

APPLICATION NOTE

**Metasys Integrator®
ESAM® E2002 as VND device Application**

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Introduction

This document explains how to connect on Johnson Controls Metasys Building Management System the ESAM E2002 Network Analyze directly on N2 Bus acting as a VND device.

Use this document with ESAM E2002 manual which provides information on installing and commissioning ESAM device.

**Systems
Integration
Services
Europe
Contacts**

For any information on Johnson Control integration on VENDOR VND/N2 OPEN Protocols, Metasys Integrator (MIG), LONWORKS®, BACNET™, OPC® and other protocols or applications, please contact Johnson Controls Systems Integration Services Europe (SIS) at the following addresses or see contact list on Advisor, European Sites:

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Application Details

Once Esam controllers are connected to Metasys directly on N2 Bus, their data is available to the full complement of Metasys FMS features.....

ESAM device available for this application is :

- ESAM E2002

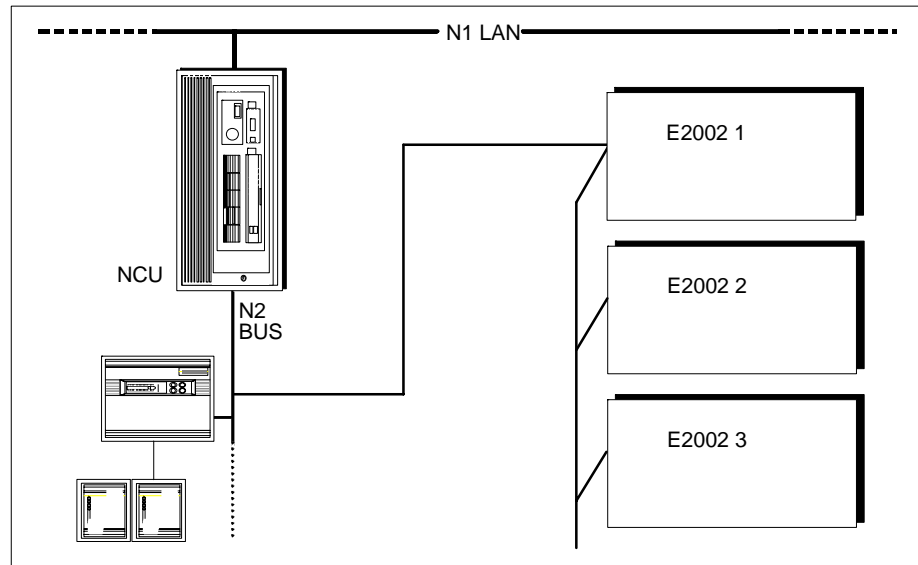


Figure.1 ESAM E2002 device on Metasys N2 Bus

**Components
Requirements**

To integrate ESAM Devices , you'll need the following:

- Properly installed ESAM devices
- Available N2 bus addresses for ESAM devices

Integration between Metasys (on N2 bus) and ESAM device has been tested with ESAM E2002 model.

Changes to ESAM devices and integration with ESAM products not discussed in this document will require additional software development and testing.

For information on integrating other products please contact JC ITALY (Phone ++39 02 28042.1, Fax ++39 02 28042.230)

**Vendor Contact
Information**

For technical information about ESAM equipment, contact your local ESAM representative or :

ESAM unicenter s.r.l.
Via S. Pietro, 10
20010 Bareggio (MI) ITALY
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Fax : ++39 02 903.62.314
Internet: <http://www.esamit.com>
E-mail: esamit@tin.it

**Design
Considerations**

When integrating ESAM equipment, keep the following considerations in mind:

- Make sure all ESAM devices are set up, started and properly running *before* attempting to integrate with Metasys.
- Get the correct serial address for each ESAM unit: the address is software setted on ESAM front Panel. For this action password is needed: please refer to ESAM instruction manual.
- Available addresses on E2002 unit: 1..255, (as for any JC device on N2 Bus). Default address 1.
- Mapping on Metasys as object belonging to VND device (AI, BI,BO)
- The transmission format is 8 data bits with 1 start and 1 stop bit.No parity bit is used.

Cable Connections

Cable Pinouts

Use the following cable pinouts for connection between Metasys N2 Bus and the ESAM device:

Connection from N2 Bus to E2002

N2 Bus (NCU Port I)		E2002	Terminal Unit
N2+	----->	19	A
N2-	<-----	20	B
Gnd	<-----	21	0

Remember to check the serial line termination according to JC and ESAM Specifications.

Keyboard operation

During Programming

- ↓ TO STEP TO NEXT TO BE SET
- ↑ TO STEP TO PREVIOUS TO BE SET
- CR** TO EXIT PROGRAMMING
- P** ALLOWS TO CHANGE THE DISPLAYED DATA

During Normal Operation

- ↓ TO STEP TO ANOTHER PAGE (NEXT)
- ↑ TO STEP TO ANOTHER PAGE (PREVIOUS)
- CR** TO DISPLAY THE PAGE NUMBER AND ITS DESCRIPTION
- P** KEEP IT PRESSED FOR 2 SECS TO START PROGRAMMING

Note 1: The programming automatically stops if no button is pressed within 1 minutes.

Setting a Parameter

Press "**P**" to change the value of a parameter. If "**select**" appears in the lower part of the display, select from a list of choices using keys "↑" or "↓", then press "**P**" to confirm.

If the parameters has a numeric value, the first digit will start blinking.

The number indicated by the cursor can be changed pressing "↑" or "↓", to obtain the desired value (Ex. 1 2 3 4 5 6 7 8 9 0 1...).

Set the first digit, move the cursor one step left pressing "**CR**" and repeat the sequence up to obtaining the desired value.

Press "**P**" to confirm the number.

If a value lower or higher then the foreseen limits, indicated on the lower area of the display, is set, the message ("**ERROR!!**") will be displayed for one second, then the device will display again the previously set value.

Setup Serial communication

Power On

At power on, the following message will be displayed for 2 seconds:
that will be afterwards replaced by the set value page.

E2002 3.4
Wait 9600,N,8,1

The number "3.4" indicates software version, 9600 is baud rate, "N" (parity), "8" (bit in one word) and "1" stop bit.

Enter Program Menu

Press button "P" for 2 second (blinking "Program") and then press "↓".

Select Protocol of Communicator

PROT = N2JC

Select protocol N2JC (Metasys N2-Johnson Controls)

Station Address

NUMT = 001
(1-255)

This assigns the network analyser an identification number from 1 to 255

Baud Rate

Baud = 9600

This sets the communication rate. It must be 9600 for N2JC protocol.

Min Delay for Reply

XDEL = 005

This is the minimim delay between answer and replay for serial communication. The default is 5 ms and is normally adequate.

Press "CR" to exit program menu.

Point Mapping Table

The following tables show the points available for mapping in the ESAM devices. For more information, please read ESAM technical notes or contact ESAM Service.

ESAM E2002 Analog Inputs

NPT ¹	NPA ²	UNIT	Description : read only data	Resolution
AI	1	V	Phase 1 : Voltage V1-N	(⁴)
	2	V	Phase 2 : Voltage V2-N	(⁴)
	3	V	Phase 3 : Voltage V3-N	(⁴)
	4	V	Voltage V1-2	(⁴)
	5	V	Voltage V2-3	(⁴)
	6	V	Voltage V1-3	(⁴)
	7	A	Phase 1 : Current I1	(⁴)
	8	A	Phase 3 : Current I2	(⁴)
	9	A	Phase 3: Current I3	(⁴)
	10	A	Not implemented (Neutral current)	(⁴)
	11		3 phase power factor value	(⁴)
	12	(³)	Type of power factor load	
	13		Power factor phase 1	(⁴)
	14		Power factor phase 2	(⁴)
	15		Power factor phase 3	(⁴)
	16		Power factor load phase 1	(⁴)
	17		Power factor load phase 2	(⁴)
	18		Power factor load phase 3	(⁴)
	19	kW	3 phase : active power	(⁴)
	20	kvar	3 phase reactive power	(⁴)

NPT¹	NPA²	UNIT	Description : read only data	Resolution
AI	21	kVA	3 phase : apparent power	(⁴)
	22	kW	3 phase : average power (average positive active power)	(⁴)
	23	kW	3 phase : peak maximum demand (peak positive active power)	(⁴)
	24	kW	Active Power phase 1	(⁴)
	25	kW	Active power phase 2	(⁴)
	26	kW	Active power phase 3	(⁴)
	27	kvar	Reactive power phase 1	(⁴)
	28	kvar	Reactive power phase 2	(⁴)
	29	kvar	Reactive power phase 3	(⁴)
	30	kVA	Apparent power phase 1	(⁴)
	31	kVA	Apparent power phase 2	(⁴)
	32	kVA	Apparent power phase 3	(⁴)
	33	Hz	Frequency	(⁴)
	34	kWh	3-Phase : positive active energy – Low	(⁴) (⁵)
	35	MWh	3-Phase : positive active energy – High	(⁴) (⁵)
	36	kWh	3-Phase : negative active energy – Low	(⁴) (⁵)
	37	MWh	3-Phase : negative active energy – High	(⁴) (⁵)
	38	kvarh	3-Phase : positive reactive energy – Low	(⁴) (⁵)
	39	Mvarh	3-Phase : positive reactive energy – High	(⁴) (⁵)
	40	kvarh	3-Phase : negative reactive energy – Low	(⁴) (⁵)
	41	Mvarh	3-Phase : negative reactive energy – High	(⁴) (⁵)

NPT ¹	NPA ²	UNIT	Description : read only data	Resolution
AI	42	%	THD V1	(⁴)
	43	%	THD V2	(⁴)
	44	%	THD V3	(⁴)
	45	%	THD I1	(⁴)
	46	%	THD I2	(⁴)
	47	%	THD I3	(⁴)
	48		Voltage transformer ratio (KTV)	(⁴)
	49		Current transformer ratio (KTA)	(⁴)
	50-63		Not used	(⁴)
	64	°C	Temperature	(⁴)
	65	hours	Hour meter	(⁴)
	66	V	Average voltage (V1-2+V2-3+V3-1)/3	(⁴)
	67	A	Average current (I1+I2+I3)/3	(⁴)
	68	(⁶)	Peak value 1	(⁴)
	69	(⁶)	Peak value 2	(⁴)
	70	(⁶)	Peak value 3	(⁴)
	71	(⁶)	Peak value 4	(⁴)
	72	kW	Average negative active power	(⁴)
	73	kvar	Average positive reactive power	(⁴)
	74	kvar	Average negative reactive power	(⁴)
	75	kW	Peak negative active power	(⁴)
	76	Kvar	Peak positive reactive power	(⁴)
	77	Kvar	Peak negative reactive power	(⁴)

ESAM E2002
Analog Inputs
Notes

- (¹) Network Point Type
- (²) Network Point Address
- (³) 1: PF inductive
 2: PF capacitive

(⁴):The values are represented in IEEE 32 bit floating point format and are expressed in the measuring units as specified in the table.

The resolution can be chosen arbitrarily by the user according to measured ranges.

(⁵):The energy overlapping value is related to the nominal input power as defined by voltage and current transformer ratios (KTV and KTA).

$$P_n = 1.5 * KTV * KTA \text{ kW}$$

Nominal input power	Energy overlapping value
$P_n < 10 \text{ kW}$	9999999.99 kWh
$10 \text{ kW} \leq P_n < 100\text{kW}$	99999999.9 kWh
$100 \text{ kW} \leq P_n < 1 \text{ MW}$	999999999 kWh
$1 \text{ MW} \leq P_n < 10 \text{ MW}$	9999999.99 MWh

(⁶) :according to selected variable

ESAM E2002
Binary Inputs

NPT ¹	NPA ²	UNIT	Read Only data : 0 = off/normal ; 64 = on/alarm
BI	1-63		Not used
	64		Alarm output 1
	65		Alarm output 2

¹ Network Point Type
² Network Point Address

ESAM E2002
Binary Outputs

NPT ¹	NPA ²	UNIT	Commanding data
BO	1		Reset average power (AI22,AI72,AI73,AI74) ^{3,4}
	2		Reset peak of average power (AI23,AI75,AI76,AI77) ^{3,4}
	3-63		Not Used
	64		Reset energy (AI34...AI41) ^{3,4}
	65		Reset Peak value (AI68,AI69,AI70,AI71) ^{3,4}
	66		Reset hour meter (AI65) ^{3,4}

¹ Network Point Type
² Network Point Address
³ 1 reset value
⁴ The value read is always 0.

Metasys Network Setup

An ESAM device must be defined using "VND" hardware type on DDL or on-line menu as any other vendor type product.

Mapping to CS Object

APPLICATION	SOFTWARE MODEL	DISPLAY ATTRIBUTE	NT COMMAND ATTRIBUTE
ESAM E2002	model diskette		

Mapping to Standard Objects

Define Systems and Objects that you need to integrate from ESAM on METASYS

Notes



Johnson Controls
Systems Integration Services Europe, Milan

www.johnsoncontrols.com