

Date	06 March 2019
Time	13:50:08
Test Number	HRSG Test 60
Mixture Composition	40% CH4 60% H2
Ambient Temperature	7.8 °C
Ambient Pressure	937 mbar
Wind Speed	4.5m/s
Wind direction	S
Relative Humidity	98.00%
Mass Flow	9.4980 kg/s
Equivalence Ratio	0.59

**General Comments: (weather, rig configuration)**

Weather: Misty but cleared by time of test. Overcast.

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 40% CH4 60% H2 at an intended EQR of 0.58  
LOW TEMPERATURE TESTS (NOMINAL 320 oC).

Test gave a moderately strong combustion event with a very good response from (nearly) all sensors.

**Ionisation Probes**

**Ionisation Rakes**

**Optical Probes**

Max overpressure  
640 mbar

Max. gas temperature  
1297 °C

Max. flame speed  
169 m/s

Max. flame speed  
228 m/s

Max. flame speed  
235 m/s

Initial gas temperature  
812 °C

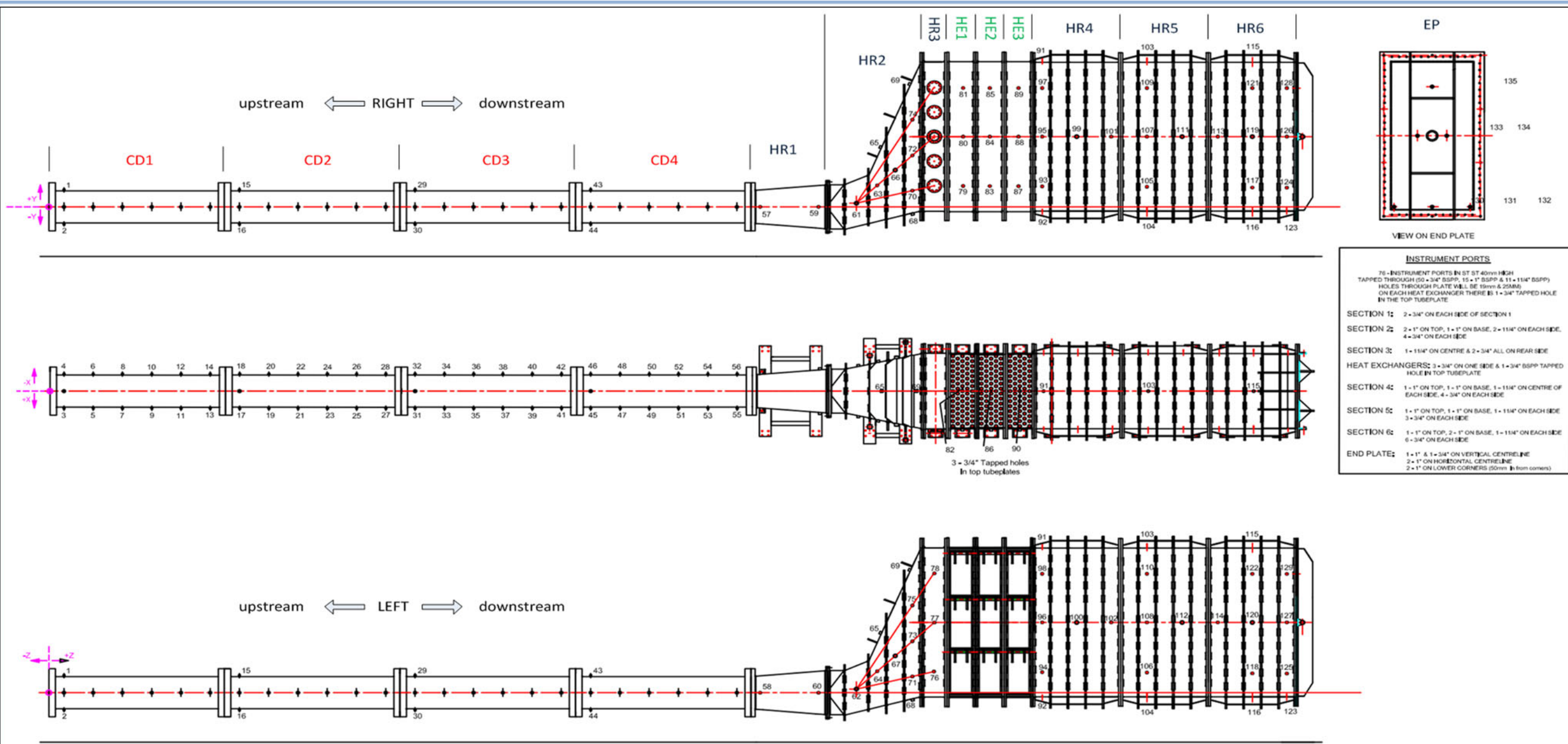
Location of Max. Overpressure  
sensor KU10  
label HR6-L5L  
distance 21165 mm

Location of Max. Temperature  
sensor TC20  
label HE2-R1L  
distance 16090 mm

Location of Max. Flame Speed  
sensor IP1  
label HR2-L5L  
distance 14745 mm

Location of Max. Flame Speed  
sensor RA3  
label HR4-R3M  
distance 17575 mm

Location of Max. Flame Speed  
sensor OP1  
label CD4-R6  
istance 11758 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	<b>HR 1 - R 1 U</b>	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**

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

There are 13 sections on the rig

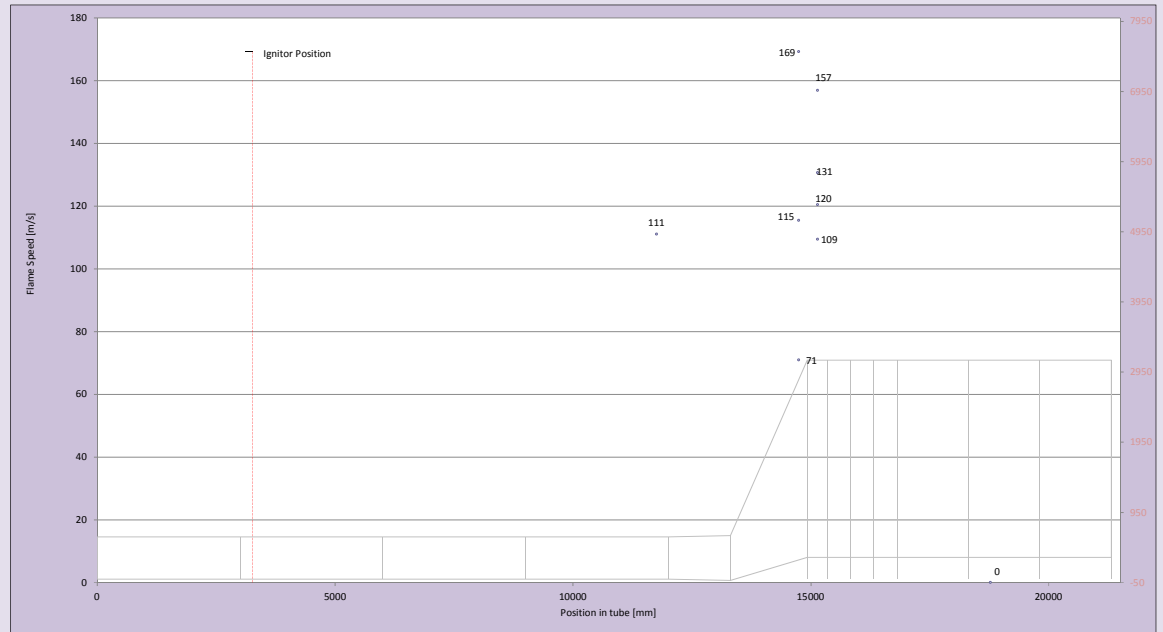
- 4 circular duct sections (CD1 to CD4)
- 6 HRSG sections (HR1 to HR6)
- 3 heat exchanger sections (HE1 to HE3) located between HR3 and HR4

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	23.91796	111
IP1	HR2-L5L	Ionisation probe 1	14745	23.93561	169
IP2	HR2-L5M	Ionisation probe 2	14745	23.94384	115
IP3	HR2-L5U	Ionisation probe 3	14745	23.96008	71
IP4	HR3-R1L	Ionisation probe 4	15140	23.93951	157
IP5	HR3-R1LM	Ionisation probe 5	15140	23.94605	120
IP6	HR3-R1M	Ionisation probe 6	15140	23.94385	131
IP7	HR3-R1U	Ionisation probe 7	15140	23.94887	109
IP8	HR3-L1U	Ionisation probe 8	15140	23.96234	
IP9	HE2-R1M	Ionisation probe 9	16090	23.94590	
IP10	HR4-L1L	Ionisation probe 10	16985	23.94932	
IP11	HR4-L1M	Ionisation probe 11	16985	23.95036	
IP12	HR4-L1U	Ionisation probe 12	16985	23.95422	
IP13	HR4-R1U	Ionisation probe 13	16985	23.95881	
IP14	HR4-R3U	Ionisation probe 14	17575	23.97620	
IP15	HR4-L5L	Ionisation probe 15	18165	23.95719	
IP16	HR4-L5M	Ionisation probe 16	18165	23.96102	
IP17	HR4-L5U	Ionisation probe 17	18165	23.97908	
IP18	HR4-R5M	Ionisation probe 18	18165	23.95835	
IP19	HR5-L2L	Ionisation probe 19	18775	23.97653	
IP20	HR5-L2M	Ionisation probe 20	18775	23.98175	
IP21	HR5-L2U	Ionisation probe 21	18775	24.00090	
IP22	HR5-R2U	Ionisation probe 22	18775	24.00416	-
IP23	HR6-L1M	Ionisation probe 23	19985	NW	

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

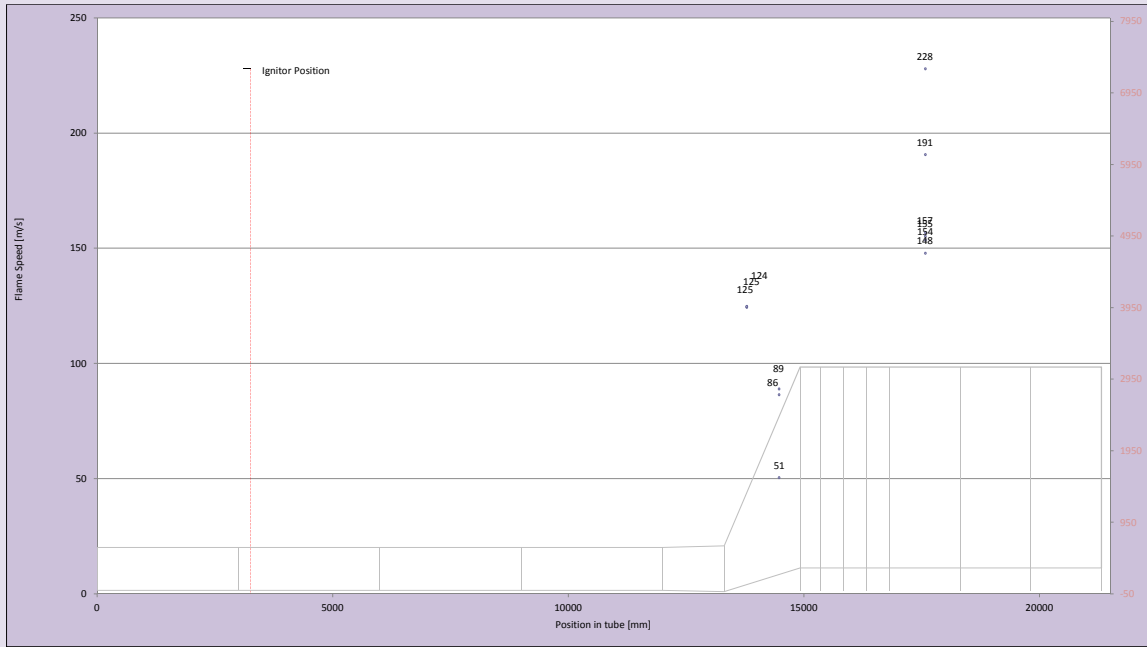
A weak combustion event. Sensors ahead of the HE gave a weak response but may sensors within the HE and further downstream did not detect an event.



Location of igniter 3258 mm Time of ignition 23.84139 seconds

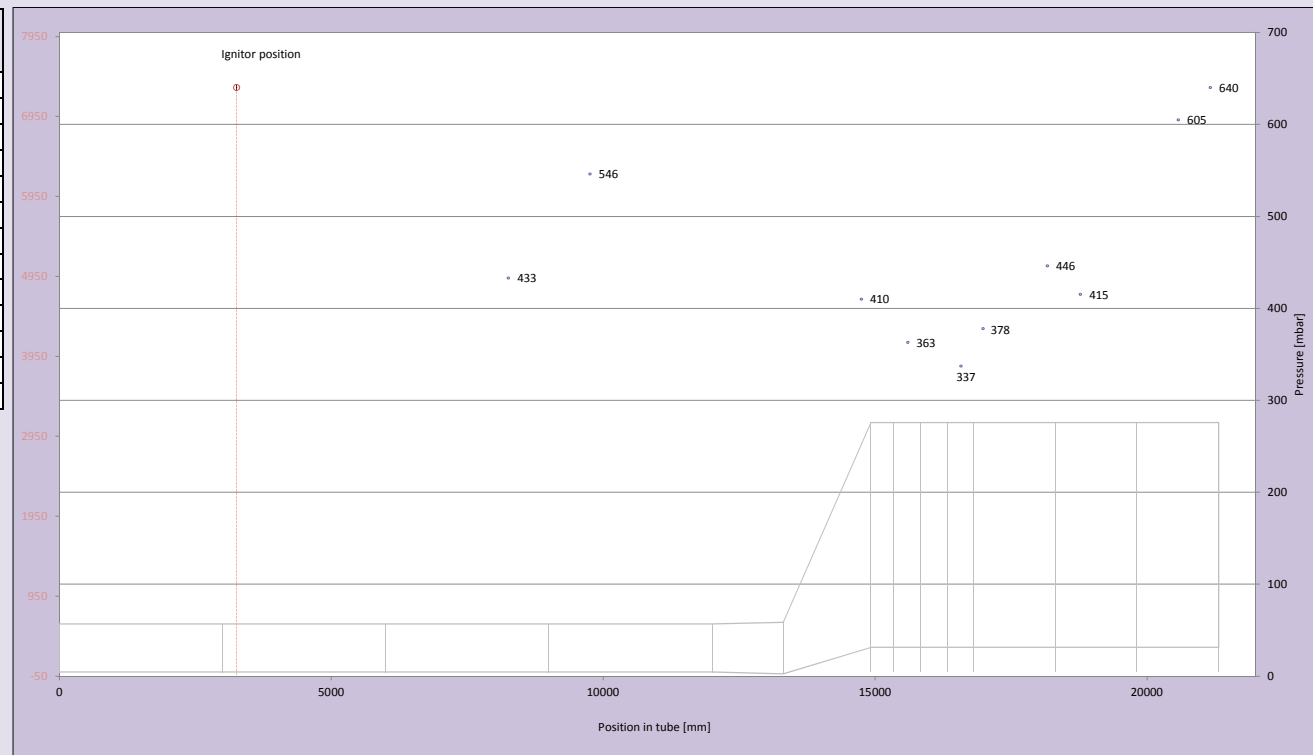
Rake Number	IP Number	Location label	Data Name	Position in tube (mm)	Flame arrival time (s)	Avg Flame speed from last sensor (m/s)
RA1	IP24	HR2-R2M	IP24	13785	23.9260	124
RA1	IP25	HR2-R2M	IP25	13785	23.9258	125
RA1	IP26	HR2-R2M	IP26	13785	23.9257	125
RA2	IP27	HR2-R4M	IP27	14475	23.9396	51
RA2	IP28	HR2-R4M	IP28	14475	23.9335	89
RA2	IP29	HR2-R4M	IP29	14475	23.9336	86
RA3	IP30	HR4-R3M	IP30	17575	23.9532	228
RA3	IP31	HR4-R3M	IP31	17575	23.9537	154
RA3	IP32	HR4-R3M	IP32	17575	23.9534	157
RA4	IP33	HR4-R3L	IP33	17575	23.9559	191
RA4	IP34	HR4-R3L	IP34	17575	23.9545	148
RA4	IP35	HR4-R3L	IP35	17575	23.9536	155

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



Location of igniter  mm

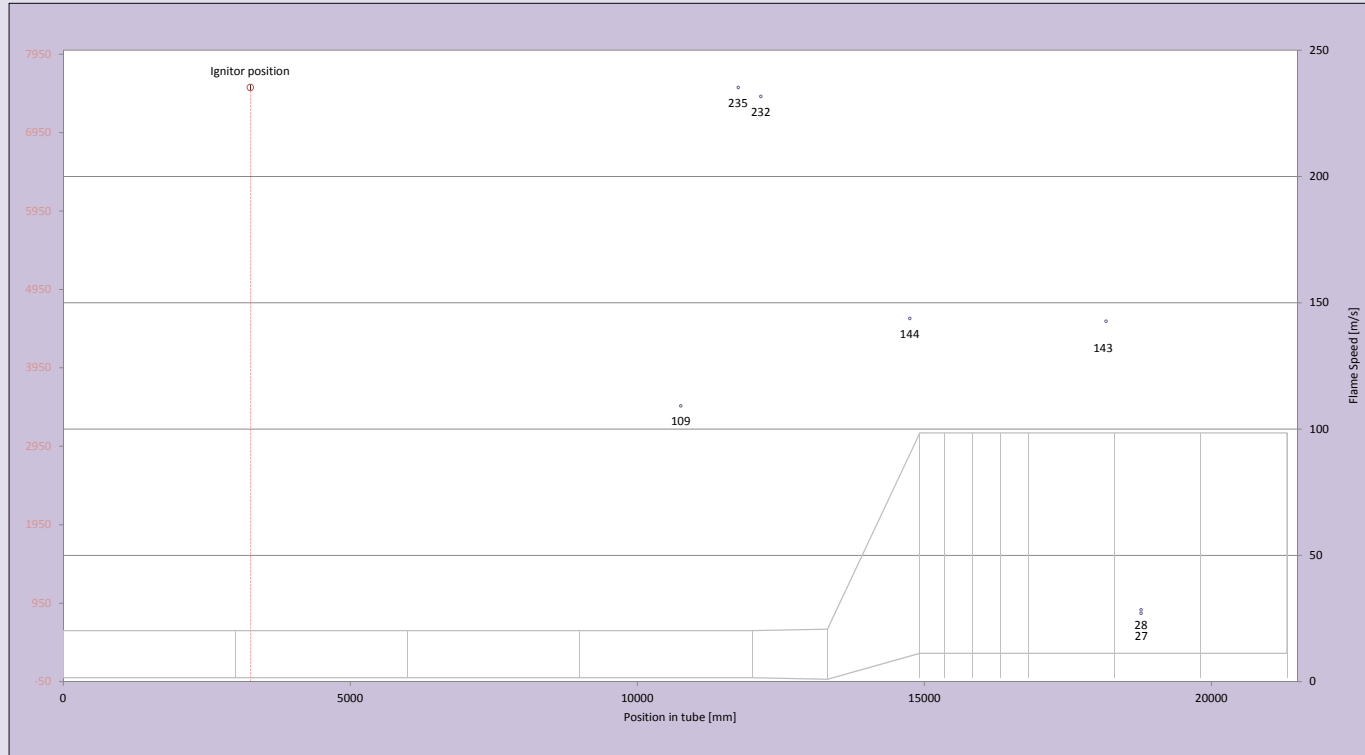
Transducer number	Location	Position in tube [mm]	$\Delta P_{max}$ [mbar]	Time $\Delta P_{max}$ [sec]
KU0	CD3-R5	8258	433	23.9773
KU1	CD4-R2	9758	546	23.9559
KU2	HR2-T5	14745	410	23.9698
KU3	HR3-L1L	15140		
KU4	HE1-R1U	15600	363	23.9482
KU5	HE3-R1L	16580	337	23.9516
KU6	HR4-R1L	16985	378	23.9517
KU7	HR4-R5U	18165	446	23.9648
KU8	HR5-R2L	18775	415	23.9633
KU9	HR6-R3L	20575	605	23.9597
KU10	HR6-L5L	21165	640	23.9579



Location of igniter 3258 mm Time of ignition 23.84139 seconds

OP Number	Location label	Position in tube (mm)	Flame arrival time (s)	Average flame speed (m/s)
OP0	CD4-L4	10758	23.9101	109
OP1	CD4-R6	11758	23.9143	235
OP2	HR1-R1	12152	23.9160	232
OP3	HR2-R5M	14745	23.9341	144
OP4	HE1-T1	15600	23.9404	
OP5	HE2-T1	16090	23.9531	
OP6	HE3-T1	16580	23.9565	
OP7	HR4-T1	16985	23.9502	
OP8	HR4-R1M	16985	23.9498	
OP9	HR4-R5L	18165	23.9580	143
OP10	HR5-T2	18775	23.9805	27
OP11	HR5-R2M	18775	23.9794	28

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

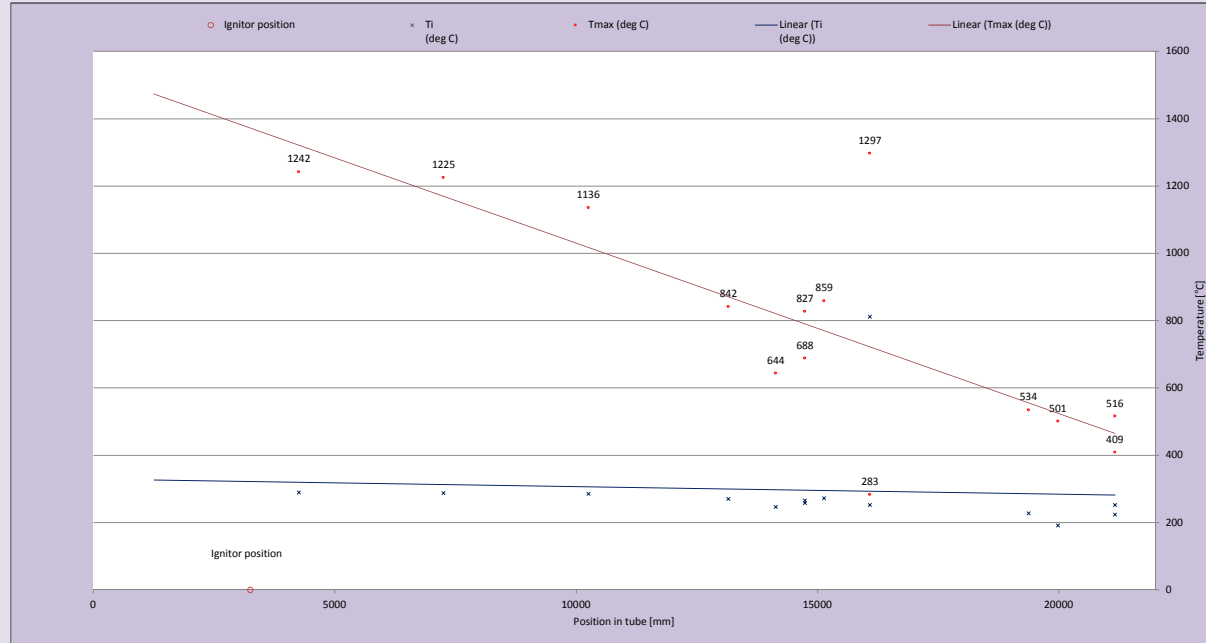


Location of igniter  mm Time of ignition  seconds

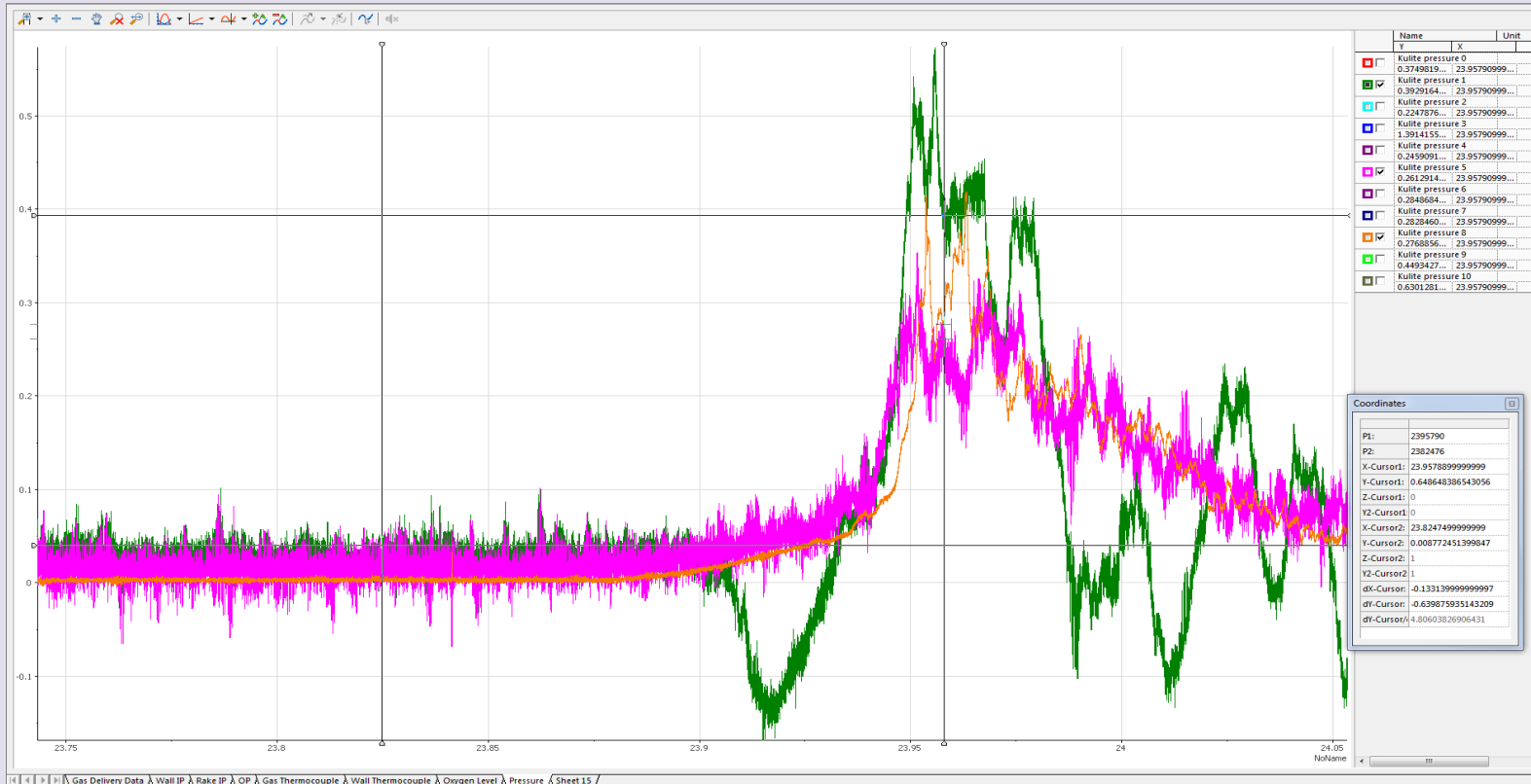
Thermocouple number	Location	Position in tube (mm)	T <sub>max</sub> (deg C)	T <sub>i</sub> (deg C)
TC0	CD1-R3	1258		
TC2	CD2-R3	4258	1242	290
TC4	CD3-R3	7258	1225	288
TC6	CD4-R3	10258	1136	286
TC8	HR1-R2	13160	842	271
TC12	CD3-T1	6258	586	290
TC13	CD3-L1	6258	613	288
TC14	CD3-B1	6258		
TC15	CD3-R1	6258	603	293
TC16	HR2-R3M	14140	644	247
TC17	HR2-R5L	14745	827	266
TC18	HR2-R5U	14745	688	258
TC19	HR3-L1M	15140	859	273
TC20	HE2-R1L	16090	1297	812
TC21	HE2-R1U	16090	283	253
TC22	HR5-R4M	19375	534	228
TC23	HR6-R1M	19985	501	192
TC24	HR6-R5L	21165	409	224
TC25	HR6-R5U	21165	516	253

surface thermocouples [not plotted]

TC1	CD1-T2	1508	274	272
TC3	CD2-T2	4508	251	249
TC5	CD3-T2	7508	264	258
TC7	CD4-T2	10508	235	232

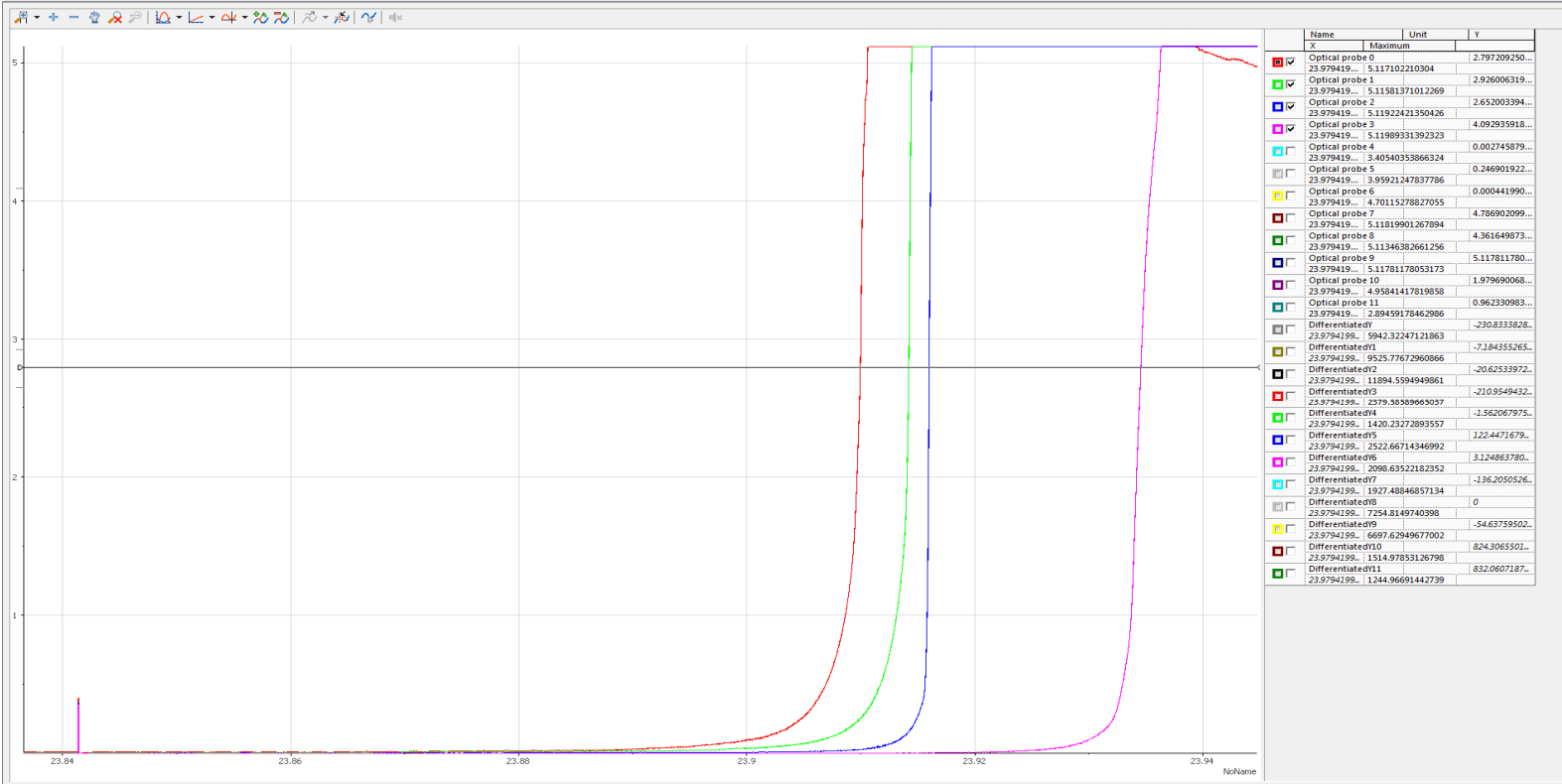


# Pressure



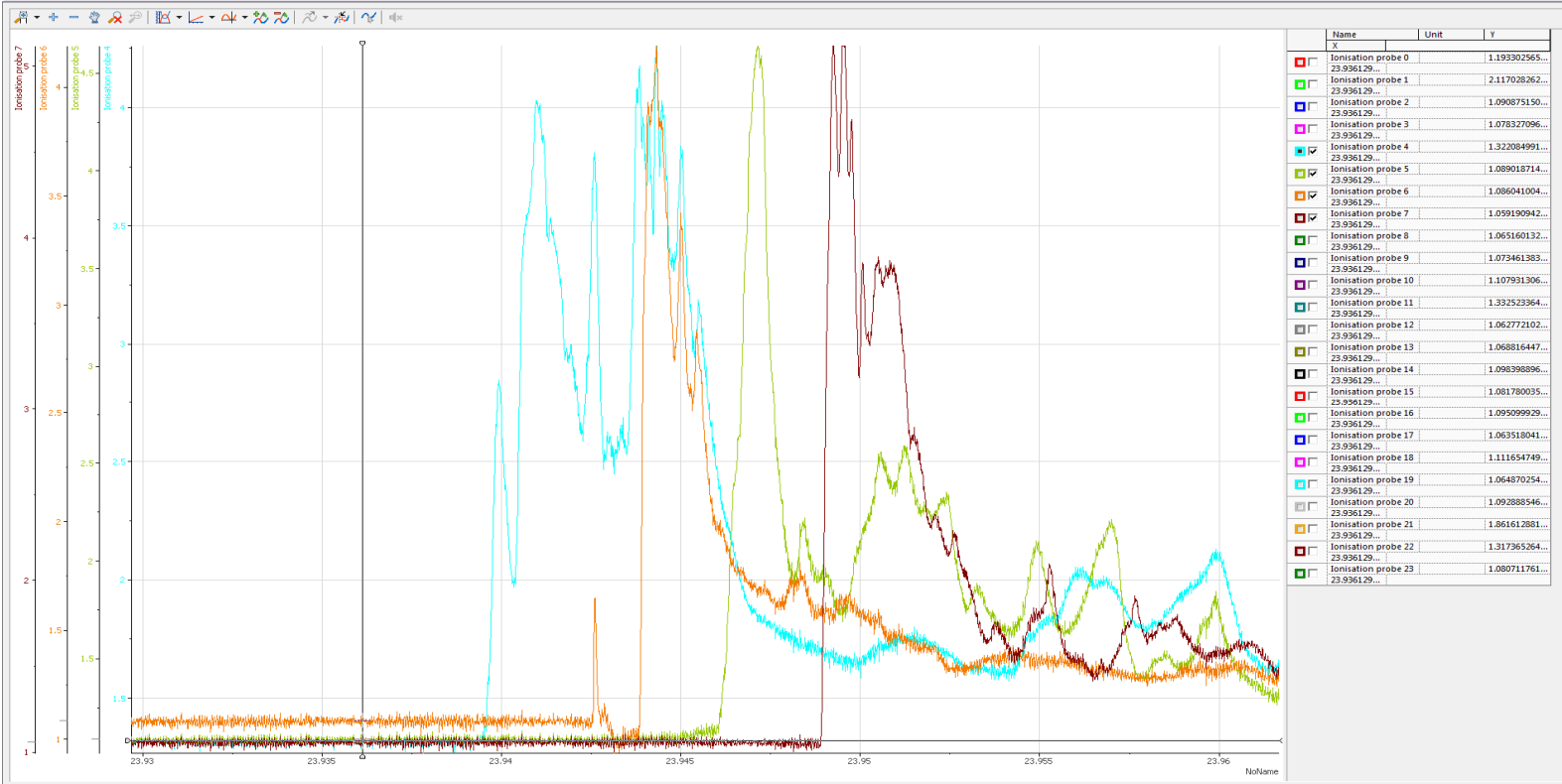


# Optical Probes



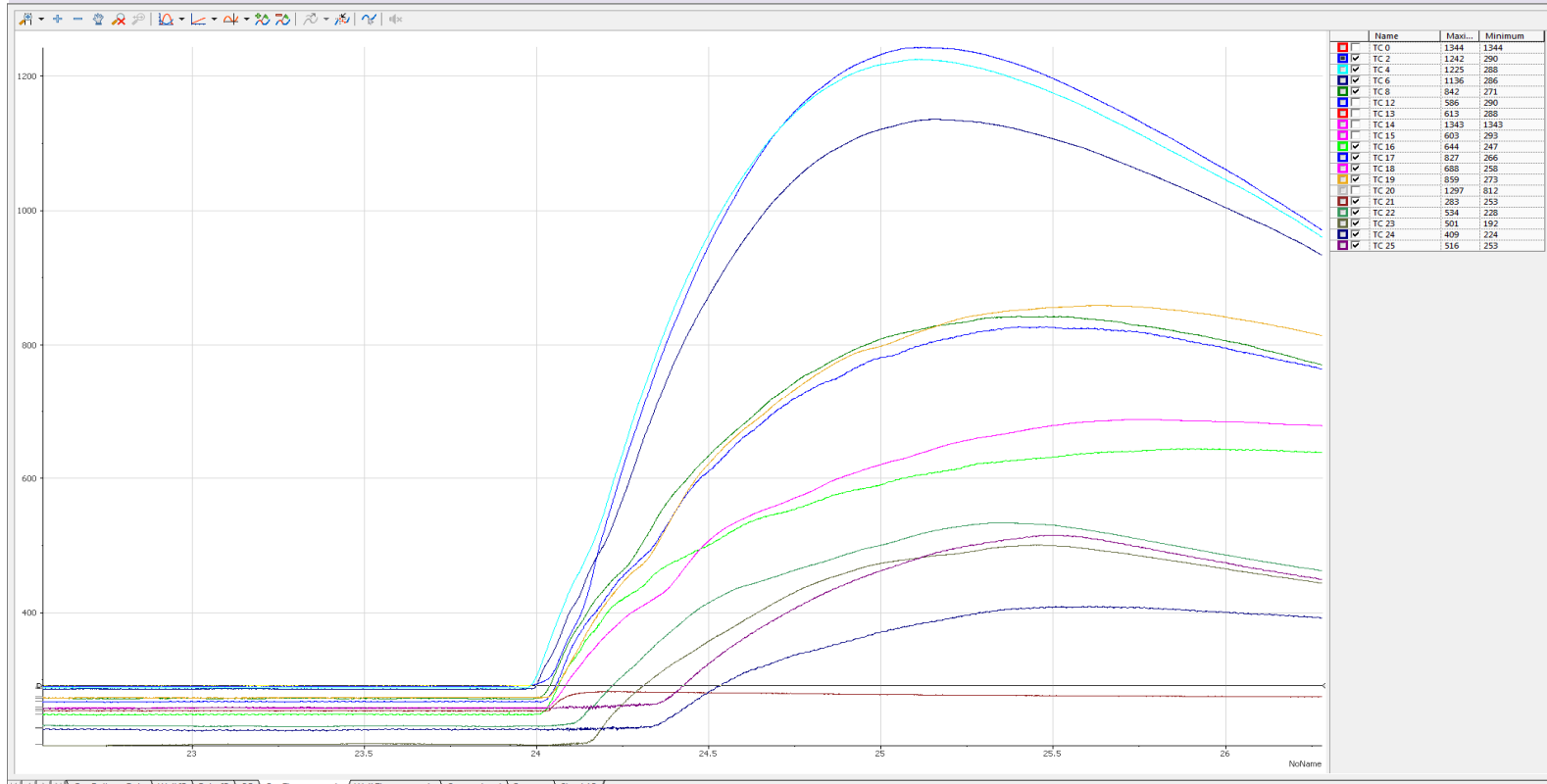
Name	Unit	Y
Optical probe 0	Maximum	2.797209250...
23.979419... 5.117102210304		
Optical probe 1		2.926006319...
23.979419... 5.11581371012269		
Optical probe 2		2.652003394...
23.979419... 5.11922421350426		
Optical probe 3		4.092935918...
23.979419... 5.11989331392323		
Optical probe 4		0.002745879...
23.979419... 3.40540353866324		
Optical probe 5		0.246901922...
23.979419... 3.95921247837786		
Optical probe 6		0.000441990...
23.979419... 4.70115278827055		
Optical probe 7		4.786902099...
23.979419... 5.11819901267894		
Optical probe 8		4.361649873...
23.979419... 5.11346383661256		
Optical probe 9		5.117811780...
23.979419... 5.11781178053173		
Optical probe 10		1.979690068...
23.979419... 4.95841417819858		
Optical probe 11		0.962330983...
23.979419... 2.89459178462986		
Differentiated0		-230.8333828...
23.9794199... 5942.32247121863		
Differentiated1		-7.184355265...
23.9794199... 9525.77672960866		
Differentiated2		-20.62533972...
23.9794199... 11894.5594949861		
Differentiated3		-210.9549432...
23.9794199... 3279.3639965057		
Differentiated4		-1.562067975...
23.9794199... 1420.23272893557		
Differentiated5		122.4471679...
23.9794199... 2522.66714346992		
Differentiated6		3.124863780...
23.9794199... 2098.63522182952		
Differentiated7		-136.2050526...
23.9794199... 1927.48846857134		
Differentiated8		0
23.9794199... 7254.8149740398		
Differentiated9		-54.63759502...
23.9794199... 6697.62949677002		
Differentiated10		824.3065501...
23.9794199... 1514.97853126798		
Differentiated11		832.0607187...
23.9794199... 1244.96691442739		

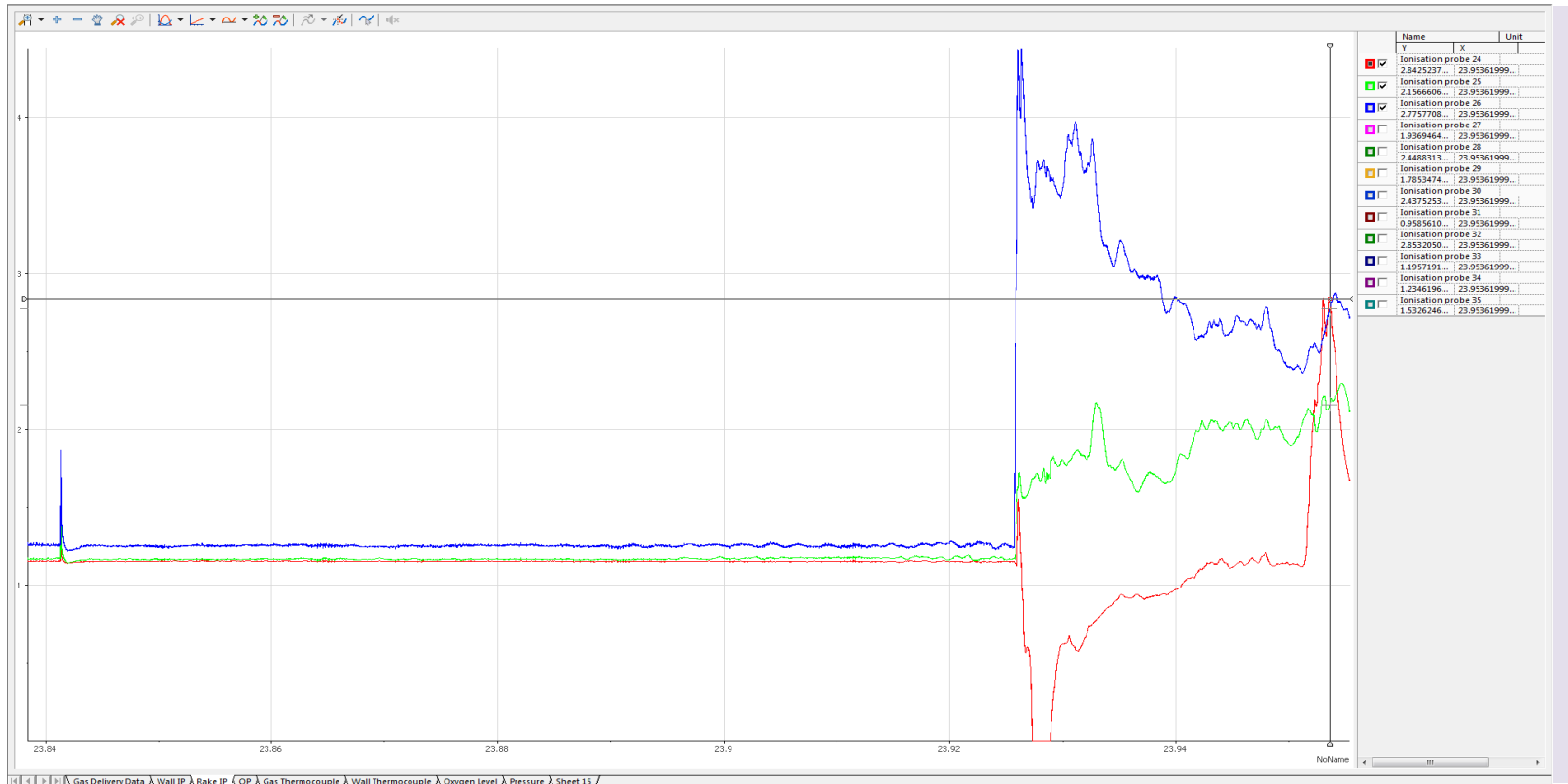
# Ionisation Probes



Name	Unit	Y
<input type="checkbox"/> Ionisation probe 0		1.193302565...
<input type="checkbox"/> Ionisation probe 1		2.117028262...
<input type="checkbox"/> Ionisation probe 2		1.090875150...
<input type="checkbox"/> Ionisation probe 3		1.078327096...
<input checked="" type="checkbox"/> Ionisation probe 4		1.322084991...
<input checked="" type="checkbox"/> Ionisation probe 5		1.089018714...
<input checked="" type="checkbox"/> Ionisation probe 6		1.086041004...
<input checked="" type="checkbox"/> Ionisation probe 7		1.059190942...
<input type="checkbox"/> Ionisation probe 8		1.065160132...
<input type="checkbox"/> Ionisation probe 9		1.073461383...
<input type="checkbox"/> Ionisation probe 10		1.107931306...
<input type="checkbox"/> Ionisation probe 11		1.332523364...
<input type="checkbox"/> Ionisation probe 12		1.062772102...
<input type="checkbox"/> Ionisation probe 13		1.068816447...
<input type="checkbox"/> Ionisation probe 14		1.098398896...
<input type="checkbox"/> Ionisation probe 15		1.081780035...
<input type="checkbox"/> Ionisation probe 16		1.095099929...
<input type="checkbox"/> Ionisation probe 17		1.063518041...
<input type="checkbox"/> Ionisation probe 18		1.111654749...
<input type="checkbox"/> Ionisation probe 19		1.064870254...
<input type="checkbox"/> Ionisation probe 20		1.092888546...
<input type="checkbox"/> Ionisation probe 21		1.861612881...
<input type="checkbox"/> Ionisation probe 22		1.317365264...
<input type="checkbox"/> Ionisation probe 23		1.080711761...

# Temperature





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

