Installation & Operation Manual

TRS Series Day Tank

Serial # _____

UL Listed # _____

Order # _____

Installation & Operation Manual:
Day Tank – TRS Series

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Thank you for choosing Tramont

Included in this manual

- Standard TRS day tank parts
- System 2000PLUS™ ECM
- Installation diagram: Main tank below ground
- Installation diagram: Main tank above ground
- Generic Tramont day tank diagrams
- Tramont day tank specifications
- System 2000PLUS™ specifications
- Standard pump and motor specifications
- Day tank pump capabilities
- Electrical installation guide
- Pump head worksheet: Pump below main tank
- Pump head worksheet: Pump above main tank
- Mechanical and plumbing guide
- System 2000PLUS sequence of operation
- System 2000PLUS problem report
- Warranty

Warning

This tank has been pressure tested from 3 to 5 psi for weld integrity. However, it has not been designed as a pressure vessel.

This tank was designed, manufactured and intended for diesel fuel only.

This tank is intended for stationary installations only.

The overflow fitting of this atmospheric day tank must be plumbed in a continuous downward path to the main tank without downsizing.

During an overfill condition, any upward plumbing will result in an undesirable fuel pressure situation. This may result in a Diesel Fuel Spill.

If a continuous downward path is impossible, consult installation guide or factory for overflow safety requirements (Installation for main tank above day tank).

NOTE: For convenience the drain can be plumbed (with a valve) into the overflow line.

WARNING: Optional Epoxy Lining
To prevent fuel contamination and deterioration of the epoxy lining, this tank must be allowed to properly cure. The curing time is seven (7) days from the time of application.

This tank lining was applied on_____

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The Tramont TRS Series is the industry standard in day tank systems. In addition to the precision engineering and quality construction that go into all of our systems, the TRS Series features the exclusive Tramont System 2000PLUS™ Electronic Control Module (ECM)

Standard Day Tank Parts
Listed below are parts currently standard on Tramont TRS day tanks. The parts on your tank may differ if optional accessories were ordered. For a complete list of parts with descriptions, consult the Tramont Spare Parts List, or contact Tramont.

TRS Series day tank

214080	1/3 HP, 115 VAC, 1 Phase, 60 Hz, Carbonator Mount Motor
214390	2 GPM Pump Carbonator Mount
216090	TRS Float Sensor
215740	TRS Inspection Plate and Gasket
216000	System 2000PLUS™ECM
215780	Poly Tank Cover

Heavy gauge steel construction, Gray painted exterior, rust-inhibitor coated interior.
Tank 1” NPT fittings are engine supply, engine return, overflow and alternate engine return. Other fittings include 2” NPT for normal vent, NPT sized appropriate for emergency vent, and on 3/8” NPT basin drain for tanks through 275 gal., 1” NPT for larger tanks. (If tank includes containment basin, alternate engine fitting omitted and drain provided on basin only).
Square 4 ½” inspection port located below electrical controls.

Commonly ordered options
While not standardly included on day tanks, these items are commonly requested on day tank orders.

216290	2” NPT Mushroom Cap with screen
216320 – 216360	Appropriately sized Emergency vent
216170	Fuel-in-Basin Switch

The System 2000PLUS™
The System 2000PLUS™ Electronic Control Module (ECM) gives you state-of-the-art control of your day tank system. The System 2000PLUS™ is standardly included on all Tramont TRS Series day tanks. This UL Listed, microprocessor-based ECM represents a significant advance in fuel system control. Old-style controllers utilize individual, elctro-mechanical float switches for each monitoring function. A malfunction can go undetected for months or years until there is a crisis. System 2000PLUS™ is self diagnostic, and features a single sensor for all functions. It lets you know immediately if there is a problem. You have time to react, avoiding a costly disruption. System 2000PLUS™ gives you fast, accurate, comprehensive monitoring – and is available exclusively from Tramont.

System 2000PLUS™ Standard Features
UL 508 Listed
Operates on standard 120VAC, 1 phase system, 50/60 Hz.
LED indicators for all functions
Fuel level sensor
Motor control relay with LED signal, rated up to 1/2HP
High and low fuel level warnings
Critical low fuel level warning for engine shutoff
Fuel-in-rupture-basin warning interface
ECM functional signal
Manual control with On, Off and Test buttons
Secure internal test button for testing warning LEDs and remote annunciation of warnings

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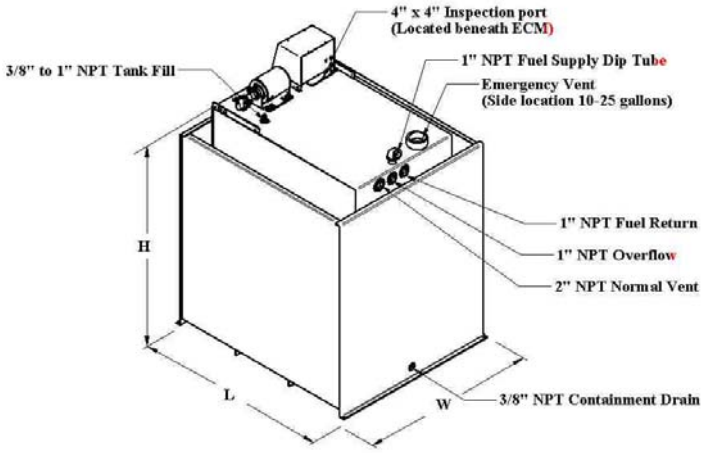

Dimensions for standard Day Tanks are listed below. Please consult a Tramont service representative if your application requires special dimensions.

Fuel Containment basins for day tanks are optional, most day tank users include them to satisfy local code requirements.
Basins are available in standard sizes of 150% and 200% of the tank capacity. A 150% capacity basin is adequate for most applications; however, some jurisdictions require a 200% capacity basin. Check with your local fire marshal or other code enforcement authorities to verify basin requirements. There are two types of containment, open top rupture and closed top double wall basins.

Tank Capacity		Steel Gauge	Emergency Vent NPT	Tank Dimensions Inches Single Wall			Weight Lbs.		
Gallons	(Liters)			Length	Width	Height	TRS	TRE	TRX
10	(38)	12	2	12	24	12	70	63	48
15	(57)	12	2	12	24	16	79	72	57
25	(95)	12	2	12	24	24	98	91	76
50	(189)	12	2	18	24	31	136	129	114
60	(227)	12	2	20	24	31	143	136	121
75	(284)	12	2	24	24	31	158	151	136
100	(378)	12	3	24	24	44	199	192	177
150	(568)	12	3	36	24	44	252	245	230
200	(757)	12	3	46	24	44	297	290	275
275	(1041)	12	4	66	24	44	386	379	364
300	(1136)	12	4	40	36	50	366	359	344
350	(1325)	12	4	46	36	50	400	393	378
400	(1514)	12	4	55	36	50	451	444	429
450	(1703)	12	4	61	36	50	485	478	463
500	(1893)	12	4	68	36	50	524	517	502
550	(2082)	10	4	74	36	50	711	704	689
600	(2271)	10	5	81	36	50	762	755	740
700	(2650)	10	5	70	48	50	804	797	782
800	(3028)	10	5	80	48	50	886	879	864
900	(3407)	10	5	90	48	50	969	962	947
1000	(3785)	10	5	100	48	50	1052	1045	1030

Rupture Basi
A rupture basin i
open top. The da
tank is placed in
basin. Because
and debris can c
in the containme
area, rupture ba
are used only fo
indoor applicatio

Double Wall
A double wall ba
closed top. The top is sealed and welded into place. An additional pressure relief vent cap is required to vent the containment area. Double wall tanks typically are used in outdoor applications. Local codes may require a double wall for indoor applications. Other options may be required to dually weatherproof the tank.

Refer to CHARTS on following page for Basin Sizing

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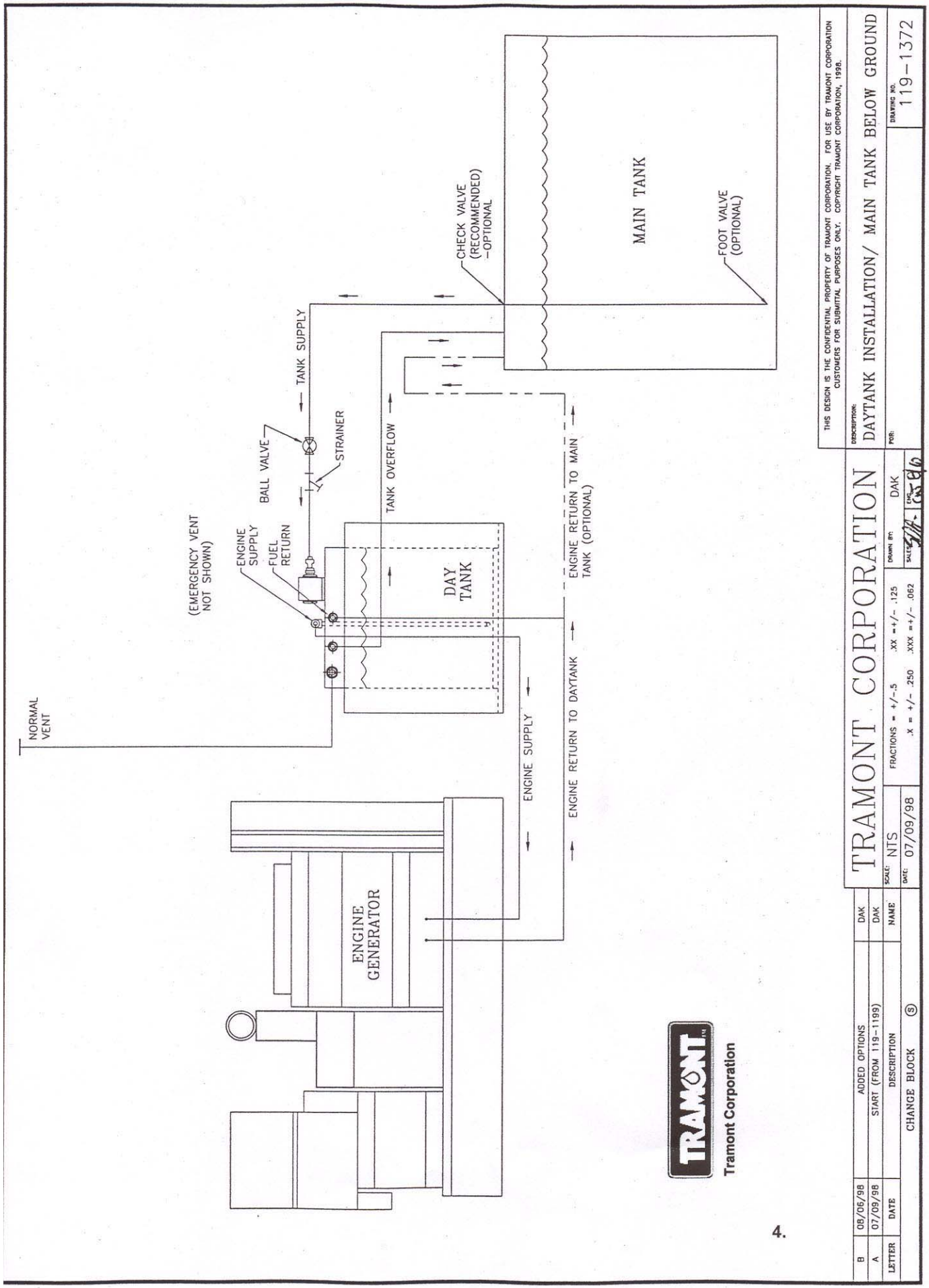
Tank Capacity		150% Containment Option #		Tank Dimensions Inches 150% Open or Double Wall			Weight Lbs. 150% Open or Double Wall		
		Open Top	Double						
Gallons	(Liters)	Basin	Wall	Length	Width	Height	TRS	TRE	TRX
10	(38)	2900	7000	16	36	13.5	137	130	115
15	(57)	2905	7005	16	36	17.5	160	153	138
25	(95)	2910	7010	16	36	25.5	206	199	184
50	(189)	2920	7015	22	36	32.5	293	286	271
60	(227)	2940	7020	28	36	32.5	325	318	303
75	(284)	2940	7020	28	36	32.5	340	333	318
100	(378)	2950	7030	28	36	45.5	440	433	418
150	(568)	2960	7035	40	36	45.5	554	547	532
200	(757)	2970	7040	50	36	45.5	650	643	628
275	(1041)	2990	7045	70	36	45.5	840	833	818
300	(1136)	2989	7050	45	48	51.5	795	788	773
350	(1325)	2991	7055	51	48	51.5	999	992	977
400	(1514)	2992	7060	60	48	51.5	1123	1116	1101
450	(1703)	2993	7065	66	48	51.5	1205	1198	1183
500	(1893)	2994	7070	73	48	51.5	1300	1293	1278
550	(2082)	2995	7075	79	48	51.5	1535	1528	1513
600	(2271)	2996	7080	86	48	51.5	1642	1635	1620
700	(2650)	2980	7085	84	60	51.5	1800	1793	1778
800	(3028)	2981	7090	96	60	51.5	1991	1984	1969
900	(3407)	2982	7095	108	60	51.5	2182	2175	2160
1000	(3785)	2983	7100	120	60	51.5	2373	2366	2351

Tank within Containment Only for Overall Height - Add 8" TRS or TRE/X Add 1.25"

Tank Capacity		200% Containment Option No.		Tank Dimensions Inches 200% Open or Double Wall			Weight Lbs. 200% Open or Double Wall		
		Open Top	Double						
Gallons	(Liters)	Basin	Wall	Length	Width	Height	TRS	TRE	TRX
10	(38)	2905	7005	16	36	12.5	218	211	196
15	(57)	2910	7010	16	36	20.5	268	261	246
25	(95)	2920	7015	22	36	27.5	363	356	341
50	(189)	2940	7020	28	36	27.5	475	468	453
60	(227)	2940	7020	28	36	27.5	507	500	485
75	(284)	2950	7030	28	36	41.5	581	574	559
100	(378)	2960	7035	40	36	41.5	742	735	720
150	(568)	2970	7040	50	36	41.5	907	900	885
200	(757)	2990	7045	70	36	41.5	1104	1097	1082
275	(1041)	2997	7046	70	48	41.5	1525	1518	1503
300	(1136)	2993	7065	66	48	47	1515	1508	1493
350	(1325)	2994	7070	73	48	47	1775	1768	1753
400	(1514)	2995	7075	79	48	47	1947	1940	1925
450	(1703)	2996	7080	86	48	47	2085	2078	2063
500	(1893)	2980	7085	84	60	47	2296	2289	2274
550	(2082)	2981	7090	96	60	47	2640	2633	2618
600	(2271)	2982	7095	108	60	47	2855	2848	2833
700	(2650)	2983	7100	120	60	47	3121	3114	3099
800	(3028)								
900	(3407)	**Consult Factory for 200% Containment Designs**							
1000	(3785)								

Tank within Containment Only for Overall Height - Add 8" TRS or TRE/X Add 1.25"


NORMAL VENT
(EMERGENCY VENT NOT SHOWN)
ENGINE SUPPLY
FUEL RETURN
BALL VALVE
STRAINER
TANK SUPPLY
TANK OVERFLOW
CHECK VALVE (RECOMMENDED) -OPTIONAL
FOOT VALVE (OPTIONAL)
MAIN TANK
DAY TANK
ENGINE RETURN TO MAIN TANK (OPTIONAL)
ENGINE SUPPLY
ENGINE RETURN TO DAYTANK
ENGINE GENERATOR
TRAMONT
Tramont Corporation
4.
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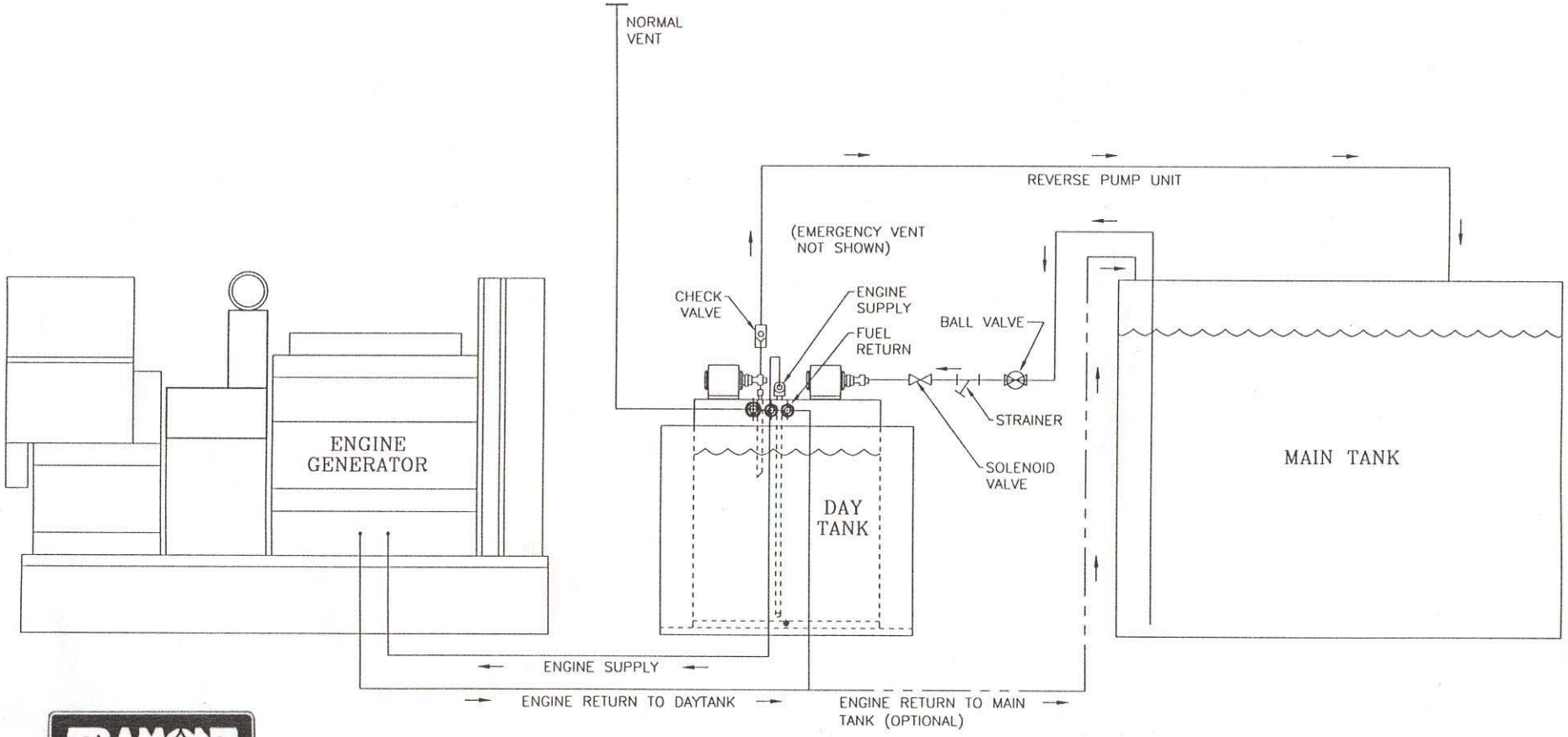
TRAMONT CORPORATION
DESCRIPTION: DAYTANK INSTALLATION/ MAIN TANK BELOW GROUND
FOR:
DRAWING NO. 119-1372
SCALE: NTS
DATE: 07/09/98
FRACTIONS = +/-.5 .XX =+/- .125 .XXX =+/- .062
.X = +/- .250
DRAWN BY: DAK
LETTER DATE DESCRIPTION NAME
B 08/06/98 ADDED OPTIONS DAK
A 07/09/98 START (FROM 119-1199) DAK
CHANGE BLOCK S



TRAMONT™

Tramont Corporation

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LETTER	DATE	DESCRIPTION	NAME
B	07/02/98	CHANGED THE FUEL RETURN PATH	DAK
A	05/29/98	START	DAK

CHANGE BLOCK (S)

TRAMONT CORPORATION

SCALE: NTS
DATE: 05/29/98

FRACTIONS = +/-.5 .XX =+/- .125
.X = +/- .250 .XXX =+/- .062

DRAWN BY: DAK
SALES:
ENG

DESCRIPTION: DAYTANK INSTALLATION/ MAIN TANK ABOVE GROUND

FOR:

DRAWING NO. 119-1199

Specification:
Day Tank Control System 2000PLUS™ ECM

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

General
This section covers the electrical description and installation of the standard TRAMONT electrical control module (ECM). Installation of the "SYSTEM 2000" should be performed by a qualified electrician. These specifications describe the standard "SYSTEM 2000" ECM as the most full featured UL508 listed fuel transfer system in the industry.

Description
The heart of the "SYSTEM 2000" ECM is an electrical analog float gauge sends a signal to the ECM for: fuel level indication, pump control, high fuel level warning, low fuel level warning, low fuel level shut off, fuel in rupture basin warning, low fuel in remote tank warning and an ECM function signal. All signals and warnings are provided with N.O. and N.C. contacts for remote annunciation. The ECM can be manually controlled by ON, OFF, and TEST push buttons. In addition, an internal test button allows for a periodic test of all warning LEDs and remote annunciation relays.

Functions
The purpose of the ECM is to maintain the fuel level of the day tank by controlling the pump/motor. The pump is off at the normal fuel level and is activated at 87% full. A "pump running" indicator LED is on when the pump is activated. A motor control relay is prewired to pump motor.

WARNING: When ECM "OFF" push button is engaged the unit is disabled, however, 120 VAC power is still present within the ECM indicated by the "power on" LED.

Options
Standard - UL 508 listed control module
1920 - Duplex pumping system. Adds 2nd pump and motor for safety redundancy. Control alternates lead pump.
1930 - Controls are available for 12 VDC operation. Single or duplex. Please consult factory for specifications.
1935 - Controls are available for 24 VDC operation. Single or duplex. Please consult factory for specifications.
3240 - Pump running contacts for remote annunciation.
3250 - Critical high shutdown. Separate float switch senses high fuel level, disengaging motor and closing N.C. solenoid valve. Warning relay supplied for remote annunciation.

Incoming Power
The ECM is powered by a customer-supplied 120 VAC line. Power terminals are accessible by removing four cover screws on the ECM and removing the ECM cover exposing the terminal strip. Wires should be run through knockout provided.

Level Sensor
The day tank's level is determined by an electrical analog float gauge located beneath the ECM. The sensor sends a 0-90ohm signal to the ECM, which converts this signal into a precise fuel level. Fuel level is indicated by nine incremental LEDs on the ECM from EMPTY to FULL.

Specification:
Day Tank Control System 2000PLUS™ ECM

Tramont Corporation
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Ph: 414.967.8800
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Alarms
The ECM has five standard alarm conditions. Each alarm is indicated locally by an LED and remotely by wiring to supplied relays. A normally open and normally closed contact is provided for customer connections. Contacts are rated at 1 amp tungsten, 120 VAC or 24 VDC.

A. High fuel - activates at 106% of normal fuel level with a two second change of state time delay.
B. Low fuel - activates at 62% of normal fuel level. This enables the customer time to react to a potential problem before low fuel shutdown occurs.
C. Low fuel shutdown - activates at 6% of normal fuel level. This enables customer to shut down engine generator before fuel runs out, preventing loss of prime or engine damage.
D. Fuel in rupture basin - with a rupture basin float switch, (option #2930) the ECM will signal if fuel is in the rupture (containment) basin.
E. ECM functional - the ECM performs many internal checks (including float sensor signal verification) to ensure proper operation. If a fault occurs, this LED will go out (or flash if an erratic signal is present) and de-energize the relay. It is suggested that the customer wire to the normally closed contact thereby providing a signal if a fault does occur.

Mode
There are four modes of operation on the ECM:

A. Off - This pushbutton disables the ECM for routine maintenance to the tank system without disrupting the ECM. **Caution:** ECM functional de-energizes, which can activate a customer alarm wired to this relay.
B. On - This pushbutton activates the ECM after the Off pushbutton has been depressed. On any initial power up condition, after a power outage, the ECM will automatically turn on.
C. Test - This pushbutton will test all front panel LEDs for three seconds and activate pump/motor for as long as the button is depressed. All alarm relays will not activate but will maintain their original state.
D. Internal test - This pushbutton, located inside the ECM, will test each LED and remote annunciation relay in sequential order - High fuel to ECM functional.
Note: It is recommended that both the external and internal test switch be activated as part of a periodic maintenance program to ensure reliable operation of the day tank.

Specification:
Day Tank Control System 2000PLUS™ ECM

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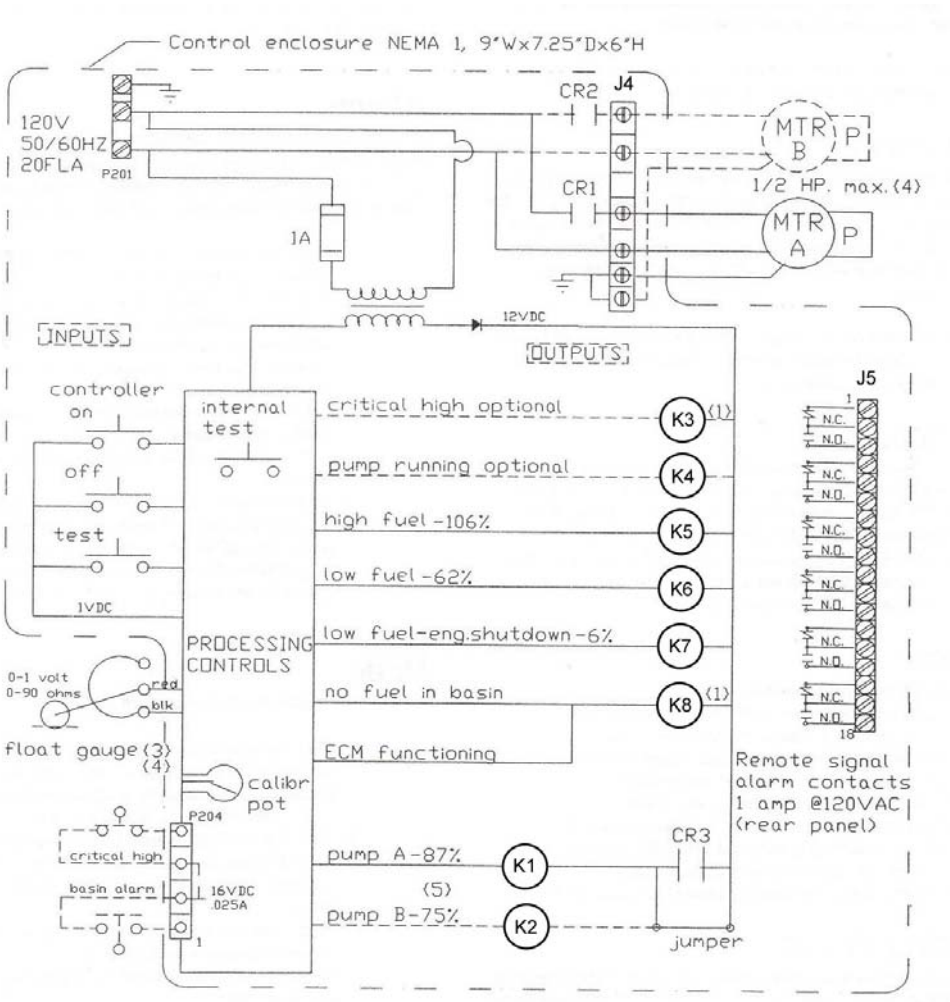
This ECM has been designed to supply the customer with all necessary options in a standard package. By following these installation guidelines a qualified electrician should be able to wire this unit into a generator control system providing the customer with complete monitoring and control over the day tank fuel transfer system.

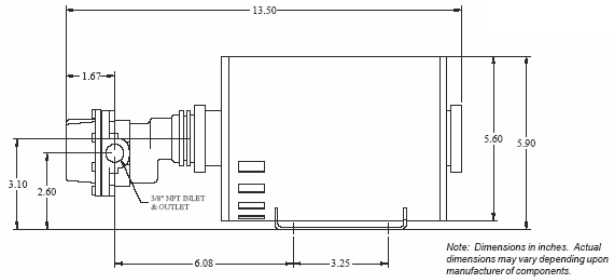


NOTES:
1. Relay is energized during normal operation.
2. Dashed line indicates optional controls.
3. The controller is normally mounted above the gauge, sitting on the day tank. However, the controller can be mounted up to 50' away from the tank and gauge using #16 gauge shielded twisted wire.
4. Motor starters are required above ½ HP.
5. Pump A and B alternate lead positions.
6. Warning: An inlet fuel strainer is highly recommended (#2230) to prevent fuel contamination, maintain fuel gauge integrity, and prolong the life of the pump.

Specification:
Standard Pump and Motor

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Standard Pump and Motor: Specifications



Pump: Heavy duty, 2GPM, self-priming, positive displacement rotary gear pump with corrosion-resistant bronze housing and gears with stainless steel shafts, self lubricating carbon bearings with lip seals. Mounted directed to motor via carbonator style split tang coupling.

Motor: 1/3 HP, open drip-proof (squirrel cage), single phase, auto-thermal protected, bearing supported shaft, Class B insulation for continuous 40 degree C operation, 115 VAC, 60 Hz. Motor rotation may be reversed by reversing wires.

Output: 2GPM at 20 psi (directly into tank) or 1.5GPM at 100 psi. 1 psi = 2.68 feet of head.

Lift: Pump is self-priming and rated at 20 feet of lift (diesel fuel) at sea level. However, pipe diameter, bends, restrictions, hot and cold ambient and other factors may reduce lift. Tramont therefore recommends that the pump/motor be remotely mounted to push fuel in applications requiring more than 17 feet of lift. To ensure continuous self-priming use of appropriately sized foot valve and/or check valve is recommended for all high-lift applications. To avoid damage to motor during start-up, Tramont recommends that the fuel be primed as closely as possible to the pump intake.

Pipe run: If a pipe run of 100 feet or more is required between the main tank and day tank, Tramont recommends the use of a check valve. This ensures that the pump does not have to evacuate a large volume of air during each operation. Even a very small leak in the pipe will prevent self-priming; therefore, Tramont strongly recommends that all pipelines receive a careful pressure check before start-up.

Fuel strainer: The Tramont pump is a high-lift, close tolerance design. Foreign particles in the fuel may prevent proper performance. New installations in particular may have significant quantities of iron scale, rust or other contaminants in the pipeline and main tank. To prevent this matter from clogging and potentially damaging the pump, Tramont recommends the installation of an appropriately designed fuel strainer to the input line.

Please consult the Tramont Day Tank Product Guide or Spare Parts Price List to locate the appropriate accessories for your pump/motor, or contact the factory at the numbers listed above.

Specification:
Design Considerations of a Day Tank Pump/Fuel Transfer System

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

This general guide is designed to assist the designer in the proper specification of the fuel transfer system. The three main areas to be covered by this paper are pump lift, pump head and pump prime. In critical or borderline applications, an experienced hydraulic engineer should always be consulted.

Pump Lift

A pump will lift fuel by displacing air from suction to discharge line. This creates low pressure in the suction line which allows the higher atmospheric pressure (14.7 psi at sea level) to lift liquid into this vacuum. If a perfect vacuum could be created and maintained fuel could theoretically be lifted to 34 feet. Since a perfect vacuum cannot be created, the lift a pump can actually achieve is approximately 50% of theoretical lift or 17 feet (7.4 psi). To determine the total available lift, the following factors need to be considered:

1. The **vertical distance** the pump needs to lift fuel is the main factor in lifting capabilities. This measurement should be taken from the bottom of the main tank to the pump's inlet port.
2. The **total length of piping and size** is important due to internal friction. This will reduce lift and must be considered. (See table one) All calculations are based on 60°F temperature. Frictional resistance will increase as temperature decreases.
3. **Fitting in the line** will disrupt flow and create friction. These fittings include elbows, tees and unions. (See table two) Valves also need to be checked for possible pressure drops.
4. **Elevation above sea level** is important since the atmospheric pressure acting against the pump's vacuum is reduced, thereby reducing lift. (See table three)

Example One

Given:

Vertical distance	12 feet
Total length of pipe	100 feet
Pipe size	1" in diameter
Pump size	2 GPM
Fitting in line	3 elbows,no valves
Elevation above sea level	3,000 feet

Solution:

Referring to table two, an elbow equals 2.6 feet of pipe. (2.6 x 3 elbows = 7.8 feet) The corrected length of pipe is now 107.8 feet. Referring to table one, the 107.8 feet is divided by 100 and multiplied by the .5 our actual head loss is .54 feet. Therefore, the total lift needed for this system is the vertical distance plus .54 feet or 12.54 feet. Since the pump is safely capable of lifting 15 feet at a 3,000 foot elevation, (see table three), the previous example will perform satisfactorily. However, if a 3/8" diameter pipe would have been used, the head loss would have been 17.63 feet. Adding the vertical distance to this figure equals 29.63 feet. The pump would not be able to lift the fuel. If the plumbing system cannot be built under a 17 foot lift limitation (at sea level), a remote pumping station must then be used. This will be placed between the main tank and the day tank. The proper placement is determined by the pump lift calculation and the following pump head calculations.

Pump Head

the pump's head is the theoretical vertical distance a pump will push fuel. Day tank standard (2 GPM/ 1/3 HP) pumps have 231 feet of head (100 psi). Refer to table four for larger pump and motor discharge rates. Because of electrical convenience the pump is normally located on the day tank, but when pump lift demands are exceeded the remote pumping station is required. This allows us to utilize the head (pushing) capabilities of the pump.

Specification:
Design Considerations of a Day Tank Pump/Fuel Transfer System

Tramont Corporation
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Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

To determine the total available head three factors need to be considered:

1. The **vertical distance from the pump to the day tank** needed to push the fuel, is the main factor in head capabilities. This measurement should be taken from the output port on the pump to the day tank's upper most piping connection.
2. The **length and size of pipe** need to be considered in the same manner as the lift calculations.
3. **Fittings** also are calculated in the same manner.

Note: Elevation does not need to be considered in head calculations.

Example Two
Given;

Vertical distance:	150 feet
Total pipe length:	175 feet
Pipe size:	3/4" in diameter
Fittings:	2 elbows,1 check & 1 solenoid valve
Pump:	7 GPM

Solution:
Referring to table two, a 3/4" elbow equals 2.1 feet of pipe (2.1 x 2= 4.2). The check valve equals 5.3 feet of pipe. Also, the solenoid valve has a 3 psi drop, (consult manufacturer), or 6.93 feet (3 x 2.31). The total adjusted length of pipe is: 175 + 4.2 + 5.31 + 6.93 = 191.4 feet. Referring to table one, 191 feet of 3/4" pipe with a 7 GPM pump interpolates to 29.2 feet of head loss (1.91 x 15.3). Therefore, total equivalent height is (150 + 29.2) 179.2 feet. Note: The resulting pressure at day tank is (231 feet - 179.2 feet) divided by 2.31 = 22 psi. Since the pump will push fuel to a height of 231 feet, this system will work.

Pump Prime
Maintaining the prime on a pump is of critical importance. Fuel must be maintained in the suction side pipe with no air pockets. Foot valves at the main tank or check valves at the day tank can be used to prevent fuel flowing back to the main tank and losing prime.

Pump cavitation is the inability for a pump to discharge fuel properly and can occur for many reasons:

1. Total equivalent lift too high for pump
2. Total equivalent head too high for pump
3. Restrictions in lines
4. Air leaks
5. Improperly plumbed systems

Cavitation can occur gradually and will eventually ruin a pump. Vertical piping loops or "traps" should be avoided when designing a pumping system. Air pockets can become trapped in the high point of the vertical loop, resulting in pump cavitation.

A hand pump is recommended for initial priming to avoid undue wear on the fuel pump. If the fuel pump must be used for initial priming, do not run for more than 60 seconds. Fuel should be flowing within that time.

A fuel strainer is also recommended on the inlet side of the pump. Foreign particles entering the pump chamber will diminish its life expectancy. The strainer should be checked periodically to avoid particle build-up, which would limit pumping capabilities.

Summary
Proper engineering practices should always be used when calculating pump head and especially pump lift. By following these guidelines, costly repair due to improper installations can be avoided.

Specification:
Design Considerations of a Day Tank Pump/Fuel Transfer System

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Notes:

1. 1 psi = 2.31 feet of head is the conversion for water. As a general rule, this is a safe conversion for #2 diesel fuel.
2. For more precise calculations refer to the formulas and conversions listed below.

   A. Head in feet = $\frac{\text{PSI x 2.31}}{\text{Specific Gravity}}$

   B. PSI = $\frac{\text{Head x Specific Gravity}}{2.31}$

   C. Specific Gravity of #2 diesel fuel - .88 at 60°F

   D. Weight of #2 diesel fuel - 7.3 lbs/gallon

3. All calculations are based on a 60°F temperature. Allowances must be made for extreme temperature variances.

A. Viscosity of #2 diesel fuel 35 @ 100°F
40 @ 70°F
60 @ 20°F
80 @ 0°F
200 @ -30°F

B. An immersion heater is recommended for below 32°F applications.

Table One
Frictional Head Loss (in feet) for 100 feet of standard weight pipe at 60°F at sea level - diesel fuel

	Pipe Size						
GPM	⅜	½	¾	1	1 ¼	1 ½	2
2	15.2	5.5	1.1	.5	.2		
4	55.5	20.3	5.1	1.4	.5	.2	
7		61.0	15.3	4.6	1.2	.5	
10			26.3	8.5	2.5	.9	2
19				28.5	7.5	3.5	1.2

Table Two
Frictional loss in pipe fittings in terms of equivalent feet of straight pipe

Pipe Size (in.)	Ball Valve	45° Elbow	Std Elbow	Std Tee	Check Valve	Angle Valve	Globe Valve	Diaphragm Valve
⅜	.28	.70	1.4	2.6	3.6	8.6	16.5	
½	.35	.78	1.7	3.3	4.3	9.3	18.6	40
¾	.44	.97	2.1	4.2	5.3	11.5	23.1	
1	.56	1.23	2.6	5.3	6.8	14.7	29.4	
1 ¼	.74	1.6	3.5	7.0	8.9	19.3	38.6	
1 ½	.86	1.9	4.1	8.1	10.4	22.6	45.2	
2	1.1	2.4	5.2	10.4	13.4	29.0	58.0	

Table Three
Lifting Capacities at various elevations

Elevation	Atmospheric Pressure	Available Lift
Sea level	14.7 psi	17’
1000’	14.2 psi	16’
2000’	13.6 psi	15.5’
3000’	13.1 psi	15’
4000’	12.6 psi	14.5’
5000’	12.1 psi	14’
6000’	11.7 psi	13.5’

Table Four
Pump discharge pressure (psi)

Motor H.P.	Nominal Pump Size (GPM) at 1725 RPM					
	2	4	7	10	19	23
⅓	100	60	2			
½		100	20	2		
¾			40	20		
1			100	40	20	2
1 ½				80	40	40
2				125	60	60
3				150	100	125

Note: Pump discharge volumes (GPM) can decrease by as much as 25% when higher pressures are required. Please consult factory for borderline consumption rates.

Worksheet: Pump Lift
Pump ABOVE Main Tank

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Pump ABOVE Main Tank
Total Lift Required for Day Tank Installation

Please complete the following before beginning the worksheet:

Vertical Pipe Length:_____ Pipe Diameter:_____ Elevation Above Sea Level:_____

Horizontal Pipe Length:_____ Pump GPM:_____ In Line Fitting Types:_____

Refer to data tables in Tramont's "Day Tank Pump Capabilities" specification sheet as indicated.

1. Total vertical length of pipe (pump inlet to main tank bottom) ....._____ ft.

2. Total length of pipe (Vertical & Horizontal) ....._____ ft.
(Each size pipe in the line must be calculated individually).

3. Additional length as a result of in line fittings (See Table Two) ....._____ ft.

4. Add results of #2 and #3....._____ ft.

5. Divide results of #4 by 100 ....._____ C ft.

6. Pipe size (diameter)....._____ inch

7. Pump capacity ....._____ GPM

8. Frictional head loss (See Table One) ....._____
per 100 ft. (Horizontal)

9. Additional head loss – multiply results of #5 by #8 ....._____ ft.

10. Repeat steps in items #2 thru #9 for each pipe size used in line....._____ ft.

11. Total lifting capacity needed (Add results of #1, #9, and #10)....._____ ft.

12. Elevation above sea level....._____ psi.

13. Available pump lift....._____ ft.

14. Subtract results of item #11 from item #13 ....._____ ft.

- If results of item #14 are positive, the system is properly sized.
- If results of item #14 are negative, the system is beyond a safe lifting capacity.
- If results of item #1 are less than results of #13, **increase pipe size.**
- If results of item #1 are more than results of item #13, **a remote pumping unit is required.**

Worksheet: Pump Head
Pump BELOW Main Tank

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Pump BELOW Main Tank
Total Head Required for Day Tank Installation

Please complete the following before beginning the worksheet:

Vertical Pipe Length:_____ Pipe Diameter:_____ Elevation Above Sea Level:_____

Horizontal Pipe Length:_____ Pump GPM:_____ Motor HP:_____ In Line Fitting Types:_____

Refer to data tables in Tramont's "Day Tank Pump Capabilities" specification sheet as indicated.

1. Total vertical length of pipe (pump inlet to day tank inlet)....._____ ft.

2. Total length of pipe (Vertical & Horizontal) ....._____ ft.
(Each size pipe in the line must be calculated individually).

3. Additional length as a result of in line fittings (See Table Two) ....._____ ft.

4. Add results of #2 and #3....._____ ft.

5. Divide results of #4 by 100 ....._____ C ft.

6. Pipe size (diameter)....._____ inch

7. Pump capacity ....._____ GPM

8. Frictional head loss (See Table One) ....._____
per 100 ft. (Horizontal)

9. Additional head loss – multiply results of #5 by #8 ....._____ ft.

10. Repeat steps in items #2 thru #9 for each pipe size used in line....._____ ft.

11. Total head capacity needed (Add results of #1, #9, and #10) ....._____ ft.

12. Pump discharge pressure (See Table Four)....._____ psi.

13. Available pump head (Multiply results of #12 by 2.31) ....._____ ft.

14. Subtract results of item #11 from item #13 ....._____ ft.

- If results of item #14 are positive, the system is properly sized.
- If results of item #14 are negative, the system is beyond a safe lifting capacity.

Operation:
System 2000PLUS™ Sequence of Operation

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
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Fuel Level Decreasing

- Tank full condition
- Fuel level in tank decreases.
- At 87% full, pump “A” starts pumping fuel from main tank into day tank.
- At 75% full, pump “B” starts pumping fuel from main tank into day tank (duplex system only).
- At 62% full, the low fuel alarm is activated, dry contacts are actuated.
- At 6% full, the low fuel engine shutdown alarm is activated, dry contacts are actuated.

Fuel Level Increasing

- Tank empty condition
- Pump “A” is pumping fuel from main tank into day tank.
- Pump “B” is pumping fuel from main tank into day tank (duplex system only).
- At 6% full, the low fuel engine shutdown alarm is deactivated, dry contacts resume normal condition.
- At 62% full, the low fuel alarm is deactivated, dry contacts resume normal condition.
- At 100% full, pump “A” stops.
- At 100% full, pump “B” stops (duplex system only).
- At 106% full, high fuel alarm is activated, dry contacts are activated.
- Fuel level continues to increase, critical high fuel level shutdown is activated, dry contacts are activated, fuel supply pumps shutdown.

Overfill/Tank Rupture Condition

- Fuel in rupture basin (basin is optional).
- Option #2930 fuel in basin float switch (optional) is activated, dry contacts are activated, fuel supply pumps shutdown.
- Option #3250 critical high alarm (optional), separate float switch activates high level alarm, dry contact activated, fuel supply pumps shutdown, can activate optional solenoid valve (2650).

Installation:
Mechanical & Plumbing guide: Day Tank Systems

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Mechanical installation
This guide covers the mechanical installation of a standard Tramont day tank system. Installation should be performed by a qualified mechanical installer or plumber experienced in black iron piping, valves and connections. This guide primarily covers "standard" tanks; that is, tanks without optional accessories or equipment. Certain optional devices may require special consideration during installation. For TRE-Series tanks also see "Electrical installation guide: TRE-Series Day Tanks." For TRS-Series tanks also see "System 2000PLUS" specification sheet.

!WARNING!
THIS TANK IS DESIGNED AND CONSTRUCTED TO HOLD DIESEL FUEL ONLY.

Tank placement
Upon receipt of the Tramont day tank, inspect for obvious signs of shipment damage. If damage is visible (dents, water logging, etc.), notify the freight company and file a claim for damages with them. This step must take place on the receiving end of the shipment; Tramont cannot do this for the purchaser or end user. Unpack the unit and inspect closely. The Tramont day tank can withstand normal stresses of shipping. However, rough handling, such as dropping the unit, may result in scratches, dents and damage to tank components and weld seams. Again, if you detect any signs of damage notify the freight company immediately.

Place the tank as close to the gen-set as practical. It should be fully accessible from all sides. The front of the unit must be visible and accessible. Position the tank so that fittings and vents can be easily connected and checked. Make sure that there is room to access the basin/tank drain. Generally a minimum of 6" - 8" from any wall is required for piping installation. Allowing adequate space for piping will make future repair and maintenance much easier.

Slots are located on the base of the tank if you choose to bolt it to the floor. Complete all piping *before* bolting the tank to any surface. This will make it much easier to correct any misalignment of piping. **The day tank is not designed to absorb the force exerted by improperly aligned pipe. "Forcing" pipes to line up with the fittings may damage the tank.**

Plumbing connections
Day tanks typically are installed with three 90° elbows in the fuel line between the day tank and the point where the line is firmly fixed to a wall or floor. This will facilitate minor adjustments when leading the piping to the tank. Pipe unions should be installed as needed to allow for future breakdown or maintenance of pipes. All threaded connections shall be covered with Teflon™ tape, thread sealant or comparable material. DO NOT use any sealant that is not compatible with #2 diesel oil. All threaded connections must be tightened leak-tight.
IMPORTANT: Gen-set installations generally are not set up so that high pressure can form in piping lines, and ***the Tramont day tank is not a pressure vessel.*** However, all connections still should be tightened so that the piping can withstand considerable pressure if necessary. Use only clean, new pipe connections. Rust, dirt, tars and other contaminants can prevent proper operation of tank components such as pumps, and may result in damage or destruction of these components.

Installation:
Mechanical & Plumbing guide: Day Tank Systems

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Milwaukee, WI 53212
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Engine supply
The engine supply fitting (1" NPT) is located on the left-hand side at the bottom rear of tanks without a basin.
On tanks with a basin the supply fitting is located on the top rear of the tank, and a dip tube extends to the bottom of the tank. Follow the gen-set supplier's requirements for pipe size; flex hose and connections to the engine.

Fuel return
On tanks without a basin there are two 1" NPT fuel return fittings on the back of the tank. One is located at the lower right-hand side of the tank; the other is located near the top of the tank. On tanks with a basin there is a single fuel return fitting on the back of the tank near the top. The fuel return fittings are for excess hot fuel returned from the engine. If your tank does not include a basin Tramont recommends using the bottom fuel return fitting. Seal the unused fuel return fitting with a 1" NPT black iron pipe plug. Another option is to pipe the fuel return line directly to the main tank, thereby eliminating a possible fuel temperature increase in the day tank.

Overflow
The 1" NPT overflow fitting is located at the upper rear of the tank. It prevents overfilling of the day tank by routing excess fuel directly back to a main tank.

Worksheet:
2000PLUS™ ECM Problem Report

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

NOTE: Return this page and the Return Authorization number from Tramont along with the defective part you are returning. This will insure proper credit is given to your account and it will allow Tramont to accurately identify any defective component.

Name: Customer Name:

Phone: Contact:

1. **Tank Serial #:** **ECM Serial #:**
2. **Status of LEDs:**

   Level:

   (do they change along with the fuel level)

   Warnings:

   Pump Running:

   ECM Functional:

   Power On:

   (If power LED is off, check fuse in ECM, check incoming power circuit breaker)
3. **Is the incoming power electrically grounded at the ECM?**

   (separate ground wire at the terminal strip, ground through piping is not sufficient)
4. **Is the ribbon connector from the front to rear panel as well as the connector from the float sensor to the front panel tight?**
5. **Are the float sensor wires connected correctly?**

   (The red wire should go to the center post and the black wire to the mounting screw. Check the compression connectors on both wires).
6. **Are the ON/OFF/TEST buttons operational?**
7. **Does turning the circuit breaker off/on reset the ECM?**
8. **Environment**

   Temperature:

   Humidity (condensation):

   Location:

   Equipment that may cause power problems:
9. Check gauge with float wires are disconnected and gauge is out of tank. Using an analog ohm meter you should get 0 (empty) to 90 (full) ohms when moving the sensor up and down. **What were your readings?**
10. **Describe the problem in detail:**

11. Office Use (Manufacturing Test):

Installation & Operation Manual:
Day Tank – TRS Series

Tramont Corporation
3701 N. Humboldt Blvd.
Milwaukee, WI 53212
Ph: 414.967.8800
Fx: 414.967.8811
www.tramont.com

Warranty

The Tramont Corporation warrants its products against defects in material or workmanship under normal use and service for a period of 12 months from date of shipment from its plant in Milwaukee, Wisconsin. All obligations and liabilities under this warranty are limited to repairing or replacing at our option F.O.B. Milwaukee, Wisconsin of such allegedly defective units or parts returned, carrier charges prepaid. No liability is accepted for consequential damage or reinstallation labor.

Warranty on accessories furnished by other manufacturers shall be limited by that manufacturer's warranty.

If field service, at the request of the Buyer, is rendered and the fault is found not to be with the Tramont Corporation product, the Buyer shall pay the time and expense of the Tramont Field Representative. Bills for service, labor or other expenses that have been incurred by the Buyer, their customer or agent will not be accepted.

Warranty does not cover failure resulting from improper installation or use.

Changes or repairs made in the field without authorization from Tramont Corporation will void this warranty.