

# Ethernet multifunction counter module

## 4 counter inputs and 16 digital I/O, 24 V

**New!\***  
Sin/Cos



More information on  
[www.addi-data.com](http://www.addi-data.com)

The intelligent Ethernet multifunction counter module MSX-E1701, MSX-E1711 and MSX-E1721 have 4 counter inputs for incremental or Sin/Cos encoders ( $1 V_{pp}$  or  $11 \mu A_{pp}$ ) as well as 16 digital inputs and outputs, 24 V. The modules can be freely cascaded and synchronised in the  $\mu s$  range. You can thus acquire data from several modules at the same time. The ARM<sup>®</sup>9 processor allows to perform calculations.

The compare logic of the counter or the timer function can generate a synchro trigger signal in order to start the acquisition e.g. of analog data on another module.

### Features

- Extended temperature range - 40° C to + 85° C
- Dynamic measurement via 24 V digital trigger input
- Synchronisation of several modules
- ARM<sup>®</sup>9 32-bit processor
- 64 MB onboard SDRAM for storing data
- Integrated Ethernet switch
- Cascading of all MSX-E module types
- Cascading of the 24 V supply
- Complies with the degree of protection IP 65
- Robust metal housing
- Power Save Mode: reduced power consumption when no acquisition runs
- LED status display for fast error diagnostics

### Counter

- M23 female connector, 12-pin (incremental, Sin/Cos  $1 V_{pp}$ ) or 9-pin (Sin/Cos  $11 \mu A_{pp}$ )
- Optical isolation 1000 V
- 4 x 32-bit incremental counter inputs for the acquisition of incremental encoders (MSX-E1701), inputs in RS422 or 24 V available
- 4 x 32-bit Sin/Cos counter inputs for the acquisition of encoders with  $1 V_{pp}$  (MSX-E1711) or  $11 \mu A_{pp}$  (MSX-E1721) signals
- Counting frequency 5 MHz (MSX-E1701), 250 kHz (MSX-E1711)
- Supply voltage of the incremental measurement transducers through the M23 connector: 24 V or 5 V, protective filters
- Single, double, quadruple edge analysis, direct mode up/down counter
- A, B (incremental signal inputs), C (Index signal input) and D (ref.) signals
- Compare logic
- Status LEDs for incremental counter input A/B

### MSX-E1701 / MSX-E1711 / MSX-E1721

4 incremental counter inputs (MSX-E1701) each with A, B, C (index) and D (ref.) signals

4 Sin/Cos counter inputs  $1 V_{pp}$  (MSX-E1711),  $11 \mu A_{pp}$  (MSX-E1721) with A, B, C (index) signals

16 digital I/O, 24 V, status LEDs

24 V trigger input

Degree of protection IP 65, M12 and M23 connectors

Extended temperature range - 40° C to + 85° C

### Digital

- One M12 female connector, 5-pin, for 2 inputs or outputs
- 8 x 2 digital lines, 24 V, which can be parameterized as pairs of inputs or outputs
- Optical isolation 1000 V
- All inputs are filtered
- High-side outputs, output current per channel 500 mA
- Shutdown logic
- Watchdog for resetting the outputs to „0“
- At Power-On the outputs are set to „0“
- Electronic fuse
- Dual LED for all 24 V digital I/O with direction indication

### Safety features

- Optical isolation 1000 V
- Overtemperature and Reverse voltage protection
- Internal temperature monitoring
- Input filter • Short-circuit protection
- Overvoltage protection 30 V

### Applications

- Event counting • Position acquisition
- Industrial I/O control • PLC-coupling • Signal switching

### Interfaces

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

### Communication interface

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

### Software:

- Software drivers for Windows Vista™ (32-bit)/XP/2000
- ADDIPACK (only for digital I/O)
- Direct access via SOAP (TCP/IP), WSDL files
- Direct access via MODBUS (TCP/IP, UDP)
- Programming examples .net2005, VC++ 6.0
- Programming examples LABVIEW from 8.5 on request
- Practical description for connecting a PLC (SIMATIC® S7®)

\*Preliminary  
product information

# Ethernet multifunction counter module

## 4 counter inputs and 16 digital I/O, 24 V

**New!\***  
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MSX-E1701 / MSX-E1711 / MSX-E1721

### Features

#### Degree of protection IP 65

Optical isolation  
1000 V

Status LEDs

2 x Ethernet

2 x Trigger/Synchronisation  
IN/OUT

2 x voltage supply,  
24 V IN/OUT  
optically isolated



LEDs for digital I/O

16 digital I/O, 24 V  
M12 5-pin female connector

LEDs for counter inputs

#### MSX-E1701

4 incremental counter inputs:  
A, B (incremental signal inputs),  
C (index signal input) and D (ref.)  
M23 12-pin female connector

#### MSX-E1711 / MSX-E1721

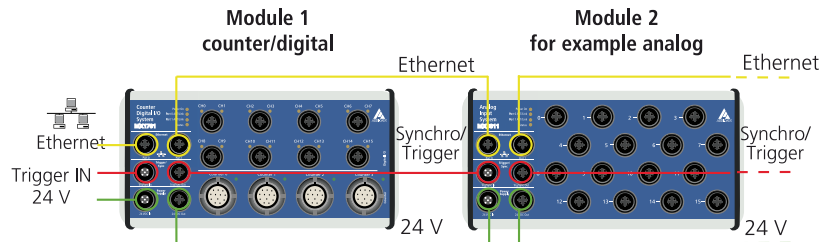
4 Sin/Cos inputs:  $1 V_{pp}$  or  $11 \mu A_{pp}$ :  
A, B (incremental signal inputs),  
C (index signal inputs)  
M23 female connector, 12-pin ( $1 V_{pp}$ ) or 9-pin ( $11 \mu A_{pp}$ )

### Synchronisation

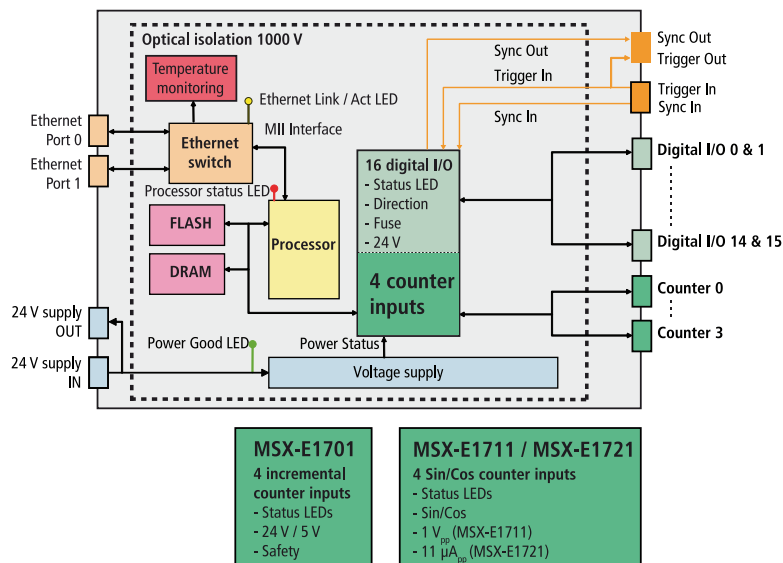
Ethernet, synchronisation and supply signals can be put through from one module to the next. In this way, you can acquire and process distributed I/O signals directly at production machines.

These features allow the I/O modules to be used for simple, distributed applications and for complex applications, in which numerous devices have to interact with signals that are far away from each other.

The compare logic of the counter or the timer function can generate a synchro trigger signal in order to start the acquisition e.g. of analog data on another module.



### Simplified block diagram



\* Preliminary product information

# Ethernet multifunction counter module

## 4 counter inputs and 16 digital I/O, 24 V

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### Incremental counter inputs

|                  |                                                              |
|------------------|--------------------------------------------------------------|
| Number of inputs | 4 incremental counter inputs each with A, B, C and D signals |
|------------------|--------------------------------------------------------------|

#### 5 V inputs

(Version MSX-E1701)

|                                                            |                                        |
|------------------------------------------------------------|----------------------------------------|
| Differential inputs                                        | Complies with the EIA-Standards RS422A |
| Input type                                                 | Differential inputs or TTL             |
| Common mode range                                          | +12 / -7 V                             |
| Input sensitivity                                          | ± 200 mV                               |
| Input hysteresis                                           | 50 mV typ.                             |
| Input impedance                                            | 12 kΩ min.                             |
| Max. input frequency                                       | 5 MHz (direct mode)                    |
| „Open Circuit Fail Safe Receiver Design“ „1“ = inputs open |                                        |
| ESD protection                                             | Up to ±15 kV                           |

#### 24 V inputs

(Version MSX-E1701-24)

|                                                   |                                                                 |
|---------------------------------------------------|-----------------------------------------------------------------|
| With this version, you can connect 24 V encoders  |                                                                 |
| Only 24 V signals can be connected to the inputs. |                                                                 |
| Nominal voltage                                   | 24 VDC                                                          |
| Max. input frequency                              | 1 MHz at nominal voltage                                        |
| Input impedance                                   | > 1 MΩ                                                          |
| Logic input levels:                               |                                                                 |
| UH (max.)                                         | 30 V typ.                                                       |
| UH (min.)                                         | 18 V typ.                                                       |
| UL (max.)                                         | 16 V typ.                                                       |
| UL (min.)                                         | 0 V typ.                                                        |
| Voltage supply                                    | of the incremental encoder selectable, 5 V or 24 V, max. 500 mA |

### Sin/Cos counter inputs

|                      |                                                                      |
|----------------------|----------------------------------------------------------------------|
| Number of inputs     | 4 incremental counter inputs each with A, B, C and D signals         |
| Resolution           | 32-bit                                                               |
| Differential inputs  | - 1 V <sub>pp</sub> (MSX-E1711)<br>- 11 μA <sub>pp</sub> (MSX-E1721) |
| Interpolation factor | up to 8192                                                           |
| Max. input frequency | max. 250 kHz (at min. interpolation), on request                     |
| ESD protection       | 2 kV                                                                 |

### Digital inputs

|                                  |                              |
|----------------------------------|------------------------------|
| Number of inputs                 | 16, 2 per female connector   |
| Common ground acc. to IEC 1131-2 |                              |
| Overvoltage protection           | 30 V                         |
| Optical isolation                | 1000 V through opto-couplers |
| Nominal voltage                  | 24 VDC                       |
| Input voltage                    | 0 to 30 V                    |
| Input impedance                  | > 1 MΩ                       |
| Logic input levels:              |                              |
| UH (max.)                        | 30 V typ.                    |
| UH (min.)                        | 18 V typ.                    |
| UL (max.)                        | 16 V typ.                    |
| UL (min.)                        | 0 V typ.                     |

### Digital outputs

|                                                   |                                                                              |
|---------------------------------------------------|------------------------------------------------------------------------------|
| Number of outputs                                 | 16, 2 per female connector                                                   |
| Optical isolation                                 | 1000 V through opto-couplers                                                 |
| Output type                                       | High Side, load against mass acc. to IEC 1131-2                              |
| Nominal voltage                                   | 24 V                                                                         |
| Supply voltage                                    | 18 V-30 V                                                                    |
| Current (max.)                                    | 1.85 A typical for 8 channels through PTC                                    |
| Output current per output                         | 500 mA max.                                                                  |
| Short-circuit current per output                  | 1.7 A max.                                                                   |
| Shut-down logic at 24V, R <sub>load</sub> = 10 mΩ |                                                                              |
| RDS ON resistance                                 | 280 mΩ max.                                                                  |
| Switch-on time                                    | 100 μs max. RL=48 Ω from 80 % V <sub>out</sub>                               |
| Switch-off time                                   | 150 μs max. RL=48 Ω from 10 % V <sub>out</sub>                               |
| Overtemperature (shutdown)                        | 135°C max. (output driver)                                                   |
| Temperature hysteresis                            | 15°C typ. (output driver)                                                    |
| Diagnostics                                       | Common diagnostics bit for all 16 channels at overtemperature of one channel |

### Voltage supply

|                             |                     |
|-----------------------------|---------------------|
| Nominal voltage             | 24 V                |
| Supply voltage              | 18-30 V             |
| Optical isolation           | 1000 V              |
| Current consumption at 24 V | 150 mA without load |
| Reverse voltage protection  | 1 A max.            |

### Ethernet

|                   |                                           |
|-------------------|-------------------------------------------|
| Number of ports   | 2                                         |
| Cable length      | 150 m max. at CAT5E UTP                   |
| Bandwidth         | 10 Mbps auto-negotiation                  |
|                   | 100 Mbps auto-negotiation                 |
| Protocol          | 10Base-T IEEE802.3 compliant              |
|                   | 100Base-TX IEEE802.3 compliant            |
| Optical isolation | 1000 V                                    |
| MAC address       | 00:0F:6C:##:##:##, unique for each device |

### Function connectors

|          |                                                               |
|----------|---------------------------------------------------------------|
| Ethernet | 2x 4-pin flange type socket, D-coded M12 for Port 0 and Port1 |
|----------|---------------------------------------------------------------|

### Trigger

|                            |                          |
|----------------------------|--------------------------|
| Number of inputs           | 1 trigger input          |
| Number of outputs          | 1 trigger output         |
| Filters/protective circuit | Low-pass/transorb diode  |
| Optical isolation          | 1000 V                   |
| Nominal voltage            | 24 V external            |
| Input voltage              | 0 to 30 V                |
| Input current              | 11 mA at 24 VDC, typical |
| Input frequency (max.)     | 2 MHz at 24 V            |

### Connectors, common with synchro

|                |                                  |
|----------------|----------------------------------|
| Trigger input  | 1 x 5-pin flange type socket M12 |
| Trigger output | 1 x 5-pin flange type socket M12 |

### Synchro

|                   |        |
|-------------------|--------|
| Number of inputs  | 1      |
| Number of outputs | 1      |
| Max. cable length | 20 m   |
| Optical isolation | 1000 V |
| Signal type       | RS485  |

### Connectors, common with trigger

|                |                                  |
|----------------|----------------------------------|
| Synchro input  | 1 x 5-pin flange type socket M12 |
| Synchro output | 1 x 5-pin flange type socket M12 |

### System requirements

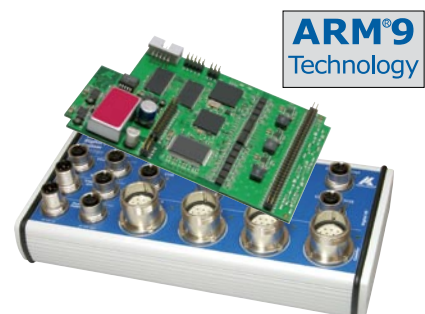
|                      |                                          |
|----------------------|------------------------------------------|
| Interface            | Ethernet acc. to specification IEEE802.3 |
| Dimensions           | 215 mm x 110 mm x 54 mm                  |
| Weight               | 900 g                                    |
| Degree of protection | IP 65                                    |

### Voltage supply

|               |                                  |
|---------------|----------------------------------|
| 24 VDC input  | 1 x 5-pin flange connector M12   |
| 24 VDC output | 1 x 5-pin flange type socket M12 |

### Connectors for sensors

|                                              |                                    |
|----------------------------------------------|------------------------------------|
| For the digital I/O                          | 8 x 5-pin flange type socket M12   |
| For the incremental counter                  | 4 x 12-pin. flange type socket M23 |
| For the Sin/Cos counters 1 V <sub>pp</sub>   | 4 x 12-pin. flange type socket M23 |
| For the Sin/Cos counters 11 μA <sub>pp</sub> | 4 x 9-pin. flange type socket M23  |



\*Preliminary  
product information

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SPIRIT OF EXCELLENCE

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## 4 counter inputs and 16 digital I/O, 24 V

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### Cables

#### Power Supply



Shielded cable,  
M12 5-pin female connector/  
open end, IP 65  
**CMX-20:** 1.5 m  
**CMX-21:** 3 m  
**CMX-22:** 5 m  
**CMX-23:** 10 m  
**CMX-29:** Length on request



For cascading  
Shielded cable,  
M12 5-pin female connector/  
connector IP 65  
**CMX-38:** 0.6 m  
**CMX-30:** 1.5 m  
**CMX-31:** 3 m  
**CMX-32:** 5 m  
**CMX-39:** Length on request

#### Trigger/Synchro



Shielded cable,  
M12 5-pin female connector/  
open end, IP 65  
**CMX-40:** 1.5 m  
**CMX-41:** 3 m  
**CMX-42:** 5 m  
**CMX-43:** 10 m  
**CMX-49:** Length on request



For cascading  
Shielded cable,  
M12 5-pin female connector/  
connector IP 65  
**CMX-58:** 0.6 m  
**CMX-50:** 1.5 m  
**CMX-51:** 3 m  
**CMX-52:** 5 m  
**CMX-59:** Length on request

#### Ethernet



CAT5E cable,  
M12 D-coded pin connector/  
RJ45 connector  
**CMX-60:** 2 m  
**CMX-61:** 5 m  
**CMX-62:** 10 m  
**CMX-69:** Length on request



For cascading  
CAT5E cable,  
2 x M12 D-coded cable  
connector  
**CMX-78:** 1 m  
**CMX-70:** 2 m  
**CMX-71:** 5 m  
**CMX-72:** 10 m  
**CMX-79:** Length on request

#### Connection to peripherals



Shielded cable,  
M12 5-pin male connector/  
open end, IP 65  
**CMX-81:** 3 m  
**CMX-89:** Length on request

#### Options

**MX-Clip:** for DIN-rail mounting



**MX-Screw:** for wall mounting



**MX-Rail:** for DIN-rail mounting  
Please specify when ordering



**PCMX-10, PCMX-12, PCMX-13:**  
Protection caps for M12  
connectors

### Ordering information

#### MSX-E1701 / MSX-E1711 / MSX-E1721

Ethernet multifunction counter module, 4 counter inputs and 16 digital I/O, 24 V. Incl. technical description and software drivers.

#### Versions

**MSX-E1701:** For 5 V RS422 incremental counter inputs  
**MSX-E1701-24:** For 24 V incremental counter inputs  
**MSX-E1711:** Sin/Cos inputs, 1 V<sub>pp</sub>  
**MSX-E1721:** Sin/Cos inputs, 11 μA<sub>pp</sub>

#### Connection cables

##### Voltage supply

Shielded cable, M12 5-pin female connector/open end, IP 65  
**CMX-20:** 1.5 m **CMX-21:** 3 m **CMX-22:** 5 m  
**CMX-23:** 10 m **CMX-29:** Length on request

For cascading:

Shielded cable, M12 5-pin female connector/connector, IP 65  
**CMX-38:** 0.6 m **CMX-30:** 1.5 m **CMX-31:** 3 m  
**CMX-32:** 5 m **CMX-39:** Length on request

##### Trigger/Synchro

Shielded cable, M12 5-pin female connector/open end, IP 65  
**CMX-40:** 1.5 m **CMX-41:** 3 m **CMX-42:** 5 m  
**CMX-43:** 10 m **CMX-49:** Length on request

For cascading:

Shielded cable, M12 5-pin female connector/connector, IP 65  
**CMX-58:** 0.6 m **CMX-50:** 1.5 m **CMX-51:** 3 m  
**CMX-52:** 5 m **CMX-59:** Length on request

#### Ethernet

CAT5E cable, M12 D-coded male connector/RJ45 connector  
**CMX-60:** 2 m **CMX-61:** 5 m **CMX-62:** 10 m  
**CMX-69:** Cable length on request

For cascading:

CAT5E cable, 2 x M12 D-coded male connector  
**CMX-78:** 1 m **CMX-70:** 2 m **CMX-71:** 5 m  
**CMX-72:** 10 m **CMX-79:** Length on request

#### Connection to peripherals

Shielded cable, M12 5-pin female connector/open end, IP 65  
**CMX-81:** 3 m **CMX-89:** Length on request

#### Options

**MX-Clip:** Mounting set for DIN-rail mounting  
or for direct mounting on machines

**MX-Rail:** Mounting set for DIN-rail mounting  
Please specify when ordering!

**MX-Screw:** Mounting set for direct mounting on devices or machines

**PCMX-10:** 5 protection caps for M12 connector (4 x female, 1 x male)  
for Ethernet, trigger/synchro, power

**PCMX-12:** 1 protection cap for M23 connector (counter)

**PCMX-13:** 10 protection caps for M12 connector (digital)

\*Preliminary product information

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