A.3 Physical Dimensions

- Height: 57 in. (144.8 cm)
- Width: 24 in. (61 cm)
- Depth: 36 in. (91 cm)
- Weight: ~550 lbs. (249 kg) with 3 analyzers
- Universal Az: 31 lbs. (14 kg)
- Pyrolyzer Az: 48 lbs. (22 kg)
- Empty Vertex M Rack: 457 lbs. (207 kg)

Tubing dimensions:

- Sample lines: 1/4 in. (6.35 mm)
- O.D. x 0.190 in. (4.83 mm) I.D. FEP Teflon
- or 1/4 in. (6.35 mm) O.D. x 0.156 in. (3.9 mm) I.D. FEP Teflon
- Exhaust line: 1/2 in. (12.7 mm) O.D. x 3/8 in.
- (9.5 mm) I.D. Teflon tubing,

  50 ft. (15 m) maximum

Output requirements:

- Optional data output: See Appendix F Network Interface and Options.
- Optional relay output contacts: Via PLC, normally open (form A). 32 isolated or 64 non-isolated contacts are user configurable. All relays are undefined by default, and must be configured as required. See Appendix E Optional Relay Specifications.
- Optional 4-20 mA analog: 0-500 ohms
- Installation Category
- (overvoltage category): II (UL 61010B-1)
- Temperature: 59°F to 95°F (15°C to 35°C)
- Humidity: 20-65% RH
- Operating Altitude: –1000 ft. (–305 m) to 6000 ft. (1829 m) above sea level
- Operating Voltage: 110 or 230 VAC ± 10% (under load) @ 50/60 Hz; 15 Amps maximum, single phase. See Section 2.6 Electrical Power for proper specifications.

A.4 Nominal Transport Times

The following table shows the time required for samples to move from the sampling point to the Vertex M system for various lengths of sample lines.

O.D.		0.25 in. Outside Diameter Tubing							
I.D.		0.15 in. (Medium Wall) I.D.				0.190 in. (Thin Wall) I.D.			
Length in Feet		100	200	300	400	100	200	300	400
Length in Meters		30	61	91	122	30	61	91	122
# of Analyzers per line	1	15 sec.	30 sec.	45 sec.	60 sec.	22 sec.	45 sec.	67 sec.	89 sec.
	2	8 sec.	15 sec.			11 sec.	22 sec.	34 sec.	45 sec.
	3	5.0 sec.	Pressure Limited			7 sec.	15 sec.	Pressure Limited	
	Nominal Transport Time in Seconds 1.3-1.8 Liters per Minute per Point (1.5 LPM nominal)								

Table A-2. Nominal Transport Times

A Detectable Gases

A.1 Detectable Gases

Vertex M System Chemcassette® analyzers are continuous monitoring instruments. The initial analysis period listed in Table C-1 varies based on the programmed alarm levels. This period is valid only after the system pulls a new Chemcassette® window. Increasing the programmed alarm levels will decrease the initial sample period.

For accurate detection, gas must be present at sufficient levels and durations. Typical response times are shown in this table at 2 TLV, which will vary in duration depending on the target gas and alarm level settings. For high concentrations (greater than full scale) a minimum of 4 seconds is required.

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Ammonia II (NH_3)	25 ppm	3 ppm	3 ppm	25 ppm	50 ppm	0-75 ppm	3-49.9 ppm 50-75 ppm	10 10	<20 sec	1295-0221
Ammonia XP (NH_3)	25 ppm	1.5 ppm	1.5 ppm	25 ppm	50 ppm	0-150 ppm	1.5-49.9 ppm 50-150 ppm	10 10	<20 sec	1295-0405
Ammonia XP4 (NH_3)	25 ppm	1.5 ppm	1.5 ppm	25 ppm	50 ppm	0-150 ppm	1.5-49.9 ppm 50-150 ppm	10 10	<20 sec	1257-9309
Arsine (AsH_3)	5 ppb	5 ppb	5 ppb	50 ppb	100 ppb	0-500 ppb	5-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH_3 gas)	1295-0300
Arsine (AsH_3) Dry	5 ppb	7 ppb	5 ppb	50 ppb	100 ppb	0-500 ppb	7-99 ppb 100-199 ppb 200-500 ppb	60 30 15	<35 sec (Alarm @ 50 ppb with 100 ppb AsH_3 gas)	1295-0300
Arsine XP (AsH_3) Low Level	5 ppb	0.5 ppb	0.3 ppb	2.5 ppb	5 ppb	0-50 ppb	0.5-1.9 ppb 2-4.9 ppb 5-9.9 ppb 10-50 ppb	300 150 60 30	<45 sec	1295-0226
Arsine XP (AsH_3)	5 ppb	3 ppb	2.5 ppb	50 ppb	100 ppb	0-500 ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH_3 gas)	1295-0226

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Arsine XP4 (AsH_3)	5 ppb	3 ppb	2.5 ppb	50 ppb	100 ppb	0-500ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH_3 gas)	1257-9300
Arsine XP4 (AsH_3) Low Level	5 ppb	0.5 ppb	0.3 ppb	2.5 ppb	5 ppb	0-50 ppb	0.5-1.9 ppb 2-4.9 ppb 5-9.9 ppb 10-50 ppb	300 150 60 30	<45 sec	1257-9300
Boron Trifluoride (BF_3) Low Level	1 ppm	120 ppb	100 ppb	125 ppb	250 ppb	0-1500 ppb	120-249 ppb 250-499 ppb 500-749 ppb 750-1500 ppb	240 120 60 30	<90 sec (Alarm @ 250 ppb with 500 ppb BF_3 gas)	1295-0225
Boron Trifluoride XP (BF_3)	1 ppm	0.12 ppm	0.1 ppm	1 ppm	2 ppm	0-10 ppm	0.12-0.99 ppm 1.0-10.0 ppm	45 30	<45 sec	1295-0507
Boron Trifluoride XP4 (BF_3)	1 ppm	0.12 ppm	0.10 ppm	1.0 ppm	2.0 ppm	0-10 ppm	0.12-0.90 ppm 1.0-10.0 ppm	45 30	<45 sec	1257-9310
Chlorine (Cl_2)	0.5 ppm	0.05 ppm	0.04 ppm	0.5 ppm	1 ppm	0-5 ppm	0.05-0.24 ppm 0.25-0.49 ppm 0.5-5 ppm	45 30 15	<25 sec	1295-0220
Chlorine XP (Cl_2)	0.5 ppm	0.05 ppm	0.05 ppm	0.5 ppm	1 ppm	0-5 ppm	0.05-0.24 ppm 0.25-5.0 ppm	45 30	<20 sec	1295-0227
Chlorine XP4 (Cl_2)	0.5 ppm	0.05 ppm	0.05 ppm	0.5 ppm	1 ppm	0-5 ppm	0.05-0.24 ppm 0.25-5.0 ppm	45 30	<20sec	1257-9308
Chlorine XP4 (Cl_2) Low Level	500 ppb	30 ppb	7 ppb	250 ppb	500 ppb	0-2000 ppb	30-199 ppb 200-499 ppb 500-2000 ppb	120 90 60	<30 sec	1257-9308

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Chlorine XP (Cl_2) Low Level	500 ppb	30 ppb	7 ppb	250 ppb	500 ppb	0-2000 ppb	30-199 ppb 200-499 ppb 500-2000 ppb	120 90 60	<30 sec	1295-0227
Chlorine Dioxide (ClO_2)	100 ppb	50 ppb	50 ppb[2]	100 ppb	200 ppb	0-1000 ppb	50-99 ppb 100-199 ppb 200-399 ppb 400-1000 ppb	300 240 120 60	<70 sec	1295-0220
Diborane (B_2H_6)	100 ppb	20 ppb	15 ppb	100 ppb	200 ppb	0-1000 ppb	20-99 ppb 100-199 ppb 200-299 ppb 300-1000 ppb	60 45 30 15	<40 sec	1295-0300
Diborane XP (B_2H_6)	100 ppb	15 ppb	10 ppb	100 ppb	200 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<40 sec	1295-0226
Diborane XP4 (B_2H_6)	100 ppb	15 ppb	10 ppb	100 ppb	200 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<40 sec	1257-9300
Dimethylamine (DMA)	5 ppm	0.4 ppm	0.3 ppm	5 ppm	10 ppm	0-30 ppm	0.4-2.4 ppm 2.5-4.9 ppm 5-30 ppm	120 60 30	<40 sec	1295-0221
Dimethylamine XP (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	5.0 ppm	10.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<20 sec	1295-0405
Dimethylamine XP4 (DMA)	5 ppm	0.5 ppm	0.5 ppm	5.0 ppm	10.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50 ppm	15 10	<20 sec	1257-9309

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Fluorine (F_2)	1 ppm	0.1 ppm	0.06 ppm	1 ppm	2 ppm	0-10 ppm	0.1-0.9 ppm 1-10 ppm	60 30	<40 sec	1295-0220
Germane XP (GeH_4)	200 ppb	100 ppb	100 ppb	200 ppb	400 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<252 sec	1295-0226
Germane XP4 (GeH_4)	200 ppb	100 ppb	100 ppb	200 ppb	400 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<252 sec	1257-9300
Hydrogen Bromide (HBr)	2 ppm	0.5 ppm	0.3 ppm	2 ppm	4 ppm	0-30 ppm	0.5-2.9 ppm 3-5.9 ppm 6-8.9 ppm 9-30 ppm	45 30 15 10	<35 sec	1295-0225
Hydrogen Bromide (HBr) Low Level	2 ppm	100 ppb	50 ppb	250 ppb	500 ppb	0-2000 ppb	100-249 ppb 250-499 ppb 500-749 ppm 750-2000 ppb	240 120 60 30	<40 sec	1295-0225
Hydrogen Bromide XP (HBr)	2 ppm	0.3 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<35 sec	1295-0507
Hydrogen Bromide XP4 (HBr)	2 ppm	0.3 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<35 sec	1257-9310
Hydrogen Bromide XP4 (HBr) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<75 sec (Alarm @ 500 ppb with 1000 ppb HBr gas)	1257-9310
Hydrogen Bromide XP (HBr) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<75 sec (Alarm @ 500 ppb with 1000 ppb HBr gas)	1295-0507

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Hydrogen Chloride (HCl)	2 ppm	0.5 ppm	0.5 ppm	2 ppm	4 ppm	0-15 ppm	0.5-9.9 ppm 10-19.9 ppm 20-50 ppm	30 20 15	<25 sec	1295-0225
Hydrogen Chloride (HCl) Low Level	2 ppm	100 ppb	80 ppb	250 ppb	500 ppb	0-8000 ppb	100-499 ppb 500-999 ppb 1000-2999 ppb 3000-8000 ppb	300 120 60 30	<30 sec	1295-0225
Hydrogen Chloride XP (HCl)	2 ppm	0.2 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.2-0.9 ppm 1-3.9 ppm 4-20 ppm	60 30 20	<25 sec	1295-0507
Hydrogen Chloride XP4 (HCl)	2 ppm	0.2 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.2-0.9 pm 1-3.9 ppm 4-20 ppm	60 30 20	<25 sec	1257-9310
Hydrogen Chloride XP4 (HCl) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<95 sec (Alarm @ 200 ppb with 400 ppb HCl gas)	1257-9310
Hydrogen Chloride XP (HCl) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<95 sec (Alarm @ 200 ppb with 400 ppb HCl gas)	1295-0507
Hydrogen Cyanide (HCN)	4.7 ppm	1 ppm	0.5 ppm	4.7 ppm	9.4 ppm	0-30 ppm	1-9.9 ppm 10-19.9 ppm 20-30 ppm	30 20 15	<25 sec	1295-0222
Hydrogen Fluoride (HF)	2 ppm	0.4 ppm	0.4 ppm	2 ppm	4 ppm	0-30 ppm	0.4-2.9 ppm 3-5.9 ppm 6-11.9 ppm 12-30 ppm	120 60 30 15	<45 sec	1295-0225
Hydrogen Fluoride XP (HF)	2 ppm	0.4 ppm	0.4 ppm	2 ppm	4 ppm	0-20 ppm	0.4-0.9 ppm 1-3.9 ppm 4-20 ppm	240 90 60	<50 sec	1295-0507

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Hydrogen Fluoride XP4 (HF)	2 ppm	0.4 ppm	0.4 ppm	2 ppm	4 ppm	0-20 ppm	0.4-0.9 ppm 1-3.9 ppm 4-20 ppm	240 90 60	<50 sec	1257-9310
Hydrogen Fluoride XP (HF) Low Level	500 ppb (ACGIH-TWA)	30 ppb	20 ppb	500 ppb	1000 ppb	0-2000 ppb*	30-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	360 240 120 90	<95 sec	1295-0507
Hydrogen Fluoride XP4 (HF) Low Level	500 ppb (ACGIH-TWA)	30 ppb	20 ppb	500 ppb	1000 ppb	0-2000 ppb*	30-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	360 240 120 90	<95 sec	1257-9310
***Due to U.S. Government regulations, this range may be subject to restrictions requiring special licensing for certain countries outside North America. Contact Honeywell Analytics for eligibility information.**										
Hydrogen Iodide (HI)	None Est.	0.2 ppm	0.1 ppm	3 ppm	6 ppm	0-25 ppm	0.2-1.4 ppm 1.5-25 ppm	240 60	<30 sec	1295-0225
Hydrogen Selenide (H_2Se)	50 ppb	8 ppb	6 ppb	50 ppb	100 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<55 sec	1295-0300
Hydrogen Selenide XP (H_2Se)	50 ppb	8 ppb	6 ppb	50 ppb	100 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<45 sec	1295-0226
Hydrogen Selenide XP4 (H_2Se)	50 ppb	8 ppb	6 ppb	50 ppb	100 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<45 sec	1257-9300
Hydrogen Sulfide (H_2S)	1 ppm	1 ppm	0.5 ppm	10 ppm	20 ppm	0-100 ppm	1-9.9 ppm 10-19.9 ppm 20-39.9 ppm 40-100 ppm	30 15 10 10	<20 sec (Alarm @ 10 ppm with 20 ppm H_2S gas)	1295-0223

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Hydrogen Sulfide (H_2S) (Hydrides)	1 ppm	2 ppm	1 ppm	10 ppm	20 ppm	0-50 ppm	2-9.9 ppm 10-19.9 ppm 20-39.9 ppm 40-50 ppm	60 45 30 15	<20 sec (Alarm @ 10 ppm with 20 ppm H_2S gas)	1295-0300
Hydrogen Sulfide (H_2S) Low Level	1 ppm	10 ppb	8 ppb	250 ppb	500 ppb	0-2000 ppb	10-99 ppb 100-499 ppb 500-999 ppb 1000-2000 ppb	480 240 120 60	<40 sec (Alarm @ 500 ppb with 1 ppm H_2S gas)	1295-0223
Hydrogen Sulfide XP (H_2S)	1 ppm	1 ppm	0.5 ppm	10 ppm	20 ppm	0-50 ppm	1-4.9 ppm 5-9.9 ppm 10-50 ppm	30 15 10	<20 sec (Alarm @ 10 ppm w/ 20 ppm H_2S gas)	1295-0226
Hydrogen Sulfide XP4 (H_2S)	1 ppm	1 ppm	0.5 ppm	10 ppm	20 ppm	0-50 ppm	1-4.9 ppm 5-9.9 ppm 10-50 ppm	30 15 10	<20 sec (Alarm @ 10 ppm with 20 ppm H_2S gas)	1257-9300
Hydrogen Sulfide XP (H_2S) Low Level	1 ppm	20 ppb	15 ppb	500 ppb	1000 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<25sec (Alarm @ 500 ppb with 1000 ppb H_2S gas)	1295-0226
Hydrogen Sulfide XP4 (H_2S) Low Level	1 ppm	20 ppb	15 ppb	500 ppb	1000 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<15sec (Alarm @ 500 ppb with 1000 ppb H_2S gas)	1257-9300
Nitrogen Dioxide (NO_2)	3 ppm	0.5 ppm	0.3 ppm	3 ppm	6 ppm	0-30 ppm	0.5-8.9 ppm 9-30 ppm	240 120	<130 sec	1295-0220
Nitrogen Trifluoride (NF_3) Pyrolyzer Only	10 ppm	1 ppm	1 ppm	10ppm	20 ppm	0-50 ppm	1-9.9 ppm 10-19.9 ppm 20-39.9 ppm 40-50 ppm	40 20 10 10	<70 sec	1295-0225

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Nitrogen Trifluoride XP (NF_3) Pyrolyzer Only	10 ppm	1 ppm	1 ppm	10 ppm	20 ppm	0-50 ppm	1-9.9 ppm 10-19.9 ppm 20-39.9 ppm 40-50 ppm	30 15 10 10	<20 sec	1295-0507
Nitrogen Trifluoride XP4 (NF_3) Pyrolyzer Only	10 ppm	1 ppm	1 ppm	10 ppm	20 ppm	0-50 ppm	1-9.9 ppm 10-19.9 ppm 20-39.9 ppm 40-50 ppm	30 15 10 10	<20 sec	1257-9310
Phosgene XP ($COCl_2$)	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-1000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-1000 ppb	60 45 30 15	<25 sec	1295-0228
Phosgene XP ($COCl_2$) High Range	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec	1295-0228
Phosgene XP4 ($COCl_2$)	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-1000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-1000 ppb	60 45 30 15	<25 sec	1257-9307
Phosgene XP4 ($COCl_2$) High Range	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec	1257-9307
Phosphine (PH_3)	300 ppb	5 ppb	5 ppb	300 ppb	600 ppb	0-3000 ppb	5-3000 ppb	15	<20 sec	1295-0300
Phosphine XP (PH_3)	300 ppb	5 ppb	5 ppb	300 ppb	600 ppb	0-3000 ppb	5-3000 ppb	15	<20 sec	1295-0226

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Phosphine XP4 (PH_3)	300 ppb	5 ppb	5 ppb	300 ppb	600 ppb	0-3000 ppb	5-3000 ppb	15	<20 sec	1257-9300
Silane (SiH_4)	5 ppm	1 ppm	0.5 ppm	5 ppm	10 ppm	0-50 ppm	1-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<35 sec	1295-0300
Silane XP (SiH_4)	5 ppm	0.5 ppm	0.3 ppm	5 ppm	10 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<30 sec	1295-0226
Silane XP (SiH_4) Low Level	5 ppm	50 ppb	50 ppb	250 ppb	500 ppb	0-5000 ppb	50-249 ppb 250-499 ppb 500-999 ppb 1000-5000 ppb	360 240 120 60	<100 sec (Alarm @ 500 ppb with 1 ppm SiH_4 gas)	1295-0226
Silane XP4 (SiH_4)	5 ppm	0.5ppm	0.3 ppm	5 ppm	10 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<30 sec	1257-9300
Silane XP4 (SiH_4) Low Level	5 ppm	50 ppb	50 ppb	250 ppb	500 ppb	0-5000 ppb	50-249 ppb 250-499 ppb 500-999 ppb 1000-5000 ppb	360 240 120 60	<100 sec (Alarm @500 ppb with 1000 ppb SiH_4 gas)	1257-9300
Silane-M XP (SiH_4-M)	5 ppm	0.06 ppm	0.05 ppm	2.5 ppm	5.0 ppm	0.05-15 ppm	0.05-2.49 ppm 2.5-4.99 ppm 5-9.99 ppm 10-15 ppm	180 60 45 30	<20 sec	1295-0226

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Silane-M XP4 (SiH_4-M)	5 ppm	0.06 ppm	0.05 ppm	2.5 ppm	5.0 ppm	0.05-15 ppm	0.05-2.49 ppm 2.5-4.99 ppm 5-9.99 ppm 10-15 ppm	180 60 45 30	<20 sec	1257-9300
Sulfur Dioxide (SO_2)	250 ppb	30 ppb	25 ppb	250 ppb	500 ppb	0-2500 ppb	30-249 ppb 250-2500 ppb	60 30	<30 sec	1295-0552
Tertiary Butyl Arsine (TBA)	0.5 mg/ m^3 as As (OSHA))	15 ppb	12 ppb	50 ppb	100 ppb	0-500 ppb	15-49 ppb 50-99 ppb 100-199 ppb 200-500 ppb	120 60 30 15	<42 sec	1295-0300
Tertiary Butyl Arsine XP (TBA)	0.5 mg/ m^3 as As (OSHA)	15 ppb	12 ppb	50 ppb	100 ppb	0-500 ppb	15-24 ppb 25-49 ppb 50-99 ppb 100-500 ppb	120 60 30 15	<45 sec (Alarm @ 50 ppb with 100 ppb TBA gas)	1295-0226
Tertiary Butyl Arsine XP4 (TBA)	0.5 mg/ m^3 as As (OSHA)	15 ppb	12 ppb	50 ppb	100 ppb	0-500 ppb	15-24 ppb 25-49 ppb 50-99 ppb 100-500 ppb	120 60 30 15	<45 sec (Alarm @ 50 ppb with 100 ppb TBA gas)	1257-9300
Tertiary Butyl Phosphine XP (TBP)	None Est	80 ppb	75 ppb	300 ppb	600 ppb	0-2000 ppb	80-149 ppb 150-299 ppb 300-599 ppb 600-2000 ppb	240 120 60 30	<70 sec (Alarm @300 ppb with 600 ppb TBP gas)	1295-0226
Tertiary Butyl Phosphine XP4 (TBP)	None Est.	80 ppb	75 ppb	300 ppb	600 ppb	0-2000 ppb	80-149 ppb 150-299 ppb 300-599 ppb 600-2000 ppb	240 120 60 30	<70 sec (Alarm @ 300 ppb with 600 ppb TBP gas)	1257-9300

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

Gas Name[1]	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1 TLV (Alarm @ 2 TLV Concentration 10-ft. Sample Line)	Chemcassette Part Number
Tetrakis Dimethylamino Titanium XP (TDMAT)	None Est.	0.1 ppm	0.1 ppm	1.0 ppm	2.0 ppm	0-10.0 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<20 sec	1295-0405
Tetrakis Dimethylamino Titanium XP4 (TDMAT)	Not Est.	0.1 ppm	0.1 ppm	1.0 ppm	2.0 ppm	0-10.0 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<20 sec	1257-9309

TLV - Threshold Limit Value **LAL - Lowest Alarm Level** **LDL - Lower Detectable Limit**

1. "-1" calibrations allow more stain development but will extend response times

2. Minimum Sample Time

A Replacement and Consumable Items

A.1 Consumables

A.1.1 Chemcassettes®

Aliphatic Amines NH3	1295-0221
Cl2-Iii Oxidizers	1295-0224
Fluorine	1295-0220
Hydrides	1295-0300
Hydrogen Cyanide	1295-0222
Hydrogen Sulfide	1295-0223
Mineral Acids	1295-0225
XP Chlorine (Extended Play)	1295-0227
XP Hydrides (Extended Play)	1295-0226
XP Phosgene (Extended Play)	1295-0228
XP Amines/Ammonia (Extended Play)	1295-0405
XP Mineral Acids (Extended Play)	1295-0507
XP4-V Chlorine	1257-9308
XP4-V Hydrides	1257-9300
XP4-V Phosgene	1257-9307
XP4-V Amines/Ammonia	1257-9309
XP4-V Mineral Acids	1257-9310

A.1.2 End of Line Particulate Sample Filters

See Appendix A Specifications.

For non-corrosive gases	780248
For corrosive gases	1830-0055
Replacement membrane, for corrosives (pk/100)	0235-1072
For corrosive gases	1991-0147

A.1.3 Analyzer Filters

Acid Scrubber Filter	710235
Particulate Filter	780248
Analyzer Internal Valve Filter Kit	1295K0366

A.1.4 Pyrolyzer Filters

Freon Filter (package of 4)	1874-0139

A.1.5 Rack Filters

Glass Fiber Filter (pump module)	0235-1186

A.2 Printed Circuit Boards

A.2.1 Pyrolyzers

AC Line Filter	1874A0248
Temperature Controller	1295A0466

A.2.2 All Analyzers

RFID PCB Assembly	1295A0412

A.2.3 Power Distribution Module

Connector PCB	1295A0420
Switch PCB	1295A0422

A.3 Components

A.3.1 All Analyzers

Proportional Valve	0235-1279
Closed Loop Optics Block Assembly (4 points)	1295A0607
Dual Optics Cover	1295-0218
Stepper Motor Assembly (tape advance)	1295A0095
Encoder Assembly	1295A0094
Encoder Brake Assembly	1295A0091
Chemcassette Sprocket	1874-0322
Tape Guide	1295-0026
Microtube Assembly (one point)	874272
2 Way N.C. Valve	874173
Aluminum Gate Actuator Kit	1874K0407
Gate Motor Assembly	1295A0096
0.015” Orifice Kit (8 pieces)	1290K0009
24VDC Fan Assembly	1295A0239
Ejector Solenoid	0100-2002

A.3.2 Pyrolyzers

Microtube Assembly (one point, for pyrolyzer Pts 1 - 4)	1295A0235
Microtube Assembly (one point, for pyrolyzer Pts 5 - 8)	1295A0236
Check Valve	0235-1157
Pyrolyzer Fan Assembly	1295A0238
Heater Kit (230 Volt, 2 required)	1295K0485

A.3.3 Rack Systems

0.250 x 0.190 x 1000ft FEP tubing	0235-0109
0.250 x 0.156 x 400ft FEP tubing	0235-0157
0.500 x 0.375 x 50ft	
Polyethylene tubing	102642
Fan, 24VDC	0220-0023
Ethernet Switch (may be different than the one installed in the unit)	0185-0086
LCD Display w/Touch Screen	Call Service
PLC Power Supply	0185-0048
PLC Processor Module	0185-0049
PLC 8 Position Relay Module (Isolated)	0185-0090
PLC 16 Position Relay Module (Non-Isolated)	0185-0053
DH485/RS232 Interface Module	0185-0050
DH485 Link Coupler	0185-0052
Advanced Interface Converter	0185-0051
All other PLC Cards	Call Service
Sample Inlet 1/4” Tube Fitting	1295-0352
Pyrolyzer Isolation Transformer	1290A0027
Sample Inlet 1/4” Tube Fitting	1295-0427
2U i3 Computer System	Call Service
Replacement Hard Disk Drive (SATA)	0185-0107

A.3.3.1 Power Distribution Module

Power Distribution Module (complete)	1295A0413
Hot Swappable 24VDC Power Supply	0060-0020

A.3.4 Pump Modules

Pump Assy, 220/230VAC	1290A0059
Pump Assy, 110VAC	1290A0058
Pump Rebuild Kit	0235-0236
Pump Stem and O-Ring	0235-1212
Neoprene Isolation Mount	0950-1061
Thermal Switch (170F)	0170-0082
Fan, 24VDC	0220-0023
Differential Pressure Switch	0050-0039

A Optional Relay Specifications

A.1 Relay Output Contacts

Relay output contacts: via PLC, normally open (form A). Available in 32 and 64 contacts, both are user configurable.

A.2 Relay Contact Ratings

- 0.1 to 2.0 Amps
- 5-24 VDC or
- 5-120 VAC

The alarm relay has a minimum load requirement of greater than 5 volts and 10 mA. For reliable relay operation, ensure the alarm circuit meets these requirements.

Maximum Volts		Amperes[1]		Amperes Continuous[2]	Volt-Amperes	
		Make	Break		Make	Break
AC	240 VAC	7.5A	0.75A	25A	1800VA	180VA
	120 VAC	15A	1.5A			
DC	125 VDC	0.22A3		1.0A	28VA	
	24 VDC	1.2A3		2.0A		
AC	240 VAC	15A	1.5A	50A	3600VA	360VA
	120 VAC	30A	3.0A			
DC	125 VDC	0.22A3		1.0A	28VA	
	24 VDC	1.2A3		2.0A		

(1) Connecting surge suppressors across your external load will extend the life of SLC 500 relay contacts. For recommended surge suppressor when switching AC inductive loads, consult the SLC 500 Modular Hardware Style Installation and Operation User Manual (Publication 1747-6.2) or the SLC 500 Fixed Hardware Style Installation and Operation User Manual (Publication 1747-6.2.1). Recommended surge suppression for switching 24 VDC inductive loads is a 1N4004 diode reverse wired across the load.

(2) The continuous current per module must be limited so the module power does not exceed 1440 VA.

(3) For DC voltage applications, the make/break ampere rating for relay contacts can be determined by dividing the 28 VA by the applied DC voltage. For example, 28 VA / 48 VDC = 0.58A. For DC voltage applications less than 14V, the make/break ratings for relay contacts cannot exceed 2A. RTB = Removable Terminal Block.

Table A-1. Relay Contact Ratings for 1746-OW16

For more information see Allen-Bradley publication 1746-2.35. This can be found at: http://literature.rockwellautomation.com/idc/groups/literature/documents/td/1746-td006_-en-p.pdf.

A.3 Default Relay Assignments

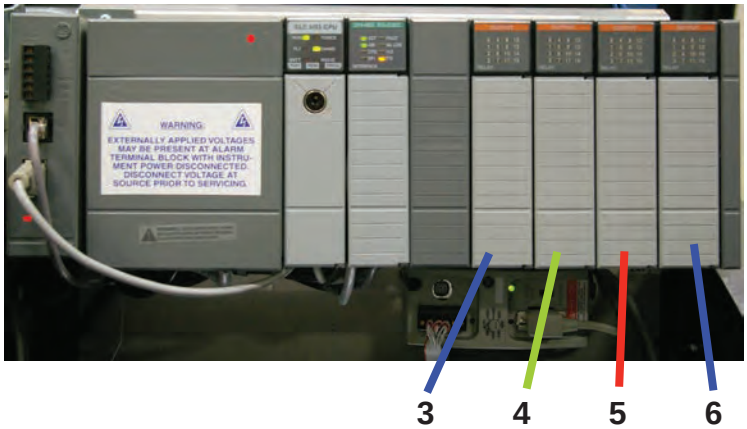
Note:

User is required to setup the relay configuration. The default settings do not include any faults or alarm levels.

A.3.1 Introduction

By default, the Vertex M reserves the first 2 contacts for faults. You may associate any remaining relay contacts with points in any analyzer. See Section 3.6.3 Set Analyzer Window for procedures to associate relay contacts with alarms.

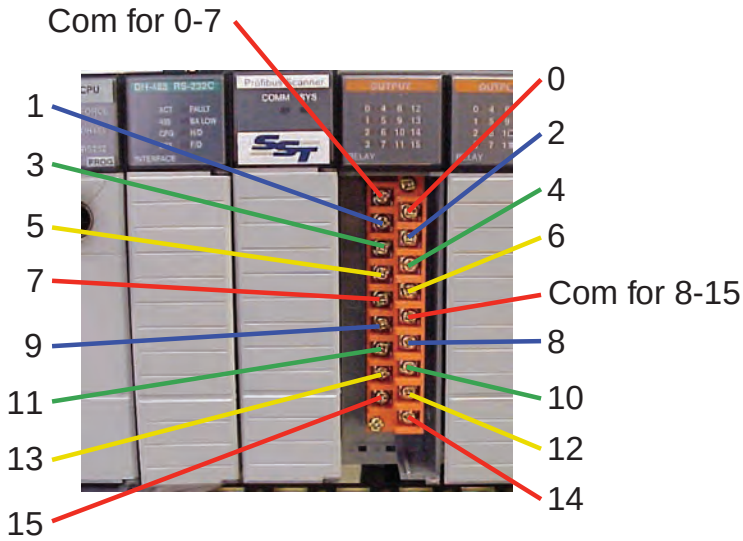
A.3.2 Main PLC



A.3.3 Terminal Assignment of 1746-OW16 Relay Module

Option Part Number: 1290-0076

Individual Relay Card Part Number: 0185-0053



A.3.4 Terminal Assignment of 1746-OX8 Relay Module

Option Part Number: 1290-0077

Individual Relay Card Part Number: 0185-0090

A Network Interface and Options

A.1 Network Interface and Options

Network interface options currently available on Vertex M are:

Standard:

- OLE for Process Control (OPC) Interface. See Section A.2 OLE for Process Control (OPC) Interface.

Options:

The Vertex M can be fitted with any one of six optional fieldbus interfaces as summarized in Table F-1.

Table A-1. Vertex M Fieldbus Options

Protocol Name	Honeywell Analytics part number	Section
Profibus - DP	1295-0275	F5
DeviceNet	1295-0329	F6
ControlNet	1295-0394*	F7
DF1	1295-0343	F8
ModBus Plus	1295-0330	F9
LonWorks	1295-0328	F10
Modbus/TCP	1295-0520	F11
Ethernet/CIP	1295-0519	F12

* Part Number obsolete

CAUTION

Do not install routers between the optional PLC fieldbus networks and the internet. These networks are not designed to resist cyberattack so their cabling must have rigorous physical isolation from malicious traffic.

Optional Remote Display Software.

The Vertex M can be ordered with an optional remote display capability as described in Section A.13 Vertex M Remote Display Setup

A.2 OLE for Process Control (OPC) Interface

The primary method of alarm and fault annunciation used by the Vertex M Gas analyzer relies on the Allen Bradley SLC500 PLC system installed in the base enclosure using optional fieldbusses or contact closure.

A secondary method for annunciation and data access is available via the Ethernet network port on the Vertex M Data Acquisition System using OPC. Concentration data as well as alarm and fault status are available through this interface. The OPC drivers are automatically initialized at startup of the application, enabling the Vertex M to act as an OPC Server. The user may connect to the Network interface Cards RJ45 Port at the rear of the data Acquisition System See Section 1.2.7 Data Acquisition Computer (rear).

The Vertex M contains 1331 OPC tags as listed in Table A-3. Tag Names. Many of these are present for historical reasons and have low utility for an external HMI system. The column “recommended for most HMI systems” is provided to help separate the useful from the obscure. The number of recommended tags is 317.

CAUTION

OPC via Ethernet is not recommended for the primary safety system notification.

CAUTION

Tunnel OPC communication outside the Vertex M rack using secure software such as KepWare OPC Connectivity Suite or Matrikon OPC Tunneller. OPC communication among Microsoft Windows computers is not highly resistant to cyberattack.

A.2.1 Setting Up an OPC Client Application

To request data from Vertex M your OPC Client application will need to include the following information. More information on OPC and client application is available at www.opcfoundation.org.

Table A-2. Additional OPC Client information

Server	Honeywell.VertexOPCServerDA.1
Type	Local
Server Computer Name or Address	Enter the Computer Name of the Vertex M Data acquisition PC from Settings, Control Panel, System, Network Identification. Typically: Vertex M_291-####, with the # being the 4 digit serial number.
Access Path	Project name. You can leave this blank. If you do specify a name, use the name of the open project.
Update Rate	A period in seconds.
Item	Tag name. Whether to specify an item depends on the client application.

Table A-3. Tag Names

Folder	Tag Count	Recommended for most HMI systems	Tag Name Format	Value Interpretation / Description
Alarm	72		##_1	Integer, 1 byte long Status 0 = No alarm 1 = Warning 2 = Alarm 1 3 = Alarm 2 Always nonlatching
AlarmLatched	72	Y	Ch##	Integer, 1 byte long Status 0 = No alarm 1 = Warning 2 = Alarm 1 3 = Alarm 2 Latching if and only if rack configured for latching alarms as described in Section 3.7.
CommStatus	9		CmmFlag#	String, “N/A” (unconfigured) , “NO” (not communicating) or “YES” (correct)
Diagnostics	9		Az#CCDaysLeft	Float32, Equivalent to “Chemcassette Tape Left” as displayed in Diagnostic / Analyzer Info
PyroTemp	72		##	Float32 Equivalent to “Pyrolyzer Temperature” as displayed in Diagnostics / Analyzer Info
Fault				

Table F-3. Tag Names (continued)

Folder	Tag Count	Recommended for most HMI systems	Tag Name Format	Value Interpretation / Description
LFault	72		Pt##	String containing the fault number and long fault description for the most recent Pt fault. The contents of this item, the corresponding short description item and the corresponding timestamp will be based on the following priority: 1) Most severe point-specific fault 2) If no point-specific fault, the most severe analyzer fault 3) If no fault, a blank string
	9		Az#	String containing the fault number and long fault description for the most recent analyzer fault. The contents of this item, the corresponding short description item, the corresponding timestamp item will be based on the following priority: 1) Most severe analyzer fault 2) Most severe simulated fault 3) If no fault, a blank string
	1		HMI	String containing the fault number and fault description for the most recent HMI fault. The contents of this item, the corresponding short description item and the corresponding timestamp item will be based on the following priority: 1) Most severe HMI fault 2) If no fault, a blank string
	1		PLC	String containing the fault number and long fault description for the most recent PLC fault. The contents of this item, the corresponding short description item and the corresponding timestamp item will be based on the following priority: 1 = Most severe PLC fault 2 = If no fault, a blank string
SFault	72		Pt##	String with short description of fault associated with Fault\LFault\Pt##
	9		Az#	String with short description of fault associated with Fault\LFault\Az#
	1		HMI	String with short description of fault associated with Fault\LFault\HMI
	1		PLC	String with short description of fault associated with Fault\Lfault\PLC
TimeStamp	72		Pt##	String representation of timestamp of fault creation associated with Fault\LFault\Pt##.
	9		Az#	String representation of timestamp of fault creation associated with Fault\LFault\Az#.
	1		HMI	String representation of timestamp of fault creation associated with Fault\LFault\HMI
	1		PLC	String representation of timestamp of fault creation associated with Fault\LFault\PLC

Table F-3. Tag Names (continued)

Folder	Tag Count	Recommended for most HMI systems	Tag Name Format	Value Interpretation / Description
Flow Control				
DtoA	72		##	For HA internal use only
Flow	72		##	Integer sample point flow in cc/minute
Pressure	72		##	Float32, point sample pressure in inches Hg, (usually approx. -1.0)
Slope	72		##	Float32 for HA internal use only
System	9		#	Float32, vacuum pump pressure in inches Hg, as measured by each analyzer (usually -13.0)
	9		Az#	String in form “Az x-y”
	72		Pt##Flow10	Float32 for HA internal use only
	72		Pt##Flow90	Float32 for HA internal use only
GasCon	72	Y	##1	Float32; Gas concentration in ppm, ppb, mg/m3 as configured.
Main	0			
Ana_Fault	9	Y	#	Unsigned integer Status 0 = No fault 1 = Maintenance Fault 2 = Instrument Fault 3 = Both Reports only analyzer-wide faults. Does not indicate the presence of a point-specifc fault
PLC	9	Y	#	Unsigned integer Status 0 = No fault 1 = Maintenance Fault 2 = Instrument Fault 3 = Both Reports faults from either analyzer or point

Table F-3. Tag Names (continued)

Folder	Tag Count	Recommended for most HMI systems	Tag Name Format	Value Interpretation / Description
Fault	72	Y	##	Unsigned integer Status 0 = No fault 1 = Maintenance Fault 2 = Instrument Fault 3 = Both Reports only point-specific faults
	1	Y	HMI	Unsigned integer Status 0 = No fault 1 = Maintenance Fault 2 = Instrument Fault 3 = Both Reports only faults originating in the HMI
	1	Y	PLC	Unsigned integer, Indicates the presence of a fault for the PLC Status 0 = No fault 1 = Maintenance Fault 2 = Instrument Fault 3 = Both Indicates the presence of a fault originating in the PLC.
MonStat	72	Y	##	Integer, 1 byte long, interpreted as a bitmask. This reports status for point as listed below: bits 0-2 - run alarm disable status as a 3-bit integer 0 = no data 1 = Point enabled 2 = RunTimeAlarmDisable Relays only 3 = RunTimeAlarmDisable Full (No gas events) 4 = RunTimePointDisable 5 = Point disabled by configuration bits 3-4 - for HA use only bit 5 -- maintenance fault exists bit 6 -- monitor fault exists bit 7 -- for HA use only

Table F-3. Tag Names (continued)

Folder	Tag Count	Recommended for most HMI systems	Tag Name Format	Value Interpretation / Description
Maintenance	0			
CFilter	9		Az#FiltDaysLeft	Integer, number of days until filters should be changed, equivalent to "Filter Left" as displayed in Diagnostics/Anlyzer Info.
Reset	0			
Monitor	9	Y	Az#	Integer monitoring state for entire analyzer , see table below 0 = Idle 1 = Pyrolyzer Warmup 2 = Monitoring 3 = Loading Chemcassette 4 = Loading new program 5 = Loading new configuration 6 = Flow auto-balance 7 = Performing Line Integrity Test
SGas_Name	72		##_1	String gas name abbreviation, e.g. "AsH3"
Unit	72		##_1	String, either "ppm" "ppb" or "mg/m3"

Note:

The Vertex M uses the same OPC server as the Vertex. Thus numerous OPC tags exist for non-existent analyzers. Tags for points greater than 24 or analyzers greater than 3 are not populated and invalid.

A.3 Data Values Common to Fieldbus Networks

All six optional fieldbus networks report alarm, fault and concentration information.

A.3.1 Alarms and Faults

The alarm status of each point is reported as a single byte. The meaning of that byte is as listed in Table A-4. Similarly, the fault status of each analyzer is reported as a single byte. The meaning of the fault byte is listed in Table A-4.

Table A-4. Alarm and Fault Interpretations

Alarm/ Fault value	LonWorks SNVT_lev_ disc value	Alarm Interpretation	Fault Interpretation
0	ST_OFF	No Gas	No Fault
1	ST_LOW	Warning of non-zero concentration below Alarm Level 1	Maintenance Fault Present
2	ST_MED	Alarm Level 1 Exceeded	Instrument Fault Present
3	ST_HIGH	Alarm Level 2 Exceeded	Both Faults Present

A.3.2 Concentrations

Finally, the concentration information is reported as one 16-bit word for each point as shown in Table A-5.

Table A-5. Interpretation of Concentration Values

Value	Description
0	Analyzer not present
3120	Instrument Fault exists (only if configured)
6241 to 31206	Normalized concentration from zero to the 20 mA full scale value as set in the point configuration.

Fault status can be superimposed over the concentration information in a manner similar to legacy 4-20 mA analog outputs. The output will drop below nominal if an instrument fault exists. However, indication of faults via the concentration output is disabled by default. It can be turned on in the configuration profile as shown in Figure A-1. For details see Section 3.6 Configuration Utility.

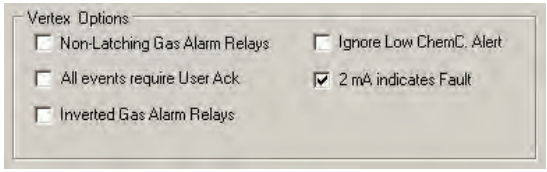


Figure A-1. Configuration Profile

If the concentration is non-zero and a fault exists, the concentration value will take priority and be reported. It is not possible to detect the existence of maintenance faults from the concentration outputs.

Unlike previous Honeywell Analytics products, the full-scale value of the concentration output is not equal to the full scale value of the gas table by default. Instead the full scale (31206 count) level defaults to twice the threshold limit value (TLV). Therefore an output of 12482 counts corresponds to a gas concentration of 0.5 TLV and 18723 counts corresponds to 1.0 TLV by default. This can be altered by editing the configuration profile as shown in Figure A-2.

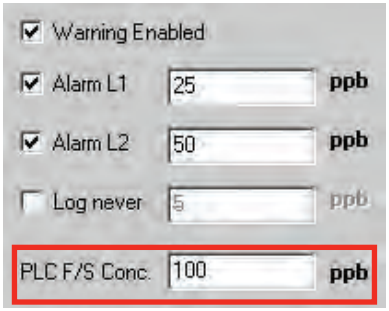


Figure A-2. Configuration Profile

For more information on the configuration profile see Section 3.6.4 Configure Point.

If the concentration data is to be used only for visualization and datalogging, it may be more convenient to capture this information through OPC. See Section A.2 OLE for Process Control (OPC) Interface. This avoids the requirement of scaling the value to get actual concentration. The concentration is available through the highly-reliable fieldbus for those customers who wish to make shutdown decisions based on concentrations instead of alarm levels.

A.3.3 Heartbeat

A heartbeat counter is provided with some of the fieldbusses in word 40. This increments every second to confirm that the internal PLC is running and that communications is working. External equipment communicating with the Vertex M via Ethernet/CIP, LonWorks or Profibus must verify that this value is changing to be certain that the PLC is operating.

Each optional fieldbus interface is implemented using commercial communications modules connected to the internal PLC. In the Vertex M the modules function as slaves only, although the hardware may be capable of acting as scanners or masters when installed elsewhere.

A.4 Data Map

Five of the optional fieldbusses (all except LonWorks) report the status of the Vertex M in the same 122 word (244 byte) format which is listed in Table F-5. If concentration information is not needed, only the first 41 words must be read. This significantly reduces the consumption of scanner memory. For Ethernet/CIP, see Table A-10.

Table A-6. Fieldbus Data Addresses (Except LonWorks)

Word Address	Hi Byte	Lo Byte
0	Pt 1-1-1 Alm	Pt 1-1-2 Alm
1	Pt 1-1-3 Alm	Pt 1-1-4 Alm
2	Pt 1-1-5 Alm	Pt 1-1-6 Alm
3	Pt 1-1-7 Alm	Pt 1-1-8 Alm
4	Pt 1-2-1 Alm	Pt 1-2-2 Alm
5	Pt 1-2-3 Alm	Pt 1-2-4 Alm
6	Pt 1-2-5 Alm	Pt 1-2-6 Alm
7	Pt 1-2-7 Alm	Pt 1-2-8 Alm
8	Pt 1-3-1 Alm	Pt 1-3-2 Alm
9	Pt 1-3-3 Alm	Pt 1-3-4 Alm
10	Pt 1-3-5 Alm	Pt 1-3-6 Alm
11	Pt 1-3-7 Alm	Pt 1-3-8 Alm
36	Az 1-1 Flt	Az 1-2 Flt
37	Az 1-3 Flt	

Table F-6. Fieldbus Data Addresses (Except LonWorks) continued

Word	Address
41	undefined
42	undefined
43	undefined
44	undefined
45	undefined
46	undefined
47	undefined
48	undefined
49	undefined
50	Pt 1-1-1 Conc
51	Pt 1-1-2 Conc
52	Pt 1-1-3 Conc
53	Pt 1-1-4 Conc
54	Pt 1-1-5 Conc
55	Pt 1-1-6 Conc
56	Pt 1-1-7 Conc

Word	Address
57	Pt 1-1-8 Conc
58	Pt 1-2-1 Conc
59	Pt 1-2-2 Conc
60	Pt 1-2-3 Conc
61	Pt 1-2-4 Conc
62	Pt 1-2-5 Conc
63	Pt 1-2-6 Conc
64	Pt 1-2-7 Conc
65	Pt 1-2-8 Conc
66	Pt 1-3-1 Conc
67	Pt 1-3-2 Conc
68	Pt 1-3-3 Conc
69	Pt 1-3-4 Conc
70	Pt 1-3-5 Conc
71	Pt 1-3-6 Conc
72	Pt 1-3-7 Conc
73	Pt 1-3-8 Conc

A.5 Profibus Option (P/N 1295-275)

Profibus is a vendor-independent, open fieldbus standard for a wide range of applications in manufacturing and process automation. Vendor independence and openness are ensured by the international standards EN 50170, EN 50254 and IEC 61158. Profibus allows communication between devices of different manufacturers without any special interface adjustment. Profibus can be used for both high-speed time critical applications and complex communication tasks. Use of special Profibus media is required.

For more information about Profibus, see www.profibus.com. Technical information on the Woodhead Connectivity / SST model

SST-PFB-SLC module which is used in the Vertex M is available from http://www.woodhead.com/products/automation/networkinterface/PLCBackplaneModules/.

The data map used by the Profibus interface is shown in Table A-5. The interpretation of the data is in Table A-3 and Table A-4. The network management tool will need a .GSE file to describe every slave on the network. The vertex.gse file can be copied from any Vertex M at c:\hmi\Profibus\vertex.gse.

A.5.1 Termination

The Profibus adapter PCB assembly shown in Figure F-3 facilitates using standard large Profibus connectors without creating mechanical interferences with the back panel of the Vertex M rack. Additionally, this functions as a Profibus terminator if JP1 through JP3 are shorted. If termination is not desired then JP1 through JP3 should be cut as shown. This is Honeywell Analytics part number 1295A0372.

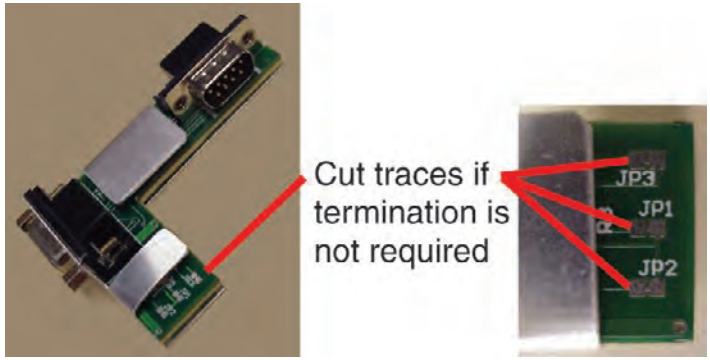


Figure A-3. Profibus Adapter PCB Assembly

A.5.2 Profibus Module Configuration

The Profibus interface is shipped from the factory with the address set to 3, the speed set to 19200 baud, and the memory length set to 122 words.

The memory length to can be reduced to 41 words if only alarms and fault are needed. Changing any of these parameters requires Procedure 1.

Table A-7. Procedure 1—Changing Profibus Configuration

F1.1.	Obtain a computer with free RS232 serial port.
F1.2.	Start a terminal emulator program such as HyperTerminal
F1.3.	Configure the terminal emulator for 38400,N,8,1
F1.4.	Connect the provided DB9 cable from the selected port on the computer to the top DB9 connector on the Profibus card.
F1.5.	Take the SLC 5/03 PLC CPU out of run mode by turning the key briefly to “PROG” then back to “REM”. Verify that the RUN light is off. The Profibus card will not enter terminal mode if the PLC is running.
F1.6.	Type asterisk (“ * “) up to 20 times until the following message is displayed: Profibus Module (DP, FDL)
F1.7.	Type “locstn xx” where xx is the desired Profibus address.
F1.8.	Type “baud yyy” where yyy is the desired baud rate from the set {9k6,19k2,93k75,187k5,500 k,750k,1m5,3m,6m or 12m}.
F1.9.	Type “shownet” and verify that the communications parameters are as desired.
F1.10.	Type “slvtxlen 0 0 zzz” where zzz is the desired memory size in words, usually 41 or 122.
F1.11.	Type “showslv” and verify that the communication parameters are as desired
F1.12.	If additional information is desired type “help” and follow the instructions.
F1.13.	Type “exit” to save the changes
F1.14.	Put the SLC 5/03 PLC CPU into run mode by turning the key briefly to “RUN” then back to “REM”. Verify that the RUN light stays on.

A.6 DeviceNet Interface (P/N 1295-0329)

The DeviceNet network is a low-level network that provides connections between simple industrial devices and higher-level devices (such as PLC controllers and computers). DeviceNet network uses a combination of taps and shielded, twisted pair media for device connection.

For more information about DeviceNet, see www.odva.org.

Furthermore, the Allen Bradley DeviceNet Cable System Planning and Installation Manual is useful.

This can be downloaded from http://literature.rockwellautomation.com/idc/groups/literature/documents/um/dnet-um072_-en-p.pdf.

Technical Information on the Allen-Bradley 1747-SDN DeviceNet interface which is used in the Vertex M is available at http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse_category.hcst.

The data map used by the DeviceNet interface is shown in Table A-5. The interpretation of the data is in Table A-3 and Table A-4.

Successful commissioning of a DeviceNet Networks requires the use of a network management tool.

Such a tool can be constructed using a PC, an interface card and RSNetWorx or similar software. Use of special DeviceNet media is required. DeviceNet requires that each network segment include a power supply.

A.7 ControlNet Interface

ControlNet a real-time, control-layer network providing for high-speed transport of both time-critical I/O data and messaging data, including upload/download of programming and configuration data and peer-to-peer messaging, on a single physical media link. Deterministic and repeatable, ControlNet offers high-speed, media redundancy and intrinsically safe options.

For more information about ControlNet, see www.controlnet.org. Technical Information on the Allen-Bradley 1747-SCNR ControlNet interface which is used in the Vertex M is available at http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse_category.hcst.

The data map used by the ControlNet interface is shown in Table A-5. The interpretation of the data is in Table A-3 and Table A-4.

Successful commissioning of a ControlNet Networks requires the use of a network management tool. Such a tool can be constructed using a PC, an interface card and RSNetWorx or similar software.

A.8 DF1 Interface (P/N1295-0343)

This module emulates the DF1 slave functionality of an Allen-Bradley SLC 5/03 DF1 port. It responds to queries for data from the N14 integer file by sending alarm, fault, and concentration data.

The DF1 protocol is defined by the Allen-Bradley DF1 Protocol and Command Set Reference Manual which can be downloaded from http://literature.rockwellautomation.com/idc/groups/literature/documents/rm/1770-rm516_-en-p.pdf.

Technical information on the ProSoft Technology MVI46-DFCM interface which is used in the Vertex M can be found at http://www.prosoft-technology.com.

The baud rate and address of the DF1 interface are set using the configuration profile utility as described in See Section 3.6 Configuration Utility. Supported speeds range from 1200 to 57,600 baud with a default of 19,200. The DF1 address can be set from 2 to 127.

The data map used by the DF1 interface is shown in Table A-5. This appears as the N14 file. The interpretation of the data is in Table A-3 and Table A-4.

DF1 connection is made to middle RJ45 socket

Figure A-4. DF1 Connection to RJ45 Socket

The pinout of the DF1 port is as follows:

Table A-8. Pinout of DF1 Port

RJ45 Pin	DB-9 Pin	RS-232 mode pin function	RS-422 mode pin function	RS-485 mode pin function
1	1		TxD+	TxD/RxD+
2	2	RxD	RxD+	
3	3	TxD		
4	4			
5	5	GND	GND	GND
6	6		RxD-	
7	7	RTS		
8	8	CTS	TxD-	TxD/RxD-
	9			

A.9 Modbus Plus Interface (P/N 1295-0330)

For more information on Modbus Plus, see http://eclipse.modicon.com. Technical information on the ProSoft Technology MVI46-MBP interface which is used in the Vertex M can be found at http://www.prosoft-technology.com.

The address of the Modbus Plus interface are set using the configuration profile utility as described in See Section 3.6 Configuration Utility. Valid address values are from 1 to 64.

The ProSoft website contains the MVI46s-MBP User Manual. Of particular interest in this manual are the general specifications on page 9 (in the pdf document) and the status LED interpretations on page 58 (in the pdf document).

Always wait for 20 seconds after energizing the PLC or changing the address before evaluating the LEDs.

The data map used by the Modbus Plus interface is shown in Table A-5. The interpretation of the data is in Table A-3 and Table A-4.

A.10 LonWorks Interface (P/N 1295-0329)

The LonWorks protocol permits peer-to-peer communication without relying on a central controller. Routers permit expansion of networks to include thousands of nodes. For more information about LonWorks see http://www.echelon.com or www.engenuity.com.

The LonWorks interface is implemented using a FieldServer Technologies model FS-B2011 bridge and other components. This is a purple box mounted below the PLC in the rear of the Vertex M rack. The interface can be operated in either Polled Mode or Bind Mode. A service pin is provided for node identification. LED indicators are provided for Power, Run, System Error, and Configuration Error. Media type is FTT-10 twisted pair. Information on the FS-B2011 may be obtained from http://www.fieldserver.com.

The LonWorks external interface has 154 network variable outputs as listed in Table A-8. The interpretation of the data is in Table A-3 and Table A-4.

Table A-9. LonWorks Network Variable Outputs

Function	Names			Type	Number
Alarms	nvoAlm_1_1_1	to	nvoAlm_3_3_8	SNVT_lev_disc	72
Faults	nvoFlt_1_1	to	nvoFlt_3_3	SNVT_lev_disc	9
Concentrations	nvoConc_1_1_1	to	nvoConc_3_3_8	SNVT_count	72
Heartbeat	nvoHeartbeat			SNVT_count	1

A.11 Modbus/TCP (P/N1295-0520)

Modbus/TCP provides the highly reliable communications like the other fieldbusses over fast, economical Ethernet media. This interface uses ProSoft-Technology MVI46-MNET hardware. In the Vertex M, this interface is always a TCP server, never a client. For more information see www.prosoft-technology.com and www.modbus.org.

The 122 words of status information listed in Table A-5 are mapped as Modbus holding registers 40001 to 40122.

A.11.1 Configuring the IP Address

The following resources are needed to needed to set the IP address of the Vertex M.

1. An external personal computer with Microsoft Windows 2000 or later operating system and an unused serial port.
2. The debugging cable shown in Figure A-5.
3. The file “WATTCP.CFG”. This may be supplied on a floppy disk or may be loaded in “C:\hmi\FieldbusFiles”

Figure A-5. Debugging Cable

Figure A-6. Connector Locations

Figure A-7. HyperTerminal Setup for Diagnostic Port

```
# WATTCP.CFG file for ProSoft Technology MVI46.DFNT
# 05/25/2005 MJG -- modify for Zellweger Analytics, Inc.
my_ip=10.1.162.99
netmask=255.255.255.0
gateway=10.1.162.1
```

Figure A-8. WATTCP.CFG File

This procedure is used to set the IP Address

Procedure 1

1. Determine the desired IP address, subnet mask, and default gateway. Usually a network administrator will assign these numbers. Note that the MVI46-MNET will not function as a client for the DHCP protocol.
2. Modify the WATTCP.CFG file for the correct Internet parameters using a suitable editor such as Notepad. The default file is shown in Figure F-7.
3. Connect the debugging cable from the external PC to the “DEBUG” port on the MVI-46 as shown in Figure F-6.
4. Start HyperTerminal and configure for 57600 baud.
5. Type “?” in HyperTerminal.
6. Verify that the menu to appears as shown in Figure F-6.
7. Type “M@?”.
8. Verify that HyperTerminal displays:

   NETWORK MENU

   ?=Display Menu

   R=Receive WATTCP.CFG

   S=Send WATTCP.CFG

   V=View WATTCP.CFG

   M=Main Menu
9. Type “RY”
10. On the HyperTerminal menu bar, click on <Transfer>/<Send>.
11. Click on <Browse> and navigate to the location of “WATTCP.CFG” in the PC.

12. Click on <Open> and then <Send>.

Note:

An error will occur if the user takes more that 50 seconds to perform this step. If an error occurs, repeat this procedure.

13. Verify that HyperTerminal displays:

    FILE TRANSFERRED FROM PC UNIT....THE MODULE MUST RESTART…

14. Cycle power to the PLC.

15. The WATTCP.CFG file may be conveniently viewed with the "V" command.

    A 10/100BaseT Ethernet network cable may now be connected to the top RJ45 jack.

Notes

1. Honeywell strongly recommends that any gas detection network which is connected to the Internet be protected from unauthorized access by a firewall.

2. Honeywell recommends that a gas detection Ethernet network be separated from a general-purpose computer networks by a switch. This is because the transmission time of Ethernet networks is non-deterministic and can become large if the network is heavily loaded.

3. When the interface is correctly installed in the PLC backplane the "BP ACT" light will glow steady amber. The "OK" light will glow steady green.

4. The "LINK" indicator will glow steady green when a valid physical-layer connection is established to an Ethernet switch.

5. An external computer can confirm that the interface is set to the correct IP address by use of the "ping" command.

6. The MVI46-MNET contains a second configuration file named "MNET.CFG". If the module was purchased from Honeywell, this file will be preloaded. Otherwise, the file provided in "C:\hmi\FieldbusFiles" must be loaded.

7. The 122 words of Vertex M status which are listed in Table F-5 may be viewed on the diagnostic port. These are mapped as registers 0 to 121 in the ProSoft database. Instructions on viewing the ProSoft database are in Chapter 6 of the ProSoft User Manual.

8. PC-based software for communicating with the MVI46-MNET and other Modbus/TCP devices may be purchased from Witte Software at www.modbustools.com.

A.12 Ethernet/CIP (P/N1295-0519)

EtherNet/CIP provides the highly reliable communications like the other fieldbusses over fast, economical Ethernet media. This interface uses ProSoft-Technology MVI46-DFNT hardware. In the Vertex M this interface is always a server, never a client. For more information see www.prosoft-technology.com and www.controlnet.org.

This interface provides 122 words of status information as listed in Table A-9. The presentation of this data varies depending on the type of client used. Examples of this presentation are included at the top of page 18 in the ProSoft User Manual and also in Table A-9.

WARNING

It is essential that Ethernet/CIP clients which communicate with the Vertex M monitor the "Heartbeat" byte in word 40. This is because the MVI46-DFNT will continue to communicate if the Vertex M PLC ceases to run. External automation equipment must be programmed to treat a failure of the heartbeat to increment as a complete loss of gas detection.

Table A-10. Data Presentation in Various PLCs

Database Address	Vertex M Meaning	PLC2 Address	PLC5 or SLC Address	ControlLogix		
				PCC	CIP Byte	CIP Integer
0 to 35	point alarm status	0 to 35	N10:0 to N10:35	N10:0 to N10:35	SintData[0] to SintData[71]	Int_Data[0] to Int_Data[35]
36 to 40	analyzer fault status	36 to 40	N10:36 to N10:40	N10:36 to N10:40	SintData[72] to SintData[80]	Int_Data[36] to Int_Data[40]
	heartbeat				SintData[81]	
41 to 49	undefined	41 to 49	N10:41 to N10:49	N10:41 to N10:49	SintData[82] to SintData[99]	Int_Data[41] to Int_Data[49]
50 to 121	point gas concentration	50 to 121	N10:50 to N10:121	N10:50 to N10:121	SintData[100] to SintData[243]	Int_Data[50] to Int_Data[121]
122 to 3999	undefined	122 to 3999	N10:122 to N13:999	N10:122 to N13:999	SintData[244] to SintData[7999]	Int_Data[122] to Int_Data[3999]

A.12.1 Configuring the IP Address

The IP address of this interface is set using a procedure similar to that listed in Section F.11. The file "WATTCP.CFG" is modified with Notepad and downloaded with HyperTerminal.

Notes

1. Honeywell strongly recommends that any gas detection network which is connected to the Internet be protected from unauthorized access by a firewall.
2. Honeywell recommends that a gas detection Ethernet network be separated from a general-purpose computer networks by a switch. This is because the transmission time of Ethernet networks is non-deterministic and can become large if the network is heavily loaded.
3. When the interface is correctly installed in the PLC backplane the "BP ACT" light will glow steady amber. The "OK" light will glow steady green.
4. The "LINK" indicator will glow steady green when a valid physical-layer connection is established to an Ethernet switch.
5. An external computer can confirm that the interface is set to the correct IP address by use of the "ping" command.
6. The MVI46-DFNT contains a second configuration file named "DFNT.CFG". If the module was purchased from Honeywell, this file will be preloaded. Otherwise, the file provided in "C:\hmi\FieldbusFiles" must be loaded.
7. The 122 words of Vertex M status which are listed in Table F-5 may be viewed on the diagnostic port. These are mapped as registers 0 to 121 in the ProSoft database. Instructions on viewing the ProSoft database are in chapter 6 of the ProSoft User Manual.
8. If desired, Allen-Bradley RSLinx software may be used to communicate with the MVI46-DFNT. This is explained in Appendix E of the ProSoft User Manual.

A.13 Vertex M Remote Display Setup

A.13.1 Checking Remote Session Count

The Vertex M Diagnostics option lets you verify the number of remote Niagara licenses.

In the main display screen, touch the **Menu** button, then touch **Diagnostics**. This displays the **System Information** window. The number of licenses is displayed to the right of "Remote Sessions Count".

Note: If there are not sufficient licenses or if all licenses are in use, you will not be able to access the Vertex M remotely. Changing this number is beyond the scope of this procedure; contact your Honeywell Analytics representative for more information.

Figure A-9. Checking Remote Session Count

A.13.2 Determining the IP Address

Many computer networks contain a DHCP server

that sets the IP (internet protocol) address of the rack automatically. This number is necessary to establish communication with the rack. The address is available by running a command prompt, the "ipconfig" command as shown in Figure 2. Note that the Vertex M has two Ethernet interfaces: the address of "***External_Ethernet***" is the relevant one, as shown in the image below.

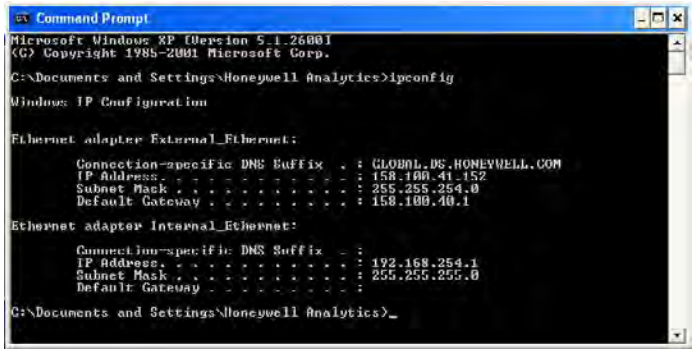


Figure A-10. ipconfig Command

A.13.3 Basic Desktop Station Setup

This adapts a desktop computer for viewing the Niagara HMI. In this basic configuration, event history and data trend are available. But the following features are unavailable remotely:

- Chemcam viewer
- Configuration editor
- Event database export
- Concentration trend database export

A.13.3.1 Installing Java Runtime Environment Software

The Java runtime environment must be installed on the desktop to view Niagara Racks. If this is not installed on your PC, you must install it to use the virtual Vertex M: Click on the **Free Java Download** button on the webpage (http://www.java.com) and follow the prompts.

A.13.3.2 Install Adobe Reader Software

Adobe Acrobat Reader is needed to view this Technical Handbook on the remote station. This may be downloaded from www.adobe.com. Click on <Get Adobe Reader> and follow the prompts.

A.13.3.3 Create HMI account

Creating multiple HMI accounts is useful to facilitate using the HMI security system to control access to the HMI's features. This is described in Section 4.6.6 of the Vertex M Technical handbook. The default account has the username "administrator" with the password "administrator".

A.13.3.4 Starting the Niagara Remote Display

The Niagara remote display is presented in Microsoft Internet Explorer, versions IE6 and IE7.

Type the Vertex M rack's IP address in the IE Address bar to start the virtual Vertex M display. The address must begin with http:// and must end with ":88" In the example, the URL http://158.100.40.130:88 displays the virtual Vertex M, shown in the following page. The initial startup may take a few moments before the login window appears.

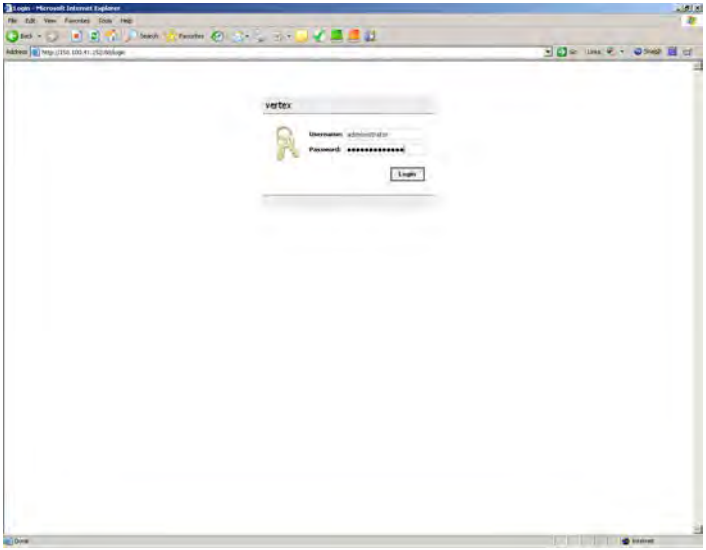


Figure A-11. Starting Niagara Remote Display

TIP	Adding the Vertex M IP address to the IE Favorites folder saves time.

The Vertex M HMI will appear in Internet Explorer as shown in Figure F-12. The virtual Vertex M interface can be displayed on most screen sizes (1024 X 768 is a minimum, however larger screens are better for this application).

Figure A-12. Vertex M HMI in Internet Explorer

A.13.4 Full Desktop Station Setup

This adapts a desktop computer for complete HMI functionality including the Chemcam Viewer. However, the Configuration Editor and Chemcassette installation screens are not available remotely.

Vertex M Client is distributed on the Vertex M Application Software CD.

Remote configuration is possible but requires changing many security settings. Contact Honeywell Analytics for information on permitting remote configuration.

WARNING

The procedures provided in this section require making changes to your computer's security and component settings. Only qualified personnel should undertake this procedure.

A.13.4.1 Add Honeywell software to Desktop

The "VertexClient" software from Honeywell Analytics must be installed in the desktop computer for correct operation. Previous versions of VertexClient must be removed before installing the newer version (Start/ Control Panel/Add or Remove Programs).

CAUTION

Protect both the remote station and the network between it and the Vertex monitor from unauthorized contact. Software changes increase the vulnerability of the Vertex rack to malicious attack.

A.13.4.2 Create a "Honeywell Analytics" account

This is described in Section A.13.4.7 Create matching Windows Accounts.

A.13.4.3 Create Group "VertexDCOMUsers"

This group is needed to facilitate acceptance of the credentials of the two computers. To do this

1. Click on <Start>.
2. Then click-right on <My Computer>. Select "Manage".
3. Navigate to Computer Management / System Tools / Local Users and Groups / Groups.
4. Create a group "VertexDCOMUsers"
5. Add members "Everyone", "Interactive", "Network" and "System" as shown in Figure A-13.

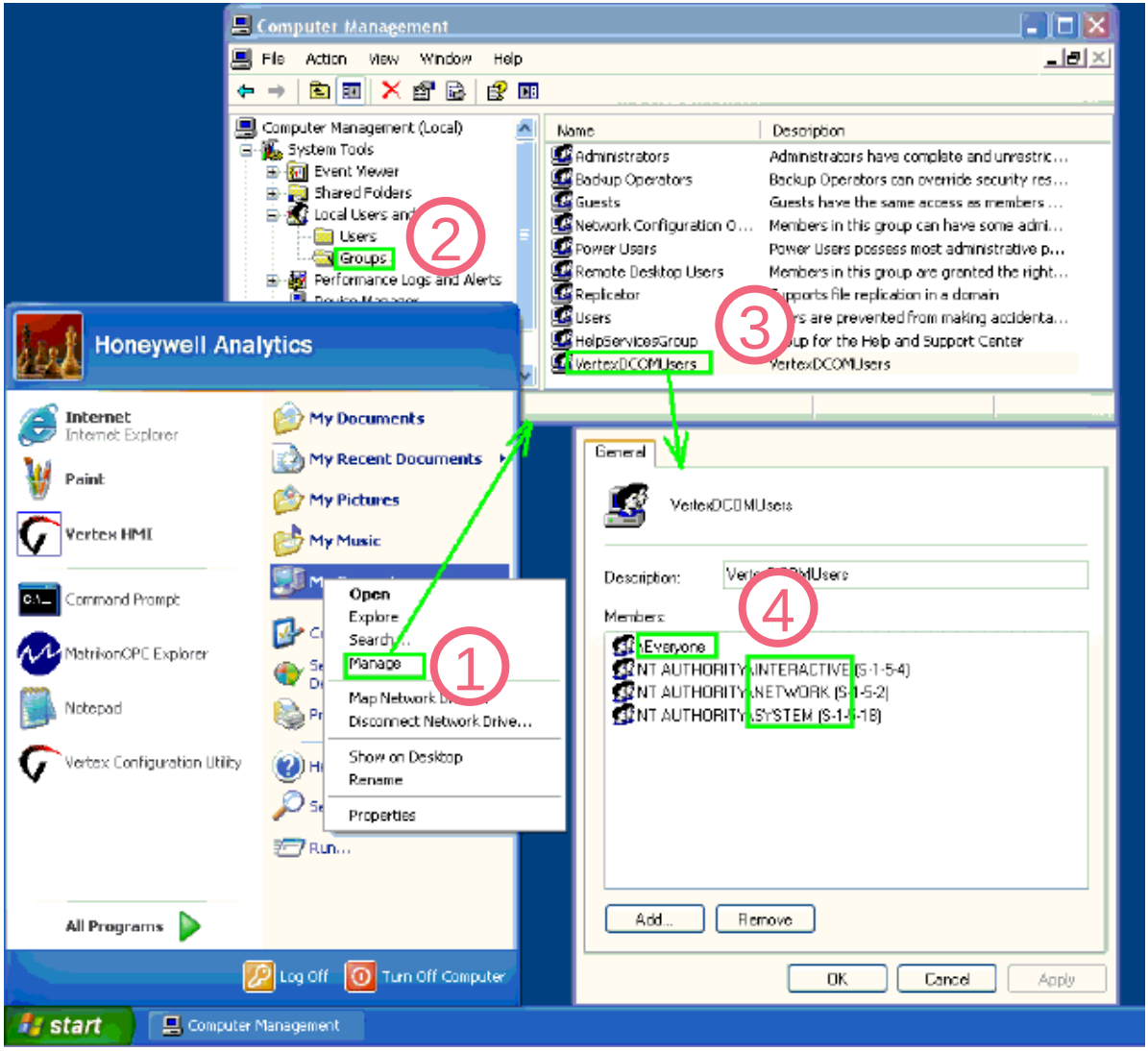


Figure A-13. Create Group "VertexDCOMUsers"

A.13.4.4 Disable Windows Firewall

This is described in Section A.13.4.6 Windows Firewall.

A.13.4.5 Configure DCOM

Remote operation of the Chemcam Viewer and the Configuration Editor requires numerous changes to Windows XP using the **dcomcnfg** program:

- Click on Start and then Run...
- In the Run window, type ***dcomcnfg*** and click OK. The **Component Services** window opens

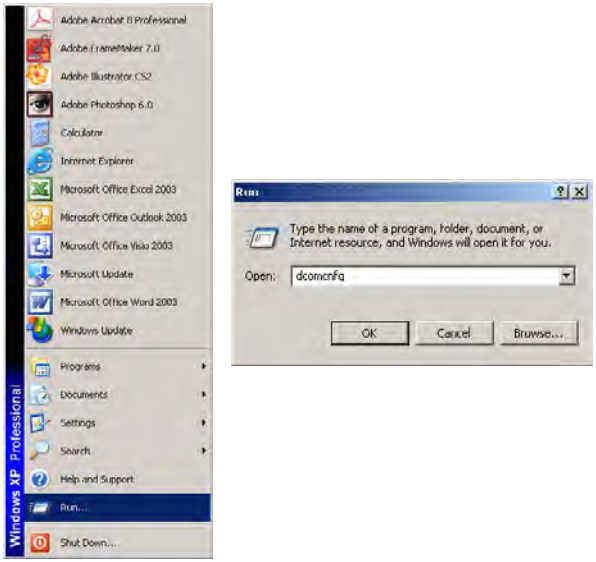


Figure A-14. Starting Component Services

Note:

If a DCOM Configuration Warning! window appears, simply click on Yes to record the warning and continue with the procedure.

The **Component Services** tool allows users to set default security for the entire computer and security settings for individual programs. Some programs require special attention. See Table F-11 for complete details.

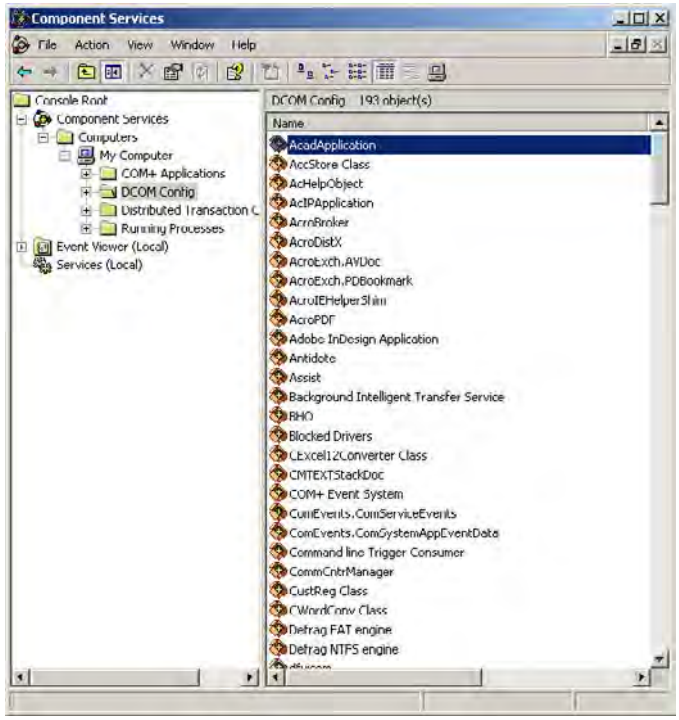


Figure A-15. Component Services

First, modify the security settings for the computer:

- Click on Component Services to display sub-options, until my computer is visible.
- Right-click My Computer and select Properties. This opens the My Computer Properties window.
- Click on the COM Security tab, which contains both Access Permissions and Launch and Activation Permissions.

Figure A-16. COM Security Tab

- Click on any Edit button to open a Permission window. Check to Allow or uncheck to Deny permissions.

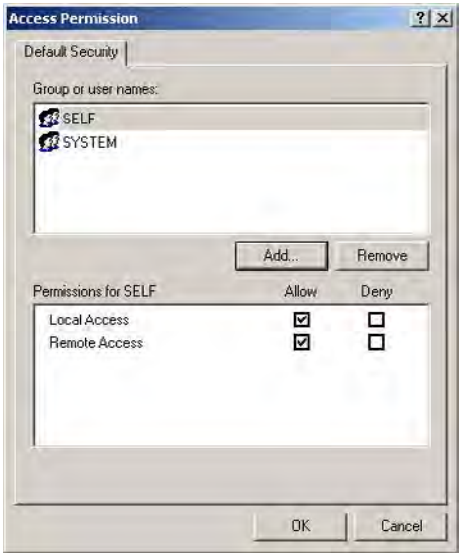


Figure A-17. Access Permission

Table A-12 contains the programs that need security modifications and which modifications are required. Table A-11 contains the explanations for the abbreviations used in Table A-12.

Table A-11. Category Symbols

Symbol	Label
APED	Access Permissions / < Edit Default > button
APEL	Access Permissions / < Edit Limts > button
LAED	Launch and Activation Permission/ < Edit Default > button
LAEL	Launch and Activation Permission/ < Edit Limts > button

1. Most changes are under “Console Root / Component Services / Computers / My Computer”. This is abbreviated to “CR/CS/C/MC” in Table 2.
2. The necessary DCOM permission settings are listed below. In many cases it is necessary to add new objects. (a.k.a. Group or user names”)
3. In some cases, Windows XP requires that “custom” permissions be used instead of the equivalent default permissions.:
4. Select the program in the Component Services window and right-click to select Properties.
5. Click to select “**Customize**” then click **Edit** as shown on the following page.

	Permissions for a particular program can revert from custom to default if they match the default permissions. The recommended workaround is to create a new object “Guest”. (singular, not “Guests” plural). This prevents XP from reverting to default.

6. Click “Apply” after making changes as shown in Figure A-17.
7. Reboot remote computer after configuration.

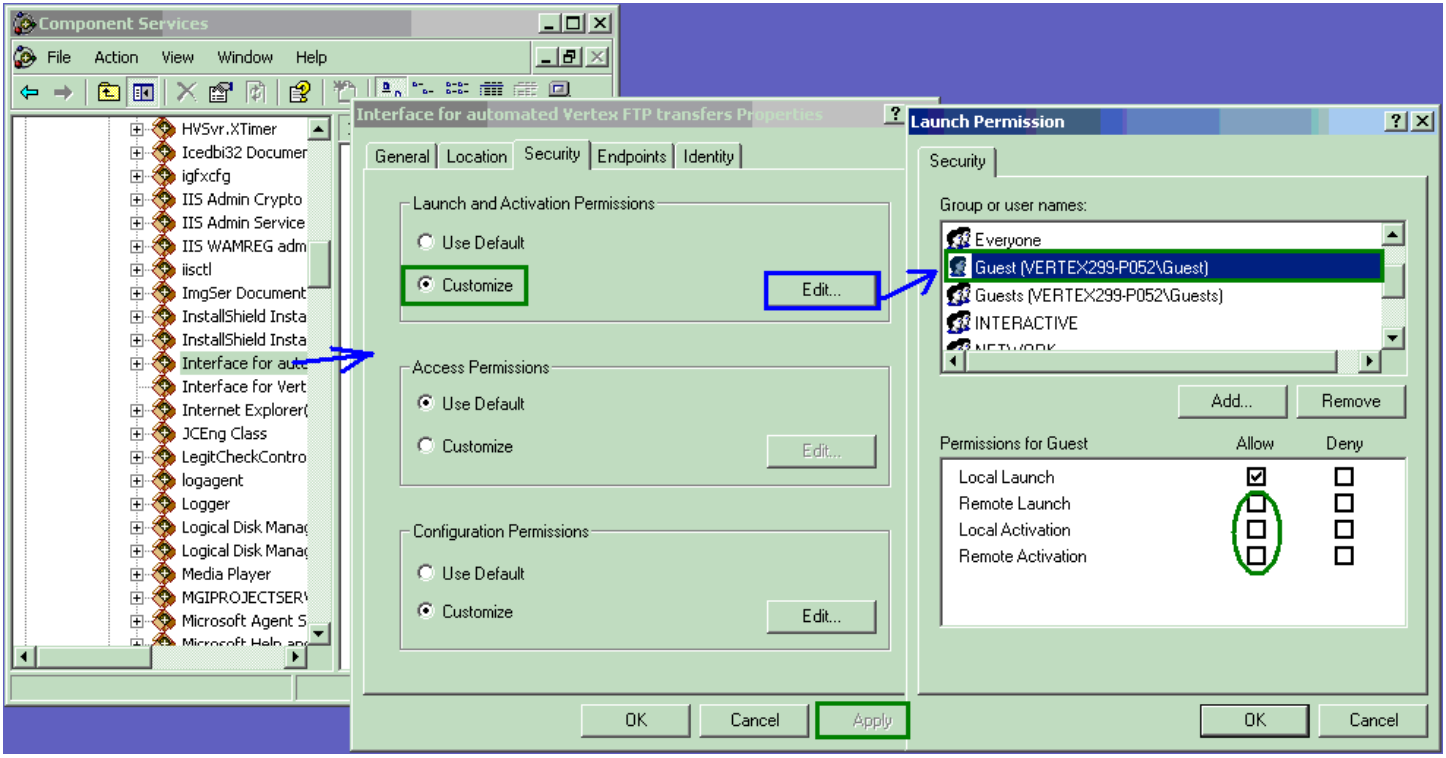


Figure A-18. Custom Permissions

Table A-12. Program List for Security Modifications

Program	Tab	Category (See Table F-11)	Object	Value
CR/CS/C/MC/ Properties	COM Security	APED	Administrators, ANONYMOUS LOGON, Everyone, Guests, INTERACTIVE, NETWORK, SYSTEM, Users, VertexDCOMUsers	all “Allow”
		APEL	ANONYMOUS LOGON, Everyone, Interactive, Network, System	all “Allow”
		LAED	Administrators, ANONYMOUS LOGON, Everyone, Guests, NETWORK, Users VertexDCOMUsers	all “Allow”
			INTERACTIVE, SYSTEM	“Local Launch” and “Local Activation”
		LAEL	Administrators, ANONYMOUS LOGON, Everyone, INTERACTIVE, NETWORK, SYSTEM,	all “Allow”
	Default Properties		“Default Authentication Level”	“None”
			“Default Impersonation Level”	“Identify”

Table 12. Program List for Security Modifications (continued)

CR/CS/C/MC/DCOM Config/ChemCamSrv. Chemcam AND OPCEnum	Identify		Which user account do you want to use to run this application?	“The interactive user” (Note this setting not needed for OPCEnum.)
	General		Authentication level	“None”
	Security	Launch and Activation Permissions/ Customize/<Edit>	Guest	all “Allow”
			All pre-existing objects	all “Allow”
		Access Permissions/ Customize/<Edit>	Guest	all “Allow”
			All pre-existing objects	all “Allow”

A.13.4.6 Windows Firewall

The Windows Firewall must be turned off:

- Click on **Start** in the Windows taskbar
- Select **Settings** and then **Control Panel** from the menu.

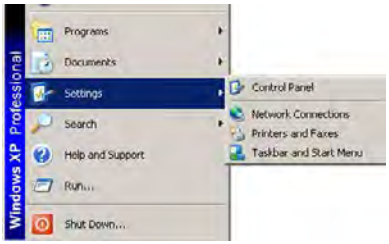


Figure A-19. Control Panel

- Double click on Windows Firewall and click to select **Off (not recommended)**, as shown in Figure F-19.

Figure A-20. Windows Firewall

A.13.4.7 Create matching Windows Accounts

Microsoft Windows security requires that matching accounts exist on both the rack and the desktop to provide the necessary credentials. Every Vertex M rack ships with an account named “Honeywell Analytics” and the password “vertex” One way to provide the matching accounts is to create a similar account on the desktop.

- Click on **Start** in the Windows taskbar and select **My Computer**
- Right-click on **Properties** to open the Computer Management screen.
- Add a new account as shown in Figure F-20. Also add “Honeywell Analytics” to the “Administrators” group.

Note:

If My Computer does not appear in the Start menu, it may be necessary to search for Computer Management.

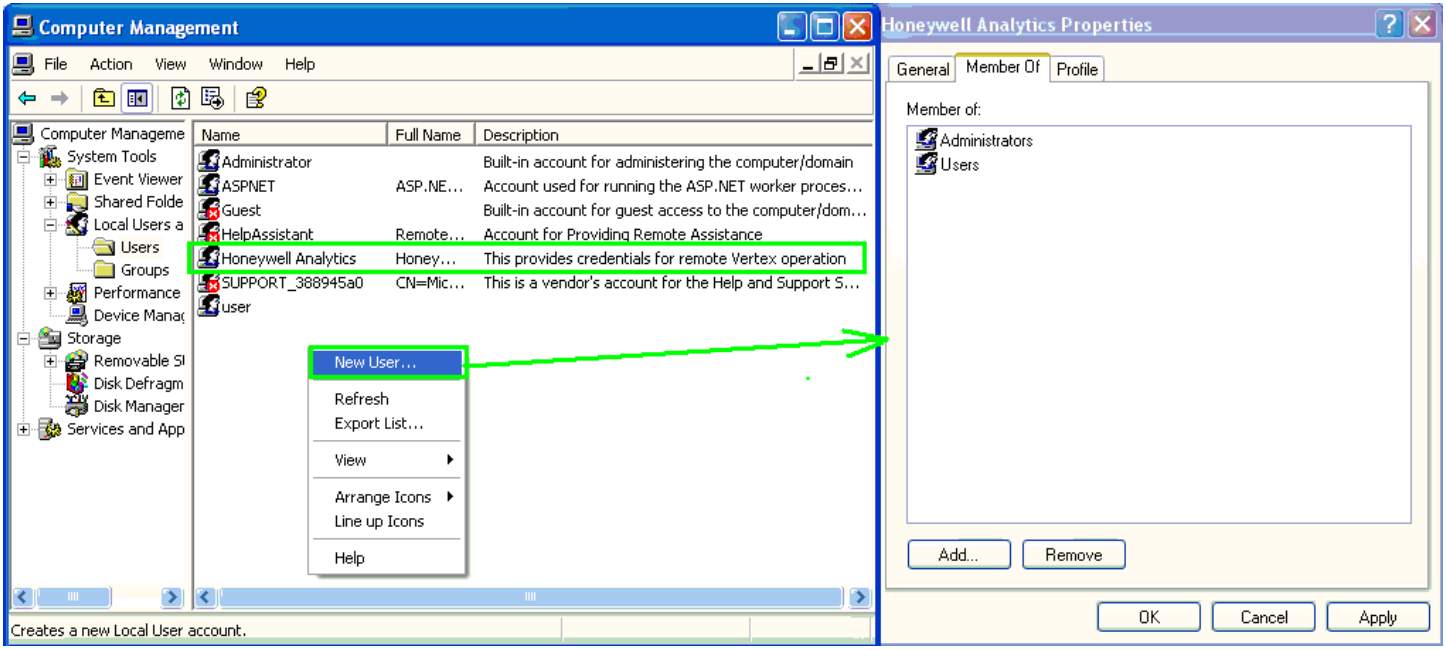


Figure A-21. Computer Management

A.14 Demonstrating Remote OPC Communication

This procedure describes how to set up OPC communications from a Vertex M rack and an external Microsoft Windows computer. Some of the required files are provided on the Vertex M CD.

A.14.1 Setup Procedure

1. Create "Honeywell Analytics" account as listed in Section A.13.4.7 Create matching Windows Accounts if account does not exist.
2. Log into "Honeywell Analytics" account.
3. Disable the Windows firewall, as described in Section A.13.4.6 Windows Firewall.
4. Install the OPC core components provided on the Vertex M CD (or download from http://www.opcfoundation.org/SiteMap.aspx?MID=Downloads, after registration. It is also on the Vertex M Application CD.
5. Confirm that both computers have valid names with the DNS server.
6. The external computer registry must be modified to make it 'aware' of the OPC server. This can be conveniently accomplished by running the file Vertex_OPC_Server_Info_RN.REG which is on the Vertex M CD.
7. Determine the IP address of the rack. This can be done with the "ipconfig" command See Section F.13.2 Determining the IP Address in a command prompt window on the Vertex M.
8. Confirm that IP communication to the rack works This can be done by using the "ping" command in a command prompt.
9. Create an account on the external computer "Honeywell Analytics" with the password of "vertex". See Section F.13.4.4 Create matching Windows Accounts. To do this, select Start/MyComputer/Manage/LocalUsersAndGroup/Users. Also add the user to the "Administrators" group. Log in using this account.
10. Install an OPC Client program on the external computer. Screenshots of two examples are included. The Matrikon OPC Explorer is on the Vertex M CD and is pre-installed on the Vertex M rack. It may also be downloaded from www.matrikon.com. Additionally, DAClient from Rockwell Software might be useful and is shown here. Contact Rockwell Software to obtain this.
11. Edit the DCOM configuration as listed in Table F-12. It is necessary to click on the [Apply] button before closing the properties form for each object. For information on this, see Section F.13.4.2 Configure DCOM. This is noted in boldface.
12. Reboot the external computer.

A.14.2 Demonstration with Matrikon OPC Explorer

1. Install the program.
2. Start OPC Explorer.
3. Set “View”/“Options”/“General”/“Browse Methods” = “Registry”. Start the program.
4. Select <Server>/<Add/Connect Server>
5. Fill in the IP address or host name.
6. To communicate with a Niagara rack, fill in the server name with “Honeywell. VertexOPCServerDA.1” as shown below. To communicate with an RSView rack, us a server name of “RSI.32OPCTagServer”.

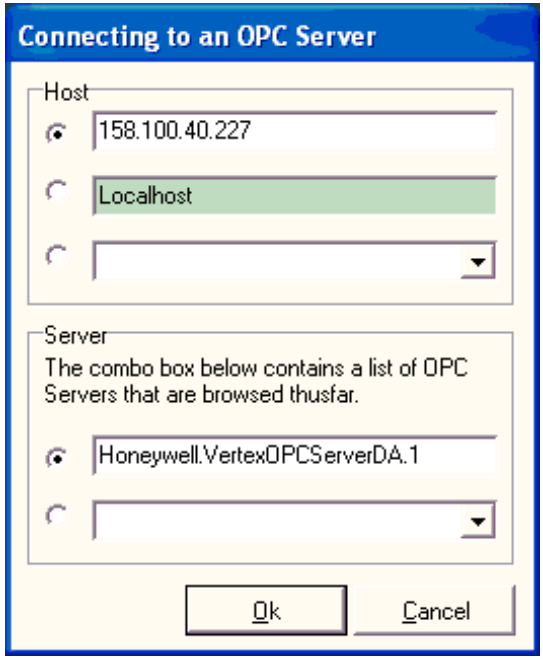


Figure A-22. Connecting To An OPC Server

7. Expand the tree on the left to reveal the Vertex M server as highlighted in purple the Matrikon OPC Explorer window in Figure F-23.
8. Click on **Server** then select **Add Group**. The example name is “g1”.
9. Select the group as shown highlighted in Figure F-22.
10. Click on **Group** then select **Add Items**. The group’s Matrikon Explorer window opens.
11. In the group’s explorer window, make sure that the “Write Access” checkbox is unchecked.
12. Select an item from the list of Available Items (as shown underlined in pink in the MatrikonOPC Explorer (g1) window.
13. Double click on a tag as shown underlined in green in the MatrikonOPC Explorer (g1) window.
14. Confirm that the desired tag name appears in the “Item ID” textbox.
15. Click the large arrow (Add) button as highlighted in yellow in the MatrikonOPC Explorer (g1) window.
16. Repeat above steps as desired. It is also possible to add tags by right-clicking on the tag and selecting “Add all items to tag list”.
17. Click on **File** then select **Close**
18. Verify that the tag quality is “Good” as shown in light-blue in the Matrikon OPC Explorer window in Figure F-22.

Matrikon OPC Explorer window

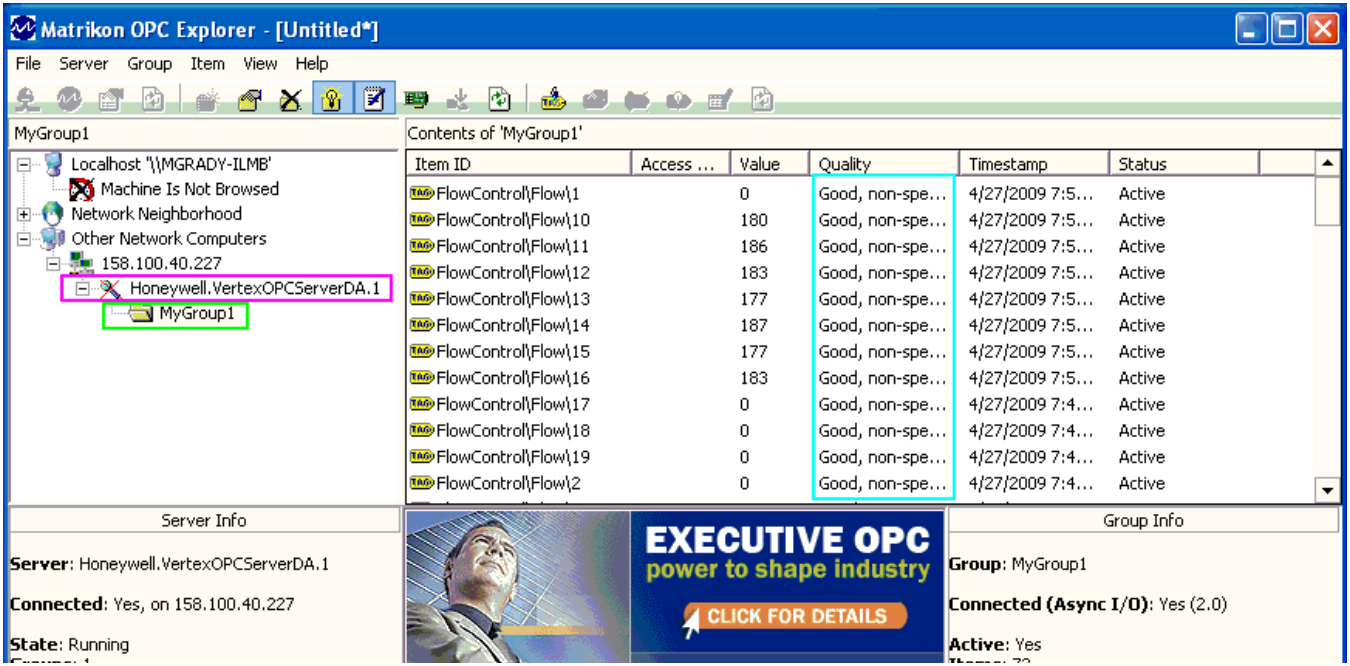


Figure A-23. Matrikon OPC Explorer Window

MatrikonOPC Explorer (g1) window

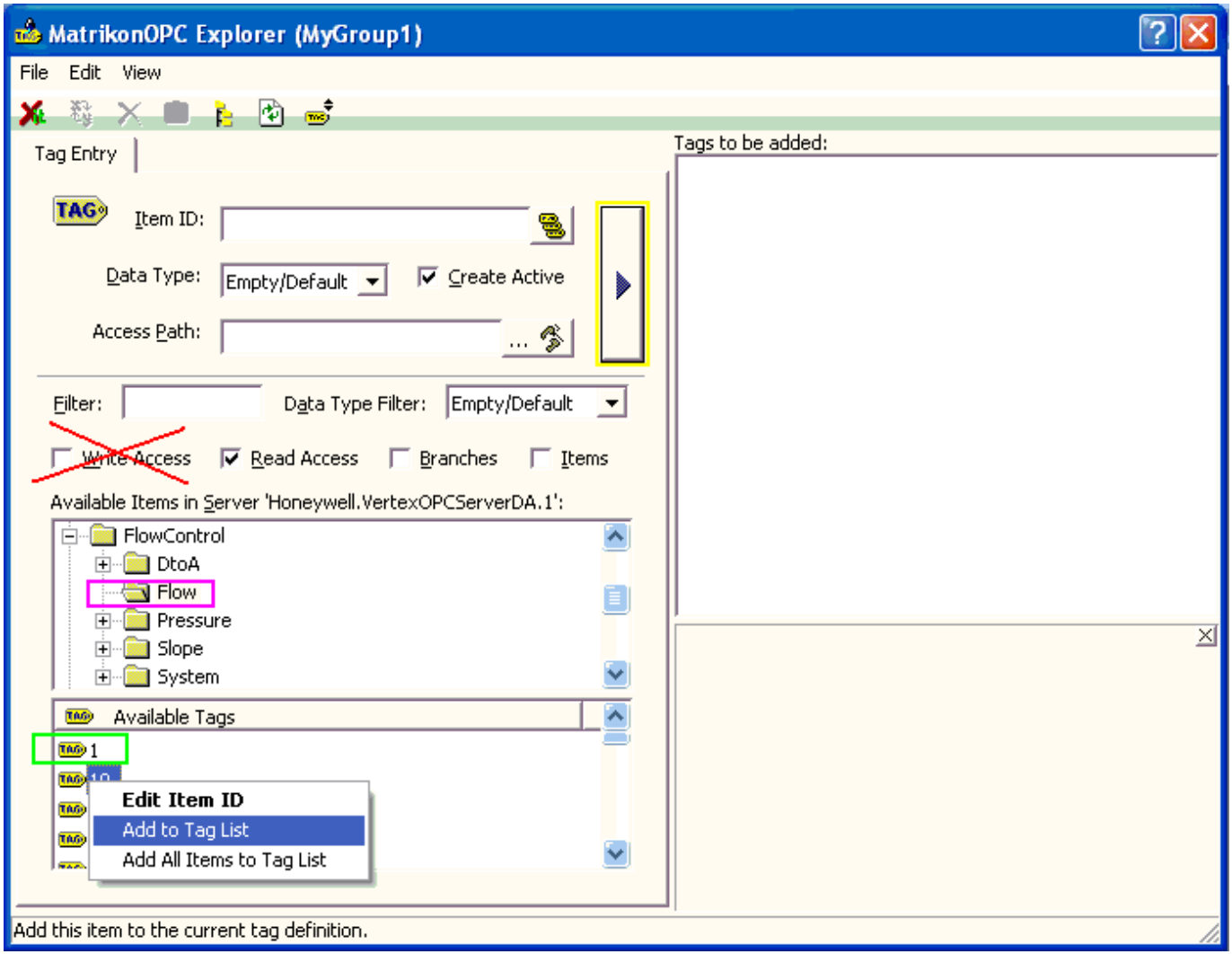


Figure A-24. MatrikonOPC Explorer (g1)

A.14.3 Demonstration with DAClient

Note:

DAClient is a free OPC demonstration program from Rockwell Software.

1. Start the program. Type in the name of the OPC Server and the OPC server machine as shown in Figure F-24.

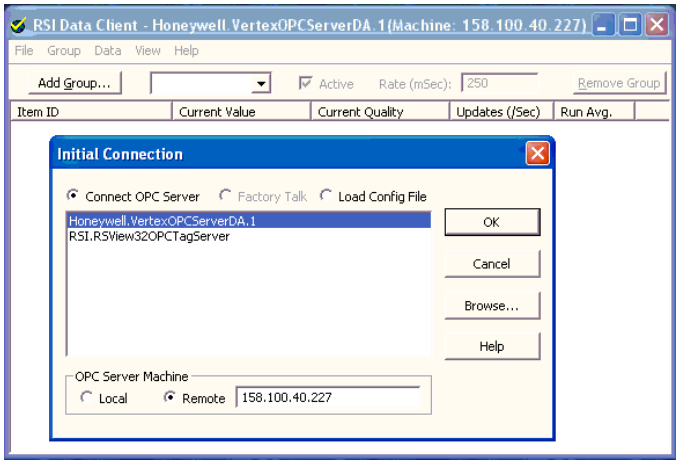


Figure A-25. Enter OPC Server and Machine Name

2. Select a group name such as the default "Group1".
3. Select tags by double-clicking on the bottom-right box of the "Add Item" form as shown in Figure F-25.

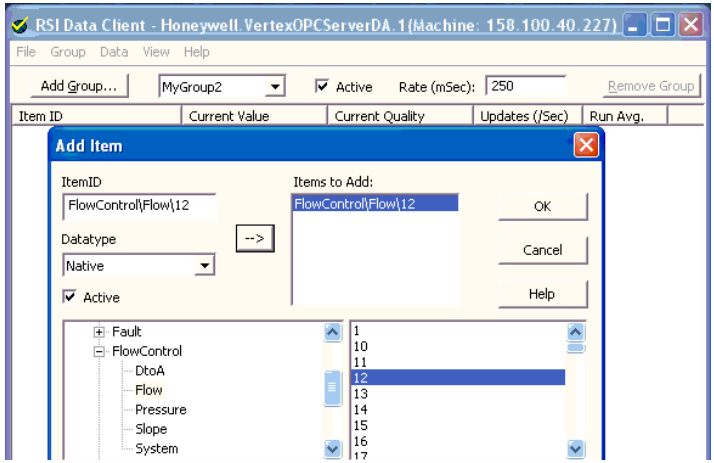
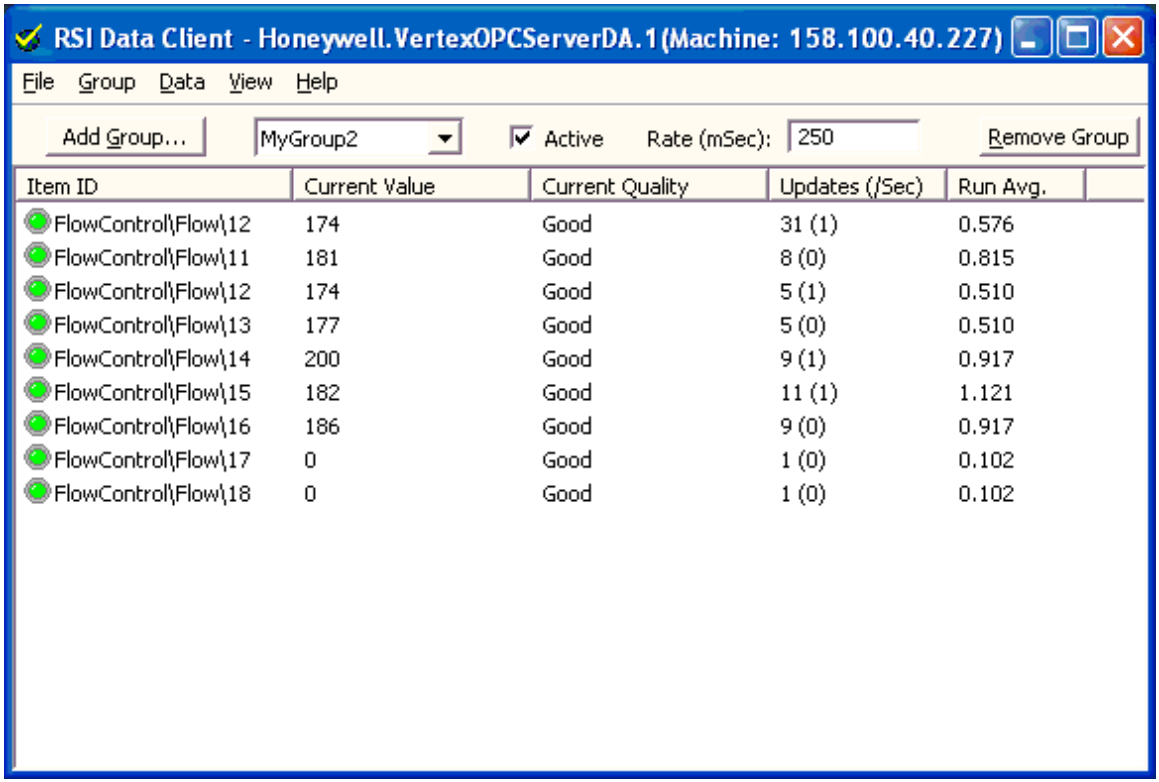


Figure A-26. Add Item Form

4. When all desired tags have been added, click **OK** to close the window
5. Verify that data appears with Current Quality set to “Good” as shown.



Item ID	Current Value	Current Quality	Updates (/Sec)	Run Avg.
FlowControl\Flow\12	174	Good	31 (1)	0.576
FlowControl\Flow\11	181	Good	8 (0)	0.815
FlowControl\Flow\12	174	Good	5 (1)	0.510
FlowControl\Flow\13	177	Good	5 (0)	0.510
FlowControl\Flow\14	200	Good	9 (1)	0.917
FlowControl\Flow\15	182	Good	11 (1)	1.121
FlowControl\Flow\16	186	Good	9 (0)	0.917
FlowControl\Flow\17	0	Good	1 (0)	0.102
FlowControl\Flow\18	0	Good	1 (0)	0.102

Figure A-27. RSI Data Client

A 4-20mA Analog Output Option

A.1 Overview

The application provides an analog output option for the Vertex M by utilizing a second SLC 5/03 PLC rack. This rack communicates with the primary PLC via the DF1 Fieldbus option.

A.2 Hardware Requirements

Primary PLC	The primary Vertex M PLC must be configured with the DF1 Fieldbus option. This option includes the following hardware:	
	(1)	Prosoft MVI46-DFCM module installed in slot 2
	(1)	Prosoft RJ45 to DB9 adaptor cable
Secondary PLC	The secondary PLC requires the following items	
	(1)	1746-A7 Rack
	(1)	1746-P4 Power supply
	(1)	1747-L532 SLC 5/03 Processor
	(1)	RS232 Null Modem Cable
	(6)	Spectrum Controls 1746sc-INO4i Analog Output Modules
	Any required mounting hardware to mount PLC rack in Vertex M Chassis	

A.3 Configuration Requirements

Primary PLC – In addition to loading the correct program for the DF1 Slave, the primary PLC must also have the channel number and baud rate for the PLC setup properly. The procedure for configuring these parameters is documented in Section 3.6 Configuration Utility. The 'Fieldbus' radio button must be selected for DF1, the 'Set Address' field needs to be set to 10 and the 'Set Baud Rate' field set to 19,200.

The Prosoft DF1 module in the primary PLC also has one required jumper setting. The com2 jumper must be in the RS232 position. This is the default configuration.

Secondary PLC – The secondary PLC must be assembled with the 5/03 module in the first slot (slot 0) and all other slots populated with Spectrum Controls 1746sc-INO4i modules. No configuration is needed on these modules, however there is a user settable dip switch for selecting between rack loop power and external loop power. This is an application specific setting, the default is rack power.

The RS232 port on the secondary PLC's 5/03 module (bottom port on module) must be connected to the Prosoft module's port 2 (middle port on module in slot 2 of primary PLC rack).

The only software configuration needed is to load the PLC program ("VertexM AnalogOut Rack2.rss") into the Secondary PLC 5/03 processor. The software required to load this is RSLogix 500 and RSLinx.

Once the PLC program has been loaded, the standard RS232 port will be configured for communication with the Prosoft DF1 module and will not support the standard COM port connection for programming. Any subsequent attempts to load the PLC (either to restore factory default or load program revisions) will require following a procedure to clear the PLC memory or communication through the DH485 port. Connecting to this port requires a special adaptor (1747-UIC) and cable (1747-C13). COntact Honeywell Analytics Service for assistance.

A.4 Operational Description

The analog outputs on the secondary PLC will mirror the corresponding Fieldbus concentration register as defined in Section F.3.2 Concentrations. This section fully describes the outputs under normal operating conditions. The following table describes the outputs including some additional error states.

Condition	Channel Output	Notes
Normal	Concentration Value or 2 mA fault indicator	See Section F.3.2. 2ma fault indicator must be enabled and is off by default
Primary PLC Failure	1 mA on all channels	Including PLC faulted or in program mode
Com Failure	1 mA on all channels	Communication link failure between Primary and Secondary PLC's
Secondary PLC Failure	0 mA on all channels	Including PLC faulted or in program mode

Channel mapping is defined by the following Table G-1.

Table A-1.

Vertex M Point	Secondary PLC Slot	AO Channel on Card
1-1-1	Slot 1	Ch. 0
1-1-2	Slot 1	Ch. 1
1-1-3	Slot 1	Ch. 2
1-1-4	Slot 1	Ch. 3
1-1-5	Slot 2	Ch. 0
1-1-6	Slot 2	Ch. 1
1-1-7	Slot 2	Ch. 2
1-1-8	Slot 2	Ch. 3
1-2-1	Slot 3	Ch. 0
1-2-2	Slot 3	Ch. 1
1-2-3	Slot 3	Ch. 2
1-2-4	Slot 3	Ch. 3
1-2-5	Slot 4	Ch. 0
1-2-6	Slot 4	Ch. 1
1-2-7	Slot 4	Ch. 2
1-2-8	Slot 4	Ch. 3
1-3-1	Slot 5	Ch. 0
1-3-2	Slot 5	Ch. 1
1-3-3	Slot 5	Ch. 2
1-3-4	Slot 5	Ch. 3
1-3-5	Slot 6	Ch. 0
1-3-6	Slot 6	Ch. 1
1-3-7	Slot 6	Ch. 2
1-3-8	Slot 6	Ch. 3

A Line Integrity Test Option

Honeywell Analytics now offers the optional capability to check for leaks in Vertex M sample lines. Analyzers equipped with option 1295-0510 detect a pneumatic signal from valves installed at the end of the sample line. Any leak in the tubing will cause a change in the signal and will be detected. This test is performed automatically as a line integrity test (LIT). This new test complements the ability of all Vertex M analyzers to detect blocked sample lines.

The Line Integrity Test Option requires a minimum software revision of 1.21.1 and configuration of analyzer software by a Honeywell Analytics Field Service Engineer.

Pneumatic Overview

The pneumatic design of the Vertex M rack is summarized in Figure H-1. The Vertex M analyzer contains eight sample pressure transducers, one for each point. The external tubing is terminated with a filter and a check valve. The check valve will not permit any flow until a "cracking" pressure of about 1.0 in. Hg is applied. (see Note: on page H-2) A leak between the analyzer and the check valve will result in an increase in pressure at the analyzer.

Before the LIT test can be performed, the Vertex M and the external plumbing must be "characterized". This process involves measuring the sample pressure when the tubes are known to be leak-free and otherwise correct. It is possible to confirm that a tube is leak-free by plugging the end and observing the sample flow decrease to zero. During the characterization process, the Vertex M records the observed sample pressure. Later LIT tests will issue a fault if the sample pressure increases significantly. Performing the characterization without a leak check invalidates the LIT.

Note:

In this document all pressures are given in inches of mercury. This may be converted to kilopascals by multiplying by 3.38. Furthermore, all pressures are reported as gauge pressure, not as vacuum. Using this nomenclature, the effect of a sample line leak is described as a pressure increase instead of a vacuum decrease.

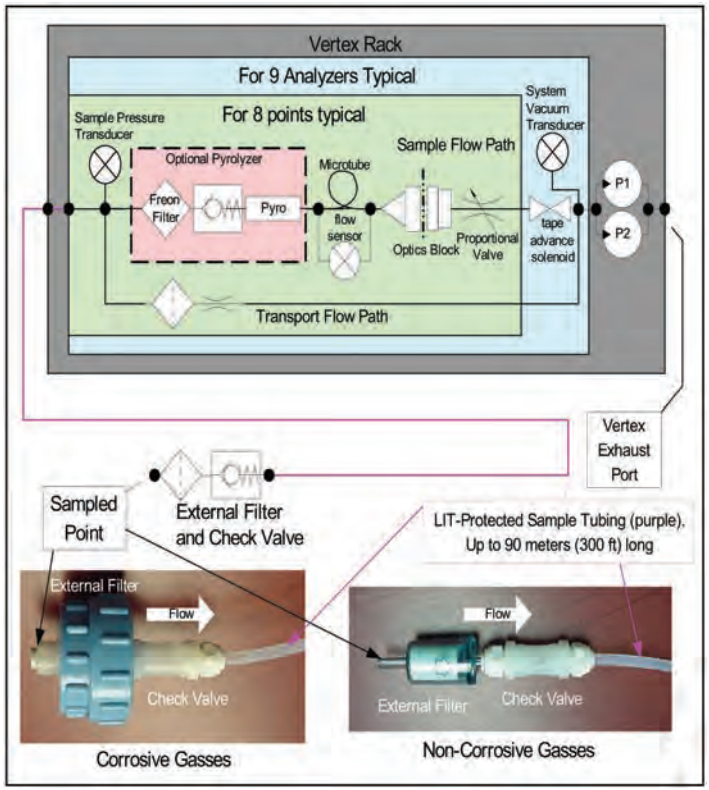


Figure A-1. Simplified Pneumatic Schematic

In practice, the sample pressure measurements are made as a differential measurement with the pump on and then off. This eliminates the effect of any transducer offset. However, since analyzers share a pump, performing the LIT requires that all analyzers stop monitoring. Pressures throughout the Vertex M are allowed to stabilize for 30 seconds before taking

any measurements. An LIT causes monitoring to be interrupted for about two minutes because of synchronization delays.

The test is not compatible with shared sample lines.

The use of external filters is mandatory with Vertex M LIT as it is with all Vertex M points. Appendix B Specifications and Section B.2 Filter Compatibility contains guidance on filter selection.

Quantitative Performance

The pressure at the pump inlet must be less than -7.0 in Hg or the test will be inhibited. The sample line must be 4.8 mm ID [thin wall or 0.190 inch ID] and have a length of 90 meters or less. This supersedes table B-2 in Appendix B, Specifications.

The total gas flow (transport plus sample) is typically 1.3 liters per minute per point. This results in a differential pressure of about 1.2 in. Hg with the maximum tubing length. The check valve increases the differential pressure by an additional 1.0 in. Hg for a total of about 2.2 in Hg.

During characterization the differential pressure must be 0.8 in. Hg or more or a fault will be issued. During LI testing the differential pressure must be at least 70% of the characterization differential pressure or more or a fault will be issued. Leaks of 1 mm [0.039 inch] diameter or larger will cause a substantial decrease in the differential pressure and the generation of a fault.

The LIT measurement requires that the total pressure variance of the sampled point, the Vertex M rack and the exhaust outlet must be less than 0.3 in. Hg. for correct operation. See Figure H-2.

Software Overview

Automatic LI tests can be scheduled to take place at any of the times when a time weighted average (TWA) is recorded. TWAs are recorded every eight hours so that up to three LI tests can be performed per day. As with previous software, the time of the TWA can be shifted up to eight hours so that the LI test time can be any time of day. The LI test can be disabled on a per-point basis to permit a rack with LIT to have some tube configurations that are incompatible with LIT.

Buttons are provided to start an LI characterization or an unscheduled test. These two buttons are on the RS View “Authorized Service” screen.

Accessing LIT Parameters

A checkbox on the Configure Point screen as highlighted by the red rectangle in Figure H-2, enables the selected analyzer to participate in the LIT. By default, all analyzers purchased with this option will participate. Clearing this checkmark removes the analyzer from the LIT and prevents the generation of LIT-related faults for the associated point. Otherwise, nuisance faults may be generated for points with incompatible external components. Examples include tubes longer than 90m, medium-walled tubing, and shared sample lines.

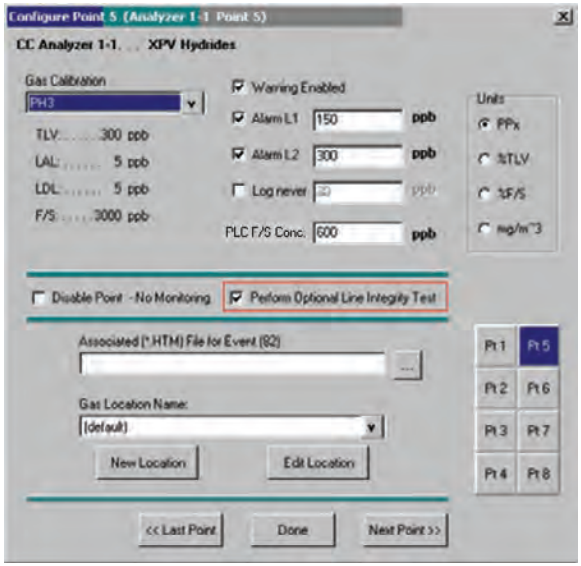


Figure A-2. LIT Access

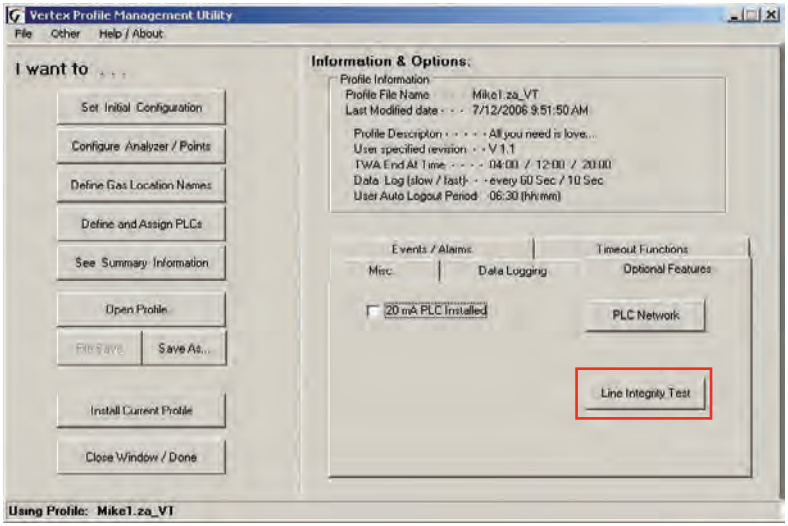


Figure A-3. Configuration Editor New Button

Pressing the "Line Integrity Test" button shown in Figure H-3 causes the form shown in Figure H-4 to appear.

The three times displayed on the left of the new tabsheet indicate the TWA times. (TWA times are set on Data Logging tabsheet.)

The checkbox and labels on the right of the new page will become black if any of the left-side checkboxes are checked. Otherwise the right-side items will become gray.

The checkmark itself indicates the status of the point-specific checkboxes shown in Figure H-2. If the point-specific LIT checkboxes are all set, this checkmark will be set.

LIT Access from the HMI

The HMI has two buttons.

1. Two buttons in the Authorized Service screen as shown in Figure H-3. When the associated analyzer is in Monitor mode this will appear as shown in Figure H-4.

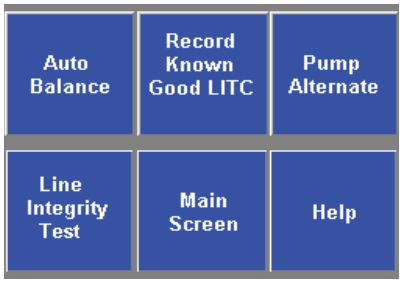


Figure A-4. LIT Access from Authorized Service Mode

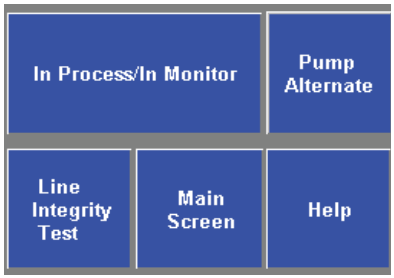


Figure A-5. LIT Access from Monitor Mode

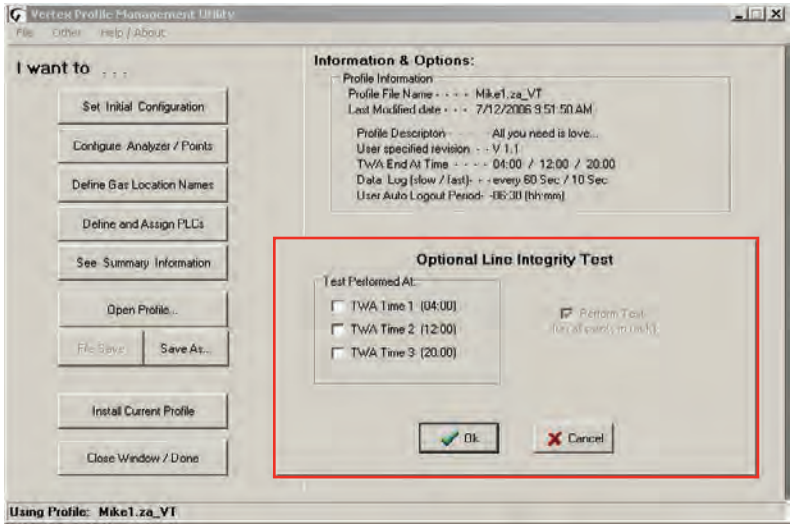


Figure A-6. Configuration Editor New Page

Pressing the “Record Known Good LITC” button will cause a characterization to be performed on all analyzers in the rack. Similarly, pressing the “Line Integrity Test” button will cause a line integrity test to be performed immediately. This is in addition to the LITs which are scheduled by the checkboxes in Figure H-6.

During a LIT test or characterization, the HMI analyzer status display will change from “MONT” or “IDLE” to “LIT”

LIT Related Events

The Vertex M is capable of creating four Maintenance Faults 122 through 125 as shown in Section 6.3 Maintenance Faults.

If the LIT generates Event 124, care must be taken to inspect the integrity of the sample line tubing along its length as the monitored sample may be taken from the break in the tubing, not from the intended area.

The Vertex M is also capable of five new informational events as listed in Section 6.5 Information Events.

Note :

If additional or replacement Vertex M Analyzers are purchased without specifying the LIT option, no faults will be generated for the lack of the option in the new analyzer. However, an “INFO” message will be logged in the Event History each time the LIT option is invoked. Existing analyzers configured for LIT will be unaffected.

A Warranty Statement