

ES4456.1 Load Board for 8 RB Piezo Injectors

User's Guide



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V1.0.0 R03 EN - 10.2015

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1 Introduction

This User's Guide describes the ES4456.1 Load Board for 8 RB Piezo Injectors. It consists of the following chapters:

- "Introduction" on page 5
This chapter – here you will find general information on the ES4456.1 Load Board for 8 RB Piezo Injectors.
- "Hardware" on page 11
This chapter describes the individual function units of the ES4456.1 Load Board for 8 RB Piezo Injectors in more detail.
- "Pin Assignment, Cables and Display Elements" on page 15
This chapter contains a description of the pins and LEDs on the front panel of the ES4456.1 Load Board for 8 RB Piezo Injectors.
- "Technical Data" on page 21
This chapter contains the technical data of the ES4456.1 Load Board for 8 RB Piezo Injectors.



CAUTION!

Some components of the ES4456.1 Load Board for 8 RB Piezo Injectors may be damaged or even destroyed by static discharge. Leave the board in its transport package until you want to install it. The ES4456.1 should only be taken from its package, configured and installed at a working place that is protected against static discharge.



WARNING!

The components, connectors and conductors of the ES4456.1 Load Board for 8 RB Piezo Injectors may carry dangerous voltages. These voltages may even exist if the ES4456.1 is not installed in the ES4408.1 Load Chassis or the ES4408.1 Load Chassis is powered off. Make sure the ES4456.1 is protected against contact during operation. Disconnect all connectors to the ES4456.1 before removing the board.



CAUTION!

If cards are unlocked (e.g. during setup or calibration) but not completely removed from the housing, they nevertheless have to be pulled out of the housing so that the distance between the card and the backplane of the housing is at least 1 cm! Otherwise there could be contacts between the cards which could then be destroyed as a result.

1.1 Applications

The ES4456.1 Load Board for 8 RB Piezo Injectors is a load simulation for eight Piezo Injectors.

For fast project change, an ES4408.1 Load Chassis is usually equipped with two ES4450.2 Load Boards for 4 RB CRS Injectors (or two ES4451.3 Load Boards for 4 RB GDI Injectors) for simulating eight injectors with solenoid valves for Common Rail systems or gasoline direct injection and one ES4456.1 Load Board for 8 RB Piezo Injectors for simulating eight Piezo Injectors.

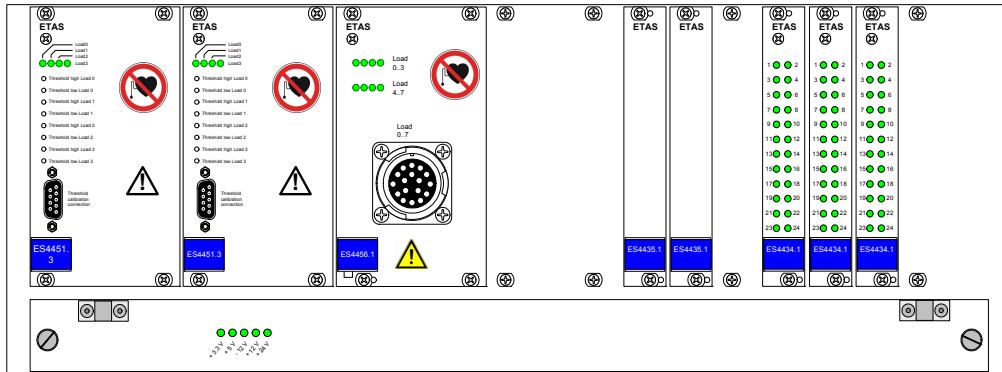


Fig. 1-1 ES4408.1 Load Chassis with ES4456.1 Load Board for 8 RB Piezo Injectors (Slot 3)

1.2 Features

The ES4456.1 Load Board for 8 RB Piezo Injectors has the following features:

- 3 U plug-in board (14 HP, 340 mm x 100 mm)
- Eight channels for load simulations to 16 A/250 V
- Eight galvanically isolated analog channels for voltage measuring

Fig. 1-2 shows the block diagram of the ES4456.1 Load Board for 8 RB Piezo Injectors.

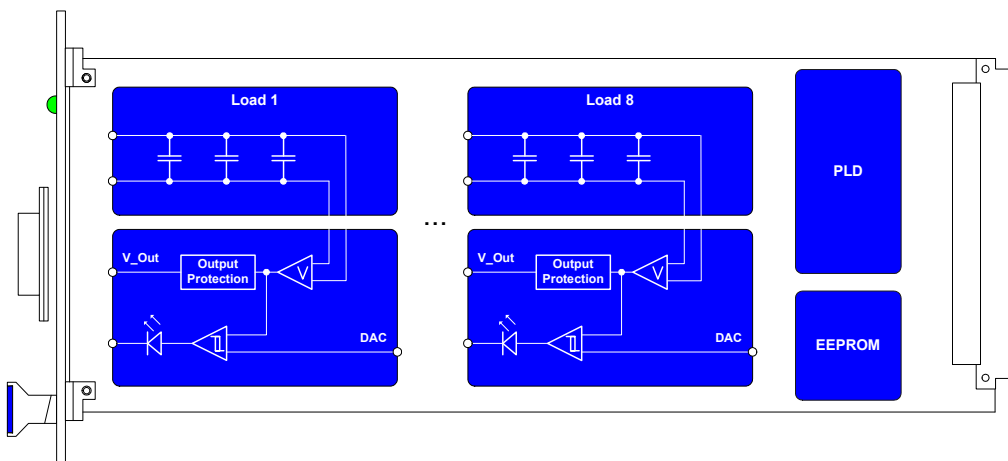


Fig. 1-2 Block Diagram of the ES4456.1 Load Board for 8 RB Piezo Injectors

The following figure shows the front panel of the ES4456.1 Load Board for 8 RB Piezo Injectors.

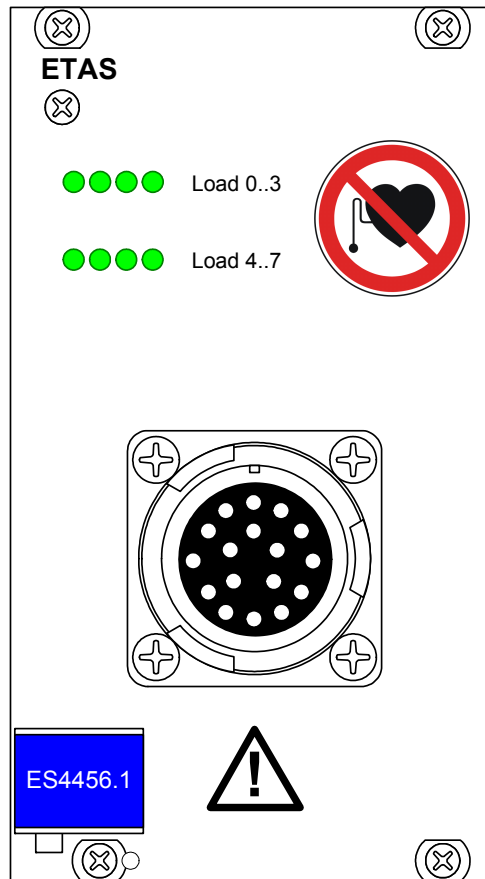


Fig. 1-3 Front Panel of the ES4456.1 Load Board for 8 RB Piezo Injectors

The elements of the front panel are:

- The LEDs "Load n" that light up when the currents exceed the thresholds set in the software
- The "Load 0..7" port to which the eight loads of the board can be connected (e.g. to a LABCAR).

1.3 Basic Safety Instructions

Please adhere to the safety instructions in this manual to avoid injury to yourself and others as well as damage to the device.

1.3.1 Correct Use

ETAS GmbH cannot be made liable for damage which is caused by incorrect use and not adhering to the safety instructions.

1.3.2 Labeling of Safety Instructions

The safety instructions contained in this manual are shown with the standard danger symbol shown below:



The following safety instructions are used. They provide extremely important information. Please read this information carefully.

**CAUTION!**

indicates a low-risk danger which could result in minor or less serious injury or damage if not avoided.

**WARNING!**

indicates a possible medium-risk danger which could lead to serious or even fatal injuries if not avoided.

**DANGER!**

indicates a high-risk, immediate danger which could lead to serious or even fatal injuries if not avoided.

1.4 Taking the Product Back and Recycling

The European Union has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are setup throughout the EU for the collection, treating and recycling of electronic waste.

This ensures that the devices are recycled in a resource-saving way representing no danger to health or the environment.



Fig. 1-4 WEEE Symbol

The WEEE symbol on the product or its packaging shows that the product must not be disposed of as residual garbage.

The user is obliged to collect the old devices separately and return them to the WEEE take-back system for recycling.

The WEEE directive concerns all ETAS devices but not external cables or batteries.

For more information on the ETAS GmbH Recycling Program, contact the ETAS sales and service locations (see "ETAS Contact Addresses" on page 23).

2 Hardware

This chapter describes the individual function units of the ES4456.1 Load Board for 8 RB Piezo Injectors in more detail.

These are:

- "Connecting Loads and Measuring the Signals" on page 11
- "Overcurrent Protection of the Measure Outputs" on page 11
- "LED Display" on page 11
- "Acoustic Signals" on page 12
- "Calibration" on page 12
- "Settings in LABCAR-RTC" on page 12

2.1 Connecting Loads and Measuring the Signals

The ES4456.1 Load Board for 8 RB Piezo Injectors can be used in slot 1, 2 or 3 in an ES4408.1 Load Chassis. The loads are connected at the front panel connector "Load 0...7" of the ES4456.1 - the measure signals are available at connectors on the back of the ES4408.1 Load Chassis.

Board in Slot	Measure Signals to
1	Meas 8-2
2	Meas 8-1
3	Meas 7

For details of the pin assignment of the front panel connector "Load 0...7" refer to section " "Load 0..7" Connector" on page 15 – the pin assignment of the measure connectors is described in the ES4408.1 Load Chassis manual.

Special cables are available for connecting loads and measure signals with a PT-LABCAR (see " "CBAV344.1-1" Cable" on page 16 and " "CBAV345.1-1" Cable" on page 17).

Note

The "CBAV345.1-1" cable must be used if the measure signals are from an ES4456.1 Load Board for 8 RB Piezo Injectors. It is not possible to use one of the three DSUB9 connectors of the CBAV343.1-1 cable which are intended for slots with an ES4450.2 Load Board for 4 RB CRS Injectors or an ES4451.3 Load Board for 4 RB GDI Injectors.

2.2 Overcurrent Protection of the Measure Outputs

The outputs of the ES4456.1 Load Board for 8 RB Piezo Injectors are protected against shorts to +UBatt and against ± 60 V.

2.3 LED Display

The LED display on the front panel (see "LEDs for Status Display" on page 19) shows when a specific voltage value between 0 and 250 V has been reached – if the voltage at a load is over this value, the relevant LED lights up.

The thresholds are set in the software; this is described in the section "To set thresholds for LEDs" on page 12.

2.4 Acoustic Signals

An acoustic signal can be emitted when the above-mentioned thresholds have been attained. The section "To set the beeper" on page 13 describes how to enable/disable this function.

2.5 Calibration

ETAS provides a calibration service for correcting any voltage converter offsets. The order data is as follows:

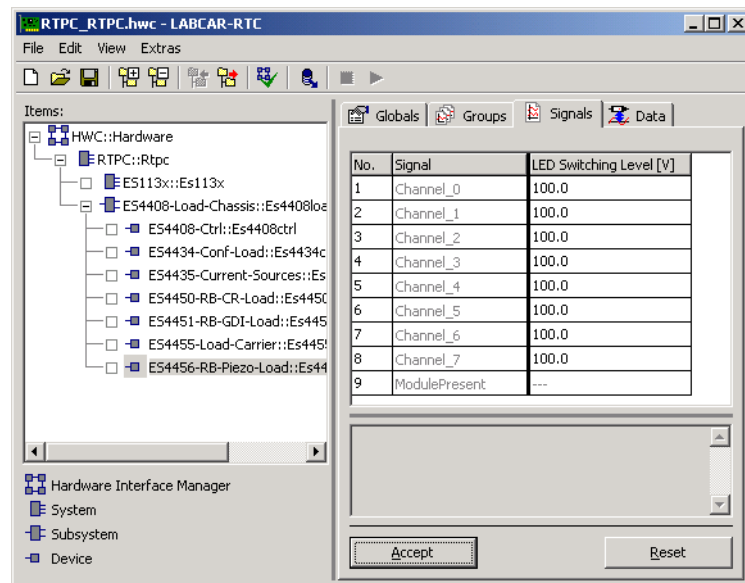
Order Name	Short Name	Order Number
Calibration Service for ES4456	K_ES4456	F-00K-106-542

2.6 Settings in LABCAR-RTC

The software settings for the ES4456.1 Load Board for 8 RB Piezo Injectors are described below.

To set thresholds for LEDs

- To configure the thresholds for the optical (via LEDs) and acoustic signals, select the "Signals" tab.
- Enter a value (for the relevant channel) for "LED Switching Level [V]".

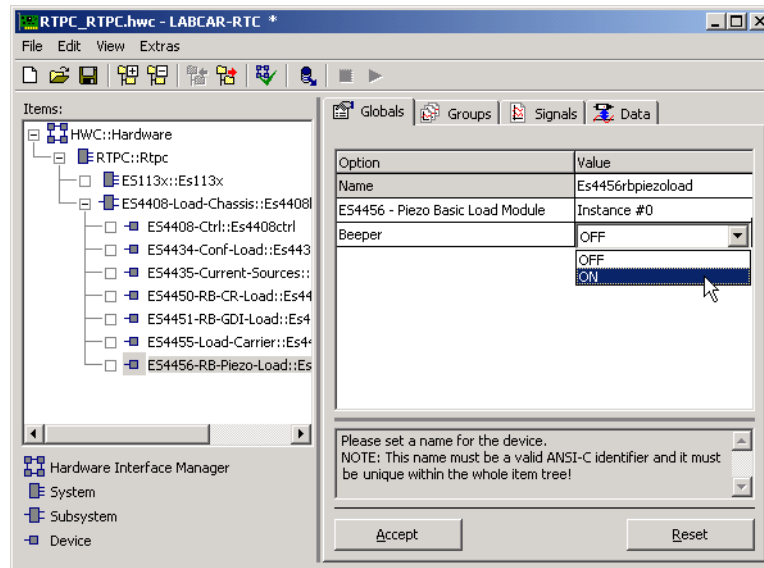


- Click **Accept**.
The settings are accepted.

For more detailed information on LABCAR-RTC, refer to the LABCAR-RTC User's Guide.

To set the beeper

- To enable/disable the acoustic signal to indicate when a threshold has been exceeded (see "To set thresholds for LEDs" on page 12), select the option "Beeper" "ON" or "OFF".



- Click **Accept**.
The settings are accepted.

3 Pin Assignment, Cables and Display Elements

This chapter contains a description of the pins and LEDs on the front panel of the ES4456.1 Load Board for 8 RB Piezo Injectors.

3.1 "Load 0..7" Connector

The "Load 0..7" connector is used to connect the loads.

Type: ITT Cannon CA02COM-E20-29P-B (male)

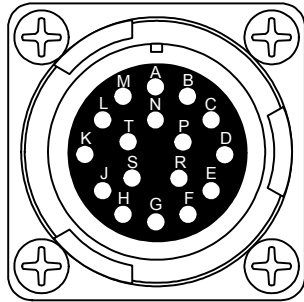


Fig. 3-1 "Load 0..7" Connector



DANGER!

After removing the cable, wait a minute before touching the connectors or board. Resistors are connected in parallel to the capacitors and enable safe discharge.

The pin assignment is as follows:

Pin	Signal	Pin	Signal
A	Load 1_High	K	Load 3_High
B	Load 2_High	L	Load 5_Low
C	Load 1_Low	M	Load 6_Low
D	Load 2_Low	N	Load 7_Low
E	Load 3_Low	P	Load 8_Low
F	Load 4_Low	R	Load 7_High
G	Load 5_High	S	Load 8_High
H	Load 6_High	T	n.c.
J	Load 4_High	Housing	Protective earth

Tab. 3-1 Pin Assignment: "Load 0..7"

3.2 Cables

This section contains the specification of the cables available from ETAS for connecting the ES4456.1 with a PT-LABCAR and their order data.

3.2.1 "CBAV344.1-1" Cable

This cable is used to connect "Load 0...7" to the corresponding "Load8" port of the PT-LABCAR.

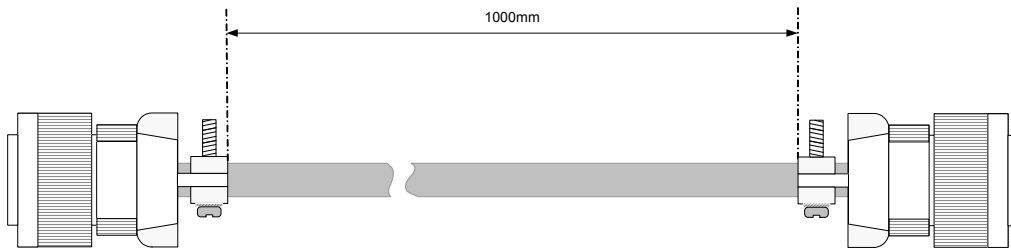


Fig. 3-2 "CBAV344.1-1" Cable

Connectors and Wiring

ES4456.1 side: ITT Cannon CA06COM-E20-29P-B (male)

PT-LABCAR side: ITT Cannon CA06COM-E20-29S-B (female)

The cables have a cross section of 1.5 mm² and are twisted pair cables.

For details of the assignment of the signals between these two ports, refer to Tab. 3-2 on page 16.

ES4456 ("Load 0...7")		PT-LABCAR ("Load8")		
Signal Name	Pin	Pin	Signal Name	Signal (LED)
Load 1_High	A	A	Inj_Ch0	Inj 1
Load 1_Low	C	C	Inj_Ch2	Inj 1
Load 2_High	B	G	Inj_Ch6	Inj 2
Load 2_Low	D	E	Inj_Ch4	Inj 2
Load 3_High	K	B	Inj_Ch1	Inj 3
Load 3_Low	E	D	Inj_Ch3	Inj 3
Load 4_High	J	H	Inj_Ch7	Inj 4
Load 4_Low	F	F	Inj_Ch5	Inj 4
Load 5_High	G	J	Inj_Ch8	Inj 5
Load 5_Low	L	L	Inj_Ch10	Inj 5
Load 6_High	H	R	Inj_Ch14	Inj 6
Load 6_Low	M	N	Inj_Ch12	Inj 6
Load 7_High	R	K	Inj_Ch9	Inj 7
Load 7_Low	N	M	Inj_Ch11	Inj 7
Load 8_High	S	S	Inj_Ch15	Inj 8
Load 8_Low	P	P	Inj_Ch13	Inj 8
n.c.	T	T	Inj_Ch16	-

Tab. 3-2 Pin Assignment of the "CBAV344.1-1" Cable (Gray) and the Extended Environment of the Signals

Order Data

Order Name	Short Name	Order Number
High current connection cable (ES4408/ES4640), Round Connector - Round Connector (17fc-17mc), 1 m	CBAV344.1-1	F-00K-106-618

Tab. 3-3 Order Data for the "CBAV344.1-1" Cable

3.2.2 "CBAV345.1-1" Cable

This cable connects the measure signals ("Meas 8-1", "Meas 8-2" or "Meas 7" connector (on the back of the ES4408.1 Load Chassis)) with the "Measure" port of a PT-LABCAR.

Note

The "CBAV345.1-1" cable must be used if the measure signals are from an ES4456.1 Load Board for 8 RB Piezo Injectors. It is not possible to use one of the three DSUB9 connectors of the CBAV343.1-1 cable which are intended for slots with an ES4450.2 Load Board for 4 RB CRS Injectors or an ES4451.3 Load Board for 4 RB GDI Injectors.

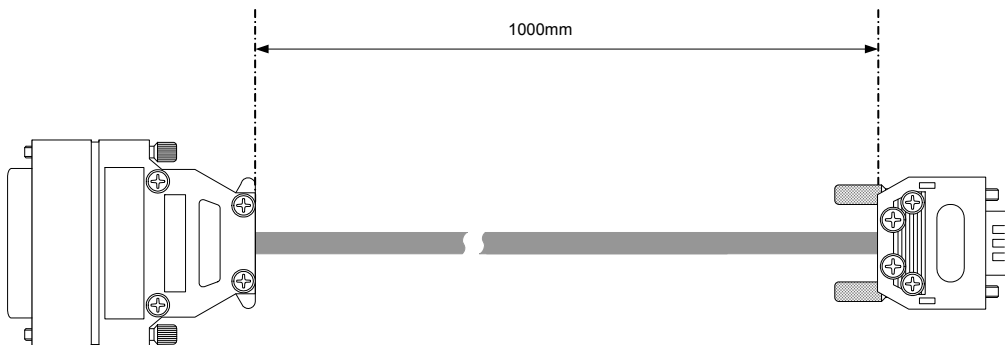


Fig. 3-3 "CBAV345.1-1" Cable

Connectors and Wiring

ES4408.1 side: DSUB9 (male)

PT-LABCAR side: DSUB25 (female)

For details of the assignment of the signals between these two ports, refer to Tab. 3-4 on page 18.

ES4408 (DSUB9)		PT-LABCAR (DSUB25)	
Slot*:Signal Name	Pin	Pin	ES1336:Signal Name
Slot n:voltage 0	1	1	In_CH0
Slot n:voltage 1	2	2	In_CH1
Slot n:voltage 2	3	3	In_CH2
Slot n:voltage 3	4	4	In_CH3
Slot n:voltage 4	5	5	In_CH4
Slot n:voltage 5	6	6	In_CH5
Slot n:voltage 6	7	7	In_CH6
Slot n:voltage 7	8	8	In_CH7
		9	n.c.
	
		24	n.c.
GND	9	25	n.c.

* n = 1,2 or 3

Tab. 3-4 Pin Assignment of the "CBAV345.1-1" Cable (Gray) and the Extended Environment of the Signals

Order Data

Order Name	Short Name	Order Number
Connection Cable, DSUB - DSUB, (25fc-9mc), 1 m	CBAV345.1-1	F-00K-106-619

Tab. 3-5 Order Data for the "CBAV345.1-1" Cable

3.3 LEDs for Status Display

There are eight LEDs on the front panel of the ES4456.1 Load Board for 8 RB Piezo Injectors which light up when the thresholds set in the software are exceeded.

 Load 0..3

 Load 4..7

Fig. 3-4 LEDs on the Front Panel

The LEDs have the following meaning:

LED	Display	Meaning
Load n	Showing green	Current over load n is greater than the threshold value set (see "LED Display" on page 11)

Tab. 3-6 Meaning of the LEDs

4 Technical Data

This chapter contains the technical data of the ES4456.1 Load Board for 8 RB Piezo Injectors.

Load Channels

Number	8
Capacity	6.2 μ F
Max. load current	16 A
Max. load voltage	250 V

Measurement channels

Accuracy of voltage measuring - level	$\pm 3\%$
Electrical strength of the outputs	± 60 V

Environmental Conditions

Operating temperature	5 °C to 35 °C (41 °F to 95 °F)
Relative humidity	0 to 95% (non-condensing)

Power Supply

Current consumption	+ 3.3 V: 100 mA + 5 V: 20 mA +12 V: 30 mA -12 V: 30 mA +24 V: 200 mA
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Dimensions

Height	3 U
Width	14 HP
Depth	340 mm

Fulfilled Standards and Norms

The module adheres to the following standards and norms:

Norm	Test
EN 55022 (Class A)	Radiation/radio interference voltage emissions
EN 61000-3-2	Harmonic current emissions
EN 61000-4-2	ESD immunity
EN 61000-4-3	Radiated RF immunity
EN 61000-4-4	Electrical fast transient/burst immunity
EN 61000-4-5	Surge immunity
EN 61000-4-6	Conducted RF immunity
EN 61000-4-11	Voltage dips, short interruptions and voltage variations immunity

The module meets the requirements of the electromagnetic emission class A of EN 55022 and is designed only for use in industrial environments in accordance with EN 61000-6-4. When using the module outside of industrial environments avoid possible radio disturbances by additional shielding measures!



WARNING!

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

5 **ETAS Contact Addresses**

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ETAS Subsidiaries and Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries WWW: www.etas.com/en/contact.php

ETAS technical support WWW: www.etas.com/en/hotlines.php

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