

ADR Project. wM-Bus Profile

Rev.1.0

Revision History

| Version | Date | Description |
|---------|------------|-------------------------|
| 1.0 | 14.05.2025 | First document revision |

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wM-Bus Protocol Stack and References

wM-Bus protocol stack implemented in water meter has the following structure:

| | |
|---|------------------------------------|
| Application layer | EN 13757-3:2018 |
| Transport Layer | EN 13757-7:2018 |
| Authentication and Fragmentation Layer | EN 13757-7:2018 clause 6 |
| Data Link layer | EN 13757-2:2018 EN 13757-4:2019 |
| Physical Layer | EN 13757-4:2019 |

wM-Bus Address Elements

As it is specified for wM-Bus, Link Layer Address (LLA) always contains the address of the sender (meter).

Extended Link Layer Address (ELLA) is not used.

Application Layer Address (ALA) is not used.

The LLA consists of four parts:

- Identification Number (Device ID)
- Manufacturer ID
- Version
- Device Type

Usage of these elements is in accordance with EN 13757-7:2018, clauses 7.5.1 to 7.5.4.

| Manufacturer ID (HEX) | Identification Nr. (BCD) | Version | Device Type |
|------------------------------|---------------------------------|----------------|--------------------|
| 04 98 | 14 16 44 74 | 00 | 07 |

- MAN ID = 0498H (ADX)
- Identification Number = e.g., 14164474 (big endian)
 - In BCD = 14164474H
- Version = 00H
- Type = 07H (Cold Water Meter)

In real wM-Bus frame each field is represented as LSB-First (little endian). Thus, for the example address shown above this would be 98 04 74 44 16 14 00 07.

Physical Layer

Complies with OMS Gen.4 Specifications, Issue 4.3.3 / 2020-10 (<https://oms-group.org/en/open-metering-system/oms-specification-1-1#c2451>).

OMS PHY_A mode T1 or C1.

H_T = Highest transmission power (> +5 dBm).

Unidirectional synchronous transmission: transmit every 20 sec, interval of Consumption Data is 1 hour.

Data Link Layer (DLL)

Supported C-Fields: SND-NR only.

Security mode 0 (default configuration by delivery) or 5 (may be chosen by agreement with the customer).

Transport Layer (TPL)

Short TPL header, the meter identification is taken from the Link Layer

wM-Bus Data Points

| N | Type / Encryption | MB-Tag | Description | Data field | Tariff [T] | Function [F] | Storage [X] | Final DIFE [FD] | VIB-Type Reference | Cold Water (07h) |
|---|-------------------------|--------|---|------------|------------|--------------|-------------|-----------------|--------------------|------------------|
| 1 | Date/Time of device | DT1! | Current date/time at time of transmission | Type F, | 0 | 0 | 0 | no | DT01 | C |
| 2 | Meter reading | VM1! | Volume, current value, total | INT | 0 | 0 | 0 | no | VM01 | M |
| 3 | Meter reading | VM4! | Volume, forward value | INT | 0 | 0 | 0 | no | VM07 | O |
| 4 | Error (Alarm structure) | MM2! | Error flags | INT | 0 | 0 | 0 | no | MM02 | C |
| 5 | Device information | MM8! | Remaining battery lifetime | INT | 0 | 0 | 0 | no | MM10 | O |
| 6 | Temperature | TC1! | Flow Temperature | INT | 0 | 0 | 0 | no | TC01 | |

Alarm structure (Error Flags)

| Byte No.\Bit No. | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|----------------|-----------|-------------------|---------|---------|----------|--|----------------|
| 0 | WV comm. error | WV Tamper | WV Magnetic field | Reserve | Reserve | Reserve | Valve state: 0 – closed, 1 – opened 100%, 2 – opened 10% 3- opened 50% | |
| 1 | Clock invalid | Tamper | Magnetic field | Reserve | Reserve | Low bat | Firmware changed | Hardware Fault |
| 2 | Leakage | Dry | Backflow | Burst | Reserve | Low temp | Reserve | Reserve |

Alarms description:

“WV comm. error” – Water valve communication error

“WV Tamper” – Water valve case opened

“WV Magnetic field” – Magnetic field on water valve detected

- “Valve state” – Current water valve state
- “Clock invalid” – System time not valid
- “Tamper” – Meter case opened
- “Magnetic field” – Detect magnetic field
- “Low bat” – Critical battery level (appear before half year before 0% level)
- “Hardware fault” – Meter internal hardware fault
- “Frmw changed” – Firmware version was updated
- “Leakage” – Water flow during more than 24 hours detected
- “Dry” – Water is absent during long time
- “Backflow” – Reverse water flow more than Q1 detected
- “Burst” – Water flow >= Q3 during long time detected
- “Low temp” – Low ambient temperature detected

Message examples

In this section examples of some messages are presented.

Example 1

Raw message (HEX):

3B 44 98 04 48 44 17 14 00 07 8C 20 7F 7A 73 00 00 20 04 6D 1B 11 01 37 04 13 03 D9 00 00
04 93 3B 9C AD 00 00 03 FD 17 01 00 00 02 FD FD 02 65 00 02 5B 19 00

Table 1: SND-NR, no errors

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|--|-------------|----------------|-------|
| 1 | L | Length of data: 59 bytes | 3B | 3B | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code: ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Address: 14174448 | 48 | 48 | LL |
| 6 | A | | 44 | 44 | LL |
| 7 | A | | 17 | 17 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version: 00 | 00 | 00 | LL |
| 10 | A | Device type: Water | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access: 127 | 7F | 7F | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access: 115 | 73 | 73 | TPL |
| 16 | Status | No error -- | 00 | 00 | TPL |
| 17 | Config | SecMode: 0 EncB: 0 Cont: 00b Bits: -S- | 00 | 00 | TPL |
| 18 | Config | | 20 | 20 | TPL |
| 19 | DR1 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 20 | DR1 | VIF = Date-Time "F" | 6D | 6D | APL |
| 21 | DR1 | 2024-07-01 17:27 | 1B | 1B | APL |
| 22 | DR1 | | 11 | 11 | APL |
| 23 | DR1 | | 01 | 01 | APL |
| 24 | DR1 | | 37 | 37 | APL |
| 25 | DR2 | DIF = 32 Bit Integer | 04 | 04 | APL |

| | | | | | |
|----|-----|-------------------------------------|----|----|-----|
| 26 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 13 | APL |
| 27 | DR2 | 55,555 m3 | 03 | 03 | APL |
| 28 | DR2 | | D9 | D9 | APL |
| 29 | DR2 | | 00 | 00 | APL |
| 30 | DR2 | | 00 | 00 | APL |
| 31 | DR3 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 32 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 93 | APL |
| 33 | DR3 | VIFE = Forward volume | 3B | 3B | APL |
| 34 | DR3 | 44,444 m3 | 9C | 9C | APL |
| 35 | DR3 | | AD | AD | APL |
| 36 | DR3 | | 00 | 00 | APL |
| 37 | DR3 | | 00 | 00 | APL |
| 38 | DR4 | DIF = 24 Bit Integer | 03 | 03 | APL |
| 39 | DR4 | VIF | FD | FD | APL |
| 40 | DR4 | VIFE = "Error flags (binary)" | 17 | 17 | APL |
| 41 | DR4 | 1 (WV opened 100%, no alarms) | 01 | 01 | APL |
| 42 | DR4 | | 00 | 00 | APL |
| 43 | DR4 | | 00 | 00 | APL |
| 44 | DR5 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 45 | DR5 | VIFE1 | FD | FD | APL |
| 46 | DR5 | VIFE2 = month(s) | FD | FD | APL |
| 47 | DR5 | 101 mon | 02 | 02 | APL |
| 48 | DR5 | | 65 | 65 | APL |
| 49 | DR5 | | 00 | 00 | APL |
| 50 | DR6 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 51 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 5B | APL |
| 52 | DR6 | 25 °C | 19 | 19 | APL |
| 53 | DR6 | | 00 | 00 | APL |

Example 2

Raw message (HEX):

3B 44 98 04 48 44 17 14 00 07 8C 20 8F 7A 5C 00 00 20 04 6D 1F 11 01 37 04 13 03 D9 00 00
04 93 3B 9C AD 00 00 03 FD 17 01 00 80 02 FD FD 02 65 00 02 5B 19 00

Table 2: SND-NR, alarm “Leakage”

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|--|-------------|----------------|-------|
| 1 | L | Length of data: 59 bytes | 3B | 3B | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code: ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Address: 14174448 | 48 | 48 | LL |
| 6 | A | | 44 | 44 | LL |
| 7 | A | | 17 | 17 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version: 00 | 00 | 00 | LL |
| 10 | A | Device type: Water Meter | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access: 143 | 8F | 8F | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access: 92 | 5C | 5C | TPL |
| 16 | Status | No error -- | 00 | 00 | TPL |
| 17 | Config | SecMode: 0 EncB: 0 Cont: 00b Bits: -S- | 00 | 00 | TPL |

| | | | | | |
|----|--------|---|----|----|-----|
| 18 | Config | | 20 | 20 | TPL |
| 19 | DR1 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 20 | DR1 | VIF = Date-Time "F" | 6D | 6D | APL |
| 21 | DR1 | 2024-07-01 17:31 | 1F | 1F | APL |
| 22 | DR1 | | 11 | 11 | APL |
| 23 | DR1 | | 01 | 01 | APL |
| 24 | DR1 | | 37 | 37 | APL |
| 25 | DR2 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 26 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 13 | APL |
| 27 | DR2 | 55,555 m3 | 03 | 03 | APL |
| 28 | DR2 | | D9 | D9 | APL |
| 29 | DR2 | | 00 | 00 | APL |
| 30 | DR2 | | 00 | 00 | APL |
| 31 | DR3 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 32 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 93 | APL |
| 33 | DR3 | VIFE = Forward volume | 3B | 3B | APL |
| 34 | DR3 | 44,444 m3 | 9C | 9C | APL |
| 35 | DR3 | | AD | AD | APL |
| 36 | DR3 | | 00 | 00 | APL |
| 37 | DR3 | | 00 | 00 | APL |
| 38 | DR4 | DIF = 24 Bit Integer | 03 | 03 | APL |
| 39 | DR4 | VIF | FD | FD | APL |
| 40 | DR4 | VIFE = "Error flags (binary)" | 17 | 17 | APL |
| 41 | DR4 | 8388609 (WV opened 100%, alarm "Leakage") | 01 | 01 | APL |
| 42 | DR4 | | 00 | 00 | APL |
| 43 | DR4 | | 80 | 80 | APL |
| 44 | DR5 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 45 | DR5 | VIF | FD | FD | APL |
| 46 | DR5 | VIFE1 | FD | FD | APL |
| 47 | DR5 | VIFE2 = month(s) | 02 | 02 | APL |
| 48 | DR5 | 101 mon | 65 | 65 | APL |
| 49 | DR5 | | 00 | 00 | APL |
| 50 | DR6 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 51 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 5B | APL |
| 52 | DR6 | 25 °C | 19 | 19 | APL |
| 53 | DR6 | | 00 | 00 | APL |

Example 3

Raw message (HEX):

3B 44 98 04 48 44 17 14 00 07 8C 20 C3 7A BD 00 00 20 04 6D 18 11 01 37 04 13 03 D9 00 00
04 93 3B 9C AD 00 00 03 FD 17 01 00 10 02 FD FD 02 65 00 02 5B 19 00

Table 3: SND-NR, alarm "Burst"

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|--------------------------|-------------|----------------|-------|
| 1 | L | Length of data: 59 bytes | 3B | 3B | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code: ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Address: 14174448 | 48 | 48 | LL |
| 6 | A | | 44 | 44 | LL |

| | | | | | |
|----|--------|---|----|----|-----|
| 7 | A | | 17 | 17 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version: 00 | 00 | 00 | LL |
| 10 | A | Device type: Water Meter | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access: 195 | C3 | C3 | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access: 189 | BD | BD | TPL |
| 16 | Status | No error -- | 00 | 00 | TPL |
| 17 | Config | SecMode: 0 EncB: 0 Cont: 00b Bits: -S- | 00 | 00 | TPL |
| 18 | Config | | 20 | 20 | TPL |
| 19 | DR1 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 20 | DR1 | VIF = Date-Time "F" | 6D | 6D | APL |
| 21 | DR1 | 2024-07-01 17:24 | 18 | 18 | APL |
| 22 | DR1 | | 11 | 11 | APL |
| 23 | DR1 | | 01 | 01 | APL |
| 24 | DR1 | | 37 | 37 | APL |
| 25 | DR2 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 26 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 13 | APL |
| 27 | DR2 | 55,555 m3 | 03 | 03 | APL |
| 28 | DR2 | | D9 | D9 | APL |
| 29 | DR2 | | 00 | 00 | APL |
| 30 | DR2 | | 00 | 00 | APL |
| 31 | DR3 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 32 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 93 | APL |
| 33 | DR3 | VIFE = Forward volume | 3B | 3B | APL |
| 34 | DR3 | 44,444 m3 | 9C | 9C | APL |
| 35 | DR3 | | AD | AD | APL |
| 36 | DR3 | | 00 | 00 | APL |
| 37 | DR3 | | 00 | 00 | APL |
| 38 | DR4 | DIF = 24 Bit Integer | 03 | 03 | APL |
| 39 | DR4 | VIF | FD | FD | APL |
| 40 | DR4 | VIFE = "Error flags (binary)" | 17 | 17 | APL |
| 41 | DR4 | 1048577 (WV opened 100%, alarm "Burst") | 01 | 01 | APL |
| 42 | DR4 | | 00 | 00 | APL |
| 43 | DR4 | | 10 | 10 | APL |
| 44 | DR5 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 45 | DR5 | VIF | FD | FD | APL |
| 46 | DR5 | VIFE1 | FD | FD | APL |
| 47 | DR5 | VIFE2 = month(s) | 02 | 02 | APL |
| 48 | DR5 | 101 mon | 65 | 65 | APL |
| 49 | DR5 | | 00 | 00 | APL |
| 50 | DR6 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 51 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 5B | APL |
| 52 | DR6 | 25 °C | 19 | 19 | APL |
| 53 | DR6 | | 00 | 00 | APL |

Example 4

Raw message (HEX):

3B 44 98 04 48 44 17 14 00 07 8C 20 64 7A E7 00 00 20 04 6D 11 11 01 37 04 13 03 D9 00 00 04 93 3B 9C AD 00 00 03 FD 17 01 40 00 02 FD FD 02 65 00 02 5B 19 00

Table 4: SND-NR, alarm "Meter case opened"

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|---|-------------|----------------|-------|
| 1 | L | Length of data: 59 bytes | 3B | 3B | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code: ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Address: 14174448 | 48 | 48 | LL |
| 6 | A | | 44 | 44 | LL |
| 7 | A | | 17 | 17 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version: 00 | 00 | 00 | LL |
| 10 | A | Device type: Water Meter | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access: 100 | 64 | 64 | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access: 231 | E7 | E7 | TPL |
| 16 | Status | No error -- | 00 | 00 | TPL |
| 17 | Config | SecMode: 0 EncB: 0 Cont: 00b Bits: -S- | 00 | 00 | TPL |
| 18 | Config | | 20 | 20 | TPL |
| 19 | DR1 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 20 | DR1 | VIF = Date-Time "F" | 6D | 6D | APL |
| 21 | DR1 | 2024-07-01 17:17 | 11 | 11 | APL |
| 22 | DR1 | | 11 | 11 | APL |
| 23 | DR1 | | 01 | 01 | APL |
| 24 | DR1 | | 37 | 37 | APL |
| 25 | DR2 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 26 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 13 | APL |
| 27 | DR2 | 55,555 m3 | 03 | 03 | APL |
| 28 | DR2 | | D9 | D9 | APL |
| 29 | DR2 | | 00 | 00 | APL |
| 30 | DR2 | | 00 | 00 | APL |
| 31 | DR3 | DIF = 32 Bit Integer | 04 | 04 | APL |
| 32 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 93 | APL |
| 33 | DR3 | VIFE = Forward volume | 3B | 3B | APL |
| 34 | DR3 | 44,444 m3 | 9C | 9C | APL |
| 35 | DR3 | | AD | AD | APL |
| 36 | DR3 | | 00 | 00 | APL |
| 37 | DR3 | | 00 | 00 | APL |
| 38 | DR4 | DIF = 24 Bit Integer | 03 | 03 | APL |
| 39 | DR4 | VIF | FD | FD | APL |
| 40 | DR4 | VIFE = "Error flags (binary)" | 17 | 17 | APL |
| 41 | DR4 | 16385 (WV opened 100%, alarm "Meter case opened") | 01 | 01 | APL |
| 42 | DR4 | | 40 | 40 | APL |
| 43 | DR4 | | 00 | 00 | APL |
| 44 | DR5 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 45 | DR5 | VIF | FD | FD | APL |
| 46 | DR5 | VIFE1 | FD | FD | APL |
| 47 | DR5 | VIFE2 = month(s) | 02 | 02 | APL |
| 48 | DR5 | 101 mon | 65 | 65 | APL |
| 49 | DR5 | | 00 | 00 | APL |
| 50 | DR6 | DIF = 16 Bit Integer | 02 | 02 | APL |
| 51 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 5B | APL |
| 52 | DR6 | 25 °C | 19 | 19 | APL |
| 53 | DR6 | | 00 | 00 | APL |

Example 5

Encryption key (HEX):

2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C

Raw ciphered message (HEX):

41 44 98 04 13 90 84 14 00 07 8C 20 07 7A 0E 00 30 25 64 D4 36 B4 FF 27 F5 42 1C 6D C4
6A C6 68 7E 22 99 F1 EB 99 26 1E C3 95 8E F6 F1 0C 20 F3 42 8B 16 E0 B9 E2 89 5A D9 2A
7B 62 CE 28 8A F7 54 DA

Deciphered message (HEX):

41 44 98 04 13 90 84 14 00 07 8C 20 07 7A 0E 00 30 25 2F 2F 04 6D 35 0A 22 35 04 13 02 01
00 00 04 93 3C 00 00 00 00 03 FD 17 01 00 00 02 FD FD 02 99 00 02 5B 16 00 2F 2F 2F 2F 2F
2F 2F 2F 2F 2F 2F

Table 5: SND-NR, wM-Bus Security mode 5

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|--|-------------|----------------|-------|
| 1 | L | Length of data = 65 bytes | 41 | 41 | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code = ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Serial No (BCD) (=14849013) | 13 | 13 | LL |
| 6 | A | | 90 | 90 | LL |
| 7 | A | | 84 | 84 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version (=0) | 00 | 00 | LL |
| 10 | A | Device type (Water Meter = 7) | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access | 07 | 07 | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access | 0E | 0E | TPL |
| 16 | Status | No error | 00 | 00 | TPL |
| 17 | Config | SecMode: 5 EncB: 3 Cont: 00b Bits: -S- | 30 | 30 | TPL |
| 18 | Config | | 25 | 25 | TPL |
| 19 | APL check | Encryption verification | 2F | 64 | TPL |
| 20 | APL check | Encryption verification | 2F | D4 | TPL |
| 21 | DR1 | DIF = 32 Bit Integer | 04 | 36 | APL |
| 22 | DR1 | VIF = Date-Time "F" | 6D | B4 | APL |
| 23 | DR1 | Value = 2025-05-02 10:53 | 35 | FF | APL |
| 24 | DR1 | | 0A | 27 | APL |
| 25 | DR1 | | 22 | F5 | APL |
| 26 | DR1 | | 35 | 42 | APL |
| 27 | DR2 | DIF = 32 Bit Integer | 04 | 1C | APL |
| 28 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 6D | APL |
| 29 | DR2 | Value = 0,258 m3 | 02 | C4 | APL |
| 30 | DR2 | | 01 | 6A | APL |
| 31 | DR2 | | 00 | C6 | APL |
| 32 | DR2 | | 00 | 68 | APL |

| | | | | | |
|----|------------|---------------------------------------|----|----|-----|
| 33 | DR3 | DIF = 32 Bit Integer | 04 | 7E | APL |
| 34 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 22 | APL |
| 35 | DR3 | VIFE = Forward volume | 3C | 99 | APL |
| 36 | DR3 | Value = 0,000 m3 | 00 | F1 | APL |
| 37 | DR3 | | 00 | EB | APL |
| 38 | DR3 | | 00 | 99 | APL |
| 39 | DR3 | | 00 | 26 | APL |
| 40 | DR4 | DIF = 24 Bit Integer | 03 | 1E | APL |
| 41 | DR4 | VIF | FD | C3 | APL |
| 42 | DR4 | VIFE = "Error flags (binary)" | 17 | 95 | APL |
| 43 | DR4 | Value = 1 (wv opened 100%, no errors) | 01 | 8E | APL |
| 44 | DR4 | | 00 | F6 | APL |
| 45 | DR4 | | 00 | F1 | APL |
| 46 | DR5 | DIF = 16 Bit Integer | 02 | 0C | APL |
| 47 | DR5 | VIF | FD | 20 | APL |
| 48 | DR5 | VIFE1 | FD | F3 | APL |
| 49 | DR5 | VIFE2 = month(s) | 02 | 42 | APL |
| 50 | DR5 | Value LSB = 153 months | 99 | 8B | APL |
| 51 | DR5 | | 00 | 16 | APL |
| 52 | DR5 | DIF = 16 Bit Integer | 02 | E0 | APL |
| 53 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | B9 | APL |
| 54 | DR6 | Value LSB = 22 °C | 16 | E2 | APL |
| 55 | DR6 | | 00 | 89 | APL |
| 56 | APL filler | | 2F | 5A | APL |
| 57 | APL filler | | 2F | D9 | APL |
| 58 | APL filler | | 2F | 2A | APL |
| 59 | APL filler | | 2F | 7B | APL |
| 60 | APL filler | | 2F | 62 | APL |
| 61 | APL filler | | 2F | CE | APL |
| 62 | APL filler | | 2F | 28 | APL |
| 63 | APL filler | | 2F | 8A | APL |
| 64 | APL filler | | 2F | F7 | APL |
| 65 | APL filler | | 2F | 54 | APL |
| 66 | APL filler | | 2F | DA | APL |

Example 6

Encryption key (HEX):

2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C

Raw ciphered message (HEX):

41 44 98 04 18 45 16 14 00 07 8C 20 87 7A 21 00 30 25 79 76 64 CF 4A B4 13 AD A1 FB AD
2C 3E FA 4C 0E 94 CA 70 79 EB 53 29 54 50 02 2D E1 6B E0 83 C0 D2 B9 69 19 F0 E8 87 87
5B 6B 4E 5C 08 BF 20 54

Deciphered message (HEX):

41 44 98 04 18 45 16 14 00 07 8C 20 87 7A 21 00 30 25 2F 2F 04 6D 34 89 2E 35 04 13 0D 00
00 00 04 93 3C 00 00 00 00 03 FD 17 01 02 40 02 FD FD 02 90 00 02 5B 16 00 2F 2F 2F 2F 2F
2F 2F 2F 2F 2F 2F

Table 6: SND-NR, wM-Bus Security mode 5, “Dry”, “Firmware changed” alarms

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|---|-------------|----------------|-------|
| 1 | L | Length of data = 65 bytes | 41 | 41 | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code = ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Serial No (BCD) (=14164518) | 18 | 18 | LL |
| 6 | A | | 45 | 45 | LL |
| 7 | A | | 16 | 16 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version (=0) | 00 | 00 | LL |
| 10 | A | Device type (Water Meter = 7) | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access | 87 | 87 | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access | 21 | 21 | TPL |
| 16 | Status | No error | 00 | 00 | TPL |
| 17 | Config | SecMode: 5 EncB: 3 Cont: 00b Bits: -S- | 30 | 30 | TPL |
| 18 | Config | | 25 | 25 | TPL |
| 19 | APL check | Encryption verification | 2F | 79 | TPL |
| 20 | APL check | Encryption verification | 2F | 76 | TPL |
| 21 | DR1 | DIF = 32 Bit Integer | 04 | 64 | APL |
| 22 | DR1 | VIF = Date-Time "F" | 6D | CF | APL |
| 23 | DR1 | Value = S 2025-05-14 09:52 | 34 | 4A | APL |
| 24 | DR1 | | 89 | B4 | APL |
| 25 | DR1 | | 2E | 13 | APL |
| 26 | DR1 | | 35 | AD | APL |
| 27 | DR2 | DIF = 32 Bit Integer | 04 | A1 | APL |
| 28 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | FB | APL |
| 29 | DR2 | Value = 0,013 m3 | 0D | AD | APL |
| 30 | DR2 | | 00 | 2C | APL |
| 31 | DR2 | | 00 | 3E | APL |
| 32 | DR2 | | 00 | FA | APL |
| 33 | DR3 | DIF = 32 Bit Integer | 04 | 4C | APL |
| 34 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 0E | APL |
| 35 | DR3 | VIFE = Forward volume | 3C | 94 | APL |
| 36 | DR3 | Value = 0,000 m3 | 00 | CA | APL |
| 37 | DR3 | | 00 | 70 | APL |
| 38 | DR3 | | 00 | 79 | APL |
| 39 | DR3 | | 00 | EB | APL |
| 40 | DR4 | DIF = 24 Bit Integer | 03 | 53 | APL |
| 41 | DR4 | VIF | FD | 29 | APL |
| 42 | DR4 | VIFE = "Error flags (binary)" | 17 | 54 | APL |
| 43 | DR4 | Value = 4194817 (WV opened 100%, Dry, Firmware changed) | 01 | 50 | APL |
| 44 | DR4 | | 02 | 02 | APL |
| 45 | DR4 | | 40 | 2D | APL |
| 46 | DR5 | DIF = 16 Bit Integer | 02 | E1 | APL |
| 47 | DR5 | VIF | FD | 6B | APL |
| 48 | DR5 | VIFE1 | FD | E0 | APL |
| 49 | DR5 | VIFE2 = month(s) | 02 | 83 | APL |
| 50 | DR5 | Value LSB = 144 months | 90 | C0 | APL |
| 51 | DR5 | | 00 | D2 | APL |
| 52 | DR6 | DIF = 16 Bit Integer | 02 | B9 | APL |
| 53 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 69 | APL |
| 54 | DR6 | Value LSB = 22 °C | 16 | 19 | APL |
| 55 | DR6 | | 00 | F0 | APL |

| | | | | | |
|----|------------|--|----|----|-----|
| 56 | APL filler | | 2F | E8 | APL |
| 57 | APL filler | | 2F | 87 | APL |
| 58 | APL filler | | 2F | 87 | APL |
| 59 | APL filler | | 2F | 5B | APL |
| 60 | APL filler | | 2F | 6B | APL |
| 61 | APL filler | | 2F | 4E | APL |
| 62 | APL filler | | 2F | 5C | APL |
| 63 | APL filler | | 2F | 08 | APL |
| 64 | APL filler | | 2F | BF | APL |
| 65 | APL filler | | 2F | 20 | APL |
| 66 | APL filler | | 2F | 54 | APL |

Example 7

Encryption key (HEX):

2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C

Raw ciphered message (HEX):

41 44 98 04 74 45 16 14 00 07 8C 20 DD 7A 0E 00 30 25 E5 8E 75 13 92 E7 09 D7 EF 34 A2
7A 48 79 4A 20 0F 5E 03 3B 9E E2 AC 90 EA EF E6 28 BA 23 5C 5C 01 F3 5D A8 7D A4 CE
37 21 E9 C2 99 6F FD D4 23

Deciphered message (HEX):

41 44 98 04 74 45 16 14 00 07 8C 20 DD 7A 0E 00 30 25 2F 2F 04 6D 0E 0A 2E 35 04 13 00 00
00 00 04 93 3C 00 00 00 00 03 FD 17 01 00 00 02 FD FD 02 00 00 02 5B 16 00 2F 2F 2F 2F 2F
2F 2F 2F 2F 2F 2F

Table 7: SND-NR, wM-Bus Security mode 5, no alarms

| Byte | Field Name | Content | Plain (HEX) | Ciphered (HEX) | Layer |
|------|------------|--|-------------|----------------|-------|
| 1 | L | Length of data = 65 bytes | 41 | 41 | LL |
| 2 | C | SND-NR + Primary | 44 | 44 | LL |
| 3 | M | Manufacturer code = ADX | 98 | 98 | LL |
| 4 | M | | 04 | 04 | LL |
| 5 | A | Serial No (BCD) (=14164574) | 74 | 74 | LL |
| 6 | A | | 45 | 45 | LL |
| 7 | A | | 16 | 16 | LL |
| 8 | A | | 14 | 14 | LL |
| 9 | A | Version (=0) | 00 | 00 | LL |
| 10 | A | Device type (Water Meter = 7) | 07 | 07 | LL |
| 11 | CI | Extended Link Layer I | 8C | 8C | ELL |
| 12 | CC | Bits: -S- | 20 | 20 | ELL |
| 13 | ACC | Access | DD | DD | ELL |
| 14 | CI | | 7A | 7A | TPL |
| 15 | ACC | Access | 0E | 0E | TPL |
| 16 | Status | No error | 00 | 00 | TPL |
| 17 | Config | SecMode: 5 EncB: 3 Cont: 00b Bits: -S- | 30 | 30 | TPL |
| 18 | Config | | 25 | 25 | TPL |
| 19 | APL check | Encryption verification | 2F | E5 | TPL |
| 20 | APL check | Encryption verification | 2F | 8E | TPL |

| | | | | | |
|----|------------|---------------------------------------|----|----|-----|
| 21 | DR1 | DIF = 32 Bit Integer | 04 | 75 | APL |
| 22 | DR1 | VIF = Date-Time "F" | 6D | 13 | APL |
| 23 | DR1 | Value = 2025-05-14 10:14 | 0E | 92 | APL |
| 24 | DR1 | | 0A | E7 | APL |
| 25 | DR1 | | 2E | 09 | APL |
| 26 | DR1 | | 35 | D7 | APL |
| 27 | DR2 | DIF = 32 Bit Integer | 04 | EF | APL |
| 28 | DR2 | VIF = Volume 10 (nnn-6) m3 | 13 | 34 | APL |
| 29 | DR2 | Value = 0,000 m3 | 00 | A2 | APL |
| 30 | DR2 | | 00 | 7A | APL |
| 31 | DR2 | | 00 | 48 | APL |
| 32 | DR2 | | 00 | 79 | APL |
| 33 | DR3 | DIF = 32 Bit Integer | 04 | 4A | APL |
| 34 | DR3 | VIF = Volume 10 (nnn-6) m3 | 93 | 20 | APL |
| 35 | DR3 | VIFE = Forward volume | 3C | 0F | APL |
| 36 | DR3 | Value = 0,000 m3 | 00 | 5E | APL |
| 37 | DR3 | | 00 | 03 | APL |
| 38 | DR3 | | 00 | 3B | APL |
| 39 | DR3 | | 00 | 9E | APL |
| 40 | DR4 | DIF = 24 Bit Integer | 03 | E2 | APL |
| 41 | DR4 | VIF | FD | AC | APL |
| 42 | DR4 | VIFE = "Error flags (binary)" | 17 | 90 | APL |
| 43 | DR4 | Value = 1 (WV opened 100%, no errors) | 01 | EA | APL |
| 44 | DR4 | | 00 | EF | APL |
| 45 | DR4 | | 00 | E6 | APL |
| 46 | DR5 | DIF = 16 Bit Integer | 02 | 28 | APL |
| 47 | DR5 | VIF | FD | BA | APL |
| 48 | DR5 | VIFE1 | FD | 23 | APL |
| 49 | DR5 | VIFE2 = month(s) | 02 | 5C | APL |
| 50 | DR5 | Value LSB = 0 months | 00 | 5C | APL |
| 51 | DR5 | | 00 | 01 | APL |
| 52 | DR6 | DIF = 16 Bit Integer | 02 | F3 | APL |
| 53 | DR6 | VIF = Temperature Flow 10 (nn-3) °C | 5B | 5D | APL |
| 54 | DR6 | Value LSB = 22 °C | 16 | A8 | APL |
| 55 | DR6 | | 00 | 7D | APL |
| 56 | APL filler | | 2F | A4 | APL |
| 57 | APL filler | | 2F | CE | APL |
| 58 | APL filler | | 2F | 37 | APL |
| 59 | APL filler | | 2F | 21 | APL |
| 60 | APL filler | | 2F | E9 | APL |
| 61 | APL filler | | 2F | C2 | APL |
| 62 | APL filler | | 2F | 99 | APL |
| 63 | APL filler | | 2F | 6F | APL |
| 64 | APL filler | | 2F | FD | APL |
| 65 | APL filler | | 2F | D4 | APL |
| 66 | APL filler | | 2F | 23 | APL |