

MODULAR

MULTIFUNCTION



TRANSCIVER

Alto ATEX

The Alto radio transceiver by JAY Electronique provides solutions to the wide range of functional needs involved in secure industrial applications. This highly flexible product integrates today's cutting edge technology for optimum performance.

This Transceiver is designed for use in zone 1, 2, 21 and 22 explosible atmospheres.

MAIN FEATURES

- Modular unit with a large choice of functions
- Configurable, intelligent bi-directional radio link exchanges information while adapting to the radio environment.
- Internal, unique SIM card contains all the transceiver and operator module parameters linked to the application, and :
 - allows an operator module to associate to a transceiver by recovering the application configuration,
 - allows you to quickly replace a transceiver if necessary.
- Quick and easy product configuration by mini-B USB connector and thanks iDialog software (labels, feedback information, alarms, mapping for control devices and outputs, interlockings, network functions, access PINs codes).
- Cable glands or industrial connector (32, 40 or 72 contacts) on transceiver for easy installation.
- Spring-type, plug-in terminal strips facilitate wiring and maintenance.

FULLY COMPLIANT WITH EUROPEAN DIRECTIVES :

ATEX manufacturer
94/9/CE

EC type
certificate
issued by
LCIE



Machinery directive 2006/42/CE:

- Emergency stop
- SIL 3 per EN 61508-1-7
- Performance level PL e per EN ISO 13849-1 and -2
- EC type certificate issued by TÜV NORD



No 44 250 11 382580 006

Radio and telecommunication
terminal equipment

(low voltage, electromagnetic compatibility, radio spectrum)
R&TTE 99/5/EC
ARCEP certificate





DEFINITION OF A POTENTIALLY EXPLOSIVE ATMOSPHERE

How an explosion happens

An explosion is formed by an association of the following 3 elements :

■ **An oxidant :**

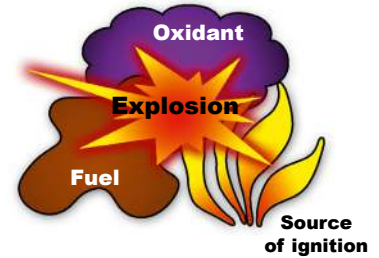
in our case, the oxygen in the air.

■ **A fuel :**

- ◆ A gas (methane, acetylene, ...)
- ◆ A fume (gasoline, solvent, ...)
- ◆ A dust (wood, sugar, grain, ...).

■ **A source of ignition :**

- ◆ An electric arc
- ◆ A mechanical spark
- ◆ A high temperature



Consequences of an explosion

Explosions are responsible every year for around 6 deaths and 387 persons with permanent disability (IP) out of 379 accidents. These can produce major catastrophes, such as the explosion at the «AZF» plant at Toulouse (France) in 2001 or the «Blaye silo» near Bordeaux (France) in 1997, resulting in a large number of deaths and injuries, and destruction of the sites.

Protection against explosions

It is necessary to evaluate the specific hazards created by explosible atmospheres, keeping in mind :

- ◆ the probability that **explosible atmospheres** will occur and persist,
- ◆ the probability that **sources of ignition**, including **electrostatic discharges**, are present and will become active and effective,
- ◆ the **installations, substances and methods** used, and their possible **interactions**,
- ◆ the extent of the **foreseeable consequences**.

The explosion hazards must be evaluated globally.

In practice, this requires :

- 🔧 Identification of zones representing a hazard and substances which could create explosible atmospheres.
- 🔧 Classification of the explosive atmospheres in zones where there is an explosion hazard, assisted if necessary, by an outside organization.
- 🔧 Definition of the equipment required to carry out the project.

With reference to user ATEX directive 99/92/CE.

The zones are standardised in accordance with their degree of dangerousness.

■ **Definition of explosion hazard zones linked to :**

GASES, FUMES AND FOG

ZONE 0 : location where an explosive atmosphere, consisting of a mixture with the air of combustible material in the form of gases, fumes or fog, is present continuously or over extended periods of time, or frequently.

ZONE 1 : location where an explosive atmosphere, consisting of a mixture with the air of combustible materials in the form of gases, fumes or fog, is likely to form occasionally under normal operation.

ZONE 2 : location where an explosive atmosphere, consisting of a mixture with the air of combustible materials in the form of gases, fumes or fog, is not likely to form during normal operation, or should such a formation occur, is nonetheless only of short duration.

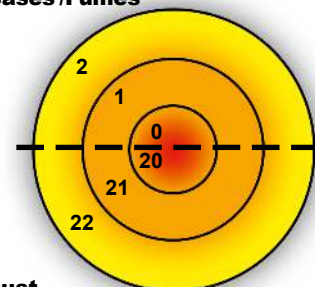
DUST

ZONE 20 : Location where an explosive atmosphere in the form of a cloud of combustible dust is present in the air continuously, or over extended periods of time, or frequently.

ZONE 21 : Location where an explosive atmosphere in the form of a cloud of combustible dust may occasionally form in the air during operation.

ZONE 22 : Location where an explosive atmosphere in the form of a cloud of combustible dust is not likely to form in the air during normal operation, or should such a formation occur, is nonetheless only of short duration.

Gases /Fumes







Dust

- Continuous hazard
- Hazard present during normal operating conditions
- Limited hazard in the event of failure of a system (limited in time)

DEFINITION OF MARKINGS
ON ATEX - IECEx PRODUCTS

Since July 1st, 2003, all Ex products must satisfy the requirements of the directive ATEX 94/9/CE, the evolution of the standard 60079-0 leads to a new product marking presented in the following tables :

Transceiver Alto ATEX + cable link	Transceiver Alto ATEX	Connection interface unit PYR ATEX	Kit PYA Output BNC antenna kit with intrinsic safety barrier
 C € 0081 ¹ ² ³ ⁴ ⁵ ⁶ ⁷ ⁸ ⁹ ¹⁰ ⁷ ¹³ Ex d [ia Ga] IIB T6 Gb Ex tb [ia Da] IIIC T85°C Db Uo:5.9V ; Io:210mA, Po:310mW Co:1000µF ; Lo:3.22mH, Lo/Ro: 460µH/Ω LCIE 14 ATEX 3005 X IECEX LCIE 14.0014 X	 C € 0081 ¹ ² ³ ⁴ ⁵ ⁶ ⁷ ⁸ ⁹ ¹⁰ ⁷ ¹¹ ¹² Ex d IIB T6 Gb Ex tb IIIC T85°C Db LCIE 14 ATEX 3005 X IECEX LCIE 14.0014 X	 C € 0081 ¹ ² ³ ⁴ ⁵ ⁶ ⁷ ⁸ ⁹ ¹⁰ ⁷ ¹¹ ¹² Ex e IIC T6 Gb Ex tb IIIC T85°C Db LCIE 14 ATEX 3011 X IECEX LCIE 14.0013 X	 C € 0081 ¹ ² ³ ⁴ ⁵ ⁷ ⁸ ⁹ ⁷ ¹¹ ¹² Ex ia IIC Ga Ex ia IIIC Da LCIE 14 ATEX 3004 U IECEX LCIE 14.0006 U

Below are the tables to understand the **ATEX** marquing :

1 Device group

Device group	Application
Group I	Electrical devices intended for use in firedamp mines. (underground work in the mines and parts of ground installations) => Protection against firedamp
Group II	Electrical devices intended for all other explosible atmospheres than firedamp mines (ground industries) => Protection against explosions

2 3 ATEX classification

Category of equipment	Flammable substances	Degree of protection	Description
1	G Gas D Dust	Very high level	Devices capable of operating in the atmospheres where the risk of explosion is permanent or almost permanent (zones 0, 1, 2 and 20, 21, 22)
2	G Gas D Dust	High level	Devices capable of operating in the atmospheres where the risk of explosion is frequent (zones 1, 2 and 21, 22)
3	G Gas D Dust	Normal	Devices capable of operating in the atmospheres where the risk of explosion is occasional (zones 2 and 22)

4 Protection modes for electrical equipment in gaseous atmospheres

Protection mode		Standard	Basic principle	Application in ZONE		
				0	1	2
d	Explosion proof enclosure	EN/IEC 60079-1	The extremely heavy duty enclosure contains the explosion inside the device. The explosion proof seals of the device prevent any propagation of the flame outside the enclosure. The seals are regularly serviced.		●	●
e	Enhanced safety	EN/IEC 60079-7	The components inside the enclosure must not produce arcs, sparks or dangerous temperatures under normal utilization conditions. The enclosure must be tight to IP 54 and withstand impacts.		●	●
i	Intrinsic safety	ia	EN/IEC 60079-11	The actual design of the circuit, where the energy is limited at the entry by a Zener barrier or a galvanic insulator makes it impossible for arcs or electrical sparks to form, subdivided into "ia" resists 2 defects: suitable for zone 0, and "ib" resists 1 defect: suitable for zones 1 and 2.	●	●
		ib	EN/IEC 60079-11	The actual design of the circuit, where the energy is limited at the entry by a Zener barrier or a galvanic insulator makes it impossible for arcs or electrical sparks to form, subdivided into "ia" resists 2 defects: suitable for zone 0, and "ib" resists 1 defect: suitable for zones 1 and 2.		●
m	Encapsulation	EN/IEC 60079-18	For this protection mode, all the electronics is encapsulated in an insulating material to prevent electrical arcs or electrical sparks.		●	●
n	Zone 2	EN/IEC 60079-15	This protection mode is only suitable for devices intended for zone 2 where the risk of explosion is low. It combines the enhanced safety mode "e" with lower protection requirements.			●
o	Immersion in oil	EN/IEC 60079-6	The material or the electrical circuit is immersed in oil. The explosive mixture is located above the liquid and cannot be ignited by the electrical circuit.		●	●
p	Internal overpressure	EN/IEC 60079-2	A pressurized gas is introduced in the enclosure to prevent the possibly-explosive surrounding atmosphere from entering the enclosure.		●	●
q	Powdery filler	EN/IEC 60079-5	For this protection mode, all the electronics is encapsulated in an inert powdery material to prevent electrical arcs or electrical sparks.		●	●

5 Classification of gases and fumes by explosion groups (non-exhaustive list)

Group IIA		Group IIB		Group IIC
Propane	Acetone	Ethylene	Ethyl oxide	Acetylene
Ethane	Hexane	Diethylene	Sulphuretted hydrogen	Hydrogen
Butane	Methanol	Ethyl ether	Ethanol	Carbon disulfide
Benzene	Paint thinners	Cycloprodene		
Pentane	Natural gas	Butadiene 1-3		
Heptane		Propylene oxide		

6 Gas temperature classes

The safe use of equipment in dangerous areas requires knowledge of the gas group and compare the temperature auto-ignition of gaseous mixtures treated to the temperature of equipment marking.

The maximum surface temperature of the material must always be less than the autoignition temperature of the gas present in the dangerous area.

Temperature class	MAXIMUM surface temperature of electrical equipment	Ignition temperatures of FLAMMABLE materials
T1	450°C	> 450°C
T2	300°C	> 300°C
T3	200°C	> 200°C
T4	135°C	> 135°C
T5	100°C	> 100°C
T6	85°C	> 85°C

7 Equipment protection level (EPL)

Traditional relationship between level of protection and areas / categories (without additional risk assessment).

Equipment protection level (EPL)	Normal range of application	Category (94/9/CE)
Ga	0 (and 1 and 2)	1G
Gb	1 (and 2)	2G
Gc	2	3G
Da	20 (and 21 and 22)	1D
Db	21 (and 22)	2D
Dc	22	3D
Ma / Mb	mines	M1 / M2

8 Protection modes for electrical equipment in dusty atmospheres

Protection mode			Standard	Basic principle	Application in ZONE		
					20	21	22
i	Intrinsic safety	ia	EN/IEC 60079-11	The actual design of the circuit, where the energy is limited at the entry by a Zener barrier or a galvanic insulator makes it impossible for arcs or electrical sparks to form, subdivided into "ia" resists 2 defects: suitable for zone 0, and "ib" resists 1 defect: suitable for zones 1 and 2.	●	●	●
		ib	EN/IEC 60079-11	The actual design of the circuit, where the energy is limited at the entry by a Zener barrier or a galvanic insulator makes it impossible for arcs or electrical sparks to form, subdivided into "ia" resists 2 defects: suitable for zone 0, and "ib" resists 1 defect: suitable for zones 1 and 2.	●	●	●
m	Encapsulation	EN/IEC 60079-18	For this protection mode, all the electronics is encapsulated in an insulating material to prevent electrical arcs or electrical sparks.	●	●	●	
p	Internal overpressure	EN/IEC 60079-2	A pressurized gas is introduced in the enclosure to prevent the possibly-explosive surrounding atmosphere from entering the enclosure.	●	●	●	
t	Explosion proof enclosure	EN/IEC 60079-31	The extremely heavy duty envelope contains the explosion inside the device. The explosion proof seals of the device prevent any propagation of the flame outside the enclosure. The seals are regularly serviced.	●	●	●	

9 Classification of dust by explosion groups

Explosion groups	Type of dust	Fundamental principle
Group IIIA	Combustible dust in suspension	Very fine solid particles of nominal size of about 500 microns or less, can be suspended in the air, which can be deposited because of their own weight and that can burn or be consumed in the air and are susceptible to form explosive mixtures with air under conditions of atmospheric pressure and normal temperature.
Group IIIB	Non-conductive dust	Combustible dust electrical resistivity greater than 103 Ω.m. Size < 500 μm
Group IIIC	Conductive dust	Combustible dust electrical resistivity at or below 103 Ω.m. Size < 500 μm

10 Maximum surface temperature for dusty atmospheres

11 LCIE : certificate of EC type examination number

12 LCIE : IECEx certificate number

13 Intrinsic safety parameters of cable link



ANTENNA ON BNC CONNECTOR

CONTROL BOARD

PLUG-IN SIM CARD WITH APPLICATION CONFIGURATION

BIDIRECTIONAL RADIO LINK

USB CONNECTOR FOR MAINTENANCE AND CONFIGURATION

INTRINSIC SAFETY BARRIER FOR CABLE LINK

IDENTIFICATION AND PLUG-IN TERMINAL STRIPS WITH SPRING CONNECTION SYSTEM



CAPTIVE SCREWS WITH MASTERY OF THE PRESSURE ON THE SEAL

1 CABLE GLAND PG 1/2" NPT SIZE 20 (OPTION) FOR CABLE LINK

1 CABLE GLAND PG 1" NPT SIZE 32 (OPTION) PASSAGEWAY FOR CONTROL CABLES / POWER SUPPLY

3 POSITIONS FOR AUXILIARY BOARDS OF YOUR CHOICE

POWER SUPPLY BOARD

EXPLOSION PROOF SEAL PLANE

EXPLOSION PROOF HOUSING

18 HOUSING CLOSURE SCREWS

Transceiver Alto ATEX

1 CABLE GLAND PG 1" NPT SIZE 32 PASSAGEWAY FOR CONTROL CABLES / POWER SUPPLY

4 TERMINALS FOR SAFETY RELAYS

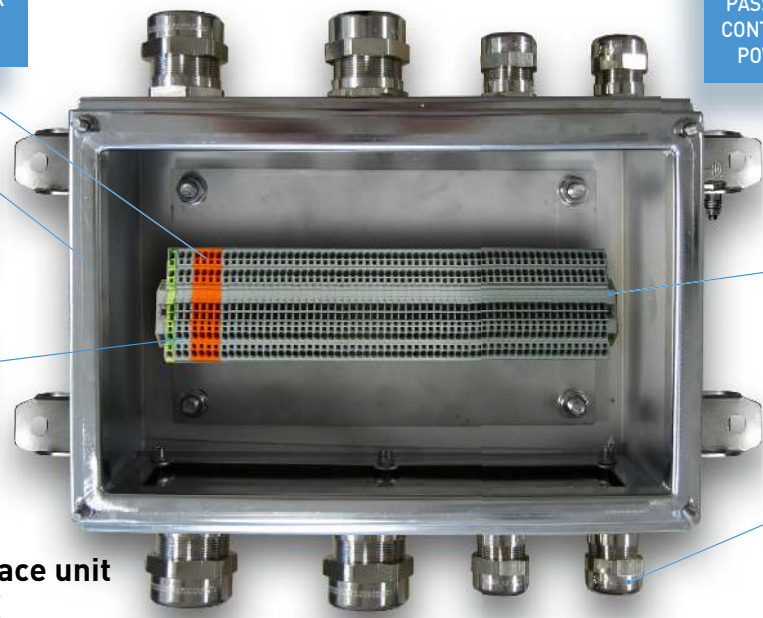
ENHANCED SAFETY HOUSING

2 TERMINALS FOR ALTO TRANSCIVER POWER SUPPLY

55 TERMINALS FOR INPUTS / OUTPUTS

HOUSING DELIVERED WITH CABLE GLANDS OR CAPS TO BE MOUNTED :
4 CABLE GLANDS M20
4 CABLE GLANDS M32
4 CAPS M20
2 CAPS M32

**Connection interface unit
PYR ATEX**





DESCRIPTION

The modular transceiver is formed by boards which connect into the unit's motherboard.

The unit is systematically equipped with :

- 1 power supply board
- 1 control board containing safety relays RS1 & RS2 / On relay / Auxiliary relay / 1 logic input / 1 analog input / 1 RS485 Modbus serial link
- 3 positions are provided to receive, in accordance with your application :
- 1 board with 12 On/Off relays
- 1 board with 12 logic inputs + 2 analog inputs
- 1 board with 6 analog outputs + 1 bypass output
- 1 BUS board

Wireless HMI Control (WHC)

Displaying text messages or graphic images on the screen of the operator module from CANopen or Modbus network.

Compatibility:

These transceivers work with **Beta, Gama, Pika, Moka** Operator modules to be defined according the application.

TECHNICAL CHARACTERISTICS

MECHANICAL CHARACTERISTICS AND ENVIRONMENTAL WITHSTAND CAPACITY

Housing material	Aluminium alloy
Tightness	IP 66
Weight	26Kg [approx.]
Dimensions	340 x 415 x 258,3 mm max (without antenna)
Operating temperature range	- 20°C to + 60°C
Storage temperature range	- 30°C to + 70°C
Cable lead-out	- 1 cable gland PG 1 " NPT Size 32 passageway for control cables / power supply - 1 cable gland PG 1 " NPT Size 32 passageway for control cables / power supply (in OPTION) - 1 cable gland PG 1/2 " NPT Size 20 for cable link (in OPTION)
Wiring connection	Spring-type plug-in connectors

RADIO CHARACTERISTICS

Frequency	- 64 programmable frequencies on 433-434 MHz band - 12 programmable frequencies on 869 MHz band - 64 programmable frequencies on 911-918 MHz band
Transmit power	< 10 mW (license free)
Modulation	FM
Antenna	plug-in antenna on BNC connector
Average range (1)	100 m in industrial environment 300 m in open space

ELECTRICAL CHARACTERISTICS OF POWER SUPPLY BOARD

Power supply voltage	- 115-230VAC (- 15% / Max voltage = Um ≤ 250VAC, Max current = Im ≤ 4A per connection) [2] - 24-48VAC (+/- 25%) - 12-24VDC (+/- 15%)
Maximum consumption	15 W
USB Interface	mini-B 5-contact USB connector
Indication	- yellow indicator lights : power on
Number of relays	30
controllable according to power supply	

ELECTRICAL CHARACTERISTICS OF CONTROL BOARD

Contact type	2 relays with linked contacts
Contacts and connection	3 connection points, 1 Contact Spring-type plug-in connectors
Indication	- 1 green indicator light : Radio status and quality - 1 yellow indicator light : Power on - 1 red indicator light : fault and diagnostic
Active stop time	100 ms
Passive stop time	adjustable 0,5 to 2 sec

ON CONTROL BOARD

1 Logic input

Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
1 active input consumption	< 10mA
Voltage	0 to 30VDC
Lowlevel on input	< 2VDC
Highlevel on input	> 3VDC

1 Analog input

Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
Max. input level	10V or 4-20mA
1 active input consumption	< 12mA

1 RS485 serial link

Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
Protocol	Modbus RTU slave
Data rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s
Parity	none / even / odd
Slave address	1 to 247

ADDITIONAL OPTIONS

ELECTRICAL CHARACTERISTICS OF BOARD WITH 12 CONTROL RELAY OUTPUTS

Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
Outputs	Independent relays - Category DC13 0,5A / 24VDC , AC15 2A / 230VAC - Interrupting capacity. 2000VA - Max. current. 8A (control relay), 6A (safety relay) - Min. current 10 mA (12 Vmin.) - Max. voltage. 250VAC
Response time	- On startup : 0,5s max - On command : 200ms typical

ELECTRICAL CHARACTERISTICS OF BOARD WITH 12 LOGIC INPUTS + 2 ANALOG INPUTS

Logic inputs	
Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
1 active input consumption	< 10mA
Voltage	0 to 30VDC
Low level on input	< 2VDC
High level on input	> 3VDC
Analog inputs	
Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
Max. input level	10V or 4-20mA
1 active input consumption	< 12mA

ELECTRICAL CHARACTERISTICS OF BOARD WITH 6 ANALOG OUTPUTS + 1 BYPASS OUTPUT

Analog outputs	
Contacts and connection	2 connection points, 1 Contact Spring-type plug-in connectors
Output level	0 / 10V -10V / 0 / +10V 3V / 6V / 9V 6V / 12V / 18V
Voltage output max. current	10mA

ELECTRICAL CHARACTERISTICS OF BOARD WITH OUTPUT BUS

CANopen slave compliant CIA 401	
Connection	2 connection points, Spring-type plug-in connectors
Data rate	20, 50, 100, 125, 250, 500, 800 kbits/s and 1 Mbits/s
Slave address	1 to 127

RECOVERY CONTROL BY CABLE LINK

EQUIPMENT SYNCHRONIZATION

(1) Range varies according to environment conditions around operator module and reception antenna (steel works, metal walls ...).

(2) Power supply limited to 125VAC if any of the following are present: logic and/or analogue signals at inputs OR Moka / Alto cable link

CONNECTION INTERFACE UNIT ATEX



Reference : PYR

MECHANICAL CHARACTERISTICS AND ENVIRONMENTAL WITHSTAND CAPACITY

Housing material	Inox
Tightness	IP 66
Weight	8,5Kg (approx.)
Dimensions	230 x 330 x 148 mm
Operating temperature range	- 20°C to + 60°C
Storage temperature range	- 30°C to + 70°C
Cable lead-out	- 2 cable glands M32 to Alto ATEX transceiver housing - 2 cable glands M32 passageway power supply cables / control - 3 cable glands M20 passageway power supply cables / control
Wiring connection	62 terminals

ELECTRICAL CHARACTERISTICS

Maximum allowable current on the terminals :
2 possible cases :

1) at least 12 terminals crossed by a 4A current working simultaneously (for example, for the ATEX Alto Transceiver unit: 2 active safety relays + 4 function relays simultaneously; for the connection interface unit: 12 terminals may be loaded simultaneously).

2) A maximum current of 1A without limitation of terminals connected and loaded.

ANTENNA WITH INTRINSIC SAFETY BARRIER ATEX



Reference : PYA

THIS KIT ALLOWS YOU TO INTEGRATE A STANDARD JAY ELECTRONIQUE TRANSCIEVER IN A CUSTOMER ATEX / IECEx HOUSING.

ACCESSORIES

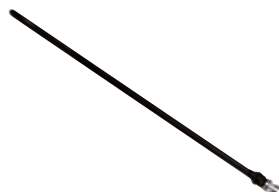


Straight antenna, 1/4 wave, BNC, on 433 MHz

Reference : VUB084

Short straight antenna, 1/4 wave, BNC, on 433 MHz

Reference : VUB082



Straight antenna, 1/2 wave, BNC, on 433 MHz

Reference : VUB086



0.5 m extension for BNC antenna

Reference : VUB170



2 m extension for BNC antenna + bracket

Reference : VUB105



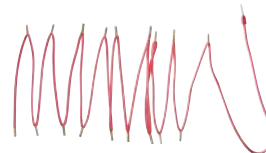
5 m extension for BNC antenna + bracket

Reference : VUB125



10 m extension for BNC antenna + bracket

Reference : VUB131



Wiring accessories for common points

Reference : PWT03



Cable link connection between the operator module and transceiver

Reference : PWLY40

Length : 40 meters



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