



Performance Qualification

• Step Accuracy: STD Gradient_3

• Instruments and Fluidics

Instrument Name	Model	Supplier's Name	Serial Number
Pump	LPG-3400A	Thermo Scientific	8013359
UV Detector	DAD-3000RS	Thermo Scientific	8043573
Chromeleon Datasystem	V. 6.80 SR16 Build 5387	Thermo Scientific	40640

Accessories	Description
Back Pressure Device	Capillary (L:15 m; ID:0,18 mm)
Solvent A	Water (HPLC-Grade)
Solvent B for Gradient	Water + 0.1% Acetone

• Additional Information

Customer: Customer's Name
 Operator: Operator's Name
 Operator's Jobtitle
 Execution Date: 2020-mars-26
 Next Qualification: 2020-sept

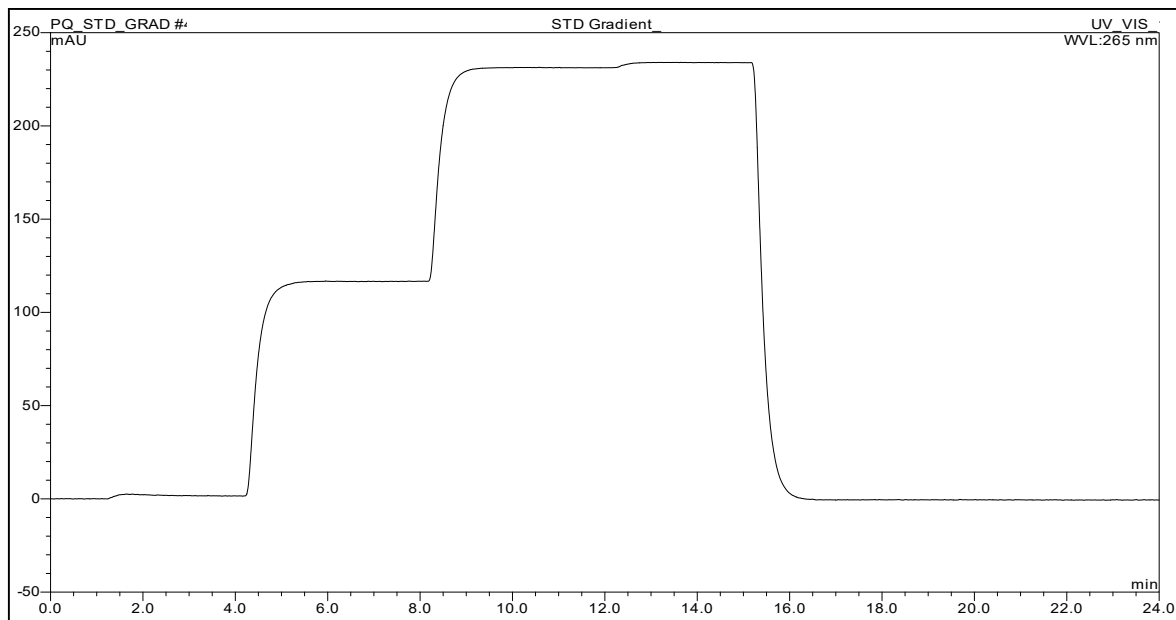
• Limits and Test Results

	Limit	Observed max. Deviation	Result of all Steps
Step Accuracy	<= 2,000 %	0,312 %	Test passed
Step Ripple	<= 0,500 %	0,085 %	Test passed

• Signatures

	Signature	Date
Submitter / Operator:	{seq.submitOperator.userName}	{seq.submitTime}
Reviewer:	{seq.reviewOperator.userName}	{seq.reviewTime}
Approver (e-sig. only):	{seq.approveOperator.userName}	{seq.approveTime}

• **Chromatogram of STD Gradient_3**



Flow [ml/min]: 2,000

• **Data of STD Gradient_3**

Observed Value [mAU]	Expected Value [%]	Calculated Value [%]	Abs. Critical Deviation [%]	Calculated Deviation [%]	Result
0,00	0,00	0,000	2,000	0,000	ok
1,61	1,00	0,688	2,000	-0,312	ok
116,82	50,00	49,859	2,000	-0,141	ok
231,47	99,00	98,792	2,000	-0,208	ok
234,30	100,00	100,000	2,000	0,000	ok

• **Ripple of STD Gradient_3**

Step [%]	Ripple [mAU]	Calculated Ripple [%]	Critical Ripple [%]	Result
1,00	0,199	0,085	0,500	ok
50,00	0,185	0,079	0,500	ok
99,00	0,063	0,027	0,500	ok

Definition:

Sample Name: **STD Gradient_3**
 Gradienttype: **STD** 1 0 0 1

Sample Number: 4
 First Solvent: A Solvent Help: Grad
 Second Solvent: B

Calculation of Gradient accuracy and -precision:

Observed Values for Pumps with Standard Mixing Chamber:

Name	Signal Start mAU	Signal Step mAU	Signal Step 50 mAU	Signal Step 99 mAU	Signal Step 100 mAU
	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD Gradient_1	0,104	2,208	117,058	231,512	234,210
STD Gradient_2	0,053	1,688	116,692	231,275	233,991
STD Gradient_3	0,029	1,559	116,659	231,201	233,950

Calculated Steps [%]

	STD A-B	LON	STD C-D	C-D (1.0 ml/ml)	Current
Start	0,00	0,00	0,00	0,00	0,00
Step 1	1,00	1,00	0,00	0,00	1,00
Step 2	50,00	99,00	0,00	0,00	50,00
Step 3	99,00	0,00	0,00	0,00	99,00
End	100,00	0,00	0,00	0,00	100,00

Calculation of Ripple:

**Observed Values for Pumps:
 with Standard Mixing Chamber: with Mixing Kit 1 or 2:**

Name	Ripple Step 1 mAU	Ripple Step 50 mAU	Ripple Step 99 mAU	Ripple Step 100 mAU	Ripple Step 100 mAU
	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD Gradient_1	0,210	0,141	0,143	0,143	0,228
STD Gradient_2	0,271	0,229	0,154	0,208	0,199
STD Gradient_3	0,199	0,185	0,063	0,176	0,269

Determination of Pump Unit for Dionex DGPs

Sequence name: PQ_STD_GRAD
 Right end of the sequence GRAD
 Pump's model number: LPG-3400A
 Pump's model variant: LPG
 Pump unit:

Determination of Pump Flow (Full Qualified and Non-Full-Qualified Variable Name)

CM-Version:	Flow:
CM6:	2,000 (Pump)
CM7:	n.a. (Pump - DDK driver)
	n.a. (MicroPump - DDK driver)
	n.a. (LoadingPump - DDK driver)
	n.a. (PumpLeft - DDK driver)
	n.a. (PumpRight - DDK driver)
	2,000 (Pump)
	n.a. (MicroPump)
	n.a. (LoadingPump)
	n.a. (PumpLeft)
	n.a. (PumpRight)
Used Flow Rate	2,000 (= maximum flow rate)

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variable Name)

CM-Version:	%B(0.1):	%B(1.1):	%B(4.1):	%B(8.1):	%B(12.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	1,0	50,0	99,0	100,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %B	0,000	1,000	50,000	99,000	100,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variable Name)

CM-Version:	%B(0.1):	%B(2.1):	%B(8.1):	%B(23.1):	%B(36.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	1,0	99,0	0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %B	0,000	1,000	99,000	0,000	0,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variable Name)

CM-Version:	%D(0.1):	%D(1.1):	%D(4.1):	%D(8.1):	%D(12.1):
CM6:	0,0	0,0	0,0	0,0	0,0
CM7:	0,0	0,0	0,0	0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %D	0,000	0,000	0,000	0,000	0,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variab

CM-Version:	%D(0.1):	%D(2.1):	%D(8.1):	%D(23.1):	%D(36.1):	
CM6:	0,0	0,0		0,0	0,0	0,0
CM7:	0,0	0,0		0,0	0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.	
	n.a.	n.a.	n.a.	n.a.	n.a.	
	n.a.	n.a.	n.a.	n.a.	n.a.	
	n.a.	n.a.	n.a.	n.a.	n.a.	
	0,0	0,0		0,0	0,0	0,0
Used %D	0,000	0,000	0,000	0,000	0,000	







Observed Values for Pumps with Mixing Kit 1 or 2:

<i>Sr</i>	<i>Signal Start</i> <i>mAU</i>	<i>Signal Step 1</i> <i>mAU</i>	<i>Signal Step 50</i> <i>mAU</i>	<i>Signal Step 99</i> <i>mAU</i>	<i>Signal Step 100</i> <i>mAU</i>	<i>Signal Step End</i> <i>mAU</i>
<i>UV</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
-1	2,919	117,067	-0,530	n.a.	n.a.	n.a.
-1	2,080	116,666	-0,671	n.a.	n.a.	n.a.
-1	2,093	116,680	-0,612	n.a.	n.a.	n.a.

with Micro Mixing Kit:

<i>Ri</i>	<i>Ripple Step 1</i> <i>mAU</i>	<i>Ripple Step 50</i> <i>mAU</i>	<i>Ripple Step 99</i> <i>mAU</i>
<i>UV</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>	<i>UV_VIS_1</i>
n.a.	n.a.	n.a.	n.a.
n.a.	0,210	0,141	0,143
n.a.	0,271	0,229	0,154
n.a.	0,199	0,185	0,063

File Name) - STD Gradient A-B

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

File Name) - LON Gradient A-B

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

File Name) - STD Gradient C-D

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %D)

File Name) - Gradient C-D (Flow rate: 1.000 ml/min)

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

Observed Values for Pumps with Micro Mixing Kit:

Signal Start mAU	Signal Step 1 mAU	Signal Step 50 mAU	Signal Step 99 mAU	Signal Step 100 mAU	Signal End mAU
UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0,104	2,208	117,058	231,512	234,210	-0,536
0,053	1,688	116,692	231,275	233,991	-0,705
0,029	1,559	116,659	231,201	233,950	-0,588

Linear Drift correction: $Y = m \cdot X + t$ Drift corrected Signal values: $Y(\text{corr}) = Y(\text{obs}) - m \cdot X - t$

Slope m mAU / min $m = (Y2-Y1)/(X2-X1)$	Offset t mAU $t = Y1 - m \cdot X1$	Signal Step 5 mAU UV_VIS_1	Signal Step 1 mAU UV_VIS_1	Signal Step 50 mAU UV_VIS_1	Signal Step 99 mAU UV_VIS_1
#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!
-0,028187711	0,132070657	0,000	2,189	117,152	231,719
-0,033384492	0,086070301	0,000	1,735	116,873	231,590
-0,027163869	0,05585611	0,000	1,612	116,820	231,471

Calculated Steps [%]

Signal Step 100 mAU	Signal Step 99 %	Signal Step 50 %	Signal Step 1 %	Signal Step 0 %	Signal Step 100 %
UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!
234,500	0,000	0,933	49,958	98,814	100,000
234,406	0,000	0,740	49,859	98,799	100,000
234,302	0,000	0,688	49,859	98,792	100,000