Application

The input module for analog signals 81 EA11 is used to input standard current and voltage signals in the signal ranges 0...20 mA, 4...20 mA or 0...10 V. In the measuring range 4...20 mA, 2-wire transducers can be supplied.

The module contains the IO-bus system and has 16 measured value inputs. The resolution for the measured values is 12 bits.

Three hardware versions are available.

81 EA11-E/R0100 - for analog signals of 0...20 mA
81 EA11-E/R0200 - for analog signals of 4...20 mA
81 EA11-E/R0300 - for analog signals of 0...10 V

Features

The module can be plugged into every multi-purpose processing station of the PROCONTROL bus system and has a slot requirement of 2 divisions.

It incorporates a standard interface SEA to the IO-bus.

The module receives the analog signals from analog value transmitters installed in the process and transfers the values, in the form of telegrams, via the IO-bus to the PROCONTROL bus system.

The analog transmitters are scanned cyclically by twin-pole CMOS switches, and the signals are digitized by means of a non-integrating A/D converter.

The input module 81 EA11-E/R0200 for analog signals 4...20 mA is suitable for feeding 2-wire transducers.

In connection with the two module versions R0100 and R0200 the measured analog values can directly be cutout again.
Description

Basically, the module consists of three functional blocks:

- Analog/digital conversion of the input signals

- Sequential control of signal acquisition and filing of the digitized measured value in a memory

- Bus adaption with output of the stored measured value when the module is called.

SIGNAL INPUT FROM THE PROCESS

The module is used for acquisition of 16 standard current signals in the range 0...20 mA or 4...20 mA or, alternatively, for acquisition of 16 standard voltage signals 0...10 V.

Current signals of 0...20 mA or 4...20 mA pass through a load resistance of 100 ohms where they are converted to voltage signals in the range of 0...2000 mV and 400...2000 mV, respectively.

With the modules of versions R0100 and R0200, the current signal can be brought out for external use via outputs A11/A12 (FE1) to A161/A162 (FE16). On modules of version R0300, z-diode Z3.9 of the corresponding function units must be bridged.

The voltage signals are supplied via resistors.

The 16 measuring voltages are scanned cyclically by a CMOS multiplexer and transferred in analog form to a non-integrating analog/digital converter. This converter converts the analog value into a digital value of 12-bit word length and files this in a memory.

The module receives the measured values via its two process connectors X3 and X4.

The supply voltage is fed to the module via its bus connector X1. Auxiliary voltages required internally are generated on the module.

The voltage sources for the 2-wire transducers have a current limitation to 40 mA. They are short-circuit-proof and overload-proof.

WIRING OF UNUSED FUNCTIONAL UNITS

In versions R0100 and R0300, all unused function units of the module should be bridged and connected to frame (2) on the process connectors.

If unused function units of version R0200 are not supplied with a current of approximately 4 mA, the disturbance bit in the respective data telegram will be set.

To avoid the initiation of disturbance annunciations, the inputs of the unused function units are to be connected with the transmitter simulation module 81 ES01/R0300 on the connector. This is only possible when the respective input switches S501 to S516 are in position 2.

Connection of version R0200 with transmitter simulation module 81 ES01/R0300:

Note: The transmitter simulation modules should be plugged onto the corresponding contacts of the process connector in place of any wiring. (Operating mode switches S501..S516 in position 2)
DATA OUTPUT TO 10-BUS

Whenever the module is called by its starting address, it transfers the data and specification telegrams of its function units to the 10-bus, beginning with the next transfer cycle. The module additionally transfers the specification telegram pertaining to each data telegram.

Formation of telegrams

Two telegrams are formed for every function unit and transferred to the 10-bus. For this, 32 consecutive addresses are needed on the 10-bus.

DATA TELEGRAM

The data telegram has a length of 16 bits with the contents specified below. It is output under an even-numbered address.

```
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
```

<table>
<thead>
<tr>
<th>0</th>
<th>Measured value 12 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Disturbance bit</td>
</tr>
<tr>
<td>Sign (always 0)</td>
<td>Measuring range (always 00)</td>
</tr>
</tbody>
</table>

The measured value is represented digitally as a percentage of the corresponding measuring range as follows:

```
14 13 12 11 10 9 8 7 6 5 4 3
```

<table>
<thead>
<tr>
<th>0,048.. %</th>
<th>0,097.. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,195.. %</td>
<td>0,390.. %</td>
</tr>
<tr>
<td>0,781.. %</td>
<td>1,562.. %</td>
</tr>
<tr>
<td>3,125 %</td>
<td>6,25 %</td>
</tr>
<tr>
<td>12,5 %</td>
<td>25 %</td>
</tr>
<tr>
<td>100 %</td>
<td></td>
</tr>
</tbody>
</table>

Adding the bits set to logic "1" yields the analog measured variable.

SPECIFICATION TELEGRAM

Details on the type of transmitter as well as the start and end of the set measuring range are additionally output by the module for every data telegram.

The specification telegram is output to the next odd-numbered address of the preceding data telegram.

```
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
```

| Transmitter type | Start of measuring range (always 0) | End of measuring range (always 0) |

Data communication with the module

The module is provided on its front with 2 hex code switches which serve to set the module starting address.

The 3rd hex code switch required for complete addressing is permanently wired on the module to 0. It contains the least significant bits (LSB) of the module address.

The 3rd hex code switch is marked on the module front by figure 0 in white colour.

When the module is called by the bus control module (module address, address of the function unit, specification), it transfers the corresponding telegram to the 10-bus with the next clock cycle.

FORMATION OF ADDRESS

The bus control module transfers address telegrams of 16 bit length to call the individual modules connected to the 10-bus. In the module, every incoming address telegram is compared with its own module address. This comparison takes place in parallel mode.
The address transferred by the bus control module is evaluated as follows:

<table>
<thead>
<tr>
<th>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0 0 P 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
</tr>
</tbody>
</table>

- Module address
- Parity bit: always 000
- Specification (0 or 1)
- Address of function unit

The address transferred by the bus control module is compared with the address set on the module.

The address required by the module for comparison is as follows:

<table>
<thead>
<tr>
<th>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0 0 P 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
</tr>
</tbody>
</table>

- Address switch S2
- Specification (0 or 1)
- Parity bit
- Address of function unit

If bits 5 to 11 of the address telegrams are the same, the module responds and transfers; during the next clock cycle, the data telegram of the addressed function unit to the IO-bus.

The measured value memories of the individual function units are addressed directly by bits 1 to 4.

The 0 address bit is the specification bit. Depending on the state of the specification bit, either a specification telegram or a data telegram is transferred:

- 0 = data telegram
- 1 = specification telegram

Disturbances can be signalled by the module in the following three ways:

- Visual disturbance annunciation on the module by the light-emitting diode ST visible on the module front which emits a steady light in the event of a disturbance.
- Annunciation via bus line SME of the IO-bus.
- Annunciation by setting of disturbance bit SB in the data telegram of the corresponding function unit.

ANNUNCIATION ON THE MODULE

The red light-emitting diode ST is connected with bus line SME. It emits a steady light when a disturbance annunciation is transferred via bus line SME.

ANNUNCIATION TO THE IO-bus

A disturbance annunciation is output in the following cases:

- If the module is not addressed by a valid address telegram within 7 s.
- If one or more of the bus connecting lines are interrupted or disturbed.
- If disturbances occur in the internal sequential cycle, e.g. in the measured value memory allocation.

Annunciation functions

Disturbances in the module, in the process peripherals, and in the communication with the IO-bus are detected and signalled by the module.
- If one or more function units are supplied by the process with values exceeding 125% of the measuring range.

Disturbance bit SB in the corresponding data telegram is set as long as the measured value exceeds this 125% limit. (This applies for versions R0100 and R0200)

- If one or more measuring lines to the process inputs are interrupted. (This applies only to module version R0200)

Disturbance bit SB is set in the corresponding data telegram, and value 0 is output. (This applies only to version R0200)

- If one or more function units have negative input values.

Disturbance bit SB is set in the data telegram, and value 0 is output when the analog input value is \(-2 \text{ mA} +/-0.2 \text{ mA}\) in the case of R0100, \(-2.4 \text{ mA} +/-0.16 \text{ mA}\) in the case of R0200, and \(-1 \text{ V} +/-0.1 \text{ V}\) in the case of R0300.

If the values do not fall below these limits, disturbance bit SB is not set, and only value 0 is output.

Setting of the module

The settings on the module are performed using address switches S1, S2 and S3, configuration switch S4 as well as potentiometers U6 (lower limit value = R129) and U6 (upper limit value = R144).

In the case of version R0200, transmitters with and without voltage supply can be used simultaneously (note switch setting!).

Possible settings of the hex. code address switches:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>adjustable</td>
<td>0</td>
<td>always 0</td>
</tr>
<tr>
<td>0 - F</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

Other settings are not accepted by the module. In this case, the module outputs a disturbance announcement signal SME after 7 s and signals a disturbance via light-emitting diode S1.

The address set on these address switches is the address of the first function unit of the module (module starting address).

It can be read on the front panel.

When the module is used in connection with a bus coupling module R8 QTO2, value 1 must be set on address switch S1.

by setting the first address switch to position "1", the bus coupling module R8 QTO2 is notified that specification telegrams are transferred by the module.

MEANING OF THE CONFIGURATION SWITCH

Configuration switch S4 is used to set the transmitter type in the specification telegram

<table>
<thead>
<tr>
<th>Version</th>
<th>Transmitter type</th>
<th>Switch positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0100</td>
<td>0...20 mA</td>
<td>S4 :1 :2 :3 :4 :5 :6 :7 :8 ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R0200</td>
<td>4...20 mA</td>
<td>S4 :1 :2 :3 :4 :5 :6 :7 :8 ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R0300</td>
<td>0...10 V</td>
<td>S4 :1 :2 :3 :4 :5 :6 :7 :8 ON</td>
</tr>
</tbody>
</table>

SETTING OF ADDRESS

The module starting address is to be set by means of address switches S1 and S2. The address is set with the module withdrawn. The 3rd address switch is permanently wired in the module. The position of switch S3 is marked by 0 imprinted on the module front below the cut-outs for switches S1 and S2.
Contacts S4:6 to S4:8 are not used and can be set as desired.

It is not possible to convert a version only by changing the contacts. To convert a version, it is additionally necessary to re-arrange the resistors in the analog value processing part. Also, the load resistors must be removed or installed, as required.

It is necessary to re-calibrate the module after conversion.

MEANING OF THE CHANGEOVER SWITCHES S501 TO S516

Every function unit of the module is provided with a changeover switch assigned to it, through which the arrangement of the input circuit can be selected.

For feeding 2-wire transducers (version R0200), the switch is to be set to position 2.

Switch position 1 is for separately fed transducers 0...20 mA (version R0100) or 0...10 V (version R0300).

<table>
<thead>
<tr>
<th>Version</th>
<th>Range</th>
<th>Switch positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0100</td>
<td>4...20 mA</td>
<td>S501...S516 :</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FE1...FE16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R0200</td>
<td>4...20 mA with transducer supply</td>
<td>S501...S516 :</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FE1...FE16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4...20 mA w/o transducer supply</td>
<td>S501...S516 :</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FE1...FE16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R0300</td>
<td>0...10 V</td>
<td>S501...S516 :</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FE1...FE16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Switch position S501...S516 is the same for all function units in the modules of versions R0100 and R0300.

Switches S501...S508 (FE1...FE8) are arranged on the lower printed circuit board, switches S509...S516 (FE9...FE16) on the upper board.

The switches on the lower printed circuit board can be set through cut-outs in the upper printed circuit board.

Coupling-out of the function-unit-specific analog value via the analog value outputs A11...A16 is ensured in both switch positions.

With modules of version R0300 (0 V...10 V), coupling-out of the analog values is not possible.

Adjustment and calibration of module

Potentiometers are provided on the module to allow adjustment of the lower limit value, the upper limit value and the 4 mA live zero current (in the case of version R0200) of the analog inputs.

Adjustments are performed on function unit 1 simultaneously for all function units. All other function units of the module are not wired. The adjustments are only valid for the version concerned.

For adjustment, a telegram receiver is required in addition to a telegram transmitter.

If the module is to be converted from version 0100 or 0200 to version 0300, the resistors in the analog value processing part have to be changed, and the module has to be re-calibrated. Furthermore, the load resistors must be removed and the Z diode in the input circuit has to be bridged.

ADJUSTMENT OF THE UPPER AND LOWER LIMIT VALUES

Adjustments are made with the potentiometers for the upper limit value (UG = R144), the lower limit value (UG = R129), and the 4 mA live zero current (R156) in the case of version R0200.

VERSION R0100 (0 mA...20 mA)

Before adjustments are made, the following pre-requisites must be satisfied:
- Contacts S4:1 to S4:5 of the configuration switch and of switches S501 to S516 must be set as required for the version concerned.

- Jumper 1001 removed.

- Jumper 1002 in place.

- Jumper 1003 removed.

**Calibration procedure**

- Set 0 % + 1 LSB -value at measured value input.

- Using potentiometer R129, calibrate to 0 % + 1 LSB of the measuring range.

  **Note:** Negative measured values generate a 0 %-measured value code.

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \]

  or

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 1 \]

  The value alternates between the two indications shown.

- Set 100 % -value at measured value input (≤ 100 %).

- Using potentiometer R144, calibrate to 100 % - 1 LSB of the measuring range.

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \]

  or

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \]

  The value alternates between the two indications shown.

- Perform a zero check.

**VERSION RO200 (4 mA...20 mA)**

Before adjustments are made, the following prerequisites must be satisfied:

- Contacts S3:1 to S3:5 of the configuration switch and of switches S501 to S516 must be set as required for the version.

- At the beginning, Jumper 1001 removed.

- Jumper 1002 removed.

- Jumper 1003 in place.

**Calibration procedure**

- Set 0 % + 1 LSB -value at measured value input.

- Using potentiometer R129, calibrate to 0 % + 1 LSB of the measuring range.

  **Note:** Negative measured value gives a 0 %-measured value code.

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \]

  or

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 1 \]

  The value alternates between the two indications shown.

- Install jumper 1001.

- Set 0 % + 1 LSB-value at measured value input (4.0078 mA).

- Using potentiometer R156, calibrate to 0 % + 1 LSB of the measuring range.

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \]

  or

  \[ 14 \ 13 \ 12 \ 11 \ 10 \ 9 \ 8 \ 7 \ 6 \ 5 \ 4 \ 3 \]

  \[ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 1 \]
The value alternates between the two indications shown:

- Set 100 %-value at measured value input (≤ 100 %).

- Using potentiometer R144, calibrate to 100 % - 1 LSB of the measuring range.

14 13 12 11 10 9 8 7 6 5 4 3

or

14 13 12 11 10 9 8 7 6 5 4 3

The value alternates between the two indications shown:

- Perform a zero check.

VERSION R0300 (0 V...10 V)

Before calibration is made, the following prerequisites must be satisfied:

- Contacts S3:1 to S3:5 of the configuration switch and of switches S501 to S516 must be set as required for the version.

- Jumper 1001 removed.

- Jumper 1002 in place.

- Jumper 1003 removed.

Calibration procedure

- Set 0 % + 1 LSB value at measured value input. (0.0049 V).

- Using potentiometer R129, calibrate to 0 % + 1 LSB of the measuring range.

Note: Negative measured values generate a 0 %-measured value code.
Functional diagram

Module 81 EAl1 consists of two printed circuit boards (see "Mechanical design") which are equipped with four connectors X1, X2, X3 and X4, two address switches S1 and S2, one configuration switch S4, 16 change-over switches SS01...SS16, as well as the potentiometers for the lower and upper measuring range limits.

TERMINAL DESIGNATIONS:

Printed circuit board (1) is fitted with connectors X1 and X3. The operating voltage is supplied through connector X1.

Connector X3 contains the connections for the 8 process inputs E11 to E82 as well as the analog value outputs A11 to A62.

Printed circuit board (2) is equipped with connectors X2 and X4. Connector X4 contains the standard interface SEA, connector X4 contains 8 process inputs E91 to E162 as well as the analog value outputs A91 to A162.

Terminals S for the screen can be connected via a jumper with b32 of connector X1 or connector X2.
Connection diagrams

The connections of module versions R0100 and R0300 are the same.

Connections of module version R0200 in which unused function units are wired via the transmitter simulation module 81 ES01/R0300
Mechanical design

The mechanical design is the same for all module versions.

Board size: 6 U, 2 T, 160 mm deep

Connector: to DIN 41 612

1 x for IO-bus connection
   48-pole, edge connector type F
   (connector X2)

2 x for process connection 32-pole,
   edge connector type F
   (connector X3, X4)

1 x for operating voltage supply
   48-pole, edge connector type F
   (connector X1)

Weight: approx. 0.84 kg

Both printed circuit boards are connected with each other mechanically and electrically.

The exact contact allocation of the individual connectors can be seen from the operating principles description "Connectors of the IO-bus modules" GKWE 705 321 or from the functional diagram of the module.
POSITIONS OF THE ADJUSTABLE COMPONENTS AND VISUAL DISPLAYS ON THE FRONT

The front panels of module versions RO100, RO200 and RO300 as well as the functions of the components shown are the same.

---

Light-emitting diode for disturbance annunciation ST

<table>
<thead>
<tr>
<th>IO-bus address</th>
<th>Significance</th>
<th>Hexadecimal</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>100</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>10</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Upper limit of measuring range (R144) Lower limit of measuring range (R129)

Switch S3 is permanently wired to 0 and shown as imprint on the module front.
POSITIONS OF THE ADJUSTABLE COMPONENTS ON PRINTED CIRCUIT BOARD (1)

The printed circuit board contains the two potentiometers for adjusting limit values OG (R144) and UG (R129), the potentiometer R156 which serves to increase the lower limit value to 4 mA on module version R0200, as well as the five soldering jumpers 1001 to 1005 which are installed in the factory in their basic positions as required for the respective module versions.

Switches S501 to S508 are provided for changing over the input circuits.

With the aid of plug-in jumpers X11...X81, the negative input (EXIT) of every function unit can be connected to frame or potential isolated in the case of versions R0100 and R0300.

On module version R0200, jumpers X11...X81 must be in place.

Position of soldering jumpers on the printed circuit board:

<table>
<thead>
<tr>
<th>Version:</th>
<th>R0100</th>
<th>R0200</th>
<th>R0300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper: 1001</td>
<td>removed</td>
<td>in place</td>
<td>removed</td>
</tr>
<tr>
<td>1002</td>
<td>in place</td>
<td>removed</td>
<td>in place</td>
</tr>
<tr>
<td>1003</td>
<td>removed</td>
<td>in place</td>
<td>removed</td>
</tr>
<tr>
<td>1004</td>
<td>removed</td>
<td>removed</td>
<td>removed</td>
</tr>
<tr>
<td>1005</td>
<td>removed</td>
<td>removed</td>
<td>removed</td>
</tr>
</tbody>
</table>

Plug-in jumper: X102

X11...X81 | removed | in place | removed |
POSITIONS OF THE ADJUSTABLE COMPONENTS ON PRINTED CIRCUIT BOARD (2)

This printed circuit board incorporates address switches S1 and S2, configuration switch S4 as well as switches S509 to S16.

With the aid of plug-in jumpers X101...X801, the negative input (EXX2) of every function unit can be connected to frame or potential isolated in the case of versions RO100 and RO300.

On module version RO200, jumpers X101...X108 must be in place.

Position of the plug-in jumpers on the printed circuit board:

<table>
<thead>
<tr>
<th>Version:</th>
<th>RO100</th>
<th>RO200</th>
<th>RO300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper: 51-52</td>
<td>in place</td>
<td>in place</td>
<td>in place</td>
</tr>
<tr>
<td>53-54</td>
<td>in place</td>
<td>in place</td>
<td>in place</td>
</tr>
<tr>
<td>55-56</td>
<td>removed</td>
<td>removed</td>
<td>removed</td>
</tr>
<tr>
<td>57-58</td>
<td>in place</td>
<td>in place</td>
<td>in place</td>
</tr>
<tr>
<td>2004</td>
<td>removed</td>
<td>removed</td>
<td>removed</td>
</tr>
<tr>
<td>2005</td>
<td>removed</td>
<td>removed</td>
<td>removed</td>
</tr>
<tr>
<td>X101...X108</td>
<td>removed</td>
<td>in place</td>
<td>removed</td>
</tr>
</tbody>
</table>
Technical data

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

MODULE VERSION:  
RO100  |  RO200  |  RO300

POWER SUPPLY

Rated voltage:  
16.8...33 V  |  16.8...33 V  |  16.8...33 V

Operating voltage US:  
24 V  |  24 V  |  24 V

Current consumption \( I_{\text{typ}} \):  
150 mA  |  150 mA  |  150 mA

Power dissipation \( P_{\text{typ}} \):  
3.6 W  |  3.6 W  |  3.6 W

The values specified for \( P_{\text{typ}} \) and \( I_{\text{typ}} \) apply for unloaded inputs. To obtain an exact value the input loads must be added.

Reference potential 10-bus Z:  
0 V  |  0 V  |  0 V

TRANSFER

Multiplexer:  
twin-pole CMOS-switch

Analog-digital converter:  
non-integrating, step converter

Scanning time of all inputs:  
100\( \mu \)s

Resolution:  
12 bits + sign

INPUTS

Number of function inputs to be connected:

Differential inputs:  
16  |  16  |  16

Input type:

Standard current inputs:  
0 mA...20 mA  |  4 mA...20 mA  |  0 V...10 V

Input designations:  
E11 to E162  |  E11 to E162  |  E11 to E162

INPUT VALUES OF STANDARD CURRENT INPUTS

Nominal range 0 %...100 %:  
0 mA...20 mA  |  4 mA...20 mA  |  -

Maximum measuring range 0 %...200 %:  
0 mA...40 mA  |  4 mA...36 mA  |  -

Load resistance:  
100 Ohm +/- 0.1%  |  100 Ohm +/- 0.1%  |  -

Temperature effect of load:  
20 ppm/K  |  20 ppm/K  |  -
MODULE VERSION:

INPUT VALUES OF STANDARD VOLTAGE INPUTS

<table>
<thead>
<tr>
<th></th>
<th>R0100</th>
<th>R0200</th>
<th>R0300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal range 0 %...100 %:</td>
<td>-</td>
<td>-</td>
<td>0 V...10 V</td>
</tr>
<tr>
<td>max. measuring range within the error limits (0 %...125 %):</td>
<td>-</td>
<td>-</td>
<td>0 V...12.5 V</td>
</tr>
<tr>
<td>Overvoltage not causing destruction:</td>
<td>-</td>
<td>-</td>
<td>45 V</td>
</tr>
</tbody>
</table>

OUTPUTS

| Output designation: | SEA standard interface 10-bus |
| Number of analog value outputs: | 16 | 16 |
| Output designation: | All-A162 | All-A162 | All-162 |

OUTPUT VALUE PER OUTPUT

| Output current: | 0 ... 20 mA | 4 ... 20 mA |
| Output voltage: | - | - |
| maximum load: | 100 Ohm | 100 Ohm |

ERROR SPECIFICATION

| Zero error at 0 °C...70 °C typ.: | 0.08 % | 0.12 % | 0.045 % |
| Zero error at 0 °C...70 °C max.: | 0.3 % | 0.41 % | 0.07 % |
| Linearity error: | 0.1 % | 0.1 % | 0.1 % |
| Effect of temperature max.: | 60 ppm/K | 60 ppm/K | 60 ppm/K |
| Effect of supply voltage variations: | none with 16.8 V...33 V supply voltage |
| Common-mode rejection: | 60 dB |
| Series-mode rejection typ.: | Cut-off frequency 5.6 Hz |
| | Suppression with cut-off frequency f₀ = 3 dB |
| | increase 20 dB per decade f/f₀ |

PERMISSIBLE TEMPERATURE RANGES

| Operating temperature: | 0°C...70°C |
| Storage temperature: | -40°C...85°C | -40°C...85°C | -40°C...85°C |
ORDERING DATA:

1) Complete module:

Type designation: 81 EA11-E/R0100
81 EA11-E/R0200
81 EA11-E/R0300

Order number: GJR2346700R0100
GJR2346700R0200
GJR2346700R0300

2) Transmitter simulation module for terminating unused function units of version R0200:
(smallest packing contains 15 items)

Type designation: 81 ES01 R0300:

Order number: GJR2355800R0300

Technical data are subject to change without notice.