Performance Qualification

• Step Accuracy: STD Gradient_3

• Instruments and Fluidics

Instrument Name	Model	Supplier's Name	Serial Number
Pump	**HPG-3400RS**	**Thermo Scientific**	**8125299**
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-24
Next Qualification:	2020-sept

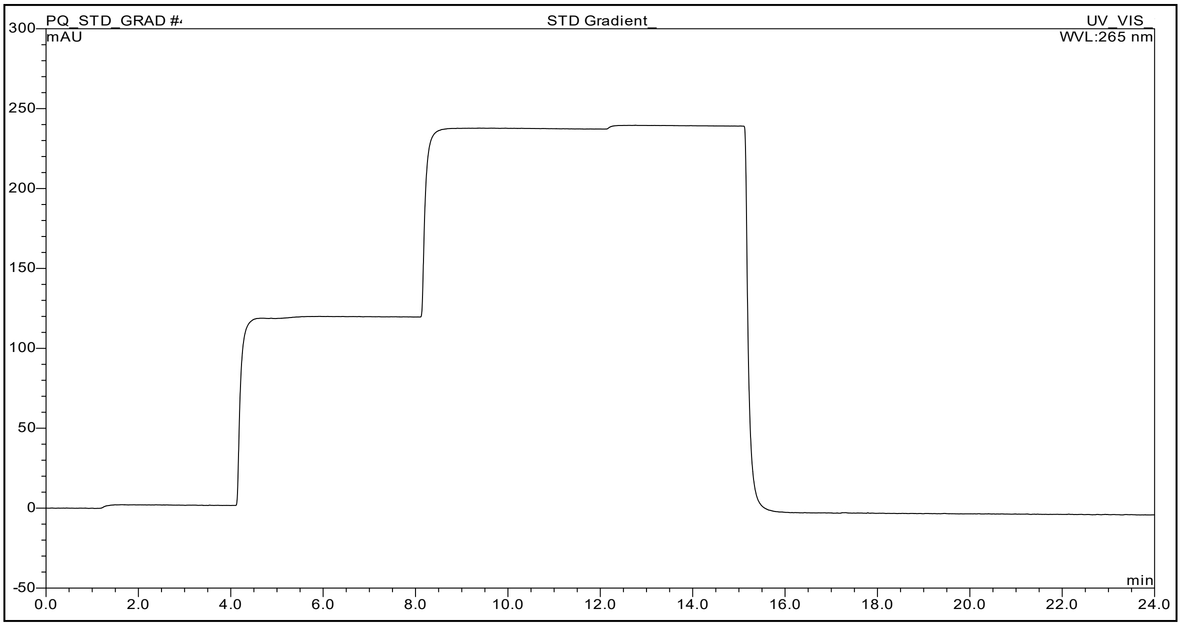
• Limits and Test Results

	Limit	Observed max. Deviation	Result of all Steps
Step Accuracy	<= 0,500 %	0,063 %	**Test passed**
Step Ripple	<= 0,500 %	0,043 %	**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	0,500	0,000	ok
2,32	1,00	0,961	0,500	-0,039	ok
121,01	50,00	50,063	0,500	0,063	ok
239,29	99,00	99,000	0,500	0,000	ok
241,71	100,00	100,000	0,500	0,000	ok

• *Ripple of STD Gradient_3*

Step [%]	*Ripple [mAU]*	*Calculated Ripple [%]*	*Critical Ripple [%]*	*Result*
1,00	0,102	0,042	0,500	ok
50,00	0,092	0,038	0,500	ok
99,00	0,104	0,043	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 Gradientaccuracy and -precision:

Observed Values for Pumps with Standard Mixing Chamber:

Name	*Signal Start mAU* *UV_VIS_1*	*Signal Step mAU* *UV_VIS_1*	*Signal Step 50 mAU* *UV_VIS_1*	*Signal Step 99 mAU* *UV_VIS_1*	*Signal Step 100 mAU* *UV_VIS_1*
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD Gradient_1	-0,129	1,429	118,817	235,802	237,304
STD Gradient_2	-0,375	1,386	119,283	236,826	238,328
STD Gradient_3	-0,056	1,720	119,674	237,231	239,100

Calculated Steps [%]

	STD A-B	LON	STD C-D	C-D (1.0 ml/mi	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* *UV_VIS_1*	*Ripple Step mAU* *UV_VIS_1*	*Ripple Step 99 mAU* *UV_VIS_1*	*Ripple Step 1 mAU* *UV_VIS_1*	*Ripple Step 50 mAU* *UV_VIS_1*
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD Gradient_1	0,358	0,239	0,054	0,240	0,114
STD Gradient_2	0,174	0,163	0,084	0,169	0,108
STD Gradient_3	0,102	0,092	0,104	0,082	0,242

Determination of Pump Unit for Dionex DGPs

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

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

CM-Version:	Flow:	
CM6:	2,000	(Pump)
CM7:	2,000	(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 Variab

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.
	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 Variab

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.
	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 Variab

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.
	0,0	0,0	0,0	0,0	0,0
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:

Si mA UV	Signal Start 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	Signal Step 100 mAU UV_VIS_1	Signal Step End mAU UV_VIS_1
n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
-6	1,816	118,791	-5,948	n.a.	n.a.	n.a.
-5	1,699	119,261	-4,869	n.a.	n.a.	n.a.
-4	2,048	119,658	-4,023	n.a.	n.a.	n.a.

with Micro Mixing Kit:

Ri mA UV	Ripple Step 1 mAU UV_VIS_1	Ripple Step 50 mAU UV_VIS_1	Ripple Step 99 mAU UV_VIS_1
n.a	n.a.	n.a.	n.a.
n.a	0,358	0,239	0,054
n.a	0,174	0,163	0,084
n.a	0,102	0,092	0,104

ple Name) - STD Gradient A-B

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

ple Name) - LON Gradient A-B

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

ple Name) - STD Gradient C-D

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

ıle 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 Sta 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*	*Signal Step 100 mAU UV_VIS_1*	*Signal End mAU UV_VIS_1*
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
-0,129	1,429	118,817	235,802	237,304	-6,123
-0,375	1,386	119,283	236,826	238,328	-4,963
-0,056	1,720	119,674	237,231	239,100	-4,195

Linear Driftcorrection: Y = m*X + t ***Drift corrected Signal values: Y(corr) = Y(obs) - m*X - t***

Slope m mAU / min m = (Y2-Y1)/(X2-X1)	***Offset t mAU t = Y1-m*X1***	***Signal Step S 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!
-0,264068313	0,135251218	0,000	2,350	120,794	238,836
-0,202091252	-0,173194931	0,000	2,367	121,073	239,424
-0,182334188	0,12633871	0,000	2,323	121,007	239,292

Calculated Steps [%]

Signal Step 100 mAU *UV_VIS_1*	*Signal Step S % UV_VIS_1*	*Signal Step 1 % UV_VIS_1*	*Signal Step 50 % UV_VIS_1*	*Signal Step 99 % UV_VIS_1*	*Signal Step 100 % UV_VIS_1*
#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!
241,130	0,000	0,975	50,095	99,048	100,000
241,533	0,000	0,980	50,127	99,127	100,000
241,709	0,000	0,961	50,063	99,000	100,000