

MANUAL

CHRONECT™ HDX LC Columns

Analytical columns for HDX-MS workflows

Contents

1. Introduction.....	1
2. Intended use.....	2
3. HDX workflow context.....	2
4. Expected benefits.....	3
5. Column characteristics.....	3
6. Before you begin.....	4
7. Storage and handling.....	5
8. Safety and general precautions.....	5
9. Best practices.....	6
10. Recommended implementation pathway.....	6
11. Installation.....	8
12. Baseline method and optimization example.....	9
13. MS acquisition considerations.....	10
14. Workflow productivity considerations with CHRONOS™ and HDExaminer™ PRO.....	11
15. Evaluating Success.....	12
16. Column Cleaning and Regeneration.....	12
17. Troubleshooting.....	13
18. When to Contact Support.....	14
19. Column Warranties.....	14
20. Summary.....	15
21. Implementation and Evaluation Record.....	15

1. Introduction

Purpose of this document

This manual supports installation, implementation, optimization, and routine use of CHRONECT HDX LC Columns within HDX-MS workflows.

What is CHRONECT HDX LC?

The CHRONECT HDX LC Column is an analytical column designed specifically for HDX-MS workflows operating. The column is intended to:

- provide fit-for-purpose analytical separation for HDX workflows
- reduce the operating pressure burden associated with chilled operation
- create more room for method optimization
- improve overall workflow robustness and throughput

Why this column exists

In HDX workflows, analytical columns are typically operated cold to preserve post-exchange sample state. Under these conditions, mobile-phase viscosity increases and conventional analytical columns may operate at substantially higher pressure than they do at ambient temperature.

This can:

- limit usable flow rate
- extend LC runtime
- increase burden on the LC fluidic path
- restrict flexibility in method optimization

The CHRONECT HDX LC Columns are designed to help relieve that pressure burden while maintaining acceptable chromatographic performance for HDX analysis.

Product formats

The CHRONECT HDX LC Column family includes multiple dimensions to support different workflow needs. Full flow-rate and maximum-pressure specifications for each format are in Column Characteristics ([Section 5](#)).

Part number	Description
CHR-HD-LC-1001	CHRONECT HDX LC, 100 × 1.0 mm
CHR-HD-LC-501	CHRONECT HDX LC, 50 × 1.0 mm
CHR-HD-LC-100.3	CHRONECT HDX LC, 100 × 0.3 mm
CHR-HD-LC-50.3	CHRONECT HDX LC, 50 × 0.3 mm
CHR-HD-LC-150.15	CHRONECT HDX LC, 150 × 0.15 mm
CHR-HD-LC-50.15	CHRONECT HDX LC, 50 × 0.15 mm

2. Intended use

CHRONECT HDX LC Columns are intended for:

HDX-MS analytical separation

- use in workflows incorporating:
 - protease digestion,
 - trap capture,
 - analytical peptide separation,
 - and LC-MS integration
- implementation in both automated and semi-automated HDX workflows

Typical applications

- higher-order structure characterization
- protein conformational analysis
- comparability studies
- protein–ligand interaction mapping
- protein–protein interaction mapping
- replicate-intensive HDX workflows
- throughput-optimized HDX studies

3. HDX workflow context

Where the analytical column sits in the HDX workflow

A standard HDX workflow typically includes:

1. protein labeling / exchange
2. quench
3. injection
4. protease digestion
5. trap capture
6. analytical separation
7. MS detection
8. data analysis

The analytical column is the final separation stage prior to MS detection and is one of the most important determinants of:

- LC runtime,
- pressure burden,
- reproducibility,
- and overall schedule efficiency.

What stays the same and what changes

Implementation does not require rebuilding the entire HDX workflow. In most cases, users can begin with a direct column replacement and then decide whether to optimize further.

Stays the same	Changes
Overall HDX workflow logic	Analytical column installed
Digestion/trap workflow	Operating pressure profile
General method structure	Flow rates during cleanup/re-equilibration
LC-MS integration	Total LC runtime
HDX sample handling	Potential throughput/overlap efficiency

4. Expected benefits

These outcomes depend on system configuration, method structure, acquisition settings, and user optimization choices.

Representative outcomes

Feature	What this means for you
Lower operating pressure	Easier operation in chilled HDX workflows.
More pressure headroom	More room to optimize without hitting pressure limits.
Flexible method optimization	A simpler path to faster methods.
Shorter LC runtime	More samples in the same amount of time.
Improved robustness	More consistent day-to-day performance.
Reduced service risk	Less downtime from pressure-related interruptions.
Greater sample capacity	More throughput from your existing setup.
Better CHRONOS efficiency	Better use of overlap scheduling and instrument time.
Better fit with HDExaminer PRO	Front-end speed that better matches faster downstream analysis.
Stronger workflow productivity	Better performance across the full HDX workflow.

Quantified benefits

Feature	What this means for you
Up to ~40% lower backpressure	More operating margin under chilled conditions.
Similar / acceptable chromatography	Performance gains without compromising fit-for-purpose separation.
~25% to 35% runtime reduction after optimization	Meaningful throughput gains in routine HDX workflow

5. Column characteristics

General information

Phase	Description	Shipping solvent	pH stability
CHRONECT HDX LC	Proprietary phase and particle size, designed to optimize HDX (Hydrogen Exchange) workflows and results	Acetonitrile/Water	1.5-8.5*

*pH stability under gradient conditions. pH stability is 1.5–10 under isocratic conditions.

Mobile phase compatibility

When using any HPLC/UHPLC column, be sure to only use HPLC grade solvents and materials while also avoiding immiscible solvent/buffer combinations. Additionally, the use of solvent filtration is highly recommended to remove trace impurities from your mobile phase of choice.

With all columns, please ensure that mobile phase pH does not exceed individual stationary phase limits.

Typical flow rate, backpressure, and temperature

Typical values for common dimensions of CHRONECT HDX LC columns are given below. These numbers are not absolute values and can differ based on the LC system, running parameters, and sample analytes/matrix. The values below have been created using a solvent system of acetonitrile and water.

Column type	Column inner diameter	Typical flow rate
Micro LC	0.15 – 0.5 mm	see Section 11 installation procedure for flow-rate setup
Standard-bore	1.0 mm	see Section 11 installation procedure for flow-rate setup

Maximum backpressure: 15,000 psi for all CHRONECT HDX LC Column formats. If used above this recommendation, it may compromise column longevity.

Maximum temperature: Trajan's HDX columns can be operated at 0°C without concern.

Note: Backpressures from a water/methanol mixture for the same column dimension and flow rate will be approximately 40% higher than a H₂O/acetonitrile mixture.

Testing and column quality documentation

Every CHRONECT HDX LC Column is individually QC tested, and every column is supplied with a Certificate of Quality Assurance (CQA) which indicates testing conditions, operating parameters, and column details. The column details, including specifications and performance test results, should be entered into your information management system for easy tracking and reference.

6. Before you begin

Before installing the column, confirm the following:

System readiness checklist

- HDX system is operating normally
- protease and trap column performance is acceptable
- no existing unresolved leak or overpressure issues
- current analytical method is documented
- baseline pressure and runtime are known
- LC plumbing and connections are in good condition
- chilled operation is stable
- current MS acquisition settings are documented

Recommended baseline data to record

Before implementation, see evaluation form to help with completion, and documentation:

- current analytical column format
- operating temperature
- digestion time
- gradient profile
- flow rates
- runtime
- backpressure profile
- retention behavior
- carryover / blank strategy
- current samples/day or conditions/day

This information will make before/after comparison meaningful.

7. Storage and handling

Storage

Store columns according to supplied packaging and standard laboratory best practices for chromatography consumables.

Recommended storage conditions:

- CHRONECT HDX LC phase: Acetonitrile/Water (65:35 v/v). Methanol can be used in place of acetonitrile.
- Please store with HPLC grade solvents only.

It is very important to make sure your column is clean before storage. This includes the removal of buffers, salts, sample, and ion-pairing agents.

Handling

- Handle carefully to avoid mechanical damage
- Do not overtighten fittings; use the appropriate tool if needed and follow the instructions on column tightening
- Tubing should be fitted with no inlet voids, as this will result in poor peak shape
- Avoid dropping or impact
- Keep inlet and outlet protected until installation
- Use clean fittings and tubing appropriate to the instrument setup
- Do not start the pump at high flow rates; instead, ramp up gradually over a few minutes
- Set your pump pressure limit to protect the column in the event of a blockage — blockages can create voids which will detrimentally affect the column's performance

⚠ General caution

Do not install the column if:

- packaging appears damaged
- the column hardware shows visible defects
- the system has unresolved leak or overpressure issues

8. Safety and general precautions

General laboratory use

Use appropriate laboratory safety procedures when handling:

- solvents
- acids
- chilled components
- pressurized LC systems
- HDX reagents and samples

⚠ Operational precautions

- Do not exceed instrument or method pressure limits
- Do not assume flow can be increased without reviewing the full method
- Confirm leak-free connections before running sample sequences
- Review MS acquisition settings if analytical runtime is shortened
- Use only trained personnel for installation and optimization

⚠ Important HDX-specific caution

Because HDX workflows are pressure-sensitive and temperature-sensitive, any method change should be made in a controlled way and documented carefully.

9. Best practices

Recommended best practices

- Start with a like-for-like column replacement where possible
- Record baseline pressure and runtime before testing
- Confirm pressure reduction before changing method timing
- Optimize cleanup and re-equilibration before changing elution
- Increase flow and gradient rate with respect to the change in pressure offered by the new column
- Review MS acquisition before routine use of shorter methods
- Document method changes and results carefully
- Involve applications support for advanced optimization

Do not

- Change multiple major variables at once
- Assume shorter runtime automatically equals acceptable MS acquisition
- Evaluate performance without a baseline comparison
- Move directly to the most aggressive method without staged testing

10. Recommended implementation pathway

Goal: Use the column as a direct replacement with minimal method change, then decide whether to optimize further for speed and throughput.

- Confirm lower operating pressure
- Confirm acceptable chromatography
- Verify performance within the existing workflow

Phase 1 — Direct replacement

Purpose: Lowest-risk adoption step.

Goal:

- Confirm lower operating pressure
- Confirm acceptable chromatography
- Verify performance within the existing workflow

Keep constant

- method structure
- gradient shape
- general flow profile
- digestion conditions
- trap conditions
- MS acquisition settings
- sequence logic

Evaluate

- pressure reduction
- chromatography quality
- retention stability
- ease of installation
- overall workflow behavior

Best use

Users who:

- want a lower-risk first step
- are satisfied with current separation
- want lower pressure and better robustness before optimizing speed

Start by keeping the method as stable as possible and use the first trial to confirm lower-pressure operation.

Phase 2 — Cleanup and re-equilibration optimization

Purpose: Recover runtime without changing the analytical separation first.

Goal: Reduce total runtime without changing the analytical elution phase first.

Typical change: Increase flow in cleanup and re-equilibration, while preserving the elution phase.

Expected result

- shorter total LC runtime
- preserved separation behavior
- improved schedule efficiency
- minimal analytical risk

Why this is recommended: This step reclaims time from non-separation phases and is typically the lowest-risk route to runtime reduction. It is the preferred first optimization step because it preserves the elution profile while reclaiming non-separation time.

Phase 3 — Elution optimization

Purpose: Pursue greater runtime reduction if the workflow and acquisition method allow it.

Goal: Further reduce total LC runtime by increasing elution flow where appropriate.

Use only after

- lower pressure has been confirmed
- Phase 2 has been successful
- acceptable chromatography has been demonstrated
- MS acquisition implications are understood

Expected result

- greater runtime reduction
- higher throughput
- more capacity for samples, replicates, or conditions

⚠ Important caution

As peaks become narrower, MS sampling must remain appropriate. Mass spectrometry acquisition settings must still provide adequate peak sampling. Shorter LC methods may require corresponding MS method review, especially for DIA workflows. Elution optimization is a second-step option once lower-risk gains have already been captured.

11. Installation

This section covers the mechanical steps for the Phase 1 direct-replacement installation described in [Section 10](#).

Preparing the LC system

Initial setup of your LC system is very important to ensure column performance. Ensure that your LC system is ready:

- Seals, lines, and injector are clean
- Lines are primed (no dry lines or bubbles)
- Steady baseline
- Consistent pressures

Flush the LC system pump and line with mobile phase (HPLC grade and miscible with the solvents the column is shipped in).

Mobile phase starting conditions checklist:

- Ensure the HPLC grade mobile phase is well mixed, filtered, and degassed prior to use.
- Ensure column shipping solvent, remaining solvent in the LC system, and mobile phase solvents are miscible.

General installation steps

1. Stop the LC method and bring the system to a safe state
2. Depressurize the system according to instrument procedures
3. Remove the existing analytical column
4. Inspect tubing ends, fittings, and connections
5. Install the CHRONECT HDX LC Column in the correct flow direction
6. Reconnect fittings using appropriate tightening practice
7. Confirm that the column is seated correctly in the temperature-controlled zone
8. Equilibrate under the starting mobile-phase conditions
9. Check for leaks before sample introduction
10. Run initial system suitability / baseline verification sequence

Micro-flow column installation procedure

For micro-flow formats (0.15–0.5 mm ID), follow this specific flow-ramping procedure to avoid pressure shock to the column:

- Set flow rate to 7 $\mu\text{L}/\text{min}$ (for 0.15–0.5 mm ID) and install the column, making sure that the arrow is in the direction of flow.
- Increase the flow rate to 14 $\mu\text{L}/\text{min}$ (0.15 mm ID), 29 $\mu\text{L}/\text{min}$ (0.3 mm ID), or 48 $\mu\text{L}/\text{min}$ (0.5 mm ID) for 5–10 minutes. Collect solvent in a small beaker.
- Stop flow and wipe the outlet end of the column to remove any particulates before connecting to a detector.
- Install fitting/tubing into the outlet end and run a minimum of 10 column volumes at low flow (~ 0.2 mL/min) while monitoring the backpressure.
- A steady pressure should indicate constant flow, while pressure fluctuation will indicate air in the system.
- Wide fluctuations in pressure may shock and damage the column, so it is important to monitor the pressure.
- Monitor pressure as well as the signal from the detector; when both are steady, the column is ready for use.

1.0 mm ID column installation procedure

For 1.0 mm ID formats, follow this specific flow-ramping procedure to avoid pressure shock to the column:

- Set flow rate to 28 $\mu\text{L}/\text{min}$ and install the column, making sure that the arrow is in the direction of flow.
- Increase the flow rate to 190 $\mu\text{L}/\text{min}$ for 5–10 minutes. Collect solvent in a small beaker.
- Stop flow and wipe the outlet end of the column to remove any particulates before connecting to a detector.
- Install fitting/tubing into the outlet end and run a minimum of 10 column volumes at low flow (45–50 $\mu\text{L}/\text{min}$) while monitoring the backpressure.
- A steady pressure should indicate constant flow, while pressure fluctuation will indicate air in the system.
- Wide fluctuations in pressure may shock and damage the column, so it is important to monitor the pressure.
- Monitor pressure as well as the signal from the detector; when both are steady, the column is ready for use.

Initial verification checks

After installation, confirm:

- no leaks at fittings
- stable pressure profile
- no unexpected pressure spikes
- acceptable retention behavior
- acceptable chromatography versus current baseline
- no abnormal carryover behavior
- acceptable instrument readiness for further testing

12. Baseline method and optimization example

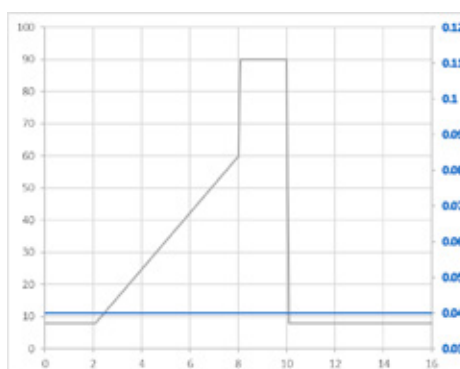
Baseline method

Representative method using a 1.0 mm × 50 mm analytical column at 0°C:

- Total LC runtime: 16.0 min
- Flow: 0.04 mL/min
- Max pressure: around 6–8 kpsi

Standard structure:

	Time	Flow (ml/min)	%A	%B	Total volume (mL)
Digestion	0	0.06	92	8	0.08
	2	0.06	92	8	
Elution	2.1	0.06	92	8	236
	6	0.06	40	60	
Cleanup	6.1	0.08	10	90	80
	7	0.08	10	90	
Equilibration	7.4	0.07	92	8	245
	8	0.07	92	8	
	10.5	0.07	92	8	



- Elution: 2.1–8.0 min
- Cleanup: 8.1–10.0 min
- Re-equilibration: 10.1–16.0 min

Standard gradient — detailed profile

With a traditional analytical column, flow rates are constructed to maintain backpressures within manageable ranges (<10k psi / 689 Bar). For this reason, HDX gradients can be longer than desired. In the example below, a 16-minute gradient has an elution slope from 8% B to 40% B, followed by a cleanup at 90% B, then re-equilibration back to 8% B.

This gradient is based on a 1 mm × 50 mm column (25 µL swept), running at 0°C with a max pressure of 12.5k psi.

Optimization example — Stage 1 | Cleanup and re-equilibration

Preserve elution, increase cleanup and re-equilibration flow:

- cleanup to 0.08 mL/min
- re-equilibration to 0.07 mL/min

Representative outcome

- runtime reduced from 16.0 min to 12.5 min
- approximately 25% throughput increase

Optimization example — Stage 2 | Elution optimization

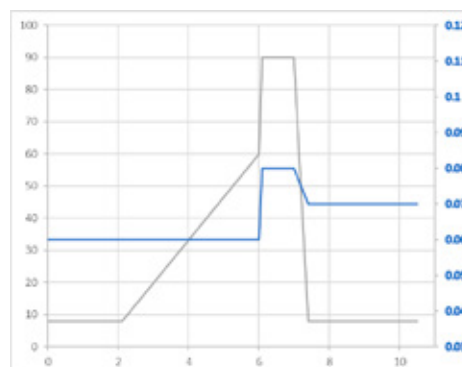
Increase elution flow as well:

- digestion/elution to 0.06 mL/min
- cleanup to 0.08 mL/min
- re-equilibration to 0.07 mL/min

Representative outcome

- runtime reduced from 16.0 min to 10.5 min
- approximately 37% throughput increase

	Time	Flow (ml/min)	%A	%B	Total volume (mL)
Digestion	0	0.06	92	8	0.08
	2	0.06	92	8	
Elution	2.1	0.06	92	8	236
	6	0.06	40	60	
Cleanup	6.1	0.08	10	90	80
	7	0.08	10	90	
Equilibration	7.4	0.07	92	8	245
	8	0.07	92	8	
	10.5	0.07	92	8	



In this example, total LC runtime has been reduced by ~6 minutes when combined with cleanup optimization — a total increase of throughput of 37% from the original method, all because of a change to the CHRONECT HDX LC low pressure column.

13. MS acquisition considerations

Important note: Narrower LC methods require review of MS acquisition settings.

Especially for DIA workflows

- Maintain adequate sampling across the chromatographic peak
- Aim for at least 5 scan cycles per LC peak

Narrower LC peaks may require:

- fewer DIA windows
- wider DIA windows

Wider windows can increase spectral complexity. DIA cycles are slower than MS1-only cycles, and the number of DIA windows and their size should be adjusted when using shorter elution times to ensure a minimum of 5 scan cycles per LC peak. As elution time shrinks, fewer but wider DIA windows are needed to maintain the same m/z coverage.

Practical guidance

If elution is shortened:

- confirm peak sampling remains acceptable
- verify data quality
- review the acquisition method before moving into routine production use

14. Workflow productivity considerations with CHRONOS™ and HDExaminer™ PRO

CHRONOS™ and throughput

Why shorter LC runtime matters in CHRONOS-controlled workflows

CHRONOS improves throughput by overlapping sample preparation tasks into regions of workflow inactivity where possible. The two key scheduling concepts are:

- Sample Preparation Overlap Zone — required sample actions that can be scheduled into preceding sample LC/MS time
- Overlap Window — available LC/MS time where no other sample preparation actions are taking place

Important principle: The sample preparation overlap zone contains steps that cannot be made shorter. As sample preparation takes place before LC/MS runtime, there is no sample prep taking place during LC/MS runtime. CHRONOS can schedule sample preparation time into the LC/MS runtime of preceding samples to reduce total workflow runtime.

Example workflow compression (7-timepoint example)

- Serial workflow with blanks: 15.5 h
- Serial workflow with backflushing, no blanks: 12.5 h
- Backflushing + CHRONOS overlap: 4.0 h

Use of the lower-pressure analytical column can reduce total time further by reducing the LC runtime within each sample schedule.

CHRONOS and scheduling efficiency

CHRONOS improves HDX throughput by coordinating:

- reagent movement
- exchange timing
- quenching
- injection
- method initiation
- valve switching
- sample overlap

Because LC runtime is one of the largest fixed blocks in the HDX schedule, reducing analytical runtime can improve how efficiently required sample actions fit into available overlap windows.

Practical implication

When LC runtime is shortened:

- more overlap may be possible
- total workflow compression may improve
- more samples or replicates may fit into the same instrument window

In this way, lower-pressure analytical columns can increase the value of CHRONOS scheduling by making the analytical portion of the workflow less restrictive.

Workflow optimization with CHRONOS™ and HDExaminer™ PRO

CHRONECT HDX LC Columns are designed to support broader workflow optimization, not just standalone chromatographic improvement.

As HDX data analysis becomes faster, chromatography and workflow robustness become more important to total productivity.

- HDExaminer PRO helps reduce the downstream analysis burden
- front-end data generation speed matters more
- schedule delays from LC runtime become more visible
- robust and efficient chromatography has greater overall impact

Practical implication

When the CHRONECT HDX LC Column is used alongside HDExaminer PRO, laboratories may realize greater benefit from:

- faster data generation
- better use of operating windows
- more complete end-to-end workflow efficiency

End-to-end workflow takeaway

The analytical column can be adopted on its own as a lower-pressure chromatography upgrade. However, its full workflow value is often greatest when used as part of a broader HDX workflow that includes:

- automated sample handling
- CHRONOS scheduling logic
- efficient LC runtime
- rapid downstream analysis with HDExaminer PRO

15. Evaluating Success

What success looks like

Users evaluating the column should assess:

- Is backpressure materially lower than the current column?
- Is chromatographic separation similar or acceptable?
- Can cleanup and re-equilibration be shortened safely?
- Can total LC runtime be reduced?
- Does the gained time create room for more samples or replicates?
- Are service interruptions reduced?
- Does the workflow feel more stable under chilled conditions?

Success criteria

Suggested success criteria:

- Up to 40% lower backpressure
- Similar / acceptable chromatography
- Up to 25–35% lower runtime after optimization (versus original baseline method)
- Up to a further ~40% reduction in runtime compared to Phase 2 optimization steps (when Phase 3 elution optimization is also applied)
- More usable workflow capacity
- Less fluidic stress
- Improved throughput or schedule efficiency

16. Column Cleaning and Regeneration

Column cleaning

Clean with a gradient that is closest to the last solvent system on the system:

- For example, if the last injection ended with buffer/acetonitrile (75:25), it is more appropriate to start with 95:5 water/acetonitrile and then move step by step as needed to increase organic content (i.e., 75:25 water/acetonitrile → 50:50 water/acetonitrile → 5:95 water/acetonitrile).

Tips

- When cleaning, set your flow rate lower than that of your method flow rate, especially when attempting to clean using methanol or IPA.
- Cleaning for a longer period of time is more often beneficial than adding more cycles.
- Reverse flushing the column (against the direction of the arrow on the column) is fine, but please use low flow. Suggested reverse-flushing flow rates based on column ID:
 - * 7 $\mu\text{L}/\text{min}$ (0.15 mm ID)
 - * 14 $\mu\text{L}/\text{min}$ (0.3 mm ID)
 - * 24 $\mu\text{L}/\text{min}$ (0.5 mm ID)
 - * 96 $\mu\text{L}/\text{min}$ (1.0 mm ID)

Column regeneration

The CHRONECT HDX LC phase can be regenerated by:

Applying the same gradient flush as in the cleaning steps above, overnight at low flow.

- Reverse flushing is acceptable.
- For column storage conditions, see Storage and Handling ([Section 7](#)).

17. Troubleshooting

Problem: Pressure is not lower than expected

Remember that CHRONECT HDX LC Columns will produce up to ~40% lower back pressure, so this is expected.

Possible causes:

- column not installed correctly
- upstream restriction
- tubing/fitting issue
- unrelated system pressure issue
- method conditions differ from baseline

Recommended actions:

- confirm correct installation
- compare against baseline under matched conditions
- inspect fittings and tubing
- review upstream components

Problem: Chromatography changes unexpectedly

Chromatography from CHRONECT HDX LC Columns can sometimes elute analytes earlier than other columns, depending on the column chemistry. If this is the case, lowering the organic in the gradient by 3–5% should help to compensate.

Possible causes:

- method not directly matched
- system dead volume differences
- changed flow profile
- changed temperature behavior

Recommended actions:

- return to baseline method conditions
- evaluate direct replacement first
- compare retention and peak behavior before optimizing further

Problem: Runtime does not improve after optimization

Possible causes:

- cleanup/re-equilibration not compressed enough
- method already near scheduling limit
- acquisition settings limiting further optimization
- Overlap Zone exceeds Overlap Window

Recommended actions:

- confirm which phase is limiting
- review CHRONOS schedule efficiency
- assess whether the workflow has reached an overlap limitation

Problem: Data quality declines after shortening elution

Possible causes:

- insufficient MS peak sampling
- acquisition not adjusted
- excessive spectral complexity

Recommended actions:

- review acquisition cycle timing
- assess scan density across peaks
- involve applications support before routine use

18. When to Contact Support

Contact Trajan support when:

- chromatography changes more than expected
- pressure reduction is not observed
- runtime optimization goals are not achieved
- MS acquisition adjustments are needed
- advanced workflow compression is being evaluated
- unusual proteins or specialized methods are in use
- performance differs materially from expected outcome
- you want to evaluate more aggressive runtime optimization

Visit chronect.trajanscimed.com or contact automation@trajanscimed.com.

19. Column Warranties

CHRONECT HDX LC Columns are warranted to meet the stated performance and quality and to be free of defects in material and workmanship.

If you are not satisfied with your LC column, please contact us within 30 days of receipt. Before any return or refund is approved, we require a discussion with one of our technical specialists to understand the concern and review the application. We'll do our best to solve the problem to your satisfaction.

⚠ Never change from one solvent to another which is immiscible without going through an intermediate solvent which is miscible with both — this will damage the column. Never change to (or from) a buffer/salt solution where the buffer/salt is not soluble in the second solvent — this will also damage the column. Never attempt to remove the column end fittings; this will void the warranty.

20. Summary

CHRONECT HDX LC Columns are intended to solve a specific HDX problem: how to maintain fit-for-purpose chromatography under chilled conditions without paying the full pressure penalty of conventional analytical columns.

The result is a more robust operating window, greater flexibility for method optimization, and measurable gains in full-workflow throughput.

Key takeaway

For most users, the best onboarding path is:

- install as a direct replacement
- confirm lower-pressure operation
- optimize cleanup and re-equilibration
- optimize elution only if needed and supported by acquisition settings

21. Implementation and Evaluation Record

Baseline documentation, implementation tracking, and evaluation criteria for the CHRONECT HDX LC Column are maintained in a companion [Implementation and Evaluation Record](#).