



AD FALCON API Manual

# Staged DOF Changes (Release-Boundary / RestrainDOFs)

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## 1 Staged DOF Changes (ReleaseBoundary / RestrainDOFs)

FALCON supports changing *restrained (Dirichlet)* degrees of freedom (DOFs) at specific simulation steps:

- **Release** restraints with % ReleaseBoundary (a DOF becomes active again).
- **Add** new restraints with % RestrainDOFs (a DOF becomes restrained, optionally with a prescribed value).

### 1.1 Supported DOF names

DOF	Meaning	Use when
DisX	X displacement	Always
DisY	Y displacement	Always
DisZ	Z displacement	3D analyses only
PW	Pore-water pressure	Coupled / fully-coupled analyses; only on nodes that have the PW DOF
PA	Pore-air pressure	Fully-coupled analyses; only on nodes that have the PA DOF

Notes:

- In higher-order elements, pore-pressure DOFs exist only on **principal (corner)** nodes. See [Elements](#).
- DOF names are case-sensitive.

### 1.2 % ReleaseBoundary

Releases (un-fixes) one or more restrained DOFs at a given step.

#### 1.2.1 Syntax

```
% ReleaseBoundary
Id: <int>          # optional
Step: <int>        # required (matches an @Step id)
Constraint: <ids>  # optional (deactivates MPCCconstraints by id)
<NodeID> <DOF1> <DOF2> ...
<NodeID> <DOF1> <DOF2> ...
```

```
%%%
```

### 1.2.2 Rules

- `Step:` is required. If it is missing, input parsing fails.
- `Id:` is optional. If omitted, FALCON assigns an internal ID.
- `Constraint:` is optional. If provided, it deactivates the listed `% MPCConstraints` (see [MPCConstraints](#)).
- The `Id:` and `Step:` labels are case-sensitive and must include the trailing `:`.
- A release entry has an effect only if that DOF is currently restrained on that node.

### 1.2.3 Example

```
% ReleaseBoundary
Step: 10
Constraint: 30
5 DisX DisY
8 PW
%%%
```

## 1.3 % RestrainDOFs

Adds new restraints at a given step. Each restrained DOF may optionally specify a prescribed value; if omitted, the prescribed value defaults to `0.0`.

### 1.3.1 Syntax

```
% RestrainDOFs
Id: <int>          # optional
Step: <int>        # required (matches an @Step id)
Constraint: <ids>  # optional (activates MPCConstraints by id)
<NodeID> <DOF1> [value1] <DOF2> [value2] ...
<NodeID> <DOF1> [value1] <DOF2> [value2] ...
%%%
```

### 1.3.2 Rules

- `Step:` is required. If it is missing, input parsing fails.
- `Id:` is optional. If omitted, FALCON assigns an internal ID; if a provided `Id:` is already used, FALCON assigns the next free ID.
- `Constraint:` is optional. If provided, it activates the listed `% MPCConstraints` (see

[MPCConstraints](#)).

- The Id: and Step: labels are case-sensitive and must include the trailing :.
- If a numeric value is not provided after a DOF token, that DOF's prescribed value defaults to 0.0.

### 1.3.3 Example

```
% RestrainDOFs
Step: 12
10 DisX 0.01 DisY
15 PW 0.0
%%%
```

## 1.4 Multiple events

Each % ReleaseBoundary ... %% or % RestrainDOFs ... %% block defines one scheduled event (one Step: applying to all node lines in that block). To schedule multiple changes at different steps, repeat the corresponding section.