



## Redundant L-Band Block Converter Indoor

S-, C-, X-, Ku-, K- (DBS)-Band



1+1 Redundant Block Converter System (cover not shown)

WORK Microwave's 1+1 redundant block converter system combines a redundancy switching system and two block converters in one unit, increasing operators efficiencies and cost savings. By consolidating previously separate capabilities into a single, compact, 19" housing, the WORK Microwave system dramatically reduces power consumption, providing operators with an innovative approach to redundant block converter systems. The hot plugging capability of the slide-in converters allows changing the spare unit without any downtime. Ideal use cases include fixed satellite ground stations as well as in satellite newsgathering (SNG) vehicles, fly-aways and other mobile or portable applications.

The fifth-generation frequency converter series is built with the most advanced technologies available to ensure outstanding performance, high reliability and a longer lifetime.

### 5<sup>th</sup>-generation enhancements

**Reduced phase noise:** Based on a powerful new synthesizer the frequency converters achieve a phase noise significantly beyond the recommended industry specification (Intelsat's IESS-308/309).

**Improved flexibility and usability:** Through a new USB port, operators can now access the converter via the back panel to make copies of parameter settings, replicate selected configurations on another device, or save configuration settings for future reference. In addition, a user-friendly, Web-based interface offers an intuitive user experience. When coupled with the enhanced USB port, the customizable GUI also simplifies the installation of firmware updates.

**Higher reliability:** An AC power consumption of typically 45 VA / 30 W maximizes the reliability and lifetime of the system.

### High signal integrity

The very low phase noise of the oscillators guarantees an excellent signal quality. Low spurious emissions allow our customers to use the converters in the environments with demanding requirements, such as high power video uplinks. Sophisticated temperature compensation guarantees the stability over a wide temperature range.

### Housing

The redundant block converters normally are delivered without fans and can be operated in environments, where at minimum one RU space for natural ventilation is available above each unit. This eliminates the fan as a potential point of failure. For rack installations without any space in between the units, a fan within the converter unit is recommended. This forces airflow from the right side to left side of the units.

Each part of the systems can be operated separately via remote control by using TCP/IP over Ethernet. By using the serial interface (RS485) for remote control, all parts can be controlled via one interface. Detailed monitoring of the system status and a summary alarm output (dual change over switch contacts) are provided. For the remote control either ASCII string-based commands as well as addressable, packet-based commands are provided. Remote monitoring and control through SNMP and a Web browser interface is also available.

## Redundancy Switch System

The redundancy switch system includes a coaxial signal splitter for the input signal and a coaxial signal switch for the output signal. The system can operate in automatic mode, whereby an automatic switchover unit is performed upon detection of an alarm generated by the active unit. In addition, a manual switchover of the standby unit can be initiated.

## Redundant Power Supply

Each slide-in converter comes with a separate power supply, capable to supply the redundancy controller and the second converter to guarantee highest possible availability.

## Key features

- Previously three devices in one 19" housing
- Hot pluggable slide-in converters
- Redundant power supplies
- Low phase noise
- Adjustable attenuator (range: 0 ... 20 dB, 0.1 dB step size)
- Output power +10 dBm (1 dB compression point)
- Low spurious emissions
- Internal OCXO with long term stability  $10^{-7}$  / year
- External reference input 5 or 10 MHz
- Reference output 10 MHz

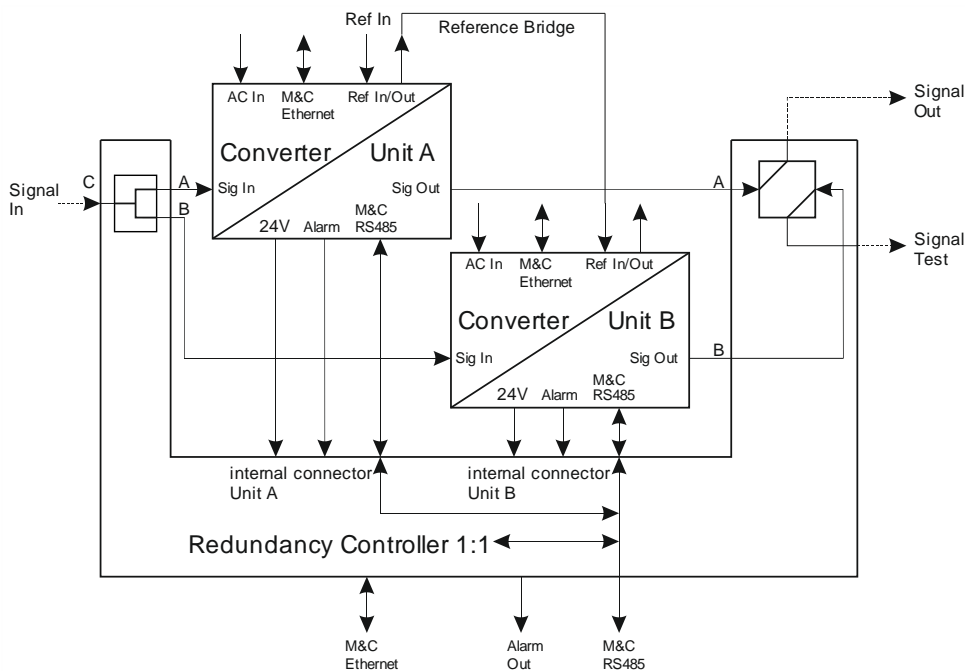
- Local control through push buttons on front panel
- Stored alarms with time stamps
- Remote controls through RS485 interface. Packet command syntax supports RS485 bus systems and allows addressed operation. TCP/IP over Ethernet, Web browser interface, SNMP with MIBs downloadable from the device
- Summary alarm output (DPDT)
- Low power consumption, typically 30 W
- CE compliant
- **3 years warranty**

## Orders information

WORK Microwave offers two series of 19" rack satellite converters, Standard and High Performance. The specifications are the same for both types except the operating temperature range. The High Performance type operates between -30 °C to 60 °C (-22 °F to 140 °F) and the Standard type between 0 °C to 50 °C (32 °F to 122 °F). Therefore if you only need units for inside use, the standard unit is perfectly suited for this application.

## Open questions, demo units

If you need more information about WORK Microwave's synthesized frequency block converters or if you would like to have demo unit, please contact us via e-mail: [sales@work-microwave.com](mailto:sales@work-microwave.com) or call us. We are glad to assist you.



Functional Block Diagram 1+1 Redundant Block Converter System

# Redundant L-Band Block Upconverter

Indoor

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These converter types are only a small selection of what is available. Please contact us for further frequency bands and features.

Upconverter Type:	VHBU- / VSBU-				
	C	C3	X	Ku1, Ku2, Ku3, Ku7	K2, K3, K4
RF-Output Frequency:	C-Band 5.85 ... 6.45 GHz	C-Band 6.45 ... 7.05 GHz	X-Band 7.90 ... 8.40 GHz	Ku-Band Ku1: 13.75 ... 14.50 GHz Ku2: 12.75 ... 13.75 GHz Ku3: 12.75 ... 13.50 GHz Ku7: 14.50 ... 14.80 GHz	K-Band K2: 17.6 ... 18.4 GHz K3: 17.3 ... 18.1 GHz K4: 17.3 ... 18.4 GHz
LO Frequency:	4.90 GHz	5.50 GHz	6.95 GHz	Ku1: 12.80 GHz Ku2: 11.80 GHz Ku3: 11.80 GHz Ku7: 13.40 GHz	K2: 16.35 GHz K3: 16.35 GHz K4: 16.35 GHz
Phase Noise:	<b>10 Hz</b> -70 / -60 <b>100 Hz</b> -90 / -80 <b>1 kHz</b> -100 / -90 <b>10 kHz</b> -105 / -95 <b>100 kHz</b> -110 / -100 <b>1 MHz</b> -133 / -123	-70 / -60 -90 / -80 -100 / -90 -105 / -95 -110 / -100 -133 / -123	-68 / -58 -88 / -78 -98 / -88 -103 / -93 -106 / -96 -130 / -120	-65 / -55 <sup>1)</sup> -65 / -55 <sup>2)</sup> -85 / -75 <sup>1)</sup> -85 / -75 <sup>2)</sup> -95 / -85 <sup>1)</sup> -95 / -85 <sup>2)</sup> -100 / -90 <sup>1)</sup> -100 / -93 <sup>2)</sup> -103 / -93 <sup>1)</sup> -123 / -113 <sup>2)</sup> -127 / -117 <sup>1)</sup> -140 / -130 <sup>2)</sup>	-60 / -50 -80 / -70 -90 / -80 -97 / -87 -117 / -107 -135 / -125
	typ. / max. values in dBc/Hz <sup>1)</sup> standard values <sup>2)</sup> values with low phase noise option LPN				
IF-Input Frequency:	950 ... 1550 MHz	950 ... 1550 MHz	950 ... 1450 MHz	Ku1: 950 ... 1700 MHz Ku2: 950 ... 1950 MHz Ku3: 950 ... 1700 MHz Ku7: 1100 ... 1400 MHz	K2: 1250 ... 1750 MHz K3: 950 ... 1750 MHz K4: 950 ... 2050 MHz
Conversion Scheme:	Block up conversion, no frequency inversion				
IF-Input Characteristics:	Impedance: 50 Ω Return loss: > 18 dB Maximum aggregate input level: 0 dBm (damage Level) Connector: SMA female (standard)				
RF-Output Characteristics:	Impedance: 50 Ω Return loss: > 18 dB 1 dB compression point: > 10 dBm <sup>1)</sup> Output muting: > 75 dB (by command or sense input or by alarm condition) Connectors: SMA female (standard) K female (2.92 mm) (f > 18 GHz)				
Transfer Characteristics:	Max. conversion gain: 35 dB ±1 dB Attenuation range: 0 ... 20 dB, 0.1 dB steps Gain variation over temp.: ±0.5 dB max. Gain flatness over freq.: ±1.0 dB max. over band Gain flatness over 40 MHz: ±0.5 dB Image rejection: > 80 dB Noise figure: < 11 dB <sup>1)</sup>				
Group Delay:	Ripple, Slope: < 1 ns peak to peak / 80 MHz				
Spurious Outputs:	Signal related: < -65 dBc <sup>1) 2)</sup> Output harmonics: < -40 dBc <sup>1) 2)</sup> Signal independent: < -85 dBm				
Output Intercept Point 3 <sup>rd</sup> Order:	OIP3: > 20 dBm <sup>1)</sup>				
Internal Frequency Stability:	±1 x 10 <sup>-7</sup> , -30 °C ... 60 °C ±1 x 10 <sup>-8</sup> , -30 °C ... 60 °C (after 30 min warm up) ±1 x 10 <sup>-9</sup> per day (fixed temperature after 24 h warm up)				

<sup>1)</sup> at max. conversion gain

<sup>2)</sup> P<sub>out</sub> = 0 dBm

Specifications are subject to change

# Redundant L-Band Block Downconverter

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Downconverter Type:	VHBD- / VSBD-				
	C	X	Ku1, Ku2, Ku3		
<b>RF-Input Frequency:</b>	C-Band 3.4 ... 4.2 GHz	X-Band 7.25 ... 7.75 GHz	Ku-Band Ku1: 10.95 ... 11.70 GHz Ku2: 10.70 ... 11.70 GHz Ku3: 11.70 ... 12.75 GHz		
<b>LO Frequency:</b>	5.15 GHz	6.30 GHz	Ku1: 10.00 GHz Ku2: 9.75 GHz Ku3: 10.75 GHz		
<b>Phase Noise:</b>					
	<b>10 Hz</b>	-70 / -60	-68 / -58	-65 / -55 <sup>1)</sup>	-65 / -55 <sup>2)</sup>
	<b>100 Hz</b>	-90 / -80	-88 / -78	-85 / -75 <sup>1)</sup>	-85 / -75 <sup>2)</sup>
	<b>1 kHz</b>	-100 / -90	-98 / -88	-95 / -85 <sup>1)</sup>	-95 / -85 <sup>2)</sup>
	<b>10 kHz</b>	-105 / -95	-103 / -93	-100 / -90 <sup>1)</sup>	-100 / -93 <sup>2)</sup>
	<b>100 kHz</b>	-110 / -100	-106 / -96	-103 / -93 <sup>1)</sup>	-123 / -113 <sup>2)</sup>
	<b>1 MHz</b>	-133 / -123	-130 / -120	-127 / -117 <sup>1)</sup>	-140 / -130 <sup>2)</sup>
	typ. / max. values in dBc/Hz <sup>1)</sup> standard values <sup>2)</sup> values with low phase noise option LPN				
<b>IF-Output Frequency:</b>	950 ... 1750 MHz	950 ... 1450 MHz	Ku1: 950 ... 1700 MHz Ku2: 950 ... 1950 MHz Ku3: 950 ... 2000 MHz		
<b>Conversion Scheme:</b>	frequency inversion	no frequency inversion			
<b>RF-Input Characteristics:</b>	Impedance: 50 Ω		Return loss: > 18 dB		
	Maximum aggregate input level: 0 dBm (damage level)		LO leakage: < -80 dBm		
	RF-connector: SMA female (standard)		K female (2.92 mm) (f > 18 GHz)		
<b>IF-Output Characteristics:</b>	Impedance: 50 Ω		Return Loss: > 18 dB		
	1 dB Compression Point: > 17 dBm <sup>1)</sup>		IF-Connectors: SMA female		
<b>Transfer Characteristics:</b>	Max. conversion gain: 35 dB ±1 dB		Attenuation range: 0 ... 20 dB, 0.1 dB steps		
	Gain Variation over Temp.: ±0.5 dB		Gain Flatness over Freq.: ±1.0 dB max. over band		
	Image Rejection: > 80 dB		Noise Figure: < 11 dB <sup>1)</sup>		
<b>Group Delay:</b>	Ripple, Slope: < 1 ns peak to peak / 80 MHz				
<b>Spurious Outputs:</b>	Signal related: < -65 dBc <sup>1)2)</sup>		Output harmonics: < -40 dBc <sup>1)2)</sup>		
	Signal independent: < -75 dBm				
<b>Output Intercept Point 3<sup>rd</sup> Order:</b>	OIP3: > 30 dBm <sup>1)</sup>				
<b>Internal frequency Stability:</b>	±1 x 10 <sup>-7</sup> , -30 °C ... 60 °C		±1 x 10 <sup>-8</sup> , -30 °C ... 60 °C (after 30 min warm up)		
	±1 x 10 <sup>-9</sup> per day (fixed temperature after 24 h warm up)				

<sup>1)</sup> at max. conversion gain

<sup>2)</sup> Pout = 0 dBm

Specifications are subject to change

These converter types are only a small selection of what is available. Please contact us for further frequency bands and features.

# Redundant L-Band Block Converter

Indoor

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## General Information:

<b>Slide-in Block Converters:</b>	
<b>Reference Input:</b>	Frequency: 5 or 10 MHz sine wave Level: 5 dBm ±5 dB Modes: auto/extern/intern Connector: SMA female
<b>Reference Output:</b>	Frequency: 10 MHz Level: 0 dBm ±3 dB Connector: SMA female
<b>Monitoring and Control Interface:</b>	Protocol: SNMP Connection: UDP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
	Protocol: HTTP (web browser interface) Connection: TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
	Protocol: Multipoint packet format commands Connection: TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
	Protocol: Multipoint packet format commands Connection: TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
<b>Mains Power Input:</b>	100 ... 240 V AC nominal, 90 ... 264 V AC max., 50 ... 60 Hz
<b>Mains Power Consumption:</b>	Max.: 30 VA / 20 W, Typ.: 25 VA / 15 W
<b>Mains Power Input Connector:</b>	IEC C14
<b>Mains Fuse:</b>	2 x 2 A time-lag fuse
<b>Dimension and Weight:</b>	134 x 36 x 416 mm <sup>3</sup> (WxHxD), approx. 1.8 kg
<b>Redundancy Controller:</b>	
<b>Switching:</b>	Manual or Automatic
<b>Switching Time:</b>	< 100 ms
<b>Monitoring and Control Interface:</b>	Protocol: SNMP Connection: UDP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
	Protocol: HTTP (web browser interface) Connection: TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
	Protocol: Multipoint packet format commands Connection: RS422/RS485, connector DSUB09 female or
	Protocol: Multipoint packet format commands Connection: TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
<b>Summary Alarm Interface:</b>	Two potential free contacts (DPDT), connector DSUB09 female
<b>Configuration:</b>	16 DIP switches on rear side
<b>Signal Splitter:</b>	Frequency range: 1 ... 18 GHz
	Connectors: SMA female
	Return loss: > 14 dB
	Attenuation: 1.2 dB max. above 3 dB
<b>Signal Switch:</b>	Transfer Relay
	Frequency Range: 0 ... 18 GHz
	Connectors: SMA female
	Return loss: > 15 dB Attenuation: 0.5 dB max.
<b>Housing:</b>	
<b>User Interface:</b>	10 LEDs, 4 Function Keys
<b>Temperature Range:</b>	Standard performance: 0 °C ... 50 °C operating, -30 °C ... 80 °C storage High performance: -30 °C ... 60 °C operating (10 minutes warm up at -30 °C)
<b>Relative Humidity:</b>	< 95 % non condensing
<b>Dimension and Weight:</b>	483 x 44 x 460 mm <sup>3</sup> (WxHxD), 1 RU (19"), approx. 8.0 kg with two slide in converters