

ROBUST

ERGONOMIC

SECURE



OPERATOR MODULE

Gama

For Ex-hazardous areas

The Beta operator module adapts to your application to make your process more efficient. This easy-to-use handheld module gives you incomparable freedom of movement, precise quality manoeuvres, and higher productivity while ensuring your operators' safety. With the Beta operator module, experience today's cutting-edge technology.

This operator module is designed for use in potentially explosive gases atmospheres classified 0, 1, 2, dust classified 20, 21, 22 and mines.

MAIN FEATURES

- Configurable, intelligent bi-directional radio link exchanges information while adapting to the radio environment.
- User-friendly screen for look-up, selection, validation, configuration...
- Ergonomic casing and buttons, even when wearing gloves.
- Function buttons designed to SIL 2 per EN 61508 and PL d per EN ISO 13849.
- Quick and easy setup for application configuration thanks to **iDialog** software (labels, feedback, alarms, mapping actuators/outputs, interlocks, network features, access by PIN codes).
- Easy to maintain thanks to its diagnostic aid system (information on screen, iDialog analysis software).

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
TUV NORD



Radio and telecommunication
terminal equipment
(low voltage, electromagnetic
compatibility, radio spectrum)
R&TTE 99/5/EC
ARCEP certificate

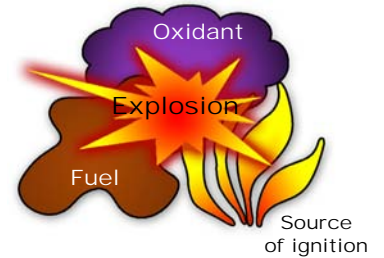
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DEFINITION OF A POTENTIALLY EXPLOSIVE ATMOSPHERE

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.

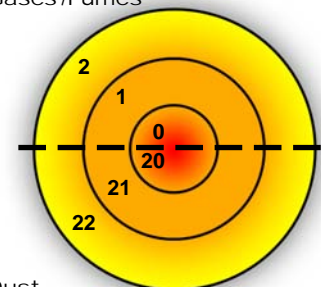
DUST

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 :

Operator modules Gama ATEX :	
	<p> ¹ C ² ³ € 0081  ⁴ II ⁵ 1 ⁶ G ⁷ D ⁸ Ex ia ⁹ IIB ¹⁰ T4 or 145°C ¹¹ Ga (1) ¹² Ex ia ¹³ IIIC ¹⁴ T135°C or T145°C ¹⁵ Da (1) </p>
Gama 6+4 ATEX	
	<p> ¹ II ² 2 ³ G ⁴ D ⁵ Ex ia ⁶ IIC ⁷ T4 or 145°C ⁸ Gb (1) ⁹ Ex ia ¹⁰ IIIC ¹¹ T135°C or T145°C ¹² Db (1) ¹³ I ¹⁴ M1 ¹⁵ Ex ia ¹⁶ I Ma ¹⁷ LCIE 15 ATEX 3055 X ¹⁸ IECEX LCIE 15.0045 X </p>
Gama 10+4 ATEX	

(1) Temperature classes depending on Tamb :

-20°C ≤ Tamb ≤ +40°C, temperature classes are T4 for gas and T135°C for dust.

+40°C ≤ Tamb ≤ +50°C, temperature classes are 145°C for gas and T145°C for dust.

■ 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	●	●	●
		ib	EN/IEC 60079-11		●	●
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	Cyclopropane		
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 $10^3 \Omega.m$. Size < 500 μm
Group IIIC	Conductive dust	Combustible dust electrical resistivity at or below $10^3 \Omega.m$. Size < 500 μm

10 Maximum surface temperature for dusty atmospheres

11 LCIE : certificate of EC type examination number

12 LCIE : IECEx certificate number



DESCRIPTION

The operator module comes in two housing versions :

→ « 6+ 4 »^[a] operator module with 6 function buttons^[b] :

- 6 single-action pushbuttons
- OR • 6 double-action pushbuttons
- OR • 4 double-action pushbuttons + 2 single-action pushbuttons (under the display)

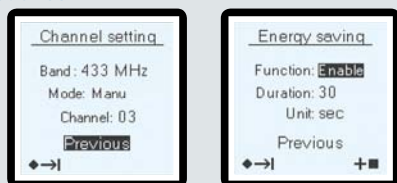
→ « 10 + 4 »^[a] operator module with 10 function buttons^[b] :

- 10 single-action pushbuttons
- OR • 10 double-action pushbuttons
- OR • 6 double-action pushbuttons + 4 single-action pushbuttons (under the display)
- OR • 8 double-action pushbuttons + 2 single-action pushbuttons (under the display)

^[a] Each version has 2 navigation pushbuttons, 1 «On/Validation» pushbutton and 1 emergency stop pushbutton.

^[b] The single-action pushbuttons can be configured as selectors for 2, 3 or «n» positions with status indication on the screen.

The screen on the operator module allows you to easily configure and choose items such as :



- The screen language
- The transceiver which you want to use
- The radio transmit frequency and power
- The duration of the « standby » time delay (Automatically stops operator module and associated transceiver if not used for a defined period of time)
- The different operating modes of the equipment (32 max.)

It also allows to view :

- Battery charge level
- Radio communication
- Equipment labels and controlled functions (max 96 different labels for selectors)
- Equipment feedback (16 max feedback with 10 labels / feedback and max 48 labels in total)
- Alarms (8 for application use + 8 for system)

Compatibility:

These operator modules work with **Elio, Alto, Timo, Nemo** transceivers to be defined according to the application.

TECHNICAL CHARACTERISTICS

MECHANICAL CHARACTERISTICS AND ENVIRONMENTAL WITHSTAND CAPACITY

Housing material	shock-resistant reinforced ABS with anti-static charge
Tightness	IP65
Weight (with battery)	6+4 buttons : 768 g 10+4 buttons : 893g
Dimensions	6+4 buttons : 290 x 93 x 64 mm 10+4 buttons : 360 x 93 x 64 mm
Carried	by 2-point shoulder strap

ENVIRONMENTAL WITHSTAND CAPACITY

Operating temperature range	-20°C to + 50°C
Storage temperature range of housing alone	-20°C to + 70°C
Storage temperature range of battery	-20°C to + 50°C

ELECTRICAL AND RADIO CHARACTERISTICS

Power supply	Li-ion battery
Endurance [25°C] of radio link, activated 100% time	10 hours
Frequency selection	64 frequencies on 433-434 MHz band
Manual / automatic	12 frequencies on 869 MHz band 64 frequencies on 911-918 MHz band
Transmit power	<10 mW (license free)
Range limitation	10 power levels, configurable
Modulation	FM
Average range ^[1]	100 m in industrial space ^[1] 300 m in open space ^[1]
Charging time (endurance > 80%)	3 h (20 mn of charge get 1h autonomy)
Charging temperature range	0°C to + 40°C

FUNCTIONAL CHARACTERISTICS

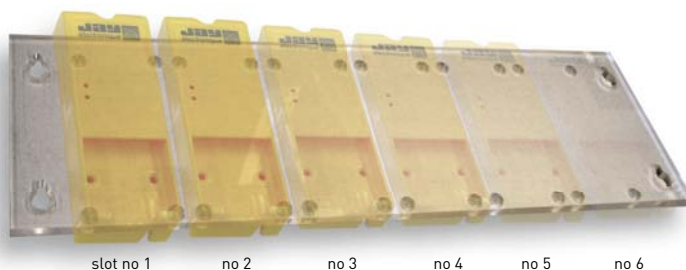
Display	Backlit LCD, 128 x 128 pixels 42mm (L) x 40mm (H)
USB interface for configuration and diagnostics	mini-B 5-contact USB connector Easily accessible by cover on back of operator module
Operating indications	Visible on screen (radio link status, battery status, status of buttons, information feedback...)
Function buttons	6 or 10 pushbuttons (available as single or double-action buttons and configurable as selectors with n positions) Ø 14 mm - travel 7 mm Endurance : 1 million cycles for 1st level pushbutton action 500 000 cycles for 2nd level pushbutton action
Navigation and startup buttons	2 pushbuttons to configure the product (above the emergency stop pushbutton) On / Validation button (for startup and validation of menus on screen) Endurance: 500 000 cycles
Emergency stop	2 positions with rotary unlock system
Standby function	User-definable time delay (from 1 s to infinity)

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

ACCESSORIES



IMPORTANT :
The battery shall not be charged in potentially explosive area.



Battery charger

Reference : PWC
Dimensions: 170x65x36 mm
Power supply : 12/24 VDC
Power : 7w

Plug-in battery for operator module

Reference : PYB
Dimensions : 57x56x16 mm
Voltage : 3,7V
Capacity : 1900mAh
Technology : lithium Ion

Mains power adapter for battery charger

Reference : UBCU
Dimensions : 41x72x39 mm
Power supply : 100-240VAC
Output : 12VDC
Power : 7 w



Cigarette lighter plug adapter for battery charger

Reference : PWA4
Dimensions : 90x20x20 mm
Power supply : 12-24VDC
Output : Power supply

Rack for battery chargers (6 slots)

Sold without charger
Reference : PWR
Dimensions : 470x147x8 mm



Mains power adapter for rack

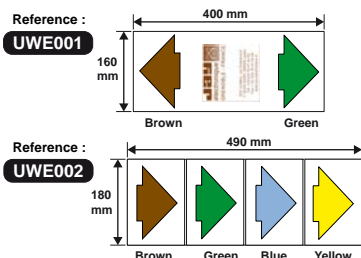
Reference : PWAUR
Power supply : 100-240VAC
Output : 12VDC
Power : 36 w



Removable 2-point shoulder strap

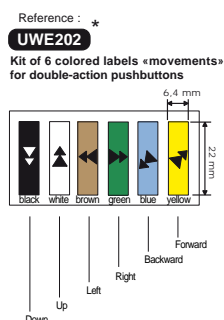
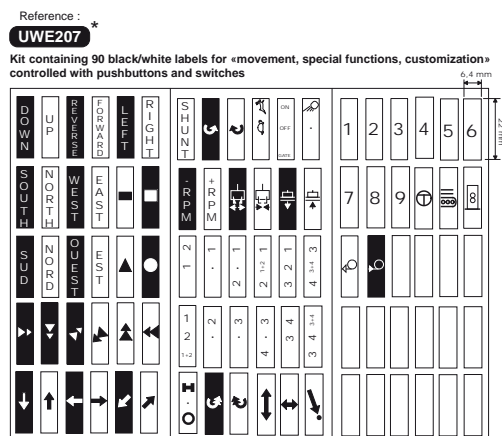
Reference : PYM110

Sheet of adhesive labels for your mobile equipment :

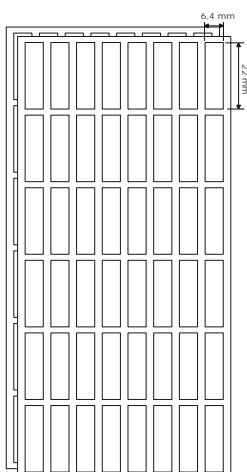


Sheet of adhesive labels for operator module :

The button functions are identified by adhesive labels in the recesses provided in the operator module casing next to the pushbuttons.



Reference : UW E205
Kit containing 48 white blank labels + 48 transparent protecting labels for customised markings



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