HI-PERFORMANCE • MAINTENANCE FRIENDLY

NEXGEN™ 4000 PLC

WITH A VISION OF TOMORROW

SYSTEM OVERVIEW

NEXGEN™ 4000 PLC

पूर्णतः भारतीय उद्गम

MESSUNG

AUTOMATION PEOPLE

CONTENTS

NEXGEN™ 4000 PLC

NEXGEN-4000 series is the latest in world class, high performance, user-friendly, PLC from Messung Systems, pioneer in indigenous PLCs in India.

NEXGEN-4000 is a highly reliable, extremely user and maintenance friendly modular Programmable Logic Controller. NEXGEN-4000 PLC combines high performance to meet complex requirement, versatile communication facility to integrate intelligent devices like inverter, printer economically and unique built-in diagnostic facility for easy maintenance and reduced downtime.

Highlighting Features

High Speed Execution:

A 16-bit microprocessor and specially designed Boolean processor help to execute instructions at high speed. A Boolean instruction is executed in 0.5 sec and it takes approximately 80 sec to execute logical (16 bit) operation.

Extensive Instruction Set:

Wide choice of instructions along with indexed addressing and advanced program organization help to develop and upgrade application program easily. The data processing instructions like scale, bit operations etc help to reduce program size drastically.

Built-in Diagnostic Tool:

The PLC provides unique diagnostic tool in the form of 8 keys Keyboard and 4 character alphanumeric display. It can be used to adjust timer and counter preset values, force or redirect input or output to reduce downtime of the machine.

Display:

The onboard 4 character alphanumeric display can be programmed to display user messages indicating status and faults. Besides user messages, it is used to show system fault messages leading to easy diagnosis.

Communication Options:

The CPU module provides 3 communication ports i.e. three external devices can be simultaneously connected to the PLC. The programming port is RS-232 type. The RS-422 type Human Machine Interface (HMI) port facilitates connection of HMI at longer distance.

The 3rd communication port is really versatile. It is user configurable and supports multiple protocols to suit every requirement. The **Open protocol** integrates peripheral intelligent devices like inverter, printer etc. easily and economically. The **ASCII protocol** realises single Master multiple slaves type of network suitable for central data processing. With **Messung protocol** second HMI can be connected to CPU.

Password:

The Password facility protects intellectual property in the form the application program and unwarranted data modifications.

Specifications

General Specifications

Processing time Bit Instruction Word Instruction		500 nano second 80 micro second			
No. of I/Os		512 (free mix) Ouptuts retentive			
No. of Flags		2048 (Retentive)			
No. of Registers		8 K bytes (Retentive)			
No. of Timers		256 (On /Off Delay, Pulse delay, Duty timer) (Retentive)			
No. of counters		256 (Up, Down, Up/Down) (Retentive)			
No. of Racks		4			
Maximum modules/rack		8			
User Memory Cassette	Size	32 KB			
	Type	EEPROM			
Battery-Type/Life		3 V DC Lithium, 2 Years			
Dimensions - WxHxD		W x 190 x 145 mm			
			3 I/O	5 I/O	8 I/O
		W (mm)	230	314	440

Special Features

Built-in Maintenance Tool	4 Character Alphanumeric Display with Keyboard for fault diagnostic, parameter settings, I/O operations-view, forcing & redirection
Real Time Clock	Time, Date, Day settable
Communication	1. Programming Port 2. Auxiliary port for HMI, SCADA 3. User configurable port supporting • Open protocol for interfacing intelligent device - Inverter, printer etc., • ASCII protocols for central data processing • Messung protocol for interfacing SMARTLINE Series HMI OR Beijer make E-Series operator terminals
Password	Password for program and data

EMI Specifications

Conductive	2 KV as per standard IEC 1000-4-4, level 3
Serial Port	1 KV as per standard IEC 1000-4-4, level 3 impedance (capacitive coupled)

Product development is a continuous process. Consequently specifications are subject to change without prior notice. For latest information please contact our nearest sales office.

System Components

This section introduces the components that can be selected in NEXGEN 4000 System

Base Plate

The processor exchanges information with I/O modules via back plane. The base and expansion plates are available to suit I/O and power supply requirement. The base plate holds power supply, CPU and I/O modules.

Power Supply

The power supply provides power to the processor, I/O modules. In multi-rack system, additional power supplies can be connected into expansion plates.

Input Output Modules

Variety of digital, analog and special function modules are available. The functional details of modules is given in page no. 6.

User Memory Cassette

The User Memory Cassette (UMC) holds application program. It is EEPROM type. The program can be transferred to and from UMC.

3V Lithium Battery

The battery provides power to memory holding application information and real time clock during power off. The battery is user replaceable. The processor provides low battery indication. During battery replacement in power off condition, onboard super capacitor provides power, for 5 minutes.

Expansion Cables

In multi-rack configuration, the expansion cable is used to connect base or expansion plate to the expansion plate. The expansion cables are available in a variety of lengths.

Terminal Blocks

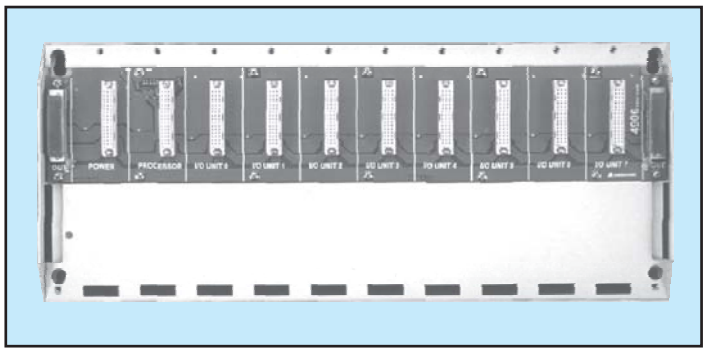
The terminal blocks are useful for field I/O wiring. These are of removable type.

Programming

DOXMINI+ is DOS based programming and documentation software for NEXGEN 4000 PLCs. The application program can be organised into multiple Program Organisation Units (POUs). The program can be downloaded to PLC using PC-PLC cable via programming port of the processor. The software allows I/O forcing, data monitoring and modification for easy debugging.

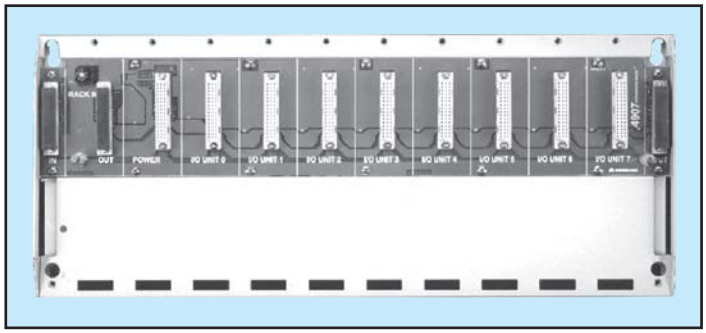
Base & Expansion Plates

Base Plate



The base plate holds Power Supply, CPU and I/O modules. It is available in varieties to suit I/O and expansion requirement. The base plate is available with or without expansion connector to offer economic solution. Both the base plates are available in 3 I/O, 5 I/O and 8 I/O slots.

Expansion Plate

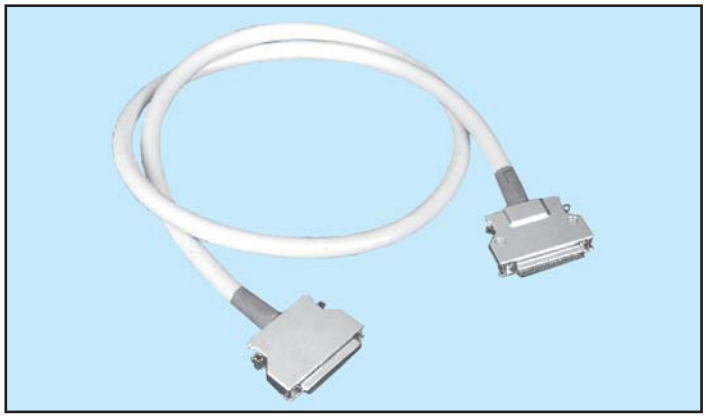


In multi-rack system, the expansion plate can be mounted next to each other or one below other. The expansion plate is available in varieties to suit I/O and power supply requirement. It is available with or without power supply connection facility. Both the expansion plates are available in 3 I/O, 5 I/O and 8 I/O slots.

At the most 3 expansion plates can be connected to the base plate.

Item Description	Ordering Code
BASE PLATES	
8 I/0 without expansion connector	4906
5 I/0 without expansion connector	4932
3 I/0 without expansion connector	4930
8 I/0 with expansion connector	4937
5 I/0 with expansion connector	4938
3 I/0 with expansion connector	4939
EXPANSION PLATES	
8 I/0 without Slot for Aux Power Supply	4934
5 I/0 without Slot for Aux Power Supply	4935
3 I/0 without Slot for Aux Power Supply	4936
8 I/0 with Slot for Aux Power Supply	4907
5 I/0 with Slot for Aux Power Supply	4933
3 I/0 with Slot for Aux Power Supply	4931

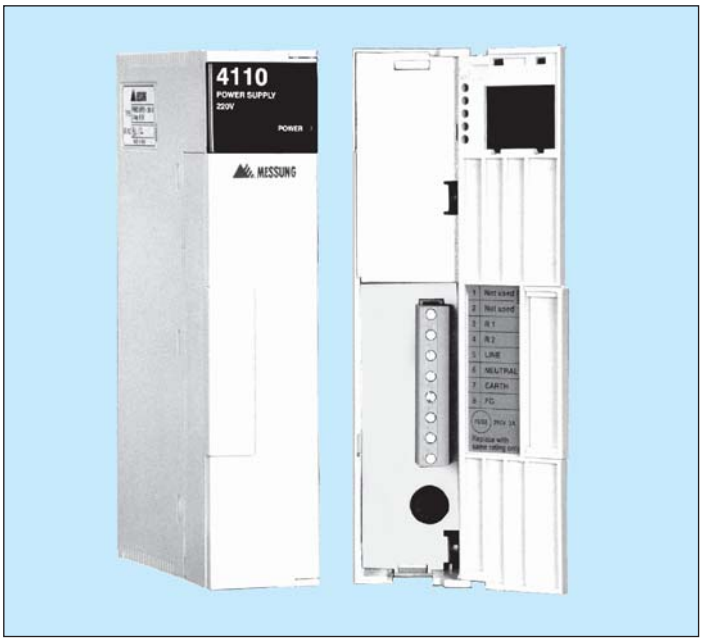
Expansion Cables



The expansion cable is used in multi-rack system for connecting base or expansion plate to expansion plate. These cables are available in different lengths.

Expansion Cable (Length)	Ordering Code
0.5 meter	4940
1 meter	4941
2 meters	4942
3 meters	4943

Power Supply Module

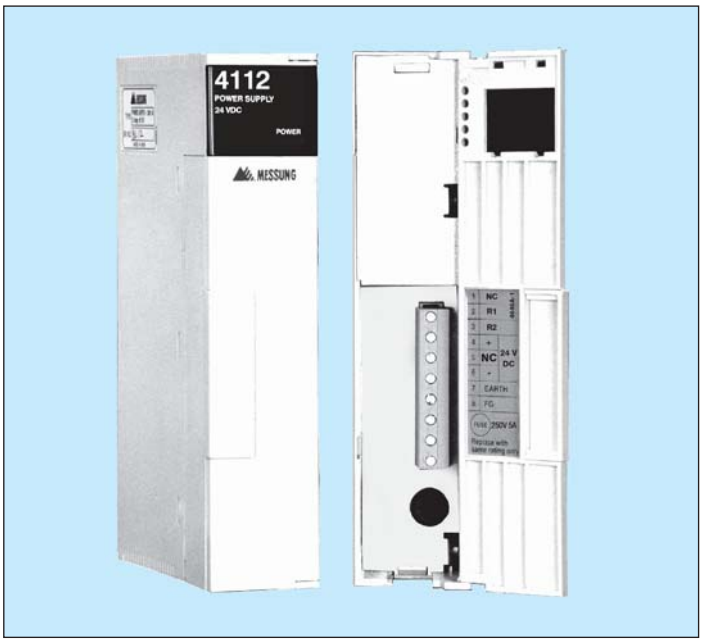


The power supply provides 5 V DC power to the processor, I/O modules and 12 V DC power for interfacing HMI Jr to HMI port.

In multi-rack system, additional power supplies can be connected into expansion plates.

Power Supply Module, with 220VAC Supply Input - 4110

Input supply	220VAC, ± 15 %, 50 Hz, ± 6%, 50VA
Inrush current	8A for 2 msec typical
Output voltages	5V DC - 5A, 12V DC - 0.5A
Fuse protection for incoming mains	3A / 20 mm glass fuse
Protections	• MOV for incoming over voltage • Output short circuit protection
Connector	8 pin (removable)
Ordering Code	4110



Power Supply Module, with 24VDC Supply Input-4112

Input supply	24VDC (18 TO 30 VDC including ripple) 45 Watt
Inrush current	25A for 10 msec typical
Output voltages	5V DC - 5A, 12V DC - 0.5A
Fuse protection for incoming supply	5A / 20 mm glass fuse
Protections	• Reverse polarity diode protection for incoming supply • Output short circuit protection
Connector	8 Pin (removable)
Ordering Code	4112

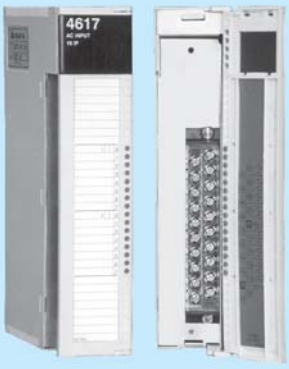
User Memory Cassette-4901

The User Memory Cassette (UMC) holds application program. It is EEPROM type and removable. The processor provides memory for application program. Hence the UMC need not be connected to the processor. The application program can be transferred from UMC to memory (or vice versa) using keyboard or DOXMINI+ .

Digital I/O Modules

32 pt DC Input Module

16 pt DC Input Module

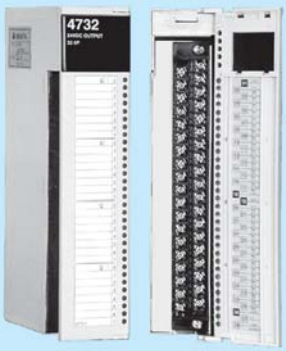


16 pt AC Input Module

Digital Input Modules

Inputs Type	Inputs		Input Current (mA)	Response Time (ms)		Operating Voltage (V)		Backplane Current (mA)	Ordering Code
	Total	Per Common		On	Off	On	Off		
DC Sink/Source selectable	32	8	6 @ 24V DC	15-20	15-20	18-30	0-5	110	4632
DC Sink/Source selectable	16	8	6 @ 24V DC	15-20	15-20	18-30	0-5	110	4616
AC	16	8	8 @ 230V AC 4 @ 120V AC	15-35	15-35	79-265	0-40	90	4617

16 pt DC Output Module



32 pt DC Output Module

16 pt Relay (Potential Free) Output Module

8 pt AC Output Module

Digital Output Modules

Output Type	Output		Load Current (A)			Response Time (ms)		Back-plane Current (mA)	Ordering Code
	Total	Per Common	Max per Output	Max per Group	Off State Leakage	On	Off		
DC Source	16	8	1.5	4.0	10 A	0.1	0.4	200	4716
DC Source	32	8	0.2	1.5	10 A	0.1	0.4	315	4732
AC	8	1	1.5	-	3 mA	1.0	10.0	210	4711
Relay (Potential free) type	16	1	0.75	-	3 mA	10.0	5.0	185	4721
To use 16pt. Relay (Potential free) type module "4721" with "2 independent commons" arrangement, we recommend to use Prewired Terminal Block, 38 pin									4910

Mixed Digital I/O Modules

16 pt DC Input 8 pt DC Output Module

16 pt DC Input 8 pt Relay Output Module

16 pt DC Input / 8 pt DC Output Module - 4425

Input Configuration								Backplane Current (mA)	Ordering Code
Inputs Type	Inputs		Input Current (mA)	Response Time (ms)		Operating Voltage (V)			
	Total	Per Common		On	Off	On	Off		
DC Sink/Source selectable	16	8	6 @ 24V DC	15-20	15-20	18-30	0-5		
Output Configuration								220	4425
Outputs Type	Output		Load Current(A)			Response Time (ms)			
	Total	Per Common	Max Per Output	Max Per Group	Off state Leakage	On	Off		
DC Source	8	4	1.5	4.0	10 A	0.1	0.4		

16 pt DC Input / 8 pt Relay Output Module - 4424

Input Configuration								Backplane Current (mA)	Ordering Code
Inputs Type	Inputs		Input Current (mA)	Response Time (ms)		Operating Voltage (V)			
	Total	Per Common		On	Off	On	Off		
DC Sink/Source selectable	16	8	6 @ 24V DC	15-20	15-20	18-30	0-5		
Output Configuration								220	4424
Outputs Type	Output		Load Current(A)			Response Time (ms)			
	Total	Per Common	Max Per Output	Max Per Group	Off state Leakage	On	Off		
Relay (Potential free)	8	1	0.75	–	3 mA	10	5		

3V Lithium Battery - 4952

The battery provides power to application program memory, data memory and real time clock during power off state. The battery is lithium type and operates satisfactorily upto 60^{0}C. The life of battery is two years. The battery is mounted at the front and is user replaceable. The processor provides LED indication and status information bit indicating when to replace battery. During battery replacement in power off condition, onboard super capacitor provides power for 5 minutes.

Counter Input Modules

4 Channel Counter Input Module-4634

4 Channel Counter Input Module provides 4 channels for counter inputs as A, B & Z. Four Z inputs can be configured individually either as normal inputs (with minimum 10 S pulse width) or as pulse catch input (with minimum 10 S pulse width) or reset to counter.

Inputs	12
Type of Inputs	Sink/source/differential selectable by type of connections to module
Counter Input Channels	4 maximum (A,B,Z inputs for each channel)
Filter	10 S
Minimum Pulse Width	10 S for pulse catch type of input & reset type of input
Maximum frequency	50 Khz in Counter Mode of Operation 25 Khz in Encoder Mode of Operation
ON time minimum	10 S for counter inputs
OFF time minimum	10 S for counter inputs
Indications	• GREEN LED for each input • Yellow LED for Error
Current	• 7 mA for Sink/source input • 17 mA for Differential input
Isolation	Optical (1.5KV from internal bus)
Back Plane Current	210 mA
IO points consumed	16 Input bits and 8 output bits
Terminal Connections	Removable 38 pin terminal block
Ordering code	4634

Multifuction Input Module-4633

The Multifuction Input module provides mix of inputs with programmable filter time, pulse catch input, interrupt input and counters with programmable 16 bit operational mode. Programmable filter (10ms) and up counter is the default configuration. The alternate configuration can be easily set using DOXMINI+. In such case, the inputs are not available as normal inputs.

The pulse having minimum 500 sec ON time can be detected. Upon detection of interrupt signal, the operating system of PLC branches to predefined interrupt task.

The counters can be configured for

- 4 up counters or
- 2 up/down counters or
- 2 up and 1 up/down counter

The counters can be programmed for external reset using normal inputs. Counting direction for up/down counter can be selected by external inputs.

	Input type	Channels	Filter Time / Max freq.	Remark
Discrete	Programmable Delay	12 (max)	100 sec 1ms, 10 ms	24 V field interface. These inputs can be selected in groups of 4.
	Pulse catch	2	500 sec	
Counter	Up Counter with programmable reset	4	10 sec / 10 Khz	12 / 24 V field interface. These are accumulating type counters. The count is added to predefined register
	Up-Down counter with direction input and programmable reset	2	10 sec / 10 Khz	12 / 24 V field interface. The counter has external direction input. This count is available in predefined register.
Back plane current :		205 mA		
I/O points consumed :		16 Input Bits and 16 Output Bits		
Ordering code		4633		

Analog I/O Modules

8 Channel Non-Isolated Analog Input Module-4308

The module incorporates microprocessor for carrying out scaling and on-board diagnostic operations. High resolution - 16 bit provides accurate control. Input channel filtering rejects high frequency noise coupled with signal.

No. of Input Channels		8	
Types	Voltage	-10 to +10VDC 0 to 10VDC 0 to 5VDC 1 to 5VDC	
	Current	0 to 20 mA 4 to 20 mA	
Resolution	Voltage/Current Range	Significant Bits	Resolution per LSB
	-10 to +10VDC 0 to 10VDC 0 to 5VDC 1 to 5VDC 0 to 20 mA 4 to 20 mA	16 Bits 15 Bits 14 Bits 13.67 Bits 14 Bits 13.67 Bits	305.176 V 305.176 V 305.176 V 305.176 V 1.2207 1.2207
Analog to Digital conversion time (mSec)		Filter frequency	Channel Update time
		50 Hz 60 Hz 250 Hz 500 Hz	60 ms 50 ms 12 ms 6 ms
Isolation	Channel to Channel Channel to internal circuit	No 1.5 KV optical	
External voltage requirement		24 V DC, 200 mA	
Indications		• No 24 VDC • CPU Error • Configuration Error • 8 Channel Status	
Back-plane current		400 mA	
I/O points consumed		8 Input Bits and 8 Output Bits	
Ordering Code		4308	

8 Channel Thermocouple Input Module-4310

The module converts thermocouple input mV values into equivalent temperature values of 0.1oC resolution with Cold Junction Compensation and Linearization.

No. of Input Channels		8	
Conversion Method		Sigma Delta with digital filter	
Thermocouple Input Types And Output Range		From (°C)	To (°C)
	J	-210.0	760.0
	K	-270.0	1370.0
	T	-270.0	400.0
	E	-270.0	1000.0
	R	0.0	1760.0
	S	0.0	1760.0
	B	0.0	1820.0
	N	-270.0	1300.0
Temperature Resolution		0.1°C	
Thermocouple Linearization		In Steps Of 10°C	
Cold Junction Compensation		LM 35 IC Sensor Mounted On Terminal Block Itself	
Analog to Digital Conversion Time		60 mSec per channel	
Isolation	Channel to Channel Channel to internal circuit	Nil 1.5 KV optical	
Input Impedance		1 M Ohms	
External Supply Requirement		24 V DC, 100 mA (18-30 VDC Including Ripple)	
External Supply Protection		• 315 mA miniature glass fuse on module. • Reverse polarity protection.	
Indications		• No 24 V Supply • CPU Fault • CJC Fault • Channel Status(8)	
Back-plane current		250 mA	
I/O points consumed		8 Input Bits And 8 Output Bits	
Terminal/Connection		Removable 38 Pin Terminal Block	
Ordering Code		4310	

Analog I/O Modules

8 Channel RTD Input Module-4311

The module converts RTD input resistance values into equivalent temperature values of 0.1°C resolution with Lead Compensation.

No. of Input Channels		8
Conversion Method		Sigma Delta with digital filter
RTD Input Type And Output Range	3 Wire PT 100	-200°C To 850°C
Temperature Resolution		0.1°C
Accuracy		0.5 % of Full Scale
Input Filter Frequency		50 Hz
Conversion Time		60 mS per Channel
Analog To Digital Conversion Time		60 mS per Channel
Isolation	Channel to Channel Channel to internal circuit	Nil 1.5 KV optical
Excitation Current		1 mA
External Supply Requirement		24 V DC, 100 mA (18-30 VDC Including Ripple)
External Supply Protection		● 315 mA miniature glass fuse on module. ● Reverse polarity protection.
Indications		● No 24 V Supply ● CPU Fault ● Channel Status (8)
Back-plane current		250 mA
I/O points consumed		8 Input Bits And 8 Output Bits
Terminal/Connection		Removable 38 Pin Terminal Block
Ordering Code		4311

2 Channel Isolated Analog Output Module (Voltage/Current)-4332

The module provides 2 isolated channels with 12-bit resolution. Output type can be Voltage/Current.

No. Of Output Channels		2 Isolated Channels with 16 bit resolution	
Conversion Method		R-2R Ladder	
		Voltage	Current
Input Range		-2048 to + 2047	0 to 2047
Output Range		-10 to + 10 VDC	4 to 20 mA
Resolution		4.8 mV	7.8 A
Load Resistance		> 1K	7.8 A
Overall Accuracy (%of FSR)		0.049	0.1674
Output short circuit protection		Yes	
Maximum conversion time		20 sec per channel	
Isolation	Channel to Internal circuit	1.5 KV optical	
	Channel to Channel	1.5 KV optical	
External Supply Requirement		24 VDC, 500 mA (18 - 30 VDC including ripple)	
External Supply Protection		315 mA miniature glass fuse on module. Reverse polarity protection	
Indications		● No 24 V Supply	
Back-plane current (5V consumption)		150 mA	
I/O points consumed		32 Input Bits And 32 Output Bits	
Terminal/Connection		20-Pin Removable Terminal Block	
Ordering Code		4332	

Analog I/O Modules

4 Channel Non Isolated Analog Output Module-4334

The module converts digital values data from CPU to equivalent analog output voltage.It provides 4 non-isolated channels with 16 bit resolution.

No. Of Output Channels		4 Non Isolated, 16 Bit
Conversion Method		R-2R Ladder
Input Range		-32,000 To +32,000
Output Voltage Range		-10 To +10 V DC
Resolution		312.5 V
Load Resistance		> 1 K Ohm
Load Current		10 mA Maximum
Output Protection		Infinite Short Circuit Protection.
Accuracy		0.5 % of Full Scale Reading.
Conversion Time		50 S (Irrespective of No. of ON Channels)
Isolation	Channel to Channel Channel to Internal circuit	Nil 1.5 KV optical
External Power Requirement		24 V DC, 300 mA 18-30 VDC, Including Ripple
External Supply Protection		●315 mA miniature glass fuse on module ●Reverse Polarity Protection
Indications		● No 24 V Supply ● Channel On (For Each Channel)
Back-plane current		300 mA
I/O points consumed		8 Input Bits And 8 Output Bits
Terminal/Connection		Removable 20 Pin Terminal Block
Ordering Code		4334

Fast Analog I/O Module-4366

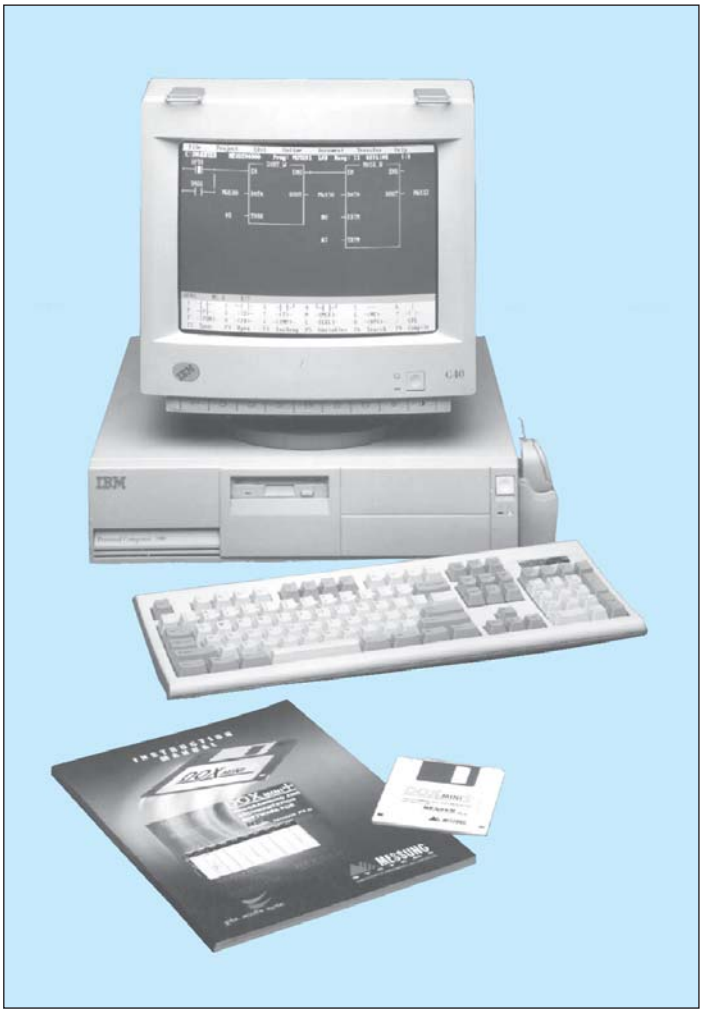
This module converts 4 differential analog voltage inputs to equivalent binary numbers with ADC, 16 bit resolution. Similarly it converts binary data from CPU to analog voltage output with DAC, 12 bit resolution.

No. Of Input Channels		4 Differential
Conversion Method		Sigma Delta with digital filter
Input Range		0 - 10 VDC, 0 - 20 mA
Output Range		0 - 32000 (unipolar)
ADC Resolution		312.5 V (15 bit) 625 A (15 bit)
Analog To Digital Conversion Time		1 mS per Channel
Isolation (Input Channels)	Channel to Channel Channel to internal circuit	Nil 1.5 KV optical
Input Impedance	Voltage Current	1 M Ohms 500 Ohms
No. Of Output Channels		2 Non-Isolated
Conversion Method		R-2R Ladder
Output Voltage		0 To 10 V DC
Output Voltage Range		0 - 32000 (unipolar)
Resolution		2.50 mV (12 bit)
Load Resistance		> 1 K Ohm
Load Current		10 mA Maximum
Output Short Circuit Protection		Yes
Maximum Conversion Time		200 S
Isolation	Channel To Channel Channel To Internal Circuit	Nil 1.5 KV Optical
Indications		● No 5 V Supply ● CPU Fault ● Analog Input Channel Status (8)
Back-plane current		1000 mA
I/O points consumed		8 Input Bits And 8 Output Bits
Terminal / Connection		Removable 38 Pin Terminal Block
Ordering Code		4366

Note : This module does not require any external power supply.

DOXMINI+, Programming & Documentation Software Package

DOXMINI+ is DOS based programming and documentation software for NEXGEN 4000 PLC. It has been designed in such a way that program development is quicker. It provides context sensitive help. It also provides special utilities for configuration of complex modules, interfacing intelligent peripheral devices like printer, inverters etc simplifying program development.



Modular Programming

The application program can be organized into multiple Program Organisation Units (POUs). Such POUs are easy to develop, test and upgrade. Also POUs can be developed by different programmers and merged together after thorough testing.

Symbolic Programming

It helps to develop, test and upgrade application programs easily. It is very useful particularly when hardware change calls for change in addresses of application program.

Advanced Editing

Cut, copy and paste feature facilitates to reuse application program. Similarly advanced import facility allows integrating Program Organisation Units from different application programs. Thus new application program development time is substantially reduced. The advanced search facility provides filters for performing search operations.

Advanced Online Debugging

Powerflow and Online Status monitoring modes are provided for program debugging. The PLC variables can be monitored, modified and forced. The powerflow mode permits monitoring of variables in network form. This is very useful to fix a logic bug. The online status monitoring allows monitoring multiple variables simultaneously in a tabular form. Further it provides reading options like decimal, binary, hex.

Complete Documentation

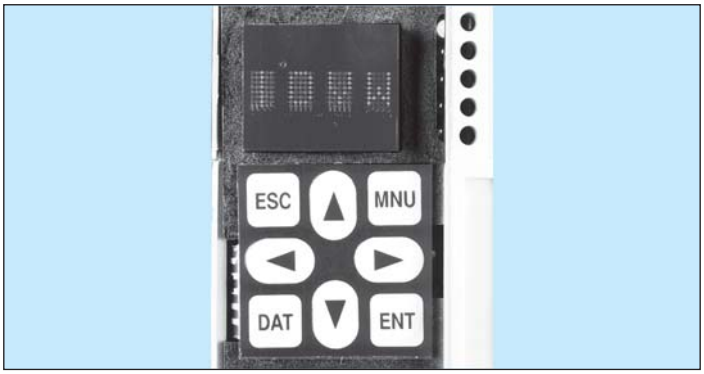
The software generates informative document useful for maintenance. It provides complete details of configuration, application program and communication details alongwith comments and unique cross-reference - backward and forward.

CPU Advanced Features

Display

The CPU provides 4 character alphanumeric display. Besides system messages, it can be programmed to show messages related to fault or status in an application.

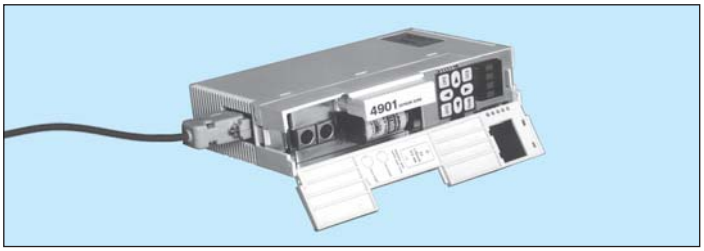
Diaganostic Tool



Unique built-in diagnostic tool is provided in the form of 8 keys keyboard and 4-character alphanumeric display. It is useful for

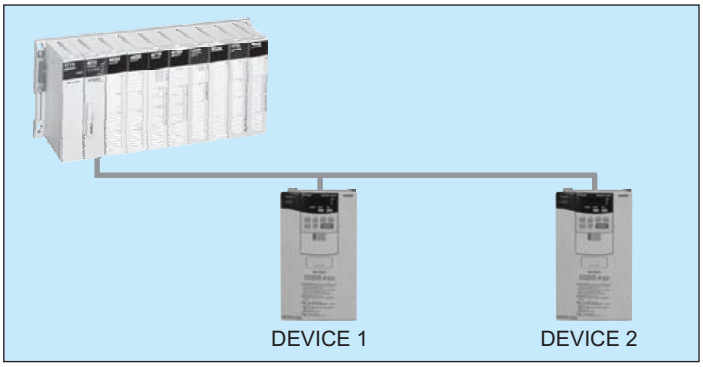
- **Redirecting faulty input / output to healthy one to reduce down time. No program modifications.**
- Monitoring status of input and output for diagnosis
- Forcing input and output for field I/O simulation
- Adjusting timer and counter preset values without programming tool
- Setting real time clock on the field
- Transferring application program from internal memory to UMC and vice-versa
- Control processor operating modes i.e. RUN, STOP etc

Versatile 3rd Port



The 3rd communication port is really versatile. It is user configurable and supports multiple protocols-**Open protocol, ASCII protocol and Messung protocol**. The hardware interfaces available are RS232, RS422 for 1:1 and RS485 for 1:n connectivity.

Open Protocol

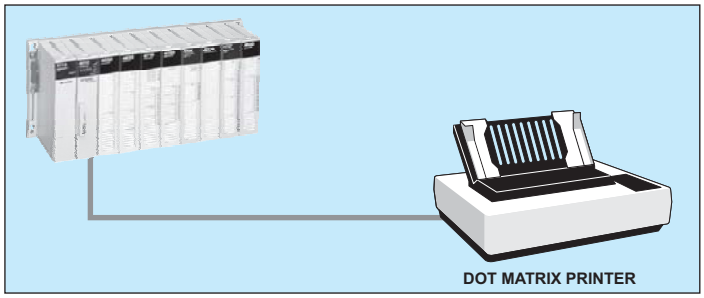


The intelligent peripheral devices like printer, inverter can be interfaced to PLC easily and economically. Only hardware interface details and protocol information is required for interfacing.

The programming software - DOXMINI+ provides special tools to set communications and protocol parameters and enter communication strings. The communication is established in a simple way. The PLC operating system completely takes care of communication, relieving related overheads.

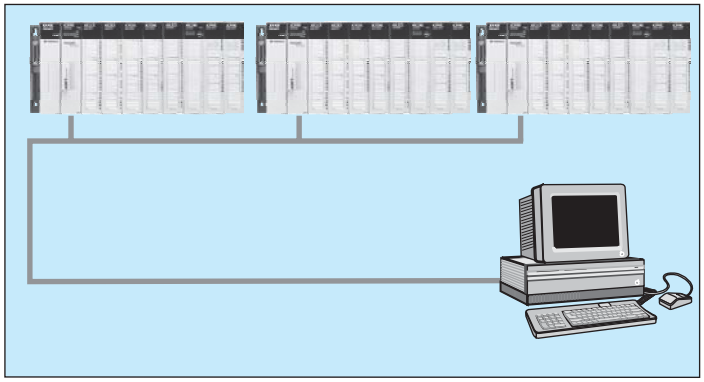
CPU Advanced Features

Open Protocol



Specifications (summary)			
Transmission standard	RS232	RS422	RS485
Interface type	1 : 1	1 : 1	1 : 31
Transmission distance	15 m	50 m	
Isolation	No		
Communication method	Half duplex		

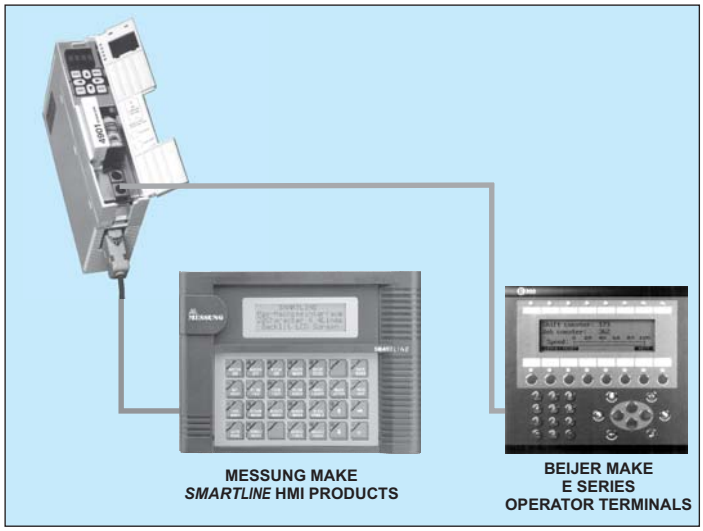
ASCII Protocol



At times, data from multiple PLCs needs to be accessed (for eg. SCADA). In such a case, the third port can be configured as a ASCII port. Now multiple PLCs can be connected in multidrop topology. The hardware interface is RS485. The network topology is single master and multiple slaves. At the most 31 PLCs can be connected.

These PLCs can be assigned station addresses through programming software. The master can access data from desired PLC (slave). The PLCs can not exchange any information within themselves directly.

Messung Protocol



For interfacing one of the HMIs, from SMARTLINE Series Human Machine Interface or Beijer make E-Series Operator Terminals.

The 3rd port can be configured for Messung protocol. Thus one more standard communication port (like 2nd port) is available to interface Human Machine Interface or computer running SCADA software. This realises connectivity of two HMIs to NEXGEN 4000 PLC cost effectively.

Picture shows : One HMI on 2nd port and second HMI on 3rd port.

Instruction Set - Quick Reference

Instruction		B	W	D	I	DI	R	
Relay	---I I---							Normally Open (NO) contact.
	---I / I---							Normally closed (NC) contact.
	---( )---I							Coil.
	---(/)---I							Inverted coil.
	---(S)---I							Latch coil.
	---(R)---I							Unlatch coil.
	---(T)---I							Toggle coil.
	---I P I---							Rising edge contact.
	---I N I---							Falling edge contact.
Arithmetic	ADD_							Adds DAT1 with DAT2, result is available in DOUT.
	ADDC_				X	X	X	Adds DAT1 with DAT2 with carry, result is available in DOUT.
	SUB_							Subtracts DAT2 from DAT1, result is available in DOUT.
	SUBB_				X	X	X	Subtracts DAT2 from DAT1 with borrow, result is available in DOUT.
	MUL_							Multiplies DAT1 by DAT2, result is available in DOUT.
	DIV_							Divides DAT1 by DAT2, quotient is available in DOUT, remainder next to DOUT.
	SQRT_	X	X	X	X	X		Square root of real number.
Logical	AND_				X	X	X	Logically ANDs bit pattern of DAT1 and DAT2, result is available in DOUT.
	OR_				X	X	X	Logically ORs bit pattern of DAT1 and DAT2, result is available in DOUT.
	XOR_				X	X	X	Logically XORs bit pattern of DAT1 and DAT2, result is available in DOUT.
	CPL_				X	X	X	Complements DATA, result is available in DOUT.
	CMP_							Comparision of DAT1 and DAT2 and result is available in DOUT.
	NEG_	X	X	X				Reverses the polarity of a value.
Data Transfer	MASK_			X	X	X	X	Masks the bit pattern of DATA, result is available in DOUT.
	MOV_			X	X	X	X	Transfers DATA to DOUT.
	SWAP_			X	X	X	X	Swaps the nibbles / bytes of DATA, result is available in DOUT.
	XCHG_			X	X	X	X	Exchanges the contents of DAT1 and DAT2.
Conversion	ASBD_			X	X	X	X	Converts ASCII coded DATA to BCD code, result is available in the DOUT.
	BDAS_			X	X	X	X	Converts BCD coded DATA to ASCII code, result is available in the DOUT.
	BDBN_			X	X	X	X	Converts BCD coded DATA to Binary code, result is available in the DOUT.
	BNBD_			X	X	X	X	Converts Binary coded DATA to BCD code, result is available in the DOUT.
	I_TO_DI	X	X	X		X	X	Converts integer to double integer.
	I_TO_R	X	X	X		X	X	Coverts integer to real number.
	DI_TO_R	X	X	X	X		X	Coverts double integer to real number.
	R_TO_I	X	X	X	X	X		Coverts real to integer number.
	R_TO DI	X	X	X	X	X		Coverts real to double integer number.
	DI_TO_I	X	X	X	X		X	Coverts double integer to integer number.
Program Control and Branch	MCR							Master Control Relay, it enables a zone of ladder programs as per requirement. It is a coil type of instruction.
	ME							Master End. It works along with MCR. ME ends the zone.
	JMP							Skips a part of a program execution.
	LBL							It acts as destination for JMP instruction.
Shift and Rotation Operations	SHLF_W							Shifts bit pattern of DATA to left by value specified, result is available in DOUT.
	SHRT_W							Shifts bit pattern of DATA to right by value specified, result is available in DOUT.
	ROTLF_W							Rotates bit pattern of DATA to left by value specified, result is available in DOUT.
	ROTRT_W							Rotates bit pattern of DATA to right by value specified, result is available in DOUT.
	ROTLFC_W							Rotates bit pattern of DATA through carry to left by value specified, result is available in DOUT.
	ROTRTC_W							Rotates bit pattern of DATA through carry to right by value specified, result is available in DOU.

B : Byte, **W :** Word, **D :** Double Word, **I :** Signed Integer, **DI :** Signed Double Integer, **R :** Real

New Instructions : Applicable from Nexgen-4000 CPU O.S.V. 2.00 onwards.

Instruction Set - Quick Reference

Instruction		
Data Processing	DBMOV_W	The data blocks specified by address and length is transferred to the data block whose start address is at DOUT.
	DBRD_W	Contents of word present at offset from DATA are copied into DOUT.
	DBFIL_W	DATA is copied in every word of data block whose start address is at DOUT, quantity of words to be copied is decided by LEN.
	CMP_W	Compares the contents of DAT1 and DAT2, result is available in the form of decision bits at DOUT.
	CMPTBL_W	Performs comparision of a word with those in a table and sets corresponding bit.
	DBCMP_W	Data block whose start address is DAT 1 is compared word by word with data block whose start address DAT2. If contents of both data blocks are equal then DOUT is set.
	DBWR_W	DATA is written at an offset from DOUT.
	DBSRH_W	DATA is searched in data block whose start of address is ADDR.
	LIFO_RD	Read from LIFO area.
	LIFO_WR	Write to LIFO area.
	FIFO_RD	Read from FIFO area.
	FIFO_WR	Write to FIFO area.
	READ_W	Read number of words from module buffer memory.
	WRITE_W	Write number of words to module buffer memory
	MAX_SCAN	Limit of maximum scan time is set.
Timers	TON 10 msec	On delay timer with 10 msec time base.
	TON 100 msec	On delay timer with 100 msec time base.
	TON 1 sec	On delay timer with 1 sec time base.
	TON 1 min	On delay timer with 1 min time base.
	TOFF 10 msec	Off delay timer with 10 msec time base.
	TOFF 100 msec	Off delay timer with 100 msec time base.
	TOFF 1 sec	Off delay timer with 1 sec time base.
	TOFF 1 min	Off delay timer with 1 min time base.
	TP 10 msec	Pulse delay timer with 10 msec time base.
	TP 100 msec	Pulse delay timer with 100 msec time base.
	TP 1 sec	Pulse delay timer with 1 sec time base.
	TP 1 min	Pulse delay timer with 1 min time base.
	TDT 10 msec	Duty timer with 10 msec time base.
	TDT 100 msec	Duty timer with 100 msec time base.
	TDT 1 sec	Duty timer with 1 sec time base.
	TDT 1 min	Duty timer with 1 min time base.
Counters	CNTU	Up counter with RESET facility.
	CNTD	Down counter with PRESET facility.
	CNTUD	UP/Down Counter with RESET and PRESET facility.
Miscellaneous	ENCODE	Encodes (16 to 4 bit) DATA, result is available at DOUT.
	DECODE	Decodes (4 to 16 bit) DATA, result is available at DOUT.
	BTSET_W	Sets bit defined by DAT2, of DAT1 word.
	BTRST_W	Resets bit defined by DAT2, of DAT1 word.
	BTMOD_W	Toggles bit defined by DAT2, of DAT1 word.
	BTCHK_W	Copies bit defined by DAT2 of word DAT1 to STAT.
	BT COPY	Status of bits from STBT is copied to destination and number of bits is defined.
	BTSRH_W	Search a bit in DATA word from FBTN Bit number onwards.
	LMTCMP_W	Compares DATA with LOLMT and HILMT, result is available in form of decision bits at DOUT.
	SCALE	Scales DATA to a value defined by X1, Y1, X2, Y2.
	READ	Reads buffer memory on I/O modules.
	WRITE	Writes buffer memory on I/O modules.
	DATA COPY	Copies word at offset location indicated by bit in a prioritised way.
	IMM-IN	Updates input image.
	IMM-OUT	Updates output image.

New Instructions : Applicable from Nexgen-4000 CPU O.S.V. 2.00 onwards.

Operator Interfaces

Human-Machine Interfaces (HMI) are panel mounted devices that provide effective dialogue between the operator and machine. Equipped with programmable display and keys, HMIs allow easy operation and monitoring in the production area. HMIs display operational and fault messages, enable machine specific parameters to be monitored and modified in suitable format. HMI keeps the operator fully informed of the current status of operations at all times.

Benefits of using Human Machine Interface alongwith PLC

- Replaces conventional push button panel (and related wiring), indicating lamps etc.
- Connects to PLC via serial interface. So easy and quick installation
- Simple operation and control
- Clear display of information
- Fault messages and instructions help reduce down time thereby improving productivity directly

The table summarises key features of Messung make Smartline series of Human Machine Interfaces.

Item	HMI - Jr	HMI - Sr
Display	16 charaters X 2 lines	20 characters X 4 lines
Display type	LCD with back-lit	LCD with back-lit / VFD
LEDs	4 bicolour LEDs with 2 flash frequencies	28 LEDs
User Configurable Keys	4 (+ fixed function keypad)	28
Buzzer	-	Potential free contact
Password	-	3 levels
Memory	8 K EEPROM	16 K EEPROM
Maximum screens	256	256
Power	Derives power from PLC	External 24 V DC
Dimensions W X H X D mm	125 X 75 X 45	200 X 180 X 55

Item Description	Ordering Code
SMARTLINE^{Jr} HMI with 16 Ch. X 2 Lines LCD (Backlit)	SL JR 1602 LN
SMARTLINE^{Sr} HMI with 20 Ch. X 4 Lines LCD (Backlit)	SL 2004 LN
SMARTLINE^{Sr} HMI with 20 Ch. X 4 Lines VFD	SL 2004 VN
PC Based Software Package ***SOFTLINE*** V4.02, DOS based HMI configuration software on IBM compatible PC-XT/AT	SFL V4.02
Serial Link Cable • From HMI Jr to IBM compatible PC-XT/AT & Link Adapter/Power Supply Unit (Length 3 Mtrs.) • From HMI Sr to IBM compatible PC-XT/AT (Length 3 Mtrs.) • From E-Series operator terminal to IBM compatible PC-XT/AT (length 3 Mtrs.)	 SL JR CAB 0300 SL CAB 0300 SL E CAB 0300
Serial Port Converter For Port conversion of IBM compatible PC-XT/AT	XMP8 SPC 2010

Item Description	Ordering Code					
HMI to PLC Link Cables	**Link Cable Length**					
	3 Meters	**5 Meters**	**10 Meters**	**15 Meters**	**20 Meters**	**25 Meters**
HMI Jr to NEXGEN 4000 PLC	SL JR CAB 0307	SL JR CAB 0507	SL JR CAB 1007	SL JR CAB 1507	SL JR CAB 2007	SL JR CAB 2507
HMI Sr to NEXGEN 4000 PLC	SL CAB 0307	SL CAB 0507	SL CAB 1007	SL CAB 1507	SL CAB 2007	SL CAB 2507
E-Series Terminals to NEXGEN 4000 PLC	E CAB 0307	E CAB 0507	E CAB 1007	E CAB 1507	E CAB 2007	E CAB 2507

Product development is a continuous process. Consequently specifications are subject to change without prior notice. For latest information please contact our nearest sales office.

	 E50	 E100	 E150	 E200	 E300	 E600
Display type LCD	Backlit STN	Backlit STN	Backlit STN	Backlit STN	Backlit STN	Backlit STN, black / white
Presentation form	Text	Text	Text	Text	Graphics + Text	Graphics + Text
Display size	2 rows x 16 characters	2 rows x 20 characters	2 rows x 20 characters	4 rows x 20 characters	240 x 64 pixels	240 x 128 pixels
Active area of display W x H (mm)	55.7 x 11.0	73.5 X 11.5	73.5 X 11.5	70.4 x 20.8	127.2 x 33.9 (5.2")	120 x 64 (5.3")
Backlight Lifetime (h)	50,000	50,000	50,000	50,000	50,000	15,000
Text height (mm)	5	5	5	5	Variable	Variable
LEDs	-	-	-	5 (two colors)	16 (two colors)	16 (two colors)
Function keys	4	4	6 (text strip)	5 (text strip)	8 (text strip)	16 (8 with text strip)
Dual drivers	-					
Transparent mode (1)	-					
Passthrough mode	-					
Web functionality	-	-	-	-		
Terminal reflection via Internet	-	-	-	-		
Multi Language / Unicode	-	/ -	/ -	/ -	/	/
Recipe handler	-					
Alarm management	-	-	-	1 group	Up to 4 groups	Up to 4 groups
Time channels	-					
Real-time clock	-					
Trend graphs	-	-	-	-	Real time	Historic
Report printouts	-					
Password for security	-	8 levels	8 levels	8 levels	8 levels	8 levels
Buzzer	-	-	-	-		
Memory for application	16 kb Flash	64 kb Flash	64 kb Flash	64 kb Flash	400 kb Flash / 8 Mb expansion	400 kb Flash / 8 Mb expansion
Number of expansion card positions	-	-	-	-	1	1
Communication interfaces	RS422 or RS 232C	RS422 and RS 232C	RS422 and RS 232C	RS422 and RS 232C	RS422 and RS 232C	RS422 and RS 232C
Support for Palm™ handhelds						
Support for extended keyboard	-	-	-	-		
Ambient temperature	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC
Waterproof front	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)
EMC	EN 50081 -1, EN 61000-6-2	EN 50081 -1, EN 61000-6-2	EN 50081 -1, EN 61000-6-2	EN 50081 -1, EN 61000-6-2	EN 50081 -1, EN 61000-6-2	EN 50081 -1, EN 61000-6-2
LVD	-	-	-	-	-	-
UL	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)
DNV						
Power supply	+ 5 V DC ± 5 %	+ 5 V DC ± 5 %	+ 5 V DC ± 5 %	+24 V DC, 20-30 V	+24 V DC, 20-30 V	+24 V DC, 20-30 V
Power consumption	200 mA (5 V)	200 mA (5 V)	200 mA (5 V)	150 mA (24 V)	450 mA (24 V)	450 mA (24 V)
Dimensions W x H x D (mm)	104 X 69 X 38 (4.1" X 2.7" X 1.5")	142 X 100 X 29 (5.6" X 3.5" X 1.1")	142 X 100 X 29 (5.6" X 3.5" X 1.1")	147 X 163.5 X 38 (5.8" X 6.4" X 1.5")	211 X 198 X 69 (8.3" X 7.8" X 2.7")	214 X 232 X 87 (8.4" X 9.1" X 3.4")
Weight (kg)	0.2	0.5	0.5	0.7	1.5	1.4

Note : 1) The controller can be accessed simultaneously by the terminal and an additional unit such as a PC. Depending on the driver. 2) Indoor use only

					
E610	**E615 / E615T**	**E700**	**E710**	**E900T / E900TD**	**E910T / E910TD**
Backlit STN, 16 grays, touch	Backlit STN / TFT color, touch	Backlit STN color	Backlit STN color, touch	Backlit TFT color	Backlit TFT color, touch
Graphics + Text	Graphics + Text	Graphics + Text	Graphics + Text	Graphics + Text	Graphics + Text
320 x 240 pixels	320 x 240 pixels	320 x 240 pixels	320 x 240 pixels	640 x 480 pixels	640 x 480 pixels
115.2 x 86.4 (5.7")	115.2 x 86.4 (5.7")	115.2 x 86.4 (5.7")	115.2 x 86.4 (5.7")	211.2 x 158.4 (10.4")	211.2 x 158.4 (10.4")
25,000	40,000 / 50,000	40,000	40,000	50,000	50,000
Variable	Variable	Variable	Variable	Variable	Variable
-	-	14 (two colors)	8 (two colors)	20 (two colors)	-
-	-	16 (8 with text strip)	8 (text strip)	22 (10 with text strip)	-
/	/	/	/	/	/
Up to 5 groups	Up to 5 groups	Up to 16 groups	Up to 5 groups	Up to 16 groups	Up to 11 groups
Historic	Historic	Historic	Historic	Historic	Historic
8 levels	8 levels	8 levels	8 levels	8 levels	8 levels
400 kb Flash / 8 Mb expansion	400 kb Flash / 8 Mb expansion	400 kb Flash / 8 Mb expansion	400 kb Flash / 8 Mb expansion	1,600 kb Flash / 8 Mb expansion	1,600 kb Flash / 8 Mb expansion
1	1	2	2	2	2
RS485, RS422, RS 232C (4)	RS485, RS422, RS 232C (4)	RS422 and RS232C	RS422 and RS232C	RS422 and RS232C	RS422 and RS232C
0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC	0 ºC - + 50 ºC
IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4X (2)	IP65, NEMA 4 / IP 65, NEMA 4X (2)	IP65, NEMA 4 / IP 65, NEMA 4X (2)
EN 50081 -2, EN 61000-6-2	EN 50081-2, EN 61000-6-2 / EN 50081-1, EN 61000-6-2	EN 61000-6-3, EN 61000-6-2	EN 61000-6-3, EN 61000-6-2	EN 50081-2, EN 61000-6-2 / EN 61000-6-4, EN 61000-6-2	EN 50081-2, EN 61000-6-2 / EN 61000-6-4, EN 61000-6-2
-	-	-	-	EN 60950 / -	EN 60950 / -
UL 508, UL 1604 (3)	UL 508, UL 1604 (3) / -	UL 508, UL 1604 (3)	UL 508, UL 1604 (3)	UL 1950, UL 1604 (3) / UL 508, UL 1604 (3)	UL 1950, UL 1604 (3) / UL 508, UL 1604 (3)
	/ -				
+24 V DC, 20-30 V	+24 V DC, 20-30 V	+24 V DC, 20-30 V	+24 V DC, 20-30 V	100-240 V AC / 24 V DC, 20-30 V	100-240 V AC / 24 V DC, 20-30 V
400 mA (24 V)	450 mA (24 V)	550 mA (24 V)	550 mA (24 V)	Max 0.35 A / 1A	Max 0.35 A / 1A
200 X 150 X 69 (7.8" X 5.9" X 2.7")	200 X 150 X 69 (7.8" X 5.9" X 2.7")	276 X 198 X 89 (10.9" X 7.8" X 3.5")	276 X 198 X 89 (10.9" X 7.8" X 3.5")	367 X 274 X 90 (14.4" X 10.8" X 3.5")	290 X 250 X 105 (11.4" X 9.8" X 4.1")
1.5	1.5	1.7	1.7	3.5	3.3

3) Class 1, Div 2, Groups A,B,C,D, and T4 4) Two of the three ports can be used simultaneously.

Ordering Information

Item Description	Ordering Code
BASE PLATES	
8 I/O without expansion connector	4906
5 I/O without expansion connector	4932
3 I/O without expansion connector	4930
8 I/O with expansion connector	4937
5 I/O with expansion connector	4938
3 I/O with expansion connector	4939
EXPANSION PLATES	
8 I/O without Slot for Aux Power Supply	4934
5 I/O without Slot for Aux Power Supply	4935
3 I/O without Slot for Aux Power Supply	4936
8 I/O with Slot for Aux Power Supply	4907
5 I/O with Slot for Aux Power Supply	4933
3 I/O with Slot for Aux Power Supply	4931
EXPANSION CABLES (length)	
0.5 meter	4940
1 meter	4941
2 meters	4942
3 meters	4943

POWER SUPPLY MODULE	Ordering Code
PSU 220 V AC, 5 V DC - 5 A, 12 V DC - 0.5 A	4110
PSU 24 V DC, 5 V DC - 5 A, 12 V DC - 0.5 A	4112

PROCESSOR	Ordering Code	Back Plane Current (mA) at 5V DC
CPU	4210	600
CPU with RS-232 3rd port	4211	600
CPU with RS-422/RS-485 3rd port	4212	600
Low Cost CPU	4213	600

USER MEMORY CASSETTE	Ordering Code
32 KB EEPROM	4901

TERMINAL BLOCKS	Ordering Code
Terminal blocks - 20 pin	4908
Terminal blocks - 38 pin	4909
Prewired Terminal Block - 38 pin	4910

I/O MODULES	Ordering Code	* Back Plane Current (mA) at 5 V DC	Terminal Block Required
DIGITAL INPUT MODULES			
16 I/Ps 24 V DC, Source/Sink Selectable	4616	110	20 pin
16 I/Ps, 110/220 V AC	4617	90	20 pin
32 I/Ps, 24 V DC, Source/Sink Selectable	4632	110	38 pin
16 Channel, Multifunction Input, Source/Sink Selectable	4633	205	38 pin
4 Channel Counter Input Module	4634	210	38 pin
DIGITAL OUTPUT MODULES			
8 Triac O/Ps, 110/220 V AC @ 1.5 A with fuse protection	4711	210	20 pin
32 DC O/Ps, 24 V DC @ 0.2 A with short circuit protection, Source Type	4732	315	38 pin
16 DC O/PS 24 V DC @ 1.5 A with short circuit protection, Source Type	4716	200	20 pin
16 Relay O/Ps (Potential Free) 24-250 V AC @ 750 mA	4721	185	38 pin
MIXED DIGITAL INPUT-OUTPUT MODULES			
16 DC I/Ps, 24 V Source/Sink Selectable, 8 Relay O/Ps (Potential Free) 24-250 V AC @ 0.75 A	4424	220	38 pin
16 DC I/Ps, 24 V Source/Sink Selectable, 8 DC O/Ps 24 V @ 1.5 A With short circuit protection, source type	4425	220	38 pin
ANALOG INPUT MODULES			
8 Channel, 16 bit, non-isolated Input Module	4308	400	38 pin
8 Channel, 16 bit, Thermocouple Input Module, For Interfacing J,K,T,E,N,R,S,B type of thermocouples	4310	250	38 pin
8 Channel, 16 bit, RTD Input Module, For Interfacing PT-100 Sensors	4311	250	38 pin
ANALOG OUTPUT MODULES			
2 Channel, 12 bit, Isolated Output Module (Voltage/Current Type)	4332	150	20 pin
4 Channel, 16 bit, Non-Isolated Output Module	4334	300	20 pin
FAST ANALOG INPUT & OUTPUT MODULES			
4 Channel, High Speed , Non-isolated, 16 Bit Analog Input & 2 Channel, Non-isolated, 12 Bit, Analog Output (Voltage type)	4366	1000	38 pin

** Please note that if current consumption at 5 V DC of "CPU, all Digital & Analog I/O Modules" exceeds 5 A, an additional power supply is required to be ordered.*

INTRODUCING

NEXGEN™ 5000 PLC

AN ICON OF THE FUTURE

Messung Systems, a leading pioneer in indigenous PLC in India, has constantly innovated to achieve global standards in designing and manufacturing PLC products. **With pride, it has now launched a high performance series of world class CPUs viz. Nexgen-5000**; coupled with basic building blocks of its earlier launched and established Nexgen-4000 PLC, this Nexgen-5000 PLC family offers a wide range of CPU variants, with IEC 61131-3 compatibility, having performance excellence, Windows® based programming software.

IEC 61131-3 COMPATIBLE

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