Application, characteristics and technical data have to be taken from the hardware data sheet:

- **560CIG10** 1KGT 150 719

**Operation**

The 560CIG10 is a DIN rail RTU560 consisting of a communication unit (CMU), a multi-I/O module (MIO) and a power supply (PSU) in a metal DIN rail housing.

The essential tasks of the 560CIG10 are:

- Capturing of 8 analog input signals (mA or V signals)
- Capturing of 16 digital input signals
- Output of 8 binary commands (by relay)
- \((1 \text{ out of } n)\) check
- Managing and controlling of the RTU211 I/O modules via the 10 pole Wired-OR-Bus (WRB).
- Reading Process events from the input boards.
- Writing commands to the output boards.
- Communicating with control systems and local MMI systems via the 3 integrated serial line interfaces and the Ethernet 10/100 BaseT LAN interface.
- Managing the time base for the RTU560 station and synchronizing the I/O modules.
- Handling the dialogue between RTU560 and Web-Browser via the Ethernet interface.

**Fig. 1:** Block diagram 560CIG10

To force the IP-Address to a default value at start-up, the “Def. IP-Addr” switch on the front side (see Fig. 16) has to be switched “ON”. The 560CIG10 starts with the factory settings for the Ethernet Interface (see Fig. 2) which are 192.168.0.1 for the IP-address with the network setting 255.255.255.0 for the subnet mask and 192.168.0.20 for the gateway.

**Fig. 2:** Usage of Switch “Def. IP-Addr“
**CPA Interface**

The CPA Interface is available on the RJ45 connector. It can interface RS485 signals. The bus is terminated by a 1 kΩ resistor.

The settings have to be done by the RTUtil560 configuration tool. The signals are used according to Tab. 1.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>2</td>
<td>TA</td>
<td>Data -</td>
</tr>
<tr>
<td>3</td>
<td>TB</td>
<td>Data +</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>Not used</td>
</tr>
</tbody>
</table>

*Tab. 1: CPA Interface RS485 Mode*

**CP1 and CP2 Interface**

The CP1 and CP2 Interfaces USART (universal synchronous/asynchronous receiver/transmitter) are available on the RJ45 connectors. They can interface RS232C signals. On both Interfaces different UART based protocol types can be used.

The signals are used according to Tab. 2.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Input/Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
<td>Input</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
<td>Output</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>Output</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>Input</td>
</tr>
<tr>
<td></td>
<td>Shield</td>
<td>Connected with housing</td>
</tr>
</tbody>
</table>

*Tab. 2: CP1- and CP2 Interface RS232C Mode*
**RTU560**
Connections and Settings DIN Rail RTU 560CIG10

**Ethernet Interface**
The Ethernet Interface is available on a RJ45 connector and supports different functions:

- Webserver-diagnostic with download of configuration files and firmware
- TCP/IP based protocols IEC 60870-5-104, DNP3, ...
- Integrated HMI

The signals are used according to Tab. 3

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Input/Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TD +</td>
<td>Output</td>
</tr>
<tr>
<td>2</td>
<td>TD -</td>
<td>Output</td>
</tr>
<tr>
<td>3</td>
<td>RD +</td>
<td>Input</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>6</td>
<td>RD -</td>
<td>Input</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>Not used</td>
</tr>
<tr>
<td></td>
<td>Shield</td>
<td>Connected with housing</td>
</tr>
</tbody>
</table>

**Main Power Supply (MPS)**
The supply voltage for the 560CIG10 is 24VDC. The connector X4 consists of a 3 pole pluggable screw-terminal 5,08mm (see Tab. 4, Fig. 14 and Fig. 15). The maximum input power is 67 Watt.

<table>
<thead>
<tr>
<th>Pin</th>
<th>DC-IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vin (+)</td>
</tr>
<tr>
<td>2</td>
<td>Vin (-)</td>
</tr>
<tr>
<td>3</td>
<td>Earth</td>
</tr>
</tbody>
</table>

**Tab. 4: 3 Pole Power Connector**

In some cases an external potential isolation for the DC-Input is necessary. This can be done e.g. by a power supply unit 560PSU40/41

**560CIG10 Earthing**
On the strength of safety and EMC protection it is important to make a connection as short as possible to a system earth (may be DIN-rail or mounting plate). An ordinary 1.5mm² multi-core wire (green/yellow) can be used and should not exceed a length of 100 cm (39 inch). Pin X4-3 of the 3 pole DC-In connector is the earth-pin (see Tab. 4). The protection earth must be connected there.

The power supply terminal X4-2 (Vin -) is internal connected with the housing potential by jumper X9 (see Fig. 7 or Fig. 8).

Attention: It is not allowed to pull or to plug the 20 pole ribbon cable during the operation process.
RTU560
Connections and Settings DIN Rail RTU 560CIG10

Signalling

The LED’s of the 560CIG10 are controlled by the RTU560 firmware (except Tx and Rx). For the definition and operation of the LED “ERR” please refer to the release specific function description. The connector embedded LEDs “Tx” and “Rx” are directly connected to the receiver/transmitter of the communication line. The LEDs “Act” and “Lnk” are directly connected to the Ethernet-controller. Tab.5 describes the system LEDs of the 560CIG10.

<table>
<thead>
<tr>
<th>LED</th>
<th>Colour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERR</td>
<td>(1x) red</td>
<td>Warning / Error</td>
</tr>
<tr>
<td>Tx</td>
<td>(4x) green</td>
<td>Transmit data (CP1, 2, A)</td>
</tr>
<tr>
<td>Rx</td>
<td>(4x) green</td>
<td>Receive data (CP1, 2, A)</td>
</tr>
<tr>
<td>Lnk</td>
<td>(2x) yellow</td>
<td>Ethernet Link</td>
</tr>
<tr>
<td>Act</td>
<td>(2x) green</td>
<td>Ethernet Activity</td>
</tr>
<tr>
<td>IO-Bus</td>
<td>(1x) green</td>
<td>Serial Peripheral Bus</td>
</tr>
<tr>
<td>PF</td>
<td>(1x) red</td>
<td>One of the output voltage is fail</td>
</tr>
<tr>
<td>RUN</td>
<td>(1x) green</td>
<td>The CMU is reachable via Ethernet</td>
</tr>
<tr>
<td>RUN</td>
<td>(1x) yellow</td>
<td>The firmware is running but not reachable via Ethernet</td>
</tr>
<tr>
<td>RUN</td>
<td>OFF</td>
<td>No firmware is running</td>
</tr>
<tr>
<td>Def. IP- Addr</td>
<td>(1x) red</td>
<td>The default IP-address is active</td>
</tr>
<tr>
<td>BI</td>
<td>(16x) yellow</td>
<td>Signals the binary Input-Units status</td>
</tr>
<tr>
<td>BO</td>
<td>(8x) yellow</td>
<td>Signals the binary Out-Units status</td>
</tr>
</tbody>
</table>

Tab. 5: Meaning of LEDs

Firmware Version

The current firmware version will be delivered on a CompactFlash™ memory card. A new firmware file can be loaded via the Web diagnostic tool into the removable CompactFlash™ memory card.

The 560CIG10 will be delivered without a CompactFlash™ memory card.

For changing the CompactFlash™ memory card the right side of the housing has to be opened (see Fig. 16).

⚠️ For changing the CompactFlash™ card follow the instructions below:

1. Disconnect the power-supply of the 560CIG10.
2. Take care of ESD protection before opening the 560CIG10 housing.
3. Open the 4 screws on the right side of the housing (see Fig. 16).
4. Pull or plug only the CF-card. Don’t touch other components.
5. Close the housing before the power-supply is connected to the 560CIG10.
**Input / Output**

The multi-I/O-part of the 560CIG10 board scans analog and digital signals and prepares them for the RTU560 on the basis of predefined parameters. The board is available in two versions:

- R0001: 24 ... 60 V DC process voltage
- R0002: 110 / 125 V DC process voltage

In general the 560CIG10 board can process the following signals:

- Max. 8 analog inputs
- Max. 16 binary inputs
- Max. 8 binary outputs

In addition the 560CIG10 is equipped with an (1 out of n) check circuit for command output.

**Processing functions**

**Analog Input**

Each analog input can process the following functions (see Fig. 15 and 17):

- Zero point monitoring
- Switching recognition
- Smoothing
- Threshold value monitoring of absolute value or with accumulation and periodic background transmission

**Input signal conversion**

The 560CIG10 board transmits the measured value with 12-bit plus sign. The scaling for the telecontrol transmission protocol presentation is done by the CMU.

**Binary Input**

The 16 binary inputs of the 560CIG10 are grouped into two groups of 8 inputs each (see Fig. 15 and 17). Each group has its own common return.

The 560CIG10 board scans all 16 binary inputs every millisecond and prepares them for the RTU560 on the basis of predefined parameters.

The board 560CIG10 supports:

- 16 single indications with time stamp
- 8 double indications with time stamp
- 2 digital measured values with 8-bit
- 1 digital measured value with 16-bit
- 16 pulse counters channel 1 up to 16 kHz count events, all others up to 120 Hz count events (on the lower eight input channels)

**Binary Output**

The 560CIG10 has 8 binary output channels equipped with relays. The outputs are isolated from the electronic part by means of optocoupler. Each output channel has its own return.

The 560CIG10 can process the following commands:

- Commands with 1 or 2 pole connection without (1 out of n) check
- Commands with 1 or 2 pole connection with (1 out of n) check
- Regulation commands (1 and 2 pole)
- Setpoint commands (8 bit)
- Bit string output (1, 2 or 8 bit)

**(1 out of n) check circuit**

Two transistor outputs are available to connect two external relays X1-4 and X1-5 for the integrated (1 out of n) check circuit of the 560CIG10.

The check circuit can be used also for additional output boards. The resistor measurement range for the integrated (1 out of n) check circuit can be configured between 100Ω and 10kΩ in steps of 10Ω by the RTUtil560 configuration tool.
Settings

Analog Input

Input Signal Range

The voltage/current measuring range can be independently configured for each of the channels by switches (DIP-Switches) S1 and S2 (see Fig. 14).

![Diagram of Analog Input Measurement Range Configuration]

The measuring range for the channels 1 to 5 (X3-1 to X3-10) can be configured with S1. The measuring range for the channels 6 to 8 (X7-7 to X7-2) can be configured with S2.

The configuration of the switches S1 and S2 have to be assumed into the RTUill560 configuration tool.

The switch configuration for the different measuring ranges is shown in Tab. 6.

The default configuration of the Analog Inputs is set to measuring voltages!

<table>
<thead>
<tr>
<th>CH</th>
<th>S1-1</th>
<th>S1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>2V, 20V (bipolar)</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>2mA, 5mA, 10mA (bipolar)</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>20mA, 40mA (bipolar)</td>
</tr>
</tbody>
</table>

Tab. 6: Analog Input Measurement Range Configuration
Configuring the line frequency

The information about the line frequency is requested for the A/D conversion. The configured line frequency is valid for all 8 channels and will be configured by a parameter at the RTUtil560 configuration tool.

<table>
<thead>
<tr>
<th>Line frequency [Hz]</th>
<th>Conversion time per input [ms]</th>
<th>Complete scan cycle [ms]</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>50.0</td>
<td>400</td>
</tr>
<tr>
<td>50</td>
<td>60.0</td>
<td>480</td>
</tr>
<tr>
<td>16.6</td>
<td>180.0</td>
<td>1440</td>
</tr>
</tbody>
</table>

Tab. 7: Configuration of line frequency

In addition max. two channels can operate at the fast-scan mode (the other channels will be deactivated at the fast-scan mode). For the fast-scan mode following values are valid:

<table>
<thead>
<tr>
<th>Line frequency [Hz]</th>
<th>Conversion time per input [ms]</th>
<th>Complete scan cycle [ms]</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>50.0</td>
<td>100</td>
</tr>
<tr>
<td>50</td>
<td>50.0</td>
<td>100</td>
</tr>
<tr>
<td>16.6</td>
<td>100.0</td>
<td>200</td>
</tr>
</tbody>
</table>

Tab. 8: Configuration of line frequency at fast-scan mode

Factory calibration

On-site calibration of the A/D converter is not necessary.

The 560CIG10 is calibrated for all channels and measuring ranges at the factory. During the calibration the firmware calculates a rating value per measuring range and channel and stores this rating value in an EEPROM.

Binary Input

The 560CIG10 has no switch or jumper for the binary input part.

Binary Output

The output solid state relay circuit (24 VDC) is monitored during the output process.

Connections

Power Supply

The power supply for the 560CIG10 R0001 (see Fig. 6) and for the 560CIG10 R0002 (see Fig. 8) will be connected to screw terminal X4-1 (+) and X4-2 (-) and will be relayed internal to the power supply unit board.

The protection earth must be connected to screw terminal 4-3 (see Fig. 14) for both 560CIG10 revisions.

The power supply terminal X4-2 (-) is internal connected with the housing potential by jumper X9 (see Fig. 7 and Fig. 8).

In rare cases (e.g. when grounding signal zero to Vin (+)) the jumper X9 has to be removed. Opening of the housing is done in the same way as for changing the CF card but the opposite side has to be open.

![Fig. 4: Placement of X9 (topside PCB inside housing)]
Binary Output

The process signals will be connected to screw terminal \( X_2 \) (channel 1 to 8), see Fig. 14.

Figure 10 shows the one pole connection.

For a 2 pole connection (see Fig. 11 and Fig. 12) two internal relays of the 560CIG10 are used (e.g. C1 and C3 for a double command output, and C2 and C4).

(1 out of n) check circuit

For the (1 out of n) check two external relays are used, which will be connected to \( X_6-1 \) (GO relay R9, optional) and \( X_6-2 \) (measurement relay R10).

The external relays are not scope of delivery!

ABB recommend following relay:
Finder, miniature-relay
(55.32.9.024.0090, 24VDC, 2W, 10A)

The measuring relays are switched on and the configured delay time has to be expire before the actual measuring starts.

Process Voltage \((U_P)\)

The process voltage (see Fig. 14) will be connected to screw terminal \( X_1-3 \) (+) and \( X_1-2 \) (–). The function earth can be connected to screw terminal \( X_1-1 \) (PE).

Main Supply Supervision (MSS)

By using an AC-power supply unit (e.g. 23VG23) with integrated battery load control a MSS is necessary. The MSS shows the status of the battery, cabling and fuse protection.

![Fig. 5: Main Supply Supervision (MMS)](image)

ALARM – Output (ALR)

If an error condition occurs in the RTU the ALR-output will be switched. RTU error conditions have to be taken from the function description of the RTU560 releases.

The alarm output is a normal close contact which will be opened if alarm status is off.

![Fig. 6: ALARM-Output](image)

Signaling

Analog Input

The analog input part of the 560CIG10 has no external signaling.

Binary Input

16 yellow LED’s are mounted on the front side of the 560CIG10 (see Fig. 16), showing the actual state of the binary inputs.

Binary Output

8 yellow LED’s are mounted on the front side of the 560CIG10 (see Fig. 16), showing the actual state of the binary output channels.
Fig. 7: Power Supply 560CIG10 R0001

Fig. 8: Power Supply 560CIG10 R0002
**Fig. 9:** Binary Input 560CIG10

**Fig. 10:** Binary Output 560CIG10, single command, 1 pole connection
Fig. 11: Binary Output, Single Command, 2 pole connection

Fig. 12: Binary Output, Double Command, 2 pole connection
Fig. 13: Binary Output, (1 out of n) check, single command, 1 pole connection

Fig. 14: Placement of the terminal screws and switches
**Settings**

Hardware settings and operation of the communication Interfaces of the 560CIG10 and IO-settings are carried out with the RTUtil560 configuration tool. For the configuration procedure of the communication Interfaces and the IO-Bus, please refer to the RTUtil560 user guide.

The following parameters have to be defined for all protocols:

- Baudrate: 50 to 19200 baud

Modem control:

- Direct link (TxD/RxD only)
- WT link full duplex (560FSM10/11 no handshake)
- WT link half duplex (560FSM10/11 with RTS / DCD)
- Dial up (external modem without handshake, without RTS / CTS)
- Loop switch unit (RP570/71 Host Interface only)
- Link with collision avoidance (TxD, RxD, DCD, without handshake (DNP 3.0 only)

The settings of the Ethernet Interface are:

- Node name
- IP address
- Subnet mask
- Default gateway
- Routing information
- Number of the host Interfaces.


Fig. 15: Top side of 560CIG10 housing

Fig. 16: Front and right side of 560CIG10 housing

Fig. 17: Bottom side of 560CIG10 housing