


# Cooling Temperature and Pressure Settings

## Neslab Recirculating Chillers M33 and M75

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# Revision History

| Revision | Date | Author | Comments |
|---|---|---|---|
| A | January 5, 2006 | Ch.Townsend/ /P.Lagodzki | • Updates to wording regarding M33 pressure relief valve settings.<br>• Added discussion on chillers – sections 2-5.<br>• Added setting values for Neslab M75 chiller (thermal head TH3).<br>• This procedure includes setting values for TH2.25 head and M33 chiller combination which is not a new device configuration (it is only considered a field upgrade/downgrade option).<br>• Released for production. |
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# 1. SCOPE

This document provides values for temperature and pressure settings in order to prepare new M33 and M75 type chillers for proper cooling of specific thermal imaging devices. Detailed information on chillers is included in the ThermoNeslab Merlin Manual U00753. Full version of the manufacturer's manual can be found at:
http://www.thermo.com/eThermo/CMA/PDFs/Articles/articlesFile_26256.pdf

# 2. THE CHILLER PUMP AND THE BYPASS PRESSURE RELIEF VALVE

The M33 and M75 type chillers used in our products are designed around a positive displacement (PD-1) vane pump. The PD vane pump in these chillers will deliver a constant flow of coolant over a wide range of pressures.

Taking coolant discharge directly from the chiller PD pumps would result in flows and pressures in excess of the operating limits of our thermal head cooling systems. To limit flows and pressures, both chillers feature a built-in adjustable bypass pressure relief valve. This valve is connected across the internal chiller supply and return lines. It is adjusted from the rear of the chiller using a slotted screw driver.

The bypass pressure relief valve continuously diverts pump output before it entered the external cooling circuit. If we increased the flow resistance in the cooling circuit (sharp hose bend for example) more flow is diverted by the valve. If resistance continued to increase, the pressure seen by the cooling circuit would reach the bypass relief valve set-point and all pump output would be safely diverted before entering the cooling circuit. The bypass pressure relief valve set-point is referred to as the deadhead setting.

Our thermal heads require a fixed flow of coolant (L/Min) to remove excess heat from the thermal heads. Components inside our thermal heads need protection from excess pressures. The bypass pressure relief valve deadhead setting is done in the factory to provide adequate flow and pressure protection for our thermal heads. Only under special circumstances should the bypass pressure relief valve require adjustment in the field.

# 3. DEADHEAD SET-POINT AND SYSTEM PRESSURE

It is important to understand the difference between deadhead pressure settings and normal system pressures.

**System pressure** is the pressure indicated by the gauge on the front of the chiller when the cooling circuit is attached and all is working properly. The cooling circuit provides resistance to the established rate of flow. This resistance creates system pressure. Normal working system pressure is always less than the deadhead pressure setting. We cannot adjust the system pressure. The system pressure should not match the pressure marked on the factory 'pre-set' label. If so, consider the following causes: disconnected hose, kinked hose, clogged filter, incorrect deadhead pressure setting.

**Deadhead pressure** is the pressure indicated by the gauge on the front of the chiller when the cooling circuit is not connected and the chiller is operating. The pressure indicated by the gauge should match the pressure printed on the factory 'pre-set' label. It is impossible to correctly set the chiller deadhead pressure without first isolating the cooling circuit from the

chiller. In the factory, a hose with a valve is installed between the supply and return ports of the chiller. In the field, the cooling circuit is removed by disconnecting the supply line from the chiller to the head. Deadhead pressure settings should be done only after the coolant has reached the temperature set-point.

**Warning: Only disconnecting the return line to the chiller will isolate the cooling circuit for setting the deadhead pressure. However this is an unsafe practice because the head could be exposed to over pressures as the bypass pressure relief valve is adjusted through its operating range.**

## 4. COUPLING-DECOUPLING ORDER OF THE M75 CHILLER HOSES

Although the supply and return fittings on the chiller and hoses are gendered for error free hookup, a special procedure is required when making or breaking these connections. Following this procedure always ensures an 'escape' flow path for potential pressure surges that could be applied to the head when connecting the chiller supply line. Hose coupling-decoupling order for the M75 chiller is illustrated on label 382-01347A. This label is applied to the rear of the chiller in our factory.

Pressure surges are most serious when coupling-decoupling hoses of a chiller that is operating. However, pressure surges may also occur when coupling-decoupling hoses of a chiller that is not operating but has stored system pressure. For this reason, we urge adoption of the coupling-decoupling procedure as standard work habit.

Note: There is also a special procedure required when making or breaking cooling hose connections at the M75 head. This procedure ensures an 'escape' flow path for pressure surges out of the TH3 head before attaching the supply line from the chiller. Coupling-decoupling order of the M75 cooling hoses at the head is illustrated on label 382-01371A.

## 5. CHILLER FREQUENCIES (60HZ VERSUS 50HZ) – SETUP AND TESTING

Our equipment uses M33 and M75 chillers run by both electrical supply frequencies. Pump performances differ between types. When setting up and testing the 50Hz chillers in the factory, it is important to drive them at the proper frequency and voltage (50Hz, 230VAC, 1 Phase). In our factory, the M75-50Hz chiller has been successfully tested with the Chroma Programmable AC Source Model 6460.

## 6. SETTINGS FOR THERMAL HEAD TH2.7 (M33 CHILLER)

**Thermal Head TH2.7 (kits 518-00223A and 518-00224A)**

Deadhead pressure setting.....**55** psig

Cooling fluid (coolant)..... Kodak P/N 402-00056

Coolant temperature set point .....**14**ºC

Plastic cap over pressure relief valve..... Kodak P/N 390-00092

Label ("55 psi factory pre-set for TH2.7") .....Kodak P/N 382-00431B

**Procedure**

Refer to the Operation Manual for Merlin Recirculation Chillers U00753.

1. Locations of pressure gage, pressure relief valve, etc. ..... Page viii*
2. Fill up chiller with cooling fluid (Note: Level needs to be topped up again after start up of pump, and again after connecting the chiller to the thermal head hose circuit) .....Page 11*
3. Temperature set point .....Page 15*
4. Adjusting pressure relief valve (deadhead) setting .....Page 29*
5. Install label (382-00431B) on the rear of the chiller between the supply and return ports.
6. Install plastic cap (390-00092) to cover the pressure relief valve. Push the cap 'lip first' into the hole over the square nut and is captured by the hole

* Page numbers as per chiller manual U00753.

## 7. SETTINGS FOR THERMAL HEAD TH2.25 (M33 CHILLER)

**Thermal Head TH2.25 (upgrade kit 518-00509A)**

Deadhead pressure setting.....**75** psig

Cooling fluid (coolant)..... Kodak P/N 82-1032A

Coolant temperature set point.....**24**ºC

Plastic cap over pressure relief valve..... Kodak P/N 390-00092

Label ("75 psi factory pre-set for TH2.25") ..... Kodak P/N 382-00443A

**Procedure**

Upgrading a TH2.7 chiller (from either 518-00223A or 518-00224A).

1. Temperature set point .....Page 15*
2. Adjusting pressure relief valve (deadhead) setting .....Page 29*
3. Replace old label (55 psi) with new (75psi) label (382-00443A). Label placed on rear of chiller between supply and return ports.
4. Install plastic cap (390-00092) to cover the pressure relief valve. Push the cap 'lip first' into the hole over the square nut and is captured by the hole

* Page numbers as per chiller manual U00753.

# 8. SETTINGS FOR THERMAL HEAD TH3.0 (M75 CHILLER)

**Thermal Head TH3.0 (500-03396A 50Hz and 500-03400A 60Hz)**

Deadhead pressure setting.....**66** (+/-1) psig

Cooling fluid (coolant)..... Kodak P/N 82-1032A

Coolant temperature set point.....**20**°C

Label ("66 PSI Deadhead Factory Pre-set for TH3").....Kodak P/N 382-01327B

Label (Coupling-Decoupling Order of M75 Hoses)..... Kodak P/N 382-01347A

**Procedure**

Refer to the Operation Manual for Merlin Recirculation Chillers U00753.

1. Locations of pressure gage, pressure relief valve, etc. ..... Page viii*
2. Fill up chiller with cooling fluid .....Page 11*
   **Note:** Level needs to be topped up again after start up of pump, and again after connecting the chiller to the thermal head cooling hoses circuit.
3. Temperature set point .....Page 15*
4. Adjusting pressure relief valve (deadhead) setting.....Page 29*
5. Install label 382-01327B on rear of chiller between the supply and return ports.
6. Install label 382-01347A on top center of rear ventilated panel per chiller assembly drawing.

* Page numbers as per chiller manual U00753.