



## RTOS Debugger for Windows

**x86**

**x64**

- Non-intrusive Display of Windows system Resources
- Debugging Windows Device Drivers
- Debugging Several Windows Applications At Once
- Dynamic Thread Performance Measurement
- Windows Specific Evaluation of Real Time Trace Listing
- PRACTICE Functions for OS Data
- Windows related Pull-Down Menu

The TRACE32 System includes a configurable RTOS debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the Windows OS from Microsoft Corporation.

In close cooperation with Microsoft, we built a high sophisticated Windows awareness, which enables you to do a most effective debugging with the TRACE32 systems on targets running Windows Standard, supporting Windows XP, Vista, Windows7, Windows8 and Windows10.

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## RTOS Debugging in TRACE32 with Windows Standard

### Non-Intrusive Display of Windows System Resources

The TRACE32 RTOS Debugger for Windows provides display functions to show internal information. The system resources processes, threads, DLLs and kernel modules (device drivers) can be displayed. All this information is

read out of the target by only reading the memory. No target function is called, thus the current program flow isn't affected at all, and no instrumentation is necessary.

The screenshot displays the TRACE32 RTOS Debugger interface with four overlapping windows showing system resources:

- B::TASK.Process**: A list of system processes including System, smss.exe, csrss.exe, wininit.exe, services.exe, lsass.exe, svchost.exe, sppsvc.exe, and others.
- B::TASK.Process "loader"**: A detailed view of the 'loader' process, showing its magic number (85D26640), name (loader.exe), cid (07F4), session (2), and path (C:\Users\Rudi Dienstbeck\Desktop\...). It also shows the process's peb, sechase, debug path, threads (including a 'Loader' thread), and loaded modules (loader.exe, ntdll.dll, KERNEL32.DLL, KERNELBASE.dll, ADVAPI32.dll, MSVCRT.dll, etc.).
- B::TASK.Thread**: A list of threads for the 'loader' process, showing magic numbers, names (e.g., SystemSettings:0F0808, s!ui), cid, session, prio, wait, and status (e.g., Suspended, UserRequest, WrQueue).
- B::TASK.MODULE**: A list of loaded modules for the 'loader' process, showing magic numbers, names (e.g., rspndr.sys, HTTP.sys, bowser.sys), base, size, entry, and path.

Process list, detailed view of one process, thread list and module list

## Driver and/or Application Debugging

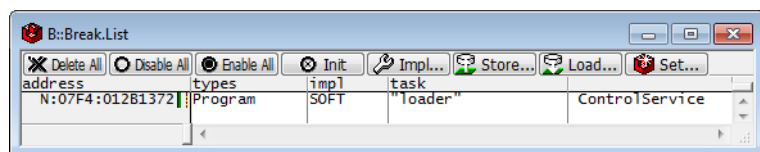
Due to the fact, that TRACE32 is a hardware debugging tool, you are able to debug anything you want, including interrupt routines, drivers, etc. TRACE32 includes a complete MMU support, providing mechanisms to inspect the target memory using virtual addresses or physical addresses and to show the translation tables.

Additionally, TRACE32 has a special MMU support for several address spaces, which allows you to debug several Windows applications (processes) at once. An internal logic provides you with an easy access to all process memory spaces. A special process detection mechanism allows to halt the application exactly on the entry point of a process, allowing you to debug your process right from main().

## Task Related Breakpoints

Any breakpoint set in the TRACE32 debugger can be set dependent to a specific task. This means, that the breakpoint will then only halt, if hit by

the specified task. This allows task related debugging even in shared code.



Breakpoint list window with thread specific breakpoint

## Thread Context Display

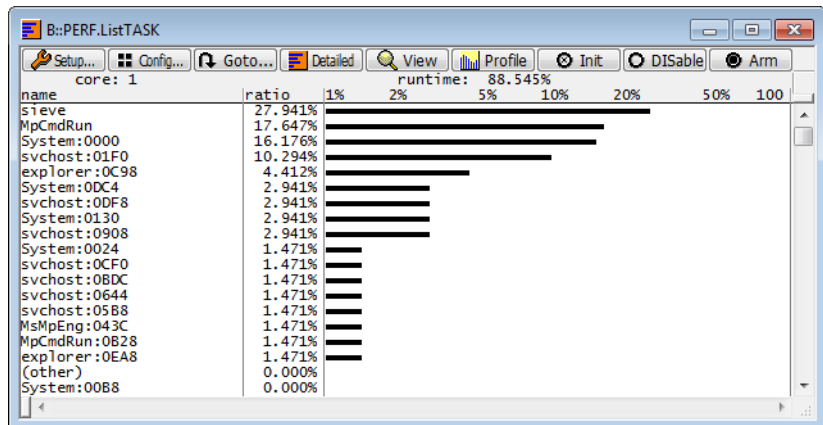
The TRACE32 RTOS debugger provides an easy way to switch the current displayed context to another task. Normally all register related windows (e.g. listing at current PC, local variables or function call stack)

are displayed related to the actual context (i.e. current executed task). You can switch to the context of another task to see all this information at the time this task was scheduled.

## Dynamic Thread Performance Measurement

While Windows is running, TRACE32 is capable of recurrently evaluating the current running thread and collecting the results. The percentage, each thread consumes of the system, is then

displayed graphically and updated permanently. The longer time you let the measurement run, the more exact are the results. This feature is available even without any hardware trace.



Performance measurement list

## Windows Specific Display of Trace Listing

The data recorded in the real time trace buffer (if available) can be displayed and interpreted specific to the operating system. The thread switches are

displayed symbolically, either exclusively or in addition to other information.

## Statistic Evaluation and Graphic Display of Thread Run Times

Out of the real time trace buffer (if available), the analyzer can calculate statistic tables of thread run times and thread switches. A graphical diagram

shows which thread was active at a specific time, giving a clear view of the behavior of the system.

## Thread Related Evaluation of Function Run Times

The statistic and graphic evaluation of function calls and function run times (if available) can be done dependant to the actual running thread. This is nec-

essary, if different threads call one single function at the same time, or if a thread switch occurs in between the function.

## PRACTICE Functions for OS Data

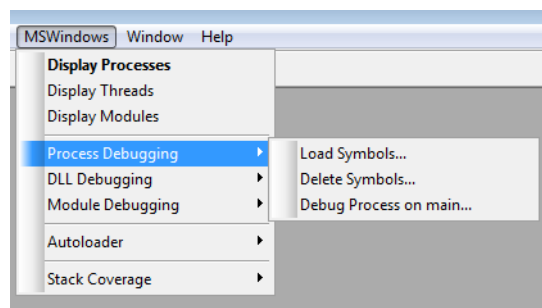
The support includes extended PRACTICE functions for process specific data. E.g. the function “task.proc.spa-

ceid (“ping”)” returns an id specifying the MMU memory area that this process uses.

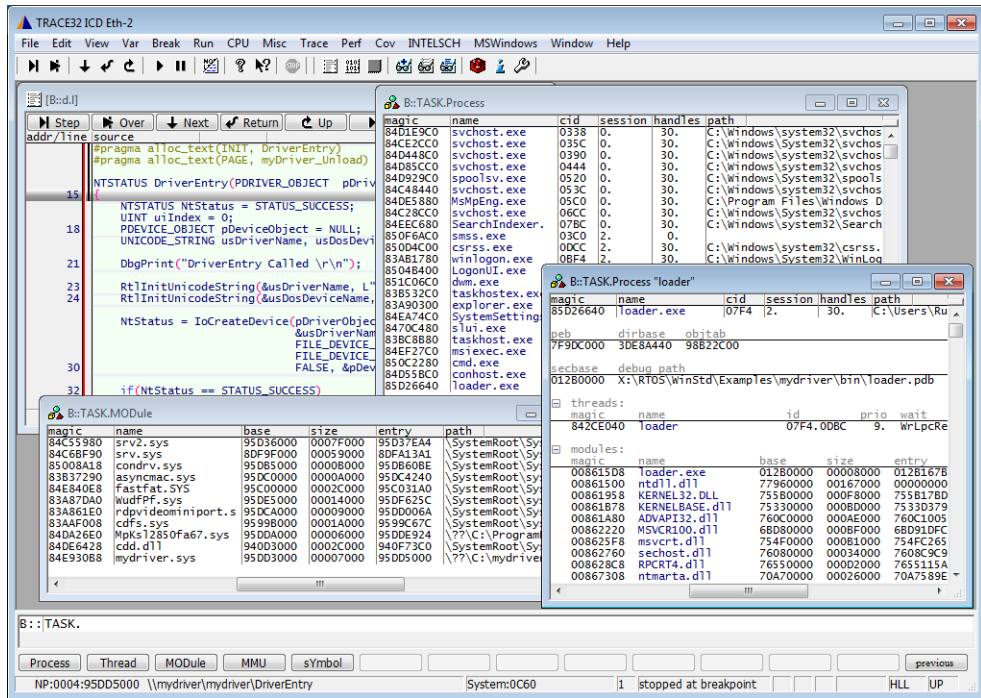
## Windows Related Pull-Down Menu

Because the menu bar of the TRACE32 user interface can be fully customized, you can create a new pull down menu, including operating system specific commands. We deliver

Windows support with an example for such specific menues, which provides fast and easy access to the Windows specific features.



Windows specific menu items



TRACE32 with source window and opened Windows specific displays

## Contact

### International Representative

#### Argentina

Anacom Eletronica Ltda.  
Mr. Rafael Sorice  
Rua Nazareth, 807, Barcelona  
BR-09551-200 São Caetano do Sul, SP  
Phone: +55 11 3422 4200  
FAX: +55 11 3422 4242  
EMAIL: rsorice@anacom.com.br

#### Australia

Embedded Logic Solutions P/L  
Mr. Ramzi Kaffan  
Suite 2, Level 3  
144 Marsden Street  
Parramatta NSW 2150  
Phone: +61 2 9687 1880  
FAX: +61 2 9687 1881  
EMAIL: sales@emlogic.com.au

#### Austria

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Belgium

Tritec Benelux B.V.  
Mr. Robbert de Voogt  
Stationspark 550  
NL-3364 DA Slidrecht  
Phone: +31 184 41 41 31  
FAX: +31 184 42 36 11  
EMAIL: software@tritec.nl

#### Brazil

Anacom Eletronica Ltda.  
Mr. Rafael Sorice  
Rua Nazareth, 807, Barcelona  
BR-09551-200 São Caetano do Sul, SP  
Phone: +55 11 3422 4200  
FAX: +55 11 3422 4242  
EMAIL: rsorice@anacom.com.br

#### Canada

Lauterbach Inc.  
Mr. Udo Zoettler  
4 Mount Royal Ave.  
USA-Marlborough, MA 01752  
Phone: +1 508 303 6812  
FAX: +1 508 303 6813  
EMAIL: info\_us@lauterbach.com

#### China Beijing

Lauterbach Technologies Co., Ltd  
Mr. Linglin He  
Beijing Office  
A3, South Lishi Road, XiCheng District  
Beijing 100037, P.R. China  
Phone: +86 10 68023502  
FAX: +86 10 68023523  
EMAIL: linglin.he@lauterbach.com

#### China Shenzhen

Lauterbach Technologies Co., Ltd  
1406/E Xihaimingzhu Building  
No.1 Taoyuan Road, Nanshan District  
Shenzhen 518052, P.R. China  
Phone: +86 755 8621 0671  
FAX: +86 755 8621 0675  
EMAIL: emily.zhang@lauterbach.com

#### China Suzhou

Lauterbach Technologies Co., Ltd  
Mr. Linglin He  
Hengyu Square, Rm 709  
No. 188, Xing Hai Street  
Suzhou, 215021 P.R. of China  
Phone: +86 512 6265 8030  
FAX: +86 512 6265 8032  
EMAIL: info\_cn@lauterbach.com

#### Czech. Republic

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Denmark

Nohau Danmark A/S  
Mr. Flemming Jensen  
Klausdalsbrovej 493  
DK-2730 Herlev  
Phone: +45 44 52 16 50  
FAX: +45 44 52 26 55  
EMAIL: info@nohau.dk

#### Egypt

Wantech Egypt  
Mr. Wagih A. Nawara  
5 Shafik Ghalie St., Suite 2  
Off Pyramids Road, Giza  
Cairo 12111  
Phone: +20 100 1251955  
FAX: +20 100 1250349  
EMAIL: sales@wantech.net.com

#### Finland

Nohau Solutions Finland  
Mr. Martti Viljainen  
Teknobulevardi 3-5  
FI-01531 Vantaa  
Phone: +358 40 546 1469  
FAX: +358 9 2517 8101  
EMAIL: sales@nohau.fi

#### France

Lauterbach S.A.R.L.  
Mr. Jean-Pierre Paradiso  
Europarc - Le Hameau B  
135 Chemin Des Bassins  
F-94035 Créteil Cedex  
Phone: +33 1 49 56 20 30  
FAX: +33 1 49 56 20 39  
EMAIL: info\_fr@lauterbach.com

#### Germany

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

#### Germany North

Lauterbach GmbH  
Mr. Klaus Hommann  
Leonhardring 5  
D-31319 Sehnde  
Phone: +49 8102 9876 174  
FAX: +49 5138 6185 3  
EMAIL: klaus.hommann@lauterbach.com

**Germany South**

Lauterbach GmbH  
 Andreas Grimm  
 Altlaufstr. 40  
 D-85635 Höhenkirchen-Siegertsbrunn  
 Phone: +49 8102 9876 190  
 FAX: +49 8102 9876 187  
 EMAIL: andreas.grimm@lauterbach.com

**Greece**

Lauterbach GmbH  
 Altlaufstr. 40  
 D-85635 Höhenkirchen-Siegertsbrunn  
 Phone: +49 8102 9876 0  
 FAX: +49 8102 9876 999  
 EMAIL: info@lauterbach.com

**Hungary**

Lauterbach GmbH  
 Altlaufstr. 40  
 D-85635 Höhenkirchen-Siegertsbrunn  
 Phone: +49 8102 9876 0  
 FAX: +49 8102 9876 999  
 EMAIL: info@lauterbach.com

**India-Bangalore**

Electro Systems Associates Pvt. Ltd.  
 Mr. G. V. Gurunatham  
 S-606, World Trade Center  
 Malleswaram West, No.26/1, Dr. Rajkumar  
 Road  
 India - Bangalore 560055  
 Phone: +91 80 67648888  
 FAX: +91 80 23475615  
 EMAIL: Trace32sales@esaindia.com

**India-Chennai**

Electro Systems Associates Pvt. Ltd.  
 Mr. D. Kannan  
 No.109/59A, Ground Floor  
 IV Avenue, Ashok Nagar  
 India - Chennai - 600 083 Tamilnadu  
 Phone: +91 044-24715750  
 FAX: +91 44 24715750  
 EMAIL: chennai@esaindia.com

**India-Delhi**

Electro Systems Associates Pvt. Ltd.  
 Mr. R.K. Bhandari  
 No. 705, 7th Floor, Laxmi Deep  
 Shivajinagar  
 India - Delhi - 110 092  
 Phone: +91 11-22549351  
 FAX:  
 EMAIL: delhi@esaindia.com

**India-Hyderabad**

Electro Systems Associates Pvt. Ltd.  
 Mr. C.V.M. Sri Ram Murthy  
 Shop No. 14, "Global Enclave"  
 Bhagyannagar Colony, Kukat pally  
 India - Hyderabad 500 072  
 Phone: +91 40-23063346  
 FAX: +91 40-23063346  
 EMAIL: hyderabad@esaindia.com

**India-Pune**

Electro Systems Associates Pvt. Ltd.  
 Mr. R K Bhandari  
 Shriram Complex, 1126/1, Model Colony  
 Shivajinagar  
 India - Pune - 411 016  
 Phone: +91 20 - 30462035 / 25663  
 FAX: +91 20-25677202  
 EMAIL: pune@esaindia.com

**Ireland**

Lauterbach Ltd.  
 Mr. Barry Lock  
 11 Basepoint Enterprise Centre  
 Stroudley Road  
 Basingstoke, Hants RG24 8UP  
 Phone: +44-1256-333-690  
 FAX: +44-1256-336-661  
 EMAIL: info\_uk@lauterbach.com

**Israel**

Itec Ltd.  
 Mr. Mauri Gottlieb  
 P.O. Box 10002  
 IL-Tel Aviv 61100  
 Phone: +972 3 6491202  
 FAX: +972 3 6497661  
 EMAIL: general@itec.co.il

**Italy**

Lauterbach Srl  
 Mr. Maurizio Menegotto  
 Via Enzo Ferrieri 12  
 I-20153 Milano  
 Phone: +39 02 45490282  
 FAX: +39 02 45490428  
 EMAIL: info\_it@lauterbach.com

**Japan**

Lauterbach Japan, Ltd.  
 Mr. Kenji Furukawa  
 3-8-8 Shinyokohama  
 Kouhoku-ku, Nisso 16th Building  
 Yokohama-shi, Japan 222-0033  
 Phone: +81 45 477 4511  
 FAX: +81 45 477 4519  
 EMAIL: info@lauterbach.co.jp

**Luxembourg**

Tritec Benelux B.V.  
 Mr. Robbert de Voogt  
 Stationspark 550  
 NL-3364 DA Sliedrecht  
 Phone: +31 184 41 41 31  
 FAX: +31 184 42 36 11  
 EMAIL: software@tritec.nl

**Malaysia**

Flash Technology  
 Mr. Teo Kian Hock  
 No 61, # 04-15 Kaki Bukit Av 1  
 Shun Li Industrial Park  
 SGP-Singapore 417943  
 Phone: +65 6749 6168  
 FAX: +65 6749 6138  
 EMAIL: teokh@flashtech.com.sg

**Mexico**

Lauterbach Inc.  
 Mr. Udo Zoettler  
 4 Mount Royal Ave.  
 USA-Marlborough, MA 01752  
 Phone: +1 508 303 6812  
 FAX: +1 508 303 6813  
 EMAIL: info\_us@lauterbach.com

**Netherlands**

Tritec Benelux B.V.  
 Mr. Robbert de Voogt  
 Stationspark 550  
 NL-3364 DA Sliedrecht  
 Phone: +31 184 41 41 31  
 FAX: +31 184 42 36 11  
 EMAIL: software@tritec.nl

**New Zealand**

Embedded Logic Solutions P/L  
 Mr. Ramzi Kattan  
 Suite 2, Level 3  
 144 Marsden Street  
 Parramatta NSW 2150  
 Phone: +61 2 9687 1880  
 FAX: +61 2 9687 1881  
 EMAIL: sales@emlogic.com.au

**Norway**

Nohau Solutions AB  
 Mr. Jörgen Nilsson  
 Derbyvägen 4  
 SE-21235 Malmö  
 Phone: +46 40 592 206  
 FAX: +46 40 592 229  
 EMAIL: sales@nohau.se

**Poland**

QUANTUM Sp. z o.o.  
 Mr. Aleksander Bil  
 ul. Jeleniogorska 6  
 54-056 Wrocław  
 Phone: +48 71 362 6356  
 FAX: +48 71 362 6357  
 EMAIL: info@quantum.com.pl



**Portugal**

Captura Electronica, SCCL  
Mr. Juan Martinez  
c/Duero, 40  
E-08031 Barcelona  
Phone: +34 93 429 5730  
FAX: +34 93 407 0778  
EMAIL: info@captura-el.com

**Romania**

Lauterbach GmbH  
Altlaufstr. 40  
D-85635 Höhenkirchen-Siegersbrunn  
Phone: +49 8102 9876 0  
FAX: +49 8102 9876 999  
EMAIL: info@lauterbach.com

**Russia**

RTSoft  
Mr. Alexey Isaev  
Nikitinskaya 3  
RUS-105037 Moscow  
Phone: +7 495 742 6828  
FAX: +7 495 742 6829  
EMAIL: sales@rtsoft.msk.ru

**Singapore**

Flash Technology  
Mr. Teo Kian Hock  
No 61, # 04-15 Kaki Bukit Av 1  
Shun Li Industrial Park  
SGP-Singapore 417943  
Phone: +65 6749 6168  
FAX: +65 6749 6138  
EMAIL: teokh@flashtech.com.sg

**South Korea, Pangyo**

MDS Technology Co., Ltd.  
Mr. Sangheon Lee  
3FL, Hancom Tower  
49, Daewangpangyo-ro 644, Bundang-gu  
Seongnam-si, Gyeonggi-do, 463-400, ROK  
Phone: +82-31-627-3000  
FAX: +82-31-627-3100  
EMAIL: trace32@mdstec.com

**Spain**

Captura Electronica, SCCL  
Mr. Juan Martinez  
c/Duero, 40  
E-08031 Barcelona  
Phone: +34 93 429 5730  
FAX: +34 93 407 0778  
EMAIL: info@captura-el.com

**Sweden**

Nohau Solutions AB  
Mr. Jörgen Nilsson  
Derbyvägen 4  
SE-21235 Malmö  
Phone: +46 40 592 206  
FAX: +46 40 592 229  
EMAIL: sales@nohau.se

**Switzerland**

JDT Jberg DatenTechnik  
Mr. Andreas Jberg  
Zimmereistrasse 2  
CH-5734 Reinach AG  
Phone: +41 62 7710 886  
FAX:  
EMAIL: Andreas.Jberg@jdt.ch

**Taiwan**

Superlink Technology Corp.  
Mr. Sulin Huang  
3F-8, No. 77, Sec. 1, Xintaiwu Rd., Xizhi District,  
New Taipei City 22101, Taiwan, R.O.C.  
Phone: +886 2 26983456  
FAX: +886 2 26983535  
EMAIL: info.stc@superlink.com.tw

**Tunisia**

Lauterbach Consulting S.A.R.L.  
Mr. Khaled Jmal  
Route El Ain Km 3.5  
TN-3062 Sfax  
Phone: +216-74611730  
FAX: +216-74611723  
EMAIL: info\_tn@lauterbach.com

**Turkey-1**

Tektronik Muh. ve Tic. A.S.  
Mr. Hakan Yavuz  
CyberPlaza B-Blok, 702B  
Bilkent  
06800 Ankara  
Phone: +90 312 437 3000  
FAX: +90 312 437 1616  
EMAIL: info@tektronik.com.tr

**Turkey-2**

G3TEK Embedded Technologies Ltd.  
Mr. Celal Aygun  
Ilkyerlesim Mah. 445.  
Sok. No: 48  
06370 Batikent/Ankara  
Phone: +90 312 3324769  
FAX: +90 312 3324769  
EMAIL: info@g3tek.com

**UK**

Lauterbach Ltd.  
Mr. Barry Lock  
11 Basepoint Enterprise Centre  
Stroudley Rd  
Basingstoke, Hants RG24 8UP  
Phone: +44 1256 333 690  
FAX: +44 1256 350 301  
EMAIL: info\_uk@lauterbach.com

**USA East**

Lauterbach Inc.  
Mr. Udo Zoettler  
4 Mount Royal Ave.  
USA-Marlborough, MA 01752  
Phone: +1 508 303 6812  
FAX: +1 508 303 6813  
EMAIL: info\_us@lauterbach.com

**USA West**

Lauterbach Inc.  
Mr. Bob Kupyn  
1111 Main Street, Suite 620  
USA-Vancouver, WA, 98660  
Phone: +1 503 524 2222  
FAX: +1 503 524 2223  
EMAIL: bob.kupyn@lauterbach.com

---

## Additional Information

<http://www.lauterbach.com>

### Lauterbach GmbH

Altlaufstr. 40  
D-85635 Höhenkirchen-Siegertsbrunn  
Tel. ++49 8102 9876-0 FAX -999  
info@lauterbach.com  
http://www.lauterbach.de

### Lauterbach Inc.

4 Mount Royal Ave.  
Marlboro MA 01752  
Phone (508) 303 6812 FAX (508) 303 6813  
info\_us@lauterbach.com  
http://www.us.lauterbach.com

### Lauterbach Ltd.

11 Basepoint Enterprise Ctre Stroudley Road  
Basingstoke, Hants RG24 8UP  
Phone ++44-1256-333-690 FAX -661  
info\_uk@lauterbach.com  
http://www.lauterbach.co.uk

### Lauterbach S.A.R.L.

135 Chemin Des Bassins  
F-94035 Créteil Cedex  
Phone ++33-149-562-030  
FAX ++33-149-562-039  
info\_fr@lauterbach.com  
http://www.lauterbach.fr

### Lauterbach Japan, Ltd.

3-9-5 Shinyokohama Kouhoku-ku  
Yokohama-shi Japan 222-0033  
Phone ++81-45-477-4511 FAX -4519  
info\_j@lauterbach.com  
http://www.lauterbach.co.jp

### Lauterbach s.r.l.

Lauterbach s.r.l.  
Via Enzo Ferrieri 12  
I-20153 Milano  
Phone ++39 02 45490282  
FAX ++39 02 45490428  
info\_it@lauterbach.it  
http://www.lauterbach.it

### Suzhou Lauterbach Consulting Co.,Ltd.

Room 1605, Xing Hai International Square  
No.200, Xing Hai Street  
Suzhou, 215021 PR of China  
Phone: 0086-512 6265 8030  
FAX: 0086-512 6265 8032  
info\_cn@lauterbach.cn  
http://www.lauterbach.cn

---

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