

# WR88 Wicket Reader

## For Cashless Stored Value Payment Systems

Rev 12/22/2008



### Features:

- Uses ISO 15693 Password Protected RFID Tags
- Account, Bonus, & Loyalty Point Balances
- Field Set Pulse Output Or Serial Interface
- Multi-Color Illumination For Status Indication
- Small Footprint: .875" Mounting Hole Diameter
- RF Antenna Not Affected By Metal Panel Mount
- Password Secured Host Controller Protocol

### General

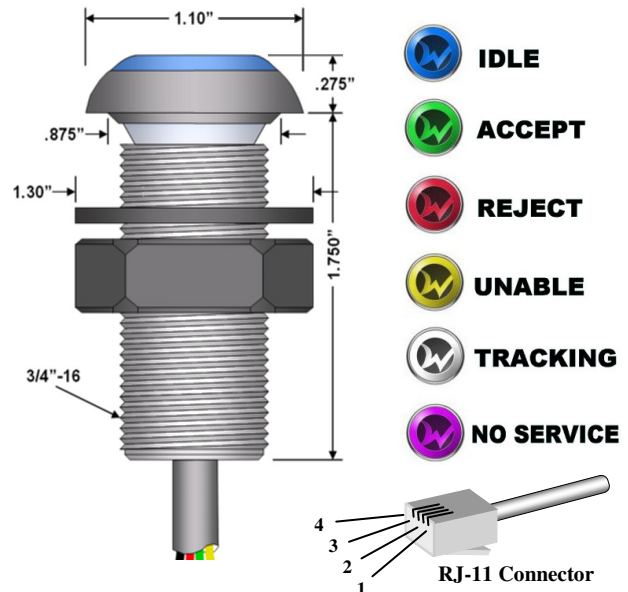
A Wicket is tag or card with an ISO 15693 RFID (radio frequency identification) inlay laminated within its center layer. The WR88 Wicket Reader is designed for stored value applications wherein the account information is securely stored right on the Wicket. It is packaged in a sealed 3/4" threaded tubular housing and has a full color spectrum illuminated face to indicate the status of a transaction. Wicket sensing range is about 1/2 inch.

The chip laminated in a Wicket has neither a battery nor electrical contacts to power it. The RF field of the WR88 antenna is used to both power and communicate with the Wicket chip. Stored value technology eliminates the need for networks and servers while still providing the full benefits of an account balance, a bonus balance, and a loyalty point balance.

The WR88 requires only 5VDC to operate and has an input/output interface that can be field configured to that of 1.) a serial port for data communication with a controller, or 2.) a pulse-output / status-input mode for use with traditional coin operated equipment. IDX has numerous Interface Modules designed to provide power from local 24VAC or 120/240VAC power and connect to local coin operated equipment or controllers with serial ports. The WR88 body is intrinsically water tight, has no moving parts, and its Lexan (polycarbonate) body is not subject to corrosion... and should have a long life in the field.

### Security

The WR88 incorporates 4 levels of security to authenticate Stored Value Wickets and their data. First, Wickets utilize special security inlays having an invisible encrypted 32-bit password unique to each Wicket that is required for data access. Second, data stored in each memory block on the Wicket inlay is authenticated by a proprietary cipher algorithm. Third, each Wicket holds a property specific Site-ID number which must match that of the WR88 configuration in order to be accepted. Fourth, the host controller must first be validated by a challenge/response sequence before the WR88 will write anything to a Wicket. Much more detailed security information is available at our online Wicket Security Web page.



Wicket Reader Model WR88 Specifications	
Supply operating voltage	+5VDC to +7.5VDC
Supply current - no Wicket	70mA typical
Supply current - w/Wicket	170mA typical
Sensing range to Wicket	0.5" (12.5mm) typical
Operating temperature range	-20 °C to +50 °C
Enclosure materials	Polycarbonate
Fastener materials	Nylon
COM parameters	9600, N, 8, 2
TxD output high, output low, (Note 1)	+5V PNP source 10K sink to 0V
RxD input threshold, input impedance, (Note 1)	1.2V 10K sink to 0V
Recommended cable length	15 feet maximum (Note 2)
Wicket Reader connector:	RJ-11 (telephone style)
▪ Pin 1, Yellow	▪ RxD (receive)
▪ Pin 2, Green	▪ +V Supply
▪ Pin 3, Red	▪ TxD (transmit)
▪ Pin 4, Black	▪ Supply Common
Note 1: TxD and RxD are RS-232 compatible with all known common computer COM ports and USB converter dongles.	
Note:2 Cable length may be extended by interface modules.	

## Programming

Since the WR88 operates independent of any network, it must make its own decisions about accepting a Wicket, how much to debit from it, and how to convey the information to the equipment. These operational parameters may be changed in the field by using a Reader Programming Wicket that has been programmed by the Wickets Administrator software utility, some of which are briefly outlined below.

**Factory Virgin WR88:** When a WR88 arrives from the factory, unless it has been pre-programmed by the factory according to your request, it arrives in a "virgin state" having no idea of how it should operate. It will blink purple to indicate that it is in the virgin state and will reject all Wickets presented to it - except for a Reader Programming Wicket. The SiteID of this first read Reader Programming Wicket will be permanently imprinted in the WR88 and it will hence forth only accept Reader Programming Wickets having this SiteID, and only accept Customer and Service Wickets having either this SiteID or one of two Alternate SiteIDs that you have chosen.

**Interface: Pulse Output, Or Serial Port:** The WR88 electrical interface for equipment may be configured in either 1) a serial port for data communication with a controller, or 2) a pulse-output / status-input mode for use with traditional coin operated equipment. Electrical interfaces for these may be found on the Interfaces page.

**Serial Port Data Mode:** Wickets Administrator allows you to select one of two different serial port protocols: 1) the WR88 native protocol, referred to as 'MDB Vendor', which provides functionality for Wickets Administrator and Turbo Accessories software applications as well as for MDB vending machines and Revalue Stations, and 2) the Card-Display protocol for use with IDX display-timer products as detailed in the Card-Display Specification PDF. IDX is working with various OEMs to incorporate their proprietary protocols for controlling their machines.

**Pulse Output Mode:** When Pulse Output mode is selected in Wickets Administrator for programming your WR88, then you must also set the pulse duration in milliseconds and the monetary value of a pulse. A Service Sense input signal is also read by the WR88 and is used to determine if the service equipment has started. In Wickets Administrator you can program the WR88 to be sensitive to the Service Sense signal going either high or low when the service equipment starts. This signal is used to a.) determine whether a Start Amount or Increment Amount should be debited from the Wicket, b.) turn the face color of the WR88 white to indicate that the equipment has been turned on, and c.) possibly lockout further debiting of a customer's Wicket if the equipment fails to turn on after a long period of time thereby indicating equipment failure.

**Setting The Price:** Through Wickets Administrator you can set the Start Amount, Increment Amount, Pulse Value, Maximum Debit Increments. The Start Amount is the amount to be first debited from a Wicket to start the service equipment. If this amount is not available, the WR88 will flash yellow to indicate it is unable. Once the Start Amount has been debited, the WR88 will attempt to debit the Increment Amount on further presentations of a customer Wicket - up to the value chosen for Maximum Debit Increments.

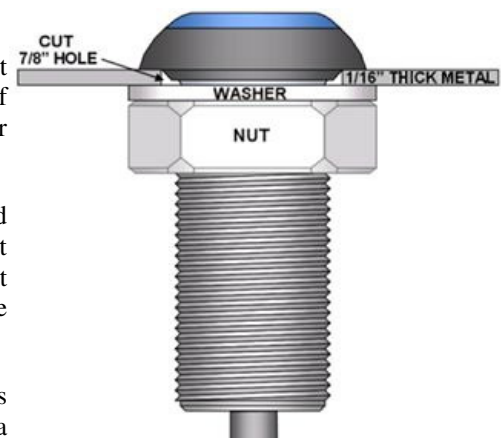
There are a few other less significant parameters set by Wickets Administrator, then written to a Reader Programming Wicket, to then be read in by a WR88 Wicket Reader integrated into your operating service equipment that will not be described here, but are well described on the Wickets Administrator page.

## Installation

The WR88 requires a 7/8" diameter hole for mounting through a panel. It has a threaded tubular body 3/4" in diameter, however, the bottom side of the black outer escutcheon ring around the face has a beveled inside corner requiring the 7/8" hole.

After inserting the WR88 through the mounting hole slide the washer and nut over the cable onto the back side of the WR88. When tightening the nut please remember that you are dealing with plastic parts. **CAUTION:** Do not over-tighten with a big wrench and bubba muscle... you could damage the WR88.

The WR88 body is intrinsically water tight, has no moving parts, and its Lexan (polycarbonate) body is not subject to corrosion... and should have a long life in the field. Although Lexan is a tough non-brittle polymer that is relatively chemically immune, exposure to ammonia cleaners will eventually attack the Lexan causing it to become brittle and possibly crack or break.



## Field Operation

The short answer to what the WR88 Wicket Reader is doing at any moment is answered by the illuminated face color, and is summarized by the graphic to the right. This graphic is also conveniently placed on the back side of every Customer Wicket. Below is a summary of typical operations that may be preformed by a customer or by service personnel.



**Program A Wicket Reader:** In the field, a Wicket Reader must know a.) which Wickets are yours so that only they are accepted, b) how much to debit from a Wicket to startup the equipment, c) how much to incrementally debit after the startup amount has been take, d) what the pulse duration and pulse value is if the output is to be pulsed like a coin acceptor, or e) what the protocol is if it is a serial data interface. This information is set by you in the Wickets Administrator Reader Programming screen. The data is then written to a Reader Programming Wicket and then you must take that Wicket around to each installed WR88 Wicket Reader that is to operate with those parameters and have each of them read in the data from the Reader Programming Wicket by tapping it slowly on the face of the WR88. It will blink green if the data has been successfully read and accepted. This process must be repeated for each class of equipment that operates with different pricing or has different interface requirements. When a WR88 arrives from the factory, unless it has been pre-programmed by the factory according to your request, it arrives in a "virgin state" having no idea of how it should operate. It will **blink purple to indicate it is in the virgin state** and will reject all Wickets presented to it - except for a Reader Programming Wicket. The SiteID of this first read Reader Programming Wicket will be permanently imprinted in the WR88 and it will hence forth only accept Reader Programming Wickets having this SiteID.

**Read A Wicket:** The RF energy field extends out of the face of the WR88 Wicket Reader about 1/2" in sufficient strength to be received by the RFID inlay with a Wicket and provide power to its circuitry so that it may communicate with the Wicket Reader. Thus, in order to read the data contents of a Wicket, the RFID inlay must be brought within 1/2" of the Wicket Reader face. The center location of the RFID inlay is indicated on the Wicket by the location of the circle-W icon on the front face of the Wicket. We recommend a simple slow tap of that portion of the Wicket on the face of the Wicket Reader as the easiest way to physically read the Wicket. If the Wicket is **accepted, it will blink green** for a second. If the Wicket is rejected as **invalid, it will blink red** for a second. It will **blink yellow to indicate it is unable** to complete the transaction for cases such as when there are insufficient funds.

**Debit A Customer Wicket:** When a Customer Wicket is presented to a WR88 installed on service equipment, the WR88 first checks to see if it is a valid Wicket, if the SiteID matches, and if it is a Customer Wicket that is being presented. If any of these is incorrect, the Wicket is rejected and the WR88 face blinks red. Then it checks its programmed Start Amount against the Account Balance and Bonus Balance stored in memory on the Wicket. If there is insufficient balance between the two of them the WR88 face blinks yellow to indicate it is unable to process the transaction. If there is sufficient balance, the Start Amount is debited from the Wicket and the WR88 face blinks green. Value is first debited from the Account Balance (real money), and then from the Bonus Balance (promotional credits) when none remains in the Account Balance.

**See The Wicket Balances:** There are three ways in which a customer can find out the Account Balance (real money), Bonus Balance, and Loyalty Points Balance on his Wicket: a.) with the Redemption Station, b.) when the service equipment uses and IDX display timer and the CardDisplay interface, or c.) by bringing the Wicket into your office to be read with the Wickets Administrator Wicket Reader.

**Refund A Customer Wicket:** When a customer has a few dollars left in the Account Balance (real money) of his Wicket and wants to have his money refunded, the transaction must be executed through the Wickets Administrator Refund/Redeem screen using its Wicket Reader. Here you can read the Wicket, clear its Account Balance, adjust Loyalty Points down accordingly, and account for the cash transaction with the customer.

**Redeem Loyalty Points:** Customers accumulate one Loyalty Point for every dollar purchased and put in the Account Balance of their Wicket. Loyalty Points that are available for redemption are calculated by subtracting the Account Balance from the Loyalty Points Balance. There are three ways that Loyalty Points can be redeemed. First, the Wickets Administrator Refund/Redeem screen can be used to redeem them manually. What the owner/operator provides in exchange can be anything of their choosing. Second, at the Redemption Station the customer can automatically redeem his Loyalty Points any time of the day or night for a fixed number of Bonus Bucks that are automatically added to the Bonus Account on his Wicket. The ratio of Bonus Bucks per Loyalty Points is

determined in the corresponding Setup screen within the Wickets Turbo Accessories software that runs the Redemption Station. Third, a Wicket Reader can be programmed to start your "bonus equipment" by directly deducting Loyalty Points for the Wicket.

**Equipment Failure Refund:** If the service equipment uses the WR88 in the Pulse Output mode and the WR88's Service Sense input line is connected to monitor an available signal from the service equipment, then the WR88 can confirm that the service equipment actually does turn on and function. The details for setting up this mode of operation are found on the Wickets Administrator Reader Programming screen. When the Debit Lockout feature is enabled and the WR88 fails to detect activity on the Service Sense input line for 10 minutes, the WR88 will conclude that the service equipment has failed. When this occurs, the WR88 face will continuously blink red to indicate equipment failure has occurred. No further Wicket debiting will occur in this condition. If a customer had earlier debited his Wicket by some amount in an attempt to start the failed equipment, then when Debit Lockout is triggered the customer may read in his Wicket and automatically get a refund from the WR88 of any amount taken earlier in the transaction. When a successful refund has been given, the WR88 will blink green. If the fault is later cleared and other customers have since used the equipment, that refund amount will still be held by the WR88 and will be waiting to be refunded to that same Wicket when it next is read.

**Vending Machine Transaction:** Vending machine transactions are transacted a little bit differently from those on timed service equipment. The usual procedure is one in which coins or bills are first deposited, or a credit/debit card is first read. The customer then makes his selection. When the item is vended change is either given from the original cash deposit, or the card transaction for the amount is then transmitted to the clearing house. In the case of a Wicket, the transaction is again started by reading the Wicket. The customer is prompted to make a selection, and then again prompted to read in his Wicket again to complete the transaction by debiting the price of the selected item from the Wicket so that the item may be dispensed. The WR88 will blink green if the debit transaction is completed satisfactorily. If the item then fails to vend from the machine, the vending machine controller will attempt to refund the amount to the customer's Wicket. When a refund is being attempted, the Wicket Reader face will blink white to indicate a transaction is pending. When the customer then (or at some later time) returns to read the same Wicket, the refund amount will be credited back to the Wicket and the Wicket Reader face will blink green. The WR88 uses the MDB Vendor protocol for vending machine and Revalue Station applications.

**Ban A Wicket From Use:** If you have cause to ban one of your registered Wickets from further use you must first create a Banned List Wicket using the Registration Management module of Wickets Turbo Accessories. Once you have created the Banned List Wicket, then you must take it around to each WR88 Wicket Reader installed on your service equipment so that each can read the contents of the Banned List Wicket in order to identify and reject these Wickets in the future should they be presented. If a banned Wicket is then later read, the WR88 will permanently disable it.

**Gather System Report Information:** Wickets Administrator supports the use of a Systems Report Wicket for use in gathering data from each of the WR88 Wicket Readers in your establishment. When a WR88 recognizes a System Report Wicket has been presented, then it quickly writes a summary of its transactions onto the System Report Wicket for use with the Wickets Administrator Reports screen. Each WR88 is identified with a group of other WR88's having the same configuration and which all report as a single group.