# BLANKOM®

**Professional Headend Solutions**

# Operating instructions

## RF Converter
TV RF → TV RF

## Contents

**》》 RCB 199**
**Part N°: 9259.01**

...Setting Signals

## 1. Safety and operating instructions

**STOP** When assembling, starting-up and adjusting the modules, it is necessary to consider the system specific references in the manual instruction!

⚠ The modules may only be installed and started up by authorized technical personnel!

⚠ When assembling the modules into the receiving points, the adherence of the EMC regulations is to be secured!

⚠ The assembly and wiring have to be done without voltage!

⚠ All active modules may only be operated with the Headend Controller HCB x00 or Bus Extender BEB x00!

⚠ The main voltage and the operating voltage of the modules working by DC have to be in complience to the operating parameters described in the technical data.

⚠ With all work the defaults of the DIN EN 50083 have to be considered! Especially the safety relevant execution of the DIN EN 60728-11[2] is necessary!

## 2. Device variants

RCB 199        9259.01        TV-RF → TV-RF

**Mininum software requirements for HCB x00:**

9650.03:        version 2.34[*]
9650.04/.05:   version 3.25[*]
9652.01:        version 3.25[*]
9653.01:        version 3.27[*]

*) Updates: www.blankom.de

## 3. General

The RF Converter RCB 199 is a module of the head end system B-LINE wich is conceived as a complete system for middle-sized networks. The module converts digital and analogue terrestrial TV signals in cable channels. The frequency conversion of a QAM signal is possible too.
All modules will be programmed via a central control unit (HCB x00) and are working fully independent afterwards. The status of the modules are displayed via LED's (see chapter 7 "Meaning of status LED`s on front panel").

## 4. Front view

**RF CONVERTER**
TV-RF � TV-RF
Type: **RCB 199**   Part No.: **9259.01**

| | | |
|---|---|---|
| TV-IF IN | 45...862 | MHz |
| INPUT LEVEL | 40...106 | dBµV |
| TV-RF OUT | 45...862 | MHz |
| OUTPUT LEVEL | max. 116 | dBµV |
| SUPPLY CURRENT | 0.8 | A |

gile

— TV RF input

— Operating voltage/ control bus

— LED „STANDBY" (red)
— LED „READY 2" (green)
— LED „ADDR." (yellow)

— Address selector

— TV RF output
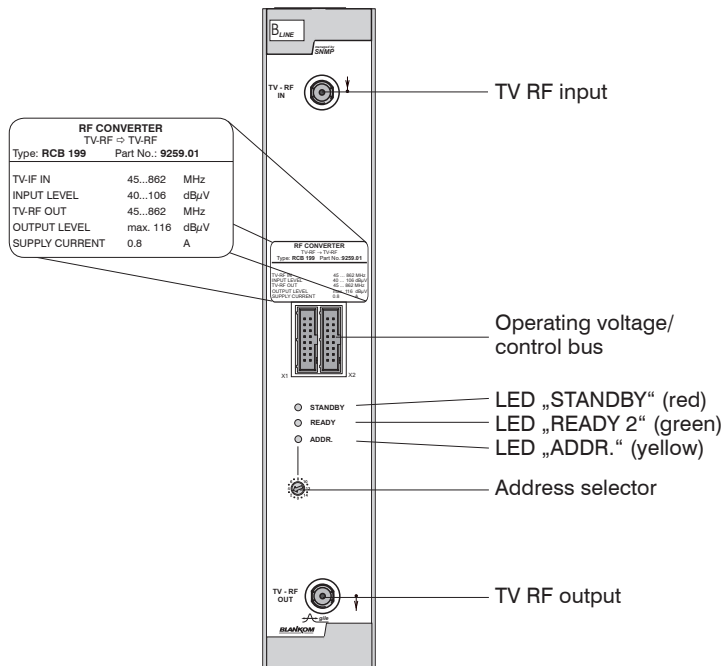
*managed by*
**SNMP**

## 5. Functional description

### 5.1 General

The RF Converter contains a low noise and large signal stable broadband receiver for terrestrial digital and analogue signals of the frequency range 45 ... 862 MHz and a output converter for cable channel in the same frequency range. The functions of the module are the gain, selection, shift of the frequency position and level assimilations of a TV signal delivered from a receiving antenna to process it for feed into a cable channel. The input signal won't be demodulated, the modulation type and the spectral position will remain unchanged.

The signal processing is made via 4 sequencing mixers (quad-converter) with 3 fractional N-PLL's and 3 IF locations to realize the required broadband tunability at the in- and output. The first and the third IF are located above the input respective output ranges, the second is located in a lower frequency range around 36 MHz. The second and the third mixer are supplied by a common mixer oscillator,  own synthesizers are assigned to the first and forth mixer in the frequency-converting operation mode. This both mixers are supplied by a common VCO in the co-channel operation mode. In the last-mentioned operation mode this configuration minimizes the total phase noise of the converter and generates favourable phase-locked relation between input and output signal.

The high linear SiGe mixers respective amplifier stages and low noise synthesizers ensure a low noise transmission quality. Total 6 SAW filters provide outstanding image rejection ratio and adjacent-channel selection values. By a switchable input filter bank, consisting of eight band filters, a high immuniy against disturbing signals at the input of the receiver is ensured. A controller-supported AGC function in the lower IF range together with each one digital attenuator at input and output is the basis of a large level dynamic and ensures the optimal IF level within the module for analogue and digital types of modulation.

### 5.2 Explanations of the adjustments

#### Input and output frequencies

The input and display values of the input respective output frequencies are related to center frequencies of the channels (digital types of modulation) respective vision carrier (analogue types of modulation).

The entering and receivable input frequency isn't tied to a special radio-frequency pattern, but the output frequency can be adjusted only in a defined gridded frequency spacing respective to the input frequency. This frequency step is 0.5 MHz to get high signal-to-noise ratio and phase-noise ratio. When located on the user interface output frequency is entered outside of this grid, you'll see the differences. Because of the quad-converter concept the adjacent-channel selection is independent of it and follows by calculation the input of the input frequency with a maximum deviation of 12.5 kHz. So an exact input of the input frequency is important.

## Selection and adjacent channel operation

The primary use case of the RF converter is the input-processing of terrestrial TV signals, which are exempt limitations on their channel sufficiently, which in general is already through the planning of terrestrial broadcasting frequencies is given. Under these conditions, a low noise feed of the processed signal can be assured into a cable system with adjacent channel assignments in the output channel. The reception of input signals from a group of input channels, which abut without gaps at the channel entrance, is always associated with limitations. Due to the finite steepness of the filter slopes it's not technically possible to complete such an input signal from immediately adjacent neighboring signals, such as present in one with QAM signals occupied cable system, separate. In such a case is either the „inevitable co-implementation" of the remains of the input-adjacent channels into the output-adjacent channels, or the curtailment of the useful signal. On the other hand is , for example, the detachment and implementation of a single UHF TV signal possible from an occupied adjacent channel signals with frequency band, if the occupied bandwidth of the channel correspondingly is smaller than the channel spacing (e.g. analogue TV channels, standard G in an 8-MHz).

## Co-channel operation mode

The co-channel operation mode of input and output is possible. Between input and output signals is realized in the mixed approach, a phase-locked relationship. The converter behaves like a highly amplifying therefore, regulated selective amplifier a constant signal period, which is formed approximately by the sum of times in the SAW filters. The phase-locked behavior is advantageous regarding noise ratios that are caused by coupling of input and output radiation of the cable network to the receiving antenna, and by directly radiation the terrestrial signal in the cable and into the connected receiver. Because of this inevitable jamming scenarios with their impact should not be ignored completely, however, the decision will always fall in favor of a frequency conversion, if there is a planning technical possibility. It should be noted that the assembly in the fully adjusted state a straight gain of more than 76 dB has the screening of components, cables, plug and terminal connections, however, of the same order of magnitude and therefore little or no reserves for adequate noise ratios exist could. Aging of the above parts on weather and level fluctuations are added .

## Input level

The received signal strength of terrestrial TV signal is subject to fluctuations. The basis for a stable output level of the assembly is formed by a digitally assisted AGC. The corresponding analog actuator is located in the second IF domain. This IF control is still in operation.

If it exceeds a certain input level can to prevent overloading the input stages of the receiver, a digital, highly controllable input attenuator are included in the rule chain (delayed scheme). This has a scale of 1 dB and maximum attenuation value of 31 dB. The acquisition-based control points are of the type of modulation and also depends on one of two levels (low noise or low distortion), which can be chosen depending on the disturb conditions at the input. The existence and the magnitude of interference signals are not covered by the automatic, however. It evaluates the useful level in the receiving channel (narrowband system). The inevitable disruptions in the full automatic mode by the amplitude of the jumps in the input attenuation switch are minimized by a hysteresis point of the takeover of approximately 3 dB, and the consequent reduction in the number of starts reached .

To avoid such problems and to complete manual optimization of the modulation of the input section taking into account specifical disturb conditions at the receiver can adjust the input attenuator to a fixed value is selected by the user. For its optimization the assessment and evaluation of the input conditions and the signal to noise ratio at the output of the converter with the aid of a suitable measuring device are advantageous. In addition, the current level at the input of the internal preamplifier can be read (after the input attenuator) approximately on the user interface. This display must be updated. Optimum values for the input level with respect to the signal to noise ratio at the output should be in the respective magnitude of the rule transfer points (see technical data) to. Are the available antenna levels smaller, the input attenuator is set to 0 dB. Since this attenuator is located at the input of the module, the module increases the noise figure at low input levels to the respective amount of input attenuation. Future weather-related fluctuations in the input level are possible. When manually setting the input attenuation reduces the control dynamics on the extent of the IF AGC.

## 6. Adjustments

For the adjustments of the module the manual instructions of the Headend Controller HCB x00 and the Bus Extender BEB x00 have to be considered.

### 6.1 Adjustment with the Headend Controller

· Adjustment of the addresses at the Bus Extender BEB x00 and at the modules
· Activation of the programming mode on each module by selecting the line (BEB x00) and the module position (01... 15) at the Headend Controller(HCB x00)
 → yellow LED illuminates until the beginning of the parameter adjustment
· Adjustment of the RCB 199 parameters (see chapter 9) → green LED is switched on
· After the programming the RCB 199 will be automatically switched into the operating mode
 → yellow LED flashes shortly/ green LED is switched on

### 6.2 Adjustment with the PC/ laptop

· Prerequisite for the remote programming is an "online-connection" according the IP standard and an ethernet connection at the PC/ laptop
· Adjustment of the line/ position addresses at the Bus Extender BEB x00 as well as at the modules
· At the Headend Controller HCB x00 input IP address (e.g. 192.168.001.001)
· For "direct connection" between a PC and HCB x00 use crossover cable (RJ 45)
· For connection over a HUB use a normal straight throught patch cable
· Start-up HTML browser and put in IP address as target address
· If connected correctly the web interface will be opened on the pc and a blue LED (LINK) at the HCB x00 will be lit up.
· All adjustments of the modules are specified on the web interface.

### 6.3 Adjustment with SNMP

· Prerequisite for the SNMP functionality is the use of HCB x00 with enabled SNMP software option CKB 100.
· Supported is SNMP version 1.0 [3].
· Automatic creation of the MIB based on the current head-end configuration by the HCB x00.
· For setting and reading out the parameters and is to receive traps from an SNMP management software required.
· Further Notes on the SNMP functionality of BLANKOM modules are listed in the SNMP manual.

## 7. Meaning of status LED`s on front panel

| Designation (Colour) | Status | Meaning of display |
|---|---|---|
| STANDBY (red) | permanently on | Module is in standby |
| | flashing | Module faulty (hardware error detected or output level faulty) |
| READY (green) | permanently on | Module working properlyi |
| | flashing | Error warnings, depending on signal:<br>- Input level is outside the control range<br> (only if the level monitoring = ON) |
| ADDR. (yellow) | illuminated/ flashing | remote control connection/ data being exchanged |

## 8. Programming by web server*

### 8.1 Main menu

**RF CONVERTER, RCB 199**
(9259.01/ 00), Address 00 / 01

| Description | Test analog TV |
|---|---|

Name of device, item number, address in head end

**Description**     Name of programme (max. 30 characters)

**Input**

| Frequency | 23 (487,250 MHz) | [B/G] |
|---|---|---|
| Attenuation | 0 | dB |
| Attenuator automatic | Low noise | |

**Input**
Frequency                    channel selection
  standard B/G              channel 2..69
  standard D/K              channel R1.. 69
Attenuation                  is influenced by control; only adjustable, if automatic is setting "Off"
Attenuator automatic   displays settings according menu 1

**Output**

| Frequency | 25 (503,250 MHz) | [B/G] |
|---|---|---|
| Attenuation | 10 | dB |
| RF signal | On | |

**Outpur**
Frequency                    channel selection
  standard B/G              channel 2..69
  standard D/K              channel R1.. 69
Attenuation                  adjustment range: 0..31.5 dB
RF signal                     selection: On/ Off

**Channel**

| Band width | 8 | MHz |
|---|---|---|

**Channel**
Band width                  selection: 7/ 8 MHz

**Module settings**

| Operating status | On | [On] |
|---|---|---|
| Send trap | On | |
| Level monitoring | On | |
| Default set | Load | |

**Module settings**
Operating status          selection: On/ Off/ Reset
Send trap                    On/ Off, if SNMP option in HCB x00 is enabled, otherwise "locked" is displayed
Level monitoring           at output port. selection: On/ Off
Default set                   see menu 2

|  |  |
|---|---|
| | Advanced settings | Status |
| | Software overview |
| Update | Clear | Transmit |
| <<<< | Back | >>>> |

Routing to the appropriate adjustment menu:
Advanced settings       see menu 1
Status                         see menu 4
Software overview        see menu 3

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* For further details see the HCB manual

## 8.2 Extended settings (menu 1)

**RF CONVERTER, RCB 199**
(9259.01/ 00), Address 00 / 01

**Input**

| Frequency | 487250 | kHz |
|---|---|---|
| Attenuator automatic (see user manual) | Low noise | |

**Output**

| Frequency | 503250 | kHz |
|---|---|---|

**Input + Output**

| Frequency table TV Standard | B/G | |
|---|---|---|
| Carrier | analogue | |

Back  Transmit

Name of device, item number, address in head end

**Input**
Frequency                adjustment range: 45000 ... 862000 kHz*
Attenuator automatic   selection: Off/ Low noise/ Low distortion

**Output**
Frequency                adjustment range: 45000 ... 862000 kHz*

**Input + Output**
Frequency table TV
  Standard              selection: B/G, D/K
  Carrier               selection: analogue/ DVB-T/ DVB-C

\* Enter the vision carrier or the carrier frequency in analogue, center frequency for a digital carrier

## 8.3 Factory settings (menu 2)

**Windows Internet Explorer**

? Are you sure to load factory settings?

OK    Abbrechen

When this menu item is requested, at first a security query whether it really set all parameters to the factory default settings pops up.

**Default values are set.**
**Please wait...**
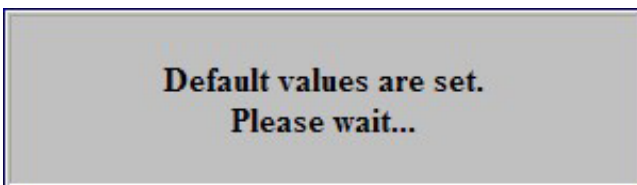
Affirming the query, all settings stored in the EEPROM will be deleted and replaced by the default settings. The module will go back to these default values, which are listed in chapter 9 (Manual menu control at the Headend Controller).
Once the setting process is over, there will be an automatic return to the main menu. It takes about one minute.

## 8.4 Software overview (menu 3)

**RF CONVERTER, RCB 199**
(9259.01/ 00), Address 00 / 01

**Versions**

| AP Controller | 9259.01-81.01 AP-Controller V1.00 24.03.2010 RN |
|---|---|
| Internal controller | 9259.01-88.01 internal Controller V1.00 25.03.2010 RN,JH |

Back

Name of device, item number, address in head end

**Versions**
Displays the software versions for the controllers as follows:
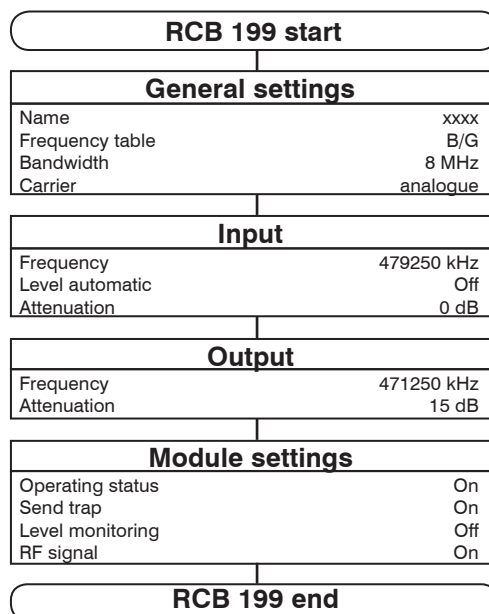
- Controller of terminals board

- Internal controller

## 8.5 Status of the device (menu 4)

| RF CONVERTER, RCB 199 (9259.01/ 00), Address 00 / 01 | | | Name of device, item number, address in head endT |
|---|---|---|---|
| **Signal** | OK | | **Signal** — displays ok/ not ok |
| **Status input** | | | **Status input** |
| Status AGC | 55 | % | Status AGC — displays the carrier in AGC range (0% respective 100% edge location, 50% mid range) |
| Attenuation | 0 | dB | Attenuation — displays in dB |
| Mixer level (see user manual) | 57 | dBµV | Mixer level — displays in dBµV |
| **Status output** | | | **Status output** |
| Signal level | 105 | dBµV | Signal level — displays in dBµV |
| **Information** | | | **Information** |
| System | ok | | System — operating status of module |
| Temperature external | 100 | °F | Temperature external — temperature terminal board |
| Internal temperature | 102 | °F | Internal temperature — internal temperature of the module |
| Serial number | 0000000 | | Serial number — display of the device number |
| Device index | 00 | | Device index — display of the device index (hardware) |
| | Update | Back | |

# 9. Manual menu control at the Headend Controller (HCB x00)

The values in the blocks settings are the default values. After pushing the button "default" settings on the main page, all settings stored in the EEPROM are erased and reset to default values. The device is set to these values again (see also chapter 8.3).

**RCB 199 start**

**General settings**

| Name | xxxx |
|---|---|
| Frequency table | B/G |
| Bandwidth | 8 MHz |
| Carrier | analogue |

**Input**

| Frequency | 479250 kHz |
|---|---|
| Level automatic | Off |
| Attenuation | 0 dB |

**Output**

| Frequency | 471250 kHz |
|---|---|
| Attenuation | 15 dB |

**Module settings**

| Operating status | On |
|---|---|
| Send trap | On |
| Level monitoring | Off |
| RF signal | On |

**RCB 199 end**

## 10. Trap messages

| Item | Message | Type | Explanation |
|------|---------|------|-------------|
| 01 | Signal ok | INFORMATION | Signal ok |
| 02 | Signal not ok | WARNING | Signal not ok (input level faulty) |
| 03 | Hardware Error | CRITICAL | Hardware error detected |
| 04 | System reset | WARNING | Reset |
| 05 | Internal temperature to high | WARNING | Internal temperature is too big (> 85°C), module is switched off |
| 06 | External temperature ok | INFORMATION | Ambient temperature is ok (≤ 60°C), module is switched on |
| 07 | Output level error | WARNING | Output level faultyt |
| 08 | Output level ok | INFORMATION | Output level ok |

## 11. Block diagram
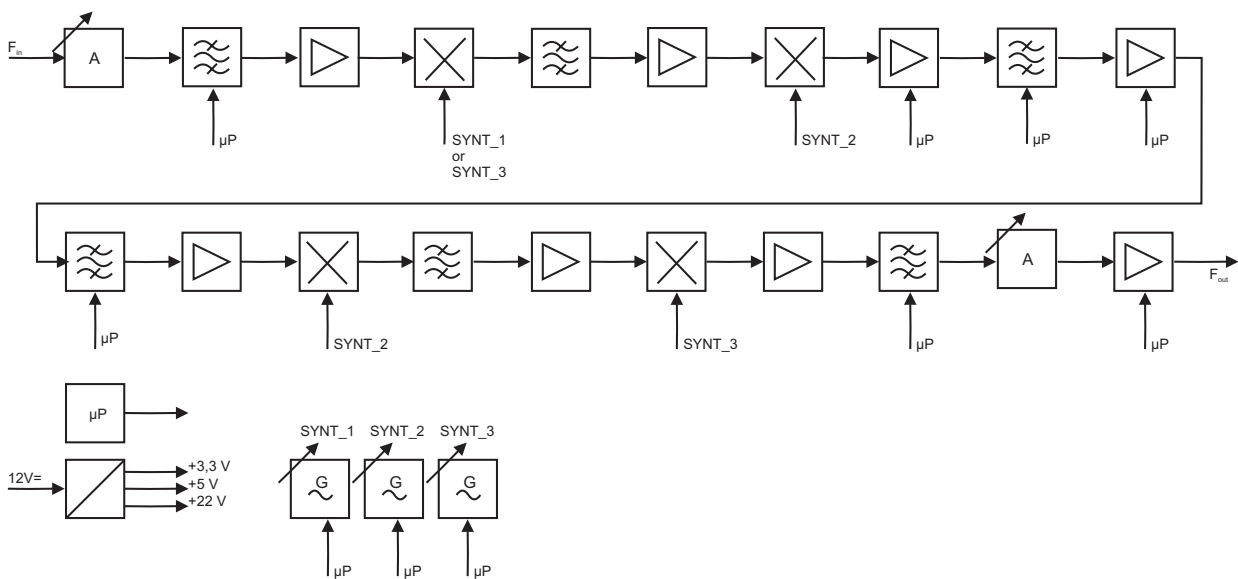
## 12. Head end bus structure

HCB x00

BEB x00 ADDR. 01

Module ADDR. 01 — Module ADDR. 15

BEB x00 ADDR. 02

Module ADDR. 01 — Module ADDR. 15

BEB x00 ADDR. 15

Module ADDR. 01 — Module ADDR. 15

**HCB x00**
Headend Controller

**BEB x00**
Bus Extender

**Modul**
signal processing unit
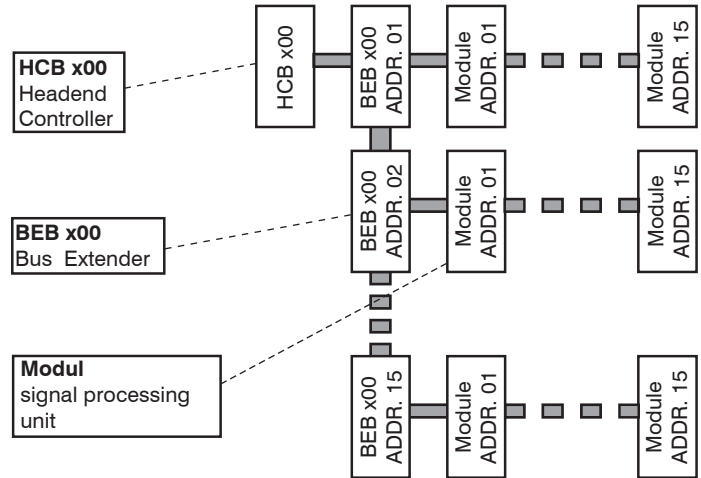
**The number of the possible module connections (00 ... 15) to a BEB x00 depends on the total power consumption of this line!**

## 13. Application example

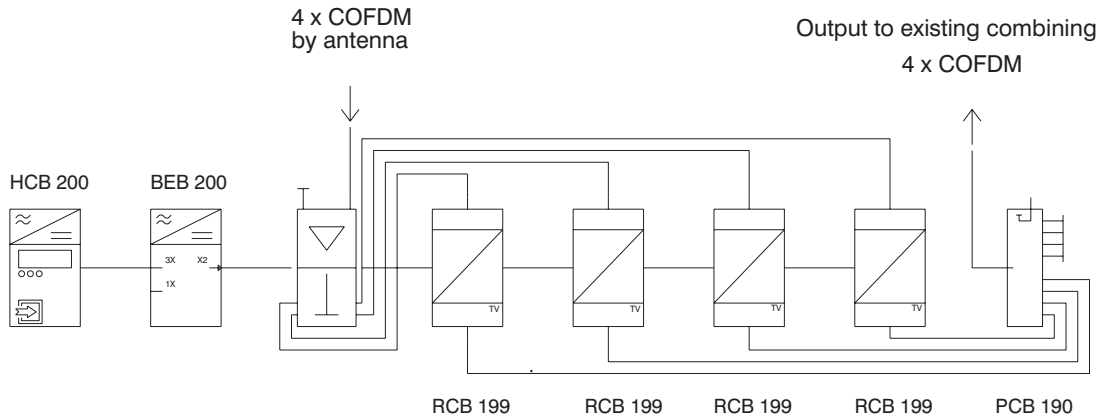### Integration in existing B-LINE configuration

Conversion of 4 COFDM (DVB-T-)
transponders to "own" cable-frequencies

4 x COFDM
by antenna

Output to existing combining

4 x COFDM

HCB 200    BEB 200

3X    X2

1X

RCB 199    RCB 199    RCB 199    RCB 199    PCB 190

## 14. Technical data

**RF input**

| | |
|---|---|
| Frequency range | 45 … 862 MHz |
| Resolution frequency input | 1 kHz |
| Nominal bandwidth (swichable) | 7 MHz/ 8 MHz |
| TV modulation types | AM, VSB 0.75 MHz, negative |
| | AM, VSB 0.75 MHz, positive |
| | (with white bar/ field) |
| | COFDM 2k, 8k |
| | QAM 16, 32, 64, 256 |
| Signal level total | typ. 40…106 dB$\mu$V |
| Attenuator adjustment range (switchable: automatic or fixed value) | 31 dB (1 dB steps) |
| Typically use point IF control (Input attenuator 0 dB) | typ. 40 dB$\mu$V |
| Rule scope IF control | > 45 dB |
| Normally use points input attenuator automatic | |
| AM VSB low noise | typ. 75 dB$\mu$V |
| AM VSB low distortion | typ. 69 dB$\mu$V |
| QAM low noise | typ. 67 dB$\mu$V |
| QAM low distortion | typ. 61 dB$\mu$V |
| COFDM low noise | typ. 64 dB$\mu$V |
| COFDM low distortion | typ. 58 dB$\mu$V |
| Nominal operating level for immunity according DIN EN 50083-2 (connection to a receiving antenna) [1] Mode | |
| AM VSB low distortion | 75 dB$\mu$V |
| COFDM low distortion | 70 dB$\mu$V |
| Nominal impedance | 75 $\Omega$ |
| Connector | F socket |
| Return loss (input attenuator $\geq$ 6 dB) | $\geq$18 dB @45 MHz, -1.5dB/Okt. |

**RF output**

| | |
|---|---|
| Frequency range | 45…862 MHz |
| Frequency step of output frequency (tied to the input frequency) | 0.5 MHz |
| | $\lvert (f_{in} - f_{out}) \rvert = n * 0.5$ MHz |
| | n...integer |
| Max. valid output level | |
| AM VSB | 116 dB$\mu$V |
| QAM | 116 dB$\mu$V |
| COFDM | 115 dB$\mu$V |
| Level adjustment range | 0…31.5 dB (0.5 dB steps) |
| Nominal impedance | 75 $\Omega$ |
| Connector | F socket |
| Return loss (output attenuator $\geq$ 3 dB) | $\geq$18 dB @45 MHz, -1.5dB/Okt. |

**Features of transmission**

| | |
|---|---|
| Noise figure (input attenuator 0 dB) | $\leq$ 10 dB |
| Selectivity | |
| Nominal bandwidth | 7 MHz: |
| Bandwidth 3 dB | typ. 6.7 MHz |
| Bandwidth 6 dB | typ. 7.0 MHz |
| Bandwidth 30 dB | typ. 8.0 MHz |
| Bandwidth 60 dB | typ. 8.5 MHz |
| Nominal bandwidth 8 MHz: | |
| Bandwidth 3 dB | typ. 7.7 MHz |
| Bandwidth 6 dB | typ. 8.0 MHz |
| Bandwidth 30 dB | typ. 8.9 MHz |
| Bandwidth 60 dB | typ. 9.4 MHz |

| | |
|---|---|
| additional amplitude response within channel | typ. 1.5 dB$_{pp}$ |
| Image rejection ratio 2.IF | |
| $f_{in\,center} + (2*36.15$ MHz$) \pm$ BW/2 | > 80 dB |
| IF puncture 1.IF | |
| (946.4 MHz $\pm$ BW/2) | > 70 dB |
| Frequency stability | $\pm$ 30 kHz |
| Phase noise (frequency conversion) | |
| 1 kHz | typ. -89 dBc/ Hz |
| 10 kHz | typ. -98 dBc/ Hz |
| 100 kHz | typ. -105 dBc/ Hz |
| Output level stability | max. 1 dB$_{pp}$ |
| Spurious 45…862 MHz | $\leq$ - 60 dB$_{pp}$ |
| Output signal-to-intermodulation ratio 3. order | |
| AM VSB: ($f_{image} - f_{audio}$) | $\geq$ 60 dB |
| C/N within channel (AM VSB, BW = 4.8 MHz) | |
| @ V$_{in}$ = 75 dB$\mu$V, input attenuator 0 dB | typ. 61 dB |
| Single channel signal-to-intermodulation ratio (AM VSB) | |
| @ V$_{in}$ = 75 dB$\mu$V, input attenuator 0 dB | $\geq$ 66 dB |
| MER (QAM) | |
| @ V$_{in}$ = 67 dB$\mu$V, input attenuator 0 dB | typ. 43 dB |
| MER (COFDM) | |
| @ V$_{in}$ = 64 dB$\mu$V, input attenuator 0 dB | typ. 35 dB |
| C/N from 16 MHz space to channel center (V$_{out}$ = 116 dB$\mu$V, BW = 4.8 MHz) | typ. 80 dB |

**Operation parameters**

| | |
|---|---|
| Voltage/ current | 12 V ($\pm$ 0.2 V)/ 0.8 A |
| Residual ripple of supply voltage | $\leq$ 10 mV$_{pp}$ |

**Enviromental conditions**

| | |
|---|---|
| Temperature range | -10 ... +55 °C |
| Temperature range for data keeping | 5 ... 45 °C |
| Relative humidity | $\leq$ 80 % ((non condensing) |
| Method of mounting | vertical |
| Location of mounting | splash-proof and drip-proof |

**Miscellaneous**

| | |
|---|---|
| Dimensions (l x w x h) | |
| without 19"-adapter | 50 x 276 x 148 mm |
| with 19"-adapter | 50 x 301 x 148 mm |
| Weight | 1,200 g |

**Delivery content**

1 x Bus connector

## 15. Glossary

| | |
|---|---|
| AGC | **A**utomatic **G**ain **C**ontrol |
| AP | **A**nschluss**pl**atte (Terminals board) |
| AM | **A**mplitude **m**odulation |
| CCIR | **C**omité **C**onsultatif **I**nternational des **R**adiocommunications |
| CATV | **Ca**ble **Tele**vision |
| COFDM | **C**oded **O**rthogonal **F**requency **D**ivision **M**ultiplex |
| DVB | **D**igital **V**ideo **B**roadcasting (-C Cable, -S Satellite, -S2 Satellite 2, -T Terrestrial) |
| EMC | **E**lektro**m**agnetic compatibility |
| ETSI | **E**uropean **T**elecommunications **S**tandards **I**nstitute |
| FPGA | **F**ield **P**rogrammable **G**ate **A**rray |
| HTML | **H**yper**t**ext **M**arkup **L**anguage |
| HTTP | **H**yper**t**ext **T**ransfer **P**rotocol |
| ID | **Id**entifier |
| IF | **I**ntermediate **F**requency |
| IIC | **I**nter-**I**ntegrated **C**ircuit |
| LED | **L**ight **E**mitting **D**iode |
| MC | **M**icro**c**ontroller |
| MIB | **M**anagement **I**nformation **B**ase |
| MPEG | **M**oving **P**icture **E**xperts **G**roup |
| PLL | **P**hase-**l**ocked **l**oop |
| QAM | **Q**uadrature **A**mplitude **M**odulation |
| RF | **R**adio **F**requency |
| SAW | **S**urface **a**coustic **w**ave |
| SiGe | **Si**licium-**Ge**rmanium- |
| SNMP | **S**imple **N**etwork **M**anagement **P**rotocol |
| SPI | **S**erial **P**eripheral **I**nterface |
| TV | **T**ele**v**ision |
| UHF | **U**ltra-**H**igh-**F**requency |
| VCO | **V**oltage **c**ontrolled **o**scillator |
| VHF | **V**ery **H**igh **F**requency |
| VSB | **V**estigial **S**ide**b**and |

## 16. Bibliography

[1] EN 50083-2 : Cabled distribution systems for television, sound and interactive multimedia signals, partl 2: Electromagnetic compatibility for equipment; German version EN 50083-2:2001

[2] EN 60728-11: Cable networks for television signals, sound signals and interactive services Part 11: Safety (IEC 60728-11:2005); German version EN 60728-11:2005

[3] RFC 1157 Request for Comments (RFC): RFC Database URL: http://www.rfc-editor.org/rfc.html

## 17. Document history

| Version | Date | Modification | Author |
|---|---|---|---|
| 1.00 | 23.02.2010 | Basic document | Häußer |
| 1.01 | 17.03.2010 | Revision | Häußer |

Options and other TV standards available upon request! Changes due to technical progress possible.

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# C€ Declaration of Conformity

**The Manufacturer**

BLANKOM Antennentechnik GmbH · Hermann-Petersilge-Str. 1 · 07422 Bad Blankenburg · Germany

**herewith declares the conformity of the product**

| | |
|---|---|
| **Product name:** | RF Converter |
| **Type:** | RCB 199 |
| **Product number:** | 9259.01 |

**according to the following regulations**

EN 50083-2
EN 60728-11 (as far as relevant)

**and additional device-specific regulations, enclosed above, which this product is subjected to.**

**Date:** 23.02.2010

**Signature:**

(Managing Director)