STRECKEISEN SEISMIC INSTRUMENTATION	**CERTIFICATE OF CALIBRATION**		**V2.5-1.1**
Seismometer type	**STS-2.5**	Test engineer	STRECKEISEN SEISMIC INSTRUMENTATION
Serial number	**192409**	Nicolas Rüst	
Calibration valid-from	**February 25, 2021**		

ITEM 1 — PRELIMINARY REMARKS

The certificate of calibration condenses information for the sophisticated customer who is interested in the exact status and performance of a specific seismometer.
For a detailed description and explanations on how to read and use this information we refer to manuals and fact sheets available on www.kinemetrics.com.
Please note the meaning of the following symbols used below: R(value) = real part of value, I(value) = imaginary part of value, NE = "not evaluated".

ITEM 2 — OSCILLATOR FREQUENCY & HUMIDITY

NOTE	The initial oscillator frequency f and the air humidity RH have been measured at room temperature. A drift of the relative air humidity within the seismometer is a diagnostic tool for sensor functionality monitoring.
parameter	$f = 22.05\ kHz$ $\quad$ $RH < 5\ \%$

ITEM 3 — CORNER PERIOD & DAMPING CONSTANT

NOTE: Values for low frequency corner period T and damping constant h, with standard deviation σ each, constraining $118.8\ s < T < 121.2\ s$ and $0.700 < h < 0.714$ according to 1 %-specification. Parameters for the sensor components U, V, W are optimized for best fit between 5.6 and $29.9\ mHz$.

parameter	U	σ_U	V	σ_V	W	σ_W
T	$120.2\ s$	$0.02\ \%$	$119.9\ s$	$0.02\ \%$	$120.2\ s$	$0.04\ \%$
h	0.709	$0.06\ \%$	0.705	$0.05\ \%$	0.710	$0.09\ \%$

ITEM 4 — POLES & ZEROS

NOTE: Real and imaginary parts of all poles $p_1,..., p_4$ and zeros $z_1,..., z_5$ are given in $\frac{rad}{s}$. Optimized parameters yielding best fit between 0.75 and $50\ Hz$.

pre-established values	z_1	z_2	z_3	$R(z_4)$	$I(z_4)$	
U, V, W	15.7	15.7	605	522	961	
optimized parameters	z_5	p_1	p_2	$R(p_3)$	$I(p_3)$	p_4
U	-869	15.97	15.97	364	79	869
V	-876	15.98	15.98	364	78	876
W	-869	15.99	15.99	357	84	869

ITEM 5 — SENSITIVITY COORDINATES

NOTE: Individiual generator constants G (default value $G_0 = 1500\ \frac{Vs}{m}$), azimuth angles φ relative to orientation hole, and tilt angels ϑ relative to z-direction are deduced from shake-table calibration.

coordinate	G	φ	ϑ
U	$1333\ \frac{Vs}{m}$	$269.75\ °$	$56.95\ °$
V	$1354\ \frac{Vs}{m}$	$149.61\ °$	$57.06\ °$
W	$1362\ \frac{Vs}{m}$	$29.74\ °$	$56.95\ °$

ITEM 6 — COMPLETE TRANSFER FUNCTION FORMULAE

NOTE: The transfer function, applicable in the frequency range between $1\ mHz$ and $50\ Hz$, is related to ground velocity. s denotes Laplace complex frequency and i the imaginary unit.

$$TF_{tot}(s) = G \cdot TF_{hfcal}(s) \cdot TF_{hfcorr}(s) \cdot TF_{lf}(s) \quad \text{with generator constant } G$$

$$TF_{hfcal}(s) = -\frac{p_1 p_2 \cdot (R(p_3)^2 + I(p_3)^2)}{z_1 z_2} \cdot \frac{(s+z_1)(s+z_2)(s+z_5)}{(s+p_1)(s+p_2)(s+R(p_3)+iI(p_3))(s+R(p_3)-iI(p_3))(s+p_4)},$$

$$TF_{hfcorr}(s) = \frac{(s+z_3)(s+R(z_4)+iI(z_4))(s+R(z_4)-iI(z_4))}{(R(z_4)^2+I(z_4)^2)z_3} \quad \text{and} \quad TF_{lf}(s) = \frac{s^2}{s^2 + 2h\frac{2\pi}{T} \cdot s + \left(\frac{2\pi}{T}\right)^2}$$

ITEM 7	ADDITIONAL INFORMATION
NOTE	

ITEM 8	ADDITIONAL FEATURES
NOTE	

ITEM 9	MANUFACTURER INFORMATION		
CONTACT	Streckeisen GmbH	Phone	+41 52 315 67 00
	Daettlikonerstr. 5	Fax	+41 52 315 67 09
	CH-8422 Pfungen	E-Mail	info@streckeisen.biz
	Switzerland	Homepage	www.streckeisen.swiss