Ethernet system for length measurement, 24-bit, simultaneous, 8 transducers, counter and temperature inputs

MSX-E3711

Simultaneous acquisition of up to 8 inductive displacement transducers

For half-bridge, LVDT, Mahr or Knaebel transducers

1 incremental counter input (32-bit)

1 input for temperature measurement (Pt100) or for thermocouples (TC)

24 V digital trigger input

Features

- ARM®9 32-bit processor
- Robust standardized metal housing
- Power Save Mode: Reduced power consumption when no acquisition runs

Transducer inputs

- 8 transducer inputs, 24-bit, 5-pin M18 female connector
- Half-bridge (HB), LVDT, Mahr-compatible, Knaebel
- Simultaneous acquisition
- Diagnostic option (short-circuit, line break)

Counter input

- 1 x 32-bit incremental counter input, max. 5 MHz
- Voltage supply of sensors with M23 female connector (24 V or 5 V)
- Single, double, quadruple edge analysis
- Compare logic

Temperature input

- 1 x RTD input, 16-bit, 5-pin M12 female connector
- +/- 0.01 °C resolution
- Thermocouple input, optional (MSX-E3711-TC)

Safety features

- Status LEDs for fast error diagnostics
- Optical isolation
- Input filters
- Overvoltage protection ± 40 V
- Internal temperature monitoring

Interfaces

- Fast 24 V trigger input
- Ethernet switch with 2 ports
- Synchronisation/trigger In/Out
- Line in for 24 V supply and cascading

Communication interfaces

- Web server (configuration and monitoring)
- Command server SOAP for transferring commands
- Data server (TCP/IP or UDP socket) for sending acquisition data
- Event server (TCP/IP socket) for sending system events (Diagnostics such as temperature, short-circuits ...)
- Command server Modbus TCP and Modbus (UDP) for sending commands

Synchronisation/time stamp

Time stamp

Several MSX-E systems can be synchronised with one another in the µs range through a synchro connection. This allows to start a synchronous data acquisition, to generate trigger events and to synchronise the time on several MSX-E systems. Furthermore, the systems have a time stamp that logs the point in time at which the data was acquired by the system.

The combination of synchronisation and time stamp (TS) allows the clear allocation of signals that were captured by several systems.
**Acquisition modes**

**Auto-refresh mode**
In the auto-refresh mode, the measurement values are updated automatically after each acquisition. The acquisition is initialised once and the values of the channels are stored in the memory of the MSX-E Ethernet system. The client (e.g. PC, server, PLC, ...) reads the acquired values asynchronously to the acquisition through socket connection, SOAP or Modbus function. Thereby, the new value is read and the old values are overwritten. In addition to the measurement values, the auto-refresh counter can also be read, which allows to sort the measurement values chronologically. The auto-refresh mode can be combined with a hardware or a synchro trigger and also allows the automatic averaging of values.

**Sequence mode**
In the sequence mode, a list of channels is acquired. Thereby, the single measurement rows are stored one after another. The client receives the acquired values asynchronously to the acquisition through a socket connection. In the sequence mode, the measurement values are read in chronological order, this means the oldest values are read first. The acquisition can be effected continuously, with or without delay or in combination with a hardware or synchro trigger.

**Compare logic**
With the compare logic of the incremental counter, a synchro-trigger signal can be generated in order to latch the counter value, the transducers and the temperature input as soon as the counter value is equal to the compare value. Thus all the inputs of the MSX-E3711 system can be acquired simultaneously.

With the additional „Modulo-Mode“ (Modulo Compare), a trigger can also be generated at the n value of the compare value. Thus it is possible, e.g. when using an encoder with 3,600 steps / revolution to obtain each degree of a measurement value (Modulo Compare = 10). The thus generated synchro-trigger can also be used for data acquisition on further MSX-E systems.

**Onboard programming / stand-alone operation**

**Development mode**
With the Development mode of the MSX-E systems you can customise your measurement, control and regulation applications to fit your requirements. The programs run directly on the MSX-E systems, which has two advantages: external PCs are relieved and you can process data freely according to your requirements. This helps you to improve the efficiency of your processes and to secure your investments.
**ConfigTools**

The ConfigTools program allows an easy administration of the MSX-E systems. These are recognised automatically in the network. ConfigTools consists of common and specific functions.

In addition, with ConfigTools, the complete configuration of an MSX-E system can be saved and transferred to another system of the same type (clone function).

ConfigTools is included in the delivery.

**ConfigTools functions for MSX-E3711:**
- Change of IP address
- Display of web interface
- Firmware update
- Save/load system configuration
- Data base of transducers
- Monitoring of transducers
- Diagnostics of transducers

Very easy use through the „ConfigTools“ program; the MSX-E system is automatically detected in the network.

Monitor function example: Check of the analog inputs.

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**Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Status LEDs</td>
<td>System and transducer status</td>
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<tr>
<td>2 x Ethernet</td>
<td>Network connection</td>
</tr>
<tr>
<td>2 x Trigger/Synchronisation IN/OUT</td>
<td>Input/output for triggers and synchronization</td>
</tr>
<tr>
<td>2 x voltage supply, 24 V IN/OUT, optical isolated</td>
<td>Power supply</td>
</tr>
<tr>
<td>1 x temperature input for Pt100</td>
<td>Temperature measurement</td>
</tr>
<tr>
<td>1 x incremental counter input M23 female connector, 12-pin</td>
<td>Incremental counter input</td>
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</tbody>
</table>

**Simplified block diagram**

- **Combination possibilities:**
  - Several MSX-E of the same type: acquisition of a large number of channels
  - Different types of MSX-E systems: combination of different functions

**Cascading**

- **Combination possibilities:**
  - Several MSX-E of the same type: acquisition of a large number of channels
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**ADDI-DATA connection technology**

- **M18 cable and sensor supplied through sensor manufacturer**
- **Ethernet (CMX-7x)**
- **Trigger/Synchro (CMX-5x)**
- **Power (CMX-3x)**
Ordering information

MSX-E3711
Ethernet system for length measurement, 24-bit, simultaneous, 8 transducers, counter and temperature input.
Incl. technical description, software drivers and ConfigTools.

Versions

- **MSX-E3711-HB:** for 8 HB inductive transducers, 5 V counter input
- **MSX-E3711-LVDT:** for 8 LVDT inductive transducers, 5 V counter input
- **MSX-E3711-M:** for 8 Mahr-comp. transducers, 5 V counter input
- **MSX-E3711-K:** for 8 Knaebel transducers, 5 V counter input
- **MSX-E3711-HB-24V:** for 8 HB inductive transducers, 24 V counter input
- **MSX-E3711-LVDT-24V:** for 8 LVDT inductive transducers, 24 V counter input
- **MSX-E3711-TC:** Type K thermocouple in place of the Pt100 input, other types on request

Connection cables

- **Voltage supply**
  - CMX-2x: Shielded cable, M12 5-pin female connector/open end, IP 65
  - CMX-3x: For cascading, shielded cable, M12 5-pin female connector/male connector IP 65

Trigger/Synchro

- **CMX-4x:** Shielded cable, M12 5-pin female connector/open end, IP 65
- **CMX-5x:** For cascading, shielded cable, M12 5-pin female connector/male connector IP 65

Ethernet

- **CMX-6x:** CATSE cable, M12 D-coded male connector/RJ45 connector
- **CMX-7x:** For cascading: CATSE cable, 2 x M12 D-coded male connector

Options

- **S7 Modbus TCP Client Library for S7:** Easy use of the Ethernet systems MSX-E with PLCs
- **MSX-E 3V-Trigger:** Level change of the trigger inputs and outputs to 5 V

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