Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO/IEC 17025:2005
Registration number: **K 127**

of **Bronkhorst High-Tech B.V.**
Afd. R&D

This annex is valid from: **19-07-2017** to **01-06-2018** Replaces annex dated: **14-06-2017**

Location(s) where activities are performed under accreditation

Head Office

Nijverheidsstraat 1A
7261 AK
Ruurlo
Netherland

Location	Abbreviation/ location code
Hoofdlocatie Nijverheidsstraat 1A 7261 AK Ruurlo Netherland	RU

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
FG 1 0	FLOW OF GAS				RU
FG 1 1	Gas volume flow	0.16 ml/min – 0.38 ml/min	0.55%	Mercury Sealed Piston Prover	
		0.38 ml/min – 0.71 ml/min	0.45%	Mercury Sealed Piston Prover	
		0.71 ml/min – 3.5 ml/min	0.35%	Mercury Sealed Piston Prover	
		3.5 ml/min – 16.6 ml/min	0.30%	Mercury Sealed Piston Prover	

This annex has been approved by the Board of the Dutch Accreditation Council, on its behalf,

J.A.W.M. de Haas
Director of Operations

[1] Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty, *U*, is calculated according to EA-4/02 "Expression of the Uncertainty of Measurement in Calibration".

Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO/IEC 17025:2005
Registration number: **K 127**

of **Bronkhorst High-Tech B.V.**
Afd. R&D

This annex is valid from: **19-07-2017** tot **01-06-2018** Replaces annex dated: **14-06-2017**

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
FG 1 1	Gas volume flow	16.6 ml/min – 83.4 ml/min	0.25%	Mercury Sealed Piston Prover	
		83.4 ml/min – 22.5 l/min	0.25%	Mercury Sealed Piston Prover	
		22.5 l/min – 6645 l/min	0.25%	Dual Rotary Meter	
FG 1 1	Gas mass flow	0.15 ml_n/min – 0.35 ml_n/min	0.55%	Mercury Sealed Piston Prover	
		0.35 ml_n/min – 0.66 ml_n/min	0.45%	Mercury Sealed Piston Prover	
		0.66 ml_n/min – 3.3 ml_n/min	0.35%	Mercury Sealed Piston Prover	
		3.3 ml_n/min – 15.5 ml_n/min	0.30%	Mercury Sealed Piston Prover	
		15.5 ml_n/min – 77.5 ml_n/min	0.25%	Mercury Sealed Piston Prover	
		77.5 ml_n/min – 21 l_n/min	0.25%	Mercury Sealed Piston Prover	
		21 l_n/min – 6202 l_n/min	0.25%	Dual Rotary Meter	
FL 1 0	FLOW OF LIQUIDS				RU
FL 1 1	Liquid flow rate	1 – 2 g/h	0.65%	Balance	
		2 – 10 g/h	0.35%		
		10 – 200 g/h	0.10%		

Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO/IEC 17025:2005
Registration number: **K 127**

of **Bronkhorst High-Tech B.V.**
Afd. R&D

This annex is valid from: **19-07-2017** tot **01-06-2018** Replaces annex dated: **14-06-2017**

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
FL 1 1	Liquid flow rate	200 g/h – 30 kg/h	0.10%	Balance	
PV 0 0	PRESSURE AND VACUUM				RU
PV 1 1	Absolute gas pressure	(0.025 – 400) bar	$5 \cdot 10^{-4} \cdot p$	Pressure Calibrator	
PV 1 2	Over atmospheric gas pressure	(0.025 – 400) bar	$5 \cdot 10^{-4} \cdot p_e$	Pressure Calibrator	

Remarks:

The ambient temperature and humidity during calibration is: 21 °C ± 2 °C and 50 %rh± 20 %rh resp.

Calibration gases:
For Piston prover: Compressed dry Air, Ar, N_2, CO_2, H_2 or He; other gases on request
For Rotary meter: Compressed dry Air only

The flow units ml_n/min and l_n/min refer to gases under normal (n) conditions of 273.15 K and 101325 Pa.

Fixed normal densities ρ_n [kg/m^3] are used to convert from the flow unit [l_n/min] to the mass flow unit [g/h], using the equation:

$$\Phi_m\left[\frac{g}{h}\right] = \Phi_m\left[\frac{l_n}{\text{min.}}\right] \cdot \rho_n\left[\frac{kg}{m^3}\right] \cdot 60$$

For example:

Gas	Normal density [kg/m3]	Equivalent [g/h] to 1 [l_n/min]:
Compressed dry air (AiR)	1.293	77.58
Argon (Ar)	1.784	107.0
Nitrogen (N2)	1.250	75.02
Carbon dioxide (CO2)	1.977	118.6
Hydrogen (H2)	0.08991	5.395
Helium (He)	0.1785	10.71

This way, any flow of any gas in [l_n/min] can be converted into mass flow in [g/h].