

Mag-Drive Pump Protection for Semiconductor Chemical Transfer

Sealless eliminates the mechanical-seal leak path. It does not eliminate failure — it changes the failure profile. The 9-layer protection stack that closes it.

Sealless Does Not Mean Failure-Proof

A magnetic-drive centrifugal pump transfers torque through a containment shell instead of a rotating mechanical shaft seal — that eliminates a major traditional leak path. But mag-drive pumps fail in their own distinct ways. "We bought a mag-drive pump, so it can't leak" is a different claim than "we bought a mag-drive pump and protected it correctly."

THE REAL FAILURE MODES

What Actually Damages a Mag-Drive Pump

Dry running

Most designs rely on the pumped liquid to lubricate and cool internal bushings. Loss of liquid generates rapid heat — dry-run tolerance should never be assumed from "mag drive" alone; it depends on the specific bushing design.

Cavitation

Insufficient suction pressure produces vapor cavities — reduced flow, damaged internals, vibration, heat, and potential decoupling.

Magnet decoupling

The driven magnet loses sync with the outer drive magnet. The motor keeps turning while the impeller stops — silent unless something is watching the motor load.

Deadhead / excessive flow / entrained gas / solids / crystallizing chemicals

Closed-discharge recirculates energy and raises temperature; over-flow overloads the pump and motor; entrained gas is generally poorly tolerated; solids can damage lubrication passages; residue can crystallize and damage the pump after shutdown, even after a clean run.

A 9-Layer Protection Stack, Not One Device

A high-consequence chemical-transfer pump shouldn't depend on a single protective device. Each layer catches a different failure mode or a different stage of the same failure.

1 Source tank low-low level

Don't allow the pump to empty the source tank.

2 Suction pressure / source confirmation

Confirms an adequate suction condition before and during operation.

3 Motor power monitor

Detects the underload/overload signature of dry running, decoupling, and cavitation — often before a standard overload relay reacts.

4 Discharge pressure

Confirms the pump is producing the expected hydraulic response.

5 Flow verification

Confirms commanded operation is actually moving liquid.

6 Temperature

Useful wherever heat generation or crystallization is a concern.

7 Minimum-flow strategy

Where the pump/application requires one.

8 Leak detection

Protects the surrounding area, connections, and skid — not merely the pump.

9 Control-system interlock

The protective instruments have to actually stop the equipment — without this, the first 8 layers are just data on a screen.

The Finish Thompson M20 Power Monitor

Sourced directly from Finish Thompson's own current published specs.

M20 Power Monitor

PROTECTS AGAINST	Run-dry damage, deadheading, excess power, decoupling, lack of priming (SP Series)
OPERATING RANGE	50 or 60 Hz, all motor voltages up to 690 VAC
INCLUDED	Transducer at no additional charge
PROTECTION LEVELS	4 – pre-alarm minimum power, pre-alarm maximum power, alarm minimum power, alarm maximum power
OUTPUT	Digital display, PLC output

REAL REPRESENTED CAPABILITY

What LibertyCES Specifies for Mag-Drive Chemical Transfer

Finish Thompson UCR Series – ANSI-Dimensional Sealless Pumps

300 psi max pressure, 250°F max temperature, 1–1,450 GPM flow range, up to 492 ft head. Pure ETFE housing lining and barrier liner, neodymium drive magnets fully ETFE-encapsulated, ductile iron casing to ANSI/ASME B73.1m & 73.3, CE/UKCA/ATEX certified.

Richter Chemie-Technik MNK Series – Dry-Run-Optimized Bearings

SAFEGLIDE PLUS dry-running-optimized plain bearings (pure SSiC or SSiC/SAFEGLIDE PLUS), eddy-current-free CFRP/PTFE double containment can, -60°C to +200°C range. Richter's own spec table lists a dedicated Semi-Conductor/Photovoltaic sector.

The Protection-Stack Checklist

Run this on your next mag-drive chemical transfer application before the pump is ordered.

- ☐ Source tank low-low level interlock specified?
- ☐ Suction pressure / source confirmation specified?
- ☐ Motor power monitor specified, with real protection-level setpoints?
- ☐ Discharge pressure monitoring specified?
- ☐ Flow verification specified?
- ☐ Temperature monitoring specified, if crystallization or heat is a real risk?
- ☐ Minimum-flow strategy specified, if required by the pump/application?
- ☐ Leak detection specified for the skid/area, not just the pump?
- ☐ Control-system interlock confirmed to actually stop the equipment on any of the above?
- ☐ Dry-run tolerance verified for the specific pump model — not assumed from "mag drive"?

Run This on Your Next Application

LibertyCES specifies mag-drive protection on every chemical transfer application where a leak isn't an option — a documented answer, not a catalog guess. For a spec review, call, text, or email James directly.

(559) 395-5500 · james@libertyces.com · libertyces.com