

# Series-IV Electronics Advancements Reigning Signal Processing and Reliability

Technical Release



## Introduction

The Transducer Interface Processor (TIP) Series-IV is the latest version of the hardware and software developed for the Elster-Instromet ultrasonic gas flow meters. With the use of new associated software, the functionality of the meter has been greatly enhanced by applying patented breakthroughs in: digital signal detection, valve noise suppression, actual pulse-signal analysis, path substitution, calibration utilizing multi-point linearization, embedded data logger, expanded communication ports, and multilevel password protection.

Series-IV utilizes a new enhanced communication protocol. This new protocol fully interfaces with all previous electronics. Parts are fully interchangeable in case of repairs, and meters can be upgraded while communication remains transparent and effective. Series-IV electronics also interfaces with all transducer models and is capable of handling 1 to 5 path configurations.

## Specific features of Series-IV

### Digital signal detection

The Series-IV meter features total digital signal processing which results in high flexibility with detection and travel time measurement. The main advantages of total digital signal processing are:

- Accurate and robust ultrasonic signal detection for more reliable measurements
- Improved resolution of measured travel times
- Easy storage and analysis of received signals (no external equipment required)
- Optional noise suppression by means of advanced excitation methods (CMB)

### Valve noise suppression by Coded Multiple Burst (CMB) excitation (optional)

The Series-IV meter offers advanced excitation methods where transducers transmit a burst signal instead of a single pulse. With Coded Multiple Burst (CMB) the transmitted signal consists of a time coded sequence of bursts. The interval between bursts is shorter than the acoustic travel time. The received sequence of burst signals is sampled, decoded and the original pulse is reconstructed. By using CMB the signal-to-noise ratio is improved considerably which decreases the sensitivity to regulator noise and gas mixtures with high acoustic attenuation. Also, cross-over interference between two adjacent meters can be minimized using CMB.

### Actual pulse-signal analysis with Sample View

Sample View is an integrated function for directly storing the ultrasonic signal. The "snapshot" can be acquired through one of the communications ports using UNIFORM without interrupting the measurement. Subsequently the signal can be reviewed and checked for service and maintenance purposes.



### Path substitution (optional)

In the event of path failure, commonly the electronics estimates the failing path value based on its historical ratio and substitutes a fixed number until the unit is repaired. With "smart path substitution" in Series-IV, the failed path value can be replaced for an actual corrected value dictated by the high pressure calibration lab.

### Calibration utilizing optional Multi-point Linearization

During calibration the measurement error is determined at various flows. The errors at each calibrated flow rate can be corrected using linearization with interpolation. A linearization can be made for each flow direction independently.

### Embedded data logger

The Series-IV meter contains an integrated ("embedded") data logger that stores all relevant measured values automatically:

- Fiscal data
- Periodically measured data
- Critical data for maintenance

The available data can be acquired at any moment with UNIFORM. It's not necessary to have a continuous communication link with the meter. All stored information in the embedded data logger is tagged with a time stamp derived from the Real Time Clock.

## Expanded communication ports

Four independent communication ports are available: two RS232 ports and two RS485 ports.

- Port A: RS232 , 4800 Baud. Data protocol: UNIFORM
- Port B: RS232 , 4800, 9600, 19200, 38400 Baud. Data protocol: UNIFORM or Modbus RTU
- Port C: RS485 , 4800, 9600, 19200, 38400 Baud. Data protocol: UNIFORM or Modbus RTU
- Port D: RS485 , 4800, 9600, 19200, 38400 Baud. Data protocol: UNIFORM or Modbus RTU

## Multilevel password protection

Functions and settings inside the meter are protected on different levels. By password authorization it is possible to protect the parameter set-up against unauthorized use.

Function	Series-III	Series-IV
Suitable for number of paths	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Approval for custody transfer	Yes	Yes
Transducer excitation	Single pulse	single or multiple burst
Suitable for hot-tap installation	Yes	Yes
Series-III communication data protocol	Yes	Yes
Series-IV communication data protocol	No	Yes
Noise suppression (CMB)	No	Yes
Signal analysis with Sample View	No	Yes
Password authorization	No	Yes
Substitution of non-functional path	No	Yes
Linearization	No	Yes
Embedded data logger	No	Yes
Real time clock	No	Yes
Counters	Yes (volatile)	Yes
Communication ports	1 (RS485 of RS232)	4 Config. RS485 or RS232
Opto-coupler outputs (i.e. alarm, frequency etc.)	4	4
Analog output (4-20mA)	1 (with C-mod.) / active	2 (with Display Mod.) / passive
Remote Unit support	Yes	No
C-module support	Yes	No
PTZ correction	Yes	No (end 2009)
Flow Direction output	fixed polarity	programmable polarity
UNIFORM 3.01 compatible	Yes	Yes
AGC scale	linear	logarithmic
Parameter set-up modification in	Programming Mode	Normal or Programming Mode
"On the fly" programming of parameters	No	Yes
Scope Mode	Yes (not during measurement)	Yes (during flow measurement)
AGA 9 compliant	Yes	Yes

## About Elster Group

A world leader in advanced metering infrastructure, integrated metering, and utilization solutions to the gas, electricity and water industries. Elster's metering and system solutions reflect over 170 years of knowledge and experience in measuring precious resources and energy.

Elster provides solutions and advanced technologies to help utilities more easily, efficiently and reliably obtain and use advanced metering intelligence to improve customer service, enhance operational efficiency, and increase revenues. Elster's AMI solutions enable utilities to cost-effectively generate, deliver, manage, and conserve the life-essential resources of gas, electricity, and water.

Elster has a staff of over 7,500 serving customers globally in North America, Central America, South America, Europe, Asia, Africa and the Middle East.

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EI-TI0002-EN-P - July 2009