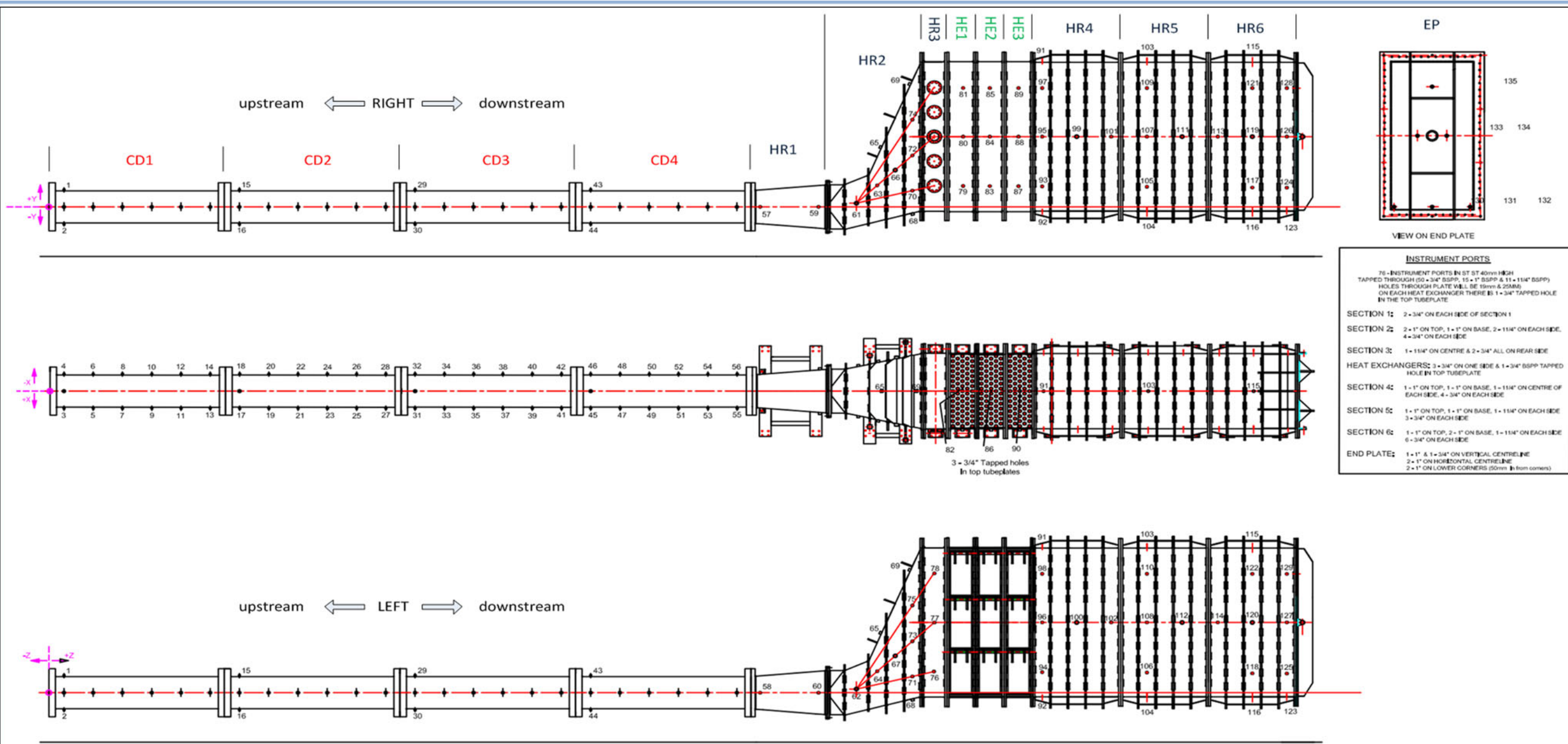


Date	14 February 2019	<b>General Comments: (weather, rig configuration)</b>  Weather: Sunny and crisp day. Temperature increasing. Light breeze with some cloud cover.  Rig configuration: 4 x 3m circular duct; expansion section and HRSG attached. End Plate attached. Igniter 258mm from beginning of 2nd circular duct section  Engine Speed: 34%; 11,500 rpm  Test on 60% CO 40% H2 at an intended EQR of 0.45  Test gave a WEAK COMBUSTION event with SOME sensors providing a good response. However, the combustion event was too weak to be detected by many of the IP sensors particularly downstream of the HE. Maximum overpressure of 123 mbar seen at KU1 in the duct.  The mixed gas supply was depleted during the test and hence the actual mass flow was falling during the injection. An average value between the peak mass flow and the final mass flow (at time of ignition) was taken and from which the EQR was calculated.
Time	15:17:52	
Test Number	HRSG Test 48	
Mixture Composition	40% CO 60% H2	
Ambient Temperature	6 °C	
Ambient Pressure	980 mbar	
Wind Speed	3 m/s	
Wind direction	S	
Relative Humidity	90.00%	
Mass Flow	10.1000 kg/s	
Equivalence Ratio	0.34	

		Ionisation Probes		Ionisation Rakes		Optical Probes	
Max overpressure		Max. gas temperature		Max. flame speed		Max. flame speed	
123 mbar		848 °C		107 m/s		117 m/s	
		Initial gas temperature				162 m/s	
		314 °C					
Location of Max. Overpressure		Location of Max. Temperature		Location of Max. Flame Speed		Location of Max. Flame Speed	
sensor	KU1	sensor	TC19	sensor	IPO	sensor	RA1
label	CD4-R2	label	HR3-L1M	label	CD4-L6	label	HR2-R2M
distance	9758 mm	distance	15140 mm	distance	11758 mm	distance	13785 mm
						sensor	OP1
						label	CD4-R6
						istance	11758 mm



**Naming Convention**

Section Identifier  
i.e. HE, HR, CD or EP

Section Number (1-6)  
Numbered from downstream to upstream

Vertical position in section (sides only) i.e. U, M or L.  
Absence of letter denotes centreline

Longitudinal position in section (numbered from 1)

Side  
i.e. R, L, T or B

**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

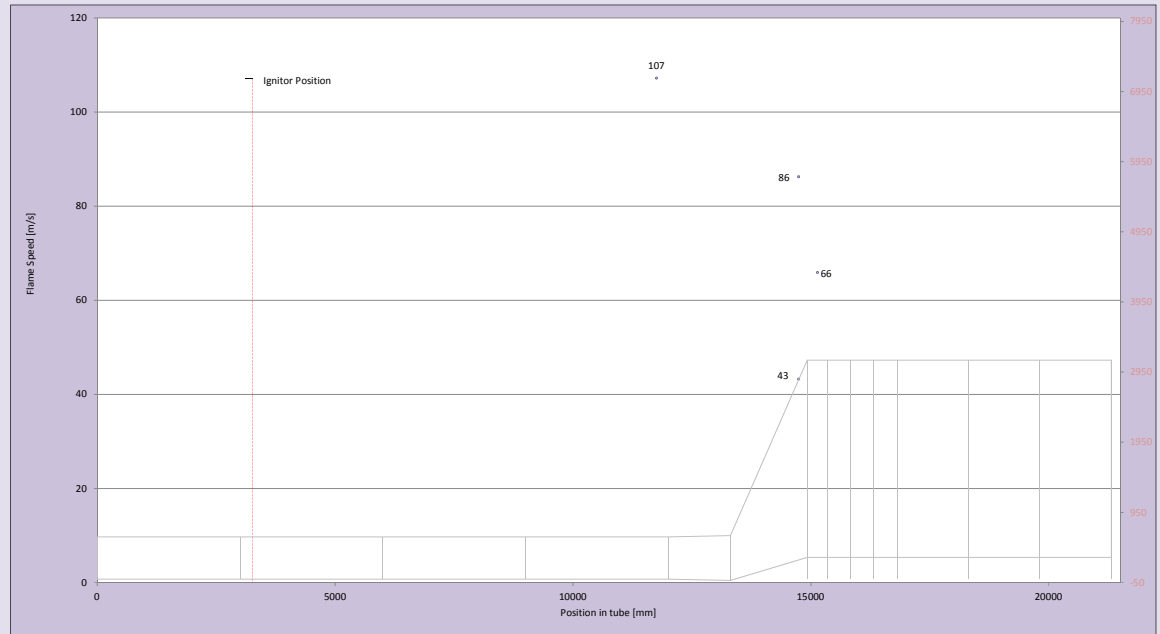
- 4 circular duct sections (CD1 to CD4)
- 6 HRSG sections (HR1 to HR6)
- 3 heat exchanger sections (HE1 to HE3) located between HR3 and HR4

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	18.57374	107
IP1	HR2-L5L	Ionisation probe 1	14745	18.60838	86
IP2	HR2-L5M	Ionisation probe 2	14745	18.64289	43
IP3	HR2-L5U	Ionisation probe 3	14745	ND	
IP4	HR3-R1L	Ionisation probe 4	15140	ND	
IP5	HR3-R1LM	Ionisation probe 5	15140	ND	
IP6	HR3-R1M	Ionisation probe 6	15140	ND	
IP7	HR3-R1U	Ionisation probe 7	15140	18.62506	66
IP8	HR3-L1U	Ionisation probe 8	15140	ND	
IP9	HE2-R1M	Ionisation probe 9	16090	ND	
IP10	HR4-L1L	Ionisation probe 10	16985	ND	
IP11	HR4-L1M	Ionisation probe 11	16985	ND	
IP12	HR4-L1U	Ionisation probe 12	16985	ND	
IP13	HR4-R1U	Ionisation probe 13	16985	ND	
IP14	HR4-R3U	Ionisation probe 14	17575	ND	
IP15	HR4-L5L	Ionisation probe 15	18165	ND	
IP16	HR4-L5M	Ionisation probe 16	18165	ND	
IP17	HR4-L5U	Ionisation probe 17	18165	ND	
IP18	HR4-R5M	Ionisation probe 18	18165	ND	
IP19	HR5-L2L	Ionisation probe 19	18775	ND	
IP20	HR5-L2M	Ionisation probe 20	18775	ND	
IP21	HR5-L2U	Ionisation probe 21	18775	ND	
IP22	HR5-R2U	Ionisation probe 22	18775	ND	
IP23	HR6-L1M	Ionisation probe 23	19985	ND	

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

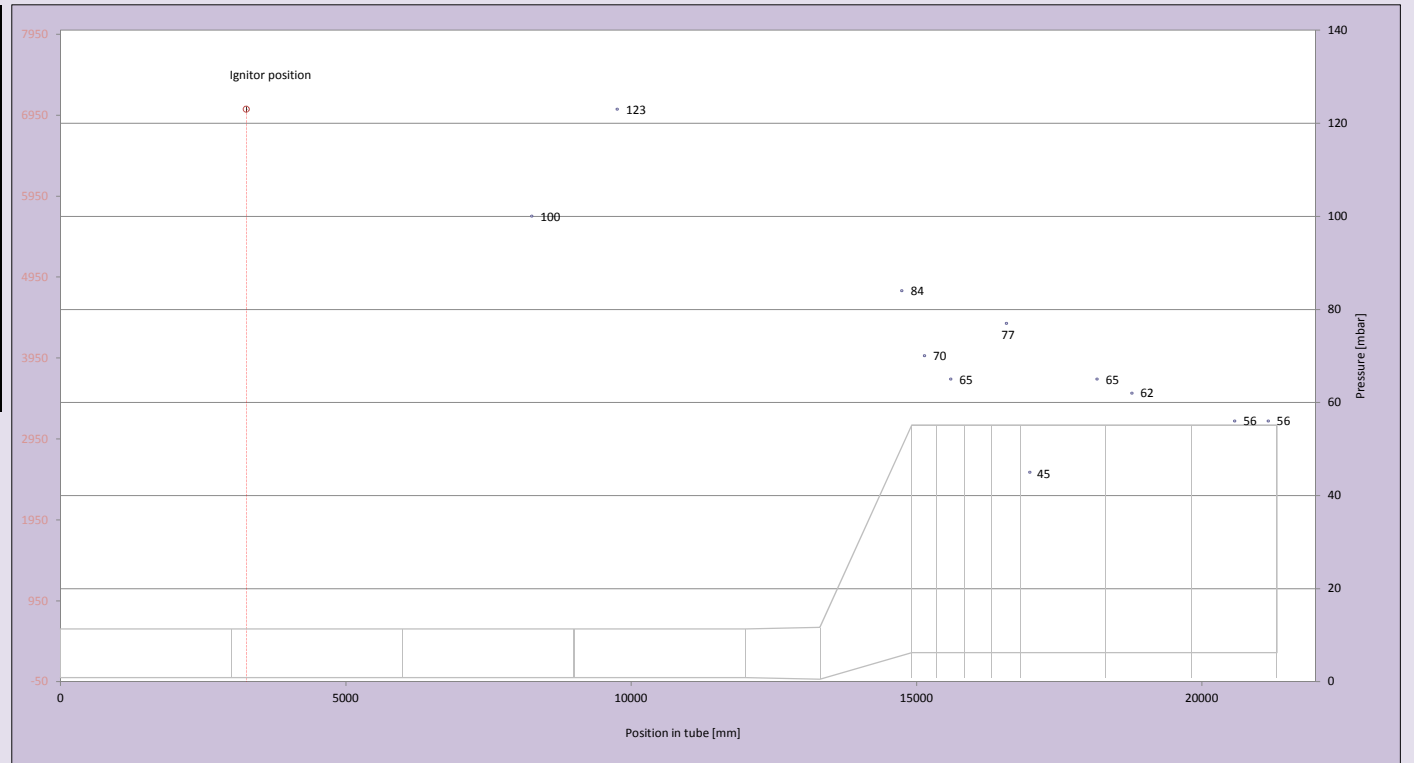
Only a weak responses from sensors after the HE. Many responses too weak to accurately pick out flame arrival time. Further analysis required





Location of igniter 3258 mm

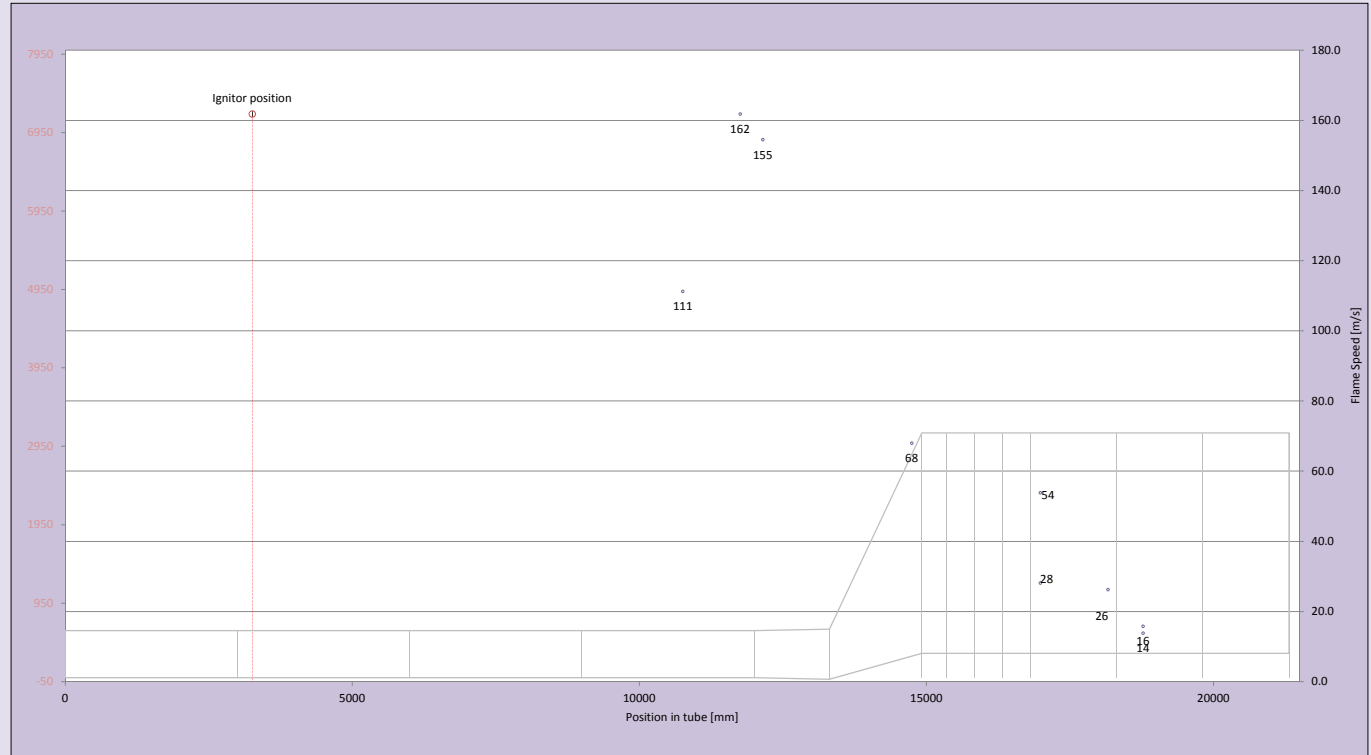
Transducer number	Location	Position in tube [mm]	$\Delta P_{max}$ [mbar]	Time $\Delta P_{max}$ [sec]
KU0	CD3-R5	8258	100	18.6157
KU1	CD4-R2	9758	123	18.6386
KU2	HR2-T5	14745	84	18.6197
KU3	HR3-L1L	15140	70	18.5968
KU4	HE1-R1U	15600	65	18.6147
KU5	HE3-R1L	16580	77	18.6328
KU6	HR4-R1L	16985	45	18.6366
KU7	HR4-R5U	18165	65	18.6180
KU8	HR5-R2L	18775	62	18.6195
KU9	HR6-R3L	20575	56	18.6209
KU10	HR6-LSL	21165	56	18.6246



Location of igniter 3258 mm Time of ignition 18.49442 seconds

OP Number	Location label	Position in tube (mm)	Flame arrival time (s)	Average flame speed (m/s)
OP0	CD4-L4	10758	18.5618	111.3
OP1	CD4-R6	11758	18.5680	161.8
OP2	HR1-R1	12152	18.5706	154.5
OP3	HR2-R5M	14745	18.6087	68.0
OP4	HE1-T1	15600	18.6108	
OP5	HE2-T1	16090	18.6234	
OP6	HE3-T1	16580	18.6324	
OP7	HR4-T1	16985	18.6603	53.9
OP8	HR4-R1M	16985	18.6883	28.1
OP9	HR4-R5L	18165	18.7332	26.3
OP10	HR5-T2	18775	18.7737	15.8
OP11	HR5-R2M	18775	18.8178	13.8

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

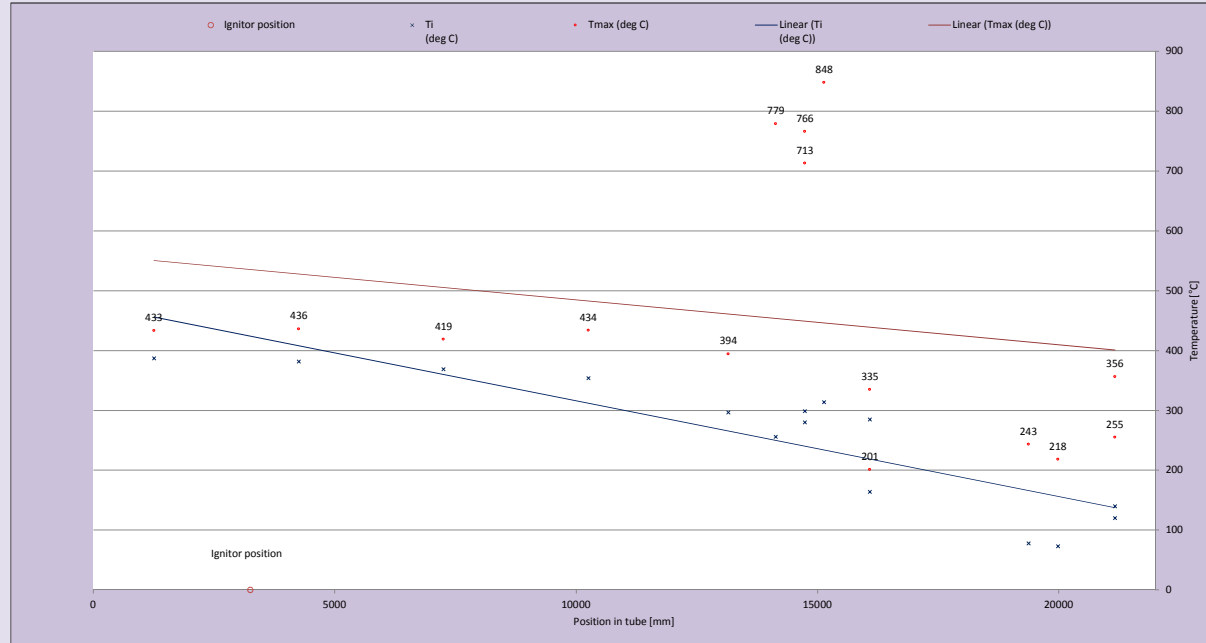


Location of igniter  mm Time of ignition  seconds

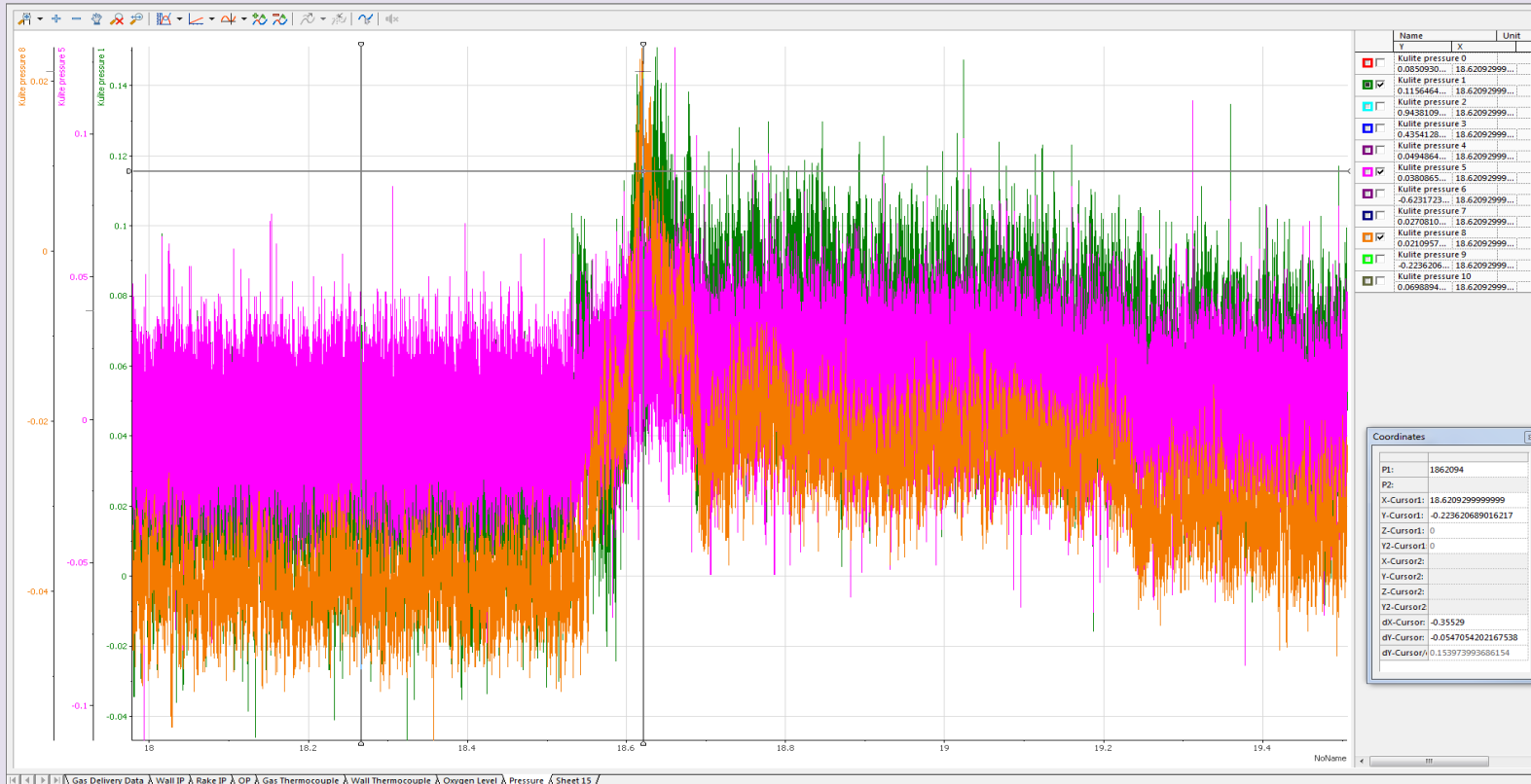
Thermocouple number	Location	Position in tube (mm)	T <sub>max</sub> (deg C)	T <sub>i</sub> (deg C)
TC0	CD1-R3	1258	433	387
TC2	CD2-R3	4258	436	382
TC4	CD3-R3	7258	419	369
TC6	CD4-R3	10258	434	354
TC8	HR1-R2	13160	394	297
TC12	CD3-T1	6258	392	374
TC13	CD3-L1	6258	428	386
TC14	CD3-B1	6258		
TC15	CD3-R1	6258	442	398
TC16	HR2-R3M	14140	779	256
TC17	HR2-R5L	14745	766	299
TC18	HR2-R5U	14745	713	280
TC19	HR3-L1M	15140	848	314
TC20	HE2-R1L	16090	335	285
TC21	HE2-R1U	16090	201	164
TC22	HR5-R4M	19375	243	78
TC23	HR6-R1M	19985	218	73
TC24	HR6-R5L	21165	255	120
TC25	HR6-R5U	21165	356	140

surface thermocouples [not plotted]

TC1	CD1-T2	1508	68	59
TC3	CD2-T2	4508	62	55
TC5	CD3-T2	7508	67	60
TC7	CD4-T2	10508	53	50

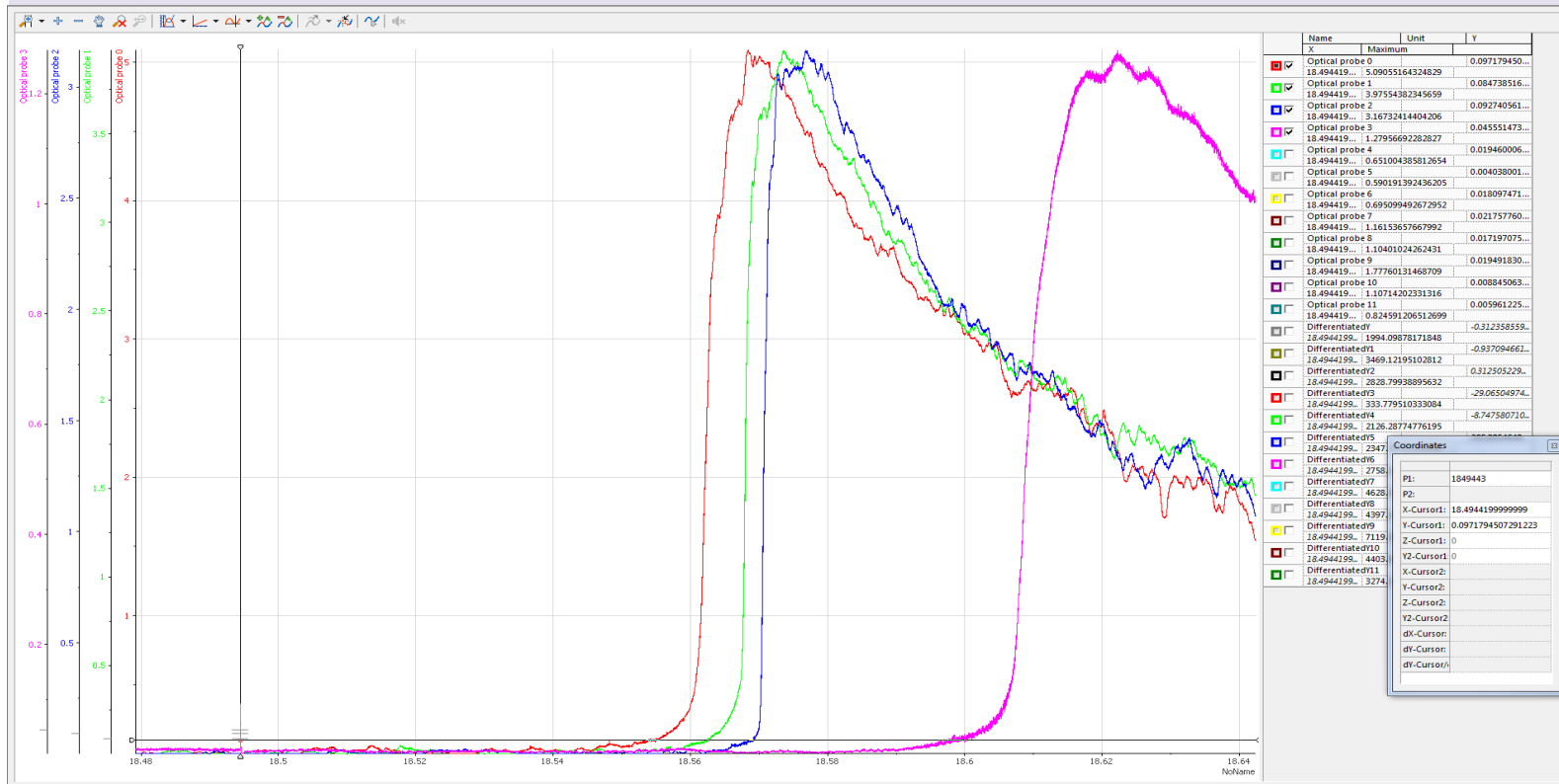


# Pressure





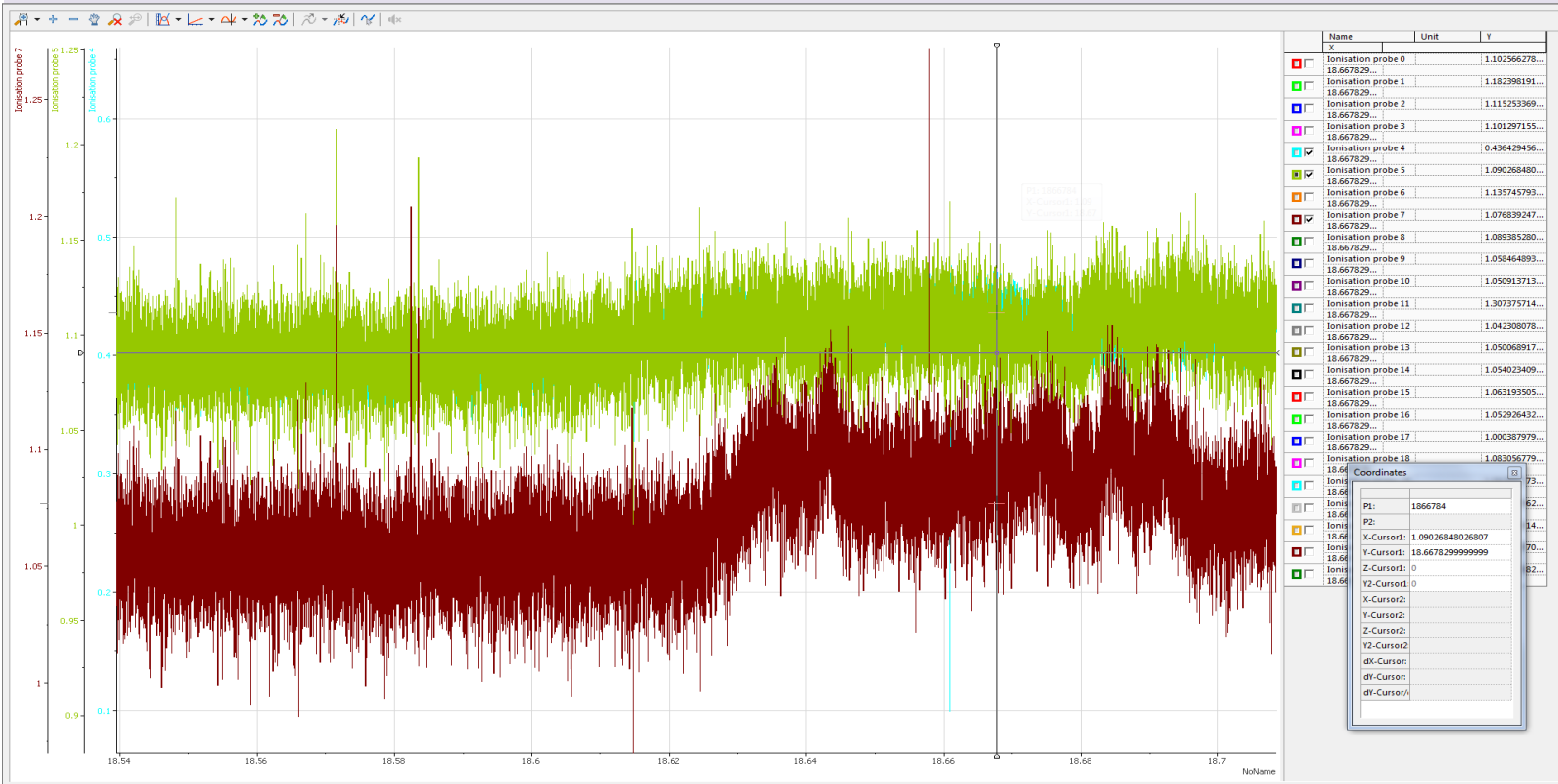
# Optical Probes



**Coordinates**

P1:	1849443
P2:	
X-Cursor1:	18.4944199999999
Y-Cursor1:	0.0971794507291223
Z-Cursor1:	0
Y2-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
Z-Cursor2:	
Y2-Cursor2:	
dX-Cursor:	
dY-Cursor:	
dZ-Cursor:	

# Ionisation Probes

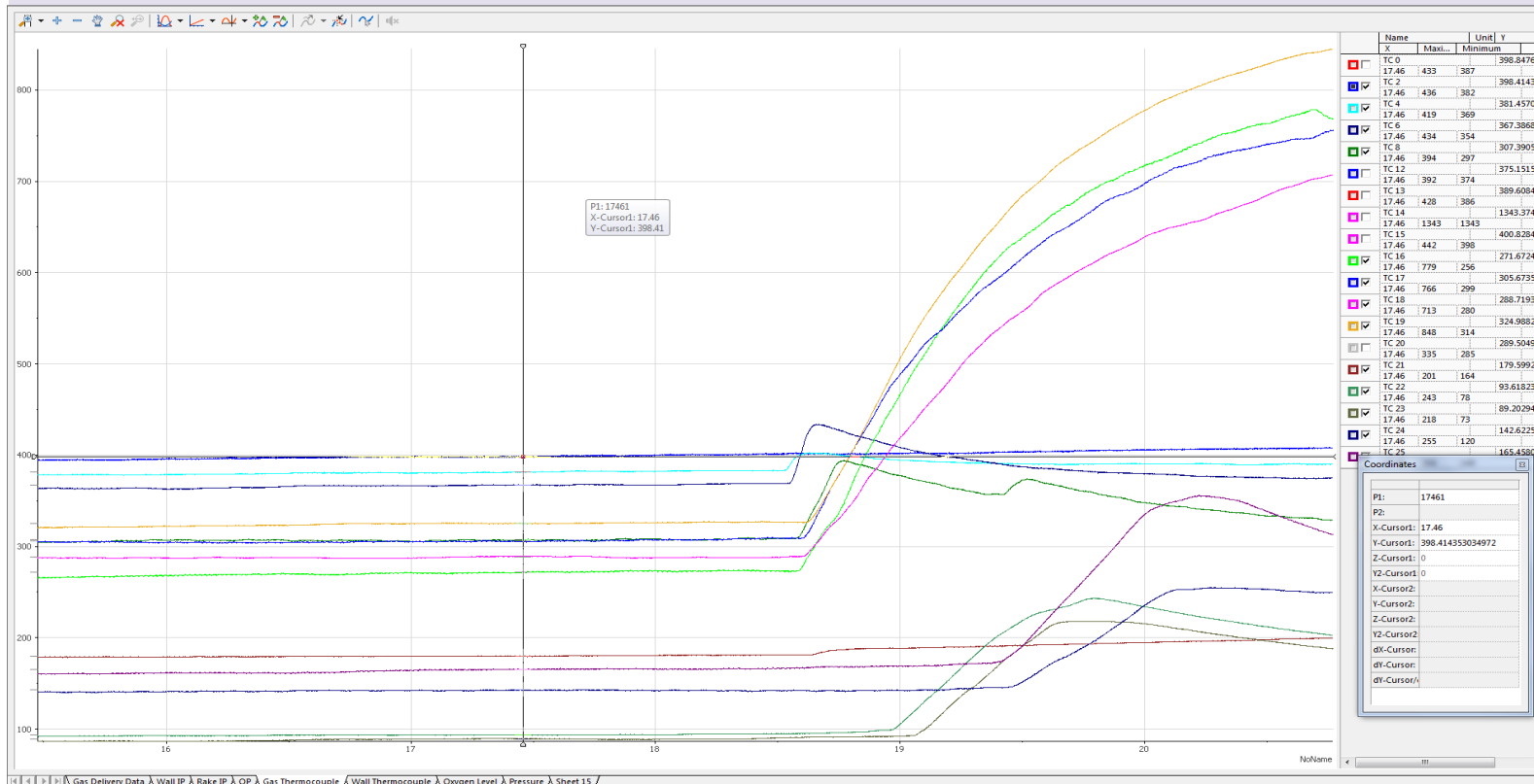


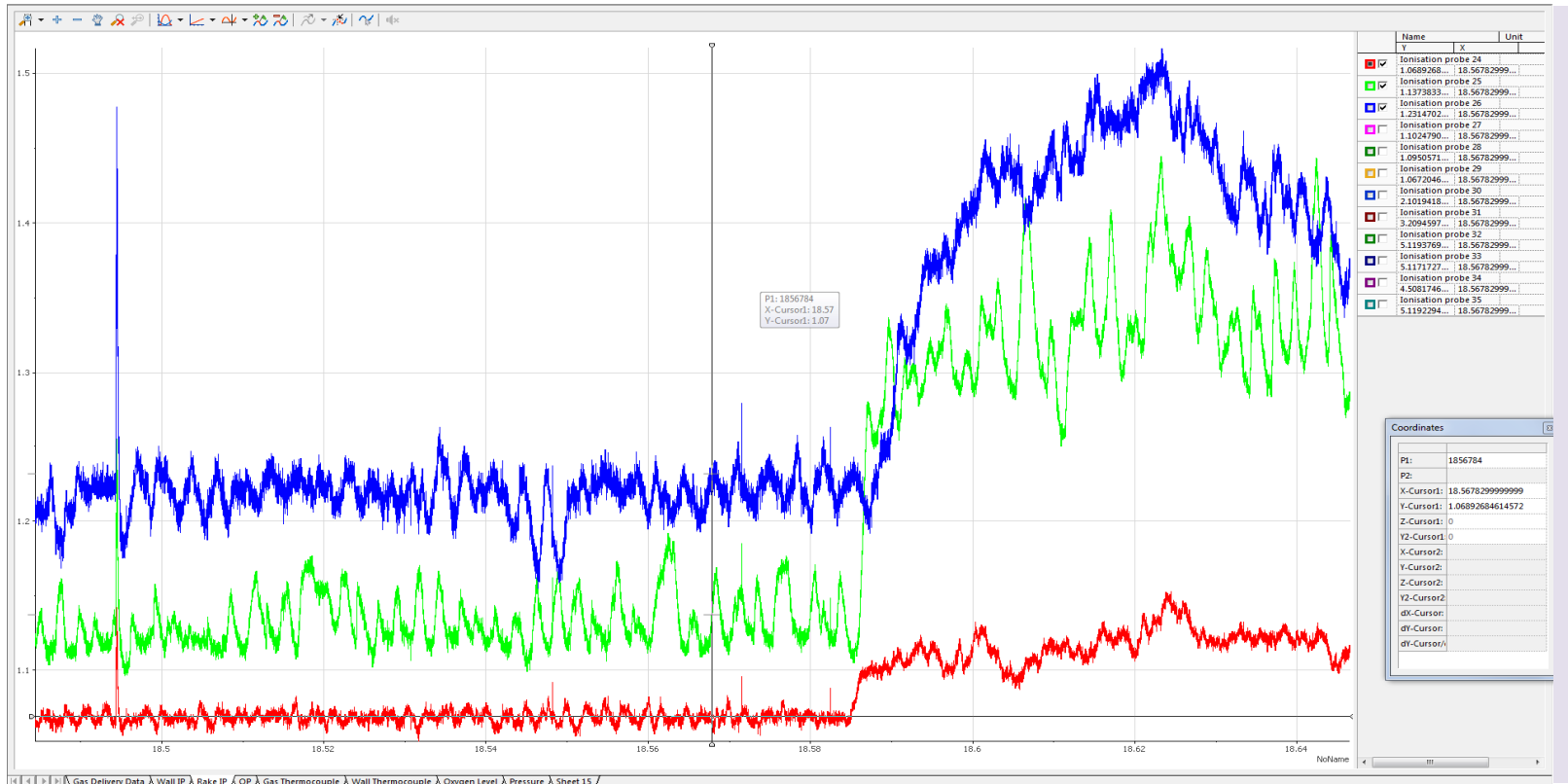
Name	Unit	Y
X		
<input type="checkbox"/> Ionisation probe 0		1.102566278...
<input type="checkbox"/> Ionisation probe 1		1.182398191...
<input type="checkbox"/> Ionisation probe 2		1.115253369...
<input type="checkbox"/> Ionisation probe 3		1.101297155...
<input type="checkbox"/> Ionisation probe 4		0.436429456...
<input checked="" type="checkbox"/> Ionisation probe 5		1.090268480...
<input checked="" type="checkbox"/> Ionisation probe 6		1.135745793...
<input checked="" type="checkbox"/> Ionisation probe 7		1.076839247...
<input type="checkbox"/> Ionisation probe 8		1.089385280...
<input type="checkbox"/> Ionisation probe 9		1.058464893...
<input type="checkbox"/> Ionisation probe 10		1.050913713...
<input type="checkbox"/> Ionisation probe 11		1.307375714...
<input type="checkbox"/> Ionisation probe 12		1.042308078...
<input type="checkbox"/> Ionisation probe 13		1.050068917...
<input type="checkbox"/> Ionisation probe 14		1.054023409...
<input type="checkbox"/> Ionisation probe 15		1.063193505...
<input type="checkbox"/> Ionisation probe 16		1.052926432...
<input type="checkbox"/> Ionisation probe 17		1.000387979...
<input type="checkbox"/> Ionisation probe 18		1.083056779...

Coordinates	
P1:	1866784
P2:	
X-Cursor1:	1.09026848026807
Y-Cursor1:	18.6678299999999
Z-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
Z-Cursor2:	
dX-Cursor:	
dY-Cursor:	

# Temperature





Name	Y	X	Unit
<input checked="" type="checkbox"/> Ionisation probe 24	1.0689268...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 25	1.1373833...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 26	1.2314702...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 27	1.1024790...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 28	1.0950551...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 29	1.0672046...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 30	2.1019418...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 31	3.2094597...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 32	5.1193769...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 33	5.1171707...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 34	4.5081746...	18.56782999...	
<input checked="" type="checkbox"/> Ionisation probe 35	5.1192294...	18.56782999...	

Coordinates	
P1:	1856784
P2:	
X-Cursor1:	18.5678299999999
Y-Cursor1:	1.06892684614572
Z-Cursor1:	0
Y2-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
Z-Cursor2:	
Y2-Cursor2:	
dX-Cursor:	
dY-Cursor:	
dZ-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

