MAKES YOUR FLYING SAFER

PRODUCT CATALOGUE

New product line of the TL elektronic TL-xx24 series

NEW PRODUCTS · MODERN CONCEPT · ORIGINAL KNOW-HOW

NEW

© TL-ELEKTRONIC

TL elektronic Inc.

**Development and production
of aircraft instruments and equipment**

www.tl-elektronic.com

CONTENTS

REFERENCES

Dynamic test equipment for assessment of flutters - developed exclusively for the Czech Centre for Aeronautical and Cosmic Research

Supplier of Flydat instrument for past 8 years. This instrument were developed exclusively for the BRP-Rotax GmbH, the largest manufacturer of aircraft engines in Europe. We took all the experiences we have learned from Flydat and designed our new Integra as a successor of the Flydat. In cooperation with Rotax we prepared our glass cockpit EMS Integra TL-6724 for connection to new engine Rotax 912iS.

Structural Life Monitoring Unit for determination of remaining lifetime of aircraft - developed in cooperation with the Ministry of Trade and Industry of the Czech Republic, the Czech Technical University and the aeronautical computer centre Vanessa Air Ltd

Engine control unit for release engines in motorised gliders - developed exclusively for Martin Wezel - Flugzeugtechnik, Germany

Contents / About us / References

ABOUT US

GENERAL INFORMATION

TL elektronic Inc. is a joint-stock company with basic capital USD 1.5 million. It is located at the airport in Hradec Kralove, about 100 km to the east from Prague. TL elektronic was founded in 1995. Within more than 10 years of its activity, the company has developed more than 40 instruments or units determined entirely for aircrafts. TL elektronic is a world leader in the development and manufacturing of aerospace instruments and aircraft equipment.

For continuous enhancement of quality of products TL elektronic has implemented a system of quality management according to ISO9001:2009. Moreover, has gained approvals for Design and Production of General Aviation and Military Aviation products, furthermore, an approval for Verification and Testing of aviation appliances and also is authorized to handle with confidential information. TL elektronic is approved for products supplies within scope of European Space Agency (ESA) programmes.

TL elektronic's major customers include e.g. the company BRP-ROTAX (Bombardier), the largest manufacturer of aircraft engines in Europe, and also the Aerospace Department of the Czech Technical University in Prague. TL elektronic participates significantly in the aircraft research and is one of the main partners of the Czech Aerospace Research Centre of the Czech Republic.

PRODUCTS

TL elektronic sells its products through the distributors in more than 30 countries. The foreign sales represent 98% of the company's overall production. TL elektronic is a very flexible and reputable company. The chief priorities include using the most advanced technologies and keeping the delivery dates of orders, furthermore, 100% support is given to all customers. The company TL elektronic also deals with the development of sophisticated instruments. In 2004 one of its units was nominated for the most prestigious Czech national award in the category of "The most significant new technology or product developed in the Czech Republic".

OTHER ACTIVITIES AND FUTURE

TL elektronic plays an important role in the Unmanned Systems Manufacturers Association of the Czech Republic, the Czech Space Alliance and in the Association of Sports Aircraft Manufacturers.
TL elektronic is also a permanent member of the Sub-committee for Science, Research, Aviation and Cosmonautics of the Chamber of Deputies in the Czech Republic. In the coming years, TL elektronic intends to keep expanding particularly in the Sportplane, Experimental and General Aviation categories. Among other activities, there are military projects and cosmic research projects for the organization ESA.

CERTIFICATES AND APPROVALS

Expansion and prosperity of our company is dependant mostly upon its position on national market and abroad. Hence, all our business activities are focused on continuous extension of our customer network. We try our best to provide them with products and services that meet their expectations. In doing so, we accent quality, reliability, performance and environmental friendliness.

Quality management certificate ISO9001:2009 (Granted by Bureau Veritas Certification - BVQI).
Number of certificate: 10000665

Approval for production of general aviation products according to Part 21 (Granted by Civil Aviation Authority Czech Republic - CAA).
Number of Approval: CZ.21G.0046

Approval for alternative procedures of design of general aviation products according to Part 21 (Granted by European Aviation Safety Agency - EASA).
Number of Approval: AP168

Approval for production of military aviation products (Granted by Ministry of Defence Czech Republic - OVL MO).
Number of Approval: MAA075

Approval for testing of general aviation products (Granted by Civil Aviation Authority Czech Republic - CAA).
Number of Approval: L-3-076

Sample of an ETSO certificate for one of our products granted by European Aviation Safety Agency - EASA.

Certificates and Approvals

THE TEN COMMANDMENTS OF TL ELEKTRONIC

1 Change a company logo to your own one. Simply download your comany logo in the instrument. When the instrument is turned on, your logo will light up on the display.

change a logo

2 Set the language of your choice for easy operation and setting of the instruments.

choice of language

3 Our instruments monitor all quantities and their limits according to your settings. You can see exceeded values in a report downloaded from the instrument or directly on its display.

monitoring of measured values

4 You can download at any time a history of measured values from your instrument. A sufficient memory capacity in your instrument will allow you to obtain several-hour record, which can be used for further analysis, and thus prevent from future problems. You can find more about this **SchecK®** method we have developed on page 15.

history of measured values

5 Update at any time the firmware in your instrument with the up-to-date files, which you can download from our website. This can be done simply by using the **sModern®** method we have developed. Naturally, we will keep you informed on changes and updates.

keep your instruments always modern

6 Our instruments use an **iFamily®** Bus which allows simple communication and synchronization among the instruments. More information about this communication protocol we have developed can be found on page 16.

connection and synchronisation

7 When downloading the data from your instrument to your PC you can use also other means of communication such as: IrDa, Blue Tooth or Wireless Data Communicator TL-5024, all only by using just one connector.

IrDa, Blue Tooth or Wireless Data Communicator

8 Use our Intercom TL-2424 or Voice Module TL-5624 to receive voice warning messages directly into your headphones whenever any limit values measured by your instruments from TL-xx24 series are exceeded. Using a PC you can download the history of measured values.

voice warning messages

9 If you have any suggestions of improving the functions of your instrument, please send your ideas to innovation@tl-elektronic.com. We will consider them and inform you if any new firmware is released.

request further updates

10 Become a member of TL elektronic and benefit from the advantages of registered members, such as up-to-date information on present and planned products, updated software and firmware, application notes, etc. Send a message including your e-mail address entitled 'member' to news@tl-elektronic.com or register on our website.

and in addition

INTERCOM TL-2424

Diameter 57mm (2 1/4")
Weight: 0.25 kg (0.55 lbs)

Intercom TL-2424 is a digital intercom with an intelligent voice activator (VOX). It can replay 10 last recorded communications from the tower into your headphones. Furthermore, it gives you a voice warning message into your headphones, e.g. from your thermo-meter in case any temperature or other limits are exceeded. This function is enabled only if the other instruments are connected to an **iFamily®** Bus. Using the instrument Setup menu or PC, you can easily record a checklist in the Intercom and replay it e.g. before flight, after landing etc.

Accessories:*

1/ **TL-2406** Microphone with amplifier suitable for helmets or headphones sets
2/ **2424-01** Connection cable to ICOM A-3 or ICOM A-22 VHF air band transceiver
3/ **2424-10** Voltage filter for power supply of the hand-held VHF air band transceiver

FUEL COMPUTER TL-2524

Diameter 57mm (2 1/4")
Weight: 0.25 kg (0.55 lbs)

Fuel Computer TL-2524 is multifunctional management of fuel in your aircraft. The Fuel Computer enables you to measure fuel quantity in one or two tanks, instant fuel consumption in various units (litres, gallons, US gallons per hour, per 100 km, per 100 miles), average fuel consumption, remaining flight time or flight range (in kilometres, miles or nautical miles) and fuel pressure. You can connect the Fuel Computer to the GPS in order to calculate a fuel plan. Using a PC and the program, which is a part of delivery, the Fuel Computer also enables you anytime to go through the history of measured values.

Accessories:*

1/ **2524-01** Metal high-quality flow sensor (Floscan P/N:201A-6 0 to 113 litres/hour / 0 to 30 GPH) - for all engines
2/ **2524-03** Active capacity fuel level sender (Westach P/N:395-5SB-5, three wire) - for all aircrafts
3/ **2524-04** Active fuel pressure sender (Honeywell P/N:MLH010BGB06E - three wire 0 to 10 bar / 0 to 145 PSI, 1/8"NPT) - for all aircrafts

Intercom TL-2424 / Fuel Computer TL-2524

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

3
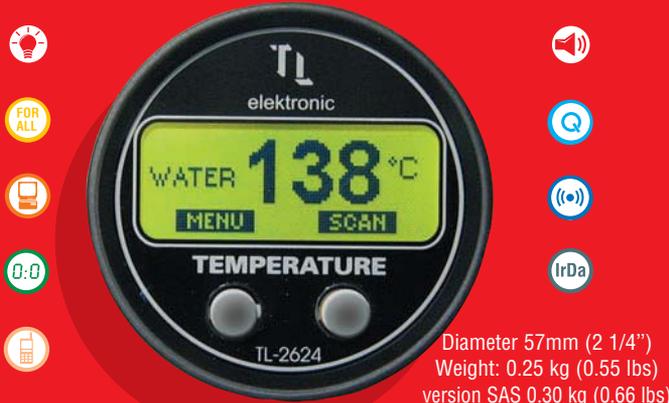
Diameter 57mm (2 1/4")
Weight: 0.25 kg (0.55 lbs)
version SAS 0.30 kg (0.66 lbs)

THERMOMETER TL-2624

Thermometer TL-2624 is a multifunctional thermometer for your engine. You can easily replace several instruments necessary for monitoring your engine with this instrument. The Thermometer enables you to measure up to four temperatures such as EGT, CHT, water temperature, oil temperature and oil pressure. Using the servo placed on your engine, the Thermometer enables to control automatically the choke according to any of the measured temperatures. You can easily set all limit values in your Thermometer with help of the buttons, and the instrument will monitor them for you. Using a PC and the program, which is a part of delivery, the Thermometer also enables you anytime to go through the history of measured values.

Related versions:

TL-2624_SAS Thermometer – above the standard version this one contains an internal altitude sensor and controls fuel mixture richness according to the altitude.

Accessories:*

1/ **2624-01** Thermocouple probe for Exhaust temperature EGT (type K) M8x1 SCREW TYPE - for all engines
2/ **2624-02H2** Thermocouple probe for Cylinder head CHT (type J) 12mm hole - for all engines
3/ **2624-04** OIL or WATER temperature sender (VDO P/N:Silver line - 0 to 150 °C / 0 to 300°F) for Rotax 4-stroke
4/ **2624-06** Active OIL pressure sender (Honeywell P/N:MLH010BGB06E - three wire 0 to 10 bar / 0 to 145 PSI, 1/8"NPT) - for all engines

Diameter 57mm (2 1/4")
Weight: 0.30 kg (0.66 lbs)

VOLT-AMPERE METER TL-2724

Volt-Ampere Meter TL-2724 is one of few instruments enabling to measure voltage and current each in 3 different places. Using the Volt-Ampere Meter, you can measure voltage in your battery or behind the circuit breakers for the avionics. Furthermore, you can keep yourself informed on current consumption and voltage of avionics, flashlights or electric fuel pumps. You can easily set all limit values in your Volt-Ampere Meter with help of the buttons, and the instrument will monitor them for you. Using a PC and the program, which is a part of delivery, the Volt-Ampere Meter also enables you anytime to go through the history of measured values.

Related versions:

TL-2724_ACV Volt-Ampere Meter – measures alternating current and alternating voltage and their frequency. Other functions are the same as in the standard version.

Accessories:*

1/ **2724-01** Current shunt sensor for measuring to 50 Amperes - for all aircrafts

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth   digital control   enables using infraport IrDa   enables connection with TL-5024   allows connection of warning signalization   universal usage   high precision measurement   communication with PC

Diameter 57mm (2 1/4")
Weight: 0.25 kg (0.55 lbs)

RPM & ENGINE HOURS METER   TL-2824

RPM and Engine Hours Meter TL-2824 is an ideal instrument for your aircraft. Simply replace your old tachometer with a new RPM and Engine Hours Meter, and get additionally the information on the engine hours and flight hours. The RPM and Engine Hours Meter also enables you to block an engine starter, and only after entering the correct code, the instrument enables starting of the engine. You can browse a complete logbook on the display or download this data from the instrument into your PC. The logbook includes date, flight time, engine time and name of the pilot or a student. You can easily set all limit values in your RPM and Engine Hours Meter with help of the buttons, and the instrument will monitor them for you. Using a PC and the program, which is a part of delivery, the RPM and Engine Hours Meter also enables you anytime to go through the history of measured values.
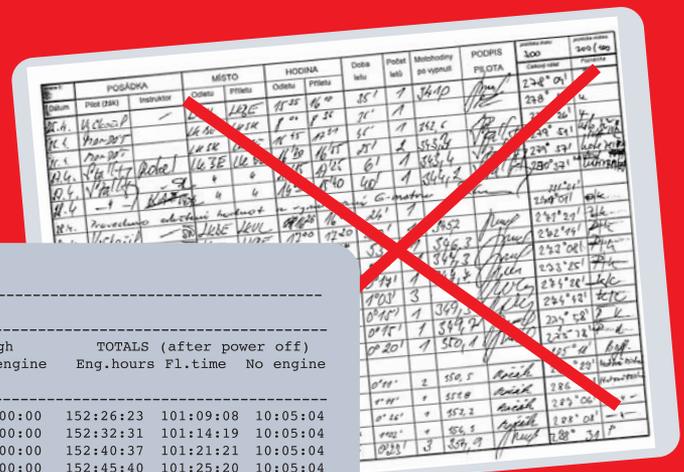
Accessories:*

1/ **2824-01** Passive speed sensor for all engines (inductive sensor)
2/ **2824-02** Active speed sensor for all engines
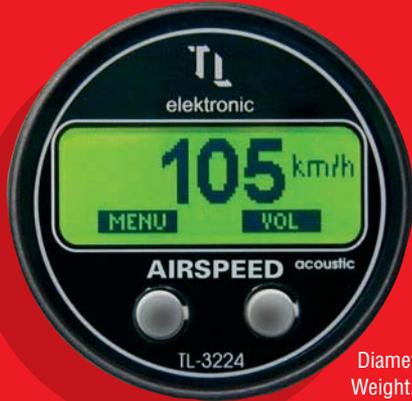(inductive three-wire sensor) - 5 to 30 Volts power supply required

Related versions:

TL-2824_SAS RPM and Engine Hours Meter – above the standard version this one contains an internal air speed sensor which allows distinguishing between the engine time and the flight time.

MEMORY LOG

```
---------------------------------------------------- FLIGHT  REPORT ------------------------------------------------
Number of lines:   8
--------------------------------------------------------------------------------------------------------------------
Page   3                    CREW            Time clock (UTC)            Time of this fligh          TOTALS (after power off)
Date         Pilot-student  Instructor   Take-off  Landing    Engine  Fl.time   No engine    Eng.hours Fl.time   No engine
engine
--------------------------------------------------------------------------------------------------------------------
08.06.2004  Henry Nowak   Jim White      8:00:56   8:05:14    0:04:18  0:03:58   0:00:00     152:26:23 101:09:08  10:05:04
08.06.2004  Steve Chalk   Jim White      8:09:14   8:15:22    0:06:08  0:05:11   0:00:00     152:32:31 101:14:19  10:05:04
08.06.2004  Steve Chalk   Jim White      8:17:23   8:25:29    0:08:06  0:07:02   0:00:00     152:40:37 101:21:21  10:05:04
08.06.2004  Steve Chalk   Jim White      8:26:55   8:31:58    0:05:03  0:03:59   0:00:00     152:45:40 101:25:20  10:05:04
08.06.2004  John Black    John Black     9:27:01  10:33:22    0:20:49  1:02:20   0:45:32     153:52:01 101:27:40  10:50:36
08.06.2004  Henry Nowak   Jim White     10:45:21  10:55:28    0:10:07  0:08:45   0:00:00     154:02:08 101:36:25  10:50:36
08.06.2004  Henry Nowak   Jim White     11:00:28  11:05:05    0:04:37  0:03:01   0:00:00     154:06:45 101:39:26  10:50:36
08.06.2004  Henry Nowak   Jim White     11:07:10  11:15:32    0:08:22  0:07:03   0:00:00     154:15:07 101:46:29  10:50:36
--------------------------------------------------------------------------------------------------------------------
```

allows connection via Blue Tooth
digital control
enables using infraport IrDa
enables connection with TL-5024
allows connection of warning signalization
universal usage
high precision measurement
communication with PC

* A full list of accessories can be found on our web sites
**www.tl-elektronic.com** in section Aviation products.

Diameter 57mm (2 1/4")
Weight: 0.30 kg (0.66 lbs)

AIR SPEED INDICATOR TL-3224

Air Speed Indicator TL-3224 not only displays air speed, but also monitors minimum speed for opening trailing edge flaps or landing gear and maximum speed limit for closing them providing you with acoustic signalization. You can easily set all these limit values and your Air Speed Indicator will monitor them for you. In combination with our Intercom or Voice Module it gives you voice information on instant speed directly into your headphones. Using a PC and the program, which is a part of delivery, the Air Speed Indicator also enables you anytime to go through the history of measured values.

Accessories:*
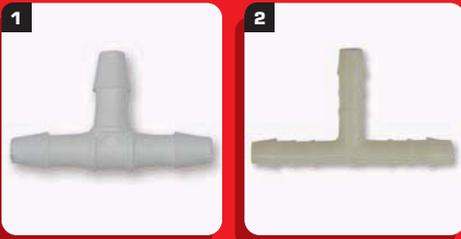
1/ **0024-12** Pressure T-Fitting for hoses with 4mm (1/6") in diameter
2/ **0024-13** Pressure T-Fitting for hoses with 6mm (1/4") in diameter

Diameter 57mm (2 1/4")
Weight: 0.25 kg (0.55 lbs)
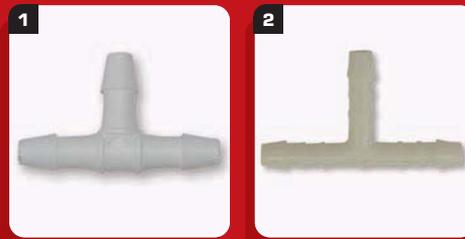version SAS 0.30 kg (0.66 lbs)

ACCELEROMETER TL-3424

Accelerometer TL-3424 is an ideal instrument for monitoring the operation of your aircraft in terms of "G" acceleration. It is offered in several versions. One option is to measure also airspeed, the other one is to record date and time into the memory, the third one integrates both functions, which is particularly suitable for flight schools. Furthermore, the Accelerometer distinguishes the air traffic from the ground traffic, and thus is able to exclude e.g. taxiing on runway. You can easily set all +/- acceleration limit values in your Accelerometer with help of the buttons, and the instrument will monitor them for you. Using a PC and the program, which is a part of delivery, the Accelerometer also enables you anytime to go through the history of measured values.

Related versions:

- **TL-3424_SAS Accelerometer** with internal air speed sensor
- **TL-3424_RTC Accelerometer** with real time & date recording into Scheck® memory
- **TL-3424_RAS Accelerometer** including internal air speed sensor and with real time & date recording into Scheck® memory

Accessories:*

1/ **0024-12** Pressure T-Fitting for hoses with 4mm (1/6") in diameter
2/ **0024-13** Pressure T-Fitting for hoses with 6mm (1/4") in diameter

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

ALTIMETER TL-3524

Altimeter TL-3524 is an altimeter with encoder in one. With the Altimeter, you can not only save weight by having two instruments in one but, in addition, it is also one of the first encoders that transmits the code immediately after the switch-on. In your Altimeter, you can easily set altitude that is to be kept - the instrument will inform you whether you are above or bellow this set altitude. You will be informed also on minimum descent altitude, approach, transition altitude, altitude with lack of oxygen etc. Using a PC and the program, which is a part of delivery, the Altimeter also enables you anytime to go through the history of measured values.

Diameter 57mm (2 1/4")
Weight: 0.30 kg (0.66 lbs)

Accessories:*

1/ **0024-12** Pressure T-Fitting for hoses with 4mm (1/6") in diameter
2/ **0024-13** Pressure T-Fitting for hoses with 6mm (1/4") in diameter
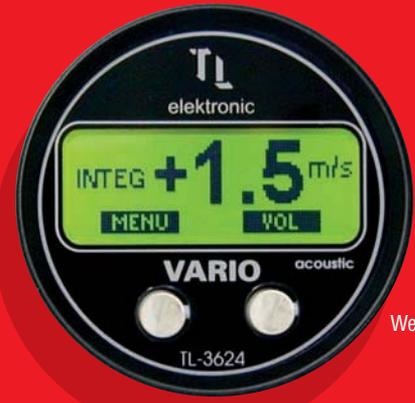
VERTICAL SPEED INDICATOR

TL-3624

Diameter
57mm (2 1/4")
Weight: 0.30 kg (0.66 lbs)

Vertical Speed Indicator TL-3624 is suitable for both - aircrafts and gliders. You can easily set a range of climb/descend in your Vertical Speed Indicator with help of the buttons, and the instrument will monitor it for you and provide you with acoustic signals. Using a PC and the program, which is a part of delivery, the Vertical Speed Indicator also enables you anytime to go through the history of measured values.

Related versions:

- **TL-3624_ACS Acoustic Vertical Speed Indicator**
  - contains an air speed sensor and is designed especially for gliders

Accessories:*

1/ **0024-12** Pressure T-Fitting for hoses with 4mm (1/6") in diameter
2/ **0024-13** Pressure T-Fitting for hoses with 6mm (1/4") in diameter

Altimeter TL-3524 / Vertical Speed Indicator TL-3624

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

7
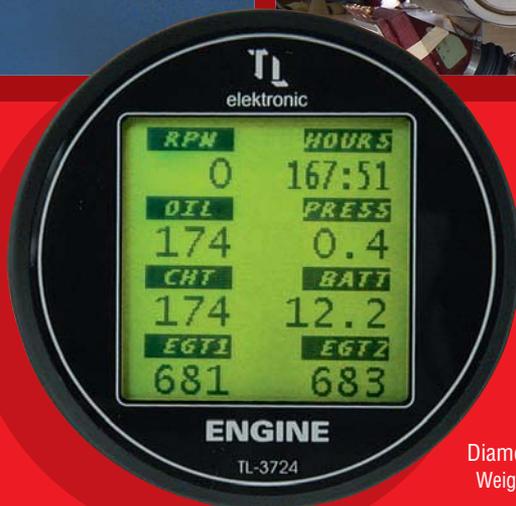
Diameter 80 mm (3 1/8")
Weight: 0.25 kg (0.55 lbs)

COMBINED ENGINE INSTRUMENT TL-3724

MEMORY LOG

Combined Engine Instrument TL-3724 is a multifunctional and fully monitoring instrument for your engine. Simply replace several instruments necessary for monitoring your engine with this instrument. The Combined Engine Instrument enables you to measure up to six EGTs or CHTs, temperature of oil and water, oil pressure, fuel flow, battery voltage, engine hours, RPM. The combination of eight values displayed including limits for the particular measured values can be easily set with help of attached configuration program. Using a PC and the program, which is a part of delivery, the Combined Engine Instrument also enables you anytime to go through the history of measured values.

Accessories:*

1/ **3724-01** Thermocouple probe for Exhaust temperature EGT (type K) M8x1 SCREW TYPE - for all engines

2/ **3724-02H2** Thermocouple probe for Cylinder head CHT (type J) 12mm hole - for all engines

3/ **3724-04** OIL or WATER temperature sender (VDO P/N:Silver line - 0 to 150 °C / 0 to 300°F) for Rotax 4-stroke

4/ **3724-06** Active OIL pressure sender (Honeywell P/N:MLH010BGB06E - three wire 0 to 10 bar / 0 to 145 PSI, 1/8"NPT) - for all engines

5/ **3724-07** Metal high-quality flow sensor (Floscan P/N:201A-6 0 to 113 litres/hour / 0 to 30 GPH) - for all engines

6/ **3724-09** Active speed sensor for all engines (inductive three-wire sensor) - 5 to 30 Volts power supply required

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Instrument Engine Log                        Created: 3.5.2004 17:42:42

Engine Type: Rotax 912_S                     Serial No.: 4 427 920

Configuration Data
                                   Maximal                    Minimal
Channel   Input      Units    Warning  Alarm  Service   Warning  Alarm  Service
   1      EGT1       [°C]       880     900     ---
   2      EGT2       [°C]       880     900     ---
   3      EGT3       [°C]       880     900     ---
   4      EGT4       [°C]       880     900     ---
   5      Water      [°C]       135     150     180
   6      Oil        [°C]       130     145     160
   7      Press      [bar]      6.0     8.0     8.0      2.0     1.0     1.0
   8      RPM        [1/min]   5800    6000    6000

Time of Operation: 17:21

   Time     EGT1   EGT2   EGT3   EGT4   Water   Oil    Press   RPM
[hh:mm:ss]  [°C]   [°C]   [°C]   [°C]   [°C]   [°C]   [bar]  [1/min]
           --------------------------------------------------------------
 17:18:50   573    572    609    635    72     76     4.6     3236
 17:19:00   566    564    601    622    72     76     4.6     2867
 17:19:10   555    553    590    605    72     76     4.8     2439
 17:19:20   549    535    575    588    70     74     4.6     2439
 17:19:30   541    523    567    580    72     76     4.5     2521
 17:19:40   540    520    568    580    72     76     5.4     3322
 17:19:50   552    544    588    604    71     76     4.5     2485

           -------------------- P o w e r   O f f -------------------------
 17:20:00   566    564    607    624    72     77     4.5     3424
 17:20:10   573    572    609    635    72     76     4.6     3236
 17:20:20   566    564    601    622    72     76     4.6     2867
 17:20:30   555    553    590    605    72     76     4.8     2439
 17:20:40   549    535    575    588    70     74     4.6     2439
 17:20:50   541    523    567    580    72     76     4.5     2521
 17:21:00   541    524    567    580    72     76     4.5     2521
           -------------------- P o w e r   O f f -------------------------

           ---------------- U S E R   M E M O R Y   S T A T U S --------------

            EGT1   EGT2   EGT3   EGT4   Water   Oil    Press   RPM
            [°C]   [°C]   [°C]   [°C]   [°C]   [°C]   [bar]  [1/min]
           --------------------------------------------------------------
Alarm Value:  763    790    802    793    95     104    6.2     5482
Alarm Time :  0:00   0:00   0:00   0:00   0:00   0:00   0:00    0:00
Min. Press :                                              2.4
Alarm Time :                                              0:00
Overdriven :  *No*   *No*   *No*   *No*   *No*   *No*   *No*    *No*

           ---------------- N O   S C H E C K   R E P O R T ----------------

           ----------------- N O   L I N E   R E P O R T ------------------

           -------------------- E N D   O F   R E P O R T -------------------
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* A full list of accessories can be found on our web sites

www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth
digital control
enables using infraport IrDa
enables connection with TL-5024
allows connection of warning signalization
universal usage
high precision measurement
communication with PC

FATIGUEMETER TL-4324

Fatiguemeter TL-4324 is an ideal unit monitoring operational "G" acceleration of your aircraft in the vertical axis. After a simple installation into a centerplane of your aircraft, the Fatiguemeter will enable you to obtain the history of aircraft's operational "G" acceleration, number of landings with date and time, history of the operational "G" acceleration including air speed. It also signals if the operational "G" acceleration is exceeded. This unit is offered in several versions (SPA, SPC, SPE, SPP), which allow different modes of recording into the memory. The Fatiguemeter was developed in cooperation with the Czech Centre for Aeronautical and Cosmic research.

Dimensions
67x71x52 mm (5,62x2,20x1,41")
Weight 0.30 kg (0.66 lbs)

Related versions:

- **TL-4324_SPC Fatiguemeter** with one-parametric storing
  into memory and rolling memory and with internal air speed sensor
- **TL-4324_SPD Fatiguemeter** with two-parametric storing
  into memory and rolling memory and with internal air speed sensor
- **TL-4324_SPT Fatiguemeter** with storing of ascending
  and descending half of amplitudes into memory and rolling memory
  and with internal air speed sensor
- **TL-4324_SPP Fatiguemeter** with separate storing of ascending
  and descending half of amplitudes into memory and rolling memory
  and with internal air speed sensor

Accessories:*

1/ **4324-01** Strain-gauge module for iFamily® - for all aircrafts
2/ **0024-12** Pressure T-Fitting for hoses with 4mm (1/6") in diameter
3/ **0024-13** Pressure T-Fitting for hoses with 6mm (1/4") in diameter

WIRELESS DATA COMMUNICATOR TL-5024

Dimensions
143x56x36 mm
(2,63x2,79x2,04")
Weight 0.20 kg
(0.44 lbs)

Wireless Data Communicator TL-5024 is a very smart unit that enables wireless communication between your aircraft and your PC or mobile phone. The unit provides you with information on your aircraft's position, condition of a battery, outside air temperature etc. All this information can be sent to your mobile phone or your e-mail. It performs wireless transfer of the history of measured values from all TL elektronic instruments in your aircraft (connected to iFamily® Bus). This unit can also find out automatically whether there is the new firmware version available for the instruments manufactured by TL elektronic, and can carry out their update. Therefore all your instruments in your aircraft panel will be automatically updated. Furthermore, this unit serves also as a security device preventing from a theft of your aircraft or its parts.

Accessories:*

1/ **5024-01** Antenna for GPRS module - for all aircrafts

Fatiguemeter TL-4324 / Wireless Data Communicator TL-5024

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC
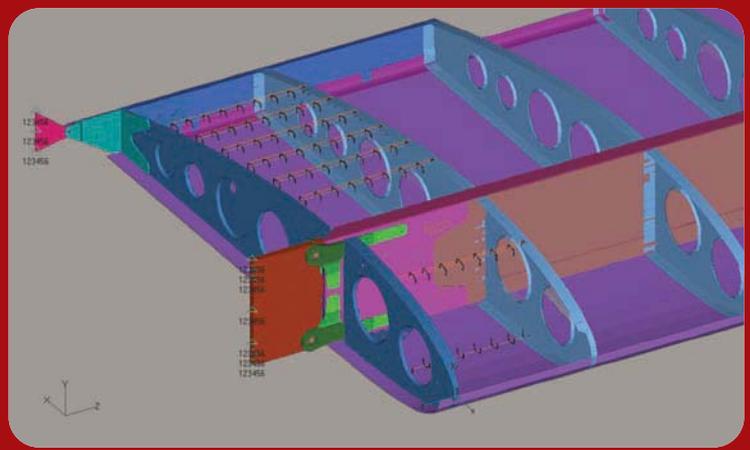
Dimensions
193x104x36 mm
(7,59x4,09x1,41")

STRUCTURAL LIFE MONITORING UNIT

TL-5824

Developed in cooperation with the Ministry of Industry and Trade.

Structural Life Monitoring Unit TL-5824 is a unique unit for aircraft operational data acquisition or its parts. It enables monitoring and evaluating residual life of several critical places in an aircraft structure. The residual life evaluation process is based on in-time measurement of vertical "G", which is recalculated on the stress spectra in the aircraft structure critical places. The unit offers great benefits for airplane manufacturers, flight schools or other aircraft operators in order to monitor airplane's operation and its structural life. This feature of the Structural Life Monitoring Unit can be useful e.g. for flights schools, where the same type of airplanes is operated in different ways (aerobatics, training, navigation flights etc.). Aircraft manufacturers will appreciate simple monitoring of even a huge number of airplanes.

Accessories:*

1/ **5824-01** Display unit to instrument panel
2/ **5824-03** Strain-gauge module for iFamily® - for all aircrafts
3/ **5824-04** GPS and GPRS antenna - for all aircrafts

The **TL-5824** enables monitoring and evaluating the residual life of several critical places in the aircraft structure. The residual life evaluation process is based on the in-time measurement of the vertical '**g**', which is recalculated on the **stress** spectra in the aircraft structure critical places. Then the stress spectra are filtered to omit insignificant load cycles. After that, the filtered **stress** spectra are decomposed by the **Rain-Flow** method on the separate load hysteresis loops. The decomposed stress spectra, together with the **S-N** curves of all critical places are the main input data for the fatigue calculation process. The fatigue calculation process is based on the '**Palmgren-Miner**' hypothesis of fatigue damage cumulation. The critical place with the minimum calculated residual life defines the fatigue residual life of the 'whole' aircraft. The residual life expressed in [%] together with the information about which critical place contains the minimum residual life, are shown on the display in the cockpit instrument panel.

In the aircraft structure places where the correlation of '**g**' vs. **stress** cannot be proven, the **TL-5824** provides the option of the strain-gauge measurement. The record of **stress** can be directly used in the **TL-5824**'s fatigue evaluation process. Besides the aircraft fatigue evaluation, the **TL-5824** records the load history of the whole aircraft. The aircraft's load history is cumulatively written into the 'two-parametric' matrix of ascending and descending amplitudes of the '**g**' spectra.

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

Dimensions
143x56x36 mm
(2,63x2,79x2,04")
Weight: 0.20 kg
(0.44 lbs)

FLIGHT POSITION LOGGER TL-6024

EMAIL REPORT

Flight Position Logger TL-6024 is a flight recorder of aircraft position that enables you to record a track followed by an aircraft, altitude, ground speed, positions of intermediate landings and total flight time. The Flight Position Logger is suitable particularly for flight schools as it proofs the flight track, whether the planned landings were kept, their positions and total flight time for precise billing. The information about flight is possible to gain from the instrument via the PC. With GWG version, moreover, you can also get this information wirelessly, e.g. always after landing and have the latest data in your PC or email. TL elektronic were proud to sponsor cross country flight of 5 ultralights made in Czech on expedition Balkan 2010. Each aircraft was equiped with our instrument TL-6024_GWG Flight position logger. For more information please visit www.ultralightexpedition.cz

```
Dear User of TL elektronic equipment,
In the attachment we are sending you information on current position of your
aircraft, which you have activated through our web sites.

Aircraft: OK-JHC          Flight ID: 48

------ T a k e - o f f ------------------------------------------------
Date of take-off (UTC):                          2007/04/05
Time of take-off (UTC):                          8:04:31
GPS position of take-off:         49`44'26.44"N,14`38'29.12"E
Take-off airport:                                LKBE

------ L a n d i n g --------------------------------------------------
Date of landing (UTC):                           2007/04/05
Time of landing (UTC):                           8:58:00
GPS position of landing:          50`14'49.98"N,15`50'58.39"E
Landing airport:                                 LKHK
----------------------------------------------------------------------
Total flight time:                               0:53:29
----------------------------------------------------------------------

Thank you for using wireless GPRS service by TL elektronic.

----------------------------------------------------------------------
If you are not the intended recipient please delete this e-mail immediately.
Any unauthorized copying, disclosure or distribution of the material in this
e-mail is strictly forbidden.
----------------------------------------------------------------------
Copyright 2007 — TL elektronic, generated on: 05.04.2007 09:02:08
```

Sample of take-off from Prague airport

Related versions:

- **TL-6024_GWG Flight Position Logger** with wireless communication via GSM/GPRS technology

Accessories:*

Sample of a circuit flight with a different take-off runway

Detail of ground speed and altitude in a selected point of the track

1/ **6024-02** GPS and GPRS antenna - for all aircrafts
2/ **6024-03** GPS Antenna - for all aircrafts

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

EFIS INTEGRA TL-6524

Dimensions
192x149x90 mm
(7,55x5,86x3,54")
Weight: 1100 grams
(2.42 lbs)
Guarantee: 5 years

EFIS Integra TL-6524 is a multifunctional flight monitoring system with 7 inch display integrating all primary flight instruments (i.e. Altimeter, Vertical Speed Indicator, Air Speed Indicator, Compass, Accelerometer, Chronometers, Turn & Bank Indicators, Angle Of Attack Indicators, IAT, OAT etc.). Moreover, the EFIS Integra integrates navigation (i.e. HSI, CDI with connection to the popular Garmin SL-30) and 3-D terrain with world use.

Wide viewing angles, brilliant colour and direct sunlight readability of display will allow you a new dimension in EFIS instrument. Used high-tech technology and components will provide you with high comfort and user friendly control. It is friendly to the right-handed as well as to the left-handed, moreover, it allows what you could have only dreamt of – listening to your favourite music after inserting your flash disc into the connector in the front panel, 3-D visualization of terrain, integrated 3-axis autopilot, voice warning directly into the headphones etc.

You can also connect up to 4 cameras to be view on the Integra display. Then you can use Integra as a mirror when towing a glider or to check position of the retractable gear.

Thanks to iFamily® Bus a split screen is enabled so that this instrument displays also engine data from TL-6724 EMS Integra

Accessories:*

1/ **6524-02** Servo with magnetic clutch
(torque 4.5Nm / 40in/lb, weight 0.7kg/1.5lb)
2/ **6524-04** Remote compass
3/ **6524-05** 3D terrain of Europe

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth
digital control
enables using infraport IrDa
enables connection with TL-5024
allows connection of warning signalization
universal usage
high precision measurement
communication with PC

EMS INTEGRA TL-6724

Dimensions
192x149x90 mm
(7,55x5,86x3,54")
Weight: 1150 grams
(2,53 lbs)
Guarantee: 5 years

EMS Integra TL-6724 is a multifunctional engine monitoring system with 7 inch display integrating all primary engine instruments (i.e. Tachometer, Manifold Pressure Indicator, EGT, CHT, Oil and Water Indicator, Fuel Quantity, Fuel Pressure and Fuel Flow Indicator, Voltmeter, Ammeter, Timer, IAT, OAT etc. Moreover, the EMS Integra integrates propeller control for Constant Speed and Choke Control. EMS Integra is designed for all engines from all over the world.

Wide viewing angles, brilliant colour and direct sunlight readability of display will allow you a new dimension in EMS instrument. Used high-tech technology and components will provide you with high comfort and user friendly control. It is friendly to the right-handed as well as to the left-handed, moreover, it allows what you could have only dreamt of – well-arranged display using true vision of analogue instrument, download of measured values history of engine after inserting your flash disc into the connector in the front panel, protection of your engine by checking all measured values, voice warning directly into the headphones etc.

Thanks to iFamily® Bus a split screen is enabled so that this instrument displays also flight data from TL-6524 EFIS Integra

Accessories:*

1/ **6724-06** Active OIL pressure sender (Honeywell P/N:MLH010BGB06E - three wire 0 to 10 bar / 0 to 145 PSI, 1/8"NPT) - for all engines
2/ **6724-07** Metal high-quality flow sensor (Floscan P/N:201A-6 0 to 113 litres/hour / 0 to 30 GPH) - for all engines
3/ **6724-16** Thermocouple probe for Exhaust temperature EGT (type K) M8x1 SCREW TYPE - for all engines

Integra is your EMS 912iS solution!
In cooperation with BRP Powertrain we prepared our glass cockpit EMS Integra TL-6724 for connection to the new engine Rotax 912iS. Now you can have verified solution!

* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

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EMS Integra TL-6724

Dimensions
192x149x90 mm
(7,55x5,86x3,54")
Weight: 1200 grams
(2.64 lbs)
Guarantee: 5 years

EFIS/EMS INTEGRA TL-6624

EFIS & EMS Integra TL-6624 is a multifunctional system with 7 inch display that monitors both your flight and engine. All function available like on EFIS TL-6524 or EMS TL-6724 glass cockpit Integra with the weight just 100g more then EFIS TL-6524 Integra. Save space on your instrument panel and get it all in one. You can switch between EFIS, EFIS with EMS combination or full EMS by hitting just 1 button.

Integra on your computer
Integra's PC Demo includes all the features of the real Integra glass cockpit instruments. Enables you to learn how to control the Integra in the comfort and safety of your home on your PC. Enables you to save your configuration on a PC at any time and transfer it via flash drive directly to the Integra in your airplane. After downloading the flight and engine parameters on a flash drive, you can replay it again at home on your PC.Integra on your Integra's PC Demo includes all the features of the real Integra glass cockpit instruments. Enables you to learn how to control the Enables you to save your configuration on a PC at any time and transfer it via flash drive directly to the Integra in your airplane. After downloading the flight and engine parameters on a flash drive, you can replay it again at home on your PC.

REMOTE DISPLAY TL-6824

Dimensions
192x149x90 mm (7,55x5,86x3,54")
Weight: 950 grams (2.1 lbs)
Guarantee: 5 years

Remote Integra Display TL-6824 is designed for displaying all values measured by TL-6524, TL-6624 and TL-6724. Remote Integra Display can provide information to the co-pilot or to inform other crew members. The low-profile of the TL-6824 allows it to be installed into seat backs and by giving passengers flight information and the ability to watch films or listen to music stored on a flash drive, it enriches their flight experience.
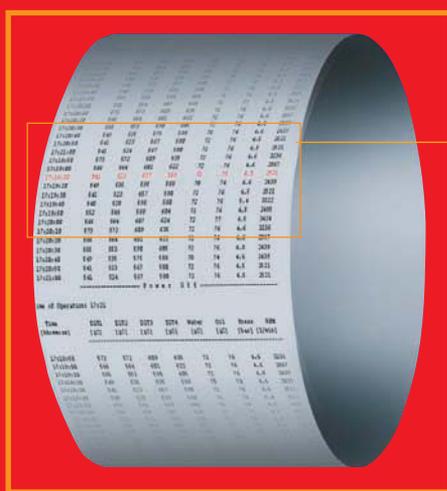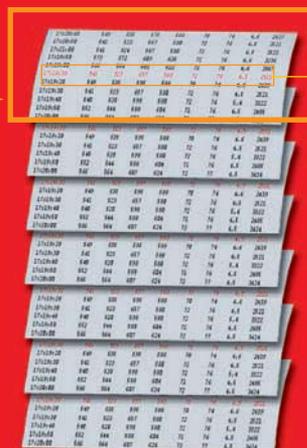
* A full list of accessories can be found on our web sites
www.tl-elektronic.com in section Aviation products.

allows connection via Blue Tooth | digital control | enables using infraport IrDa | enables connection with TL-5024 | allows connection of warning signalization | universal usage | high precision measurement | communication with PC

SchecK®

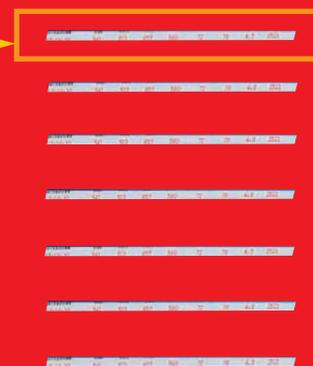| Rolling memory	Case memory	Line memory
last 2000 lines with 0.1 to 60 second sample rate	Short-term memory with limit-exceeding values – last 20 cases	One-line with the maximum measured values from the last record into the drawer till the instant record into the drawer

SchecK® Description

SchecK® is a unique method developed in the company TL elektronic, which represents a mode of storing the measured values into the memory, particularly in case of exceeding the limits, and provided it is necessary to keep this record for a longer period of time in course of check back analysis. All instruments of the TL-xx24 series store into the **Rolling memory** (which includes a few thousand lines) the measured values in the set intervals. If a measured value exceeds the set limit, the value is recorded into the Rolling memory. However, after a period of time, new values will rewrite the oldest ones, as the Rolling memory is time-limited. For this reason, the instrument incorporates so-called Case Memory, which includes a few tens of drawers, into which the short record of the limit-exceeding values is stored. This record consists of a short record from before exceeding the limit and a short record from after exceeding the limit. While the values are being stored into the **Case**

Memory, recording into the **Line Memory** (which includes a few tens of lines) is activated. It is only a one-line memory, into which the real time and date are stored (if the instrument is connected with some other instruments, such as the TL-2824 or the TL-3724, that incorporate the "real time and date" circuit) and also the maximum measured values from the last record into the drawer till the instant record into the drawer.

The **SchecK®** memory will provide a perfect protection of your engine or your aircraft and will help you to analyze a defect occurring, e.g. in the engine.

The instruments with the **SchecK®** are suitable mainly for air schools and aircrafts with more than one owner, where it is necessary to monitor the operation history of the aircraft. **The SchecK® method is used even by the company ROTAX, Austria, the largest manufacturer of aircraft engines in Europe, in the new instrument Flydat, which we developed and now are producing for the company ROTAX**

✔ check your engine or the flight's procedure with use of the unique method, which will ensure the check back analysis of the measured values
✔ this **SchecK®** method will enable to solve the problem in a more simple way, e.g. in case of an engine damage
✔ protect your aircraft or engine with use of the **SchecK®** method in case that the aircraft has more than one owner or the aircraft is used by an air school
✔ enables short-term monitoring of the measured values' history with use of the Rolling memory, e.g. for replaying the measured values from the previous flight
✔ enables monitoring of the measured values' history in case of exceeding the set limit; the short record of the measured values' history will be stored into the Case memory, which enables at any time to download them into your PC and then analyse them
✔ enables monitoring of the maximum measured values from the last record into the drawer till the instant record into the drawer with use of the Line memory; with use of this memory, you can read back the real maximum measured values; with use of this memory, you can read back the real maximum measured values.

SERVICE MESSAGE
For more information press info button.
CHECK MEMORY!
INFO   WAIT

If any of the measured values exceeds the set limit, then always after the next turn-on of the instrument, this message will show on the display, which also warns you that during the previous flight the measured values were exceeded.

SERVICE MESSAGE

INFO   WAIT

The information about exceeding the measured value during the previous flight can be deleted in a simple way; however, the record of exceeding will be stored into the Case memory.

CONTACT SERVICE

See manual!
INFO   WAIT

In case that the measured values exceed the set limits repeatedly, then after filling the Line memory, this message will show on the display and it can be deleted only using a PC and entering the correct code.

SchecK®

iFamily®

IrDa, GSM, Blue Tooth connection

SUMMARY OF TECHNICAL PARAMETERS SERIES TL-XX24

Voltage	10.0 to 32.0 Volts
Backlights	internal or external 5V, 12V or 24V
Current consumption	50 to 250 mA @ 14 Volts
Maximum voltage and signal current	30 Volts, 1 Ampere
Measurement accuracy	+/-1%(not including sensor accuracy)
Operating temperature range	-20°C to 70°C (-4°F to 158°F)
Relative humidity	95% without condensation
Load	+/-20 g
Vibration	1 to 200 Hz
Weight	350 grams (0,77 lbs)
Dimensions of 57 mm instruments	71x67x45 mm 2.795x2.637x1.771 inch
Diameter	57 mm 2 1/4"
Dimensions of 80 mm instruments	85x85x65 mm 3.346x3.346x2.559 inch
Diameter	80 mm 3 1/8"

iFamily® Description

The **iFamily®** is a unique bus that enables communication among the TL elektronic instruments of the TL-xx24 series and, of course, also the instruments of other licensed manufacturers. The communication proceeds on the basis of the communication protocol developed in the company TL elektronic. The communication itself is based on the communication bus of the I2C type or CAN-BUS, in which only two leads are needed, and the instruments are connected in parallel.

The main advantage of the **iFamily®** Bus is the fact that when downloading the measured values from the particular instruments, it is not necessary for each instrument to have a communication outlet for connecting to the COM port of your computer (RS-232c), but just one outlet connected to any of the instruments is sufficient. As soon as you connect your PC to the communication connector of any instrument, then this instrument will ensure the connection to all other instruments connected with the **iFamily®** Bus.

Another advantage is forwarding some of the parameters and values and the record synchronization of the particular instruments. As an example, let's mention the RPM Meter TL-2824, the standard version of which is provided with the "real date and time" circuit. If you connect e.g. the Accelerometer TL-3424 to this instrument, then the TL-3424 will always have the information on the real date and time from the RPM Meter. The Accelerometer can use this information e.g. in case of exceeding acceleration. In such case, the record will be stored into the **SchecK®** memory including the real time and date.

You will also appreciate the **iFamily®** Bus when connected to the Intercom TL-2424 or the Voice Module TL-5624. If there are some instruments of the TL-xx24 series connected to these instruments, then in case of exceeding the limits, this instrument will forward the information on exceeding via the **iFamily®** Bus. The Intercom TL-2424 or the Voice Module TL-5624 will send this information into your headphones as a voice message (e.g. Warning, the exhaust temperature No. 1 is over).
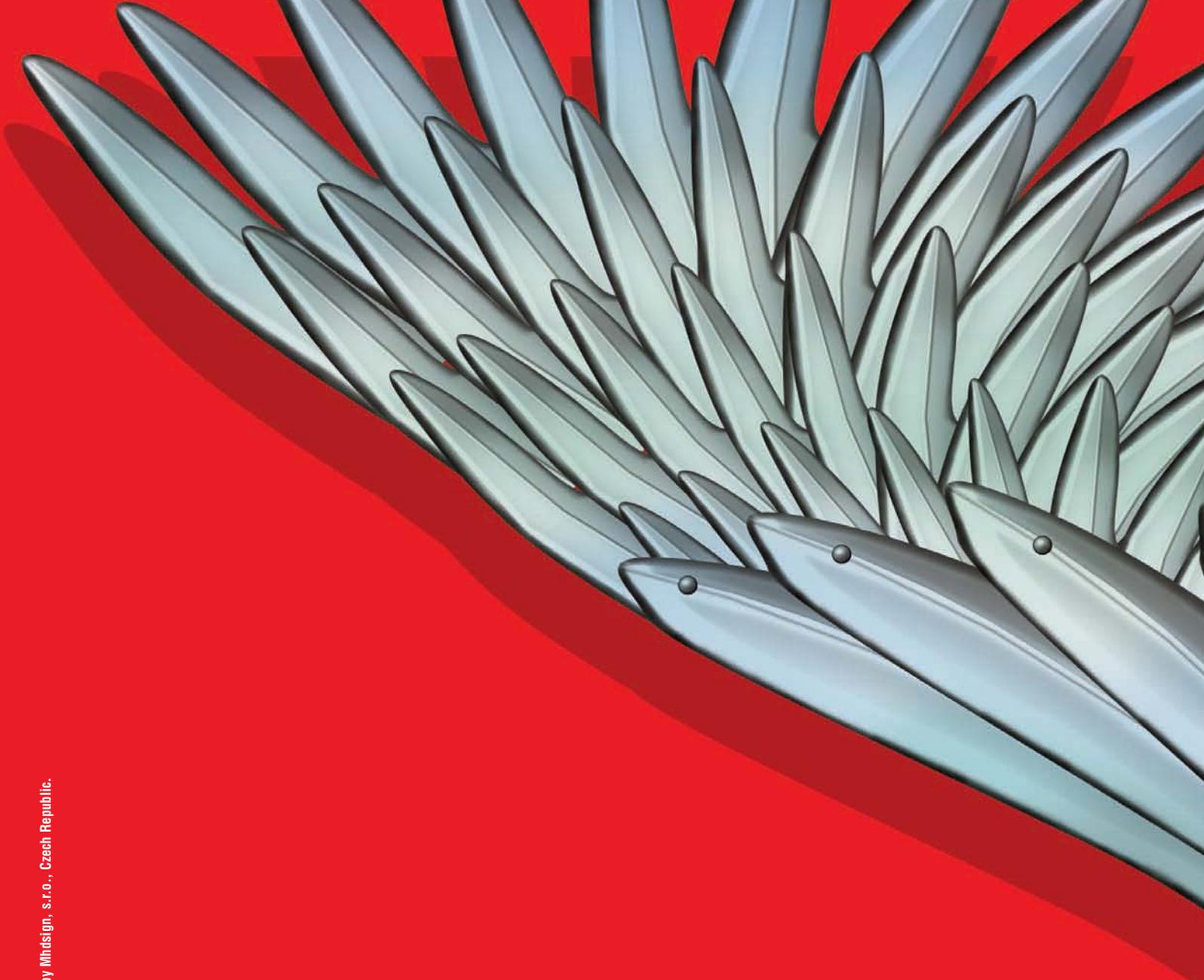
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TL elektronic Inc.

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