

TA-CMI



User Manual

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Guarantee

TA-CMI is guaranteed to be free of material or performance defects in normal use and service. The guarantee period is five years, starting from and including the day of delivery. A guarantee period of 180 days applies for repairs and service.

This guarantee applies only for the original purchaser and does not include consumable materials or measuring instruments which, in TA's opinion, have been used incorrectly, have been neglected or have been damaged as a result of accident or abnormal use or handling.

Tour & Andersson AB guarantees that its software operates in all significant respects in accordance with its performance specification. TA does not guarantee that its software is fault-free or that it will operate without crashing.

TA's obligations in respect of its guarantee are restricted to full replacement of the purchase cost or cost-free repair or replacement of defective products delivered to a Tour&Andersson AB authorised service centre during the guarantee period, at Tour&Andersson AB's discretion. To claim service under guarantee, either contact the nearest TA authorised service centre or send the product, carriage-paid (FOB) and insured, to the nearest Tour & Andersson AB authorised service centre with a description of the problem. TA does not accept the risk of damage to the product during transport. After repair under guarantee, the product will be returned carriage-paid (FOB) to the purchaser.

If TA is of the opinion that the fault has been caused by incorrect use, modifications, accident or abnormal use or handling, we will submit an estimate for the cost of repairs and await approval of this estimate before starting work. After repair, the product will be returned carriage-paid to the customer, after which the customer will be invoiced for the cost of repair and of returning the product (FOB).

Note! If the warranty seal is broken or tampered with, this guarantee is null and void.

FCC Notification and ETL markings

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

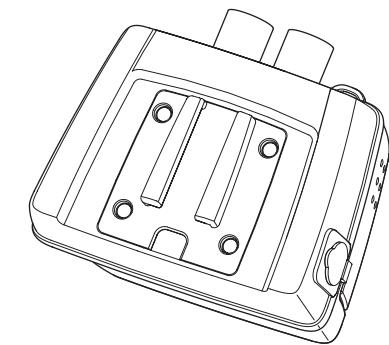
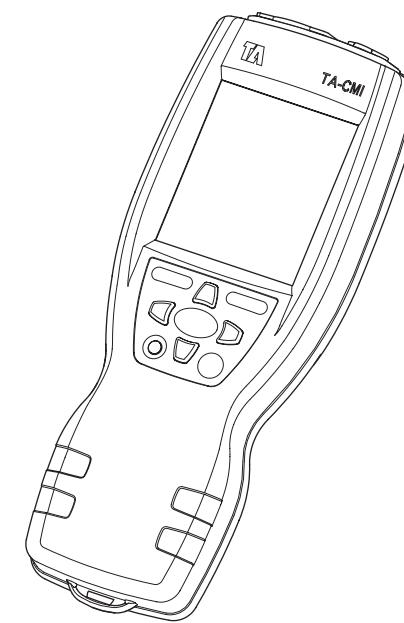
Caution: Changes or modifications of the equipment, not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protections against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

ETL LISTED: Conforms to UL std. 61010B-1: Certified to CAN/CSA std. C22.2 No.1010.1-92

General



TA-CMI is a computer programmed measuring instrument. It is a handheld instrument for measuring differential pressure, temperature, and flow through balancing valves in hydronic systems. It consists of a sensor unit and a instrument unit that has been programmed with the TA valve characteristics, which makes it possible to take a direct reading of flow and differential pressures.

The TA-CMI has two main components:

- A sensor unit which contains a piezoresistive pressure sensor, one measurement valve, connections and rechargeable NiMH batteries. The measurement valve has a safety function which protects the sensor from too high differential pressures.
- An instrument unit which contains a micro computer, input touch pad, LCD display and rechargeable NiMH batteries.

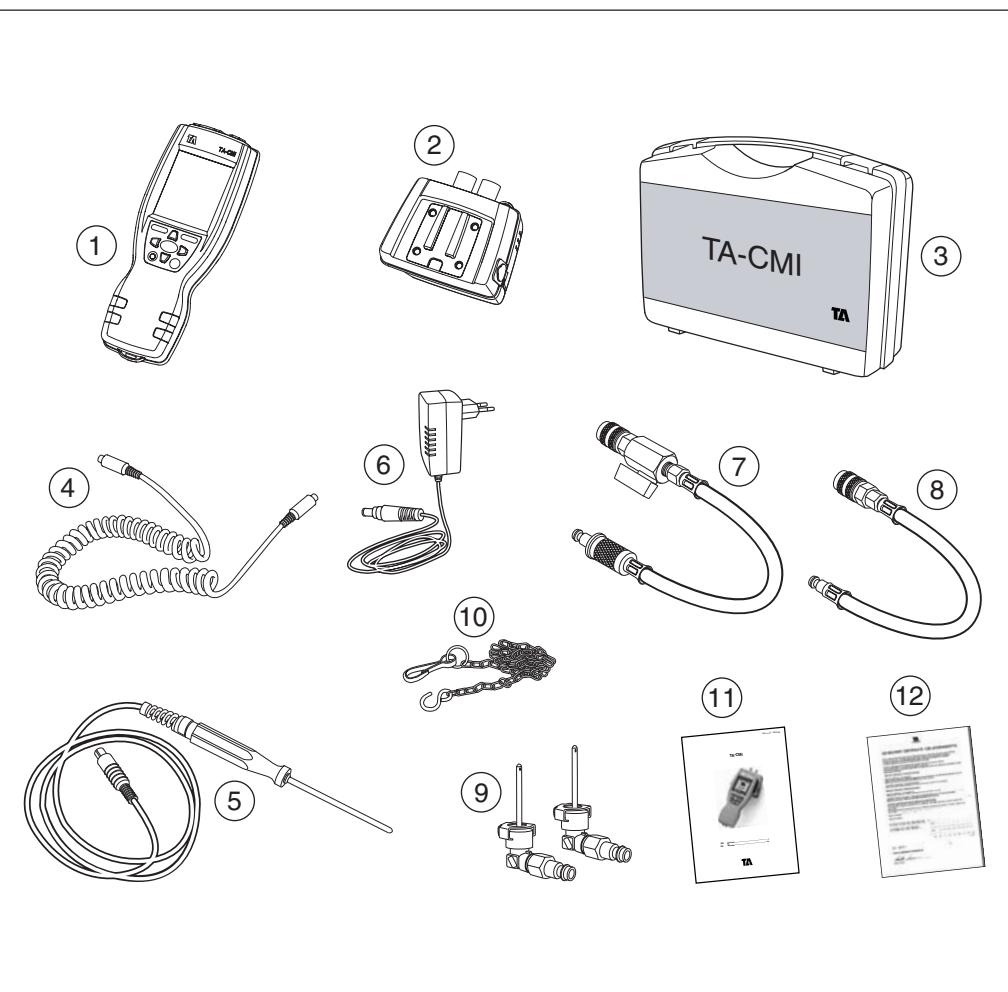
The instrument and the sensor units communicate wirelessly or by cable.

 = Warning – read the manual.

The TA-CMI can be cleansed with a damped cloth and a lenient cleaning-agent.

Unpacking

Check that these items are delivered.



1. Instrument unit
2. Sensor unit
3. Case
4. Connection cable
5. Temperature sensor Pt 1000
6. Charger Mascot 9725, 5.0 V
7. Measuring hose, 400 mm red with shut off valve
8. Measuring hose, 400 mm blue
9. Measuring needles
10. Chain for mounting
11. User Manual
12. Calibration certificate

Important information

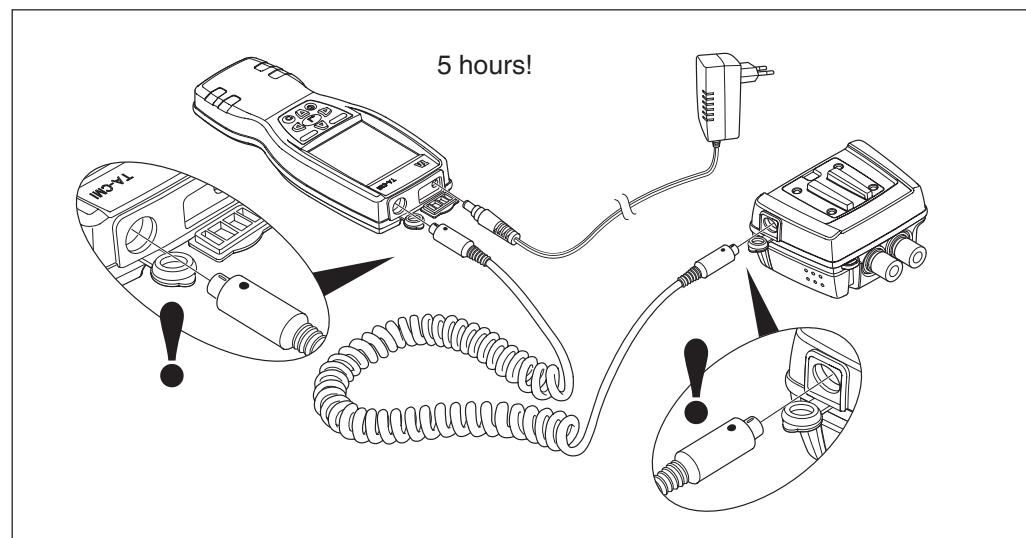
Radio frequency communication

TA-CMI uses radio frequency to communicate wirelessly between the instrument and sensor units. **Always turn off radio communication when there is risk that TA-CMI disturbs other vital electronic devices, i.e. near medical equipment and implanted cardiac pacemakers, in health care facilities, aircrafts, blasting areas, areas with potentially explosive atmospheres and other areas posted “turn off two-way radio”!** You turn off radio communication by setting the radio channel to “OFF” in the Instrument setup menu (see page 30).

Storage recommendations

- Never leave water in the sensor unit when there is a risk of freezing (i.e. in a car during winter)!
- Storage above 40°C reduces battery life.

Charging of batteries



Note! Both the sensor unit and the instrument unit contains batteries that need to be charged. For best charging performance keep the connector clean. The supplied charger from TA must be used!



Following batteries must be used (user **not** allowed to change batteries):
 Instrument unit: 3 pcs NiMh type AA/R6
 Sensor unit: 2 pcs NiMh type AAA/R03

Warning! Do not open the instrument as this could damage the warranty seal and void your guarantee! See page 2 for further information.

Keyboard and display

Keyboard

■ (two keys) Functions according to text in display (see picture)

▲ Navigating up/increasing digit or character/changing unit

▼ Navigating down/decreasing digit or character/changing unit

◀ Selecting digit, character or unit to change/go to selected function

▶ Selecting digit, character or unit to change/go to selected function

◀ Go to selected function/confirming settings (Enter)

○ Turning power to the instrument on and off. Press the start key for at least 2 seconds.

↶ Returning to previous menu (Escape)



Symbols

These symbols are used in the instrument:

✓ Radio communication between the instrument and sensor unit is on.

✗ Radio communication between the instrument and sensor unit is off.

○ The sensor unit is connected to the instrument via the cable.

🔋 Sensor unit battery capacity

🔋 Instrument battery capacity

▀ Valve type

⚙ Valve setting (number of turns, see next page)

⽔ Media

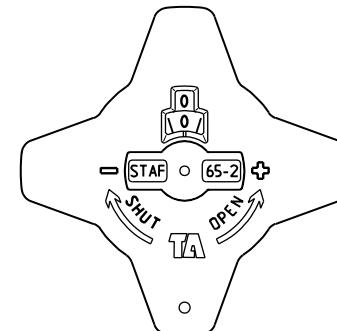
🌡 Temperature

Valve setting

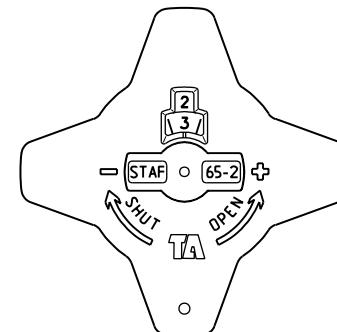
This section shows how you set or determine the number of valve turns on a TA valve. 

The valve's opening position can be read on the digital handwheel.

Closed valve



Valve open to 2.3 turns



Starting the instrument

Starting the instrument for the first time

The first time you use the instrument and after the radio channel has been in “Sleeping” (see page 30), you start the instrument according to below.

1. Start the instrument by pressing the start key **for at least 2 seconds**.



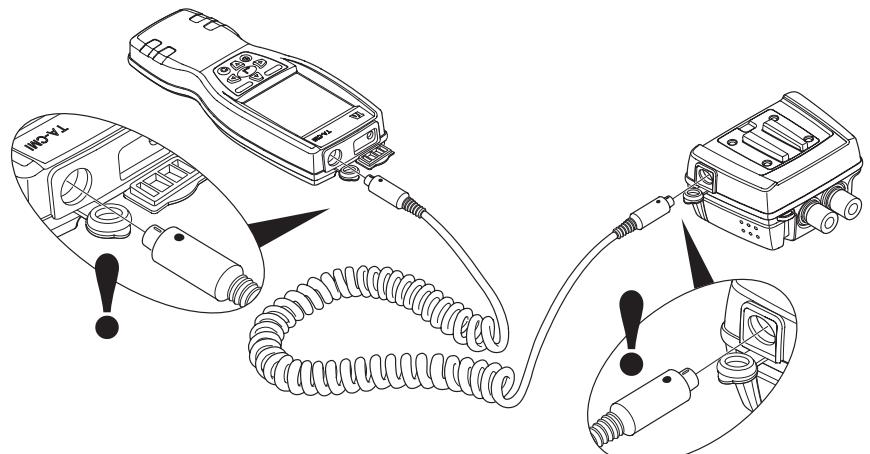
2. Navigate to the line corresponding to your language by repeatedly pressing the down (or up) key.



3. Press Enter on the desired selection, e.g. desired selection English.

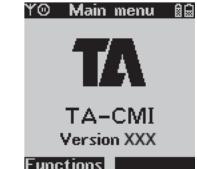


4. Connect the cable.



5. Press OK.

When the “radio on” symbol is displayed at the top of the LCD, you can disconnect the cable.



6. Select Functions. The main function menu of the TA-CMI is displayed.



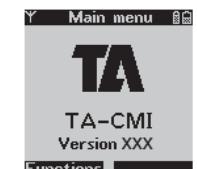
You select different functions from the main function menu by pressing the down (or up) key repeatedly and then pressing Enter on the desired selection.



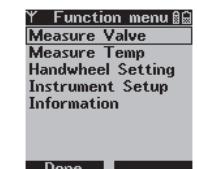
Normal start of the instrument

Normally you start the instrument according to below.

1. Start the instrument by pressing the start key **for at least 2 seconds**.



2. Select Functions. The main function menu of the TA-CMI is displayed.



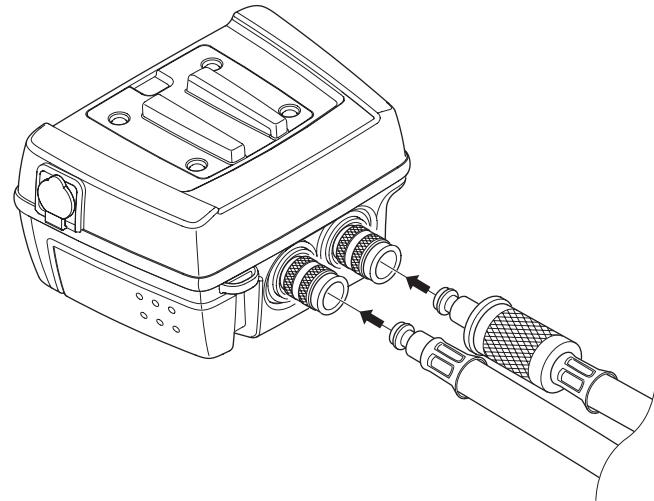
You select different functions from the main function menu by pressing the down (or up) key repeatedly and then pressing Enter on the desired selection.



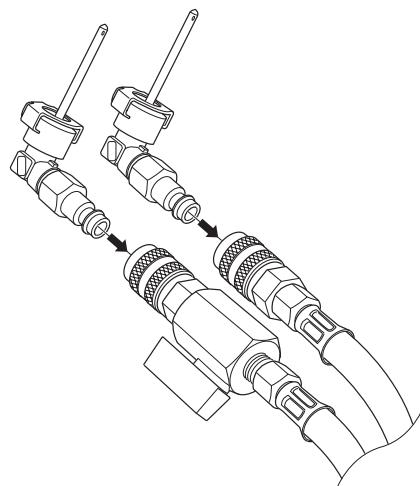
Connection to measuring points

! **Risk of burn if the media is hot!** Always connect the measuring needles and the measuring hoses to the sensor unit (1 – 2) before connecting the measuring needles to the measuring points (3).

1. Connect the measuring hoses to the sensor unit.



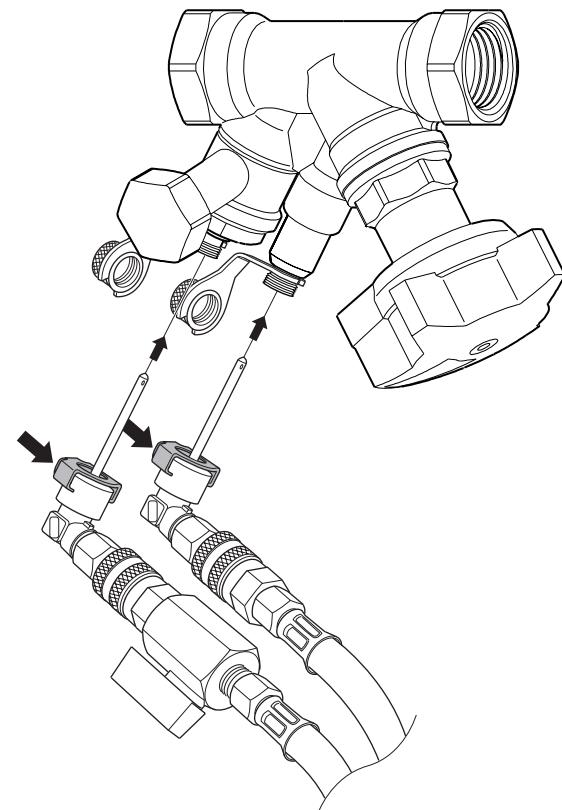
2. Connect the measuring needles to the measuring hoses.



Note! The connections with the red markings on the sensor unit and the measuring hose shall be connected to the pressure test point with the red marking (the test point with the highest pressure). The connections with the blue markings on the sensor unit and the measuring hose shall be connected to the pressure test point with the blue marking (the test point with the lowest pressure).

3. Connect the measuring needles to the measuring points.

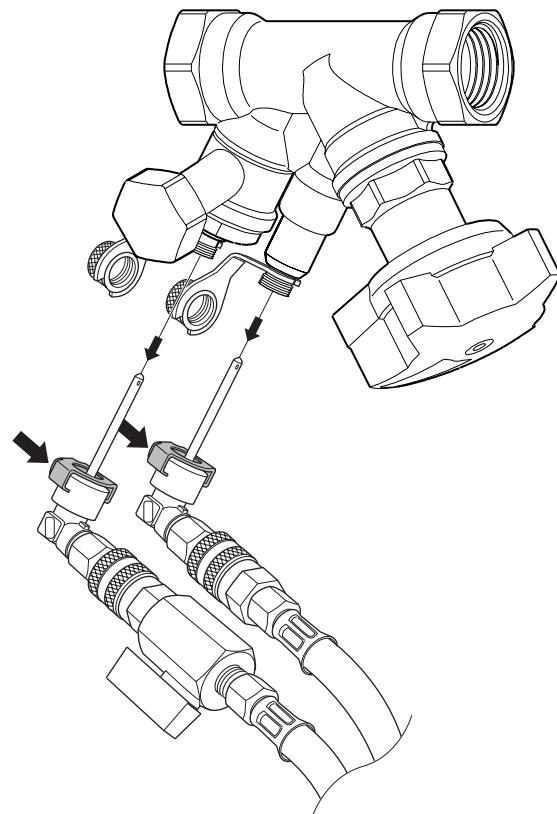
Note! The shut off valve on the red measuring hose must be open when measuring.



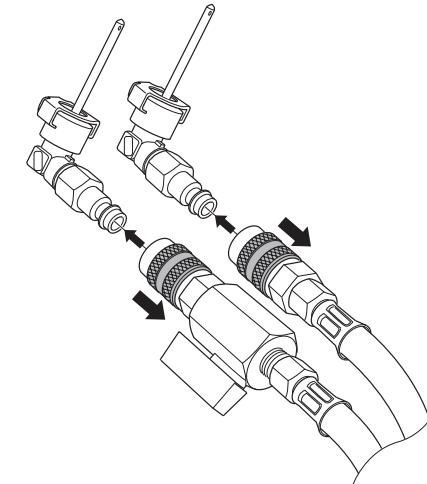
Disconnection from measuring points

! **Risk of burn if the media is hot!** Always disconnect the measuring needles from the measuring points (1) before disconnecting the bayonet couplings at the measuring hoses and the sensor unit (2 – 3).

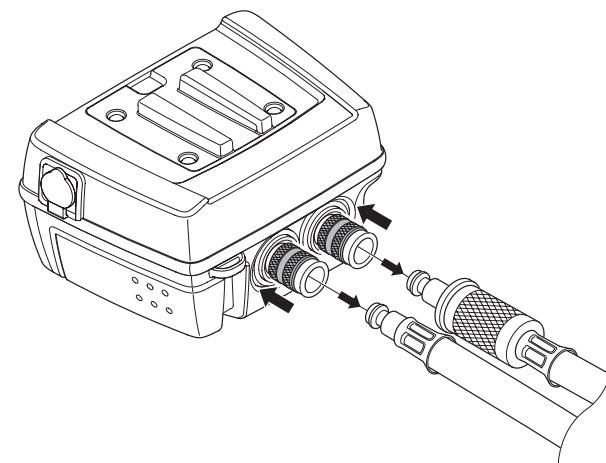
1. Disconnect the measuring needles from the measuring points.



2. Disconnect the measuring needles from the measuring hoses.



3. Disconnect the measuring hoses from the sensor unit.



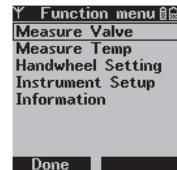
Measure Valve

You use this function if you want to measure differential pressure and/or flow through a valve in a water borne heating/cooling system.

1. Connect the sensor unit to the measuring points on the valve according to pages 10 – 11.

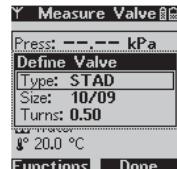
! Risk of burn if the media is hot! Always connect the measuring needles and the measuring hoses to the sensor unit before connecting the measuring needles to the measuring points.

2. Navigate to Measure Valve in the main function menu by pressing the down or up key if necessary.

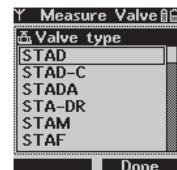


3. Press Enter.

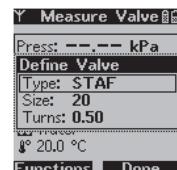
The Define Valve menu appears.



4. Go to the Valve type menu by pressing Enter again.

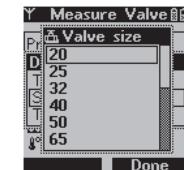


5. Select the correct valve type by pressing the down (or up) key repeatedly, then pressing Enter on the desired valve.

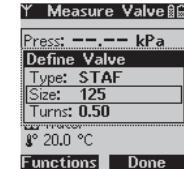


If you are measuring on a non TA valve, see section “Entering the valve factor (Kv value) for other valve types” on page 18. Otherwise continue below.

6. Go to the Valve size menu by pressing the down key, then pressing Enter.

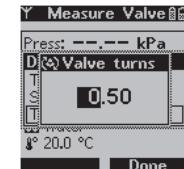


7. Select the correct valve size by pressing the down (or up) key repeatedly, then pressing Enter.

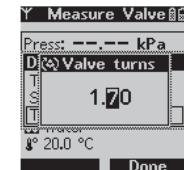


If you are measuring on a valve without adjustment possibility (e.g. TA LOOP) go directly to step 12 on page 16, otherwise continue below.

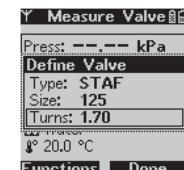
8. Open the Valve turns dialog by pressing the down key, then pressing Enter.



9. Enter the actual number of valve turns by using the up and down keys. Use the right key to move the cursor to the next digit. (See page 7 for description of how you determine number of valve turns on a TA valve.)



10. Confirm the entered value.



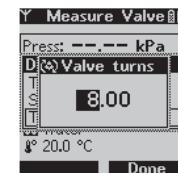
If you enter an invalid valve setting, e.g. 9 turns for STAF 125, this error message is displayed.



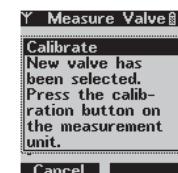
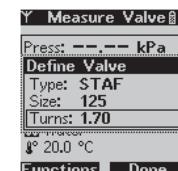
If an error message is displayed, press OK.

The setting is automatically changed to the maximum value possible, or if you have tried to enter a too small value, to the minimum value possible.

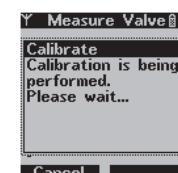
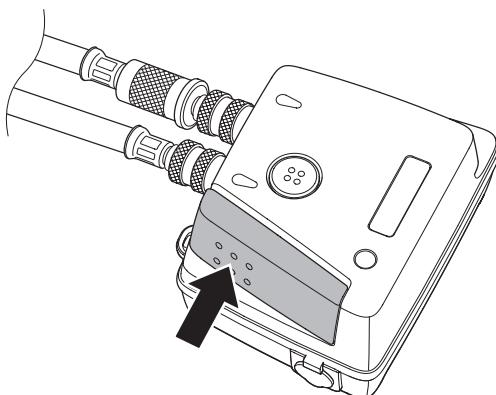
Then enter the correct number of turns by using the up, down and right keys. Confirm the new value by pressing Enter.



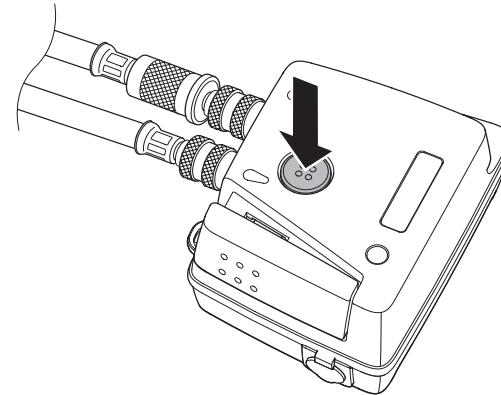
- When the correct valve setting is specified, press Done.



- Press the calibration button on the sensor unit.



- Release the calibration button on the sensor unit.



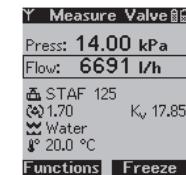
Measurement now begins. TA-CMI displays the differential pressure and flow. It is important that the correct media type (e.g. water or glycol) is specified, so that the instrument will display the appropriate flow value.

If the correct media type  is displayed in the Measure Valve menu the appropriate flow value is now displayed.

If the media type displayed does not correspond to actual media type, define appropriate media according to page 20.

When you have finished measuring the valve, disconnect the sensor unit from the measuring points according to pages 12 – 13.

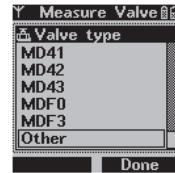
! Risk of burn if the media is hot! Always disconnect the measuring needles from the measuring points before disconnecting the bayonet couplings at the measuring hoses and the sensor unit.



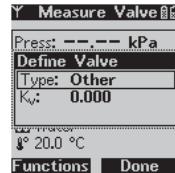
Entering the valve factor (K_v value) for other valve types

This section applies only to non TA valves.

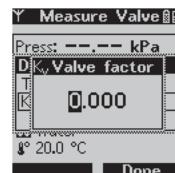
1. Select valve type "Other".



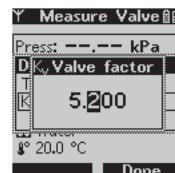
2. Confirm.



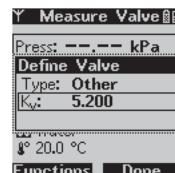
3. Open the Valve factor dialog by pressing the down key, then pressing Enter.



4. Enter the appropriate valve factor, by using the up and down keys. Use the right key to move the cursor to the next digit.

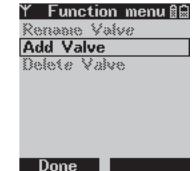


5. Confirm.

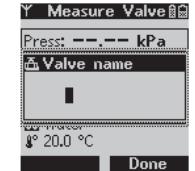


If you want to enter a name for the valve (optional), do this according to steps 6 – 9. Otherwise go directly to step 10.

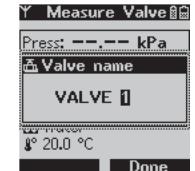
6. To enter a name for the valve, select Functions.



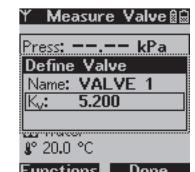
7. Then select Add Valve.



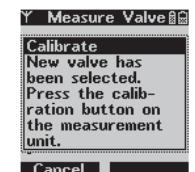
8. Enter a suitable valve name by using the up, down and right keys.



9. Confirm the entered valve name.



10. After you have entered the appropriate valve factor (and perhaps valve name) press Done. Then continue with step 12 on page 16.



Define media

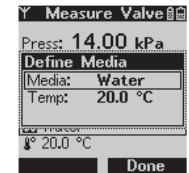
If the media type  displayed in the Measure Valve menu does not correspond to actual media type you have to define appropriate media according to below.

Note! This section is only applicable to TA valve types STAD, STAF and TBV.

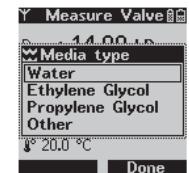
1. Navigate to the media type line by repeatedly pressing the down key.



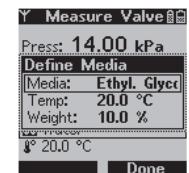
2. Open the Define Media menu by pressing Enter.



3. Go to the Media type menu.



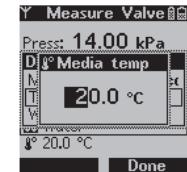
4. Select media type by pressing the down key repeatedly, then pressing Enter.



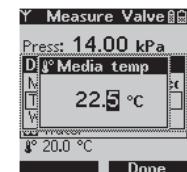
If the system contains ethylene glycol or propylene glycol, enter the media temperature and the media weight (% of glycol) according to steps 5 – 11 below.

If the system contains “other” media type you have to enter the density and the viscosity of the media according to steps 12 – 18 on pages 22 – 23.

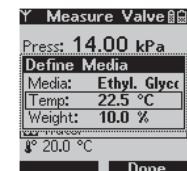
5. Open the Media Temperature dialog by pressing the down key, then pressing Enter.



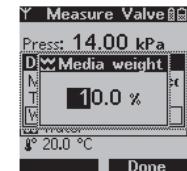
6. Enter the appropriate media temperature, by using the up and down keys. Use the right key to move the cursor to the next digit.



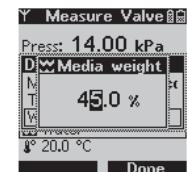
7. Confirm the entered value.



8. Open the Media weight dialog by pressing the down key, then pressing Enter.



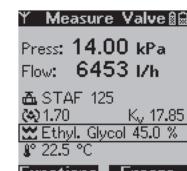
9. Enter the appropriate media weight in percentage, by using the up, down and right keys.



10. Confirm the entered value.



11. Press Done.

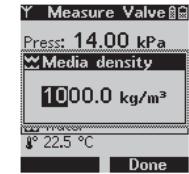


If the selected valve is any other than TA valve types STAD, STAF or TBV and you try to set the media to anything other than water, this error message is displayed and the media setting is automatically changed to water. The reason for this is that the correction method that TA-CMI uses to calculate the flow when using media types other than water, can only be made with these valve types.

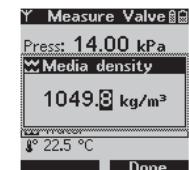
If the system contains water, ethylene glycol or propylene glycol you can stop reading here. The appropriate flow value is now displayed.

If the system contains any other media type, enter the density and the viscosity of the media according to below.

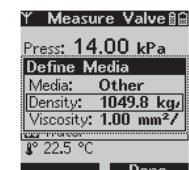
12. Open the Media density dialog by pressing the down key, then pressing Enter.



13. Enter the appropriate media density, by using the up, down and right keys.



14. Confirm the entered value.



15. Open the Media viscosity dialog by pressing the down key, then pressing Enter.



16. Enter the appropriate viscosity, by using the up, down and right keys.



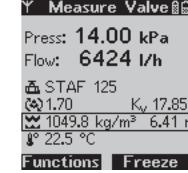
17. Confirm the entered value.



18. Press Done.

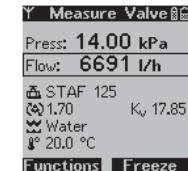
The appropriate flow value is now displayed.

The temperature displayed in the Measure Valve menu is in this case without importance.



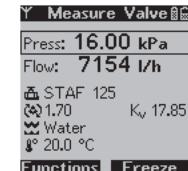
Freezing measurements

While measuring differential pressure (and flow) or temperature (see pages 24 – 25) you can freeze measurements by pressing Freeze.



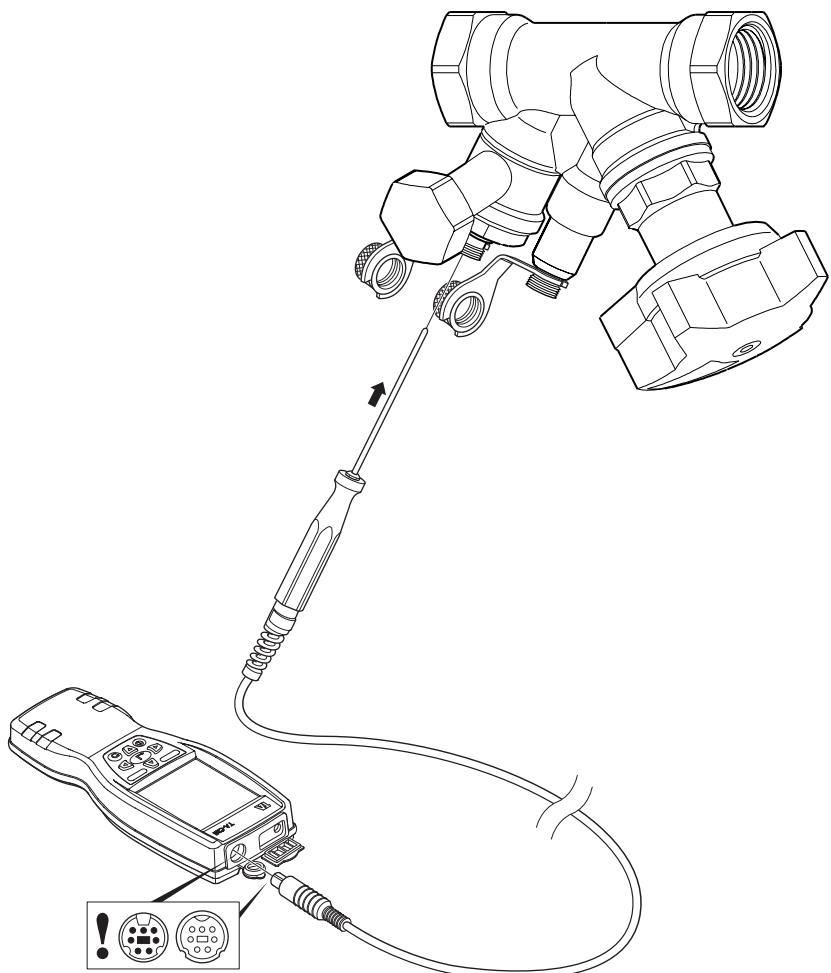
The measured values will be freezed, i.e. so that you will have time to make a note of them.

Press Start when you want to restart measurement.



Measure Temperature

1. Connect the temperature sensor to one of the measuring points on the valve.

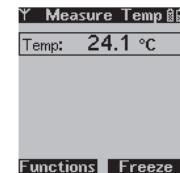


2. Navigate to Measure Temp in the main function menu, by pressing the down (or up) key.



3. Press Enter.

The actual temperature is displayed.



If you try to measure the temperature without having connected the temperature sensor, the value will be displayed as “---.”.

Save as media temperature

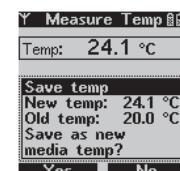
It is possible to save the measured temperature as “media temperature” for later valve measurements. This means that the media temperature is preset when you define media for flow calculations (see pages 20 – 21).

Save the measured temperature as media temperature according to below.

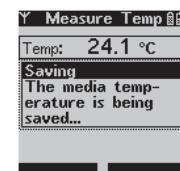
1. In the Measure Temp menu, press Functions.



2. Select “Save as media temp” by pressing Enter.



3. Press Yes.



The measured temperature is saved and will be used in valve measurements to calculate flow values, until a new media temperature is specified.

Handwheel Setting calculation

This function is used to calculate the valve setting that corresponds to a given flow and differential pressure for a specific valve. The function includes no measuring.

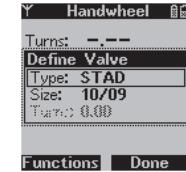
For non TA valves, the valve factor (K_v value) that corresponds to a given flow and differential pressure will be calculated.

1. Step to Handwheel Setting in the main function menu, by pressing the down (or up) key.

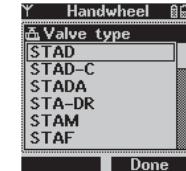


2. Press Enter.

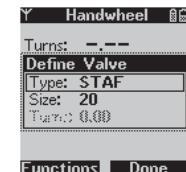
The Define Valve menu appears.



3. Go to the Valve type menu.

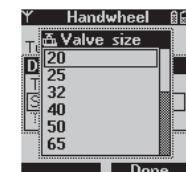


4. Select the appropriate valve type by pressing the down (or up) key repeatedly, then pressing Enter.

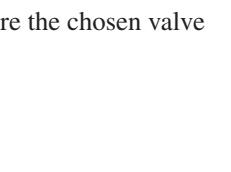


If you want to calculate the valve factor for a non TA valve, see section "Calculation of the valve factor (K_v value) for other valve types" on page 29. Otherwise continue below.

5. Go to the Valve size menu, by pressing the down key and then pressing Enter.



6. Select the appropriate valve size by pressing the down (or up) key repeatedly, then pressing Enter.



7. Press Done.

8. Enter desired flow by pressing the up and down keys repeatedly. Use the right key to move the cursor to the next digit.

9. Confirm the entered value.

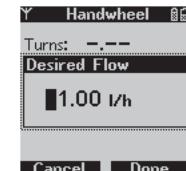
10. Enter desired differential pressure by using the up, down and right keys.

11. Confirm the entered value.

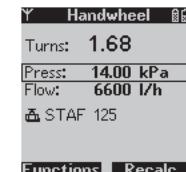
The calculated valve setting (number of turns) is displayed. (See page 7 for description of how you set the number of valve turns on a TA valve.)

If you enter a combination of desired flow and pressure the chosen valve cannot produce, an error message will be displayed.

If an error message is displayed, press OK.

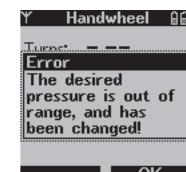


Then enter the appropriate flow by using the up, down and right keys. Confirm the new value by pressing Enter.



The calculated valve setting (number of turns) is displayed.

If the pressure value is out of the pressure range (0.5-200 kPa) for TA-CMI, an error message is displayed, press OK.



Finally enter the appropriate differential pressure and press Enter.

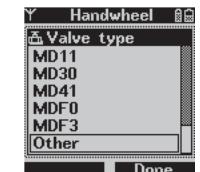
The calculated valve setting (number of turns) is displayed.



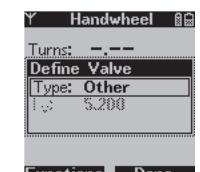
Calculation of the valve factor (K_v value) for other valve types

This section applies only to non TA valves. The valve factor that corresponds to a given flow and differential pressure will be calculated.

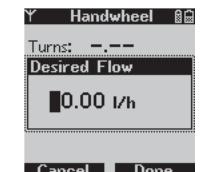
1. Select valve type "Other".



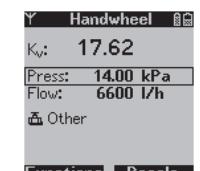
2. Confirm.



3. If you want to enter a name for the valve (optional), do this according to steps 6 – 9 on page 19.



4. Press Done.



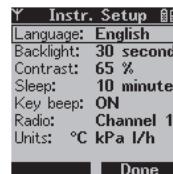
5. Enter the desired flow and differential pressure according to steps 8 – 11 on page 27.

The valve factor is displayed.

Instrument Setup and Information

Instrument Setup

In the Instrument Setup menu you can set the parameters described in this section.



Language

When you change language, the default measurement units will automatically be changed to the most commonly used in the corresponding country. You can adapt the unit settings according to your requirements in the Units menu (see below).

Backlight

The backlight will stay on after any key is pressed. Here you can set the duration it stays on from 30 seconds to 5 minutes.

Contrast

Setting the LCD contrast for optimal reading

Sleep

TA-CMI will go into sleep mode after a period when the keys are not pressed. Here you can set the period from 1 to 10 minutes. If Sleep delay is set to "OFF" the instrument will not go into sleep mode when it is not used.

Key beep

Turning on and off the key beep sound

Radio

Turning on and off radio communication between the instrument and sensor units. Selecting radio communication channel. If the radio channel is set to "Sleeping", the radio communication is off until the sensor unit has been connected to the instrument unit via the cable.

! **Always set the radio channel to "OFF" when there is risk that TA-CMI disturbs other vital electronic devices, i.e. near medical equipment and implanted cardiac pacemakers, in health care facilities, aircrafts, blasting areas, areas with potentially explosive atmospheres and other areas posted "turn off two-way radio"!**

Units

Setting the measurement units for temperature, differential pressure and flow

Shown below is an example of how you set any of the parameters described on previous page.

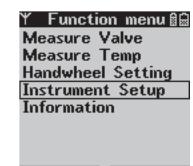
1. You select any of the parameters by pressing the down or up key repeatedly, then pressing Enter.



2. You then set the current parameter by pressing the down or up key repeatedly, then pressing Enter.



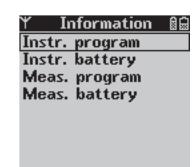
3. Leave the Instrument Setup menu and save your settings by pressing Done.



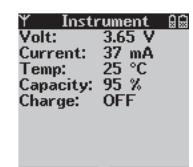
Information

In the Information menu you can access information about:

- The instrument unit program version
- The instrument unit battery status (volt, current, temperature, capacity, charge)
- The sensor unit program version
- The sensor unit battery status (volt, current, temperature, capacity, charge)



You access information about the different areas by pressing the down or up key repeatedly, then pressing Enter.



Clearing faults, service and calibration

Clearing faults

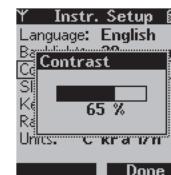
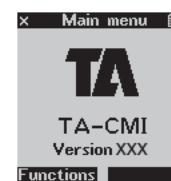
No radio communication between instrument and sensor units

If the “radio off” symbol  is displayed at top of the LCD, start radio communication by connecting the cable between the instrument and sensor units (see page 8).

Note! When you connect the instrument unit via the cable to a sensor unit, you synchronise that particular sensor unit to communicate with your instrument unit.

Blank LCD

If it is not possible to see the menus in the LCD, press the Escape key for more than 2 seconds. The LCD contrast will increase as long as the Escape key is depressed.



Incorrect function

If the instrument works incorrectly, i.e. due to static electricity discharge, keep the start key depressed and within one second also press the first function key and the left key. This makes the instrument restart but all saved data in the instrument will be unchanged.

Automatic restart

If the instrument detects a lockup condition (the keyboard is not working), the instrument restarts itself within 5 seconds. All saved data in the instrument will be unchanged.

Service

If you have tried to clear a fault according to above but the fault remains, contact your nearest Tour & Andersson office. If the unit has to be sent in for repair, **please enclose a description of the fault.**

Calibration

A calibration certificate for TA-CMI is issued after the delivery control. The equipment used is traceable to national standards according to ISO 9001 or equivalent. Customers, who want a regular calibration of the TA-CMI can order that from Tour&Andersson AB. Please mark “Calibration” when you order. How frequent calibration of the instrument is necessary are dependent upon usage and if it is required according to standards. As a general rule a calibration interval of 1 year is recommended.

Technical data

Measurement range

Total pressure	max 2 500 kPa
Differential pressure	-9 – 200 kPa
Pressure range during flow measurements	0.5 – 200 kPa
Temperature air measurement	-20 – 120°C
Temperature liquid medium measurement	-20 – 120°C

Measurement deviation

Differential pressure	0.2 kPa or 1% of reading, whichever is the highest
Flow	As for differential pressure + valve deviation
Temperature	<0.2°C + sensor deviation

Battery capacity, operating and charge times

Instrument unit battery capacity	1 300 mAh
Instrument unit battery operating time (with backlight on)	18 h
Instrument unit battery charge time to full capacity	5 h
Sensor unit battery capacity	600 mAh
Sensor unit battery operating time (continuous measurements)	18 h
Sensor unit battery charge time to full capacity	5 h

Ambient temperature

During operation	0 – 40°C
During charging	0 – 40°C
During storage ^{*)}	-20 – 60°C

^{*)} Do not leave water in the sensor when there is a risk of freezing.
Storage above 40°C reduces battery life.

Humidity

Ambient humidity (not condensing)	max. 90%RH
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Sealing

Class	IP 54
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X

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Sweden

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