



PULSION PiCCO *plus*

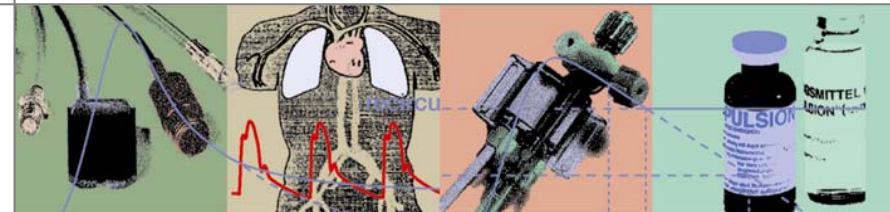
CONTINUOUS CARDIAC OUTPUT

PRELOAD VOLUME

CONTRACTILITY

EXTRAVASCULAR LUNGWATER

CONTINUOUS DISPLAY OF VOLUME RESPONSIVENES



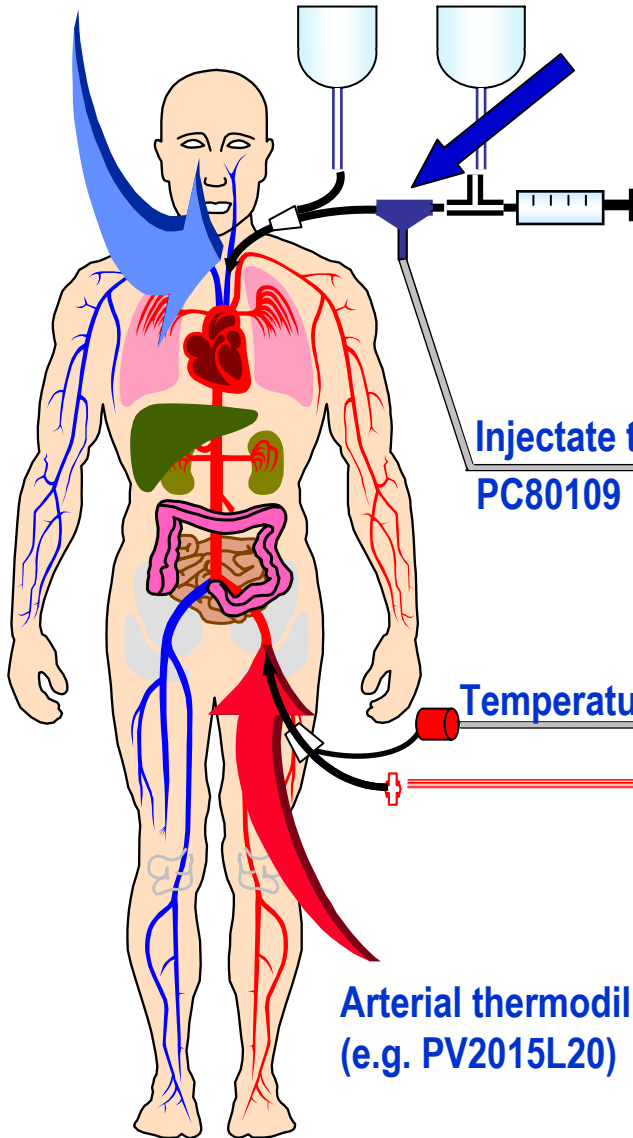
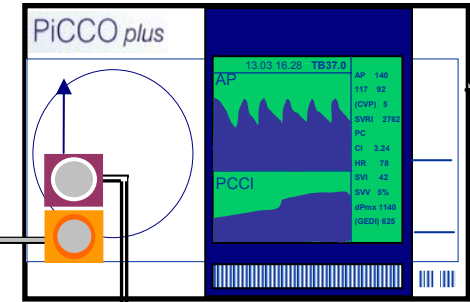
PiCCO_{plus} setup



AUX- Adapter
cable PC81200

Central venous catheter

Injectate temperature
sensor housing PV4046
(included in PV8115)



Injectate temperature sensor cable
PC80109

Temperature interface cable PC80150

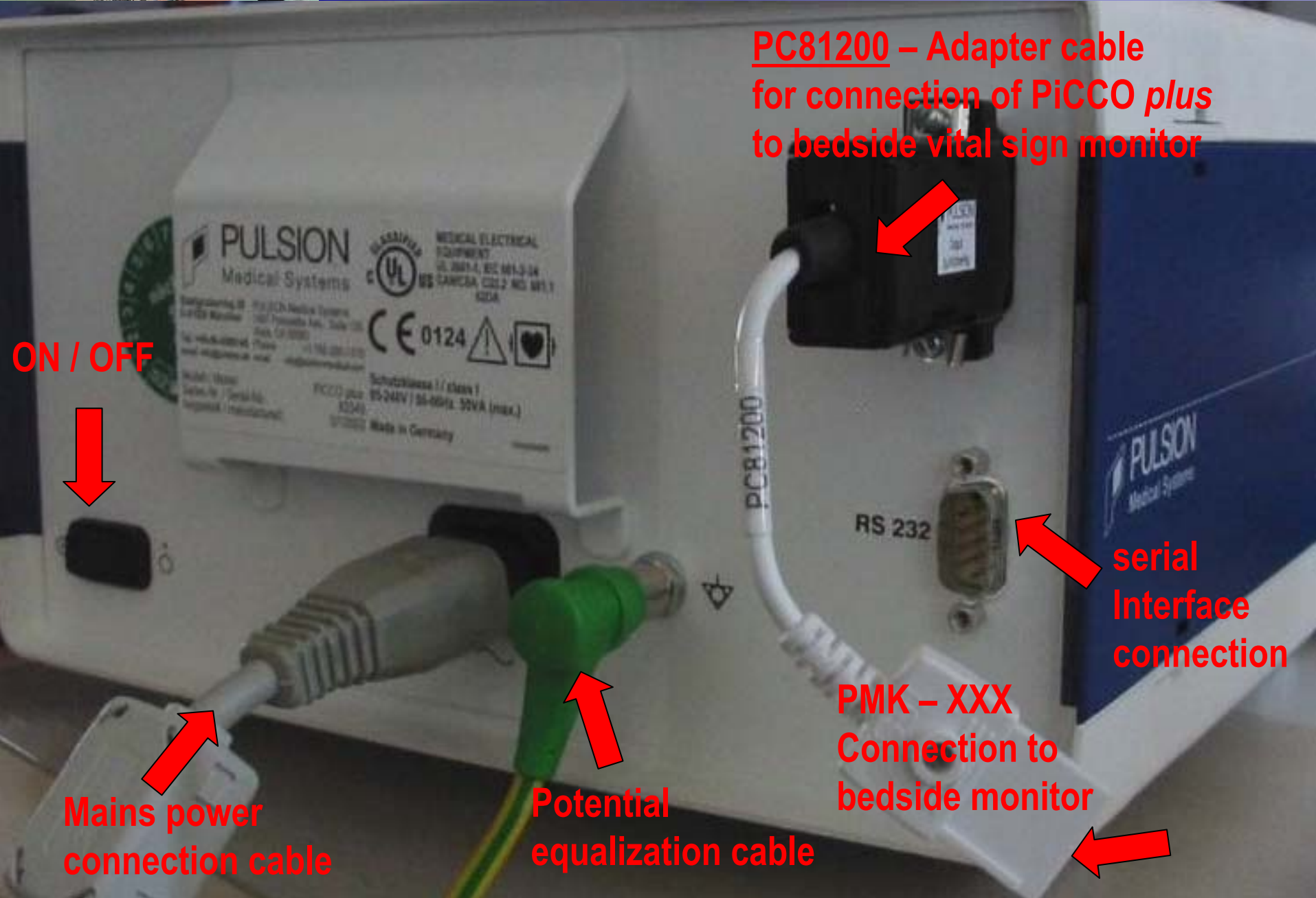
PULSION disposable pressure transducer
(e.g. PV8115)

Interface cable for
pressure signal
PMK-206

Arterial thermodilution catheter
(e.g. PV2015L20)

PMK – XXX
Connection cable
to bedside monitor

PiCCO_{plus} design – Rear panel



PC81200 – Adapter cable for connection of PiCCO plus to bedside vital sign monitor

ON / OFF



Mains power connection cable



Potential equalization cable



RS 232

serial Interface connection

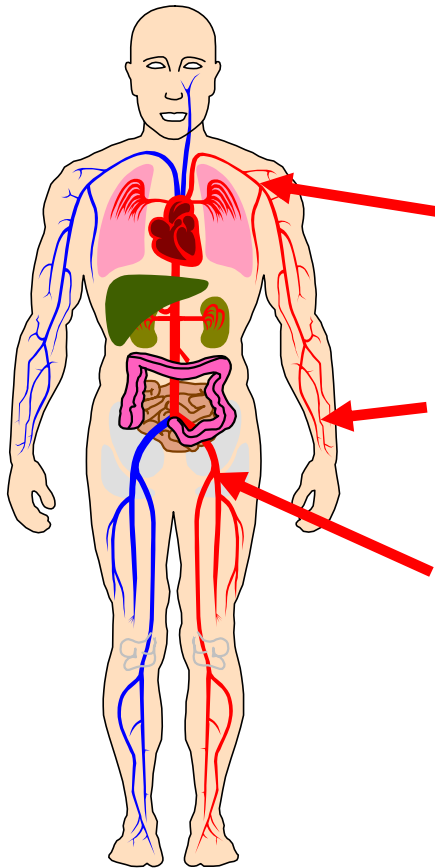


PMK - XXX Connection to bedside monitor





Application sites for thermodilution catheters



**axillary artery
(brachial artery)**



PV2014L08

4F 8 cm

radial artery



PV2014L50LGWA

4F 50 cm

femoral artery



PV2015L20

5F 20 cm



PV2014L08*

more than 10 kg body weight



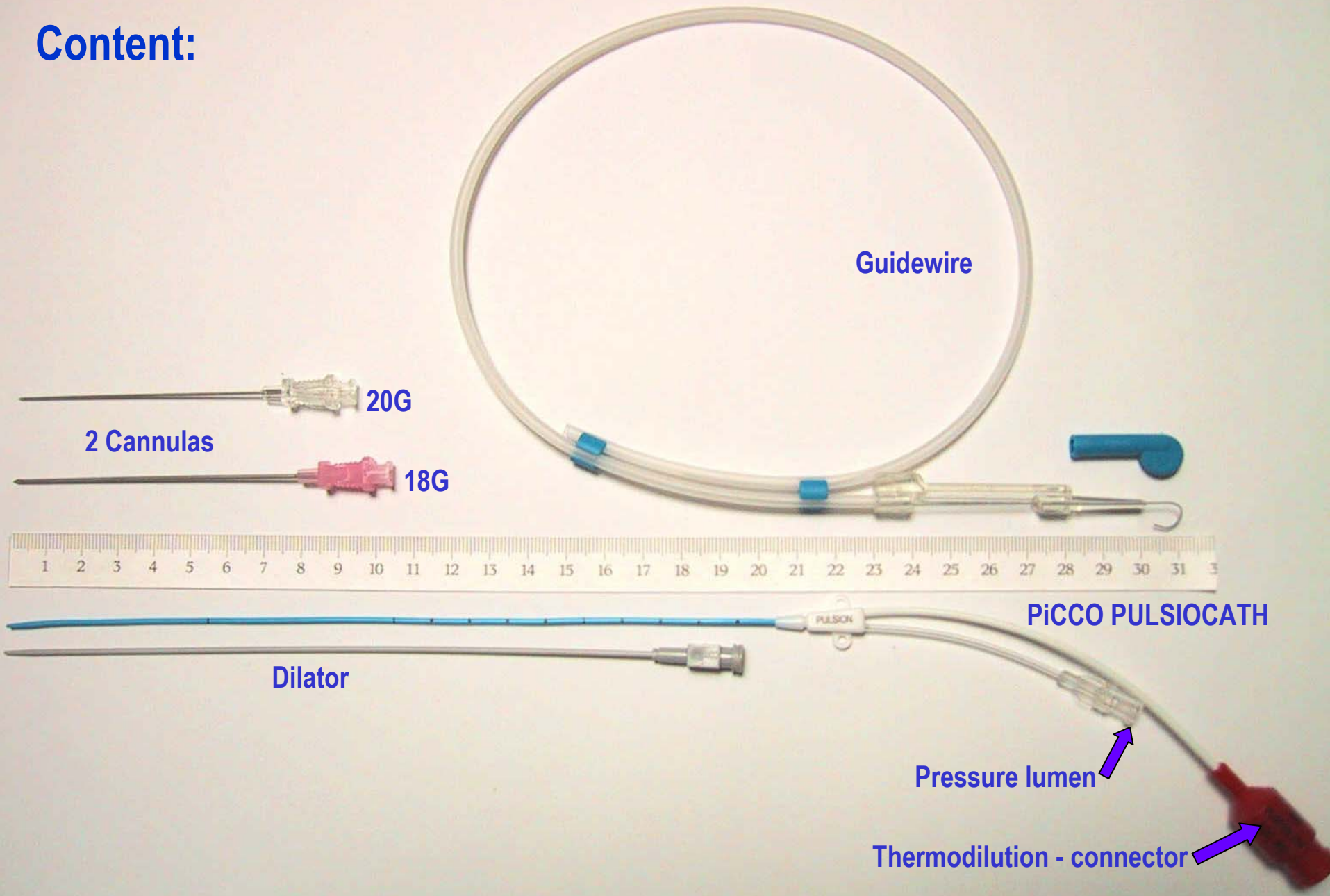
PV2013L07*

3F 7 cm

 * for application in paediatric patients

Example of a PULSIOCATH – PV2015L20

Content:



Switch on the PiCCOplus

PULSION PiCCO plus

V 5.2.2 non US

Last patient calibration at:
09.12. 14:37

Patient ID: 201000200

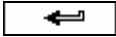
Weight: 75.0 kg

Height: 175 cm

New patient? No

Navigation icons: [Mute] [Minus] [Plus] [Enter] [Back]

Hand 1 points to the Plus icon. Hand 2 points to the Back icon.

- 1 By modification of patient ID number, date or time, patient related data is deleted and the system is ready to monitor a new patient.
- 2 To continue monitoring of the patient, press function key .



Input menu (I)

INPUT	
Patient	201000200 *
Weight	75.0 kg
Height	175 cm
Catheter type	
PV 2015L20	ACC : 342
Injectate temp sensor	PV 4046
Injectate temperature	< 24 °C
Inj Vol (min. 15ml)	15 ml
CVP	10 mmHg
Range PCCO	0.. 10 l/min
Range AP	60.. 160 mmHg
Warning PCCO	0.2.. 8.6 l/min

Navigation icons: Mute, Minus, Plus, Left Arrow, Right Arrow, Double Left Arrow

Enter Height and Weight of the patient for calculation of the indexed parameters.

***Changing this number will delete all previous data !**

Input menu (II)

INPUT

Patient	201000200
Weight	75.0 kg
Height	175 cm
Catheter type	
PV 2015L20	ACC : 342
Injectate temp sensor	PV 4046
Injectate temperature	< 24 °C
Inj Vol (min. 15ml)	15 ml
CVP	10 mmHg
Range PCCO	0.. 10 l/min
Range AP	60.. 160 mmHg
Warning PCCO	0.2.. 8.6 l/min

**Arterial Catheter
Constant (ACC) and the
Injectate temperature Sensor
Housing will be detected
automatically, if the
PULSIOCATH is connected**

**< 24°C = room temp. injectate
< 8 °C = cold injectate**

Input menu (III)

INPUT

Patient 201000200
 Weight 75.0 kg
 Height 175 cm
 Catheter type
 PV 2015L20 ACC : 342
 Injectate temp sensor PV 4046
 Injectate temperature < 24 °C
 Inj Vol (min. 15ml) 15 ml
 CVP 10 mmHg
 Range PCCO 0.. 10 l/min
 Range AP 60.. 160 mmHg
 Warning PCCO 0.2.. 8.6 l/min

⏪ - + ⏩

Weight of pat.	PV4046	
	For cold injectate	For roomtemp. injectate
< 3 kg	2 ml	3ml
< 10 kg	2 ml	3ml
< 25 kg	3 ml	5ml
< 50 kg	5 ml	10 ml
< 100 kg	10 ml	15 ml
≥ 100 kg	15 ml	20 ml

The minimal injectate volume is recommended by the PiCCOplus in (),

Parameter to be modified can be chosen by moving the inverse marker with  .

The highlighted parameter can be changed using the function keys  .

Input menu (IV)

INPUT	
Patient	201000200
Weight	75.0 kg
Height	175 cm
Catheter type	
PV 2015L20	ACC : 342
Injectate temp sensor	PV 4046
Injectate temperature	< 24 °C
Inj Vol (min. 15ml)	15 ml
CVP	10 mmHg
Range PCCO	0.. 10 l/min
Range AP	60.. 160 mmHg
Warning PCCO	0.2.. 8.6 l/min

Navigation icons: Mute, Minus, Plus, Home

CVP should be updated when the CVP changes ± 5 to accurately calculate SVR

Upper / lower limit for the display scaling for the cardiac output trend display

Upper / lower warning limits for pulse contour cardiac output

Pressure zeroing menu



1
Open pressure transducer
to atmosphere.

AP ZEROING

Zero adjust	apply	0 mmHg
measured AP		15 mmHg

2
Press  for zeroing

3
... next screen

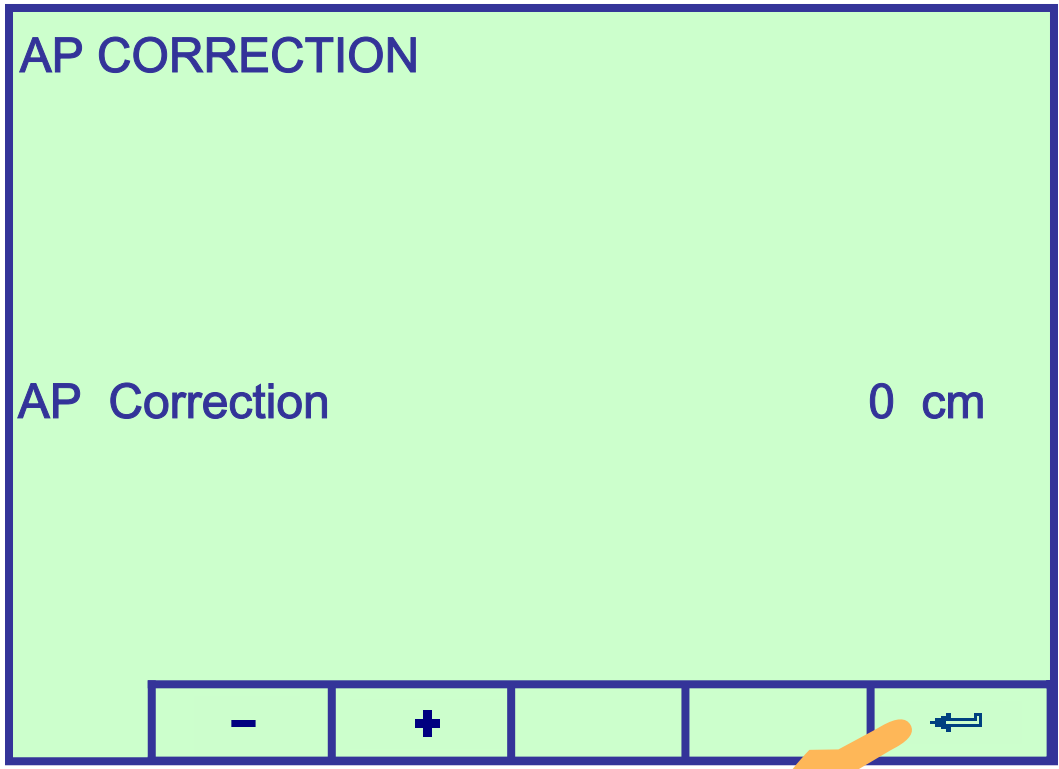
Perform zero adjustment first on PiCCOplus then on bedside monitor!



AP correction menu

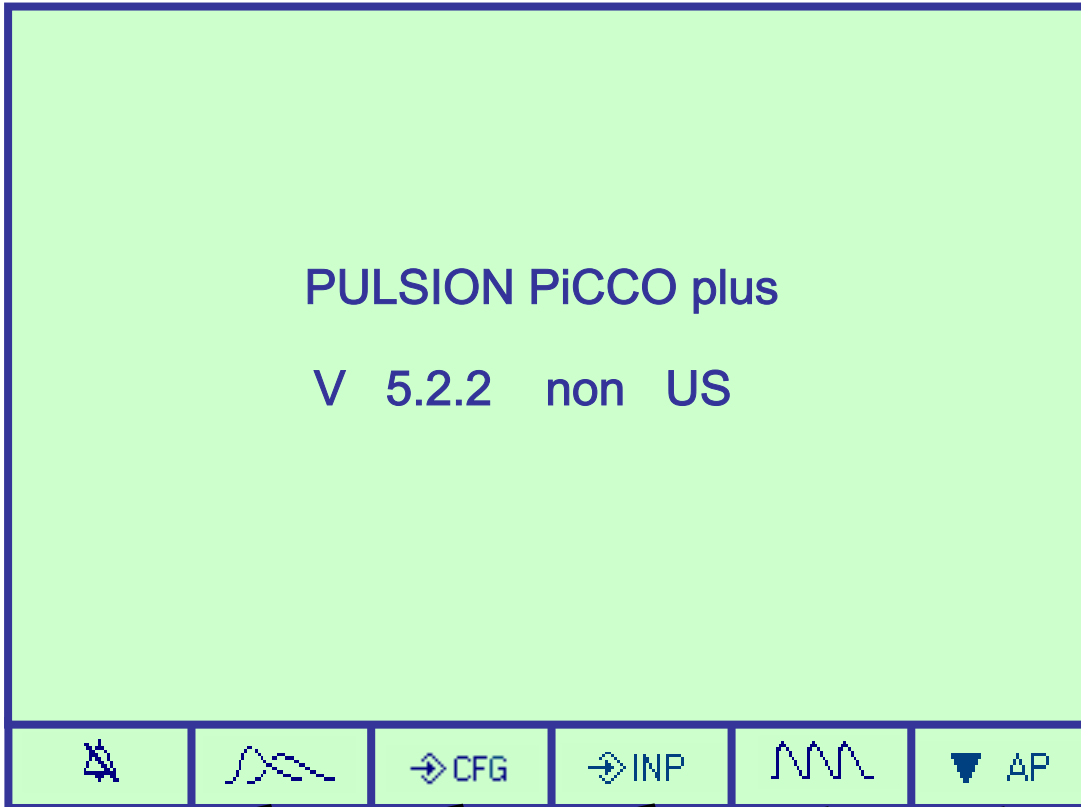
Recalibration (thermodilution) is necessary after each change of AP-correction!!!

If necessary, enter the difference between pressure transducer and the heart by pressing

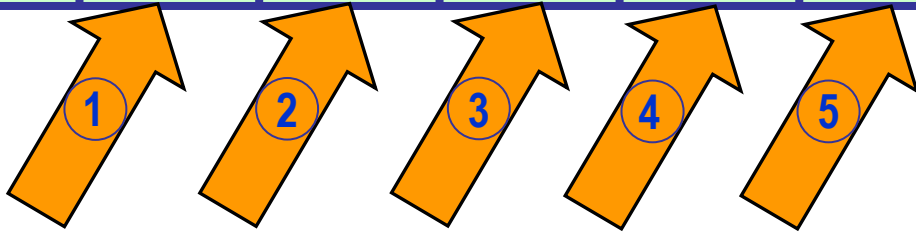


...change to main menu

Main display



- 1 Thermodilution display page
- 2 Configuration menu
- 3 Input menu
- 4 Pulse contour display page
- 5 Pressure zeroing menu





Configuration menu – Parameter selection

CONFIGURATION	
Date	09.12.02*
Time	15:33*
(change deletes previous results)	
Parameter selection	individual
Display span	5 d
Language	ENG
Loudness	4

Configure Display (individual)	
(CVP)	on
PVPI	on
SVR	on
SV	on
SVV	on
PPV/dPmx	on
GEF/CFI	on
TB	on
PPV/dPmx	dPmx
GEF/CFI	CFI
ITBV/GEDV	GEDV



Individual parameter configuration:

Basic setup:

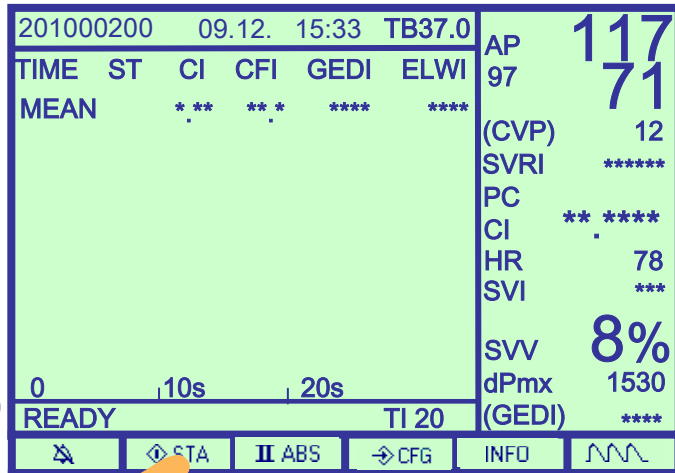
Most common parameters are displayed as default

Individual selection:

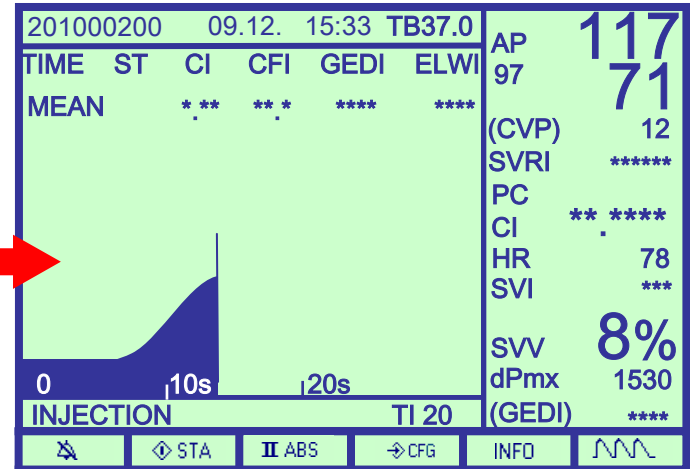
Customer can configure own parameter selection (except of most important PiCCO parameters)

***By modification of date or time, patient related data is deleted and the system is ready to monitor a new patient.**

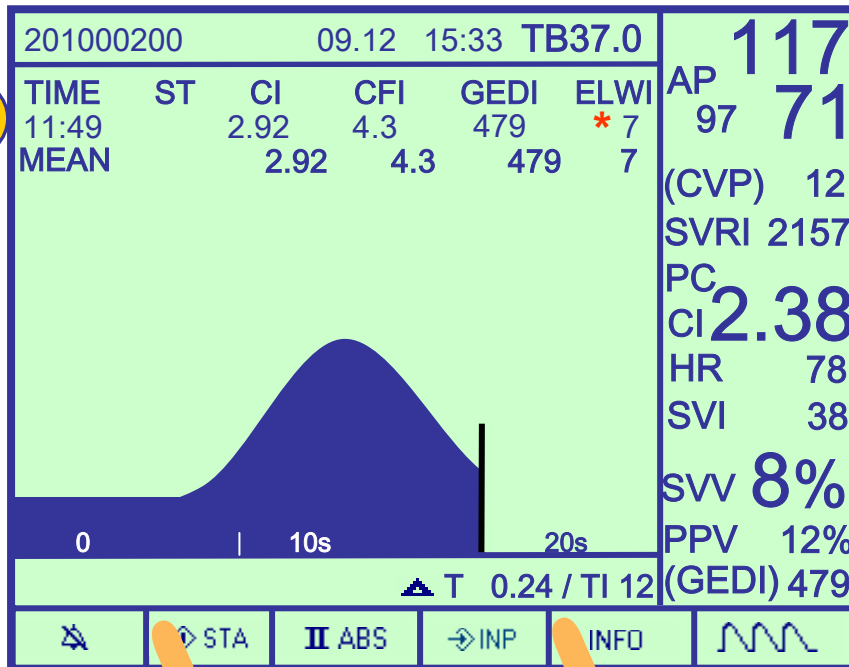
Thermodilution display page (I)



- 1 Press **STA** to perform a thermodilution measurement.
- 2 Wait until "STABLE" appears
- 3 Injection of the indicator should be done as fast (< 7 sec) and steadily as possible.



Thermodilution display page (II)



- 1 Initially please perform 3 thermodilution measurements
- 2 Press for further thermodilution measurement
- 3change to thermodilution info screen

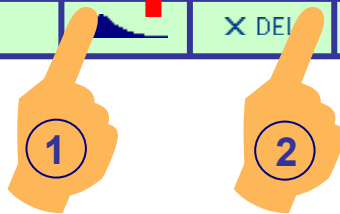
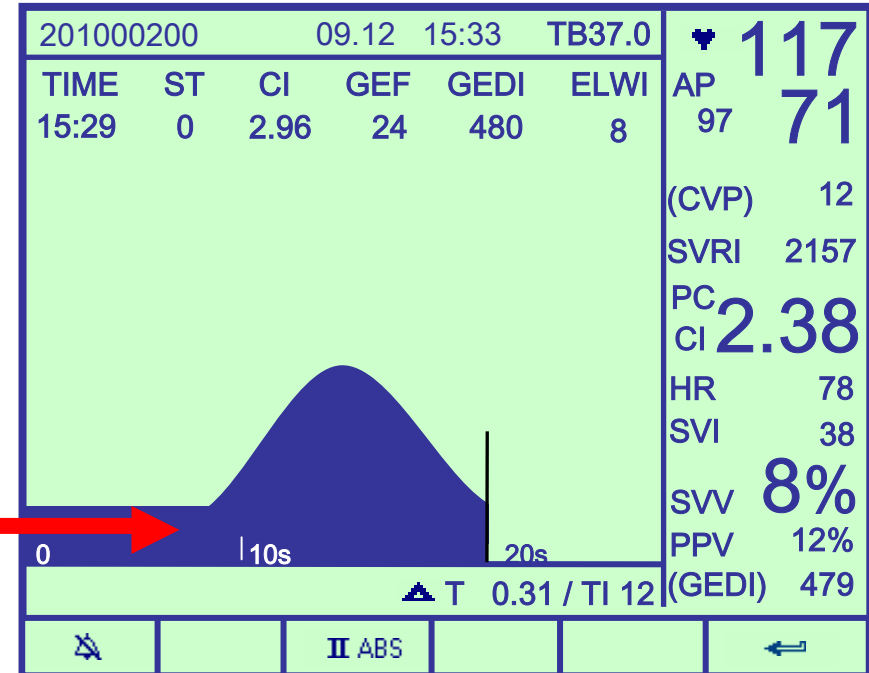
*If $EVLWI \geq 10$ ml/kg the use of cold injectate is recommended.

Don't forget to select for iced injectate $< 8^{\circ}\text{C}$ in the Input menu.

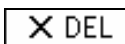
Thermodilution info screen

TD info screen provides enhanced information about the last 50 TD measurements

TIME	ST	CI	GEF	GEDI	ELWI	AP	SVRI	PC	CI	HR	SVI	SVV	PPV	(GEDI)
201000200	09.12	15:33	TB37.0	117	71	97	12	2157	2.38	78	38	8%	12%	479
07:02	0	2.81	26	450	8									
07:03	0	3.06	24	474	8									
07:05	0	3.16	26	489	8									
11:56	0	3.22	26	496	8									
11:58	0	2.90	25	475	7									
11:59	0	3.24	26	509	8									
15:05	0	2.92	24	520	6									
15:06	0	3.15	25	502	8									
15:29	0	2.96	24	480	8									
MEAN		2.96	24	480	8									



1 The last 5 TD curves can be displayed graphically by pressing 

2 To delete a TD measurement of the valid calibration, highlight the measurement you want to delete and press  two times.

Most important data from the thermodilution

values from the thermodilution

continuous values

CI = Cardiac index

CFI = Cardiac Function Index

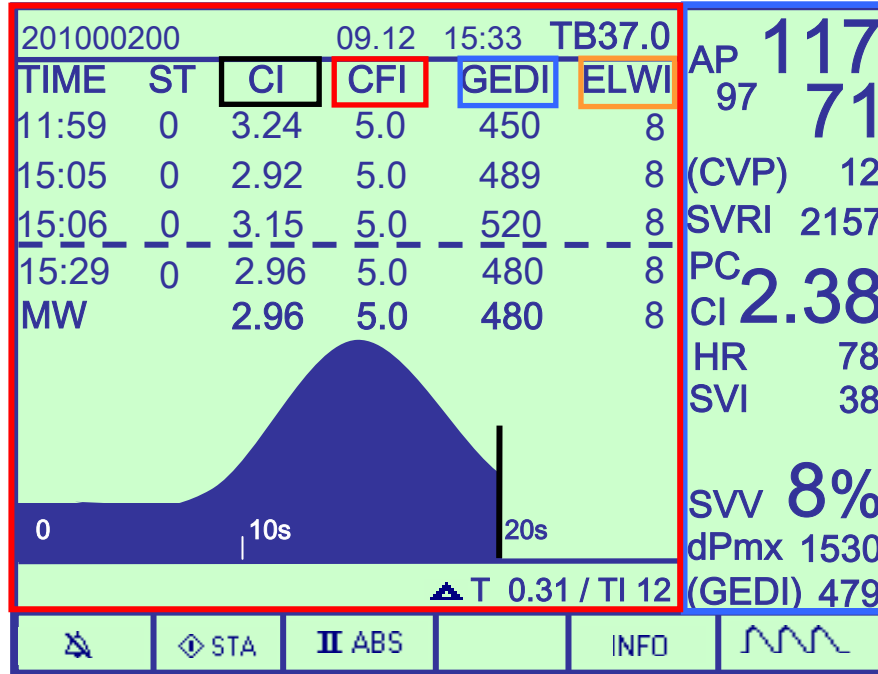
or

GEF = Global Ejection Fraction

GEDV = Global end diastolic volume index

or

ITBI = Intrathoracic blood volume index

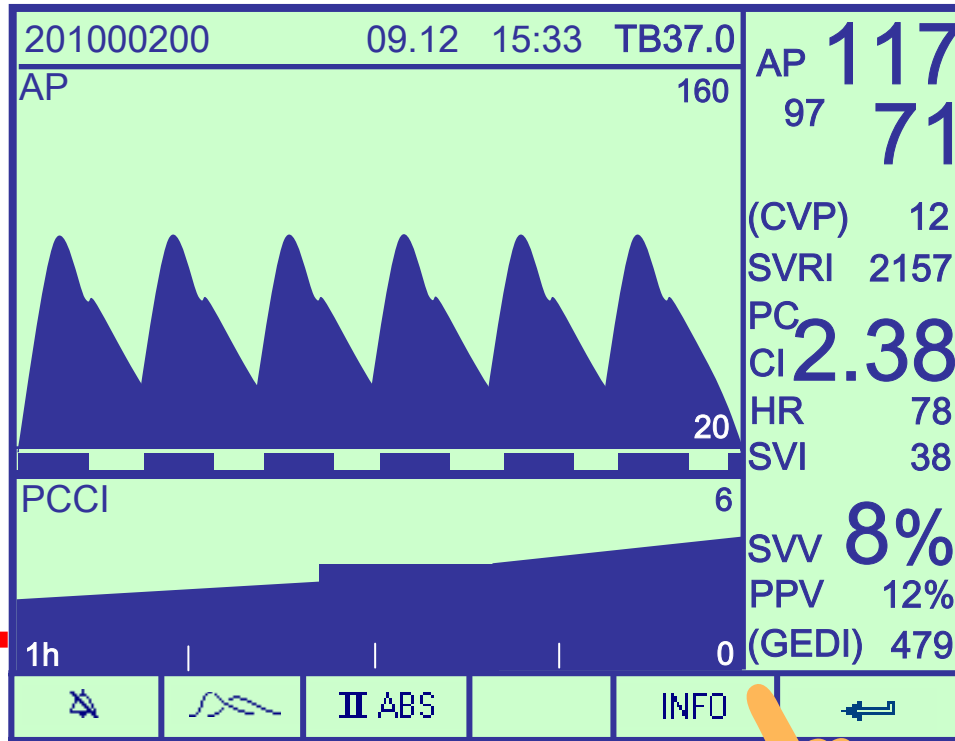


Continuous Cardiac Output (PCCO) (mean value of the last 12 seconds)

Stroke Volume Variation (SVV)

ELWI = Extravascular lung water index

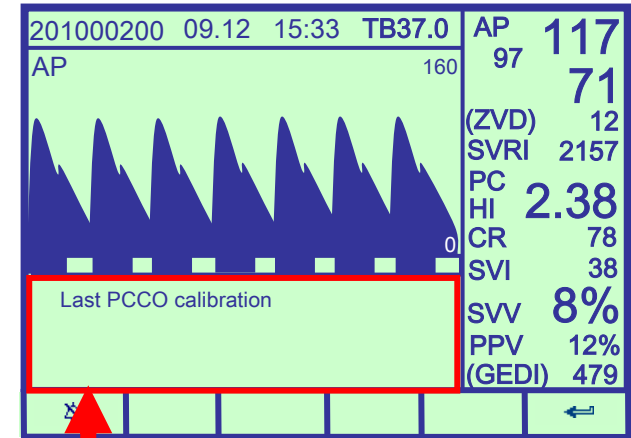
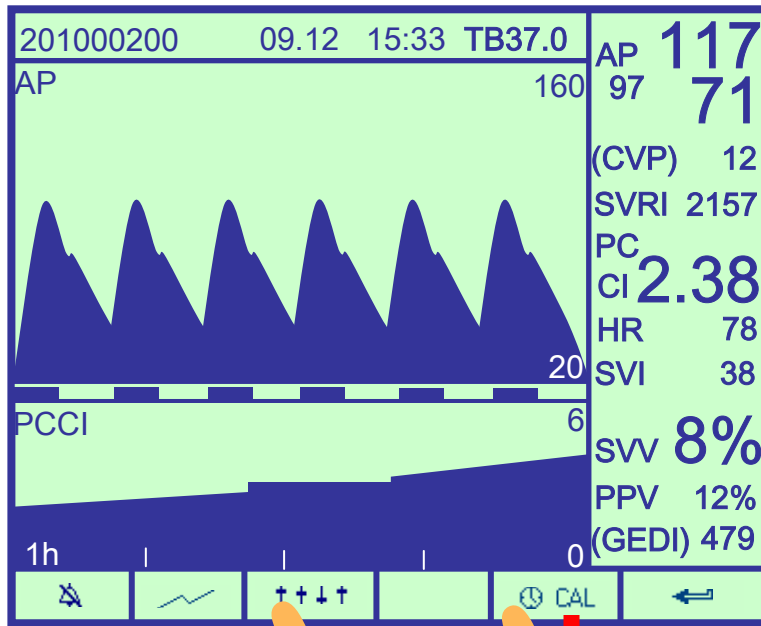
Pulse contour display page

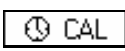


..... change to info screen

Trend of continuous cardiac output (PCCO),
Time scale was defined in the Configuration menu (1h – max. 5 days)

Info screen

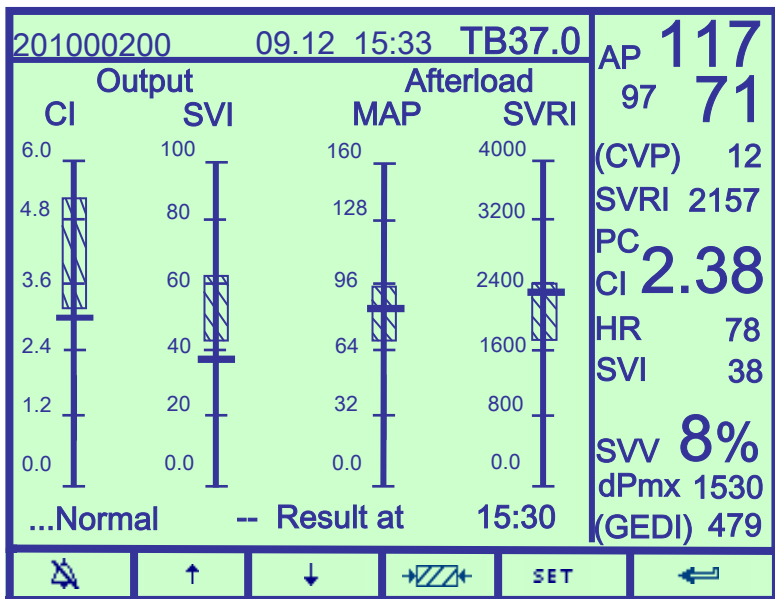


- 1 Press  to get information about the last PCCO calibration
- 2 change to the patient profile screen

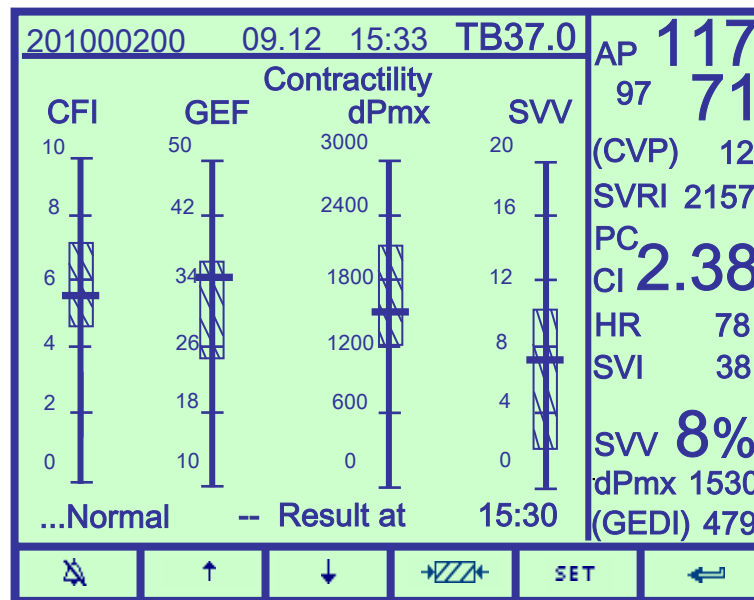


Patient profile screen (I)

1. Output / Afterload



2. Contractility

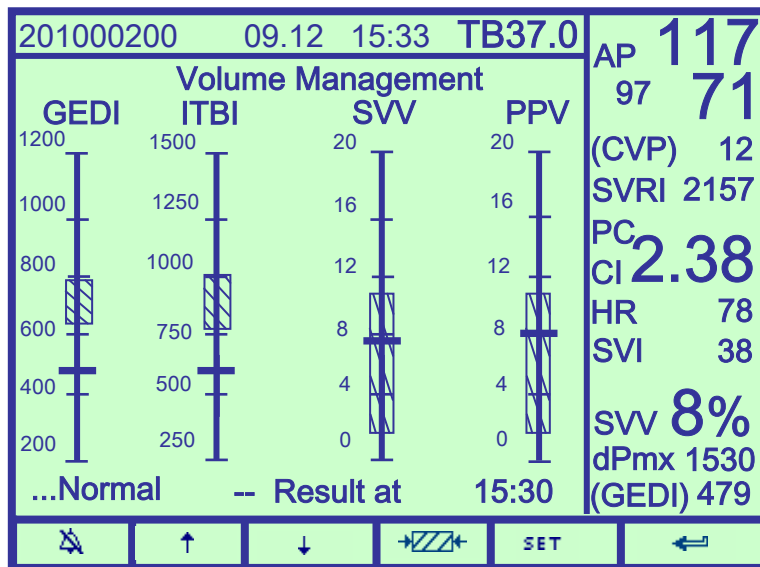


 The hatched areas display the patient specific normal ranges

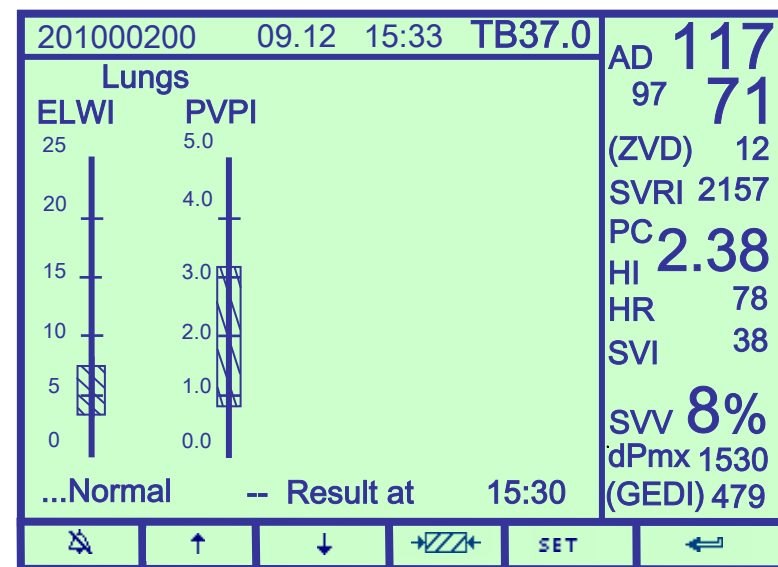
 A bar marks the value of the parameter at the point of time of the last calibration

Patient profile screen (II)

3. Volume Management



4. Lungs

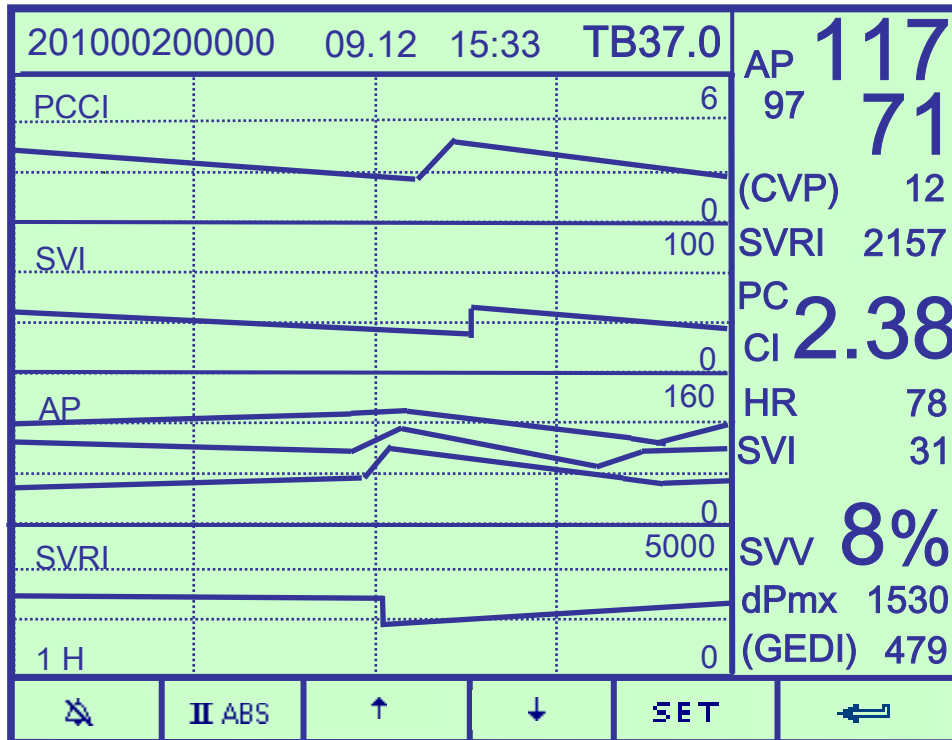


The hatched areas display the patient specific normal ranges



A bar marks the value of the parameter at the point of time of the last calibration

Trend display screens



- All PiCCOplus parameters are displayed as trends.
- Continuous parameters are shown as a line, thermodilution measurement obtained parameters are marked with a cross „X“.
- Trend display spans can be adjusted by pressing .
- Use to scroll between the parameters.



Abbreviations of the parameters

CO / CI

Cardiac output / Cardiac index

SV / SVI

Stroke volume / -index

GEDV / GEDI

Global end diastolic volume / -index

ITBV / ITBI

Intrathoracic blood volume / -index

EVLW / ELWI

Extravascular lung water / -index

PVPI

Pulmonary vascular permeability index

SVV

Stroke volume variation

PPV

Pulse pressure variation

GEF

Global ejection fraction

CFI

Cardiac function index

MAP

Mean arterial blood pressure

SVR / SVRI

Systemic vascular resistance / -index

CVP

Central venous pressure

HR

Heart rate

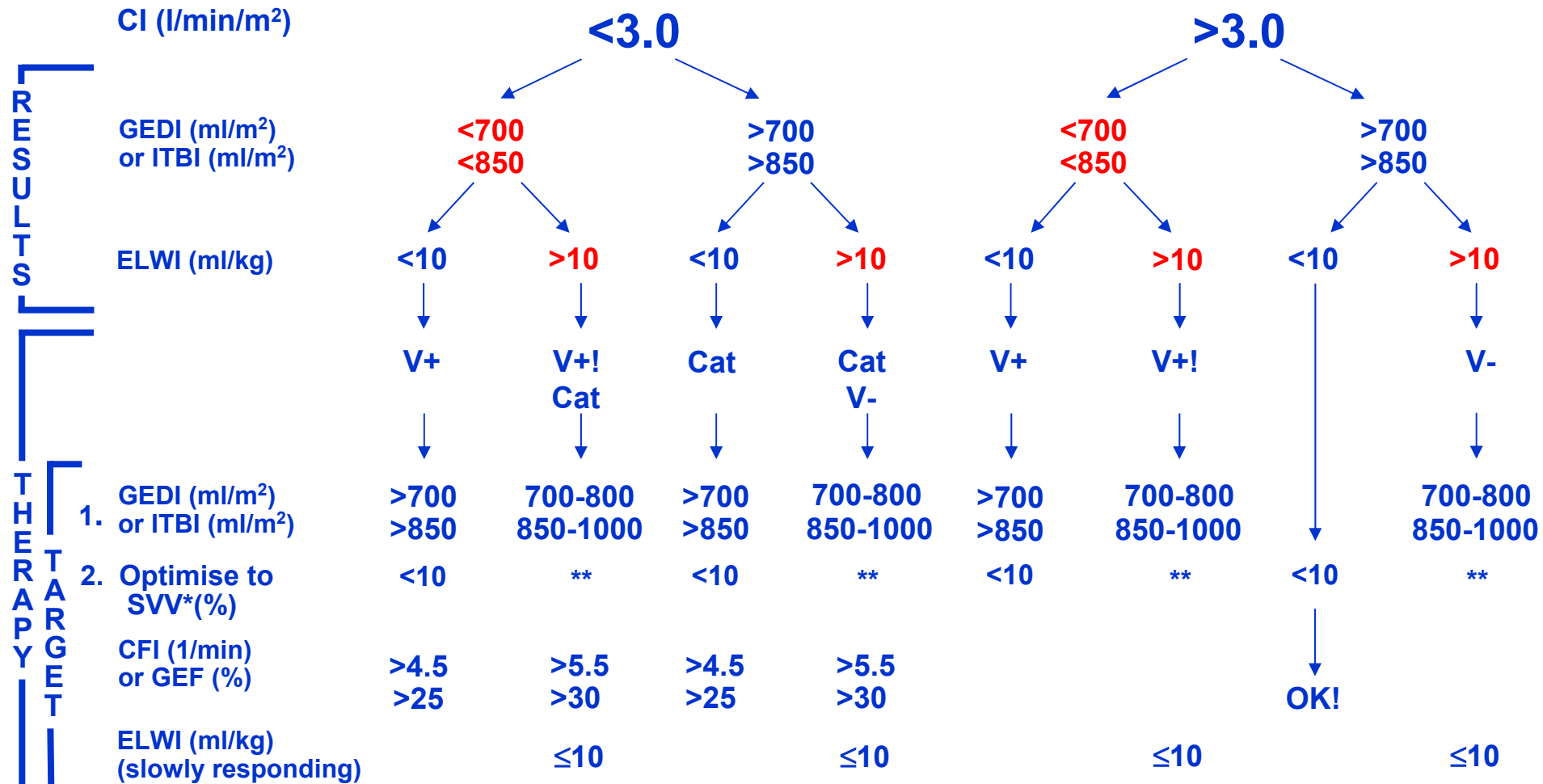


Normal ranges

	Variable	Normal ranges	Unit
➤	CI	3.0 – 5.0	l/min/m²
➤	SVI	40 – 60	ml/m²
➤	GEDI	680 – 800	ml/m²
➤	ITBI	850 – 1000	ml/m²
➤	ELWI	3.0 – 7.0	ml/kg
➤	PVPI	1.0 – 3.0	-
➤	SVV	≤ 10	%
➤	PPV	≤ 10	%
➤	GEF	25 – 35	%
➤	CFI	4.5 – 6.5	1/min
➤	MAP	70 – 90	mmHg
➤	SVRI	1700 – 2400	dyn*s*cm⁻⁵*m²



PiCCO Technology - Decision Tree



V+ = volume loading (! = cautiously) V- = volume contraction Cat = catecholamine / cardiovascular agents

*** SVV only applicable in ventilated patients without cardiac arrhythmia ** Use of SVV not recommended in patients with ELWI >10 ml/kg**



Flowchart of PiCCO *plus* software

