Module and Application Description

Application

This input module is used to connect contacts of the following types:

- 16 single contacts without monitoring.
  Internal power supply of function units.
- 15 single contacts without monitoring.
  Optionally external power supply of function units, providing for electrical isolation.

Features

The module can be plugged into any PROCONTROL station. It is equipped with a standard interface for the PROCONTROL station bus.

The module transfers binary input signals in the form of data telegrams on the PROCONTROL station bus to the PROCONTROL bus system. Before transmission the telegrams are checked and are given parity bits; this allows checking for error—free transmission by the receiving module.

The individual function units of the module do not interfere with each other nor with the station bus.

For each function unit a short—circuit—proof voltage supply is available at the contacts. The supply for all function units is selected with the X100/X101 plug—in jumpers (supply from internal USA/USB voltage or external UX voltage). In the case of external voltage supply the process part is electrically isolated from the processing section.

Responses from the internal monitoring circuits are indicated as disturbance annunciation ST (general disturbance) or SG (module disturbance) on the module front.

PROCONTROL P
Input, Output
Signal Conditioning

Input Module for Binary Signals
16—fold, for Contacts

81EB03—E/R1410

Signal input

For single contacts and internal power supply the 16 contacts are connected to inputs E01 through E16. The contacts are supplied through supply outputs S01 through S16.

For single contacts and external power supply the 15 contacts are connected to inputs E02 through E15. The contacts are supplied from supply outputs S02 through S16.

If power is supplied externally, the supply voltage is connected to inputs UX and ZX of function unit 1; the function unit will then not be available for other purposes.

The inputs are surge—proof up to 60 V DC. Contacts with AC power supply cannot be connected.

Each module input is provided with bounce suppression. The module interprets the first signal change as an effective signal if the signal is present for more than 10 ms.

Signal monitoring

In the case of external power supply the UX voltage is monitored. Any power breakdown trips a disturbance signal, and disturbance light ST at the module front panel lights up; in addition, bit 14 (process channel disturbed) in diagnosis register 246 is set.

In both data telegrams, general disturbance signal SM is set.

Event generation

Normally the input module is cyclically prompted by the PROCONTROL bus system for its measured values. A change of values within the cycle time is treated as an “event”. The input module recognizes the following occurrences as events:

- Change of binary signal (contact actuation).

As soon as an event occurs, the new values are given priority and are transferred to the PROCONTROL bus system.
Signal output to the PROCONTROL bus

Data telegrams from the module are sent to the station bus via the standard interface. Data transfer is serial.

Signal designation

The conditioned and digitized input signals are written into specific registers (see "Data communication..."). The following data are written into the address section of the data telegram:

- System address (possible values 0 ... 3)
- Station address (possible values 1 ... 249)
- Module address (possible values 0 ... 58)
- Register address (possible values 0 ... 1 for signals 246 for diagnostic data 205 for processing time determination)

Data communication with the module

Address formation

All modules of a particular PROCONTROL station have the same system and station addresses.

The address is set automatically as soon as the module is plugged into the associated slot of the PROCONTROL station.

The data words of the input signals and the results of the diagnosis are written into specific registers of the shared memory. The register number also serves as the register address. Each data word has a register permanently assigned to it. The assignment takes place automatically by connecting a process signal to the module’s process connector.

Unused telegrams are not sent. Unused bits in telegrams that are used only partly are always set to "0".

Data readout

To read out the contents of a register, the register address must be known. Table 1 shows address entries together with the contents of the associated registers. Addresses marked "a" vary with the module location.

Simulation

Source simulation

Source simulation of the connected signals is possible using the PPDS/EDS.
### Table 1

Legend:

SM = General disturbance signal, telegram  
En = Contact input  
DA = Data type  
a = Address depending on module location  
* set to 1 on external power supply

### Diagnosis and annunciation functions

#### Disturbance annunciations on the module

Disturbances are indicated by two red LEDs on the module front:

- **Disturbance** ST  
- **Module disturbance** SG

The ST LED indicates all module disturbances and disturbances of data communication with the module.

The SG LED indicates module disturbances only.

#### Disturbance signals to the annunciation system

Disturbance signals issued by the input module are transmitted to the annunciation system or the control diagnosis system (CDS) via the bus.

#### Diagnosis

The processing section checks incoming telegrams, the formation of telegrams to be sent and internal signal processing for faults (self-diagnosis).

In the event of a disturbance the disturbance type is stored in the diagnosis register, and a general disturbance signal is sent to the PROCONTROL system.

On request the module sends a telegram containing the data stored in the diagnosis register (register 246) (see Fig. 2).
### Module operating

**Diagnosis register 246**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Type</th>
<th>CDS annunciations *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0</td>
<td>6600</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>6601</td>
</tr>
<tr>
<td>13</td>
<td>S</td>
<td>6602</td>
</tr>
<tr>
<td>12</td>
<td>S</td>
<td>6603</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td></td>
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<tr>
<td>5</td>
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</tr>
<tr>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>6612</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

- Process channel disturbed
- Processing disturbed
- Checksum error
- Timer defective
- Module restart
- Bus disconnection defective
- Event mode disturbed

### Module not operating

Incorrect firmware PROM
Hardware fault in process section
EEPROM invalid
Initialization of processing active

**Module not addressable via bus**

Module transmitter disconnected by bus control module
Module address not within 0 – 58
Hardware fault in bus interface

D = Dynamic annunciations are cancelled after transmission of diagnosis register contents
S = Static annunciations disappear automatically on deactivation
0 = not used

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Fig. 2: Diagnostic annunciations for 81EB03

*) The control diagnosis system (CDS) provides a description for every annunciation number. Among other data this description contains:
- Information on cause and effect of the disturbance
- Recommendations for its elimination.
**Function diagram**

Connection designations: The module consists of a printed circuit board (see "Mechanical design") with the connectors X21 and X11. Connector X21 contains all process inputs and the outputs for contact supply.

Connector X11 includes the standard station bus interface and the operating voltages for the module.

*For correct module operation in non-redundant stations connector terminal X11/d18 must be connected with ZD (once per subrack).*
Connection diagram

Single contacts without monitoring
Internal power supply of function units (without potential isolation)

Single contacts without monitoring
External power supply of function units (with potential isolation)
Mechanical design

Board size:  6 units, 1 division, 160 mm deep
Connector:  to DIN 41612

1 x for station—bus connection, 48—pin edge—connector, type F (connector X11)
1 x for connection to process, 32—pin edge—connector, type F (connector X21)

Weight:  approx. 0.5 kg

Contact assignments of process connector X21

View of contact side:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>z</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>E01/UX</td>
<td>S01/ZX</td>
</tr>
<tr>
<td>04</td>
<td>E02</td>
<td>S02</td>
</tr>
<tr>
<td>06</td>
<td>E03</td>
<td>S03</td>
</tr>
<tr>
<td>08</td>
<td>E04</td>
<td>S04</td>
</tr>
<tr>
<td>10</td>
<td>E05</td>
<td>S05</td>
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<tr>
<td>12</td>
<td>E06</td>
<td>S06</td>
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<tr>
<td>14</td>
<td>E07</td>
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<tr>
<td>16</td>
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<td>24</td>
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<td>26</td>
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<tr>
<td>28</td>
<td>E14</td>
<td>S14</td>
</tr>
<tr>
<td>30</td>
<td>E15</td>
<td>S15</td>
</tr>
<tr>
<td>32</td>
<td>E16</td>
<td>S16</td>
</tr>
</tbody>
</table>
Side view and module front view

EPROM, programmed, order number: GJR2394042Pxxxx
xxxx = Position number indicating the applicable program version.
Technical data

In addition to the system data, the following values apply:

**Power supply**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>USA/USB and UX 19.5 V ... 30 V, typ. 24 V</td>
</tr>
<tr>
<td>Power consumption, internal power supply USA/USB = 24 V</td>
<td>200 mA + n \cdot 4 mA</td>
</tr>
<tr>
<td>Power consumption, internal power supply USA/USB = 30 V</td>
<td>190 mA + n \cdot 5 mA</td>
</tr>
<tr>
<td>Power consumption, external power supply USA/USB = 24 V</td>
<td>100 mA</td>
</tr>
<tr>
<td>Power consumption, external power supply USA/USB = 30 V</td>
<td>80 mA</td>
</tr>
<tr>
<td>UX = 24 V</td>
<td>100 mA + n \cdot 4 mA</td>
</tr>
<tr>
<td>UX = 30 V</td>
<td>110 mA + n \cdot 5 mA</td>
</tr>
</tbody>
</table>

n = number of closed contacts

**Power dissipation**

4.0 W ... 8.1 W, depending on operating voltage and number of closed contacts

**Potential isolation between process side and bus side with external power supply**

500 V

**Input values**

0 signal 0 ... 3 V

1 signal 11.2 ... 30 V

Input resistance 15 kΩ

Destruction limit > 60 V

**Times**

Processing time 15 ms

Initialization time on voltage connection or plugging—in of the module 1 ... 12 s

**Output values**

Output voltage with internal power supply USA/USB – 3.5 V

Output voltage with external power supply UX – 3.5 V

Output current max. 100 mA

**Noise immunity (of process inputs and outputs)**

ESD acc. to IEC 801/2 8 kV to front panel

EMC acc. to IEC 801/4 1 kV burst

Destruction acc. to IEC 801/5 (Draft) 1 kV against reference potential of the module

**ORDERING DATA**

Type designation: 81EB03–E/R1410 Order number: GJR2394000R1410

Technical data are subject to change without notice!