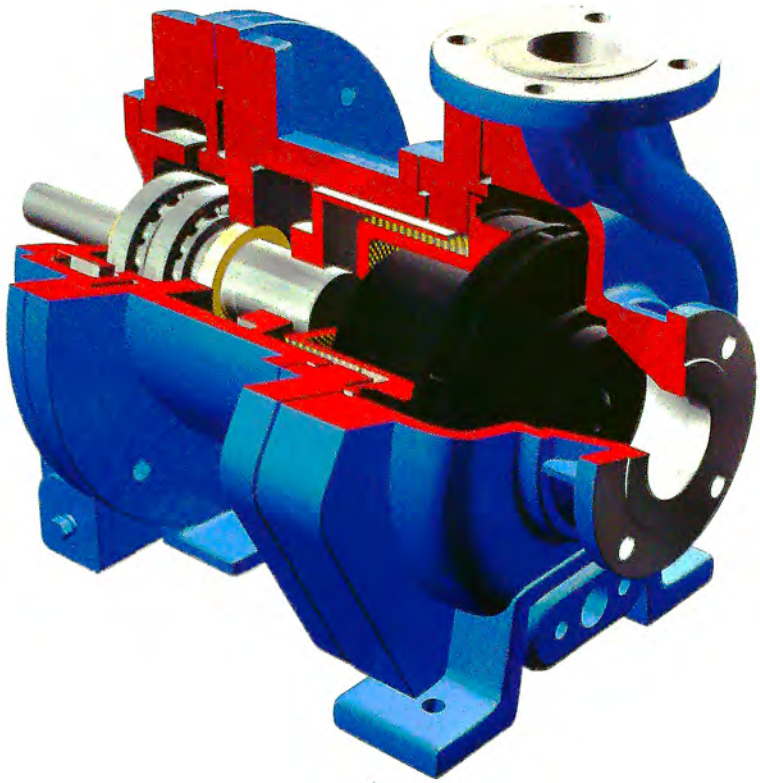
TNP Series

Non-Metallic Magnetic Drive Pump

ASME B73.3

Installation, Operation, & Maintenance Manual



TRUFLO™

QUALITY • VALUE • SERVICE

A New Vision For Quality Pumps

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Limited Warranty

One year limited warranty

TRUFLO pumps are warranted by TRUFLO to the original user against defects in manufacturing and materials under normal use for one year from the shipping date. Any parts returned with prepaid shipping cost to a designated TRUFLO authorized service location will be evaluated for defects. Parts determined to be defective in material or construction will be repaired or replaced at TRUFLO's option as the exclusive remedy.

Limitation of liability

To the extent allowable under law, TRUFLO's liability for consequential damages is expressly disclaimed. TRUFLO's liability in all events is limited to and shall not exceed the purchase price.

This warranty excludes:

1. Labor, transportation and related costs incurred by the consumer to make the allegedly defective equipment available to the dealer for inspection.
2. Re-installation costs of repaired equipment.
3. Re-installation costs of replacement equipment.
4. Consequential damages of any kind.

Warranty disclaimer

TRUFLO has made an earnest effort to illustrate and describe the products in this literature accurately; however, such illustrations and descriptions are purely for the purpose of identification and do not in any way express or imply a warranty that the products are to be sold or used for a particular purpose. All products may not concur exactly to the illustrations or descriptions.

Other than the exceptions stated, no warranty or affirmation of fact, expressed or implied, other than as stated in "**Limited Warranty**" is made or authorized by TRUFLO.

Product suitability

Most areas have codes and regulations concerning the sale, construction, installation and/or use of products for certain purposes, which may differ from neighboring areas. While TRUFLO maintains that its products adhere to such codes, it cannot guarantee compliance in all areas, and cannot be held liable for how the product is installed or used. Before purchasing and using a product, please review the product application as well as the national and local codes and regulations, and be sure that the product, installation, and use complies with them.

Warranty exclusions

The following items are not warranted, due to matters beyond TRUFLO's control.

1.) Normal wear and tear to parts that are considered standard wear parts
2.) Defects caused by the fault or negligence of the buyer or third party
3.) Use of unauthorized repair parts
4.) Modifications made to the pump other than by TRUFLO
5.) Components such as seals, motors, couplings that fall within their respective manufacturer's standard warranty.

Important!

Read all instructions before removing the product from the shipping container or preparing it for operation. It is imperative to install and operate the pump as directed to eliminate any possible occurrence that may be harmful to property or personnel. Keep this manual for future reference.

PUMP IDENTIFICATION

Each pump and wet end Truflo ships has a serial number, model number, and code number stamped on a stainless steel identification tag riveted on a bracket or casing. Verify all information stamped on the plate when product is received. Any discrepancy between the order and the information stamped on the plate must be reported to your local distributor or TRUFLO. If the pump is purchased with a factory supplied motor, the motor nameplate must also be checked to verify motor's voltage, HP, RPM, and frequency compatibility with the pump and the order. Please include serial numbers, model number, including impeller diameter, with the code number and mounting code number with all correspondence to define the specific pump.

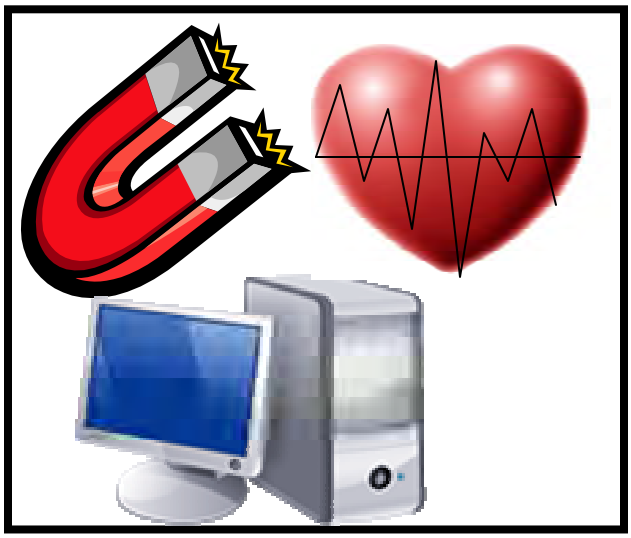
Name Plate

TRUFLO ANSI PROCESS PUMP			
ITEM NO.		CAP.	gpm
MODEL		TDH	ft
MAT'L		HP	
Mfr's NO.		RPM	
SERIAL NO.			
TRUFLO PUMP CO., GREENSBORO, NC MADE IN KOREA — ASSEMBLED IN U.S.A.			

TNP PUMP CODE

SERIES	
S – Series	**S**
M – Series	**M**
L – Series	**L**
SIZE OF PUMP	
S1515 – 1.5” x 1” – 5”	**1515**
S2156 – 2” x 1.5” – 6”	**2156**
M1516 – 1.5” x 1” – 6”	**1516**
M326 – 3” x 2” – 6”	**326**
M436 – 4” x 3” – 6”	**436**
M1518 – 1.5” x 1” – 8”	**1518**
M3158 – 3” x 1.5” – 8”	**3158**
PUMP TYPE	
Close Coupled	**C**
Wet End	**W**
DRIVE SIZE	
5 HP	**AA**
7 HP	**AB**
10 HP	**A**
15 HP	**B**
30 HP	**C**
Wet End Only	**0**
MOTOR FRAME SIZE (NEMA)	
Wet End Only	**0**
56C	**1**
143/145TC	**2**
182/184TC	**3**
213/215TC	**4**
254/256TC	**5**
284/286TSC	**6**
324/326TSC	**7**
TYPE OF CASING O-RING	
Viton	**1**
EPDM	**2**
Teflon Encapsulated Viton	**3**
WEAR PARTS (SHAFT & BUSHING)	
SiC/CFR-ETFE	**1**
WETTED MATERIAL	
CFR-ETFE	**1**
CASE MATERIAL	
CI/ETFE	**1**
CASE FLANGE	
150 LBS	**1**
300 LBS	**2**

SAFETY PRECAUTIONS



Warning! **Magnetic Field Hazard.** Magnetic drive pumps contain strong magnets. These magnets are located in the impeller and outer drive magnet assemblies. Their powerful magnetic fields could be detrimental to people who rely on electronic devices that may contain reed switches, and these people should avoid magnetic pumps and their parts. **Avoid use if you wear a pacemaker or use a defibrillator.**

Magnetic Field Sensitive Objects such as computers, credit cards, floppy disks, or magnetic tapes should not be placed close to pump or pump parts.

Warning! **Bodily Injury** could result from not using the recommended disassembly and assembly procedures. The magnets are very strong and anything caught in between the mating faces of the wet end and drive end could be crushed.

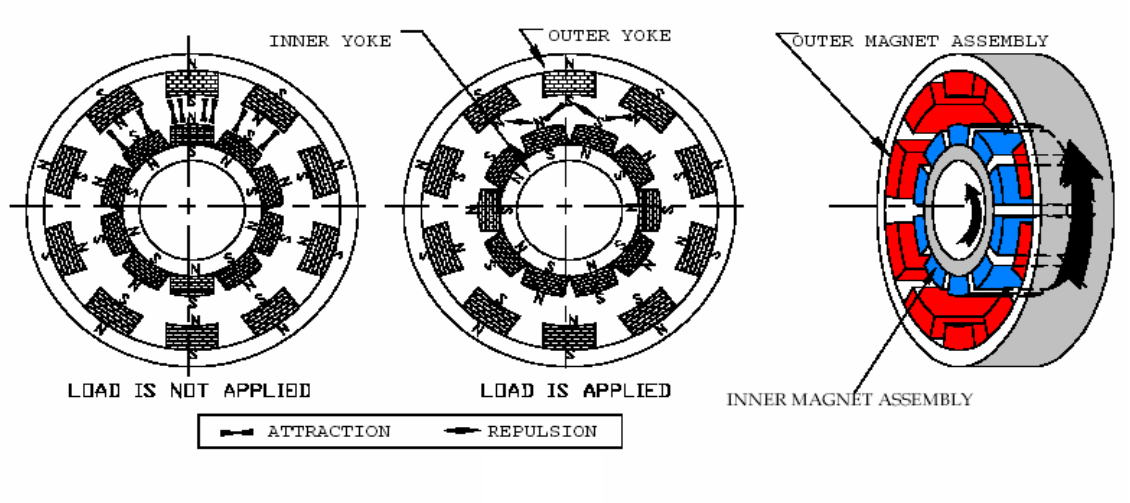
Warning! **Burn Potential** If pumping hot liquids, the outer surface of the pump may become very hot resulting in potential burns if touched. These pumps may handle liquids up to 250 degrees.

Warning! **Rotating Parts Hazard** Use recommended lock out/tag out procedures during maintenance. Secure the coupling guard and assemble completely before operation.

Warning! **Chemical Hazard** These pumps handle all types of chemicals. Many are hazardous and may leak or spill during maintenance. Plant procedures for decontamination should be followed during pump disassembly and parts inspection. Chemicals may be trapped between pump parts.

Caution! Do not use steel or iron tools near magnets.

Principals of Magnetic Drive Pumps



A magnetic coupling refers to the inner and outer magnetic drive assemblies. The outer assembly, or driver magnet, is connected to a motor. The inner assembly, or driven magnet, is directly or indirectly attached to a pump impeller. The diagram above shows magnet components of the outer assembly aligned with their counterparts in the inner assembly. When load or torque is applied, the magnets create a force of simultaneous attraction and repulsion which is used to transfer torque from the motor to the impeller. This permanent magnet coupling eliminates slippage during rotation, although, the magnets will decouple if excessive torque is applied. The pump must be stopped to recouple. There is no energy loss in this permanent coupling unless a conductive material is used for the containment. Eddy-currents will be generated which will cause some energy loss. TRUFLO's TNP Series pumps use only non-conductive containment shells**.** TRUFLO's magnets are shown below. They are located behind the impeller.

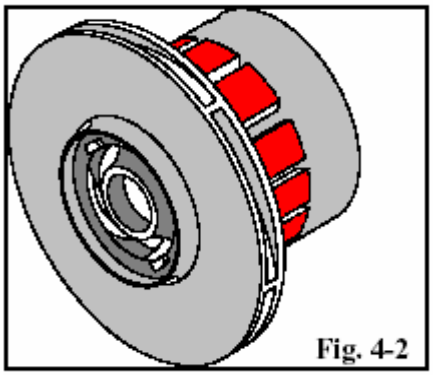


Fig. 4-2

PUMP INSTALLATION

PIPING

1. Install the pump as close as possible to the suction tank, since pumps are designed to push, not pull liquid.

2. TRUFLO recommends supporting and restraining both the suction and discharge pipes near the pump to avoid the application of forces and moments to the pump casing. All piping should line up with the pump flanges naturally to avoid bending moments at the pump nozzles.

3. The suction line should have a short straight run to the pump, and be free of fittings, for a length equivalent to or larger than (10) times its diameter to minimize friction.

4. Do not reduce the suction piping size . The suction line size should be at least as large as the pump's suction port or one size larger if the suction line is so long that it significantly affects NPSH available.

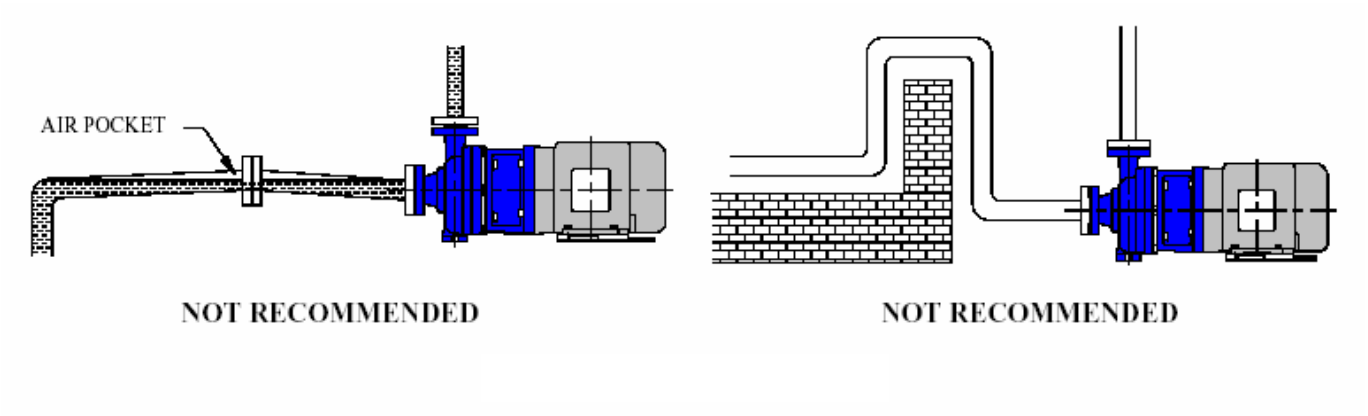
5. The suction line should be straight to prevent air pockets.

6. The NPSH available to the pump must be greater than the NPSH required. Avoid the use of screens or filters in the suction line which will reduce the NPSH available.

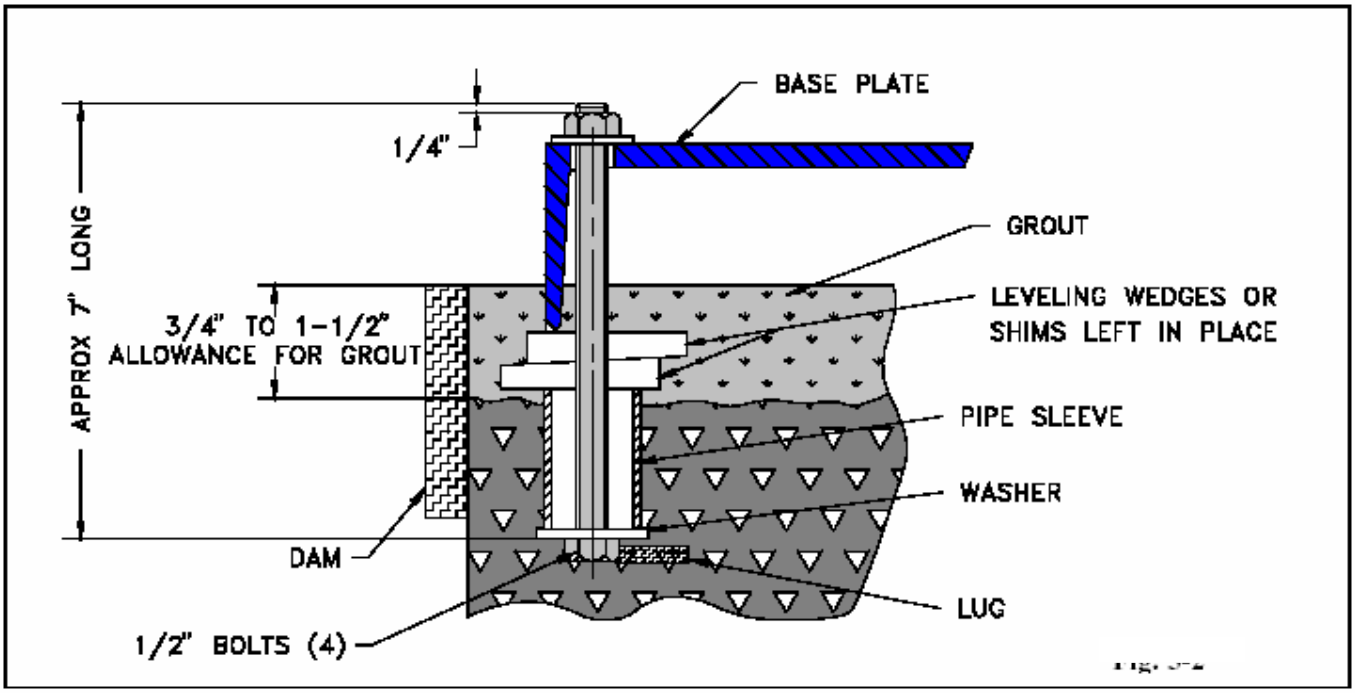
7. **Caution: Do not install a check valve in the suction line even if a check valve is installed in the discharge line.**

8. The discharge piping should be the same size as the pump outlet port.

9. A shutoff valve and a check valve should be installed in the **discharge** line. The shutoff valve is used when starting and stopping the pump, and to isolate the pump for maintenance. It is advisable to close the shutoff valve before stopping the pump.



FOUNDATION



Do Not operate the pump without first securing it into position.

1. The foundation should be a permanent, rigid support for the base plate to absorb vibration and maintain alignment of a long coupled unit. A concrete foundation is acceptable. Create a template to embed foundation bolts of the proper size (1/2" -13 x 7" recommended for ordinary installation) in the concrete. Use a pipe sleeve larger than the bolt to allow enough base movement for final positioning of the bolts.

2. Support the base plate on rectangular metal blocks and shims, or on metal wedges with a small taper. Place the support pieces close to the foundation bolts. A spacing of 24" is suggested. Allow a gap of 3/4" to 1-1/2" between the base plate and the foundation for grouting.

3. Level the shafts of the pump and driver by adjusting the metal supports or wedges. Check the horizontal and vertical positions of the coupling faces as well as the suction and discharge flanges of the pump with a level. If necessary, adjust the supports or wedges under the base plate as required.

4. When correct alignment is attained, tighten foundation bolts evenly but do not over tighten. The units can then be grouted to the foundation. The legs of the base plate should be completely filled with grout and the leveling pieces, shims, or wedges should be grouted in place. The foundation bolts should not be tightened until the grout is hardened, usually about 54 hours after pouring.

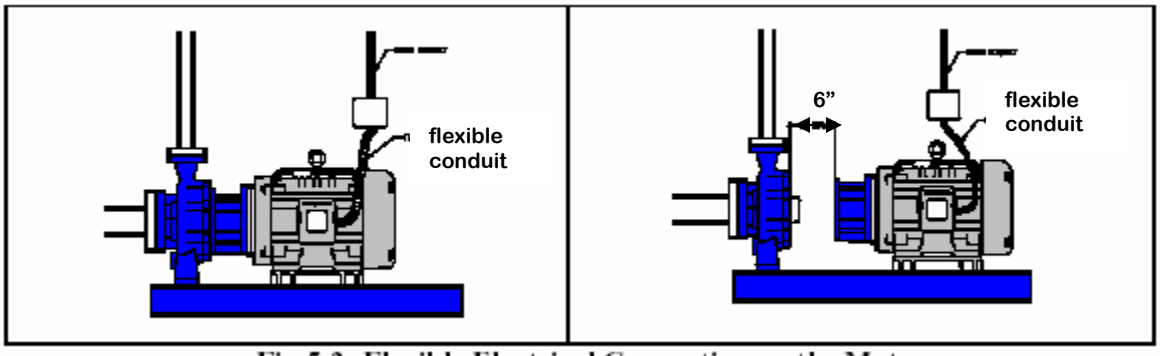
INSTALLATION AND ELECTRICAL CONNECTIONS

TRUFLO TNP series pumps can be inspected without removing the casing from any piping, by separating the drive end from the wet-end. In a close-coupled pump this requires moving the motor, drive magnet, and bracket backwards and away from the casing. **Close-coupled installations should review the following:**

1. Allow at least 6" [150 mm] clearance behind the motor fan cover to move motor backwards.

2. The base plate under the motor must be flat and long enough to allow for safe movement of the motor.

3. When wiring the motor, please allow a 6" flexible section near the motor to be able to service the pump without disconnecting piping. The recommended installation is shown below.



Flexible Electrical Connection on the Motor

START UP AND SHUTDOWN

BEFORE INITIAL START UP AND AFTER INSPECTIONS of the wet end of pump:

1. Manually turn the motor fan or flexible coupling to insure free rotation. For a close coupled installation, insert a screwdriver or other tool through the fan cover and rotate the fan. It should move freely**.**

2. Make sure the suction valve is open and the pump is full of liquid.

3. Purge the pump by opening the closing the discharge valve to evacuate any entrapped air.

4. Check all electrical connections using a wiring diagram. Make sure that the voltage, frequency, and horsepower on the motor nameplate match the line circuit.

TNP S and TNP M pumps are not designed to self prime. The suction must be flooded and the liquid level above the centerline of the pump. Once a foot valve is attached, and the pump is filled with liquid, the TNP pump can pull a lift.

START UP AND OPERATION

1. Pump should be full of liquid and suction valve opened.

2. Open discharge valve fully and close it to purge air in pump and suction line.

3. With the pump **full of liquid**, check motor rotation by bumping pump and motor for about 1 second. The correct rotation is clockwise as viewed from the motor fan end. Once the motor rotation is confirmed bump 5 or 6 times more. **This process is very important to fully moisten the sleeve bushing and pump shaft, and to purge some of the air trapped in the pump and discharge line.**

4. Open the discharge valve once and close it again to release more air downstream.

5. Turn the pump on and open the discharge valve slowly. It is important to open the valve very slowly. A sudden open valve while air is trapped between the pump and the valve may cause water hammer.

6. Keep the suction valve fully opened and only **adjust flow with the discharge valve**, not the suction valve.

Attention! Future pump starts do not require motor bumping or valve position changes if the piping and pump has remained full of liquid.

ATTENTION! **Do not run the pump dry.** This will cause severe damage to the pump. The pumps use slide bearings lubricated by the liquid being pumped. No lubrication, no bearings. Even short periods of dry running could damage the pump.

ATTENTION! **Do not run the pump dead head.** Some liquids boil at temperatures sufficient to melt pump components and destroy the magnets. Other liquids will flash into vapor. This vapor collects at the bushing resulting in the pump running dry.

ATTENTION! **Cavitation.** Prolonged cavitation may cause pitting on the pump components. Short term severe cavitation, such as that caused by a closed suction will damage the pump bearings.

ATTENTION! **Water Hammer.** Sudden changes in fluid velocity can cause large, rapid pressure surges. These pressure surges can damage the pump, piping and instrumentation. Typical causes are closing valves too quickly. Check valves on the suction can be responsible for this, also.

ATTENTION! **Truflo Power Monitors** are recommended on all pumps. Installing these devices will protect the pumps from dry running, cavitation, or when frequent overload is expected. They are also very effective during tank unloading applications. This will also protect the pump from clogged suction filters, closed valves, or pump seizure.

SHUTDOWN PROCEDURE

1. Close the discharge valve slowly to prevent water hammer.
2. Shut off the motor.
3. Close the suction valve.

Safety

TEMPERATURE CLASSIFICATION

The maximum surface temperature of a metallic drive pump is the highest temperature determined by any one of the following conditions:

1. The temperature of the pumped liquid, **plus** 20 degrees Celsius (approx. 36 degrees Fahrenheit).

2. The ambient temperature **plus** 20 degrees Celsius (approx. 36 degrees Fahrenheit.)

3. If you have a separately mounted pump with oil lubricated bearing assembly, the ambient temperature **plus** 39 degrees Celsius (approx. 72 degrees Fahrenheit.)

4. The temperature of the heating medium being used in the heating jacket (if fitted).

The actual classification is calculated by finding the maximum surface temperature and then using the following table to obtain the Temperature Class:

Temperature Class	Maximum Surface Temperature (C)
T1	450 (842° F)
T2	300 (572° F)
T3	200 (392° F)
T4	135 (275° F)
T5	100 (212° F)
T6	85 (185° F)

Example:
The pump is pumping a liquid with a temperature of 120 degrees Celsius and if the pump is close coupled and therefore does not have an external oil lubricated bearings. The maximum ambient temperature in which the pump may operate is 30 degrees Celsius.

Condition 1 equates to 120° C + 20° C = 140° C
Condition 2 equates to 30° C + 20° C = 50° C
Condition 3 does not apply
Condition 4 does not apply

Thus the maximum surface temperature of the pump is 140° C which equates to a temperature classification of T3.

DISASSEMBLY AND MAINTENANCE

INSPECTION

Inspect pump for wear after the first 500 hours or after 3 months of operation, whichever comes first. Inspect again in 6-12 months, depending on the results of the initial inspection.

Before inspecting, have a **spare casing O-ring** on hand to install when inspection is complete.

To inspect the pump interior, flush thoroughly before opening to remove hazardous chemicals.

Operating conditions differ so recommending one schedule of preventive maintenance for all centrifugal pumps is not practical. Vibration monitoring is not useful or reliable for wet end preventive maintenance**.** For best maintenance results, keep a record of actual opening data such as flow, pressure, motor load, and hours of operation.

DISASSEMBLY

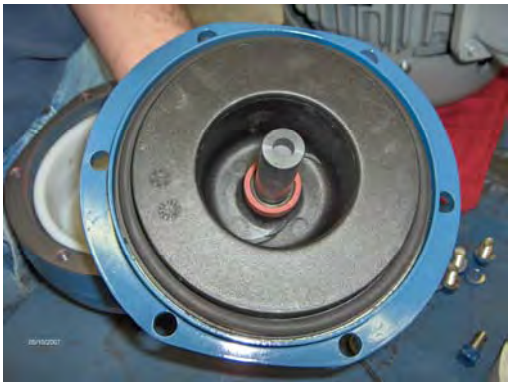
1. Remove the bolts attaching the bracket to the rear casing support/wet end. Pull the motor away from the wet end. **Caution! This safely breaks the strong magnetic field to avoid injury from crushing.**

2. **Be sure that pump is drained and flushed of all liquid.** Remove bolts from rear support/casing. Pull rear support from pump casing. Holding impeller by the shroud, remove from containment shell.

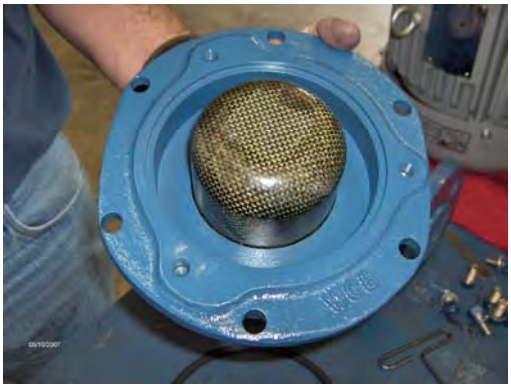
PARTS INSPECTION

1. From front of the impeller, check for wear on the **mouth ring**. No chips or cracks should be visible. Polished marks are normal. **If the 3 lubrication flutes are not visible, replace the mouth ring.** . Check the **main bushing** for chips or cracks. Replace if necessary.

2. Check **shaft** for wear, chips, or cracks. Polishing is normal. Check inner surface of **containment shell** for abrasion, cracks, or signs of melting. Replace if needed. Replace o-ring if cracked.



4. Check outer surface of containment shell for abrasion or cracks.

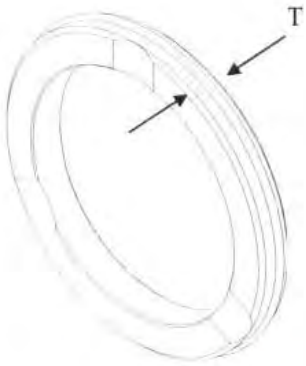
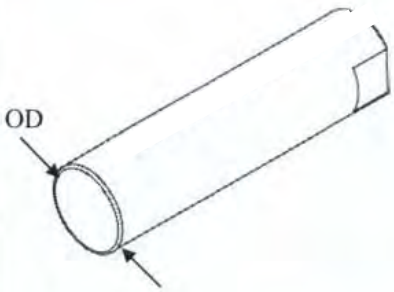
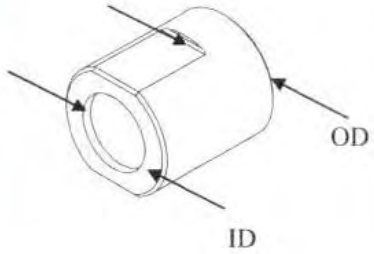


6. Clean the cover that protects outer drive magnets if needed.

7. Check **casing lining** for cracks. Check for integrity by using a 15-20 KV electrostatic discharge tester.

8. Check **thrust ring** for cracks or chips. Replace if necessary.

Part Wear Measurements

MOUTH RING (25% CFR/PTFE or SiC)	PUMP SHAFT (SiC)	MAIN BUSHING (Carbon or SiC)
		
As new condition: = 0.250" +/- 0.010" = 0.375" +/- 0.010" **Recommended replacement:** If wear is greater than 0.063" if cracks/chips are visible (SiC)	**As new condition:** OD = 0.750" +0.000/-0.002" **Recommended replacement:** OD= 0.740" or if cracks/chips are visible.	**As new condition:** ID = 0.751" +0.001/-0.000" **Recommended replacement:** ID + 0.770" or If cracks/chips are visible.

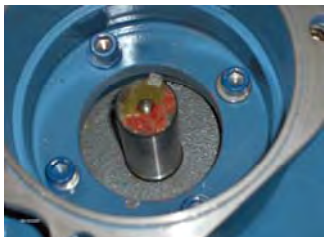
ASSEMBLY

1. Place pump preferably vertically on a clean surface with motor shaft pointing up. Horizontal assembly is acceptable. With motor mounting plate placed on the C-face of motor, align bolt holes. Mounting plates come in different sizes, but will work only with correlating motor frame size. Secure the bolts attaching mounting plate to motor face.

Bolt Size	Recommended Torque	
mm	Ft-lb	N-m
M10	20	27
M12	40	45

2. Slide close coupled bracket over motor shaft onto mounting plate with bolt holes aligned. Insert socket bolts and torque to 20 ft-lbs.

3. Place motor shaft key into outer drive keyway. Align outer drive and key with motor keyway and slide onto motor shaft. Measurement from raised bracket surface to flat surface should be 7/8".
Use grease or "anti-seize" on motor shaft.



4. Secure outer drive position by removing the bracket plug and insert a 3/16" hex key to tighten the two set screws on hub. Pay attention to the proper distancing per step 3. A torque of 10 ft-lbs. is recommended.

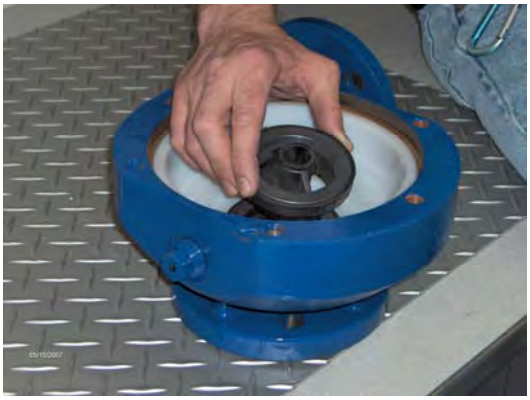
5. Insert containment shell into rear support. Line up rear support groove with projection on outer diameter of containment shell. This will align shaft groove to the correct position. This assembly is a light press fit. A small rubber hammer may be used to tap containment shell into position if needed.


6. Insert pump shaft into back of containment shell socket. Align shaft flat with mating flat on socket. A rear thrust ring is on the front of the socket. Position o-ring. Clean o-ring groove before installation.


7. Align notch on back of mouth ring with driving dog on impeller nose. Use a flat piece of aluminum over mouth ring for an arbor press to apply assembly force to snap into position.

8. Align main bushing flats with flats in the impeller bore. Main bushing is pressed into the impeller bore. **Do not use a hydraulic press!**

9. The shaft support/thrust ring is assembled in the suction of the pump casing and held by an interference fit. **Do not use a hydraulic press!**



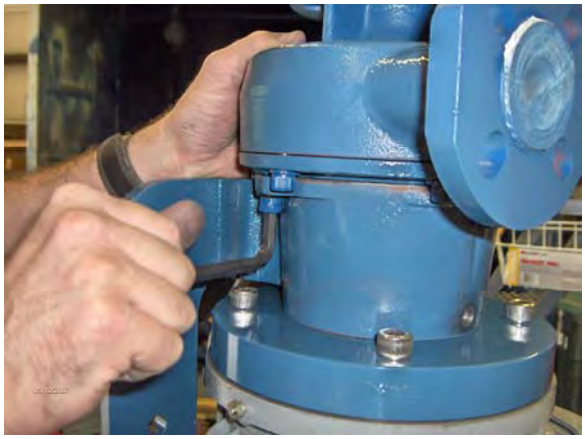
10. Slide the impeller assembly carefully onto shaft placed in the containment shell assembly. Keep drive end clean of metal chips and particles. **Caution! Strong magnets being used. Keep hands and metal objects from being drawn or crushed in pump.**

11. Attach impeller drive and containment shell assembly onto pump casing with 6 socket bolts and tighten to a torque of 20 (ft.-lbs.)

12. Carefully place the assembled pump wet end into outer drive magnet end.
Caution: The magnet force is 40 lbs. Be aware when the two drives begin to attract.

<u>DO NOT</u> assemble the rear support to the bracket, because you must next place the impeller into the containment shell where the magnetic force is strongest. The coupling will require 40 lbs. of force to separate the impeller from the outer drive magnet.

13. The magnetic force will hold the two pump ends together as the socket bolts are tightened to 20 ft-lbs.



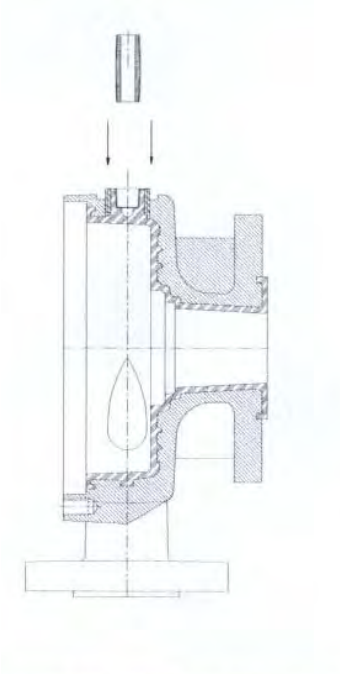
14. After the wet end is secured to the motor drive, ensure the internal parts move freely by inserting a screwdriver into the motor fan to rotate drive. If not rotating freely, inspect internal parts for debris.

15. Completed pump assembly

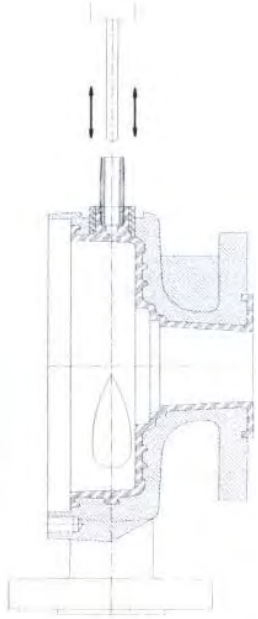
TNPs pumps include a drain port located on the bottom of the front casing. A ¼" drain plug is supplied with every casing. To use the drain option, follow the procedure below.

1
Loosen and remove the supplied drain plug with a ¾" wrench. To protect the molded threads while drilling, tighten a ¼" pipe nipple to the drain hole.

2
Drill the drain hole using a ¼" diameter drill size. The pipe nipple will easily and safely guide the ¼" drill through the casing lining.

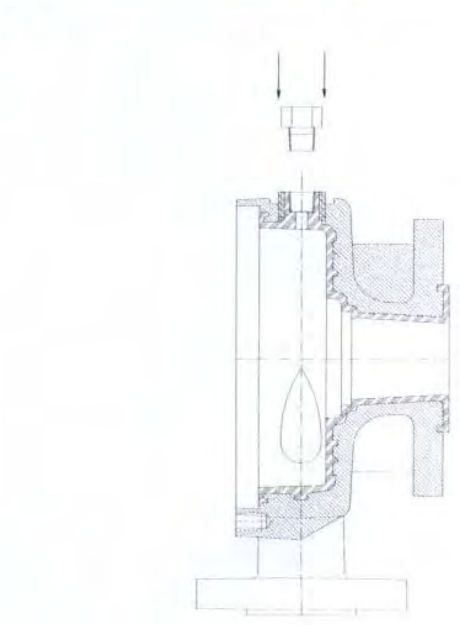


Insert pipe nipple



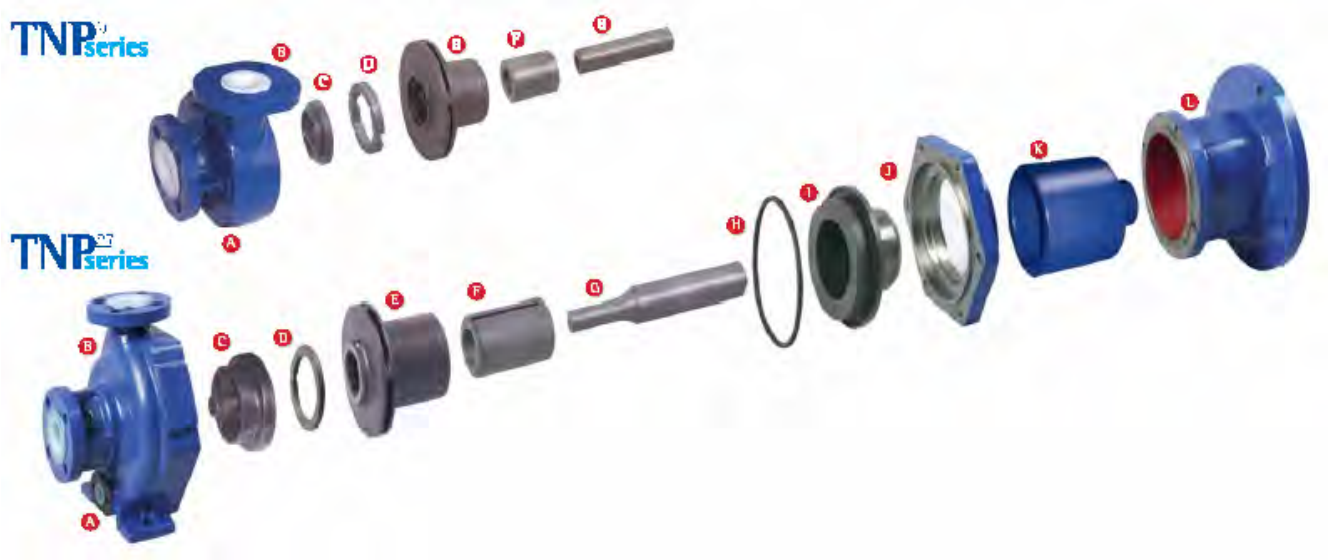
Drilling hole

3
Remove the pipe nipple used for guiding the drill. Generously wrap the drain plug with Teflon tape and tighten.

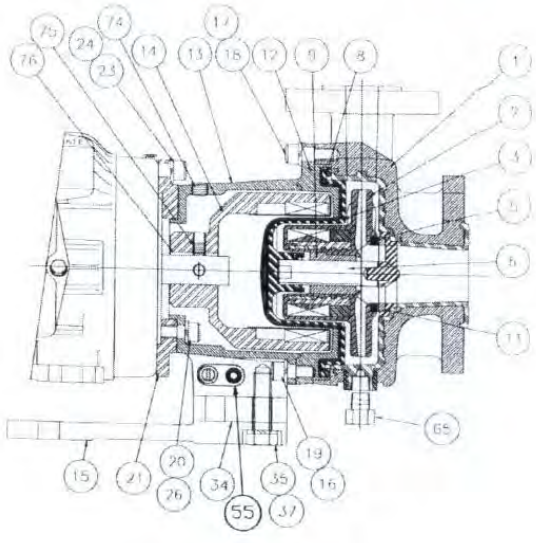


Assemble drain plug

Exploded View



Sectional Drawing



PARTS LIST

■ Recommended Spare Parts

	ITEM#	PART NAME	QTY.	TNPS1515	TNPS2156
■	1	**Casing**	1		
		Ductile Iron lined ETFE		P11BP081ZZ	P11BQ081ZZ
■	2	**Impeller**	1		
		AA & AB Drive, CFR-ETFE		P12BP083ZZ	P12BQ083ZZ
■	3	**Containment Shell**	1		
		CFR/ETFE		P29BP083ZZ	P29BQ083ZZ
■	5	**Mouth Ring**	1		
		CFR/Teflon		P28BP043ZZ	P28CM043ZZ
		SiC		P28BP084ZZ	P28CM084ZZ
■	6	**Shaft-** SiC	1	P31BP084ZZ	P31BQ084ZZ
■	8	**Casing O-ring**	1		
		Viton		P37BP035ZZ	P37BQ035ZZ
		EPDM		P37BP036ZZ	P37BQ036ZZ
■	9	**Main Bushing**	1		
		CFR-ETFE,SiC		P27BS085ZZ	P27BS085ZZ
■	11	**Shaft Support/Thrust Ring**	1		
		CFR-ETFE,SiC		P26BP085ZZ	P26CM085ZZ
	12	**Rear Casing Support**	1		
		Ductile Iron		P30BP011ZZ	P30BQ011ZZ
	13	**Bracket**	1	P32BS011ZZ	P32BS011ZZ
	14	**Outer Drive**	1		
		AA Drive			
		56C		P34CV049AA	P34CV049AA
		143/145TC		P34CW049AA	P34CW049AA
		182/184TC		P34CX049AA	P34CX049AA
		213/215TC (S2156 ONLY)			P34CZ049AB
		AB Drive			
		182/184TC		P34CY049AB	P34CY049AB
		213/215TC		P34CZ049AB	P34CZ049AB
	15	**Bracket Foot**	1	P33BS011ZZ	P33BS011ZZ
	17	**Lock Washer**	6	P47CH015ZZ	P47CH015ZZ
	18	**Hex Bolt, Rear Support/Pump Case**	6	P48CF015ZZ	P48CF015ZZ
	19	**Socket Bolt, Bracket/Rear Support**	7	P49CF015ZZ	P48CF015ZZ
	16	**Lock Washer**	7	P47CH015ZZ	P47CH015ZZ
	21	**Motor Mounting Plate**	1		
		143/145TC NEMA		P35CP015ZZ	P33CP011ZZ
		182/184TC NEMA		P35CQ015ZZ	P35CQ015ZZ
		213/215TC NEMA		P35CQ015ZZ	P35CQ015ZZ
	34	**Riser, Bracket Foot**	1	NA	P36BQ011ZZ

	35	**Hex Bolt, Bracket Foot**	3		
		All		NA	
		All except 100 frame (IEC)			
	37	**Lock Washer**	3	P47CJ015ZZ	P47CJ015ZZ
	51	**Name Plate**	1		
	65	**Drain Plug 1/4" NPT, Pump Case**	1		
	73	**Drain Plug, Bracket**	1	P45BS015ZZ	P45BS015ZZ
	74	**Set Screw Plug, Bracket**	1	P45BS015ZZ	P45BS015ZZ
	75	**Set Screw, Outer Drive**	2	P46BS015ZZ	P46BS015ZZ
	76	**Motor Shaft Key**	1		

PUMP SPECIFICATIONS

	TNPs 1.5x1-5	TNPs 2x1.5-6
Horsepower:	5HP Max	7.5HP Max
Temperature:	250°F Max / -20°F Min	250°F Max / -20°F Min
Pressure:	150psi (Hydrostatic 225 psi)	150psi (Hydrostatic 225psi)
Viscosity:	700SSU (150 centistokes) Max	700SSU (150 centistokes) Max
Minimum Flow:	1.0gpm at 3600rpm 0.5gpm at 1750rpm 0.23m^3/h at 2900rpm 0.11m^3/h at 1450rpm	3.0gpm at 3600rpm 1.5gpm at 1750rpm 0.68m^3/h at 2900rpm 0.34m^3/h at 1450rpm
Port Size:	Sub-ANSI 1-1/2" x 1" x 5.0" ISO 40mm x 25mm x 127mm JIS 40mm x 25mm x 127mm	Sub-ANSI 1-1/2" x 1" x 5.0" ISO 40mm x 25mm x 127mm JIS 40mm x 25mm x 127mm
Solids:	500 microns Max 0.5% by weight max	500 microns Max 0.5% by weight max
Impeller:	5.00" (127mm) 3.00" trimmed	5.00" (127mm) 3.00" trimmed
Mounting:	Close Coupled NEMA and IEC	Close Coupled NEMA and IEC
Ship Weight:	53lbs (24kg) standard pump end without motor	53lbs (24kg) standard pump end without motor

Note: Pump performance (flow, head & efficiency) will be greatly affected by the viscosity of the liquid being pumped. Maximum viscosity given above is an approximate number. Please refer to the Hydraulic Institute's "Viscosity Correction" chart. A pump should not be used with caution if efficiency with viscous liquid is less than 50% of efficiency with water.
Note: Minimum flow data is based on water. Consult factory for other liquids.

COMMON CONVERSIONS

Flow (capacity)

GPM (US)	m^3/h	l/min	GPM (UK)
1	0.2271	3.785	0.8327
4.403	1	16.6	3.666
0.2642	0.06	1	0.2200
1.201	0.2727	4.5458	1

GPM (US) x 0.2271 = m^3/h l/min x 0.2642 = GPM (US)
m^3/h x 4.403 = GPM (US) GPM (US) x 3.785 = l/min
m^3/h x 16.6 = l/min l/min x 0.06 = m^3/h

Head (pressure / vacuum)

Ft (H^2O)	M (H^2O)	PSI	Kg/cm^2	KPa	inch Hg	mmHg	bar
1	0.3048	0.4335	0.03048	2.989	0.8851	22.48	0.02987
3.281	1	1.422	0.100	9.807	2.904	73.76	0.3685
2.307	0.7031	1	0.07031	6.895	2.042	51.87	0.0690
32.83	10.01	14.23	1	98.07	29.04	737.6	3.685
0.3349	0.1020	0.1450	0.01020	1	0.2961	7.521	0.01
1.132	0.3450	0.491	0.03443	3.377	1	25.4	0.0339
0.04457	0.5339	0.01933	0.001356	0.1330	0.03937	1	0.005
33.5	2.714	14.50	0.2714	100	29.5	200	1

Ft (in water) x 0.3048 = m (in water) PSI x 2.307 = Ft (in Water)
M (in water) x 3.2808 = Ft (in water) Ft (in water) x .433 = PSI
Kg/cm^2 x 0.328 = Ft (in water) PSI x 6.895 = KPa
Ft (in water) x 3.049 = Kg/cm^2 KPa x 0.1450 = PSI

Volume

Ft^3	M^3	liter	gallon (US)	gallon (UK)	lbs of water
1	0.02832	28.32	7.481	6.229	62.44
35.31	1	1000	264.2	220.00	2205
0.03531	0.001	1	0.2642	0.2200	2.204
0.1337	0.003785	3.785	1	0.8327	8.347
0.1606	0.004545	4.548	1.201	1	10.025
0.01620	0.0004537	0.4537	.1198	0.09975	1

Temperature Conversions

F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	ΔF	ΔC
-60	-51	0	-18	60	15.6	120	48.9	180	82.2	240	116	300	149	360	182	1	0.6
-55	-48	5	-15	65	18.3	125	51.7	185	85.0	245	118	305	152	365	185	2	1.1
-50	-46	10	-12	70	21.1	130	54.4	190	87.8	250	121	310	154	370	188	3	1.7
-45	-43	15	-9.4	75	23.9	135	57.2	195	90.6	255	124	315	157	375	191	4	2.2
-40	-40	20	-6.7	80	26.7	140	60.0	200	93.3	260	127	320	160	380	193	5	2.8
-35	-37	25	-3.9	85	29.4	145	62.8	205	96.1	265	129	325	163	385	196	6	3.3
-30	-34	30	-1.1	90	32.2	150	65.6	210	98.9	270	132	330	166	390	199	7	3.9
-25	-32	35	1.67	95	35.0	155	68.3	215	102	275	135	335	168	395	202	8	4.4
-20	-29	40	4.44	100	37.8	160	71.1	220	104	280	138	340	171	400	204	9	5.0
-15	-26	45	7.22	105	40.6	165	73.9	225	107	285	141	345	174	405	207	10	5.6
-10	-23	50	10.0	110	43.3	170	76.7	230	110	290	143	350	177	410	210	11	6.1
-5	-21	55	12.8	115	46.1	175	79.4	235	113	295	146	355	179	415	213	12	6.7

F=(9/5)C+32 C=(5/9) x (F-32)

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