# Relevance and application of cartridge meters in the submetering sector

**International Workshop on Water and Heat Meters**

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# Agenda

**Legal & market environment**

**Application of cartridge meters**

**Outlook**

# Legal situation / regulations

**Why do we use apartment water meters? Some examples …**

Germany

- Decree on heat cost allocation (1981, revised in 2009)
  - Allocation of heat costs for warm water generation mandatory
- federal state building codes
  - Obligation for billing of cold water dependent on federal state

Austria

- Act of heat cost billing: warm water meters mandatory
- act of residential and ownership rights
  - billing of cold water not mandatory; dependent on owner's decision

Switzerland

- Billing of water (cold or warm) not mandatory
  - Regulation dependent on federal state

# Market / distribution

**Main Markets of cartridge meters are**

- Germany
- Austria
- Switzerland
- Netherlands
- Czech Republik
- Italy

In smaller numbers also in

- Poland
- France
- Denmark

# History of cartridge meters

**A brief view back …**

- Invention of cartridge meters end of 1960‘s
- transfer of technology / design to heat meters in 1980‘s
- End of 1980‘s increase of meters with communication interfaces (radio, M-Bus, reed contact)
- Modern cartridge meters are
  - Mechanical with clip-on communication modules
  - Electronic meters with LCD and integrated communication modules

# Facts & figures

## Economic relevance in submetering

- installed base in Germany:
  - 25 Mio. apartment water meters installed
  - thereof roughly 2/3 are cartridge meter types
- estimated consumption of water measured by those:
  - 498 Mio. $m^3$ drinking water per year [1]
- monetary equivalent: [2]
  - 0.93 Bn. EUR (fresh drinking water costs)
  - 1.76 Bn. EUR (incl. waste water fee)

[1] average accumulated volume per meter: 30$m^3$/a
[2] Average cost: 1.86€/$m^3$ fresh water, 1.66€/$m^3$ waste water fee; source: various German utilities, Oct.2013

# Application 1/4 - basics

**Intention and main characteristics of a cartridge meter**

- Retrofitting of metering point for old buildings
- unremarkable and easy to use metering point

  for new buildings
- Easy to install and to carry out periodic change

  due to calibration period
  - cartridge meter + connection interface = metering point
- high quality and robust metering point for submetering at reasonable costs

# Application 2/4 – on site

## On site installation & meters

- Installed meters per apartment:
  - In new buildings typically 2 meters
  - In old buildings very variable due to number of retrofitted metering points
  - Statistically 1.5 meters per appartment[1]

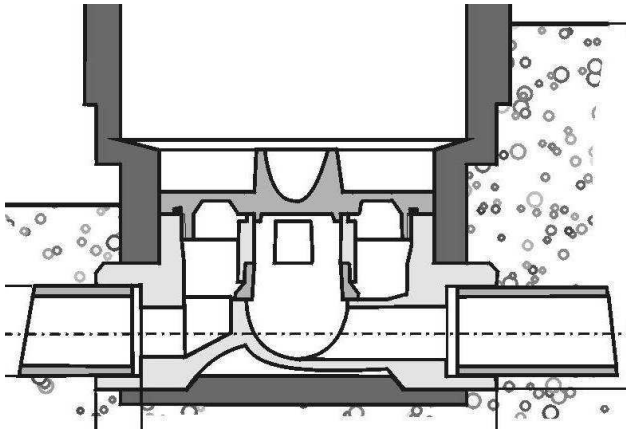
- Meter types & size
  - standard meter size in terms of flowrate is $Q_n$1.5 m³/h (>99%)
  - Multi-jet type 80%, single-jet type 20%

[1] Estimation based on different approaches

# Application 3/4 – connection interfaces I

**Connection interfaces according to EN 14154-2:2005+A2:2011**

- standard is in-wall type (80…85%)
  - directly connected to supply pipes
  - bathroom, kitchen
  - incl. stop valve or separate
  - mainly in new buildings



# Application 4/4 – connection interfaces II

**As a retrofitting solution**

on-wall [1] and valve connection interfaces [2]

- Bath room, kitchen
- under the sink, angle stop valve,

  washing machine tube
- mainly in old buildings

[1]

[2]

# Metrological characteristics in the field

**PTB technical regulation TR-W19**

- Annex D; additional check on-site
- Only very few cases per year
- Not relevant for cartridge meters due to
  - stable measuring characteristics of cartridge meters (see lecture of Dr. Wendt) referring unsuitable pipe installation or fittings
  - original installed connection interface has to be removed and transferred to the calibration site
  - Costs for tenant (typically the person who orders an on-site check)

# Outlook 1/2

**Marking of connection interfaces**

- EN 14154-3 requires marking of connection interfaces
  - To cross-check if marking of the meter is the same
- New connection interfaces have such markings
- interfaces already installed in the field:
  - Basically it is accepted by the market surveillance / PTB to mark the interfaces when installing a MID cartridge meter
    - Results of PTB working group on water meters (PTB VV AA Wasserzähler)
  - The realization „How to mark it in the field“ is not decided yet
    - Discussions/fine tuning of realization is ongoing between market participiants (surveillance bodies, manufacturers, submetering companies)

# Outlook 2/2

**Suitable flow rate for apartment meters**

- Inline meters have a variety such as $Q_n1.0$ / $Q_n1.5$ / $Q_n2.5$ m³/h
- Actually > 99% of all cartridge meters have $Q_n1.5$ m³/h
- with change to MID we expect
  - inline meters to be or already are „transferred“ to $Q_3 1.6$ / $Q_3 2.5$ / $Q_3 4.0$ m³/h due to market requirements
  - to have $Q_3 2.5$ as a standard for cartridge meters
    - long term developments could go for $Q_3 1.6$ due to change of installation standards or legal regulation to reduce water consumption
  - expert working group has been set up to evaluate demands for a change (technically, regulatory)

# Contact

## Contact for further information or questions

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