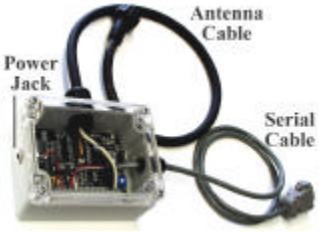
$R^3 2$ (R cubed 2) Specifications and Data Sheet

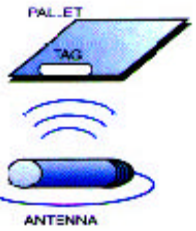
This 125 KHz product line is not interchangeable with our 148 KHz R^3 Solutions.
This 2nd generation product is based on the same rugged proven technology as that of our R^3 (R cubed) family of RFID solutions with the following enhancements:

- Dozens of Tag styles
- Operates at Standard (ISO approved) 125 KHz frequency
- Reader protocol outputs of DeviceNet, Profibus, Modbus, Ethernet, Discrete I/O, RS485, and standard Serial
- Smaller Reader packages, OEM level PCB packages
- 7 to 28 VDC power requirements

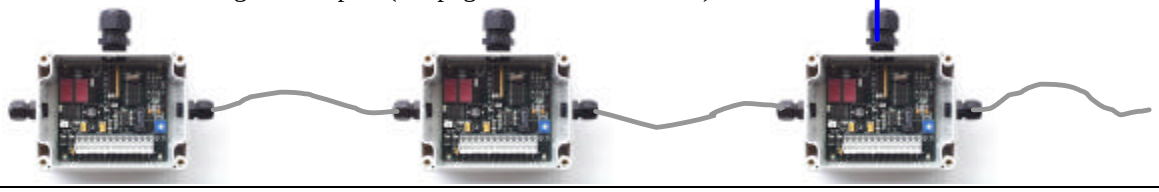
There are 5 architectures of Read Station solutions discussed in this data sheet:

1. RS232 – Model 7000E series of Readers offers a one Reader per one serial port solution (see page 5 for further details).



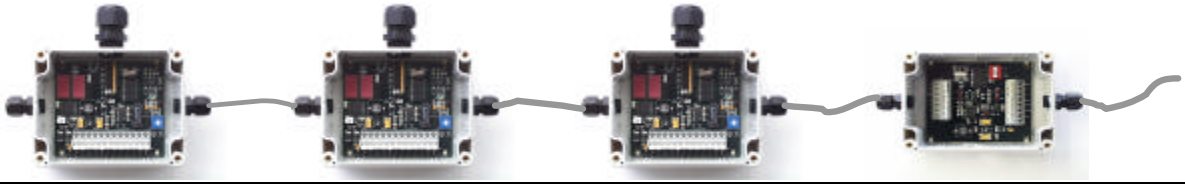


2. RS485 – Model 7050E series of Readers allows for multi-drop of 32 Readers to a single serial port (see page 5 for further details).



RS485

3. Ethernet – Model 7000E or 7050E series of Readers wired to our Model 3035E TCPIP RFID Interface (see page 7).



TCPIP Ethernet

4. Industrial protocol Readers – Profibus, DeviceNet, Modbus, Discrete I/O – see page 6 for system diagram and details.

5. Hand Helds, Specialty and OEM Reader Solutions – see pages for 8 & 9 for details.

The R cubed products primarily serve applications of:

- Tote/Pallet/Carrier ID of Widgets thru Processes
- Wafer Identification thru Manufacturing
- Mold/Tool Identification
- Automated Guided Vehicles
- Appliance Shells/Vehicle Body Parts thru Bake Ovens
- Gas Cylinder Identification
- Laundry Identification
- Customer Loyalty Programs
- Authentication/Verification
- Products or Pallets in ASRS Systems
- Employee ID, Access Control,
- ID Prescriptions in Automated Pharmaceutical Systems
- Mining Conveyor Belt Identification
- Automated Airline Baggage Systems
- Stacker/Reclaimer Systems in Mining
- Identify/Track Rental Items

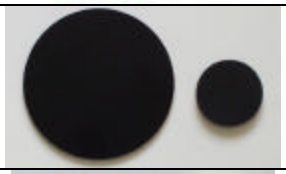
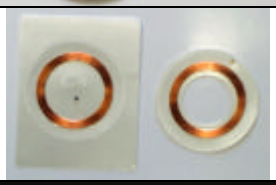
Certainly not limited to these applications, the $R^3 2$ products excel at any industrial identification need where tough, 100% dependable systems are necessary. R cubed stands for Rapid, Robust and Reliable.

14100 E. Jewell Avenue Suite 12 Aurora, CO 80012
p 303-366-1234 f 303-366-1222 www.rfidinc.com email: info@rfidinc.com ver. 11/03

1. General Specifications for all R^{3}2 Transponders:

Power:	Passive, no defined term of life
Programming:	R/O or R/W with lock bit
RW Memory:	8, 16 or 32 ASCII characters, 1k bits or 160 ASCII characters available upon request
RO Memory:	10 unique hexadecimal characters
Frequency:	125 KHz
Read Time:	12 to 50 ms, dependent upon Tag memory
Temperatures:	-60 to +80/+130 degrees C in most cases, some up to 246 degrees C (475 degrees F)
Read Ranges:	Up to 1 meter, dependent on Tag and Read Head combination used. See Read Range Matrix on page 7.
Immersion:	IP66 minimum on most Tags
Durability:	Potted Tags are extremely durable, inert to practically every acid or caustic solution, withstands direct hits

Not all Tags are RW, and a RO or RW suffix to the Model number must be specified when ordering. RO Tags are delivered with the guarantee of unique numbers. RW Tags can be delivered in sequential order or with customer specified data.

	Model 1762 Peel & Stick Button Tag Potted w/peel & stick backing Red, blue, yellow, green or black	.625” diameter x .0625” 20mm diameter. x 2mm Read Only or Read Write
	Model 1765 30mm Clear Flexible Disc Tag Polyurethane transparent package	30mm diameter x .6mm thick Read Only or Read Write
	Model 1766 20mm Plastic Laminate Disc Model 1767 50mm Plastic Laminate Disc Laminate Epoxy with glass fiber	20mm diameter Laminate Plastic x 1mm thick 50mm diameter Laminate Plastic x 1mm thick 1766 = Read Only 1767 = Read Only or Read Write
	Model 1768 Inventory Sticky Label Tag Model 1769 CD-ROM Sticky Label Tag White Polypropylene label Tag is destroyed when removed	4cm x 5cm 34mm diameter Read Only or Read Write
	Model 1770 ISO Card Tag Credit card size and thickness Magnetic swipe strip optional Laminated gloss or matt finish Clamshell available	3.75” x 2.125” x 31 mils Read Only or Read Write
	Model 1771 35mm Disc Tag With or w/o center hole Laminate	35mm diameter x 2mm, w/4mm center hole 1.38” x .0625”, .15625 center hole Read Write
	Model 1772 22mm High Temp Disc Tag With or without center hole, potted	22mm diameter x 3mm thick, w/4mm center hole .875” diameter x .125”, .15625 center hole Read Write
	Model 1773 Keyfob Tag Sealed ABS Black, Red, Blue	31mm width 40mm length 4.5mm thick Read Only or Read Write

General Specifications for all R^{3}2 Transponders (continued):

	Model 1774 Coffin Tag Extremely small architecture Plastic	.5” x .25” x .125” Read Only or Read Write
	Model 1775 Glass Ampoule Tag Extremely small architecture Model 1775LG Glass Ampoule Tag	2mm diameter x 12mm length 4mm diameter x 34mm length Read Only or Read Write
	Model 1776 Wrist Tag ABS plastic, water resistant perlon band Black, Red or Blue	32mm x 42mm 5mm thick Read Only or Read Write
	Model 1777 Nail Tag Polyamid with glass fiber	4mm diameter x 35mm thick Read Only
	Model 1778 Pill Tag PPS and Epoxy	12.4mm diameter x 2mm thick Read Only or Read Write
	Model 1779 16mm Laundry Tag High Temp & Pressure Tested Epoxy over molded	16mm diameter x 3mm thick Read Only
	Model 1781M2 Bar Tag Potted Two mounting holes	3.5” x .90” x .90” Read Write
	Model 1783 Tough Thin Tag Credit card in size with thick plastic shell Optional 1783H attachment housing pictured	2.13” x 3.38” x .16” Read Write

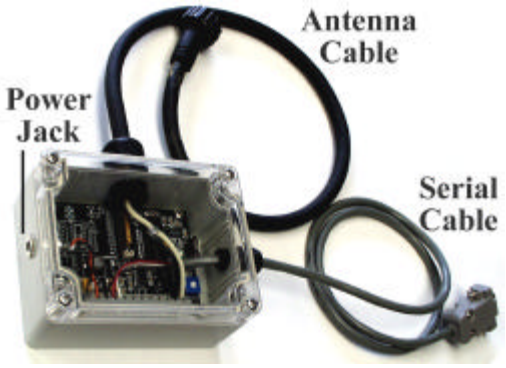
General Specifications for all R^{3}2 Transponders (continued):

	Model 1784 Volcano High Temp Tag Epoxy, shells sonically welded	6.8cm diameter x 7mm height Read Only or Read Write
	Model 1786 Hockey Puck Tag Potted, two mounting holes	1.19” x 3.35” diameter Read Write
	Model 1787 Lipstick Tag Cylindrical housing for in floor mounting	2.3” x .75” diameter Read Write
	Model 1788 Cylinder Tank Tag Sloped inner lip provides perfect adhesion to any curved surface Perfect for application to welding or oxygen Tanks	31mm diameter x 8 mm height Read Only or Read Write
	Model 1791 Deck of Cards Tag Model 1791M Deck of Cards for metal Potted Two mounting holes	2.17” x 4.05” x .55” Read Write
	Model 1795 Frisbee Tag Potted Two mounting holes	6” diameter x .625” thick Read Write
	Model 1796 Clear Laminate Monster Tag Peel and stick backing	8” x 6.75” Read Write

2. Serial Reader Specifications

Model 7000E series Reader Writer

Used by itself as a simple Serial peripheral, this Reader outputs standard RS232.



LED for power and read indication. LED can be optioned for relay driver.

Model 7050E (E signifies Enclosure)

Using RS485, 32 of these Readers can be multi-dropped to a single serial port.

LED for power and read indication. LED can be optioned for relay driver.

Connectors:	Thumb pressure terminal strips on PCB Cable glands on Enclosure	Housing:	NEMA 4X with clear lid for quick troubleshooting Measuring 4.5" x 3.5"x 2.1875" Optional Metal Housing
Voltage:	+7 to +28 volts DC	Temperature:	
Current:	200 mA (max) 125 mA (typ)		Operating -40 to +55 degrees C Non-Operating -55 to +85 degrees C

Model	Description	Serial Connection	Power Connection
7000E	RS232 Reader	Pigtail Wiring	Pigtail Wiring
7001E	RS232 Reader	Pigtail Wiring	Power Jack
7002E	RS232 Reader	9 PIN Connector	Pigtail Wiring
7003E	RS232 Reader	9 PIN Connector	Power Jack
7050E	RS485 Reader	NA	Pigtail Wiring
7051E	RS485 Reader	NA	Power Jack

PS12PJ	AC Power Supply with Power Jack Connector
PS12PT	AC Power Supply with Pigtail Wiring

Reader Model numbers must be ordered with the suffix RO for Read Only or RW for Read Write dependent upon the style of Tag being ordered. The Tag specifications list whether a Tag is RO or RW.

For example, ordering Model 1764 Clear Laminate Flexible Disc Tag in a Read Only format you would have to specify Model 700xE-RO on your order (x being a variable to the exact Reader model number). Ordering Model 1764 Clear Laminate Flexible Disc Tag in a Read Write format you would have to specify Model 700xE-RW on your order.

You can always use a Read Write Tag in a Read Only application by simply not using the Write function, but cannot use a Read Only Tag in a Read Write application.

The "E" suffix stands for our standard NEMA 4X Enclosure. Drop the "E" to order Readers at an OEM PCB level. Add "EM" to order Readers in a metal enclosure. Add "IA" to have Internal Antenna Mounted to the lid of the Enclosure.

12' of Antenna cable is standard. 19' or 33' of Antenna cable is also available but must be specified by adding the suffix -19 or -33. 19' cable option garners 25% less read range, 33' cable option garners 50% less read range, on average. Antenna cables may not be altered, cut down or added to, as they are a part of the overall tuned signal.

3. Industrial Protocols Reader Specifications

Used in conjunction with our Smart Antennas, these solutions offer a fresh and unique approach. Smart Antennas actually have a portion of the RFID Reader circuitry installed in them thus providing the following advantages:

1. Antenna cable can be twisted pair wiring of varying lengths.
1. Up to 4 Antennas can be linked to a single Reader.
2. Reduced circuitry at the Reader equates to more processing power, faster speeds.
3. Because of the increased processing power, CAN has been added as the basis to network Readers.

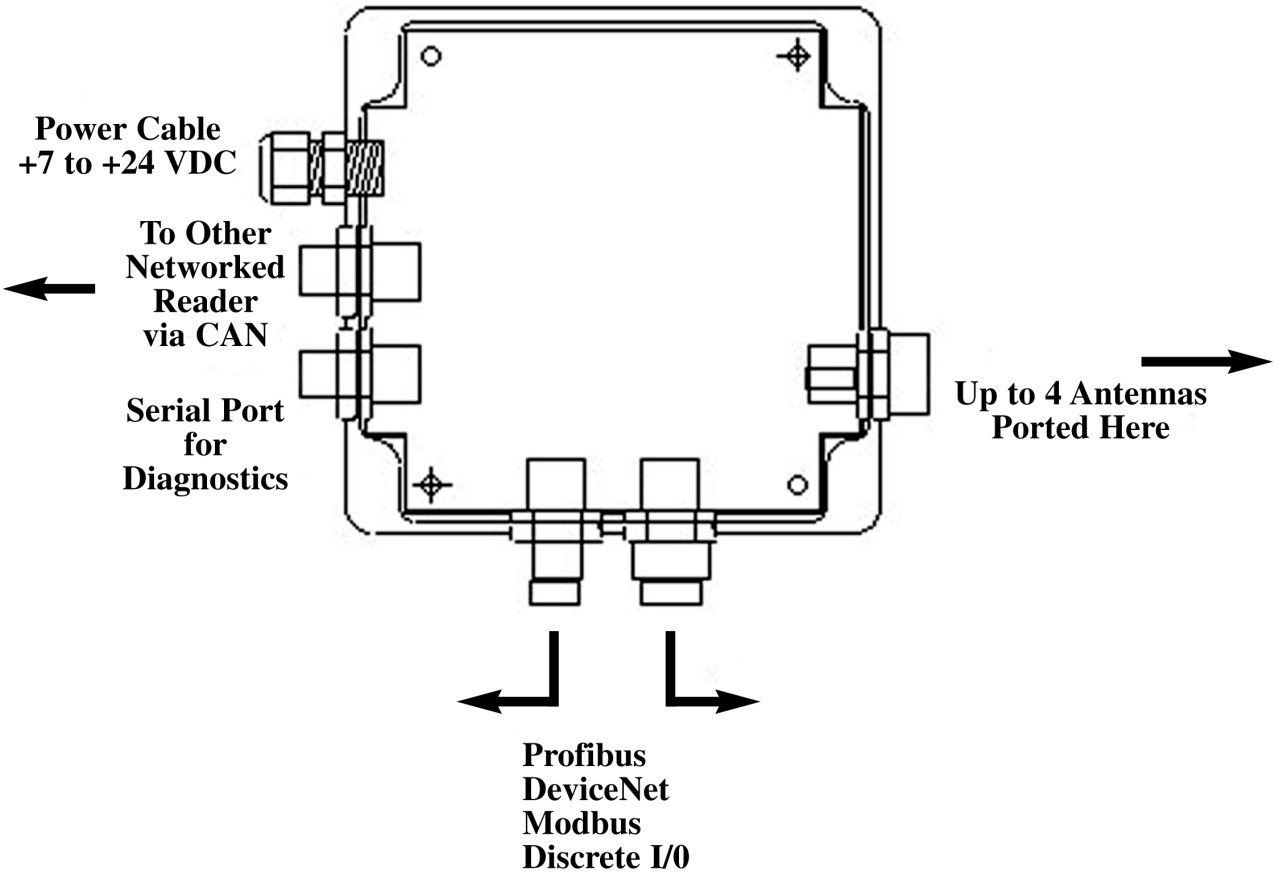
Model 7060E ODVA DeviceNet Interface (1st quarter 2004)

Model 7080E Modbus Interface (2nd quarter 2004 release)

Model 7070E Profibus Interface (in stock)

Model 7090E Remote I/O Interface (3rd quarter 2004 release)

All of these Readers follow the basic architecture as shown below. Ask for the product manual for detailed specifications.



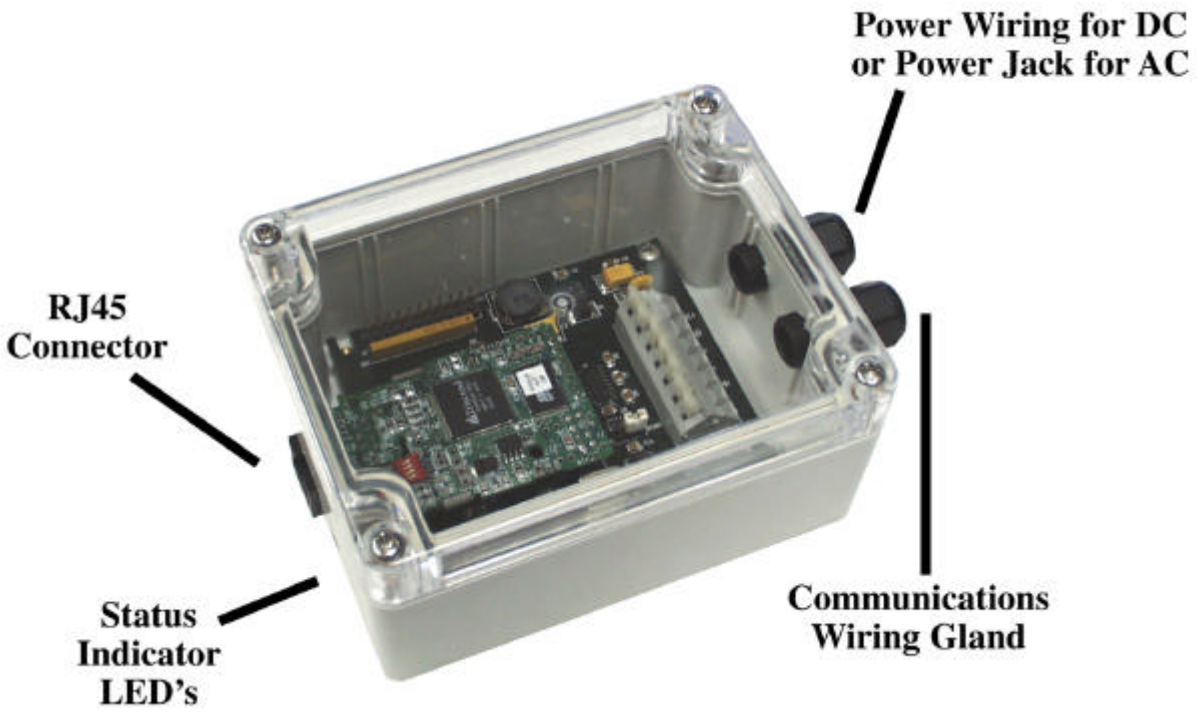
Connections Area

Note: Antennas are automatically addressed when connected

4. Ethernet Interface Specifications

Model 3035E Ethernet Interface

Intended for use in conjunction with a Reader or network of Readers, the Model 3035E Ethernet Interface converts RS-232 (Model 7000E) or RS-485 (Model 7050E) communications to an Ethernet Platform. Using a true TCPIP protocol, this unit is very simple to setup through an HTML page and designed to be specifically interfaced with RFID, Inc.'s serial Readers.



Connectors:	Thumb pressure terminal strips on PCB Cable glands on Enclosure	Housing:	NEMA 4X with clear lid for quick troubleshooting Measuring 4.5" x 3.5"x 2.1875" Optional Metal Housing
Voltage:	+7 to +28 volts DC	Temperature:	
Current:	200 mA (max) 125 mA (typ)		Operating -40 to +55 degrees C Non-Operating -55 to +85 degrees C

5. Hand Held Readers/Programmers

Model 3036E Reader Programmer

Keypad and LCD Screen allows for remote reading and programming of Tags without the need of a PC or software.
Auto sequencing allows programming of Tags consecutively

Model 3037E RF Wand Reader Programmer

The Wand comes in Read Only or Read Write versions
Vibration read indicator for noisy environments
Operates on a standard 9 volt battery

Model 3045E Hand Held Computer with RFID and Bar Code Engine

Based on Dap Technologies highly rugged Model 5320 PDT, we have integrated our MicroReader into this industrially robust hand held computer offering bar code and Wireless LAN options.

OS:	Windows CE
Memory:	16 to 24 MB
Processor:	RISC 190 MHz
	DRAM, NAND, PCMCIA
Wireless:	2.45 GHz WLAN cards
Other:	Bar Code Scanner
RFID Modes:	Read Only or Read Write
Measures:	11” x 4.25” x 2.5”
Op Temp:	-30 to +50 C
St Temp:	-30 to +50 C
Weight:	2 lbs. 950 grams
Tag Types:	Most 125 KHz chips

Model 3037E-WL – Hand Held Wireless Reader (with Receiver base station, not photo’d)

Hand Held Reader

Power:	9 volt battery
Weight:	8 oz. – 216 grams
Measures:	5.5” x 2.5” x 1.25”
Modes:	Read Write or Read Only
Responses:	Vibrates & flashes LED upon Tag read
OEM:	Custom label, private labeling available

RS232 Receiver Base Station

Protocol:	RS232
Power:	7 to 28 VDC @ 125 mA
Weight:	9 oz. – 250 grams

6. Specialty Readers

Model 3020 Series MicroReader

A total solution, plug & go miniature Reader and Writer for OEM applications. This unit can be supplied with/without Antenna, or custom Antennas.

Protocols: RS232 or TTL

Power: +5 VDC @ 125 mA

Measures: 1” x 2” x .25”
5.9cm x 2.5cm x .7cm

Modes: Read Write or Read Only

Op Temp: -40 C to +55 C

St Temp: -55 C to +85 C

Weight: .3 oz. – 9 grams (base pcb only)

Tag Types: Most 125 KHz chips


MicroReader w/Antenna Coil

Model 3038E Long Range Read Only DSP Reader

New DSP (digital signal processing) technology
12” to 48” read range, tag dependent

Only available in a Read Only format however RW Tags can be programmed as RO

Measures 10.5” x 10.5” x 3”

LED’s for power and read indication, audible beep for read indication, RS232 output

Auto tuning feature

DSP is very susceptible to EMI
Field testing is mandatory, ask for test sample

7. Antenna Specifications

Temperature: -60 to +99 degrees C Connector: 3 pin male receptacle, quick connect/disconnect
Cabling: 12' standard, 19' and 33' optional, cable shields can be added as option for environments of heavy EMI. 12' of Antenna cable is standard. 19' or 33' of Antenna cable is also available but must be specified by adding the suffix -19 or -33. 19' cable option garners 25% less read range, 33' cable option garners 50% less read range, on average. Antenna cables may not be altered, cut down or added to, as they are a part of the overall tuned signal.

Model 5101 Mini Prox Antenna

(Antenna cable cannot be shielded)
(Cabled directly to Reader, no quick disconnect)
Threaded with Hex nuts, 1mm pitch
3.375" long x .6875" diameter

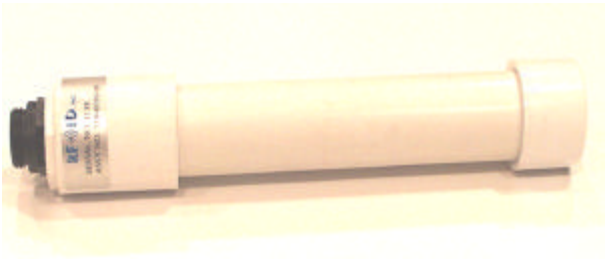
Model 5100 or 5100-SA Medium Prox Antenna

Threaded with Hex nuts,
4" long x 1.125" diameter

Model 5110 or 5110-SA Hockey Puck Antenna

Mountable on metal w/mounting holes
2" x 2" base x 1.625" height

Model 5120 or 5120-SA 10.5" Tubular Antenna

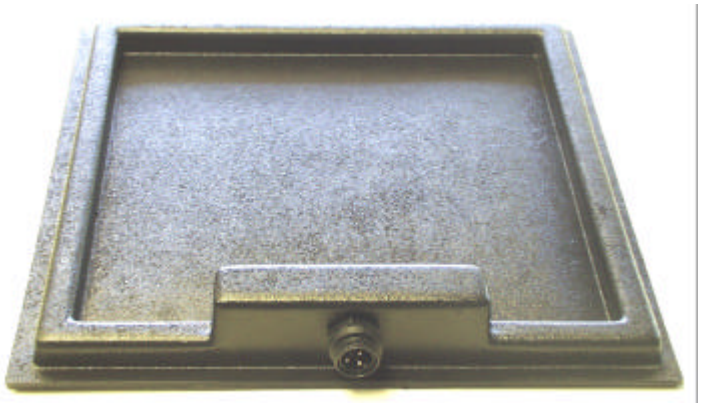


Potted in PVC

Model 5150 or 5150-SA 7" x 7" Flat Antenna

Sealed vacuum formed plastic

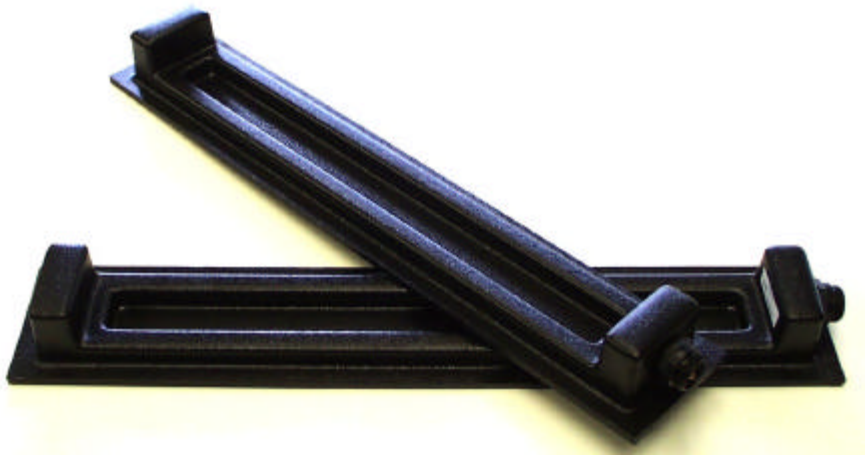
Model 5160 or 5160-SA 12" x 12" Flat Antenna



Sealed vacuum formed plastic

7. Reader Antenna Specifications (continued)

Model 5180 or 5180-SA Conveyor Antenna



Brackets allow expandability from 19” to 30” variable conveyor width
Measures

Model numbers without a suffix designate standard Antennas for use with Model 7000E and 7050E Readers. Model numbers with a –SA suffix designate Smart Antennas for use with Models 7060E, 7070E, 7080E, 7090E.

All ranges are represented in inches.

Read Head	IA	5101	5100	5110	5120	5150	5160	5180	3038E Reader
Tag									
1762 & 1766 20mm 1765 30mm 1767 50mm	2 2 4	.25 1 .5	2 3 4.5	2 3 4	1 3 6	4 4.5 8	-- 5 10.5	1.5 2.5 5.5	15 20 30
1768 Inventory 1769 CD ROM 1770 ISO	2 2 4	1 1 2.5	3 3 5	3 3 5	3 3 7	5.5 5.5 7.5	5.5 5.5 12	2 2 5	18 18 42
1771 35mm 1772 22mm 1773 Keyfob	2.5 2 3	2 1.5 3	3 3 4	3 2.5 4	4 2.5 5	6 4 4	7 3.5 9	3 2 3.5	20 16 21
1774 Coffin 1775 Glass 1775LG Glass 1776 Wrist	1.5 1 1.5 2.5	1 1 2 1.5	2 1 2.5 2	2 1.5 2.5 2	1 .5 3 1.5	3 2 5 4	1 -- 7 1	1 .5 2.5 1	-- 13 20 15
1777 Nail 1778 Pill 1779 16mm Laundry	1 2 2.5	-- 1 .25	1 1.5 2	1.5 1.5 2.5	1 1 2.5	3 2.5 4.5	-- -- 4.5	1 .5 2.5	11 14 16
1781M2 Bar 1783 TTT	3 5	3.5 6	4 7	4 6.5	4 7	7.5 9	8 10	3.5 7	14 42
1784 Volcano 1786 Orange	4.5 6	.25 7	5 7	5 7	6.5 9	9 13	11.5 15	6.5 7	28 48
1787 Lipstick 1788 Tank	4 1.5	4 2	6 2	6 2	6 2.5	7.5 3	10.5 2	6.5 1.5	25 14
1791 Deck 1795 Frisbee 1796 Monster	5 7 8	6 8.5 10.5	7 11 10	6.5 10 9	7 9.5 17	7.5 14 13	12 16 20	7 12 14.5	42 48 48

9. Customer List

We are proud to disclose the following as satisfied users of our products.

USA:
Abbot Labs
Ace Hardware
Alcoa
Allen Bradley
Amana
American Bar Code
Ameripharm
Anheuser Busch
Anthem Prescription
Apple Valley Scale
Asyst Technologies
AT&T/Lucent
Atmel/Temic
Automated Tooling Systems
Avtron
BAE Automation
Boeing Corporation
Cal Poly State University
Cameron Barkley
Carlton Bates
Caterpillar
CDS/Procare
CEI Automation
Charbroil
Computers Unlimited
Copeland
Cutler Hammer (Puerto Rico)
Daimler Chrysler
Detroit Diesel
DT Industries
Eastman Kodak
Eckerd Drug (misspelled)
Eglin AFB
EI DuPont
Eskay
Esselte
Estee Lauder
ExcelleRx
Exxon Mobil
Fairfield Engineering
FamilyMeds.com
Federal Mogul
Ford Motor Company
Frigidaire
Fuel-All
General Electric
General Motors
Georgia Tech. University
Graybar
H.E. Butt Grocery
Hewlett Packard
High Jump Software
Howmet
Inland Steel
Jervis Webb
Kaiser Permanente
Key Handling Systems
Kim Automation
Knapp Automation
Krauss-Maffei
Lemans
Los Alamos Labs
Los Angeles Times
Lowry Computer Products
Magic Chef
Maytag
McKesson
Meridian Automotive
Motorola
NASA
National Control Systems
Northwest Airlines
Nippon Steel
Osh Kosh B'Gosh
Osram Sylvania
Pacifcare
Penn State University
Praxair
Purdue University
Prilgrim's Pride
Polaris
Proctor & Gamble
Reliance Rockwell
Rice Lake Weighing
Rite Aid
Rockwell Automation
Rx Direct
Sandia National Labs
Schick Shaving Products
SCI Sanmina
Sears
SI/Baker & SI/Handling Systems
Square D Company
Siemens
Stanley Tools
TAVA/Topro Technologies
Tel-Drug
Texas Instruments
The Denver Post
The Boston Globe
Thomson Consumer Electronics
Timkin
TJ Maxx
Toyota
Trident Automotive
TRW
U.S. Navy
Vail Resorts
Valeo Sylvania
Veteran's Administration
Visteon
Volvo
Wabash
Walgreens
Walt Disney amusement parks
Wepco
Whirlpool
Wunderlich-Malec
Wyeth Labs

Asia:
Electronic Corporation of India
Toyoto (Japan)

Australia:
Alcoa World Alumina
BHP Billiton Iron Ore
C&K Technologies (dist)
CMA Systems
Dampier Salt
Hamersley Iron
Logitech Consultants
Pacific Automation (dist)
Port Waratah
Queens Creek
Robe River Iron Associates
Sinclair Knight Merz
ThyssenKrupp Engineering
Voest-Alpine Materials Hndling
WMC Resources

Canada:
AMT Machine Tools (dist)
Aurora Bar Code
Dofasco
Kellogg's Cereal
Kielhauer
LSZ Papertech
Port St. Charles
SJS (dist)
Stelco Steel
WBM

Central & South America:
General Electric (Mexico)
MABE Leiser (Mexico)
SCI Sanmina (Mexico)
Retex (Peru)
Thomson Electronics (Mexico)

Europe:
Efacec (Portugal)
London Heathrow Airport
MDA Systems (France)
Moncks & Crane (UK)
Pyrotec (South Africa)
SCI Sanmina (Hungary)
TRW (UK)
TRW (Germany)

Distributors:
Advent Electric (PA)
AMT Machine Tools (Toronto)
C&E Sales (IN, OH, KY)
C&K Technologies (Australia)
Danlaw Technologies (India)
Electro-Matic (OH, MI)
Elect-Trol (MN)
Emergent Technology (MO, KS)
Gibson Eng. (MA, CT)
Industrial Controls (MI)
Lowry Computers (all USA)
Mektron (NJ, NY)
Pacific Automation (Australia)
Palms On (Korea)
PRI (NY, NJ)
Pyrotec (South Africa)
Regan Inc. (SC, NC)
SJS (Toronto)
Taylor Data (SC, NC, FL)
Vision Control (WI)