ms_03184897190V9.0

C-Peptide

cobas®

Connecting peptide

REF	Σ	SYSTEM
		Elecsys 2010
		MODULAR ANALYTICS E170
03184897 190	100	**cobas e** 411
		cobas e 601
		cobas e 602

English

Intended use

Immunoassay for the in vitro quantitative determination of C-peptide in human serum, plasma and urine.

The assay is intended for use as an aid in the diagnosis and treatment of patients with abnormal insulin secretion.

The **e**lectro**c**hemi**l**uminescence **i**mmuno**a**ssay "ECLIA" is intended for use on Elecsys and **cobas e** immunoassay analyzers.

Summary

C-peptide is a single chain 31-amino acid (AA 33-63) connecting (C) polypeptide with a molecular weight of approximately 3021 daltons.[1,2]

In the process of biosynthesis of insulin the C-peptide is formed as a by-product together with insulin by the proteolytic cleavage of the precursor molecule proinsulin, stored in secretory granules in the Golgi complex of the pancreatic β-cells. Proinsulin in turn was cleaved from preproinsulin.[2,3]

C-peptide fulfills an important function in the assembly of the two-chain insulin (A- and B-chain) structure and the formation of the two disulfide bonds within the proinsulin molecule. Insulin and C-peptide are secreted in equimolar amounts and released into circulation via the portal vein.[4] As half of the insulin, but almost none of the C-peptide is extracted in the liver, C-peptide has a longer half-life (about 35 minutes) than insulin; 5 to 10 times higher concentration of C-peptide persist in the peripheral circulation, and these levels fluctuate less than insulin.[2,3,4]

The liver does not extract C-peptide, which is removed from the circulation by the kidneys and degraded, with a fraction excreted unchanged in the urine. The concentration in urine is about 20-50 fold higher than in serum. C-peptide concentrations are therefore elevated in renal disease.[1,2,3]

In the past, C-Peptide has been considered biologically inactive. However, recent studies have demonstrated that it is capable of eliciting molecular and physiological effects suggesting that C-peptide is in fact a bioactive peptide. There is evidence that C-peptide replacement, together with insulin administration, may prevent the development or retard the progression of long-term complications in type 1 diabetes.[5,6,7,8,9,10]

Measurements of C-peptide, insulin and glucose are used as an aid in the differential diagnosis of hypoglycemia (factitious hypoglycemia and hypoglycemia caused by hyperinsulinism) to ensure an appropriate management and therapy of the patients. To quantify the endogenous insulin secretion, C-peptide is measured basally, after fasting and after stimulation and suppression tests. Due to high prevalence of endogenous anti-insulin antibodies C-peptide concentrations reflect the endogenous pancreatic insulin secretion more reliably in insulin-treated diabetics than the levels of insulin itself. Measurements of C-peptide may therefore be an aid in the assessment of a residual β-cell function in the early stages of type-1 diabetes mellitus and for the differential diagnosis of latent autoimmune diabetes of adults (LADA) and type-2 diabetes.[2,3,11,12,13,14]

C-peptide measurements are also used to assess the success of islet transplantation and for monitoring after pancreatectomy.[2,3]

Urine C-peptide is measured when a continuous assessment of β-cell function is desired or frequent blood sampling is not practical (e.g. in children).[2] C-peptide excretion in urine has been used to assess pancreatic function in gestational diabetes, and in patients with unstable glycemic control in insulin-dependent diabetes mellitus (IDDM).[15,16]

Although testing for C-peptide is not requested for the routine monitoring of diabetes, it is a valuable tool for the individual therapeutic decisions which are essential for an optimal long-term metabolic control.[17,18]

Elevated C-peptide levels may result from increased β-cell activity observed in hyperinsulinism, from renal insufficiency, and obesity.[2]

Correlation was also found between higher C-peptide levels and increasing hyperlipoproteinaemia and hypertension.[19]

Decreased C-peptide levels are observed in: starvation, factitious hypoglycemia, hypoinsulinism (NIDDM, IDDM), Addison's disease and after radical pancreatectomy.

Test principle

Sandwich principle. Total duration of assay: 18 minutes.

- 1st incubation: 20 µL of sample, a biotinylated monoclonal C-peptide-specific antibody, and a monoclonal C-peptide-specific antibody labeled with a ruthenium complex[a)] react to form a sandwich complex.
- 2nd incubation: After addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and streptavidin.
- The reaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Unbound substances are then removed with ProCell/ProCell M. Application of a voltage to the electrode then induces chemiluminescent emission which is measured by a photomultiplier.
- Results are determined via a calibration curve which is instrument-specifically generated by 2-point calibration and a master curve provided via the reagent barcode.

a) Tris(2,2'-bipyridyl)ruthenium(II)-complex ($Ru(bpy)_3^{2+}$)

Reagents - working solutions

The reagent rackpack is labeled as CPEPTID.

M Streptavidin-coated microparticles (transparent cap), 1 bottle, 6.5 mL:
Streptavidin-coated microparticles 0.72 mg/mL; preservative.

R1 Anti-C-peptide-Ab~biotin (gray cap), 1 bottle, 9 mL:
Biotinylated monoclonal anti-C-peptide antibody (mouse) 1 mg/L, phosphate buffer 50 mmol/L, pH 6.0; preservative.

R2 Anti-C-peptide-Ab~$Ru(bpy)_3^{2+}$ (black cap), 1 bottle, 9 mL:
Monoclonal anti-C-peptide antibody (mouse) labeled with ruthenium complex 0.4 mg/L; phosphate buffer 50 mmol/L, pH 6.0; preservative.

Precautions and warnings

For in vitro diagnostic use.
Exercise the normal precautions required for handling all laboratory reagents.
Disposal of all waste material should be in accordance with local guidelines.
Safety data sheet available for professional user on request.

Avoid foam formation in all reagents and sample types (specimens, calibrators and controls).

Reagent handling

The reagents in the kit have been assembled into a ready-for-use unit that cannot be separated.

All information required for correct operation is read in from the respective reagent barcodes.

Storage and stability

Store at 2-8 °C.

Do not freeze.

Store the Elecsys reagent kit **upright** in order to ensure complete availability of the microparticles during automatic mixing prior to use.

Stability	
unopened at 2-8 °C	up to the stated expiration date
after opening at 2-8 °C	12 weeks

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Stability	
on the analyzers	8 weeks

Specimen collection and preparation

Only the specimens listed below were tested and found acceptable.

Serum collected using standard sampling tubes or tubes containing separating gel.

Li-heparin and K_3-EDTA plasma.

Criterion: Recovery within 90-110 % of serum value or slope 0.9-1.1 + coefficient of correlation > 0.95.

24 h Urine, 1:10 prediluted with Diluent MultiAssay.

Stability of the serum and 24 h urine samples: 4 hours at 15-25 °C, 24 hours at 2-8 °C, 30 days at -20 °C. Freeze only once.[20]

The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, i.e. not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. When processing samples in primary tubes (sample collection systems), follow the instructions of the tube manufacturer.

Centrifuge samples containing precipitates before performing the assay.

Do not use heat-inactivated samples.

Do not use samples and controls stabilized with azide.

Ensure the samples, calibrators and controls are at 20-25 °C prior to measurement.

Due to possible evaporation effects, samples, calibrators and controls on the analyzers should be analyzed/measured within 2 hours.

Materials provided

See "Reagents – working solutions" section for reagents.

Materials required (but not provided)

- REF 03184919190, C-Peptide CalSet, for 4 x 1 mL
- REF 05341787190, PreciControl Multimarker, for 3 x 2 mL each of PreciControl Multimarker 1 and 2
- REF 05341787160, PreciControl Multimarker, for 3 x 2 mL each of PreciControl Multimarker 1 and 2 (for USA)
- REF 03609987190, Diluent MultiAssay, 2 x 16 mL sample diluent
- General laboratory equipment
- Elecsys 2010, MODULAR ANALYTICS E170 or **cobas e** analyzer

Accessories for Elecsys 2010 and **cobas e** 411 analyzers:

- REF 11662988122, ProCell, 6 x 380 mL system buffer
- REF 11662970122, CleanCell, 6 x 380 mL measuring cell cleaning solution
- REF 11930346122, Elecsys SysWash, 1 x 500 mL washwater additive
- REF 11933159001, Adapter for SysClean
- REF 11706802001, Elecsys 2010 AssayCup, 60 x 60 reaction vessels
- REF 11706799001, Elecsys 2010 AssayTip, 30 x 120 pipette tips

Accessories for MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers:

- REF 04880340190, ProCell M, 2 x 2 L system buffer
- REF 04880293190, CleanCell M, 2 x 2 L measuring cell cleaning solution
- REF 03023141001, PC/CC-Cups, 12 cups to prewarm ProCell M and CleanCell M before use
- REF 03005712190, ProbeWash M, 12 x 70 mL cleaning solution for run finalization and rinsing during reagent change
- REF 12102137001, AssayTip/AssayCup Combimagazine M, 48 magazines x 84 reaction vessels or pipette tips, waste bags
- REF 03023150001, WasteLiner, waste bags
- REF 03027651001, SysClean Adapter M

Accessories for all analyzers:

- REF 11298500316, Elecsys SysClean, 5 x 100 mL system cleaning solution
- REF 11298500160, Elecsys SysClean, 5 x 100 mL system cleaning solution (for USA)

Assay

For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator's manual for analyzer-specific assay instructions.

Resuspension of the microparticles takes place automatically prior to use. Read in the test-specific parameters via the reagent barcode. If in exceptional cases the barcode cannot be read, enter the 15-digit sequence of numbers.

Bring the cooled reagents to approx. 20 °C and place on the reagent disk (20 °C) of the analyzer. Avoid foam formation. The system automatically regulates the temperature of the reagents and the opening/closing of the bottles.

Calibration

Traceability: This method has been standardized against the WHO International Reference Reagent for C-peptide of human insulin for immunoassay, IRR, code 84/510, established 1986, from the National Institute for Biological Standards and Control (NIBSC).[21]

Every Elecsys reagent set has a barcoded label containing specific information for calibration of the particular reagent lot. The predefined master curve is adapted to the analyzer using the relevant CalSet.

Calibration frequency: Calibration must be performed once per reagent lot using fresh reagent (i.e. not more than 24 hours since the reagent kit was registered on the analyzer). Renewed calibration is recommended as follows:

- after 1 month (28 days) when using the same reagent lot
- after 7 days (when using the same reagent kit on the analyzer)
- as required: e.g. quality control findings outside the defined limits

Quality control

For quality control, use PreciControl Multimarker.

In addition, other suitable control material can be used.

Controls for the various concentration ranges should be run individually at least once every 24 hours when the test is in use, once per reagent kit, and following each calibration.

The control intervals and limits should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits.

Follow the applicable government regulations and local guidelines for quality control.

Calculation

The analyzer automatically calculates the analyte concentration of each sample in nmol/L, ng/mL or pmol/L (selectable).

Conversion factors:	ng/mL (µg/L) x 0.33333 = nmol/L
	ng/mL x 333.33 = pmol/L
	nmol/L x 3.0 = ng/mL
	pmol/L x 0.003 = ng/mL

Limitations - interference

The assay is unaffected by icterus (bilirubin < 855 µmol/L or < 50 mg/dL), hemolysis (Hb < 0.186 mmol/L or < 0.3 g/dL), lipemia (Intralipid < 2000 mg/dL) and biotin (< 246 nmol/L or < 60 ng/mL).

Criterion: Recovery within ± 10 % of initial value.

Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

No interference was observed from rheumatoid factors up to a concentration of 1200 IU/mL.

There is no high-dose hook effect at C-peptide concentrations up to 60 nmol/L (180 ng/mL).

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In vitro tests were performed on 17 commonly used pharmaceuticals in serum and 13 commonly used pharmaceuticals in urine. No interference with the assay was found.

In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design.

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Limits and ranges

Measuring range

Serum and plasma: 0.003-13.3 nmol/L or 0.010-40.0 ng/mL (defined by the lower detection limit and the maximum of the master curve). Values below the lower detection limit are reported as < 0.003 nmol/L (< 0.010 ng/mL). Values above the measuring range are reported as > 13.3 nmol/L (> 40.0 ng/mL) (or up to 133 nmol/L or 400 ng/mL for 10-fold diluted samples).

Urine: 0.030-133 nmol/L or 0.100-400 ng/mL (defined by the lower detection limit and the maximum of the master curve for urine prediluted 1:10 with Diluent MultiAssay). Values below the lower detection limit are reported as < 0.030 nmol/L (< 0.100 ng/mL). Values above the measuring range are reported as > 133 nmol/L (> 400 ng/mL) or retested in a higher dilution of the sample.

Lower limits of measurement

Lower detection limit of the test

Lower detection limit: 0.003 nmol/L (0.010 ng/mL)

The lower detection limit represents the lowest measurable analyte level that can be distinguished from zero. It is calculated as the value lying two standard deviations above that of the lowest standard (master calibrator, standard 1 + 2 SD, repeatability study, n = 21).

Dilution

Serum and plasma: Although the necessity for dilutions is unlikely due to the high measuring range samples with C-peptide concentrations above the measuring range can be diluted with Diluent MultiAssay. The recommended dilution is 1:10 (either automatically by the MODULAR ANALYTICS E170, Elecsys 2010 or **cobas e** analyzers or manually). The concentration of the diluted sample must be > 1.3 nmol/L (> 4 ng/mL).

After manual dilution, multiply the result by the dilution factor.

After dilution by the analyzers, the MODULAR ANALYTICS E170, Elecsys 2010 and **cobas e** software automatically takes the dilution into account when calculating the sample concentration.

Urine: All urine samples must be prediluted 1:10 with Diluent MultiAssay before measurement. After dilution by the analyzers, the MODULAR ANALYTICS E170, Elecsys 2010 and **cobas e** software automatically takes the dilution into account when calculating the sample concentration. Urine samples with C-peptide concentrations above the measuring range can be retested using a 1:20 or higher dilution with Diluent MultiAssay either automatically by the MODULAR ANALYTICS E170, Elecsys 2010 or **cobas e** analyzers or manually. The concentration of the diluted sample must be > 1.3 nmol/L (> 4 ng/mL).

After manual dilution, multiply the result by the dilution factor.

After dilution by the analyzers, the MODULAR ANALYTICS E170, Elecsys 2010 and **cobas e** software automatically takes the dilution into account when calculating the sample concentration.

Expected values

Studies with the Elecsys C-Peptide assay were performed using serum samples from apparently healthy fasting males and females, and 24 h urine samples from apparently healthy individuals.

The following results were obtained:

	N	Median	5th-95th percentile	Unit
C-peptide in serum/plasma	96	1.96	1.1-4.4	ng/mL
		0.65	0.37-1.47	nmol/L
C-peptide in 24 h urine	79	54.8	17.2-181	µg/24 h
		18.3	5.74-60.3	nmol/24 h

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

Specific performance data

Representative performance data on the analyzers are given below. Results obtained in individual laboratories may differ.

Precision

Serum and plasma:

Precision was determined using Elecsys reagents and pooled human sera in a modified protocol (EP5-A) of the CLSI (Clinical and Laboratory Standards Institute): 6 times daily for 10 days (n = 60); human serum 3 at one day 5 times (n = 59); repeatability on MODULAR ANALYTICS E170 analyzer (n = 21). The following results were obtained:

Elecsys 2010 and **cobas e** 411 analyzers					
			Repeatability		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Master calibrator 3	0.302	0.907	0.005	0.015	1.6
Human serum 2	0.606	1.82	0.028	0.084	4.6
Human serum 3	1.90	5.69	0.034	0.103	1.8
Human serum 4	5.57	16.7	0.212	0.637	3.8
Human serum 5	8.05	24.1	0.105	0.315	1.3

Elecsys 2010 and **cobas e** 411 analyzers					
			Intermediate precision		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Master calibrator 3	0.302	0.907	0.007	0.021	2.4
Human serum 2	0.606	1.82	0.030	0.090	5.0
Human serum 3	1.90	5.69	0.042	0.126	2.2
Human serum 4	5.57	16.7	0.209	0.627	3.8
Human serum 5	8.05	24.1	0.141	0.424	1.8

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
	Repeatability				
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Master calibrator 3	0.33	0.98	0.002	0.005	0.6
Human serum 2	0.643	1.93	0.003	0.009	0.5
Human serum 3	2.00	6.01	0.019	0.056	0.9
Human serum 4	5.99	18.0	0.054	0.163	0.9
Human serum 5	8.59	25.8	0.126	0.378	1.5

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
	Intermediate precision				
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Master calibrator 3	0.307	0.922	0.006	0.017	1.9
Human serum 2	0.615	1.84	0.010	0.030	1.6
Human serum 3	1.92	5.75	0.044	0.132	2.3

Precision was determined using Elecsys reagents and controls in a protocol (EP5-A2) of the CLSI (Clinical and Laboratory Standards Institute): 2 runs per day in duplication each for 21 days (n = 84). The following results were obtained:

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Elecsys 2010 and **cobas e** 411 analyzers					
			Repeatability		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
PreciControl MM[b)]1	0.667	2.00	0.006	0.018	0.9
PreciControl MM2	3.33	9.98	0.043	0.129	1.3

b) MM = Multimarker

Elecsys 2010 and **cobas e** 411 analyzers					
			Intermediate precision		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
PreciControl MM1	0.667	2.00	0.016	0.047	2.3
PreciControl MM2	3.33	9.98	0.091	0.272	2.7

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
			Repeatability		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
PreciControl MM1	0.650	1.95	0.020	0.059	3.0
PreciControl MM2	3.24	9.72	0.104	0.312	3.2

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
			Intermediate precision		
Serum sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
PreciControl MM1	0.650	1.95	0.028	0.084	4.3
PreciControl MM2	3.24	9.72	0.151	0.453	4.7

Urine:

Precision was determined using Elecsys reagents, native and spiked human urine; repeatability (n = 21), intermediate precision: 1-fold determination in 10 runs (n = 10); predilution by the analyzer. The following results were obtained:

Elecsys 2010 and **cobas e** 411 analyzers					
	Repeatability				
Urine sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Urine 1	5.38	16.1	0.158	0.475	2.9
Urine 2	8.92	26.8	0.141	0.428	1.6
Urine 3	12.8	38.4	0.515	1.54	4.0
Urine 4	54.1	162	0.888	2.67	1.6
Urine 5	78.3	235	1.70	5.09	2.2

Elecsys 2010 and **cobas e** 411 analyzers					
	Intermediate precision				
Urine sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Urine 1	5.33	16.0	0.214	0.64	4.0
Urine 2	9.06	27.2	0.222	0.67	2.4
Urine 3	12.9	38.7	0.237	0.71	1.8
Urine 4	53.5	160	1.95	5.86	3.6
Urine 5	76.4	229	1.32	3.97	1.7

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
	Repeatability				
Urine sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Urine 1	5.55	16.7	0.045	0.13	0.8
Urine 2	9.48	28.4	0.087	0.26	0.9
Urine 3	13.1	39.2	0.081	0.24	0.6
Urine 4	58.9	177	0.454	1.36	0.8
Urine 5	81.8	246	1.09	3.28	1.3

MODULAR ANALYTICS E170, **cobas e** 601 and **cobas e** 602 analyzers					
	Intermediate precision				
Urine sample	Mean		SD		CV
	nmol/L	ng/mL	nmol/L	ng/mL	%
Urine 1	5.82	17.5	0.197	0.59	3.4
Urine 2	9.64	28.9	0.385	1.15	4.0
Urine 3	13.9	41.8	0.366	1.10	2.6
Urine 4	58.6	176	1.74	5.22	3.0
Urine 5	83.0	249	1.53	4.60	1.8

Method comparison

Serum

A comparison of the Elecsys C-Peptide assay (y) with a commercially available C-peptide assay (x) using clinical serum samples gave the following correlations:

Number of samples measured: 266

Passing/Bablok[22]	Linear regression
y = 1.07x + 0.026	y = 1.11x - 0.149
τ = 0.962	r = 0.996

The sample concentrations were between approximately 0.157 and 7.26 nmol/L or approximately 0.470 and 21.8 ng/mL.

Urine

A comparison of the Elecsys C-Peptide assay (y) with a commercially available C-peptide assay (x) using clinical urine samples gave the following correlations:

Number of samples measured: 72

Passing/Bablok[22]	Linear regression
y = 0.95x - 0.823	y = 1.02x - 3.69
τ = 0.921	r = 0.992

The sample concentrations were between approximately 0.223 and 173 nmol/L or approximately 0.670 and 518 ng/mL.

Analytical specificity

For the monoclonal antibodies used, the following cross-reactivities were found:

Substance	Concentration tested µg/mL	Cross-reactivity %
Proinsulin, human[c)]	0.10	32.5
Insulin, human[d)]	8.66	0.005
Insulin, porcine[e)]	7.50	n.d.[f)]
Insulin, bovine[g)]	7.69	n.d.
Somatomedin (Insulin-like growth factor 1 - IGF-I)	1.0	n.d.
Human Growth Hormone	10.0	n.d.

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Substance	Concentration tested µg/mL	Cross-reactivity %
Glucagon	10.0	n.d.

c) WHO preparation 84/611

d) WHO preparation 66/304

e) WHO preparation 86/690

f) n.d. = not detectable

g) WHO preparation 83/511

The Elecsys C-Peptide assay uses two monoclonal antibodies specifically directed against human C-peptide. The antibodies show cross-reactivity with the C-chain of human proinsulin and presumably with partially processed proinsulins (split products). The concentrations of proinsulin and split products of fasting healthy subjects are 100 times lower than the C-peptide concentrations and therefore the cross-reactivity is of no clinical significance. In patients with insulinoma, the proinsulin concentrations are reported as up to 60-fold higher than those from fasting healthy subjects.[23, 24]

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For further information, please refer to the appropriate operator's manual for the analyzer concerned, the respective application sheets, the product information and the Method Sheets of all necessary components (if available in your country).

A point (period/stop) is always used in this Method Sheet as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols

Roche Diagnostics uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard.

CONTENT	Contents of kit
SYSTEM	Analyzers/Instruments on which reagents can be used
REAGENT	Reagent
CALIBRATOR	Calibrator
→	Volume after reconstitution or mixing

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