



INDIRECT Frost-Tec Systems

INSTALLERS MANUAL

Description

Frost-Tec is a slightly viscous, water soluble, food grade, golden yellow liquid, specially formulated to prevent freezing of circulation water.

Suitable for Indirect Pump Circulating or Thermosyphon Systems

For positioning and mounting of HWC and Solar Collectors follow the manual for Pump Circulating or Thermosyphon Manuals. Pipe work fitting diagrams for indirect closed circuits are attached to this manual. Frost-Tec cannot enter the potable water storage so must be piped indirectly either through a coil in the Hot Water Cylinder or via an external Heat Exchanger.

Frost-Tec is not considered a hazardous product. As with all chemical products, safe handling procedures are recommended. Avoid contact with the eyes and skin, wash any splashes with water. Keep the product out of the reach of children.

MUST ONLY BE INSTALLED IN BROADY'S SOLAPOWER CLOSED CIRCUIT OR HEAT EXCHANGE SYSTEMS.

Dose Rate

- For Protection to -8°C add at a rate of 20%. (I.e. 2 litres of Frost-Tec to 8 litres of water = 10 litre system)
- For Protection to -15°C add at a rate of 30%. (I.e. 3 litres of Frost-Tec to 7 litres of water = 10 litre system)
- For Protection to -24°C add at a rate of 40%. (I.e. 4 litres of Frost-Tec to 6 litres of water = 10 litre system)

Standard Broady's Solapower Frost-Tec protection is to -15°C . If higher frost protection or additional information is required, contact your local dealer or Broady's Solapower direct.

Adding Frost-Tec to your system.

Warning: If the local water quality is poor or you are in doubt about the water quality, used distilled water. Failure to do so may void warranty.

If the system is a new installation, fill with water first and check for any leaks within the system. Rectify if necessary, then drain the system by removing the blanking plug and disc at the bottom of one collector. Replace the blanking plug and disc, then proceed as follows:

Expansion Tank Systems – Fig 1.

IMPORTANT: Cover collectors and run water through the collectors to cool them if required. Check for leaks as set out above.

Slowly add the correct amount of Frost-Tec directly from the bottle:

- 1/ Either through the filling port at the hot water storage tank for thermosyphoning system or
- 2/ Through the filling port at the highest point on the collectors for pump systems. Then refill the Frost-Tec bottles with water and totally fill the system. Now simply screw the expansion tank into position on the filling port. The system is now fully charged and ready for use.

If topping up your system, add the correct ratio of Frost-Tec and water for your system.

Header or Make-Up Tank Systems – Fig 2.

If the system is being filled via a header or make up tank with an expansion vent pipe returning back to the header tank, add the Frost-Tec to the header tank first and then slowly flood the system with water. Set the float valve (if fitted) to no more than 1/3 full. The header tank must have a good fitting lid attached.

VERY IMPORTANT: Turn off the filling tap to the header tank (if fitted) so that if the fluid is lost from the system it can be seen on inspection as the fluid in the header tank will be below the required level. If this occurs add the correct ratio of Frost-Tec and water for your system.

Failure to do so may result in the Frost-Tec being diluted and frost damage occurring.

Water Volume Calculation for correct ratio mix of Frost-Tec

The following equation is a simple method of determining the volume of water in a length of pipe so as to mix the correct ratio of Frost-Tec for Frost Protection.

General requirements are 1 litre Frost-Tec for each Solar Collector.

Calculation	Example – 15mm pipe x 10m long
1. Measure the inside pipe diameter (bore) in cm	13mm = 1.3cm
2. Half this figure	1.3 / 2 = 0.65
3. Multiply by itself (square root)	0.65 x 0.65 = 0.4225
4. Multiply by 3.1416 (pi)	0.4225 x 3.1416 = 1.327
5. Multiply by the length of pipe (cm)	1.327 x 1000cm
6. Result is in mm	= 1327mm
7. Divide by 1000 for conversion to litres	or 1.327 litres

Working Example: Broady's Indirect Pump Circulated System – 2 collectors connected to Hot Water Cylinder located at ground level.

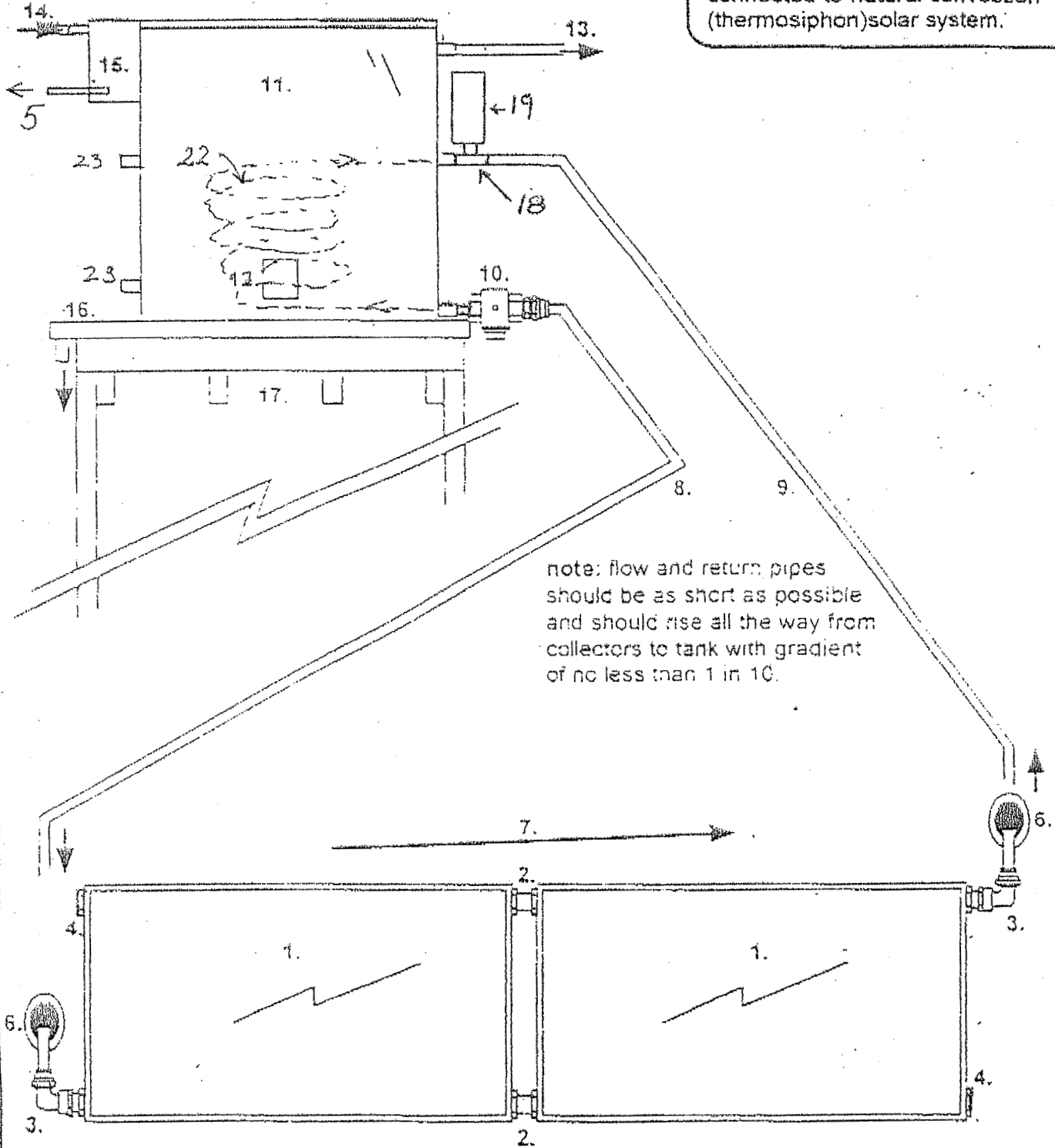
The hot water cylinder has a 6m indirect coil (19.4mm I/D) plus total of 8m flow and return pipe (13mm I/D) to the 2 Solar Collectors on the roof. Freeze protection required to -15°C (30% Frost-Tec:70% Water).

1. HWC Indirect Coil	2. Flow and Return Pipes	3. Solar Panels = 2 litres each
1.94cm	1.3cm	
1.94 / 2 = 0.97	1.3 / 2 = 0.65	4. Total Volume
0.97 x 0.97 = 0.941	0.65 x 0.65 = 0.4225	1.77 + 1.06 + 4.00 = 6.83 litres
0.941 x 3.1416 = 2.956	0.4225 x 3.1416 = 1.327	
2.956 x 600cm = 1,774 mm	1.327 x 800cm = 1,062mm	5. Mix Ratio
1,774 / 1000 = 1.77 litres	1,062 / 1000 = 1.062 litres	6.83 x 30% = 2 litres Frost-Tec
		6.83 x 70% = 4.83 litres Water

fig. 1.

BROADY'S
 46a SIR WILLIAM AVE, EAST TAMAKI
 PH (09) 274 0658 FAX (09) 272 2519
 E-MAIL: enquiries@broadys.co.nz

Ceiling (constant pressure) tank connected to natural convection (thermosiphon) solar system.



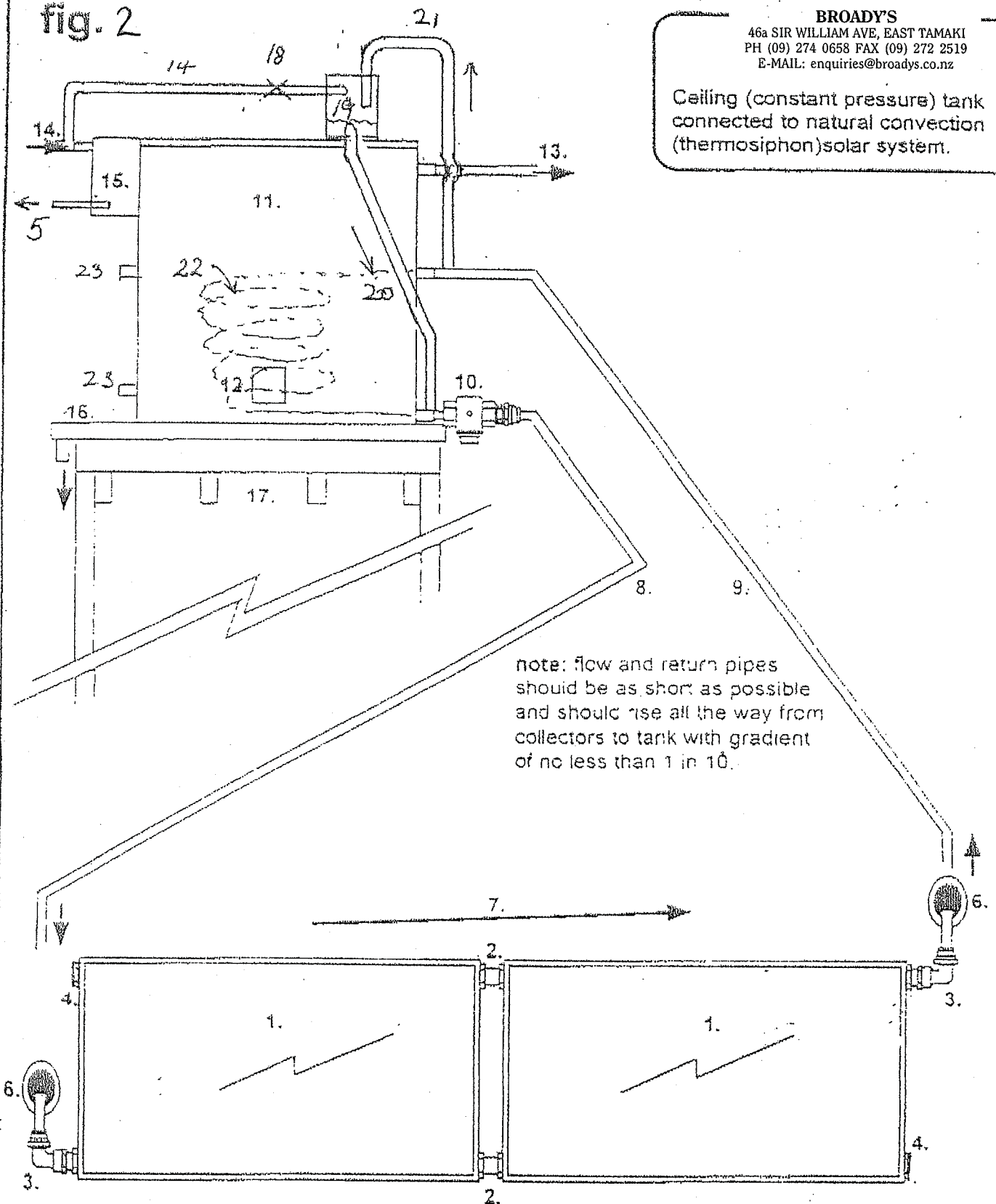
note: flow and return pipes should be as short as possible and should rise all the way from collectors to tank with gradient of no less than 1 in 10.

- | | | |
|-------------------------------------|---|--------------------------|
| 1. solar collector | 7. slight rise toward collector outlet | 11. hot water tank |
| 2. 1" connector | 8. cold flow pipe (3/4") | 12. electric element |
| 3. 1" x 3/4" elbow | 9. hot return pipe (3/4") | 13. hot water outlet |
| 4. BLANK ENDS | 10. anti reverse circulation (ARC) valve. | 14. cold water inlet |
| 5. COLD WATER TO SHOWER (IF FITTED) | | 15. cold water feed tank |
| 6. roof flashing | | 16. safe tray |
| | | 17. tank stand |
| 18. FROST-TEC FILLING PORT FITTING. | 19. EXPANSION TANK | |
| 22. SOLAR COIL | 23. STOVE CONNECTIONS | |

fig. 2

BROADY'S
 46a SIR WILLIAM AVE, EAST TAMAKI
 PH (09) 274 0658 FAX (09) 272 2519
 E-MAIL: enquiries@broadys.co.nz

Celling (constant pressure) tank connected to natural convection (thermosiphon) solar system.



note: flow and return pipes should be as short as possible and should rise all the way from collectors to tank with gradient of no less than 1 in 10.

- | | | |
|--------------------------|---|--------------------------|
| 1. solar collector | 7. slight rise toward collector outlet | 11. hot water tank |
| 2. 1" connector | 8. cold flow pipe (3/4") | 12. electric element |
| 3. 1" x 3/4" elbow | 9. hot return pipe (3/4") | 13. hot water outlet |
| 4. BLANK ENDS | 10. anti reverse circulation (ARC) valve. | 14. cold water inlet |
| 5. COLD WATER TO SHOWER | | 15. cold water feed tank |
| 6. roof flashing | | 16. safe tray |
| | | 17. tank stand |
| 18. STOP COCK | 19. FROST-FREE MAKE-UP TANK | 20. 1/2" SOLAR TOP UP |
| 21. 1/2" SOLAR EXPANSION | 22. SOLAR COIL | 23. STOVE CONNECTIONS |