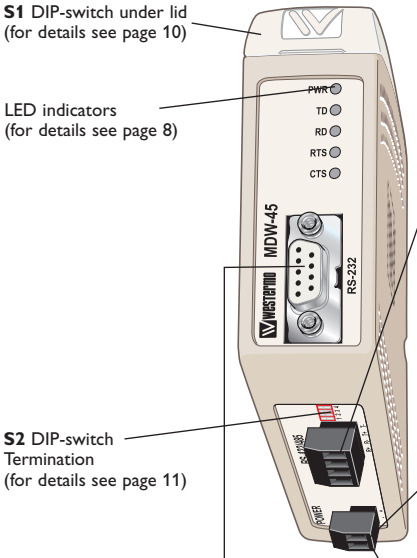
Interface specifications

Power		
	MDW-45 LV **MDW-45 LV EX**	**MDW-45 HV**
Rated voltage	12 to 48 VDC	95 to 240 VAC 110 to 250 VDC
Operating voltage	9.6 to 57.6 VDC	85.5 to 264 VAC 88 to 300 VDC
Rated current	95 mA @ 12 VDC 35 mA @ 48 VDC	21 mA @ 95 VAC 10 mA @ 110 VDC
Rated frequency	DC	48 – 62 Hz / DC
Polarity	Reverse polarity protected	Polarity independent
Connection	Detachable screw terminal	Detachable screw terminal
Connector size	0.2 – 2.5 mm² (AWG 24-12)	0.2 – 2.5 mm² (AWG 24-12)

RS-422/485	
Electrical specification	RS-485
Data rate	1 200 bit/s – 115.2 kbit/s
Data format	7 or 8 data bit, Odd, even or none parity, 1 or 2 stop bit
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm² (AWG 24-12)
Transmission range	In accordance with EIA RS-485 ≤ 1200 m, depending on data rate and cable type
Settings	120 Ω termination and failsafe biasing 680 Ω , by DIP-switch
Protection	Installation Fault Tolerant (up to ±60 V)

RS-232	
Electrical specification	RS-232
Data rate	1 200 bit/s – 115.2 kbit/s
Data format	7 or 8 data bit, Odd, even or none parity, 1 or 2 stop bit
Connection	9-pin D-sub female DCE
Transmission range	15 m

Locations of Interface ports, LED`s and DIP-switches



RS-422/485 interface screw terminal

4-position	Direction*	Description
No. 1	In	R+ line RS-422
No. 2	In	R– line RS-422
No. 3	In/Out	T+ line RS-422/485
No. 4	In/Out	T– line RS-422/485

Power connection, LV

2-position	Description
No. 1	0 VDC
No. 2	12 – 48 VDC

Power connection, HV screw terminal

2-position	Description	Product marking
No. 1 ⎓ ~	AC: Neutral DC: –Voltage	N/–
No. 2 ⎓ ~	AC: Line DC: +Voltage	L/+

RS-232 (DCE)

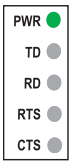
9-position	Direction	Description
No. 1	–	
No. 2	Out	Received Data (RD)
No. 3	In	Transmitted Data (TD)
No. 4	–	
No. 5	–	Signal Ground (SG)
No. 6	Out	Data Set Ready (DSR)
No. 7	In	Request To Send (RTS)
No. 8	Out	Clear To Send (CTS)
No. 9	–	

Railway installation close to the rails (RS-232, RS-422/485)

For a cable located inside 3 m boundary and connected to this port, the use of shielded cable is recommended, this to minimize the risk of interference. The cable shield should be properly connected (360°) to an earthing point within 1 m from this port. This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth.

LED Indicators

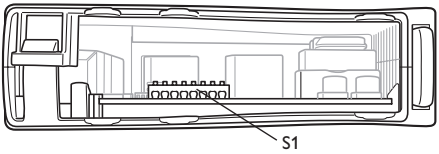
LED	Status	Description
PWR	ON	In service
	OFF	Out of service
TD	ON	Transmitted Data: Displays data received from the local RS-232 port
	OFF	No data
RD	ON	Received Data: Displays data leaving the modem on the RS-232 port
	OFF	No data
RTS	ON	Status of RTS from the RS-232 interface
	OFF	No RTS
CTS	ON	Status of CTS from the RS-232 interface
	OFF	No CTS



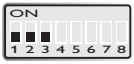
DIP-switch settings

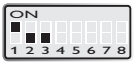
Before DIP-switch settings:

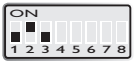
Prevent damage to internal electronics from electrostatic discharges (ESD) by discharging your body to a grounding point (e.g. use of wrist strap).

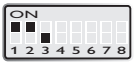


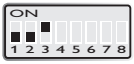
Selection of data rate

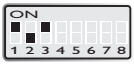
S1  1200 bit/s

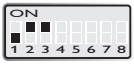
S1  2400 bit/s

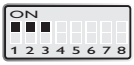
S1  4800 bit/s

S1  9600 bit/s

S1  19.2 kbit/s

S1  38.4 kbit/s

S1  57.6 kbit/s

S1  115.2 kbit/s

Selection of data format

S1  9 bit format*

S1  10 bit format*

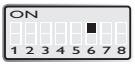
S1  11 bit format*

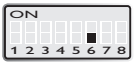
S1  12 bit format*

Supervision table when selecting data format								
7 bit	●	●	●		●			
8 bit				●		●	●	●
No parity	●	●		●		●		
Parity			●		●		●	●
1 stop bit	●		●	●			●	
2 stop bit		●			●	●		●
Number of bit	9	10	10	10	11	11	11	12

* See Supervision table when selecting data bits. Turning time 1 – 1.5 bit time

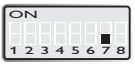
Selection of bus format

S1  2-wire RS-485

S1  4-wire RS-422

In RTS-control and Transmitter always active. The switches for data rate and number of bits has no effects.

Selection of bus control

S1  Data control

S1  RTS-control

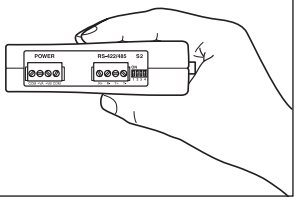
S1  Transmitter always active

S2 Below panel, RS-422/485 termination

No termination and fail-safe

Termination with fail-safe (2-wire)

Termination with fail-safe (4-wire)



Note! DIP-switch alterations are only effective after a power on.

Factory settings

S1

Data rate – 9600 bit/s, data format – 10 bit
Bus format, 2-wire
Note: Switch 1:8 is not used

S2

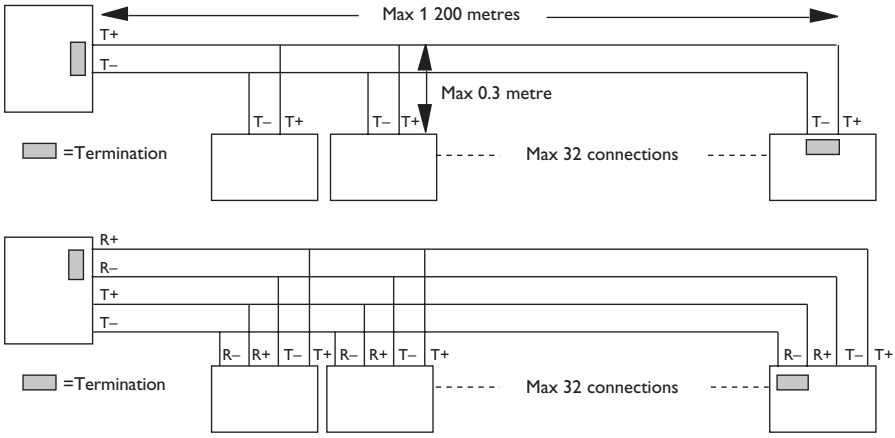
No termination and fail-safe

Unit specific description

When the converter is set to data-control mode the transmitter is activated by data on TD (RS-232). The time the transmitter stays active corresponds to one character-time plus the turning time for the set data rate and number of bits. If more data arrives on TD before the turning time has expired the transmitter stays active for an additional one character time and so on. In RTS-control mode the transmitter is activated by the RS-232 RTS-signal. In this mode the dip-switches for data rate and number of bits have no effect. The LED indicators show the status of the data signals. The fail-safe termination ensures that the signal level at the receiver is in 'mark state' (differential>0.2 Volts) when there is no data on the RS-485 bus. Full duplex is only possible if 4-wires are used.

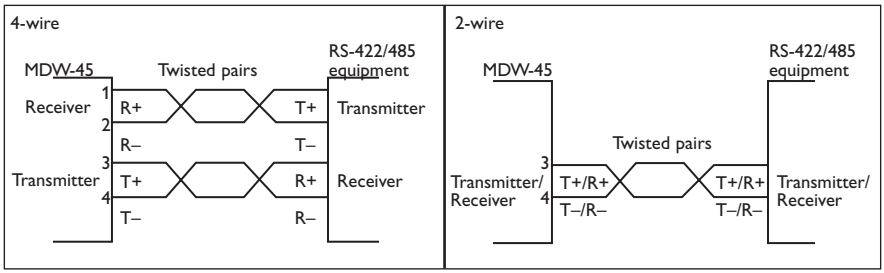
Field of application

RS-422 and RS-485 were both designed for multidrop applications. When a system is installed it should always form a bus structure (see diagrams). Star shaped networks should never be created; there are other Westermo products that can be used to create star net applications. To install a system according to the RS-422/485 specification it is very important that the line is terminated at the correct points. The recommendation is to terminate the receiver on the master unit and the final bus slave unit. See diagrams for details of how this is done with RS-485 (2-wire) and RS-422 (4-wire).



N.B. R+/R–, T+/T– definitions are not standard, it can help to shift + and – if the unit does not work.

Line connection



Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfil the warranty obligations.

- This unit must not be operating with removed covers or lids.
- Do not attempt to disassemble the unit.
- There are no user serviceable parts inside.
- Do not drop, knock or shake the unit, rough handling above the specification may cause damage to internal circuit boards.
- Do not use harsh chemicals, cleaning solvents or strong detergents to clean the unit.
- Do not paint the unit. Paint can clog the unit and prevent proper operation.
- Do not expose the unit to any kind of liquids (rain, beverages, etc). The unit is not waterproof. Keep the unit within the specified humidity levels.
- Do not use or store the unit in dusty, dirty areas, connectors as well as other mechanical part may be damaged.

If the unit is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo Tech support.

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