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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

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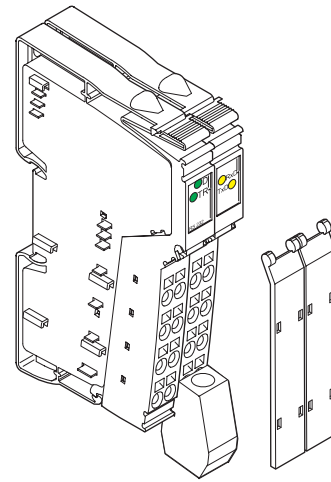
# IB IL RS 232 ...

## Inline terminal for serial data transmission

### AUTOMATION

Data sheet  
5935\_en\_05

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5935B002

## 1 Description

The terminal is designed for use within an Inline station. It is used to operate standard I/O devices with serial interfaces on a bus system.

### Features

- A serial I/O channel (RS-232)
- DTR/CTS handshake supported
- Various protocols supported
- Transmission speed can be set up to 38400 baud
- Number of data bits, stop bits, and parity can be set
- 4 kbyte receive buffer and 1 kbyte transmit buffer
- Parameterization and data exchange via INTERBUS using PCP services
- Diagnostic and status indicators

Figure 1 The IB IL RS 232-PAC terminal



This data sheet only is valid with the IL SYS INST UM E user manual (see "Ordering data" on page 3).



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This data sheet is valid for the products listed on page 3.

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## 2 Ordering data

### Products

Description	Type	Order No.	Pcs./Pkt.
Inline terminal for serial data transmission including connectors and labeling fields transmission speed of 500 kbps	IB IL RS 232-PAC	2861357	1
Inline terminal for serial data transmission; without accessories	IB IL RS 232	2727349	1
Inline terminal for serial data transmission including connectors and labeling fields transmission speed of 2 Mbps;	IB IL RS 232-2MBD-PAC	2862084	1
Inline terminal for serial data transmission, without accessories, transmission speed 2 Mbps	IB IL RS 232-2MBD	2855826	1



The connector set listed below is needed for the complete fitting of the IB IL RS 232 and IB IL RS 232-2MBD terminals.

### Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector set with a standard connector and a shield connector	IB IL AO/CNT-PLSET	2732664	1

### Documentation

Description	Type	Order No.	Pcs./Pkt.
"Automation terminals of the Inline product range" user manual	IL SYS INST UM E	2698737	1
"INTERBUS addressing" data sheet	DB GB IBS SYS ADDRESS	9000990	1

## 3 Technical data

### General data

Housing dimensions (width x height x depth)	24.4 mm x 136 mm x 72 mm (with connectors)
Weight	90 g (without connectors), 128 g (with connectors)
Operating mode	Process data operation with 1 word PCP operation with 2 words
Transmission speed	
IB IL RS 232 -PAC	500 kbps
IB IL RS 232	500 kbps
IB IL RS 232-2MBD-PAC	2 Mbps
IB IL RS 232-2MBD	2 Mbps
Permissible temperature (operation)	-25°C to +55 °C
Permissible temperature (storage/transport)	-25°C to +85 °C
Permissible humidity (operation/storage/transport)	75% to 85% according to DIN EN 61131-2
Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2000 m above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class 3 according to EN 61131-2, IEC 61131-2
Connection data for Inline connectors	
Connection method	Spring-cage terminals
Conductor cross-section	0.08 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (solid or stranded), 28 - 16 AWG

## Interfaces

### Bus

Local bus	Through data routing
-----------	----------------------

### Serial interfaces

Type	V.24 (RS-232) interface with DTR/CTS handshake Data terminal equipment (DTE) Electrical data according to EIA (RS) 232, CCITT V.28, DIN 66259 Part 1
Input impedance	5 k $\Omega$ typical
Permissible input voltage range	-30 V to +30 V
Switching thresholds	0.8 V to 2.4 V
Hysteresis	0.5 V typical
Output voltage "HIGH" (with 3 kW load)	6.7 V typical
Output voltage "LOW" (with 3 kW load)	-6.7 V typical
Output voltage "HIGH" (no-load operation)	$\leq 25$ V
Output voltage "LOW" (no-load operation)	$\geq -25$ V
Permissible load capacity	2500 pF
Short-circuit protected against GND	Yes
Short-circuit current	$\pm 60$ mA, maximum

### Power consumption

	500 kbps	2 Mbps
Communications power $U_L$	7.5 V	7.5 V
Current consumption at $U_L$	155 mA, typical, 225 mA, maximum*	165 mA, typical, 225 mA, maximum*
Total power consumption	Approx. 1.163 W, typical, 1.688 W, maximum*	Approx. 1.238 W, typical, 1.688 W, maximum*

\* All serial interface connections short circuited.



This terminal takes no current from the  $U_M$  and  $U_S$  potential jumpers.

## Supply of the module electronics through the bus coupler

Connection method	Potential routing
-------------------	-------------------

### Power dissipation

	500 kbps	2 Mbps
Power dissipation in the terminal $P_{TOT}$	$P_{TOT} = 1.163$ W	$P_{TOT} = 1.238$ W
Power dissipation of the housing $P_{HOJ}$	1.2 W, maximum*	1.4 W, maximum*

\* within the permissible operating temperature

### Limitation of simultaneity, derating

	500 kbps	2 Mbps
$T_A \leq 50^\circ\text{C}$	No limitation of simultaneity, no derating	No limitation of simultaneity, no derating
$T_A > 50^\circ\text{C}$	No limitation of simultaneity, no derating	$I_Q = 4$ A $I_Q$ : Total diagonal routing current $I_M/I_S/GND$

## Protective equipment

None



### Electrical isolation/isolation of the voltage areas

Electrical isolation of the logic level from the serial interface is ensured by the DC/DC converter.

### Common potentials

The serial interface control and data lines have galvanically the same potential. FE is a separate potential area.

### Separate potentials in the system consisting of bus coupler/power terminal and I/O terminal

#### Test distance

#### Test voltage

5 V supply incoming remote bus/7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
5 V supply outgoing remote bus/7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
V. 24 (RS-232) interface/7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
V. 24 (RS-232) interface/24 V supply (I/O)	500 V AC, 50 Hz, 1 min
V. 24 (RS-232) interface/functional earth ground	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic) / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic) / functional earth ground	500 V AC, 50 Hz, 1 min
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min

### Error messages to the higher-level control or computer system

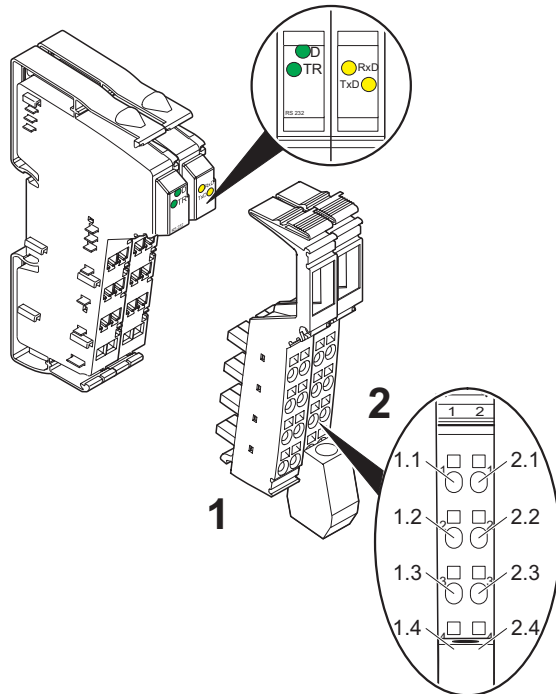
None

### Approvals

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## 5 Diagnostic/status indicators and terminal point assignment



5935A003

Figure 3 Diagnostic/status indicators and terminal point assignment

### Terminal point assignment

Connector	Terminal point	Signal	Assignment
1	1.4, 2.4	FE	Functional earth ground
	All other terminal points of this connector are not used.		
2	1.1	RxD	Serial data input
	2.1	TxD	Serial data output
	1.2	+5 V	Control output, internally wired to +5 V DC
	2.2	CTS	Control input for hardware handshake
	1.3	DTR	Control output for hardware handshake
	2.3	GND	GND for serial interface
	1.4, 2.4	Shield	Shield connection



Please observe the "Connection notes" on page 11.

### Local diagnostic and status indicators

Des.	Color	Meaning
D	Green	Diagnostics
TR	Green	PCP active
<b>Serial interface:</b>		
RxD	Yellow	Terminal receives data from the connected device
TxD	Yellow	Terminal transmits data to the connected device

### Function identification

Orange

2 Mbps: White stripe in the vicinity of the D LED



## 6 V.24 (RS-232) interface

The V.24 (RS-232) interface on the terminal represents a piece of DTE (data terminal equipment). This means that connector 2 terminal point 2.1 (TxD) is always used to transmit and connector 2 terminal point 1.1 (RxD) is always used to receive.

The standard requires that DCE (data communication equipment) be connected to the V.24 interface as a peer. However, DTE can also be connected. Please refer to the connection notes under 6.2 and 6.3.

Measuring the voltage between the connection points for the TxD and GND signals in idle state will determine whether the device to be connected to the V.24 (RS-232) interface is a form of DTE or DCE. If the voltage measures approximately **-5 V**, the device is a form of **DTE**. If the voltage is approximately **0 V**, the device is a form of **DCE**.

Example: When using a 25-pos. standard connector (see Figure 4 on page 9) the voltage between **pin 2 (TxD)** and **pin 7 (GND)** must be measured.



### 6.1 V.24 (RS-232) terminal handshake signals

Any device with a V.24 (RS-232) interface can be connected to the V.24 (RS-232) interface on the terminal. Both the terminal and the device connected to the V.24 (RS-232) interface can act as a transmitter **and** a receiver for data exchange. As errors can occur during data exchange if both devices transmit or receive simultaneously, the **handshake** is used as a procedure for the mutual signaling of clear to receive and clear to transmit.

The terminal supports DTR and CTS handshake signals. Each uses one wire of the connecting cable.

The connecting signals are described from the point of view of the terminal, i.e., from the point of view of the DTE.

### Handshake signals:

Signal	Meaning	Direction
CTS (Clear To Send)	The IB IL RS 232 terminal receives the CTS signal from the connected device via the V.24 interface. If the CTS signal is set to <i>High</i> , the terminal can transmit data.	Input
 The exception is: 3964R, XON/XOFF Protocol		
DTR (Data Terminal Ready)	The DTR signal is transmitted from the IB IL RS 232 terminal, i.e., set to <i>High</i> , once it is ready to receive. The peer connected to the V.24 (RS-232) interface is now able to transmit. After 4,095 characters (4 kbytes), the terminal receive buffer is full. As soon as more characters are read from the bus side, the DTR signal is set to <i>High</i> and the terminal is ready to receive.	Output
 With the transparent and XON/XOFF protocols, DTR is set to "0" if fewer than 15 characters are free in the receive FIFO.		

### 6.2 V.24 interface wiring with four-wire handshake

The TxD, RxD, DTR, and CTS signals are used for a four-wire handshake connection between the terminal and the device to be connected. Each signal corresponds to one wire in the connecting cable. An Inline male connector is required on the terminal side. A 9-pin or 25-pin socket is required on the opposite side depending on the device to be connected. Both GND pins are also wired.

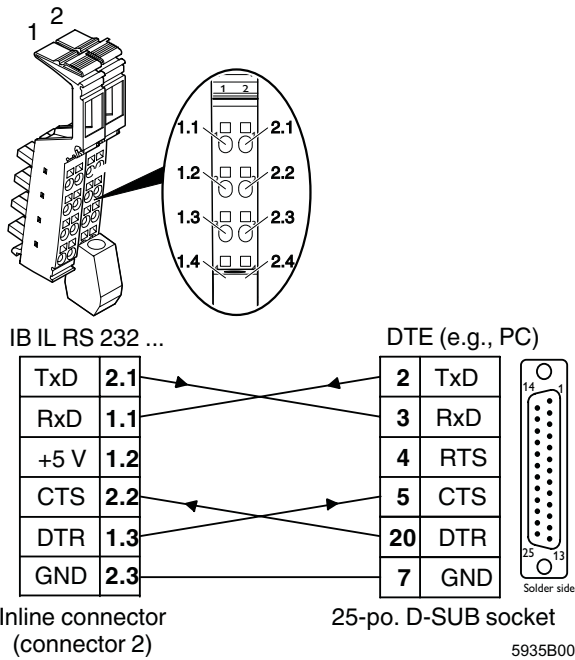


Figure 4 V.24 interface wiring with handshake for DTE (25-pos.)

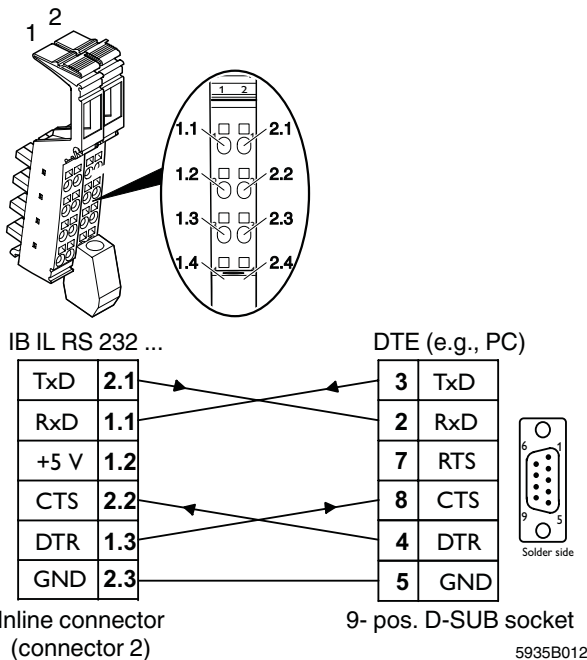


Figure 5 V.24 interface wiring with handshake for DTE (9-pos.)



In Figure 6 and Figure 5, the shield connector is connected on the right-hand side of the terminal. In this case, a capacitor is placed between the shield and FE.

If the shield is to be placed directly on FE, the shield connector must be connected on the left-hand side of the terminal.

Please refer to the "Connection examples" on page 11.



In Figure 6 and Figure 5, it is assumed that the signal assignment of the connectors for the device to be connected corresponds to the assignment of a PC connector.

In individual cases, however, the signal assignment of the pins might be different, as the DTE-DTE connections as well as the connections between 25-pin and 9-pin connectors and sockets are not standardized.

### 6.3 V.24 (RS-232) interface wiring without handshake

For wiring without handshake, the transmission can only be executed with the help of both TxD and RxD signals. Both wires for the TxD and RxD signals, in the same way as the GND contacts, are connected to the terminal male connector and are soldered to the socket on the side of the device to be connected.

In addition, a jumper is connected on the male connector between the terminal points for the +5 V and CTS signals and on the socket between the pins for the RTS and CTS signals.

In this way, permanent readiness to receive of the peer is simulated and the connected device is again able to transmit data via the V.24 interface.

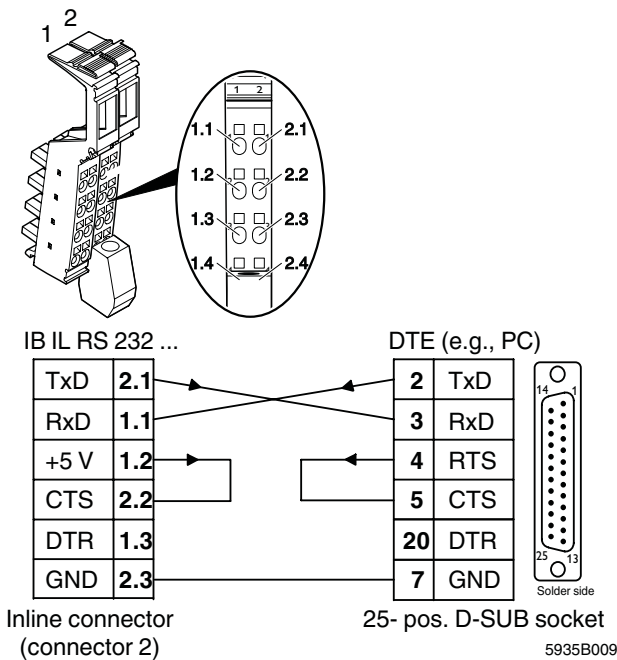


Figure 6 V.24 interface wiring without handshake for DTE (25-pos.)



In Figure 6 and Figure 7 the shield connector is connected on the right-hand side of the terminal. In this case, a capacitor is placed between the shield and FE.

If the shield is to be placed directly on FE, the shield connector must be connected on the left-hand side of the terminal.



In Figure 6 and Figure 7, it is assumed that the signal assignment of the connectors for the device to be connected corresponds to the assignment of a PC connector.

In individual cases, however, the signal assignment of the pins might be different, as the DTE-DTE connections as well as the connections between 25-pin and 9-pin connectors and sockets are not standardized.

Since the DTR signal is not evaluated for the wiring without handshake, some data sent to the terminal may be lost until the terminal is ready to receive data again.

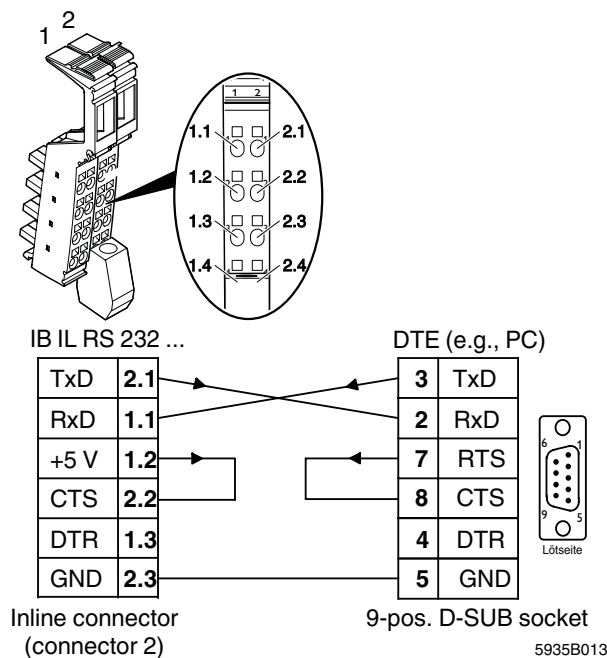


Figure 7 V.24 interface wiring without handshake for DTE (9-pos.)

## 7 Application examples

- Scale with RS-232 interface
- Label printer
- PC interface (e.g., communication between master and PC via a bus system)
- Control of indication elements
- Parameterization of intelligent field devices (e.g., frequency inverter)
- Transition to other protocols and media (e.g., wireless)

## 8 Connection notes



By assigning terminal points 1.4 and 2.4 of both connectors you can connect the cable shield either using a capacitor (connector 2) or directly (connector 1) to functional earth ground (FE).

With the two connection options, you can connect one side of the cable shield directly and one side using a capacitor to FE without any additional effort. In this way, you can prevent ground loops occurring if a shield with two direct connection were placed on FE.



Ensure that on connector 2, terminal point 1.2 (+5 V) is exclusively used to provide the 5 V signal for the CTS input (terminal point 2.2), in the event of communication without a handshake. In this case insert a jumper between the terminal points. **Any other use is not permitted.**

## 9 Connection examples

### Shield capacitively connected to FE

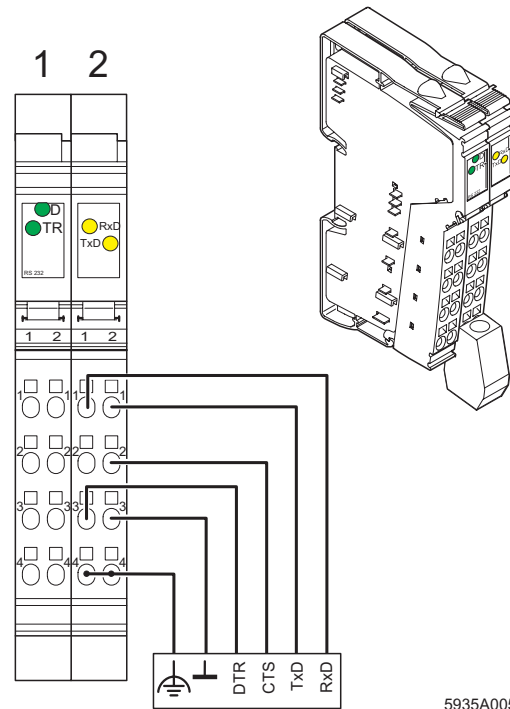


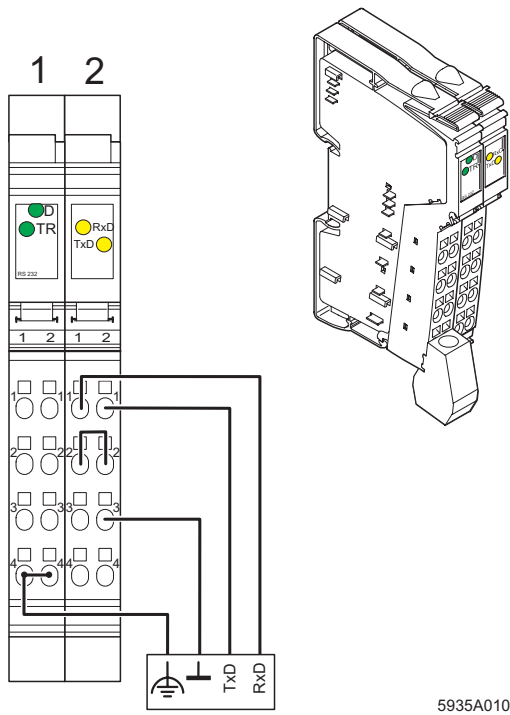
Figure 8 Connection of an I/O device with a serial interface

In this example, the V.24 interface wiring for communication with 4-wire handshake is shown.



Use a connector with shield connection when installing the I/O device. Figure 8 shows the connection schematically (without shield connector).

## Shield connected directly to FE



5935A010

Figure 9 Connection of an I/O device with a serial interface

In this example, the V.24 interface wiring for communication without handshake is shown. You should insert a jumper between connection points 1.2 (+5 V) and 2.2 (CTS).

## 10 Data storage and transmission

The terminal stores the received V.24 data in an intermediate buffer, until it is fetched from the V.24 interface by the bus controller board or the device. V.24 data traffic can be managed using various protocols. The protocol used depends on the type of protocol supported by the peer.

### 10.1 Overview of supported protocols

Protocol	Receive memory	Transmit memory	Special features when receiving
Transparent	4096 bytes	1023 bytes	
End-to-end	25 buffers with 58 bytes each	1023 bytes (including end characters)	Two end characters are filtered out
Dual buffer	2 buffers with 58 bytes each	1023 bytes (including end characters)	Only stores the most recently received data, end characters are filtered out
3964R	25 buffers with 58 bytes each	15 buffers with 58 bytes each	Data exchange with software handshake, time monitoring, and checksum
XON/XOFF	4096 bytes	1023 bytes	Software handshake

### 10.2 Transparent protocol

If the transparent protocol is used, V.24 data is transmitted through the terminal in the same format it was received from the V.24 (RS-232) or bus side.

The transmit FIFO (First-In-First-Out memory) can store 1023 bytes (1 kbyte), and the receive FIFO can store 4096 bytes (4 kbytes). If the terminal receives another character after the 4095th character, the error pattern is stored in the receive FIFO. All further characters are ignored.

A CTS hardware handshake is supported with this protocol.

### 10.3 End-to-end protocol

The V.24 (RS-232) data is conditioned for the end-to-end protocol.

If V.24 (RS-232) data is sent from the user side (bus side), two additional characters, the first and second delimiters, are attached for transmission to the V.24 (RS-232) side. The first and second delimiters are defined when the terminal is configured using the INIT-TABLE object.

V.24 (RS-232) data transmitted from the V.24 side can only be read by the user if the terminal has received the first and second delimiters. The two end characters confirm that the V.24 (RS-232) data has been received without error and the maximum data length of 58 bytes has been observed. The delimiters are filtered out when the data is read by the bus side.

Unlike in the transparent protocol, the receive memory is not organized as a FIFO but as a buffer. 25 buffers with 58 bytes each are available. If the buffer size of 58 bytes is exceeded, without the two delimiters being detected, the buffer is overwritten again. Depending on the INIT-TABLE object, subindex  $0C_{hex}$  (rotation switch), there are two variants.

Variant 1 ( $0C_{hex} = 0$ ; default setting):

In the re-written buffer **only** the **new** data is available, i.e., data from the previous cycle is rejected.

Variant 2 ( $0C_{hex} = 1$ ): The buffer is re-written character by character. If the two delimiters are detected the **new** characters **and** the **remaining** characters from the previous cycle are available in the re-written buffer (rotation).

The transmit FIFO consists of 1023 bytes. The delimiters are attached to, and stored with, the data to be sent.

### 10.4 Dual buffer protocol

With this protocol, the **last** received data block is stored. A data block is defined as a sequence of V.24 characters with the first and second delimiter end characters, as in the end-to-end protocol.

As soon as a new data block is received, the previous one is overwritten. This is achieved by means of two buffers, which are written alternately. This means that one buffer will always be available to receive V.24 (RS-232) data, while the other will be storing the last received data block. A data block is only regarded as complete once both delimiters have been detected, one after the other. It can then be read from the bus side.

If the buffer size of 58 bytes is exceeded, without the two end characters (delimiters) being detected, the buffer is overwritten again. Depending on the INIT-TABLE object, subindex  $0C_{hex}$  (rotation switch), there are two variants.

Variant 1 ( $0C_{hex} = 0$ ): In the re-written buffer **only** the **new** data is available, i.e., data from the previous cycle is rejected.

Variant 2 ( $0C_{hex} = 1$ ): The buffer is re-written character by character. If the two delimiters are detected the **new** characters **and** the **remaining** characters from the previous cycle are available in the re-written buffer (rotation).



The same conditions as in the end-to-end protocol apply to sending V.24 (RS-232) data. If V.24 data is transmitted from the bus side, two additional characters, the first and second delimiters, are attached for transmission to the V.24 side.

### 10.5 3964R protocol

This protocol, developed by Siemens, is the most complex. It uses beginning and end identifiers, a checksum, and a time monitoring function.

15 buffers are available for transmitting, 25 buffers are available for receiving.

Character delay time:	220 ms
Acknowledgment delay time:	2 s
Block waiting time:	10 s
Number of attempts to establish a connection:	6

The optional 3964 priority defines which device may transmit first (high priority) if there is an initialization conflict (several devices attempting to transmit data simultaneously).

### 10.6 XON/XOFF protocol

This protocol operates like the transparent protocol, however, not with hardware handshake but with software handshake.

Data transmission with this protocol is controlled by the XON and XOFF characters. XON is set to 11<sub>hex</sub> and XOFF to 13<sub>hex</sub>. You can also define these characters upon terminal configuration.

If the terminal receives an XOFF, no more V.24 (RS-232) data will be sent until an XON is received.

The terminal itself will transmit an XOFF if the available space in the receive memory is less than 5 bytes. As soon as more memory becomes available again, the module will transmit a single XON. The transmission does not depend on the CTS input.

V.24 data is not filtered when it is transmitted. Any characters, which occur with the code defined for XON and XOFF, are thus transmitted and may trigger undesirable events at the receiver. When V.24 (RS-232) data is received, the XON and XOFF characters are filtered and are not available as data. Any characters with the XON or XOFF code are lost. Ensure that characters with these codes do not appear in the data stream.

## 11 Programming data/ configuration data

### Local bus (INTERBUS)

ID code	DC <sub>hex</sub> (220 <sub>dec</sub> )
Length code	01 <sub>hex</sub>
Process data channel	16 bits
Input address area	1 word
Output address area	1 word
Parameter channel (PCP)	2 words
Register length (bus)	3 words

### Other bus systems



For the configuration data of other bus systems, please refer to the appropriate electronic device data sheet (GSD, EDS).

## 12 PCP communication



For further information on PCP communication, please refer to the IBS SYS PCP G4 UM E (Order No. 2745169) user manual.

By default upon delivery, the terminal is configured for data transmission according to the parameters on page 18. You can configure the terminal to meet the requirements of your application.

The terminal is configured in PCP mode using the "INIT-TABLE" object.



The programs IBS CMD (for standard controller boards) and IBS PC WorX (for Field Controllers [FC] and Remote Field Controllers [RFC]) are available for the configuration and parameterization of your bus system.

For information on this, please refer to the software user manuals.

Parameter records and text strings are transmitted to or from a connected I/O device in PCP mode using the "V24-DATA" object.

## 13 Object dictionary

Index	Data type	N	L	Meaning	Object name	Rights
5FC1 <sub>hex</sub>	Var of unsigned 8	1	1	Module start indicator	START-IND	rd/wr
5FE0 <sub>hex</sub>	String Var of Octet String	1	58	Receive/transmit V.24 data	V24-DATA	rd/wr
5FFF <sub>hex</sub>	Array of Unsigned 8	20	1	Terminal configuration	INIT-TABLE	rd/wr

N: Number of elements                      rd: Read access permitted

L: Length of an element in bytes        wr: Write access permitted

## 14 Object descriptions



In the tables for the value ranges of objects or elements, designations used in the IBS CMD and IBS PC WorX programs are shown in *italics*.



If **you** set the object to 01<sub>hex</sub>, it has **no effect** on the function of the terminal. **A power up cannot be triggered in this way.** However, it is not possible to detect a terminal restart.

### 14.1 START-IND object

The object indicates whether or not the terminal was restarted. After the voltage has been switched on (power up), the byte will always have a value of 01<sub>hex</sub>. For a restart to be detected, the application must have set the byte to 00<sub>hex</sub>. If it is then set to 01<sub>hex</sub> again **by the terminal**, this indicates that it has been restarted.

#### Description:

<b>Object</b>	START-IND
<b>Access</b>	Read, write
<b>Data type</b>	Simple Var      1 byte
<b>Index</b>	5FC1 <sub>hex</sub>
<b>Subindex</b>	00 <sub>hex</sub>
<b>Length (bytes)</b>	01 <sub>hex</sub>
<b>Data</b>	Module start indicator

#### Value range of the object

Code	Module start indicator	
	Meaning	Representation in CMD/PC WorX
00 <sub>hex</sub>	Reset power-up message	<i>Reset power up message</i>
01 <sub>hex</sub>	Power up was carried out	<i>Power up completed</i>

### 14.2 V24-DATA object

This object is used for sending and receiving V.24 data.

#### Description

<b>Object</b>	V24-DATA	
<b>Access</b>	Read, write	
<b>Data type</b>	String Var of Octet String	1 x 58 bytes
<b>Index</b>	5FE0 <sub>hex</sub>	
<b>Subindex</b>	00 <sub>hex</sub>	(Only access to all data possible)
<b>Length (bytes)</b>	00 <sub>hex</sub>	Amount of data present in the buffer
	:	:
	3A <sub>hex</sub>	Maximum length of the object
<b>Data</b>	Receive/transmit V.24 (RS-232) data	

If no V.24 data is available on a read access, a read response (read service reply) is generated with result (+) and length = 0.

With a protocol data unit (PDU size) of 64 bytes a maximum of 58 characters can be transmitted.

The length of the read or write service depends on the number of V.24 characters to be transmitted. If, for example, 20 V.24 characters are to be read, the read response will be 24 bytes long (20 bytes V.24 data + 4 bytes PCP overhead).

#### Error messages for the V24-DATA object:

If, during a write service, there is not enough transmit memory available for V.24 data, the service will be answered with a negative confirmation.

Here, the parameters are the following:

```
Error_Class      8
Error_Code       0
Additional_Code   0022hex
Meaning          No character of the V.24 data will be
                  accepted from this service.
```

A write service without user data (length = 0) will be answered with a negative confirmation.

Here, the parameters are the following:

```
Error_Class      8
Error_Code       0
Additional_Code   0030hex
Meaning          Leaving the value range
```

### 14.3 INIT-TABLE object

Writing the INIT-TABLE object with a write service configures the terminal.

#### Description

<b>Object</b>	INIT-TABLE																																				
<b>Access</b>	Read, write																																				
<b>Data type</b>	Array of 20x1 byte Unsigned 8																																				
<b>Index</b>	5FFF <sub>hex</sub>																																				
<b>Subindex</b>	<table> <tr> <td>00<sub>hex</sub></td> <td>Write all elements</td> </tr> <tr> <td>01<sub>hex</sub></td> <td>Protocol</td> </tr> <tr> <td>02<sub>hex</sub></td> <td>Baud rate</td> </tr> <tr> <td>03<sub>hex</sub></td> <td>Data width</td> </tr> <tr> <td>04<sub>hex</sub></td> <td>Reserved</td> </tr> <tr> <td>05<sub>hex</sub></td> <td>Reserved</td> </tr> <tr> <td>06<sub>hex</sub></td> <td>Error pattern</td> </tr> <tr> <td>07<sub>hex</sub></td> <td>First delimiter</td> </tr> <tr> <td>08<sub>hex</sub></td> <td>Second delimiter</td> </tr> <tr> <td>09<sub>hex</sub></td> <td>3964R priority</td> </tr> <tr> <td>0A<sub>hex</sub></td> <td>Output type</td> </tr> <tr> <td>0B<sub>hex</sub></td> <td>DTR control</td> </tr> <tr> <td>0C<sub>hex</sub></td> <td>Rotation switch</td> </tr> <tr> <td>0D<sub>hex</sub></td> <td>XON pattern</td> </tr> <tr> <td>0E<sub>hex</sub></td> <td>XOFF pattern</td> </tr> <tr> <td>0F<sub>hex</sub></td> <td>Reserved</td> </tr> <tr> <td>:</td> <td>:</td> </tr> <tr> <td>14<sub>hex</sub></td> <td>Reserved</td> </tr> </table>	00 <sub>hex</sub>	Write all elements	01 <sub>hex</sub>	Protocol	02 <sub>hex</sub>	Baud rate	03 <sub>hex</sub>	Data width	04 <sub>hex</sub>	Reserved	05 <sub>hex</sub>	Reserved	06 <sub>hex</sub>	Error pattern	07 <sub>hex</sub>	First delimiter	08 <sub>hex</sub>	Second delimiter	09 <sub>hex</sub>	3964R priority	0A <sub>hex</sub>	Output type	0B <sub>hex</sub>	DTR control	0C <sub>hex</sub>	Rotation switch	0D <sub>hex</sub>	XON pattern	0E <sub>hex</sub>	XOFF pattern	0F <sub>hex</sub>	Reserved	:	:	14 <sub>hex</sub>	Reserved
00 <sub>hex</sub>	Write all elements																																				
01 <sub>hex</sub>	Protocol																																				
02 <sub>hex</sub>	Baud rate																																				
03 <sub>hex</sub>	Data width																																				
04 <sub>hex</sub>	Reserved																																				
05 <sub>hex</sub>	Reserved																																				
06 <sub>hex</sub>	Error pattern																																				
07 <sub>hex</sub>	First delimiter																																				
08 <sub>hex</sub>	Second delimiter																																				
09 <sub>hex</sub>	3964R priority																																				
0A <sub>hex</sub>	Output type																																				
0B <sub>hex</sub>	DTR control																																				
0C <sub>hex</sub>	Rotation switch																																				
0D <sub>hex</sub>	XON pattern																																				
0E <sub>hex</sub>	XOFF pattern																																				
0F <sub>hex</sub>	Reserved																																				
:	:																																				
14 <sub>hex</sub>	Reserved																																				
<b>Length (bytes)</b>	14 <sub>hex</sub> Subindex 00 <sub>hex</sub> 01 <sub>hex</sub> Subindex 01 <sub>hex</sub> to 14 <sub>hex</sub>																																				
<b>Data</b>	Terminal configuration																																				

## INIT-TABLE object elements

Element		Meaning	Default setting		Data type
dec	hex		Code	Meaning	
1	1	Protocol	00 <sub>hex</sub>	Transparent	Unsigned 8
2	2	Baud rate	07 <sub>hex</sub>	9600 baud	Unsigned 8
3	3	Data width	02 <sub>hex</sub>	8 data bits, even parity, 1 stop bit	Unsigned 8
4	4	Reserved	00 <sub>hex</sub>		Unsigned 8
5	5	Reserved	00 <sub>hex</sub>		Unsigned 8
6	6	Error pattern	24 <sub>hex</sub>	(\$)	Unsigned 8
7	7	First delimiter	0D <sub>hex</sub>	Carriage Return (CR)	Unsigned 8
8	8	Second delimiter	0A <sub>hex</sub>	Line Feed (LF)	Unsigned 8
9	9	3964R priority	00 <sub>hex</sub>	Low	Unsigned 8
10	A	Output type	00 <sub>hex</sub>	V.24 (RS232)	Unsigned 8
11	B	DTR control system	00 <sub>hex</sub>	Automatic	Unsigned 8
12	C	Rotation switch	00 <sub>hex</sub>	No rotation	Unsigned 8
13	D	XON pattern	11 <sub>hex</sub>		Unsigned 8
14	E	XOFF pattern	13 <sub>hex</sub>		Unsigned 8
15-20	F-14	Reserved	00 <sub>hex</sub>		Unsigned 8

## Element value range



The options in bold are default settings.

Code	Protocol	
	Meaning	Representation in CMD/PC WorX
<b>00<sub>hex</sub></b>	<b>Transparent</b>	<i>Transparent</i>
01 <sub>hex</sub>	End-to-end	<i>End-End</i>
02 <sub>hex</sub>	Dual buffer	<i>Dual buffer</i>
03 <sub>hex</sub>	3964R	<i>3964R</i>
04 <sub>hex</sub>	XON/XOFF	<i>XON/XOFF</i>

Code	Baud rate
	Value
00 <sub>hex</sub>	110
01 <sub>hex</sub>	300
02 <sub>hex</sub>	600
03 <sub>hex</sub>	1200
04 <sub>hex</sub>	1800
05 <sub>hex</sub>	2400
06 <sub>hex</sub>	4800
<b>07<sub>hex</sub></b>	<b>9600</b>
08 <sub>hex</sub>	19200
09 <sub>hex</sub>	38400

Code	Data width			
	Meaning			Representation in CMD/PC WORX
	Data bits	Parity	Stop bits	
00 <sub>hex</sub>	7	Even	1	7 data bits, even parity, 1 stop bit
01 <sub>hex</sub>	7	Odd	1	7 data bits, odd parity, 1 stop bit
<b>02<sub>hex</sub></b>	<b>8</b>	<b>Even</b>	<b>1</b>	<b>8 data bits, even parity, 1 stop bit</b>
03 <sub>hex</sub>	8	Odd	1	8 data bits, odd parity, 1 stop bit
04 <sub>hex</sub>	8	None	1	8 data bits, without parity, 1 stop bit
05 <sub>hex</sub>	7	None	1	7 data bits, without parity, 1 stop bit
06 <sub>hex</sub>	7	Even	2	7 data bits, even parity, 2 stop bits
07 <sub>hex</sub>	7	Odd	2	7 data bits, odd parity, 2 stop bits
08 <sub>hex</sub>	8	Even	2	8 data bits, even parity, 2 stop bits
09 <sub>hex</sub>	8	Odd	2	8 data bits, odd parity, 2 stop bits
0A <sub>hex</sub>	8	None	2	8 data bits, without parity, 2 stop bits
0B <sub>hex</sub>	7	None	2	7 data bits, without parity, 2 stop bits

Code	Error pattern
	Meaning
24 <sub>hex</sub>	\$
xx <sub>hex</sub>	Any character

Code	First delimiter
	Meaning
0D <sub>hex</sub>	Carriage Return (CR)
xx <sub>hex</sub>	Any character

Code	Second delimiter
	Meaning
0A <sub>hex</sub>	Line Feed (LF)
xx <sub>hex</sub>	Any character

Code	3964R priority	
	Meaning	Representation in CMD/PC WORX
00 <sub>hex</sub>	Low Priority	<i>Low priority</i>
01 <sub>hex</sub>	High priority	High priority

Code	Output type
	Meaning
00 <sub>hex</sub>	V.24 (RS232)



Code	DTR control	
	Meaning	Representation in CMD/PC WORX
00 <sub>hex</sub>	Automatic	<i>Automatic</i>
01 <sub>hex</sub>	Via process data	Via process data

Code	Rotation switch	
	Meaning	Representation in CMD/PC WORX
00 <sub>hex</sub>	No rotation	<i>No rotation</i>
01 <sub>hex</sub>	Rotation	Rotation

Code	XON pattern
	Meaning
11 <sub>hex</sub>	
xx <sub>hex</sub>	Any character (not the same as XON pattern)

Code	XOFF pattern
	Meaning
13 <sub>hex</sub>	
xx <sub>hex</sub>	Any character (not the same as XON pattern)

The **error pattern** contains the character that is written to the FIFO if a V.24 character was received with errors (this does not apply to the 3964R protocol). Reasons are e.g. parity errors, exceeded value range, noise interference. In the transparent and XON/XOFF protocols, the pattern is also used if the receive FIFO is full and further characters are received.

The **first delimiter** and the **second delimiter** contain the end characters for the dual buffer and the end-to-end protocols.

The value in the **3964R priority** element defines the priority of a device if there is an initialization conflict (more than one device attempting to transmit data simultaneously). The device with priority level 1 has priority over the device with priority level 0.

**XON pattern** and **XOFF pattern** contain the control characters for the XON/XOFF protocol. The characters must not be the same.

The **rotation switch** determines how the buffer is re-written when it is full and the two end characters (delimiters) have not been detected.

**No rotation:** In the re-written buffer **only** the **new** data is available, i.e., data from the previous cycle is rejected.

**Rotation:** The buffer is re-written character by character. If the two delimiters are detected the **new** characters **and** the **remaining** characters from the previous cycle are available in the re-written buffer.



If at least one element of the INIT-TABLE object is written, the pointers for the transmit and receive FIFOs will be reset. In this way, all transmit and receive data that have not yet been processed will be deleted.

**INIT-TABLE object error messages**

- If an element with an invalid value is written during a write service, the service will be acknowledged with a negative confirmation.

Here, the parameters are the following:

Error_Class	8
Error_Code	0
Additional_Code	xx30 <sub>hex</sub>
Meaning	Leaving the value range

The high-byte of the Additional\_Code (xx) contains the number of the element in question. If several elements are affected, the highest number is given. If, for example, the DTR control element is written with the value 2, an error message with the Additional\_Code 0B30<sub>hex</sub> will be displayed, because element 11 is faulty.

An error message will be generated for a write request with the subindex 0 (write entire table) in which the XON/XOFF protocol is to be set and the XON pattern is the same as the XOFF pattern.

Here, the parameters are the following:

Error_Class	8
Error_Code	0
Additional_Code	0E30 <sub>hex</sub>
Meaning	Parameterization error

- If a reserved element is written, the value must equal 0, otherwise an error message is generated.

Here, the parameters are the following:

Error_Class	8
Error_Code	0
Additional_Code	xx30 <sub>hex</sub>
Meaning	Parameterization error

**PCP mode error messages**

The terminal error messages have the parameters Error\_Class = 8 (device-specific error) and Error\_Code = 0 (no communication error).

The exact error cause is indicated with the Additional\_Code. The low byte of the Additional\_Code specifies the error cause.

The high-byte of the Additional\_Code (xx) contains the number of the element in question.

If several elements are affected, the highest number is given.

The following Additional\_Codes can occur on this terminal:

0022 <sub>hex</sub>	No character of the V.24 data will be accepted from this service
xx30 <sub>hex</sub>	Value is out of range or parameterization error
0000 <sub>hex</sub>	Hardware fault



For additional information on PCP mode error messages, please refer to the IBS SYS PCP G4 UM E user manual (Order No. 2745169) and the user manual for your controller board.

## 15 Process data



For the assignment of the illustrated (byte.bit) view under 15.1 and 15.3 to your control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet, Order No. 9000990.

### 15.1 Assignment of the OUT process data word (*~Control word*)

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment		Reserved								DTR	Reserved	Reserved	Reserved	Execute re-initialization	Reset transmit error	Reset receive error	Reserved



Set all reserved bits to 0.

15.2 Assignment of the OUT process data word (~Control word)

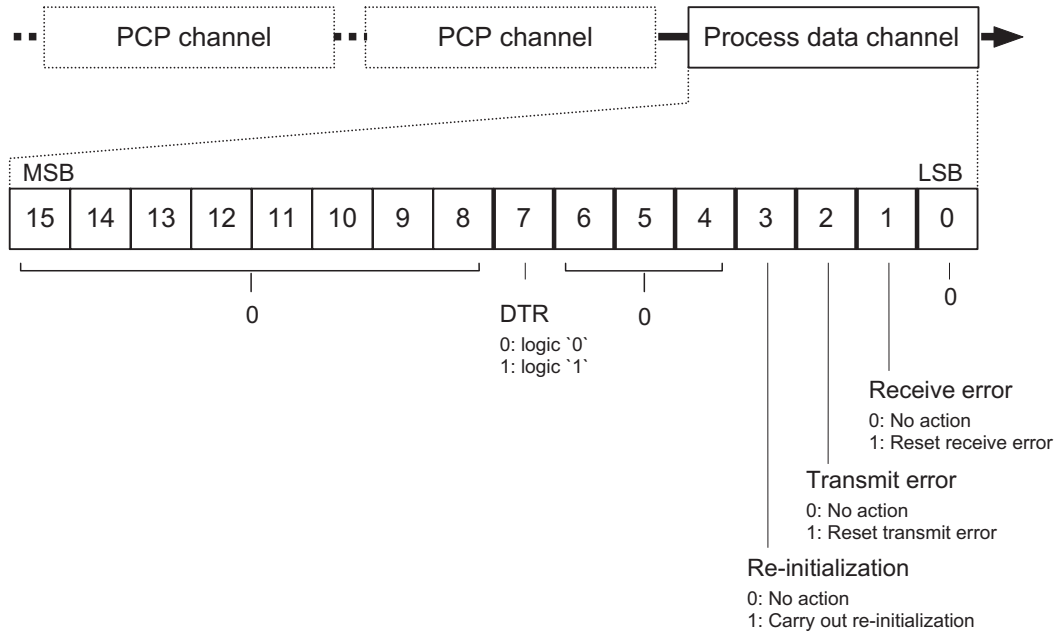


Figure 10 Format of the OUT process data word

The DTR signal can only be generated when "DTR control via process data" is enabled.

If the control word has the contents 3C00<sub>hex</sub>, then the status word returns the firmware version.

Example:

Status word (hex)	1	2	3	0
	Firmware version 1.23			0

**15.3 Assignment of the IN process data word (~Status word)**

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment		Number of received characters								Reserved	Send buffer not empty	Send buffer full	Receive buffer full	Re-initialization executed	Transmit error	Receive error	Receive buffer not empty

**15.4 Format of the IN process data word (~Status word)**

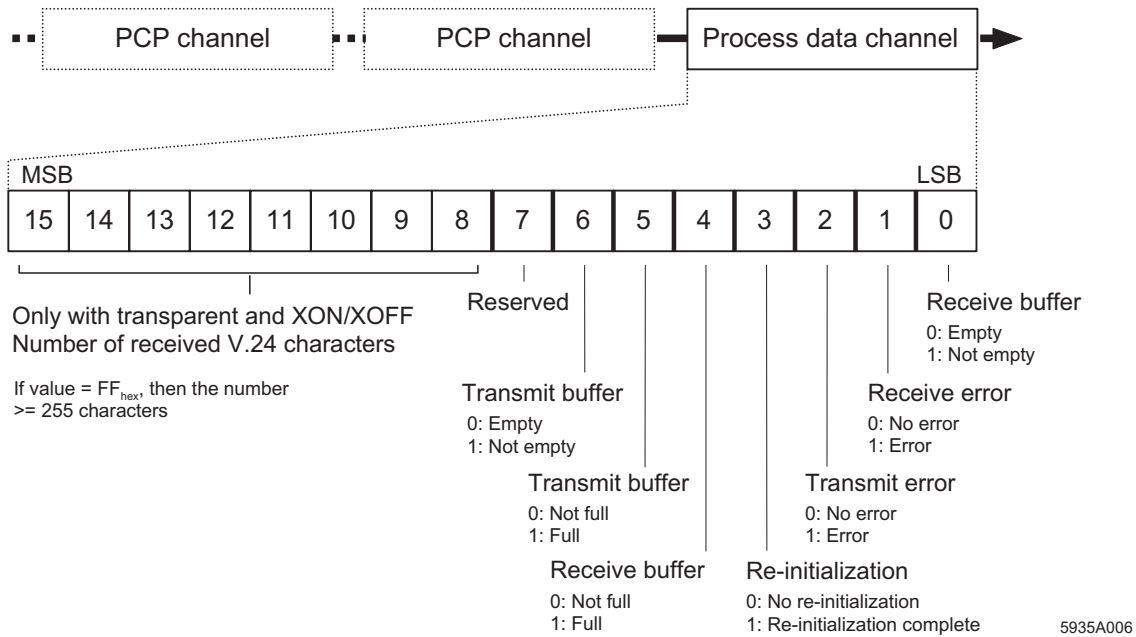


Figure 11 Format of the IN process data word

Bit/status	Effect	Protocol
Bit 0 = '1'	The receive buffer is not empty, characters to be read are available.	All
Bit 1 = '1'	The receive error indicates that a 3964R telegram could not be received without error after six transmit attempts by the V.24 peer or after the block waiting time had elapsed.	3964R
Bit 2 = '1'	The transmit error indicates that a 3964R telegram could not be transmitted from the module to the V.24 (RS-232) peer without error after six transmit attempts. The telegram was rejected.	3964R
Bit 3 = '1'	A re-initialization was carried out; transmit and receive buffers are now empty.	All
Bit 4 = '1'	The receive buffer is full: Transparent and XON/XOFF protocol:      Residual capacity: < 15 characters 3964R and end-to-end protocol:              Residual capacity: None	Transparent, end-to-end, 3964R, XON/XOFF
Bit 5 = '1'	The transmit buffer is full: 3964R protocol:                                      Residual capacity: none Dual buffer, transparent, End-to-end, XON/XOFF protocol:              Residual capacity: ≤30 characters	All
Bit 6 = '1'	The transmit buffer is not empty, there are characters to be transmitted.	All
Bit 7 = '1'	Reserved	



Both error bits (bit 1 and 2) are not automatically reset. They can only be reset by the OUT process data word.