BusBlock Analog Input Module
for the Smart Distributed System
TECHNICAL DATA

Description

The Holjeron BusBlock Analog Input Module is designed to handle small amounts of analog inputs in a limited amount of space. The BusBlock Analog Input Module has four channels, with each channel using bus power to power the analog device being connected. Each input can be either a separate SDS address, or can be configured to be four embedded objects within a single SDS address.

Field terminations are captive screw terminals. Each input has its own LED indication for immediate verification of I/O states.

Other BusBlock products include an eight point configurable digital module; as well as analog output and frequency modules.

Warranty/Remedy

Seller warrants its products to be free from defects in design, material and workmanship under normal use and service. Seller will repair or replace without charge any such products it finds to be so defective on its return to Seller within 18 months after date of shipment by Seller. **The foregoing is in lieu of all other expressed or implied warranties (except title), including those of merchantability and fitness for a particular purpose.** The foregoing is also purchaser's sole remedy and is in lieu of all other guarantees, obligations, or liabilities or any consequences incidental, or punitive damages attributable to negligence or strict liability, all by way of example.
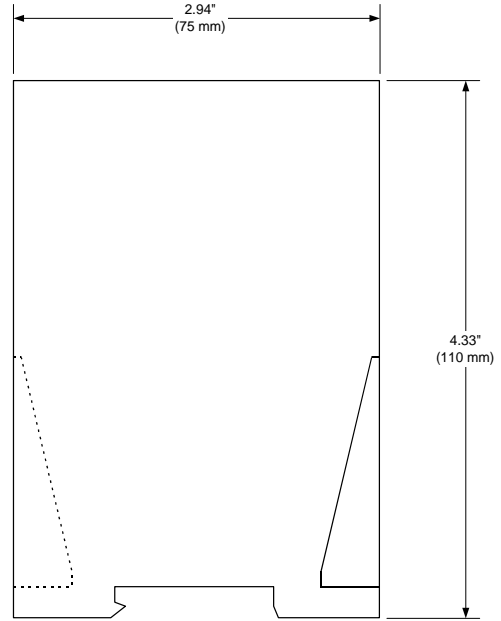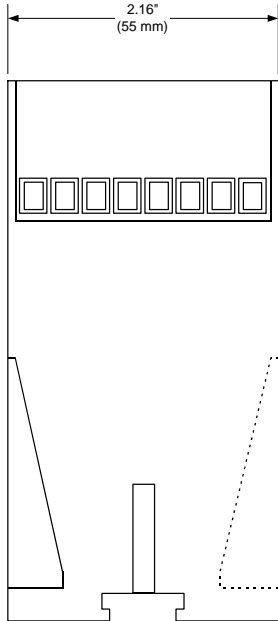
While Holjeron provides application assistance, personally and through our literature, it is up to the customer to determine the suitability of the product in the application.

All information contained herein, including illustrations, specifications and dimensions, is believed to be reliable as of the date of publication, but is subject to change without notice.
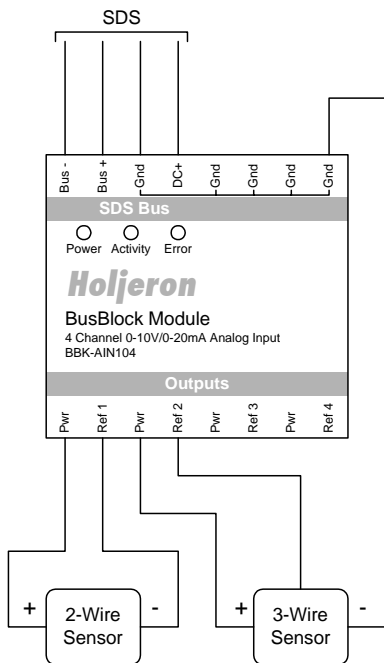
Specifications

Part Number	4 Channel Analog Input Module		BBK-AIN104
Electrical	SDS Voltage Range		11-25 VDC
	Current Consumption		60 mA + analog loop power
	Data Rates		125, 250, 500 and 1000 kbps
Inputs	Type		0-20 mA/0-5 VDC (selectable)
	Number		Four (4)
Environmental	Temperature	Storage	-30° to 70° C (-22° to 158° F)
		Operating	0° to 60° C (32° to 140° F)
	Humidity		5-95% RH, non-condensing
	Vibration		2G at 10 to 500 Hz
	Shock		10G
Physical	Dimensions		2.95" H x 2.17" W x 4.33" D
	Weight		12 oz
	Color		Bone Gray
	Case Material		Polycarbonate
	Mounting		DIN Rail or foot mount
	Terminations		Cage Clamp Screw Terminal
	Indication	Power	Green
		Error	Red
		SDS	Green

Dimensions

2.16"
(55 mm)

2.94"
(75 mm)

4.33"
(110 mm)

Wiring

SDS

| Bus - | Bus + | Gnd | DC+ | Gnd | Gnd | Gnd | Gnd |

SDS Bus

○ Power ○ Activity ○ Error

Holjeron

BusBlock Module
4 Channel 0-10V/0-20mA Analog Input
BBK-AIN104

Outputs

| Pwr | Ref 1 | Pwr | Ref 2 | Pwr | Ref 3 | Pwr | Ref 4 |

+ 2-Wire Sensor -

+ 3-Wire Sensor -

Configuration Tools

A BusBlock module can be configured using several tools. The information below summarizes the configuration tools available and hardware requirements for each tool.

Holjeron Device Manager for SDS

Requires an HSIM Portable (RS-232 to CAN converter) that connects to the serial port of a personal computer. The bus **or** the HSIM Portable must have power.

Honeywell hand-held activator

The Honeywell activator may not supply enough power by itself. The SDS bus might require external power to be applied.

Think & Do Software

Requires a Honeywell PC Interface Card with separate bus power. Follow the instructions for installing the SDS Driver in I/O View.

Quick Start

The following steps are the minimum steps to configure BusBlock module. Default values are shown in bold typeface.

Set Device Address

Using one of the tools described above, change the device address from the default. All units are shipped from the factory as **address 123-126** .

Note
Set the address before attaching any component to a complete bus. This will help prevent duplicate addresses on a bus.
The default addresses are:
Channel 1 – Address 126 *Channel 2 – Address 125* *Channel 3 – Address 124* *Channel 4 – Address 123*

Channel Configuration

If using less than four channels, set the **Number of Channels (attribute 58)** to the appropriate value. Legal entries are 1, 2, 3 and **4**.

Each channel can also be configured as an embedded object within a single SDS address. This requires an SDS master that understands how to communicate with embedded objects.

Enable Objects (attribute 59), when set to a value of 1, each channel is configured as an embedded object within a single SDS address.
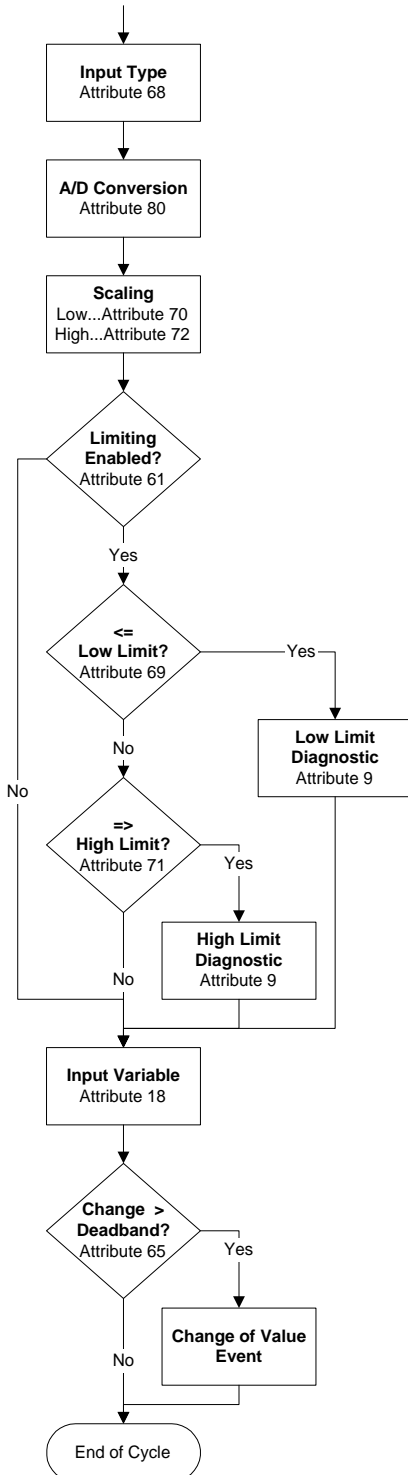
Note
Changes to attributes 58 or 59 require power to be cycled to the module before changes take effect.

Tag Name

Tag Name (attribute 56) is a 32-character string that the user can enter to describe the functionality and/or location of each channel of the BusBlock Analog Input Module.

Operation

The BusBlock Analog Input module converts analog signals using the process defined below.

```
        │
        ▼
┌─────────────────┐
│   Input Type    │
│   Attribute 68  │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│  A/D Conversion │
│   Attribute 80  │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│     Scaling     │
│ Low...Attribute 70 │
│ High...Attribute 72 │
└─────────────────┘
        │
        ▼
     ◇ Limiting
       Enabled?
       Attribute 61
        │ Yes
        ▼
     ◇ <=
       Low Limit?      ──Yes──┐
       Attribute 69           │
        │ No                  ▼
        │          ┌─────────────────┐
        │          │   Low Limit     │
        │          │   Diagnostic    │
        │          │   Attribute 9   │
        │          └─────────────────┘
        ▼
     ◇ =>
       High Limit?     ──Yes──┐
       Attribute 71           │
        │ No                  ▼
        │          ┌─────────────────┐
        │          │   High Limit    │
        │          │   Diagnostic    │
        │          │   Attribute 9   │
        │          └─────────────────┘
        ▼
┌─────────────────┐
│  Input Variable │
│   Attribute 18  │
└─────────────────┘
        │
        ▼
     ◇ Change >
       Deadband?       ──Yes──┐
       Attribute 65           │
        │ No                  ▼
        │          ┌─────────────────┐
        │          │ Change of Value │
        │          │     Event       │
        │          └─────────────────┘
        ▼
   ( End of Cycle )
```

Input Range

The BusBlock Analog Input Module can be configured to accept either 0-5 VDC or 0-20 mA inputs through the **Input Range (attribute 68)**. A value of 0 is for voltage, a value of 1 for current.

The digital value resulting from the A/D conversion is **stored in Raw Data (attribute 80)**.

Scaling

The **Low Scale (attribute 70)** is the value to be transmitted over SDS when the incoming analog signal is at 0 (volts or milliamps) and, conversely, the **High Scale (attribute 72)** is the value to be sent when the incoming analog signal is at its highest value (10 VDC or 20 mA). The incoming analog signal is then linearized to the low and high scale values.

The default value for low scale is 0. The default value for high scale is 32767.

Limiting

When **Enable Limiting** (**attribute 61**) is set to 1, the input variable reported in a Change of Value Event will never be below the **Low Limit (attribute 69)** or above the **High Limit (attribute 71)**. If the actual value falls outside the bounds of the limits then a diagnostic bit is set and an event reported (see Diagnostics).

The default value for low limit is 0. The default value for high limit is 32767.

Input Variable

Attribute 18 functions as the input attribute for the BusBlock Analog Input Module. Whenever an event is generated that reports the state of inputs, the data in attribute 18 will be passed.

Note

When using a packaged control system, such as Think & Do Software, it is not necessary to explicitly read input and output variables. The SDS I/O Driver and Interface Card perform this function. All that is required is to map inputs and outputs as described in the software user manual.

Change of Value Deadband

A **Change of Value Deadband (attribute 65)** can also be set. This will limit events from being sent unless the input variable changes at least as much as the value entered in the Change of Value Deadband. This prevents insignificant changes in the input variable from generating events on the bus. The default value for the Change of Value Deadband is 16.

Input Event Mode

Most systems will require a BusBlock I/O Module to generate an event whenever one or more inputs change state. This requires the **Unsolicit Mode (attribute 6)** be enabled by setting its value to **1**. Other options are to disable change of value events (Unsolicit Mode = 0) or use the **Cyclic Timer (Attribute 10)** by setting it to some non-zero value. The Cyclic Timer will transmit the input variable on an interval equal to the value in the Cyclic Timer attribute times 10 milliseconds (0.01 seconds).

Diagnostics

The Diagnostics Register (**attribute 9**) is two bytes and contains the minimum diagnostics required for the Smart Distributed System, plus additional diagnostics specific to the BusBlock Analog Input module.

Diagnostic Register Bit Definitions Byte 0

Bit	Name	Description
0	CHKSUM	ROM checksum error
1	WDOG	Output watchdog timer expired
2	BUSOFF	Off us communications error
3	DEVERR	Fatal component error
4	NODE	Missing node detected
5	RSVD	Reserved
6	RSVD	Reserved
7	EPRM	EEPROM error detected

Diagnostic Register Bit Definitions Byte 1

Bit	Name	Description
0	SRVLIFE	Service Life exceeded
1	RSVD	Reserved
2	IOERR	I/O error
3	IOTIM	I/O Timeout
4	LOLIM	Low Limit
5	HILIM	High Limit
6	RSVD	Reserved
7	RSVD	Reserved

SDS host controllers are equipped to receive a diagnostic event, then automatically obtain the information from the **Diagnostic Register (attribute 9)**. Consult the documentation for the host controller being used to determine how errors are handled.

CHKSUM

A ROM checksum error is generated on power up if there is a memory error test.

WDOG

The Output Watchdog Timer is not active in the BusBlock Analog Input module.

BUSOFF

The CAN controller on the BusBlock module counts error messages. Every error message increments a counter by 8, every good message decrements the counter by 1. If the counter reaches 128 then the module will go BUSOFF, and will need to be reset by the host controller.

DEVERR

The DEVERR diagnostic bit will be set if a fatal error is detected within the component.

NODE

The host controller will report the node is missing using the NODE bit.

EPRM

The EPRM error will occur when the microprocessor on the BusBlock module is unable to read or write EEPROM.

SRVLIFE

BusBlock modules are equipped with two attribute settings for managing the service life of the module. The first, **Service Time (attribute 63)** is the number of hours the module has been in operation. The second, **Service Life (attribute 64)** is set by the user, and is the number of service hours before the unit requires maintenance and/or replacement. When the Service Time value reaches the Service Life setting then an SRVLIFE diagnostic is transmitted.

IOERR

The IOERR diagnostic is enabled when the microprocessor on the BusBlock encounters communication errors with the A/D converter.

IOTIM

An IOTIM diagnostic occurs when the microprocessor requests new data from the A/D converter and does not receive a response.

LOLIM

A LOLIM diagnostic is generated when the scaled input value is at or below the Low Limit set in attribute 69.

HILIM

A HILIM diagnostic is generated when the scaled input value is at or above the High Limit set in attribute 71.

Attributes

ID	Description	R/W	Data Type	Size	Count	Default
0	Network Data Descriptor	R	Unsigned	Byte	3	18,04h,40h
1	Baud Rate	R	Unsigned	Byte	1	0 [autobaud]
2	Object Model	R	Unsigned	Byte	5	1, 2, 5, 1, 2
3	Vendor Id	R	Unsigned	Word	1	9 [Holjeron]
4	Logical Address	R	Unsigned	Byte	1	125
6	Un/solicited Mode	W	Boolean	Undef	1	1
7	Software Version	R	Character	Undef	12	
8	Diagnostic Counter	R	Unsigned	Byte	1	
9	Diagnostic Register	W	Unsigned	Byte	2	
10	Cyclic Timer	W	Unsigned	Word	1	0
11	Serial Number	R	Unsigned	Long	1	
12	Date Code	R	Character	Undef	4	
13	Catalog Listing	R	Character	Undef	32	BBK-AIN104
14	Vendor	R	Character	Undef	32	Holjeron
15	Description	W	Character	Undef	32	4-Channel Analog Input
18	Input Variable	R	Signed	Word	1	
55	Manufacturing Codes	R	Unsigned	Byte	1	0
56	Tag Name	W	Character	Undef	32	
58	Number of Channels Used	W	Unsigned	Byte	1	4
59	Enable Object Mode	W	Boolean	Undef	1	0
61	Enable Limiting	W	Boolean	Undef	1	0
63	Service Time	R	Unsigned	Word	1	
64	Service Life	W	Unsigned	Word	1	5000
65	Change of Value Deadband	W	Unsigned	Word	1	16
68	Input Range	W	Boolean	Undef	1	0 [current mode]
69	Input Low Limit	W	Signed	Word	1	0
70	Input Low Scale	W	Signed	Word	1	0
71	Input High Limit	W	Signed	Word	1	32767
72	Input High Scale	W	Signed	Word	1	32767
80	Raw Analog Data	R	Unsigned	Word	1	

Actions

ID	Description	Request Data	Response Data
0	NOOP	---	---
1	Change Address	New logical address	
2	Self Test	---	---
6	Clear All Errors	---	---
8	Enroll Logical Device	---	Vendor Id, Serial Number
10	Change Baud Rate	New baud rate (0…4)	
51	Force State	Input Variable	
52	Unforce State	---	---
53	Read Attribute Descriptor	Attribute Id	Attribute Id, Attribute Descriptor
57	Password	Password	
60	Reset Factory Defaults	---	---

Events

ID	Description	Event Data
0	Diagnostic Event	Number of diagnostic bits set in Attribute 9
3	End of Timer	Attribute, Input Variable
6	Change of Value	Attribute, Input Variable