Guidelines for MagFlux® Verification

Use the following guidelines to fill in the MagFlux Verification Sheet correctly. After a successful verification of an MJK MagFlux flow meter, the customer receives a signed certificate that verifies optimal performance equal to or better than the stated specifications of the MJK MagFlux® flow meter.

Required tools are: A standard digital multimeter, a 500V Megger and an MJK MagFlux Calibrator unit.

Supplementary guidelines and remarks for each and every step are listed on the following pages.

1. **Date / Time**

   Enter the date for the verification in ***dd-mm-yyyy*** format or in ***mm-dd-yyyy*** (US) format.
   The time can be in ***00-24*** hour format or in ***am/pm*** (US) format as appropriate.

2. **Verification performed by**

   Enter the company name and the name of the person who conducts the verification.

3. **Customer**

   Enter the company name of the customer who has requested the verification.

4. **Contact person**

   Enter the name of the contact person at the site.

5. **Installation site address**

   Enter the address of the site where the MagFlux® is installed.

6. **Sensor part no. / DN, serial no. and cal. code**

   Copy the key data of the sensor from the green MJK label located on the sensor itself.

7. **Converter part no. and serial no.**

   Copy the key data of the converter from the white MJK label located on the converter housing. If the label is missing or the numbers cannot be read, find the information via the MagFlux® menu system (see the manual for help and additional guidelines).

8. **Totalizer**

   Note the MagFlux® totalizer read-out. Normally the volume is displayed on the main menu display (***FTot***). If that is not the case, make it happen (see the manual).
   Do not forget to return the main menu display to its original state once the reading is done.

9. **Current flow**

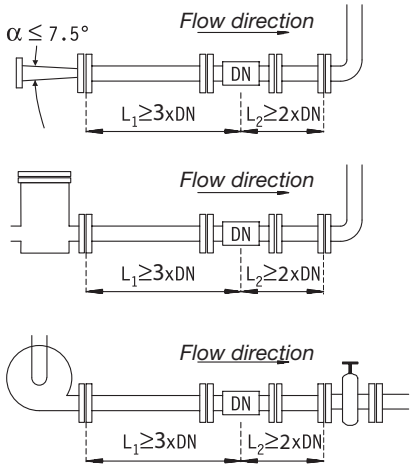
   Note the MagFlux® current flow read-out. Normally the number is displayed on the main menu display (***Flow***). If it is not the case, make it happen (see the manual).
   Remember to return the main menu display to its original state once the reading has been completed.

10. Is the sensor installed correctly according to the instructions in the Installation and User Manual?

Ensure that the installation complies with the recommendations listed in the manual:

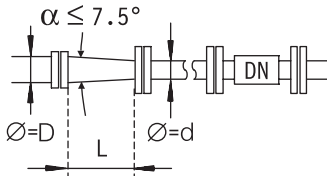
Pipe System

1. The flow sensor must be mounted in a location which is free from interfering elements like valves, Ts, bends, pumps, etc. to ensure a laminar flow without turbulence upstream of the flow sensor. For that reason the flow sensor must be mounted in a straight pipe at a distance from interfering elements of minimum 3 x DN upstream and minimum 2 x DN downstream.



Important: Valves should always be mounted on the downstream side of the flow sensor!

2. If it becomes necessary to use reducers, the inner angle must not exceed 7.5°.

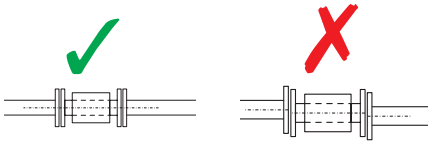


The minimum length to keep the angle below 7.5° can be checked by means of the formula ***L = (D - d) x 7.63*** where "D" is the large diameter and "d" the small diameter of the reducer.

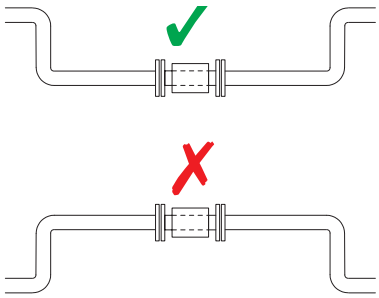
*Example: If a flow sensor in dimension DN **80** is mounted downstream of a **100** mm pipe, the reducer must then have a length of minimum 152,6 mm in order to keep the inner angle below 7,5 °.*

3. Flange connections must be assembled concentrically on both the upstream and the downstream side. Measuring accuracy will be affected by turbulence in the liquid from poorly made connections.

Important: Gaskets and grounding rings must also be mounted concentrically!



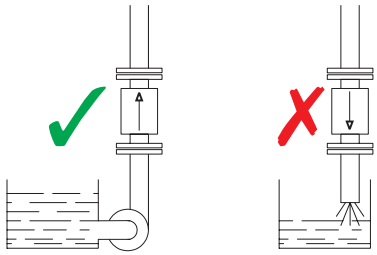
4. The flow sensor should always be filled with liquid. For that reason the flow sensor must not be mounted at the highest point of the pipe system or in free outlets, where gravity could empty or partially empty the pipe.



5. The flow sensor can be mounted vertically or horizontally.

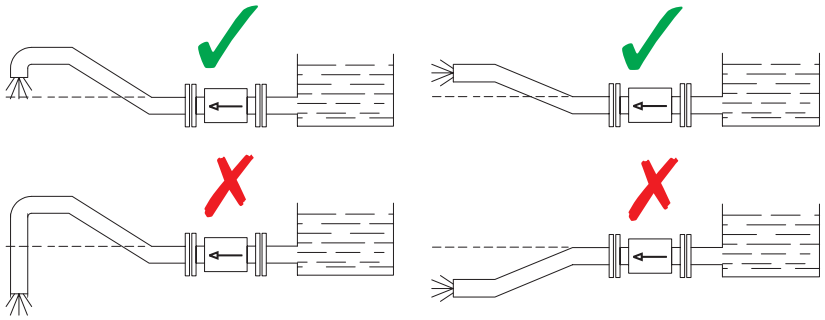
   If the flow sensor is mounted vertically, the flow direction should always be upwards. In that way the effect from possible bubbles in the liquid will be significantly reduced, just as it will ensure that the flow sensor is always filled with liquid.

   In case the liquid is carrying particles, for example when measuring sludge, sewage, etc., the flow sensor must be mounted vertically.



6. When mounting horizontally in pipes with free downstream outlet, the flow sensor should be mounted such that it will always be filled with liquid, for example in a bend situated lower than the height of the outlet.

   In case the liquid is carrying particles, e.g. when measuring sludge, sewage etc. the flow sensor must be mounted vertically.

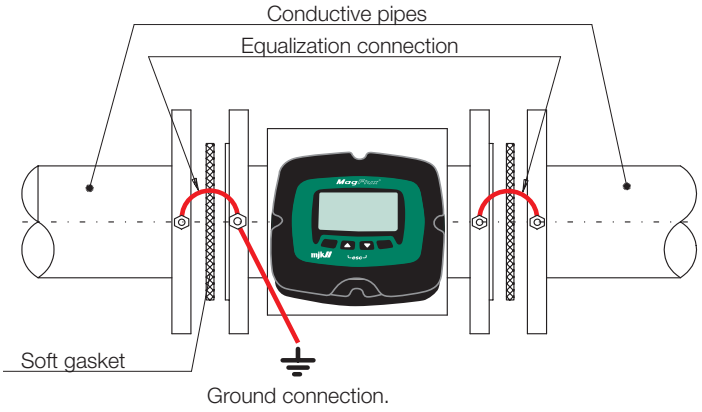


11. Has the sensor been earthed correctly?

Check that the earth connections are established correctly. Proper operation requires an electrical connection between the liquid itself and ground (GND) on the converter.
Most sensors have a built-in earth electrode. If that is not the case, comply with the recommendations in the manual.

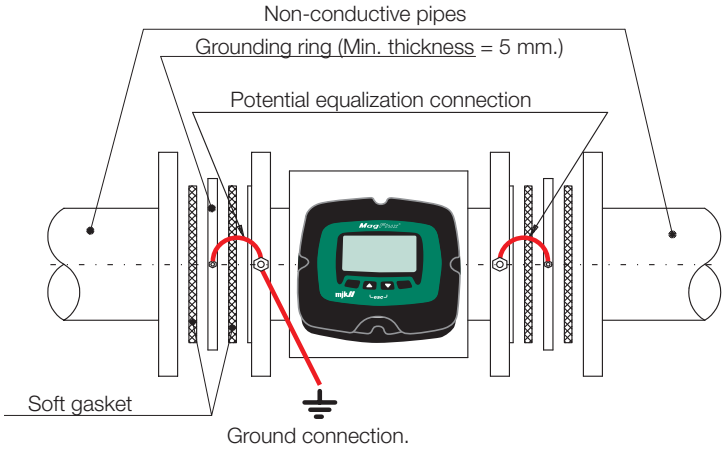
Potential Equalization and Grounding

Type 7100/7200/7600 in Conductive Pipes



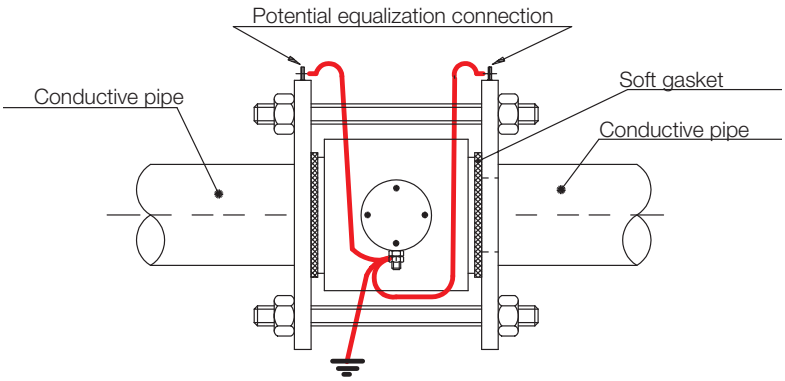
NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

Type 7100/7200/7600 in Non-conductive Pipes



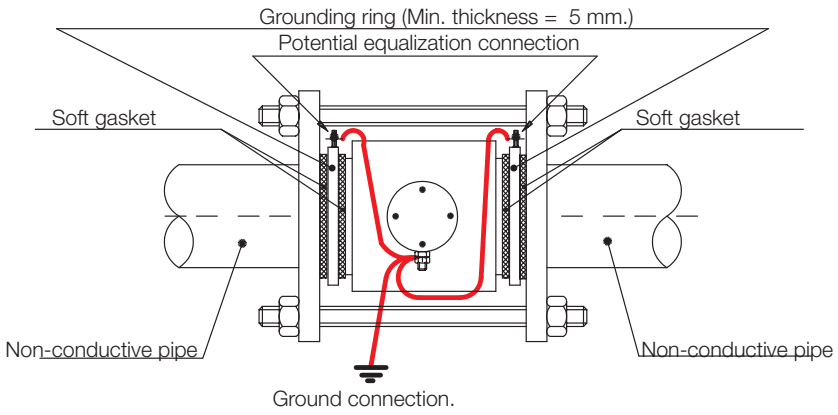
NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

Type 7300/7400 in Conductive Pipes



NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

Type 7300/7400 in Non-conductive Pipes



NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

12. Does the pipe work allow the sensor to be always full?

Make sure that the sensor at all times will be filled with liquid.

13. Is the sensor sized correctly for the application?

Investigate into the size of the sensor. At nominal flow the velocity must be within 0,5 - 10 m/s (0.6 ft./s - 33 ft./s). The actual velocity can be seen using the following path: ***Setup --> Converter Setup menu --> Service Menu --> Type Password 00000 --> Internal Meas. and Calibration --> View Raw ADC***

With the fluid velocity and the actual flow data at hand, the correct sensor size can be determined via the sizing chart in the manual.

14. Is the flow sensor centered on the pipe?

Check that the sensor is centered between the pipe flanges. Use a ruler or a slide gauge to ensure that up, down, left and right have the same reading.

15. Are all bolts fitted and evenly tensioned?

Check that all bolts are fitted and evenly tensioned.

16. Check insulation integrity of L1 coil circuit
Check insulation integrity of L2 coil circuit

Disconnect leads L1 and L2 from the converter.
Use a 500V Megger to measure the insulation between the MagFlux coils and the earth screw on the flange. The value must exceed 1 Mohm.

17. Check coil resistance and integrity between L1 and L2 with a multimeter

Use a multimeter to measure the resistance between L1 and L2 from the sensor.The value must be within 38 - 50 ohm.
Reconnect leads L1 and L2.

18. Check contact between electrodes and liquid

Use a multimeter to measure the resistance between E1/E2 and liquid earth. Expect values between 0,005 Mohm and 0,5 Mohm depending on the connectivity of the liquid.

19. Is the specified signal cable used between sensor and converter?

On remote MagFlux installations the deployed cable type is important. Only one cable type may be used: MJK MagFlux cable, part number 691080. The cable colour is MJK green marked with “691080”.
The max. cable length is 50 m (150 ft.)

20. Are all connections correct and tight?

Ensure that all electrical connections are implemented in a craftsmanlike manner.

21. Correct power supply voltage?

Use a multimeter to check that the mains power supply voltage is the same as the converter voltage requirements. Standard voltage requirements are:
230 V AC +/- 10%
110 V AC +/- 10%
24 V AC +/- 10%.

22. Confirm correct sensor calibration code

(For units produced prior to February 1, 2007: Sensor no.)

Compare the calibration code from the green MJK label located on the sensor with the calibration code (or Sensor No. on early models) entered into the converter firmware.
Use the following path: ***Setup --> Converter Setup menu --> Service Menu --> Type Password 00000 --> Sensor Calibration Code***.

23. Check the 4 - 20 mA output

Check the 4 - 20 mA output from the converter, and remember that the MagFlux is a high precision flow meter calibrated to a accuracy of +/- 0,01 mA.
Insert the multimeter in the current loop and set the MagFlux to fixed currents (4, 12 and 20 mA). Note the read-outs on the multimeter and enter them into the sheet.

Use the following path: ***Setup --> Converter Setup menu --> Service Menu --> Type Password 00000 --> Calibrate mA --> Set Fixed Current***

24. Is the noise acceptable?

Make sure that the signal-to-noise ratio is satisfactory at constant flow (noise must be less than 5%). Use the following path: ***Setup --> Converter Setup menu --> Service Menu --> Type Password 00000 --> Internal Meas. and Calibration --> View Raw ADC***

25. Converter check - low flow

Check the sensor calibration code in the verification table.

Disconnect the wires between the sensor and the converter. Note down the colour codes if they do match the description in the user manual.

Connect the MJK MagFlux Verificator unit to the converter.

Enter the verification code from the verification table on page 8 (xxxxxx, 6 digits) into the converter as the sensor calibration code.

Set the MJK MagFlux Verificator to “Sensor OFF” and wait approx. 1minute until the reading has stabilized.

Follow this path: *Converter Setup --> Service Menu --> Internal meas. & Cal. --> View Raw ADC*

Check in the “View Raw ADC” menu that the reading is valid according to the verification table.

26. Converter check - flow

Set the MJK MagFlux Verificator to “Signal Level 1” or “Signal Level 2” according to the verification table and wait approx. 2 minutes until the reading has stabilized.

Check in the “View Raw ADC” menu that the reading is valid according to the verification table.

Reenter the correct calibration code.

27. Minimum flow
28. Averaging
29. Unit
30. mA output
31. Digital output DO1
32. Digital output DO2
33. Digital input DI

Complete the verification by entereing the MagFlux setup parameters. See the manual for additional information about the variuos parameters.

Comments / recommendations

If one or more steps result in a “No”checkmark, explain why and suggest how the problem can be solved.
Conclude the verification procedure by signing the verification document and, if applicable, arrange a next date for a new verification check.
Finally hand over or send the verification document to the customer and keep a copy for filing.

Verification Table

DON'T CHANGE THE FIRST LETTER IN SENSOR CAL. CODE !
*p5800 (*) is always the same in the orginal Sensor Cal. Code
Flow [m3/s] can be read under "service menu" => "internal meas. & cal." => "View raw ADC"

DN	Test Sensor Cal. Code	Level	Zero - Flow [m3/s] min. flow 0 and averaging 30s			Flow +/- 0,25% [m3/s] averaging 30s		
3	**1**p5800	Level 1	-0,000000012	-	0,000000012	0,00003836	-	0,00003859
6	**2**p5800	Level 1	-0,00000005	-	0,00000005	0,0001534	-	0,0001544
8	**3**p5800	Level 2	-0,00000016	-	0,00000016	0,0005456	-	0,0005488
10	**4**p5800	Level 2	-0,00000026	-	0,00000026	0,0008524	-	0,0008576
15	**5**p5800	Level 2	-0,0000006	-	0,0000006	0,001918	-	0,001930
20	**6**p5800	Level 2	-0,0000010	-	0,0000010	0,003410	-	0,003430
25	**7**p5800	Level 1	-0,0000008	-	0,0000008	0,002664	-	0,002680
32	**8**p5800	Level 2	-0,0000026	-	0,0000026	0,008729	-	0,008781
40	**9**p5800	Level 2	-0,000004	-	0,000004	0,01364	-	0,01372
50	**a**p5800	Level 1	-0,000003	-	0,000003	0,01066	-	0,01072
65	**b**p5800	Level 1	-0,000005	-	0,000005	0,01801	-	0,01812
80	**c**p5800	Level 1	-0,000008	-	0,000008	0,02728	-	0,02744
100	**d**p5800	Level 1	-0,000013	-	0,000013	0,04262	-	0,04288
125	**e**p5800	Level 1	-0,000020	-	0,000020	0,06660	-	0,06700
150	**f**p5800	Level 1	-0,000029	-	0,000029	0,09590	-	0,09648
200	**g**p5800	Level 1	-0,00005	-	0,00005	0,1705	-	0,1715
250	**h**p5800	Level 1	-0,00008	-	0,00008	0,2664	-	0,2680
300	**i**p5800	Level 1	-0,00012	-	0,00012	0,3836	-	0,3859
350	**j**p5800	Level 1	-0,00016	-	0,00016	0,5221	-	0,5253
400	**k**p5800	Level 1	-0,00021	-	0,00021	0,6819	-	0,6861
450	**l**p5800	Level 1	-0,00026	-	0,00026	0,8631	-	0,8683
500	**m**p5800	Level 1	-0,0003	-	0,0003	1,066	-	1,072
600	**n**p5800	Level 1	-0,0005	-	0,0005	1,534	-	1,544
700	**o**p5800	Level 1	-0,0006	-	0,0006	2,088	-	2,101
800	**p**p5800	Level 1	-0,0008	-	0,0008	2,728	-	2,744
900	**q**p5800	Level 1	-0,0010	-	0,0010	3,452	-	3,473
1000	**r**p5800	Level 1	-0,0013	-	0,0013	4,262	-	4,288
1200	**s**p5800	Level 1	-0,0018	-	0,0018	6,138	-	6,174

eof