



AD FALCON API Manual

Special Outputs

Javad Ghorbani

March 26, 2026

Contents

- 1 Special Outputs 3**
 - 1.1 Reaction force sum (% ReactionForceSum) 3
 - 1.1.1 Syntax 3
 - 1.1.2 Parameters 3
 - 1.1.3 Output format 3
 - 1.1.4 Notes 4
 - 1.1.5 Example 4
 - 1.2 DOF time history (% DOFOutput) 4
 - 1.2.1 Syntax 4
 - 1.2.2 Parameters 4
 - 1.2.3 Output format 5
 - 1.2.4 Example 5
 - 1.3 Picard loop CSV (% PicardLoopOutput) 5
 - 1.3.1 Syntax 5
 - 1.3.2 Parameters 5
 - 1.3.3 Output columns 5
 - 1.3.4 Example 6

1 Special Outputs

This page describes the `% ReactionForceSum`, `% DOFOutput`, and `% PicardLoopOutput` sections.

General notes:

- Directive keywords are case-insensitive and accept one or more leading `@` characters (for example, `@Nodes`, `@@Nodes`, `@Nodes:` are equivalent).
- Integer lists accept IDs separated by spaces/commas/semicolons, and ranges may be written as `lo-hi` (and also `lo:hi` where supported).

1.1 Reaction force sum (`% ReactionForceSum`)

Writes a CSV that (1) sums reactions over a set of nodes and (2) records the corresponding per-node DOF values, at selected simulation steps.

1.1.1 Syntax

```
% ReactionForceSum
@Nodes <nodeId...>
@Steps <stepId...>
@DOFs <dof...>
@OutputFile <path> (optional)
@Frequency <integer> (optional, default: 1)
%%%
```

1.1.2 Parameters

- `@Nodes` (required): node IDs to include.
- `@Steps` (required): simulation step IDs at which output is written.
- `@DOFs` (required): DOFs to include: `DisX`, `DisY`, `DisZ`, `PW`, `PA`.
- `@OutputFile` (optional): output CSV path. If omitted, defaults to `reaction_force_sum.csv`.
- `@Frequency` (optional): write every n th converged substep within the selected steps (default 1).

1.1.3 Output format

The CSV header is written once. Columns are:

- `StepID`, `Time`
- One column per requested DOF: `Sum_Reaction_<DOF>`
- One column per requested node/DOF: `Node<id>_Displacement_<DOF>`

Note: the per-node columns report the current value of the requested DOF (not only displacement-type DOFs).

1.1.4 Notes

- The output file is cleared once (the first time this output is written) and then appended to for the rest of the run.
- Node IDs are checked to be positive at parse time; they should refer to nodes defined in % Nodes.

1.1.5 Example

```
% ReactionForceSum
@Nodes 1 2 5 10
@Steps 1 3 5
@DOFs DisX DisY
@OutputFile reaction_summary.csv
@Frequency 2
%%%
```

1.2 DOF time history (% DOFOutput)

Writes a CSV time history for selected DOFs at selected nodes.

1.2.1 Syntax

```
% DOFOutput
@Nodes <nodeId...>
@DOFs <dof...>
@OutputFile <path> (optional)
@Every <integer> (optional, default: 1)
%%%
```

@Every and @Frequency are treated as equivalent.

1.2.2 Parameters

- @Nodes (required): node IDs to record.
- @DOFs (required): DOFs to record: DisX, DisY, DisZ, PW, PA.
- @OutputFile (optional): output CSV path. If omitted, defaults to dof_output.csv.
- @Every / @Frequency (optional): write every *n*th converged substep (default 1).

1.2.3 Output format

When the section is parsed, the CSV file is created/truncated and a header row is written:

```
Time, Node 3 DisX, Node 3 DisY, Node 7 DisX, ...
```

Each subsequent written row appends the current Time followed by values in the same node/DOF order.

1.2.4 Example

```
% DOFOutput
@Nodes 3 7
@DOFs DisX DisY PW
@OutputFile node_dof_history.csv
@Every 5
%%%
```

1.3 Picard loop CSV (% PicardLoopOutput)

Enables CSV reporting for the Picard loop (void-ratio / saturation initialization) when that procedure is executed.

1.3.1 Syntax

```
% PicardLoopOutput
@OutputFile <path>          (optional)
@Append <Yes|No>           (optional, default: No)
%%%
```

1.3.2 Parameters

- @OutputFile (optional): output CSV path. If omitted, defaults to picard_loop_output.csv.
- @Append (optional): if Yes, appends to an existing file and suppresses a new header when the file is non-empty.

1.3.3 Output columns

The CSV includes (per Gauss point when executed): element ID, Gauss point coordinates, initial/final void ratio and saturation, iteration count, convergence flag, and error/tolerance

fields.

1.3.4 Example

```
% PicardLoopOutput
@OutputFile picard_loop_stats.csv
@Append No
%%%
```

