



MX08 Multichannel System

Technical Manual

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1. SAFETY INSTRUCTIONS



CAUTION READ this manual BEFORE operating or servicing this equipment. FOLLOW these instructions carefully. SAVE this manual for future reference. DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment. ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance. CALL BAYKON ENGINEERING for parts, information, and service.



WARNING ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



WARNING FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.



WARNING DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING ANY CONNECTION, OPENING THE ENCLOSURE OR SERVICING.



WARNING BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT OR BODILY HARM.



CAUTION OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



Declaration of Conformity

We;
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Kimya Sanayicileri Organize Sanayi Bölgesi Organik Cad. No:31
34956 Tepeören Tuzla/İSTANBUL

to which this declaration relates, is in conformity with the following standard(s) or other normative document(s).

EC Directive:	Applicable Standards:
Low Voltage Directive (LVD): (2006/95/EC)	EN 60950-1
Electromagnetic Compatibility (EMC): (2004/108/EC)	EN 61326-1

Baykon, January 2010

Emin Y. SÖZER
General Manager

Sedat AYDEMİR
Quality Assurance Manager

1. INTRODUCTION

1.1. Overview

MX08 is an economic multi-channel interfacing system including high resolution and powerful state-of-the-art weighing and force measurement digitizer, weight display unit, Input / Output unit and various gateways. MX08 family instruments are mounted on the DIN rail in the control cabinet and communicate each other by internal data bus which is named N-Bus. The external interface is done via Gateway. Gateway is slave in the field bus and master in N-Bus. Available instruments are shown in figure below.

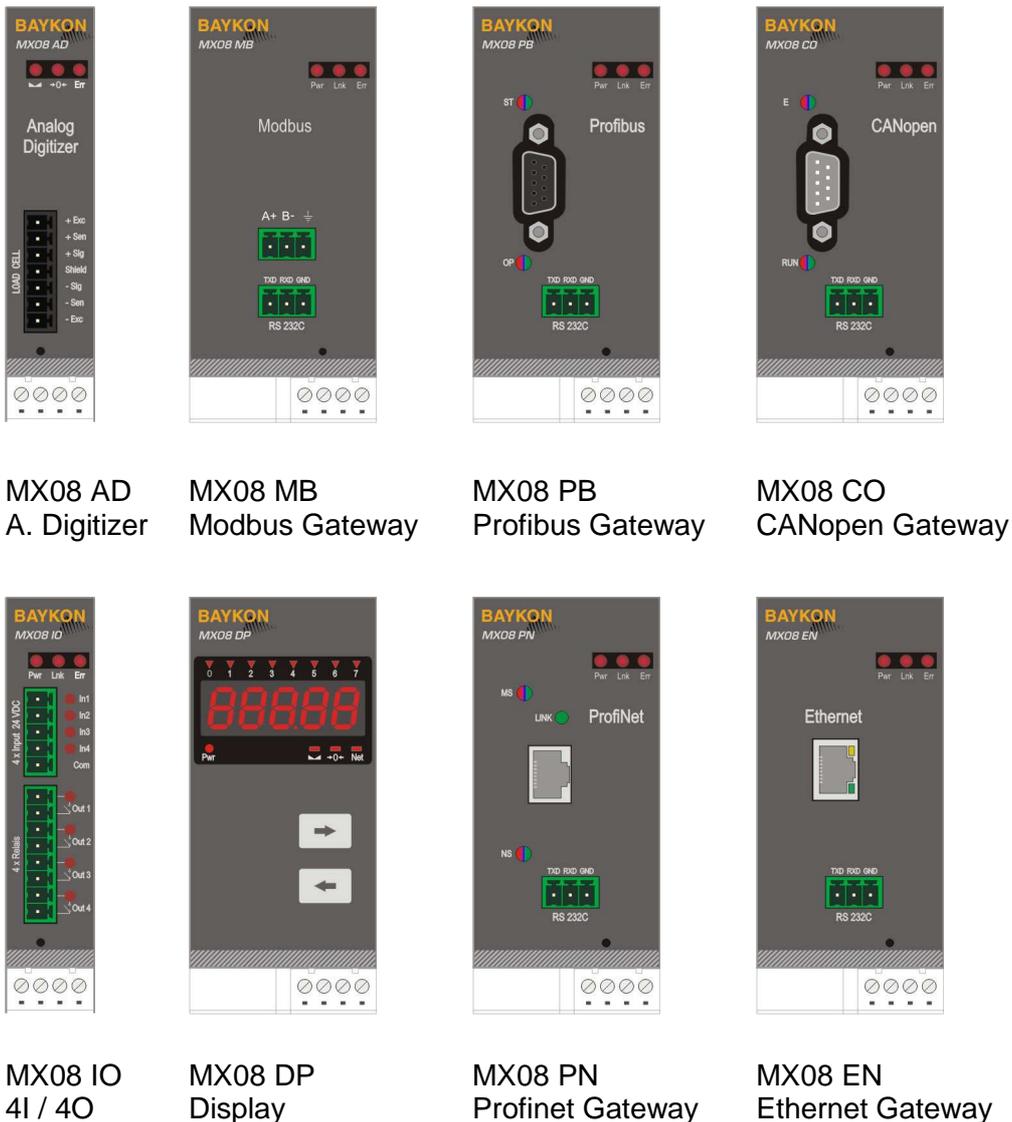


Figure 1.1 - MX08 family instruments

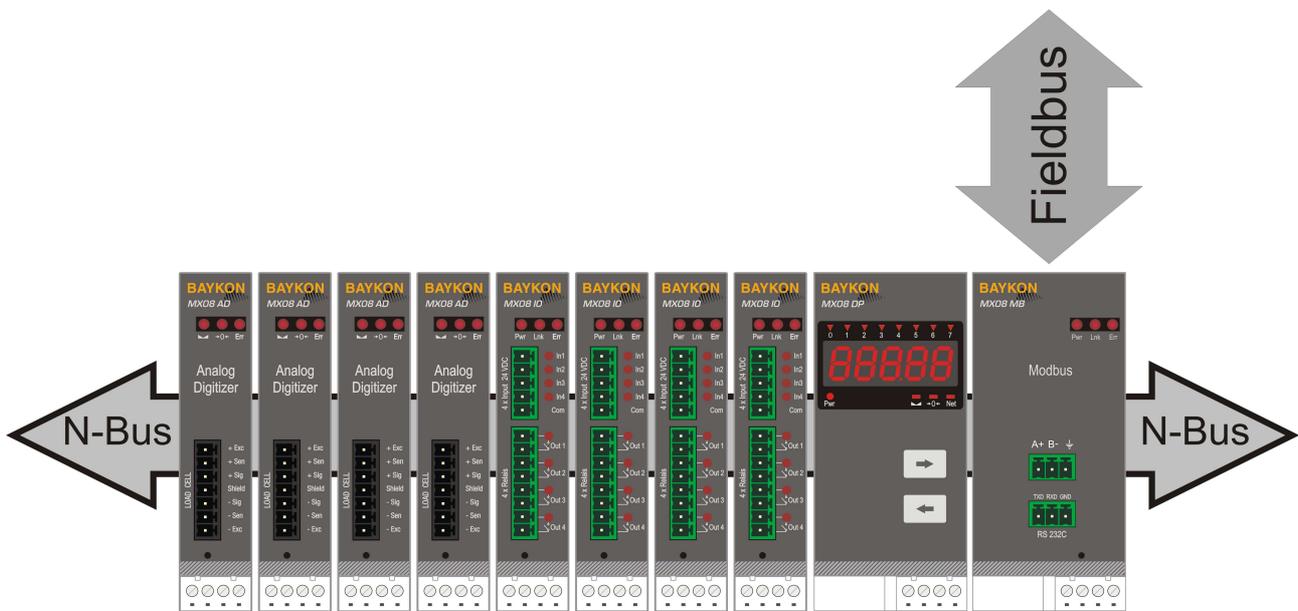


Figure 1.2 - MX08 instrument connection diagram

The principal configuration of MX08 multi-channel system is shown in Figure 1.2. In this configuration, the gateway unit is the master of N-Bus and acts as a slave in process field bus. The Gateway connects a field bus network to the local MX08 instruments and transports commands and responses to and from the field bus. It scans all instruments for their status and then transmits this status information continuously to the field bus processor.

One of the most powerful instruments in this family is MX08 AD Analog Digitizer. It converts the low level strain gage load cell analog signal to high resolution and accurate digital signal. Its programmability for bipolar input signal gives the instrument advantage in bidirectional force measurement applications without decreasing the external unipolar resolution. MX08 DP Display Unit gives advantage to the operators to follow the weight data and testing weighing system performance in the control cabinet locally. Low priced Digital I/O units give advantage to the designers expending their field bus system with I/O control in the cabinet without requiring additional gateway.

They are used for any type of weighing processes and force measurement including tank and silo weighing, dynamic weighing, check weighing, filling, tension /compression force measurement, process I/O control etc.

1.2. Key features and specifications

MX08 AD Analog Digitizer	
A/D Converter:	
A/D converter type:	24 bit Delta-Sigma radiometric with integral analog and digital filters
Conversion rate:	Up to 800 measurements per second
Input sensitivity:	0.1 $\mu\text{V/e}$ (non approved)
Analog input range:	0 mV to +18 mV (unipolar) ; - 18 mV to +18 mV (bipolar)
Internal resolution:	up to 8 000 000
External Resolution:	
Count mode	1 000 000 count in unipolar signal range 2 000 000 count in bipolar signal range
Weighing and Force mode	up to 100 000 increment
Scale Calibration and Functions:	
Calibration:	Calibration is performed with or without etalon weights via xFace or field bus
Digital filter:	10 steps programmable adaptive filter
Weighing functions:	Taring, zeroing, auto zero tracking, motion detection, auto zero at power up, save tare at power-off, increased resolution
Linearity:	
	Within 0.0015% FS, ≤ 2 ppm/ $^{\circ}\text{C}$
Load cells:	
Excitation:	5 VDC max. 100 mA
Number of load cells:	Up to 6 load cells 350 Ω or 18 load cells 1100 Ω in parallel
Connection:	4- or 6-wire technique. Cable length: maximum 250 m/mm ² for 6-wire connection
DC Power supply:	
	12 to 28 VDC max. 200 mA
Environment and Enclosure:	
Operation temp.:	-10 $^{\circ}\text{C}$ to +40 $^{\circ}\text{C}$; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 MB Modbus-RTU	
Communication:	
RS-485:	1200 to 57600 baudrate, 8N1,7E1,7O1
RS-232C:	9600 baudrate, 8N1
Response delay:	Up to 4 ms. delay after read/write commands
Max Stations:	Up to 31 stations per segment
DC Power supply:	
	11 to 28 VDC max. 100 mA
Environment and Enclosure:	
Operation temp.:	-10 $^{\circ}\text{C}$ to +40 $^{\circ}\text{C}$; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 PB Profibus DP	
Communication:	
Data rate:	Up to 12000 kbit/s with automatic baudrate detection
GSD file	Generic GSD-file provided
Topology:	Depending on physical media RS-485: segmented line topology without stubs
Installations:	Shielded twisted pair cable Line length depending on physical media and transmission speed
Max. Stations:	Up to 32 stations per segment, up to 126 stations per network
Isolation:	Galvanically isolated bus electronics
Response delay:	4 ms. delay after read/write commands
RS-232C:	9600 baud 8N1, used for service port (xFace)
DC Power supply:	
	11 to 28 VDC max. 100 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 PN Profinet	
Communication:	
Data rate:	100 Mbit/s, full duplex
GSDML file:	Generic GSDML-file provided
TCP/IP settings:	DHCP or manual IP assign over xFace or Anybus Ipconfig, Device identity customization
Topology:	Line, Bus, Star or Tree topology depending on physical media
Installation:	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Isolation:	Galvanically isolated bus electronics
Response delay:	4 ms. delay after read/write commands
RS-232C:	9600 baud 8N1, used for service port (xFace)
DC Power supply:	
	11 to 28 VDC max. 300 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 EN Ethernet	
Communication:	
Transmission rate:	10 Mbit/s, half duplex
Response delay:	4 ms. delay after read/write commands
TCP/IP settings:	Manual IP assign over xFace
Installation:	Switched Ethernet transmission with shielded twisted pair cables
Web client:	MX08 system is presented over web page
RS-232C:	9600 baud 8N1, used for service port (xFace)
DC Power supply:	
	11 to 28 VDC max. 300 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

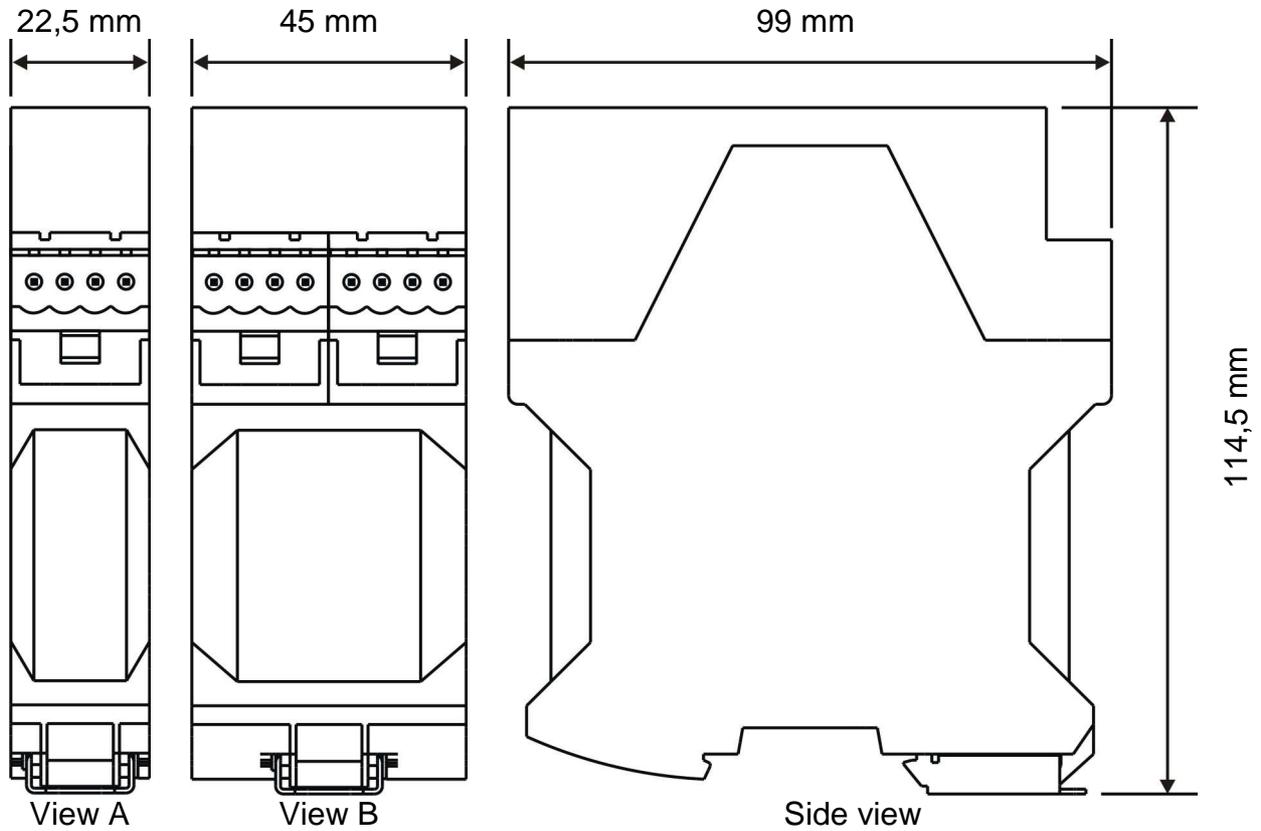
MX08 CO CANopen	
Communication:	
Data rate:	10 kbit/s – 1 Mbit/s (selectable) kBit/s
ESD file	Generic ESD-file provided
Topology:	Line with Trunkline, Dropline structure and Termination at both Ends Line length depending on baudrate 25 – 500 meter.
Installation:	2 wire shielded twisted pair cable Alternatively 4 wire with 24 Volt power over the bus
Max. Stations:	Up to 127 stations per network
Isolation	Galvanically isolated bus electronics
Response delay:	4 ms. Delay after read/write commands
RS-232C:	9600 baud 8N1, used for service port (xFace)
DC Power supply:	
	11 to 28 VDC max. 100 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 IO 4 input / 4 output	
Input / Output:	
Inputs:	4 optic isolated digital inputs
Outputs:	4 free contact outputs. 1A @ 250VAC, 30VDC
Input signal range:	12 VDC to 30 VDC
IO response time:	4 ms. delay after read/write commands from field bus
DC Power supply:	
	24 VDC max. 100 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

MX08 DP Display	
Conversion rate:	
Conversion rate:	4 refresh per second
Max. displayed value:	5 digits with overflow indication
Scale functions:	Scale select with scale annunciater
Weighing functions:	Stable, Zero and Net indication
DC Power supply:	
	11 to 28 VDC max. 100 mA
Environment and Enclosure:	
Operation temp.:	-10 °C to +40 °C; 85% RH max, non-condensing
Enclosure	Polyamide, mounting in standard DIN rails, IP20

1.3. Housing

MX08 housings are IP20, polyamide and easily mounting on NS 37/7 or NS 35/15 standard DIN rail. Drawings of the housing are seen below.



	MX08 AD	MX08 IO	MX08 MB	MX08 PB	MX08 PN	MX08 EN	MX08 CO	MX08 DP
View A	√	√						
View B			√	√	√	√	√	√

Figure 1.3 - Dimensions

1.4. Accessories

The following accessories are supplied with the instrument or can be purchased separately.

1.4.1. Accessories supplied with the instrument

The following accessories are supplied together with the MX08 instruments. If any part is missed, please contact to your supplier.

	MX08 AD	MX08 IO	MX08 MB	MX08 PB	MX08 PN	MX08 EN	MX08 CO	MX08 DP
4-pos and 5mm pitch light gray plug for power connection	1	1	1	1	1	1	1	1
5-pos and 3,81mm pitch light gray N-Bus connector	1	1	2	2	2	2	2	2
3-pos and 3,81mm pitch green plug for RS-232C or RS-485			2	1	1	1	1	
7-pos and 3,81mm pitch black plug for load cell cable	1							
5-pos and 3,81mm pitch green plug for inputs		1						
8-pos and 3,81mm pitch green plug for free contact outputs		1						
Installation CD (xFace setup, user manual and technical documents)			1	1	1	1	1	

Table 1.1 - Accessories supplied with instrument

1.4.2. Accessories sold separately

The following accessories can be supplied from BAYKON.

	MX08 AD	MX08 IO	MX08 MB	MX08 PB	MX08 PN	MX08 EN	MX08 CO	MX08 DP
RS-232C cable for PC connection (3 meter)			√	√	√	√	√	
Junction box for load cell connection	Refer to junction box catalog							
Open end load cell cable 6 wire (0.22 cm ² each)	Maximum 200 meter length							

Table 1.2 - Accessories supplied separately

2. INSTALLATION

PRECAUTION: Please read this manual carefully before installation of the instrument. Applying the recommendations in this section will increase your system reliability and long term performance.

2.1. Recommendations

2.1.1. Control Cabinet Design

Warning: Please care the following warnings for designing the control cabinet which will increase your system reliability.

The control cabinet should be designed so that MX08 AD Analog Digitizer can operate safely. The panel should be placed clean area, not getting direct sun light if possible, with a temperature between $-10\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$, humidity not exceeding 85% non-condensing. All external cables should be installed safely to avoid mechanical damages.

MX08 instruments are very low level signal measuring, I/O and gateway units. To avoid electrical noise, MX08 should be separated from the equipments that produce electrical noise. Preferable use metal cabinet against radio frequency interference and the cabinet shall be connected to ground against the electromagnetic disturbances. Load cell cable trays must be separated from others, if possible. If there are noise-generating equipments such as heavy load switches, motor control equipments, inductive loads etc., please be careful against the EMC interference in the cabinet. If possible protect MX08 instruments with the faraday cage or install them in separate section or install them far a way from this kind of equipments. Connect parallel reverse diodes to the DC inductive loads like relays, solenoids etc. to minimize voltage peaks on the DC power lines.

2.1.2. Cabling

All cables coming to the control cabinet shall be shielded. Please use separate cable trays for these low signal level cables. Distance from load cell cables, interface cables and DC power supply cables to power line cables shall be minimum 50 cm.

2.2. Mechanical Installation

After interior designing the control panel and installing DIN rails according to the recommendation in Section 2.1, install N-Bus connectors on the DIN rail as seen in the Figure 2.1.

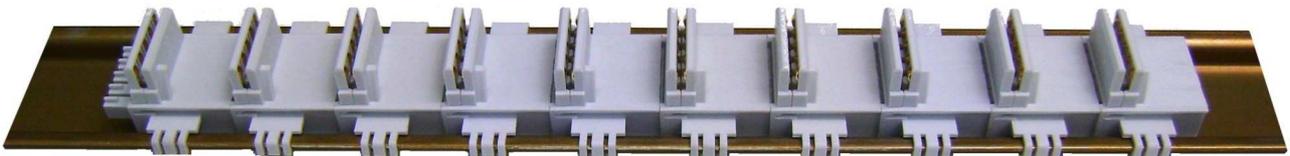


Figure 2.1 - N-Bus connectors on DIN rail

Place the instruments on DIN rail for making N-bus connection between MX08 instruments as seen Figure 2.2. Be sure that the mechanical installation and N-Bus connection of the instruments are done properly.

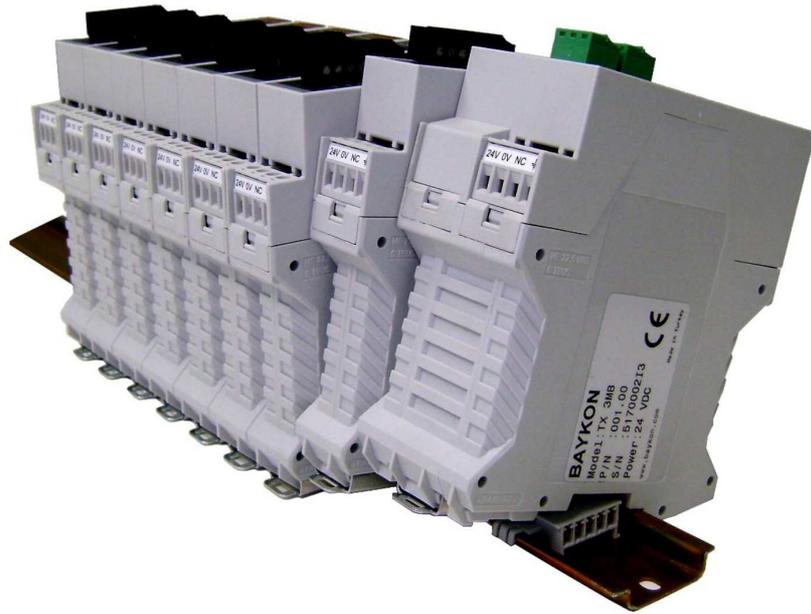


Figure 2.2 - Din rail installation

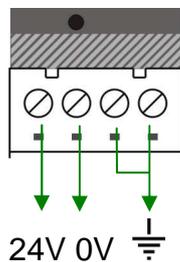
2.3. Electrical Connections

Warning: Please always remember that MX08 AD instruments are very low voltage measuring instruments. Your control cabinet design and proper installation increases reliability and performance of the instrument. Please do not forget that the instrument must be powered off before inserting or removing any peripheral connector.

All required electrical connections should be done as described below.

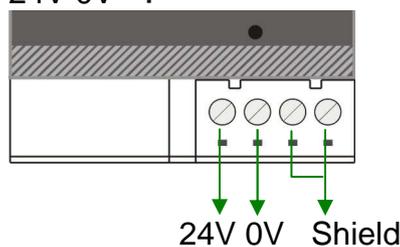
2.3.1. Power Supply and Grounding

Power supply voltage of the instrument shall be between 12 VDC and 28 VDC. The current resumption of the power supply will be calculated by multiplying 0,2A and the quantity of instruments. The pin configuration of the 24 VDC power supply connector located front bottom of the instrument is shown in Figure 2.3 below.



The pin layout of the 24 VDC connector of MX08 AD and MX08 IO

(front view)



The pin layout of the 24 VDC connector of MX08 MB, MX08 PB, MX08 PN, MX08 EN, MX08 CO

(front view)

Figure 2.3 - The pin layout of 24VDC connector

The quality of the instrument's ground will determine the accuracy and the safety of your measuring system. A proper ground connection is needed to minimize extraneous electrical noise affects on the measurement. A poor ground can result in an unsafe and unstable operation. It is important that the instrument should not share power lines with noise-generating equipments such as heavy load switching, motor control equipments, inductive loads, etc. If the condition of the power line in the plant is poor, prepare a special power line and grounding.

Before interfering the instrument, turn off the power and wait at least for 30 seconds.

Warning: Do not forget to connect the grounding pin to the reference ground.

2.3.2. Load Cell Connector

To avoid damages, the load cell wiring should be made carefully before energizing the instrument. Load cell connection detail is shown in figure below. In 4-wire installations the sense and excitation pins with the same polarity should be short circuited at the connector side. If you have junction box in your system, use 6 wire cable between MX08 AD and the junction box, and short circuit these pins at junction box for better performance.

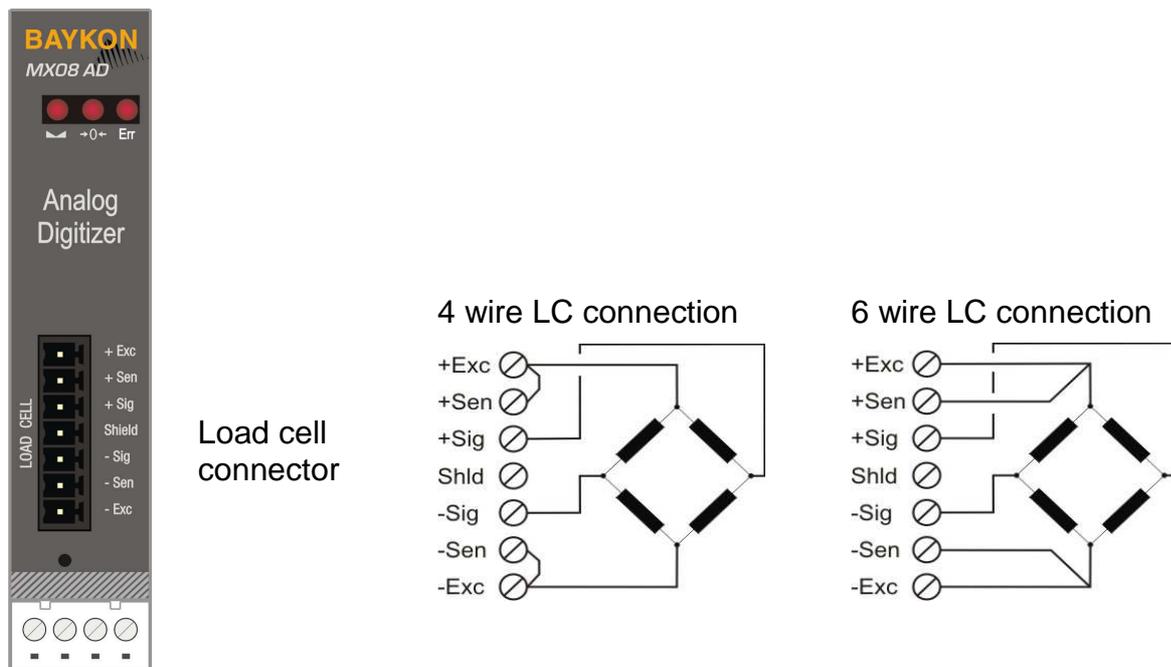


Figure 2.4 - Load cell connection

Warning: Connect the load cell cable shield to the reference ground or shield pin of the load cell connector.

2.4. Gateway Connections

Gateways have two connectors on the front of the instruments: Field bus connector and RS-232C serial interface connector.

2.4.1. Field bus Connection

You will find this connector details in the related gateway section.

Modbus-RTU Connection: Refer to 'Section 7.2'

Profibus Connection: Refer to 'Section 8.2'

Profinet Connection: Refer to 'Section 9.2'

Ethernet Connection: Refer to Section 10.2'

CANopen Connection: Refer to Section 11.2

2.4.2. RS-232C Serial Interface Connection

RS-232C serial ports located on gateways are using for programming the system and for other purposes described in the related gateway section.

RS-232C Serial interface Specifications

Usage	Programming and calibration (xFace), Interfacing with PC or PLC,
Data formats	BSI (Refer to Section 3.11), Modbus RTU High-Low (Refer to Section 7.5), Modbus RTU Low-High (Refer to Section 7.5)
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1 stop bit

Warning: Connect the shield to the reference ground or shield pin of the power connector.

2.5. Digital I/O Connections

MX08 IO unit has the input and output connectors on the front of the instrument. I/O connection diagram is shown in Figure 2.5. The outputs are free contact and the inputs are opto isolated.

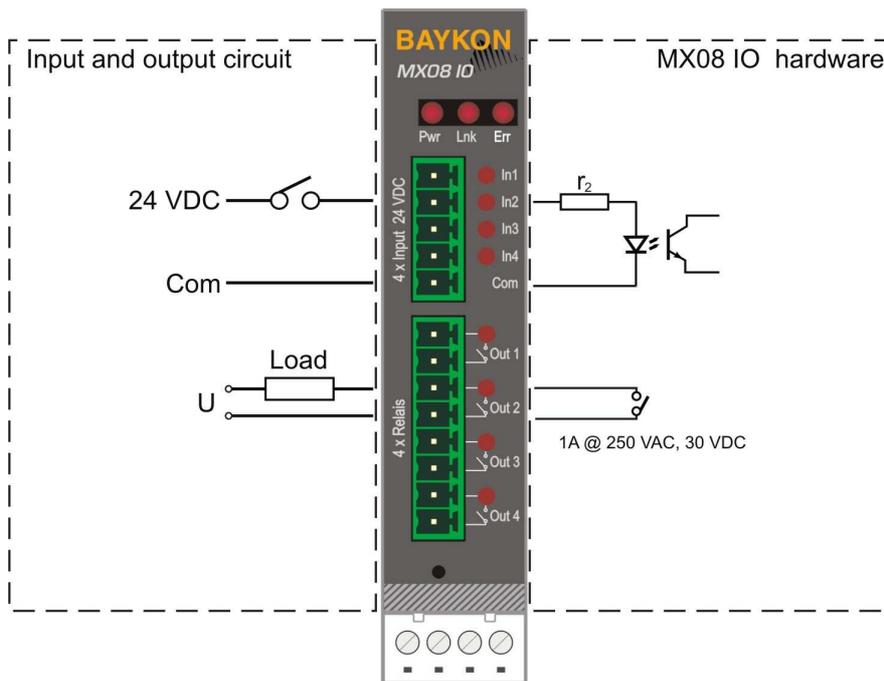


Figure 2.5 - Input/Output Connection

2.6. Commissioning

PRECAUTION: Please read this manual carefully before energizing the instrument. Perform the commissioning operation according the procedure given in this section. Only trained person is allowed for cleaning, commissioning, checking and servicing of the instrument. The interference of untrained person may cause some unwanted damages or injures.

Before power on the instrument, please make the required mechanical and electrical installations. After power on, you have to program your MX08 system before field bus interfacing.

Install xFace to your PC as described in Section 3 Programming. xFace software is used for programming, calibration and testing of MX08 system.

After checking the performance of instruments with xFace, you can begin to use MX08 system in your application.

3. PROGRAMMING

PRECAUTION: Please read this manual carefully before energizing the instrument. Perform the commissioning operation according the procedure given in Section 2.6. Only trained person is allowed for cleaning, commissioning, checking and servicing of the instrument. The interference of untrained person may cause some unwanted damages or injures.

MX08 system needs to be programmed in sequence below before field bus interfacing;

- Installing xFace software to your PC.
- Connection between PC and MX08 gateway
- N-Bus addressing
- Gateway set up
- Analog Digitizer programming and calibration
- Analog Digitizer performance tests
- Digital Input / Output tests

MX08 family instruments are programmed and calibrated by xFace software given with the instrument. The latest version of xFace software can be downloaded from BAYKON website www.baykon.com.

3.1. Installation of xFace

Please follow following steps to install the xFace software:

- Close all applications on your PC.
- Insert the CD that contains the xFace software into the CD-ROM drive.
- Double click to setup.exe to start installation. The setup Wizard is displayed.

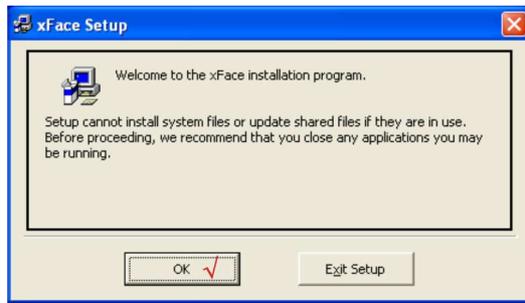


Figure 3.1 - xFace installation step 1

- Follow menus in the setup wizard step by step.
- The installation directory name shall be written with Latin characters. Chinese folder name is not supported.

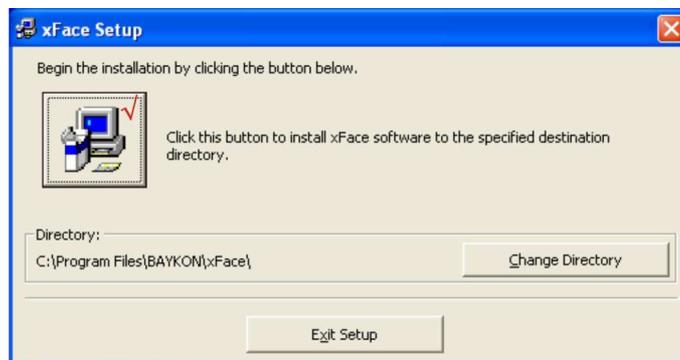


Figure 3.2 – xFace installation step 2

- If the Version Conflict window is displayed, click to “No to All” button.

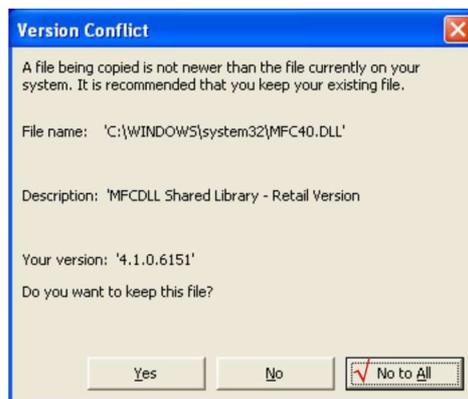


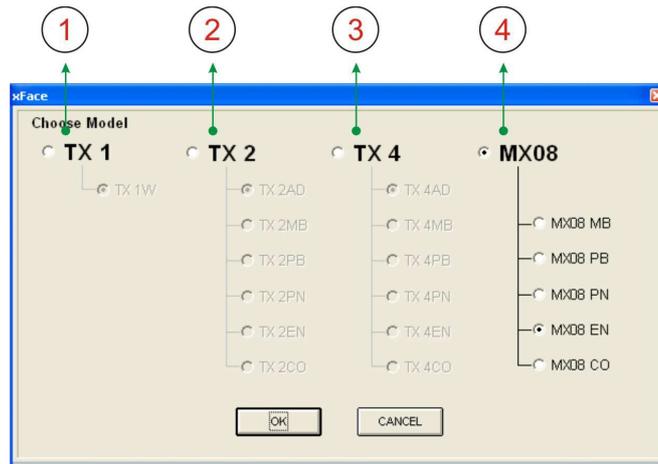
Figure 3.3 – xFace installation step 3

- After finishing the installation, the Setup Wizard will inform you the software is installed successfully and then click to “OK” button.



Figure 3.4 – xFace installation step 4

- After closing the Setup Wizard you can start using the xFace software.



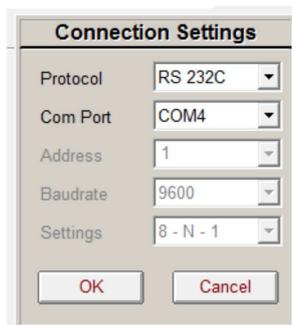
①	TX 1 Models
②	TX 2 Models
③	TX 4 Models
④	MX08 Models: Select one of the MX08 models and press OK button

Figure 3.5 - xFace model selector window

3.2. Connection to xFace

MX08 gateway and xFace connection is done via RS-232C service port for all gateway instruments. Additionally, RS-485 can be used for xFace connection. You can supply any PC connection cable as an accessory from BAYKON (Refer to Section 1.4.2 Accessories sold separately).

After running xFace, select the instrument model you use. Select PC com port at connection settings menu in the tools tab and click the connect icon. The traffic lights of connect icon turns from red to green light when the communication is built between MX08 gateway instrument and your PC.



Protocol: Select programming port of the instrument. MX08 MB instruments can be programmed over both RS-232C and RS-485. But the other type of instruments can be programmed over only RS-232C

Com Port: Select the com port of the PC.

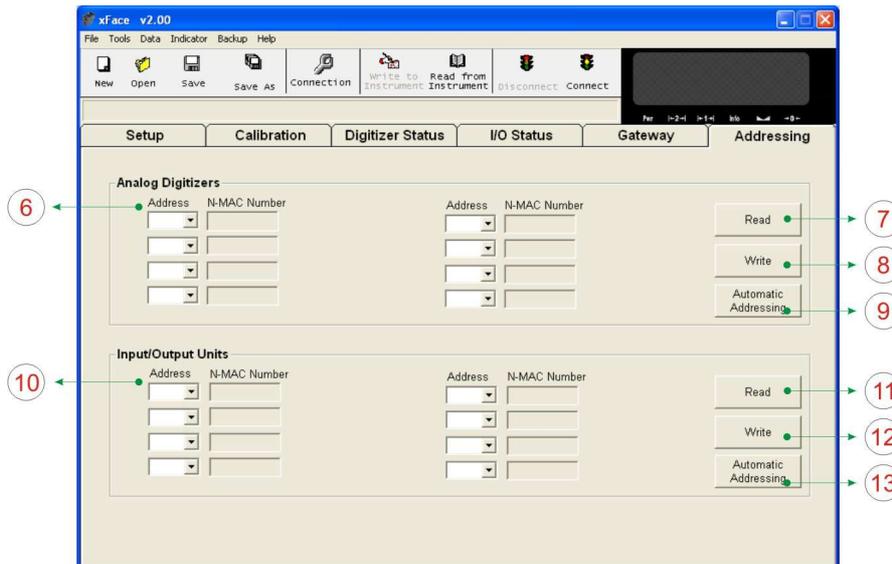
Address: Select the address of the RS-485, if the protocol is selected RS-485.

Baudrate: Select the baudrate of the RS-485, if the protocol is selected RS-485.

Setting: Select com port setting of the RS-485, if the protocol is selected RS-485.

Figure 3.6 - xFace connection settings

3.3. N-Bus Addressing via xFace



6	N-Bus Addresses of Analog Digitizer Instrument.
7	Read Button: Reads the Address and N-MAC Numbers of Analog Digitizers.
8	Write Button: Writes the N-Bus address to Analog Digitizers related to N-MAC number.
9	Auto Address: Fills the address fields from 0 to 7.
10	N-Bus Addresses of I/O Instrument.
11	Read Button: Reads the Address and N-MAC numbers of I/O units.
12	Write Button: Writes the N-Bus address to I/O units related to N-MAC number.
13	Auto Address: Fills the address fields from 0 to 7.

Figure 3.7 - N-Bus Addressing tab

For the first time connection to MX08 system, only Gateway and Addressing tabs becomes active. First, address the instruments to N-Bus to activate the instruments in MX08 system.

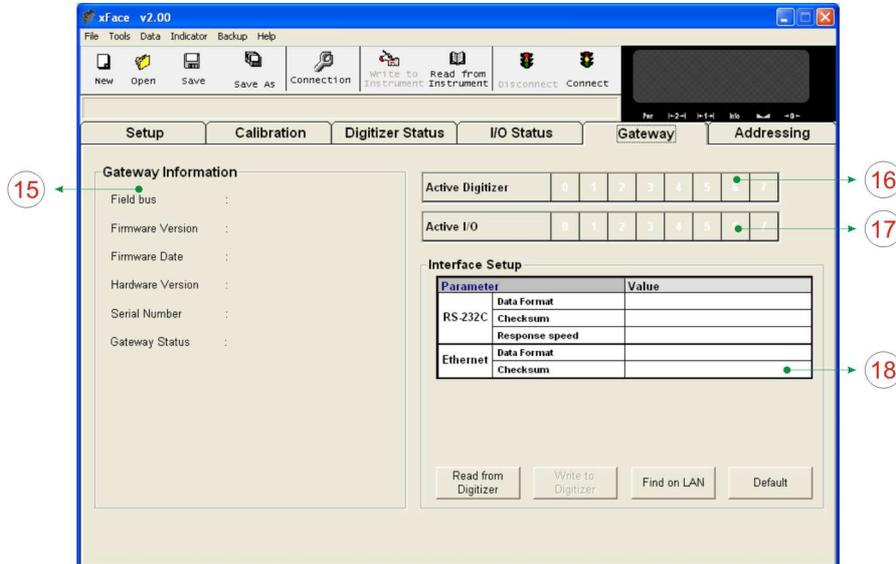
Addressing Analog Digitizers to N-Bus: First, click 'Read' button to read the N-MAC numbers and the addresses. Give an address number to each Analog Digitizers. Then click 'Write' button to save the addressing settings. If the addressing Analog Digitizers to N-Bus is completed successfully; Setup, Calibration and Digitizer Status tabs, Scale Address and Visual Weight Display will be activated.

Addressing Input/Output Instruments to N-Bus: First, click 'Read' button to read N-MAC numbers and addresses. Give an address to each MX08 IO. Then click 'Write' button to save the addressing settings. If the addressing MX08 IOs to N-Bus is completed successfully, I/O Status tab will be activated.

Note: Sequential address numbers of N-Bus slave instruments are recommended.

3.4. Gateway Setup

Gateways have an interface parameters depend on their interfacing structure and this parameters shall be programmed before MX08 field bus connection. Gateway programming is done in the Gateway tab. Details on the Gateway parameters and their descriptions can be found in the related gateway section.



15	Gateway Information: This block indicates the field bus type, hardware and software versions of Gateway instrument.
16	Active Digitizer: This block indicates the active Analog Digitizers and their N-Bus address in the system. For more information refer to Section 4.
17	Active I/O: This block indicates the active Input / Output instruments and their N-Bus address in the system. For more information refer to Section 6.
18	Field bus Setup: This block allows the user to set up field bus parameters. Each Gateway has own parameters related to field bus type.

Figure 3.8 - xFace Gateway tab

3.5. GSD/GSDML/EDS Configuration

By default, Profibus, Profinet, CANopen data structures of MX08 includes 8 pcs MX08 AD and 8 pcs MX08 IO. This is full configuration.

Gateway {
MX08 AD {
[0]

Steckplatz	DP-Keurung	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1	209	Input 2 words	50..53		
2	225	Output 2 words		50..53	
3	209	Input 2 words	60..63		
4	209	Input 2 words	64..67		
5	225	Output 2 words		60..63	
6	225	Output 2 words		64..67	
7	209	Input 2 words	70..73		
8	209	Input 2 words	74..77		
9	225	Output 2 words		70..73	
10	225	Output 2 words		74..77	
11	209	Input 2 words	80..83		
12	209	Input 2 words	84..87		
13	225	Output 2 words		80..83	
14	225	Output 2 words		84..87	
15	209	Input 2 words	90..93		
16	209	Input 2 words	94..97		
17	225	Output 2 words		90..93	
18	225	Output 2 words		94..97	
19	209	Input 2 words	100..103		
20	209	Input 2 words	104..107		
21	225	Output 2 words		100..103	
22	225	Output 2 words		104..107	
23	209	Input 2 words	110..113		
24	209	Input 2 words	114..117		
25	225	Output 2 words		110..113	
26	225	Output 2 words		114..117	
27	209	Input 2 words	120..123		
28	209	Input 2 words	124..127		
29	225	Output 2 words		120..123	
30	225	Output 2 words		124..127	
31	209	Input 2 words	130..133		
32	209	Input 2 words	134..137		
33	225	Output 2 words		130..133	
34	225	Output 2 words		134..137	
35	144	Input 1 byte	140	140	
36	160	Output 1 byte		140	
37	144	Input 1 byte	150	150	
38	160	Output 1 byte		150	
39	144	Input 1 byte	160	160	
40	160	Output 1 byte		160	
41	144	Input 1 byte	170	170	
42	160	Output 1 byte		170	
43	144	Input 1 byte	180	180	
44	160	Output 1 byte		180	
45	144	Input 1 byte	190	190	
46	160	Output 1 byte		190	
47	144	Input 1 byte	200	200	
48	160	Output 1 byte		200	
49	144	Input 1 byte	210	210	
50	160	Output 1 byte		210	
51					
52					

MX08 IO {
[0]

Figure 3.9 - Full system GSD configuraton

Clicking “GSD/GSDML/EDS Configuration” in “Tool” menu opens the below window. Select quantity of MX08 AD and MX08 IO in your system and click to “Write new GSD/GSDML/EDS file”. This property would help to the PLC programmers to save time.

GSD Configuration

Enter the quantity of Analog Digitizer and I/O units to configured GSD file and press "Write New GSD File" to upload it in the gateway.

Quantity of digitizer: 4

Quantity of I/O: 4

Read current GSD Config Write new GSD file

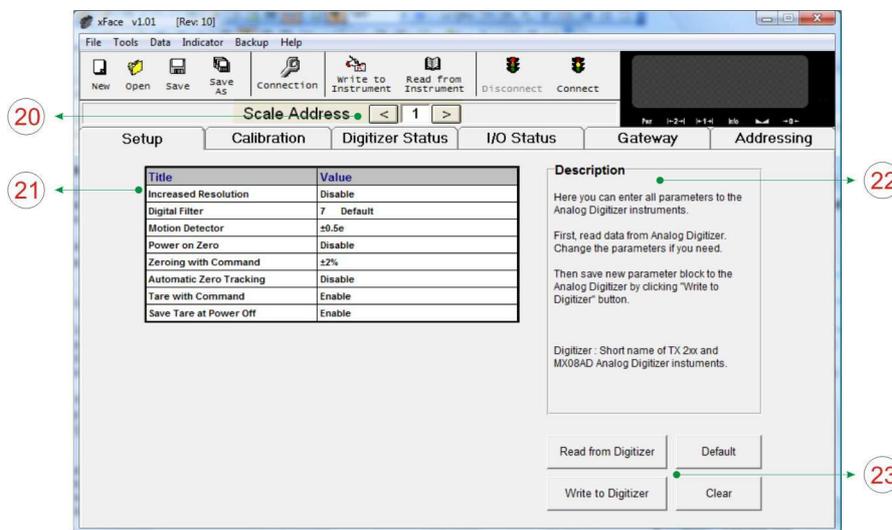
Figure 3.10 - GSD/GSDML/EDS configuration

Note: PLC GSD/GSDML/EDS configuration shall be match with selected configuration. The new GSD configuration will be include only bytes/words of number of selected MX08 AD and IO.

3.6. Analog Digitizer Programming and Calibration

PROPOSEL: Read the MX08 AD Analog Digitizer section carefully before programming and calibration of the instruments. This will increase your weighing system performance by applying proper programming and calibration.

MX08 AD Analog Digitizers shall be programmed in this sequence, if there is any analog digitizer in the system. First select the scale number you will program by pressing the scale selection buttons.



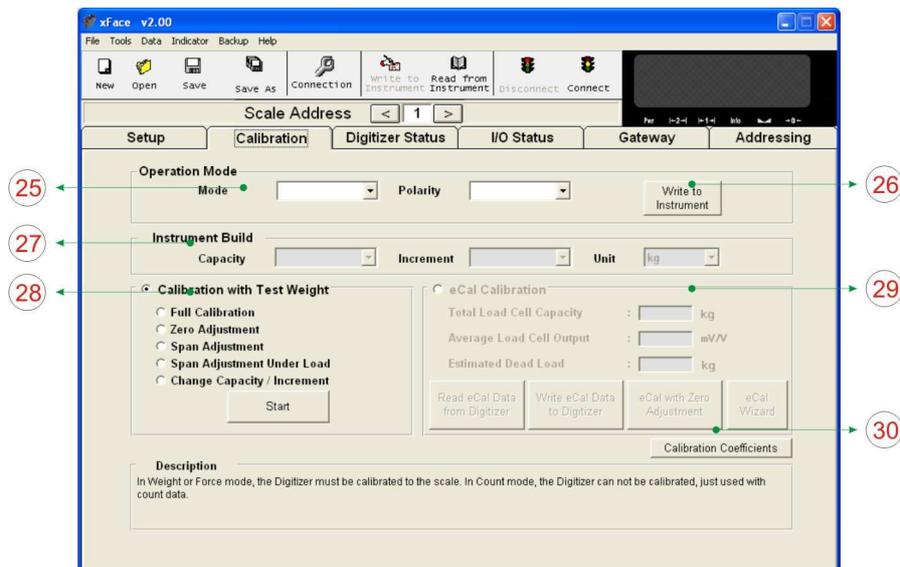
20	Scale Selection: Clicking to left or right arrows selects the current Analog Digitizer.
21	Analog Digitizer Parameters: Refer to Section 4.3.1 for details.
22	Description: This block helps to user to explain the parameters.
23	Read from Digitizer: Click this button to read the parameters from selected Digitizer.
	Write to Digitizer: Click this button to save the parameters to selected Digitizer.
	Default: Click this button to load the default parameters to parameter fields.

Figure 3.11 - MX08 AD setup parameters

For entering the parameter values enter set up tab, adjust parameter values and then write this data to the Analog Digitizer. After writing parameter values to the Analog Digitizer, calibrate the Digitizers. You can find parameter descriptions in Section 4.

3.6.1. Calibration

Scale build, operation mode selection and scale calibration is performed in the calibration tab of xFace as seen in Figure 3.12. Please follow the procedure described in the following sections in Section 4.3.2.



25	This block allows the user to select operation mode and polarity.
26	Write to Digitizer: Click this button to save the operation mode and polarity.
27	Scale setup
28	Calibration block: This block allows the user to make calibration with test weights.
29	eCal Calibration: This block allows the user to make calibration without test weights.
30	Calibration coefficients

Figure 3.12 - Calibration

You can find programming and calibration descriptions in Section 4.3.

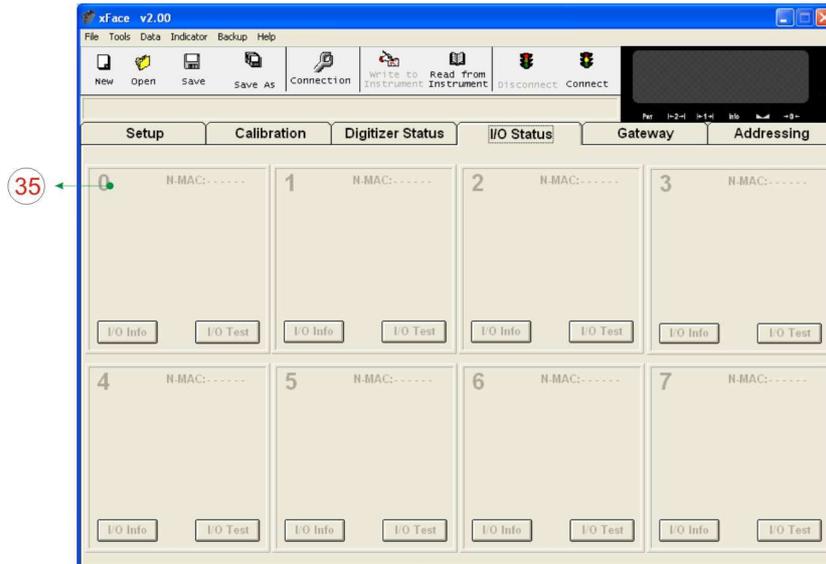
3.7. Analog Digitizer Performance Testing

MX08 AD performance testing is very important for assuring the stability, weighing speed, linearity, repeatability and eccentricity of the weighing system.

During testing your system stability and weighing speed, you may change some parameter values for better performance by using Setup tab.

You can follow the virtual display on the right top, status tab or indicator menu to check the performance.

3.8. Digital Input/Output Tests



35 **Input / Output tests:** This block allows the user to check I/O status. I/O test button is used to test outputs as seen in this figure.

Figure 3.13 - I/O Status

The active MX08 IO instruments are seen with its own N-Bus address block. You can follow inputs and outputs, and change outputs. I/O test property is very useful for checking the output states.

Warning: Please be careful to avoid damaging your process during output test.

3.9. N-Bus Addressing via Programming Switch

For the first time energizing of MX08 system, all Analog Digitizer and I/O instruments need to be addressed to N-Bus. One way is addressing by xFace and it is described above. Another way is addressing via programming switch (up to 7).

First, energize the instruments installed on the N-Bus. Press programming switch of gateway instrument for 5 seconds. Three LEDs of the gateway instrument flash 4 times and then indicate an address number to be assigned to Analog Digitizer or I/O instrument for N-Bus address number. Change the address number via pressing programming switch of the gateway instrument. Assign selected address number to AD or I/O by pressing programming switch of AD or I/O.

LED and Programming Switch Descriptions in N-Bus Addressing Mode:

MX08 MB etc.			Description of LED	Description of Programming Switch
Pwr	Lnk	Err		
○	○	○	Address number is [0].	Increases address number to [1].
○	○	●	Address number is [1].	Increases address number to [2].
○	●	○	Address number is [2].	Increases address number to [3].

.
●	●	●	Address number is [7].	Increases address number to [0].

MX08 AD & MX08 IO			Description of LED	Description of Programming Switch
	→0←	Err		
★	★	★	Its N-Bus address number is same as gateway's selected address number.	Assigns gateway's selected address number to its N-Bus address number.
★	○	○	Its N-Bus address number is not same as gateway's selected address number.	

Note: Sequential address numbers of N-Bus slave instruments are recommended.

3.10. Back-up Parameters and Calibration

The parameter settings and calibration coefficients can be saved to the back up file after reading these data from MX08 instruments. This back up file can be written to MX08 instruments after opening it by xFace.

Back up feature gives service advantage to MX08 instruments. Proposal is burning these files to CD/DVD and saving this back up CD/DVD in the control cabinet additional saving file in your PC.

Important note: The previous parameter values and calibration coefficients in MX08 AD will be lost after loading back up to the instrument.

3.11. BSI Data Structure

All new generation BAYKON instruments launched on the market support the standardized command set BSI data form, depending on the functionality of the instrument. This easy data format gives the reliable and speedy interface advantages with communicating PLC or PC for process control or transactional applications. You can expand your system with additional scales from BAYKON without having to change your application program base.

General Rules:

1. Commands are only in CAPITAL
2. CHK (2 ASCII char) can be enabled or disabled from both command and response.
3. Weight data is 8-byte with dot and non-significant zeros on the left.
4. Address data (2 ASCII char) will be located in the structure. 1st char is address byte of N-Bus master instrument and 2nd char is address byte of N-Bus slave instrument.
5. N-Bus master instrument's address byte is default "1" for RS-232C and Ethernet interfaces.

Command format: A general description of the command is the following:

[ADR][COMMAND][CHK][CR][LF]

Response format with weight / force or count data

A general description of the response is the following:

[ADR][COMMAND][STATUS][SIGN][WEIGHT/FORCE/COUNT][CHK][CR][LF]

Response format without weight / force or count data

[ADR][COMMAND][STATUS][CHK][CR][LF]

Command Table:

A	Read all weight data immediately
B	Read Gross weight value immediately
C	Clear the tare memory
D	Read Count value immediately
I	Read current weight (indicated) value immediately
P	Print : Read the current stable weight value
S	Read Status
T	Tare
U	Read digital inputs
V	Read digital outputs
W	Set/Reset digital outputs
Z	Zero

Status Table:

A	Ack, the command is operated successfully
D	Dynamic, unstable weight
E	Errors except of H, L, O, +, -.
H	High voltage detected
I	The weight is in range
L	Low voltage detected
N	Nack, the command couldn't be operated
O	ADC out
S	Stable weight

X	Syntax error (not recognized the received command)
+	Overload
-	Underload

Note: CHK, CR and LF will not be shown in below data format descriptions in this section.
Address of N-Bus master instrument is 1 and address of N-Bus slave instrument is 2.

Commands and Responses:

A	Read all weight data
----------	----------------------

Command : [ADR][A]
Response : [ADR][A][STATUS][SIGN][NET W][SIGN][TARE W][SIGN][GROSS W]
Example :

Command : 12A
Response : 12AS+000123.4+000111.1+000234.5
 12AD+000123.4+000111.1+000234.5
 12AO (ADC out error)

Comments :
The response is net, tare and gross weight values or error status.
All weight data is transmitted immediately after receiving the command.

B	Read Gross weight
----------	-------------------

Command : [ADR][B]
Response : [ADR][B][STATUS][SIGN][WEIGHT VALUE]
Example :

Command : 12B
Response : 12BS+000123.4 (gross weight is stable and 123.4)
 12BD+000123.4 (gross weight is dynamic and 123.4)
 12B (under load)

Comments :
The response is the gross weight value (stable or dynamic) or error status.
Gross weight data is transmitted immediately after receiving command.

C	Clear the tare memory
----------	-----------------------

Command : [ADR][C]
Response : [ADR][C][A])Cleared and the scale is in gross mode)
 [ADR][C][X] (Unavailable in count mode)

Comments :
The response status is always Ack in weighing or force mode.
The response status is always X in count mode.

D	Read Count value immediately
----------	------------------------------

Command : [ADR][D]
Response : [ADR][D][STATUS][SIGN][COUNT VALUE]
Example :

Command : 12D
Response : 12DD+00123400 or
 : 12DO (ADC out error)
 : 12DX (Not in count mode)

Comments : Count value is send immediately.

I	Read indicated weight
----------	-----------------------

Command : [ADR][I]
Response : [ADR][I][STATUS][SIGN][WEIGHT VALUE]
Example :
Command : 12I
Response : 12IS+000123.4 (weight is stable and 123.4)
 : 12ID+000123.4 (weight is dynamic and 123.4)
 : 12I+ (overload)

Comments :
The response is the indicated weight value (stable or dynamic). It will be transmitted immediately after receiving the command.
The weight value may be in gross or net.

P	Print : Read the stable weight
----------	--------------------------------

Command : [ADR][P]
Response : [ADR][P][STATUS][SIGN][WEIGHT VALUE]
Example :
Command : 12P
Response : 12PS+000123.4 (weight is stable and 123.4) or
 : 12PN (could not print)

Comments :
Checks status and it must be stable. Else Nack status is send.
There is no time duration for stability checking.
Status can be Stable or Nack.

S	Read Status
----------	-------------

Command : [ADR][S]
Response : [ADR][S][STATUS-1][STATUS-2][STATUS-3]
Example :
Command : 12S
Response : 12SSGI (Stable, Gross, In Range)
 : 12SDGL (Dynamic, Gross, Low voltage error)

Comments :
The response is current 3 status information.
STATUS-1 can be Stable or Dynamic.
STATUS-2 can be Gross or Net.
STATUS-3 can be 'in range', 'out of range', 'low voltage' or 'high voltage'.

T	Tare
----------	------

Command : [ADR][T]
Response : [ADR][T][A] (Taring is done successfully and scale is in net)
 : [ADR][T][N] (Taring could not executed)
 : [ADR][T][X] (Taring is disabled or instrument is in count mode)

Comments :
The tare value is overwritten by the new tare weight value.
Status must be stable in 2 seconds time out delay. If so, Ack is send.
If it can not be stable in time out delay, Nack is send.

U	Read digital inputs
----------	---------------------

Command : [ADR][U]
 Response : [ADR][U][A][Inputs]
 Example :

Command : 12U
 Response : 12UA3 (Input 2 and Input 1 are active)
 12UA4296 (Input 15,10,8,5,3,2 are active)
 : 12UAFF (All 8 inputs are active)
 : 12UN (Could not read inputs)

Comments :
 Data length change according to number of digital inputs.
 Inputs are implemented to ASCII char of 4-bit. '1111' inputs are implemented to char 'F'.

INPUTS	IN-16	IN-15	IN-14	IN-13	IN-12	IN-11	IN-10	IN-9	IN-8	IN-7	IN-6	IN-5	IN-4	IN-3	IN-2	IN-1
Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

V	Read digital outputs
----------	----------------------

Command : [ADR][V]
 Response : [ADR][V][A][Outputs]
 Example :

Command : 12V
 Response : 12VA3 (Output 2 and Output 1 are active)
 12VA4296 (Output 15,10,8,5,3,2 are active)
 : 12VAFF (All 8 outputs are active)
 : 12VN (Could not read outputs)

Comments :
 Data length change according to number of digital outputs.
 Outputs are implemented to ASCII char of 4-bit. '1111' outputs are implemented to char 'F'.

OUTPUTS	OUT-16	OUT-15	OUT-14	OUT-13	OUT-12	OUT-11	OUT-10	OUT-9	OUT-8	OUT-7	OUT-6	OUT-5	OUT-4	OUT-3	OUT-2	OUT-1
Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

W	Set/Reset digital outputs
----------	---------------------------

Command : [ADR][W][Outputs]
 Response : [ADR][W][A]
 Example :
 Command : 12W4296
 Response : 12WA (Outputs 15,10,8,5,3,2 are activated)
 12WN (Outputs could not be activated)

Comments :
 Data length change according to number of digital outputs.
 Outputs are implemented to ASCII char of 4-bit. '1111' outputs are implemented to char 'F'.

OUTPUTS	OUT-16	OUT-15	OUT-14	OUT-13	OUT-12	OUT-11	OUT-10	OUT-9	OUT-8	OUT-7	OUT-6	OUT-5	OUT-4	OUT-3	OUT-2	OUT-1
Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

Z	Zero
----------	------

Command : [ADR][Z]
 Response : [ADR][Z][A] (Zeroed)
 [ADR][Z][N] (Zeroing could not be operated)
 [ADR][Z][X] (Zeroing is disabled)

Comments :
 Zero command can not work in net weighing.
 Weight or Count must be in zeroing range for all operating modes.
 Status must be stable in 2 seconds time out delay. If so, Ack is send.
 If it can not be stable in time out delay, Nack is send.

CHK is transmitted as two ASCII characters calculated with the Checksum formulation.
 Checksum = 0 – (SUM of all response data before CHK)

Example: Read stable current weight data.

BSI Examples: (CHK is enabled and instrument address is 01)

Command: 12P[CHK][CR][LF]

Checksum = 0 – (0x31 + 0x32 + 0x50) = 0 – 0xB3 = 0x4D
 CHK = Char '4' and 'D'

Response: 12PS+000123.4[CHK][CR][LF]

Checksum = 0 – (0x31 + 0x32 + 0x50 + 0x53 + 0x2B + 0x30 + 0x30 + 0x30 + 0x31+ 0x32 + 0x33 + 0x2E + 0x34) = 0 – 0xB9 = 0x47.
 CHK = Char '4' and Char '7'

4. MX08 AD ANALOG DIGITIZER

MX08 AD instrument is state-of-the-art strain gage load cell signal digitizer for weighing and force measurement. These instruments are used for any type of weighing processes and force measurement including tank and silo weighing, dynamic weighing, check weighing, filling, tension /compression force measurement etc.

4.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (Refer to Section 3.9) and for diagnostic tests (refer to Section 4.6).

The operation mode of the instrument is announced by different lights at stable condition (refer to Table 4.1) and there is no zero indication in count mode operation.

When error LED lightened, other two LED announces the error type. Please refer to Section 4.5 for detailed error descriptions.

Load cell and power terminals are located at the front of the DIN rail mount instrument as seen in Figure 4.1.

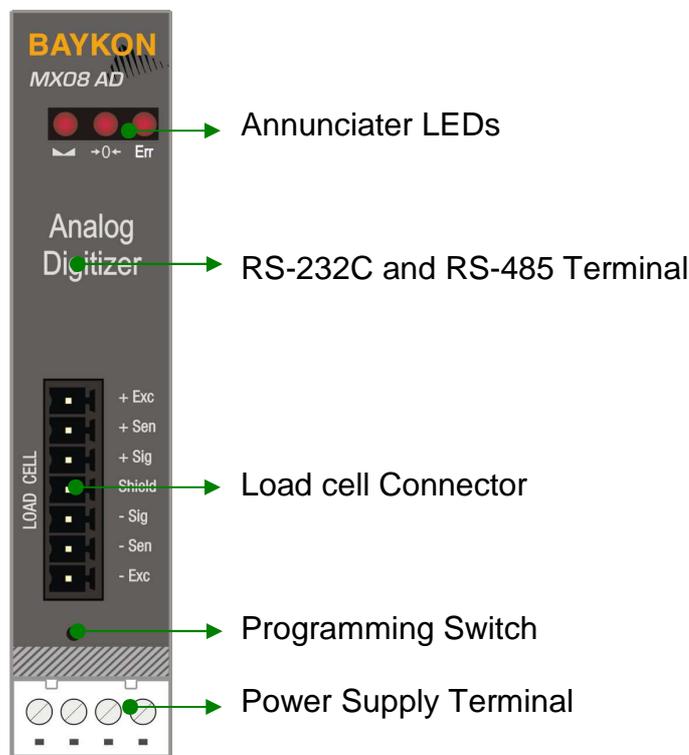


Figure 4.1 - Front view

The meanings of these LEDs in operation are given below.

LED		Operating Mode	
Symbol	Name	Weight / Force	Count
	Stable	<ul style="list-style-type: none"> ● Stable ○ Unstable (Dynamic) 	<ul style="list-style-type: none"> ⏻ Blanks for 0.3 seconds in 2 seconds period. (No stable indication)
	Centre of Zero	<ul style="list-style-type: none"> ● in the centre of zero range ($-0.25 e < w < 0.25 e$) ○ Out of centre of zero range 	<ul style="list-style-type: none"> ○ Always blank (No centre of zero indication)
Err	Error (*)	<ul style="list-style-type: none"> ● ADC conversion error ✳ Digital processing error ○ No error 	<ul style="list-style-type: none"> ● ADC conversion error ✳ Digital processing error ○ No error

○ Blank ● Light ✳ Flash ⏻ Blank for 0.3 second

(*) : Refer to the error table in Section 4.5.

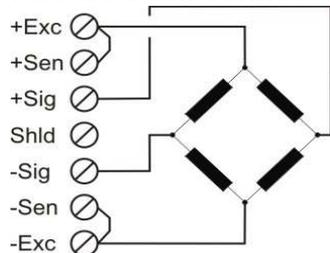
Table 4.1 - Annunciater LEDs

4.2. Electrical Connection

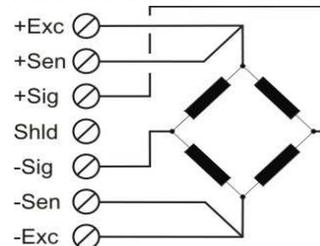
Load cell Connection:

To avoid damages, the load cell wiring should be made carefully before energizing the instrument. The input resistance of the connected load cells should fit the instrument specification you have. In 4-wire installations the sense and excitation pins with the same polarity should be short circuited at the connector side. If you have junction box in your system, use 6 wire cable between MX08 AD and the junction box, and short circuit these pins at junction box for higher accuracy.

4 wire load cell connection



6 wire load cell connection



Warning: Connect the load cell cable shield to the reference ground or shield pin of the load cell connector.

Power Supply Connection:

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in Figure 4.2. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

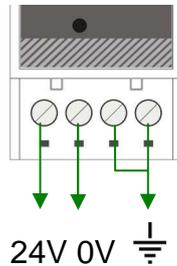


Figure 4.2 - Pin layout of 24VDC Connector

4.3. Programming and Calibration

MX08 AD instruments are programmed and calibrated by xFace software which is connected via Gateway instrument. Analog digitizer parameter values are very important for better weighing performance.

4.3.1. Setup the Scale Parameters

In setup menu, parameter values at MX08 AD can be seen, changed and saved to MX08 AD. These parameters are;

Increased External Resolution

This parameter enables to follow the weight value as 10 time higher resolution than programmed division in weighing and force mode for service engineer. Increased resolution must be disabled for usage in process.

(Not available in Count Mode)

Default is 'Disable'.

Digital Filter

Environmental noises like bounding forces, air flow, vibration, motor control instruments etc. disturb the load cell signal. The selection of proper filter determines how quickly the system will react to the load cell signal.

Load cell signal digital filtering is done according to the selected value of this parameter. This parameter values are changed from 0 (fastest settling by low filtering) to 9 (slowest settling by high filtering).

Default is '7'.

Motion Detection

This parameter defines the motion detection window which determines the weighing is stable or dynamic. If the stable weight status is not required, this parameter can be disabled.

The available motion detection window values are (Weighing / Count);

Weighing and Force Mode:

$\pm 0.3e$	$\pm 0.5e$	$\pm 1e$	$\pm 2e$	No motion detection
------------	------------	----------	----------	---------------------

Default is ' $\pm 0.5e$ '.

Count Mode:

± 60	± 100	± 200	± 400	No motion detection
----------	-----------	-----------	-----------	---------------------

Default is ' ± 100 '.

Power On Zero

This parameter enables automatic power on zeroing at the power on the instrument. This automatic zeroing is done if the total zero drift from the calibrated zero signal is in the selected range of the capacity.

The available power on zeroing windows in the percentage of the scale capacity are;

Disable	$\pm 2\%$	$\pm 10\%$
---------	-----------	------------

This parameter must be disabled or carefully programmed at the silo weighing, tank weighing or automatic weighing applications for preventing unwanted zeroing at power on.

If the weight is not in zeroing range, instrument is powered on without zeroing. (Not available in Count Mode)

Default is 'Disable'.

Zeroing Range

Zeroing of the scale is performed if the difference between load cell signal value and unloaded load cell signal value at the calibration is in the selected percentage of the scale capacity. Zeroing can be done by zeroing command when the scale is stable.

The available zeroing ranges in the percentage of the scale capacity are;

Disable	$\pm 2\%$	$\pm 20\%$	$\pm 40\%$
---------	-----------	------------	------------

Default is ' $\pm 2\%$ '.

Auto Zero Tracking

AZT automatically re-adjusts the scale to zero for compensating defined small deviations around the center of zero. AZT is uses the range of zeroing and is not performed if this range is exceeded.

(Not available in Count Mode)

The available AZT window values are;

Disable	$\pm 0,5e$	$\pm 1e$	$\pm 3e$
---------	------------	----------	----------

This parameter must be disabled or carefully programmed at the silo weighing, tank weighing and automatic weighing applications for preventing unwanted zeroing.

Default is 'Disable'.

Tare

If this function is enabled, the weight is tared when the tare command is received. Additional conditions for taring are positive gross weight and no motion. Multi-taring is possible at MX08 AD instrument.

(Not available in Count Mode)

Default is 'Enable'.

Save Tare at Power Off

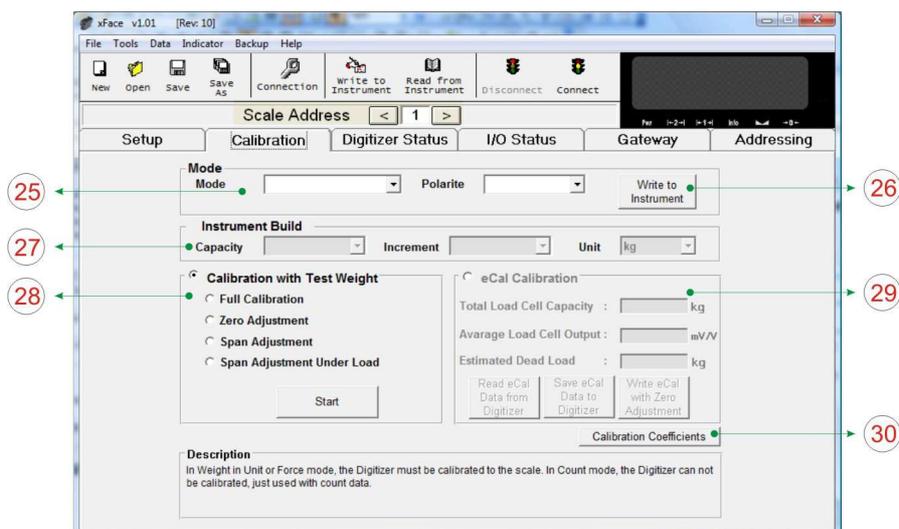
If this function is enabled, tare value is stored at power off and instrument starts up in Net mode at power on.

(Not available in Count Mode)

Default is 'Enable'.

4.3.2. Calibration

Scale build, operation mode selection and scale calibration is performed in the calibration tab of xFace as seen in Figure 4.3. Please follow the procedure described in the following sections in sequence.



25	This block allows the user to select operation mode and polarity.
26	Write to Digitizer: Click this button to save the operation mode and polarity to selected Digitizer.
27	Scale setup
28	Calibration block: This block allows the user to make calibration with test weights.

29	eCal Calibration: This block allows the user to make calibration without test weights.
30	Calibration coefficients

Figure 4.3 – Calibration

4.3.2.1. Mode Selection

MX08 AD instruments have three operation modes which are;

- Count Mode : Filtered and normalized ADC count data is transmitted in this mode. The calibration is performed at PLC, if any.
- Weighing Mode : Unipolar weight data in calibrated weighing unit is transmitted. This mode is compatible to OIML R76 and EN 45501.
- Force Mode : Bipolar or unipolar force measurement data in calibrated force unit is transmitted.

Select scale operation mode and polarity. Click *Write to Digitizer* button to save your mode selection.

Default calibration of MX08 AD instruments is Count Mode and 10 mV unipolar input signal range.

If you select the count mode, there is no scale build and instrument calibration. Each MX08 AD instrument is adjusted in production to increase the calibration accuracy. MX08 AD input signal ranges and their external resolutions are seen in Table 4.2.

Input signal range	Input Signal level	Polarity	External resolution
0 to 5 mV -5 to 5 mV	5 mV	Unipolar	1.000.000 count
		Bipolar	2.000.000 count
0 to 10 mV -10 to 10 mV	10 mV	Unipolar	1.000.000 count
		Bipolar	2.000.000 count
0 to 15 mV -15 to 15 mV	15 mV	Unipolar	1.000.000 count
		Bipolar	2.000.000 count
0 to 18 mV -18 to 18 mV	18 mV	Unipolar	1.000.000 count
		Bipolar	2.000.000 count

Table 4.2 - Count mode input signal ranges and external resolutions

Select the input signal level and polarity for high external resolution. Write your mode selection to the instrument by clicking *Write to Digitizer* button.

4.3.2.2. Scale Build

The scale capacity, increment and unit must be introduced to the MX08 AD instrument before performing calibration in Weighing and Force measurement.

Capacity : To select a new value for the scale capacity, click in the text box. Use the keyboard to enter a new value, or use drop-down menu.

Increment : Use the drop-down menu to select the increment.

Unit : Select the unit

Scale calibration can be performed by using test weights or by electronic calibration.

4.3.2.3. Calibration with test weights

This calibration method performs zero and span calibrations using test weights. Test weight value should not be less than 1/10 of the scale capacity for accurate calibration.

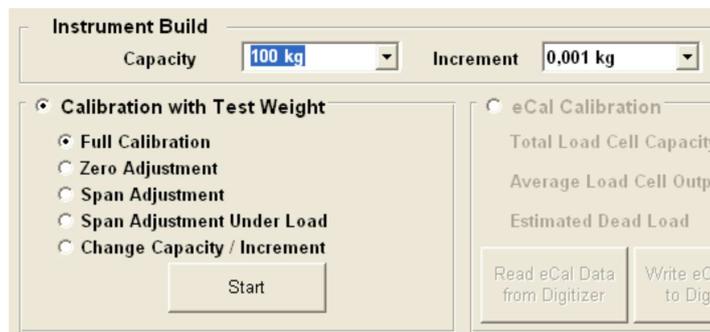


Figure 4.4 - Calibration with test weights

Please note that scale build values shall be entered before starting calibration.

Select *Full Calibration* for performing scale calibration. Click the *Start* button. Unload the scale for performing zero calibration and click *Yes* button. The virtual display will show [WAIT] message during zero calibration. During zero calibration the scale must be stable. Approximately 5 seconds later, the span calibration window is displayed. Load the scale and enter the loaded test weight value, then click *OK* button. The scale must be stable during span calibration. Approximately 5 seconds later, the new calibration settings are saved automatically.

If any error occurs during calibration, an error message warns you. Click *Yes* button to reload the previous values or click *No* button to use the new settings.

You can adjust zero or span of your scale without performing full calibration. Additionally, *span calibration to the unloaded scale* feature gives advantage to TX 2 instruments in after-sale service.

Zero Adjustment:

If your scale has a residual zero drift, you may perform only zero adjustment. Select *Zero adjustment* and press *Start* button. Then, the zero calibration window is displayed. Unload the scale and click *OK* button. The [WAIT] message appears on the virtual display during zero adjustment. Approximately 5 seconds later zero adjustment will be finalized.

Note: Zero adjustment is also performed over field bus commands. Refer to data structure of related field bus.

Span Adjustment:

If your scale has a span drift, you may perform only span adjustment. After selecting *Span adjustment* and pressing *Start* button, enter the test weight value; place the test weights on the scale and press *Yes* button. The [WAIT] message appears on the virtual display approximately for 5 seconds while span calibration is being performed. After finalizing the span adjustment, the instrument will save span coefficients automatically.

Note: Span adjustment is also performed over field bus commands. Refer to data structure of related field bus.

Span Adjustment under Load:

This feature is being used to perform span adjustment without unloading the scale. This operation is especially used for span adjustment for non-empty tanks to make span adjustment without emptying the tank. After selecting *span adjustment under load*, press *Start* button. Temporary zeroing message appears on the monitor. This means the instrument will determine the existing load as temporary zero. If the scale is stable, press *Yes* button. The [WAIT] message appears on the virtual display approximately for 5 seconds to determine temporary zero. Then, the span calibration window is displayed. Load the scale and enter the loaded test weight value, then click *OK* button. The scale must be stable in this period. Approximately 5 seconds later, the new calibration settings are saved automatically.

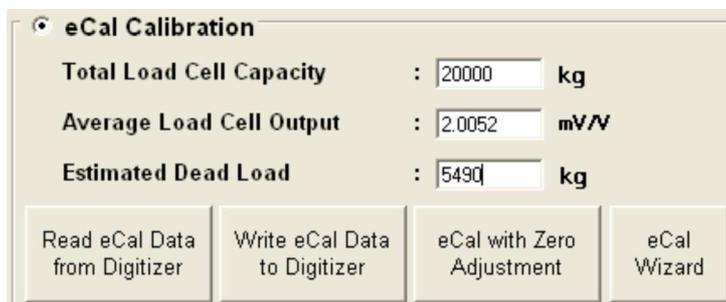
Please refer to the Section 3.7.

Change Capacity / Increment:

This feature is used to change Capacity/Increment without making re-calibration.

4.3.2.4. eCal Electronic Calibration

eCal lets you to perform calibration without using test weights. MX08 AD is adjusted in production for increasing eCal accuracy. Calibration coefficients are calculated by scale capacity, total load cell capacity, load cell output and estimated dead load values. If the conditions are convenient for zero calibration, you may perform automatic zero adjustment instead of entering estimated dead load.



eCal Calibration	
Total Load Cell Capacity	: 20000 kg
Average Load Cell Output	: 2.0052 mV/V
Estimated Dead Load	: 5490 kg
Read eCal Data from Digitizer	Write eCal Data to Digitizer
eCal with Zero Adjustment	eCal Wizard

Figure 4.5 – eCal electronic calibration

After selecting eCal calibration, enter the following values as;

Total Load cell Capacity: Enter total load cell capacity in kg as the example below.

Example: If the weighing system has 4 pcs 1000 kg load cell, enter 4000 kg.

Average Load cell Output: Enter load cell output sensitivity in mV/V. If the weighing system has more than one load cell, calculate the mean value of load cells outputs mV/V indicated on the certificates of the load cells.

Example: If load cell outputs are LC1: 2.0010, LC2: 1.9998, LC3:1.9986 and LC4:2.0002, the mean value will be

LC output = (2.0010 + 1.9998 + 1.9986 + 2.0002) ÷ 4 = 1.9999 mV/V.

Estimated Dead Load: Enter the estimated dead load value of the weighing system in kg. You may perform zero adjustment in convenient time for exact dead load compensation.

After pressing *Save eCal Data to Digitizer*, these data transferred to the instrument and eCal is finalized.

If the scale is empty and you want to make automatic zero adjustment instead of entering estimated dead load, press *eCal with Zero Adjustment* button for starting zero calibration. The display will show [WAIT] message during zero adjustment for approximately 5 seconds. In this while the scale must be unloaded and stable. eCal calibration coefficients are saved automatically.

eCal Wizard:

eCal Wizard helps the user to calculate Total Load Cell capacity and Average Load cell Output values via entering each loadcell capacity and mV/V values.

4.4. MX08 AD Status

xFace status tab provides you information of count, gross, tare, net, indication, in zero range, error, serial number, firmware revisions of MX08 AD which have the selected address. Taring, Zeroing and Clear keys are located in this tab.

4.5. Error Table

The MX08 AD instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
		Err		
			ADC Error	– Re-energize the instrument. If seen again, change the board.
			Over Load	– Check the load – Load cell or instrument could be defective
			Weight is too low	
			ADC Out: Input signal outside the input range	– Check the load – Check the calibration – Load cell or instrument could be defective
			System Error	– Re-energize the instrument. If seen again, change the board
			Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing)
			N-Bus Communication Error	– Check the Gateway instrument whether it is in system and powered on – Check the N-Bus connector whether they are installed on the rail
			High Voltage Detected	– Check the power supply that the voltage is in the required voltage range.
			Low Voltage Detected	– Check the power supply that the voltage is in the required voltage range.

○ Blank ● Light ✨ Flash ◐ Blank for 0.3 second

Table 4.3 - Error table

4.6. Diagnostic Tests

To enter load cell signal digitizing diagnostic test, press the programming switch before power on and release the switch after power on the instrument. The instrument will go in to the Load cell Signal test mode which is indicated by status of LEDs as seen below.

Test	LED's Status			Description
			Err	
Load cell signal				 LED blanks while load cell signal increases.
				 LED blanks while load cell signal decreases.

○ Blank ● Light ✨ Flash ◐ Blank for 0.3 second

Table 4.4 - Diagnostic test sequence

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

5. MX08 DP DISPLAY

MX08 DP instrument is display unit for Analog Digitizers. One of Analog Digitizer's weight/force or count data and stable, zero, net information are displayed. Also installed Analog Digitizers on the N-Bus are indicated with N-Bus address information.

Two keys are used for selecting Analog Digitizer to display weight or count data.

5.1. Front View

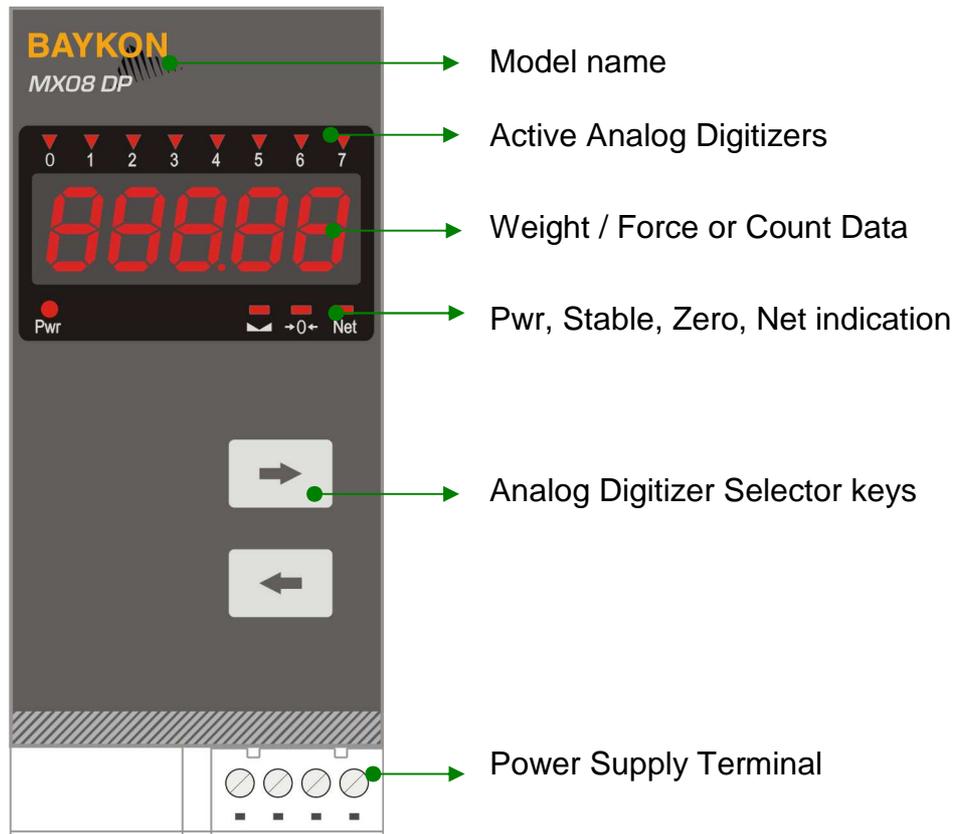


Figure 5.1 - Front panel view



Arrow keys: Selects the Analog Digitizer which is indicated with blanked LED.

The meanings of the LEDs in operation are given below.

Symbol	Name	Description
▼ 0	Active MX08 AD	○ Analog Digitizer is not installed on N-Bus ● Analog Digitizer is active ✱ Current displayed Analog Digitizer.
▾	Stable	○ Unstable (Dynamic) ● Stable
→0←	Zero	○ Out of centre of zero ● At centre of zero ($-0.25 e < w < 0.25 e$)
Net	Net	○ Gross weight ● Net weight
Pwr	Power / Digit	○ Displayed data is overflowed to 6th or 7th digit. ● Power indication

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 5.1 - Annunciater LEDs

In weight/force mode, data is displayed on the display. If weight/force data is overflowed to the 6th digit, most significant digit does not display and Pwr LED blanks.

For example: If the weight data is 123 010, Pwr LED blanks and 23010 is displayed.

In count mode, data is displayed on the display without least significant digit. If count data is overflowed to the 7th digit, most significant digit does not display and Pwr LED blanks. For example: If the count data is 1 450 000, Pwr LED blanks and 45000 is displayed.

5.2. Electrical Connection

Power Supply Connection:

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in Figure 5.2. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

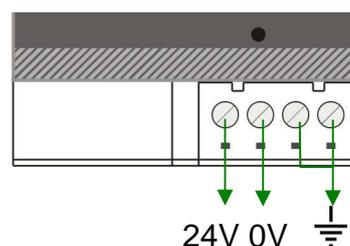


Figure 5.2 - Pin layout of MX08 DP 24VDC connector

5.3. Error Table

The MX08 instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Message	Description	Actions to take / Possible cause
-----	N-Bus Communication Error	<ul style="list-style-type: none"> – Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing). – Check the Gateway instrument whether it is in system and powered on. – Check the N-Bus connector whether they are installed on the rail.
PROG	Programming	<ul style="list-style-type: none"> – MX08 is in programming mode.
SYS	System Error	<ul style="list-style-type: none"> – Re-energize the instruments. If seen again, change the board of related instrument.
ADC	ADC Error	<ul style="list-style-type: none"> – Check the load on MX08 AD. – Check the calibration of MX08 AD. – Load cell or instrument could be defective. – Re-energize the instrument. If seen again, change the board.
OVER	Over load	<ul style="list-style-type: none"> – Check the load of MX08 AD. – Check the calibration of MX08 AD. – Load cell or instrument could be defective.
UNDER	Weight is too low	

Table 5.2 - Error table

6. MX08 IO 4-INPUT / 4-OUTPUT

MX08 IO instrument has 4 opto-isolated digital inputs and 4 digital relay outputs. All over the I/O control is done over field bus communication or xFace connection. Refer to data structures of related gateway section for input output commands. For example, if Profibus is used for gateway communication, all input and output conditions are changed over Profibus commands.

6.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (Refer to Section 3.9).

The status of the instrument is announced by different lights (refer to Table 6.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 6.4 for detailed error descriptions.

Power and I/O terminals are located at the front of the DIN rail mount instrument as seen in Figure 6.1.

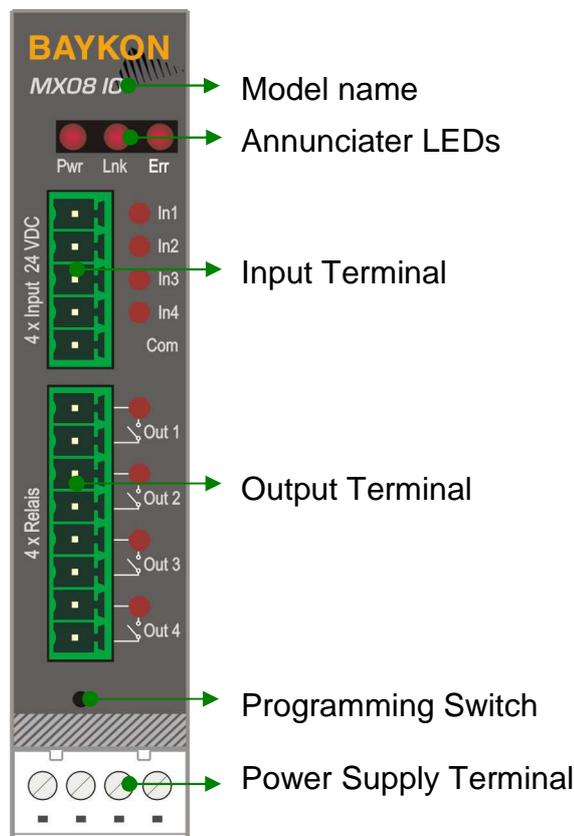


Figure 6.1 - Front panel view

The meanings of the annunciator LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 IO not powered. Check power cable. <input checked="" type="radio"/> MX08 IO powered.
Lnk	Link	<input checked="" type="radio"/> Input/output state changed
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 6.4

Blank
 Light
 ✱ Flash
 Blank for 0.3 second

(*) : Refer to the error table in Section 6.4.

Table 6.1 - Annunciater LEDs

6.2. Electrical Connection

Digital I/O Connections

MX08 IO unit has the input and output connectors on the front of the instrument. Figure 6.2 helps to user to make I/O connections. The outputs are free contact and the inputs are opto-isolated.

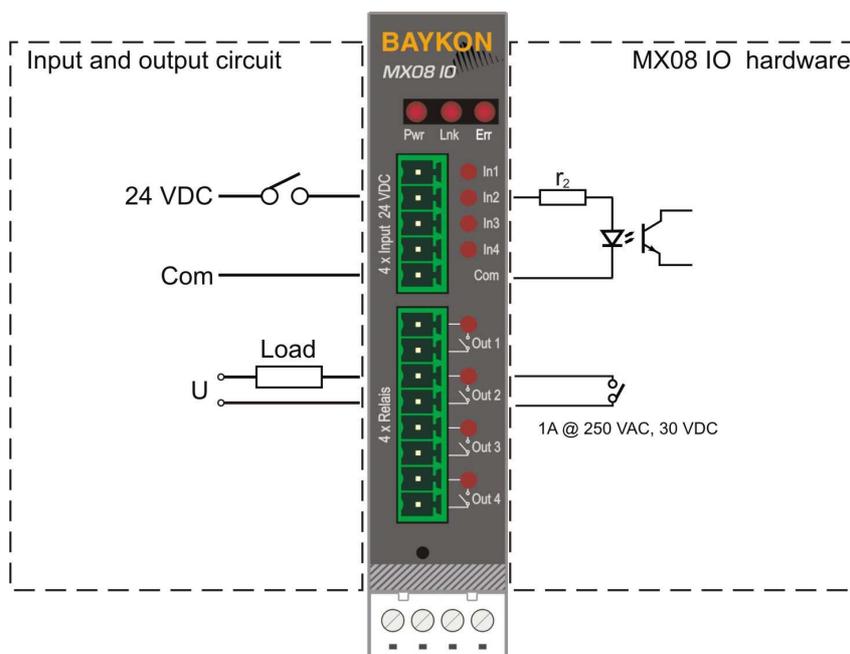


Figure 6.2 - Input / Output connection

Power Supply Connection:

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in Figure 6.3. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

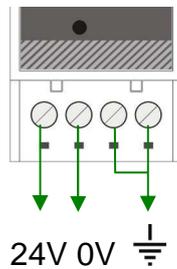


Figure 6.3 - Pin layout of MX08 IO 24 VDC connector

6.3. MX08 IO Status

MX08 IO instruments are followed by xFace software which is connected via Gateway instrument. xFace status tab provides you information of input and output status. Additionally, I/O test function helps you to change output conditions. Be careful while changing output conditions to not to damage your devices connected to outputs. Or unplug output connector before output testing.

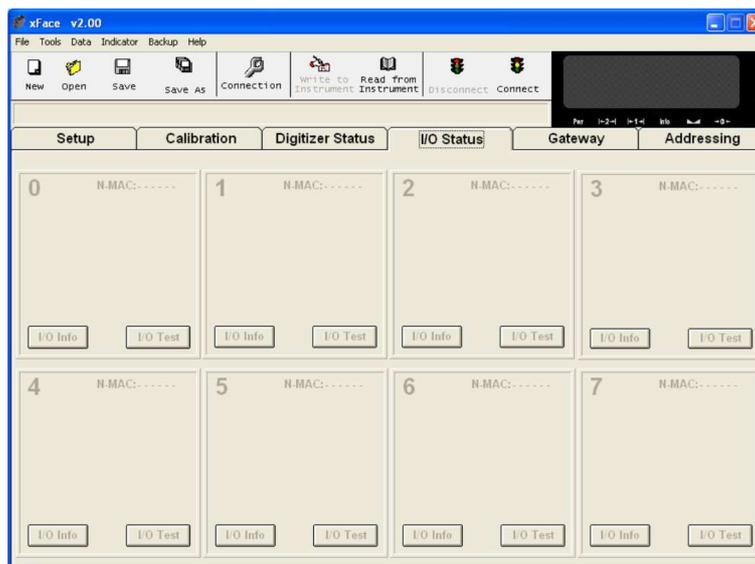


Figure 6.4 - MX08 IO Status

6.4. Error Table

The MX08 IO instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	N-Bus Communication Error	– Check the Gateway instrument whether it is in system and powered on. – Check the internal bus connector whether it is installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 6.2 - Error Table

7. MX08 MB MODBUS RTU GATEWAY

MX08 MB gateway instrument integrates up to 8 pcs Analog Digitizer device and up to 8 pcs Input / Output device to Modbus-RTU field bus. MX08 MB instrument communicates with other MX08 instruments via internal data bus N-Bus and responses to the PLC very fast via Modbus RTU.

7.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (refer to Section 3.9) and for diagnostic tests (refer to Section 7.7).

The status of the instrument is announced by different lights (refer to Table 7.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 7.6 for detailed error descriptions.

Power and serial interface terminals are located at the front of the DIN rail mount instrument as seen in Figure 7.1.

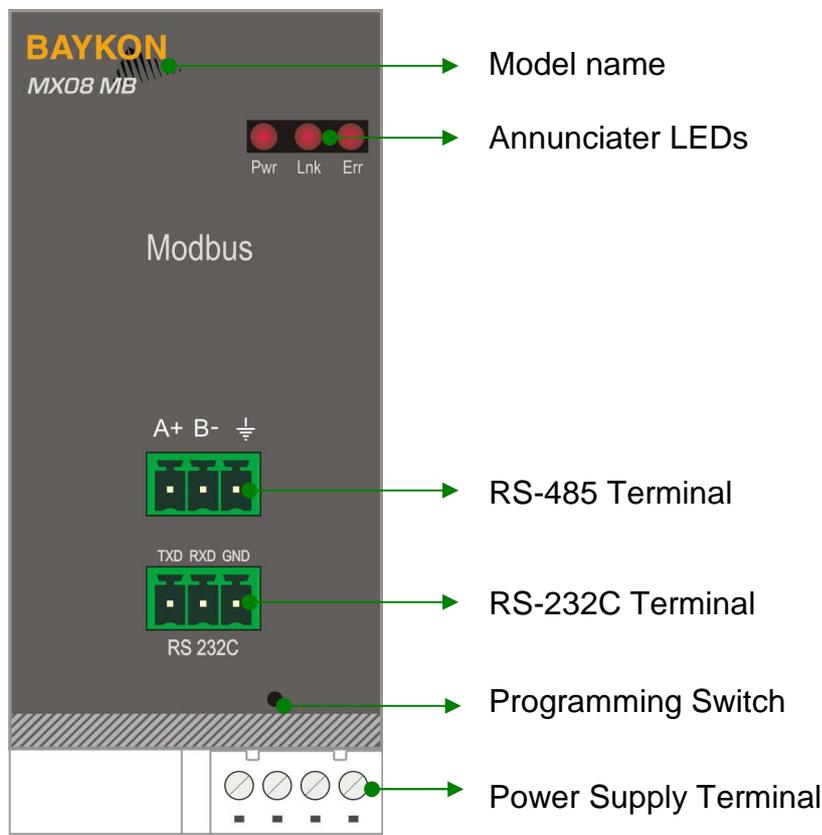


Figure 7.1 - Front View

The meanings of the annunciater LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 MB is not powered. Check power cable. <input checked="" type="radio"/> MX08 MB is powered.
Lnk	Link	<input type="radio"/> No data transmission done. <input checked="" type="radio"/> Data transmission done to xFace or Modbus-RTU
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 7.6.

Blank
 Light
 ✨ Flash
 ⏸ Blank for 0.3 second

Table 7.1 - Annunciater LEDs

7.2. Electrical Connection

RS-485 and RS-232C and power supply terminals pin configurations are shown in Figure 7.2.

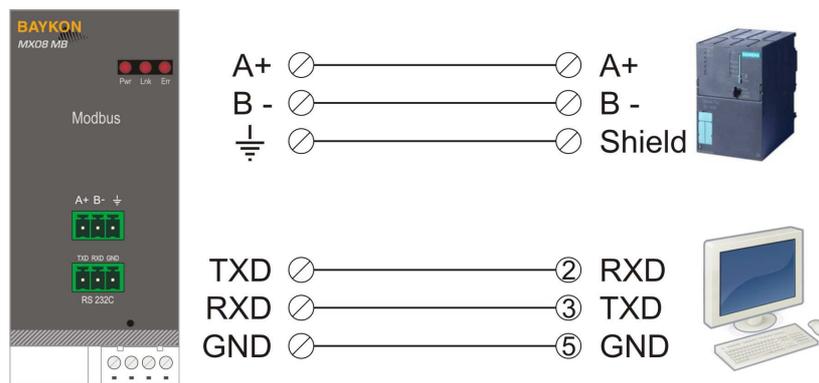


Figure 7.2 MX08 MB serial interface connections

RS-232C Serial interface

Usage	Interfacing with PC, programming the MX08 system (xFace), BSI interface with PC or PLC.
Data formats	BSI (*) (Refer to Section 3.11) Modbus RTU High-Low (Refer to Section 7.5) Modbus RTU Low-High (Refer to Section 7.5)
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1stop bit

(*) : Default

RS-485 Serial interface

Usage	Interfacing with PC or PLC
Data formats	BSI (Refer to Section 3.11) Modbus RTU High-Low (*) (Refer to Section 7.5) Modbus RTU Low-High (Refer to Section 7.5)
Baud rate	1200 / 2400 / 4800 / 9600 (*) / 19200 / 38400 / 57600 bps
Length and parity	8 None 1 (*), 7 Odd 1, 7 Even 1
Start / Stop bits	1 start bit and 1 stop bit

(*) : Default

Warning: Connect the shield to the reference ground or shield pin of the power connector.

Warning: Disconnect xFace PC software for Modbus-RTU interfacing.

Power Supply Connection

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in figure below. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

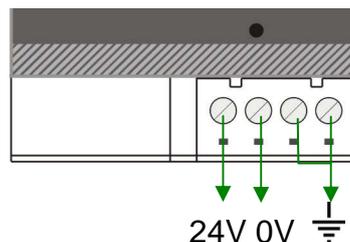


Figure 7.3 - Pin layout of MX08 MB 24 VDC connector

7.3. N-Bus Addressing

MX08 instruments communicate each other over internal data bus which is called N-Bus. MX08 gateway instrument is master of N-Bus. All other instruments are slave and shall be addressed to gateway.

N-Bus addressing can be done by using xFace PC software (refer to Section 3.3) or via programming switch (refer to Section 3.9).

7.4. Modbus RTU Setup

MX08 gateway set up is done by xFace software as described in this section. Connect MX08 MB instrument to your PC via RS-232C service port on the instrument as indicated in Figure 7.2.

Select Gateway tab after connecting xFace to MX08 MB. Gateway tab is seen in figure below. You will see the gateway information and Modbus-RTU parameters in this tab.

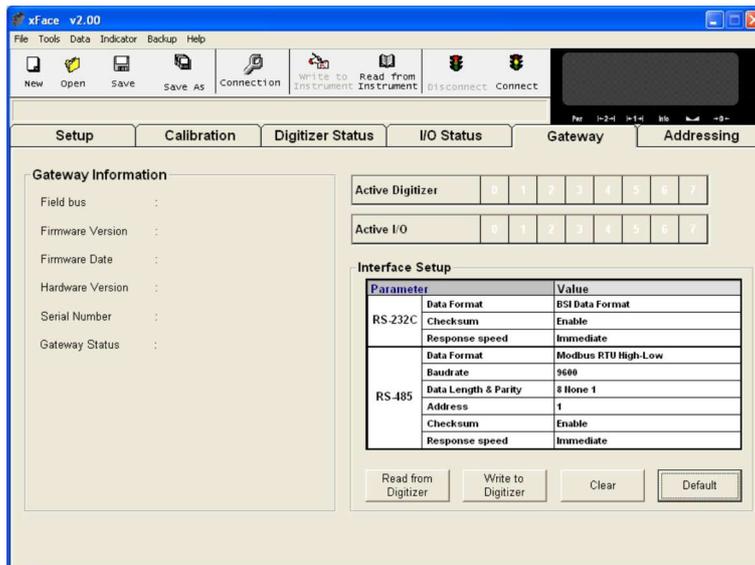


Figure 7.4 - Modbus RTU setup

7.4.1. Modbus RTU Parameters

RS-485 and RS-232C serial port parameters are data format, baudrate, parity and address.

RS-232C Data Format

This parameter programs the RS-232C communication port data format. The available data formats are;

- Disable : No data will be transmitted. Select disable if this port is not used.
- BSI : Communicates in BSI data format as a slave. Refer to 'Refer to Section 3.11' for details.
- Modbus RTU High-Low : Modbus RTU communication. Refer to *Section 7.5* for details.
- Modbus RTU Low-High : Modbus RTU communication. Refer to *Section 7.5* for details.

Note: xFace automatically connects to the instrument whatever the data format is. After xFace disconnection, the instrument returns to run with last saved data format.

Warning: Disable this interface if it is not used to increase the interfacing performance.

Default is 'BSI'.

RS-232C Checksum

The checksum can be enabled or disabled from BSI data format. The checksum calculation can be found in the related data format description.

Default is 'Enable'.

Response Speed

Response speed can be selected as “immediate” or “20 msec” for Modbus RTU data format.

- Immediate : Modbus RTU Answer is sent immediately after Request is received.
- 20 msec : Modbus RTU Answer is delayed 20 msec after Request is received.
This property is very helpful for slow PLC systems.

Default is 'immediate'.

RS-485 Data Format

This parameter programs the RS-485 communication port data format. The available data formats are;

- Disable : No data will be transmitted. Select disable if this port is not used.
- BSI : Communicates in BSI data format as a slave. Refer to 'Refer to Section 3.11' for details.
- Modbus RTU High-Low : Modbus RTU communication. Refer to *Section 7.5* for details.
- Modbus RTU Low-High : Modbus RTU communication. Refer to *Section 7.5* for details.

Note: xFace automatically connects to the instrument whatever the data format is. After xFace disconnection, the instrument returns to run with last saved data format.

RS-485 Baud rate

One of the following baudrate is selected for RS-485 communication port.

1200	2400	4800	9600
19200	38400	57600	

Default is '9600'.

RS-485 Data Length & Parity

The data length and parity can be selected as 8 None 1, 7 Odd 1 or 7 Even 1.

Default is '8 None 1'.

RS-485 Address

The Modbus-RTU slave addresses are from 1 to 31.
BSI data structure slave addresses are from 0 to 9.

Default is '01'.

RS-485 Checksum

The checksum can be enabled or disabled from BSI data format. The checksum calculation can be found in the related data format description.

Default is 'Enable'.

Response Speed

Response speed can be selected as "immediate" or "20 msec" for Modbus RTU data format.

- Immediate : Modbus RTU Answer is sent immediately after Request is received.
- 20 msec : Modbus RTU Answer is delayed 20 msec after Request is received.
This property is very helpful for slow PLC systems.

Default is 'immediate'.

7.4.2. Modbus Information

xFace Gateway information block in Gateway tab allows the user to know much information about gateway instrument as in the following;

Field bus: Modbus RTU

Firmware Version: Revision number of firmware

Firmware Date: Generated firmware date

Hardware Version: Revision number of main pcb board.

Serial Number: Instrument's serial number.

Gateway Status: Follow the status whether the system is proper or not.

7.5. Modbus RTU Data Structure

The Modbus slave address is defined in the RS-485 Address in Section 7.4.1. Functions code '0x03' and function code '0x10' are supported. Make the RS-485 connection settings in Section 7.2.

Modbus RTU High-Low: In two word registers, the data is stored to the registers in big-endian format. Least significant word is stored to the highest register address; and most significant word is stored to the lowest register address.

Modbus RTU Low-High: In two word registers, the data is stored to the registers in little-endian format. Least significant word is stored to the lowest register address; and most significant word is stored to the highest register address.

Write operations can only be done to the allowed registers. And they are indicated as W or W/R. Do not try to write 'only read' registers indicated as R. The below Modbus table identifies MX08 AD and MX08 IO instruments' N-Bus address as [X].

Please find Modbus information in the web site of <http://www.modbus.org>

Examples:

Performing Read and Write operations according (Modbus RTU High-Low) to hex system with the MX08 MB set to address '0x01'.

Indicated value of MX08 AD [0] at register start address 41006

Request : 01, 03, 03, ED, 00, 02, 54, 7A
Answer : 01, 03, 04, 00, 00, 27, 10, E0, 0F
Indicated : 2710 hex (10000 dec)

Status, Indicated, Gross and Tare values of MX08 AD [0] at register 41005 - 41011.

Request : 01, 03, 03, EC, 00, 07, C5, B9
Answer : 01, 03, 0E, 01, 0A, 00, 00, 10, E2, 00, 00, 14, CA, 00, 00, 03, E8, BD, 55
Status : 010A hex
Indicated : 000010E2 hex (4322 dec)
Gross : 000014CA hex (5322 dec)
Tare : 000003E8 hex (1000 dec)

Indicated value of MX08 AD [5] at register start address 41041

Request : 01, 03, 04, 10, 00, 02, C4, FE
Answer : 01, 03, 04, 00, 04, BF, 21, 0B, DA
Indicated : 0004BF21 hex (311073 dec)

Status, Indicated, Gross and Tare values of MX08 AD [5] at register 41040 - 41046.

Request : 01, 03, 04, 0F, 00, 07, 35, 3B
Answer : 01, 03, 0E, 04, 22, 00, 04, BF, 38, 00, 04, BF, 38, 00, 00, 00, 00, 7D, EF
Status : 0422 hex
Indicated : 0004BF38 hex (311096 dec)
Gross : 0004BF38 hex (311096 dec)
Tare : 00000000 hex (0 dec)

Read inputs of MX08 IO [0] at register 41071.

Request : 01, 03, 04, 2E, 00, 01, E5, 33
Answer : 01, 03, 02, 05, 0D, 7A, D1
Inputs : 0D hex (1011 binary)
Outputs : 05 hex (0101 binary)

Set all outputs of MX08 IO [0] at register 41071.

Request : 01, 10, 04, 2E, 00, 01, 02, 00, 0F, A5, DA

Answer : 01, 10, 04, 2E, 00, 01, 60, F0

Outputs activated.

Zeroing MX08 AD [0] at register 41062.

Request : 01, 10, 04, 25, 00, 01, 02, 00, 01, 25, 65

Answer : 01, 10, 04, 25, 00, 01, 11, 32

MX08 AD [0] is zeroed.

Zeroing MX08 AD [1] at register 41063.

Request : 01, 10, 04, 26, 00, 01, 02, 00, 01, 25, 56

Answer : 01, 10, 04, 26, 00, 01, E1, 32

MX08 AD [1] is zeroed.

Taring MX08 AD [0] at register 41062.

Request : 01, 10, 04, 25, 00, 01, 02, 00, 02, 65, 64

Answer : 01, 10, 04, 25, 00, 01, 11, 32

MX08 AD [0] is tared.

Taring MX08 AD [1] at register 41063.

Request : 01, 10, 04, 26, 00, 01, 02, 00, 02, 65, 57

Answer : 01, 10, 04, 26, 00, 01, E1, 32

MX08 AD [1] is tared.

Zero Calibration of MX08 AD [0].

Request : 01, 03, 04, 66, 00, 01, 65, 25 (Read status; it must be in ready status)

Answer: 01, 03, 02, 00, 01, 79, 84 (MX08 AD [0] is in ready status; zero calibration can be performed)

Request : 01, 10, 04, 63, 00, 01, 02, 00, BC, EB, B2 (Zero calibration command)

Answer : 01, 10, 00, 6D, 00, 01, 90, 14

Request : 01, 03, 04, 66, 00, 01, 65, 25 (Read status; it must be in ready status)

Answer : 01, 03, 02, 00, 01, 79, 84 (If it changed "zeroing" to "ready" status, zero calibration is performed successfully.)

Span Calibration of MX08 AD [0].

Request : 01, 03, 04, 66, 00, 01, 65, 25 (Read status; it must be in ready status)

Answer : 01, 03, 02, 00, 01, 79, 84 (MX08 AD [0] is in ready status; span calibration can be performed)

Request : 01, 10, 04, 63, 00, 03, 06, 00, DC, 00, 00, 0B, B8, D6, 90

(Span calibration command with 3000 (0x0BB8 hex) span value)

Answer : 01, 10, 00, 6D, 00, 03, 11, D5

Request : 01, 03, 04, 66, 00, 01, 65, 25 (Read status; it must be in ready status)

Answer : 01, 03, 02, 00, 01, 79, 84 (If it changed "span calb" to "ready" status, span calibration is performed successfully.)

Exception codes:

1: Function code is not supported

2 : Received data address is not in allowable address range

3 : Invalid value entrance or wrong byte number

4 : Operation error

MX08 MB Modbus RTU Command Set 1:

The below register table is used for MX08 AD[0].

Address	R/W	Word	Command	Description			
40001	R	2	Weight / Force / Count Data				
40003	R	1	Status	D0	0 – System Ready 1 – System Busy		
				D1	0 – Error 1 – Data ok		
				D2	0 – Weight Stable 1 – Weight unstable		
				D3	0 – Gross Mode 1 – Net mode		
				D4	Not in use		
				D5	0 – Weight / Force 1 – Count Mode		
				D6 .. D11	Not in use		
				D12	0 – Out of zero range 1 – Weight is in zero range		
				D13 D14 D15	Error Code	0	No Errors
						1	ADC out of range
2	ADC overrange						
3	ADC underrange						
4	System error						
5	In programming mode						
6	Power supply is not in required voltage range						
7	No instrument found						
40004	R	2	Tare Weight				
40006	R	2	Gross Weight				
40008	R	1	Status	Motion, Net mode, Data ok, (image of register 40003)			
40009	R/W	1	Control	0	None		
				1	Zero		
				2	Tare		
				3	Clear		
40010	R/W	1	Calibration	0	None		
				188	Adjust Zero Calibration		
				220	Adjust Span Calibration		
40011	R/W	2	Span Calibration Value				
40013	R	1	Calibration Status	D0 .. D7	1	System ready for calibration	
					3	Zero calibration in process	
				Calibration Process Status	4	Span calibration in process	
					9	Error (Refer to D8 .. D15)	
			D8 .. D15	Calibration Errors	1	Calibration Timeout - Restart calibration	
					2	ADC Error - Re-energize the instrument	
					3	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument	
					34	Instrument can not be calibrating - Load cell signal is very low or too high	

					35	Calibration Error - Calibration test weight is not enough - Increase calibration weight value (40011) - Check load cell connections
					37	Scale unstable - Wait until scale becomes stable - Check grounding wiring
40014	R/W	1	Operation Mode Selection	0	Count Mode Unipolar	
				1	Count Mode Bipolar	
				2	Force Mode Unipolar	
				3	Force Mode Bipolar	
				4	Weight Mode (Unipolar)	
40015	R/W	1	Operation mV of Count Mode	0	5 mV	
				1	10 mV	
				2	15 mV	
				3	18 mV	
40016	R/W	1	Digital Filters	0	Fast	
				.	.	
				.	.	
				9	Slow	
40034	R	1	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 V increment. For example: 23.4 VDC is indicated as 234 value.		

All MX08 AD uses the same register table like above.

Starting register address of all MX08 AD:

MX08 AD[0]: 40001
MX08 AD[1]: 40101
MX08 AD[2]: 40201
MX08 AD[3]: 40301
MX08 AD[4]: 40401
MX08 AD[5]: 40501
MX08 AD[6]: 40601
MX08 AD[7]: 40701

MX08 MB Modbus RTU Command Set 2:

The below command set is recommended for fast communication.

Address	R/W	Word	Command	Description		
41001	R	1	System Status of MX08 AD and MX08 DP	D0	00: No instrument found	
				D1	01: 0 addressed MX08 AD is active	
				D2	00: No instrument found	
				D3	01: 1 addressed MX08 AD is active	
				D4	00: No instrument found	
				D5	01: 2 addressed MX08 AD is active	
				D6	00: No instrument found	
				D7	01: 3 addressed MX08 AD is active	
				D8	00: No instrument found	
				D9	01: 4 addressed MX08 AD is active	
				D10	00: No instrument found	
				D11	01: 5 addressed MX08 AD is active	
				D12	00: No instrument found	
				D13	01: 6 addressed MX08 AD is active	
				D14	00: No instrument found	
D15	01: 7 addressed MX08 AD is active					
41002	R	1	System Status of MX08 IO	D0	IO [0]	00 = 0 addressed no instrument found
				D1		01 = 0 addressed 4I / 4O is active
				D2	IO [1]	10 = 0 addressed 8I is active
				D3		11 = 0 addressed 8O is active
				D4	IO [2]	00 = 1 addressed no instrument found
				D5		01 = 1 addressed 4I / 4O is active
				D6	IO [3]	10 = 1 addressed 8I is active
				D7		11 = 1 addressed 8O is active
				D8	IO [4]	00 = 2 addressed no instrument found
				D9		01 = 2 addressed 4I / 4O is active
				D10	IO [5]	10 = 2 addressed 8I is active
				D11		11 = 2 addressed 8O is active
				D12	IO [6]	00 = 3 addressed no instrument found
				D13		01 = 3 addressed 4I / 4O is active
				D14	IO [7]	10 = 3 addressed 8I is active
D15	11 = 3 addressed 8O is active					
41003	R	1	MX08 MB Gateway Status	D0	System fail	
				D1	Eeprom fail	
				D2	Field bus communication error	

				D3	An instrument is installed/removed in/from system			
				D4	Any instrument is not found in system			
				D5	Not in use			
				.. D15				
41004	W	1	Not used					
41005	R	1	MX08 AD [0] Status	D0	0 – System Ready	1 – System Busy		
				D1	0 – Error	1 – Data OK		
				D2	0 – Weight Stable	1 – Weight not stable		
				D3	0 – Gross Mode	1 – Net mode		
				D4	Not in use			
				D5	0 – Weight/Force Mode	1 – Count Mode		
				D6	Not in use			
				.. D11				
				D12	0 – Out of Zero Range	1 – In Zero Range		
				D13 D14 D15	Error code	0	No Error	
						1	ADC out	
	2	ADC over						
	3	ADC under						
	4	System error						
	5	In programming mode						
	6	Power supply is not in required voltage range						
	7	No instrument found						
41006	R	2	MX08 AD [0] Indicated Weight					
41008	R	2	MX08 AD [0] Gross Weight					
41010	R	2	MX08 AD [0] Tare Weight					
41012	R	1	MX08 AD [1] Status					
41013	R	2	MX08 AD [1] Indicated Weight					
41015	R	2	MX08 AD [1] Gross Weight					
41017	R	2	MX08 AD [1] Tare Weight					
41019	R	1	MX08 AD [2] Status					
41020	R	2	MX08 AD [2] Indicated Weight					
41022	R	2	MX08 AD [2] Gross Weight					
41024	R	2	MX08 AD [2] Tare Weight					
41026	R	1	MX08 AD [3] Status					
41027	R	2	MX08 AD [3] Indicated Weight					
41029	R	2	MX08 AD [3] Gross Weight					
41031	R	2	MX08 AD [3] Tare Weight					
41033	R	1	MX08 AD [4] Status					
41034	R	2	MX08 AD [4] Indicated Weight					
41036	R	2	MX08 AD [4] Gross Weight					
41038	R	2	MX08 AD [4] Tare Weight					
41040	R	1	MX08 AD [5] Status					
41041	R	2	MX08 AD [5] Indicated Weight					
41043	R	2	MX08 AD [5] Gross Weight					
41045	R	2	MX08 AD [5] Tare Weight					
41047	R	1	MX08 AD [6] Status					
41048	R	2	MX08 AD [6] Indicated Weight					
41050	R	2	MX08 AD [6] Gross Weight					

41052	R	2	MX08 AD [6] Tare Weight				
41054	R	1	MX08 AD [7] Status				
41055	R	2	MX08 AD [7] Indicated Weight				
41057	R	2	MX08 AD [7] Gross Weight				
41059	R	2	MX08 AD [7] Tare Weight				
41061	W	1	Not used				
41062	R/W	1	MX08 AD [0] Commands	00	None		
				01	Zero		
				02	Tare		
				03	Clear		
				04	Not in use		
				.. 07			
41063	R/W	1	MX08 AD [1] Commands				
41064	R/W	1	MX08 AD [2] Commands				
41065	R/W	1	MX08 AD [3] Commands				
41066	R/W	1	MX08 AD [4] Commands				
41067	R/W	1	MX08 AD [5] Commands				
41068	R/W	1	MX08 AD [6] Commands				
41069	R/W	1	MX08 AD [7] Commands				
41070	W	1	Not used				
41071	R/W	1	MX08 IO [0] I/O Control		4 Input 4 Output	8 Input	8 Output
				D0	Input 1	Input 1	
				D1	Input 2	Input 2	
				D2	Input 3	Input 3	
				D3	Input 4	Input 4	
				D4		Input 5	
				D5		Input 6	
				D6		Input 7	
				D7		Input 8	
				D8	Output 1		Output 1
				D9	Output 2		Output 2
				D10	Output 3		Output 3
				D11	Output 4		Output 4
				D12			Output 5
				D13			Output 6
				D14			Output 7
D15			Output 8				
41072	R/W	1	MX08 IO [1] Control				
41073	R/W	1	MX08 IO [2] Control				
41074	R/W	1	MX08 IO [3] Control				
41075	R/W	1	MX08 IO [4] Control				
41076	R/W	1	MX08 IO [5] Control				
41077	R/W	1	MX08 IO [6] Control				
41078	R/W	1	MX08 IO [7] Control				
41079	W	1	Not used				
41080	R	1	MX08 AD [0] Status				
41081	R	2	MX08 AD [0] Indicated Weight				
41083	R	1	MX08 AD [1] Status				
41084	R	2	MX08 AD [1] Indicated Weight				
41086	R	1	MX08 AD [2] Status				
41087	R	2	MX08 AD [2] Indicated Weight				
41089	R	1	MX08 AD [3] Status				
41090	R	2	MX08 AD [3] Indicated Weight				
41092	R	1	MX08 AD [4] Status				

41093	R	2	MX08 AD [4] Indicated Weight			
41095	R	1	MX08 AD [5] Status			
41096	R	2	MX08 AD [5] Indicated Weight			
41098	R	1	MX08 AD [6] Status			
41099	R	2	MX08 AD [6] Indicated Weight			
41101	R	1	MX08 AD [7] Status			
41102	R	2	MX08 AD [7] Indicated Weight			
41104	W	1	Not used			
41105	R	1	All MX08 AD Status in Zero, Motion	D0	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [0]
				D1	0 – Weight Stable 1– Unstable	
				D2	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [1]
				D3	0 – Weight Stable 1– Unstable	
				D4	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [2]
				D5	0 – Weight Stable 1– Unstable	
				D6	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [3]
				D7	0 – Weight Stable 1– Unstable	
				D8	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [4]
				D9	0 – Weight Stable 1– Unstable	
				D10	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [5]
				D11	0 – Weight Stable 1– Unstable	
				D12	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [6]
				D13	0 – Weight Stable 1– Unstable	
				D14	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [7]
D15	0 – Weight Stable 1– Unstable					
41106	R	1	All MX08 AD Status in Okay, Active	D0	0 – Error 1 – Data Ok	MX08 AD [0]
				D1	0 – Not in system 1 – Active	
				D2	0 – Error 1 – Data Ok	MX08 AD [1]
				D3	0 – Not in system 1 – Active	
				D4	0 – Error 1 – Data Ok	MX08 AD [2]
				D5	0 – Not in system 1 – Active	
				D6	0 – Error 1 – Data Ok	MX08 AD [3]
				D7	0 – Not in system 1 – Active	
				D8	0 – Error 1 – Data Ok	MX08 AD [4]
				D9	0 – Not in system 1 – Active	
				D10	0 – Error 1 – Data Ok	MX08 AD [5]
				D11	0 – Not in system 1 – Active	
				D12	0 – Error 1 – Data Ok	MX08 AD [6]
				D13	0 – Not in system 1 – Active	
				D14	0 – Error 1 – Data Ok	MX08 AD [7]
D15	0 – Not in system 1 – Active					
41107	R	2	MX08 AD [0] Indicated Weight			
41109	R	2	MX08 AD [1] Indicated Weight			
41111	R	2	MX08 AD [2] Indicated Weight			
41113	R	2	MX08 AD [3] Indicated Weight			
41115	R	2	MX08 AD [4] Indicated Weight			
41117	R	2	MX08 AD [5] Indicated Weight			
41119	R	2	MX08 AD [6] Indicated Weight			
41121	R	2	MX08 AD [7] Indicated Weight			

7.6. Error Table

The MX08 MB gateway instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	No Instrument Found	– Install MX08 AD or MX08 IO instruments to the system. – Check the N-BUS connector whether they are installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 7.2 - Error table

7.7. Diagnostic Tests

RC-232C and RS-485 serial interface tests can be performed sequentially in this test menu.

For entering diagnostic test mode, press the programming switch before power on and release the switch after power on the instrument. The instrument will go into RS-232C RXD test mode which is indicated by lighted Pwr LED and flashed Err LED as seen below. The status of LEDs on the front panel indicates test steps and the test result as described below. You can go to the next test by pressing the programming switch.

Test	LED's Status			Description
	Pwr	Lnk	Err	
RS-232C RxD	◐	○	✱	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go next test.
RS-232C TxD	◐	✱	✱	'A' to 'Z' characters are send sequentially in 0.8 s period. If the same data is received, Pwr LED blanks 0.3 sec. Press programming switch to go following test.
RS-485 RD	◐	○	○	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go following test.
RS-485 TD	●	✱	○	'A' to 'Z' characters are send sequentially in 0.8 sec period. Press programming switch to go following test.
○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second				

Table 7.3 - Diagnostic test sequence

If you short circuit RXD and TXD pins on RS-232C port and go in to TxD test, the receiving data is shown by Pwr LED.

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

8. MX08 PB PROFIBUS DP GATEWAY

MX08 PB gateway instrument integrates up to 8 pcs Analog Digitizer device and up to 8 pcs Input / Output device to Profibus field bus. MX08 PB instrument communicates with other MX08 instruments via internal data bus N-Bus and responses to the PLC very fast via Profibus.

MX08 PB instrument GSD file is available in CD which is supplied together with the instrument.

8.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (refer to Section 3.9) and for diagnostic tests (refer to Section 8.7).

The status of the instrument is announced by different lights (refer to Table 8.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 8.6 for detailed error descriptions.

Power and serial interface terminals are located at the front of the DIN rail mount instrument as seen in Figure 8.1.

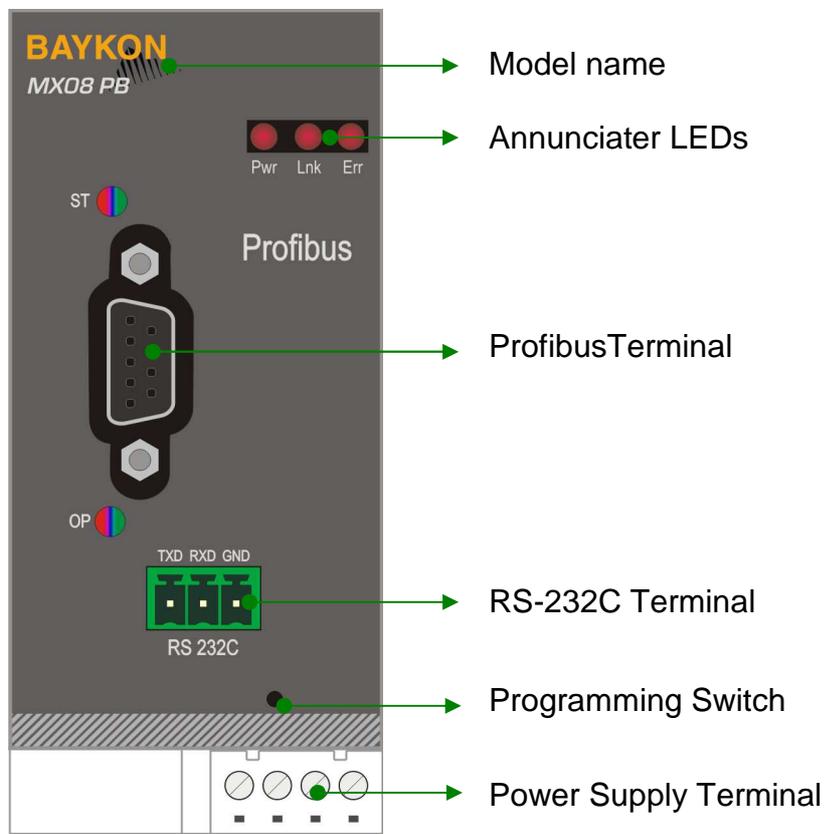


Figure 8.1 - Front View

The meanings of the annunciater LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 PB not powered. Check power cable. <input checked="" type="radio"/> MX08 PB powered.
Lnk	Link	<input type="radio"/> No data transmission done. <input checked="" type="radio"/> Data transmission done to xFace or Profibus
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 8.6.

Blank
 Light
 Flash
 Blank for 0.3 second

Table 8.1 - Annunciater LEDs

ST Status LED

State	Indication	Comment
Off	Not power or not initialized	No power or profibus module is in initialization state
Green	Initialized	
Flashing Green	Initialized, diagnostic event(s) present	Diagnostic is active
Red	Exception error	There is an exception error

OP Operation mode LED

State	Indication	Comment
Off	Not online /No power	Check power and cable
Green	On-line, data exchange	-
Flashing Green	On-line, clear	-
Flashing Red (2 flash)	PROFIBUS configuration error	Check GSD file configuration.

8.2. Electrical Connections

Profibus, RS-232C and power supply terminals are shown in Figure 8.1.

PROFIBUS Connector (DB9F)

Pin	Signal	Description
1	-	-
2	-	-
3	B Line	Positive RxD / TxD, RS-485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5V Bus Output	+5V termination power (isolated)
7	-	-
8	A Line	Negative RxD / TxD, RS-485 level
9	-	-
Housing	Cable Shield	Ground

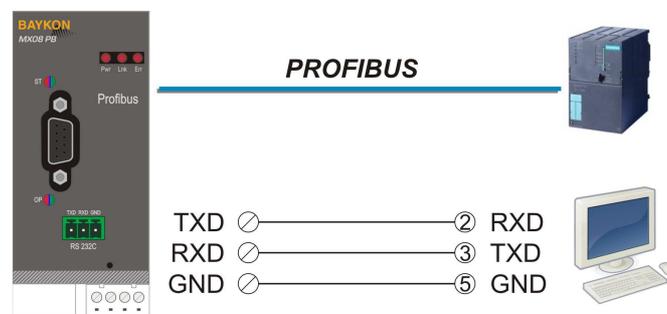


Figure 8.2 - MX08 PB serial interface connections

RS-232C Serial interface

Usage	Used for service port (xFace)
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1 stop bit

Profibus-DP interface

Usage	Interfacing with PC or PLC
Data formats	Profibus
Baud rate	Automatically detected and supported baud rates are 9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5Mbps, 3 Mbps, 6 Mbps and 12 Mbps. No 'baud rate' instance exists.

Warning: Connect the shield to the reference ground or shield pin of the power connector.

Warning: Disconnect xFace PC software for Profibus interfacing.

Power Supply Connection

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in figure below. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

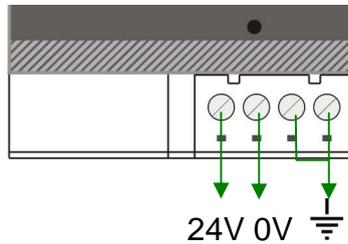


Figure 8.3 - Pin layout of 24VDC Connector

8.3. N-Bus Addressing

MX08 instruments communicate each other over internal data bus which is called N-Bus. MX08 gateway instrument is master of N-Bus. All other instruments are slave and shall be addressed to gateway.

N-Bus addressing can be done by using xFace PC software (Refer to Section 3.3) or via programming switch (Section 3.9).

8.4. Profibus DP Setup

MX08 gateway set up is done by xFace software as described in this section. Connect MX08 PB instrument to your PC via RS-232C service port on the instrument as indicated in Figure 8.2.

Select Gateway tab after connecting xFace to MX08 PB. Gateway tab is seen in figure below. You will see the gateway information and Profibus DP parameters in this tab.

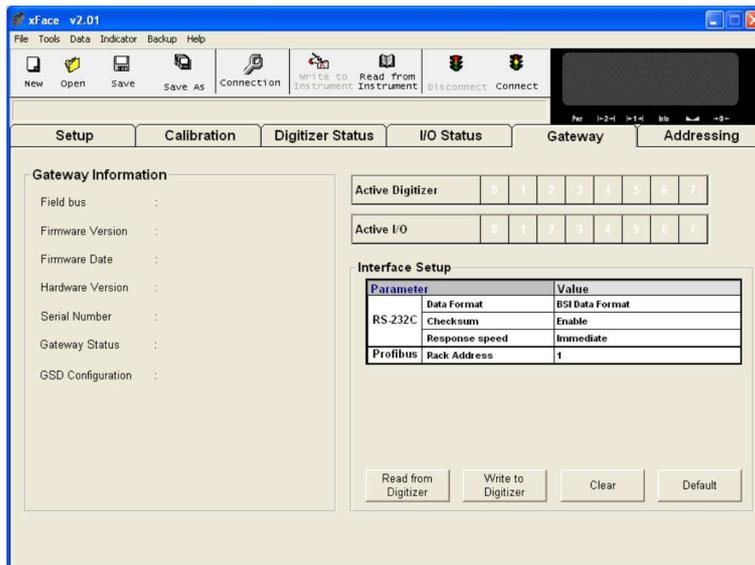


Figure 8.4 - Profibus DP setup

8.4.1. Profibus DP Parameters

There is only one parameter for Profibus network.

Profibus Rack Address

The address range is 1 to 126.

Default is '01'.

8.4.2. Profibus Information

xFace Gateway information block in Gateway tab allows the user to know much information about gateway instrument as in the following;

Field bus: Profibus DP

Firmware Version: Revision number of firmware

Firmware Date: Generated firmware date

Hardware Version: Revision number of main pcb board.

Serial Number: Instrument's serial number.

Gateway Status: Follow the status whether the system is proper or not.

GSD Configuration: Max. quantity of MX08 AD and MX08 IO instruments in the system.

8.5. Profibus DP Data Structure

Please refer to the Section 3.5 for detailed PLC configuration.

MX08 PB Output to PLC Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 PB	1st Dword (R)	Active MX08 IO instruments						Active MX08 AD instruments						Cmd Flg
		Error Table			Not in use									

Bit Number	1 st Dword Description		
D31	0: No instrument found	1: 7 addressed MX08 IO is active	Active IO instruments
D30	0: No instrument found	1: 6 addressed MX08 IO is active	
D29	0: No instrument found	1: 5 addressed MX08 IO is active	
D28	0: No instrument found	1: 4 addressed MX08 IO is active	
D27	0: No instrument found	1: 3 addressed MX08 IO is active	
D26	0: No instrument found	1: 2 addressed MX08 IO is active	
D25	0: No instrument found	1: 1 addressed MX08 IO is active	
D24	0: No instrument found	1: 0 addressed MX08 IO is active	

D23	0: No instrument found	1: 7 addressed MX08 AD is active	Active AD instruments
D22	0: No instrument found	1: 6 addressed MX08 AD is active	
D21	0: No instrument found	1: 5 addressed MX08 AD is active	
D20	0: No instrument found	1: 4 addressed MX08 AD is active	
D19	0: No instrument found	1: 3 addressed MX08 AD is active	
D18	0: No instrument found	1: 2 addressed MX08 AD is active	
D17	0: No instrument found	1: 1 addressed MX08 AD is active	
D16	0: No instrument found	1: 0 addressed MX08 AD is active	

D15 D14 D13 D12	0000	No error found	Error Codes of MX08 PB
	0001	System fails. – Re-energize the instrument. If seen again, change the board.	
	0010	EEPROM fail. – Re-energize the instrument. If seen again, change the board.	
	0011	Field bus module error. – Re-energize the instrument. – Check the field-bus module is installed on the board. – If seen again, change the board.	
	0100	No Instrument found on N-Bus. – Install Digitizer or I/O instruments to the system. – Check N-BUS connectors whether they are installed.	
	0101	An instrument is installed/removed in/from system. – Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing)	

D11...D1	Not in use		
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D0	Toggles	The command is applied successfully	CMD Flag
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MX08 AD[0]	2 nd Dword (R)	By default, Indicated Weight value is represented. To represent other weight or calibration status, refer to next Dword.								
	3 rd Dword (R)	Not in use								
		Error Table of Digitizer[0]			Weight or Count	Zero Rang.	Gross or Net	Motion Detec	Response of Read Selected Data	Cmd Flag

Bit Number	3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
---------------	---

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12	0111	Instrument does not found	Error Codes of Digitizer
	0110	Low/High voltage detection error	
	0101	In programming mode	
	0100	System Error	
	0011	ADC under	
	0010	ADC over	
	0001	ADC out	
	0000	No error found	

D11 ... D10	Not in use
----------------	------------

D9	0	Weighing / Force Mode	Operation Mode
	1	Count Mode	
D8	0	Out of Zero Range	Zero Range
	1	In Zero Range	
D7	0	Gross	Indication
	1	Net	
D6	0	Stable	Motion Dedection
	1	Dynamic	

D5 D4 D3 D2 D1	00000	Indicated weight	Response of 2 nd Dword description
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status (Refer to below table)	

D0	Toggles	The command is applied successfully	CMD Flag
----	---------	-------------------------------------	----------

Bit Number	2 nd , 4 th , 6 th , 8 th , 10 th , 12 th , 14 th , 16 th Dword descriptions when Read Command is ' Calibration Status '. Refer to PLC Output to MX08 PB Input for 3 rd Dword
------------	---

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12 D11 D10 D9 D8	0000 0001	Calibration Timeout - Restart calibration	Calibration Status
	0000 0010	ADC Error - Re-energize the instrument	
	0000 0011	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument	
	0010 0010	Instrument can not be calibrating - Load cell signal is very low or too high	
	0010 0011	Calibration Error - Calibration test weight is not enough - Increase calibration weight value - Check load cell connections	
	0010 0101	Scale unstable - Wait until scale become stable - Check grounding wiring	

D7 D6 D5 D4 D3 D2 D1 D0	0000 1001	Calibration Errors	Calibration Process Status
	0000 0100	Span calibration in process	
	0000 0011	Zero calibration in process	
	0000 0001	System ready for calibration	

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte	D7	D6	D5	D4	D3	D2	D1	D0
------------	------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[1]	+2 nd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[2]	+3 rd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[3]	+4 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[4]	+5 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[5]	+6 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[6]	+7 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[7]	+8 th Byte					Input 4	Input 3	Input 2	Input 1

PLC Output to MX08 PB Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 PB	1 st Dword (W)	Not in use													
		Not in use							I/O Write	Common Command List				Not in use	

Bit Number	1 st Dword Description
------------	-----------------------------------

D31 ... D9	Not in use
------------	------------

D8	0: Input / Outputs change over PLC Output to MX08 PB Input I/O Bytes. This flag does not need to New CMD command.		I/O Write Control
	1: Input / Outputs are change over Common Command List below. 1001: RESET, 1000: SET Outputs.		

D7 D6 D5 D4	0000	None	Common Command List
	0001	Zeroing command sent to all Digitizers.	
	0010	Tare command sent to all Digitizers.	
	0011	Clear command sent to all Digitizers.	
	1000	SET all I/O outputs. (if I/O Write Control = 1)	
1001	RESET all I/O outputs. (if I/O Write Control = 1)		

D3 ... D1	Not in use
-----------	------------

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

MX08 AD[0]	2 nd Dword (W)	Next Dword defines the usage of this Dword.			
	3 rd Dword (W)	Not in use			New CMD
Not in use		Command List	Description of 2 nd Dword (R)		

Bit Number	3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
------------	---

D31 ... D11	Not in use
-------------	------------

D10 D9 D8 D7 D6	00000	None command selected	Command List
	00001	Zero	
	00010	Tare	
	00011	Clear	
	00101	Start zero calibration.	
	00110	Start span calibration. First, load 2 nd Dword with test weight value, then apply this command with New CMD.	
	01000	Operation Mode Selection. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = Count mode unipolar, 1 = Count mode bipolar 2 = Force mode unipolar, 3 = Force mode bipolar, 4 = Weight mode unipolar	
01001	Operation mV of Count Mode. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = 5mV, 1 = 10mV, 2 = 15mV, 3 = 18mV		
01010	Digital Filter. First, load 2 nd Dword with selected value, then apply this command with New CMD. Filter Values: 0 = Fast, ... , 9 = Slow.		

D5 D4 D3 D2 D1	00000	Indicated weight	Description of 2 nd Dword (R)
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00100	Gross weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status	

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte (W)	D7	D6	D5	D4	D3	D2	D1	D0
------------	----------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[1]	+2 nd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[2]	+3 rd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[3]	+4 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[4]	+5 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[5]	+6 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[6]	+7 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[7]	+8 th Byte (W)					Output 4	Output 3	Output 2	Output 1

8.6. Error Table

The MX08 PB gateway instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	No Instrument Found	– Install MX08 AD or MX08 IO instruments to the system. – Check the N-BUS connector whether they are installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 8.2 - Error table

8.7. Diagnostic Tests

RC-232C serial interface test can be performed sequentially in this test menu.

For entering diagnostic test mode, press the programming switch before power on and release the switch after power on the instrument. The instrument will go into RS-232C RXD test mode which is indicated by lighted Pwr LED and flashed Err LED as seen below. The status of LEDs on the front panel indicates test steps and the test result as described below. You can go to the next test by pressing the programming switch.

Test	LED's Status			Description
	Pwr	Lnk	Err	
RS-232C RxD	●	○	✱	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go next test.
RS-232C TxD	●	✱	✱	'A' to 'Z' characters are send sequentially in 0.8 s period. If the same data is received, Pwr LED blanks 0.3 sec. Press programming switch to go following test.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 8.3 - Diagnostic test sequence

If you short circuit RXD and TXD pins on RS-232C port and go in to TxD test, the receiving data is shown by Pwr LED.

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

9. MX08 PN PROFINET GATEWAY

MX08 PN gateway instrument integrates up to 8 pcs Analog Digitizer device and up to 8 pcs Input / Output device to Profinet field bus. MX08 PN instrument communicates with other MX08 instruments via internal data bus N-Bus and responses to the PLC very fast via Profinet.

MX08 PN instrument GSDML file is available in CD which is supplied together with the instrument.

9.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (Refer to Section 3.9) and for diagnostic tests (refer to Section 9.7).

The status of the instrument is announced by different lights (refer to Table 9.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 9.6 for detailed error descriptions.

Power and serial interface terminals are located at the front of the DIN rail mount instrument as seen in Figure 9.1.

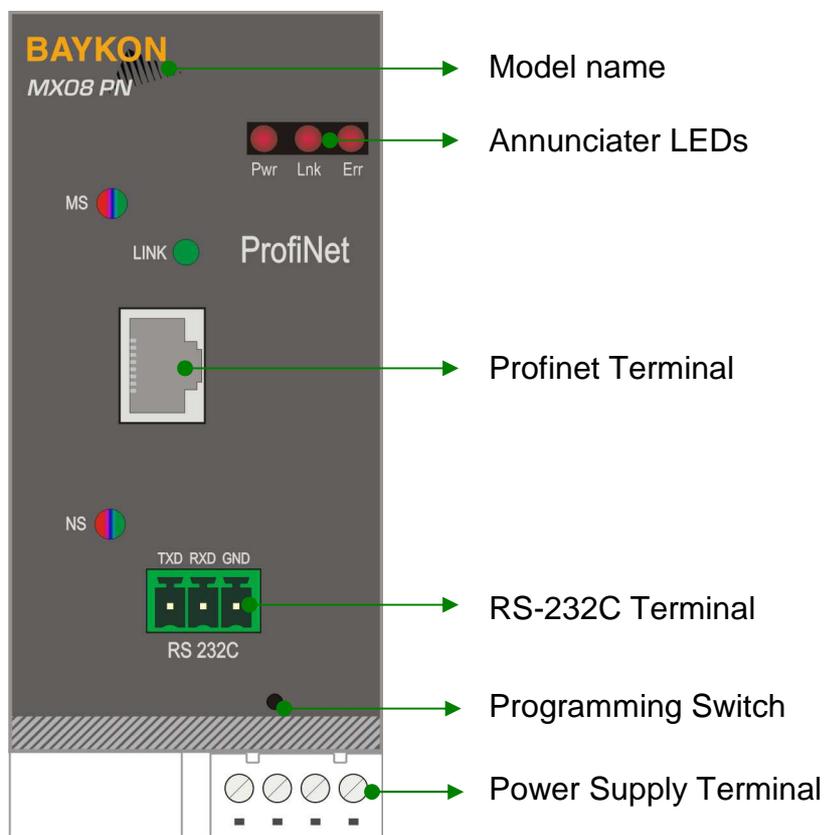


Figure 9.1 - Front View

The meanings of the annunciater LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 PN is not powered. Check power cable. <input checked="" type="radio"/> MX08 PN is powered.
Lnk	Link	<input type="radio"/> No data transmission done. <input checked="" type="radio"/> Data transmission done to xFace or Modbus-RTU
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 9.6.

Blank
 Light
 Flash
 Blank for 0.3 second

Table 9.1 - Annunciater LEDs

MS Module Status LED

LED State	Description	Comment
Off	Not power or not initialized	No power or profinet module is in initialization state
Green	Initialized	
Green, 1 flash	Initialized, diagnostic event(s) present	Diagnostic is active
Red	Exception error	There is an exception error
Red, 1 flash	Configuration Error	Check GSDML configuration
Red, 2 flashes	IP Address Error	IP address not set
Red, 3 flashes	Station Name Error	Station name not set
Red, 4 flashes	Internal Module Error	Re-energize the instrument. If seen again, change the board.

LINK/Activity LED

LED State	Description	Comment
Off	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

NS Network Status LED

LED State	Description	Comment
Off	Not online /No power	Check power and cable
Green	On-line (RUN)	-
Green, flashing	On-line (STOP)	-

9.2. Electrical Connections

Profinet, RS-232C and power supply terminals are shown in Figure 9.1.

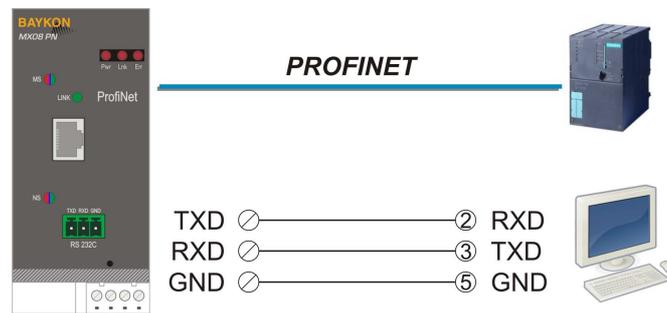


Figure 9.2 - MX08 PN serial interface connections

RS-232C Serial interface

Usage	Used for service port (xFace)
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1stop bit

Profinet interface

Usage	Profinet interface with PC or PLC
Data formats	Profinet
Ethernet	The Ethernet interface operates at 100Mbit, full duplex, as required by PROFINET.

Warning: Connect the shield to the reference ground or shield pin of the power connector.

Warning: Disconnect xFace PC software for Profibus interfacing.

Power Supply Connection

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in figure below. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

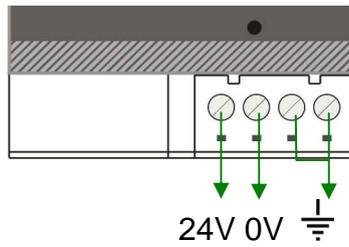


Figure 9.3 - Pin layout of MX08 PN 24 VDC connector

9.3. N-Bus Addressing

MX08 instruments communicate each other over internal data bus which is called N-Bus. MX08 gateway instrument is master of N-Bus. All other instruments are slave and shall be addressed to gateway.

N-Bus addressing can be done by using xFace PC software (Refer to Section 3.3) or via programming switch (Section 3.9).

9.4. MX08 PN Setup

MX08 gateway set up is done by xFace software as described in this section. Connect MX08 PN instrument to your PC via RS-232C service port on the instrument as indicated in Figure 9.2.

Select Gateway tab after connecting xFace to MX08 PN. Gateway tab is seen in figure below. You will see the gateway information and Profinet parameters in this tab.

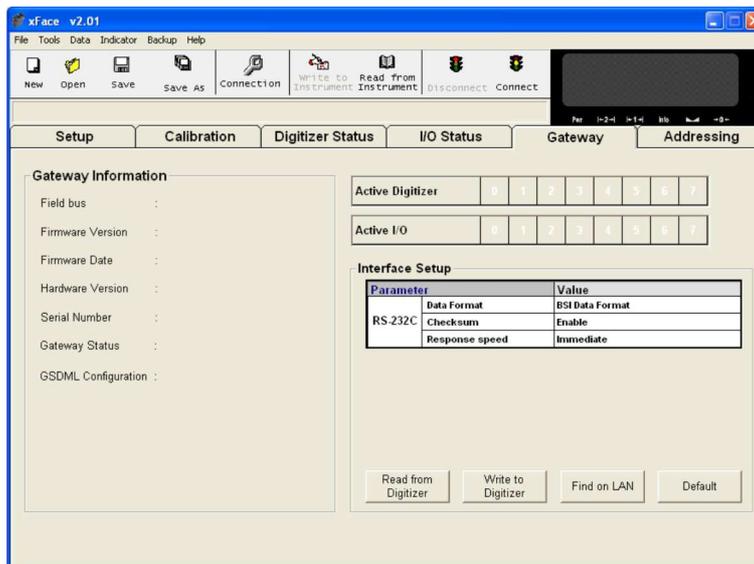


Figure 9.4 - Profinet setup

9.4.1. Profinet Parameters on EtherX

There are 7 parameters for Profinet network.

DHCP

Dynamic Host Configuration Protocol automates network parameters if it is enabled.

Default is 'Disable'.

IP Address

If DHCP is disabled, obtain IP address manually.

Default is '192.168.16.250'.

Subnet Mask

If DHCP is disabled, obtain subnet mask manually.

Default is '255.255.255.0'.

Default Gateway

If DHCP is disabled, obtain default gateway manually.

Default is '192.168.16.254'.

Primary DNS

If DHCP is disabled, obtain primary DNS manually.

Default is '208.67.222.222'.

Secondary DNS

If DHCP is disabled, obtain secondary DNS manually.

Default is '208.67.220.220'.

Host Name

Enter a unique host name to the instrument.

Default is ' '.

9.4.2. Profinet Information

xFace Gateway information block in Gateway tab allows the user to know much information about gateway instrument as in the following;

Field bus: Profinet

Firmware Version: Revision number of firmware

Firmware Date: Generated firmware date

Hardware Version: Revision number of main pcb board.

Serial Number: Instrument's serial number.

Gateway Status: Follow the status whether the system is proper or not.

GSDML Configuration: Max. quantity of MX08 AD and MX08 IO instruments in the system.

9.5. Profinet Data Structure

Please refer to the Section 3.5 for detailed PLC configuration.

MX08 PN Output to PLC Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 PN	1st Dword (R)	Active MX08 IO instruments						Active MX08 AD instruments						Cmd Flg
		Error Table			Not in use									

Bit Number	1 st Dword Description		
D31	0: No instrument found	1: 7 addressed MX08 IO is active	Active IO instruments
D30	0: No instrument found	1: 6 addressed MX08 IO is active	
D29	0: No instrument found	1: 5 addressed MX08 IO is active	
D28	0: No instrument found	1: 4 addressed MX08 IO is active	
D27	0: No instrument found	1: 3 addressed MX08 IO is active	
D26	0: No instrument found	1: 2 addressed MX08 IO is active	
D25	0: No instrument found	1: 1 addressed MX08 IO is active	
D24	0: No instrument found	1: 0 addressed MX08 IO is active	

D23	0: No instrument found	1: 7 addressed MX08 AD is active	Active AD instruments
D22	0: No instrument found	1: 6 addressed MX08 AD is active	
D21	0: No instrument found	1: 5 addressed MX08 AD is active	
D20	0: No instrument found	1: 4 addressed MX08 AD is active	
D19	0: No instrument found	1: 3 addressed MX08 AD is active	
D18	0: No instrument found	1: 2 addressed MX08 AD is active	
D17	0: No instrument found	1: 1 addressed MX08 AD is active	
D16	0: No instrument found	1: 0 addressed MX08 AD is active	

D15 D14 D13 D12	0000	No error found	Error Codes of MX08 PN
	0001	System fails. – Re-energize the instrument. If seen again, change the board.	
	0010	EEPROM fail. – Re-energize the instrument. If seen again, change the board.	
	0011	Field bus module error. – Re-energize the instrument. – Check the field-bus module is installed on the board. – If seen again, change the board.	
	0100	No Instrument found on N-Bus. – Install Digitizer or I/O instruments to the system. – Check N-BUS connectors whether they are installed.	
	0101	An instrument is installed/removed in/from system. – Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing)	

D11...D1	Not in use		
----------	------------	--	--

D0	Toggles	The command is applied successfully	CMD Flag
----	---------	-------------------------------------	----------

MX08 AD[0]	2 nd Dword (R)	By default, Indicated Weight value is represented. To represent other weight or calibration status, refer to next Dword.								
	3 rd Dword (R)	Not in use								
		Error Table of Digitizer[0]			Weight or Count	Zero Rang.	Gross or Net	Motion Detec	Response of Read Selected Data	Cmd Flag

Bit Number	3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
---------------	---

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12	0111	Instrument does not found	Error Codes of Digitizer
	0110	Low/High voltage detection error	
	0101	In programming mode	
	0100	System Error	
	0011	ADC under	
	0010	ADC over	
	0001	ADC out	
	0000	No error found	

D11 ... D10	Not in use
----------------	------------

D9	0	Weighing / Force Mode	Operation Mode
	1	Count Mode	
D8	0	Out of Zero Range	Zero Range
	1	In Zero Range	
D7	0	Gross	Indication
	1	Net	
D6	0	Stable	Motion Dedection
	1	Dynamic	

D5 D4 D3 D2 D1	00000	Indicated weight	Response of 2 nd Dword description
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status (Refer to below table)	

D0	Toggles	The command is applied successfully	CMD Flag
----	---------	-------------------------------------	----------

Bit Number	2 nd , 4 th , 6 th , 8 th , 10 th , 12 th , 14 th , 16 th Dword descriptions when Read Command is 'Calibration Status'. Refer to PLC Output to MX08 PN Input for 3 rd Dword
------------	--

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12 D11 D10 D9 D8	0000 0001	Calibration Timeout - Restart calibration	Calibration Status
	0000 0010	ADC Error - Re-energize the instrument	
	0000 0011	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument	
	0010 0010	Instrument can not be calibrating - Load cell signal is very low or too high	
	0010 0011	Calibration Error - Calibration test weight is not enough - Increase calibration weight value - Check load cell connections	
	0010 0101	Scale unstable - Wait until scale become stable - Check grounding wiring	

D7 D6 D5 D4 D3 D2 D1 D0	0000 1001	Calibration Errors	Calibration Process Status
	0000 0100	Span calibration in process	
	0000 0011	Zero calibration in process	
	0000 0001	System ready for calibration	

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte	D7	D6	D5	D4	D3	D2	D1	D0
------------	------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[1]	+2 nd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[2]	+3 rd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[3]	+4 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[4]	+5 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[5]	+6 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[6]	+7 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[7]	+8 th Byte					Input 4	Input 3	Input 2	Input 1

PLC Output to MX08 PN Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 PN	1 st Dword (W)	Not in use													
		Not in use							I/O Write	Common Command List				Not in use	

Bit Number	1 st Dword Description
------------	-----------------------------------

D31 ... D9	Not in use
------------	------------

D8	0: Input / Outputs change over PLC Output to MX08 PN Input I/O Bytes. This flag does not need to New CMD command.		I/O Write Control
	1: Input / Outputs are change over Common Command List below. 1001: RESET, 1000: SET Outputs.		

D7 D6 D5 D4	0000	None	Common Command List
	0001	Zeroing command sent to all Digitizers.	
	0010	Tare command sent to all Digitizers.	
	0011	Clear command sent to all Digitizers.	
	1000	SET all I/O outputs. (if I/O Write Control = 1)	
	1001	RESET all I/O outputs. (if I/O Write Control = 1)	

D3 ... D1	Not in use
-----------	------------

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

MX08 AD[0]	2 nd Dword (W)	Next Dword defines the usage of this Dword.			
	3 rd Dword (W)	Not in use			New CMD
Not in use		Command List	Description of 2 nd Dword (R)		

Bit Number	3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
------------	---

D31 ... D11	Not in use
-------------	------------

D10 D9 D8 D7 D6	00000	None command selected	Command List
	00001	Zero	
	00010	Tare	
	00011	Clear	
	00101	Start zero calibration.	
	00110	Start span calibration. First, load 2 nd Dword with test weight value, then apply this command with New CMD.	
	01000	Operation Mode Selection. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = Count mode unipolar, 1 = Count mode bipolar 2 = Force mode unipolar, 3 = Force mode bipolar, 4 = Weight mode unipolar	
01001	Operation mV of Count Mode. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = 5mV, 1 = 10mV, 2 = 15mV, 3 = 18mV		
01010	Digital Filter. First, load 2 nd Dword with selected value, then apply this command with New CMD. Filter Values: 0 = Fast, ... , 9 = Slow.		

D5 D4 D3 D2 D1	00000	Indicated weight	Description of 2 nd Dword (R)
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00100	Gross weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status	

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte (W)	D7	D6	D5	D4	D3	D2	D1	D0
------------	----------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[1]	+2 nd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[2]	+3 rd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[3]	+4 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[4]	+5 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[5]	+6 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[6]	+7 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[7]	+8 th Byte (W)					Output 4	Output 3	Output 2	Output 1

9.6. Error Table

The MX08 PN gateway instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	No Instrument Found	– Install MX08 AD or MX08 IO instruments to the system. – Check the N-BUS connector whether they are installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 9.2 - Error table

9.7. Diagnostic Tests

RC-232C serial interface test can be performed sequentially in this test menu.

For entering diagnostic test mode, press the programming switch before power on and release the switch after power on the instrument. The instrument will go into RS-232C RXD test mode which is indicated by lighted Pwr LED and flashed Err LED as seen below. The status of LEDs on the front panel indicates test steps and the test result as described below. You can go to the next test by pressing the programming switch.

Test	LED's Status			Description
	Pwr	Lnk	Err	
RS-232C RxD	◐	○	✱	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go next test.
RS-232C TxD	◐	✱	✱	'A' to 'Z' characters are send sequentially in 0.8 s period. If the same data is received, Pwr LED blanks 0.3 sec. Press programming switch to go following test.
○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second				

Table 9.3 - Diagnostic test sequence

If you short circuit RXD and TXD pins on RS-232C port and go in to TxD test, the receiving data is shown by Pwr LED.

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

10. MX08 EN ETHERNET GATEWAY

MX08 EN gateway instrument integrates up to 8 pcs Analog Digitizer device and up to 8 pcs Input / Output device to Ethernet field bus. MX08 EN instrument communicates with other MX08 instruments via internal data bus N-Bus and responses to the PLC very fast via Ethernet.

10.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (refer to Section 3.9) and for diagnostic tests (refer to Section 10.7).

The status of the instrument is announced by different lights (refer to Table 10.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 10.6 for detailed error descriptions.

Power and serial interface terminals are located at the front of the DIN rail mount instrument as seen in Figure 10.1.

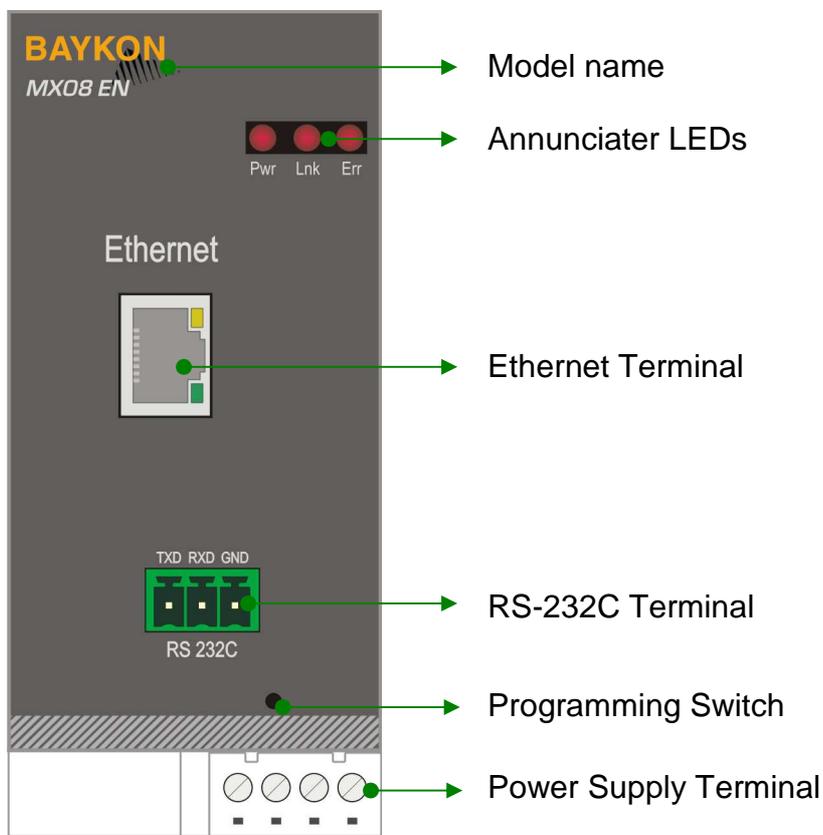


Figure 10.1 - Front View

The meanings of the annunciater LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 EN is not powered. Check power cable. <input checked="" type="radio"/> MX08 EN is powered.
Lnk	Link	<input type="radio"/> No data transmission done. <input checked="" type="radio"/> Data transmission done to xFace or Modbus TCP/IP
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 10.6.

Blank
 Light
 Flash
 Blank for 0.3 second

Table 10.1 - Annunciater LEDs

10.2. Electrical Connections

Ethernet and RS-232C and power supply terminals are shown in Figure 10.1.

Ethernet Connector (RJ45)

Pin	Signal	Direction	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX-	Out	Differential Ethernet transmit data -
3	RX+	In	Differential Ethernet receive data +
6	RX-	In	Differential Ethernet receive data -
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chasis ground

The HUB connection cabling will be a direct connection as shown below:

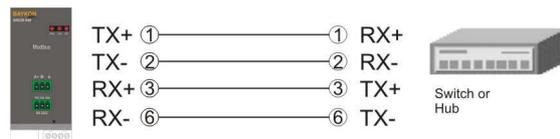


Figure 10.2 - HUB connection

The PC connection cabling will be done via cross cable as shown below:

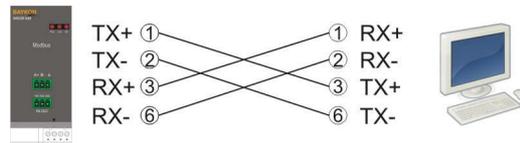


Figure 10.3 - Cross cabling PC connection

MX08 EN serial interface connections are shown below:

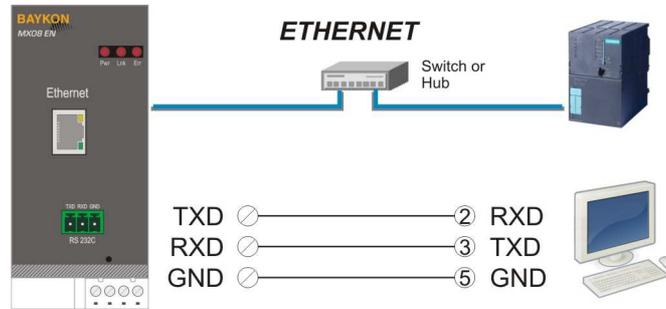


Figure 10.4 - MX08 EN serial interface connections

RS-232C Serial interface

Usage	Interfacing with PC and PLC, programming the MX08 (xFace)
Data formats	BSI, Modbus RTU High-Low, Modbus RTU Low-High
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1 stop bit

Ethernet interface

Usage	Ethernet interface with PC or PLC
Data formats	BSI, Modbus TCP/IP High-Low, Modbus TCP/IP Low-High
Ethernet	The Ethernet interface operates at 10 Mbit, half duplex

Warning: Connect the shield to the reference ground or shield pin of the power connector.

Warning: Disconnect xFace PC software for Ethernet interfacing.

Power Supply Connection

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in figure below. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

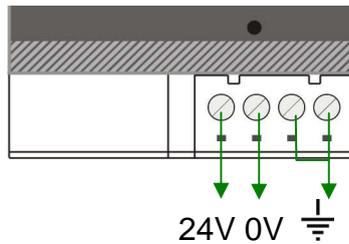


Figure 10.5 - Pin layout of MX08 EN 24 VDC connector

10.3. N-Bus Addressing

MX08 instruments communicate each other over internal data bus which is called N-Bus. MX08 gateway instrument is master of N-Bus. All other instruments are slave and shall be addressed to gateway.

N-Bus addressing can be done by using xFace PC software (Refer to Section 3.3) or via programming switch (Section 3.9).

10.4. MX08 EN Setup

MX08 gateway set up is done by xFace software as described in this section. Connect MX08 EN instrument to your PC via RS-232C service port on the instrument as indicated in Figure 10.1.

Select Gateway tab after connecting xFace to MX08 EN. Gateway tab is seen in figure below. You will see the gateway information and Ethernet parameters in this tab.

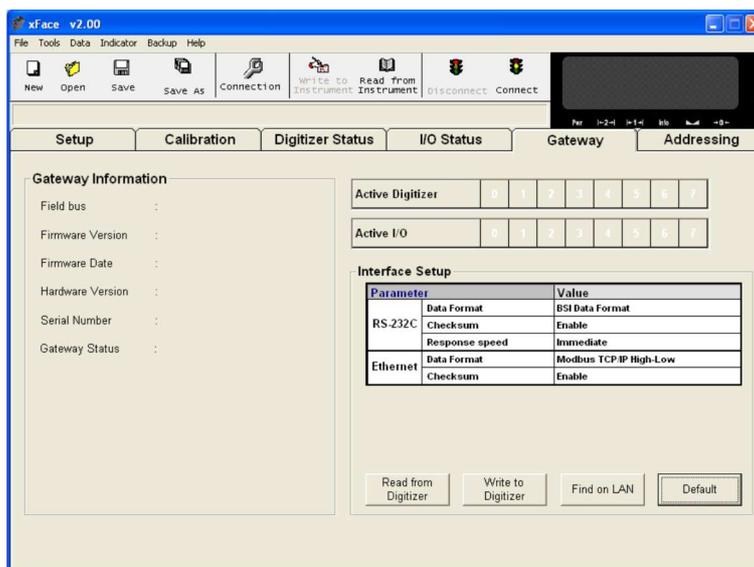


Figure 10.6 - Ethernet Setup

10.4.1. Interface Parameters

RS-232C Data Format

This parameter programs the RS-232C communication port data format. The available data formats are;

- Disable : No data will be transmitted. Select disable if this port is not used.
- BSI : Communicates in BSI data format as a slave. Refer to 'Refer to Section 3.11' for details.
- Modbus RTU High-Low : Modbus communication. Refer to *Section 7.5* for details.
- Modbus RTU Low-High : Modbus communication. Refer to *Section 7.5* for details.

Note: xFace automatically connects to the instrument whatever the data format is. After xFace disconnection, the instrument returns to run with last saved data format.

Warning: Disable this interface if it is not used to increase the interfacing performance.

Default is 'BSI'.

RS-232C Checksum

The checksum can be enabled or disabled from BSI data format. The checksum calculation can be found in the related data format description.

Default is 'Enable'.

Response Speed

Response speed can be selected as "immediate" or "20 msec" for Modbus data format.

- Immediate : Modbus RTU Answer is sent immediately after Request is received.
- 20 msec : Modbus RTU Answer is delayed 20 msec after Request is received.
This property is very helpful for slow PLC systems.

Default is 'immediate'.

Ethernet Data Format

This parameter programs the Ethernet communication port data format. The available data formats are;

- Disable : No data will be transmitted. Select disable if this port is not used.
- BSI : Communicates in BSI data format as a slave. Refer to 'Refer to Section 3.11' for details.
- Modbus TCP/IP High-Low : Modbus TCP/IP communication. Refer to *Section 10.5* for details.

Modbus TCP/IP : Modbus TCP/IP communication. Refer to *Section 10.5* for details.
Low-High

Note: xFace automatically connects to the instrument whatever the data format is. After xFace disconnection, the instrument returns to run with last saved data format.

Checksum

The checksum can be enabled or disabled from BSI data format. The checksum calculation can be found in the related data format description.

Default is 'Enable'.

10.4.2. Ethernet Parameters on EtherX

There are 11 parameters for Ethernet network.

Host Name

Device name of the instrument.

Default is ''.

IP Address

Obtain IP address manually.

Default is '192.168.16.250'.

Local Port

Ethernet connection port of the instrument.

Default is '10001'.

Gateway

Network point that acts as an entrance to another network.

Default is '192.168.16.254'.

Subnet Mask

Describes IP address can be used in network.

Default is '255.255.255.0'.

Primary DNS

Obtain primary DNS manually.

Default is '208.67.222.222'.

Secondary DNS

Obtain secondary DNS manually.

Default is '208.67.220.220'.

10.4.3. Ethernet Information

xFace Gateway information block in Gateway tab allows the user to know much information about gateway instrument as in the following;

Field bus: Ethernet

Firmware Version: Revision number of firmware

Firmware Date: Generated firmware date

Hardware Version: Revision number of main pcb board.

Serial Number: Instrument's serial number.

Gateway Status: Follow the status whether the system is proper or not.

10.5. Modbus TCP/IP Data Structure

The Modbus slave address is defined in the Ethernet Address in Section 10.4.1. Functions code '0x03' and function code '0x10' are supported. Make the Ethernet connection settings in Section 10.2.

Modbus TCP/IP High-Low: In two word registers, the data is stored to the registers in big-endian format. Least significant word is stored to the highest register address; and most significant word is stored to the lowest register address.

Modbus TCP/IP Low-High: In two word registers, the data is stored to the registers in little-endian format. Least significant word is stored to the lowest register address; and most significant word is stored to the highest register address.

Write operations can only be done to the allowed registers. And they are indicated as W or W/R. Do not try to write 'only read' registers indicated as R. The below Modbus table identifies MX08 AD and MX08 IO instruments' N-Bus address as [X].

Please find Modbus information in the web site of <http://www.modbus.org>

Examples:

Performing Read and Write operations according to hex system with the MX08 EN set to address '0x01'. MBAP (Modbus Application Protocol) Header is not included to the below Modbus TCP/IP application data units.

Indicated value of MX08 AD [0] at register start address 41006

Request : 03, 03, ED, 00, 02

Answer : 03, 04, 00, 00, 27, 10

Indicated : 2710 hex (10000 dec)

Status, Indicated, Gross and Tare values of MX08 AD [0] at register 41005 - 41011.

Request : 03, 03, EC, 00, 07

Answer : 03, 0E, 01, 0A, 00, 00, 10, E2, 00, 00, 14, CA, 00, 00, 03, E8

Status : 010A hex

Indicated : 000010E2 hex (4322 dec)

Gross : 000014CA hex (5322 dec)

Tare : 000003E8 hex (1000 dec)

Indicated value of MX08 AD [5] at register start address 41041

Request : 03, 04, 10, 00, 02

Answer : 03, 04, 00, 04, BF, 21

Indicated : 0004BF21 hex (311073 dec)

Status, Indicated, Gross and Tare values of MX08 AD [5] at register 41040 - 41046.

Request : 03, 04, 0F, 00, 07

Answer : 03, 0E, 04, 22, 00, 04, BF, 38, 00, 04, BF, 38, 00, 00, 00, 00,
Status : 0422 hex
Indicated : 0004BF38 hex (311096 dec)
Gross : 0004BF38 hex (311096 dec)
Tare : 00000000 hex (0 dec)

Read inputs of MX08 IO [0] at register 41071.

Request : 03, 04, 2E, 00, 01
Answer : 03, 02, 05, 0D
Inputs : 0D hex (1011 binary)
Outputs : 05 hex (0101 binary)

Set all outputs of MX08 IO [0] at register 41071.

Request : 10, 04, 2E, 00, 01, 02, 00, 0F
Answer : 10, 04, 2E, 00, 01
Outputs activated.

Zeroing MX08 AD [0] at register 41062.

Request : 10, 04, 25, 00, 01, 02, 00, 01
Answer : 10, 04, 25, 00, 01
MX08 AD [0] is zeroed.

Zeroing MX08 AD [1] at register 41063.

Request : 10, 04, 26, 00, 01, 02, 00, 01
Answer : 10, 04, 26, 00, 01
MX08 AD [1] is zeroed.

Taring MX08 AD [0] at register 41062.

Request : 10, 04, 25, 00, 01, 02, 00, 02
Answer : 10, 04, 25, 00, 01
MX08 AD [0] is tared.

Taring MX08 AD [1] at register 41063.

Request : 10, 04, 26, 00, 01, 02, 00, 02
Answer : 10, 04, 26, 00, 01
MX08 AD [1] is tared.

Zero Calibration of MX08 AD [0].

Request : 03, 04, 66, 00, 01 (Read status; it must be in ready status)
Answer : 03, 02, 00, 01 (MX08 AD [0] is in ready status; zero calibration can be performed)

Request : 10, 04, 63, 00, 01, 02, 00, BC (Zero calibration command)

Answer : 10, 00, 6D, 00, 01

Request : 03, 04, 66, 00, 01 (Read status and wait to become in ready status)

Answer : 03, 02, 00, 01 (If it changed "zeroing" to "ready" status, zero calibration is performed successfully.)

Span Calibration of MX08 AD [0].

Request : 03, 04, 66, 00, 01 (Read status; it must be in ready status)

Answer : 03, 02, 00, 01 (MX08 AD [0] is in ready status; span calibration can be performed)

Request : 10, 04, 63, 00, 03, 06, 00, DC, 00, 00, 0B, B8

(Span calibration command with 3000 (0x0BB8 hex) span value)

Answer : 10, 00, 6D, 00, 03

Request : 03, 04, 66, 00, 01 (Read status; it must be in ready status)

Answer : 03, 02, 00, 01 (If it changed "span calb" to "ready" status, span calibration is performed successfully.)

Exception codes:

- 1: Function code is not supported
- 2 : Received data address is not in allowable address range
- 3 : Invalid value entrance or wrong byte number
- 4 : Operation error

MX08 EN Modbus TCP/IP Command Set 1:

The below register table is used for MX08 AD[0].

Address	R/W	Word	Command	Description			
40001	R	2	Weight / Force / Count Data				
40003	R	1	Status	D0	0 – System Ready 1 – System Busy		
				D1	0 – Error 1 – Data ok		
				D2	0 – Weight Stable 1 – Weight unstable		
				D3	0 – Gross Mode 1 – Net mode		
				D4	Not in use		
				D5	0 – Weight / Force 1 – Count Mode		
				D6 .. D11	Not in use		
				D12	0 – Out of zero range 1 – Weight is in zero range		
				D13 D14 D15	Error Code	0	No Errors
						1	ADC out of range
2	ADC overrange						
3	ADC underrange						
4	System error						
5	In programming mode						
6	Power supply is not in required voltage range						
7	No instrument found						
40004	R	2	Tare weight				
40006	R	2	Gross Weight				
40008	R	1	Status	Motion, Net mode, Data ok, (image of register 40003)			
40009	R/W	1	Control	0	None		
				1	Zero		
				2	Tare		
				3	Clear		
40010	R/W	1	Calibration	0	None		
				188	Adjust Zero Calibration		
				220	Adjust Span Calibration		
40011	R/W	2	Span Calibration Value				

40013	R	1	Calibration Status	D0 .. D7 Calibration Process Status	1	System ready for calibration
					3	Zero calibration in process
					4	Span calibration in process
					9	Error (Refer to D8 .. D15)
				D8 .. D15 Calibration Errors	1	Calibration Timeout - Restart calibration
					2	ADC Error - Re-energize the instrument
					3	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument
					34	Instrument can not be calibrating - Load cell signal is very low or too high
					35	Calibration Error - Calibration test weight is not enough - Increase calibration weight value (40011) - Check load cell connections
					37	Scale unstable - Wait until scale becomes stable - Check grounding wiring
40014	R/W	1	Operation Mode Selection	0	Count Mode Unipolar	
				1	Count Mode Bipolar	
				2	Force Mode Unipolar	
				3	Force Mode Bipolar	
				4	Weight Mode (Unipolar)	
40015	R/W	1	Operation mV of Count Mode	0	5 mV	
				1	10 mV	
				2	15 mV	
				3	18 mV	
40016	R/W	1	Digital Filters	0	Fast	
				.	.	
				.	.	
				.	.	
				9	Slow	

All MX08 AD uses the same register table like above.

Starting register address of all MX08 AD:

MX08 AD[0]: 40001
MX08 AD[1]: 40101
MX08 AD[2]: 40201
MX08 AD[3]: 40301
MX08 AD[4]: 40401
MX08 AD[5]: 40501
MX08 AD[6]: 40601
MX08 AD[7]: 40701

MX08 EN Modbus TCP/IP Command Set 2:

Address	R/W	Word	Command	Description		
41001	R	1	System Status of MX08 AD and MX08 DP	D0	00: No instrument found	
				D1	01: 0 addressed MX08 AD is active	
				D2	00: No instrument found	
				D3	01: 1 addressed MX08 AD is active	
				D4	00: No instrument found	
				D5	01: 2 addressed MX08 AD is active	
				D6	00: No instrument found	
				D7	01: 3 addressed MX08 AD is active	
				D8	00: No instrument found	
				D9	01: 4 addressed MX08 AD is active	
				D10	00: No instrument found	
				D11	01: 5 addressed MX08 AD is active	
				D12	00: No instrument found	
				D13	01: 6 addressed MX08 AD is active	
				D14	00: No instrument found	
D15	01: 7 addressed MX08 AD is active					
41002	R	1	System Status of MX08 IO	D0	IO [0]	00 = 0 addressed no instrument found 01 = 0 addressed 4I / 4O is active 10 = 0 addressed 8I is active 11 = 0 addressed 8O is active
				D1		
				D2	IO [1]	00 = 1 addressed no instrument found 01 = 1 addressed 4I / 4O is active 10 = 1 addressed 8I is active 11 = 1 addressed 8O is active
				D3		
				D4	IO [2]	00 = 2 addressed no instrument found 01 = 2 addressed 4I / 4O is active 10 = 2 addressed 8I is active 11 = 2 addressed 8O is active
				D5		
				D6	IO [3]	00 = 3 addressed no instrument found 01 = 3 addressed 4I / 4O is active 10 = 3 addressed 8I is active 11 = 3 addressed 8O is active
				D7		
				D8	IO [4]	00 = 4 addressed no instrument found 01 = 4 addressed 4I / 4O is active 10 = 4 addressed 8I is active 11 = 4 addressed 8O is active
				D9		
				D10	IO [5]	00 = 5 addressed no instrument found 01 = 5 addressed 4I / 4O is active 10 = 5 addressed 8I is active 11 = 5 addressed 8O is active
				D11		
				D12	IO [6]	00 = 6 addressed no instrument found 01 = 6 addressed 4I / 4O is active 10 = 6 addressed 8I is active 11 = 6 addressed 8O is active
				D13		
				D14	IO [7]	00 = 7 addressed no instrument found 01 = 7 addressed 4I / 4O is active 10 = 7 addressed 8I is active 11 = 7 addressed 8O is active
D15						
41003	R	1	MX08 MB Gateway Status	D0	System fail	
				D1	Eeprom fail	
				D2	Field bus communication error	
				D3	An instrument is installed/removed in/from system	
				D4	Any instrument is not found in system	

				D5 .. D15	Not in use				
41004	W	1	Not used						
41005	R	1	MX08 AD [0] Status	D0	0 – System Ready		1 – System Busy		
				D1	0 – Error		1 – Data OK		
				D2	0 – Weight Stable		1 – Weight is not stable		
				D3	0 – Gross Mode		1 – Net mode		
				D4	Not in use				
				D5	0 – Weight/Force Mode		1 – Count Mode		
				D6 .. D11	Not in use				
				D12	0 – Out of Zero Range		1 – In Zero Range		
				D13 D14 D15	Error code	0	No Error		
						1	ADC out		
	2	ADC over							
	3	ADC under							
	4	System error							
	5	In programming mode							
	6	Power supply is not in required voltage range							
	7	No instrument found							
41006	R	2	MX08 AD [0] Indicated Weight						
41008	R	2	MX08 AD [0] Gross Weight						
41010	R	2	MX08 AD [0] Tare Weight						
41012	R	1	MX08 AD [1] Status						
41013	R	2	MX08 AD [1] Indicated Weight						
41015	R	2	MX08 AD [1] Gross Weight						
41017	R	2	MX08 AD [1] Tare Weight						
41019	R	1	MX08 AD [2] Status						
41020	R	2	MX08 AD [2] Indicated Weight						
41022	R	2	MX08 AD [2] Gross Weight						
41024	R	2	MX08 AD [2] Tare Weight						
41026	R	1	MX08 AD [3] Status						
41027	R	2	MX08 AD [3] Indicated Weight						
41029	R	2	MX08 AD [3] Gross Weight						
41031	R	2	MX08 AD [3] Tare Weight						
41033	R	1	MX08 AD [4] Status						
41034	R	2	MX08 AD [4] Indicated Weight						
41036	R	2	MX08 AD [4] Gross Weight						
41038	R	2	MX08 AD [4] Tare Weight						
41040	R	1	MX08 AD [5] Status						
41041	R	2	MX08 AD [5] Indicated Weight						
41043	R	2	MX08 AD [5] Gross Weight						
41045	R	2	MX08 AD [5] Tare Weight						
41047	R	1	MX08 AD [6] Status						
41048	R	2	MX08 AD [6] Indicated Weight						

41050	R	2	MX08 AD [6] Gross Weight					
41052	R	2	MX08 AD [6] Tare Weight					
41054	R	1	MX08 AD [7] Status					
41055	R	2	MX08 AD [7] Indicated Weight					
41057	R	2	MX08 AD [7] Gross Weight					
41059	R	2	MX08 AD [7] Tare Weight					
41061	W	1	Not used					
41062	R/W	1	MX08 AD [0] Commands	00	None			
				01	Zero			
				02	Tare			
				03	Clear			
				04	Not in use			
				.. 07				
41063	R/W	1	MX08 AD [1] Commands					
41064	R/W	1	MX08 AD [2] Commands					
41065	R/W	1	MX08 AD [3] Commands					
41066	R/W	1	MX08 AD [4] Commands					
41067	R/W	1	MX08 AD [5] Commands					
41068	R/W	1	MX08 AD [6] Commands					
41069	R/W	1	MX08 AD [7] Commands					
41070	W	1	Not used					
41071	R/W	1	MX08 IO [0] I/O Control		4 Input	4 Output	8 Input	8 Output
				D0	Input 1		Input 1	
				D1	Input 2		Input 2	
				D2	Input 3		Input 3	
				D3	Input 4		Input 4	
				D4			Input 5	
				D5			Input 6	
				D6			Input 7	
				D7			Input 8	
				D8	Output 1			Output 1
				D9	Output 2			Output 2
				D10	Output 3			Output 3
				D11	Output 4			Output 4
				D12				Output 5
				D13				Output 6
				D14				Output 7
D15				Output 8				
41072	R/W	1	MX08 IO [1] Control					
41073	R/W	1	MX08 IO [2] Control					
41074	R/W	1	MX08 IO [3] Control					
41075	R/W	1	MX08 IO [4] Control					
41076	R/W	1	MX08 IO [5] Control					
41077	R/W	1	MX08 IO [6] Control					
41078	R/W	1	MX08 IO [7] Control					
41079	W	1	Not used					
41080	R	1	MX08 AD [0] Status					
41081	R	2	MX08 AD [0] Indicated Weight					
41083	R	1	MX08 AD [1] Status					
41084	R	2	MX08 AD [1] Indicated Weight					
41086	R	1	MX08 AD [2] Status					
41087	R	2	MX08 AD [2] Indicated Weight					
41089	R	1	MX08 AD [3] Status					

41090	R	2	MX08 AD [3] Indicated Weight			
41092	R	1	MX08 AD [4] Status			
41093	R	2	MX08 AD [4] Indicated Weight			
41095	R	1	MX08 AD [5] Status			
41096	R	2	MX08 AD [5] Indicated Weight			
41098	R	1	MX08 AD [6] Status			
41099	R	2	MX08 AD [6] Indicated Weight			
41101	R	1	MX08 AD [7] Status			
41102	R	2	MX08 AD [7] Indicated Weight			
41104	W	1	Not used			
41105	R	1	All MX08 AD Status in Zero, Motion	D0	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [0]
				D1	0 – Weight Stable 1– Unstable	
				D2	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [1]
				D3	0 – Weight Stable 1– Unstable	
				D4	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [2]
				D5	0 – Weight Stable 1– Unstable	
				D6	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [3]
				D7	0 – Weight Stable 1– Unstable	
				D8	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [4]
				D9	0 – Weight Stable 1– Unstable	
				D10	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [5]
				D11	0 – Weight Stable 1– Unstable	
				D12	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [6]
				D13	0 – Weight Stable 1– Unstable	
				D14	0 – Out of Zero R. 1 – In Zero Range	MX08 AD [7]
D15	0 – Weight Stable 1– Unstable					
41106	R	1	All MX08 AD Status in Okay, Active	D0	0 – Error 1 – Data Ok	MX08 AD [0]
				D1	0 – Not in system 1 – Active	
				D2	0 – Error 1 – Data Ok	MX08 AD [1]
				D3	0 – Not in system 1 – Active	
				D4	0 – Error 1 – Data Ok	MX08 AD [2]
				D5	0 – Not in system 1 – Active	
				D6	0 – Error 1 – Data Ok	MX08 AD [3]
				D7	0 – Not in system 1 – Active	
				D8	0 – Error 1 – Data Ok	MX08 AD [4]
				D9	0 – Not in system 1 – Active	
				D10	0 – Error 1 – Data Ok	MX08 AD [5]
				D11	0 – Not in system 1 – Active	
				D12	0 – Error 1 – Data Ok	MX08 AD [6]
				D13	0 – Not in system 1 – Active	
				D14	0 – Error 1 – Data Ok	MX08 AD [7]
D15	0 – Not in system 1 – Active					
41107	R	2	MX08 AD [0] Indicated Weight			
41109	R	2	MX08 AD [1] Indicated Weight			
41111	R	2	MX08 AD [2] Indicated Weight			
41113	R	2	MX08 AD [3] Indicated Weight			
41115	R	2	MX08 AD [4] Indicated Weight			
41117	R	2	MX08 AD [5] Indicated Weight			
41119	R	2	MX08 AD [6] Indicated Weight			
41121	R	2	MX08 AD [7] Indicated Weight			

10.6. Error Table

The MX08 EN gateway instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	No Instrument Found	– Install MX08 AD or MX08 IO instruments to the system. – Check the N-BUS connector whether they are installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 10.2 - Error table

10.7. Diagnostic Tests

RC-232C serial interface test can be performed sequentially in this test menu.

For entering diagnostic test mode, press the programming switch before power on and release the switch after power on the instrument. The instrument will go into RS-232C RXD test mode which is indicated by lighted Pwr LED and flashed Err LED as seen below. The status of LEDs on the front panel indicates test steps and the test result as described below. You can go to the next test by pressing the programming switch.

Test	LED's Status			Description
	Pwr	Lnk	Err	
RS-232C RxD	◐	○	✱	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go next test.
RS-232C TxD	◐	✱	✱	'A' to 'Z' characters are send sequentially in 0.8 s period. If the same data is received, Pwr LED blanks 0.3 sec. Press programming switch to go following test.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 10.3 - Diagnostic test sequence

If you short circuit RXD and TXD pins on RS-232C port and go in to TxD test, the receiving data is shown by Pwr LED.

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

11. MX08 CO CANOPEN GATEWAY

MX08 CO gateway instrument integrates up to 8 pcs Analog Digitizer device and up to 8 pcs Input / Output device to CANopen field bus. MX08 CO instrument communicates with other MX08 instruments via internal data bus N-Bus and responses to the PLC very fast via CANopen.

EDS file is available in CD which is supplied together with the instrument.

11.1. Front View

There are 3 annunciater LEDs on front panel to show the instrument status in operation.

The programming switch on front panel of the instrument is used for N-Bus addressing without PC (refer to Section 3.9) and for diagnostic tests (refer to Section 11.7).

The status of the instrument is announced by different lights (refer to Table 11.1).

When error LED lightened, other two LED announces the error type. Please refer to Section 11.6 for detailed error descriptions.

Power and serial interface terminals are located at the front of the DIN rail mount instrument as seen in Figure 11.1.

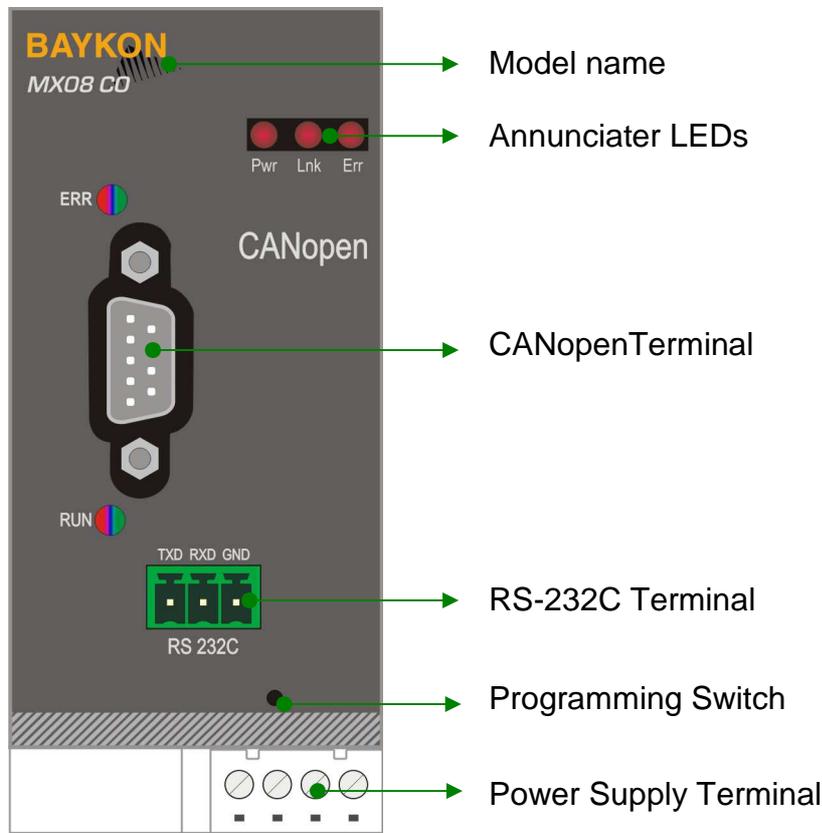


Figure 11.1 – Front View

The meanings of the annunciater LEDs in operation are given below.

LED		
Symbol	Name	
Pwr	Power	<input type="radio"/> MX08 CO not powered. Check power cable. <input checked="" type="radio"/> MX08 CO powered.
Lnk	Link	<input type="radio"/> No data transmission done. <input checked="" type="radio"/> Data transmission done to xFace or CANopen
Err	Error	<input type="radio"/> No Error found. <input checked="" type="radio"/> Error: Look at the error table in Section 11.6.

Blank
 Light
 Flash
 Blank for 0.3 second

Table 11.1 – Annunciater LEDs

Run LED

State	Indication	Comment
Off	Not online /No power	Check power and cable
Green	On-line, data exchange	-
Green, blinking	On-line, initializing	-
Green, single flash	Stopped	Check hardware damages
Green, flickering	Auto baudrate detection in progress	-
Red	CANopen configuration error	Check EDS file

Error LED

State	Indication	Comment
Off	-	No power or CANopen module is in initialization state
Red, single flash	Warning limit reached	A bus error counter reached or exceeded its warning level
Red, flickering	LSS	LSS services in progress
Red, double flash	Error count event	A guard- (NMT-Slave or NMT-master) or heartbeat event (Heartbeat consumer) has occurred.
Red	Bus off (Fatal Event)	Bus off.

11.2. Electrical Connections

CANopen, RS-232C and power supply terminals are shown in Figure 11.1.

CANopen Connector (DB9F)

Pin	Signal	Description
1	-	-
2	CAN_L	-
3	CAN_GND	-
4	-	-
5	CAN_SHIELD	-
6	-	-
7	CAN_H	-
8	-	-
9	-	-
Housing	Cable Shield	-

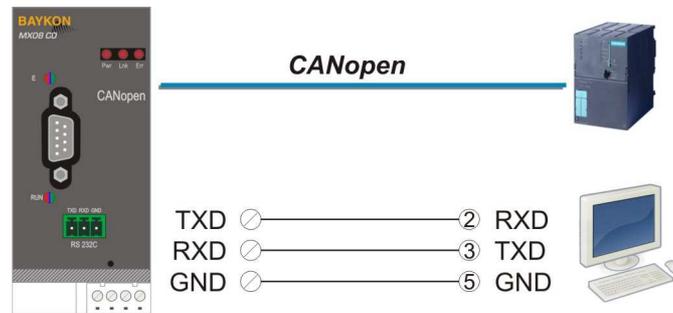


Figure 11.2 - MX08 CO serial interface connections

RS-232C Serial interface

Usage	Used for service port (xFace)
Baud rate	9600 bps
Length and parity	8 bit no parity
Start / Stop bits	1 start bit and 1 stop bit

CANopen interface

Usage	Interfacing with PC or PLC
Data formats	CANopen
Baud rate	Automatically detected and supported baud rates are 10 kbps, 50 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, 1 Mbps, Autobaud (default).

Warning: Connect the shield to the reference ground or shield pin of the power connector.

Warning: Disconnect xFace PC software for CANopen interfacing.

Power Supply Connection

The pin configuration of the 24 VDC power supply connector located on front bottom of the instrument is shown in figure below. Proper grounding is very important for the accuracy and the safety of your measuring system. Before interfering the instrument, please turn off the power and wait at least for 30 seconds.

Warning: Connect the grounding terminal to the reference ground.

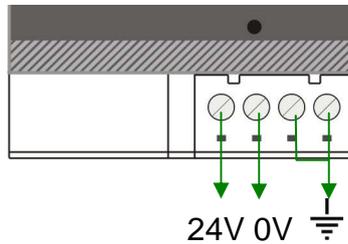


Figure 11.3 - Pin layout of 24VDC Connector

11.3. N-Bus Addressing

MX08 instruments communicate each other over internal data bus which is called N-Bus. MX08 gateway instrument is master of N-Bus. All other instruments are slave and shall be addressed to gateway.

N-Bus addressing can be done by using xFace PC software (Refer to Section 3.3) or via programming switch (Section 3.9).

11.4. CANopen Setup

CANopen set up is done by xFace software as described in this section. Connect MX08 CO instrument to your PC via RS-232C service port on the instrument as indicated in Figure 11.2.

Select Gateway tab after connecting xFace to MX08 CO. Gateway tab is seen in figure below. You will see the gateway information and CANopen parameters in this tab.

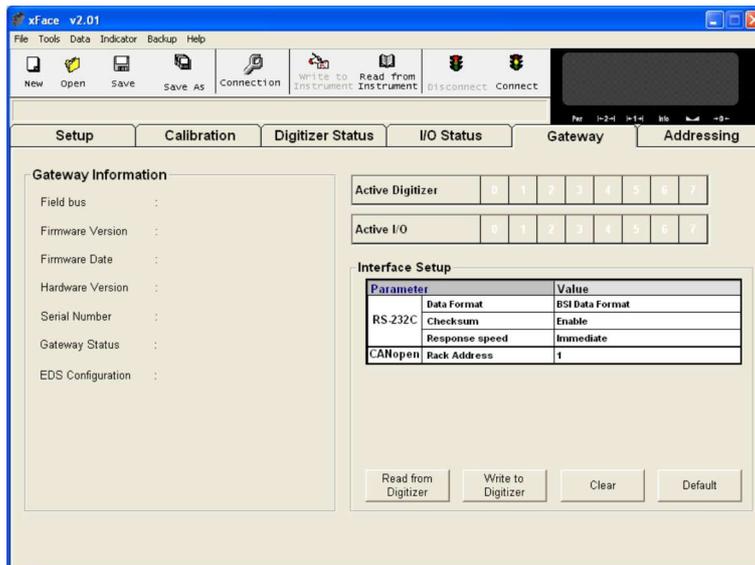


Figure 11.4 – CANopen setup

11.4.1. CANopen Parameters

There is only one parameter for CANopen network.

CANopen Rack Address

The address range is 1 to 127.

Default is '01'.

11.4.2. CANopen Information

xFace Gateway information block in Gateway tab allows the user to know much information about gateway instrument as in the following;

Field bus: CANopen

Firmware Version: Revision number of firmware

Firmware Date: Generated firmware date

Hardware Version: Revision number of main pcb board.

Serial Number: Instrument's serial number.

Gateway Status: Follow the status whether the system is proper or not.

EDS Configuration: Max. quantity of MX08 AD and MX08 IO instruments in the system.

11.5. CANopen Data Structure

Please refer to the Section 3.5 for detailed PLC configuration.

MX08 CO Output to PLC Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 CO	TxPDO 1 (T_DW1)	Active MX08 IO instruments						Active MX08 AD instruments						Cmd Flg
		Error Table			Not in use									

Bit Number	TxPDO 1 st Dword Description		
D31	0: No instrument found	1: 7 addressed MX08 IO is active	Active IO instruments
D30	0: No instrument found	1: 6 addressed MX08 IO is active	
D29	0: No instrument found	1: 5 addressed MX08 IO is active	
D28	0: No instrument found	1: 4 addressed MX08 IO is active	
D27	0: No instrument found	1: 3 addressed MX08 IO is active	
D26	0: No instrument found	1: 2 addressed MX08 IO is active	
D25	0: No instrument found	1: 1 addressed MX08 IO is active	
D24	0: No instrument found	1: 0 addressed MX08 IO is active	

D23	0: No instrument found	1: 7 addressed MX08 AD is active	Active AD instruments
D22	0: No instrument found	1: 6 addressed MX08 AD is active	
D21	0: No instrument found	1: 5 addressed MX08 AD is active	
D20	0: No instrument found	1: 4 addressed MX08 AD is active	
D19	0: No instrument found	1: 3 addressed MX08 AD is active	
D18	0: No instrument found	1: 2 addressed MX08 AD is active	
D17	0: No instrument found	1: 1 addressed MX08 AD is active	
D16	0: No instrument found	1: 0 addressed MX08 AD is active	

D15 D14 D13 D12	0000	No error found	Error Codes of MX08 CO
	0001	System fails. – Re-energize the instrument. If seen again, change the board.	
	0010	EEPROM fail. – Re-energize the instrument. If seen again, change the board.	
	0011	Field bus module error. – Re-energize the instrument. – Check the field-bus module is installed on the board. – If seen again, change the board.	
	0100	No Instrument found on N-Bus. – Install Digitizer or I/O instruments to the system. – Check N-BUS connectors whether they are installed.	
	0101	An instrument is installed/removed in/from system. – Re-address the instruments on N-Bus (Refer to section 3.3 or Section 3.9 N-Bus addressing)	

D11...D1	Not in use		
----------	------------	--	--

D0	Toggles	The command is applied successfully	CMD Flag
----	---------	-------------------------------------	----------

MX08 AD[0]	TxPDO 2 (T_DW2)	By default, Indicated Weight value is represented. To represent other weight or calibration status, refer to next Dword.								
	TxPDO 3 (T_DW3)	Not in use								
	Error Table of Digitizer[0]			Weight or Count	Zero Rang.	Gross or Net	Motion Detec	Response of Read Selected Data	Cmd Flag	

Bit Number	TxPDO 3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
---------------	---

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12	0111	Instrument does not found	Error Codes of Digitizer
	0110	Low/High voltage detection error	
	0101	In programming mode	
	0100	System Error	
	0011	ADC under	
	0010	ADC over	
	0001	ADC out	
	0000	No error found	

D11 ... D10	Not in use
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D9	0	Weighing / Force Mode	Operation Mode
	1	Count Mode	
D8	0	Out of Zero Range	Zero Range
	1	In Zero Range	
D7	0	Gross	Indication
	1	Net	
D6	0	Stable	Motion Dedection
	1	Dynamic	

D5 D4 D3 D2 D1	00000	Indicated weight	Response of 2 nd Dword description
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status (Refer to below table)	

D0	Toggles	The command is applied successfully	CMD Flag
----	---------	-------------------------------------	----------

Bit Number	TxPDO 2 nd , 4 th , 6 th , 8 th , 10 th , 12 th , 14 th , 16 th Dword descriptions when Read Command is 'Calibration Status'. Refer to PLC Output to MX08 CO Input for 3 rd Dword
------------	--

D31 ... D16	Not in use
-------------------	------------

D15 D14 D13 D12 D11 D10 D9 D8	0000 0001	Calibration Timeout - Restart calibration	Calibration Status
	0000 0010	ADC Error - Re-energize the instrument	
	0000 0011	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument	
	0010 0010	Instrument can not be calibrating - Load cell signal is very low or too high	
	0010 0011	Calibration Error - Calibration test weight is not enough - Increase calibration weight value - Check load cell connections	
	0010 0101	Scale unstable - Wait until scale become stable - Check grounding wiring	

D7 D6 D5 D4 D3 D2 D1 D0	0000 1001	Calibration Errors	Calibration Process Status
	0000 0100	Span calibration in process	
	0000 0011	Zero calibration in process	
	0000 0001	System ready for calibration	

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte	D7	D6	D5	D4	D3	D2	D1	D0
------------	------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[1]	+2 nd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[2]	+3 rd Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[3]	+4 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[4]	+5 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[5]	+6 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[6]	+7 th Byte					Input 4	Input 3	Input 2	Input 1
MX08 IO[7]	+8 th Byte					Input 4	Input 3	Input 2	Input 1

PLC Output to MX08 CO Input

Bitwise of Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

MX08 CO	RxPDO 1 (R_DW1)	Not in use													
		Not in use							I/O Write	Common Command List				Not in use	

Bit Number	1 st Dword Description
------------	-----------------------------------

D31 ... D9	Not in use
------------	------------

D8	0: Input / Outputs change over PLC Output to MX08 CO Input I/O Bytes. This flag does not need to New CMD command.		I/O Write Control
	1: Input / Outputs are change over Common Command List below. 1001: RESET, 1000: SET Outputs.		

D7 D6 D5 D4	0000	No error found	Common Command List
	0001	Zeroing command sent to all Digitizers.	
	0010	Tare command sent to all Digitizers.	
	0011	Clear command sent to all Digitizers.	
	1000	SET all I/O outputs. (if I/O Write Control = 1)	
	1001	RESET all I/O outputs. (if I/O Write Control = 1)	

D3 ... D1	Not in use
-----------	------------

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

MX08 AD[0]	RxPDO 2 (R_DW2)	Next Dword defines the usage of this Dword.			
	RxPDO 3 (R_DW3)	Not in use			
Not in use		Command List	Description of 2 nd Dword (R)	New CMD	

Bit Number	RxPDO 3 rd , 5 th , 7 th , 9 th , 11 th , 13 th , 15 th , 17 th Dword Description
------------	---

D31 ... D11	Not in use
-------------	------------

D10 D9 D8 D7 D6	00000	None command selected	Command List
	00001	Zero	
	00010	Tare	
	00011	Clear	
	00101	Start zero calibration.	
	00110	Start span calibration. First, load 2 nd Dword with test weight value, then apply this command with New CMD.	
	01000	Operation Mode Selection. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = Count mode unipolar, 1 = Count mode bipolar 2 = Force mode unipolar, 3 = Force mode bipolar, 4 = Weight mode unipolar	
01001	Operation mV of Count Mode. First, load 2 nd Dword with selected value, then apply this command with New CMD. 0 = 5mV, 1 = 10mV, 2 = 15mV, 3 = 18mV		
01010	Digital Filter. First, load 2 nd Dword with selected value, then apply this command with New CMD. Filter Values: 0 = Fast, ... , 9 = Slow.		

D5 D4 D3 D2 D1	00000	Indicated weight	Description of 2 nd Dword (R)
	00001	Gross weight	
	00010	Tare weight	
	00011	Indicated weight (floating point type)	
	00100	Gross weight (floating point type)	
	00101	Tare weight (floating point type)	
	10000	Calibration Status	

D0	Toggle	Apply commands which are listed in this table.	New CMD
----	--------	--	---------

Register address for

MX08 AD[1]: 4th – 5th Dwords

MX08 AD[2]: 6th – 7th Dwords

MX08 AD[3]: 8th – 9th Dwords

MX08 AD[4]: 10th – 11th Dwords

MX08 AD[5]: 12th – 13th Dwords

MX08 AD[6]: 14th – 15th Dwords

MX08 AD[7]: 16th – 17th Dwords definitions are same as 2nd – 3rd Dwords

MX08 IO[x]	Byte (W)	D7	D6	D5	D4	D3	D2	D1	D0
------------	----------	----	----	----	----	----	----	----	----

MX08 IO[0]	+1 st Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[1]	+2 nd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[2]	+3 rd Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[3]	+4 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[4]	+5 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[5]	+6 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[6]	+7 th Byte (W)					Output 4	Output 3	Output 2	Output 1
MX08 IO[7]	+8 th Byte (W)					Output 4	Output 3	Output 2	Output 1

11.6. Error Table

The MX08 CO gateway instruments have been designed as very reliable and virtually error free instruments. However if an error occurs do not attempt to repair the equipment before you understand what caused the error. Note the problems you have with your instrument and the error messages shown by the LEDs located on the front panel. Then try to solve the problem according to the error table given below.

Error Code			Description	Actions to take / Possible cause
Pwr	Link	Err		
○	○	✱	System Error	– Re-energize the instrument. If seen again, change the board.
●	○	✱	Configuration Error	– Re-address the instruments on N-Bus (Refer to Section 3.3 or Section 3.9 N-Bus addressing).
●	●	✱	No Instrument Found	– Install MX08 AD or MX08 IO instruments to the system. – Check the N-BUS connector whether they are installed on the rail.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

Table 11.2 - Error table

11.7. Diagnostic Tests

RS-232C serial interface test can be performed sequentially in this test menu.

For entering diagnostic test mode, press the programming switch before power on and release the switch after power on the instrument. The instrument will go into RS-232C RXD test mode which is indicated by lighted Pwr LED and flashed Err LED as seen below. The status of LEDs on the front panel indicates test steps and the test result as described below. You can go to the next test by pressing the programming switch.

Test	LED's Status			Description
	Pwr	Lnk	Err	
RS-232C RxD	◐	○	✱	Pwr LED blanks 0.3 sec after receiving any data. Press programming switch to go next test.
RS-232C TxD	◐	✱	✱	'A' to 'Z' characters are send sequentially in 0.8 s period. If the same data is received, Pwr LED blanks 0.3 sec. Press programming switch to go following test.

○ Blank ● Light ✱ Flash ◐ Blank for 0.3 second

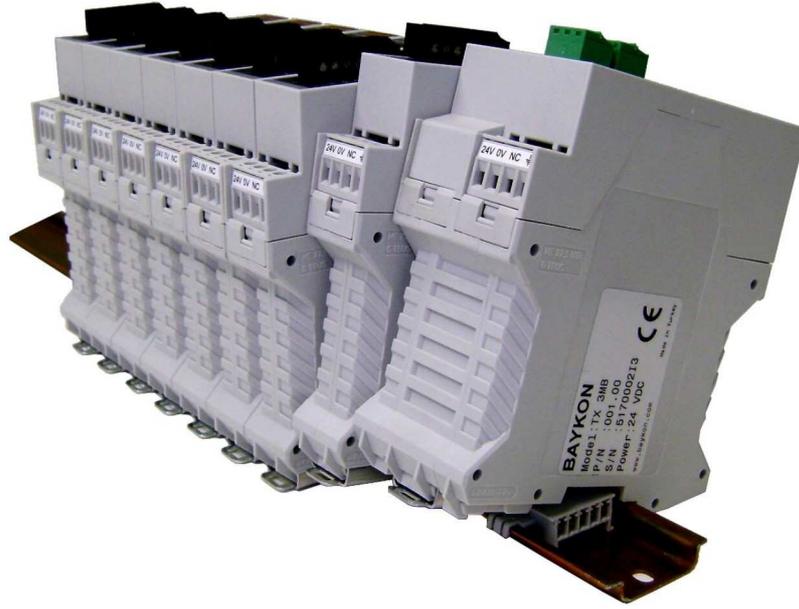
Table 11.3 - Diagnostic test sequence

If you short circuit RXD and TXD pins on RS-232C port and go in to TxD test, the receiving data is shown by Pwr LED.

Press programming switch for 5 seconds to exit diagnostic test mode and go to operation mode.

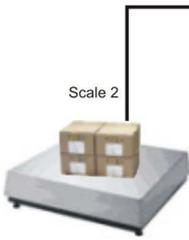
12. FAQ

Question : My PC could not interface with MX08. How can I check the com port?
Answer : <ul style="list-style-type: none">– Connect the instrument to the PC and run Hyper Terminal.– Check com ports as described in related section of gateway instruments.
Question : xFace installation needs restart every time. How can I install it?
Answer : <ul style="list-style-type: none">– Read and follow the installation notes in the installation directory.– Update your computer (visit http://update.microsoft.com).
Question : xFace could not connect to instrument. What can I do?
Answer : <ul style="list-style-type: none">– Check the power, data cabling and LED status of the gateway instrument.– Check PC port setting.– Remove other connections. Re-energize the gateway instrument and then make connection.
Question : My PC doesn't have any COM port. How can I connect transmitter to my PC?
Answer : <ul style="list-style-type: none">– You can use RS-232 / USB converter for serial interfacing via USB port. And select com port with Connection Settings menu.
Question : My PC have a COM port but I couldn't see COM port in Connection Setting menu. How can I solve that problem?
Answer : <ul style="list-style-type: none">– Another software may be connected to that COM port. Close all applications before running xFace.
Question : My PC could not interface with MX08. How can I check the com ports?
Answer : <ul style="list-style-type: none">– Short circuit RXD and TXD pins of com port. Check if the sending data is received or not by using any terminal software. You may test also MX08 com ports as described in Diagnostic Tests by short circuiting RXD and TXD pins.
Question : I need very fast interfacing. What is the response delay time of MX08.
Answer : <ul style="list-style-type: none">– MX08 response delay is 4 milliseconds for weight data. Extremely fast interfacing.
Question : What is the external conversion rate of MX08?
Answer : <ul style="list-style-type: none">– Only continuous data output rate might be called as an external conversion rate which depends on the baudrate and data length and up to 65 conversion/second.
Question : How can I check Ethernet connection?
Answer : <ul style="list-style-type: none">– MX08 EN has a dummy web page. You can easily open web page with any browser installed on any PC in network.
Question : How does auto slave addressing run with "Auto Addressing" command in xFace?
Answer : <ul style="list-style-type: none">– "Auto Addressing" command gives addresses (0 to 7) to slave devices, according to their initialization sequence, at power-on..



Digital In/Out

Scale 1



Scale 2



Scale 3

Digital In/Out



RS-232C
RS-485
Modbus RTU
Ethernet TCP/IP
Modbus TCP/IP
Profibus DP
Profinet
CANopen



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