

## Coupling Module

### Coupling a 87TP01 Module to the Station Bus

## 87TS01 – E/R1510

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### Application

Module 87TS01 – E/R1510 is a coupling module designed to connect a 87TP01 coupling module for external systems to the PROCONTROL system.

A serial interface of the RS 232c type can be used to couple either an 87TP01 module 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 transfer with the PROCONTROL system must be activated from the 87TP01 or 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 mainly comprises the 3 following sections:

- Station bus interface using a standard interface
- Processing section
- Serial (RS 232c) interface for 87TP01 or 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 P 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 5 87TS01 modules in parallel to the computer. The number of modules operating in parallel will be determined by the type of application.

## Module functions

1. Using an address list loaded onto the module, data from 230 PROCONTROL send registers ( $\hat{=}$  telegrams) can be received at the same time. 8 of these telegrams are reserved for receiving the system time.

Transfer to the computer is in form of "listening-in data without time stamp" including information on PROCONTROL transmission direction, type of transfer, data type, signal memory ID, and data word after a data change has been detected.

In the case of analog values, response of a change threshold and a time-out is considered to be a change; in the case of binary values, a change rate above an adjustable value/time unit is treated like a change.

The setting values for signal suppression are predetermined by the connected computer.

The address list is secured against data corruption by a CRC check sum.

2. Intermittent sending of a maximum of 200 send-location telegrams with possible send register addresses 0 ... 199.
3. Selective logging-out of send registers which have already been loaded.
4. Transferring diagnosis functions of the computer to the PROCONTROL system.
5. Destination-addressed reception of a maximum of 200 destination telegrams with receive register addresses 0 ... 199.
6. Monitoring for "failure of remote-bus operation" in its own PROCONTROL station, including status message to the computer, and for "data transmission failure on the V24 interface", including diagnosis message to the PROCONTROL system.

### 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 annunciation 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.

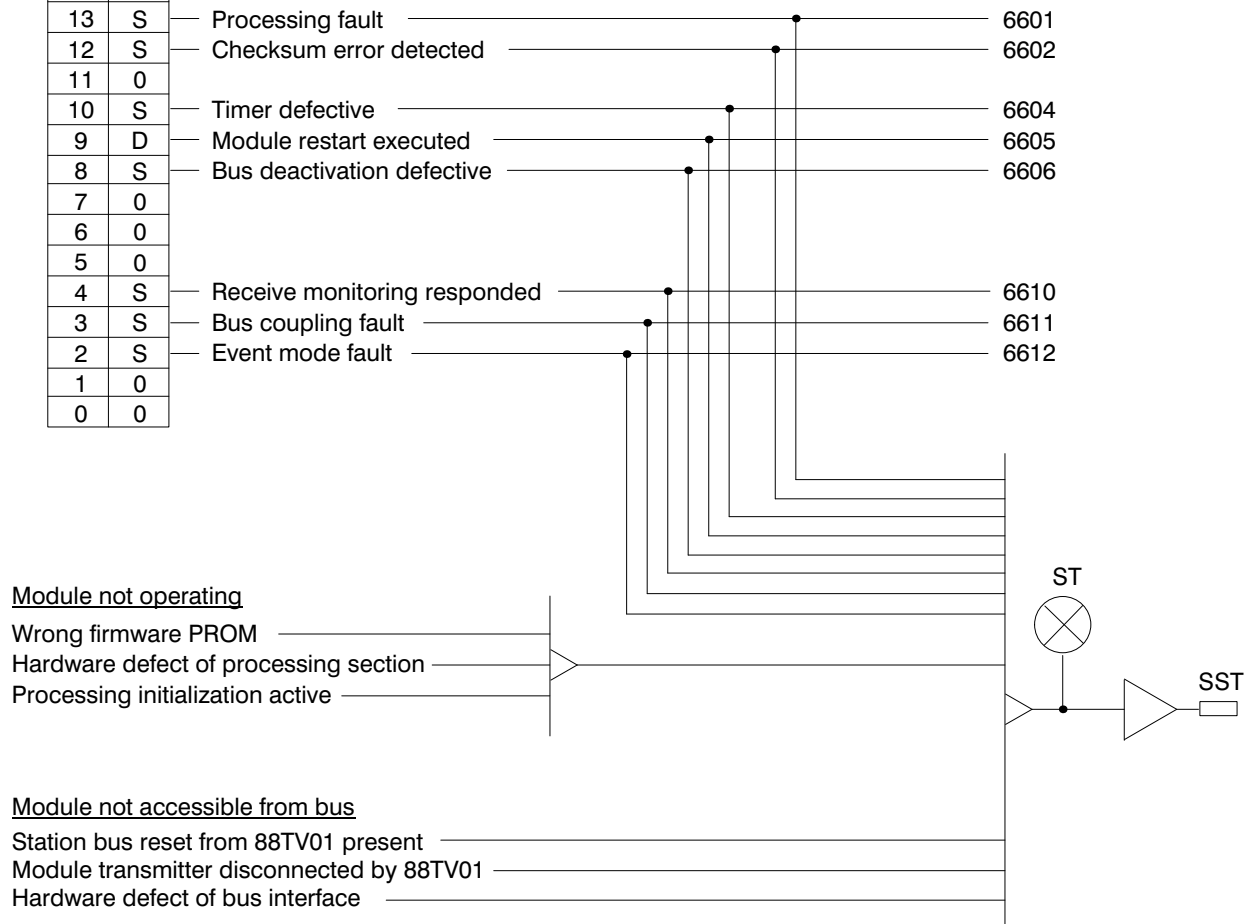
Upon request, the module sends a telegram containing the data stored in the diagnosis register (register 246), for allocation cf. Figure 1.

Module in operating

Diagnosis  
register 246

Bit	Type
15	S
14	S
13	S
12	S
11	0
10	S
9	D
8	S
7	0
6	0
5	0
4	S
3	S
2	S
1	0
0	0

CDS messages \*)



D = Dynamic annunciations are cancelled after the contents of the diagnosis register has been transmitted  
 S = Static annunciations disappear automatically upon deactivation  
 0 = Not used

Fig. 1: 87TS01 diagnosis messages, register 246

- \*) The control diagnosis station (CDS) provides a description for every message number. This description comprises:
- Information about cause and effect of the disturbance
  - Recommendations for elimination.

Thus, fast disturbance elimination is ensured.

## Connection diagrams

The 87TS01–E/R1510 modules are connected to the 87TP01–E/ R1210 modules using a W161 or W158 standard cable.

Connection is possible through connector X1 or connector X2 of the SS1 interface.

Using a W161 or W158 standard cable guarantees that a RS232 interface is connected to the connector.

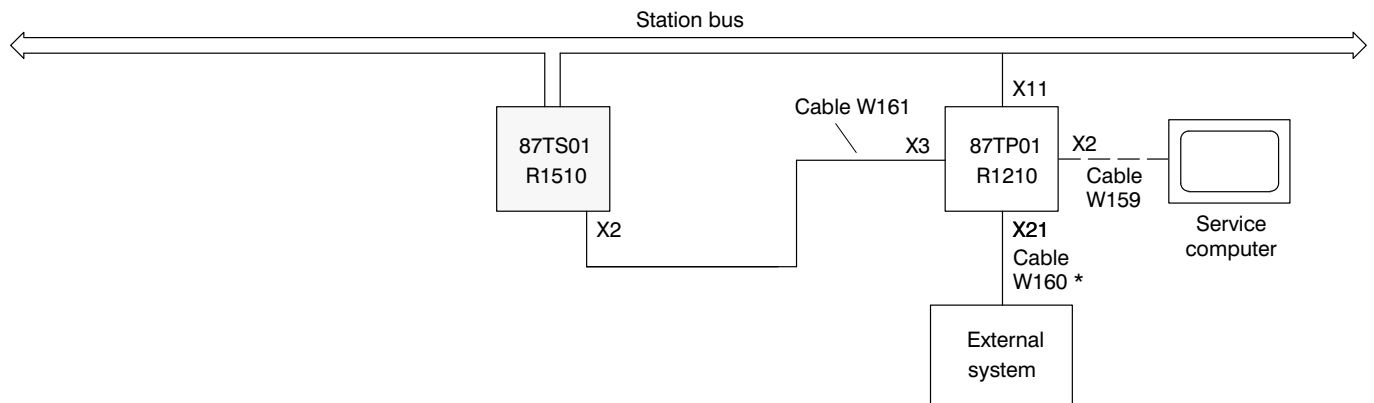
The maximum distance between modules 87TS01–E/R1510 and 87TP01–E/R1210 is 1 m.

Up to five 87TS01–E/R1510 modules may be connected in parallel to one 87TP01 module.

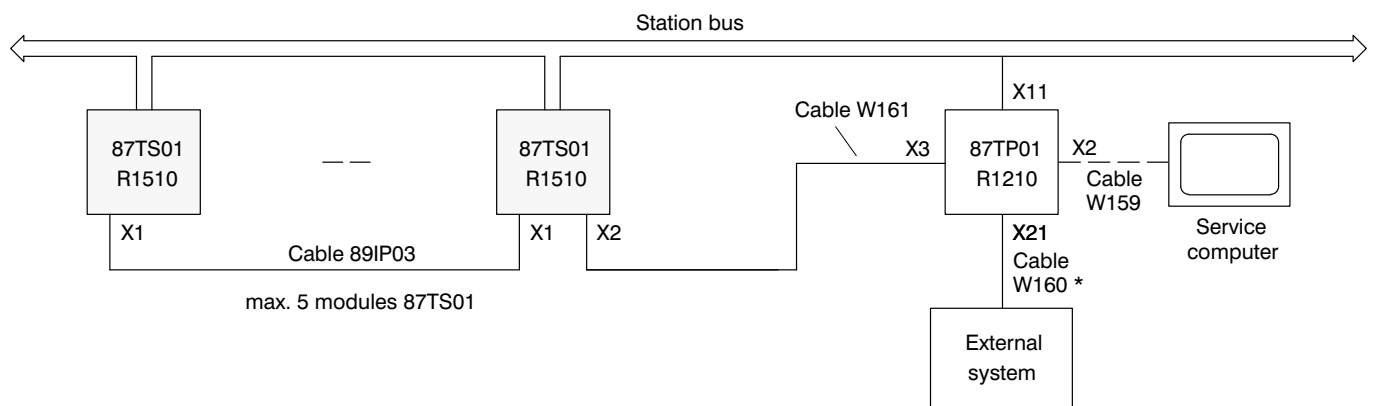
The modules may be interconnected either through connector X1 or connector X2 of the SS1 interface using a 89IP03 standard cable.

In order to enable the 87TP01 to make a distinction, the modules connected in parallel must be assigned different coupling module numbers (cf. the 87TS01–E/R215.. module description).

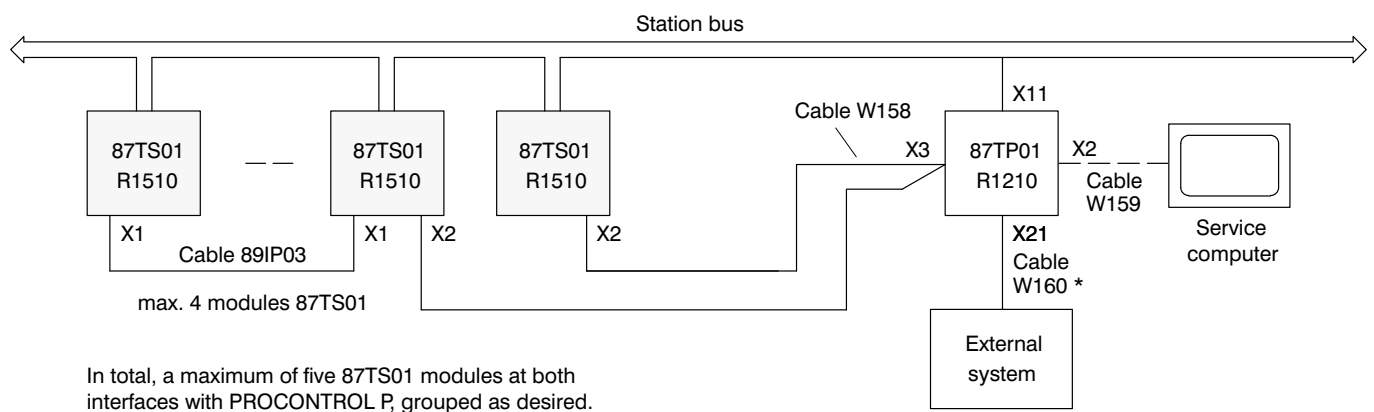
### Connection with one 87TS01



### Connection with several 87TS01 modules connected to one RS232 interface



### Connection with grouped 87TS01 modules and two RS232 interfaces



\* For connecting the external system, a W160 cable with a 25-pole HDP20 pin-type connector can be used.

If the external system uses another type of connector, the cable needs to be adapted accordingly.

## Ordering data

### Order no. for complete module

Type: 87TS01–E/R1510

Order no.: GJR2368900R1510

### Order no. of the plug–in memory modules

(of basic firmware R2510)

Memory module	Position	Order number
Bus interface section	A401	GJR2352836Pxxxx
Processing section, low	A106	GJR2352837Pxxxx
Processing section, high	A108	GJR2352838Pxxxx

Pxxxx = Position number according to the latest program version.

### Ordering data for standard accessories

89IP03/R0040 connecting cable

W161 cable to one or several 87TS01

W158 cable to two or several 87TS01

xxxx = cable length in cm.

Order no.:

GJR2363100R0040

GKWE602580Rxxxx

GKWE602577Rxxxx

Technical data are subject to change without notice!



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