Portal constraint links two bodies together (the body and it's portal clone) via two portals defined on a further two objects.

These portals are defined by a local anchor and direction on the 'portal' bodies $\vec{a}_i$ and $\vec{d}_i$ to portal bodies A and B together with a scaling η from portal 1 to 2.

We then have:
$\vec{n}_1 = R(\theta_A)\,\vec{d}_1,\ \vec{n}_2 = R(\theta_B)\,\vec{d}_2$ as the world-space portal directions
$\vec{p}_1 = R(\theta_A)\,\vec{a}_1,\ \vec{p}_2 = R(\theta_B)\,\vec{a}_2$ as the world-space relative portal positions
$\alpha_1 = \theta_A + \arg\left(\vec{d}_1\right),\ \alpha_2 = \theta_B + \arg\left(\vec{d}_2\right)$ as the world-space portal angles

Furthermore, defining:
$\vec{s}_1 = \vec{x}_1 - \vec{p}_1 - \vec{x}_A,\ \vec{s}_2 = \vec{x}_2 - \vec{p}_2 - \vec{x}_B$
as the vectors from portal position in world space to object positions, we can define the constraint by:

$$C(\vec{x}) = \begin{bmatrix} \eta\vec{s}_1 \cdot \vec{n}_1 - \vec{s}_2 \cdot \vec{n}_2 \\ \eta\vec{s}_1 \times \vec{n}_1 - \vec{s}_2 \times \vec{n}_2 \\ (\theta_1 - \alpha_1) - (\theta_2 - \alpha_2) \end{bmatrix}$$

Computing the time derivatives of the quantities above:
$\frac{d}{dt}\vec{n}_1 = \omega_A \times \vec{n}_1,\ \frac{d}{dt}\vec{n}_2 = \omega_B \times \vec{n}_2$
$\frac{d}{dt}\vec{p}_1 = \omega_A \times \vec{p}_1,\ \frac{d}{dt}\vec{p}_2 = \omega_B \times \vec{p}_2$
$\frac{d}{dt}\vec{s}_1 = \vec{v}_1 - (\omega_A \times \vec{p}_1) - \vec{v}_A,\ \frac{d}{dt}\vec{s}_2 = \vec{v}_2 - (\omega_B \times \vec{p}_2) - \vec{v}_B$
$\frac{d}{dt}\alpha_1 = \omega_A,\ \frac{d}{dt}\alpha_2 = \omega_B$

We can find the velocity constraint:

$$V(\vec{v}) = \begin{bmatrix} \eta\left[\left(\frac{d}{dt}\vec{s}_1\right) \cdot \vec{n}_1 + \vec{s}_1 \cdot \left(\frac{d}{dt}\vec{n}_1\right)\right] - \left[\left(\frac{d}{dt}\vec{s}_2\right) \cdot \vec{n}_2 + \vec{s}_2 \cdot \left(\frac{d}{dt}\vec{n}_2\right)\right] \\ \eta\left[\left(\frac{d}{dt}\vec{s}_1\right) \times \vec{n}_1 + \vec{s}_1 \times \left(\frac{d}{dt}\vec{n}_1\right)\right] - \left[\left(\frac{d}{dt}\vec{s}_2\right) \times \vec{n}_2 + \vec{s}_2 \times \left(\frac{d}{dt}\vec{n}_2\right)\right] \\ \frac{d}{dt}(\theta_1 - \alpha_1) - \frac{d}{dt}(\theta_2 - \alpha_2) \end{bmatrix}$$

Expanding the inner parts of the equations:
$\left(\frac{d}{dt}\vec{s}_1\right) \cdot \vec{n}_1 = (\vec{v}_1 - (\omega_A \times \vec{p}_1) - \vec{v}_A) \cdot \vec{n}_1$
$\vec{s}_1 \cdot \left(\frac{d}{dt}\vec{n}_1\right) = \vec{s}_1 \cdot (\omega_A \times \vec{n}_1)$
$+$ similar results.

We can define:
$\vec{u}_1 = \vec{v}_1 - (\omega_A \times \vec{p}_1) - \vec{v}_A,\ \vec{u}_2 = \vec{v}_2 - (\omega_B \times \vec{p}_2) - \vec{v}_B$

And express the velocity constraint more succintly by:

$$V(\vec{v}) = \begin{bmatrix} \eta\left(\vec{u}_1 \cdot \vec{n}_1 + \omega_A\left(\vec{s}_1 \times \vec{n}_1\right)\right) - \left(\vec{u}_2 \cdot \vec{n}_2 + \omega_B\left(\vec{s}_2 \times \vec{n}_2\right)\right) \\ \eta\left(\vec{u}_1 \times \vec{n}_1 + \omega_A\left(\vec{s}_1 \cdot \vec{n}_1\right)\right) - \left(\vec{u}_2 \times \vec{n}_2 + \omega_B\left(\vec{s}_2 \cdot \vec{n}_2\right)\right) \\ (\omega_1 - \omega_A) - (\omega_2 - \omega_B) \end{bmatrix}$$

Noting the following results of partial differentiations:
$\frac{\partial}{\partial\vec{u}}\vec{u} \cdot \vec{v} = \frac{\partial}{\partial\vec{u}}\vec{v}^\top\vec{u} = \vec{v}^\top$

$\frac{\partial}{\partial \vec{u}} \vec{u} \times \vec{v} = -\frac{\partial}{\partial \vec{u}} [\vec{v}]_\times^\top \vec{u} = -[\vec{v}]_\times^\top$

We find the jacobian of our portal constraint as:

$$\mathbf{J} = \begin{bmatrix} \begin{bmatrix} \eta \vec{n}_1^\top \\ -\eta [\vec{n}_1]_\times^\top \\ 0 \end{bmatrix} & \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} & \begin{bmatrix} -\eta \vec{n}_2^\top \\ \eta [\vec{n}_2]_\times^\top \\ 0 \end{bmatrix} & \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix} \end{bmatrix}$$

And our effective mass matrix:

$$\mathbf{K} = \frac{1}{m_1} \begin{bmatrix} \eta \vec{n}_1^\top \\ -\eta [\vec{n}_1]_\times^\top \\ 0 \end{bmatrix} \begin{bmatrix} \eta \vec{n}_1^\top \\ -\eta [\vec{n}_1]_\times^\top \\ 0 \end{bmatrix}^\top + \frac{1}{i_1} \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}^\top$$
$$+\frac{1}{m_2} \begin{bmatrix} -\eta \vec{n}_2^\top \\ \eta [\vec{n}_2]_\times^\top \\ 0 \end{bmatrix} \begin{bmatrix} -\eta \vec{n}_2^\top \\ \eta [\vec{n}_2]_\times^\top \\ 0 \end{bmatrix}^\top + \frac{1}{i_2} \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix}^\top$$

Noting the lovely facts:

$\vec{u}^\top \left(\vec{u}^\top\right)^\top = \|\vec{u}\| = [\vec{u}]_\times^\top \left([\vec{u}]_\times^\top\right)^\top, \ \|\vec{n}_i\| = 1$

$\vec{u}^\top \left([\vec{u}]_\times^\top\right)^\top = \vec{u} \cdot [\vec{u}]_\times = \vec{u} \times \vec{u} = 0$

We show:

$$\begin{bmatrix} \eta \vec{n}_1^\top \\ -\eta [\vec{n}_1]_\times^\top \\ 0 \end{bmatrix} \begin{bmatrix} \eta \vec{n}_1^\top \\ -\eta [\vec{n}_1]_\times^\top \\ 0 \end{bmatrix}^\top = \begin{bmatrix} \eta^2 & 0 & 0 \\ 0 & \eta^2 & 0 \\ 0 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}^\top = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

And so we arrive at a very simple effective mass matrix:

$$\mathbf{K} = \begin{bmatrix} \left(\frac{\eta^2}{m_1} + \frac{1}{m_2}\right) \mathbf{E}_2 & 0 \\ 0 & \frac{1}{i_1} + \frac{1}{i_2} \end{bmatrix}$$