Powered Roller Controller
for the Smart Distributed System

PRC-6110-1 0304 **TECHNICAL DATA**

Description

The Holjeron Powered Roller Controller for use with the Smart Distributed System has the features needed to handle up to four zones in a material handling system. Each zone is defined by a Brushless DC Powered Roller and a sensor, usually a photoelectric.

Information about each zone's status is available for use by a host controller to aid in tracking units through a system.

The PRC-SDS204 additionally has an analog output signal that can be used to control the speed of the powered roller via the SDS network.

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.

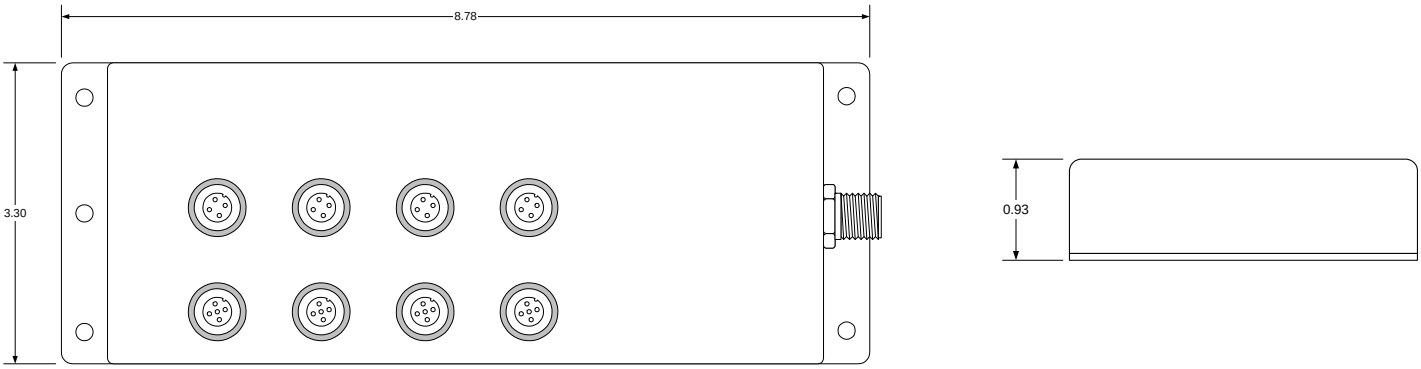
While Holjeron provides application assistance, personally and through our literature, it is up to the customer to determine the suitability of the product in the application.

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

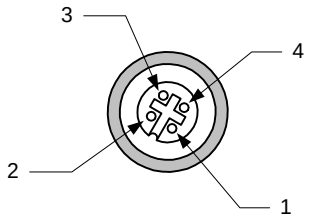
Part Numbers	Powered Roller Controller for SDS		PRC-SDS104
	PRC for SDS with Speed Control		PRC-SDS204
SDS Interface	Termination		4 pin M12 connector, Male
	SDS Voltage Range		11-25 VDC
	Current Consumption		60 mA plus sensors
	Data Rates		125, 250, 500 and 1000 kbps
Sensor Interface	Type		Autosense (NPN or PNP)
	Number		Four (4)
	Termination		4-pin M12, Female
	Voltage Range		11-25 VDC (SDS power)
	Maximum Current		20 mA
Powered Roller Interface	Type		Powered Roller Driver Module
	Number		Four (4)
	Termination		5-pin M12, Female
	Voltage Range		24 VDC
	Maximum Current		2 amps
	Isolation		1500 Vrms
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		8.78H x 3.30W x 0.93D
	Weight		14 oz
	Mounting		Tab Mount
	Indication	Power	Green
		Error	Red
		SDS	Green

Dimensions



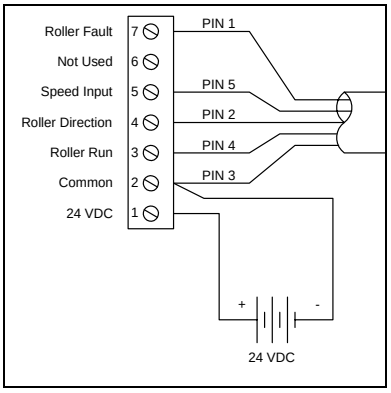
Wiring

Sensor Connector

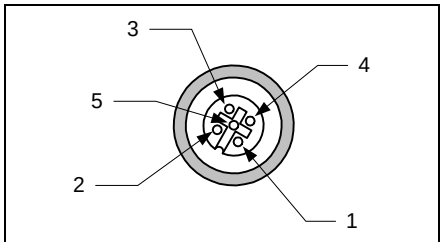


1	DC + (SDS Power)
2	Sensor Diagnostic
3	DC Common (SDS Power)
4	Sensor Signal

Powered Roller Wiring



Powered Roller Connector



1	Roller Diagnostic Input
2	Roller Direction Output
3	Common
4	Roller Run Output
5	Motor Speed Output (0-5 V) (PRC-SDS204 Only)

Configuration Tools

The Powered Roller Controller for SDS can be configured using several tools. The information below summarizes the configuration tools available and hardware requirements for each tool.

Note

The microprocessor and the SDS interface are powered from the SDS bus. This means the Powered Roller Controller can be configured without roller power being connected.

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 a Powered Roller Controller. Default values are shown in bold typeface.

Device Address

Set the address of the device. All units are shipped from the factory as **address 126**.

Note

Set the address before attaching an Powered Roller Controller for SDS to a complete bus. Otherwise, other devices may exist on the bus at the default address of 126.

Number of Zones

Each Powered Roller Controller is capable of handling four (4) zones. If fewer zones are needed, the **Number of Zones (attribute 61)** can be set to some value less than 4.

Note

Disabled zones cannot be accessed, even in manual mode.

Zones are disabled beginning at the highest number. The following table shows the results of setting the Number of Zones to various values:

Number of Zones (Attribute 61)

Value	Zone 0	Zone 1	Zone 2	Zone 3
1	X	O	O	O
2	X	X	O	O
3	X	X	X	O
4	**X**	**X**	**X**	**X**

Operation

Once a Powered Roller Controller is configured for a specific application, the host controller manages the system by receiving events which contain the input variable and turning bits on and off in the output variable.

There are two modes of operation: manual and automatic. By default, a Powered Roller Controller is in manual mode. Whether a powered roller is running, and which direction, is controlled by specific points in the output variable (*see the Output Variable section*).

Note

When using a packaged control system, such as Think & Do Software, it is not necessary to explicitly read and write the 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.

Automatic Accumulation

How a Powered Roller Controller functions when automatic zero-pressure accumulation is enabled is determined by values entered into configuration attributes. The following describes accumulation functionality when a zone is in automatic mode *(see the Output Variable section*). Note that all automatic accumulation functions are disabled when a zone is controlled manually.

Adjacent Zone Addresses

Enabling the automatic zero-pressure accumulation feature requires that the address of the **upstream** controller **(attribute 70)** and the **downstream** controller **(attribute 76)** be configured.

If the Powered Roller Controller is the first one on the bus, then the upstream address should be set to 0. Conversely, the last Powered Roller Controller on the bus should have its downstream address set to 0.

If the upstream and/or downstream controllers have more than one direction from which units can be received and/or transported (i.e. merges, diverts or transfers), then the **Upstream Lane (attribute 71)** and/or the **Downstream Lane (attribute 77)** must also be set. If the adjacent zones are accumulation zones then the lane attributes can remain at the default value of 0.

Release Mode

There are two methods for releasing product to the next zone. The default, singulation mode, is in effect when the **Release Mode (attribute 62)** is set to 1. The other release method, continuous mode, is implemented when the attribute is set to 0. Singulation will not make a zone available unless the zone is completely clear. Continuous allows units to be transported as long as the line is running. This function is sometimes referred to as train mode, as the units on the conveyor appear to move as a train.

When in continuous mode, the **Release Delay Timer (attribute 63)** allows for a time delay to be implemented before a unit is released. This, in effect, provides for increasing the gap between units.

The Release Delay Timer value is in 100 millisecond increments (0.1 seconds), with a range of 0-25.5 seconds.

Sleep Timer

When in Auto Mode, the **Sleep Timer (attribute 77)** will turn off the Powered Roller in a zone if it's inactive for the time set.

The Sleep Timer is value is in 100 millisecond increments (0.1 seconds), with a range of 0-25.5 seconds.

Input Variable (Attribute 18)

Byte	Bit	Description
0	0	Ready
	1	Reserved
	2	Reserved
	3	Reserved
	4	Sending
	5	Reserved
	6	Reserved
	7	Reserved
1	0	Sensor State 1
	1	Sensor State 2
	2	Sensor State 3
	3	Sensor State 4
	4	Zone 1 Occupied
	5	Zone 2 Occupied
	6	Zone 3 Occupied
	7	Zone 4 Occupied

Input Events

The Powered Roller Controller should be configured to transmit a Change of Value event whenever the value of the **Input Variable (attribute 18)** changes.

There are two different methods for generating a Change of Value event. The first is to enable the **Unsolicit Mode (attribute 6)**. This is the default setting. The second method is to enable the **Cyclic Timer (attribute 10)** by entering a non-zero value. The Cyclic Timer will then cause a Change of Value event to be periodically transmitted at a rate equal to the value in attribute 10 times 10 milliseconds (0.01 seconds).

Ready and Sending

The Ready and Sending bits are active when the Powered Roller Controller is in automatic mode. They are used as the handshaking bits between Powered Roller Controllers.

When Zone 1 is empty and able to receive a unit from the upstream Powered Roller Controller, the Ready bit will be set high (1) and an SDS change of value event will be generated. The upstream controller is able to receive events from the controller, and knows it is okay to transfer a unit.

When the last zone in a Powered Roller Controller (Zone 4 if all zones are used) is transferring a unit to a downstream Powered Roller Controller it sets the Sending bit high and generates a Change of Value Event. This lets the receiving Powered Roller Controller know to expect a unit at its photoelectric.

If a Powered Roller Controller is the first or last in a system then the auxiliary input and/or output can be used to handshake with adjacent systems.

Sensor State

Bit 0 in the input variable contains the state of the physical input. The value of the input can be inverted by setting the corresponding bit in **Input NO/NC (attribute 60)** to 1.

Zone Occupied

The Zone Occupied bits are enabled (set to 1) whenever a unit is being received, or is being held, in a zone. In manual mode, the Zone Occupied bits never change state. The sensor inputs are used to track objects through a system.

Output Variable (Attribute 34)

Byte	Bit	Description
0	0	Auto/Man Zone 1
	1	Auto/Man Zone 2
	2	Auto/Man Zone 3
	3	Auto/Man Zone 4
	4	Accum Zone 1
	5	Accum Zone 2
	6	Accum Zone 3
	7	Accum Zone 4
1	0	Run Roller 1
	1	Run Roller 2
	2	Run Roller 3
	3	Run Roller 4
	4	Direction Roller 1
	5	Direction Roller 2
	6	Direction Roller 3
	7	Direction Roller 4

Output Watchdog Timer

When set to some value other than 0, the **Output Watchdog Timer (attribute 50)** will cause the physical output to be set to a normalized state if there are no SDS messages to the Powered Roller Controller in the time allotted (value in attribute 50 times 10 milliseconds).

The normal state of the physical outputs is defined by the **Default Output (attribute 51)**, where 0 in a bit location represents a default state of off and a value of 1 represents a default state of on.

Auto/Manual Modes

When in Manual Mode (0) the motors are controlled using the Run and Direction bits (byte 1, bits 0-7). When placed in Auto Mode, the Powered Roller Controller will receive its commands from upstream and/or downstream controllers.

Note

Auto Mode will not function unless the address of adjacent controllers (upstream and downstream) are entered into attributes 70 and 76.

In Auto Mode, changing the value of the Run and Direction bits does not affect the operation of the Powered Roller Controller.

Accumulate Zone Outputs

When in automatic mode, setting a Zone Accumulate bit high for a specific zone will cause the Powered Roller Controller to accumulate units, and to disable its Ready bit.

When in manual mode, changing the accumulation bits will have no affect on the operation of the Powered Roller Controller.

Run/Direction Roller Outputs

The Run Roller and Roller Direction bits are only active when a Powered Roller Controller is in Manual Mode *(see Auto/Manual Modes)*.

Turning on a Run bit starts a motor. Conversely, turning off a Run bit will stop the motor. Turning on a Direction bit changes the direction of rotation of the motor.

Note

When using Sparks Belting Micro-roller, the direction switch on the driver module must be left in the factory default.

The default direction (when the direction bit is off) can be set through **attribute 90, Default Roller Direction.** A value of 1 in a bit location inverts the normal direction of operation for a zone. The table below lists the values for the attribute based on the desired directions (0 = factory default, 1 = reverse):

Default Roller Direction

Zone				Value	
4	3	2	1	Dec	Hex
0	0	0	0	0	0x00
0	0	0	1	1	0x01
0	0	1	0	2	0x02
0	0	1	1	3	0x03
0	1	0	0	4	0x04
0	1	0	1	5	0x05
0	1	1	0	6	0x06
0	1	1	1	7	0x07
1	0	0	0	8	0x08
1	0	0	1	9	0x09
1	0	1	0	10	0x0A
1	0	1	1	11	0x0B
1	1	0	0	12	0x0C
1	1	0	1	13	0x0D
1	1	1	0	14	0x0E
1	1	1	1	15	0x0F

Roller Speed (PRC-SDS204 Only)

If supported by the Powered Roller vendor, the rate at which a roller accelerates, runs and decelerates can be configured in attributes. **Acceleration Time (attribute 93)** and **Deceleration Time (attribute 94)** are in 0.01 second increments (0-2.55 seconds). The **Roller Speed Setpoint (attribute 95)** has a value of 0-255 for each roller, representing zero speed to the full range of the Powered Roller.

Note that speed control attributes are only available in the PRC-SDS204 product.

Diagnostic Register (Attribute 9)

Byte	Bit	Description
0	0	ROM checksum error
	1	Watchdog timer expired
	2	Off bus error
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	EEPROM error
1	0	Missing Sensor 1
	1	Missing Sensor 2
	2	Missing Sensor 3
	3	Missing Sensor 4
	4	Low Gain Sensor 1
	5	Low Gain Sensor 2
	6	Low Gain Sensor 3
	7	Low Gain Sensor 4
2	0	Jam Zone 1
	1	Jam Zone 2
	2	Jam Zone 3
	3	Jam Zone 4
	4	Missing Unit Zone 1
	5	Missing Unit Zone 2
	6	Missing Unit Zone 3
	7	Missing Unit Zone 4
3	0	Motor Fault 1
	1	Motor Fault 2
	2	Motor Fault 3
	3	Motor Fault 4
	4	Reserved
	5	Reserved
	6	Reserved
	7	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. The table below lists the values to be entered to configure a diagnostic feature.

Table of Values to Enable Diagnostics

Zone				Value	
4	3	2	1	Dec	Hex
0	0	0	0	0	0x00
0	0	0	1	1	0x01
0	0	1	0	2	0x02
0	0	1	1	3	0x03
0	1	0	0	4	0x04
0	1	0	1	5	0x05
0	1	1	0	6	0x06
0	1	1	1	7	0x07
1	0	0	0	8	0x08
1	0	0	1	9	0x09
1	0	1	0	10	0x0A
1	0	1	1	11	0x0B
1	1	0	0	12	0x0C
1	1	0	1	13	0x0D
1	1	1	0	14	0x0E
1	1	1	1	15	0x0F

Zone Jam Protection

When the **Jam Protection Timer (attribute 65)** is enabled and the sensor in a zone is blocked for the time set, then a Zone Jam error is transmitted.

The Jam Protection Timer is enabled by entering a value other than 0, up to 255. The value entered is in 100 millisecond increments (0.1 seconds).

Zone Missing Unit

When the **Transfer Timer (attribute 66)** is enabled, and a Sending bit is received from the upstream controller, the sensor in a receiving zone must be blocked before the Transfer Timer expires. Otherwise, a Missing Unit error is transmitted.

The Transfer Timer is enabled by entering a value other than 0, up to 255. The value entered is in 100 millisecond increments (0.1 seconds). Note that a Powered Roller Controller must be in Automatic Mode for the Transfer Timer to be relevant.

Missing Sensor

Each sensor input has circuitry to detect whether the sensor is drawing power. If a zone is enabled and the sensor is not drawing power, a missing sensor error will be generated. This feature can be controlled using **Enable Missing Sensor (attribute 83)**.

Sensor Low Gain

Some sensors are equipped with diagnostic signals to depict when there is not enough light returning for the sensor to function consistently. The Powered Roller Controller has three attributes that are used to take advantage of this sensor diagnostic signal.

First, the Powered Roller Controller needs to know whether a sensor has a diagnostic signal. This is done in **Enable Sensor Diagnostics (attribute 85)**. A value of 1 in a bit position for a given zone enables the marginal gain function for that sensor. The Table of Values to Enable Diagnostics shown below lists the values to be entered for the various combinations (0 = disabled, 1 = enabled).

The second attribute for sensor diagnostics is **Sensor Type (attribute 84)**. This sets whether the sensor is operating in dark operate or light operate mode. The Table of Values to Enable Diagnostics lists the values to be entered to configure the sensor types (0 = light operate, 1 = dark operate).

The last attribute to be configured is the **Sensor Diagnostic Limit (attribute 86)**. Each time a marginal gain error is received an internal counter is incremented by 8. Each good read decrements the counter by 1. The value entered in the Sensor Diagnostic Limit is the count value that must be reached before a Low Gain error is generated. This acts as a filter that limits diagnostic events from being generated every time a sensor might have a low gain situation.

Motor Fault

Most Brushless Powered Roller modules have overcurrent protection circuitry, and can report that a motor fault has occurred.

Enabling Roller Diagnostics (attribute 91) instructs the Powered Roller Controller to look for the fault input from a given roller. The Table of Values to Enable Diagnostics lists the values to be entered for the various combinations (0 = disabled, 1 = enabled).

Attributes

Attributes in SDS products are used to report input and output data, configure the functionality of a product, and provide information about the product and its status.

ID	Name	Read/ Write	Data Type [Count]	Default
0	Network Data Descriptor	R	Byte [6]	
1	Baud Rate	R	Byte	0 [autobaud]
2	Object Model	R	Byte [6]	1,41,5,4,7,1
3	Vendor Id	R	Word	9
4	Logical Address	R	Byte	126
6	Unsolicit Mode	W	Boolean	1 [Enabled]
7	Software Version	R	Char [12]	
8	Diagnostic Counter	R	Byte	
9	Diagnostic Register	W	Byte [4]	
10	Cyclic Timer	W	Word	0 [Disabled]
11	Serial Number	R	Char [12]	
12	Date Code	R	Char [4]	
13	Catalog Listing	R	Char [32]	PRC-SDS104 (-SDS204)
14	Vendor	R	Char [32]	Holjeron
15	Description	W	Char [32]	
18	Input Variable	R	Boolean [16]	0000h
34	Output Variable	W	Boolean [16]	0000h
50	Output Watchdog Timer	W	Word	0 [Disabled]
51	Default Output	W	Boolean [16]	0000h
53	Number of Power Cycles	R	Long Word	
54	Hours of Operation	R	Long Word	
55	Manufacturing Codes	R	Byte	
56	Tag Name	W	Char [32]	
60	Input NO/NC	W	Boolean [16]	0000h
61	Number of Zones	W	Byte	4
62	Release Mode	W	Boolean	1 [Singulation]
63	Release Delay Timer	W	Byte	0 [Disabled]
65	Jam Protection Timer	W	Byte	20 [2 Seconds]
66	Transfer Timer	W	Byte	20 [2 Seconds]
67	Sleep Timer	W	Byte	0 [Disabled]
70	Upstream Address	W	Byte	0 [Disabled]
71	Upstream Lane	W	Byte	0 [Disabled]
76	Downstream Address	W	Byte	0 [Disabled]
77	Downstream Lane	W	Byte	0 [Disabled]
83	Enable Missing Sensor	W	Boolean[4]	FFh
84	Sensor Type	W	Boolean[4]	0h
85	Enable Sensor Diagnostics	W	Boolean[4]	0h
86	Sensor Diagnostic Limit	W	Byte	96
90	Roller Direction	W	Boolean[4]	0h
91	Enable Roller Diagnostic	W	Boolean[4]	0h
92	Roller Diagnostic Limit	W	Byte	96
93	Roller Acceleration Time (204 only)	W	Byte	20 [0.2 seconds]
94	Roller Deceleration Time (204 only)	W	Byte	20 [0.2 seconds]
95	Roller Speed Setpoints (204 only)	W	Byte[4]	200, 200, 200, 200

Actions

ID	Name	Request Data	Response Data
0	NOOP	---	---
1	Change Address	New Address	---
2	Self Test	---	---
6	Clear All Errors	---	---
8	Enroll Logical Device	Address	Vendor Id, Serial No.
10	Change Baud Rate	New baud rate (0…4)	---
51	Force States	Input Variable Value	---
52	Unforce States	---	---
53	Read Attribute Descriptor	Attribute ID	Attribute Descriptor
57	Send Password	Password	---
60	Reset Factory Defaults	---	---

Events

ID	Name	Event Data
0	Diagnostic Event	Number of diagnostics in attribute 9
3	End-Of-Timer	Attribute, Input Variable
6	Change of Value	Attribute, Input Variable
7	NOOP	---