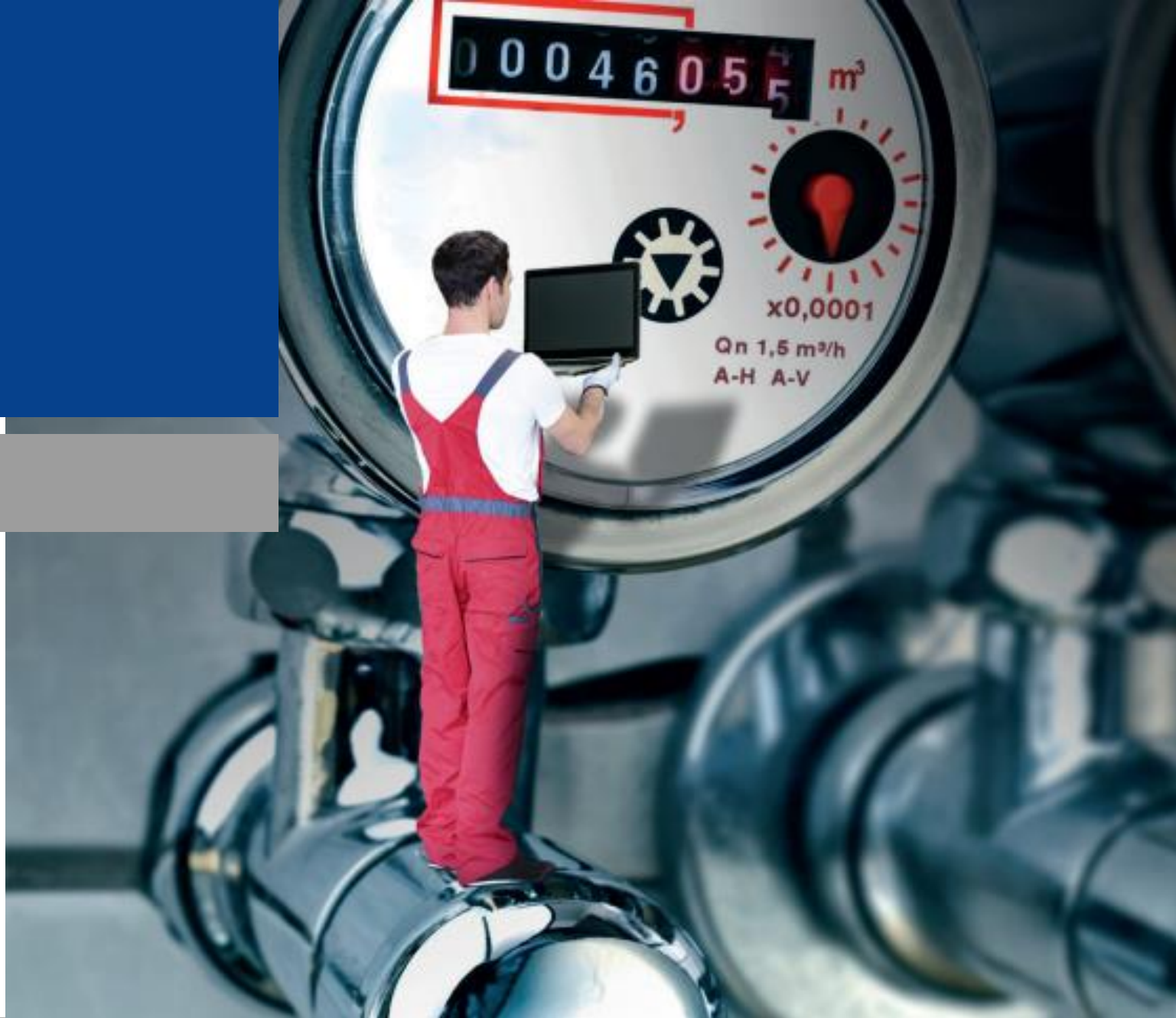
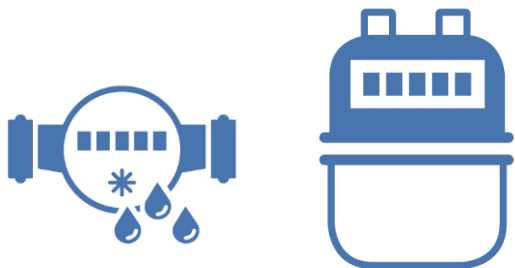


EU001

AMR Retrofit Meter Module



ABSTRACT

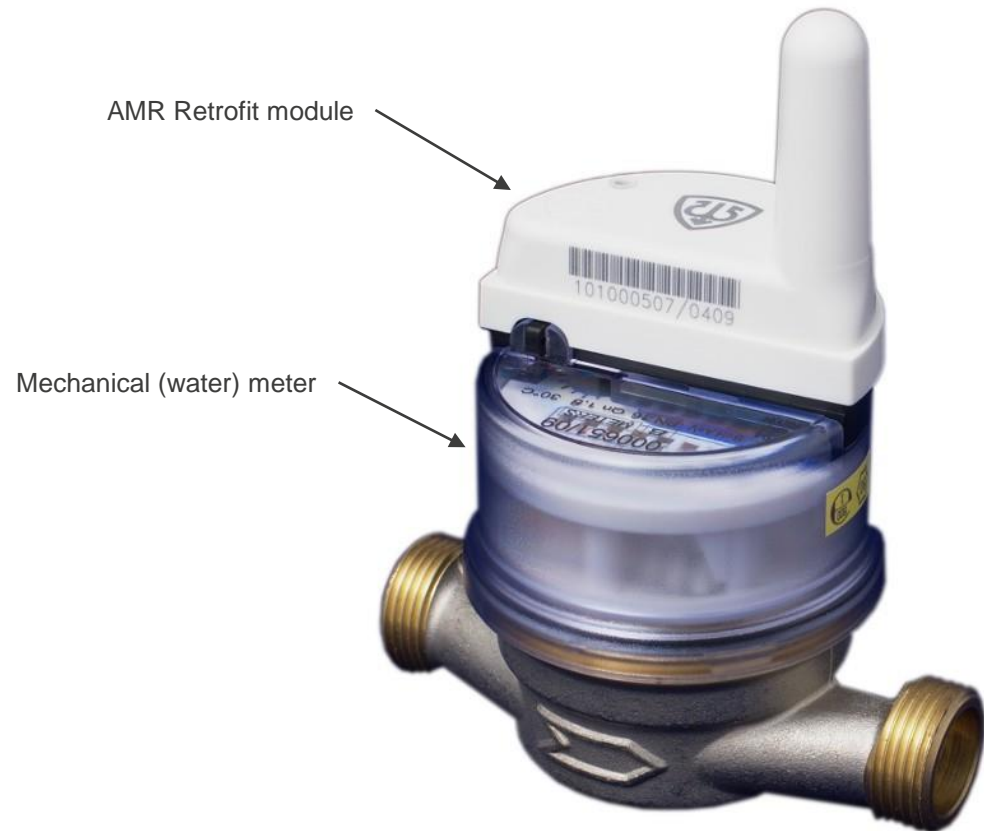
In the context of an increasing requirement of **Automated Meter Reading** (“AMR”) capability for water, heat and gas meters, many utilities have decided to use MID certified “plug-and-play” retrofit modules for already deployed mechanical meters as a viable option for a complete replacement with purely electronic meters before official lifetime expiry.

Although the following concept had been developed for a mechanical water **retrofit module**, the principle of operation is **media agnostic** (heat & gas) and fully applicable to **electronic direct drive meters** (no mechanical gear box).

Also, as a result of the **current** market requirements, this solution had been implemented using a 16-Bit RL78 MCU core technology; however, in order to address possible future market trends especially with respect to more complex communication schemes, this proposal is flexible enough to be implemented on **any other fit-able RENESAS MCU**

GENERAL SYSTEM REQUIREMENTS

- AMR retrofit capability for (already deployed) mechanical meters
- Capability to detect reverse flow
- Low power (10 – 15 years of life time)
- Magnetic tamper protection



WC PROPOSAL – „AMR RETROFIT METER MODULE“

Long life time: ultra low power MCU + Buck-Boost

AMR capability: Sub-1-GHz wireless connectivity

Magnetic tamper protection:

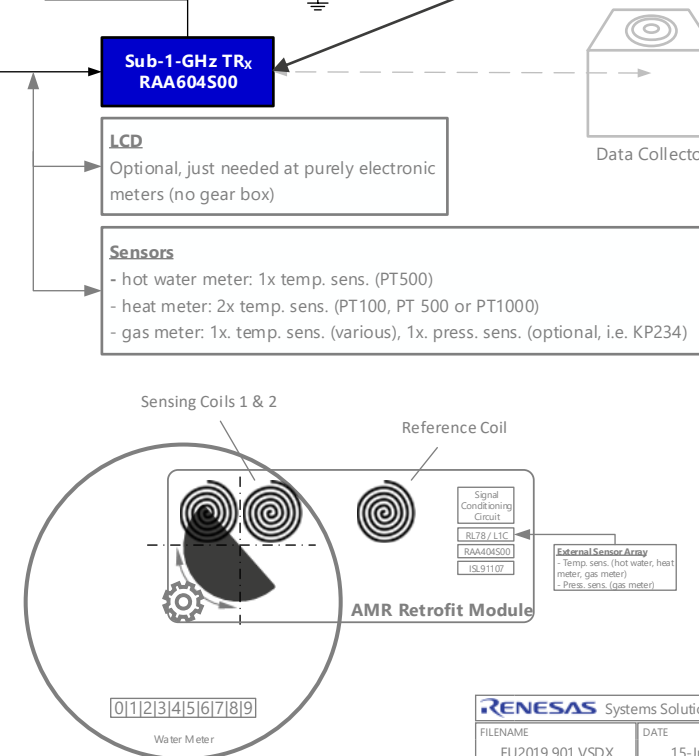
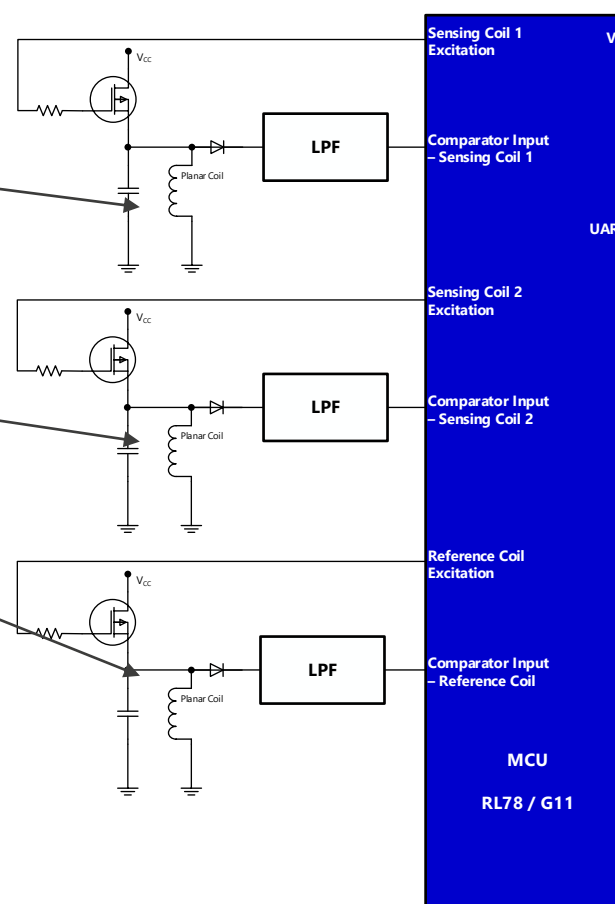
3x aircore inductors

Reverse flow detection:

2x sensing coils

Thermal immunity:

differential sensing against ref. aircore inductor



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Water Meter

RENESAS Systems Solutions Team	
FILENAME EU2019.901.VSDX	DATE 15-Jul-19
DRAWN BY Axel Kleinitz, PhD	PAGE 1 OF 1

SOLUTION BENEFITS

Using aircore inductors instead of traditionally selected ferrite inductors will provide an **intrinsic magnetic immunity** (= protection) of the meter's metrology against external permanent magnetic fields.

The commonly used approach of using 2 sensors in an axisymmetric configuration allows the **detection of reverse flow**. Yet, using the 3rd coil as a pure reference in a differential sensing mode eliminates the requirement of intensive algorithmic compensation providing a fully **thermally immune metrology** solution as well as less susceptibility against voltage drifts, components aging and general tolerance issues.

The selected RL78/G11 MCU offers the advantage of running both – metrology + application – on one MCU at an **attractive cost level**; other options could be alternatively selected, like the RL78/L1C (including the LCD on-chip controller) especially important when the task would be to design a **purely electronic meter** using the rotation detection metrology method but eliminating the no longer needed mechanical gear box.

Implementing the suggested Buck-Boost DC-DC converter provides two key benefits: not only that RF transceiver proper operability is herewith guaranteed, but also a significant **system's lifetime extension** by a more efficient use of the battery's available capacity.

The proposed Sub-1-GHz transceiver provides RF connectivity key to address AMR capability.

Q & A

