Honeywell

Experion Process Knowledge System (PKS)

Experion Platform DeviceNet Interface Specifications and Technical Data

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Honeywell

Experion DeviceNet Interface Specification and Technical Data

Table of Contents **Page**

Introduction

The Experion ™ platform to DeviceNet interface provides a communication path from a DeviceNet network to an Experion C200 controller through a dedicated DeviceNet Bridge (DNB) interface module. The DNB module is an Allen-Bradley-supplied device that can mount in both the Controller and the I/O rack. The diagram below depicts a topology example.

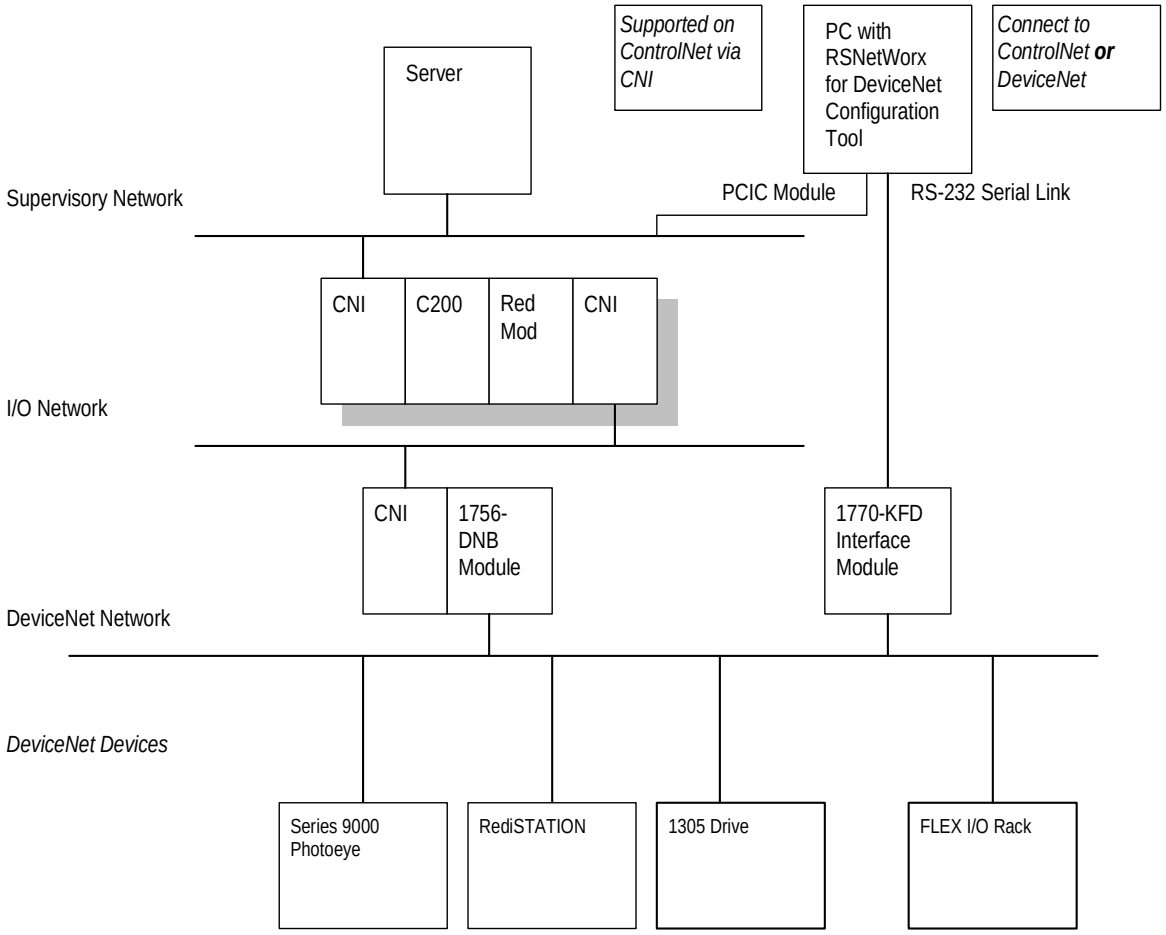

Figure 1 — Redundant Controller Experion platform with DeviceNet Interface

Functional Description

Introduction

The Experion-to-DeviceNet interface uses generic Experion C200 Controller function blocks contained within a DeviceNet interface library (DNETIF). This library is used within the Experion Control Builder to build control strategies.

These generic blocks provide a simple interface to Open DeviceNet Vendor Association (ODVA) certified devices that support numeric and discrete data. Additional devices can be certified by contacting a Honeywell representative.

The DNETIF library is packaged as an optional Control Component Library.

DeviceNet Interface Library

The DeviceNet Library contains *generic* DeviceNet function blocks. Generic blocks offer a flexible configuration model for providing a simple interface to most devices. The goal of the generic library is to utilize one set of function blocks that can be configured for use with most DeviceNet devices. The generic DeviceNet blocks allow users to achieve read and write capability with DeviceNet devices. After installation of the DNETIF, this library is visible on the Library tab of Control Builder.

The DNETIF library supports Experion R100 and later, and includes the following blocks:

DeviceNet Library Function Block	Description
DNET_IM block	An IOM block representing the DNB module.
DNET_DEVICE block	A block representing a Device.
DNET_INCHAN block	An associated input channel block representing data received from a DeviceNet device.
DNET_OUTCHAN block	An associated output channel block representing data sent to a DeviceNet device.

DNET_IM Function Block

The *DNET_IM* Function Block is an I/O module function block that represents the DNB Module. The *DNET_IM* block itself does not interpret any I/O data; it merely serves I/O data to each of its associated device blocks. It supports communication to any/all DeviceNet devices within the valid station address range of 0-63. In addition, it supports a maximum of 64 devices, identified by a unique network address.

The following table shows important information that is configured using Control Builder.

Use Control Builder to configure this DNET_IM function block information:
The name and type of module and the chassis address.
The Input and Output data size, and the data connection update rate.
DeviceNet configuration—A table of textual descriptors showing the configuration of the DeviceNet network, which has been configured previously using the RSNetWorx for DeviceNet configuration tool. This table shows the network address of each device, the device online/offline status, and the device communication status.

DNET_DEVICE Function Block

The *DNET_DEVICE* block is the generic device module block that represents the device of interest.

The following table shows important information that is configured using Control Builder.

Use Control Builder to configure this DNET_DEVICE function block information:
The *DNET_IM* block that serves its I/O data.
The DeviceNet network *Address* of the DeviceNet device that the function block represents.
The *Format* of the input and output data of the device.

DNET_INCHAN Function Block

The *DNET_INCHAN* (Input Channel Block) represents the input received from a DeviceNet device.

The following table shows important information that is configured using Control Builder.

Use Control Builder to Configure this DNET_INCHAN Function Block Information:	Description
Channel Assignment	The input channel block (*DNET_INCHAN*) is assigned to a *DNET_DEVICE* block within the same C200 control execution environment. This block type reserves one of the channels 0-15 of the *DNET_DEVICE* block for assignment. Like other Experion I/O modules, both the device block and the CM containing the input or output channels must be assigned to the same control execution environment prior to assigning the channel to the device block.
Pin Exposure	The input channel block is capable of processing up to 8 numeric inputs and 32 discrete inputs or any combination thereof; thus, the user must choose the appropriate parameters for pin exposure and connection to other blocks. One numeric input parameter and one discrete input parameter are exposed as block pins by default.
Input Channel Data Message Location	The data offset and data size of the channel block's message structure must be configured.
Numeric Input Configuration	Up to 8 numeric input parameters can be derived from the input channel. The position, type and scaling of each numeric input parameter used must be configured.
Discrete Input Data Configuration	Up to 32 discrete input parameters can be derived from the input channel. The position of each discrete input parameter used must be configured.

DNET_OUTCHAN Function Block

The *DNET_OUTCHAN* (Output Channel Block) represents the output sent to a DeviceNet device.

The following table shows important information that is configured using Control Builder.

Use Control Builder to Configure this DNET_OUTCHAN Function Block Information:	Description
Channel Assignment	The output channel block (*DNET_OUTCHAN*) is assigned to a *DNET_DEVICE* block within the same control execution environment. This block type reserves channels 16-32 of the *DNET_DEVICE* block for assignment. Like other Experion I/O modules, both the device block and the CM containing the input or output channels must be assigned to the same control execution environment, prior to assigning the channel to the device block.
Pin Exposure	The output channel block can process up to 8 numeric outputs and 32 discrete outputs. The user must choose the appropriate parameters for pin exposures and connections to other blocks. One numeric output parameter and one discrete output parameter are exposed as block pins by default.
Access Level Constraints on Control Outputs	A view-only access lock is enforced on the discrete and numeric output parameters of the *DNET_OUTCHAN* block; therefore, the operator/engineer cannot change the value of these parameters directly. Any output parameter that must be capable of being changed by the operator or engineer should be exposed as a block pin and connected to another block.
Output Channel Data Message Location	The data offset and data size of the device block's message structure must be configured.
Numeric Output Configuration	Up to 8 numeric output parameters can be derived from the output channel. The position, type and scaling of each numeric output parameter used must be configured.
Discrete Output Data Configuration	Up to 32 discrete output parameters can be derived from the output channel. The position of each discrete output parameter used must be configured.

Generic Function Block Constraints

Generic blocks provide the Experion Control Execution Environment (CEE) with I/O data of FLOAT64 and BOOLEAN data types only, for analog and discrete devices, respectively. However, I/O parameters can be connected to blocks such as the *TypeConvert* block in order to effectively interpret other data types

Although analog/numeric data is exposed to the control process in the FLOAT64 data type, as described above, the generic blocks interpret/package all numerical data in either integer or floating point format for transport from/to DeviceNet.

The following table lists the integer and floating point formats supported for data transport by the DeviceNet Interface Library generic channel blocks.

Integer and Floating-point formats supported by generic blocks

Signed 8 bit integer
Unsigned 8 bit integer
Signed 16 bit integer [1]
Unsigned 16 bit integer [1]
[1] 16 bit data formats are only supported in Experion Release 101 and later.

Generic blocks interpret (or package) all discrete/Boolean data as an individual bit, where the byte and bit number can be specified. Conventional logic polarity is assumed, whereby a “1” corresponds to an On/True condition and a “0” corresponds to an Off/False condition.

The use of logic blocks, such as the NOT block, can be used to effectively invert the polarity of the logical conditions.

The following table lists the configuration limits that apply to the use of generic blocks.

Device Block Configuration Limits	
Configuration Limit per Device Block	**Description**
Channels: • 16 Input channel blocks • 16 Output channel blocks	Each device block supports up to 16 input channel blocks and 16 output channel blocks.
Numerics: • 128 Input Numeric values • 128 Output Numeric values	Each of the 16 input and output channel blocks is capable of mapping up to 8 numeric values. 16 channels/device x 8 numerics/channel = 128 numerics/device A maximum of 128 numeric input values and 128 numeric output values per device is possible.
Discretes: • 512 Input Discrete values • 512 Output Discrete values	Each input and output channel is capable of mapping up to 32 discrete values. 16 channels/device x 32 discretes/channel = 512 discretes/device A maximum of 512 discrete input values and 512 discrete output values per device is possible.

Input and output parameter names are fixed at the parameter names indicated in the following table; however, 24 character descriptors are configurable on each parameter.

DeviceNet Interface Library Block I/O Parameter Names		
	Input Channel Block	**Output Channel Block**
Numeric Parameter Name	PV[0-7]	OP[0-7]
Discrete Parameter Name	PVFL[0-31]	OPFL[0-31]

Data Sizes

All data sizes are indicated in units of bytes. All byte and bit offsets are zero-based specifications. All data offsets are indicated in units of words and bits and are “left justified”.

Bit Offsets

All bit offsets are made relative to a particular byte, and therefore span the range 0 to 7. Bit offsets are “right justified”, meaning that when a byte is presented in binary numerical format, bit 0 is on the right side. In the following example, only bit 0 is set: 00000001.

Although input and output channel blocks are capable of specifying and interpreting a discrete value in a single bit, the entire byte (which contains the referenced bit) is read and written by the input/output channel blocks, respectively.

Data Formats

Numeric Data

Five integer formats are supported for both input and output channel blocks.

The tables below list the data types, sizes and the minimum and maximum mathematical ranges for the integer data types. This information is a property of the device of interest and must be known by the configuration engineer in order to properly configure the generic input and output channel blocks.

Numeric inputs and outputs do not support under range or over range protection in the form of fail-safe behavior nor are alarms generated at such limits.

Integer Data Formats Supported with DeviceNet Interface

Data Type	Description	Size (bytes)	Minimum Value	Maximum Value
BYTE_SIGNED	Signed 8 bit integer	1	-128	127
BYTE_UNSIGND	Unsigned 8 bit integer	1	0	256
WORD_SIGNED [1]	Signed 16 bit integer	2	-32,767	32,768
WORD_UNSIGND[1]	Unsigned 16 bit integer	2	0	65,536

[1] Word data formats are only supported in Experion Release 101 and later.

Discrete/Boolean Data Type

The generic blocks are configured with the necessary parameters to specify the particular byte and bit necessary to convert between discrete I/O data and integer format.

Specifications

Hardware Details

The DeviceNet Bridge Module possesses the following characteristics:

Parameter	Specification
Module Model Number and Type	1756-DNB; Available from Allen-Bradley; CIOM-A form-factor; single slot-width
Physical Interface	Provides a communication bridge between ControlNet and DeviceNet
Chassis Locations	Controller or Remote I/O Chassis (as with other CIOM-A modules, it is located in the I/O Chassis in a redundant Controller configuration)
DeviceNet baud rates supported	500 KBps, 250 KBps and 125KBps
Maximum Number of 1756-DNB Modules per C200 Controller	32 *[6 supported with 5ms CEE]*
Maximum Number of 1756-DNB Modules per Downlink CNI *A Downlink CNI can support the equivalent of 24 IOMs.*	12 *[not supported with 5ms CEE]*
Communication update between module and DNB block	50 ms
Maximum Bytes per Network	496 Input; 492 Output
Maximum Number of 1756-DNB Modules per Server *(Redundant or Non-Redundant)*	100
Maximum Number of DeviceNet Usage Licenses per Server *(Redundant or Non-Redundant)*	100
Update Rates from the 1756-DNB Module to the C200	5ms CEE: Read at 5ms; Write at 5ms 50ms CEE: Read at 25ms; Write at 25 ms
Configuration	Configured from a PC running the *RSNetWorx for DeviceNet* Configuration Tool connected to either DeviceNet through a 1770-KFD Interface Module or ControlNet through a PCIC Module.

See the Experion CEE-based Controller Specifications and Technical Data for important Controller specifications.

A DeviceNet Usage License, TC-DNLXxx, is required based on the total number of DeviceNet Bridge Modules per Server actually in use.

Configuration

All devices on the DeviceNet, including the DNB modules, are configured as necessary using Allen-Bradley's RSNetWorx for DeviceNet software. Configurations of the DeviceNet and Experion networks are performed separately and differently. Experion configuration (Controller, DeviceNet Control Blocks residing in the controller, Server, Station) is performed using the normal Experion system configuration methods such as the Control Builder and Experion Station. The DeviceNet system (such as devices on DeviceNet, 1756-DNB, and DeviceNet network configuration) is performed using the appropriate DeviceNet tool such as the DeviceNet RediStation or a PC with a DeviceNet connection using RSNetWorx for DeviceNet and RSLinx.

The following tables lists the various software, hardware, and system components required to implement the DeviceNet Interface with Experion.

Honeywell DeviceNet Interface Software Requirements

Software Package	Optional/ Required	Purchasable from Honeywell
Honeywell's DeviceNet Interface Library - included with the DeviceNet Usage Licenses.	Required	Yes
RSLinx or RSLinx Lite	Required	Yes
RSNetWorx for DeviceNet	Required	No
Experion Control Builder	Required	Yes
Experion DeviceNet Bridge Usage License DeviceNet Usage Licenses: TC-DNLX01: DeviceNet Usage License, 1 DNB TC-DNLX05: DeviceNet Usage License, 5 DNBs TC-DNLX10: DeviceNet Usage License, 10 DNBs *(these licenses are additive and ordered in quantities required for the number of DNB Modules)*	Required	Yes
All software not purchased from Honeywell must be acquired from their respective supplier.		

Hardware Requirements for DeviceNet Configuration Tools

Hardware	Optional/ Required	Purchasable from Honeywell
PC/Laptop with Serial Port	Required	No
1770-KFD Interface Module & RS-232 cabling	Optional*	No
ControlNet through a PCIC Module and cabling	Optional*	No
Either a ControlNet Interface Card (TC-PCIC01K) or a third-party 1770-KFD is required to configure devices.		

Honeywell DeviceNet Interface System Requirements

Element	Optional/ Required
Experion R100 or later	Required
1756-DNB - Allen-Bradley DeviceNet Bridge device	Required
C200 Controller	Required
DeviceNet network	Required

Experion Process Knowledge System (PKS)

www.experionpks.com

USA: Honeywell, 2500 W. Union Hills Drive, Phoenix, AZ 85023 /**Canada**: The Honeywell Centre, 155 Gordon Baker Rd., North York, Ontario M2H 3N7/**Latin America**: Honeywell, Inc., 480 Sawgrass Corporate Parkway, Suite 200, Sunrise, Florida 33325/**Japan**: Honeywell K.K., 14-6 Shibaura 1-chome, Minato-ku, Tokyo, Japan 105-0023/**Asia**: Honeywell Pte Ltd., Honeywell Building, 17 Changi Business Park Central 1, Singapore 486073, Republic of Singapore/**Pacific Division**: Honeywell Pty Ltd., 5 Thomas Holt Drive, North Ryde NSW Australia 2113/**Europe and Africa**: Honeywell S.A. Avenue du Bourget 3, 1140 Brussels, Belgium/**Eastern Europe**: Honeywell Praha, s.r.o. Budejovicka 1, 140 21 Prague 4, Czech Republic/**Middle East**: Honeywell Middle East Ltd., Technology Park, Cert Complex Block Q, Muroor Rd., Abu Dhabi, U.A.E.

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