

User Guide

BESPA™ (Bidirectional Electronically Steerable Phased Array)
RF Controls Intelligent Tracking and Control System (ITCS™)

ITCS-A-405 BESPA™ Antenna Models

Configured with an RFC-A-405 RFID Reader CCA

Revision History

<u>Rev</u>	<u>Date</u>	<u>Description</u>
1.00-	Sept 2015	FAE 2013 1st Draft from A-30X Family
1.10-	Oct 2015	ACC Change to A-405
1.20-	June 2016	Reviewer Comment List Max Antenna Gain

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Introduction

This **BESPA™ User Guide** provides the basic information needed to install an individual **BESPA** antenna unit containing an RFC-A-405 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™**). Detailed instructions are provided in the **Technical Manual** (ITCS-A-100-002) and **Programmer’s Reference Guide** (ITCS-A-100-003).

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.

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FCC 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.

The BESPA products and individual BESPA components are protected by one or more US and International Patents pending.

The “**RF Controls**” logo, and the words “**RF Controls, Identify, Locate, Track**”, “**ITCS**”, and “**BESPA**” are registered Trademarks of RF Controls, LLC.

-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 ITCS-A-405 contains the RF Controls RFC-40X RFID reader CCA.

- ITCS-A-405 are constructed using a Bi-directional Electronically Steerable Phased Array (**BESPA™**) arranged to provide a single array with a circularly polarized gain of more than 6dBi and Linear Gains of more than 9dBi.

The particular units used in an installation will depend on the system design and determined by a qualified applications engineer.



Figure 1 BESPA (Bidirectional Electronically Steerable Phased Array) Units

INDICATOR LIGHTS

ITCS-A-405 Reader Indicator Lights

The RF Controls ITCS-A-405 RFID antenna is equipped with four status indicators located on the top of the Radome. From left to right, these LEDs provide indication according to the following table:

Indication	Color/State	Indication
Tag Sense	Off	No Tags Detected
	Blue	Tags Detected
Transmit	Off	RF Off
	Yellow	Transmit Active
Fault	Off	OK
	Red-Flashing	Error/Fault Blink Code
Power	Off	Power Off
	Green	Power On

Note that when the ITCS-A-405 antenna is performing power on auto-test, the indicator lights will flash momentarily.

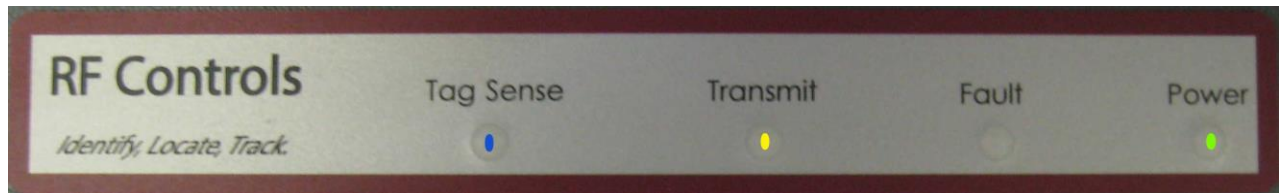


Figure 2 RF Controls ITCS-A-405 RFID Antenna Indicator Lights.

-INSTALLATION

-Mechanical Installation

Each model of the ITCS-A-405 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.

When mounting the **BESPA** as a stand-alone unit, make sure that it is mounted the 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.

ITCS-A-405

The ITCS-A-405 **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 4. Consult the **Technical Manual**, for further information. Contact a member of our technical support team for more information.

SAFETY WARNING

The ITCS-A-405 weighs approximately 15 lbs (7kg). These units should only be installed using suitable safety and lifting equipment. Ensure that the wall fixings or mounting hardware is suitably rated.

AVERTISSEMENT DE SÉCURITÉ

ITCS-A-405 pèse environ 7kg. Ces unités ne doivent être installés à l'aide des équipements de sécurité et de levage approprié. Veiller à ce que les fixations murales ou le matériel de montage est convenablement évalués.

-Electrical Installation

POE Power Input

POE+ power input is available for the ITCS-A-405 using the RJ-45 connector as shown in Figure 4. Connect POE+ power supply and plug it in to a suitable mains outlet and the POE+ Bias T. POE+ power, DC Input equivalent to IEEE 802.3at type 2. When using a multiport Ethernet switch the power budget for each antenna should be +25W. 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+ bias T should be located in close proximity to 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 connector. A suitable Ethernet cable fitted with an RJ-45 plug is connected to the **BESPA** Array Controller box as shown in Figure 4. The **BESPA** is factory programmed with a fixed IP address which is shown on the label adjacent to the Ethernet connector. A Ferrite clamp must be attached to the Ethernet cable in a single loop approximately six inches from the antenna in order to meet EMI emission requirements. Suggested ferrite part number is Fair-Rite #0431176451 to be included in installation Kit.



Figure 4 ITCS-A-405 Power and Ethernet Connections

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

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 23cm must be maintained at all times between antenna and all persons. See **FCC Radiation Exposure Statement** in the Safety Instructions section of this guide.

Notice for European Installers

The Installer shall ensure that he is familiar with any restrictions of the local EU Member State on the use of this device and ensure compliance! Examples may include: restrictions on geographic location or only for indoor use etc.

Due to differences between ETSI and FCC frequency bands, "Phase Ranging" Techniques are not available with the ETSI version of the BESPA.

Usable Frequency Range in US and Canada

In USA and Canada this device is factory programmed to operate in ISM 902MHz – 928MHz band.

MULTIPLE BESPAs CONFIGURED AS AN ITCS

Figure 5 shows how two or more ITCS-A-300 **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**. The **Programmers Reference Guide** provides details of the Application Program Interface (API) used by the **ITCS**.

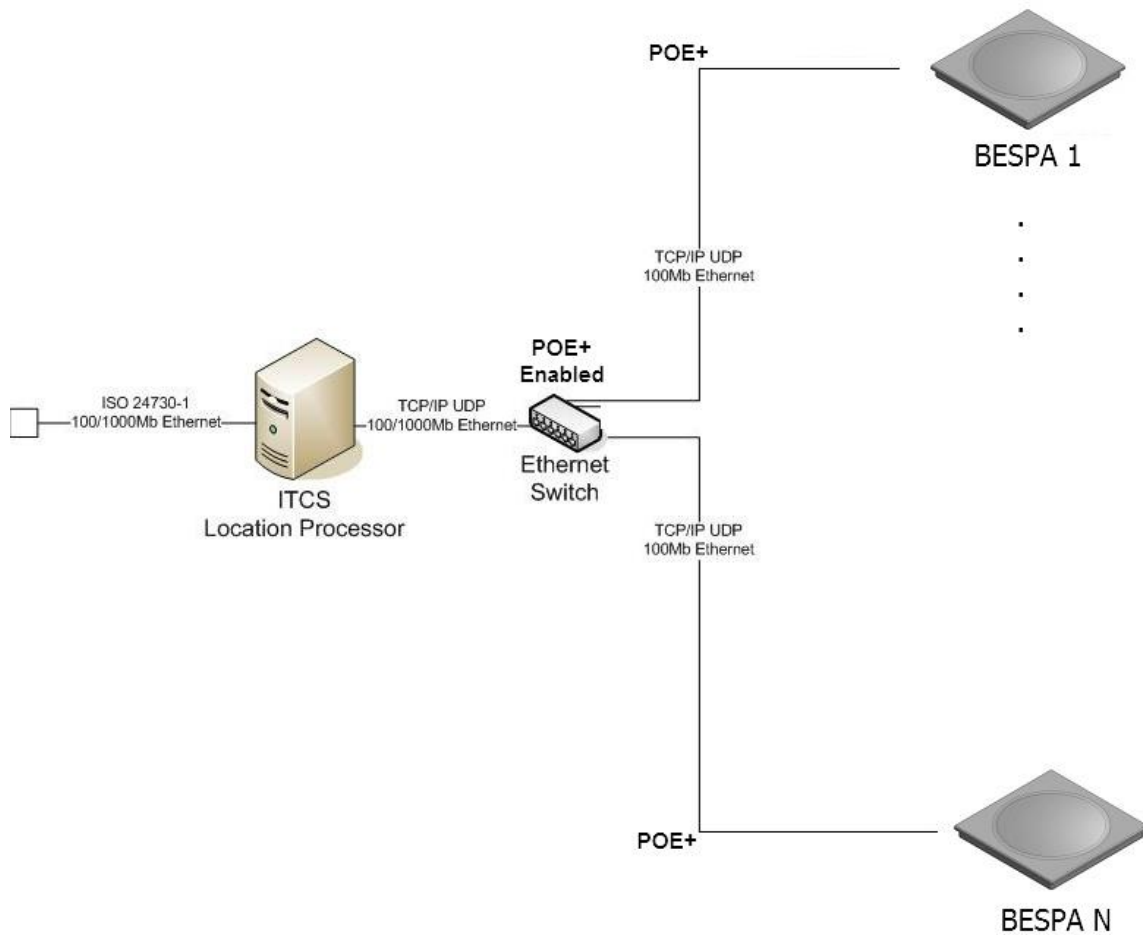


Figure 5 Intelligent Tracking and Control System comprising a number of BESPA units connected via an POE+ Ethernet Network to an ITCS Location Processor

-SOFTWARE

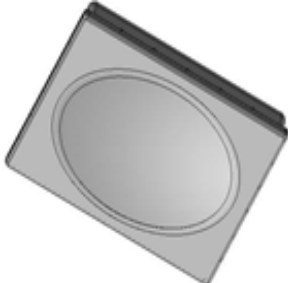
The **BESPA** is provided with a basic test program on a CD, to run on a Microsoft™ Windows® equipped Personal Computer. The program enables you to carry out a number of basic tests.

See the **Technical Manual** for further instruction on Software usage.

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**.

-SPECIFICATIONS

<p style="text-align: center;">ITCS-A-405</p> <p>Frequency RF Radiated Power Regulatory Compliance</p> <p>Reading/Writing Protocols FCC ID IC ID Application Interface</p>	<div style="text-align: center;">  </div> <p style="text-align: center;">UHF band: 860 – 940 MHz¹ Adjustable 0.2W to 4Watts EIRP</p> <p style="text-align: center;">FCC, CFR47 Part 15.247 EN 302 208, EN 301 489-3, EN 301 489-1, EN55022, EN55024, EN 60950-1:2005</p> <p style="text-align: center;">ISO18000-6C / EPC UHF Gen 2 EM 4122 (TTO)</p> <p style="text-align: center;">WFQITCS-A-405 10717A-ITCSA405 ISO/IEC 24730-1</p>
<p>Environmental Operating Temperature Storage Temperature Relative Humidity Dimensions Weight</p>	<p style="text-align: center;">+14 to +130°F (-10 to +55°C) -40 to +185°F (-40 to +85°C) 5 to 85% non-condensing 24in x 24in x 4in (60 x 60 x 10 cm) 15 lbs (7 kg)</p>
<p>Ethernet LAN</p>	<p style="text-align: center;">RJ-45 Connector</p>
<p>Power Current and Voltage</p>	<p style="text-align: center;">POE+ DC Input IEEE 802.3at Type 2 0.7Amp at +48Vdc</p>
<p>Antenna Gain²</p>	<p style="text-align: center;">4.6 dBi Circular Polarization 10.9 dBi Linear Polarization</p>

¹ The SASL uses the RFC RFC-6100XR RFID reader which will be factory set at time of shipping, to suit the country of installation and use.

² Maximum value over Operating Frequency Range as referenced to an isotropic antenna.

-SAFETY INSTRUCTIONS

Consignes de Sécurité

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.

Cet appareil émet Radio Fréquence rayonnements non ionisants. L'installateur doit s'assurer que l'antenne est située ou orientée de façon à ne pas créer un champ RF supérieure à celle permise par le Règlement sur la santé et applicable dans le pays d' 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 4 Watts EIRP and under EN 302 208 this is 2 Watts ERP (3.2 W EIRP).

Entrer la puissance de sortie RF souhaité sous forme d' un pourcentage de la puissance maximale dans la zone d'alimentation Set. Cliquez sur le bouton **ensemble d'alimentation** . Remarque: le maximum réel rayonnée de puissance RF est réglé en usine pour se conformer à la réglementation de radio dans le pays d'utilisation. Aux Etats-Unis et au Canada c'est 4 Watts EIRP et selon la norme EN 302 208 c'est 2 watts (3,2 W PIRE).

FCC Radiation Exposure Statement

The antenna used on this equipment must be installed to provide a separation distance of at least 23cm from all persons and must not be co-located or operated in conjunction with another antenna or transmitter.

L'antenne utilisée sur cet équipement doit être installé pour fournir une distance de séparation d'au moins 23cm de toutes les personnes et ne doit pas être co- implantés ou exploités conjointement avec une autre antenne ou émetteur .

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.

La modification de ce dispositif est strictement interdite. Toutes les modifications apportées au matériel d'usine ou les paramètres du logiciel de cet appareil annulera toutes les garanties et sera considérée comme non conforme aux normes FCC et d'Industry Canada.

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux normes d'Industrie Canada exempts de licence(s) RSS. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement non désiré de l'appareil.

Power Disconnect Device

The plug on the power supply cord is intended to be the power disconnect device. The power source (socket or outlet) shall be located near the equipment and shall be easily accessible.

La fiche du cordon d'alimentation est destiné à être le dispositif de coupure de courant. La source d'alimentation (prise ou sortie) doit être située près de l'équipement et doit être facilement accessible .

Statement of Compliance with R&TTE Directive

RF Controls, LLC hereby declares that it's ITCS-A-405 product is in compliance with the essential requirements and other relevant provisions of European Directive 1999/5/EC. The original Certificate of Conformity is available at www.rf-controls.com

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