
Installation and Adjustment Instruction for BVT-225, BVR-225 & BVX-225

1 Introduction

The following units are covered in this manual:

- ◆ The boxed video transmitter BVT-225
- ◆ The boxed video receiver BVR-225
- ◆ The boxed video repeater BVX-225.

All three units are fully compatible with other Ernitec twisted pair video equipment. However, the specified transmission distance assumes the use of Series 225 equipment only.

1.1 Twisted Pair Video Transmitter BVT-225

The BVT-225 is a video transmitter for twisted pair cables housed in an IP 65 rated ABS-box. One unbalanced video output for 75 Ω coaxial cables are available; the output can be used simultaneously if the video needs to be supervised from a local monitor. This feature might eliminate the need for a video distribution amplifier.

The following settings are available: Selection of cable impedance, selection of output voltage on the unbalanced and the balanced video output. The transmitter output is galvanically separated from the twisted pair input in order to avoid ground loop problems.

The BVT-225 is mains supplied and is equipped with a mains change-over switch for selection between 230 VAC and 115 VAC mains voltage.

1.2 Twisted Pair Video Receiver BVR-225

The BVR-225 is a video receiver for twisted pair cables housed in an IP 65 rated ABS-box. Two unbalanced video outputs for 75 Ω coaxial cables are available; both outputs can be used simultaneously if the video needs to be supervised from two locations. This feature might eliminate the need for a video distribution amplifier.

The following settings are available: Selection of cable impedance, unbalanced video output, voltage adjustments and five different frequency adjustments.

The BVR-225 is mains supplied and is equipped with a mains change-over switch for selection between 230 VAC and 115 VAC mains voltage.

1.3 Twisted Pair Video Repeater BVX-225

The BVX-225 is a video repeater, i.e. a combined video transmitter and video receiver for twisted pair cables housed in an IP 65 rated ABS-box. On the receiver part of the BVX-225 two unbalanced video outputs for 75 Ω coaxial cables are available; both outputs can be used simultaneously. The transmitter output is galvanically separated from the twisted pair input in order to avoid ground loop problems.

The BVX-225 is mains supplied and is equipped with a mains change-over switch for selection between 230 VAC and 115 VAC mains voltage.

2 Installation

Coaxial- and twisted pair cables can be connected to and removed from the units, although mains voltage is connected.

Note: The stated approvals and specifications are valid only if the equipment is installed according to the instructions contained in this manual.

2.1 Box installation

Choose a plain surface to prevent the box from being twisted and thereby becoming leaky while mounted. When mounted out-door the box should be oriented with the cable glands pointing downwards.

Screws and wall plugs are supplied in the mounting kit. Drilling dimensions are shown on the figures at the end of this manual.

2.2 Mains installation

The BVT-225, BVR-225 and the BVX-225 can be supplied with either 115 VAC or 230 VAC mains voltage. The mains voltage is selected by the mains voltage change-over switch, refer to the figures. The connection of the mains cable is also shown on the figures.

Terminals marked with hazardous live symbol requires installation by an instructed person.

The BVT/R/X-225 must be used with a 3-wire mains connection (2W+PE @ min. 0,75mm²).

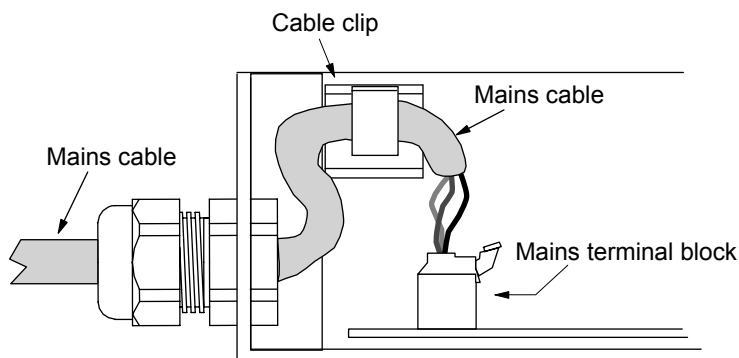
Details on the mains supply can also be found on a label fitted inside the lid of the BVT/R/X-225.

Terminals marked with hazardous live symbol requires installation by an instructed person.

If permanently connected to mains, a readily accessible disconnect device shall be incorporated in the building installation wiring.

If pluggable connection to mains, the socket-outlet shall be installed near the equipment and shall be easily accessible .

In order to fulfil the safety standard (IEC 60950), the mains cable must be routed via the provided cable clip inside the Series 225 box. Figure below shows how the mains cable should be routed.



Warning: Before connecting the unit to the mains outlet make sure that the mains voltage change-over switch is set for correct mains voltage in order to avoid damage on the equipment.

Warning: Make sure the equipment is earthed; otherwise the over voltage protection will not work! Although both the transmitter and the receiver are earthed no ground loop problems will occur due to the galvanic separation of the video signal introduced in the transmitter.

2.3 Video cable connections

Connect the cables exactly as shown on the figure. The unbalanced outputs on all three units can be used simultaneously.

Note: If any of the unbalanced outputs are unused make sure to leave the factory fitted termination load in position for optimum performance.

Warning: At the transmitter end do not in any way connect the twisted pair shield. If the shield is connected to the transmitter the galvanic separation will not work!

The shield should be connected at the receiver end only.

3 Adjustment

The best performance is obtained by connecting a greyscale/multiburst video generator to the video transmitter BVT 225 and oscilloscope and a monitor to the receiver or the receiver part of the BVX-225. On the receiver check that H1 line status indication (green LED) is flashing. The yellow LED H2 indicates power.

If a negative or turned over picture is displayed on the monitor, the twisted pair cable should be reversed at the receiver input terminal X1.

If the transmission line includes a BVX-225 repeater, the two twisted pair lines should be treated as two individual twisted pair lines - the only issue to be considered is the order in which the individual units are adjusted:

1. Video transmitter BVT-225.
2. Receiver part of BVX-225.
3. Transmitter part of BVX-225.
4. Video receiver BVR-225.

Several BVX-225 repeaters can be inserted in a line to extend the transmission distance further. However, a certain decrease of video quality must be expected.

3.1 Cable impedance settings

The cable impedance setting should be set in accordance with the characteristic impedance of the twisted pair cable used in order to avoid signal reflections (shadows in the picture).

Cable impedance BVT-225 & BVX-225 switch S1		Cable impedance BVR-225 & BVX-225 jumper W1	
Pos.	Description	Position	Description
H	124 Ω for 90-140 Ω cables	124 (pins 1-2)	124 Ω for 90-140 Ω cables
L	62 Ω for 50-70 Ω cables	62 (pins 2-3)	62 Ω for 50-70 Ω cables

3.2 Setting of unbalanced output voltage for BVT-225

It is possible to choose between two values for unbalanced output voltage:

**Unbalanced output voltage:
BVT-225: jumper W2**

Pos.	Pin no.	Output voltage	Cable length (approx.)*
1.0	1-2	1.0 Vpp linear	<150m
2.0	2-3	1.2 Vpp, +2 dB @ 5 MHz	<300m

***Note:** These settings are determined using the cable type: RG59

3.3 Initial setting for BVT-225 and BVX-225

Under normal circumstances the setting mentioned below only need to be set when the transmitter or the repeater is installed. However, if the cable quality is either very high or very low, or the cable distance is not exactly known it may be necessary to alter the transmitter settings at a later stage; i.e. if impossible to adjust the receiver to the required video quality.

**Balanced output voltage:
BVT-225: jumper W1 & BVX-225: jumper W2**

Pos.	Pin no.	Output voltage	Cable length (approx.)*
2.0	2 (or none)	2 Vpp linear	< 1500 meters
3.0	1-2	3 Vpp, +2 dB @ 5 MHz	< 2000 meters
4.0	2-3	4 Vpp, +4 dB @ 5 MHz	> 2000 meters

***Note:** These settings are determined using the cable type: Mödinger A-2Y(L)2Y / 2x2x0,6 mm.

3.4 Adjusting the BVR-225/receiver part of BVX-225

The adjustment procedures below should be considered as guidelines only - please note that the adjustments are not working fully independently, for example altering e.g. the RV2 will, to a certain extent, influence the frequency response adjusted by RV3 and RV4 etc. Consequently several readjustments of each adjustment might be necessary. Also note, that e.g. the RV3 is not a linear adjustment, meaning that at certain points the level will "jump" up to 15 dB.

Use the table below as a introduction to the individual adjustments.

BVR-225/receiver part of BVX-225 adjustments

Designator	Description	Adjustment order	Comments
RV1	Output gain conn. A & B	1'st	Adjust to 1 V pp output
RV2	Middle frequency	3'rd	
RV3	Low frequency	2'nd	Synchronisation pulse shape
RV4	Lower and middle frequency	Fine adjust	Needs to be adjusted only at cable lengths beyond 1000-1500 meters
RV5	Middle and high frequency	Fine adjust	Needs to be adjusted only at cable lengths beyond 1500 meters
RV6	High frequency	4'th	

3.4.1 Adjusting with cable lengths up to approx. 1000 meters

1. Turn all adjustments fully counter clockwise.
2. RV1: Adjust to 1 Vpp output (incl. sync. pulse) at connector A & B.
3. RV3: Adjust the shape of the synchronisation pulse.
4. RV2: Adjust the middle frequency part of the signal.
5. RV6: Adjust the high frequency part of the signal.
6. Fine tune using the adjustments mentioned above.

3.4.2 Adjusting with cable lengths beyond 1000 meters

1. Turn all adjustments fully counter clockwise.
2. RV1: Adjust to 1 Vpp output (incl. sync. pulse) at connector A & B.
3. RV3: Turn almost fully clockwise.
4. RV5: Turn fully clockwise.
5. RV6: Turn 3/4 clockwise.
6. RV2: Adjust to best overall signal response.
7. Fine tune using RV3, RV4, RV5 and RV6 in any combination and re-adjust RV1 to 1 Vpp.

Hint: The video signal measured at the receiver end of the twisted pair cable with the receiver connected should preferably be in the range of 0,7-1 Vpp in order to ease the adjustment.

4 Twisted pair cable specifications

The cables are an important part of an twisted pair installation and the overall performance and the transmission distance depends on the selected twisted pair cable. Please note, that twisted pair cable with stranded conductors are NOT suitable - *the conductors must be solid.*

Also note, that when shielded cables are used the transmission distance might be considerably lowered, due to the higher capacitance introduced by the shield - carefully study the specification on the actual cable and compare them with the table below. The choice between shielded and unshielded cable will always be a compromise between the obtainable transmission distance and immunity towards noise and crosstalk.

Description	Min.	Typ.	Max.	Unit
Solid conductors, diameter (Ø)	0,5	0,6-0,8	1	mm
Characteristic impedance @ <1 MHz	90	124	140	Ω
Capacitance			90	nF/km
Capacitance, unbalanced			800	pF/km
Inductance			0,7	mH/km
Isolation	500			MΩ
Loop resistance			130	Ω
Attenuation @ approx. 5 MHz			30-36	dB/km
Twists	5			pcs./m

Examon suitable cables:ples

- ◆ Mödinger A-2Y(L)2Y / 2x2x0,6 mm (2 pairs)
- ◆ Alcatel 6806 Ecomatch (4 pairs)

Note: When using cables including several pairs, not individually screened, it is, as a general rule, not recommended to use more than one pair per cable in order to avoid possible crosstalk phenomena.

Hint: Avoid locating unscreened twisted pair cables parallel to data cables carrying high speed data traffic, mains cables, or other cables with high energy and/or high frequency signals

5 EMC/EMI

All electronic equipment can emit, or be sensitive to, induced electromagnetic noise which can be conducted by the connected wires, or transmitted as electromagnetic fields.

Electromagnetic noise can cause malfunction or damage to the equipment.

The Series 225 fulfils the relevant EMC standard (refer to specifications) and is therefore CE labelled.

Note: The stated EMC- and safety approvals and other specifications are valid only if the equipment is installed according to the instructions contained in this manual.



HEAD OFFICE: ERNITEC A/S, HØRKÆR 24, P.O. BOX 720, DK-2730 HERLEV, DENMARK

TELEPHONE: +45 44 50 33 00, TELEFAX: +45 44 50 33 33

Homepage: <http://www.ernitec.dk>, E-MAIL: ernitec@ernitec.dk

UK OFFICE: ERNITEC UK, GERRARD HOUSE, WORTHING ROAD, EAST PRESTON, WEST SUSSEX BN16 1AW, ENGLAND

TELEPHONE: 01903 77 27 27, TELEFAX: 01903 77 27 07

E-MAIL: sally@ernitec-uk.co.uk

GERMAN OFFICE: ERNITEC GmbH., STORMARNRING 28, 22145 STAPELFELD, GERMANY

TELEPHONE: (040) 6756 25 0, TELEFAX: (040) 67 56 25 25

E-MAIL: ernitec@aol.com

FRENCH OFFICE: ERNITEC FRANCE, N° 29 PARC CLUB DU MILLENAIRE, 1025 RUE HENRI BECQUEREL, 34036 MONTPELLIER CEDEX 1, FRANCE

TELEPHONE: (4) 67 15 10 15, TELEFAX: (4) 67 64 01 81

E-MAIL: ernitec@ernitec.fr

MIDDLE EAST OFFICE: ERNITEC ME, HAMRA-MAKDESI STR., YOUNIS CENTER-5th FLOOR, OFFICE NO. 503

P.O. BOX 113/5721, BEIRUT, LEBANON TELEPHONE: +961 1 751 796, TELEFAX: +961 1 751 795

Homepage: <http://www.ernitecme.com>, E-MAIL: malek_kabrit@ernitecme.com

6 Specifications

BVT-225		Min.	Typ.	Max.	Unit	Comments
Unbalanced video input X1	Voltage		1	1,5	Vpp	Unbalanced 75 Ω
	Galvanic separation	By optocoupler				
Unbalanced video output X2:	Voltage	1		1,2	Vpp	Unbalanced 75 Ω
	Frequency response	20		8 M	Hz	@ -1 dB
	Equalisation			2	dB	@ 5 MHz
	Signal/noise ratio	48			dB	Unweighted
	CMMR	36			dB	
BVT-225 video transmitter / BVX-225 (transmitter part)						
Balanced video output BVT-225: X3 BVX-225: X4	Voltage	2		4	Vpp	Balanced 124/62 Ω
	Frequency response	20		15 M	Hz	@ -1 dB
	Equalisation	0	2	4	dB	@ 5 MHz
	Signal/noise ratio	50	56		dB	Unweighted
	CMMR	36			dB	
BVR-225 video receiver / BVX-225 (receiver part)						
Balanced video input X1	Voltage			2	Vpp	Balanced 124/62 Ω
	Distance, colour and B/W with Series 225	2000			m	@Mödingen A-2Y(L)2Y cable used.
	Equalisation	0		>60	dB	@ 5MHz
Unbalanced video output X2/X3	Voltage, adjustable	0,7	1	1,5	Vpp	Unbalanced 75 Ω
	Frequency response	20		15 M	Hz	@ ±1,5 dB
	Signal/noise ratio	56			dB	Unweighted
	CMMR	60			dB	@ 20 Hz-10 MHz
BVT-225, BVR-225 and BVX-225						
Power supply	Input 230 V position	207	230	253	VAC	@ 45-60 Hz
	Input 115 V position	104	115	126	VAC	@ 45-60 Hz
	Power consumption	BVT-225: 30 / 60	BVR-225: 45 / 90	BVX-225: 55 / 110	mA	@ 230/115 VAC
Environment	Temperature	- 25		55	°C	
	Humidity			85	%	@ 86-106 KPa
Enclosure (ABS-box)	Dimensions, L x W x H	250	160	90	mm	excl. cable glands
	Weight		1,2		kg	
	Protection	IP 65				
	Cable glands	1xPG13,5 + 2xPG11 + 2xPG9 + 3xPG7				
Approvals	EMC/EMI	EN 50081-1 ^{*1} , EN 50082-2 ^{*2}			Also tested to EN 50130-4	
	Safety	IEC 60950, EN 60742				

*1: Radiated electromagnetic fields: Field strength is limited to 5 V/m with modulation, unshielded cable used.

*2: Conducted disturbances: Voltage is limited to 130 dB μ V with modulation, unshielded cable used.