Inmarsat Downconverter
Narrowband Downconverter

L-Band to 70/140 MHz
S-Band to 725 MHz
140 MHz to 15 MHz
Single Conversion

Dual Channel Converters also available.

These narrowband converters of WORK Microwave are designed to meet the requirements of specific applications, where often single conversion is sufficient as the required bandwidth coverage is quite narrow and the difference of the input and output frequency is not too big. They are mainly based on the same proven core modules as used in the standard satellite upconverters and downconverters of WORK Microwave. Additional special functions can be included:

- Application specific filtering.
- Automatic level control. The output level is kept constant independent of the strength of the input signal with adjustable control characteristics.
- Additional PLO output.
- DC bias tee included at signal input to provide DC power to LNAs or LNBs.

For Inmarsat downconverters also a combination with a satellite single band downconverter, resulting in a dual channel unit, is possible.

High signal integrity

The extreme low phase noise of the oscillators guarantees a very good signal quality. Low spurious emissions allow to use the converters also in environments with demanding requirements, like high power video uplinks. Sophisticated temperature compensation guarantees gain stability over a very wide temperature range.

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 either 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 1 RU space for natural ventilation is available above each unit. This eliminates the fan as potential point of failure. For rack installations without any space in between the units a fan within the converter unit is recommended, which forces an airflow from the right side to left side of the units.

Inmarsat Downconverter
Indoor Version

L-Band to 70/140 MHz, Single or Dual Channel Downconverter
S-Type (standard version), H-Type (extended temperature range)

Downconverter Type:	HCD-Lx / SCD-Lx or HCD-LxLx / SCD-LxLx
RF-Input Frequency:	L-Band L1: 1525,0…1559,0 MHz (single band) L2: 1626,5…1660,5 MHz (single band) L: 1525,0…1559,0 MHz or 1626,5…1660,5 MHz (single band, input band front panel selectable) L1L1: 1525,0…1559,0 MHz and 1525,0…1559,0 MHz (dual channel) L2L2: 1626,5…1660,5 MHz and 1626,5…1660,5 MHz (dual channel) LL: 1525,0…1559,0 MHz or 1626,5…1660,5 MHz (dual channel, input band front panel selectable)
Conversion Scheme:	Single down conversion, no frequency inversion
LO-Frequency:	L1: 1402,0 MHz, L2: 1503,5 MHz
RF-Input Characteristics:	Impedance: 50 Ω Return Loss: >18 dB RF-Connector: SMA female Max. Input Level: -20 dBm @ IP3 < -60 dBc (operation) -10 dBm @ IP3 < -30 dBc (operation) +10 dBm (damage level) IIP_3: 0 dBm Cross Talk: Unit 1 to IF out @ unit 2: < -80 dB (only dual channel)
IF-Output Characteristics:	Frequency: 140 ± 17 MHz Impedance: 50 or 75 Ω Return Loss: > 18 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: -20dB of IF-output IF-Connector: SMA female
Transfer Characteristics:	Max. Conversion Gain: 35 dB Attenuation Range: 0…30 dB, Step 0.1 dB (Conversion Gain 35…5 dB) Gain Accuracy: ± 1 dB Level Stability: ± 0.25 dB/day (constant temperature) Amplitude Response: ± 0.5 dB / 10 MHz Noise Figure: <16 dB
Equalizer (Gain Slope):	± 2.5 dB / 40 MHz (programmable)
Intermodulation (3rd Order):	-60 dBc max (Δf_{in} : 5 MHz, P_{in} : 2 x –40 dBm, P_{out} : 2 x –10 dBm)
Phase Noise :	10 Hz - 55 dBc/Hz 100 Hz - 75 dBc/Hz 1 kHz - 85 dBc/Hz 10 kHz - 95 dBc/Hz 100 kHz - 100 dBc/Hz [1)] 1 MHz - 120 dBc/Hz [1)] [1)] 0°C to 50°C, outside this temperature range degraded by max 5 dB.
Spurious Outputs:	Signal related: < - 60 dBc (Δf < 1 MHz), < -70 dBc ($\Delta f \geq$ 1 MHz) Signal independent: < - 76 dBm (< - 80 dBm typical)
Frequency Stability:	± 1 x 10^{-7}, 0°C to 50°C ± 2 x 10^{-8}, 0°C to 50°C (after 30 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)
Reference Input:	Frequency: 10 MHz or 5 MHz Level: -5…10 dBm Modes: internal, external, auto (senses reference input) Connector: SMA female
Reference Output:	Frequency: 10 MHz Impedance: 50 Ω Return Loss: >15 dB Level: 0 ± 3 dBm Connector: SMA female
Reference Output: **with Option: -PLO**	Frequency: 187.20 MHz (other frequencies on request) Impedance: 50 Ω Return Loss: > 15 dB Harmonics: < -40 dBc Level: 11 ± 1.5 dBm Connector: SMA female
Monitoring and Control Interface:	RS232 or RS422/RS485 (Connectors DSUB09 female) (selectable by customer), TCP/IP over Ethernet, 10/100 Base-T (RJ45 connector)
Alarm Interface: **Mute Input:**	Two potential free contacts (DPDT) Mute Input: TTL logic input with internal pull up Connector DSUB09 female)
Temperature Range:	HCU : -30°C to 60°C operating (10 minutes warm up at –30°C, the LCD display is operational: -20°C to 60°C) SCU : 0°C to 50°C operating - 30°C to 80°C storage
Relative Humidity:	< 95 % non condensing
User Interface:	SCU: LCD-Display 2 x 40 characters, 4 cursor keys, 4 function keys HCU: VFD-Display 2 x 40 characters, 4 cursor keys, 4 function keys

Specifications continued next page

Inmarsat Downconverter
Indoor Version

L-Band to 70/140 MHz Downconverter
S-Type (standard version), H-Type (extended temperature range)

Specifications continued:

Power Supply:	85…264 V AC, 40…70 Hz, 0.9 A max
DC Power to external LNA: **with Option DC** **(DC bias tee included at Signal input)**	DC Voltage : 15 V (other voltages on request) Current : max. 0,4 A (each output) Switchable: ON / OFF Protection: Short circuit protection
Dimension and Weight:	483 x 44 x 500 mm³, 1 RU (19“) appr. 8.6 kg

Specifications are subject to change

Order Information:

HCD-[RF Band(s)]-[IF Band in MHz]-[IF Imp in Ω]-[Options]
SCD-[RF Band(s)]-[IF Band in MHz]-[IF Imp in Ω]-[Options]

Possible Options are:
FAN (internal Fan)
VFD (VFD display, standard with HCD-type converters)
DC15 (DC bias tee on signal input with 15 V DC output)
PLO187 (additional 187 MHz reference signal output)
ALC-BW (Automatic level control- Filter bandwidth, see product: Automatic Level Control)

Examples:
HCD-L1-140-50
SCD-L2L2-140-75-FAN-DC15-PLO187
HCD-LL-140-50-FAN-DC15
SCD–LC-140-50-FAN Combination with of L-Band (Narrowband) Downconverter and C-Band Satellite Downconverter) with Fan

Satellite Narrowband Downconverter
Indoor Version

S-Band to 725 MHz Downconverter
S-Type (standard version), H-Type (extended temperature range)

Downconverter Type:	SCD-S	
Frequency resolution:	100 kHz	
RF-Input Frequency:	2.3…2.95 GHz	
Conversion Scheme:	Single down-conversion, no frequency inversion	
LO Frequency:	1.55…2.25 GHz	
RF-Input Characteristics:	Impedance: Return Loss: Maximum Aggregate Input Level: LO Leakage RF-Connector	50 Ω > 15 dB (VSWR = 1.22) 0 dBm -42 dBm max. SMA female
IF-Output Characteristics:	Frequency: Impedance: Return Loss: 1 dB Compression Point: IF-Connectors:	700…750 MHz 50 Ω > 15 dB (VSWR = 1.22) > +7 dBm SMA female
Transfer Characteristics:	Conversion Gain: Gain-Resolution: Gain Accuracy: Gain Stability: Amplitude Ripple: IF Output Bandwidth (3 dB): Noise Figure:	5…35 dB 1 dB ± 0.2 dB typical (± 0.3 dB max.) ± 0.25 dB/day (constant temperature) ± 0.2 dB / 20 MHz 1 GHz [2)] < 12 dB [2)]
Group Delay (700…750 MHz):	Ripple, Slope:	< 2 ns peak to peak / 80 MHz
Intermodulation (3rd Order):	-60 dBc max (Δf_{in} : 5 MHz, $P_{out\ ges}$: < -12 Bm) (OIP3 = +15 dBm)	
AM / PM conversion:	0.1° / dB (P_{out} = 0 dBm)	
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 50 dBc/Hz - 70 dBc/Hz - 80 dBc/Hz - 83 dBc/Hz - 95 dBc/Hz [1)] - 111 dBc/Hz [1)]
Spurious Outputs:	Signal dependent:	< - 55 dBc
Frequency Stability:	± 1 x 10^{-7}, 0 °C to 50 °C with OCXO ± 2 x 10^{-8}, 0 °C to 50 °C (after 10 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)	
Test Output: **(Microwave Oscillator)**	not available	
Temperature Range:	0 °C to 50 °C operating - 30 °C to 80 °C storage	
Relative Humidity:	< 95 % non condensing	
Power Supply:	85…264 V AC, 40…70 Hz	
Power Consumption:	Max: 24 VA / 14 W Typ: 20 VA / 11 W	
User Interface	LCD, 2 x 40 characters, 4 cursor keys, 2 function keys Mains Power Switch on Front Panel	
Mains Fuse:	3.15 A time-lag fuse	
Dimension and Weight:	483 x 44 x 323 mm³, 1 RU (19") (maximum Dimension) 436 x 44 x 280 mm³ (Dimension without Front panel) appr. 3.5 kg	

[1)] 0 °C to 50 °C, outside this temperature range degraded by max 5 dB.

Specifications are subject to change

Order Information: **SCD-S-725 [IF Band in MHz]-LC**

Examples:
SCD-S-725-50-LC
SCD-S-725-75-LC

Satellite Downconverter Narrowband
Indoor Version

140 MHz to 15 MHz Downconverter
S-Type (standard version), H-Type (extended temperature range)

Downconverter Type:	DNC-V
VHF-Input Frequency:	80…200 MHz
Conversion Scheme:	Single down-conversion, no frequency inversion
LO Frequency:	80…200 MHz, Resolution 10 Hz
RF-Input Characteristics:	Impedance: 50 Ω Return Loss: > 14 dB Maximum Aggregate Input Level: approx. –25 dBm (operational) approx. +10 dBm (damage level) RF-Connector: BNC female
IF-Output Characteristics:	Frequency: 0…30 MHz Impedance: 50 Ω Return Loss: > 20 dB 1 dB Compression Point: > 10 dBm Output Muting: > 60 dB (during warm-up or during alarm condition) IF-Connectors: BNC female
Transfer Characteristics:	Conversion Gain: 45 dB Attenuation Range: 0…30 dB, Step 0.1 dB (Conversion Gain 45…15 dB) Gain Accuracy: ± 1.5 dB Level Stability: ± 0.25 dB/day (constant temperature) Amplitude Ripple: ± 0.25 dB / 20 MHz Noise Figure: < 20 dB
Internal Filter*: ***) other filter characteristics on request**	4 internal filters 80…110 MHz 110…140 MHz 140…170 MHz 170…200 MHz
External Filter:	via BNC connectors Impedance: 50 Ohms
Phase Noise:	10 Hz - 80 dBc/Hz 100 Hz - 100 dBc/Hz 1 kHz - 110 dBc/Hz 10 kHz - 120 dBc/Hz 100 kHz - 125 dBc/Hz [1)] [1)] 0℃ to 50℃, outside this temperature range degraded by max 5 dB.
Spurious Outputs:	< - 70 dB
Frequency Stability:	± 1 x 10^{-7}, 0℃ to 50℃ ± 2 x 10^{-8}, 0℃ to 50℃ (after 10 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)
Reference Input:	Frequency: 10 MHz or 5 MHz Level: -3…10 dBm Modes: internal, external, auto (senses reference input) Impedance: 50 Ω Connector: BNC female
Reference Output:	Frequency: 10 MHz Level: 0 ± 3 dBm Impedance: 50 Ω Connector: BNC female
Monitoring and Control Interface:	TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing) RS232 or RS422/RS485 (Connectors DSUB09 female) (configurable by software) Mute Input: TTL logic input with internal pull up
Temperature Range:	0℃ to 50℃ operating - 30℃ to 80℃ storage
Relative Humidity:	< 95 % non condensing
User Interface:	LCD-Display 2 x 40 characters, 4 cursor keys, 2 function keys
Power Supply:	85…264 V AC, 40…70 Hz
Power Consumption:	Max: 33 VA / 20 W Typ: 29 VA / 18 W
Mains Fuse:	2 x 3.15 A time-lag fuse
Dimension and Weight:	483 x 44 x 260 mm³, 1 RU (19") approx. 4.2 kg

Specifications are subject to change

Order Information: **DNC-V-15-50**