

Operation Addendum

Model T200UP

Photolytic Nitrogen Oxide Analyzer

(Addendum to T200 Manual, PN 06858)

© TELEDYNE ADVANCED POLLUTION INSTRUMENTATION (TAPI)
9480 CARROLL PARK DRIVE
SAN DIEGO, CA 92121-5201
USA

Toll-free Phone: 800-324-5190

Phone: 858-657-9800

Fax: 858-657-9816

Email: api-sales@teledyne.com

Website: <http://www.teledyne-api.com/>

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Teledyne Advanced Pollution Instrumentation

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SAFETY MESSAGES

Important safety messages are provided throughout this manual for the purpose of avoiding personal injury or instrument damage. Please read these messages carefully. Each safety message is associated with a safety alert symbol, and are placed throughout this manual and inside the instrument. The symbols with messages are defined as follows:



WARNING: Electrical Shock Hazard



HAZARD: Strong oxidizer



GENERAL WARNING/CAUTION: Read the accompanying message for specific information.



CAUTION: Hot Surface Warning



Do Not Touch: Touching some parts of the instrument without protection or proper tools could result in damage to the part(s) and/or the instrument.



Technician Symbol: All operations marked with this symbol are to be performed by qualified maintenance personnel only.



Electrical Ground: This symbol inside the instrument marks the central safety grounding point for the instrument.

CAUTION



This instrument should only be used for the purpose and in the manner described in this manual. If you use this instrument in a manner other than that for which it was intended, unpredictable behavior could ensue with possible hazardous consequences.

NEVER use any gas analyzer to sample combustible gas(es)!

Note

Technical Assistance regarding the use and maintenance of this instrument or any other Teledyne API product can be obtained by contacting Teledyne API's Technical Support Department:

Telephone: 800-324-5190

Email: sda_techsupport@teledyne.com

or by accessing various service options on our website at <http://www.teledyne-api.com/>

CONSIGNES DE SÉCURITÉ

Des consignes de sécurité importantes sont fournies tout au long du présent manuel dans le but d'éviter des blessures corporelles ou d'endommager les instruments. Veuillez lire attentivement ces consignes. Chaque consigne de sécurité est représentée par un pictogramme d'alerte de sécurité; ces pictogrammes se retrouvent dans ce manuel et à l'intérieur des instruments. Les symboles correspondent aux consignes suivantes :



AVERTISSEMENT : Risque de choc électrique



DANGER : Oxydant puissant



AVERTISSEMENT GÉNÉRAL / MISE EN GARDE : Lire la consigne complémentaire pour des renseignements spécifiques



MISE EN GARDE : Surface chaude



Ne pas toucher : Toucher à certaines parties de l'instrument sans protection ou sans les outils appropriés pourrait entraîner des dommages aux pièces ou à l'instrument.



Pictogramme « technicien » : Toutes les opérations portant ce symbole doivent être effectuées uniquement par du personnel de maintenance qualifié.



Mise à la terre : Ce symbole à l'intérieur de l'instrument détermine le point central de la mise à la terre sécuritaire de l'instrument.

MISE EN GARDE



Cet instrument doit être utilisé aux fins décrites et de la manière décrite dans ce manuel. Si vous utilisez cet instrument d'une autre manière que celle pour laquelle il a été prévu, l'instrument pourrait se comporter de façon imprévisible et entraîner des conséquences dangereuses.

NE JAMAIS utiliser un analyseur de gaz pour échantillonner des gaz combustibles!

ABOUT THIS MANUAL

This operation addendum for the Teledyne API Model T200UP, Photolytic Nitrogen Oxide Analyzer, must be used in conjunction with the Teledyne API Model T200 Nitrogen Oxide Analyzer Operation Manual, part number 06858. Where operation of the Model T200UP diverges from that of the Model T200, this manual addendum takes precedence.

STRUCTURE

This T200UP operation addendum is comprised of multiple appendices that take the place of their respective counterparts in the T200 operation manual:

Appendix A	Menu Tree for the T200UP SAMPLE menu; all other software documentation in Appendix A of the T200 operation manual applies.
Appendix B	Spare Parts List for the T200UP; other lists in Appendix B of the T200 operation manual apply.
Appendix C	Repair Questionnaire form for the T200UP replaces Appendix C of the T200 operation manual.
Appendix D	Interconnect List and Interconnect Diagram for the T200UP replaces the Interconnect List and Diagram of the T200 operation manual. All other schematics in Appendix D of the T200 operation manual apply.

REVISION HISTORY

T200UP Addendum, PN07450

Date	DCN	Description
2012, June 07	6495	Add power consumption and EPA designation
2012, March 27	6413	Initial Release Rev A

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1. OVERVIEW

The Teledyne Advanced Pollution Instrumentation Model T200UP, Photolytic Nitrogen Oxide Analyzer (PN 07028), herein referred to as T200UP, provides true measurement of ambient Nitrogen Dioxide (NO₂) and is a close derivative of the Model T200 NO_x Analyzer. The main differences are as follows:

- The T200UP has better speciation for lower NO₂ levels than a standard T200, due to the inclusion of a UV based photolytic converter. The converter has an expected lifetime of 5,000+ hours of continuous operation.
- The Photolytic converter includes a Teflon cell with reflective properties that increase the overall conversion efficiency.
- The reaction cell is gold plated. In addition, there is a pre-reactor, which allows the measurement of hydrocarbon interferences to be excluded from the sample measurement.
- The sample flow, at approximately 1100 cm³/min, is twice the mass flow rate which in turn generates more light, allowing for lower LDL.
- The T200UP is equipped with a high performance pump, capable of producing a reaction cell pressure of less than 5 Inch Hg Absolute, thereby increasing the Chemiluminescent reaction.

Because the T200UP is derived from the T200, the Model T200 operation manual continues to be valid as the reference manual, covering details of the instrument's components, maintenance and general operation. This addendum covers supplemental details specific to the components, maintenance and operation of the T200UP.

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2. SPECIFICATIONS, APPROVALS, AND COMPLIANCE

PARAMETER	SPECIFICATION
Ranges (Physical Analog Output)	Min: 0-5 ppb Full scale Max 0-2000 ppb Full scale (selectable, independent NO, NO ₂ , NO _x ranges and auto ranging supported)
Measurement Units	ppb, ug/m ³ (user selectable Single, independent or auto ranges)
Noise at Zero ¹	<25 ppt (RMS)
Noise at Span ¹	<0.5% of reading (RMS) above 5 ppb
Lower Detectable Limit ¹	50 ppt NO, <100 ppt NO ₂ (RMS)
Zero Drift ²	<0.1 ppb / 24 hours
Span Drift ²	<0.5% of reading or 50 ppt RMS whichever is greater /24 hrs
Lag Time ¹	20 seconds
Rise / Fall Time ^{1,3}	<50 sec to 95%
Linearity	1% of full scale or ± 0.1 ppb whichever is greater
Precision	0.5% of reading above 5 ppb
Sample Flow Rate	1100 cm ³ /min. ± 10%
AC Power, Analyzer	100V-120V, 60Hz (165W); 220V-240V, 50 Hz (165W)
AC Power, Ext Pump	115V, 60 Hz (345W); 220V-240V, 50/60 Hz, (230W)
Analog Output Ranges	All outputs: 10V, 5V, 1V, 0.1V (selectable) All ranges with 5% under/over range
Recorder Offset	± 10%
Standard I/O	1 Ethernet: 10/100Base-T 2 RS-232 (300 – 115,200 baud) 2 USB device ports 8 opto-isolated digital status outputs (7 defined, 1 spare) 6 opto-isolated digital control inputs (4 defined, 2 spare) 4 analog outputs
Optional I/O	1 USB com port 1 RS485 8 analog inputs (0-10V, 12-bit) 4 digital alarm outputs Multidrop RS232 3 4-20mA current outputs
Analog Output Resolution	1 part in 4096 of selected full-scale voltage
Temperature Range	5 - 40°C (20-30°C within drift and noise specifications, and operating with EPA equivalency)
Humidity	0-95% RH non-condensing
Hydrocarbon Interference	Propylene rejection ratio > 20,000:1 Ethylene rejection ratio > 40,000:1
Voltage Coefficient	< 0.1% per V
Dimensions H x W x D	7" x 17" x 23.5" (178mm x 432 mm x 597 mm)
Weight, Analyzer	40 lbs (18 kg)

PARAMETER	SPECIFICATION
Weight, Ext Pump Pack	21 lbs (9.5 kg)
Environmental ⁴	Installation Category (Over-voltage Category) II, Pollution Degree 2

⁽¹⁾ As defined by the USEPA

⁽²⁾ At constant temperature and voltage

⁽³⁾ With adaptive filter, > 20 ppb change

2.1. EPA Equivalency

Teledyne API's T200UP nitrogen oxides analyzer is designated as an equivalent method (Number EQNA-0512-200) for NO₂ measurement, as defined in 40 CFR Part 53, when operated under the following conditions:

- Range: Any full-scale range between 0-0.05 and 0-1.0 ppm (parts per million).
- Ambient temperature range of 20 to 30°C.
- Software Settings: Temperature and Pressure compensation ON.

2.2. Approvals and Certifications

The Teledyne API Model T200UP analyzer was tested and certified for Safety and Electromagnetic Compatibility (EMC). This section presents the compliance statements for those requirements and directives.

2.2.1. Safety

IEC 61010-1:2001, Safety requirements for electrical equipment for measurement, control, and laboratory use.

CE: 2006/95/EC, Low-Voltage Directive

North American:

cNEMKO (Canada): CAN/CSA-C22.2 No. 61010-1-04

NEMKO-CCL (US): UL No. 61010-1 (2nd Edition)

2.2.2. EMC

EN 61326-1 (IEC 61326-1), Class A Emissions/Industrial Immunity

EN 55011 (CISPR 11), Group 1, Class A Emissions

FCC 47 CFR Part 15B, Class A Emissions

CE: 2004/108/EC, Electromagnetic Compatibility Directive

2.2.3. Other Type Certifications

For additional certifications, please contact Technical Support:

Toll-free Phone: 800-324-5190

Phone: 858-657-9800

Fax: 858-657-9816

Email: sda_techsupport@teledyne.com

3. GETTING STARTED

Follow the unpacking, inspection, and the electronic and pneumatic connections instructions in the T200 manual.

The front and rear panel illustrations and indicator/control/display descriptions in the T200 manual are the same for the T200UP. The internal chassis layout is shown in Figure 3-1; compared to the T200 layout, the differences include the photolytic converter, a sample conditioner, and an additional power supply (24V).

For the internal pneumatics of the T200UP in its standard configuration, along with the optional Zero/Span valves, refer to the pneumatic diagram shown in Figure 3-2. The sample flow is approximately 1100 cm³/min. Also during Auto Zero mode, the sample gas is routed through a pre-reactor before the mixture enters the reaction cell. Since the reaction rate constant between NO and ozone is several times faster than the reaction rate constant between hydrocarbons and ozone, this mechanism helps to eliminate the interference effects of hydrocarbons in NO_x measurements. In addition, the T200UP is equipped with a high performance pump, capable of producing a reaction cell pressure of less than 5 Inch Hg absolute, which enhances the chemiluminescent reaction.

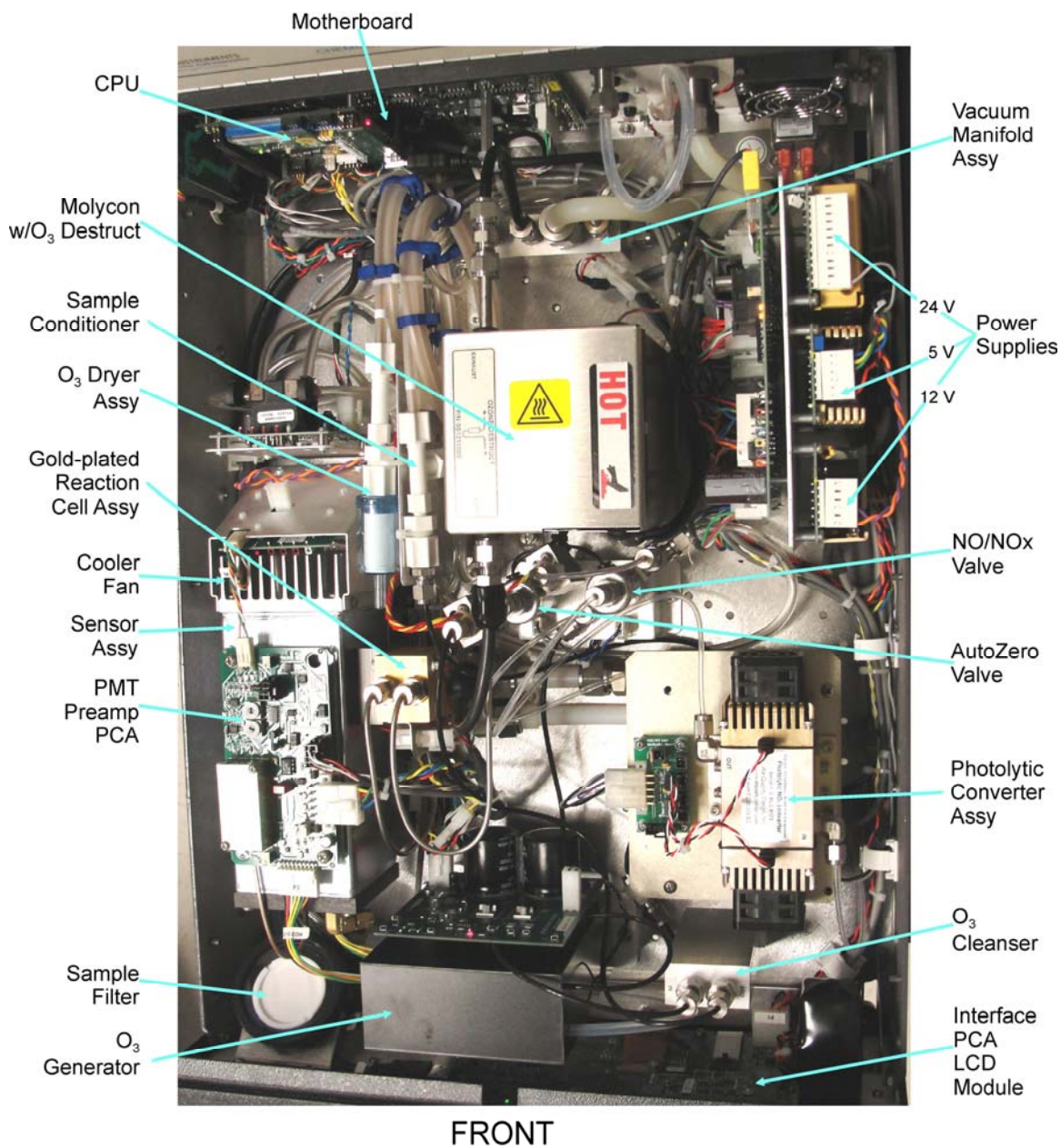


Figure 3-1. T200UP Internal Chassis Layout

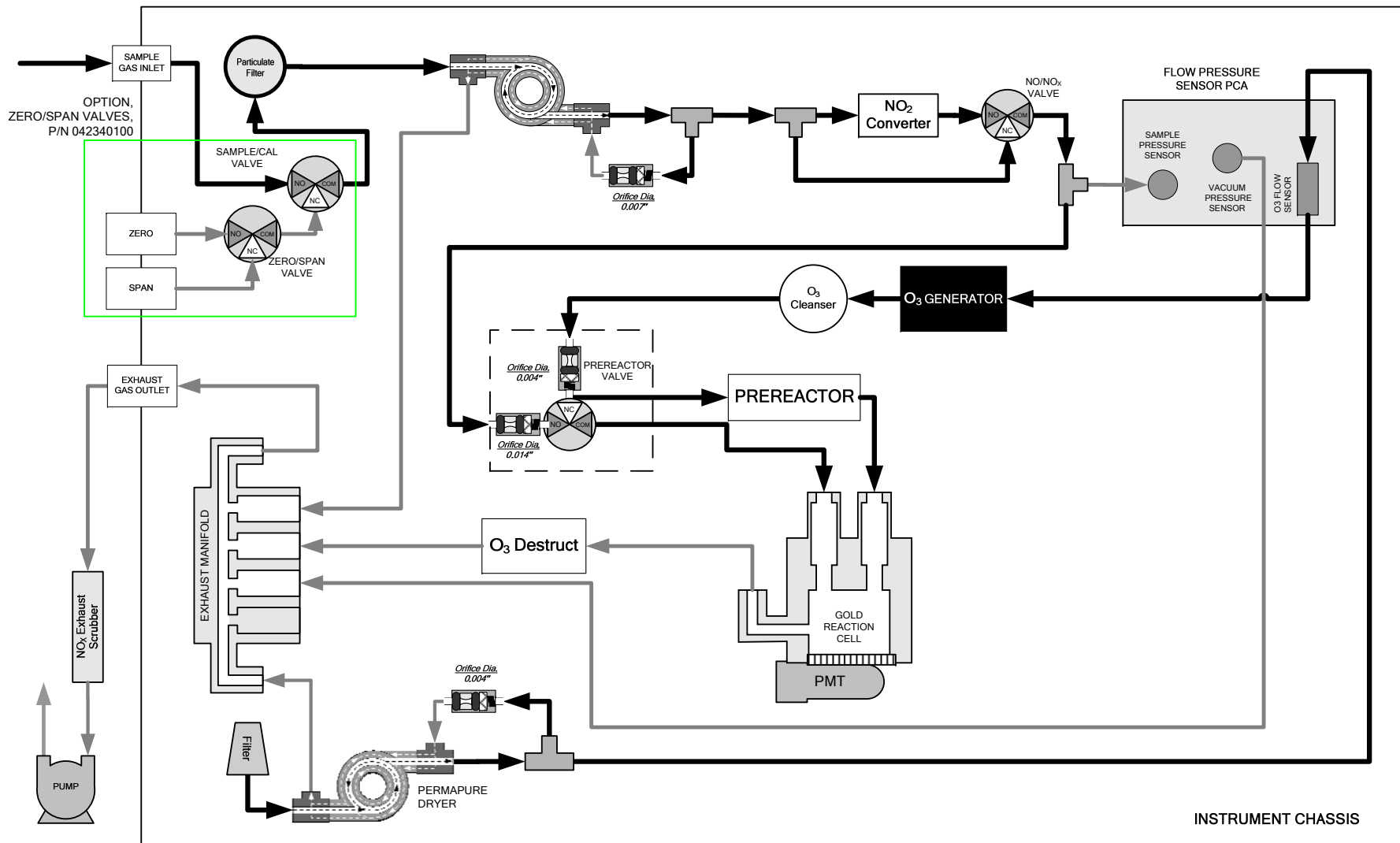


Figure 3-2. Pneumatic Diagram With Zero/Span Valves Option

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4. SETUP AND CALIBRATION

After making electrical and pneumatic connections, run a basic functionality check as described in the T200 manual section, *Startup, Functional checks, and Initial Calibration* under *GETTING STARTED*. The T200UP requires zero and span calibrations, possibly HVPS adjustment, followed by calibration of the converter efficiency points before operation begins. This section presents those procedures.

4.1 Calibration Procedure

Calibration of the photolytic analyzer consists of a three-step process:

- Zero the analyzer using dry instrument grade air per the *EPA Protocol Calibration* section of the T200 manual.
- Calibrate the Nitric Oxide (NO) and Oxides of Nitrogen (NO_x) slopes using instrument grade NO calibration gas balanced in Nitrogen per the *EPA Protocol Calibration* section of the T200 manual.
- Calibrate the two converter efficiency points (CEA and CEB) by either diluting instrument grade NO₂ gas balanced in Nitrogen, or gas phase titration (GPT) to generate the NO₂.

Note

As outlined in the T200 manual, calibration gases must be vented prior to the sample port, at the rear of the analyzer. Also the total flow of the calibration gas should exceed 2 slpm to assure excess gas.

4.1.1 NO/NO_x Slope and Offset Calibration

1. Enter the Converter Efficiency menu (CAL>CONC>CONV), and set CE point A and point B to 1.000:
 - a. Press **SETA**, then press the numbered buttons until the Param field reads "CONV EFF A:1.0000 Gain", and press **ENTR**.
 - b. Press **SETB**, then press the numbered buttons until the Param field reads "CONV EFF B:1.0000 Gain", then press **ENTR**.
2. Press **EXIT** to leave the Converter Efficiency menu.
3. Conduct a Zero calibration using zero air per the T200 Operation Manual calibration procedures in the *EPA Protocol Calibration* section. This sets the NO & NO_x offsets for each channel.
4. Conduct an NO Span calibration at 80-90% of the expected span range per the T200 Operation Manual calibration procedures in the

EPA Protocol Calibration section. This sets the NO and NO_x slopes for each channel.

5. Note, a hardware adjustment of the PMT may be required, by adjusting the HVPS, in order to get the NO & NO_x slopes to be close to 1.000. Refer to PMT Sensor Hardware Calibration in the *Troubleshooting and Repair* section of the T200 Operation Manual.
6. Calibrate the photolytic converter efficiencies at 10-20% and 80-90% of the expected NO₂ range (details provided next in Section 4.1.2) using either bottled NO₂ balanced in nitrogen or by conducting a low level GPT using a T700U calibrator.

Note

 The photolytic converter dissociates the NO₂ Molecule into NO + O. The free radical oxygen atoms combine with ambient O₂ to form O₃. The excess NO used during GPT will react with the byproduct O₃, which in turn affects the calculated NO₂ concentration. If calibrating using GPT the amount of excess NO should be kept to a minimum.

The Ozone generated as part of the photolytic process back titrates the converted NO. This phenomenon is non-linear and leads to a situation where the calculated CE value is less at higher concentrations of NO₂.

Example:

At 50 PPB of NO₂ the CE value is Typically CE = 28/50 = 0.5600

At 400 PPB of NO₂ the CE value is CE = 200/400 = 0.5000

The software allows calibration of the CE value at two NO₂ concentration points, A and B. Thereafter, the software corrects the measured NO₂ concentration based on a calculated slope and offset. Concentration values entered for the B parameter are higher than those entered for A. Therefore, it is recommended that the user calibrate the B point first, so that the higher concentration of NO₂ helps to stabilize the pneumatic tubing.

4.1.2 Converter Efficiency (CE) Points (A&B) Calibration

High Value NO₂ concentration, Point B:

1. Deliver 80-90% of selected range for NO₂ (if using GPT, keep excess NO at or below 20ppb), and allow the analyzer to sample for an adequate period to achieve stability and display the measured NO_x, NO and NO₂ concentrations.
2. Enter the actual NO₂ concentration being delivered into the **NO2B** menu of the CAL>CONC>CONV menu, and press **ENTR**. The actual NO₂ concentration, if using GPT to generate the gas, is equal to the difference between the NO being delivered and the measured NO remaining as part of the GPT.
3. Exit to the SETUP menu and allow the analyzer to sample for an adequate period to achieve stability.

4. Calibrate the B point by pressing the **CALB** button in the CAL>CONC>CONV menu.
5. Press the **CAL** button and then the **ENTR** button; view the Point B CE value that appears in the front panel display.
6. Press **EXIT** until the display returns to the **SETUP** menu.

Low Value NO₂ concentration, Point A:

7. Deliver 10-20% of selected range for NO₂, and allow the analyzer to sample for an adequate period to achieve stability and display the the measured NO_x, NO and NO₂ concentrations.
8. Enter the actual NO₂ concentration being delivered into the **NO2A** menu of the CAL>CONC>CONV menu, and press **ENTR**. The actual NO₂ concentration, if using GPT to generate the gas, is equal to the difference between the NO being delivered and the measured NO remaining as part of the GPT.
9. Calibrate the A point by pressing the **CALA** button in the CAL>CONC>CONV menu.
10. Press the **CAL** button and then the **ENTR** button; view the Point A CE value that appears in the front panel display.
11. Press **EXIT** until the display returns to the **SETUP** menu.

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5. OPERATION

The operation instructions for the T200 manual apply to the T200UP.

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6. MAINTENANCE AND SERVICE



CAUTION – PERSONAL SAFETY HAZARD: UV RADIATION

UV radiation is associated with LED arrays. Never open the photolytic converter while power is ON.

Over time the light output from the LED's will diminish, thus reducing the photolytic converter efficiency (CE). This may be caused either by the lamps having reached their life limit or by contamination building up on the LED array of the photolytic lamps and on the inside surface of the Teflon chamber that houses the lamps. The former requires lamp replacement; the latter requires cleaning.

When the CE falls below 40%, determine the cause by first cleaning the lamp assembly and then checking the CE again. If the CE is still below 40% when calibrated using a 0-500 ppb range, then replacement of the lamp assemblies is recommended (KIT 000328). The procedure for either case involves removing both lamp assemblies, by following steps 1 to 9 below.

6.1. Procedure for Lamp Replacement or Cleaning

For cleaning, use distilled water and a non-abrasive, lint-free cloth.

1. Power OFF the instrument.
2. Remove the setscrew located in the top, center of the Front panel.
3. Remove the top cover of the analyzer.
4. Slide the cover backward until it clears the analyzer's front bezel
5. Lift the cover straight up.
6. Locate the Photolytic Converter assembly (Figure 3-1) and remove both lamp assemblies as follows:
 - a. Gently disconnect the electrical connectors (they are delicate) between the housing and each lamp assembly (Figure 6-1).
 - b. Remove the four socket head cap screws holding the body of the converter to the base plate. Remove the Photolytic Converter assembly from the analyzer.
 - c. Remove the four screws that secure the lamp assembly at either end of the housing.
 - d. Follow either Step i or Step ii next, and then continue to Step 7.
 - i. For cleaning, wipe the LED array and the interior of the Teflon chamber.

- ii. For replacement, remove each lamp assembly and install the replacement lamp assemblies.
7. Reassemble in reverse order (screws, electrical connection).
NOTE: Converter's electrical connectors are delicate. Do not use force during reconnection: the arrows on the molded connectors should face inward so that they point toward each other.



CAUTION – PERSONAL SAFETY HAZARD: UV RADIATION

Ensure that the Photolytic Converter is completely reassembled so that there is no exposure to UV radiation before powering ON the analyzer.

8. Conduct a leak check per instructions in the T200 manual Maintenance section.
9. Calibrate per the procedures in the preceding *Setup and Calibration* section and check the converter efficiency..

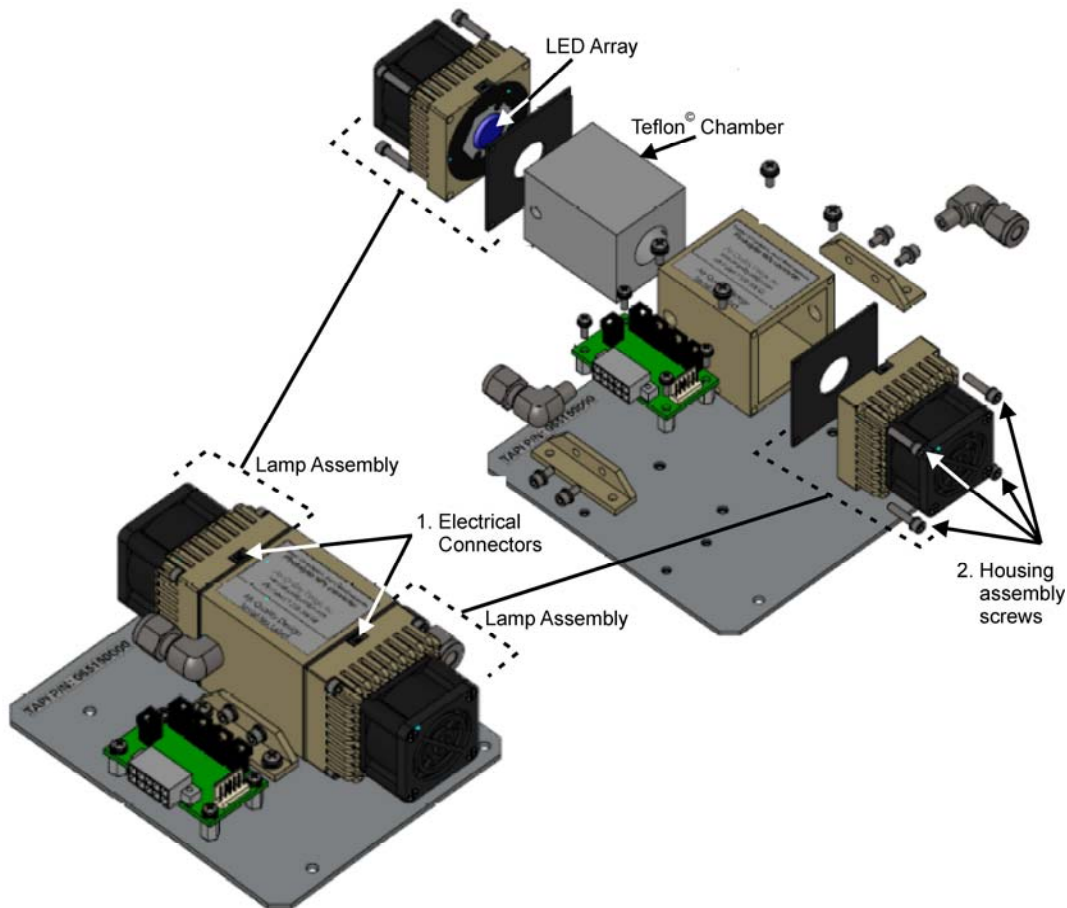


Figure 6-1. Photolytic Lamp Assembly Replacement

During regular maintenance, check the four hex head screws on each lamp and tighten if necessary.

For all other instrument maintenance, follow the instructions in the T200 Operation Manual.

7. PRINCIPLES OF OPERATION

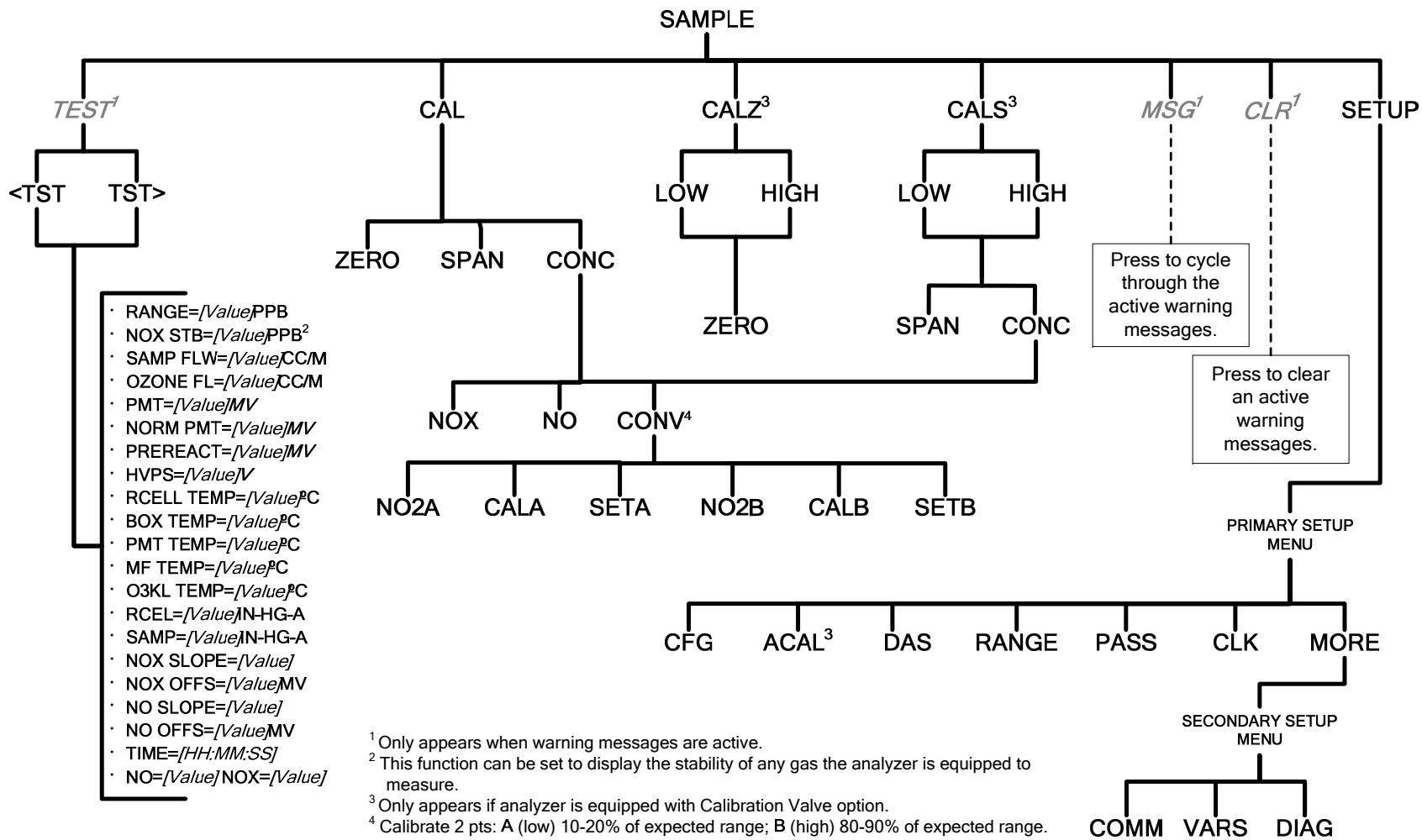
The Model T200UP uses a UV-based photolytic converter to provide “true” trace level measurements of NO₂. The patented technology allows for speciation of NO₂. As the sample gas passes through the converter chamber it is exposed to blue light at specific wavelengths (350-420 nm) from an array of ultraviolet light-emitting diodes (LEDs). This selectively converts the NO₂ to NO with negligible radiant heating or interference from other gases. The T200 operation manual section, *Principles of Operation*, details the Chemiluminescent measurement as well as other components.

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Appendix A – Menu Trees

With the exception of the software menu tree that follows, the menus in Appendix A of the T200 Operation Manual apply to the T200UP.

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Appendix B – Spare Parts List

The Spare Parts List that follows applies to the T200UP.

Note

Use of replacement parts other than those supplied by Teledyne Advanced Pollution Instrumentation (TAPI) may result in non-compliance with European standard EN 61010-1.

Note

Due to the dynamic nature of part numbers, please refer to the TAPI Website at <http://www.teledyne-api.com> or call Technical Support at 800-324-5190 for more recent updates to part numbers.

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T200UP Spare Parts List

(Reference: 07455 1/31/2012 2:45p)

PARTNUMBER	DESCRIPTION
000940100	CD, ORIFICE, .003 GREEN
000940400	CD, ORIFICE, .004 BLUE
000941100	CD, ORIFICE, .014 ORG/VIOLET
001330001	SLEEVE, GOLD PLATED, NOX
001761800	ASSY, FLOW CTL, 90CC, 1/4" TEE-TMT, B
002270100	AKIT, GASKETS, WINDOW, (12 GASKETS = 1)
002730000	CD, FILTER, 665NM (KB)
004330000	ZERO AIR SCRUBBER (NO/NO2)
005960000	AKIT, EXP, 6LBS ACT CHARCOAL (2 BT=1)
005970000	AKIT, EXP, 6LB PURAFIL (2BT=1)
009690200	AKIT, TFE FLTR ELEM (FL19,100=1) 47mm
009690300	AKIT, TFE FLTR ELEM (FL19, 30=1) 47mm
011310000	ASSY, DRYER, NOX
011630000	HVPS INSULATOR GASKET (KB)
013140000	ASSY, COOLER FAN (NOX/SOX)
014030000	AKIT, NOX EXPENDABLES, IZS
014080200	ASSY, HVPS, NOX
016290000	WINDOW, SAMPLE FILTER, 47MM (KB)
016301200	ASSY, SAMPLE FILTER, 47MM, ANG BKT, 1UM
018720300	ASSY, 03 DESTRUCT. W/O MOLY
024600100	ASSY, PREREACTION NO/NOX VALVE
024930000	CD, PMT, NOX
037860000	ORING, TEFLON, RETAINING RING, 47MM (KB)
039700100	HEATER, BAND, TYPE K, DUAL VOLTAGE(KB)*
040010000	ASSY, FAN REAR PANEL (B/F)
040030800	PCA, PRESS SENSORS (2X), FLOW, (NOX)
040400000	ASSY, HEATERS/THERMAL SWITCH, RX CELL
040410500	ASSY, VACUUM MANIFOLD
041510200	ASSY, PRESS/FLOW SENSOR, NOX
041800600	PCA, PMT PREAMP, VR,
041920000	ASSY, THERMISTOR
042340100	OPTION, ZERO/SPAN VALVES, (KB)
042680100	ASSY, VALVE (SS)
044340000	ASSY, HTR, BYPASS MANIFOLD
044540000	ASSY, THERMISTOR, NOX
044600000	AKIT, SPARES, NOX
045230100	PCA, RELAY CARD(KB)
045430000	ASSY, DRYER, O3, W/RELAYS & BRKT *
04550010A	ASSY, ORIFICE HOLDER, 4 MIL
04550030A	ASSY, ORIFICE HOLDER, 10 MIL, (NOX) (KB)
045500400	ASSY, ORIFICE HOLDER, 3 MIL
046030000	AKIT, CH-43, 3 REFILLS
046480000	ASSY, DILUTION MANIFOLD, (KB)
046490000	OPTION, DILUTION MANIFOLD (KB)
047150000	AKIT, EXPENDABLES, NOX
049310100	PCA,TEC DRIVER,PMT,(KB)
049760300	ASSY, TC PROG PLUG, MOLY,TYP K, TC1
050700200	KIT, RELAY BD NOX CONFIG (KB)
051990000	ASSY, SCRUBBER, INLINE EXHAUST, DISPOS

T200UP Spare Parts List

(Reference: 07455 1/31/2012 2:45p)

PARTNUMBER	DESCRIPTION
052930200	ASSY, BAND HEATER TYPE K, NOX
055300000	AKIT, PUMP REBUILD, THOMAS 2688, DUAL HD
055740000	ASSY, PUMP, NOx PUMP PACK, 115V/60HZ
055740100	ASSY, PUMP, NOx PUMP PACK, 220V/60HZ
055740200	ASSY, PUMP, NOx PUMP PACK, 220V/50HZ
056490000	FILTER, DFU, DESORBER (SOAKED)
058021100	PCA, MOTHERBD, GEN 5-ICOP
058230000	ASSY, O3 CLEANSER, ALUMINUM
059940000	OPTION, SAMPLE GAS CONDITIONER, NOX*
062390000	ASSY, MOLY GUTS w/WOOL
064540000	ASSY, PUMP NOX INTERNAL, 115V/60HZ
064540100	ASSY, PUMP NOX INTERNAL, 230V/60HZ
064540200	ASSY, PUMP NOX INTERNAL, 230V/50HZ
066970000	PCA, INTRF. LCD TOUCH SCRN, F/P
067240000	CPU, PC-104, VSX-6154E, ICOP *(KB)
067300000	PCA, AUX-I/O BD, ETHERNET, ANALOG & USB
067300100	PCA, AUX-I/O BOARD, ETHERNET
067300200	PCA, AUX-I/O BOARD, ETHERNET & USB
067900000	LCD MODULE, W/TOUCHSCREEN(KB)
068810000	PCA, LVDS TRANSMITTER BOARD
069500000	PCA, SERIAL & VIDEO INTERFACE BOARD
072150000	ASSY. TOUCHSCREEN CONTROL MODULE
072280000	ASSY, O3 GEN BRK, PULSE, 100HZ,
074500000	MANUAL, ADDENDUM, T200UP
074540100	DOM, w/SOFTWARE, STD, T200UP *
075250000	KIT, MANUAL, OPERATORS, T200UP
CN0000073	POWER ENTRY, 120/60 (KB)
FL0000001	FILTER, SS (KB)
FL0000003	FILTER, DFU (KB)
FM0000004	FLOWMETER (KB)
FT0000010	CONNECTOR-ORING, SS, 1/8" (KB)
HW0000005	FOOT
HW0000020	SPRING
HW0000030	ISOLATOR
HW0000036	TFE TAPE, 1/4" (48 FT/ROLL)
HW0000099	STANDOFF, #6-32X.5, HEX SS M/F
HW0000101	ISOLATOR
HW0000453	SUPPORT, CIRCUIT BD, 3/16" ICOP
KIT000051	AKIT, REBUILD, RX CELL AMBIENT
KIT000095	AKIT, REPLACEMENT COOLER
KIT000156	OPTION, CARRYING HANDLE
KIT000253	ASSY & TEST, SPARE PS37
KIT000254	ASSY & TEST, SPARE PS38
KIT000328	AKIT, REPLACEMENT, DIODE ARRAY, OP40
OR0000001	ORING, 2-006VT *(KB)
OR0000002	ORING, 2-023V
OR0000025	ORING, 2-133V
OR0000027	ORING, 2-042V
OR0000034	ORING, 2-011V FT10

T200UP Spare Parts List

(Reference: 07455 1/31/2012 2:45p)

PARTNUMBER	DESCRIPTION
OR0000039	ORING, 2-012V
OR0000044	ORING, 2-125V
OR0000046	ORING, 2-019V
OR0000083	ORING, 105M, 1MM W X 5 MM ID, VITON(KB)
OR0000086	ORING, 2-006, CV-75 COMPOUND(KB)
OR0000094	ORING, 2-228V, 50 DURO VITON(KB)
PS0000044	PS, AC-DC, 100W SWITCHING (2.5x4.5), 24V
PU0000047	PUMP, THOMAS 2688VE44, 2 HEAD, 115V/60HZ
PU0000048	PUMP, THOMAS 2688VGH144, 230V 50/60HZ CE
PU0000083	KIT, REBUILD, PU80, PU81, PU82
RL0000015	RELAY, DPDT, (KB)
SW0000025	SWITCH, POWER, CIRC BREAK, VDE/CE *(KB)
WR0000008	POWER CORD, 10A(KB)

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Appendix C
Warranty/Repair Questionnaire
T200U/UP and M200EU/EUP
(06863C, DCN6371)



TELEDYNE
ADVANCED POLLUTION INSTRUMENTATION
A Teledyne Technologies Company

CUSTOMER: _____ PHONE: _____

CONTACT NAME: _____ FAX NO. _____

SITE ADDRESS: _____

MODEL SERIAL NO.: _____ FIRMWARE REVISION: _____

1. ARE THERE ANY FAILURE MESSAGES? _____

PLEASE COMPLETE THE FOLLOWING TABLE: (NOTE: DEPENDING ON OPTIONS INSTALLED, NOT ALL TEST PARAMETERS SHOWN BELOW WILL BE AVAILABLE IN YOUR INSTRUMENT)

*IF OPTION IS INSTALLED

PARAMETER	RECORDED VALUE	ACCEPTABLE VALUE
RANGE	PPB	5 PPB TO 2,000 PPB
NO_x STAB	PPB	≤ 0.1 PPB WITH ZERO AIR
SAMPLE FLOW	CM ³	1,100 ± 110
OZONE FLOW	CM ³	80 ± 15
PMT SIGNAL WITH ZERO AIR	MV	-20 TO 150
PMT SIGNAL AT SPAN GAS CONC	MV	0-5,000MV
	PPB	0-2,000 PPB
NORM PMT SIGNAL AT SPAN GAS CONC	MV	0-5,000MV
	PPB	0-2,000PPB
PREREACTION	MV	-20 TO 150
HVPS	V	400 – 900
RCELL TEMP	°C	40 ± 1
BOX TEMP	°C	AMBIENT ± 5°C
PMT TEMP	°C	5 ± 2°C
MF TEMP	°C	40 ± 1°C
U/EU models only: MOLY TEMP	°C	315 ± 5°C
UP/EUP models only: O3KL TEMP	°C	200 ± 5°C
RCEL PRESS	IN-HG-A	<4" (CONSTANT)
SAMP PRESS	IN-HG-A	~ 1-5" < AMBIENT (CONSTANT)
NO_x SLOPE		1.0 ± 0.3
NO_x OFFSET		-50 TO 50
NO SLOPE		1.0 ± 0.3
NO OFFSET		-50 TO 50
E TEST	PMT MV	2000 ± 1000
O TEST	PMT MV	2000 ± 1000
In the CAL>CONC>CONV menu:		
NO2A (value input for low NO ₂ cal)		
SETA (CE for low NO ₂)		Should be >0.4 of NO2A
NO2B (value input for high NO ₂ cal)		
SETB (CE for NO ₂ cal)		Should be >0.4 of NO2B

TELEDYNE API CUSTOMER SERVICE

EMAIL: api-customerservice@teledyne.com

PHONE: (858) 657-9800 TOLL FREE: (800) 324-5190 FAX: (858) 657-9816

Appendix C
Warranty/Repair Questionnaire
T200U/UP and M200EU/EUP
 (06863C, DCN6371)



TELEDYNE
 ADVANCED POLLUTION INSTRUMENTATION
 A Teledyne Technologies Company

PARAMETER	RECORDED VALUE	ACCEPTABLE VALUE
Values in the Signal I/O:		
REF_4096_MV	MV	4096mv ±2mv and Must be Stable
REF_GND	MV	0± 0.5 and Must be Stable

2. WHAT ARE THE RCELL & SAMPLE PRESSURES WITH THE SAMPLE INLET ON REAR OF MACHINE CAPPED?

RCELL PRESS - _____ IN-HG-A **SAMPLE PRESSURE** - _____ IN-HG-A

3. WHAT ARE THE FAILURE SYMPTOMS? _____

4. WHAT TEST(S) HAVE YOU DONE TRYING TO SOLVE THE PROBLEM? _____

5. IF POSSIBLE, PLEASE INCLUDE A PORTION OF A STRIP CHART PERTAINING TO THE PROBLEM. CIRCLE PERTINENT DATA.

THANK YOU FOR PROVIDING THIS INFORMATION. YOUR ASSISTANCE ENABLES TELEDYNE API TO RESPOND FASTER TO THE PROBLEM THAT YOU ARE ENCOUNTERING.

TELEDYNE API CUSTOMER SERVICE
 EMAIL: api-customerservice@teledyne.com
 PHONE: (858) 657-9800 TOLL FREE: (800) 324-5190 FAX: (858) 657-9816

APPENDIX D – Wire List and Electronic Schematics

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T200UP INTERCONNECT LIST

(Reference: 0745701A DCN5833)

Cable Part #	Signal	CONNECTION FROM				CONNECTION TO			
		Assembly	PN	J/P	Pin	Assembly	PN	J/P	Pin
036490400	CBL, AC POWER								
	AC Line	Power Entry	CN0000073		L	Power Switch	SW0000025		L
	AC Neutral	Power Entry	CN0000073		N	Power Switch	SW0000025		N
	Power Grnd	Power Entry	CN0000073			Shield	SW0000025		
	Power Grnd	Power Entry	CN0000073			Chassis			
	AC Line Switched	Power Switch	SW0000025		L	PS2 (+12)	060820000	SK2	1
	AC Neutral Switched	Power Switch	SW0000025		N	PS2 (+12)	060820000	SK2	3
	Power Grnd	Power Entry	CN0000073			PS2 (+12)	060820000	SK2	2
	AC Line Switched	Power Switch	SW0000025		L	PS3 (24V)	PS0000044	SK2	1
	AC Neutral Switched	Power Switch	SW0000025		N	PS3 (24V)	PS0000044	SK2	3
	Power Grnd	Power Entry	CN0000073			PS3 (24V)	PS0000044	SK2	2
	AC Line Switched	Power Switch	SW0000025		L	PS1 (+5, ±15)	068010000	SK2	1
	AC Neutral Switched	Power Switch	SW0000025		N	PS1 (+5, ±15)	068010000	SK2	3
	Power Grnd	Power Entry	CN0000073			PS1 (+5, ±15)	068010000	SK2	2
	AC Line Switched	Power Switch	SW0000025		L	Relay PCA	045230100	J1	1
	AC Neutral Switched	Power Switch	SW0000025		N	Relay PCA	045230100	J1	3
	Power Grnd	Power Entry	CN0000073			Relay PCA	045230100	J1	2
03829	CBL, DC POWER TO MOTHERBOARD								
	DGND	Relay PCA	045230100	P7	1	Motherboard	058021100	P15	1
	+5V	Relay PCA	045230100	P7	2	Motherboard	058021100	P15	2
	AGND	Relay PCA	045230100	P7	3	Motherboard	058021100	P15	3
	+15V	Relay PCA	045230100	P7	4	Motherboard	058021100	P15	4
	AGND	Relay PCA	045230100	P7	5	Motherboard	058021100	P15	5
	-15V	Relay PCA	045230100	P7	6	Motherboard	058021100	P15	6
	+12V RET	Relay PCA	045230100	P7	7	Motherboard	058021100	P15	7
	+12V	Relay PCA	045230100	P7	8	Motherboard	058021100	P15	8
	Chassis Gnd	Relay PCA	045230100	P7	10	Motherboard	058021100	P15	9
04021	CBL, PREAMP, O2 SENSOR, O3 GEN, FAN, RELAY PCA & MOTHERBOARD								
	+15V	Relay PCA	045230100	P12	4	Ozone generator	07228XXXX	P1	4
	AGND	Relay PCA	045230100	P12	3	Ozone generator	07228XXXX	P1	5
	+12V	Relay PCA	045230100	P12	8	PMT cooling fan	013140000	P1	1
	+12V RET	Relay PCA	045230100	P12	7	PMT cooling fan	013140000	P1	2
	O3GEN enable signal	Motherboard	058021100	P108	15	Ozone generator	07228XXXX	P1	6
	ETEST	Motherboard	058021100	P108	8	Preamp PCA	041800600	P6	1
	OTEST	Motherboard	058021100	P108	16	Preamp PCA	041800600	P6	2
	PHYSICAL RANGE	Motherboard	058021100	P108	7	Preamp PCA	041800600	P6	4
	PMT TEMP	Motherboard	058021100	P109	4	Preamp PCA	041800600	P6	5
	HVPS	Motherboard	058021100	P109	5	Preamp PCA	041800600	P6	6
	PMT SIGNAL+	Motherboard	058021100	P109	6	Preamp PCA	041800600	P6	7
	AGND	Motherboard	058021100	P109	11	Preamp PCA	041800600	P6	S
04022	CBL, DC POWER, FANM KEYBOARD, TEC, SENSOR PCA								
	TEC +12V	TEC PCA	049310100	P1	1	Relay PCA	045230100	P10	8
	TEC +12V RET	TEC PCA	049310100	P1	2	Relay PCA	045230100	P10	7
	DGND	LCD Interface PCA	066970000	P14	8	Relay PCA	045230100	P10	1
	+5V	LCD Interface PCA	066970000	P14	1	Relay PCA	045230100	P10	2
	DGND	LCD Interface PCA	066970000	P14	2	Relay PCA	045230100	P11	1
	+5V	LCD Interface PCA	066970000	P14	3	Relay PCA	045230100	P11	2
	+12V RET	Chassis fan	040010000	P1	1	Relay PCA	045230100	P11	7
	+12V	Chassis fan	040010000	P1	2	Relay PCA	045230100	P11	8
	P/Flow Sensor AGND	P/Flow Sensor PCA	040030800	P1	3	Relay PCA	045230100	P11	3
	P/Flow Sensor +15V	P/Flow Sensor PCA	040030800	P1	6	Relay PCA	045230100	P11	4
	Pressure signal 1	P/Flow Sensor PCA	040030800	P1	2	Motherboard	058021100	P110	6
	Pressure signal 2	P/Flow Sensor PCA	040030800	P1	4	Motherboard	058021100	P110	5
	Flow signal 1	P/Flow Sensor PCA	040030800	P1	5	Motherboard	058021100	P110	4
	Flow signal 2	P/Flow Sensor PCA	040030800	P1	1	Motherboard	058021100	P110	3
	Shield	P/Flow Sensor PCA	040030800	P1	S	Motherboard	058021100	P110	12
	Shield	Motherboard	058021100	P110	9	Relay PCA	045230100	P17	S
	Thermocouple signal 1	Motherboard	058021100	P110	2	Relay PCA	045230100	P17	1
	TC 1 signal DGND	Motherboard	058021100	P110	8	Relay PCA	045230100	P17	2
	Thermocouple signal 2	Motherboard	058021100	P110	1	Relay PCA	045230100	P17	3
	TC 2 signal DGND	Motherboard	058021100	P110	7	Relay PCA	045230100	P17	4

T200UP INTERCONNECT LIST

(Reference: 0745701A DCN5833)

Cable Part #	Signal	CONNECTION FROM				CONNECTION TO			
		Assembly	PN	J/P	Pin	Assembly	PN	J/P	Pin
04023	CBL, I2C, RELAY PCA TO MOTHERBOARD								
	I2C Serial Clock	Motherboard	058021100	P107	3	Relay PCA	045230100	P3	1
	I2C Serial Data	Motherboard	058021100	P107	5	Relay PCA	045230100	P3	2
	I2C Reset	Motherboard	058021100	P107	2	Relay PCA	045230100	P3	4
	I2C Shield	Motherboard	058021100	P107	6	Relay PCA	045230100	P3	5
04024	CBL, NOX, ZERO/SPAN, IZS VALVES								
	Zero/Span valve +12V	Relay PCA	045230100	P4	1	Zero/Span valve	042680100	P1	1
	Zero/Span valve +12V RET	Relay PCA	045230100	P4	2	Zero/Span valve	042680100	P1	2
	Sample valve +12V	Relay PCA	045230100	P4	3	Sample valve	042680100	P1	1
	Sample valve +12V RET	Relay PCA	045230100	P4	4	Sample valve	042680100	P1	2
	AutoZero valve +12V	Relay PCA	045230100	P4	5	AutoZero valve	042680100	P1	1
	AutoZero valve +12V RET	Relay PCA	045230100	P4	6	AutoZero valve	042680100	P1	2
	NONOx valve +12V	Relay PCA	045230100	P4	7	NONOx valve	042680100	P1	1
	NONOx valve +12V RET	Relay PCA	045230100	P4	8	NONOx valve	042680100	P1	2
0402603	CBL, IZS & O2 SENSOR HEATERS/THERMISTORS, REACTION CELL & MANIFOLD THERMISTORS								
	Rcell thermistor A	Motherboard	058021100	P27	7	Reaction cell thermistor	041920000	P1	2
	Rcell thermistor B	Motherboard	058021100	P27	14	Reaction cell thermistor	041920000	P1	1
	CO2 thermistor A	Motherboard	058021100	P27	6	CO2 thermistor/htr	06693	P1	2
	CO2 thermistor B	Motherboard	058021100	P27	13	CO2 thermistor/htr	06693	P1	3
	CO2 heater L	Relay PCA	045230100	P18	1	CO2 thermistor/htr	06693	P1	4
	CO2 heater L	Relay PCA	045230100	P18	2	CO2 thermistor/htr	06693	P1	1
	CO2 heater L	Relay PCA	045230100	P18	11				
	O2 sensor heater	Relay PCA	045230100	P18	6	O2 sensor therm./heater	043420000	P1	4
	O2 sensor heater	Relay PCA	045230100	P18	7	O2 sensor therm./heater	043420000	P1	2
	Shield	Relay PCA	045230100	P18	12	O2 sensor therm./heater	043420000	P1	
	O2 sensor thermistor A	Motherboard	058021100	P27	4	O2 sensor therm./heater	043420000	P1	3
	O2 sensor thermistor B	Motherboard	058021100	P27	11	O2 sensor therm./heater	043420000	P1	1
	By/dil. man. thermistor A	Motherboard	058021100	P27	1	Manifold thermistor	043420000	P1	1
	By/dil. man. thermistor B	Motherboard	058021100	P27	8	Manifold thermistor	043420000	P1	2
	Configuration jumper intern.	Relay PCA	045230100	P18	3	Relay PCA	045230100	P18	4
	Configuration jumper intern.	Relay PCA	045230100	P18	8	Relay PCA	045230100	P18	9
04027	CBL, NO2 CONVERTER, REACTION CELL & MANIFOLD HEATERS								
	Bypass/dil. manifold heater L	Manifold heater 1	044340000	P1	1	Relay PCA	045230100	P2	11
	Bypass/dil. manifold heater N	Manifold heater 1	044340000	P1	2	Relay PCA	045230100	P2	12
	Bypass/dil. manifold heater L	Relay PCA	045230100	P2	11	Manifold heater 2	044340000	P1	1
	Bypass/dil. manifold heater N	Relay PCA	045230100	P2	15	Manifold heater 2	044340000	P1	2
	Moly heater A	Relay PCA	045230100	P2	7	Moly heater A	039700100	P1	1
	Moly heater C	Relay PCA	045230100	P2	6	Moly heater C	039700100	P1	2
	Moly heater B	Relay PCA	045230100	P2	10	Moly heater B	039700100	P1	3
	Configuration jumper intern.	Relay PCA	045230100	P2	13	Relay PCA	045230100	P2	14
	Configuration jumper intern.	Relay PCA	045230100	P2	8	Relay PCA	045230100	P2	9
	Reaction cell heater/switch	Relay PCA	045230100	P2	1	Reaction cell heater 1B	040400000	P1	4
	Reaction cell heater/switch	Relay PCA	045230100	P2	1	Reaction cell heater 2B	040400000	P1	6
	Reaction cell heater/switch	Relay PCA	045230100	P2	2	Reaction cell heater 1A	040400000	P1	3
	Reaction cell heater/switch	Relay PCA	045230100	P2	3	Reaction cell heat switch	040400000	P1	1
	Reaction cell heater/switch	Relay PCA	045230100	P2	4	Reaction cell heat switch	040400000	P1	2
	Reaction cell heater/switch	Relay PCA	045230100	P2	5	Reaction cell heater 2A	040400000	P1	5
04105	CBL, KEYBOARD, DISPLAY TO MOTHERBOARD								
	Kbd Interrupt	LCD Interface PCA	066970000	J1	7	Motherboard	058021100	J106	1
	DGND	LCD Interface PCA	066970000	J1	2	Motherboard	058021100	J106	8
	SDA	LCD Interface PCA	066970000	J1	5	Motherboard	058021100	J106	2
	SCL	LCD Interface PCA	066970000	J1	6	Motherboard	058021100	J106	6
	Shld	LCD Interface PCA	066970000	J1	10	Motherboard	058021100	J106	5
04176	CBL, DC POWER TO RELAY PCA								
	DGND	Relay PCA	045230100	P8	1	Power Supply Triple	068010000	J1	3
	+5V	Relay PCA	045230100	P8	2	Power Supply Triple	068010000	J1	1
	+15V	Relay PCA	045230100	P8	4	Power Supply Triple	068010000	J1	6
	AGND	Relay PCA	045230100	P8	5	Power Supply Triple	068010000	J1	4
	-15V	Relay PCA	045230100	P8	6	Power Supply Triple	068010000	J1	5
	+12V RET	Relay PCA	045230100	P8	7	Power Supply Single	068020000	J1	3
	+12V	Relay PCA	045230100	P8	8	Power Supply Single	068020000	J1	1

T200UP INTERCONNECT LIST

(Reference: 0745701A DCN5833)

Cable Part #	Signal	CONNECTION FROM				CONNECTION TO			
		Assembly	PN	J/P	Pin	Assembly	PN	J/P	Pin
04433	CBL, PREAMPLIFIER TO RELAY PCA								
	Preamplifier DGND	Relay PCA	045230100	P9	1	Preamp PCA	041800600	P5	1
	Preamplifier +5V	Relay PCA	045230100	P9	2	Preamp PCA	041800600	P5	2
	Preamplifier AGND	Relay PCA	045230100	P9	3	Preamp PCA	041800600	P5	3
	Preamplifier +15V	Relay PCA	045230100	P9	4	Preamp PCA	041800600	P5	4
	Preamplifier -15V	Relay PCA	045230100	P9	6	Preamp PCA	041800600	P5	6
04437	CBL, PREAMPLIFIER TO TEC								
	Preamp TEC drive VREF	Preamp PCA	041800600	J1	1	TEC PCA	049310100	J3	1
	Preamp TEC drive CTRL	Preamp PCA	041800600	J1	2	TEC PCA	049310100	J3	2
	Preamp TEC drive AGND	Preamp PCA	041800600	J1	3	TEC PCA	049310100	J3	3
04671	CBL, MOTHERBOARD TO XMITTER BD (MULTIDROP OPTION)								
	GND	Motherboard	058021100	P12	2	Xmitter bd w/Multidrop	069500000	J4	2
	RX0	Motherboard	058021100	P12	14	Xmitter bd w/Multidrop	069500000	J4	14
	RTS0	Motherboard	058021100	P12	13	Xmitter bd w/Multidrop	069500000	J4	13
	TX0	Motherboard	058021100	P12	12	Xmitter bd w/Multidrop	069500000	J4	12
	CTS0	Motherboard	058021100	P12	11	Xmitter bd w/Multidrop	069500000	J4	11
	RS-GND0	Motherboard	058021100	P12	10	Xmitter bd w/Multidrop	069500000	J4	10
	RTS1	Motherboard	058021100	P12	8	Xmitter bd w/Multidrop	069500000	J4	8
	CTS1/485-	Motherboard	058021100	P12	6	Xmitter bd w/Multidrop	069500000	J4	6
	RX1	Motherboard	058021100	P12	9	Xmitter bd w/Multidrop	069500000	J4	9
	TX1/485+	Motherboard	058021100	P12	7	Xmitter bd w/Multidrop	069500000	J4	7
	RS-GND1	Motherboard	058021100	P12	5	Xmitter bd w/Multidrop	069500000	J4	5
	RX1	Motherboard	058021100	P12	9	Xmitter bd w/Multidrop	069500000	J4	9
	TX1/485+	Motherboard	058021100	P12	7	Xmitter bd w/Multidrop	069500000	J4	7
	RS-GND1	Motherboard	058021100	P12	5	Xmitter bd w/Multidrop	069500000	J4	5
06737	CBL, I2C to AUX I/O (ANALOG IN OPTION)								
	ATX+	AUX I/O PCA	067300000	J2	1	Motherboard	058021100	J106	1
	ATX-	AUX I/O PCA	067300000	J2	2	Motherboard	058021100	J106	2
	LED0	AUX I/O PCA	067300000	J2	3	Motherboard	058021100	J106	3
	ARX+	AUX I/O PCA	067300000	J2	4	Motherboard	058021100	J106	4
	ARX-	AUX I/O PCA	067300000	J2	5	Motherboard	058021100	J106	5
	LED0+	AUX I/O PCA	067300000	J2	6	Motherboard	058021100	J106	6
	LED1+	AUX I/O PCA	067300000	J2	8	Motherboard	058021100	J106	8
06738	CBL, CPU COM to AUX I/O (USB OPTION)								
	RXD1	CPU PCA	067240000	COM1	1	AUX I/O PCA	0673000 or -02	J3	1
	DCD1	CPU PCA	067240000	COM1	2	AUX I/O PCA	0673000 or -02	J3	2
	DTR1	CPU PCA	067240000	COM1	3	AUX I/O PCA	0673000 or -02	J3	3
	TXD1	CPU PCA	067240000	COM1	4	AUX I/O PCA	0673000 or -02	J3	4
	DSR1	CPU PCA	067240000	COM1	5	AUX I/O PCA	0673000 or -02	J3	5
	GND	CPU PCA	067240000	COM1	6	AUX I/O PCA	0673000 or -02	J3	6
	CTS1	CPU PCA	067240000	COM1	7	AUX I/O PCA	0673000 or -02	J3	7
	RTS1	CPU PCA	067240000	COM1	8	AUX I/O PCA	0673000 or -02	J3	8
	RI1	CPU PCA	067240000	COM1	10	AUX I/O PCA	0673000 or -02	J3	10
06738	CBL, CPU COM to AUX I/O (MULTIDROP OPTION)								
	RXD	CPU PCA	067240000	COM1	1	Xmitter bd w/Multidrop	069500000	J3	1
	DCD	CPU PCA	067240000	COM1	2	Xmitter bd w/Multidrop	069500000	J3	2
	DTR	CPU PCA	067240000	COM1	3	Xmitter bd w/Multidrop	069500000	J3	3
	TXD	CPU PCA	067240000	COM1	4	Xmitter bd w/Multidrop	069500000	J3	4
	DSR	CPU PCA	067240000	COM1	5	Xmitter bd w/Multidrop	069500000	J3	5
	GND	CPU PCA	067240000	COM1	6	Xmitter bd w/Multidrop	069500000	J3	6
	CTS	CPU PCA	067240000	COM1	7	Xmitter bd w/Multidrop	069500000	J3	7
	RTS	CPU PCA	067240000	COM1	8	Xmitter bd w/Multidrop	069500000	J3	8
	RI	CPU PCA	067240000	COM1	10	Xmitter bd w/Multidrop	069500000	J3	10

T200UP INTERCONNECT LIST

(Reference: 0745701A DCN5833)

Cable Part #	Signal	CONNECTION FROM				CONNECTION TO			
		Assembly	PN	J/P	Pin	Assembly	PN	J/P	Pin
06739	CBL, CPU LAN TO AUX I/O PCA								
	ATX-	CPU PCA	067240000	LAN	1	AUX I/O PCA	06730XXXX	J2	1
	ATX+	CPU PCA	067240000	LAN	2	AUX I/O PCA	06730XXXX	J2	2
	LED0	CPU PCA	067240000	LAN	3	AUX I/O PCA	06730XXXX	J2	3
	ARX+	CPU PCA	067240000	LAN	4	AUX I/O PCA	06730XXXX	J2	4
	ARX-	CPU PCA	067240000	LAN	5	AUX I/O PCA	06730XXXX	J2	5
	LED0+	CPU PCA	067240000	LAN	6	AUX I/O PCA	06730XXXX	J2	6
	LED1	CPU PCA	067240000	LAN	7	AUX I/O PCA	06730XXXX	J2	7
	LED1+	CPU PCA	067240000	LAN	8	AUX I/O PCA	06730XXXX	J2	8
06741	CBL, CPU USB to Front Panel								
	GND	CPU PCA	067240000	USB	8	LCD Interface PCA	066970000	JP9	
	LUSBD3+	CPU PCA	067240000	USB	6	LCD Interface PCA	066970000	JP9	
	LUSBD3-	CPU PCA	067240000	USB	4	LCD Interface PCA	066970000	JP9	
	VCC	CPU PCA	067240000	USB	2	LCD Interface PCA	066970000	JP9	
06746	CBL, MB TO 06154 CPU								
	GND	Motherboard	058021100	P12	2	Shield			
	RX0	Motherboard	058021100	P12	14	CPU PCA	067240000	COM1	1
	RTS0	Motherboard	058021100	P12	13	CPU PCA	067240000	COM1	8
	TX0	Motherboard	058021100	P12	12	CPU PCA	067240000	COM1	4
	CTS0	Motherboard	058021100	P12	11	CPU PCA	067240000	COM1	7
	RS-GND0	Motherboard	058021100	P12	10	CPU PCA	067240000	COM1	6
	RTS1	Motherboard	058021100	P12	8	CPU PCA	067240000	COM2	8
	CTS1/485-	Motherboard	058021100	P12	6	CPU PCA	067240000	COM2	7
	RX1	Motherboard	058021100	P12	9	CPU PCA	067240000	COM2	1
	TX1/485+	Motherboard	058021100	P12	7	CPU PCA	067240000	COM2	4
	RS-GND1	Motherboard	058021100	P12	5	CPU PCA	067240000	COM2	6
	RX1	Motherboard	058021100	P12	9	CPU PCA	067240000	485	1
	TX1/485+	Motherboard	058021100	P12	7	CPU PCA	067240000	485	2
	RS-GND1	Motherboard	058021100	P12	5	CPU PCA	067240000	485	3
07452	CBL, PHOTOLYTIC DC PWR, T200UP								
		Relay PCA	045230100	P1	5	PS3 (24V)	PS0000044	SK1	1
		Relay PCA	045230100	P1	10	PS3 (24V)	PS0000044	SK1	5
		Relay PCA	045230100	P1	4	Relay PCA	045230100	P8	9
WR256	CBL, TRANSMITTER TO INTERFACE								
		LCD Interface PCA	066970000	J15		Transmitter PCA	068810000	J1	

