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# Pressure Calibrator

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PM205 / PC705M



User's manual



Thank you for purchasing a IKM Instrutek pressure calibrator. The products are manufactured by IKM Instrutek AS in accordance with our high quality standards in design, choice of components and workmanship in order to achieve maximum customer satisfaction.

### ***Designed and manufactured by:***

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All efforts have been made to ensure the accuracy of this handbook. We at IKM Instrutek are always striving to improve our products and handbooks, therefore we would greatly appreciate being informed of any errors found in our product or in its manual. The above notwithstanding, IKM Instrutek can assume no responsibility for any errors in this handbook or of their consequences.



Synbol used to identify an action that can cause personal injuri or damage to equipment.



Always release internal pressure at connectors **before** disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to equipment.

The unit is certified by DNV-GL. Please contact us if a copy of the approval is required.



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## 1 DESCRIPTION OF THE PM205 / PC705M

The PM205 / PC705M Pressure Calibrator has been designed as a self-contained, portable pressure meters that have been calibrated to precision pressure equipment traceable to national standards.

Each unit is marked with:

- Calibration label, next calibration date
- Serial number
- Production year
- Pressure range.

### 1.1 CALIBRATION LABEL

IKM Instrutek AS certifies that this product meets published specifications at the time of shipment from the factory. IKM Instrutek AS further certifies that its calibration measurements are traceable to accredited international standards. Each pressure calibrator has a calibrated label showing the last date of calibration and the date when the next calibration is due. Calibration is scheduled annually, unless you believe the unit to be defective, whereupon the unit will be recalibrated after repair and receive a new label showing the date calibrated and the new calibration-due date. Check the calibrated label to ensure the Pressure Meter Calibrator has a valid calibration date before using the unit. Calibration must be done by IKM Instrutek AS or a certified supplier/service center.

### 1.2 CERTIFICATION

IKM Instrutek AS certifies that the PM205 complies with its published list of specifications at the time it was manufactured. IKM Instrutek AS also certifies that its calibration measurements are traceable to Norwegian Accreditation and to the calibration facilities of other International Standards Organization (ISO) members. IKM Instrutek AS confirms that the PM205 / PC705M complies with the following standards:





Electromagnetic compatibility as established in the guidelines of the European Community, EMC 89/336/EEG .  
The following norms are applied:  
EN 61000-6-2, EN 61000-6-3.

### 1.3 WARRANTY

This product is guaranteed free from defects in material and workmanship for one (1) year from the date of shipment. During this warranty period, IKM Instrutek AS will, at its option, either repair or replace the PM205 / PC705M should it prove to be defective. The product must be returned to a service facility designated by IKM Instrutek AS for warranty service or repair. The foregoing warranty will not apply to defects resulting from improper maintenance by the purchaser, purchaser-supplied software or interfacing, unauthorized modification or misuse, operation exceeding the environmental specifications for the PM205 / PC705M, or improper site preparation. No other warranty is expressed or implied by IKM Instrutek AS, and IKM Instrutek AS shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract, tort, or any other legal theory.

## 1.4 CONVENTIONS USED IN THIS DOCUMENT

We have provided this section of the Handbook to help you identify noteworthy symbols, terms and conventions used in this handbook. Look for the following:

	Symbol used to identify an action that can cause personal injury or damage to equipment.	<u>Terms and definitions:</u> We define calibration as being able to compare the ability of the equipment to perform to a known standard. Pressure calibration provides a means of quantifying uncertainties in pressure measurement in order to optimize sensor and/or system accuracy.
	Conformité Européenne	

## 1.5 BATTERY CHANGE / BATTERY LIFE

When the battery starts weakening, a low battery warning (BAT LOW) will appear in the upper left corner of the display. Battery change: Open the instrument (turn the display ring beyond the limit stop). Open the battery compartment and change the battery (type CR2430).

Make sure that the O-ring remains embedded in the cover. The battery life is 150 hours in Peak-mode (at continuous operation) and 1000 hours in normal measuring mode.

For PC705M the battery life is approximately 2000 hours in normal measuring mode.

## 1.6 PM205 / PC705M NOT OPERATING / FAILED

Repairs must be done by manufacturer or supplier certified for service/repair.

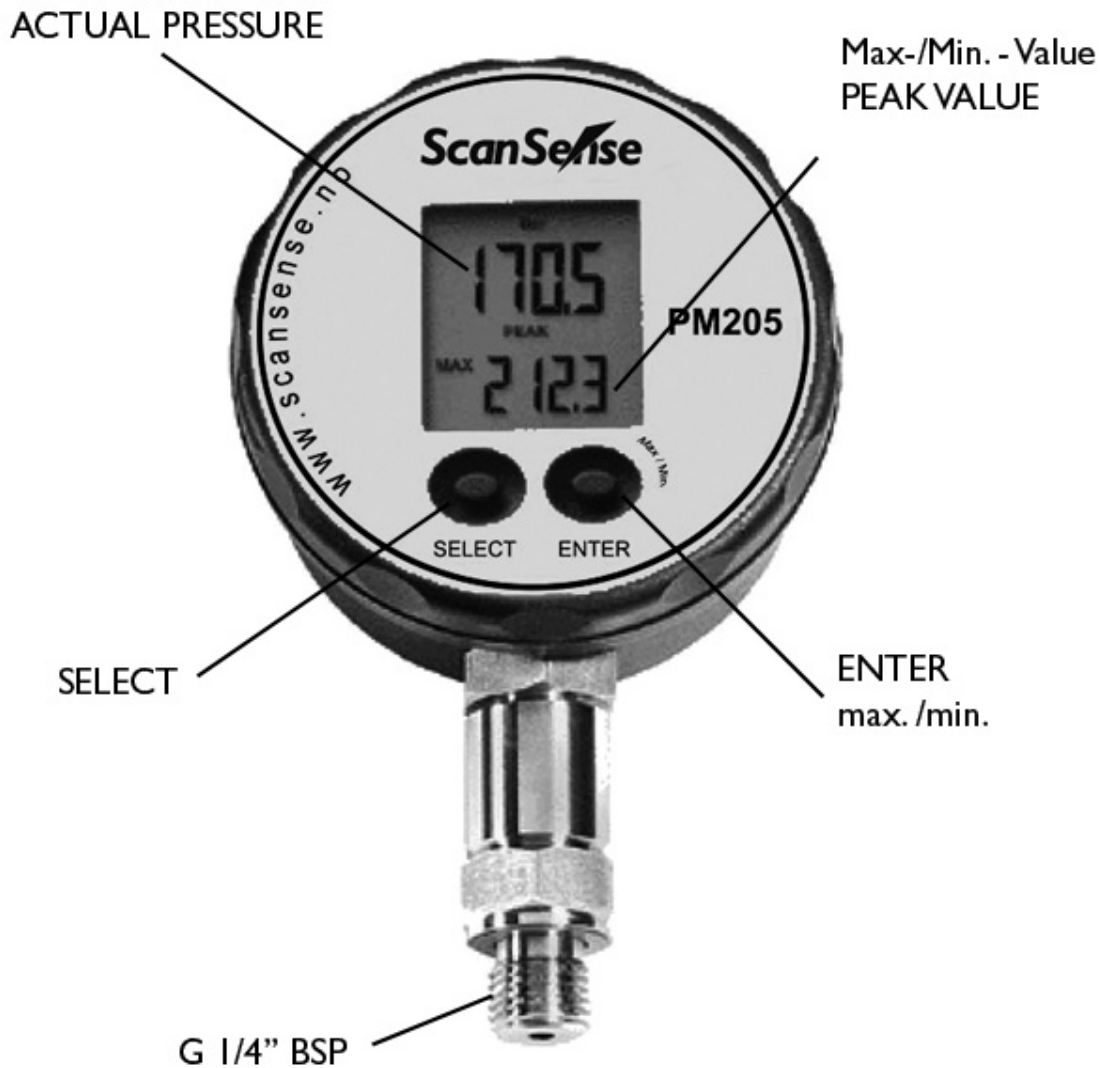
Replacement parts must be obtained from the manufacturer.

### Manufacturers address:

IKM Instrutek AS  
 Elveveien 28, 3262 Larvik, Norway  
 Tel.: + 47 33 16 57 00  
 Fax.: + 47 33 16 57 10  
 Web.: [www.IKM.com](http://www.IKM.com)  
 E-mail: [IKMinstrutek@IKM.no](mailto:IKMinstrutek@IKM.no)

## 2 CONTROLS AND INDICATORS

### PM205 / PC705M Digital Pressure Calibrator



### 2.1 DISPLAY, CONTROLS AND CONNECTIONS

The PM205 / PC705M has two operating keys. The left key (SELECT) serves to select the functions and the pressure units. The right key (ENTER) activates the selected function or pressure unit. The right key is also used to switch between the MAX.- and MIN.-value in both the Mano- and Peak-mode.

**Turn-on:**

Pressing the **SELECT** key turns the instrument on.

The instrument subsequently displays the software version (year/week), the full-scale pressure range, the actual pressure (top display) and the last measured MAX.-value (bottom display).

**The instrument has the following functions:**

**RESET:** Max./Min.-value and Peak-value are set to the actual pressure

**OFF:** Turns off the instrument

**MANO:** Releases the following functions:

**PEAK off:** Normal measuring mode with 2 measurements per second

**PEAK on:** Fast measuring mode with 5000 measurements per second

**ZERO SET:** Sets a new Zero reference

**ZERO rES:** Sets the Zero to factory setting

**CONT on:** Deactivates the automatic turn-off function

**CONT off:** Activates the automatic turn-off function (the instrument turns off 15 minutes after the last key function) followed by the unit selection.

**PM205:** bar, mbar, hPa, kPa, MPa, PSI, kp/cm<sup>2</sup>

**PC705M:** bar, mbar, hPa, kPa, MPa, PSI, kp/cm<sup>2</sup>, cm-H<sub>2</sub>O, mH<sub>2</sub>O, inH<sub>2</sub>, ftH<sub>2</sub>O, mmHg, inHg

**Example: Setting a new Zero Reference:**

- > Turn on the instrument by shortly pressing the SELECT-key.
- > Wait for the instrument's measuring mode (approx. 3 seconds).
- > Press the SELECT-key 3 times: **MANO** appears.
- > Press ENTER: **PEAK on** or **PEAK off** appears.
- > Press SELECT: **ZERO SET** appears.
- > Press ENTER: The new Zero reference is set. The instrument returns to the measuring mode.

**Example: Setting new pressure unit (mbar).**

- > Turn on the instrument by shortly pressing SELECT.
  - > Wait for the instrument's measuring mode ( $\approx 3$  s).
  - > Press the SELECT-key 3 times: **MANO** appears.
  - > Press ENTER: **ZERO SET** appears.
  - > Press SELECT: **ZERO rES** appears.
  - > Press SELECT: **CONT on** or **CONT off** appears.
  - > Press SELECT: **bar** appears.
  - > Press SELECT: **mbar** appears.
  - > Press ENTER: The new pressure unit (mbar) is set.
- The instrument returns to the measuring mode.

**Display of the Minimum Pressure Value**

When in the measuring mode (Display: Actual Pressure and Max.- value), you may display the Min.-value for 5 seconds by shortly pressing the **ENTER**-key.



**Notes:**

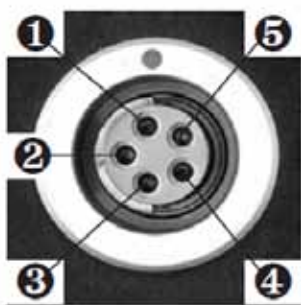
- 1) The functions and units can also be called up by keeping the SELECT-key depressed. Releasing the key enables the displayed function or unit to be activated with the ENTER-key.
- 2) If the selected function or unit is not activated within 5 seconds with the ENTER-key, PM205 / PC705M returns to the measuring mode without changing any settings.
- 3) Turning PM205 / PC705M on and off does not influence any of the previous settings.
- 4) If the **PEAK** on or **CONT** on function is activated, it is indicated with a flashing sign on the display.
- 5) If a pressure can not be represented on the display, **OFL** (overflow) or **UFL** (underflow) appears on the display.
- 6) If the actual pressure goes beyond the measuring range, the last valid pressure value starts flashing on the display.

**2.2 COMMUNICATION PC705M****Interface (RS485)**

The interface converter K-103A (RS232) or K-114A (USB) can be connected at the back of the manometer (Fischer plug Series 103), allowing the data transfer to the PC.

The corresponding PC software can be found on our web site.

Note: The RS485 interface may only be used outside the zone with a potentially explosive atmosphere!

**Fischer Series 103**

①	n.c.	④	RS485 A
②	n.c.	⑤	RS485 B
③	n.c.		

The connection at the rear for the RS485 interface may only be used outside the zone with a potentially explosive atmosphere.

Due to the internal capacitances only a safe maximum voltage of  $U_m = 6,3 \text{ V}$  may be applied and the power of  $0,9 \text{ W}$  may not be exceeded.

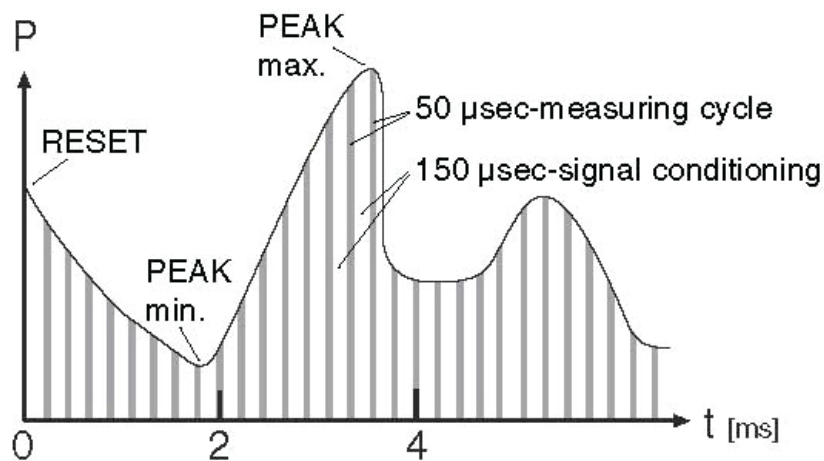
This guarantees that the capacitance limit for the basic voltage level is not exceeded on reintroducing the equipment to the hazardous zone.

The battery may be changed inside the zone with a potentially explosive atmosphere.

The following battery type must be used in explosive atmospheres: Renata CR2430 or CR2430MFR

Do not conduct such processes in close proximity, which generate charged particles (air ioniser, high-voltage electrodes, etc.)

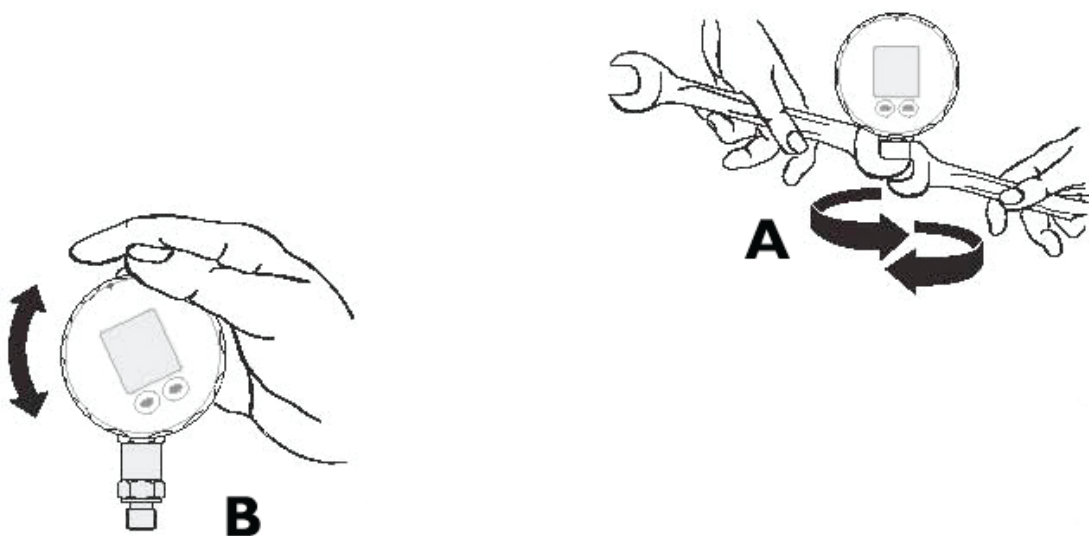
## 2.3 MEASURING PROCEDURE OF THE PEAK-MODE



## 2.4 INSTALLATION

Ref. A) Screw the G ¼" male port of PM205 / PC705M into the chosen pressure pump and tighten using the lower hexagon of the transducer. Loosen the upper hexagon and rotate the PM205 / PC705M to the desired position. Retighten. Ref. Chapter 4 to 7 for further details.

Ref. B) The face of the PM205 / PC705M can be rotated through 355 Degrees. This feature allows the PM205 / PC705M to be mounted in all possible positions; vertical, horizontal or upside down.



## 2.5 RANGES / CALIBRATION

The factory setting of the Zero for the ranges -1...3 bar, -1...30 bar or -1...60 bar is at 0 bar absolute. For sealed gauge pressure measurements, activate "Zero Set" at ambient pressure. Instruments with ranges > 60 bar are calibrated in a sealed gauge mode at ambient pressure.

### 3 SPECIFIKATIONS OF PM205 / PC705M

Pressure Ranges, Resolution, Overpressure:

	Range	Resolution	Overpressure
PM205	-1 to 30 bar	1 mbar	10 bar
PM205	-1 to 30 bar	10 mbar	60 bar
PM205	-1 to 60 bar	10 mbar	120 bar
PM205	0 to 300 bar	100 mbar	400 bar
PM205 / PC705M	0 to 700 bar	200 mbar	700 bar
PM205	0 to 1000 bar	200 mbar	1000 bar

Reading per second	5000 (PEAK mode)
Zero function	Yes
Peak function	Max. or Min.
Auto power off	15 min.
Power supply	Battery
Battery life	1000 / 2000 * hours continous operation
	MANO-Mode
	150 hours of continous operation in
	PEAK-Mode
Litium battery	3.0V size CR2430
Display	LCD
Selectable read out	PM205: bar, mbar, hPa, kPa, MPa, PSI, kp/cm <sup>2</sup> PC705M: bar, mbar, hPa, kPa, MPa, PSI, kp/cm <sup>2</sup> , cm-H <sub>2</sub> O, mH <sub>2</sub> O, inH <sub>2</sub> , ftH <sub>2</sub> O, mmHg, inHg
Standard process coupling	¼" BSP MALE, Swivel
Protection class (EN 60529)	IP65
PM205:	
Dimintions	118 x 42, ø76mm
Weight	0,21 kg
PC705M:	
Dimintions	345 x 160 x 180mm
Weight	7,5kg
Accuracy RT (room temperature)	PM205: < 0,1 %FS
Accuracy RT (room temperature)	PC705M: < 0,05% FS
Total Error Band (0 to 50 °C)	< 0,2 % FS
Storage-/ Operating Temperature	PM205: -20 to 70 °C / 0 to 50 °C
Storage-/Operating Temperature	PC705M: -10 to 60 °C
Compensated Temperature Range	0 to 50 °C

\* PM205 / PC705M

## 4 LOW PRESSURE HAND PUMP

Provides low pressure of -0,9 to 3 bar.

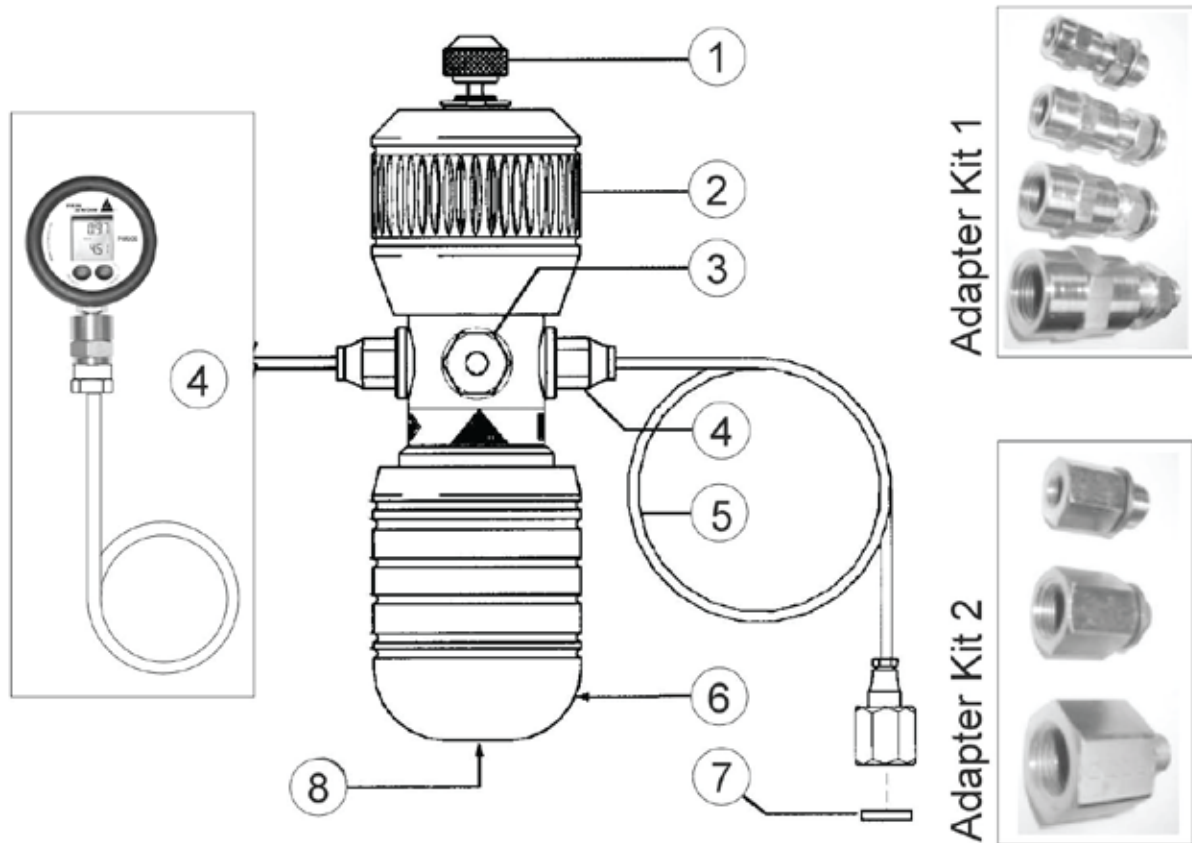
IKM Instrutek part no. IN3PPM02050



Always release the internal pressure at the connectors before disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to equipment.

**Do not connect the pump to external pressure source!**

### 4.1 CONTROLS AND ORIENTATION



Drawing key:

1. **1.** Pressure-release valve.
2. **2.** Fine-adjustment control.
3. **3.** Pressure or Vacuum selector.
4. **4.** Two push-fit connectors to accept 4mm OD hoses to item under test and PM205 (master instrument).
5. **5.** Pressure port: ¼-inch BSP female connector to suit adapters/item under test.
6. **6.** Pump handle.
7. **7.** Nylon seals (see seal kit provided). DO NOT use PTFE tape for sealing with parallel threads.
8. **8.** Pressure-relief valve.

**RELEASE VALVE 1. 1.**

Can be used to reduce or release pressure in the system. The rate of pressure reduction is dependent upon the degree of rotation when operating the valve. Minimal force is required to seal the system.

**FINE-ADJUSTMENT CONTROL 2. 2.**

The generated pressure can be fine adjusted by turning the fine-adjustment valve either in or out to increase or decrease the pressure.

**IMPORTANT**

Do not wind the fine-adjustment valve 2. 2. any further when the top of the pump body is visible.

**PRESSURE / VACUUM SELECTION 3. 3.**

Press the selector 3. 3. as indicated on the label to engage the desired mode. Ensure that the release valve 1. 1. is fully closed (clockwise motion) prior to pumping.

**PRESSURE PORTS 4. 4.**

The hoses 5. 5. are fitted by pushing them into the connectors 4. 4. until resistance is felt. To remove the hoses, press the collar "in" on the connector while pulling on the hose.

**PRESSURE RELIEF VALVE 8. 8.**

The maximum output pressure can be set using the pressure relief valve 8. 8. located inside the main piston, and is accessed via the handle-retaining "Grub Screw".



Grub Screw

If the system has not been used for a period of time, it may be difficult to operate on the first stroke.

**Seal replacement:** Depending on the frequency of use, the main piston seal (and others) may need replacing. replacement seals and instructions for fitting are contained in the seal kit (LTPK1).

## 4.2 OPERATION

Refer to the orientation drawing to locate the controls.

1. Choose the correct adapters and seals and connect to the pressure port 4. 4. at one end of the flexible hoses 5. 5.
2. Choose the correct adapters and seals and connect the item under test to the pressure port at the end of the second flexible hoses 5. 5. Ensure seals are fitted and adapters tightened to a maximum torque of 15Nm.
3. Screw the fine-adjustment valve 2. 2. fully clockwise.
4. Screw the fine-adjustment valve 2. 2. counter-clockwise 4 to 6 full turns.
5. Screw the pressure-release valve 1. 1. fully clockwise, tightening to ensure a good seal.
6. Using a small screwdriver, adjust the pressure-relief valve 8. 8. to set the desired maximum output pressure. Turn the "Grub Screw" located in the main piston clockwise to increase or counter-clockwise to decrease the pressure setting.
7. Operate the handle 6. 6. until the pressure is close to that which is finally required.
8. Wind the fine-adjustment valve 2. 2. "in" to increase pressure or "out" to decrease pressure until the required pressure is reached. After increasing the pressure, it may take up to 30 seconds for the pressure to settle due to thermodynamic effects, setting of seals or expansion of the flexible hose.



**STOP** unscrewing the fine-adjustment valve 2. 2. when the top of the pump body becomes visible!

9. Reductions in pressure can also be achieved by careful use of the pressure-release valve 1. 1.
10. Vacuum is achieved using the above procedure and having the changeover valve 3.3.. pushed completely towards the vacuum position.
11. End of operation procedure.

## 4.3 FAULT INVESTIGATION

In the event that the system appears to lose pressure, check the connections to ensure that they are tight and the seals are good. Replace poor seals and repeat the operation. When testing for leaks you may notice that air is drawn in or expelled from around the changeover valve 3. 3., this is normal and should not be a cause for concern.

Connection to the handheld test system is sealed with "o"-ring or bonded seals and should not leak. The pipe or body connection can be checked but should not be tightened more than 2 Nm.



**DO NOT** attempt to tighten the other fittings to the test system as this can cause damage to the sealed joints!

## 5 HAND HELD PRESSURE TEST SYSTEM

Provides pneumatic pressure of -0,95 to 60 bar.

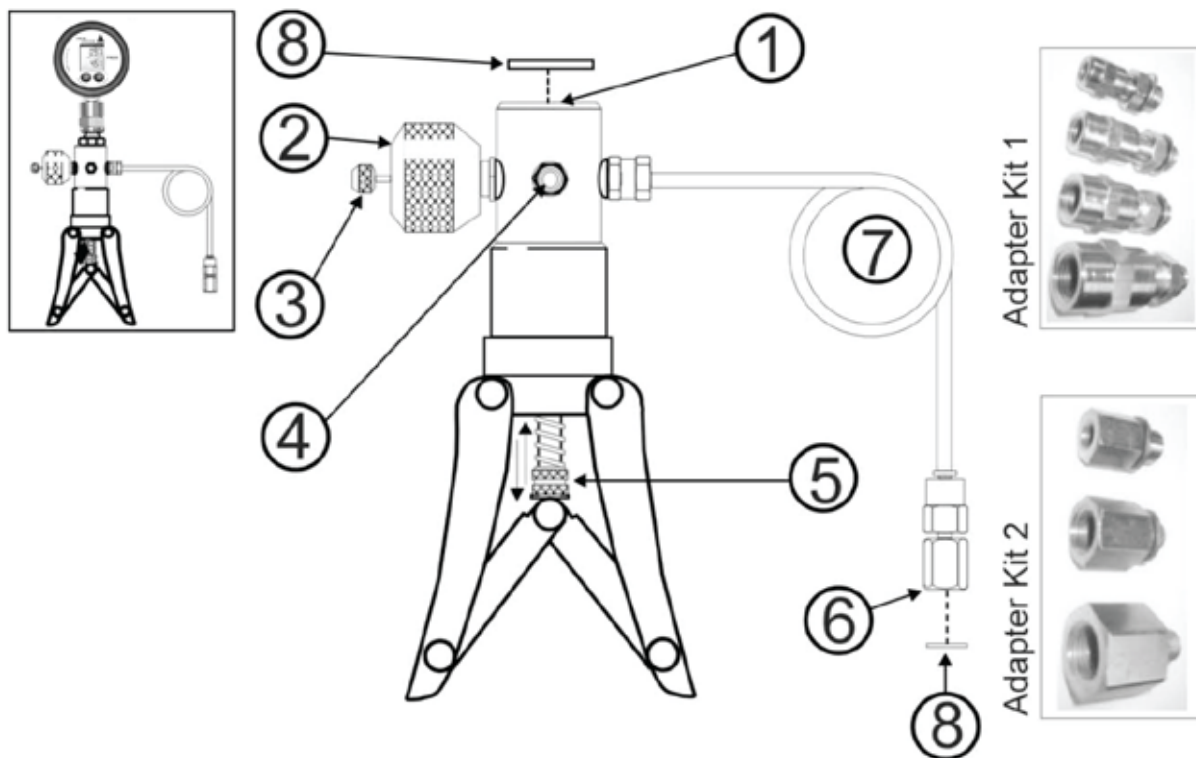
IKM Instrutek part no. IN3PP60050



Always release the internal pressure at the connectors before disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to equipment.

**Do not connect the pump to external pressure source!**

### 5.1 CONTROLS AND ORIENTATION



Drawing key:

1. **1.** 3/8-inch to 1/4-inch BSP connector for PM205 (master instrument).
2. **2.** Fine-adjustment valve (volume control).
3. **3.** Pressure-release valve.
4. **4.** Pressure or Vacuum selector.
5. **5.** Adjustable stroke for varying maximum pressure output.
6. **6.** Pressure port: 1/4-inch BSP female connector to suit adapters/item under test.
7. **7.** Flexible hose item under test.
8. **8.** Nylon seals (see seal kit provided). DO NOT use PTFE tape for sealing with parallel threads.

**RELEASE VALVE 3. 3.**

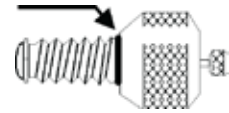
Can be used to reduce or release pressure in the system. The rate of pressure reduction is dependent upon the degree of rotation when operating the valve. Minimal force is required to seal the system.

**VOLUM CONTROL 2. 2.**

The generated pressure can be fineadjusted by turning the fine-adjustment valve either clockwise or counter-clockwise to increase or decrease the pressure accordingly.

**INPORTANT**

Under no circumstances should the fine-adjust valve 2. 2. be wound back beyond the read-line indicator on the body. Should this occur, then the pressure must be released from the system before attempting to re-engage the fine-adjustment valve.

**OVER PRESSURE PROTECTION 5. 5.**

To adjust the maximum output pressure of the system, turn the nuts to increase or decrease the stroke length.

**PRESSURE/VACUUM SELECTION 4. 4.**

Press the selector 4. 4. as indicated on the label to engage the desired mode. Ensure that the release valve 3. 3. is fully closed (use a clockwise motion) prior to pumping.

If the system has not been used for a period of time, it may be difficult to operate on the first stroke. The cylinder has been lightly greased at assembly, but if additional lubrication is ever required, apply a minimal amount to the inside of the cylinder. Access is via the three retaining screws located under the black collar.

**Seal replacement:** Depending on the frequency of use, the main piston seal (and others) may need replacing. Replacement seals and instructions for fitting are contained in the seal kit (TPK1).



## 5.2 OPERATION

Refer to the orientation drawing to locate the controls.

1. Choose the correct adapters and seals and connect to the pressure port 6. **6.** at one end of the flexible hoses 7. **7.**
2. Screw the fine-adjustment valve 2. **2.** fully clockwise.
3. Screw the fine-adjustment valve 2. **2.** counter-clockwise 4 to 6 full turns.
4. Screw the pressure-release valve 3. **3.** fully clockwise, tightening to ensure a good seal.
5. Operate handles until the pressure is close to that which is finally required. Ensure handles are fully squeezed together on each stroke to achieve maximum pressure output.
6. Wind the fine-adjustment valve 2. **2.** (clockwise to increase pressure or counter-clockwise to decrease pressure) until the required pressure is reached. After increasing the pressure, it may take up to 1 minute for the pressure to settle due to thermodynamic effects, setting of seals or expansion of the flexible hose.



**NEVER** screw the fine-adjustment valve 2. **2.** beyond the red line indicator!

7. Reductions in pressure can also be achieved by careful use of the pressure release valve 3. **3.**
8. Vacuum is achieved using the above procedure and having the changeover valve 4. pushed completely towards the vacuum position.
9. End of operation procedure.

## 5.3 FAULT INVESTIGATION

In event that the system appears to lose pressure, check the connections to ensure they are tight and the seals are good. Replace poor seals and repeat the operation. When testing for leaks you may be notice that air is drawn in or expelled from around the changeover valve 4., this is normal and should not be a cause for concern

Connection to the handheld test system is sealed with "o"-ring or bonded seals and should not leak. The pipe or body connection can be checked but should not be tightened more than 2 Nm.



**DO NOT** attempt to tighten the other fittings to the test system as this can cause damage to the seled joints!

## 6 HYDRAULIC HAND HELD PRESSURE TEST SYSTEM

Provides hydraulic pressure of 0 to 700 bar.

IKM Instrutek part no. IN3PPM70150



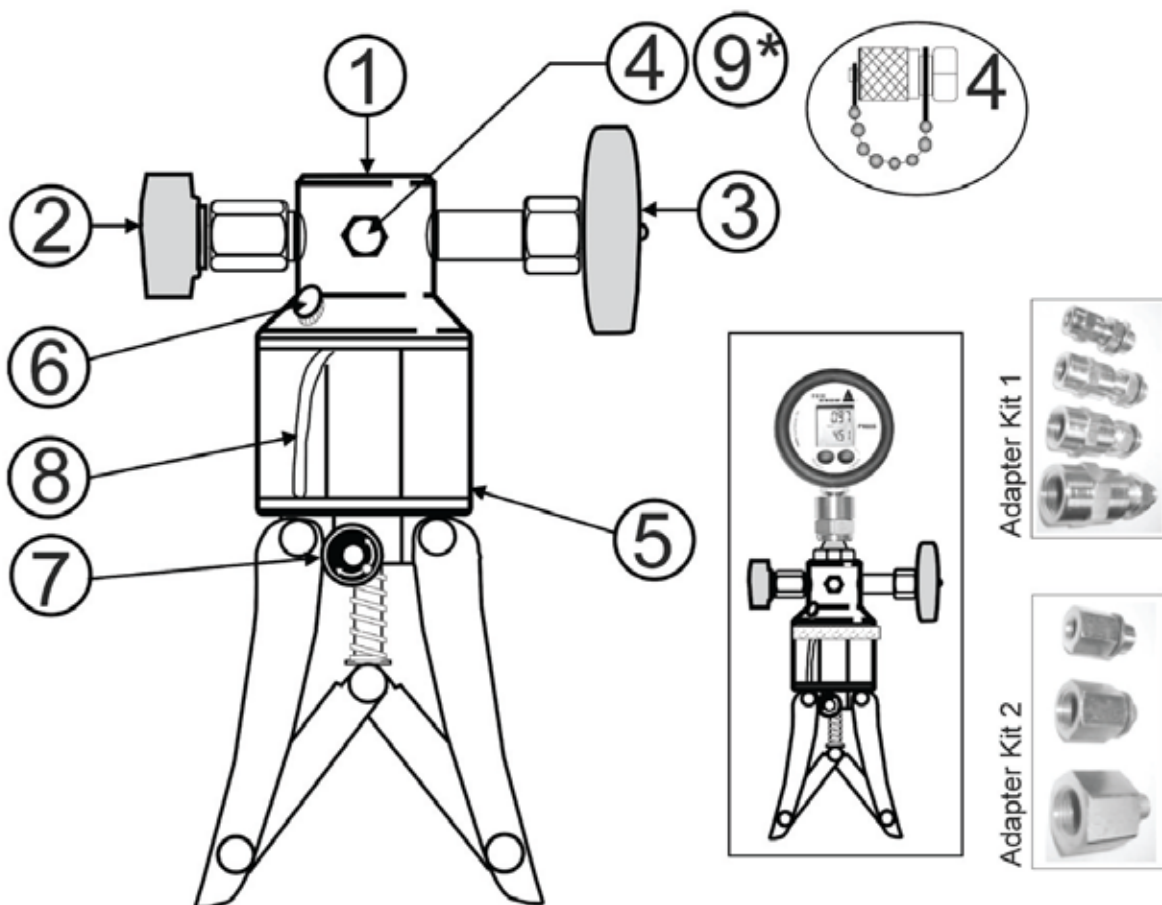
Always release the internal pressure at the connectors before disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to equipment.

**Excessive pressure can crack or break the fluid reservoir case!**

### 6.1 CONTROLS AND ORIENTATION

**Reservoir fluid level:** If the fluid level in the reservoir falls considerably during use, a partial vacuum may be created in the reservoir that can affect the performance of the pump. To avoid this, simply allow air to enter the reservoir by partly unscrewing the filling plug.

**Seal replacement:** Depending on the frequency of use, the main piston seal (and others) may need replacing.



Drawing key:

1. **1.** 3/8-inch to 1/4-inch BSP connector for PM205 (master instrument).
2. **2.** Pressure-release valve..
3. **3.** Fine control.
4. **4.** Pressure port: M16 x 1.5 mm quick connector for flexible hose to switch adapters or item under test.
5. **5.** 100cc reservoir. Fluid level to maximum fill marker.
6. **6.** Reserve-filling plug.
7. **7.** Prime/High pressure selector.
8. **8.** Fluid-inlet tube.
9. **9.** Rear port: for Pressure Relief Valve ONLY. **DO NOT use for any other purpose.**



## 6.2 OPERATION

Refer to the orientation drawing to locate the controls.

1. Remove the filling plug **6.** and fill the reservoir **5.** to 6mm level with the recommended fluid and replace the filling plug.
2. Connect the instrument under test to the flexible hose/gaugeadapter and attach to the pump via the quick-fit connection **4.**
3. Adjust the fine control **3.** to mid-travel.
4. Ensure that the pressure-release valve **2.** is open (turn fully clockwise, then one turn counter-clockwise). Fully squeeze the handles "in" and turn the selector **7.** to the "prime" position.
5. Operate the handles several times to expel air from the pump (ensure that the fluid-inlet tube **8.** remains immersed in fluid at all times).
6. Close the release valve **2.** fully clockwise.
7. Prime the system by squeezing the handles together and then releasing them, to allow the oil to enter the pump cylinder. Repeat as necessary until the system is fully primed and low pressure is indicated on either the master or test instrument.
8. With the handles fully squeezed "in" select the "high" pressure position on the selector **7.** and operate the handles to generate approximate pressure. **Note:** Smaller handle strokes enable easier pressure generation at high pressures.
9. Adjust pressure to the required value using the fine control **3.** **Note:** that the pressure will fall slightly, immediately after pressure generation due to the thermodynamic effect but will stabilize after a short time.



**Do NOT EXCEED** the maximum operating pressure indicated on the pump label! Fluid reservoir can crack or break if excess pressure applied.

10. To totally release pressure from the system, turn the release valve **2.** one turn counterclockwise and select the "prime" position on the selector **7.** after first squeezing the handles fully "in". **Note:** Careful use of the release valve **2.** and fine control **3.** enables a controlled release of pressure, essential for calibration purposes.
11. End of operation procedure.

## 7 PNEUMATIC / HYDRAULIC HAND-PUMP SYSTEM

IKM Instrutek part no. DRPV411

Pressure ranges (maximum safe working pressure is 700 bar):

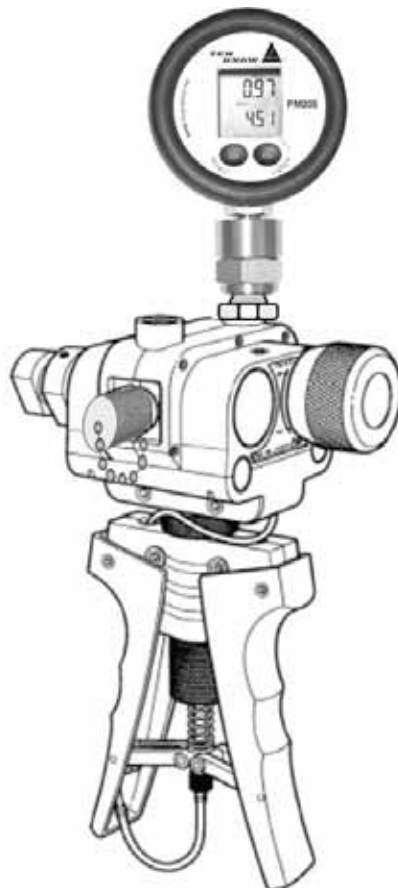
- Provides pneumatic pressure of -0,95 to 60 bar, part no. DRPV411.
- Provides hydraulic pressure of 0 to 700 bar, part no. DRPV411-115.



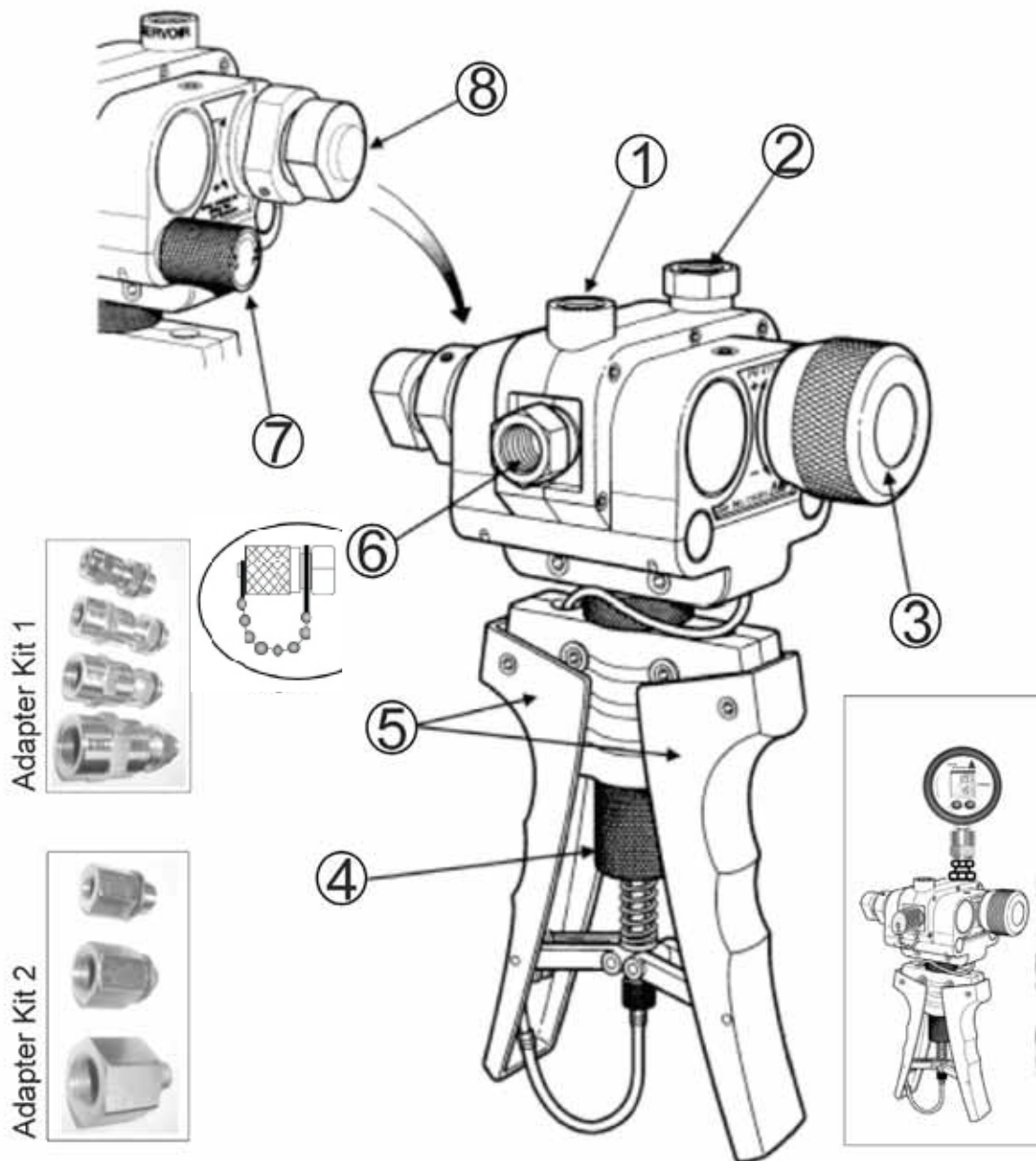
Always release the internal pressure at the connectors **before** disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to the equipment.

**Reservoir-fluid level:** If the fluid level in the reservoir falls considerably during use, a partial vacuum may be created in the reservoir that can affect the performance of the pump. To avoid this, simply allow air to enter the reservoir by partly unscrewing the filling plug. Hydraulic fluids must be compatible with stainless steel, anodized aluminum, nitrile rubber, PTFE, polypropylene, delrin, acrylic and nylon. Hydraulic fluid must have a maximum viscosity of 150 cSt at 40°C. Other fluids that can be used are de-mineralized water or mineral-based oils (SAE 40W, ISO viscosity grade 150).

**Seal replacement:** Depending on frequency of use, the main piston seal (and others) may need replacing. Replacement seals and instructions for fitting are contained in the seal kit (PV411K1).



## 7.1 CONTROLS AND ORIENTATION



Drawing key 1

Drawing key 1:

1. ....Inlet (reservoir) port
2. 1/4-inch to 1/4-inch BSP connector for PM305 (master instrument)
3. Volume adjuster
4. Limit adjuster
5. Scissor-action handles
6. Pressure port: M16 x 1.5 mm quick connector for flexible hose to suit adapters and item under test.
7. Selector valve
8. Pressure-relief valve

## 7.2 PNEUMATIC OPERATION

### 7.2.1 Pneumatic-selector valve and scissor-action handles limitadjuster of the PV411

#### Selector valve 7. 7.

##### **Pressure**

Turn the selector valve fully clockwise ("in") position.

##### **Vacuum**

Turn the selector valve fully counterclockwise ("out") position.

##### **Vent**

Slowly turn the selector valve to the center position.

#### Scissor-action handles limit-adjuster

Turning the limit adjuster **4. 4.** clockwise reduces the stroke of the scissor-action handles **5. 5.** Turning the limit adjuster **4. 4.** counter-clockwise increases the stroke.

For maximum pneumatic pressure generation, turn the limit adjuster fully counter-clockwise.

### 7.2.2 Pneumatic Operation

As a pneumatic pump, selector valve **7. 7.** vents the system to atmosphere, between selection of pressure and vacuum. Operating the scissor-action handles **5. 5.** provides the pumping stroke for generating pressure. A volume adjuster **3. 3.** allows small adjustments of the system pressure.

**In pressure mode**, air/fluid is drawn through the inlet port **1. 1.** on top of the pump and forced out through the two outlet ports (**2. 2.** and **6. 6.**). **In vacuum mode**, the air/fluid flow is reversed as air/fluid is drawn in through the top and rear outlet ports (**2. 2.** and **6. 6.**) and expelled through the inlet port **1. 1.**

#### Volume adjuster

##### **Low pressure**

With the selector valve **7. 7.** set to vent ("open"), turn the volume adjuster fully counter-clockwise to the "out" position. Turn the selector valve fully clockwise to the "in" position to select pressure. Turn the volume adjuster **3. 3.** clockwise to generate pressure.

##### **High pressure**

Turn the volume adjuster **3. 3.** to the mid-position. In this position, fine adjustments of the generated pressure can be made. Using the scissor-action handles **5. 5.**, generate the approximate pressure; then turn the volume adjuster **3. 3.** clockwise to the "in" position to increase the pressure or turn the volume adjuster **3. 3.** counter-clockwise to the "out" position to decrease the pressure.

**Vacuum**

Turn the selector valve **7. 7.** fully counter-clockwise to the "out" position. Turn the volume adjuster to the mid-position. In this position, fine adjustments of the generated vacuum can be made. Using the scissoraction handles **5. 5.**, generate the approximate pressure; then turn the volume adjuster **3. 3.** clockwise to the "in" position to increase the pressure or turn the volume adjuster **3. 3.** counter-clockwise to the "out" position to decrease the pressure.

Refer to the orientation drawing to locate the controls.

**Pressure**

1. Connect the pump to the item under test using the hoses, pipes and adapters.
2. Turn the selector valve **7. 7.** fully clockwise to the "in" position.
3. Operate the scissor-action handles **5. 5.** to generate the approximate pressure, allowing time for thermal stabilization.
4. If necessary, use the volume adjuster **3. 3.** to adjust to the required pressure.
5. After attaining the required pressure, operate the scissor-action handles **5. 5.** to generate a higher pressure. Alternatively, vent pressure to atmosphere by slowly turning the selector valve **7. 7.** counter-clockwise to the center position.
6. End of procedure. Depressurize the pump and disconnect from the pipes and equipment.

**Vacuum**

1. Connect the pump to the item under test using the hoses, pipes and adapters.
2. Turn the selector valve **7. 7.** fully counter-clockwise to the "out" position.
3. Operate the scissor-action handles **5. 5.** to generate the approximate vacuum, allowing time for thermal stabilization.
4. If necessary, use the volume adjuster **3. 3.** to adjust to the required vacuum.
5. After attaining the required vacuum, operate the scissor-action handles **5. 5.** to generate more vacuum. Alternatively, vent vacuum to atmosphere by slowly turning the selector valve **7. 7.** counterclockwise to the center position.
6. End of procedure. Depressurize the pump and disconnect.

## 7.3 HYDRAULIC OPERATION

### 7.3.1 Setting pressure relief valve

The pressure relief valve (PRV) can be set at pressures from 30 to 700 bar.



Do not exceed 700 bar as this can damage the internal seals of the PRV and pump

If the system pressure exceeds the set pressure, the PRV opens and vents fluid through the inlet port to the reservoir. When system pressure decreases below the set pressure, the PRV closes.

Drawing key 3:

1. 1. PRV locking screw (Quantity 2).
2. 2. PRV locknut (with left-hand thread).
3. 3. PRV adjusting nut (with left-hand thread).



PRV, drawing key 3

Refer to the orientation drawing PRV411 drawing key 1 and PRV drawing key 3 to locate the controls.

1. Connect a suitable pressure indicator to either outlet port 2. 2. or 6. 6. (see Drawing key 1). Fit a blank to the unused port.
2. Squeeze the scissor-handles 5. 5. together to increase pressure until the relief valve operates.
3. Loosen the two PRV locking screws 1. 1.
4. Loosen the locking nut 2. 2. by turning it clockwise.
5. Set the relief pressure by turning the PRV adjusting nut 3. 3.  
*Turn counter-clockwise to increase pressure.*  
*Turn clockwise to decrease pressure.*
6. After setting the PRV, hold the adjusting nut 3. 3. in position and tighten the locking nut 2. 2. Remember that the locking nut has a **left-hand** thread.
7. Check operation of the PRV. If necessary, reset the PRV.
8. Secure the locking nut 2. by tightening the two locking screws 1. 1.
9. End of procedure.



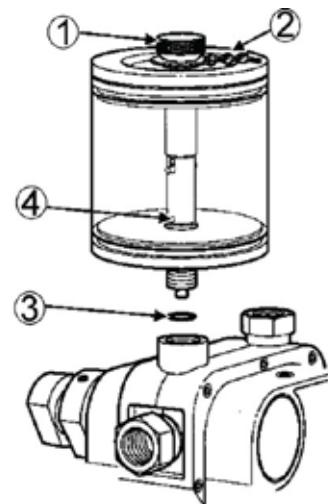
### 7.3.2 Hydraulic Operation of the PV411

As a hydraulic pump, selector valve **7. 7.** vents the system to the reservoir, between selections of pressure and vacuum (using a priming process). The volume adjuster **3. 3.** generates the required system pressure. To complete the hydraulic circuit, the fluid reservoir (see drawing key 2) is screwed into the inlet port **1. 1.** (marked RESERVOIR) on top of the hand-pump. A pressure relief valve **8. 8.** can be adjusted to set the pressure between 30 and 70 bar. Operating the scissoraction handles **5. 5.** provides the pumping stroke for generating pressure. A volume adjuster allows small adjustments of the system pressure.

The fluid-reservoir body (see drawing key 2) is transparent acrylic to provide a clear view of the contents. The reservoir can be removed from the pump without the need to empty the fluid (a self-sealing connection prevents leakage). The spring-loaded reservoir cover 2. seals under atmospheric pressure conditions but, in the event of inadvertent pressurization, it will vent excess internal pressure harmlessly. Ensure that the O-ring 3. is fitted to the inlet pot to prevent leakage. Screw the reservoir clockwise into the inlet port marked RESERVOIR.

Drawing key 2:

1. **1.** Reservoir-cover locknut.
  2. **2.** Reservoir-cover.
  3. **3.** O-ring.
  4. **4.** Bleed hole.
- Do not mix hydraulic fluids.
  - Use only compatible fluids.
  - Fit only appropriate seals.
  - Damage can be caused if equipment connected to this pump is contaminated. Avoid particulate contamination.
  - After use, the pump should be considered contaminated with hydraulic fluid.



Reservoir, drawing key 2

#### Filling the reservoir

Unscrew the reservoir cover lock **1. 1.** and remove the reservoir cover **2. 2.** Using clean recommended fluid, fill the reservoir to approximately 2/3 full. Refit the reservoir cover **2. 2.** and re-tighten the reservoir locknut **1. 1.** Connect the required pipes and equipment to the outlet ports.

#### Priming the system

There are two methods for priming the system:

- Vacuum priming to extract the air or
- Pre-filing the system.



1. *If air remains in the system, full pressure cannot be achieved because the air in the fluid will compress. Air must be removed from the system fluid.*
2. *Both priming methods require the pump to be held in the vertical position to keep the reservoir bleed hole 4. 4. submerged in the fluid. Do not allow air to enter the system through the bleed hole 4. 4.*

### Vacuum priming



*This method should not be used with vacuum-sensitive equipment.*

1. Connect the pump to the item under test using the hoses, pipes and adaptors.
2. Turn the selector valve **7. 7.** fully counter-clockwise to the "out" position.
3. Operate the scissor-action handles **5. 5.** until bubbles stop appearing in the reservoir ( this generates the vacuum in the system).
4. Turn the selector valve **7. 7.** fully clockwise to the "in" position (this action releases the vacuum and rapidly fills the system with fluid from the reservoir).
5. End of procedure. The pump and connected system are ready for use.

### Pre-filling the system

1. Connect the pump to the item under test using the hoses, pipes and adaptors.
2. Turn the selector valve **7. 7.** fully clockwise to the "in" position.
3. Loosen the reservoir-cover lock **1. 1.** to open the reservoir cover **2. 2.** and allow atmospheric pressure into the top of the reservoir.
4. Open the bleed valve on the unit under test.
5. Carefully operate the scissor-action handles **5.** to fill the system. Stop pumping when fluid comes out of the bleed valve.
6. Close the bleed valve on the unit under test.
7. If necessary, top-up the reservoir to the 2/3 full level.
8. Refit and secure (tighten) the reservoir cover **2. 2.** and re-tighten the reservoir locknut **1. 1.**
9. End of procedure. The pump and connected system are ready for use.

### Hydraulic Opreation

Refer to the orientation drawing to locate the controls.

1. Connect the pump to the item under test using the hoses, pipes and adaptors.
2. Open the selector valve **7. 7.** by 1 turn counter-clockwise to the "in" position.
3. Screw the volume adjuster **3. 3.** fully counter-clockwise to the "out" position.
4. Close the selector valve **7. 7.**
5. Operate the scissors-action handles **5. 5.** to generate the initial pressure.
6. Turn the volume adjuster **3. 3.** clockwise to generate the required pressure. Allow time for thermal stabilization.
7. To reduce pressure, turn the volume adjuster **3. 3.** counterclockwise (the "out" position) to the required pressure.
8. After completion, turn the volume adjuster **3. 3.** counter-clockwise (the "out" position) and the selector valve **7. 7.** to the center position to depressurize the pump.
9. 9. End of procedure. Depressurize the pump and disconnect from the pipes and equipment.

## 7.4 FAULT INVESTIGATION

If the system pressure reduces, check the following:


Refer to the orientation drawing Drawing key 1 to locate the controls.

1. Check that the selector valve **7. 7.** is in the correct position and properly tightened.
2. Allow sufficient time after generating pressure for the temperature to stabilize. The larger the system volume, the longer the time for thermal stability.
3. Check for leaks between the pump and the equipment under test and the adaptors, flexible pipe and connections. Tighten any loose joints and replace any seals that are worn or damaged.
4. In hydraulic mode, if the volume adjuster can be wound fully in, but maximum pressure cannot be achieved, there is probably air trapped in the system. Re-prime and repeat.
5. Check the Pressure-Relief Valve **8. 8.** pressure setting.
6. Wind the fine-adjustment valve **2. 2.** (clockwise to increase pressure or counter-clockwise to decrease pressure) until the required pressure is reached. After increasing the pressure, it may take up to 1 minute for the pressure to settle due to thermodynamic effects, setting of seals or expansion of the flexible hose. If, for any reason, a fault occurs within the pump, it is recommended that the equipment be returned to IKM Instrutek AS.


## 8 ACCESSORIES

### 8.1 ADAPTERS FOR THE ITEM UNDER TEST

IKM Instrutek part no. INADAPTERKIT1

Adapter kit1, 1/4-inch BSP to NPT Female, Carbon Steel	
Description	Drawing
1/4" BSP male – 1/8" NPT female	
1/4" BSP male – 1/4" NPT female	
1/4" BSP male – 3/8" NPT female	
1/4" BSP male – 1/2" NPT female	

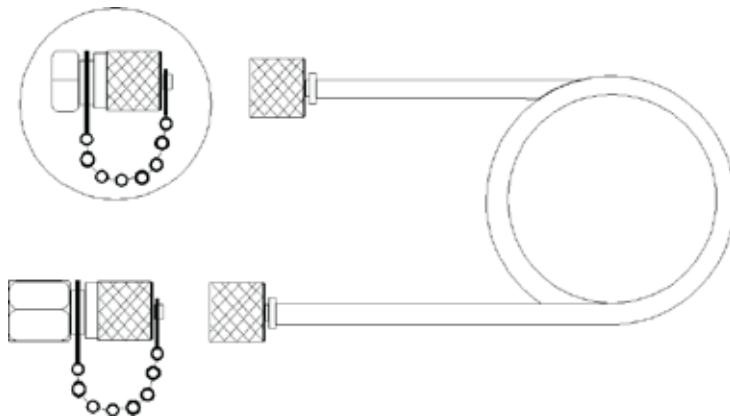
IKM Instrutek part no. INADAPTERKIT2

Adapter kit 2, 1/4-inch BSP to BSP Female, Carbon Steel	
Description	Drawing
1/4" BSP male – 1/8" BSP female	
1/4" BSP male – 3/8" BSP female	
1/4" BSP male – 1/2" BSP female	

**IKM Instrutek part no. INADAPTERKIT4**  
**Adapter kit 4 BSP-BSP Swivel, Carbon Steel**  
1/4" BSP male – 3/8" BSP male.



**IKM Instrutek part no. INP00408**  
**Test hose kit 700 bar, Carbon Steel**  
1/4" BSP male – 1/4" BSP male connects to M16 x1.5mm quick connector at pump and to item with M16 x 1.5mm with 1/4" BSP female adapter.



## 9 PC705M HYDRAULIC HAND HELD PRESSURE TEST SYSTEM

Provides hydraulic pressure of 0 to 700 bar.

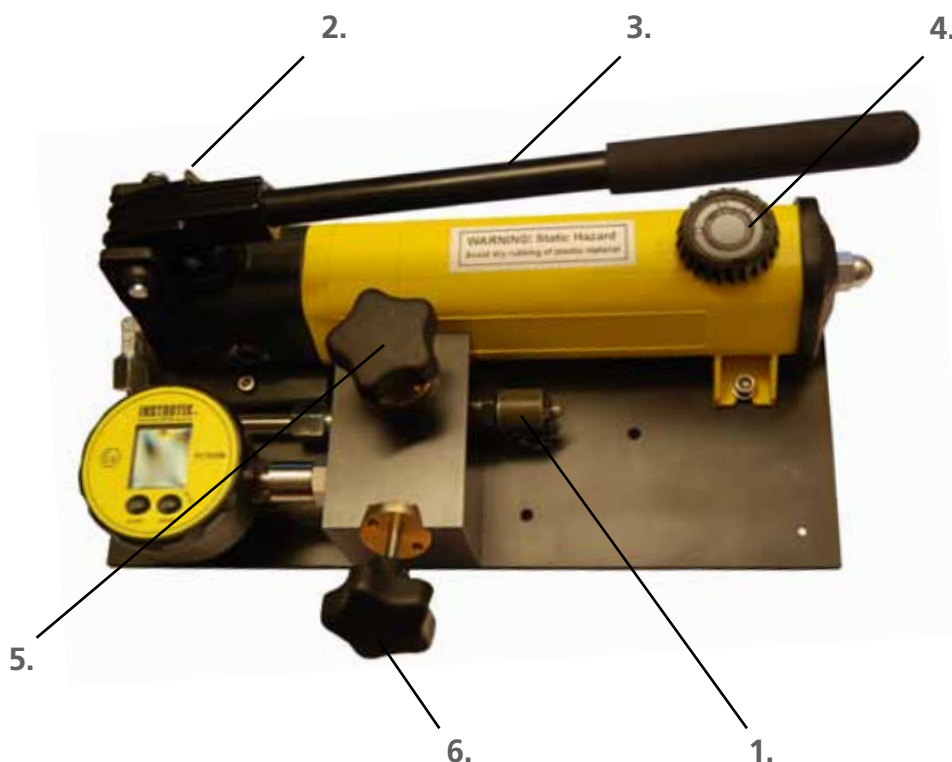


Always release the internal pressure at the connectors before disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to equipment.

**Reservoir fluid level:** If the fluid level in the reservoir falls considerably during use, a partial vacuum may be created in the reservoir that can affect the pump performance of the pump. To avoid this, simply allow air to enter the reservoir by partly unscrewing the filling plug.

**Seal replacement:** Depending on the frequency of use, the main piston seal (and others) may need replacing.

### 9.1 CONTROLS AND ORIENTATION



Drawing key:

1. Pressure port: M16 X 1,55 mm quick connector for flexible hose to adapters and item under test
2. Pressure release valve
3. Pump handle
4. Filling cap
5. Main pressure valve
6. Fine adjustment valve

## 9.2 OPERATION

Refer to the orientation drawing to locate the controls.

1. Lift the pump handle **3.** remove the filling plug **4.** and fill the reservoir to 6mm level with the recommended fluid. Replace the filling plug.
2. Connect the instrument under test to the flexible hose/gauge adapter and attach it to the pump via the quick-fit connection **1.**
3. Adjust the main-pressure valve **5.** and fine-adjustment valve **6.** to mind-travel.
4. Ensure that the pressure-release valve **2.** fully clockwise.
5. Operate the pump handle **3.** several times to expel air from the pump.
6. Close the pressure-release valve **2.** fully clockwise.
7. Prime the system by pumping the handle to allow the oil to enter the pump cylinder. Repeat as necessary until the system is fully primed and low pressure is indicated on either the master or the test instrument.
8. Close the main-pressure valve **5.**
9. Adjust the pressure to the required value using the fine-adjustment valve **6.**  
 Note: The pressure will fall slightly, immediately after pressure generation due to the thermodynamic effect but will stabilize after a short time.



**DO NOT EXCEED** the maximum operating presure indicated on the pump label!

10. To totally release pressure from the system, turn the pressure-release valve **2.** and the main-pressure **5.** one turn counterclockwise (the pump handle **3.** can be operated without pressure resistance). Note: Careful use of the release valve **2.**, main-pressure valve **5.** and fine-adjustment valve **6.** enables a controlled release of pressure, essential for calibration purposes.
11. End of operation procedure.

## 10 CERTIFICATES

Please contact us for copies of EEx/Is certification.

### PM205

ExII 1G EEx ia IIC T6  
 LCIE 01 ATEX 6001x

### PC705M

Ex II 2G Ex ia IIC T6 Gb  
 PTB 05 ATEX 2012x and,  
 1ECEX PTB 13.0028x



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