MUSEN file format (as text)

Each line of a text file describes a single object or specific scene property and can have the following format:

IDENTIFIER | OBJ_ID | OBJ_TYPE_IDENT OBJ_TYPE | OBJ_GEOM_IDENT OBJ_GEOM | OBJ_MATERIAL_IDENT LOCAL_MATERIAL_ID | OBJ_ACTIVITY_IDENT OBJECT_ACTIVITY| OBJ_TIME_IDENT OBJECT_TIME | OBJ_COORD_IDENT OBJECT_COORD …

Each line starts with one of the following indicators, which define the type of information stored in this line. There exist eight possible types of **main identifiers**:

Table 1. List of main identifiers.

IDENTIFIER	Description
0	Information in this line describes one of the physical objects (Particle, Wall, Solid bond, etc.)
22	Information in this line describes computational domain (more information about computational domain is given in the user's guide)
25	Main description of the geometrical object (union of triangular walls)
26	Time-dependent properties of specific geometrical object
27	Indexes of walls included into this geometry
28	Information about selected periodic boundary conditions
29	A flag indicating whether anisotropy of particles is taken into account during the simulation
30	A flag indicating whether particles have increased contact radius
32	Compounds
33	Interactions
34	Mixtures

Each line starting with the main identifier equal to **0** contains complete information about a particular physical object. This information is separated by internal identifiers (marked as blue) and for all objects have a similar format:

Information about a sphere:

0 | OBJ_ID | 1 1 | 5 RADIUS CONTACT-RADIUS | 23 LOCAL_MATERIAL_ID | 24 INIT_ACTIV END_ACTIV | …

… 2 TP_1 | 12 COORD | 15 VEL | 16 ANGL_VEL | 18 TOT_FORCE | 20 FORCE | 31 QUATERNION | 36 STRESS_TENSOR |

Information about a triangular wall:

0 | OBJ_ID | 1 14 | 5 _ | 23 LOCAL_MATERIAL_ID |24 INIT_ACTIV END_ACTIV | …

… 2 TP_1 | 12 COORD_V1 | 15 VEL | 16 COORD_V3 | 18 TOT_FORCE | 20 FORCE | 31 COORD_V2 |

Information about a solid bond:

0 | OBJ_ID | 1 9 | 5 ID1 ID2 DIAMETER INIT_LENGTH | 23 LOCAL_MATERIAL_ID | 24 INIT_ACTIV END_ACTIV | …

… 2 TP_1 | 12 TOT_TORQUE 0 0 | 15 0 0 0 | 16 TANG_OVERLAP | 18 TOT_FORCE | 20 FORCE | 31 0 0 0 0 |

Lines that do not start from **0** describe specific properties of the scene and have the following format:

Information about the computational domain:

22 | coordMin   coordMax

Information about a geometrical object:

25 | geometry_name   mass   freeMotionX   freeMotionY   freeMotionZ

26 | Time-dependent velocity properties

27 | Indexes of all planes in this geometry

Information about boundary conditions:

28 | Boundary conditions

Information about anisotropy:

29 | Flag

Information about contact radius:

30 | Flag

Information about materials:

32 | compound_key   compound_name | 0 density | 2 dynamic_viscosity | 7 young_modulus | …

… 8 normal_strength | 9 tangential_strength | 10 poisson_ratio | 11 surface_energy | 12 atomic_volume | …

… 13 surface_tension | 14 time_therm_exp_coeff | 15 yield_strength |

33 | compound_key_1   compound_key_2 | 200 restitution_coefficient | 201 static_friction | …

… 202 rolling_friction |

34 | mixture_key   mixture_name | number of fraction (0)   compound   diameter   value | …

… number of fraction (1)   compound   diameter   value |…

Table 2. Description of properties.

ID	Name	Value	Description
Time-independent data:		
-	**OBJ_ID**	ID	Unique identifier of this object
1	**OBJ_TYPE**	1	Sphere
		9	Solid bond
		13	Liquid bond
		14	Triangular wall
5	**OBJ_GEOM**	**RADIUS, CONTACT-R**	Radius and contact radius of a Sphere
		ID1, ID2, DIAMETER, INIT_LENGTH	Unique identifiers of connected particles and diameter of a Solid bond

		ID1, ID2, DIAMETER, INIT_LENGTH	Unique identifiers of connected particles and diameter of a Liquid bond
		-	Triangular wall
23	**LOCAL_MATERIAL_ID**	**Material-ID**	Material Identifier of an Object
24	**INIT_ACTIV END_ACTIV**	**t1 t2**	Two time points which define activity interval of an object
Time-dependent data:			
2	TP_1, TP_2	t	New time point
12	COORD	X Y Z	Object coordinates
	COORD_V1	X Y Z	Coordinates of the first vertex of a triangular wall
	TOT_TORQUE	T	Total torque
15	VEL	X Y Z	Velocity
16	ANGL_VEL	X Y Z	Angular velocity
	COORD_V3	X Y Z	Coordinates of the second vertex of a triangular wall
	TANG_OVERLAP	X Y Z	Vector of tangential overlap
18	TOT_FORCE	F	Magnitude of force (for bonds can be negative)
20	FORCE	X Y Z	Vector of force
31	QUATERNION	q0 q1 q2 q3	Quaternion
	COORD_V2	X Y Z 0	Coordinates of the third vertex of a triangular wall
36	STRESS_TENSOR	t[0][0] t[0][1] t[0][2] t[1][0] t[1][1] t[1][2] t[2][0] t[2][1] t[2][2]	Stress tensor of particles
37	TEMPERATURE	T	Temperature of particles or solid bonds

Examples:

Several examples of text files are given in the MUSEN installation folder at

<PathToMUSEN\Examples\InitScenes\>.