

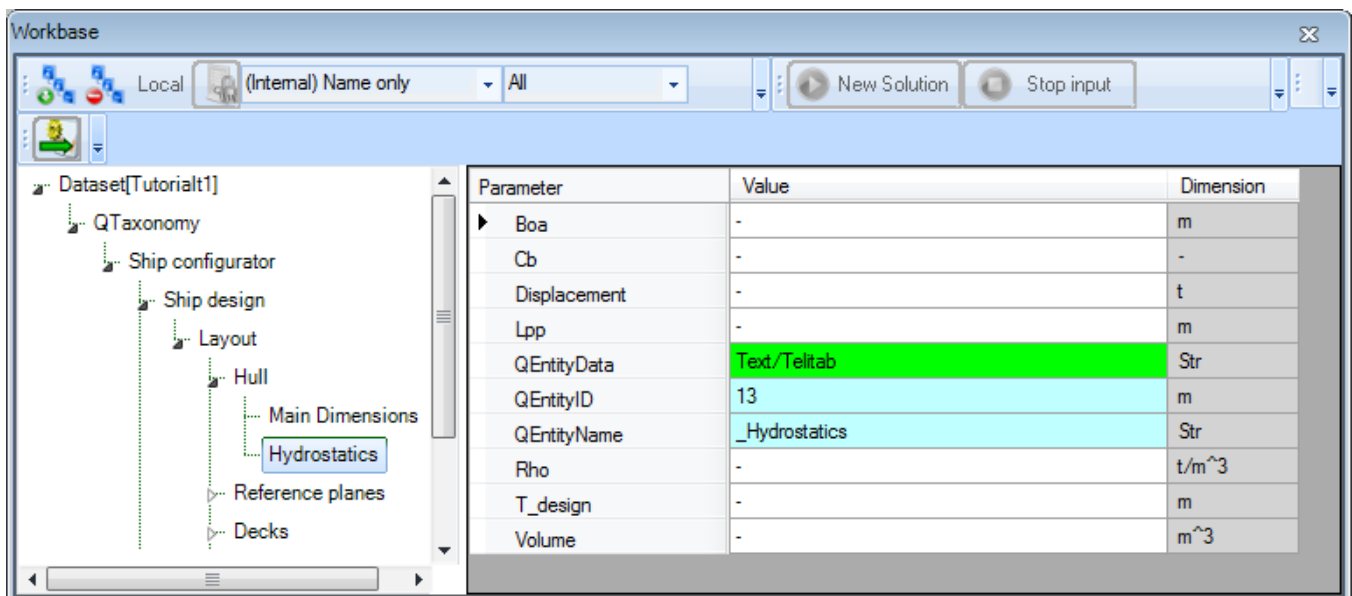
# Creating entity relations

## 1 Adding parameters to Hydrostatics

- Create a new class alongside **Dimensions** and call it **General**.
- Create the following parameters (all are values) within the **Knowledge Browser**:

Parameter name	Dimension	Determined by	Reference	In Class
Cb	[-] (none!)	VR: User only	Block coefficient	Dimensions
Displacement	[t]	USR: User or System/equation	Displacement of vessel at design draft	Dimensions
Rho	[t/m <sup>3</sup> ]	VR: User only	Density of water	General
T_design	[m]	VR: User only	Design draft of ship	Dimensions
Volume	[m <sup>3</sup> ]	USR: User or System/equation	Hull volume at design draft	Dimensions

- Next drag and drop the parameters: Lpp, Boa, Cb, Displacement, Rho, T\_design and Volume from the **Knowledge Browser** into the entity **Hydrostatics**.



Incidentally, the parameters **Displacement** and **Volume** still have their red crosses because they are not completely defined. You will add relations for them in a minute.

- To show 3 decimal places for parameter **Rho**, change the number of decimals places into 3 in the **Properties** window of parameter **Rho**.



## 2 Creating a drop down box

Because there will only be two possible values for parameter **Rho** (1.025 or 1.000 [t/m<sup>3</sup>]), it is useful to create a dropdown box. This can be done by providing a special reference.

- Select the **Parameter** tab of the **Properties** window for **Rho**.
- In the **Reference** field type the following:

```
Density of water. Select water type;  
1.025<EQ>Saltwater  
1.000<EQ>Freshwater
```



### 3 Creating entity relations

In the *Hydrostatics* entity, calculations need to be performed based upon information from *Main Dimensions* and some [relation](#). In order to achieve this, you have to create so called **entity-relations**. The first entity-relation to create will be for parameter *Boa* in entity *Hydrostatics*: the value of *Boa* in entity *Hydrostatics* should be equal to the value of *Boa* in entity *Main Dimensions*.

- *Right-click* on the parameter *Boa* in entity *Hydrostatics* in the [Workbase](#) and select *Taxonomy > Create Relation* or press *Ctrl+T*.

The **Expression Editor** opens:

A screenshot of the 'Create new Taxonomy Relation' dialog box. The 'Expression Text' field contains the text 'Boa = ENTITY#(' with a cursor. The 'Expression Data' field is empty. The 'Expression Reference' field contains the text 'Width over all'. At the bottom are three buttons: 'Save', 'As Instance', and 'Cancel'.

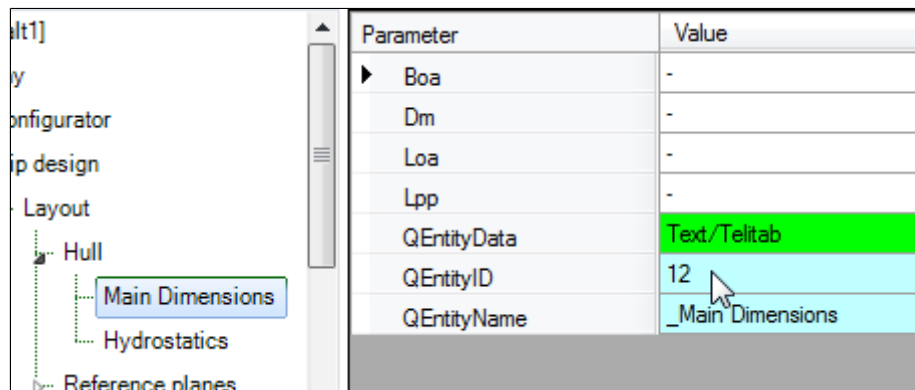
Providing a relation in the (upper part of) the Expression Editor will add a relation to the system, which is only valid in entity *Hydrostatics*.

Because the most common purpose of an entity-relation is to refer to other entities, the Expression Editor for entity relations is started up with the [ENTITY#\(\)](#) function already there.

By providing the unique and correct **QEntityId** within the **ENTITY#()** function, you can refer to information in other entities. You will want to refer to information in *Main Dimensions*. So, you need the unique **QEntityId** of this entity.

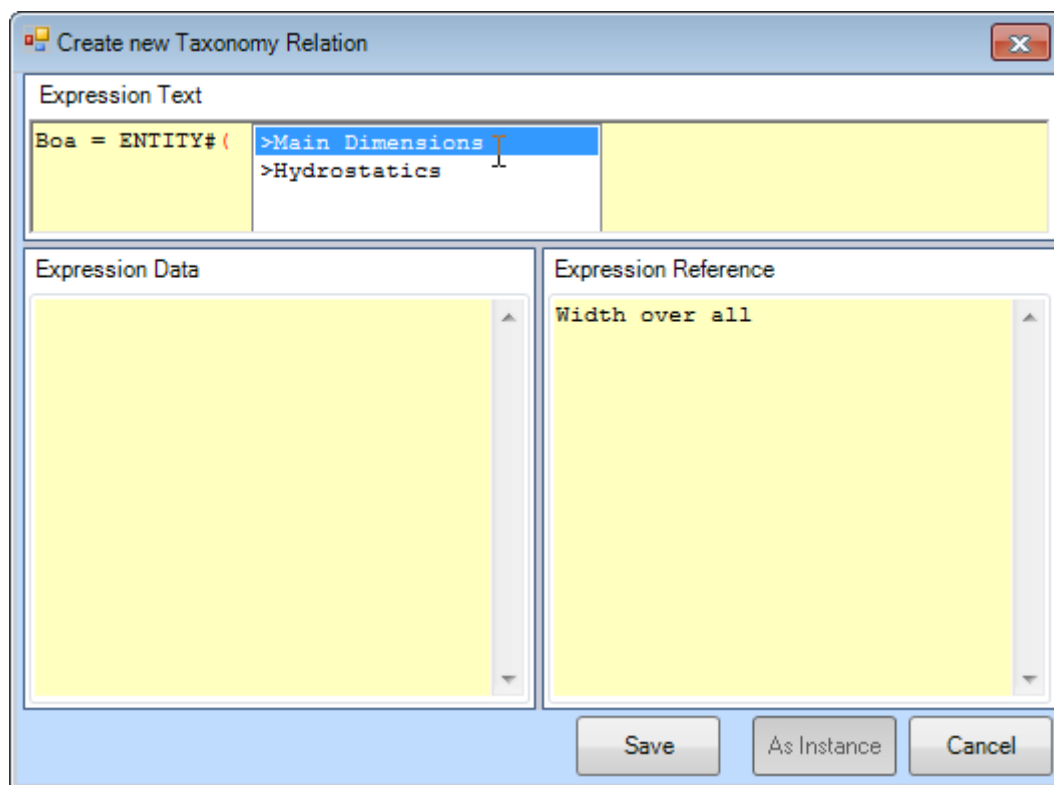
There are two ways to get this ID:

1. Look-up the ID by browsing to the entity in the taxonomy and read the **QEntityId**: The **QEntityId** of Entity "**Main Dimensions**" is 12. Figure 53 shows that **QEntityId** = 12 for Entity "**Main Dimensions**".



Parameter	Value
Boa	-
Dm	-
Loa	-
Lpp	-
QEntityData	Text/Telitab
QEntityID	12
QEntityName	_Main Dimensions

2. Inside the Expression Editor, press *Right-Arrow* to initiate a "walk through" menu to navigate through all entity levels in your taxonomy (showing **QEntityNames**). Repeatedly scroll and press *Right-Arrow* until you have reached the entity you want, press *Enter*, and its ID will be filled in the expression.



**Create new Taxonomy Relation**

Expression Text

Boa = ENTITY#( >Main Dimensions  
>Hydrostatics

Expression Data

Expression Reference

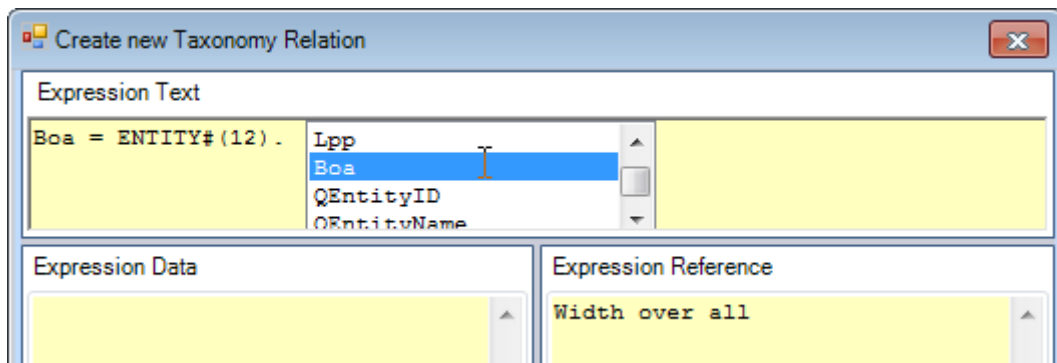
Width over all

Save As Instance Cancel



The value of **QEntityID** of *Main Dimensions* as presented in this tutorial could differ from yours, because it depends on the sequence in which you have created entities.

After selecting/entering the correct ID, placing the closing bracket and placing the dot, Quaestor will show all available parameters in the selected entity. You can scroll to the correct parameter and press *Enter* to select the parameter.

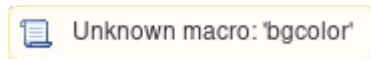


- Enter the following relation and click **Save**.

`Boa = ENTITY#(12) .Boa`

This means `Boa` is equal to (will copy the value of) the `Boa` of the entity with **QEntityID = 12**.

Hereafter, the cell colour of `Boa` in `Hydrostatics` has turned to yellow.



To reset a parameter with a relation back to a 'normal' one with an input value, *Right-Click* on it the **Workbase** and select *Taxonomy > Value = Input* or press **Ctrl+T** again.

To edit an entity relation, *Right-Click* on the pertaining parameter in the **Workbase** and select *Taxonomy > Edit Relation* or press **Ctrl+M**.

**i** An entity relation is something special. If you have experience with creating Quaestor knowledge bases (see the [Tutorials on Quaestor basics](#)), you will know that a relation will be visible in the **Knowledge Browser**. Entity relations have the 'dimension' *Taxonomy* instead of *None* in the Knowledge browser.

- Create an entity relation for `Lpp` in entity `Hydrostatics` in the same way. This parameter must be equal to the value of `Lpp` in Entity Main Dimensions:

`Lpp = ENTITY#(12) .Lpp`

Finally, relations must be provided to calculate `Displacement` and `Volume` in entity `Hydrostatics`. The following calculations should be made:

`Displacement = Cb * Lpp * Boa * T_design * Rho`

`Volume = Cb * Lpp * Boa * T_design`

- Create an entity relation for `Volume` in the same way. Delete `ENTITY#( )` in the editor and enter the expression above.

There is another way to create an entity relation. One that is very convenient when you know that a particular relation might be used in several entities. You will use this next for parameter `Displacement`.

## 4 Connecting existing relations to entities



By adding the relation to the **Knowledge Browser**, you can connect it several times to various parameters in various entities, saving a lot of time.

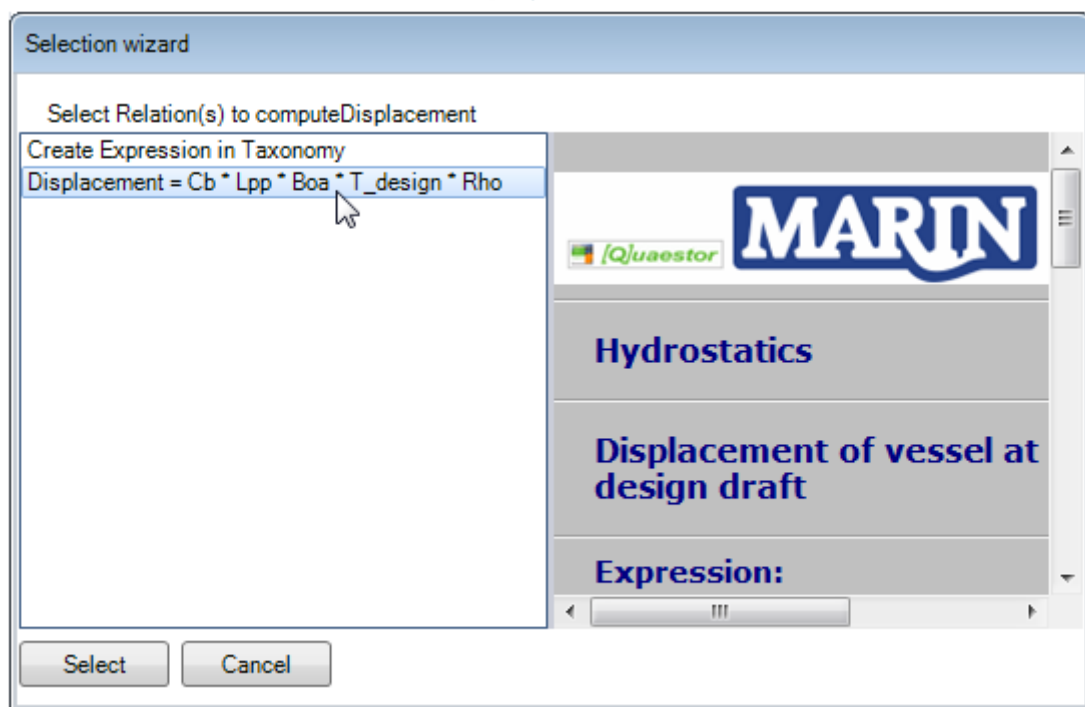
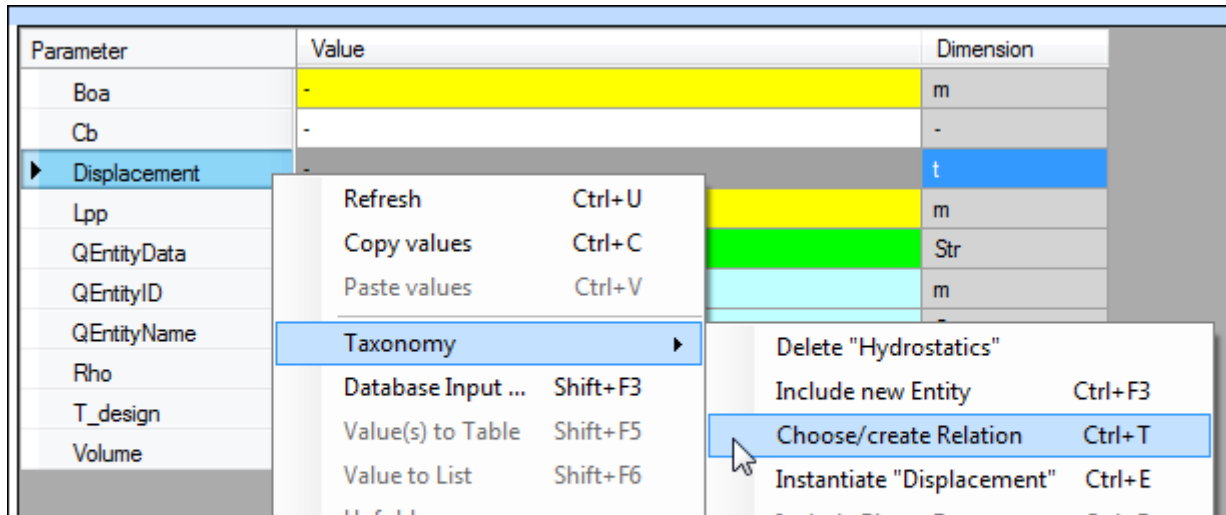
Start with creating a relation in the **Knowledge Browser**.

- Select parameter `Displacement` in the right window of the **Knowledge Browser**, then *Right-Click*, and select option *New relation...* (or press **CTRL + N**). The **Expression Editor** opens and you can type the expression for `Displacement` that is given above.

In this way the relation is added to the **knowledge base**. However, realise that it is not yet connected to the parameter in the entity of your taxonomy!

To connect the relation, in the **Workbase**, select the parameter **Displacement** in entity **Hydrostatics**. Then, select the right mouse button menu **Ta**  
**xonomy**>**Choose/create relation** or press **Ctrl+T**. A window will open showing the available relations for the selected parameter in the **Knowledge Brow**  
**ser**.

You can browse through the available relations and select the relation you want to use to compute the parameter, see below. In this case select the relation you have just created. The same method can be used to include any available relation for any selected parameter.



Note that it is still possible to create a new taxonomy relation by selecting the first option in the popup window.

## 5 Strategy for adding relations in taxonomy type knowledge bases



Perhaps you would like to have a bit more insight in the creation of relations in taxonomy type knowledge bases. Above you encountered two different methods of adding relations to entities. Why are there two different methods?

1. The general approach is to create entity relations in the taxonomy.
2. The main reason to use normal (global) relations and connecting them to parameters in an entity is when you know that the relation will be used at more than one spot in the taxonomy. In that case you rather create one relation and connect it to the parameters in the relevant entities.
3. Also use normal relations if you want to use the modeling/reasoning functionality of Quaestor. You might want to use the modeler when you want to execute complex models which make use of reasoning an advantage over a normal traditional fully hardcoded model (which a taxonomy is to some extent). This is the case when you want the structure (network of relations) of a model to be dependent on the choices made and input provided by the user. You then have a hybrid knowledge base (mix of taxonomy and classical).



Use the **ENTITY#** function only in combination with entity relations!

You can use this function in normal relations but this is not advisable. This is because the EntityID in the ENTITY# function will be renumbered when modifications are made to the taxonomy that cause entities to be renumbered. This renumbering will not take place for normal relations.

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