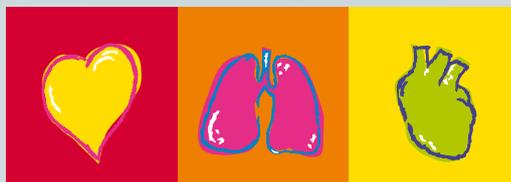




# SCHILLER's medilog® Holter system

ECG analysis that meets highest demands

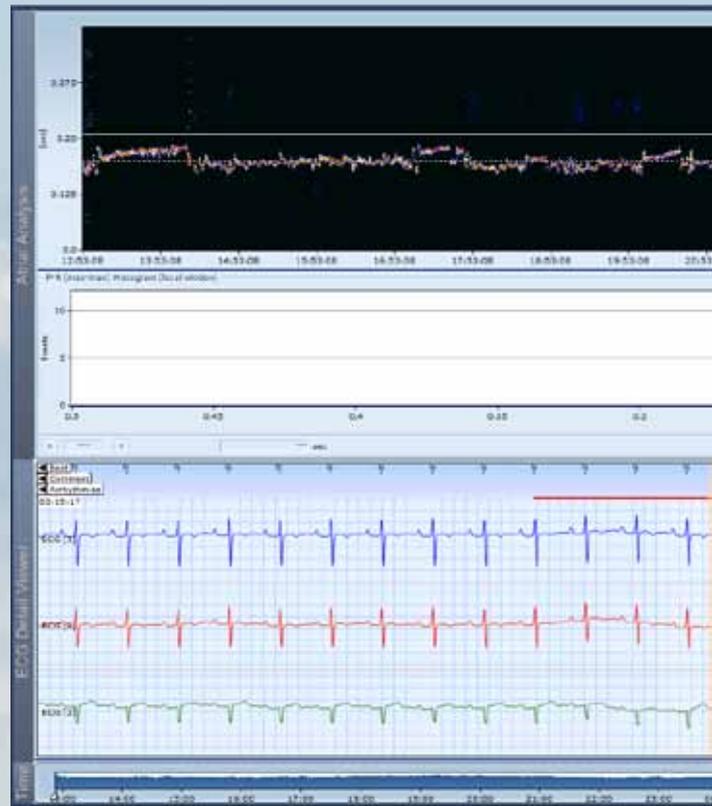


**SCHILLER**  
**medilog®**

# medilog®DARWIN 2

## ... the unique diagnostic tool!

With medilog®DARWIN 2, you can now process a routine Holter ECG quicker and more accurately. In addition to the detection of all cardiopathological events, medilog®DARWIN 2 provides a comprehensive analysis of the human being as a unit. Functional atrial diagnostics, apnoea diagnostics and the determination of the quality of life are just some of the exceptionally useful features that medilog®DARWIN 2 uses to filter information from a Holter recording without any additional sensors.



### 99.9 % accuracy

Every tenth of a percent of accuracy means approx. 100 beats more that are automatically detected correctly – which for you means 100 interactions less to post-process a 24-hour recording. For the medilog®ADAPT algorithm, we were able to increase the accuracy to 99.9 % <sup>(1)</sup>.

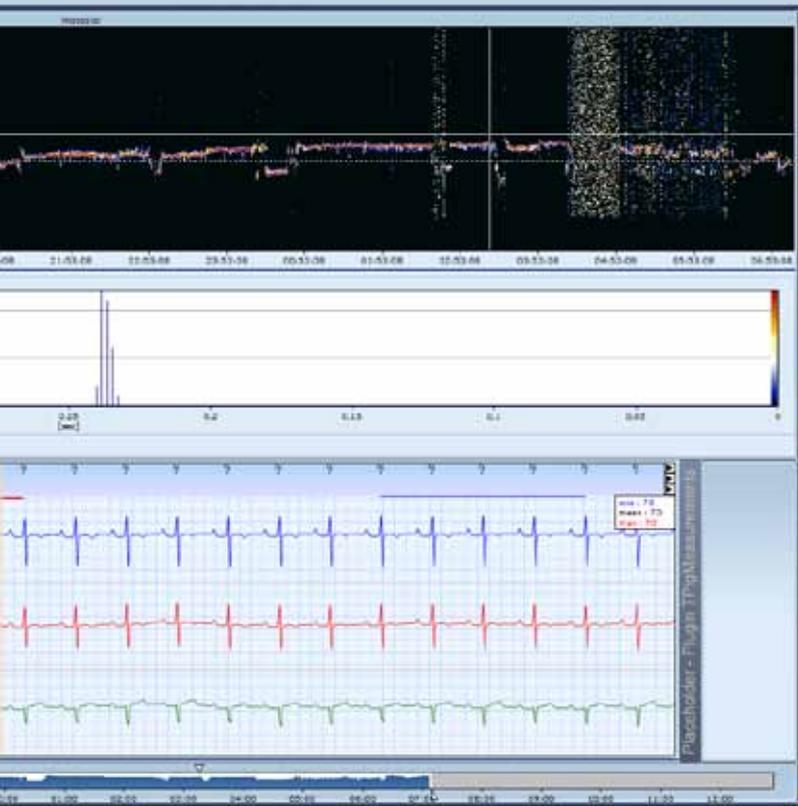
Moreover, all recorded channels are analysed and episodes that are too noisy are automatically excluded. This results in an improved analysis of a «true» Holter recording and saves you a large amount of time.

### Just three mouse clicks away from a printout

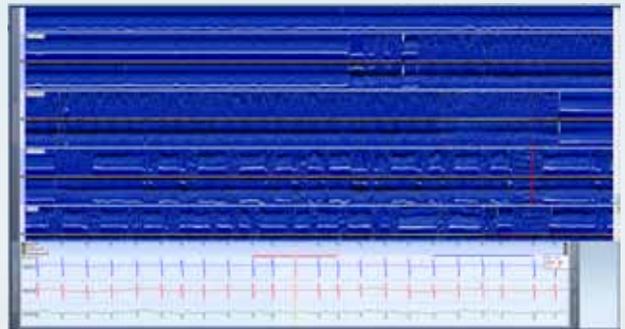
Thanks to medilog®DARWIN 2's accuracy, it just takes a few seconds to obtain a comprehensive Holter report. You can load, analyse and assess a recording and create a report with only a few clicks, supported by the user interface that is optimised for rapid processing. The automatic analysis of a 24-hour Holter recording takes less than 90 seconds.

### Adapting to your needs

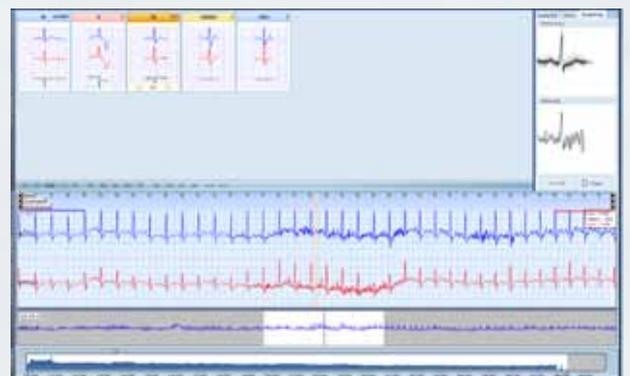
Each medical practice has its own work routine. We believe that the user should not adapt to the software, but that the software should adapt to the user; we have therefore developed medilog®DARWIN 2 in a way so that it can be customised to your habits and routines. Freely configurable reports, adjustable screens and workflows are just some of the features which you can benefit from. We take the comments from thousands of medilog®DARWIN users from all over the world very seriously and are continuously developing the system.



Specific PR-trend display for fast and accurate atrial analysis



ECHOView® saves precious time during arrhythmia analysis

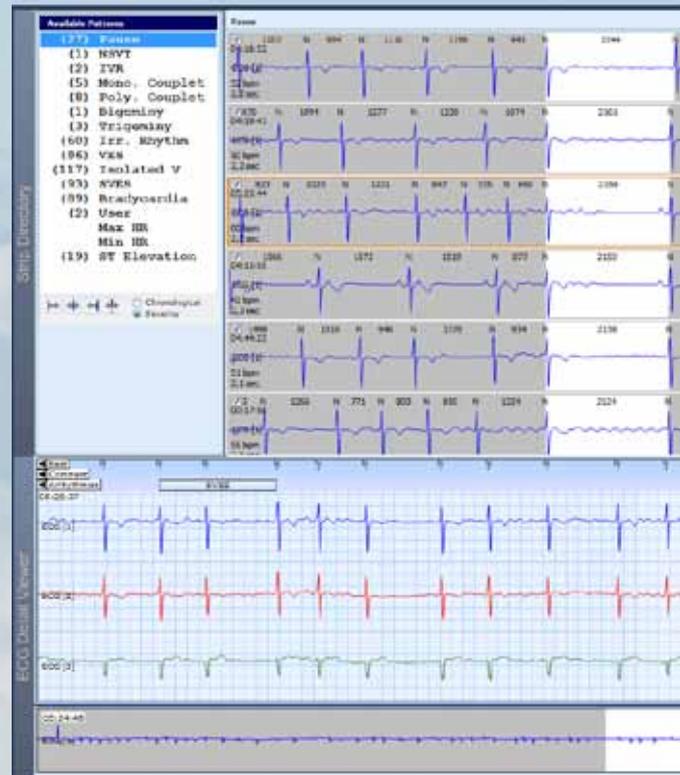


Workflows... adjustable screen presentations

<sup>(1)</sup> Obtained in comparison with the American Heart Association database (AHA; QRS Se: 99.9 %, QRS +P: 99.9 %, VES Se: 98.0 %, VES +P: 97.5 %) and the MIT-BIH arrhythmia database (MIT; QRS Se: 99.9 %, QRS +P: 99.9 %, VES Se: 96.4 %, VES +P: 93.7 %) according to the ANSI/AAMI standards EC38:1998 and EC57:1998.

# medilog®DARWIN 2

Feature	medilog®DARWIN 2 full version	medilog®DARWIN 2 Scanlab
ADAPT™	99,9% accuracy	99,9% accuracy
Workflows	Drop-down menu for the selection of workflows	Presentation adjustable but fixed workflow
ST Analysis	•	•
QT Analysis	•	•
Pacemaker Analysis	•	•
HRV Analysis	Time and frequency domain	Only time domain
Atrial Analysis	•	
Apnoea Analysis	•	
ECHOView®	•	
Arrhythmia Overview	•	
Time adjustment	•	
Reports	Holter reports as well as atrial, apnoea and HRV reports	Various Holter reports
HL7 interface	optional	optional



## Revolutionary atrial diagnostics

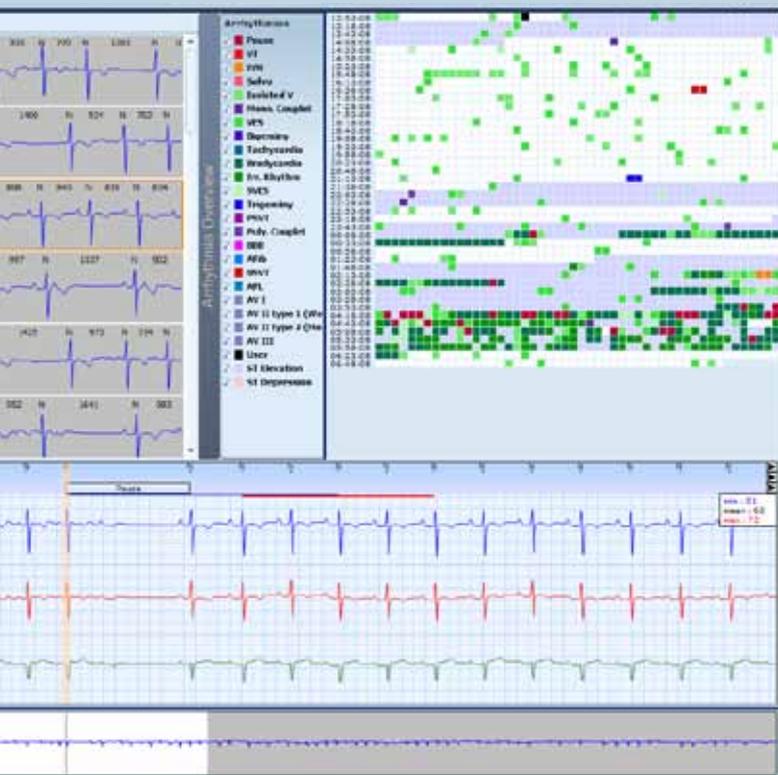
Thanks to the extremely high sampling frequency used in our medilog®AR recorders, the P waves are detected in real time. medilog®DARWIN 2 processes this information and presents the atrial activity in unique graphs such as ECHOView® and the P-R trend. These tools help detecting cardiac diseases like A-V block, atrial flutter and atrial fibrillation very quickly and accurately.

## Suitable for any application...

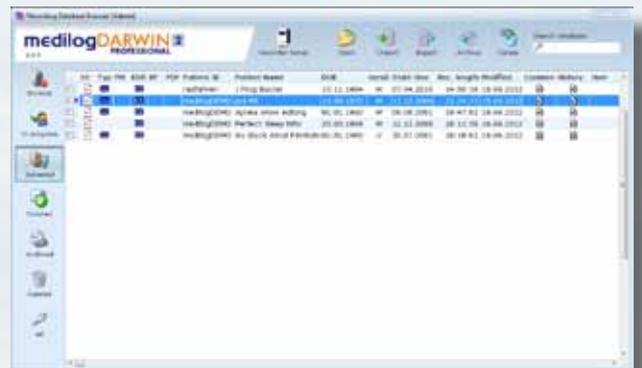
In combination with our ECG recorders, medilog®DARWIN 2 delivers constant high-quality results for a wide variety of applications, ranging from laboratories with a high throughput (medilog®DARWIN 2 Scanlab) to complex research problems.

## Fully flexible...

medilog®DARWIN 2 can be operated with one or two monitors to match your work routine. It can easily be integrated in networks and is compatible with a multitude of the latest high-speed printers. Patient data is safely stored on DVD (Windows 7), network drive or removable hard disk.



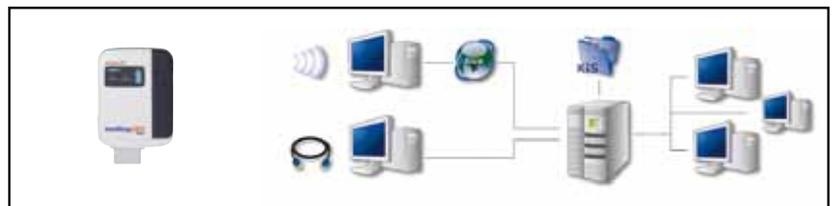
The combination of strip directory and arrhythmia overview provides you with the most important cardiological results



Compatible with hospital information systems based on HL7

### Recommended minimal system requirements (standard)

- Intel® Core™2 CPU with 2 GHz or similar
- 20 GB hard disk
- 1 GB RAM
- Minimal monitor resolution 1280 x 800 (recommended 1920 x 1080)
- TCP/IP-compatible network hardware
- Available USB interface for the software key
- Compact Flash Card reader for medilog®AR4 and medilog®AR12
- DVD/RW drive
- MS Windows™ 2000, XP or Vista



medilog®DARWIN 2 allows you to work at different reading and analysis stations within the network. The applications range from interconnection of several PCs in a practice, to larger groups in hospitals and to the integration of remote reading and analysis stations via Internet. medilog®DARWIN 2 blocks patient data that is edited by another user and provides information on who is editing which data. In addition, our proven data management system SEMA-200 is fully compatible with medilog®DARWIN 2.

# medilog®DARWIN 2 Apnoea

## True apnoea screening

- Apnoea pre-screening
- Therapy assessment
- Assessment/review of sleep quality and quality of life
- Synchronised presentation of ECG waveforms and respiration curves

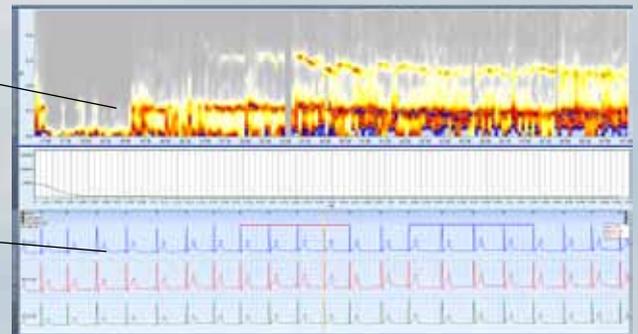
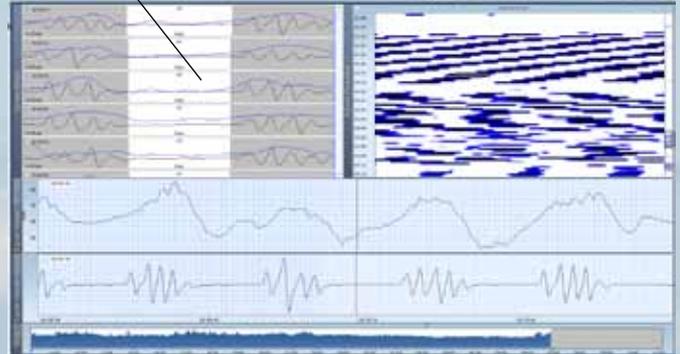
The unique tool to quickly detect apnoea and assess sleep quality. Thanks to the high sampling frequency and resolution (4096 Hz and 16 bit), the recorder is able to register the respiration curve in addition to the ECG.

This is done by means of the recognised EDR method (ECG-Derived Respiration). The apnoea index calculated from this data provides you with information on if and to what extent the patient has had nightly apnoea phases.

**Assess the sleep quality by use of the unique HRV frequency spectrogram. This spectrogram shows the sympathetic and vagal activity.**

**Did the interruption cause apnoea or did the apnoea cause the interruption? The integrated ECG provides both information synchronously.**

The clear overview gives you all apnoea events at a glance, sorted by length.



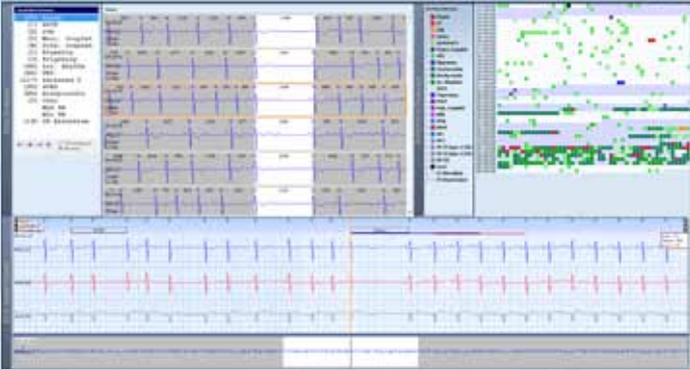
## Apnoea pre-screening at home. Reducing costs through prevention.

Just some of the reasons for using medilog®DARWIN 2 Apnoea... In around 30 % of all patients that undergo a polysomnography, no apnoea is detected. However, it is very often these patients who suffer from cardiolo-gical diseases. And yet it is not un-common for cardiolo-gical diseases to occur in combination with apnoea. Apnoeas are often chronic and, if left untreated, can lead to enormous financial burdens for the health care system due to high follow-up costs.

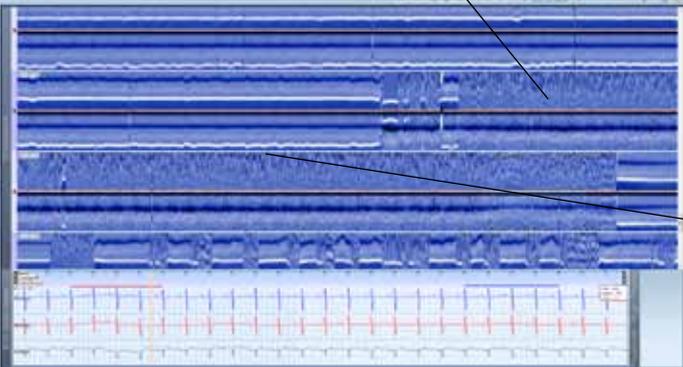
medilog®DARWIN 2 Apnoea offers you a fast, reliable and inexpensive screening tool to exclude apnoea in your patients.

# medilog® DARWIN 2 Atrial

In the atrial analysis window, A-V block patterns and other critical anomalies are presented simply and clearly to get a detailed overview at a glance.



ECHOView® presents more than 15,000 beats in a compressed format and allows the quickly check large ECG segments for incorrectly located P and T waves.



## True atrial screening

- Reducing costs through early detection of atrial fibrillation and atrial flutter
- Preliminary assessment of the need for further invasive diagnosis, therapy or surgery
- Even more effective patient monitoring following surgery or ablation

The unique diagnostic package that allows you to specifically search for atrial anomalies.

Thanks to a sampling frequency of 8000 times/sec., our medilog®AR recorders detect and mark P and T waves online and in real time.

In combination with the unique medilog®DARWIN 2 features such as ECHOView®, you are now able to distinguish between atrial fibrillation, atrial flutter and A-V block patterns at a glance.

You no longer need time-consuming beat or arrhythmia analyses to detect all atrial events.

When you click on an unusual ECG segment in the ECHOView® window, the ECG waveforms are displayed and you can check them for indications of atrial fibrillation or atrial flutter.

## The ageing population

Just one reason why medilog® DARWIN 2 Atrial is so important... Atrial fibrillation (AF) is the most common form of irregular cardiac rhythm and affects approx. 2 % of all people. The risk of such disease increases with age and the number of people affected is going to double over the coming 20 years. Atrial fibrillation is believed to account for one third of all hospital admissions for cardiac rhythm problems and it is believed to cause around 15 % of all strokes. Early diagnosis and treatment could reduce the enormous costs for the

health care system for emergency treatment, and increase the patient's chance of survival.

medilog®DARWIN 2 Atrial puts a reliable, affordable and non-invasive screening device in the hands of people that can make a difference.

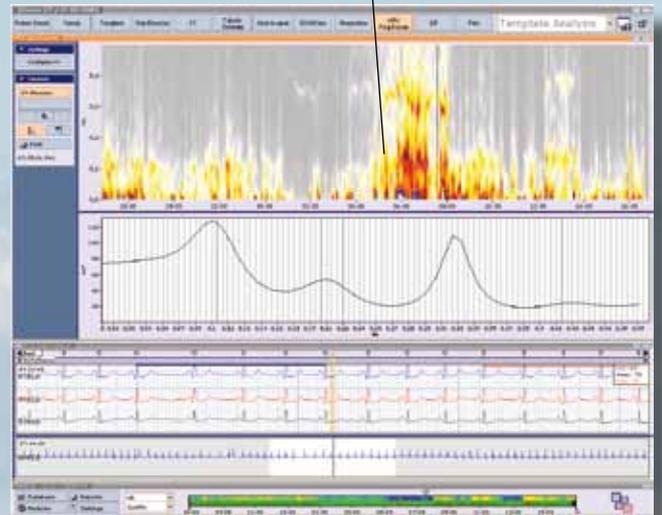
# medilog®DARWIN 2 HRV

## True HRV screening

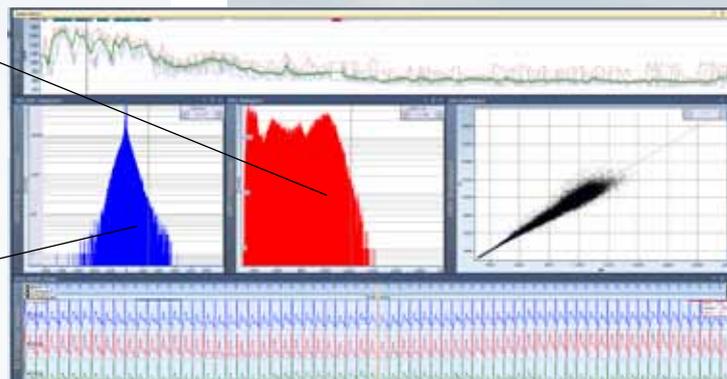
- HRV screening for all patients with high blood pressure or diabetes
- Prevention of «burn-out syndrome» or diabetic neuropathy
- Assessment of sleep quality
- MatLab and many additional export possibilities
- Detection of «burn-out syndrome»

Comprehensive HRV analysis in graphic and tabular form, conducted in the time and frequency domain.

Extensive export options for HRV research purposes.



Unique „Fire of Life™“ spectrogram serving as indicator for sleep quality and quality of life



## Heart rate variability – an underestimated indicator

A traditional Holter recording does not take into account the heart rate variability (HRV), or just some parameters that are delivered by an HRV analysis. Yet the HRV is essential for the assessment of the autonomic nervous system and complements a standard Holter diagnosis.

This is confirmed by numerous publications in this field. Moreover, Chinese physicians knew already 3000 years ago that a too regular pulse poses a deadly risk to the patient. Many Holter systems offer an HRV analysis; however,

only very few systems deliver the precision required for a reliable analysis. medilog®DARWIN 2 provides you with the best beat-to-beat analysis that a non-invasive measuring method can offer. It is therefore the ideal screening tool to assess the autonomic nervous system and to complement a Holter diagnosis.

A unique tool to obtain a further-reaching HRV analysis and to assess the sleep quality and quality of life.

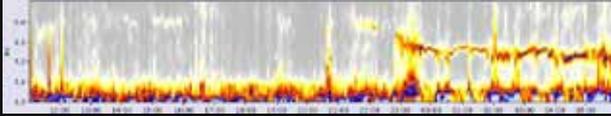
Thanks to the high sampling frequency and resolution (8000 Hz), the R peak is measured very accurately. The exact position of R is then stored separately

and is used in the HRV analysis. The software performs the HRV analysis in the time and frequency domain. The coloured spectrogram is a new and easy method to assess the sleep quality and level of stress.

For research purposes, all files can be exported as MatLab, ISHNE or in MS EXCEL.

# Fire of Life™

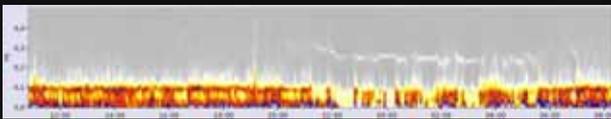
## NORMAL REGULATION and recovery during the night



### Example 1:

Manager, 52 years old, deep sleep, good recovery, high working capacity.

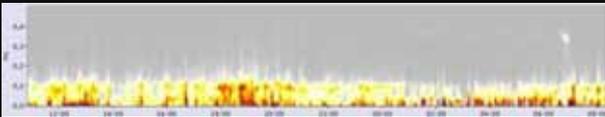
## REDUCED REGULATION – overloaded, only little recovery at night



### Example 2:

Manager, 48 years old, poor sleep, tired and low working capacity.

## BURN-OUT SYNDROME – heavily overloaded, incapable of working



### Example 3:

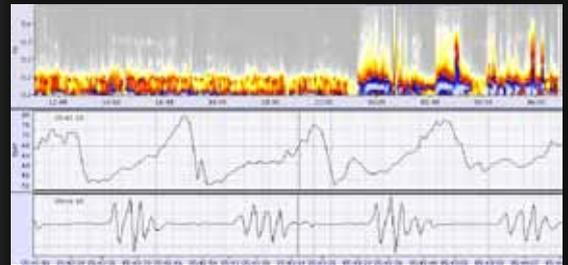
Manual worker, 49 years old, very poor sleep, always tired, incapable of working

## Fire of Life™ and Heart Rate Variability (HRV)

### HRV

Heart rate variability (HRV) is the variation between consecutive heartbeats and is affected by several factors such as age, stress, cardiac diseases and state of health. The HRV decreases with age and is lower among people who lead an inactive lifestyle and those who suffer from medical conditions such as coronary heart disease, hypertension or diabetic neuropathy. Since the heart is the centre of many regulating systems, the heart rate is influenced by various body functions. The heart rate is continuously adjusted by the autonomic nervous system, the controlling network of the human body, in response to internal and external triggers such as physical activation, stress, relaxation, recovery and sleep.

## APNOEA PRE-SCREENING – and analysis of the sleep quality



### Example 4:

- Team leader, 57 years old, poor sleep quality, always tired, falls asleep during the day
- Heart rate – saw-tooth pattern at night, characteristic of people with sleep apnoea
- Respiration curve – periods without respiration, again an indication of sleep apnoea

## Fire of Life™

By use of the SCHILLER medilog® ECG recorders and the new «Fire of Life» software, the HRV is analysed and displayed in a new way to help judge the function of the autonomic nervous system. «Fire of Life» helps you to see how well the human body reacts to stress and recovery. If repeated, it indicates if therapeutic actions or lifestyle changes are successful in reducing stress and improving recovery. This opens up completely new diagnostic possibilities.

## New perspectives in HRV measurement

The HRV is an important value to assess the autonomic nervous system. A low HRV can indicate an increased mortality risk. However, it is important to ensure that the HRV measurement is reliable and not influenced by inaccuracies caused by the equipment. SCHILLER medilog®DARWIN 2 HRV provides the best beat-to-beat measurement available non-invasively and is an ideal screening tool to detect autonomic failure, syncopes and neuropathy and to conduct detailed re-

search into HRV and associated conditions.

SCHILLER medilog®DARWIN 2 HRV is part of the range of medilog products which have been used for more than 30 years to record ECGs and to diagnose arrhythmias. The latest range of ECG and HRV recorders and software now puts a reliable, affordable and non-invasive screening device and research tool in your hands – so that you can make that difference in treatment and cost.

# Holter/software overview



## medilog® Holter Recorder Feature Matrix

Feature	medilog® AR12 plus	medilog® FD12 plus	medilog® AR4 plus	medilog® FD5 plus
PureECG™	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>
ST / QT / pacemaker analysis	yes	yes	yes	yes
HRV analysis	High resolution <sup>(1)</sup>	High resolution <sup>(1)</sup>	high resolution <sup>(1)</sup>	yes <sup>(3)</sup>
Fire of Life™ & autonomic diff.	yes	yes	yes	yes <sup>(3)</sup>
Apnoea detection	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	no	no
QRS detection	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	no
P wave detection & atrial analysis	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	<b>yes</b> <sup>(1)</sup>	no
Motion detection and analysis	yes	yes	yes	no
Wireless interface	BlueTooth™	BlueTooth™	no	no
SpO <sub>2</sub> sensor	optional	optional	no	no
12 channels	no	yes	no	no
7 days	no	yes <sup>(4)</sup>	no	no

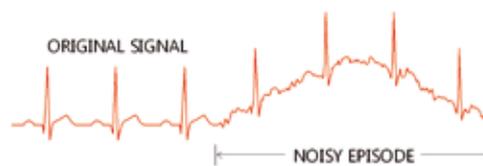
<sup>(1)</sup> items in bold letters emphasize the characteristic features of the specific device

<sup>(2)</sup> 1000 Hz sampling rate recommended to obtain comparable results

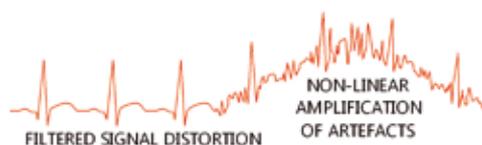
<sup>(3)</sup> accuracy of results is limited due to lower storage rate

<sup>(4)</sup> The FD12 plus is a 12-channel long-term recorder; when the AF/AFL configuration is selected, 3 ECG channels can be recorded for 7 days without having to change the battery.

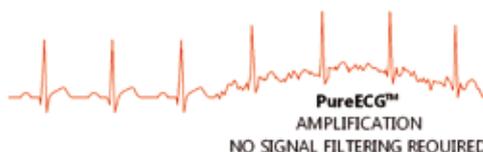
The limitations a mobile design entails on amplifier circuits in modern digital long-term ECG recorders challenge a compromise between quality of operation and power consumption. Until now! With the medilog® plus recorder series, SCHILLER is introducing the new PureECG™ technology which sets a new standard for both signal quality and power consumption!



During a 24-hour or even longer ECG recording, noisy episodes due to muscle artefacts and/or degrading electrodes are unavoidable.



A conventional Holter recorder tends to amplify noise much more than the actual signal we are interested in. To compensate, the signal often is heavily filtered, which further distorts the ECG traces.



With the new PureECG™ technology in our medilog® plus recorder series, we have broken up this vicious circle. Although we were able to reduce the power consumption dramatically, the recorded signal is remarkably clearer and matches the original signal.



**MT-101 /  
MT-101 nano**

no

yes

yes <sup>(2)</sup>

yes <sup>(2)</sup>

no

no

no

no

no

no

no

no

**medilog®FD5 plus, medilog®AR4 plus, medilog®AR12 plus  
recorder specifications**

Dimensions (h x w x l) in mm	76 x 60 x 25
Weight without battery	115 g
Electrodes	3, 5 or 7
ECG channels	1 or 3
Sampling frequency	3 x 8.000 Hz
Resolution	15.5 bit
Batteries	1 x 1.5 V (AAA)
Recording duration	max. 80 hours
Waterproof	IPX4
Automated cable test	Impedance

**medilog®FD12 plus recorder specifications**

Dimensions (h x w x l) in mm	70 x 85 x 25
Weight without battery	165 g
Electrodes	7 or 10
ECG channels	1, 3 or 12
Sampling frequency	3 x 8.000 Hz
Resolution	15.5 bit
Batteries	1 x 1.5 V (AA)
Recording duration	max. 72 hours (168 hours <sup>5</sup> )
Automated cable test	Impedance



**Microvit MT-101 recorder specifications**

Dimensions (h x w x l) in mm	90 x 60 x 20
Weight incl. batteries	110 g
Electrodes	4 or 6
ECG channels	2 or 3
Sampling frequency	1000 Hz
Resolution	12 bit
Batteries	2 x 1.5v AA
Max. recording duration	72 hours



**Microvit MT-101 nano recorder specifications**

Dimensions (h x w x l) in mm	62 x 58 x 18
Weight incl. accumulator	66 g
Electrodes	5
ECG channels	2 or 3
Sampling frequency	1000 Hz
Resolution	12 bit
Accumulator	1.37 V Li-Ion 800 mA
Max. recording duration	72 hours



**Asia**  
**SCHILLER Asia-Pacific / Malaysia**  
52200 Kuala Lumpur, Malaysia  
Phone +603 6272 3033  
Fax +603 6272 2030  
sales@schiller.com.my  
www.schiller-asia.com



**Austria**  
**SCHILLER Handelsgesellschaft m.b.H.**  
A-4040 Linz  
Phone +43 732 709 90  
Fax +43 732 757 000  
sales@schiller.at  
www.schiller.at



**China**  
**SCHILLER Int'l Trading (Shanghai) Co. Ltd.**  
200335 Shanghai, China  
Phone +86-21-62099627  
Fax + 86-21-62099623  
sales@schiller.com.my  
www.schiller.cn



**France**  
**SCHILLER Médical S.A.S.**  
F-67162 Wissembourg/Cedex  
Phone +33 3 88 63 36 00  
Fax +33 3 88 94 12 82  
info@schiller.fr  
www.schiller-medical.com



**France (distribution France)**  
**SCHILLER France S.A.S.**  
F-77600 Bussy St Georges  
Phone +33 1 64 66 50 00  
Fax +33 1 64 66 50 10  
infoschiller@schiller-france.fr  
www.schiller-france.com



**Germany**  
**SCHILLER Medizintechnik GmbH**  
D-85521 Ottobrunn  
Phone +49 89 62 99 81-0  
Fax +49 89 609 50 90  
info@schillermed.de  
www.schillermed.de



**Hungary**  
**SCHILLER Diamed Ltd.**  
H-1141 Budapest  
Phone +36 (1) 383-4780 / 460-9491  
Fax +36 (1) 383-4778  
sales@schiller.at  
www.schiller-hungary.hu



**India**  
**SCHILLER Healthcare India Pvt. Ltd.**  
Mumbai - 400 001, India  
Phone +91 22 6152 3333/ 2920 9141  
Fax +91 22 2920 9142  
sales@schillerindia.com  
www.schillerindia.com



**Japan**  
**SCHILLER Japan, Ltd.**  
Hiroshima 734-8551  
Phone +81 82 250 2055  
Fax +81 82 253 1713  
koji.maekawa@schiller.jp  
www.schiller.jp



**Poland**  
**SCHILLER Poland Sp. z o.o.**  
PL-02-729 Warszawa  
Phone +48 22 8432089  
Fax +48 22 8432089  
schiller@schiller.pl  
www.schiller.pl



**Russia & C.I.S.**  
**SCHILLER AG Rep. office**  
125124 Moscow, Russia  
Phone +7 (495) 970 11 33  
Fax +7 (495) 970 11 33  
mail@schiller-ag.com  
www.schiller-cis.com



**Spain**  
**SCHILLER ESPAÑA, S.A.**  
E-28230-Las Rozas/Madrid  
Phone +34 91 713 01 76  
Fax +34 91 355 79 33  
schiller@schiller.es  
www.schiller.es



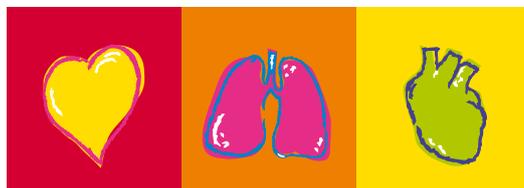
**Switzerland**  
**SCHILLER-Reomed AG**  
CH-8953 Dietikon  
Phone +41 44 744 30 00  
Fax +41 44 740 37 10  
sales@schiller-reomed.ch  
www.schiller-reomed.ch



**Turkey**  
**SCHILLER TÜRKIYE**  
Okmeydani-Sisli - Istanbul  
Phone +90 212 210 8681 (pbx)  
Fax +90 212 210 8684  
sales@schiller-turkiye.com  
www.schiller-turkiye.com



**USA**  
**SCHILLER America Inc.**  
Doral, Florida 33172  
Phone +1 786 845 0620  
Fax +1 786 845 06 02  
sales@schilleramerica.com  
www.schilleramerica.com



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