

# Distributed Antenna Systems (DAS)

## RF products

Edition 2012



Count on proven DAS technology





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The HUBER+SUHNER group is a leading global supplier of components and systems for electrical and optical connectivity. Our customers in communication, industry and transportation appreciate that we are specialists with detailed knowledge of practical applications. We offer expertise in radio frequency, fiber optics and low frequency all under one roof, thus providing a unique basis for continual innovation which is focused on the needs of our customers all over the world.





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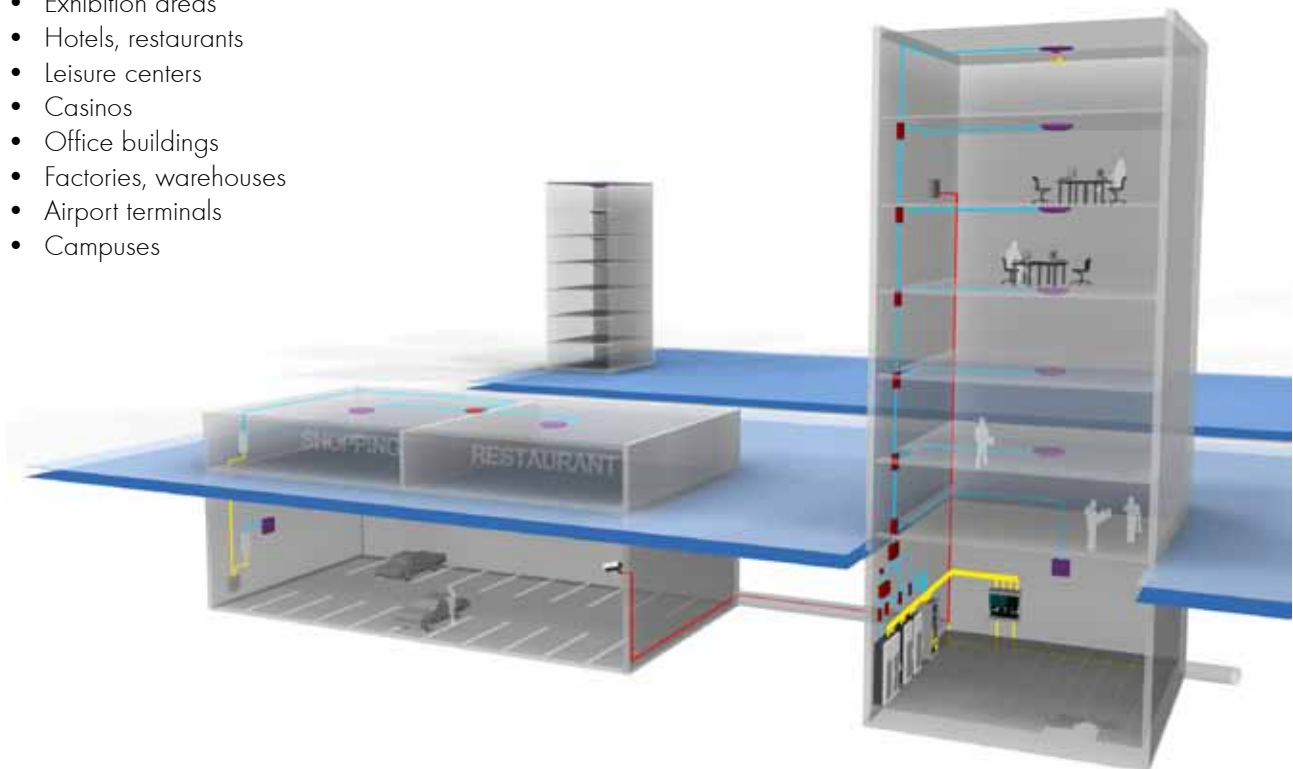
# DAS - Distributed Antenna System

When it comes to the availability and quality of wireless voice and data communication services, the high coverage requirements apply equally both outside as well as inside buildings. The shielding effect of the building's front and structure on radio signals often is reason for insufficient service quality. In such cases additional technical measures are indispensable. With the implementation of dedicated solutions in the form of systems with distributed antennas (distributed antenna systems - DAS), the internal coverage required can be achieved in every case. Moreover, using DAS, additional capacity for voice and data channels can be created as required. To this extent, the use of broadband system components offers good investment protection to the customer and guarantees sustainable flexibility in the event of later expansion plans. In the case of DAS, as a result of the appropriate use of active and passive system components, seamless availability of the services across floors and individual rooms is guaranteed.

## Fields of application

A DAS permits the use of mobile telephones and the wireless connection of data terminals like smart-phones and tablet-PDs within entire buildings or delimited zones which are normally not covered by wireless signals. These can be both private as well as public institutions, such as

- Shopping malls
- Convention centers
- Exhibition areas
- Hotels, restaurants
- Leisure centers
- Casinos
- Office buildings
- Factories, warehouses
- Airport terminals
- Campuses



## HUBER+SUHNER's proposition

- Antennas
- Feederlines and connectors
- Cable assemblies
- Components to couple, combine, distribute and terminate cellular RF-signals
- Fiber optic connectivity solutions and fiber management systems (separate catalog)

## SENCITY® antennas

### General description

Distributed antenna systems for indoor coverage of mobile communication voice and data traffic have to cover an ever-wider range of demanded services. For this, HUBER+SUHNER offers the matching antenna portfolio.

HUBER+SUHNER its antenna families cover the frequency range from 380 MHz to 6 GHz. Thanks to these extremely broadband radiation properties, cost-intensive and space-wasting installation of separate antennas for individual applications is unnecessary, facilitating the integration of DAS in existing buildings with reasonable material and installation expense and simultaneously enabling an aesthetic design. Excellent IM behavior makes these antennas deeply interesting for DAS in a multi-operator environment.

### Features

- Broadband 380 MHz - 6 GHz
- Low IM distortion level
- High gain






### Benefits

- Very effective and economic RF coverage
- Less IM problems
- Fit and forget



# SENCITY® antennas

## Multiband omni-directional antennas overview

Antenna description	Ultra	Optimal-L	Optima-S	Avant	Art
					
Directivity / polarization	omni / vertical	omni / vertical	omni / vertical	omni / vertical	omni / vertical
Tetra / Public safety 400 MHz	✓ <sup>1)</sup>	•	•	•	•
LTE 700 MHz	✓	✓	•	•	•
GSM 900 / AMPS	✓	✓	•	✓	✓
DCS 1800 / PCS 1900	✓	✓	✓	✓	✓
UMTS 1710 - 2170 MHz	✓	✓	✓	✓	✓
LTE 2700	✓	✓	✓	✓	✓
WiFi 2.4 / 5.6 GHz	✓	✓	✓	✓	✓
Gain from ... to (dBi) <sup>2)</sup>	3.5 ... 10	4 ... 8.5	3.5 ... 6.5	6 ... 9.5	5 ... 7
Available type(s) <sup>3)</sup>	1399.17.0120	1399.17.0114	1399.17.0116	1399.17.0102	1399.17.0055 white 1399.17.0037 light-blue / grey
Remarks	ground-plane mounting set included	above drop-ceiling mounting option	above drop-ceiling mounting option		
For more information see page	16	13	14	15	12

<sup>1)</sup> With ground-plane min. size 620 mm x 620 mm



<sup>2)</sup> Frequency dependent

<sup>3)</sup> All antennas are configured with N (f) interface



## SENCITY® antennas




### Single and dualband omni-directional stick antennas overview

Antenna description	SOA-2000/360/2/0/V	SOA-0820/360/2/0/V	SOA-820/360/4/0/V
			
Directivity / polarization	omni / vertical	omni / vertical	omni / vertical
Frequency (MHz)	1710 - 2170	806 - 960 1710 - 2170	806 - 960 1710 - 2170
Gain (dBi)	1.5	2	4
GSM 900 / AMPS	•	✓	✓
DCS 1800 / PCS 1900	✓	✓	✓
UMTS 1710 - 2170 MHz	✓	✓	✓
For indoor and outdoor DAS	✓	✓	✓
Available type <sup>1)</sup>	1320.17.0004	1399.17.0200	1399.17.0204
Remarks	•	mounting material included	mounting material included
Page	17	17	17




<sup>1)</sup> All antennas are configured with N (f) interface

# SENCITY® antennas

## Single and dualband planar antennas overview

Antenna description	SPA-8090/75/8/0/V	SPA-920/65/10/0/V	SPA-1800/75/8/0/LCP
			
Polarization	linear vertical	linear vertical	left-circular
Frequency (MHz)	806 - 960	870 - 960	1710 - 1880
Gain (dBi)	8	9.5	7.5
Beamwidth h (°)	75	65	75
Beamwidth v (°)	70	55	70
AMPS	✓	•	•
GSM 900	✓	✓	•
GSM 1800	•	•	✓
PCS 1900	•	•	•
UMTS IMT	•	•	•
UMTS AWS	•	•	•
Indoor / outdoor	indoor/outdoor	indoor/outdoor	indoor only
Available type(s) (interface) female	1399.17.0028 (N)	1309.17.0003 (N)	1309.19.0006 (SMA)
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## SENCITY® antennas

Antenna description	SPA-1800/85/8/0/V	SPA-2100/75/8/0/DS	SPA-2000/80/8/0/V
			
Polarization	linear vertical	dual-linear $\pm 45^\circ$	linear vertical
Frequency (MHz)	1710 - 1880	1920 - 2170	1710 - 2170
Gain (dBi)	7.5	8	8
Beamwidth h ( $^\circ$ )	85	75	80
Beamwidth v ( $^\circ$ )	60	70	75
AMPS	•	•	•
GSM 900	•	•	•
GSM 1800	✓	•	✓
PCS 1900	•	•	✓
UMTS IMT	•	✓	✓
UMTS AWS	•	•	✓
Indoor / outdoor	indoor only	indoor only	indoor only
Available type(s) (interface) female	1318.19.0005 (SMA)	1321.19.0004 (2 x SMA)	1320.19.0001 (SMA) 1320.26.0001 (TNC) 1320.99.0001 (TNC w/pigtail 0.3 m)
Page	18	19	19

# SENCITY® antennas

## Multiband omni-directional antennas

### SENCITY Art, SWA-0859/360/4/10/V

- Omni-directional antenna for indoor DAS
- Ultra broad band antenna supporting AMP's, CDMA, PCS, GSM 900/1800, UMTS, WiFi 2.4 and 5.6 GHz, WiMax and LTE 2700



<b>HUBER+SUHNER type</b>	1399.17.0055
<b>Item no.</b>	84006023

<b>Electrical data</b>	<b>Band 1</b>	<b>Band 2</b>	<b>Band 3</b>	<b>Band 4</b>
Frequency (MHz)	806 - 960	1710 - 2170	2400 - 5600	5600 - 5875
VSWR	1.5	1.5	1.5	2
Gain (dBi)	5	6	7	7
3 dB beamwidth (h) (°)	360	360	-	-

<b>General data</b>	
Nominal impedance (Ω)	50
IMD level	143 dBc at carrier power 2 x 30 dBm
Polarisation	vertical
Connector	N, jacket (female), bottom
Composite power max.	300 W at ambient temperature 50 °C

<b>Mechanical data</b>	
Dimensions (mm)	91 x 200 (height x diameter)
Weight (kg)	0.3

<b>Environmental data</b>	
Operation temperature (°C)	-40 to +80
RoHS	2002/95/EC

<b>Material data</b>	
Radiator colour	grey-white
Baseplate colour	grey-white
Back/base plate material	aluminium

<b>Available accessory</b>	<b>HUBER+SUHNER type</b>	<b>Item no.</b>	<b>Description</b>
Mounting bracket	9091.99.0095	8401045	ceiling bracket

#### Related antenna types

<b>HUBER+SUHNER type</b>	<b>Item no.</b>	<b>Description</b>
1399.17.0037	23040329	Radiator: light blue, baseplate: grey

# SENCITY® antennas

## Multiband omni-directional antennas

### SENCITY Optima, SWA-0764/360/6/30/V

- Omni-directional antenna for indoor DAS
- High gain 6 dBi
- Ultra broad band antenna supporting AMP's, GSM 900/1800, PCS, UMTS, WiFi 2.4 and 5.6 GHz, WiMax, LTE 700/2700



<b>HUBER+SUHNER type</b>	1399.17.0114
<b>Item no.</b>	84048165

<b>Electrical data</b>	<b>Band 1</b>	<b>Band 2</b>	<b>Band 3</b>	<b>Band 4</b>	<b>Band 5</b>	<b>Band 6</b>
Frequency (MHz)	690 - 1100	1100 - 1710	1710 - 2700	2700 - 3800	3800 - 5150	5150 - 6400
VSWR	2	1.5	1.7	1.5	1.7	1.5
Gain (dBi)	4	6	6	7	7.5	8.5
3 dB beamwidth (h) (°)	360	360	-	-	-	-

<b>General data</b>	
Nominal impedance (Ω)	50
IMD level	145 dBc at carrier power 2 x 30 dBm
Polarisation	vertical
Connector	N, jack (female), back
Composite power max.	10 W at ambient temperature 25 °C

<b>Mechanical data</b>	
Dimensions (mm)	69 x 321 (height x diameter)
Weight (kg)	1.0

<b>Environmental data</b>	
Operation temperature (°C)	0 to +55
RoHS	2002/95/EC

<b>Material data</b>	
Radome colour	RAL 9010 (white)
Radome material	ABS
Back/base plate material	aluminium

<b>Available accessory</b>	<b>HUBER+SUHNER type</b>	<b>Item no.</b>	<b>Description</b>
Mounting Bracket	9091.99.0096	84024380	Z-bracket
Mounting Bracket	9091.99.0233	84071923	drop-ceiling bracket

#### Related antenna types

<b>HUBER+SUHNER type</b>	<b>Item no.</b>	<b>Description</b>
1399.99.0027	84071797	Antenna with pigtail 0.5 m and N (f) connector

# SENCITY® antennas

## Multiband omni-directional antennas

### SENCITY Optima, SWA-1864/360/6/30/V

- Omni-directional antenna for indoor DAS
- High gain 6 dBi
- Ultra broad band antenna supporting AMP's, GSM 1800, PCS, UMTS, WiFi 2.4 and 5.6 GHz, WiMax, LTE 2700



<b>HUBER+SUHNER type</b>	1399.17.0116
<b>Item no.</b>	84048174

<b>Electrical data</b>	<b>Band 1</b>	<b>Band 2</b>	<b>Band 3</b>	<b>Band 4</b>
Frequency (MHz)	1710 - 2900	2900 - 3500	3500 - 4500	4500 - 6400
VSWR	2	1.5	1.6	1.3
Gain (dBi)	3.5	6.5	6	6.5
3 dB beamwidth (h) (°)	360	360	-	-

<b>General data</b>	
Nominal impedance (Ω)	50
IMD level	145 dBc at carrier power 2 x 30 dBm
Polarisation	vertical
Connector	N, jack (female), back
Composite power max.	10 W at ambient temperature 25 °C

<b>Mechanical data</b>	
Dimensions (mm)	33.1 x 139.2 (height x diameter)
Weight (kg)	0.23

<b>Environmental data</b>	
Operation temperature (°C)	0 to +55
RoHS	2002/95/EC

<b>Material data</b>	
Radome colour	RAL 9010 (white)
Radome material	ABS
Back/base plate material	aluminium

<b>Available accessory</b>	<b>HUBER+SUHNER type</b>	<b>Item no.</b>	<b>Description</b>
Mounting bracket	9091.99.0096	84024380	Z-bracket
Mounting bracket	9091.99.0233	84071923	drop-ceiling bracket



# SENCITY® antennas

## Multiband omni-directional antennas

### SENCITY Avant, SWA-0860/360/4/0/V\_3

- Omni-directional antenna for indoor DAS
- Ultra broad band antenna supporting AMP's, CDMA, PCS, UMTS, GSM 900/1800, WiFi 2.4 and 5.6 GHz, WiMax, LTE 2700



<b>HUBER+SUHNER type</b>	1399.17.0102
<b>Item no.</b>	84033273

<b>Electrical data</b>	<b>Band 1</b>	<b>Band 2</b>	<b>Band 3</b>	<b>Band 4</b>	<b>Band 5</b>	<b>Band 6</b>
Frequency (MHz)	806 - 824	824 - 960	1710 - 2170	2400 - 2700	3400 - 3700	4900 - 5935
VSWR	1.9	1.6	1.8	1.5	1.5	1.7
Gain (dBi)	6	6	8.5	9.5	9.5	8.5
3 dB beamwidth (h) (°)	360	360	-	-	-	-

<b>General data</b>	
Nominal impedance (Ω)	50
IMD level	143 dBc at carrier power 2 x 30 dBm
Polarisation	vertical
Connector	N, jack (female), back
Composite power max.	100 W at ambient temperature 50 °C

<b>Mechanical data</b>	
Dimensions (mm)	90 x 78 x 255 (height x width x depth)
Weight (kg)	0.83

<b>Environmental data</b>	
Operation temperature (°C)	0 to +55
RoHS	2002/95/EC

<b>Material data</b>	
Radome colour	RAL 9010 (white)
Radome material	ASA_SAN
Back/base plate colour	RAL 9010 (white)
Back/base plate material	aluminium

# SENCITY® antennas

## Multiband omni-directional antennas

### SENCITY Ultra, SWA-0459/360/4/25/V\_1

- Omni-directional antenna for indoor DAS
- High gain 4 dBi
- Ultra broad band and multi band antenna supporting
  - Homeland Security, Tetra, Tetrapol
  - DVB-T, DVB-H
  - AMP's, GSM, PCS, CDMA, UMTS, WiFi 2.4 and 5.6 GHz, WiMax, LTE 4.9 GHz



<b>HUBER+SUHNER type</b>	1399.17.0120
<b>Item no.</b>	84078635

<b>Electrical data</b>	<b>Band 1</b>	<b>Band 2</b>	<b>Band 3</b>	<b>Band 4</b>
Frequency (MHz)	380 - 560	560 - 960	1710 - 5500	5500 - 5875
VSWR	2	2	1.5	1.5
Gain (dBi)	3.5	5	8	10
3 dB beamwidth (h) (°)	360	360	-	-

<b>General data</b>	
Nominal impedance (Ω)	50
Polarisation	vertical
Connector	N, jack (female), back
Composite power max. (W)	10

<b>Mechanical data</b>	
Dimensions (mm)	153.6 x 78.6 x 255 (height x width x depth)
Weight (kg)	0.8

<b>Environmental data</b>	
Operation temperature (°C)	0 to +55
RoHS	2002/95/EC

<b>Material data</b>	
Radome colour	RAL 9010 (white)
Radome material	ASA (Acrylic Styrene Acrylonitrile)
Back/base plate colour	RAL 9010 (white)
Back/base plate material	aluminium



# SENCITY® antennas

## Single and dualband omni-directional stick antennas

HUBER+SUHNER type	1320.17.0004	1399.17.0200	1399.17.0204		
Item no.	23033387	84065576	84075715		
					
Description	SOA-2000/360/2/0/V	SOA-0820/360/2/0/V	SOA-0820/360/4/0/V		
Electrical data					
Frequency (MHz)	1710 - 2170	806 - 960	1710 - 2170	806 - 960	1710 - 2170
VSWR	1.8	2	2	2.5	2.5
Gain (dBi)	1.5	2	2.5	4	5
3dB beamwidth (h) (°)	360	-	-	360	360
3dB beamwidth (v) (°)	65	-	-	40	20
General data					
Nominal impedance (Ω)	50 Ω				
Polarisation	vertical				
Connector	N, jack (female), bottom				
Composite power max. (W)	10	25			
Mechanical data					
Dimensions (mm)	120 x 32 (height x diameter)	250 x 32 (height x diameter)	410.4 x 38 (height x diameter)		
Weight (kg)	0.15	0.3	0.22		
Environmental data					
Environmental conditions	indoor and outdoor				
Operation temperature (°C)	-40 to +70	-40 to +80	-40 to +85		
RoHS	2002/95/EC	-	2002/95/EC		
Material data					
Radome colour	RAL 7035 (light-grey)				
Back/base plate material	aluminium	glass fibre	-		
Plating	anodized	-	-		
Mounting material	-	included mast mounting material (2 metal bands)			
Accessory	HUBER+SUHNER type	Item no.	Description		
Mounting bracket	9091.99.0173	23035942	L-bracket		



# SENCITY® antennas

## Single and dualband planar antennas

HUBER+SUHNER type	1318.19.0006	1318.19.0005
Item no.	22650479	22649571
		
Description	SPA-1800/75/8/0/LCP	SPA-1800/85/8/0/V
<b>Electrical data</b>		
Frequency (MHz)	1710 - 1880	1710 - 1880
VSWR	1.5	1.5
Gain (dBi)	7.5	7.5
3dB beamwidth (h) (°)	75	85
3dB beamwidth (v) (°)	70	60
Front to back ratio (dB)	20	12
<b>General data</b>		
Nominal impedance (Ω)	50	
Polarisation	circular left	vertical
Connector	SMA, jack (female), bottom	SMA, jack (female), bottom
Composite power max.	10 W at ambient temperature 25 °C	
<b>Mechanical data</b>		
Dimensions (mm)	101 x 95 x 32 (height x width x depth)	
Weight (kg)	0.11	0.11
<b>Environmental data</b>		
Environmental conditions	indoor	
Operation temperature (°C)	-40 to +80	
RoHS	2002/95/EC	
<b>Material data</b>		
Radome colour	RAL 7035 (light-grey)	
Radome material	ASA (Acrylic Styrene Acrylonitrile)	
Back/base plate colour	RAL 7042 (dark-grey)	
Back/base plate material	ASA (Acrylic Styrene Acrylonitrile)	
Mounting material	wall mounting material included	

# SENCITY® antennas

## Single and dualband planar antennas



HUBER+SUHNER type	1320.26.0001	1321.19.0004
Item no.	23005586	84009796
		
Description	SPA-2000/80/8/0/V	SPA-2100/75/8/0/DS
<b>Electrical data</b>		
Frequency (MHz)	1710 - 2170	1920 - 2170
VSWR	1.8	1.7
Gain (dBi)	8	8
3dB beamwidth (h) (°)	80	75
3dB beamwidth (v) (°)	75	70
Front to back ratio (dB)	18	15
<b>General data</b>		
Nominal impedance (Ω)	50	
Polarisation	vertical	+/-45° slant
Connector	TNC, jack (female), bottom	2 x SMA, jack (female), bottom
Composite power max.	10 W at ambient temperature 25 °C	
<b>Mechanical data</b>		
Dimensions (mm)	101 x 80 x 20 (height x width x depth)	101 x 95 x 32 (height x width x depth)
Weight (kg)	0.13	0.11
<b>Environmental data</b>		
Environmental conditions	indoor	
Operation temperature (°C)	-40 to +80	
RoHS	2002/95/EC	
<b>Material data</b>		
Radome colour	RAL 7035 (light-grey)	
Radome material	ASA (Acrylic Styrene Acrylonitrile)	
Back/base plate colour	-	RAL 7042 (dark-grey)
Back/base plate material	-	ASA
Mounting Material	included	wall mounting material included

### Related antenna types

HUBER+SUHNER type	Item no.	Description
1320.19.0001	23005585	SPA-2000/80/8/0/V with SMA connector
1320.99.0001	23036082	SPA-2000/80/8/0/V with pigtail

# SENCITY® antennas

## Single and dualband planar antennas

HUBER+SUHNER type	1399.17.0028	1309.17.0003	
Item no.	23027215	22651262	
			
Description	SPA-8090/75/8/0/V		SPA-920/65/10/0/V
Electrical data			
Frequency (MHz)	806 - 824	824 - 960	870 - 960
VSWR	1.8	1.5	1.5
Gain (dBi)	8	8	9.5
3dB beamwidth (h) (°)	75	75	65
3dB beamwidth (v) (°)	70	70	55
Front to back ratio (dB)	20	20	20
General data			
Nominal impedance (Ω)	50		
Polarisation	vertical		
Connector	N, jack (female), bottom,		
Composite power max.	10 W at ambient temperature 25 °C	100 W at ambient temperature 25 °C	
Mechanical data			
Dimensions (mm)	200 x 200 x 43 (height x width x depth)		
Weight (kg)	0.5	1.1	
Environmental data			
Environmental conditions	outdoor		
Operation temperature (°C)	-40 to +80		
RoHS	2002/95/EC		
Material data			
Radome colour	RAL 7035 (light-grey)		
Radome material	ASA (Acrylic Styrene Acrylonitrile)		
Back/base plate colour	aluminium		
Mounting Material	included		
Available accessory	HUBER+SUHNER type	Item no.	Description
Down-sidetilt bracket	9091.99.0168	23028430	for SPA-8090/75/8/0/V
Downtilt bracket	9091.99.0076	22652443	for SPA-920/65/10/0/V
Sidetilt bracket	9091.99.0081	22652639	



# SUCOFEED – corrugated cables

## Copper – corrugated cables

### General description

HUBER+SUHNER SUCOFEED product range of foam corrugated coaxial cables with suitable stripping tools. The cables have excellent electrical, mechanical and environmental properties for indoor DAS installations.

The cables promise optimal shielding, low attenuation, low VSWR, remarkable intermodulation performance and flexibility for handling and installation on site.

### Features

- Low IM distortion levels
- Low loss
- Flame retardant designs available
- High power capability
- High shielding effectiveness
- UV resistant
- Guaranteed performance up to 3 GHz

### Benefits

- High efficient signal distribution
- Excellent for multi-operator DAS
- Economic high performance solution if assembled with QUICK-FIT connectors



## SUCOFEED – corrugated cables



### 1/4" high-flex

Cable design	Order/ type no.	SUCOFEED_1/4_HF	SUCOFEED_1/4_HF_FR	SUCOFEED_1/4_HF_FR_UL
	Dimension	1/4" high-flex	1/4" high-flex	1/4" high-flex
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	1.90		
Dielectric	(Ø in mm)	4.60		4.40
Outer conductor	(Ø in mm)	6.40		
Jacket	(Ø in mm)	7.60		7.95

Electrical data				
Typ. operating frequency	(GHz)	≤ 18		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	79.7		80
Relative signal propagation	(%)	83.5		83
Signal delay	(ns/m)	4.00		
Max. operating voltage	(kVrms)	0.6		
Typ. attenuation @ 1 GHz	(dB/100 m)	19.54		19.56
Typ. attenuation @ 2 GHz	(dB/100 m)	28.45		28.53
Typ. attenuation @ 2.2 GHz	(dB/100 m)	29.98		30.08
Typ. attenuation @ 2.5 GHz	(dB/100 m)	32.17		32.30
Typ. attenuation @ 3.0 GHz	(dB/100 m)	35.60		35.77
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.290		
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.205		
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.196		
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.183		
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.167		

General data				
Temp. range operating	(°C)	-55 / +85		-40 / +85
Temp. range installation	(°C)			-25 / +60
Typ. weight	(kg/100 m)	7.5		8.7
Min. bending radius	(mm)	25		

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for type "SUCOFEED".

## SUCOFEED – corrugated cables



### 3/8" high-flex

Cable design	Order/ type no.	SUCOFEED_3/8_HF	SUCOFEED_3/8_HF_FR	SUCOFEED_3/8_HF_FR_UL
	Dimension	3/8" high-flex	3/8" high-flex	3/8" high-flex
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	2.80		
Dielectric	(Ø in mm)	7.00		6.90
Outer conductor	(Ø in mm)	9.50		
Jacket	(Ø in mm)	10.80		11.15

Electrical data				
Typ. operating frequency	(GHz)	≤ 12		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	79.5		80
Relative signal propagation	(%)	83		
Signal delay	(ns/m)	4.00		
Max. operating voltage	(kVrms)	0.9		
Typ. attenuation @ 1 GHz	(dB/100 m)	13.33		
Typ. attenuation @ 2 GHz	(dB/100 m)	19.43		
Typ. attenuation @ 2.2 GHz	(dB/100 m)	20.48		
Typ. attenuation @ 2.5 GHz	(dB/100 m)	21.99		
Typ. attenuation @ 3.0 GHz	(dB/100 m)	24.34		
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.540		
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.382		
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.364		
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.342		
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.312		

General data				
Temp. range operating	(°C)	-55 / +85	-40 / +85	
Temp. range installation	(°C)	-25 / +60		
Typ. weight	(kg/100 m)	12.2	13.2	14.2
Min. bending radius	(mm)	25		

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for type "SUCOFEED".

# SUCOFEED – corrugated cables



## 1/2" high-flex

Cable design	Order/ type no.	SUCOFEED_1/2_HF	SUCOFEED_1/2_HF_FR	SUCOFEED_1/2_HF_FR_UL
	Dimension	1/2" high-flex	1/2" high-flex	1/2" high-flex
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	3.60		
Dielectric	(Ø in mm)	9.0		
Outer conductor	(Ø in mm)	12.20		12.10
Jacket	(Ø in mm)	13.40		13.65

Electrical data				
Typ. operating frequency	(GHz)	≤ 10		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	80.3		78.5
Relative signal propagation	(%)	81		85
Signal delay	(ns/m)	4.00		3.90
Max. operating voltage	(kVrms)	1.27		
Typ. attenuation @ 1 GHz	(dB/100 m)	11.77		10.67
Typ. attenuation @ 2 GHz	(dB/100 m)	17.48		15.69
Typ. attenuation @ 2.2 GHz	(dB/100 m)	18.48		16.56
Typ. attenuation @ 2.5 GHz	(dB/100 m)	19.92		17.81
Typ. attenuation @ 3.0 GHz	(dB/100 m)	22.19		19.78
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.83		≤ 0.780
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.587		≤ 0.552
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.56		≤ 0.526
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.525		≤ 0.499
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.479		≤ 0.450

General data				
Temp. range operating	(°C)	-55 / +85		-40 / +85
Temp. range installation	(°C)			-25 / +60
Typ. weight	(kg/100 m)		20	
Min. bending radius	(mm)		25	

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".

## SUCOFEED – corrugated cables



1/2"

Cable design	Order/ type no.	SUCOFEED_1/2	SUCOFEED_1/2_FR	SUCOFEED_1/2_FR_UL
	Dimension	1/2"	1/2"	1/2"
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	4.80		
Dielectric	(Ø in mm)	12.10		11.90
Outer conductor	(Ø in mm)	13.80		13.70
Jacket	(Ø in mm)	15.90		16.00

### Electrical data

Typ. operating frequency	(GHz)	≤ 8		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	75.9		
Relative signal propagation	(%)	88		
Signal delay	(ns/m)	3.80		
Max. operating voltage	(kVrms)	1.60		
Typ. attenuation @ 1 GHz	(dB/100 m)	7.29		
Typ. attenuation @ 2 GHz	(dB/100 m)	10.62		
Typ. attenuation @ 2.2 GHz	(dB/100 m)	11.20		
Typ. attenuation @ 2.5 GHz	(dB/100 m)	12.02		
Typ. attenuation @ 3.0 GHz	(dB/100 m)	13.31		
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.040		
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.735		
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.701		
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.658		
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.600		

### General data

Temp. range operating	(°C)	-55 / +85	-40 / +85	
Temp. range installation	(°C)	-25 / +60		
Typ. weight	(kg/100 m)	25.0	27.6	25.8
Min. bending radius	(mm)	70		

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".

## SUCOFEED – corrugated cables



### 7/8" high-flex and low attenuation

Cable design	Order/ type no.	SUCOFEED_7/8_HF	SUCOFEED_7/8
	Dimension	7/8" high-flex	7/8"
	Jacket version	standard	standard
Inner conductor	(Ø in mm)	9.40	9.00
Dielectric	(Ø in mm)	22.40	22.30
Outer conductor	(Ø in mm)	25.00	24.80
Jacket	(Ø in mm)	27.50	27.60

Electrical data			
Typ. operating frequency	(GHz)	≤ 4.9	≤ 5
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	75.4	75.8
Relative signal propagation	(%)	85	88
Signal delay	(ns/m)	3.90	3.80
Max. operating voltage	(kVrms)	3.00	2.91
Typ. attenuation @ 1 GHz	(dB/100 m)	4.25	4.11
Typ. attenuation @ 2 GHz	(dB/100 m)	6.42	6.11
Typ. attenuation @ 2.2 GHz	(dB/100 m)	6.81	6.46
Typ. attenuation @ 2.5 GHz	(dB/100 m)	7.37	6.96
Typ. attenuation @ 3.0 GHz	(dB/100 m)	8.26	7.76
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.940	≤ 2.190
Max. power @ 2 GHz (40°C)	(kW)	≤ 1.372	≤ 1.549
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 1.308	≤ 1.476
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.227	≤ 1.385
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 1.120	≤ 1.264

General data			
Temp. range operating	(°C)	-55 / +85	
Temp. range installation	(°C)	-25 / +60	
Typ. weight	(kg/100 m)	48.0	53
Min. bending radius	(mm)	90	120

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".



## SUCOFEED – corrugated cables



7/8"

Cable design	Order/ type no.	SUCOFEED_7/8_FR	SUCOFEED_7/8_LA	SUCOFEED_7/8_LA_FR
	Dimension	7/8"	7/8" low attenuation	7/8" low attenuation
	Jacket version	flame retardant	standard	flame retardant
Inner conductor	(Ø in mm)	9.00	9.50	
Dielectric	(Ø in mm)	22.30	22.70	
Outer conductor	(Ø in mm)	24.80	25.40	
Jacket	(Ø in mm)	27.60	27.90	

Electrical data				
Typ. operating frequency	(GHz)	≤ 5	≤ 5.0	
Impedance	(W)	50 ± 1	50 ± 1	
Capacitance	(pF/m)	75.8	73.8	
Relative signal propagation	(%)	88	90.3	
Signal delay	(ns/m)	3.80	3.70	
Max. operating voltage	(kVrms)	2.91	3.00	
Typ. attenuation @ 1 GHz	(dB/100 m)	4.11	3.76	
Typ. attenuation @ 2 GHz	(dB/100 m)	6.11	5.53	
Typ. attenuation @ 2.2 GHz	(dB/100 m)	6.46	5.83	
Typ. attenuation @ 2.5 GHz	(dB/100 m)	6.96	6.28	
Typ. attenuation @ 3.0 GHz	(dB/100 m)	7.76	6.97	
Max. power @ 1 GHz (40°C)	(kW)	≤ 2.190	≤ 2.440	
Max. power @ 2 GHz (40°C)	(kW)	≤ 1.549	≤ 1.725	
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 1.476	≤ 1.645	
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.385	≤ 1.543	
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 1.264	≤ 1.409	

General data				
Temp. range operating	(°C)	-40 / +85	-55 / +85	-40 / +85
Temp. range installation	(°C)		-25 / +60	
Typ. weight	(kg/100 m)	65.0	48	52
Min. bending radius	(mm)		120	

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".

## SUCOFEED – corrugated cables



### 1 1/4" high-flex and low attenuation

Cable design	Order/ type no.	SUCOFEED_1_1/4	SUCOFEED_1_1/4_FR
	Dimension	1 1/4"	1 1/4"
	Jacket version	standard	flame retardant
Inner conductor	(Ø in mm)	13.10	
Dielectric	(Ø in mm)	32.40	
Outer conductor	(Ø in mm)	35.80	
Jacket	(Ø in mm)	39.50	

Electrical data		
Typ. operating frequency	(GHz)	≤ 3
Impedance	(W)	50 ± 1
Capacitance	(pF/m)	76.5
Relative signal propagation	(%)	88
Signal delay	(ns/m)	3.80
Max. operating voltage	(kVrms)	4.20
Typ. attenuation @ 1 GHz	(dB/100 m)	2.94
Typ. attenuation @ 2 GHz	(dB/100 m)	4.43
Typ. attenuation @ 2.2 GHz	(dB/100 m)	4.69
Typ. attenuation @ 2.5 GHz	(dB/100 m)	5.08
Typ. attenuation @ 2.7 GHz	(dB/100 m)	5.68
Max. power @ 1 GHz (40°C)	(kW)	≤ 3.120
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.206
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.104
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.973
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 1.801

General data		
Temp. range operating	(°C)	-55 / +85
Temp. range installation	(°C)	-25 / +60
Typ. weight	(kg/100 m)	92
Min. bending radius	(mm)	200

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".

## SUCOFEED – corrugated cables



1 5/8"

Cable design	Order/ type no.	SUCOFEED_ 1_5/8	SUCOFEED_ 1_5/8_FR	SUCOFEED_ 1_5/8_LA	SUCOFEED_ 1_5/8_LA_FR
	Dimension	1 5/8"	1 5/8"	1 5/8" low att.	1 5/8" low att.
	Jacket version	standard	flame retardant	standard	flame retardant
Inner conductor	(Ø in mm)	17.30		17.60	
Dielectric	(Ø in mm)	42.40		41.00	
Outer conductor	(Ø in mm)	46.50		46.50	
Jacket	(Ø in mm)	49.80		50.30	
<b>Electrical data</b>					
Typ. operating frequency	(GHz)	≤ 2.75			
Impedance	(W)	50 ± 1			
Capacitance	(pF/m)	76.80		72.50	
Relative signal propagation	(%)	87.50		92	
Signal delay	(ns/m)	3.80			
Max. operating voltage	(kVrms)	5.40		5.50	
Typ. attenuation @ 1 GHz	(dB/100 m)	2.43		2.25	
Typ. attenuation @ 2 GHz	(dB/100 m)	3.71		3.36	
Typ. attenuation @ 2.2 GHz	(dB/100 m)	3.94		3.56	
Typ. attenuation @ 2.5 GHz	(dB/100 m)	4.27		3.84	
Typ. attenuation @ 2.7 GHz	(dB/100 m)	4.48		4.02	
Max. power @ 1 GHz (40°C)	(kW)	≤ 4.100			
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.899			
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.764			
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 2.593			
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 2.495			
<b>General data</b>					
Temp. range operating	(°C)	-55 / +85	-40 / +80	-55 / +85	-40 / +85
Temp. range installation	(°C)	-25 / +60			
Typ. weight	(kg/100 m)	144.8	160.0	110.0	130.0
Min. bending radius	(mm)	300		300	

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for "SUCOFEED".

# SUCOFEED – corrugated cables

## Aluminium – corrugated cables

### General description

HUBER+SUHNER SUCOFEED\_LW is a foam dielectric corrugated coaxial cable designed with an aluminium outer conductor and a copper inner conductor. This low weight SUCOFEED\_LW family is a cost efficient alternative to the copper transmission line. The performance of the aluminium cables is equivalent to the copper transmission cables.

Our FR and UL types provide enhanced flame-resistance and are therefore excellent choice for indoor DAS applications.

### Features

- Light weight
- Electrical performance similar to copper cables
- HUBER+SUHNER connectors are fully compatible with aluminium and copper cables
- Cables with flame-retardant jackets on request

### Benefits

- Cost efficient solution
- High efficient signal distribution
- Excellent for multi-operator DAS
- Economic high performing solution if assembled with QUICK-FIT connectors



## SUCOFEED – corrugated cables



### 1/2" and 7/8" light weight

Cable design	order/type no.	SUCOFEED_1/2_LW	SUCOFEED_7/8_LW_LA
	dimension	1/2"	7/8" low attenuation
	jacket version	PE	PE
Inner conductor	(Ø in mm)	4.80	9.40
Dielectric	(Ø in mm)	12.20	22.80
Outer conductor	(Ø in mm)	13.80	25.30
Jacket	(Ø in mm)	15.90	27.90

Electrical data			
Typ. operating frequency	(GHz)	≤ 8.8	≤ 5
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	76	74
Relative signal propagation	(%)	88	90
Signal delay	(ns/m)	3.80	3.80
Max. operating voltage	(kVrms)	1.95	2.95
Typ. attenuation @ 1 GHz	(dB/100 m)	7.76	4.16
Typ. attenuation @ 2 GHz	(dB/100 m)	11.38	6.08
Typ. attenuation @ 2.2 GHz	(dB/100 m)	12.00	6.41
Typ. attenuation @ 2.5 GHz	(dB/100 m)	12.90	6.88
Typ. attenuation @ 3.0 GHz	(dB/100 m)	14.31	7.62
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.020	≤ 2.520
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.721	≤ 1.782
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.688	≤ 1.699
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.645	≤ 1.594
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.589	≤ 1.455

General data			
Temp. range operating	(°C)	-55 / +85	-55 / +85
Temp. range installation	(°C)	-40 / +60	-40 / +60
Typ. weight	(kg/100 m)	≤ 17.5	≤ 37
Min. bending radius (single/rep.)	(mm)	70 / 125	120 / 250

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for type «SUCOFEED»

## SUCOFEED – corrugated cables



### 1-1/4" and 1 5/8" light weight

Cable design	order/type no.	SUCOFEED_1-1/4_LW	SUCOFEED_1-5/8_LW_LA
	dimension	1-1/4"	1-5/8" low attenuation
	jacket version	PE	PE
Inner conductor	(Ø in mm)	13.10	17.60
Dielectric	(Ø in mm)	32.00	41.50
Outer conductor	(Ø in mm)	36.00	46.50
Jacket	(Ø in mm)	39.20	50.30

Electrical data			
Typ. operating frequency	(GHz)	≤ 3.60	≤ 2.75
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	75	74
Relative signal propagation	(%)	88	89
Signal delay	(ns/m)	3.8	3.8
Max. operating voltage	(kVrms)	4.2	5.6
Typ. attenuation @ 1 GHz	(dB/100 m)	3.20	2.48
Typ. attenuation @ 2 GHz	(dB/100 m)	4.70	3.69
Typ. attenuation @ 2.2 GHz	(dB/100 m)	4.97	3.91
Typ. attenuation @ 2.5 GHz	(dB/100 m)	5.34	4.21
Typ. attenuation @ 2.7 GHz	(dB/100 m)	5.58	4.41
Max. power @ 1 GHz (40°C)	(kW)	≤ 3.350	≤ 4.100
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.369	≤ 2.899
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.259	≤ 2.764
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 2.119	≤ 2.593
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 2.039	≤ 2.690

General data			
Temp. range operating	(°C)	-55 / +85	-55 / +85
Temp. range installation	(°C)	-40 / +60	-40 / +60
Typ. weight	(kg/100 m)	≤ 65	≤ 99
Min. bending radius (single/rep.)	(mm)	200 / 400	280 / 500

For detailed data sheets please go to [www.hubersuhner.com](http://www.hubersuhner.com) and then search for type «SUCOFEED»



# LISCA jumper cables

## Description

Our low loss and low intermodulation soldered cables assemblies LISCA are specially developed for applications where low VSWR and low attenuation combined with low intermodulation products are required. The excellent performance is achieved by utilizing corrugated cables with low intermodulation connectors and a controlled assembly process with HUBER+SUHNER solder technology.

These products are factory-made cable assemblies and can only be ordered in predetermined lengths. A hot polyamide moulding between connector and cable jacket guarantees highest stability and tightness.

## Standard LISCA

These assemblies are produced under stringent quality manufacturing standards in order to achieve consistent high performance. All standard products are based on SUCOFEED cables with black PE jacket material. The assemblies are 100 % tested for attenuation and return loss according to the technical data.

## Customised LISCA

HUBER+SUHNER's strengths also include the production of products according to customer specifications. This product line offers additional features for demanding customer wishes based on the LISCA standard requirements, like improved return loss values, even better IM performance, customised labelling or assembly lengths up to 150 m.

## Features of standard LISCA

- Excellent RF performance
- High RF shielding efficiency
- Low attenuation
- Moisture protection IP 68
- High flexibility and small bending radius
- Low, stable intermodulation products

## Benefits

- RoHS compliant (2002/95/EC)
- Wide variety of corrugated cable and connector types
- Standard products as well as customized assemblies with special lengths and markings according to customer specifications
- High volume capacity thanks to standard assembly processing at all main HUBER+SUHNER production sites worldwide



# LISCA jumper cables

## Assembly performance code

Performance code		LIS...-51	LIS...-52		LIS...-71	LIS...-81	LIS...-01
Description		Standard	LTE*		USA1)	Test leads	Customer specific
Impedance ( $\Omega$ )		50	50		50	50	50
Frequency (max. operating) (GHz)		6	6	6	6	6	6
Length of assemblies		$\leq 10$ m	$\leq 5$ m	$\leq 12$ m	$\leq 5$ m	$\leq 5$ m	$\leq 120$ m
Return loss (dB)	DC ..1.0 GHz	$\geq 28$	$\geq 28$	$\geq 28$	$\geq 28$	$\geq 24$	open
	>1.0 .. 2.2 GHz	$\geq 26$	$\geq 26$	$\geq 26$	$\geq 26$	$\geq 24$	
	>2.2 .. 2.7 GHz	-	$\geq 23$	$\geq 21$	-	-	
	>2.2 .. 4.0 GHz	-	-	-	$\geq 22$	-	
	>4.0 .. 6.0 GHz	-	-	-	-	-	
Intermodulation	IM3 (2 x 20 W)	-162 dBc (typical)	-150 dBc -162 dBc (typical)		-160 dBc	-165 dBc QN: -155 dBc	open
RF power	see cable specification						
Attenuation	see cable specification						

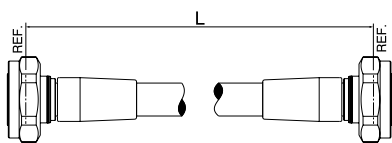
LTE = Long Term Evolution

<sup>1)</sup> special marking on cable

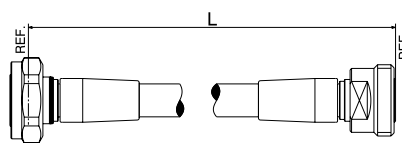
## Order number for standard LISCA

		Example:	LIS-C9F-11	716-16	716-02000	-51
		Product name				
SUCOFEED_1/4_HF	C5	Cable type				
SUCOFEED_3/8_HF	C7					
SUCOFEED_1/2_HF	C9					
SUCOFEED_1/2	C12					
Flame retardant: F PE: no indication						
Straight male	11	Pattern of connector			1	
Right angle male	16					
Straight female	21	Pattern of connector			2	
DIN 7/16	716	Connector interface		1	2	
N	N					
QN	QN					
		Assembly length in mm				
Jumper performance code	example: 51	Technical performance				

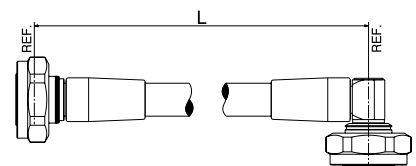
Assembly length: tolerance +/- 1 %



Plug to plug



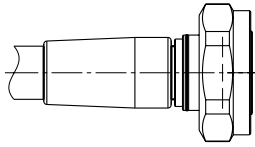
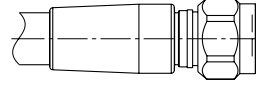
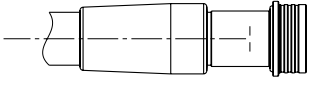
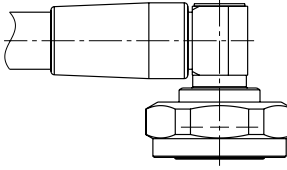
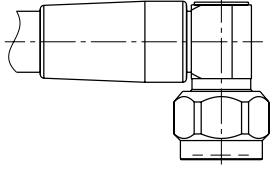
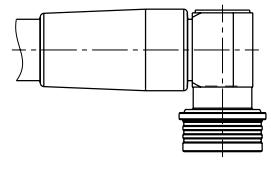
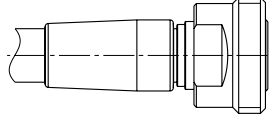
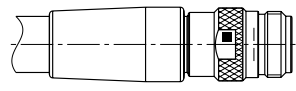
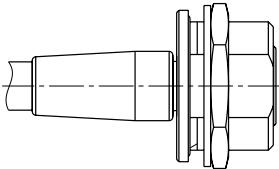
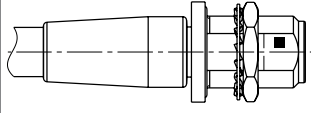
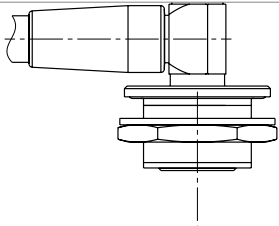
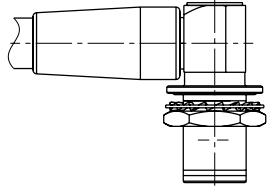
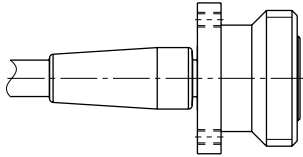
Plug to jack



Plug to right angle plug

# LISCA jumper cables

## LISCA connector pattern

Description	Series DIN 7/16	Series N	Series QN
Straight male (Pattern code: 11)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12
Right angle male (Pattern code: 16)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12
Straight female (Pattern code: 21)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	
Straight bulkhead female (Pattern code: 24)			
	cable: C5, C7, C9	cable: C5, C7	
Right angle bulkhead female (Pattern code: 29)			
	cable: C5, C7	cable: C7	
Straight bulkhead female (Pattern code: 25)			
	cable: C5, C7		

## QUICK-FIT coaxial connectors

### Description

HUBER+SUHNER QUICK-FIT connectors are worldwide approved and 7/16 connectors for foam dielectric corrugated copper tube cables. They offer a greatly simplified and economic approach to cable preparation and assembly. The product line meets the requirements of multi-carrier, high-channel-count transceivers such as base stations of today's mobile communication infrastructure networks.

### Features

- Excellent RF performance
- Low, stable and reproducible IM (Passive InterModulation) - typically -165 dBc
- Safe assembly process performance - in-field termination with reproducible electrical performance
- Quick and easy assembly - 2 main connector parts, 4 steps in less than 4 minutes
- High IP rating - IP 68
- Multibrand, multi-design and multi-material cable compatibility

### Benefits

- Time saving due to easy field installation
- Excellent for multi-operator DAS
- Low cost of ownership
- Support and expertise of a proven connector house



# QUICK-FIT coaxial connectors

## General technical data

Electrical data	Requirements
Impedance	50 $\Omega$
Frequency range (for connector interface)	N: DC ... 11 GHz 7/16: DC ... 7.5 GHz
VSWR	$\leq 1.06$ (RL $\geq 30$ dB); $f \leq 2.5$ GHz
IM <sup>1)</sup>	better than -155 dBc

1) Carrier to 3rd order intermodulation product ratio with 2 x 20 W (43 dBm) carrier power,  $f \leq 1.88$  GHz

Mechanical data	Requirements
Recommended coupling nut torque IEC	N: 0.68 ... 1.13 Nm / 0.49 ... 0.82 ft lb. IEC 61169-16 7/16: 25 ... 30 Nm / 18.05 ... 21.66 ft lb. IEC 61169-4
Recommended coupling nut torque HUBER+SUHNER	N: 3 Nm / 2.2 ft lb. with 100 matings max.
Coupling nut retention force	N: $\geq 450$ N / 101.2 lbs. 7/16: $\geq 1000$ N / 225.0 lbs.
Centre contact	captivated
Durability (matings)	$\geq 500$

Environmental data	Requirements
Temperature range	-40 °C ... +85 °C / -40 °F ... +185 °F
IP rating	IP 68 (acc. to IEC 60529)

Material data		
Connector part	Material	Plating
Cable entry	brass	SUCOPLATE®
Connector head	brass	SUCOPLATE®
Outer contact	brass	SUCOPLATE®
Centre contact	spring bronze/brass	silver
Insulators	PTFE or PFA	
Gaskets	rubber	

Some connectors may have a specification that differs from the above mentioned data. The products are designed and guaranteed to pass the above mentioned test procedures. Any additional or different requirement arising from specific applications or environmental conditions which is not covered by these test procedures is subject to request.

## QUICK-FIT coaxial connectors

Suitable for SUCOFEED corrugated cables in the diameters below



1/2" \_HF, 1/2" \_HF\_FR, 1/2" \_HF\_FR\_UL

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-9-9	22660309	DIN 7/16 male	DOC-0000179418	74_Z-0-9-15	23001006
16_716-50-9-5	23007298	DIN 7/16 male right angle			
21_716-50-9-9	22660310	DIN 7/16 female			
11_N-50-9-9	22660311	N male			
16_N-50-9-6	23007299	N female right angle			
21_N-50-9-9	22660312	N female			

Cable compatibility list on request.



1/2", 1/2" \_FR, 1/2" \_FR\_UL

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-12-10	22658311	DIN 7/16 male	DOC-0000179113	74_Z-0-12-15	23000319
16_716-50-12-11	23011827	DIN 7/16 male right angle			
21_716-50-12-10	22658313	DIN 7/16 female			
11_N-50-12-10	22658314	N male			
16_N-50-12-9	23011828	N female right angle			
21_N-50-12-10	22658315	N female			

Cable compatibility list on request.

## QUICK-FIT coaxial connectors

Suitable for SUCOFEED corrugated cables in the diameters below



7/8", 7/8"\_FR, 7/8"\_LA, 7/8"\_LA\_FR, 7/8"\_HF

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-23-44	84069135	DIN 7/16 male	DOC-0000295365	74_Z0-23-18	84074476
21_716-50-23-44	84069194	DIN 7/16 female			
11_N-50-23-43	84124063	N male			
21_N-50-23-43	84124062	N female			

Cable compatibility list on request.



1\_1/4", 1\_1/4"\_FR

HUBER+SUHNER type	Item no.	Connector style	Assembly instruction	Stripping/flairing tool	Item no. stripping tool
11_716-50-32-4	84116088	DIN 7/16 male	DOC-0000341341	74_Z0-32-14/ 74_Z0-32-15	23010533/ 84120843
21_716-50-32-4	84116150	DIN 7/16 female			

Cable compatibility list on request.



1\_5/8"\_LA

HUBER+SUHNER type	Item no.	Connector style	Assembly instruction	Stripping/flairing tool	Item no. stripping tool
11_716-50-42-4	84079343	DIN 7/16 male	DOC-0000299051	74_Z0-42-14/ 74_Z0-42-15	23010534/ 84085074
21_716-50-42-4	84079305	DIN 7/16 female			

Cable compatibility list on request.

## HUBER+SUHNER ECO connectors

### Description

The ECO Connectors are an economic business approach for Cell Site applications. They comprise straight connectors for 1/2", 7/8", 1 1/4" and 1 5/8" corrugated antenna feeder installations.

Due to certain restriction regarding environmental specifications and in comparison with our Quick-Fit connectors our ECO connectors are ideally suitable for indoor DAS applications.

### Features

- Quick and easy cable termination
- Good RF performance
- Multi design and multi material cable compatibility (copper and aluminium cables)

### Benefit

- Cost efficient sourcing





# HUBER+SUHNER ECO connectors

## General technical data

Electrical data	Requirements
Impedance ( $\Omega$ )	50
Return loss*	DC to 2.5 GHz: $\geq 30$ dB; 2.5 to 2.7 GHz: $\geq 28$ dB
IM**	typical -155 dBc, better than -150 dBc

\* Single connector detail specification is the reference

\*\* Carrier to 3rd order intermodulation product ratio with 2 x 20 W (43 dBm) carrier power

Mechanical data	Requirements
Recommended coupling nut torque IEC	N: 0.68 ... 1.13 Nm / 0.49 ... 0.82 ft lb. IEC 61169-16 7/16: 25 ... 30 Nm / 18.05 ... 21.66 ft lb. IEC 61169-4
Recommended coupling nut torque HUBER+SUHNER for series N	N: 3 Nm / 2.2 ft lb. with 100 matings max.
Coupling nut retention force	N: $\geq 450$ N / 101.2 lbs 7/16: $\geq 1000$ N / 225.0 lbs
Centre contact	captivated
Durability (matings)	$\geq 500$

Environmental data	Requirements
Temperature range	-40 °C ... +85 °C / -40 °F ... +185 °F
IP rating	IP 67 (acc. to IEC 60529) with taping or similar measures IP 68

Material data		
Connector part	Material	Plating
Outer contacts / connector bodies	brass	SUCOPLATE®
Cable entries / coupling nuts	brass	nickel
Centre contacts	bronze or copper beryllium / brass	silver
Insulators	PTFE or TPX	
Gaskets	EPDM	

Some connectors may have a specification that differs from the above mentioned data. The products are designed and guaranteed to pass the above mentioned test procedures. Any additional or different requirement arising from specific applications or environmental conditions which is not covered by these test procedures is subject to request.

## HUBER+SUHNER ECO connectors

Suitable for SUCOFEEED corrugated cables in the diameters below



1/2"

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-12-100	84125745	DIN 7/16 male	DOC-0000364681	74_Z0-12-100	84133923
21_716-50-12-100	84125740	DIN 7/16 female			
11_N-50-12-100	84125756	N male	DOC-0000364683		
21_N-50-12-100	84125770	N female			



7/8", 7/8\_LA, 7/8\_HF

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-23-100	84124984	DIN 7/16 male	DOC-0000363432	74_Z0-23-100 74_Z0-23-20 74_Z0-23-18	84133924 84117046 84074476
21_716-50-23-100	84124988	DIN 7/16 female			
11_N-50-23-100	84125762	N male			
21_N-50-23-100	84125871	N female			



1 1/4", 1 1/4\_HF

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Flaring tool	Item no. flaring tool
11_716-50-32-100	84127325	DIN 7/16 male	DOC-0000364680	74_Z0-32-15	84120843
21_716-50-32-100	84127329	DIN 7/16 female			
11_N-50-32-100	84132614	N male			
21_N-50-32-100	84132616	N female			

## HUBER+SUHNER ECO connectors

Suitable for SUCOFEED corrugated cables in the diameters below



1\_5/8"

HUBER+SUHNER type	Item no.	Interface	Assembly instruction	Flaring tool	Item no. flaring tool
11_716-50-42-100	84132564	DIN 7/16 male	DOC-0000375031	74_Z-0-42-15	84085074
21_716-50-42-100	84132566	DIN 7/16 female			
11_N-50-42-100	84132618	N male			
21_N-50-42-100	84132620	N female			



# Cable stripping tools for QUICK-FIT and HUBER+SUHNER ECO connectors

Automating rotation stripping tools (can be used manually as well)



Automating rotation stripping tools		Cable type	Connector		Picture and remarks
Type no.	Item no.		Type no.	Item no.	
74_Z-0-9-15	23001006	SUCOFEEED_1/2_HF SUCOFEEED_1/2_HF_FR SUCOFEEED_1/2_HF_FR_UL	11_716-50-9-9	22660309	
			16_716-50-9-5	23007298	
			21_716-50-9-9	22660310	
			11_N-50-9-9	22660311	
			16_N-50-9-6	23007299	
			21_N-50-9-9	22660312	
74_Z-0-12-15	23000319	SUCOFEEED_1/2 SUCOFEEED_1/2_FR SUCOFEEED_1/2_FR_UL SUCOFEEED_1/2_LW	11_716-50-12-10	22658311	
			16_716-50-12-11	23011827	
			21_716-50-12-10	22658313	
			11_N-50-12-10	22658314	
			16_N-50-12-9	23011828	
			21_N-50-12-10	22658315	
74_Z-0-12-17	84147227	SUCOFEEED_1/2 SUCOFEEED_1/2_FR SUCOFEEED_1/2_FR_UL SUCOFEEED_1/2_LW	11_716-50-12-100	84125745	
			21_716-50-12-100	84125740	
			11_N-50-12-100	84125756	
			21_N-50-12-100	84125770	
74_Z-0-23-21	84147228	SUCOFEEED_7/8_HF SUCOFEEED_7/8 SUCOFEEED_7/8_FR	11_716-50-23-44	84069135	
			21_716-50-23-44	84069194	
			11_N-50-23-43 (Q2 2012)	84124063	
			21_N-50-23-43 (Q2 2012)	84124062	
74_Z-0-23-22	84147229	SUCOFEEED_7/8_LA SUCOFEEED_7/8_LA_FR SUCOFEEED_7/8_LW_LA	11_716-50-23-100	84124984	Available as from Q2 2012
			21_716-50-23-100	84124988	
			11_N-50-23-100	84125762	
			21_N-50-23-100	84125871	
74_Z-0-32-14	23010533	SUCOFEEED_1_1/4 SUCOFEEED_1_1/4_FR SUCOFEEED_1-1/4_LW	11_716-50-32-4	84116088	
			21_716-50-32-4	84116150	
			11_716-50-32-100	84127325	
			21_716-50-32-100	84127329	
			11_N-50-32-100	84132614	
			21_N-50-32-100	84132616	Jacket stripping only
74_Z-0-42-14	23010534	SUCOFEEED_1_5/8 SUCOFEEED_1_5/8_FR SUCOFEEED_1_5/8_LA SUCOFEEED_1_5/8_LA_FR SUCOFEEED_1-5/8_LW_LA	11_716-50-42-4	84079343	
			21_716-50-42-4	84079305	
			11_716-50-42-100	84132564	
			21_716-50-42-100	84132566	
			11_N-50-42-100	84132618	
			21_N-50-42-100	84132620	Jacket stripping only

# Cable stripping tools for QUICK-FIT and HUBER+SUHNER ECO connectors

## Manual stripping tools

Manual stripping tools		Cable type	Connector		Picture
Type no.	Item no.		Type no.	Item no.	
74_Z-0-12-100	84133923	SUCOFEED_1/2 SUCOFEED_1/2_FR SUCOFEED_1/2_FR_UL SUCOFEED_1/2_LW	11_716-50-12-100	84125745	
			21_716-50-12-100	84125740	
			11_N-50-12-100	84125756	
			21_N-50-12-100	84125770	
74_Z-0-23-100 74_Z-0-23-20 74_Z-0-23-18	84133924 84117046	SUCOFEED_7/8_HF SUCOFEED_7/8 SUCOFEED_7/8_FR SUCOFEED_7/8_LA SUCOFEED_7/8_LA_FR SUCOFEED_7/8_LW_LA	11_716-50-23-44	84069135	
			21_716-50-23-44	84069194	
	11_N-50-23-43 (Q2 2012)		84124063		
	21_N-50-23-43 (Q2 2012)		84124062		
	11_716-50-23-100		84124984		
	21_716-50-23-100		84124988		
	11_N-50-23-100		84125762		
	21_N-50-23-100		84125871		

## Flaring tools

Flaring tools		Cable type	Connector		Picture
Type no.	Item no.		Type no.	Item no.	
74_Z-0-32-15	84120843	SUCOFEED_1_1/4 SUCOFEED_1_1/4_FR SUCOFEED_1-1/4_LW	11_716-50-32-4	84116088	
			21_716-50-32-4	84116150	
			11_716-50-32-100	84127325	
			21_716-50-32-100	84127329	
			11_N-50-32-100	84132614	
			21_N-50-32-100	84132616	
74_Z-0-42-15	84085074	SUCOFEED_1_5/8 SUCOFEED_1_5/8_FR SUCOFEED_1_5/8_LA SUCOFEED_1_5/8_LA_FR SUCOFEED_1-5/8_LW_LA	11_716-50-42-4	84079343	
			21_716-50-42-4	84079305	
			11_716-50-42-100	84132564	
			21_716-50-42-100	84132566	
			11_N-50-42-100	84132618	
			21_N-50-42-100	84132620	

## Cable stripping tools for QUICK-FIT and HUBER+SUHNER ECO connectors

### Spare parts for cable stripping tools

H+S type	Item no.	Part description
74_Z-0-0-359	23014976	handle (for stripping tools)
74_Z-0-0-402	22652193	abrasive paper 320
74_Z-0-0-424	23001952	spanner AF 17 mm
74_Z-0-0-425	23001953	spanner AF 18 mm
74_Z-0-0-426	23001954	spanner AF 19 mm
74_Z-0-0-427	23001955	spanner AF 21 mm
74_Z-0-0-428	23001956	spanner AF 22 mm
74_Z-0-0-429	23001957	spanner AF 24 mm
74_Z-0-0-415	22652206	counter sink
74_Z-0-0-418	22652209	stanley knife
74_Z-0-0-420	22652211	steel brush
74_Z-0-0-422	22652213	steel measure 200 mm
74_Z-0-0-432	23002005	screw driver
74_Z-0-0-433	23002007	screw driver
74_Z-0-0-12	22642718	small metal saw
74_Z-0-0-434	23002166	monkey wrench
74_Z-0-0-347	23000937	blade (cutting corrugated copper tube) for 74_Z-0-12-15
74_Z-0-0-349	23001008	blade (cutting corrugated copper tube) for 74_Z-0-9-15
74_Z-0-0-355	23008264	blade (cutting jacket) for 74_Z-0-32-14
74_Z-0-0-356	23010537	blade (cutting jacket) 74_Z-0-42-14
74_Z-0-0-416	22652207	allen wrench AF 2.5 mm/.098 in. for 74_Z-0-9-15, 74_Z-0-12-15, 74_Z-0-32-14 and 74_Z-0-42-14
74_Z-0-0-423	23000311	allen wrench AF 4 mm/.157 in. for removing the BIT adapter
74_Z-0-0-421	22652212	screwdriver, Torx 1 (Torx T7) for changing the triangle knife 74_Z-0-0-348

# Grounding kits for coaxial cables

HUBER+SUHNER series 9076 grounding kits enable reliable grounding of today's usual corrugated copper tube and RG cables for radio transmitter antenna installations.

## Features

- Quick and easy installation
- No loose piece parts
- Low contact transition resistance (1 mΩ max.)
- Grounding cable AWG6 (16 mm<sup>2</sup>)
- Current handling capability 100 kA 8/20 μs, 25 kA 10/350 μs
- Waterproof IP 67
- Corrosion resistant



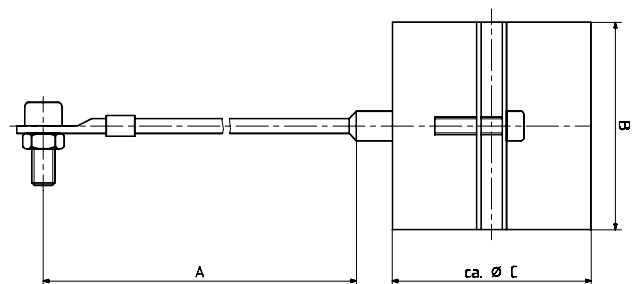
## Material data

Component part	Material
Metal mounting parts	stainless steel
Contact part	copper
Gasket	EPDM

## Grounding kit N-style

Straight grounding cable connection

Right angle to corrugated copper tube cable



HUBER+SUHNER type	Item no.	For cable size <small>Sucofeed, Andrew, Nokia, Kabelmetal, RFS, Eupen, etc.</small>	«A» (mm)	«B» (mm)	«C» (mm)	Stripping length	Grounding screws
9076.99.N012-50	84124423	1/2"	500	50	32	26	M8
9076.99.N013-50	84124422	1/2" highflex	500	50	32	26	M8
9076.99.N078-50	84069990	7/8" / 7/8" highflex	500	50	44	26	M8
9076.99.N114-50	84069991	1 - 1/4"	500	50	59	26	M8
9076.99.N012	23009965	1/2"	840	50	32	26	M8
9076.99.N013	23012643	1/2" highflex	840	50	32	26	M8
9076.99.N014	23015053	1/4", RG_213/214*	840	50	28	26	M8
9076.99.N038	23012644	3/8"	840	50	28	26	M8
9076.99.N078	23009966	7/8" / 7/8" highflex	840	50	44	26	M8
9076.99.N114	23012646	1 - 1/4"	840	70	59	26	M8
9076.99.N158	23012647	1 - 5/8"	840	70	69	30	M8

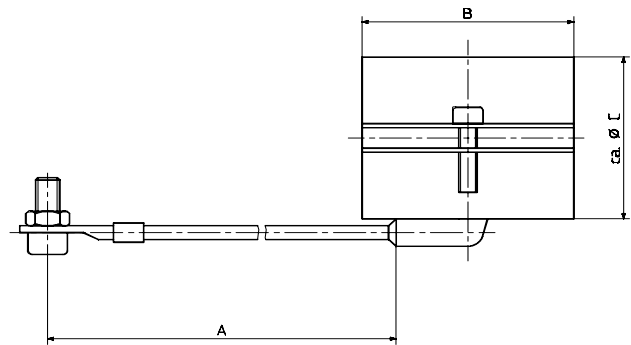
\* Including 3/8" highflex

# Grounding kits for coaxial cables

## Grounding kit P-style

Parallel grounding cable connection

Aligned to corrugated copper tube cable

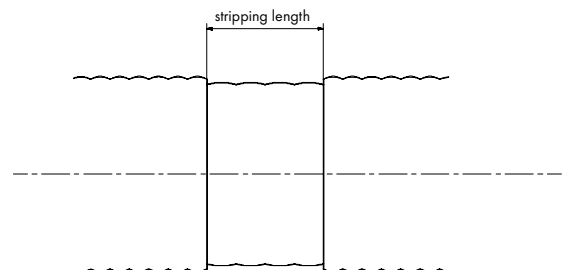


HUBER+SUHNER type	Item no.	For cable size Sucofeed, Andrew, Nokia, Kabel metal, RFS, Eupen, etc.	«A» (mm)	«B» (mm)	«C» (mm)	Stripping length (mm)	Grounding screws
9076.99.P012	23011466	1/2"	840	50	32	26	M8
9076.99.P013	23012649	1/2" highflex	840	50	32	26	M8
9076.99.P014	23015054	1/4", RG_213/214*	840	50	28	26	M8
9076.99.P038	23012650	3/8"	840	50	28	26	M8
9076.99.P078	23011467	7/8" / 7/8" highflex	840	50	44	26	M8
9076.99.P114	23012652	1 - 1/4"	840	70	59	26	M8
9076.99.P158	23012653	1 - 5/8"	840	70	69	30	M8

\* Including 3/8" highflex

## Stripping dimensions

Concerning the necessary cable jacket length which has to be removed, refer the tables above, column «stripping length». Select according to type number.



The mounting instruction is shipped with every kit.



## RF components

An effective concept for wireless communication in buildings depends to a large extent on the proper selection of RF components. Particularly in the case of a multiband DAS or one suitable for multi-operators, the solution must satisfy high technical and qualitative requirements. Thanks to many years of experience and competence in the area of RF components, HUBER+SUHNER is able to meet these requirements with a wide range of components.

### Applications

- Combination or filtering of RF signals from different signal sources
- Asymmetrical or symmetrical distribution of RF signals
- Termination of open RF lines or connections
- Coupling of carriers from the same frequency band

### Features

- Directional couplers and tappers with different plug interfaces and couple values between 5 dB and 30 dB.
- Modular cable load with permanently stable, very low IM levels.
- Low loss, broadband power splitters with very good IM performance.
- Hybrid couplers with wide bandwidth and for high power with very low IM levels.
- Diplexers and triplexers with very good IM performance for the combination and separation of cellular, W-LAN and WiMAX signals.

### Benefits

- Extensive passive component portfolio
- RoHS compatible components
- Low loss high quality products
- Robust and reliable design

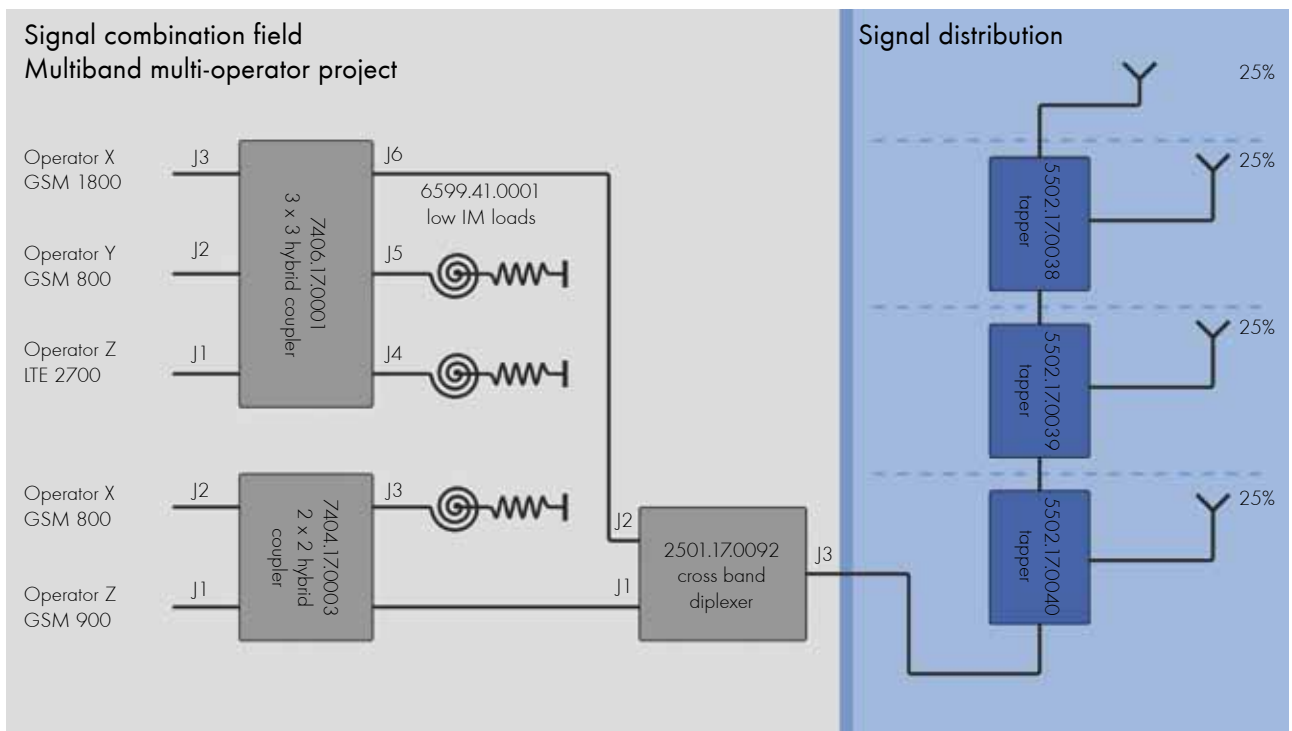


# RF components

## Overview

Component	Hybrid coupler	Diplexer Triplexer	Wilkinson divider	Directional coupler	Tapper	Power splitter
Main application	addition of signals even in the same band	combining of separate signal bands	symmetrical low power signal dividing	unequal signal dividing	unequal signal dividing	equal signal splitting
Typical isolation	30 - 35 dB	30 - 70 dB	20 dB	20 dB directivity	n/a	n/a
Power rating	high (200 W)	10 W to 250 W	low (few watts)	high	high	high
IM performance	excellent	excellent	poor	good	excellent	excellent
Price level (1: low, 3: high)	2	3	1	2	1	1
Significance for DAS	high	high	low	moderate	high	moderate
Where used	multi-operator DAS	multiband DAS	deployed with small DAS only	sometimes deployed with DAS	commonly deployed with DAS	used with simple DAS design
Available types	2 x 2 3 x 3 4 x 4	cellular / W-LAN cellular / cellular cellular / WiMAX	2 way 3 way 4 way	various coupling values	various dividing values	2 way 3 way 4 way

## Example of a small multiband multi-operator passive DAS network



## RF components

### Diplexers



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	
			Low Band	High band
7501.17.0010	84045217	N female	80 - 2700	3300 - 5850
7501.17.0011	84045218	N female	80 - 2170	2400 - 2500
7501.17.0012	84019435	N female	80 - 2170	2400 - 2500
7501.17.0015	84071496	N female	700 - 960	1710 - 2170
2501.17.0090	84103471	N female	698 - 960	1710 - 2170
2501.17.0091	84103625	N female	80 - 520	698 - 2700
2501.17.0092	84103626	N female	80 - 960	1710 - 2700

### Triplexer



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)		
			Band 1	Band 2	Band 3
7501.17.0016	84071498	N female	820 - 960	1710 - 1880	1920 - 2170

### Hybrid coupler



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	Coupling (dB)	Matrix
7404.17.0003	84115336	N female	698 - 2700	3	2 x 2

## RF components

### Hybrid matrix couplers



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	Coupling (dB)	Matrix
7406.17.0001	84103650	N female	698 - 2700	4.8	3 x 3
7408.17.0001	84103648	N female	698 - 960	6	4 x 4
7408.17.0002	84103649	N female	1710 - 2700	6	4 x 4
7408.17.0003	84104543	N female	698 - 2700	6	4 x 4

### Directional couplers



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	Coupling (dB)	Power ratio between outputs
7205_N-50-1	84057612	N female	800-2500	5	7 : 3
7206.17.0004	84103633	N female	698-2700	6	3 : 1
7206.17.0005	84103644	N female	380-2700	6	3 : 1
7207_N-50-1	84057614	N female	800-2500	7	4 : 1
7208_N-50-1	84057615	N female		8.5	6 : 1
7210.17.0006	84103635	N female	698-2700	10	9 : 1
7210.17.0007	84103645	N female	380-2700	10	9 : 1
7213_N-50-1	84057618	N female	800-2500	13.2	20 : 1
7215.17.0003	84103647	N female	380-2700	15	30 : 1
7220.17.0007	84103636	N female	698-2700	20	100 : 1
7230.17.0003	84103641	N female	698-2700	30	1000 : 1

Directivity (dB)  $\geq 18$

## RF components

### Tappers



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	Output split ratio
5502.17.0038	84115006	N female	350 - 2700	2 : 1 / 3 dB
5502.17.0039	84115013	N female	350 - 2700	3 : 1 / 4.8 dB
5502.17.0040	84115014	N female	350 - 2700	4 : 1 / 6 dB
5502.17.0041	84115015	N female	350 - 2700	6 : 1 / 8 dB
5502.17.0042	84115016	N female	350 - 2700	10 : 1 / 10 dB
5502.17.0043	84115017	N female	350 - 2700	20 : 1 / 13 dB
5502.17.0044	84115018	N female	350 - 2700	30 : 1 / 15 dB
5502.17.0045	84115019	N female	350 - 2700	100 : 1 / 20 dB
5502.17.0046	84115020	N female	350 - 2700	1000 : 1 / 30 dB

### Wilkinson dividers



HUBER+SUHNER type	Item number	Interface	Frequency (MHz)	Split	Average power* (W)	Split loss (dB)	Output isolation (dB)
5501.17.0027	84104565	N female	380 - 2700	2-way	10	3	20
5501.17.0028	84104566	N female	380 - 2700	3-way	5	4.8	> 20
5501.17.0029	84104567	N female	380 - 2700	4-way	10	6	> 19
5502.17.0030	84104570	N female	698 - 2700	2-way	50	3	> 20
5502.17.0031	84104572	N female	698 - 2700	3-way	50	4.8	> 20
5502.17.0032	84104573	N female	698 - 2700	4-way	50	6	> 20

\* Used as divider into load

## RF components

### Power splitters

Description	Product	Splitting loss (dB)
Nominal split loss	2-way splitters	3.0
	3-way splitters	4.8
	4-way splitters	6.0
Isolation between ports	2-way splitters	6.0
	3-way splitters	9.5
	4-way splitters	12.0

### N types, 698 – 2700 MHz



HUBER+SUHNER type	Item no.	Split	Interface	Return loss input (dB)	Insertion loss (dB)	Average power (W)	IP rating
5502.17.0020	84093137	2-way	N female	min. 23	typ. 3.05	500	IP 67
5502.17.0028	84093138	3-way	N female	min. 23	typ. 4.85	500	IP 67
5502.17.0035	84104576	4-way	N female	min. 24	typ. 6.05	500	IP 67
5502.17.0036	84104577	5-way	N female	min. 17	typ. 7.05	500	IP 67
5502.17.0037	84104578	6-way	N female	min. 17	typ. 7.85	500	IP 67

## RF components

DIN 7/16 types, 698 - 2700 MHz



HUBER+SUHNER type	Item no.	Split	Interface	Return loss input (dB)	Insertion loss (dB)	Average power	IP rating
5502.41.0029	84086614	2-way	7/16 female	min. 24 dB	typ. 3.05 dB	500 W	IP 67
5502.41.0030	84104878	3-way	7/16 female	min. 23 dB	typ. 4.85 dB	500 W	IP 67
5502.41.0031	84104879	4-way	7/16 female	min. 19 dB	typ. 6.05 dB	500 W	IP 67

SMA types, 1700 - 2500 MHz



HUBER+SUHNER type	Item no.	Split	Interface	Return loss input (dB)	Insertion loss (dB)	Average power	IP rating
5502.19.0005	22650304	3-way	SMA male	min. 17.5 dB	typ. 0.2 dB	100 W	IP 20
5502.19.0004	22650303	2-way	SMA male	min. 19 dB	typ. 0.2 dB	100 W	IP 20
5502.19.0006	22650305	4-way	SMA male	min. 16.5 dB	typ. 0.2 dB	100 W	IP 20

## RF components

### Terminators, DIN 7/16, 50 Ω



HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Interface characteristics
6506.41.A	22550272	6	8	1.2	20.8	male
6506.41.B	22550271					female
65010_716-50-1	84048315	10	4	1.2	20.8	male
6515.41.A	22544577	15	8	1.2	20.8	male
6515.41.B	22544578					female
6525.41.AB	22643788	25	2	1.1	26.4	male
6525.41.BB	22643790					female
6525.41.AA	23007076		5	1.2	20.8	male
6560.41.AB	22643803	60	2	1.1	26.4	male
6560.41.BB	22643805					female
6560.41.AA	23008377		5	1.2	20.8	male
6560.41.BA	23010487					female

### Terminators, N, 50 Ω



HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Interface characteristics
6506.17.0001	22659464	6	6	1.25	19.1	male
65010_N-50-1	84047978	10	6	1.2	20.8	male
65010_N-50-4	84068990					female
6525.17AB	22643785	25	2	1.1	26.4	male
6525.17BB	22643787					female
6525.17AA	22642248		5	1.2	20.8	male
6525.17BA	22643786					female
6560.17AB	22643799	60	2	1.1	26.4	male
6560.17BB	22643801					female
6560.17AA	22643798		5	1.2	20.8	male
6560.17BA	22643800					female



## RF components overview

Attenuators, N, 50  $\Omega$ , connector configuration male to female

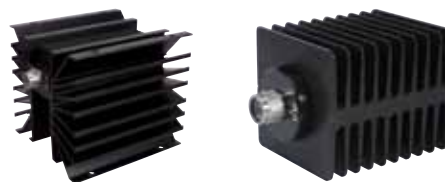


HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Nom. attenuation (dB)
5901_N-50-6	84060474	5	6	1.2	20.8	1
5902_N-50-6	84060477					2
5903_N-50-6	84060582					3
5904_N-50-6	84060583					4
5905_N-50-6	84060584					5
5906_N-50-6	84060587					6
5907_N-50-6	84060588					7
5908_N-50-6	84060589					8
5909_N-50-6	84060590					9
5910_N-50-6	84060597					10
5912_N-50-6	84060646					12
5915_N-50-6	84060647					15
5920_N-50-6	84060649	20				
5903.17.0003	22648036	10	6	1.25	19.1	3
5906.17.0003	22648039			1.35		16.5
5903.17.0004	22648037	25	6	1.25	19.1	3
5906.17.0004	22648040					6
5910_N-50-025	84067096			1.2	20.8	10
5920_N-50-025	84067101					20
5903.17.0005	22648038	50	6	1.25	19.1	3
5906.17.0005	22648041			1.35		16.5
5910_N-50-050*	84067128			1.25	19.1	10
5920_N-50-050*	84067127					20

\* Unidirectional unit, input port is the male connector.

## RF components

Attenuators, N, 50  $\Omega$ , connector configuration male to female

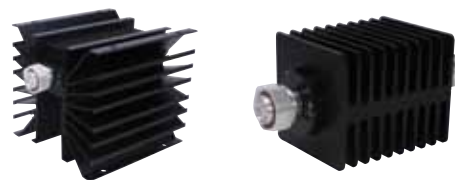


HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Nom. attenuation (dB)
5903_N-50-1	84060038	100	6	1.45	14.7	3
5906_N-50-1	84060058					6
5910_N-50-1	84060059					10
5920_N-50-1	84060060					20
5903_N-50-200	84067251	200	4	1.35	16.5	3
5906_N-50-200	84067260					6
5910_N-50-200	84067268					10
5920_N-50-200	84067269					20
5903_N-50-250	84065155	250	6	1.3	17.7	3
5906_N-50-250	84065181					6
5910_N-50-250	84065183					10
5920_N-50-250	84065184					20
5903_N-50-300	84065030	300	4	1.35	16.5	3
5906_N-50-300	84065095					6
5910_N-50-300	84065098					10
5920_N-50-300	84065099					20

All units are unidirectional, input port is the male connector.

## RF components

### Attenuators, DIN 7/16, 50 $\Omega$ , connector configuration male to female



HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Nom. attenuation (dB)
5903.41.0001	22652689	10	6	1.25	19.1	3
5906.41.0001	22652690			1.35	16.5	6
5910_716-50-010	84067139			1.45	14.7	10
5920_716-50-010	84067141					20
5906.41.0002	22651235	25	6	1.35	16.5	6
5910_716-50-025	84067156			1.2	20.8	10
5920_716-50-025	84067171					20
5903.41.0003	22651243	50	6	1.25	19.1	3
5906.41.0003	22650373			1.35	16.5	6
5910_716-50-050*	84067275			1.45	14.7	10
5920_716-50-050*	84067278					20

\* Unidirectional unit, input port is the male connector.

### Attenuator, DIN 7/16, 50 $\Omega$ , connector configuration male to female



HUBER+SUHNER type	Item no.	Power rating (W)	Frequency DC to (GHz)	VSWR max.	Return loss min. (dB)	Nom. attenuation (dB)
5903_716-50-1	84060159	100	2.5	1.35	16.5	3
5906_716-50-1	84060655					6
5910_716-50-1	84060657					10
5920_716-50-1	84060658					20

All units are unidirectional, input port is the male connector.

## Low IM termination / load

### Features

- Very low IM load
- High power carrying capability
- Wide frequency range
- Compact size
- Mounting bracket included

### Benefits

- Reliable design
- Applicable for all major cellular bands
- Excellent for multi-operator DAS



Electrical data	
Impedance ( $\Omega$ )	50
Frequency range (MHz)	698 to 2700
VSWR max.	1.15:1
3rd order intermodulation max.	static: -160 dBc at 2 x 43 dBm / 2 x 20 W carrier
RF CW power (W)	100

Mechanical data	
Weight (kg)	2.5
Dimensions (mm)	210 x 99 x 62 (height x width x depth), without bracket and connector

Environmental data	
Operating temperature ( $^{\circ}\text{C}$ )	-35 up to +70
Water	IP 67
2002/95/EC (RoHS)	compliant

Material data		
Piece part	material	surface plating
Housing	aluminium	black
Connector body	brass	tri-metal plating
Centre contact female	brass	tri-metal plating

Order information	
HUBER+SUHNER type	6599.41.0001
Item no.	84130809

# IM test kit

## Features

- All components needed for on-site IM and S-parameter tests with DIN 7/16 and N connectors
- Unique set of excellent IM test components including:
  - adapters
  - power load with two connectors
  - IM references at 900 and 1800 MHz
- Complete set of transmission line evaluation components including:
  - open
  - short
  - termination
- Components are easy to identify and handle through memorable designators
- Securely packed in a ruggedized case for outdoor use



## Benefits

- Existing and approved technology
- All components are available for on-site IM testing
- High mating cycles

Electrical data		
Impedance ( $\Omega$ )	50	
Frequency range (MHz)	690 to 2700	
3rd order intermodulation max.	static: -155 dBc at 2 x 43 dBm / 2 x 20 W carrier static: -160 dBc typ. at 2 x 43 dBm / 2 x 20 W carrier	
RF CW power (W)	50 for low IM components	
Mechanical data		
Number of matings	500 with max. torque of 30 Nm for DIN 7/16 or max. torque of 1 Nm for N interfaces, increased torque may reduce the number of matings significantly	
Environmental data		
Operating temperature ( $^{\circ}\text{C}$ )	0 up to +40	
2002/95/EC (RoHS)	compliant	
Material data		
Piece part	material	surface plating
Body	brass	tri-metal plating
Centre contact female	copper beryllium alloy	gold plating / silver plating / tri-metal plating
Centre contact male	brass	gold plating / silver plating / tri-metal plating
Order information		
Item no.	84108289	

# IM test kit

## IM test kit (cont.) - kit content

Part ID	Description	Configuration (connector series - gender)
<b>IM adapter, <math>\leq -155</math> dBc, 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power</b>		
ADP-1	adapter 1	DIN 7/16 female - female
ADP-2	adapter 2	DIN 7/16 male - male
ADP-3	adapter 3	DIN 7/16 male - female
ADP-4	adapter 4	N male - DIN 7/16 female
ADP-5	adapter 5	N female - DIN 7/16 female
ADP-6	adapter 6	N male - DIN 7/16 male
ADP-7	adapter 7	DIN 7/16 male - N female
ADP-8	adapter 8	N female - female
<b>IM standard, adjusted to <math>-57</math> dBm for 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power</b>		
IMS-1	IM standard 1, at 900 MHz	DIN 7/16 male - female
IMS-2	IM standard 2, at 1800 MHz	DIN 7/16 male - female
<b>IM load, <math>\leq -155</math> dBc, 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power</b>		
LOD-1	load termination 1	DIN 7/16 male and female
<b>Open circuit, <math>\leq -155</math> dBc typ. for 3rd order IM performance</b>		
OPN-1	open circuit 1	N male
OPN-2	open circuit 2	N female
OPN-3	open circuit 3	DIN 7/16 male
OPN-4	open circuit 4	DIN 7/16 female
<b>Short circuit, <math>\leq -155</math> dBc typ. for 3rd order IM performance</b>		
SHT-1	short circuit 1	N male
SHT-2	short circuit 2	N female
SHT-3	short circuit 3	DIN 7/16 male
SHT-4	short circuit 4	DIN 7/16 female
<b>50 <math>\Omega</math> termination, power rating: 1 W, VSWR max.: 1.1 for N series; 1.15 for DIN 7/16 series, no IM rating</b>		
TRM-1	fixed termination 1	N male
TRM-2	fixed termination 2	N female
TRM-3	fixed termination 3	DIN 7/16 male
TRM-4	fixed termination 4	DIN 7/16 female

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## Additional catalogues



### RF and Microwave Components Item no. 84068668

Coaxial attenuators  
Terminations  
RF power splitters  
Special products



### Distributed Antenna Systems (Brochure) Item no. 84078171

RF connectors, cables,  
assemblies, components  
Antennas  
Fiber management systems



### Lightning Protection Item no. 23002023

Lightning EMP protectors  
NEMP protectors  
Data line protectors  
DC blocks



### Fiber Optic Cables Item no. 84019826

Indoor cables  
Universal cables  
Outdoor cables  
Special cables



### Wireless Infrastructure Item no. 84126953

Remote radio installation  
solutions  
Conventional cell site  
solution



### Fiber Optic Connectors and Assemblies Item no. 84101808

Connectors and adapters  
Cable assemblies  
Connectors for harsh  
environment  
Equipment for serial pro-  
duction and measurement



### RF Coaxial Connectors General Catalogue Item no. 84019826

Micro miniature  
connectors  
Cable connectors  
Subminiature connectors  
Adaptors



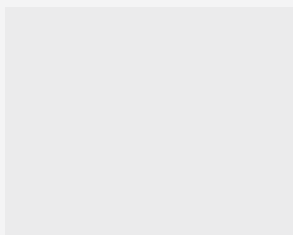
### Fiber Optic Cabling Systems Item no. 23029084

Pre-terminated cabling  
systems  
MASTERLINE  
SMARTLINE  
Mobile cabling system

HUBER+SUHNER is certified according to  
ISO 9001, ISO 14001, ISO/TS 16949 and IRIS.

**WAIVER**

It is exclusively in written agreements that we provide our customers with warrants and representations as to the technical specifications and/or the fitness for any particular purpose. The facts and figures contained herein are carefully compiled to the best of our knowledge, but they are intended for general informational purposes only.



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4387/16/02.2012



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