

Dual Channel, Shared Oscillator Downconverter

Indoor / Outdoor

S-, C-, X-, Ku-, K (DBS)-, Ka-, and Q-band
Triple-channel converters also available



All of WORK Microwave's satellite down converters meet the demanding requirements of modern satellite transmission applications. Customers worldwide appreciate their reliability and high level of quality. The dual-channel, shared oscillator converters can be used in systems where an accurate phase relationship is required between two converter channels, as is the case for monopulse tracking system down conversion.

Operating and control

The converters can be operated via the push buttons on the front panel using self-explanatory display menus or via remote control (RS232, RS422/485, TCP/IP over Ethernet).

Detailed monitoring of the system status and a summary alarm output (dual change over switch contacts) are provided. For the remote control ASCII string-based commands as well as addressable, packet-based commands are provided.

Housing options

The 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. Outdoor versions with IP 67 degree of protection are also available.

Key features

- Shared oscillator to guarantee excellent phase tracking in between channels
- 70 MHz or 140 MHz IF bands available
- Low power consumption
- Extreme low phase noise (< -60 dBc/Hz @ 10 Hz)
- Long- term stability 10^{-7} / year
- Output power +10 dBm (1 dB compression point)
- Automatic reference recognition (5 and 10 MHz)
- 0 °C to 50 °C (32 °F to 122 °F) (VSCD units)
-30 °C to 60 °C (-22 °F to 140 °F) (VHCD units)
-40 °C to 60 °C (-40 °F to 140 °F) (VECD units)
- Remote control through RS232, RS422/485 (2-wire or 4-wire) interfaces. Packet command syntax supports RS485 bus systems and allows addressed operation.
- Remote control through Ethernet supporting a TCP/IP command interface (Indoor Version only)
- IF test outputs (standard on indoor units, on outdoor units with Option IFT)
- Summary alarm output with dual change over switch contacts
- Internal Fan as option for indoor units (Option FAN)
- CE compliant
- **3 years warranty**

Dual Channel, Shared Oscillator Downconverter

S-, C-, X-, Ku-, K (DBS)-, and Ka- band

Q-band on request (contact factory)

Downconverter Type:	VHCD-S1S1T / VSCD-S1S1T	VHCD-S4S4T / VSCD-S4S4T	VHCD-CCT / VSCD-CCT	VHCD-XXT / VSCD-XXT
RF-Input Frequency:	S-Band 2.2 ... 2.3 GHz	S-Band 2.00 ... 2.60 GHz	C-Band 3.4 ... 4.2 GHz	X-Band 7.25 ... 7.75 GHz
Intermediate Frequency:	2450 MHz for 70 MHz IF Output 2440 MHz for 140 MHz IF Output	3050 MHz for 70 MHz IF Output 3060 MHz for 140 MHz IF Output	2150 MHz for 70 MHz IF Output 2140 MHz for 140 MHz IF Output	2150 MHz for 70 MHz IF Output 2140 MHz for 140 MHz IF Output
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	-70 / -67 -84 / -81 -98 / -95 -104 / -101 -107 / -104 ¹⁾ -112 / -109 ¹⁾	-70 / -67 -84 / -81 -98 / -95 -104 / -101 -107 / -104 ¹⁾ -112 / -109 ¹⁾	-63 / -60 -83 / -80 -93 / -90 -98 / -95 -100 / -97 ¹⁾ -110 / -107 ¹⁾
typ. / max. values in dBc/Hz ¹⁾ 0 °C ... 50 °C, outside this temperature range degraded by max. 5 dB				
Fixed Oscillator with Test Output (indoor only, optional for outdoor):	2520 MHz (70 MHz IF) 2580 MHz (140 MHz IF) -6 ±3 dBm, SMA female	3120 MHz (70 MHz IF) 3200 MHz (140 MHz IF) -6 ±3 dBm, SMA female	2220 MHz (70 MHz IF) 2280 MHz (140 MHz IF) -6 ±3 dBm, SMA female	2220 MHz (70 MHz IF) 2280 MHz (140 MHz IF) -6 ±3 dBm, SMA female
Microwave Oscillator with Test Output (indoor only, optional for outdoor): (LO > 20 GHz = LO/2 on Test Output)	4.65 ... 4.75 GHz (70 MHz IF) 4.64 ... 4.74 GHz (140 MHz IF) -7 ±3 dBm SMA female	5.05 ... 5.65 GHz (70 MHz IF) 5.06 ... 5.66 GHz (140 MHz IF) -7 ±3 dBm SMA female	5.55 ... 6.35 GHz (70 MHz IF) 5.54 ... 6.34 GHz (140 MHz IF) -7 ±3 dBm SMA female	9.40 ... 9.90 GHz (70 MHz IF) 9.39 ... 9.89 GHz (140 MHz IF) -7 ±3 dBm SMA female

Downconverter Type:	VHCD-X3X3T / VSCD-X3X3T	VHCD-KuKuT / VSCD-KuKuT	VHCD-KaKaT / VSCD-KaKaT	VHCD-Ka1Ka1T / VSCD-Ka1Ka1T
RF-Input Frequency:	X-Band 7.0 ... 9.0 GHz	Ku-Band 10.70 ... 12.75 GHz	Ka-Band 18.10 ... 21.20 GHz	Ka-Band 19.70 ... 20.10 GHz
Intermediate Frequency:	2150 MHz for 70 MHz IF Output 2140 MHz for 140 MHz IF Output	2150 MHz for 70 MHz IF Output 2140 MHz for 140 MHz IF Output	2450 MHz for 70 MHz IF Output 2440 MHz for 140 MHz IF Output	2150 MHz for 70 MHz IF Output 2140 MHz for 140 MHz IF Output
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	-63 / -60 -83 / -80 -93 / -90 -98 / -95 -100 / -97 ¹⁾ -110 / -107 ¹⁾	-61 / -58 -81 / -78 -91 / -88 -96 / -93 -98 / -95 ¹⁾ -108 / -105 ¹⁾	-61 / -58 -81 / -78 -91 / -88 -96 / -93 -98 / -95 ¹⁾ -108 / -105 ¹⁾
typ. / max. values in dBc/Hz ¹⁾ 0 °C ... 50 °C, outside this temperature range degraded by max 5 dB.				
Fixed Oscillator with Test Output (indoor only, optional for outdoor):	2220 MHz (70 MHz IF) 2280 MHz (140 MHz IF) -6 ±3 dBm, SMA female	2220 MHz (70 MHz IF) 2280 MHz (140 MHz IF) -6 ±3 dBm, SMA female	2380 MHz (70 MHz IF) 2300 MHz (140 MHz IF) -6 ±3 dBm, SMA female	2080 MHz (70 MHz IF) 2000 MHz (140 MHz IF) -6 ±3 dBm, SMA female
Microwave Oscillator with Test Output (indoor only, optional for outdoor): (LO > 20 GHz = LO/2 on Test Output)	9.15 ... 11.15 GHz (70 MHz IF) 9.14 ... 11.14 GHz (140 MHz IF) -7 ±3 dBm SMA female	12.85 ... 14.90 GHz (70 MHz IF) 12.84 ... 14.89 GHz (140 MHz IF) -7 ±3 dBm SMA female	15.65 ... 18.75 GHz (70 MHz IF) 15.66 ... 18.76 GHz (140 MHz IF) -7 ±3 dBm SMA female	17.55 ... 17.95 GHz (70 MHz IF) 17.56 ... 17.96 GHz (140 MHz IF) -7 ±3 dBm SMA female

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Q-band on request (contact factory)

Common Parameters	
Conversion Scheme:	Dual down conversion, no frequency inversion. All channels with shared oscillator. Same conversion frequency for all channels. Gain setting individual for each channel.
Phase Tracking between channels:	< 10 deg rms after 1 hour warm up, constant gain setting, constant frequency setting, signal frequency constant within 10 kHz. Initial phase difference to be compensated externally.
Frequency Resolution:	100 Hz
RF-Input Characteristics:	Impedance: 50 Ω Return loss: > 20 dB Operational input level: -45 dBm ¹⁾ Maximum aggregate input level: +5 dBm (damage level) LO leakage: < -80 dBm RF-connector: SMA female (standard) K female (-Ka standard) WR28 waveguide (-Ka with option WR28)
IF-Output Characteristics:	Frequency: 70 \pm 20 MHz or 140 \pm 40 MHz (optional: both \rightarrow [IF-Band] = 70/140) Impedance: 50 or 75 Ω Return Loss: > 20 dB 1 dB compression point: > 10 dBm, 13 dBm typical Output muting: > 60 dB (by command or sense input or by alarm condition) IF-signal monitor: -20 dB of IF-output (approx.) IF-Connectors: BNC female N female (standard with option OD)
Transfer Characteristics:	Max. conversion gain: 45 dB \pm 1.0 dB Attenuation range: 0 ... 30 dB, Step 0.1 dB Level stability: \pm 0.25 dB/day at constant temperature \pm 0.5 dB max., \pm 0.2 dB typ. over temperature range Gain flatness: \pm 0.25 dB over \pm 20 MHz (IF 70 MHz), \pm 0.40 dB over \pm 40 MHz (IF 140 MHz) Image rejection: > 80 dB Noise figure: < 12 dB ¹⁾ Isolation between channels: > 60 dB
Equalizer (Gain slope):	Max. \pm 0.0625 dB / MHz (IF 70 MHz), Max. \pm 0.05 dB / MHz (IF 140 MHz) (programmable)
Group Delay (\pm 18 MHz):	Linear: 0.03 ns / MHz max. Parabolic: 0.01 ns / MHz ² max. Ripple: 1 ns peak to peak max.
Group Delay (\pm 36 MHz):	Linear: 0.015 ns / MHz max. Parabolic: 0.005 ns / MHz ² max. Ripple: 2 ns peak to peak max.
Intermodulation (3rd Order):	OIP3: > 20 dBm ¹⁾
AM / PM conversion:	0.1° / dB ¹⁾
Spurious Outputs:	Signal related: < -60 dBc (Δf < 2 MHz), < -70 dBc ($\Delta f \geq 2$ MHz) ^{1) 2)} Output harmonics: < -40 dBc ^{1) 2)} Signal independent: < -75 dBm
Frequency Stability:	$\pm 1 \times 10^{-7}$, -30 °C ... 60 °C $\pm 1 \times 10^{-8}$, -30 °C ... 60 °C (after 30 min warm up) $\pm 1 \times 10^{-9}$ per day (fixed temperature after 24 h warm up)

¹⁾ at max. conversion gain

²⁾ 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.

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S-, C-, Ku-band

K- and Q-band on request (contact factory)

Indoor Housing:

Reference Input:	Frequency: 5 or 10 MHz sine wave Level: 5 dBm ±5 dB Modes: auto/extern/intern Connector: BNC female
Reference Output:	Frequency: 10 MHz Level: 0 dBm ±3 dB Connector: BNC female
Monitoring and Control Interface:	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 Connection: RS232 or RS422/RS485 (configurable), connector DSUB09 female or TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45
Alarm Interface: Mute Input:	Alarm: two potential free contacts (DPDT), Mute Input: TTL logic input with internal pull up Connector DSUB09 female
Temperature Range:	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)
Relative Humidity:	< 95 % non condensing
User Interface: (Indoor only)	LCD-Display 2 x 40 characters, 4 cursor keys, 4 function keys VFD-Display 2 x 40 characters, 4 cursor keys, 4 function keys (with option VFD)
Mains Power Input:	100 ... 240 V AC nominal, 90 ... 264 V AC max., 50 ... 60 Hz
Mains Power Consumption:	Max.: 45 VA / 35 W Typ.: 40 VA / 28 W
Mains Power Input Connector:	Indoor: IEC C14
Mains Fuse:	2 x 2.0 A, time-lag fuse
Dimension and Weight:	Indoor: 483 x 44 x 505 mm ³ (WxHxD), 1 RU (19") approx. 8.4 kg

Outdoor Housing:

Reference Input (Option):	Frequency: 5 or 10 MHz sine wave Level: 5 dBm ±5 dB Modes: auto/extern/intern Connector: SMA female
Reference Output (Option):	Frequency: 10 MHz Level: 0 dBm ±3 dB Connector: SMA female
Combined Monitoring and Control Interface and Alarm Interface:	Protocol: Multipoint packet format commands Connection: RS232 or RS422/RS485 (configurable), connector MIL-C-26482: MS 3120 E 14-19-S
	Alarm output: Two potential free contacts (DPDT) 24 V DC output: max. 0.3 A 6.5 V DC output: max. 0.2 A
	Connection type: MIL-C-26482: MS 3120 E 14-19-S
	Mute Input: TTL logic input with internal pull up
Monitoring and Control Interface:	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
Temperature Range:	-30 °C ... 60 °C operating (10 minutes warm up at -30 °C)
Relative Humidity:	< 100 %
Mains Power Input:	100 ... 240 V AC nominal, 90 ... 264 V AC max., 50 ... 60 Hz
Mains Power Consumption:	Max.: 45 VA / 35 W
Mains Power Input Connector:	Amphenol C16-1 (3+PE) male
Mains Fuse:	2 x 2 A time-lag fuse
Dimensions:	402 x 111 x 391 mm ³ (WxHxD) (standard)
	412 x 74 x 515 mm ³ (WxHxD) (XL housing)
Degree of Protection:	IP 67 (acc. IEC 529)

Specifications are subject to change