

Coupling Module

Coupling the
CDS Control Diagnostic System
to the Station Bus

87TS01 – E/R1550/R1551

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Application

Module 87TS01–E/R1550/R1551 is a coupling module designed to connect computers to the PROCONTROL system in order to enable special diagnosis functions or listening-in to process data which have been given a time stamp.

A serial interface of the RS 232c type can either be used to couple a CDS control diagnostic system or another computer, used for controlling the protocol of the serial interface, to the PROCONTROL station bus. The module's scope of action includes the entire PROCONTROL system. Data communication with the PROCONTROL system has to be activated from the computer.

Features

The module may be plugged into any station of the PROCONTROL bus system with redundant 24 V module supply (from 89MS01/R0200 or 89MS02/R0100). It is provided with a standard interface to the PROCONTROL station bus.

The module is equipped with an internal clock which is being synchronized by a computer either using a master clock installed in the PROCONTROL system or a serial interface.

The module mainly comprises the 3 following sections:

- Station bus interface using a standard interface
- Processing section
- Serial (RS 232c) interface for computer

The station bus interface serves for conditioning the telegrams to be received and sent over the station bus interface and for transferring data to the processing section.

The entire data exchange between station bus interface and processing section takes place through a shared memory comprising a receiving shared memory and a sending shared memory.

The processing section is to fulfill the task of, firstly, receiving, selecting, converting and processing data coming from the PROCONTROL bus interface, providing them with a time stamp and then transferring them to the computer through the serial interface, and secondly, receiving and converting jobs and data coming via the serial interface, and then transferring them to the bus interface, or processing them.

All transfer operations on the serial interface will be carried out as specified in a defined protocol.

The control over the serial interface and over the jobs to be performed also lies with the processing section.

The serial interface is suitable to connect up to 4 87TS01 modules in parallel to the computer. The number of modules operating in parallel will be determined by the type of application.

Operating modes

The coupling module of version R1550 can be operated in 2 operating modes each providing different functions. The operating modes are selected according to an instruction given by the interfaced computer. The selectable operating modes are called operating mode 1 or 2.

The coupling module of version R1551 is independent of any operating mode.

For CDS applications, two 87TS01–E/R1550 modules and one 87TS01–E/R1551 module are necessary. The CDS computer sets module no. 1 to operating mode 1 and module no. 2 to operating mode 2. The operation of module no. 3 is automatically defined by version R1551.

Operating mode 1 for version R1550

In this operating mode, the coupling module is provided with the following functions:

1. Cyclic reception of diagnosis and data telegrams in order to perform the following diagnosis functions.

The diagnosis functions can be individually activated and deactivated by instructions given by the interfaced computer.

- Data telegram diagnosis:

Automatic reception and evaluation of a maximum of 500 different send data telegrams from the PROCONTROL station modules which will be transferred together with a set fault flag in the event mode, as well as cyclically within the PROCONTROL system.

- Station diagnosis:

The diagnosis registers of the 88TK0X and 88TV01 modules will be received and compared with the stored old data values. In case the data contents has changed, the change will be transferred to the computer.

- Diagnosis of user modules:

For the purpose of identifying the disturbed modules of a certain station, the diagnosis registers of that station are read out and the data contents is transferred to the computer. This operation is initiated by the computer.

- Bus system diagnosis:

The diagnosis telegrams of the master station A/B are received and are transferred to the processing computer.

The messages are transferred to the computer chronologically as "listening–in data with time stamps" including complete PROCONTROL address, change code, and reception time.

2. Reading registers from PROCONTROL modules.
3. Writing registers on PROCONTROL modules, e.g. for command output with and without reading back transmitted data.
4. Reading lists from PROCONTROL modules such as limit value and parameter lists.

5. Writing lists of PROCONTROL modules such as limit value and parameter lists.
6. Performing summary jobs for register and list handling (max. 24 read operations from one destination module).
7. Loading bit masks for the purpose of message suppression in the case of station and bus system diagnosis operations.

Operating mode 2 for version R1550

In this operating mode, the coupling module can make use of the following functions:

1. Operator–configurable diagnosis functions

An address list loaded on the module allows to receive 222 PROCONTROL addresses at the same time.

Transfer to the computer as "listening–in data with time stamp" including complete PROCONTROL address, code of measured–value memory, and reception time will take place after a change has been recognized.

A condition recognized as a change will either be the response of a change threshold and an expired specified time interval, in the case of analog values, or a change frequency, which is greater than a selectable value/time unit, in the case of binary values.

The setting values for message suppression will be preselected by the connected computer.

The address list is secured against data corruption by using a CRC checksum.

2. Special functions

- Cyclic calculation of the system cycle time and of the mean value of the system cycle time over 8 system cycles.

- Reception and calculation of the number of event telegrams and of cyclic telegrams per module or station or for the overall system.

- Reception and calculation of the number of event telegrams/minute per module or station or for the overall system.

The values are transferred to the computer according to instructions given.

Operating mode 1 and 2 for version R1550

Independent of the operating mode selected, the following additional functions are available.

1. Transmission of up to 128 send–location telegrams
2. Reception of time data from a time master connected to the PROCONTROL bus for the purpose of synchronizing the internal clock.
3. Transfer of time to computer.
4. Monitoring function "Failure of remote bus operation" in the associated PROCONTROL station, status message to the computer included.

Version R1551

The coupling module of version R1551 is designed for the following functions:

1. Listening—in to the status registers of all PROCONTROL station modules.
This function is activated by a job order issued by the connected computer. As a result, all status telegrams with register addresses (RGA) and belonging to module addresses 0 ... 58 transmitted within the system will, from now on, be transferred to the connected computer as "listening—in data" with time stamps, i. e. along with the time of reception and complete PROCONTROL address. In order to avoid excessive numbers of messages, consecutively transferred status telegrams of identical contents will be transferred only once.
2. Reading registers from PROCONTROL modules.
3. Writing into registers on PROCONTROL modules, e. g. for command output with and without reading the transferred data back.
4. Reading lists from PROCONTROL modules, e. g. limit-value and parameter lists.
5. Writing lists from PROCONTROL modules, e. g. limit-value and parameter lists.
6. Processing summary jobs for register and list handling (max. 24 reading operations from one destination module).
7. Sending up to 128 send—location telegrams.
8. Receiving the time from a time master on the PROCONTROL bus for synchronizing the internal clock.
9. Transferring the time to the computer.
10. Monitoring for "failure of remote—bus operation" in its own PROCONTROL station and issuing a status message to the computer.

Activation and monitoring of the time function

By means of a computer instruction, the address of the time master connected to the PROCONTROL bus (87TS01/R1313 with a DCF77 time receiver) has to be loaded onto the coupling module.

The same instruction contains a specified starting—time and date in case the time master should be defective or not provided.

From this point on, every time a consistent time/data set of the time master is received, the internal clock of the coupling module is synchronized.

If no time telegrams are received, the internal clock is running independently.

The computer can use an instruction to interrogate the current status of the time function "internal time/time master reception".

The internal time resolution of the coupling module is 10 ms.

Addressing

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

- For the PROCONTROL bus system, addressing takes place automatically based on the module location.
- For the computer, addressing is effected by setting the coupling module number on the 87TS01 module.

In case several modules are connected in parallel via the RS 422 interfaces, it is necessary to assign different coupling module numbers to provide for differentiation. Addressing on the bus system side will again take place automatically based on the new and different module locations.

Detailed information on addressing is given in the chapter on "Module setting" of the 87TS01—E/ R15.. module description.

Initialization

Initialization of the modules on the bus system side takes place automatically when the voltage supply is connected. It is effected by plugging the module into its location.

During the initialization phase, all light—emitting diodes of the module are on. After initialization is completed successfully, the light—emitting diodes are deenergized again.

Initialization on the computer side is carried out upon an instruction given by the interfaced computer via the serial interface.

Annunciation functions and diagnosis

Defects of the module as well as of the RS 232c interface are recognized by the module by way of diagnosis and are annunciated (see also the 87TS01–E/R15.. module description).

Disturbance annunciations on the module

Two red and two green light–emitting diodes are located on the module front:

- Light–emitting diode ST
The red light–emitting diode ST gives off a steady light if a disturbance is detected in the area of the station bus interface or if the receive monitoring function has responded.
- Light–emitting diode STV
The 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 via the station bus interface of the module.

The two green light–emitting diodes, M1 and M2, indicate the operational statuses of the processing section.

- Light–emitting diode M1
The green light–emitting diode M1 is on when data transfer to and from the computer takes place through the serial RS 232c interface.
- Light–emitting diode M2
The green light–emitting diode M2 is on when jobs are being processed in the processing section of the module.

Light–emitting diodes M1 and M2 are additionally used to annunciate the following states:

- M1 and M2 off continuously – indicates a stand–by state.
- M1 and/or M2 lit continuously – shows a fault condition.
- M1 and M2 flashing alternately at regular 1–second intervals – indicates a fault condition during initialization.

The monitoring function of the processing section ensures that a new initialization would be effected by the computer in the event of disturbances within the processing program.

Transfer through the serial interface is ensured by using a checksum.

Diagnosis

The telegrams received and the generation of the telegrams to be sent as well as the internal signal processing functions are monitored for fault–free condition within the module's processing section (self–diagnosis).

In the event of a disturbance, the type of the fault is filed in the diagnosis register and, simultaneously, a disturbance signal is sent to the PROCONTROL system.

Upon request, the module sends a telegram containing the data stored in the diagnosis register (register 246).

The allocation of the individual CDS messages in the diagnosis register is shown in the 87TS01–E/ R15.. module description.

For the CDS coupler application, the individual diagnosis messages need to be mirrored in a processing section.

Connection diagram

The computer is connected to the 87TS01–E/R1550/R1551 modules using a potential–isolated (MFI) line amplifier.

The line amplifier may either be connected through connector X1 or connector X2 of the SS1 interface.

It must be ensured that an RS 422 interface is connected to the connector (cf. Module description).

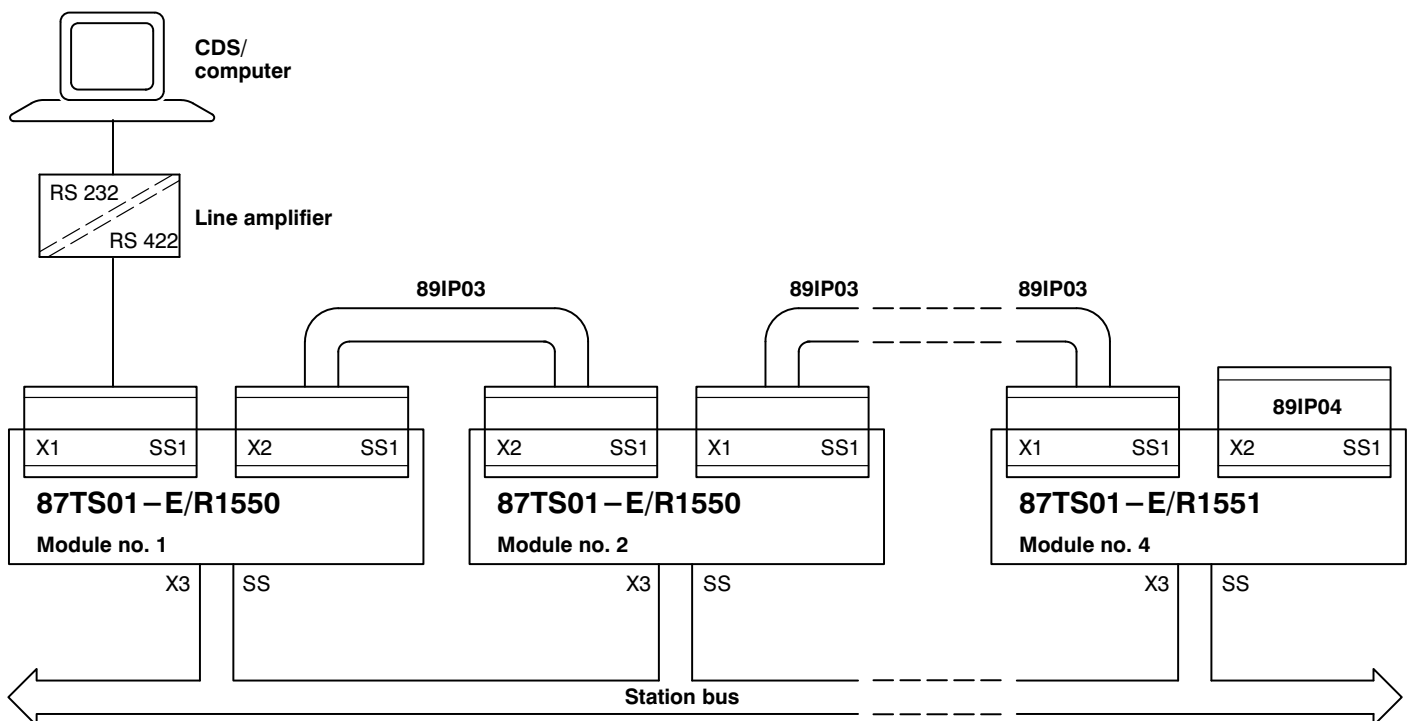
The maximum distance between line amplifier and 87TS01 is 500 m.

Up to four 87TS01–E/R1550/R1551 modules may be connected in parallel to the computer. In the case of an CDS applica-

tion, two 87TS01–E/R1550 modules and one 87TS01–E/R1551 module are required.

The modules may either be interconnected through connector X1 or connector X2 of the SS1 interface using a 89IP03 standard cable. A 89IP04 bus termination plug needs to be installed on the last free connector.

In order to enable the computer to make a distinction, the modules connected in parallel must be assigned different coupling module numbers (see also the 87TS01–E/R15.. Module description).



Ordering data

Order no. for complete module

Type: 87TS01 – E/R1550
87TS01 – E/R1551

Order no.: GJR2368900R1550
GJR2368900R1551

Order no. of the plug-in memory modules of basic firmware R1550

Memory module	Position	Order number
Bus interface section	A401	GJR2352843Pxxxx
Processing section, low	A106	GJR2352844Pxxxx
Processing section, high	A108	GJR2352845Pxxxx

of basic firmware R1551

Memory module	Position	Order number
Bus interface section	A401	GJR2352846Pxxxx
Processing section, low	A106	GJR2352847Pxxxx
Processing section, high	A108	GJR2352848Pxxxx

Pxxxx = Position number according to the latest program version.

Ordering data for standard accessories

89IP03 connecting cable

Type: 89IP03/R0040

Order no.: GJR2363100R0040

89IP04 resistor network

Type: 89IP04/R0100

Order no.: GJR2363200R0100

Signal cable for CDS/computer max. length 15 m

Cable assignments depending on the line amplifier used.

Signal cable for line amplifier max. length 500 m

Cable assignments depending on the line amplifier used.

Technical data are subject to change without notice!



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