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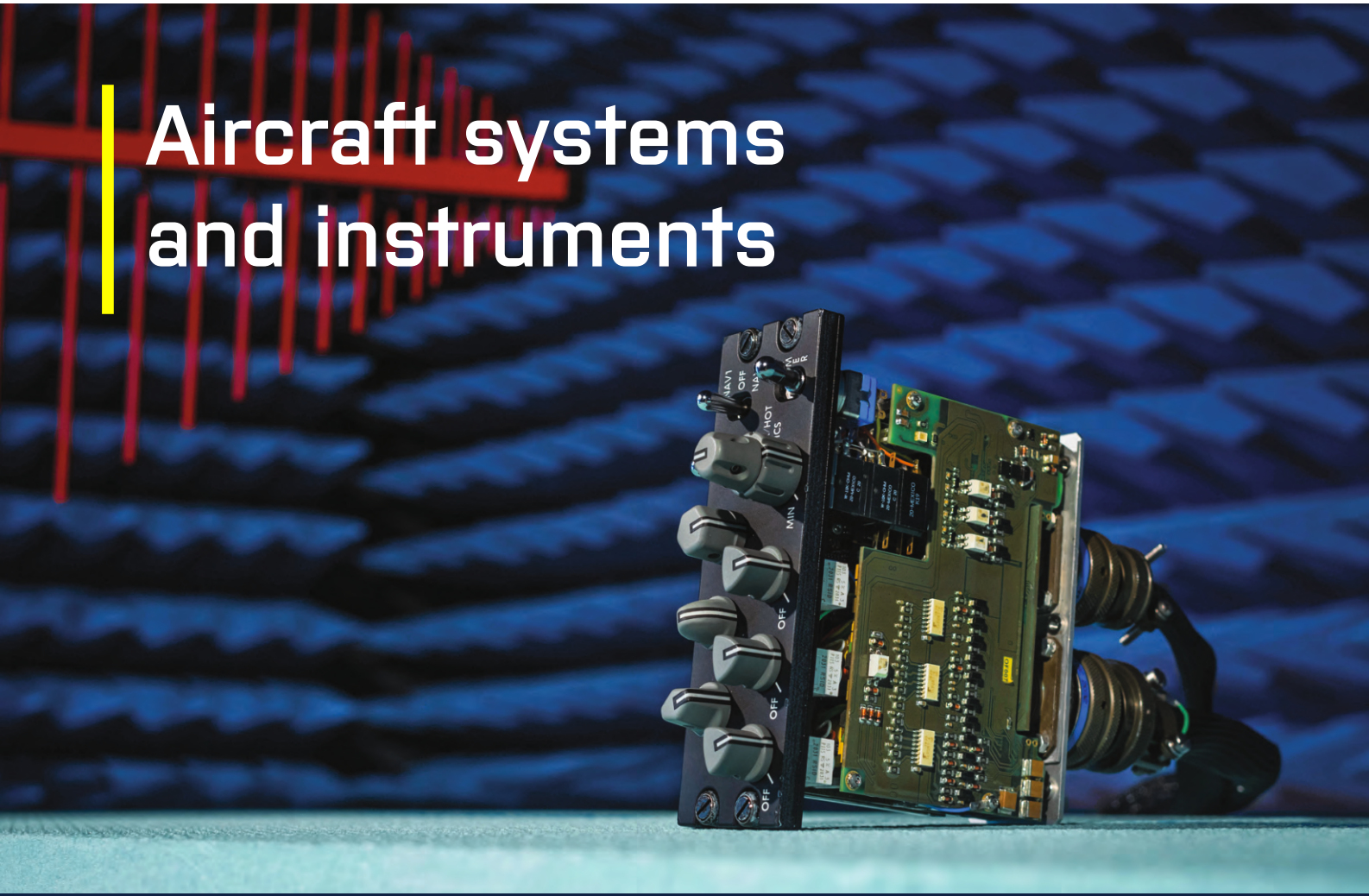
GROUP OMNIPOL

Aircraft systems and instruments



Research & Development & Production

Our systems operate in civil and military aircraft on all continents.

Focus:
System for Fuel Filling and Measurement
Intercoms
De-icing Systems
Air Conditioning and Heating Systems
Control Units
Power Converters
Measurement of Physical Values
Firing control systems

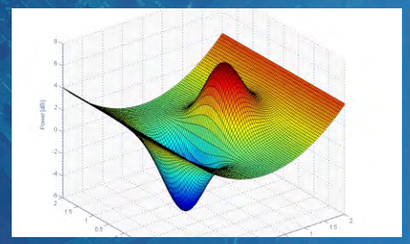
Since 1952, we have taken part in the most important Czech aviation projects - instruments for notable aircraft such as L 39, L 39NG, L 410, L 410NG, L 159 and many others.

Verified quality - we test our products and prototypes in own specialized laboratories equipped with extreme condition simulators.

We develop instruments and systems in compliance with EASA and FAA standards.

Aircraft systems and instruments

Qualified technologists, along with technical support provided by designers, are involved in the manufacturing process. We test products under simulated extreme conditions in our own laboratories.



We have the tools, skills and experience for specific customer solutions.

System for Fuel Filling and Measurement

A highly developed and well-established solution applied by a number of manufacturers. We design on the principle of capacity sensors for fuel level measurement.

- Complete solutions for various types of fuel tanks
- High accuracy of measurement, including aircraft banking solutions
- Possibility of connection to on-board bus bars (FMS, EFIS, etc.)

De-icing Systems

These systems control the pneumatic de-icing of the airframe and indicate possible failures and anomalies of the de-icing process.

- Verified method of ice elimination on the leading edges of wings
- Highly reliable control system
- Possibility to modify technical parameters based on the aircraft type
- Intuitive control of panel

Control Units

Reliable systems for controlling, monitoring and indicating the condition of aircraft systems, engine and assemblies.

High number of sensors and power elements. Enhanced operational safety and reduction of operating costs. Certified software.

Heating Systems

These systems ensure flight safety and aircraft controllability. They provide heated comfort to the passengers and the pilots.

- Cabin Heating
- Windscreen Heating
- Propeller Heating
- Pressure Probe Heating
- Automatic Temperature Control
- User-adjustable Parameters

Measurement of Physical Values

We produce highly accurate and tough on-board aircraft instruments for measurement of physical flight parameters.

The outputs of measurements are processed in such a way that they provide the clear data needed to control the aircraft.

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Intercoms

The latest solution for aircraft crew communication.

- high quality and intelligibility of communication
- modern design based on digital processing.

Power Converters

The power converters serve as a source of alternating current for supplying the aircraft instruments and equipment.

- single-phase and three-phase converters
- three-phase voltage converters ranging from 50 to 1800VA, 3x36V/400 Hz, 1x115V/400Hz and 3x115V/400Hz.

Applications

Aircraft instruments and systems are installed in many types of military and civil aeroplanes.

We have been offering verified solutions for civil and military aircraft since 1952.

Aeroplanes: L 39, L39 NG, L 59, L 159 A, L 159 B, L 410, L 410NG, Ae 270 IBIS, Z 37, Z 142, Z 242, EV 55...
Helicopters: Mi-2, Mi-8, Mi-17, SOKOL, Mi-24/35, Mi 171...

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Fuel Measurement Systems

A sophisticated and proven solution based on the principle of capacitive sensors for measuring the level of fuel in airplane tanks.

- **Complete solution for different types of fuel tanks**
- **High measurement accuracy up to ±2 %**
- **Software meets the RTCA DO-178 and hardware RTCA DO-160**
- **Any number of fuel level transmitters depending on the airplane design**
- **High level of security (redundancy of calculations, independent measurement circuits)**
- **System configurable using a regular PC**
- **Communication line RS 422, RS 485 or ARINC 429 for communication with the parent system**

Assembly

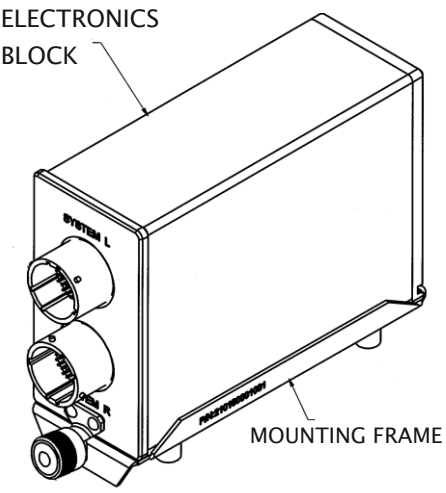
The standard configuration of the fuel measurement system set consists of an electronics control block and capacitive fuel level transmitters.

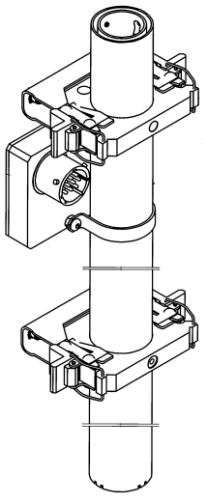
It can be supplemented with a minimum level sensor, a pressure filling control block and a maximum level sensor. The output of the electronics block provides information about the amount of fuel and the system status for a parent computer or digital indicator.

Electronics block

The system control block initiates measurement in capacitive fuel level transmitters.

There can be any number of these transmitters depending on the airplane design. The transmitters are either purely analogue, i.e. information about the amount of fuel is transmitted in analogue form, or fully digital using standardized buses. After receiving information from individual transmitters, the control block calculates the real amount of fuel in the airplane tanks.





Capacitive fuel level transmitters

Measuring of the volume of fuel carried in the airplane tanks is based on measuring the capacity using the interface height of two different dielectrics (fuel and air) in a capacitive transmitter.

A change in fuel volume in the tank is then reflected in a changed flooding height of the transmitter and, also, in a changed capacity of the transmitter. This data is converted to a value suitable for transmission to the electronics block (analogue or digital).

Technical parameters of the electronics block

Supply voltage	22 VDC – 32.2 VDC, emergency 18 VDC
Temperature range	-55 °C to 70 °C
Weight	max. 0.650 kg
Dimensions	60 mm × 109 mm × 158 mm
Certification	RTCA/DO-160G, RTCA/DO-178B

Application

Fuel measurement systems are supplied for airplanes:
L 410UVP-E20, L 410NG, EV 55, L 39, L 59, L 159, L 159T1.

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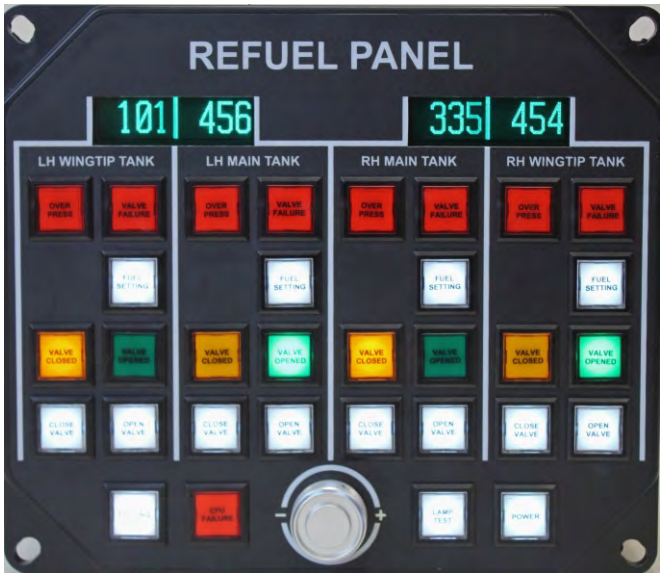
Refuel Control Panel

The unit is used to control central (pressure) refuelling of airplane tanks. It allows setting of the required amount of fuel for filling into individual tanks, provides information about the current state of refuelling and controls its progress. It communicates with the fuel gauge electronics block or directly with a parent computer (CMC, EFIS, etc.).

- **Information about the refuelled amount with an accuracy of up to ±2 %**
- **Software meets the RTCA DO-178 and hardware RTCA DO-160**
- **Any choice of tanks and fuel quantities for refuelling**
- **Refuelling check and automatic stop**
- **Panel configurable using a regular PC**
- **Communication line RS 422, RS 485 or ARINC 429**

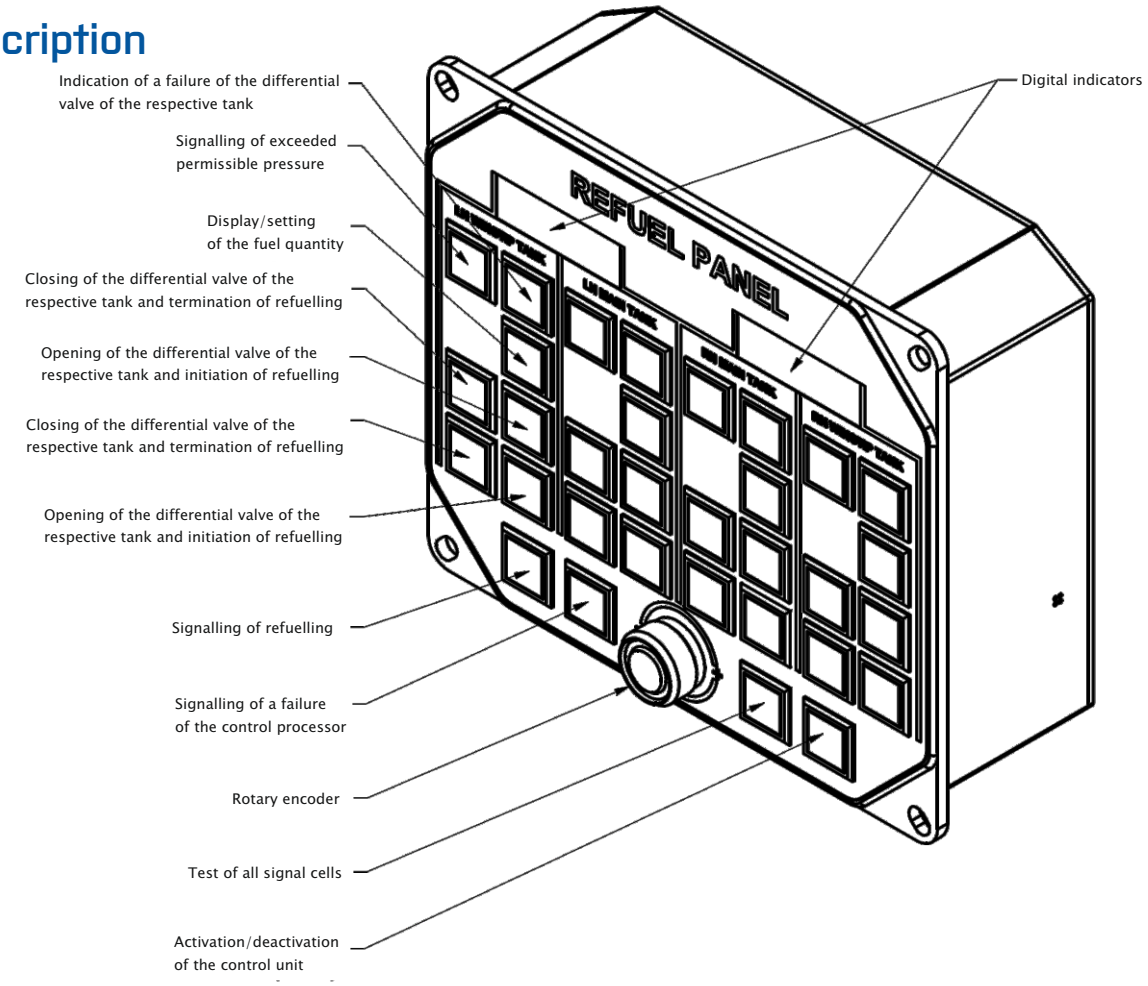


Description

The control unit is used to control pressure filling of fuel tanks. It allows simultaneous refuelling of one, multiple or all tanks and independent setting of the refuel value for each of the tanks.

The control panel processes information about the currently filled fuel from the fuel gauge electronics block, feedback from controlled valves and other signals such as overpressure, signal from safety floats, information from the maximum level transmitter, etc. Based on this information, it controls the refuelling process and thus allows refuelling of the precise amount into selected airplane tanks.

Description



Technical parameters

Supply voltage	22 VDC – 32.2 VDC, emergency 18 VDC
Temperature range	-55 °C to 70 °C
Dimensions	250 mm × 215 mm × 82 mm
Certification	RTCA/DO-160G

Application

The refuelling system is supplied for airplane L 410NG.

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De-icing Systems

The systems control pneumatic airframe de-icing and indicate possible faults and anomalies of the de-icing process.

- **Proven method for removing the icing on leading wing edges**
- **Hardware meets the RTCA DO-160**
- **Automatic control**
- **High reliability**
- **Possible modification of technical parameters depending on the airplane type**
- **Intuitive control**

Control unit

The control unit of pneumatic airframe de-icing allows controlling of the pneumatic airframe de-icing system and indication of failures of the de-icing system.

The control unit contains circuits that check if the required pressure was reached in the de-icing sections.

Description of the function

The control unit is used to control and monitor the activity of the pneumatic airframe de-icing system. It controls solenoid valves and processes signals from pressure switches.

It allows automatic or manual control of the de-icing system. The timer electronics generates start pulses for solenoid valves. The signalling electronics evaluates signals from pressure switches and monitors whether the required pressure was reached in individual sections.

Technical parameters

Supply voltage	22 VDC – 32.2 VDC, emergency 18 VDC
Temperature range	-55 °C to 70 °C
Dimensions	156 mm × 58 mm × 75 mm
Weight	0.65 kg
Certification	RTCA/DO-160G

Application

De-icing control systems are supplied for airplanes L 410 UVP-E, L 410 NG and EV-55.

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Heating Systems

The passenger cabin and cockpit heating system provides sufficient thermal comfort in the airplane.

- **User-adjustable PID controller**
- **User-adjustable temperature range**
- **Software meets the RTCA DO-178 and hardware RTCA DO-160**
- **Unit configurable using a regular PC**
- **Discrete status output**

Control unit function

The airplane heating control unit works as a temperature controller.

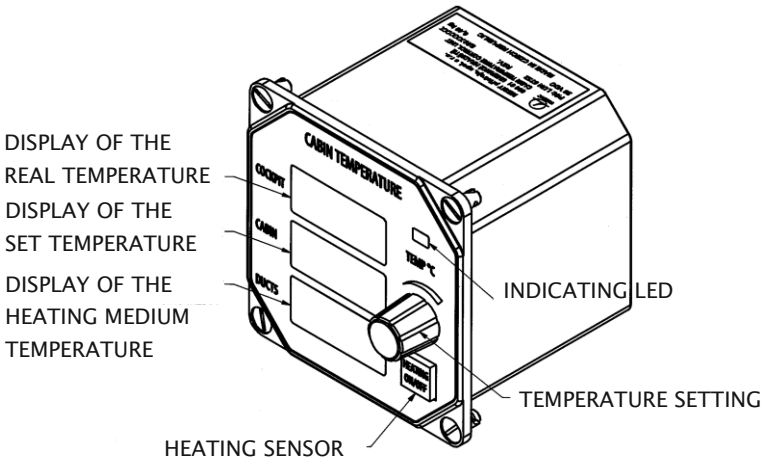
The controller compares the real temperature in the airplane with the required temperature. Based on this comparison, the unit controls the actuator(s) of the heating system.

Description

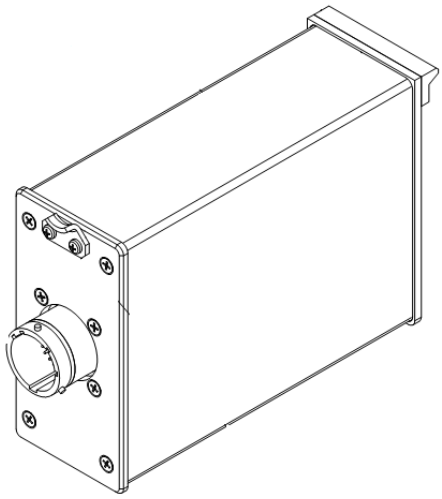
The heating control unit works as a temperature controller.

The control unit consists of a triple segment display that shows the measured and set temperature values in the heating system and indicates fault states.

Another embodiment of the heating control unit is a control cabinet located in the airframe. The crew can use controls for the activation of heating and setting of the required temperature. Other information is displayed by external indicators and provided to parent systems.



Heating control unit with indication



Heating control unit with external indication

Technical parameters

Supply voltage:	22 VDC – 32.2 VDC, emergency 18 VDC
Temperature range:	-55 °C to 70 °C
Weight:	max. 0.4kg
Dimensions:	86 mm × 86 mm × 71 mm
Certification:	RTCA/DO-160G, RTCA/DO-178B

Application

Heating systems are supplied for airplanes L 410 UVP-E and L 410 NG.

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P/S Sensors Heating Control Unit

The probe heating control unit is a part of the airplane power supply checking system. The inputs of the control unit are connected to signals from current sensors located in power supply of airplane heating systems. The unit monitors the state and controls switching of these systems.

- **The number of connected sensors is essentially unlimited (currently used unit with 4 or 8 inputs)**
- **Electronic current sensors with a range of 0–5 A or 0–50 A with an accuracy of ±3 %**
- **Discrete error outputs for a parent system**
- **Hardware meets the RTCA DO-160**

Control unit function

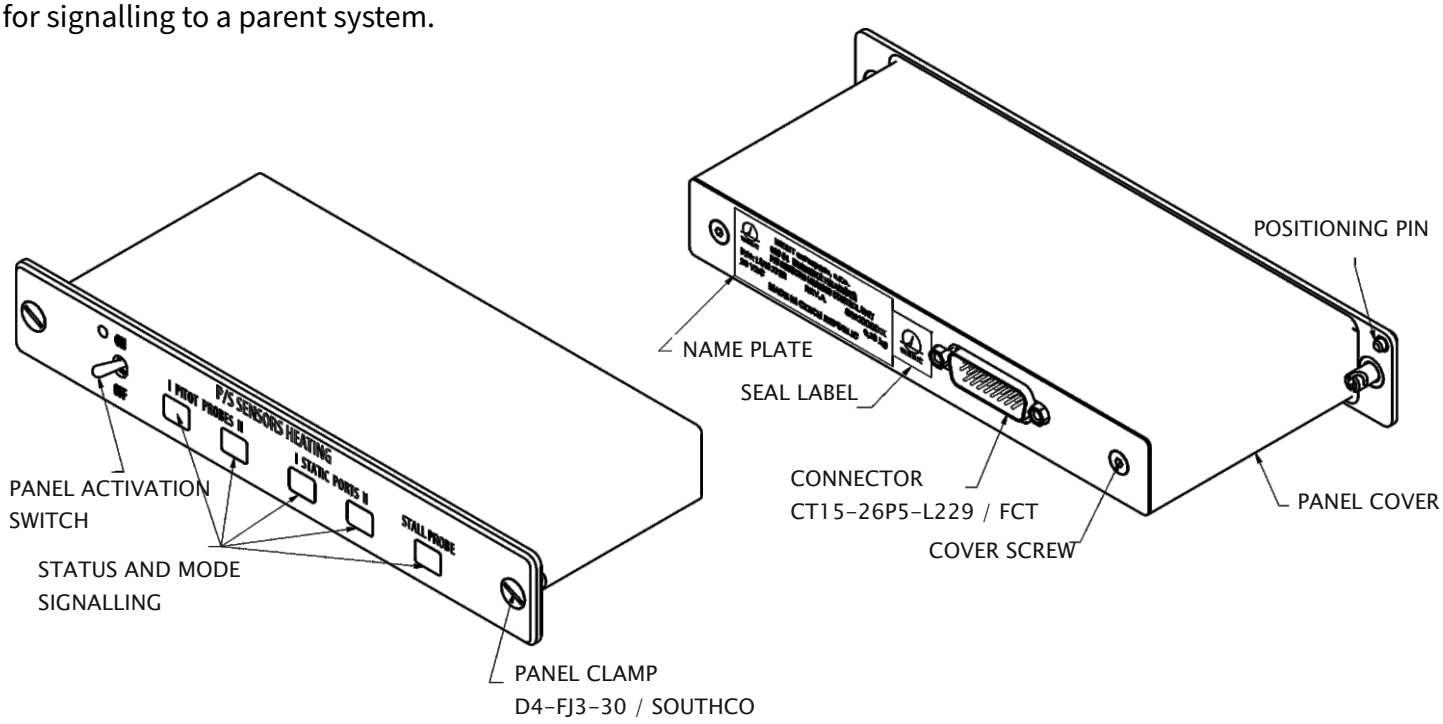
The control unit is a flight instrument.

If the heating system works without errors, only the system activation is indicated and no further setting is required. If the current consumption of heating circuits exceeds the permissible limit or does not reach the required level, a fault is signalled. The faulty circuit is disconnected and the crew is informed of the fault.

Description

The control unit can be in the form of a flight instrument signalling and controlling the heating system.

Another embodiment of the unit is a control block without signalling. Both types feature status signals for signalling to a parent system.



Technical parameters

Supply voltage	22 VDC – 32.2 VDC, emergency 18 VDC
Operating temperature	55 °C to 70 °C
Weight	max. 0.26kg
Dimensions	180 mm × 27 mm × 71 mm
Certification	RTCA/DO-160G

Application

Heating systems are supplied for airplanes L 410 UVP-E and L 410 NG.

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Electrical Sources Parameters Measuring Unit

The system is designed for measuring any parameters of power supply in the airplane. The main unit of the system can be connected to power supplies such as dynastarters, alternators, batteries, external power supplies or emergency buses.

- **19 inputs for direct voltage and current**
- **8 inputs for alternating voltage and current**
- **Measurement of DC 0–40 V with an accuracy of ±3 %**
- **Measurement of AC 0–150 A with an accuracy of ±5 %**
- **Measurement of DC 900 A with an accuracy of ±3 %**
- **Modified input ranges**
- **Unit configurable using a regular PC**
- **Communication line RS 422, RS 485 or ARINC 429**
- **Software meets the RTCA DO-178 and hardware RTCA DO-160**

Control unit function

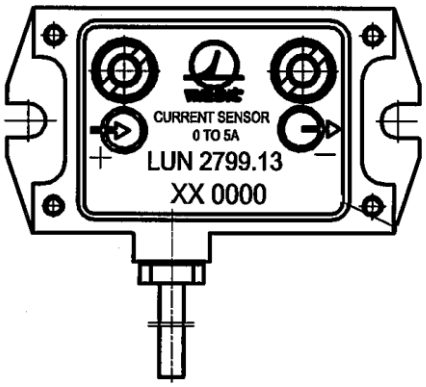
The unit processes information about alternating or direct voltages or currents from individual power supplies.

It digitizes these voltages, currents and status signals and sends them to a parent computer (FMS, CMC, EFIS, etc.). Currents are sensed by current shunts or electronic current sensors using a Hall probe.

Technical parameters of the control unit

Supply voltage	20.5 VDC – 32.2 VDC, emergency 18 VDC
Operating temperature	-55 °C to 70 °C
Weight	max. 0.45 kg
Dimensions	152 mm × 112 mm × 55 mm
Certification	RTCA/DO-160G, RTCA/DO-178B

Electronic current sensors and current shunts



Current sensors and shunts for current measurement are essential elements in systems for monitoring the value of current (e.g. power supply monitoring system or probe heating monitoring system).

The basic component of the electronic sensor is a current probe utilizing the Hall effect. The output of the sensor is voltage corresponding to the current or status signal. The connection is two- or three-wire.

- **measuring ranges of current sensors 0 to 5 A, 0 to 50 A or -100 to 400 A**
- **measuring ranges of current shunts up to 900 A**
- **current sensors with a voltage or status output**

Technical parameters of sensors

Supply voltage	22.5 – 32.2 VDC
Operating temperature	-55 °C to 70 °C
Weight:	max. 0.15 kg
Dimensions	65 mm × 40 mm × 18 mm
Certification	RTCA/DO-160G

Application

Power supply monitoring systems are supplied for airplanes L 410 UVP-E, L 410 NG or L39NG.

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Integration of the SHM to System for Ensurance of the Airworthiness

The SHM system is a measuring system acquiring data to determine the current state of airplane parts. The system enables excitation of surface ultrasound waves in the material by means of small and light PZT actuators and sensing of the interaction of these waves with material inhomogeneities using identical PZT elements.

- **Reliable diagnostic system**
- **Hardware meets the RTCA DO-160**
- **Any number of measuring units according to the airplane design**
- **Communication line RS-422 and USB**
- **Complete data for the analysis of airplane structure defects**
- **Regular monitoring of the airplane structure in places that are difficult to reach without dismounting**

System composition

The system consists of a central unit that controls measuring units. Each unit is connected to several PZT elements. The number of measuring units and thus the number of monitored areas is arbitrary and depends on the design of the airplane.

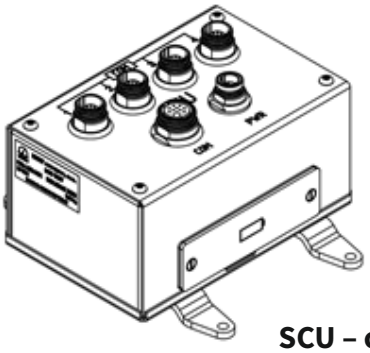
The control centre of the SHM system is an SCU unit equipped with a memory storage for the aggregation of measured signals. The storage also contains measuring configurations that can be used to create measuring scenarios depending, for example, on the number of flight hours.

Description of the function

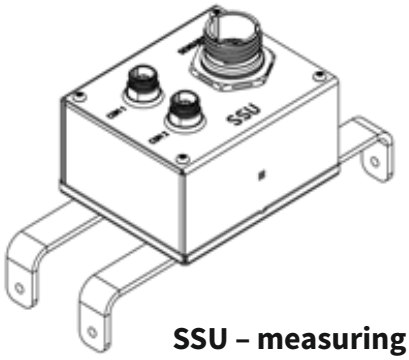
The control unit is accessible by parent systems through communication line RS-422 and standard USB interface.

The USB interface is used to set configuration files for measurement according to the current installation in the airplane. The same interface provides access to the measured data. This data is intended for downloading to a PC and subsequent analysis to determine airplane structure defects or to predict spreading of these defects.

The SCU unit is connected by a digital communication line to SSU units that perform the measurement itself. The SSU units are connected to small and light PZT actuators that can be integrated in the airplane structure or installed in normally inaccessible places. This provides regular monitoring of the airplane structure in places that are difficult to reach without dismounting critical parts.



SCU – control unit



SSU – measuring unit

Technical parameters

Supply voltage	22.5 VDC – 32.2 VDC, emergency 18 VDC
Operating temperature	-55 °C to 70 °C
Weight	max. 0.5 kg (SCU) / max. 0.4 kg (SSU)
Dimensions	80 mm × 120 mm × 59 mm (SCU) / 79 mm × 97 mm × 49 mm (SCU)
Certification	RTCA/DO-160G

Application

The SHM system is supplied for airplane L 410 NG.

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