

safety in test > safety in flight

TESTFUCHS

Maintenance and Ground Support Equipment



Maintenance and Ground Support Equipment

HYDRAULICS

Hydraulic Ground Power Unit >HGPU< “Main Line Aircraft”
Hydraulic Ground Power Unit >HGPU< “Regional Aircraft”
Hydraulic Ground Power Unit >HGPU< Accessories
Test Equipment for Ram Air Turbines >PGRAT1< >RATMK< >RSIK1<
Water Separation System >WSS3-20<
Mobile Fill and Drain Device for Remote Chiller System >RCFD340<
Test Equipment For Supplemental Cooling System A350 >SCST1<
Fill and Drain Device >SCSFD380<
Device for Refill Supplemental Cooling System for A380 >SCSR1-1<
Waste Line Cleaning Trolley >WLC1<
Servicing Trolley for Flaps and Thrust Reversers >SFTR1<
Landing Gear Strut Servicing Trolley >LGST1<

PNEUMATICS

Nitrogen Filling Equipment >SFE300<
Cabin Pressurization Trolley >KDP8<
Cabine Pressure Tester >KDP4AF<
Reservoir Ventilaton Trolley >TBWIEX<
Vacuum Toilet Leak Tester For A380 >VTLT1<
Vacuum Toilet Leak Tester For A318/A319/A320/A321 >VTLT2<
Oxygen and Nitrogen Trolley >ONT1<

AIR CONDITION

Mobile Air Conditioner, Electric Motor Powered >BKG26EM<
Mobile Air Conditioner Diesel Motor Powered >BKG8D<

FUEL

Aircraft Fuel Sump Drain Equipment >ASE900<

BONDING TESTER

Reasons for Bonding Tests
Bonding Tester - Function
Bonding Tester >MVP10L-FS<
Bonding Tester >MVP10R-FS<
Test Equipment Bonding Tester >PA-MVP11<
Loop Resistance Tester - Function
Loop Resistance Tester >IM2-FS<
Antistatic Paint Testing - Function
Antistatic Paint Tester >IA2<
Bonding and Loop Resistance Tester >BLRT2<

Hydraulic Ground Power Unit - Mainline Aircraft 3000psi and 5000psi >HGPU<



Hydraulic Ground Power Unit used for maintenance and testing of mainline aircraft hydraulic systems (ATA Chapter 29).

Designed for all aircraft types with 3000psi or 5000psi hydraulic systems and a flow rate of up to 60USgpm.

- > Single system or dual independent systems (two motors and two pumps)
- > Easy pressure control using the Opsi, 3000psi / 5000psi push buttons as applicable
- > Very suitable hydraulic supply for "Ram Air Test Ground Checks" together with the Airbus certified TEST-FUCHS RAT Tester P/N PGRAT 1; RATMK; RATMK 380.
- > Automatic over temperature shutoff feature at 160°F (70°C)
- > Ramp function for soft pressure build-up
- > Pressure and flow rates are infinitely variable and limitable
- > The customer can choose whatever matches his requirements:
 - A wide range of options and accessories are available
 - In addition, any customer special wishes will be respected

RANGE OF APPLICATION

The >HGPU< family is designed for aircraft using Phospate-Ester Hydraulic Oil ("Skydrol" or "Hyjet") or Mineral Oil based Hydraulic Oil ("MIL-H-5606", "MIL-H-83282", "MIL-H-87257")

e. g.: Airbus:	Boeing:	Embraer:	Antonov:
A300	B737	ERJ135/145	AN124
A310	B747	E-Jets	AN148
A320	B757		
A330/340	B767		
A350	B777	Bombardier:	Sukhoi:
A380	B787	CRJ Series	SuperJet 100
A400M		C-Series	

GENERAL INFORMATION

- > The stainless steel hydraulic reservoir has a capacity of 63USgal (240l)
- > Hydraulic reservoir selection (A/C or >HGPU<) via illuminated buttons on the control panel
- > Easy draining and filling of the aircraft reservoirs is carried out by "Fill" / "Drain" push buttons
- > Two large oil-air coolers fan operated ensure optimum cooling
- > Easy access is provided by the hydraulically operated cover
- > Maximum towing speed is 15mph (25km/h)
- > When parked the control panel is protected (Accessories 04 - "Weatherproof Cover for Control Panel")
- > Dual system without a transfer gear box (to prevent the possibility of hydraulic/lubricating oil contamination)
- > A large fuel tank (53USgal (200l)) is fitted to the diesel version enabling 8 hours of continuous operation

TECHNICAL DATA (ELECTRIC AND DIESEL DRIVEN >HGPU<)

> Hydraulic Parameters:

High Pressure Circuit - Single System:

100 - 3000psi at max. 50 - 60gpm

(7 - 207bar at max. 190-227lpm)

max. 4000psi (275bar) at

reduced flow rate

100 - 5000psi at max. 60gpm

(7 - 345bar at max. 227lpm)

max. 5300psi (375bar) at

reduced flow rate

High Pressure Circuit - Dual System:

2 x 100 - 3000psi at max. 2 x 25

at 2 x 30gpm

(2 x 7 - 207bar at max. 2 x 95

at 2 x 114lpm)

max. 2 x 4000psi (2 x 275bar) at

reduced flow rate

Depending on the type of the equipment, the following hydraulic oils can be used:

Phosphate-Ester Hydraulic Oil

("Skydrol" or "Hyjet")

or Mineral Oil based Hydraulic Oil

("MIL-H-5606", "MIL-H-83282",

"MIL-H-87257")

Filter:

3 micron in filling circuit, 6 micron in each low and high pressure circuit

25 micron in return (Option D)

> Measurement Accuracy:

Supply pressure (analog): 0 - 5800psi (0 - 400bar),
cl. 1 (EN 837)

Return pressure (analog): 0 - 145psi (0 - 10bar),
cl. 1.6 (EN 837)

Oil temperature indicator: 0 - 100°C

Flow measurement (Options A,B):

Single circuit 0.08 - 66gpm
(0.32 - 250lpm)
±1% of full scale

Dual circuit 0.08 - 42gpm
(0.32 - 160lpm)
±1% of full scale

ELECTRIC MOTOR DRIVEN >HGPU< WITH SINGLE SYSTEM

<p>> Electrical Parameters (requirements):</p> <p>Supply: 3/PE AC 50-60Hz 400V</p> <p>Nominal current: 125 - 150A 63 - 80A 250 - 280A</p> <p>Power: approx. 86 - 104kVA approx. 44 - 59kVA approx. 173kVA</p>	<p>> Dimensions and weight:</p> <p>Length (towbar folded up): 12.5ft (3800mm) 9.4ft (2850mm) 13.0ft (3950mm)</p> <p>Width: 5.9ft (1800mm) 5.2ft (1600mm) 5.9ft (1800mm)</p> <p>Height: 5.6ft (1700mm) 4.9ft (1500mm) 5.6ft (1700mm)</p> <p>Weight: 5500lb (2500kg) 3530lb (1600kg) 6400lb (2900kg)</p>
<p>> Operating conditions:</p> <p>Ambient temperature: -25 to +45°C (-13 to +113°F)</p> <p>Noise emission: max. 75dB(A) at 1m distance</p>	

ELECTRIC MOTOR DRIVEN >HGPU< WITH SINGLE SYSTEM Cover open

- 1 Filter (6 micron) for each high and low pressure circuit
- 2 Filter (25 micron) in the return line (Option D)
- 3 Filling pump to refill the aircraft reservoir
- 4 Two large oil-air coolers
- 5 A hand pump enables easy and quick opening of the cover
- 6 Drive motor



ELECTRIC MOTOR DRIVEN >HGPU< WITH DUAL SYSTEM

> Electrical Parameters (requirements):

Supply:	3/PE AC 50-60Hz 400V
Nominal current:	125 - 150A 63 - 80A
Power:	approx. 86 - 104kVA approx. 44 - 59kVA

> Operating conditions:

Ambient temperature:	-25 to +45°C (-13 to +113°F)
Noise emission:	max. 75dB(A) at 1m distance

> Dimensions and weight:

Length (towbar folded up):	12.5ft (3800mm) 9.4ft (2850mm)
Width:	5.9ft (1800mm) 5.2ft (1600mm)
Height:	5.6ft (1700mm) 4.9ft (1500mm)
Weight:	5500lb (2500kg) 3530lb (1600kg)

ELECTRIC MOTOR DRIVEN >HGPU< WITH DUAL SYSTEM

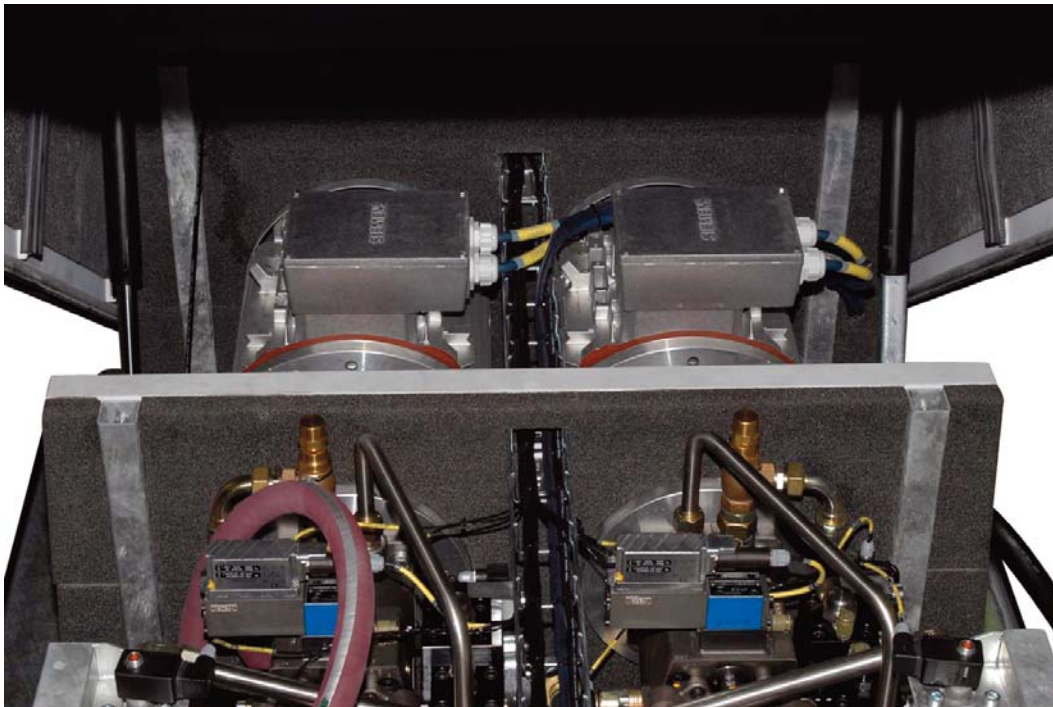


Figure shows interior view of an >HGPU< with dual system. The two electric pump drive motors for the two independent hydraulic circuits drive the DUAL SYSTEM without interconnection with each other.

DIESEL ENGINE DRIVEN >HGPU<

> Deutz Diesel Engine:

Six cylinder, four-stroke in-line engine
Common Rail, 128kW

> Operating conditions:

Ambient temperature: -25 to +45°C
(-13 to +113°F)

Noise emission: approx. 84dB(A) at control panel
(at 2200rpm, approx. 50gpm, 3000psi)

> Dimensions and weight:

Length (towbar folded up):
14.6ft (4450mm)

Width: 5.9ft (1800mm)

Height: 5.6ft (1700mm)

Weight: 6400lb (2900kg)

DIESEL ENGINE DRIVEN >HGPU< Cover open

- ① Ventilation grille prevents heat accumulation inside the >HGPU<
- ② Six cylinder diesel engine drive 128kW
- ③ Large diesel tank for 8hrs continuous operation
- ④ Openings for transport with forklift truck
- ⑤ Chassis with towbar



Control Panel

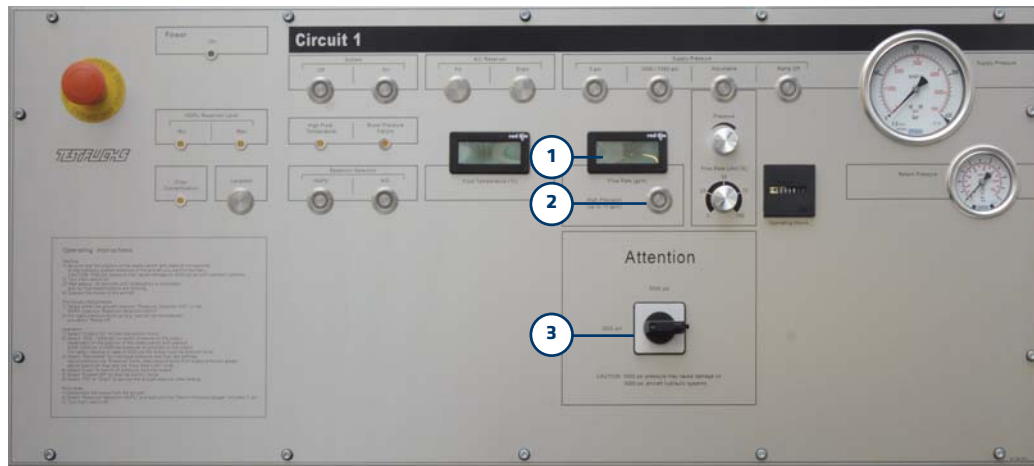


Figure shows the control panel of an electric driven >HGPU< with Single System, 5000psi

1

Digital indicator for flow measurement (Option A)

2

Illuminated button for activating the leakage measurement (Option B) for "ITCAN/TARAN-Test"

3

Selector switch to change between 3000 and 5000psi operations (only fitted to >HGPU60-50-1S<)

WEATHERPROOF COVER FOR CONTROL PANEL (ACCESSORIES 04) for protection when stored out of doors



The weatherproof cover is easy to close with latch locks

ELECTRIC MOTOR DRIVEN >HGPU< (3000psi)

Suitable for aircraft with 3000psi System

Type	System	Flow (USgpm)*	Motor (kW)
HGPU50-30-1	Single	50	75
HGPU60-30-1	Single	60	90
HGPU25-30-2	Dual (independent)	2 x 25	2 x 37
HGPU30-30-2	Dual (independent)	2 x 30	2 x 45
HGPU25-30-1	Single	25	37
HGPU30-30-1	Single	30	45
HGPU8-30-2	Dual (independent)	2 x 8	2 x 15
HGPU12-30-2	Dual (independent)	2 x 12	2 x 22

* the specified values are based on the nominal flow at 50Hz supply, the values are proportionately higher at 60Hz.

ELECTRIC MOTOR DRIVEN >HGPU< (5000psi)

Suitable for aircraft with either a 3000psi System or a 5000psi System

Type	System	Flow (USgpm)*	Motor (kW)
HGPU60-50-1	Single	60	132

* the specified values are based on the nominal flow at 50Hz supply, the values are proportionately higher at 60Hz.

DIESEL ENGINE DRIVEN >HGPU< (3000psi)
Suitable for aircraft with 3000psi System

Type	System	Flow (USgpm)	Engine (kW)
HGPU50-30-1D	Single	50	128

REAR VIEW OF AN >HGPU< WITH DUAL SYSTEM



1

Short description for simple and easy operation in the required language (Option S)

2

Clear and ergonomic design of control panel with all control and indication elements

OPTIONS

OPTION	Description
A	Flow measurement with digital indicator: Single system 2 to 66USgpm (10 to 250l/min), ±1% of full scale Dual System (independent) 1.3 to 42gpm (5 to 160l/min), ±1% of full scale
B	Leakage measurement: 0.08 to 5.3USgpm (0.32 to 20l/min), ±1% of full scale
B1	Leakage measurement: 0.11 to 10.6USgpm (0.40 to 40l/min), ±1% of full scale
C	Flushing circuit with loading system
D	Filter (25 micron) in the return line
G	Required hose lengths differing from the standard 33ft (10m) for Single System and 39ft (12m) for Dual System <u>must be specified by costumer.</u>
H	Electrical soft start
K	Sampling points
L	Connected Mode for >HGPU< with Dual System. The hose lengths will be 33ft long.
R	Cover color change from standard blue (RAL 5007) / white (RAL 9003) <u>The required color combination must be specified by the costumer including the RAL standard.</u>
S	Changes to the standard languages German, English, Russian, Spanish for front panel <u>markings must be clearly defined by the costumer as an additional requirement.</u>
T	Dual Output Kit for >HGPU< with Single System

ORDERING INSTRUCTIONS

1) DEFINE THE REQUIRED TYPE OF >HGPU<

2) SELECT THE MOTIVE POWER OF >HGPU<

Diesel drive: Specify the ID Letter "D"

Electric drive: No specification of an ID Letter is required

3) SELECT THE REQUIRED TYPE OF MEDIUM

Phosphate-Ester Hydraulic Oil ("Skydrol" or "Hyjet")

Specify the ID Letter "S"

Mineral Oil based Hydraulic Oil ("MIL-H-5606", "MIL-H-83282", "MIL-H-87257")

Specify the ID Letter "M"

4) SELECT ADDITIONAL FEATURES AS REQUIRED

Required Information			Options
HGPU50-30-1	D	S	A, B, B1, C, D, G, H, K, L, R, S, T
1) >HGPU< TYPE			
2) DRIVE TYPE (DIESEL)			
3) MEDIUM TYPE			
4) ADDITIONAL FEATURES			

ACCESSORIES

The hydraulic couplings necessary for connection to the aircraft as well as the required hydraulic medium and the electrical connection plug are not included in the standard scope of delivery.

An extensive offer of hydraulic couplings (Coupling Kits) and other accessories are in the brochure "Hydraulic Ground Power Unit >HGPU< - Accessories".

Hydraulic Ground Power Unit - Regional Aircraft

>HGPU<

3000psi at 12USgpm



Hydraulic Ground Power Unit used for maintenance and testing of regional aircraft hydraulic systems (i. a. w. ATA Chapter 29).

Designed for all aircraft types with 3000psi systems and a flow rate of up to 12USgpm.

- > Single hydraulic system capable of open or closed circuit operation
- > Easy pressure control using "0psi" and "3000psi" push buttons
- > Ramp function ensures a controllable pressure build up
- > Pressure and flow rates are infinitely variable and limitable
- > The customer can choose whatever matches his requirements
 - e.g. pressure, single or dual system, hydraulic fluids, electric or diesel driven, accessories etc.
 - In addition, any customer special wishes will be respected.

RANGE OF APPLICATION

The HGPU family is designed for aircraft using Phospate-Ester Hydraulic Oil ("Skydrol" or "Hyjet") or Mineral Oil based Hydraulic Media ("MIL-H-5606", "MIL-H-83282", "MIL-H-87257")

ATR: 42/72	Bombardier: CRJ Series Dash 8 / Q 100-300	Embraer: ERJ135/145	Pilatus: PC-12 PC-21
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GENERAL INFORMATION

- > The stainless steel hydraulic reservoir has a capacity of 19USgal (70l)
- > Open or closed circuit operation is selected electrically (Option P)
- > Easy draining and filling of the aircraft reservoirs is carried out by "Fill"/"Drain" push buttons (Option M)
- > A large oil-air cooler fan operated ensures optimum cooling
- > Easy access for maintenance is provided by a hinged cover which is fitted with gas spring struts
- > Maximum towing speed is 15mph (25km/h)
- > Designed to be used in an external environment

TECHNICAL DATA

> Hydraulic Parameters:

High pressure circuit:

100 - 3000psi at max. 8 - 12USgpm
(7 - 207bar at max. 30 - 45lpm)
max. 3500psi (240bar) at reduced
flow rate

Test medium (depending on type of equipment):

Phosphate-Ester Hydraulic Oil ("Sky-
drol" or "Hyjet") or Mineral Oil
based Hydraulic Media
("MIL-H-5606", "MIL-H-83282",
"MIL-H-87257")

Filter: 3 micron in filling and low
pressure circuit

; 3 micron in high pressure circuit;
25 micron in return (Option D)

> Electrical parameters (requirements):

Supply: 3/N/PE AC 50-60Hz 400V
3/N/PE AC 50-60Hz 230V
Nominal current: 30A / 50A
Power: approx. 20kVA

> Dimensions and weight:

Length: 6.2ft (1900mm)
Length: 6.9ft (2100mm) (Option N)
Width: 3.9ft (1200mm)
Height: 4.9ft (1500mm)
Weight: approx. 1.870lb (850kg)

> Measurement range:

Supply pressure (analog): 0 - 3600psi
(0 - 250bar),
cl. 1 (EN 837)

Return pressure (analog): 0 - 145psi
(0 - 10bar),
cl. 1,6 (EN 837)

Oil temperature indicator: 0 - 100°C

Flow measurement (Option A): 0,05 - 12USgpm
(0.2 - 46lpm), ±1% F.S.

> Operating conditions:

Operating temperature: -25 to +45°C
(-13 to +113°F)

Noise emission: max. 73dB(A) at 1m distance

HYDRAULIC GROUND POWER UNIT Cover open

- ① Filter (3 micron) in filling/low pressure circuit and in high pressure circuit
- ② Retaining brackets for electrical connection cable
- ③ Chassis with towing bar (Option N)
- ④ The large oil-air cooler
- ⑤ Gas spring struts enabling easy operation of the hinged cover
- ⑥ Electrical drive motor



HYDRAULIC GROUND POWER UNIT Cover closed

- ① Hydraulic connection hoses
- ② Test sampling points (Option K)
- ③ Braked swivelling castors and steering arm <HGPU>
- ④ Forklift truck access points
- ⑤ Non-standard color (Option R)



CONTROL PANEL



1 Digital indicator for flow measurement (Option A)

2 Digital indicator for oil temperature measurement

3 Quick guide for operation of the ground power unit. The required language can be ordered (Option S)

4 Pressure gauges for supply and return pressure

REAR VIEW OF AN <HGPU>

- 1 Locking screws for the switch cabinet access doors
- 2 Main switch of the <HGPU>
- 3 Grounding screw for potential equilization
- 4 Electrical connection cable
- 5 Hydraulic hoses for connecting the <HGPU> to the aircraft



3000psi Hydraulic Ground Power Unit >HGPU< Suitable for aircraft with 3000psi system

Type	System	Flow (USgpm)	Motor (kW)
HGPU8-30-1	Single	8	15
HGPU12-30-1	Single	12	22

OPTIONS

OPTION	DESCRIPTION
A	Flow measurement with digital indicator: 0,05 to 12USgpm (0,2 to 46lpm) ±1% of full scale
C	Flushing circuit with loading system
D	Filter (25 micron) in the return line
G	Required hose lengths differing from the standard 20ft (6 m) <u>must be specified by the costumer.</u>
K	Test sampling points
M	Electrical filling pump
N	Chassis with steering axle and towing bar
P	Electrically selectable open/ closed hydraulic circuit operation
R	Cover color change from standard blue (RAL 5007)/ white (RAL 9003) <u>The required color combination must be specified by the costumer including the RAL standard</u>
S	<u>Changes to the standard languages German, English, Russian, Spanish for front panel markings must be clearly defined by the costumer as an additional requirement.</u>
T	Dual Output Kit

ORDERING INSTRUCTIONS

1) DEFINE THE REQUIRED TYPE OF >HGPU<

2) SELECT THE REQUIRED TYPE OF MEDIUM

Phosphate Ester Hydraulic Oil ("Skydrol" or "Hyjet")

Specify the ID Letter "S"

Mineral Oil based Hydraulic Media ("MIL-H-5606", "MIL-H-83282", "MIL-H-87257")

Specify the ID Letter "M"

3) SELECT ADDITIONAL FEATURES AS REQUIRED

Required information		Options
HGPU8-30-1	S	A, C, D, G, K, M, N, P, R, S, T
1) >HGPU< TYPE		
2) MEDIUM TYPE		
3) ADDITIONAL FEATURES		

ACCESSORIES

The hydraulic couplings necessary for connection to the aircraft as well as the required hydraulic medium and the electrical connection plug are not included in the standard scope of delivery.

An extensive range of hydraulic couplings (Coupling Kits) and other accessories are in the brochure "Hydraulic Ground Power Unit <HGPU> - Accessories".

Hydraulic Ground Power Unit - Accessories

>HGPU<

1. Hydraulic Coupling Kit

There are basically two types of Coupling Kits:

- a) female (CK...F)
- b) male (CK...M)

a)



Supply



Return

b)



Supply



Return

Illustrative example - CK001F

Illustrative example- CK001M

a) Coupling Kit female, complete (CK...F):

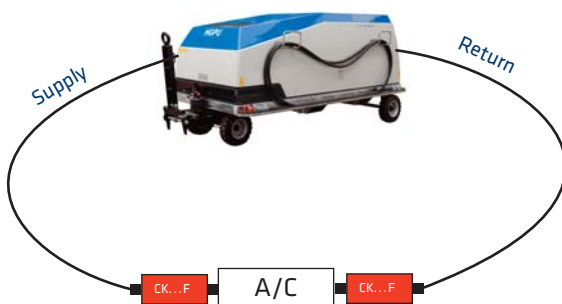
This Coupling Kit is required to connect the single system hydraulic hoses of HGPU to an aircraft.

Note:

For an HGPU with Dual System two Coupling Kits are required.

b) Coupling Kit male, complete (CK...M):

This Coupling Kit is required to connect the Option C (flushing circuit with loading mechanism) with the hydraulic hoses of HGPU (which are equipped with a Coupling Kit female (CK...F)).



The currently available Coupling Kits are as follows

PN	DESIGNATION	TYPE OF AIRCRAFT	
CK001F	Coupling Kit, Female, Complete	AIRBUS: BOEING: LOCKHEED:	all except A380, A350 B747, B757, B767, B777, DC-10, MD-11 L-1011
CK002F	Coupling Kit, Female, Complete	AIRBUS:	A380, A350
CK003F	Coupling Kit, Female, Complete	BOEING: FOKKER: BOMBARDIER:	B707, B737-100 to 900, DC-9, MD-80 70, 100 Global 5000
CK004F	Coupling Kit, Female, Complete	LOCKHEED:	C-130
CK005F	Coupling Kit, Female, Complete	BOMBARDIER:	CRJ-200, 700, 900, 1000
CK006F	Coupling Kit, Female, Complete	EMBRAER:	ERJ-135, 140, 145
CK007F	Coupling Kit, Female, Complete	BOEING:	B787
CK008F	Coupling Kit, Female, Complete	ATR:	42, 72
CK009F	Coupling Kit, Female, Complete	PILATUS	PC-6, PC-7, PC-9, PC-12, PC-21
CK010F	Coupling Kit, Female, Complete	SUKHOI	SuperJet 100
CK011F	Coupling Kit, Female, Complete	EUROCOPTER	Tiger
CK012F	Coupling Kit, Female, Complete	EUROCOPTER	NH90
CK013F	Coupling Kit, Female, Complete	EMBRAER	E-170, 175, 190, 195
CK014F	Coupling Kit, Female, Complete	EUROCOPTER	AS332-Super Puma, AS365-Dauphin
CK015F	Coupling Kit, Female, Complete	EUROCOPTER	BK117, BO105, EC135, EC145
CK016F	Coupling Kit, Female, Complete	LOCKHEED	P-3 ORION
CK017F	Coupling Kit, Female, Complete	CASA	CASA CN235, C295
CK018F	Coupling Kit, Female, Complete	FOKKER	50
CK019F	Coupling Kit, Female, Complete	BOMBARDIER	DASH 8 Q400
CK020F	Coupling Kit, Female, Complete	CESSNA	525
CK021F	Coupling Kit, Female, Complete	ANTONOV	148
CK022F	Coupling Kit, Female, Complete	BAe CESSNA FOKKER GULFSTREAM	146 Citation X750 28 350 - 650

All listed Coupling Kits female can be provided with the matching male part

e.g.: **CK001M** matches with **CK001F** and etc.

Further Coupling Kits are available on request!

2. Adapter Hose Kit



Example of AHK001 Adapter Hose Kit

An Adapter Hose Kit (hose length 2m) enables the HGPU fitted with a particular Coupling Kit to be used on another aircraft type without changing the HGPU fitted Coupling Kit.

Advantage: time saved and oil spill prevented.

Example of usage:

An HGPU is fitted with the Coupling Kit CK001F and is to be used on a B737.

The Adaptor Hose Kit AHK001 is connected with the Coupling Kit CK001F (fitted to the HGPU) and with the B737.

It is not necessary to change coupling.

Note:

For a Dual System HGPU, two Adaptor Hose Kits are required.



The currently available Adapter Hose Kits are as follows

PN	THE COUPLING KIT MOUNTED ON THE HGPU (CK...F) OR ADAPTER HOSE KIT (AHK...)	ATTACHABLE AIRCRAFT TYPES
AHK001	CK001F AHK002, AHK003 (compatible with all AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	BOEING B707, B737-100 to 900, DC-9, MD-80 FOKKER 70, 100 BOMBARDIER Global 5000
AHK002	CK002F (compatible with A380, A350)	AIRBUS, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011
AHK003	CK007F (compatible with B787)	AIRBUS, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011
AHK004	CK001F AHK002, AHK003 (compatible with AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	BOMBARDIER CRJ-200, 700, 900, 1000
AHK005	CK002F (compatible with A380, A350)	BOEING B787
AHK006	CK001F AHK002, AHK003 (compatible with AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	BOMBARDIER DASH 8 Q400
AHK007	CK001F AHK002, AHK003 (compatible with AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	EMBRAER E-170, 175, 190, 195
AHK008	CK001F AHK002, AHK003 (compatible with AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	ATR 42, 72
AHK009	CK011F (compatible with EUROCOPTER Tiger)	EUROCOPTER NH90

The currently available Adapter Hose Kits are as follows (Continuation)

PN	THE COUPLING KIT MOUNTED ON THE HGPU (CK...F) OR ADAPTER HOSE KIT (AHK...)	ATTACHABLE AIRCRAFT TYPES
AHK010	CK003F (compatible with BOEING B707, B737-100 bis 900, DC-9, MD-80 FOKKER 70, 100)	BOMBARDIER CRJ-200
AHK011	CK001F AHK002, AHK003 (compatible with AIRBUS aircraft types, with an exception of A380, A350 BOEING B747, B757, B767, B777, DC-10, MD-11 LOCKHEED L-1011)	BAe 146 CESSNA Citation X750 FOKKER 28 GULFSTREAM 350 - 650

Note: 2 different Adaptor Hose Kits can also be used in combination (in series).

- e.g.:
- Adaptation of an HGPU with B787 Coupling Kit (CK007F) to B737
[HGPU + CK007F + AHK003 + AHK001] compatible with B737
 - Adaptation of an HGPU with A380 Coupling Kit (CK002F) to B737
[HGPU + CK002F + AHK002 + AHK001] compatible with B737



Further Adapter Hose Kits are available on request!

3. Other Accessories

DUST COVER FOR HGPU IN THE APPROPRIATE SIZE

(Please, specify the type of HGPU)
(TEST-FUCHS item no. 151040061)
ACCESSORY 01

The Dust Cover protects the HGPU from external hazard

compatible with the following HGPU-types:

- <HGPU50-30-1>
- <HGPU60-30-1>
- <HGPU25-30-2>
- <HGPU30-30-2>



SAMPLING SET

(TEST-FUCHS item no. 151040062)
ACCESSORY 02

The Sampling Set (consisting of a sampling glass with connection hose) is used for taking oil samples from the hoses at HGPU (Option K - sampling points is a requirement for this accessory).



2 SPARE SAMPLING GLASSES

(TEST-FUCHS item no. 151040063)
ACCESSORY 03

The spare sampling glasses can be used as extension to the Sampling Set.



WEATHERPROOF COVER FOR CONTROL PANEL

(Please, specify the type of HGPU)
(TEST-FUCHS item no. 151040050)
ACCESSORY 04

The cover is used for permanent protection of the control panel when the HGPU is parked out of doors.

compatible with the following HGPU-types:

- <HGPU60-50-1>
- <HGPU50-30-1>
- <HGPU60-30-1>
- <HGPU25-30-2>
- <HGPU30-30-2>



Further accessories are available on request!

Technical data are subject to change!

TEST EQUIPMENT FOR RAM-AIR TURBINES

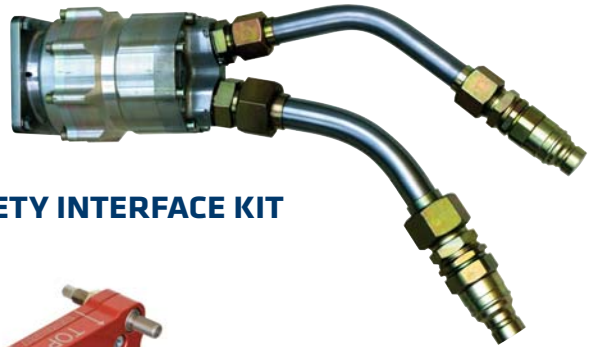
TEST EQUIPMENT RAT

>PGRAT1<



GROUND CHECK MOTOR RAT

>RATMK<



RAT SAFETY INTERFACE KIT

>RSIK1<



AIRBUS CERTIFIED

> Originally designed for

- A318,
- A320 (from S/N 1050),
- A330 - 200/300,
- A319,
- A321,
- A340 - 200/300/500/600

> Test device and RAT-Motor AIRBUS certified

- >PGRAT1< Certificate-No: D 29065, D 29066
- >RATMK< Certificate-No: D 29071, D 29072
- >RSIK1< Certificate-No: D 29057

> This test equipment is necessary to accomplish a functional test of the Ram Air Turbine (RAT)

> Compact stainless steel construction

> Storage space for RAT-Motor, cables and hoses in the test device

> Skydrol-resistant construction with sealed electrical chamber and safety glass cover plate

> RAT-Motor available in two versions

> Operation with battery / mains or aircraft supply

Test Equipment RAT >PGRAT1<

TECHNICAL DATA

> Hydraulic parameter

Measuring circuit with loading throttle

High pressure filter with mechanic contamination indication, 6 mic

Oil relief valve G 1/4"

> Measurements

Flow measurement, digital
1.3 - 40 gpm (5 - 150 lpm) Cl.1.0

Temperature indicator, analog
0 - 100 °C Cl. 1.0

Pressure indicator, analog
0 - 3600 psi (0 - 250 bar) Cl. 1.0

RAM-AIR pressure indicator, digital
0 - 4000 psi (0 - 275 bar) Cl. 0.5

RAM-AIR speed indicator, digital
0 - 9999 rpm \pm 2 rpm

> Standard accessories

Hose l = 13 ft (4.0 m) with
Aeroquip-Coupling with protective cap,
(P/N AE 95074 N)

Hose l = 13 ft (4.0 m) with
Aeroquip-Coupling with protective cap
(P/N AE 94186 P)

Supply and test cable <PKL 730-1> for
RAM-AIR pressure- and speed indicator and
28 V DC A/C supply

Supply cable <PKL 730-2> for 28 V DC
A/C supply

Charging- and supply cable <PKL 730-3> for
test equipment RAT (Range 90-260 V AC, 47 - 63 Hz)

> Dimensions and weight

Width: approx. 3 ft (920 mm)
Depth: approx. 2.9 ft (900 mm)
Height: approx. 3.9 ft (1200 mm)
Weight: approx. 540 lb (245 kg) net

Rear side



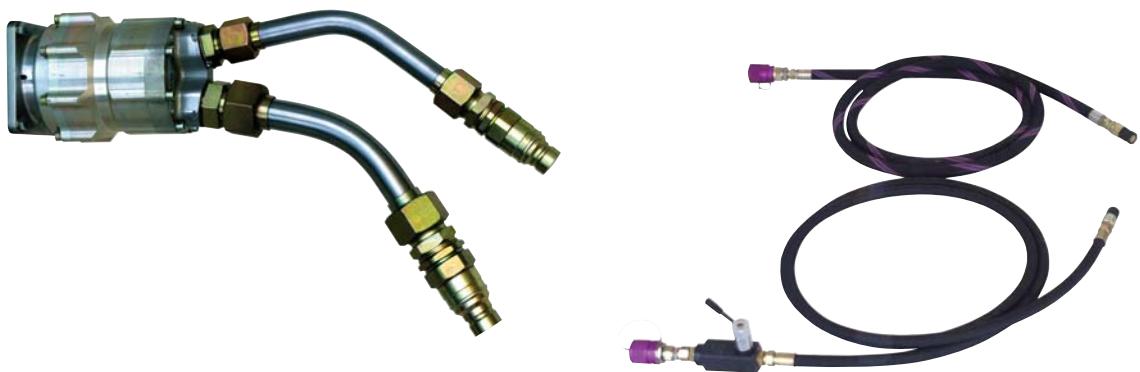
Control panel



RAT-Motor for Ground Check >RATMK<

- > This ground check motor, driven by a hydraulic ground power unit is necessary to accomplish a functional test of the Ram Air Turbine (RAT).
- > Aluminium light-weight construction
- > Fully exchangeable with Abex Motor P/N AM8C-12 AGE 10690-9
- > Storage in the drawer of the test equipment RAT >PGRAT1<

Version 1: A 313165-1



Version 2: A 313165-2



Differences >RATMK< Version 1 and Version 2

- | | |
|------------|---|
| Version 1: | <ul style="list-style-type: none">> Supply and return hoses for the RAT-Motor are part of delivery> RAT-Motor is equipped with leak-free industrial couplings> Appropriate to the RAT-Motor one end of the hose is equipped with a leak-free industrial couplings, the other end is equipped with standard Aeroquip-couplings (AE 96997 M, AE 96996 P)> Supply hose with integrated flow regulator> Equivalent to RAT-Motor-Kit AGE 10600A |
| Version 2: | <ul style="list-style-type: none">> No hoses for RAT-Motor> RAT-Motor is equipped with standard Aeroquip-couplings (AE 96997 M, AE 96996 P) |

TECHNICAL DATA

> RAT-Motor, P/N GM 743 100		RAT-Motor housing connections:	
Medium:	Skydrol	Inlet and outlet	MS 33649-12
Absorption capacity:	3.5 cb.in (22.30 cm ³ /U)	RAT-Motor-inlet:	MS 33656-16
Rated pressure:	3000 psi (210 bar)	RAT-Motor-outlet:	MS 33656-20
Speed:	6000 rpm	> Minimum performance data of the ground power unit	
Torque:	≥ 46 Nm at 166 bar Diff.		
Absorption current:	max. 39 gpm (148 lpm)		
Max. speed:	max. 6500 rpm at min. 267 lb/in (30 Nm)		
Inlet temperature:	-20 to +75 °C		
Rotation:	CW		
Min. load:	≥ 15 Nm at 5000 rpm	> Version 1:	
Test pressure - static:	Inlet 4500 psi (310.3 bar) Outlet and Housing 250 psi (17.3 bar)	Pressure:	min. 3000 psi (210 bar) with pressure regulation
		Flow:	min. 40 gpm (150 lpm)
		> Version 2:	
		Pressure:	min. 3000 psi (210 bar) with pressure regulation
		Flow:	min. 40 gpm (150 lpm) with pressure regulation
		Connections:	Supply hoses min. 20 ft (6 m)

STANDARD ACCESSORIES

> Version 1:		> Version 2:	
Supply hose with integrated flow regulator, l = 20 ft (6 m)		Rigid supply and return connections	
Return hose, l = 20 ft (6 m)		Inlet coupling with protective cap, Aeroquip, P/N AE 96997 M	
Leak-free industrial coupling for connecting the RAT-Motor		Outlet coupling with protective cap, Aeroquip, P/N AE 96996 P	
Inlet coupling with protective cap, Aeroquip P/N AE 96997 M		Transport case	
Outlet coupling with protective cap, Aeroquip P/N AE 96996 P			
Transport case			
Dimensions and weight		Dimensions and weight	
Width :	approx. 3.9 ft (1200 mm)	Width:	approx. 2.3 ft (700 mm)
Depth:	approx. 2.6 ft (800 mm)	Depth :	approx. 1.5 ft (450 mm)
Height:	approx. 1.4 ft (440 mm)	Height :	approx. 0.7 ft (200 mm)
Weight:	approx. 86 lb (39 kg) (net, without transport case)	Weight :	approx. 26.5 lb (12 kg) (net, without transport case)

RAT Safety Interface Kit

>RSIK1<



Developed to protect aircraft components from damage during RAT ground test. This damage could occur when the gasket (drive shaft seal) of the RAT Ground Check Motor fails.

The RAT Safety Interface Kit can be used in conjunction with all AIRBUS approved RAT Ground Check Motors.

- > AIRBUS approved - certificate-number: D29057
- > Intermediate flange suitable for every RAT Ground Check Motor product
- > Comes with detailed instructions
- > Scope of delivery includes rugged transport case

TECHNICAL DATA

<p>> Medium:</p> <p>SKYDROL 500-B4, SKYDROL 5 and SKYDROL LD-4 HYJET IV-4A and HYJET V</p>	<p>> Operating conditions:</p> <p>Ambient temperature: -20 to +50°C (-4 to +122°F)</p> <p>Relative humidity: 50% at 40°C (104°F) at low temperatures higher relative humidities are permitted (e.g. 90% at 20°C (68°F))</p>
<p>> Dimensions and weight of the transport case:</p> <p>Length: approx. 450mm (1.5ft) Width: approx. 280mm (0.9ft) Height: approx. 120mm (0.4ft) Weight: approx. 3kg (6.6lb)</p>	

SCOPE OF DELIVERY

POS. NO.	PIECE	DESIGNATION	PART NUMBER (TKZ)	ORDER NUMBER (TAN)
1	1	RAT SAFETY INTERFACE ADAPTER consists of:	<GM1084014>	107502290
2		1 pc. adapter plate with AN16 connecting screw	<M1094146>	107505399
3		1 pc. adapter pinion	<M1064267>	107501874
4		4 pcs. attachment screws	<M1082071>	107502288
5		4 pcs. high beams	DIN 125A 8,4	107011318
6		4 pcs. mounting nuts	<M1091019>	107503764
7	1	conducting hose	<GM1081029>	107504197
8	1	substitute - locking spring	<M771161>	107020566
9	1	transport case	<M1094145>	107505396



Technical data are subject to change!

TYPE KEY

DESCRIPTION	TYPE KEY
Test equipment for RAM-Air Turbines, consisting of: > Test equipment RAT >PGRAT1< and RAT-Motor >RATMK< Version 1	>PGRAT1-1<
Test equipment for RAM-Air Turbines, consisting of: > Test equipment RAT >PGRAT1< and RAT-Motor >RATMK< Version 2	>PGRAT1-2<
Test equipment for RAM-Air Turbines complete, consisting of: > Test equipment RAT >PGRAT1<, RAT-Motor >RATMK< Version 1 and RAT Safety Interface Kit >RSIK1<	>PGRAT1-1-RS<
Test equipment for RAM-Air Turbines complete, consisting of: > Test equipment RAT >PGRAT1<, RAT-Motor >RATMK< Version 2 and RAT Safety Interface Kit >RSIK1<	>PGRAT1-2-RS<

Water Separation System

>WSS3-20<



Innovative atomization and vacuum separation concept separates water and Skydrol.

The equipment reaches a water concentration below 1000ppm.

The water content in the Skydrol (200l) is reduced from 5000ppm to below 1000ppm with an ambient temperature of 20°C within 8 hours.

- > Autonomous device with system ON/ OFF button
- > Integrated humidity sensor
- > Manual operation with analog indication
- > Leak oil free self-sealing-coupling for supply and return
- > Skydrol-resistant

GENERAL INFORMATION

- > Upper cover standard RAL5017, optionally a different colour can be chosen
- > Automatic overtemperature shutdown at 100°C
- > Mobile setup with fixing and swivel rollers
- > Fans for cooling the device
- > Stainless steel housing with covers and aluminium front panel

TECHNICAL DATA

> **Electrical supply (requirements):**

Mains connection: 3/PE AC 50Hz 415V

Nominal current: 12A

Power: 8.2kVA

> **Hydraulic parameters:**Pressure:

max. 70bar (1,015psi)

Temperature:

max. 100°C (212°F)

Vacuum tank:

approx. 50l (13gal)

Vacuum pump:

0.6kW

Nominal suction capacity: 10m³/h

Heat exchanger:

Oil-oil heat exchanger

> **Measurements:**

Temperature: 0 to 120°C (0 to 250°F)

Pressure: -1 to 1.5bar rel.
0 to 40bar rel.
0 to 100bar rel.

Humidity in oil: 0 to 100%

Optional: Humidity in oil: 0-20,000ppm

> **Dimensions and weight:**

Width: 1,050mm (43.3in) (3.4ft)

Depth: 1,420mm (55.9in) (4.7ft)

Height: 1,356mm (53.4in) (4.4ft)

Weight: approx. 585kg (1,290lb)

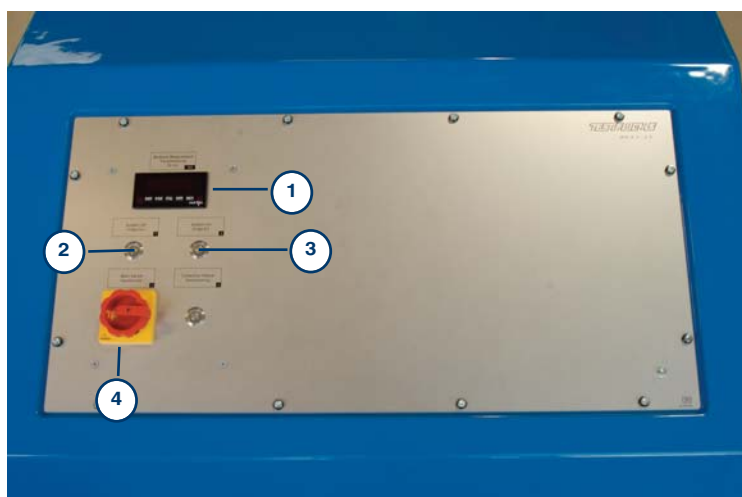
> **Operating conditions:**

Ambient temperature: +5 to +40°C (+41 to +113°F)

Noise emission: max. 80 db(A) in 1m distance

OPTIONS

OPTION	DESCRIPTION
H01	Absolute humidity sensor measures the absolute humidity in oil of 0-20,000ppm
H02	Filters 1 filter for supply and 1 for return, 3mic.
H03	Particle measurement Skydrol particle measurement with evaluation according to AS 4058
H04	Pall-Filters 1 filter for supply and 1 for return, 5mic.
M01	Colour of the upper cover free choice of a RAL-colour
	Only option H02 or H04 can be selected, not both.



① Digital display for humidity measurement

③ Illuminated pushbutton to switch the equipment on

② Illuminated pushbutton to shut the equipment down

④ Main switch

ACCESSORIES

The hydraulic hoses (5m each), hydraulic couplings and electrical connecting plug needed for the connection to the aircraft are included in the standard scope of delivery.

Mobile Fill and Drain Device for Remote Chiller System >RCFD340<



AIRBUS CERTIFIED

Originally designed for:

AIRBUS A340-500/600
(Airbus Certificate-No. D25012), i.a.w. ATA Chapter 25

- > To fill and drain the Remote Chiller System
- > To extract of coolant samples
- > To adjust the pressure in the cooling system
- > To filter the coolant (Galden HT 135)

GENERAL INFORMATION

- > Consisting of a mobile ground support equipment, pressure regulator box, filter package with Coalescer-water separator and pressure release hose
- > Storage space in the ground support equipment for all components
- > Medium: Galden HT 135

TECHNICAL DATA

> Ground support equipment:

Fill/ Drain Tank:

Capacity:	approx. 60 l (15.9 gal)
Used capacity:	approx. 48 l (12.7 gal)
Pressurization:	0 - 5 bar (0 - 75.5 psi)

Pressure gauge:

Pressure in the fill/drain tank:
0 to 6 bar (0 to 87 psi), Cl. 1.0

Hoses:

Drain hose:
21 m (68.9 ft), connection coupling AE73961K
red, NW 18 mm (3/4 in)

Liquid out hose:
15 m (49.2 ft), connection coupling AE73963K
yellow, NW 18 mm (3/4 in)

Density of the filter:

Filter to fill the fill/drain tank:
2 Micron
Nitrogen supply: 10 Micron

> Pressure release hose:

Hose:

2 m (6.6 ft), Schrader valve with ball valve,
NW 6 mm (1/4 in)

> Pressure regulator box:

Pressure regulator:

Regulator for the fill/drain tank:	0.2 - 4 bar (3 - 58 psi)
Regulator for the RU:	0.2 - 8.5 bar (3 - 123 psi)

Pressure gauge:

Pressurization of the fill/drain tank:
0 to 6 bar (0 to 87 psi), Cl. 1.0

Pressurization of the RU:

0 to 10 bar (0 to 145 psi), Cl. 0.1
(Digital-pressure gauge with display for ambient
temperature)
(RU-connecting hose stored in box)

> Filter package:

Hoses:

Filter in hose:	3 m (9.8 ft), AE710702-1 yellow, NW 18 mm (3/4 in)
Filter out hose:	3.2 m (10.5 ft), AE74493K yellow, NW 18 mm (3/4 in)

Density of the filter:

Filling of the Remote Chiller System
2 Micron

Integrated Coalescer-water separator

> Dimension and weight:

Width:	approx. 1310 mm	(approx. 4.298 ft)
Depth:	approx. 990 mm	(approx. 3.248 ft)
Height:	approx. 1220 mm	(approx. 4.003 ft)
Weight:	approx. 320 kg	(approx. 705 lb)

Technical data are subject to change!

Test Equipment For Supplemental Cooling System A350

>SCST1<



Handpump-Topup, SCS
>SCST1-TU<



Device-Fill/Drain, SCS
>SCST1-FD< and >SCST1-FD-D<



Kit-Adapter GSP, SCS350
>SCST1-AK350GSP<



Kit-Adapter CU, SCS350
>SCST1-AK350CU<

AIRBUS CERTIFIED

For fully-automatic filling, draining, bleeding, replenishing and emptying of the Supplemental Cooling System (SCS) on the AIRBUS A350.

ATA Chapter 21

World-wide universal connection
(compatible with multiple voltages)

- > Simple handling
- > SCS system of the A/C automatically turns to maintenance mode
- > Exactly planned service time
- > Minimizes service time
- > For hangar and outdoor application

Device-Fill/Drain, SCS

>SCST1-FD< AND >SCST1-FD-D<

PURPOSE

- > The equipment is developed for the following purposes:
 - "Fill of Whole System"
 - "Drainage of Whole System"
 - "Top Up of Accumulator"
 - "Top Up and Drainage of Small ACU"
 - "Top Up and Drainage of SCS Chiller"
 - "Top Up and Drainage of VCRU"

GENERAL INFORMATION

- > User friendly ergonomic setup and easy operation via display and buttons
- > Interruption of service tasks with re-entry possible (replenishing with nitrogen)
- > Safe and trouble-free operation also in case of extreme environmental conditions
- > Connection to the A/C or their components in connection with the adapter kits >SCST1-AK350CU< and >SCST1-AK350GSP<



ADDITIONAL INFORMATION

- > All preparation tasks for the Device-Fill/Drain, SCS can be carried out before the actual application on the A/C
- > Easy maintenance via hinged or removable covers
- > Equipped for the transport by forklift
- > Compact and robust design - double-axis-chassis with steering axle and towing bar
- > Spring-loaded chassis available as an option, recommended for long towing distances
- > Mechanic safety brake, also for use without towing vehicle

TECHNICAL DATA

<p>> Hydraulic parameters:</p> <p>Flow: max. 50l/min, max. 6.5bar abs. (max. 13.2gal/min, max. 94psi abs.)</p>	<p>> Nitrogen supply (requirements):</p> <p>Input: min. 20bar (min. 290psi) (external supply)</p>
<p>> Medium:</p> <p>Propylen Glycol Water (according to AIRBUS specification) (not included in the scope of delivery)</p>	<p>> Nitrogen connections:</p> <p>- AN4 - 8S - AN6 - Schrader</p>
<p>> Reservoir volume:</p> <p>Main-Reservoir: approx. 180l (47gal) Drain-Reservoir: approx. 190l (50gal) Sub-Reservoir: approx. 25l (6.6gal)</p>	<p>> Dimensions:</p> <p>Length: 3,400mm (133.8in) (tow bar folded up) 4,400mm (173.2in) (tow bar folded down)</p> <p>Width: 1,350mm (53.2in)</p> <p>Height: 1,600mm (63.0in)</p>
<p>> Operating conditions:</p> <p>Ambient temperature: -30 to +50°C (-22 to +122°F)</p> <p>Storage temperature: -30 to +60°C (-22 to +140°F)</p> <p>Rel. air humidity: 5 to 90% (non-condensing)</p>	

TYPE SPECIFIC TECHNICAL DATA

>SCST1-FD<

> Electrical supply (requirements):

Mains connection: 3/PE AC 50/60Hz 380-480V
 Nominal current: 23.8A
 Performance: 16.5kVA
 Back-up fuse: 32A gG

> Noise emission at the rear of the device:

- Operation by means of the electrical supply:
 max. 60.5dB(A) in 1m (39in) distance

> Weight:

approx. 1,200kg (2,646lb)

>SCST1-FD-D<

> Electrical supply (requirements):

Mains connection: 3/PE AC 50/60Hz 380-480V
 Nominal current: 23.8A
 Performance: 16.5kVA
 Back-up fuse: 32A gG

> Diesel generator set:

Performance: 20HP / 14.7kW
 Cubic capacity: 997ccm
 Rotational speed: 3,000rpm
 Consumption: approx. 4.5l/h (1.2gal/h) (at full load)
 Tank content: 7.0l (1.8gal)

> Noise emission at the rear of the device:

- Operation via electrical supply:
 max. 60.5dB(A) in 1m (39in) distance
- Operation via diesel generator set:
 max. 81.5dB(A) in 1m (39in) distance

> Weight:

approx. 1,300kg (2,866lb)



STANDARD SCOPE OF DELIVERY

- > 2 EA hoses 15m (49ft) for the connection to the aircraft (1x FILL, 1x DRAIN)
- > 1 EA AC / GSE interconnection cable 15m (49ft)
- > 1 EA grounding cable to establish potential equalization
- > 1 EA current supply cable 20m (66ft) with CE-plug for operation by the external electrical supply
- > 1 set of nitrogen connections for world-wide application

OPTIONS

> **Option - Spring-loaded chassis**

In case of long towing distances, the device must be prevented from damage by integrating spring-loaded axes into the chassis.

> **Option - Cover paint alternative to standard**

Paint is skydrol-resistant.

Standard-cover paint: light grey (RAL 7035) / yellow orange (RAL 2000)

ACCESSORIES (optionally available)

- > Drum pump - with the drum pump, the medium can easily be pumped off the canister or off a barrel into the Main-Reservoir.
- > PH-Meter - to determine the pH-value of the medium according to AMM
- > Sampling glass - measuring glass for sample taking of the medium during pH-value measurement.
- > Dust Cover- for protection from climatic influences and contamination during storage.



drum pump
(symbolic figure)



PH-meter
(symbolic figure)



sampling glass
(symbolic figure)



dust cover
(symbolic figure)

Handpump-Topup,SCS

>SCST1-TU<

PURPOSE

- > The device is developed for the following purposes:
 - "Top Up of Accumulator"
 - "Top Up and Drainage of Small ACU"
 - "Top Up and Drainage of SCS Chiller"
 - "Top Up and Drainage of VCRU"

GENERAL INFORMATION

- > Simple manual operation, filling procedure via integrated handpump
- > No electrical supply required
- > Tank with filling point, venting deaeration filter, drain plug and sight glass for fill level control
- > Pressure indication via pressure gauge on the operating plate, integrated hydraulic filter to clean the medium
- > Connection to the A/C or its components in combination with the adapter kits>SCST1-AK350CU< and >SCST1-AK350GSP<



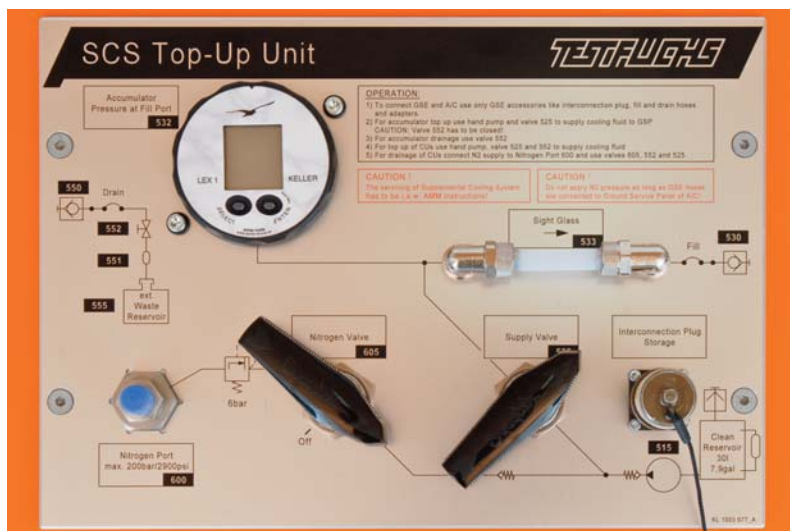
ADDITIONAL INFORMATION

- > Laterally mounted retainers for the storage of the fill or drain hose
- > Removable collecting reservoir to catch used medium
- > Tow bar with grip and towing eye for manual manoeuvring or transporting the device with an appropriate towing vehicle
- > User friendly ergonomic setup of the device, simple, compact and robust setup, such as easy access for maintenance tasks

TECHNICAL DATA

<p>> Nitrogen supply (requirements):</p> <p>Pressure: min. 6bar (87psi) max. 200bar (2,900psi)</p>	<p>> Operating conditions:</p> <p>Ambient temperature: -30 to +50°C (-22 to +122°F)</p> <p>Storage temperature: -30 to +60°C (32 to 140°F)</p> <p>Rel. air humidity: 5 to 90% (non-condensing)</p>
<p>> Main-Reservoir:</p> <p>Volume: 30l (7.9gal)</p> <p>Usable volume: 18l (4.8gal)</p> <p>Propylen Glycol Water (according to AIRBUS specification) (not included in the scope of delivery)</p>	

CONTROL UNIT



(Symbolic figure)

- > Colourless eloxated front panel
- > Imprinted hydraulic schematics
- > Resistant against mineral oils and other fuels
- > Clearly arranged operating elements

Kit-Adapter GSP, SCS350

>SCST1-AK350GSP<

GENERAL INFORMATION

- > Developed for the connection of the GSE and the A/C
- > Appropriate for the following GSE:
 - >SCST1-TU<
 - >SCST1-FD<
 - >SCST1-FD-D<
- > For the following purposes:
 - „Top Up of Accumulator“
 - „Filling of Whole System“
 - „Draining of Whole System“



Kit-Adapter CU, SCS350

>SCST1-AK350CU<

GENERAL INFORMATION

- > Developed for the connection of the GSE and the A/C
- > Appropriate for the following GSE:
 - >SCST1-TU<
 - >SCST1-FD<
 - >SCST1-FD-D<
- > For the following purposes:
 - „Top Up and Drainage of Small ACU“
 - „Top Up and Drainage of SCS Chiller“
 - „Top Up and Drainage of VCRU“



Fill And Drain Device

>SCSFD380<



AIRBUS CERTIFIED

Developed to fill and drain both circuits of the Supplemental Cooling System (SCS) in the AIRBUS A380, i.a.w. ATA Chapter 21.
AIRBUS number of certificate: GCA D21010

- > Fully automatic fill, drain and top up of the Supplemental Cooling System
- > Communication between SCS - control and unit during automatic runs (with parameter monitoring)
- > Integrated fill-pump for possible external fill of the hydraulic reservoir
- > Supply of nitrogen with internal bottles or external
- > Electric driven hose drums
- > Fully automatic water separation with coalescer filter
- > Easy operation via Touch - Panel

TECHNICAL DATA

<div>> Electrical supply:</div> <div>Mains supply: 3/N/PE AC 50/60Hz 400V</div> <div>Power: approx. 14.6kVA</div> <div>Nominal current: approx. 21A</div> <div>Preliminary fuse: 32A</div>	<div>> Connections (A/C, 15m hose each):</div> <div>Fill Port: NW 25</div> <div>Drain Port 1: NW 25</div> <div>Drain Port 2: NW 25</div> <div>Vent Port: NW 12</div> <div>Gas Charging Port: NW 6</div>												
<div>> Main reservoir:</div> <div>Capacity: approx. 450l</div> <div>Medium: H-Galden HT135 / ZT130</div>	<div>> Measurement range:</div> <div>Pressure measurements:</div> <table><tr><td>Galden pressure (supply):</td><td>0 to 40bar</td><td>Cl. 0.5</td></tr><tr><td>N₂ - Pressure (output):</td><td>0 to 10bar</td><td>Cl. 0.25</td></tr><tr><td>N₂ - Pressure (input):</td><td>0 to 400bar</td><td>Cl. 2.5</td></tr><tr><td>N₂ - Pressure (reservoir):</td><td>0 to 1bar</td><td>Cl. 2.5</td></tr></table> <div>Flow measurements:</div> <div>0 to 90lpm</div>	Galden pressure (supply):	0 to 40bar	Cl. 0.5	N ₂ - Pressure (output):	0 to 10bar	Cl. 0.25	N ₂ - Pressure (input):	0 to 400bar	Cl. 2.5	N ₂ - Pressure (reservoir):	0 to 1bar	Cl. 2.5
Galden pressure (supply):	0 to 40bar	Cl. 0.5											
N ₂ - Pressure (output):	0 to 10bar	Cl. 0.25											
N ₂ - Pressure (input):	0 to 400bar	Cl. 2.5											
N ₂ - Pressure (reservoir):	0 to 1bar	Cl. 2.5											
<div>> High pressure-radial pump:</div> <div>Fluid quantity: 90lpm at 30bar</div> <div>Flow and pressure adjustable</div>													
<div>> Ambient temperature:</div> <div>-20°C to +55°C</div>	<div>> Dimensions and weight:</div> <div>Length: approx. 3,090mm</div> <div>Width: approx. 1,410mm</div> <div>Height: approx. 1,635mm</div> <div>Weight: 1,800kg</div>												

OPTIONS

A wide range of options is available to fulfil our customers' requirements.
e.g.: Adaption for other aircraft types, different touch-screens, etc.

Device for refill supplemental cooling system for A380

>SCSR1-1<



AIRBUS CERTIFIED

Developed for AIRBUS A380 and further
AIRBUS-Types.

- > Top up of the accumulator of the supplemental cooling system (SCS) with required quantities of GALDEN® according to ATA Chapter 21
- > Fully automatic top up and drain procedures for Centralized Equipment (CE)
- > Programmable logic controller with serial port for communication to the supplemental cooling system controller (SCSC) in AIRBUS A380
- > 5,7" TFT-Touchpanel
- > 24V 70Ah battery system with multi-norm charger

RANGE OF APPLICATION

- > Depressurization of the supplemental cooling system in case of equipment change
- > Pre-filling of supplemental cooling system components in case of equipment change
- > Fully automatic water separation with coalescer filter
- > Nitrogen supply with internal bottle (not included in the scope of delivery) or external supply
- > Hose drum 4 x 10m hoses
- > Drawer for accessories storage

OPTIONALLY AVAILABLE FOR THE BASIC DEVICE <SCSR1>

> **Model of aircraft dependent adapter kit for the basic device**

The adapter kit includes special adapter and hoses, which are necessary for testing a particular type of aircraft.

> **Model of aircraft dependent software kit for the basic device**

The software kit includes a memory card for the tested aircraft aligned software

> **Carriage for the basic device**

The carriage enables easy transportation of the test control unit.

Note: The basic device is only together with adapter kit and software kit workable.
GALDEN® and nitrogen gas cylinder are not contained in the scope of delivery!

TECHNICAL DATA

<p>> Pressure measurement:</p> <p>0 - 174psi (0- 12bar) abs., 0.25% F.S. 0 - 5801psi (0 - 400bar) 1% F.S.</p>	<p>> Main tank:</p> <p>approx. 7.9USgal (approx. 30 litres)</p>
<p>> Connected load:</p> <p>Power supply: Multi-voltage 100 - 240V 50/60 / 400Hz</p> <p>Nominal current: 1.9 - 4.6A (100 - 240V)</p> <p>Power: max. 460VA</p>	<p>> Dimensions and weight:</p> <p>Length: 3.53ft (1075mm) Width: 4.76ft (1450mm) Height: 4.59ft (1400mm) Weight: approx. 1323lb (approx. 600kg)</p>
<p>> Ambient temperature:</p> <p>-30°C to +50°C (-22°F to +122°F)</p>	



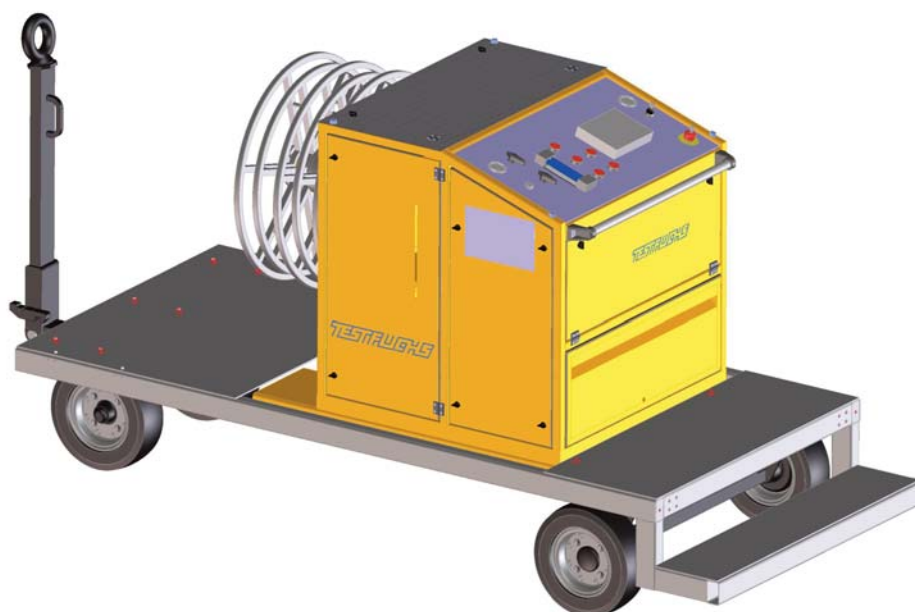
Type of aircraft specific software and memory card



Type of aircraft specific adapter

TYPE KEY

DESCRIPTION	TYPE KEY
<p>> Total test equipment of the SCS of A380, consisting of:</p> <ul style="list-style-type: none"> - Basic device <SCSR1> - Adapter kit <AK1-380PAX> - Software kit <S920010-003> 	<SCSR1-1>
> Basic device without type of aircraft specific adapter and software	<SCSR1>
> Adapter kit for aircraft A380	<AK1-380PAX>
> Software kit for aircraft A380	<S920010-003>
> Carriage to transport the test equipment	<GPT3>



Option carriage

OPTIONS

A wide range of options is available to fulfil our customers' requirements.
e.g.: Adaption for other aircraft types, different hose lengths, etc.

Technical data are subject to change!

Waste Line Cleaning Trolley

>WLC1<



AIRBUS CERTIFIED

Developed for cleaning vacuum waste line systems of different aircraft types.
(ATA Chapter 38)

Suitable for all aircraft types with vacuum waste line systems, e.g.

- A318 / A319 / A320 / A321 (TEB 320-D0351)
(TEB 320-D0352)
- A330 / A340 (TEB 340-D0620)
- A350 (TEB 350-D0135)
- A380 (TEB 380-D0271)
- B737
- B767
- B747 / B777
- B787

- > Fully automatic cleaning process (no monitoring required)
- > Automatic leakage test of vacuum waste line system before cleaning process start-up
- > Implementation during standard maintenance tasks (e.g. Line Maintenance Check)
- > Preselectable cleaning time enables high flexibility, perfect cleanliness is provided within a few hours
- > Implementation for already significantly clogged waste lines as well as for preventive cleaning
- > Environmental friendliness is ensured by usage of water and citric acid as cleaning agents

TECHNICAL DATA

> **Electrical supply:**

Mains supply:	3/PE AC 50-60Hz 380-480V
Nominal current:	max. 21A (max. 32A with Option B)
Power:	14,6kVA (max. 22,1kVA with Option B)
Preliminary fuse:	25A gL (max. 32A gL with Option B)

(electricity- and performance characteristics at 400V 50Hz)

> **Dimensions and weight:**

Length:	2,850mm	(112.2in)
Width:	1,600mm	(63.0in)
Height:	1,500mm	(59.1in)
Weight:	approx. 1,200kg	(approx. 2,645.5lb)

> **Operating conditions:**

Ambient temperature:	5 to 40°C (41 to 104°F)
Storage temperature:	0 to 60°C (32 to 140°F)
Altitude:	max. 1,000m MSL (3,280ft)
Humidity:	5 to 90% (non-condensing)
Noise emission:	max. 63dB(A) in 1m distance

STANDARD SCOPE OF DELIVERY

- > 1 EA water supply hose, 20m (65ft), on hose reel with standard claw coupling (GEKA)
- > 3 EA cleaning hose, 20m (65ft) each, on hose reel with couplings
- > 2 EA Blanking caps for cleaning hose
- > 2 EA A/C sensor head each with a sensor cable (40m (130ft)) on cable reel for measurement and monitoring
- > 1 EA A/C adapter 0,4m 0° to connect cleaning hoses to the vacuum waste line system
- > 1 EA A/C adapter 0,4m 90° to connect cleaning hoses to the vacuum waste line system
- > 1 EA electrical connection cable, 20m (65ft), with CEE-plug (32A)
- > 1 EA rope, 20m (65ft), with carabiner to lift the cleaning hoses up to cabin height and bag for storage
- > 2 EA strain relief for cleaning hoses
- > 3 EA. Blanking caps A/C Waste Line (in case, leaking toilets can be repaired and pipes can be blanked off)
- > 1 EA waste water hose, 10m (33ft), with couplings and caps, stored in an extractable drawer
- > 1 EA Ball valve „SUPPLY“ (to avoid leaking of cleaning fluid in the A/C while connecting or disconnecting)
- > 1 EA Ball valve „RETURN“ (to avoid leaking of cleaning fluid in the A/C while connecting or disconnecting)
- > 2 bags of citric acid (25kg each) for initial cleaning

OPTIONS

> **Option A - Extended functionality for upper deck and simultaneous cleaning of two systems**

Flow direction change results in a significant increase in efficiency during cleaning, extracting and drying. This option is strongly recommended for A380 and B747 (upper deck) because of the enormous height. Furthermore, this option enables simultaneous cleaning of two vacuum waste line systems. With this option, a interconnection hose is also delivered, serving as connection of the two systems, as well as an additional A/C adapter 0,4 0° and an A/C adapter 0,4m 90°.

<u>Overview of systems:</u>	B737 / A320	1 system
	B767 / A330-340	2 systems
	B747 / B777	3 systems
	A380	4 systems

> **Option B - Continuous-flow heater**

This option is recommended if no warm water (at least 30°C / 85°F) is available in the hangar. The integrated continuous-flow heater enables filling with cold water (at least 10°C / 50°F).

> **Option C - Motor drive for hose reel**

The hose reel for the cleaning hoses is motor driven. Operated via foot switch, it enables guiding hoses with both hands.

> **Option D - Tool box with drawer and storage shelf for citric acid**

For small parts such as cleaning cloths, glasses, protective clothing etc. a drawer is installed. The two bags of citric acid can be stored on the integrated shelf which is protected against rain.

> **Option E - Spring-loaded chassis**

Spring-loaded axes are integrated into the chassis to prevent damage due to long distance trailing.

> **Option F - Cover paint alternative to standard**

Skydrol resistant paint is used.

Standard cover paint: light grey (RAL 7035) with upper part in traffic blue (RAL 5017)

ACCESSORIES (optionally available)

- > Dust cover
- > Additional waste water hose 10m (33ft) with couplings and caps, stored in a separate storage shelf between the fork lift access points.



Dust cover
(Exemplary figure)



Waste water hose

Servicing trolley for Flaps and Thrust Reversers

>SFTR1<



The equipment is developed to provide a controlled movement of Flap and Thrust Reverser Actuators during servicing and adjustment in accordance with the ATA chapter 29.

It is used in the civil aviation field for AIRBUS and BOEING aircraft.

It can be adapted for use on other aircraft types.

The equipment is fitted with:

- > An Axial Piston pump which enables the maximum flow of 15 l/min to be quickly achieved.
- > An Air Cooled Heat Exchanger is used for cooling of the hydraulic oil in the <SFTR1>.
- > Temperature is controlled by a cut off thermostat.
- > Simple manual regulation of maximum pressure and flow.
- > Needle valves for hose pressure relief.
- > Oil Level Float Switch to monitor oil level and to indicate a minimum oil level.

GENERAL INFORMATION

- > A compact design ensures easy transportation and fixed and steerable castors are provided for manoeuvrability during use.
- > Stainless steel framework protects against Skydrol and corrosion.

TECHNICAL DATA

<p>> Current supply:</p> <p>Power: approx. 7.5 kW Voltage: 3/N/PE AC 50 Hz 400 V Supply cable: 10 m long (33 ft)</p>	<p>> Measurement range:</p> <p>Pressure: 0 - 400 bar (0 - 5800 psi) ± 1 % o.f.s.</p>
<p>> Performance data:</p> <p>Pressure: max. 230 bar (3336 psi) Axial piston pump: max. 15 l/min at 230 bar (max. 4 USgpm at 3336 psi) Reservoir capacity: 140 l (37 USgal)</p>	<p>> Operation conditions:</p> <p>Ambient temperature +5 to +35 °C (+41 to +95 °F) Storage temperature: 0 to +60 °C (+32 to +140 °F) Humidity: 10 - 95 % rel. humidity Altitude: up to 1000 m above SL (up to 3280 ft above SL) Protection class: IP55</p>
<p>> Medium:</p> <p>Skydrol 500 B4</p>	<p>> Dimensions and weight</p> <p>Length: 1000 mm (3.3 ft) Width: 900 mm (3.0 ft) Height: 1210 mm (4.0 ft) Weight: 300 kg (660 lb)</p>
<p>> Output hoses:</p> <p>2-off: each 6 m (19.7 ft)</p>	

OPTIONS

A wide range of options is available to fulfil our customers' requirements.
e.g.: Adaption for different aircraft types, etc.

Landing Gear Strut Servicing Trolley

>LGST1<



Serves for controlled filling and emptying of shock absorbers (NLG and MLG) using hydraulic fluid.

- > Basic frame out of steel profile tubes and aluminium covers located on four wheels for easy transportability
- > Safety valve for pump pressure limitation
- > Fine filter with visual contamination indicator
- > Throttle valve for adjusting flow limits and slow pressure build-up

GENERAL INFORMATION

- > The required filling pressure is generated via a gear pump driven by an electric motor.
- > The outlet (NLG/MLG) is equipped with a quick-acting solenoid valve and pressure switches.
- > Automatic closing of the outlet valve and of the pump as soon as the required filling pressure in the shock absorber is reached.
- > Shock absorber emptying can be effected via drain cock in the pump circuit or via the drain connection.
- > Built-in sight glass allows test medium inspection for bubbles.
- > A digital instrument serves to measure flow volume and rate of the fluid.
- > Precision gages display pump pressure and outlet pressure (NLG/MLG).
- > Hose and cable suspension units are located on the rear of the device.

TECHNICAL DATA

> Hydraulic parameters:

Pump (for generating the filling pressure)

Flow:	max. 8.5l/min (2.25USgpm)
Pressure:	max. 25bar (363psi)

2 manometer: 0 to 25bar (363psi), Cl. 1.0

2 flow regulators: 0 to 10l/min (2.64USgpm)
(for filling and draining the absorbers)

Sensor: 0 to 10l/min (2.64USgpm)
(for measuring the volume/flow)

> Electrical requirements:

Voltage:	230V
Frequency:	50Hz
Power:	approx. 1.1kW
Mains protection:	16A
Cable length:	approx. 10m (393in)
Hydraulic hose length:	approx. 2.5m (98.4in)

> Dimensions and weight:

Width:	approx. 700mm	(27,6in)
Depth:	approx. 800mm	(31,5in)
Height:	approx. 1,000mm	(39,4in)
Weight:	approx. 150kg	(330lb)

Nitrogen Filling Equipment

>SFE300<



Hand-held unit to top up nitrogen-filled actuators in aircrafts

- > TÜV-approval
- > Portable due to light weight construction
- > Output pressure adjustable (2 to 280bar)
- > Safety valve 300bar
- > Flow controllable
- > Filling device to refill the bottle

GENERAL INFORMATION

- > 3/2-way fill valve
- > Fill hose 2m with Schrader valve
- > Tool bag

TECHNICAL DATA

> Pneumatic parameters:

Nitrogen circuit	Pressure	max. 300bar
	Bottle	6.8 Litre
	Medium	Nitrogen

Pressure regulator 2 to 280bar

In-/output pressure gauge: 0 to 400bar

> Dimensions and weight:

L x W x H	650 mm x 300 mm x 510 mm
Weight	approx. 22 kg

> Ambient conditions:

Operation temperature:	-10°C to 60°C
Storage temperature:	-20°C to 60°C
Altitude:	up to 1,000m above sea level
Humidity:	30 to 95%

Cabin Pressurization Trolley

>KDP8<



Developed for performing pneumatic pressure tests on the aircraft type MITSUBISHI MRJ according to ATA Chapter 21.

Serves for verifying cabin tightness as well as for testing the security valve at the aircraft.

It is possible to adapt this trolley for other aircraft types.

- > Measurements:
Outlet and cabin pressure, flow, temperature and vertical speed (Vertical Speed Indicator)
- > Integrated roots blower to generate the pressures and flows necessary for pressure tests
- > Integrated aftercooler for a max. outlet temperature of 60°C (140°F)
- > Heat protection cover to protect the operator during test runs
- > Chassis with turntable steering, solid rubber tires and integrated automatic parking brake
- > Box for hose storage
- > Holding for supply cable storage

TECHNICAL DATA

> Electrical supply:

Mains supply:	3/PE AC 60Hz 440V
Nominal current:	max. 102.3A
Power:	approx. 78kVA
Back-up fuse:	160AgL
Connection:	20m (65ft) supply cable
Short circuit current:	max. 120kA

> Pneumatical parameters:

Pressure:	max. 0.9bar (max. 13psi)
Flow:	max. 900scfm (max. 25,500NI/min)
Flow control:	0 to 900scfm (0 to 25,500NI/min)
Outlet temperature:	max. 60°C (max. 140°F)

> Operating conditions:

Ambient temperature:	-10 to +50°C (14 to 122°F)
Storage temperature:	-10 to +60°C (14 to 140°F)
Altitude:	up to 1,000m above MSL (3,280ft)
Rel. humidity:	10 to 95% (non-condensing)
Towing speed:	max. 10km/h

> Medium:

Ambient air

> Measurement range:

Pressure: (2x)

Range: 0 to 1bar (0 to 15psi)

Tolerance: ±0.6% o.m.r.

Flow:

Range: 0 to 900scfm (0 to 25,500NI/min)

Tolerance: ±2.5% o.f.s.

Temperature:

Range: -20 to +80°C (-4 to +176°F)

Tolerance: ±2% o.m.r.

o.f.s. ... of full scale

o.m.r. ... of measuring range

> Dimensions and weight:

Length:	4,380mm (172in)
	(towing bar in vertical position)
	5,350mm (211in)
	(towing bar in horizontal position)
Width:	1,870mm (74in)
Height:	2,350mm (93in)

Weight: approx. 2,500kg (approx. 5,512lb)



Rear view with heat protection
cover and cable holding



Control panel

Cabin pressure tester

>KDP4AF<



The Cabin Pressure Tester is developed to carry out pressure testing of the AIRBUS A320 family, i.a.w. ATA Chapter 53.

It is possible to adapt this tester for other aircraft types.

- > Cabin pressurization and over pressure relief valve operation can be tested
- > Measurement of cabin pressure, ambient pressure, cabin temperature, ambient temperature and time
- > Dummy door for the Avionic Compartment for integrated measurements
- > Fully automatic test sequence
- > The mobile Cabin Pressure Tester can be easily positioned for use

MISCELLANEOUS

- > The computer system is operated via touch-LCD panel
- > Test results can be shown numerically and graphically
- > Test results can be stored electronically or printed by means of a connector for external equipment (printer, modem, USB stick, etc.)
- > Software can be maintained and updated via modem by the factory

TECHNICAL DATA

<p>> Pneumatic parameters:</p> <p>Controllable pressure: 0 - 600 mbar (0 - 8.7 psi)</p> <p>Flow: 0 - 1 kg/sec (0 - 2.2 lb/sec)</p>	<p>> Electrical parameters:</p> <p>Mains supply: 1/N/PE AC 50 Hz 230 V</p> <p>Nominal power: 2.3 kVA</p> <p>Nominal current: 10 A / 16 A</p>
<p>> Medium:</p> <p>Shop air pressure (filtered, dry)</p>	<p>> Dimensions and weight:</p> <p>Length: 1700 mm (5.6 ft)</p> <p>Width: 950 mm (3.1 ft)</p> <p>Height: 1610 mm (5.3 ft)</p> <p>Weight: 510 kg (1124 lb)</p>
<p>> Measurements:</p> <p>Temperature: Range: 0 - 50 °C (32 - 122 °F) Accuracy: ± 0.5 °C (± 0.9 °F)</p> <p>Pressure: Range: 0 - 1 bar (0 - 14.5 psi) Accuracy: 0.15 % o.m.r.</p> <p>Time: Range: 0 - 30 s Accuracy: ± 0.2 s</p>	<p>> Ambient conditions:</p> <p>Temperature: +10 °C to +45 °C (+50 °F to +113 °F)</p>

OPTIONS

Many options are possible for adaption,
e.g. adaption to other aircraft types, different touch-screens etc.

Technical data are subject to change!

Reservoir Ventilation Trolley

>TBW1EX<



The trolley is developed for ventilation of fuel reservoirs inside diverse A/C types such as AIRBUS A320 and FOKKER 70 before and during inspection in the dock.

The Reservoir Ventilation Trolley can remove fuel vapour out of the reservoir and replenish it with fresh air.

It can also be adapted for other A/C types.

- > The trolley is designed in accordance with ATEX Directive 94/9/EC for use in zone 2 explosive areas.
- > Certain system parts, such as the complete internal air ducting, the radial fan and the heater are designed for zone 1. Thus fuel vapour collected in exchangeable cartridges in the activated carbon filter, can be directly extracted. In this operating mode, the equipment is additionally monitored by the gas warning equipment.
- > Antistatic spiral compressible hoses are used.
- > To keep the noise level as low as possible, air-ducting components are mounted on anti-vibration elements.

GENERAL INFORMATION

- > The trolley is equipped with an explosion-proof fan-drive motor and an explosion-proof heating of 8kW for temperature increase of approx. 10°C (18°F).
- > The outlet temperature is infinitely variable up to 38°C (100°F) by means of the thermostat.
- > In hazardous situation, the Reservoir Ventilation Trolley can be switched off by main switch without any danger for the user.
- > The trolley is of an ergonomic and spacious design.
- > Components requiring periodical testing and/or maintenance are easily accessible.
- > The trolley is equipped with one fix/one steerable axis and a parking brake.
- > Fork lift access points allow transportation by fork lift truck.
- > An activated carbon filter is provided for exhaust air including a gas warning equipment with optical and acoustical warning and shutdown.

TECHNICAL DATA

> Pneumatic parameters:

Volume flow: 2,500m³/h (88,300ft³/h)
 Pressure differential: 1,500Pa (0.218psi)
 (Data without connection hose)

Electrical supply: 400VAC 50Hz
 Power: 2.5kW

2,860U/min
 Connection hose: 2 x 5m (197in), Ø 300mm
 (11.8in), anti-static

> Dimensions and weight

Length: 2,900mm (114in) (tow bar upright)
 3,900mm (154in) (tow bar lowered)
 Width: 1,400mm (55.1in)
 Height: 2,200mm (86.6in)
 Weight: 930kg (2,050lb)

> Electrical supplies (requirements):

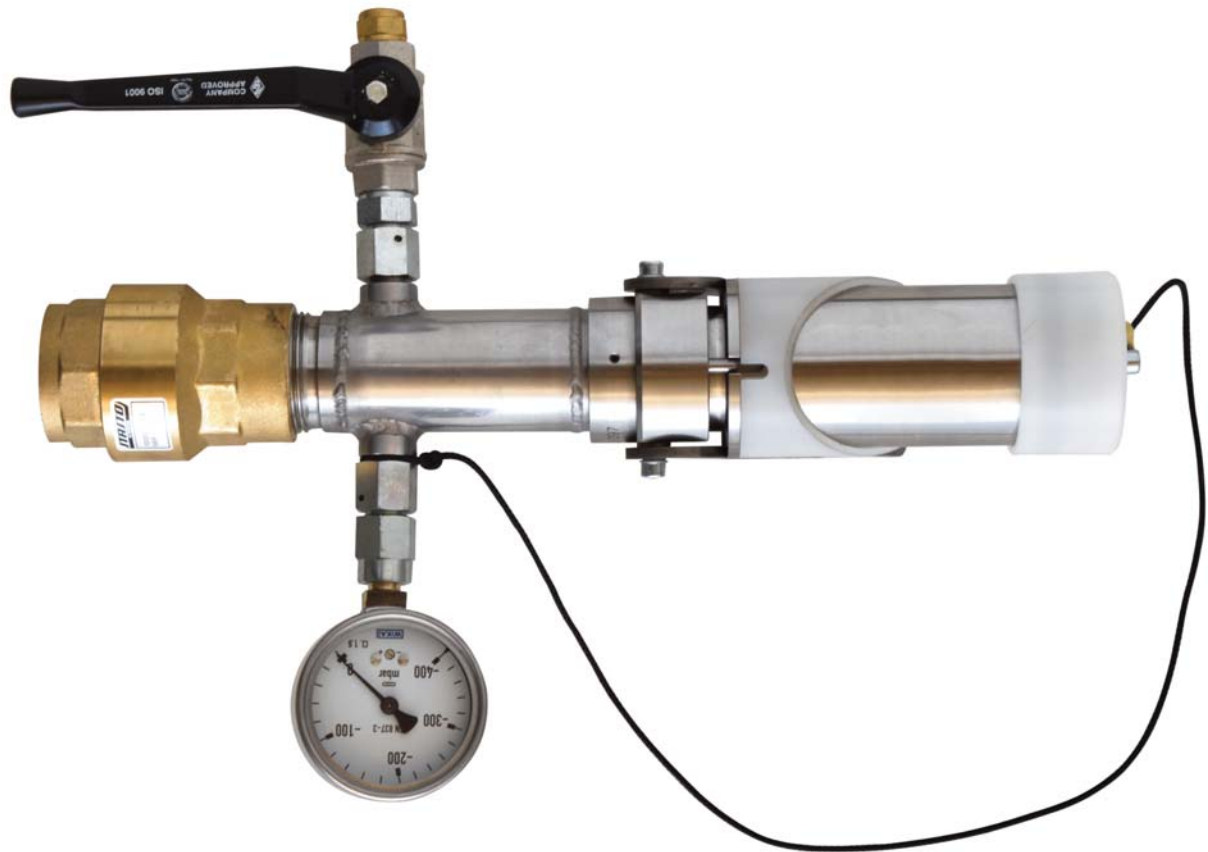
3/N/PE AC 50Hz 400V
 Nominal current: approx. 20A
 Back-up fuse: 32A
 Connection: via CEE-plug (32A)
 Cable length: 20m (787in)

> Operating conditions:

Ambient temperature: 0°C to +35°C (32 to 95°F)
 Storage temperature: 0°C to +60°C (32 to 140°F)
 Rel. air humidity: max. 80% to 31°C (87.8°F), then
 linearly decreasing to 67% at
 35°C (95°F), non-condensing
 Altitude: max. 1,000m (3,280ft) MSL
 (Main Sea Level)
 Noise level: max. 76dB(A)
 in 1m (39.4in) distance
 Protection class: IP54

Vacuum Toilet Leak Tester For A380

>VTLT1<



The “VACUUM TOILET LEAK TESTER <VTLT1>” is developed for quick and easy leakage tests without any additional equipment.

The required vacuum is generated by the aircraft system.

Pressure gauge 0 to 1 bar (CL. 1.6)

AMM Task: 38-31-00-790-801-A

> Function:

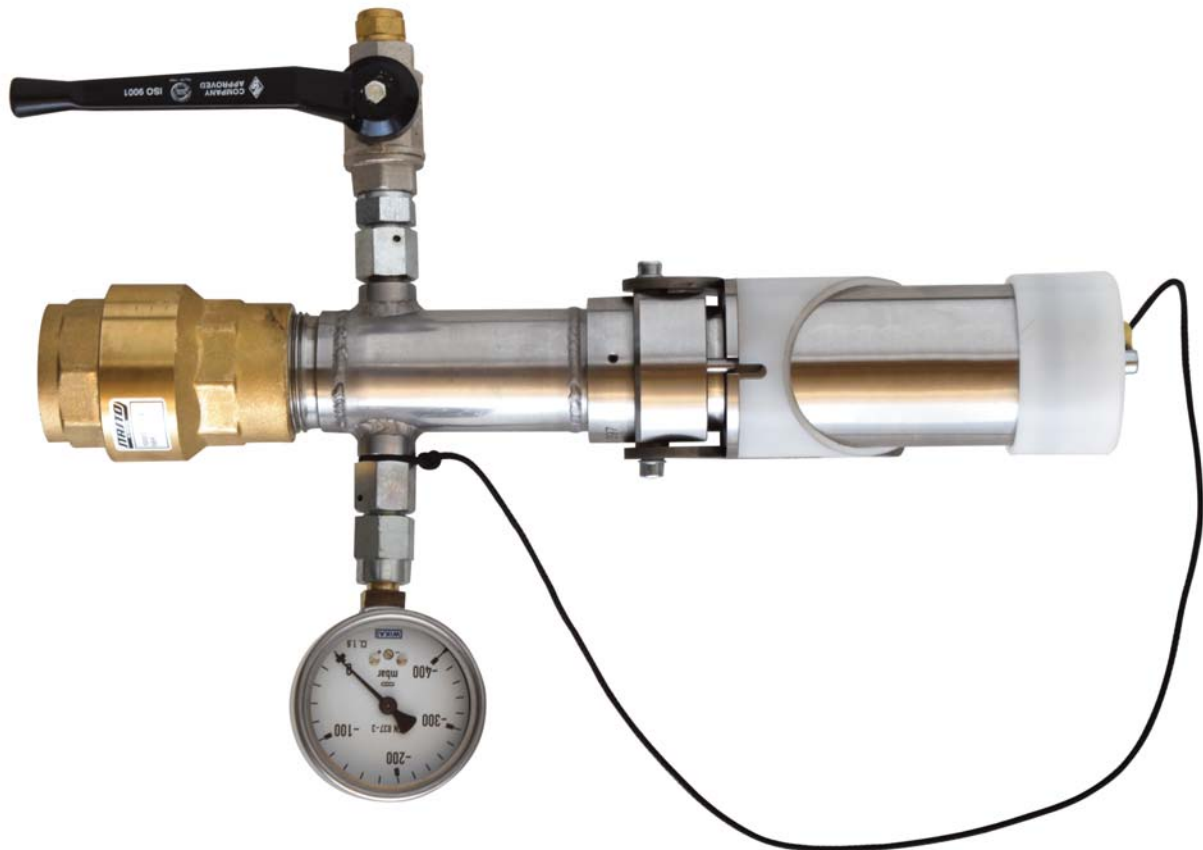
The Overboard Vent Adapter is attached to the connection on the aircraft. If the toggle lever is pulled down the Overboard Vent Adapter is sealed. To ensure complete sealing, the ball valve must be closed.

If this is the case the drainage system of the aircraft toilets can be tested for leaks with the vacuum generated by the aircraft. At the same time, the pressure gauge measures low pressure.

To remove the “VACUUM TOILET LEAK TESTER <VTLT1>”, the ball valve must be opened and the toggle lever must be pulled up again.

Vacuum Toilet Leak Tester For A318/A319/A320/A321

>VTLT2<



The “VACUUM TOILET LEAK TESTER <VTLT2>” is developed for quick and easy leakage tests without any additional equipment.

The required vacuum is generated by the aircraft system.

Pressure gauge 0 to 1 bar (CL. 1.6)

AMM Task: 38-31-00-790-002-A

> Function:

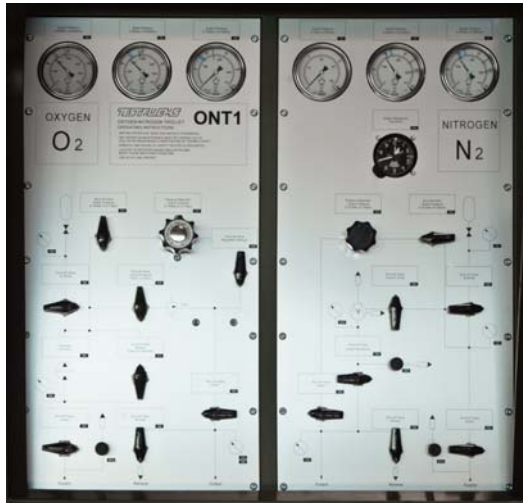
The Overboard Vent Adapter is attached to the connection on the aircraft. If the toggle lever is pulled down the Overboard Vent Adapter is sealed. To ensure complete sealing, the ball valve must be closed.

If this is the case the drainage system of the aircraft toilets can be tested for leaks with the vacuum generated by the aircraft. At the same time, the pressure gauge measures low pressure.

To remove the “VACUUM TOILET LEAK TESTER <VTLT2>”, the ball valve must be opened and the toggle lever must be pulled up again.

Oxygen and nitrogen trolley

>ONT1<



This equipment is developed to pressurize the AIRBUS A400M oxygen system with nitrogen for leakage and pressure tests in accordance with ATA Chapter 35.

It is possible to adapt this trolley for other aircraft types.

- > The vacuum pump is driven by nitrogen, thus making it independent of electrical or compressed air supply
- > Operating temperature -30 to +50 °C
- > Maximum towing speed is 25 km/h (15 mph)
- > A portable flow tester and ultrasonic leakage detector for ease of testing
- > The equipment can operate in an unsheltered environment

GENERAL INFORMATION

- > Three oxygen bottles and one nitrogen bottle are provided
- > A compressed air driven pressure intensifier can be used when refilling the bottles from a source with lower pressure
- > If required bottles can be removed separately
- > Output is effected via a 10 m stainless steel hose mounted on a spring loaded drum
- > Earthing cable with copper clamp approx. 15m with spring loaded drum
- > Simple maintenance by means of a GRP cover fitted with a gas filled strut
- > The parking brakes on the front axle are operated by lowering or lifting to the vertical position
- > The operating panel is covered when not in use by a shutter

TECHNICAL DATA

<p>> Oxygen circuit:</p> <p>Input pressure: 50 - 300 bar (725 - 4350 psi)</p> <p>Output pressure: 0 - 150 bar (0 - 2176 psi) 192 bar (2785 psi)</p> <p>Storage capacity: 150 l at 300 bar (3 bottles per 50 l) (40 USgal at 4350 psi)</p> <p>Safety valve: 310 bar (4500 psi)</p>	<p>> Vacuum circuit:</p> <p>Working pressure: 6 bar (87 psi) (Nitrogen)</p> <p>Vacuum: 0.5 - 1 bar abs. (7.3 - 14.5 psi) 0 - 22.000 ft</p> <p>Suction capacity: 33.6 NI/min (0.9 USgal/min)</p>
<p>> Nitrogen circuit:</p> <p>Input pressure : 50 - 200 bar (725 - 2900 psi)</p> <p>Output pressure: 0 - 10,5 bar (0 - 152 psi)</p> <p>Storage capacity: 50 l at 200 bar (1 bottle) (13 USgal at 2900 psi)</p> <p>Safety valve : 210 bar (3046 psi)</p>	<p>> Measurements:</p> <p>Pressure: 0 - 400 bar \pm 4 bar (0 - 5800 psi \pm 58 psi)</p> <p>0 - 250 bar \pm 2.5 bar (0 - 3626 psi \pm 36 psi)</p> <p>0 - 14 bar \pm 0.1 bar (0 - 203 psi \pm 1.5 psi)</p> <p>Altimeter: 0 - 22.000 ft \pm 100 ft</p> <p>Flow: 0.2 - 5 lpm \pm 0.2 lpm (0.05 - 1.3 USgpm \pm 0.05 USgpm)</p>
<p>> Pressure intensifier (for filling the unit):</p> <p>Input pressure : max. 300 bar (4350 psi)</p> <p>Output pressure: 300 bar (4350 psi)</p> <p>Working pressure: 6 - 10 bar (87 - 145 psi) (Compressed air)</p>	<p>> Dimensions and weight (tow bar vertical):</p> <p>Length: 2890 mm (9.5 ft)</p> <p>Width: 1190 mm (3.9 ft)</p> <p>Height: 1420 mm (4.7 ft)</p> <p>Weight: 950 kg (2094 lb)</p>

OPTIONS

Many options are possible for adaption,
e.g. adaption to other aircraft types, to different touch-screens etc.

Technical data are subject to change!

Mobile Air Conditioner, Electric Motor Powered >BKG26EM<



Developed for regulated air supply (cooling, drying and heating) of various aircraft types from different manufacturers while they are parked.

- > Two speed regulated, sound optimized axial fans
- > Simple and user friendly control via touch panel directly on the equipment
- > Extremely low noise level - only 73.5dB(A) in 1m distance with nominal load
- > Fully automatic operation
- > High cooling performance
- > Thermic isolation of air-ducting lines
- > Low maintenance screw compressor

GENERAL INFORMATION

- > Ergonomic and compact design
- > Easy service due to doors and covers which can easily be opened
- > High maneuverability through turntable steering
- > Fork lift access points, lifting points and tie-down points

TECHNICAL DATA

> **Electrical connection values:**

Mains supply:	3/PE AC 50Hz 400V
Nominal current:	max. 110A
Power:	76.2kVA
Back-up fuse:	125AgL
Short-circuit current:	50kA

> **Hydraulic / pneumatic parameters:**

Controllable air quantity:
1,700 or 3,500m³/h
(60,034.9 or 123,601.3ft³/h)
(variable adjustment)

Supplied pressure:
8kPa (1.2psi)

Adjustable outlet temperature:
5 to 60°C (41 to 140°F)

Nominal cooling performance:
50kW

Refrigerant:
R134a

Max. heating performance:
50kW
(temperature limit adjustable to customer requirements)

> **Medium:**

Ambient air

> **Operating conditions:**

Ambient temperature:	-10 to +45°C (14 to 113°F)
Storage temperature:	-35 to +60°C (-31 to +140°F)
Altitude:	max. 1,000m above MSL (3,280ft)
Rel. humidity:	10 to 95% (non-condensing)
Towing speed:	max. 10km/h (6.2mph)
Permanent noise emission:	max. 73.5dB(A) (in 1m (3.3ft) distance)

> **Dimensions and weight:**

Length:	approx. 4,800mm	(189.0in)
	(Towing bar in vertical position)	
	approx. 5,800mm	(224.4in)
	(Towing bar in horizontal position)	
Width:	approx. 2,050mm	(80.7in)
Height:	approx. 2,150mm	(84.6in)
Weight:	approx. 3,000kg	(6,613.9lb)

OPTIONS

A wide range of options is available to fulfil our customers' requirements.

Mobile Air Conditioner Diesel Motor Powered >BKG8D<



The test stand is developed to air condition (cooling and heating) the AIRBUS A400M while on ground

It is possible to adapt this test stand for other aircraft types

- > The fitted touch panel enables easy and user friendly control of the equipment
- > The screw compressor requires little maintenance
- > Continuous operation of the equipment is possible
- > The device is provided with a high performance cooling capacity
- > Pipes conveying air are thermally insulated
- > The fitted diesel generator set operates in accordance with the EU emission standard IIIA

- > Doors and coverings can be opened easily thus enabling easy access for maintenance
- > The turntable steering ensures high maneuverability of the unit
- > The parking brake is fitted at the rear axle
- > Fork lift access points and tie down points are provided for transportation

<p>> Hydraulic / pneumatic parameters:</p> <p><u>Adjustable air volume:</u> 3000 or 6000m³/h (105,944 or 211,888ft³/h) (can be adjusted variably)</p> <p><u>Supply pressure:</u> max. 10kPa (1.45psi)</p> <p><u>Adjustable outlet temperature:</u> 5 to 50°C (41 to 122°F)</p> <p><u>Nominal cooling capacity:</u> 150kW</p> <p><u>Refrigerant:</u> R134a</p> <p><u>Max. heating capacity:</u> 75kW (temperature is limited to 70°C)</p>	<p>> Medium:</p> <p>Ambient air</p> <p>> Conditions of service:</p> <p>Ambient temperature: -25 to +49°C (-13 to 120.2°F)</p> <p>Storage temperature: -35 to +60°C (-31 to 159.8°F)</p> <p>Altitude: up to 1,000m above MSL (3,280ft)</p> <p>Rel. air humidity: 10 to 100% (non-condensing)</p> <p>Towing speed: max. 10km/h (6.2mph)</p> <p>> Dimensions and weight:</p> <p>Length: approx. 6,600mm (252.0in), (tow bar stowed in vertical position)</p> <p>Width: approx. 2,400mm (94.5in)</p> <p>Height: approx. 2,500mm (98.4in)</p> <p>Weight: approx. 6,400kg (14.330lb)</p>
<p>> Diesel generator set:</p> <p>Tank capacity: 400l</p> <p>Diesel consumption at 75% engine load: appr. 38.5lph</p>	

Various options are available to meet our customers' requirements,
e.g.: Appointed as power generator for other devices, operation without diesel generator with external power supply

Aircraft Fuel Sump Drain Equipment

>ASE900<



The equipment is developed to drain the fuel systems and tanks of most existing aircraft types.

If required, adapters can be supplied for special cases.

- > The 900l tank gives a large storage capacity for drained fuel.
- > A pneumatically driven double diaphragm pump enables rapid aircraft fuel draining as well as the <ASE900> storage tank drainage.
- > 4 connections enable simultaneous draining of 4 independent fuel circuits.
- > The control panel fitted at the rear of the equipment enables easy operation.

GENERAL INFORMATION

- > A hose drum is provided for the approx 10m long compressed air connection hose
- > A spring loaded drum is provided for storage of the 20m long grounding cable fitted with crocodile clips
- > The chassis is fitted with a steering axle and the towing bar with a safety brake
- > The equipment is designed for transport with fork lift truck or crane
- > A flow indicator is used to monitor the draining process
- > 5kg CO₂ fire extinguisher is provided
- > A connection hose for equipment tank drainage and aircraft connection hoses together with adapters complete the drain equipment

TECHNICAL DATA

> Pneumatic supply (requirements): 5 to 10bar (72.5 to 145.0psi)	> Dimensions and weight: Length: 2,900mm (9.5ft) (towbar vertical) 3,500mm (11.5ft) (towbar horizontal) Width: 1,450mm (4.8ft) Height: 1,800mm (5.9ft) Weight: 880kg (1,940lb) (empty) 1,500kg (3,307lb) (full)
> Operating conditions: Operational temperature: -10 to +32°C (14.0 to 89.6°F) Storage temperature: -10 to +55°C (14.0 to 131.0°F)	
> Measurement range: Suction pressure: -0.5 to 0bar (-7.3 to 0.0psi)	



Rear view of the
Sump Drain Equipment
with Control Panel

OPTIONS

A wide range of options is available to fulfil our customers' requirements.
e.g.: Adaption for different aircraft types, other cable and hose length, etc.

Technical data are subject to change!

REASONS FOR BONDING TESTS?

Aircraft are very complex electrically and structurally:

They

- > can be struck by lightning
- > are exposed to external fields and electrostatic charging
- > are exposed to large temperature differences
- > are liable to corrosion due to large environmental variations
- > have to be suitably treated to minimize or prevent damage

Due to the above factors it is essential that NDT Conductivity Testing is carried out to ensure structural and electrical integrity!

In the age of Digital **FLY BY WIRE** control systems it has become more important than ever to ensure flight safety by performing accurate regular inspection. The control system must always work.



Aircraft are exposed to a large number of environmental challenges: lightning strikes, electromagnetic fields (radar, wireless and television, cosmic radiation), bird strikes, storm, hail, rain, humidity, rapid extreme pressure and temperature changes which result in vibration and shock loading, all of which have an adverse effect on aircraft life and performance.

Aircraft are struck by lightning on average once a year! The main points of impact are, due to aircraft geometry, the aircraft nose, wing tips, engines, vertical and horizontal tail tips, and during the start and landing phases, the landing gear.

Aircraft although similar to a Faraday cage differ in that lightning strikes (**lightning current**) create electromagnetic fields, which, when coupled through openings into the wiring and equipment, cause high voltages. This can have serious consequences such as power supply interruption, malfunction of the computers or total shutdown of certain equipments and/or systems. Additional damage can occur to composite structures by lightning current flow via components e.g. flaps, valves, joints, pipe connections and equipment connector plugs.



Electrostatic charges are generally created by flight through clouds by aircraft and in dust laden low level air by helicopters. To prevent unintentional electrical discharge between aircraft components, all parts including the antennas should be conductively connected to one another in order to prevent

navigation and communication systems malfunction. Bonding is affected by:
Rain and sea air (contains salt) which have a corrosive influence on externally mounted wiring and connectors.

High air pressure and temperature differences, e.g. an aircraft starts in the tropics at high ground temperatures and at 10.000 m is exposed to temperatures of -50°C. These factors cause **water condensation** which collects in seams and low points and also in the lower cargo areas where it even freezes.

Corrosion is created where salt, moisture or corrosive fluids e.g. skydrol etc. come in contact with connections and cables. The resulting oxides reduce the conductivity, thus increasing the conductive connector resistances. As a result, in case of system failure, this will mean non or slow operation of the safety circuit breaker which can result in a fire. Corroded structural connections can lead to enormous damage when subjected to a lightning strike. Unfortunately, this form of corrosion is not always visible to the naked eye.

DAMAGE LIMITATION AND PREVENTION

Equipments and their wiring must be screened and grounded in order to protect the flight critical aircraft components and systems from damage. As the grounding of an aircraft cannot be performed in the normal way, the whole aircraft itself is used as ground.



In addition special methods and materials are used during manufacture to prevent corrosion as far as is possible. Critical areas are protected by using special sealing material and paint.

The fuel tanks must have a redundant electrical bonding to ensure prevention of the possibility of an explosion if normal bonding fails i.e. failsafe.

A continuous good electricity conductivity of the aircraft structure, especially of the outer skin, minimises or protects it from damage by lightning strikes or electrostatic discharges. Structures made of fiber composites together with associated equipment and wires are especially prone to damage.

It is very important that junctions, screw connections, connectors, earthing cables, cable ducts, etc. are tested for conductivity, but they are often very difficult to access.

By testing the resistance of screens, equipment, structural components etc. it is possible to detect compliance to regulations during manufacturing processes, or if the connections, despite ageing, meet the requirements.

The performance of these measures in the manufacture and in service phases is naturally subject to stringent quality control.

TESTING

TEST-FUCHS has developed and launched convenient test equipment to meet stringent safety critical requirements of bonding testing.

The tests can be easily carried out by a single operator and it is not required to remove parts or loosen screw connections. All equipments are battery operated, easy to use and compact to ensure easy use in difficult to access points.

Three different types of equipment are offered for testing the following test requirements:

- > Bonding Tester
- > Loop Resistance Tester
- > Anti Static Paint Tester

CALIBRATION

- > TEST-FUCHS recommends yearly calibration of these systems to safeguard the system specification compliance.
- > Calibration can also be carried out by the customer if he has the necessary competence, equipment and experience. If required, TEST-FUCHS can provide the necessary training and technical information.
- > Our experience shows however that most of customers prefer TEST-FUCHS to carry out calibration.

Our calibration record can be seen in the following list.

- ▶ 1960 - Establishment of its own calibration laboratory
Calibration in accordance with instructions of AQAP at the time
- ▶ 1996 - Introduction of the ISO 9001
Calibration in accordance with ISO 9001 Standard
- ▶ 2004 - Accreditation as DKD Calibration Laboratory
Calibration in accordance with DIN EN ISO/IEC 17 025
Registration no: DKD-K-39301
- > Calibration can be carried out at the Customer's premises or on our premises.
- > Calibration carried out on our premises depending on urgency takes, 3 to 5 working days, at the Customer's, normally 2 to 3 weeks.
- > To reduce the Customer's maintenance staff's workload we can perform the following maintenance tasks:
 - ▶ Function testing
 - ▶ Electrical safety testing to BGV A3
 - ▶ Integrity testing
 - ▶ Preventive maintenance

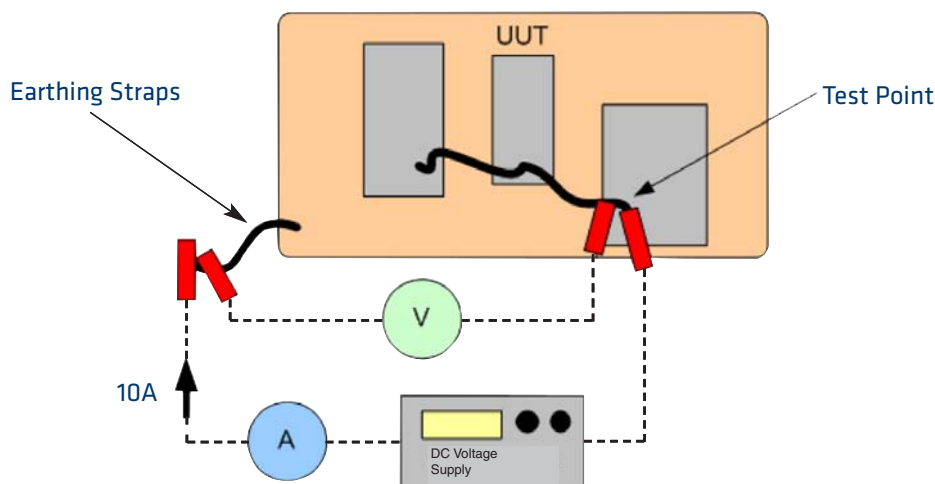
BONDING TESTER - FUNCTION

All conductive aircraft components are electrically connected to one another. These connections must have a minimal electrical resistance to prevent damage in cases of lightning strike or residual current in the aircraft systems.

Test points are the screening, screw connections, earthing straps, and pipes including connections. A test current (e.g. 10A) is fed into the measurement point. Based on the voltage drop the contact resistance is calculated.

TEST-FUCHS Bonding Testers are designed to enable resistance measurements to be easily and accurately measured, especially on extremely low impedance UUTs.

Measuring principle:



Used Test Currents:

10ADC	Normally
100 - 150ADC	For tests between wings and fuselage
0,1ADC	For sensitive UUTs

Typical Connection Resistance:

1-100mΩ

Operational Methods:

The Bonding Testers use the so called 4 wire system method (the KELVIN Method). Thus all the Transition and Cable resistances will be compensated to ensure that the test results are correct.

Testing times:

These are dependant on the type of bonding tester used.

TEST-FUCHS has developed test cables to match any testing requirements. The customer can choose the appropriate length and end connections depending on the area of application. There are A, B and AB cables available. E.g. for a full 4 wire measurement test either an A and a B cable are required or a combined AB cable.

Bonding Tester >MVP10L-FS<

The Bonding Tester >MVP10L-FS< is used for fast and simple inspection of bonding connections. Test currents of up to 10A are injected and the contact resistance is measured using the 4 wire test method.

- > Especially light and ergonomic design
- > Easy to read large display
- > Battery powered, rechargeable in situ or removed
- > Has a galvanically isolated interface for remote control or data exchange
- > Measurement current up to 10A with impulse current testing, automatic field switching and automatic polarity reversal
- > Automatic 4 wire identification
- > Can be hand carried, shoulder strap carried or operated placed on a suitable surface



<MVP10L-FS>
(TEST-FUCHS item no. 151020009)

TECHNICAL DATA

Power supply: To charge the battery
1/N/PE AC 50Hz 230V \pm 10%

Battery life: up to 2000 measurement
/charging

Battery: 2 x 7.2V Li-Ion

Charging time: 6 hours

Test current: 0.1A; 1A; 10A

Test voltage: max. 8V

Pulse duration: 1sec, 3sec

Measurement mode: 2 or 4 wire measurement

Resolution: from 1 $\mu\Omega$ on

Accuracy: \pm 0.2% of full scale
and \pm 0.2% of reading

Measurement range: 1m Ω , 10m Ω , 100m Ω , 600m Ω ,
1 Ω , 6 Ω , 10 Ω , 60 Ω , 600 Ω ,
6k Ω , 60k Ω , 600k Ω for each
measurement current

Measured value storage: 1000 measurement

Dimensions: approx 25 x 13 x 16cm

Weight of equipment: approx 2.8kg

INCLUDED IN STANDARD SCOPE OF DELIVERY:



Battery package
2 Batteries "SWIT S-8970"
(TEST-FUCHS item no. 106220138)



Power supply unit incl. powercable for battery
charging „S306287“
(TEST-FUCHS item no. 103070362)



Shoulder strap „1472“
(TEST-FUCHS item no.
106330923)

NOTE:

The required Measurement Cables are not included in the standard scope of delivery.

Optional Accessories for Bonding Tester

>MVP10L-FS<

Transport case „EXPLORER“ (TEST-FUCHS item no. 107101335)

Very robust, stackable

Lined with foam

Storage

compartment for:

- Bonding Tester <mvp10l-fs>
- Accessories
- Documentation

Dimensions: approx 58 x 44 x 16cm

Weight: approx 5kg



Battery Package (2 Batteries „SWIT S-8970“ (TEST-FUCHS item no. 106220138)



Manufacturer: SWIT
Model: S-8970
Output voltage: 7.2V
Power: 47.5Wh
Intermediate charging possible (no memory effect)
The equipment is fitted with 2 batteries

External Charger for 2 Batteries incl. Power Cable (TEST-FUCHS item no. 106220111)

Manufacturer: SWIT
Model: SC-3602F
Input: AC 100 - 240V; 50 / 60Hz
Output: DC 7 - 8.4V; 1.8A
Possible to charge 2 batteries at the same time



Recommended Standard Measurement Cables for Bonding Tester >MVP10L-FS<

NOTE:

For operation at least a measurement cable A and a measurement cable B are required.
The measurement cables are each delivered in a labeled cable bag.

PKL668-9 (Measurement cable B) (TEST-FUCHS item no. 103240297)

The measurement cable is suitable for a fast bonding testing on stiff UUTs.

Type:	Test pin with spring mounted test prod
Max current:	max. 10A
Cable length:	3m
Test pin handle:	Ø 30 x 170mm
Test prod:	Ø 6 x 95mm



PKL668-12 (Measurement cable A) (TEST-FUCHS item no. 103240298)

The measurement cable is suitable for the ground connection at the UUT.
Each current and voltage poles are connected fixed with the structure.

Type:	Ground connection cable with 2 alligator clips
Max current:	max. 10A
Cable length:	5m
Safety taper:	2 x XKK-1001



FURTHER MEASUREMENT CABLES

PKL668-2 (Measurement cable A+B) (TEST-FUCHS item no. 103240198)

The measurement cable is suitable for testing single screw connections. When placing the test prod on a measurement point, make sure all four contact points sit well. The measurement is carried out single-handed.

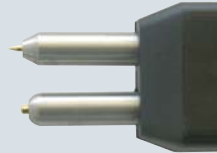
Type:	4 wire test pin for miniature UUTs (screw head)
Max current:	max. 10A
Cable length:	2.5m
Test pin handle:	Ø 16 x 70mm
Test prod:	Ø 8 x 12mm



PKL668-3 (Measurement cable A+B) (TEST-FUCHS item no. 103240316)

This measurement cable is suitable for connection testing of pressed metallic screens. The measurement is carried out single-handed.

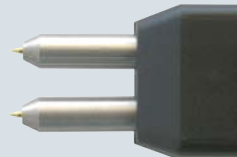
Type:	4 wire test prod, spring mounted (sharp / blunt)
Max current:	max. 10A
Cable length:	2.5m
Test pin handle:	30 x 22 x 145mm
Test prod:	ø 7 x 22mm



PKL668-4 (Measurement cable A+B) (TEST-FUCHS item no. 103240296)

The measurement cable is suitable for general applications, where contact point to be measured is less than 12mm wide. The measurement is carried out single-handed.

Type:	4 wire test prod, spring mounted (sharp / sharp)
Max current:	max. 10A
Cable length:	2.5m
Test pin handle:	30 x 22 x 145mm
Test prod:	ø 7 x 22mm



PKL668-14 (Measurement cable A) (TEST-FUCHS item no. 103240310)

This measurement cable is suitable for a fast bonding testing on stiff UUTs.

Type:	Test pin with spring mounted test prod
Max current:	max. 10A
Cable length:	3m
Test pin handle:	ø 30 x 170mm
Test prod:	ø 6 x 95mm



SPECIAL MODELS OR OTHER CABLE LENGTHS ARE AVAILABLE ON REQUEST!

Bonding Tester >MVP10R-FS<

The Bonding Tester <MVP10R-FS> is designed for fast and simple inspection of bonding. Test currents of up to 10A are injected and the contact resistance is measured using the 4 wire test method.

The 19" rack design enables the tester to be incorporated into a special to type test system.

- > Easy to read large display
- > Has a galvanically isolated interface for remote control or data exchange
- > Measurement current up to 10A with impulse current testing, automatic field switching and automatic polarity reversal
- > Automatic 4 wire identification
- > Two off connector sockets are fitted to the front and rear of the equipment



<MVP10R-FS>
(TEST-FUCHS item no. 151020024)

TECHNICAL DATA

Power connection:	1/N/PE AC 50Hz 230V
Nominal current:	0.7A
Test current:	0.1A; 1A; 10A
Test voltage:	max. 8V
Pulse duration:	1sec, 3sec
Measurement mode:	2 or 4 wire measurement
Resolution:	from 1μΩ on
Accuracy:	± 0.2% of full scale and ± 0.2% of reading

Measurement range:	1mΩ, 10mΩ, 100mΩ, 600mΩ 1Ω, 6Ω, 10Ω, 60Ω, 600Ω, 6kΩ, 60kΩ, 600kΩ for each measurement current
Dimensions:	approx 45 x 25 x 13 cm
Weight of equipment:	approx 5.4kg

INCLUDED IN STANDARD SCOPE OF DELIVERY:



Power cable
(TEST-FUCHS item no. 103240028)

OPTIONAL ACCESSORIES:



19" Housing
(TEST-FUCHS item no. 107100466)

NOTE:

The required Measurement Cables are not included in the standard scope of delivery. All accessories are in the brochures of the "bonding tester <MVP10L-FS>".

Test Equipment, Bonding Tester

>PA-MVP11<

The Bonding Tester >PA-MVP11< can be used for inspection of bondings using a test current of up to 200A continuous current.

- > Usable on all aircraft types
- > Display and operating controls are laid out in an easy to use manner
- > A GRP - carrying case is provided to ensure the tester is not damaged during the transport
- > The tester is compactly designed



<PA-MVP11>
(TEST-FUCHS item no. 150020029))

TECHNICAL DATA

Current measurement with digital ammeter:

Range: 0 - 200A

Tolerance: Cl. 0.5

Voltage drop measurement digital voltmeter:

Range: 0 - 2000mV

Tolerance: Cl. 0.1

Output current: 0 - 200ADC

Power connection: 1/N/PE AC 50Hz 230V

Back-up fuse: 16A

Nominal current: 7A

Dimensions: approx 63 x 49 x 39cm

Weight incl. test cable: approx 53kg

INCLUDED IN STANDARD SCOPE OF DELIVERY:

2 Measurement cables with alligator clip (each 10m)

2 Test cables for 200A (each 10m)

1 Power cable

2 Safety tapper

5 Cable bags

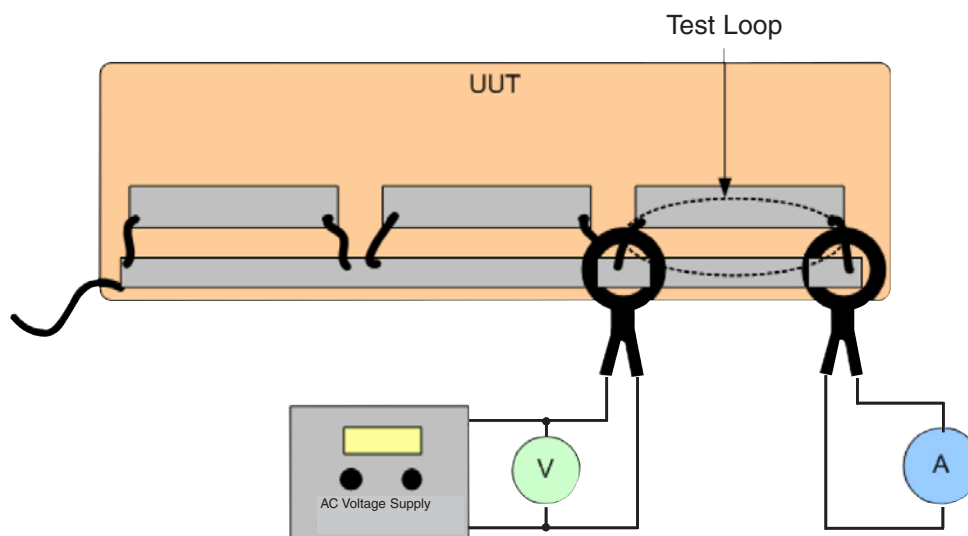
LOOP RESISTANCE TESTER - FUNCTION

Electrical cables are screened at both ends and designed to form an electrical loop in which the current flows through the cable and back through the screen. As a result, a magnetic field appears which is eliminated by the voltage build-up. If the loop resistance is kept at a minimum, then the maximum level of safety has been reached. The loop resistance of non-electrical loops (pipes and flaps with multiple ground connections) can also be measured in this way.

The Loop Resistance is tested accurately with easy to use equipment.

TEST-FUCHS Loop Resistance Testers are designed to enable loop resistance measurements to be easily and accurately carried out.

MEASURING PRINCIPLE:



Typical Loop Resistance:

2-100 mΩ

Operational Method:

Transformatorprinzip with supply and measurement Clamps

Supply Frequency:

1 kHz oder 2kHz (special design)

The supply Clamp induces a current flow in the Bonding Loop to be tested. A second clamp measures the current in the loop. The applied voltage together with the measured current, phase selective, when calculated gives the measured impedance. As the loops are not always accessible, special to type or adaptable measurement Clamps could be required.

TEST-FUCHS has developed impedance measurement Clamps for test purposes. A unique feature (not available on the market) is the combination of supply and current measurement Clamps, which are screened from one another.

As an alternative more economical solution, split standard Clamps can be supplied.

Measurement Clamps are available with a variety of openings and the cable lengths can of course be supplied in accordance with the customer's requirements.

Loop Resistance Tester >IM2-FS<

The Loop Resistance Tester >IM2-FS< is designed for fast and simple checking of loop impedance.

- > Especially light and practical design
- > Very large, easy to read display
- > Battery powered, rechargeable in situ or removed
- > Has a galvanically isolated interface for remote control or data exchange
- > Automatic residual current compensation
- > Range is switched automatically
- > Used in conjunction with combined or separate measurement Clamps
- > Search mode for rapid location of faulty connections
- > Including self test unit for function control of the test equipment and the measuring clamps



<IM2-FS>
(TEST-FUCHS item no. 150020605)

TECHNICAL DATA

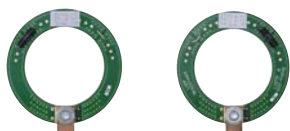
Power operation:	1/N/PE AC 50Hz 230V \pm 10%
Battery:	14.4V Li-Ion
Charging time:	6 hours
Measurement range:	depends on Clamps e.g. 20m Ω , 200m Ω
Data storage:	90 measured values
Max. resolution:	0.1m Ω

Output voltage:	max 70V
Output current:	max 1A
Measurement frequency:	1kHz \pm 10Hz
Accuracy:	\pm 5% of full scale \pm 4 digit
Dimensions:	approx 25 x 28 x 16cm
Weight of equipment:	approx 5kg

INCLUDED IN STANDARD SCOPE OF DELIVERY:



1 Battery "SWIT S-80805"
(TEST-FUCHS item no. 106220098)



Self test UUT
- M882067 100m Ω
(TEST-FUCHS item no. 103130581)
- M882071 10m Ω
(TEST-FUCHS item no. 103130582)
- not calibrated



Shoulder strap "1472"
(TEST-FUCHS item no. 106330923)



Measurement cable set "S307073" with two banana plugs and test prods for Search Mode
(TEST-FUCHS item no. 103191770)



Power supply unit incl. power cable for charging "S306287"
(TEST-FUCHS item no. 103070362)

NOTE:

Measurement Clamps are not included in the standard scope of delivery and have to be ordered in accordance with customer requirements.

Optional Accessories for Loop Resistance Tester

>IM2-FS<

Transport case "FREIGHTAINER PLUS" (TEST-FUCHS item no. 107101334)

Very robust, provided with transport roller

Lined with foam

Storage

compartment for:

- Loop Resistance Tester <IM2-FS>
- Charger
- 2 Batteries
- Cable bags

Dimensions: approx 60 x 45 x 18 cm

Weight: approx 9kg



Battery (TEST-FUCHS item no: 106220098)



Manufacturer: SWIT
Model: S-8080S
Output voltage: 14,4V
Power: 88Wh
Intermediate charging possible
(no memory effect)
Diagnostic display

Charger for Battery incl. Power Cable (TEST-FUCHS item no: 106220099)

Manufacturer: SWIT
Model: SC-302S
Input: AC 100 - 240V; 50 / 60Hz
Output: DC 14 - 20V; 1,9A
Possible to charge 2 batteries at the same time



Recommended Standard Measurement Clamps for Loop Resistance Tester >IM2-FS<

Note:

For operation at least one Combined Measurement Clamp or two Single Measurement Clamps are required. The Measurement Clamps are delivered in labeled cable bags.

IMPEDANCE MEASUREMENT CLAMP

<IMZ1>

(TEST-FUCHS item no. 103130395)

- > Robust design, symmetric Clamps
- > Capable of being used with cables or metal rails up to a diameter of approx 70 mm
- > Spring loaded to closed (operating) position
- > Combined Supply and Measurement Clamps
- > Shielded cable
- > "Measure" button on the Electronic Unit



TECHNICAL DATA

Frequency:	for test equipments with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 70mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening:	± 3% of full scale ± 1mΩ

Overall dimension (without cable):	Width: approx 120mm
	Depth: approx 40mm
	Height: approx 260mm
Jaws opening:	approx 70mm
Weight:	approx 1.6kg
Cable length:	3m

IMPEDANCE MEASUREMENT CLAMP <IMZ7>

(TEST-FUCHS item no. 150020514)

- > Symmetric design
- > Small measuring head
- > Capable of being used with cables in a confined area of up to approx 26mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamps
- > Symmetric windings for high repetition accuracy
- > "Measure" button
- > Shielded cable



TECHNICAL DATA

Frequency: for test equipments with 1 or 2kHz
 Resistance range: 20mΩ, 200mΩ
 UUT diameter: max. 26mm
 Accuracy: ± 5% of full scale ± 4 digit
 Repetition accuracy of UUT variations position in clamp opening: ± 2% of full scale ± 1mΩ

Overall dimension (without cable): Width: approx 58mm
 Depth: approx 31mm
 Height: approx 120mm
 Jaws opening: approx 31mm
 Weight: approx 500g
 Cable length: 3m

Further Measurement Clamps

IMPEDANCE MEASUREMENT CLAMP <IMZ2>

(TEST-FUCHS item no. 150020003)

- > Robust design non-circular measurement Clamps
- > The front face is narrower than the other parts of the jaws
- > Capable of being used on cables in a confined area of up to approx 50mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamps
- > Shielded cable
- > "Measure" button on the Electronic Unit



TECHNICAL DATA

Frequency:	for test equipments with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 50mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening: ± 3% of full scale ± 1mΩ	

Overall dimension: (without cable)	Width:	approx 95mm
	Depth:	approx 50mm
	Height:	approx 255mm
Jaws opening:	approx 50mm	
Weight:	approx 1.8kg	
Cable length:	3m	

IMPEDANCE MEASUREMENT CLAMP <IMZ3>

(TEST-FUCHS item no. 150020004)

- > Robust design non-circular measurement Clamps
- > Jaws are narrower on the lower side
- > Capable of being used on cables in a confined area of up to approx 55mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamps
- > Shielded cable
- > "Measure" button on the Electronic Unit



TECHNICAL DATA

Frequency:	for test equipments with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 50mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening: ± 3% of full scale ± 1mΩ	

Overall dimension: (without cable)	Width:	approx 105mm
	Depth:	approx 40mm
	Height:	approx 270mm
Jaws opening:		approx 55mm
Weight:		approx 1.5kg
Cable length:		3m

IMPEDANCE MEASUREMENT CLAMP <IMZ4>

(TEST-FUCHS item no. 103130444)

- > Robust design non-circular measurement Clamps
- > Especially narrow design with short handles
- > Capable of being used on cables in a confined area of up to approx 60 mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamps
- > Shielded cable
- > "Measure" button at the Electronic Unit



TECHNICAL DATA

Frequency:	for test equipments with 1 or 2kHz
Resistance range:	10mΩ, 200mΩ
UUT diameter:	max. 60mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening:	± 5% of full scale ± 1mΩ

Overall dimension: (without cable)	Width:	approx 85mm
	Depth:	approx 37mm
	Height:	approx 175mm
Jaws opening:		approx 60mm
Weight:		approx 1.5kg
Cable length:		3m

SUPPLY CLAMP <IMZ5>

(TEST-FUCHS item no. 150020064)

CURRENT MEASUREMENT CLAMP

<SMZ5>

(TEST-FUCHS item no. 150020065)

SET CONSIST OF <IMZ5> + <SMZ5>

(TEST-FUCHS item no. 150020607)

- > Modified LEM PR 1201ACI
- > An IMZ5 Supply Clamp and a SMZ5 Current Measurement Clamp are required for testing
- > Capable of being used on cables and metal rails of up to approx 55mm dia
- > Spring loaded to closed (operating) position
- > Modified Split Standard Clamps
- > An integrated "Measure" button is fitted to the Supply Clamp
- > Both Clamps have arrows showing the current direction



SUPPLY CLAMP IMZ5



CURRENT MEASUREMENT CLAMP SMZ5

TECHNICAL DATA

Frequency:	for test equipments with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 55mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening:	± 3% of full scale ± 1mΩ

Overall dimension : (without cable)	Width:	approx 106mm
	Depth:	approx 40mm
	Height:	approx 230mm
Jaws opening:		approx 55mm
Weight:		approx 1.6kg
Cable length:		3m

SUPPLY CLAMP <IMZ6>

(TEST-FUCHS item no. 150020590)

CURRENT MEASUREMENT CLAMP

<SMZ6>

(TEST-FUCHS item no. 150020589)

- > Modified FLUKE i200
- > For measurement both a Supply and a Current Measuring Clamps are required
- > Capable of being used on cables and metal rails of up to approx 20mm dia
- > Spring loaded to closed (operating) position
- > Modified Split Standard Clamps
- > An integrated "Measure" button is fitted to the Supply Clamps
- > Both Clamps have arrows showing the current direction



SET CONSISTS OF <IMZ6> + <SMZ6>

(TEST-FUCHS item no. 150020591)



SUPPLY CLAMP IMZ6



CURRENT MEASUREMENT CLAMP SMZ6

TECHNICAL DATA

Frequency:	for test equipment with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 20mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations position in clamp opening:	± 3% of full scale ± 1mΩ

Overall dimension: (without cable)	Width:	approx 50mm
	Depth:	approx 30mm
	Height:	approx 135mm
Jaws opening:		approx 21mm
Weight:		approx 1.6kg
Cable length:		3m

IMPEDANCE MEASUREMENT CLAMP <IMZ8>

(TEST-FUCHS item no. 150020608)

- > Symmetric design
- > Small measurement head
- > Capable of being used on cables in a confined area of up to approx 36mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamps
- > Symmetric windings for high Repetition Accuracy
- > "Measure" button



TECHNICAL DATA

Frequency:	for test equipment with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 36mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations-position in clamp opening:	± 3% of full scale ± 1mΩ

Overall dimension: (without cable)	Width:	approx 72mm
	Depth:	approx 31mm
	Height:	approx 134mm
Jaws opening:		approx 40mm
Weight:		approx 1.4kg
Cable length:		3m

IMPEDANCE MEASUREMENT CLAMP <IMZ9>

(TEST-FUCHS item no. 150020613)

- > Symmetric design
- > Small measurement head
- > Capable of being used on cables in a confined area of up to approx 66mm dia
- > Spring loaded to closed (operating) position
- > Combined Supply and Current Measurement Clamp
- > Symmetric windings for high Repetition Accuracy
- > "Measure" button



TECHNICAL DATA

Frequency:	for test equipment with 1 or 2kHz
Resistance range:	20mΩ, 200mΩ
UUT diameter:	max. 66mm
Accuracy:	± 5% of full scale ± 4 digit
Repetition accuracy of UUT variations-position in clamp opening:	± 2% of full scale ± 1mΩ

Overall dimension: (without cable)	Width:	approx 106mm
	Depth:	approx 38mm
	Height:	approx 160mm
Jaws opening:		approx 68mm
Weight:		approx 850g
Cable length:		3m

SPECIAL TO TYPE MODELS ARE AVAILABLE ON REQUEST!

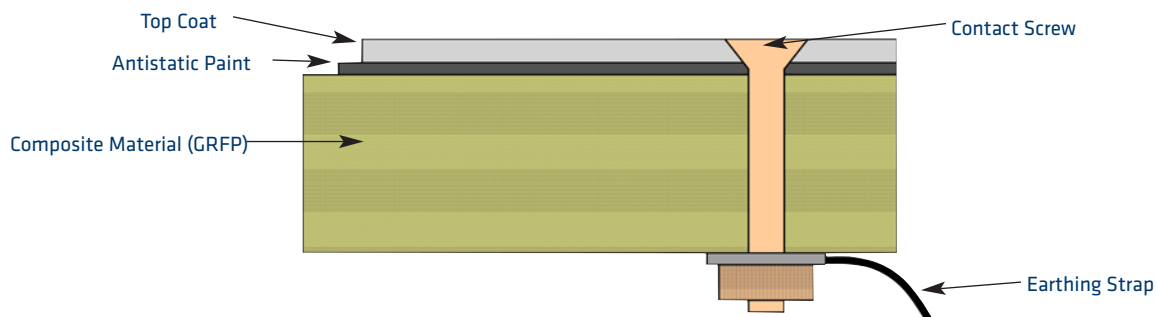
ANTISTATIC PAINT TESTING - FUNCTION

In order to dissipate electrostatic charges, all outer non-conductive surfaces of the aircraft are painted with a conductive coating (antistatic paint). On top of this coat a non-conductive, anti-corrosion paint is applied.

The antistatic paint must be tested for conductivity as well as its adhesion without damaging coatings. These measurements are carried out with special flexible (to match aircraft contours) measuring heads which are used in conjunction with Test-Fuchs Antistatic Paint Tester <IA2>.

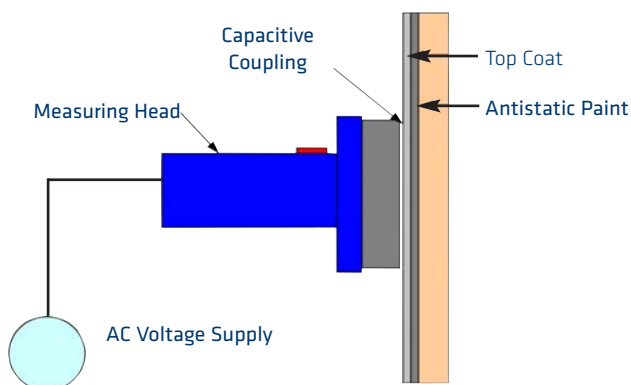
TEST-FUCHS Antistatic Paint Tester enables quick, easy and accurate testing of the surfaces and volume resistances of aircraft exterior surfaces.

Composition of Antistatic Paint:



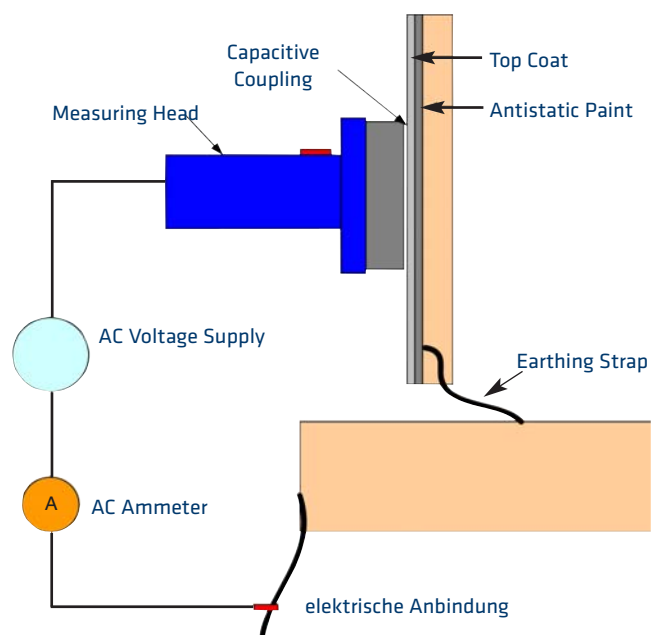
Measurement mode S1:

- Measurement of surface resistance through insulating layers:



Measurement mode B1:

- Measurement of resistance from the measurement point of the structure connection (volume resistance):



Typical measured values:

20 KOhm to 2 MOhm (volume resistance)

Measurement frequency:

20 kHz

TEST-FUCHS has developed Flexible Measuring Heads for Aircraft Contours.

Antistatic Paint Tester >IA2<

The Anti Static Paint Tester is designed for fast and simple testing of conductive layers and their bonding.

- > Light, practical, robust test equipment
- > Battery powered, rechargeable in situ or removed
- > Measurement of surface resistance through insulated layers (Mode S1)
- > Measurement of contact resistance (Mode B1) to the structure connection through insulated layers
- > Automatic field switching
- > Has a galvanically isolated interface for remote control or data exchange
- > Specific measuring heads conforming to curved surfaces
- > Visual and acoustic signals for over/under limit values
- > Including self test unit for function control of the test equipment and the measuring heads



>IA2<
(TEST-FUCHS item no. 150020606)

TECHNICAL DATA

Power operation
with power supply: 1/N/PE AC 50Hz 230V ± 10%
Battery life: > 200 measurements
Battery: 7.2V Li-Ion
Charging time: 6 hours

Measurement mode: S1: Surface-Surface and
B1: Surface-Structure
Measuring frequency: 20kHz

Accuracy: ± 10% of reading ± 2 digit
Measurement range S1: Depends on sensor
(see data sheet)
Measurement range B1: Depends on sensor
(see data sheet)
Dimensions: approx 25 x 13 x 16cm
Weight: approx 2.5kg

INCLUDED IN STANDARD SCOPE OF DELIVERY:



1 Battery „SWIT S-8970“
(TEST-FUCHS item no. 106220110)



1 Self test plate B1
<S306294>
(TEST-FUCHS item no.
103230133)
not calibrated



Shoulder strap „1472“
(TEST-FUCHS item no. 106330923)



1 Bonding cable PKL320-1
length: 5m
(TEST-FUCHS item no. 103240311)



Power supply unit incl. powerca-
ble for charging „S306287“
(TEST-FUCHS item no.
103070362)

NOTE:

The required Measuring Head is not included in the standard scope of delivery but can be ordered separately, see next pages.

Optional Accessories

Antistatic Paint Tester >IA2<

Transport case „EXPLORER“ (TEST-FUCHS item no. 107101335)

Very robust, stackable

Lined with foam

Storage

compartment for:

- Antistatic Paint Tester <IA2>
- Accessory
- Documentation

Dimensions:

approx 58 x 44 x 16cm

Weight:

approx 5kg



Battery (TEST-FUCHS item no. 106220110)



Manufacturer: SWIT

Model: S-8970

Output voltage: 7.2V

Power: 47.5Wh

Intermediate charging possible (no memory effect)

The equipment is fitted with one battery

External Charger for 2 Batteries incl. Power Cable (TEST-FUCHS item no. 106220111)

Manufacturer: SWIT

Model: SC-3602F

Input: AC 100 - 240V; 50 / 60Hz

Output: DC 7 - 8.4V; 1.8A

Possible to charge 2 batteries at the same time



Recommended Standard Measuring Head for Antistatic Paint Tester >IA2<

<IATP3> Specially optimized for use in Measurement Mode B1 (TEST-FUCHS item no. 150020603)

Dimensions:	Ø 76 x 130mm
Connecting cable:	3m
Measurement range:	B1: 20kΩ to 2MΩ
Accuracy:	±10% ±2 digit of reading
MAX-LED at head:	YES
Measurement button:	YES
Max. paint thickness:	1mm
Maximum radius of the test surface:	200mm
Contact pressure:	0.2 to 2kg (2 to 20N) alternative
Special feature:	Skydrol resistant



FURTHER MEASURING HEADS AND BONDING CABLES

<IATP1> For universal use in Measurement Mode B1 and S1 (TEST-FUCHS item no. 150020055)

Dimensions:	Ø 76 x 130mm
Connecting cable:	3m
Measurement range S1:	5kΩ to 10MΩ
Measurement range B1:	112kΩ/sq to 470MΩ/sq
Accuracy:	±10% ±4 digit of reading
MAX-LED at head:	YES
Measurement button:	YES
Max. paint thickness:	0.5mm (50 kΩ to 1MΩ)
Maximum radius of the test surface:	200mm
Contact pressure:	1kg constant (10N) required



Bonding Cable Extension 5 m PKL320-2
(TEST-FUCHS item no. 103240318)



Measuring Head Cable Extension 10 m PKL320-3
(TEST-FUCHS item no. 103240319)



SPECIAL DESIGNS ARE AVAILABLE ON REQUEST!

Bonding And Loop Resistance Tester

>BLRT2-XX-X<



<BLRT2>
TEST-FUCHS part no. 151020031

The equipment is developed as multi functional bonding tester. It is especially used in aircraft manufacturing. It can be used on all aircraft types. It is capable of performing various tests depending on used accessories.

The test capability ranges from simple 4-wire bonding tests to loop resistance testing using current clamps with or without current measuring clamps up to special tests e.g. ESN tests (electrical structure network) or bonding test of multiple connected earth connections.

- > All testing features can be selected and combined independently. Options can also be retrofitted at a later stage.
- > The tester is housed in a light and practical case with handle ensuring easy handling by the user
- > The high capacity accumulator ensures that the equipment can be used for long periods of time
- > A wide range of accessories for this tester is available

GENERAL INFORMATION

- > Large display for good readability
- > User friendly software for easy operator use
- > Multi-function tester with selectable standard and special functions
- > Clamps and cables are coded
- > USB interface
- > Memory capacity for 1,000 measuring values (including date and time)
- > PC-Software for data processing is available
- > Including self test unit for function control of the test equipment and the measuring clamps

TECHNICAL DATA

<p>> Electrical supply (requirements):</p> <p>Mains charger adapter: 1/N/PE AC 50Hz Accumulator: 2 x Li-Ion 7.2V 47.5Wh</p>	<p>> Interface:</p> <p>Interface: USB (Mini USB) Memory capacity: min. 1,000 measuring values</p>
<p>> Functions:</p> <p>Measuring functions: see "FUNCTIONS" Ranges: see "OPTIONS" Accuracy: see "OPTIONS"</p>	<p>> Operating conditions (operation):</p> <p>Temperature: -15°C to +50°C (+5°F to +122°F) does not apply to all measuring functions +10°C to +50°C (+50°F to +122°F) for "Single Clamp Measurement"</p> <p>Rel. humidity: max. 95% relative humidity (non-condensing)</p>
<p>> Output values:</p> <p>Output voltage DC: max. 7VDC Output current DC: max. 10ADC Output voltage AC: max. 40VAC Output power AC: max. 30W</p>	<p>> Operating conditions (storage):</p> <p>Temperature: -20°C to +70°C (-4°F to 158°F) Rel. humidity: max. 95% relative humidity (non-condensing)</p>
<p>> Measurement range:</p> <p>Functions: Measurement ranges and tolerances are listed in the item "FUNCTIONS"</p> <p>Battery voltage: Range: 0 to 10V Tolerance: 0.5% of reading</p>	<p>> Dimensions and weight:</p> <p>Width: approx. 250mm (9.8in) Depth: approx. 170mm (6.7in) Height: approx. 170mm (6.7in) Weight: approx. 3.2kg (7.1lb)</p>

FUNCTIONS

BONDING TESTER (OPTION B)

(TEST-FUCHS part no. 151020036)

> Technical description

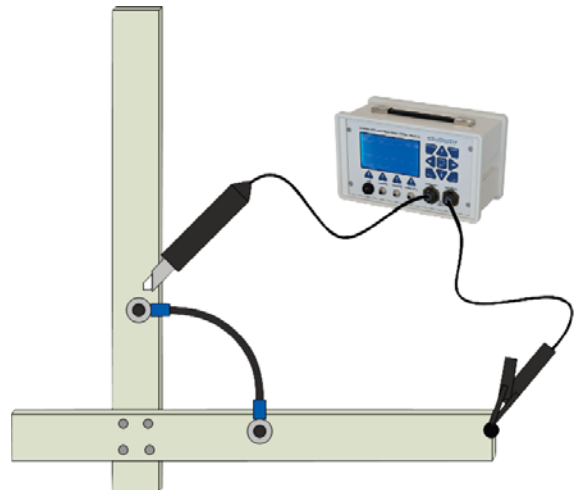
Bonding Tester with 10A, 1A and 0.1A test current. It works as a Kelvin Resistance Meter.

The bonding tester measures the resistive connection between two measuring points.

During the bonding test an increased test current is injected in the unit under test by means of test probes or terminals. The voltage drop is recorded on two test points. The contact resistance between voltage test points is calculated by means of current and voltage values.

This measuring method only works when the total measurement current flows through the unit under test.

Schematic diagram of the test set-up

**BONDING TEST FOR MULTIPLE CROSSED CONNECTIONS (UP TO 20A) (OPTION C)**

(TEST-FUCHS part no. 151020037)

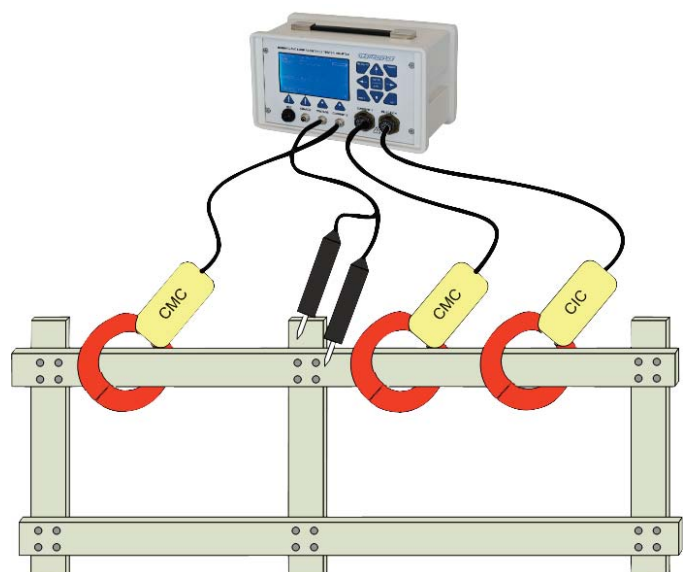
> Technical description

This bonding test is carried out when the injected test current can flow through different paths and there is a physical access to the unit under test.

The test current is injected by means of a "Current Injection Clamp" (CIC). Here a loop resistance is necessary. The "Current Measurement Clamp" (CMC) measures this test current. The voltage drop at the UUT is measured by means of a pair of voltage test probes. The injected current which is not flowing through the unit under test is measured by means of an additional "Current Measurement Clamp" (CMC) and is taken into account at the calculation.

The contact resistance is determined by means of measured currents and voltage drop.

Schematic diagram of the test set-up



FUNCTIONS

HIGH CURRENT / LOW FREQUENCY MICRO-OHMMETER (OPTION E)

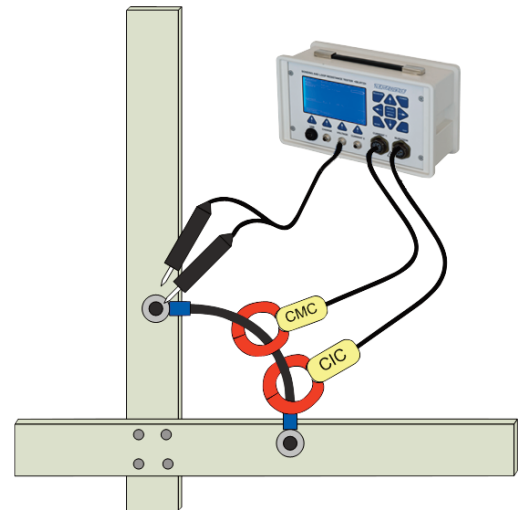
(TEST-FUCHS part no. 151020038)

> Technical description

The “High Current / Low Frequency Test” (up to 150A and with different frequencies) is used to evaluate the quality of the connections. A low frequency is used to limit damages to the composite material in case of a problem.

The very high test current with low frequency is injected by means of a “Current Injection Clamp” (CIC) For this purpose a loop resistance is necessary. A “Current Measurement Clamp” (CMC) measures this test current. The voltage drop at the UUT is measured by a pair of voltage test probes. The contact resistance is determined by means of test current and voltage drop.

Schematic diagram of the test set-up

**LOOP RESISTANCE TEST (OPTION L, M, N)**

(TEST-FUCHS part no. 151020039 for option L - 1,000Hz)

(TEST-FUCHS part no. 151020040 for option M - 2,000Hz)

(TEST-FUCHS part no. 151020041 for option N - 100 to 200Hz)

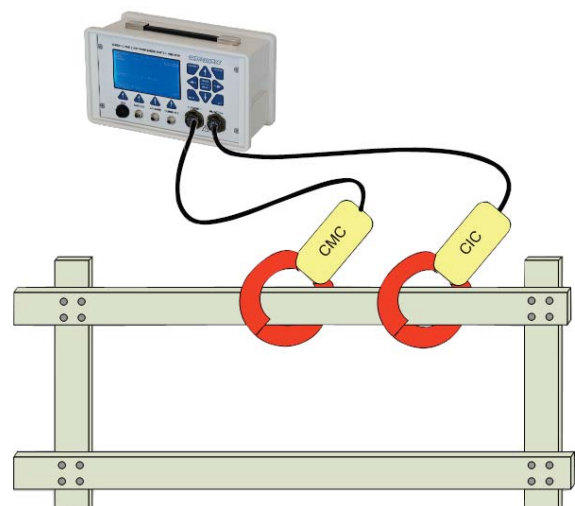
> Technical description

The “Loop Resistance Test” measures overall resistance of a bonding loop. It is used for example when a metal tube has multiple connections to structure.

A “Current Injection Clamp” (CIC) injects alternating current into the current loop and the required voltage is measured. A “Current Measurement Clamp” (CMC) measures the injected current. The overall resistance of the current loop is calculated by means of voltage and current value.

For this method it is essential that there is only one current loop.

Schematic diagram of the test set-up



FUNCTIONS

OVERBRAID TEST (OPTION O)

(TEST-FUCHS part no. 151020042)

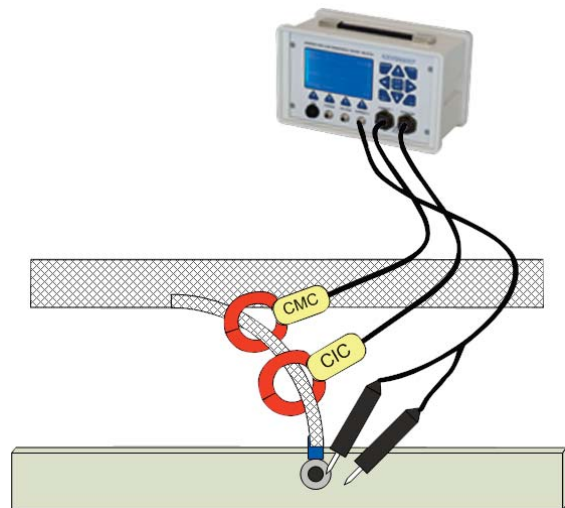
> **Technical description**

The Overbraid Test verifies whether bonding connections (e.g. of a shielding braid) are properly connected to the structure.

The test current up to 10A is injected by means of the "Current Injection Clamp" (CIC). For this purpose a loop resistance is necessary. A "Current Measurement Clamp" (CMC) measures this test current. The voltage drop at the connection is measured by means of a pair of voltage test probes. Contact resistance is determined by means of test current and voltage drop.

This test method is similar to option E however lower currents are used in this case.

Schematic diagram of the test set-up

**MICRO-OHMMETER WITH SEPARATE CURRENT MEASUREMENT CLAMP (OPTION S)**

(TEST-FUCHS part no. 151020043)

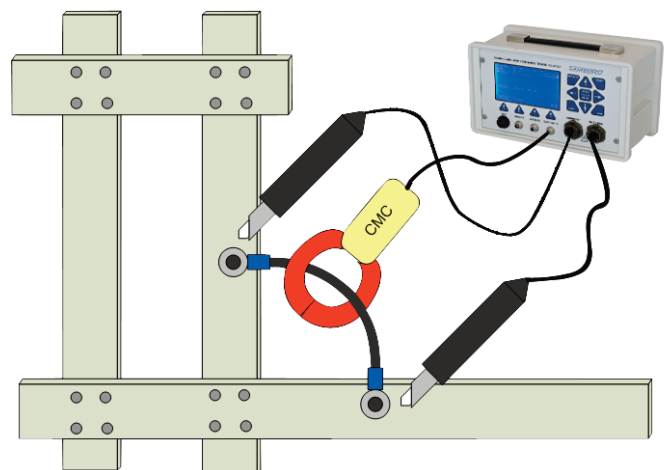
> **Technical description**

This bonding test is carried out when the injected test current can use different paths and there is a physical access to the unit under test (and also for the current measuring clamp). When this is not the case, option C can be used instead.

This bonding test operates like a standard bonding test (option B), in addition the real UUT current is measured by means of a „Current Measurement Clamp“.

The result is the contact resistance of the connection element which is located between the voltage probes and which is enclosed by the current probe.

Schematic diagram of the test set-up



FUNCTIONS

WIRELESS COMMUNICATION (OPTION V)

(TEST-FUCHS part no. 151020044)

> Technical description

Automatic wireless transfer of data between the <BLRT2> and a PC can be performed. For this purpose a RF USB stick is inserted into the PC.

SINGLE CLAMP MEASUREMENT (OPTION Y)

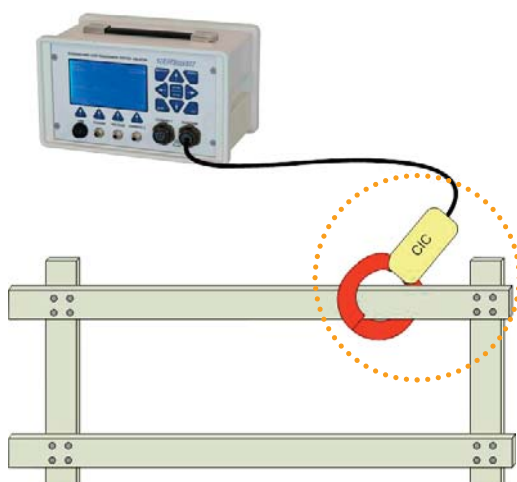
(TEST-FUCHS part no. 151020045)

> Technical description

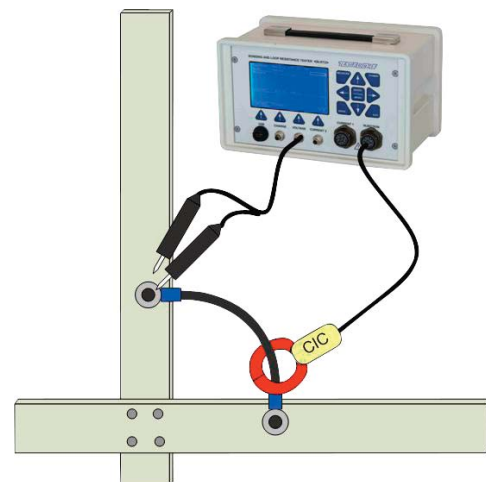
Single Clamp Measurement for the options E and N.

Many of the functions require one "Current Injection Clamp" (CIC) and one "Current Measurement Clamp" (CMC). When due to space strictions it is not possible to attach two clamps to the unit under test, the "Single Clamp Measurement" method can be used. In this case only one clamp is used (to inject the current). The injected current is calculated using the operating parameters. The advantage of this method is that measurements can easily be carried out and the number of clamps is reduced to one. The disadvantage is that the measurement accuracy is reduced by approx. +2% of reading (depends on the used function).

Schematic diagram of the test set-up



Loop Resistance
Test (Option L, M, N)
Single Clamp Measurement



High Current / Low Frequency
Test (Option E)
Single Clamp Measurement

FUNCTIONS

CAPACITIVE MEASUREMENT (OPTION Z)

(TEST-FUCHS part no. 151020046)

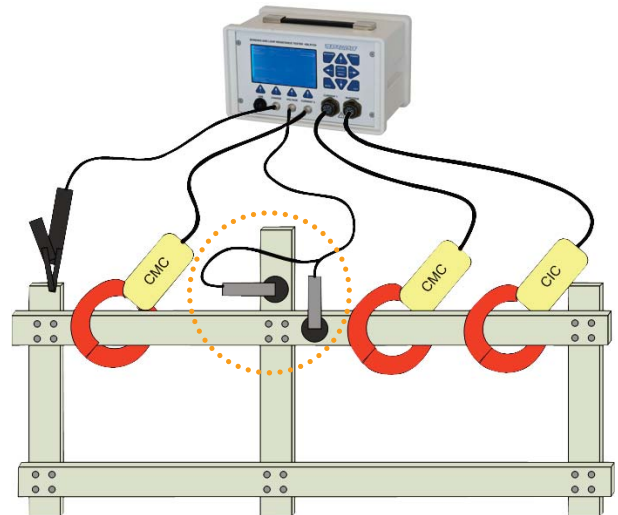
> **Technical description**

Voltage probes must have a conductive connection to the metal. Therefore it might be necessary to break through the varnish coating of the UUT which will require renewal after test completion.

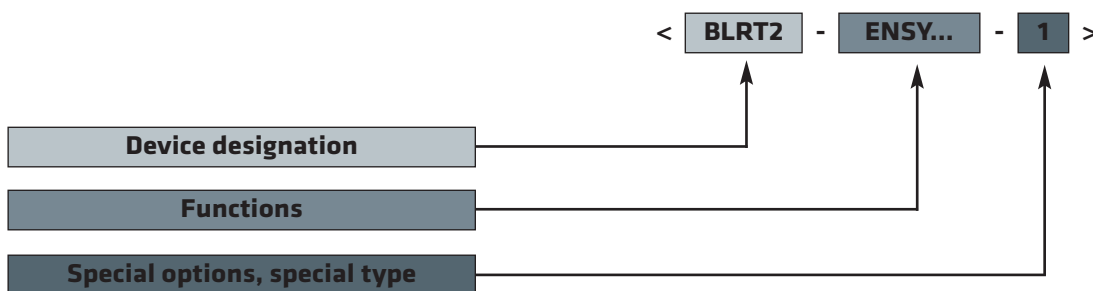
To avoid this extensive process it is possible to use capacitive voltage measurement instead of the voltage probes. This can replace one or both voltage measurements. This test method can only be used for AC measurements.

Due to the capacitive measurement system, the accuracy of measurements is reduced by approx. +3% (depending on the used function).

Schematic diagram of the sensor



TYPE KEY



OPTIONS

Option	Function	TEST-FUCHS part no.	Measurement (mOhm)	Resolution (μOhm)	Adjustable current (A)	Frequency (Hz)	Standard accuracy (% of reading)	Required accessories	Remarks
B	Bonding Tester	151020036	2 to 1000 at 0.1A	1	0.1 1 10	DC	0.2% reading +0.2% final v.	2 x Kelvin Probe	(available) Standard Bonding
C	Bonding Test for Multiple Crossed Connections	151020037	0.01 to 100	1	10 20	1000	10 ±2μOhm	1 x Voltage Probe 1 x Current Injection Clamp 2 x Current Measurement Clamp	(under development)
E	High Current / Low Frequency Micro-Ohmmeter	151020038	Rc: 0.005 to 0.5 Zloop: 0.1 to 20	0.1	10 20 50 100 150	100 200	10 ±1μOhm	1 x Current Injection Clamp 1 x Current Measurement Clamp or 1 x Combined Injection Measurement Clamp and 1 x Voltage Probe	(available) e.g.: used for ESN Measurement
L	Loop Resistance Tester 1000Hz	151020039	1 to 200	10	1 10	1000	5 ±50μOhm	1 x Current Injection Clamp 1 x Current Measurement Clamp or 1 x Combined Injection Measurement Clamp	(available) Standard Loop Resistance Test
M	Loop Resistance Tester 2000Hz	151020040	1 to 200	10	1 10	2000	5 ±50μOhm	1 x Current Injection Clamp 1 x Current Measurement Clamp or 1 x Combined Injection Measurement Clamp	(development is planned)
N	Loop Resistance Tester 100Hz	151020041	0.1 to 20	1	0.1 1 10	100 200	10 ±20μOhm	1 x Current Injection Clamp 1 x Current Measurement Clamp or 1 x Combined Injection Measurement Clamp	(available) e.g.: used for ESN Measurement
O	Overbraid Test	151020042	Rc: 0.005 to 0.5 Zloop: 0.1 to 20	1	0.1 1 10	100 200	5	1 x Current Injection Clamp 1 x Current Measurement Clamp or 1 x Voltage probe	(development is planned)
S	Micro-Ohmmeter with separate Current Measurement Clamp	151020043	0.1 to 10	1	0.1 1 10	DC	10	2 x Kelvin Probe 1 x Current Measurement Clamp	(available) e.g.: used for ESN Measurement
V	Wireless communication	151020044				858MHz		RF USB Stick for Computer	RF 858MHz (development is planned)
Y	Single Clamp Measurement	151020045					additional 2%	only Current Injection Clamp required	(available) In combination with one of these options: E, L, M, N, O
Z	Capacitive Measurement	151020046					additional 3%		In combination with one of these options: E, O (development is planned)

Standard Accessories For Bonding And Loop Resistance Tester

>BLRT2-XX-X<

Battery Package

(2 batteries "SWIT S-307149")

(TEST-FUCHS part no. 106220138)

Manufacturer:	SWIT
Type:	S-307149
Output voltage:	7.2V
Power:	47.5Wh
Current output:	min. 6A
Intermediate charging is possible (no memory effect)	



Power Supply Unit "S307164"

(TEST-FUCHS part no. 103070582)



Shoulder strap

Type "1472"

(TEST-FUCHS part no. 106330923)



Connection cable

Mini USB B-A 2m

(TEST-FUCHS part no. 106331470)



Optional Accessories For Bonding And Loop Resistance Tester

>BLRT2-XX-X<

Storage Case "EXPLORER 8.850-W"

(TEST-FUCHS part no. 150090174)

With wheels and extendable handle

Very solid and stackable

Inside coated with foam

Compartment for: - BONDING AND LOOP RESISTANCE
TESTER <BLRT2-XX-X>

- Various accessories

- Technical documentation

Dimensions: approx. 650 x 500 x 250mm

(approx. 25.6 x 19.7 x 9.8in)

Weight (empty): approx. 5kg (approx. 11.0lb)



Battery Charger

(TEST-FUCHS part no. 103230267)

Manufacturer: TEST-FUCHS

Type: S274257

Input: AC 100 to 240V; 50 / 60Hz

Output: DC 7 to 8.4V; 1.8A

Loading time: approx. 4h (90%)

Two batteries can be charged at the same time



Self Test Unit

(TEST-FUCHS part no. 106361013)

Manufacturer: TEST-FUCHS

Type: S854039 / L1708

Functions: E, S, N
not calibrated



Body strap

Type „1-8151“

(TEST-FUCHS part no. 106331548)



Small Current Injection Clamp <CIC1>

(TEST-FUCHS part no. 151020047)

Manufacturer:	Fluke modified by TEST-FUCHS
Inner diameter:	21mm (0.8in)
Length:	135mm (5.3in)
Width of the clamp:	18mm (0.7in)
Width of the clamp housing:	28mm (1.1in)
Height:	48mm (1.9in)
Weight:	494g (1.1lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	180
Windings, measurement:	30
Supply max. 100Hz:	7.2V
Supply max. 200Hz:	15V
Supply max. 400Hz:	22V
Uloop max. 100Hz:	36mV
Uloop max. 200Hz:	75mV
Uloop max. 400Hz:	110mV



Big Current Injection Clamp <CIC2>

(TEST-FUCHS part no. 151020049)

Manufacturer:	Metrel modified by TEST-FUCHS
Inner diameter:	55mm (2.2in)
Length:	170mm (6.7in)
Width of the clamp:	36mm (1.4in)
Width of the clamp housing:	36mm (1.4in)
Height:	97mm (3.8in)
Weight:	877g (1.9lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	180
Windings, measurement:	30
Supply max. 100Hz:	16.5V
Supply max. 200Hz:	30V
Supply max. 400Hz:	37V
Uloop max. 100Hz:	82.5mV
Uloop max. 200Hz:	150mV
Uloop max. 400Hz:	185mV



Small Current Injection Clamp For Single Clamp And Clamp-Open Detection And Temperature Sensor <CIC5>

(TEST-FUCHS part no. 151020059)

Manufacturer:	Fluke modified by TEST-FUCHS
Inner diameter:	23mm (0.9in)
Length:	135mm (5.3in)
Width of the clamp (reduced):	13mm (0.5in)
Width of clamp housing:	28mm (1.1in)
Height:	48mm (1.9in)
Weight:	494g (1.1lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	180
Windings, measurement:	30
Supply max. 100Hz:	7.2V
Supply max. 200Hz:	15V
Supply max. 400Hz:	22V
Uloop max. 100Hz:	36mV
Uloop max. 200Hz:	75mV
Uloop max. 400Hz:	110mV
Integrated temperature sensor	
Automatic clamp-open detection	



Big Current Injection Clamp For Single Clamp And Clamp-Open Detection And Temperature Sensor <CIC6>

(TEST-FUCHS part no. 151020060)

Manufacturer:	Metrel modified by TEST-FUCHS
Inner diameter:	55mm (2.2in)
Length:	170mm (6.7in)
Width of the clamp (rear):	36mm (1.4in)
Width of the clamp (front):	25mm (1.0in)
Width of the clamp housing:	36mm (1.4in)
Height:	97mm (3.8in)
Weight:	877g (1.9lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	180
Windings, measurement:	30
Supply max. 100Hz:	16.5V
Supply max. 200Hz:	30V
Supply max. 400Hz:	37V
Uloop max. 100Hz:	825mV
Uloop max. 200Hz:	150mV
Uloop max. 400Hz:	185mV
Integrated temperature sensor	
Automatic clamp-open detection	



Big Current Injection Clamp For Single Clamp And Clamp-Open Detection And Temperature Sensor <CIC8>

(TEST-FUCHS part no. 150020835)

Manufacturer:	Metrel modified by TEST-FUCHS
Inner diameter:	55mm (2.2in)
Length:	170mm (6.7in)
Width of the clamp (rear):	36mm (1.4in)
Width of the clamp (front):	25mm (1.0in)
Width of the clamp housing:	36mm (1.4in)
Height:	97mm (3.8in)
Weight:	877g (1.9lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	180
Windings, measurement:	30
Supply max. 100Hz:	16.5V
Supply max. 200Hz:	30V
Supply max. 400Hz:	37V
Uloop max. 100Hz:	825mV
Uloop max. 200Hz:	150mV
Uloop max. 400Hz:	185mV
Integrated temperature sensor	
Automatic clamp-open detection	



Small Current Measurement Clamp <CMC1>

(TEST-FUCHS part no. 151020048)

Manufacturer:	Fluke modified by TEST-FUCHS
Inner diameter:	21mm (0.8in)
Length:	135mm (5.3in)
Width of the clamp:	18mm (0.7in)
Width of the clamp housing:	28mm (1.1in)
Height:	48mm (1.9in)
Weight:	494g (1.1lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	1,000
Max. current measurement:	150A



Big Current Measurement Clamp <CMC2>

(TEST-FUCHS part no. 151020050)

Manufacturer:	Metrel modified by TEST-FUCHS
Inner diameter:	55mm (2.2in)
Length:	170mm (6.7in)
Width of the clamp:	36mm (1.4in)
Width of the clamp housing:	36mm (1.4in)
Height:	97mm (3.8in)
Weight:	877g (1.9lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	1,000
Max. current measurement:	150A



Active DC Clamp <CMC3>

(TEST-FUCHS part no. 151020051)

Active, small AC and DC current measurement clamp

Supplied by the <BLRT2> thus batteries are not required

The switch and regulator that are fitted on the clamp are deactivated and have no influence on the operation

Manufacturer:	Fluke modified by TEST-FUCHS
Inner diameter:	20mm (0.8in)
Length:	180mm (7.1in)
Width of the clamp:	15mm (0.6in)
Width of the clamp housing:	25mm (1.0in)
Height:	70mm (2.8in)
Weight:	326g (0.7lb)
Cable length:	4,000mm (157.5in)
Proportion:	10mV/A AC and DC
Max. current measurement:	10A



Rogowski Current 1 <CMC4>

(TEST-FUCHS part no. 151020061)

At the moment this clamp is under development

Rogowski Current 2 <CMC5>

(TEST-FUCHS part no. 151020062)

At the moment this clamp is under development

Small Current Measurement Clamp - Reduced Size <CMC6>

(TEST-FUCHS part no. 150090173)

Manufacturer:	Fluke modified by TEST-FUCHS
Inner diameter:	23mm (0.9in)
Length:	135mm (5.3in)
Width of clamp (reduced):	13mm (0.5in)
Width of clamp housing:	28mm (1.1in)
Height:	48mm (1.9in)
Height of a clamp arm (reduced):	8,5mm (0.3in)
Weight:	494g (1.1lb)
Cable length:	4,000mm (157.5in)
Windings, primary:	1,000
Max. current measurement:	150A



Small Combined Injection / Measurement Clamp <CIMC7>

(TEST-FUCHS part no. 151020052)

At the moment this clamp is under development

Middle Combined Injection / Measurement Clamp <CIMC8>

(TEST-FUCHS part no. 151020053)

At the moment this clamp is under development

Big Combined Injection / Measurement Clamp <CIMC9>

(TEST-FUCHS part no. 151020054)

At the moment this clamp is under development

Kelvin Probes With Extended Tips Injection <PKL552-2>

(TEST-FUCHS part no. 103240488)

Hardened and spring-loaded Kelvin tips were developed by TEST-FUCHS

Design of these tips ensures their capability to test through varnished and anodized material

The tips are made of hardened steel and can be exchanged

The cable is designed for one current injection and one voltage metering

The plug has to be connected to the plug "INJECTION" of the <BLRT2>

The cable length is 4,000mm (157.5in)



Kelvin Probes With Extended Tips Current 1 <PKL552-3>

(TEST-FUCHS part no. 103240489)

Hardened and spring-loaded Kelvin tips were developed by TEST-FUCHS

Design of these tips ensures their capability to test through varnished and anodized material

The tips are made of hardened steel and can be exchanged

The cable is designed for one current injection and one voltage metering

The plug has to be connected to the plug "CURRENT 1" of the <BLRT2>

The cable length is 4,000mm (157.5in)



Kelvin Probes With Standard Tips Injection <PKL552-4>

(TEST-FUCHS part no. 103240490)

Standard Kelvin tips

Kelvin tips are required for injecting current and for voltage metering

The cable is designed for one current injection and one voltage metering

The plug has to be connected to the plug "INJECTION" of the <BLRT2>

The cable length is 4,000mm (157.5in)



Kelvin Probes With Standard Tips Current 1 <PKL552-5>

(TEST-FUCHS part no. 103240491)

Standard Kelvin tips

Kelvin tips are required for injecting current and for voltage metering

The cable is designed for one current injection and one voltage metering

The plug has to be connected to the plug "CURRENT 1" of the <BLRT2>

The cable length is 4,000mm (157.5in)



Voltage Probes With Extended Tips

<PKL552-6>

(TEST-FUCHS part no. 103240502)

Two point voltage metering tips with hardened tips

Hardened tips were developed by TEST-FUCHS

Design of these tips ensures their capability to break through varnished and anodized material

The tips are made of hardened steel and can be exchanged

While using this cable, there is no need of any other voltage metering

The plug has to be connected to the plug "VOLTAGE" of the <BLRT2>

The cable length is 4,000mm (157.5in)



Injection Probes With Banana Plug And Clips

<PKL552-8>

(TEST-FUCHS part no. 103240517)

This cable is used if the test current is fed separately into the measuring point

The tips can be chosen. In the scope of delivery there are two measuring tips and two crocodile clips

Instead of the delivered measuring tips also other tips can be used if they are approved for 10A test current for three seconds

The cable length is 2,000mm (78.7in)



Cable Extension - Injection

<PKL552-10>

(TEST-FUCHS part no. 103240644)

Cable extension between the test cables and the plug „INJECTION“ on the <BLRT2>

The cable length is 12m (472.4in)

Cable Extension - Current

<PKL552-11>

(TEST-FUCHS part no. 103240645)

Cable extension between the test cables and the plug „CURRENT“ on the <BLRT2>

The cable length is 12m (472.4in)

Maintenance and Ground Support Equipment

safety in test > safety in flight

TESTAUFGEH



Bonding and Loop Resistance Tester
>BLRT2<



Impedance Measuring Pliers
>IMZ3<



Anti Static Paint Tester
>IA2<



Impedance Measuring Equipment for Loop Resistance
>IM2-F5<



Earthing Test Set
>PA-MVP10L-F5<



Mobile Air Conditioner Diesel or Electric Motor Powered
>BKG26EM<



Walclean Waste Line Cleaning
>WLC1<



Aircraft Fuel Sump Drain Equipment
>ASE300<



Aircraft Fuel Drain Equipment
>ASE900<



Reservoir Ventilation Trolley
>TBW1<



Cabin Pressure Test Equipment
>KDP<



Nitrogen Filling Equipment
>SFE300<



Landing Gear Strut Servicing Trolley
>LGS1<



Fill and Drain Device for Remote Chiller System A340
>RCFD340<



Water Separation System
>WS53-20<



Device for Refill Supplemental Cooling System A380
>SCSR1<



Fill and Drain Device for Supplemental Cooling System A380
>SCSFD380<



Device Fill/Drain and Handpump Top-Up for Supplemental Cooling System A350
>SCST1-FD< >SCST1-TU<



Hydraulic Ground Power Unit Mainline Aircraft
>HGPU<



Hydraulic Ground Power Unit Regional Aircraft
>HGPU<



Test Equipment for RAM-Air Turbines A320, A330/340
>PGRAT1< >RATMK<



Test Equipment for RAM-Air Turbines A380
>RATMK380<

WWW.TEST-FUCHS.COM