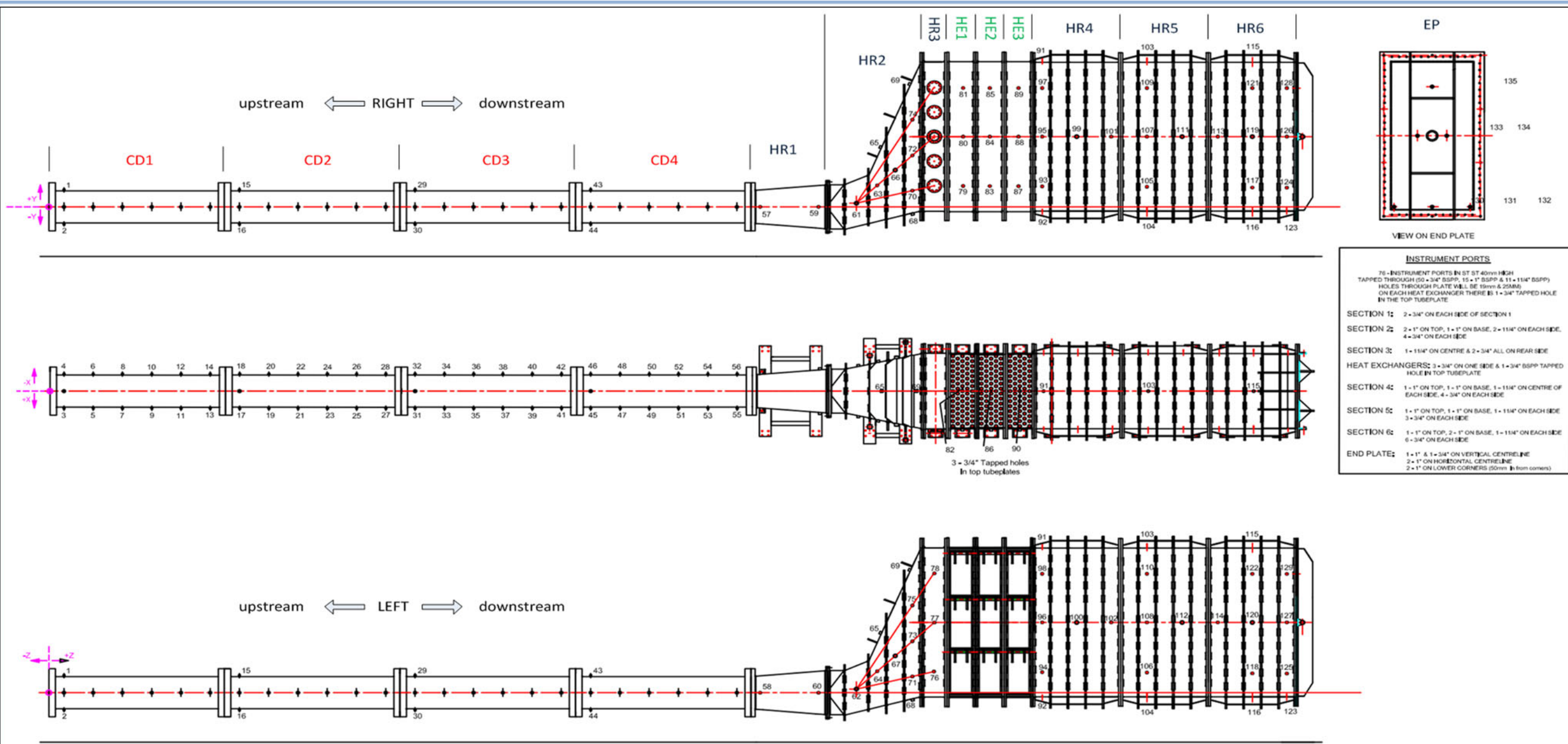


Date	05 March 2019	General Comments: (weather, rig configuration) Weather: Cloudy with sunny intervals. Cold and crisp with a light breeze. Rig configuration: 4 x 3m circular duct; expansion section and HRSG attached. End Plate attached. Igniter 258mm from beginning of 2nd circular duct section Engine Speed: 12%; 8,100 rpm Test on 60% CH4 40% H2 at an intended EQR of 0.60 LOW TEMPERATURE TESTS (NOMINAL 320 oC). Test gave a moderately strong combustion event with most sensors providing a good response.
Time	11:20:12	
Test Number	HRSG Test 55	
Mixture Composition	60% CH4 40% H2	
Ambient Temperature	5.2 °C	
Ambient Pressure	950 mbar	
Wind Speed	3.6 m/s	
Wind direction	SW	
Relative Humidity	85.00%	
Mass Flow	9.7120 kg/s	
Equivalence Ratio	0.60	

		Ionisation Probes		Ionisation Rakes		Optical Probes	
Max overpressure		Max. gas temperature		Max. flame speed		Max. flame speed	
514 mbar		1231 °C		193 m/s		#VALUE! m/s	
		Initial gas temperature					
		269 °C					
Location of Max. Overpressure		Location of Max. Temperature		Location of Max. Flame Speed		Location of Max. Flame Speed	
sensor	KU1	sensor	TC4	sensor	IP1	sensor	OP2
label	CD4-R2	label	CD3-R3	label	HR2-L5L	label	HR1-R1
distance	9758 mm	distance	7258 mm	distance	14745 mm	istance	12152 mm



INSTRUMENT PORTS

75 - INSTRUMENT PORTS IN ST 37 40mm I.D. 24 TAPPED THROUGH (50 x 3/4" BSPP, 15 x 1" BSPP & 11 x 11/4" BSPP) HOLES THROUGH PLATE WILL BE 15mm & 25mm ON EACH HEAT EXCHANGER THERE IS 1 x 3/4" TAPPED HOLE IN THE TOP TUBEPLATE

SECTION 1: 2 x 3/4" ON EACH SIDE OF SECTION 1

SECTION 2: 2 x 1" ON TOP, 1 x 1" ON BASE, 2 x 11/4" ON EACH SIDE, 4 x 3/4" ON EACH SIDE

SECTION 3: 1 x 11/4" ON CENTRE & 2 x 3/4" ALL ON REAR SIDE

HEAT EXCHANGERS: 3 x 3/4" ON ONE SIDE & 1 x 3/4" BSPP TAPPED HOLE IN TOP TUBEPLATE

SECTION 4: 1 x 1" ON TOP, 1 x 1" ON BASE, 1 x 11/4" ON CENTRE OF EACH SIDE, 4 x 3/4" ON EACH SIDE

SECTION 5: 1 x 1" ON TOP, 1 x 1" ON BASE, 1 x 11/4" ON EACH SIDE, 3 x 3/4" ON EACH SIDE

SECTION 6: 1 x 1" ON TOP, 2 x 1" ON BASE, 1 x 11/4" ON EACH SIDE, 6 x 3/4" ON EACH SIDE

END PLATE: 1 x 1" & 1 x 3/4" ON VERTICAL CENTRELINE, 2 x 1" ON HORIZONTAL CENTRELINE, 2 x 1" ON LOWER CORNERS (25mm from corners)

Naming Convention

Section Identifier i.e. HE, HR, CD or EP	HR 1 - R 1 U	Vertical position in section (sides only) i.e. U, M or L. Absence of letter denotes centreline
Section Number (1-6) Numbered from downstream to upstream	Side i.e. R, L, T or B	Longitudinal position in section (numbered from 1)

Key

CD Circular duct	U Upper
HR HRSG	M Middle
HE Heat Exchanger	L Lower
EP End Plate	R Right Side (when viewed downstream from engine)
	L Left Side
	T Top
	B Bottom

There are 13 sections on the rig

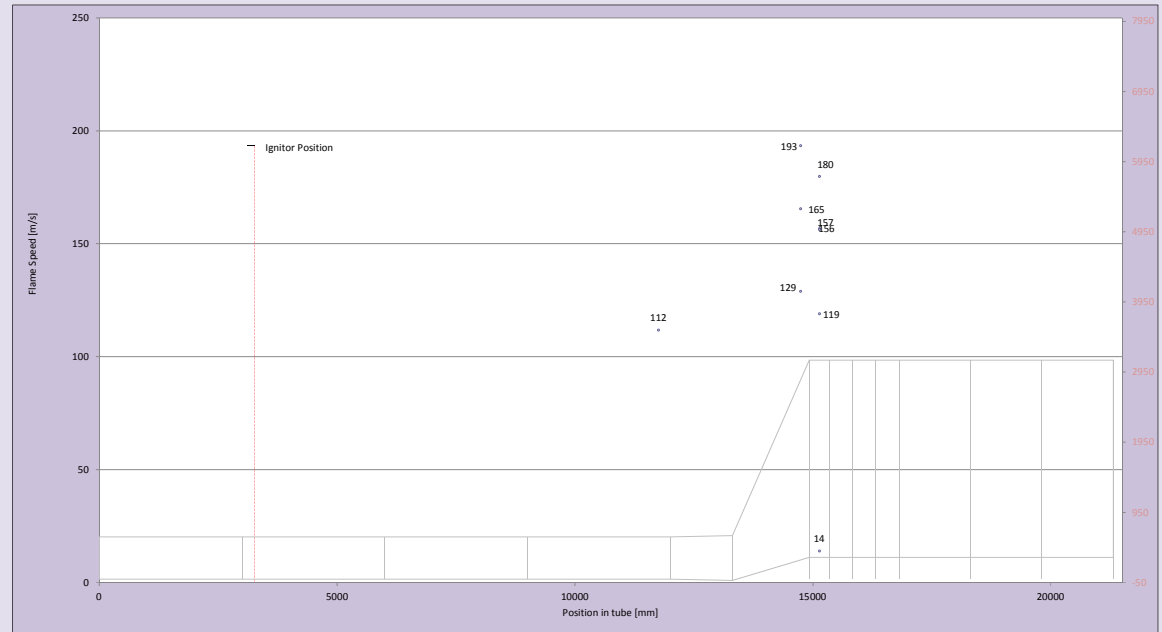
- 4 circular duct sections (CD1 to CD4)
- 6 HRSG sections (HR1 to HR6)
- 3 heat exchanger sections (HE1 to HE3) located between HR3 and HR4

Location of igniter mm Time of ignition seconds

IP Number	Location label	Data Name	Position in tube (mm)	Flame arrival time (s)	Avg Flame speed from last sensor (m/s)
IP0	CD4-L6	Ionisation probe 0	11758	18.92602	112
IP1	HR2-L5L	Ionisation probe 1	14745	18.94147	193
IP2	HR2-L5M	Ionisation probe 2	14745	18.94920	129
IP3	HR2-L5U	Ionisation probe 3	14745	18.94408	165
IP4	HR3-R1L	Ionisation probe 4	15140	18.94483	180
IP5	HR3-R1LM	Ionisation probe 5	15140	18.94761	157
IP6	HR3-R1M	Ionisation probe 6	15140	18.94766	156
IP7	HR3-R1U	Ionisation probe 7	15140	18.95444	119
IP8	HR3-L1U	Ionisation probe 8	15140	18.97246	14
IP9	HE2-R1M	Ionisation probe 9	16090	18.95052	
IP10	HR4-L1L	Ionisation probe 10	16985		
IP11	HR4-L1M	Ionisation probe 11	16985	18.96478	
IP12	HR4-L1U	Ionisation probe 12	16985	18.98089	
IP13	HR4-R1U	Ionisation probe 13	16985	18.98394	
IP14	HR4-R3U	Ionisation probe 14	17575	19.02662	
IP15	HR4-L5L	Ionisation probe 15	18165		
IP16	HR4-L5M	Ionisation probe 16	18165	19.02662	
IP17	HR4-L5U	Ionisation probe 17	18165	19.01275	
IP18	HR4-R5M	Ionisation probe 18	18165	18.98141	
IP19	HR5-L2L	Ionisation probe 19	18775		
IP20	HR5-L2M	Ionisation probe 20	18775		
IP21	HR5-L2U	Ionisation probe 21	18775	19.05672	
IP22	HR5-R2U	Ionisation probe 22	18775	19.07584	
IP23	HR6-L1M	Ionisation probe 23	19985		

KEY: ND - not detected - sensor working but flame too weak to be picked up
 NW - not working - sensor not

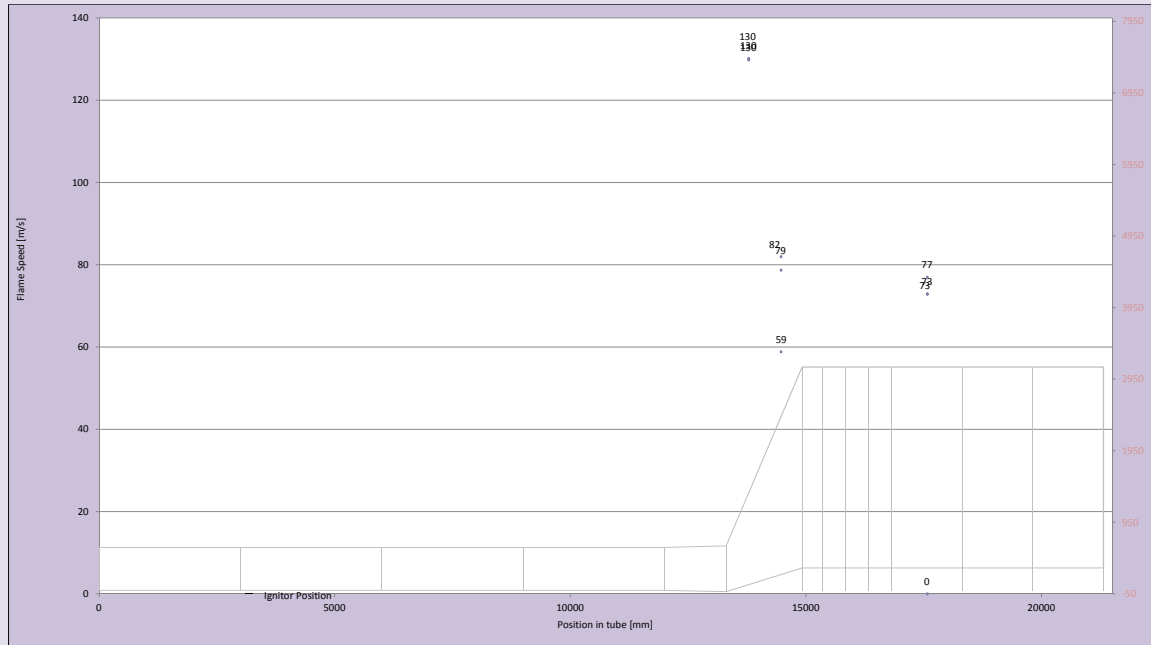
Most sensors did give a response to the combustion event albeit weaker after th HE. Further analysis required



Location of igniter mm Time of ignition seconds

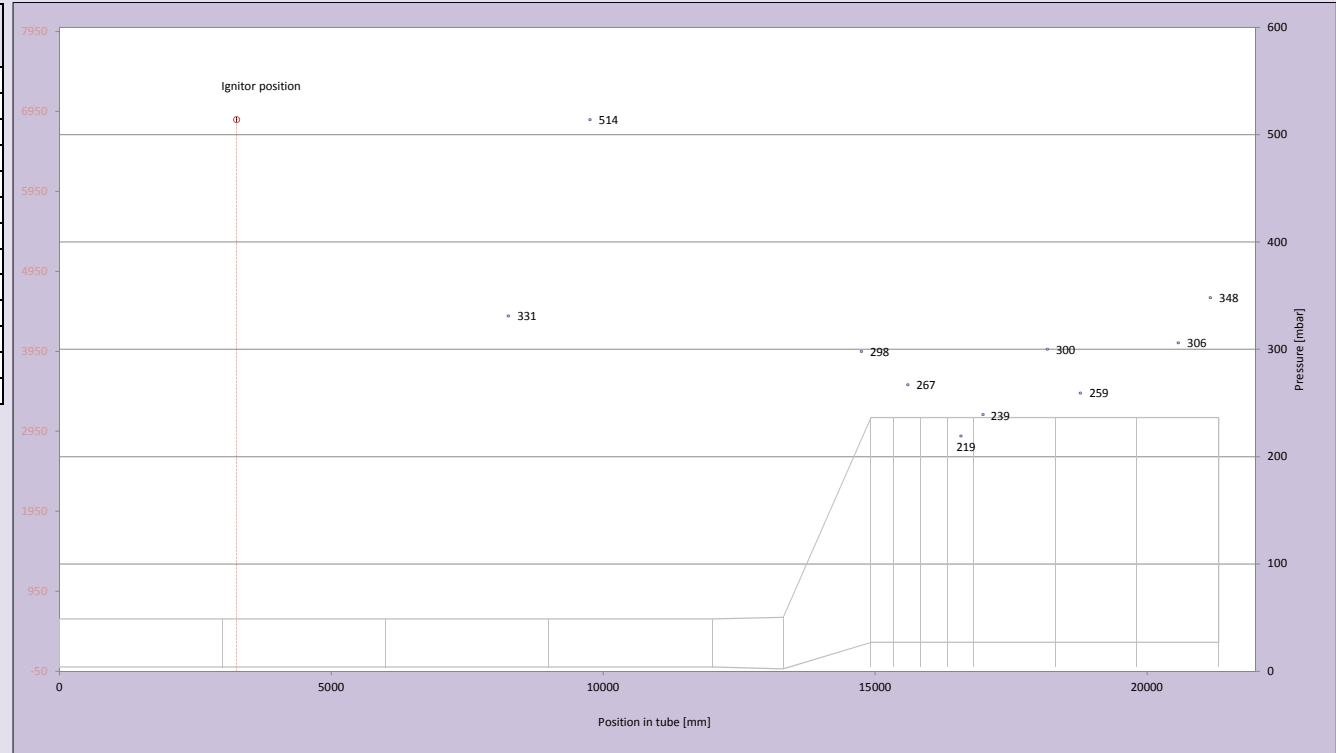
Rake Number	IP Number	Location label	Data Name	Position in tube (mm)	Flame arrival time (s)	Avg Flame speed from last sensor (m/s)
RA1	IP24	HR2-R2M	IP24	13785	18.9308	130
RA1	IP25	HR2-R2M	IP25	13785	18.9309	130
RA1	IP26	HR2-R2M	IP26	13785	18.9310	130
RA2	IP27	HR2-R4M	IP27	14475	18.9426	59
RA2	IP28	HR2-R4M	IP28	14475	18.9397	79
RA2	IP29	HR2-R4M	IP29	14475	18.9394	82
RA3	IP30	HR4-R3M	IP30	17575	18.9851	73
RA3	IP31	HR4-R3M	IP31	17575	18.9822	73
RA3	IP32	HR4-R3M	IP32	17575	18.9797	77
RA4	IP33	HR4-R3L	IP33	17575	NW	
RA4	IP34	HR4-R3L	IP34	17575	NW	
RA4	IP35	HR4-R3L	IP35	17575	NW	#VALUE!

KEY: ND - not detected - sensor working but flame too weak to be picked up
 NW - not working - sensor not working.



Location of igniter mm

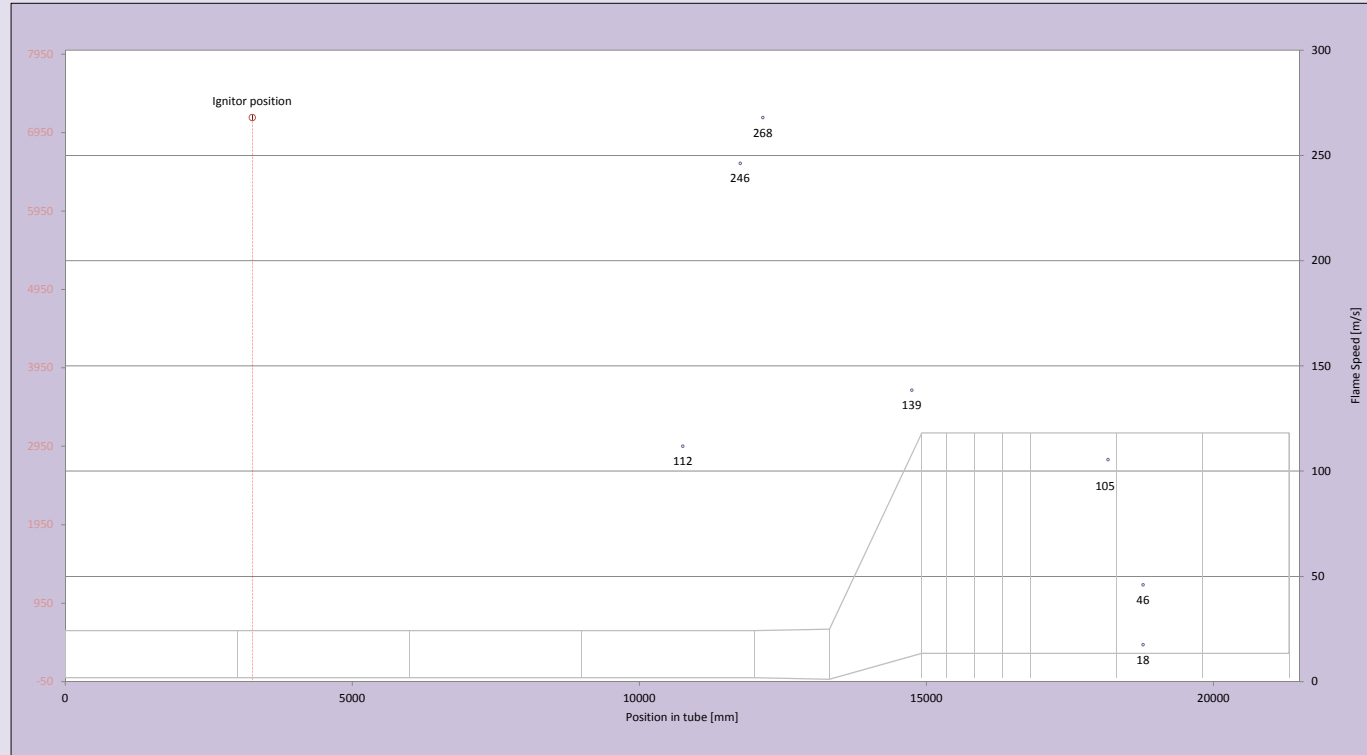
Transducer number	Location	Position in tube [mm]	ΔP_{max} [mbar]	Time ΔP_{max} [sec]
KU0	CD3-R5	8258	331	18.9581
KU1	CD4-R2	9758	514	18.9568
KU2	HR2-T5	14745	298	18.9516
KU3	HR3-L1L	15140		
KU4	HE1-R1U	15600	267	18.9525
KU5	HE3-R1L	16580	219	18.9536
KU6	HR4-R1L	16985	239	18.9762
KU7	HR4-R5U	18165	300	18.9847
KU8	HR5-R2L	18775	259	18.9973
KU9	HR6-R3L	20575	306	18.9890
KU10	HR6-L5L	21165	348	18.9920



Location of igniter 3258 mm Time of ignition 18.84993 seconds

OP Number	Location label	Position in tube (mm)	Flame arrival time (s)	Average flame speed (m/s)
OP0	CD4-L4	10758	18.9170	112
OP1	CD4-R6	11758	18.9210	246
OP2	HR1-R1	12152	18.9225	268
OP3	HR2-R5M	14745	18.9412	139
OP4	HE1-T1	15600	18.9666	
OP5	HE2-T1	16090	18.9720	
OP6	HE3-T1	16580	18.9819	
OP7	HR4-T1	16985	18.9685	
OP8	HR4-R1M	16985	18.9641	
OP9	HR4-R5L	18165	18.9736	105
OP10	HR5-T2	18775	18.9869	46
OP11	HR5-R2M	18775	19.0082	18

KEY: ND - not detected - sensor working but flame too weak to be picked up
 NW - not working - sensor not working

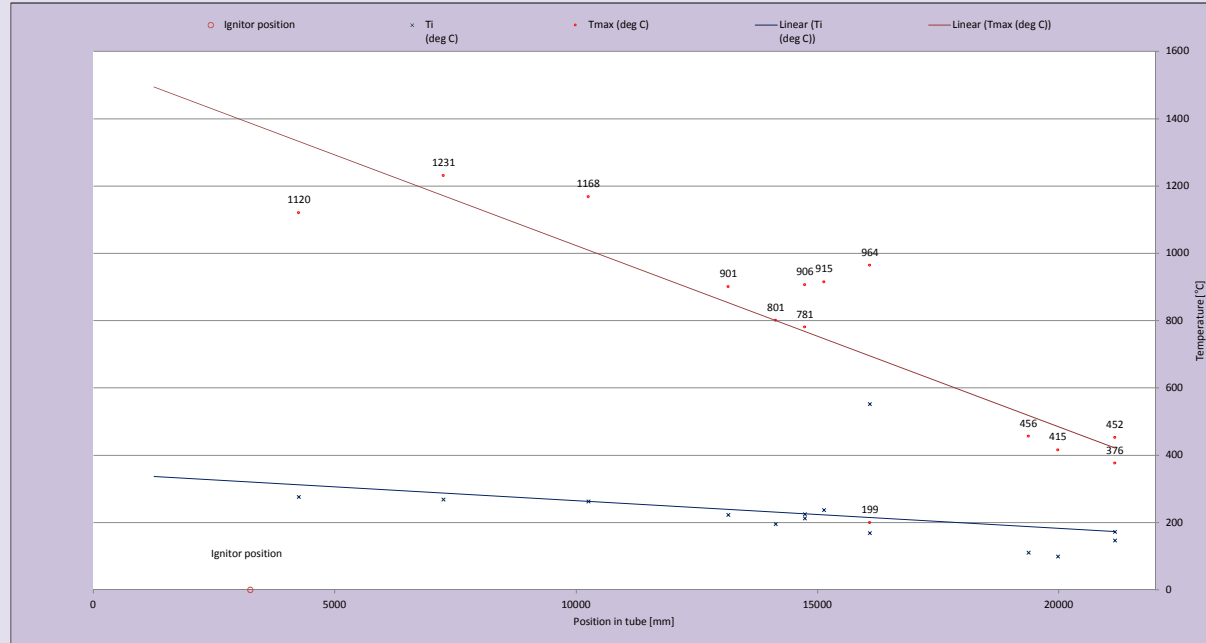


Location of igniter mm Time of ignition seconds

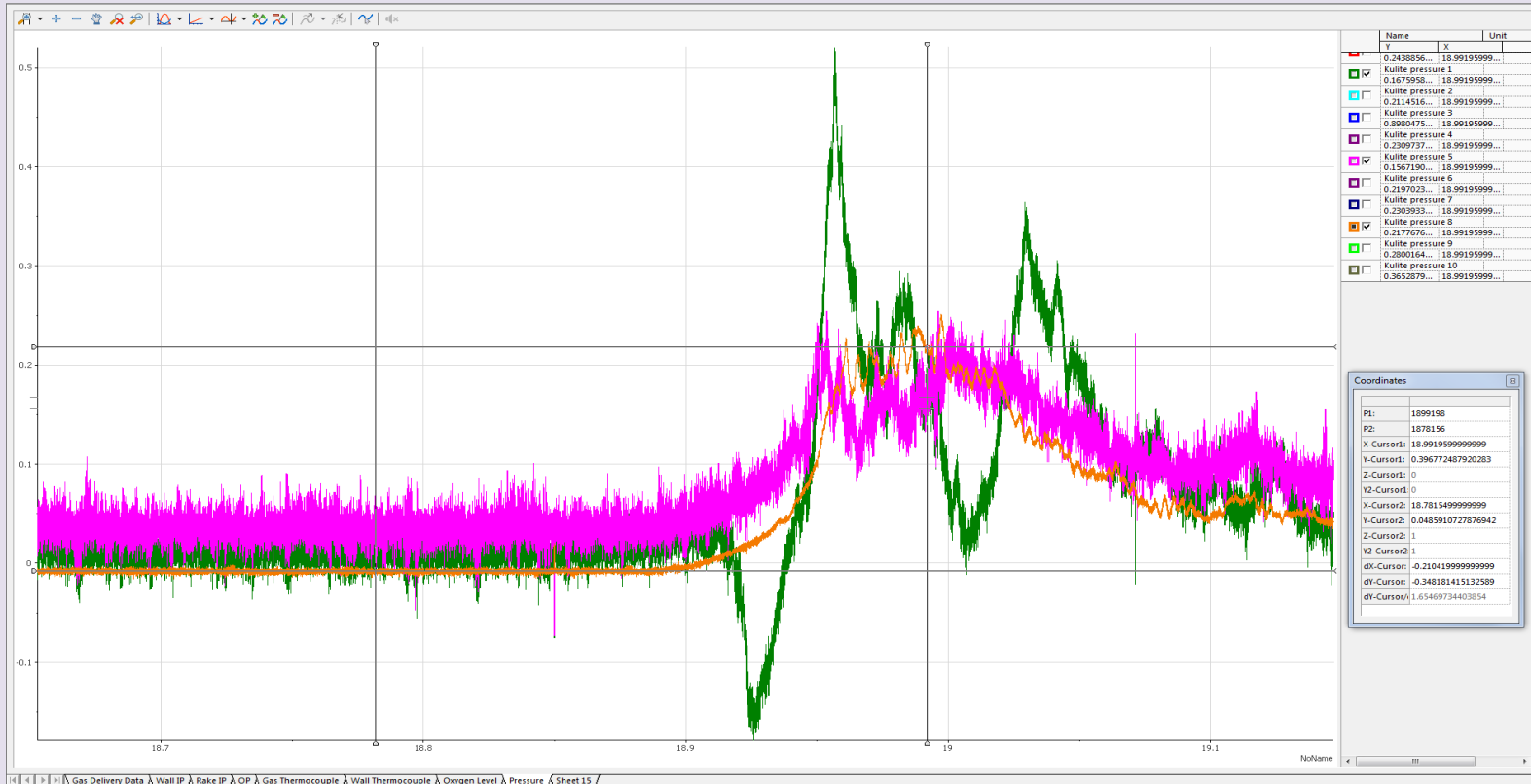
Thermocouple number	Location	Position in tube (mm)	T _{max} (deg C)	T _i (deg C)
TC0	CD1-R3	1258		
TC2	CD2-R3	4258	1120	276
TC4	CD3-R3	7258	1231	269
TC6	CD4-R3	10258	1168	263
TC8	HR1-R2	13160	901	223
TC12	CD3-T1	6258	474	261
TC13	CD3-L1	6258	467	272
TC14	CD3-B1	6258		
TC15	CD3-R1	6258	477	282
TC16	HR2-R3M	14140	801	196
TC17	HR2-R5L	14745	906	225
TC18	HR2-R5U	14745	781	213
TC19	HR3-L1M	15140	915	237
TC20	HE2-R1L	16090	964	552
TC21	HE2-R1U	16090	199	169
TC22	HR5-R4M	19375	456	111
TC23	HR6-R1M	19985	415	99
TC24	HR6-R5L	21165	376	147
TC25	HR6-R5U	21165	452	173

surface thermocouples [not plotted]

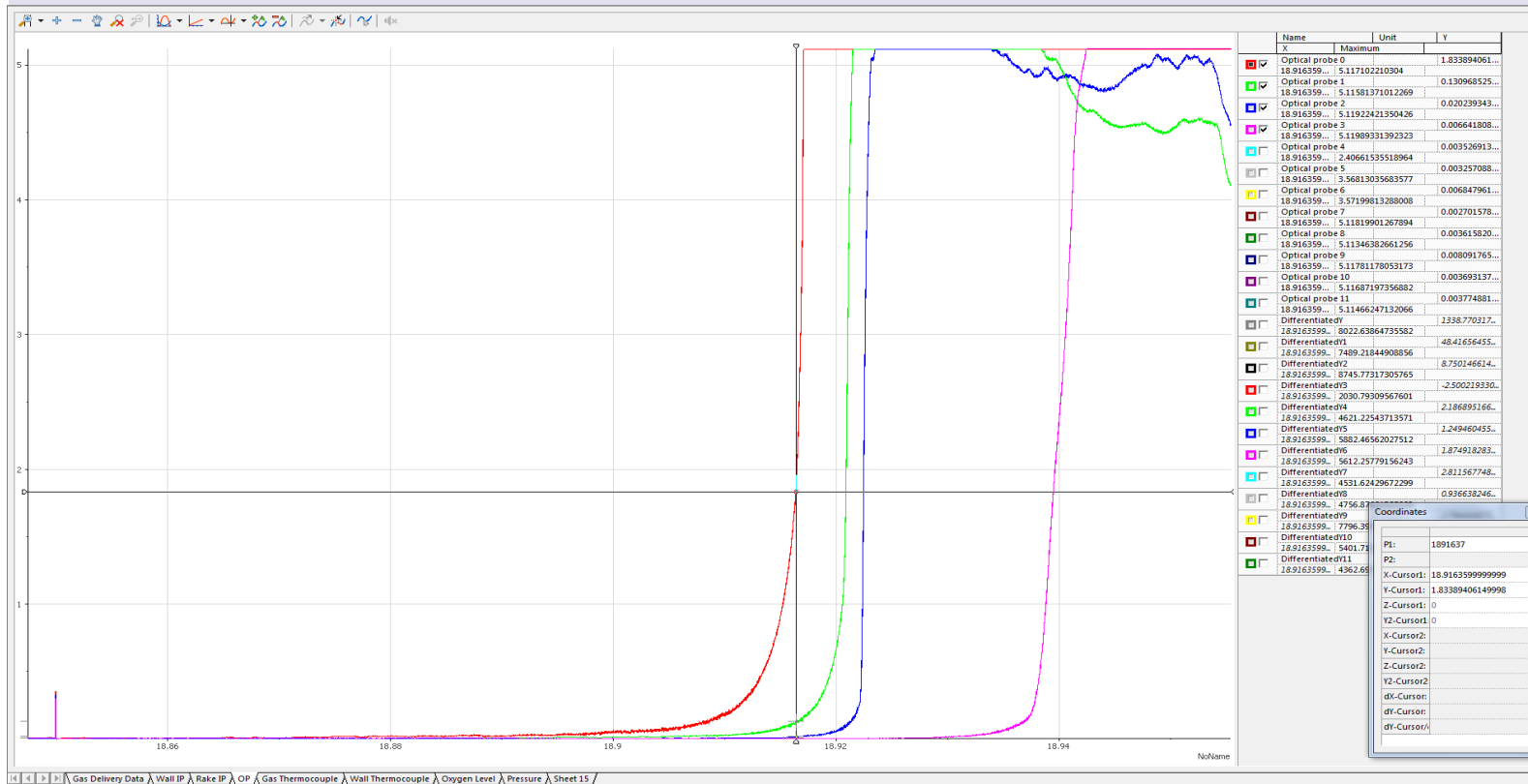
TC1	CD1-T2	1508	88	80
TC3	CD2-T2	4508	72	64
TC5	CD3-T2	7508	69	61
TC7	CD4-T2	10508	45	40



Pressure



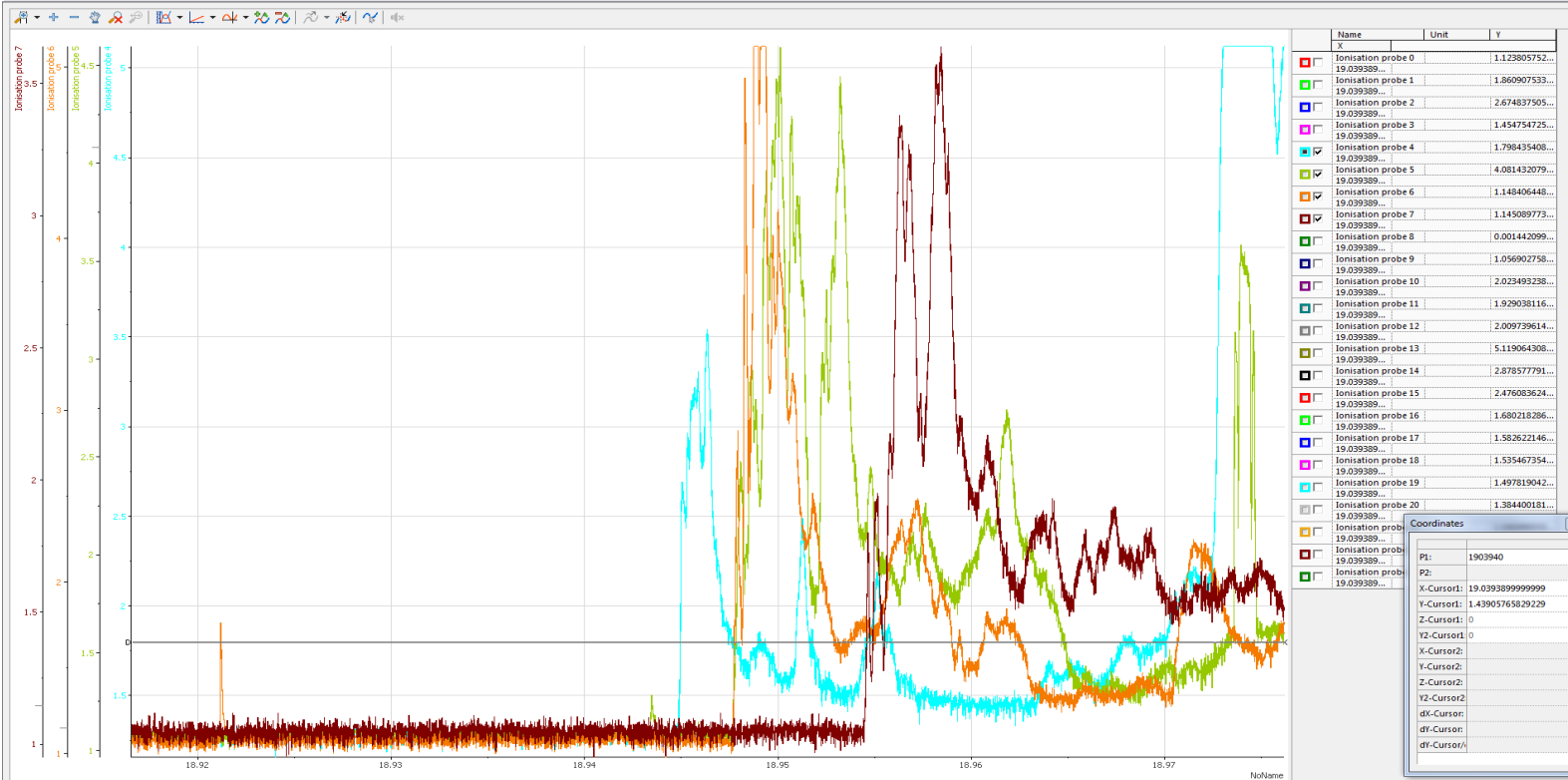
Optical Probes



Coordinates

P1:	1891637
P2:	
X-Cursor1:	18.916399999999
Y-Cursor1:	1.83389406149998
Z-Cursor1:	0
Y2-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
Z-Cursor2:	
Y2-Cursor2:	
dX-Cursor:	
dY-Cursor:	
dZ-Cursor:	

Ionisation Probes



Name	Unit	Y
Ionisation probe 0		1.123805752...
Ionisation probe 1		1.860907533...
Ionisation probe 2		2.674837505...
Ionisation probe 3		1.454754725...
Ionisation probe 4		1.798435408...
Ionisation probe 5		4.081432079...
Ionisation probe 6		1.148406448...
Ionisation probe 7		1.145089773...
Ionisation probe 8		0.001442099...
Ionisation probe 9		1.056902758...
Ionisation probe 10		2.023493238...
Ionisation probe 11		1.929038116...
Ionisation probe 12		2.009739614...
Ionisation probe 13		5.119064308...
Ionisation probe 14		2.878577791...
Ionisation probe 15		2.476083624...
Ionisation probe 16		1.680218286...
Ionisation probe 17		1.582622146...
Ionisation probe 18		1.535467354...
Ionisation probe 19		1.497819042...
Ionisation probe 20		1.384400181...

Coordinates

P1: 1903940

P2:

X-Cursor1: 19.0393899999999

Y-Cursor1: 1.43905765829229

Z-Cursor1: 0

Y2-Cursor1: 0

X-Cursor2:

Y-Cursor2:

Z-Cursor2:

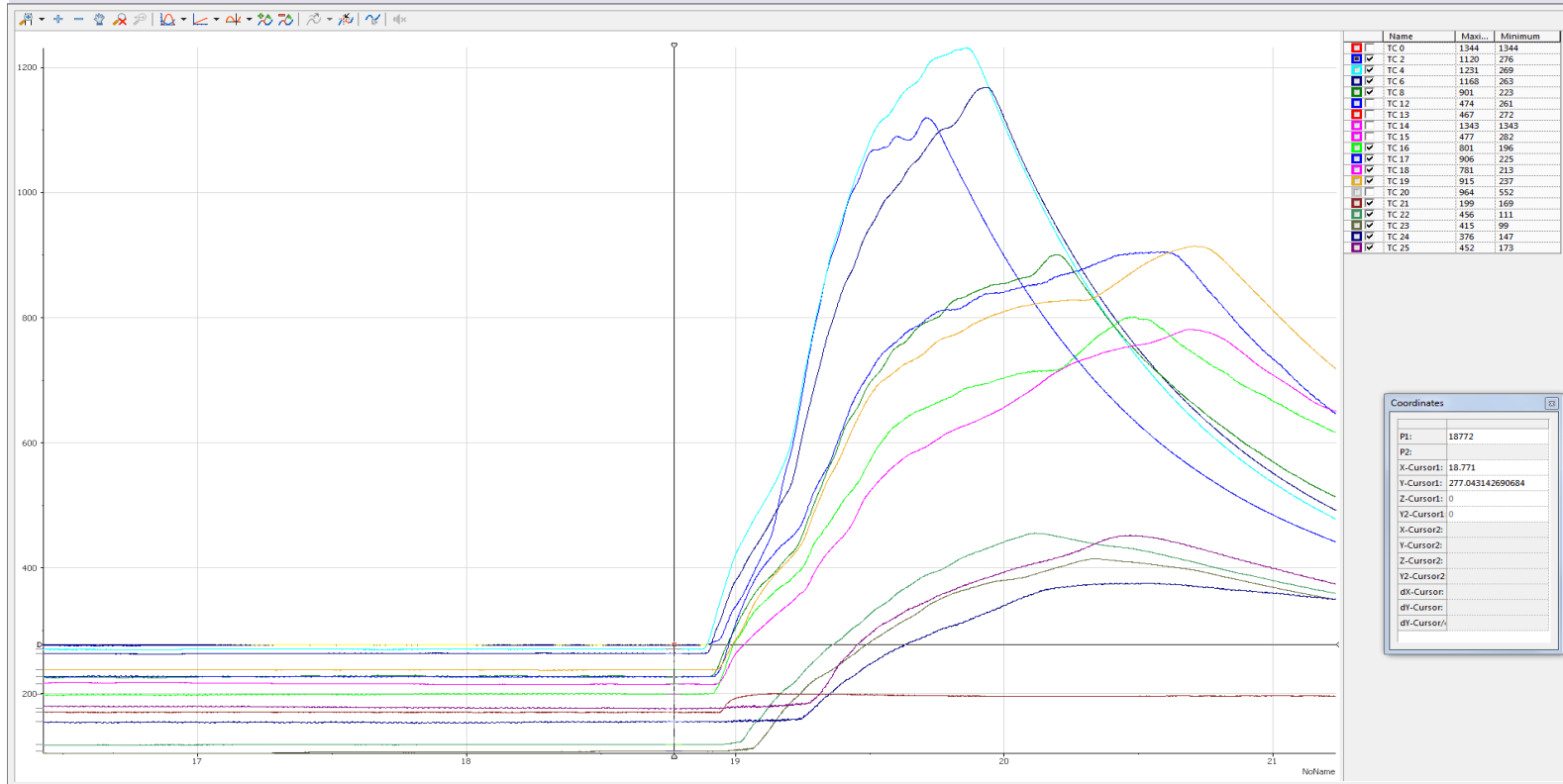
Y2-Cursor2:

dX-Cursor:

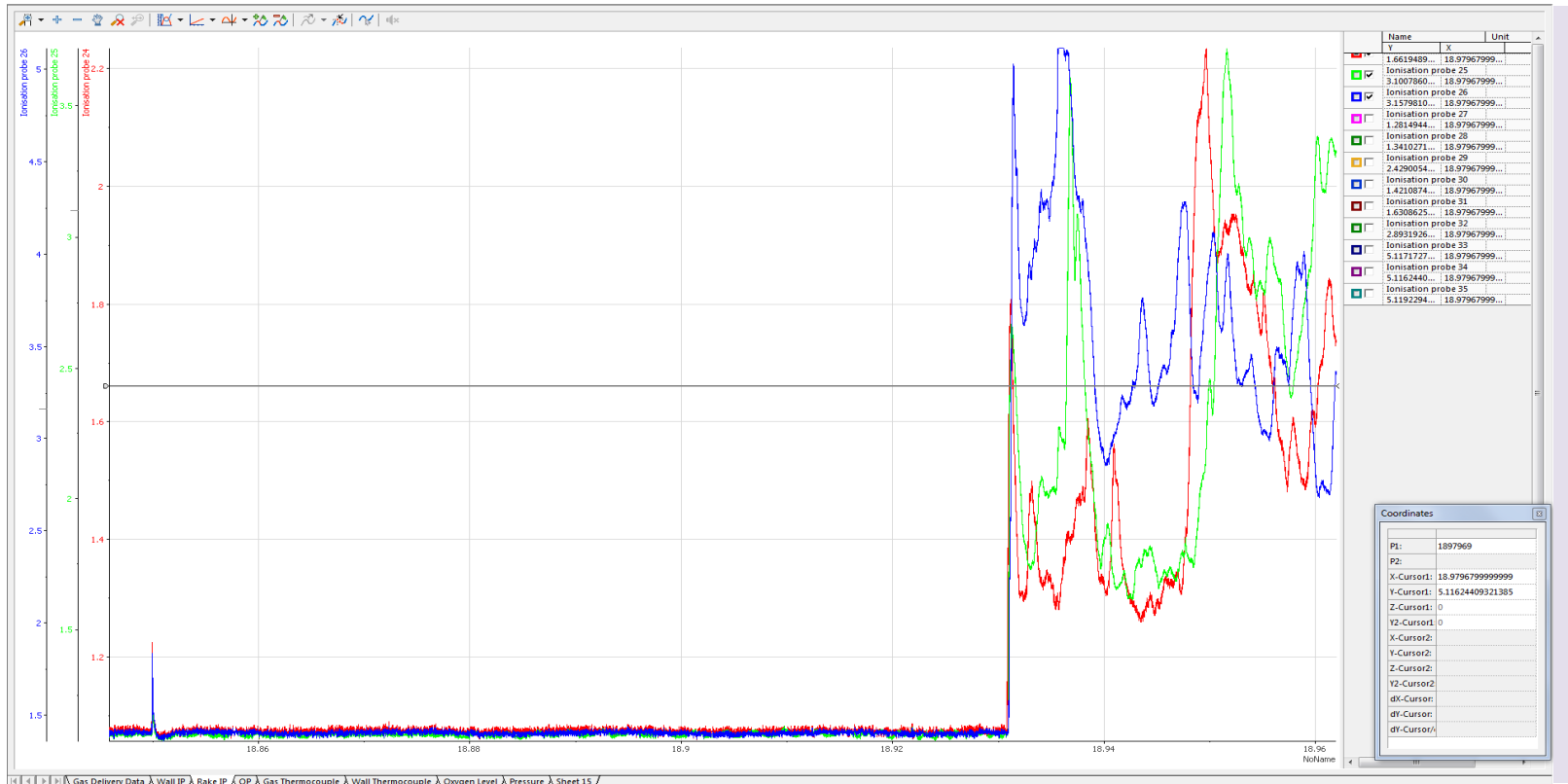
dY-Cursor:

dZ-Cursor:

Temperature



Coordinates	
P1:	18772
P2:	
X-Cursor1:	18.771
Y-Cursor1:	277.043142690684
Z-Cursor1:	0
Y2-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
Z-Cursor2:	
Y2-Cursor2:	
dX-Cursor:	
dY-Cursor:	
dY-Cursor/:	



Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
-		CD1-T1	CD	1	T	1		1	1" BSPP	0	298	258
TC1	TS1-1	CD1-T2	CD	1	T	2		NA	SURFACE	0	298	1508
-		CD1-B1	CD	1	B	1		2	1" BSPP	0	-298	258
-	NS1-1	CD1-R1	CD	1	R	1		3	3/4" BSPP	298	0	258
-	FS1-1	CD1-L1	CD	1	L	1		4	3/4" BSPP	-298	0	258
-	NS1-2	CD1-R2	CD	1	R	2		5	3/4" BSPP	298	0	758
-	FS1-2	CD1-L2	CD	1	L	2		6	3/4" BSPP	-298	0	758
TC0	NS1-3	CD1-R3	CD	1	R	3		7	3/4" BSPP	298	0	1258
-	FS1-3	CD1-L3	CD	1	L	3		8	3/4" BSPP	-298	0	1258
-	NS1-4	CD1-R4	CD	1	R	4		9	3/4" BSPP	298	0	1758
-	FS1-4	CD1-L4	CD	1	L	4		10	3/4" BSPP	-298	0	1758
-	NS1-5	CD1-R5	CD	1	R	5		11	3/4" BSPP	298	0	2258
-	FS1-5	CD1-L5	CD	1	L	5		12	3/4" BSPP	-298	0	2258
-	NS1-6	CD1-R6	CD	1	R	6		13	3/4" BSPP	298	0	2758
-	FS1-6	CD1-L6	CD	1	L	6		14	3/4" BSPP	-298	0	2758
IGN		CD2-T1	CD	2	T	1		15	1" BSPP	0	298	3258
TC3	TS2-1	CD2-T2	CD	2	T	2		NA	SURFACE	0	298	4508
-		CD2-B1	CD	2	B	1		16	1" BSPP	0	-298	2358
-	NS2-1	CD2-R1	CD	2	R	1		17	3/4" BSPP	298	0	3258
-	FS2-1	CD2-L1	CD	2	L	1		18	3/4" BSPP	-298	0	3258
-	NS2-2	CD2-R2	CD	2	R	2		19	3/4" BSPP	298	0	3758
-	FS2-2	CD2-L2	CD	2	L	2		20	3/4" BSPP	-298	0	3758
TC2	NS2-3	CD2-R3	CD	2	R	3		21	3/4" BSPP	298	0	4258
-	FS2-3	CD2-L3	CD	2	L	3		22	3/4" BSPP	-298	0	4258
-	NS2-4	CD2-R4	CD	2	R	4		23	3/4" BSPP	298	0	4758
-	FS2-4	CD2-L4	CD	2	L	4		24	3/4" BSPP	-298	0	4758
-	NS2-5	CD2-R5	CD	2	R	5		25	3/4" BSPP	298	0	5258
-	FS2-5	CD2-L5	CD	2	L	5		26	3/4" BSPP	-298	0	5258
-	NS2-6	CD2-R6	CD	2	R	6		27	3/4" BSPP	298	0	5758
-	FS2-6	CD2-L6	CD	3	L	6		28	3/4" BSPP	-298	0	5758
TC12		CD3-T1	CD	3	T	1		29	1" BSPP	0	298	6258
TC5	TS1-1	CD3-T2	CD	3	T	2		NA	SURFACE	0	298	7508
TC14		CD3-B1	CD	3	B	1		30	1" BSPP	0	-298	6258
TC15	NS3-1	CD3-R1	CD	3	R	1		31	3/4" BSPP	298	0	6258
TC13	FS3-1	CD3-L1	CD	3	L	1		32	3/4" BSPP	-298	0	6258
-	NS3-2	CD3-R2	CD	3	R	2		33	3/4" BSPP	298	0	6758
-	FS3-2	CD3-L2	CD	3	L	2		34	3/4" BSPP	-298	0	6758
TC4	NS3-3	CD3-R3	CD	3	R	3		35	3/4" BSPP	298	0	7258
-	FS3-3	CD3-L3	CD	3	L	3		36	3/4" BSPP	-298	0	7258
-	NS3-4	CD3-R4	CD	3	R	4		37	3/4" BSPP	298	0	7758
-	FS3-4	CD3-L4	CD	3	L	4		38	3/4" BSPP	-298	0	7758
KU0	NS3-5	CD3-R5	CD	3	R	5		39	3/4" BSPP	298	0	8258
-	FS3-5	CD3-L5	CD	3	L	5		40	3/4" BSPP	-298	0	8258
-	NS3-6	CD3-R6	CD	3	R	6		41	3/4" BSPP	298	0	8758
-	FS3-6	CD3-L6	CD	3	L	6		42	3/4" BSPP	-298	0	8758
-		CD4-T1	CD	4	T	1		43	1" BSPP	0	298	9258
TC7	TS1-1	CD4-T2	CD	4	T	2		NA	SURFACE	0	298	10508
-		CD4-B1	CD	4	B	1		44	1" BSPP	0	-298	9258
-	NS4-1	CD4-R1	CD	4	R	1		45	3/4" BSPP	298	0	9258
-	FS4-1	CD4-L1	CD	4	L	1		46	3/4" BSPP	-298	0	9258
KU1	NS4-2	CD4-R2	CD	4	R	2		47	3/4" BSPP	298	0	9758
-	FS4-2	CD4-L2	CD	4	L	2		48	3/4" BSPP	-298	0	9758
TC6	NS4-3	CD4-R3	CD	4	R	3		49	3/4" BSPP	298	0	10258
-	FS4-3	CD4-L3	CD	4	L	3		50	3/4" BSPP	-298	0	10258
-	NS4-4	CD4-R4	CD	4	R	4		51	3/4" BSPP	298	0	10758
OP0	FS4-4	CD4-L4	CD	4	L	4		52	3/4" BSPP	-298	0	10758
-	NS4-5	CD4-R5	CD	4	R	5		53	3/4" BSPP	298	0	11258
-	FS4-5	CD4-L5	CD	4	L	5		54	3/4" BSPP	-298	0	11258
OP1	NS4-6	CD4-R6	CD	4	R	6		55	3/4" BSPP	298	0	11758

Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
IP0	FS4-6	CD4-L6	CD	4	L	6		56	3/4" BSPP	-298	0	11758
OP2		HR1-R1	HR	1	R	1		57	3/4" BSPP	308	0	12152
-		HR1-L1	HR	1	L	1		58	3/4" BSPP	-308	0	12152
TC8		HR1-R2	HR	1	R	2		59	3/4" BSPP	393	0	13160
-		HR1-L2	HR	1	L	2		60	3/4" BSPP	-393	0	13160
RA1		HR2-R2M	HR	2	R	2	M	61	11/4" BSPP	448	70	13785
RA1		HR2-L2M	HR	2	L	2	M	62	11/4" BSPP	-448	70	13785
TC16		HR2-R3M	HR	2	R	3	M	63	3/4" BSPP	528	410	14140
-		HR2-L3M	HR	2	L	3	M	64	3/4" BSPP	-528	410	14140
-		HR2-T3	HR	2	T	3		65	1" BSPP	0	1122	14215
RA2		HR2-R4M	HR	2	R	4	M	66	11/4" BSPP	598	700	14475
RA2		HR2-L4M	HR	2	L	4	M	67	11/4" BSPP	-598	700	14475
-		HR2-B5	HR	2	B	5		68	1" BSPP	0	-100	14745
KU2		HR2-T5	HR	2	T	5		69	1" BSPP	0	2315	14745
TC17		HR2-R5L	HR	2	R	5	L	70	3/4" BSPP	662	310	14745
IP1		HR2-L5L	HR	2	L	5	L	71	3/4" BSPP	-662	310	14745
OP3		HR2-R5M	HR	2	R	5	M	72	3/4" BSPP	662	975	14745
IP2		HR2-L5M	HR	2	L	5	M	73	3/4" BSPP	-662	975	14745
TC18		HR2-R5U	HR	2	R	5	U	74	3/4" BSPP	662	1660	14745
IP3		HR2-L5U	HR	2	L	5	U	75	3/4" BSPP	-662	1660	14745
KU3		HR3-L1L	HR	3	L	1	L	76	3/4" BSPP	-700	400	15140
TC19		HR3-L1M	HR	3	L	1	M	77	11/4" BSPP	-700	1335	15140
IP8		HR3-L1U	HR	3	L	1	U	78	3/4" BSPP	-700	2270	15140
IP4		HR3-R1L	HR	3	R	1	L	136	3/4" BSPP	700	400	15140
IP5		HR3-R1LM	HR	3	R	1	LM	137	3/4" BSPP	700	868	15140
IP6		HR3-R1M	HR	3	R	1	M	138	3/4" BSPP	700	1335	15140
-		HR3-R1UM	HR	3	R	1	UM	139	3/4" BSPP	700	1802	15140
IP7		HR3-R1U	HR	3	R	1	U	140	3/4" BSPP	700	2270	15140
-		HE1-R1L	HE	1	R	1	L	79	3/4" BSPP	700	400	15600
-		HE1-R1M	HE	1	R	1	M	80	3/4" BSPP	700	1335	15600
KU4		HE1-R1U	HE	1	R	1	U	81	3/4" BSPP	700	2270	15600
TC20		HE2-R1L	HE	2	R	1	L	83	3/4" BSPP	700	400	16090
IP9		HE2-R1M	HE	2	R	1	M	84	3/4" BSPP	700	1335	16090
TC21		HE2-R1U	HE	2	R	1	U	85	3/4" BSPP	700	2270	16090
KU5		HE3-R1L	HE	3	R	1	L	87	3/4" BSPP	700	400	16580
-		HE3-R1M	HE	3	R	1	M	88	3/4" BSPP	700	1335	16580
-		HE3-R1U	HE	3	R	1	U	89	3/4" BSPP	700	2270	16580
OP4		HE1-T1	HE	1	T	1		82	3/4" BSPP HOLE	-47	2735	15600
OP5		HE2-T1	HE	2	T	1		86	3/4" BSPP HOLE	0	2735	16090
OP6		HE3-T1	HE	3	T	1		90	3/4" BSPP HOLE	-47	2735	16580
OP7		HR4-T1	HR	4	T	1		91	1" BSPP	0	2735	16985
-		HR4-B1	HR	4	B	1		92	1" BSPP	0	-65	16985
KU6		HR4-R1L	HR	4	R	1	L	93	3/4" BSPP	700	400	16985
IP10		HR4-L1L	HR	4	L	1	L	94	3/4" BSPP	-700	400	16985
OP8		HR4-R1M	HR	4	R	1	M	95	3/4" BSPP	700	1335	16985
IP11		HR4-L1M	HR	4	L	1	M	96	3/4" BSPP	-700	1335	16985
IP13		HR4-R1U	HR	4	R	1	U	97	3/4" BSPP	700	2270	16985
IP12		HR4-L1U	HR	4	L	1	U	98	3/4" BSPP	-700	2270	16985
RA3		HR4-R3M	HR	4	R	3	M	99	11/4" BSPP	700	1335	17575
RA3		HR4-L3M	HR	4	L	3	M	100	11/4" BSPP	-700	1335	17575
RA4		HR4-R3L	HR	4	R	3	L	141	11/4" BSPP	700	400	17575
IP14		HR4-R3U	HR	4	R	3	U	142	3/4" BSPP	700	2270	17575
RA4		HR4-L3L	HR	4	L	3	L	143	11/4" BSPP	-700	400	17575
-		HR4-L3U	HR	4	L	3	U	144	3/4" BSPP	-700	2270	17575
IP18		HR4-R5M	HR	4	R	5	M	101	3/4" BSPP	700	1335	18165
IP16		HR4-L5M	HR	4	L	5	M	102	3/4" BSPP	-700	1335	18165
OP9		HR4-R5L	HR	4	R	5	L	145	3/4" BSPP	700	400	18165
KU7		HR4-R5U	HR	4	R	5	U	146	3/4" BSPP	700	2270	18165
IP15		HR4-L5L	HR	4	L	5	L	147	3/4" BSPP	-700	400	18165

Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
IP17		HR4-L5U	HR	4	L	5	U	148	3/4" BSPP	-700	2270	18165
-		HR5-R1M	HR	5	R	1	M	NA	SURFACE	700	1200	18455
OP10		HR5-T2	HR	5	T	2		103	1" BSPP	0	2735	18775
-		HR5-B2	HR	5	B	2		104	1" BSPP	0	-65	18775
KU8		HR5-R2L	HR	5	R	2	L	105	3/4" BSPP	700	400	18775
IP19		HR5-L2L	HR	5	L	2	L	106	3/4" BSPP	-700	400	18775
OP11		HR5-R2M	HR	5	R	2	M	107	3/4" BSPP	700	1335	18775
IP20		HR5-L2M	HR	5	L	2	M	108	3/4" BSPP	-700	1335	18775
IP22		HR5-R2U	HR	5	R	2	U	109	3/4" BSPP	700	2270	18775
IP21		HR5-L2U	HR	5	L	2	U	110	3/4" BSPP	-700	2270	18775
TC22		HR5-R4M	HR	5	R	4	M	111	11/4" BSPP	700	1335	19375
-		HR5-L4M	HR	5	L	4	M	112	11/4" BSPP	-700	1335	19375
TC23		HR6-R1M	HR	6	R	1	M	113	3/4" BSPP	700	1335	19985
IP23		HR6-L1M	HR	6	L	1	M	114	3/4" BSPP	-700	1335	19985
-		HR6-T3	HR	6	T	3		115	1" BSPP	0	2735	20575
-		HR6-B3	HR	6	B	3		116	3/4" BSPP	0	-65	20575
KU9		HR6-R3L	HR	6	R	3	L	117	3/4" BSPP	700	400	20575
-		HR6-L3L	HR	6	L	3	L	118	3/4" BSPP	-700	400	20575
-		HR6-R3M	HR	6	R	3	M	119	11/4" BSPP	700	1335	20575
-		HR6-L3M	HR	6	L	3	M	120	11/4" BSPP	-700	1335	20575
-		HR6-R3U	HR	6	R	3	U	121	3/4" BSPP	700	2270	20575
-		HR6-L3U	HR	6	L	3	U	122	3/4" BSPP	-700	2270	20575
-		HR6-B5	HR	6	B	5		123	1" BSPP	0	-65	21165
TC24		HR6-R5L	HR	6	R	5	L	124	3/4" BSPP	700	400	21165
KU10		HR6-L5L	HR	6	L	5	L	125	3/4" BSPP	-700	400	21165
-		HR6-R5M	HR	6	R	5	M	126	3/4" BSPP	700	1335	21165
-		HR6-L5M	HR	6	L	5	M	127	3/4" BSPP	-700	1335	21165
TC25		HR6-R5U	HR	6	R	5	U	128	3/4" BSPP	700	2270	21165
-		HR6-L5U	HR	6	L	5	U	129	3/4" BSPP	-700	2270	21165
-		EP-1L	EP			1	L	130	1" BSPP	650	-15	21330
-		EP-2L	EP			2	L	131	1" BSPP	0	-15	21330
-		EP-3L	EP			3	L	132	1" BSPP	-650	-15	21330
-		EP-1M	EP			1	M	133	1" BSPP	250	1335	21330
-		EP-2M	EP			2	M	134	1" BSPP	-250	1335	21330
-		EP-1U	EP			1	U	135	3/4" BSPP	0	2270	21330

