

# Speed Extractor



# New dimensions in high pressure extraction

**The new SpeedExtractor is revolutionising pressurized solvent extraction: 6 samples in only 20 minutes, and that with minimum solvent consumption. Economical and ecological advantages combined, what more do you want?**

## Results conveniently and quickly

Thanks to high temperatures and pressures, solvent extraction can be undertaken very efficiently in a short time. Nevertheless, it is still often the time limiting factor during sequential sample processing.

The unique concept of the new SpeedExtractor achieves a new time dimension. Up to 6 samples can be extracted not one after the other, but at the same time in completely separate cells. The result: 6 extracts in only 20 minutes!

The SpeedExtractor also makes day-to-day work easier. The automatic sealing of the extraction cells, the easy operation and the flexible process parameters make the work not only convenient, but also safe and of versatile application.

## The advantages at a glance

- Unmatched speed: 6 samples in 20 minutes, 96 samples in a working day
- Low running costs: 5–60 ml solvent per sample
- High level of automation reduces the number of user actions and increases safety
- Integrated flushing process into a separate waste vessel makes cleaning easier

- Unique flexibility in relation to volume (10–120 ml cells; 60, 220, 240 ml round-bottom bottles, flat-bottom vials, and 150 ml vessels with appendix) and type of sample thanks to flexible process parameters (30–200 °C, 50–150 bar)

## An overview of the E-916 and E-914

The SpeedExtractor is available in two configurations: E-916 and E-914. They differ in the size of the extraction cells (E-916 up to 40 ml, E-914 up to 120 ml) and therefore in the number of samples that can be processed simultaneously.

	E-916	E-914
<b>Number of samples</b>	6	4
<b>Extraction cells</b>	10, 20, 40 ml	40, 80, 120 ml
<b>Collection bottles</b>	60, 150, 220, 240 ml	
<b>Mixer</b>	2 or 4 solvents	



# 10 unique features

The SpeedExtractor makes day-to-day work in the laboratory easier due to unmatched ease of use and efficiency, is of versatile and flexible application and ensures a high level of safety without restrictions.

## Ease of use

The SpeedExtractor is easy and intuitive to operate. This feature minimises training effort and eliminates potential sources of error.



### Convenient and safe

The extraction cells are automatically sealed using a unique sealing principle. This feature saves time-consuming preparation and increases safety.



### Flushing made simple

During system cleaning the flushing solution can be fed directly to a waste vessel. The use of new collection bottles for the flushing solution is therefore unnecessary.

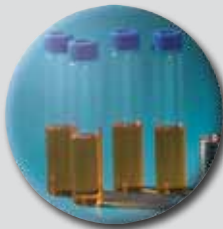


### Extraction at the press of a button

At the press of a button an established extraction method can be applied simultaneously to up to 6 samples. Simply unbeatable ease of use.

## Economically and ecologically expedient

The low solvent consumption and the high level of automation reduce the running costs and make a valuable contribution to the environment.



### Low solvent consumption

Pure efficiency: 6 extractions in 20–40 minutes with only 5–60 ml of solvent per sample.



### Save energy with Eco mode

When operated in the Eco mode, the heating is automatically switched off after extraction is completed to save energy and costs.

## Flexible

The wide selection of process parameters permits versatile usage in a very wide range of applications.



### 10–120 ml samples

Thanks to different extraction cells it is possible to optimise the amount of solvent for each sample size.

E-916: 10, 20, 40 ml

E-914: 40, 80, 120 ml



### Different collection bottles

As required, the flexible collection unit can be used with 60, 150, 220 or 240 ml round-bottom bottles or flat-bottom vials that is also compatible with the parallel evaporator Multivapor.



### Integrated mixer

Solvent mixtures can be prepared as required using the integrated 2 or 4-port mixer. A clever, compact solution.

## Safe and reliable

Intelligent safety mechanisms ensure safe, unrestricted working even at high pressures and temperatures.



### Safe process control

Various automatic process checks simplify and safeguard operation. An ingenious IQ/OQ software package ensures the device functions correctly.

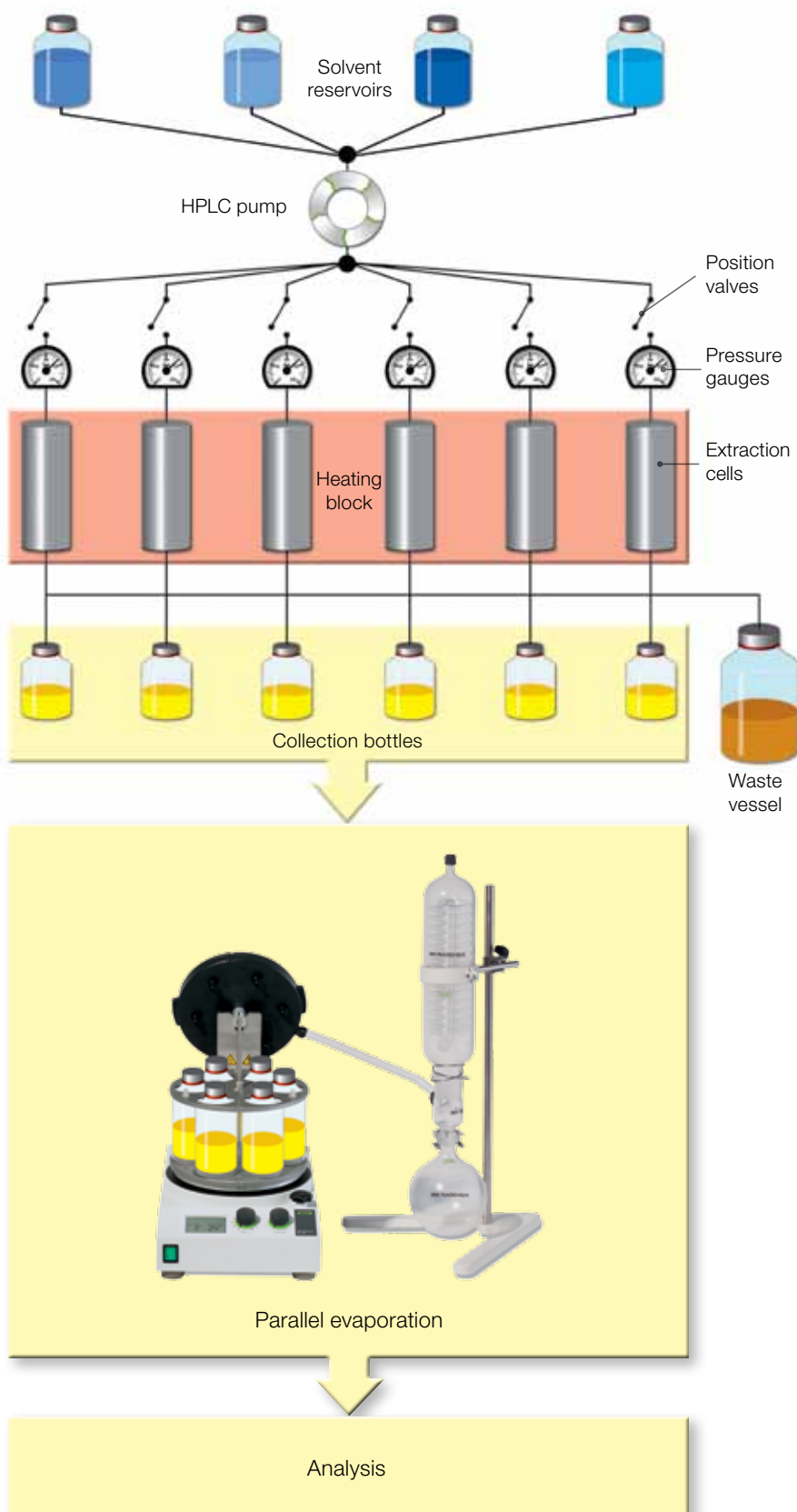


### Reliable recording

The SpeedExtractorRecord™ software records all process parameters and any external intervention and provides complete reporting at the press of a button.

# The small 1-by-6 in extraction technology

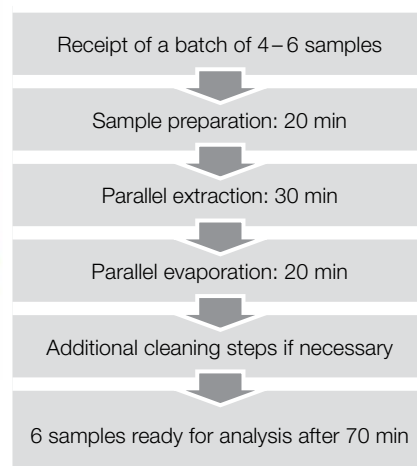
The parallel pressurized solvent extraction provides two significant advantages: on the one hand the time from the receipt of a batch of samples to the analysis result can be drastically reduced, on the other hand the sample throughput can be increased several times over.



## Making six from one

The solvent mixture is transferred into separate extraction cells by a pump at high pressure (<150 bar) and heated (<200 °C). The extracts are collected in vials and can be evaporated in parallel immediately on the parallel evaporator Multivapor without sample transfer. As a result 6 samples are processed in one run in exactly the same conditions. Two examples demonstrate the advantages:

### 1 Quick results



### 2 High throughput

	Operating hours	
	1 shift / 8 hrs.	3 shifts / 24 hrs.
<b>Runs*</b>	480 min:30 min = 16 runs	1440 min:30 min = 48 runs
<b>Sequential approach</b>	16 x 1 = 16 samples	48 x 1 = 48 samples
<b>Parallel approach</b>	16 x 6 = 96 samples	48 x 6 = 288 samples
<b>Capacity increase</b>	600%	600%

\* with an averaged extraction time of 30 min



# Wide range of applications thanks to flexible process parameters

The flexible sample volume and the wide range of process parameters make it possible to use the SpeedExtractor in a very wide range of applications: from trace analysis to quality control, from 1 ml to 120 ml sample size, with a simple or very complex matrix.



## Environmental analysis

High pressure extraction is used for a wide range of applications in environmental analysis. Recognition by the US EPA method SW-846 3545 and SW-846 6860 reflects the excellent results in comparison to classic Soxhlet extraction. The following analytes are particularly suitable: PAH, BNA, PCB, dioxins and furanes, TPH, pesticides and many more.



## Foodstuff analysis

Along with the determination of fat in foodstuffs, high pressure extraction is recognised by European and Asian countries for the determination of pesticide, dioxin or furane residues and flavourings. The E-914 is particularly suitable for these applications, as the low detection limits often require large sample sizes (80–120 ml).



## Plastics and their additives

The classic extraction of polymers requires very long extraction times (12–24 hrs.) and large amounts of solvent. The SpeedExtractor is the ideal solution for the quality control of batch processes, as the extracts for an entire batch are available in a very short time. The method is particularly suitable for the extraction of softeners or additives, and also for the characterisation of polymer structures.



## Pharmaceuticals and natural products

The wide pressure and temperature range and the ability to make up solvent mixtures as required are particularly advantageous especially for the identification of actives in pharmaceutical products or for natural product extraction, as the extraction can be performed gently and quickly. Typical applications are quality control of actives in natural products or pharmaceutical products or research on new actives in plant materials.

## PAHs from sediments compared with the international round robin test SETOC 2008/4

Compound	SpeedExtractor		SETOC	
	[µg/kg]	RSD[%]	[µg/kg]	RSD[%]
Naphthalene	249	6	227	29
Acenaphthene	55	6	47	22
Fluoranthene	1058	5	1060	11
Pyrene	801	5	761	16
Benzo(a)anthracene	528	5	493	11
Chrysene	618	3	629	17
Benzo(k)fluoranthene	343	8	335	13
Benzo(a)pyrene	495	9	463	13
Indeno(1,2,3-cd)pyrene	469	6	447	13
Dibenzo(ah)anthracene	105	8	101	23
Benzo(ghi)perylene	447	10	423	9

## PCBs and phthalates from waste polymers

Compound	Speed Extractor [ng/g]	FIPEP* [ng/g]
2,4,4'-TriCB (28)	6192	5436
2,2',5,5'-TetraCB (52)	1172	1063
2,2',4,5,5'-PentaCB (101)	222	217
2,2',3,4,4',5'-HexaCB (138)	98.0	112.8
2,2',4,4',5,5'-HexaCB (153)	79.4	95.2
2,2',3,4,4',5,5'-HeptaCB (180)	18.5	21.7
DecaCB (209)	0.5	0.4
DIBP Disobutylphthalate	8565	7837
DBP Dibutylphthalate	5716	5821
DEHP Diethylhexylphthalate	1257374	1278679

\*Reference value from the Fraunhofer Institute in Freising, Germany.

## Extraction of Jin Ci Tau (St. John's Wort)


Hypericin content according to PhEur 6.2	0.8 mg/g
Hypericin determination with SpeedExtractor	0.8 mg/g
RSD [%]	1.6

## Method parameters for 6 x 0.6 g sample

Step 1	Pre-extraction of chlorophyll	
	Solvent #1	CH <sub>2</sub> Cl <sub>2</sub> (80 °C, 100 bar)
	Solvent volume	35 ml
	Extraction time	35 min
Step 2	Main extraction of hypeicin	
	Solvent	MeOH (80 °C, 100 bar)
	Solvent volume	60 ml
	Extraction time	50 min

# SpeedExtractor to suit your needs

The SpeedExtractor is available in 8 different configurations. For small samples (up to 40 ml) the E-916 is recommended, for large samples (from 40 ml) the E-914. Both types are equipped with a 2 or 4-port mixer and a set of extraction cells each.



1 1 5 1

Number of positions	
4	E-914: 4 positions
5	E-914: 4 positions mounted on pedestal
6	E-916: 6 positions

Size of the extraction cells	
01	10 ml (E-916 only)
02	20 ml (E-916 only)
04	40 ml (E-916 or E-914)
08	80 ml (E-914 only)
12	120 ml (E-914 only)

Number of solvent ports	
2	2-port mixer
4	4-port mixer

Included in the scope of delivery are the following parts: choice of 6 extraction cells with plug screw and extraction cell gripper, all tools including plunger and brush, funnel, replacement seals (12 pcs. each), replacement support rings (2 pcs.), paper filters for top and bottom (100 pcs. each), metal frits

(25 pcs.), extra plug screws (2 pcs.), replacement fittings and ferrules (10 pcs. each), FEP tubing (2 x 5 m), suction filter (4 pcs.), one solvent vessel with GL45 lid (1 l), extraction sand (2.5 kg), and cell carrier.

## In six steps from sample preparation to parallel evaporation



Convenient packing of the extraction cells with a funnel ideally matched to the cell size.



The heating block can be simply pulled out and the extraction gripper fitted using the extraction cell gripper.



The protective shield is closed, the cells sealed automatically and 6 samples are extracted at the push of a button.



The extracts are collected simultaneously in collection bottles. The entire unit can be removed in one action.



The collection bottles can be transferred directly – i.e. without sample transfer – to the parallel evaporator Multivapor P-6, or Syncore® Analyst R-12.



The flexible sealing system in the Multivapor makes it possible to individually seal different collection bottles (60, 150, 220 and 240 ml). Cross-contamination is therefore excluded.



### Extraction cells

The extraction cells for the E-916 and E-914 are available in three different volumes.

Order no.		
Volumes	E-916	E-914
10 ml	51237	–
20 ml	51236	–
40 ml	51235	51234
80 ml	–	51233
120 ml	–	51232



### Carrier for extraction cells

The carrier for the extraction cells is used for sample preparation and ensures the hot cells do not fall over. A carrier is included in the scope of delivery.

Order no.	
Carrier for cells E-916	53690
Carrier for cells E-914	53691



### Safety caps

The 7-port and 2-port safety caps are compatible with standard GL45 thread bottles. The 7-port cap is used to mount 1/16" waste tubing and the 2-port for 1/8" inlet tubing.

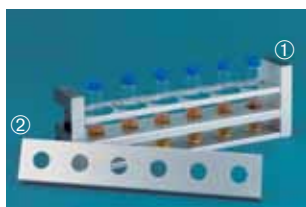
Order no.	
2-port safety cap	11056949
7-port safety cap	11056948
1 L bottle, GL45	53203



### Sand and diatomaceous earth

Sand (granulation 0.3–0.9 mm, dried at 750 °C) and diatomaceous earth are used for loosening and homogenising the sample or as a drying agent. The sand is included in the scope of delivery.

Order no.	
Sand (2.5 kg)	37689
Diatomaceous earth (1 kg)	53201



### Collection unit

The collection unit ① is compatible with 220 and 240 ml vessels. With the help of retaining plates ②, 60 ml and 150 ml Syncore® Analyst vessels R-12 with appendix, respectively, can also be used.

Order no.	
Collection unit	53698
Retaining plates for 60 ml vials (2 pcs.)	11055205
Retaining plate for Analyst vessels	11057054



### Collection vessels

The collection unit ① is compatible with a variety of collection vessels with PTFE-coated septa, varying in volume, shape and neck diameter. The vessels ③, ⑤, and ⑥ are designed for the use with the Multivapor™ P-6 for evaporation to dryness, the vessels ④ are recommended for concentration using the Syncore® Analyst R-12. The quantity is given in brackets.

Size	Order no. vessel	Order no. cap*	Order no. septa
③ 60 ml, flat bottom	49535 (72)	11056535 (100)	49536 (100)
④ 150 ml, Analyst, 1 ml	11056498 (12)	11056528 (12)	53677 (12)
④ 150 ml, Analyst, 0.3 ml	11056499 (12)	11056528 (12)	53677 (12)
⑤ 220 ml, round bottom	53208 (6)	11056528 (12)	53677 (12)
⑥ 240 ml, flat bottom	52672 (6)	11056535 (100)	49536 (100)

\* Caps are equipped with the corresponding septa.



### IQ/OQ

An ingenious service software package and independent temperature and pressure measurement ensure correct operation in the context of an IQ/OQ.

Order no.	
IQ/OQ documents	11056092
OQ repetitive	11056093
IQ/OQ kit	11055354

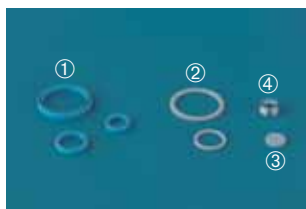


### Expansion elements and funnels

Expansion elements are the ideal accessory for quick function tests, without consuming too much solvent in the process. The funnels make it easier to add the sample. One funnel type is included in the scope of delivery.

Order no.		
Volumes	Ex. element	Funnel
10 ml	53708*	53035
10 ml	53359	53035
20 ml	53358	53396
40 ml E-916	53357	53397
40 ml E-914	53357	53036
80 ml	53356	53036
120 ml	53355	53036

\*Length 32 mm, otherwise length 120 mm



### Sealing parts

To achieve good sealing, the seals ① and PEEK rings ② must be replaced regularly. The metal frit ③ can clog, and on the screw cap ④ the thread must be intact.

Order no.	E-916	E-914
Seals (12 pcs.):		
Top, PTFE	53669	53671
Top, PE	11056106	11056108
Bottom, PTFE	53670	53670
Bottom, PE	11056107	11056107
PEEK ring (2 pcs.)	53666	53667
Screw cap (2 pcs.)	53209	53209
Metal frit (25 pcs.)	49568	49568



### Disposable items

Filters are available of cellulose and glass fibre. They must be replaced after each run. The bottom filter are compatible with both, the E-914 and E-916. The weighing boats considerably ease the filling of the extraction cells.

Order no.	
Weighing boat (250 pcs.)	53202
Filters (100 pcs.):	
E-914 top, cellulose	51249
E-916 top, cellulose	49572
Bottom filter, cellulose	49569
Bottom filter, glass fiber	11055932
E-916 top, glass fiber	11057189
E-914 top, glass fiber	11057190



### Extraction thimbles

Extraction thimbles prevent clogging of the metal frits with fine particles. They are available in cellulose or glass fiber in quantities of 25 pcs.

Thimble for:	Order no.
40 ml cell, cellulose	11055334
40 ml cell, glass fiber	11056633
120 ml cell, cellulose	11055358

# Complete documentation and method preparation with SpeedExtractorRecord™

Optionally, the extraction process can be recorded and documented using the SpeedExtractorRecord™ software. In addition, methods can be prepared conveniently and saved independent of the instrument. The PC software SpeedExtractorRecord™ offers the following advantages:

- Preparation, editing and saving of any number of extraction methods
- Online process display of all activities
- Graphic display of temperature and pressure curves for the different extraction cycles / positions

- Recording of all unexpected events such as pause, blockage of the cell, changing of the extraction vessels etc.

- PDF reporting of all process parameters, events, p,T-time curve, sample and operator information

- CSV export feature for graphics in own publications

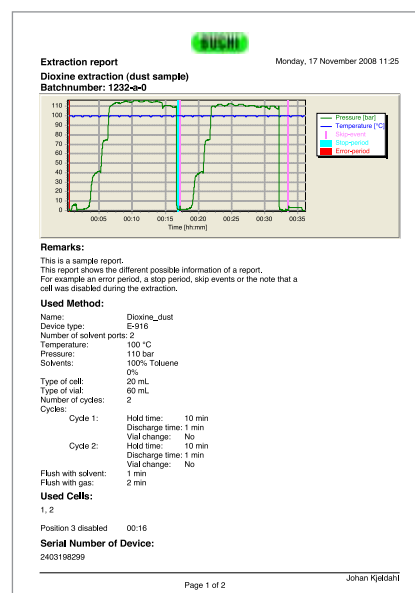
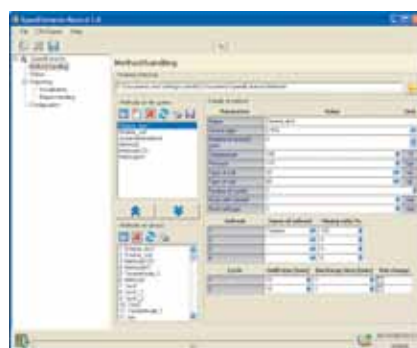
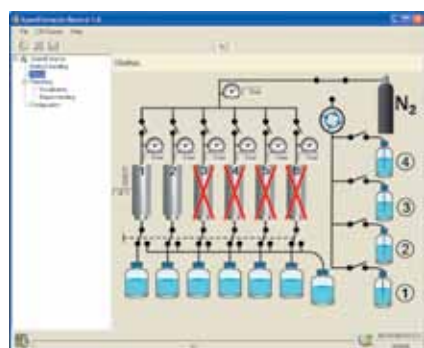
A CD-ROM with demo licence for 60 days is included in the scope of delivery. The communication with the device is via a USB port.

Order no.

SpeedExtractorRecord™

CD-ROM with licence

53073



## Technical data

Dimensions (W x H x D)	670 x 725 x 500 mm
Weight	90 kg
Power consumption	max. 1750 W
Supply voltage	100–240 VAC ± 10 %, 50–60 Hz
Temperature range	30–200 °C ± 3 °C
Pressure range	50–150 bar ± 5 bar
Laboratory nitrogen connection	5–10 bar; purity 4.5–5.0
Solvent mixer	4-port, 2-port mixer

Flow rate of the HPLC pump	1–50 ml/min ± 2 %
Size of the extraction cells	E-916: 10, 20, 40 ml; E-914: 40, 80, 120 ml
Size of the collection bottles	60, 120, 220, 240 ml
Material with solvent or sample contact	EP, FPM, PEEK, PTFE, metal, ceramic, glass
Interface	USB 2.0
Protection class	IP21
Approvals	CE, CSA

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