cytiva

MidJet pressure display unit

Instructions for use

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1 Introduction

About this user guide

This user guide describes how to use the CytivaMidJet pressure display unit PRT-DPM-3T. Topics include a product description, assembly instructions, operation instructions, and maintenance procedures.

Audience

This user guide addresses the needs of scientists, process engineers, and technicians who operate laboratory-scale cross-flow systems. The level of information presented in this guide assumes the user possesses basic laboratory and technical skills, and has the knowledge and documentation to safely operate any user supplied equipment connected to the pressure display unit. If you need assistance with the instructions in this guide, contact Cytiva for more information.

Where to find more information

You can download technical documents and learn more about Cytiva cross-flow systems by visiting our website, *cytiva.com*.

Safety

Anyone who works with the pressure display unit should read, understand, and follow the instructions in this user guide. If any operator does not understand an instruction, they should stop working with the pressure display unit and contact Cytiva for guidance. You should save these instructions and make them available to all users of the pressure display unit.

Cytiva designed the pressure display unit for displaying the pressure readings from pressure transducers installed into laboratory-scale, cross-flow filtration systems under the conditions stated in this user guide. If you use the pressure display unit and pressure transducers in a manner not specified by Cytiva, you may impair the protection provided by the pressure display unit and pressure transducers.

When using any laboratory equipment, the potential exists for personal injury unless you follow established safety procedures. When installing and using Cytiva cross-flow systems, you should follow good engineering practices as well as OSHA, federal, state, local, and your company's safety regulations and codes. You should follow your company's safety regulations and the specific safety instructions provided in this user guide.

Only qualified personnel who are adequately trained and who understand the operating instructions should install, operate, maintain, and inspect the pressure display unit.

Warnings, cautions, and tips

This user guide uses symbols and blocks of text to provide you with safety warnings and other important information:

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.

Tip: *A tip contains useful information that can improve or optimize your procedures.*

WARNING

If a pressure transducer leaks, it can release potentially hazardous process or cleaning fluids and cause bodily harm. To prevent leaks and the release of potentially hazardous fluids, limit system pressure to 2 barg (30 psig), periodically check pressure transducer connections for proper assembly and wear. Isolate and depressurize your system before installing, removing, and checking pressure transducers. Wear the appropriate personal protection devices and clothing when operating and cleaning the system.

WARNING

Mishandling potentially hazardous process and cleaning solutions can cause bodily harm. To safely handle potentially hazardous process, cleaning, and storage solutions, read the material safety data sheets for the solutions you use. Follow the material safety data sheet instructions for safe handling and use the personal protection equipment required by your company, and local, state, and federal laws.

WARNING
If you autoclave or use hot caustic cleaning solution (0.5 N NaOH) to clean the pressure transducers, the transducers can fail causing leaks of potentially hazardous cleaning or process fluid and bodily harm. To avoid leaks of potentially hazardous solutions, do not autoclave the pressure transducers. Limit exposure to caustic solution (0.5 N NaOH) to room temperature and only for short periods (30 to 60 minutes) of time. Rinse all caustic thoroughly from the transducers after exposure.

WARNING
If water or other liquids enter the pressure display unit, equipment damage and electrical shock (bodily harm) can occur. Locate the pressure display unit where it will not be exposed to water and other fluids. Prevent water or other liquids from entering the unit.

Product labeling

The pressure display unit labeling, located on the back of the housing, provides key identification and specification information (see the Figure below).

Figure 1.1: The PRT-DPM-3T pressure display unit labeling

2 Pressure display unit

Package contents

Your pressure display unit arrives packaged in a cardboard box. The box includes these components:

Contents of PRT-DPM-3T

- display unit
- Three pressure transducers
- One temperature sensor
- Power cord (U.S.)
- User guide
- Certificates of compliance for pressure display unit

System overview

The PRT-DPM-3T pressure display unit includes three pressure displays and a temperature display (see the Figure below).

Figure 2.1: The PRT-DPM-3T pressure display unit

Transducers

Each pressure display unit includes a set of pressure tranducers. Additional pressure transducers can be purchased separately in packs of one or two.

The transducers use Luer-Lok™ connectors for connecting to your lab system tubing and an electrical jack for connecting the electrical wire to the back of the pressure display unit.

WARNING

If you autoclave or use hot caustic cleaning solution (0.5 N NaOH) to clean the pressure transducers, the transducers can fail causing leaks of potentially hazardous cleaning or process fluid and bodily harm. To avoid leaks of potentially hazardous solutions, do not autoclave the pressure transducers. Limit exposure to caustic solution (0.5 N NaOH) to room temperature and only for short periods (30 to 60 minutes) of time. Rinse all caustic solution thoroughly from the transducers after exposure.

Thermocouple

The temperature signal is sent to the pressure display using a J-type thermocouple set in a maleLuer-Lok fitting. The 5-foot length of signal wire ends in a standard 2-pin plug that plugs into the back of the display unit. The thermocouple is calibrated by the manufacturer for digital displays.

The LED temperature display indicates temperature in °C.

3 Setup and operation

To setup your system you must integrate the pressure transducers in to your cross-flow system and connect the transducer signal cables to the back of the pressure display unit.

Typical transducer placement in a cross-flow filtration system

Monitoring the feed and retentate pressure—and sometimes the permeate pressure—enables the safe and precise control of a cross-flow filtration system. Therefore, pressure transducers are mounted on the feed and retentate lines (*Fig. 3.1, on page 9*). For cross-flow systems that can benefit from monitoring the permeate pressure, a third pressure transducer (model PRT-DPM-3T) can be mounted on the permeate line.

Temperature probe (thermocouple)

Monitoring the temperature in the reservoir or permeate collection vessel can be helpful. Pressure display unit PRT-DPM-3T includes a temperature probe and LED temperature display that indicates the temperature in °C.

CAUTION
If you overtighten the locking nut when installing transducers using Luer-Lok connectors, you can damage the transducer. Often the damage occurs when trying to loosen an overtightened connection. When you join the male and female components of a Luer-Lok, a tight connection is essentially made. Rotating the nut prevents the components from coming apart—it does not make the connection tighter. To prevent damaging pressure transducers, use only light fingertip pressure to tighten the Luer-Lok's rotating nut.

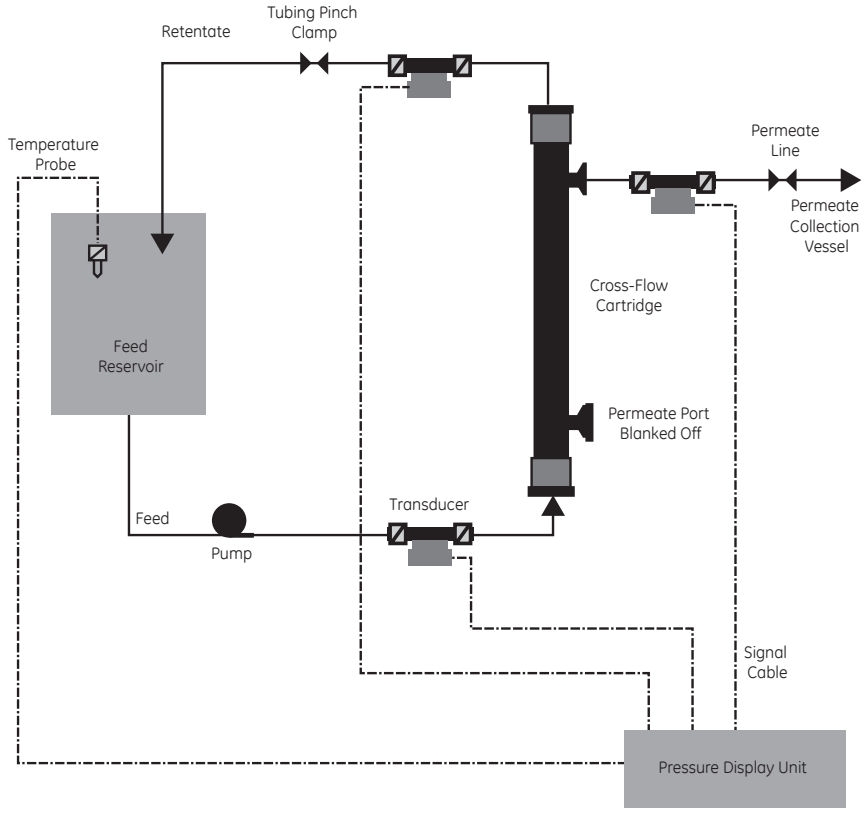

Figure 3.1: Typical transducer placement in a cross-flow system

Installing the transducers

CAUTION

The pressure display unit is calibrated at the factory with the installed transducers. If you swap the transducers by plugging them into different terminals on the back of the pressure display unit, the accuracy of the pressure reading will be compromised. To maintain the accuracy of the pressure display unit, do not swap the transducers by plugging them into different terminals on the back of the pressure display unit. Recalibrate the pressure display unit when you install new pressure transducers.

Connect pressure transducers to the feed, retentate, and one of the permeate ports of your cross-flow cartridge. Connect the transducer signal cables to the appropriate jacks—Inlet (or feed), Outlet (or retentate and Permeate—on the back of the display unit. Plug the temperature sensor signal cable into the jack on the back of the display unit. Place the temperature probe in the feed reservoir, permeate collection vessel, or integrate it into the retentate line using a tee adaptor andLuer-Lok connectors.

WARNING

If a pressure transducer leaks, it can release potentially hazardous process or cleaning fluids and cause bodily harm. To prevent leaks and the release of potentially hazardous fluids, limit system pressure to 2 barg (30 psig), periodically check pressure transducer connections for proper assembly and wear. Isolate and depressurize your system before installing, removing, and checking pressure transducers. Wear the appropriate personal protection devices and clothing when operating and cleaning the system.

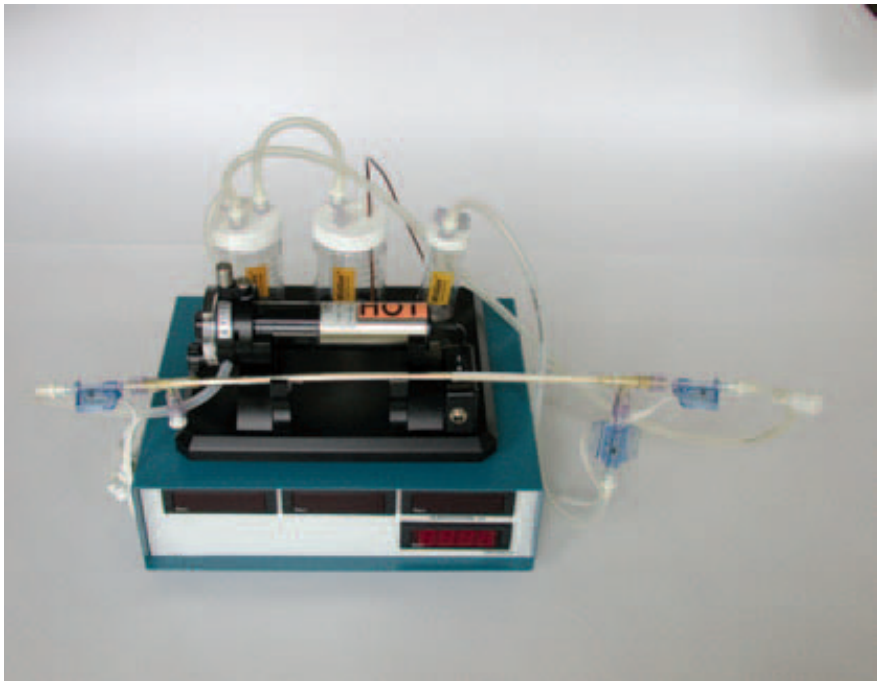

Figure 3.2: A MidJet system and a pressure and temperature display unit

Powering up the display

Connect the pressure display unit power cord to a fuse-protected, electrical outlet of the proper voltage (110 to 220 VAC, 50 to 60 Hz).

If you need to order a power cord for use outside the United States and Canada, see the part list in *Ordering parts, on page 16*.

After making all the connections, power up the pressure display unit using the On/Off switch located on the back panel of the unit.

WARNING
If water or other liquids enter the pressure display unit, equipment damage and electrical shock (bodily harm) can occur. Locate the pressure display unit where it will not be exposed to water and other fluids. Prevent water or other liquids from entering the unit.

Tip: *If the display does not illuminate when you power up the unit, or if one of displays does not seem to work properly, you may have to reset the system by switching it off and back on again. This enables the display unit to reset the memory much like rebooting a computer.*

Tip: *The pressure display units can be integrated into various cross-flow systems using a number of different fittings and adaptors. See the part list in* *Ordering parts, on page 16* *for a list of the available fittings, adaptors, and cross-flow system components.*

Operation

After powering up the pressure display, the pressure in pounds per square inch (or bar) will be displayed for each transducer. The LED temperature display indicates temperature in °C as measured by the temperature probe.

To shut the unit down, move the power switch to the Off position.

4 Maintenance and calibration

Inspection

Routine maintenance is not required on the pressure display unit. You should visually inspect the pressure transducers for leaks periodically.

Based on usage (run hours, process fluid chemistry, cleaning cycles), develop a schedule for the routine replacement of transducers before performance is affected or leaks develop.

Calibration of temperature LED display

The temperature LED display does not require calibration. Periodically test the accuracy of the thermocouple and display using a standard. Replace the thermocouple if needed.

Calibration of LCD pressure displays

Only a trained and qualified instrument technician or metrologist should calibrate the pressure displays. Calibrate the pressure display unit whenever you change a pressure transducer. Once calibrated, you should not switch transducer connections on the back of the unit.

Following calibration, the pressure display units should provide an accuracy of ±2 percent over the range of calibration. For example, if you calibrate the unit using a pressure range of 2.5 to 15 psig, you will achieve ±2 percent accuracy over that range. If you calibrate the unit from 15 to 30 psig, you will achieve ±2 percent accuracy over that range.

The LCD displays may have different internal appearances, but the model number, performance, and calibration procedure are the same.

Calibration of the three-transducer pressure display unit (PRT-DPM-3T)

Follow the steps below to calibrate the three-transducer pressure display unit:

Equipment needed

Gather these materials:

- A hand-held tester with a pressure standard. The standard should be traceable to NIST for the most precise calibration.
- Very small flathead screwdriver and small Philips head screwdriver
- Tubing and Luer-Lok fittings to connect all transducers in series to the pressure tester

Removing the pressure display unit cover

Follow these steps to remove the LCD display unit's cover:

Step	Action
1	Disconnect the power cord from the electrical power source.
2	Remove the four screws that hold the rubber feet to the bottom of the cabinet, and remove the top half of the cabinet.
3	Plug the power cable in, power up the unit, and allow it to warm up for 20 minutes.

Calibrating the LCD displays

You should calibrate the unit over a 15-psig range that covers the pressures anticipated during processing. This procedures provides instructions for calibrating between 2.5 and 15 psig. If, however, you anticipate that most of your process pressures will be from 15 to 30 psig, modify the test pressures to cover that range.
Follow these steps to calibrate the LCD displays:

Step	Action
1	Connect the feed (inlet) and retentate (outlet) and permeate transducers in series to the pressure tester. Blank off the open end of the last transducer and pressurize the transducer circuit to 15 psig. Allow the displays to equilibrate.
2	Rotate the adjustment screw on each LCD display until the displays indicate the exact pressure shown on the pressure tester.
3	Repeat steps 1 through 2 in this section at pressures of 2.5, 5, and 10 psig.
4	Repeat steps 1 through 3 in this section two more times.

Qualification and acceptance

Follow these steps to qualify and accept the calibration of the unit:

Step	Action
1	Pressurize the transducers to 2.5 psig using the pressure tester and record the actual pressure displayed on the pressure tester and the indicated readings of the pressure display unit. Repeat this step at 5, 7.5, 10, 12.5, and 15 psig.
2	If more than six of the pressure readings are outside the actual pressure applied by ± 0.3 psig , repeat the calibration and qualification and acceptance procedures again.

Assembly

Follow these steps to assemble the pressure display unit after calibrating it:

Step	Action
1	Power down the pressure unit and unplug its power cord.
2	Decompress the transducer circuit and remove the pressure tester from the transducers.
3	Replace the top cover on the pressure display unit and reinstall the four rubber feet and screws to hold the cover in place.

Transducer and system disposal

To dispose of a transducer, clean potentially hazardous solutions from it with a water flush, unplug the transducer from the back of the pressure display unit, and dispose of the transducer in the trash.

When the pressure display unit reaches the end of its service life, dispose of the unit in accordance with the government and environmental regulations that pertain to your location.

5 Specifications

Pressure display unit PRT-DPM-3T

Size and dimensions

Dimensions, approximate (W × D × H)—26 × 18.5 × 7.5 cm (10.3 × 7 × 3 in)

Weight, approximate: 1.5 kg (3 lbs)

Operating parameters

Ambient operating temperature range: 5-50°C

Recommended maximum operating pressure: 2 barg (30 psig)

Accuracy: ±2 percent over the 15 psig range to which it is calibrated

Power requirements: 110 to 220 VAC, 50 to 60 Hz

Thermocouple

Thermocouple: type J thermocouple, -210 to 1200°C (display range is limited to -99 to 999.9°C, limit of error of 2.2°C

Pressure transducers

Operating parameters

Recalibrate the pressure display after installing new transducers

Recommended maximum operating pressure—2 barg (30 psig)

Material of construction—polycarbonate shell

Connection to process lines—male and female Luer-Lok connectors

Connection to pressure display—RJ15 phone jack

6 Parts and accessories

Ordering parts

Cytiva can supply you with spare parts and accessories for your pressure display unit (see the Table below).

Table 6.1: Pressure display unit part numbers

Code number	Model number	Description
56-4106-11	PRT-DPM-3T	Pressure display unit with three pressure transducers and temperature thermocouple (included)
56-4110-25	PRT-DPM-3T150	Same as part PRT-DPM-3T, 220V. Power cord must be ordered separately.
56-4109-47	PC01-CH	Power Cord, China
56-4109-48	PC02-EU	Power Cord, Europe
56-4109-49	PC03-IN	Power Cord, India
56-4109-50	PC04-UK	Power Cord, United Kingdom
56-4106-14	PT-109-01	Replacement pressure transducer (single)
56-4106-15	PT-109-02	Replacement pressure transducers (pair)
56-4110-05	TC-1308-01	Thermocouple—type J, -210 to 1200°C
56-4106-16	PTSL02-10	Size 14 tubing, 1/16-in (1.6 mm) ID, 3.1m L (silicone)
56-4106-17	PTSL03-10	Size 16 tubing, 1/8-in (3.1 mm) ID, 3.1m L (silicone)
56-4107-19	RB12-MLPC	1.5-in TC (polysulfone) x male Luer-Lok (polycarbonate
56-4107-02	RB4-MLPC	0.5-in TC (polysulfone) x male Luer-Lok (polycarbonate)
56-4105-75	RBFL-1	Female Luer-Lok x 1/8-in tubing barb (nylon), pkg. of 10
56-4105-76	RBFL-2	Female Luer-Lok x 3/32-in tubing barb (nylon), pkg. of 10
56-4105-77	RBFL-ML	Female Luer-Lok x male Luer-Lok adaptor (nylon), pkg. of 10
56-4105-78	RBFL-SC	Female Luer-Lok x solid cap (nylon), pkg. of 10
56-4107-06	T4M-L-2PS	0.5-in TC x 0.25-in tubing barb (polysulfone) x male Luer-Lok (polycarbonate)
56-4105-80	MRV-030	MidGee™ reservoir, 30 ml
56-4105-81	MRV-120	MidGee reservoir, 120 ml
56-4105-85	MRV-175A	MidGee reservoir, 175 ml, autoclavable

Code number	Model number	Description
56-4105-83	KMRV-030	MidGee reservoir kit, including: 12 polystyrene reservoirs, 30 ml non-autoclavable, 12 caps, 2 sets of caps with fittings, 12 sets of internal tubing
56-4105-84	KMRV-120	MidGee reservoir kit, including: 12 polystyrene reservoirs, 120 ml, non-autoclavable, 12 caps, 2 sets of caps with fittings, 12 sets of internal tubing
56-4105-86	KMDG-175R01A	Autoclavable MidGee reservoir kit, including: 6 polycarbonate conical bottom reservoirs, 175 ml, 3 solid caps, 6 sets of caps with fittings, 3 bases to fit MidJet system 1 standard base
56-4105-87	KMDG-175R02A	Autoclavable Replacement MidGee reservoir kit, including: 3 polycarbonate conical bottom reservoirs, 175 ml, , 3 solid caps, 3 sets of caps with fittings
56-4105-79	KMDG-1	MidGee starter kit (for use with standard peristaltic pump such as PRP-09WM), including: PTSL02-10, PTSL03-10, KMRV-030, KMRV-120, RBFL-1, RBFL-2, RBFL-SC
56-4105-82	KMDG-2	MidJet system accessory kit; includes: PTSL02-10, PTSL03-10, KMRV-030, KMRV-120, RBFL-1, RBFL-2, RBFL-SC
56-4106-37	MDG-3SP	Basic MidJet System, includes: miniature peristaltic pump with exchangeable saddles for size 14 and size 16 tubing, (single speed, maximum recirculation rate of 50 ml/min with size 14 tubing and 140 ml/min with size 16 tubing); KMDG-2 MidJet accessory kit
56-4106-38	MDG-4SP	Advanced MidJet system, includes: MDG-3SP basic MidJet system, PRT-DPM-3T pressure display unit with three pressure transducers
56-4106-53	PRP-09WM	Peristaltic pump, Watson Marlow 323S, dual voltage 110/220V

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