

# Release Notes: Plate-Fin Module

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INSTED Ver. 9.1



**TTC TECHNOLOGIES, INC.**

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## Release Features

### INSTED Ver. 9.1

The latest version of INSTED (Ver. 9.1) includes the following bug fixes and enhancements to INSTED 9.0.

#### *Enhancements to Plate-Fin Solver*

- I. In the INSTED/Plate-Fin Rating Module, the following optional inputs have been added in “Set Calculation Method” tab to allow you to add user-specified scaling factors on J/F data:
  - Scaling factor for hot-side J data
  - Scaling factor for hot-side F data
  - Scaling factor for cold-side J data
  - Scaling factor for cold-side F data

The user interface for these input data is shown below.

Note that

- (1) The specified scaling factors are applied to the J/F data calculated by the selected J/F correlations or the J/F data that has been entered by the user.
- (2) A factor of unity implies no scaling
- (3) J/F data scaling factors are currently available only for single-phase calculations
- (4) When the Default button is clicked in the dialog box above, all scaling factors are set to 1.0
- (5) By default, the checkbox for “Add user-specified scaling factors on J/F data” is unchecked to disable this functionality

When a scaling factor is specified, an additional text “(scaled)” is added to the J and F field in the display of the results.

Effective hA:	8.6262e+5	W/K ▼
Colburn Factor J (scaled):	0.035099008	
Friction Factor F (scaled):	0.27465418	
Fin Shape:	rectangular	

Enhancement to INSTED UI

- II. The thermal conductivity of the plates and fins has been added to the Excel file of the Rating & Multiple-Rating calculating results.

T	U	V	W	X	Y	Z
<b>HX Core Dimensions</b>						
P-L	P-W	L-NF/S	Np-h	Np-c	W	k <sub>plate</sub>
[m]	[m]	[m]	[-]	[-]	[kg]	[W/(m*K)]
0.9	1.8	1.8	150	150	1488	15

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
<b>Hot Side</b>									
Type	N-Fin or Channel	H (Plate Spacing)	t-fin	l or λ	2a	dh	Ac	A	k <sub>fin</sub>
[-]	[1/m]	[m]	[m]	[m]	[m]	[m]	[m <sup>2</sup> ]	[m <sup>2</sup> ]	[W/(m*K)]
rectangular/h	500	0.006	2E-04	0.005	0	0.003	1.386	243	15

AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
<b>HX</b>									
<b>Cold Side</b>									
Type	N-Fin or Channel	H (Plate Spacing)	t	l or λ	2a	dh	Ac	A	k <sub>fin</sub>
[-]	[1/m]	[m]	[m]	[m]	[m]	[m]	[m <sup>2</sup> ]	[m <sup>2</sup> ]	[W/(m*K)]
rectangular/he	500	0.006	2E-04	0.005	0	0.003	0.693	243	15

- III. In the Rating calculation result table, the following new entries have been added:

- Fin Weight (Hot)
- Fin Weight (Cold)
- Plate Weight

The user interface is shown below:

**Calculation Result:**

Hot Flow	Cold Flow	Overall
No. Plates:	301	
Total Width:	1.8	m ▼
Total Length:	0.9	m ▼
Total Height:	1.8003	m ▼
Mean Temperature Diff.:	6.469959998	K ▼
Heat Transfer Area:	486.0	m <sup>2</sup> ▼
U:	1164.553737263	W/(m <sup>2</sup> ·K) ▼
UA:	5.659731e+5	W/K ▼
Heat Flow Rate:	3.661823e+6	W ▼
Ratio of Heat Capacity:	0.984251969	
Effectiveness:	0.8636376	
NTU:	21.357476087	
COP:	0.630911085	
Fin Weight (Hot):	371.7918225	kg ▼
Fin Weight (Cold):	371.7918225	kg ▼
Plate Weight:	196.83	kg ▼
Empty Weight:	1488.47949	kg ▼
Operating Weight:	1495.21599675	kg ▼

IV. For all power or heat transfer rate input and output fields, additional units have been added as shown below:

- Btu/s
- Btu/min

Flow Width:	1.8	m ▼
Power:	5.222595e+6	<div style="border: 1px solid black; padding: 2px;">                     W ▼                      W                      hp                      Btu/s                      Btu/min                      Btu/h                      cal/s                      kcal/h                      lbf·ft/s                      erg/s                      N·m/s                      J/s                 </div>
Mean Temperature:	665.157039396	
Mean Density:	0.54	
Mean Specific Heat:	1060.0	J
Mean Viscosity:	3.2e-5	
Mean Conductivity:	0.05	W/(r

### *Bug Fixes in INSTED Plate-Fin*

- V. In INSTED 9.0, if custom J/F data is used for both the hot and cold streams of the plate-fin heat exchanger, the cold side custom J/F data did not load correctly, causing a run-time exception error when the solver tried to interpolate the cold-side J/F data. This bug has been fixed in INSTED 9.1. The error alluded to here was manifested in the optimization task of the INSTED/Plate-Fin module.