INTELLIGENT ETHERNET SYSTEMS

Measurement and control directly in the field



The intelligent Ethernet systems of the MSX-E series are especially suited for industrial measurement, control and regulation tasks directly at the measuring point. They are mounted in robust metal housings and comply with the degrees of protection IP67/IP 65/IP 40. Furthermore, they can be used in a temperature range from -40 C to +85 °C as they are equipped with many protective circuits. The Ethernet systems can be freely cascaded and synchronised in the µs range. Sensors can be connected directly to the measurement systems through screw connectors.

Driverless installation

The installation of the MSX-E systems is fast and easy: After connecting the systems just click on "import web services" in your compiler and enter the IP address of your MSX-E system. Then open the WSDL file, where all functionalities are described. After that you can access all system functionalities without driver installation. To get remote access to the system from a distant PC, each system has a SOAP server. The data transfer is realised with the network protocol HTTP.

Direct administration via PLC

The MSX-E systems can relieve PLCs by taking over fast measurement tasks. To administrate the systems from a PLC, the Modbus TCP Client library is available which enables a direct parameterisation of the systems, the installation of the measurement processes like for example the choice of the acquisition mode, start and stop commands or trigger functionalities and the administration and reading-out of system information.

Easy administration with ConfigTools

ConfigTools is a user-friendly tool with which all MSX-E systems in a network can be scanned and administrated and their status visualised. It is available for 32-bit and 64-bit Windows and Linux operating systems in German, English, French and Chinese.

ConfigTools features

- Automatic scan of all MSX-E systems in a network
- Administration of the MSX-E systems: IP address, firmware version
- System-specific plug-ins: for example sensor calibration and visualisation
- Plug-Ins clickable / selectable via buttons: for example upload / save configuration, firmware update
- Possibility of customised plug-ins
- Changes that are made are logged
- A direct access to the website of the MSX-E systems is possible



HIGHLIGHTS

- Designed for use in the field
- ARM[®]9 processor for intelligent systems
- Stand-alone operating
- Easy configuration





Measurement and control directly in the field

The MSX-E systems are organised in two parts:

- The **control part** is common to all system types and allows a fast and reliable communication as well as signal processing.
- The signal part features the specific function of each system type: counter, digital I/O, analog I/O, length measurement etc.



Time stamp

Several MSX-E systems can be synchronised with one another 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 the **synchronisation** and **time stamp** allows a clear allocation of signals that were captured by several systems.



Without synchro: $TS_{Ax} \neq TS_{Bx}$ With synchro: $TS_{Ax} = TS_{Bx}$





Intelligent Ethernet systems: Special functions

Synchro timer

With the "synchro timer function" you can choose whether a synchro trigger signal shall be generated and if yes define the frequency at which it shall be generated.



During the measurement of a test item the measuring table must move. To guarantee the parallelism of the axis there are two incremental encoders placed at each side of the table and connected to the counter system MSX-E1701. The cycle for the trigger which starts the acquisition is defined in the FPGA of the system. All counters are acquired simultaneously.

Synchro trigger

With the synchro trigger line a MSX-E system that serves as a Master can start a simultaneous acquisition on several other MSX-E systems, generate trigger events and synchronise the time.

Customisation

Hardware combination

Each Ethernet system has its specific functionality and can be freely combined with the other system types. Through synchronisation and cascading the systems work together fast and reliably. Create your own system combination according to your requirements!

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.

Event logic for digital I/O

With the event logic of the digital I/O Ethernet system MSX-E1516 status changes of the inputs and outputs can be detected and logged.

Advantages:

- The generated data set contains the time stamp as well as the event mask, i.e. which input or output has generated the event, and the status of all inputs and outputs.
- The data set can be read out for example in databases for statistical purposes or in operating and machine data logging for process control.
- The "polling" on the inputs is not necessary anymore.
- Status changes are also registered when there is no Ethernet connection. The according data sets (events) can be read out as soon as the Ethernet connection is available again.

See more examples on www.addi-data.com

Function generator with analog outputs

The analog output system MSX-E3511 can generate up to 8 different analog signal curves like for example trapezoid signals, sine curves or sawtooth curves. Thus for example real processes or measuring processes can be simulated and automatic test processes can be realised at test benches.

Software tools

The MSX-E Ethernet systems come with a CD with samples for .NET, C, LabVIEW, etc. and technical descriptions. For applications that run in the development mode we provide you with a Live-DVD including numerous free development tools and a cross compiler for ARM. The Live-DVD is based on the Eclipse development environment and the Ubuntu distribution.

Firmware adaptations

The functionalities of the MSX-E systems can be extended through a change in the firmware. Calculations like for example calculation of the average value, data conversion or digital filter etc. can be implemented.

Our service: We develop your applications

Save time and resources without forgoing the advantages of a customised solution.

Describe us your requirements and we will take care of the programming..



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info@addi-data.com www.addi-data.com



Measurement, Control, Regulation.

Discover the wide range of applications of the intelligent Ethernet systems!

Process optimisation and monitoring

The intelligent Ethernet systems MSX-E allow the direct connection to MES and ERP systems. The MSX-E systems acquire data directly at the measuring point, convert raw data into physical values and transfer them via the company network into the MES systems on the IT level.

Thanks to their integrated intelligence, the MSX-E systems can, in stand-alone operating mode, transfer measurement values, i.e. "meaningful" data and not raw data, directly to the MES.



Extend the functionality range of PLCs with MSX-E systems

The MSX-E systems can be connected via Ethernet directly to a PLC and thus significantly extend its functionality. The actual measurement task is parameterised and stored on the systems via the website. With the autostart function, the systems load the measurement settings after booting and execute them independently, which makes additional programming unnecessary. The PLC accesses the data and stores it in a data block.

New! The Ethernet systems of the MSX-E series can now be managed directly from a PLC by means of a library. Frames enable the PLC to directly parameterise the MSX-E systems, to read system information and to start or stop measurements.

Data measurement and visualisation

For the visualisation of data acquired via the intelligent Ethernet systems MSX-E, ADDI-DATA offers two solutions: the software procella® by Q-DAS and SPC.kompakt by ProNES. There is no need for programming a connection to the hardware. The values acquired are directly recorded and displayed by procella® or SPC.kompakt. The graphical display allows the operator to distinguish fast and reliably between "good" and "incorrect" parts.

Configuration Start/stop PLC connection with Program Modbus TCP Client Library Measurement values FC6 Data Server TCP/IF MSX-E PLC New! PLC connection without ogramming wi function library Modbus TCP Client Configuration Library (option) start/stop Modbus Serve FB Data Server EC₆ Measurement values TCP/IP PLC MSX-E





The MSX-E systems feature a Development Mode which allows to realise and execute applications directly on the MSX-E systems. The MSX-E systems can access other MSX-E systems or any other Ethernet hardware through the Ethernet switch.

The connection via standard Ethernet allows to realise complex distributed measurement and control tasks on site, close to the test item. Such stand-alone applications would be suitable for fill level monitoring and regulation tasks.





Overview	Dig I/O	gital 24 V		Multifunction counter			Analog I/O	Analog input		Ana out	alog put	Tempera- ture meas-		
of the Ethernet		z								· · ·				urement
systems		MSX-E1516-NPI	MSX-E1701	MSX-E1711	MSX-E1721	New! MSX-E1731	New! MSX-E1741-1VP	MSX-E3121 New! MSX-E3122	MSX-E3011	MSX-E3021	MSX-E3027	MSX-E3511	New! MSX-E3511-C	MSX-E3211
Intelligent through ARM [©] 9 technology		1	1		/	1	1	1		1			/	1
Ethernet		/	1	•	/	1	1	1		/			/	1
Optical isolation 1000 V		/								/		•		
time synchronisation		/	1	•	/	1	1	1		1		•	/	1
Compare logic generates synchro trigger signal			1	•	/	on request	on request	on request		on reques	t			on request
Timer function generates synchro trigger signal		<u>/</u>			/					<u> </u>		•		<i>\</i>
Cascading		✓ 65	IP 65	ID	/ 65	IP 65	IP 65	IP 65	IP	√	IP 67	IP	65	IP 65
Temperature range from -40 °C to +85 °C		05	11 05		<u>,</u>	11 05	11 05	11 05	- "			- "	<u>,</u>	
(Internal temperature of the system)		V	V	•	/	V	V	V				•	, 	V
Dimensions (mm)	215 x	110 x 50	215 x 110 x 54	215 x 1	10 x 54	215 x 110 x 50	215 x 110 x 54	260 x 140 x 50	21	5 x 110 x	50	154 x 1	10 x 54	215 x 138 x 50
Digital I/O, 24 V / 5 V, status LEDs	10	0/5	16		0	16		32						
Event logic		<i>.</i>												
M12 female connector, 5-pin (for 2 inputs or outputs)		8	8		8	8		1 x 37-pin, D-Sub						
Multifunction counter			1		/	1	1							
Incremental counter inputs (A, B, C, D Signals) M23 female connector			4 x 12-pin											
Sin/Cos counter inputs (A, B, C signals), M23 female connector				4 x 12-pin 1 V _{an}	4 x 9-pin 11 μΑ _{ρο}		1							
EnDat 2.2-inputs, M12 female connector				PF	1 1 1	4 x 8-pin			İ –					
5 V inputs, RS422, 24 V inputs (opt.)			1			1			İ –					
Max. input frequency			5 MHz	250 kHz		4.5 MHz clock speed	250 kHz							
Analog input (channels)							3 diff.	6 diff.	4	x 4, dif	ff.			16/8 diff.
Resolution							24-bit	24-bit		16-bit				24-bit
Туре							V/A	V/A		V/A				Thermo cou- ples / RTD
Connector							63 x M12 female 5-pin	6 x M12 female 5-pin	1	6 x M1 female 5-pin	2			8 x M12 female 8-pin
Simultaneous acquisition								· · · ·	up te	o 4 chai	nnels			8 channels
Throughput								up to 100 kHz	up	to 100 /	kHz			up to 788 Hz
Input ranges							± 10 V, ± 1 V, ± 100 mV, ± 10 mV, 0-10 V, 0-1 V, 0-100 mV, 0-10 mV	± 10 V, ± 1 V, ± 100 mV, ± 10 mV, 0-10 V, 0-1 V, 0-100 mV, 0-10 mV	± ! 0-!	5 V, ± 1(5 V, 0-1)	D V, D V			
Current inputs (PC-Diff option): 0(4)-20 mA							1	1		1				
Analog output, 16-Bit								4				8	3	
M12 female connector								2 x 4-pin				8 x 5	5-pin	
Output voltage: 0-10 V, ± 10 V								1				•	/	
Current outputs: 0-20 mA			ļ					1					/	
Length measurement			 											
Number of transducers (Half-Bridge, LVDT, Mahr)														
5-pin M18 female connector														
Simultaneous acquisition														
Temperature input for Pt100														
Page	:	36	40	4	10	44	48	72 76	52	64	68	8	0	84
Software	Current	river list or	the web: war		lata com									





Pressure measure- ment	Force d measu	istance rement	Acquisition of dynamic signals		Length me	asuremen	t	Protocol interpreter
MSX-E3311	New! MSX-E3017	New! MSX-E3317	MSX-E3601	MSX-E3711	MSX-E3701	MSX-E3700	MSX-E3701-DIO	MSX-E7511
1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1
1	1		1	1	1	1	1	1
on request	on request	on request		 ✓ 			on request	on request
✓ ✓	1	1		1	1	1	1	
						V 10.40		
IP 65	11, 62	11, 62	17 65	11.62	18.62	IP 40	17.65	18.62
<i>✓</i>	1		<i>✓</i>	1	1	1	1	1
215 x 138 x 50	on request	on request	215 x 110 x 50	215 x 110 x 54	215 x 110 x 50	215 x 110 x 39	260 x 110 x 50	215 x 138 x 50
							32	
							✓ 1. 37 nin	
							D-Sub	
	1	1						Carialı
	./			1 v 17-nin				Serial: RS232,
	v	•		1 / 12 pm				RS422, RS485
	1	1						20 mA CL
				./				
	an request	an request		• F MU7				
	ON request	ON request	ocr diff					
16/8 diff.			B SE, UIII.,					
24-bit	16-bit	24-bit	24-bit					
Strain	V/A	Strain	V/A/ICP					
8 x M12 female 8-nin	3 x M12 female 5-nin	3 x M12 female 8-pin	8 x BNC					
8 channels	3 channels	8 channels	up to 8 channels					
up to 1 kHz	up to 100 kHz	up to 788 kHz	up to 128 kHz					
	± 5 V, ± 10 V, 0-5 V, 0-10 V		± 5 V, ± 10 V					
	1		1					
				24-bit	24-bit	24-bit	24-bit	
				8	4/8/16	4/8/16	16 only HB	
					4/0/16	4/0/16	and LVDT	
				δ	4/8/10	4/8/10	01	
				· ·				
88	56	60	92	₽	100	100	106	110

Common specifications for all MSX-E systems

Manufacture Landan and	241/	
Nominal voltage:	24 V	
Supply voltage:	18-30 V	
Optical isolation:	1000 V	
Reverse voltage protection	n: 1 A max. (exe	cept MSX-E3711)
Connectors		
24 VDC input	1 x 5-pin M1	2 male connector
	(except MSX	-E3700)
24 VDC output	1 x 5-pin M1	2 female connector
	(except MSX-	-E3700)
Ethernet		
Interface:	Ethernet acc.	to IEEE802.3 specification
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
Connectors		
Ethernet:	2 x 4-pin fem	ale connector, D-coded M12
	for Port 0 and	d Port 1 (except MSX-E3700)

rigger

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 M12 male connector
	(except MSX-E3700)
Trigger output:	1 x 5-pin M12 female connector
	(except MSX-E3700)

Synchro

· · ·	
Number of inputs:	1
Number of outputs:	1
Max. cable length:	20 m
Optical isolation:	1000 V
Signal type:	RS422
Connectors, common	with trigger
Synchro input:	1 x 5-pin M12 male connector
	(except MSX-E3700)
Synchro output:	1 x 5-pin M12 female connector
	(except MSX-E3700)
	-

EMC – Electromagnetic compatibility

The product complies with the European EMC directive. The tests were carried out by a certified EMC laboratory in accordance with the norm from the EN 61326 series (IEC 61326). The limit values as set out by the European EMC directive for an industrial environment are complied with. The respective EMC test report is available on request.



Database connection

DatabaseConnect is an easy-to-use database interface software which does not require any programming skills. DatabaseConnect stores measurement data which has been acquired through MSX-E Ethernet systems directly into databases via standard Ethernet. System requirements and other important product information see the datasheet on page 114.

Accessories	for the Ethernet systems	Digital I/O, 24 V	Multifunction counter				
Cables and	connectors						
		MSX-E1516 MSX-E1516-NPN	MSX-E1701 MSX-E1711 MSX-E1721	New! MSX-E1731	New! MSX-E1741		
Cables: Temperature ra	ange from –25 °C to +80 °C, bent cables and special length on re	quest					
	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)	1	1	1	1		
	Voltage supply – Cascading: Shielded cable, M12 5-pin female connector/male connector, IP 65 CMX-38 (0.6 m), CMX-30 (1 m), CMX-31 (3 m), CMX-32 (5 m), CMX-39_0,3 (0.3 m), CMX-39 (length on request)	1	1	1	1		
	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)	1	1	1	1		
<i>,</i>	Trigger/Synchro – Cascading: Shielded cable, M12 5-pin female connector/male connector, IP 65 CMX-58 (0.6 m), CMX-50 (1 m), CMX-51 (3 m), CMX-52 (5 m), CMX-59_0,3 (0.3 m), CMX-59 (length on request)	1	1	1	1		
\$	Ethernet: CAT5E cable, M12 D-coded male connector/RJ45 connector CMX-60 (2 m), CMX-61 (5 m), CMX-62 (10 m), CMX-69 (length on request)	1	1	1	1		
\$	Ethernet – 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_0,3 (0,3 m), CMX-79 (length on request)	1	1	1	1		
	Connecting peripheral equipment: Shielded cable, M12 5-pin male connector/open end, IP 65 CMX-80 (1.5 m), CMX-81 (3 m), CMX-83 (10 m), CMX-89 (length on request)	1	1	1	1		
	Connecting peripheral equipment: Shielded cable, M12 8-pin male connector/open end, IP 65 CMX-9x (length on request)			1	1		
Connectors		<u>.</u>					
	SC-M12: M12 5-pin connector for connecting open end cables	1	1	1	1		
	SC-M12-8: M12 8-pin connector for connecting open end cables						
	SC-M12-8-TC: M12 8-pin connector for connecting thermocouples with integrated cold junction compensation (CJC)						
	SC-M12-ABGW: M12 5-pin 90° bent connector for connecting open end cables	1	1	1	1		
	SC-M12-BU-ABGW: M12 5-pin 90° bent female connector for connecting open end cables	1	1	1	1		
	SC-M12-8-ABGW: M12 8-pin 90° bent connector for connecting open end cables						
	SC-M12-Y-M12: 5-pin Y-splitter cable with M12 connector to 2 x M12 female connectors	1	1	1	1		
	SC-M23: M23 12-pin connector for the direct connection of shaft encoders, gauges, and digital transducers		not for MSX-E1721		1		







Ana I/	alog 'O	Ana inp	log ut	Ana out	alog tput	Force d measu	listance rement	Temperature measurement	Pressure measure- ment	Acquisition of dynamic signals	Le	ength me	asurem	ent	Protocol interpreter
MSX-E3121	New! MSX-E3122	MSX-E3011 MSX-E3021	MSX-E3027	MSX-E3511	New! MSX-E3511-C	New! MSX-E3017	New! MSX-E3317	MSX-E3211	MSX-E3311	MSX-E3601	MSX-E3711	MSX-E3701	MSX-E3700	MSX-E3701-DIO	MSX-E7511
		<i>•</i>													
1	~	1	1	1	1	1	1	1	1	1	1	1		1	1
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								(TC)			MSX-E- 3711-TC				
1	~	1	1	~	1	1	1	1	1	1	1	1		1	~
1	1	1	1	1	1	1	1	1	1						
						1	1	not suitable for TC	1						
1	1														
						1	1				1				

Accessories	for the Ethernet systems	Digital I/O, 24 V	Multifunction counter			
	ounting components	MSX-E1516 MSX-E1516-NPN	MSX-E1701 MSX-E1711 MSX-E1721	New! MSX-E1731	New! MSX-E1741	
Screw connector bind	ers for voltage supply: 3-pin binder, 5.08 mm grid					
	SMX-10 1-row screw connector, included in the delivery content					
	SMX-11 2-row screw connector					
· · · ·	SMX-12 2-row spring-cage connector with double link					
Screw connector bind	ers for trigger/synchro					
	SMX-20 3-pin binders, 5.08 mm grid, included in the delivery content					
Options / Mounting						
	MX-Clip 2 clips for DIN-rail mounting or for direct mounting on units	1	1	1	1	
	MX-Rail Assembly equipment for DIN-rail mounting. Please specify when ordering!	1	1	1	1	
	MX-Screw Assembly equipment for direct mounting on machines	1	1	1	1	
Options / Protection c	aps					
9	PCMX-10: 5 x protection caps for M12 connector (4 x female, 1 x male)	1	1	1	1	
	PCMX-11: 10 x protection caps for M18 connector					
	PCMX-12: 1 protection cap for M23 connector		1		1	
	PCMX-13: 10 x protection caps for M12 connector	√	~	1	1	





Intelligent	Ethernet	systems
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Ana I/	alog O	Anal inp	log ut	Ana out	alog put	Force d measu	listance rement	Temperature measurement	Pressure measure- ment	Acquisition of dynamic signals	Le	ngth me	asureme	ent	Protocol interpreter
MSX-E3121	<mark>New!</mark> MSX-E3122	MSX-E3011 MSX-E3021	MSX-E3027	MSX-E3511	<mark>New!</mark> MSX-E3511-C	New! MSX-E3017	New! MSX-E3317	MSX-E3211	MSX-E3311	MSX-E3601	MSX-E3711	MSX-E3701	MSX-E3700	MSX-E3701-DIO	MSX-E7511
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						1	1				1				
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