

# orxBODY structure

## Summary

### Body

```
[BodyTemplate]
PartList          = BodyPartTemplate1#BodyPartTemplate2#...
AllowGroundSliding = <bool>
AngularDamping    = <float>
Dynamic           = <bool>
FixedRotation     = <bool>
HighSpeed         = <bool>
GravityMultiplier = <float>
Inertia           = <float>
LinearDamping     = <float>
Mass              = <float>
```

### BodyPart

#### Sphere

```
[BodyPartSphereTemplate]
Type      = sphere
Center    = <vector> | full
Radius    = <float> | full
CheckMask = <16b flags>
SelfFlags = <16b flags>
Density   = <float>
Friction  = <float>
Restitution = <float>
Solid     = <bool>
```

#### Box

```
[BodyPartBoxTemplate]
Type      = box
TopLeft   = <vector> | full
BottomRight = <vector> | full
CheckMask = <16b flags>
SelfFlags = <16b flags>
Density   = <float>
Friction  = <float>
Restitution = <float>
```

**Solid** = <bool>

## Mesh (polygon)

```
[BodyPartMeshTemplate]
Type          = mesh
VertexList    = <vector>#<vector>#...
CheckMask     = <16b flags>
SelfFlags     = <16b flags>
Density       = <float>
Friction      = <float>
Restitution   = <float>
Solid         = <bool>
```

## Details

### Body

Here's a list of the available properties for an `orxBODY` structure:

- **PartList**: List of all the parts that will compose a body. Up to 8 parts can be defined for a single body. This property *needs* to be defined if you want it to collide with other bodies.
- **AllowGroundSliding**: If set to `false` on a dynamic object, it will prevent it from sliding on static slopes of more than 45°. This only works with a vertical top-down gravity. By default its value is `true`.
- **AngularDamping**: Damping of angular velocity for this body. By default its value is 0.0, which means no damping.
- **Dynamic**: Defines if this body should be dynamic or static. If your object is expected to move, this property should be set to `true`. Static bodies can't collide with other static bodies. By default, its value is `false` (ie. static).
- **FixedRotation**: Defines if your dynamic object is allowed to rotate as a result of collision forces. By default its value is `false` which means it can rotate freely.
- **GravityMultiplier**: Defines a multiplier that will be applied on gravity for this body. By default its value is 1.0 which means the gravity will be applied unchanged for this body.
- **HighSpeed**: For high velocity objects (like bullets), this property should be set to `true` to avoid collision errors. However, every object flagged as `HighSpeed` will cost more when processed by the physics engine. By default its value is `false`.
- **Inertia**: Defines an inertia value for this body. By default its value is 0.0.
- **LinearDamping**: Damping of speed (linear velocity) for this body. By default its value is 0.0, which means no damping.
- **Mass**: Defines a mass, in kg, for this body. If parts are defined, the mass will be overridden by an automatically calculated value based of parts' sizes and positions.

## BodyPart

### Common

Here's a list of the available properties for all types of body parts:

- **Type:** Defines the type of the body part. Available types are sphere, box and mesh (ie. convex polygon). This property *needs* to be defined.
- **CheckMask/SelfFlags:** Both properties are flags expressed on 16bits. The **SelfFlags** defines this part identity whereas the **CheckMask** defines which parts are allowed to collide with it. For a collision to happen between two parts the expressions (Part1.CheckMask & Part2.SelfFlags) and (Part2.CheckMask & Part1.SelfFlags) have both to evaluate to `true`. NB: Two parts of the same body won't collide whichever **CheckMask/SelfFlags** they have. <sup>1)</sup>
- **Density:** Defines the density of this part. Its default value is 0.0, which means it doesn't have any influence on the body's mass.
- **Friction/Restitution:** Define the friction and restitution of this part, usually between 0.0 and 1.0. <sup>2)</sup> By default both their values are 0.0.
- **Solid:** Defines if this part is solid or not. Only solid parts will trigger a reaction on their body when colliding with others. By default its value is `false` which means the collision info will be signaled through events, but the physics simulation of this body won't be automatically affected by it.

### Sphere

Here's a list of the available properties only available to sphere parts:

- **Center:** Defines the center of the sphere (in 2D it's a circle, of course) in the parent's space (ie. in object's space). By default its value is `full` which means the center will match the object's one (ie. the center of its current graphic).
- **Radius:** Defines the radius of the sphere (or 2D circle). By default its value is `full` which means the sphere's radius will match the biggest dimension of the parent object. You can find an example in the [spawner tutorial](#) <sup>3)</sup>.

### Box

Here's a list of the available properties only available to box parts:

- **TopLeft/BottomRight:** Define the extrema of the box (in 2D it's a rectangle, of course) in the parent's space (ie. in object's space). By default their values are `full` which means **TopLeft** and **BottomRight** will match the full rectangle defined by the parent object's current graphic. You can find an example in the [physics tutorial](#).

### Mesh (polygon)

Here's a list of the available properties only available to mesh <sup>4)</sup> parts:

- **VertexList:** Provides a list of vertex coordinates in parent object's space. The resulting

polygon *needs* to be convex. Up to 8 vertices can be defined and they *have to be entered clockwise*. You can find an example in the [spawner tutorial](#) <sup>5)</sup>.

1)

Check [Box2D wiki](#) for more information on filtering

2)

Check [Box2D wiki](#) for more information on friction/restitution

3) <sup>5)</sup>

by looking directly at the config files as they're not covered in the wiki

4)

convex polygon

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