Application Description

The 87TS01 module is a coupling module for connecting computers to the PROCONTROL system. Using a serial RS 232c interface, module version R1341 is suitable to connect a computer, which supports the protocol of the serial interface, to the PROCONTROL station bus. The module’s scope of action includes

– Listening—in on process data
– Reading registers
– Sending 200 send—location telegrams

throughout the entire PROCONTROL system. Data communication with the PROCONTROL system has to be activated from the computer.

Features

The module allows to load the addresses of up to 230 telegrams to be received under addresses 0 ... 229 of the receive shared memory and up to 200 send—location telegrams under addresses 0 ... 199 of the send shared memory.

If there are not enough addresses available for loading, a total of four 87TS01 modules can be connected in parallel via standard interfaces type RS 422.

The number of modules which can be used in parallel depends on the application intended with the computer.

PROCONTROL P
Communication

Coupling Module
Coupling Computers to the Station Bus for Listening—in

87TS01 – E/R1341

Description

Processing

The connection to the computer is established by the processing section of the module via a serial interface type RS 232c.

The entire data exchange between station—bus interface and processing section is handled over the shared memories.

This module can be used in any station belonging to the PROCONTROL bus system using a redundant 24 V module supply (89MS01/R0200 or 89MS02/R0100 or higher). It is provided with a standard interface for the PROCONTROL station bus. For this purpose, up to four 87TS01/R1341 modules can be connected in parallel and can be interfaced to a computer via a serial interface type RS 232c.

All transfer operations over the V 24 interface are initiated by the computer in the form of jobs based on a defined protocol.

Each coupling module enables the following data exchange to take place with the entire PROCONTROL system:

– Listening—in on a maximum of 230 PROCONTROL telegrams.

The listen—in address list transferred from the computer is protected against data corruption by a CRC checksum.

– Changes of thresholds for listen—in telegrams of analog values, with individually adjustable time—outs.

The change threshold can be adjusted within 0 ... 6 % in steps of 0.05 %. The time—out can be adjusted within 0 ... 10 sec in steps of 80 msec.

Basic setting for thresholds is 1 %, and for time—outs 1 sec.

– Suppression of analog values with frequently changing disturbance bits.

Analog values, whose disturbance bits change more often than n times in m seconds, are not forwarded to the computer.

n and m are specified by the computer, where n = number of changes from 1 up to 127, and m is adjustable from 80 msec up to 10 sec in steps of 80 msec.
Analog—value changes exceeding the change threshold and the time—out will be forwarded even in the case of active suppression.

After the suppression has been canceled (disturbance bit of the respective analog value changing less than \( n \) times in \( n \) seconds), the current analog value telegram is sent to the computer.

Basic setting: no suppression.

The setting values for suppression are specified by the computer.

– Suppression of binary—value signals with frequently changing binary values (disturbance suppression).

Binary value telegrams whose contents changes more than \( i \) times in \( k \) seconds are not forwarded to the computer.

\( i \) and \( k \) are specified by the computer, and \( i = \) number of changes from 1 up to 127, and \( k \) ranges from 80 msec up to 10 sec, adjustable in steps of 80 msec.

In the case of an active suppression, the respective binary—value telegram, however, is forwarded once every \( k \) seconds.

After suppression has been canceled (contents of the respective binary—value telegram changes less often than \( i \) times in \( k \) seconds), the current binary—value telegram is forwarded to the computer.

Basic setting: no suppression.

The setting values for suppression are specified by the computer.

– Reading registers of PROCONTROL modules.

– Reading PROCONTROL module designations.

– Reading lists of PROCONTROL modules, e.g. limit—value, structure and parameter lists.

– Sending send—location telegrams in cyclic mode and per event.

Addressing

On account of the module’s interface with two systems, addressing of the module is done in two directions.

– In the direction of the PROCONTROL bus system, addressing takes place automatically based on the module location.

– In the direction of the serial interface, addressing is done by setting the coupling—module number on the 87TS01 module.

In case several modules are connected in parallel via RS 422 interfaces, different coupling—module numbers need to be assigned in order to avoid confusion of the modules. Addressing in the direction of the bus system will still take place automatically based on the new and differing module locations.

For detailed information on addressing, please refer to the chapter on 'Module settings' of the 87TS01/R13.. module description.

Initialization

Initialization of the module takes place in two phases, both phases are run through automatically.

Initialization of the modules in the direction of the bus system takes place automatically when the supply voltage is connected, i.e. by plugging the module into its slot.

During the initialization phase, all LEDs of the module are illuminated. After successful initialization, the LEDs will go off.

Initialization on the computer side also takes place automatically. It is effected by the computer through the serial interface.

Shared—memory allocation

The module uses two shared memories.

One ‘receive shared memory’ for telegrams to be received and one ‘send shared memory’ for telegrams to be sent.

Due to the use of a standard—type station—bus interface, the number of telegrams to be received at the same time is limited to a maximum of 230, using addresses 0 ... 229 of the receive shared memory.

The maximum number of send—location telegrams to be loaded is 200 for addresses 0 ... 199 of the send shared memory.

Receive—register allocation

– Contrary to other station—bus modules, in this case no fixed bus addresses stored on the EPROM are used.

– The bus—address list of the module is stored on the RAM memory and is specified by the computer through the processing section.

Send—register allocation

The send registers under addresses 0 ... 199 of the send shared memory are used one after the other, starting from 0.

Transmission mode, data type and data are specified as required for the application at hand.

Transmission to the bus system is cyclic, until the computer puts out a stop command. If the transmission mode = 1, transmission will take place once per event after the take—over.

Transmission of lists

From the connected computer, parameter, structure, address or limit—value lists can be read on the PROCONTROL modules according to a defined protocol.
Annunciation and diagnostic functions

Defects of the module or the RS 232c interface are detected and indicated by the module’s diagnostic functions (cf. 87TS01/R13.. module description).

Annunciations on the module

On the module front, two red and two green LEDs are located:

– Light–emitting diode ST
  Red light–emitting diode ST gives off a steady light if a disturbance has been detected within the range of the station–bus interface, or if the receive monitoring function has responded.

– Light–emitting diode STV
  Red light–emitting diode STV gives off a steady light if a disturbance has been detected on the processing section of the module.

Light–emitting diodes ST and STV are activated from the module’s station–bus interface.

Both green LEDs, M1 and M2, indicate certain operating states of the processing section.

– Light–emitting diode M1
  Green light–emitting diode M1 is illuminated during data communication over the serial interface type RS 232c.

– Light–emitting diode M2
  Green light–emitting diode M2 is illuminated during job processing on the processing section of the module.

Furthermore, LEDs M1 and M2 indicate the following conditions:

– M1 and M2 continuously off, indicating an idle condition.
– M1 and/or M2 emitting a steady light, indicating a fault condition.
– M1 and M2 flashing at one–second intervals, indicating a fault condition during initialization.

The monitoring function in the processing section ensures that a reinitialization is effected in the case of errors in the processing program. Transmission via the serial interface is protected by a checksum. In the case of transmission errors, the erroneous telegram will be repeated.

The diagnostic functions of the bus interface are described in the 87TS01/R13.. module description.
Connection diagrams

The module is to be connected using the specified standard cable sets.

**Combining a 87TS01 module with a computer on the station bus**

The computer can either be connected to connector X1 or connector X2. By the use of a W1 standard cable, it is made sure that an interface type RS 422 is linked to the connector. For operation, either one of module numbers 1 ... 4 may be selected.
Combining several 87TS01 modules for one computer at the station bus

The following example shows three 87TS01 modules connected in parallel, jointly coupled to a computer. Up to four 87TS01 modules can be coupled in this fashion.

The computer is connected using a W1 standard cable at connector X1.

The modules are interconnected using an 89IP03 standard cable at connector X2. The 89IP03 cable ensures that an interface type RS 422 is connected to connector X2.

The modules connected in parallel have to be distinguished by different coupling — module numbers (cf. 87TS01/R13., module description). In the case of parallel connection of several modules, the last free connector of this module combination has to be used for installing a bus termination in the form of an 89IP04 connector containing an appropriate resistor network.
Ordering data

Order no. for complete module

<table>
<thead>
<tr>
<th>Memory module</th>
<th>Position</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus–interface section</td>
<td>A401</td>
<td>GJR2352823Pxxxx</td>
</tr>
<tr>
<td>Processing section, low</td>
<td>A106</td>
<td>GJR2352824Pxxxx</td>
</tr>
<tr>
<td>Processing section, high</td>
<td>A108</td>
<td>GJR2352825Pxxxx</td>
</tr>
</tbody>
</table>

Pxxxx = Position number indicating the applicable program version.

Order nos. of plug-in memory modules

Order data for standard accessories

89IP03 connecting cable

| Type: 89IP03/R0040 | Order no.: GJR2363100R0040 |

89IP04 resistor network

| Type: 89IP04/R0100 | Order no.: GJR2363200R0100 |

W1 signal cable max. length 500 m

| Type: W1 (RS 422) | Order no.: GKWE601527R... * |

W102 signal cable max. length 15 m

| Type: W102 (RS 232) | Order no.: GKWE602052R... * |

* Version no. = cable length in cm.
In the case of cable lengths over 99.99 m = 9999 cm, the lengths need to be indicated in plaintext for tailored cables.

Line amplifier MFI

| Type: MFI–G/V24/RS422/2/D/O/U/S | Order no.: GKWN000203R0001 |

Technical data are subject to change without notice!