Test Equipment For Supplemental Cooling System A350



PNEUMATICS / HYDRAULICS



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

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Handpump-Topup, SCS >SCST1-TU<

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

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<</p>

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

> Hydraulic parameters:		> Nitrogen supply (requirements):		
Flow: m. (m	ax. 50l/min, max. 6.5bar abs. Iax. 13.2gal/min, max. 94psi abs.)	Input:	min. 20bar (min. 290psi) (external supply)	
> Medium:		> Nitrogen cor	inections:	
Propylen Glycol Wat (according to AIRBU (not included in the	er S specification) scope of delivery)	- AN4 - AN6	- 85 - Schrader	
> Reservoir volume:		> Dimensions:	:	
Main-Reservoir: Drain-Reservoir: Sub-Reservoir:	approx. 1801 (47gal) approx. 1901 (50gal) approx. 251 (6.6gal)	Length:	3,400mm (133.8in) (tow bar folded up) 4,400mm (173.2in) (tow bar folded down)	
> Operating condition	5:	Width: Height:	1,350mm (53.2in) 1,600mm (63.0in)	
Ambient temperatu	re: -30 to +50°C (-22 to +122°F)			
Storage temperature	e: -30 to +60°C (-22 to +140°F)			
Rel. air humidity:	5 to 90% (non-condensing)			



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: 7.01 (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)



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<</p>

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 manoeuvering 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

<image>



TECHNICAL DATA

> Nitrogen supply (requirements):	> Operating conditions:
Pressure: min. 6bar (87psi) max. 200bar (2,900psi)	Ambient temperature: -30 to +50°C (-22 to +122°F)
> Main-Reservoir:	Storage temperature: -30 to +60°C (32 to 140°F)
Volume: 301 (7.9gal)	Rel. air humidity: 5 to 90%
Usable volume: 181 (4.8gal)	(non-condensing)
Propylen Glycol Water (according to AIRBUS specification) (not included in the scope of delivery)	

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

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"



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.

AIRBUS CERTIFIED

HYDRAULICS

- 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 costumer can choose whatever matches his requirements:
 - A wide range of options and accessories are available
 - In addition, any costumer 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")

Boeing: B737 B747	Embraer: ERJ135/145 E-Jets	Antonov: AN124 AN148
B757		
B767	Bombardier:	Sukhoi:
B777	CRJ Series	SuperJet 100
B787	C-Series	
	Boeing: B737 B747 B757 B767 B777 B787	Boeing:Embraer:B737ERJ135/145B747E-JetsB757Bombardier:B767Bombardier:B777CRJ SeriesB787C-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 (200I)) is fitted to the diesel version enabling 8 hours of continuous operation

TECHNICAL DATA (ELECTRIC AND DIESEL DRIVEN >HGPU<)

> Hydraulic Parameters:		> Measurement Accuracy:	
High Pressure Ci	rcuit - Single System: 100 - 3000psi at max. 50 -60gpm (7 - 207bar at max. 190-227lpm)	Supply pressure (analog):	0 – 5800psi (0 – 400bar), cl. 1 (EN 837)
	max. 4000psi (275bar) at reduced flow rate 100 - 5000psi at max. 60gpm	Return pressure (analog):	0 - 145psi (0 - 10bar), cl. 1.6 (EN 837)
	(7 - 345bar at max. 227lpm) max. 5300psi (375bar) at	Oil temperature indicator:	0 – 100°C
	reduced flow rate	Flow measurement (Options A	,B):
High Pressure Circu	uit - 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)	Single circuit Dual circuit	0.08 - 66gpm (0.32 - 250lpm) ±1% of full scale 0.08 - 42gpm (0.32 - 160lpm)
	max. 2 x 4000psi (2 x 275bar) at reduced flow rate		±1% of full scale
Depending on the t	type of the equipment, the following be used: Phospate-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)		

ELECTRIC MOTOR DRIVEN >HGPU< WITH SINGLE SYSTEM

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

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 rese
4	Two large oil-air coolers
5	A hand pump enables easy and quic opening of the cover
6	Drive motor



ELECTRIC MOTOR DRIVEN >HGPU< WITH DUAL SYSTEM

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

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:		> 🛛	Dimensions an	d weight:
Six cylinder, four-stroke Common Rail, 128kW	in-line engine	L	ength (towbar.	folded up): 14.6ft (4450mm)
> Operating conditions:		V	Vidth:	5.9ft (1800mm)
Ambient temperature:	-25 to +45°C (-13 to +113°F)	Н	leight:	5.6ft (1700mm)
Noise emission:	approx. 84dB(A) at control panel (at 2200rpm, approx. 50gpm, 3000psi)	V	Veight:	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 ope- ration
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



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



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

2



ELECTRIC MOTOR DRIVEN >HGPU< (3000psi) Suitable for aircraft with 3000psi System

Туре	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

Туре	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

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

REAR VIEW OF AN >HGPU< WITH DUAL SYSTEM



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

2

1)

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

OPTIONS

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OPTION	Description
A	Flow measurement with digital indicator: Single system 2 to 66USgpm (10 to 2501/min), ±1% of full scale Dual System (independent) 1.3 to 42gpm (5 to 1601/min), ±1% of full scale
B B1	Leakage measurement: 0.08 to 5.3USgpm (0.32 to 201/min), ±1% of full scale Leakage measurement: 0.11 to 10.6USgpm (0.40 to 401/min), ±1% of full scale
С	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>
н	Electrical soft start
К	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) The required color combination must be specified by the costumer including the RAL standard.
S	Changes to the standard languages German, English, Russian, Spanish for front panel <u>markings must be</u> <u>clearly defined by the costumer as an additional requirement.</u>
т	Dual Output Kit for >HGPU< with Single System



ORDERING INSTRUCTIONS

1) DEFINE THE REQUIRED TYPE OF >HGPU<

2) SELECT THE MOTIVE POWER OF >HGPU<

<u>Diesel drive:</u> Specify the ID Letter "D" <u>Electric drive:</u> No specification of an ID Letter is required

3) SELECT THE REQUIRED TYPE OF MEDIUM

<u>Phospate-Ester Hydraulic Oil ("Skydrol" or "Hyjet")</u> Specifiy the ID Letter "S" <u>Mineral Oil based Hydraulic Oil ("MIL-H-5606", "MIL-H-83282", "MIL-H-87257")</u> Specifiy the ID Letter "M"

4) SELECT ADDITIONAL FEATURES AS REQUIRED



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".

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HYDRAULICS

Waste Line Cleaning Trolley



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

AIRBUS CERTIFIED

- 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

> Elecrical supply:		> Operating conditions:		
Mains supply: Nominal current:	3/PE AC 50-60Hz 380-480V max. 21A (max. 32A with Option B)	Ambient temperature:	5 to 40°C (41 to 104°F)	
Power: Preliminary fuse:	14,6kVA (max. 22,1kVA with Option B) 25A gL (max. 32A gL with Option B)	Storage temperature:	0 to 60°C (32 to 140°F)	
(electricity- and perfo 400V 50Hz)	rmance characteristics at	Altitude:	max. 1,000m MSL (3,280ft)	
> Dimensions and we	eight:	Humidity:	5 to 90% (non-condensing)	
Length: 2,850n Width: 1,600n Height: 1,500n Weight: approx	nm (112.2in) nm (63.0in) nm (59.1in) . 1,200kg (approx. 2,645.5lb)	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 vaccum waste line system
- > 1 EA A/C adapter 0,4m 90° to connect cleaning hoses to the vaccum 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

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> 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>verview 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.





Bonding And Loop Resistance Tester
BLRT2-XX-X<</p>



The equipment is developed as multifunctional 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.

AIRBUS CERTIFIED

- > 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

> Electrical supply	(requirements):	> Interface:		
Mains charger ad Accumulator:	lapter: 1/N/PE AC 50Hz 2 x Li-lon 7.2V 47.5Wh	Interface: Memory capacity	USB (Mini USB) /: min. 1,000 measuring values	
> Functions:		> Operating condit	tions (operation):	
Measuring functi Ranges: Accuracy:	ions: see "FUNCTIONS" see "OPTIONS" see "OPTIONS"	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"	
> Output values: Output voltage D	IC: max. 7VDC	Rel. humidity:	max. 95% relative humidity (non-condensing)	
Output current DC:max. 10ADCOutput voltage AC:max. 40VACOutput power AC:max. 30W		> Operating conditions (storage):		
		Temperature:	-20°C to +70°C (-4°F to 158°F)	
> Measurement ra	nge:	Rel. humidity:	max. 95% relative humidity (non-condensing)	
Functions:	Measurement ranges and tolerances are listed in the item	> Dimensions and	weight:	
Battery voltage:	Range: 0 to 10V Tolerance: 0.5% of reading	Width: Depth: Height: Weight:	approx. 250mm (9.8in) approx. 170mm (6.7in) approx. 170mm (6.7in) approx. 3.2kg (7.1lb)	

>BLRT2<

TEST-FUCHS GmbH / Test-Fuchs Strasse 1-5 / A-3812 Gross-Siegharts T +43(0)2847 9001-0 / F +43(0)2847 9001-299 / office@test-fuchs.com

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 ther is only one current loop.

Schematic diagram of the test set-up



FUNCTIONS

OVERBRAID TEST (OPTION 0)

(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





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

cessories Remarks	(<i>available</i>) Standard Bonding	np (under development) t Clamp	mp t Clamp assurement Clamp Measurement d		mp t Clamp Standard Loop Resi- stance Test stance Test	The clamp (available) it Clamp Standard Loop Resi- assurement Clamp stance Test The clamp (development is planned) assurement Clamp	The clamp caracter (available) Standard Loop Resi- easurement Clamp stance Test stance Test est est est est est est est est est	i Clamp i Clamp essurement Clamp The clamp i Clamp i Clamp i Clamp e.g.: used for ESN e.g.: used for ESN e.g.: used for ESN mp i Clamp e.g.: used for ESN Measurement is essurement Clamp i Clamp i Clamp i Clamp e.g.: used for is mp i Clamp i Cl	The clamp cavailable clamp clamp cavailable clamp cavairant clamp cance Test as the clamp clamp clamp clamp clamp clamp clamp e.g. used for ESN measurement clamp	The ic Clamp(available) Standard Loop Resi- assurement Clamp(available) stance TestThe mp t Clamp(development is planned)The mp t Clamp(aevelopment is planned)The mp t Clamp(aevelopment is planned)The mp t Clamp(available) e.g.: used for ESN mentThe mp t Clamp(available) e.g.: used for ESN blanned)The mp t Clamp(available) e.g.: used for ESN mentThe mp t Clamp(available) blanned)The t Clamp(available) blanned)The t Clamp(available) blanned)The t Clamp(available) blanned)The t Clampe.g.: used for ESN blanned)The t Clamp(available) blanned)The t Clampe.g.: used for ESN blannedThe t tere.g.: used for ESN blanned	The ic Clamp(available) Standard Loop Resi- assurement Clamp(available) stance TestThe mp t Clamp(development is planned)The mp t Clamp(aevelopment is planned)The mp t Clamp(aevelopment is planned)The mp t Clamp(available)The mp t Clamp(available)The mp t Clamp(available)The mp t Clamp(available)The mp t Clamp(available)The mp t Clamp(available)The mp t t Clamp(available)The mp t t Clamp(available)The mp t t Clamp(available)The mp t t Clamp(available)The t t
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Resolution (µ0hm)	4		0.1	10		0	- -			6	6
ment (m0hm)	2 to 1000 at 0.1A	0.01 to 100	Rc: 0.005 to 0.5 Zloop: 0,1 to 20	1 to 200		1 to 200	1 to 200 0.1 to 20	1 to 200 0.1 to 20 8.5 0.005 to 0.5 0.5 0.1 to 20	1 to 200 0.1 to 20 20 8 : 20 20 0.005 to 0.105 to 0.1 to 20 0.1 to 20 0.1 to 20 10,1 to	1 to 200 200 200 8 20 20 20 0.1 0.005 0.5 0.1 0.1 to 10 10 10 10	1 to 200 200 200 20 0.1 0.005 0.5 0.1 0.1 10 10 10
FUCHS part no.	151020036	151020037	151020038	151020039		151020040	151020040 151020041	151020040 151020041 151020042	151020040 151020041 151020042 151020043	151020040 151020041 151020042 151020043 151020043	151020040 151020041 151020042 151020043 151020043 151020043
Function	Bonding Tester	Bonding Test for Multiple Crossed Connections	High Current / Low Frequency Micro- Ohmmeter	Loop Resistance Tester 1000Hz		Loop Resistance Tester 2000Hz	Loop Resistance Tester 2000Hz Loop Resistance Tester 100Hz	Loop Resistance Tester 2000Hz Loop Resistance Tester 100Hz Overbraid Test	Loop Resistance Tester 2000Hz Loop Resistance Tester 100Hz Overbraid Test Micro-Ohmmeter with separate Current Measu- rement Clamp	Loop Resistance Tester 2000Hz Loop Resistance Tester 100Hz Overbraid Test Overbraid Test Micro-Ohmmeter with Separate Current Measu- rement Clamp Wireless	Loop Resistance Tester 2000Hz Loop Resistance Tester 100Hz Overbraid Test Overbraid Test Micro-Ohmmeter with Separate Current Measu- rement Clamp Wireless communication Measurement Measurement
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Standard Accessories For Bonding And Loop Resistance Tester >BLRT2-XX-X<

Battery Package (2 batteries "SWIT S-307149")

(TEST-FUCHS part no. 106220138)

Manufacturer:SWITType:S-307149Output voltage:7.2VPower:47.5WhCurrent output:min. 6AIntermediate 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)

>BLRT2<

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 stac	kable			
Inside coated with	foam			
Compartments for:	- BONDING AND LOOP RESISTANCE			
	TESTER <blrt2-xx-x></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)				



Standard Battery Charger

(TEST-FUCHS part no. 103230267)

Manufacturer: TEST-FUCHSType:S274257Input:AC 100 to 240V; 50 / 60HzOutput:DC 7 to 8.4V; 1.8ALoading time:approx. 4h (90%)Two batteries can be charged at the same time



Extended Battery Charger

(TEST-FUCHS part no. 103070532)

Manufacturer: TEST-FUCHSType:S307139Input:AC 100 to 240V; 50 / 60HzOutput:DC 12 to 17V; 10ALoading time:approx. 1.5h (90%)Two batteries can be charged at the same time



Self Test Unit (TEST-FUCHS part no. 106361013)

Manufacturer:TEST-FUCHSType:S854039 / L1708Functions:E, S, Nnot calibratedS854039



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
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 detec	tion			



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 detec	tion			



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 sense	or
Automatic clamp-open detec	tion



Small Current Measurement Clamp <CMC1>

(TEST-FUCHS part no. 151020048)

Manufacturer:	Fluke modified by
La construction de la constructi	IESI-FULHS
Inner diameter:	21mm (0.81n)
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>

с.

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(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

Manulacturer:	Гике
	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

>BLRT2<

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

>BLRT2<

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)