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RF CONTROLS CS-490 Intelligent Tracking and Control System User Guide

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RF CONTROLS CS-490 Intelligent Tracking and Control System

Introduction

This BESPA™ User Guide provides the basic information needed to install an individual BESPA antenna unit containing an RFC-445B RFID Reader CCA. This guide is not intended to provide instructions for installing, configuring and calibrating the RF Controls Intelligent Tracking and Control System (ITCS™). For additional information about RF Controls, LLC antennas, **contact info@rf-controls.com**

INTENDED AUDIENCE

This guide is intended for those who will install and set up the RF Controls BESPA (Bidirectional Electronically Steerable Phased Array) unit. Before attempting to install, configure and operate this product, you should be familiar with the following:

- Windows-based software installation and operation
- Device communication parameters including Ethernet and serial communications
- RFID reader configuration including antenna placement and RF Parameters
- Electrical and RF safety procedures.

BESPA Overview

BESPA is a multi-protocol, multi-regional Radio Frequency Bidirectional Electronically Steerable Phased Array unit, which is used to Identify and locate RFID tags operating in the UHF 840 – 960 MHz frequency band. A number of BESPA units may be used together with an ITCS Location Processor to form an Intelligent Tracking and Control System (ITCS). BESPA comprises an embedded multi-protocol, multi-regional RFID reader/writer transceiver connected to the patented steerable phased array antenna system. BESPA is designed to be powered from Power-Over-Ethernet and communicates with a host computer using standard Ethernet TCP/IP and UDP protocol. Figure 1 illustrates the version of BESPA currently available. The CS-490 contains the RF Controls RFC-445B RFID reader CCA. CS-490 is constructed using a Bi-directional Electronically Steerable Phased Array

(BESPA™) arranged to provide a single array with a circularly polarized gain of approximately 7.7dBi and Vertical and Horizontal Linear Gains of approximately 12.5dBi at all steer angles. The particular units used in an installation will depend on the system design and determined by a qualified applications engineer.
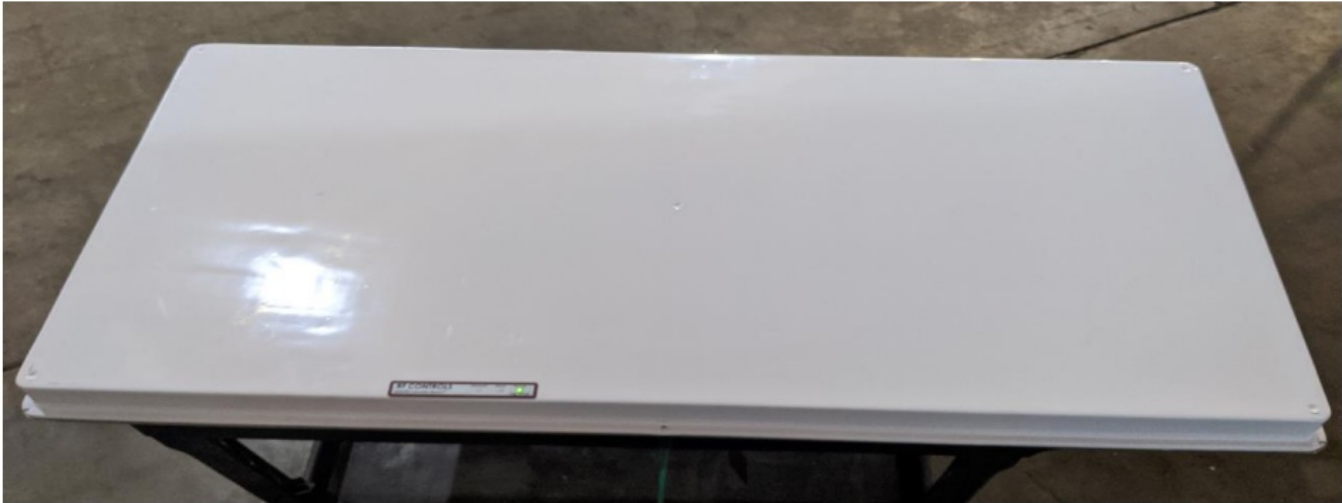

Indicator LEDs

CS-490 Reader Indicator Lights
The RF Controls CS-490 RFID antenna is equipped with three status indicators located on the top of the Radome. If the LED indicators are enabled, these LEDs provide indication according to the following table:

Indication	Color/State	Indication
Transmit	Off	RF Off
	Yellow	Transmit Active
Fault	Off	OK
	Red-Flashing	Error/Fault Blink Code
Power/ Tag Sense	Off	Power Off
	Green	Power On
	Green – Blinking	Tag Sensed

Note that when the CS-490 antenna is performing power on auto-test, the indicator lights will flash momentarily and the Green power LED will remain lit.
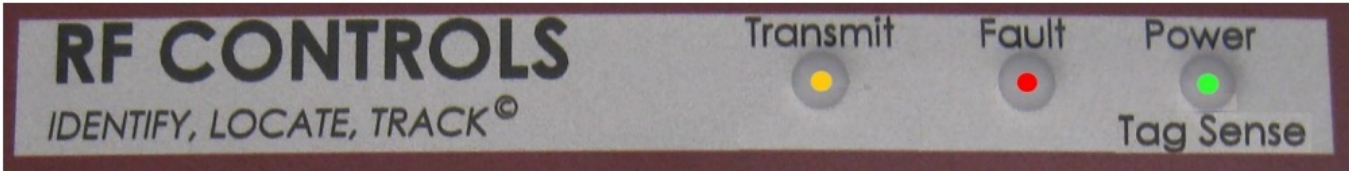
Red LED Fault Light Error Codes

Red LED Appearance	Error Code
OFF	No Arcon or Reader Issues
Solid Red	No Communication with the Reader for over an Hour
Two Blinks	Unable to Sweep
Nine Blinks	Error with BSU/BSA
Thirteen Blinks	Antenna Error-Reflected Power too High
Fourteen Blinks	Over Temperature Error

INSTALLATION

Mechanical Installation

Each model of the CS-490 family of BESPA units is mounted slightly differently. BESPA units weigh up to 15 lbs (7 kg), it is important to ensure that the structure, to which the BESPA is to be attached, is of sufficient strength. The BESPA may be ceiling mounted, wall mounted or attached to a suitable stand. A safety cable rated at three (3) times the hanging weight of the BESPA and associated hardware must be secured to a separate fixture and attached to the BESPA mounting bracket. There are two mounting options designed into the CS-490 Rear Enclosure. A standard VESA 400 x 400mm hole pattern and one that accommodates the RF Controls, LLC Ceiling Mount & Cathedral Mount adapter with custom channel strut. There are four points of attachment for each pattern using Qty 4 #10-32×3/4" long Steel Pan Head Screws with Internal Tooth Lock Washer and Qty 4 #10 1" diameter Flat Oversize Washers. When mounting the BESPA as a stand-alone unit, make sure that it is mounted with the POE RJ45 facing down as indicated by information in the Technical Manual. If the BESPA is one of several and is part of an ITCS network, then orient each BESPA according to the ITCS system installation drawings. If in doubt contact a member of our technical support team. CS-490 The CS-490 BESPA is only mounted in a landscape orientation because the array is symmetrical, there is no benefit to mounting the array in a portrait fashion. When mounting the BESPA refer to Figure 1. Consult the Technical Manual, for further information. Contact a member of our technical support team for more information.

SAFETY WARNING
The CS-490 weighs approximately 26 lbs (12kg). These units should only be installed using suitable safety and lifting equipment. Ensure that the wall fixings or mounting hardware is suitably rated.

Electrical Installation

POE+ Power Input Power over Ethernet, PoE+, power input is available for the CS-490 using the RJ-45 connector as shown in Figure 1. Connect POE power supply and plug it in to a suitable mains outlet and the POE+ injector. POE+ power, DC Input equivalent to IEEE 802.3at type 2 Class 4. When using a multiport Ethernet switch the power budget for each antenna Powered Device should be +16W with 25W max supplied by the PSE switch. Do not plug in more than the calculated number of POE antennas to a multiport switch if the total Switch Ethernet power will be exceeded. Note that the power for the POE+ should be located within 300feet of the BESPA and should be accessible to enable easy disconnection of the power to the BESPA in case of emergency or when servicing.

Ethernet

The Ethernet LAN connection uses the industry standard RJ-45 8P8C modular connector. A suitable Ethernet cable fitted with an RJ-45 plug is connected to the BESPA Array Antenna as shown in Figure 1. The BESPA is factory programmed with a fixed IP address which is shown on the label adjacent to the Ethernet connector.

Non-Ionizing Radiation

This unit incorporates a Radio Frequency Transmitter and should therefore be installed and operated so as to avoid exposure of any persons to unsafe emissions. A minimum separation distance of 34cm must be maintained at all times between antenna and all persons. See FCC Radiation Exposure Statement in the Safety Instructions section of this guide.

Usable Frequency Range in US and Canada
For use in USA, Canada, and other North American countries, this device is factory programmed to operate in ISM 902MHz – 928MHz band and cannot be operated on other frequency bands. Model#: CS-490 NA

MULTIPLE BESPA UNITS CONFIGURED AS AN ITCS
Figure 3 shows how two or more CS-490 BESPA units may be connected via an Ethernet network to an ITCS Location Processor. One Location Processor and multiple distributed BESPAs operate collaboratively to form RF Controls' Intelligent Tracking and Control System (ITCS™). In this example two BESPA units have been attached to the network. Combinations of the various model BESPA units may be mixed and matched as required to suit a particular installation. The RF Controls Technical Manual provides details on how to install, configure and calibrate an ITCS.
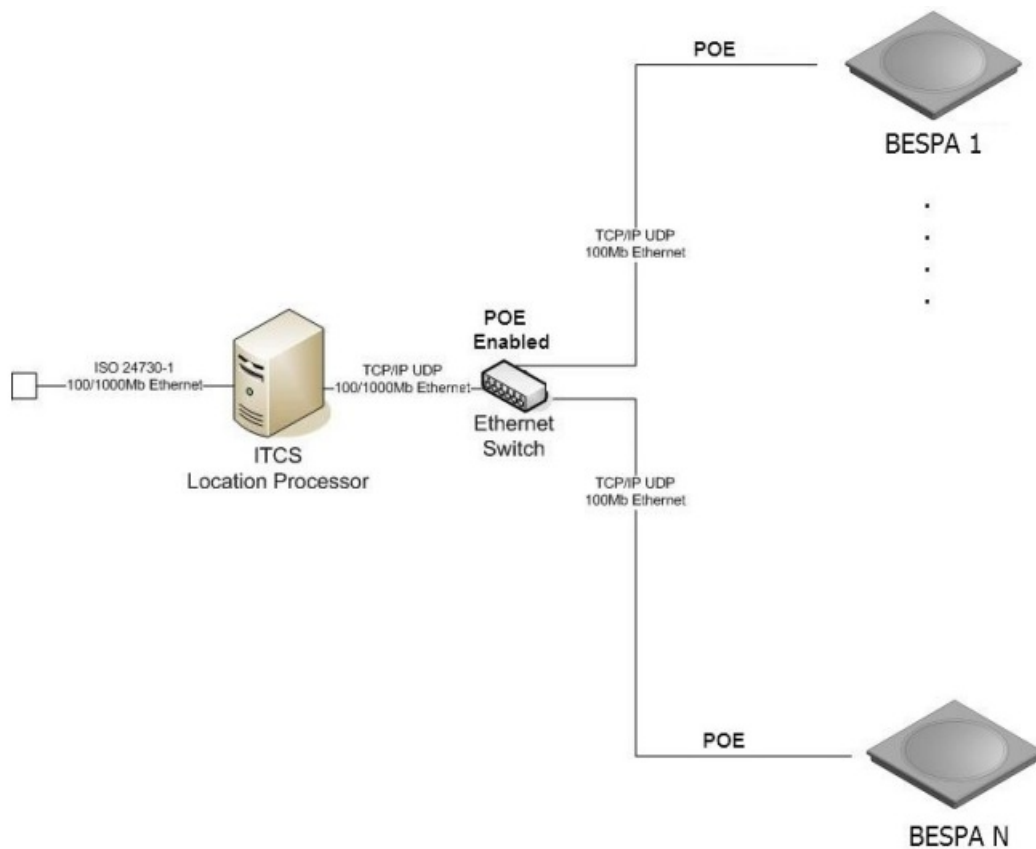
SOFTWARE
Operation requires the purchase of a Software License. Software may then be downloaded from the RFC Customer Portal. **https://support.rf-controls.com/login** For additional information about RF Controls, LLC antennas, contact **info@rf-controls.com**

APPLICATION INTERFACE
The BESPA uses an International Standard, Application Program Interface (API) as defined in ISO/IEC 24730-1. Further details of the API and commands are contained in the Programmer's Reference Guide

SPECIFICATION

CS-490

Frequency	UHF band: 902-928 MHz[1]
RF Radiated Power	Adjustable 0.05W to 4Watts EiRP
Regulatory Compliance	FCC, CFR47 Part 15.247, RSS-247 Issue 2, RSS-Gen Issue 5, RSS-102 Issue 5
Safety Regulations	IEC62368-1
Reading/Writing Protocols	ISO18000-6C / EPC UHF Gen 2 EM 4122 (TTO)
FCC ID IC ID	FCC: WFQCS-490 IC: 10717A-CS490
Application Interface	ISO/IEC 24730-1
Environmental	
Operating Temperature	-22 to +113°F (-30 to +45°C)
Storage Temperature	-40 to +185°F (-40 to +85°C)
Relative Humidity	5 to 95% non-condensing
Dimensions Weight	46in x 24in x 4in (115 x 60 x 10 cm) 26 lbs (12 kg)
Ethernet LAN	RJ-45 Connector
Power	POE+ DC Input IEEE 802.3at Type 2 Class 4
Current and Voltage	0.35 Amp at +48Vdc
Antenna Gain[2]	~7.7 dBi Circular Polarization ~12.5 dBi Linear Polarization Vertical and Horizontal
Antenna FWHM Beamwidth[3]	18/33 degrees

SAFETY INSTRUCTIONS

This unit emits Radio Frequency non-ionizing radiation. The installer must ensure that the antenna is located or pointed such that it does not create an RF field in excess of that permitted by the Health and Safety Regulations applicable to the country of installation.

Setting RF Output Power
Enter the desired RF output power as a percentage of the maximum power into the Set Power box. Click the set Power button. Note: the actual maximum Radiated RF Power is factory set to comply with the radio regulations in the country of use. In the USA and Canada this is 36dBm or 4 Watts EiRP. Model#: CS-490 NA

FCC and IC Radiation Exposure Statement
The antenna used on this equipment must be installed to provide a separation distance of at least 34cm from all persons and must not be co-located or operated in conjunction with another antenna or transmitter. The criteria used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation is specified in FCC Part 1 SUBPART I & PART 2 SUBPART J §1.107(b), Limits for General Population/Uncontrolled Exposure. This antenna meets INDUSTRY CANADA RSS 102 ISSUE 5, the SAR and RF field strength limits in Health Canada's RF exposure guideline, Safety Code 6 for Devices used by the General Public (Uncontrolled Environment).

FCC Part 15 Notice
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC and Industry Canada Modification Warning Statement

Modification of this device is strictly prohibited. Any modifications to the factory hardware or software settings of this device will void all warranties and be deemed non-compliant with FCC and Industry Canada Regulations.

Industry Canada Statement
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device. Model#: CS-490 NA
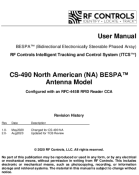
Power Disconnect Device
This device is Power Over Ethernet. The plug on the ethernet cord is intended to be the power disconnect device. The power source socket is located at the equipment and is easily accessible.

Warning
The BESPA is not user serviceable. Disassembly or opening the BESPA will cause damage to its operation, will void any warranty and may invalidate the FCC type approval and/or IC RSS standards.

Documents / Resources

	RF CONTROLS CS-490 Intelligent Tracking and Control System [pdf] User Guide CS-490, CS490, WFQCS-490, WFQCS490, CS-490 Intelligent Tracking and Control System, Intelligent Tracking and Control System, Tracking and Control System

References

- 🌐 **Motion Control - Control Solutions LLC**
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