

MAS-100 REGULUS

SERVICE INFORMATION LETTER 2020_02 V3.0

Product affected: MAS-100 Family

Change level:

- optional
- recommend by MBV
- mandatory
- for information only

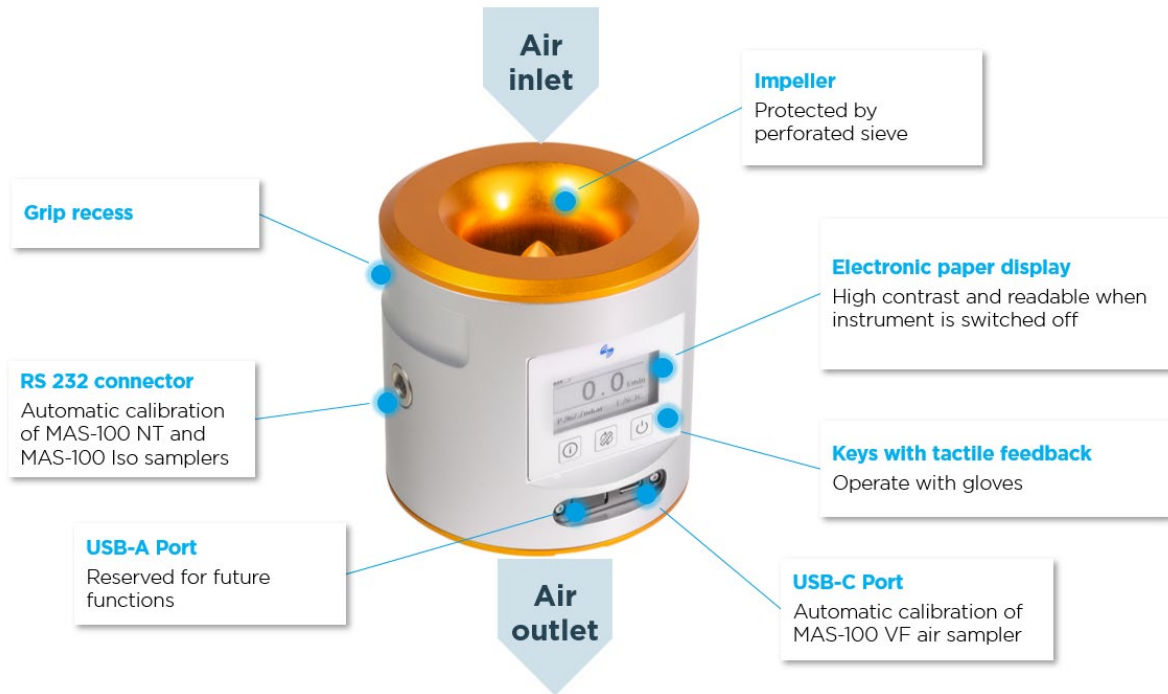
1. DOCUMENT HISTORY

VERSION	RELEASED	HISTORY
3.0	2023-08-09	Extension of Air Flow Range to 300 L/min and publication of accuracy specification above 200 L/min up to 300 L/min. (chapter 4.1) Starting September 1st, 2023, MAS-100 Regulus will be calibrated in the range from 50 L/min - 300 L/min.
2.0	2022-07-21	Added option to have the MAS-100 Regulus calibrated for mass flow (Standard Liters per Minute, SLPM) in MBVs ISO 17025 accredited calibration laboratory in addition to volume flow calibration (Liters per Minute, L/min) (new chapter 5.6) Added details on the calibration certificate of air samplers (new chapter 5.3)
1.0	2020-07-31	First released version Introduction of the MAS-100 Regulus digital anemometer as replacement to DA-100 NT

2. REASON



This SIL introduces the MAS-100 Regulus® digital anemometer to the market. The MAS-100 Regulus replaces the DA-100 NT and is used to calibrate the air flow of all MAS-100 microbial air samplers except those for compressed gasses. The anemometer works on the principle of impeller anemometer.

3. MAS-100 REGULUS



4. TECHNICAL SPECIFICATIONS

4.1. COMPARISON OF DA-100 NT AND MAS-100 REGULUS

	A-100 NT	MAS-100 Regulus	More information
			
Air Flow Range	100 L/min	50-300 L/min	Ready to calibrate future MAS-100 air samplers
Accuracy	+/- 1 %	+/- 1 L/min at 50-200 L/min +/- 1.5L/min above 200 up to 300 L/min	Excellent accuracy over wide air flow range
Altitude	0-2000 m ASL	0-3000 m ASL	Compliant air sampler calibration at all altitudes
Temperature	Storage: 0 to +40°C Operation: +5 to +40°C	Storage: 0 to +40°C Operation: +15 to +30°C	-
Calibration	Liters per minute (L/min)	- Liters per minute (LPM) - Optionally Standard Liters per minute (SLPM)	Direct comparison of air flows of air samplers with sensors (MAS-100 NT and MAS-100 Iso families)
Battery	9 V DC (6LR61)	9 V DC (6LR61)	-
Dimension (diameter x height)	11cm x 7.55cm	11cm x 11.5cm	-
Weight	0.8 kg	1.2 kg	-
Interfaces	RS 232	RS 232 & USB C	Backward and forward compatibility of interface
Display	LCD	Electronic Paper Display	Improved contrast and easy legibility
Transportation case	Standard	Shock-resistant Pelicase	Protects calibration instrument from damage. Water and dust-proof. Life-time warranty on case
Impeller technology	Ruby-pin	Ball-bearing	Mechanically more robust and extended lifetime
Impeller friction test	-	Self-check test	Warns from potential damage to ball-bearing
Shock-detection	-	Acceleration test	Warns if instrument dropped approx. 1m or more

4.2. STATEMENT OF EQUIVALENCE

Comparison tests between MAS-100 Regulus and DA-100 NT performed at MBV both on MAS-100 air samplers and on the ISO 17025 accredited test bench at MBV demonstrated equivalency of air flow readings within specifications.

4.3. COMPATIBILITY

4.3.1. AUTOMATIC ADJUSTMENT AND CALIBRATION

MAS-100 Regulus has been tested for automatic calibration and adjustment with the instruments and firmware versions listed in this table:

Instrument	Firmware Version															
MAS-100 NT	1.2	1.3	1.4	1.6	1.7.18											
MAS-100 VF	1.07.1251															
MAS-100 Iso NT	1.9	2.0	2.1	2.11	2.2	2.3	2.4	2.5	2.55	2.6	2.7	2.7.20	2.8.5	2.8.6	2.9	
MAS-100 Iso MH	1	1.2	1.2.6													

4.3.2. MANUAL ADJUSTMENT AND CALIBRATION

All instruments listed above plus the following instruments can be manually adjusted and calibrated using MAS-100 Regulus: MAS-100 Eco, MAS-100, MAS-100 Iso CU/AU/VU

5. ADDITIONAL INFORMATION

Air samplers which have been developed before MAS-100 Regulus may still refer to the DA-100 NT due to a fixed text in the firmware/software version of the air sampler. This chapter describes incorrect expressions on firmware, software and certificates, due to the newly introduced anemometer MAS-100 Regulus. Different firmware versions of the air sampler may differ slightly from the description below. In general, the term DA-100 NT stands for digital anemometer and can be replaced by MAS-100 Regulus. The unique serial number of the adjustment equipment mentioned on the certificate identifies which calibration equipment was used.

Serial number: 15'000 – 17'000 DA-100 NT

Serial number: 18'000 – 20'000 MAS-100 Regulus

5.1. MAS-100 ISO NT AND MAS-100 ISO MH CERTIFICATE

On the certificate of the MAS-100 Iso NT and MAS-100 Iso MH air sampler, DA-100 NT is displayed at various locations even if a MAS-100 Regulus is used.

Adjustment	Adjustment equipment:	DA-100 NT digital anemometer
	Accuracy:	+/- 1%
	Serial number:	15506
	Adjustment date:	27. Aug. 2019
	Deviation in V/min:	0.0
	Adjustment conditions:	Temp.: 21.8 [°C], Amb. pressure: 971 [mbar]
	ADC at 0 Flow [mV]:	801
	ADC at target flow [mv]:	3763
	Gain:	129

Calibration check results

Measurement number		1	2	3	Result
Target air flow	[SLPM]	102.5	102.5	102.5	102.5
Air flow on DA-100 NT measurement 1	[SLPM]	102.2	103.3	103.7	NA
Air flow on DA-100 NT measurement 2	[SLPM]	102.4	102.8	103.4	NA
Air flow on DA-100 NT measurement 3	[SLPM]	102.8	103.2	103.3	NA
Air flow on DA-100 NT	[SLPM]	102.4	103.2	103.4	NA
Flow deviation of DA-100 NT *	[l/min]	+0.0	+0.0	+0.0	NA
Testresult (corr. air flow of DA-100 NT)	[SLPM]	102.4	103.2	103.4	103.0
Deviation from target air flow: Maximum allowable deviation: 2.5%	[%]	-0.1	+0.7	+0.9	+0.5
Calibration check status:					Accepted

(*) For the DA-100 NT the deviation mentioned on the calibration certificate is not normalized to SLPM conditions (20°C; 1013 mbar) as it is not significant: The correction would be 0.34% per °C (1/293) and 0.09% (1/1013) per mbar difference to the SLPM standard conditions. E.g. a 0.2l/min deviation measured at 25°C and 940mbar leads to an error of 8.8% or 0.018 l/min.

5.2. MAS-100 NT&NT EX CERTIFICATE

On the certificate of the MAS-100 NT and MAS-100 NT Ex air sampler, DA-100 NT is displayed at various locations even if a MAS-100 Regulus is used.

Calibration results:

		Sequence			Result
		1	2	3	
Target air flow	SLPM	100.0	100.0	100.0	100.0
Air flow on anemometer measurement 1	SLPM	99.9	100.0	100.1	NA
Air flow on anemometer measurement 2	SLPM	99.9	99.8	99.6	NA
Air flow on anemometer measurement 3	SLPM	100.0	100.0	100.0	NA
Air flow	SLPM	99.9	99.9	99.9	NA
Flow deviation of the anemometer ¹	l/min	0.0	0.0	0.0	NA
Calibration result (corr. air flow of anemometer)	SLPM	99.9	99.9	99.9	99.9
Deviation from target air flow Maximum allowable deviation: ± 2.5%	%	-0.1	-0.1	-0.1	-0.1
Calibration check status:					Accepted

¹) For the DA-100 NT the deviation mentioned on the calibration certificate is not normalized to SLPM conditions (20°C; 1013 mbar) as it is not significant: The correction would be 0.34% per °C (1/293) and 0.09% (1/1013) per mbar difference to the SLPM standard conditions. E.g. a 0.2 l/min deviation measured at 25°C and 940 mbar leads to an error of 8.8% or 0.018 l/min.

5.3. INFLUENCE OF MAS-100 REGULUS CALIBRATION DATA ON THE CALIBRATION OF MICROBIAL AIR SAMPLERS

Calibration results of MAS-100 Regulus at each flow rate follow a standard distribution with a low deviation and variation from the reference flow (below an excerpt of a typical MAS-100 Regulus calibration certificate in L/min).

Flow L/min	Reference L/min	Examinee L/min	Deviation L/min
50	49.4	49.2	-0.2
60	59.3	59.3	0.0
70	69.2	69.1	-0.1
80	79.8	79.8	0.0
90	89.7	89.6	-0.1
100	99.6	99.5	-0.1
110	109.4	109.3	-0.1
120	119.0	118.9	-0.1

This deviation of MAS-100 Regulus calibration data from the nominal flow is random and not systematic with a mean of 0 L/min . It is therefore neglected for the calibration of the MAS-100 air samplers. Consequently, all calibration certificates of air samplers will show a deviation of 0.0 L/min for the adjustment equipment MAS-100 Regulus. An excerpt of an air sampler calibration certificate is shown below.

Adjustment and calibration certificate #120380_3_201203

Object	Instrument:	MAS-100 NT / NT Ex Microbial Air Sampler
	Serial number:	0000120380
	FW version:	1.7.18
	HW version:	8
	Name:	QC-MAS100NT
	Department:	QC
	Perforated lid:	300 × 0.6 mm
Calibration procedure:	MBV SOP / Version 1.6.31	
Adjustment equipment	Serial number:	18012
	Adjustment date:	08.09.2020
	Deviation:	0.0 [l/min]

5.4. DISPLAY USER INTERFACE (FIRMWARE)

During adjustment and calibration of the MAS-100 NT, MAS-100 NT Ex, MAS-100 Iso NT and MAS-100 Iso MH, the air sampler will display "connect DA-100 NT" or "no connection to DA-100 NT" even though a MAS-100 Regulus is connected. In this context DA-100 NT is to be understood as digital anemometer in general which is also valid for the MAS-100 Regulus.

5.5. CHANGES IN INSTRUMENT PRODUCTION AND AIR SAMPLER ADJUSTMENT/CALIBRATION SERVICES

All instruments currently in production (except those for compressed gas sampling) will be adjusted and calibrated using MAS-100 Regulus with immediate effect. Their factory calibration certificate will show the information outlined in the previous chapters.

All instrument adjusted and calibrated by the MBV service department (except those for compressed gas sampling) will be adjusted and calibrated using MAS-100 Regulus with immediate effect. Their factory calibration certificate will show the information outlined in the previous chapters.

5.6. INSTRUMENT CALIBRATION FOR L/MIN AND OPTIONALLY SLPM

The MAS-100 Regulus is calibrated and certified in MBV's own ISO 17025 accredited calibration laboratory. Service information letter published for the laboratory accreditation:

(https://www.mbv.ch/media/sil_2019_01_iso17025_calibration_laboratory_accreditation.pdf).

Since 03. March 2022 the MBV calibration laboratory is accredited to calibrate air flows in standard liters per minute (SLPM) in addition to volumetric air flow (liters per minute, L/min). Database entry of the Swiss Accreditation Service SAS (only available in German):

https://www.mbv.ch/media/scs_akkreditierung_auszug_0154_de.pdf.

This permits to directly trace to international standards the air flow of MAS-100 microbial air samplers with mass-flow sensors (these are as of July 2022: MAS-100 NT and all variants, MAS-100 Iso NT, MAS-100 Iso MH). MBV offers SLPM certificates as an option for recalibration and for new MAS-100 Regulus (with firmware V1.4 and above) in addition to volume flow (L/min) certificates. In that case four calibration certificates will be issued: 'as found' and 'as left' certificates for both L/min and SLPM.

5.7. UPDATE OF INSTRUMENT DOCUMENTATION

Instrument manuals (user manual, software manuals, quick-start guides etc) of all presently distributed instruments was updated with regards to the introduction of MAS-100 Regulus and the option to calibrate MAS-100 Regulus for SLPM.

All presently distributed qualification (IQ/OQ) documents were updated with regards to the introduction of MAS-100 Regulus.

MBV AG

Stäfa, 09.08.2023/CHA