# UI Configurable converter - Trip amplifier

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I. Characteristics of the device

1.1 Function
Configurable electrical value converter with universal input and trip amplifier function. Configuration by PC with ProgressX Manager software and a standard USB cable connection, or using the BlueSet backlit removable programming console.

1.2 Presentation of the device

Screw connector for rear power supply connector (option):

P/N ACCDIVUI-003 (connection on the left)
P/N ACCDIVUI-002 (connection on the right)

P/N ACCDIVUI-001
The configurable universal electrical value converter UI, with galvanic isolation and trip amplifier function monitors or regulates the usual physical parameters (temperature, pressure, position, level, rate, etc.).

The UI ATEX version [Ex ia] IIC, also provides an intrinsic safety barrier for electrical signals from zones where an explosion risk exists. The value to be processed may be either measured directly by a sensor (RTD100, thermocouple, potentiometer), or received from the output of an electrical signal transmitter (current 4-20 mA, voltage 0-10V, voltage 0-100mV).

UI can linearize the input signal up to 20 points. Depending on the version, the unit has output relay contacts, combined with programmable trip values and a proportional 4-20 mA analog output. The unit has simulation functions for its relay outputs and for the 4-20 mA output. The UI has an individual status relay (NC) and a group status relay (NO) which are activated if a fault is detected on the unit input or output.

The UI is equipped with a universal power supply and can be connected to AC or DC supplies. The UI is mounted on DIN rails in the control cabinets, in accordance with standard EN50022. An optional rear connector provides a group power supply on the DIN RAIL. Operating defects are indicated by intelligent flashing LEDs on the front panel. The UI may be configured using the BlueSet removable console or through the USB port, with a standard cable and the ProgressX Manager software.
## 1.3 Electrical characteristics

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>1 or 2 depending on model (coming soon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Universal:</td>
</tr>
<tr>
<td></td>
<td>21.6 to 300 Vdc (removable terminals 11+ and 12-), 99 to 253 Vac (removable terminals 11 and 12 only)</td>
</tr>
<tr>
<td></td>
<td>24 to 48 Vdc (with back power supply optional connector on DIN rail, maximum 48 units in 24 Vdc and 96 units in 48 Vdc)</td>
</tr>
<tr>
<td></td>
<td>Through the USB port with a USB type A x micro USB type B cable (for the configuration only)</td>
</tr>
<tr>
<td></td>
<td>Front panel green LED “Logic“ and “ON“ when energized.</td>
</tr>
<tr>
<td></td>
<td>Reverse polarity protection</td>
</tr>
<tr>
<td></td>
<td>Warm-up time for optimum parameters: 5 minutes</td>
</tr>
<tr>
<td>Consumption</td>
<td>≤ 4 VA</td>
</tr>
<tr>
<td>Input signal</td>
<td>Universal input (from hazardous area). See table below</td>
</tr>
</tbody>
</table>
## UI Configurable converter - Trip amplifier

<table>
<thead>
<tr>
<th>Input</th>
<th>Scale</th>
<th>Input impedance</th>
<th>Minimum scale</th>
<th>Basic precision*</th>
<th>Characteristics</th>
<th>Thermal drift</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td>-2.5/21.5 mA</td>
<td>18.5 Ω</td>
<td>2 mA</td>
<td>10 µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transmitter</strong></td>
<td>3.5/21.5 mA</td>
<td>18.5 Ω</td>
<td>2 mA</td>
<td>10 µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>-1/10.1 V</td>
<td>1 MΩ</td>
<td>1 V</td>
<td>10 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>-10/101 mV</td>
<td>15 MΩ</td>
<td>10 mV</td>
<td>10 µV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Thermocouple J | -210/1200°C | -210°C ≤ T < -100°C: 1.5°C |
| Thermocouple K | -250/1372°C | -100°C ≤ T < 1200°C: 0.5°C |
| Thermocouple B | +400/1820°C | 400°C ≤ T < 900°C: 1.5°C |
| Thermocouple R | -50/1768°C  | 900°C ≤ T < 1820°C: 0.5°C |
| Thermocouple S | -50/1768°C  | 200°C ≤ T < 1768°C: 1.5°C |
| Thermocouple T | -250/400°C  | -250°C ≤ T < -200°C: 1.5°C |
| Thermocouple E | -270/1000°C | -270°C ≤ T < -250°C: 10°C |
| Thermocouple N | -240/1300°C | -240°C ≤ T < -200°C: 5°C |
| Thermocouple W5 | -20/2320°C | -20°C ≤ T < 600°C: 1.5°C |

| RTD100 2 wires | -220/750°C | Measurement current 500 µA | 20°C | 0.5°C | Influence of line 2.5°C /ohm |
| RTD100 3 wires | -220/750°C | Measurement current 500 µA | 20°C | 0.5°C | 2.5°C/ohm out of balance between wires |
| RTD100 4 wires | -220/750°C | Measurement current 500 µA | 20°C | 0.5°C | - |
| RTD100 2 wires extended | -270/750°C | Measurement current 500 µA | 20°C | -270°C ≤ T < -220°C: 3°C |
| RTD100 3 wires extended | -270/750°C | Measurement current 500 µA | 20°C | -270°C ≤ T < -750°C: 0.5°C |
| RTD100 4 wires extended | -270/750°C | Measurement current 500 µA | 20°C | -270°C ≤ T < -750°C: 0.5°C |

| Potentiometer | 0/100% | 370 Ω | 10% | 0.5% | Potentiometer 1/20 kΩ |

* precision: ≤ 0.1% of FSD or less than the basic precision of the greater of the 2 values
**Output signal (depending on model M1 to M6)**

(Towards safe zone) **1 analog output** 4-20 mA (M1 to M3) generator with load of 800 Ω maximum (terminals 31+ and 32-) or receiver (terminals 32+ and 33-) or 0-10 V (M4 to M6) with charge 10 kΩ minimum

**Depending on model:**

- **1 alarm threshold relay** (M1 and M4) type SPDT (value displayed on front panel by orange LED « AL1 ») 6A - 250 Vac on cos ρ = 1, breaking power 1500 VA.

  or  

- **2 alarm threshold relays** type NO (M2 and M5) or NC (M3 and M6), value displayed on front panel by orange LED «AL1» and «AL2» 6A - 250 Vac on cos ρ = 1, breaking power 1500 VA

**For all versions**

- **1 mechanical relay NC** for individual status (default display on front panel with red LED «Out-OVL»). 0.3 A under 125 Vac or 1 A under 30  Vdc on cos ρ = 1, breaking power 30 VA in Vdc and 37.5 VA in Vac (terminals 13-14)

- **1 static relay NO «group» status** (default display on front panel with red LED «Out-OVL») 70 mA - 50 Vdc breaking power 3.5 W (terminals A-B)

**Protection against reversed polarity**

- **Response time** <2 seconds

- **Connections**
  - 10-pin connector on front panel for communication with BlueSet console
  - Detachable screw terminals for cable 0.2 mm² to 2.5 mm² (number depends on model)
  - Detachable DIN rail connector for power supply group and recovery of the «group status» signal (connector option)
  - One or two USB ports, depending on the number of input channels, under the detachable label holder
  - Utilization of a standard type A USB cable x micro type B

- **Configuration**
  - The UI is either configurable by the **BlueSet backlit removable console** or by the **ProgressX Manager software**.

- **Galvanic isolation**
  - Power supply/Input: 3000 Vac 50Hz
  - Power supply/Output: 3000 Vac 50Hz
  - Input/Output: 3000 Vac 50Hz

### 1.4 Structural characteristics

| **Installation** | In safe area |
| **Presentation** | Polyamide case |
| **Weight** | Approx. 200 g |
| **Storage temperature** | -20 to 70°C |
| **Operating temperature** | -20 to 60°C |
| **Relative humidity** | 5 to 95% without condensation |
| **Connection** | Removable terminals with screws |
| **Mounting** | On rail DIN EN 50022 |
### 1.5 Certifications

<table>
<thead>
<tr>
<th>EMC</th>
<th>EN/CEI 61326 &amp; EN/CEI 61000-6-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Voltage Directive</td>
<td>EN/CEI 61010-1</td>
</tr>
<tr>
<td>Intrinsic safety</td>
<td>EN/CEI 60079-0, EN/CEI 60079-11</td>
</tr>
<tr>
<td>Certificate ATEX INERIS</td>
<td>in progress</td>
</tr>
<tr>
<td>Certificate IECEx</td>
<td>in progress</td>
</tr>
<tr>
<td>Protection mode ATEX-IECEx</td>
<td>CE 0081 II (1) GD</td>
</tr>
<tr>
<td></td>
<td>[Ex ia]IIC and [Ex ia] IIIC</td>
</tr>
<tr>
<td></td>
<td>[Ex ia]IIB and [Ex ia] IIIB</td>
</tr>
</tbody>
</table>

### 1.6 Safety parameters

<table>
<thead>
<tr>
<th></th>
<th>Transmitter 2 and 3-wire</th>
<th>Current and voltage (V)</th>
<th>mV ,TC,RTD100, Pot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Uo (V)</td>
<td>27.41</td>
<td>6.51</td>
<td>6.51</td>
</tr>
<tr>
<td>Current Io (mA)</td>
<td>78.5</td>
<td>0.16</td>
<td>6.3</td>
</tr>
<tr>
<td>Power Po (mW)</td>
<td>538</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>Resistance Ro (Ω)</td>
<td>349.2</td>
<td>39904</td>
<td>1027</td>
</tr>
<tr>
<td>External capacitance (IIC) Co (µF)</td>
<td>0.086</td>
<td>21.9</td>
<td>21.9</td>
</tr>
<tr>
<td>External inductance (IIC) Lo (mH)</td>
<td>5.7</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>L/R ratio (IIC) (mH/ohm)</td>
<td>66</td>
<td>133.9</td>
<td>3.4</td>
</tr>
<tr>
<td>External capacitance (IIB) Co (µF)</td>
<td>0.672</td>
<td>499.9</td>
<td>499.9</td>
</tr>
<tr>
<td>External inductance (IIB) Lo (mH)</td>
<td>23</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>L/R ratio (IIB) (mH/ohm)</td>
<td>264</td>
<td>535.6</td>
<td>137</td>
</tr>
</tbody>
</table>
UI Configurable converter – Trip amplifier

1.7 Dimensions (mm)
1.8 Connection

**Zone**

- RTD100/Potentiometer
  - 2W
  - 3W
  - 4W
  - 21
  - 22
  - 23
  - 24

- Current generator
  - 4/20mA
  - 43 +

- Voltage (V)
  - 42

- Voltage (mV)
  - 22

- Thermocouple
  - 4-20mA
  - 43 -

- 3-wire transmitter
  - 41+
  - 43 -
  - 44 signal

- 2-wire transmitter
  - 41+
  - 43 -

**Safe zone**

- M1/M4
  - 1x SPDT

- M2/M5
  - 2x NO

- M3/M6
  - 2x NC

- AN/M1/M2/M3
  - C
  - NO
  - 51
  - 52
  - 53
  - 54

- M4/M5/M6
  - 0-10 V10 kΩ minimum

**Power supply**

- ~/+ 24/48
- ~/- Vdc110/230 Vac

**Individual status**

- 11
- 12
- 13
- 14

**Group status NO**

- 11-12-13-14

**Common status**

- Used only for 24/28 power supply

- 21-22-23-24
- 41-42-43-44
- 31-32-33-34
- 51-52-53-54

**Zone 43**

- 4/20mA

**2W**

**3W**

**4W**

**11-12-13-14**

**AN/M1/M2/M3**

**M4/M5/M6**

**Group status NO**

- 11-12-13-14

- 51-52-53-54

**Common status**

- Used only for 24/28 power supply

- 21-22-23-24
- 41-42-43-44
- 31-32-33-34
- 51-52-53-54

**Zone 43**

- 4/20mA
### 1.9 Coding

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
<th>version</th>
<th>Number of input channels</th>
<th>Input type</th>
<th>Number of input/output channels</th>
<th>Output type</th>
<th>Power supply</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>UI</td>
<td>Universal Input</td>
<td>X ATEX Ex ia or IECEx</td>
<td>1 input</td>
<td>1 input</td>
<td>1 output per input</td>
<td>1 input (code UN)</td>
<td>1 input</td>
<td>000 Without</td>
</tr>
<tr>
<td>ST</td>
<td>Standard</td>
<td>N Standard</td>
<td>1 input</td>
<td>1 input</td>
<td>Universal input 4-20 mA Passive</td>
<td>1 input</td>
<td>001 With *</td>
<td></td>
</tr>
<tr>
<td>TA</td>
<td>Trip amplifier</td>
<td>2 inputs</td>
<td>2 inputs</td>
<td>2 inputs</td>
<td>Universal input 4-20 mA Active/Passive</td>
<td>1 x 4-20 mA active or passive</td>
<td>UN Universal</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>Standard</td>
<td>2 inputs</td>
<td>2 inputs</td>
<td>2 inputs</td>
<td>Universal input 4-20 mA Passive</td>
<td>1 x 0-10 V + 1 switch SPDT</td>
<td>DC 24/48 Vdc</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>1 x 4-20 mA active or passive + 1 switch SPDT</td>
<td>UN Universal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>1 x 4-20 mA active or passive + 2 contacts (2 poles) NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>1 x 4-20 mA active or passive + 2 contacts (2 poles) NC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M4</td>
<td>1 x 0-10 V + 1 switch SPDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M5</td>
<td>1 x 0-10 V + 2 contacts (2 poles) NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6</td>
<td>1 x 0-10 V + 2 contacts (2 poles) NC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>1 or 2 inputs (code U0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>Analog active or passive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Group back power supply connector
II. Installation

2.1 General

ATEX/IECEEx:
If the equipment is to be used in an intrinsically safe combination, the installation must comply with standard EN/CEI 60079-14

SIL:
Supplementary conditions when using the UI in a safety instrumented function system (SIF):
The user should determine the SIL level according to the type of safety-related system (continuous or intermittent use). In accordance with standard EN 61508, the UI must be regularly tested, with scheduled maintenance.

The electrical signal flowing through the UI must be monitored in order to detect any safety system failure, indicated by the status signal and the 4-20 mA loop.

The 4-20 mA analog output de-energized position must activate the safety function or activate an alarm to inform the operator. For this, the UI must be configured for an analog output de-energized position <3.5 mA. This is done using the ProgressXmanager (sensor fault management – analog output – de-energized value) software or the BlueSet console.

The trip amplifier de-energized positions must be configured in the rest status if they are used for safety monitoring. This is done using the ProgressXmanager software or the BlueSet console (sensor fault management – Relays – Rest).

If the UI is used for a safety function, the stated failure rates are guaranteed for the following period:
The UI life cycle: 10 years.

If it is used in a SIL safety loop, the UI configuration must be protected by a password.
2.2 Mounting

Installation and removable of back power supply connectors

screw connector for back power supply connector
Optional ref. ACCDIVUI-003 (connection on the left)

screw connector for back power supply connector
Optional ref. ACCDIVUI-002 (connection on the right)

back group power supply connector
optional réf. ACCDIVUI-001

eexample of rear connector plugging
The units are designed to be mounted on a DIN rail (profile EN50022) and may be mounted horizontally or vertically. Do not block the air vents. The connectors may be removed using a screwdriver, as shown below.

**Mounting and dismounting the UI on the DIN rail***

**Mounting**

1. Clip the UI on the DIN rail

**Dismounting**

1. Insert a screwdriver in the notch provided, to remove the UI upwards

*mounting and dismounting are identical with the back power supply connector

**Mounting and dismounting the BlueSet**

**Mounting**

1. Position the BlueSet in the housing provided
2. Press the BlueSet into the front panel of the UI

**Dismounting**

1. Push the BlueSet upwards
2. Detach the BlueSet from the front panel of the UI
2.3 Installation location

The equipment must be installed in a non-explosive atmosphere, in a clean environment, free of condensation and corrosive or conductive dust.

For the ATEX/IECEx model:
Overvoltage category: II or III
Pollution factor: 2
Intrinsic safety remains assured within the operating temperature range specified in 1.4. However, the life cycle of the electronic hardware is reduced when its utilization temperature rises (approximately by half every 10°C). You should therefore install the equipment in suitably ventilated equipment rooms, avoid the proximity of elements that may heat the equipment by radiation or which are likely to generate electromagnetic radiation greater than 10V/m.

2.4 Electrical connection

Electrical connections must be made when the equipment is DE-ENERGIZED, using wires with a maximum section of 2.5 mm².

For the ATEX/IECEx model:
The USB link is galvanically isolated from I.S. terminals, so that cables from dangerous zones can be left connected while the UI is being configured. This operation is only possible for hardware installed OUTSIDE OF A DANGEROUS ZONE.
The intrinsic safety terminals must be connected only to hardware that is I.S. or compliant of section 5.7 in standard EN/CEI 60079-11.
In addition, the hardware/connecting cable combinations must be compatible in terms of intrinsic safety, as defined in EN/CEI 60079-25.

2.5 Cable routing

The nature and routing of the cables between the potentially explosive zone (I.S. cables) must meet the requirements defined in sections 6.1, 6.2.1 and 6.3 of standard EN/CEI 60079-11.

For the ATEX/IECEx model:
Full precautions must be taken to prevent electromagnetic disturbance with other cables that may generate dangerous voltages or currents. I.S. cables must be secured in order to prevent accidental contact with other cables if any cable is pulled off the terminal strip.
III. Operation

3.1 Internal operation principle

The UI is managed by two micro-controllers that are supporting the embedded program and all the setup parameters in their internal flash (backup) memory.

Example for an UITAX-1UN-1-M-UN000
3.2 Input processing

3.2.1 Input values

- Current received from 4-20 mA measurement transmitters
  The UI can be connected with either passive or active transmitters (2 or 3/4 wires).
  In the case of a passive transmitter, the transmitter is powered by the UI (only valid for UI models that have a transmitter power supply).

- Current mA
  This input operates as a milliammeter. Consult the « sensor faults » and « special functions » sections for an explanation of the differences between « current » and « transmitter » inputs.

- Voltage 100 mV
  This input operates as a millivoltmeter, with a very high input impedance (>15 MΩ).

- Voltage 10 Vdc
  This input operates as a voltmeter with an input impedance of 1 MΩ.

- Temperature by thermocouple:
  Input that supports all the usual types of thermocouple sensors.
  The user may opt for cold junction compensation inside the UI or be compensate using an external circuit.

- Temperature platinum resistor probe (RTD100)
  Value from resistor probe wired with two, three or four wires, with line impedance compensation.
  Measurement current is 500 μA.

- Position by potentiometer sensor
  Measures the ratio (0 to 100%) between the voltage available on the cursor and the power supply voltage from the potentiometer sensor (supplied by the UI).

3.2.2 Input range

This is the part of the input scale that corresponds to an analog output variation from 4 mA (minimum) to 20 mA (maximum). When the input value is outside the range, the analog output goes either to its maximum value, or to its minimum value.

3.2.3 Special functions related to input sensors

Specific processing can be applied to certain sensors:

- 4-20 mA transmitter - extract square root: input value E is transformed into E’ using the formula E’ = 4+4√(E-4)
  This quadratic transformation is only applicable to the 4-20 mA transmitter input and not to the 0-20mA current input! (this function is generally used for rate transmitters operating by differential pressure measurement: Q = k√Δp)
Platinum probe with two wires – line resistance: this value is subtracted from the measured resistance of the platinum resistor probe (RTD100) between its two connection points. The ProgressXmanager configuration software and the BlueSet console allow the line resistance value to be either entered or measured.

Potentiometer – « dark zone »:
The measured value (in %) can be corrected to take into account the real cursor movement. The configuration software or the BlueSet allow the two potentiometer « dark zones » to be either entered or measured. After correction, the input value will vary between 0 and 100% when the signal fluctuates between the two « dark zones ».

Temperature by thermocouple sensor - internal cold junction compensation:
When the value is measured with internal cold junction compensation, the UI corrects the voltage output by the thermocouple, to take into account the temperature of its connections on the UI terminal strip (cold junction), to obtain the hot weld temperature.

### 3.2.4 Analog-digital conversion - Input stage

The microcontroller connected to the ADC receives the input signal by digital value, which is provided by a DeltaSigma type ADC, with 19-bit resolution. Analog-digital conversion time is around 150 ms. Before conversion, all the inputs are formatted, and are then multiplexed and amplified, depending on their origin:

- 20 mA or 4-20 mA current: the signal passes through 18 Ω shunt.
- 100 mV voltage: the signal is injected directly onto the multiplexer.
- 10 V voltage: the signal is divided through a resistor bridge.
- Temperature by platinum resistor probe (RTD100): a constant current of 500 μA is injected onto the resistance to be measured. Depending on the wiring (2, 3 or 4 wires), the voltages across the resistor terminals are processed successively and the impact of the line resistances is eliminated by computing.
- Temperature by thermocouple probe: The voltage output by the thermocouple is applied directly to the multiplexer input. When selected « internal », the cold junction compensation is computed by measuring the temperature of the connection points, using a platinum resistor probe.
- Position by potentiometer sensor:
The voltages from the power supply and potentiometer cursor are measured alternately, using the same process as for the 100 mV input. The cursor position is determined by computing, using these two signal values.
3.2.5 Physical value represented

This is the value of the physical parameter represented by the input value (e.g. sensor 0-100mV/0-50bar, an input value of 50 mV represents a physical value of 25 bar).
This is configured by defining physical values corresponding to the minimum and maximum parameter values. Caution: it’s the physical value that is used to configure the threshold setpoints. For temperature inputs, the physical value represented cannot be configured.

3.3 Output signal processing

3.3.1 Output values

Depending on the options selected (consult the commercial references table to find the output combinations possible), the UI can manage:

- 1 or 2 threshold monitoring relays on the input value.
- a 4-20 mA or 0/10 V analog output

The output can be configured to be directly or inversely proportional. For example, a 4-20 mA output can be inversely proportional, so that the maximum scale value corresponds to an output of 4 mA and the minimum scale value corresponds to an output of 20 mA.

Nota: in the case of the configuration of the 0-10V output with blueSet, it is preferable to start configuring the default substitute values before the range limits in order to avoid possible error messages when imputing them.
3.3.2 Analog-Digital conversion. Output phase
The microcontroller uses the measured input value and the configuration parameters to compute the analog output value. It then generates a signal, the duty factor of which is a function of the required analog value. After isolation through optocouplers, a voltage-current converter converts the mean value of this signal into a current that is injected onto the 4-20 mA analog output.

3.3.3 Monitoring trip threshold
The threshold data are processed (value, hysteresis and delay) by the microcontroller, which also controls the corresponding relays.
The operating way of the relays, when a threshold value is exceeded, is configured in the configuration setup.
The exceeding of a threshold value is indicated by an orange LED on the front panel.

3.3.4 Operation of alarm threshold values
Each alarm threshold is defined by four parameters:
The threshold: this is the value for which the measured physical value is compared
Hysteresis (fig. 1)*:
Hysteresis is expressed as a % of the input range, depending on the physical values represented.
In practice, hysteresis prevents repeated relay status changes when an input value is fluctuating around the setpoint value.
Delay: Expressed in ms, this is the minimum time for which a threshold value must be exceeded (rising or falling) for the relay to be activated (or deactivated).
In practice, the timer allows short fluctuations of the input value to be ignored, but it delays the relay reaction to the exceeding of a threshold value.
Note: The threshold value statuses are indicated on the front panel: a LED lit up indicates that the corresponding threshold value is exceeded.

Cutout
3.3.5 Output simulation

When the UI is connected to a PC, the configuration software or the Blue Set console:
- controls the power supply to the threshold relays and status relays: cutout or energized
- imposes a current value on the analog outputs.
Caution: This operating mode is displayed by the LED in front panel. See LED operation chapter.

3.4 Power supply, galvanic isolation

The UI power supply uses the switch mode type with FLYBACK topology. Operation is regulated by a specific circuit, working at a frequency of 50 kHz, which gives an excellent EMC performance. The transformer used in the power supply provides galvanic isolation between three potentials:
- the power supply network potential.
- the input stages potentiometer (including the passive transmitters power supply) to which the microcontroller is also connected.
- the output stages potential: analog output and US

3.5 Operation in the event of a fault

An input sensor fault is detected in the following cases:
- 4-20 mA transmitter: input signal outside minimum or maximum values, according to recommendation NAMUR NE43.
UI Configurable converter – Trip amplifier

- temperature by platinum resistor probe: one of the connecting wires broken.
- temperature by thermocouple: sensor broken or internal cold junction compensation probe broken.
- position by potentiometer sensor: one of the connecting wires broken.
- Voltage and current inputs (100 mV, 10V, 20 mA): input signal outside scale range.

If a sensor fault occurs, depending on the UI setup, it can:

- Treat the fault:
  - By forcing the status of one or more threshold. In this case, the sensor fault is indicated by the flashing of the corresponding LED on the UI front panel.
  - By forcing the current value on the 4-20 mA analog output (default value).
  - The proposed values are 3.5 mA or 21.5 mA. If the SIL function is active, the loop current must be ≤ 3.5 mA.
- Ignore the fault: in this case, the output value goes to the minimum or maximum scale value (depending on the type of failure identified!).
  - In the case of a sensor failure, the NO and NC status relays are activated, and also the corresponding red LED OUT OVL.
  - In the case of an input or output fault, the UI indicates its status by specific LED flashing on the front panel (see section 5.1).

IV. Configuration

4.1 General

The UI is configured either:

- **Using the ProgressX Manager software** (type of input, units, scale, value represented, square root extraction, SIL function, fault relay statuses, mode, value, hysteresis and alarm relay time, output simulation, output current, 20-point linearization), by connecting the UI to a PC. Data is transferred to the UI through a standard USB link (the USB port is under the openable and detachable flap on the front panel). The PC manages the dialog through optocouplers and a specific interface circuit that adapts the logic levels.
- Or using **BlueSet backlight removable console** (same as with ProgressXManager except 20-point linearization) navigation, with a control joystick.

The BlueSet console can also be used to save a standard configuration, it can be duplicated in other instruments of the same type.

Note: the output simulation function are not available when the UI is connected using USB only (without its main power supply).

4.2 Configuration using the PC: ProgressXManager

**ProgressXManager** is the configuration and running software for units of the ProgressX range, from a PC.

The configuration allows the following to be read:
- the value of the physical parameter measured.
- any sensor fault.
- threshold statuses.
the value of the analog output current.

All the configuration parameters are saved in the UI ROM. In addition, access to UI setup changing can be protected by a password. The password is also saved in ROM.

The PC is connected to the UI using the USB type A cable x micro USB type B, and the operation doesn’t need a specific driver.

The software was developed under a Windows 7 environment. It is user friendly and simple to use. ProgressXmanager is a free download from the site www.georgin.com

Recommended minimum configuration: Windows 7 and 1 GHz processor / 1 GB of RAM

4.3 Configuration using the BlueSet removable display

4.2.1 Main menu

When the BlueSet is connected to the UI for the first time, the edit and configuration entry menu is not available and neither is the password menu.

When the BlueSet is connected to the UI and a configuration (UI, BlueSet memory or default) is loaded, the configuration can be edited:
4.2.2 Chap. 1A - Display functions

Used to browse through the « zoom » display functions for the process value, current or input status

Function available for 2-channel units: Transition to display of channel 2 process values, when the screen is on channel 1 and vice-versa

To obtain the configuration menu

Reverses the BlueSet console programming display, if the user wishes to use the unit reversed (e.g. for wiring problems)

4.2.3 Chap. 1B - Loading the UI configuration

BlueSet recovers the UI converter configuration and makes it available for editing. This operation is necessary in order to be able to edit the UI configuration.

Get cfg. From...

initial loading (RAM empty) if configuration present in RAM

Operation canceled !

Discard actual channel X settings ?

Continue

Channel X cfg. Of UI loaded

= Return
4.2.4 Chap. 1C - Loading the BlueSet configuration
BlueSet recovers its internal (backup) configuration and makes it available for editing.

This operation is necessary in order to send it to the UI converter or to edit it. When this operation is completed, the configuration can be edited and transferred into the BlueSet RAM or the UI RAM.

Get cfg. From...

4.2.5 Chap. 1D - Loading the default configuration
BlueSet recovers the default (factory) configuration and makes it available for editing.
This operation is necessary in order to send it to the UI converter or to edit it. When this operation is completed, the configuration can be edited and transferred into the BlueSet RAM or the UI RAM.

Get cfg. From...

4.1.6 Chap. 2A - The UI channel 2 menu
The UI is available in the 2-channel version. In this case, the channel 2 menu is available and its structure is identical to that of channel 1)
4.2.7 Chap. 2B - UI data

This menu is used to obtain specific data to the UI converter (complete reference, serial N°, embedded software version)

- Channel 1
- Channel 2
- UI infos
- About
- Exit

- UITA-1UN
- 1M1-0707
- (831961)
- v0.68.1.05
- UI converter complete reference
- UI converter serial number
- UI converter embedded software version

4.2.8 Chap. 2C - BlueSet data

This menu is used to obtain specific data to the BlueSet programming console (complete reference, serial N°, embedded software version)

- Channel 1
- Channel 2
- UI infos
- About
- Exit

- BlueSet
- (84E81247)
- v0.05
- BlueSet programming console complete reference
- BlueSet programming console serial number
- BlueSet programming console embedded software version

4.2.9 Chap. 3A - Transferring a configuration into the UI:

When the configuration has been edited, it has to be transferred into the UI converter, to be applied and used.

Channel X ....

- Edit cfg.
- Send cfg. to UI
- Save cfg. to BlueSet
- Get cfg. From...
- Password
- Simulation
- Return → Exit

- Operation canceled!
- = Return

- Overwrite channel X cfg. of UI?
- Cancel
- Continue

- Channel X settings sent to UI
- = Return
4.2.10 Chap. 3B - Transferring a configuration into the BlueSet ROM

When the configuration has been edited, it can also be saved in the BlueSet programming console ROM, that the same configuration can also be transferred into other UI converters, of the same reference, in the future.

Channel X ...

4.2.11 Chap. 3C - Password

The UI converter has a SIL 2 capability. When the UI is used in SIL mode (chap 4B), it must be locked by a password. The password menu is used to define and activate the password, and also to delete it. A password can be defined and activated, even if the SIL is not required.
4.2.12 Chap. 4A - Tag changing
The UI converter can be tagged using a string of 15 characters:

EditCfg...

Tag
SIL2
Input
Fault Management
Output
Return ←
→ Exit←

Confirm new Tag?

YES
NO

Delete a character
Confirm the tag

X

Tag:
TT 2355A****
A B C D E F
G H J K L
...
: _ ← X ←

→ Exit←

If the password wasn’t active, then it must be entered. The menu refers directly to chap. 3C
Some functions in the configuration become unavailable

4.2.13 Chap. 4B - SIL2 operating mode
The UI converter has a SIL 2 capability. In this operating mode, certain functions are automatically activated and mandatory, such as the password. Conversely, other functions are unavailable, such as setting the 4-20mA output to 21.5mA in the event of a fault.

EditCfg...

Yes
No

Yes
No

Return ←
→ Exit←
4.2.14 Chap. 4C-1 - Configuring the sensor input type
The UI converter has an universal input that can be configured as follows:

**EditCfg…**

<table>
<thead>
<tr>
<th>Tag</th>
<th>SIL2</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Management</td>
<td>Output</td>
<td>Return → Exit ←</td>
</tr>
</tbody>
</table>

**Type**
- Temperature unit [1]
- Aquire range
- Low range
- High range
- Represent. (2)
- Return → Exit ←

**Voltage 0-100mV**
- -10mV to 105mV
- -1V to 10.5V
- -2.5mA to 23mA

**SIL2 Temperature unit (1)**
- Voltage 0-10 V
- -1V to 10.5V

**Input Aquire range**
- Current 2w
- 0-20mA
- Transmitt. 2/3/4w
- 4/20mA

**Fault Management**
- Low range
- Transmitt. 2/3/4w
- 4/20mA

**Output High range**
- Potentiomètre
- 0-100%
- 0 to 100%

**Tag Type Voltage 0-100mV -10mV to 105mV**

**SIL2 Temperature unit (1) Voltage 0-10 V -1V to 10.5V**

**Input Aquire range Current 2w 0-20mA -2.5mA to 23mA**

**Fault Management Low range Transmitt. 2/3/4w 4/20mA 3.5 to 23mA Only available on UITA**

**Output High range Potentiomètre 0-100% 0 to 100%**

Menu available only for certain types of selected inputs. See Chap. 4C-1

**Thermocouple J**
- -210 to 1200 °C
- 1210 to 2162 °F

**Thermocouple K**
- -250 to 1372 °C
- 1372 to 2510 °F

**Thermocouple B**
- 400 to 1820 °C
- 752 to 3308 °F

**Thermocouple S**
- -50 to 1768 °C
- -58 to 3214.4 °F

**Thermocouple T**
- -250 to 400 °C
- -418 to 752 °F

**Thermocouple E**
- -270 to 1000 °C
- -454 to 1832 °F

**Thermocouple N**
- -240 to 1300 °C
- -400 to 2372 °F

**Thermocouple W5**
- -20 to 2320°C
- -4°C to 4208 °F

Values recorded in range Low and High
### 4.2.16 Chap. 4C-3 - Selecting the range minimum and maximum values by manual entry

In this section, the unit range minimum and maximum values must be entered manually.

**EditCfg....**

<table>
<thead>
<tr>
<th>Tag</th>
<th>SIL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
</tr>
<tr>
<td>Fault Management</td>
<td>Output</td>
</tr>
<tr>
<td>Return ↩️</td>
<td>Exit ↛</td>
</tr>
</tbody>
</table>

**Input L.r.:**

- **Type** Temp: unit
- **Aquire range**
  - **Low range**
  - **High range**
- **Represent.**
  - **Return** ↛ Exit ↛

- **Input H.r.:**
  - **+000.0°C**

### 4.2.17 Chap. 4C-4 - Editing the value represented

For certain types of selected input, the physical value represented can be edited.

**EditCfg....**

<table>
<thead>
<tr>
<th>Tag</th>
<th>SIL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
</tr>
<tr>
<td>Fault Management</td>
<td>Output</td>
</tr>
<tr>
<td>Return ↩️</td>
<td>Exit ↛</td>
</tr>
</tbody>
</table>

**Unit**

- **Limit of range editing**
  - **Low range**
  - **High range**
- **Return** ↛ Exit ↛

**User Unit:**

- ** psi, bar, mbar, psi, mm**
- **(other)**
- **Return** ↛ Exit ↛

**Repr. L.r.:**

- **±9.999**
- **±99.99**
- **±999.9**
- **±9999.9**

**Repr. H.r.:**

- **+000.0 bar**

**Editing a character string (1 or 2 characters max)**

- **User Unit:**
  - **E, A, B, C, D, E, F, G, H, J, K, L, ...**
  - **← →**
  - **Return** ↛ Exit ↛
4.2.18 Chap. 4D - Operation in the event of a fault
The UI converter allows output relay statuses and the analog output to be configured for operation in case:

**EditCfg....**

When operating in SIL mode (see Chap.4B) the 4-20mA output must be at the minimum default value <3.6mA. The SIL relay can only be configured in de-energized mode

4.2.19 Chap. 4E - Configuring outputs

**EditCfg.....**
4.2.20 Chap. 5A, 5B, 5C - Output simulation

The UI converter allows modification of its outputs in simulation mode:
If the device is not used, the inverter switches to safety after 10 minutes (fault mode) LED “Run / Def” flashing “SYSTEM FAULT”

Chann. X…
UI Configurable converter – Trip amplifier

IV. Diagnostic and maintenance

5.1. LED operation

- LED lit up steady
- LED out
- LED flashing

**UIXXX powered by its main power supply:**

<table>
<thead>
<tr>
<th>“NORMAL” operation:</th>
<th>Logic: ●</th>
<th>Out-OVL: ○</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
<td>1s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Copy SATURATED (input value outside configured range)</th>
<th>Logic: ●</th>
<th>Out-OVL: ○</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
<td>1s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
<td>1s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Copy 4-20mA OUT OF LOOP:</th>
<th>Logic: ●</th>
<th>Out-OVL: ●</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
<td>1s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Configuration by APPRENTICESHIP in progress:</th>
<th>Logic: ●</th>
<th>Out-OVL: ●</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td></td>
<td>1s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System DEFAULT</th>
<th>Logic: ●</th>
<th>Out-OVL: ●</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05s / 0.05s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Unit "OUT OF CONTROL" theoretically impossible**

<table>
<thead>
<tr>
<th>Logic: ●</th>
<th>Out-OVL: ○ or ● if fault</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit in &quot;RESET&quot; (requested by BlueSet module or by ProgressX manager software and confirmed by operator)</th>
<th>Logic: ●</th>
<th>Out-OVL: ●</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>2s</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SIMULATION copy -> copy OK:**

<table>
<thead>
<tr>
<th>Logic: ●</th>
<th>Out-OVL: ○ or ● if copy fault only</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>2s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SIMULATION default relay -> relay "OFF" (cutout):**

<table>
<thead>
<tr>
<th>Logic: ●</th>
<th>Out-OVL: ●</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>2s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SIMULATION default relay -> relay "ON" (set):**

<table>
<thead>
<tr>
<th>Logic: ●</th>
<th>Out-OVL: ○</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2s</td>
<td>2s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Data TRANSFER USB or BlueSet:**

<table>
<thead>
<tr>
<th>Logic: ●</th>
<th>Out-OVL: ○ or ● if fault</th>
<th>AL1: ○</th>
<th>ON: ●</th>
<th>Run/Del: ●/○</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.2s</td>
<td>0.2s</td>
<td>1s</td>
</tr>
</tbody>
</table>
5.2 Maintenance

Precautions necessary during maintenance: Dismounting must be carried out DE-ENERGIZED. In the event of a suspected fault or a failure, please return the unit to our technical department or agent. These are the only services authorized to conduct inspection or repair work.
“Designed, developed and manufactured in France”

Régulateurs GEORGIN

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